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2565 Plymouth Rd.  
Ann Arbor, Michigan 48105

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Air



# **Effect of Ambient Temperature and Driving Cycle on Exhaust Emissions**



**EFFECT OF AMBIENT TEMPERATURE AND  
DRIVING CYCLE ON EXHAUST EMISSIONS**

by

**W. F. Marshall**

**U.S. Department of Energy  
Bartlesville Energy Technology Center  
Division of Utilization  
Bartlesville, Oklahoma 74003**

**Interagency Agreement No. EPA-IAG 79-DX0678**

**EPA Project Officer: Edward Anthony Barth**

**Prepared for  
U.S. ENVIRONMENTAL PROTECTION AGENCY  
OFFICE OF AIR, NOISE AND RADIATION  
OFFICE OF MOBILE SOURCE AIR POLLUTION CONTROL  
EMISSION CONTROL TECHNOLOGY DIVISION  
TEST AND EVALUATION BRANCH  
ANN ARBOR, MI 48105**

**June 1980**

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## FOREWORD

This report presents a summary of work performed by the U.S. Department of Energy's Bartlesville (Okla.) Energy Technology Center for the Environmental Protection Agency, Office of Air, Noise and Radiation, under Interagency Agreement No. EPA-IAG 79-DX0678.

Mr. Edward Anthony Barth was the Project Officer for EPA. The program at Bartlesville was directed by R. W. Hurn (now retired), Director of Utilization, and W. F. Marshall was the Project Leader. Others who contributed to the project were B. H. Eccleston (now deceased), T. R. Owens, J. K. Brooke, E. R. Inman, S. J. Golemon, R. F. Stevens, A. R. Silva, and D. R. Thompson.

## SUMMARY

Data on exhaust emissions were obtained from two vehicle fleets (1970 and 1979 model-year) operating over a range of ambient temperatures. The work is providing a baseline against which current-production vehicles can be compared, thus enabling a more complete assessment of automotive emissions reduction achievements.

The baseline fleet represented the 1970 model-year nationwide mix. The 37 cars were tested at 25°, 75°, and 100° F over the urban Federal Test Procedure, Highway Fuel Economy Test, and New York City Cycle.

Both temperature and driving cycle were found to have significant effects on exhaust emissions. The conditions which yielded the greatest adverse effects on emissions were (1) low temperature--urban driving cycle, and (2) high temperature--New York City driving cycle. The data also indicate that the use of air conditioners causes increased emission levels.

These results apply directionally to both fleets. However, the influences of temperature and driving cycle on emission rates of the current model-year fleet were significantly less than on those of the baseline fleet.

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## LIST OF ABBREVIATIONS AND SYMBOLS

A/C	-- air conditioning
CO <sub>2</sub>	-- carbon dioxide
CO	-- carbon monoxide
CT	-- cold transient phase of the FTP
CVS	-- constant volume sample
FIA	-- fluorescence indicating absorption
FID	-- flame ionization detector
FTP	-- Federal Test Procedure
GLC	-- gas liquid chromatography
gpm	-- grams per mile
HC	-- hydrocarbon
HFET	-- Highway Fuel Economy Test
HT	-- hot transient phase of the FTP
IBP	-- initial boiling point
MBTH	-- 3-methyl-2-benzothiazolone hydrozone hydrochloride
MY	-- model year
NDIR	-- nondispersive infrared
NO <sub>x</sub>	-- nitrogen oxides
NYCC	-- New York City Cycle
scfm	-- standard cubic feet per minute
ST	-- stabilized phase of the FTP

EPA Baseline Testing

FINAL REPORT

Report of experimental work done in cooperation with EPA:

Interagency Agreement No. EPA-IAG 79-DX0678

PURPOSE

The purpose of this interagency agreement between the Environmental Protection Agency (EPA) and the Department of Energy (DOE) was to determine a baseline for automobile emissions at a variety of ambient temperatures, and to evaluate the emission trends of new technology vehicles relative to that baseline. This baseline may be used in formulating regulations for reducing emissions at other than "standard FTP" conditions as well as provide information for future testing procedure revisions.

BACKGROUND

When the Clean Air Act became law, it required that a 90 percent reduction of automobile emissions be accomplished within a specified time frame. The Federal Test Procedure (FTP) for measuring automotive emissions is accomplished under limited ambient temperature conditions, namely between 68° and 86° F. Data exists which shows that automobile emissions increase with reductions in ambient temperature and may also increase at higher temperatures. Because of the need to reduce vehicle emissions under all ambient conditions, the EPA needs data to aid in establishing baseline vehicle emissions levels under conditions which encompass most national ambient conditions. With such a baseline the effects of a 90 percent reduction of emissions at different temperatures can be calculated, corresponding emission standards or guidelines determined, and the impact of such regulations evaluated.

OBJECTIVE

The objective of this interagency agreement was to determine the effect of ambient temperature on the exhaust emissions of automobiles equipped with 1970 engines and control systems, to establish a baseline from the data for 1970 vehicles, and to determine how a few late model vehicles perform with regard to this baseline. In order to achieve these objectives, the tasks specified in the scope of work were performed.

Vehicle Selection

The baseline fleet was acquired from two sources: twenty-five 1970 model-year vehicles had been previously acquired and tested by Automotive Testing Laboratories, Inc., under contract with Motor Vehicle Manufacturers Association (MVMA). The vehicles were selected to represent the 1970 model-year nation-wide sales mix (1).\* After receiving the vehicles, idle speed and timing checks were made as necessary. It should be noted that dynamometer power settings and inertia weights in this work were not identical to those used by Automotive Testing Laboratories and, therefore, there could be differences in test results. The reason for the differences in settings

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\*Numbers in parentheses designate references at the end of the report.

was that the 1970 procedure was used by the MVMA, and the 1975 procedure was used in the present work. Results obtained with this 25-car fleet were published previously (2).

The EPA supplied the five other vehicles of the baseline fleet. The current production vehicles were purchased as new cars by DOE from various automobile dealers.

