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Durability Demonstration of Systems for Control of Sulfuric Acid

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Durability Demonstration of Systems for Control of Sulfuric Acid

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ABSTRACT

The work described in this report involved the development testing, optimization, and durability testing of emission control systems capable of meeting the 1981 gaseous emission standards while maintaining low sulfate emissions. Four emission control systems were investigated: (1) oxidation catalyst with air modulation system, (2) high temperature exhaust system, (3) threeway catalyst with feedback carburetor, and (4) three way plus oxidation catalyst with air modulation system and feedback fuel injection.

In Phase I of the project, the air modulation system and the threeway catalyst system were selected for optimization and durability testing. In addition to the usual gaseous emissions, nonmethane hydrocarbons, total cyanide and ammonia were measured on both systems. The oxidation system was operated on a test car for 24100 km (15,000 miles) and the threeway catalyst system for 32200 km (20,000 miles), with emission tests every 8050 km (5,000 miles). The durability distance accumulation was halted on both cars because gaseous emission levels exceeded the 1981 standards.

In Phase II of the project, a threeway plus oxidation catalyst system was developed, optimized and tested for durability for 64,400 km (40,000 miles). During the durability testing, emissions tests were performed every 8050 km (5000 miles).

FOREWORD

This project was conducted for the U.S. Environmental Protection Agency by the Department of Emissions Research for Southwest Research Institute. The project was begun in November 1976, and the laboratory work was completed in September 1979. The project was conducted under EPA contract No. 68-03-2481 and was identified within Southwest Research Institute as Project 11-4746.

During the course of the project, several of the personnel in the Emission Control Technology Division, Office of Mobile Source Pollution Control, Environmental Protection Agency, Ann Arbor, Michigan, served as EPA Project Officer. These persons were: Randall H. Field, John J. McFadden, Kenneth Partymiller, Andrew W. Kaupert and Robert I. Bruetsch. Karl J. Springer, Director, Department of Emissions Research at Southwest Research Institute, served as Project Manager. The project was under the supervision of Melvin N. Ingalls, Senior Research Engineer, as Project Leader. Although a number of Department of Emissions Research personnel were involved in the project, key personnel included C. E. Grinstead, senior technician and C. D. Suhler, lead technician, who were responsible for installation and maintenance of the mechanical systems; N. C. Reeh, senior technician, who fabricated much of the necessary systems hardware; and J. T. Jack, Jr., senior technician, and D. A. Travers, technician, who were responsible for the emissions testing.

Project Review meetings involving EPA and SwRI personnel, either at SwRI or the EPA facility in Ann Arbor, Michigan, were held on November 23, 1976, December 10, 1976, August 23, 1977 and June 7, 1978. In addition, frequent telephone conversations between the Project Leader at SwRI and the EPA Project Officer insured a proper understanding by both SwRI and EPA of the project aims, problems and accomplishments.

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SUMMARY

The objective of this project was to demonstrate the durability of two low sulfate emission control systems capable of meeting the 1981 gaseous emission standards. In numerical terms, the Project emission goals were as shown below.

Test Cycle	Emission Type	Goal
FTP	HC	0.25 g/km (0.41 g/mi.)
FTP	CO	2.11 g/km (3.4 g/mi.)
FTP	NO_x	0.62 g/km (1.0 g/mi.)
CFDS	$SO_4^=$	3.11 mg/km (5.0 mg/mi.)

Initially, the project emphasis was to be on the durability testing of developed advanced systems. However, most of the advanced systems existed only in concept or tailored to a single engine model only. Therefore, hardware development necessarily became a large part of the project.

Phase I

At the outset of the project it was decided that a threeway catalyst with feedback fuel control system would be one of the systems tested for durability. The other system would be either an oxidation catalyst with modulated air injection and EGR, or a high temperature exhaust system with standard air injected oxidation catalyst and EGR. Which of these two systems would be tested for durability would depend of the results of the evaluation testing.

The oxidation catalyst, modulated air injection system was evaluated on a 1976 Chevrolet Impala with a 5.7 litre (350 CID) engine. The high temperature exhaust system was evaluated on a 1975 Chevrolet Nova with a 5.7 litre (350 CID) engine. While neither system met the project goals during the evaluation, the modulated air injection was selected as having the best chance of meeting the goals with further optimizaiton.

The 1975 Chevrolet Nova was to be used as the durability test vehicle. Therefore, the air modulation system was installed on the Nova and a series of tests run, modifying the system as necessary during the testing to produce a system capable of meeting the project goals. The final emission control system consisted of the following elements and changes from stock condition:

- Two monolith oxidation catalysts, one in the exhaust pipe of each cylinder bank
- Modulated air injection to catalyst
- 2.56 rear axle ratio replacing standard 3.08 ratio rear axle
- Ignition timing advanced from 6° to 9° BTC
- Increased EGR
- Single plane aluminum intake manifold

The emission levels for the optimized system are listed below:

Test Cycle	Emission Type	Value
FTP	HC	0.18 g/km (0.29 g/mi.)
FTP	CO	1.03 g/km (1.65 g/mi.)
FTP	NO_x	0.48 g/km (0.77 g/mi.)
CFDS	$SO_4^=$	3.85 mg/km (6.19 mg/mi.)

A 1977 Plymouth Fury was used as the test car for the threeway catalyst system. A series of optimization tests were run during which system hardware and settings were changed to produce a system that would meet the project goals. The final emission control system consisted of the following elements:

- Two threeway catalysts with 5 to 1 Pt/Rd ratio. One catalyst on the exhaust of each cylinder bank.
- Experimental Holley feedback carburetor
- An SwRI built open loop fuel control circuit, independent of the fuel system main electronic control unit, for use during cold starts
- An EGR system
- Shortened cold start operation of the choke, inlet air heater and manifold heat
- Orifice spark advance control (OSAC) ststem

The emission levels for the optimization system are listed below:

Test Cycle	Emission Type	Value
FTP	HC	0.09 g/km (0.14 g/mi.)
FTP	CO	1.98 g/km (3.19 g/mi.)
FTP	NO_x	0.43 g/km (0.69 g/mi.)
CFDS	SO_4	0.57 mg/km (0.92 mg/mi.)

Following optimization, both systems were tested for durability using the Durability Driving Schedule. Emission tests were performed every 8050 km (5,000 miles). Durability testing was halted at 24100 km (15,000) on the 1975 Nova with the air modulation system and at 32200 km (20,000 miles) on the 1977 Fury because some of the gaseous emissions on both systems were above the 1981 standards.

Phase II

In a continuation of the effort to meet the project goals, an air injected oxidation catalyst was added to a stock Volvo threeway catalyst system on a 1978 California Volvo sedan with a four cylinder engine. Since threeway plus oxidation catalyst systems can produce large amounts of sulfates, an air modulation scheme was included as part of the air injection system. Considerable optimization testing was required before the system met the project goals. The final emission control system consisted of the following additions and changes to the stock California Volvo threeway catalyst system.

- Oxidation catalyst
- Modulated air injection system
- Open loop cold start fuel control circuit
- A/F ratio leaner than stock setting

The emission levels for the optimized system are listed below:

Test Cycle	Emission Type	Value
FTP	HC	0.14 g/km (0.23 g/mi.)
FTP	CO	1.31 g/km (2.10 g/mi.)
FTP	NO_x	0.13 g/km (0.23 g/mi.)
CFDS	$SO_4^=$	0.04 mg/km (0.06 mg/mi.)

Following optimization, the system was tested for durability for 64,400 km (40,000 miles) using the Durability Driving Schedule. Emission tests were performed every 8050 km (5,000 miles). At the end of the durability testing, the HC, NO_x and sulfate emissions were still within the project goals. The CO emissions were greater than the 1981 standards by approximately seven percent.

Emission tests with the car in stock condition at the end of the durability testing indicated that most of the emission increases were caused by deterioration of the air modulation system hardware. Therefore for a system such as tested in this project to pass an 80500 km (50,000 mile) certification test, requires only more durable air modulation hardware. Thus the project demonstrated that it is possible to meet the 1981 gaseous emission standards while maintaining low sulfate emissions.

I. INTRODUCTION

Sulfuric acid (sulfate) emissions from catalyst equipped cars have been extensively studied by EPA for the past several years.[1-5]* At present, it appears that automotive sulfate emissions standards are not necessary. However, with the expected extensive use of threeway plus oxidation catalyst emission control system in 1981, there is a possibility of greatly increased sulfate emissions due to the tendency of this system to produce larger amounts of sulfates than current control systems.[5-7] In addition, the 1977 Amendments to the Clean Air Act, as interpreted by EPA in OMSAPC Advisory Circular 76, places the burden on the manufacturers to establish that their emission control systems, or vehicle and engine design elements, do not cause an unreasonable risk to public health, welfare or safety.[6] The Advisory Circular specifically names sulfates as one of the unregulated emissions to be considered.

This study was undertaken to evaluate the low sulfate potential of several emission control systems proposed for meeting the 1981 gaseous emissions standards and to demonstrate the durability of two of these systems. It builds upon research in mobile source sulfate emissions conducted at Southwest Research Institute for EPA and others since 1975.[7-11]

Initially, the project emphasis was to be on the durability testing of developed advanced systems. However, most of the advanced systems existed only in concept or tailored to a single engine model. Therefore, hardware development necessarily became a large part of the project.

Objective

The objective of this project was to evaluate a variety of emission control systems which would produce low sulfate emissions and meet the 1981 gaseous emission standards of 0.26 g/km (0.41 g/mile) HC, 2.11 g/km (3.4 g/mile) CO, and 0.62 g/km (1.0 g/mile) NO_x after 80500 km (50,000 miles). Low sulfate emissions were defined to be below 3.1 mg/km (5 mg/mile). Following the evaluation, two of the most promising systems were to be optimized and tested for durability.

Approach

To meet the objectives of the project, three emission control systems were chosen from the approximately six systems proposed. These three systems were fabricated and installed on test vehicles or, in one case, obtained already installed from the car manufacturer. Chassis dynamometer tests over the light-duty Federal Test Procedure (FTP) and the Congested Freeway Driving Schedule

*Superscript numbers in parentheses refer to references at the end of this report.

(CFDS) were performed to evaluate the ability of the system to produce low sulfate emissions, while meeting the 1981 gaseous emission standards. The two most promising systems, the modulated air injection system and the three-way catalyst system, were optimized and durability tested for approximately 32,000 km (20,000 miles). Durability distance accumulation was halted on both cars because some FTP gaseous emissions rates were above the 1981 limits.

In Phase II of the project, a threeway plus oxidation catalyst system with modulated air injection was chosen for use in a continued effort to meet the project emission objectives. This system was used on a five passenger Volvo sedan with a four-cylinder, fuel injected engine. The air modulation system was optimized and the car driven for 64,400 km (40,000 miles) of durability distance accumulation. The durability testing was halted at this point because of funding limitations.

II. TEST EQUIPMENT AND PROCEDURES

This section covers the equipment and procedures used to obtain and analyze the gaseous exhaust emissions, exhaust sulfates, and other unregulated emissions measured during both Phase I and Phase II of this project. Also covered are the procedures for durability distance accumulation and analysis of the fuels used during the project.

A. General Emission Test Procedures

The 1978 light-duty Federal Test Procedure (FTP) without evaporative emissions, was followed in terms of procedure and equipment as much as possible for all tests. It is assumed that the reader is familiar with this test procedure. If not, it can be found in 40 CFR Part 86. The latest recodification was published in the Federal Register, Volume 42, Number 124, dated June 28, 1977.

The gaseous emissions of hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NO_x) were collected and analyzed using the procedures of the light-duty FTP. The tests were performed on a Clayton chassis dynamometer, model EC-50, with the vehicles manually driven. A Positive Displacement Pump Constant Volume Sampler (PDP-CVS), with a nominal capacity of 350 CFM was used. To collect the sulfate sample, the usualy CVS system was modified by inserting a three meter long tunnel, approximately 21 cm in diameter, between the CVS room air filter box and the entrance to the CVS heat exchanger. Figure 1 shows various views of the test area, CVS system and the analysis instruments for the bagged gaseous emissions.

There were three main driving cycles used during this project. The first was the driving cycle used in the light-duty FTP, known as the LA-4 cycle or the Urban Dynamometer Driving Schedule (UDDS). The second was the Highway Fuel Economy Test (HFET) cycle. The third cycle, developed specifically as a sulfate test cycle, is called the Congested Freeway Driving Schedule (CFDS). The speed versus time traces of these three cycles are shown in Figure 2.

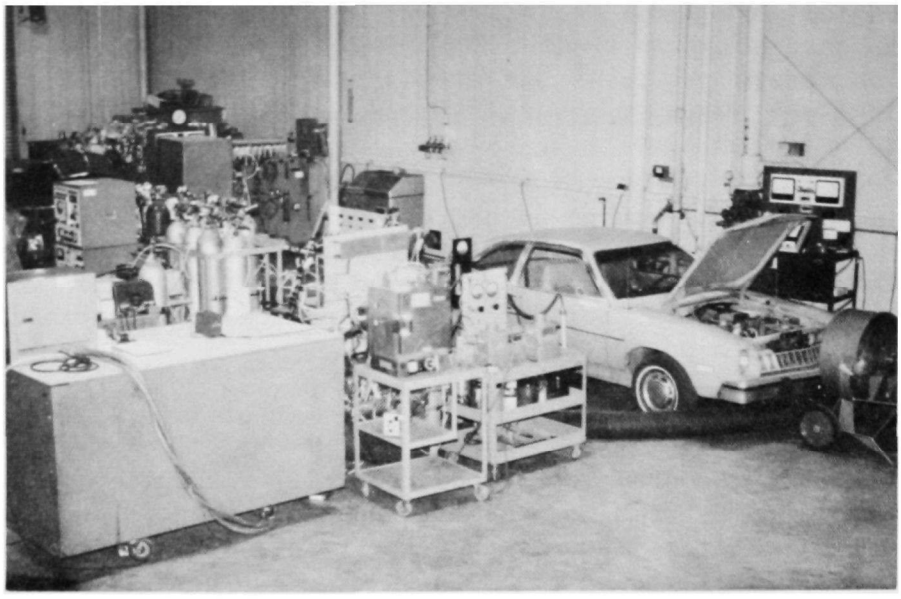
B. Collection and Analysis of Unregulated Emissions

This section discusses the collection and analysis of exhaust sulfate, nonmethane hydrocarbons, hydrogen cyanide and ammonia; the unregulated emissions measured as part of this project.

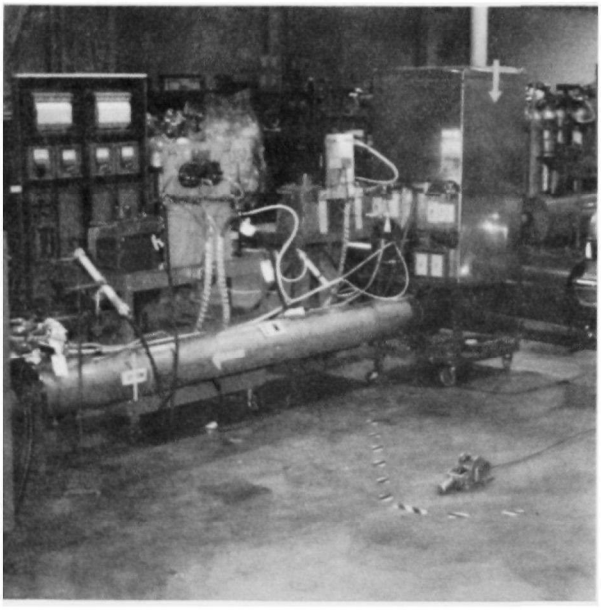
Sulfate

The exhaust sulfates were collected as sulfuric acid on 47 mm Fluoropore*

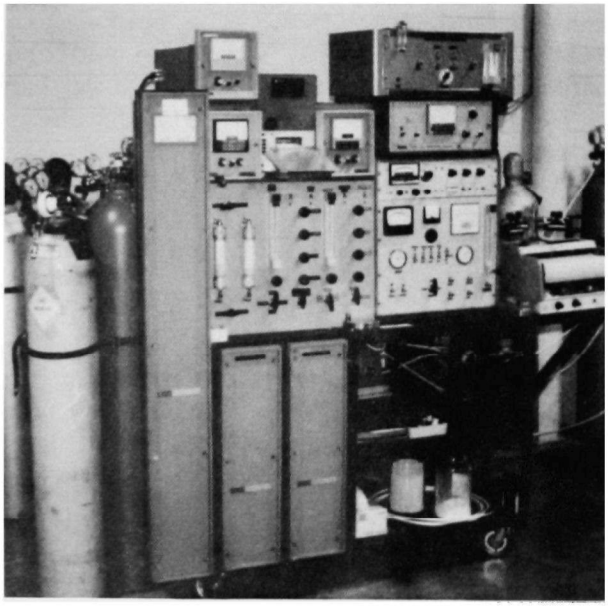
*Fluoropore is a registered trademark of the Millipore Corporation. Fluoropore filters are made of PTFE (Polytetrofluorethylene) bonded to polyethylene net.



General View of Test Area

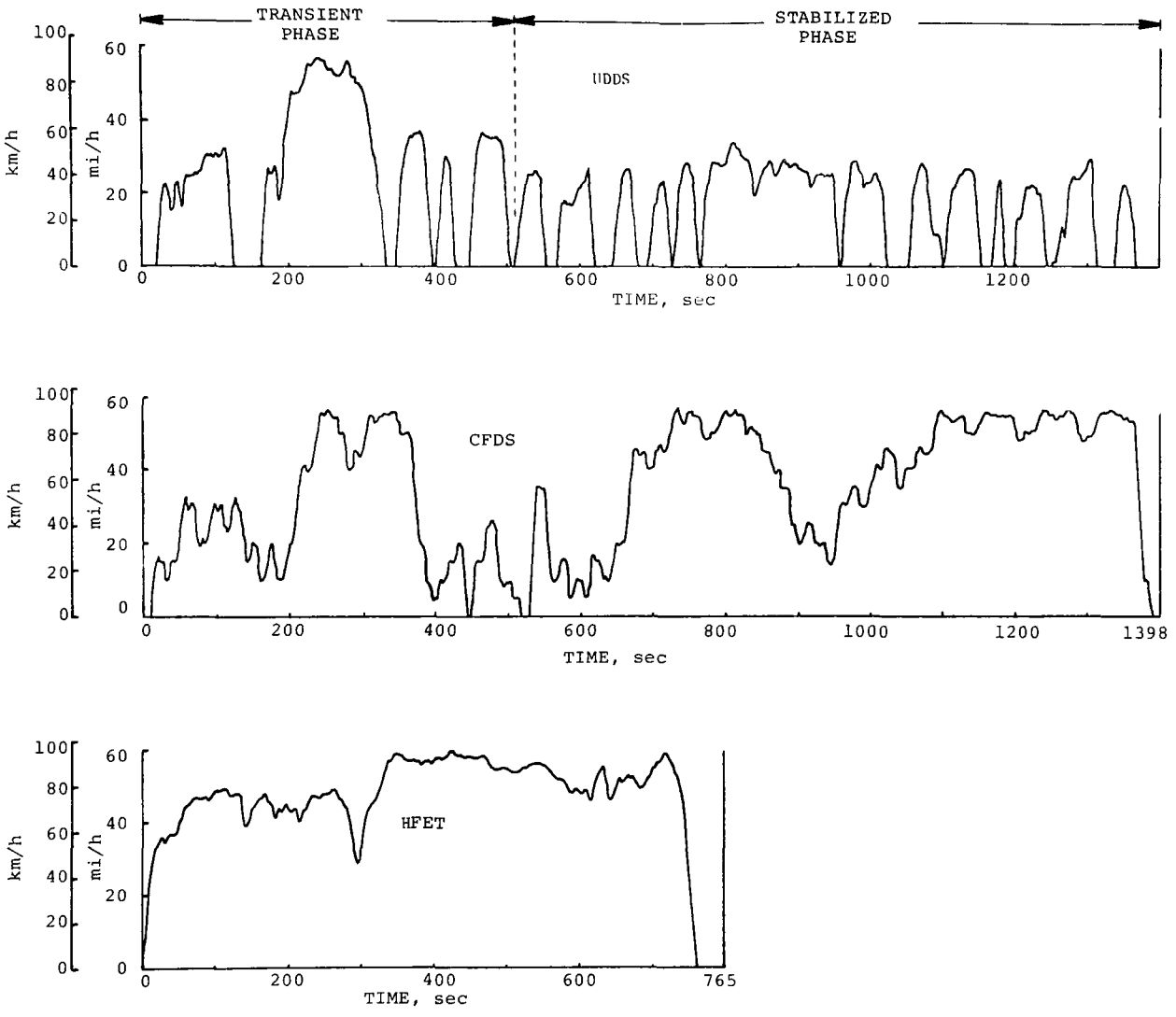


Dilution Air Filter Box
and Sulfate Tunnel



Emission Analyzers for Bagged
Gaseous Emissions

Figure 1. Emissions collection and analysis equipment



Cycle	Avg. Speed kph (mph)	Distance km(miles)	Time Seconds
HFET	77.55(48.20)	16.48(10.24)	765
UDDS	31.70(19.70)	12.07(7.50)	1372
CFDS	55.96(34.78)	21.74(13.51)	1398

Figure 2. Speed vs. time traces of FTP, HFET and CFDS driving cycles

filters with 0.5 μm pore size. The samples were obtained isokinetically using a probe centered in the 21 cm diameter tube. Figure 3 is a schematic of the collection system.

The amount of sulfate deposited on the filter is determined by the barium chloranilate analysis (BCA) procedure developed by EPA.[12] A complete description of this procedure as used at SwRI, can be found in Reference 8. Briefly, it involves placing the filter in a 60/40 mixture of isopropanol and water to place the sulfates in solution. Part of the solution is fed through a column containing barium chloranilate, which reacts with the sulfates forming barium sulfate and releasing chloranilic acid. The amount of chloranilic acid released is measured using a UV Spectrophotometer.

Non-Methane Hydrocarbons

Over the years, there has been much discussion concerning whether or not methane should be included in the HC emission standards since it does not enter in the classical smog reaction. On some tests during this project, the amount of methane in the bag samples was determined using a method developed by EPA.[13-15] The methane is then subtracted from the total FID HC to give the total nonmethane hydrocarbons. This procedure uses a single gas chromatograph with a multiple column arrangement and dual gas sampling valves. The timed sequence selection values allow baseline separation of air, methane, ethylene, acetylene, propane, propylene, benzene, and toluene. For this project, only the methane value was used. Both sample and background bags were analyzed to determine the net hydrocarbon emission rates.

Hydrogen Cyanide (Total Cyanide)

There is a possibility of hydrogen cyanide (HCN) being produced with a threeway catalyst system.[16] Therefore, HCN was measured in Phase I on the 1977 Fury during the durability test phase. Because the collection and analysis procedure for HCN will also collect any cyanogen (C_2N_2) present, the results are expressed as total cyanide. The complete collection and analysis procedure can be found in Reference 17. Briefly, it involves collecting a continuous sample of the dilute exhaust in a glass impinger filled with 1.0N potassium hydroxide. Upon completion of the test, an aliquot of the absorbing reagent is treated with KH_2PO_4 and Chloramine-T. A portion of the resulting cyanogen chloride is injected into a gas chromatograph equipped with an electron capture detector (ECD). External CN^- standards are used to quantify results.

Ammonia

It is possible for a threeway catalyst to produce ammonia at rich A/F ratios. At rich A/F ratios, there is a lack of oxygen and NO_x is converted to NH_3 rather than N_2.[18] For this reason, ammonia was measured on the 1977 Fury threeway catalyst car tested in Phase 1 during the durability testing. The procedure is to pass a continuous sample of the dilute exhaust through a glass impinger containing dilute sulfuric acid. The ammonia is collected in the impinger as NH_4+. The solution from the impinger is analyzed for ammonia using an ion chromatograph, with the concentration being determined by com-

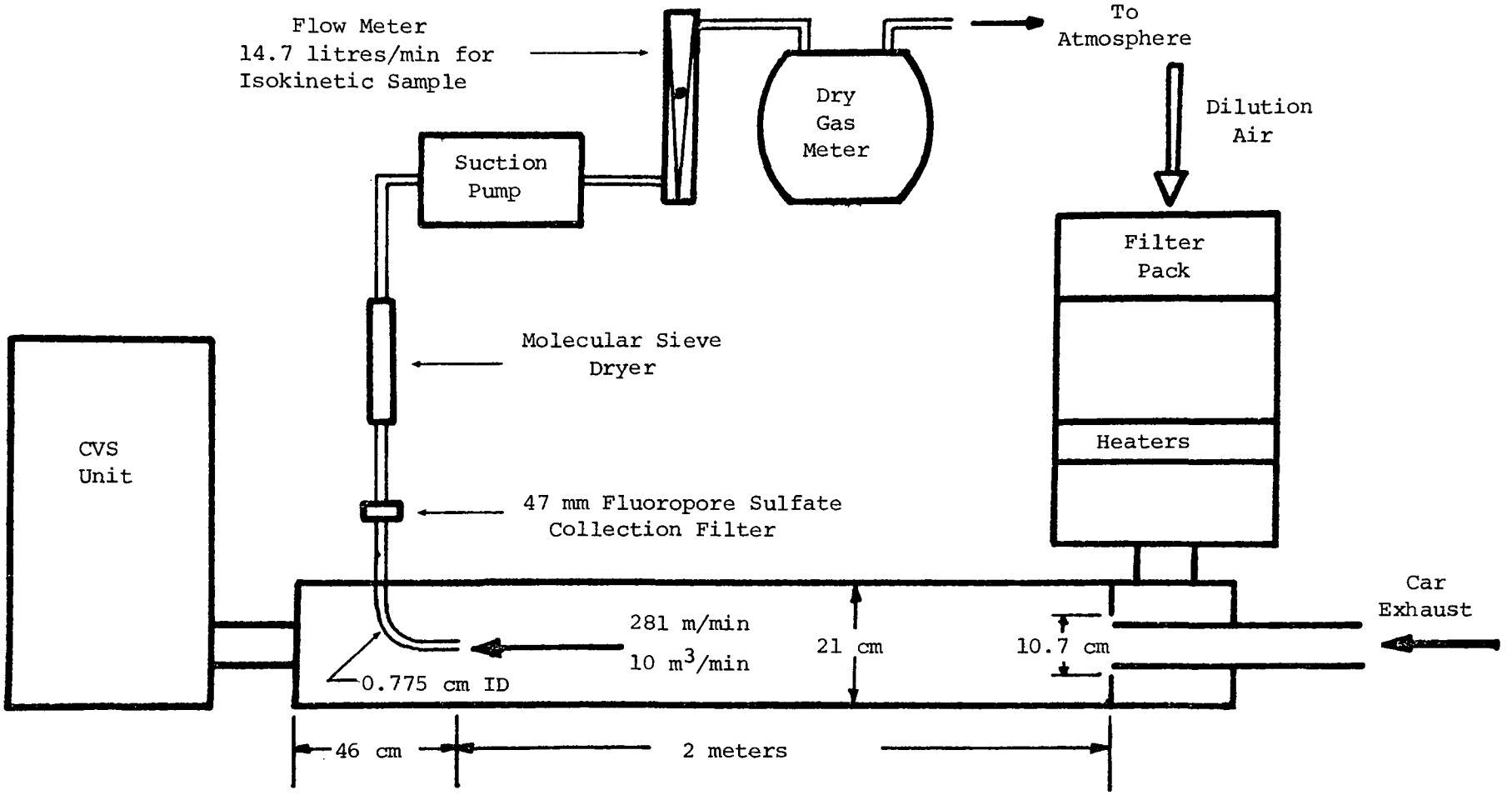


Figure 3. Schematic of sulfate sample collection system

parison to standard solutions. The complete procedure for collection and analysis of exhaust ammonia can be found in Reference 17.

C. Durability Test Procedures

During both Phase I and Phase II of this project, the emission control systems being evaluated were tested for durability by driving the cars on which the systems were installed in a specified manner for a specified distance. The basic durability distance accumulation procedure is specified in 40 CFR Part 86, paragraph 86.080-26 and Appendix IV to Part 86. It is often refered to as the "AMA driving schedule." The durability driving schedule listed in Appendix IV of Part 86, was modified by MSAPC Advisory Circular 37, to permit lower speeds on the last two laps of the schedule, allowing operation within the speed limit on public roads. The durability driving course used at SwRI is shown in Figure 4. During the durability testing in both Phase I and Phase II, the 52.3 km driving schedule was driven repeatatively for two 8-hour shifts per day, 5 days per week. With allowance for breaks and meals, approximately 640 km (400 miles) could be accumulated per day. A tachograph was installed in each vehicle undergoing distance accumulation to insure that the driving schedule was being driven correctly.

Oil level and tire pressure were checked at every shift change. All engine and driveline system fluid levels were checked weekly. Scheduled maintenance was performed at 12070 km (7500 miles) intervals in accordance with the applicable vehicle service manual.

Emission tests were performed every 8050 km (5000 miles) during the distance accumulation.

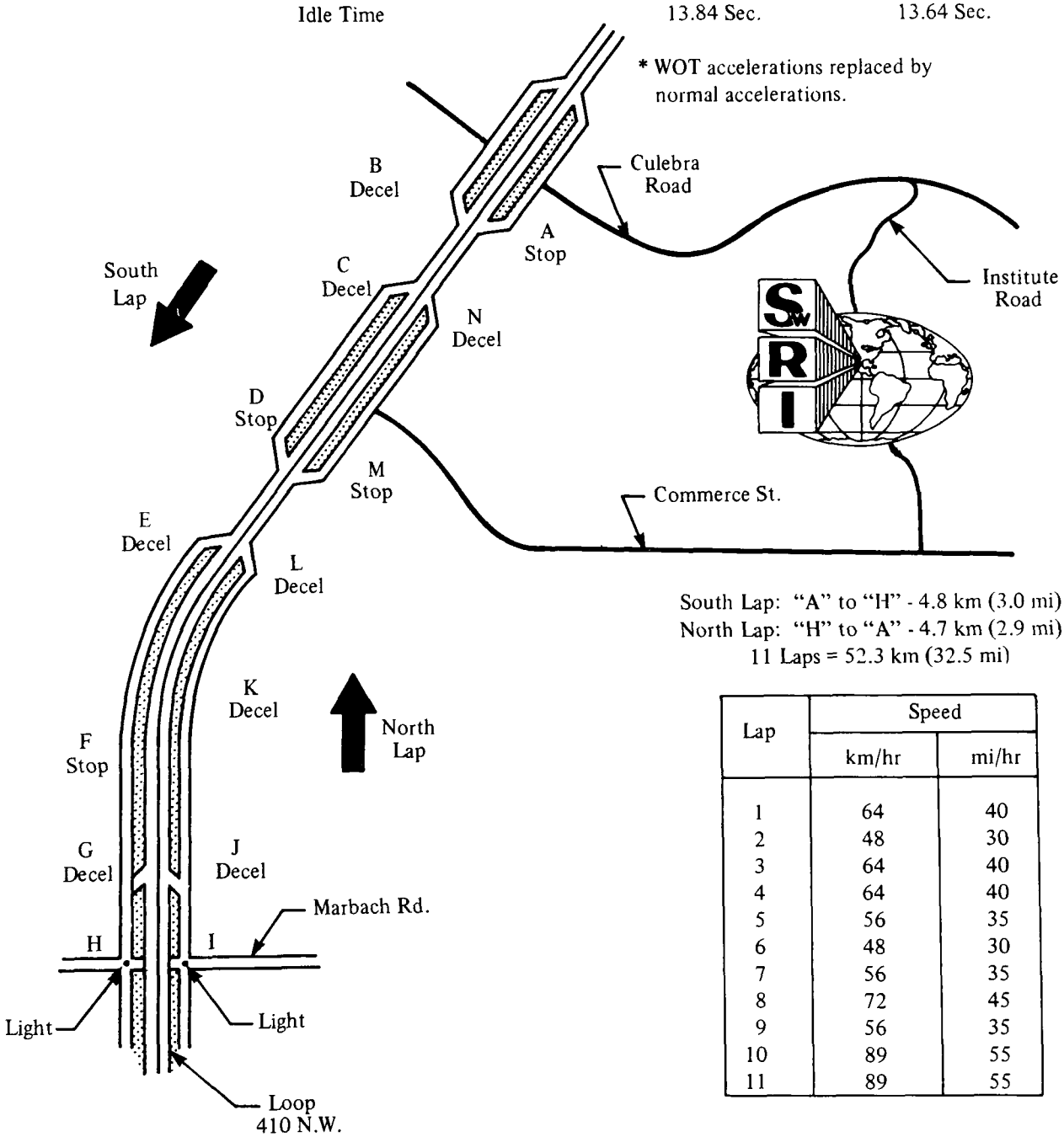
D. Fuels

Two types of fuels were used during the project. The first was a commercially available unleaded regular gasoline with the sulfur level increased to 0.03 weight percent by the addition of thiophene. This fuel was used during the development and optimization testing in both Phase I and II and for distance accumulation during the durability testing of Phase I. Since considerable fuel was required for durability testing, two batches of fuel were used. The first, designated EM-237-F, was used for development and optimization tests in Phase I, and the first 16100 km of distance accumulation on the 1977 Fury and the first 8050 km on the 1975 Nova. The second batch, designated EM-344-F, was used for the remaining durability distance accumulation in Phase I and all distance accumulation in Phase II.

The second fuel was a specially blended emissions test fuel, meeting all of the specifications for the light-duty FTP. This fuel, designated EM-274-F, was used for the final optimization tests on both cars in Phase I It was used for all emissions tests in Phase II. An analysis of each fuel used is presented in Table 1.

Driving Mode	Events Per Mile, 55 mph Top Speed: SwRI Course*	AC No. 37
Stops	1.02	1.01
Normal Accelerations from Stop	1.01	0.91
Normal Accelerations from 20 mph	1.11	1.11
Wide-Open Throttle Accelerations and Fast Deceleration	0.00	0.10
Idle Time	13.84 Sec.	13.64 Sec.

* WOT accelerations replaced by normal accelerations.



South Lap: "A" to "H" - 4.8 km (3.0 mi)
North Lap: "H" to "A" - 4.7 km (2.9 mi)
11 Laps = 52.3 km (32.5 mi)

Lap	Speed	
	km/hr	mi/hr
1	64	40
2	48	30
3	64	40
4	64	40
5	56	35
6	48	30
7	56	35
8	72	45
9	56	35
10	89	55
11	89	55

Figure 4. SwRI Durability Driving Course

TABLE 1. FUEL ANALYSIS

Property		Commercially Available Unleaded Gasoline: Development and Evaluation EM-237-F	Commercially Available Unleaded Gasoline: Service Accumulation EM-344-F	Gasoline Blended by Howell Refinery: Emissions Testing EM-274-F
Distillation Range, °C (°F)	IBP	32 (89)	36 (97)	32 (89)
	10 Pct	52 (125)	54 (129)	56 (132)
	50 Pct	103 (217)	100 (212)	106 (222)
	90 Pct	107 (338)	164 (328)	159 (319)
	EP	211 (412)	197 (386)	201 (394)
	Pct Recovered	97.9	97.5	97.6
	Pct Residue	1.3	1.0	1.0
R.V.P., kPa (pounds)		62.7 (9.10)	61.4 (8.9)	57.2 (8.3)
Gravity, g/ml (°API)		0.739 (59.9)	0.745 (58.4)	0.751 (56.9)
Lead, mg/litre (g/gallon)		<1.3 (<0.005)	0.3 (0.001)	0.3 (0.001)
Sulfur, weight percent		0.03	0.03	0.03
Hydrocarbon Composition, percent				
	Aromatics	26.4	28	33.7
	Olefins	2.9	8	0.9
	Saturates	70.7	64	65.4
Phosphorus, mg/litre (g/gallon)		<0. (<0.001)	0.05 (0.0002)	0.00 (0.0000)
Octane Number	Research	91.4	91.6	97.1
	Motor	84.5	83.2	87.6

III. PHASE I - INITIAL EVALUATION, OPTIMIZATION AND DURABILITY TESTING OF LOW SULFATE SYSTEMS

This project conveniently divides into two phases. The first phase includes all activities to meet the objective of the project: the selection of emission control systems, evaluation, optimization and durability testing of two low sulfate emission control systems. This first phase used a 1975 Chevrolet Nova and a 1977 Plymouth Fury as test cars. Because the two systems being tested did not meet the durability goals, the durability testing was halted. Phase II of the project involved the selection and testing of a different emission control system on another test vehicle. This section of the report covers the work done under Phase I of the project.

III-1. EMISSION CONTROL SYSTEM AND VEHICLE SELECTION

The first task of the project was to consider a variety of possible emission control systems proposed for use in meeting future emission standard and choose two or three for further evaluation. The criteria for the initial evaluation was the possibility of meeting gaseous emissions levels of 0.26 g/km (0.41 g/mile) HC, 2.11 g/km (3.4 g/mile) CO, and 0.93 g/km (1.5 g/mile) NO_x while maintaining low sulfate emissions. During the course of the project, the 1977 amendments to the Clean Air Air were passed, setting the NO_x limits for 1981 and beyond at 0.61 g/km (1.0 g/mile) NO_x. While the systems had already been chosen at this time, the NO_x goal was changed at that time to 0.61 g/km to conform to the new statuatory limits.

A variety of emission control systems were considered for evaluation, including oxidation catalyst with modulated air; threeway catalyst with feedback fuel system; lean burn system without oxidation catalyst; "start only" catalyst systems; and high temperature exhaust systems. Of these systems, three were chosen by EPA at the beginning of the project for further evaluation. The three systems chosen were the oxidation catalyst with modulated air, high temperature exhaust, and threeway catalyst with feedback controlled carburetor. Two of these systems would be selected for durability testing.

Initially, it was planned to obtain two new "matched" vehicles to use as test cars for the emission control systems. However, when the systems for evaluation were chosen it became obvious that availability of system hardware would dictate the selection of the test cars. Thus, instead of two "matched" cars to which systems would be fitted, each system would be installed on a test car suited for that system. This approach not only resulted in a better match of emission control systems and test car, but it also conserved project funds.

The high temperature exhaust system would require exhaust port liners. After a search of moderate effort, it was found that the Chevrolet 5.74 litre (350 in^3) engine was the most readily adaptable to port liners. Since the EPA had, from another project, a 1975 California model Chevrolet Nova with a 5.74 litre engine equipped with lined exhaust ports, it was decided to use this car for the high temperature exhaust system test car.

While selecting the system components for the air modulation system, it was realized that the 1975 Nova would also be a suitable test car for that system. Since it was believed that the 1975 Nova had accumulated only a few thousand kilometers, and could accommodate either the high temperature exhaust of air modulation system, it was decided to use it as one of the test cars.

At the project inception, there were no intermediate size cars in production with threeway catalysts and feedback fuel control systems. However, Chrysler Corporation agreed to loan EPA a 1977 Fury, equipped with a 5.90 litre (360 in^3) V8 engine and an experimental Holley feedback carburator and fuel control system. To complete the system, two 1475 cc (90 in^3) threeway catalysts with a 5 to 1 platinum/rhodium ratio were supplied to EPA by Engelhard Industries. Thus, the 1977 Plymouth Fury became the second test car for the project.

A. 1975 Chevrolet Nova

The 1975 Nova test car is described in Table 2. After the car had been delivered to SwRI, it was discovered that some of the engine systems had been considerably modified during its use on a previous EPA project. The changes are discussed in the final report of that project.[19] Prior to use of the car in this study, most of the systems were returned to stock configuration. However, some were left in the "as-received" configuration. The system changes are listed in Table 3.

B. 1977 Plymouth Fury

A description of the 1977 Plymouth Fury is also included in Table 2. The car was a stock 1977 Fury, except for the fuel system, catalyst, and the fact that the EGR and OSAC systems were, while installed, purposely not operational. An airpump was also installed, but not operational. The air pump, EGR and OSAC system were included for possible use during optimization testing.

The feedback controlled carburetor fuel system supplied with the car was an experimental system developed by Holley carburetor. The pictorial schematic in Figure 5 shows the elements of the basic system. The O_2 sensor, located in the exhaust stream between the engine and the catalyst, produces a voltage of about 800 millivolts in the absence of oxygen in the exhaust. This voltage decreases to zero as the oxygen in the exhaust stream increases from 0 to 1.5 percent.

The voltage signal from the sensor is the prime control input to the electronic control unit which provides a square wave output signal of constant frequency, but of variable band width depending on the O_2 sensor voltage. The ECU is designed so that at low values of oxygen in the exhaust (highest level of sensor voltage output), the output signal band width is the greatest. Conversely, as the oxygen concentration increases in the exhaust and the sensor voltage decrease, the band width decreases.

This variable width output signal operates the vacuum control valve, which serves to modulate the vacuum that is applied to the carburetor from the vacuum storage canister. Because the "on time" of the value is a function of O_2 sensor signal, the modulated vacuum resulting from variable "on time" is also a function of O_2.

TABLE 2. DESCRIPTION OF TEST CARS

Manufacturer	Chevrolet	Plymouth
Model	Nova	Fury
Model year	1975	1977
Vehicle Identification No. (VIN)	1X27L5L119711	RH41K7A115764
Emission family designation	11K43	N.A.
Engine displacement, litres (cu.in.)	5.74(350)	5.90(360)
No. of cylinders and configuration	V8	V8
Transmission	3 speed auto.	3 speed auto.
Ignition timing	6° BTC	10° BTC
Idle rpm	600	700
Carburetor	Rochester "Quadajet"	Holley Model 2245
Rear axle ratio	3.08	2.45
Tires	ER78-14	H78-15
Stock Emission Control System	"California" (Air pump, ox.cat.& EGR)	N.A.
Inertia weight class (lbs)	3500	4500

TABLE 3. COMPONENT CHANGES TO 1975 NOVA

Component	Contract 68-03-2161 Modifications*	Configuration for Contract 68-03-2481		
		Stock	Baseline	High Temp. Exhaust System
1. Exhaust manifolds	Replaced with 1973 prod. nodular iron manifold, #34622 & 364753	Reinstalled stock manifolds	Stock manifolds	Returned to '73 manifolds, #34622 & 364753
2. Exhaust piping	Removed, installed "NO_x canisters"	Reinstalled stock pipes	Installed modified pipes	Modified pipes
3. Oxidation catalyst	Removed, installed Engelhard PTX-IIC modified with air injection tube	Reinstalled stock catalyst	Installed 2 monolith catalysts	2 Monolith Catalysts
4. Air injection piping system	Removed piping, reinstalled new piping system with timer controlled solenoid and temp. control in lines to exhaust ports	Replumbed to stock configuration	Stock configuration	Stock configuration
5. Transmission cross member	Replaced with 1973 Impala cross-member	Retained	Retained	Retained
6. Transmission control rod	Modified	Retained	Retained	Retained
7. Ignition system	Added a time controlled ignition retard with vacuum overide (stopped vacuum signal to dist. for 45 sec. after start) retarding ignition at start	Returned to stock configuration	Stock configuration	Stock configuration
8. Choke actuator	Replaced with Delco electric choke with resistor added	Returned to stock configuration	Stock configuration	Stock configuration
9. Oil pressure sending unit	Replaced with Cadillac unit #6464144	Replaced with stock unit	Stock unit	Stock unit
10. Early Fuel Evap. (EFE) System	Disabled by wiring valve open and removing vacuum actuator	Returned to stock configuration	Stock configuration	Stock configuration

TABLE 3 (Cont'd). COMPONENT CHANGES TO 1975 NOVA

11. Carburetor	(a) replaced with complete 49 State carburetor #7045202	(a) retained	(a) retained	(a) retained
	(b) replaced main jets and metering rods (new rods of constant diameter)	(b) retained	(b) retained	(b) retained
	(c) increased size of channel restrictors	(c) retained	(c) retained	(c) retained
	(d) To eliminate lean A/F ratio excursions and minimize extremely rich excursions, changes may have been made to accelerator pump actuation, strobe, nozzle diameter, power valve orifice and actuation vacuum	(d) retained	(d) retained	(d) retained
	(e) Initial choke opening, cold idle speed and choke time adjusted to give 4-5% CO at start	(e) returned to Mfgr's specifications	(e) Mfgr. spec	(e) Mfgr. spec
12. PCV system	Installed 1.6 MM orifice in line	Retained	Retained	Retained
13. EGR valve	Installed dual diaphragm EGR valve	Retained	Retained	Retained
14. Cylinder heads	Replaced with heads with exhaust port liners	Returned to stock head	Reinstalled head with port liners	Port lined heads

*Vehicle originally a 1975 California Nova with 5.74 litre engine (family LM-1); California emission controls including single-diaphragm EGR valve, air pump and associated plumbing and a 4261 cc pelleted cat.; HEI ignition and automatic transmission.

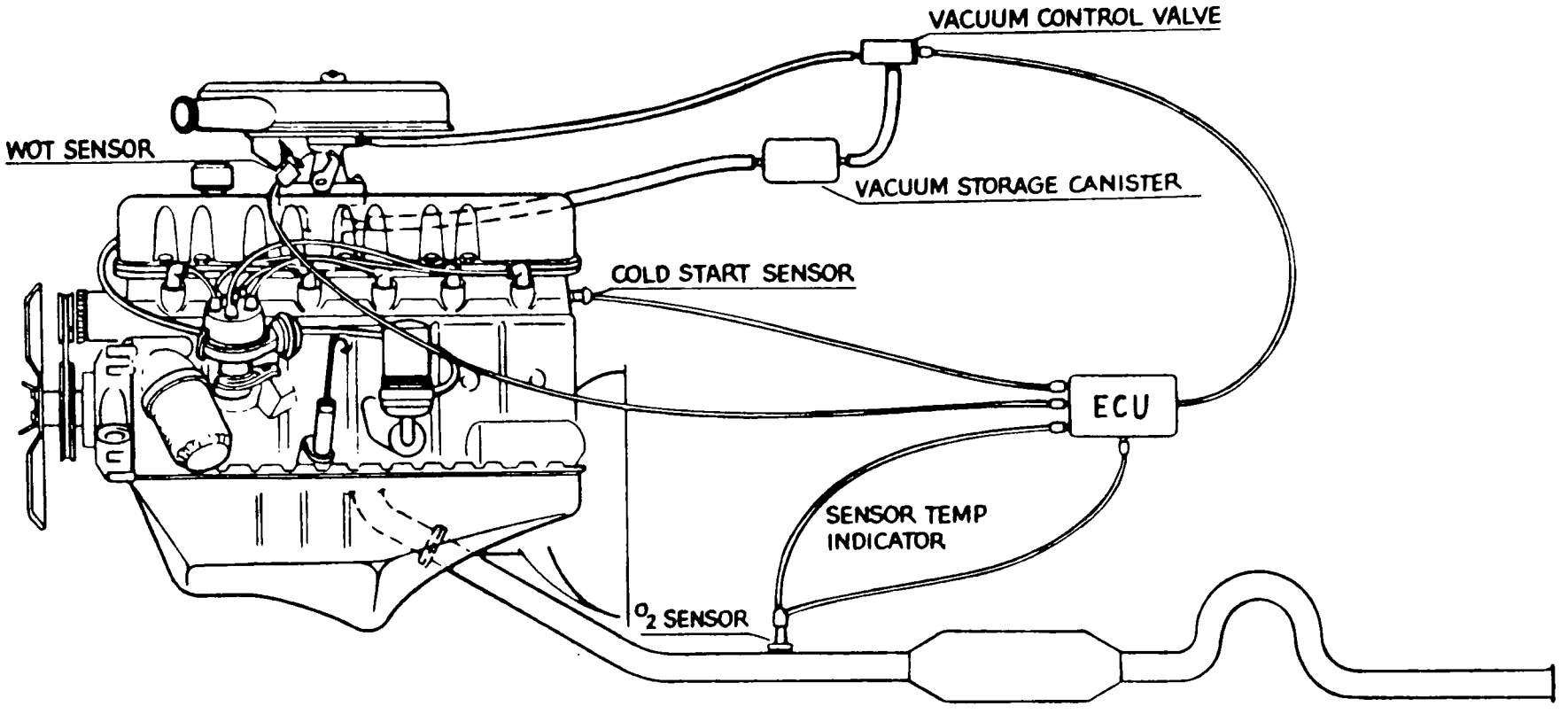


Figure 5. Holley feedback carburetor engine system

The sensor temperature indicator, the cold start sensor, and the wide-open-throttle sensor shown in the schematic, can override the O_2 sensor signal to the ECU so that richer air/fuel ratios are provided at wide-open-throttle and cold operating conditions.

Figure 6 shows the two systems in the carburetor that are controlled by the modulated vacuum. The idle system is controlled by providing a variable air bleed in parallel with the normal air bleed.

Control of the main system is accomplished by varying the fuel orifice in parallel with the main metering jet. This construction is a refinement of today's power enrichment system.

In operation, when a high vacuum is applied to the carburetor, it will tend to meter lean. This is accomplished when the solenoid has a high percentage of "on" time. Conversely, when the solenoid is off or operating at a low "on" time level, the control vacuum is low and the carburetor metering will enrichen.

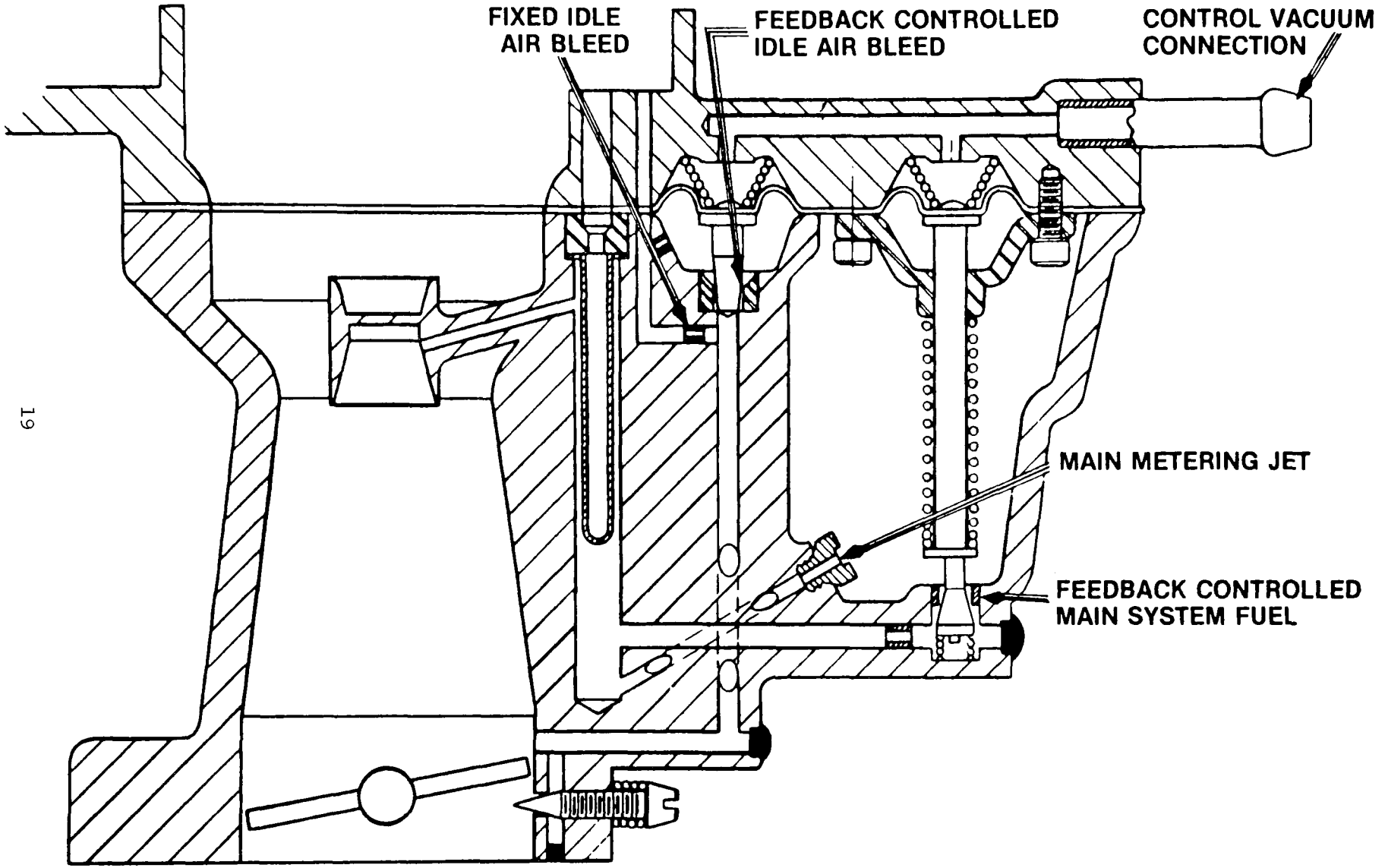


Figure 6. Feedback carburetor cross-section

III-2. EMISSION CONTROL SYSTEM DEVELOPMENT AND EVALUATION

This section covers the development and evaluation of two of the three low sulfate systems chosen for evaluation. The systems evaluated were: an oxidation catalyst with modulated air injection (referred to as the "air modulation system") and a high temperature exhaust system. The third system, a threeway catalyst with feedback fuel control, was selected for system optimization and durability testing prior to the start of the project.

A. Air Modulation System Development

Previous studies conducted at SwRI had indicated that the amount of air injected into the exhaust before the catalyst greatly affected the amount of sulfate produced by the catalyst.[7] While bench tests using SO_2 did not show changes in sulfate level above approximately two percent,[20,21] theoretical considerations show that a significant reduction in sulfates should be possible with decreases in injected air.[22]

In order to meet the 1981 HC and CO emission standards a catalyst air injection system may be required for an oxidation catalyst with the engine operating at conventionsl A/F ratios. Thus, for low HC and CO emissions a high oxygen level is required, while for low sulfate emissions a low oxygen level is required.

In current catalyst air injection systems, the air injected is a function of engine speed only, with the air pump output increasing as engine speed increases. For the catalyst to have sufficient air at all operating conditions, a great deal of excess air is produced for some operating conditions. The purpose of an air modulation system is to tailor the air injection to provide air only in the amount needed at any operating condition, minimizing the excess oxygen and thus the sulfate emissions.

Investigation of HC and CO emissions from carbureted gasoline fueled engines at various operating conditions indicate that for a given speed, emissions generally increase with power.[23] If the amount of air injected could be made a function of engine power, it would be possible to more closely tailor the air injection to catalyst need.

Since intake manifold vacuum is an indication of engine power, it was the first parameter considered for a control signal. Using a vacuum actuated valve it should be possible to modulate the amount of air supplied to the catalyst. Work done at G.M. Research Laboratories had shown successful air modulation using a control valve on the inlet of the air pump.[24] It was therefore decided that the first approach would be to try controlling the air at the pump inlet.

A control valve was designed and built using manifold vacuum as the valve actuator. The valve was then tested on an air injection system. Because of air leakage into the pump through shaft seals, etc., it was not possible to achieve a sufficient reduction in discharge flow.

The next approach was to control the air pump discharge flow. Another air modulation valve was built by modifying a standard G.M. air pump diverter valve. Figure 7 shows the standard G.M. diverter valve and the valve modified for air modulation. This valve was installed on the test engine and performed in a satisfactory manner. Figure 8 shows the percent flow versus vacuum level. The relationship of flow to manifold vacuum must, of course, be tailored to the car chosen as a test vehicle.

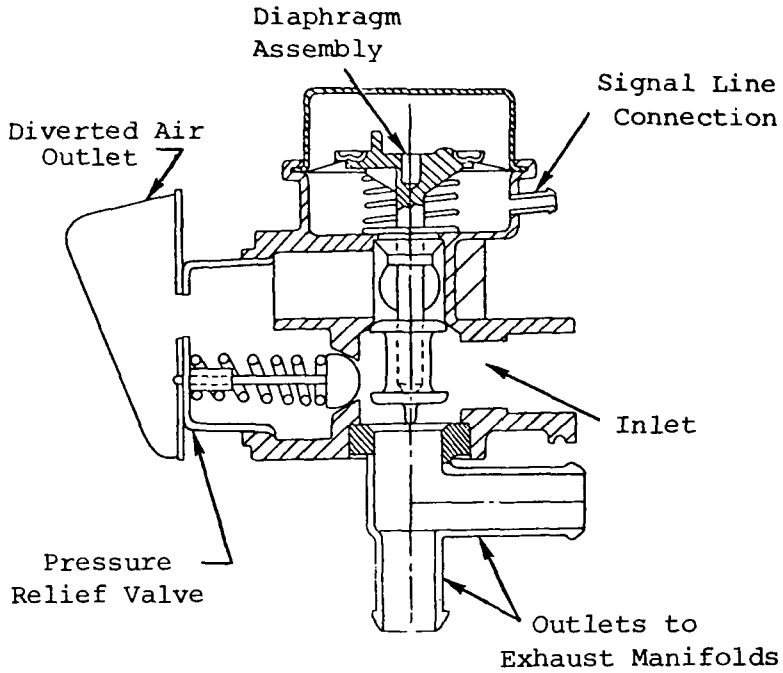
Since the 1975 Nova test car on which the system was to be installed, was not available at the time the system was ready for test, a rental car was obtained for use in the development of the air modulation system. Originally it was planned to use a Chevrolet Nova with a 5.74 litre (350 CID) engine to match the test car to be used for durability testing. However, a Nova with a 5.74 litre engine was not available from rental sources. A 1976 Chevrolet Impala with a 5.74 litre engine was chosen as the best available alternative.

The timing and idle speed were set to specification values at the test series shown in Table 4 run to obtain the stock condition emission levels. The results of this test series is shown in Table 5. The FTP emissions from the "stock" test were higher than the certification level for this car, however it was felt that the car would be satisfactory for evaluation and development of the air modulation system.

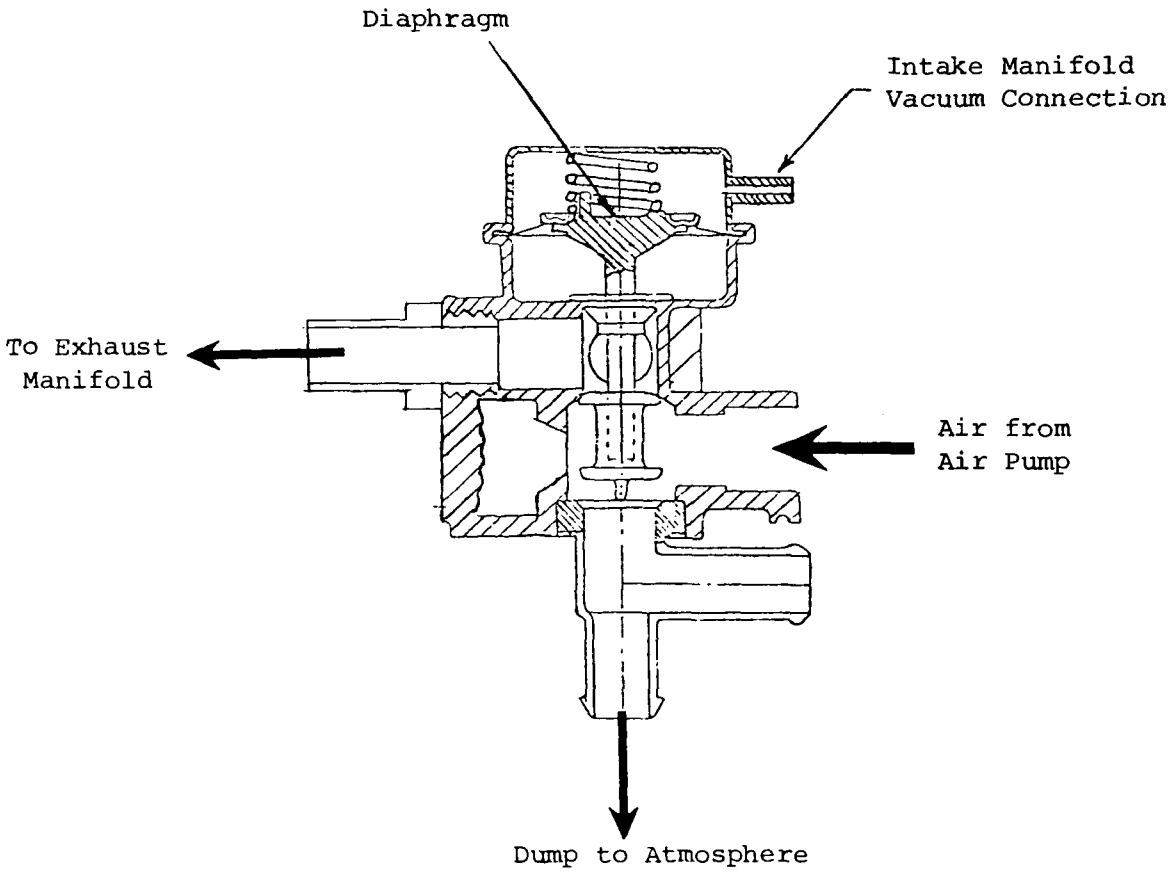
After the "stock" test, an air injection system, including air pump, necessary plumbing, and exhaust manifolds with air injection ports, was installed on the engine. The stock pelleted catalyst was removed. The exhaust system was modified to accommodate a monolith catalyst in the exhaust from each cylinder bank. The monolith catalysts were new stock Ford catalysts (part no. D7AZ5E212) used with the 1977 LTD with 5.75 litre (351 CID) engine. The car was then driven 160 km (100 miles) to season the exhaust system.

A test series was run which was to be the baseline test with a standard air injection system. During the testing the catalyst exit temperature, engine rpm, intake manifold vacuum, CO before the catalyst, and O_2 behind the catalyst, were continuously recorded.

The CO emissions were reduced with the air injection system and the CFDS sulfate level increased. However, the sulfate level was still much lower than expected. The HC emissions were not reduced by the addition of the air injection system. The catalyst exit temperature was recorded during all tests and was found to be considerably higher than expected. The high catalyst exit temperature, together with the higher than expected HC emissions indicated an ignition system problem which was later found to be a spark plug wire arcing to the exhaust manifold. However, at this time it



Standard G.M. Air Diverter Valve



Air Modulation Valve

Figure 7. Standard air diverter valve and air modulation valve

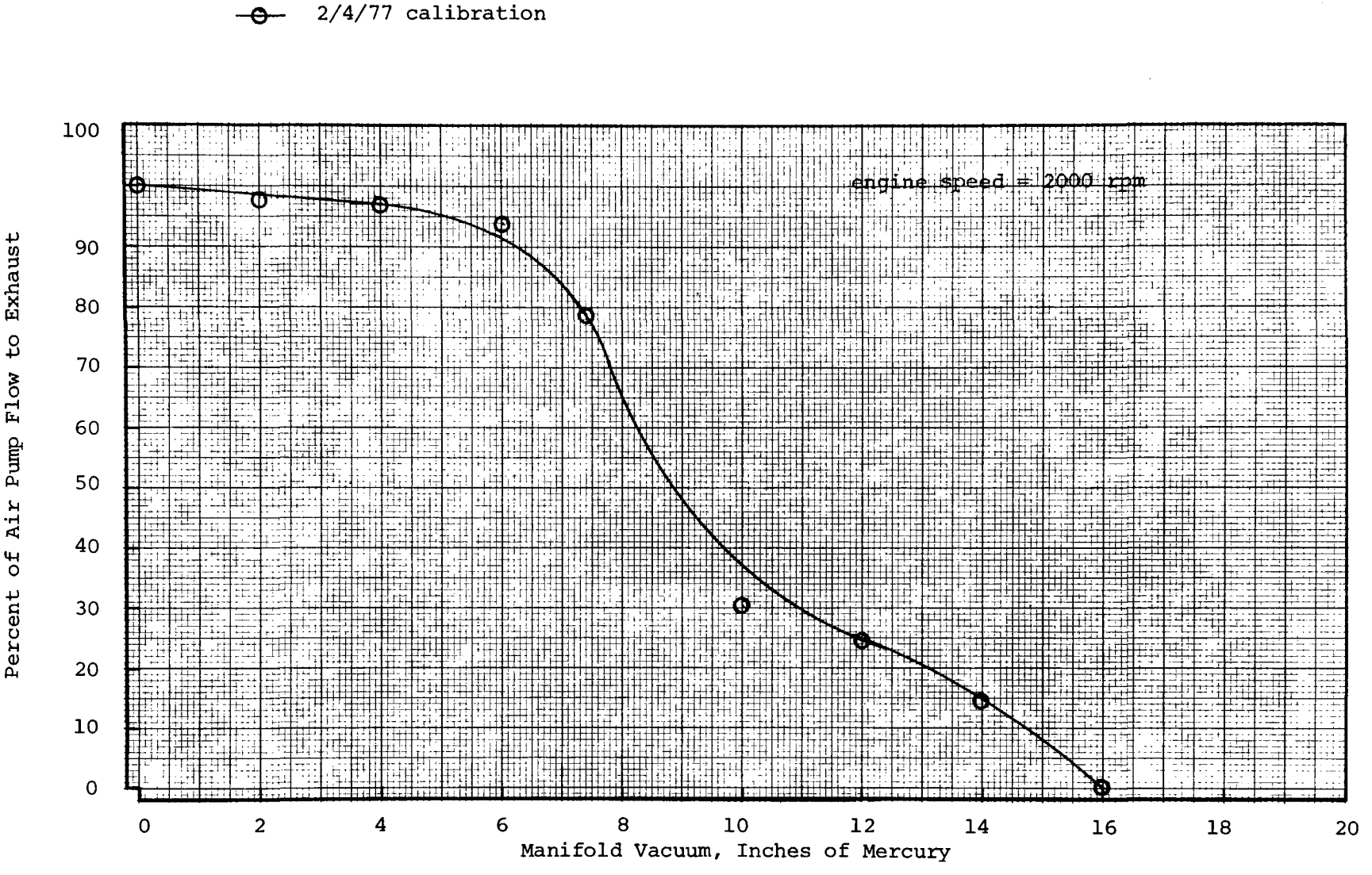


Figure 8. Air modulation valve calibration

TABLE 4. AIR MODULATION SYSTEM DEVELOPMENT TEST SEQUENCE

1. Precondition, LA-4

2. Soak 12 to 20 hours

3. FTP - 3 bags for gaseous emissions

4. Idle 1 minute ($\pm$ 15 seconds)

   (a) auto trans - drive manual - neutral
   (b) place filter holder in tunnel

5. CFDS - 1 gaseous bag
   1 filter sample

6. Engine off - 5 minutes

7. HFET - 1 gaseous bag

TABLE 5. RESULTS OF AIR MODULATION SYSTEM DEVELOPMENT TESTS

Date	Configuration	Gaseous emissions g/km (g/mile) HC	CO	NO_x	H_2SO_4 gm/km (mg/mile)	Fuel ℓ/100 km (mpg)
		FTP TESTS				
3/17/77	Stock	1.20(1.93)	10.84(17.44)	2.03(3.27)		20.34(11.60)
3/30/77	Baseline[a]	1.14(1.84)	1.95(3.14)	3.02(4.85)		21.66(10.90)
4/01/77	w/modulation	0.93(1.50)	2.18(3.51)	2.41(3.88)		19.33(12.17)
4/06/77	w/modulation	0.42(0.68)	4.34(6.98)	2.39(3.85)		19.62(11.99)
4/19/77	w/modulation	0.27(0.43)	8.89(14.30)	1.67(2.68)		19.26(12.21)
5/05/77	Baseline	0.14(0.23)	0.82(1.33)	2.22(3.58)		17.99(13.07)
5/10/77	Baseline	0.14(0.23)	0.81(1.30)	2.06(3.31)		17.55(13.40)
5/18/77	w/modulation	0.21(0.34)	0.95(1.53)	2.22(3.57)		16.01(14.69)
5/26/77	w/modulation	0.25(0.40)	1.25(2.02)	1.43(2.30)		18.82(12.50)
5/30/77	w/modulation	0.36(0.58)	3.62(5.82)	1.42(2.28)		18.28(12.87)
6/02/77	Baseline	0.28(0.45)	1.28(2.06)	2.09(3.36)		17.54(13.41)
6/06/77	Baseline	0.38(0.61)	1.02(1.64)	1.60(2.57)		17.54(13.41)
		CFDS TESTS				
3/17/77	Stock	0.19(.31)	5.59(8.99)	1.89(3.04)	0.16(0.26)	
3/30/77	Baseline	0.57(0.92)	3.41(5.49)	2.66(4.28)	3.30(5.31)	
4/01/77	w/modulation	0.50(0.80)	5.54(8.91)	1.85(2.98)	1.08(1.74)	
4/06/77	w/modulation	0.05(0.08)	1.37(2.20)	2.44(3.93)	1.39(2.24)	
4/19/77	w/modulation	0.10(0.16)	5.53(8.90)	1.69(2.72)	1.52(2.45)	
5/05/55	Baseline	0.05(0.08)	0.18(0.29)	2.44(3.92)	32.57(52.40)	
5/10/77	Baseline	0.08(0.13)	0.17(0.27)	2.07(3.33)	37.27(59.98)	
5/18/77	w/modulation	0.05(0.08)	0.42(0.68)	1.81(2.91)	3.72(5.99)	
5/26/77	w/modulation	0.08(0.13)	2.10(3.40)	1.13(1.83)	0.60(0.97)	
5/30/77	w/modulation	0.07(0.11)	1.04(1.67)	1.11(1.79)	0.53(0.86)	
6/02/77	Baseline	0.11(0.18)	0.19(0.31)	1.47(2.37)	80.49(129.51)	
6/06/77	Baseline	0.07(0.11)	0.11(0.18)	1.51(2.43)	62.29(100.22)	

(a) Baseline configuration is with catalyst air injection system without air modulation.

was felt that an initial check of the air modulation system was more important than an investigation of possible ignition system problems.

Following these initial tests, a total of six development tests on the air modulation system and four additional baseline tests with standard air injection were performed. The development testing proceeded in three steps:

1. Idle A/F adjusted to specifications, new spark plugs and first schedule of air modulation valve prior to tests on April 1 and April 6.

2. Cold start delay in air modulation additional EGR, and ignition system problem corrected prior to test series on April 19.

3. In addition to those changes in (2), installation of a centrifugal clutch on the air pump prior to tests on May 26 and May 30.

Baseline tests with a standard air injection system were run between steps 1 and 2, and following the completion of the development testing. The test results from all tests are listed in Table 5.

As the first step in the system development, the air modulation valve was inserted in the air injection system between the air pump diverter valve and the exhaust manifold air injectors and a test series run on April 1, 1977. Following the test series, an air modulation valve leak was corrected, new spark plugs installed, and the idle A/F ratio adjusted to specification using the "lean drop" method. The "lean drop" method utilized the fact that engine speed will vary with A/F ratio, at a constant throttle setting. For this case throttle setting is at idle (throttle closed). The idle mixture screws are turned in all the way, then turned out, enrichening the mixture until the engine speed no longer increases. The curb idle throttle stop is adjusted to give an idle speed a certain amount above specification idle speed (usually 50-100 rpm). The mixture screws are then turned in, leaning the mixture, until the idle speed decreased to the specification valve. During the next test on April 6, 1977, the cause of the suspected ignition system malfunction was discovered. The number 8 spark plug was observed arcing through the boot to the exhaust manifold. The spark plug boot was replaced during the soak period of the FTP and testing continued. The hot start portion of the FTP produced much lower catalyst exhaust temperatures and HC levels. However, as can be seen from Table 5, the CO and NO_x levels were still considerably above the project goals.

Following the April 6 test, the raw exhaust gas traces were examined to determine if the air modulation valve was correctly scheduled. The manifold vacuum and engine speed traces from the FTP test without air modulation, run on March 30, 1977, were read every two seconds and the values punched on computer cards. A scatter plot of manifold vaccum and engine speed pairs was then obtained using a computer plotter. The plot is shown in Figure 9. The CO trace from the same test was examined and the CO levels above 1 percent manually plotted on the graph. The CO levels above 1 percent for the first three minutes are shown as unshaded symbols;

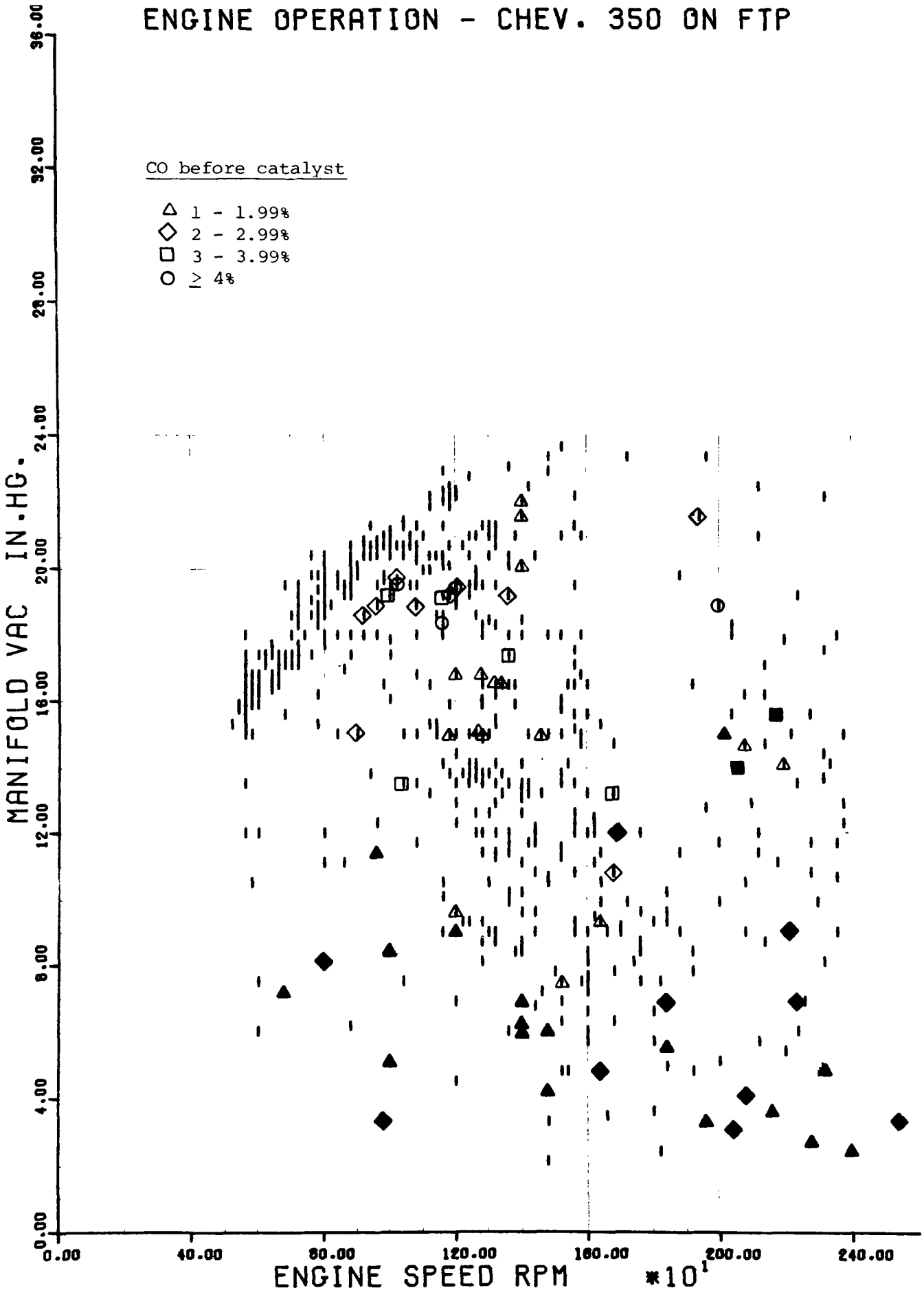


Figure 9. Manifold vacuum as a function of engine speed during FTP test on 1976 Impala

the remainder of the test as shaded symbols. The area of high CO was then compared to the modulation valve schedule, Figure 8.

Examination of Figure 8 and 9 indicated that the modulation valve schedule was satisfactory for that stage of development, but that full air to the catalyst was needed during approximately the first three minutes of the cold start. It also appeared that some air was needed at vacuum levels up to 18 to 20 inches of mercury at higher engine speeds, but not at idle speed.

To obtain full air injection during the cold start portion of the FTP, the vacuum chamber of the modulation valve needed to be opened to the atmosphere during the first three minutes of the cold start. To provide air at higher engine speeds, but not at idle, it was decided to use a centrifugal clutch on the air pump to disengage the air pump when the engine was idling.

Step two of the development process was to install and test the cold start hardware. The main part of the system was a solenoid valve installed in the vacuum to the air modulation valve. A time delay relay actuated the solenoid valve. The time delay relay was set at approximately 2-1/2 minutes. The vacuum system to the solenoid valve was plumbed in such a way that full air was admitted to the exhaust system until the solenoid was actuated, at which time the air injection was modulated by the manifold vacuum signal.

Also during this step, a dual diaphragm EGR valve was installed on the engine in an effort to reduce NO_x to the project goal. The dual diaphragm EGR valve is constructed such that for high intake manifold vacuum levels, as would be experienced in cruising, the valve opening is less than for low manifold vacuums obtained during accelerations. Thus, the valve is capable of providing more recirculation on acceleration than the standard EGR valve.

The next series of development tests was run on April 19, 1977. The test results, listed in Table 5, showed a reduction of HC and NO_x. Examination of the before catalyst CO trace revealed a need for further adjustment to the idle CO level.

At that point in the development testing it was felt that another baseline test with the standard air injection system should be run to evaluate the effects of catalyst seasoning in sulfate emissions. The car was first driven 161 km (100 miles) on suburban expressways as a quick mileage accumulation, then tested on May 5 and 10, 1977 using the FTP and CFDS test cycles. The sulfate emissions from the two CFDS tests averaged 34.92 mg/km, which is ten times the initial baseline CFDS sulfates. It was obvious that the lower sulfates from the initial CFDS baseline test with standard air injection were the result of having an unseasoned catalyst. Thus, the second baseline CFDS sulfate levels were used as the standard air injection system levels.

The third step of the development testing was to install the air pump centrifugal clutch. The centrifugal clutch used was a modified small gasoline engine clutch manufactured by Mercury Clutch Division of Aspro, Inc., Model No. GW8-30. It was modified to have the pulley as the driving element rather than the shaft. A cross-section sketch of the modified clutch is shown in Figure 10.

The time delay relay actuated solenoid valve in the vacuum line to the air modulation valve was replaced with engine coolant temperature switch identical to the EGR vacuum signal switch that is stock equipment on the car. This was accomplished by installing a pipe tee in the EGR switch location and fitting an EGR switch in both ends of the tee.

The air modulation system then consisted of three additional elements in a standard air injection system. These elements were:

- A centrifugal clutch on the air pump pulley sheave
- A manifold vacuum actuated air modulation valve
- A coolant temperature controlled switch in the vacuum line to the air modulation valve.

Figure 11 is a sketch of the system showing the various elements. After installing the system on the car, it was driven 161 km and tested on May 18, 1977 using the FTP and CFDS cycles. The CFDS sulfate emissions from this test was 3.7 mg/km. This large decrease in sulfate emissions was taken to indicate that the air injection system did indeed have potential as a method to reduce sulfate emissions. The complete results from these tests are also given in Table 5.

At this time, it was felt that the system was ready for the final demonstration test series: 805 km on the AMA durability driving schedule; a test series consisting of an FTP, CFDS, and HFET; 480 km on the AMA durability schedule; and a repeat of the test series. This was to be done with both the standard air injection system and the modulated air injection system. Since the modulated air injection system was installed on the car, it was tested first. The results of the replicate tests run on May 26 and 30, 1977 are shown in Table 5.

The sulfate levels from the CFDS were surprisingly low, being 0.60 mg/km for the first CFDS and 0.53 mg/km for the second CFDS. This is an average 98 percent reduction in sulfates from two previous tests with the standard air injection system.

The air modulation system was then removed from the test car. The emission control systems were then in stock 1976 Federal configurations except for:

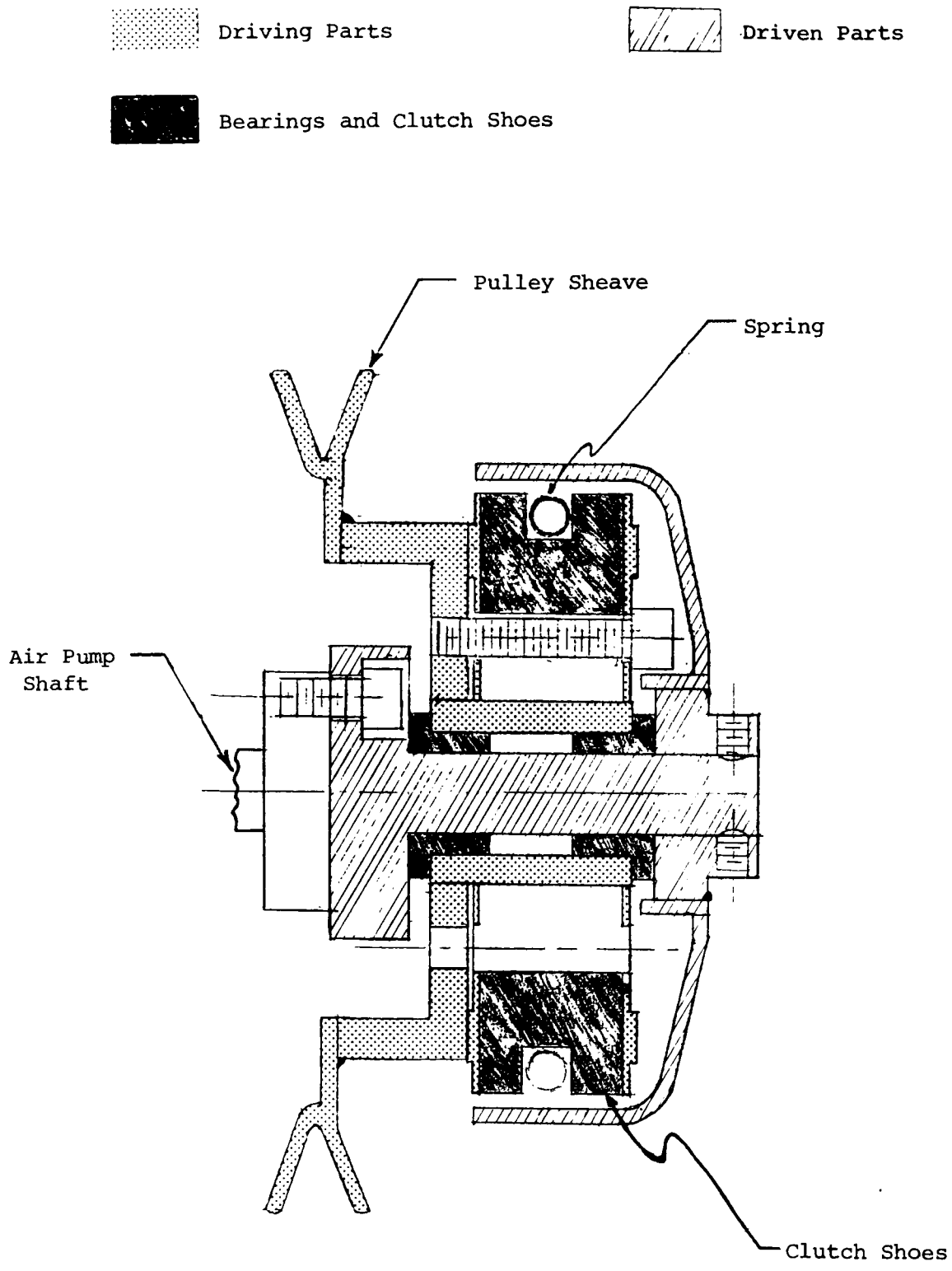
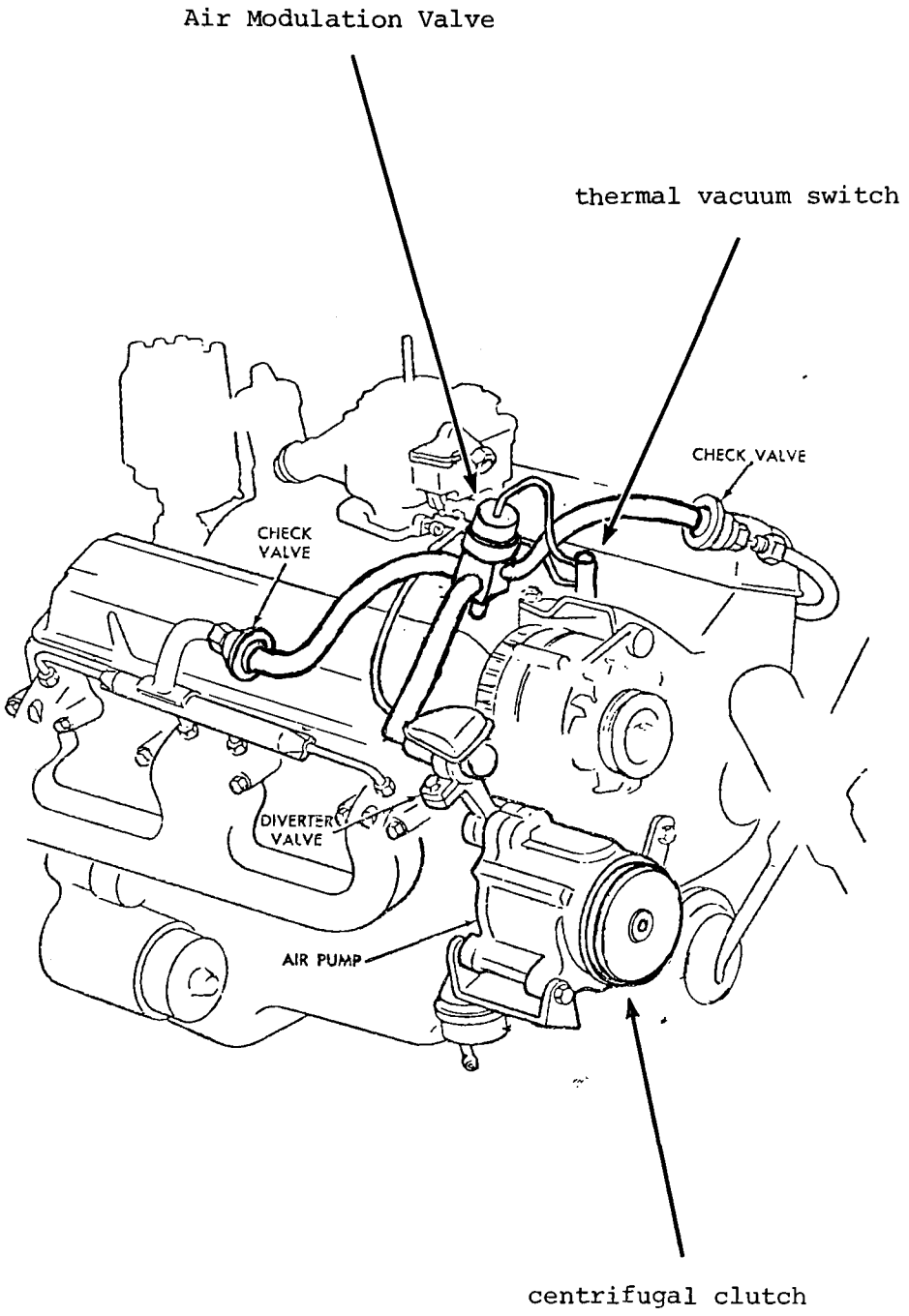


Figure 10. Cross section of centrifugal clutch



(items added to standard injection system are in large print)

Figure 11. Modulated air injection system

- a dual diaphragm EGR valve in the EGR system;
- two monolith catalyst in place of the one pelleted catalyst, and
- a standard air injection system.

With the car in this configuration, it was driven 805 km on the AMA durability driving schedule, then tested for sulfate and gaseous emissions. The test series consisted of an FTP, CFDS and HFET. Following these tests, the car was driven 483 km on the AMA schedule and the test series repeated. The test results are shown in Table 5.

Recall that the FTP emission level goals for this project are 0.25 g/km HC, 2.11 g/km CO, and 0.93 g/km NO_x. While no goal was set for sulfates, it has been agreed that a practical target level was 3.11 mg/km or less. The car without air modulation met the goal for CO only. When equipped with air modulation, the car met the sulfate target but none of the gaseous emissions goals.

The air modulation system had demonstrated its ability to reduce sulfate emissions. While the gaseous goals were not met, the FTP gaseous emissions were close enough to the goals to indicate that with additional adjustments to the engine and air modulation system, the gaseous emission goals could be met, while keeping the sulfates below the target of 3.11 mg/km.

It was felt that sufficient testing had been done to successfully demonstrate the effectiveness of the air modulation system so that this series of tests concluded the system development phase.

B. High Temperature Exhaust System Development

Theoretical analysis and laboratory tests have shown that the amount of exhaust SO_2 converted to sulfate in an oxidation catalyst system decreases as temperature increases.[20,25] An increase in exhaust temperature at the catalyst from 480° to 540°C (900°F to 1000°F) could theoretically result in a 30 to 40 percent reduction in sulfate emissions.

Raising the catalyst inlet temperature then becomes an attractive technique for control of sulfate emissions, particularly if the temperature increase can be accomploshed by heat conservation techniques alone. As one of the emission control systems to be evaluated for this project, a high temperature exhaust system was to be designed and built. This system was to rely on heat conservation techniques, with a target temperature increase of 80°C (approximately 150°F).

To accomplish this objective three changes were proposed to the exhaust system:

- Install exhaust port liners in the engine heads
- Use insulated exhaust manifolds
- Mount the catalysts as close as possible to the exhaust manifold

Published studies indicated that by far the most effective means of conserving exhaust heat is by the use of exhaust port liners. [19,26] Since heads with exhaust port liners were available for a Chevrolet 5.7 litre (350 CID) engine, the 1975 Nova described in Section II was used as the test car for the high temperature exhaust system evaluation. The insulated exhaust manifold and port liners were to be tested separately and in combination so that the contribution of each component could be evaluated. In addition, the stock pelleted catalysts were to be replaced with monolith catalysts, which had shown a somewhat lower sulfate storage capacity in a previous project.[7]

For the insulated manifolds, a decision was made against merely insulating the stock exhaust manifolds, since it was felt that the stock nodular cast iron manifolds would have a tendency to crack when insulated. It was therefore decided to design and fabricate a set of exhaust manifolds specifically for this project.

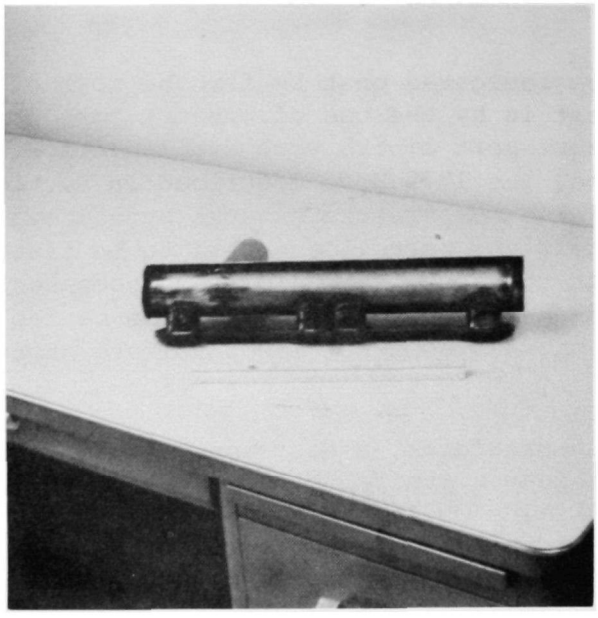
A study of port liners by Ford Motor Company[26] had indicated that air gap insulation gave the lowest heat loss of several techniques evaluated. It was felt that for the exhaust manifold also, air gap insulation would give the lowest heat rejection. The insulated exhaust manifold should also have low thermal inertia to keep the start up exhaust temperature as hot as possible.

Using these criteria, a set of welded stainless steel exhaust manifolds were designed with a 19 cm (0.75 in) air gap. Photographs of the manifolds are shown in Figure 12.

The manifold weldments were fabricated and installed prior to installing the heads with exhaust port liners so that the effects of the insulated manifolds alone could be evaluated. To conserve badly needed time, the insulated manifolds were evaluated with the stock exhaust pipe and pelleted catalyst, since the exhaust system with the two monolith catalysts was still being fabricated.

Table 6 shows the test results of the test series with the stock exhaust manifolds and exhaust system and series with the insulated exhaust manifolds. The temperature data from the test series with the SwRI built insulated exhaust manifolds indicated that these manifolds were only marginally successful in increasing the exhaust gas temperature into the catalyst. The FTP test with insulated manifolds showed only a 7°C(12°F) increase over the stock manifold FTP temperature.

When the temperature traces from the two tests were compared, the insulated manifolds were found to produce hotter exhaust gas temperatures during the cold start 505 second portion of the FTP test. The exhaust temperature difference between the two systems began to decrease after 505 seconds. It continued to decrease until the end of the test, when the exhaust temperature using stock manifolds was actually higher than the exhaust temperature from the insulated manifolds.



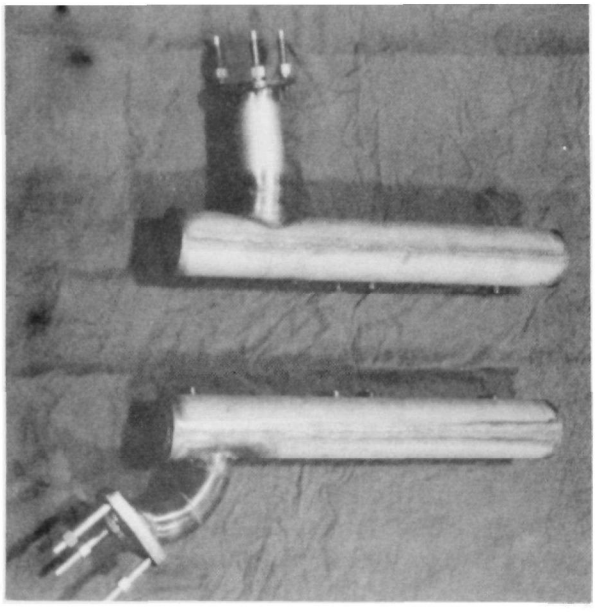


Figure 12. Air gap insulated exhaust manifolds

TABLE 6. RESULTS FROM INSULATED MANIFOLD TESTS WITH PELLETED CATALYST

Date	Test Type	Configuration	Gaseous Emissions g/km (g/mile) HC	CO	NO_x	H_2SO_4 mg/km (mg/mile)	Average Exhaust Temp°C[a]	Fuel ℓ/100 km (mpg)
5/13/77	FTP	Stock	0.22 (0.35)[b]	1.44 (2.32)	0.77 (1.24)	----------	472 (882)	17.26 (13.63)
5/13/77	CFDS	Stock	0.03 (0.05)	0.23 (0.37)	0.81 (1.30)	7.11 (11.44)	545 (1013)	14.05 (16.74)
6/10/77	FTP	w/ins.exh.[c]	0.34 (0.55)	1.72 (2.77)	0.77 (1.24)	----------	479 (894)	18.87 (12.46)
6/10/77	CFDS[d]	w/ins.exh.	0.21 (0.34)	3.57 (5.74)	0.45 (0.72)	14.51 (23.35)	517 (962)[b]	17.06 (13.79)

[a] average temperature at exhaust manifold exit
[b] left cylinder bank only (cylinders 1,3,5,7). See Note d.
[c] insulated exhaust manifolds installed
[d] two spark plugs misfiring during this test

The CFDS tests with the SwRI insulated manifolds had a 28°C (50°F) lower average temperature than the CFDS tests with stock manifolds. During the CFDS tests with the insulated manifolds the numbers six and eight spark plugs were observed arcing through the boot to the manifold. Since these cylinders exhaust into the right hand manifold, only the left cylinder bank exhaust temperature was used for the CFDS comparison.

The HC and CO emissions and fuel consumption from the CFDS test with the insulated manifolds are higher, and the NO_x emissions are lower than the CFDS test with the stock exhaust system, as would be expected with the misfiring cylinder.

From the temperature data of these two test series, it appears that insulated manifolds give higher exhaust temperatures during cold engine operation only. During stop and go driving, as represented by the stabilized portion of the FTP, the stock cast exhaust manifolds apparently give up some stored heat during low power and idle operation. This raises the temperature from the stock manifolds above the temperature from the insulated manifolds, which being less massive than the stock manifolds, have a smaller heat storage capacity.

As was pointed out earlier, these tests were run with a stock pelleted catalyst, rather than the monolith catalysts planned for use with the high temperature system. Pelleted catalysts are capable of considerable sulfate storage and subsequent release. Since no attempt was made to duplicate the long term preconditioning, no comparison should be attempted between the sulfate emissions of the two CFDS tests run on May 13 and June 10.

Following these tests, the stock exhaust manifolds were reinstalled and the pelleted catalyst was replaced with two monolith catalysts, one for each cylinder bank. The car was driven for 805 km on the AMA durability driving schedule. It was then tested twice (June 28, and July 1, 1977) using the development test sequence (FTP, CFDS, HFET) with 483 km durability driving between the two test series. This test series was designated as the baseline test. The cylinder heads with exhaust port liners were then installed together with the exhaust manifolds supplied with the heads. (1973 production nodular iron manifolds). The car was again driven for 805 km of durability and the test sequence repeated twice (July 20 and 22, 1977) with 483 km of durability between test sequences. The results of these tests are shown in Table 7.

The average gaseous emissions from the two baseline FTP tests and the average of the two FTP tests with port liners were within the project goals as they were prior to changing the NO_x goal (0.25 g/km HC, 2.11 g/km CO, 0.93 g/km NO_x). However, one of the baseline FTP tests had a NO_x level slightly above the goal level. One FTP test with port liners had both CO and NO_x levels slightly above the goals.

The exhaust temperature for all tests with port liners were higher than the exhaust temperatures from the same test type without exhaust port liners. CFDS tests with the port liners had an average sulfate emission level approimately 37 percent less than the average baseline CFDS sulfate level.

TABLE 7. RESULTS FROM BASELINE AND TESTS WITH PORT LINERS AND MONOLITH CATALYSTS

Date	Test Type	Configuration	Gaseous Emissions, g/km (g/mile) HC	CO	NO_x	H_2SO_4 mg/km (µg/mi)	Avg. Exh. Temp. °C (°F)[a]	Fuel ℓ/100 km(mpg)
6/28/77	FTP	Baseline	0.19(0.31)	1.25(2.01)	0.77(1.24)	3.04(4.89)	456(852)	17.54(13.41)
7/1/77	FTP	Baseline	0.19(0.31)	1.24(2.00)	0.94(1.51)	0.11(0.18)	445(834)	17.24(13.64)
Average			0.19(0.31)	1.24(2.00)	0.86(1.38)	1.58(2.54)	450(843)	17.39(13.53)
6/28/77	CFDS	Baseline	0.05(0.08)	0.20(0.32)	0.73(1.17)	11.52(18.54)	545(1013)	13.95(16.86)
7/1/77	CFDS	Baseline	0.06(0.10)	0.21(0.34)	0.87(1.40)	8.53(13.73)	520(968)	13.44(17.50)
Average			0.06(0.09)	0.20(0.33)	0.80(1.29)	10.03(16.14)	532(990)	13.70(17.18)
6/28/77	FET	Baseline	0.04(0.06)	0.13(0.21)	0.78(1.26)	27.54(44.31)	573(1063)	12.60(18.69)
7/1/77	FET	Baseline	0.03(0.05)	0.12(0.19)	0.91(1.46)	26.18(42.12)	573(1063)	12.82(18.35)
Average			0.03(0.05)	0.12(0.20)	0.84(1.36)	26.86(43.22)	573(1063)	12.71(18.52)
7/20/77	FTP	w/liners[b]	0.15(0.24)	1.85(2.98)	0.78(1.25)	1.11(1.79)	526(979)	17.86(13.17)
7/22/77	FTP	w/liners	0.18(0.29)	2.25(3.62)	0.95(1.53)	0.40(0.64)	519(967)	18.52(12.70)
Average			0.16(0.26)	2.05(3.30)	0.86(1.39)	0.76(1.22)	522(973)	18.19(12.94)
7/20/77	CFDS	w/liners	0.04(0.06)	0.57(0.92)	0.82(1.32)	5.43(8.74)	608(1126)	13.81(17.03)
7/22/77	CFDS	w/liners	0.04(0.06)	0.55(0.88)	0.99(1.59)	7.16(11.52)	606(1123)	13.86(16.97)
Average			0.04(0.06	0.56(0.90)	0.90(1.46)	6.30(10.13)	607(1124)	13.84(17.00)
7/20/77	FET	w/liners	0.02(0.03)	0.10(0.16)	0.88(1.42)	18.66(30.02)	651(1204)	13.04(18.04)
7/22/77	FET	w/liners	0.02(0.03)	0.24(0.39)	1.05(1.69)	18.05(29.04)	657(1214)	13.26(17.74)
Average			0.02(0.03)	0.17(0.28)	0.96(1.56)	18.36(29.53)	654(1209)	13.15(17.89)

[a]Average temperature at exhaust manifold exit
[b]Exhaust port liners installed

While this is a considerable decrease in sulfate emissions, two facts should be pointed out. The first is that the baseline CFDS sulfate emissions are lower than average for a car with air injection. The EPA sulfate baseline study showed an average of 17.7 mg/km for oxidation catalyst cars with air injection.[5] The second fact is that even with a 37 percent reduction, the CFDS sulfate emissions from tests with the port liners are still somewhat above the target level of 3.1 mg/km.

The percent conversion of fuel sulfur to sulfate for the CFDS and HFET tests listed in Table 7 are shown in Figure 13 as a function of exhaust temperature. Also shown on the figure is a theoretical equilibrium curve for two percent excess oxygen and a curve showing laboratory test results for a catalyst with 50,000 hr^{-1} space velocity. Both of these curves are from Reference 20. From the figure, it can be seen that the actual rate of decrease in sulfate emissions with temperature is considerably less than the theoretical equilibrium rate. From examination of the figure, it appears that an additional exhaust temperature increase of approximately 70°C (126°F) would be required to obtain the target sulfate level. In an attempt to reach the target sulfate levels, the insulated exhaust manifolds were installed on the car and the test procedure repeated. The temperature as the exit of the exhaust manifold (left side) is shown in Table 8 for the tests with and without the insulated manifolds.

TABLE 8. EXHAUST TEMPERATURE WITH AND WITHOUT INSULATED MANIFOLDS

Test Type	Date	Configuration	Exhaust Manifold Exit Temp. °C
FTP	7/20 & 7/22 (Avg.)	w/o insulated man. w/liners	522 (973°F)
FTP	8/15/77	w/insulated man. w/liners	522 (972°F)
SET	7/20 & 7/22 (Avg.)	w/o insulated man. w/liners	607 (1124°F)
SET	8/15/77	w/insulated man. w/liners	595 (1103°F)

It is evident that the insulated manifolds had little affect on the exhaust temperature. This is not to say that exhaust manifolds could not be built that would give increased exhaust temperature. However, these test results do indicate that successful design of such manifolds requires more time and effort than programmed under this study.

Since there was little difference in temperature with insulated manifolds, the test results with port liners alone were used to evaluate the potential of the high temperature exhaust system. Development testing of the high temperature exhaust system was therefore brought to a close.

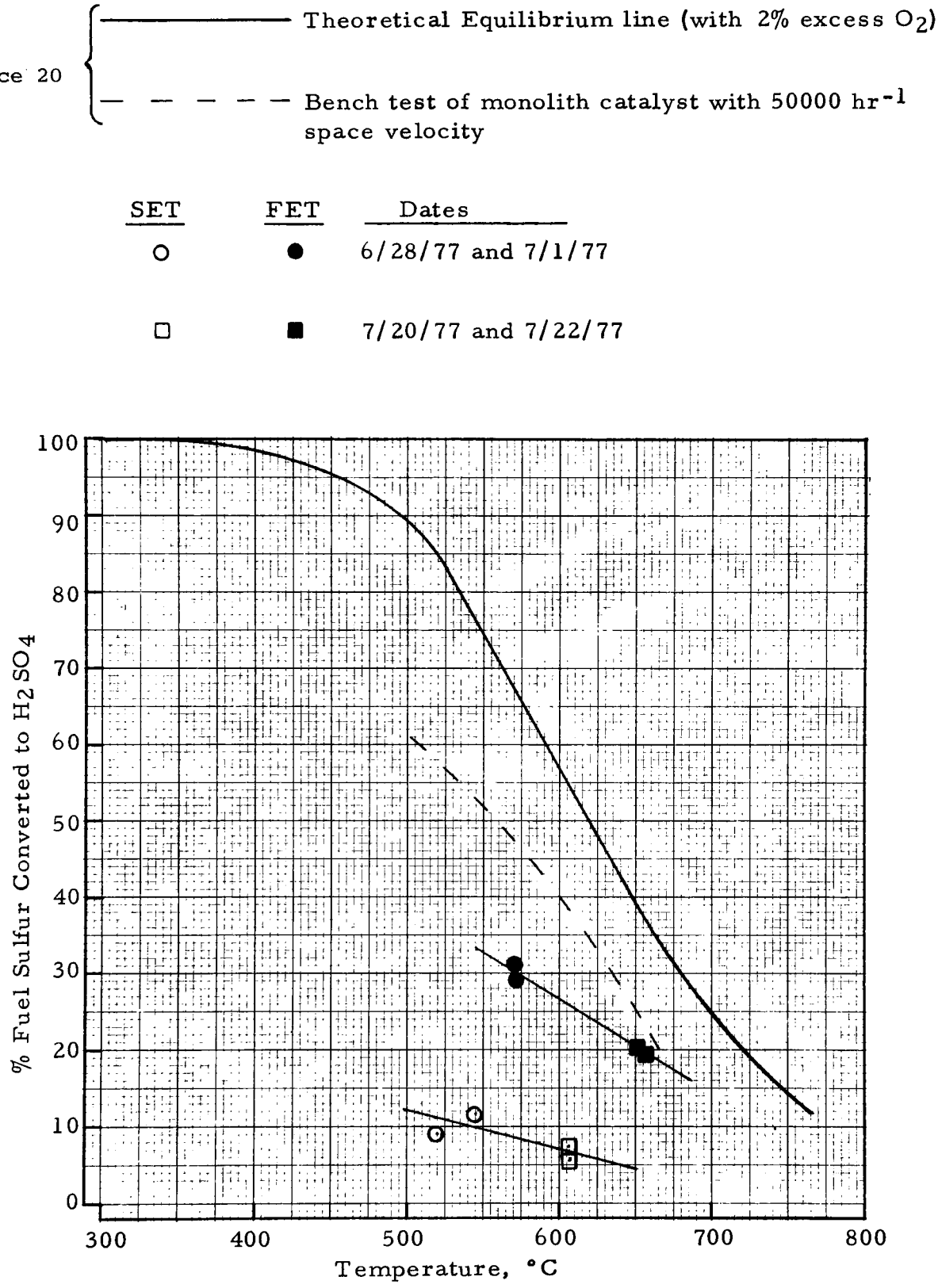


Figure 13. Conversion of fuel sulfur to H_2SO_4 for baseline and high temperature tests of 1975 Nova

C. Emission Control System Rating

Only one of the two systems evaluated was to be tested for durability. Therefore, some method of rating each system was needed so that the best system was chosen for durability testing. The systems were rank ordered, based on an assigned numerical value for each system. This numerical value was obtained by assigning a number between one and ten for each of several evaluation parameters, then summing the individual numbers to obtain a single number of each system.

The parameters considered were gaseous emissions, sulfate emissions, fuel economy. estimated durability, and estimated cost. Gaseous emissions were based on the 1975 FTP (LA-4 cycle), sulfate emissions on the CFDS cycle, and fuel economy on the city and the highway cycle.

Each of the parameters considered had a different scoring criteria. Basically, the higher the score, the more desirable (lower cost, better durability, lower emissions, etc.) the control system. Individual parameter scores were multiplied by a weighting factor, indicating the relative importance of each parameter. The weighting factors were subjective, but did serve to give more emphasis to the more important evaluation items. The scoring criteria for each individual item is shown in Table 9.

The evaluation scores of the two systems are shown in Table 10. An explanation of each score is contained in Appendix A. Since the air modulation system scored highest in the evaluation, it was chosen for further optimization and durability testing.

TABLE 9. EVALUATION SCORING CRITERIA

Evaluation Item	Scoring Criteria	Score	Weighting Factor
1. Gaseous Emissions	(a) HC, CO, NO_x below 0.25, 2.11 and 0.93 g/km respectively	10	2.0
	(b) Only one of the gaseous emissions is over the goal and it does not exceed the goal by more than 50%	5	
	(c) More than one of the gaseous emissions is over the goal	0	
2. Sulfate Emissions	(a) 3.1 mg/km or less on CFDS test	10	1.5
	(b) Greater than 6.2 mg/km	0	
	(c) Between 3.1 and 6.2 mg/km	(3.226-SO_4 mg/km)	
3. Fuel Economy	(a) Fuel economy improved by more	10	1.0
	(b) Fuel economy ±5%	5	
	(c) Fuel economy decreased by more than 5%	0	
4. Durability	(a) Estimate life of system without repairs or replacement (only addition parts added for sulfate control - not total system).	$(\frac{\text{miles}}{50{,}000 \times 10})$	1.0
5. Cost	(a) Least cost system	10	1.0
	(b) For other systems	$(\frac{\text{least cost}}{\text{system cost}}) \times 10$	

TABLE 10. EMISSION CONTROL SYSTEM EVALUATION RATINGS

Evaluation Item	Score	Weighting Factor	Weighted Score	Max. Possible Weighted Score
		Air Modulation System		
1. Meets gaseous emission goals	5	2.0	10	(20)
2. Sulfate emissions	10	1.5	15	(15)
3. Fuel economy	5	1.5	7.5	(15)
4. Durability	5	1.0	5	(10)
5. Cost	10	1.0	10	(10)
TOTAL SCORE		---	47.5	(70)
		High Temperature Exhaust System		
1. Meets gaseous emission goals	10	2.0	20	(20)
2. Sulfate emissions	0	1.5	0	(15)
3. Fuel economy	5	1.5	7.5	(15)
4. Durability	10	1.0	10	(10)
5. Cost	3.3	1.0	3.3	(10)
TOTAL SCORE		---	40.8	(70)

III-3. AIR MODULATION SYSTEM-OPTIMIZATION AND DURABILITY TESTING

The air modulation concept was proven on the 1976 Chevrolet Impala and chosen as one of the systems to be optimized and tested for durability. The complete air modulation system was therefore installed on the durability test car, the 1975 Nova described in Section II, and optimization of the system begun.

A. Air Modulation System Optimization

Since the basic car was not designed to meet 1981 standards, considerable work was required to bring the gaseous emissions within the project goals. The steps to reaching the project goals were:

1. Installed heads with exhaust port liners
2. Reinstalled stock head without port liners
3. Installed new rear axle (changed from 3.08 to 2.56 ratio)
4. Changed timing from 6° to 8° BTC and increased EGR
5. Installed new carburetor, increased EGR
6. Installed new intake manifold and increased EGR valve orifice to 12.8 mm

When the air modulation system was installed on the Nova, considerable testing was required to adjust the air modulation valve. The intake manifold vacuum range for the Nova was smaller than the vacuum range of the 1976 Impala on which the system was developed, necessitating a change in the size of the valve vacuum chamber and spring.

