EPA-AA-SDSB-80-20

Technical Report

1972/73 Light-Duty Truck Baseline Program and NOx Emission Standard Development

by

Larry D. Ragsdale

September 1980

NOTICE

Technical Reports do not necessarily represent final EPA decisions or positions. They are intended to present technical analysis of issues using data which are currently available. The purpose in the release of such reports is to facilitate the exchange of technical information and to inform the public of technical developments which may form the basis for a final EPA decision, position or regulatory action.

Standards Development and Support Branch
Emission Control Technology Division
Office of Mobile Source Air Pollution Control
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U.S. Environmental Protection Agency

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I. Foreword

The Clean Air Act as amended in 1977 requires the U.S. Environmental Protection Agency (EPA) to develop and promulgate a more stringent oxides of nitrogen emission standard for heavy-duty vehicles. This standard is to be at least a 75 percent reduction from the average emission levels of uncontrolled heavy-duty gasoline-fueled vehicles (1973 and, in some instances, 1972 model year vehicles).

The Clean Air Act specifies that the new standard apply to vehicles having gross vehicle weight ratings (GVWR) over 6,000 pounds. Since vehicles having GVWR's greater than 6,000 pounds include two EPA defined classes of vehicles, heavy-duty vehicles (GVWR over 8,500 lb.) and light-duty trucks (GVWR 6,001-8,500 lb.), it was necessary to determine baseline NOx emissions for each class.

The heavy-duty baseline was conducted by the Emission Control Technology Division (ECTD) of EPA's Office of Mobile Source Air Pollution Control and Southwest Research Institute of San Antonio, Texas. The results are reported in another ECTD technical report soon to be released.

For the LDT baseline, ECTD set up a testing program by contract to procure 1972-73 model year light-duty trucks and test them for exhaust emissions.

The purposes of this test program were:

1) To determine the average oxides of nitrogen (NOx) emission levels (baseline) from a representative sample of 1972-73 model year LDTs in the 6,001-8,500 lb. GVWR range, and

2) To calculate a NOx value that represents a 75 percent reduction from the baseline level.

The purpose of this report is to describe the test program, present the emission results, and explain the methodology used to derive the proposed NOx emission standard for the light-duty truck class.

II. Summary

The Clean Air Act as amended in 1977 directed the U.S. Environmental Protection Agency (EPA) to develop a more stringent

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* The light-duty truck class includes all trucks in the 0 to 8,500 lb. GVWR range. EPA plans to propose new standards applicable for the entire light-duty truck class.

NOx emission standard for heavy-duty engines used in heavy-duty vehicles and light-duty trucks in the 6,000 to 8,500 lb. GVWR range (hereafter called light-duty trucks). This Congressional mandate required that EPA set standards which would require at least a 75 percent reduction in NOx emissions. The 75 percent reduction should be measured from uncontrolled emission levels of 1972 or 1973 model year light-duty trucks and heavy-duty vehicles.

EPA developed and conducted (through contract) an emission testing program that determined baseline NOx emission levels for these light-duty trucks in the 6,001 to 8,500 lb. GVWR range. EG&G Automotive Research, Inc. of San Antonio,Texas was the contractor for this program.

The contract (EPA No. 68-03-2683) required EG&G to procure and test both 1969 and 1972-73 light-duty trucks over the 1979 LDT test procedure. The 1969 trucks were tested to establish HC and CO baseline emissions for the 1984 standards. The 1972-73 light-duty trucks were tested to establish the NOx baseline for determining a NOx emission standard. Both parts of the contract have been completed. A detailed summary of EG&G's work performed for this contract is contained in the contract final report (EPA-460/3-80-011), entitled "Procurement and Emissions Testing of 1969 and 1972/73 Model Year Gasoline Powered Light-Duty Trucks, (6,001-8,500 lbs. GVWR)."

The 1972-73 baseline consists of twenty-five light-duty trucks which were tested three times for emissions. The sales-weighted average of the actually measured NOx emissions is 3.606 g/mi. The corresponding 75 percent NOx reduction from this baseline level is 0.9 g/mi.

Besides Federal emission tests, eighteen of the vehicles were also tested for idle emissions using the recently finalized idle test procedure (Subpart P of part 86, CFR 40). The average sales-weighted idle emission levels for the 18 vehicles are shown below.

%LDT Sales	% CO	HC ppm C
92.1	1.072	5,120.9

III. Introduction

This technical report describes the test program the Emission Control Technology Division (ECTD) developed to measure oxides of nitrogen (NOx) emissions for 1972/73 model year light-duty trucks (LDT). This baseline is being used to set a proposed NOx emission standard for LDTs which have gross vehicle weight ratings (GVWR) of 8,500 lb. or less.

The actual test program was conducted by a contractor, EG&G Automotive Research, Inc. of San Antonio, Texas. They were contracted to procure twenty-five 1972-73 light-duty trucks, and test each vehicle three times for emissions using the 1979 LDT Federal Test Procedure. Also 11 of the vehicles whose engines were also used in heavy-duty vehicles (vehicles with GVWR >8,500 lbs.), had their engines removed and prepared for engine dynamometer testing. Later in the program an idle emission test was added to the test program. Table 1 lists the vehicles tested under this program.

This report describes the baseline testing program for light-duty trucks and includes the procurement and testing activities performed by EG&G. The final baseline emission results and standards derived from the baseline are reported. Also included are the idle test results for the 1972-73 LDTs which were tested.

IV. Discussion

A. LDT Baseline Program Formulation

In order to set HC, CO and NOx emission standards for light-duty trucks, it was necessary to establish baseline emission levels for 1969 and 1972-73 model year LDTs. EPA decided that a testing contractor should be selected to procure and test both 1969 and 1972/73 LDTs.

In the summer of 1977, the Standards Development and Support Branch of the Emission Control Technology Division began work on the contract solicitation to establish the 1969 HC and CO and the 1972/73 NOx baseline. The contract would require the testing contractor to procure and test thirty 1969 and twenty-five 1972/73 model year light-duty trucks (6,001-8,500 lbs. GVWR). The trucks would be tested on the 1979 light-duty truck emission test procedure. The contract solicitation (Request for Proposal No. CI 77-0329) was made available to bidders on December 8, 1977.

B. EPA Contract No. 68-03-2683

On July 26, 1978, Contract No. 68-03-2683 Baseline Characterization of Emissions from Medium-Duty Gasoline Vehicles Tested on a Chassis Dynamometer, was awarded to EG&G Automotive Research, Inc. (EG&G) of San Antonio, Texas. All vehicle procurement and testing of both 1969 and 1972/73 vehicles has been completed. Twenty-one 1969 LDTs were tested to determine the HC and CO baseline emission levels used for setting the new 1984 HC and CO emission standards. Twenty-five 1972-73 LDTs were tested to create the NOx baseline. The final report for this contract (EPA-460/3-80-011) Procurement and Emissions testing of 1969 and 1972-73 Model Year Gasoline-Powered Light-Duty trucks (6,001-8,500 lbs. GVWR) details the procurement and testing of these vehicles at EG&G. During the course of this contract EPA amended the original contract to include idle emissions tests.

Table 1

Engine	Model Year	EG&G Vehicle No.	Engine	Model	Body Type	Mileage	Source	Engine Used for HD Nox Baseline
1	(72)	612	GMC 350	1500	Suburban	90,192	Harry Pierce San Antonio, TX	No
2	(72)	642	Chev 350	C-20	Pick-up	77,096	Charles Dake Houston, TX	Yes
3	(72)	637	Chev 350	C-20	Pick-up	97,917	R.W. Dyer Adkins, TX	No
4	(72)	634	Chev 350	C-20	Pick-up	99,861	Braden Oil Co. San Antonio, TX	Yes
5	(72)	629	Chev 350	C-20	Pick-up	84,080	Elizabeth Trainor San Antonio, TX	Yes
6	(72)	631	Chev 350	C-20	Pick-up	91,098	Bill Crouch Chrysler Englewood, CO	Yes
7	(72)	644	Chev 350	C-20	Pick-up	87,263	James Blake Garland, TX	No
8	(73)	628	Chev 292	C-20	Pick-up	48,484	S.R. Sigler El Paso, TX	Yes
9	(73)	632	Chev 250	C-20	Pick-up	76,907	Colden Ford Golden, Colorado	No
10	(73)	608	GMC 454	2500	Pick-up	70,891	H.M. Vik San Antonio, TX	No
11	(73)	474	GMC 454	C-20	Pick-up	51,140	R.V. Gonzales San Antonio, TX	Yes
12	(73)	486	Dodge 360	D-200	Pick-up	42,696	Arthur Smith Johnson City, TX	Yes

Table 1 (Cont'd)

Engine	Model Year	EG&G Vehicle No.	Engine	Model	Body Type	Mileage	Source	Engine Used for HD Nox Baseline
13	(73)	609	Dodge 360	Camper 7500	Pick-up	70,669	David Prescott San Antonio, TX	No
14	(73)	627	Dodge 360	W-200	Pick-up	63,196	Smith Nelson Dodge El Paso, TX	No
15	(73)	605	Dodge 318	D-200	Pick-up	68,094	Herb's Used Cars San Antonio, TX	Yes
16	(72)	630	Ford 360	F-250	Pick-up	92,152	Big Country Motors Denver, CO	No
17	(72)	620	Ford 360	F-250	Pick-up	71,297	Sidney Forster San Antonio, TX	Yes
18	(72)	624	Ford 360	F-250	Pick-up	59,781	Paul Buhler Garland, TX	No
19	(72)	643	Ford 360	F-250	Pick-up	77,071	Edward Rogers Houston, TX	No
20	(72)	641	Ford 360	F-250	Pick-up	81,124	Charles Morrell San Antonio, TX	No
21	(72)	625	Ford 302	E-300	Van	98,900	H&H Motors Garland, TX	No
22	(72)	635	Ford 390	F-250	Pick-up	79,116	Charles Valentine San Antonio, TX	Yes
23	(72)	640	Ford 390	F-250	Pick-up	92,094	Michael McAdams San Antonio, TX	Yes