<u>Test Fleet</u>	<u>No. of Vehicles</u>
Baseline vehicles (1970 MY).....	30
Production late model:	
three-way catalyst vehicles.....	3
stratified charge.....	1
diesel.....	2
turbocharged.....	<u>1</u>
Total cars	37

A more complete description of the test fleet is given in table 1. A description of maintenance and repairs for each of the 1970 MY baseline vehicles is given in table 2.

#### Test Sequence and Analyses

All cars were tested according to the 1975 FTP, 1975 Federal HFET, the NYCC, and the idle and 2500 rpm test. A description of these driving cycles is given in table 3. Deviations from the 1975 FTP and HFET were:

- a. No evaporative emissions test.
- b. The vehicle hoods were closed; cooling air velocity keyed to vehicle speed.
- c. The 10 percent load increment for vehicles equipped with air conditioning was not used in any tests.
- d. Actual vehicle mileage was used in all emissions and economy computations.

Emissions measured for the four tests noted above were HC, CO, NO<sub>x</sub>, and CO<sub>2</sub>. In addition to these, aldehydes and HC distribution (by gas chromatography) were determined for the current-production vehicles for each of the three phases of the 1975 FTP.

Tests were conducted at ambient temperatures of 25°, 50°, 75°, and 100° F with duplicates of the 25° and 100° F test points. In addition, tests were conducted at 75° and 100° F with air conditioning operating for those vehicles with functioning air-conditioning systems.

### Test Fuels

Four fuels were used in this work. Fuel A was used in all tests of spark-ignition powered vehicles conducted at 50° F and above. Two winter-grade fuels were used in this work. Fuel B was used in 25° F tests for 25 of the cars with baseline fleet and for four of the late model cars. The quantity of fuel B was insufficient to conduct all at the 25° F tests, and the original supplier was not able to furnish any additional fuel within the period of this work. Therefore, another winter-grade fuel was used to complete the low temperature tests. This fuel, fuel C, was used in 25° F tests for five of the cars in the baseline fleet and one of the late model cars. All three gasolines were produced by Phillips Petroleum Company with target specifications based on those given in the Federal Register.

A single lot of diesel fuel meeting 2-D specifications was used for both diesel vehicles at all test temperatures. Fuel inspection data are given in table 4.

### Test Facilities

A schematic diagram of the chassis dynamometer facility is shown in figure 1. Details of the facility and analytical systems are given below:

#### Chassis dynamometer (Clayton Model ECE-50):

- o dual roll, 8.65 in. diameter, 17.25 in. spacing
- o direct drive flywheel system - 1750-9625-lb compatibility in 125-lb increments
- o road load power control to provide good tracking of speed power relationship

#### Ambient conditions:

- o closed system with make-up air
- o temperature controlled within range of 20° to 120° F
- o humidity control, with target of 50 percent relative humidity
- o cooling air supplied to front of vehicle; air velocity modulated to follow dynamometer roll speed

#### CVS system:

- o critical flow orifice system (with heat exchanger), 320 scfm (nominal)
- o air supply independent of chassis dynamometer room air
- o dilution air temperature controlled within range of 60° to 110° F
- o length of connection from tailpipe to CVS system = 10 ft

#### Analytical instruments:

##### For CVS samples -

Beckman 864 NDIR - CO<sub>2</sub>  
Beckman 865 NDIR - CO

Beckman 851H chemiluminescence detector - NOx  
Beckman 400 FID - HC  
Beckman 402 heated FID - HC

For raw exhaust measurement -

Beckman 315A NDIR - CO  
Beckman 851H CL - NOx  
Beckman FID - HC

Other: EG&G 880 dew point hygrometer

Analytical procedures:

- o aldehydes - MBTH method, sampling via bubblers
- o hydrocarbons - GLC; sample from bags (corresponding to test phases) directly into GLC sample loop

## RESULTS

A summary of the FTP results is given in table 5. Detailed information is given in the appendices. A summary of the results of individual FTP emissions, FTP fuel economy, and HFET fuel economy is given in appendix A. Results with respect to the HC, CO, and NOx emissions are given in appendices B, C, and D, respectively. Fuel economy data are in appendix E. Aldehyde emissions (for the seven current-production vehicles only) are in appendix F.

Comparison of average emissions and fuel economy for the three fleets (baseline, current gasoline, and current diesel) is shown in tables 6-9. Referenced to the 75° F, FTP case, the results appear to show that temperature extremes had a greater deleterious effect on emissions performance of the current production fleet. However, if the results are referenced to the emissions "standards" applicable to each fleet, the current-production fleet's performance appears to be markedly better than that of the baseline fleet.

Absolute and percentage differences in emission rates between the baseline and the two current fleets are given in table 10. The current gasoline fleet's emission levels were about 70 percent less than the baseline fleet. Emissions of CO and HC from the two diesel vehicles were about 90 percent less than those from the baseline fleet, and NOx emissions were about 60 percent less.

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TABLE 1. - Vehicle description

Vehicle No.	Make/Model	Eng. CID- config.	Carb.	Trans.	Air cond.	Test condition	
						Inertia weight, lb	Power absorb.
1	Ford Wagon	351-V8	2 bbl	Auto	Yes	4000	12.0
2	Pontiac LeMans	350-V8	2 bbl	Auto	Yes	4000	12.0
3	Chevrolet Malibu	307-V8	2 bbl	Auto	Yes	3500	11.2
4	Mercury Marquis	429-V8	2 bbl	Auto	Yes	5000	13.4
5	Dodge Charger	318-V8	2 bbl	Auto	Yes	4500	12.7
6	Olds. Delta 88	455-V8	2 bbl	Auto	Yes	4500	12.7
7	Plymouth Duster	318-V8	2 bbl	Auto	No	3500	11.2
8	Chevrolet Impala	400-V8	2 bbl	Auto	Yes	4000	12.0
9	Buick LeSabre	350-V8	2 bbl	Auto	Yes	4500	12.7
10	Ford Galaxie	351-V8	2 bbl	Auto	No	4000	12.0
11	Chevrolet Nova	230-L6	1 bbl	Auto	No	3500	11.2
12	Pontiac Catalina	350-V8	2 bbl	Auto	Yes	4500	12.7
13	Buick Skylark	350-V8	2 bbl	Auto	Yes	4000	12.0
14	Dodge Challenger	225-L6	1 bbl	Man. 3	No	3500	11.2
15	Ford Maverick	200-L6	1 bbl	Auto	Yes	3000	10.3
16	Chevrolet Monte Carlo	350-V8	2 bbl	Auto	Yes	4000	12.0
17	Ford Fairlane	302-V8	2 bbl	Auto	No	4000	12.0
18	Chevrolet El Camino	350-V8	2 bbl	Man. 3	No	4000	12.0
19	Cadillac DeVille	472-V8	4 bbl	Auto	No	5500	13.9
20	Chrysler Newport	383-V8	2 bbl	Auto	Yes	5000	13.4