Since the high temperature exhaust system had just completed evaluation on the 1975 Nova, the cylinder heads with exhaust port liners were still installed. These heads were left in place to determine if the port liners would help reduce the CO emissions. Eleven tests were performed using the cylinder heads with exhaust port liners. The results from the test with the lowest overall emissions (9/30/77) are listed in Table 11. As can be seen, the car did not meet the CO or NO_x emission goals in that configuration.

On examination of test data with the stock emission control system, it was found that the stock cylinder heads, without port liners had lower CO emissions than the heads with liners. The reason for this difference was not evident, but was assumed to be a function of some difference in head geometry. It was therefore decided to reinstall the stock cylinder heads and continue the optimization testing.

TABLE 11. FTP TEST RESULTS FOR AIR MODULATION SYSTEM INSTALLED ON 1975 NOVA

Date	Configuration	Gaseous Emissions g/km (g/mile)			Fuel
		HC	CO	NO_x	ℓ/100 km (mpg)
9/30/77	w/liners & air mod.	0.19(0.31)	2.75(4.42)	0.76(1.22)	16.95(13.88)
11/3/77	std. head w/o air mod.	0.21(0.34)	1.86(2.99)	0.85(1.37)	16.95(13.89)
11/4/77	std. heads & air mod.	0.23(0.37)	2.54(4.09)	0.79(1.27)	17.86(13.17)
11/29/77	std. head, 2.56 axle w/air mod.	0.20(0.32)	1.42(2.28)	0.89(1.43)	16.13(14.58)
11/30/77	std. head, 2.56 axle w/air mod.	0.22(0.35)	3.38(5.44)	0.81(1.30)	16.67(14.11)
12/12/77	increased EGR, 8°BTC	0.18(0.29)	2.84(4.57)	0.64(1.03)	17.24(13.64)
12/30/77	new intake manifold, new carb., inc. EGR, 8° BTC	0.28(0.45)	1.86(2.99)	0.62(1.00)	17.09(13.76)
1/16/78	new intake manifold, 12.8 mm EGR, 9°BTC	0.19(0.31)	0.93(1.49)	0.55(0.89)	17.22(13.66)
1/18/78	new intake manifold, 12.8 mm EGR, 9°BTC	0.19(0.31)	0.92(1.49)	0.59(0.91)	17.19(13.68)
1/31/78	new intake manifold, 12.8 mm EGR, 9°BTC	0.19(0.31)	1.03(1.65)	0.48(0.77)	17.54(13.41)

Seven cold start FTP tests were run in this configuration. The test on 11/4/77 produced the best overall emissions. However, CO and NO_x were still above the project goals as shown in Table 11.

The third step of the optimization procedure was to change the rear axle ratio in an effort to lower CO emissions and improve fuel economy. A test without the air modulation system showed a reduction in CO and an improvement of approximately five percent in fuel economy. When a test was run on 11/30/77 with the air modulation system installed, the CO increased to a level above the best test with the original axle ratio. While not realized at the time, this was the result of an intermittent carburetor problem which would continue to hinder the optimization effort.

Since the 11/30/77 test demonstrated CO and NO_x emissions above the project goals, it was decided that additional changes were required. The EGR valve flow area was enlarged to increase the amount of EGR. The carburetor accelerator pump stroke was shortened and the ignition timing advanced to 8° BTC. This configuration constituted the forth step in the optimization procedure.

Six tests were run in this configuration, with the idle CO set at various A/F ratios. The best overall emissions were obtained from the 12/12/77 test. The CO and NO_x emissions were still above the project goals as shown in Table 11. However, there was a decrease in NO_x compared to previous tests.

After examining the CO traces from tests during Steps 3 and 4, it was evident that there was an intermittent problem with the carburetor, confusing the interpretation of the test results. The carburetor on the car had undergone extensive modification during a previous EPA project. It was felt that returning to a stock carburetor would improve the test-to-test repeatability.

A new Rochester "Quadajet" four barrel carburetor, part number 17054703, was installed. The amount of EGR was also increased. This configuration was the fifth step of optimization. Three tests were run in this configuration. The best emissions were obtained from the 12/30/77 test, listed in Table 11. For the first time, both CO and NO_x met the project goals, however HC was slightly above the project goal.

The last step in the optimization process was to install an aluminum Edelbrock "Streetmaster II" single plane intake manifold in an effort to decrease the time for the intake manifold to reach operating temperature. The timing was also advanced to 9° BTC. The EGR valve metering rod diameter was reduced to increase EGR. To further increase EGR, a new EGR valve orifice, 12.5 mm in diameter, was installed to place of the 10 mm orifice that had been used. An FTP test with this configuration was run on 1/16/78, with a replicate test run on 1/18/78. These tests met all gaseous emission goals with a sufficient margin for deterioration during durability testing.

The car was driven for 320 km (200 miles) on the AMA durability route to season the catalyst at the new exhaust oxygen level. A complete series of tests (FTP, CFDS, FET) was then run on 1/31/78 to determine the sulfate emissions. The CFDS sulfuric acid emissions were 3.85 mg/km (6.19 mg/mile). This was a 62% reduction from the Nova baseline obtained during the high temperature exhaust study (see Table 7). While the sulfate emissions were slightly above the 3.1 mg/km project goal, it was decided that they were low enough to proceed with the durability testing.

B. Air Modulation System Durability Testing

Following optimization of the air modulation system, the car was readied for durability testing. During a previous EPA project, the car had been driven 14160 km (8800 miles). By the end of optimization testing of the air modulation system, the 1975 Nova had accumulated a total of 19630 km (12200 miles). This represents a significant amount of use for the basic engine systems; therefore a minor overhaul was performed to bring the engine as close to a "zero miles" condition as possible. The overhaul consisted of the following maintenance items.

- Remove heads and remove deposits from top of piston
- Remove deposits from head, soak head in solvent, lap valves in seats and reinstall heads
- Clean inside of exhaust manifolds and reinstall
- Replace spark plugs and ignition wires
- Replace catalysts
- Replace manifold air injection tubes
- Change oil and oil filter
- Set timing 10° BTC and idle speed to 600 rpm

Following this minor overhaul, the car was driven for 322 km (200 miles) on the AMA durability schedule. Two replicate test series constituting the "zero kilometer" test were then performed.

Nova Distance Accumulation Chronology

With the zero kilometer tests on 2/28/78, the durability testing on the 1975 Nova with the air modulation system was begun. A replicate emissions, zero kilometer, test was run on 3/2/78. Distance accumulation began on March 9, 1978. The car was driven on the distance accumulation course shown in Figure 4, Section II, for two 8-hour shifts per day, 5 day per week. Approximately 640 km (400 miles) were accumulated each day. Duplicate emission tests were performed every 8050 km, with 805 km (500 miles) of the durability driving schedule accumulated between the first and second test series to provide equivalent catalyst sulfate conditioning.

Scheduled maintanance was performed every 12,070 km (7500 miles) as specified in the 1975 Chevrolet Service Manual. A summary of the required maintenance is shown in Table 12.

Durability distance accumulation continued until 28435 km (17673 miles), at which time the durability testing was stopped because all FTP gaseous emissions were at or above the project goals, with no possibility of decreasing as distance accumulation continued. A graphical representation of the distance accumulation records is presented in Figure 14. The figure shows daily distance, maintenance and emissions test points.

Nova Fuel and Oil Consumption

The average fuel and oil consumption for the interval between each emission test is shown in Table 13. The fuel consumption is quite consistent between emissions test and at the level expected from FTP and HFET tests during the optimization. Since there were only 5 quarts (4.7 litres) of oil added between oil changes during the 28435 km of durability testing, the oil consumption in each interval appears somewhat erratic, depending on when the oil was added.

TABLE 13. FUEL AND OIL CONSUMPTION DURING DURABILITY TESTING FOR 1975 NOVA

Distance Interval, km (mile)	Fuel ℓ/100 km (mpg)	Oil Consumption ℓ/1000 km (qt/1000 mi)
0-8050 (0-10000)	15.50(15.18)	0.261(0.444)
8050-16100 (5000-10000)	15.61(15.07)	no oil added
16100-24150 (10000-15000)	15.17(15.51)	0.513(0.873)
0-24150 (0-15000)	15.48(15.20)	0.166(0.283)

However, the overall oil consumption of 0.17 ℓ/1000 km (0.28 qts/1000 miles) is considered somewhat better than average.

Nova Emission Rest Results

The average results from the four duplicate emission test series run on the Nova during durability testing are listed in Table 14. These test results are shown graphically as a function of distance accumulated in Figures 15 and 16. As can be seen from the table and figures, all emissions were at or within the project goals at the zero and 8050 km test points. However, starting with the 16100 km test series, at least two, and on occasion all, of the FTP gaseous emissions were above project goals.

TABLE 12. MAINTENANCE SCHEDULE FOR 1975 NOVA

COMPLETE VEHICLE MAINTENANCE SCHEDULE

When To Perform Services (Months or Miles, Whichever Occurs First)	Item No.	Services (For Details, See Numbered Paragraphs)
Every 6 Months or 7,500 Miles	1	*Chassis Lubrication
	2	•*Fluid Levels Check
	3	*Engine Oil Change
At 1st Oil Chg. - Then Every 2nd	4	*Oil Filter Change
See Explanation	5	Tire Rotation (Steel Belted Radial)
	6	Rear Axle Lube Change
Every 12 Months	7	Air Conditioning Check
Every 12 Months or 15,000 Miles	8	*Cooling System Check
		— Coolant Change & Hose Replacement
Every 30,000 Miles	9	Wheel Bearing Repack
	10	*Auto. Trans. Fluid & Filter Change
	11	Manual Steering Gear Check
	12	Clutch Cross Shaft Lubrication
Every 6 Months or 7,500 Miles	13	Owner Safety Checks
	14	Tire and Wheel Inspection
	15	*Exhaust System Check
	16	*Drive Belt Check
		*— Belt Replacement
	17	Suspension and Steering Check
	18	Brake and Power Steering Check
Every 12 Months or 15,000 Miles	19	Drum Brake and Parking Brake Check
	20	Throttle Linkage Check
	21	Underbody Flush & Check
	22	Bumper Check
At First 6 Months or 7,500 Miles Then at 18 Month/ 22,500 Mile Intervals	23	Thermo. Controlled Air Cleaner Check
	24	Carburetor Choke Check
	25	Engine Idle Speed Adjustment
	26	EFE Valve Check
	27	Carburetor Mounting Torque
Every 12 Months or 15,000 Miles	28	Fuel Filter Replacement
	29	Vacuum Advance System & Hoses Check
	30	PCV System Check
		— PCV Valve & Filter Replacement
Every 18 Months or 22,500 Miles	31	Idle Stop Solenoid Check
	32	Spark Plug Wires Check
Every 22,500 Miles	33	Spark Plug Replacement
	34	Engine Timing Adjustment & Dist. Check
Every 24 Months or 30,000 Miles	35	ECS System Check & Filter Replacement
	36	Fuel Cap, Tank and Lines Check
Every 30,000 Miles	37	Air Cleaner Element Replacement

• Also A Safety Service

* Also An Emission Control Service

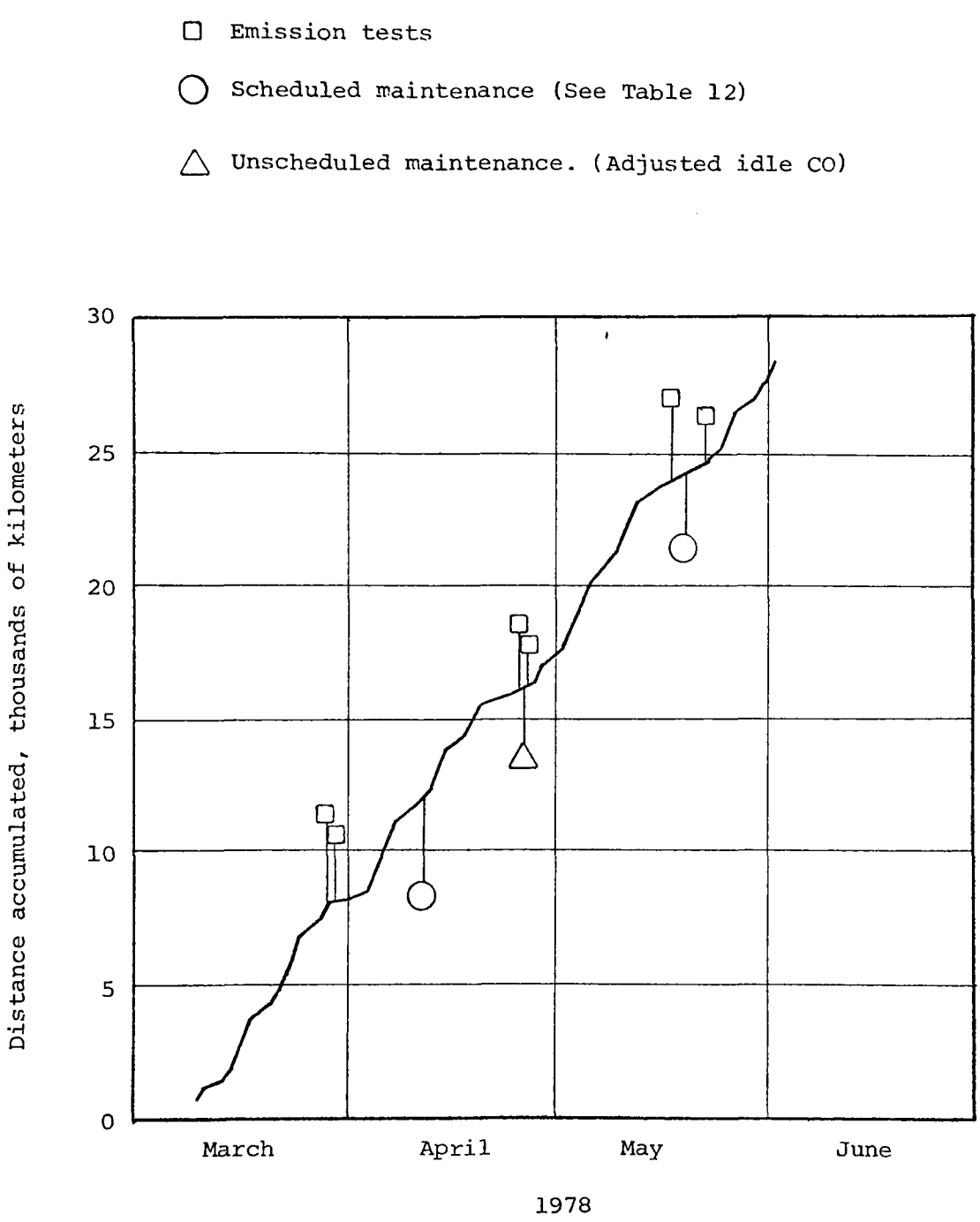


Figure 14. Distance accumulation record of 1975 Chevrolet Nova.

TABLE 14. DURABILITY TEST RESULTS FROM 1975 NOVA WITH AIR MODULATION SYSTEM

Distance Accumulation km (miles)	Gaseous Emissions g/km (g/mile) HC	CO	NO_x	H_2SO_4 mg/km (mg/mile)	Fuel ℓ/100 km (mpg)
		FTP Tests			
300(480)	0.20(0.32)	1.47(2.36)	0.46(0.73)		19.58(12.02)
8050(5000)	0.26(0.41)	2.09(3.36)	0.48(0.78)		18.04(13.04)
16,100(10,000)	0.36(0.58)	4.75(7.64)	0.60(0.97)		17.83(13.20)
16,100(10,000)[a]	0.30(0.48)	0.74(1.18)	0.63(1.01)		17.22(13.66)
24,150(15,000)	0.35(0.56)	2.56(4.12)	0.65(1.04)		17.24(13.65)
24,150(15,000)[b]	0.30(0.48)	2.52(4.06)	0.50(0.80)		17.03(13.82)
		CFDS Tests			
300(480)	0.07(0.11)	1.78(2.88)	0.48(0.76)	2.46(3.97)	14.92(15.78)
8050(5000)	0.08(0.14)	0.44(0.70)	0.58(0.94)	0.40(0.65)	13.58(17.35)
16,100(10,000)	0.11(0.18)	1.15(1.86)	0.67(1.08)	0.47(0.76)	12.89(18.24)
16,100(10,000)[a]	0.12(0.20)	0.05(0.08)	0.73(1.17)	10.47(16.85)	13.27(17.73)
24,150(15,000)	0.13(0.21)	0.27(0.43)	0.71(1.14)	0.62(1.00)	12.97(18.13)
24,150(15,000)[b]	0.12(0.19)	1.16(1.87)	0.50(0.81)	0.75(1.21)	13.64(17.25)
		HFET Tests			
300(480)	0.05(0.08)	0.62(1.00)	0.50(0.80)		13.74(17.13)
8050(5000)	0.06(0.10)	0.38(0.60)	0.70(1.12)		12.38(19.00)
16,100(10,000)	0.08(0.13)	0.11(0.18)	0.67(1.07)		11.36(20.70)
16,100(10,000)	0.10(0.17)	0.04(0.06)	0.65(1.04)		11.42(20.61)
24,150(15,000)	0.10(0.15)	1.13(0.21)	0.74(1.19)		11.77(19.99)
24,150(15,000)	0.10(0.16)	0.43(0.69)	0.50(0.80)		12.00(19.60)

[a] After adjusting idle CO level to 0.30 percent.
[b] After 24150 km (15,000 miles) scheduled maintenance

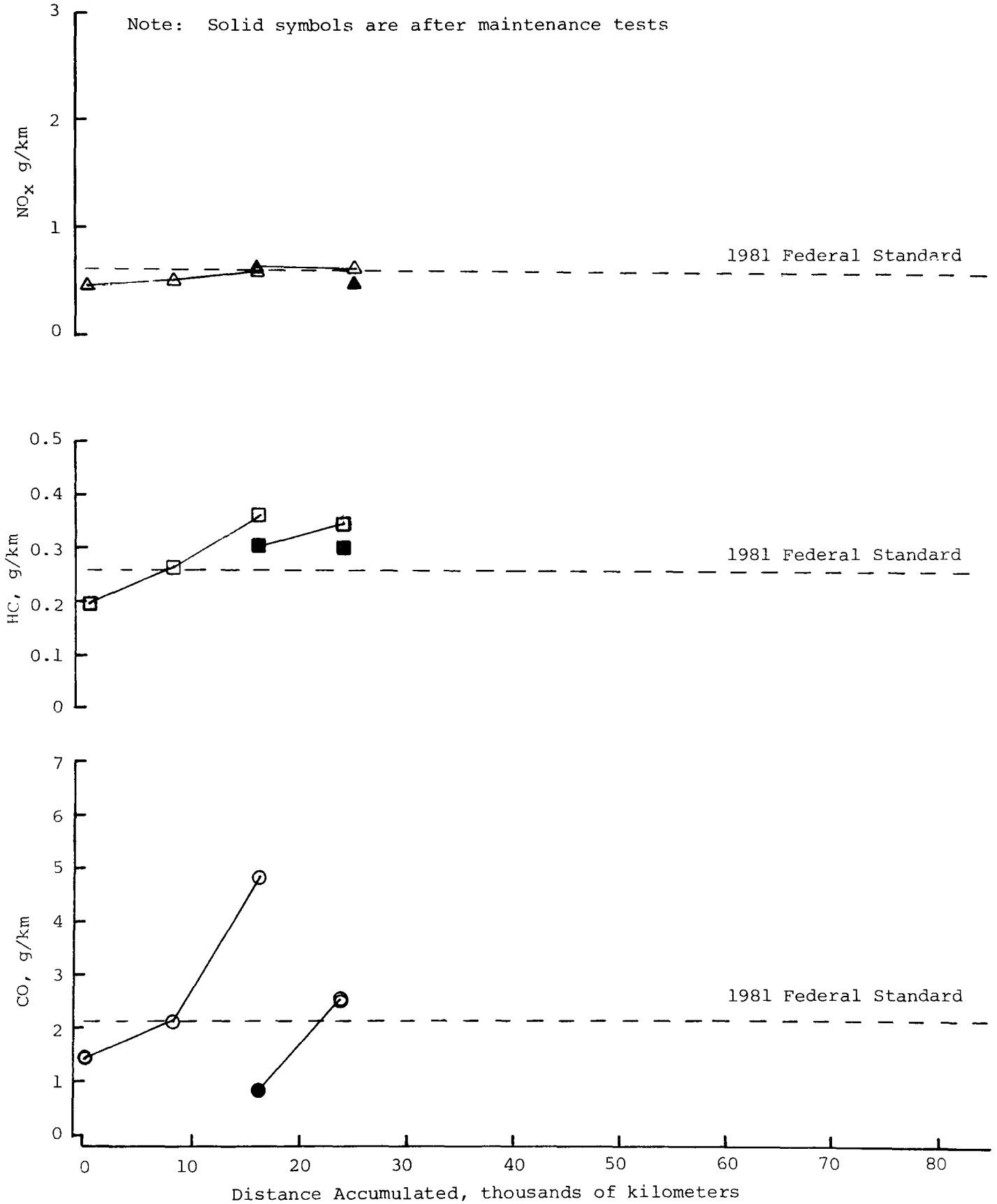


Figure 15. Emissions as a function of distance accumulated for a 1975 Nova with air modulation

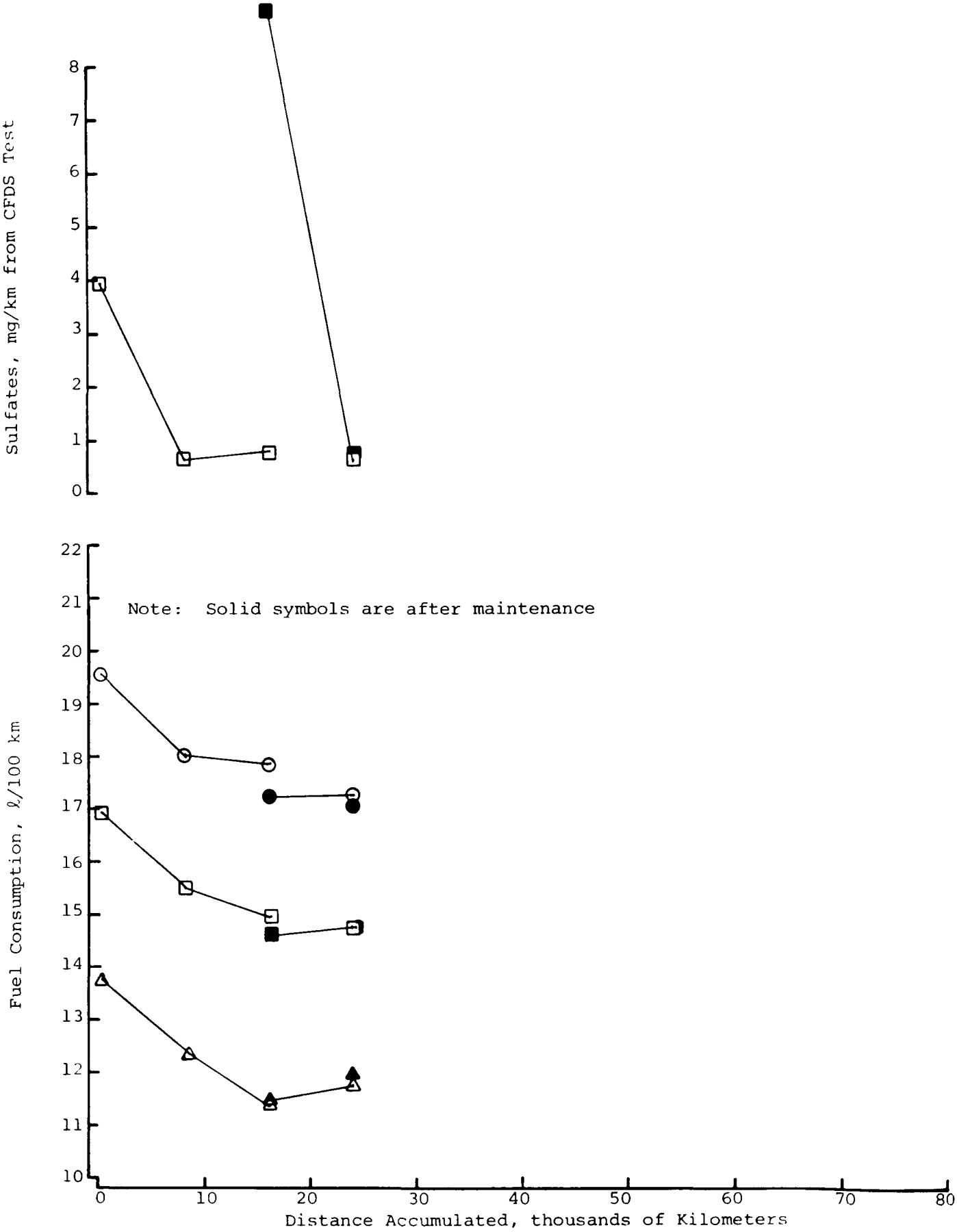


Figure 16. Fuel consumption and sulfates as a function of distance for a 1975 Nova with air modulation system

After the first 16100 km test, the high CO level seemed to indicate a carburetor problem. Following the test series, the engine out emissions were meausred at several speeds, including idle. The measured idle CO level of 1.53 percent was considerably higher than the 0.30 percent idle CO set at the start of durability testing. The reason for this change could not be ascertained. The idle mixture screws were adjusted to give an engine out CO of 0.30 percent at idle in drive.

A test sequence with the correct idle CO was run on April 26, 1978. From the results, shown in Table 14 as "after maintenance", it can be seen that the FTP CO and HC levels were considerably lower than the first test series. The CO and NO_x FTP emissions met the project goals. However, the HC emissions from the FTP were slightly higher than the 0.25 g/km project goal. The sulfate emissions on the CFDS tests increased from 0.47 mg/km on April 25, 1978, to 10.47 mg/km on April 26, 1978. This magnitude of increase could have been caused by the air modulation valve sticking at times, allowing more than the scheduled air injection to the catalyst. The centrifugal clutch was also observed engaging sporadically during idle modes. This too may have contributed to the higher than usual sulfate emissions by providing some air injection at idle. The additional air injection could have also helped to lower the CO emission levels. Maintenance on the centrifugal clutch and air modulation valve was not scheduled until 24100 km.

At the first 24100 km test series, all FTP gaseous emissions were above the project goals. Since 24100 km (15000 miles) was a major scheduled maintenance point, the scheduled maintenance was performed prior to the second test series. There was a small decrease in all three emissions after maintenance, but HC and CO still remained above the project goals.

Unregulated Emissions

From the outset of the project, it was planned to measure methane (CH_4), ammonia (NH_3) and cyanide (HCN) as soon as all the analytical procedures were developed under another EPA project.[17] For the Nova, these emissions were measured at the 16100 and 24150 km test points. Tables 15 and 16 present the results of these measurements. The results are presented without comment since there are no emission standards to which the levels can be compared, and the toxicity of the various compounds was not researched for this project. However, a brief discussion of the relative importance of a number of unregulated emissions is contained in Reference 27.

TABLE 15. UNREGULATED EMISSIONS FROM 1975 NOVA WITH AIR MODULATION SYSTEM - 16100 km TEST

Date	Test Type	Ammonia mg/km	Total[a] cyanide mg/km	Methane g/km	Non-methane HC g/km
4/25/78	FTP	3.65[b]	0.15[b]	0.14	0.22
4/26/78	FTP[c]	0.03[b]	0.06[b]	0.10	0.20
4/25/78	CFDS	3.33	0.02	0.04	0.07
4/26/78	CFDS[c]	2.16	N.D.[d]	0.04	0.08
4/25/78	HFET	2.45	0.17	0.03	0.05
4/26/78	HFET[c]	0.53	0.12	0.03	0.07

[a] Total cyanide is cyanide (HCN) plus cyanogen (C_2N_2)
[b] Single unweighted sample for all of FTP
[c] Tests on 4/26/78 were after adjusting idle CO level to 0.30 percent
[d] N.D. - none detected

TABLE 16. UNREGULATED EMISSIONS FROM 1975 NOVA WITH AIR MODULATION SYSTEM - 24100 km TEST

Date	Test Type	Ammonia mg/km	Total[a] cyanide mg/km	Methane g/km	Non-methane HC g/km
5/17/78	FTP	6.56[b]	0.11[b]	0.14	0.21
5/22/78	FTP[c]	1.54[b]	0.12[b]	0.15	0.15
5/17/78	CFDS	2.47	0.07	0.04	0.09
5/22/78	CFDS[c]	2.39	0.01	0.05	0.07
5/17/78	HFET	5.23	0.11	0.03	0.07
5/22/78	HFET[c]	2.52	0.23	0.04	0.06

[a] Total cyanide is cyanide (HCN) plus cyanogen (C_2N_2)
[b] Single unweighted sample for all of FTP test
[c] Tests on 5/22/78 were after maintenance

III-4. THREEWAY CATALYST SYSTEM-OPTIMIZATION AND DURABILITY TESTING

Threeway catalyst systems have been shown to have low exhaust sulfate emissions.[5,28] Therefore, it was decided at the beginning of the project that a threeway catalyst system should be one of the emission control systems optimized and tested for durability. For effective operation, threeway catalysts require a restricted A/F ratio range. Therefore, a feedback fuel control system is required with the threeway catalyst.

Chrysler Corporation agreed to loan EPA a 1977 Fury with a 5.9 litre (360 CID) engine with an experimental Holley feedback carburetor. It was also equipped with an air pump and EGR valve, both disconnected from their respective systems, but installed for possible use during optimization. The car is described in Table 2, Section II. The Holley feedback carburetor is also described in detail in Section II. As received from Chrysler, the car had dummy catalysts installed on each cylinder bank exhaust pipe. Two threeway catalysts, with 5:1 platinum to rhodium ratio and a volume of 1475cc (90 in^3) each, were supplied by Engelhard Industries.

A. Threeway Catalyst System Optimization

A complete test series, consisting of an FTP, CFDS and HFET cycle was performed on the car in the as-received condition. While the car was equipped with an air pump and EGR valve, neither was operational during this test. The test results from this test on March 30, 1977, are shown in Table 17. Since the car had no catalyst installed, the FTP gaseous emissions were quite high. The CFDS sulfate emissions were typical of a noncatalyst car. The fuel consumption on both the FTP and HFET tests indicated that the A/F ratio was richer than desired.

After receipt of the catalysts from Engelhard Industries, a catalyst was installed in the exhaust system of each cylinder bank, as close as possible to the exhaust manifold. After installing the catalysts, the main fuel control circuit trim potentiometer and carburetor idle mixture screws were adjusted to give engine out CO values of 0.80 percent at 80 kph (40 mph) and during warmed up idle, as recommended by Holley.

The usual FTP, CFDS and HFET test sequence was run on 8/17/79, with engine out CO monitored in addition to the usual bagged emissions. Sulfate emissions were taken during the CFDS test. The emissions from each test are shown in Table 17. The FTP gaseous HC and NO_x emissions were at or below the project goals. The CO emission level was over twice the goal level of 2.1 g/km (3.4 g/mile). The CFDS sulfate emission level of 0.49 mg/km (0.79 mg/mile) was below the sulfate target of 3.1 mg/km (5 mg/mile).

TABLE 17. RESULTS OF OPTIMIZATION TESTS OF THREEWAY CATALYST SYSTEM ON A 1977 FURY

Date	Gaseous Emissions g/km (g/mile) HC	CO	NO_x	H_2SO_4 mg/km (mg/mi.)	Fuel ℓ/100 km (mpg)
		FTP Tests			
3/30/77	2.00(3.23)	19.04(30.63)	5.47(8.80)		22.81(10.31)
8/17/77	0.26(0.42)	4.45(7.16)	0.53(0.85)		17.00(13.83)
9/23/77	0.20(0.32)	3.25(5.23)	0.31(0.50)		17.54(13.41)
9/28/77	0.16(0.26)	2.36(3.79)	1.39(2.23)		17.24(13.64)
10/20/77	0.20(0.32)	3.53(5.68)	0.33(0.54)		17.72(13.27)
11/28/77	0.16(0.26)	2.61(4.20)	0.58(0.93)		17.24(13.64)
12/13/77	0.20(0.32)	2.18(3.51)	0.45(0.72)		17.81(13.21)
12/16/77	0.08(0.13)	1.39(2.24)	0.54(0.87)		18.87(12.50)
12/19/77	0.09(0.14)	1.98(3.19)	0.43(0.69)		17.50(13.44)
		CFDS Tests			
3/30/77	1.04(1.67)	10.15(16.33)	4.29(6.90)	1.08(1.74)	
8/17/77	0.14(0.23)	3.26(5.24)	0.12(0.19)	0.49(0.79)	
		HFET Tests			
3/30/77	0.88(1.42)	8.19(13.18)	4.06(6.53)		12.93(18.19)
8/17/77	0.14(0.23)	3.13(5.04)	0.11(0.18)		11.91(19.75)

An examination of the FTP data showed that almost all of the CO was produced during the cold start transient phase of the FTP.

The rest of the optimization testing on this system was performed to reduce the CO during the cold start transient phase of the FTP, while maintaining the HC and NO_x levels within the project goals. Thirty-eight cold start FTP tests were run, with various adjustments and additions to the emission control system, before all FTP gaseous emissions were within the project goals.

The adjustments made can be divided into 5 steps:

1. Manual switching of the cold start circuit to reduce time on cold start open loop, and changing carburetor main jets to a leaner A/F ratio.

2. In addition to (1), manually controlling cold start inlet air heater and manifold heat control valve.

3. In addition to (1) and (2), a separate cold start, open loop fuel control signal generator was installed.

4. In addition to (1), (2), and (3), the EGR valve was activated.

5. In addition to (1), (2), (3), and (4), the standard Plymouth OSAC (orifice spark advance control) system was installed.

To illustrate the effect of each step of the optimization testing, results from seven of 38 tests performed are shown in Table 17.

The first step in the optimization procedure was to shorten the time the fuel control was in open loop mdoe during a cold start. This was done by providing a manually operated switch on the fuel control open loop circuit. The carburetor main jets were also changed to provide a leaner A/F ratio operating range. Ten cold start FTP tests were run during this step with various settings of the electronic control unit closed and open loop trim pots. The CO emission level had been reduced considerably but was still above the project goal. Any attempt to reduce the CO further by leaning the A/F ratio raised the NO_x emissions above the goal level, as seen from the results of the 9/28/77 test, listed in Table 17.

Testing during this time was plagued by intermittent malfunctions of the electronic control unit (ECU) in the fuel system. After the problem was identified, another ECU was obtained from Holley Carburetor and the next step in the optimization testing begun.

Examination of engine out CO traces had shown that the majority of the CO was produced during the first 210 seconds of the cold start. Since there was considerably less CO produced during the same time period of the FTP hot start, CO production during the cold start was obviously a function of engine warmup. There were four systems installed on the car that were

used during engine warmup. The systems were: (1) the feedback carburetor cold start system, (2) carburetor choke, (3) manifold heat control system, and (4) the inlet air heating system.

The first two of these system were checked and/or modified during the first step in the optimization testing. During the second step of optimization, operation of the last two systems was investigated. Both systems were modified to allow manual operation, and the flow area for the inlet air heating system was increased. Nine tests were run while investigating the effects of these two systems. The best overall emissions were obtained from the test on 10/20/77. The results of the test, listed in Table 17, showed almost no change from the best Step 1 results.

The fuel control for the feedback carburetor has two modes of operation, as explained earlier. The open loop or cold start mode was understood to be independent of the closed loop mode, so that A/F ratio in one mode could be adjusted without affecting A/F ratio in the other mode. However, during ECU adjustments prior to each of the tests in Steps 1 and 2, it appeared that the open loop and closed loop circuits were not independent of each other.

To test these observations, a test at idle conditions was run on both open loop and closed loop modes. During this test, the control vacuum to carburetor was recorded on a strip chart recorder using a vacuum transducer in the control line. The oxygen sensor millivolt output (an indication of A/F ratio) was also recorded on a strip chart. The control was run in the closed loop mode, then switched to open loop mode. The open loop A/F ratio only was adjusted. However, when the control was switched back to closed loop mode, a corresponding change in the closed loop A/F ratio was observed. After running these tests, it became obvious that a completely independent open loop circuit was required.

A pulse generator circuit was designed and built using a Signetics 555 timer. Tests with the circuit installed constituted the third step in the optimization procedure. While the independent open loop circuit resulted in significantly lower CO emissions, the CO level was still not within the project goal. The best overall emissions obtained from five tests comprising Step 3 were from the 11/28/77 test, as shown in Table 17. Examination of the emission results and A/F ratios indicated that this was the lowest CO level that could be obtained without exceeding the NO_x goal.

It was decided that the EGR system which was installed, but not used, should be activated to allow a leaner A/F ratio for lower CO emission, while maintaining NO_x levels. The activation of the EGR was Step 4 of optimization. While this improved the CO emissions, after seven cold start FTP tests with various ECU settings, it was concluded that it was still not possible to simultaneously meet the CO and NO_x goals. The best overall emission results with the EGR system were on 12/13/77 as listed in Table 17.

At this point, it appeared that it would not be possible to meet the project emission goals with this car. However, there was a stock Plymouth emission control device that had not been used. This device was the standard

Plymouth orifice spark advance control (OSAC) which was used to provide a delay in the distributor vacuum advance signal. The fifth and last step in the optimization process was to test the car with the addition of the OSAC system. Emissions from the initial test with this system met the project goals; however, there was approximately a five percent increase in fuel consumption as demonstrated by the 12/16/77 test results shown in Table 17.

In order to recover some of the fuel economy lost with the OSAC system, a thermally actuated valve was installed in the vacuum lines to bypass the OSAC valve after the engine warmed up (about 2 to 3 minutes). A test with this system was run on 12/19/77. As can be seen from Table 17 there was a definite fuel economy improvement using the OSAC valve only during the cold start, at the expense of a small increase in CO. Since all gaseous FTP emissions were within the project goals and further reduction did not appear possible within the project scope of work, this testing terminated the optimization of the threeway catalyst system. The final emission control system included:

- Feedback controlled carburetor
- Independent open loop fuel control signal for cold starts
- Threeway catalysts
- Shortened cold start operation for choke, inlet air heater and manifold heat
- An EGR system
- An Orifice Spark Advance Control valve

B. Threeway Catalyst System Durability Testing

At the completion of the optimization testing, the Fury had accumulated 9607 km (5971 miles). However, the threeway catalyst system had been operated for less than 3200 km, with most of the system having less than 1200 km of use. It was decided to use the threeway catalyst installation at 8530 km (5300 miles) as the "zero distance" point for durability testing.

To bring the engine systems as close as possible to a zero distance condition, the oil was changed and the spark plugs, air filter and oil filter replaced. This was the only maintenance done prior to starting durability testing. For purposes of maintenance schedules, these items were counted as through they were performed at the zero distance point.

Plymouth Distance Accumulation Chronology

Initial durability emissions testing was performed on 12/29/77. The emissions test series is shown in Table 4, Section III-2. This test series was counted as a 965 km (600 mile) test. The car was driven for 320 km (200 miles) on the AMA distance accumulation schedule between the two replicate

tests. Distance accumulation started on January 4, 1978. The car was driven on the distance accumulation course shown in Figure 4, Section II, for two eight hour shifts per day, five days per week. Approximately 640 km (400 miles) were accumulated each day. Duplicate emission tests were performed every 8050 km, with 805 km (500 miles) of the durability driving schedule between the two duplicate tests, to provide equivalent catalyst sulfate conditioning for each test. Scheduled maintenance was performed every 12,070 (7500 miles) as specified in the 1977 Plymouth Service Manual. A summary of the required maintenance is shown in Table 18. Some unscheduled maintenance was required. Figure 17 shows what unscheduled maintenance was performed and indicates the accumulated distance at which it occurred. A graphical representation of the distance accumulation records is presented in Figure 17. The figure shows daily distance, maintenance and emissions test points. Starting with the 8050 km (5000 mile) test point, at least one of FTP gaseous emissions exceeded the project limit at each test point. Considerable time was spent at each emission test series investigating the reasons for the high emission levels and replacing some of the emission control system parts. The details of these investigations are covered in the discussion of the emission test results in the next subsection.

The car accumulated 32200 km (20000 miles) on June 1, 1978. At that time the durability testing was stopped because the CO and NO_x emissions were above the project goals, with no possibility of reduction in emission levels as distance accumulation continued.

Fury Fuel and Oil Consumption

The average fuel and oil consumption for each interval between emission tests is shown in Table 19. The fuel consumption is quite consistent between emission tests at the level expected. Since there were only 4 quarts (3.8 litres) of oil added during the 32633 km (20281 miles) of distance accumulation, the oil consumption in each interval appears somewhat erratic, depending on when the oil was added. However, the overall oil consumption of 1.15 ℓ/1000 km (0.25 qt/1000 miles) is ocnsidered better than average.

TABLE 19. FUEL AND OIL CONSUMPTION DURING DURABILITY TESTING FOR 1977 FURY

Distance Interval km (mile)	Fuel ℓ/100 km (mpg)	Oil Consumption ℓ/1000 km (qt/1000 mi.)
0-8050 (0-10,000)	16.59 (14.18)	0.214 (0.364)
8050-16,100 (5000-10,000)	16.60 (14.17)	0.068 (0.116)
16,100-24,150 (10,000-15,000)	17.45 (13.48)	0.305 (0.519)
24,150-32,200 (15,000-20,000)	no data	0.113 (0.192)
Overall	16.86 (13.95)	0.145 (0.247)

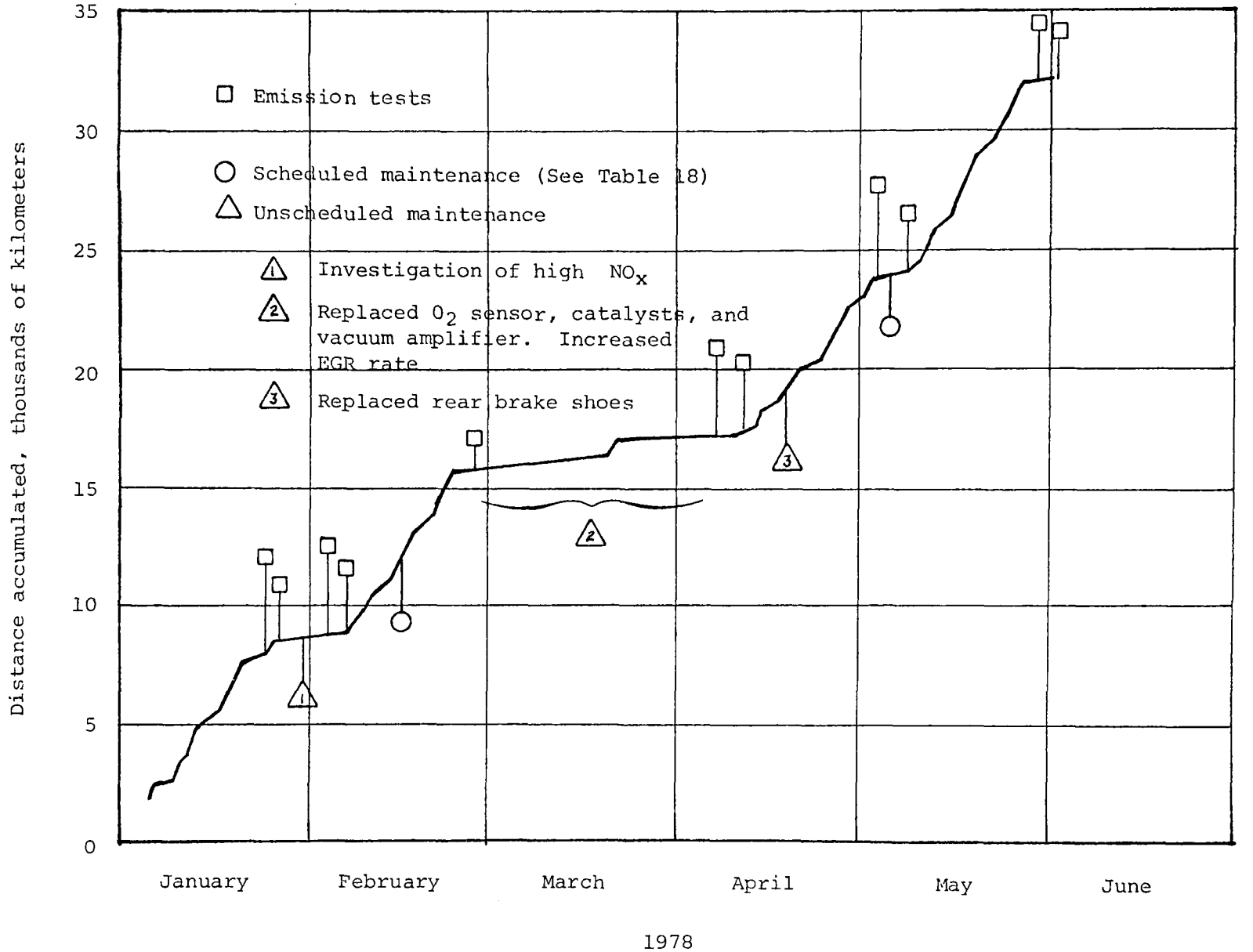


Figure 17. Distance accumulation record of 1977 Plymouth Fury

TABLE 18. MAINTENANCE SCHEDULE FOR 1977 FURY

LUBRICATION AND MAINTENANCE SCHEDULES

REQUIRED MAINTENANCE SERVICES FOR EMISSION CONTROL AND PROPER VEHICLE PERFORMANCE

	MILEAGE INTERVALS MILEAGE IN THOUSANDS		7.5	15	22.5	30	37.5	45
AUTOMATIC CHOKE	CHECK AND ADJUST AS REQUIRED	AT				•		
CARBURETOR CHOKE SHAFT	APPLY SOLVENT EVERY SIX MONTHS	OR	•	•	•	•	•	•
CARBURETOR AIR FILTER	REPLACE	AT				•		
COOLING SYSTEM	CHECK AND SERVICE AS REQUIRED EVERY 12 MONTHS	OR		•		•		•
CRANKCASE INLET AIR CLEANER	CLEAN	AT				•		
ENGINE OIL	CHANGE EVERY SIX MONTHS	OR	•	•	•	•	•	•
ENGINE OIL FILTER	REPLACE AT INITIAL OIL CHANGE AND EVERY 2ND OIL CHANGE THEREAFTER							
FAST IDLE CAM AND PIVOT PIN	APPLY SOLVENT EVERY SIX MONTHS	OR	•	•	•	•	•	•
FUEL FILTER	REPLACE	AT				•		
IDLE SPEED AND AIR-FUEL MIXTURE	CHECK AND ADJUST AS REQUIRED	AT		•		•		•
IGNITION CABLES	CHECK AND REPLACE AS REQUIRED AT TIME OF SPARK PLUG REPLACEMENT							
MANIFOLD HEAT CONTROL VALVE	APPLY SOLVENT	AT				•		
POSITIVE CRANKCASE VENT VALVE	CHECK OPERATION AND REPLACE IF NECESSARY			•				•
POSITIVE CRANKCASE VENT VALVE	REPLACE	AT				•		
SPARK PLUGS (WITHOUT CAT. CONV.)	REPLACE	AT		•		•		•
SPARK PLUGS (WITH CAT. CONV.)	REPLACE	AT				•		
TAPPET ADJUSTMENT 6 CYL. ENG.	CHECK AND ADJUST AS REQUIRED	AT		•		•		•
UNDERHOOD RUBBER AND PLASTIC COMPONENTS (EMISSION HOSES)	INSPECT AND REPLACE IF NECESSARY	AT		•		•		•
VAPOR STORAGE CANISTER FILTER ELEMENT	REPLACE	AT				•		

Inspection and Service should also be performed anytime a malfunction is observed or suspected. Retain receipts for all vehicle emission services to protect your emission warranty.

RECOMMENDED MAINTENANCE SERVICES

POWER STEERING	CHECK FLUID LEVEL	EVERY OIL CHANGE
EXHAUST SYSTEM	CHECK FOR LEAKS, MISSING OR DAMAGED PARTS	EVERY 6 MONTHS
BRAKE MASTER CYLINDER	INSPECT FLUID LEVEL	EVERY 6 MONTHS
TRANSMISSION	INSPECT FLUID LEVEL	EVERY 6 MONTHS
BRAKE & POWER STEERING HOSES	CHECK FOR DETERIORATION OR LEAKS	EVERY 6 MONTHS
AIR CONDITIONED CARS	CHECK BELTS, SIGHT GLASS & OPERATION OF CONTROLS	EVERY 6 MONTHS
BALL JOINTS, STEERING LINKAGE, AND UNIVERSAL JOINTS	INSPECT SEALS	EVERY 6 MONTHS
HOOD LOCK, REL. MECH. & SAFETY CATCH	LUBRICATE	EVERY 6 MONTHS
DRIVE BELTS	CHECK CONDITION & TENSION	EVERY OIL CHANGE
UPPER AND LOWER CONTROL ARM BUSHINGS	INSPECT	EVERY OIL CHANGE
TIRES	ROTATE	EVERY 10,000 MILES
COOLING SYSTEM	DRAIN, FLUSH & REFILL	AT 24 MONTHS OR 30,000 MILES AND EVERY 12 MONTHS OR 15,000 MILES THEREAFTER
BRAKE LININGS	INSPECT	EVERY 15,000 MILES
FRONT WHEEL BEARINGS*(1)	INSPECT	EVERY 22,500 MILES
AUTOMATIC TRANSMISSION—SEVERE USAGE ONLY	CHANGE FLUID & FILTER, ADJUST BANDS	EVERY 24,000 MILES
BALL JOINTS & TIE ROD ENDS	LUBRICATE	EVERY 3 YEARS OR 30,000 MILES

NOTE: Local driving conditions, or special equipment such as high performance or heavy duty options may require special service recommendations.
* Inspect the front wheel bearings whenever the brake drums or rotors are removed to inspect or service the brake system.
(1) Severe usage such as police or taxi service involving frequent or continuous brake application: Lubricate every 9,000 miles.

Fury Emission Test Results

The average test results from the five duplicate test series run on the Fury during durability testing are listed in Table 20. The emissions are shown graphically as a function of distance accumulated in Figures 18 and 19. As can be seen from the table and figures, all emissions were within the project goals at 965 km (600 miles).

At 8050 km (500 miles) NO_x was above the project goal. Some time was spent investigating the cause of the high NO_x emissions. While no reason could be found for the high NO_x, another test series was run with NO_x levels at the project goals. Both test series are shown in Table 20.

The first 16100 km (10000 miles) test produced CO and NO_x levels above the project goals. Additional testing was performed to ascertain the cause of these high emissions. Catalyst conversion efficiency for both CO and NO_x was checked. The left cylinder bank catalyst was removed from the car and radiographed to check for possible catalyst damage. No damage was found. After considerable investigation, the following adjustments and parts replacements were made:

- replaced oxygen sensor
- replaced catalyst with two Volvo catalyst (5:1 pt/pd ratio)
- increased EGR
- richened idle A/F ratio approximately two tenths of a ratio
- adjusted vacuum amplifier to hold EGR valve closed at idle

A cold start FTP was run on the test car on April 6, 1978, with the emissions once again within project limits. Two complete test series were then run. These tests are listed in Table 20 as "16100 km, after maintenance" tests.

Since 24150 km (15000 miles) was a major scheduled maintenance point, a single test series was run before and after maintenance. The before maintenance FTP emissions were all above the project goal levels. Both CO and HC emissions were approximately three times the previous (16100 km) tests. The after maintenance HC level was again within the project goals, but CO and NO_x emissions were still not within their respective goals. Nevertheless, distance accumulation was continued until 32200 km (20,000 miles).

The HC and CO emissions changed only slightly between 24150 and the 32200 km test. HC was still within the project goals and NO_x still was higher than the goals. The CO emissions almost doubled between the after maintenance 21150 km test and the 3200 km FTP test. It was obvious by then that CO emissions were going to increase at a rapid rate and could not be held even close to the project goal level. Therefore, the durability test was halted.

TABLE 20. DURABILITY TEST RESULTS FROM 1977 PLYMOUTH FURY WITH FEEDBACK CARBURETOR AND THREEWAY CATALYST

Distance Accumulation km (miles)	Gaseous Emissions g/km (g/mile)			H_2SO_4 mg/km (mg/mile)	Fuel ℓ/100 km (mpg)
	HC	CO	NO_x		
FTP Tests					
965(600)	0.22(0.36)	1.80(2.90)	0.59(0.95)		17.84(13.21)
8050(5000)	0.16(0.25)	1.77(2.85)	0.83(1.33)		18.51(12.72)
16,100(10,000)	0.22(0.35)	2.66(4.28)	0.91(1.46)		18.52(12.70)
16,100(10,000)[a]	0.19(0.31)	2.02(3.24)	0.64(1.02)		18.18(12.95)
24,150(15,000)	0.59(0.95)	6.66(10.71)	0.85(1.37)		18.65(12.62)
24,150(15,000)[b]	0.18(0.28)	2.87(4.62)	1.08(1.74)		18.39(12.79)
32,200(20,000)	0.23(0.36)	4.79(7.70)	1.11(1.79)		20.56(11.56)
CFDS Tests					
965(600)	0.03(0.05)	0.32(0.51)	0.73(1.18)	0.66(1.07)	
8050(5000)	0.02(0.04)	0.67(1.08)	0.78(1.26)	0.43(0.69)	
16,1000(10,000)	0.03(0.05)	1.35(2.17)	1.10(1.77)	0.37(0.60)	
16,100(10,000)[a]	0.02(0.04)	0.58(0.94)	0.60(0.98)	0.34(0.54)	
24,150(15,000)	0.02(0.04)	0.65(1.04)	1.01(1.63)	0.40(0.64)	
24,150(15,000)[b]	0.03(0.05)	1.23(1.98)	0.90(1.44)	0.42(0.68)	
32,200(20,000)	0.04(0.06)	1.88(3.03)	1.03(1.63)	0.76(1.23)	
HFET Tests					
965(600)	0.02(0.04)	0.17(0.28)	0.82(1.32)		12.14(19.38)
8050(5000)	0.02(0.03)	0.36(0.58)	0.84(1.36)		11.79(19.96)
16,100(10,000)	0.02(0.03)	0.90(1.45)	1.12(1.80)		12.49(18.83)
16,100(10,000)[a]	0.02(0.04)	0.40(0.63)	0.53(0.84)		11.70(20.10)
24,150(15,000)	0.03(0.05)	0.81(1.31)	0.96(1.55)		11.80(19.94)
24,150(15,000)	0.02(0.04)	0.87(1.40)	0.78(1.25)		11.63(20.22)
32,200(20,000)	0.02(0.04)	1.28(2.06)	0.84(1.37)		10.94(21.53)

[a] After maintenance tests

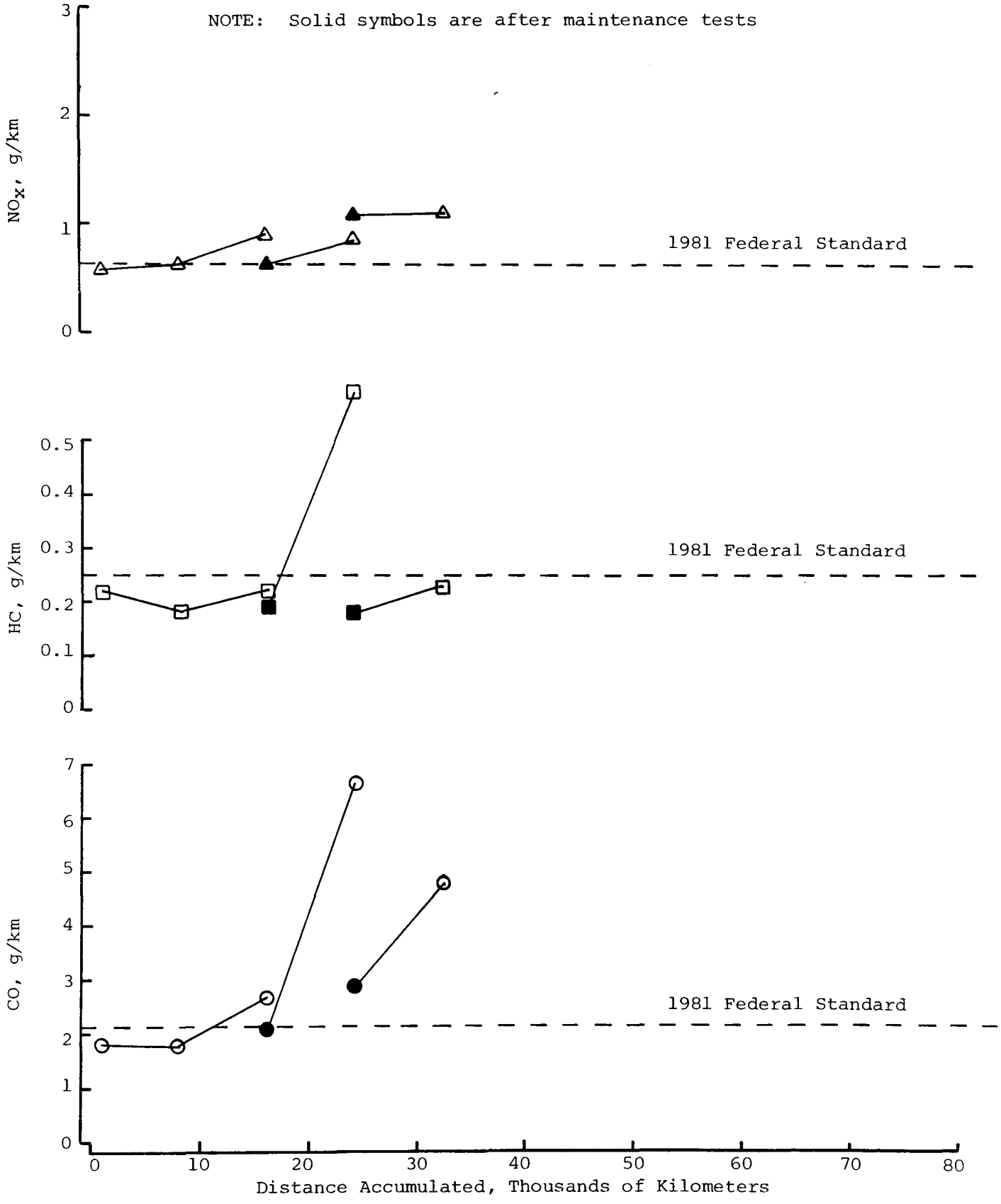


Figure 18. Emissions as a function of distance accumulated for a 1977 Fury with 3-way catalyst and feedback carburetor

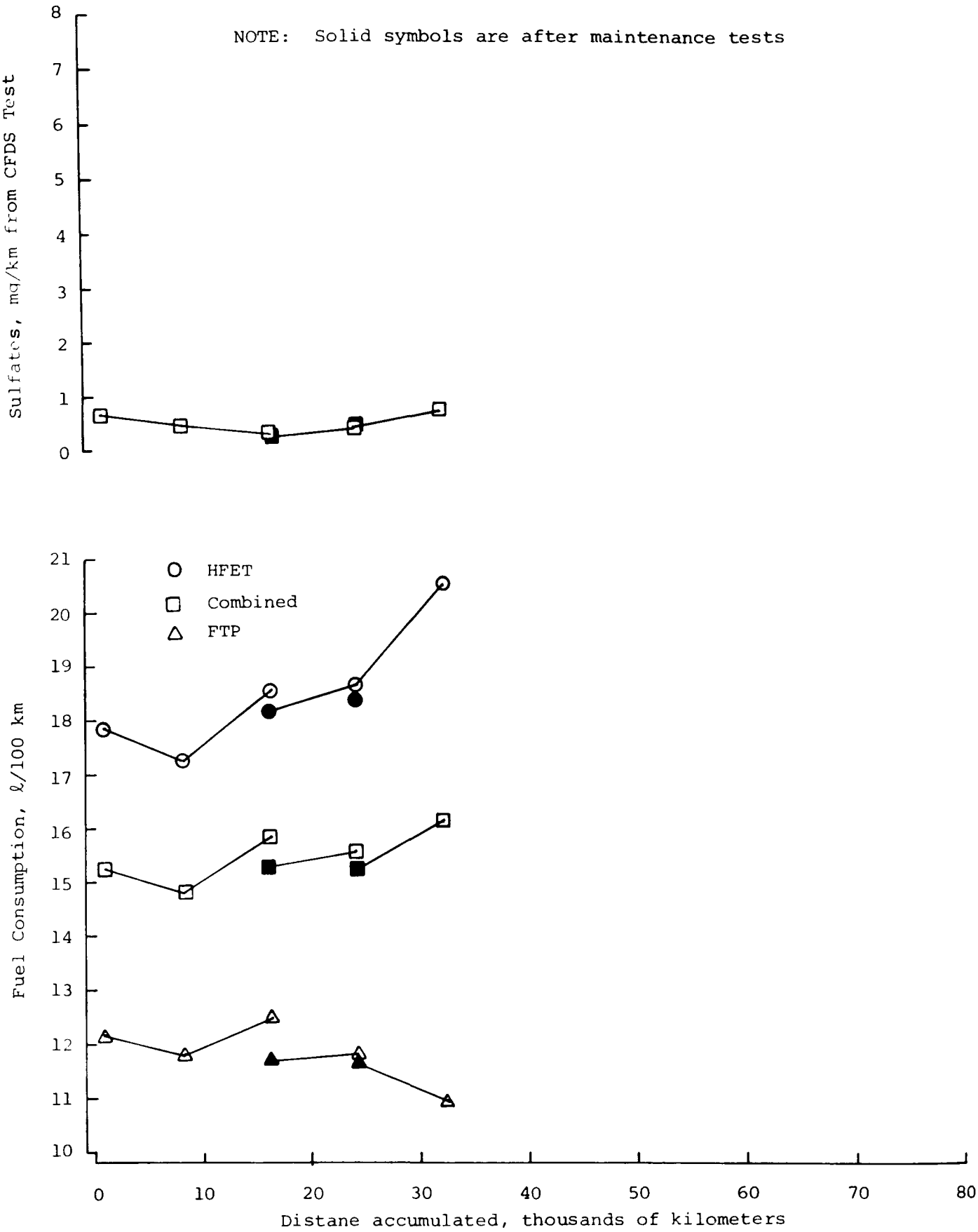


Figure 19. Fuel consumption and sulfates as a function of distance for a 1977 Fury with feedback carburetor

Examining Figures 18 and 19, it can be seen that the HC levels were above the project goal at only one point, the 24,150 km before maintenance test; after maintenance it returned to the levels of the three previous emission tests. While the NO_x emissions had been above the project goals from 8050 kilometers onward, the increase was fairly gradual and appeared to be leveling off. Thus, it is possible that this system installed on a different car, with somewhat lower initial emissions, might meet the 1981 HC and NO_x standards, but it is doubtful that this vehicle could ever meet the 1981 CO standards after 80,500 km (50,000 miles) of durability distance accumulation.

Unregulated Emissions

Emissions of ammonia, total cyanide and methane were measured during the 24100 and 23300 km test series. These emissions are presented in Tables 21 and 22. As was stated in the presentation of unregulated emissions for the Nova in Section III-3B, there is little that can be said about the absolute levels of these emissions, since there are no standards against which they could be compared. However, a comparison of levels between the two cars tested may be of value. FTP methane levels as a percent of the total hydrocarbons are approximately the same for the two cars, at about 40 percent of the total hydrocarbons. Cyanide levels of all tests form the Fury are the same order of magnitude as those from the Nova. As would be expected from a threeway catalyst system, ammonia emissions from the Fury are 5 to 10 times ammonia emissions from the Nova. The HFET tests on the Fury appear to produce the highest ammonia levels. Simply because ammonia emissions from the Fury are an order of magnitude greater than those from the Nova, does not imply that ammonia emissions from the Fury should be of concern. That can only be determined by consideration of what levels might be hazardous. Such consideration was not part of this project. However, Reference 27 contains a discussion of a method for grossly estimating the importance of a number of unregulated emissions for those interested in persuing the subject further.

TABLE 21. UNREGULATED EMISSIONS FROM 1977 PLYMOUTH FURY WITH FEEDBACK CARBURETOR AND THREEWAY CATALYST - 24100 km

Date	Test Type	Ammonia mg/km	Total Cyanide mg/km	Methane g/km	Non-Methane HC g/km
5/3/78	FTP[c]	31.80[b]	0.09[b]	0.10	0.49
5/8/78	FTP[c]	4.31[b]	0.04[b]	0.07	0.11
5/3/78	CFDS[c]	27.93	0.03	0.01	0.01
5/8/78	CFDS[c]	51.24	0.06	0.01	0.02
5/3/78	HFET[c]	33.90	0.14	0.02	0.01
5/8/78	HFET[c]	70.53	0.11	0.01	0.01

[a] Total cyanide is cyanide (HCN) plus cyanogen (C_2N_2)

[b] Single unweighted sample for all of FTP test

[c] Test on 5/3/78 after maintenance

TABLE 22. UNREGULATED EMISSIONS FROM 1977 PLYMOUTH FURY WITH FEEDBACK CARBURETOR AND THREEWAY CATALYST - 32200 km

Date	Test Type	Ammonia mg/km	Total Cyanide[a] mg/km	Methane g/km	Non-Methane HC g/km
5/29/78	FTP	25.22[b]	0.11[b]	0.10	0.12
6/1/78	FTP	48.67[b]	0.37[b]	0.08	0.16
Average		36.95	0.24	0.09	0.14
5/29/78	CFDS	49.79	0.03	0.02	0.02
6/1/78	CFDS	64.39	0.01	0.01	0.02
Average		57.09	0.02	0.02	0.02
5/29/78	HFET	68.34	0.22	0.02	0.01
6/1/78	HFET	103.98	0.26	0.01	<0.01
Average		86.16	0.24	0.02	0.01

[a] Total cyanide is cyanide (HCN) plus cyanogen (C_2N_2)

[b] Single unweighted sample for all of FTP test

IV. PHASE II - OPTIMIZATION AND DURABILITY TESTING OF THREEWAY PLUS OXIDATION CATALYST SYSTEM

The two low sulfate emission control systems originally chosen and tested for durability, were not able to maintain gaseous emissions within the 1981 standards as distance accumulation progressed. In a continuation of the effort to meet the project goals, a different emission control system and test car were selected to undergo optimization and durability testing. The emission control system was a threeway catalyst, plus an air injected oxidation catalyst. The system was installed on a 1978 California Volvo sedan with a four cylinder engine. This part of the project is designated as Phase II.

IV.1. TEST VEHICLE, EMISSION CONTROL SYSTEM AND TEST PLAN

Following the decision to terminate testing of the two low sulfate emission cars, a meeting was held at Ann Arbor, Michigan, between EPA and SwRI representatives to discuss the direction the project should take. Both emissions control systems that were undergoing tests, the threeway catalyst with feedback carburetor, and the air modulation system demonstrated the ability to keep sulfate emissions low. Their problem was a rapid deterioration of gaseous emissions. It was felt that a different fuel system, such as a feedback fuel injection system, might provide less rapid deterioration.

From information provided to EPA by the automotive manufacturers, it appeared that fuel injection and threeway plus oxidation catalysts would be two of the approaches to meeting the 1981 Federal standards.(31) Therefore, it was decided to change the demonstration vehicle and emission control system to ones more closely resembling what was planned by manufacturers for 1981. The new vehicle would be obtained, the emission control system installed and optimized, and as much durability testing completed as the funds remaining permitted.

A. Vehicle Selection and Description

Three considerations dominated the choice of test vehicle. The first was the stock emission control system. A threeway catalyst with feedback fuel control, preferably fuel injected, was desired. The second consideration was vehicle size. A vehicle that would be considered medium size in 1981, capable of carrying at least five passengers, was desired. It was judged that this size car would probably have a curb weight of approximately 1360 kg (3000 lbs). The third consideration was fuel economy. The fuel economy standards for 1981 require a CAFE value of 22 miles per gallon. A manufacturer with a complete vehicle mix of large, medium and small cars would require a medium size, five passenger car, having a fuel economy approximately equal to the CAFE standard. Therefore, the car chosen should have a combined fuel economy of approximately 10.7 ℓ/100 km (22 mpg).

After consideration of several vehicles, a four-cylinder, 1978 Volvo, with the Lambda-Sond emission control system was chosen as the best readily available car meeting the selection considerations. A description of the car is presented in Table 23. Photographs of the car and engine compartment are shown in Figure 20.

B. Emission Control System

The stock emission control system on the California version of the Volvo 244 is a threeway catalytst, feedback fuel injection system, named the "Lambda-Sond" system by Volvo. The stock Lambda-Sond emission control system is shown

TABLE 23. DESCRIPTION OF PHASE II TEST CAR

Manufacturer	Volvo
Model	244DL
Model year	1978
Vehicle Identification No. (VIN)	24445L1-309507
Emission family designation	4CL/E1
Engine displacement, litres (cu.in.)	2.1(130)
No. of cylinders and configurations	I4
Transmission	3 speed auto.
Ignition timing	12° BTC @ 750 rpm
Idle rpm	900 rpm
Fuel system	Volvo "CI" fuel injection
Rear axle ratio	3.91
Tires	175 SR 14
Stock Emission Control System	California Lambda-Sond (threeway catalyst w/feedback fuel injection)
Inertia weight class (lbs)	3500

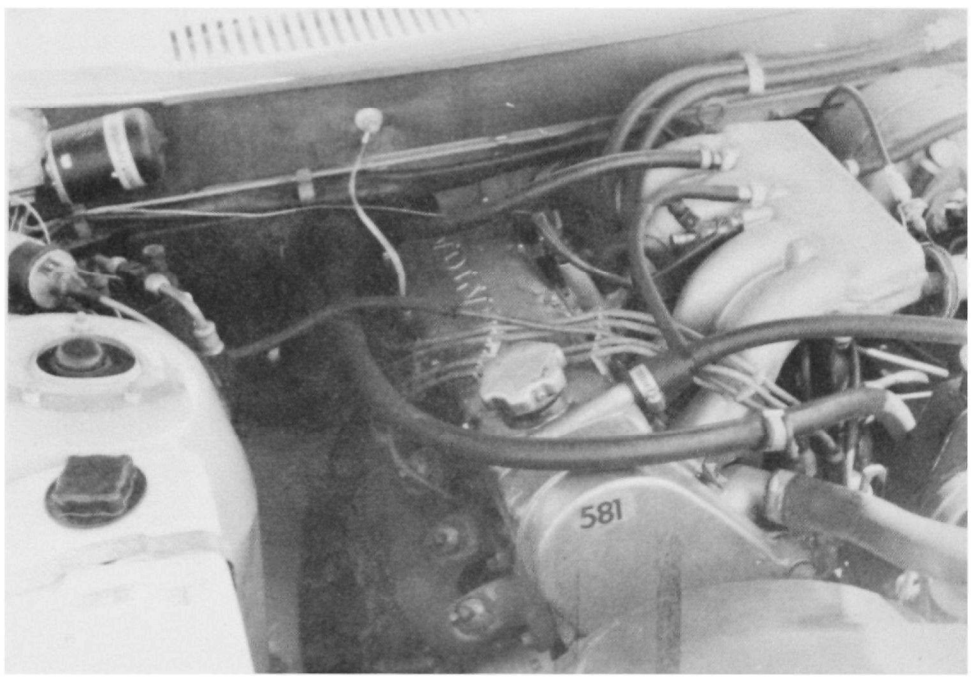


Figure 20. 1978 Volvo 244 test car

in Figure 21. This system is used with the mechanical fuel injection system, shown in Figure 22.

One way to reduce CO emissions from this system is to install an oxidation catalyst downstream of the threeway catalyst and provide air for oxidation by means of air injection between the two catalysts. This threeway plus oxidation catalyst system was in use on the 1978 Ford Pinto in California and was actively being investigated by a number of automobile manufacturers. The drawback to this system is that the air injected oxidation catalyst can produce large amounts of sulfate. However, it was demonstrated in Phase I of this project that modulated air injection can significantly reduce the sulfate emissions from an oxidation catalyst.

Therefore, the new system chosen to meet the project goals of a low sulfate system capable of meeting the 1981 gaseous emission standards was a feedback fuel injection system with a threeway plus modulated air injected oxidation catalyst.

An additional technique was planned for evaluation on the test car. This technique was to use the stock emission control system, but to add air injection to the exhaust manifold only during the first minute or so of the cold start to provide air for CO and HC oxidation in the manifold during the catalyst warmup. Since a large part of the CO emitted occurs during the first minute of the cold start, it is possible that this technique could work. As an example, on the 20,000 mile test of the Fury with threeway catalyst, listed in Section III-4, 61 percent of the CO was produced during the cold start 505 second portion of the test.

A cold start exhaust manifold air injection system also fitted into the modulated air injection system already planned. In fact, the 1978 California Pinto included this feature in its emission control system. While the EPA had suggested using reed valve exhaust manifold air injection during the cold start, it was felt that using the air pump already installed was a more expedient method of demonstrating this concept. Since the exhaust manifold injection system was already part of the emission control system, to test it alone, the oxidation catalyst is removed and the air injection to the oxidation catalyst is dumped. to atmosphere. More importantly however, aspirator design is an art. The aspirator connecting tubes must be properly tuned to obtain maximum airflow. Much time and effort could be expended in developing as aspirator only to find it produced insufficient CO control.

A sketch of the manifold air injection system is shown in Figure 23. The technique was tested during the optimization phase using an air pump to supply the air. At the conclusion of the project, this technique was again evaluated using aspirated air injection often refered to as a "pulse air" system. This system is shown in Figure 24.

The modulated air injection system was similar to the one used on the 1975 Nova in Phase 1 of this project. The details of the air injection system used are shown in Figure 25. It consisted of the following components:

- A belt driven air pump equipped with a centrifugal clutch.

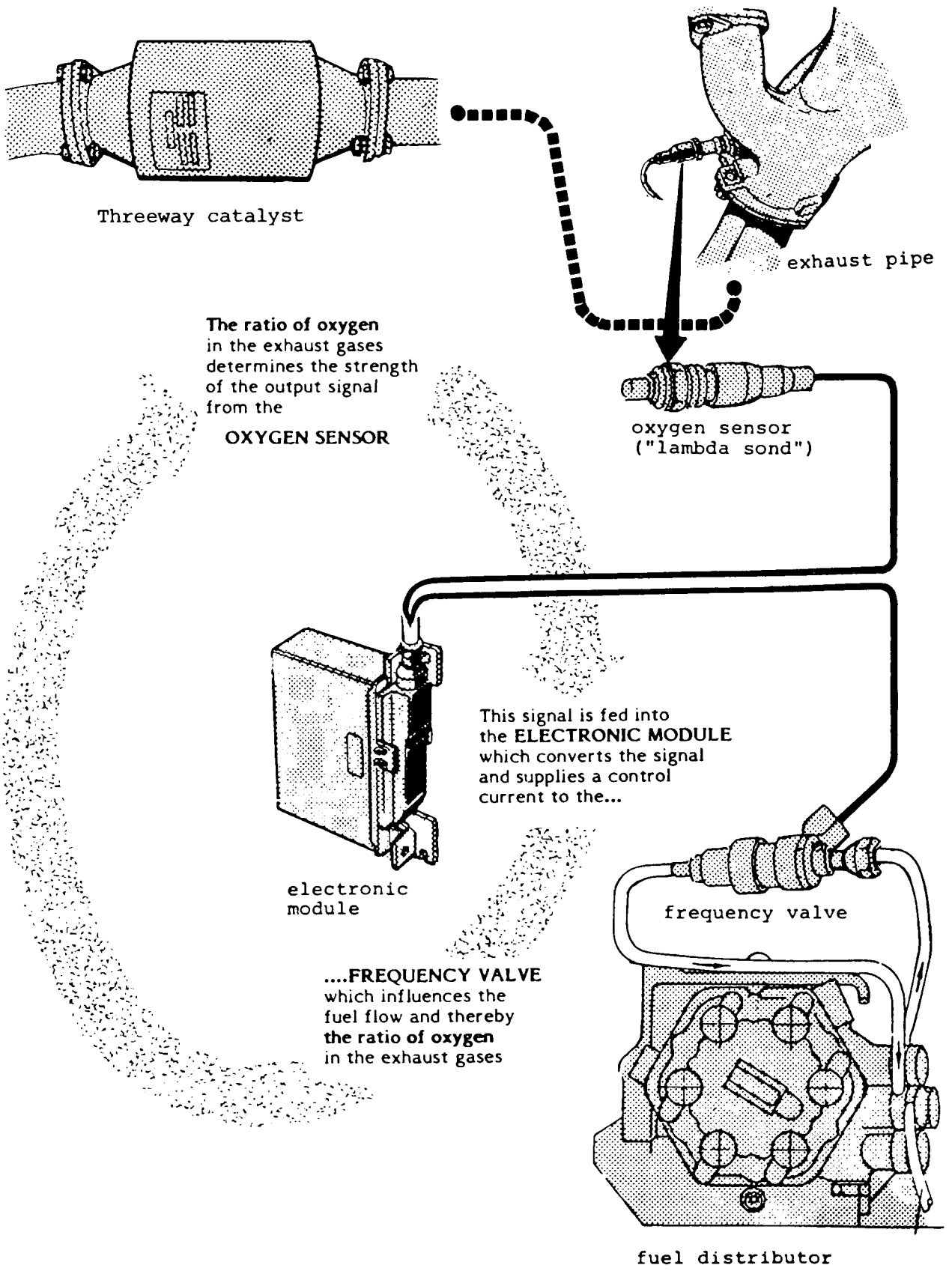


Figure 21. Lambda-Sond system

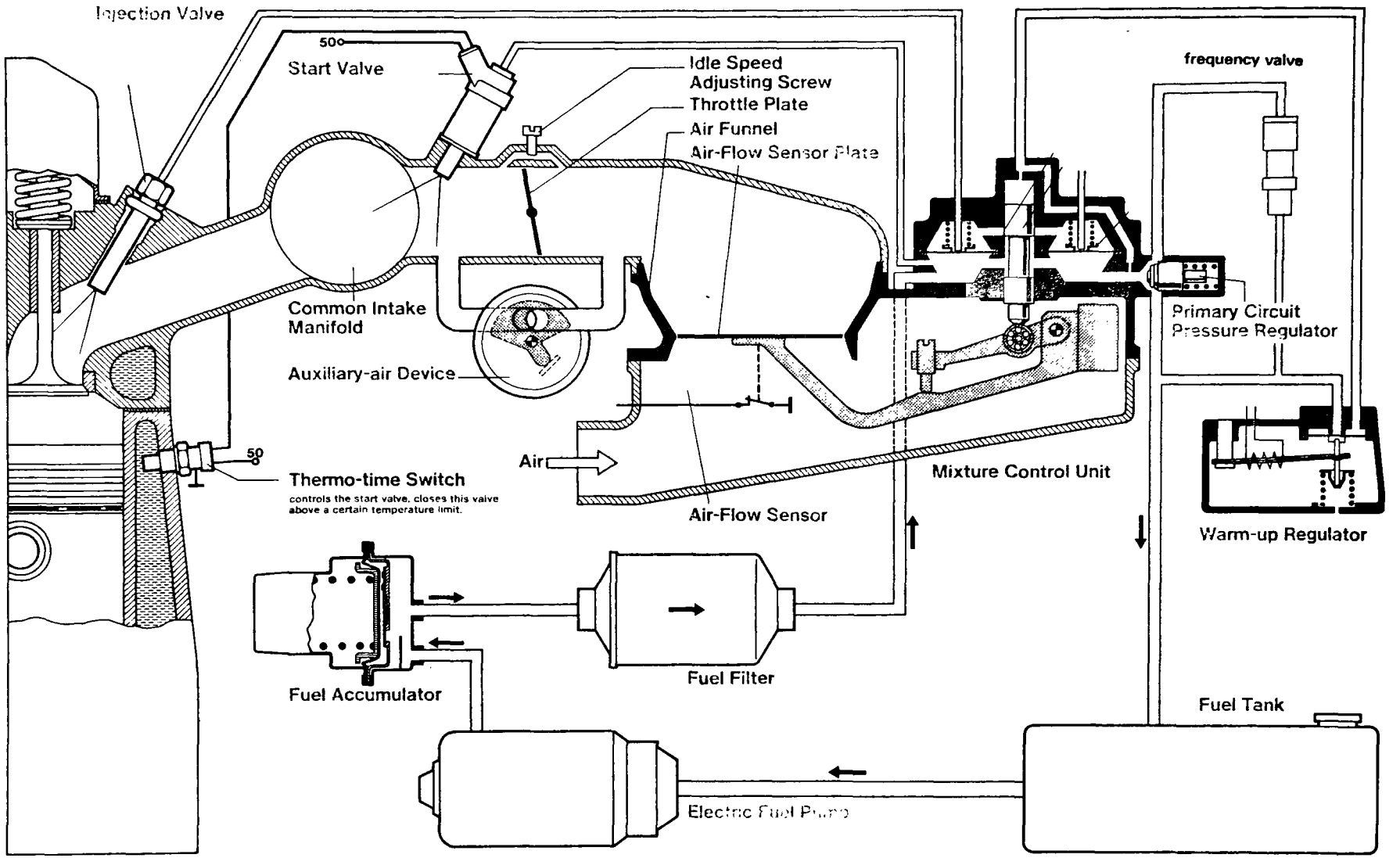


Figure 22. Fuel injection system

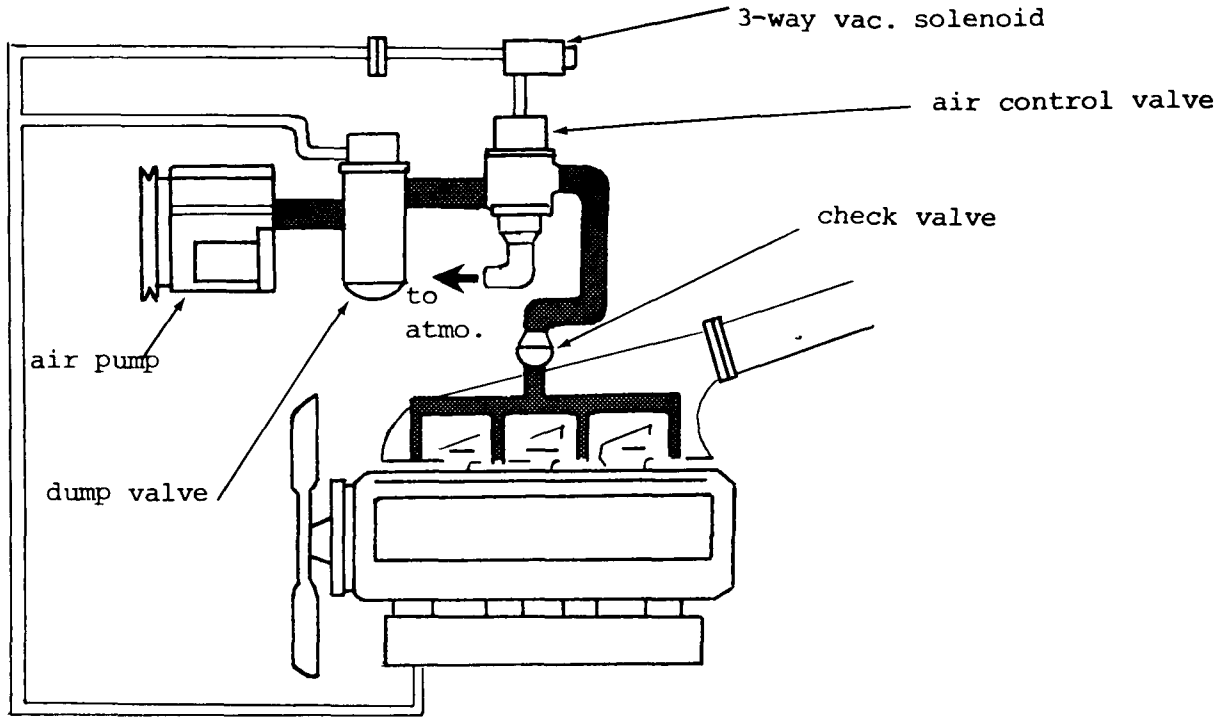


Figure 23. Air pump exhaust manifold injection

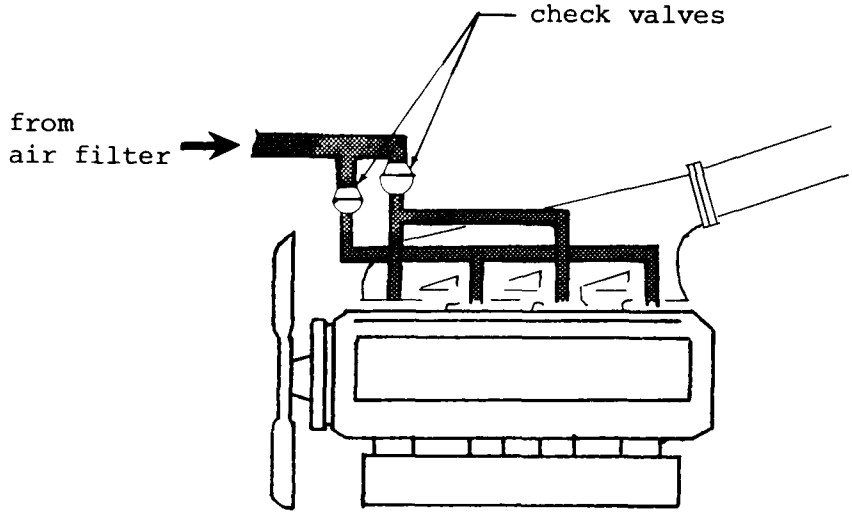


Figure 24. Aspirated exhaust manifold injection

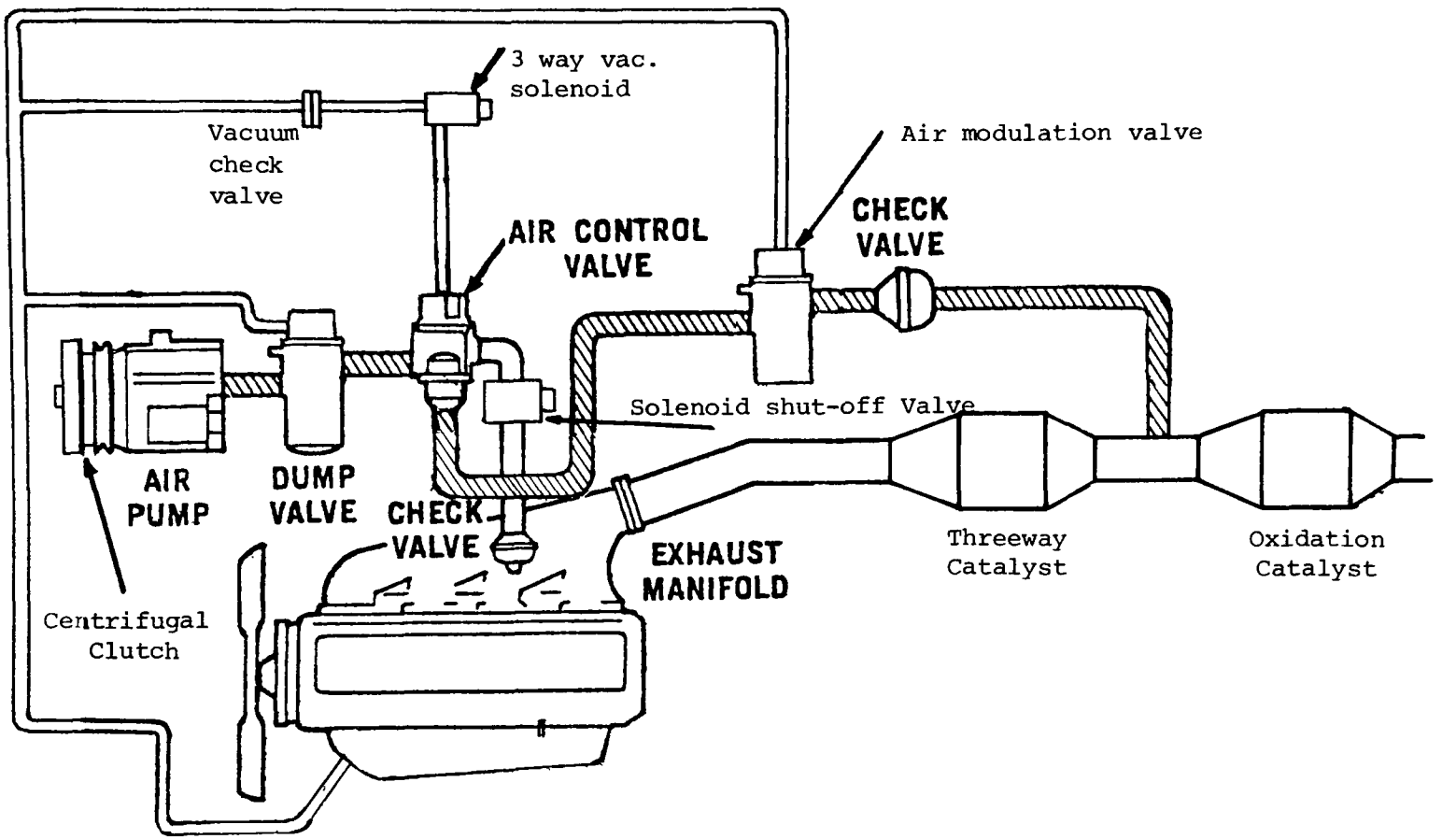


Figure 25. Air injection system

- The standard air pump dump and relief valve controlled by manifold vacuum.

- An air control valve to switch the air from the exhaust manifold to the oxidation catalyst. Air is directed to the exhaust manifold as long as there is vacuum to the valve. A solenoid valve shuts off the vacuum and vents the control valve to atmosphere. The solenoid is accuated by a time delay relay.

- A manifold vacuum controlled air modulation valve.

The air pump, dump valve, air control valve, and check valves were stock 1978 Pinto parts. The threeway vacuum solenoid was a standard automotive type manufactured by Marvel-Schebler/Tillotson. The oxidation catalyst was the same model Ford catalyst used on the 1975 Nova in Phase I. The air pump centrifugal clutch and air modulation valve were designed and built by SwRI. Both the centrifugal clutch and air modulation valve were redesigned for this phase of the project. Figure 26 is a cross section of the redesigned centrifugal clutch and Figure 27 is a cross section of the redesigned air modulation valve.

During optimization testing, various parts of the system were bypassed or disconnected to evaluate their contribution to emission control. However, the final system used in the durability test phase included all components shown in Figure 25. As the optimization testing progressed, it became obvious that additional CO control was needed during the first minute of the cold start portion of the FTP.

Many feedback fuel systems used with threeway catalysts have an open loop circuit which operates during the first part of the cold start while the oxygen sensor is warming up. The Volvo, as far as could be determined, did not have such an open loop circuit. It was reasoned that an open loop circuit, which would provide a signal to the fuel control system to run leaner than the stock system, would reduce the cold start CO. A simple, manually switched system capable of providing from 0 to 800 mv to the electronic module was built to evaluate this technique. When it proved successful, an automatic circuit was designed and built to provide A/F ratio control during cold starts.

The circuit to generate a voltage signal to the fuel system ECU to replace the oxygen sensor voltage signal during cold starts is shown in Figure 28. A recorder trace of the voltage to the ECU during an actual cold start is shown in Figure 29. The fuel system supplies more fuel when the voltage is low and less fuel when the voltage is high. A complete schematic of all electrical circuits added to the car is shown in Figure 30. The major elements of circuitry and their function are:

- SwRI cold start circuit, whose function is explained above.

- Thermal switch in cooling system to cut out SwRI cold start circuit and exhaust manifold air injection when engine is warm.

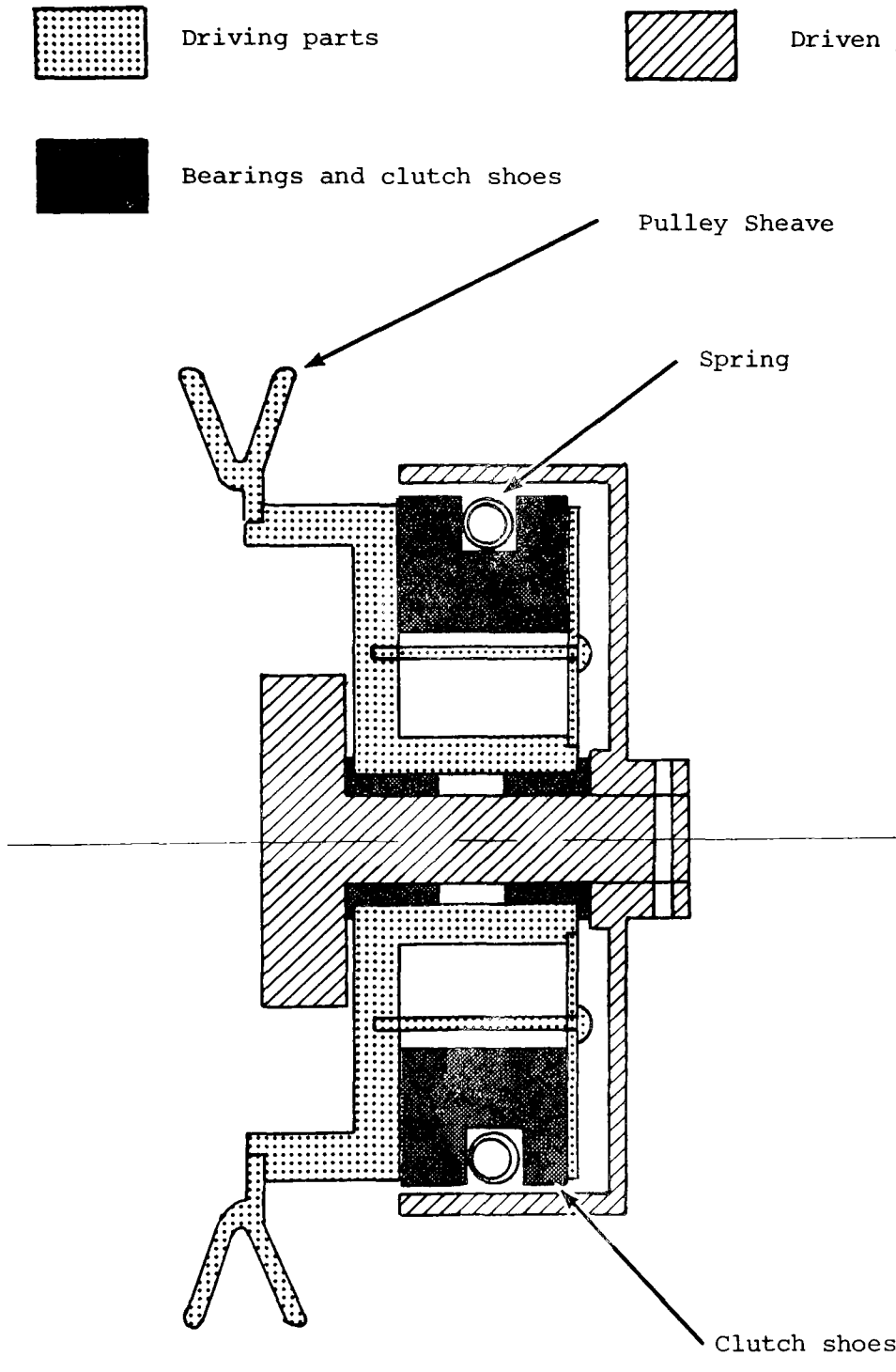


Figure 26. Redesigned centrifugal clutch

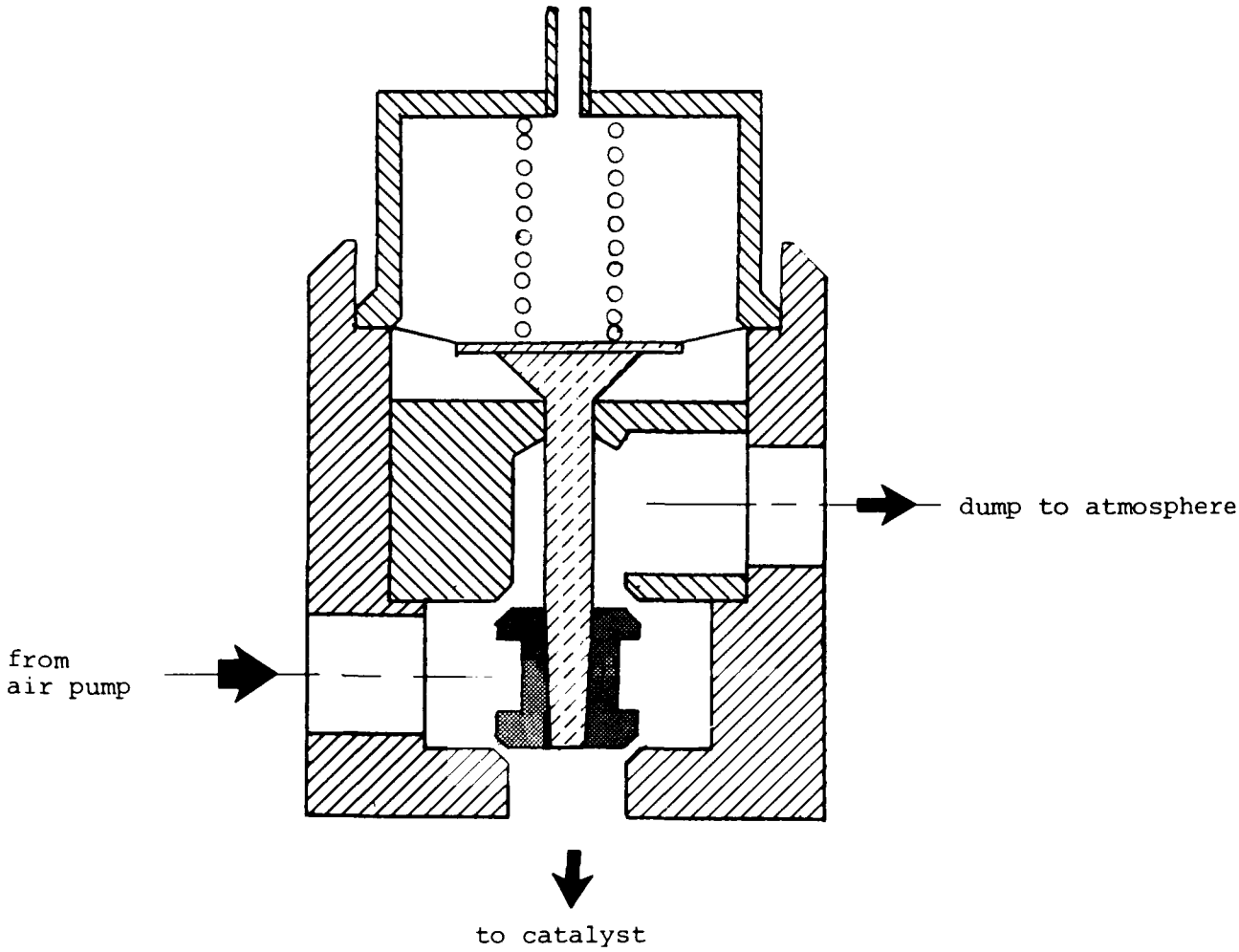


Figure 27. Redesigned air modulation valve

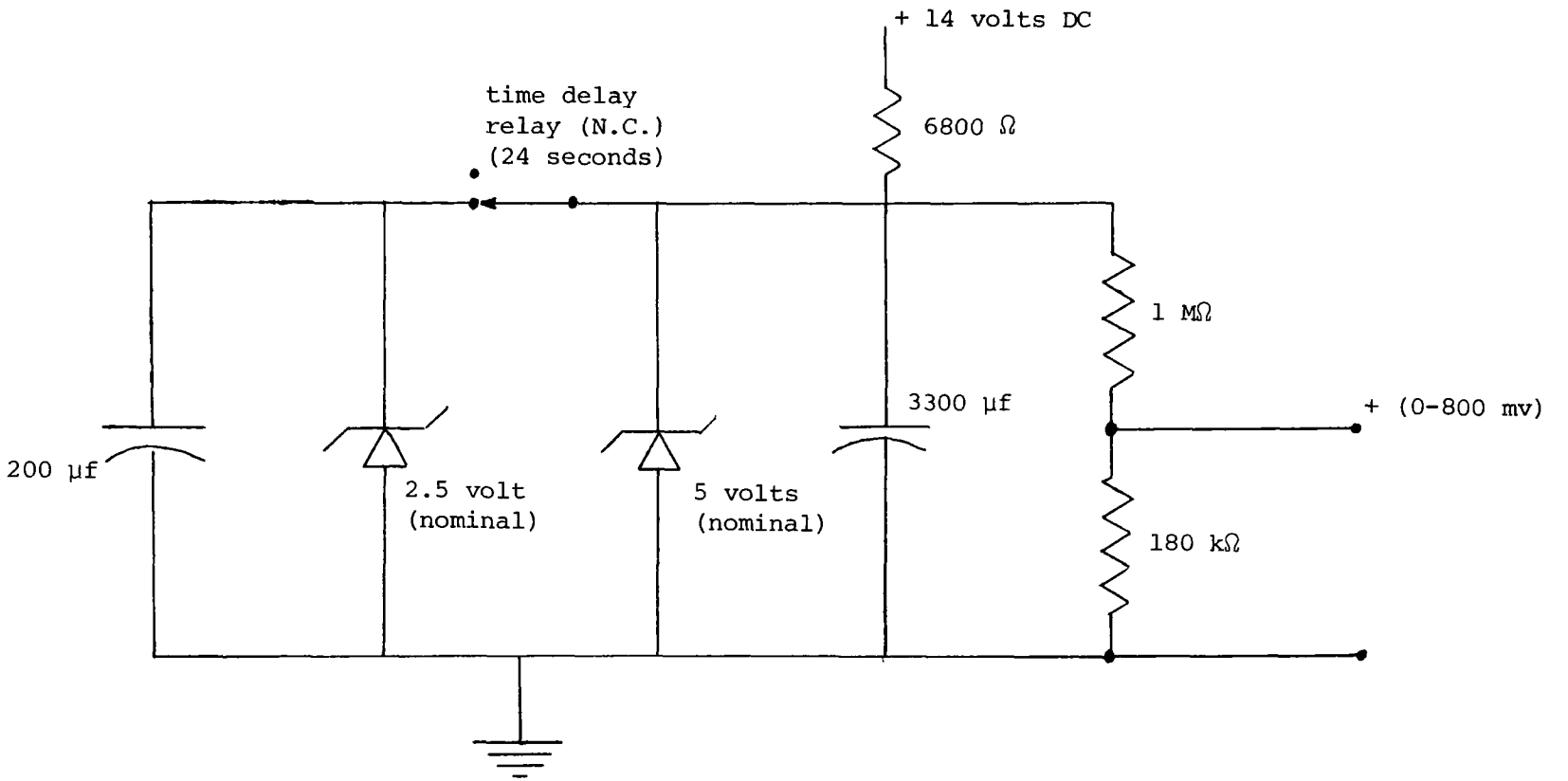


Figure 28. SwRI cold start circuit for Volvo with Lambda-Sond

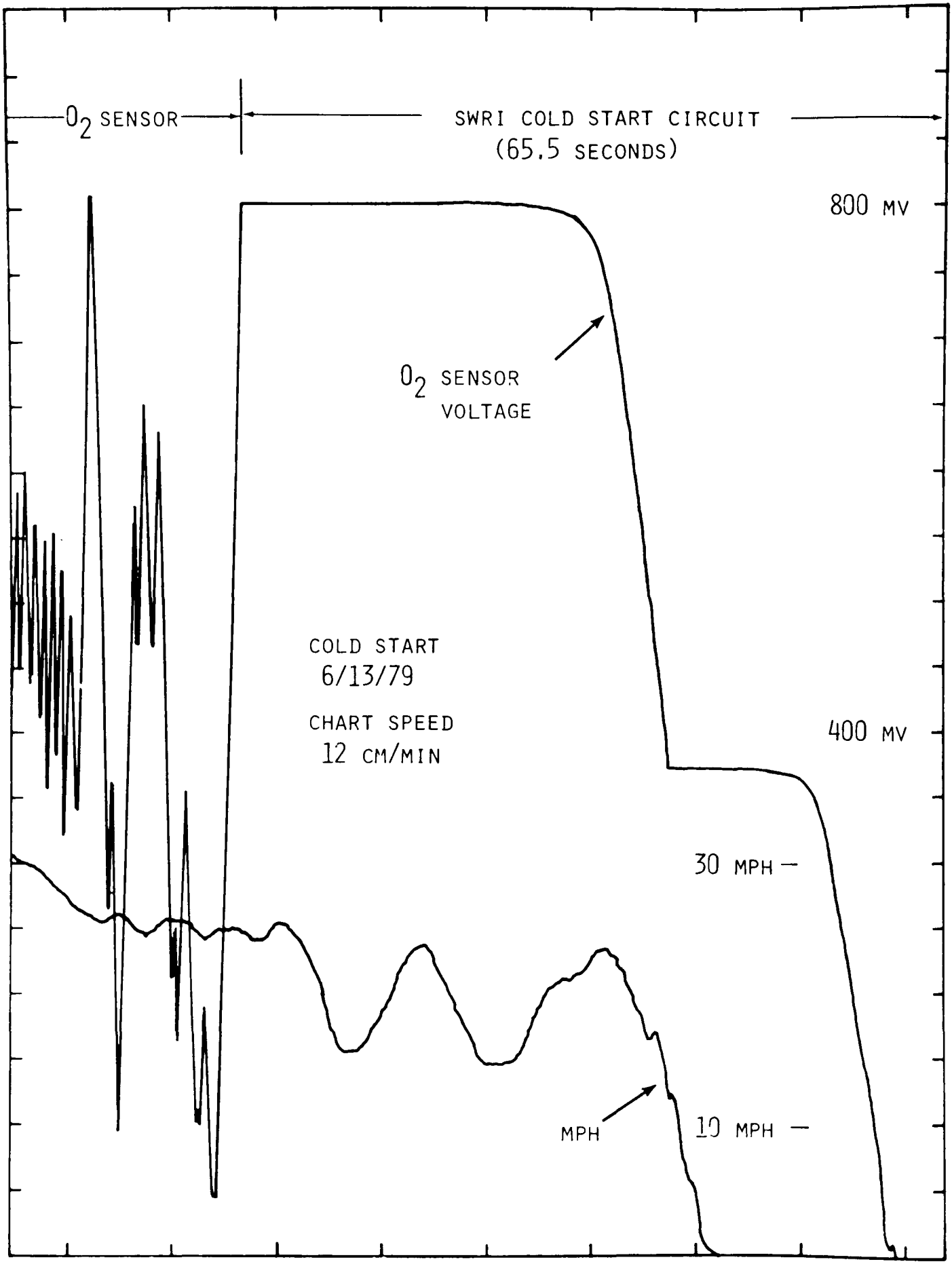


Figure 29. ECU input voltage from SwRI circuit during cold start

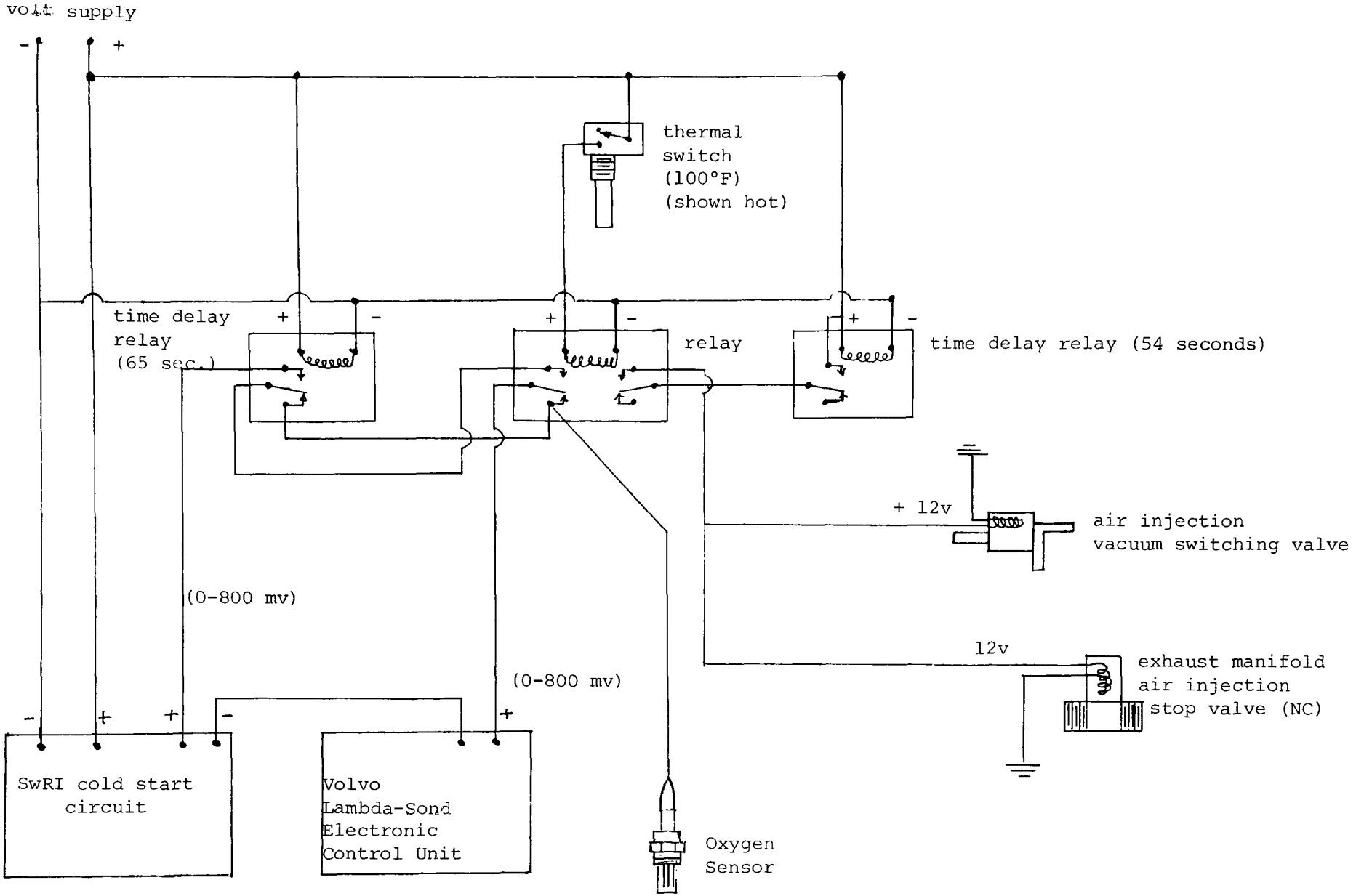


Figure 30. Cold start circuitry for modified Volvo Lambda-Sond system

- Relay controlled by thermal switch to switch ECU input from cold start circuit to oxygen sensor. Also to switch vacuum control valve and positive shut off valve in exhaust manifold air injection system.

- Time delay relay to switch from cold start ECU input to oxygen sensor input. Delay shown on schematic is final optimization value.

- Time delay relay to switch off exhaust manifold air injection. Delay shown on schematic is final optimization value.

C. Test Organization for Phase II

The testing of the Volvo and the emission control system was divided into two parts. The first, optimization testing, included "as-received" tests, various baseline configuration tests, and optimization testing of the air modulation system. The purpose of this part of the testing was to produce an emission control system with sulfate emissions below 3.1 mg/km (5.0 mg/mile) and gaseous emissions low enough to be within the 1981 emission standards after 80500 km (50,000 miles). The same test procedures used in Phase I of the project were used in Phase II.