Table 1 (Cont'd)

Engine	Model Year	EG&G Vehicle No.	Engine	Model	Body Type	Mileage	Source	Engine Used for HD Nox Baseline
24	(73)	611	IHC 304	1210	Pick-up	37,601	Bruno's Auto Mart San Antonio, TX	Yes
25	(73)	639	IHC 345	1210	Pick-up	106,634	P. Archibeque San Antonio, TX	No

Average Mileage = 76,614

C. Vehicle Procurement

Twenty-five 1972-73 model year light-duty trucks having gross vehicle weights of 6,001-8,500 pounds were procured by EG&G to be used as baseline test vehicles. Procurement of the 1972-73 LDTs began in October 1978 and was concluded on October 18, 1979. Table 1 lists the 25 vehicles which comprise the NOx baseline. In addition to those vehicles in Table 1, EG&G procured 7 1973 LDTs. These 7 vehicles, however, were deleted because they had NOx controlled engines.* Model year 1972 LDTs were substituted for any 1973 LDT which had NOx controls. Three baseline vehicles were obtained in Colorado; the remaining 22 were purchased in Texas. Mileage on these vehicles ranged from 37,601 to 106,634 miles with the average baseline vehicle mileage being 76,614 miles. The 25 vehicle samples represent 94.4 percent of the 1973 LDT sales in the 6,001 to 8,500 pound class.

EG&G procured test vehicles using the following selection criteria:

1. Vehicles must be trucks or vans; rated by the manufacturer at 6,001 to 8,500 lbs. GVWR.

2. No emission-controlled vehicles shall be included as evidenced by an emission control sticker or external emission control equipment.

3. Potential vehicles shall be inspected to ensure that they do not consume excessive amounts of oil, that they have satisfactory cylinder compression, that they have original carburetors and distributors, and that they have not undergone a major engine overhaul.

4. Every effort must be made to secure low-mileage vehicles (under 80,000 miles) which will not need extensive engine repairs.

5. Higher-mileage vehicles, or vehicles requiring more than a minor tune-up, may be used if the contractor demonstrates to the Project Officer that the desired test vehicles cannot otherwise be obtained.

Vehicles were procured using the sampling plan shown in Table 2. The sampling plan was provided to EG&G by EPA and was constructed using sales data supplied to EPA by the vehicle manufacturers and by the Motor Vehicle Manufacturers Association.

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* The decision not to test certain 1973 model year LDTs was made after the procurement process had started. Certain 1973 LDTs had NOx-controlled engines even though the first model year for Federally-mandated NOx control was 1974. If a 1973 engine had NOx controls, then a 1972 model year vehicle and engine of the same configuration was substituted. See letter in Appendix C.

Table 2

Sampling Plan and 1972-73 Sales Data (Sample Size = 25)

Manufacturer	Engine	1973 Sales	NOx * Controls	Percent of Market	Sampling Target Range
Chrysler	225	2,800	No	0.5	0-1
(Total	318	20,000	No	3.5	1
required 4)	360	59,000	No	10.4	2-3
	400	6,500	Yes	1.1	0-1
Ford	300	14,500	Yes	2.6	0-1
(Total	360	125,300	Yes	22.1	5-6
required 9)	390	46,500	Yes	8.2	2
	460	2,200	Yes	0.4	0-1
	302	29,900	Yes	5.3	1
GM	292	15,450	No	2.7	1
(Total	350-4	169,929	Yes	30.0	7
required 10-11)	454	42,000	No	7.4	2
	250	7,820	No	1.4	0-1
IHC	304	6,100	No	1.1	0-1
(Total	345	13,200	No	2.3	1
required 2)	392	5,000	Yes	0.9	0-1
		566,199		99.9	

* If a 1973 engine has NOx controls, then a 1972 engine with the same displacement and general configuration was procured instead.

Table 3 shows that EG&G closely followed the sampling plan in procuring the test vehicles.

These criteria were generally adhered to for vehicle selection. Later in the program to increase the vehicle procurement rate which was lagging, it became necessary to accept vehicles which had accumulated more than 80,000 miles. More extensive maintenance was also required on some vehicles (carburetor rebuild, carburetor replacement, valve replacement) to bring them into acceptable condition for testing. The conditions which necessitated major work or parts replacement were discovered usually during pre-test inspection and maintenance.

EG&G used several methods to identify potential test vehicles. Newspaper and radio advertisements, mail and telephone solicitations, and direct trips to other localities were all used to obtain test vehicles. Newspaper advertisements were placed in the San Antonio paper and a radio commercial campaign was initiated several times. Recipients of mail and telephone solicitations were identified from a vehicle owner's listing of 1973 LDTs purchased from the R. L. Polk Company. This listing proved to be very inaccurate. Later in the program, a second listing of 1972 vehicles was purchased from the Wilson Publishing Company of Houston, Texas. The Wilson list was for the San Antonio, Houston, and Dallas metropolitan areas. Direct trips involved a Procurement Specialist visiting El Paso, Texas; Denver, Colorado, and Dallas, Texas to inspect and purchase test vehicles.

The method EG&G used to procure each 1972-73 LDT is shown below. Trucks are listed by contractor vehicle number.

		Vehicle Owners		
Polk List	Wilson List	Newspaper	Advertisement	Trip
608	629	474	612	625
	634	486	620	627
	635	605	624	628
	637	609	639	630
	641	611	640	631
	642			632
	643			
	644			

Once a vehicle was identified as being a potential test vehicle, the selection procedure began. EG & G's vehicle selection procedure consisted of initial screening, physical inspection, vehicle purchase, and diagnostic evaluation.

Initial screening consisted of questioning the vehicle owners as to the vehicle make and GVWR, mileage, engine displacement, past maintenance history, oil consumption, and the general operating condition of the engine. Maintenance records were reviewed when available.

Table 3

1972-73 Target Versus Actual Procured Engines

Manufacturer	Engine	Sampling Target Quantity	Actual Quantity Procured
Chrysler	225	0-1	0
(total	318	1	1
required 4)	360	2-3	3
	400	0-1	0
Ford	300	0-1	0
(total	302	1	1
required 9)	360	5-6	5
	390	2	2
	460	0-1	0
GM	250	0-1	1
(total required	292	1	1
10-11)	350-4	7	7
	454	2	2
IHC	304	0-1	1
(total	345	1	1
required 2)	392	0-1	0

If the initial screening was satisfactory, then a physical inspection of the vehicle was conducted. During this inspection, the general condition of the vehicle and engine were noted, and the vehicle was driven to determine its mechanical condition. Pertinent part numbers for identification of the engine block, distributor, and carburetor were recorded to verify that they were original equipment. This verification was accomplished by using the appropriate service manuals, or by direct communication with the vehicle manufacturers. Vehicles were checked for correct GVWR rating, engine displacement, and mileage.

When a vehicle had passed the initial screening and the physical inspection satisfactorily, the vehicle was purchased by Jack King Leasing, 5625 San Pedro Street, San Antonio, Texas. The vehicle was then leased to EG&G for a fixed fee for a period of one year.

The final phase of vehicle selection was a diagnostic evaluation. At this time, any part numbers which could not be verified during the initial inspection were checked. Also, any defective parts were repaired to make the vehicle ready for emission testing.

During the diagnostic evaluation the vehicle was checked for engine oil, fuel, and coolant leaks. A cylinder compression and leak-down test were performed. The transmission, rear axle, engine, electrical system and braking system were inspected. The whole exhaust system was inspected for leaks.

D. Maintenance and Tune-Up Procedure

Essential maintenance and a minor tune-up was performed on each test vehicle before emissions testing was begun. A tune-up included replacement of the parts listed below:

Spark Plugs	Distributor Point Set
Distributor Condenser	Distributor Cap
Distributor Rotor	Air Filter Element
PCV Valve	Ignition Wire Set
Carburetor Fuel Filter	

The tune-ups were performed according to recommended tune-up procedures detailed in the manufacturer's service manuals. The distributors were checked on a distributor machine and adjusted as close as possible to original specifications for centrifugal and vacuum advance. The following items were adjusted and set to manufacturer's specifications:

Distributor Point Gap	Curb Idle Speed
Dwell Angle	Fast Idle Speed
Spark Plug Gap	Choke
Timing	

Maintenance performed on each vehicle by EG&G and maintenance performed at EPA and SwRI before heavy-duty engine transient testing is shown in Appendix A.

E. Test Equipment and Fuel

1. Fuel

All vehicles were tested using Indolene 30 leaded test fuel.

2. Chassis Dynamometer

A Clayton ECE 50 water brake dynamometer was used for all testing. It has automatic road load power control and an inertia range of 1,000 to 8,875 pounds in 125-pound increments.

3. Constant Volume Sampler (CVS) and Analyzers

The equipment listed below was used for the LDT test program:

Prior to October 1979

CVS - Scott Model 302 PDP, flow capacity approximately 325 CFM.
CO - Beckman 315B ranges 0-1000, 5000 PPM.
CO_2 - Beckman 315 ranges 0-2.5, 5.0%.
HC - Horiba FIA-2A ranges 0-100, 500, 1000, 5000 PPM.
NOx - Thermo-Electron 10B - ranges 0-100, 250 PPM.