NOTE: Vehicle No. 1-28 are 1970 MY, No. 29-30 are 1971 MY, No. 1C-2C are 1978 MY, No. 3C-6C are 1979 MY, and No. 7C is 1980 MY.

TABLE 1. - Vehicle description--Continued

Vehicle No.	Make/Model	Eng. CID-config.	Carb.	Trans.	Air cond.	Test condition	
						Inertia weight, lb	Power absorb.
21	Ford Maverick	170-L6	1 bbl	Man. 3	No	3000	10.3
22	AMC Hornet	232-L6	1 bbl	Man. 3	No	3000	10.3
23	Olds. Vista Cruiser	350-V8	2 bbl	Auto	Yes	5000	13.4
24	Volkswagen Beetle	1.6L-H4	1 bbl	Man. 4	No	2500	9.4
25	Chevrolet Nova	250-L6	1 bbl	Auto	No	3500	11.2
26	Chevrolet Impala	350-V8	2 bbl	Auto	Yes	4500	12.7
27	Ford Galaxie	351-V8	2 bbl	Auto	Yes	4500	12.7
28	Plymouth Valiant	225-L6	1 bbl	Auto	No	3500	11.2
29	Chevrolet Vega Wagon	140-L4	2 bbl	Man. 3	No	3000	10.3
30	Ford Wagon	429-V8	4 bbl	Auto	Yes	5500	13.9
1C	Buick Skylark (3-way catalyst)	231-V6	2 bbl	Auto	Yes	3500	11.2
2C	Pontiac Sunbird (3-way catalyst)	151-L4	2 bbl	Auto	Yes	3500	11.2
3C	Ford Mustang (turbocharged)	140-L4	2 bbl	Man. 4	Yes	3000	10.2
4C	Dodge Challenger (MCA-jet)	1.6L-L4	2 bbl	Man. 5	Yes	3000	10.3
5C	Olds. Cutlass Diesel (diesel)	260-V8	F.I.	Auto	Yes	4000	12.0
6C	BMW 528i (3-way catalyst)	2.8L-L6	F.I.	Man. 4	Yes	3500	11.2
7C	Volkswagen Rabbit (diesel)	1.5L-L4	F.I.	Man. 4	Yes	2250	8.8

TABLE 2. - Maintenance required for baseline fleet

Vehicle No.	Maintenance required
1	Charge A/C system
2	Repair vacuum leak in A/C controls Charge A/C system
3	Replace A/C blower
4	Replace A/C blower Replace alternator Repair transmission leak Replace exhaust system Replace rear tires
5	Replace battery cable clamp
6	Reinstall choke pull-off rod
7	Replace voltage regulator Repair A/C system
8	Replace battery
9	Replace belt
10	None
11	None
12	Replace exhaust system Replace rear tires
13	None
14	Replace clamps on exhaust pipe
15	Repair fuel leak at carburetor Replace idle stop solenoid Replace exhaust pipe
16	Repair field relay Charge A/C system
17	Replace A/C drive belt Replace exhaust system Replace rear tires

TABLE 2. - Maintenance required for baseline fleet--Continued

Vehicle No.	Maintenance required
18	Replace exhaust pipe clamp Repair choke linkage
19	Replace voltage regulator Repair heater and A/C controls
20	Charge A/C system
21	None
22	Replace vacuum switching valve
23	Charge A/C system
24	None
25	Charge A/C system
26	None
27	None
28	Replace muffler
29	None
30	None

TABLE 3. - Description of driving cycles

Cycle	FTP	HFET	NYCC
Length, miles.....	7.45	10.24	1.18
Average speed, mph.....	19.7	48.2	7.1
Maximum speed, mph.....	56.7	59.9	27.7
Stops per mile.....	2.42	0.10	9.33
Idle, pct of total time..	19.5	0.5	42.1
Cycle time, minutes.....	22.9	12.8	10.0

TABLE 4. - Fuel inspection data

Fuel.....	A	B	C	D
	Summer gasoline	Winter gasoline	Winter gasoline	No. 2-D diesel fuel
Gravity, °API.....	56.9	62.6	63.4	34.5
Cetane index.....	-	-	-	45
Distillation:				
IBP.....	96	86	85	364
10 pct point.....	133	120	113	417
50 pct point.....	219	212	202	493
90 pct point.....	304	300	336	582
End point.....	406	394	415	616
Sulfur, wt-pct.....	0.029	0.022	0.046	0.23
RVP, lb.....	8.4	11.8	13	-
Composition, FIA pct:				
Saturates.....	62	70	68	66
Olefins.....	7	6	12	2
Aromatics.....	31	24	20	32