The second part was durability testing, in which the car with emission control system installed was driven 64400 km (40,000 miles) on the durability driving schedule shown in Figure 4, Section II. Emission tests were performed every 8050 km (5000 miles) using the same test procedures as were used in Phase I. The details of each part of the system testing are covered in sections that follow.

IV-2. OPTIMIZATION TESTING

The modulated air system optimization for low gaseous emissions and low sulfates took place between August 1978 and March 1979. The test plan called for a series of baseline tests in various hardware configurations, while accumulating approximately 5950 km (3700 miles) on the car. This distance accumulation was necessary to properly age the catalyst. Experience gained with the 1975 Nova in Phase I of this project demonstrated the need to age the catalyst prior to optimization, so as not to be misled by extremely low CO emissions from a green catalyst.

Since the concept of modulating the air to an oxidation catalyst had been demonstrated in Phase I of this project, the main emphasis of the Volvo optimization testing was to reduce FTP gaseous emissions to a level that would allow the car to meet the 1981 gaseous emission standards after 80,500 km (50,000 miles) of durability testing.

The project goal was to meet emission levels of 0.25 g/km (0.41 g/mile) HC, 2.11 g/km (3.4 g/mile) CO, and 0.62 g/km (1.0 g/mile) NO_x at 80,500 km (50,000 miles). Realistic deterioration factors with threeway catalyst appeared to be 1.5 for HC, 2.0 for CO and 3.0 for NO_x.[30] Therefore, the gaseous emissions goals at the end of optimization (6500 km or 4000 miles) were set at 0.17 g/km (0.27 g/mile) HC, 1.06 g/km (1.7 g/mile) CO, and 0.21 g/km (0.33 g/mile) NO_x. The sulfate goal at 80,500 km was 3.11 g/km (5.0 g/mile) on the CFDS test. Since sulfates usually decrease with mileage[7,29], this was the goal at 6500 km also.

The plan was to run an "as-received" test series on the car, then install the air modulation system and begin distance accumulation. The test series used for this and all subsequent testing is shown in Table 24. From the beginning, the testing did not proceed smoothly. Higher than expected CO emissions from the as-received tests, and confusion over the correct idle intake manifold vacuum caused additional unscheduled tests and prolonged the actual optimization testing.

Confusion over the correct idle vacuum resulted when the idle intake manifold vacuum was measured at 10 inches of mercury gauge. This value is considerably different from the 16 to 18 inches of mercury normally seen on carbureted engines of U.S. manufacturer. Conflicting information was at first received from Volvo of America and the local area Service Representative. The final outcome was that 10 inches of mercury was a reasonable level of idle vacuum for B21F Volvo engines.

Over 40 emissions tests were performed during the optimization of the modulated air injection system. The tests were performed with the car in one

TABLE 24. PHASE II TEST SEQUENCE

*1. Precondition, LA-4

2. Soak 12 to 20 hours

3. FTP - 3 bags for gaseous emissions

**4. Soak 1.25 to 1.5 hours hood closed

**5. Precondition first 505 seconds of LA-4

6. Idle 1 minute (± 15 seconds)
   (a) auto trans - drive
   (b) start additional cooling fan
   (c) Place filter holder in tunnel

7. SET - 1 bag gaseous emissions
   1 filter sample

8. Engine off - 5 minutes

9. HFET - 1 bag gaseous emissions

---

* If necessary, drain fuel tank of distance accumulation fuel and refill with emissions test fuel.

**Steps 4 and 5 were omitted during optimization testing, but were included for baseline and final configuration test.

of three hardware configurations: (1) stock; (2) maximum air to oxidation catalyst; and (3) all or part of the air modulation system. The last hardware category included tests with and without exhaust manifold air injection.

A. Tests in Stock Configuration

Following receipt of the car from the dealer, a complete series of emission tests (FTP, CFDS and HFET) were performed on the car in the condition received. Several times during optimization of the modulated air system, the vehicle was returned to stock condition and an FTP performed to obtain stock condition emissions. The results of all stock condition FTP tests performed during optimization are shown in Table 25. Also shown in the table are the certification values for the 1978 Volvo 244D with B21F engine.

The as-received CO emissions were more than twice the certification value, while the as-received NO_x emissions were lower. The fact that the CO was higher and NO_x lower than certification values was taken as indicating that the engine was controlled to a richer A/F ratio than the certification ratio. The FTP fuel economy was also lower than the certification level, supporting the assumption that the engine was set richer. It was decided to leave the A/F ratio setting as received to take advantage of the extremely low NO_x levels obtained with this setting. The oxidation catalyst to be installed behind the threeway catalyst would then be depended on to provide sufficient CO control to meet the project CO goal. For the next four months during the optimization procedure, there were indications that the oxidation catalyst with modulated air injection would not be sufficient to meet the project goals with high CO emissions in stock condition. There were also intermittent indications of fuel system malfunction characterized by sudden, unexplainably, large increases in CO. An attempt on September 29, 1978, to obtain the certification emission levels by leaning the A/F ratio did result in CO emissions somewhat below the certification value. However, the NO_x emissions increased to well above the certification level, as shown in Table 25.

It was not until after a significant number of fuel system components had been replaced by representatives of Volvo of America in January, 1979, that good agreement was obtained between the stock FTP emissions and the certification values. See the January 16, 1979, test results in Table 25. The stock configuration tests performed in March, 1979, at the end of the optimization procedure, also were in good agreement with the certification values.

B. Tests With Maximum Air

The stock emission control system on the Volvo was converted to a threeway plus oxidation catalyst system, as described in Section IV-1, following the as-received emission tests. Currently, the normal operating method for threeway plus oxidation catalyst systems is to provide the full output of the air pump to the oxidation catalyst at all times after the first minute or so of a cold start. It is this large amount of often unneeded air that contributes to the high sulfate emissions of such systems. A threeway plus oxidation catalyst with maximum air injection thus served as a baseline system for reductions in sulfate emissions using the air modulation system.

TABLE 25. TEST RESULTS FROM 1978 "CALIFORNIA" VOLVO IN STOCK CONFIGURATION

Date	Gaseous Emissions, g/km (g/mile) HC	CO	NO_x	H_2SO_4 mg/km (mg/mi)	ℓ/100 km (mpg)
		FTP Tests			
7/27/78	0.24(0.39)	3.94(6.34)	0.02(0.03)		14.09(16.70)
7/28/78	0.33(0.52)	5.19(8.34)	0.01(0.02)		14.25(16.51)
9/20/78	0.17(0.27)	4.13(6.64)	0.06(0.09)		12.49(18.33)
9/29/78	0.02(0.03)	1.23(1.98)	0.37(0.60)		11.07(21.25)
1/16/79	0.18(0.30)	2.48(3.99)	0.09(0.14)		12.23(19.23)
3/19/79	0.12(0.20)	2.61(4.21)	0.07(0.12)		12.32(19.09)
3/20/79	0.15(0.25)	2.25(3.62)	0.05(0.08)		12.27(19.17)
9/28/79	0.17(0.27)	2.59(4.16)	0.36(0.58)		11.55(20.37)
Cert. Value	(0.2)	(3)	(0.1)		(20)
		CFDS Tests			
7/27/78	0.14(0.22)	2.56(4.12)	0.01(0.02)	0.11(0.18)	11.10(21.19)
9/20/78	0.10(0.17)	2.43(3.91)	0.07(0.11)	0.16(0.26)	10.34(22.75)
		HFET Tests			
7/27/78	0.11(0.18)	2.12(3.42)	0.01(0.01)		9.45(24.65)
9/20/78	0.10(0.16)	2.37(3.82)	0.05(0.08)		9.45(24.67)
Cert. value					(25)

The first test of the threeway plus oxidation catalyst system with maximum air was run on August 29, 1978. The purpose of this test was to insure that project gaseous emission goals could be met with maximum air injected into the catalyst. Obviously, if the goals could not be met with maximum air, there would be no point in trying to meet the emission goals with less air.

As can be seen from Table 26, replicate tests performed on August 29 and 30, 1978, demonstrated that the project gaseous emission goals for HC and NO_x could be met. However, CO emissions were slightly higher than goal. CFDS tests for sulfates were not run because the catalyst was new and still storing sulfates.

Despite the somewhat high CO emissions, catalyst and emission control system seasoning for 4800 km (3000 miles) was begun. Maximum air injection to the oxidation catalyst was used during the distance accumulation to completely season the catalyst at high oxygen levels.

On September 19, 1979, after completing 4800 km of durability driving, a complete series of tests was run with maximum air to the catalyst. The test results are presented in Table 26. The purpose of this test was to determine sulfate emissions from the car with the addition of an air injected oxidation catalyst. Note that sulfate emissions from the CFDS in this configuration are approximately 130 times higher than the CFDS sulfate emissions from the stock configuration shown in Table 25. These results once again demonstrate the high sulfate levels that can result from threeway plus oxidation catalyst systems. The FTP CO level from this test, while below the 1981 standard, was still higher than the project low service goal.

Following this test, A/F ratio was set leaner and the air modulation system activated. After an additional 800 km of durability driving, a complete test series was run on October 10, 1978. The October 10, 1978, test series was planned as a test of the air modulation system. However, examination of the raw exhaust emission traces and visual inspection of the air modulation system indicated that the air modulation components were not functioning, so that oxidation catalyst received maximum air. Thus, this test was used as another baseline test with maximum air.

The test results are shown in Table 26. The gaseous emissions reflect a leaner A/F ratio with lower CO than the previous test and higher NO_x, (because A/F ratio is further away from optimum NO_x reduction). The CFDS sulfate emissions of 74.9 mg/km (120.5 mg/mile) were almost 4 times higher than the previous test. This level is not unusual for threeway plus oxidation catalyst system.[5,7] The sulfate increase was probably the result of increased sulfate storage from the additional distance accumulation and leaner A/F ratio. This test series was used as the final maximum air baseline during the optimization testing.

The system was not operated with maximum air injection again until after the conclusion of distance durability testing. The results from the maximum air test at 65200 km (40,500 miles) are also shown in Table 27. The FTP gaseous emissions were still below the 1981 standards. The CFDS sulfate emissions decreased to 7.8 mg/km (12.5 mg/mile). This decrease with distance

TABLE 26. TEST RESULTS FROM 1978 "CALIFORNIA" VOLVO WITH THREEWAY CATALYST PLUS AIR INJECTED OXIDATION CATALYST

Date	Test Type	Gaseous Emissions, g/km (g/mile)			H_2SO_4 mg/km (mg/mi)	ℓ/100 km (mpg)
		HC	CO	NO_x		
8/29/78	FTP	0.16(0.26)	1.48(2.39)	0.16(0.26)		12.30(19.21)
8/30/78	FTP	0.16(0.26)	1.38(2.22)	0.15(0.25)		12.15(19.35)
9/19/78	FTP	0.01(0.17)	1.74(2.80)	0.10(0.17)		12.37(19.01)
10/10/78	FTP	0.04(0.06)	1.39(2.24)	0.29(0.47)		11.45(20.54)
9/24/79	FTP	0.18(0.29)	1.52(2.45)	0.36(0.58)		11.64(20.21)
9/19/78	CFDS	0.04(0.06)	0.07(0.11)	0.13(0.21)	20.55(33.06)	9.98(23.58)
10/10/78	CFDS	0.00(0.00)	0.01(0.02)	0.16(0.26)	74.89(120.50)	9.32(25.23)
9/24/79	CFDS	0.04(0.07)	0.17(0.28)	0.35(0.56)	7.79(12.53)	9.74(24.16)
9/19/78	HFET	0.04(0.07)	0.05(0.08)	0.19(0.30)		9.18(25.63)
10/10/78	HFET	0.01(0.02)	0.01(0.01)	0.20(0.32)		9.11(25.82)
9/24/79	HFET	0.02(0.03)	0.06(0.10)	0.41(0.67)		8.88(26.49)

TABLE 27. MASS EMISSIONS FROM COLD START TRANSIENT PHASE OF FTP FOR SELECTED TESTS ON 1978 VOLVO

Date	Configuration	First Bag Emissions (grams) HC	First Bag Emissions (grams) CO	% Change with Manifold Air HC	% Change with Manifold Air CO
9/20/78	Stock	2.46	54.47	--	--
9/21/78	Stock + manifold air	2.46	63.90	0	+17.3
3/1 & 3/5/79 average	Ox. Cat. + open loop + MODAIR	3.56	34.33	--	--
3/6/79	Ox. Cat. + open loop + MODAIR + manifold air	2.32	30.51	-34.8	-11.1
9/28/79	Stock	3.00	43.94		
9/26/79	Stock + aspirated manifold air	3.12	41.62	+ 4.0	-5.3

accumulation is characteristic of sulfate emissions.[7,28,29]

C. Tests with Exhaust Manifold Air Injection

One possible way to reduce emissions is to inject air directly into the exhaust manifold while the catalyst is warming up to operating temperature during a cold start. Several times during the optimization testing of the Volvo, an evaluation of the effectiveness of cold start exhaust manifold air injection was attempted. However, because of the previously explained numerous problems encountered during optimization, only three sets of comparisons were useable.

The first comparison was performed on September 20 and 21, 1978. The first test was in stock condition. The second test was run with the air pump discharging into the exhaust manifold during the first 60 seconds of the cold start, then dumping to atmosphere. The remainder of the emission control system was in stock condition. Since the cold start air injection affects only the cold start transient phase (first bag) of the FTP, its effectiveness should be evaluated by examination of first bag emissions.

Table 27 presents HC and CO emissions in grams for the first bag of the FTP test, together with the percent change in emissions with manifold air injection. As can be seen from the table, the manifold air injection test on September 21 had higher CO emissions than the test without manifold air injection on September 20. The reason for this increase is not known. One possible explanation is that there was too much air injected, so that the additional air quickly cooled the exhaust below the temperature required to convert CO to CO_2.

The next comparison check of manifold air injection was performed in March, 1979. The purpose of this comparison was to determine if manifold air injection would help the modulated air system developed for this project. In this case, the emission control configuration consisted of the oxidation catalyst with modulated air injection and an open loop A/F ratio control circuit for cold starts. (See Figures 25 and 30).

This configuration was tested on March 1 and 5, 1979. The average first bag HC and CO emissions from these tests are shown in Table 27. The manifold air injection was then installed and tested on March 6, 1979. The first bag HC and CO mass emissions from this test are also shown in Table 27. Note that CO is approximately 11 percent lower with the manifold air injection. The modulated air system continusouly dumped a portion of the air pump discharge. Thus, only part of air pump discharge was available for manifold injection.

The last investigation of exhaust manifold air injection was performed following the durability testing. For this investigation, a reed valve aspiration system, similar to Canadian Volvo model, was used. It is compared to the stock condition test run at the completion of durability testing in Table 27. In this case, there was a 5.3 percent reduction in CO emissions with the cold start exhaust manifold air injection. While no detailed investigation of air injection rates was conducted from the three sets of tests presented here, it appears that there may be an optimum air injection rate, with higher CO

emissions from air injection rates either higher or lower than optimum.

D. Tests to Optimize the Air Modulation System

Over twenty tests were run with various parts of the air modulation system installed on the Volvo. However, many of them were performed to investigate the apparent fuel system problem or merely to adjust the A/F ratio in steps to obtain the best A/F ratio for use with the air modulation system. Of these many tests, seven tests are presented in Table 28 to show the evolution of the final modulated air injection system.

Prior to beginning the optimization of the air modulation system, 4830 km (3000 miles) of durability driving was accumulated. The complete air modulation system was installed and functioning during the distance accumulation, except for the threeway vacuum solenoid and air pump centrifugal clutch. However, the air modulation valve was bypassed so that the oxidation catalyst received the full air pump discharge.

The air modulation system was completed in early October 1978, with the installation of the air pump centrifugal clutch. The idle CO was adjusted richer, from 0.6 percent to 1.4 percent (with the oxygen sensor disconnected). An FTP test was run on October 5, 1978, to check the system operation. The results of the test are shown in Table 28. The HC emissions met the target low mileage emission goal, but the CO and NO_x did not. However, the emissions results were encouraging,considering no system optimization had been done.

While checking the setting of the air modulation valve prior to the October 5 test, it was found that the idle vacuum was only 10 inches of mercury (gauge pressure). This was considerably below the usual 16 to 18 inches of mercury seen on carbureted cars of U.S. manufacture. The investigation as to whether or not this vacuum level was correct delayed the optimization testing almost two months.

While in the process of checking the vacuum level with the manufacturer, continuous CO traces from the first few tests were analyzed. When setting up the air modulation schedule for the air modulation valve, it was assumed that there would be CO excursions during accelerations, as there were with the two carbureted engines on which the system was previously used. The CO traces from the Volvo showed, however, that the Lambda-Sond system handled accelerations well and that most of the CO spikes were during decelerations. The air modulation valve required some modification to provide air during decelerations rather than accelerations. In addition, the traces indicated that changes to the air flow schedule were required. The final air injection versus manifold vacuum curve for the valve is shown in Figure 31. By the end of November, 1978, the idle vacuum had finally been determined to be correct. The air modulation system was now ready for additional testing on the car.

During the FTP tests run on December 1, 1978, continuous CO values increased two to five times after about 280 seconds into the test. A repeat test on December 4 showed the same high CO values throughout the tests. Checks of the idle CO and oxygen sensor did not reveal any abnormalities.

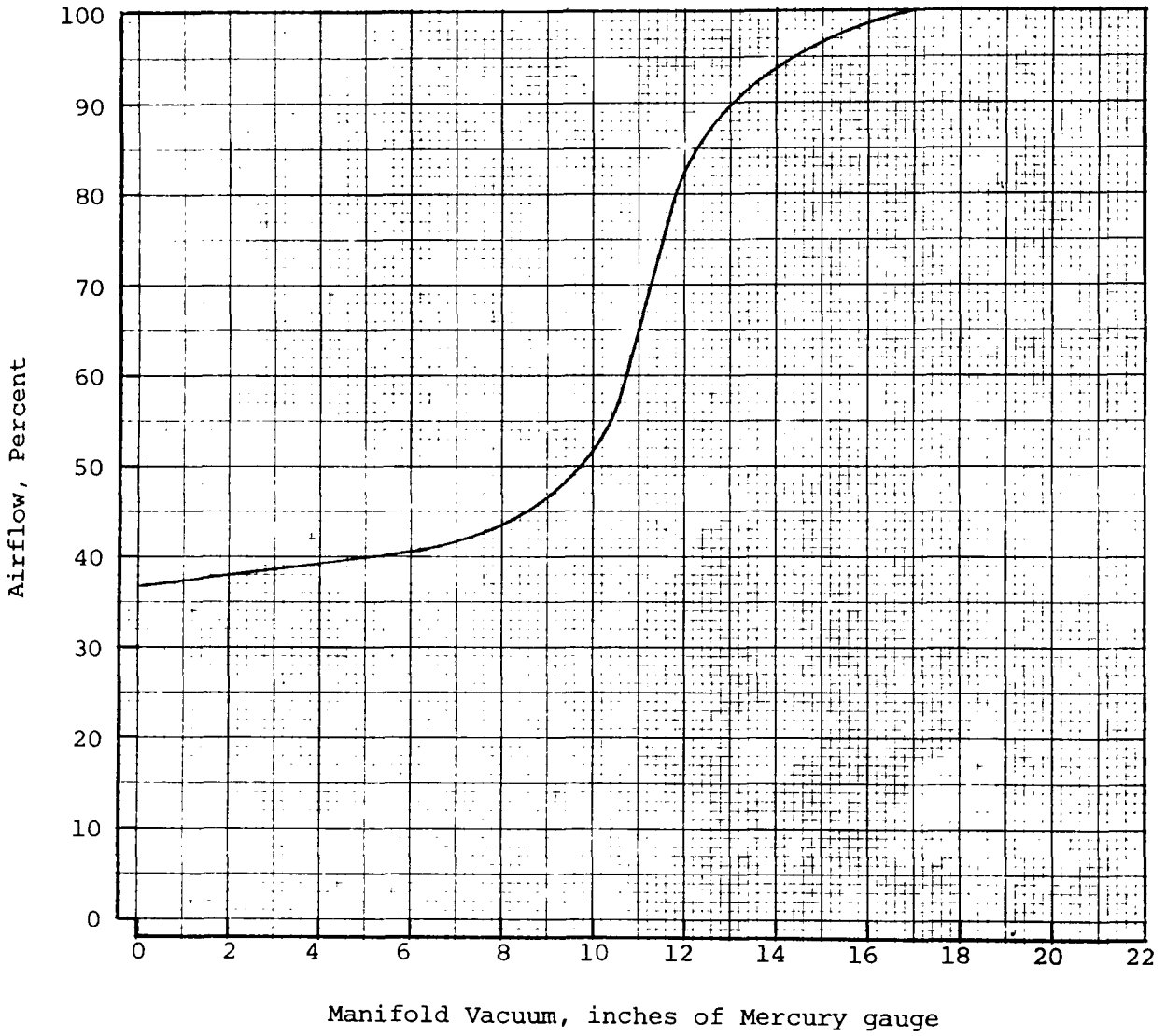


Figure 31. Air modulation valve air flow calibration on 1978 Volvo

Another delay in the optimization testing was then encountered, while the help of Volvo of America was sought and received. In January 1979, under the direction of personnel from Volvo of America, the fuel distributor and all four fuel injectors were replaced in the course of correcting the high CO problem. This apparently corrected a problem in the fuel system that had existed since the car was received from the dealer.

Optimization testing resumed in late January, 1979. Tests run in early December, 1978, had indicated that the air pump was supplying too much air to the oxidation catalyst, resulting in higher than desired sulfate levels. By utilizing the fact that the static pressure of the flowing exhaust gases is normally lower than atmospheric pressure, ambient air can be drawn into the exhaust pipe, in a manner similar to an eductor without using the air pump.

A number of tests were run in this configuration with progressively leaner A/F ratios. The best overall gaseous emission results were from the test on February 5, 1979, as shown in Table 28. The HC and NO_x emissions from this test met the project goals, but CO was still above the project goal.

Following this test, CO emissions were examined on a bag-by-bag basis. Approximately 90 percent of the composite CO level was from the first bag. From the raw exhaust CO traces, it was determined that the majority of the first bag CO came from approximately the first minute of operation.

To reduce the CO emissions during the cold start, the open loop fuel control circuit described in Section IV-1 was installed on the car.

The first test of this system was on February 7, 1979. The test results are shown in Table 28. The first bag CO for this test was 32.5 grams, compared with 42.0 grams for the first bag of the previous test on February 5. This was a reduction of 23 percent in the first bag.

The open loop system had proven effective. However, the CO emissions were still not within the project goals for 6500 km. An examination of the raw exhaust oxygen trace indicated that the CO emissions would benefit from slightly more oxygen. Therefore, the air pump was reconnected to the air injection system, but with a large portion of the air pump discharge dumped to the atmosphere. However, the cold start manifold air injection was not connected. A test was run in this configuration on February 12, 1979. The composite CO from this test was 1.23 g/km. As can be seen in Table 28, HC and NO_x were below the project goals. This was the lowest CO level achieved during the optimization testing.

In an effort to further reduce first bag CO levels, cold start air injection to the exhaust manifolds was reconnected. Tests run with this system did not give the expected results. After considerable investigation, the problem was found to be a leak in the diverter valve allowing air to be injected into the exhaust manifold. A manually operated shutoff valve was installed in the manifold air injection line to stop air leakage into the exhaust manifold.

TABLE 28. FTP TEST RESULTS FROM 1978 "CALIFORNIA" VOLVO

Date	Configuration	Gaseous Emissions, g/km (g/mile) HC	CO	NO_x	Fuel ℓ/100 km (mpg)
10/5/78	3-way + ox. + MODAIR	0.07(0.11)	1.16(1.87)	0.47(0.75)	10.72(21.94)
12/1/78	3-way + ox. + MODAIR	0.14(0.23)	1.79(2.88)	0.21(0.34)	11.26(20.88)
2/5/79	3-way + ox. + amb. MODAIR[a]	0.10(0.16)	1.69(2.72)	0.15(0.25)	11.72(20.08)
2/7/79	3-way + ox. + amb. MODAIR + open loop	0.11(0.18)	1.36(2.19)	0.13(0.20)	11.81(19.91)
2/12/79	3-way + ox. + MODAIR + open loop	0.10(0.16)	1.23(1.98)	0.12(0.19)	11.08(21.23)
3/6/79	3-way + ox. + MODAIR + open loop + manifold air	0.11(0.18)	1.31(2.10)	0.15(0.24)	11.72(20.08)
3/12/79	3-way + ox. + MODAIR + open loop + manifold air	0.14(0.23)	1.31(2.10)	0.13(0.23)	11.61(20.26)

[a] amb. MODAIR refers to modulated air injection from ambient air (no air pump).

An FTP test was run on March 6, 1979, with air to the exhaust manifold during the first 56 seconds of the cold start. There was a reduction in the first bag CO of approximately 10 percent. The first bag CO was reduced from an average of 34.3 grams for the two previous tests without manifold injection to 30.5 grams with manifold injection.

Examination of the CO traces taken during February and March seemed to indicate some sort of intermittent fuel system malfunction. Further testing was postponed while the fuel system was throughly cleaned and a new fuel filter installed. A test on March 12, 1979, produced results similar to the March 6 test. (See Table 28).

After discussing these results with the EPA, it was decided that the system was as close to the project goals as possible without expending unreasonable additional effort, and that the durability testing should begin. Thus, the test on March 12, 1979, closes the optimization phase of the project. The predurability emission goals were met for HC, NO_x and sulfate. The CO emission level was approximately 0.25 g/km higher than the goal of 1.06 g/km.

The final emission control system consisted of the stock Lambda-Sond system, plus the items listed below:

- a monolithic oxidation catalyst after the threeway catalyst
- a modulated air injection system to the oxidation catalyst
- cold start air injection to the exhaust manifolds
- a separate open loop fuel control for cold starts.

It should be pointed out that while the FTP gaseous emissions from the oxidation catalyst with modulated air system can be compared with the stock system to determine improvements resulting from the new system, the sulfate emissions should not be compared to the stock system.

It is well documented that threeway catalyst systems have low sulfate emissions. However, when an air injected oxidation catalyst is added behind the threeway system, tailpipe sulfate emissions can be quite high. Therefore, sulfate emissions from the air modulation system should be compared with tests on the air injected oxidation catalyst system without air modulation. These tests were run on the Volvo on September 19, 1978,and October 10, 1978. A comparison of the CFDS sulfate emissions for the stock system and air injected system oxidation catalyst system with and without air modulation is shown in Table 29. Since a number of changes were made in the fuel system of the car between October 1978 and March 1979, the FTP gaseous emissions for the two emission control system configurations are not comparable.

TABEL 29. COMPARISON OF EMISSIONS ON 1978 VOLVO WITH THREE EMISSION CONTROL SYSTEM CONFIGURATIONS

Date	Test Type	Configuration	Gaseous Emissions, g/km[a]			H_2SO_4 mg/km	Fuel ℓ/100 km
			HC	CO	NO_x		
9/20/78	FTP	Stock	0.17(0.27)	4.13(6.64)	0.06(0.09)	----------	12.49(18.83)
9/19/78	FTP	Stock + ox. cat. + Air[b]	0.10(0.17)	1.74(2.80)	0.10(1.17)	----------	12.37(19.01)
10/10/78	FTP	Stock + ox. cat. + Air	0.04(0.06)	1.39(2.24)	0.29(0.47)	----------	11.45(20.54)
3/16/79	FTP	Stock + ox. cat. + MODAIR[c]	0.10(0.15)	1.25(2.24)	0.13(0.22)	----------	12.18(19.32)
9/20/78	CFDS	Stock	0.10(0.17)	2.43(3.91)	0.07(0.11)	0.16(0.26)	10.34(22.75)
9/19/78	CFDS	Stock + ox. cat. + Air	0.04(0.06)	0.07(0.11)	0.13(0.21)	20.55(33.06)	9.98(23.58)
10/10/78	CFDS	Stock + ox. cat. + Air	<0.01(<0.02)	0.01(0.02)	0.16(0.26)	74.89(120.50)	9.32(25.23)
3/16/79	CFDS	Stock + ox. cat. + MODAIR	<0.01(<0.02)	0.66(1.06)	0.08(0.14)	0.04(0.06)	9.75(24.13)

[a] Numbers in parentheses are g/mile (mg/mile for H_2SO_4) except for fuel which is miles/gallons
[b] Lambda-Sond system with oxidation catalyst with air pump
[c] Lambda-Sond system with oxidation catalyst and modulated air from air pump

IV-3. DURABILITY TESTING OF 1978 VOLVO

With the gaseous emissions from air modulation system installed on the Volvo at a satisfactory level, the durability demonstration was begun. For distance accumulation, the car was driven on the road course shown in Figure 4, Section II. The distance accumulation procedure as explained in Section II was used. Emission tests were performed every 8050 km (50000 miles).

A. Distance Accumulation Chronology

Distance was being accumulated on the car throughout the optimization phase. With the exception of the open loop fuel control circuit and the solenoid shutoff valve in the manifold air injection line, all emission control hardware had been installed on the car at approximately 160 km (100 miles). Thus, the air modulation system hardware had accumulated as much service as the other systems on the car. The idea was to produce an optimized system at 8050 km, with emissions at a level that would allow for some further deterioration. This was to avoid being misled by low emissions from an unseasoned catalyst which would increase rapidly for the first few thousand kilometers as the catalyst aged. Since the car had accumulated approximately 8050 km (5000 miles) during optimization testing, it was driven for only 320 km (200 miles) on the durability driving schedule to stabilize the sulfate emissions prior to the 8050 km test series.

Following the 8050 km tests, the car was returned to stock condition and tested twice on the FTP cycle to obtain a 8050 km stock baseline. The air modulation system was reconnected and distance accumulation on a continuous basis begun on March 25, 1979.

A graphical representation of the distance accumulation records is presented in Figure 32, which shows daily distance, maintenance, and emission test points. This figure can be referred to as necessary for clarification of the order of events.

Scheduled maintenance was performed every 12,070 km (7500 miles) as specified in the Volvo service manual. A summary of the required maintenance is shown in Table 30. Unscheduled maintenance was performed as required. Unscheduled maintenance is also shown on Figure 32.

Distance accumulation continued until September 14, 1978, when 64,400 km (40,000 miles) of service had been accumulated. At that time, distance accumulation was halted due to funding limitations.

Following the 64,400 km durability test, the air modulation system was bypassed so that all of the air pump discharge went directly to the oxidation

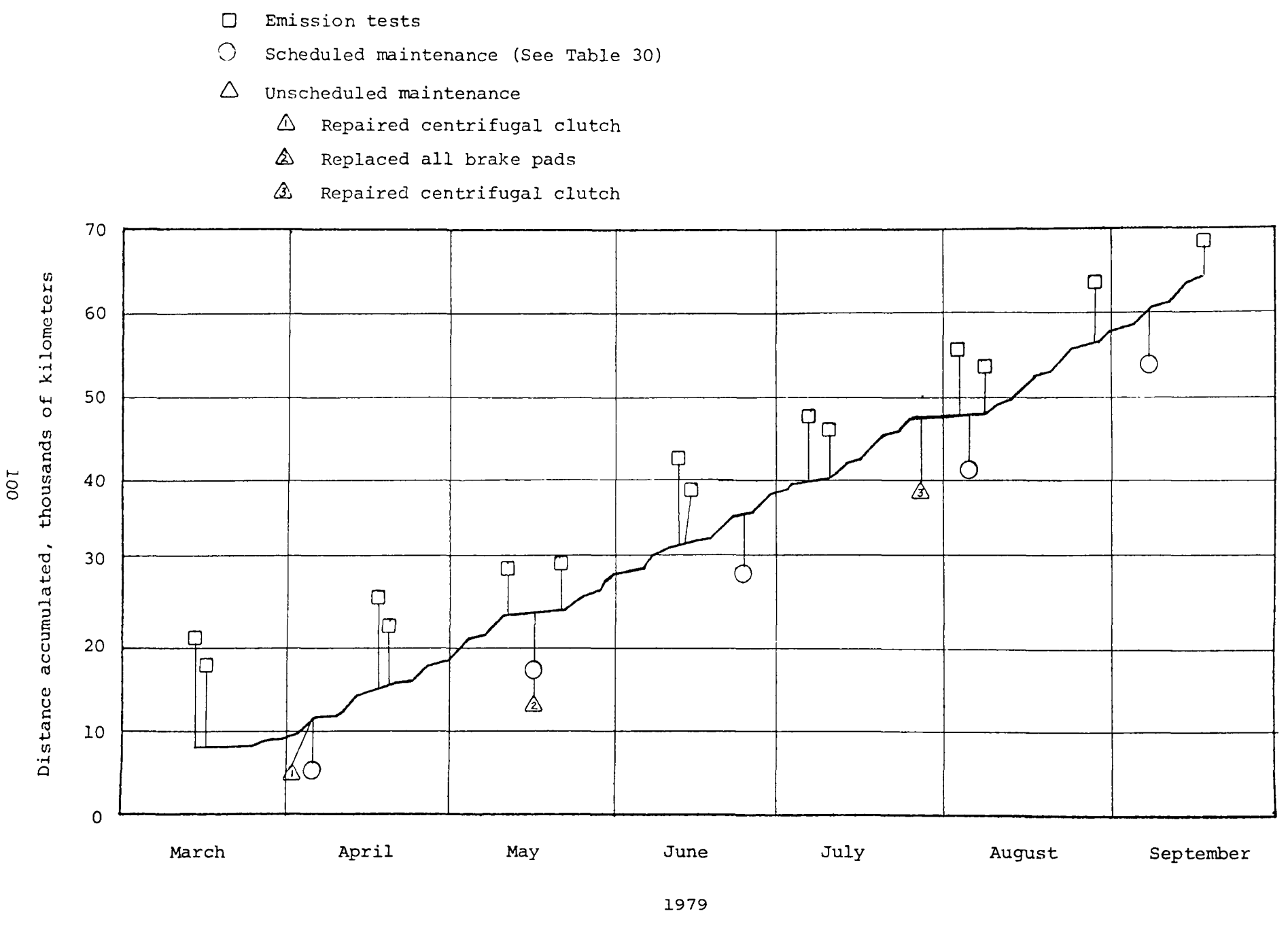


Figure 32. Distance accumulation record of 1978 Volvo 244DL.

TABLE 30. VOLVO MAINTENANCE SCHEDULE

7,500	15,000	30,000	45,000	Op. No.	
					In drivers Seat
x				1	Check Brake Vacuum Booster Function.
x				2	Check Brake Pedal operation for Leakage in System.
x				3	Check and adjust Parking Brake.
x				4	Check operation of Instrument Panel Indicator Lights.
x				5	Check Automatic Transmission Gear Selector.
x				6	Check Seat Belt and Warning Light and Buzzer.
					Exterior
x				7-10	Lubricate Door, Hood and Trunk, Hinges, Latches and Locks.
		x		11	Check Gas Cap Seal.
					On Lift
x				12	Check Steering gear Function.
x				13	Check Front End Suspension for Wear.
x				14	Check Front Wheel bearings.
x				15	Check Control arm Bushing and Strut Attachment.
x				16	Check Steering Rod play.
x				17	Check Steering Rack for Axial play.
x				18	Check Front Wheel balance.
x				19	Check Front Wheel bearings for noise.
x				20	Check Front Tire wear pattern.
x				21	Check Steering Rack Rubber Bellows.
x				22	Check Steering Rack Attachment.
x				23	Check Front Ball Joints.
x				24	Check Steering Rod ends.
x				25	Check Front Control Arm Bushings.
x				26	Check Stabilizer Bar Bushings.
x				27	Check Front Shock Absorbers.
x				28	Check Front Spring Attachment.
x				29	Check Brake Hoses.
	x			30	Check Front Wheel Brakes.
x				31	Check Clutch play.
x				32	Check Transmission for leaks.
		x		33	Change Manual Transmission oil.
x				34	Adjust Automatic Transmission Gear Selector.
x				35	Check Brake and Fuel Lines.
x				36	Check Drive Shaft Bolts and Joints.
	x			37	Check Catalytic Converter Mounting Bolts.
x				38	Check Exhaust System.
x				39	Check Rubber Bellows on Parking Brake Cables.
x				40	Check Rear Axle oil level.
x				41	Check rear Shock Absorbers.
x				42	Check Rear Suspension
x				43	Check Rear Tire Wear.
	x			44	Clean Fuel Tank Filter.
x				45	Check for Engine Leaks.
x				46	Drain Engine Oil.
x				47	Change Engine Oil Filter.
	x			48.	Check Rear Wheel Brakes.

7,500	15,000	30,000	45,000		
					Under Hood
x				49	Fill Engine oil.
x				50	Check Brake Reservoir Level.
x				51	Check Clutch Reservoir Level (260 only)
x				52	Check Steering gear for leaks.
		x		53	Change coolant.
x				54	Check Engine Coolant Freezing point.
	x			55	Check Cooling System - Pressure Test.
x				56	Check Battery Level, Terminals and Mounting.
x				57	Check and adjust Engine Throttle Cable.
		x		58	Change Air Filter.
		x		59	Change Fuel Filter (CI System).
			x	60	Change Chargoal Canister.
x				61	Check and adjust Engine Drive Belts.
	x			62	Inspect and Clean, PCV valve.
x				63	Check Torque of Manifold Bolts (B20, only).
	x			64	Replace Spark Plugs.
	x			65	Adjust Timing Gear Belt (B21 only).
			x	66	Change Timing Gear Belt (240 only).
	x			67	Adjust Valves (B21).
	x			68-70	Adjust Valves (B27).
x				71	Adjust Valve Clearance (B20 only)
	x			72	Clean E.G.R. Valve.
		x		73	Change E.G.R. Valve.
	x			74	Reset E.G.R. Reminder Light.
	x			75-76	Check Throttle Switch - Adjust.
	x			77-78	Lubricate Distributor.
	x			79	Connect Engine Test Instrument.
	x			80	Check Battery Test Voltage.
	x			81	Check Battery Starting Voltage.
	x			82	Check and Install Distributor Cap.
	x			83-84	Check and Adjust Timing.
		x		85	Check Distributor Centrifugal Advance.
	x			86	Check vacuum retard.
	x			87	Check Exhaust Gas Recirculation.
	x			88	Adjust Idle.
x				89	Check Automatic Transmission Fluid Level.
		x		90	Check Fuel Lines for Tightness Underhood.
	x			91	Check Electrical Wires under Hood.
	x			92-93	Check Function of Diverter Valve.
	x			94-116	Check Engine CO and HC Emission.
x				117	Check and Adjust Throttle Wire BW 35.
x				118	Check and Adjust Throttle Wire BW 55.
		x		119	Adjust Reverse Band (BW 35).
x				120	Check Tire Pressure.
x				121	Check and Adjust Headlight Alignment.
					Road Test
x				122	Engine Performance.
x				123	Electrical System Operation.
x				124	Drive Train Operation, Noise.
x				125	Brakes Performance.
x				126	Steering and Handling Performance.
x				127	Suspension Noise.
x				128	Body Noise, Leakage

catalyst after the first 56 seconds of the cold start. During this time, the air pump discharge was routed to the exhaust manifold. The car was driven for 500 miles on the durability driving course to season the catalyst. A full test series (FTP, SET, HFET) followed the distance accumulation to obtain gaseous emissions and sulfate using the full air pump capacity. The purpose of this test was to obtain a 64,400 km baseline CFDS test for sulfate emissions.

For a final comparison test, the car was returned to stock condition and an FTP test run. This test was the 64,400 km stock condition baseline for comparison of FTP gaseous emissions.

B. Fuel and Oil Consumption

Unleaded gasoline meeting the requirements of 40 CFR, paragraph 86.113-79 was used for distance accumulation. The fuel was designated within SwRI as EM-344-F. An analysis of the fuel is given in Table 1, Section II. Shell 20W-50 motor oil was used throughout the distance accumulation. Fuel and oil consumption between emission tests is listed in Table 31. Fuel consumption is consistent but somewhat below the level expected in the intervals between emission tests. Since only two quarts of oil were added during the entire 64,400 km (40,000 miles) of distance accumulation, the oil consumption appears erratic. In general, it can be said that the car used less than a quart of oil between oil changes (12,070 km or 7500 miles), with the oil starting at the correct capacity after each oil change.

C. Emission Test Results

The results of all the 8050 km interval emission tests (average of duplicate tests where appropriate) and the 8050 km and 64,400 km stock condition tests are presented in Table 32. The emission results are also presented graphically in Figures 33 and 34. As can be seen from the table and figures, both HC and CO increased steadily over the 64,400 km, while NO_x, after a step increase at 24,135 km (15,000 miles) after maintenance, remained approximately constant. The CFDS sulfate emissions, listed in Table 33 and shown graphically in Figure 34, also remained approximately constant during the 64,400 kilometers.

A linear regression was performed for each emission type as a function of distance. The regression lines and equations are shown in Figures 33 and 34. Extrapolating the HC and NO_x emissions to 80,400 km (50,000 miles) using the regression equations indicated that these emissions would still be within the 1981 Federal standards at that point. A similar extrapolation of the CFDS sulfate emissions indicated that they would be within the project goal at 80,400 km.

Thus, the emission control system appears able to meet the 1981 Federal gaseous emission standards, except for CO, while maintaining low sulfate levels.

TABLE 31. FUEL AND OIL CONSUMPTION DURING DURABILITY TESTING OF 1978 VOLVO

Distance Interval km (miles)	Fuel ℓ/100 km (mpg)	Oil Consumption ℓ/1000 km (qt/1000 mi)
0-8050 (0-5000)	13.44(17.50)	no oil added
8050-16100 (5000-10000)	13.16(17.88)	0.14(0.24)
16100-24150 (10000-15000)	13.23(17.78)	no oil added
24150-32200 (15000-20000)	12.93(18.19)	0.12(0.21)
32200-40250 (20000-25000)	12.87(18.28)	no oil added
40250-48300 (25000-30000)	12.91(18.22)	no oil added
48300-56350 (30000-35000)	12.86(18.30)	no oil added
56350-64400 (35000-40000)	12.59(18.69)	no oil added
Overall	13.00(18.09)	0.03(0.05)

TABLE 32. FTP EMISSIONS FOR 1978 VOLVO 244 WITH AIR MODULATION DURING 64,400 KILOMETER DURABILITY TESTING

Distance Accumulated km(miles)	Emissions g/km (g/mile) HC	CO	NO_x	Fuel ℓ/100 km (mpg)
	8050 stock baseline			
8050(5000)	0.14(0.22)	2.43(3.91)	0.06(0.10)	12.30(19.13)
	Durability Testing of Air Modulation System			
8100(5035)	0.10(0.16)	1.28(2.05)	0.14(0.22)	12.23(19.24)
15,526(9649)	0.09(0.14)	1.38(2.22)	0.14(0.22)	12.30(19.12)
24,154(15,012)	0.12(0.19)	2.09(3.36)	0.09(0.15)	11.90(19.77)
24,212(15,048)[a]	0.12(0.19)	1.27(2.04)	0.38(0.61)	12.37(19.01)
32,000(19,955)	0.14(0.23)	2.00(3.22)	0.32(0.52)	12.44(18.92)
40,280(25,035)	0.19(0.31)	1.66(2.68)	0.41(0.65)	11.97(19.67)
48,157(29,930)	0.17(0.28)	1.77(2.85)	0.41(0.66)	12.13(19.39)
48,238(29,980)[a]	0.18(0.29)	1.71(2.76)	0.43(0.69)	12.11(19.42)
56,262(34,967)	0.19(0.31)	2.45(3.94)	0.37(0.59)	11.87(19.82)
64,370(40,006)	0.16(0.25)	2.27(3.65)	0.34(0.55)	11.50(20.46)
	64,400 km stock baseline			
65,900(41,000)	0.17(0.27)	2.59(4.16)	0.36(0.58)	11.55(20.37)

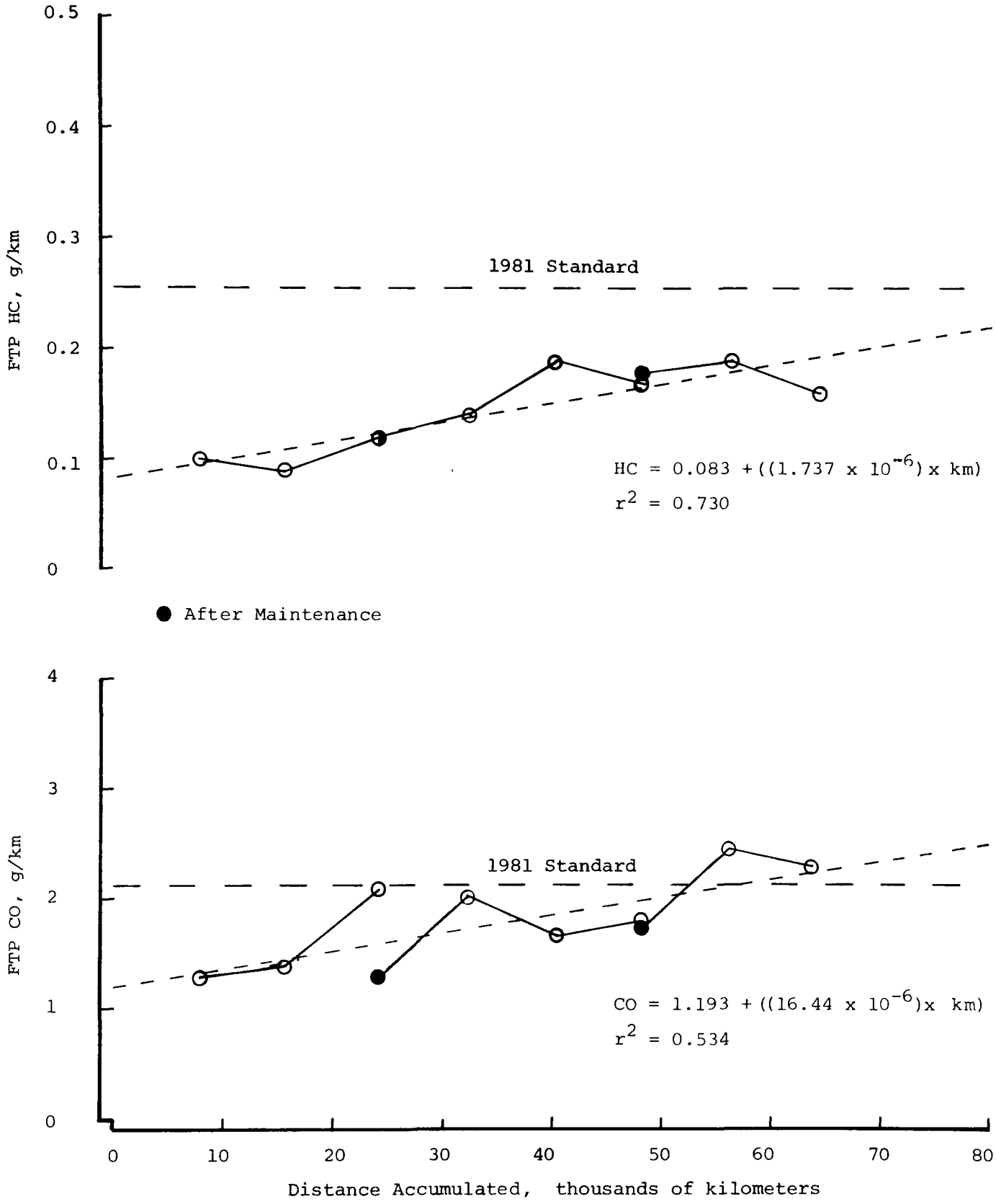


Figure 33. HC and CO emissions from a 1978 Volvo with Lambda-Sond plus oxidation catalyst and modair as a function of distance

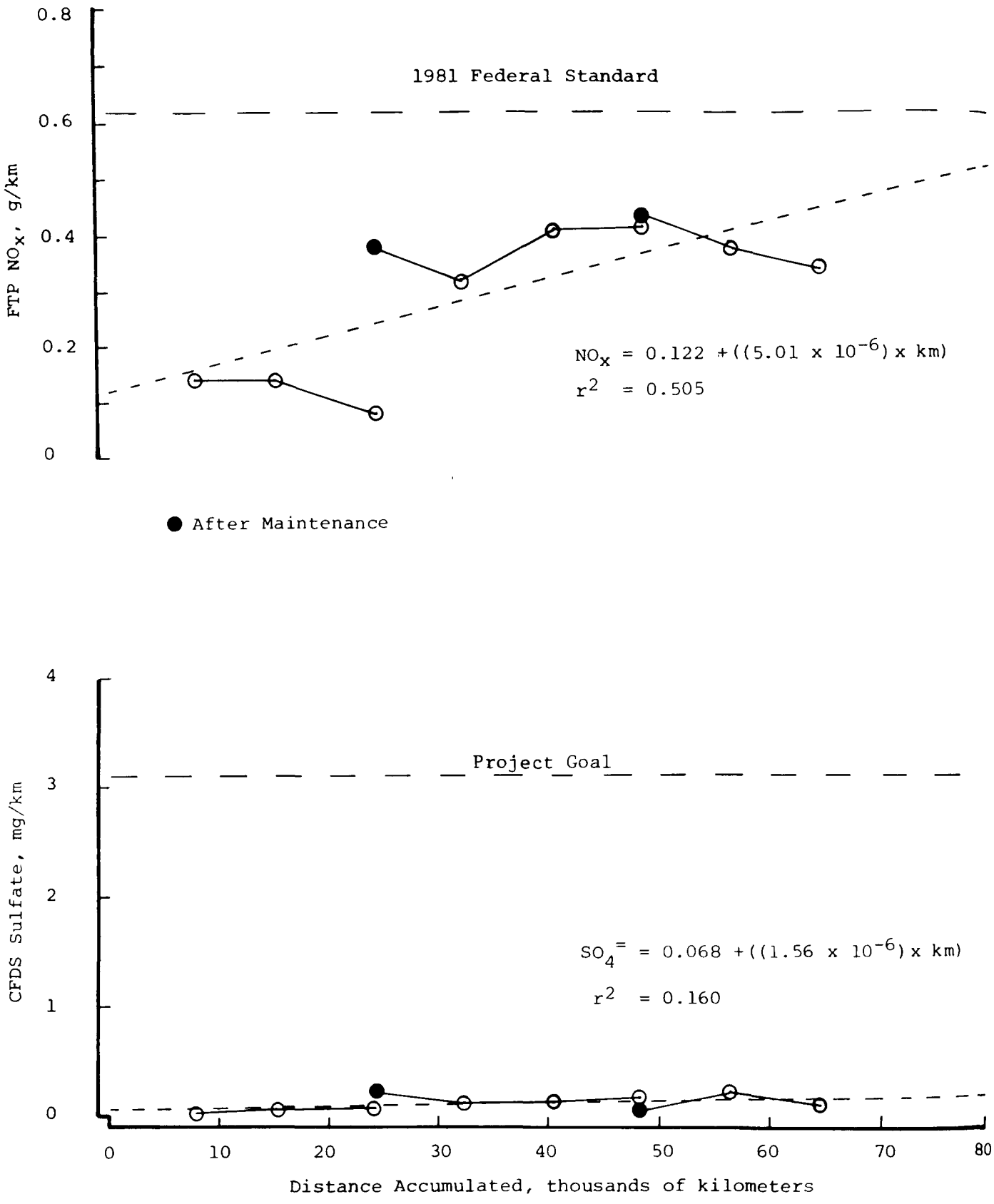


Figure 34. NO_x and sulfate emissions from a 1978 Volvo with Lambda-Sond plus oxidation catalyst and modair as a function of distance

TABLE 33. CFDS SULFATE EMISSIONS FOR 1978 VOLVO 244 WITH AIR MODULATION DURING 64,400 KILOMETRE DURABILITY TESTING

Distance Accumulated km, (miles)	Sulfate mg/km (mg/mile)
Sulfate Baseline	
5,150(3,200)	74.89(120.50)
Durability Testing of Air Modulation System	
8,100(5,035)	0.04(0.06)
15,526(9,649)	0.06(0.10)
24,154(15,012)	0.09(0.14)
24,212(15,048) (a)	0.24(0.39)
32,000(19,955)	0.09(0.14)
40,280(25,035)	0.15(0.24)
48,157(29,930)	0.14(0.23)
48,238(29,980) (b)	0.08(0.13)
56,262(34,967)	0.25(0.41)
64,370(40,600)	0.11(0.18)
64,400 km Sulfate Baseline	
65,164(40,500)	7.79(12.53)

An examination of the stock configuration emissions in Table 32 shows that the additional oxidation catalyst is required only for CO control. The threeway catalyst alone is capable of meeting the 1981 standards for HC and NO_x. If gaseous emissions from the stock condition tests are plotted as a function of distance accumulated, as shown in Figure 35, it can be seen that the CO deterioration rate is much lower for the stock vehicle than for the air modulation system. Thus, the increase in CO over the 64,400 kilometers was almost entirely due to deterioration of the oxidation catalyst/air modulation system.

The sulfate emission reduction seen in Figure 36 for the maximum air injection tests agreed well with sulfate reduction seen in a previous project using air injected oxidation catalysts.[7]

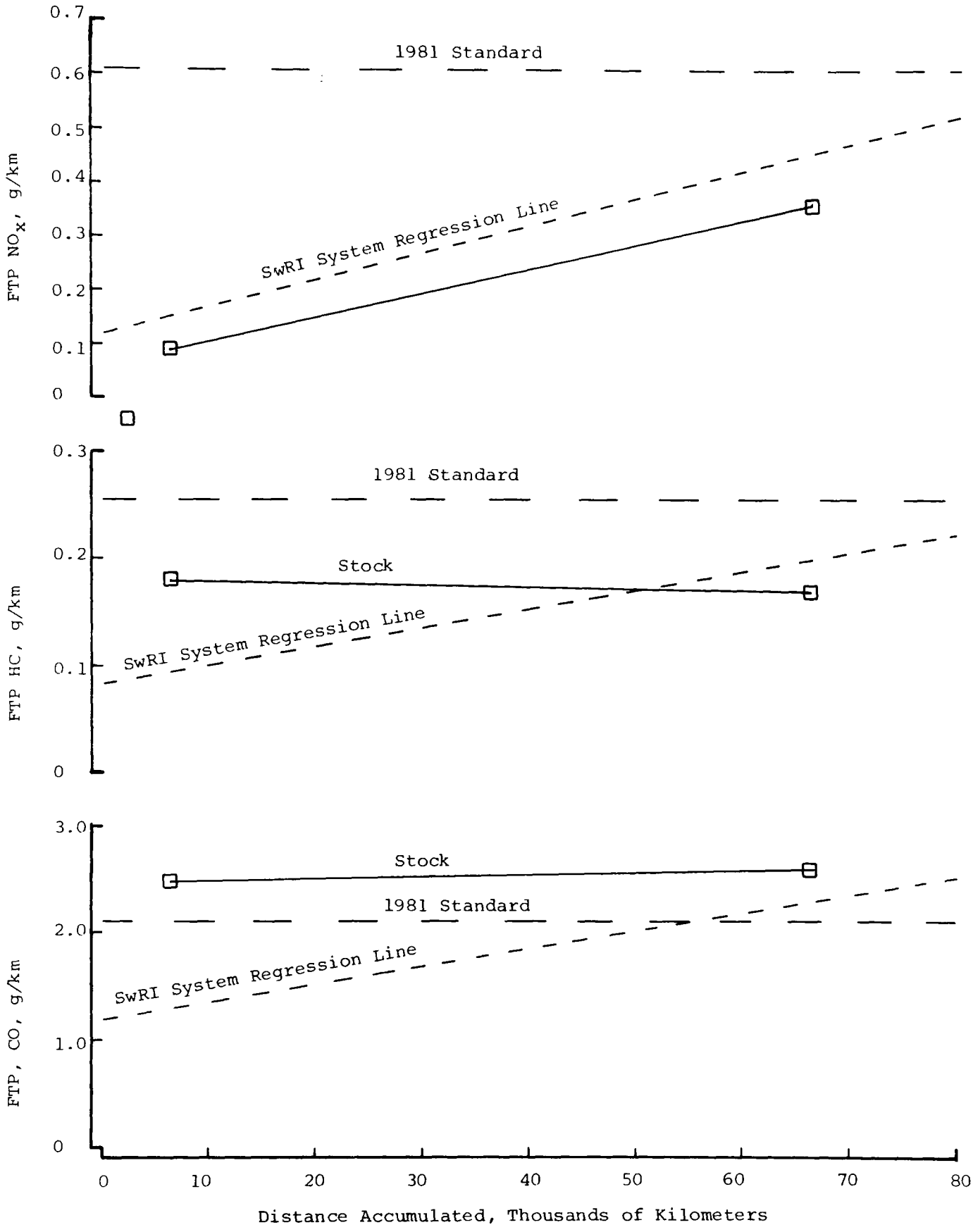


Figure 35. FTP gaseous emissions as a function of distance driven for two emission control systems on a 1978 Volvo

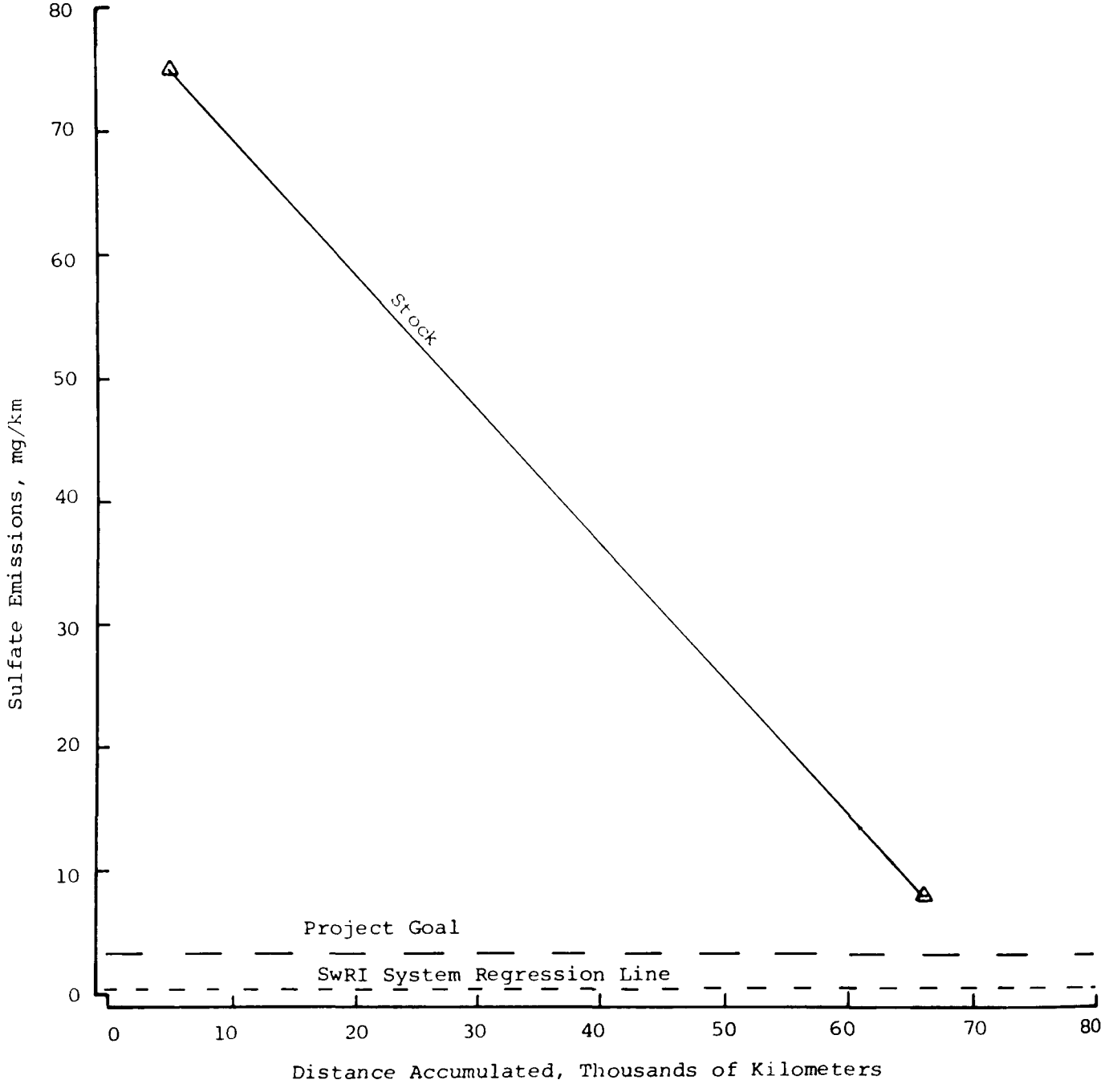


Figure 36. CFDS sulfate emissions as a function of distance driven for two emission control systems on a 1978 Volvo

V. CONCLUSIONS

The objective of this project was to evaluate the low sulfate emission ability of several emission control systems capable of meeting 1981 gaseous emission standards and to test some of these systems for durability. From the work accomplished during this project, a number of conclusions may be derived regarding the effectiveness and durability of the tested emission control system.

A. Ability to Produce Low Sulfate Emissions

For this project, low sulfate emissions were defined as being below 3.1 mg/km (5.0 mg/mi.). Four systems were evaluated: (1) oxidation catalyst with modulated air injection and EGR: (2) high temperature exhaust system with oxidation catalyst; (3) threeway catalyst with feedback carburetor; and (4) threeway plus oxidation catalyst with modulate air injection and feedback fuel injection. From tests of these systems the following conclusions were drawn:

1. Modulating the air injected into an oxidation catalyst can result in low sulfate emissions at the expense of some increase in CO emissions. When compared with standard air injection systems, air modulation reduced sulfates from all three versions of air modulation systems tested. The reductions were 98 percent for the Chevrolet Impala , 62 percent for the Chevrolet Nova, and 99+ percent for the Volvo.

2. Increasing the temperature of exhaust gases reduced sulfate emissions from oxidation catalysts. An increase of 75°C (134°F) in exhaust temperature at the exhaust manifold discharge during the CFDS test reduced sulfate emissions 37 percent with the system tested on a 1975 Chevrolet Nova with 5.74 litre (350 CID) engine.

3. Threeway catalyst systems have low sulfate emissions. However, while the two threeway systems tested could be made to meet either the 1981 CO or 1981 NO_x standard, neither system could meet both standards at the same time.

B. Durability

The sulfate emissions remained within the project goal for all systems during durability testing. However, none of the three systems tested for durability were able to maintain all gaseous emissions within the 1981 standards. Examination of the durability test results produced the following conclusions.

1. It is possible to maintain low sulfate emissions for 80,500 km (50,000 miles) with any of the three systems tested (oxidation catalyst with modulated air injection, threeway catalyst, and threeway plus oxidation catalyst with modulated air injection).

2. The fuel injected, threeway plus oxidation catalyst with modulated air injection proved the most durable, maintaining all emissions within the project goals for 56,350 km (35,000 miles).

C. General

The project demonstrated several means of obtaining low sulfate emissions from emission control systems designed for the 1981 gaseous emission standards. The most promising system tested was a threeway catalyst (5:1, Pt:Rh) plus an oxidation catalyst with modulated air injection which was tested for 64,400 km (40,000 miles). Thus, the project fulfilled its objective of demonstrating the effectiveness and durability of low sulfate emission control systems for 1981 and beyond.

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APPENDIX A

Worksheets for Sulfate Control System Evaluation

Sulfate Control Durability Demonstration
Control System Evaluation Sheet

System Air Modulation

Evaluation Item	Score	Weighting Factor	Weighted Score	Max. Possible Weighted Score
1. Meets gaseous emission goals	5	2.0	10	(20)
2. Sulfate emissions	10	1.5	15	(15)
3. Fuel economy	5	1.5	7.5	(15)
4. Durability	5	1.0	5	(10)
5. Cost	10	1.0	10	(10)
TOTAL SCORE		---	47.5	(70)

Scoring Criteria

Item

1. Meets gaseous emission goals
   (a) If HC, CO, NO_x below 0.25, 2.11 and 0.93 g/km respectively, score = 10.
   (b) If only one of the gaseous emissions is over the goal and it does not exceed the goal by more than 50%, score = 5.
   (c) If more than one of the gaseous emissions is over the goal, score = 0.

2. Sulfate emissions
   (a) If 3.1 mg/km or less on SET test score = 10.
   (b) If greater than 6.2 mg/km, score = 0.
   (c) Between 3.1 and 6.2 mg/km, score = 20 - (3.226 x Sulfate emissions, mg/km)

3. Fuel economy
   (a) If fuel economy improved by more than 5% score = 10.
   (b) If fuel economy ±5%, score = 5.
   (c) If fuel economy decreased by more than 5%, score = 0.

4. Durability
   (a) Estimate life of system without repairs or replacement (only addition parts added for sulfate control - not total system)
   (b) Score = $\frac{\text{Miles}}{50000} \times 10$

5. Cost
   (a) This is a relative evaluation - least cost system score = 10.
   (b) For other systems:
   score = $\frac{\text{least cost}}{\text{system cost}} \times 10$

System: Air Modulation

1. Gaseous Emissions (FTP) g/km

	HC	CO	NO_x
Air Modulation System	0.31	2.44	1.42
Baseline	0.33	1.15	1.84
Percent Difference	6.1	112.2	22.8
'75 Nova Baseline	0.19	1.24	0.86
Estimated w/air mod.	0.18	2.63	0.66
Goals	0.25	2.11	0.93
Percent Difference	-28.0%	+24.6%	29.0%

Score = 5

2. Sulfate Emissions (SET) mg/km

Air Modulation System: 0.57 mg/km
Goal: 3.11 mg/km

Score = 10

3. Fuel Consumption

	ℓ/100 km		
	FTP	FET	Composite
Air Modulation System	18.55	14.03	16.52
Baseline	17.54	13.36	15.66
Percent Change	+5.76	+5.02	+5.4

Score = 5

4. Durability

It is estimated that system will require some maintenance in 80,000 km (50,000 miles). To be on conservative side assume system will need to be replaced at 40,000 km (25,000 miles)

$$\text{Score} = \frac{25{,}000}{50{,}000} \times 10 = 5$$

5. Cost

a.) From other studies of automotive spare parts cost:
retail = 1.667 * wholesale

b.) Industrial discounts are approximately the same. For example Swagelok gives 30% discount on 10,000 or more.

c.) Assume manufacturer makes 15 profit on wholesale price.

d.) Assume that the air modulation valve can be combined with the present air pump diverter valve and that the vacuum switch can be combined with the EGR vacuum switch. Assume that these combinations result in a 50 percent increase in the price of the part.

e.) Cost of Air Modulation System:

	Retail	Wholesale	Mfgr. Cost	Total Additional Cost to Mfgr.
Mod. Valve	8.00	5.07	4.41	2.21
Vac Switch	5.60	3.57	3.10	1.55
Clutch	16.00	10.00 (with modification)	8.70	8.70
				$12.46

or as a very conservative estimate this system should cost the mfgr. less that $13.00

f.) This is the least cost system therefore score = 10.

Sulfate Control Durability Demonstration
Control System Evaluation Sheet

System High Temperature Exhaust

Evaluation Item	Score	Weighting Factor	Weighted Score	Max Possible Weighted Score
1. Meets gaseous emission goals	10	2.0	20	(20)
2. Sulfate emissions	0	1.5	0	(15)
3. Fuel economy	5	1.5	7.5	(15)
4. Durability	10	1.0	10	(10)
5. Cost	3.3	1.0	3.3	(10)
TOTAL SCORE		---	40.8	(70)

Scoring Criteria

Item

1. Meets gaseous emission goals
   (a) If HC, CO, NO_x below 0.25, 2.11 and 0.93 g/km respectively, score = 10.
   (b) If only one of the gaseous emissions is over the goal and it does not exceed the goal by more than 50%, score = 5.
   (c) If more than one of the gaseous emissions is over the goal, score = 0.

2. Sulfate emissions
   (a) If 3.1 mg/km or less on SET test score = 10.
   (b) If greater than 6.2 mg/km, score = 0.
   (c) Between 3.1 and 6.2 mg/km, score = 20 - (3.226 x Sulfate emissions, mg/km)

3. Fuel economy
   (a) If fuel economy improved by more than 5% score = 10.
   (b) If fuel economy ±5%, score = 5.
   (c) If fuel economy decreased by more than 5%, score = 0.

4. Durability
   (a) Estimate life of system without repairs or replacement (only addition parts added for sulfate control - not total system)
   (b) Score = $\frac{\text{Miles}}{50000} \times 10$

5. Cost
   (a) This is a relative evaluation - least cost system score = 10.
   (b) For other systems:
   score = $\frac{\text{least cost}}{\text{system cost}} \times 10$

1. Gaseous Emissions (FTP)

	g/km		
	HC	CO	NO_x
Baseline	0.19	1.24	0.86
w/port liners	0.16	2.05	0.86
Goals	0.25	2.11	0.93
Percent Difference	-36.0%	-2.8%	-7.5%

Score = 10

2. Sulfate Emission (SET)

w/port liners	6.30 mg/km
Goal	3.11 mg/km
Percent Difference	+103%

Score = 0

3. Fuel Economy

	ℓ/100 km		
	FTP	FET	Composite
Baseline	17.39	12.71	15.28
High Temp System	18.19	13.15	15.92
Percent Change	+4.6%	+3.5%	4.2%

Score = 5

4. Durability

There is no reason why properly designed portliners and manifolds should not last 50,000 miles. Therefore score = 10.

5. The cost of portliners and high temperature manifolds in quantity is unknown. However they are estimated to cost 3 times as much as the air modulation system.

Score = 1/3 x 10 = 3.3

APPENDIX B

COMPUTER PRINTOUTS
FOR
AIR MODULATION SYSTEM DEVELOPMENT
TESTS ON A 1976 CHEVROLET IMPALA
(Tests in Chronological Order)

TABLE

VEHICLE EMISSION RESULTS

1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. TEST NO. 1 DATE 3/17/77 MFGR. CODE -0 YR. 1976

VEHICLE MODEL CHEVROLET IMPALA ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 735.84 MM OF HG.
DRY BULB TEMP. 25.0 DEG. C
REL. HUMIDITY 63 PCT.

WET BULB TEMP 20.0 DEG. C
ABS. HUMIDITY 13.0 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 660.4 MM. H2O
BLOWER INLET PRESS., G1 660.4 MM. H2O
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.		1	2	3
BLOWER REVOLUTIONS		40620	69847	40649
HC	SAMPLE METER READING/SCALE	20.3/3	38.9/2	35.3/3
HC	SAMPLE PPM	203	39	353
HC	BACKGRD METER READING/SCALE	1.1/3	1.1/3	10.5/2
HC	BACKGRD PPM	11	11	10
CO	SAMPLE METER READING/SCALE	53.7/3	78.3/*	29.2/3
CO	SAMPLE PPM	1333	351	686
CO	BACKGRD METER READING/SCALE	.2/3	.2/3	.5/*
CO	BACKGRD PPM	4	4	1
CO2	SAMPLE METER READING/SCALE	44.1/2	72.0/3	94.6/3
CO2	SAMPLE PERCENT	1.96	1.30	1.77
CO2	BACKGRD METER READING/SCALE	1.7/2	1.9/2	3.7/3
CO2	BACKGRD PERCENT	.06	.07	.06
NOX	SAMPLE METER READING/SCALE	96.0/2	38.4/2	89.4/2
NOX	SAMPLE PPM	96.0	38.4	89.4
NOX	BACKGRD METER READING/SCALE	.8/2	1.0/2	.8/2
NOX	BACKGRD PPM	.8	1.0	.8
SO2	SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	SAMPLE PPM	-0.0	-0.0	-0.0
SO2	BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	BACKGRD PPM	-0.0	-0.0	-0.0
HC	CONCENTRATION PPM	194	29	344
CO	CONCENTRATION PPM	1252	332	648
CO2	CONCENTRATION PCT	1.90	1.24	1.73
NOX	CONCENTRATION PPM	95.3	37.5	88.7
SO2	CONCENTRATION PPM	0.0	0.0	0.0
HC	MASS GRAMS	8.49	2.19	15.09
CO	MASS GRAMS	110.85	50.48	57.37
CO2	MASS GRAMS	2662.83	2988.35	2414.89
NOX	MASS GRAMS	14.97	10.13	13.94
SO2	MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC 1.20 GRAMS/KILOMETRE
WEIGHTED MASS CO 10.84 GRAMS/KILOMETRE
WEIGHTED MASS CO2 456.59 GRAMS/KILOMETRE
WEIGHTED MASS NOX 2.03 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

CARBON BALANCE FUEL CONSUMPTION = 20.34 LITRES PER HUNDRED KILOMETRES
TOTAL CVS FLOW = 282.9 STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER

DATE 3/17/77	TIME -0 HRS.	TEST NO. 2
MODEL 1976 CHEVY IMPALA	SET-?	ENGINE 5.7 LITREV 8
DRIVER SR	TEST WT. 2177 KG.	GVW 0 KG
WET BULB TEMP 18 C	DRY BULB TEMP 25 C	REL. HUM. 49.2 PCT
SPEC. HUM. 10.0 GRAM/KG	BARO. 735.3 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION	23.29 MINUTES
BLOWER INLET PRESS.	660.4 MM. H2O
BLOWER DIF. PRESS.	660.4 MM H2O
BLOWER INLET TEMP.	43 DEG. C
DYNO REVOLUTIONS	31926
BLOWER REVOLUTIONS	112395
BLOWER CU. CM /REV.	2234

BAG RESULTS

HC SAMPLE METER READING/SCALE	43.1/2
HC SAMPLE PPM	43
HC BACKGRD METER READING/SCALE	9.6/2
HC BACKGRD PPM	10
CO SAMPLE METER READING/SCALE	23.2/3
CO SAMPLE PPM	537
CO BACKGRD METER READING/SCALE	.3/3
CO BACKGRD PPM	6
CO2 SAMPLE METER READING/SCALE	45.2/2
CO2 SAMPLE PERCENT	2.02
CO2 BACKGRD METER READING/SCALE	1.7/2
CO2 BACKGRD PERCENT	.06
NOX SAMPLE METER READING/SCALE	35.5/3
NOX SAMPLE PPM	106.5
NOX BACKGRD METER READING/SCALE	.3/3
NOX BACKGRD PPM	.9
HC CONCENTRATION PPM	35
CO CONCENTRATION PPM	503
CO2 CONCENTRATION PCT	1.96
NOX CONCENTRATION PPM	105.7
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	4.24
CO MASS (GRAMS)	122.99
CO2 MASS (GRAMS)	7591.60
NOX MASS (GRAMS)	41.57
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.19
CO GRAMS/KILOMETRE	5.59
CO2 GRAMS/KILOMETRE	345
NOX GRAMS/KILOMETRE	1.89
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	1.72	HC GRAMS/MIN	.18
CO GRAMS/KG OF FUEL	50.0	CO GRAMS/MIN	5.3
CO2 GRAMS/KG OF FUEL	3085	CO2 GRAMS/MIN	326
NOX GRAMS/KG OF FUEL	16.90	NOX GRAMS/MIN	1.78
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 15.22 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER

DATE 3/17/77 TIME -0 HRS. TEST NO. 2
MODEL 1976 CHEVY IMPALA SET-7 ENGINE 5.7 LITREO
RUN DURATION 23.29 MIN. DISTANCE DRIVEN 22.01 KILOMETRES
CVS BLOWER TEST VOL. 251.13 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2796	
SAMPLE VOL. CU. FT.	18.50	1.00
SAMPLE TEMP. DEG. F	85	70
SAMPLE AREA SQ. IN.	28283.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	5.00	5.00
STAND. AREA SQ. IN.	219365.00	1.00
SO4,MICROG/FILTER	6.447	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	5.00	5.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	3.461
NET H2SO4,MILLIGRAM/TEST	3.533
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	.157
NET H2SO4,MILLIGRAM/KILOMETRE	.161
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2461 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.76	0.000	.0012	.0012
PCT. RECOVERY		0.00	.15	.15

TABLE

VEHICLE EMISSION RESULTS
1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. 7 TEST NO. R DATE 3/30/77 MFGR. CODE -0 YR. 1976
VEHICLE MODEL CHEVY IMPALA ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 740.92 MM OF HG.
DRY BULB TEMP. 25.6 DEG. C
REL. HUMIDITY 28 PCT.

WET BULB TEMP 14.4 DEG. C
ABS. HUMIDITY 5.8 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 685.8 MM. H20
BLOWER INLET PRESS., G1 685.8 MM. H20
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40547	69687	40629
HC SAMPLE METER READING/SCALE	31.5/ 3	55.7/ 2	18.2/ 3
HC SAMPLE PPM	315	56	182
HC BACKGRD METER READING/SCALE	.9/ 3	1.0/ 3	6.3/ 2
HC BACKGRD PPM	9	10	6
CO SAMPLE METER READING/SCALE	77.0/11	29.3/13	69.2/12
CO SAMPLE PPM	342	27	157
CO BACKGRD METER READING/SCALE	.8/11	.6/11	1.4/13
CO BACKGRD PPM	2	2	1
CO2 SAMPLE METER READING/SCALE	49.5/ 2	32.8/ 2	43.5/ 2
CO2 SAMPLE PERCENT	2.25	1.38	1.92
CO2 BACKGRD METER READING/SCALE	1.6/ 2	1.3/ 2	1.2/ 2
CO2 BACKGRD PERCENT	.06	.05	.04
NOX SAMPLE METER READING/SCALE	50.5/ 3	28.7/ 3	47.3/ 3
NOX SAMPLE PPM	151.5	86.1	141.9
NOX BACKGRD METER READING/SCALE	.5/ 3	.5/ 3	.4/ 3
NOX BACKGRD PPM	1.5	1.5	1.2
SO2 SAMPLE METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	308	47	177
CO CONCENTRATION PPM	323	25	148
CO2 CONCENTRATION PCT	2.21	1.34	1.89
NOX CONCENTRATION PPM	150.3	84.8	140.9
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	13.50	3.53	7.77
CO MASS GRAMS	28.60	3.78	13.18
CO2 MASS GRAMS	3088.92	3213.10	2647.73
NOX MASS GRAMS	18.82	18.24	17.68
SO2 MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC 1.14 GRAMS/KILOMETRE
WEIGHTED MASS CO 1.95 GRAMS/KILOMETRE
WEIGHTED MASS CO2 501.39 GRAMS/KILOMETRE
WEIGHTED MASS NOX 3.02 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

CARBON BALANCE FUEL CONSUMPTION = 21.66 LITRES PER HUNDRED KILOMETRES
TOTAL CVS FLOW = 283.3 STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER

DATE 3/30/77	TIME -0 HRS.	TEST NO. 2
MODEL 1976 CHEVY IMPALA	SET 7	ENGINE 5.7 LITRE 8
DRIVER SR	TEST WT. 2177 KG.	GVW 0 KG
WET BULB TEMP 16 C	DRY BULB TEMP 27 C	REL. HUM. 29.4 PCT
SPEC. HUM. 6.5 GRAM/KG	BARO. 740.9 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION	23.27 MINUTES
BLOWER INLET PRESS.	762.0 MM. H2O
BLOWER DIF. PRESS.	762.0 MM H2O
BLOWER INLET TEMP.	44 DEG. C
DYNO REVOLUTIONS	31808
BLOWER REVOLUTIONS	112082
BLOWER CU. CM /REV.	2229

BAG RESULTS

HC SAMPLE METER READING/SCALE	11.1/3
HC SAMPLE PPM	111
HC BACKGRD METER READING/SCALE	.8/3
HC BACKGRD PPM	8
CO SAMPLE METER READING/SCALE	24.9/*
CO SAMPLE PPM	328
CO BACKGRD METER READING/SCALE	.9/*
CO BACKGRD PPM	3
CO2 SAMPLE METER READING/SCALE	49.2/2
CO2 SAMPLE PERCENT	2.24
CO2 BACKGRD METER READING/SCALE	1.6/2
CO2 BACKGRD PERCENT	.06
NOX SAMPLE METER READING/SCALE	55.9/3
NOX SAMPLE PPM	167.7
NOX BACKGRD METER READING/SCALE	.4/3
NOX BACKGRD PPM	1.2
HC CONCENTRATION PPM	104
CO CONCENTRATION PPM	309
CO2 CONCENTRATION PCT	2.19
NOX CONCENTRATION PPM	166.7
SO2 CONCENTRATION PPM	0.0
HC MASS (GRAMS)	12.51
CO MASS (GRAMS)	74.75
CO2 MASS (GRAMS)	8366.62
NOX MASS (GRAMS)	58.26
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.57
CO GRAMS/KILOMETRE	3.41
CO2 GRAMS/KILOMETRE	381
NOX GRAMS/KILOMETRE	2.66
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	4.65	HC GRAMS/MIN	.54
CO GRAMS/KG OF FUEL	27.8	CO GRAMS/MIN	3.2
CO2 GRAMS/KG OF FUEL	3111	CO2 GRAMS/MIN	360
NOX GRAMS/KG OF FUEL	21.66	NOX GRAMS/MIN	2.50
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 16.69 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER

DATE 3/30/77 TIME -0 HRS. TEST NO. 2
MODEL 1976 CHEVY IMPALA SET 7 ENGINE 5.7 LITREO
RUN DURATION 23.27 MIN. DISTANCE DRIVEN 21.93 KILOMETRES
CVS BLOWER TEST VOL. 244.86 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH2800	
SAMPLE VOL. CU. FT.	11.96	1.00
SAMPLE TEMP. DEG. F	84	70
SAMPLE AREA SQ. IN.	233270.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	5.00	1.00
STAND. AREA SQ. IN.	202281.00	1.00
SO4,MICROG/FILTER	57.660	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	48.402
NET H2SO4,MILLIGRAM/TEST	49.418
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	2.207
NET H2SO4,MILLIGRAM/KILOMETRE	2.253
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2689 GRAMS SULFUR IN FUEL, .0320 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.86	0.000	.0162	.0162
PCT. RECOVERY		0.00	1.88	1.88

TABLE

VEHICLE EMISSION RESULTS

1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. 7 TEST NO. 1 DATE 4/ 1/77 MFGR. CODE -0 YR. 1976

VEHICLE MODEL CHEVY IMPALA ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 740.92 MM OF HG.
DRY BULB TEMP. 22.2 DEG. C
REL. HUMIDITY 53 PCT.

WET BULB TEMP 16.1 DEG. C
ABS. HUMIDITY 9.1 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 711.2 MM. H2O

BLOWER INLET PRESS., G1 711.2 MM. H2O

BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.		1	2	3
BLOWER REVOLUTIONS		40635	69746	40635
HC	SAMPLE METER READING/SCALE	30.0/3	42.6/2	13.9/3
HC	SAMPLE PPM	300	43	139
HC	BACKGRD METER READING/SCALE	1.3/3	1.1/3	9.7/2
HC	BACKGRD PPM	13	11	10
CO	SAMPLE METER READING/SCALE	94.2/*	14.8/*	74.2/*
CO	SAMPLE PPM	481	14	170
CO	BACKGRD METER READING/SCALE	3.2/*	1.7/*	5.3/*
CO	BACKGRD PPM	10	5	5
CO2	SAMPLE METER READING/SCALE	44.9/2	29.9/2	40.9/2
CO2	SAMPLE PERCENT	2.00	1.24	1.79
CO2	BACKGRD METER READING/SCALE	1.7/2	1.5/2	2.0/2
CO2	BACKGRD PERCENT	.06	.05	.07
NOX	SAMPLE METER READING/SCALE	39.5/3	57.7/2	37.2/3
NOX	SAMPLE PPM	118.5	57.7	111.6
NOX	BACKGRD METER READING/SCALE	.4/3	.4/3	1.2/2
NOX	BACKGRD PPM	1.2	1.2	1.2
SO2	SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	SAMPLE PPM	-0.0	-0.0	-0.0
SO2	BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	BACKGRD PPM	-0.0	-0.0	-0.0
HC	CONCENTRATION PPM	289	33	131
CO	CONCENTRATION PPM	446	9	157
CO2	CONCENTRATION PCT	1.95	1.19	1.72
NOX	CONCENTRATION PPM	117.5	56.6	110.6
SO2	CONCENTRATION PPM	0.0	0.0	0.0
HC	MASS GRAMS	12.67	2.45	5.72
CO	MASS GRAMS	39.46	1.35	13.92
CO2	MASS GRAMS	2721.69	2851.36	2408.90
NOX	MASS GRAMS	16.21	13.41	15.25
SO2	MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .93 GRAMS/KILOMETRE
WEIGHTED MASS CO 2.18 GRAMS/KILOMETRE
WEIGHTED MASS CO2 447.05 GRAMS/KILOMETRE
WEIGHTED MASS NOX 2.41 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

CARBON BALANCE FUEL CONSUMPTION = 19.33 LITRES PER HUNDRED KILOMETRES
TOTAL CVS FLOW = 282.4 STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 7

DATE 4/ 1/77	TIME -0 HRS.	TEST NO. 2
MODEL 1976 CHEVY IMPALA	SET-7	ENGINE 5.7 LITREV 8
DRIVER BP	TEST WT. 0 KG.	GVW 0 KG
WET BULB TEMP 16 C	DRY BULB TEMP 21 C	REL. HUM. 55.9 PCT
SPEC. HUM. 9.0 GRAM/KG	BARO. 737.9 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION	23.28 MINUTES
BLOWER INLET PRESS.	711.2 MM. H2O
BLOWER DIF. PRESS.	711.2 MM H2O
BLOWER INLET TEMP.	40 DEG. C
DYNO REVOLUTIONS	31303
BLOWER REVOLUTIONS	112285
BLOWER CU. CM /REV.	2222

BAG RESULTS

HC SAMPLE METER READING/SCALE	9.8/3
HC SAMPLE PPM	98
HC BACKGRD METER READING/SCALE	1.0/3
HC BACKGRD PPM	10
CO SAMPLE METER READING/SCALE	22.9/3
CO SAMPLE PPM	530
CO BACKGRD METER READING/SCALE	.6/3
CO BACKGRD PPM	13
CO2 SAMPLE METER READING/SCALE	45.8/2
CO2 SAMPLE PERCENT	2.05
CO2 BACKGRD METER READING/SCALE	1.9/2
CO2 BACKGRD PERCENT	.07
NOX SAMPLE METER READING/SCALE	35.3/3
NOX SAMPLE PPM	105.9
NOX BACKGRD METER READING/SCALE	.4/3
NOX BACKGRD PPM	1.2
HC CONCENTRATION PPM	90
CO CONCENTRATION PPM	489
CO2 CONCENTRATION PCT	1.99
NOX CONCENTRATION PPM	104.9
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	10.86
CO MASS (GRAMS)	119.67
CO2 MASS (GRAMS)	7698.03
NOX MASS (GRAMS)	39.89
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.50
CO GRAMS/KILOMETRE	5.54
CO2 GRAMS/KILOMETRE	357
NOX GRAMS/KILOMETRE	1.85
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	4.35	HC GRAMS/MIN	.47
CO GRAMS/KG OF FUEL	47.9	CO GRAMS/MIN	5.1
CO2 GRAMS/KG OF FUEL	3080	CO2 GRAMS/MIN	331
NOX GRAMS/KG OF FUEL	15.96	NOX GRAMS/MIN	1.71
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 15.76 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 7

DATE 4/ 1/77 TIME -0 HRS. TEST NO. 2
MODEL 1976 CHEVY IMPALA SET-7 ENGINE 5.7 LITRE
RUN DURATION 23.28 MIN. DISTANCE DRIVEN 21.58 KILOMETRES
CVS BLOWER TEST VOL. 249.47 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47-FH-2803	
SAMPLE VOL. CU. FT.	15.38	1.00
SAMPLE TEMP. DEG. F	72	70
SAMPLE AREA SQ. IN.	36934.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	20.00	1.00
STAND. AREA SQ. IN.	212327.00	1.00
SO4,MICROG/FILTER	34.790	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	22.771
NET H2SO4,MILLIGRAM/TEST	23.250
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	1.055
NET H2SO4,MILLIGRAM/KILOMETRE	1.077
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2499 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.77	0.000	.0076	.0076
PCT. RECOVERY		0.00	.98	.98

TABLE

VEHICLE EMISSION RESULTS
1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. 7 TEST NO. R DATE 4/ 6/77 MFGR. CODE -0 YR. 1976
VEHICLE MODEL CHEVY IMPALA ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 749.55 MM OF HG.
DRY BULB TEMP. 20.6 DEG. C
REL. HUMIDITY 32 PCT.

WET BULB TEMP 11.7 DEG. C
ABS. HUMIDITY 4.9 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 736.6 MM. H20
BLOWER INLET PRESS., G1 736.6 MM. H20
BLOWER INLET TEMP. 42 DEG. C

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40585	69604	40595
HC SAMPLE METER READING/SCALE	13.5/ 3	35.8/ 2	20.0/ 2
HC SAMPLE PPM	135	36	20
HC BACKGRD METER READING/SCALE	.6/ 3	.8/ 3	6.0/ 2
HC BACKGRD PPM	6	8	6
CO SAMPLE METER READING/SCALE	31.7/ 3	55.1/12	68.6/12
CO SAMPLE PPM	749	120	155
CO BACKGRD METER READING/SCALE	.1/ 3	.1/ 3	.8/12
CO BACKGRD PPM	2	2	1
CO2 SAMPLE METER READING/SCALE	44.3/ 2	71.8/ 3	89.4/ 3
CO2 SAMPLE PERCENT	1.97	1.30	1.67
CO2 BACKGRD METER READING/SCALE	1.7/ 2	1.9/ 2	4.3/ 3
CO2 BACKGRD PERCENT	.06	.07	.07
NOX SAMPLE METER READING/SCALE	47.3/ 3	62.2/ 2	40.9/ 3
NOX SAMPLE PPM	141.9	62.2	122.7
NOX BACKGRD METER READING/SCALE	.6/ 3	.5/ 3	1.2/ 2
NOX BACKGRD PPM	1.8	1.5	1.2
SO2 SAMPLE METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	130	29	15
CO CONCENTRATION PPM	711	114	147
CO2 CONCENTRATION PCT	1.92	1.24	1.61
NOX CONCENTRATION PPM	140.4	60.8	121.7
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	5.75	2.17	.65
CO MASS GRAMS	63.60	17.48	13.17
CO2 MASS GRAMS	2703.88	2999.49	2270.56
NOX MASS GRAMS	17.29	12.85	14.99
SO2 MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .42 GRAMS/KILOMETRE
WEIGHTED MASS CO 4.34 GRAMS/KILOMETRE
WEIGHTED MASS CO2 452.15 GRAMS/KILOMETRE
WEIGHTED MASS NOX 2.39 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

CARBON BALANCE FUEL CONSUMPTION = 19.62 LITRES PER HUNDRED KILOMETRES
TOTAL CVS FLOW = 285.3 STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 7

DATE 4/ 6/77	TIME 2 HRS.	TEST NO. -0
MODEL 1976 CHEVY IMPALA	SET-7	ENGINE 5.7 LITRE 8
DRIVER BP	TEST WT. 0 KG.	GVW 0 KG
WET BULB TEMP 12 C	DRY BULB TEMP 21 C	REL. HUM. 33.1 PCT
SPEC. HUM. 5.2 GRAM/KG	BARO. 749.6 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION	23.29 MINUTES
BLOWER INLET PRESS.	736.6 MM. H2O
BLOWER DIF. PRESS.	736.6 MM H2O
BLOWER INLET TEMP.	42 DEG. C
DYNO REVOLUTIONS	32587
BLOWER REVOLUTIONS	112068
BLOWER CU. CM /REV.	2227

BAG RESULTS

HC SAMPLE METER READING/SCALE	14.5/2
HC SAMPLE PPM	14
HC BACKGRD METER READING/SCALE	6.2/2
HC BACKGRD PPM	6
CO SAMPLE METER READING/SCALE	60.0/*
CO SAMPLE PPM	133
CO BACKGRD METER READING/SCALE	.8/*
CO BACKGRD PPM	1
CO2 SAMPLE METER READING/SCALE	45.1/2
CO2 SAMPLE PERCENT	2.01
CO2 BACKGRD METER READING/SCALE	2.0/2
CO2 BACKGRD PERCENT	.07
NOX SAMPLE METER READING/SCALE	53.8/3
NOX SAMPLE PPM	161.4
NOX BACKGRD METER READING/SCALE	.5/3
NOX BACKGRD PPM	1.5
HC CONCENTRATION PPM	9
CO CONCENTRATION PPM	125
CO2 CONCENTRATION PCT	1.95
NOX CONCENTRATION PPM	160.1
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	1.13
CO MASS (GRAMS)	30.80
CO2 MASS (GRAMS)	7593.80
NOX MASS (GRAMS)	54.91
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.05
CO GRAMS/KILOMETRE	1.37
CO2 GRAMS/KILOMETRE	338
NOX GRAMS/KILOMETRE	2.44
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.47	HC GRAMS/MIN	.05
CO GRAMS/KG OF FUEL	12.8	CO GRAMS/MIN	1.3
CO2 GRAMS/KG OF FUEL	3148	CO2 GRAMS/MIN	326
NOX GRAMS/KG OF FUEL	22.76	NOX GRAMS/MIN	2.36
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 14.54 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 7

DATE 4/ 6/77 TIME 2 HRS. TEST NO. -0
MODEL 1976 CHEVY IMPALA SET-7 ENGINE 5.7 LITREO
RUN DURATION 23.29 MIN. DISTANCE DRIVEN 22.47 KILOMETRES
CVS BLOWER TEST VOL. 244.56 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2804	
SAMPLE VOL. CU. FT.	13.69	1.00
SAMPLE TEMP. DEG. F	78	70
SAMPLE AREA SQ. IN.	177881.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	5.00	1.00
STAND. AREA SQ. IN.	212747.00	1.00
SO4,MICROG/FILTER	41.806	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	30.679
NET H2SO4,MILLIGRAM/TEST	31.323
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	1.365
NET H2SO4,MILLIGRAM/KILOMETRE	1.394
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2412 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.75	0.000	.0102	.0102
PCT. RECOVERY		0.00	1.37	1.37

TABLE

VEHICLE EMISSION RESULTS

1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. TEST NO. R DATE 4/19/77 MFGR. CODE -0 YR. 1976
VEHICLE MODEL CHEVY IMPALA ENGINE 5.74 LITRE CURB WT. 0 KG GVM 0 KG

BAROMETER 738.12 MM OF HG.
DRY BULB TEMP. 23.9 DEG. C
REL. HUMIDITY 52 PCT.

WET BULB TEMP 18.9 DEG. C
ABS. HUMIDITY 11.9 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 723.9 MM. H2O
BLOWER INLET PRESS., G1 723.9 MM. H2O
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.		1	2	3
BLOWER REVOLUTIONS		40584	69956	40666
HC	SAMPLE METER READING/SCALE	89.3/ 2	20.4/ 2	39.5/ 2
HC	SAMPLE PPM	89	20	39
HC	BACKGRD METER READING/SCALE	9.3/ 2	9.3/ 2	8.8/ 2
HC	BACKGRD PPM	9	9	9
CO	SAMPLE METER READING/SCALE	41.9/ 3	64.2/11	31.0/ 3
CO	SAMPLE PPM	1013	263	732
CO	BACKGRD METER READING/SCALE	.2/ 3	.4/ 3	2.3/11
CO	BACKGRD PPM	4	9	7
CO2	SAMPLE METER READING/SCALE	45.2/ 2	66.0/ 3	98.5/ 3
CO2	SAMPLE PERCENT	2.02	1.18	1.86
CO2	BACKGRD METER READING/SCALE	1.9/ 2	1.9/ 2	4.4/ 3
CO2	BACKGRD PERCENT	.07	.07	.07
NOX	SAMPLE METER READING/SCALE	78.0/ 2	37.1/ 2	67.2/ 2
NOX	SAMPLE PPM	78.0	37.1	67.2
NOX	BACKGRD METER READING/SCALE	.9/ 2	.8/ 2	.9/ 2
NOX	BACKGRD PPM	.9	.8	.9
SO2	SAMPLE METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2	SAMPLE PPM	-0.0	-0.0	-0.0
SO2	BACKGRD METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2	BACKGRD PPM	-0.0	-0.0	-0.0
HC	CONCENTRATION PPM	81	12	32
CO	CONCENTRATION PPM	950	244	685
CO2	CONCENTRATION PCT	1.96	1.12	1.80
NOX	CONCENTRATION PPM	77.2	36.4	66.4
SO2	CONCENTRATION PPM	0.0	0.0	0.0
HC	MASS GRAMS	3.55	.90	1.39
CO	MASS GRAMS	83.46	36.95	60.32
CO2	MASS GRAMS	2717.59	2680.78	2501.92
NOX	MASS GRAMS	11.60	9.42	10.00
SO2	MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .27 GRAMS/KILOMETRE
WEIGHTED MASS CO 8.89 GRAMS/KILOMETRE
WEIGHTED MASS CO2 437.16 GRAMS/KILOMETRE
WEIGHTED MASS NOX 1.62 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

CARBON BALANCE FUEL CONSUMPTION = 19.26 LITRES PER HUNDRED KILOMETRES
TOTAL CVS FLOW = 281.2 STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 7

DATE 4/19/77	TIME -0 HRS.	TEST NO. 2
MODEL 1976 CHEVY IMPALA	SET-7	ENGINE 5.7 LITREV 8
DRIVER SR	TEST WT. 2177 KG.	GVW 0 KG
WET BULB TEMP 18 C	DRY BULB TEMP 24 C	REL. HUM. 55.6 PCT
SPEC. HUM. 10.9 GRAM/KG	BARO. 737.4 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION	23.27 MINUTES
BLOWER INLET PRESS.	723.9 MM. H2O
BLOWER DIF. PRESS.	723.9 MM H2O
BLOWER INLET TEMP.	44 DEG. C
DYNO REVOLUTIONS	32830
BLOWER REVOLUTIONS	112088
BLOWER CU. CM /REV.	2232

BAG RESULTS

HC SAMPLE METER READING/SCALE	24.7/2
HC SAMPLE PPM	25
HC BACKGRD METER READING/SCALE	8.5/2
HC BACKGRD PPM	9
CO SAMPLE METER READING/SCALE	23.0/3
CO SAMPLE PPM	532
CO BACKGRD METER READING/SCALE	2.1/*
CO BACKGRD PPM	6
CO2 SAMPLE METER READING/SCALE	46.7/2
CO2 SAMPLE PERCENT	2.10
CO2 BACKGRD METER READING/SCALE	2.3/2
CO2 BACKGRD PERCENT	.08
NOX SAMPLE METER READING/SCALE	92.8/2
NOX SAMPLE PPM	92.8
NOX BACKGRD METER READING/SCALE	1.4/2
NOX BACKGRD PPM	1.4
HC CONCENTRATION PPM	18
CO CONCENTRATION PPM	496
CO2 CONCENTRATION PCT	2.03
NOX CONCENTRATION PPM	91.6
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	2.11
CO MASS (GRAMS)	120.11
CO2 MASS (GRAMS)	7752.97
NOX MASS (GRAMS)	36.71
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.10
CO GRAMS/KILOMETRE	5.53
CO2 GRAMS/KILOMETRE	357
NOX GRAMS/KILOMETRE	1.69
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.84	HC GRAMS/MIN	.09
CO GRAMS/KG OF FUEL	47.9	CO GRAMS/MIN	5.2
CO2 GRAMS/KG OF FUEL	3091	CO2 GRAMS/MIN	333
NOX GRAMS/KG OF FUEL	14.64	NOX GRAMS/MIN	1.58
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 15.63 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 7

DATE 4/19/77 TIME -0 HRS. TEST NO. 2
MODEL 1976 CHEVY IMPALA SET-7 ENGINE 5.7 LITREO
RUN DURATION 23.27 MIN. DISTANCE DRIVEN 21.74 KILOMETRES
CVS BLOWER TEST VOL. 250.21 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47-FH-2808	
SAMPLE VOL. CU. FT.	19.79	1.00
SAMPLE TEMP. DEG. F	88	70
SAMPLE AREA SQ. IN.	49251.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	20.00	1.00
STAND. AREA SQ. IN.	153135.00	1.00
SO4, MICROG/FILTER	64.324	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA, BUBBLER 1	0.00	0.00
DIL. FACT., BUBBLER 1	1	1
AREA, BUBBLER 2	0.00	0.00
DIL. FACT., BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA, SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE, MILLIGRAM/TEST	32.312
NET H2SO4, MILLIGRAM/TEST	32.991
NET SO2, GRAM/TEST	0.000
NET SULFATE, MILLIGRAM/KILOMETRE	1.486
NET H2SO4, MILLIGRAM/KILOMETRE	1.518
NET SO2, GRAM/KILOMETRE	0.000

SULFUR BALANCE

FUEL WT., 2508 GRAMS	SULFUR IN FUEL, .0310 PCT.			
	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR, GRAMS	.78	0.000	.0108	.0108
PCT. RECOVERY		0.00	1.39	1.39

TABLE VEHICLE EMISSION RESULTS
1975 LIGHT DUTY EMISSIONS TEST

INIT NO. 7 TEST NO. 8 DATE 5/ 5/77 MFGR. CODE -0 YR. 1976
VEHICLE MODEL CHEVY IMPALA ENGINE 5.74 LITRE CURB WT. 0 KG GVM 0 KG

BAROMETER 737.11 MM OF HG.
DRY BULB TEMP. 25.0 DEG. C
REL. HUMIDITY 71 PCT.

WET BULB TEMP 21.1 DEG. C
ABS. HUMIDITY 14.5 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 711.2 MM. H20
BLOWER INLET PRESS., G1 711.2 MM. H20
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.		1	2	3
BLOWER REVOLUTIONS		40220	69838	40690
HC	SAMPLE METER READING/SCALE	50.3/ 2	18.3/ 2	26.7/ 2
HC	SAMPLE PPM	50	18	27
HC	BACKGRD METER READING/SCALE	11.1/ 2	11.8/ 2	12.4/ 2
HC	BACKGRD PPM	11	12	12
CO	SAMPLE METER READING/SCALE	28.3/12	7.2/13	56.6/13
CO	SAMPLE PPM	182	7	54
CO	BACKGRD METER READING/SCALE	.6/12	.2/12	1.2/13
CO	BACKGRD PPM	1	0	1
CO2	SAMPLE METER READING/SCALE	42.4/ 2	65.7/ 3	89.8/ 3
CO2	SAMPLE PERCENT	1.87	1.18	1.67
CO2	BACKGRD METER READING/SCALE	1.6/ 2	1.5/ 2	4.3/ 3
CO2	BACKGRD PERCENT	.06	.05	.07
NOX	SAMPLE METER READING/SCALE	84.1/ 2	46.5/ 2	87.5/ 2
NOX	SAMPLE PPM	84.1	46.5	87.5
NOX	BACKGRD METER READING/SCALE	1.5/ 2	1.7/ 2	1.7/ 2
NOX	BACKGRD PPM	1.5	1.7	1.7
SO2	SAMPLE METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2	SAMPLE PPM	-0.0	-0.0	-0.0
SO2	BACKGRD METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2	BACKGRD PPM	-0.0	-0.0	-0.0
HC	CONCENTRATION PPM	41	8	16
CO	CONCENTRATION PPM	170	6	50
CO2	CONCENTRATION PCT	1.82	1.13	1.62
NOX	CONCENTRATION PPM	82.8	44.9	86.0
SO2	CONCENTRATION PPM	0.0	0.0	0.0
HC	MASS GRAMS	1.78	.57	.69
CO	MASS GRAMS	15.07	.95	4.41
CO2	MASS GRAMS	2535.39	2696.74	2252.20
NOX	MASS GRAMS	13.75	12.78	14.25
SO2	MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .14 GRAMS/KILOMETRE
WEIGHTED MASS CO .82 GRAMS/KILOMETRE
WEIGHTED MASS CO2 420.20 GRAMS/KILOMETRE
WEIGHTED MASS NOX 2.22 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

CARBON BALANCE FUEL CONSUMPTION = 17.99 LITRES PER HUNDRED KILOMETRES
TOTAL CVS FLOW = 281.8 STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 7

DATE 5/ 5/77	TIME -0 HRS.	TEST NO. 2
MODEL 1976 CHEVY FM 7	SET 7	ENGINE 5.7 LITREV 8
DRIVER SR	TEST WT. 2267 KG.	GVW 0 KG
WET BULB TEMP 21 C	DRY BULB TEMP 25 C	REL. HUM. 70.9 PCT
SPEC. HUM. 14.5 GRAM/KG	BARO. 737.1 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION 23.28 MINUTES
BLOWER INLET PRESS. 711.2 MM. H2O
BLOWER DIF. PRESS. 711.2 MM H2O
BLOWER INLET TEMP. 45 DEG. C
DYNO REVOLUTIONS 31814
BLOWER REVOLUTIONS 112244
BLOWER CU. CM /REV. 2239

BAG RESULTS

HC SAMPLE METER READING/SCALE	19.0/2
HC SAMPLE PPM	19
HC BACKGRD METER READING/SCALE	11.9/2
HC BACKGRD PPM	12
CO SAMPLE METER READING/SCALE	18.7/*
CO SAMPLE PPM	18
CO BACKGRD METER READING/SCALE	.7/*
CO BACKGRD PPM	1
CO2 SAMPLE METER READING/SCALE	44.0/2
CO2 SAMPLE PERCENT	1.95
CO2 BACKGRD METER READING/SCALE	1.9/2
CO2 BACKGRD PERCENT	.07
NOX SAMPLE METER READING/SCALE	39.8/3
NOX SAMPLE PPM	119.4
NOX BACKGRD METER READING/SCALE	.9/3
NOX BACKGRD PPM	2.7
HC CONCENTRATION PPM	9
CO CONCENTRATION PPM	16
CO2 CONCENTRATION PCT	1.89
NOX CONCENTRATION PPM	117.1
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	1.06
CO MASS (GRAMS)	3.86
CO2 MASS (GRAMS)	7260.28
NOX MASS (GRAMS)	53.41
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.05
CO GRAMS/KILOMETRE	.18
CO2 GRAMS/KILOMETRE	331
NOX GRAMS/KILOMETRE	2.44
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.46	HC GRAMS/MIN	.05
CO GRAMS/KG OF FUEL	1.7	CO GRAMS/MIN	.2
CO2 GRAMS/KG OF FUEL	3165	CO2 GRAMS/MIN	312
NOX GRAMS/KG OF FUEL	23.29	NOX GRAMS/MIN	2.29
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 14.23 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 7

DATE 5/ 5/77 TIME -0 HRS. TEST NO. 2
MODEL 1976 CHEVY EM 7 SET 7 ENGINE 5.7 LITRE0
RUN DURATION 23.28 MIN. DISTANCE DRIVEN 21.94 KILOMETRES
CVS BLOWER TEST VOL. 251.30 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47-FH-2809	
SAMPLE VOL. CU. FT.	13.52	1.00
SAMPLE TEMP. DEG. F	86	70
SAMPLE AREA SQ. IN.	167417.00	0.00
DILUTION FACTOR	5	1
STAND. DEN. MICROG/ML	20.00	1.00
STAND. AREA SQ. IN.	177450.00	1.00
SO4,MICROG/FILTER	943.460	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	699.702
NET H2SO4,MILLIGRAM/TEST	714.396
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	31.899
NET H2SO4,MILLIGRAM/KILOMETRE	32.569
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2294 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.71	0.000	.2336	.2336
PCT. RECOVERY		0.00	32.85	32.85

TABLE

VEHICLE EMISSION RESULTS
1975 LIGHT DUTY EMISSIONS TEST

VIT NO. TEST NO. * DATE 5/10/77 MFGR. CODE -0 YR. 1976
EHICLE MODEL CHEVY IMPALA ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

AROMETER 737.62 MM OF HG. WET BULB TEMP 20.6 DEG. C
Y BULB TEMP. 27.8 DEG. C ABS. HUMIDITY 12.5 GRAMS/KG
EL. HUMIDITY 52 PCT.

XHAUST EMISSIONS

BLOWER INLET PRESS., G1 647.7 MM. H2O
BLOWER DIF. PRESS., G2, 647.7 MM. H2O BLOWER INLET TEMP. 43 DEG. C
BAG RESULTS

BAG NO.		1	2	3
BLOWER REVOLUTIONS		40794	70107	40527
HC	SAMPLE METER READING/SCALE	51.0/2	20.4/2	27.7/2
HC	SAMPLE PPM	51	20	28
HC	BACKGRD METER READING/SCALE	15.0/2	14.3/2	12.2/2
HC	BACKGRD PPM	15	14	12
CO	SAMPLE METER READING/SCALE	63.5/*	22.2/*	64.0/*
CO	SAMPLE PPM	142	21	62
CO	BACKGRD METER READING/SCALE	6.1/*	3.6/*	4.5/*
CO	BACKGRD PPM	11	6	4
CO2	SAMPLE METER READING/SCALE	42.8/2	62.8/3	88.5/3
CO2	SAMPLE PERCENT	1.89	1.12	1.65
CO2	BACKGRD METER READING/SCALE	1.8/2	1.8/2	4.1/3
CO2	BACKGRD PERCENT	.07	.07	.06
NOX	SAMPLE METER READING/SCALE	27.3/3	45.6/2	87.3/2
NOX	SAMPLE PPM	81.9	45.6	87.3
NOX	BACKGRD METER READING/SCALE	.4/3	.4/3	1.4/2
NOX	BACKGRD PPM	1.2	1.2	1.4
SO2	SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	SAMPLE PPM	-0.0	-0.0	-0.0
SO2	BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	BACKGRD PPM	-0.0	-0.0	-0.0
HC	CONCENTRATION PPM	38	7	17
CO	CONCENTRATION PPM	125	14	55
CO2	CONCENTRATION PCT	1.83	1.06	1.59
NOX	CONCENTRATION PPM	80.9	44.5	86.1
SO2	CONCENTRATION PPM	0.0	0.0	0.0
HC	MASS GRAMS	1.69	.55	.75
CO	MASS GRAMS	11.13	2.17	4.88
CO2	MASS GRAMS	2580.52	2565.07	2228.50
NOX	MASS GRAMS	12.59	11.91	13.31
SO2	MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .14 GRAMS/KILOMETRE
WEIGHTED MASS CO .81 GRAMS/KILOMETRE
WEIGHTED MASS CO2 409.77 GRAMS/KILOMETRE
WEIGHTED MASS NOX 2.06 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

CARBON BALANCE FUEL CONSUMPTION = 17.55 LITRES PER HUNDRED KILOMETRES
TOTAL CVS FLOW = 284.5 STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER

DATE 5/10/77	TIME -0 HRS.	TEST NO. 2
MODEL 1976 CHEVY	SET-7	ENGINE 5.7 LITRE 8
DRIVER SR	TEST WT. 2267 KG.	GVW 0 KG
WET BULB TEMP 21 C	DRY BULB TEMP 30 C	REL. HUM. 42.2 PCT
SPEC. HUM. 11.5 GRAM/KG	BARO. 737.9 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION 23.28 MINUTES
BLOWER INLET PRESS. 660.4 MM. H20
BLOWER DIF. PRESS. 660.4 MM H20
BLOWER INLET TEMP. 43 DEG. C
DYNO REVOLUTIONS 31709
BLOWER REVOLUTIONS 112483
BLOWER CU. CM /REV. 2235

BAG RESULTS

HC SAMPLE METER READING/SCALE	27.9/2
HC SAMPLE PPM	28
HC BACKGRD METER READING/SCALE	15.2/2
HC BACKGRD PPM	15
CO SAMPLE METER READING/SCALE	19.9/*
CO SAMPLE PPM	19
CO BACKGRD METER READING/SCALE	3.0/*
CO BACKGRD PPM	3
CO2 SAMPLE METER READING/SCALE	43.0/2
CO2 SAMPLE PERCENT	1.90
CO2 BACKGRD METER READING/SCALE	2.0/2
CO2 BACKGRD PERCENT	.07
NOX SAMPLE METER READING/SCALE	36.9/3
NOX SAMPLE PPM	110.7
NOX BACKGRD METER READING/SCALE	.7/3
NOX BACKGRD PPM	2.1
HC CONCENTRATION PPM	15
CO CONCENTRATION PPM	15
CO2 CONCENTRATION PCT	1.84
NOX CONCENTRATION PPM	108.9
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	1.81
CO MASS (GRAMS)	3.75
CO2 MASS (GRAMS)	7127.39
NOX MASS (GRAMS)	45.18
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.08
CO GRAMS/KILOMETRE	.17
CO2 GRAMS/KILOMETRE	326
NOX GRAMS/KILOMETRE	2.07
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.80	HC GRAMS/MIN	.08
CO GRAMS/KG OF FUEL	1.7	CO GRAMS/MIN	.2
CO2 GRAMS/KG OF FUEL	3164	CO2 GRAMS/MIN	306
NOX GRAMS/KG OF FUEL	20.06	NOX GRAMS/MIN	1.94
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 13.96 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER

DATE 5/10/77 TIME -0 HRS. TEST NO. 2
MODEL 1976 CHEVY SET-7 ENGINE 5.7 LITRE0
RUN DURATION 23.28 MIN. DISTANCE DRIVEN 21.86 KILOMETRES
CVS BLOWER TEST VOL. 251.37 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2810	
SAMPLE VOL. CU. FT.	13.26	1.00
SAMPLE TEMP. DEG. F	85	70
SAMPLE AREA SQ. IN.	203180.00	0.00
DILUTION FACTOR	5	1
STAND. DEN. MICROG/ML	20.00	1.00
STAND. AREA SQ. IN.	190837.00	1.00
SO4,MICROG/FILTER	1064.678	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	20.00	20.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	798.106
NET H2SO4,MILLIGRAM/TEST	814.866
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	36.505
NET H2SO4,MILLIGRAM/KILOMETRE	37.272
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2259 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.70	0.000	.2665	.2665
PCT. RECOVERY		0.00	38.16	38.16

TABLE

VEHICLE EMISSION RESULTS
1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. 7 TEST NO. * DATE 5/18/77 MFGR. CODE -0 YR. 1976
VEHICLE MODEL IMPALA EM 7 ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 739.39 MM OF HG.
DRY BULB TEMP. 22.8 DEG. C
REL. HUMIDITY 82 PCT.