After October 1979

CVS - Horiba CFV-CVS-20B flow capacity approximately 325 CFM.
CO - Horiba AIA-23AS ranges 0-100, 500, 1000, 5000 PPM.
CO_2 - Horiba AIA-23 ranges 0-1.5, 4.0%.
HC - Horiba FIA-23A ranges 0-100, 500, 1000, 5000 PPM.
NOx - Horiba CLA-22A ranges 0-100, 300 PPM.

F. Vehicle Testing

All 25 vehicles were tested at the EG & G facility located in San Antonio, Texas. Testing of the 1972-73 LDTs began in December 1978 and was completed in March 1980. Vehicles were tested using the Light-Duty Test Procedure, Title 40 Code of Federal Regulations, Part 86, Subpart B, as applicable to 1979 model year light-duty trucks. Evaporative emissions were not measured and highway fuel economy tests were not conducted. Each vehicle was required to have three valid emission tests. The average of these three tests for each vehicle are shown in Table 4. The individual test results for each vehicle are shown in Appendix A. In addition, 18 of the 25 vehicles were tested twice using the new heavy-duty idle

Table 4

1973 L.D.T. BASELINE EMISSION RESULTS

10-01-80 16:30:04

	VEHICLE	CID	VEH#	% LDT SALES		CORR. %	HC NON-WID	HC SALE-WID	CO NON-WID	CO SALE-WID	NOX NON-WID	NOX SALE-WID
1	GMC	350	612	30.00 / 7 =	4.286	4.54	3.671	0.167	61.537	2.794	3.254	0.148
2	CHEV	350	642	30.00 / 7 =	4.286	4.54	4.275	0.194	61.456	2.790	5.489	0.249
3	CHEV	350	637	30.00 / 7 =	4.286	4.54	3.545	0.161	33.411	1.517	5.123	0.233
4	CHEV	350	634	30.00 / 7 =	4.286	4.54	5.212	0.237	58.465	2.654	4.461	0.203
5	CHEV	350	629	30.00 / 7 =	4.286	4.54	8.213	0.373	38.197	1.734	3.873	0.176
6	CHEV	350	631	30.00 / 7 =	4.286	4.54	4.429	0.201	19.494	0.885	3.283	0.149
7	CHEV	350	644	30.00 / 7 =	4.286	4.54	2.952	0.134	25.584	1.162	4.603	0.209
8	CHEV	292	628	2.70 / 1 =	2.700	2.86	3.258	0.093	22.652	0.648	3.844	0.110
9	CHEV	250	632	1.40 / 1 =	1.400	1.48	4.165	0.062	54.489	0.808	2.419	0.036
10	GMC	454	608	7.40 / 2 =	3.700	3.92	6.657	0.261	51.494	2.018	2.990	0.117
11	GMC	454	474	7.40 / 2 =	3.700	3.92	6.605	0.259	22.415	0.879	2.462	0.096
12	DODGE	360	486	10.40 / 3 =	3.467	3.67	4.804	0.176	31.290	1.149	3.616	0.133
13	DODGE	360	609	10.40 / 3 =	3.467	3.67	4.916	0.181	111.513	4.095	3.734	0.137
14	DODGE	360	627	10.40 / 3 =	3.467	3.67	6.926	0.254	83.287	3.059	2.700	0.099
15	DODGE	318	605	3.50 / 1 =	3.500	3.71	4.647	0.172	49.628	1.840	5.441	0.202
16	FORD	360	630	22.10 / 5 =	4.420	4.68	7.294	0.342	91.980	4.307	2.146	0.100
17	FORD	360	620	22.10 / 5 =	4.420	4.68	6.835	0.320	65.412	3.063	2.653	0.124
18	FORD	360	624	22.10 / 5 =	4.420	4.68	4.201	0.197	57.689	2.701	3.864	0.181
19	FORD	360	643	22.10 / 5 =	4.420	4.68	5.100	0.239	39.273	1.839	3.874	0.181
20	FORD	360	641	22.10 / 5 =	4.420	4.68	5.510	0.258	63.001	2.950	3.964	0.186
21	FORD	302	625	5.30 / 1 =	5.300	5.61	4.596	0.258	40.755	2.288	3.043	0.171
22	FORD	390	635	8.20 / 2 =	4.100	4.34	5.312	0.231	47.625	2.068	3.133	0.136
23	FORD	390	640	8.20 / 2 =	4.100	4.34	5.171	0.225	60.675	2.635	3.003	0.130
24	IHC	304	611	1.10 / 1 =	1.100	1.17	5.516	0.064	127.835	1.490	2.487	0.029
25	IHC	345	639	2.30 / 1 =	2.300	2.44	5.259	0.128	38.164	0.930	2.894	0.071
					94.400	100.00		5.185		52.307		3.606
												(25%= 0.901)

PROGRAM NAME: SGWK:7140C-LDT

test procedure in 40 CFR, Part 86, Subpart P. The idle test procedure is described in Appendix B. Individual idle test results are contained in Appendix A and summarized in Table 5.

The 1979 light-duty truck test procedure requires that road load horsepower settings for the dynamometer be a function of vehicle frontal area. ECTD instructed EG&G to use an approximation for frontal area, rather than calculate frontal area for each vehicle individually. The frontal area approximation used was 33 square feet for a pick-up truck, and 37 square feet for a van. According to Section 86.129-79 of CFR 40, the road load horsepower setting for a pick-up truck is determined by multiplying the frontal area (including mirrors) by 0.58 while the road load horsepower setting for a van is determined by multiplying the van's frontal area (including mirrors) by 0.50. This frontal area approximation resulted in an actual road load horsepower setting of 19.0 hp for a pick-up truck and 18.5 hp for a van. EPA allowed this approximation to save time and reduce contract expense. The frontal area approximations which were used, were averages of frontal area measurements performed on pick-ups and vans by EPA personnel. The approximations yield road-load hp settings close to those used for emissions certification testing of LDT's in the 6,000-8,500 pound GVWR range for 1979 (19.0-21.5 hp).

Inertia weight settings for the test vehicles were determined by the loaded vehicle weight technique of the EPA test procedure. The vehicle's curb weight was used with the weight of a 40 percent fuel tank fill included. Three hundred pounds was added to obtain the final weight to be used for determining inertia weight setting.

Eleven vehicles had engines removed so that the engines could be tested as part of the heavy-duty NOx baseline. These vehicles were retested at EG&G after the engines were reinstalled into the vehicle chassis. The emission results for these retests are shown in Appendix A. The effect of this retest data when substituted for the original data is shown in Table 6. Substituting the retest data into the baseline calculation had an insignificant effect on the baseline and on the derived standard for NOx emissions shown below:

	NOx g/mile	75% Reduction
Table 4 Original Test Data	3.61	0.90
Table 6 Retest Data Substituted	3.66	0.92

The retesting of the vehicles after engine reinstallation was performed because additional maintenance was performed on the engines at EPA and Southwest Research Institute (SwRI) before engine transient cycle emission testing. This additional maintenance is summarized in Appendix A.

Table 5

1973 L.D.T. IDLE EMISSION TEST RESULTS

07-31-80 15:14:40

	VEHICLE	CID	VEH#	% LDT SALES			CORR. %	<----- CO % -----> NON-MID	SALE-MID	<--- HC PPMC ----> NON-MID	SALE-MID
1	GMC	350	612	30.00 / 5 =	6.000		6.515	3.921	0.255	18304.6	1192.5
2	CHEV	350	642	30.00 / 5 =	6.000		6.515	0.991	0.065	2135.0	139.1
3	CHEV	350	637	30.00 / 5 =	6.000		6.515	0.136	0.009	1570.2	102.3
4	CHEV	350	634	30.00 / 5 =	6.000		6.515	3.903	0.254	3289.6	214.3
5	CHEV	350	629	30.00 / 5 =	6.000		6.515	1.312	0.085	11931.0	777.3
6	CHEV	292	628	2.70 / 1 =	2.700		2.932	0.376	0.011	2860.9	83.9
7	CHEV	250	632	1.40 / 1 =	1.400		1.520	0.679	0.010	1720.3	26.2
8	GMC	454	608	7.40 / 2 =	3.700		4.017	0.767	0.031	7438.3	298.8
9	GMC	454	474	7.40 / 2 =	3.700		4.017	3.335	0.134	16768.8	673.7
10	DODGE	360	485	10.40 / 2 =	5.200		5.646	0.679	0.038	1132.2	63.9
11	DODGE	360	627	10.40 / 2 =	5.200		5.646	1.162	0.066	2451.6	138.4
12	DODGE	318	605	3.50 / 1 =	3.500		3.800	0.579	0.022	2564.2	97.6
13	FORD	360	630	22.10 / 3 =	7.367		7.999	0.466	0.037	2912.5	233.0
14	FORD	360	620	22.10 / 3 =	7.367		7.999	0.171	0.014	3575.5	286.0
15	FORD	360	624	22.10 / 3 =	7.367		7.999	0.133	0.011	961.2	76.9
16	FORD	302	625	5.30 / 1 =	5.300		5.755	0.151	0.009	3536.8	203.6
17	FORD	390	635	8.20 / 1 =	8.200		8.903	0.148	0.013	5523.3	491.8
18	IHC	304	611	1.10 / 1 =	1.100		1.194	0.720	0.009	1824.7	21.8
					92.100		100.00		1.072		5120.9