TABLE 5. - Summary of FTP results

Temp. °F	Air cond.	Emissions, gpm			Fuel economy, mpg
		HC	CO	NOx	
<b>BASELINE FLEET</b>					
25	no	4.30	40.8	4.19	12.7
50	no	3.54	30.6	4.26	14.0
75	no	3.08	22.5	4.47	14.8
100	no	3.00	18.9	4.68	15.3
75	yes	3.09	25.6	5.61	12.2
100	yes	3.17	24.2	6.53	12.2
<b>CURRENT FLEET - GASOLINE</b>					
25	no	2.12	23.1	1.60	15.6
50	no	1.14	14.4	1.39	17.2
75	no	0.67	6.6	1.35	18.1
100	no	.62	6.6	1.20	19.0
75	yes	.62	6.9	1.65	17.0
100	yes	.73	8.8	1.48	16.8
<b>CURRENT FLEET - DIESEL</b>					
25	no	0.38	1.4	1.70	25.2
50	no	.29	1.3	1.71	26.9
75	no	.31	1.3	1.82	27.4
100	no	.31	1.4	1.69	29.6
75	yes	.33	1.4	1.81	25.0
100	yes	.39	1.6	2.14	22.0

TABLE 6. - HC emissions

Temp. °F	Air cond.	FTP				HFET				NYCC			
		Baseline	Current		Baseline	Current		Baseline	Current		Baseline	Current	
			Gas	Diesel									
AVERAGE RATE, GPM													
25	no	4.30	2.12	0.38	1.50	0.14	0.18	5.68	1.15	0.69			
50	no	3.54	1.14	.29	1.50	.11	.16	5.57	1.17	.67			
75	no	3.08	0.67	.31	1.59	.10	.18	6.16	0.93	.84			
100	no	3.00	.62	.31	1.70	.10	.20	6.98	2.05	.82			
75	yes	3.09	.62	.33	1.76	.09	.15	5.85	1.13	.66			
100	yes	3.17	.73	.39	2.01	.23	.20	7.94	2.12	.88			
RATIO OF AVERAGES, REFERENCED TO FTP @ 75° F													
12	no	1.40	3.16	1.23	0.49	0.15	0.58	1.85	1.72	2.23			
	no	1.15	1.70	0.94	.49	.16	.52	1.81	1.75	2.16			
	no	1.00	1.00	1.00	.52	.15	.58	2.00	1.39	2.71			
	no	0.98	0.93	1.00	.55	.15	.65	2.27	3.06	2.65			
	yes	1.04	0.93	1.06	.59	.13	.48	1.96	1.69	2.13			
	yes	1.06	1.09	1.26	.67	.34	.65	2.66	3.16	2.84			
RATIO OF AVERAGES, REFERENCED TO STANDARDS (4.1 GPM - 1970, 1.5 GPM - 1979)													
25	no	1.05	1.41	0.25	0.37	0.09	0.12	1.39	0.77	0.46			
50	no	0.86	0.76	.19	.37	.07	.11	1.36	.78	.45			
75	no	.75	.45	.21	.39	.07	.12	1.50	.62	.56			
100	no	.73	.41	.21	.41	.07	.13	1.70	1.37	.55			
75	yes	.75	.41	.22	.43	.06	.10	1.43	.75	.44			
100	yes	.77	.49	.26	.49	.15	.13	1.94	1.41	.59			

TABLE 7. - CO emissions

Temp. °F	Air cond.	FTP				HFET				NYCC			
		Baseline	Current		Baseline	Current		Baseline	Current		Baseline	Current	
			Gas	Diesel									
AVERAGE RATE, GPM													
25	no	40.8	23.1	1.4	9.2	1.5	0.8	30.3	10.5	2.6			
50	no	30.6	14.4	1.3	9.1	.8	.7	30.8	9.9	2.6			
75	no	22.5	6.6	1.3	10.0	.6	.7	30.6	5.8	2.8			
100	no	18.9	6.6	1.4	12.2	1.1	.8	44.6	26.4	3.0			
75	yes	25.6	6.9	1.4	13.0	.7	.7	41.8	11.5	2.9			
100	yes	24.2	8.8	1.6	19.1	4.9	.9	78.3	44.9	3.1			
RATIO OF AVERAGES, REFERENCED TO FTP @ 75° F													
25	no	1.82	3.49	1.12	0.41	0.23	0.60	1.35	1.59	2.02			
50	no	1.36	2.18	1.04	.41	.12	.51	1.37	1.50	2.05			
75	no	1.00	1.00	1.00	.45	.10	.53	1.36	0.89	2.16			
100	no	0.84	1.00	1.06	.54	.17	.61	1.99	4.00	2.31			
75	yes	1.09	1.05	1.09	.55	.10	.55	1.78	1.73	2.26			
100	yes	1.02	1.34	1.21	.81	.74	.69	3.34	6.79	2.43			
RATIO OF AVERAGES, REFERENCED TO STANDARDS (34 GPM - 1970, 15 GPM - 1979)													
25	no	1.20	1.54	0.10	0.27	0.10	0.05	0.89	0.70	0.17			
50	no	0.90	0.96	.09	.27	.05	.04	.91	.66	.18			
75	no	.66	.44	.09	.29	.04	.05	.90	.39	.19			
100	no	.56	.44	.09	.36	.07	.05	1.31	1.76	.20			
75	yes	.75	.46	.09	.38	.05	.05	1.23	.76	.19			
100	yes	.71	.59	.10	.56	.32	.06	2.30	2.99	.21			