WET BULB TEMP 20.6 DEG. C
ABS. HUMIDITY 14.6 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 711.2 MM. H20
BLOWER INLET PRESS., G1 711.2 MM. H20
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40730	69849	40621
HC SAMPLE METER READING/SCALE	92.1/2	20.6/2	38.6/2
HC SAMPLE PPM	92	21	39
HC BACKGRD METER READING/SCALE	14.3/2	15.3/2	16.6/2
HC BACKGRD PPM	14	15	17
CO SAMPLE METER READING/SCALE	66.0/*	12.0/*	98.6/*
CO SAMPLE PPM	148	11	100
CO BACKGRD METER READING/SCALE	.4/*	.7/*	1.8/*
CO BACKGRD PPM	1	1	2
CO2 SAMPLE METER READING/SCALE	90.9/3	57.9/3	83.7/3
CO2 SAMPLE PERCENT	1.70	1.02	1.55
CO2 BACKGRD METER READING/SCALE	2.9/3	4.1/3	3.2/3
CO2 BACKGRD PERCENT	.04	.06	.05
NOX SAMPLE METER READING/SCALE	46.3/3	39.9/2	63.7/2
NOX SAMPLE PPM	138.9	39.9	63.7
NOX BACKGRD METER READING/SCALE	.5/3	.6/3	.8/2
NOX BACKGRD PPM	1.5	1.8	.8
SO2 SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	80	6	24
CO CONCENTRATION PPM	139	10	93
CO2 CONCENTRATION PCT	1.66	.96	1.50
NOX CONCENTRATION PPM	137.6	38.2	63.0
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	3.49	.49	1.05
CO MASS GRAMS	12.30	1.48	8.19
CO2 MASS GRAMS	2320.26	2310.57	2097.22
NOX MASS GRAMS	23.00	10.96	10.50
SO2 MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .21 GRAMS/KILOMETRE
WEIGHTED MASS CO .95 GRAMS/KILOMETRE
WEIGHTED MASS CO2 373.21 GRAMS/KILOMETRE
WEIGHTED MASS NOX 2.22 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

CARBON BALANCE FUEL CONSUMPTION = 16.01 LITRES PER HUNDRED KILOMETRES
TOTAL CVS FLOW = 282.4 STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 9

DATE 5/16/77	TIME -0 HRS.	TEST NO. 1
MODEL 1976 IMPALA EM 7	SET-7	ENGINE 5.7 LITREV 8
DRIVER SR	TEST WT. 2267 KG.	GVW 0 KG
WET BULB TEMP 20 C	DRY BULB TEMP 25 C	REL. HUM. 63.3 PCT
SPEC. HUM. 12.9 GRAM/KG	BARO. 739.9 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION 23.29 MINUTES
BLOWER INLET PRESS. 711.2 MM. H2O
BLOWER DIF. PRESS. 711.2 MM H2O
BLOWER INLET TEMP. 43 DEG. C
DYNO REVOLUTIONS 31894
BLOWER REVOLUTIONS 112358
BLOWER CU. CM /REV. 2230

BAG RESULTS

HC SAMPLE METER READING/SCALE	22.1/2
HC SAMPLE PPM	22
HC BACKGRD METER READING/SCALE	15.4/2
HC BACKGRD PPM	15
CO SAMPLE METER READING/SCALE	44.7/*
CO SAMPLE PPM	42
CO BACKGRD METER READING/SCALE	2.6/*
CO BACKGRD PPM	3
CO2 SAMPLE METER READING/SCALE	97.6/3
CO2 SAMPLE PERCENT	1.84
CO2 BACKGRD METER READING/SCALE	5.4/3
CO2 BACKGRD PERCENT	.08
NOX SAMPLE METER READING/SCALE	31.1/3
NOX SAMPLE PPM	93.3
NOX BACKGRD METER READING/SCALE	.4/3
NOX BACKGRD PPM	1.2
HC CONCENTRATION PPM	9
CO CONCENTRATION PPM	38
CO2 CONCENTRATION PCT	1.77
NOX CONCENTRATION PPM	92.3
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	1.07
CO MASS (GRAMS)	9.18
CO2 MASS (GRAMS)	6820.28
NOX MASS (GRAMS)	39.90
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.05
CO GRAMS/KILOMETRE	.42
CO2 GRAMS/KILOMETRE	310
NOX GRAMS/KILOMETRE	1.81
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.50	HC GRAMS/MIN	.05
CO GRAMS/KG OF FUEL	4.3	CO GRAMS/MIN	.4
CO2 GRAMS/KG OF FUEL	3161	CO2 GRAMS/MIN	293
NOX GRAMS/KG OF FUEL	18.50	NOX GRAMS/MIN	1.71
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 13.29 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 9

DATE 5/18/77 TIME -0 HRS. TEST NO. 1
MODEL 1976 IMPALA EM 7 SET-7 ENGINE 5.7 LITREO
RUN DURATION 23.29 MIN. DISTANCE DRIVEN 21.99 KILOMETRES
CVS BLOWER TEST VOL. 250.58 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47 FH 2812	
SAMPLE VOL. CU. FT.	14.52	1.00
SAMPLE TEMP. DEG. F	85	70
SAMPLE AREA SQ. IN.	108967.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	20.00	1.00
STAND. AREA SQ. IN.	186667.00	1.00
SO4,MICROG/FILTER	116.750	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	80.062
NET H2SO4,MILLIGRAM/TEST	81.743
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	3.641
NET H2SO4,MILLIGRAM/KILOMETRE	3.717
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2158 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.67	0.000	.0267	.0267
PCT. RECOVERY		0.00	4.00	4.00

TABLE VEHICLE EMISSION RESULTS

1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. 952 TEST NO. 1 DATE 5/26/77 MFGR. CODE -0 YR. 1976
VEHICLE MODEL CHEVY IMPALA ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 739.14 MM OF HG.
DRY BULB TEMP. 25.6 DEG. C
REL. HUMIDITY 37 PCT.

WET BULB TEMP 16.1 DEG. C
ABS. HUMIDITY 7.7 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 736.6 MM. H2O
BLOWER INLET PRESS., G1 736.6 MM. H2O
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.		1	2	3
BLOWER REVOLUTIONS		40821	70505	40861
HC	SAMPLE METER READING/SCALE	76.4/2	31.9/2	40.1/2
HC	SAMPLE PPM	76	32	40
HC	BACKGRD METER READING/SCALE	20.5/2	17.2/2	15.0/2
HC	BACKGRD PPM	20	17	15
CO	SAMPLE METER READING/SCALE	65.6/*	51.9/*	62.9/*
CO	SAMPLE PPM	147	49	61
CO	BACKGRD METER READING/SCALE	.7/*	.9/*	2.0/*
CO	BACKGRD PPM	1	2	2
CO2	SAMPLE METER READING/SCALE	43.0/2	69.1/3	92.0/3
CO2	SAMPLE PERCENT	1.90	1.25	1.72
CO2	BACKGRD METER READING/SCALE	1.7/2	1.7/2	4.5/3
CO2	BACKGRD PERCENT	.06	.06	.07
NOX	SAMPLE METER READING/SCALE	46.9/3	27.4/2	45.0/2
NOX	SAMPLE PPM	140.7	27.4	45.0
NOX	BACKGRD METER READING/SCALE	.4/3	.4/3	.8/2
NOX	BACKGRD PPM	1.2	1.2	.8
SO2	SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	SAMPLE PPM	0.0	0.0	0.0
SO2	BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	BACKGRD PPM	0.0	0.0	0.0
HC	CONCENTRATION PPM	59	16	27
CO	CONCENTRATION PPM	139	46	56
CO2	CONCENTRATION PCT	1.84	1.19	1.66
NOX	CONCENTRATION PPM	139.7	26.3	44.3
SO2	CONCENTRATION PPM	0.0	0.0	0.0
HC	MASS GRAMS	2.58	1.23	1.19
CO	MASS GRAMS	12.29	7.03	4.97
CO2	MASS GRAMS	2576.38	2871.53	2320.58
NOX	MASS GRAMS	18.45	6.01	5.86
SO2	MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .25 GRAMS/KILOMETRE
WEIGHTED MASS CO 1.25 GRAMS/KILOMETRE
WEIGHTED MASS CO2 439.37 GRAMS/KILOMETRE
WEIGHTED MASS NOX 1.43 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

FUEL ECONOMY BY CARBON BALANCE = 5.3 KILOMETRE/LITRE

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 952

DATE 5/26/77	TIME -0 HRS.	TEST NO. 2
MODEL 1976 CHEVY IMPALA	SET-7	ENGINE 5.7 LITREV 8
DRIVER SR	TEST WT. 2267 KG.	GVW 0 KG
WET BULB TEMP 22 C	DRY BULB TEMP 31 C	REL. HUM. 45.6 PCT
SPEC. HUM. 12.9 GRAM/KG	BARO. 737.9 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION	23.29 MINUTES
BLOWER INLET PRESS.	711.2 MM. H2O
BLOWER DIF. PRESS.	711.2 MM H2O
BLOWER INLET TEMP.	43 DEG. C
DYNO REVOLUTIONS	31706
BLOWER REVOLUTIONS	112314
BLOWER CU. CM /REV.	2230

BAG RESULTS

HC SAMPLE METER READING/SCALE	25.3/2
HC SAMPLE PPM	25
HC BACKGRD METER READING/SCALE	12.8/2
HC BACKGRD PPM	13
CO SAMPLE METER READING/SCALE	84.6/*
CO SAMPLE PPM	201
CO BACKGRD METER READING/SCALE	1.0/*
CO BACKGRD PPM	2
CO2 SAMPLE METER READING/SCALE	45.5/2
CO2 SAMPLE PERCENT	2.03
CO2 BACKGRD METER READING/SCALE	1.4/2
CO2 BACKGRD PERCENT	.05
NOX SAMPLE METER READING/SCALE	58.2/2
NOX SAMPLE PPM	58.2
NOX BACKGRD METER READING/SCALE	.9/2
NOX BACKGRD PPM	.9
HC CONCENTRATION PPM	14
CO CONCENTRATION PPM	189
CO2 CONCENTRATION PCT	1.99
NOX CONCENTRATION PPM	57.4
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	1.75
CO MASS (GRAMS)	45.96
CO2 MASS (GRAMS)	7656.20
NOX MASS (GRAMS)	24.75
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.08
CO GRAMS/KILOMETRE	2.10
CO2 GRAMS/KILOMETRE	350
NOX GRAMS/KILOMETRE	1.13
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.72	HC GRAMS/MIN	.07
CO GRAMS/KG OF FUEL	18.8	CO GRAMS/MIN	2.0
CO2 GRAMS/KG OF FUEL	3137	CO2 GRAMS/MIN	329
NOX GRAMS/KG OF FUEL	10.14	NOX GRAMS/MIN	1.06
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 15.12 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 952

DATE 5/26/77 TIME -0 HRS. TEST NO. 2
MODEL 1976 CHEVY IMPALA SET-7 ENGINE 5.7 LITREO
RUN DURATION 23.29 MIN. DISTANCE DRIVEN 21.86 KILOMETRES
CVS BLOWER TEST VOL. 250.46 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2814	
SAMPLE VOL. CU. FT.	14.42	1.00
SAMPLE TEMP. DEG. F	90	70
SAMPLE AREA SQ. IN.	64304.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	5.00	1.00
STAND. AREA SQ. IN.	171881.00	1.00
SO4,MICROG/FILTER	18.706	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	12.797
NET H2SO4,MILLIGRAM/TEST	13.065
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	.585
NET H2SO4,MILLIGRAM/KILOMETRE	.598
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2440 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.76	0.000	.0043	.0043
PCT. RECOVERY		0.00	.56	.56

TABLE

VEHICLE EMISSION RESULTS
1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. 7 TEST NO. 1 DATE 5/30/77 MFGR. CODE -0 YR. 1976
VEHICLE MODEL CHEVY IMPALA ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 740.66 MM OF HG.
DRY BULB TEMP. 25.6 DEG. C
REL. HUMIDITY 57 PCT.

WET BULB TEMP 19.4 DEG. C
ABS. HUMIDITY 11.9 GRAMS/KG

EXHAUST EMISSIONS

BLOWER INLET PRESS., G1 711.2 MM. H2O
BLOWER INLET TEMP. 43 DEG. C

BLOWER DIF. PRESS., G2, 711.2 MM. H2O
BAG RESULTS

BAG NO.		1	2	3
BLOWER REVOLUTIONS		40650	69830	40579
HC	SAMPLE METER READING/SCALE	15.5/3	25.1/2	45.6/2
HC	SAMPLE PPM	155	25	46
HC	BACKGRD METER READING/SCALE	1.5/3	1.6/3	12.5/2
HC	BACKGRD PPM	15	16	13
CO	SAMPLE METER READING/SCALE	36.5/3	70.9/*	86.7/*
CO	SAMPLE PPM	872	69	87
CO	BACKGRD METER READING/SCALE	.7/3	.4/3	9.2/*
CO	BACKGRD PPM	15	9	9
CO2	SAMPLE METER READING/SCALE	42.2/2	67.6/3	87.3/3
CO2	SAMPLE PERCENT	1.85	1.22	1.62
CO2	BACKGRD METER READING/SCALE	1.9/2	1.9/2	4.6/3
CO2	BACKGRD PERCENT	.07	.07	.07
NOX	SAMPLE METER READING/SCALE	40.8/3	24.5/2	40.9/2
NOX	SAMPLE PPM	122.4	24.5	40.9
NOX	BACKGRD METER READING/SCALE	.7/3	.6/3	1.5/2
NOX	BACKGRD PPM	2.1	1.8	1.5
SO2	SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	SAMPLE PPM	-0.0	-0.0	-0.0
SO2	BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	BACKGRD PPM	-0.0	-0.0	-0.0
HC	CONCENTRATION PPM	142	11	35
CO	CONCENTRATION PPM	812	59	75
CO2	CONCENTRATION PCT	1.80	1.15	1.56
NOX	CONCENTRATION PPM	120.6	22.9	39.6
SO2	CONCENTRATION PPM	0.0	0.0	0.0
HC	MASS GRAMS	6.24	.80	1.52
CO	MASS GRAMS	71.96	8.92	6.61
CO2	MASS GRAMS	2512.36	2770.31	2177.59
NOX	MASS GRAMS	18.24	5.94	5.97
SO2	MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .36 GRAMS/KILOMETRE
WEIGHTED MASS CO 3.62 GRAMS/KILOMETRE
WEIGHTED MASS CO2 421.95 GRAMS/KILOMETRE
WEIGHTED MASS NOX 1.42 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

CARBON BALANCE FUEL CONSUMPTION = 18.28 LITRES PER HUNDRED KILOMETRES
TOTAL CVS FLOW = 282.7 STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 7

DATE 5/30/77	TIME -0 HRS.	TEST NO. 2
MODEL 1976 CHEVY IMPALA	SET-7	ENGINE 5.7 LITREV 8
DRIVER SR	TEST WT. 0 KG.	GVW 0 KG
WET BULB TEMP 18 C	DRY BULB TEMP 25 C	REL. HUM. 52.5 PCT
SPEC. HUM. 10.6 GRAM/KG	BARO. 740.7 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION 23.28 MINUTES
BLOWER INLET PRESS. 711.2 MM. H2O
BLOWER DIF. PRESS. 711.2 MM H2O
BLOWER INLET TEMP. 43 DEG. C
DYNO REVOLUTIONS 31847
BLOWER REVOLUTIONS 112263
BLOWER CU. CM /REV. 2230

BAG RESULTS

HC SAMPLE METER READING/SCALE	24.1/2
HC SAMPLE PPM	24
HC BACKGRD METER READING/SCALE	13.8/2
HC BACKGRD PPM	14
CO SAMPLE METER READING/SCALE	54.5/*
CO SAMPLE PPM	119
CO BACKGRD METER READING/SCALE	12.1/*
CO BACKGRD PPM	23
CO2 SAMPLE METER READING/SCALE	45.1/2
CO2 SAMPLE PERCENT	2.01
CO2 BACKGRD METER READING/SCALE	1.9/2
CO2 BACKGRD PERCENT	.07
NOX SAMPLE METER READING/SCALE	61.6/2
NOX SAMPLE PPM	61.6
NOX BACKGRD METER READING/SCALE	1.2/2
NOX BACKGRD PPM	1.2
HC CONCENTRATION PPM	12
CO CONCENTRATION PPM	93
CO2 CONCENTRATION PCT	1.95
NOX CONCENTRATION PPM	60.6
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	1.50
CO MASS (GRAMS)	22.80
CO2 MASS (GRAMS)	7540.53
NOX MASS (GRAMS)	24.28
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.07
CO GRAMS/KILOMETRE	1.04
CO2 GRAMS/KILOMETRE	343
NOX GRAMS/KILOMETRE	1.11
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.63	HC GRAMS/MIN	.06
CO GRAMS/KG OF FUEL	9.5	CO GRAMS/MIN	1.0
CO2 GRAMS/KG OF FUEL	3152	CO2 GRAMS/MIN	324
NOX GRAMS/KG OF FUEL	10.15	NOX GRAMS/MIN	1.04
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 14.76 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 7

DATE 5/30/77 TIME -0 HRS. TEST NO. 2
MODEL 1976 CHEVY IMPALA SFT-7 ENGINE 5.7 LITREO
RUN DURATION 23.28 MIN. DISTANCE DRIVEN 21.96 KILOMETRES
CVS BLOWER TEST VOL. 250.38 ACT. CU. METRES

SULFATE DATA .	SAMPLE	BACKGROUND
FILTER NO.	47FH-2820	
SAMPLE VOL. CU. FT.	13.72	1.00
SAMPLE TEMP. DEG. F	81	70
SAMPLE AREA SQ. IN.	61016.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	5.00	1.00
STAND. AREA SQ. IN.	193974.00	1.00
SO4,MICROG/FILTER	15.728	0.000

SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	11.492
NET H2SO4,MILLIGRAM/TEST	11.733
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	.523
NET H2SO4,MILLIGRAM/KILOMETRE	.534
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2392 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.74	0.000	.0038	.0038
PCT. RECOVERY		0.00	.52	.52

TABLE

VEHICLE EMISSION RESULTS
1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. 952 TEST NO. 1 DATE 6/ 2/77 MFGR. CODE -0 YR. 1976
VEHICLE MODEL CHEVY IMPALA ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 739.39 MM OF HG.
DRY BULB TEMP. 22.8 DEG. C
REL. HUMIDITY 73 PCT.

WET BULB TEMP 19.4 DEG. C
ABS. HUMIDITY 13.1 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 711.2 MM. H2O
BLOWER INLET PRESS., G1 711.2 MM. H2O
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40658	69812	40735
HC SAMPLE METER READING/SCALE	10.6/3	22.9/2	56.5/2
HC SAMPLE PPM	106	23	56
HC BACKGRD METER READING/SCALE	1.8/3	1.6/3	14.0/2
HC BACKGRD PPM	18	16	14
CO SAMPLE METER READING/SCALE	81.1/*	6.6/*	41.6/*
CO SAMPLE PPM	371	6	39
CO BACKGRD METER READING/SCALE	1.4/*	1.1/*	2.3/*
CO BACKGRD PPM	4	3	2
CO2 SAMPLE METER READING/SCALE	42.5/2	65.3/3	83.5/3
CO2 SAMPLE PERCENT	1.87	1.17	1.54
CO2 BACKGRD METER READING/SCALE	1.5/2	1.6/2	3.0/3
CO2 BACKGRD PERCENT	.05	.06	.05
NOX SAMPLE METER READING/SCALE	39.3/3	49.3/2	49.2/2
NOX SAMPLE PPM	117.9	49.3	49.2
NOX BACKGRD METER READING/SCALE	.4/3	.5/3	.8/2
NOX BACKGRD PPM	1.2	1.5	.8
SO2 SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	91	8	44
CO CONCENTRATION PPM	346	3	35
CO2 CONCENTRATION PCT	1.82	1.12	1.50
NOX CONCENTRATION PPM	116.9	47.9	48.5
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	3.97	.62	1.94
CO MASS GRAMS	30.58	.48	3.10
CO2 MASS GRAMS	2547.62	2676.19	2101.08
NOX MASS GRAMS	18.42	12.97	7.66
SO2 MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .28 GRAMS/KILOMETRE
WEIGHTED MASS CO 1.28 GRAMS/KILOMETRE
WEIGHTED MASS CO2 411.79 GRAMS/KILOMETRE
WEIGHTED MASS NOX 2.09 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

FUEL ECONOMY BY CARBON BALANCE = 5.7 KILOMETRE/LITRE

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 952

DATE 6/ 2/77	TIME -0 HRS.	TEST NO. 2
MODEL 1976 CHEVY IMPALA	SET-7	ENGINE 5.7 LITREV 8
DRIVER SR	TEST WT. 2267 KG.	GVW 0 KG
WET BULB TEMP 18 C	DRY BULB TEMP 24 C	REL. HUM. 52.0 PCT
SPEC. HUM. 10.2 GRAM/KG	BARO. 739.9 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION 23.29 MINUTES
BLOWER INLET PRESS. 711.2 MM. H2O
BLOWER DIF. PRESS. 711.2 MM H2O
BLOWER INLET TEMP. 43 DEG. C
DYNO REVOLUTIONS 31629
BLOWER REVOLUTIONS 112385
BLOWER CU. CM /REV. 2230

BAG RESULTS

HC SAMPLE METER READING/SCALE	31.3/2
HC SAMPLE PPM	31
HC BACKGRD METER READING/SCALE	13.8/2
HC BACKGRD PPM	14
CO SAMPLE METER READING/SCALE	20.9/*
CO SAMPLE PPM	20
CO BACKGRD METER READING/SCALE	2.4/*
CO BACKGRD PPM	2
CO2 SAMPLE METER READING/SCALE	44.3/2
CO2 SAMPLE PERCENT	1.97
CO2 BACKGRD METER READING/SCALE	1.7/2
CO2 BACKGRD PERCENT	.06
NOX SAMPLE METER READING/SCALE	82.2/2
NOX SAMPLE PPM	82.2
NOX BACKGRD METER READING/SCALE	1.2/2
NOX BACKGRD PPM	1.2
HC CONCENTRATION PPM	20
CO CONCENTRATION PPM	17
CO2 CONCENTRATION PCT	1.91
NOX CONCENTRATION PPM	81.2
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	2.37
CO MASS (GRAMS)	4.05
CO2 MASS (GRAMS)	7396.09
NOX MASS (GRAMS)	32.06
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.11
CO GRAMS/KILOMETRE	.19
CO2 GRAMS/KILOMETRE	340
NOX GRAMS/KILOMETRE	1.47
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	1.01	HC GRAMS/MIN	.10
CO GRAMS/KG OF FUEL	1.7	CO GRAMS/MIN	.2
CO2 GRAMS/KG OF FUEL	3163	CO2 GRAMS/MIN	318
NOX GRAMS/KG OF FUEL	13.71	NOX GRAMS/MIN	1.38
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 14.57 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 952

DATE 6/ 2/77 TIME -0 HRS. TEST NO. 2
MODEL 1976 CHEVY IMPALA SET-7 ENGINE 5.7 LITREO
RUN DURATION 23.29 MIN. DISTANCE DRIVEN 21.74 KILOMETRES
CVS BLOWER TEST VOL. 250.65 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2823	
SAMPLE VOL. CU. FT.	14.92	1.00
SAMPLE TEMP. DEG. F	82	70
SAMPLE AREA SQ. IN.	259903.00	0.00
DILUTION FACTOR	10	1
STAND. DEN. MICROG/ML	20.00	1.00
STAND. AREA SQ. IN.	203708.00	1.00
SO4,MICROG/FILTER	2551.721	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	1713.615
NET H2SO4,MILLIGRAM/TEST	1749.601
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	78.832
NET H2SO4,MILLIGRAM/KILOMETRE	80.487
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2338 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.72	0.000	.5721	.5721
PCT. RECOVERY		0.00	78.94	78.94

TABLE

VEHICLE EMISSION RESULTS
1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. 952 TEST NO. 1 DATE 6/ 6/77 MFGR. CODE -0 YR. 1976
VEHICLE MODEL CHEVY IMPALA ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 742.70 MM OF HG.
DRY BULB TEMP. 23.9 DEG. C
REL. HUMIDITY 66 PCT.

WET BULB TEMP 19.4 DEG. C
ABS. HUMIDITY 12.6 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 698.5 MM. H2O
BLOWER INLET PRESS., G1 698.5 MM. H2O
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.			1	2	3
BLOWER REVOLUTIONS			40698	69879	40725
HC	SAMPLE	METER READING/SCALE	11.3/3	26.1/2	89.5/2
HC	SAMPLE	PPM	113	26	89
HC	BACKGRD	METER READING/SCALE	1.9/3	1.7/3	13.6/2
HC	BACKGRD	PPM	19	17	14
CO	SAMPLE	METER READING/SCALE	61.7/*	8.6/*	59.9/*
CO	SAMPLE	PPM	249	8	57
CO	BACKGRD	METER READING/SCALE	1.9/*	.9/*	3.8/*
CO	BACKGRD	PPM	3	3	4
CO2	SAMPLE	METER READING/SCALE	97.4/3	65.8/3	81.1/3
CO2	SAMPLE	PERCENT	1.83	1.18	1.49
CO2	BACKGRD	METER READING/SCALE	3.9/3	4.3/3	4.3/3
CO2	BACKGRD	PERCENT	.06	.07	.07
NOX	SAMPLE	METER READING/SCALE	43.8/3	24.5/2	48.6/2
NOX	SAMPLE	PPM	131.4	24.5	48.6
NOX	BACKGRD	METER READING/SCALE	.3/3	.3/3	.9/2
NOX	BACKGRD	PPM	.9	.9	.9
SO2	SAMPLE	METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	SAMPLE	PPM	0.0	0.0	0.0
SO2	BACKGRD	METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	BACKGRD	PPM	0.0	0.0	0.0
HC	CONCENTRATION	PPM	97	11	77
CO	CONCENTRATION	PPM	232	5	51
CO2	CONCENTRATION	PCT	1.78	1.12	1.43
NOX	CONCENTRATION	PPM	130.6	23.7	47.8
SO2	CONCENTRATION	PPM	0.0	0.0	0.0
HC	MASS	GRAMS	4.27	.80	3.42
CO	MASS	GRAMS	20.67	.84	4.58
CO2	MASS	GRAMS	2508.10	2703.36	2019.20
NOX	MASS	GRAMS	20.35	6.33	7.45
SO2	MASS	GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .38 GRAMS/KILOMETRE
WEIGHTED MASS CO 1.02 GRAMS/KILOMETRE
WEIGHTED MASS CO2 408.77 GRAMS/KILOMETRE
WEIGHTED MASS NOX 1.60 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

FUEL ECONOMY BY CARBON BALANCE = 5.7 KILOMETRE/LITRE

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 952

DATE 6/ 6/77	TIME -0 HRS.	TEST NO. 2
MODEL 1976 CHEVY IMPALA	SET-7	ENGINE 5.7 LITREV 8
DRIVER SR	TEST WT. 2267 KG.	GVW 0 KG
WET BULB TEMP 19 C	DRY BULB TEMP 26 C	REL. HUM. 53.0 PCT
SPEC. HUM. 11.1 GRAM/KG	BARO. 742.4 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION 23.29 MINUTES
BLOWER INLET PRESS. 711.2 MM. H2O
BLOWER DIF. PRESS. 711.2 MM H2O
BLOWER INLET TEMP. 43 DEG. C
DYNO REVOLUTIONS 31850
BLOWER REVOLUTIONS 112525
BLOWER CU. CM /REV. 2231

BAG RESULTS

HC SAMPLE METER READING/SCALE	24.1/2
HC SAMPLE PPM	24
HC BACKGRD METER READING/SCALE	12.9/2
HC BACKGRD PPM	13
CO SAMPLE METER READING/SCALE	12.3/*
CO SAMPLE PPM	12
CO BACKGRD METER READING/SCALE	1.7/*
CO BACKGRD PPM	2
CO2 SAMPLE METER READING/SCALE	43.9/2
CO2 SAMPLE PERCENT	1.95
CO2 BACKGRD METER READING/SCALE	1.9/2
CO2 BACKGRD PERCENT	.07
NOX SAMPLE METER READING/SCALE	81.3/2
NOX SAMPLE PPM	81.3
NOX BACKGRD METER READING/SCALE	1.3/2
NOX BACKGRD PPM	1.3
HC CONCENTRATION PPM	13
CO CONCENTRATION PPM	10
CO2 CONCENTRATION PCT	1.89
NOX CONCENTRATION PPM	80.2
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	1.59
CO MASS (GRAMS)	2.36
CO2 MASS (GRAMS)	7325.60
NOX MASS (GRAMS)	32.79
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.07
CO GRAMS/KILOMETRE	.11
CO2 GRAMS/KILOMETRE	337
NOX GRAMS/KILOMETRE	1.51
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.69	HC GRAMS/MIN	.07
CO GRAMS/KG OF FUEL	1.0	CO GRAMS/MIN	.1
CO2 GRAMS/KG OF FUEL	3166	CO2 GRAMS/MIN	314
NOX GRAMS/KG OF FUEL	14.17	NOX GRAMS/MIN	1.41
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 14.42 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 952

DATE 6/ 6/77 TIME -0 HRS. TEST NO. 2
MODEL 1976 CHEVY IMPALA SET-7 ENGINE 5.7 LITREO
RUN DURATION 23.29 MIN. DISTANCE DRIVEN 21.74 KILOMETRES
CVS BLOWER TEST VOL. 251.00 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2826	
SAMPLE VOL. CU. FT.	13.14	1.00
SAMPLE TEMP. DEG. F	82	70
SAMPLE AREA SQ. IN.	178310.00	0.00
DILUTION FACTOR	10	1
STAND. DEN. MICROG/ML	20.00	1.00
STAND. AREA SQ. IN.	205157.00	1.00
SO4,MICROG/FILTER	1738.278	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	1326.233
NET H2SO4,MILLIGRAM/TEST	1354.084
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	61.011
NET H2SO4,MILLIGRAM/KILOMETRE	62.292
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2314 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.72	0.000	.4428	.4428
PCT. RECOVERY		0.00	61.72	61.72

APPENDIX C

COMPUTER PRINTOUTS
FOR
HIGH TEMPERATURE EXHAUST SYSTEM
DEVELOPMENT TESTS ON A 1975 CHEVROLET NOVA
(Tests in Chronological Order)

TABLE VEHICLE EMISSION RESULTS

1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. 9 TEST NO. * DATE 5/13/77 MFGR. CODE -0 YR. 1975

VEHICLE MODEL NOVA CHEVROLET ENGINE 5.74 LITRE CURB WT. 0 KG GVM 0 KG

BAROMETER 741.17 MM OF HG. WET BULB TEMP 20.6 DEG. C

DRY BULB TEMP. 25.6 DEG. C ABS. HUMIDITY 13.4 GRAMS/KG

REL. HUMIDITY 64 PCT.

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 711.2 MM. H20 BLOWER INLET PRESS., G1 711.2 MM. H20

BAG RESULTS BLOWER INLET TEMP. 42 DEG. C

BAG NO.		1	2	3
BLOWER REVOLUTIONS		40633	69767	40724
HC	SAMPLE METER READING/SCALE	10.6/3	20.5/2	35.2/2
HC	SAMPLE PPM	106	20	35
HC	BACKGRD METER READING/SCALE	1.4/3	1.3/3	27.1/2
HC	BACKGRD PPM	14	13	27
CO	SAMPLE METER READING/SCALE	73.8/*	29.4/*	44.8/*
CO	SAMPLE PPM	321	27	42
CO	BACKGRD METER READING/SCALE	.5/*	.3/*	.7/*
CO	BACKGRD PPM	1	1	1
CO2	SAMPLE METER READING/SCALE	41.9/2	27.1/2	36.7/2
CO2	SAMPLE PERCENT	1.84	1.11	1.57
CO2	BACKGRD METER READING/SCALE	1.7/2	1.3/2	1.6/2
CO2	BACKGRD PERCENT	.06	.05	.06
NOX	SAMPLE METER READING/SCALE	52.7/2	12.1/2	28.6/2
NOX	SAMPLE PPM	52.7	12.1	28.6
NOX	BACKGRD METER READING/SCALE	.7/2	.7/2	.6/2
NOX	BACKGRD PPM	.7	.7	.6
SO2	SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	SAMPLE PPM	-0.0	-0.0	-0.0
SO2	BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	BACKGRD PPM	-0.0	-0.0	-0.0
HC	CONCENTRATION PPM	94	9	11
CO	CONCENTRATION PPM	302	25	39
CO2	CONCENTRATION PCT	1.79	1.06	1.52
NOX	CONCENTRATION PPM	52.1	11.5	28.1
SO2	CONCENTRATION PPM	0.0	0.0	0.0
HC	MASS GRAMS	4.13	.65	.50
CO	MASS GRAMS	26.77	3.88	3.50
CO2	MASS GRAMS	2501.84	2558.33	2133.37
NOX	MASS GRAMS	8.32	3.14	4.49
SO2	MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .22 GRAMS/KILOMETRE

WEIGHTED MASS CO 1.44 GRAMS/KILOMETRE

WEIGHTED MASS CO2 401.92 GRAMS/KILOMETRE

WEIGHTED MASS NOX .77 GRAMS/KILOMETRE

WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

CARBON BALANCE FUEL CONSUMPTION = 17.26 LITRES PER HUNDRED KILOMETRES

TOTAL CVS FLOW = 283.3 STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 9

DATE 5/13/77 TIME -0 HRS. TEST NO. 2
MODEL 1975 NOVA CHEVY SET-7 ENGINE 5.7 LITREV 8
DRIVER SR TEST WT. 1814 KG. GVW 0 KG
WET BULB TEMP 19 C DRY BULB TEMP 27 C REL. HUM. 48.2 PCT
SPEC. HUM. 11.1 GRAM/KG BARO. 741.2 MM HG. MEASURED FUEL 0.00 KG

RUN DURATION 23.32 MINUTES
BLOWER INLET PRESS. 711.2 MM. H2O
BLOWER DIF. PRESS. 711.2 MM H2O
BLOWER INLET TEMP. 42 DEG. C
DYNO REVOLUTIONS 31603
BLOWER REVOLUTIONS 112380
BLOWER CU. CM /REV. 2228

BAG RESULTS

HC	SAMPLE METER READING/SCALE	35.5/2
HC	SAMPLE PPM	35
HC	BACKGRD METER READING/SCALE	34.5/2
HC	BACKGRD PPM	34
CO	SAMPLE METER READING/SCALE	24.1/*
CO	SAMPLE PPM	23
CO	BACKGRD METER READING/SCALE	1.2/*
CO	BACKGRD PPM	1
CO2	SAMPLE METER READING/SCALE	43.0/2
CO2	SAMPLE PERCENT	1.90
CO2	BACKGRD METER READING/SCALE	1.8/2
CO2	BACKGRD PERCENT	.07
NOX	SAMPLE METER READING/SCALE	43.9/2
NOX	SAMPLE PPM	43.9
NOX	BACKGRD METER READING/SCALE	.7/2
NOX	BACKGRD PPM	.7
HC	CONCENTRATION PPM	6
CO	CONCENTRATION PPM	20
CO2	CONCENTRATION PCT	1.84
NOX	CONCENTRATION PPM	43.3
SO2	COCENTRATION PPM	0.0
HC	MASS (GRAMS)	.72
CO	MASS (GRAMS)	4.99
CO2	MASS (GRAMS)	7133.22
NOX	MASS (GRAMS)	17.69
SO2	MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.03
CO GRAMS/KILOMETRE	.23
CO2 GRAMS/KILOMETRE	328
NOX GRAMS/KILOMETRE	.81
SO2 GRAMS/KILOMETRE	0.00

HC	GRAMS/KG OF FUEL .32	HC	GRAMS/MIN .03
CO	GRAMS/KG OF FUEL 2.2	CO	GRAMS/MIN .2
CO2	GRAMS/KG OF FUEL 3165	CO2	GRAMS/MIN 306
NOX	GRAMS/KG OF FUEL 7.85	NOX	GRAMS/MIN .76
SO2	GRAMS/KG OF FUEL 0.00	SO2	GRAMS/MIN 0.00

CARBON BALANCE FUEL ECONOMY = 14.05 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 9

DATE 5/13/77 TIME -0 HRS. TEST NO. 2
MODEL 1975 NOVA CHEVY SET-? ENGINE 5.7 LITRE0
RUN DURATION 23.32 MIN. DISTANCE DRIVEN 21.74 KILOMETRES
CVS BLOWER TEST VOL. 250.44 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2811	
SAMPLE VOL. CU. FT.	14.49	1.00
SAMPLE TEMP. DEG. F	83	70
SAMPLE AREA SQ. IN.	208915.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	20.00	1.00
STAND. AREA SQ. IN.	189916.00	1.00
SO4,MICROG/FILTER	220.008	0.000

SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	151.398
NET H2SO4,MILLIGRAM/TEST	154.578
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	6.965
NET H2SO4,MILLIGRAM/KILOMETRE	7.111
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2254 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.70	0.000	.0505	.0505
PCT. RECOVERY		0.00	7.23	7.23

TABLE

VEHICLE EMISSION RESULTS
1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. 9 TEST NO. * DATE 6/10/77 MFGR. CODE -0 YR. 1975
VEHICLE MODEL NOVA CHEVY ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 741.93 MM OF HG.
DRY BULB TEMP. 23.3 DEG. C
REL. HUMIDITY 66 PCT.

WET BULB TEMP 18.9 DEG. C
ABS. HUMIDITY 12.1 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 685.8 MM. H2O
BLOWER INLET PRESS., G1 685.8 MM. H2O
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40664	69681	40676
HC SAMPLE METER READING/SCALE	16.5/3	21.9/2	53.2/2
HC SAMPLE PPM	165	22	53
HC BACKGRD METER READING/SCALE	1.8/3	1.8/3	22.1/2
HC BACKGRD PPM	18	18	22
CO SAMPLE METER READING/SCALE	75.8/*	43.6/*	51.4/*
CO SAMPLE PPM	334	41	111
CO BACKGRD METER READING/SCALE	4.5/*	4.1/*	11.8/*
CO BACKGRD PPM	13	12	11
CO2 SAMPLE METER READING/SCALE	45.2/2	66.6/3	92.8/3
CO2 SAMPLE PERCENT	2.02	1.20	1.74
CO2 BACKGRD METER READING/SCALE	2.1/2	1.8/2	3.6/3
CO2 BACKGRD PERCENT	.08	.07	.06
NOX SAMPLE METER READING/SCALE	63.0/2	12.9/2	23.5/2
NOX SAMPLE PPM	63.0	12.9	23.5
NOX BACKGRD METER READING/SCALE	.8/2	.7/2	.5/2
NOX BACKGRD PPM	.8	.7	.5
SO2 SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	150	6	34
CO CONCENTRATION PPM	303	28	95
CO2 CONCENTRATION PCT	1.95	1.14	1.69
NOX CONCENTRATION PPM	62.3	12.3	23.1
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	6.61	.42	1.50
CO MASS GRAMS	27.01	4.31	8.51
CO2 MASS GRAMS	2746.09	2738.75	2377.40
NOX MASS GRAMS	9.55	3.22	3.53
SO2 MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .34 GRAMS/KILOMETRE
WEIGHTED MASS CO 1.72 GRAMS/KILOMETRE
WEIGHTED MASS CO2 437.10 GRAMS/KILOMETRE
WEIGHTED MASS NOX .77 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

FUEL ECONOMY BY CARBON BALANCE = 5.3 KILOMETRE/LITRE

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 9

DATE 6/10/77 TIME -0 HRS. TEST NO. 2
MODEL 1975 NOVA CHEVY EM-9SET-7 ENGINE 5.7 LITREV 8
DRIVER RP TEST WT. 1814 KG. GVW 0 KG
WET BULB TEMP 18 C DRY BULB TEMP 26 C REL. HUM. 49.6 PCT
SPEC. HUM. 10.4 GRAM/KG BARO. 742.9 MM HG. MEASURED FUEL 0.00 KG

RUN DURATION 23.27 MINUTES
BLOWER INLET PRESS. 711.2 MM. H2O
BLOWER DIF. PRESS. 711.2 MM H2O
BLOWER INLET TEMP. 43 DEG. C
DYNO REVOLUTIONS -0
BLOWER REVOLUTIONS 112406
BLOWER CU. CM /REV. 2232

BAG RESULTS

HC SAMPLE METER READING/SCALE	78.9/2
HC SAMPLE PPM	79
HC BACKGRD METER READING/SCALE	49.1/2
HC BACKGRD PPM	49
CO SAMPLE METER READING/SCALE	77.3/*
CO SAMPLE PPM	345
CO BACKGRD METER READING/SCALE	3.1/*
CO BACKGRD PPM	9
CO2 SAMPLE METER READING/SCALE	49.5/2
CO2 SAMPLE PERCENT	2.25
CO2 BACKGRD METER READING/SCALE	1.7/2
CO2 BACKGRD PERCENT	.06
NOX SAMPLE METER READING/SCALE	25.3/2
NOX SAMPLE PPM	25.3
NOX BACKGRD METER READING/SCALE	.8/2
NOX BACKGRD PPM	.8
HC CONCENTRATION PPM	38
CO CONCENTRATION PPM	317
CO2 CONCENTRATION PCT	2.20
NOX CONCENTRATION PPM	24.6
SO2 CONCENTRATION PPM	0.0
HC MASS (GRAMS)	4.65
CO MASS (GRAMS)	77.71
CO2 MASS (GRAMS)	8542.10
NOX MASS (GRAMS)	9.82
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.21
CO GRAMS/KILOMETRE	3.57
CO2 GRAMS/KILOMETRE	393
NOX GRAMS/KILOMETRE	.45
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	1.70	HC GRAMS/MIN	.20
CO GRAMS/KG OF FUEL	28.4	CO GRAMS/MIN	3.3
CO2 GRAMS/KG OF FUEL	3119	CO2 GRAMS/MIN	367
NOX GRAMS/KG OF FUEL	3.59	NOX GRAMS/MIN	.42
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 12.06 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 9

DATE 6/10/77 TIME -0 HRS. TEST NO. 2
MODEL 1975 NOVA CHEVY FM-9SET-7 ENGINE 5.7 LITREO
RUN DURATION 23.27 MIN. DISTANCE DRIVEN 21.74 KILOMETRES
CVS BLOWER TEST VOL. 250.93 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2828	
SAMPLE VOL. CU. FT.	14.01	1.00
SAMPLE TEMP. DEG. F	81	70
SAMPLE AREA SQ. IN.	128899.00	0.00
DILUTION FACTOR	5	1
STAND. DEN. MICROG/ML	20.00	1.00
STAND. AREA SQ. IN.	299656.00	1.00
SO4,MICROG/FILTER	430.157	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	308.851
NET H2SO4,MILLIGRAM/TEST	315.337
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	14.208
NET H2SO4,MILLIGRAM/KILOMETRE	14.507
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2738 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.85	0.000	.1031	.1031
PCT. RECOVERY		0.00	12.15	12.15

TABLE

VEHICLE EMISSION RESULTS
1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. 9 TEST NO. 1 DATE 6/28/77 MFGR. CODE -0 YR. 1975
VEHICLE MODEL CHEVY NOVA ENGINE 5.7L LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 734.90 MM OF HG.
DRY BULB TEMP. 22.2 DEG. C
REL. HUMIDITY 57 PCT.

WET BULB TEMP 16.7 DEG. C
ABS. HUMIDITY 9.8 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 711.2 MM. H2O
BAG RESULTS

BLOWER INLET PRESS., G1 711.2 MM. H2O
BLOWER INLET TEMP. 42 DEG. C

BAG NO.		1	2	3
BLOWER REVOLUTIONS		40632	69678	40646
HC	SAMPLE METER READING/SCALE	76.8/2	20.5/2	25.2/2
HC	SAMPLE PPM	77	20	25
HC	BACKGRD METER READING/SCALE	12.7/2	12.7/2	12.8/2
HC	BACKGRD PPM	13	13	13
CO	SAMPLE METER READING/SCALE	86.1/*	36.3/*	63.0/*
CO	SAMPLE PPM	206	34	61
CO	BACKGRD METER READING/SCALE	.5/*	.3/*	.8/*
CO	BACKGRD PPM	1	1	1
CO2	SAMPLE METER READING/SCALE	43.8/2	62.5/3	85.8/3
CO2	SAMPLE PERCENT	1.94	1.11	1.59
CO2	BACKGRD METER READING/SCALE	1.8/2	1.7/2	3.5/3
CO2	BACKGRD PERCENT	.07	.06	.05
NOX	SAMPLE METER READING/SCALE	67.1/2	12.4/2	30.7/2
NOX	SAMPLE PPM	67.1	12.4	30.7
NOX	BACKGRD METER READING/SCALE	.9/2	.9/2	.6/2
NOX	BACKGRD PPM	.9	.9	.6
SO2	SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	SAMPLE PPM	0.0	0.0	0.0
SO2	BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	BACKGRD PPM	0.0	0.0	0.0
HC	CONCENTRATION PPM	66	9	14
CO	CONCENTRATION PPM	193	32	57
CO2	CONCENTRATION PCT	1.88	1.06	1.54
NOX	CONCENTRATION PPM	66.3	11.6	30.2
SO2	CONCENTRATION PPM	0.0	0.0	0.0
HC	MASS GRAMS	2.89	.67	.61
CO	MASS GRAMS	17.12	4.87	5.05
CO2	MASS GRAMS	2634.63	2532.40	2157.93
NOX	MASS GRAMS	9.35	2.80	4.26
SO2	MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .19 GRAMS/KILOMETRE
WEIGHTED MASS CO 1.25 GRAMS/KILOMETRE
WEIGHTED MASS CO2 405.66 GRAMS/KILOMETRE
WEIGHTED MASS NOX .77 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

FUEL ECONOMY BY CARBON BALANCE = 5.7 KILOMETRE/LITRE

TABLE EXHAUST EMISSIONS FROM THREE BAG SAMPLE
VEHICLE NUMBER 9

DATE 28/ 6/77 TIME 1 HRS. TEST NO. 1
MODEL 1975 CHEVY NOVA ENGINE 5.7 LITREO
RUN DURATION 62.60 MIN. DISTANCE DRIVEN 17.84 KILOMETRES
CVS BLOWER TEST VOL. 336.41 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47-FH-2846	
SAMPLE VOL. CU. FT.	18.22	1.00
SAMPLE TEMP. DEG. F	76	70
SAMPLE AREA SQ. IN.	73136.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	20.00	1.00
STAND. AREA SQ. IN.	205171.00	1.00
SO4,MICROG/FILTER	71.293	0.000

SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS	
NET SULFATE,MILLIGRAM/TEST	53.095
NET H2SO4,MILLIGRAM/TEST	54.210
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	2.976
NET H2SO4,MILLIGRAM/KILOMETRE	3.038
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2327 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.72	0.000	.0177	.0177
PCT. RECOVERY		0.00	2.46	2.46

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 9

DATE 6/28/77	TIME -0 HRS.	TEST NO. 2
MODEL 1975 CHEVY NOVA	SET-7	ENGINE 5.7 LITREV 8
DRIVER SR	TEST WT. 0 KG.	GVW 0 KG
WET BULB TEMP 17 C	DRY BULB TEMP 23 C	REL. HUM. 54.4 PCT
SPEC. HUM. 10.0 GRAM/KG	BARO. 739.1 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION	23.33 MINUTES
BLOWER INLET PRESS.	711.2 MM. H2O
BLOWER DIF. PRESS.	711.2 MM H2O
BLOWER INLET TEMP.	43 DEG. C
DYNO REVOLUTIONS	31099
BLOWER REVOLUTIONS	115942
BLOWER CU. CM /REV.	2234

BAG RESULTS

HC SAMPLE METER READING/SCALE	18.4/2
HC SAMPLE PPM	18
HC BACKGRD METER READING/SCALE	11.4/2
HC BACKGRD PPM	11
CO SAMPLE METER READING/SCALE	20.2/*
CO SAMPLE PPM	19
CO BACKGRD METER READING/SCALE	.8/*
CO BACKGRD PPM	1
CO2 SAMPLE METER READING/SCALE	97.8/3
CO2 SAMPLE PERCENT	1.84
CO2 BACKGRD METER READING/SCALE	4.9/3
CO2 BACKGRD PERCENT	.08
NOX SAMPLE METER READING/SCALE	41.6/2
NOX SAMPLE PPM	41.6
NOX BACKGRD METER READING/SCALE	2.9/2
NOX BACKGRD PPM	2.9
HC CONCENTRATION PPM	9
CO CONCENTRATION PPM	17
CO2 CONCENTRATION PCT	1.78
NOX CONCENTRATION PPM	39.1
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	1.07
CO MASS (GRAMS)	4.36
CO2 MASS (GRAMS)	7084.23
NOX MASS (GRAMS)	15.83
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.05
CO GRAMS/KILOMETRE	.20
CO2 GRAMS/KILOMETRE	326
NOX GRAMS/KILOMETRE	.73
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.48	HC GRAMS/MIN	.05
CO GRAMS/KG OF FUEL	1.9	CO GRAMS/MIN	.2
CO2 GRAMS/KG OF FUEL	3165	CO2 GRAMS/MIN	304
NOX GRAMS/KG OF FUEL	7.07	NOX GRAMS/MIN	.68
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 13.95 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 9

DATE 6/28/77 TIME -0 HRS. TEST NO. 2
MODEL 1975 CHEVY NOVA SET-7 ENGINE 5.7 LITREO
RUN DURATION 23.33 MIN. DISTANCE DRIVEN 21.74 KILOMETRES
CVS BLOWER TEST VOL. 258.96 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2847	
SAMPLE VOL. CU. FT.	14.39	1.00
SAMPLE TEMP. DEG. F	80	70
SAMPLE AREA SQ. IN.	360640.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	20.00	1.00
STAND. AREA SQ. IN.	212215.00	1.00
SO4,MICROG/FILTER	339.882	0.000

SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	245.279
NET H2SO4,MILLIGRAM/TEST	250.430
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	11.284
NET H2SO4,MILLIGRAM/KILOMETRE	11.521
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2238 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.69	0.000	.0819	.0819
PCT. RECOVERY		0.00	11.80	11.80

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 9

DATE 6/28/77	TIME -0 HRS.	TEST NO. 3
MODEL 1975 NOVA CHEVY	FET	ENGINE 5.7 LITREV 8
DRIVER SR	TEST WT. 0 KG.	GVW 0 KG
WET BULB TEMP 18 C	DRY BULB TEMP 25 C	REL. HUM. 49.1 PCT
SPEC. HUM. 10.0 GRAN/KG	BARO. 738.6 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION 12.75 MINUTES
BLOWER INLET PRESS. 711.2 MM. H2O
BLOWER DIF. PRESS. 711.2 MM H2O
BLOWER INLET TEMP. 43 DEG. C
DYNO REVOLUTIONS 23405
BLOWER REVOLUTIONS 61663
BLOWER CU. CM /REV. 2230

BAG RESULTS

HC SAMPLE METER READING/SCALE	19.9/2
HC SAMPLE PPM	20
HC BACKGRD METER READING/SCALE	10.8/2
HC BACKGRD PPM	11
CO SAMPLE METER READING/SCALE	18.7/*
CO SAMPLE PPM	18
CO BACKGRD METER READING/SCALE	1.1/*
CO BACKGRD PPM	1
CO2 SAMPLE METER READING/SCALE	51.1/2
CO2 SAMPLE PERCENT	2.34
CO2 BACKGRD METER READING/SCALE	1.7/2
CO2 BACKGRD PERCENT	.06
NOX SAMPLE METER READING/SCALE	61.7/2
NOX SAMPLE PPM	61.7
NOX BACKGRD METER READING/SCALE	1.9/2
NOX BACKGRD PPM	1.9
HC CONCENTRATION PPM	11
CO CONCENTRATION PPM	16
CO2 CONCENTRATION PCT	2.29
NOX CONCENTRATION PPM	60.1
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	.73
CO MASS (GRAMS)	2.09
CO2 MASS (GRAMS)	4853.35
NOX MASS (GRAMS)	12.91
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.04
CO GRAMS/KILOMETRE	.13
CO2 GRAMS/KILOMETRE	295
NOX GRAMS/KILOMETRE	.78
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.48	HC GRAMS/MIN	.06
CO GRAMS/KG OF FUEL	1.4	CO GRAMS/MIN	.2
CO2 GRAMS/KG OF FUEL	3166	CO2 GRAMS/MIN	381
NOX GRAMS/KG OF FUEL	8.42	NOX GRAMS/MIN	1.01
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 12.60 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 9

DATE 6/28/77 TIME -0 HRS. TEST NO. 3
MODEL 1975 NOVA CHEVY FET ENGINE 5.7 LITRE
RUN DURATION 12.75 MIN. DISTANCE DRIVEN 16.48 KILOMETRES
CVS BLOWER TEST VOL. 137.53 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-284R	
SAMPLE VOL. CU. FT.	7.62	1.00
SAMPLE TEMP. DEG. F	82	70
SAMPLE AREA SQ. IN.	125975.00	0.00
DILUTION FACTOR	5	1
STAND. DEN. MICROG/ML	20.00	1.00
STAND. AREA SQ. IN.	204539.00	1.00
SO4,MICROG/FILTER	615.897	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	444.538
NET H2SO4,MILLIGRAM/TEST	453.874
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	26.975
NET H2SO4,MILLIGRAM/KILOMETRE	27.542
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 1533 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.48	0.000	.1484	.1484
PCT. RECOVERY		0.00	31.23	31.23

TABLE

VEHICLE EMISSION RESULTS
1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. EMS TEST NO. 1 DATE 7/ 1/77 MFGR. CODE -0 YR. 1975
VEHICLE MODEL NOVA CHEVY ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVW 0 KG

BAROMETER 742.44 MM OF HG.
DRY BULB TEMP. 26.1 DEG. C
REL. HUMIDITY 71 PCT.

WET BULB TEMP 22.2 DEG. C
ABS. HUMIDITY 15.6 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 711.2 MM. H20
BLOWER INLET PRESS., G1 711.2 MM. H20
BLOWER INLET TEMP. 42 DEG. C

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40571	69710	40574
HC SAMPLE METER READING/SCALE	69.1/2	22.7/2	30.1/2
HC SAMPLE PPM	69	23	30
HC BACKGRD METER READING/SCALE	14.1/2	13.5/2	13.7/2
HC BACKGRD PPM	14	13	14
CO SAMPLE METER READING/SCALE	88.1/*	33.3/*	67.3/*
CO SAMPLE PPM	212	31	65
CO BACKGRD METER READING/SCALE	.4/*	.7/*	1.7/*
CO BACKGRD PPM	1	1	2
CO2 SAMPLE METER READING/SCALE	43.4/2	62.9/3	85.6/3
CO2 SAMPLE PERCENT	1.92	1.12	1.59
CO2 BACKGRD METER READING/SCALE	2.0/2	1.9/2	3.9/3
CO2 BACKGRD PERCENT	.07	.07	.06
NOX SAMPLE METER READING/SCALE	59.7/2	13.8/2	32.3/2
NOX SAMPLE PPM	59.7	13.8	32.3
NOX BACKGRD METER READING/SCALE	.9/2	.9/2	.7/2
NOX BACKGRD PPM	.9	.9	.7
SO2 SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	57	10	18
CO CONCENTRATION PPM	194	29	60
CO2 CONCENTRATION PCT	1.86	1.06	1.53
NOX CONCENTRATION PPM	58.9	13.0	31.7
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	2.51	.78	.79
CO MASS GRAMS	17.62	4.36	5.35
CO2 MASS GRAMS	2601.64	2546.27	2148.57
NOX MASS GRAMS	10.21	3.86	5.49
SO2 MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .19 GRAMS/KILOMETRE
WEIGHTED MASS CO 1.24 GRAMS/KILOMETRE
WEIGHTED MASS CO2 405.19 GRAMS/KILOMETRE
WEIGHTED MASS NOX .94 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

FUEL ECONOMY BY CARBON BALANCE = 5.8 KILOMETRE/LITRE

TABLE EXHAUST EMISSIONS FROM THREE BAG SAMPLE
VEHICLE NUMBER EM9

DATE 1/ 7/77 TIME 1 HRS. TEST NO. 1
MODEL 1975 NOVA CHEVY EM-9 ENGINE 5.7 LITRED
RUN DURATION 31.31 MIN. DISTANCE DRIVEN 17.84 KILOMETRES
CVS BLOWER TEST VOL. 336.19 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	42-FH-2849	
SAMPLE VOL. CU. FT.	19.34	1.00
SAMPLE TEMP. DEG. F	79	70
SAMPLE AREA SQ. IN.	2817.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	20.00	1.00
STAND. AREA SQ. IN.	204539.00	1.00
SO4,MICROG/FILTER	2.754	0.000

SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	1.920
NET H2SO4,MILLIGRAM/TEST	1.960
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	.108
NET H2SO4,MILLIGRAM/KILOMETRE	.110
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2318 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.72	0.000	.0006	.0006
PCT. RECOVERY		0.00	.09	.09

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 9

DATE 7/ 1/77	TIME -0 HRS.	TEST NO. 2
MODEL 1975 NOVA CHEVY	SET-7	ENGINE 5.7 LITREV 8
DRIVER SR	TEST WT. 1814 KG.	GVW 0 KG
WET BULB TEMP 19 C	DRY BULB TEMP 24 C	REL. HUM. 62.3 PCT
SPEC. HUM. 11.8 GRAM/KG	BARO. 742.7 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION 23.26 MINUTES
BLOWER INLET PRESS. 711.2 MM. H20
BLOWER DIF. PRESS. 711.2 MM H20
BLOWER INLET TEMP. 43 DEG. C
DYNO REVOLUTIONS 31878
BLOWER REVOLUTIONS 112226
BLOWER CU. CM /REV. 2230

BAG RESULTS

HC SAMPLE METER READING/SCALE	21.1/2
HC SAMPLE PPM	21
HC BACKGRD METER READING/SCALE	12.7/2
HC BACKGRD PPM	13
CO SAMPLE METER READING/SCALE	21.7/*
CO SAMPLE PPM	20
CO BACKGRD METER READING/SCALE	.1/*
CO BACKGRD PPM	0
CO2 SAMPLE METER READING/SCALE	97.3/3
CO2 SAMPLE PERCENT	1.83
CO2 BACKGRD METER READING/SCALE	3.8/3
CO2 BACKGRD PERCENT	.06
NOX SAMPLE METER READING/SCALE	46.7/2
NOX SAMPLE PPM	46.7
NOX BACKGRD METER READING/SCALE	1.2/2
NOX BACKGRD PPM	1.2
HC CONCENTRATION PPM	10
CO CONCENTRATION PPM	19
CO2 CONCENTRATION PCT	1.78
NOX CONCENTRATION PPM	45.7
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	1.23
CO MASS (GRAMS)	4.68
CO2 MASS (GRAMS)	6899.40
NOX MASS (GRAMS)	19.08
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.06
CO GRAMS/KILOMETRE	.21
CO2 GRAMS/KILOMETRE	314
NOX GRAMS/KILOMETRE	.87
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.56	HC GRAMS/MIN	.05
CO GRAMS/KG OF FUEL	2.1	CO GRAMS/MIN	.2
CO2 GRAMS/KG OF FUEL	3164	CO2 GRAMS/MIN	297
NOX GRAMS/KG OF FUEL	8.75	NOX GRAMS/MIN	.82
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 13.44 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 9

DATE 7/ 1/77 TIME -0 HRS. TEST NO. 2
MODEL 1975 NOVA CHEVY SET-7 ENGINE 5.7 LITRE0
RUN DURATION 23.26 MIN. DISTANCE DRIVEN 21.98 KILOMETRES
CVS BLOWER TEST VOL. 250.31 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2850	
SAMPLE VOL. CU. FT.	14.89	1.00
SAMPLE TEMP. DEG. F	80	70
SAMPLE AREA SQ. IN.	278498.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	20.00	1.00
STAND. AREA SQ. IN.	204539.00	1.00
SO4,MICROG/FILTER	272.318	0.000

SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
APEA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS	
NET SULFATE,MILLIGRAM/TEST	183.627
NET H2SO4,MILLIGRAM/TEST	187.483
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	8.355
NET H2SO4,MILLIGRAM/KILOMETRE	8.530
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2180 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.68	0.000	.0613	.0613
PCT. RECOVERY		0.00	9.07	9.07

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 9

DATE 7/ 1/77	TIME -0 HRS.	TEST NO. 3
MODEL 1975 NOVA CHEVY	FET	ENGINE 5.7 LITREV 8
DRIVER SR	TEST WT. 1814 KG.	GVW 0 KG
WET BULB TEMP 19 C	DRY BULB TEMP 26 C	REL. HUM. 56.5 PCT
SPEC. HUM. 11.8 GRAM/KG	BARO. 742.7 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION	12.77 MINUTES
BLOWER INLET PRESS.	711.2 MM. H2O
BLOWER DIF. PRESS.	711.2 MM H2O
BLOWER INLET TEMP.	43 DEG. C
DYNO REVOLUTIONS	24204
BLOWER REVOLUTIONS	61644
BLOWER CU. CM /REV.	2231

BAG RESULTS

HC SAMPLE METER READING/SCALE	18.4/2
HC SAMPLE PPM	18
HC BACKGRD METER READING/SCALE	12.1/2
HC BACKGRD PPM	12
CO SAMPLE METER READING/SCALE	14.9/*
CO SAMPLE PPM	15
CO BACKGRD METER READING/SCALE	.3/*
CO BACKGRD PPM	0
CO2 SAMPLE METER READING/SCALE	52.1/2
CO2 SAMPLE PERCENT	2.40
CO2 BACKGRD METER READING/SCALE	1.7/2
CO2 BACKGRD PERCENT	.06
NOX SAMPLE METER READING/SCALE	67.4/2
NOX SAMPLE PPM	67.4
NOX BACKGRD METER READING/SCALE	1.4/2
NOX BACKGRD PPM	1.4
HC CONCENTRATION PPM	8
CO CONCENTRATION PPM	14
CO2 CONCENTRATION PCT	2.35
NOX CONCENTRATION PPM	66.3
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	.57
CO MASS (GRAMS)	.56
CO2 MASS (GRAMS)	5003.53
NOX MASS (GRAMS)	15.22
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.03
CO GRAMS/KILOMETRE	.03
CO2 GRAMS/KILOMETRE	300
NOX GRAMS/KILOMETRE	.91
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.36	HC GRAMS/MIN	.04
CO GRAMS/KG OF FUEL	.4	CO GRAMS/MIN	.0
CO2 GRAMS/KG OF FUEL	3168	CO2 GRAMS/MIN	392
NOX GRAMS/KG OF FUEL	9.63	NOX GRAMS/MIN	1.19
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 12.82 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 9

DATE 7/ 1/77 TIME -0 HRS. TEST NO. 3
MODEL 1975 NOVA CHEVY FET ENGINE 5.7 LITREO
RUN DURATION 12.77 MIN. DISTANCE DRIVEN 16.69 KILOMETRES
CVS BLOWER TEST VOL. 137.50 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2851	
SAMPLE VOL. CU. FT.	7.37	1.00
SAMPLE TEMP. DEG. F	84	70
SAMPLE AREA SQ. IN.	117928.00	0.00
DILUTION FACTOR	5	1
STAND. DEN. MICROG/ML	20.00	1.00
STAND. AREA SQ. IN.	204691.00	1.00
SO4,MICROG/FILTER	576.127	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	427.850
NET H2SO4,MILLIGRAM/TEST	436.835
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	25.638
NET H2SO4,MILLIGRAM/KILOMETRE	26.176
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE

FUEL WT., 1580 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.49	0.000	.1428	.1428
PCT. RECOVERY		0.00	29.17	29.17

TABLE VEHICLE EMISSION RESULTS

1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. 9 TEST NO. 1 DATE 7/20/77 MFGR. CODE -0 YR. 1975
VEHICLE MODEL NOVA CHEVROLET ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 740.92 MM OF HG.
DRY BULB TEMP. 22.2 DEG. C
REL. HUMIDITY 69 PCT.

WET BULB TEMP 18.3 DEG. C
ABS. HUMIDITY 11.8 GRAMS/KG

EXHAUST EMISSIONS

BLOWER INLET PRESS., G1 711.2 MM. H2O
BLOWER INLET TEMP. 43 DEG. C

BLOWER DIF. PRESS., G2, 711.2 MM. H2O

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40648	69767	40603
HC SAMPLE METER READING/SCALE	66.6/2	20.4/2	25.1/2
HC SAMPLE PPM	67	20	25
HC BACKGRD METER READING/SCALE	15.6/2	14.6/2	13.7/2
HC BACKGRD PPM	16	15	14
CO SAMPLE METER READING/SCALE	66.5/*	63.6/*	93.0/*
CO SAMPLE PPM	277	63	95
CO BACKGRD METER READING/SCALE	2.5/*	2.2/*	4.7/*
CO BACKGRD PPM	8	7	5
CO2 SAMPLE METER READING/SCALE	43.6/2	65.6/3	83.7/3
CO2 SAMPLE PERCENT	1.93	1.18	1.55
CO2 BACKGRD METER READING/SCALE	1.6/2	1.6/2	3.9/3
CO2 BACKGRD PERCENT	.06	.06	.06
NOX SAMPLE METER READING/SCALE	63.7/2	11.9/2	30.9/2
NOX SAMPLE PPM	63.7	11.9	30.9
NOX BACKGRD METER READING/SCALE	1.3/2	1.3/2	1.0/2
NOX BACKGRD PPM	1.3	1.3	1.0
SO2 SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	53	7	13
CO CONCENTRATION PPM	254	55	86
CO2 CONCENTRATION PCT	1.88	1.12	1.49
NOX CONCENTRATION PPM	62.6	10.7	30.0
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	2.34	.53	.57
CO MASS GRAMS	22.53	8.31	7.58
CO2 MASS GRAMS	2630.62	2695.11	2087.58
NOX MASS GRAMS	9.46	2.78	4.53
SO2 MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .15 GRAMS/KILOMETRE
WEIGHTED MASS CO 1.85 GRAMS/KILOMETRE
WEIGHTED MASS CO2 415.68 GRAMS/KILOMETRE
WEIGHTED MASS NOX .78 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

FUEL ECONOMY BY CARBON BALANCE = 5.6 KILOMETRE/LITRE

TABLE EXHAUST EMISSIONS FROM THREE BAG SAMPLE
VEHICLE NUMBER 9

DATE 20/ 7/77 TIME *0000 HRS. TEST NO. 1
MODEL 1975 NOVA CHEVROLET ENGINE 5.7 LITREO
RUN DURATION 31.32 MIN. DISTANCE DRIVEN 17.84 KILOMETRES
CVS BLOWER TEST VOL. 336.81 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2852	
SAMPLE VOL. CU. FT.	18.03	1.00
SAMPLE TEMP. DEG. F	75	70
SAMPLE AREA SQ. IN.	94798.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	5.00	1.00
STAND. AREA SQ. IN.	185265.00	1.00
SO4,MICROG/FILTER	25.584	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	19.348
NET H2SO4,MILLIGRAM/TEST	19.754
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	1.084
NET H2SO4,MILLIGRAM/KILOMETRE	1.107
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2360 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.73	0.000	.0065	.0065
PCT. RECOVERY		0.00	.88	.88

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 9

DATE 7/20/77 TIME -0 HRS. TEST NO. 2
MODEL 1975 NOVA CHEVROLET SET-7 ENGINE 5.7 LITREV 8
DRIVER SR TEST WT. 1814 KG. GVW 0 KG
WET BULB TEMP 17 C DRY BULB TEMP 23 C REL. HUM. 54.4 PCT
SPEC. HUM. 9.9 GRAM/KG BARO. 741.7 MM HG. MEASURED FUEL 0.00 KG

RUN DURATION 23.27 MINUTES
BLOWER INLET PRESS. 711.2 MM. H2O
BLOWER DIF. PRESS. 711.2 MM H2O
BLOWER INLET TEMP. 42 DEG. C
DYNO REVOLUTIONS 32354
BLOWER REVOLUTIONS 112201
BLOWER CU. CM /REV. 2229

BAG RESULTS

HC SAMPLE METER READING/SCALE	19.5/2
HC SAMPLE PPM	19
HC BACKGRD METER READING/SCALE	14.2/2
HC BACKGRD PPM	14
CO SAMPLE METER READING/SCALE	57.8/*
CO SAMPLE PPM	57
CO BACKGRD METER READING/SCALE	1.5/*
CO BACKGRD PPM	2
CO2 SAMPLE METER READING/SCALE	43.4/2
CO2 SAMPLE PERCENT	1.92
CO2 BACKGRD METER READING/SCALE	2.0/2
CO2 BACKGRD PERCENT	.07
NOX SAMPLE METER READING/SCALE	48.3/2
NOX SAMPLE PPM	48.3
NOX BACKGRD METER READING/SCALE	2.0/2
NOX BACKGRD PPM	2.0
HC CONCENTRATION PPM	7
CO CONCENTRATION PPM	52
CO2 CONCENTRATION PCT	1.86
NOX CONCENTRATION PPM	46.6
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	.89
CO MASS (GRAMS)	12.78
CO2 MASS (GRAMS)	7186.27
NOX MASS (GRAMS)	18.29
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.04
CO GRAMS/KILOMETRE	.57
CO2 GRAMS/KILOMETRE	322
NOX GRAMS/KILOMETRE	.82
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.39	HC GRAMS/MIN	.04
CO GRAMS/KG OF FUEL	5.6	CO GRAMS/MIN	.5
CO2 GRAMS/KG OF FUEL	3159	CO2 GRAMS/MIN	309
NOX GRAMS/KG OF FUEL	8.04	NOX GRAMS/MIN	.79
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 13.81 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 9

DATE 7/20/77 TIME -0 HRS. TEST NO. 2
MODEL 1975 NOVA CHEVROLET SET-7 ENGINE 5.7 LITREO
RUN DURATION 23.27 MIN. DISTANCE DRIVEN 22.31 KILOMETRES
CVS BLOWER TEST VOL. 250.05 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2853	
SAMPLE VOL. CU. FT.	14.16	1.00
SAMPLE TEMP. DEG. F	77	70
SAMPLE AREA SQ. IN.	178791.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	20.00	1.00
STAND. AREA SQ. IN.	214134.00	1.00
SO4,MICROG/FILTER	166.990	0.000

SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	118.731
NET H2SO4,MILLIGRAM/TEST	121.224
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	5.322
NET H2SO4,MILLIGRAM/KILOMETRE	5.434
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2275 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.71	0.000	.0396	.0396
PCT. RECOVERY		0.00	5.62	5.62

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 9

DATE 7/20/77	TIME -0 HRS.	TEST NO. 3
MODEL 1975 NOVA CHEVROLET FET		ENGINE 5.7 LITREV 8
DRIVER SR	TEST WT. 1814 KG.	GVW 0 KG
WET BULB TEMP 18 C	DRY BULB TEMP 26 C	REL. HUM. 49.7 PCT
SPEC. HUM. 10.4 GRAM/KG	BARO. 741.7 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION	12.78 MINUTES
BLOWER INLET PRESS.	711.2 MM. H2O
BLOWER DIF. PRESS.	711.2 MM H2O
BLOWER INLET TEMP.	42 DEG. C
DYNO REVOLUTIONS	24238
BLOWER REVOLUTIONS	61603
BLOWER CU. CM /REV.	2229

BAG RESULTS

HC SAMPLE METER READING/SCALE	16.5/2
HC SAMPLE PPM	16
HC BACKGRD METER READING/SCALE	13.8/2
HC BACKGRD PPM	14
CO SAMPLE METER READING/SCALE	15.1/*
CO SAMPLE PPM	14
CO BACKGRD METER READING/SCALE	1.6/*
CO BACKGRD PPM	2
CO2 SAMPLE METER READING/SCALE	53.1/2
CO2 SAMPLE PERCENT	2.46
CO2 BACKGRD METER READING/SCALE	2.1/2
CO2 BACKGRD PERCENT	.08
NOX SAMPLE METER READING/SCALE	68.7/2
NOX SAMPLE PPM	68.7
NOX BACKGRD METER READING/SCALE	1.7/2
NOX BACKGRD PPM	1.7
HC CONCENTRATION PPM	5
CO CONCENTRATION PPM	12
CO2 CONCENTRATION PCT	2.40
NOX CONCENTRATION PPM	67.3
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	.35
CO MASS (GRAMS)	1.60
CO2 MASS (GRAMS)	5095.50
NOX MASS (GRAMS)	14.72
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.02
CO GRAMS/KILOMETRE	.10
CO2 GRAMS/KILOMETRE	305
NOX GRAMS/KILOMETRE	.88
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.22	HC GRAMS/MIN	.03
CO GRAMS/KG OF FUEL	1.0	CO GRAMS/MIN	.1
CO2 GRAMS/KG OF FUEL	3167	CO2 GRAMS/MIN	399
NOX GRAMS/KG OF FUEL	9.15	NOX GRAMS/MIN	1.15
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 13.04 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 9

DATE 7/20/77 TIME -0 HRS. TEST NO. 3
MODEL 1975 NOVA CHEVROLET FET ENGINE 5.7 LITREO
RUN DURATION 12.78 MIN. DISTANCE DRIVEN 16.71 KILOMETRES
CVS BLOWER TEST VOL. 137.29 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2854	
SAMPLE VOL. CU. FT.	7.34	1.00
SAMPLE TEMP. DEG. F	83	70
SAMPLE AREA SQ. IN.	87765.00	0.00
DILUTION FACTOR	5	1
STAND. DEN. MICROG/ML	20.00	1.00
STAND. AREA SQ. IN.	214134.00	1.00
SO4,MICROG/FILTER	409.860	0.000

SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	305.417
NET H2SO4,MILLIGRAM/TEST	311.830
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	18.276
NET H2SO4,MILLIGRAM/KILOMETRE	18.659
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 1609 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.50	0.000	.1020	.1020
PCT. RECOVERY		0.00	20.44	20.44

TABLE

VEHICLE EMISSION RESULTS

1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. 3 TEST NO. 1 DATE 7/22/77 MFGR. CODE -0 YR. 1975
VEHICLE MODEL NOVA CHEVROLET ENGINE 5.74 LITRE 8 CURR WT. 0 KG GVM 0 KG

BAROMETER 700.42 MM OF HG.
DRY BULB TEMP. 22.8 DEG. C
REL. HUMIDITY 61 PCT.

WET BULB TEMP 17.8 DEG. C
ABS. HUMIDITY 10.8 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 711.2 MM. H2O
BLOWER INLET PRESS., G1 711.2 MM. H2O
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40692	69757	40699
HC SAMPLE METER READING/SCALE	72.8/2	21.9/2	29.0/2
HC SAMPLE PPM	73	22	29
HC BACKGRD METER READING/SCALE	14.4/2	14.8/2	14.3/2
HC BACKGRD PPM	14	15	14
CO SAMPLE METER READING/SCALE	60.1/*	46.9/*	88.4/*
CO SAMPLE PPM	241	103	91
CO BACKGRD METER READING/SCALE	1.9/*	1.7/*	1.5/*
CO BACKGRD PPM	6	8	3
CO2 SAMPLE METER READING/SCALE	44.9/2	65.7/3	88.3/3
CO2 SAMPLE PERCENT	2.00	1.18	1.64
CO2 BACKGRD METER READING/SCALE	1.3/2	1.4/2	3.9/3
CO2 BACKGRD PERCENT	.05	.05	.06
NOX SAMPLE METER READING/SCALE	26.3/3	13.6/2	38.6/2
NOX SAMPLE PPM	78.9	13.6	38.6
NOX BACKGRD METER READING/SCALE	.1/3	.1/3	.8/2
NOX BACKGRD PPM	.3	.3	.8
SO2 SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	61	8	16
CO CONCENTRATION PPM	222	94	84
CO2 CONCENTRATION PCT	1.96	1.13	1.59
NOX CONCENTRATION PPM	78.6	13.3	37.9
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	2.68	.64	.73
CO MASS GRAMS	19.78	14.35	7.51
CO2 MASS GRAMS	2759.97	2729.96	2239.55
NOX MASS GRAMS	11.56	3.36	5.57
SO2 MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .18 GRAMS/KILOMETRE
WEIGHTED MASS CO 2.25 GRAMS/KILOMETRE
WEIGHTED MASS CO2 430.35 GRAMS/KILOMETRE
WEIGHTED MASS NOX .95 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

FUEL ECONOMY BY CARBON BALANCE = 5.4 KILOMETRE/LITRE

TABLE EXHAUST EMISSIONS FROM THREE BAG SAMPLE
VEHICLE NUMBER 9

DATE 2?/ ?/?? TIME *0000 HRS. TEST NO. 1
MODEL 1975 NOVA CHEVROLET ENGINE 5.7 LITREO
RUN DURATION 31.32 MIN. DISTANCE DRIVEN 17.84 KILOMETRES
CVS BLOWER TEST VOL. 337.16 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2855	
SAMPLE VOL. CU. FT.	18.76	1.00
SAMPLE TEMP. DEG. F	74	70
SAMPLE AREA SQ. IN.	10550.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	20.00	1.00
STAND. AREA SQ. IN.	218195.00	1.00
SO4,MICROG/FILTER	9.670	0.000

SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	7.047
NET H2SO4,MILLIGRAM/TEST	7.195
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	.395
NET H2SO4,MILLIGRAM/KILOMETRE	.403
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2462 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.76	0.000	.0024	.0024
PCT. RECOVERY		0.00	.31	.31

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 9

DATE 7/22/77 TIME -0 HRS. TEST NO. 2
MODEL 1975 NOVA CHEVROLET SET-7 ENGINE 5.7 LITRE
RUN DURATION 23.27 MIN. DISTANCE DRIVEN 22.46 KILOMETRES
CVS BLOWER TEST VOL. 250.54 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2856	
SAMPLE VOL. CU. FT.	14.23	1.00
SAMPLE TEMP. DEG. F	77	70
SAMPLE AREA SQ. IN.	234549.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	20.00	1.00
STAND. AREA SQ. IN.	211684.00	1.00
SO4, MICROG/FILTER	221.603	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA, BUBBLER 1	0.00	0.00
DIL. FACT., BUBBLER 1	1	1
AREA, BUBBLER 2	0.00	0.00
DIL. FACT., BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA, SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE, MILLIGRAM/TEST	157.555
NET H2SO4, MILLIGRAM/TEST	160.864
NET SO2, GRAM/TEST	0.000
NET SULFATE, MILLIGRAM/KILOMETRE	7.014
NET H2SO4, MILLIGRAM/KILOMETRE	7.161
NET SO2, GRAM/KILOMETRE	0.000

SULFUR BALANCE

FUEL WT., 2298 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR, GRAMS	.71	0.000	.0526	.0526
PCT. RECOVERY		0.00	7.38	7.38

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 9

DATE 7/22/77 TIME -0 HRS. TEST NO. 3
MODEL 1977 NOVA CHEVROLET FET ENGINE 5.7 LITRE 8
DRIVER SR TEST WT. 1814 KG. GVW 0 KG
WET BULB TEMP. 18 C DRY BULB TEMP 22 C REL. HUM. 68.9 PCT
SPEC. HUM. 11.9 GRAY/KG BARO. 744.7 MM HG. MEASURED FUEL 0.00 KG

RUN DURATION 12.76 MINUTES
BLOWER INLET PRESS. 711.2 MM. H20
BLOWER DIF. PRESS. 711.2 MM H20
BLOWER INLET TEMP. 43 DEG. C
DYNO REVOLUTIONS 24611
BLOWER REVOLUTIONS 61554
BLOWER CU. CM /REV. 2232

BAG RESULTS

HC	SAMPLE METER READING/SCALE	17.4/2
HC	SAMPLE PPM	17
HC	BACKGRD METER READING/SCALE	13.9/2
HC	BACKGRD PPM	14
CO	SAMPLE METER READING/SCALE	37.2/*
CO	SAMPLE PPM	34
CO	BACKGRD METER READING/SCALE	1.7/*
CO	BACKGRD PPM	2
CO2	SAMPLE METER READING/SCALE	54.3/2
CO2	SAMPLE PERCENT	2.53
CO2	BACKGRD METER READING/SCALE	2.1/2
CO2	BACKGRD PERCENT	.08
NOX	SAMPLE METER READING/SCALE	78.9/2
NOX	SAMPLE PPM	78.9
NOX	BACKGRD METER READING/SCALE	1.5/2
NOX	BACKGRD PPM	1.5
HC	CONCENTRATION PPM	6
CO	CONCENTRATION PPM	30
CO2	CONCENTRATION PCT	2.47
NOX	CONCENTRATION PPM	77.7
SO2	CONCENTRATION PPM	0.0
HC	MASS (GRAMS)	.41
CO	MASS (GRAMS)	4.09
CO2	MASS (GRAMS)	5254.80
NOX	MASS (GRAMS)	17.82
SO2	MASS (GRAMS)	0.00

HC	GRAMS/KILOMETRE	.02	
CO	GRAMS/KILOMETRE	.24	
CO2	GRAMS/KILOMETRE	310	
NOX	GRAMS/KILOMETRE	1.05	
SO2	GRAMS/KILOMETRE	0.00	
HC	GRAMS/KG OF FUEL	.25	HC GRAMS/MIN .03
CO	GRAMS/KG OF FUEL	2.5	CO GRAMS/MIN .3
CO2	GRAMS/KG OF FUEL	3165	CO2 GRAMS/MIN 412
NOX	GRAMS/KG OF FUEL	10.73	NOX GRAMS/MIN 1.40
SO2	GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN 0.00

CARBON BALANCE FUEL ECONOMY = 13.26 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 9

DATE 7/22/77 TIME -0 HRS. TEST NO. 3
MODEL 1977 NOVA CHEVROLET FET ENGINE 5.7 LITREO
RUN DURATION 12.26 MIN. DISTANCE DRIVEN 16.97 KILOMETRES
CVS BLOWER TEST VOL. 137.41 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2857	
SAMPLE VOL. CU. FT.	7.29	1.00
SAMPLE TEMP. DEG. F	82	70
SAMPLE AREA SQ. IN.	89931.00	0.00
DILUTION FACTOR	5	1
STAND. DEN. MICROG/ML	20.00	1.00
STAND. AREA SQ. IN.	211684.00	1.00
SO4, MICROG/FILTER	424.836	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	1	1
AREA, BUBBLER 1	0.00	0.00
DIL. FACT., BUBBLER 1	1	1
AREA, BUBBLER 2	0.00	0.00
DIL. FACT., BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA, SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE, MILLIGRAM/TEST	299.981
NET H2SO4, MILLIGRAM/TEST	306.281
NET SO2, GRAM/TEST	0.000
NET SULFATE, MILLIGRAM/KILOMETRE	17.678
NET H2SO4, MILLIGRAM/KILOMETRE	18.050
NET SO2, GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 1660 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR, GRAMS	.51	0.000	.1002	.1002
PCT. RECOVERY		0.00	19.46	19.46

APPENDIX D

COMPUTER PRINTOUTS
FOR
AIR MODULATION SYSTEM OPTIMIZATION AND
DURABILITY TESTS ON THE 1975 CHEVROLET NOVA
(Tests in Chronological Order)

TABLE

VEHICLE EMISSION RESULTS

1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. TEST NO. * DATE 9/30/77 MFGR. CODE -0 YR. 1975

VEHICLE MODEL CHEVY NOVA ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 736.35 MM OF HG.
DRY BULB TEMP. 25.6 DEG. C
REL. HUMIDITY 60 PCT.

WET BULB TEMP 20.0 DEG. C
ABS. HUMIDITY 12.7 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 680.7 MM. H2O
BLOWER INLET PRESS., G1 680.7 MM. H2O
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.		1	2	3
BLOWER REVOLUTIONS		40707	69920	40701
HC	SAMPLE METER READING/SCALE	92.7/2	17.3/2	21.6/2
HC	SAMPLE PPM	93	17	22
HC	BACKGRD METER READING/SCALE	13.7/2	12.8/2	10.9/2
HC	BACKGRD PPM	14	13	11
CO	SAMPLE METER READING/SCALE	27.0/3	61.2/*	55.4/*
CO	SAMPLE PPM	631	61	54
CO	BACKGRD METER READING/SCALE	.4/3	4.4/*	1.6/*
CO	BACKGRD PPM	9	4	2
CO2	SAMPLE METER READING/SCALE	98.3/3	62.2/3	84.4/3
CO2	SAMPLE PERCENT	1.85	1.11	1.56
CO2	BACKGRD METER READING/SCALE	4.3/3	4.9/3	4.6/3
CO2	BACKGRD PERCENT	.07	.08	.07
NOX	SAMPLE METER READING/SCALE	66.0/2	11.6/2	24.1/2
NOX	SAMPLE PPM	66.0	11.6	24.1
NOX	BACKGRD METER READING/SCALE	1.5/2	1.3/2	.9/2
NOX	BACKGRD PPM	1.5	1.3	.9
SO2	SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	SAMPLE PPM	-0.0	-0.0	-0.0
SO2	BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	BACKGRD PPM	-0.0	-0.0	-0.0
HC	CONCENTRATION PPM	81	6	12
CO	CONCENTRATION PPM	589	54	50
CO2	CONCENTRATION PCT	1.80	1.04	1.50
NOX	CONCENTRATION PPM	64.7	10.4	23.3
SO2	CONCENTRATION PPM	0.0	0.0	0.0
HC	MASS GRAMS	3.55	.42	.52
CO	MASS GRAMS	52.16	8.24	4.39
CO2	MASS GRAMS	2511.08	2491.59	2094.91
NOX	MASS GRAMS	10.07	2.78	3.63
SO2	MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .19 GRAMS/KILOMETRE
WEIGHTED MASS CO 2.75 GRAMS/KILOMETRE
WEIGHTED MASS CO2 394.90 GRAMS/KILOMETRE
WEIGHTED MASS NOX .76 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

FUEL ECONOMY BY CARBON BALANCE = 5.4 KILOMETRE/LITRE

TABLE VEHICLE EMISSION RESULTS

1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. 9 TEST NO. 1 DATE 11/ 3/77 MFGR. CODE -0 YR. 1975

VEHICLE MODEL NOVA CHEVROLET ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 740.41 MM OF HG.
DRY BULB TEMP. 23.3 DEG. C
REL. HUMIDITY 30 PCT.

WET BULB TEMP 13.3 DEG. C
ABS. HUMIDITY 5.5 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 673.1 MM. H20

BLOWER INLET PRESS., G1 673.1 MM. H20

BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.		1	2	3
BLOWER REVOLUTIONS		40705	69816	40736
HC	SAMPLE METER READING/SCALE	8.5/3	14.5/2	22.7/2
HC	SAMPLE PPM	85	14	23
HC	BACKGRD METER READING/SCALE	.8/3	7.1/2	6.9/2
HC	BACKGRD PPM	8	7	7
CO	SAMPLE METER READING/SCALE	92.9/*	25.0/*	49.2/*
CO	SAMPLE PPM	471	23	47
CO	BACKGRD METER READING/SCALE	1.5/*	2.2/*	1.1/*
CO	BACKGRD PPM	5	2	1
CO2	SAMPLE METER READING/SCALE	95.1/3	60.5/3	87.2/3
CO2	SAMPLE PERCENT	1.79	1.07	1.62
CO2	BACKGRD METER READING/SCALE	3.9/3	3.7/3	3.5/3
CO2	BACKGRD PERCENT	.06	.06	.05
NOX	SAMPLE METER READING/SCALE	92.4/2	16.2/2	28.0/2
NOX	SAMPLE PPM	92.4	16.2	28.0
NOX	BACKGRD METER READING/SCALE	1.1/2	.7/2	.8/2
NOX	BACKGRD PPM	1.1	.7	.8
SO2	SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	SAMPLE PPM	-0.0	-0.0	-0.0
SO2	BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	BACKGRD PPM	-0.0	-0.0	-0.0
HC	CONCENTRATION PPM	78	8	17
CO	CONCENTRATION PPM	446	20	44
CO2	CONCENTRATION PCT	1.73	1.02	1.57
NOX	CONCENTRATION PPM	91.5	15.6	27.3
SO2	CONCENTRATION PPM	0.0	0.0	0.0
HC	MASS GRAMS	3.45	.60	.74
CO	MASS GRAMS	39.77	3.06	3.91
CO2	MASS GRAMS	2441.24	2464.82	2215.83
NOX	MASS GRAMS	11.44	3.34	3.42
SO2	MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .21 GRAMS/KILOMETRE
WEIGHTED MASS CO 1.86 GRAMS/KILOMETRE
WEIGHTED MASS CO2 395.90 GRAMS/KILOMETRE
WEIGHTED MASS NOX .85 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

FUEL ECONOMY BY CARBON BALANCE = 5.9 KILOMETRE/LITRE

TABLE VEHICLE EMISSION RESULTS

1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. 9 TEST NO. * DATE 11/ 9/77 MFGR. CODE -0 YR. 1975

VEHICLE MODEL CHEVY NOVA ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 246.76 MM OF HG. WET BULB TEMP 16.7 DEG. C

DRY BULB TEMP. 23.9 DEG. C ABS. HUMIDITY 8.9 GRAMS/KG

REL. HUMIDITY 48 PCT.

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, *30.3 MM. H20 BLOWER INLET PRESS., G1 698.5 MM. H20

BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	12431	21431	12472
HC SAMPLE METER READING/SCALE	79.8/2	18.5/2	25.4/2
HC SAMPLE PPM	80	18	25
HC BACKGRD METER READING/SCALE	11.2/2	10.4/2	11.5/2
HC BACKGRD PPM	11	10	11
CO SAMPLE METER READING/SCALE	94.3/*	55.4/*	35.2/*
CO SAMPLE PPM	484	54	32
CO BACKGRD METER READING/SCALE	.6/*	1.1/*	.6/*
CO BACKGRD PPM	2	1	1
CO2 SAMPLE METER READING/SCALE	91.0/3	55.5/3	78.4/3
CO2 SAMPLE PERCENT	1.70	.97	1.44
CO2 BACKGRD METER READING/SCALE	3.6/3	3.3/3	4.0/3
CO2 BACKGRD PERCENT	.06	.05	.06
NOX SAMPLE METER READING/SCALE	66.0/2	10.9/2	26.0/2
NOX SAMPLE PPM	66.0	10.9	26.0
NOX BACKGRD METER READING/SCALE	.7/2	.5/2	.9/2
NOX BACKGRD PPM	.7	.5	.9
SO2 SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	70	9	15
CO CONCENTRATION PPM	459	51	30
CO2 CONCENTRATION PCT	1.65	.93	1.38
NOX CONCENTRATION PPM	65.4	10.4	25.2
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	3.52	.77	.76
CO MASS GRAMS	46.57	8.90	3.08
CO2 MASS GRAMS	2647.37	2563.84	2223.57
NOX MASS GRAMS	10.30	2.84	3.98
SO2 MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .23 GRAMS/KILOMETRE

WEIGHTED MASS CO 2.54 GRAMS/KILOMETRE

WEIGHTED MASS CO2 411.82 GRAMS/KILOMETRE

WEIGHTED MASS NOX .79 GRAMS/KILOMETRE

WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

FUEL ECONOMY BY CARBON BALANCE = 5.6 KILOMETRE/LITRE

TABLE VEHICLE EMISSION RESULTS
1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. EM9 TEST NO. 1 DATE 11/29/77 MFGR. CODE -0 YR. 1975
VEHICLE MODEL NOVA CHEVROLET ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 743.46 MM OF HG.
DRY BULB TEMP. 23.3 DEG. C
REL. HUMIDITY 58 PCT.

WET BULB TEMP 17.8 DEG. C
ABS. HUMIDITY 10.6 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 673.1 MM. H2O
BLOWER INLET PRESS., G1 673.1 MM. H2O
BLOWER INLET TEMP. 42 DEG. C

BAG RESULTS

BAG NO.		1	2	3
BLOWER REVOLUTIONS		40816	69840	40800
HC	SAMPLE METER READING/SCALE	86.6/2	13.0/2	21.4/2
HC	SAMPLE PPM	87	13	21
HC	BACKGRD METER READING/SCALE	6.7/2	7.3/2	7.8/2
HC	BACKGRD PPM	7	7	8
CO	SAMPLE METER READING/SCALE	69.8/*	35.5/*	31.6/*
CO	SAMPLE PPM	297	34	30
CO	BACKGRD METER READING/SCALE	.3/*	.5/*	.5/*
CO	BACKGRD PPM	1	0	0
CO2	SAMPLE METER READING/SCALE	94.9/3	57.3/3	79.6/3
CO2	SAMPLE PERCENT	1.78	1.01	1.46
CO2	BACKGRD METER READING/SCALE	3.9/3	3.9/3	4.2/3
CO2	BACKGRD PERCENT	.06	.06	.06
NOX	SAMPLE METER READING/SCALE	79.5/2	14.2/2	29.4/2
NOX	SAMPLE PPM	79.5	14.2	29.4
NOX	BACKGRD METER READING/SCALE	1.3/2	1.0/2	1.0/2
NOX	BACKGRD PPM	1.3	1.0	1.0
SO2	SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	SAMPLE PPM	-0.0	-0.0	-0.0
SO2	BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	BACKGRD PPM	-0.0	-0.0	-0.0
HC	CONCENTRATION PPM	81	6	14
CO	CONCENTRATION PPM	281	32	28
CO2	CONCENTRATION PCT	1.73	.95	1.40
NOX	CONCENTRATION PPM	78.4	13.3	28.5
SO2	CONCENTRATION PPM	0.0	0.0	0.0
HC	MASS GRAMS	3.60	.48	.64
CO	MASS GRAMS	25.24	4.90	2.52
CO2	MASS GRAMS	2455.46	2317.71	1992.35
NOX	MASS GRAMS	11.53	3.34	4.19
SO2	MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .20 GRAMS/KILOMETRE
WEIGHTED MASS CO 1.42 GRAMS/KILOMETRE
WEIGHTED MASS CO2 373.66 GRAMS/KILOMETRE
WEIGHTED MASS NOX .89 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

FUEL ECONOMY BY CARBON BALANCE = 6.2 KILOMETRE/LITRE

TABLE VEHICLE EMISSION RESULTS
1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. 11 TEST NO. * DATE 11/30/77 MFGR. CODE -0 YR. 1975
VEHICLE MODEL 1975 CHEVY NOVA ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 738.89 MM OF HG.
DRY BULB TEMP. 23.9 DEG. C
REL. HUMIDITY 28 PCT.

WET BULB TEMP 13.3 DEG. C
ABS. HUMIDITY 5.3 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 635.0 MM. H20
BLOWER INLET PRESS., G1 647.7 MM. H20
BLOWER INLET TEMP. 42 DEG. C

BAG RESULTS

BAG NO.		1	2	3
BLOWER REVOLUTIONS		40668	69793	40611
HC	SAMPLE METER READING/SCALE	94.9/2	16.0/2	21.1/2
HC	SAMPLE PPM	95	16	21
HC	BACKGRD METER READING/SCALE	7.7/2	7.8/2	8.1/2
HC	BACKGRD PPM	8	8	8
CO	SAMPLE METER READING/SCALE	25.3/3	52.0/*	54.0/*
CO	SAMPLE PPM	587	115	52
CO	BACKGRD METER READING/SCALE	.1/3	1.2/*	1.6/*
CO	BACKGRD PPM	2	2	2
CO2	SAMPLE METER READING/SCALE	97.3/3	59.0/3	81.7/3
CO2	SAMPLE PERCENT	1.83	1.04	1.50
CO2	BACKGRD METER READING/SCALE	4.3/3	4.1/3	3.8/3
CO2	BACKGRD PERCENT	.07	.06	.06
NOX	SAMPLE METER READING/SCALE	87.0/2	14.5/2	33.0/2
NOX	SAMPLE PPM	87.0	14.5	33.0
NOX	BACKGRD METER READING/SCALE	1.4/2	1.1/2	.9/2
NOX	BACKGRD PPM	1.4	1.1	.9
SO2	SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	SAMPLE PPM	-0.0	-0.0	-0.0
SO2	BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	BACKGRD PPM	-0.0	-0.0	-0.0
HC	CONCENTRATION PPM	88	9	14
CO	CONCENTRATION PPM	559	110	48
CO2	CONCENTRATION PCT	1.77	.99	1.45
NOX	CONCENTRATION PPM	85.8	13.5	32.2
SO2	CONCENTRATION PPM	0.0	0.0	0.0
HC	MASS GRAMS	3.91	.67	.62
CO	MASS GRAMS	49.95	16.84	4.31
CO2	MASS GRAMS	2506.65	2387.45	2049.41
NOX	MASS GRAMS	10.70	2.89	4.01
SO2	MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .22 GRAMS/KILOMETRE
WEIGHTED MASS CO 3.38 GRAMS/KILOMETRE
WEIGHTED MASS CO2 383.96 GRAMS/KILOMETRE
WEIGHTED MASS NOX .81 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

FUEL ECONOMY BY CARBON BALANCE = 6.0 KILOMETRE/LITRE

TABLE VEHICLE EMISSION RESULTS
1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. TEST NO. * DATE 12/12/77 MFGR. CODE -0 YR. 1975
VEHICLE MODEL NOVA ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 743.46 MM OF HG.
DRY BULB TEMP. 25.6 DEG. C
REL. HUMIDITY 40 PCT.

WET BULB TEMP 16.7 DEG. C
ABS. HUMIDITY 8.3 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 647.7 MM. H20.
BLOWER INLET PRESS., G1 647.7 MM. H20
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.		1	2	3
BLOWER REVOLUTIONS		40689	69843	40662
HC	SAMPLE METER READING/SCALE	11.7/3	26.2/2	34.0/2
HC	SAMPLE PPM	117	26	34
HC	BACKGRD METER READING/SCALE	2.2/3	28.7/2	24.0/2
HC	BACKGRD PPM	22	29	24
CO	SAMPLE METER READING/SCALE	25.7/3	81.5/*	33.0/*
CO	SAMPLE PPM	596	81	31
CO	BACKGRD METER READING/SCALE	.1/3	6.9/*	6.7/*
CO	BACKGRD PPM	2	7	7
CO2	SAMPLE METER READING/SCALE	95.5/3	63.0/3	83.6/3
CO2	SAMPLE PERCENT	1.79	1.12	1.54
CO2	BACKGRD METER READING/SCALE	4.9/3	4.9/3	4.9/3
CO2	BACKGRD PERCENT	.08	.08	.08
NOX	SAMPLE METER READING/SCALE	47.0/2	11.0/2	35.3/2
NOX	SAMPLE PPM	47.0	11.0	35.3
NOX	BACKGRD METER READING/SCALE	1.1/2	1.0/2	.9/2
NOX	BACKGRD PPM	1.1	1.0	.9
SO2	SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	SAMPLE PPM	-0.0	-0.0	-0.0
SO2	BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	BACKGRD PPM	-0.0	-0.0	-0.0
HC	CONCENTRATION PPM	98	-0	13
CO	CONCENTRATION PPM	566	72	24
CO2	CONCENTRATION PCT	1.73	1.05	1.48
NOX	CONCENTRATION PPM	46.1	10.1	34.5
SO2	CONCENTRATION PPM	0.0	0.0	0.0
HC	MASS GRAMS	4.36	-.01	.57
CO	MASS GRAMS	50.86	11.13	2.17
CO2	MASS GRAMS	2453.48	2566.68	2095.70
NOX	MASS GRAMS	6.29	2.37	4.71
SO2	MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .18 GRAMS/KILOMETRE
WEIGHTED MASS CO 2.84 GRAMS/KILOMETRE
WEIGHTED MASS CO2 399.11 GRAMS/KILOMETRE
WEIGHTED MASS NOX .64 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

FUEL ECONOMY BY CARBON BALANCE = 5.8 KILOMETRE/LITRE

TABLE

VEHICLE EMISSION RESULTS
1978 LIGHT DUTY EMISSIONS TEST
ACTUAL DISTANCES USED IN CALCULATIONS

UNIT NO. 11 TEST NO. 1 DATE 12/30/77 MFGR. CODE -0 YR. 1975
VEHICLE MODEL NOVA EM-4 ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 739.65 MM OF HG.
DRY BULB TEMP. 23.3 DEG. C
REL. HUMIDITY 54 PCT.

WET BULB TEMP 17.2 DEG. C
ABS. HUMIDITY 10.0 GRAMS/KG
COMMENTS 1978 FTPC

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 673.1 MM. H20
BLOWER INLET PRESS., G1 673.1 MM. H20
BLOWER INLET TEMP. 42 DEG. C

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40770	69747	40642
HC SAMPLE METER READING/SCALE	12.0/ 3	19.1/ 2	31.8/ 2
HC SAMPLE PPM	120	19	32
HC BACKGRD METER READING/SCALE	.9/ 3	10.6/ 2	10.8/ 2
HC BACKGRD PPM	9	11	11
CO SAMPLE METER READING/SCALE	84.6/11	5.4/13	71.4/12
CO SAMPLE PPM	401	5	162
CO BACKGRD METER READING/SCALE	.8/11	3.2/13	1.4/12
CO BACKGRD PPM	2	3	2
CO2 SAMPLE METER READING/SCALE	95.5/ 3	62.4/ 3	85.2/ 3
CO2 SAMPLE PERCENT	1.79	1.11	1.58
CO2 BACKGRD METER READING/SCALE	3.6/ 3	3.6/ 3	3.7/ 3
CO2 BACKGRD PERCENT	.06	.06	.06
NOX SAMPLE METER READING/SCALE	38.6/ 2	13.2/ 2	27.8/ 2
NOX SAMPLE PPM	38.6	13.2	27.8
NOX BACKGRD METER READING/SCALE	.9/ 2	.9/ 2	.9/ 2
NOX BACKGRD PPM	.9	.9	.9
SO2 SAMPLE METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	112	9	22
CO CONCENTRATION PPM	378	2	152
CO2 CONCENTRATION PCT	1.75	1.06	1.53
NOX CONCENTRATION PPM	37.8	12.4	27.0
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	4.96	.71	.98
CO MASS GRAMS	33.74	.34	13.53
CO2 MASS GRAMS	2452.17	2546.98	2138.43
NOX MASS GRAMS	5.42	3.03	3.85
SO2 MASS GRAMS	0.00	0.00	0.00
HC GRAMS/KM (GRAMS/MILE)	.86 (1.38)	.11 (.18)	.17 (.27)
CO GRAMS/KM (GRAMS/MILE)	5.82 (9.36)	.05 (.09)	2.31 (3.72)
CO2 GRAMS/KM (GRAMS/MILE)	422.74 (680.19)	403.00 (648.43)	365.06 (587.38)
NOX GRAMS/KM (GRAMS/MILE)	.93 (1.50)	.48 (.77)	.66 (1.06)
FUEL CONSUMPTION BY CB L/100KM (MPG)	18.55 (12.68)	17.22 (13.66)	15.76 (14.93)
CVS FLOW STD. CU. METRES (SCF)	76.7 (2708.4)	131.2 (4632.4)	76.4 (2699.4)
CALCULATED DISTANCE KM(MILES)	5.80 (3.61)	6.32 (3.93)	5.86 (3.64)

WEIGHTED FUEL CONSUMPTION LITRES/100KM (MPG)	17.09 (13.76)
WEIGHTED MASS HC GRAMS/KM (GRAMS/MILE)	.28 (.45)
WEIGHTED MASS CO GRAMS/KM (GRAMS/MILE)	1.86 (2.99)
WEIGHTED MASS CO2 GRAMS/KM (GRAMS/MILE)	396.66 (638.22)
WEIGHTED MASS NOX GRAMS/KM (GRAMS/MILE)	.62 (1.00)

TOTAL CVS FLOW = 284.3 STD. CU. METRES

TABLE

VEHICLE EMISSION RESULTS
1978 LIGHT DUTY EMISSIONS TEST
ACTUAL DISTANCES USED IN CALCULATIONS

UNIT NO. EM9 TEST NO. 1 DATE 1/16/78 MFGR. CODE -0 YR. 1975
VEHICLE MODEL NOVA CHEVY ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 739.14 MM OF HG.
DRY BULB TEMP. 23.3 DEG. C
REL. HUMIDITY 62 PCT.

WET BULB TEMP 18.3 DEG. C
ABS. HUMIDITY 11.4 GRAMS/KG
COMMENTS 1978 FTP-C

EXHAUST EMISSIONS

BLOWER INLET PRESS., G1 673.1 MM. H2O
BLOWER INLET TEMP. 41 DEG. C

BLOWER DIF. PRESS., G2, 673.1 MM. H2O
BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40732	69822	40684
HC SAMPLE METER READING/SCALE	84.3/ 2	17.3/ 2	27.6/ 2
HC SAMPLE PPM	84	17	28
HC BACKGRD METER READING/SCALE	12.2/ 2	11.9/ 2	10.8/ 2
HC BACKGRD PPM	12	12	11
CO SAMPLE METER READING/SCALE	70.1/11	28.3/13	20.6/13
CO SAMPLE PPM	299	27	20
CO BACKGRD METER READING/SCALE	8.6/11	23.9/13	11.8/13
CO BACKGRD PPM	27	23	11
CO2 SAMPLE METER READING/SCALE	97.1/ 3	63.2/ 3	85.3/ 3
CO2 SAMPLE PERCENT	1.83	1.13	1.58
CO2 BACKGRD METER READING/SCALE	3.1/ 3	3.9/ 3	4.2/ 3
CO2 BACKGRD PERCENT	.05	.06	.06
NOX SAMPLE METER READING/SCALE	29.6/ 2	11.1/ 2	25.4/ 2
NOX SAMPLE PPM	29.6	11.1	25.4
NOX BACKGRD METER READING/SCALE	.6/ 2	.6/ 2	.7/ 2
NOX BACKGRD PPM	.6	.6	.7
SO2 SAMPLE METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	74	6	18
CO CONCENTRATION PPM	260	5	9
CO2 CONCENTRATION PCT	1.79	1.07	1.52
NOX CONCENTRATION PPM	29.1	10.6	24.8
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	3.27	.49	.80
CO MASS GRAMS	23.25	.82	.79
CO2 MASS GRAMS	2512.19	2583.75	2138.94
NOX MASS GRAMS	4.37	2.72	3.72
SO2 MASS GRAMS	0.00	0.00	0.00
HC GRAMS/KM (GRAMS/MILE)	.56 (.90)	.08 (.12)	.14 (.22)
CO GRAMS/KM (GRAMS/MILE)	3.99 (6.42)	.13 (.21)	.13 (.22)
CO2 GRAMS/KM (GRAMS/MILE)	431.09 (693.63)	407.52 (655.71)	367.35 (591.06)
NOX GRAMS/KM (GRAMS/MILE)	.75 (1.21)	.43 (.69)	.64 (1.03)
FUEL CONSUMPTION BY CR L/100KM (MPG)	18.74 (12.55)	17.41 (13.51)	15.71 (14.98)
CVS FLOW STD. CU. METRES (SCF)	76.8 (2712.0)	131.6 (4648.3)	76.7 (2708.5)
CALCULATED DISTANCE KM(MILES)	5.83 (3.62)	6.34 (3.94)	5.82 (3.62)

EIGHTED FUEL CONSUMPTION LITRES/100KM (MPG)	17.22 (13.66)
WEIGHTED MASS HC GRAMS/KM (GRAMS/MILE)	.19 (.31)
WEIGHTED MASS CO GRAMS/KM (GRAMS/MILE)	.93 (1.49)
WEIGHTED MASS CO2 GRAMS/KM (GRAMS/MILE)	401.41 (645.87)
WEIGHTED MASS NOX GRAMS/KM (GRAMS/MILE)	.55 (.89)

TOTAL CVS FLOW = 285.1 STD. CU. METRES

TABLE

VEHICLE EMISSION RESULTS
1978 LIGHT DUTY EMISSIONS TEST
ACTUAL DISTANCES USED IN CALCULATIONS

UNIT NO. EM9 TEST NO. 1 DATE 1/18/78 MFGR. CODE -0 YR. 1975
VEHICLE MODEL NOVA CHEVY ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 742.19 MM OF HG.
DRY BULB TEMP. 22.2 DEG. C
REL. HUMIDITY 22 PCT.