PROGRAM NAME: SGWK:7140C-ILDT

Table 6

1973 L.D.T. BASELINE EMISSION RESULTS 10-01-80 16:33:51

WITH RETESTS

	VEHICLE	CID	VEH#	% LDT SALES	CORR. %	HC NON-WID	HC SALE-WID	CO NON-WID	CO SALE-WID	NOX NON-WID	NOX SALE-WID
1	GMC	350	612	30.00 / 7 = 4.286	4.54	3.671	0.167	61.537	2.794	3.254	0.148
2	CHEV	350	*642	30.00 / 7 = 4.286	4.54	3.676	0.167	39.987	1.815	3.825	0.174
3	CHEV	350	637	30.00 / 7 = 4.286	4.54	3.545	0.161	33.411	1.517	5.123	0.233
4	CHEV	350	*634	30.00 / 7 = 4.286	4.54	3.235	0.147	10.861	0.493	4.071	0.185
5	CHEV	350	*629	30.00 / 7 = 4.286	4.54	4.413	0.200	51.089	2.319	5.044	0.229
6	CHEV	350	631	30.00 / 7 = 4.286	4.54	4.429	0.201	19.494	0.885	3.283	0.149
7	CHEV	350	644	30.00 / 7 = 4.286	4.54	2.952	0.134	25.584	1.162	4.603	0.209
8	CHEV	292	*628	2.70 / 1 = 2.700	2.86	5.330	0.152	51.367	1.469	4.231	0.121
9	CHEV	250	632	1.40 / 1 = 1.400	1.48	4.165	0.062	54.489	0.808	2.419	0.036
10	GMC	454	608	7.40 / 2 = 3.700	3.92	6.657	0.261	51.494	2.018	2.990	0.117
11	GMC	454	*474	7.40 / 2 = 3.700	3.92	3.541	0.139	54.899	2.152	3.299	0.129
12	DODGE	360	*486	10.40 / 3 = 3.467	3.67	5.921	0.217	51.023	1.874	3.592	0.132
13	DODGE	360	609	10.40 / 3 = 3.467	3.67	4.916	0.181	111.513	4.095	3.734	0.137
14	DODGE	360	627	10.40 / 3 = 3.467	3.67	6.926	0.254	83.287	3.059	2.700	0.099
15	DODGE	318	*605	3.50 / 1 = 3.500	3.71	5.826	0.216	38.119	1.413	5.436	0.202
16	FORD	360	630	22.10 / 5 = 4.420	4.68	7.294	0.342	91.980	4.307	2.146	0.100
17	FORD	360	*620	22.10 / 5 = 4.420	4.68	7.629	0.357	71.307	3.339	2.685	0.126
18	FORD	360	624	22.10 / 5 = 4.420	4.68	4.201	0.197	57.689	2.701	3.864	0.181
19	FORD	360	643	22.10 / 5 = 4.420	4.68	5.100	0.239	39.273	1.839	3.874	0.181
20	FORD	360	641	22.10 / 5 = 4.420	4.68	5.510	0.258	63.001	2.950	3.964	0.186
21	FORD	302	625	5.30 / 1 = 5.300	5.61	4.596	0.258	40.755	2.288	3.043	0.171
22	FORD	390	*635	8.20 / 2 = 4.100	4.34	3.573	0.155	52.211	2.268	4.452	0.193
23	FORD	390	*640	8.20 / 2 = 4.100	4.34	5.991	0.260	73.745	3.203	2.588	0.112
24	IHC	304	*611	1.10 / 1 = 1.100	1.17	3.400	0.040	54.680	0.637	3.686	0.043
25	IHC	345	639	2.30 / 1 = 2.300	2.44	5.259	0.128	38.164	0.930	2.894	0.071
				94.400	100.00		4.892		52.334		3.663
											(25%= 0.916)

PROGRAM NAME: SGWK:7140C-LDT

G. Quality Control Procedure and Test Audit

All equipment used for emission testing received quality control calibrations in accordance with the calibration guidelines specified in the Federal Register (CFR 40, Part 86). These include checks of the chassis dynamometer, CVS, and analytical system. The detailed procedures EG & G followed are contained in the final report for EPA Contract No. 68-03-2683 entitled " Procurement and Emissions Testing of 1969 and 1973-74 Model Year Gasoline-Powered Light-Duty Trucks (6,001-8,500 lbs. GVWR)."

After completion of an emissions test, a test data packet was assembled which contained the following items:

1) Wet bulb-dry bulb temperature trace.
2) Emission results input data tape.
3) Driver's trace - FTP.
4) Test vehicle refueling record.
5) CVS temperature trace.
6) Bag emissions analysis trace.
7) CVS-PDP test data sheet.
8) Driver's FTP check list.
9) Quality control audit sheets.
10) Non-evaporative hot LA-4 precondition checklist.
11) Preconditioning driver's trace.
12) CVS operator's test preparation report.
13) Emission results summary sheet.

The quality control audit consisted of checking the non-evaporative LA-4 precondition check list (item 10 above) and precondition driver's trace, the driver's FTP check list, the FTP driver's trace, the CO/CO_2 instrument traces, and the HC/NOx instrument traces for errors. Using the quality control audit sheets, the quality control technican inspected each item on every operator check list for completeness and accuracy of the particular entry. Errors of omission or misentries were resolved by questioning the individual responsible for the particular data pack item. If any errors or omissions were not resolved, the test was voided.

Test parameters such as cell temperature, driver's trace speed tolerances, test duration, analyzer calibrations, etc. were checked to ensure that the parameters were within the proper tolerances, as specified in the Federal Register Light-Duty Truck Test Procedure.

H. Baseline Compilation

Audited test data packets were sent to the Project Officer, who compiled the baseline emissions results. Each vehicle's average emission results (the average of three tests) were multiplied by the corrected sales-weighting factor to obtain sales-weighted emissions. The sales-weighted emissions for each vehicle/

engine were then added together to yield the baseline sales-weighted emission results. Table 4 contains the final sales-weighted emissions results for each vehicle. Approximately 94.4% of the sales of LDT's in the 6,000-8,500 pound range are represented in this table (and in the baseline).

In Table 4, the percent LDT sales shown in column four were calculated by dividing the percent LDT market sales (obtained from Table 2) by the number of engines tested for a particular engine line. For example, the GM 350 engine line represents 30 percent of the LDT market sales, so each GM 350 tested is considered 4.286 percent (30 divided by 7), of the market. Column five, corrected percent, is just the percent LDT sales adjusted to 100 percent. Multiplying the corrected percent by the actual average emissions for each engine yields the sales-weighted emission results. These are added together to obtain the final baseline emission results.

The final baseline sales-weighted NOx emission results from Table 4 is 3.606 g/mile.

I. Standards Computation

The Clean Air Act Amendments require at least a 75 percent reduction. The final baseline NOx emission result of 3.606 g/mile when reduced by 75 percent yields a standard of:

NOx Standard = 0.9 g/mile

Appendix A

Vehicle Maintenance Summary and Emission Tests Results

Make:	GMC
Vehicle #:	612
Year:	1972
Model:	Suburban 1500
Engine:	350
Engine #:	V0218TDJ
VIN:	TCE162F511173
GVWR:	6,650
Mileage:	90192
Transmission:	Auto
Air Condition:	Yes
Owner:	Harry Pierce, San Antonio, TX
Inertia Wt:	5,000 lb.
HP:	19.0

EG & G Maintenance

1. Tune-up.
2. Muffler, Tailpipe, and Exhaust Y-pipe replaced.
3. Battery replaced.

Emission Test Results

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
612	1-14-80	17	4.008	64.058	3.363	11.11
	1-15-80	18	3.478	60.095	3.192	11.00
	1-16-80	19	3.526	60.458	3.206	10.93

Idle Test Results

Test Date	Test Number	HC PPM C	CO Percent
9-06-79	01	19,275.765	4.685
9-06-79	02	18,592.800	4.484
9-19-79	03	17,045.217	2.593

Appendix A (Cont'd)

Make:	Chevrolet
Vehicle #:	642
Year:	1972
Model:	C-20
Engine:	350
Engine #:	VQ202TRJ
VIN:	CCE242A143237
GVWR:	7,500
Mileage:	77096
Transmission:	Auto
Air Condition:	Yes
Owner:	Charles Dake, Houston, TX
Inertia Wt:	5,000 lb.
HP:	19.0

EG & G Maintenance

1. Tune-up.
2. Exhaust pipe replaced.
3. Muffler, tailpipe replaced.

Emission Test Results

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
642	10-30-79	01	4.563	66.887	5.781	12.01
	10-31-79	02	4.273	63.840	5.034	11.94
	11-01-79	04	3.990	53.642	5.653	11.91

Idle Test Results

Test Date	Test Number	HC PPM C	CO Percent
11-1-79	01	2,240.554	1.100
11-1-79	02	2,029.538	0.881

EPA Maintenance (Before HD testing)

1) Timing chain replaced
2) Cam gear replaced
3) Oil pan gasket replaced
4) Oil and filter replaced

Emission Retest Results (after engine reinstalled)

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
642	02-20-80	06	3.798	50.011	3.855	10.29
	02-21-80	07	3.887	25.663	3.884	12.04
	03-15-80	09	3.310	42.850	3.881	11.55
	03-27-80	10	3.719	41.425	3.678	11.53

Appendix A (Cont'd)