TABLE 8. - NO<sub>x</sub> emissions

Temp. °F	Air cond.	FTP			HFET			NYCC		
		Baseline	Current		Baseline	Current		Baseline	Current	
			Gas	Diesel		Gas	Diesel		Gas	Diesel
AVERAGE RATE, GPM										
25	no	4.19	1.60	1.70	4.96	1.23	1.31	5.35	1.67	2.99
50	no	4.26	1.39	1.71	5.08	1.49	1.31	5.40	1.84	2.81
75	no	4.47	1.35	1.82	5.22	1.33	1.35	5.62	1.99	2.57
100	no	4.68	1.20	1.69	5.69	1.22	1.36	6.10	1.30	2.93
75	yes	5.61	1.65	1.81	6.50	1.46	1.34	6.82	3.10	3.32
100	yes	6.53	1.48	2.14	7.58	1.32	1.47	8.99	1.66	3.83
RATIO OF AVERAGES, REFERENCED TO FTP @ 75° F										
25	no	0.94	1.19	0.93	1.11	0.91	0.72	1.20	1.24	1.64
50	no	.95	1.03	.94	1.14	1.10	.72	1.21	1.36	1.54
75	no	1.00	1.00	1.00	1.17	.99	.74	1.26	1.47	1.41
100	no	1.05	.89	.93	1.27	.90	.75	1.36	.96	1.61
75	yes	1.21	1.22	.99	1.41	1.08	.74	1.48	2.30	1.82
100	yes	1.41	1.10	1.18	1.64	.98	.81	1.95	1.23	2.10
RATIO OF AVERAGES, REFERENCED TO STANDARDS (4 GPM* - 1970, 2 GPM - 1979)										
25	no	1.05	0.80	0.85	1.24	0.62	0.66	1.34	0.84	1.44
50	no	1.07	.68	.86	1.27	.74	.66	1.35	.92	1.40
75	no	1.12	.68	.91	1.31	.66	.68	1.40	1.00	1.28
100	no	1.17	.60	.84	1.42	.61	.68	1.52	.65	1.46
75	yes	1.40	.82	.90	1.62	.73	.67	1.70	1.55	1.66
100	yes	1.63	.74	1.07	1.90	.66	.74	2.25	.83	1.92

\*There was no NO<sub>x</sub> emission standard for the 1970 model year; the 4 gpm value is an estimate of the average for that model year based on the average for the 1971 model-year fleet (see reference 3).

TABLE 9. - Fuel economy

Temp. °F	Air cond.	FTP			HFET			NYCC		
		Baseline	Current		Baseline	Current		Baseline	Current	
			Gas	Diesel		Gas	Diesel		Gas	Diesel
AVERAGE, MPG										
25	no	12.7	15.6	25.2	20.7	24.7	33.8	7.2	10.1	16.1
50	no	14.0	17.2	26.9	21.7	25.5	35.8	7.7	10.3	17.3
75	no	14.8	18.1	27.4	22.4	26.5	35.4	7.7	10.6	15.7
100	no	15.3	19.0	29.6	22.7	27.3	36.1	7.8	10.2	17.5
75	yes	12.2	17.0	25.0	18.4	24.9	34.2	6.5	9.6	14.5
100	yes	12.2	16.8	22.0	17.8	24.6	30.3	6.1	8.8	12.9
RATIO OF AVERAGES, REFERENCED TO FTP @ 75° F										
25	no	0.86	0.86	0.92	1.40	1.37	1.23	0.49	0.56	0.59
50	no	.94	.95	.98	1.47	1.41	1.31	.52	.57	.63
75	no	1.00	1.00	1.00	1.51	1.46	1.29	.52	.58	.58
100	no	1.04	1.05	1.08	1.53	1.51	1.32	.52	.57	.64
75	yes	.94	.94	.92	1.42	1.38	1.25	.50	.53	.53
100	yes	.94	.93	.80	1.37	1.36	1.11	.47	.48	.47

TABLE 10. - Comparison of emissions from three fleets

Temp. °F	Air cond.	FTP								NYCC							
		HC		CO		NOx		HC		CO		NOx		Gasoline		Diesel	
		Gasoline	Diesel														
DIFFERENCE IN MEANS, GPM (BASELINE - CURRENT)																	
25	no	2.18	3.92	17.7	39.4	2.59	2.49	4.53	4.99	19.8	2.77	3.68	2.36				
50	no	2.40	3.25	16.2	29.3	2.87	2.55	4.40	4.90	20.9	28.2	3.56	2.59				
75	no	2.45	2.77	15.9	21.2	3.12	2.65	5.23	5.32	24.8	27.8	3.63	3.05				
100	no	2.38	2.69	12.3	17.5	3.48	2.99	4.93	6.16	18.2	41.6	4.80	3.17				
75	yes	2.47	2.76	18.7	24.2	3.96	3.80	4.72	5.19	30.3	38.9	3.72	3.50				
100	yes	2.44	2.78	15.4	22.6	5.05	4.39	5.82	7.06	33.4	75.2	7.33	5.16				
Avg		2.39	3.03	16.0	25.7	3.51	3.19	4.94	5.60	24.6	39.9	4.45	3.31				
PERCENT DIFFERENCE																	
25	no	51	91	43	97	62	59	80	88	65	91	69	44				
50	no	68	92	53	96	67	60	79	88	68	92	66	48				
75	no	78	90	71	94	70	59	85	86	81	91	65	54				
100	no	79	90	65	93	74	64	71	88	41	93	79	52				
75	yes	80	89	73	95	71	68	81	89	72	93	55	51				
100	yes	77	88	64	93	77	67	73	89	43	96	82	57				
Avg		72	90	62	95	70	63	78	88	62	93	69	51				