WET BULB TEMP 11.1 DEG. C
ABS. HUMIDITY 3.7 GRAMS/KG
COMMENTS 1978-FTP-C

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 673.1 MM. H20
BLOWER INLET PRESS., G1 673.1 MM. H20
BLOWER INLET TEMP. 93 DEG. C

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40662	69734	40625
HC SAMPLE METER READING/SCALE	65.3/ 2	16.3/ 2	33.4/ 2
HC SAMPLE PPM	65	16	33
HC BACKGRD METER READING/SCALE	9.8/ 2	9.0/ 2	9.7/ 2
HC BACKGRD PPM	10	9	10
CO SAMPLE METER READING/SCALE	62.7/11	7.4/13	25.1/13
CO SAMPLE PPM	255	7	24
CO BACKGRD METER READING/SCALE	.6/11	1.8/13	1.8/13
CO BACKGRD PPM	2	2	2
CO2 SAMPLE METER READING/SCALE	42.6/ 2	62.2/ 3	85.3/ 3
CO2 SAMPLE PERCENT	1.88	1.11	1.58
CO2 BACKGRD METER READING/SCALE	1.9/ 2	3.3/ 3	3.6/ 3
CO2 BACKGRD PERCENT	.07	.05	.06
NOX SAMPLE METER READING/SCALE	38.7/ 2	14.0/ 2	33.0/ 2
NOX SAMPLE PPM	38.7	14.0	33.0
NOX BACKGRD METER READING/SCALE	1.1/ 2	.5/ 2	.6/ 2
NOX BACKGRD PPM	1.1	.5	.6
SO2 SAMPLE METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	57	8	25
CO CONCENTRATION PPM	243	5	21
CO2 CONCENTRATION PCT	1.82	1.06	1.53
NOX CONCENTRATION PPM	37.8	13.5	32.5
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	2.52	.61	1.10
CO MASS GRAMS	21.66	.82	1.91
CO2 MASS GRAMS	2551.93	2553.69	2148.31
NOX MASS GRAMS	4.50	2.77	3.87
SO2 MASS GRAMS	0.00	0.00	0.00
HC GRAMS/KM (GRAMS/MILE)	.43 (.70)	.10 (.16)	.19 (.30)
CO GRAMS/KM (GRAMS/MILE)	3.72 (5.98)	.13 (.21)	.33 (.52)
CO2 GRAMS/KM (GRAMS/MILE)	438.17 (705.02)	403.79 (649.70)	366.92 (590.37)
NOX GRAMS/KM (GRAMS/MILE)	.77 (1.24)	.44 (.70)	.66 (1.06)
FUEL CONSUMPTION BY CB L/100KM (MPG)	19.01 (12.37)	17.26 (13.63)	15.71 (14.98)
CVS FLOW STD. CU. METRES (SCF)	76.7 (2708.4)	131.5 (4644.4)	76.6 (2705.8)
CALCULATED DISTANCE KM(MILES)	5.82 (3.62)	6.32 (3.93)	5.86 (3.64)

WEIGHTED FUEL CONSUMPTION LITRES/100KM (MPG)	17.19 (13.68)
WEIGHTED MASS HC GRAMS/KM (GRAMS/MILE)	.19 (.31)
WEIGHTED MASS CO GRAMS/KM (GRAMS/MILE)	.92 (1.49)
WEIGHTED MASS CO2 GRAMS/KM (GRAMS/MILE)	400.77 (644.84)
WEIGHTED MASS NOX GRAMS/KM (GRAMS/MILE)	.57 (.91)

TOTAL CVS FLOW = 284.9 STD. CU. METRES

TABLE

VEHICLE EMISSION RESULTS
1978 LIGHT DUTY EMISSIONS TEST
ACTUAL DISTANCES USED IN CALCULATIONS

UNIT NO. EM9 TEST NO. 1 DATE 2/28/78 MFGR. CODE -0 YR. 1975
VEHICLE MODEL NOVA CHEVY ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 738.63 MM OF HG.
DRY BULB TEMP. 22.2 DEG. C
REL. HUMIDITY 73 PCT.

WET BULB TEMP 18.9 DEG. C
ABS. HUMIDITY 12.6 GRAMS/KG
COMMENTS 1978 FTP-C

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 736.6 MM. H2O
BLOWER INLET PRESS., G1 736.6 MM. H2O
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40618	69650	40612
HC SAMPLE METER READING/SCALE	84.3/ 2	21.0/ 2	36.3/ 2
HC SAMPLE PPM	84	21	36
HC BACKGRD METER READING/SCALE	12.0/ 2	13.5/ 2	19.5/ 2
HC BACKGRD PPM	12	13	19
CO SAMPLE METER READING/SCALE	72.6/11	17.5/13	66.8/12
CO SAMPLE PPM	315	17	150
CO BACKGRD METER READING/SCALE	.7/11	1.6/13	.6/12
CO BACKGRD PPM	2	2	1
CO2 SAMPLE METER READING/SCALE	46.4/ 2	72.3/ 3	94.2/ 3
CO2 SAMPLE PERCENT	2.08	1.31	1.77
CO2 BACKGRD METER READING/SCALE	1.7/ 2	4.0/ 3	3.1/ 3
CO2 BACKGRD PERCENT	.06	.06	.05
NOX SAMPLE METER READING/SCALE	23.9/ 2	9.3/ 2	17.6/ 2
NOX SAMPLE PPM	23.9	9.3	17.6
NOX BACKGRD METER READING/SCALE	.8/ 2	.5/ 2	.6/ 2
NOX BACKGRD PPM	.8	.5	.6
SO2 SAMPLE METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	74	9	19
CO CONCENTRATION PPM	293	15	141
CO2 CONCENTRATION PCT	2.03	1.26	1.73
NOX CONCENTRATION PPM	23.2	8.8	17.1
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	3.23	.66	.84
CO MASS GRAMS	25.79	2.19	12.38
CO2 MASS GRAMS	2806.01	2976.51	2384.50
NOX MASS GRAMS	3.58	2.34	2.63
SO2 MASS GRAMS	0.00	0.00	0.00
HC GRAMS/KM (GRAMS/MILE)	.55 (.89)	.10 (.17)	.15 (.23)
CO GRAMS/KM (GRAMS/MILE)	4.41 (7.10)	.34 (.55)	2.13 (3.42)
CO2 GRAMS/KM (GRAMS/MILE)	479.98 (772.29)	468.61 (753.99)	409.76 (659.30)
NOX GRAMS/KM (GRAMS/MILE)	.61 (.98)	.37 (.59)	.45 (.73)
FUEL CONSUMPTION BY CB L/100KM (MPG)	20.86 (11.28)	20.04 (11.74)	17.65 (13.33)
CVS FLOW STD. CU. METRES (SCF)	75.5 (2666.2)	129.4 (4571.5)	75.5 (2665.6)
CALCULATED DISTANCE KM(MILES)	5.85 (3.63)	6.35 (3.95)	5.82 (3.62)

WEIGHTED FUEL CONSUMPTION LITRES/100KM (MPG)	19.56 (12.03)
WEIGHTED MASS HC GRAMS/KM (GRAMS/MILE)	.21 (.33)
WEIGHTED MASS CO GRAMS/KM (GRAMS/MILE)	1.67 (2.68)
WEIGHTED MASS CO2 GRAMS/KM (GRAMS/MILE)	454.91 (731.96)
WEIGHTED MASS NOX GRAMS/KM (GRAMS/MILE)	.44 (.71)

TOTAL CVS FLOW = 280.5 STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM9

DATE 2/28/78	TIME -0 HRS.	TEST NO. 2
MODEL 1975 NOVA CHEVY	SET-7	ENGINE 5.7 LITREV 8
DRIVER BP	TEST WT. 1814 KG.	GVW 0 KG
WET BULB TEMP 19 C	DRY BULB TEMP 25 C	REL. HUM. 56.1 PCT
SPEC. HUM. 11.4 GRAM/KG	BARO. 738.4 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION	23.23 MINUTES
BLOWER INLET PRESS.	736.6 MM. H2O
BLOWER DIF. PRESS.	736.6 MM H2O
BLOWER INLET TEMP.	44 DEG. C
DYNO REVOLUTIONS	31583
BLOWER REVOLUTIONS	111934
BLOWER CU. CM /REV.	2231

BAG RESULTS

HC SAMPLE METER READING/SCALE	25.3/2
HC SAMPLE PPM	25
HC BACKGRD METER READING/SCALE	14.4/2
HC BACKGRD PPM	14
CO SAMPLE METER READING/SCALE	80.9/*
CO SAMPLE PPM	187
CO BACKGRD METER READING/SCALE	.5/*
CO BACKGRD PPM	1
CO2 SAMPLE METER READING/SCALE	45.9/2
CO2 SAMPLE PERCENT	2.05
CO2 BACKGRD METER READING/SCALE	1.7/2
CO2 BACKGRD PERCENT	.06
NOX SAMPLE METER READING/SCALE	26.1/2
NOX SAMPLE PPM	26.1
NOX BACKGRD METER READING/SCALE	.8/2
NOX BACKGRD PPM	.8
HC CONCENTRATION PPM	13
CO CONCENTRATION PPM	176
CO2 CONCENTRATION PCT	2.00
NOX CONCENTRATION PPM	25.4
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	1.57
CO MASS (GRAMS)	42.50
CO2 MASS (GRAMS)	7641.20
NOX MASS (GRAMS)	10.33
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.07
CO GRAMS/KILOMETRE	1.95
CO2 GRAMS/KILOMETRE	351
NOX GRAMS/KILOMETRE	.47
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.65	HC GRAMS/MIN	.07
CO GRAMS/KG OF FUEL	17.5	CO GRAMS/MIN	1.8
CO2 GRAMS/KG OF FUEL	3140	CO2 GRAMS/MIN	329
NOX GRAMS/KG OF FUEL	4.24	NOX GRAMS/MIN	.44
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 15.14 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM9

DATE 2/28/78 TIME -0 HRS. TEST NO. 2
MODEL 1975 NOVA CHEVY SET-7 ENGINE 5.7 LITREO
RUN DURATION 23.23 MIN. DISTANCE DRIVEN 21.78 KILOMETRES
CVS BLOWER TEST VOL. 249.76 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2896	
SAMPLE VOL. CU. FT.	16.26	1.00
SAMPLE TEMP. DEG. F	81	70
SAMPLE AREA SQ. IN.	221520.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	5.00	1.00
STAND. AREA SQ. IN.	144075.00	1.00
SO4,MICROG/FILTER	76.877	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	47.575
NET H2SO4,MILLIGRAM/TEST	48.574
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	2.185
NET H2SO4,MILLIGRAM/KILOMETRE	2.231
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2434 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.75	0.000	.0159	.0159
PCT. RECOVERY		0.00	2.11	2.11

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM9

DATE 2/28/78	TIME -0 HRS.	TEST NO. 3
MODEL 1975 NOVA CHEVY	FET EM-9	ENGINE 5.7 LITREV 8
DRIVER BP	TEST WT. 1814 KG.	GVW 0 KG
WET BULB TEMP 18 C	DRY BULB TEMP 26 C	REL. HUM. 49.7 PCT
SPEC. HUM. 10.4 GRAM/KG	BARO. 738.4 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION 12.76 MINUTES
BLOWER INLET PRESS. 736.6 MM. H2O
BLOWER DIF. PRESS. 736.6 MM H2O
BLOWER INLET TEMP. 44 DEG. C
DYNO REVOLUTIONS 23715
BLOWER REVOLUTIONS 61545
BLOWER CU. CM /REV. 2231

BAG RESULTS

HC SAMPLE METER READING/SCALE	22.4/2
HC SAMPLE PPM	22
HC BACKGRD METER READING/SCALE	12.8/2
HC BACKGRD PPM	13
CO SAMPLE METER READING/SCALE	68.1/*
CO SAMPLE PPM	66
CO BACKGRD METER READING/SCALE	1.1/*
CO BACKGRD PPM	1
CO2 SAMPLE METER READING/SCALE	55.1/2
CO2 SAMPLE PERCENT	2.58
CO2 BACKGRD METER READING/SCALE	1.7/2
CO2 BACKGRD PERCENT	.06
NOX SAMPLE METER READING/SCALE	38.2/2
NOX SAMPLE PPM	38.2
NOX BACKGRD METER READING/SCALE	.8/2
NOX BACKGRD PPM	.8
HC CONCENTRATION PPM	12
CO CONCENTRATION PPM	61
CO2 CONCENTRATION PCT	2.53
NOX CONCENTRATION PPM	37.6
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	.79
CO MASS (GRAMS)	8.12
CO2 MASS (GRAMS)	5304.50
NOX MASS (GRAMS)	8.12
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.05
CO GRAMS/KILOMETRE	.50
CO2 GRAMS/KILOMETRE	324
NOX GRAMS/KILOMETRE	.50
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.47	HC GRAMS/MIN	.06
CO GRAMS/KG OF FUEL	4.8	CO GRAMS/MIN	.6
CO2 GRAMS/KG OF FUEL	3160	CO2 GRAMS/MIN	416
NOX GRAMS/KG OF FUEL	4.84	NOX GRAMS/MIN	.64
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 13.91 LITRES PER HUNDRED KILOMETERS

TABLE VEHICLE EMISSION RESULTS
1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. EM9 TEST NO. 1 DATE 3/ 2/78 MFGR. CODE -0 YR. 1975
VEHICLE MODEL NOVA CHEVY ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 738.12 MM OF HG.
DRY BULB TEMP. 20.6 DEG. C
REL. HUMIDITY 59 PCT.

WET BULB TEMP 15.6 DEG. C
ABS. HUMIDITY 9.2 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 736.6 MM. H2O
BLOWER INLET PRESS., G1 736.6 MM. H2O
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.		1	2	3
BLOWER REVOLUTIONS		40585	69585	40592
HC	SAMPLE METER READING/SCALE	67.6/2	21.8/2	31.5/2
HC	SAMPLE PPM	68	22	31
HC	BACKGRD METER READING/SCALE	13.0/2	13.6/2	11.8/2
HC	BACKGRD PPM	13	14	12
CO	SAMPLE METER READING/SCALE	65.7/*	22.0/*	76.2/*
CO	SAMPLE PPM	272	21	75
CO	BACKGRD METER READING/SCALE	2.1/*	4.6/*	2.2/*
CO	BACKGRD PPM	6	4	2
CO2	SAMPLE METER READING/SCALE	46.3/2	72.4/3	94.8/3
CO2	SAMPLE PERCENT	2.08	1.31	1.78
CO2	BACKGRD METER READING/SCALE	1.9/2	4.2/3	3.7/3
CO2	BACKGRD PERCENT	.07	.06	.06
NOX	SAMPLE METER READING/SCALE	31.6/2	9.9/2	21.0/2
NOX	SAMPLE PPM	31.6	9.9	21.0
NOX	BACKGRD METER READING/SCALE	.4/2	.4/2	.3/2
NOX	BACKGRD PPM	.4	.4	.3
SO2	SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	SAMPLE PPM	-0.0	-0.0	-0.0
SO2	BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	BACKGRD PPM	-0.0	-0.0	-0.0
HC	CONCENTRATION PPM	57	10	21
CO	CONCENTRATION PPM	251	16	69
CO2	CONCENTRATION PCT	2.02	1.26	1.73
NOX	CONCENTRATION PPM	31.3	9.5	20.7
SO2	CONCENTRATION PPM	0.0	0.0	0.0
HC	MASS GRAMS	2.46	.71	.92
CO	MASS GRAMS	22.03	2.41	6.08
CO2	MASS GRAMS	2797.13	2982.19	2398.11
NOX	MASS GRAMS	4.29	2.25	2.85
SO2	MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .19 GRAMS/KILOMETRE
WEIGHTED MASS CO 1.27 GRAMS/KILOMETRE
WEIGHTED MASS CO2 460.07 GRAMS/KILOMETRE
WEIGHTED MASS NOX .47 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

FUEL ECONOMY BY CARBON BALANCE = 5.1 KILOMETRE/LITRE

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM9

DATE 3/ 2/78	TIME -0 HRS.	TEST NO. 2
MODEL 1975 NOVA CHEVY	SET 7	ENGINE 5.7 LITREV 8
DRIVER BP	TEST WT. 1814 KG.	GVW 0 KG
WET BULB TEMP 16 C	DRY BULB TEMP 21 C	REL. HUM. 59.9 PCT
SPEC. HUM. 9.6 GRAM/KG	BARO. 737.1 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION	23.28 MINUTES
BLOWER INLET PRESS.	736.6 MM. H20
BLOWER DIF. PRESS.	736.6 MM H20
BLOWER INLET TEMP.	43 DEG. C
DYNO REVOLUTIONS	31829
BLOWER REVOLUTIONS	112237
BLOWER CU. CM /REV.	2228

BAG RESULTS

HC SAMPLE METER READING/SCALE	21.0/2
HC SAMPLE PPM	21
HC BACKGRD METER READING/SCALE	9.4/2
HC BACKGRD PPM	9
CO SAMPLE METER READING/SCALE	69.4/*
CO SAMPLE PPM	157
CO BACKGRD METER READING/SCALE	.6/*
CO BACKGRD PPM	1
CO2 SAMPLE METER READING/SCALE	45.1/2
CO2 SAMPLE PERCENT	2.01
CO2 BACKGRD METER READING/SCALE	1.8/2
CO2 BACKGRD PERCENT	.07
NOX SAMPLE METER READING/SCALE	28.0/2
NOX SAMPLE PPM	28.0
NOX BACKGRD METER READING/SCALE	.5/2
NOX BACKGRD PPM	.5
HC CONCENTRATION PPM	13
CO CONCENTRATION PPM	147
CO2 CONCENTRATION PCT	1.96
NOX CONCENTRATION PPM	27.6
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	1.56
CO MASS (GRAMS)	35.58
CO2 MASS (GRAMS)	7482.68
NOX MASS (GRAMS)	10.60
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.07
CO GRAMS/KILOMETRE	1.62
CO2 GRAMS/KILOMETRE	341
NOX GRAMS/KILOMETRE	.48
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.66	HC GRAMS/MIN	.07
CO GRAMS/KG OF FUEL	15.0	CO GRAMS/MIN	1.5
CO2 GRAMS/KG OF FUEL	3144	CO2 GRAMS/MIN	321
NOX GRAMS/KG OF FUEL	4.45	NOX GRAMS/MIN	.46
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 14.69 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM9

DATE 3/ 2/78 TIME -0 HRS. TEST NO. 2
MODEL 1975 NOVA CHEVY SET 7 ENGINE 5.7 LITREO
RUN DURATION 23.28 MIN. DISTANCE DRIVEN 21.95 KILOMETRES
CVS BLOWER TEST VOL. 250.03 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2895	
SAMPLE VOL. CU. FT.	16.54	1.00
SAMPLE TEMP. DEG. F	78	70
SAMPLE AREA SQ. IN.	80917.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	20.00	1.00
STAND. AREA SQ. IN.	170105.00	1.00
SO4,MICROG/FILTER	95.138	0.000

SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	58.085
NET H2SO4,MILLIGRAM/TEST	59.304
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	2.647
NET H2SO4,MILLIGRAM/KILOMETRE	2.702
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2380 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.74	0.000	.0194	.0194
PCT. RECOVERY		0.00	2.63	2.63

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM9

DATE 3/ 2/78	TIME -0 HRS.	TEST NO. 3
MODEL 1975 NOVA CHEVY	FET	ENGINE 5.7 LITREV 8
DRIVER BP	TEST WT. 1814 KG.	GVW 0 KG
WET BULB TEMP 17 C	DRY BULB TEMP 23 C	REL. HUM. 54.4 PCT
SPEC. HUM. 10.0 GRAM/KG	BARO. 737.1 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION	12.76 MINUTES
BLOWER INLET PRESS.	736.6 MM. H2O
BLOWER DIF. PRESS.	736.6 MM H2O
BLOWER INLET TEMP.	43 DEG. C
DYNO REVOLUTIONS	23810
BLOWER REVOLUTIONS	61531
BLOWER CU. CM /REV.	2229

BAG RESULTS

HC SAMPLE METER READING/SCALE	20.2/2
HC SAMPLE PPM	20
HC BACKGRD METER READING/SCALE	9.8/2
HC BACKGRD PPM	10
CO SAMPLE METER READING/SCALE	96.6/*
CO SAMPLE PPM	98
CO BACKGRD METER READING/SCALE	.6/*
CO BACKGRD PPM	1
CO2 SAMPLE METER READING/SCALE	54.4/2
CO2 SAMPLE PERCENT	2.54
CO2 BACKGRD METER READING/SCALE	1.8/2
CO2 BACKGRD PERCENT	.07
NOX SAMPLE METER READING/SCALE	39.1/2
NOX SAMPLE PPM	39.1
NOX BACKGRD METER READING/SCALE	.8/2
NOX BACKGRD PPM	.8
HC CONCENTRATION PPM	12
CO CONCENTRATION PPM	91
CO2 CONCENTRATION PCT	2.48
NOX CONCENTRATION PPM	38.5
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	.81
CO MASS (GRAMS)	12.14
CO2 MASS (GRAMS)	5205.14
NOX MASS (GRAMS)	8.20
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.05
CO GRAMS/KILOMETRE	.74
CO2 GRAMS/KILOMETRE	316
NOX GRAMS/KILOMETRE	.50
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.49	HC GRAMS/MIN	.06
CO GRAMS/KG OF FUEL	7.4	CO GRAMS/MIN	1.0
CO2 GRAMS/KG OF FUEL	3156	CO2 GRAMS/MIN	408
NOX GRAMS/KG OF FUEL	4.97	NOX GRAMS/MIN	.64
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 13.56 LITRES PER HUNDRED KILOMETERS

TABLE

VEHICLE EMISSION RESULTS
1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. 9 TEST NO. 1 DATE 3/29/78 MFGR. CODE -0 YR. 1975
VEHICLE MODEL CHEVY NOVA ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 744.98 MM OF HG.
DRY BULB TEMP. 24.4 DEG. C
REL. HUMIDITY 14 PCT.

WET BULB TEMP 11.1 DEG. C
ABS. HUMIDITY 2.7 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 762.0 MM. H2O
BLOWER INLET PRESS., G1 762.0 MM. H2O
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.		1	2	3
BLOWER REVOLUTIONS		40609	69534	40600
HC	SAMPLE METER READING/SCALE	83.2/2	23.8/2	30.7/2
HC	SAMPLE PPM	83	23.8	30.7
HC	BACKGRD METER READING/SCALE	11.6/2	10.7/2	11.0/2
HC	BACKGRD PPM	12	10.7	11.0
CO	SAMPLE METER READING/SCALE	68.5/*	91.3/*	22.9/*
CO	SAMPLE PPM	289	92	22
CO	BACKGRD METER READING/SCALE	2.0/*	1.3/*	1.7/*
CO	BACKGRD PPM	6	4	2
CO2	SAMPLE METER READING/SCALE	43.5/2	65.3/3	85.3/3
CO2	SAMPLE PERCENT	1.92	1.17	1.58
CO2	BACKGRD METER READING/SCALE	1.9/2	3.7/3	3.0/3
CO2	BACKGRD PERCENT	.07	.06	.05
NOX	SAMPLE METER READING/SCALE	40.8/2	9.7/2	24.7/2
NOX	SAMPLE PPM	40.8	9.7	24.7
NOX	BACKGRD METER READING/SCALE	1.2/2	.8/2	.6/2
NOX	BACKGRD PPM	1.2	.8	.6
SO2	SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	SAMPLE PPM	-0.0	-0.0	-0.0
SO2	BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	BACKGRD PPM	-0.0	-0.0	-0.0
HC	CONCENTRATION PPM	73	14.1	21.0
CO	CONCENTRATION PPM	272	86	20
CO2	CONCENTRATION PCT	1.87	1.12	1.54
NOX	CONCENTRATION PPM	39.8	9.0	24.2
SO2	CONCENTRATION PPM	0.0	0.0	0.0
HC	MASS GRAMS	3.21	1.054	0.920
CO	MASS GRAMS	24.05	13.01	1.73
CO2	MASS GRAMS	2604.18	2670.59	2148.62
NOX	MASS GRAMS	4.58	1.77	2.78
SO2	MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC (0.39)
WEIGHTED MASS CO 2.02 GRAMS/KILOMETRE
WEIGHTED MASS CO2 415.59 GRAMS/KILOMETRE
WEIGHTED MASS NOX .44 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

FUEL ECONOMY BY CARBON BALANCE = 5.5 KILOMETRE/LITRE

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM9

DATE 3/29/78	TIME -0 HRS.	TEST NO. 2
MODEL 1975 CHEVY NOVA	SET-7	ENGINE 5.7 LITREV 8
DRIVER BP	TEST WT. 1814 KG.	GVW 0 KG
WET BULB TEMP 12 C	DRY BULB TEMP 26 C	REL. HUM. 13.8 PCT
SPEC. HUM. 2.9 GRAM/KG	BARO. 741.9 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION	23.29 MINUTES
BLOWER INLET PRESS.	762.0 MM. H2O
BLOWER DIF. PRESS.	762.0 MM H2O
BLOWER INLET TEMP.	43 DEG. C
DYNO REVOLUTIONS	31169
BLOWER REVOLUTIONS	112286
BLOWER CU. CM /REV.	2228

BAG RESULTS

HC SAMPLE METER READING/SCALE	22.4/2
HC SAMPLE PPM	22
HC BACKGRD METER READING/SCALE	8.4/2
HC BACKGRD PPM	8
CO SAMPLE METER READING/SCALE	51.6/*
CO SAMPLE PPM	49
CO BACKGRD METER READING/SCALE	.1/*
CO BACKGRD PPM	0
CO2 SAMPLE METER READING/SCALE	41.6/2
CO2 SAMPLE PERCENT	1.82
CO2 BACKGRD METER READING/SCALE	1.8/2
CO2 BACKGRD PERCENT	.07
NOX SAMPLE METER READING/SCALE	36.1/2
NOX SAMPLE PPM	36.1
NOX BACKGRD METER READING/SCALE	.5/2
NOX BACKGRD PPM	.5
HC CONCENTRATION PPM	15
CO CONCENTRATION PPM	47
CO2 CONCENTRATION PCT	1.77
NOX CONCENTRATION PPM	35.7
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	1.82
CO MASS (GRAMS)	11.47
CO2 MASS (GRAMS)	6782.82
NOX MASS (GRAMS)	11.31
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.08
CO GRAMS/KILOMETRE	.53
CO2 GRAMS/KILOMETRE	312
NOX GRAMS/KILOMETRE	.52
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.85	HC GRAMS/MIN	.08
CO GRAMS/KG OF FUEL	5.3	CO GRAMS/MIN	.5
CO2 GRAMS/KG OF FUEL	3158	CO2 GRAMS/MIN	291
NOX GRAMS/KG OF FUEL	5.27	NOX GRAMS/MIN	.49
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 13.38 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM9

DATE 3/29/78 TIME -0 HRS. TEST NO. 2
MODEL 1975 CHEVY NOVA SET-7 ENGINE 5.7 LITREO
RUN DURATION 23.29 MIN. DISTANCE DRIVEN 21.74 KILOMETRES
CVS BLOWER TEST VOL. 250.14 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2899	
SAMPLE VOL. CU. FT.	16.30	1.00
SAMPLE TEMP. DEG. F	80	70
SAMPLE AREA SQ. IN.	12562.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	5.00	1.00
STAND. AREA SQ. IN.	137467.00	1.00
SO4,MICROG/FILTER	4.569	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	2.832
NET H2SO4,MILLIGRAM/TEST	2.891
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	.130
NET H2SO4,MILLIGRAM/KILOMETRE	.133
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2148 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.67	0.000	.0009	.0009
PCT. RECOVERY		0.00	.14	.14

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM9

DATE 3/29/78	TIME -0 HRS.	TEST NO. 3
MODEL 1975 CHEVY NOVA	FET	ENGINE 5.7 LITREV 8
DRIVER BP	TEST WT. 1814 KG.	GVW 0 KG
WET BULB TEMP 17 C	DRY BULB TEMP 26 C	REL. HUM. 40.6 PCT
SPEC. HUM. 8.7 GRAM/KG	BARO. 741.9 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION	12.75 MINUTES
BLOWER INLET PRESS.	762.0 MM. H2O
BLOWER DIF. PRESS.	762.0 MM H2O
BLOWER INLET TEMP.	43 DEG. C
DYNO REVOLUTIONS	23541
BLOWER REVOLUTIONS	61454
BLOWER CU. CM /REV.	2228

BAG RESULTS

HC SAMPLE METER READING/SCALE	26.0/2
HC SAMPLE PPM	26.0
HC BACKGRD METER READING/SCALE	9.6/2
HC BACKGRD PPM	10
CO SAMPLE METER READING/SCALE	47.3/*
CO SAMPLE PPM	45
CO BACKGRD METER READING/SCALE	.6/*
CO BACKGRD PPM	1
CO2 SAMPLE METER READING/SCALE	50.3/2
CO2 SAMPLE PERCENT	2.30
CO2 BACKGRD METER READING/SCALE	1.5/2
CO2 BACKGRD PERCENT	.05
NOX SAMPLE METER READING/SCALE	52.4/2
NOX SAMPLE PPM	52.4
NOX BACKGRD METER READING/SCALE	1.1/2
NOX BACKGRD PPM	1.1
HC CONCENTRATION PPM	16
CO CONCENTRATION PPM	42
CO2 CONCENTRATION PCT	2.25
NOX CONCENTRATION PPM	51.5
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	1.0546
CO MASS (GRAMS)	5.58
CO2 MASS (GRAMS)	4736.24
NOX MASS (GRAMS)	10.56
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	0.06 (0.10)
CO GRAMS/KILOMETRE	.34
CO2 GRAMS/KILOMETRE	287
NOX GRAMS/KILOMETRE	.64
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	10.97	HC GRAMS/MIN	1.30
CO GRAMS/KG OF FUEL	3.7	CO GRAMS/MIN	.4
CO2 GRAMS/KG OF FUEL	3129	CO2 GRAMS/MIN	371
NOX GRAMS/KG OF FUEL	6.98	NOX GRAMS/MIN	.83
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 12.44 LITRES PER HUNDRED KILOMETERS

TABLE VEHICLE EMISSION RESULTS

1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. 9 TEST NO. 1 DATE 3/31/78 MFGR. CODE -0 YR. 1975
VEHICLE MODEL CHEVY NOVA ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 744.98 MM OF HG.
DRY BULB TEMP. 21.7 DEG. C
REL. HUMIDITY 60 PCT.

WET BULB TEMP 16.7 DEG. C
ABS. HUMIDITY 9.9 GRAMS/KG

EXHAUST EMISSIONS

BLOWER INLET PRESS., G1 736.6 MM. H2O
BLOWER DIF. PRESS., G2, 736.6 MM. H2O
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.		1	2	3
BLOWER REVOLUTIONS		40695	69510	40540
HC	SAMPLE METER READING/SCALE	91.4/2	27.2/2	37.1/2
HC	SAMPLE PPM	91	27	37
HC	BACKGRD METER READING/SCALE	16.2/2	13.4/2	13.5/2
HC	BACKGRD PPM	16	13	13
CO	SAMPLE METER READING/SCALE	70.5/*	93.3/*	42.0/*
CO	SAMPLE PPM	302	95	40
CO	BACKGRD METER READING/SCALE	1.2/*	3.1/*	1.9/*
CO	BACKGRD PPM	4	3	2
CO2	SAMPLE METER READING/SCALE	43.4/2	66.7/3	87.0/3
CO2	SAMPLE PERCENT	1.92	1.20	1.62
CO2	BACKGRD METER READING/SCALE	2.1/2	3.7/3	4.0/3
CO2	BACKGRD PERCENT	.08	.06	.06
NOX	SAMPLE METER READING/SCALE	35.2/2	10.0/2	24.8/2
NOX	SAMPLE PPM	35.2	10.0	24.8
NOX	BACKGRD METER READING/SCALE	.8/2	.7/2	.6/2
NOX	BACKGRD PPM	.8	.7	.6
SO2	SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	SAMPLE PPM	0.0	0.0	0.0
SO2	BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	BACKGRD PPM	0.0	0.0	0.0
HC	CONCENTRATION PPM	78	15	25
CO	CONCENTRATION PPM	282	88	36
CO2	CONCENTRATION PCT	1.85	1.15	1.56
NOX	CONCENTRATION PPM	34.5	9.4	24.3
SO2	CONCENTRATION PPM	0.0	0.0	0.0
HC	MASS GRAMS	3.42	1.13	1.11
CO	MASS GRAMS	25.04	13.34	3.20
CO2	MASS GRAMS	2603.17	2747.23	2183.93
NOX	MASS GRAMS	4.91	2.28	3.44
SO2	MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .27 GRAMS/KILOMETRE
WEIGHTED MASS CO 2.15 GRAMS/KILOMETRE
WEIGHTED MASS CO2 423.57 GRAMS/KILOMETRE
WEIGHTED MASS NOX .53 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

FUEL ECONOMY BY CARBON BALANCE = 5.5 KILOMETRE/LITRE

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM9

DATE 3/31/78	TIME -0 HRS.	TEST NO. 2
MODEL 1975 CHEVY NOVA	SET-7	ENGINE 5.7 LITREV 8
DRIVER SR	TEST WT. 1814 KG.	GVW 0 KG
WET BULB TEMP 18 C	DRY BULB TEMP 25 C	REL. HUM. 49.0 PCT
SPEC. HUM. 9.9 GRAM/KG	BARO. 745.0 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION	23.29 MINUTES
BLOWER INLET PRESS.	736.6 MM. H2O
BLOWER DIF. PRESS.	736.6 MM H2O
BLOWER INLET TEMP.	43 DEG. C
DYNO REVOLUTIONS	37379
BLOWER REVOLUTIONS	112422
BLOWER CU. CM /REV.	2229

BAG RESULTS

HC SAMPLE METER READING/SCALE	30.0/2
HC SAMPLE PPM	30
HC BACKGRD METER READING/SCALE	16.9/2
HC BACKGRD PPM	17
CO SAMPLE METER READING/SCALE	39.2/*
CO SAMPLE PPM	37
CO BACKGRD METER READING/SCALE	4.7/*
CO BACKGRD PPM	5
CO2 SAMPLE METER READING/SCALE	42.4/2
CO2 SAMPLE PERCENT	1.87
CO2 BACKGRD METER READING/SCALE	2.2/2
CO2 BACKGRD PERCENT	.08
NOX SAMPLE METER READING/SCALE	37.0/2
NOX SAMPLE PPM	37.0
NOX BACKGRD METER READING/SCALE	1.1/2
NOX BACKGRD PPM	1.1
HC CONCENTRATION PPM	15
CO CONCENTRATION PPM	31
CO2 CONCENTRATION PCT	1.80
NOX CONCENTRATION PPM	36.1
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	1.88
CO MASS (GRAMS)	7.69
CO2 MASS (GRAMS)	6970.39
NOX MASS (GRAMS)	14.15
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.09
CO GRAMS/KILOMETRE	.35
CO2 GRAMS/KILOMETRE	321
NOX GRAMS/KILOMETRE	.65
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.85	HC GRAMS/MIN	.08
CO GRAMS/KG OF FUEL	3.5	CO GRAMS/MIN	.3
CO2 GRAMS/KG OF FUEL	3161	CO2 GRAMS/MIN	299
NOX GRAMS/KG OF FUEL	6.42	NOX GRAMS/MIN	.61
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 13.74 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM9

DATE 3/31/78 TIME -0 HRS. TEST NO. 2
MODEL 1975 CHEVY NOVA SET-7 ENGINE 5.7 LITREO
RUN DURATION 23.29 MIN. DISTANCE DRIVEN 21.74 KILOMETRES
CVS BLOWER TEST VOL. 250.53 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2902	
SAMPLE VOL. CU. FT.	15.79	1.00
SAMPLE TEMP. DEG. F	80	70
SAMPLE AREA SQ. IN.	66447.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	5.00	1.00
STAND. AREA SQ. IN.	146019.00	1.00
SO4,MICROG/FILTER	22.753	0.000

SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	14.512
NET H2SO4,MILLIGRAM/TEST	14.816
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	.668
NET H2SO4,MILLIGRAM/KILOMETRE	.682
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2205 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.68	0.000	.0048	.0048
PCT. RECOVERY		0.00	.71	.71

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM9

DATE 3/31/78	TIME -0 HRS.	TEST NO. 3
MODEL 1977 CHEVY NOVA	FET	ENGINE 5.7 LITREV 8
DRIVER SR	TEST WT. 1814 KG.	GVW 0 KG
WET BULB TEMP 18 C	DRY BULB TEMP 24 C	REL. HUM. 55.4 PCT
SPEC. HUM. 10.8 GRAM/KG	BARO. 745.0 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION	12.76 MINUTES
BLOWER INLET PRESS.	736.6 MM. H2O
BLOWER DIF. PRESS.	736.6 MM H2O
BLOWER INLET TEMP.	43 DEG. C
DYNO REVOLUTIONS	23847
BLOWER REVOLUTIONS	61513
BLOWER CU. CM /REV.	2228

BAG RESULTS

HC SAMPLE METER READING/SCALE	31.1/2
HC SAMPLE PPM	31
HC BACKGRD METER READING/SCALE	15.2/2
HC BACKGRD PPM	15
CO SAMPLE METER READING/SCALE	67.6/*
CO SAMPLE PPM	66
CO BACKGRD METER READING/SCALE	14.4/*
CO BACKGRD PPM	14
CO2 SAMPLE METER READING/SCALE	50.2/2
CO2 SAMPLE PERCENT	2.29
CO2 BACKGRD METER READING/SCALE	2.1/2
CO2 BACKGRD PERCENT	.08
NOX SAMPLE METER READING/SCALE	57.8/2
NOX SAMPLE PPM	57.8
NOX BACKGRD METER READING/SCALE	1.7/2
NOX BACKGRD PPM	1.7
HC CONCENTRATION PPM	19
CO CONCENTRATION PPM	50
CO2 CONCENTRATION PCT	2.23
NOX CONCENTRATION PPM	56.4
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	1.23
CO MASS (GRAMS)	6.78
CO2 MASS (GRAMS)	4733.97
NOX MASS (GRAMS)	12.48
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.07
CO GRAMS/KILOMETRE	.41
CO2 GRAMS/KILOMETRE	287
NOX GRAMS/KILOMETRE	.76
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.82	HC GRAMS/MIN	.10
CO GRAMS/KG OF FUEL	4.5	CO GRAMS/MIN	.5
CO2 GRAMS/KG OF FUEL	3160	CO2 GRAMS/MIN	371
NOX GRAMS/KG OF FUEL	8.33	NOX GRAMS/MIN	.98
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 12.32 LITRES PER HUNDRED KILOMETERS

TABLE

VEHICLE EMISSION RESULTS
1978 LIGHT DUTY EMISSIONS TEST
ACTUAL DISTANCES USED IN CALCULATIONS

UNIT NO. EM9 TEST NO. 1 DATE 4/25/78 MFGR. CODE -0 YR. 1975
VEHICLE MODEL CHEVROLET NOVA ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 744.73 MM OF HG.
DRY BULB TEMP. 21.7 DEG. C
REL. HUMIDITY 45 PCT.

WET BULB TEMP 14.4 DEG. C
ABS. HUMIDITY 7.4 GRAMS/KG
COMMENTS 1978 FTPC

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 736.6 MM. H2O
BLOWER INLET PRESS., G1 736.6 MM. H2O
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40708	69485	40543
HC SAMPLE METER READING/SCALE	94.7/ 2	31.2/ 2	45.0/ 2
HC SAMPLE PPM	95	31	45
HC BACKGRD METER READING/SCALE	9.2/ 2	8.8/ 2	8.3/ 2
HC BACKGRD PPM	9	9	8
CO SAMPLE METER READING/SCALE	81.8/11	59.5/11	73.8/12
CO SAMPLE PPM	379	237	168
CO BACKGRD METER READING/SCALE	.6/11	.1/11	.4/12
CO BACKGRD PPM	2	0	1
CO2 SAMPLE METER READING/SCALE	96.6/ 3	63.3/ 3	84.6/ 3
CO2 SAMPLE PERCENT	1.82	1.13	1.57
CO2 BACKGRD METER READING/SCALE	3.0/ 3	3.1/ 3	3.0/ 3
CO2 BACKGRD PERCENT	.05	.05	.05
NOX SAMPLE METER READING/SCALE	44.9/ 2	10.8/ 2	32.6/ 2
NOX SAMPLE PPM	44.9	10.8	32.6
NOX BACKGRD METER READING/SCALE	.9/ 2	.7/ 2	.8/ 2
NOX BACKGRD PPM	.9	.7	.8
SO2 SAMPLE METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	87	23	38
CO CONCENTRATION PPM	359	229	160
CO2 CONCENTRATION PCT	1.78	1.09	1.52
NOX CONCENTRATION PPM	44.1	10.2	31.9
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	3.82	1.74	1.65
CO MASS GRAMS	31.92	34.68	14.16
CO2 MASS GRAMS	2484.97	2590.02	2123.02
NOX MASS GRAMS	5.80	2.28	4.18
SO2 MASS GRAMS	0.00	0.00	0.00
HC GRAMS/KM (GRAMS/MILE)	.67 (1.07)	.28 (.46)	.29 (.46)
CO GRAMS/KM (GRAMS/MILE)	5.56 (8.94)	5.64 (9.07)	2.46 (3.96)
CO2 GRAMS/KM (GRAMS/MILE)	432.65 (696.14)	421.03 (677.44)	368.88 (593.53)
NOX GRAMS/KM (GRAMS/MILE)	1.01 (1.63)	.37 (.60)	.73 (1.17)
FUEL CONSUMPTION BY CB L/100KM (MPG)	18.93 (12.43)	18.39 (12.79)	15.95 (14.75)
CVS FLOW STD. CU. METRES (SCF)	76.4 (2696.5)	130.3 (4602.0)	76.0 (2685.2)
CALCULATED DISTANCE KM(MILES)	5.74 (3.57)	6.15 (3.82)	5.76 (3.58)

WEIGHTED FUEL CONSUMPTION LITRES/100KM (MPG)	17.83 (13.20)
WEIGHTED MASS HC GRAMS/KM (GRAMS/MILE)	.36 (.58)
WEIGHTED MASS CO GRAMS/KM (GRAMS/MILE)	4.75 (7.64)
WEIGHTED MASS CO2 GRAMS/KM (GRAMS/MILE)	409.08 (658.21)
WEIGHTED MASS NOX GRAMS/KM (GRAMS/MILE)	.60 (.97)

TOTAL CVS FLOW = 282.7 STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM9

DATE 4/25/78	TIME -0 HRS.	TEST NO. 2
MODEL 1975 CHEVROLET NOVA	SET-7	ENGINE 5.7 LITRE 8
DRIVER JC	TEST WT. 1814 KG.	GVW 0 KG
WET BULB TEMP 14 C	DRY BULB TEMP 25 C	REL. HUM. 29.7 PCT
SPEC. HUM. 5.9 GRAM/KG	BARO. 745.0 MM HG.	MEASURED FUEL 0.00 KG
DISTANCE 21.805 KM	FUEL 738.2 G/LITRE	FUEL HC RATIO 1.860

RUN DURATION 23.30 MINUTES
BLOWER INLET PRESS. 762.0 MM. H2O
BLOWER DIF. PRESS. 762.0 MM H2O
BLOWER INLET TEMP. 43 DEG. C
DYNO REVOLUTIONS 31689
BLOWER REVOLUTIONS 112237
BLOWER CU. CM /REV. 2228

BAG RESULTS

HC SAMPLE METER READING/SCALE	29.5/ 2
HC SAMPLE PPM	29
HC BACKGRD METER READING/SCALE	10.5/ 2
HC BACKGRD PPM	10
CO SAMPLE METER READING/SCALE	49.1/12
CO SAMPLE PPM	108
CO BACKGRD METER READING/SCALE	.2/12
CO BACKGRD PPM	0
CO2 SAMPLE METER READING/SCALE	93.2/ 3
CO2 SAMPLE PERCENT	1.75
CO2 BACKGRD METER READING/SCALE	3.1/ 3
CO2 BACKGRD PERCENT	.05
NOX SAMPLE METER READING/SCALE	42.7/ 2
NOX SAMPLE PPM	42.7
NOX BACKGRD METER READING/SCALE	.7/ 2
NOX BACKGRD PPM	.7
HC CONCENTRATION PPM	20
CO CONCENTRATION PPM	103
CO2 CONCENTRATION PCT	1.70
NOX CONCENTRATION PPM	42.1
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	2.46
CO MASS (GRAMS)	25.17
CO2 MASS (GRAMS)	6540.41
NOX MASS (GRAMS)	14.58
SO2 MASS (GRAMS)	0.00

HC GRAMS/KM (GRAMS/MILE)	.11 (	.18)
CO GRAMS/KM (GRAMS/MILE)	1.15 (	1.86)
CO2 GRAMS/KM (GRAMS/MILE)	300 (	483)
NOX GRAMS/KM (GRAMS/MILE)	.67 (	1.08)
SO2 GRAMS/KM (GRAMS/MILE)	0.00 (	0.00)

HC GRAMS/KG OF FUEL	1.19	HC GRAMS/MIN	.11
CO GRAMS/KG OF FUEL	12.1	CO GRAMS/MIN	1.1
CO2 GRAMS/KG OF FUEL	3147	CO2 GRAMS/MIN	281
NOX GRAMS/KG OF FUEL	7.02	NOX GRAMS/MIN	.63
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY L/100KM (MILES/GALLON) 12.89 (18.24)

TOTAL CVS FLOW= 209.7STD. CU. METRES

ERROR [01709 042578 FORD PINTO FET 78 9.7 I4 9.7 2750] END OF RECORD

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM9

DATE 4/25/78 TIME -0 HRS. TEST NO. 2
MODEL 1975 CHEVROLET NOVA SET-7 ENGINE 5.7 LITREO
RUN DURATION 23.30 MIN. DISTANCE DRIVEN 21.77 KILOMETRES
CVS BLOWER TEST VOL. 250.05 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47 FH-2922	
SAMPLE VOL. CU. FT.	17.65	1.00
SAMPLE TEMP. DEG. F	81	70
SAMPLE AREA SQ. IN.	54421.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	5.00	1.00
STAND. AREA SQ. IN.	155115.00	1.00
SO4,MICROG/FILTER	17.542	0.000

SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS	
NET SULFATE,MILLIGRAM/TEST	10.015
NET H2SO4,MILLIGRAM/TEST	10.226
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	.460
NET H2SO4,MILLIGRAM/KILOMETRE	.470
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2087 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.65	0.000	.0033	.0033
PCT. RECOVERY		0.00	.52	.52

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM9

DATE 4/25/78	TIME -0 HRS.	TEST NO. 3
MODEL 1975 CHEVROLET NOVA	FET EM-9	ENGINE 5.7 LITRE 8
DRIVER JC	TEST WT. 1814 KG.	GVW 0 KG
WET BULB TEMP 16 C	DRY BULB TEMP 27 C	REL. HUM. 27.4 PCT
SPEC. HUM. 6.2 GRAM/KG	BARO. 745.0 MM HG.	MEASURED FUEL 0.00 KG
DISTANCE 16.621 KM	FUEL 738.2 G/LITRE	FUEL HC RATIO 1.860

RUN DURATION 12.76 MINUTES
BLOWER INLET PRESS. 769.6 MM. H2O
BLOWER DIF. PRESS. 769.6 MM H2O
BLOWER INLET TEMP. 44 DEG. C
DYNO REVOLUTIONS 24155
BLOWER REVOLUTIONS 61575
BLOWER CU. CM /REV. 2229

BAG RESULTS

HC SAMPLE METER READING/SCALE	30.4/ 2
HC SAMPLE PPM	30
HC BACKGRD METER READING/SCALE	12.7/ 2
HC BACKGRD PPM	13
CO SAMPLE METER READING/SCALE	16.1/13
CO SAMPLE PPM	15
CO BACKGRD METER READING/SCALE	1.3/13
CO BACKGRD PPM	1
CO2 SAMPLE METER READING/SCALE	47.6/ 2
CO2 SAMPLE PERCENT	2.15
CO2 BACKGRD METER READING/SCALE	1.5/ 2
CO2 BACKGRD PERCENT	.05
NOX SAMPLE METER READING/SCALE	58.5/ 2
NOX SAMPLE PPM	58.5
NOX BACKGRD METER READING/SCALE	.8/ 2
NOX BACKGRD PPM	.8
HC CONCENTRATION PPM	20
CO CONCENTRATION PPM	14
CO2 CONCENTRATION PCT	2.10
NOX CONCENTRATION PPM	57.8
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	1.31
CO MASS (GRAMS)	1.81
CO2 MASS (GRAMS)	4417.71
NOX MASS (GRAMS)	11.06
SO2 MASS (GRAMS)	0.00

HC GRAMS/KM (GRAMS/MILE)	.08 (	.13)
CO GRAMS/KM (GRAMS/MILE)	.11 (	.18)
CO2 GRAMS/KM (GRAMS/MILE)	266 (	428)
NOX GRAMS/KM (GRAMS/MILE)	.67 (	1.07)
SO2 GRAMS/KM (GRAMS/MILE)	0.00 (	0.00)

HC GRAMS/KG OF FUEL	.94	HC GRAMS/MIN	.10
CO GRAMS/KG OF FUEL	1.3	CO GRAMS/MIN	.1
CO2 GRAMS/KG OF FUEL	3164	CO2 GRAMS/MIN	346
NOX GRAMS/KG OF FUEL	7.93	NOX GRAMS/MIN	.87
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY L/100KM (MILES/GALLON) 11.36 (20.70)

TOTAL CVS FLOW= 114.8STD. CU. METRES

TABLE

VEHICLE EMISSION RESULTS
1978 LIGHT DUTY EMISSIONS TEST
ACTUAL DISTANCES USED IN CALCULATIONS

UNIT NO. EM9 TEST NO. 1 DATE 4/26/78 MFGR. CODE -0 YR. 1975
VEHICLE MODEL CHEVROLET NOVA ENGINE 5.7L LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 744.98 MM OF HG.
DRY BULB TEMP. 21.1 DEG. C
REL. HUMIDITY 37 PCT.

WET BULB TEMP 12.8 DEG. C
ABS. HUMIDITY 5.8 GRAMS/KG
COMMENTS 1978 FTPC

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 762.0 MM. H2O
BLOWER INLET PRESS., G1 762.0 MM. H2O
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40656	69632	40587
HC SAMPLE METER READING/SCALE	94.6/ 2	24.9/ 2	40.9/ 2
HC SAMPLE PPM	95	25	41
HC BACKGRD METER READING/SCALE	10.5/ 2	10.5/ 2	10.7/ 2
HC BACKGRD PPM	10	10	11
CO SAMPLE METER READING/SCALE	91.1/12	20.5/13	22.8/13
CO SAMPLE PPM	220	20	22
CO BACKGRD METER READING/SCALE	8.7/12	15.9/13	11.1/13
CO BACKGRD PPM	16	15	11
CO2 SAMPLE METER READING/SCALE	96.9/ 3	63.0/ 3	83.5/ 3
CO2 SAMPLE PERCENT	1.82	1.12	1.54
CO2 BACKGRD METER READING/SCALE	3.6/ 3	3.7/ 3	3.6/ 3
CO2 BACKGRD PERCENT	.06	.06	.06
NOX SAMPLE METER READING/SCALE	49.4/ 2	12.7/ 2	32.7/ 2
NOX SAMPLE PPM	49.4	12.7	32.7
NOX BACKGRD METER READING/SCALE	.9/ 2	.7/ 2	.7/ 2
NOX BACKGRD PPM	.9	.7	.7
SO2 SAMPLE METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	86	15	31
CO CONCENTRATION PPM	196	5	11
CO2 CONCENTRATION PCT	1.78	1.07	1.49
NOX CONCENTRATION PPM	48.6	12.1	32.1
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	3.75	1.15	1.37
CO MASS GRAMS	17.31	.77	1.01
CO2 MASS GRAMS	2468.87	2549.62	2072.95
NOX MASS GRAMS	6.08	2.58	4.01
SO2 MASS GRAMS	0.00	0.00	0.00
HC GRAMS/KM (GRAMS/MILE)	.65 (1.04)	.19 (.30)	.24 (.38)
CO GRAMS/KM (GRAMS/MILE)	2.99 (4.81)	.13 (.20)	.17 (.28)
CO2 GRAMS/KM (GRAMS/MILE)	426.78 (686.69)	413.63 (665.53)	359.20 (577.95)
NOX GRAMS/KM (GRAMS/MILE)	1.05 (1.69)	.42 (.67)	.69 (1.12)
FUEL CONSUMPTION BY C8 L/100KM (MPG)	18.50 (12.71)	17.69 (13.30)	15.37 (15.30)
CVS FLOW STD. CU. METRES (SCF)	75.9 (2681.6)	130.0 (4592.0)	75.8 (2676.8)
CALCULATED DISTANCE KM(MILES)	5.78 (3.60)	6.16 (3.83)	5.77 (3.59)

WEIGHTED FUEL CONSUMPTION LITRES/100KM (MPG)	17.22 (13.66)
WEIGHTED MASS HC GRAMS/KM (GRAMS/MILE)	.30 (.48)
WEIGHTED MASS CO GRAMS/KM (GRAMS/MILE)	.74 (1.18)
WEIGHTED MASS CO2 GRAMS/KM (GRAMS/MILE)	401.37 (645.80)
WEIGHTED MASS NOX GRAMS/KM (GRAMS/MILE)	.63 (1.01)

TOTAL CVS FLOW = 281.8 STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM9

DATE 4/26/78	TIME -0 HRS.	TEST NO. 2
MODEL 1975 CHEVROLET NOVA	SET-7	ENGINE 5.7 LITRE 8
DRIVER TJ	TEST WT. 1814 KG.	GVW 0 KG
WET BULB TEMP 14 C	DRY BULB TEMP 24 C	REL. HUM. 34.3 PCT
SPEC. HUM. 6.4 GRAM/KG	BARO. 745.0 MM HG.	MEASURED FUEL 0.00 KG
DISTANCE 21.721 KM	FUEL 738.2 G/LITRE	FUEL HC RATIO 1.860

RUN DURATION	23.29 MINUTES
BLOWER INLET PRESS.	762.0 MM. H2O
BLOWER DIF. PRESS.	762.0 MM H2O
BLOWER INLET TEMP.	44 DEG. C
DYNO REVOLUTIONS	31567
BLOWER REVOLUTIONS	112159
BLOWER CU. CM /REV.	2230

BAG RESULTS

HC SAMPLE METER READING/SCALE	33.9/ 2
HC SAMPLE PPM	34
HC BACKGRD METER READING/SCALE	13.3/ 2
HC BACKGRD PPM	13
CO SAMPLE METER READING/SCALE	12.6/13
CO SAMPLE PPM	12
CO BACKGRD METER READING/SCALE	8.7/13
CO BACKGRD PPM	8
CO2 SAMPLE METER READING/SCALE	96.8/ 3
CO2 SAMPLE PERCENT	1.82
CO2 BACKGRD METER READING/SCALE	4.6/ 3
CO2 BACKGRD PERCENT	.07
NOX SAMPLE METER READING/SCALE	45.4/ 2
NOX SAMPLE PPM	45.4
NOX BACKGRD METER READING/SCALE	.5/ 2
NOX BACKGRD PPM	.5
HC CONCENTRATION PPM	22
CO CONCENTRATION PPM	4
CO2 CONCENTRATION PCT	1.76
NOX CONCENTRATION PPM	45.0
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	2.70
CO MASS (GRAMS)	1.06
CO2 MASS (GRAMS)	6743.54
NOX MASS (GRAMS)	15.77
SO2 MASS (GRAMS)	0.00

HC GRAMS/KM (GRAMS/MILE)	.12 (	.20)
CO GRAMS/KM (GRAMS/MILE)	.05 (	.08)
CO2 GRAMS/KM (GRAMS/MILE)	310 (	500)
NOX GRAMS/KM (GRAMS/MILE)	.73 (	1.17)
SO2 GRAMS/KM (GRAMS/MILE)	0.00 (	0.00)

HC GRAMS/KG OF FUEL	1.27	HC GRAMS/MIN	.12
CO GRAMS/KG OF FUEL	.5	CO GRAMS/MIN	.0
CO2 GRAMS/KG OF FUEL	3165	CO2 GRAMS/MIN	290
NOX GRAMS/KG OF FUEL	7.40	NOX GRAMS/MIN	.68
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY L/100KM (MILES/GALLON) 13.27 (17.73)

TOTAL CVS FLOW= 209.4STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM9

DATE 4/26/78 TIME -0 HRS. TEST NO. 2
MODEL 1975 CHEVROLET NOVA SET-7 ENGINE 5.7 LITREO
RUN DURATION 23.29 MIN. DISTANCE DRIVEN 21.77 KILOMETRES
CVS BLOWER TEST VOL. 250.07 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47 FH-2925	
SAMPLE VOL. CU. FT.	17.23	1.00
SAMPLE TEMP. DEG. F	79	70
SAMPLE AREA SQ. IN.	59005.00	0.00
DILUTION FACTOR	5	1
STAND. DEN. MICROG/ML	20.00	1.00
STAND. AREA SQ. IN.	155539.00	1.00
SO4,MICROG/FILTER	379.358	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	223.180
NET H2SO4,MILLIGRAM/TEST	227.867
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	10.252
NET H2SO4,MILLIGRAM/KILOMETRE	10.467
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE

FUEL WT., 2140 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.66	0.000	.0745	.0745
PCT. RECOVERY		0.00	11.23	11.23

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM9

DATE 4/26/78	TIME -0 HRS.	TEST NO. 3
MODEL 1975 CHEVROLET NOVA HFET		ENGINE 5.7 LITRE 8
DRIVER TJ	TEST WT. 1814 KG.	GVW 0 KG
WET BULB TEMP 14 C	DRY BULB TEMP 24 C	REL. HUM. 34.3 PCT
SPEC. HUM. 6.4 GRAM/KG	BARO. 745.0 MM HG.	MEASURED FUEL 0.00 KG
DISTANCE 16.386 KM	FUEL 738.2 G/LITRE	FUEL HC RATIO 1.860

RUN DURATION 12.75 MINUTES
BLOWER INLET PRESS. 762.0 MM. H20
BLOWER DIF. PRESS. 762.0 MM H20
BLOWER INLET TEMP. 43 DEG. C
DYNO REVOLUTIONS 23814
BLOWER REVOLUTIONS 61389
BLOWER CU. CM /REV. 2228

BAG RESULTS

HC SAMPLE METER READING/SCALE	35.7/ 2
HC SAMPLE PPM	36
HC BACKGRD METER READING/SCALE	12.1/ 2
HC BACKGRD PPM	12
CO SAMPLE METER READING/SCALE	9.7/13
CO SAMPLE PPM	9
CO BACKGRD METER READING/SCALE	5.3/13
CO BACKGRD PPM	5
CO2 SAMPLE METER READING/SCALE	47.4/ 2
CO2 SAMPLE PERCENT	2.14
CO2 BACKGRD METER READING/SCALE	1.7/ 2
CO2 BACKGRD PERCENT	.06
NOX SAMPLE METER READING/SCALE	56.0/ 2
NOX SAMPLE PPM	56.0
NOX BACKGRD METER READING/SCALE	1.1/ 2
NOX BACKGRD PPM	1.1
HC CONCENTRATION PPM	26
CO CONCENTRATION PPM	5
CO2 CONCENTRATION PCT	2.09
NOX CONCENTRATION PPM	55.1
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	1.69
CO MASS (GRAMS)	.61
CO2 MASS (GRAMS)	4376.59
NOX MASS (GRAMS)	10.58
SO2 MASS (GRAMS)	0.00

HC GRAMS/KM (GRAMS/MILE)	.10 (	.17)
CO GRAMS/KM (GRAMS/MILE)	.04 (	.06)
CO2 GRAMS/KM (GRAMS/MILE)	267 (	430)
NOX GRAMS/KM (GRAMS/MILE)	.65 (	1.04)
SO2 GRAMS/KM (GRAMS/MILE)	0.00 (	0.00)

HC GRAMS/KG OF FUEL	1.22	HC GRAMS/MIN	.13
CO GRAMS/KG OF FUEL	.4	CO GRAMS/MIN	.0
CO2 GRAMS/KG OF FUEL	3165	CO2 GRAMS/MIN	343
NOX GRAMS/KG OF FUEL	7.65	NOX GRAMS/MIN	.83
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY L/100KM (MILES/GALLON) 11.42 (20.61)

TOTAL CVS FLOW= 114.7STD. CU. METRES

TABLE

VEHICLE EMISSION RESULTS
1978 LIGHT DUTY EMISSIONS TEST
ACTUAL DISTANCES USED IN CALCULATIONS

UNIT NO. 26 TEST NO. 1 DATE 5/17/78 MFGR. CODE -0 YR. 1975
VEHICLE MODEL CHEVY NOVA ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0

BAROMETER 732.54 MM OF HG.
DRY BULB TEMP. 25.6 DEG. C
REL. HUMIDITY 64 PCT.

WET BULB TEMP 20.6 DEG. C
ABS. HUMIDITY 13.6 GRAMS/KG
COMMENTS 1978 FTPC

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 762.0 MM. H2O
BLOWER INLET PRESS., G1 762.0 MM. H2O
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40617	69618	40551
HC SAMPLE METER READING/SCALE	87.6/ 2	36.2/ 2	51.9/ 2
HC SAMPLE PPM	88	36	52
HC BACKGRD METER READING/SCALE	13.5/ 2	13.3/ 2	13.1/ 2
HC BACKGRD PPM	13	13	13
CO SAMPLE METER READING/SCALE	69.9/11	54.5/12	76.3/13
CO SAMPLE PPM	298	121	75
CO BACKGRD METER READING/SCALE	1.0/11	1.3/12	2.9/13
CO BACKGRD PPM	3	2	3
CO2 SAMPLE METER READING/SCALE	41.7/ 2	64.5/ 3	83.4/ 3
CO2 SAMPLE PERCENT	1.83	1.15	1.54
CO2 BACKGRD METER READING/SCALE	1.3/ 2	3.7/ 3	3.8/ 3
CO2 BACKGRD PERCENT	.05	.06	.06
NOX SAMPLE METER READING/SCALE	42.5/ 2	10.0/ 2	27.3/ 2
NOX SAMPLE PPM	42.5	10.0	27.3
NOX BACKGRD METER READING/SCALE	.9/ 2	.6/ 2	.9/ 2
NOX BACKGRD PPM	.9	.6	.9
SO2 SAMPLE METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	76	24	40
CO CONCENTRATION PPM	279	114	69
CO2 CONCENTRATION PCT	1.79	1.10	1.49
NOX CONCENTRATION PPM	41.7	9.5	26.5
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	3.26	1.77	1.73
CO MASS GRAMS	24.17	16.89	5.97
CO2 MASS GRAMS	2437.79	2572.56	2026.14
NOX MASS GRAMS	6.56	2.55	4.16
SO2 MASS GRAMS	0.00	0.00	0.00
HC GRAMS/KM (GRAMS/MILE)	.56 (.91)	.29 (.46)	.30 (.48)
CO GRAMS/KM (GRAMS/MILE)	4.17 (6.71)	2.73 (4.40)	1.03 (1.66)
CO2 GRAMS/KM (GRAMS/MILE)	420.61 (676.76)	416.29 (669.80)	349.50 (562.35)
NOX GRAMS/KM (GRAMS/MILE)	1.13 (1.82)	.41 (.66)	.72 (1.15)
FUEL CONSUMPTION BY CB L/100KM (MPG)	18.31 (12.85)	17.99 (13.08)	15.03 (15.65)
CVS FLOW STD. CU. METRES (SCF)	74.5 (2629.3)	127.6 (4505.9)	74.3 (2624.8)
CALCULATED DISTANCE KM(MILES)	5.80 (3.60)	6.18 (3.84)	5.80 (3.60)

WEIGHTED FUEL CONSUMPTION LITRES/100KM (MPG)	17.24 (13.65)
WEIGHTED MASS HC GRAMS/KM (GRAMS/MILE)	.35 (.56)
WEIGHTED MASS CO GRAMS/KM (GRAMS/MILE)	2.56 (4.12)
WEIGHTED MASS CO2 GRAMS/KM (GRAMS/MILE)	398.76 (641.61)
WEIGHTED MASS NOX GRAMS/KM (GRAMS/MILE)	.65 (1.04)

TOTAL CVS FLOW = 276.4 STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 26

DATE 5/17/78	TIME 325 HRS.	TEST NO. 2
MODEL 1975 CHEVY NOVA	SET-7	ENGINE 5.7 LITREV 8
DRIVER TJ	TEST WT. 1814 KG.	GVW 0 KG
WET BULB TEMP 19 C	DRY BULB TEMP 27 C	REL. HUM. 47.8 PCT
SPEC. HUM. 10.8 GRAM/KG	BARO. 732.5 MM HG.	MEASURED FUEL 0.00 KG
DISTANCE 21.818 KM	FUEL 738.2 G/LITRE	FUEL HC RATIO 1.860

RUN DURATION	23.29 MINUTES
BLOWER INLET PRESS.	762.0 MM. H2O
BLOWER DIF. PRESS.	762.0 MM H2O
BLOWER INLET TEMP.	43 DEG. C
DYNO REVOLUTIONS	31708
BLOWER REVOLUTIONS	112273
BLOWER CU. CM /REV.	2227

BAG RESULTS

HC SAMPLE METER READING/SCALE	35.6/ 2
HC SAMPLE PPM	36
HC BACKGRD METER READING/SCALE	13.9/ 2
HC BACKGRD PPM	14
CO SAMPLE METER READING/SCALE	30.1/13
CO SAMPLE PPM	28
CO BACKGRD METER READING/SCALE	3.2/13
CO BACKGRD PPM	3
CO2 SAMPLE METER READING/SCALE	41.2/ 2
CO2 SAMPLE PERCENT	1.80
CO2 BACKGRD METER READING/SCALE	1.5/ 2
CO2 BACKGRD PERCENT	.05
NOX SAMPLE METER READING/SCALE	40.2/ 2
NOX SAMPLE PPM	40.2
NOX BACKGRD METER READING/SCALE	1.0/ 2
NOX BACKGRD PPM	1.0
HC CONCENTRATION PPM	24
CO CONCENTRATION PPM	24
CO2 CONCENTRATION PCT	1.76
NOX CONCENTRATION PPM	39.3
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	2.80
CO MASS (GRAMS)	5.84
CO2 MASS (GRAMS)	6614.40
NOX MASS (GRAMS)	15.52
SO2 MASS (GRAMS)	0.00

HC GRAMS/KM (GRAMS/MILE)	.13 (	.21)
CO GRAMS/KM (GRAMS/MILE)	.27 (	.43)
CO2 GRAMS/KM (GRAMS/MILE)	303 (	488)
NOX GRAMS/KM (GRAMS/MILE)	.71 (	1.14)
SO2 GRAMS/KM (GRAMS/MILE)	0.00 (	0.00)

HC GRAMS/KG OF FUEL	1.34	HC GRAMS/MIN	.12
CO GRAMS/KG OF FUEL	2.8	CO GRAMS/MIN	.3
CO2 GRAMS/KG OF FUEL	3161	CO2 GRAMS/MIN	284
NOX GRAMS/KG OF FUEL	7.42	NOX GRAMS/MIN	.67
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY L/100KM (MILES/GALLON) 12.97 (18.13)

TOTAL CVS FLOW= 205.9STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 26

DATE 5/17/78 TIME 325 HRS. TEST NO. 2
MODEL 1975 CHEVY NOVA SET-7 ENGINE 5.7 LITREO
RUN DURATION 23.29 MIN. DISTANCE DRIVEN 21.77 KILOMETRES
CVS BLOWER TEST VOL. 250.02 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2935	
SAMPLE VOL. CU. FT.	17.51	1.00
SAMPLE TEMP. DEG. F	87	70
SAMPLE AREA SQ. IN.	72734.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	5.00	1.00
STAND. AREA SQ. IN.	156539.00	1.00
SO4,MICROG/FILTER	23.232	0.000

SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS	
NET SULFATE,MILLIGRAM/TEST	13.242
NET H2SO4,MILLIGRAM/TEST	13.520
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	.608
NET H2SO4,MILLIGRAM/KILOMETRE	.621
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2102 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.65	0.000	.0044	.0044
PCT. RECOVERY		0.00	.68	.68

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 26

DATE 5/17/78	TIME -0 HRS.	TEST NO. 3
MODEL 1975 CHEVY NOVA	HFET	ENGINE 5.7 LITRE 8
DRIVER TJ	TEST WT. 1814 KG.	GVW 0 KG
WET BULB TEMP 21 C	DRY BULB TEMP 28 C	REL. HUM. 55.3 PCT
SPEC. HUM. 13.4 GRAM/KG	BARO. 732.5 MM HG.	MEASURED FUEL 0.00 KG
DISTANCE 16.413 KM	FUEL 738.2 G/LITRE	FUEL HC RATIO 1.860

RUN DURATION	12.76 MINUTES
BLOWER INLET PRESS.	762.0 MM. H2O
BLOWER DIF. PRESS.	762.0 MM H2O
BLOWER INLET TEMP.	43 DEG. C
DYNO REVOLUTIONS	23853
BLOWER REVOLUTIONS	61583
BLOWER CU. CM /REV.	2225

BAG RESULTS

HC SAMPLE METER READING/SCALE	35.4/ 2
HC SAMPLE PPM	35
HC BACKGRD METER READING/SCALE	13.7/ 2
HC BACKGRD PPM	14
CO SAMPLE METER READING/SCALE	20.6/13
CO SAMPLE PPM	20
CO BACKGRD METER READING/SCALE	2.8/13
CO BACKGRD PPM	3
CO2 SAMPLE METER READING/SCALE	49.0/ 2
CO2 SAMPLE PERCENT	2.23
CO2 BACKGRD METER READING/SCALE	1.4/ 2
CO2 BACKGRD PERCENT	.05
NOX SAMPLE METER READING/SCALE	52.0/ 2
NOX SAMPLE PPM	52.0
NOX BACKGRD METER READING/SCALE	.7/ 2
NOX BACKGRD PPM	.7
HC CONCENTRATION PPM	24
CO CONCENTRATION PPM	16
CO2 CONCENTRATION PCT	2.18
NOX CONCENTRATION PPM	51.4
SO2 CONCENTRATION PPM	0.0
HC MASS (GRAMS)	1.56
CO MASS (GRAMS)	2.13
CO2 MASS (GRAMS)	4518.13
NOX MASS (GRAMS)	12.19
SO2 MASS (GRAMS)	0.00

HC GRAMS/KM (GRAMS/MILE)	.10 (	.15)
CO GRAMS/KM (GRAMS/MILE)	.13 (	.21)
CO2 GRAMS/KM (GRAMS/MILE)	275 (	443)
NOX GRAMS/KM (GRAMS/MILE)	.74 (	1.19)
SO2 GRAMS/KM (GRAMS/MILE)	0.00 (	0.00)

HC GRAMS/KG OF FUEL	1.09	HC GRAMS/MIN	.12
CO GRAMS/KG OF FUEL	1.5	CO GRAMS/MIN	.2
CO2 GRAMS/KG OF FUEL	3164	CO2 GRAMS/MIN	354
NOX GRAMS/KG OF FUEL	8.53	NOX GRAMS/MIN	.96
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY L/100KM (MILES/GALLON) 11.77 (19.99)

TOTAL CVS FLOW= 113.1STD. CU. METRES

TABLE

VEHICLE EMISSION RESULTS
1978 LIGHT DUTY EMISSIONS TEST
ACTUAL DISTANCES USED IN CALCULATIONS

UNIT NO. EM9 TEST NO. 1 DATE 5/22/78 MFGR. CODE -0 YR. 1975
VEHICLE MODEL NOVA CHEVY ENGINE 5.74 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 739.90 MM OF HG.
DRY BULB TEMP. 24.4 DEG. C
REL. HUMIDITY 48 PCT.

WET BULB TEMP 17.2 DEG. C
ABS. HUMIDITY 9.5 GRAMS/KG
COMMENTS 1978 FTP-C

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 749.3 MM. H2O
BLOWER INLET PRESS., G1 749.3 MM. H2O
BLOWER INLET TEMP. 44 DEG. C

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40624	69461	40613
HC SAMPLE METER READING/SCALE	88.8/ 2	26.3/ 2	45.3/ 2
HC SAMPLE PPM	89	26	45
HC BACKGRD METER READING/SCALE	11.6/ 2	11.1/ 2	11.3/ 2
HC BACKGRD PPM	12	11	11
CO SAMPLE METER READING/SCALE	83.1/11	88.2/13	76.8/13
CO SAMPLE PPM	389	89	76
CO BACKGRD METER READING/SCALE	.6/11	2.6/13	2.1/13
CO BACKGRD PPM	2	3	2
CO2 SAMPLE METER READING/SCALE	96.1/ 3	61.5/ 3	81.4/ 3
CO2 SAMPLE PERCENT	1.81	1.09	1.50
CO2 BACKGRD METER READING/SCALE	3.4/ 3	3.4/ 3	2.1/ 3
CO2 BACKGRD PERCENT	.05	.05	.03
NOX SAMPLE METER READING/SCALE	34.7/ 2	9.4/ 2	22.9/ 2
NOX SAMPLE PPM	34.7	9.4	22.9
NOX BACKGRD METER READING/SCALE	1.0/ 2	.6/ 2	.8/ 2
NOX BACKGRD PPM	1.0	.6	.8
SO2 SAMPLE METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	79	16	35
CO CONCENTRATION PPM	368	83	71
CO2 CONCENTRATION PCT	1.76	1.05	1.47
NOX CONCENTRATION PPM	33.8	8.8	22.2
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	3.42	1.20	1.53
CO MASS GRAMS	32.29	12.47	6.19
CO2 MASS GRAMS	2430.69	2465.37	2028.16
NOX MASS GRAMS	4.69	2.10	3.07
SO2 MASS GRAMS	0.00	0.00	0.00
HC GRAMS/KM (GRAMS/MILE)	.60 (.96)	.20 (.31)	.27 (.43)
CO GRAMS/KM (GRAMS/MILE)	5.63 (9.06)	2.04 (3.28)	1.09 (1.75)
CO2 GRAMS/KM (GRAMS/MILE)	424.07 (682.33)	402.53 (647.66)	355.38 (571.80)
NOX GRAMS/KM (GRAMS/MILE)	.82 (1.32)	.34 (.55)	.54 (.87)
FUEL CONSUMPTION BY CB L/100KM (MPG)	18.56 (12.68)	17.34 (13.56)	15.28 (15.40)
CVS FLOW STD. CU. METRES (SCF)	75.4 (2661.4)	128.8 (4550.0)	75.3 (2660.4)
CALCULATED DISTANCE KM(MILES)	5.73 (3.56)	6.12 (3.81)	5.71 (3.55)

WEIGHTED FUEL CONSUMPTION LITRES/100KM (MPG)	17.03 (13.82)
WEIGHTED MASS HC GRAMS/KM (GRAMS/MILE)	.30 (.48)
WEIGHTED MASS CO GRAMS/KM (GRAMS/MILE)	2.52 (4.06)
WEIGHTED MASS CO2 GRAMS/KM (GRAMS/MILE)	394.04 (634.01)
WEIGHTED MASS NOX GRAMS/KM (GRAMS/MILE)	.50 (.80)

TOTAL CVS FLOW = 279.6 STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM9

DATE 5/22/78	TIME -0 HRS.	TEST NO. 2
MODEL 1975 NOVA CHEVY	SET-7	ENGINE 5.7 LITREV 8
DRIVER BP	TEST WT. 1814 KG.	GVW 0 KG
WET BULB TEMP 17 C	DRY BULB TEMP 26 C	REL. HUM. 37.5 PCT
SPEC. HUM. 8.1 GRAM/KG	BARO. 739.4 MM HG.	MEASURED FUEL 0.00 KG
DISTANCE 21.530 KM	FUEL 738.2 G/LITRE	FUEL HC RATIO 1.860

RUN DURATION	23.29 MINUTES
BLOWER INLET PRESS.	749.3 MM. H2O
BLOWER DIF. PRESS.	749.3 MM H2O
BLOWER INLET TEMP.	44 DEG. C
DYNO REVOLUTIONS	31289
BLOWER REVOLUTIONS	115129
BLOWER CU. CM /REV.	2233

BAG RESULTS

HC SAMPLE METER READING/SCALE	34.9/ 2
HC SAMPLE PPM	35
HC BACKGRD METER READING/SCALE	16.7/ 2
HC BACKGRD PPM	17
CO SAMPLE METER READING/SCALE	49.0/12
CO SAMPLE PPM	108
CO BACKGRD METER READING/SCALE	1.6/12
CO BACKGRD PPM	3
CO2 SAMPLE METER READING/SCALE	95.7/ 3
CO2 SAMPLE PERCENT	1.80
CO2 BACKGRD METER READING/SCALE	3.9/ 3
CO2 BACKGRD PERCENT	.06
NOX SAMPLE METER READING/SCALE	29.5/ 2
NOX SAMPLE PPM	29.5
NOX BACKGRD METER READING/SCALE	.9/ 2
NOX BACKGRD PPM	.9
HC CONCENTRATION PPM	20
CO CONCENTRATION PPM	100
CO2 CONCENTRATION PCT	1.75
NOX CONCENTRATION PPM	28.7
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	2.52
CO MASS (GRAMS)	24.99
CO2 MASS (GRAMS)	6832.69
NOX MASS (GRAMS)	10.81
SO2 MASS (GRAMS)	0.00

HC GRAMS/KM (GRAMS/MILE)	.12 (.19)
CO GRAMS/KM (GRAMS/MILE)	1.16 (1.87)
CO2 GRAMS/KM (GRAMS/MILE)	317 (511)
NOX GRAMS/KM (GRAMS/MILE)	.50 (.81)
SO2 GRAMS/KM (GRAMS/MILE)	0.00 (0.00)

HC GRAMS/KG OF FUEL	1.16	HC GRAMS/MIN	.11
CO GRAMS/KG OF FUEL	11.5	CO GRAMS/MIN	1.1
CO2 GRAMS/KG OF FUEL	3148	CO2 GRAMS/MIN	293
NOX GRAMS/KG OF FUEL	4.98	NOX GRAMS/MIN	.46
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY L/100KM (MILES/GALLON) 13.64 (17.25)

TOTAL CVS FLOW= 213.8STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM9

DATE 5/22/78 TIME -0 HRS. TEST NO. 2
MODEL 1975 NOVA CHEVY SET-7 ENGINE 5.7 LITREO
RUN DURATION 23.29 MIN. DISTANCE DRIVEN 21.74 KILOMETRES
CVS BLOWER TEST VOL. 257.12 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2938	
SAMPLE VOL. CU. FT.	17.19	1.00
SAMPLE TEMP. DEG. F	77	70
SAMPLE AREA SQ. IN.	76794.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	5.00	1.00
STAND. AREA SQ. IN.	146657.00	1.00
SO4,MICROG/FILTER	26.181	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	15.921
NET H2SO4,MILLIGRAM/TEST	16.255
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	.732
NET H2SO4,MILLIGRAM/KILOMETRE	.748
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE

FUEL WT., 2180 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.68	0.000	.0053	.0053
PCT. RECOVERY		0.00	.79	.79

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM9

DATE 5/22/78	TIME -0 HRS.	TEST NO. 3
MODEL 1975 NOVA CHEVY	FET	ENGINE 5.7 LITREV 8
DRIVER BP	TEST WT. 1814 KG.	GVW 0 KG
WET BULB TEMP 17 C	DRY BULB TEMP 26 C	REL. HUM. 40.6 PCT
SPEC. HUM. 8.8 GRAM/KG	BARO. 739.4 MM HG.	MEASURED FUEL 0.00 KG
DISTANCE 16.285 KM	FUEL 738.2 G/LITRE	FUEL HC RATIO 1.860

RUN DURATION	12.75 MINUTES
BLOWER INLET PRESS.	749.3 MM. H2O
BLOWER DIF. PRESS.	749.3 MM H2O
BLOWER INLET TEMP.	44 DEG. C
DYNO REVOLUTIONS	23667
BLOWER REVOLUTIONS	61391
BLOWER CU. CM /REV.	2230

BAG RESULTS

HC SAMPLE METER READING/SCALE	39.9/ 2
HC SAMPLE PPM	40
HC BACKGRD METER READING/SCALE	17.9/ 2
HC BACKGRD PPM	18
CO SAMPLE METER READING/SCALE	60.6/13
CO SAMPLE PPM	58
CO BACKGRD METER READING/SCALE	2.6/13
CO BACKGRD PPM	3
CO2 SAMPLE METER READING/SCALE	49.7/ 2
CO2 SAMPLE PERCENT	2.27
CO2 BACKGRD METER READING/SCALE	2.5/ 2
CO2 BACKGRD PERCENT	.09
NOX SAMPLE METER READING/SCALE	40.3/ 2
NOX SAMPLE PPM	40.3
NOX BACKGRD METER READING/SCALE	.9/ 2
NOX BACKGRD PPM	.9
HC CONCENTRATION PPM	25
CO CONCENTRATION PPM	53
CO2 CONCENTRATION PCT	2.19
NOX CONCENTRATION PPM	39.6
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	1.64
CO MASS (GRAMS)	7.02
CO2 MASS (GRAMS)	4563.03
NOX MASS (GRAMS)	8.09
SO2 MASS (GRAMS)	0.00

HC GRAMS/KM (GRAMS/MILE)	.10	(.16)
CO GRAMS/KM (GRAMS/MILE)	.43	(.69)
CO2 GRAMS/KM (GRAMS/MILE)	280	(451)
NOX GRAMS/KM (GRAMS/MILE)	.50	(.80)
SO2 GRAMS/KM (GRAMS/MILE)	0.00	(0.00)

HC GRAMS/KG OF FUEL	1.14	HC GRAMS/MIN	.13
CO GRAMS/KG OF FUEL	4.9	CO GRAMS/MIN	.6
CO2 GRAMS/KG OF FUEL	3158	CO2 GRAMS/MIN	358
NOX GRAMS/KG OF FUEL	5.60	NOX GRAMS/MIN	.63
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY L/100KM (MILES/GALLON) 12.00 (19.60)

TOTAL CVS FLOW= 113.9STD. CU. METRES

APPENDIX E

COMPUTER PRINTOUTS
FOR
THREEWAY CATALYST SYSTEM OPTIMIZATION AND
DURABILITY TESTS ON THE 1977 PLYMOUTH FURY
(Tests in Chronological Order)

TABLE VEHICLE EMISSION RESULTS
1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. EM8 TEST NO. R DATE 3/30/77 MFGR. CODE -0 YR. 1977
VEHICLE MODEL PLYMOUTH FURY ENGINE 5.90 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 740.92 MM OF HG.
DRY BULB TEMP. 24.4 DEG. C
REL. HUMIDITY 29 PCT.

WET BULB TEMP 13.9 DEG. C
ABS. HUMIDITY 5.6 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 711.2 MM. H20
BLOWER INLET PRESS., G1 711.2 MM. H20
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.		1	2	3
BLOWER REVOLUTIONS		42420	74713	43029
HC	SAMPLE METER READING/SCALE	32.9/ 3	16.1/ 3	21.5/ 3
HC	SAMPLE PPM	329	161	215
HC	BACKGRD METER READING/SCALE	.6/ 3	1.0/ 3	.6/ 3
HC	BACKGRD PPM	6	10	6
CO	SAMPLE METER READING/SCALE	85.4/ 3	25.6/ 3	38.0/ 3
CO	SAMPLE PPM	2377	596	911
CO	BACKGRD METER READING/SCALE	.1/ 3	.1/ 3	.1/ 3
CO	BACKGRD PPM	2	2	2
CO2	SAMPLE METER READING/SCALE	43.8/ 2	32.1/ 2	42.1/ 2
CO2	SAMPLE PERCENT	1.94	1.34	1.85
CO2	BACKGRD METER READING/SCALE	1.7/ 2	1.7/ 2	1.3/ 2
CO2	BACKGRD PERCENT	.06	.06	.05
NOX	SAMPLE METER READING/SCALE	70.0/ 3	49.1/ 3	91.9/ 3
NOX	SAMPLE PPM	210.0	147.3	275.7
NOX	BACKGRD METER READING/SCALE	.1/ 3	.3/ 3	.2/ 3
NOX	BACKGRD PPM	.3	.9	.6
SO2	SAMPLE METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2	SAMPLE PPM	-0.0	-0.0	-0.0
SO2	BACKGRD METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2	BACKGRD PPM	-0.0	-0.0	-0.0
HC	CONCENTRATION PPM	324	152	210
CO	CONCENTRATION PPM	2264	574	868
CO2	CONCENTRATION PCT	1.89	1.29	1.81
NOX	CONCENTRATION PPM	209.7	146.5	275.2
SO2	CONCENTRATION PPM	0.0	0.0	0.0
HC	MASS GRAMS	14.83	12.26	9.74
CO	MASS GRAMS	209.24	93.35	81.39
CO2	MASS GRAMS	2756.70	3311.78	2678.98
NOX	MASS GRAMS	27.28	33.55	36.30
SO2	MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC 2.00 GRAMS/KILOMETRE
WEIGHTED MASS CO 19.04 GRAMS/KILOMETRE
WEIGHTED MASS CO2 499.21 GRAMS/KILOMETRE
WEIGHTED MASS NOX 5.47 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

CARBON BALANCE FUEL CONSUMPTION = 22.81 LITRES PER HUNDRED KILOMETRES
TOTAL CVS FLOW = 299.7 STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER

DATE 3/30/77	TIME -0 HRS.	TEST NO. 2
MODEL 1977 PLYMOUTH FURY	SET 7	ENGINE 5.9 LITRE 8
DRIVER SR	TEST WT. 2177 KG.	GVW 0 KG
WET BULB TEMP 16 C	DRY BULB TEMP 26 C	REL. HUM. 31.5 PCT
SPEC. HUM. 6.8 GRAM/KG	BARO. 741.7 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION	24.31 MINUTES
BLOWER INLET PRESS.	736.6 MM. H2O
BLOWER DIF. PRESS.	736.6 MM H2O
BLOWER INLET TEMP.	43 DEG. C
DYNO REVOLUTIONS	34885
BLOWER REVOLUTIONS	117184
BLOWER CU. CM /REV.	2230

BAG RESULTS

HC SAMPLE METER READING/SCALE	20.6/3
HC SAMPLE PPM	206
HC BACKGRD METER READING/SCALE	.9/3
HC BACKGRD PPM	9
CO SAMPLE METER READING/SCALE	41.8/3
CO SAMPLE PPM	1010
CO BACKGRD METER READING/SCALE	.1/3
CO BACKGRD PPM	2
CO2 SAMPLE METER READING/SCALE	44.8/2
CO2 SAMPLE PERCENT	1.99
CO2 BACKGRD METER READING/SCALE	1.4/2
CO2 BACKGRD PERCENT	.05
NOX SAMPLE METER READING/SCALE	28.0/4
NOX SAMPLE PPM	280.0
NOX BACKGRD METER READING/SCALE	.1/4
NOX BACKGRD PPM	1.0
HC CONCENTRATION PPM	198
CO CONCENTRATION PPM	960
CO2 CONCENTRATION PCT	1.95
NOX CONCENTRATION PPM	279.2
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	25.01
CO MASS (GRAMS)	244.19
CO2 MASS (GRAMS)	7844.09
NOX MASS (GRAMS)	103.28
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	1.04
CO GRAMS/KILOMETRE	10.15
CO2 GRAMS/KILOMETRE	326
NOX GRAMS/KILOMETRE	4.29
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	9.54	HC GRAMS/MIN	1.03
CO GRAMS/KG OF FUEL	93.2	CO GRAMS/MIN	10.0
CO2 GRAMS/KG OF FUEL	2993	CO2 GRAMS/MIN	323
NOX GRAMS/KG OF FUEL	39.40	NOX GRAMS/MIN	4.25
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 14.83 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER

DATE 3/30/77 TIME -0 HRS. TEST NO. 2
MODEL 1977 PLYMOUTH FURY SET 7 ENGINE 5.9 LITREO
RUN DURATION 24.31 MIN. DISTANCE DRIVEN 24.05 KILOMETRES
CVS BLOWER TEST VOL. 261.30 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2798	
SAMPLE VOL. CU. FT.	12.19	1.00
SAMPLE TEMP. DEG. F	81	70
SAMPLE AREA SQ. IN.	127790.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	5.00	1.00
STAND. AREA SQ. IN.	216575.00	1.00
SO4, MICROG/FILTER	29.502	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA, BUBBLER 1	0.00	0.00
DIL. FACT., BUBBLER 1	1	1
AREA, BUBBLER 2	0.00	0.00
DIL. FACT., BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA, SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE, MILLIGRAM/TEST	25.433
NET H2SO4, MILLIGRAM/TEST	25.967
NET SO2, GRAM/TEST	0.000
NET SULFATE, MILLIGRAM/KILOMETRE	1.057
NET H2SO4, MILLIGRAM/KILOMETRE	1.080
NET SO2, GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2621 GRAMS SULFUR IN FUEL, .0320 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR, GRAMS	.84	0.000	.0085	.0085
PCT. RECOVERY		0.00	1.01	1.01

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER

DATE 3/30/77	TIME -0 HRS.	TEST NO. 3
MODEL 1977 PLYMOUTH FURY	H FET	ENGINE 5.9 LITREV 8
DRIVER SR	TEST WT. 2177 KG.	GVW 0 KG
WET BULB TEMP 16 C	DRY BULB TEMP 28 C	REL. HUM. 23.8 PCT
SPEC. HUM. 5.8 GRAM/KG	BARO. 741.7 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION	15.10 MINUTES
BLOWER INLET PRESS.	723.9 MM. H2O
BLOWER DIF. PRESS.	723.9 MM H2O
BLOWER INLET TEMP.	43 DEG. C
DYNO REVOLUTIONS	28935
BLOWER REVOLUTIONS	72859
BLOWER CU. CM /REV.	2231

BAG RESULTS

HC SAMPLE METER READING/SCALE	23.0/3
HC SAMPLE PPM	230
HC BACKGRD METER READING/SCALE	.8/3
HC BACKGRD PPM	8
CO SAMPLE METER READING/SCALE	44.7/3
CO SAMPLE PPM	1087
CO BACKGRD METER READING/SCALE	0.0/3
CO BACKGRD PPM	0
CO2 SAMPLE METER READING/SCALE	50.6/2
CO2 SAMPLE PERCENT	2.32
CO2 BACKGRD METER READING/SCALE	1.4/2
CO2 BACKGRD PERCENT	.05
NOX SAMPLE METER READING/SCALE	36.2/4
NOX SAMPLE PPM	362.0
NOX BACKGRD METER READING/SCALE	.1/4
NOX BACKGRD PPM	1.0
HC CONCENTRATION PPM	223
CO CONCENTRATION PPM	1030
CO2 CONCENTRATION PCT	2.28
NOX CONCENTRATION PPM	361.2
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	17.55
CO MASS (GRAMS)	163.36
CO2 MASS (GRAMS)	5695.87
NOX MASS (GRAMS)	81.00
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.88
CO GRAMS/KILOMETRE	8.19
CO2 GRAMS/KILOMETRE	286
NOX GRAMS/KILOMETRE	4.06
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	9.26	HC GRAMS/MIN	1.16
CO GRAMS/KG OF FUEL	86.2	CO GRAMS/MIN	10.8
CO2 GRAMS/KG OF FUEL	3005	CO2 GRAMS/MIN	377
NOX GRAMS/KG OF FUEL	42.73	NOX GRAMS/MIN	5.36
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 12.93 LITRES PER HUNDRED KILOMETERS

TABLE VEHICLE EMISSION RESULTS

1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. 8 TEST NO. 1 DATE 8/17/77 MFGR. CODE -0 YR. 1977

VEHICLE MODEL PLYMOUTH SALON ENGINE 5.90 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 742.95 MM OF HG.
DRY BULB TEMP. 25.0 DEG. C
REL. HUMIDITY 60 PCT.

WET BULB TEMP 19.4 DEG. C
ABS. HUMIDITY 12.1 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 736.6 MM. H20

BLOWER INLET PRESS., G1 736.6 MM. H20

BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.		1	2	3
BLOWER REVOLUTIONS		40714	69730	40645
HC	SAMPLE METER READING/SCALE	13.5/3	18.3/2	32.1/2
HC	SAMPLE PPM	135	18	32
HC	BACKGRD METER READING/SCALE	1.5/3	1.5/3	14.5/2
HC	BACKGRD PPM	15	15	14
CO	SAMPLE METER READING/SCALE	55.0/3	11.2/*	70.0/*
CO	SAMPLE PPM	1370	11	71
CO	BACKGRD METER READING/SCALE	.3/3	.2/3	2.3/*
CO	BACKGRD PPM	6	4	2
CO2	SAMPLE METER READING/SCALE	88.0/3	64.2/3	83.0/3
CO2	SAMPLE PERCENT	1.64	1.15	1.53
CO2	BACKGRD METER READING/SCALE	4.4/3	4.5/3	4.8/3
CO2	BACKGRD PERCENT	.07	.07	.07
NOX	SAMPLE METER READING/SCALE	27.7/2	13.0/2	22.7/2
NOX	SAMPLE PPM	27.7	13.0	22.7
NOX	BACKGRD METER READING/SCALE	3.1/2	1.9/2	1.7/2
NOX	BACKGRD PPM	3.1	1.9	1.7
SO2	SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	SAMPLE PPM	-0.0	-0.0	-0.0
SO2	BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	BACKGRD PPM	-0.0	-0.0	-0.0
HC	CONCENTRATION PPM	122	5	19
CO	CONCENTRATION PPM	1295	6	66
CO2	CONCENTRATION PCT	1.58	1.08	1.47
NOX	CONCENTRATION PPM	25.0	11.3	21.2
SO2	CONCENTRATION PPM	0.0	0.0	0.0
HC	MASS GRAMS	5.36	.35	.84
CO	MASS GRAMS	114.82	.96	5.82
CO2	MASS GRAMS	2209.67	2599.12	2050.59
NOX	MASS GRAMS	3.81	2.94	3.23
SO2	MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .26 GRAMS/KILOMETRE
WEIGHTED MASS CO 4.45 GRAMS/KILOMETRE
WEIGHTED MASS CO2 390.98 GRAMS/KILOMETRE
WEIGHTED MASS NOX .53 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

CARBON BALANCE FUEL CONSUMPTION = 17.00 LITRES PER HUNDRED KILOMETRES
TOTAL CVS FLOW = 282.7 STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 8

DATE 8/17/77	TIME -0 HRS.	TEST NO. 2
MODEL 1977 PLYMOUTH/SALON	SET-7	ENGINE 5.9 LITREV 8
DRIVER SR	TEST WT. 2041 KG.	GVW 0 KG
WET BULB TEMP 18 C	DRY BULB TEMP 26 C	REL. HUM. 46.3 PCT
SPEC. HUM. 9.7 GRAM/KG	BARO. 742.2 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION	23.28 MINUTES
BLOWER INLET PRESS.	736.6 MM. H2O
BLOWER DIF. PRESS.	736.6 MM H2O
BLOWER INLET TEMP.	43 DEG. C
DYNO REVOLUTIONS	32069
BLOWER REVOLUTIONS	112305
BLOWER CU. CM /REV.	2228

BAG RESULTS

HC SAMPLE METER READING/SCALE	40.6/2
HC SAMPLE PPM	41
HC BACKGRD METER READING/SCALE	18.7/2
HC BACKGRD PPM	19
CO SAMPLE METER READING/SCALE	72.9/*
CO SAMPLE PPM	317
CO BACKGRD METER READING/SCALE	4.3/*
CO BACKGRD PPM	13
CO2 SAMPLE METER READING/SCALE	95.3/3
CO2 SAMPLE PERCENT	1.79
CO2 BACKGRD METER READING/SCALE	4.1/3
CO2 BACKGRD PERCENT	.06
NOX SAMPLE METER READING/SCALE	8.0/2
NOX SAMPLE PPM	8.0
NOX BACKGRD METER READING/SCALE	1.7/2
NOX BACKGRD PPM	1.7
HC CONCENTRATION PPM	24
CO CONCENTRATION PPM	290
CO2 CONCENTRATION PCT	1.74
NOX CONCENTRATION PPM	6.5
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	2.96
CO MASS (GRAMS)	70.90
CO2 MASS (GRAMS)	6695.37
NOX MASS (GRAMS)	2.53
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.14
CO GRAMS/KILOMETRE	3.26
CO2 GRAMS/KILOMETRE	308
NOX GRAMS/KILOMETRE	.12
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	1.38	HC GRAMS/MIN	.13
CO GRAMS/KG OF FUEL	33.0	CO GRAMS/MIN	3.0
CO2 GRAMS/KG OF FUEL	3113	CO2 GRAMS/MIN	288
NOX GRAMS/KG OF FUEL	1.18	NOX GRAMS/MIN	.11
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 13.40 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 8

DATE 8/17/77 TIME -0 HRS. TEST NO. 2
MODEL 1977 PLYMOUTH/SALON SET-? ENGINE 5.9 LITRE0
RUN DURATION 23.28 MIN. DISTANCE DRIVEN 21.74 KILOMETRES
CVS BLOWER TEST VOL. 250.24 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2858	
SAMPLE VOL. CU. FT.	13.68	1.00
SAMPLE TEMP. DEG. F	80	70
SAMPLE AREA SQ. IN.	55028.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	5.00	1.00
STAND. AREA SQ. IN.	195896.00	1.00
SO4,MICROG/FILTER	14.045	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	10.330
NET H2SO4,MILLIGRAM/TEST	10.547
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	.475
NET H2SO4,MILLIGRAM/KILOMETRE	.485
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2151 GRAMS SULFUR IN FUEL, .0300 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.65	0.000	.0034	.0034
PCT. RECOVERY		0.00	.53	.53

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 8

DATE 8/17/77 TIME -0 HRS. TEST NO. 3
MODEL 1977 PLYMOUTH/SALON FFT ENGINE 5.9 LITREV 8
DRIVER SR TEST WT. 2041 KG. GVW 0 KG
WET BULB TEMP 18 C DRY BULB TEMP 26 C REL. HUM. 43.7 PCT
SPEC. HUM. 9.4 GRAM/KG BARO. 742.2 MM HG. MEASURED FUEL 0.00 KG

RUN DURATION 12.78 MINUTES
BLOWER INLET PRESS. 736.6 MM. H2O
BLOWER DIF. PRESS. 736.6 MM H2O
BLOWER INLET TEMP. 43 DEG. C
DYNO REVOLUTIONS 24211
BLOWER REVOLUTIONS 61735
BLOWER CU. CM /REV. 2228

BAG RESULTS

HC SAMPLE METER READING/SCALE	51.1/2
HC SAMPLE PPM	51
HC BACKGRD METER READING/SCALE	18.8/2
HC BACKGRD PPM	19
CO SAMPLE METER READING/SCALE	87.6/*
CO SAMPLE PPM	425
CO BACKGRD METER READING/SCALE	6.7/*
CO BACKGRD PPM	21
CO2 SAMPLE METER READING/SCALE	48.3/2
CO2 SAMPLE PERCENT	2.19
CO2 BACKGRD METER READING/SCALE	2.1/2
CO2 BACKGRD PERCENT	.08
NOX SAMPLE METER READING/SCALE	10.4/2
NOX SAMPLE PPM	10.4
NOX BACKGRD METER READING/SCALE	1.9/2
NOX BACKGRD PPM	1.9
HC CONCENTRATION PPM	35
CO CONCENTRATION PPM	384
CO2 CONCENTRATION PCT	2.12
NOX CONCENTRATION PPM	8.8
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	2.36
CO MASS (GRAMS)	51.57
CO2 MASS (GRAMS)	4504.06
NOX MASS (GRAMS)	1.87
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE .14
CO GRAMS/KILOMETRE 3.13
CO2 GRAMS/KILOMETRE 273
NOX GRAMS/KILOMETRE .11
SO2 GRAMS/KILOMETRE 0.00

HC GRAMS/KG OF FUEL 1.63 HC GRAMS/MIN .18
CO GRAMS/KG OF FUEL 35.6 CO GRAMS/MIN 4.0
CO2 GRAMS/KG OF FUEL 3108 CO2 GRAMS/MIN 352
NOX GRAMS/KG OF FUEL 1.29 NOX GRAMS/MIN .15
SO2 GRAMS/KG OF FUEL 0.00 SO2 GRAMS/MIN 0.00
CARBON BALANCE FUEL ECONOMY = 11.91 LITRES PER HUNDRED KILOMETERS

TABLE

VEHICLE EMISSION RESULTS
1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. 295 TEST NO. 1 DATE 9/23/77 MFGR. CODE -0 YR. 1977
VEHICLE MODEL PLY FURY ENGINE 5.90 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 739.90 MM OF HG.
DRY BULB TEMP. 22.8 DEG. C
REL. HUMIDITY 65 PCT.

WET BULB TEMP 18.3 DEG. C
ABS. HUMIDITY 11.6 GRAMS/KG

EXHAUST EMISSIONS

BLOWER INLET PRESS., G1 685.8 MM. H2O
BLOWER INLET TEMP. 43 DEG. C

BLOWER DIF. PRESS., G2, 685.8 MM. H2O
BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40794	69857	40727
HC SAMPLE METER READING/SCALE	90.7/2	15.1/2	26.6/2
HC SAMPLE PPM	91	15	27
HC BACKGRD METER READING/SCALE	11.0/2	10.4/2	10.8/2
HC BACKGRD PPM	11	10	11
CO SAMPLE METER READING/SCALE	28.2/3	48.1/*	83.0/*
CO SAMPLE PPM	661	45	194
CO BACKGRD METER READING/SCALE	.1/3	3.8/*	1.3/*
CO BACKGRD PPM	2	4	2
CO2 SAMPLE METER READING/SCALE	91.3/3	65.0/3	85.1/3
CO2 SAMPLE PERCENT	1.71	1.16	1.58
CO2 BACKGRD METER READING/SCALE	4.1/3	4.0/3	4.0/3
CO2 BACKGRD PERCENT	.06	.06	.06
NOX SAMPLE METER READING/SCALE	30.5/2	4.3/2	12.2/2
NOX SAMPLE PPM	30.5	4.3	12.2
NOX BACKGRD METER READING/SCALE	1.2/2	1.1/2	1.0/2
NOX BACKGRD PPM	1.2	1.1	1.0
SO2 SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	81	6	17
CO CONCENTRATION PPM	624	40	182
CO2 CONCENTRATION PCT	1.65	1.11	1.52
NOX CONCENTRATION PPM	29.5	3.3	11.3
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	3.58	.42	.75
CO MASS GRAMS	55.53	6.11	16.14
CO2 MASS GRAMS	2321.44	2665.13	2136.08
NOX MASS GRAMS	4.44	.85	1.70
SO2 MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .20 GRAMS/KILOMETRE
WEIGHTED MASS CO 3.25 GRAMS/KILOMETRE
WEIGHTED MASS CO2 404.47 GRAMS/KILOMETRE
WEIGHTED MASS NOX .31 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

FUEL ECONOMY BY CARBON BALANCE = 5.7 KILOMETRE/LITRE

TABLE

VEHICLE EMISSION RESULTS
1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. 235 TEST NO. * DATE 9/28/77 MFGR. CODE -0 YR. 1977
VEHICLE MODEL PLY. FURY ENGINE 5.90 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 739.90 MM OF HG.
DRY BULB TEMP. 22.8 DEG. C
REL. HUMIDITY 69 PCT.

WET BULB TEMP 18.9 DEG. C
ABS. HUMIDITY 12.3 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 688.3 MM. H2O
BLOWER INLET PRESS., G1 690.9 MM. H2O
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.		1	2	3
BLOWER REVOLUTIONS		40659	69813	40631
HC	SAMPLE METER READING/SCALE	9.8/3	15.6/2	18.1/2
HC	SAMPLE PPM	98	16	18
HC	BACKGRD METER READING/SCALE	1.9/3	14.0/2	13.6/2
HC	BACKGRD PPM	19	14	14
CO	SAMPLE METER READING/SCALE	32.3/3	6.9/*	11.7/*
CO	SAMPLE PPM	765	7	11
CO	BACKGRD METER READING/SCALE	.1/3	3.0/*	2.4/*
CO	BACKGRD PPM	2	3	2
CO2	SAMPLE METER READING/SCALE	90.9/3	63.5/3	84.4/3
CO2	SAMPLE PERCENT	1.70	1.13	1.56
CO2	BACKGRD METER READING/SCALE	3.7/3	3.3/3	3.4/3
CO2	BACKGRD PERCENT	.06	.05	.05
NOX	SAMPLE METER READING/SCALE	51.1/2	17.4/2	34.3/3
NOX	SAMPLE PPM	51.1	17.4	102.9
NOX	BACKGRD METER READING/SCALE	.7/2	.6/2	.3/3
NOX	BACKGRD PPM	.7	.6	.9
SO2	SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	SAMPLE PPM	-0.0	-0.0	-0.0
SO2	BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	BACKGRD PPM	-0.0	-0.0	-0.0
HC	CONCENTRATION PPM	82	3	6
CO	CONCENTRATION PPM	721	4	8
CO2	CONCENTRATION PCT	1.65	1.09	1.52
NOX	CONCENTRATION PPM	50.5	16.9	102.1
SO2	CONCENTRATION PPM	0.0	0.0	0.0
HC	MASS GRAMS	3.58	.21	.27
CO	MASS GRAMS	63.97	.57	.74
CO2	MASS GRAMS	2310.09	2615.20	2122.38
NOX	MASS GRAMS	7.78	4.46	15.72
SO2	MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .16 GRAMS/KILOMETRE
WEIGHTED MASS CO 2.36 GRAMS/KILOMETRE
WEIGHTED MASS CO2 399.28 GRAMS/KILOMETRE
WEIGHTED MASS NOX 1.39 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

FUEL ECONOMY BY CARBON BALANCE = 5.8 KILOMETRE/LITRE

TABLE

VEHICLE EMISSION RESULTS
1978 LIGHT DUTY EMISSIONS TEST
ACTUAL DISTANCES USED IN CALCULATIONS

UNIT NO. 8 TEST NO. 1 DATE 10/20/77 MFGR. CODE -0 YR. 1977
VEHICLE MODEL FURY PLYMOUTH ENGINE 5.90 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 240.66 MM OF HG.
DRY BULB TEMP. 25.0 DEG. C
REL. HUMIDITY 49 PCT.

WET BULB TEMP 17.8 DEG. C
ABS. HUMIDITY 9.9 GRAMS/KG
COMMENTS 1978 FTP-C

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 685.8 MM. H20
BLOWER INLET PRESS., G1 685.8 MM. H20
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40742	69816	40709
HC SAMPLE METER READING/SCALE	10.3/ 3	24.8/ 2	28.2/ 2
HC SAMPLE PPM	103	25	28
HC BACKGRD METER READING/SCALE	2.2/ 3	20.1/ 2	16.0/ 2
HC BACKGRD PPM	22	20	16
CO SAMPLE METER READING/SCALE	32.4/ 3	71.7/13	58.3/12
CO SAMPLE PPM	767	70	130
CO BACKGRD METER READING/SCALE	.4/ 3	10.6/13	2.7/12
CO BACKGRD PPM	9	10	5
CO2 SAMPLE METER READING/SCALE	90.5/ 3	66.1/ 3	85.6/ 3
CO2 SAMPLE PERCENT	1.69	1.19	1.59
CO2 BACKGRD METER READING/SCALE	3.2/ 3	3.7/ 3	3.9/ 3
CO2 BACKGRD PERCENT	.05	.06	.06
NOX SAMPLE METER READING/SCALE	26.0/ 2	3.5/ 2	22.1/ 2
NOX SAMPLE PPM	26.0	3.5	22.1
NOX BACKGRD METER READING/SCALE	.5/ 2	.5/ 2	1.0/ 2
NOX BACKGRD PPM	.5	.5	1.0
SO2 SAMPLE METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	84	6	14
CO CONCENTRATION PPM	723	58	120
CO2 CONCENTRATION PCT	1.65	1.13	1.53
NOX CONCENTRATION PPM	25.6	3.0	21.2
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	3.70	.49	.62
CO MASS GRAMS	64.34	8.89	10.65
CO2 MASS GRAMS	2304.62	2718.76	2145.03
NOX MASS GRAMS	3.64	.74	3.02
SO2 MASS GRAMS	0.00	0.00	0.00
HC GRAMS/KM (GRAMS/MILE)	.64 (1.03)	.08 (.13)	.11 (.17)
CO GRAMS/KM (GRAMS/MILE)	11.08 (17.83)	1.42 (2.28)	1.85 (2.97)
CO2 GRAMS/KM (GRAMS/MILE)	397.02 (638.81)	433.57 (697.62)	371.64 (597.97)
NOX GRAMS/KM (GRAMS/MILE)	.63 (1.01)	.12 (.19)	.52 (.84)
FUEL CONSUMPTION BY CB L/100KM (MPG)	17.77 (13.23)	18.61 (12.64)	16.00 (14.70)
CVS FLOW STD. CU. METRES (SCF)	76.5 (2700.0)	131.0 (4626.1)	76.4 (2697.8)
CALCULATED DISTANCE KM(MILES)	5.80 (3.61)	6.27 (3.90)	5.77 (3.59)

WEIGHTED FUEL CONSUMPTION LITRES/100KM (MPG)	17.72 (13.27)
WEIGHTED MASS HC GRAMS/KM (GRAMS/MILE)	.20 (.32)
WEIGHTED MASS CO GRAMS/KM (GRAMS/MILE)	3.53 (5.68)
WEIGHTED MASS CO2 GRAMS/KM (GRAMS/MILE)	409.10 (658.24)
WEIGHTED MASS NOX GRAMS/KM (GRAMS/MILE)	.33 (.54)

TOTAL CVS FLOW = 283.9 STD. CU. METRES

TABLE

VEHICLE EMISSION RESULTS
1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. EMR TEST NO. 1 DATE 11/28/77 MFGR. CODE -0 YR. 1977
VEHICLE MODEL FURY PLYMOUTH ENGINE 5.90 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 736.60 MM OF HG.
DRY BULB TEMP. 24.4 DEG. C
REL. HUMIDITY 35 PCT.

WET BULB TEMP 15.0 DEG. C
ABS. HUMIDITY 6.9 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 660.4 MM. H2O
BLOWER INLET PRESS., G1 660.4 MM. H2O
BLOWER INLET TEMP. 42 DEG. C

BAG RESULTS

BAG NO.			1	2	3
BLOWER REVOLUTIONS			40791	69742	40731
HC	SAMPLE	METER READING/SCALE	9.8/3	13.2/2	15.1/2
HC	SAMPLE	PPM	98	13	15
HC	BACKGRD	METER READING/SCALE	1.0/3	12.8/2	13.9/2
HC	BACKGRD	PPM	10	13	14
CO	SAMPLE	METER READING/SCALE	30.9/3	26.3/*	47.0/*
CO	SAMPLE	PPM	723	25	45
CO	BACKGRD	METER READING/SCALE	.2/3	3.9/*	3.7/*
CO	BACKGRD	PPM	5	4	4
CO2	SAMPLE	METER READING/SCALE	89.4/3	65.1/3	82.2/3
CO2	SAMPLE	PERCENT	1.67	1.16	1.52
CO2	BACKGRD	METER READING/SCALE	3.8/3	3.9/3	4.7/3
CO2	BACKGRD	PERCENT	.06	.06	.07
NOX	SAMPLE	METER READING/SCALE	42.8/2	8.6/2	38.1/2
NOX	SAMPLE	PPM	42.8	8.6	38.1
NOX	BACKGRD	METER READING/SCALE	.4/2	.5/2	.7/2
NOX	BACKGRD	PPM	.4	.5	.7
SO2	SAMPLE	METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	SAMPLE	PPM	-0.0	-0.0	-0.0
SO2	BACKGRD	METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	BACKGRD	PPM	-0.0	-0.0	-0.0
HC	CONCENTRATION	PPM	89	2	3
CO	CONCENTRATION	PPM	688	21	40
CO2	CONCENTRATION	PCT	1.61	1.11	1.45
NOX	CONCENTRATION	PPM	42.5	8.1	37.5
SO2	CONCENTRATION	PPM	0.0	0.0	0.0
HC	MASS	GRAMS	3.94	.11	.12
CO	MASS	GRAMS	61.37	3.15	3.53
CO2	MASS	GRAMS	2274.68	2673.62	2040.99
NOX	MASS	GRAMS	5.53	1.81	4.87
SO2	MASS	GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .16 GRAMS/KILOMETRE
WEIGHTED MASS CO 2.61 GRAMS/KILOMETRE
WEIGHTED MASS CO2 399.01 GRAMS/KILOMETRE
WEIGHTED MASS NOX .58 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

FUEL ECONOMY BY CARBON BALANCE = 5.8 KILOMETRE/LITRE

TABLE VEHICLE EMISSION RESULTS
1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. EM8 TEST NO. 1 DATE 12/13/77 MFGR. CODE -0 YR. 1977
VEHICLE MODEL PLY FURY ENGINE 5.90 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 739.90 MM OF HG.
DRY BULB TEMP. 23.3 DEG. C
REL. HUMIDITY 66 PCT.