Make:	Chevrolet
Vehicle #:	637
Year:	1972
Model:	C-20
Engine:	350
Engine #:	V0422TRJ
VIN:	CCE242S184011
GVWR:	7,500
Mileage:	97917
Transmission:	Auto
Air Condition:	Yes
Owner:	R.W. Dyer, Adkins, TX
Inertia Wt:	5,000 lb.
HP:	19.0

EG & G Maintenance

1. Tune-up.
2. Muffler and tailpipe replaced.
3. Starter replaced.

Emission Test Results

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
637	8-09-79	04	3.460	30.022	5.207	11.50
	8-10-79	05	3.517	32.555	5.287	11.53
	8-29-79	06	3.657	37.657	4.875	11.43

Idle Test Results

Test Date	Test Number	HC PPM C	CO Percent
8-10-79	03	1,628.001	0.134
8-10-79	04	1,512.363	0.137

Appendix A (Cont'd)

Make:	Chevrolet
Vehicle #:	634
Year:	1972
Model:	C-20
Engine:	350
Engine #:	--
VIN:	CCE242S123031
GVWR:	7,500
Mileage:	99861
Transmission:	Auto
Air Condition:	Yes
Owner:	Braden Oil Co., San Antonio, TX
Inertia Wt:	5,500 lb.
HP:	19.0

EG & G Maintenance

1. Tune-up.
2. Carburetor base gasket replaced.

Emission Test Results

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
634	7-01-79	07	8.988	74.583	4.482	11.53
	9-14-79	08	2.967	38.085	4.597	11.56
	9-15-79	09	3.861	62.728	4.305	11.85

Idle Test Results

Test Date	Test Number	HC PPM C	CO Percent
9-14-79	03	2,739.627	2.888
9-15-79	04	3,839.924	4.917

EPA Maintenance (Before HD testing)

1) Carburetor rebuilt
2) Distributor mechanical advance adjusted
3) Flywheel and starter replaced

Emission Retest Results (After engine reinstalled)

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
634	02-21-80	10	3.035	10.353	4.119	12.11
	02-22-80	11	3.181	9.557	4.365	11.98
	03-31-80	12	3.142	11.256	3.946	11.86
	04-01-80	13	3.582	12.277	3.854	11.81

Appendix A (Cont'd)

Make:	Chevrolet
Vehicle #:	629
Year:	1972
Model:	C-20
Engine:	350
Engine #:	V0908TRJ
VIN:	CCE242F309950
GVWR:	6,200
Mileage:	84080
Transmission:	Auto
Air Condition:	NO
Owner:	Elizabeth Trainor, San Antonio, TX
Inertia Wt:	5,000 lb.
HP:	19.0

EG & G Maintenance

1. Tune-up.
2. Muffler, tailpipe, and Y-pipe replaced.

Emission Test Results

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
629	09-18-79	04	7.820	38.277	4.017	11.13
	10-07-79	10	8.199	37.996	3.696	10.66
	10-12-79	11	8.621	38.319	3.906	10.45

Idle Test Results

Test Date	Test Number	HC PPM C	CO Percent
9-18-79	05	11,719.402	1.259
9-20-79	06	11,317,900	1.188
9-20-79	07	12,755,821	1.488

EPA Maintenance (Before HD testing)

1) Water pump replaced

Emission Retest Results (After engine reinstalled)

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
629	04-04-80	13	4.286	52.094	4.979	11.76
	04-07-80	16	4.540	50.084	5.109	11.85

Appendix A (Cont'd)

Make:	Chevrolet
Vehicle #:	631
Year:	1972
Model:	C-20
Engine:	350
Engine #:	V0820TRJ
VIN:	CCE242S107288
GVWR:	7,500
Mileage:	91098
Transmission:	Auto
Air Condition:	No
Owner:	Bill Crouch Chrysler, Englewood, CO
Inertia Wt:	5,000 lb.
HP:	19.0

EG & G Maintenance

1. Tune-up.
2. Carburetor replaced.
3. Tailpipe replaced.

Emission Test Results

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
631	2-5-80	06	3.750	17.884	3.197	13.40
	2-6-80	07	4.921	19.379	3.325	13.24
	2-7-80	08	4.617	21.218	3.327	13.00

Appendix A (Cont'd)

Make:	Chevrolet
Vehicle #:	644
Year:	1972
Model:	C-20
Engine:	350
Engine #:	V0923TRJ
VIN:	CCE242S120075
GVWR:	6,200
Mileage:	87263
Transmission:	Auto
Air Condition:	Yes
Owner:	James Blake, Garland, TX
Inertia Wt:	5,000 lb.
HP:	19.0

EG & G Maintenance

1. Tune-up.
2. Muffler, tailpipe, and Y-exhaust pipe replaced.
3. Universal joint replaced.
4. Adjusted lifters.

Emission Test Results

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
644	1-17-80	05	3.041	25.779	4.746	11.64
	1-18-80	06	2.844	26.013	4.760	11.77
	1-19-80	07	2.970	24.960	4.302	11.79

Appendix A (Cont'd)

Make:	Chevrolet
Vehicle #:	628
Year:	1973
Model:	C-20
Engine:	292
Engine #:	F1017THC
VIN:	CCT243Z118632
GVWR:	6,400
Mileage:	48484
Transmission:	4 speed manual
Air Condition:	Yes
Owner:	S.R. Sigler, El Paso, TX
Inertia Wt:	5,000 lb.
HP:	19.0

EG & G Maintenance

1. Tune-up.
2. Carburetor replaced.
3. Distributor replaced.

Emission Test Results

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
628	9-11-79	02	3.430	26.672	3.982	12.29
	9-12-79	03	3.202	21.929	4.266	11.99
	9-13-79	04	3.143	19.356	3.283	12.16

Idle Test Results

Test Date	Test Number	HC PPM C	CO Percent
9-11-79	01	2,446.747	0.368
1-13-79	02	3,275.047	0.363

EPA Maintenance (Before HD testing)

1) Rocker cover gasket replaced
2) Exhaust manifold and gasket replaced
3) Distribution replaced

Emission Retest Data (after engine reinstalled)

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
628	02-19-80	05	4.642	43.041	4.281	13.38
	02-20-80	06	5.030	45.403	4.114	13.46
	03-15-80	07	5.557	52.627	4.367	13.27
	03-28-80	08	6.091	64.397	4.160	13.16

Appendix A (Cont'd)

Make:	Chevrolet
Vehicle #:	632
Year:	1973
Model:	C-20
Engine:	250
Engine #:	F0409TAH
VIN:	CCQ243F422319
GVWR:	6,400
Mileage:	76,919
Transmission:	3-speed manual
Air Condition:	No
Owner:	Golden Ford, Inc., Golden, CO
Inertia Wt:	5,000 lb.
HP:	19.0

EG & G Maintenance

1. Tune-up.
2. Muffler, exhaust manifold replaced.
3. Intake and exhaust manifold gasket replaced.
4. Distributor vacumm advance unit replaced.
5. Idle solenoid value replaced.
6. Carburetor throttle return spring replaced.

Emission Test Results

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
632	7-06-79	01	4.198	53.376	2.586	13.99
	7-07-79	02	4.285	56.993	2.611	13.76
	7-08-79	03	4.013	53.097	2.060	14.77

Idle Test Results

Test Date	Test Number	HC PPM C	CO Percent
7-08-79	01	1,662.626	0.737
1-10-79	02	1,777.884	0.620

Appendix A (Cont'd)

Make:	GMC
Vehicle #:	608
Year:	1973
Model:	2500
Engine:	450
Engine #:	T0413TRK
VIN:	TCZ243F722812
GVWR:	6,400
Mileage:	70,891
Transmission:	Auto
Air Condition:	Yes
Owner:	H.M. Vils, San Antonio, TX
Inertia Wt:	5,000 lb.
HP:	19.0

EG & G Maintenance

1. Tune-up.
2. Transmission backdown switch replaced.

Emission Test Results

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
608	09-18-79	08	6.870	39.294	3.152	9.46
	09-21-79	10	6.801	50.213	2.920	9.28
	10-02-79	11	6.299	64.974	2.899	9.11

Idle Test Results

Test Date	Test Number	HC PPM C	CO Percent
9-21-79	03	6,739.597	0.653
9-21-79	04	8,136.926	0.881

Appendix A (Cont'd)

Make:	Chevrolet
Vehicle #:	474
Year:	1973
Model:	C-20
Engine:	454
Engine #:	CE459042
VIN:	CCZ243F366349
GVWR:	6,400
Mileage:	51140
Transmission:	Auto
Air Condition:	Yes
Owner:	R.V. Gonzales, San Antonio, TX
Inertia Wt:	5,000 lb.
HP:	19.0

EG & G Maintenance

1. Tune-up.
2. Replaced left exhaust manifold.
3. Replace exhaust header gaskets.
4. Replace muffler.

Emission Test Results

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
474	01-11-80	17	6.830	23.296	2.057	8.40
	01-12-80	18	8.111	21.271	2.622	8.53
	01-13-80	19	4.875	22.679	2.706	8.60

Idle Test Results

Test Date	Test Number	HC PPM C	CO Percent
7-14-79	01	16,098.114	2.852
7-15-79	02	17,439.525	3.817

EPA Maintenance (Before HD testing)

1) Spark plugs and wires replaced
2) Distributor vacuum advance replaced
3) Distributor mechanical weights and springs replaced
4) Carburetor rebuilt
5) Curb idle air mixture screws replaced
6) Idle solenoid replaced

Emission Retest Results (after engine reinstalled)

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
474	04-03-80	20	3.438	52.662	3.078	8.66
	04-04-80	21	3.644	57.135	3.520	8.52