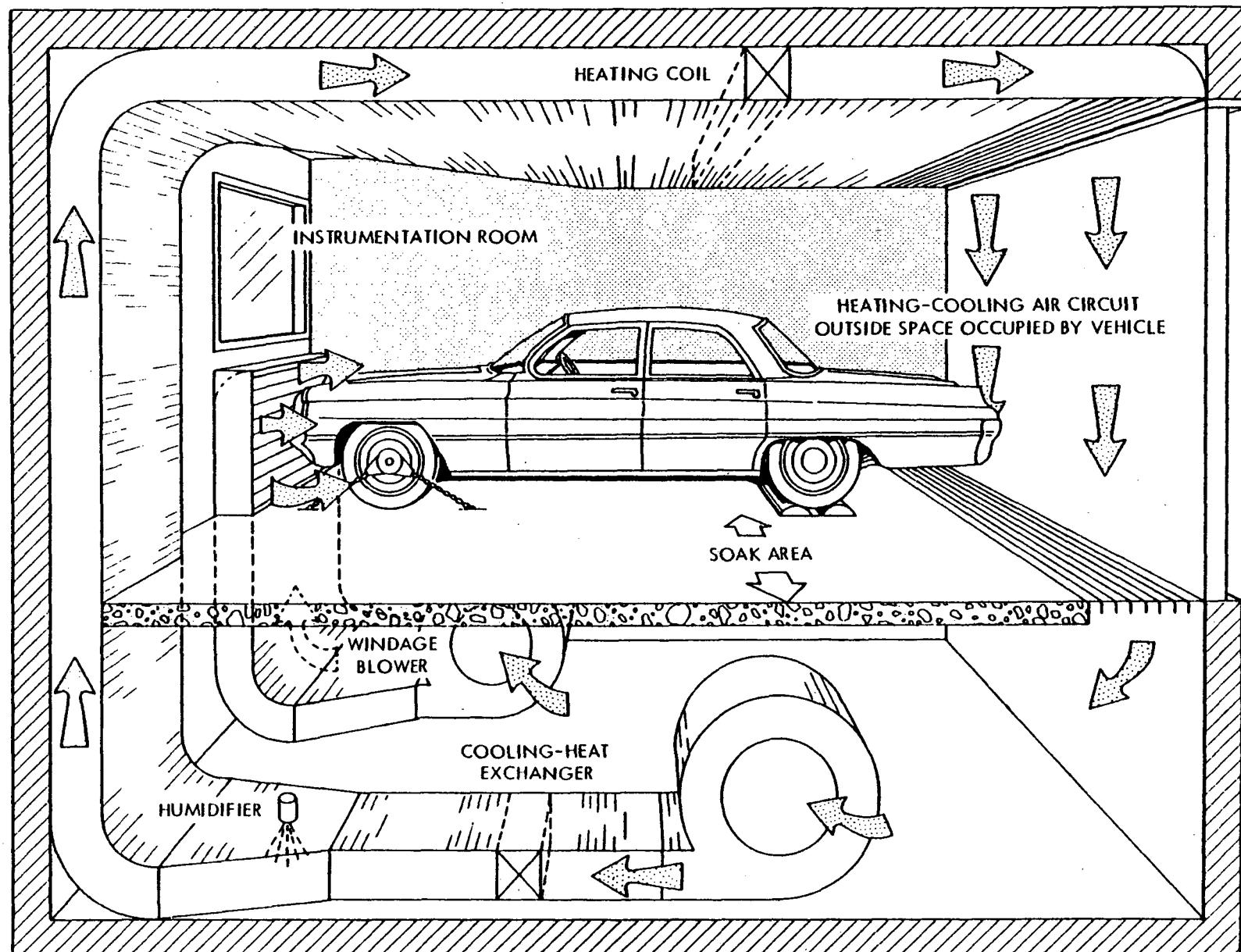


FIGURE 1.- Controlled ambient chassis dynamometer test facility.

**TECHNICAL REPORT DATA**  
*(Please read Instructions on the reverse before completing)*

1. REPORT NO. EPA-460/3-80-012A, B, C	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE <b>EFFECT OF AMBIENT TEMPERATURE AND DRIVING CYCLE ON EXHAUST EMISSIONS</b>		5. REPORT DATE June 1980
7. AUTHOR(S) W. F. Marshall		6. PERFORMING ORGANIZATION CODE
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Department of Energy Bartlesville Energy Technology Center P.O. Box 1398 Bartlesville, OK 74003		10. PROGRAM ELEMENT NO.
		11. CONTRACT/GRANT NO. EPA-IAG 79-DX0678
12. SPONSORING AGENCY NAME AND ADDRESS Environmental Protection Agency Office of Mobile Source Air Pollution Control Emission Control Technology Division Test and Evaluation Branch, Ann Arbor, MI 48105		13. TYPE OF REPORT AND PERIOD COVERED Final Report
		14. SPONSORING AGENCY CODE
15. SUPPLEMENTARY NOTES		
16. ABSTRACT <p>Data on exhaust emissions were obtained from two vehicle fleets (1970 and 1979 model-year) operating over a range of ambient temperatures. The work is providing a baseline against which current-production vehicles can be compared, thus enabling a more complete assessment of automotive emissions reduction achievements. The baseline fleet represented the 1970 MY nationwide mix. The 37 cars were tested at 25°, 75°, and 100° F over the urban Federal Test Procedure, Highway Fuel Economy Test, and New York City Cycle. Both temperature and driving cycle were found to have significant effects on exhaust emissions. The conditions which yielded the greatest adverse effects on emissions were (1) low temperature--urban driving cycle, and (2) high temperature--New York City driving cycle. The data also indicate that the use of air conditioners causes increased emission levels. These results apply directionally to both fleets. However, the influences of temperature and driving cycle on emission rates of the current model-year fleet were significantly less than on those of the baseline fleet.</p>		
17. KEY WORDS AND DOCUMENT ANALYSIS		
a. DESCRIPTORS Vehicle emissions*, Vehicle fuel economy*, Ambient temperatures*, Air conditioning, Short tests, Federal Test Procedure, Highway Fuel Economy Test, New York City Cycle	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
18. DISTRIBUTION STATEMENT Release to public		19. SECURITY CLASS ( <i>This Report</i> ) Unclassified
		20. SECURITY CLASS ( <i>This page</i> ) Unclassified
		21. NO. OF PAGES
		22. PRICE

## **APPENDIX A. - SUMMARY OF RESULTS**

## APPENDIX A

TABLE A-1. - Summary of results - baseline vehicles (1970 MY)