WET BULB TEMP 18.9 DEG. C
ABS. HUMIDITY 12.1 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 673.1 MM. H20
BLOWER INLET PRESS., G1 673.1 MM. H20
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40723	69908	40601
HC SAMPLE METER READING/SCALE	12.1/3	9.5/2	14.5/2
HC SAMPLE PPM	121	10	14
HC BACKGRD METER READING/SCALE	.9/3	8.3/2	8.8/2
HC BACKGRD PPM	9	8	9
CO SAMPLE METER READING/SCALE	27.4/3	16.3/*	36.8/*
CO SAMPLE PPM	637	16	35
CO BACKGRD METER READING/SCALE	.1/3	4.0/*	4.2/*
CO BACKGRD PPM	2	4	4
CO2 SAMPLE METER READING/SCALE	94.2/3	65.2/3	85.5/3
CO2 SAMPLE PERCENT	1.77	1.17	1.58
CO2 BACKGRD METER READING/SCALE	4.1/3	3.6/3	3.7/3
CO2 BACKGRD PERCENT	.06	.06	.06
NOX SAMPLE METER READING/SCALE	26.5/2	6.3/2	30.8/2
NOX SAMPLE PPM	26.5	6.3	30.8
NOX BACKGRD METER READING/SCALE	1.8/2	1.9/2	1.8/2
NOX BACKGRD PPM	1.8	1.9	1.8
SO2 SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	113	2	7
CO CONCENTRATION PPM	600	11	29
CO2 CONCENTRATION PCT	1.71	1.12	1.53
NOX CONCENTRATION PPM	24.9	4.6	29.2
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	5.00	.15	.30
CO MASS GRAMS	53.51	1.75	2.62
CO2 MASS GRAMS	2410.19	2698.13	2152.90
NOX MASS GRAMS	3.83	1.20	4.47
SO2 MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .20 GRAMS/KILOMETRE
WEIGHTED MASS CO 2.18 GRAMS/KILOMETRE
WEIGHTED MASS CO2 411.16 GRAMS/KILOMETRE
WEIGHTED MASS NOX .45 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

FUEL ECONOMY BY CARBON BALANCE = 5.6 KILOMETRE/LITRE

TABLE

VEHICLE EMISSION RESULTS
1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. 235 TEST NO. * DATE 12/16/77 MFGR. CODE -0 YR. 1977
VEHICLE MODEL FURY EM 8 ENGINE 5.90 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 734.31 MM OF HG.
DRY BULB TEMP. 25.0 DEG. C
REL. HUMIDITY 53 PCT.

WET BULB TEMP 18.3 DEG. C
ABS. HUMIDITY 10.8 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 660.4 MM. H2O
BLOWER INLET PRESS., G1 660.4 MM. H2O
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.		1	2	3
BLOWER REVOLUTIONS		40758	69907	40733
HC	SAMPLE METER READING/SCALE	54.5/2	8.9/2	11.5/2
HC	SAMPLE PPM	54	9	11
HC	BACKGRD METER READING/SCALE	8.5/2	9.4/2	8.6/2
HC	BACKGRD PPM	9	9	9
CO	SAMPLE METER READING/SCALE	82.4/*	18.0/*	18.6/*
CO	SAMPLE PPM	384	17	18
CO	BACKGRD METER READING/SCALE	1.0/*	2.0/*	1.3/*
CO	BACKGRD PPM	3	2	1
CO2	SAMPLE METER READING/SCALE	44.2/2	70.2/3	88.3/3
CO2	SAMPLE PERCENT	1.96	1.27	1.64
CO2	BACKGRD METER READING/SCALE	2.1/2	3.9/3	4.2/3
CO2	BACKGRD PERCENT	.08	.06	.06
NOX	SAMPLE METER READING/SCALE	30.9/2	7.7/2	35.5/2
NOX	SAMPLE PPM	30.9	7.7	35.5
NOX	BACKGRD METER READING/SCALE	1.0/2	.7/2	.8/2
NOX	BACKGRD PPM	1.0	.7	.8
SO2	SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	SAMPLE PPM	-0.0	-0.0	-0.0
SO2	BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	BACKGRD PPM	-0.0	-0.0	-0.0
HC	CONCENTRATION PPM	47	0	4
CO	CONCENTRATION PPM	360	15	16
CO2	CONCENTRATION PCT	1.90	1.21	1.59
NOX	CONCENTRATION PPM	30.0	7.1	34.8
SO2	CONCENTRATION PPM	0.0	0.0	0.0
HC	MASS GRAMS	2.08	.03	.17
CO	MASS GRAMS	31.93	2.24	1.40
CO2	MASS GRAMS	2655.43	2914.57	2218.58
NOX	MASS GRAMS	4.38	1.77	5.07
SO2	MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .08 GRAMS/KILOMETRE
WEIGHTED MASS CO 1.39 GRAMS/KILOMETRE
WEIGHTED MASS CO2 440.94 GRAMS/KILOMETRE
WEIGHTED MASS NOX .54 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

FUEL ECONOMY BY CARBON BALANCE = 5.3 KILOMETRE/LITRE

TABLE

VEHICLE EMISSION RESULTS
1978 LIGHT DUTY EMISSIONS TEST
ACTUAL DISTANCES USED IN CALCULATIONS

UNIT NO. 235 TEST NO. 1 DATE 12/19/77 MFGR. CODE -0 YR. 1977
VEHICLE MODEL FURY ENGINE 5.90 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 738.63 MM OF HG.
DRY BULB TEMP. 24.4 DEG. C
REL. HUMIDITY 45 PCT.

WET BULB TEMP 16.7 DEG. C
ABS. HUMIDITY 8.8 GRAMS/KG
COMMENTS 1978 FTP EM 8

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 655.3 MM. H2O
BLOWER INLET PRESS., G1 655.3 MM. H2O
BLOWER INLET TEMP. 41 DEG. C

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40794	70016	40793
HC SAMPLE METER READING/SCALE	80.8/ 2	13.4/ 2	16.3/ 2
HC SAMPLE PPM	81	13	16
HC BACKGRD METER READING/SCALE	18.4/ 2	17.4/ 2	16.8/ 2
HC BACKGRD PPM	18	17	17
CO SAMPLE METER READING/SCALE	23.8/ 3	23.8/13	28.6/13
CO SAMPLE PPM	550	23	27
CO BACKGRD METER READING/SCALE	.1/ 3	5.0/13	3.7/13
CO BACKGRD PPM	2	5	4
CO2 SAMPLE METER READING/SCALE	95.2/ 3	63.6/ 3	88.4/ 3
CO2 SAMPLE PERCENT	1.79	1.13	1.64
CO2 BACKGRD METER READING/SCALE	4.5/ 3	4.4/ 3	4.4/ 3
CO2 BACKGRD PERCENT	.07	.07	.07
NOX SAMPLE METER READING/SCALE	17.2/ 2	7.0/ 2	36.3/ 2
NOX SAMPLE PPM	17.2	7.0	36.3
NOX BACKGRD METER READING/SCALE	1.3/ 2	1.0/ 2	1.0/ 2
NOX BACKGRD PPM	1.3	1.0	1.0
SO2 SAMPLE METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	65	-3	2
CO CONCENTRATION PPM	522	17	23
CO2 CONCENTRATION PCT	1.73	1.07	1.59
NOX CONCENTRATION PPM	16.1	6.1	35.4
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	2.88	-.19	.07
CO MASS GRAMS	46.74	2.67	2.03
CO2 MASS GRAMS	2435.19	2595.35	2234.39
NOX MASS GRAMS	2.23	1.45	4.91
SO2 MASS GRAMS	0.00	0.00	0.00
HC GRAMS/KM (GRAMS/MILE)	.50 (.80)	-.03 (-.05)	.01 (.02)
CO GRAMS/KM (GRAMS/MILE)	8.08 (13.00)	.42 (.68)	.35 (.56)
CO2 GRAMS/KM (GRAMS/MILE)	421.01 (677.41)	412.49 (663.69)	384.88 (619.27)
NOX GRAMS/KM (GRAMS/MILE)	.39 (.62)	.23 (.37)	.85 (1.36)
FUEL CONSUMPTION BY CB L/100KM (MPG)	18.58 (12.66)	17.63 (13.34)	16.45 (14.30)
CVS FLOW STD. CU. METRES (SCF)	77.0 (2718.3)	132.1 (4665.1)	77.0 (2718.1)
CALCULATED DISTANCE KM(MILES)	5.78 (3.59)	6.29 (3.91)	5.81 (3.61)

WEIGHTED FUEL CONSUMPTION LITRES/100KM (MPG)	17.50 (13.44)
WEIGHTED MASS HC GRAMS/KM (GRAMS/MILE)	.09 (.14)
WEIGHTED MASS CO GRAMS/KM (GRAMS/MILE)	1.98 (3.19)
WEIGHTED MASS CO2 GRAMS/KM (GRAMS/MILE)	406.69 (654.36)
WEIGHTED MASS NOX GRAMS/KM (GRAMS/MILE)	.43 (.69)

TOTAL CVS FLOW = 286.1 STD. CU. METRES

TABLE

VEHICLE EMISSION RESULTS
1978 LIGHT DUTY EMISSIONS TEST
ACTUAL DISTANCES USED IN CALCULATIONS

UNIT NO. 235 TEST NO. 1 DATE 12/29/77 MFGR. CODE -0 YR. 1977
VEHICLE MODEL PLY FURY EM-8 ENGINE 5.90 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 742.19 MM OF HG.
DRY BULB TEMP. 26.1 DEG. C
REL. HUMIDITY 37 PCT.

WET BULB TEMP 16.7 DEG. C
ABS. HUMIDITY 8.1 GRAMS/KG
COMMENTS 1978 FTPC

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 736.6 MM. H2O
BLOWER INLET PRESS., G1 736.6 MM. H2O
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40460	69616	40572
HC SAMPLE METER READING/SCALE	12.2/ 3	20.5/ 2	37.4/ 2
HC SAMPLE PPM	122	20	37
HC BACKGRD METER READING/SCALE	2.1/ 3	19.5/ 2	15.8/ 2
HC BACKGRD PPM	21	19	16
CO SAMPLE METER READING/SCALE	94.1/11	18.3/13	63.3/13
CO SAMPLE PPM	482	17	61
CO BACKGRD METER READING/SCALE	2.1/11	5.7/13	3.7/13
CO BACKGRD PPM	6	6	4
CO2 SAMPLE METER READING/SCALE	42.8/ 2	68.4/ 3	89.0/ 3
CO2 SAMPLE PERCENT	1.89	1.23	1.66
CO2 BACKGRD METER READING/SCALE	1.7/ 2	4.4/ 3	3.9/ 3
CO2 BACKGRD PERCENT	.06	.07	.06
NOX SAMPLE METER READING/SCALE	32.7/ 2	9.5/ 2	42.1/ 2
NOX SAMPLE PPM	32.7	9.5	42.1
NOX BACKGRD METER READING/SCALE	1.3/ 2	1.0/ 2	1.0/ 2
NOX BACKGRD PPM	1.3	1.0	1.0
SO2 SAMPLE METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	104	3	24
CO CONCENTRATION PPM	453	12	55
CO2 CONCENTRATION PCT	1.83	1.17	1.60
NOX CONCENTRATION PPM	31.6	8.6	41.2
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	4.54	.21	1.03
CO MASS GRAMS	39.87	1.79	4.89
CO2 MASS GRAMS	2538.98	2782.15	2227.75
NOX MASS GRAMS	4.20	1.97	5.50
SO2 MASS GRAMS	0.00	0.00	0.00
HC GRAMS/KM (GRAMS/MILE)	.78 (1.26)	.03 (.05)	.18 (.28)
CO GRAMS/KM (GRAMS/MILE)	6.88 (11.06)	.29 (.46)	.84 (1.35)
CO2 GRAMS/KM (GRAMS/MILE)	437.91 (704.60)	445.16 (716.26)	382.24 (615.02)
NOX GRAMS/KM (GRAMS/MILE)	.72 (1.17)	.31 (.51)	.94 (1.52)
FUEL CONSUMPTION BY CB L/100KM (MPG)	19.26 (12.22)	19.02 (12.37)	16.39 (14.35)
CVS FLOW STD. CU. METRES (SCF)	75.6 (2669.6)	130.1 (4593.2)	75.8 (2677.2)
CALCULATED DISTANCE KM(MILES)	5.80 (3.60)	6.26 (3.89)	5.83 (3.62)

WEIGHTED FUEL CONSUMPTION LITRES/100KM (MPG)	18.35 (12.82)
WEIGHTED MASS HC GRAMS/KM (GRAMS/MILE)	.23 (.37)
WEIGHTED MASS CO GRAMS/KM (GRAMS/MILE)	1.80 (2.90)
WEIGHTED MASS CO2 GRAMS/KM (GRAMS/MILE)	426.37 (686.03)
WEIGHTED MASS NOX GRAMS/KM (GRAMS/MILE)	.57 (.92)

TOTAL CVS FLOW = 281.5 STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 8

DATE 12/29/77	TIME -0 HRS.	TEST NO. 2
MODEL 1977 PLY FURY EM-8	SET-7	ENGINE 5.9 LITREV 8
DRIVER AL	TEST WT. 2041 KG.	GVW 0 KG
WET BULB TEMP 17 C	DRY BULB TEMP 25 C	REL. HUM. 45.7 PCT
SPEC. HUM. 9.2 GRAM/KG	BARO. 740.7 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION 23.28 MINUTES
BLOWER INLET PRESS. 736.6 MM. H2O
BLOWER DIF. PRESS. 736.6 MM H2O
BLOWER INLET TEMP. 42 DEG. C
DYNO REVOLUTIONS 31835
BLOWER REVOLUTIONS 112243
BLOWER CU. CM /REV. 2226

BAG RESULTS

HC SAMPLE METER READING/SCALE	14.9/2
HC SAMPLE PPM	15
HC BACKGRD METER READING/SCALE	10.8/2
HC BACKGRD PPM	11
CO SAMPLE METER READING/SCALE	34.8/*
CO SAMPLE PPM	33
CO BACKGRD METER READING/SCALE	1.1/*
CO BACKGRD PPM	1
CO2 SAMPLE METER READING/SCALE	93.4/2
CO2 SAMPLE PERCENT	1.92
CO2 BACKGRD METER READING/SCALE	1.7/2
CO2 BACKGRD PERCENT	.06
NOX SAMPLE METER READING/SCALE	38.4/2
NOX SAMPLE PPM	38.4
NOX BACKGRD METER READING/SCALE	.9/2
NOX BACKGRD PPM	.9
HC CONCENTRATION PPM	6
CO CONCENTRATION PPM	30
CO2 CONCENTRATION PCT	1.87
NOX CONCENTRATION PPM	37.6
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	.68
CO MASS (GRAMS)	7.39
CO2 MASS (GRAMS)	7187.70
NOX MASS (GRAMS)	14.38
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.03
CO GRAMS/KILOMETRE	.34
CO2 GRAMS/KILOMETRE	327
NOX GRAMS/KILOMETRE	.65
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.30	HC GRAMS/MIN	.03
CO GRAMS/KG OF FUEL	3.3	CO GRAMS/MIN	.3
CO2 GRAMS/KG OF FUEL	3163	CO2 GRAMS/MIN	309
NOX GRAMS/KG OF FUEL	6.33	NOX GRAMS/MIN	.62
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 14.02 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 8

DATE 12/29/77 TIME -0 HRS. TEST NO. 2
MODEL 1977 PLY FURY EM-8 SET-7 ENGINE 5.9 LITREO
RUN DURATION 23.28 MIN. DISTANCE DRIVEN 21.95 KILOMETRES
CVS BLOWER TEST VOL. 249.89 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47-FH-2863	
SAMPLE VOL. CU. FT.	15.85	1.00
SAMPLE TEMP. DEG. F	78	70
SAMPLE AREA SQ. IN.	54952.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	5.00	1.00
STAND. AREA SQ. IN.	143626.00	1.00
SO4,MICROG/FILTER	19.130	0.000

SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
APEA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS	
NET SULFATE,MILLIGRAM/TEST	12.154
NET H2SO4,MILLIGRAM/TEST	12.409
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	.554
NET H2SO4,MILLIGRAM/KILOMETRE	.565
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2272 GRAMS SULFUR IN FUEL, .0320 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.73	0.000	.0041	.0041
PCT. RECOVERY		0.00	.56	.56

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 235

DATE 12/29/77	TIME ~0 HRS.	TEST NO. 3
MODEL 1970 PLY FURY EM-B	HFET	ENGINE 59.0 LITREV 8
DRIVER AI	TEST WT. 2041 KG.	GVW 0 KG
WET BULB TEMP 17 C	DRY BULB TEMP 26 C	REL. HUM. 40.6 PCT
SPEC. HUM. 8.8 GRAM/KG	BARO. 740.2 MM HG.	MEASURED FUEL 0.00 KG
DISTANCE 16.465 KM	FUEL 738.2 G/LITRE	FUEL HC RATIO 1.860

RUN DURATION	12.76 MINUTES
BLOWER INLET PRESS.	736.6 MM. H2O
BLOWER DIF. PRESS.	736.6 MM H2O
BLOWER INLET TEMP.	43 DEG. C
DYNO REVOLUTIONS	23929
BLOWER REVOLUTIONS	61485
BLOWER CU. CM /REV.	2228

BAG RESULTS

HC SAMPLE METER READING/SCALE	14.8/ 2
HC SAMPLE PPM	15
HC BACKGRD METER READING/SCALE	11.3/ 2
HC BACKGRD PPM	11
CO SAMPLE METER READING/SCALE	31.8/13
CO SAMPLE PPM	30
CO BACKGRD METER READING/SCALE	.9/13
CO BACKGRD PPM	1
CO2 SAMPLE METER READING/SCALE	50.0/ 2
CO2 SAMPLE PERCENT	2.28
CO2 BACKGRD METER READING/SCALE	1.7/ 2
CO2 BACKGRD PERCENT	.06
NOX SAMPLE METER READING/SCALE	63.3/ 2
NOX SAMPLE PPM	63.3
NOX BACKGRD METER READING/SCALE	1.0/ 2
NOX BACKGRD PPM	1.0
HC CONCENTRATION PPM	5
CO CONCENTRATION PPM	28
CO2 CONCENTRATION PCT	2.23
NOX CONCENTRATION PPM	62.5
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	.36
CO MASS (GRAMS)	3.69
CO2 MASS (GRAMS)	4679.29
NOX MASS (GRAMS)	12.86
SO2 MASS (GRAMS)	0.00

HC GRAMS/KM (GRAMS/MILE)	.02 (	.04)
CO GRAMS/KM (GRAMS/MILE)	.22 (	.36)
CO2 GRAMS/KM (GRAMS/MILE)	284 (	457)
NOX GRAMS/KM (GRAMS/MILE)	.78 (	1.26)
SO2 GRAMS/KM (GRAMS/MILE)	0.00 (	0.00)

HC GRAMS/KG OF FUEL	.24	HC GRAMS/MIN	.03
CO GRAMS/KG OF FUEL	2.5	CO GRAMS/MIN	.3
CO2 GRAMS/KG OF FUEL	3165	CO2 GRAMS/MIN	367
NOX GRAMS/KG OF FUEL	8.70	NOX GRAMS/MIN	1.01
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY L/100KM (MILES/GALLON) 12.15 (19.37)

TABLE

VEHICLE EMISSION RESULTS
1978 LIGHT DUTY EMISSIONS TEST
ACTUAL DISTANCES USED IN CALCULATIONS

UNIT NO. EM8 TEST NO. 1 DATE 1/ 3/78 MFGR. CODE -0 YR. 1977
VEHICLE MODEL FURY PLY ENGINE 5.90 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 750.82 MM OF HG.
DRY BULB TEMP. 21.1 DEG. C
REL. HUMIDITY 23 PCT.

WET BULB TEMP 10.6 DEG. C
ABS. HUMIDITY 3.5 GRAMS/KG
COMMENTS 1978 FTP-C

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 736.6 MM. H2O
BLOWER INLET PRESS., G1 736.6 MM. H2O
BLOWER INLET TEMP. 42 DEG. C

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40558	69651	40548
HC SAMPLE METER READING/SCALE	12.5/ 3	10.6/ 2	15.5/ 2
HC SAMPLE PPM	125	11	15
HC BACKGRD METER READING/SCALE	8.5/ 2	.9/ 3	8.1/ 2
HC BACKGRD PPM	9	9	8
CO SAMPLE METER READING/SCALE	96.1/11	22.0/13	36.1/13
CO SAMPLE PPM	501	21	34
CO BACKGRD METER READING/SCALE	2.6/11	2.0/11	5.3/13
CO BACKGRD PPM	8	6	5
CO2 SAMPLE METER READING/SCALE	97.4/ 3	68.2/ 3	86.4/ 3
CO2 SAMPLE PERCENT	1.83	1.23	1.60
CO2 BACKGRD METER READING/SCALE	4.5/ 3	4.8/ 3	4.2/ 3
CO2 BACKGRD PERCENT	.07	.07	.06
NOX SAMPLE METER READING/SCALE	37.8/ 2	11.5/ 2	48.1/ 2
NOX SAMPLE PPM	37.8	11.5	48.1
NOX BACKGRD METER READING/SCALE	.8/ 2	.7/ 2	.7/ 2
NOX BACKGRD PPM	.8	.7	.7
SO2 SAMPLE METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	118	2	8
CO CONCENTRATION PPM	472	15	28
CO2 CONCENTRATION PCT	1.77	1.16	1.55
NOX CONCENTRATION PPM	37.1	10.9	47.5
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	5.22	.18	.37
CO MASS GRAMS	42.26	2.27	2.53
CO2 MASS GRAMS	2496.37	2803.85	2174.63
NOX MASS GRAMS	4.41	2.22	5.64
SO2 MASS GRAMS	0.00	0.00	0.00
HC GRAMS/KM (GRAMS/MILE)	.90 (1.45)	.03 (.05)	.06 (.10)
CO GRAMS/KM (GRAMS/MILE)	7.30 (11.75)	.36 (.58)	.44 (.70)
CO2 GRAMS/KM (GRAMS/MILE)	431.23 (693.85)	444.02 (714.43)	374.85 (603.13)
NOX GRAMS/KM (GRAMS/MILE)	.76 (1.23)	.35 (.57)	.97 (1.57)
FUEL CONSUMPTION BY CB L/100KM (MPG)	19.02 (12.37)	18.98 (12.39)	16.04 (14.67)
CVS FLOW STD. CU. METRES (SCF)	76.8 (2713.5)	131.9 (4659.5)	76.8 (2712.6)
CALCULATED DISTANCE KM(MILES)	5.79 (3.60)	6.31 (3.92)	5.80 (3.61)

WEIGHTED FUEL CONSUMPTION LITRES/100KM (MPG)	18.18 (12.94)
WEIGHTED MASS HC GRAMS/KM (GRAMS/MILE)	.22 (.35)
WEIGHTED MASS CO GRAMS/KM (GRAMS/MILE)	1.81 (2.91)
WEIGHTED MASS CO2 GRAMS/KM (GRAMS/MILE)	422.51 (679.82)
WEIGHTED MASS NOX GRAMS/KM (GRAMS/MILE)	.61 (.97)

TOTAL CVS FLOW = 285.6 STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 8

DATE 1/ 3/78 TIME -0 HRS. TEST NO. 2
MODEL 1977 FURY PLY SET-7 ENGINE 5.9 LITREV 8
DRIVER SR TEST WT. 2041 KG. GVW 0 KG
WET BULB TEMP 12 C DRY BULB TEMP 24 C REL. HUM. 19.7 PCT
SPEC. HUM. 3.8 GRAM/KG BARO. 751.3 MM HG. MEASURED FUEL 0.00 KG

RUN DURATION 23.29 MINUTES
BLOWER INLET PRESS. 711.2 MM. H2O
BLOWER DIF. PRESS. 711.2 MM H2O
BLOWER INLET TEMP. 43 DEG. C
DYNO REVOLUTIONS 31639
BLOWER REVOLUTIONS 112257
BLOWER CU. CM /REV. 2231

BAG RESULTS

HC	SAMPLE METER READING/SCALE	12.0/2
HC	SAMPLE PPM	12
HC	BACKGRD METER READING/SCALE	8.1/2
HC	BACKGRD PPM	8
CO	SAMPLE METER READING/SCALE	29.8/*
CO	SAMPLE PPM	28
CO	BACKGRD METER READING/SCALE	2.1/*
CO	BACKGRD PPM	2
CO2	SAMPLE METER READING/SCALE	44.0/2
CO2	SAMPLE PERCENT	1.95
CO2	BACKGRD METER READING/SCALE	2.1/2
CO2	BACKGRD PERCENT	.08
NOX	SAMPLE METER READING/SCALE	54.0/2
NOX	SAMPLE PPM	54.0
NOX	BACKGRD METER READING/SCALE	.6/2
NOX	BACKGRD PPM	.6
HC	CONCENTRATION PPM	5
CO	CONCENTRATION PPM	25
CO2	CONCENTRATION PCT	1.89
NOX	CONCENTRATION PPM	53.5
SO2	COCENTRATION PPM	0.0
HC	MASS (GRAMS)	.63
CO	MASS (GRAMS)	6.27
CO2	MASS (GRAMS)	7400.57
NOX	MASS (GRAMS)	17.77
SO2	MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.03
CO GRAMS/KILOMETRE	.29
CO2 GRAMS/KILOMETRE	339
NOX GRAMS/KILOMETRE	.81
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.27	HC GRAMS/MIN	.03
CO GRAMS/KG OF FUEL	2.7	CO GRAMS/MIN	.3
CO2 GRAMS/KG OF FUEL	3164	CO2 GRAMS/MIN	318
NOX GRAMS/KG OF FUEL	7.60	NOX GRAMS/MIN	.76
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 14.52 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 8

DATE 1/ 3/78 TIME -0 HRS. TEST NO. 2
MODEL 1977 FURY PLY SET-7 ENGINE 5.9 LITREO
RUN DURATION 23.29 MIN. DISTANCE DRIVEN 21.81 KILOMETRES
CVS BLOWER TEST VOL. 250.45 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47-FH-2865	
SAMPLE VOL. CU. FT.	15.84	1.00
SAMPLE TEMP. DEG. F	78	70
SAMPLE AREA SQ. IN.	74835.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	5.00	1.00
STAND. AREA SQ. IN.	146996.00	1.00
SO4,MICROG/FILTER	25.455	0.000

SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	16.190
NET H2SO4,MILLIGRAM/TEST	16.530
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	.742
NET H2SO4,MILLIGRAM/KILOMETRE	.758
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2339 GRAMS SULFUR IN FUEL, .0320 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.75	0.000	.0054	.0054
PCT. RECOVERY		0.00	.72	.72

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER 8

DATE 1/ 3/78	TIME -0 HRS.	TEST NO. 3
MODEL 1977 FURY PLY	FET	ENGINE 5.9 LITREV 8
DRIVER SR	TEST WT. 2041 KG.	GVW 0 KG
WET BULB TEMP 12 C	DRY BULB TEMP 24 C	REL. HUM. 19.7 PCT
SPEC. HUM. 3.8 GRAM/KG	BARO. 751.3 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION	12.76 MINUTES
BLOWER INLET PRESS.	711.2 MM. H2O
BLOWER DIF. PRESS.	711.2 MM H2O
BLOWER INLET TEMP.	42 DEG. C
DYNO REVOLUTIONS	23921
BLOWER REVOLUTIONS	61553
BLOWER CU. CM /REV.	2228

BAG RESULTS

HC SAMPLE METER READING/SCALE	12.1/2
HC SAMPLE PPM	12
HC BACKGRD METER READING/SCALE	8.2/2
HC BACKGRD PPM	8
CO SAMPLE METER READING/SCALE	17.1/*
CO SAMPLE PPM	16
CO BACKGRD METER READING/SCALE	1.6/*
CO BACKGRD PPM	2
CO2 SAMPLE METER READING/SCALE	48.9/2
CO2 SAMPLE PERCENT	2.22
CO2 BACKGRD METER READING/SCALE	1.7/2
CO2 BACKGRD PERCENT	.06
NOX SAMPLE METER READING/SCALE	77.4/2
NOX SAMPLE PPM	77.4
NOX BACKGRD METER READING/SCALE	.5/2
NOX BACKGRD PPM	.5
HC CONCENTRATION PPM	5
CO CONCENTRATION PPM	14
CO2 CONCENTRATION PCT	2.17
NOX CONCENTRATION PPM	77.0
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	.36
CO MASS (GRAMS)	1.94
CO2 MASS (GRAMS)	4676.12
NOX MASS (GRAMS)	14.05
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.02
CO GRAMS/KILOMETRE	.12
CO2 GRAMS/KILOMETRE	284
NOX GRAMS/KILOMETRE	.85
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.24	HC GRAMS/MIN	.03
CO GRAMS/KG OF FUEL	1.3	CO GRAMS/MIN	.2
CO2 GRAMS/KG OF FUEL	3167	CO2 GRAMS/MIN	367
NOX GRAMS/KG OF FUEL	9.51	NOX GRAMS/MIN	1.10
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 12.14 LITRES PER HUNDRED KILOMETERS

TABLE

VEHICLE EMISSION RESULTS
1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. EM8 TEST NO. 1 DATE 1/24/78 MFGR. CODE -0 YR. 1977
VEHICLE MODEL FURY PLYMOUTH ENGINE 5.90 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 737.11 MM OF HG.
DRY BULB TEMP. 22.2 DEG. C
REL. HUMIDITY 42 PCT.

WET BULB TEMP 14.4 DEG. C
ABS. HUMIDITY 7.2 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 736.6 MM. H2O
BLOWER INLET PRESS., G1 736.6 MM. H2O
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.		1	2	3
BLOWER REVOLUTIONS		42508	71883	40910
HC	SAMPLE METER READING/SCALE	85.9/2	11.2/2	14.6/2
HC	SAMPLE PPM	86	11	15
HC	BACKGRD METER READING/SCALE	8.7/2	8.1/2	8.2/2
HC	BACKGRD PPM	9	8	8
CO	SAMPLE METER READING/SCALE	93.9/*	26.3/*	66.2/*
CO	SAMPLE PPM	480	25	64
CO	BACKGRD METER READING/SCALE	1.4/*	1.7/*	3.1/*
CO	BACKGRD PPM	4	2	3
CO2	SAMPLE METER READING/SCALE	98.4/3	68.4/3	89.3/3
CO2	SAMPLE PERCENT	1.85	1.23	1.66
CO2	BACKGRD METER READING/SCALE	4.5/3	2.9/3	3.4/3
CO2	BACKGRD PERCENT	.07	.04	.05
NOX	SAMPLE METER READING/SCALE	44.7/2	17.3/2	54.0/2
NOX	SAMPLE PPM	44.7	17.3	54.0
NOX	BACKGRD METER READING/SCALE	.9/2	1.0/2	.9/2
NOX	BACKGRD PPM	.9	1.0	.9
SO2	SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	SAMPLE PPM	-0.0	-0.0	-0.0
SO2	BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	BACKGRD PPM	-0.0	-0.0	-0.0
HC	CONCENTRATION PPM	78	4	7
CO	CONCENTRATION PPM	453	22	59
CO2	CONCENTRATION PCT	1.80	1.19	1.62
NOX	CONCENTRATION PPM	43.9	16.4	53.2
SO2	CONCENTRATION PPM	0.0	0.0	0.0
HC	MASS GRAMS	3.57	.30	.32
CO	MASS GRAMS	41.59	3.49	5.18
CO2	MASS GRAMS	2606.28	2922.13	2255.81
NOX	MASS GRAMS	5.95	3.75	6.92
SO2	MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .17 GRAMS/KILOMETRE
WEIGHTED MASS CO 2.02 GRAMS/KILOMETRE
WEIGHTED MASS CO2 441.57 GRAMS/KILOMETRE
WEIGHTED MASS NOX .85 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

FUEL ECONOMY BY CARBON BALANCE = 5.3 KILOMETRE/LITRE

TABLE

VEHICLE EMISSION RESULTS
1978 LIGHT DUTY EMISSIONS TEST
ACTUAL DISTANCES USED IN CALCULATIONS

UNIT NO. EMR TEST NO. 1 DATE 1/26/78 MFGR. CODE -0 YR. 1977
VEHICLE MODEL PLY FURY FM B ENGINE 5.90 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 748.03 MM OF HG.
DRY BULB TEMP. 24.9 DEG. C
REL. HUMIDITY 16 PCT.

WET BULB TEMP 11.1 DEG. C
ABS. HUMIDITY 2.9 GRAMS/KG
COMMENTS 1978 FTPC

EXHAUST EMISSIONS

BLOWER INLET PRESS., G1 736.6 MM. H2O
BLOWER INLET TEMP. 43 DEG. C

BLOWER DIF. PRESS., G2, 736.6 MM. H2O

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40671	69714	40596
HC SAMPLE METER READING/SCALE	71.8/ 2	11.4/ 2	16.9/ 2
HC SAMPLE PPM	72	11	17
HC BACKGRD METER READING/SCALE	10.3/ 2	8.3/ 2	9.3/ 2
HC BACKGRD PPM	10	8	9
CO SAMPLE METER READING/SCALE	73.9/11	26.6/13	70.1/13
CO SAMPLE PPM	324	25	68
CO BACKGRD METER READING/SCALE	.7/11	1.7/13	1.5/13
CO BACKGRD PPM	2	2	1
CO2 SAMPLE METER READING/SCALE	42.2/ 2	68.3/ 3	87.6/ 3
CO2 SAMPLE PERCENT	1.85	1.23	1.63
CO2 BACKGRD METER READING/SCALE	1.3/ 2	3.5/ 3	4.0/ 3
CO2 BACKGRD PERCENT	.05	.05	.06
NOX SAMPLE METER READING/SCALE	47.8/ 2	18.5/ 2	58.5/ 2
NOX SAMPLE PPM	47.8	18.5	58.5
NOX BACKGRD METER READING/SCALE	.6/ 2	.4/ 2	.7/ 2
NOX BACKGRD PPM	.6	.4	.7
SO2 SAMPLE METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	63	4	9
CO CONCENTRATION PPM	309	23	65
CO2 CONCENTRATION PCT	1.81	1.18	1.57
NOX CONCENTRATION PPM	47.3	18.1	57.9
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	2.78	.29	.39
CO MASS GRAMS	27.55	3.51	5.76
CO2 MASS GRAMS	2547.23	2841.19	2205.23
NOX MASS GRAMS	5.52	3.63	6.75
SO2 MASS GRAMS	0.00	0.00	0.00
HC GRAMS/KM (GRAMS/MILE)	.47 (.76)	.05 (.07)	.07 (.11)
CO GRAMS/KM (GRAMS/MILE)	4.68 (7.53)	.55 (.88)	.98 (1.58)
CO2 GRAMS/KM (GRAMS/MILE)	432.71 (696.23)	442.37 (711.77)	375.93 (604.87)
NOX GRAMS/KM (GRAMS/MILE)	.94 (1.51)	.57 (.91)	1.15 (1.85)
FUEL CONSUMPTION BY CB L/100KM (MPG)	18.85 (12.48)	18.92 (12.43)	16.12 (14.59)
CVS FLOW STD. CU. METRES (SCF)	76.7 (2707.2)	131.4 (4640.0)	76.5 (2702.0)
CALCULATED DISTANCE KM(MILES)	5.89 (3.66)	6.42 (3.99)	5.87 (3.65)

WEIGHTED FUEL CONSUMPTION LITRES/100KM (MPG)	18.14 (12.96)
WEIGHTED MASS HC GRAMS/KM (GRAMS/MILE)	.14 (.22)
WEIGHTED MASS CO GRAMS/KM (GRAMS/MILE)	1.52 (2.44)
WEIGHTED MASS CO2 GRAMS/KM (GRAMS/MILE)	422.30 (679.49)
WEIGHTED MASS NOX GRAMS/KM (GRAMS/MILE)	.80 (1.29)

TOTAL CVS FLOW = 284.6 STD. CU. METRES

TABLE

VEHICLE EMISSION RESULTS
1978 LIGHT DUTY EMISSIONS TEST
ACTUAL DISTANCES USED IN CALCULATIONS

UNIT NO. EM8 TEST NO. 1 DATE 2/ 3/78 MFGR. CODE -0 YR. 1977
VEHICLE MODEL FURY PLY ENGINE 5.90 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 743.46 MM OF HG.
DRY BULB TEMP. 23.3 DEG. C
REL. HUMIDITY 30 PCT.

WET BULB TEMP 13.3 DEG. C
ABS. HUMIDITY 5.5 GRAMS/KG
COMMENTS 1978 FTP-C

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 736.6 MM. H2O
BLOWER INLET PRESS., G1 736.6 MM. H2O
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40680	69703	40569
HC SAMPLE METER READING/SCALE	85.8/ 2	12.6/ 2	21.4/ 2
HC SAMPLE PPM	86	13	21
HC BACKGRD METER READING/SCALE	9.9/ 2	10.2/ 2	11.7/ 2
HC BACKGRD PPM	10	10	12
CO SAMPLE METER READING/SCALE	97.5/11	43.4/13	55.7/12
CO SAMPLE PPM	514	41	124
CO BACKGRD METER READING/SCALE	1.0/11	2.5/13	1.0/12
CO BACKGRD PPM	3	2	2
CO2 SAMPLE METER READING/SCALE	91.2/ 3	66.1/ 3	85.6/ 3
CO2 SAMPLE PERCENT	1.70	1.19	1.59
CO2 BACKGRD METER READING/SCALE	4.5/ 3	4.1/ 3	4.2/ 3
CO2 BACKGRD PERCENT	.07	.06	.06
NOX SAMPLE METER READING/SCALE	37.1/ 2	12.1/ 2	45.6/ 2
NOX SAMPLE PPM	37.1	12.1	45.6
NOX BACKGRD METER READING/SCALE	.7/ 2	.8/ 2	.9/ 2
NOX BACKGRD PPM	.7	.8	.9
SO2 SAMPLE METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	77	3	11
CO CONCENTRATION PPM	490	38	117
CO2 CONCENTRATION PCT	1.64	1.13	1.53
NOX CONCENTRATION PPM	36.5	11.4	44.8
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	3.39	.25	.49
CO MASS GRAMS	43.42	5.71	10.37
CO2 MASS GRAMS	2291.91	2694.55	2126.81
NOX MASS GRAMS	4.53	2.42	5.55
SO2 MASS GRAMS	0.00	0.00	0.00
HC GRAMS/KM (GRAMS/MILE)	.58 (.93)	.04 (.06)	.08 (.13)
CO GRAMS/KM (GRAMS/MILE)	7.44 (11.97)	.90 (1.46)	1.78 (2.86)
CO2 GRAMS/KM (GRAMS/MILE)	392.64 (631.76)	426.76 (686.66)	364.32 (586.18)
NOX GRAMS/KM (GRAMS/MILE)	.78 (1.25)	.38 (.62)	.95 (1.53)
FUEL CONSUMPTION BY CB L/100KM (MPG)	17.34 (13.57)	18.28 (12.87)	15.68 (15.00)
CVS FLOW STD. CU. METRES (SCF)	76.2 (2689.8)	130.5 (4608.0)	75.9 (2682.0)
CALCULATED DISTANCE KM(MILES)	5.84 (3.63)	6.31 (3.92)	5.84 (3.63)

WEIGHTED FUEL CONSUMPTION LITRES/100KM (MPG)	17.37 (13.54)
WEIGHTED MASS HC GRAMS/KM (GRAMS/MILE)	.16 (.26)
WEIGHTED MASS CO GRAMS/KM (GRAMS/MILE)	2.49 (4.01)
WEIGHTED MASS CO2 GRAMS/KM (GRAMS/MILE)	402.61 (647.80)
WEIGHTED MASS NOX GRAMS/KM (GRAMS/MILE)	.62 (1.00)

TOTAL CVS FLOW = 282.6 STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM8

DATE 2/ 3/78	TIME -0 HRS.	TEST NO. 2
MODEL 1977 FURY PLY	SET-?	ENGINE 5.9 LITREV 8
DRIVER BP	TEST WT. 2041 KG.	GVW 0 KG
WET BULB TEMP 13 C	DRY BULB TEMP 24 C	REL. HUM. 22.7 PCT
SPEC. HUM. 4.4 GRAM/KG	BARO. 748.5 MM HG.	MEASURED FUEL 0.00 KG
DISTANCE 21.837 KM	FUEL 738.2 G/LITRE	FUEL HC RATIO 1.860

RUN DURATION	23.28 MINUTES
BLOWER INLET PRESS.	762.0 MM. H2O
BLOWER DIF. PRESS.	762.0 MM H2O
BLOWER INLET TEMP.	43 DEG. C
DYNO REVOLUTIONS	31735
BLOWER REVOLUTIONS	112176
BLOWER CU. CM /REV.	2226

BAG RESULTS

HC SAMPLE METER READING/SCALE	18.6/ 2
HC SAMPLE PPM	19
HC BACKGRD METER READING/SCALE	16.6/ 2
HC BACKGRD PPM	17
CO SAMPLE METER READING/SCALE	67.8/13
CO SAMPLE PPM	66
CO BACKGRD METER READING/SCALE	2.5/13
CO BACKGRD PPM	2
CO2 SAMPLE METER READING/SCALE	41.9/ 2
CO2 SAMPLE PERCENT	1.84
CO2 BACKGRD METER READING/SCALE	2.2/ 2
CO2 BACKGRD PERCENT	.08
NOx SAMPLE METER READING/SCALE	51.5/ 2
NOX SAMPLE PPM	51.5
NOX BACKGRD METER READING/SCALE	1.7/ 2
NOX BACKGRD PPM	1.7
HC CONCENTRATION PPM	4
CO CONCENTRATION PPM	61
CO2 CONCENTRATION PCT	1.77
NOX CONCENTRATION PPM	50.0
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	.52
CO MASS (GRAMS)	14.99
CO2 MASS (GRAMS)	6833.46
NOX MASS (GRAMS)	16.69
SO2 MASS (GRAMS)	0.00

HC GRAMS/KM (GRAMS/MILE)	.02	(.04)
CO GRAMS/KM (GRAMS/MILE)	.69	(1.10)
CO2 GRAMS/KM (GRAMS/MILE)	313	(504)
NOX GRAMS/KM (GRAMS/MILE)	.76	(1.23)
SO2 GRAMS/KM (GRAMS/MILE)	0.00	(0.00)

HC GRAMS/KG OF FUEL	.24	HC GRAMS/MIN	.02
CO GRAMS/KG OF FUEL	6.9	CO GRAMS/MIN	.6
CO2 GRAMS/KG OF FUEL	3158	CO2 GRAMS/MIN	294
NOX GRAMS/KG OF FUEL	7.71	NOX GRAMS/MIN	.72
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY L/100KM (MILES/GALLON) 13.41 (17.55)

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM8

DATE 2/ 3/78 TIME -0 HRS. TEST NO. 2
MODEL 1977 FURY PLY SET-? ENGINE 5.9 LITREO
RUN DURATION 23.28 MIN. DISTANCE DRIVEN 21.88 KILOMETRES
CVS BLOWER TEST VOL. 249.75 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2881	
SAMPLE VOL. CU. FT.	16.00	1.00
SAMPLE TEMP. DEG. F	79	70
SAMPLE AREA SQ. IN.	48388.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	5.00	1.00
STAND. AREA SQ. IN.	143478.00	1.00
SO4,MICROG/FILTER	16.863	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	10.628
NET H2SO4,MILLIGRAM/TEST	10.851
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	.486
NET H2SO4,MILLIGRAM/KILOMETRE	.496
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2173 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.67	0.000	.0035	.0035
PCT. RECOVERY		0.00	.53	.53

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM8

DATE 2/ 3/78	TIME -0 HRS.	TEST NO. 3
MODEL 1977 FURY PLYMOUTH	FET	ENGINE 5.9 LITREV 8
DRIVER BP	TEST WT. 2041 KG.	GVW 0 KG
WET BULB TEMP 11 C	DRY BULB TEMP 20 C	REL. HUM. 27.6 PCT
SPEC. HUM. 4.0 GRAM/KG	BARO. 748.5 MM HG.	MEASURED FUEL 0.00 KG
DISTANCE 16.491 KM	FUEL 738.2 G/LITRE	FUEL HC RATIO 1.860

RUN DURATION	12.75 MINUTES
BLOWER INLET PRESS.	762.0 MM. H2O
BLOWER DIF. PRESS.	762.0 MM H2O
BLOWER INLET TEMP.	43 DEG. C
DYNO REVOLUTIONS	23966
BLOWER REVOLUTIONS	61454
BLOWER CU. CM /REV.	2226

BAG RESULTS

HC SAMPLE METER READING/SCALE	16.0/ 2
HC SAMPLE PPM	16
HC BACKGRD METER READING/SCALE	13.8/ 2
HC BACKGRD PPM	14
CO SAMPLE METER READING/SCALE	51.2/13
CO SAMPLE PPM	49
CO BACKGRD METER READING/SCALE	2.7/13
CO BACKGRD PPM	3
CO2 SAMPLE METER READING/SCALE	48.5/ 2
CO2 SAMPLE PERCENT	2.20
CO2 BACKGRD METER READING/SCALE	2.2/ 2
CO2 BACKGRD PERCENT	.08
NOX SAMPLE METER READING/SCALE	75.9/ 2
NOX SAMPLE PPM	75.9
NOX BACKGRD METER READING/SCALE	2.1/ 2
NOX BACKGRD PPM	2.1
HC CONCENTRATION PPM	4
CO CONCENTRATION PPM	44
CO2 CONCENTRATION PCT	2.13
NOX CONCENTRATION PPM	74.1
SO2 CONCENTRATION PPM	0.0
HC MASS (GRAMS)	.30
CO MASS (GRAMS)	5.94
CO2 MASS (GRAMS)	4506.72
NOX MASS (GRAMS)	13.43
SO2 MASS (GRAMS)	0.00

HC GRAMS/KM (GRAMS/MILE)	.02	(.03)
CO GRAMS/KM (GRAMS/MILE)	.36	(.58)
CO2 GRAMS/KM (GRAMS/MILE)	273	(440)
NOX GRAMS/KM (GRAMS/MILE)	.81	(1.31)
SO2 GRAMS/KM (GRAMS/MILE)	0.00	(0.00)

HC GRAMS/KG OF FUEL	.21	HC GRAMS/MIN	.02
CO GRAMS/KG OF FUEL	4.2	CO GRAMS/MIN	.5
CO2 GRAMS/KG OF FUEL	3162	CO2 GRAMS/MIN	353
NOX GRAMS/KG OF FUEL	9.42	NOX GRAMS/MIN	1.05
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY L/100KM (MILES/GALLON) 11.69 (20.12)

TABLE VEHICLE EMISSION RESULTS
1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. EMR TEST NO. 1 DATE 2/ 6/78 MFGR. CODE -0 YR. 1977
VEHICLE MODEL FURY PLYMOUTH ENGINE 5.90 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 747.52 MM OF HG. WET BULB TEMP 12.2 DEG. C
DRY BULB TEMP. 25.0 DEG. C ABS. HUMIDITY 3.6 GRAMS/KG
REL. HUMIDITY 18 PCT.

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 749.3 MM. H2O BLOWER INLET PRESS., G1 749.3 MM. H2O
BLOWER INLET TEMP. 44 DEG. C

BAG RESULTS

BAG NO.		1	2	3
BLOWER REVOLUTIONS		40531	69560	40632
HC	SAMPLE METER READING/SCALE	11.1/3	15.4/2	19.1/2
HC	SAMPLE PPM	111	15	19
HC	BACKGRD METER READING/SCALE	1.5/3	13.3/2	13.1/2
HC	BACKGRD PPM	15	13	13
CO	SAMPLE METER READING/SCALE	88.1/*	38.3/*	86.3/*
CO	SAMPLE PPM	429	36	86
CO	BACKGRD METER READING/SCALE	1.2/*	2.6/*	2.4/*
CO	BACKGRD PPM	4	3	2
CO2	SAMPLE METER READING/SCALE	95.6/3	64.2/3	84.4/3
CO2	SAMPLE PERCENT	1.80	1.15	1.56
CO2	BACKGRD METER READING/SCALE	4.3/3	4.1/3	3.4/3
CO2	BACKGRD PERCENT	.07	.06	.05
NOX	SAMPLE METER READING/SCALE	40.2/2	15.3/2	39.4/2
NOX	SAMPLE PPM	40.2	15.3	39.4
NOX	BACKGRD METER READING/SCALE	.8/2	.7/2	.8/2
NOX	BACKGRD PPM	.8	.7	.8
SO2	SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	SAMPLE PPM	-0.0	-0.0	-0.0
SO2	BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	BACKGRD PPM	-0.0	-0.0	-0.0
HC	CONCENTRATION PPM	98	3	8
CO	CONCENTRATION PPM	409	33	81
CO2	CONCENTRATION PCT	1.74	1.09	1.52
NOX	CONCENTRATION PPM	39.5	14.7	38.7
SO2	CONCENTRATION PPM	0.0	0.0	0.0
HC	MASS GRAMS	4.30	.24	.33
CO	MASS GRAMS	36.18	5.00	7.22
CO2	MASS GRAMS	2431.56	2614.24	2124.09
NOX	MASS GRAMS	4.65	2.96	4.57
SO2	MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .19 GRAMS/KILOMETRE
WEIGHTED MASS CO 2.04 GRAMS/KILOMETRE
WEIGHTED MASS CO2 403.61 GRAMS/KILOMETRE
WEIGHTED MASS NOX .63 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

FUEL ECONOMY BY CARBON BALANCE = 5.8 KILOMETRE/LITRE

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM8

DATE 2/ 6/78	TIME -0 HRS.	TEST NO. 2
MODEL 1977 FURY PLYMOUTH	SET-7	ENGINE 5.9 LITREV 8
DRIVER BP	TEST WT. 2041 KG.	GVW 0 KG
WET BULB TEMP 14 C	DRY BULB TEMP 24 C	REL. HUM. 25.8 PCT
SPEC. HUM.' 5.0 GRAM/KG	BARO. 746.5 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION 23.27 MINUTES
BLOWER INLET PRESS. 736.6 MM. H2O
BLOWER DIF. PRESS. 736.6 MM H2O
BLOWER INLET TEMP. 44 DEG. C
DYNO REVOLUTIONS 32272
BLOWER REVOLUTIONS 112230
BLOWER CU. CM /REV. 2232

BAG RESULTS

HC SAMPLE METER READING/SCALE	14.6/2
HC SAMPLE PPM	15
HC BACKGRD METER READING/SCALE	11.4/2
HC BACKGRD PPM	11
CO SAMPLE METER READING/SCALE	66.3/*
CO SAMPLE PPM	64
CO BACKGRD METER READING/SCALE	3.6/*
CO BACKGRD PPM	4
CO2 SAMPLE METER READING/SCALE	42.5/2
CO2 SAMPLE PERCENT	1.87
CO2 BACKGRD METER READING/SCALE	1.5/2
CO2 BACKGRD PERCENT	.05
NOX SAMPLE METER READING/SCALE	52.9/2
NOX SAMPLE PPM	52.9
NOX BACKGRD METER READING/SCALE	.6/2
NOX BACKGRD PPM	.6
HC CONCENTRATION PPM	5
CO CONCENTRATION PPM	59
CO2 CONCENTRATION PCT	1.82
NOX CONCENTRATION PPM	52.4
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	.58
CO MASS (GRAMS)	14.35
CO2 MASS (GRAMS)	7066.35
NOX MASS (GRAMS)	17.75
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.03
CO GRAMS/KILOMETRE	.65
CO2 GRAMS/KILOMETRE	318
NOX GRAMS/KILOMETRE	.80
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.26	HC GRAMS/MIN	.03
CO GRAMS/KG OF FUEL	6.4	CO GRAMS/MIN	.6
CO2 GRAMS/KG OF FUEL	3158	CO2 GRAMS/MIN	304
NOX GRAMS/KG OF FUEL	7.93	NOX GRAMS/MIN	.76
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 13.62 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM8

DATE 2/ 6/78 TIME -0 HRS. TEST NO. 2
MODEL 1977 FURY PLYMOUTH SET-7 ENGINE 5.9 LITREO
RUN DURATION 23.27 MIN. DISTANCE DRIVEN 22.25 KILOMETRES
CVS BLOWER TEST VOL. 250.51 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2887	
SAMPLE VOL. CU. FT.	15.81	1.00
SAMPLE TEMP. DEG. F	81	70
SAMPLE AREA SQ. IN.	35617.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	5.00	1.00
STAND. AREA SQ. IN.	143478.00	1.00
SO4,MICROG/FILTER	12.412	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	7.918
NET H2SO4,MILLIGRAM/TEST	8.084
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	.356
NET H2SO4,MILLIGRAM/KILOMETRE	.363
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2237 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.69	0.000	.0026	.0026
PCT. RECOVERY		0.00	.38	.38

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM8

DATE 2/ 6/78	TIME -0 HRS.	TEST NO. 3
MODEL 1977 FURY PLYMOUTH	FET	ENGINE 5.9 LITREV 8
DRIVER BP	TEST WT. 2041 KG.	GVW 0 KG
WET BULB TEMP 15 C	DRY BULB TEMP 26 C	REL. HUM. 28.4 PCT
SPEC. HUM. 6.1 GRAM/KG	BARO. 746.5 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION	12.76 MINUTES
BLOWER INLET PRESS.	736.6 MM. H2O
BLOWER DIF. PRESS.	736.6 MM H2O
BLOWER INLET TEMP.	42 DEG. C
DYNO REVOLUTIONS	24159
BLOWER REVOLUTIONS	61539
BLOWER CU. CM /REV.	2227

BAG RESULTS

HC SAMPLE METER READING/SCALE	14.7/2
HC SAMPLE PPM	15
HC BACKGRD METER READING/SCALE	11.9/2
HC BACKGRD PPM	12
CO SAMPLE METER READING/SCALE	51.0/*
CO SAMPLE PPM	49
CO BACKGRD METER READING/SCALE	1.8/*
CO BACKGRD PPM	2
CO2 SAMPLE METER READING/SCALE	49.0/2
CO2 SAMPLE PERCENT	2.23
CO2 BACKGRD METER READING/SCALE	1.9/2
CO2 BACKGRD PERCENT	.07
NOX SAMPLE METER READING/SCALE	76.0/2
NOX SAMPLE PPM	76.0
NOX BACKGRD METER READING/SCALE	1.0/2
NOX BACKGRD PPM	1.0
HC CONCENTRATION PPM	5
CO CONCENTRATION PPM	45
CO2 CONCENTRATION PCT	2.17
NOX CONCENTRATION PPM	75.2
SO2 CONCENTRATION PPM	0.0
HC MASS (GRAMS)	.32
CO MASS (GRAMS)	6.02
CO2 MASS (GRAMS)	4619.29
NOX MASS (GRAMS)	14.44
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.02
CO GRAMS/KILOMETRE	.36
CO2 GRAMS/KILOMETRE	277
NOX GRAMS/KILOMETRE	.87
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.22	HC GRAMS/MIN	.03
CO GRAMS/KG OF FUEL	4.1	CO GRAMS/MIN	.5
CO2 GRAMS/KG OF FUEL	3162	CO2 GRAMS/MIN	362
NOX GRAMS/KG OF FUEL	9.89	NOX GRAMS/MIN	1.13
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 11.88 LITRES PER HUNDRED KILOMETERS

TABLE VEHICLE EMISSION RESULTS
1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. 8 TEST NO. 1 DATE 2/27/78 MFGR. CODE -0 YR. 1977
VEHICLE MODEL PLYMOUTH FURY ENGINE 5.90 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 737.11 MM OF HG.
DRY BULB TEMP. 25.0 DEG. C
REL. HUMIDITY 46 PCT.

WET BULB TEMP 17.2 DEG. C
ABS. HUMIDITY 9.3 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 736.6 MM. H20
BLOWER INLET PRESS., G1 736.6 MM. H20
BLOWER INLET TEMP. 42 DEG. C

BAG RESULTS

BAG NO.		1	2	3
BLOWER REVOLUTIONS		40628	69598	40618
HC	SAMPLE METER READING/SCALE	11.8/3	13.9/2	19.5/2
HC	SAMPLE PPM	118	14	19
HC	BACKGRD METER READING/SCALE	1.2/3	10.6/2	10.2/2
HC	BACKGRD PPM	12	11	10
CO	SAMPLE METER READING/SCALE	97.1/*	57.6/*	61.1/*
CO	SAMPLE PPM	510	55	137
CO	BACKGRD METER READING/SCALE	1.1/*	4.0/*	.9/*
CO	BACKGRD PPM	3	4	2
CO2	SAMPLE METER READING/SCALE	42.6/2	68.8/3	89.0/3
CO2	SAMPLE PERCENT	1.88	1.24	1.66
CO2	BACKGRD METER READING/SCALE	1.8/2	4.2/3	3.8/3
CO2	BACKGRD PERCENT	.07	.06	.06
NOX	SAMPLE METER READING/SCALE	49.4/2	18.2/2	51.0/2
NOX	SAMPLE PPM	49.4	18.2	51.0
NOX	BACKGRD METER READING/SCALE	.9/2	.9/2	.7/2
NOX	BACKGRD PPM	.9	.9	.7
SO2	SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	SAMPLE PPM	-0.0	-0.0	-0.0
SO2	BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2	BACKGRD PPM	-0.0	-0.0	-0.0
HC	CONCENTRATION PPM	108	4	11
CO	CONCENTRATION PPM	481	50	129
CO2	CONCENTRATION PCT	1.82	1.18	1.61
NOX	CONCENTRATION PPM	48.6	17.4	50.4
SO2	CONCENTRATION PPM	0.0	0.0	0.0
HC	MASS GRAMS	4.69	.32	.46
CO	MASS GRAMS	42.27	7.47	11.31
CO2	MASS GRAMS	2524.60	2806.02	2226.98
NOX	MASS GRAMS	6.70	4.10	6.94
SO2	MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .22 GRAMS/KILOMETRE
WEIGHTED MASS CO 2.66 GRAMS/KILOMETRE
WEIGHTED MASS CO2 427.68 GRAMS/KILOMETRE
WEIGHTED MASS NOX .91 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

FUEL ECONOMY BY CARBON BALANCE = 5.4 KILOMETRE/LITRE

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM8

DATE 2/27/78	TIME -0 HRS.	TEST NO. 2
MODEL 1977 PLYMOUTH FURY	SET-7	ENGINE 5.9 LITREV 8
DRIVER BP	TEST WT. 2041 KG.	GVW 0 KG
WET BULB TEMP 18 C	DRY BULB TEMP 24 C	REL. HUM. 52.0 PCT
SPEC. HUM. 10.2 GRAM/KG	BARO. 738.4 MM HG.	MEASURED FUEL 0.00 KG
DISTANCE 21.865 KM	FUEL 738.2 G/LITRE	FUEL HC RATIO 1.850

RUN DURATION 23.67 MINUTES
BLOWER INLET PRESS. 736.6 MM. H2O
BLOWER DIF. PRESS. 736.6 MM H2O
BLOWER INLET TEMP. 45 DEG. C
DYNO REVOLUTIONS 31776
BLOWER REVOLUTIONS 112669 47760
BLOWER CU. CM /REV. 2235

BAG RESULTS

HC SAMPLE METER READING/SCALE	14.8/ 2
HC SAMPLE PPM	15
HC BACKGRD METER READING/SCALE	10.3/ 2
HC BACKGRD PPM	10
CO SAMPLE METER READING/SCALE	57.6/12
CO SAMPLE PPM	128
CO BACKGRD METER READING/SCALE	.4/12
CO BACKGRD PPM	1
CO2 SAMPLE METER READING/SCALE	42.7/ 2
CO2 SAMPLE PERCENT	1.88
CO2 BACKGRD METER READING/SCALE	1.7/ 2
CO2 BACKGRD PERCENT	.06
NOX SAMPLE METER READING/SCALE	61.8/ 2
NOX SAMPLE PPM	61.8
NOX BACKGRD METER READING/SCALE	.9/ 2
NOX BACKGRD PPM	.9
HC CONCENTRATION PPM	6
CO CONCENTRATION PPM	121
CO2 CONCENTRATION PCT	1.83
NOX CONCENTRATION PPM	61.0
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	.72
CO MASS (GRAMS)	29.39
CO2 MASS (GRAMS)	6995.80
NOX MASS (GRAMS)	23.99
SO2 MASS (GRAMS)	0.00

HC GRAMS/KM (GRAMS/MILE)	.03	(.05)
CO GRAMS/KM (GRAMS/MILE)	1.34	(2.16)
CO2 GRAMS/KM (GRAMS/MILE)	320	(515)
NOX GRAMS/KM (GRAMS/MILE)	1.10	(1.77)
SO2 GRAMS/KM (GRAMS/MILE)	0.00	(0.00)

HC GRAMS/KG OF FUEL	.32	HC GRAMS/MIN	.03
CO GRAMS/KG OF FUEL	13.2	CO GRAMS/MIN	1.2
CO2 GRAMS/KG OF FUEL	3148	CO2 GRAMS/MIN	296
NOX GRAMS/KG OF FUEL	10.79	NOX GRAMS/MIN	1.01
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY L/100KM (MILES/GALLON) 13.75 (17.11)

TOTAL CVS FLOW= 209.1STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM8

DATE 2/27/78 TIME -0 HRS. TEST NO. 2
MODEL 1977 PLYMOUTH FURY SET-7 ENGINE 5.9 LITREO
RUN DURATION 23.67 MIN. DISTANCE DRIVEN 21.74 KILOMETRES
CVS BLOWER TEST VOL. 251.84 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2889	
SAMPLE VOL. CU. FT.	16.42	1.00
SAMPLE TEMP. DEG. F	81	70
SAMPLE AREA SQ. IN.	39416.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	5.00	1.00
STAND. AREA SQ. IN.	155402.00	1.00
SO4, MICROG/FILTER	12.641	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA, BUBBLER 1	0.00	0.00
DIL. FACT., BUBBLER 1	1	1
AREA, BUBBLER 2	0.00	0.00
DIL. FACT., BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA, SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE, MILLIGRAM/TEST	7.826
NET H2SO4, MILLIGRAM/TEST	7.990
NET SO2, GRAM/TEST	0.000
NET SULFATE, MILLIGRAM/KILOMETRE	.360
NET H2SO4, MILLIGRAM/KILOMETRE	.368
NET SO2, GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2292 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR, GRAMS	.69	0.000	.0026	.0026
PCT. RECOVERY		0.00	.38	.38

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM8

DATE 2/27/78	TIME -0 HRS.	TEST NO. 3
MODEL 1977 PLYMOUTH FURY	FET	ENGINE 5.9 LITREV 8
DRIVER RP	TEST WT. 2041 KG.	GVW 0 KG
WET BULB TEMP 18 C	DRY BULB TEMP 25 C	REL. HUM. 52.6 PCT
SPEC. HUM. 10.7 GRAM/KG	BARO. 738.4 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION 12.74 MINUTES
BLOWER INLET PRESS. 736.6 MM. H2O
BLOWER DIF. PRESS. 736.6 MM H2O
BLOWER INLET TEMP. 43 DEG. C
DYNO REVOLUTIONS 23535
BLOWER REVOLUTIONS 61429
BLOWER CU. CM /REV. 2230

BAG RESULTS

HC SAMPLE METER READING/SCALE	14.2/2
HC SAMPLE PPM	14
HC BACKGRD METER READING/SCALE	10.1/2
HC BACKGRD PPM	10
CO SAMPLE METER READING/SCALE	54.4/*
CO SAMPLE PPM	121
CO BACKGRD METER READING/SCALE	.7/*
CO BACKGRD PPM	1
CO2 SAMPLE METER READING/SCALE	50.9/2
CO2 SAMPLE PERCENT	2.33
CO2 BACKGRD METER READING/SCALE	1.6/2
CO2 BACKGRD PERCENT	.06
NOX SAMPLE METER READING/SCALE	85.8/2
NOX SAMPLE PPM	85.8
NOX BACKGRD METER READING/SCALE	1.0/2
NOX BACKGRD PPM	1.0
HC CONCENTRATION PPM	6
CO CONCENTRATION PPM	112
CO2 CONCENTRATION PCT	2.29
NOX CONCENTRATION PPM	85.0
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	.39
CO MASS (GRAMS)	14.89
CO2 MASS (GRAMS)	4792.07
NOX MASS (GRAMS)	18.51
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.02
CO GRAMS/KILOMETRE	.90
CO2 GRAMS/KILOMETRE	291
NOX GRAMS/KILOMETRE	1.12
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.25	HC GRAMS/MIN	.03
CO GRAMS/KG OF FUEL	9.8	CO GRAMS/MIN	1.2
CO2 GRAMS/KG OF FUEL	3153	CO2 GRAMS/MIN	376
NOX GRAMS/KG OF FUEL	12.18	NOX GRAMS/MIN	1.45
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 12.49 LITRES PER HUNDRED KILOMETERS

TABLE

VEHICLE EMISSION RESULTS

1975 LIGHT DUTY EMISSIONS TEST

UNIT NO. EMB TEST NO. 1 DATE 4/ 7/78 MFGR. CODE -0 YR. 1977
VEHICLE MODEL FURY PLY ENGINE 5.90 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 742.95 MM OF HG.
DRY BULB TEMP. 26.1 DEG. C
REL. HUMIDITY 50 PCT.

WET BULB TEMP 18.9 DEG. C
ABS. HUMIDITY 10.8 GRAMS/KG

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 749.3 MM. H2O
BLOWER INLET PRESS., G1 749.3 MM. H2O
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40703	69494	40716
HC SAMPLE METER READING/SCALE	12.6/3	16.3/2	19.8/2
HC SAMPLE PPM	126	16	20
HC BACKGRD METER READING/SCALE	1.6/3	15.2/2	14.4/2
HC BACKGRD PPM	16	15	14
CO SAMPLE METER READING/SCALE	23.8/3	23.8/*	54.4/*
CO SAMPLE PPM	550	23	52
CO BACKGRD METER READING/SCALE	.1/3	3.5/*	2.4/*
CO BACKGRD PPM	2	3	2
CO2 SAMPLE METER READING/SCALE	42.1/2	67.3/3	85.8/3
CO2 SAMPLE PERCENT	1.85	1.21	1.59
CO2 BACKGRD METER READING/SCALE	1.5/2	4.5/3	4.5/3
CO2 BACKGRD PERCENT	.05	.07	.07
NOX SAMPLE METER READING/SCALE	27.6/2	11.8/2	33.1/2
NOX SAMPLE PPM	27.6	11.8	33.1
NOX BACKGRD METER READING/SCALE	.9/2	1.0/2	1.2/2
NOX BACKGRD PPM	.9	1.0	1.2
SO2 SAMPLE METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2 SAMPLE PPM	0.0	0.0	0.0
SO2 BACKGRD METER READING/SCALE	-0.0/*	-0.0/*	-0.0/*
SO2 BACKGRD PPM	0.0	0.0	0.0
HC CONCENTRATION PPM	112	2	7
CO CONCENTRATION PPM	520	19	48
CO2 CONCENTRATION PCT	1.80	1.15	1.53
NOX CONCENTRATION PPM	26.8	10.9	32.0
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	4.92	.19	.31
CO MASS GRAMS	46.02	2.81	4.21
CO2 MASS GRAMS	2520.24	2735.31	2138.30
NOX MASS GRAMS	3.92	2.71	4.68
SO2 MASS GRAMS	0.00	0.00	0.00

WEIGHTED MASS HC .21 GRAMS/KILOMETRE
WEIGHTED MASS CO 2.07 GRAMS/KILOMETRE
WEIGHTED MASS CO2 417.47 GRAMS/KILOMETRE
WEIGHTED MASS NOX .59 GRAMS/KILOMETRE
WEIGHTED MASS SO2 0.00 GRAMS/KILOMETRE

FUEL ECONOMY BY CARBON BALANCE = 5.6 KILOMETRE/LITRE

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM8

DATE 4/ 7/78	TIME -0 HRS.	TEST NO. 2
MODEL 1977 FURY PLYMOUTH	SET-7	ENGINE 5.9 LITRE 8
DRIVER BP	TEST WT. 2041 KG.	GVW 0 KG
WET BULB TEMP 20 C	DRY BULB TEMP 28 C	REL. HUM. 48.8 PCT
SPEC. HUM. 11.7 GRAM/KG	BARO. 740.2 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION	23.28 MINUTES
BLOWER INLET PRESS.	736.6 MM. H2O
BLOWER DIF. PRESS.	736.6 MM H2O
BLOWER INLET TEMP.	43 DEG. C
DYNO REVOLUTIONS	31359
BLOWER REVOLUTIONS	112471
BLOWER CU. CM /REV.	2228

BAG RESULTS

HC SAMPLE METER READING/SCALE	14.4/2
HC SAMPLE PPM	14
HC BACKGRD METER READING/SCALE	12.8/2
HC BACKGRD PPM	13
CO SAMPLE METER READING/SCALE	54.5/*
CO SAMPLE PPM	52
CO BACKGRD METER READING/SCALE	.1/*
CO BACKGRD PPM	0
CO2 SAMPLE METER READING/SCALE	96.8/3
CO2 SAMPLE PERCENT	1.82
CO2 BACKGRD METER READING/SCALE	4.1/3
CO2 BACKGRD PERCENT	.06
NOX SAMPLE METER READING/SCALE	29.4/2
NOX SAMPLE PPM	29.4
NOX BACKGRD METER READING/SCALE	1.2/2
NOX BACKGRD PPM	1.2
HC CONCENTRATION PPM	3
CO CONCENTRATION PPM	49
CO2 CONCENTRATION PCT	1.77
NOX CONCENTRATION PPM	28.4
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	.40
CO MASS (GRAMS)	12.06
CO2 MASS (GRAMS)	6807.14
NOX MASS (GRAMS)	11.73
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.02
CO GRAMS/KILOMETRE	.55
CO2 GRAMS/KILOMETRE	313
NOX GRAMS/KILOMETRE	.54
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.19	HC GRAMS/MIN	.02
CO GRAMS/KG OF FUEL	5.6	CO GRAMS/MIN	.5
CO2 GRAMS/KG OF FUEL	3160	CO2 GRAMS/MIN	292
NOX GRAMS/KG OF FUEL	5.45	NOX GRAMS/MIN	.50
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 13.42 LITRES PER HUNDRED KILOMETERS

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM8

DATE 4/ 7/78 TIME -0 HRS. TEST NO. 2
MODEL 1977 FURY PLYMOUTH SET-7 ENGINE 5.9 LITREO
RUN DURATION 23.28 MIN. DISTANCE DRIVEN 21.74 KILOMETRES
CVS BLOWER TEST VOL. 250.61 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2905	
SAMPLE VOL. CU. FT.	17.33	1.00
SAMPLE TEMP. DEG. F	90	70
SAMPLE AREA SQ. IN.	44174.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	5.00	1.00
STAND. AREA SQ. IN.	157162.00	1.00
SO4,MICROG/FILTER	14.054	0.000

SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	8.026
NET H2SO4,MILLIGRAM/TEST	8.194
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	.369
NET H2SO4,MILLIGRAM/KILOMETRE	.377
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE

FUEL WT., 2154 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.67	0.000	.0027	.0027
PCT. RECOVERY		0.00	.40	.40

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM8

DATE 4/ 7/78	TIME -0 HRS.	TEST NO. 3
MODEL 1977 FURY PLYMOUTH	FET	ENGINE 5.9 LITREV 8
DRIVER BP	TEST WT. 2041 KG.	GVW 0 KG
WET BULB TEMP 19 C	DRY BULB TEMP 27 C	REL. HUM. 45.0 PCT
SPEC. HUM. 10.4 GRAM/KG	BARO. 740.2 MM HG.	MEASURED FUEL 0.00 KG

RUN DURATION	12.74 MINUTES
BLOWER INLET PRESS.	736.6 MM. H2O
BLOWER DIF. PRESS.	736.6 MM H2O
BLOWER INLET TEMP.	43 DEG. C
DYNO REVOLUTIONS	23523
BLOWER REVOLUTIONS	61831
BLOWER CU. CM /REV.	2229

BAG RESULTS

HC SAMPLE METER READING/SCALE	15.2/2
HC SAMPLE PPM	15
HC BACKGRD METER READING/SCALE	12.3/2
HC BACKGRD PPM	12
CO SAMPLE METER READING/SCALE	50.0/*
CO SAMPLE PPM	48
CO BACKGRD METER READING/SCALE	2.2/*
CO BACKGRD PPM	2
CO2 SAMPLE METER READING/SCALE	48.0/2
CO2 SAMPLE PERCENT	2.17
CO2 BACKGRD METER READING/SCALE	1.6/2
CO2 BACKGRD PERCENT	.06
NOX SAMPLE METER READING/SCALE	37.9/2
NOX SAMPLE PPM	37.9
NOX BACKGRD METER READING/SCALE	1.3/2
NOX BACKGRD PPM	1.3
HC CONCENTRATION PPM	5
CO CONCENTRATION PPM	43
CO2 CONCENTRATION PCT	2.12
NOX CONCENTRATION PPM	36.8
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	.33
CO MASS (GRAMS)	5.79
CO2 MASS (GRAMS)	4494.81
NOX MASS (GRAMS)	8.03
SO2 MASS (GRAMS)	0.00

HC GRAMS/KILOMETRE	.02
CO GRAMS/KILOMETRE	.35
CO2 GRAMS/KILOMETRE	273
NOX GRAMS/KILOMETRE	.49
SO2 GRAMS/KILOMETRE	0.00

HC GRAMS/KG OF FUEL	.23	HC GRAMS/MIN	.03
CO GRAMS/KG OF FUEL	4.1	CO GRAMS/MIN	.5
CO2 GRAMS/KG OF FUEL	3162	CO2 GRAMS/MIN	353
NOX GRAMS/KG OF FUEL	5.65	NOX GRAMS/MIN	.63
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY = 11.68 LITRES PER HUNDRED KILOMETERS

TABLE

VEHICLE EMISSION RESULTS
1978 LIGHT DUTY EMISSIONS TEST
ACTUAL DISTANCES USED IN CALCULATIONS

UNIT NO. EMS TEST NO. 1 DATE 4/11/78 MFGR. CODE -0 YR. 1977
VEHICLE MODEL FURY PLYMOUTH ENGINE 5.90 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 740.98 MM OF HG.
DRY BULB TEMP. 24.4 DEG. C
REL. HUMIDITY 29 PCT.

WET BULB TEMP 13.9 DEG. C
ABS. HUMIDITY 5.6 GRAMS/KG
COMMENTS 1978 FTP-C

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 762.0 MM. H2O
BLOWER INLET PRESS., G1 762.0 MM. H2O
BLOWER INLET TEMP. 42 DEG. C

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40880	70691	40591
HC SAMPLE METER READING/SCALE	70.7/ 2	11.8/ 2	21.1/ 2
HC SAMPLE PPM	71	12	21
HC BACKGRD METER READING/SCALE	8.6/ 2	7.1/ 2	7.2/ 2
HC BACKGRD PPM	9	7	7
CO SAMPLE METER READING/SCALE	93.2/11	24.3/13	66.5/13
CO SAMPLE PPM	473	23	65
CO BACKGRD METER READING/SCALE	.8/11	1.4/13	5.2/13
CO BACKGRD PPM	2	1	5
CO2 SAMPLE METER READING/SCALE	42.0/ 2	66.9/ 3	88.8/ 3
CO2 SAMPLE PERCENT	1.84	1.20	1.65
CO2 BACKGRD METER READING/SCALE	1.6/ 2	3.5/ 3	4.0/ 3
CO2 BACKGRD PERCENT	.06	.05	.06
NOX SAMPLE METER READING/SCALE	34.6/ 2	15.8/ 2	42.0/ 2
NOX SAMPLE PPM	34.6	15.8	42.0
NOX BACKGRD METER READING/SCALE	.7/ 2	.4/ 2	.4/ 2
NOX BACKGRD PPM	.7	.4	.4
SO2 SAMPLE METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	63	5	15
CO CONCENTRATION PPM	450	21	58
CO2 CONCENTRATION PCT	1.79	1.15	1.60
NOX CONCENTRATION PPM	34.0	15.4	41.6
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	2.78	.41	.64
CO MASS GRAMS	39.86	3.23	5.06
CO2 MASS GRAMS	2499.61	2776.36	2210.77
NOX MASS GRAMS	4.24	3.33	5.15
SO2 MASS GRAMS	0.00	0.00	0.00
HC GRAMS/KM (GRAMS/MILE)	.48 (.78)	.07 (.11)	.11 (.18)
CO GRAMS/KM (GRAMS/MILE)	6.95 (11.18)	.53 (.85)	.88 (1.41)
CO2 GRAMS/KM (GRAMS/MILE)	435.78 (701.17)	451.83 (726.99)	383.99 (617.84)
NOX GRAMS/KM (GRAMS/MILE)	.74 (1.19)	.54 (.87)	.89 (1.44)
FUEL CONSUMPTION BY CB L/100KM (MPG)	19.13 (12.30)	19.93 (12.17)	16.46 (14.29)
CVS FLOW STD. CU. METRES (SCF)	76.1 (2686.1)	131.6 (4646.2)	75.5 (2666.0)
CALCULATED DISTANCE KM(MILES)	5.74 (3.56)	6.14 (3.82)	5.76 (3.58)

WEIGHTED FUEL CONSUMPTION LITRES/100KM (MPG) 18.50 (12.72)
WEIGHTED MASS HC GRAMS/KM (GRAMS/MILE) .17 (.27)
WEIGHTED MASS CO GRAMS/KM (GRAMS/MILE) 1.96 (3.15)
WEIGHTED MASS CO2 GRAMS/KM (GRAMS/MILE) 429.79 (691.54)
WEIGHTED MASS NOX GRAMS/KM (GRAMS/MILE) .68 (1.09)
TOTAL CVS FLOW = 283.2 STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM8

DATE 4/11/78	TIME -0 HRS.	TEST NO. 2
MODEL 1977 FURY PLYMOUTH	SET-7	ENGINE 5.9 LITREV 8
DRIVER BP	TEST WT. 2041 KG.	GVW 0 KG
WET BULB TEMP 16 C	DRY BULB TEMP 26 C	REL. HUM. 33.7 PCT
SPEC. HUM. 7.0 GRAM/KG	BARO. 740.4 MM HG.	MEASURED FUEL 0.00 KG
DISTANCE 21.500 KM	FUEL 738.2 G/LITRE	FUEL HC RATIO 1.860

RUN DURATION	23.29 MINUTES
BLOWER INLET PRESS.	762.0 MM. H2O
BLOWER DIF. PRESS.	762.0 MM H2O
BLOWER INLET TEMP.	43 DEG. C
DYNO REVOLUTIONS	31246
BLOWER REVOLUTIONS	112262
BLOWER CU. CM /REV.	2226

BAG RESULTS

HC SAMPLE METER READING/SCALE	11.7/ 2
HC SAMPLE PPM	12
HC BACKGRD METER READING/SCALE	7.6/ 2
HC BACKGRD PPM	8
CO SAMPLE METER READING/SCALE	62.5/13
CO SAMPLE PPM	60
CO BACKGRD METER READING/SCALE	3.7/13
CO BACKGRD PPM	4
CO2 SAMPLE METER READING/SCALE	41.8/ 2
CO2 SAMPLE PERCENT	1.83
CO2 BACKGRD METER READING/SCALE	1.6/ 2
CO2 BACKGRD PERCENT	.06
NOX SAMPLE METER READING/SCALE	41.5/ 2
NOX SAMPLE PPM	41.5
NOX BACKGRD METER READING/SCALE	1.2/ 2
NOX BACKGRD PPM	1.2
HC CONCENTRATION PPM	5
CO CONCENTRATION PPM	54
CO2 CONCENTRATION PCT	1.78
NOX CONCENTRATION PPM	40.5
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	.62
CO MASS (GRAMS)	13.23
CO2 MASS (GRAMS)	6808.31
NOX MASS (GRAMS)	14.38
SO2 MASS (GRAMS)	0.00

HC GRAMS/KM (GRAMS/MILE)	.03	(.05)
CO GRAMS/KM (GRAMS/MILE)	.62	(.99)
CO2 GRAMS/KM (GRAMS/MILE)	317	(510)
NOX GRAMS/KM (GRAMS/MILE)	.67	(1.08)
SO2 GRAMS/KM (GRAMS/MILE)	0.00	(0.00)

HC GRAMS/KG OF FUEL	.29	HC GRAMS/MIN	.03
CO GRAMS/KG OF FUEL	6.1	CO GRAMS/MIN	.6
CO2 GRAMS/KG OF FUEL	3159	CO2 GRAMS/MIN	292
NOX GRAMS/KG OF FUEL	6.67	NOX GRAMS/MIN	.62
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY L/100KM (MILES/GALLON) 13.56 (17.35)

TOTAL CVS FLOW= 208.6STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM8

DATE 4/11/78 TIME -0 HRS. TEST NO. 2
MODEL 1977 FURY PLYMOUTH SET-7 ENGINE 5.9 LITREO
RUN DURATION 23.29 MIN. DISTANCE DRIVEN 21.74 KILOMETRES
CVS BLOWER TEST VOL. 249.87 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2913	
SAMPLE VOL. CU. FT.	16.42	1.00
SAMPLE TEMP. DEG. F	82	70
SAMPLE AREA SQ. IN.	33190.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	5.00	1.00
STAND. AREA SQ. IN.	161767.00	1.00
SO4,MICROG/FILTER	10.259	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	6.273
NET H2SO4,MILLIGRAM/TEST	6.404
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	.289
NET H2SO4,MILLIGRAM/KILOMETRE	.295
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2164 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.67	0.000	.0021	.0021
PCT. RECOVERY		0.00	.31	.31

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM8

DATE 4/11/78	TIME -0 HRS.	TEST NO. 3
MODEL 1977 FURY PLYMOUTH	FET	ENGINE 5.9 LITREV 8
DRIVER RP	TEST WT. 2041 KG.	GVW 0 KG
WET BULB TEMP 11 C	DRY BULB TEMP 24 C	REL. HUM. 16.2 PCT
SPEC. HUM. 3.0 GRAM/KG	BARO. 740.4 MM HG.	MEASURED FUEL 0.00 KG
DISTANCE 16.245 KM	FUEL 738.2 G/LITRE	FUEL HC RATIO 1.860

RUN DURATION 12.74 MINUTES
BLOWER INLET PRESS. 762.0 MM. H20
BLOWER DIF. PRESS. 762.0 MM H20
BLOWER INLET TEMP. 42 DEG. C
DYNO REVOLUTIONS 23608
BLOWER REVOLUTIONS 61495
BLOWER CU. CM /REV. 2222

BAG RESULTS

HC SAMPLE METER READING/SCALE	11.2/ 2
HC SAMPLE PPM	11
HC BACKGRD METER READING/SCALE	6.8/ 2
HC BACKGRD PPM	7
CO SAMPLE METER READING/SCALE	62.3/13
CO SAMPLE PPM	60
CO BACKGRD METER READING/SCALE	4.9/13
CO BACKGRD PPM	5
CO2 SAMPLE METER READING/SCALE	48.0/ 2
CO2 SAMPLE PERCENT	2.17
CO2 BACKGRD METER READING/SCALE	1.5/ 2
CO2 BACKGRD PERCENT	.05
NOX SAMPLE METER READING/SCALE	52.3/ 2
NOX SAMPLE PPM	52.3
NOX BACKGRD METER READING/SCALE	.4/ 2
NOX BACKGRD PPM	.4
HC CONCENTRATION PPM	6
CO CONCENTRATION PPM	53
CO2 CONCENTRATION PCT	2.12
NOX CONCENTRATION PPM	52.0
SO2 CONCENTRATION PPM	0.0
HC MASS (GRAMS)	.36
CO MASS (GRAMS)	7.11
CO2 MASS (GRAMS)	4450.61
NOX MASS (GRAMS)	9.08
SO2 MASS (GRAMS)	0.00

HC GRAMS/KM (GRAMS/MILE)	.02 (.04)
CO GRAMS/KM (GRAMS/MILE)	.44 (.70)
CO2 GRAMS/KM (GRAMS/MILE)	274 (441)
NOX GRAMS/KM (GRAMS/MILE)	.56 (.90)
SO2 GRAMS/KM (GRAMS/MILE)	0.00 (0.00)

HC GRAMS/KG OF FUEL	.26	HC GRAMS/MIN	.03
CO GRAMS/KG OF FUEL	5.0	CO GRAMS/MIN	.6
CO2 GRAMS/KG OF FUEL	3161	CO2 GRAMS/MIN	349
NOX GRAMS/KG OF FUEL	6.44	NOX GRAMS/MIN	.71
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY L/100KM (MILES/GALLON) 11.73 (20.06)

TABLE

VEHICLE EMISSION RESULTS
1978 LIGHT DUTY EMISSIONS TEST
ACTUAL DISTANCES USED IN CALCULATIONS

UNIT NO. EM8 TEST NO. 1 DATE 5/ 3/78 MFGR. CODE -0 YR. 1977
VEHICLE MODEL PLY FURY ENGINE 5.90 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 734.31 MM OF HG.
DRY BULB TEMP. 22.8 DEG. C
REL. HUMIDITY 36 PCT.

WET BULB TEMP 13.9 DEG. C
ABS. HUMIDITY 6.4 GRAMS/KG
COMMENTS 1978 FTPC

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 736.6 MM. H20
BLOWER INLET PRESS., G1 736.6 MM. H20
BLOWER INLET TEMP. 45 DEG. C

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40663	69520	40543
HC SAMPLE METER READING/SCALE	33.4/ 3	11.8/ 2	38.7/ 2
HC SAMPLE PPM	334	12	39
HC BACKGRD METER READING/SCALE	1.1/ 3	10.0/ 2	9.9/ 2
HC BACKGRD PPM	11	10	10
CO SAMPLE METER READING/SCALE	54.4/ 3	29.0/13	25.0/ 3
CO SAMPLE PPM	1347	27	579
CO BACKGRD METER READING/SCALE	.1/ 3	3.0/13	.1/ 3
CO BACKGRD PPM	2	3	2
CO2 SAMPLE METER READING/SCALE	97.1/ 3	67.4/ 3	87.2/ 3
CO2 SAMPLE PERCENT	1.83	1.21	1.62
CO2 BACKGRD METER READING/SCALE	3.5/ 3	2.7/ 3	2.1/ 3
CO2 BACKGRD PERCENT	.05	.04	.03
NOX SAMPLE METER READING/SCALE	36.5/ 2	23.0/ 2	48.4/ 2
NOX SAMPLE PPM	36.5	23.0	48.4
NOX BACKGRD METER READING/SCALE	.9/ 2	.9/ 2	.9/ 2
NOX BACKGRD PPM	.9	.9	.9
SO2 SAMPLE METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	325	3	30
CO CONCENTRATION PPM	1282	24	552
CO2 CONCENTRATION PCT	1.78	1.17	1.59
NOX CONCENTRATION PPM	35.7	22.2	47.6
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	14.04	.20	1.30
CO MASS GRAMS	111.94	3.56	48.10
CO2 MASS GRAMS	2446.58	2755.62	2178.99
NOX MASS GRAMS	4.49	4.77	5.97
SO2 MASS GRAMS	0.00	0.00	0.00
HC GRAMS/KM (GRAMS/MILE)	2.47 (3.98)	.03 (.05)	.23 (.36)
CO GRAMS/KM (GRAMS/MILE)	19.71 (31.72)	.58 (.93)	8.39 (13.50)
CO2 GRAMS/KM (GRAMS/MILE)	430.87 (693.28)	445.36 (716.59)	380.25 (611.82)
NOX GRAMS/KM (GRAMS/MILE)	.79 (1.27)	.77 (1.24)	1.04 (1.68)
FUEL CONSUMPTION BY CB L/100KM (MPG)	20.05 (11.73)	19.05 (12.35)	16.82 (13.98)
CVS FLOW STD. CU. METRES (SCF)	75.0 (2648.3)	128.2 (4527.4)	74.8 (2640.4)
CALCULATED DISTANCE KM(MILES)	5.68 (3.53)	6.19 (3.85)	5.73 (3.56)

WEIGHTED FUEL CONSUMPTION LITRES/100KM (MPG)	18.65 (12.62)
WEIGHTED MASS HC GRAMS/KM (GRAMS/MILE)	.59 (.95)
WEIGHTED MASS CO GRAMS/KM (GRAMS/MILE)	6.66 (10.71)
WEIGHTED MASS CO2 GRAMS/KM (GRAMS/MILE)	424.53 (683.07)
WEIGHTED MASS NOX GRAMS/KM (GRAMS/MILE)	.85 (1.37)

TOTAL CVS FLOW = 278.0 STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EMR

DATE 5/ 2/78	TIME -0 HRS.	TEST NO. 2
MODEL 1977 PLY FURY	SET 7	ENGINE 5.9 LITREV 8
DRIVER JC	TEST WT. 2041 KG.	GVW 0 KG
WET BULB TEMP 14 C	DRY BULB TEMP 25 C	REL. HUM. 30.1 PCT
SPEC. HUM. 6.1 GRAM/KG	BARO. 733.0 MM HG.	MEASURED FUEL 0.00 KG
DISTANCE 21.630 KM	FUEL 738.2 G/LITRE	FUEL HC RATIO 1.860

RUN DURATION	23.30 MINUTES
BLOWER INLET PRESS.	749.3 MM. H2O
BLOWER DIF. PRESS.	749.3 MM H2O
BLOWER INLET TEMP.	43 DEG. C
DYNO REVOLUTIONS	31434
BLOWER REVOLUTIONS	112292
BLOWER CU. CM /REV.	2228

BAG RESULTS

HC SAMPLE METER READING/SCALE	15.0/ 2
HC SAMPLE PPM	15
HC BACKGRD METER READING/SCALE	12.7/ 2
HC BACKGRD PPM	13
CO SAMPLE METER READING/SCALE	67.0/13
CO SAMPLE PPM	65
CO BACKGRD METER READING/SCALE	4.5/13
CO BACKGRD PPM	4
CO2 SAMPLE METER READING/SCALE	42.6/ 2
CO2 SAMPLE PERCENT	1.88
CO2 BACKGRD METER READING/SCALE	1.9/ 2
CO2 BACKGRD PERCENT	.07
NOX SAMPLE METER READING/SCALE	65.2/ 2
NOX SAMPLE PPM	65.2
NOX BACKGRD METER READING/SCALE	1.7/ 2
NOX BACKGRD PPM	1.7
HC CONCENTRATION PPM	4
CO CONCENTRATION PPM	58
CO2 CONCENTRATION PCT	1.82
NOX CONCENTRATION PPM	63.7
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	.49
CO MASS (GRAMS)	14.03
CO2 MASS (GRAMS)	6866.11
NOX MASS (GRAMS)	21.85
SO2 MASS (GRAMS)	0.00

HC GRAMS/KM (GRAMS/MILE)	.02 (	.04)
CO GRAMS/KM (GRAMS/MILE)	.65 (	1.04)
CO2 GRAMS/KM (GRAMS/MILE)	317 (	511)
NOX GRAMS/KM (GRAMS/MILE)	1.01 (	1.63)
SO2 GRAMS/KM (GRAMS/MILE)	0.00 (	0.00)

HC GRAMS/KG OF FUEL	.22	HC GRAMS/MIN	.02
CO GRAMS/KG OF FUEL	6.5	CO GRAMS/MIN	.6
CO2 GRAMS/KG OF FUEL	3159	CO2 GRAMS/MIN	295
NOX GRAMS/KG OF FUEL	10.05	NOX GRAMS/MIN	.94
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY L/100KM (MILES/GALLON) 13.60 (17.30)

TOTAL CVS FLOW= 206.5STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM8

DATE 5/ 2/78 TIME -0 HRS. TEST NO. 2
MODEL 1977 PLY FURY SET-? ENGINE 5.9 LITREO
RUN DURATION 23.30 MIN. DISTANCE DRIVEN 21.74 KILOMETRES
CVS BLOWER TEST VOL. 250.18 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2929	
SAMPLE VOL. CU. FT.	17.48	1.00
SAMPLE TEMP. DEG. F	78	70
SAMPLE AREA SQ. IN.	44869.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	5.00	1.00
STAND. AREA SQ. IN.	151493.00	1.00
SO4,MICROG/FILTER	14.809	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	8.590
NET H2SO4,MILLIGRAM/TEST	8.770
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	.395
NET H2SO4,MILLIGRAM/KILOMETRE	.403
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2183 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.68	0.000	.0029	.0029
PCT. RECOVERY		0.00	.42	.42

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EMR

DATE 5/ 3/78	TIME -0 HRS.	TEST NO. 3
MODEL 1977 PLY FURY	HFET	ENGINE 5.9 LITREV 8
DRIVER JC	TEST WT. 2041 KG.	GVW 0 KG
WET BULB TEMP 14 C	DRY BULB TEMP 26 C	REL. HUM. 28.0 PCT
SPEC. HUM. 5.9 GRAM/KG	BARO. 732.8 MM HG.	MEASURED FUEL 0.00 KG
DISTANCE 16.354 KM	FUEL 738.2 G/LITRE	FUEL HC RATIO 1.860

RUN DURATION	12.76 MINUTES
BLOWER INLET PRESS.	749.3 MM. H2O
BLOWER DIF. PRESS.	749.3 MM H2O
BLOWER INLET TEMP.	43 DEG. C
DYNO REVOLUTIONS	23767
BLOWER REVOLUTIONS	61427
BLOWER CU. CM /REV.	2226

BAG RESULTS

HC SAMPLE METER READING/SCALE	18.0/ 2
HC SAMPLE PPM	18
HC BACKGRD METER READING/SCALE	12.5/ 2
HC BACKGRD PPM	13
CO SAMPLE METER READING/SCALE	50.1/12
CO SAMPLE PPM	110
CO BACKGRD METER READING/SCALE	2.4/12
CO BACKGRD PPM	4
CO2 SAMPLE METER READING/SCALE	48.9/ 2
CO2 SAMPLE PERCENT	2.22
CO2 BACKGRD METER READING/SCALE	1.5/ 2
CO2 BACKGRD PERCENT	.05
NOX SAMPLE METER READING/SCALE	85.6/ 2
NOX SAMPLE PPM	85.6
NOX BACKGRD METER READING/SCALE	1.3/ 2
NOX BACKGRD PPM	1.3
HC CONCENTRATION PPM	8
CO CONCENTRATION PPM	101
CO2 CONCENTRATION PCT	2.18
NOX CONCENTRATION PPM	84.5
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	.49
CO MASS (GRAMS)	13.32
CO2 MASS (GRAMS)	4498.32
NOX MASS (GRAMS)	15.75
SO2 MASS (GRAMS)	0.00

HC GRAMS/KM (GRAMS/MILE)	.03 (	.05)
CO GRAMS/KM (GRAMS/MILE)	.81 (	1.31)
CO2 GRAMS/KM (GRAMS/MILE)	275 (	443)
NOX GRAMS/KM (GRAMS/MILE)	.96 (	1.55)
SO2 GRAMS/KM (GRAMS/MILE)	0.00 (	0.00)

HC GRAMS/KG OF FUEL	.35	HC GRAMS/MIN	.04
CO GRAMS/KG OF FUEL	9.3	CO GRAMS/MIN	1.0
CO2 GRAMS/KG OF FUEL	3154	CO2 GRAMS/MIN	353
NOX GRAMS/KG OF FUEL	11.04	NOX GRAMS/MIN	1.23
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY L/100KM (MILES/GALLON) 11.80 (19.94)

TOTAL CVS FLOW= 113.0STD. CU. METRES

TABLE

VEHICLE EMISSION RESULTS
1978 LIGHT DUTY EMISSIONS TEST
ACTUAL DISTANCES USED IN CALCULATIONS

UNIT NO. EM8 TEST NO. 1 DATE 5/ 8/78 MFGR. CODE -0 YR. 1977
VEHICLE MODEL PLYMOUTH FURY ENGINE 5.90 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 738.12 MM OF HG.
DRY BULB TEMP. 23.9 DEG. C
REL. HUMIDITY 31 PCT.

WET BULB TEMP 13.9 DEG. C
ABS. HUMIDITY 5.9 GRAMS/KG
COMMENTS 1978 FTPC

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 736.6 MM. H2O
BLOWER INLET PRESS., G1 736.6 MM. H2O
BLOWER INLET TEMP. 93 DEG. C

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40689	69614	40539
HC SAMPLE METER READING/SCALE	95.2/ 2	13.1/ 2	18.2/ 2
HC SAMPLE PPM	95	13	18
HC BACKGRD METER READING/SCALE	10.9/ 2	10.3/ 2	9.9/ 2
HC BACKGRD PPM	11	10	10
CO SAMPLE METER READING/SCALE	26.7/ 3	42.2/13	60.0/12
CO SAMPLE PPM	620	90	134
CO BACKGRD METER READING/SCALE	.1/ 3	.5/13	.9/12
CO BACKGRD PPM	2	0	1
CO2 SAMPLE METER READING/SCALE	42.5/ 2	66.9/ 3	89.6/ 3
CO2 SAMPLE PERCENT	1.87	1.20	1.67
CO2 BACKGRD METER READING/SCALE	1.6/ 2	3.0/ 3	2.4/ 3
CO2 BACKGRD PERCENT	.06	.05	.04
NOX SAMPLE METER READING/SCALE	54.9/ 2	31.0/ 2	51.9/ 2
NOX SAMPLE PPM	54.9	31.0	51.9
NOX BACKGRD METER READING/SCALE	.7/ 2	.7/ 2	.9/ 2
NOX BACKGRD PPM	.7	.7	.9
SO2 SAMPLE METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	86	4	10
CO CONCENTRATION PPM	590	38	128
CO2 CONCENTRATION PCT	1.82	1.16	1.64
NOX CONCENTRATION PPM	54.3	30.4	51.1
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	3.74	.28	.41
CO MASS GRAMS	51.86	5.75	11.18
CO2 MASS GRAMS	2518.11	2742.06	2255.50
NOX MASS GRAMS	6.77	6.48	6.35
SO2 MASS GRAMS	0.00	0.00	0.00
HC GRAMS/KM (GRAMS/MILE)	.65 (1.05)	.04 (.07)	.07 (.11)
CO GRAMS/KM (GRAMS/MILE)	9.01 (14.50)	.92 (1.49)	1.93 (3.10)
CO2 GRAMS/KM (GRAMS/MILE)	437.69 (704.24)	440.72 (709.12)	388.51 (625.12)
NOX GRAMS/KM (GRAMS/MILE)	1.18 (1.89)	1.04 (1.67)	1.09 (1.76)
FUEL CONSUMPTION BY CB L/100KM (MPG)	19.37 (12.14)	18.88 (12.46)	16.72 (14.07)
CVS FLOW STD. CU. METRES (SCF)	75.5 (2666.3)	129.1 (4560.9)	75.2 (2656.0)
CALCULATED DISTANCE KM(MILES)	5.75 (3.58)	6.22 (3.87)	5.81 (3.61)

WEIGHTED FUEL CONSUMPTION LITRES/100KM (MPG)	18.39 (12.79)
WEIGHTED MASS HC GRAMS/KM (GRAMS/MILE)	.18 (.28)
WEIGHTED MASS CO GRAMS/KM (GRAMS/MILE)	2.87 (4.62)
WEIGHTED MASS CO2 GRAMS/KM (GRAMS/MILE)	425.73 (685.00)
WEIGHTED MASS NOX GRAMS/KM (GRAMS/MILE)	1.08 (1.74)

TOTAL CVS FLOW = 279.9 STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM8

DATE 5/ 8/78	TIME -0 HRS.	TEST NO. 1
MODEL 1977 PLY FURY	SET-?	ENGINE 5.9 LITRE 8
DRIVER TJ	TEST WT. 2041 KG.	GVW 0 KG
WET BULB TEMP 16 C	DRY BULB TEMP 28 C	REL. HUM. 28.4 PCT
SPEC. HUM. 6.8 GRAM/KG	BARO. 737.6 MM HG.	MEASURED FUEL 0.00 KG
DISTANCE 21.741 KM	FUEL 738.2 G/LITRE	FUEL HC RATIO 1.860

RUN DURATION	23.28 MINUTES
BLOWER INLET PRESS.	762.0 MM. H2O
BLOWER DIF. PRESS.	762.0 MM H2O
BLOWER INLET TEMP.	43 DEG. C
DYNO REVOLUTIONS	31668
BLOWER REVOLUTIONS	112172
BLOWER CU. CM /REV.	2227

BAG RESULTS

HC SAMPLE METER READING/SCALE	16.0/ 2
HC SAMPLE PPM	16
HC BACKGRD METER READING/SCALE	12.3/ 2
HC BACKGRD PPM	12
CO SAMPLE METER READING/SCALE	53.6/12
CO SAMPLE PPM	119
CO BACKGRD METER READING/SCALE	1.4/12
CO BACKGRD PPM	2
CO2 SAMPLE METER READING/SCALE	43.0/ 2
CO2 SAMPLE PERCENT	1.90
CO2 BACKGRD METER READING/SCALE	1.6/ 2
CO2 BACKGRD PERCENT	.06
NOX SAMPLE METER READING/SCALE	56.6/ 2
NOX SAMPLE PPM	56.6
NOX BACKGRD METER READING/SCALE	1.1/ 2
NOX BACKGRD PPM	1.1
HC CONCENTRATION PPM	5
CO CONCENTRATION PPM	111
CO2 CONCENTRATION PCT	1.85
NOX CONCENTRATION PPM	55.7
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	.65
CO MASS (GRAMS)	26.84
CO2 MASS (GRAMS)	7010.24
NOX MASS (GRAMS)	19.52
SO2 MASS (GRAMS)	0.00

HC GRAMS/KM (GRAMS/MILE)	.03 (.05)
CO GRAMS/KM (GRAMS/MILE)	1.23 (1.98)
CO2 GRAMS/KM (GRAMS/MILE)	322 (518)
NOX GRAMS/KM (GRAMS/MILE)	.90 (1.44)
SO2 GRAMS/KM (GRAMS/MILE)	0.00 (0.00)

HC GRAMS/KG OF FUEL	.29	HC GRAMS/MIN	.03
CO GRAMS/KG OF FUEL	12.1	CO GRAMS/MIN	1.2
CO2 GRAMS/KG OF FUEL	3149	CO2 GRAMS/MIN	301
NOX GRAMS/KG OF FUEL	8.77	NOX GRAMS/MIN	.84
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY L/100KM (MILES/GALLON) 13.82 (17.02)

TOTAL CVS FLOW= 207.3STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM8

DATE 5/ 8/78 TIME -0 HRS. TEST NO. 1
MODEL 1977 PLY FURY SET-7 ENGINE 5.9 LITREO
RUN DURATION 23.28 MIN. DISTANCE DRIVEN 21.74 KILOMETRES
CVS BLOWER TEST VOL. 249.83 ACT. CU. METRES

SULFATE DATA	SAMPLE	BACKGROUND
FILTER NO.	47FH-2932	
SAMPLE VOL. CU. FT.	17.11	1.00
SAMPLE TEMP. DEG. F	88	70
SAMPLE AREA SQ. IN.	50406.00	0.00
DILUTION FACTOR	1	1
STAND. DEN. MICROG/ML	5.00	1.00
STAND. AREA SQ. IN.	164372.00	1.00
SO4,MICROG/FILTER	15.333	0.000
SULFUR DIOXIDE DATA		
SAMPLE VOL. CU. FT.	1.00	1.00
SAMPLE TEMP. DEG. F	70	70
AREA,BUBBLER 1	0.00	0.00
DIL. FACT.,BUBBLER 1	1	1
AREA,BUBBLER 2	0.00	0.00
DIL. FACT.,BUBBLER 2	1	1
STAND. DEN. MICROG/ML	1.00	1.00
STAND. AREA,SQ. IN.	1.00	1.00
SO2, MILLIG/BUBBLER 1	0.000	0.000
SO2, MILLIG/BUBBLER 2	0.000	0.000
SO2, PPM	0.0	0.0

SULFATE AND SO2 EMISSIONS

NET SULFATE,MILLIGRAM/TEST	8.918
NET H2SO4,MILLIGRAM/TEST	9.106
NET SO2,GRAM/TEST	0.000
NET SULFATE,MILLIGRAM/KILOMETRE	.410
NET H2SO4,MILLIGRAM/KILOMETRE	.419
NET SO2,GRAM/KILOMETRE	0.000

SULFUR BALANCE
FUEL WT., 2235 GRAMS SULFUR IN FUEL, .0310 PCT.

	FUEL	SO2	H2SO4	SO2 + H2SO4
SULFUR,GRAMS	.69	0.000	.0030	.0030
PCT. RECOVERY		0.00	.43	.43

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM8

DATE 5/ 8/78	TIME -0 HRS.	TEST NO. 1
MODEL 1977 PLY FURY	FET	ENGINE 5.9 LITRE 8
DRIVER TJ	TEST WT. 2041 KG.	GVW 0 KG
WET BULB TEMP 16 C	DRY BULB TEMP 29 C	REL. HUM. 24.8 PCT
SPEC. HUM. 6.3 GRAM/KG	BARO. 737.6 MM HG.	MEASURED FUEL 0.00 KG
DISTANCE 16.469 KM	FUEL 738.2 G/LITRE	FUEL HC RATIO 1.860

RUN DURATION	12.76 MINUTES
BLOWER INLET PRESS.	762.0 MM. H2O
BLOWER DIF. PRESS.	762.0 MM H2O
BLOWER INLET TEMP.	43 DEG. C
DYNO REVOLUTIONS	23934
BLOWER REVOLUTIONS	61571
BLOWER CU. CM /REV.	2226

BAG RESULTS

HC SAMPLE METER READING/SCALE	16.1/ 2
HC SAMPLE PPM	16
HC BACKGRD METER READING/SCALE	11.8/ 2
HC BACKGRD PPM	12
CO SAMPLE METER READING/SCALE	52.0/12
CO SAMPLE PPM	115
CO BACKGRD METER READING/SCALE	.8/12
CO BACKGRD PPM	1
CO2 SAMPLE METER READING/SCALE	48.2/ 2
CO2 SAMPLE PERCENT	2.18
CO2 BACKGRD METER READING/SCALE	1.3/ 2
CO2 BACKGRD PERCENT	.05
NOX SAMPLE METER READING/SCALE	68.1/ 2
NOX SAMPLE PPM	68.1
NOX BACKGRD METER READING/SCALE	1.0/ 2
NOX BACKGRD PPM	1.0
HC CONCENTRATION PPM	6
CO CONCENTRATION PPM	108
CO2 CONCENTRATION PCT	2.14
NOX CONCENTRATION PPM	67.3
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	.41
CO MASS (GRAMS)	14.32
CO2 MASS (GRAMS)	4464.73
NOX MASS (GRAMS)	12.78
SO2 MASS (GRAMS)	0.00

HC GRAMS/KM (GRAMS/MILE)	.02 (	.04)
CO GRAMS/KM (GRAMS/MILE)	.87 (	1.40)
CO2 GRAMS/KM (GRAMS/MILE)	271 (	436)
NOX GRAMS/KM (GRAMS/MILE)	.78 (	1.25)
SO2 GRAMS/KM (GRAMS/MILE)	0.00 (	0.00)

HC GRAMS/KG OF FUEL	.29	HC GRAMS/MIN	.03
CO GRAMS/KG OF FUEL	10.1	CO GRAMS/MIN	1.1
CO2 GRAMS/KG OF FUEL	3153	CO2 GRAMS/MIN	350
NOX GRAMS/KG OF FUEL	9.03	NOX GRAMS/MIN	1.00
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY L/100KM (MILES/GALLON) 11.63 (20.22)

TOTAL CVS FLOW= 113.9STD. CU. METRES

TABLE

VEHICLE EMISSION RESULTS
1978 LIGHT DUTY EMISSIONS TEST
ACTUAL DISTANCES USED IN CALCULATIONS

UNIT NO. EM8 TEST NO. 1 DATE 5/29/78 MFGR. CODE -0 YR. 1977
VEHICLE MODEL PLYMOUTH FURY ENGINE 5.90 LITRE 8 CURB WT. 0 KG GVM 0 KG

BAROMETER 740.16 MM OF HG.
DRY BULB TEMP. 25.6 DEG. C
REL. HUMIDITY 53 PCT.