Appendix A (Cont'd)

Make:	Dodge
Vehicle #:	486
Year:	1973
Model:	D-200
Engine:	360
Engine #:	--
VIN:	D24BF3S136442
GVWR:	6,200
Mileage:	42696
Transmission:	4 speed manual
Air Condition:	No
Owner:	Arthur B. Smith, Johnson City, TX
Inertia Wt:	4,500 lb.
HP:	19.0

EG & G Maintenance

1. Tune-up.
2. Tailpipe replaced.
3. Ignition ballast resistor replaced.

Emission Test Results

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
486	09-17-79	07	4.066	22.231	3.682	12.13
	09-20-79	08	4.906	34.668	3.603	11.72
	10-02-79	10	5.439	36.970	3.564	11.44

Idle Test Results

Test Date	Test Number	HC PPM C	CO Percent
9-20-79	03	1,094.901	0.616
9-24-79	04	1,169.503	0.742

EPA Maintenance (Before HD testing)

1) Distributor replaced
2) Ignition module replaced

Emission Retest Results (After engine reinstalled)

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
486	02-07-80	11	6.234	52.406	3.461	10.97
	02-19-80	12	5.608	49.640	3.723	11.11

Appendix A (Cont'd)

Make:	Dodge
Vehicle #:	609
Year:	1973
Model:	Camper 7500
Engine:	360
Engine #:	3W360R4155 R6486A
VIN:	W24BF35083226
GVWR:	8,000
Mileage:	70669
Transmission:	Auto
Air Condition:	Yes
Owner:	Dave Prescott, San Antonio, TX
Inertia Wt:	5,500 lb.
HP:	19.0

EG & G Maintenance

1. Tune-up.

Emission Test Results

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
609	5-11-79	04	5.265	115.502	3.403	9.40
	5-13-79	05	4.503	102.002	4.102	9.74
	5-15-79	06	4.980	117.036	3.698	9.16

Appendix A (Cont'd)

Make:	Dodge
Vehicle #:	627
Year:	1973
Model:	D200
Engine:	360
Engine #:	3418496-7-360
VIN:	W24BF3S111186
GVWR:	8000
Mileage:	63196
Transmission:	4 speed
Air Condition:	Yes
Owner:	Smith Nelson Dodge, El Paso, TX
Inertia Wt:	5,500 lb.
HP:	19.0

EG & G Maintenance

1. Tune-up.
2. Muffler, tailpipe, and Y-exhaust pipe replaced.
3. Ignition ballast resistor replaced.

Emission Test Results

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
627	07-07-79	02	7.413	85.777	2.683	10.37
	07-08-79	03	6.705	78.195	2.687	10.55
	07-09-79	04	6.659	85.890	2.731	10.43

Idle Test Results

Test Date	Test Number	HC PPM C	CO Percent
7-06-79	01	2,643.937	1.188
7-08-79	02	2,259.330	1.136

Appendix A (Cont'd)

Make:	Dodge
Vehicle #:	605
Year:	1973
Model:	D200
Engine:	318
Engine #:	2535030-318-13
VIN:	D21BE3S067142
GVWR:	6900
Mileage:	68,094
Transmission:	Auto
Air Condition:	Yes
Owner:	Herb's Used Cars, San Antonio, TX
Inertia Wt:	4,500 lb.
HP:	19.0

EG & G Maintenance

1. Tune-up.
2. Carburetor replaced.
3. Muffler and Tailpipe replaced.
4. Right exhaust manifold replaced.

Emission Test Results

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
605	05-18-79	03	4.465	41.298	5.718	10.50
	05-19-79	04	4.601	47.099	5.536	10.61
	05-21-79	06	4.876	60.488	5.070	10.87

Idle Test Results

Test Date	Test Number	HC PPM C	CO Percent
9-04-79	01	3,264.364	0.758
9-04-79	02	1,874.123	0.399

EPA Maintenance (Before HD testing)

1) Timing chain and cam gear replaced
2) Distributor replaced
3) Distributor module replaced
4) Choke spring replaced
5) Carburetor baseplate gasket replaced

Emission Retest Results (After engine reinstalled)

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
605	02-23-80	07	5.948	41.411	5.391	12.54
	02-24-80	08	5.703	34.827	5.481	12.80

Appendix A (Cont'd)

Make:	Ford
Vehicle #:	630
Year:	1972
Model:	F-250
Engine:	360
Engine #:	-
VIN:	F2SYKNS0683
GVWR:	6200
Mileage:	92,152
Transmission:	Manual, 4-speed
Air Condition:	No
Owner:	Big Country Motors, Denver, CO
Inertia Wt:	4,500 lb.
HP:	19.0

EG & G Maintenance

1. Tune-up.
2. Carburetor replaced.
3. Distributor replaced.
4. Tailpipe replaced.

Emission Test Results

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
630	09-17-79	07	6.482	87.264	2.237	12.00
	09-20-79	08	7.772	100.611	2.064	11.62
	10-05-79	11	7.627	88.060	2.138	12.12

Idle Test Results

Test Date	Test Number	HC PPM C	CO Percent
9-16-79	04	3,641.411	0.426
9-20-79	05	2,427.230	0.473
9-20-79	06	2,668.984	0 499

Appendix A (Cont'd)

Make:	Ford
Vehicle #:	620
Year:	1972
Model:	F-250
Engine:	360
Engine #:	-
VIN:	F25YKN01148
GVWR:	6200
Mileage:	71,297
Transmission:	4-speed manual
Air Condition:	No
Owner:	Sidney Forster, San Antonio, TX
Inertia Wt:	5,000 lb.
HP:	19.0

EG & G Maintenance

1. Tune-up.
2. Radiator cap replaced.
3. Tailpipe replaced.
4. Vacuum advance diaphragm replaced.

Emission Test Results

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
620	09-14-79	08	7.105	68.130	2.569	11.26
	09-15-79	09	6.564	62.694	2.736	11.19

Idle Test Results

Test Date	Test Number	HC PPM C	CO Percent
9-12-79	02	2,433.020	0.185
9-14-79	03	3,999.585	0.156
9-15-79	04	4,293.877	0.171

EPA Maintenance (before HD testing)

1) Carburetor rebuilt
2) Carburetor power valve replaced
3) Choke diaphragm replaced
4) Timing chain, crank gear cam gear replaced

Emission Retest Results (after engine reinstalled)

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
620	02-20-80	11	7.957	75.652	2.725	11.12
	03-03-80	12	6.915	63.915	2.731	11.36
	03-08-80	13	8.015	74.353	2.599	11.20

Appendix A (Cont'd)

Make:	Ford
Vehicle #:	624
Year:	1972
Model:	F-250
Engine:	360
Engine #:	2F-KD-301-S
VIN:	F25YKP45618
GVWR:	6200
Mileage:	59,781
Transmission:	Auto
Air Condition:	Yes
Owner:	Paul Bukler, Garland, TX
Inertia Wt:	4,500 lb.
HP:	19.0

EG & G Maintenance

1. Tune-up.
2. Starter replaced.
3. Muffler and tailpipe replaced.
4. Rear brake shoes replaced.

Emission Test Results

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
624	09-15-79	06	3.872	53.595	3.802	11.22
	09-16-79	07	3.902	53.322	4.109	11.27
	09-27-79	08	4.828	66.149	3.681	10.75

Idle Test Results

Test Date	Test Number	HC PPM C	CO Percent
9-15-79	03	983.701	0.137
9-16-79	04	938.636	0.128

Appendix A (Cont'd)

Make:	Ford
Vehicle #:	643
Year:	1972
Model:	F-250
Engine:	360
Engine #:	360-72-4 J-KO-3015
VIN:	F25YLM64393
GVWR:	6200
Mileage:	77,071
Transmission:	Auto
Air Condition:	Yes
Owner:	Edward Rogers, Houston, TX
Inertia Wt:	5,000 lb.
HP:	19.0

EG & G Maintenance

1. Tune-up.
2. Exhaust valves on cylinder 4 and 7 replaced.
3. Piston rings for 3 cylinders replaced.
4. One push rod replaced.
5. Tailpipe replaced.
6. 1000 mile break-in mileage accumulation performed.