Car No.	Vehicle description	Temp., ° F	Air cond.	FTP emissions, gpm			Fuel econ, mpg	
				HC	CO	NO <sub>x</sub>	FTP	HFET
1	Ford Wagon 351-CID Auto 4000 lb	25		4.32	42.3	4.76	10.4	17.8
		50		3.52	27.8	5.13	11.4	18.8
		75		2.89	15.8	5.50	12.0	19.0
		100		2.46	10.1	6.02	12.2	19.2
		75	yes	3.01	17.2	6.31	11.3	17.8
		100	yes	3.07	14.3	7.49	11.5	17.6
2	Pontiac Lemans 350-CID Auto 4000 lb	25		4.39	46.9	4.47	11.6	19.9
		50		3.42	35.7	4.73	12.4	21.2
		75		2.66	11.9	4.78	13.9	21.4
		100		2.74	10.8	5.30	14.0	20.7
		75	yes	3.13	21.6	6.66	12.4	18.8
		100	yes	2.96	11.4	7.17	12.6	18.1
3	Chevrolet Malibu 307-CID Auto 3500 lb	25		4.32	34.4	2.81	12.8	20.5
		50		4.31	33.5	2.88	13.5	20.9
		75		3.74	24.0	2.78	14.1	21.3
		100		3.65	19.2	2.81	14.8	21.7
		75	yes	3.75	26.4	3.95	12.6	18.6
		100	yes	3.51	22.1	4.62	13.1	18.8
4	Mercury Marquis 429-CID Auto 5000 lb	25		5.20	44.9	6.11	10.2	17.9
		50		4.28	27.9	5.90	11.4	17.7
		75		3.90	18.4	6.21	12.3	19.0
		100		3.97	16.6	6.85	12.4	18.5
		75	yes	3.87	18.5	7.59	11.7	17.6
		100	yes	3.97	19.6	8.76	11.2	16.7
5	Dodge Charger 318-CID Auto 4500 lb	25		3.33	23.3	6.23	13.6	20.2
		50		2.73	13.5	6.67	13.9	20.9
		75		2.96	17.3	5.88	14.9	21.3
		100		2.72	19.7	5.71	15.5	22.1
		75	yes	2.93	18.1	6.34	14.3	20.6
		100	yes	3.88	34.0	6.27	14.3	19.6

## APPENDIX A

TABLE A-1. - Summary of results - baseline vehicles (1970 MY)--Continued

Car No.	Vehicle description	Temp., ° F	Air cond.	FTP emissions, gpm			Fuel econ., mpg	
				HC	CO	NOx	FTP	HFET
6	Oldsmobile Delta 455-CID Auto 4500 lb	25	yes	3.36	54.1	4.02	9.5	17.0
		50		2.21	15.8	4.36	11.0	18.4
		75		2.19	11.7	4.32	11.5	19.2
		100		2.35	9.4	4.65	11.8	19.7
		75		2.49	13.3	5.49	10.6	17.3
		100		1.95	9.8	6.55	10.8	16.5
7	Plymouth Duster 318-CID Auto 3500 lb	25		2.62	14.3	3.88	13.8	21.7
		50		2.32	11.1	4.14	13.3	21.3
		75		2.01	12.7	4.03	14.3	22.5
		100		2.12	16.5	3.74	14.9	21.7
		25		5.43	50.3	2.70	10.5	17.3
8	Chevrolet Impala 400-CID Auto 4000 lb	50	yes	3.66	32.7	2.61	11.9	18.5
		75		2.54	22.7	2.60	12.2	17.9
		100		2.52	23.1	2.52	12.8	18.4
		75		2.79	27.2	3.47	11.4	16.5
		100		2.52	23.3	3.56	11.9	16.7
		25		4.02	39.0	5.30	12.4	18.8
9	Buick LeSabre 350-CID Auto 4500 lb	50	yes	3.53	36.5	5.45	12.6	19.9
		75		3.63	29.7	5.29	13.2	20.1
		100		4.81	19.0	6.05	13.8	20.0
		75		4.03	27.3	6.85	12.9	18.0
		100		4.11	21.2	8.48	12.8	19.0
		25		5.58	45.6	6.48	12.5	20.6
10	Ford Galaxy 351-CID Auto 4000 lb	50		5.14	25.0	7.30	13.9	20.9
		75		4.69	11.7	7.98	14.5	22.4
		100		4.35	10.0	8.19	15.3	21.7

## APPENDIX A

TABLE A-1. - Summary of results - baseline vehicles (1970 MY)--Continued

Car No.	Vehicle description	Temp., ° F	Air cond.	FTP emissions, gpm			Fuel econ, mpg	
				HC	CO	NOX	FTP	HFET
11	Chevrolet Nova 230-CID Auto 3500 lb	25		3.82	49.4	2.68	13.0	21.2
		50		3.71	43.3	2.92	13.0	21.7
		75		2.58	34.8	2.36	15.2	23.5
		100		2.44	25.8	2.68	15.6	23.9
12	Pontiac Catalina 350-CID Auto 4500 lb	25		4.64	43.6	6.30	10.0	17.5
		50		3.70	22.6	5.29	12.5	18.5
		75		3.17	11.2	5.40	13.2	20.8
		100		3.38	11.4	6.28	13.2	20.0
		75	yes	3.63	14.5	8.36	11.4	17.6
		100	yes	4.00	24.1	10.23	10.9	15.9
13	Buick Skylark 350-CID Auto 4000 lb	25		4.24	60.9	4.40	12.5	20.9
		50		3.12	42.9	4.50	14.0	20.7
		75		2.99	38.6	4.11	14.7	22.0
		100		3.04	25.7	5.61	15.2	20.4
		75	yes	3.06	41.2	5.60	13.8	19.2
		100	yes	3.18	33.4	8.77	12.6	18.4
14	Dodge Challenger 225-CID Manual 3500 lb	25		4.76	33.0	3.58	16.1	24.9
		50		4.27	33.5	3.59	17.0	26.8
		75		2.91	19.6	3.94	18.7	27.4
		100		3.08	20.0	3.92	19.4	28.1
15	Ford Maverick 200-CID Auto 3000 lb	25		3.00	12.2	3.90	15.5	22.0
		50		2.12	6.2	3.56	17.5	24.3
		75		2.47	6.3	3.86	18.6	25.2
		100		2.54	3.9	4.60	19.8	26.5
		75	yes	2.64	5.6	4.94	17.9	25.3
		100	yes	2.59	4.2	6.51	17.8	23.8