WET BULB TEMP 18.9 DEG. C
ABS. HUMIDITY 11.1 GRAMS/KG
COMMENTS 1978 FTPC

EXHAUST EMISSIONS

BLOWER DIF. PRESS., G2, 736.6 MM. H2O
BLOWER INLET PRESS., G1 736.6 MM. H2O
BLOWER INLET TEMP. 43 DEG. C

BAG RESULTS

BAG NO.	1	2	3
BLOWER REVOLUTIONS	40598	69661	40609
HC SAMPLE METER READING/SCALE	9.9/ 3	17.7/ 2	33.6/ 2
HC SAMPLE PPM	99	18	34
HC BACKGRD METER READING/SCALE	1.5/ 3	13.0/ 2	14.6/ 2
HC BACKGRD PPM	15	13	15
CO SAMPLE METER READING/SCALE	42.8/ 3	60.0/12	97.7/12
CO SAMPLE PPM	1028	134	245
CO BACKGRD METER READING/SCALE	.1/ 3	2.4/12	1.9/12
CO BACKGRD PPM	2	4	3
CO2 SAMPLE METER READING/SCALE	93.5/ 3	68.1/ 3	86.2/ 3
CO2 SAMPLE PERCENT	1.75	1.23	1.60
CO2 BACKGRD METER READING/SCALE	3.9/ 3	4.3/ 3	2.7/ 3
CO2 BACKGRD PERCENT	.06	.07	.04
NOX SAMPLE METER READING/SCALE	31.8/ 2	15.7/ 2	48.2/ 2
NOX SAMPLE PPM	31.8	15.7	48.2
NOX BACKGRD METER READING/SCALE	1.0/ 2	.5/ 2	1.2/ 2
NOX BACKGRD PPM	1.0	.5	1.2
SO2 SAMPLE METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 SAMPLE PPM	-0.0	-0.0	-0.0
SO2 BACKGRD METER READING/SCALE	-0.0/-0	-0.0/-0	-0.0/-0
SO2 BACKGRD PPM	-0.0	-0.0	-0.0
HC CONCENTRATION PPM	86	6	21
CO CONCENTRATION PPM	974	125	231
CO2 CONCENTRATION PCT	1.70	1.17	1.56
NOX CONCENTRATION PPM	30.9	15.2	47.1
SO2 CONCENTRATION PPM	0.0	0.0	0.0
HC MASS GRAMS	3.75	.44	.91
CO MASS GRAMS	85.75	18.85	20.33
CO2 MASS GRAMS	2354.49	2769.59	2164.37
NOX MASS GRAMS	4.54	3.84	6.92
SO2 MASS GRAMS	0.00	0.00	0.00
HC GRAMS/KM (GRAMS/MILE)	.65 (1.05)	.07 (.12)	.16 (.25)
CO GRAMS/KM (GRAMS/MILE)	14.87 (23.92)	3.08 (4.95)	3.55 (5.71)
CO2 GRAMS/KM (GRAMS/MILE)	408.27 (656.91)	452.50 (728.07)	377.92 (608.08)
NOX GRAMS/KM (GRAMS/MILE)	.79 (1.27)	.63 (1.01)	1.21 (1.94)
FUEL CONSUMPTION BY CB L/100KM (MPG)	18.51 (12.71)	19.53 (12.05)	16.39 (14.35)
CVS FLOW STD. CU. METRES (SCF)	75.6 (2670.9)	129.8 (4582.5)	75.7 (2671.6)
CALCULATED DISTANCE KM(MILES)	5.77 (3.58)	6.12 (3.80)	5.73 (3.56)

WEIGHTED FUEL CONSUMPTION LITRES/100KM (MPG)	18.45 (12.75)
WEIGHTED MASS HC GRAMS/KM (GRAMS/MILE)	.22 (.35)
WEIGHTED MASS CO GRAMS/KM (GRAMS/MILE)	5.67 (9.12)
WEIGHTED MASS CO2 GRAMS/KM (GRAMS/MILE)	422.73 (680.17)
WEIGHTED MASS NOX GRAMS/KM (GRAMS/MILE)	.82 (1.32)

TOTAL CVS FLOW = 281.1 STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM8

DATE 5/29/78	TIME -0 HRS.	TEST NO. 2
MODEL 1977 PLYMOUTH FURY	SET-7	ENGINE 5.9 LITREV 8
DRIVER TJ	TEST WT. 2041 KG.	GVW 0 KG
WET BULB TEMP 17 C	DRY BULB TEMP 24 C	REL. HUM. 45.0 PCT
SPEC. HUM. 8.8 GRAM/KG	BARO. 740.2 MM HG.	MEASURED FUEL 0.00 KG
DISTANCE 21.652 KM	FUEL 738.2 G/LITRE	FUEL HC RATIO 1.860

RUN DURATION 23.29 MINUTES
BLOWER INLET PRESS. 762.0 MM. H2O
BLOWER DIF. PRESS. 762.0 MM H2O
BLOWER INLET TEMP. 43 DEG. C
DYNO REVOLUTIONS 31466
BLOWER REVOLUTIONS 112256
BLOWER CU. CM /REV. 2226

BAG RESULTS

HC SAMPLE METER READING/SCALE	19.2/ 2
HC SAMPLE PPM	19
HC BACKGRD METER READING/SCALE	14.4/ 2
HC BACKGRD PPM	14
CO SAMPLE METER READING/SCALE	78.4/12
CO SAMPLE PPM	180
CO BACKGRD METER READING/SCALE	2.5/12
CO BACKGRD PPM	4
CO2 SAMPLE METER READING/SCALE	92.3/ 3
CO2 SAMPLE PERCENT	1.73
CO2 BACKGRD METER READING/SCALE	3.6/ 3
CO2 BACKGRD PERCENT	.06
NOX SAMPLE METER READING/SCALE	54.6/ 2
NOX SAMPLE PPM	54.6
NOX BACKGRD METER READING/SCALE	1.6/ 2
NOX BACKGRD PPM	1.6
HC CONCENTRATION PPM	7
CO CONCENTRATION PPM	168
CO2 CONCENTRATION PCT	1.68
NOX CONCENTRATION PPM	53.2
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	.80
CO MASS (GRAMS)	40.75
CO2 MASS (GRAMS)	6402.92
NOX MASS (GRAMS)	19.95
SO2 MASS (GRAMS)	0.00

HC GRAMS/KM (GRAMS/MILE)	.04 (	.06)
CO GRAMS/KM (GRAMS/MILE)	1.88 (	3.03)
CO2 GRAMS/KM (GRAMS/MILE)	296 (	476)
NOX GRAMS/KM (GRAMS/MILE)	.92 (	1.48)
SO2 GRAMS/KM (GRAMS/MILE)	0.00 (	0.00)

HC GRAMS/KG OF FUEL	.39	HC GRAMS/MIN	.03
CO GRAMS/KG OF FUEL	20.0	CO GRAMS/MIN	1.7
CO2 GRAMS/KG OF FUEL	3137	CO2 GRAMS/MIN	275
NOX GRAMS/KG OF FUEL	9.77	NOX GRAMS/MIN	.86
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY L/100KM (MILES/GALLON) 12.75 (18.45)

TOTAL CVS FLOW= 208.5STD. CU. METRES

TABLE EXHAUST EMISSIONS FROM SINGLE BAG SAMPLE
VEHICLE NUMBER EM8

DATE 5/29/78	TIME -0 HRS.	TEST NO. 3
MODEL 1977 PLYMOUTH FURY	H-FET	ENGINE 5.9 LITREV 8
DRIVER TJ	TEST WT. 2041 KG.	GVW 0 KG
WET BULB TEMP 16 C	DRY BULB TEMP 24 C	REL. HUM. 41.7 PCT
SPEC. HUM. 8.1 GRAM/KG	BARO. 740.4 MM HG.	MEASURED FUEL 0.00 KG
DISTANCE 16.340 KM	FUEL 738.2 G/LITRE	FUEL HC RATIO 1.860

RUN DURATION	12.76 MINUTES
BLOWER INLET PRESS.	762.0 MM. H2O
BLOWER DIF. PRESS.	762.0 MM H2O
BLOWER INLET TEMP.	43 DEG. C
DYNO REVOLUTIONS	23747
BLOWER REVOLUTIONS	61501
BLOWER CU. CM /REV.	2226

BAG RESULTS

HC SAMPLE METER READING/SCALE	18.2/ 2
HC SAMPLE PPM	18
HC BACKGRD METER READING/SCALE	12.6/ 2
HC BACKGRD PPM	13
CO SAMPLE METER READING/SCALE	81.5/12
CO SAMPLE PPM	189
CO BACKGRD METER READING/SCALE	1.4/12
CO BACKGRD PPM	2
CO2 SAMPLE METER READING/SCALE	46.8/ 2
CO2 SAMPLE PERCENT	2.10
CO2 BACKGRD METER READING/SCALE	1.6/ 2
CO2 BACKGRD PERCENT	.06
NOX SAMPLE METER READING/SCALE	79.1/ 2
NOX SAMPLE PPM	79.1
NOX BACKGRD METER READING/SCALE	1.1/ 2
NOX BACKGRD PPM	1.1
HC CONCENTRATION PPM	8
CO CONCENTRATION PPM	177
CO2 CONCENTRATION PCT	2.05
NOX CONCENTRATION PPM	78.2
SO2 COCENTRATION PPM	0.0
HC MASS (GRAMS)	.50
CO MASS (GRAMS)	23.52
CO2 MASS (GRAMS)	4296.21
NOX MASS (GRAMS)	15.74
SO2 MASS (GRAMS)	0.00

HC GRAMS/KM (GRAMS/MILE)	.03 (	.05)
CO GRAMS/KM (GRAMS/MILE)	1.44 (	2.32)
CO2 GRAMS/KM (GRAMS/MILE)	263 (	423)
NOX GRAMS/KM (GRAMS/MILE)	.96 (	1.55)
SO2 GRAMS/KM (GRAMS/MILE)	0.00 (	0.00)

HC GRAMS/KG OF FUEL	.37	HC GRAMS/MIN	.04
CO GRAMS/KG OF FUEL	17.2	CO GRAMS/MIN	1.8
CO2 GRAMS/KG OF FUEL	3141	CO2 GRAMS/MIN	337
NOX GRAMS/KG OF FUEL	11.51	NOX GRAMS/MIN	1.23
SO2 GRAMS/KG OF FUEL	0.00	SO2 GRAMS/MIN	0.00

CARBON BALANCE FUEL ECONOMY L/100KM (MILES/GALLON) 11.32 (20.78)

TOTAL CVS FLOW= 114.3STD. CU. METRES

TABLE VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-001

VEHICLE NO. EM8
VEHICLE MODEL 77 FURY
ENGINE 5.9 L(360 CID) V-8
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO.5-2 RUN 1
DATE 6/ 1/78
TIME 09:32
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 2045 KG(4500 LBS)
ACTUAL ROAD LOAD 10.4 KW(14.0 HP)
GASOLINE
ODOMETER 25589

BAROMETER 739.14 MM HG(29.10 IN HG)
DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)

RELATIVE HUMIDITY 56 PCT
ABSOLUTE HUMIDITY 11.4 GM/KG(79.9 GRAINS/LB) NOX HUMIDITY C.F. 1.0234

BAG RESULTS

	1	2	3
BAG NUMBER			
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.9 (111.0)	43.3 (110.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40621	69653	40605
CVS FLOW STD. CU. METRES(SCF)	75.2 (2656.0)	129.1 (4558.1)	75.2 (2657.3)
HC SAMPLE METER/RANGE/PPM	14.0/ 3/ 140	20.3/ 2/ 20	24.8/ 2/ 25
HC BCKGRD METER/RANGE/PPM	1.9/ 3/ 19	18.6/ 2/ 19	16.1/ 2/ 16
CO SAMPLE METER/RANGE/PPM	26.1/ 3/ 606	59.1/12/ 132	73.9/12/ 168
CO BCKGRD METER/RANGE/PPM	.3/ 3/ 7	4.9/12/ 9	.9/12/ 2
CO2 SAMPLE METER/RANGE/PCT	48.6/ 2/ 2.20	83.8/ 3/ 1.55	43.6/ 2/ 1.93
CO2 BCKGRD METER/RANGE/PCT	1.9/ 2/ .07	3.9/ 3/ .06	1.3/ 2/ .05
NOX SAMPLE METER/RANGE/PPM	53.6/ 2/ 54	37.2/ 2/ 37	50.9/ 2/ 51
NOX BCKGRD METER/RANGE/PPM	1.5/ 2/ 2	.6/ 2/ 1	.6/ 2/ 1
DILUTION FACTOR	5.89	8.57	6.88
HC CONCENTRATION PPM	124	4	11
CO CONCENTRATION PPM	564	118	158
CO2 CONCENTRATION PCT	2.15	1.50	1.89
NOX CONCENTRATION PPM	52.4	36.7	50.4
HC MASS GRAMS	5.39	.29	.48
CO MASS GRAMS	49.36	17.72	13.82
CO2 MASS GRAMS	2955.9	3535.1	2603.3
NOX MASS GRAMS	7.71	9.26	7.42
HC GRAMS/KM (GRAMS/MILE)	.94 (1.50)	.05 (.07)	.08 (.14)
CO GRAMS/KM (GRAMS/MILE)	8.57 (13.78)	2.82 (4.54)	2.43 (3.91)
CO2 GRAMS/KM (GRAMS/MILE)	513.0 (825.4)	562.5 (905.1)	458.1 (737.2)
NOX GRAMS/KM (GRAMS/MILE)	1.34 (2.15)	1.47 (2.37)	1.31 (2.10)
FUEL CONSUMPTION BY CB L/100KM(MPG)	22.60 (10.41)	24.20 (9.72)	19.73 (11.92)
CALCULATED DISTANCE KM (MILES)	5.76 (3.58)	6.28 (3.91)	5.68 (3.53)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.24 (.38)
CO GRAMS/KM (GRAMS/MILE)	3.90 (6.27)
CO2 GRAMS/KM (GRAMS/MILE)	524.08 (843.25)
NOX GRAMS/KM (GRAMS/MILE)	1.40 (2.25)
FUEL CONSUMPTION BY CB L/100KM (MPG)	22.66 (10.38)

TABLE VEHICLE EMISSION RESULTS
SET

PROJECT NO. 11-4746-001

VEHICLE NO. EM8
VEHICLE MODEL 77 FURY
ENGINE 5.9 L(360 CID) V-8
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO.5-2 RUN 2
DATE 6/ 1/78
TIME 11:36
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1818 KG(4000 LBS)
ACTUAL ROAD LOAD 10.4 KW(14.0 HP)
GASOLINE
ODOMETER 25604

BAROMETER 739.90 MM HG(29.13 IN HG)
DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)

RELATIVE HUMIDITY 48 PCT
ABSOLUTE HUMIDITY 9.1 GM/KG(63.5 GRAINS/LB)

NOX HUMIDITY C.F. .9485

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	762.0 (30.0)
BLOWER INLET P MM. H2O(IN. H2O)	762.0 (30.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)
BLOWER REVOLUTIONS	112335
CVS FLOW STD. CU. METRES(SCF)	208.4 (7359.7)
HC SAMPLE METER/RANGE/PPM	19.8/ 2/ 20
HC BCKGRD METER/RANGE/PPM	16.3/ 2/ 16
CO SAMPLE METER/RANGE/PPM	78.8/12/ 181
CO BCKGRD METER/RANGE/PPM	.8/12/ 1
CO2 SAMPLE METER/RANGE/PCT	44.8/ 2/ 1.99
CO2 BCKGRD METER/RANGE/PCT	1.6/ 2/ .06
NOX SAMPLE METER/RANGE/PPM	65.7/ 2/ 66
NOX BCKGRD METER/RANGE/PPM	1.4/ 2/ 1
DILUTION FACTOR	6.66
HC CONCENTRATION PPM	6
CO CONCENTRATION PPM	171
CO2 CONCENTRATION PCT	1.95
NOX CONCENTRATION PPM	64.5
HC MASS GRAMS	.71
CO MASS GRAMS	41.38
CO2 MASS GRAMS	7422.5
NOX MASS GRAMS	24.39
HC GRAMS/KM (GRAMS/MILE)	.03 (.05)
CO GRAMS/KM (GRAMS/MILE)	1.87 (3.02)
CO2 GRAMS/KM (GRAMS/MILE)	336.3 (541.1)
NOX GRAMS/KM (GRAMS/MILE)	1.11 (1.78)
FUEL CONSUMPTION BY CB L/100KM(MPG)	14.48 (16.24)
CALCULATED DISTANCE KM (MILES)	22.07 (13.72)

TABLE VEHICLE EMISSION RESULTS
HFET

PROJECT NO. 11-4746-001

VEHICLE NO. EM8
VEHICLE MODEL 77 FURY
ENGINE 5.9 L(360 CID) V-8
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO.5-2 RUN 3
DATE 6/ 1/78
TIME 12:45
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1818 KG(4000 LBS)
ACTUAL ROAD LOAD 10.4 KW(14.0 HP)
GASOLINE
ODOMETER 25628

BAROMETER 739.14 MM HG(29.10 IN HG)
DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)

RELATIVE HUMIDITY 45 PCT
ABSOLUTE HUMIDITY 8.8 GM/KG(61.9 GRAINS/LB)

NOX HUMIDITY C.F. .9419

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	762.0 (30.0)
BLOWER INLET P MM. H2O(IN. H2O)	762.0 (30.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)
BLOWER REVOLUTIONS	61399
CVS FLOW STD. CU. METRES(SCF)	113.8 (4017.9)
HC SAMPLE METER/RANGE/PPM	14.1/ 2/ 14
HC BCKGRD METER/RANGE/PPM	12.5/ 2/ 13
CO SAMPLE METER/RANGE/PPM	70.8/12/ 160
CO BCKGRD METER/RANGE/PPM	2.2/12/ 4
CO2 SAMPLE METER/RANGE/PCT	47.2/ 2/ 2.13
CO2 BCKGRD METER/RANGE/PCT	1.5/ 2/ .05
NOX SAMPLE METER/RANGE/PPM	64.4/ 2/ 64
NOX BCKGRD METER/RANGE/PPM	1.8/ 2/ 2
DILUTION FACTOR	6.26
HC CONCENTRATION PPM	4
CO CONCENTRATION PPM	148
CO2 CONCENTRATION PCT	2.08
NOX CONCENTRATION PPM	62.9
HC MASS GRAMS	.24
CO MASS GRAMS	19.64
CO2 MASS GRAMS	4333.4
NOX MASS GRAMS	12.89
HC GRAMS/KM (GRAMS/MILE)	.01 (.02)
CO GRAMS/KM (GRAMS/MILE)	1.11 (1.79)
CO2 GRAMS/KM (GRAMS/MILE)	245.6 (395.2)
NOX GRAMS/KM (GRAMS/MILE)	.73 (1.18)
FUEL CONSUMPTION BY CB L/100KM(MPG)	10.56 (22.28)
CALCULATED DISTANCE KM (MILES)	17.64 (10.96)

APPENDIX F

COMPUTER PRINTOUTS
FOR
AIR MODULATION SYSTEM OPTIMIZATION AND
DURABILITY TESTS ON A 1978 VOLVO
(Tests in Chronological Order)

TABLE A-4. VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-001

VEHICLE NO. EM-10
VEHICLE MODEL 78 VOLVO EM-10
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION
GVW KG(-0 LBS)

TEST NO. 1 RUN 1
DATE 7/27/78
TIME 12:48
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1364 KG(3000 LBS)
ACTUAL ROAD LOAD 8.4 KW(11.3 HP)
GASOLINE EM-274-F
ODOMETER 78

BAROMETER 748.89 MM HG(29.09 IN HG)
DRY BULB TEMP. 22.2 DEG C(72.0 DEG F)

RELATIVE HUMIDITY 49 PCT
ABSOLUTE HUMIDITY 8.5 GM/KG(59.4 GRAINS/LB) NOX HUMIDITY C.F. .9316

BAG RESULTS

	1	2	3
BAG NUMBER			
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)
BLOWER INLET P MM. H2O(IN. H2O)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	42.8 (109.0)	43.3 (110.0)
BLOWER REVOLUTIONS	41199	70560	40524
CVS FLOW STD. CU. METRES(SCF)	76.5 (2700.4)	131.0 (4628.6)	75.2 (2655.9)
HC SAMPLE METER/RANGE/PPM	76.2/ 2/ 76	20.1/ 2/ 20	30.7/ 2/ 31
HC BCKGRD METER/RANGE/PPM	8.0/ 2/ 8	8.4/ 2/ 8	8.0/ 2/ 8
CO SAMPLE METER/RANGE/PPM	24.0/ 3/ 555	55.0/12/ 122	76.6/12/ 175
CO BCKGRD METER/RANGE/PPM	.1/ 3/ 2	1.3/12/ 2	1.5/12/ 3
CO2 SAMPLE METER/RANGE/PCT	77.2/ 3/ 1.41	52.5/ 3/ .92	68.0/ 3/ 1.22
CO2 BCKGRD METER/RANGE/PCT	3.4/ 3/ .05	4.3/ 3/ .07	3.5/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	2.4/ 2/ 2	.8/ 2/ 1	1.1/ 2/ 1
NOX BCKGRD METER/RANGE/PPM	.6/ 2/ 1	.6/ 2/ 1	.7/ 2/ 1
DILUTION FACTOR	9.10	14.42	10.78
HC CONCENTRATION PPM	69	12	23
CO CONCENTRATION PPM	529	116	166
CO2 CONCENTRATION PCT	1.37	.85	1.17
NOX CONCENTRATION PPM	1.9	.2	.5
HC MASS GRAMS	3.05	.93	1.02
CO MASS GRAMS	47.12	17.69	14.55
CO2 MASS GRAMS	1911.8	2049.6	1617.9
NOX MASS GRAMS	.25	.06	.06
HC GRAMS/KM (GRAMS/MILE)	.54 (.86)	.15 (.25)	.18 (.29)
CO GRAMS/KM (GRAMS/MILE)	8.30 (13.36)	2.91 (4.69)	2.57 (4.13)
CO2 GRAMS/KM (GRAMS/MILE)	336.8 (541.9)	337.7 (543.4)	285.6 (459.5)
NOX GRAMS/KM (GRAMS/MILE)	.04 (.07)	.01 (.01)	.01 (.02)
FUEL CONSUMPTION BY CB L/100KM(MPG)	15.01 (15.68)	14.63 (16.08)	12.38 (18.99)
CALCULATED DISTANCE KM (MILES)	5.68 (3.53)	6.07 (3.77)	5.67 (3.52)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.24 (.39)
CO GRAMS/KM (GRAMS/MILE)	3.94 (6.34)
CO2 GRAMS/KM (GRAMS/MILE)	323.18 (519.99)
NOX GRAMS/KM (GRAMS/MILE)	.02 (.03)
FUEL CONSUMPTION BY CB L/100KM (MPG)	14.09 (16.70)

TABLE VEHICLE EMISSION RESULTS
SET

PROJECT NO. 11-4746-001

VEHICLE NO.EM-10
VEHICLE MODEL 78 VOLVO EM-10
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION
GVW 0 KG(-0 LBS)

TEST NO. 1 RUN 2
DATE 7/27/78
TIME 14:22
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1364 KG(3000 LBS)
ACTUAL ROAD LOAD 8.4 KW(11.3 HP)
GASOLINE EM-274-F
ODOMETER 113

BAROMETER 738.38 MM HG(29.07 IN HG)
DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)

RELATIVE HUMIDITY 39 PCT
ABSOLUTE HUMIDITY 7.9 GM/KG(55.6 GRAINS/LB)

NOX HUMIDITY C.F. .9166

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	749.3 (29.5)
BLOWER INLET P MM. H2O(IN. H2O)	749.3 (29.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)
BLOWER REVOLUTIONS	112268
CVS FLOW STD. CU. METRES(SCF)	208.2 (7352.3)
HC SAMPLE METER/RANGE/PPM	31.6/ 2/ 32
HC BCKGRD METER/RANGE/PPM	8.0/ 2/ 8
CO SAMPLE METER/RANGE/PPM	95.7/12/ 237
CO BCKGRD METER/RANGE/PPM	1.7/12/ 3
CO2 SAMPLE METER/RANGE/PCT	80.2/ 3/ 1.47
CO2 BCKGRD METER/RANGE/PCT	3.5/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	1.8/ 2/ 2
NOX BCKGRD METER/RANGE/PPM	1.2/ 2/ 1
DILUTION FACTOR	8.93
HC CONCENTRATION PPM	24
CO CONCENTRATION PPM	225
CO2 CONCENTRATION PCT	1.43
NOX CONCENTRATION PPM	.7
HC MASS GRAMS	2.94
CO MASS GRAMS	54.50
CO2 MASS GRAMS	5436.9
NOX MASS GRAMS	.27
HC GRAMS/KM (GRAMS/MILE)	.14 (.22)
CO GRAMS/KM (GRAMS/MILE)	2.56 (4.12)
CO2 GRAMS/KM (GRAMS/MILE)	255.7 (411.4)
NOX GRAMS/KM (GRAMS/MILE)	.01 (.02)
FUEL CONSUMPTION BY CB L/100KM(MPG)	11.10 (21.19)
CALCULATED DISTANCE KM (MILES)	21.27 (13.22)

TABLE VEHICLE EMISSION RESULTS
FET

PROJECT NO. 11-4246-001

VEHICLE NO.EM-30
VEHICLE MODEL 78 VOLVO EM-30
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION
GVW 0 KG(-0 LBS)

TEST NO. 1 RUN 3
DATE 7/27/78
TIME 14:17
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1364 KG(3000 LBS)
ACTUAL ROAD LOAD 8.4 KW(11.3 HP)
GASOLINE EM-274-F
ODOMETER 103

BAROMETER 738.38 MM HG(29.07 IN HG)
DRY BULB TEMP. 25.6 DEG C(78.0 DEG F)

RELATIVE HUMIDITY 40 PCT
ABSOLUTE HUMIDITY 8.4 GM/KG(58.6 GRAINS/LB)

NOX HUMIDITY C.F. .9285

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	749.3 (29.5)
BLOWER INLET P MM. H2O(IN. H2O)	749.3 (29.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)
BLOWER REVOLUTIONS	61581
CVS FLOW STD. CU. METRES(SCF)	114.2 (4032.7)
HC SAMPLE METER/RANGE/PPM	35.8/ 2/ 36
HC BCKGRD METER/RANGE/PPM	8.2/ 2/ 8
CO SAMPLE METER/RANGE/PPM	68.0/11/ 286
CO BCKGRD METER/RANGE/PPM	1.0/11/ 3
CO2 SAMPLE METER/RANGE/PCT	41.2/ 2/ 1.80
CO2 BCKGRD METER/RANGE/PCT	.8/ 2/ .03
NOX SAMPLE METER/RANGE/PPM	1.0/ 2/ 1
NOX BCKGRD METER/RANGE/PPM	.6/ 2/ 1
DILUTION FACTOR	7.31
HC CONCENTRATION PPM	29
CO CONCENTRATION PPM	270
CO2 CONCENTRATION PCT	1.78
NOX CONCENTRATION PPM	.5
HC MASS GRAMS	1.89
CO MASS GRAMS	35.90
CO2 MASS GRAMS	3716.4
NOX MASS GRAMS	.10
HC GRAMS/KM (GRAMS/MILE)	.11 (.18)
CO GRAMS/KM (GRAMS/MILE)	2.12 (3.42)
CO2 GRAMS/KM (GRAMS/MILE)	219.9 (353.9)
NOX GRAMS/KM (GRAMS/MILE)	.01 (.01)
FUEL CONSUMPTION BY CB L/100KM(MPG)	9.54 (24.65)
CALCULATED DISTANCE KM (MILES)	16.90 (10.50)

TABLE A-3. VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-001

VEHICLE NO.EM-10
VEHICLE MODEL 78 VOLVA EM-10
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION
GVW 1 KG(-0 LBS)

TEST NO. 2 RUN 1
DATE 7/28/78
TIME 13:29
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1364 KG(3000 LBS)
ACTUAL ROAD LOAD 8.4 KW(11.3 HP)
GASOLINE EM-274-F
ODOMETER 127

BAROMETER 741.43 MM HG(29.19 IN HG)
DRY BULB TEMP. 21.1 DEG C(70.0 DEG F)

RELATIVE HUMIDITY 64 PCT
ABSOLUTE HUMIDITY 10.2 GM/KG(71.7 GRAINS/LB)

NOX HUMIDITY C.F. .9846

BAG RESULTS

BAG NUMBER	1	2	3
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	43.3 (110.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40598	69541	40506
CVS FLOW STD. CU. METRES(SCF)	75.5 (2666.3)	129.3 (4566.2)	75.3 (2659.9)
HC SAMPLE METER/RANGE/PPM	87.5/ 2/ 88	34.0/ 2/ 34	41.9/ 2/ 42
HC BCKGRD METER/RANGE/PPM	11.0/ 2/ 11	13.0/ 2/ 13	10.5/ 2/ 10
CO SAMPLE METER/RANGE/PPM	28.5/ 3/ 664	87.9/12/ 209	81.1/12/ 188
CO BCKGRD METER/RANGE/PPM	.3/ 3/ 7	3.3/12/ 6	1.4/12/ 2
CO2 SAMPLE METER/RANGE/PCT	79.6/ 3/ 1.46	54.5/ 3/ .95	67.2/ 3/ 1.21
CO2 BCKGRD METER/RANGE/PCT	3.5/ 3/ .05	4.0/ 3/ .06	3.4/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	2.8/ 2/ 3	.8/ 2/ 1	.8/ 2/ 1
NOX BCKGRD METER/RANGE/PPM	.8/ 2/ 1	.8/ 2/ 1	.6/ 2/ 1
DILUTION FACTOR	8.24	13.70	10.90
HC CONCENTRATION PPM	78	22	32
CO CONCENTRATION PPM	626	195	178
CO2 CONCENTRATION PCT	1.41	.90	1.16
NOX CONCENTRATION PPM	2.1	.1	.3
HC MASS GRAMS	3.34	1.64	1.41
CO MASS GRAMS	55.04	29.42	15.57
CO2 MASS GRAMS	1954.7	2125.1	1599.9
NOX MASS GRAMS	.30	.01	.04
HC GRAMS/KM (GRAMS/MILE)	.58 (.94)	.27 (.43)	.24 (.39)
CO GRAMS/KM (GRAMS/MILE)	9.45 (15.20)	4.80 (7.72)	2.68 (4.32)
CO2 GRAMS/KM (GRAMS/MILE)	335.5 (539.9)	346.5 (557.6)	275.7 (443.5)
NOX GRAMS/KM (GRAMS/MILE)	.05 (.08)	.00 (.00)	.01 (.01)
FUEL CONSUMPTION BY CB L/100KM(MPG)	15.03 (15.65)	15.15 (15.53)	11.98 (19.64)
CALCULATED DISTANCE KM (MILES)	5.83 (3.62)	6.13 (3.81)	5.80 (3.61)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.33 (.52)
CO GRAMS/KM (GRAMS/MILE)	5.19 (8.34)
CO2 GRAMS/KM (GRAMS/MILE)	324.59 (522.27)
NOX GRAMS/KM (GRAMS/MILE)	.01 (.02)
FUEL CONSUMPTION BY CB L/100KM (MPG)	14.25 (16.51)

TABLE A-2. VEHICLE EMISSION RESULTS
FTPC

PROJECT NO. 11-4746-001

VEHICLE NO.EM-10
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION M3
GVW 0 KG(-0 LBS)

TEST NO. 3 RUN 1
DATE 8/29/78
TIME 14:27
DYNO NO. 2
CVS NO. 7
BAG CART NO. 1

TEST WEIGHT 1364 KG(3000 LBS)
ACTUAL ROAD LOAD 8.4 KW(11.3 HP)
GASOLINE
ODOMETER 146

BAROMETER 738.12 MM HG(29.06 IN HG)
DRY BULB TEMP. 26.1 DEG C(79.0 DEG F)

RELATIVE HUMIDITY 47 PCT
ABSOLUTE HUMIDITY 10.2 GM/KG(71.5 GRAINS/LB)

NOX HUMIDITY C.F. .9840

BAG RESULTS

BAG NUMBER	1	2	3
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	1600.2 (63.0)	1600.2 (63.0)	1600.2 (63.0)
BLOWER INLET P MM. H2O(IN. H2O)	1447.8 (57.0)	1447.8 (57.0)	1447.8 (57.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	43.3 (110.0)	43.3 (110.0)
BLOWER REVOLUTIONS	10390	17795	10368
CVS FLOW STD. CU. METRES(SCF)	63.7 (2251.4)	109.2 (3855.7)	63.6 (2246.5)
HC SAMPLE METER/RANGE/PPM	88.3/ 2/ 88	21.1/ 2/ 21	23.9/ 2/ 24
HC BCKGRD METER/RANGE/PPM	16.1/ 2/ 16	14.0/ 2/ 14	11.9/ 2/ 12
CO SAMPLE METER/RANGE/PPM	99.7/11/ 536	7.2/13/ 7	37.0/13/ 35
CO BCKGRD METER/RANGE/PPM	2.7/11/ 8	4.7/13/ 5	4.3/13/ 4
CO2 SAMPLE METER/RANGE/PCT	82.6/ 3/ 1.52	54.0/ 3/ .94	73.9/ 3/ 1.34
CO2 BCKGRD METER/RANGE/PCT	3.0/ 3/ .05	3.2/ 3/ .05	3.5/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	11.1/ 2/ 11	4.8/ 2/ 5	6.5/ 2/ 7
NOX BCKGRD METER/RANGE/PPM	.3/ 2/ 0	.3/ 2/ 0	.3/ 2/ 0
DILUTION FACTOR	8.46	14.14	9.93
HC CONCENTRATION PPM	74	8	13
CO CONCENTRATION PPM	505	3	30
CO2 CONCENTRATION PCT	1.48	.90	1.30
NOX CONCENTRATION PPM	10.8	4.5	6.2
HC MASS GRAMS	2.72	.51	.48
CO MASS GRAMS	37.50	.33	2.21
CO2 MASS GRAMS	1731.4	1797.7	1509.2
NOX MASS GRAMS	1.30	.93	.75
HC GRAMS/KM (GRAMS/MILE)	.48 (.76)	.08 (.13)	.08 (.14)
CO GRAMS/KM (GRAMS/MILE)	6.54 (10.52)	.05 (.08)	.39 (.62)
CO2 GRAMS/KM (GRAMS/MILE)	302.0 (485.9)	290.3 (467.0)	263.6 (424.1)
NOX GRAMS/KM (GRAMS/MILE)	.23 (.36)	.15 (.24)	.13 (.21)
FUEL CONSUMPTION BY CB L/100KM(MPG)	13.39 (17.57)	12.40 (18.97)	11.29 (20.84)
CALCULATED DISTANCE KM (MILES)	5.73 (3.56)	6.19 (3.85)	5.73 (3.56)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.16 (.26)
CO GRAMS/KM (GRAMS/MILE)	1.48 (2.39)
CO2 GRAMS/KM (GRAMS/MILE)	285.37 (459.16)
NOX GRAMS/KM (GRAMS/MILE)	.16 (.26)
FUEL CONSUMPTION BY CB L/100KM (MPG)	12.30 (19.12)

TABLE A-1. VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-001

VEHICLE NO.EM-18
VEHICLE MODEL 78 VOLVO -244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION
GVW 0 KG(-0 LBS)

TEST NO. 4 RUN 1
DATE 8/30/78
TIME 14:12
DYNO NO. 2
CVS NO. 7
BAG CART NO. 1

TEST WEIGHT 1364 KG(3000 LBS)
ACTUAL ROAD LOAD 8.4 KW(11.3 HP)
GASOLINE
ODOMETER 157

BAROMETER 740.92 MM HG(29.17 IN HG)
DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)

RELATIVE HUMIDITY 59 PCT
ABSOLUTE HUMIDITY 11.6 GM/KG(81.3 GRAINS/LB)

NOX HUMIDITY C.F. 1.0306

BAG RESULTS

BAG NUMBER	1	2	3
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	1600.2 (63.0)	1600.2 (63.0)	1600.2 (63.0)
BLOWER INLET P MM. H2O(IN. H2O)	1473.2 (58.0)	1473.2 (58.0)	1473.2 (58.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	41.7 (107.0)	43.3 (110.0)	43.3 (110.0)
BLOWER REVOLUTIONS	10389	17760	10383
CVS FLOW STD. CU. METRES(SCF)	64.2 (2266.0)	109.1 (3854.3)	63.8 (2253.2)
HC SAMPLE METER/RANGE/PPM	75.3/ 2/ 75	19.9/ 2/ 20	20.7/ 2/ 21
HC BCKGRD METER/RANGE/PPM	13.5/ 2/ 13	10.5/ 2/ 10	9.1/ 2/ 9
CO SAMPLE METER/RANGE/PPM	98.8/11/ 527	10.7/13/ 10	17.3/13/ 17
CO BCKGRD METER/RANGE/PPM	5.0/11/ 15	9.0/13/ 9	6.2/13/ 6
CO2 SAMPLE METER/RANGE/PCT	80.0/ 3/ 1.47	53.6/ 3/ .94	74.4/ 3/ 1.35
CO2 BCKGRD METER/RANGE/PCT	4.0/ 3/ .06	4.0/ 3/ .06	3.5/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	10.1/ 2/ 10	4.4/ 2/ 4	6.5/ 2/ 7
NOX BCKGRD METER/RANGE/PPM	.5/ 2/ 1	.5/ 2/ 1	.4/ 2/ 0
DILUTION FACTOR	8.77	14.26	9.87
HC CONCENTRATION PPM	63	10	13
CO CONCENTRATION PPM	489	2	10
CO2 CONCENTRATION PCT	1.42	.88	1.31
NOX CONCENTRATION PPM	9.7	3.9	6.1
HC MASS GRAMS	2.34	.64	.46
CO MASS GRAMS	36.51	.25	.78
CO2 MASS GRAMS	1662.9	1758.4	1525.7
NOX MASS GRAMS	1.22	.85	.77
HC GRAMS/KM (GRAMS/MILE)	.41 (.66)	.10 (.17)	.08 (.13)
CO GRAMS/KM (GRAMS/MILE)	6.42 (10.32)	.04 (.07)	.14 (.22)
CO2 GRAMS/KM (GRAMS/MILE)	292.2 (470.2)	285.1 (458.8)	268.6 (432.2)
NOX GRAMS/KM (GRAMS/MILE)	.21 (.35)	.14 (.22)	.14 (.22)
FUEL CONSUMPTION BY CB L/100KM(MPG)	12.96 (18.15)	12.19 (19.30)	11.48 (20.48)
CALCULATED DISTANCE KM (MILES)	5.69 (3.54)	6.17 (3.83)	5.68 (3.53)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.16 (.26)
CO GRAMS/KM (GRAMS/MILE)	1.38 (2.22)
CO2 GRAMS/KM (GRAMS/MILE)	282.08 (453.86)
NOX GRAMS/KM (GRAMS/MILE)	.15 (.25)
FUEL CONSUMPTION BY CB L/100KM (MPG)	12.15 (19.35)

ERROR [IH4041 1083078 9:15 COLD TRANSIENT CT 404V-8 SFMARL 01] END OF RECORD

*LINE NO.11 *ERROR DATA INPUT* ILLEGAL DATA IN FIELD* FORMAT NO.1001
ERROR NUMBER 0078 DETECTED BY KRAKER AT ADDRESS 025256

TABLE VEHICLE EMISSION RESULTS
FTP SET

PROJECT NO. 11-4746-001

VEHICLE NO. EM10
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 5 RUN 1
DATE 9/19/78
TIME 09:38
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1364 KG(3000 LBS)
ACTUAL ROAD LOAD 8.4 KW(11.3 HP)
GASOLINE EM-274-F
ODOMETER 2648

BAROMETER 742.44 MM HG(29.23 IN HG)
DRY BULB TEMP. 22.8 DEG C(73.0 DEG F)

RELATIVE HUMIDITY 61 PCT
ABSOLUTE HUMIDITY 10.9 GM/KG(76.1 GRAINS/LB) NOX HUMIDITY C.F. 1.0054

BAG RESULTS

	1	2	3	4
BAG NUMBER				
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT	SET-7
BLOWER DTF P MM. H20(IN. H20)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H20(IN. H20)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	43.3 (110.0)	43.3 (110.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40670	69822	40575	111927
CVS FLOW STD. CU. METRES(SCF)	75.7 (2675.1)	130.0 (4592.0)	75.6 (2668.7)	208.4 (7359.2)
HC SAMPLE METER/RANGE/PPM	65.5/ 2/ 65	17.5/ 2/ 18	16.3/ 2/ 16	16.7/ 2/ 17
HC BCKGRD METER/RANGE/PPM	18.8/ 2/ 19	15.9/ 2/ 16	12.9/ 2/ 13	11.5/ 2/ 11
CO SAMPLE METER/RANGE/PPM	24.3/ 3/ 562	4.9/13/ 5	6.7/13/ 7	8.7/13/ 8
CO BCKGRD METER/RANGE/PPM	.5/ 3/ 11	2.5/13/ 2	2.0/13/ 2	2.6/13/ 3
CO2 SAMPLE METER/RANGE/PCT	71.0/ 3/ 1.28	48.2/ 3/ .83	61.7/ 3/ 1.10	74.6/ 3/ 1.36
CO2 BCKGRD METER/RANGE/PCT	3.5/ 3/ .05	4.2/ 3/ .06	4.2/ 3/ .06	3.3/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	7.8/ 2/ 8	1.7/ 2/ 2	5.1/ 2/ 5	7.5/ 2/ 8
NOX BCKGRD METER/RANGE/PPM	.8/ 2/ 1	.1/ 2/ 0	.7/ 2/ 1	.6/ 2/ 1
DILUTION FACTOR	9.96	16.05	12.19	9.85
HC CONCENTRATION PPM	49	3	4	6
CO CONCENTRATION PPM	527	2	4	6
CO2 CONCENTRATION PCT	1.24	.77	1.04	1.31
NOX CONCENTRATION PPM	7.1	1.6	4.5	7.0
HC MASS GRAMS	2.12	.19	.19	.77
CO MASS GRAMS	46.52	.36	.39	1.40
CO2 MASS GRAMS	1714.8	1838.2	1435.8	5009.5
NOX MASS GRAMS	1.03	.40	.65	2.79
HC GRAMS/KM (GRAMS/MILE)	.37 (.60)	.03 (.05)	.03 (.05)	.04 (.06)
CO GRAMS/KM (GRAMS/MILE)	8.13 (13.08)	.06 (.09)	.07 (.11)	.07 (.11)
CO2 GRAMS/KM (GRAMS/MILE)	299.6 (482.1)	300.7 (483.9)	251.3 (404.3)	233.5 (375.7)
NOX GRAMS/KM (GRAMS/MILE)	.18 (.29)	.07 (.11)	.11 (.18)	.13 (.21)
FUEL CONSUMPTION BY CB L/100KM(MPG)	13.38 (17.58)	12.84 (18.32)	10.73 (21.92)	9.98 (23.58)
CALCULATED DISTANCE KM (MILES)	5.72 (3.56)	6.11 (3.80)	5.71 (3.55)	21.45 (13.33)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.10 (.17)
CO GRAMS/KM (GRAMS/MILE)	1.74 (2.80)
CO2 GRAMS/KM (GRAMS/MILE)	286.88 (461.59)
NOX GRAMS/KM (GRAMS/MILE)	.10 (.17)
FUEL CONSUMPTION BY CB L/100KM (MPG)	12.37 (19.01)

COMBINED FUEL ECONOMY L/100KM (MPG) 11.30 (20.83)

TABLE VEHICLE EMISSION RESULTS
HFET

PROJECT NO. 11-4746-001

VEHICLE NO. EM10
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 5 RUN 3
DATE 9/19/78
TIME
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1364 KG(3000 LBS)
ACTUAL ROAD LOAD 8.4 KW(11.3 HP)
GASOLINE EM-274-F
ODOMETER -0

BAROMETER 741.68 MM HG(29.20 IN HG)
DRY BULB TEMP. 23.3 DEG C(74.0 DEG F)

RELATIVE HUMIDITY 51 PCT
ABSOLUTE HUMIDITY 9.3 GM/KG(64.9 GRAINS/LB)

NOX HUMIDITY C.F. .9548

BAG RESULTS	
BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	762.0 (30.0)
BLOWER INLET P MM. H2O(IN. H2O)	762.0 (30.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)
BLOWER REVOLUTIONS	61556
CVS FLOW STD. CU. METRES(SCF)	114.5 (4044.5)
HC SAMPLE METER/RANGE/PPM	18.9/ 2/ 19
HC BCKGRD METER/RANGE/PPM	9.8/ 2/ 10
CO SAMPLE METER/RANGE/PPM	9.2/13/ 9
CO BCKGRD METER/RANGE/PPM	3.2/13/ 3
CO2 SAMPLE METER/RANGE/PCT	92.3/ 3/ 1.73
CO2 BCKGRD METER/RANGE/PCT	3.5/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	15.3/ 2/ 15
NOX BCKGRD METER/RANGE/PPM	.9/ 2/ 1
DILUTION FACTOR	7.75
HC CONCENTRATION PPM	10
CO CONCENTRATION PPM	6
CO2 CONCENTRATION PCT	1.68
NOX CONCENTRATION PPM	14.5
HC MASS GRAMS	.68
CO MASS GRAMS	.77
CO2 MASS GRAMS	3522.6
NOX MASS GRAMS	3.04
HC GRAMS/KM (GRAMS/MILE)	.04 (.07)
CO GRAMS/KM (GRAMS/MILE)	.05 (.08)
CO2 GRAMS/KM (GRAMS/MILE)	214.8 (345.7)
NOX GRAMS/KM (GRAMS/MILE)	.19 (.30)
FUEL CONSUMPTION BY CB L/100KM(MPG)	9.18 (25.63)
CALCULATED DISTANCE KM (MILES)	16.40 (10.19)

TABLE VEHICLE EMISSION RESULTS
FTP SET

PROJECT NO. 11-4746-001

VEHICLE NO. EM10
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) V-8
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 6 RUN 1
DATE 9/20/78
TIME 12:45
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1364 KG(3000 LBS)
ACTUAL ROAD LOAD 8.4 KW(11.3 HP)
GASOLINE EM-274-F
ODOMETER 3076
IN STOCK CONDITION

BAROMETER 740.41 MM HG(29.15 IN HG)
DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)

RELATIVE HUMIDITY 48 PCT
ABSOLUTE HUMIDITY 9.1 GM/KG(63.4 GRAINS/LB)

NOX HUMIDITY C.F. .9483

BAG RESULTS

	1	2	3	4
BAG NUMBER				
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT	SET-7
BLOWER DIF P MM. H2O(IN. H2O)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)
BLOWER INLET P MM. H2O(IN. H2O)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	43.3 (110.0)	43.3 (110.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40605	69643	40649	112352
CVS FLOW STD. CU. METRES(SCF)	75.5 (2667.4)	129.5 (4574.3)	75.6 (2670.4)	209.0 (7380.3)
HC SAMPLE METER/RANGE/PPM	65.9/ 2/ 66	16.8/ 2/ 17	18.6/ 2/ 19	26.0/ 2/ 26
HC BCKGRD METER/RANGE/PPM	10.5/ 2/ 10	8.7/ 2/ 9	7.6/ 2/ 8	8.3/ 2/ 8
CO SAMPLE METER/RANGE/PPM	27.9/ 3/ 650	63.5/12/ 142	53.4/12/ 118	93.4/12/ 228
CO BCKGRD METER/RANGE/PPM	.2/ 3/ 5	4.0/12/ 7	3.2/12/ 6	2.5/12/ 4
CO2 SAMPLE METER/RANGE/PCT	72.0/ 3/ 1.30	46.6/ 3/ .80	63.3/ 3/ 1.13	76.2/ 3/ 1.39
CO2 BCKGRD METER/RANGE/PCT	3.6/ 3/ .06	3.7/ 3/ .06	3.8/ 3/ .06	3.8/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	7.0/ 2/ 7	.8/ 2/ 1	4.0/ 2/ 4	4.4/ 2/ 4
NOX BCKGRD METER/RANGE/PPM	1.1/ 2/ 1	.5/ 2/ 1	.9/ 2/ 1	.5/ 2/ 1
DILUTION FACTOR	9.75	16.39	11.73	9.47
HC CONCENTRATION PPM	56	9	12	19
CO CONCENTRATION PPM	619	131	109	215
CO2 CONCENTRATION PCT	1.26	.75	1.08	1.34
NOX CONCENTRATION PPM	6.0	.3	3.2	4.0
HC MASS GRAMS	2.46	.64	.51	2.24
CO MASS GRAMS	54.47	19.82	9.58	52.24
CO2 MASS GRAMS	1736.4	1775.7	1489.1	5124.1
NOX MASS GRAMS	.82	.08	.44	1.50
HC GRAMS/KM (GRAMS/MILE)	.43 (.69)	.11 (.17)	.09 (.14)	.10 (.17)
CO GRAMS/KM (GRAMS/MILE)	9.52 (15.32)	3.25 (5.23)	1.68 (2.71)	2.43 (3.91)
CO2 GRAMS/KM (GRAMS/MILE)	303.6 (488.4)	291.5 (469.0)	261.5 (420.7)	238.1 (383.1)
NOX GRAMS/KM (GRAMS/MILE)	.14 (.23)	.01 (.02)	.08 (.12)	.07 (.11)
FUEL CONSUMPTION BY CB L/100KM(MPG)	13.65 (17.23)	12.67 (18.56)	11.28 (20.85)	10.34 (22.75)
CALCULATED DISTANCE KM (MILES)	5.72 (3.56)	6.09 (3.79)	5.70 (3.54)	21.52 (13.37)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.17 (.27)
CO GRAMS/KM (GRAMS/MILE)	4.13 (6.64)
CO2 GRAMS/KM (GRAMS/MILE)	285.72 (459.72)
NOX GRAMS/KM (GRAMS/MILE)	.06 (.09)
FUEL CONSUMPTION BY CB L/100KM (MPG)	12.49 (18.83)

COMBINED FUEL ECONOMY L/100KM (MPG) 11.52 (20.41)

TABLE VEHICLE EMISSION RESULTS
HFET

PROJECT NO. 11-4746-001

VEHICLE NO. EM10
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 6 RUN 3
DATE 9/20/78
TIME
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1364 KG(3000 LBS)
ACTUAL ROAD LOAD 8.4 KW(11.3 HP)
GASOLINE EM274-F
ODOMETER -0

BAROMETER 740.41 MM HG(29.15 IN HG)
DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)

RELATIVE HUMIDITY 48 PCT
ABSOLUTE HUMIDITY 9.1 GM/KG(63.4 GRAINS/LB)

NOX HUMIDITY C.F. .9483

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	749.3 (29.5)
BLOWER INLET P MM. H2O(IN. H2O)	749.3 (29.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)
BLOWER REVOLUTIONS	61681
CVS FLOW STD. CU. METRES(SCF)	114.7 (4052.3)
HC SAMPLE METER/RANGE/PPM	33.5/ 2/ 33
HC BCKGRD METER/RANGE/PPM	9.7/ 2/ 10
CO SAMPLE METER/RANGE/PPM	71.3/11/ 307
CO BCKGRD METER/RANGE/PPM	.8/11/ 2
CO2 SAMPLE METER/RANGE/PCT	93.7/ 3/ 1.76
CO2 BCKGRD METER/RANGE/PCT	3.9/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	4.9/ 2/ 5
NOX BCKGRD METER/RANGE/PPM	1.0/ 2/ 1
DILUTION FACTOR	7.49
HC CONCENTRATION PPM	25
CO CONCENTRATION PPM	290
CO2 CONCENTRATION PCT	1.70
NOX CONCENTRATION PPM	4.0
HC MASS GRAMS	1.66
CO MASS GRAMS	38.70
CO2 MASS GRAMS	3580.4
NOX MASS GRAMS	.84
HC GRAMS/KM (GRAMS/MILE)	.10 (.16)
CO GRAMS/KM (GRAMS/MILE)	2.37 (3.82)
CO2 GRAMS/KM (GRAMS/MILE)	219.4 (353.0)
NOX GRAMS/KM (GRAMS/MILE)	.05 (.08)
FUEL CONSUMPTION BY CB L/100KM(MPG)	9.54 (24.67)
CALCULATED DISTANCE KM (MILES)	16.32 (10.14)

TABLE VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-001

VEHICLE NO. EM10
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 7 RUN 1
DATE 9/21/78
TIME 13:25
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1364 KG(3000 LBS)
ACTUAL ROAD LOAD 8.4 KW(11.3 HP)
GASOLINE EM-274-F
ODOMETER 3118
1 MINUTE OF AIR INJECTION INTO MANIFOLD

BAROMETER 742.44 MM HG(29.23 IN HG)
DRY BULB TEMP. 21.1 DEG C(70.0 DEG F)

RELATIVE HUMIDITY 60 PCT
ABSOLUTE HUMIDITY 9.6 GM/KG(66.9 GRAINS/LB)

NOX HUMIDITY C.F. .9633

BAG RESULTS

BAG NUMBER	1	2	3
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H20(IN. H20)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)
BLOWER INLET P MM. H20(IN. H20)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	42.8 (109.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40812	69614	40633
CVS FLOW STD. CU. METRES(SCF)	76.2 (2689.8)	130.0 (4590.9)	75.8 (2677.5)
HC SAMPLE METER/RANGE/PPM	65.8/ 2/ 66	15.8/ 2/ 16	19.2/ 2/ 19
HC BCKGRD METER/RANGE/PPM	10.9/ 2/ 11	9.8/ 2/ 10	10.6/ 2/ 11
CO SAMPLE METER/RANGE/PPM	32.2/ 3/ 756	96.0/13/ 98	51.3/12/ 113
CO BCKGRD METER/RANGE/PPM	.1/ 3/ 2	3.0/13/ 3	1.2/12/ 2
CO2 SAMPLE METER/RANGE/PCT	70.7/ 3/ 1.28	46.4/ 3/ .80	62.0/ 3/ 1.10
CO2 BCKGRD METER/RANGE/PCT	3.2/ 3/ .05	3.9/ 3/ .06	3.9/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	5.1/ 2/ 5	.8/ 2/ 1	4.0/ 2/ 4
NOX BCKGRD METER/RANGE/PPM	.6/ 2/ 1	.7/ 2/ 1	.5/ 2/ 1
DILUTION FACTOR	9.87	16.56	12.01
HC CONCENTRATION PPM	56	7	9
CO CONCENTRATION PPM	721	92	107
CO2 CONCENTRATION PCT	1.23	.74	1.05
NOX CONCENTRATION PPM	4.6	.1	3.5
HC MASS GRAMS	2.46	.49	.41
CO MASS GRAMS	63.90	13.87	9.43
CO2 MASS GRAMS	1721.6	1766.1	1454.9
NOX MASS GRAMS	.64	.03	.49
HC GRAMS/KM (GRAMS/MILE)	.43 (.69)	.08 (.13)	.07 (.12)
CO GRAMS/KM (GRAMS/MILE)	11.12 (17.89)	2.27 (3.66)	1.65 (2.65)
CO2 GRAMS/KM (GRAMS/MILE)	299.6 (482.0)	289.3 (465.5)	254.2 (409.0)
NOX GRAMS/KM (GRAMS/MILE)	.11 (.18)	.01 (.01)	.09 (.14)
FUEL CONSUMPTION BY CB L/100KM(MPG)	13.59 (17.31)	12.51 (18.80)	10.97 (21.45)
CALCULATED DISTANCE KM (MILES)	5.75 (3.57)	6.10 (3.79)	5.72 (3.56)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.15 (.24)
CO GRAMS/KM (GRAMS/MILE)	3.95 (6.35)
CO2 GRAMS/KM (GRAMS/MILE)	281.77 (453.36)
NOX GRAMS/KM (GRAMS/MILE)	.05 (.08)
FUEL CONSUMPTION BY CB L/100KM (MPG)	12.31 (19.11)

TABLE VEHICLE EMISSION RESULTS
CFTP 3 BAG

PROJECT NO. 11-4746-001

VEHICLE NO. 10
VEHICLE MODEL 78 VOLVO 244 DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 8 RUN 1
DATE 9/29/78
TIME
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1364 KG(3000 LBS)
ACTUAL ROAD LOAD 8.4 KW(11.3 HP)
GASOLINE
ODOMETER 3128
IN STOCK CONDITION WITH CO ADJUSTMENT

BAROMETER 742.19 MM HG(29.22 IN HG)
DRY BULB TEMP. 22.8 DEG C(73.0 DEG F)

RELATIVE HUMIDITY 58 PCT
ABSOLUTE HUMIDITY 10.2 GM/KG(71.3 GRAINS/LB)

NOX HUMIDITY C.F. .9829

BAG RESULTS

BAG NUMBER	1	2	3
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	711.2 (28.0)	711.2 (28.0)	711.2 (28.0)
BLOWER INLET P MM. H2O(IN. H2O)	685.8 (27.0)	698.5 (27.5)	698.5 (27.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	44.4 (112.0)	43.3 (110.0)	44.4 (112.0)
BLOWER REVOLUTIONS	40636	69648	40527
CVS FLOW STD. CU. METRES(SCF)	76.3 (2694.0)	130.8 (4619.2)	76.0 (2682.7)
HC SAMPLE METER/RANGE/PPM	52.6/ 2/ 53	10.1/ 2/ 10	11.5/ 2/ 11
HC BCKGRD METER/RANGE/PPM	20.1/ 2/ 20	15.6/ 2/ 16	14.7/ 2/ 15
CO SAMPLE METER/RANGE/PPM	83.9/11/ 395	9.8/13/ 9	10.5/13/ 10
CO BCKGRD METER/RANGE/PPM	3.0/11/ 9	9.5/13/ 9	7.6/13/ 7
CO2 SAMPLE METER/RANGE/PCT	63.4/ 3/ 1.13	43.3/ 3/ .74	58.5/ 3/ 1.03
CO2 BCKGRD METER/RANGE/PCT	3.9/ 3/ .06	4.8/ 3/ .07	4.4/ 3/ .07
NOX SAMPLE METER/RANGE/PPM	22.4/ 2/ 22	7.9/ 2/ 8	18.1/ 2/ 18
NOX BCKGRD METER/RANGE/PPM	1.4/ 2/ 1	1.1/ 2/ 1	1.0/ 2/ 1
DILUTION FACTOR	11.41	18.07	12.94
HC CONCENTRATION PPM	34	-5	-2
CO CONCENTRATION PPM	371	1	3
CO2 CONCENTRATION PCT	1.08	.67	.97
NOX CONCENTRATION PPM	21.1	6.9	17.2
HC MASS GRAMS	1.51	-.35	-.09
CO MASS GRAMS	32.97	.10	.27
CO2 MASS GRAMS	1503.3	1604.0	1350.4
NOX MASS GRAMS	3.03	1.69	2.45
HC GRAMS/KM (GRAMS/MILE)	.27 (.43)	-.06 (-.09)	-.02 (-.03)
CO GRAMS/KM (GRAMS/MILE)	5.81 (9.35)	.02 (.03)	.05 (.08)
CO2 GRAMS/KM (GRAMS/MILE)	264.9 (426.2)	264.6 (425.7)	238.1 (383.2)
NOX GRAMS/KM (GRAMS/MILE)	.53 (.86)	.28 (.45)	.43 (.70)
FUEL CONSUMPTION BY CB L/100KM(MPG)	11.73 (20.05)	11.29 (20.84)	10.17 (23.14)
CALCULATED DISTANCE KM (MILES)	5.67 (3.53)	6.06 (3.77)	5.67 (3.52)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.02 (.03)
CO GRAMS/KM (GRAMS/MILE)	1.23 (1.98)
CO2 GRAMS/KM (GRAMS/MILE)	257.37 (414.11)
NOX GRAMS/KM (GRAMS/MILE)	.37 (.60)
FUEL CONSUMPTION BY CB L/100KM (MPG)	11.07 (21.25)

TABLE VEHICLE EMISSION RESULTS
CFTP

PROJECT NO. 11-4746-001

VEHICLE NO. 10
VEHICLE MODEL 78 VOLVO 244 DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. RUN 1
DATE 10/ 5/78
TIME 8:45
DYNO NO. 2
CVS NO. 7
BAG CART NO. 1

TEST WEIGHT 1364 KG(3000 LBS)
ACTUAL ROAD LOAD 8.4 KW(11.3 HP)
GASOLINE
ODOMETER 2648

BAROMETER 741.43 MM HG(29.19 IN HG)
DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)

RELATIVE HUMIDITY 74 PCT
ABSOLUTE HUMIDITY 14.7 GM/KG(102.8 GRAINS/LB)

NOX HUMIDITY C.F. 1.150

BAG RESULTS

BAG NUMBER	1	2	3
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	1600.2 (63.0)	1625.6 (64.0)	1625.6 (64.0)
BLOWER INLET P MM. H2O(IN. H2O)	1473.2 (58.0)	1498.6 (59.0)	1498.6 (59.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	44.4 (112.0)	43.3 (110.0)
BLOWER REVOLUTIONS	10368	17825	10363
CVS FLOW STD. CU. METRES(SCF)	60.9 (2152.6)	103.9 (3671.3)	60.6 (2141.1)
HC SAMPLE METER/RANGE/PPM	66.6/ 2/ 67	19.0/ 2/ 19	23.8/ 2/ 24
HC BCKGRD METER/RANGE/PPM	22.4/ 2/ 22	18.9/ 2/ 19	23.5/ 2/ 23
CO SAMPLE METER/RANGE/PPM	99.2/11/ 492	12.2/13/ 12	9.8/13/ 9
CO BCKGRD METER/RANGE/PPM	6.0/11/ 19	12.1/13/ 12	8.7/13/ 8
CO2 SAMPLE METER/RANGE/PCT	77.8/ 3/ 1.42	50.9/ 3/ .88	70.4/ 3/ 1.27
CO2 BCKGRD METER/RANGE/PCT	4.9/ 3/ .08	4.7/ 3/ .07	4.5/ 3/ .07
NOX SAMPLE METER/RANGE/PPM	32.9/ 2/ 33	9.9/ 2/ 10	25.2/ 2/ 25
NOX BCKGRD METER/RANGE/PPM	1.7/ 2/ 2	1.5/ 2/ 2	1.3/ 2/ 1
DILUTION FACTOR	9.07	15.10	10.50
HC CONCENTRATION PPM	47	1	3
CO CONCENTRATION PPM	450	1	2
CO2 CONCENTRATION PCT	1.36	.82	1.21
NOX CONCENTRATION PPM	31.4	8.5	24.0
HC MASS GRAMS	1.64	.08	.09
CO MASS GRAMS	31.97	.08	.11
CO2 MASS GRAMS	1514.7	1555.2	1343.0
NOX MASS GRAMS	4.21	1.94	3.20
HC GRAMS/KM (GRAMS/MILE)	.29 (.46)	.01 (.02)	.02 (.02)
CO GRAMS/KM (GRAMS/MILE)	5.56 (8.95)	.01 (.02)	.02 (.03)
CO2 GRAMS/KM (GRAMS/MILE)	263.6 (424.1)	251.0 (403.8)	235.0 (378.1)
NOX GRAMS/KM (GRAMS/MILE)	.73 (1.18)	.31 (.50)	.56 (.90)
FUEL CONSUMPTION BY CB L/100KM(MPG)	11.66 (20.17)	10.71 (21.96)	10.03 (23.44)
CALCULATED DISTANCE KM (MILES)	5.75 (3.57)	6.20 (3.85)	5.71 (3.55)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.07 (.11)
CO GRAMS/KM (GRAMS/MILE)	1.16 (1.87)
CO2 GRAMS/KM (GRAMS/MILE)	249.21 (400.98)
NOX GRAMS/KM (GRAMS/MILE)	.47 (.75)
FUEL CONSUMPTION BY CB L/100KM (MPG)	10.72 (21.94)

TABLE VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-001

VEHICLE NO.EM-10
VEHICLE MODEL 78 VOLVO
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 7 RUN 1
DATE 10/10/78
TIME 13:53
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1364 KG(3000 LBS)
ACTUAL ROAD LOAD 8.4 KW(11.3 HP)
GASOLINE EM-274-F
ODOMETER 2648

BAROMETER 741.17 MM HG(29.18 IN HG)
DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)

RELATIVE HUMIDITY 45 PCT
ABSOLUTE HUMIDITY 8.8 GM/KG(61.6 GRAINS/LB)

NOX HUMIDITY C.F. .9409

BAG RESULTS

BAG NUMBER	1	2	3
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	42.8 (109.0)	40.6 (105.0)	44.4 (112.0)
BLOWER REVOLUTIONS	40675	69612	40650
CVS FLOW STD. CU. METRES(SCF)	76.0 (2682.7)	130.5 (4608.7)	75.7 (2673.1)
HC SAMPLE METER/RANGE/PPM	50.4/ 2/ 50	7.4/ 2/ 7	8.5/ 2/ 9
HC BCKGRD METER/RANGE/PPM	13.9/ 2/ 14	11.6/ 2/ 12	8.8/ 2/ 9
CO SAMPLE METER/RANGE/PPM	92.1/11/ 464	9.0/13/ 9	6.8/13/ 7
CO BCKGRD METER/RANGE/PPM	5.1/11/ 16	8.2/13/ 8	5.1/13/ 5
CO2 SAMPLE METER/RANGE/PCT	69.9/ 3/ 1.26	44.6/ 3/ .76	61.1/ 3/ 1.08
CO2 BCKGRD METER/RANGE/PCT	4.2/ 3/ .06	4.9/ 3/ .08	4.9/ 3/ .08
NOX SAMPLE METER/RANGE/PPM	20.2/ 2/ 20	5.0/ 2/ 5	16.9/ 2/ 17
NOX BCKGRD METER/RANGE/PPM	.6/ 2/ 1	.6/ 2/ 1	.6/ 2/ 1
DILUTION FACTOR	10.22	17.50	12.34
HC CONCENTRATION PPM	38	-4	0
CO CONCENTRATION PPM	432	1	2
CO2 CONCENTRATION PCT	1.20	.69	1.02
NOX CONCENTRATION PPM	19.7	4.4	16.3
HC MASS GRAMS	1.66	-.27	.02
CO MASS GRAMS	38.17	.16	.16
CO2 MASS GRAMS	1674.7	1655.7	1407.6
NOX MASS GRAMS	2.69	1.04	2.23
HC GRAMS/KM (GRAMS/MILE)	.28 (.46)	-.04 (-.07)	.00 (.01)
CO GRAMS/KM (GRAMS/MILE)	6.55 (10.54)	.03 (.04)	.03 (.05)
CO2 GRAMS/KM (GRAMS/MILE)	287.6 (462.7)	268.8 (432.5)	244.3 (393.1)
NOX GRAMS/KM (GRAMS/MILE)	.46 (.74)	.17 (.27)	.39 (.62)
FUEL CONSUMPTION BY CB L/100KM(MPG)	12.75 (18.45)	11.47 (20.51)	10.43 (22.55)
CALCULATED DISTANCE KM (MILES)	5.82 (3.62)	6.16 (3.83)	5.76 (3.58)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.04 (.06)
CO GRAMS/KM (GRAMS/MILE)	1.39 (2.24)
CO2 GRAMS/KM (GRAMS/MILE)	265.99 (427.98)
NOX GRAMS/KM (GRAMS/MILE)	.29 (.47)
FUEL CONSUMPTION BY CB L/100KM (MPG)	11.45 (20.54)

TABLE VEHICLE EMISSION RESULTS
SET

PROJECT NO. 11-4746-001

VEHICLE NO.EM-10
VEHICLE MODEL 78 VOLVO
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION
GVW 0 KG(-0 LBS)

TEST NO. 7 RUN 1
DATE 10/10/78
TIME 14:50
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1364 KG(3000 LBS)
ACTUAL ROAD LOAD 8.4 KW(11.3 HP)
GASOLINE EM-274-F
ODOMETER -0

BAROMETER 741.17 MM HG(29.18 IN HG)
DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)

RELATIVE HUMIDITY 42 PCT
ABSOLUTE HUMIDITY 8.6 GM/KG(60.0 GRAINS/LB)

NOX HUMIDITY C.F. .9340

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	736.6 (29.0)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	42.8 (109.0)
BLOWER REVOLUTIONS	112339
CVS FLOW STD. CU. METRES(SCF)	209.8 (7409.0)
HC SAMPLE METER/RANGE/PPM	9.4/ 2/ 9
HC BCKGRD METER/RANGE/PPM	10.6/ 2/ 11
CO SAMPLE METER/RANGE/PPM	4.8/13/ 5
CO BCKGRD METER/RANGE/PPM	3.8/13/ 4
CO2 SAMPLE METER/RANGE/PCT	72.6/ 3/ 1.32
CO2 BCKGRD METER/RANGE/PCT	5.0/ 3/ .08
NOX SAMPLE METER/RANGE/PPM	10.8/ 2/ 11
NOX BCKGRD METER/RANGE/PPM	1.4/ 2/ 1
DILUTION FACTOR	10.16
HC CONCENTRATION PPM	-0
CO CONCENTRATION PPM	1
CO2 CONCENTRATION PCT	1.25
NOX CONCENTRATION PPM	9.5
HC MASS GRAMS	-.02
CO MASS GRAMS	.29
CO2 MASS GRAMS	4793.7
NOX MASS GRAMS	3.57
HC GRAMS/KM (GRAMS/MILE)	-.00 (-.00)
CO GRAMS/KM (GRAMS/MILE)	.01 (.02)
CO2 GRAMS/KM (GRAMS/MILE)	218.4 (351.5)
NOX GRAMS/KM (GRAMS/MILE)	.16 (.26)
FUEL CONSUMPTION BY CB L/100KM(MPG)	9.32 (25.23)
CALCULATED DISTANCE KM (MILES)	21.95 (13.64)

TABLE VEHICLE EMISSION RESULTS
HFET

PROJECT NO. 11-4746-001

VEHICLE NO.EM-10
VEHICLE MODEL 78 VOLVO
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION
GVW 0 KG(-0 LBS)

TEST NO. 7 RUN 1
DATE 10/10/78
TIME
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1364 KG(3000 LBS)
ACTUAL ROAD LOAD 8.4 KW(11.3 HP)
GASOLINE EM-274-F
ODOMETER -0

BAROMETER 741.17 MM HG(29.18 IN HG)
DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)

RELATIVE HUMIDITY 48 PCT
ABSOLUTE HUMIDITY 9.0 GM/KG(63.3 GRAINS/LB)

NOX HUMIDITY C.F. .9479

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	736.6 (29.0)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	42.8 (109.0)
BLOWER REVOLUTIONS	61689
CVS FLOW STD. CU. METRES(SCF)	115.2 (4068.9)
HC SAMPLE METER/RANGE/PPM	11.5/ 2/ 11
HC BCKGRD METER/RANGE/PPM	10.1/ 2/ 10
CO SAMPLE METER/RANGE/PPM	5.1/13/ 5
CO BCKGRD METER/RANGE/PPM	4.7/13/ 5
CO2 SAMPLE METER/RANGE/PCT	94.1/ 3/ 1.76
CO2 BCKGRD METER/RANGE/PCT	4.6/ 3/ .07
NOX SAMPLE METER/RANGE/PPM	17.0/ 2/ 17
NOX BCKGRD METER/RANGE/PPM	1.2/ 2/ 1
DILUTION FACTOR	7.59
HC CONCENTRATION PPM	3
CO CONCENTRATION PPM	1
CO2 CONCENTRATION PCT	1.70
NOX CONCENTRATION PPM	16.0
HC MASS GRAMS	.18
CO MASS GRAMS	.11
CO2 MASS GRAMS	3592.7
NOX MASS GRAMS	3.33
HC GRAMS/KM (GRAMS/MILE)	.01 (.02)
CO GRAMS/KM (GRAMS/MILE)	.01 (.01)
CO2 GRAMS/KM (GRAMS/MILE)	213.4 (343.4)
NOX GRAMS/KM (GRAMS/MILE)	.20 (.32)
FUEL CONSUMPTION BY CB L/100KM(MPG)	9.11 (25.82)
CALCULATED DISTANCE KM (MILES)	16.84 (10.46)

TABLE VEHICLE EMISSION RESULTS
FPP-C

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION
GVW 0 KG(-0 LBS)

TEST NO. 8 RUN 1
DATE 12/ 1/78
TIME
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM-274-F
ODOMETER 3783

BAROMETER 740.16 MM HG(29.14 IN HG)
DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)

RELATIVE HUMIDITY 35 PCT
ABSOLUTE HUMIDITY 6.9 GM/KG(48.1 GRAINS/LB)

NOX HUMIDITY C.F. .8879

BAG RESULTS

	1	2	3
BAG NUMBER			
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET P MM. H2O(IN. H2O)	723.9 (28.5)	723.9 (28.5)	723.9 (28.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	42.2 (108.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40674	69924	40613
CVS FLOW STD. CU. METRES(SCF)	75.9 (2679.7)	130.7 (4615.5)	75.7 (2675.5)
HC SAMPLE METER/RANGE/PPM	89.0/ 2/ 89	6.2/ 2/ 6	11.5/ 2/ 11
HC BCKGRD METER/RANGE/PPM	8.2/ 2/ 8	6.5/ 2/ 7	6.3/ 2/ 6
CO SAMPLE METER/RANGE/PPM	24.4/ 3/ 565	4.3/13/ 4	17.2/13/ 16
CO BCKGRD METER/RANGE/PPM	.5/ 3/ 11	2.1/13/ 2	.9/13/ 1
CO2 SAMPLE METER/RANGE/PCT	67.2/ 3/ 1.21	44.1/ 3/ .75	56.8/ 3/ 1.00
CO2 BCKGRD METER/RANGE/PCT	4.3/ 3/ .07	3.6/ 3/ .06	3.6/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	13.0/ 2/ 13	5.6/ 2/ 6	14.1/ 2/ 14
NOX BCKGRD METER/RANGE/PPM	.9/ 2/ 1	1.5/ 2/ 2	1.6/ 2/ 2
DILUTION FACTOR	10.54	17.73	13.37
HC CONCENTRATION PPM	82	0	6
CO CONCENTRATION PPM	535	2	15
CO2 CONCENTRATION PCT	1.15	.70	.95
NOX CONCENTRATION PPM	12.2	4.2	12.6
HC MASS GRAMS	3.57	.01	.25
CO MASS GRAMS	47.28	.33	1.33
CO2 MASS GRAMS	1594.5	1681.1	1315.9
NOX MASS GRAMS	1.57	.93	1.62
HC GRAMS/KM (GRAMS/MILE)	.62 (1.00)	.00 (.00)	.04 (.07)
CO GRAMS/KM (GRAMS/MILE)	8.20 (13.19)	.05 (.09)	.23 (.37)
CO2 GRAMS/KM (GRAMS/MILE)	276.4 (444.8)	271.5 (436.9)	228.3 (367.4)
NOX GRAMS/KM (GRAMS/MILE)	.27 (.44)	.15 (.24)	.28 (.45)
FUEL CONSUMPTION BY CB L/100KM(MPG)	12.43 (18.92)	11.59 (20.29)	9.77 (24.08)
CALCULATED DISTANCE KM (MILES)	5.77 (3.59)	6.19 (3.85)	5.76 (3.58)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.14 (.23)
CO GRAMS/KM (GRAMS/MILE)	1.79 (2.88)
CO2 GRAMS/KM (GRAMS/MILE)	260.67 (419.42)
NOX GRAMS/KM (GRAMS/MILE)	.21 (.34)
FUEL CONSUMPTION BY CB L/100KM (MPG)	11.26 (20.88)

TABLE VEHICLE EMISSION RESULTS
CFTP

PROJECT NO. 11-4746-001

VEHICLE NO. 365
VEHICLE MODEL 78 VOLVO
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION
GVW 0 KG(-0 LBS)

TEST NO. RUN
DATE 1/16/79
TIME
DYNO NO. 2
CVS NO. 8
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE
ODOMETER 3956

BAROMETER 745.24 MM HG(29.34 IN HG)
DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)

RELATIVE HUMIDITY 42 PCT
ABSOLUTE HUMIDITY 8.5 GM/KG(59.5 GRAINS/LB)

NOX HUMIDITY C.F. .9321

BAG RESULTS

	1	2	3
BAG NUMBER			
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	1219.2 (48.0)	1219.2 (48.0)	1219.2 (48.0)
BLOWER INLET P MM. H2O(IN. H2O)	792.5 (31.2)	792.5 (31.2)	792.5 (31.2)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	43.3 (110.0)	43.3 (110.0)
BLOWER REVOLUTIONS	12467	21304	12491
CVS FLOW STD. CU. METRES(SCF)	86.0 (3035.9)	146.8 (5185.1)	86.1 (3042.2)
HC SAMPLE METER/RANGE/PPM	65.5/ 2/ 65	18.0/ 2/ 18	25.8/ 2/ 26
HC BCKGRD METER/RANGE/PPM	9.7/ 2/ 10	11.4/ 2/ 11	12.5/ 2/ 13
CO SAMPLE METER/RANGE/PPM	92.7/11/ 469	42.7/13/ 40	91.3/13/ 92
CO BCKGRD METER/RANGE/PPM	2.1/11/ 6	4.4/13/ 4	5.4/13/ 5
CO2 SAMPLE METER/RANGE/PCT	63.4/ 3/ 1.13	43.1/ 3/ .74	59.1/ 3/ 1.05
CO2 BCKGRD METER/RANGE/PCT	4.1/ 3/ .06	4.5/ 3/ .07	3.8/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	8.2/ 2/ 8	2.9/ 2/ 3	6.1/ 2/ 6
NOX BCKGRD METER/RANGE/PPM	1.4/ 2/ 1	2.0/ 2/ 2	2.3/ 2/ 2
DILUTION FACTOR	11.33	18.07	12.68
HC CONCENTRATION PPM	57	7	14
CO CONCENTRATION PPM	447	35	84
CO2 CONCENTRATION PCT	1.07	.67	.99
NOX CONCENTRATION PPM	6.9	1.0	4.0
HC MASS GRAMS	2.81	.61	.71
CO MASS GRAMS	44.69	6.04	8.46
CO2 MASS GRAMS	1689.7	1802.2	1563.8
NOX MASS GRAMS	1.06	.26	.61
HC GRAMS/KM (GRAMS/MILE)	.48 (.77)	.10 (.16)	.12 (.20)
CO GRAMS/KM (GRAMS/MILE)	7.65 (12.31)	.96 (1.55)	1.45 (2.33)
CO2 GRAMS/KM (GRAMS/MILE)	289.3 (465.5)	286.6 (461.2)	268.1 (431.3)
NOX GRAMS/KM (GRAMS/MILE)	.18 (.29)	.04 (.07)	.10 (.17)
FUEL CONSUMPTION BY CB L/100KM(MPG)	12.93 (18.20)	12.31 (19.11)	11.55 (20.36)
CALCULATED DISTANCE KM (MILES)	5.84 (3.63)	6.29 (3.91)	5.83 (3.63)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.18 (.30)
CO GRAMS/KM (GRAMS/MILE)	2.48 (3.99)
CO2 GRAMS/KM (GRAMS/MILE)	282.09 (453.89)
NOX GRAMS/KM (GRAMS/MILE)	.09 (.14)
FUEL CONSUMPTION BY CB L/100KM (MPG)	12.23 (19.23)

TABLE VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. RUN
DATE 2/ 5/79
TIME 15:43
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM-274-3
ODOMETER 4216

BAROMETER 739.39 MM HG(29.11 IN HG)
DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)

RELATIVE HUMIDITY 48 PCT
ABSOLUTE HUMIDITY 9.1 GM/KG(63.5 GRAINS/LB)

NOX HUMIDITY C.F. .9488

BAG RESULTS

BAG NUMBER	1	2	3
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.9 (111.0)	42.2 (108.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40799	69760	40933
CVS FLOW STD. CU. METRES(SCF)	75.8 (2676.6)	129.9 (4588.8)	76.1 (2688.7)
HC SAMPLE METER/RANGE/PPM	59.0/ 2/ 59	9.9/ 2/ 10	14.1/ 2/ 14
HC BCKGRD METER/RANGE/PPM	10.3/ 2/ 10	8.9/ 2/ 9	8.3/ 2/ 8
CO SAMPLE METER/RANGE/PPM	96.0/11/ 500	5.1/13/ 5	50.4/13/ 48
CO BCKGRD METER/RANGE/PPM	1.5/11/ 5	2.8/13/ 3	2.8/13/ 3
CO2 SAMPLE METER/RANGE/PCT	70.3/ 3/ 1.27	45.7/ 3/ .78	61.0/ 3/ 1.08
CO2 BCKGRD METER/RANGE/PCT	2.9/ 3/ .04	3.5/ 3/ .05	3.9/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	12.9/ 2/ 13	4.3/ 2/ 4	9.4/ 2/ 9
NOX BCKGRD METER/RANGE/PPM	1.8/ 2/ 2	1.9/ 2/ 2	1.9/ 2/ 2
DILUTION FACTOR	10.12	17.04	12.31
HC CONCENTRATION PPM	50	2	6
CO CONCENTRATION PPM	476	2	44
CO2 CONCENTRATION PCT	1.23	.73	1.03
NOX CONCENTRATION PPM	11.3	2.5	7.7
HC MASS GRAMS	2.17	.11	.28
CO MASS GRAMS	41.97	.34	3.88
CO2 MASS GRAMS	1707.5	1747.2	1432.9
NOX MASS GRAMS	1.55	.59	1.06
HC GRAMS/KM (GRAMS/MILE)	.37 (.59)	.02 (.03)	.05 (.08)
CO GRAMS/KM (GRAMS/MILE)	7.10 (11.42)	.05 (.09)	.67 (1.07)
CO2 GRAMS/KM (GRAMS/MILE)	288.7 (464.5)	278.5 (448.1)	245.4 (394.8)
NOX GRAMS/KM (GRAMS/MILE)	.26 (.42)	.09 (.15)	.18 (.29)
FUEL CONSUMPTION BY CB L/100KM(MPG)	12.85 (18.31)	11.89 (19.78)	10.53 (22.35)
CALCULATED DISTANCE KM (MILES)	5.91 (3.68)	6.27 (3.90)	5.84 (3.63)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.10 (.16)
CO GRAMS/KM (GRAMS/MILE)	1.69 (2.72)
CO2 GRAMS/KM (GRAMS/MILE)	271.53 (436.89)
NOX GRAMS/KM (GRAMS/MILE)	.15 (.25)
FUEL CONSUMPTION BY CB L/100KM (MPG)	11.72 (20.08)

TABLE VEHICLE EMISSION RESULTS
FTPC

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION
GVW 0 KG(-0 LBS)

TEST NO. RUN
DATE 2/ 7/79
TIME 10:35
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE
ODOMETER 4155

BAROMETER 745.74 MM HG(29.36 IN HG)
DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)

RELATIVE HUMIDITY 34 PCT
ABSOLUTE HUMIDITY 6.4 GM/KG(44.9 GRAINS/LB)

NOX HUMIDITY C.F. .8760

BAG RESULTS

	1	2	3
BAG NUMBER			
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)	749.3 (29.5)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	42.2 (108.0)	40.6 (105.0)	42.2 (108.0)
BLOWER REVOLUTIONS	40723	69715	40600
CVS FLOW STD. CU. METRES(SCF)	76.6 (2704.8)	131.3 (4637.5)	76.3 (2696.2)
HC SAMPLE METER/RANGE/PPM	59.3/ 2/ 59	9.1/ 2/ 9	13.3/ 2/ 13
HC BCKGRD METER/RANGE/PPM	7.6/ 2/ 8	7.5/ 2/ 8	7.5/ 2/ 8
CO SAMPLE METER/RANGE/PPM	81.8/11/ 379	3.6/13/ 4	47.2/13/ 45
CO BCKGRD METER/RANGE/PPM	.7/11/ 2	1.5/13/ 1	1.3/13/ 1
CO2 SAMPLE METER/RANGE/PCT	67.8/ 3/ 1.22	45.2/ 3/ .78	63.5/ 3/ 1.13
CO2 BCKGRD METER/RANGE/PCT	3.0/ 3/ .05	3.6/ 3/ .06	3.7/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	11.3/ 2/ 11	2.3/ 2/ 2	7.9/ 2/ 8
NOX BCKGRD METER/RANGE/PPM	.4/ 2/ 0	.5/ 2/ 1	.8/ 2/ 1
DILUTION FACTOR	10.62	17.25	11.77
HC CONCENTRATION PPM	52	2	6
CO CONCENTRATION PPM	364	2	42
CO2 CONCENTRATION PCT	1.18	.72	1.08
NOX CONCENTRATION PPM	10.9	1.8	7.2
HC MASS GRAMS	2.32	.15	.28
CO MASS GRAMS	32.49	.31	3.76
CO2 MASS GRAMS	1652.0	1739.4	1511.1
NOX MASS GRAMS	1.40	.40	.92
HC GRAMS/KM (GRAMS/MILE)	.40 (.64)	.02 (.04)	.05 (.08)
CO GRAMS/KM (GRAMS/MILE)	5.58 (8.98)	.05 (.08)	.64 (1.03)
CO2 GRAMS/KM (GRAMS/MILE)	283.8 (456.6)	279.6 (449.8)	257.3 (414.0)
NOX GRAMS/KM (GRAMS/MILE)	.24 (.39)	.06 (.10)	.16 (.25)
FUEL CONSUMPTION BY CB L/100KM(MPG)	12.54 (18.76)	11.94 (19.70)	11.03 (21.32)
CALCULATED DISTANCE KM (MILES)	5.82 (3.62)	6.22 (3.87)	5.87 (3.65)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.11 (.18)
CO GRAMS/KM (GRAMS/MILE)	1.36 (2.19)
CO2 GRAMS/KM (GRAMS/MILE)	274.29 (441.33)
NOX GRAMS/KM (GRAMS/MILE)	.13 (.20)
FUEL CONSUMPTION BY CB L/100KM (MPG)	11.81 (19.91)

TABLE VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. RUN
DATE 2/12/79
TIME 13:45
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM-274-F
ODOMETER 4196

BAROMETER 745.74 MM HG(29.36 IN HG)
DRY BULB TEMP. 27.2 DEG C(81.0 DEG F)

RELATIVE HUMIDITY 39 PCT
ABSOLUTE HUMIDITY 8.9 GM/KG(62.3 GRAINS/LB)

NOX HUMIDITY C.F. .9935

BAG RESULTS

BAG NUMBER	1	2	3
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.9 (111.0)	43.3 (110.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40924	69772	41267
CVS FLOW STD. CU. METRES(SCF)	76.8 (2710.8)	130.9 (4624.1)	77.5 (2737.5)
HC SAMPLE METER/RANGE/PPM	54.7/ 2/ 55	12.0/ 2/ 12	15.5/ 2/ 15
HC BCKGRD METER/RANGE/PPM	9.4/ 2/ 9	9.6/ 2/ 10	10.4/ 2/ 10
CO SAMPLE METER/RANGE/PPM	74.9/11/ 330	4.1/13/ 4	57.7/13/ 55
CO BCKGRD METER/RANGE/PPM	.8/11/ 2	3.0/13/ 3	1.9/13/ 2
CO2 SAMPLE METER/RANGE/PCT	66.7/ 3/ 1.20	43.0/ 3/ .73	57.9/ 3/ 1.02
CO2 BCKGRD METER/RANGE/PCT	3.0/ 3/ .05	3.5/ 3/ .05	2.8/ 3/ .04
NOX SAMPLE METER/RANGE/PPM	11.0/ 2/ 11	4.2/ 2/ 4	7.6/ 2/ 8
NOX BCKGRD METER/RANGE/PPM	1.9/ 2/ 2	2.3/ 2/ 2	2.3/ 2/ 2
DILUTION FACTOR	10.85	18.22	13.03
HC CONCENTRATION PPM	46	3	6
CO CONCENTRATION PPM	316	1	52
CO2 CONCENTRATION PCT	1.16	.68	.98
NOX CONCENTRATION PPM	9.3	2.0	5.5
HC MASS GRAMS	2.04	.22	.26
CO MASS GRAMS	28.28	.18	4.69
CO2 MASS GRAMS	1624.2	1637.9	1393.6
NOX MASS GRAMS	1.28	.48	.77
HC GRAMS/KM (GRAMS/MILE)	.35 (.56)	.04 (.06)	.05 (.07)
CO GRAMS/KM (GRAMS/MILE)	4.79 (7.70)	.03 (.05)	.80 (1.29)
CO2 GRAMS/KM (GRAMS/MILE)	274.8 (442.2)	259.9 (418.2)	239.3 (385.0)
NOX GRAMS/KM (GRAMS/MILE)	.22 (.35)	.08 (.12)	.13 (.21)
FUEL CONSUMPTION BY CB L/100KM(MPG)	12.10 (19.45)	11.10 (21.20)	10.27 (22.90)
CALCULATED DISTANCE KM (MILES)	5.91 (3.67)	6.30 (3.92)	5.82 (3.62)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.10 (.16)
CO GRAMS/KM (GRAMS/MILE)	1.23 (1.98)
CO2 GRAMS/KM (GRAMS/MILE)	257.35 (414.08)
NOX GRAMS/KM (GRAMS/MILE)	.12 (.19)
FUEL CONSUMPTION BY CB L/100KM (MPG)	11.08 (21.23)

TABLE VEHICLE EMISSION RESULTS
FTP SET

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244-DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. RUN
DATE 3/ 1/79
TIME 14:52
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE
ODOMETER 4659

BAROMETER 739.90 MM HG(29.13 IN HG)
DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)

RELATIVE HUMIDITY 38 PCT
ABSOLUTE HUMIDITY 7.1 GM/KG(49.8 GRAINS/LB)

NOX HUMIDITY C.F. .8942

BAG RESULTS

	1	2	3	4
BAG NUMBER				
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT	SET-7
BLOWER DIF P MM. H20(IN. H20)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)
BLOWER INLET P MM. H20(IN. H20)	723.9 (28.5)	723.9 (28.5)	723.9 (28.5)	723.9 (28.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	43.3 (110.0)	43.3 (110.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40678	69628	40796	112380
CVS FLOW STD. CU. METRES(SCF)	75.8 (2677.7)	129.8 (4582.9)	76.0 (2685.3)	209.4 (7396.4)
HC SAMPLE METER/RANGE/PPM	10.8/ 3/ 108	13.4/ 2/ 13	22.8/ 2/ 23	25.6/ 2/ 26
HC BCKGRD METER/RANGE/PPM	1.3/ 3/ 13	11.6/ 2/ 12	12.5/ 2/ 13	21.9/ 2/ 22
CO SAMPLE METER/RANGE/PPM	88.4/11/ 432	21.3/13/ 20	78.7/13/ 78	87.2/13/ 88
CO BCKGRD METER/RANGE/PPM	1.6/11/ 5	3.2/13/ 3	2.5/13/ 2	1.7/13/ 2
CO2 SAMPLE METER/RANGE/PCT	76.4/ 3/ 1.40	47.8/ 3/ .82	63.1/ 3/ 1.12	74.0/ 3/ 1.35
CO2 BCKGRD METER/RANGE/PCT	3.6/ 3/ .06	4.0/ 3/ .06	3.8/ 3/ .06	4.0/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	12.1/ 2/ 12	5.2/ 2/ 5	6.3/ 2/ 6	5.8/ 2/ 6
NOX BCKGRD METER/RANGE/PPM	1.4/ 2/ 1	1.5/ 2/ 2	1.8/ 2/ 2	1.1/ 2/ 1
DILUTION FACTOR	9.26	16.18	11.81	9.88
HC CONCENTRATION PPM	96	3	11	6
CO CONCENTRATION PPM	410	17	73	83
CO2 CONCENTRATION PCT	1.35	.77	1.07	1.29
NOX CONCENTRATION PPM	10.9	3.8	4.7	4.8
HC MASS GRAMS	4.22	.19	.50	.71
CO MASS GRAMS	36.23	2.54	6.47	20.17
CO2 MASS GRAMS	1868.9	1823.2	1491.8	4950.1
NOX MASS GRAMS	1.41	.84	.61	1.72
HC GRAMS/KM (GRAMS/MILE)	.73 (1.17)	.03 (.05)	.09 (.14)	.03 (.05)
CO GRAMS/KM (GRAMS/MILE)	6.28 (10.10)	.40 (.65)	1.12 (1.80)	.93 (1.49)
CO2 GRAMS/KM (GRAMS/MILE)	323.7 (520.9)	291.0 (468.2)	258.4 (415.8)	228.0 (366.9)
NOX GRAMS/KM (GRAMS/MILE)	.24 (.39)	.13 (.22)	.10 (.17)	.08 (.13)
FUEL CONSUMPTION BY CB L/100KM(MPG)	14.34 (16.41)	12.45 (18.89)	11.12 (21.16)	9.80 (24.01)
CALCULATED DISTANCE KM (MILES)	5.77 (3.59)	6.27 (3.89)	5.77 (3.59)	21.71 (13.49)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.19 (.31)
CO GRAMS/KM (GRAMS/MILE)	1.81 (2.91)
CO2 GRAMS/KM (GRAMS/MILE)	288.84 (464.75)
NOX GRAMS/KM (GRAMS/MILE)	.15 (.24)
FUEL CONSUMPTION BY CB L/100KM (MPG)	12.48 (18.86)

COMBINED FUEL ECONOMY L/100KM (MPG) 11.27 (20.87)

TABLE VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. RUN
DATE 3/ 5/79
TIME 13:30
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE
ODOMETER 4691

BAROMETER 748.03 MM HG(29.45 IN HG)
DRY BULB TEMP. 25.6 DEG C(78.0 DEG F)

RELATIVE HUMIDITY 22 PCT
ABSOLUTE HUMIDITY 4.5 GM/KG(31.4 GRAINS/LB)

NOX HUMIDITY C.F. .8298

BAG RESULTS

BAG NUMBER	1	2	3
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)
BLOWER INLET P MM. H2O(IN. H2O)	723.9 (28.5)	723.9 (28.5)	723.9 (28.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	46.1 (115.0)	42.2 (108.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40661	69694	40550
CVS FLOW STD. CU. METRES(SCF)	76.7 (2710.8)	131.7 (4652.1)	76.5 (2701.4)
HC SAMPLE METER/RANGE/PPM	75.3/ 2/ 75	12.5/ 2/ 13	22.2/ 2/ 22
HC BCKGRD METER/RANGE/PPM	11.0/ 2/ 11	10.9/ 2/ 11	9.5/ 2/ 10
CO SAMPLE METER/RANGE/PPM	81.5/11/ 377	13.8/13/ 13	72.2/13/ 71
CO BCKGRD METER/RANGE/PPM	1.1/11/ 3	3.8/13/ 4	2.5/13/ 2
CO2 SAMPLE METER/RANGE/PCT	66.5/ 3/ 1.19	43.5/ 3/ .74	60.9/ 3/ 1.08
CO2 BCKGRD METER/RANGE/PCT	3.3/ 3/ .05	3.6/ 3/ .06	3.6/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	12.0/ 2/ 12	4.7/ 2/ 5	5.8/ 2/ 6
NOX BCKGRD METER/RANGE/PPM	.8/ 2/ 1	.7/ 2/ 1	.7/ 2/ 1
DILUTION FACTOR	10.83	17.97	12.29
HC CONCENTRATION PPM	65	2	13
CO CONCENTRATION PPM	363	9	67
CO2 CONCENTRATION PCT	1.15	.69	1.03
NOX CONCENTRATION PPM	11.3	4.0	5.2
HC MASS GRAMS	2.89	.17	.59
CO MASS GRAMS	32.42	1.45	5.92
CO2 MASS GRAMS	1612.6	1667.1	1442.9
NOX MASS GRAMS	1.37	.84	.63
HC GRAMS/KM (GRAMS/MILE)	.49 (.79)	.03 (.04)	.10 (.16)
CO GRAMS/KM (GRAMS/MILE)	5.51 (8.87)	.23 (.38)	1.01 (1.62)
CO2 GRAMS/KM (GRAMS/MILE)	274.1 (441.0)	268.6 (432.1)	245.2 (394.6)
NOX GRAMS/KM (GRAMS/MILE)	.23 (.38)	.14 (.22)	.11 (.17)
FUEL CONSUMPTION BY CB L/100KM(MPG)	12.13 (19.39)	11.48 (20.49)	10.55 (22.30)
CALCULATED DISTANCE KM (MILES)	5.88 (3.66)	6.21 (3.86)	5.88 (3.66)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.14 (.23)
CO GRAMS/KM (GRAMS/MILE)	1.55 (2.50)
CO2 GRAMS/KM (GRAMS/MILE)	263.25 (423.56)
NOX GRAMS/KM (GRAMS/MILE)	.15 (.24)
FUEL CONSUMPTION BY CB L/100KM (MPG)	11.36 (20.71)

TABLE VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. RUN
DATE 3/ 6/79
TIME 13:20
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE
ODOMETER -0

BAROMETER 745.49 MM HG(29.35 IN HG)
DRY BULB TEMP. 21.7 DEG C(71.0 DEG F)

RELATIVE HUMIDITY 34 PCT
ABSOLUTE HUMIDITY 5.6 GM/KG(39.1 GRAINS/LB)

NOX HUMIDITY C.F. .8555

BAG RESULTS

BAG NUMBER	1	2	3
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	43.3 (110.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40615	69641	40561
CVS FLOW STD. CU. METRES(SCF)	76.2 (2690.8)	130.6 (4613.5)	76.1 (2687.1)
HC SAMPLE METER/RANGE/PPM	63.3/ 2/ 63	12.5/ 2/ 13	18.5/ 2/ 18
HC BCKGRD METER/RANGE/PPM	11.5/ 2/ 11	11.3/ 2/ 11	10.5/ 2/ 10
CO SAMPLE METER/RANGE/PPM	79.1/11/ 360	11.3/13/ 11	35.0/13/ 33
CO BCKGRD METER/RANGE/PPM	1.2/11/ 4	3.3/13/ 3	2.7/13/ 3
CO2 SAMPLE METER/RANGE/PCT	67.4/ 3/ 1.21	46.2/ 3/ .79	61.4/ 3/ 1.09
CO2 BCKGRD METER/RANGE/PCT	3.6/ 3/ .06	3.9/ 3/ .06	3.7/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	12.1/ 2/ 12	4.9/ 2/ 5	5.0/ 2/ 5
NOX BCKGRD METER/RANGE/PPM	.8/ 2/ 1	.7/ 2/ 1	.5/ 2/ 1
DILUTION FACTOR	10.70	16.82	12.23
HC CONCENTRATION PPM	53	8	9
CO CONCENTRATION PPM	344	8	30
CO2 CONCENTRATION PCT	1.16	.74	1.04
NOX CONCENTRATION PPM	11.4	4.2	4.5
HC MASS GRAMS	2.32	.14	.39
CO MASS GRAMS	30.51	1.16	2.63
CO2 MASS GRAMS	1620.4	1765.5	1447.2
NOX MASS GRAMS	1.42	.91	.57
HC GRAMS/KM (GRAMS/MILE)	.40 (.64)	.02 (.04)	.07 (.11)
CO GRAMS/KM (GRAMS/MILE)	5.21 (8.38)	.19 (.30)	.45 (.72)
CO2 GRAMS/KM (GRAMS/MILE)	276.4 (444.8)	284.2 (457.3)	246.4 (396.4)
NOX GRAMS/KM (GRAMS/MILE)	.24 (.39)	.15 (.23)	.10 (.15)
FUEL CONSUMPTION BY CB L/100KM(MPG)	12.20 (19.28)	12.15 (19.37)	10.55 (22.29)
CALCULATED DISTANCE KM (MILES)	5.86 (3.64)	6.21 (3.86)	5.87 (3.65)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.11 (.18)
CO GRAMS/KM (GRAMS/MILE)	1.31 (2.10)
CO2 GRAMS/KM (GRAMS/MILE)	272.11 (437.83)
NOX GRAMS/KM (GRAMS/MILE)	.15 (.24)
FUEL CONSUMPTION BY CB L/100KM (MPG)	11.72 (20.08)

TABLE VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 1 KG(-0 LBS)

TEST NO. RUN
DATE 3/12/79
TIME 09:17
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE
ODOMETER 4721

BAROMETER 747.78 MM HG(29.44 IN HG)
DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)

RELATIVE HUMIDITY 31 PCT
ABSOLUTE HUMIDITY 5.8 GM/KG(40.5 GRAINS/LB)

NOX HUMIDITY C.F. .8603

BAG RESULTS

BAG NUMBER	1	2	3
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	42.8 (109.0)	42.2 (108.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40649	69769	40581
CVS FLOW STD. CU. METRES(SCF)	76.6 (2705.1)	131.6 (4647.1)	76.4 (2697.6)
HC SAMPLE METER/RANGE/PPM	81.2/ 2/ 81	13.2/ 2/ 13	15.0/ 2/ 15
HC BCKGRD METER/RANGE/PPM	10.7/ 2/ 11	11.2/ 2/ 11	11.3/ 2/ 11
CO SAMPLE METER/RANGE/PPM	80.5/11/ 370	14.5/13/ 14	28.2/13/ 27
CO BCKGRD METER/RANGE/PPM	2.5/11/ 8	8.1/13/ 8	3.8/13/ 4
CO2 SAMPLE METER/RANGE/PCT	67.1/ 3/ 1.21	44.0/ 3/ .75	61.9/ 3/ 1.10
CO2 BCKGRD METER/RANGE/PCT	4.0/ 3/ .06	4.0/ 3/ .06	3.6/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	11.5/ 2/ 11	5.0/ 2/ 5	5.5/ 2/ 6
NOX BCKGRD METER/RANGE/PPM	1.9/ 2/ 2	1.7/ 2/ 2	1.0/ 2/ 1
DILUTION FACTOR	10.73	17.74	12.13
HC CONCENTRATION PPM	71	3	5
CO CONCENTRATION PPM	351	6	22
CO2 CONCENTRATION PCT	1.15	.69	1.05
NOX CONCENTRATION PPM	9.8	3.4	4.6
HC MASS GRAMS	3.16	.20	.20
CO MASS GRAMS	31.27	.95	2.00
CO2 MASS GRAMS	1612.5	1673.9	1468.9
NOX MASS GRAMS	1.23	.74	.58
HC GRAMS/KM (GRAMS/MILE)	.55 (.89)	.03 (.05)	.04 (.06)
CO GRAMS/KM (GRAMS/MILE)	5.48 (8.82)	.15 (.25)	.35 (.57)
CO2 GRAMS/KM (GRAMS/MILE)	282.8 (454.9)	270.3 (434.9)	258.3 (415.6)
NOX GRAMS/KM (GRAMS/MILE)	.22 (.35)	.12 (.19)	.10 (.16)
FUEL CONSUMPTION BY CB L/100KM(MPG)	12.51 (18.80)	11.55 (20.37)	11.05 (21.28)
CALCULATED DISTANCE KM (MILES)	5.70 (3.54)	6.19 (3.85)	5.69 (3.53)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.14 (.23)
CO GRAMS/KM (GRAMS/MILE)	1.31 (2.10)
CO2 GRAMS/KM (GRAMS/MILE)	269.58 (433.76)
NOX GRAMS/KM (GRAMS/MILE)	.13 (.22)
FUEL CONSUMPTION BY CB L/100KM (MPG)	11.61 (20.26)

TABLE VEHICLE EMISSION RESULTS
FTP SET

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. RUN
DATE 3/16/79
TIME
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE
ODOMETER -0

BAROMETER 744.98 MM HG(29.33 IN HG)
DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)

RELATIVE HUMIDITY 42 PCT
ABSOLUTE HUMIDITY 8.5 GM/KG(59.5 GRAINS/LB)

NOX HUMIDITY C.F. .9322

BAG RESULTS

BAG NUMBER	1	2	3	4
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT	SET-7
BLOWER DIF P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H2O(IN. H2O)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	42.2 (108.0)	43.3 (110.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40567	69645	40699	112257
CVS FLOW STD. CU. METRES(SCF)	75.9 (2682.0)	130.6 (4612.9)	76.2 (2690.4)	210.1 (7420.8)
HC SAMPLE METER/RANGE/PPM	70.9/ 2/ 71	11.5/ 2/ 11	16.7/ 2/ 17	18.6/ 2/ 19
HC BCKGRD METER/RANGE/PPM	12.1/ 2/ 12	13.2/ 2/ 13	15.0/ 2/ 15	22.9/ 2/ 23
CO SAMPLE METER/RANGE/PPM	81.4/11/ 376	8.6/13/ 8	26.1/13/ 25	65.2/13/ 63
CO BCKGRD METER/RANGE/PPM	3.2/11/ 10	6.6/13/ 6	5.2/13/ 5	3.1/13/ 3
CO2 SAMPLE METER/RANGE/PCT	70.7/ 3/ 1.28	45.9/ 3/ .79	62.8/ 3/ 1.12	72.3/ 3/ 1.31
CO2 BCKGRD METER/RANGE/PCT	3.7/ 3/ .06	3.8/ 3/ .06	3.9/ 3/ .06	3.6/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	10.0/ 2/ 10	3.2/ 2/ 3	5.1/ 2/ 5	5.8/ 2/ 6
NOX BCKGRD METER/RANGE/PPM	.5/ 2/ 1	.4/ 2/ 0	.4/ 2/ 0	1.1/ 2/ 1
DILUTION FACTOR	10.14	16.95	11.93	10.16
HC CONCENTRATION PPM	60	-1	3	-2
CO CONCENTRATION PPM	353	2	19	58
CO2 CONCENTRATION PCT	1.23	.73	1.06	1.26
NOX CONCENTRATION PPM	9.5	2.8	4.7	4.8
HC MASS GRAMS	2.63	-.07	.13	-.25
CO MASS GRAMS	31.23	.32	1.71	14.20
CO2 MASS GRAMS	1706.7	1755.1	1484.2	4853.3
NOX MASS GRAMS	1.29	.66	.64	1.80
HC GRAMS/KM (GRAMS/MILE)	.46 (.74)	-.01 (-.02)	.02 (.04)	-.01 (-.02)
CO GRAMS/KM (GRAMS/MILE)	5.45 (8.76)	.05 (.09)	.30 (.49)	.66 (1.06)
CO2 GRAMS/KM (GRAMS/MILE)	297.6 (478.9)	288.4 (464.0)	261.8 (421.2)	226.1 (363.8)
NOX GRAMS/KM (GRAMS/MILE)	.23 (.36)	.11 (.17)	.11 (.18)	.08 (.14)
FUEL CONSUMPTION BY CB L/100KM(MPG)	13.13 (17.92)	12.31 (19.11)	11.20 (21.01)	9.69 (24.27)
CALCULATED DISTANCE KM (MILES)	5.73 (3.56)	6.09 (3.78)	5.67 (3.52)	21.46 (13.34)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.10 (.15)
CO GRAMS/KM (GRAMS/MILE)	1.25 (2.01)
CO2 GRAMS/KM (GRAMS/MILE)	283.00 (455.35)
NOX GRAMS/KM (GRAMS/MILE)	.13 (.22)
FUEL CONSUMPTION BY CB L/100KM (MPG)	12.18 (19.32)

COMBINED FUEL ECONOMY L/100KM (MPG) 11.06 (21.27)

TABLE VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. RUN
DATE 3/19/79
TIME 13:23
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE
ODOMETER 5196

BAROMETER 736.85 MM HG(29.01 IN HG)
DRY BULB TEMP. 29.4 DEG C(85.0 DEG F)

RELATIVE HUMIDITY 73 PCT
ABSOLUTE HUMIDITY 19.7 GM/KG(137.8 GRAINS/LB)

NOX HUMIDITY C.F. 1.4185

BAG RESULTS

	1	2	3
BAG NUMBER			
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H20(IN. H20)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H20(IN. H20)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	41.7 (107.0)	40.6 (105.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40615	69647	40573
CVS FLOW STD. CU. METRES(SCF)	75.3 (2660.5)	129.4 (4571.4)	75.0 (2649.8)
HC SAMPLE METER/RANGE/PPM	68.1/ 2/ 68	15.3/ 2/ 15	23.7/ 2/ 24
HC BCKGRD METER/RANGE/PPM	12.5/ 2/ 13	13.4/ 2/ 13	17.8/ 2/ 18
CO SAMPLE METER/RANGE/PPM	98.4/11/ 523	65.5/13/ 64	73.9/13/ 73
CO BCKGRD METER/RANGE/PPM	.8/11/ 2	2.3/13/ 2	2.2/13/ 2
CO2 SAMPLE METER/RANGE/PCT	69.3/ 3/ 1.25	46.9/ 3/ .81	65.3/ 3/ 1.17
CO2 BCKGRD METER/RANGE/PCT	3.7/ 3/ .06	4.0/ 3/ .06	3.9/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	7.6/ 2/ 8	.9/ 2/ 1	2.2/ 2/ 2
NOX BCKGRD METER/RANGE/PPM	1.6/ 2/ 2	.6/ 2/ 1	.6/ 2/ 1
DILUTION FACTOR	10.26	16.44	11.37
HC CONCENTRATION PPM	57	3	7
CO CONCENTRATION PPM	496	59	67
CO2 CONCENTRATION PCT	1.20	.75	1.11
NOX CONCENTRATION PPM	6.2	.3	1.7
HC MASS GRAMS	2.47	.20	.32
CO MASS GRAMS	43.50	8.89	5.88
CO2 MASS GRAMS	1653.6	1777.8	1531.1
NOX MASS GRAMS	1.26	.12	.34
HC GRAMS/KM (GRAMS/MILE)	.43 (.69)	.03 (.05)	.06 (.09)
CO GRAMS/KM (GRAMS/MILE)	7.55 (12.15)	1.46 (2.35)	1.03 (1.65)
CO2 GRAMS/KM (GRAMS/MILE)	287.0 (461.8)	292.0 (469.9)	267.5 (430.4)
NOX GRAMS/KM (GRAMS/MILE)	.22 (.35)	.02 (.03)	.06 (.09)
FUEL CONSUMPTION BY CB L/100KM(MPG)	12.81 (18.36)	12.57 (18.72)	11.49 (20.47)
CALCULATED DISTANCE KM (MILES)	5.76 (3.58)	6.09 (3.78)	5.72 (3.56)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.12 (.20)
CO GRAMS/KM (GRAMS/MILE)	2.61 (4.21)
CO2 GRAMS/KM (GRAMS/MILE)	284.21 (457.30)
NOX GRAMS/KM (GRAMS/MILE)	.07 (.12)
FUEL CONSUMPTION BY CB L/100KM (MPG)	12.32 (19.09)

TABLE VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. RUN
DATE 3/20/79
TIME 13:45
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE
ODOMETER 5207

BAROMETER 739.14 MM HG(29.10 IN HG)
DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)

RELATIVE HUMIDITY 46 PCT
ABSOLUTE HUMIDITY 9.3 GM/KG(64.9 GRAINS/LB)

NOX HUMIDITY C.F. .9549

BAG RESULTS

	1	2	3
BAG NUMBER			
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	787.4 (31.0)	787.4 (31.0)	787.4 (31.0)
BLOWER INLET P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	43.3 (110.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40673	69740	40448
CVS FLOW STD. CU. METRES(SCF)	75.3 (2659.5)	129.1 (4559.5)	74.9 (2644.5)
HC SAMPLE METER/RANGE/PPM	67.3/ 2/ 67	14.3/ 2/ 14	26.3/ 2/ 26
HC BCKGRD METER/RANGE/PPM	9.1/ 2/ 9	10.0/ 2/ 10	11.9/ 2/ 12
CO SAMPLE METER/RANGE/PPM	94.4/11/ 484	64.0/13/ 62	70.2/13/ 69
CO BCKGRD METER/RANGE/PPM	4.6/11/ 14	14.6/13/ 14	12.0/13/ 12
CO2 SAMPLE METER/RANGE/PCT	69.4/ 3/ 1.25	48.2/ 3/ .83	65.8/ 3/ 1.18
CO2 BCKGRD METER/RANGE/PCT	3.7/ 3/ .06	4.7/ 3/ .07	4.7/ 3/ .07
NOX SAMPLE METER/RANGE/PPM	7.7/ 2/ 8	1.2/ 2/ 1	2.7/ 2/ 3
NOX BCKGRD METER/RANGE/PPM	1.3/ 2/ 1	1.1/ 2/ 1	.9/ 2/ 1
DILUTION FACTOR	10.27	15.95	11.28
HC CONCENTRATION PPM	59	5	15
CO CONCENTRATION PPM	453	47	56
CO2 CONCENTRATION PCT	1.20	.76	1.11
NOX CONCENTRATION PPM	6.5	.2	1.9
HC MASS GRAMS	2.57	.37	.67
CO MASS GRAMS	39.72	7.08	4.85
CO2 MASS GRAMS	1655.8	1808.0	1526.4
NOX MASS GRAMS	.90	.04	.26
HC GRAMS/KM (GRAMS/MILE)	.44 (.71)	.06 (.10)	.12 (.19)
CO GRAMS/KM (GRAMS/MILE)	6.85 (11.02)	1.14 (1.84)	.84 (1.36)
CO2 GRAMS/KM (GRAMS/MILE)	285.5 (459.4)	292.0 (469.8)	265.6 (427.3)
NOX GRAMS/KM (GRAMS/MILE)	.15 (.25)	.01 (.01)	.04 (.07)
FUEL CONSUMPTION BY CB L/100KM(MPG)	12.71 (18.51)	12.55 (18.75)	11.41 (20.62)
CALCULATED DISTANCE KM (MILES)	5.80 (3.60)	6.19 (3.85)	5.75 (3.57)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.15 (.25)
CO GRAMS/KM (GRAMS/MILE)	2.25 (3.62)
CO2 GRAMS/KM (GRAMS/MILE)	283.41 (456.01)
NOX GRAMS/KM (GRAMS/MILE)	.05 (.08)
FUEL CONSUMPTION BY CB L/100KM (MPG)	12.27 (19.17)