Emission Test Results

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
643	12-01-79	01	4.855	40.275	4.310	11.74
	12-02-79	02	4.926	41.758	4.108	11.38
	12-10-79	03	5.518	35.787	3.203	12.18

Appendix A (Cont'd)

Make:	Ford
Vehicle #:	641
Year:	1972
Model:	F-250
Engine:	360
Engine #:	360-72-4-2D-KO-301S
VIN:	F25YCP23691
GVWR:	7500
Mileage:	81,124
Transmission:	Auto
Air Condition:	Yes
Owner:	Charles Murrell, San Antonio, TX
Inertia Wt:	5,000 lb.
HP:	19.0

EG & G Maintenance

1. Tune-up.
2. Tailpipe replaced.

Emission Test Results

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
641	01-25-80	13	5.603	65.833	3.721	11.36
	02-01-80	14	5.359	60.966	4.113	11.18
	02-05-80	15	5.568	62.205	4.057	11.41

Appendix A (Cont'd)

Make:	Ford
Vehicle #:	625
Year:	1972
Model:	F-300
Engine:	302
Engine #:	
VIN:	F34GHN43332
GVWR:	6200
Mileage:	98,900
Transmission:	Auto
Air Condition:	Yes
Owner:	H & H Motors, Garland, TX
Inertia Wt:	5,000 lb.
HP:	18.5

EG & G Maintenance

1. Tune-up.
2. Carburetor replaced.
3. Muffler, tailpipe, and Y-exhaust pipe replaced.

Emission Test Results

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
625	09-22-79	06	4.572	41.113	3.058	11.34
	09-23-79	07	4.659	41.867	3.100	11.33
	10-04-79	09	4.556	39.286	2.970	11.67

Idle Test Results

Test Date	Test Number	HC PPM C	CO Percent
9-22-79	03	3,345.840	0.157
9-23-79	04	3,731.675	0.144

Appendix A (Cont'd)

Make:	Ford
Vehicle #:	635
Year:	1972
Model:	F-250
Engine:	390
Engine #:	
VIN:	F25HKN00326
GVWR:	7500
Mileage:	79,116
Transmission:	Auto
Air Condition:	Yes
Owner:	C. Valentine, San Antonio, TX
Inertia Wt:	5,000 lb.
HP:	19.0

EG & G Maintenance

1. Tune-up.
2. Muffler replaced.
3. Tailpipe replaced.
4. Carburetor rebuilt.

Emission Test Results

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
635	09-01-79	06	5.294	48.333	2.064	11.16
	09-05-79	08	5.330	46.917	4.201	11.13

Idle Test Results

Test Date	Test Number	HC PPM C	CO Percent
9-01-79	04	5,243.107	0.137
9-05-79	05	5,803.488	0.158

EPA Maintenance (before HD testing)

1) Timing chain, crank gear, cam gear replaced
2) Water pump replaced
3) Fuel pump replaced

Emission Retest Results (after engine reinstalled)

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
635	02-23-80	09	3.854	63.197	4.168	10.20
	02-24-80	10	3.353	38.629	4.734	10.54
	03-27-80	13	3.536	55.633	4.617	9.98
	03-28-80	14	3.550	51.386	4.287	10.10

Appendix A (Cont'd)

Make:	Ford
Vehicle #:	640
Year:	1972
Model:	F-250
Engine:	390
Engine #:	D-KO-306S
VIN:	F25HCP20119
GVWR:	7500
Mileage:	92,094
Transmission:	4-speed manual
Air Condition:	Yes
Owner:	Michael McAdams, San Antonio, TX
Inertia Wt:	5,500 lb.
HP:	19.0

EG & G Maintenance

1. Tune-up.
2. Starter replaced.
3. Tailpipe replaced.
4. Alternator belt replaced.
5. Distributer replaced.
6. Carburetor rebuilt.
7. Fuel pump replaced.

Emission Test Results

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
640	01-12-80	08	5.084	59.060	3.022	11.50
	01-13-80	09	5.130	61.440	2.975	11.54
	01-14-80	10	5.298	61.525	3.012	11.29

EPA Maintenance (before HD testing)

1) Timing chain, crank gear, cam gear, replaced
2) Oil pump replaced
3) Oil and filter replaced
4) Cylinder #3 lifter replaced

Emission Retest Results (after engine reinstalled)

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
640	04-05-80	08	6.056	73.794	2.893	11.71
	04-08-80	11	5.925	73.696	2.282	11.78

Appendix A (Cont'd)

Make:	IHC
Vehicle #:	611
Year:	1973
Model:	1210
Engine:	V-304
Engine #:	21744-R3
VIN:	3H2COCHB64287
GVWR:	7200
Mileage:	37,601
Transmission:	Auto
Air Condition:	No
Owner:	Bruno's Auto Mart, San Antonio, TX
Inertia Wt:	5,000 lb.
HP:	19.0

EG & G Maintenance

1. Tune-up.
2. Vacuum Advance Unit replaced.

Emission Test Results

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
611	09-25-79	05	5.570	124.619	2.461	10.15
	09-26-79	06	5.526	126.137	2.288	10.28
	10-14-79	12	5.451	132.748	2.712	10.02

Idle Test Results

Test Date	Test Number	HC PPM C	CO Percent
9-25-79	03	1,750.239	0.718
9-26-79	04	1,899.216	0.721

EPA Maintenance (before HD testing)

1) Carburetor replaced

Emission Retest Results (after engine reinstalled)

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
611	03-29-80	13	3.478	56.129	3.699	10.89
	03-30-80	14	3.322	53.230	3.673	11.13

Appendix A (Cont'd)

Make:	IHC
Vehicle #:	639
Year:	1973
Model:	1210
Engine:	V-345
Engine #:	151023R5
VIN:	3H2COCHB80282
GVWR:	6300
Mileage:	106,634
Transmission:	Auto
Air Condition:	No
Owner:	Mr. P. Archibeque, San Antonio, TX
Inertia Wt:	5,000 lb.
HP:	19.0

EG & G Maintenance

1. Tune-up.
2. Intake manifold gaskets replaced.
3. Carburetor replaced.
4. Exhaust pipe replaced.
5. Transmission valve body replaced.

Emission Test Results

Vehicle Number	Test Date	Test Number	HC Grams Per Mile	CO Grams Per Mile	NOx Grams Per Mile	Fuel Economy MPG
639	11-15-79	02	4.933	39.329	2.772	10.66
	12-01-79	07	5.538	33.488	3.185	11.07
	12-09-79	08	5.305	41.675	2.724	10.29

APPENDIX B

Idle Test Procedure

(d) If the sampling and analysis procedures of Subpart D or N are used, the required calibrations and their frequencies are specified in their respective Subparts.

§ 86.1517-83 [Reserved]

§ 86.1518-83 [Reserved]

§ 86.1519-83 CVS calibration.

If the CVS system is used for sampling during the idle emission test, the calibration instructions are specified in § 86.1319-83 of Subpart N.

§ 86.1520-83 [Reserved]

§ 86.1521-83 Hydrocarbon analyzer calibration.

(a) *Initial check.* (1) Follow the manufacturers instructions for instrument start-up and operation. Adjust the analyzer to optimize performance on the range specified in § 86.1511(a)(1).

(2) Calibrate the analyzer with the calibration gas specified in § 86.1514(c).

(3) Adjust the electrical span network such that the electrical span point is correct when the analyzer reads the calibration gas correctly.

(4) Determine that the analyzer complies with the specifications in § 86.1511.

(b) *Periodic check.* Follow steps (a) (1), (2), and (3) of this section as specified in § 86.1516(b). Adjust or repair the analyzer as necessary.

(c) If the analysis procedures of Subparts D or N are used, the required calibrations are specified in their respective Subparts.

§ 86.1522-83 Carbon monoxide analyzer calibration.

(a) *Initial check.* (1) Follow the manufacturers instructions for instrument start-up and operation. Adjust the analyzer to optimize performance on the range specified in § 86.1511(a)(1).

(2) Calibrate the analyzer with the calibration gas specified in § 86.1514(c).

(3) Adjust the electrical span network such that the electrical span point is correct when the analyzer reads the calibration gas correctly.

(4) Determine that the analyzer complies with the specifications in § 86.1511.

(b) *Periodic check.* Follow steps (a) (1), (2), and (3) of this section as specified by § 86.1516(b). Adjust or repair the analyzer as necessary.

(c) If the analysis procedures of Subpart D or N are used, the required calibrations are specified in their respective Subparts.

§ 86.1523-83 [Reserved]

§ 86.1524-83 Carbon dioxide analyzer calibration.

(a) The calibration requirements for the dilute-sample carbon dioxide analyzer are specified in Subpart N.

(b) The calibration requirements for the raw carbon dioxide analyzer are specified in Subpart D.

(c) If another sampling and analyzing system is used that does not require carbon dioxide (CO_2) analysis, this section may be disregarded.

§ 86.1525-83 [Reserved]

§ 86.1526-83 Calibration of other equipment.

Other test equipment used for testing shall be calibrated as often as required by the manufacturer or as necessary according to good practice.

§ 86.1527-83 Idle test procedure; overview.

(a) The idle emission test procedure is designed to determine the raw concentrations (in parts per million of carbon) of hydrocarbons and carbon monoxide in the exhaust flow at idle. The test procedure begins with a warm engine, required to be at the normal operating temperature. (For example, the warm-up for an engine may be a transient dynamometer test, or for a vehicle it may be any convenient operation).

(b) *Vehicles.* (1) If the idle test is being performed on a vehicle, all emission control systems shall be intact and functioning.

(c) *Engines.* (1) If the idle test is being performed on an engine, the required engine configuration is specified in Subpart N.

§ 86.1528-83 [Reserved]

§ 86.1529-83 [Reserved]

§ 86.1530-83 Test sequence; general requirements.

The test sequence shown in Figure P83-1 shows the major steps encountered during the idle test described by the subsequent procedures. The average ambient temperature of the engine test cell (in the case of an engine dynamometer test) or the vehicle environment (in the case of a vehicle test) shall be between −20°C and 45°C (−4°F to 113°F).

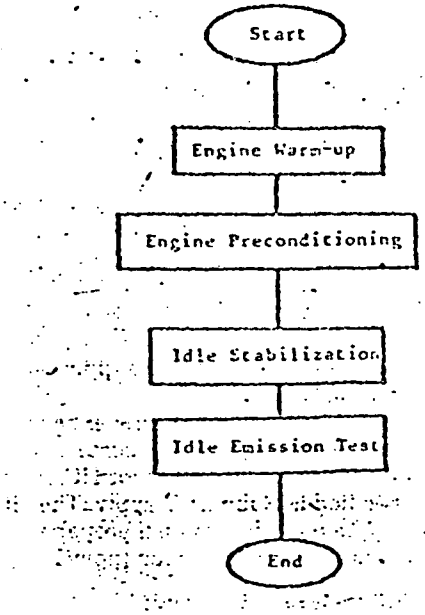

Figure P83-1 – Test Sequence

§§ 86.1531-83—86.1536-83 [Reserved]

§ 86.1537-83 Idle test run.