TABLE VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. RUN
DATE 4/17/79
TIME 13:15
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM-274-F
ODOMETER 9627

BAROMETER 739.90 MM HG(29.13 IN HG)
DRY BULB TEMP. 26.7 DEG C(80.0 DEG F)

RELATIVE HUMIDITY 48 PCT
ABSOLUTE HUMIDITY 10.7 GM/KG(74.7 GRAINS/LB)

NOX HUMIDITY C.F. .9986

BAG RESULTS

BAG NUMBER	1	2	3
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	774.7 (30.5)	774.7 (30.5)	774.7 (30.5)
BLOWER INLET P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	42.8 (109.0)	42.2 (108.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40602	69695	40550
CVS FLOW STD. CU. METRES(SCF)	75.4 (2661.6)	129.5 (4572.9)	75.2 (2655.3)
HC SAMPLE METER/RANGE/PPM	59.0/ 2/ 59	16.3/ 2/ 16	18.5/ 2/ 18
HC BCKGRD METER/RANGE/PPM	12.9/ 2/ 13	14.6/ 2/ 15	16.3/ 2/ 16
CO SAMPLE METER/RANGE/PPM	76.0/11/ 338	11.4/13/ 11	31.8/13/ 30
CO BCKGRD METER/RANGE/PPM	1.4/11/ 4	4.6/13/ 4	3.4/13/ 3
CO2 SAMPLE METER/RANGE/PCT	71.1/ 3/ 1.29	46.9/ 3/ .81	64.3/ 3/ 1.15
CO2 BCKGRD METER/RANGE/PCT	3.5/ 3/ .05	4.0/ 3/ .06	3.4/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	11.4/ 2/ 11	3.6/ 2/ 4	4.8/ 2/ 5
NOX BCKGRD METER/RANGE/PPM	1.3/ 2/ 1	1.0/ 2/ 1	.6/ 2/ 1
DILUTION FACTOR	10.11	16.54	11.62
HC CONCENTRATION PPM	47	3	4
CO CONCENTRATION PPM	321	6	26
CO2 CONCENTRATION PCT	1.24	.75	1.10
NOX CONCENTRATION PPM	10.2	2.7	4.3
HC MASS GRAMS	2.06	.19	.16
CO MASS GRAMS	28.12	.98	2.27
CO2 MASS GRAMS	1708.9	1778.3	1516.2
NOX MASS GRAMS	1.47	.66	.61
HC GRAMS/KM (GRAMS/MILE)	.36 (.58)	.03 (.05)	.03 (.04)
CO GRAMS/KM (GRAMS/MILE)	4.93 (7.94)	.16 (.26)	.40 (.64)
CO2 GRAMS/KM (GRAMS/MILE)	299.7 (482.2)	292.7 (471.0)	264.5 (425.6)
NOX GRAMS/KM (GRAMS/MILE)	.26 (.42)	.11 (.17)	.11 (.17)
FUEL CONSUMPTION BY CB L/100KM(MPG)	13.17 (17.86)	12.51 (18.80)	11.32 (20.78)
CALCULATED DISTANCE KM (MILES)	5.70 (3.54)	6.07 (3.78)	5.73 (3.56)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.10 (.16)
CO GRAMS/KM (GRAMS/MILE)	1.22 (1.96)
CO2 GRAMS/KM (GRAMS/MILE)	286.38 (460.78)
NOX GRAMS/KM (GRAMS/MILE)	.14 (.22)
FUEL CONSUMPTION BY CB L/100KM (MPG)	12.32 (19.10)

TABLE VEHICLE EMISSION RESULTS
SET

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. RUN
DATE 4/17/79
TIME 15:40
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM-274-F
ODOMETER 9641

BAROMETER 739.65 MM HG(29.12 IN HG)
DRY BULB TEMP. 26.7 DEG C(80.0 DEG F)

RELATIVE HUMIDITY 44 PCT
ABSOLUTE HUMIDITY 10.0 GM/KG(69.7 GRAINS/LB)

NOX HUMIDITY C.F. .9755

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	774.7 (30.5)
BLOWER INLET P MM. H2O(IN. H2O)	762.0 (30.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	44.4 (112.0)
BLOWER REVOLUTIONS	112162
CVS FLOW STD. CU. METRES(SCF)	207.5 (7327.8)
HC SAMPLE METER/RANGE/PPM	17.4/ 2/ 17
HC BCKGRD METER/RANGE/PPM	12.7/ 2/ 13
CO SAMPLE METER/RANGE/PPM	84.0/13/ 84
CO BCKGRD METER/RANGE/PPM	1.8/13/ 2
CO2 SAMPLE METER/RANGE/PCT	74.2/ 3/ 1.35
CO2 BCKGRD METER/RANGE/PCT	3.6/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	6.1/ 2/ 6
NOX BCKGRD METER/RANGE/PPM	1.1/ 2/ 1
DILUTION FACTOR	9.85
HC CONCENTRATION PPM	6
CO CONCENTRATION PPM	79
CO2 CONCENTRATION PCT	1.30
NOX CONCENTRATION PPM	5.1
HC MASS GRAMS	.72
CO MASS GRAMS	19.07
CO2 MASS GRAMS	4941.1
NOX MASS GRAMS	1.98
HC GRAMS/KM (GRAMS/MILE)	.03 (.05)
CO GRAMS/KM (GRAMS/MILE)	.89 (1.43)
CO2 GRAMS/KM (GRAMS/MILE)	230.5 (370.8)
NOX GRAMS/KM (GRAMS/MILE)	.09 (.15)
FUEL CONSUMPTION BY CB L/100KM(MPG)	9.90 (23.76)
CALCULATED DISTANCE KM (MILES)	21.44 (13.33)

TABLE VEHICLE EMISSION RESULTS
FET

PROJECT NO. 11-4246-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. RUN
DATE 4/17/79
TIME 16:13
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM-224-F
ODOMETER 4654

BAROMETER 739.14 MM HG(29.10 IN HG)
DRY BULB TEMP. 27.2 DEG C(81.0 DEG F)

RELATIVE HUMIDITY 42 PCT
ABSOLUTE HUMIDITY 9.7 GM/KG(68.0 GRAINS/LB) NOX HUMIDITY C.F. .9683

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	774.7 (30.5)
BLOWER INLET P MM. H2O(IN. H2O)	762.0 (30.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	44.4 (112.0)
BLOWER REVOLUTIONS	61544
CVS FLOW STD. CU. METRES(SCF)	113.8 (4017.8)
HC SAMPLE METER/RANGE/PPM	12.5/ 2/ 18
HC BCKGRD METER/RANGE/PPM	11.1/ 2/ 11
CO SAMPLE METER/RANGE/PPM	48.8/12/ 107
CO BCKGRD METER/RANGE/PPM	1.0/12/ 2
CO2 SAMPLE METER/RANGE/PCT	92.3/ 3/ 1.73
CO2 BCKGRD METER/RANGE/PCT	3.5/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	7.5/ 2/ 8
NOX BCKGRD METER/RANGE/PPM	1.1/ 2/ 1
DILUTION FACTOR	7.71
HC CONCENTRATION PPM	8
CO CONCENTRATION PPM	101
CO2 CONCENTRATION PCT	1.68
NOX CONCENTRATION PPM	6.5
HC MASS GRAMS	.51
CO MASS GRAMS	13.36
CO2 MASS GRAMS	3499.4
NOX MASS GRAMS	1.38
HC GRAMS/KM (GRAMS/MILE)	.02 (.04)
CO GRAMS/KM (GRAMS/MILE)	.60 (.96)
CO2 GRAMS/KM (GRAMS/MILE)	155.9 (250.8)
NOX GRAMS/KM (GRAMS/MILE)	.06 (.10)
FUEL CONSUMPTION BY CB L/100KM(MPG)	9.24 (25.460)
CALCULATED DISTANCE KM (MILES)	16.27 (10.11)

TABLE VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. RUN
DATE 4/19/79
TIME 13:00
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM-274F
ODOMETER 9674

BAROMETER 740.41 MM HG(29.15 IN HG)
DRY BULB TEMP. 26.7 DEG C(80.0 DEG F)

RELATIVE HUMIDITY 48 PCT
ABSOLUTE HUMIDITY 10.7 GM/KG(74.6 GRAINS/LB)

NOX HUMIDITY C.F. .9982

BAG RESULTS

	1	2	3
BAG NUMBER			
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	774.7 (30.5)	774.7 (30.5)	774.7 (30.5)
BLOWER INLET P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	43.3 (110.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40671	69631	40508
CVS FLOW STD. CU. METRES(SCF)	75.5 (2665.6)	129.2 (4562.9)	75.2 (2654.4)
HC SAMPLE METER/RANGE/PPM	71.1/ 2/ 71	19.0/ 2/ 19	21.0/ 2/ 21
HC BCKGRD METER/RANGE/PPM	19.8/ 2/ 20	22.6/ 2/ 23	18.7/ 2/ 19
CO SAMPLE METER/RANGE/PPM	86.3/11/ 414	9.9/13/ 10	56.2/13/ 54
CO BCKGRD METER/RANGE/PPM	1.6/11/ 5	4.7/13/ 5	4.1/13/ 4
CO2 SAMPLE METER/RANGE/PCT	70.2/ 3/ 1.27	47.1/ 3/ .81	64.6/ 3/ 1.15
CO2 BCKGRD METER/RANGE/PCT	4.3/ 3/ .07	4.1/ 3/ .06	4.2/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	10.2/ 2/ 10	3.6/ 2/ 4	5.3/ 2/ 5
NOX BCKGRD METER/RANGE/PPM	1.5/ 2/ 2	1.3/ 2/ 1	1.3/ 2/ 1
DILUTION FACTOR	10.19	16.46	11.53
HC CONCENTRATION PPM	53	-2	4
CO CONCENTRATION PPM	394	5	48
CO2 CONCENTRATION PCT	1.21	.75	1.10
NOX CONCENTRATION PPM	8.8	2.4	4.1
HC MASS GRAMS	2.32	-.17	.17
CO MASS GRAMS	34.58	.76	4.22
CO2 MASS GRAMS	1670.5	1780.0	1508.4
NOX MASS GRAMS	1.27	.59	.59
HC GRAMS/KM (GRAMS/MILE)	.41 (.66)	-.03 (-.04)	.03 (.05)
CO GRAMS/KM (GRAMS/MILE)	6.08 (9.78)	.12 (.20)	.74 (1.19)
CO2 GRAMS/KM (GRAMS/MILE)	293.5 (472.2)	293.2 (471.8)	264.1 (424.9)
NOX GRAMS/KM (GRAMS/MILE)	.22 (.36)	.10 (.16)	.10 (.17)
FUEL CONSUMPTION BY CB L/100KM(MPG)	12.99 (18.11)	12.52 (18.79)	11.32 (20.77)
CALCULATED DISTANCE KM (MILES)	5.69 (3.54)	6.07 (3.77)	5.71 (3.55)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.08 (.13)
CO GRAMS/KM (GRAMS/MILE)	1.53 (2.47)
CO2 GRAMS/KM (GRAMS/MILE)	285.22 (458.92)
NOX GRAMS/KM (GRAMS/MILE)	.13 (.20)
FUEL CONSUMPTION BY CB L/100KM (MPG)	12.29 (19.15)

TABLE VEHICLE EMISSION RESULTS
SET

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. RUN
DATE 4/19/79
TIME 15:25
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM-274-F
ODOMETER 9687

BAROMETER 736.09 MM HG(28.98 IN HG)
DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)

RELATIVE HUMIDITY 63 PCT
ABSOLUTE HUMIDITY 13.0 GM/KG(90.9 GRAINS/LB)

NOX HUMIDITY C.F. 1.0805

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	774.7 (30.5)
BLOWER INLET P MM. H2O(IN. H2O)	762.0 (30.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)
BLOWER REVOLUTIONS	112114
CVS FLOW STD. CU. METRES(SCF)	206.7 (7299.3)
HC SAMPLE METER/RANGE/PPM	19.1/ 2/ 19
HC BCKGRD METER/RANGE/PPM	15.1/ 2/ 15
CO SAMPLE METER/RANGE/PPM	75.6/13/ 74
CO BCKGRD METER/RANGE/PPM	1.9/13/ 2
CO2 SAMPLE METER/RANGE/PCT	74.9/ 3/ 1.36
CO2 BCKGRD METER/RANGE/PCT	4.3/ 3/ .07
NOX SAMPLE METER/RANGE/PPM	6.7/ 2/ 7
NOX BCKGRD METER/RANGE/PPM	2.5/ 2/ 3
DILUTION FACTOR	9.76
HC CONCENTRATION PPM	6
CO CONCENTRATION PPM	69
CO2 CONCENTRATION PCT	1.31
NOX CONCENTRATION PPM	4.5
HC MASS GRAMS	.66
CO MASS GRAMS	16.68
CO2 MASS GRAMS	4939.5
NOX MASS GRAMS	1.90
HC GRAMS/KM (GRAMS/MILE)	.03 (.05)
CO GRAMS/KM (GRAMS/MILE)	.77 (1.24)
CO2 GRAMS/KM (GRAMS/MILE)	228.3 (367.4)
NOX GRAMS/KM (GRAMS/MILE)	.09 (.14)
FUEL CONSUMPTION BY CB L/100KM(MPG)	9.80 (24.00)
CALCULATED DISTANCE KM (MILES)	21.63 (13.45)

TABLE VEHICLE EMISSION RESULTS
FET

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. RUN
DATE 4/19/79
TIME
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM-274-F
ODOMETER 9691

BAROMETER 736.09 MM HG(28.98 IN HG)
DRY BULB TEMP. 27.8 DEG C(82.0 DEG F)

RELATIVE HUMIDITY 40 PCT
ABSOLUTE HUMIDITY 9.5 GM/KG(66.8 GRAINS/LB)

NOX HUMIDITY C.F. .9627

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	800.1 (31.5)
BLOWER INLET P MM. H2O(IN. H2O)	762.0 (30.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)
BLOWER REVOLUTIONS	61475
CVS FLOW STD. CU. METRES(SCF)	113.2 (3999.0)
HC SAMPLE METER/RANGE/PPM	18.7/ 2/ 19
HC BCKGRD METER/RANGE/PPM	13.5/ 2/ 13
CO SAMPLE METER/RANGE/PPM	91.5/13/ 93
CO BCKGRD METER/RANGE/PPM	2.0/13/ 2
CO2 SAMPLE METER/RANGE/PCT	91.6/ 3/ 1.71
CO2 BCKGRD METER/RANGE/PCT	4.1/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	8.9/ 2/ 9
NOX BCKGRD METER/RANGE/PPM	2.6/ 2/ 3
DILUTION FACTOR	7.78
HC CONCENTRATION PPM	7
CO CONCENTRATION PPM	87
CO2 CONCENTRATION PCT	1.66
NOX CONCENTRATION PPM	6.6
HC MASS GRAMS	.45
CO MASS GRAMS	11.41
CO2 MASS GRAMS	3435.6
NOX MASS GRAMS	1.38
HC GRAMS/KM (GRAMS/MILE)	.03 (.04)
CO GRAMS/KM (GRAMS/MILE)	.70 (1.13)
CO2 GRAMS/KM (GRAMS/MILE)	211.2 (339.9)
NOX GRAMS/KM (GRAMS/MILE)	.09 (.14)
FUEL CONSUMPTION BY CB L/100KM(MPG)	9.07 (25.95)
CALCULATED DISTANCE KM (MILES)	16.27 (10.11)

TABLE VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 1591 KG(3500 LBS)

TEST NO. 3 RUN 1
DATE 5/11/79
TIME 13:09
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM-274-F
ODOMETER 14998

BAROMETER 739.14 MM HG(29.10 IN HG)
DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)

RELATIVE HUMIDITY 62 PCT
ABSOLUTE HUMIDITY 11.9 GM/KG(83.3 GRAINS/LB)

NOX HUMIDITY C.F. 1.0404

BAG RESULTS

	1	2	3
BAG NUMBER			
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H20(IN. H20)	787.4 (31.0)	787.4 (31.0)	800.1 (31.5)
BLOWER INLET P MM. H20(IN. H20)	774.7 (30.5)	774.7 (30.5)	774.7 (30.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	43.3 (110.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40477	69682	40471
CVS FLOW STD. CU. METRES(SCF)	74.8 (2642.7)	128.8 (4549.1)	74.8 (2640.6)
HC SAMPLE METER/RANGE/PPM	54.8/ 2/ 55	12.9/ 2/ 13	16.3/ 2/ 16
HC BCKGRD METER/RANGE/PPM	9.4/ 2/ 9	8.2/ 2/ 8	8.9/ 2/ 9
CO SAMPLE METER/RANGE/PPM	76.0/11/ 338	74.6/13/ 73	57.1/13/ 55
CO BCKGRD METER/RANGE/PPM	1.0/11/ 3	1.8/13/ 2	.5/13/ 0
CO2 SAMPLE METER/RANGE/PCT	68.6/ 3/ 1.24	45.0/ 3/ .77	63.8/ 3/ 1.14
CO2 BCKGRD METER/RANGE/PCT	2.7/ 3/ .04	2.7/ 3/ .04	2.8/ 3/ .04
NOX SAMPLE METER/RANGE/PPM	11.8/ 2/ 12	1.3/ 2/ 1	5.2/ 2/ 5
NOX BCKGRD METER/RANGE/PPM	1.4/ 2/ 1	1.0/ 2/ 1	1.1/ 2/ 1
DILUTION FACTOR	10.52	17.18	11.70
HC CONCENTRATION PPM	46	5	8
CO CONCENTRATION PPM	320	69	52
CO2 CONCENTRATION PCT	1.20	.73	1.10
NOX CONCENTRATION PPM	10.5	.4	4.2
HC MASS GRAMS	2.00	.38	.35
CO MASS GRAMS	27.91	10.37	4.53
CO2 MASS GRAMS	1642.1	1728.2	1505.6
NOX MASS GRAMS	1.57	.09	.62
HC GRAMS/KM (GRAMS/MILE)	.35 (.56)	.06 (.10)	.06 (.10)
CO GRAMS/KM (GRAMS/MILE)	4.85 (7.80)	1.67 (2.69)	.78 (1.26)
CO2 GRAMS/KM (GRAMS/MILE)	285.1 (458.7)	279.0 (448.9)	260.4 (419.0)
NOX GRAMS/KM (GRAMS/MILE)	.27 (.44)	.01 (.02)	.11 (.17)
FUEL CONSUMPTION BY CB L/100KM(MPG)	12.54 (18.76)	12.03 (19.56)	11.18 (21.05)
CALCULATED DISTANCE KM (MILES)	5.76 (3.58)	6.19 (3.85)	5.78 (3.59)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.12 (.19)
CO GRAMS/KM (GRAMS/MILE)	2.09 (3.36)
CO2 GRAMS/KM (GRAMS/MILE)	275.15 (442.71)
NOX GRAMS/KM (GRAMS/MILE)	.09 (.15)
FUEL CONSUMPTION BY CB L/100KM (MPG)	11.90 (19.77)

TABLE VEHICLE EMISSION RESULTS
SET

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 3 RUN 1
DATE 5/11/79
TIME 15:05
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM-274
ODOMETER 15012

BAROMETER 740.66 MM HG(29.16 IN HG)
DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)

RELATIVE HUMIDITY 42 PCT
ABSOLUTE HUMIDITY 8.2 GM/KG(57.1 GRAINS/LB)

NOX HUMIDITY C.F. .9222

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	787.4 (31.0)
BLOWER INLET P MM. H2O(IN. H2O)	774.7 (30.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)
BLOWER REVOLUTIONS	112057
CVS FLOW STD. CU. METRES(SCF)	207.6 (7332.3)
HC SAMPLE METER/RANGE/PPM	18.8/ 2/ 19
HC BCKGRD METER/RANGE/PPM	11.0/ 2/ 11
CO SAMPLE METER/RANGE/PPM	59.2/12/ 132
CO BCKGRD METER/RANGE/PPM	.6/12/ 1
CO2 SAMPLE METER/RANGE/PCT	24.8/ 3/ 1.36
CO2 BCKGRD METER/RANGE/PCT	3.3/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	5.3/ 2/ 5
NOX BCKGRD METER/RANGE/PPM	2.3/ 2/ 2
DILUTION FACTOR	9.73
HC CONCENTRATION PPM	9
CO CONCENTRATION PPM	126
CO2 CONCENTRATION PCT	1.32
NOX CONCENTRATION PPM	3.2
HC MASS GRAMS	1.07
CO MASS GRAMS	30.43
CO2 MASS GRAMS	5007.0
NOX MASS GRAMS	1.19
HC GRAMS/KM (GRAMS/MILE)	.05 (.08)
CO GRAMS/KM (GRAMS/MILE)	1.40 (2.25)
CO2 GRAMS/KM (GRAMS/MILE)	229.8 (369.7)
NOX GRAMS/KM (GRAMS/MILE)	.05 (.09)
FUEL CONSUMPTION BY CB L/100KM(MPG)	9.91 (23.74)
CALCULATED DISTANCE KM (MILES)	21.79 (13.54)

TABLE VEHICLE EMISSION RESULTS
FET

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 3 RUN 1
DATE 5/11/79
TIME 15:40
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM-279
ODOMETER 15025

BAROMETER 740.66 MM HG(29.16 IN HG)
DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)

RELATIVE HUMIDITY 51 PCT
ABSOLUTE HUMIDITY 9.7 GM/KG(68.1 GRAINS/LB)

NOX HUMIDITY C.F. .9687

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	787.4 (31.0)
BLOWER INLET P MM. H2O(IN. H2O)	774.7 (30.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)
BLOWER REVOLUTIONS	61450
CVS FLOW STD. CU. METRES(SCF)	113.8 (4021.1)
HC SAMPLE METER/RANGE/PPM	19.9/ 2/ 20
HC BCKGRD METER/RANGE/PPM	9.0/ 2/ 9
CO SAMPLE METER/RANGE/PPM	70.5/12/ 160
CO BCKGRD METER/RANGE/PPM	.6/12/ 1
CO2 SAMPLE METER/RANGE/PCT	94.3/ 3/ 1.77
CO2 BCKGRD METER/RANGE/PCT	2.4/ 3/ .04
NOX SAMPLE METER/RANGE/PPM	8.1/ 2/ 8
NOX BCKGRD METER/RANGE/PPM	2.0/ 2/ 2
DILUTION FACTOR	7.50
HC CONCENTRATION PPM	12
CO CONCENTRATION PPM	151
CO2 CONCENTRATION PCT	1.74
NOX CONCENTRATION PPM	6.4
HC MASS GRAMS	.79
CO MASS GRAMS	19.97
CO2 MASS GRAMS	3621.0
NOX MASS GRAMS	1.34
HC GRAMS/KM (GRAMS/MILE)	.05 (.08)
CO GRAMS/KM (GRAMS/MILE)	1.20 (1.93)
CO2 GRAMS/KM (GRAMS/MILE)	217.5 (349.9)
NOX GRAMS/KM (GRAMS/MILE)	.08 (.13)
FUEL CONSUMPTION BY CB L/100KM(MPG)	9.37 (25.11)
CALCULATED DISTANCE KM (MILES)	16.65 (10.35)

TABLE VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 3 RUN 2
DATE 5/21/79
TIME 09:33
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM-274-F
ODOMETER 15048

BAROMETER 738.12 MM HG(29.06 IN HG)
DRY BULB TEMP. 22.2 DEG C(72.0 DEG F)

RELATIVE HUMIDITY 69 PCT
ABSOLUTE HUMIDITY 11.9 GM/KG(83.4 GRAINS/LB)

NOX HUMIDITY C.F. 1.0410

BAG RESULTS

	1	2	3
BAG NUMBER			
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	800.1 (31.5)	800.1 (31.5)	800.1 (31.5)
BLOWER INLET P MM. H2O(IN. H2O)	787.4 (31.0)	787.4 (31.0)	787.4 (31.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	42.2 (108.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40561	69753	40518
CVS FLOW STD. CU. METRES(SCF)	74.7 (2639.3)	128.8 (4547.6)	74.6 (2636.3)
HC SAMPLE METER/RANGE/PPM	62.8/ 2/ 63	10.9/ 2/ 11	19.5/ 2/ 19
HC BCKGRD METER/RANGE/PPM	11.9/ 2/ 12	9.4/ 2/ 9	9.1/ 2/ 9
CO SAMPLE METER/RANGE/PPM	76.7/11/ 343	4.8/13/ 5	60.6/13/ 58
CO BCKGRD METER/RANGE/PPM	1.0/11/ 3	2.1/13/ 2	1.6/13/ 2
CO2 SAMPLE METER/RANGE/PCT	70.2/ 3/ 1.27	48.4/ 3/ .84	63.4/ 3/ 1.13
CO2 BCKGRD METER/RANGE/PCT	2.9/ 3/ .04	3.0/ 3/ .05	2.9/ 3/ .04
NOX SAMPLE METER/RANGE/PPM	21.3/ 2/ 21	8.6/ 2/ 9	18.5/ 2/ 18
NOX BCKGRD METER/RANGE/PPM	2.9/ 2/ 3	1.4/ 2/ 1	1.0/ 2/ 1
DILUTION FACTOR	10.25	15.99	11.77
HC CONCENTRATION PPM	52	2	11
CO CONCENTRATION PPM	324	3	54
CO2 CONCENTRATION PCT	1.23	.79	1.09
NOX CONCENTRATION PPM	18.7	7.3	17.6
HC MASS GRAMS	2.24	.16	.48
CO MASS GRAMS	28.19	.39	4.73
CO2 MASS GRAMS	1680.8	1870.6	1490.3
NOX MASS GRAMS	2.78	1.87	2.61
HC GRAMS/KM (GRAMS/MILE)	.39 (.63)	.02 (.04)	.08 (.13)
CO GRAMS/KM (GRAMS/MILE)	4.90 (7.89)	.06 (.10)	.82 (1.32)
CO2 GRAMS/KM (GRAMS/MILE)	292.4 (470.4)	300.8 (484.0)	258.8 (416.4)
NOX GRAMS/KM (GRAMS/MILE)	.48 (.78)	.30 (.48)	.45 (.73)
FUEL CONSUMPTION BY CB L/100KM(MPG)	12.86 (18.29)	12.85 (18.31)	11.11 (21.17)
CALCULATED DISTANCE KM (MILES)	5.75 (3.57)	6.22 (3.87)	5.76 (3.58)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.12 (.19)
CO GRAMS/KM (GRAMS/MILE)	1.27 (2.04)
CO2 GRAMS/KM (GRAMS/MILE)	287.55 (462.67)
NOX GRAMS/KM (GRAMS/MILE)	.38 (.61)
FUEL CONSUMPTION BY CB L/100KM (MPG)	12.37 (19.01)

TABLE VEHICLE EMISSION RESULTS
SET

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 3 RUN 2
DATE 5/21/79
TIME 11:59
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM-274-F
ODOMETER 15062

BAROMETER 738.12 MM HG(29.06 IN HG)
DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)

RELATIVE HUMIDITY 59 PCT
ABSOLUTE HUMIDITY 11.2 GM/KG(78.3 GRAINS/LB)

NOX HUMIDITY C.F. 1.0157

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	800.1 (31.5)
BLOWER INLET P MM. H2O(IN. H2O)	787.4 (31.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)
BLOWER REVOLUTIONS	112149
CVS FLOW STD. CU. METRES(SCF)	206.6 (7297.0)
HC SAMPLE METER/RANGE/PPM	9.7/ 2/ 10
HC BCKGRD METER/RANGE/PPM	8.1/ 2/ 8
CO SAMPLE METER/RANGE/PPM	11.7/13/ 11
CO BCKGRD METER/RANGE/PPM	1.1/13/ 1
CO2 SAMPLE METER/RANGE/PCT	76.6/ 3/ 1.40
CO2 BCKGRD METER/RANGE/PCT	3.2/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	10.9/ 2/ 11
NOX BCKGRD METER/RANGE/PPM	1.0/ 2/ 1
DILUTION FACTOR	9.56
HC CONCENTRATION PPM	2
CO CONCENTRATION PPM	10
CO2 CONCENTRATION PCT	1.36
NOX CONCENTRATION PPM	10.0
HC MASS GRAMS	.29
CO MASS GRAMS	2.36
CO2 MASS GRAMS	5128.7
NOX MASS GRAMS	4.02
HC GRAMS/KM (GRAMS/MILE)	.01 (.02)
CO GRAMS/KM (GRAMS/MILE)	.11 (.18)
CO2 GRAMS/KM (GRAMS/MILE)	236.8 (381.0)
NOX GRAMS/KM (GRAMS/MILE)	.19 (.30)
FUEL CONSUMPTION BY CB L/100KM(MPG)	10.12 (23.26)
CALCULATED DISTANCE KM (MILES)	21.66 (13.46)

TABLE VEHICLE EMISSION RESULTS
FET

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 3 RUN 2
DATE 5/21/79
TIME 12:31
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM-274-F
ODOMETER 15076

BAROMETER 738.12 MM. HG(29.06 IN HG)
DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)

RELATIVE HUMIDITY 55 PCT
ABSOLUTE HUMIDITY 10.5 GM/KG(73.3 GRAINS/LB)

NOX HUMIDITY C.F. .9921

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	800.1 (31.5)
BLOWER INLET P MM. H2O(IN. H2O)	787.4 (31.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)
BLOWER REVOLUTIONS	61471
CVS FLOW STD. CU. METRES(SCF)	113.2 (3999.7)
HC SAMPLE METER/RANGE/PPM	11.1/ 2/ 11
HC BCKGRD METER/RANGE/PPM	7.9/ 2/ 8
CO SAMPLE METER/RANGE/PPM	31.7/13/ 30
CO BCKGRD METER/RANGE/PPM	1.2/13/ 1
CO2 SAMPLE METER/RANGE/PCT	93.6/ 3/ 1.75
CO2 BCKGRD METER/RANGE/PCT	3.1/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	20.0/ 3/ 60
NOX BCKGRD METER/RANGE/PPM	1.4/ 2/ 1
DILUTION FACTOR	7.62
HC CONCENTRATION PPM	4
CO CONCENTRATION PPM	27
CO2 CONCENTRATION PCT	1.71
NOX CONCENTRATION PPM	58.8
HC MASS GRAMS	.28
CO MASS GRAMS	3.62
CO2 MASS GRAMS	3551.6
NOX MASS GRAMS	12.63
HC GRAMS/KM (GRAMS/MILE)	.02 (.03)
CO GRAMS/KM (GRAMS/MILE)	.22 (.36)
CO2 GRAMS/KM (GRAMS/MILE)	217.9 (350.6)
NOX GRAMS/KM (GRAMS/MILE)	.78 (1.25)
FUEL CONSUMPTION BY CB L/100KM(MPG)	9.32 (25.25)
CALCULATED DISTANCE KM (MILES)	16.30 (10.13)

TABLE VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4246-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 4 RUN 1
DATE 6/12/79
TIME 12:57
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.1 KW(12.2 HP)
GASOLINE EM
ODOMETER 19935

BAROMETER 745.74 MM HG(29.36 IN HG)
DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)

RELATIVE HUMIDITY 35 PCT
ABSOLUTE HUMIDITY 6.8 GM/KG(47.5 GRAINS/LB)

NOX HUMIDITY C.F. .8857

BAG RESULTS

BAG NUMBER	1	2	3
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	838.2 (33.0)	838.2 (33.0)	838.2 (33.0)
BLOWER INLET P MM. H2O(IN. H2O)	812.8 (32.0)	812.8 (32.0)	812.8 (32.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	41.7 (107.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40421	69504	40312
CVS FLOW STD. CU. METRES(SCF)	75.0 (2649.2)	129.3 (4568.5)	74.8 (2641.9)
HC SAMPLE METER/RANGE/PPM	79.9/ 2/ 80	12.4/ 2/ 12	20.7/ 2/ 21
HC BCKGRD METER/RANGE/PPM	11.8/ 2/ 12	10.1/ 2/ 10	9.4/ 2/ 9
CO SAMPLE METER/RANGE/PPM	88.9/11/ 436	34.5/13/ 33	53.2/12/ 118
CO BCKGRD METER/RANGE/PPM	2.4/11/ 7	5.7/13/ 6	1.7/12/ 3
CO2 SAMPLE METER/RANGE/PCT	71.3/ 3/ 1.29	48.9/ 3/ .85	64.1/ 3/ 1.14
CO2 BCKGRD METER/RANGE/PCT	3.5/ 3/ .05	3.7/ 3/ .06	3.5/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	32.4/ 2/ 32	5.2/ 2/ 5	18.2/ 2/ 18
NOX BCKGRD METER/RANGE/PPM	1.2/ 2/ 1	1.1/ 2/ 1	1.0/ 2/ 1
DILUTION FACTOR	9.99	15.76	11.57
HC CONCENTRATION PPM	69	3	12
CO CONCENTRATION PPM	413	27	111
CO2 CONCENTRATION PCT	1.24	.79	1.10
NOX CONCENTRATION PPM	31.3	4.2	17.3
HC MASS GRAMS	3.00	.22	.52
CO MASS GRAMS	36.11	4.01	9.69
CO2 MASS GRAMS	1706.6	1878.0	1501.2
NOX MASS GRAMS	3.98	.91	2.19
HC GRAMS/KM (GRAMS/MILE)	.52 (.84)	.04 (.06)	.09 (.14)
CO GRAMS/KM (GRAMS/MILE)	6.29 (10.12)	.65 (1.04)	1.61 (2.59)
CO2 GRAMS/KM (GRAMS/MILE)	297.1 (478.1)	303.2 (487.8)	249.8 (401.9)
NOX GRAMS/KM (GRAMS/MILE)	.69 (1.12)	.15 (.24)	.36 (.59)
FUEL CONSUMPTION BY CB L/100KM(MPG)	13.17 (17.86)	12.99 (18.11)	10.78 (21.82)
CALCULATED DISTANCE KM (MILES)	5.74 (3.57)	6.19 (3.85)	6.01 (3.74)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.15 (.24)
CO GRAMS/KM (GRAMS/MILE)	2.08 (3.35)
CO2 GRAMS/KM (GRAMS/MILE)	286.94 (461.68)
NOX GRAMS/KM (GRAMS/MILE)	.32 (.52)
FUEL CONSUMPTION BY CB L/100KM (MPG)	12.41 (18.96)

TABLE VEHICLE EMISSION RESULTS
SET FET

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 11-4746-001
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 4 RUN 1
DATE 6/12/79
TIME 15:00
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.1 KW(12.2 HP)
GASOLINE
ODOMETER 19999

BAROMETER 745.24 MM HG(29.34 IN HG)
DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)

RELATIVE HUMIDITY 38 PCT
ABSOLUTE HUMIDITY 7.0 GM/KG(49.3 GRAINS/LB)

NOX HUMIDITY C.F. .8921

BAG RESULTS

BAG NUMBER	1	2
BLOWER DIF P MM. H2O(IN. H2O)	838.2 (33.0)	838.2 (33.0)
BLOWER INLET P MM. H2O(IN. H2O)	812.8 (32.0)	812.8 (32.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	43.9 (111.0)
BLOWER REVOLUTIONS	111559	61389
CVS FLOW STD. CU. METRES(SCF)	206.8 (7304.5)	113.7 (4016.7)
HC SAMPLE METER/RANGE/PPM	11.8/ 2/ 12	12.8/ 2/ 13
HC BCKGRD METER/RANGE/PPM	9.4/ 2/ 9	8.2/ 2/ 8
CO SAMPLE METER/RANGE/PPM	47.2/13/ 45	73.1/13/ 72
CO BCKGRD METER/RANGE/PPM	3.1/13/ 3	2.7/13/ 3
CO2 SAMPLE METER/RANGE/PCT	75.7/ 3/ 1.38	92.2/ 3/ 1.72
CO2 BCKGRD METER/RANGE/PCT	3.2/ 3/ .05	3.1/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	16.7/ 2/ 17	19.2/ 2/ 19
NOX BCKGRD METER/RANGE/PPM	2.0/ 2/ 2	1.6/ 2/ 2
DILUTION FACTOR	9.67	7.73
HC CONCENTRATION PPM	3	6
CO CONCENTRATION PPM	40	66
CO2 CONCENTRATION PCT	1.34	1.68
NOX CONCENTRATION PPM	14.9	17.8
HC MASS GRAMS	.40	.37
CO MASS GRAMS	9.74	8.76
CO2 MASS GRAMS	5063.5	3505.3
NOX MASS GRAMS	5.26	3.46
HC GRAMS/KM (GRAMS/MILE)	.02 (.03)	.02 (.04)
CO GRAMS/KM (GRAMS/MILE)	.45 (.72)	.54 (.86)
CO2 GRAMS/KM (GRAMS/MILE)	232.9 (374.7)	214.2 (344.7)
NOX GRAMS/KM (GRAMS/MILE)	.24 (.39)	.21 (.34)
FUEL CONSUMPTION BY CB L/100KM(MPG)	9.97 (23.59)	9.18 (25.62)
CALCULATED DISTANCE KM (MILES)	21.74 (13.51)	16.36 (10.17)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.02 (.03)
CO GRAMS/KM (GRAMS/MILE)	.49 (.78)
CO2 GRAMS/KM (GRAMS/MILE)	224.85 (361.78)
NOX GRAMS/KM (GRAMS/MILE)	.23 (.37)
FUEL CONSUMPTION BY CB L/100KM (MPG)	9.63 (24.42)

TABLE VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION
GVW 0 KG(-0 LBS)

TEST NO. 4 RUN 2
DATE 6/13/79
TIME 10:22
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM-274-F
ODOMETER 19973

BAROMETER 748.54 MM HG(29.47 IN HG)
DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)

RELATIVE HUMIDITY 38 PCT
ABSOLUTE HUMIDITY 7.4 GM/KG(51.7 GRAINS/LB)

NOX HUMIDITY C.F. .9012

BAG RESULTS

BAG NUMBER	1	2	3
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	838.2 (33.0)	838.2 (33.0)	825.5 (32.5)
BLOWER INLET P MM. H2O(IN. H2O)	812.8 (32.0)	812.8 (32.0)	800.1 (31.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	41.1 (106.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40468	69622	40416
CVS FLOW STD. CU. METRES(SCF)	75.4 (2663.8)	130.3 (4600.7)	75.4 (2664.7)
HC SAMPLE METER/RANGE/PPM	81.0/ 2/ 81	10.8/ 2/ 11	18.8/ 2/ 19
HC BCKGRD METER/RANGE/PPM	11.6/ 2/ 12	9.8/ 2/ 10	8.5/ 2/ 9
CO SAMPLE METER/RANGE/PPM	87.2/11/ 422	27.1/13/ 26	95.3/13/ 97
CO BCKGRD METER/RANGE/PPM	1.1/11/ 3	3.0/13/ 3	2.3/13/ 2
CO2 SAMPLE METER/RANGE/PCT	72.5/ 3/ 1.32	47.7/ 3/ .82	65.6/ 3/ 1.18
CO2 BCKGRD METER/RANGE/PCT	3.2/ 3/ .05	3.7/ 3/ .06	3.5/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	28.5/ 2/ 28	5.0/ 2/ 5	21.0/ 2/ 21
NOX BCKGRD METER/RANGE/PPM	1.2/ 2/ 1	1.3/ 2/ 1	1.5/ 2/ 2
DILUTION FACTOR	9.82	16.21	11.30
HC CONCENTRATION PPM	71	2	11
CO CONCENTRATION PPM	403	22	92
CO2 CONCENTRATION PCT	1.27	.77	1.13
NOX CONCENTRATION PPM	27.4	3.8	19.6
HC MASS GRAMS	3.07	.12	.48
CO MASS GRAMS	35.37	3.37	8.04
CO2 MASS GRAMS	1755.7	1836.1	1556.0
NOX MASS GRAMS	3.57	.85	2.55
HC GRAMS/KM (GRAMS/MILE)	.53 (.85)	.02 (.03)	.08 (.13)
CO GRAMS/KM (GRAMS/MILE)	6.10 (9.82)	.54 (.87)	1.39 (2.23)
CO2 GRAMS/KM (GRAMS/MILE)	303.0 (487.5)	293.3 (471.9)	268.6 (432.2)
NOX GRAMS/KM (GRAMS/MILE)	.62 (.99)	.14 (.22)	.44 (.71)
FUEL CONSUMPTION BY CB L/100KM(MPG)	13.41 (17.54)	12.56 (18.73)	11.57 (20.33)
CALCULATED DISTANCE KM (MILES)	5.79 (3.60)	6.26 (3.89)	5.79 (3.60)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.14 (.23)
CO GRAMS/KM (GRAMS/MILE)	1.92 (3.09)
CO2 GRAMS/KM (GRAMS/MILE)	288.53 (464.25)
NOX GRAMS/KM (GRAMS/MILE)	.32 (.51)
FUEL CONSUMPTION BY CB L/100KM (MPG)	12.46 (18.87)

TABLE VEHICLE EMISSION RESULTS
SET FET

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 4 RUN 2
DATE 6/13/79
TIME 12:53
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM-274-F
ODOMETER 19988

BAROMETER 744.98 MM HG(29.33 IN HG)
DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)

RELATIVE HUMIDITY 42 PCT
ABSOLUTE HUMIDITY 8.1 GM/KG(56.6 GRAINS/LB)

NOX HUMIDITY C.F. .9203

BAG RESULTS

BAG NUMBER	1	2
BLOWER DIF P MM. H2O(IN. H2O)	838.2 (33.0)	838.2 (33.0)
BLOWER INLET P MM. H2O(IN. H2O)	812.8 (32.0)	812.8 (32.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	42.2 (108.0)	45.6 (114.0)
BLOWER REVOLUTIONS	111912	61391
CVS FLOW STD. CU. METRES(SCF)	207.8 (7340.5)	113.8 (4018.5)
HC SAMPLE METER/RANGE/PPM	13.2/ 2/ 13	12.1/ 2/ 12
HC BCKGRD METER/RANGE/PPM	11.6/ 2/ 12	9.2/ 2/ 9
CO SAMPLE METER/RANGE/PPM	34.0/13/ 32	53.4/13/ 51
CO BCKGRD METER/RANGE/PPM	1.7/13/ 2	1.8/13/ 2
CO2 SAMPLE METER/RANGE/PCT	76.0/ 3/ 1.39	94.1/ 3/ 1.76
CO2 BCKGRD METER/RANGE/PCT	3.1/ 3/ .05	2.9/ 3/ .04
NOX SAMPLE METER/RANGE/PPM	15.7/ 2/ 16	22.9/ 2/ 23
NOX BCKGRD METER/RANGE/PPM	.8/ 2/ 1	.8/ 2/ 1
DILUTION FACTOR	9.63	7.57
HC CONCENTRATION PPM	3	4
CO CONCENTRATION PPM	29	47
CO2 CONCENTRATION PCT	1.34	1.73
NOX CONCENTRATION PPM	15.0	22.2
HC MASS GRAMS	.34	.27
CO MASS GRAMS	7.11	6.24
CO2 MASS GRAMS	5117.4	3595.9
NOX MASS GRAMS	5.48	4.45
HC GRAMS/KM (GRAMS/MILE)	.02 (.02)	.02 (.03)
CO GRAMS/KM (GRAMS/MILE)	.33 (.52)	.38 (.61)
CO2 GRAMS/KM (GRAMS/MILE)	234.5 (377.3)	219.0 (352.3)
NOX GRAMS/KM (GRAMS/MILE)	.25 (.40)	.27 (.44)
FUEL CONSUMPTION BY CB L/100KM(MPG)	10.03 (23.45)	9.37 (25.09)
CALCULATED DISTANCE KM (MILES)	21.83 (13.56)	16.42 (10.21)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.02 (.03)
CO GRAMS/KM (GRAMS/MILE)	.35 (.56)
CO2 GRAMS/KM (GRAMS/MILE)	227.82 (366.56)
NOX GRAMS/KM (GRAMS/MILE)	.26 (.42)
FUEL CONSUMPTION BY CB L/100KM (MPG)	9.75 (24.13)

TABLE VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-001

VEHICLE NO.
VEHICLE MODEL 78 VOLVO
ENGINE 2.3 L(140 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 06 RUN 1
DATE 7/ 6/79
TIME 01:00
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 0 KG(-0 LBS)
ACTUAL ROAD LOAD 0.0 KW(-0.0 HP)
GASOLINE
ODOMETER -0

BAROMETER 739.14 MM HG(29.10 IN HG)
DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)

RELATIVE HUMIDITY 63 PCT
ABSOLUTE HUMIDITY 12.9 GM/KG(90.4 GRAINS/LB)

NOX HUMIDITY C.F. 1.0781

BAG RESULTS

BAG NUMBER	1	2	3
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	927.1 (36.5)	927.1 (36.5)	916.9 (36.1)
BLOWER INLET P MM. H2O(IN. H2O)	901.7 (35.5)	901.7 (35.5)	889.0 (35.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	43.3 (110.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40514	69350	40138
CVS FLOW STD. CU. METRES(SCF)	73.5 (2595.3)	125.8 (4441.8)	72.9 (2574.4)
HC SAMPLE METER/RANGE/PPM	71.6/ 2/ 72	14.7/ 2/ 15	19.0/ 2/ 19
HC BCKGRD METER/RANGE/PPM	7.9/ 2/ 8	6.4/ 2/ 6	6.2/ 2/ 6
CO SAMPLE METER/RANGE/PPM	85.5/11/ 404	17.4/13/ 15	27.6/13/ 25
CO BCKGRD METER/RANGE/PPM	1.0/11/ 3	.7/13/ 1	.7/13/ 1
CO2 SAMPLE METER/RANGE/PCT	71.5/ 3/ 1.29	45.6/ 3/ .78	66.3/ 3/ 1.19
CO2 BCKGRD METER/RANGE/PCT	3.1/ 3/ .05	3.3/ 3/ .05	3.1/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	33.3/ 2/ 33	4.6/ 2/ 5	23.6/ 2/ 24
NOX BCKGRD METER/RANGE/PPM	.9/ 2/ 1	.4/ 2/ 0	.6/ 2/ 1
DILUTION FACTOR	10.00	17.05	11.23
HC CONCENTRATION PPM	64	9	13
CO CONCENTRATION PPM	383	14	23
CO2 CONCENTRATION PCT	1.25	.74	1.15
NOX CONCENTRATION PPM	32.5	4.2	23.1
HC MASS GRAMS	2.73	.63	.56
CO MASS GRAMS	32.81	2.09	1.97
CO2 MASS GRAMS	1684.8	1693.6	1529.6
NOX MASS GRAMS	4.92	1.10	3.47
HC GRAMS/KM (GRAMS/MILE)	.47 (.76)	.10 (.16)	.10 (.16)
CO GRAMS/KM (GRAMS/MILE)	5.70 (9.17)	.34 (.55)	.34 (.56)
CO2 GRAMS/KM (GRAMS/MILE)	292.7 (471.0)	275.1 (442.6)	267.5 (430.4)
NOX GRAMS/KM (GRAMS/MILE)	.86 (1.38)	.18 (.29)	.61 (.98)
FUEL CONSUMPTION BY CB L/100KM(MPG)	12.94 (18.18)	11.78 (19.97)	11.45 (20.54)
CALCULATED DISTANCE KM (MILES)	5.76 (3.58)	6.16 (3.83)	5.72 (3.55)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.18 (.29)
CO GRAMS/KM (GRAMS/MILE)	1.45 (2.34)
CO2 GRAMS/KM (GRAMS/MILE)	276.66 (445.14)
NOX GRAMS/KM (GRAMS/MILE)	.44 (.70)
FUEL CONSUMPTION BY CB L/100KM (MPG)	11.93 (19.72)

TABLE VEHICLE EMISSION RESULTS
HFET

PROJECT NO. 11-4746-001

VEHICLE NO.
VEHICLE MODEL 78
ENGINE 2.3 L(140 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 06 RUN 1
DATE 7/ 6/79
TIME
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 0.0 KW(-0.0 HP)
GASOLINE
ODOMETER -0

BAROMETER 739.14 MM HG(29.10 IN HG)
DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)

RELATIVE HUMIDITY 63 PCT
ABSOLUTE HUMIDITY 12.9 GM/KG(90.4 GRAINS/LB)

NOX HUMIDITY C.F. 1.0781

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	944.9 (37.2)
BLOWER INLET P MM. H2O(IN. H2O)	914.4 (36.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)
BLOWER REVOLUTIONS	61172
CVS FLOW STD. CU. METRES(SCF)	110.7 (3910.2)
HC SAMPLE METER/RANGE/PPM	17.3/ 2/ 17
HC BCKGRD METER/RANGE/PPM	10.5/ 2/ 10
CO SAMPLE METER/RANGE/PPM	13.1/13/ 12
CO BCKGRD METER/RANGE/PPM	.6/13/ 1
CO2 SAMPLE METER/RANGE/PCT	94.5/ 3/ 1.77
CO2 BCKGRD METER/RANGE/PCT	4.6/ 3/ .07
NOX SAMPLE METER/RANGE/PPM	34.0/ 2/ 34
NOX BCKGRD METER/RANGE/PPM	1.5/ 2/ 2
DILUTION FACTOR	7.55
HC CONCENTRATION PPM	8
CO CONCENTRATION PPM	10
CO2 CONCENTRATION PCT	1.71
NOX CONCENTRATION PPM	32.7
HC MASS GRAMS	.52
CO MASS GRAMS	1.35
CO2 MASS GRAMS	3469.7
NOX MASS GRAMS	7.47
HC GRAMS/KM (GRAMS/MILE)	.03 (.05)
CO GRAMS/KM (GRAMS/MILE)	.08 (.13)
CO2 GRAMS/KM (GRAMS/MILE)	215.9 (347.4)
NOX GRAMS/KM (GRAMS/MILE)	.46 (.75)
FUEL CONSUMPTION BY CB L/100KM(MPG)	9.23 (25.50)
CALCULATED DISTANCE KM (MILES)	16.07 (9.99)

TABLE VEHICLE EMISSION RESULTS
SET-7

PROJECT NO. 11-4746-001

VEHICLE NO.
VEHICLE MODEL 78
ENGINE 2.3 L(140 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 06 RUN 1
DATE 7/ 6/79
TIME 03:00
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 0.0 KW(-0.0 HP)
GASOLINE
ODOMETER -0

BAROMETER 739.14 MM HG(29.10 IN HG)
DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)

RELATIVE HUMIDITY 63 PCT
ABSOLUTE HUMIDITY 12.9 GM/KG(90.4 GRAINS/LB)

NOX HUMIDITY C.F. 1.0781

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	914.4 (36.0)
BLOWER INLET P MM. H2O(IN. H2O)	889.0 (35.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)
BLOWER REVOLUTIONS	111699
CVS FLOW STD. CU. METRES(SCF)	202.9 (7167.5)
HC SAMPLE METER/RANGE/PPM	17.8/ 2/ 18
HC BCKGRD METER/RANGE/PPM	11.4/ 2/ 11
CO SAMPLE METER/RANGE/PPM	19.8/13/ 18
CO BCKGRD METER/RANGE/PPM	.7/13/ 1
CO2 SAMPLE METER/RANGE/PCT	76.2/ 3/ 1.39
CO2 BCKGRD METER/RANGE/PCT	4.0/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	20.6/ 2/ 21
NOX BCKGRD METER/RANGE/PPM	1.5/ 2/ 2
DILUTION FACTOR	9.61
HC CONCENTRATION PPM	8
CO CONCENTRATION PPM	16
CO2 CONCENTRATION PCT	1.39
NOX CONCENTRATION PPM	19.3
HC MASS GRAMS	.89
CO MASS GRAMS	3.84
CO2 MASS GRAMS	4965.7
NOX MASS GRAMS	8.06
HC GRAMS/KM (GRAMS/MILE)	.04 (.07)
CO GRAMS/KM (GRAMS/MILE)	.18 (.29)
CO2 GRAMS/KM (GRAMS/MILE)	231.4 (372.2)
NOX GRAMS/KM (GRAMS/MILE)	.38 (.60)
FUEL CONSUMPTION BY CB L/100KM(MPG)	9.89 (23.78)
CALCULATED DISTANCE KM (MILES)	21.46 (13.34)

TABLE VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(0 LBS)

TEST NO. 6 RUN 2
DATE 7/10/79
TIME 12:55
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM-274-F
ODOMETER 25059

BAROMETER 738.86 MM HG(29.09 IN HG)
DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)

RELATIVE HUMIDITY 60 PCT
ABSOLUTE HUMIDITY 12.2 GM/KG(85.1 GRAINS/LB)

NOX HUMIDITY C.F. 1.0499

BAG RESULTS

	1	2	3
BAG NUMBER			
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	901.7 (35.5)	901.7 (35.5)	901.7 (35.5)
BLOWER INLET P MM. H2O(IN. H2O)	876.3 (34.5)	876.3 (34.5)	876.3 (34.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.9 (111.0)	43.3 (110.0)	44.4 (112.0)
BLOWER REVOLUTIONS	40451	69376	40335
CVS FLOW STD. CU. METRES(SCF)	73.5 (2597.4)	126.2 (4458.0)	73.2 (2586.9)
HC SAMPLE METER/RANGE/PPM	81.1/ 2/ 81	14.0/ 2/ 14	20.5/ 2/ 20
HC BCKGRD METER/RANGE/PPM	6.9/ 2/ 7	6.0/ 2/ 6	6.3/ 2/ 6
CO SAMPLE METER/RANGE/PPM	93.8/11/ 475	25.3/13/ 23	53.3/13/ 51
CO BCKGRD METER/RANGE/PPM	.8/11/ 2	1.4/13/ 1	1.3/13/ 1
CO2 SAMPLE METER/RANGE/PCT	70.0/ 3/ 1.26	46.6/ 3/ .80	63.3/ 3/ 1.13
CO2 BCKGRD METER/RANGE/PCT	3.5/ 3/ .05	3.5/ 3/ .05	3.2/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	30.8/ 2/ 31	4.0/ 2/ 4	20.3/ 2/ 20
NOX BCKGRD METER/RANGE/PPM	1.4/ 2/ 1	.9/ 2/ 1	.7/ 2/ 1
DILUTION FACTOR	10.17	16.63	11.80
HC CONCENTRATION PPM	75	8	15
CO CONCENTRATION PPM	453	21	48
CO2 CONCENTRATION PCT	1.22	.75	1.08
NOX CONCENTRATION PPM	29.5	3.2	19.7
HC MASS GRAMS	3.18	.61	.62
CO MASS GRAMS	38.76	3.05	4.05
CO2 MASS GRAMS	1637.4	1737.2	1453.9
NOX MASS GRAMS	4.36	.80	2.89
HC GRAMS/KM (GRAMS/MILE)	.56 (.90)	.10 (.16)	.11 (.18)
CO GRAMS/KM (GRAMS/MILE)	6.83 (11.00)	.50 (.80)	.71 (1.15)
CO2 GRAMS/KM (GRAMS/MILE)	288.7 (464.5)	284.4 (457.6)	256.0 (411.8)
NOX GRAMS/KM (GRAMS/MILE)	.77 (1.24)	.13 (.21)	.51 (.82)
FUEL CONSUMPTION BY CB L/100KM(MPG)	12.86 (18.30)	12.19 (19.30)	10.99 (21.41)
CALCULATED DISTANCE KM (MILES)	5.67 (3.53)	6.11 (3.80)	5.68 (3.53)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.20 (.32)
CO GRAMS/KM (GRAMS/MILE)	1.87 (3.01)
CO2 GRAMS/KM (GRAMS/MILE)	277.49 (446.48)
NOX GRAMS/KM (GRAMS/MILE)	.37 (.59)
FUEL CONSUMPTION BY CB L/100KM (MPG)	12.00 (19.61)

TABLE VEHICLE EMISSION RESULTS

SET

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(0 LBS)

TEST NO. 6 RUN 2
DATE 7/10/79
TIME 1448
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM-274-F
ODOMETER 26401

BAROMETER 737.89 MM HG(29.05 IN HG)
DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)

RELATIVE HUMIDITY 45 PCT
ABSOLUTE HUMIDITY 8.9 GM/KG(62.0 GRAINS/LB) NOX HUMIDITY C.F. .9425

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	901.7 (35.5)
BLOWER INLET P MM. H2O(IN. H2O)	876.3 (34.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	44.4 (112.0)
BLOWER REVOLUTIONS	111769
CVS FLOW STD. CU. METRES(SCF)	202.6 (7157.4)
HC SAMPLE METER/RANGE/PPM	15.2/ 2/ 15
HC BCKGRD METER/RANGE/PPM	7.5/ 2/ 8
CO SAMPLE METER/RANGE/PPM	18.3/13/ 16
CO BCKGRD METER/RANGE/PPM	.9/13/ 1
CO2 SAMPLE METER/RANGE/PCT	73.6/ 3/ 1.34
CO2 BCKGRD METER/RANGE/PCT	3.9/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	18.8/ 2/ 19
NOX BCKGRD METER/RANGE/PPM	1.1/ 2/ 1
DILUTION FACTOR	9.99
HC CONCENTRATION PPM	8
CO CONCENTRATION PPM	15
CO2 CONCENTRATION PCT	1.28
NOX CONCENTRATION PPM	17.8
HC MASS GRAMS	.99
CO MASS GRAMS	3.51
CO2 MASS GRAMS	4764.7
NOX MASS GRAMS	6.51
HC GRAMS/KM (GRAMS/MILE)	.05 (.07)
CO GRAMS/KM (GRAMS/MILE)	.17 (.27)
CO2 GRAMS/KM (GRAMS/MILE)	224.2 (360.7)
NOX GRAMS/KM (GRAMS/MILE)	.31 (.49)
FUEL CONSUMPTION BY CB L/100KM(MPG)	9.59 (24.54)
CALCULATED DISTANCE KM (MILES)	21.25 (13.21)

TABLE VEHICLE EMISSION RESULTS
FET

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 0.0 L(-0 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 6 RUN 2
DATE 7/10/79
TIME 15:31
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM-274-F
ODOMETER 25087

BAROMETER 737.87 MM HG(29.05 IN HG)
DRY BULB TEMP. 27.2 DEG C(81.0 DEG F)

RELATIVE HUMIDITY 55 PCT
ABSOLUTE HUMIDITY 12.7 GM/KG(89.2 GRAINS/LB)

NOX HUMIDITY C.F. 1.0717

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	901.7 (35.5)
BLOWER INLET P MM. H2O(IN. H2O)	876.3 (34.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	44.4 (112.0)
BLOWER REVOLUTIONS	61248
CVS FLOW STD. CU. METRES(SCF)	111.1 (3922.4)
HC SAMPLE METER/RANGE/PPM	17.6/ 2/ 18
HC BCKGRD METER/RANGE/PPM	8.1/ 2/ 8
CO SAMPLE METER/RANGE/PPM	33.0/13/ 30
CO BCKGRD METER/RANGE/PPM	1.1/13/ 1
CO2 SAMPLE METER/RANGE/PCT	93.1/ 3/ 1.74
CO2 BCKGRD METER/RANGE/PCT	4.9/ 3/ .08
NOX SAMPLE METER/RANGE/PPM	33.6/ 2/ 34
NOX BCKGRD METER/RANGE/PPM	1.3/ 2/ 1
DILUTION FACTOR	7.67
HC CONCENTRATION PPM	11
CO CONCENTRATION PPM	28
CO2 CONCENTRATION PCT	1.68
NOX CONCENTRATION PPM	32.5
HC MASS GRAMS	.68
CO MASS GRAMS	3.58
CO2 MASS GRAMS	3412.1
NOX MASS GRAMS	7.39
HC GRAMS/KM (GRAMS/MILE)	.04 (.07)
CO GRAMS/KM (GRAMS/MILE)	.22 (.36)
CO2 GRAMS/KM (GRAMS/MILE)	210.8 (339.2)
NOX GRAMS/KM (GRAMS/MILE)	.46 (.73)
FUEL CONSUMPTION BY CB L/100KM(MPG)	9.02 (26.09)
CALCULATED DISTANCE KM (MILES)	16.19 (10.06)

TABLE VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) V-8
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 6 RUN 2
DATE 8/ 7/79
TIME 09:14
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM-274-F
ODOMETER 29929

BAROMETER 748.24 MM HG(29.34 IN HG)
DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)

RELATIVE HUMIDITY 67 PCT
ABSOLUTE HUMIDITY 13.0 GM/KG(91.2 GRAINS/LB)

NOX HUMIDITY C.F. 1.0826

BAG RESULTS

	1	2	3
BAG NUMBER			
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H20(IN. H20)	914.4 (36.0)	914.4 (36.0)	914.4 (36.0)
BLOWER INLET P MM. H20(IN. H20)	889.0 (35.0)	889.0 (35.0)	889.0 (35.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	43.3 (110.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40591	69458	40375
CVS FLOW STD. CU. METRES(SCF)	74.5 (2629.7)	127.4 (4498.7)	74.0 (2615.0)
HC SAMPLE METER/RANGE/PPM	9.3/ 3/ 93	9.3/ 2/ 9	15.2/ 2/ 15
HC BCKGRD METER/RANGE/PPM	.8/ 3/ 8	6.6/ 2/ 7	5.8/ 2/ 6
CO SAMPLE METER/RANGE/PPM	90.5/11/ 446	23.8/13/ 21	60.0/13/ 58
CO BCKGRD METER/RANGE/PPM	2.5/11/ 7	2.3/13/ 2	1.6/13/ 1
CO2 SAMPLE METER/RANGE/PCT	71.4/ 3/ 1.29	47.0/ 3/ .81	64.4/ 3/ 1.15
CO2 BCKGRD METER/RANGE/PCT	3.7/ 3/ .06	3.7/ 3/ .06	3.6/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	27.3/ 2/ 27	5.8/ 2/ 6	21.6/ 2/ 22
NOX BCKGRD METER/RANGE/PPM	1.4/ 2/ 1	.9/ 2/ 1	.9/ 2/ 1
DILUTION FACTOR	9.97	16.49	11.57
HC CONCENTRATION PPM	86	3	10
CO CONCENTRATION PPM	419	19	54
CO2 CONCENTRATION PCT	1.24	.76	1.10
NOX CONCENTRATION PPM	26.0	5.0	20.8
HC MASS GRAMS	3.68	.23	.42
CO MASS GRAMS	36.31	2.77	4.65
CO2 MASS GRAMS	1693.0	1764.1	1492.1
NOX MASS GRAMS	4.02	1.31	3.19
HC GRAMS/KM (GRAMS/MILE)	.64 (1.04)	.04 (.06)	.07 (.12)
CO GRAMS/KM (GRAMS/MILE)	6.35 (10.22)	.45 (.72)	.81 (1.30)
CO2 GRAMS/KM (GRAMS/MILE)	296.2 (476.6)	286.0 (460.2)	259.9 (418.2)
NOX GRAMS/KM (GRAMS/MILE)	.70 (1.13)	.21 (.34)	.55 (.89)
FUEL CONSUMPTION AY CB L/100KM(MPG)	13.16 (17.88)	12.24 (19.22)	11.16 (21.08)
CALCULATED DISTANCE KM (MILES)	5.72 (3.55)	6.17 (3.83)	5.74 (3.57)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.17 (.28)
CO GRAMS/KM (GRAMS/MILE)	1.77 (2.85)
CO2 GRAMS/KM (GRAMS/MILE)	280.94 (452.03)
NOX GRAMS/KM (GRAMS/MILE)	.41 (.66)
FUEL CONSUMPTION AY CB L/100KM (MPG)	12.13 (19.39)

TABLE VEHICLE EMISSION RESULTS
SET

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) V-8
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 6 RUN 2
DATE 8/7/79
TIME 14:08
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM-274-F
ODOMETER 29900

BAROMETER 743.20 MM HG(29.26 IN HG)
DRY BULB TEMP. 26.1 DEG C(79.0 DEG F)

RELATIVE HUMIDITY 50 PCT
ABSOLUTE HUMIDITY 10.8 GM/KG(75.9 GRAINS/LB) NOX HUMIDITY C.F. 1.0044

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	914.4 (36.0)
BLOWER INLET P MM. H2O(IN. H2O)	889.0 (35.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.9 (111.0)
BLOWER REVOLUTIONS	111805
CVS FLOW STD. CU. METRES(SCF)	204.2 (7212.1)
HC SAMPLE METER/RANGE/PPM	9.7/ 2/ 10
HC BCKGRD METER/RANGE/PPM	6.4/ 2/ 6
CO SAMPLE METER/RANGE/PPM	17.1/13/ 15
CO BCKGRD METER/RANGE/PPM	.7/13/ 1
CO2 SAMPLE METER/RANGE/PCT	78.6/ 3/ 1.44
CO2 BCKGRD METER/RANGE/PCT	3.5/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	28.7/ 2/ 29
NOX BCKGRD METER/RANGE/PPM	1.9/ 2/ 2
DILUTION FACTOR	9.29
HC CONCENTRATION PPM	4
CO CONCENTRATION PPM	14
CO2 CONCENTRATION PCT	1.39
NOX CONCENTRATION PPM	27.0
HC MASS GRAMS	.47
CO MASS GRAMS	3.31
CO2 MASS GRAMS	5208.5
NOX MASS GRAMS	10.59
HC GRAMS/KM (GRAMS/MILE)	.02 (.04)
CO GRAMS/KM (GRAMS/MILE)	.15 (.25)
CO2 GRAMS/KM (GRAMS/MILE)	242.2 (389.7)
NOX GRAMS/KM (GRAMS/MILE)	.49 (.79)
FUEL CONSUMPTION BY CB L/100KM(MPG)	10.35 (22.73)
CALCULATED DISTANCE KM (MILES)	21.51 (13.37)

TABLE VEHICLE EMISSION RESULTS
FET

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) V-8
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 6 RUN 2
DATE 8/7/79
TIME 15:40
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM-274F
ODOMETER 29913

BAROMETER 743.20 MM HG(29.26 IN HG)
DRY BULB TEMP. 26.7 DEG C(80.0 DEG F)

RELATIVE HUMIDITY 48 PCT
ABSOLUTE HUMIDITY 10.6 GM/KG(74.3 GRAINS/LB)

NOX HUMIDITY C.F. .9965

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	914.4 (36.0)
BLOWER INLET P MM. H2O(IN. H2O)	889.0 (35.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)
BLOWER REVOLUTIONS	61218
CVS FLOW STD. CU. METRES(SCF)	111.9 (3952.7)
HC SAMPLE METER/RANGE/PPM	10.3/ 2/ 10
HC BCKGRD METER/RANGE/PPM	6.4/ 2/ 6
CO SAMPLE METER/RANGE/PPM	26.7/13/ 24
CO BCKGRD METER/RANGE/PPM	.6/13/ 1
CO2 SAMPLE METER/RANGE/PCT	95.5/ 3/ 1.79
CO2 BCKGRD METER/RANGE/PCT	3.6/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	43.0/ 2/ 43
NOX BCKGRD METER/RANGE/PPM	1.8/ 2/ 2
DILUTION FACTOR	7.46
HC CONCENTRATION PPM	5
CO CONCENTRATION PPM	22
CO2 CONCENTRATION PCT	1.75
NOX CONCENTRATION PPM	41.4
HC MASS GRAMS	.31
CO MASS GRAMS	2.91
CO2 MASS GRAMS	3578.3
NOX MASS GRAMS	8.84
HC GRAMS/KM (GRAMS/MILE)	.02 (.03)
CO GRAMS/KM (GRAMS/MILE)	.18 (.29)
CO2 GRAMS/KM (GRAMS/MILE)	219.3 (352.9)
NOX GRAMS/KM (GRAMS/MILE)	.54 (.87)
FUEL CONSUMPTION BY CB L/100KM(MPG)	9.38 (25.09)
CALCULATED DISTANCE KM (MILES)	16.32 (10.14)

TABLE VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244 DL
ENGINE 2.1 L(130 CID) V-8
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 6 RUN 3
DATE 8/ 8/79
TIME 09:17
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM-274-F
ODOMETER 29951

BAROMETER 743.20 MM HG(29.26 IN HG)
DRY BULB TEMP. 23.3 DEG C(74.0 DEG F)

RELATIVE HUMIDITY 54 PCT
ABSOLUTE HUMIDITY 9.9 GM/KG(69.5 GRAINS/LB)

NOX HUMIDITY C.F. .9748

BAG RESULTS

BAG NUMBER	1	2	3
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	927.1 (36.5)	927.1 (36.5)	927.1 (36.5)
BLOWER INLET P MM. H2O(IN. H2O)	901.7 (35.5)	901.7 (35.5)	901.7 (35.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	42.2 (108.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40555	69609	40453
CVS FLOW STD. CU. METRES(SCF)	74.0 (2614.4)	127.3 (4495.6)	73.8 (2607.5)
HC SAMPLE METER/RANGE/PPM	91.3/ 2/ 91	13.0/ 2/ 13	22.5/ 2/ 23
HC BCKGRD METER/RANGE/PPM	8.9/ 2/ 9	9.6/ 2/ 10	10.4/ 2/ 10
CO SAMPLE METER/RANGE/PPM	92.0/11/ 459	14.6/13/ 13	60.9/13/ 59
CO BCKGRD METER/RANGE/PPM	1.6/11/ 5	2.6/13/ 2	1.4/13/ 1
CO2 SAMPLE METER/RANGE/PCT	71.3/ 3/ 1.29	46.8/ 3/ .81	63.1/ 3/ 1.12
CO2 BCKGRD METER/RANGE/PCT	3.0/ 3/ .05	3.0/ 3/ .05	3.2/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	28.0/ 2/ 28	9.5/ 2/ 10	20.7/ 2/ 21
NOX BCKGRD METER/RANGE/PPM	1.2/ 2/ 1	1.1/ 2/ 1	1.3/ 2/ 1
DILUTION FACTOR	9.97	16.58	11.83
HC CONCENTRATION PPM	83	4	13
CO CONCENTRATION PPM	436	10	55
CO2 CONCENTRATION PCT	1.25	.76	1.08
NOX CONCENTRATION PPM	26.9	8.5	19.5
HC MASS GRAMS	3.56	.29	.55
CO MASS GRAMS	37.54	1.54	4.76
CO2 MASS GRAMS	1693.6	1777.7	1460.1
NOX MASS GRAMS	3.72	2.01	2.69
HC GRAMS/KM (GRAMS/MILE)	.62 (1.00)	.05 (.08)	.10 (.16)
CO GRAMS/KM (GRAMS/MILE)	6.56 (10.55)	.25 (.40)	.83 (1.34)
CO2 GRAMS/KM (GRAMS/MILE)	295.8 (476.0)	288.0 (463.3)	255.0 (410.4)
NOX GRAMS/KM (GRAMS/MILE)	.65 (1.04)	.33 (.52)	.47 (.75)
FUEL CONSUMPTION BY CB L/100KM(MPG)	13.15 (17.89)	12.31 (19.10)	10.95 (21.47)
CALCULATED DISTANCE KM (MILES)	5.72 (3.56)	6.17 (3.84)	5.72 (3.56)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.18 (.29)
CO GRAMS/KM (GRAMS/MILE)	1.71 (2.76)
CO2 GRAMS/KM (GRAMS/MILE)	280.56 (451.41)
NOX GRAMS/KM (GRAMS/MILE)	.43 (.69)
FUEL CONSUMPTION BY CB L/100KM (MPG)	12.11 (19.42)

TABLE VEHICLE EMISSION RESULTS
FET

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) V-8
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 6 RUN 3
DATE 8/ 8/79
TIME 11:45
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM-274-F
ODOMETER 29977

BAROMETER 743.46 MM HG(29.27 IN HG)
DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)

RELATIVE HUMIDITY 56 PCT
ABSOLUTE HUMIDITY 11.3 GM/KG(79.3 GRAINS/LB)

NOX HUMIDITY C.F. 1.0206

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	927.1 (36.5)
BLOWER INLET P MM. H2O(IN. H2O)	901.7 (35.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)
BLOWER REVOLUTIONS	61364
CVS FLOW STD. CU. METRES(SCF)	112.0 (3956.8)
HC SAMPLE METER/RANGE/PPM	13.3/ 2/ 13
HC BCKGRD METER/RANGE/PPM	7.9/ 2/ 8
CO SAMPLE METER/RANGE/PPM	61.7/13/ 60
CO BCKGRD METER/RANGE/PPM	1.5/13/ 1
CO2 SAMPLE METER/RANGE/PCT	92.7/ 3/ 1.73
CO2 BCKGRD METER/RANGE/PCT	2.8/ 3/ .04
NOX SAMPLE METER/RANGE/PPM	24.8/ 2/ 25
NOX BCKGRD METER/RANGE/PPM	1.1/ 2/ 1
DILUTION FACTOR	7.69
HC CONCENTRATION PPM	6
CO CONCENTRATION PPM	55
CO2 CONCENTRATION PCT	1.70
NOX CONCENTRATION PPM	23.8
HC MASS GRAMS	.42
CO MASS GRAMS	7.23
CO2 MASS GRAMS	3482.9
NOX MASS GRAMS	5.21
HC GRAMS/KM (GRAMS/MILE)	.03 (.04)
CO GRAMS/KM (GRAMS/MILE)	.45 (.72)
CO2 GRAMS/KM (GRAMS/MILE)	216.8 (348.8)
NOX GRAMS/KM (GRAMS/MILE)	.32 (.52)
FUEL CONSUMPTION BY CB L/100KM(MPG)	9.29 (25.34)
CALCULATED DISTANCE KM (MILES)	16.07 (9.99)

TABLE VEHICLE EMISSION RESULTS
SET

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) V-8
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 6 RUN 3
DATE 8/ 8/79
TIME 11:16
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM-274-F
ODOMETER 29965

BAROMETER 743.71 MM HG(29.28 IN HG)
DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)

RELATIVE HUMIDITY 63 PCT
ABSOLUTE HUMIDITY 12.8 GM/KG(89.7 GRAINS/LB)

NOX HUMIDITY C.F. 1.0745

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	927.1 (36.5)
BLOWER INLET P MM. H2O(IN. H2O)	901.7 (35.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)
BLOWER REVOLUTIONS	112021
CVS FLOW STD. CU. METRES(SCF)	204.6 (7226.2)
HC SAMPLE METER/RANGE/PPM	13.5/ 2/ 13
HC BCKGRD METER/RANGE/PPM	8.1/ 2/ 8
CO SAMPLE METER/RANGE/PPM	45.1/13/ 42
CO BCKGRD METER/RANGE/PPM	.9/13/ 1
CO2 SAMPLE METER/RANGE/PCT	79.8/ 3/ 1.38
CO2 BCKGRD METER/RANGE/PCT	2.8/ 3/ .04
NOX SAMPLE METER/RANGE/PPM	17.7/ 2/ 18
NOX BCKGRD METER/RANGE/PPM	1.1/ 2/ 1
DILUTION FACTOR	9.65
HC CONCENTRATION PPM	6
CO CONCENTRATION PPM	39
CO2 CONCENTRATION PCT	1.34
NOX CONCENTRATION PPM	16.7
HC MASS GRAMS	.74
CO MASS GRAMS	9.39
CO2 MASS GRAMS	5037.8
NOX MASS GRAMS	7.03
HC GRAMS/KM (GRAMS/MILE)	.03 (.06)
CO GRAMS/KM (GRAMS/MILE)	.44 (.71)
CO2 GRAMS/KM (GRAMS/MILE)	235.4 (378.8)
NOX GRAMS/KM (GRAMS/MILE)	.33 (.53)
FUEL CONSUMPTION BY CB L/100KM(MPG)	10.08 (23.33)
CALCULATED DISTANCE KM (MILES)	21.40 (13.30)

TABLE VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 7 RUN 1
DATE 8/28/79
TIME 09:13
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE
ODOMETER 34967

BAROMETER 739.14 MM HG(29.10 IN HG)
DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)

RELATIVE HUMIDITY 74 PCT
ABSOLUTE HUMIDITY 14.2 GM/KG(99.3 GRAINS/LB)

NOX HUMIDITY C.F. 1.1288

BAG RESULTS

BAG NUMBER	1	2	3
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H20(IN. H20)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H20(IN. H20)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	42.2 (108.0)	42.8 (109.0)
BLOWER REVOLUTIONS	40783	69783	40514
CVS FLOW STD. CU. METRES(SCF)	75.8 (2677.2)	129.9 (4588.6)	75.3 (2661.3)
HC SAMPLE METER/RANGE/PPM	87.0/ 2/ 87	11.8/ 2/ 12	23.8/ 2/ 24
HC BCKGRD METER/RANGE/PPM	7.8/ 2/ 8	7.2/ 2/ 7	7.2/ 2/ 7
CO SAMPLE METER/RANGE/PPM	86.0/11/ 408	37.0/13/ 34	85.5/12/ 206
CO BCKGRD METER/RANGE/PPM	1.0/11/ 3	2.8/13/ 2	1.2/12/ 2
CO2 SAMPLE METER/RANGE/PCT	69.6/ 3/ 1.26	44.3/ 3/ .76	60.3/ 3/ 1.07
CO2 BCKGRD METER/RANGE/PCT	2.8/ 3/ .04	2.7/ 3/ .04	3.0/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	26.5/ 2/ 26	5.0/ 2/ 5	16.1/ 2/ 16
NOX BCKGRD METER/RANGE/PPM	.8/ 2/ 1	.8/ 2/ 1	1.6/ 2/ 2
DILUTION FACTOR	10.28	17.57	12.28
HC CONCENTRATION PPM	80	5	17
CO CONCENTRATION PPM	386	30	195
CO2 CONCENTRATION PCT	1.22	.72	1.03
NOX CONCENTRATION PPM	25.8	4.2	14.6
HC MASS GRAMS	3.50	.38	.75
CO MASS GRAMS	34.08	4.60	17.13
CO2 MASS GRAMS	1689.9	1711.6	1416.8
NOX MASS GRAMS	4.22	1.19	2.38
HC GRAMS/KM (GRAMS/MILE)	.62 (.99)	.06 (.10)	.13 (.21)
CO GRAMS/KM (GRAMS/MILE)	6.02 (9.69)	.75 (1.20)	2.99 (4.81)
CO2 GRAMS/KM (GRAMS/MILE)	298.7 (480.7)	277.7 (446.9)	247.0 (397.4)
NOX GRAMS/KM (GRAMS/MILE)	.75 (1.20)	.19 (.31)	.41 (.67)
FUEL CONSUMPTION BY CB L/100KM(MPG)	13.24 (17.77)	11.91 (19.75)	10.76 (21.86)
CALCULATED DISTANCE KM (MILES)	5.66 (3.52)	6.16 (3.83)	5.74 (3.56)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.19 (.31)
CO GRAMS/KM (GRAMS/MILE)	2.45 (3.94)
CO2 GRAMS/KM (GRAMS/MILE)	273.61 (440.24)
NOX GRAMS/KM (GRAMS/MILE)	.37 (.59)
FUEL CONSUMPTION BY CB L/100KM (MPG)	11.87 (19.82)

TABLE VEHICLE EMISSION RESULTS
SET

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 7 RUN 1
DATE 8/28/79
TIME 11:48
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE
ODOMETER 34981

BAROMETER 739.14 MM HG(29.10 IN HG)
DRY BULB TEMP. 26.1 DEG C(79.0 DEG F)

RELATIVE HUMIDITY 57 PCT
ABSOLUTE HUMIDITY 12.4 GM/KG(87.0 GRAINS/LB)

NOX HUMIDITY C.F. 1.0598

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	762.0 (30.0)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)
BLOWER REVOLUTIONS	112273
CVS FLOW STD. CU. METRES(SCF)	208.6 (7367.6)
HC SAMPLE METER/RANGE/PPM	18.2/ 2/ 18
HC BCKGRD METER/RANGE/PPM	11.7/ 2/ 12
CO SAMPLE METER/RANGE/PPM	56.9/12/ 123
CO BCKGRD METER/RANGE/PPM	.8/12/ 1
CO2 SAMPLE METER/RANGE/PCT	73.8/ 3/ 1.34
CO2 BCKGRD METER/RANGE/PCT	3.1/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	14.2/ 2/ 14
NOX BCKGRD METER/RANGE/PPM	1.1/ 2/ 1
DILUTION FACTOR	9.89
HC CONCENTRATION PPM	8
CO CONCENTRATION PPM	117
CO2 CONCENTRATION PCT	1.30
NOX CONCENTRATION PPM	13.2
HC MASS GRAMS	.92
CO MASS GRAMS	28.33
CO2 MASS GRAMS	4963.0
NOX MASS GRAMS	5.59
HC GRAMS/KM (GRAMS/MILE)	.04 (.07)
CO GRAMS/KM (GRAMS/MILE)	1.31 (2.11)
CO2 GRAMS/KM (GRAMS/MILE)	230.0 (370.0)
NOX GRAMS/KM (GRAMS/MILE)	.26 (.42)
FUEL CONSUMPTION BY CB L/100KM(MPG)	9.91 (23.74)
CALCULATED DISTANCE KM (MILES)	21.58 (13.41)

TABLE VEHICLE EMISSION RESULTS
FET

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 7 RUN 1
DATE 8/28/79
TIME 12:16
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE
ODOMETER 34995

BAROMETER 739.14 MM HG(29.10 IN HG)
DRY BULB TEMP. 26.7 DEG C(80.0 DEG F)

RELATIVE HUMIDITY 58 PCT
ABSOLUTE HUMIDITY 13.0 GM/KG(90.7 GRAINS/LB)

NOX HUMIDITY C.F. 1.0799

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	762.0 (30.0)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	45.0 (113.0)
BLOWER REVOLUTIONS	61579
CVS FLOW STD. CU. METRES(SCF)	114.3 (4036.3)
HC SAMPLE METER/RANGE/PPM	16.5/ 2/ 16
HC BCKGRD METER/RANGE/PPM	9.8/ 2/ 10
CO SAMPLE METER/RANGE/PPM	69.6/12/ 158
CO BCKGRD METER/RANGE/PPM	.8/12/ 1
CO2 SAMPLE METER/RANGE/PCT	90.3/ 3/ 1.68
CO2 BCKGRD METER/RANGE/PCT	2.7/ 3/ .04
NOX SAMPLE METER/RANGE/PPM	16.9/ 2/ 17
NOX BCKGRD METER/RANGE/PPM	1.0/ 2/ 1
DILUTION FACTOR	7.88
HC CONCENTRATION PPM	8
CO CONCENTRATION PPM	149
CO2 CONCENTRATION PCT	1.65
NOX CONCENTRATION PPM	16.0
HC MASS GRAMS	.52
CO MASS GRAMS	19.79
CO2 MASS GRAMS	3449.9
NOX MASS GRAMS	3.78
HC GRAMS/KM (GRAMS/MILE)	.03 (.05)
CO GRAMS/KM (GRAMS/MILE)	1.22 (1.97)
CO2 GRAMS/KM (GRAMS/MILE)	213.3 (343.2)
NOX GRAMS/KM (GRAMS/MILE)	.23 (.38)
FUEL CONSUMPTION BY CR L/100KM(MPG)	9.19 (25.60)
CALCULATED DISTANCE KM (MILES)	16.18 (10.05)

TABLE VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-00

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 8 RUN 1
DATE 9/17/79
TIME 14:22
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE
ODOMETER 39006

BAROMETER 741.17 MM HG(29.18 IN HG)
DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)

RELATIVE HUMIDITY 33 PCT
ABSOLUTE HUMIDITY 6.6 GM/KG(46.4 GRAINS/LB)

NOX HUMIDITY C.F. .8814

BAG RESULTS

	1	2	3
BAG NUMBER			
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	800.1 (31.5)	800.1 (31.5)	800.1 (31.5)
BLOWER INLET P MM. H2O(IN. H2O)	774.7 (30.5)	774.7 (30.5)	774.7 (30.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	42.8 (109.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40435	69515	40479
CVS FLOW STD. CU. METRES(SCF)	74.9 (2646.6)	128.9 (4554.3)	75.0 (2649.4)
HC SAMPLE METER/RANGE/PPM	77.2/ 2/ 77	12.2/ 2/ 12	20.4/ 2/ 20
HC BCKGRD METER/RANGE/PPM	7.2/ 2/ 7	8.5/ 2/ 9	10.8/ 2/ 11
CO SAMPLE METER/RANGE/PPM	97.1/11/ 507	43.3/13/ 40	75.6/13/ 75
CO BCKGRD METER/RANGE/PPM	.9/11/ 3	1.3/13/ 1	2.5/13/ 2
CO2 SAMPLE METER/RANGE/PCT	66.0/ 3/ 1.18	45.0/ 3/ .77	62.0/ 3/ 1.10
CO2 BCKGRD METER/RANGE/PCT	2.6/ 3/ .04	3.6/ 3/ .06	3.4/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	30.3/ 2/ 30	7.5/ 2/ 8	19.7/ 2/ 20
NOX BCKGRD METER/RANGE/PPM	1.9/ 2/ 2	1.6/ 2/ 2	1.8/ 2/ 2
DILUTION FACTOR	10.81	17.18	12.05
HC CONCENTRATION PPM	71	4	10
CO CONCENTRATION PPM	487	37	71
CO2 CONCENTRATION PCT	1.15	.72	1.06
NOX CONCENTRATION PPM	28.6	6.0	18.0
HC MASS GRAMS	3.05	.31	.45
CO MASS GRAMS	42.54	5.59	6.16
CO2 MASS GRAMS	1574.1	1699.2	1449.3
NOX MASS GRAMS	3.61	1.30	2.28
HC GRAMS/KM (GRAMS/MILE)	.53 (.85)	.05 (.08)	.08 (.12)
CO GRAMS/KM (GRAMS/MILE)	7.33 (11.80)		1.05 (1.70)
CO2 GRAMS/KM (GRAMS/MILE)	271.3 (436.6)	271.0 (436.0)	247.9 (398.9)
NOX GRAMS/KM (GRAMS/MILE)	.62 (1.00)	.21 (.33)	.39 (.63)
FUEL CONSUMPTION BY CB L/100KM(MPG)	12.14 (19.37)	11.68 (20.13)	10.66 (22.06)
CALCULATED DISTANCE KM (MILES)	5.80 (3.61)	6.27 (3.90)	5.85 (3.63)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.16 (.25)
CO GRAMS/KM (GRAMS/MILE)	2.27 (3.65)
CO2 GRAMS/KM (GRAMS/MILE)	264.69 (425.89)
NOX GRAMS/KM (GRAMS/MILE)	.34 (.55)
FUEL CONSUMPTION BY CB L/100KM (MPG)	11.50 (20.46)

TABLE VEHICLE EMISSION RESULTS
SET

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 8 RUN 1
DATE 9/17/79
TIME 15:21
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE
ODOMETER 39017

BAROMETER 740.16 MM HG(29.14 IN HG)
DRY BULB TEMP. 25.6 DEG C(78.0 DEG F)

RELATIVE HUMIDITY 31 PCT
ABSOLUTE HUMIDITY 6.4 GM/KG(44.8 GRAINS/LB)

NOX HUMIDITY C.F. .8757

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	800.1 (31.5)
BLOWER INLET P MM. H2O(IN. H2O)	774.7 (30.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)
BLOWER REVOLUTIONS	111936
CVS FLOW STD. CU. METRES(SCF)	207.1 (7314.9)
HC SAMPLE METER/RANGE/PPM	19.5/ 2/ 19
HC BCKGRD METER/RANGE/PPM	10.0/ 2/ 10
CO SAMPLE METER/RANGE/PPM	66.5/12/ 149
CO BCKGRD METER/RANGE/PPM	1.0/12/ 2
CO2 SAMPLE METER/RANGE/PCT	72.6/ 3/ 1.32
CO2 BCKGRD METER/RANGE/PCT	2.8/ 3/ .04
NOX SAMPLE METER/RANGE/PPM	19.0/ 2/ 19
NOX BCKGRD METER/RANGE/PPM	1.3/ 2/ 1
DILUTION FACTOR	10.05
HC CONCENTRATION PPM	10
CO CONCENTRATION PPM	142
CO2 CONCENTRATION PCT	1.28
NOX CONCENTRATION PPM	17.8
HC MASS GRAMS	1.25
CO MASS GRAMS	34.34
CO2 MASS GRAMS	4849.8
NOX MASS GRAMS	6.19
HC GRAMS/KM (GRAMS/MILE)	.06 (.09)
CO GRAMS/KM (GRAMS/MILE)	1.58 (2.54)
CO2 GRAMS/KM (GRAMS/MILE)	223.1 (358.9)
NOX GRAMS/KM (GRAMS/MILE)	.28 (.46)
FUEL CONSUMPTION BY CB L/100KM(MPG)	9.63 (24.42)
CALCULATED DISTANCE KM (MILES)	21.74 (13.51)

TABLE VEHICLE EMISSION RESULTS
FET

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 8 RUN 1
DATE 9/17/79
TIME 15:50
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE
ODOMETER 39030

BAROMETER 740.16 MM HG(29.14 IN HG)
DRY BULB TEMP. 25.6 DEG C(78.0 DEG F)

RELATIVE HUMIDITY 28 PCT
ABSOLUTE HUMIDITY 5.8 GM/KG(40.5 GRAINS/LB)

NOX HUMIDITY C.F. .8604

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	800.1 (31.5)
BLOWER INLET P MM. H2O(IN. H2O)	774.7 (30.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)
BLOWER REVOLUTIONS	61317
CVS FLOW STD. CU. METRES(SCF)	113.4 (4006.9)
HC SAMPLE METER/RANGE/PPM	17.8/ 2/ 18
HC BCKGRD METER/RANGE/PPM	10.6/ 2/ 11
CO SAMPLE METER/RANGE/PPM	88.7/12/ 217
CO BCKGRD METER/RANGE/PPM	1.2/12/ 2
CO2 SAMPLE METER/RANGE/PCT	85.6/ 3/ 1.59
CO2 BCKGRD METER/RANGE/PCT	2.7/ 3/ .04
NOX SAMPLE METER/RANGE/PPM	18.2/ 2/ 18
NOX BCKGRD METER/RANGE/PPM	1.5/ 2/ 2
DILUTION FACTOR	8.33
HC CONCENTRATION PPM	8
CO CONCENTRATION PPM	206
CO2 CONCENTRATION PCT	1.55
NOX CONCENTRATION PPM	16.9
HC MASS GRAMS	.55
CO MASS GRAMS	27.27
CO2 MASS GRAMS	3220.0
NOX MASS GRAMS	3.15
HC GRAMS/KM (GRAMS/MILE)	.03 (.06)
CO GRAMS/KM (GRAMS/MILE)	1.68 (2.71)
CO2 GRAMS/KM (GRAMS/MILE)	198.9 (320.0)
NOX GRAMS/KM (GRAMS/MILE)	.19 (.31)
FUEL CONSUMPTION BY CB L/100KM(MPG)	8.61 (27.33)
ALCULATED DISTANCE KM (MILES)	16.19 (10.06)

TABLE VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 9 RUN 1
DATE 9/24/79
TIME 01:55
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE
ODOMETER 40727

BAROMETER 742.95 MM HG(29.25 IN HG)
DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)

RELATIVE HUMIDITY 52 PCT
ABSOLUTE HUMIDITY 10.6 GM/KG(74.3 GRAINS/LB) NOX HUMIDITY C.F. .9967

BAG RESULTS

BAG NUMBER	1	2	3
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	42.2 (108.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40595	69705	40591
CVS FLOW STD. CU. METRES(SCF)	75.9 (2679.1)	130.5 (4609.4)	75.8 (2678.7)
HC SAMPLE METER/RANGE/PPM	86.3/ 2/ 86	14.4/ 2/ 14	22.6/ 2/ 23
HC BCKGRD METER/RANGE/PPM	8.8/ 2/ 9	10.5/ 2/ 10	11.8/ 2/ 12
CO SAMPLE METER/RANGE/PPM	91.5/11/ 455	4.9/13/ 4	24.5/13/ 22
CO BCKGRD METER/RANGE/PPM	.4/11/ 1	1.2/13/ 1	1.3/13/ 1
CO2 SAMPLE METER/RANGE/PCT	66.7/ 3/ 1.20	44.4/ 3/ .76	58.5/ 3/ 1.03
CO2 BCKGRD METER/RANGE/PCT	3.0/ 3/ .05	3.2/ 3/ .05	2.7/ 3/ .04
NOX SAMPLE METER/RANGE/PPM	28.7/ 2/ 29	7.2/ 2/ 7	17.8/ 2/ 18
NOX BCKGRD METER/RANGE/PPM	2.3/ 2/ 2	2.0/ 2/ 2	2.0/ 2/ 2
DILUTION FACTOR	10.72	17.58	12.91
HC CONCENTRATION PPM	78	4	12
CO CONCENTRATION PPM	435	3	20
CO2 CONCENTRATION PCT	1.16	.71	1.00
NOX CONCENTRATION PPM	26.6	5.3	16.0
HC MASS GRAMS	3.43	.34	.51
CO MASS GRAMS	38.46	.48	1.78
CO2 MASS GRAMS	1605.3	1706.5	1382.1
NOX MASS GRAMS	3.85	1.32	2.31
HC GRAMS/KM (GRAMS/MILE)	.59 (.96)	.06 (.09)	.09 (.14)
CO GRAMS/KM (GRAMS/MILE)	6.66 (10.72)	.08 (.13)	.31 (.50)
CO2 GRAMS/KM (GRAMS/MILE)	278.1 (447.5)	280.7 (451.6)	242.9 (390.9)
NOX GRAMS/KM (GRAMS/MILE)	.67 (1.07)	.22 (.35)	.41 (.65)
FUEL CONSUMPTION BY CB L/100KM(MPG)	12.40 (18.98)	11.99 (19.61)	10.40 (22.61)
CALCULATED DISTANCE KM (MILES)	5.77 (3.59)	6.08 (3.78)	5.69 (3.54)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.18 (.29)
CO GRAMS/KM (GRAMS/MILE)	1.52 (2.45)
CO2 GRAMS/KM (GRAMS/MILE)	269.75 (434.03)
NOX GRAMS/KM (GRAMS/MILE)	.36 (.58)
FUEL CONSUMPTION BY CB L/100KM (MPG)	11.64 (20.21)

TABLE VEHICLE EMISSION RESULTS
SET

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 9 RUN 1
DATE 9/24/79
TIME 02:56
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE
ODOMETER 40739

BAROMETER 742.70 MM HG(29.24 IN HG)
DRY BULB TEMP. 26.1 DEG C(79.0 DEG F)

RELATIVE HUMIDITY 47 PCT
ABSOLUTE HUMIDITY 10.1 GM/KG(70.9 GRAINS/LB)

NOX HUMIDITY C.F. .9813

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	762.0 (30.0)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	42.8 (109.0)
BLOWER REVOLUTIONS	112028
CVS FLOW STD. CU. METRES(SCF)	209.4 (7397.4)
HC SAMPLE METER/RANGE/PPM	17.4/ 2/ 17
HC BCKGRD METER/RANGE/PPM	10.5/ 2/ 10
CO SAMPLE METER/RANGE/PPM	18.6/13/ 16
CO BCKGRD METER/RANGE/PPM	1.0/13/ 1
CO2 SAMPLE METER/RANGE/PCT	71.9/ 3/ 1.30
CO2 BCKGRD METER/RANGE/PCT	2.7/ 3/ .04
NOX SAMPLE METER/RANGE/PPM	20.8/ 2/ 21
NOX BCKGRD METER/RANGE/PPM	2.2/ 2/ 2
DILUTION FACTOR	10.26
HC CONCENTRATION PPM	8
CO CONCENTRATION PPM	15
CO2 CONCENTRATION PCT	1.27
NOX CONCENTRATION PPM	18.8
HC MASS GRAMS	.96
CO MASS GRAMS	3.67
CO2 MASS GRAMS	4854.6
NOX MASS GRAMS	7.40
HC GRAMS/KM (GRAMS/MILE)	.04 (.07)
CO GRAMS/KM (GRAMS/MILE)	.17 (.28)
CO2 GRAMS/KM (GRAMS/MILE)	227.7 (366.4)
NOX GRAMS/KM (GRAMS/MILE)	.35 (.56)
FUEL CONSUMPTION BY CB L/100KM(MPG)	9.74 (24.16)
CALCULATED DISTANCE KM (MILES)	21.32 (13.25)

TABLE VEHICLE EMISSION RESULTS
FET

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(0 LBS)

TEST NO. 9 RUN 1
DATE 9/24/79
TIME
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE
ODOMETER 4051

BAROMETER 742.70 MM HG(29.24 IN HG)
DRY BULB TEMP. 26.7 DEG C(80.0 DEG F)

RELATIVE HUMIDITY 83 PCT
ABSOLUTE HUMIDITY 18.9 GM/KG(132.0 GRAINS/LB)

NOX HUMIDITY C.F. 1.3661

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	762.0 (30.0)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)
BLOWER REVOLUTIONS	61354
CVS FLOW STD. CU. METRES(SCF)	114.6 (4047.3)
HC SAMPLE METER/RANGE/PPM	13.3/ 2/ 13
HC BCKGRD METER/RANGE/PPM	9.1/ 2/ 9
CO SAMPLE METER/RANGE/PPM	10.4/13/ 9
CO BCKGRD METER/RANGE/PPM	1.3/13/ 1
CO2 SAMPLE METER/RANGE/PCT	87.9/ 3/ 1.63
CO2 BCKGRD METER/RANGE/PCT	2.5/ 3/ .04
NOX SAMPLE METER/RANGE/PPM	24.2/ 2/ 24
NOX BCKGRD METER/RANGE/PPM	2.1/ 2/ 2
DILUTION FACTOR	8.19
HC CONCENTRATION PPM	5
CO CONCENTRATION PPM	8
CO2 CONCENTRATION PCT	1.60
NOX CONCENTRATION PPM	22.4
HC MASS GRAMS	.35
CO MASS GRAMS	1.02
CO2 MASS GRAMS	3359.1
NOX MASS GRAMS	6.69
HC GRAMS/KM (GRAMS/MILE)	.02 (.03)
CO GRAMS/KM (GRAMS/MILE)	.06 (.10)
CO2 GRAMS/KM (GRAMS/MILE)	207.9 (334.5)
NOX GRAMS/KM (GRAMS/MILE)	.41 (.67)
FUEL CONSUMPTION BY CB L/100KM(MPG)	8.88 (26.49)
CALCULATED DISTANCE KM (MILES)	16.16 (10.04)

TABLE VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 10 RUN 1
DATE 9/26/79
TIME 13:05
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM
ODOMETER 40976
40K MILES NATURAL AIR

BAROMETER 743.20 MM HG(29.26 IN HG)
DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)

RELATIVE HUMIDITY 39 PCT
ABSOLUTE HUMIDITY 7.9 GM/KG(55.1 GRAINS/LB) NOX HUMIDITY C.F. .9145

BAG RESULTS

	1	2	3
BAG NUMBER			
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H20(IN. H20)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H20(IN. H20)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	42.2 (108.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40539	69651	40524
CVS FLOW STD. CU. METRES(SCF)	75.8 (2676.4)	130.4 (4607.2)	75.7 (2675.3)
HC SAMPLE METER/RANGE/PPM	81.3/ 2/ 81	12.5/ 2/ 13	23.2/ 2/ 23
HC BCKGRD METER/RANGE/PPM	10.9/ 2/ 11	9.6/ 2/ 10	9.9/ 2/ 10
CO SAMPLE METER/RANGE/PPM	95.5/11/ 491	53.9/13/ 51	84.1/13/ 84
CO BCKGRD METER/RANGE/PPM	.8/11/ 2	1.8/13/ 2	1.5/13/ 1
CO2 SAMPLE METER/RANGE/PCT	67.2/ 3/ 1.21	45.3/ 3/ .78	59.2/ 3/ 1.05
CO2 BCKGRD METER/RANGE/PCT	3.0/ 3/ .05	3.1/ 3/ .05	3.2/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	28.9/ 2/ 29	7.3/ 2/ 7	18.1/ 2/ 18
NOX BCKGRD METER/RANGE/PPM	2.2/ 2/ 2	2.1/ 2/ 2	1.9/ 2/ 2
DILUTION FACTOR	10.61	17.10	12.67
HC CONCENTRATION PPM	71	3	14
CO CONCENTRATION PPM	472	48	80
CO2 CONCENTRATION PCT	1.17	.73	1.00
NOX CONCENTRATION PPM	26.9	5.3	16.3
HC MASS GRAMS	3.12	.26	.62
CO MASS GRAMS	41.62	7.35	7.10
CO2 MASS GRAMS	1617.8	1750.0	1389.8
NOX MASS GRAMS	3.57	1.21	2.17
HC GRAMS/KM (GRAMS/MILE)	.54 (.87)	.04 (.07)	.11 (.17)
CO GRAMS/KM (GRAMS/MILE)	7.22 (11.61)	1.18 (1.91)	1.24 (1.99)
CO2 GRAMS/KM (GRAMS/MILE)	280.6 (451.4)	282.3 (454.2)	242.8 (390.7)
NOX GRAMS/KM (GRAMS/MILE)	.62 (1.00)	.20 (.32)	.38 (.61)
FUEL CONSUMPTION AY CB L/100KM(MPG)	12.53 (18.77)	12.13 (19.39)	10.46 (22.49)
CALCULATED DISTANCE KM (MILES)	5.77 (3.58)	6.20 (3.85)	5.72 (3.56)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.16 (.26)
CO GRAMS/KM (GRAMS/MILE)	2.45 (3.94)
CO2 GRAMS/KM (GRAMS/MILE)	271.13 (436.25)
NOX GRAMS/KM (GRAMS/MILE)	.33 (.54)
FUEL CONSUMPTION AY CB L/100KM (MPG)	11.76 (20.01)

TABLE VEHICLE EMISSION RESULTS
SET

PROJECT NO. 11-4744-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 10 RUN 1
DATE 9/26/79
TIME 14:50
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM
ODOMETER 40987

BAROMETER 742.95 MM HG(29.25 IN HG)
DRY BULB TEMP. 27.2 DEG C(81.0 DEG F)

RELATIVE HUMIDITY 33 PCT
ABSOLUTE HUMIDITY 7.6 GM/KG(53.1 GRAINS/LB)

NOX HUMIDITY C.F. .9066

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	762.0 (30.0)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)
BLOWER REVOLUTIONS	111962
CVS FLOW STD. CU. METRES(SCF)	209.2 (7388.4)
HC SAMPLE METER/RANGE/PPM	16.1/ 2/ 16
HC BCKGRD METER/RANGE/PPM	9.7/ 2/ 10
CO SAMPLE METER/RANGE/PPM	52.0/12/ 111
CO BCKGRD METER/RANGE/PPM	.5/12/ 1
CO2 SAMPLE METER/RANGE/PCT	71.4/ 3/ 1.29
CO2 BCKGRD METER/RANGE/PCT	2.5/ 3/ .04
NOX SAMPLE METER/RANGE/PPM	17.5/ 2/ 18
NOX BCKGRD METER/RANGE/PPM	2.0/ 2/ 2
DILUTION FACTOR	10.27
HC CONCENTRATION PPM	7
CO CONCENTRATION PPM	106
CO2 CONCENTRATION PCT	1.26
NOX CONCENTRATION PPM	15.7
HC MASS GRAMS	.89
CO MASS GRAMS	25.85
CO2 MASS GRAMS	4820.2
NOX MASS GRAMS	5.69
HC GRAMS/KM (GRAMS/MILE)	.04 (.07)
CO GRAMS/KM (GRAMS/MILE)	1.20 (1.93)
CO2 GRAMS/KM (GRAMS/MILE)	223.8 (360.0)
NOX GRAMS/KM (GRAMS/MILE)	.26 (.43)
FUEL CONSUMPTION BY CB L/100KM(MPG)	9.64 (24.41)
CALCULATED DISTANCE KM (MILES)	21.54 (13.39)

TABLE VEHICLE EMISSION RESULTS
FET

PROJECT NO. 11-4746-001

VEHICLE NO. 244
VEHICLE MODEL 78 VOLVO 244DL
ENGINE 2.1 L(130 CID) L-4
TRANSMISSION A3
GVW 0 KG(-0 LBS)

TEST NO. 10 RUN 1
DATE 9/26/79
TIME 15:28
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1591 KG(3500 LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM
ODOMETER 40999

BAROMETER 742.95 MM HG(29.25 IN HG)
DRY BULB TEMP. 28.9 DEG C(84.0 DEG F)

RELATIVE HUMIDITY 30 PCT
ABSOLUTE HUMIDITY 7.5 GM/KG(52.8 GRAINS/LB)

NOX HUMIDITY C.F. .9054

BAG RESULTS

BAG NUMBER	1
BLOWER DIF P MM. H2O(IN. H2O)	762.0 (30.0)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)
BLOWER REVOLUTIONS	61320
CVS FLOW STD. CU. METRES(SCF)	114.6 (4046.4)
HC SAMPLE METER/RANGE/PPM	15.7/ 2/ 16
HC BCKGRD METER/RANGE/PPM	9.9/ 2/ 10
CO SAMPLE METER/RANGE/PPM	60.8/12/ 134
CO BCKGRD METER/RANGE/PPM	.7/12/ 1
CO2 SAMPLE METER/RANGE/PCT	87.7/ 3/ 1.63
CO2 BCKGRD METER/RANGE/PCT	3.2/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	22.0/ 2/ 22
NOX BCKGRD METER/RANGE/PPM	2.2/ 2/ 2
DILUTION FACTOR	8.15
HC CONCENTRATION PPM	7
CO CONCENTRATION PPM	127
CO2 CONCENTRATION PCT	1.59
NOX CONCENTRATION PPM	20.1
HC MASS GRAMS	.46
CO MASS GRAMS	16.95
CO2 MASS GRAMS	3329.8
NOX MASS GRAMS	3.98
HC GRAMS/KM (GRAMS/MILE)	.03 (.05)
CO GRAMS/KM (GRAMS/MILE)	1.03 (1.67)
CO2 GRAMS/KM (GRAMS/MILE)	203.3 (327.1)
NOX GRAMS/KM (GRAMS/MILE)	.24 (.39)
FUEL CONSUMPTION BY CB L/100KM(MPG)	8.75 (26.89)
CALCULATED DISTANCE KM (MILES)	16.38 (10.18)

TABLE VEHICLE EMISSION RESULTS
FTP

PROJECT NO. 11-4746-001

VEHICLE NO.0;
VEHICLE MODEL 78 VOLVO 244D
ENGINE 2.3 L(*** CID) L-4
TRANSMISSION A3
GVW 0. KG(0. LBS)

TEST NO. RUN
DATE 9/28/79
TIME
DYNO NO. 3
CVS NO. 2
BAG CART NO. 1

TEST WEIGHT 1364. KG(3000. LBS)
ACTUAL ROAD LOAD 9.2 KW(12.3 HP)
GASOLINE EM274-F
ODOMETER 41000.

BAROMETER 740.41 MM HG(29.15 IN HG)
DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)

RELATIVE HUMIDITY ** PCT
ABSOLUTE HUMIDITY 10.2 GM/KG(71.3 GRAINS/LB) NOX HUMIDITY C.F. .9831

BAG RESULTS

BAG NUMBER	1	2	3
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT
BLOWER DIF P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	43.3 (110.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40625.	69696.	40637.
CVS FLOW STD. CU. METRES(SCF)	75.6 (2671.2)	129.7 (4582.4)	75.6 (2671.7)
HC SAMPLE METER/RANGE/PPM	76.2/ 2/ 76.	11.7/ 2/ 12.	20.9/ 2/ 21.
HC BCKGRD METER/RANGE/PPM	8.1/ 2/ 8.	7.5/ 2/ 8.	6.9/ 2/ 7.
CO SAMPLE METER/RANGE/PPM	22.6/ 3/ 522.	61.8/13/ 60.	75.7/13/ 75.
CO BCKGRD METER/RANGE/PPM	.1/ 3/ 2.	4.9/13/ 4.	2.3/13/ 2.
CO2 SAMPLE METER/RANGE/PCT	66.3/ 3/ 1.19	44.0/ 3/ .75	59.2/ 3/ 1.05
CO2 BCKGRD METER/RANGE/PCT	2.9/ 3/ .04	3.4/ 3/ .05	3.7/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	31.5/ 2/ 32.	5.1/ 2/ 5.	18.3/ 2/ 18.
NOX BCKGRD METER/RANGE/PPM	1.2/ 2/ 1.	1.1/ 2/ 1.	1.2/ 2/ 1.
DILUTION FACTOR	10.75	17.64	12.68
HC CONCENTRATION PPM	69.	5.	15.
CO CONCENTRATION PPM	499.	54.	70.
CO2 CONCENTRATION PCT	1.15	.70	.99
NOX CONCENTRATION PPM	30.4	4.1	17.2
HC MASS GRAMS	3.00	.35	.63
CO MASS GRAMS	43.94	8.14	6.21
CO2 MASS GRAMS	1591.3	1671.5	1378.1
NOX MASS GRAMS	4.33	.99	2.45
HC GRAMS/KM (GRAMS/MILE)	.52 (.84)	.06 (.09)	.11 (.18)
CO GRAMS/KM (GRAMS/MILE)	7.65 (12.31)	1.34 (2.15)	1.09 (1.75)
CO2 GRAMS/KM (GRAMS/MILE)	277.0 (445.7)	274.8 (442.1)	241.1 (388.0)
NOX GRAMS/KM (GRAMS/MILE)	.75 (1.21)	.16 (.26)	.43 (.69)
FUEL CONSUMPTION BY CB L/100KM(MPG)	12.41 (18.96)	11.83 (19.89)	10.38 (22.66)
CALCULATED DISTANCE KM (MILES)	5.74 (3.57)	6.08 (3.78)	5.72 (3.55)

COMPOSITE FTP RESULTS

HC GRAMS/KM (GRAMS/MILE)	.17 (.27)
CO GRAMS/KM (GRAMS/MILE)	2.59 (4.16)
CO2 GRAMS/KM (GRAMS/MILE)	265.94 (427.90)
NOX GRAMS/KM (GRAMS/MILE)	.36 (.58)
FUEL CONSUMPTION BY CB L/100KM (MPG)	11.55 (20.37)

TECHNICAL REPORT DATA

(Please read Instructions on the reverse before completing)

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15. SUPPLEMENTARY NOTES

16. ABSTRACT

The report describes development testing, optimization, and durability testing of emission control systems capable of meeting 1981 gaseous emission standards while maintaining low sulfate emissions. Four emission control systems were investigated: (1) oxidation catalyst with air modulation system, (2) high temperature exhaust system, (3) threeway catalyst with feedback carburetor, and (4) threeway plus oxidation with air modulation system and feedback fuel injection.

In Phase I of the project, the air modulation system and the threeway catalyst system were selected for optimization and durability testing. The usual gaseous emissions, plus nonmethane hydrocarbons, total cyanide and ammonia were measured on both systems. The oxidation system was operated on a test car for 24100 km and the threeway catalyst system for 32200 km, with emission tests every 8050 km. The durability distance accumulation was halted on both cars because emissions levels exceeded the 1981 standards.

In Phase II of the project, a threeway plus oxidation catalyst system was developed, optimized and tested for durability for 64,400 km. During the durability testing, emissions tests were performed every 8050 km.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
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