(a) *Test run.* The following steps shall be taken for each test:

(1) Achieve normal engine operating parameters. The transient emission dynamometer test is an acceptable technique to warm-up the engine to normal operating parameters for an engine test. If the transient emission test is not performed prior to the idle emission test, the engine may be warmed-up according to § 86.1332-83(d)(1)(i) through (iii) (applies to gasoline-fueled engines) or § 86.1332-83(d)(2)(i) through (iii) (applies to diesel engines). For a vehicle test, sufficient vehicle operation shall take place to achieve normal operating parameters.

(2) Check the device(s) for removing water from the exhaust sample and the sample filter(s). Remove any water from the water trap(s). Clean and replace the filter(s) as necessary.

(3) Set the zero and span points of the HC and CO analyzers with the electrical spanning network. It is permitted to set the analyzer span with calibration gases.

(4) Hook-up or attach the sampling system to the tailpipe of the engine or vehicle.

(5) Operate the engine at 2500±50 rpm for gasoline-fueled engines (1200±50 rpm for diesel) and zero load for a minimum of 30 seconds and a maximum of 6 minutes.

(6) Operate the engine at curb idle for 30±5 seconds with the dynamometer off for the engine test, or the transmission in neutral (or park for automatic transmissions) for the vehicle tests.

(7) Sample the exhaust (after step 6) for an additional 30±5 seconds for raw dry-basis HC in ppm C–6 (n-hexane) and raw dry-basis CO in percent. The highest value observed during this sample period shall be the value recorded.

(b) If the CVS sampling system is used, the following procedures apply:

(1) Warm-up the engine as specified in (a)(1) of this section.

(2) Precondition the engine as specified in (a)(5) of this section.

(3) With the sample selector valves in the "standby" position, connect evacuated sample collection bags to the dilute exhaust and dilution air sample collection systems.

(4) Start the CVS (if not already on), the sample pumps, the temperature recorder, the engine cooling fan, the heated hydrocarbon analysis recorder (diesel only), and the raw CO_2 analyzer. (The heat exchanger of the constant volume sampler, if used, diesel hydrocarbon analyzer continuous sample line, and filter (if applicable) shall be preheated to their respective operating temperatures before the test begins.

(5) Adjust the sample flow rates to the desired flow rate and set the gas flow measuring devices to zero.

(6) Operate the engine at the conditions specified in (a)(6) of this section.

(7) Begin HC and CO bag sampling and raw CO_2 sampling.

(8) Sample idle emissions long enough to obtain a sufficient bag sample, but in no case shorter than 60 seconds nor longer than 6 minutes. Follow the sampling and exhaust measurements requirements of subpart D for the conducting of the idle modes of the gasoline or diesel steady-state test for the raw CO_2 measurement.

(9) As soon as possible, transfer the idle test exhaust and dilution air samples to the analytical system and process the samples according to § 86.1540 obtaining a stabilized reading of the exhaust sample on all analyzers within 20 minutes of the end of the sample collection phase of the test.

(10) Disconnect the exhaust tube from the engine tailpipe(s).

(11) The CVS may be turned off, if desired.

(c) If the raw exhaust sampling and analysis technique specified in Subpart D is used, the following procedures apply:

(1) Warm-up the engine as specified in (a)(1) of this section.

(2) Precondition the engine as specified in (a)(5) of this section.

(3) Operate the engine at the conditions specified in (a)(6) of this section.

(4) Follow the sampling and exhaust measurement requirements of subpart D for conducting the idle modes. The respective mode lengths for gasoline-fueled and diesel engines apply.

(d) If the engine stalls at any time during the test run, the test is void.

§ 86.1538–83 [Reserved]

§ 86.1539–83 [Reserved]

§ 86.1540–83 Idle exhaust sample analysis.

(a) Record the idle concentrations in ppm C–6 (n-hexane) for HC and percent for CO.

(b) If the CVS sampling system is used, the analysis procedures for dilute HC, CO, and CO_2 specified in Subpart N apply. Follow the raw CO_2 analysis procedure specified in Subpart D for the raw CO_2 analyzer. The HC may be recorded as ppm propane (ppmC–3) or ppm carbon (ppmC).

(c) If the continuous raw exhaust sampling technique (Subpart D) is used, the analysis procedures for HC and CO specified in Subpart D apply. The HC may be recorded as ppm propane (ppmC–3) or ppm carbon (ppmC).

§ 86.1541–83 [Reserved]

§ 86.1542–83 Information required.

(a) *General data.* The following information shall be recorded for each idle emission test:

(1) Vehicle identification number for a vehicle test.

(2) Engine identification number for an engine test.

(3) Engine family.

(4) Engine displacement.

(5) Analyzer operator(s).

(6) Vehicle (engine) operator(s).

(7) Fuel identification.

(8) Date of purchase of analytical equipment.

(9) Date of most recent analytical assembly calibration.

(10) All pertinent instrument information such as tuning, gain, serial numbers, detector number, calibration curve numbers, etc. As long as this information is traceable, it may be summarized by system number or analyzer identification numbers.

(11) *Pre-test data.* (i) Date and time of day.

(ii) Test number.

(iii) Ambient temperature (vehicle test) or engine intake air temperature (engine test).

(iv) Vehicle mileage or engine hours as applicable.

(12) *Test data.* (i) Curb idle speed during the test.

(ii) Idle exhaust HC concentration.

(iii) Idle exhaust CO concentration.

(b) If a CVS sampling system with bag analysis is used for the idle emission test, record the additional information specified in Subpart N as applicable. In addition, record the raw exhaust CO_2 concentration during the test.

(c) If the raw exhaust sampling and analysis system specified in Subpart D is used, record the additional information specified in Subpart D as applicable.

§ 86.1543–83 [Reserved]

§ 86.1544–83 Calculations; idle exhaust emissions.

(a) The final idle emission test results shall be reported as ppmC (equivalent carbon) for hydrocarbons and percent for carbon monoxide, both on a dry basis. The results shall be reported to the same number of significant digits as the idle standards specified in § 86.083–10 and § 86.083–11.

(b) Convert dry-basis ppmC–6 (n-hexane) to ppmC (equivalent carbon) by:

$$\text{ppmC} = (6.0)\ \text{ppmC–6}$$

(c) If a CVS sampling system is used, the following procedure shall apply:

(1) Use the procedures, as applicable, in Subpart N to determine the dilute wet-basis HC in ppmC, and CO and CO_2 in percent.

(2) Use the procedure, as applicable, in Subpart D to determine the raw dry-basis CO_2 in percent.

(3) Convert the raw dry-basis CO_2 to raw wet-basis. An assumption that the percent of water by volume in the raw sample is equal to the percent of raw dry-basis CO_2 minus 0.5 percent is acceptable. For example:

10.0% dry CO_2 − 0.5% = 9.5% water

(1.00 − 0.095) (10.0% dry CO_2) = 9.05% wet CO_2

(4) Calculate the CVS dilution factor (DF) by:

$$DF = \frac{\text{Raw Wet } CO_2 - \text{Background } CO_2}{\text{Dilute Wet } CO_2 - \text{Background } CO_2}$$

(5) Convert the dilute wet-basis HC and CO to dilute dry-basis values. An assumption that the percent of water by volume in the sample bag is 2 percent is acceptable. For example:

dilute dry HC = (dilute wet HC) / (1.00 − 0.02)

(6) Calculate the raw dry-basis HC and CO values by:

raw dry HC = (DF) (dilute dry HC)
raw dry CO = (DF) (dilute dry CO)

(d) If the raw exhaust sampling and analysis system specified in Subpart D is used, the following procedure shall apply:

(1) Use the procedure, as applicable, in Subpart D to determine raw wet-basis HC and raw dry-basis CO and CO_2.

(2) Use the calculations specified in Subpart D to determine raw dry-basis HC.

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Appendix C

EPA's Letter to MVMA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

March 21, 1979

OFFICE OF
AIR AND WASTE MANAGEMENT

Mr. Harry B. Weaver
Assistant Director, Engineering
Motor Vehicle Manufacturers Association
300 New Center Building
Detroit, Michigan 48202

Dear Mr. Weaver:

Please accept my apology for not replying to your October 30, 1978 letter earlier. It is certainly in our interest, as much as yours, to resolve any issues concerning the NOx baseline as soon as possible.

We have carefully reviewed our initial position as outlined to you in Mr. Gray's letter of April 28, 1978. Our Office of General Counsel (OGC) has now advised us that considering the legislative history concerning the intent of Congress in establishing baseline model years, EPA does have some flexibility available in interpreting the Clean Air Act Amendments in this regard.

In light of OGC's opinion and the apparent Congressional intent, EPA will use the following policy in developing a NOx baseline for heavy-duty vehicles. We will test only vehicles or engines which have not been modified for NOx control in response to either Federal or State NOx regulations. 1973 vehicles or engines will be tested wherever possible. However, where a 1973 vehicle or engine has been modified for NOx control, the equivalent 1972 vehicle or engine (absent the NOx control) will be substituted. We believe that this policy embodies the intent of Congress for developing the NOx baseline. We also believe that it should satisfy the concerns which you have raised.

You are correct in your understanding that we have begun the process of baseline engine selection. Procurement of engines is already underway based upon the above policy.

Sincerely,

Michael P. Walsh
Deputy Assistant Administrator
for Mobile Source Air Pollution Control