## APPENDIX A

TABLE A-1. - Summary of results - baseline vehicles (1970 MY)--Continued

Car No.	Vehicle description	Temp., ° F	Air cond.	FTP emissions, gpm			Fuel econ., mpg	
				HC	CO	NO <sub>x</sub>	FTP	HFET
16	Chevrolet Monte 350-CID	25	yes	3.72	37.9	2.40	11.7	18.8
		50		3.31	31.4	2.84	12.2	19.3
		Auto		3.06	22.5	2.62	13.2	19.8
		4000 lb		3.12	18.0	2.43	13.6	20.3
		75		2.87	23.0	3.41	12.4	19.4
		100		2.88	21.7	4.17	12.1	18.0
17	Ford Fairlane	25	yes	4.14	42.0	4.24	11.2	18.6
	302-CID	50		3.27	30.3	4.66	12.6	19.6
	Auto	75		3.34	21.6	5.05	13.1	19.7
	4000 lb	100		2.74	9.3	5.94	13.5	20.1
18	Chevrolet Camino	25	yes	8.11	39.8	2.12	11.7	19.7
22	350-CID	50		5.80	37.1	1.90	14.0	21.0
	Manual	75		5.33	34.9	2.22	14.0	21.5
	4000 lb	100		4.90	31.0	2.30	14.5	22.0
	Cadillac	25		2.58	16.3	6.22	9.6	16.0
19	472-CID	50	yes	2.64	22.6	6.27	10.5	16.7
	Auto	75		2.62	14.2	6.97	10.8	17.3
	5500 lb	100		2.11	9.9	7.54	11.3	17.8
20	Chrysler Newport	25		4.72	67.7	5.10	10.3	17.4
	383-CID	50	yes	4.12	65.7	5.41	10.8	18.3
	Auto	75		3.59	46.2	5.70	11.7	18.1
	5000 lb	100		2.60	31.4	4.98	12.5	19.4
		75		3.70	48.4	5.60	11.2	17.3
		100		3.43	45.9	6.10	11.5	17.2

**APPENDIX A**

**TABLE A-1. - Summary of results - baseline vehicles (1970 MY)--Continued**

Car No.	Vehicle description	Temp., ° F	Air cond.	FTP emissions, gpm			Fuel econ., mpg	
				HC	CO	NO <sub>x</sub>	FTP	HFET
21	<b>Ford Maverick</b> 170-CID Manual 3000 lb	25		3.86	18.2	2.66	17.1	28.5
		50		3.81	19.4	2.61	19.9	28.5
		75		2.82	6.1	2.86	20.8	30.9
		100		3.59	13.7	2.74	22.6	33.8
22	<b>AMC Hornet</b> 232-CID Manual 3000 lb	25		4.17	17.9	3.32	16.1	24.0
		50		3.32	12.4	3.72	17.7	25.0
		75		3.06	13.2	3.99	19.2	25.6
		100		3.52	10.0	4.02	20.2	26.3
23	<b>Oldsmobile Vista</b> 350-CID Auto 5000 lb	25		3.26	49.3	3.14	9.3	14.8
		50		3.18	45.3	2.97	10.2	15.5
		75		2.75	48.9	3.03	10.1	15.1
		100		3.12	43.9	3.06	10.7	16.1
		75	yes	2.73	51.6	4.05	9.6	14.1
		100	yes	3.38	50.3	4.35	9.7	14.2
24	<b>Volkswagen Bug</b> 1.6 L Manual 2500 lb	25		3.39	26.2	3.59	21.4	32.2
		50		3.06	21.2	3.42	23.3	33.5
		75		2.41	18.3	3.47	24.1	34.4
		100		2.18	21.3	3.51	24.3	35.1
25	<b>Chevrolet Nova</b> 250-CID Auto 3500 lb	25		4.81	32.8	2.44	13.4	23.8
		50		4.01	27.6	2.54	14.4	25.3
		75		3.61	19.9	2.54	15.8	25.8
		100		3.18	13.3	2.60	16.5	26.1

## APPENDIX A

TABLE A-1. - Summary of results - baseline vehicles (1970 MY)--Continued

Car No.	Vehicle description	Temp., ° F	Air cond.	FTP emissions, gpm			Fuel econ, mpg	
				HC	CO	NO <sub>x</sub>	FTP	HFET
24	Chevrolet Impala 350-V8 Auto 4500 lb	25		3.68	67.6	4.22	11.0	18.7
		50		3.02	44.4	4.07	12.5	20.0
		75		2.68	35.7	4.97	12.3	19.3
		100		2.48	28.2	4.34	14.0	20.0
		75	yes	2.68	35.4	5.17	12.1	19.1
		100	yes	2.79	37.4	5.41	12.3	17.8
27	Ford Galaxy 351-CID Auto 4500 lb	25		5.56	65.9	4.68	10.9	18.8
		50		3.02	33.5	4.40	12.8	19.7
		75		3.00	16.8	6.03	13.0	20.6
		100		2.68	15.6	6.06	13.6	21.0
		75	yes	2.81	18.1	5.84	12.6	19.7
		100	yes	2.93	12.7	6.71	12.8	18.9
28	Plymouth Valiant 225-CID Auto 3500 lb	25		8.88	77.3	6.30	14.7	21.8
		50		5.59	50.4	6.79	16.7	25.8
		75		3.89	36.3	7.09	18.7	25.5
		100		2.61	24.1	7.90	19.7	26.5
		25		2.40	34.6	2.72	19.2	32.6
		50		3.31	40.4	2.43	23.5	36.8
29	Chevrolet Vega 140-CID Manual 3000 lb	75		2.38	31.5	3.02	24.5	36.8
		100		2.49	35.8	2.54	22.1	36.7
		25		2.69	35.2	4.77	9.0	16.4
		50		2.58	29.0	4.89	9.9	16.9
		75		2.48	21.0	5.47	10.3	17.7
		100		2.58	20.1	5.64	10.5	17.1
30	Ford Wagon 429-CID Auto 5500 lb	75	yes	2.40	28.5	5.72	9.8	16.3
		100	yes	2.71	25.6	5.90	9.9	15.9

## APPENDIX A

TABLE A-2. - Summary of results - production late model

Car No.	Vehicle description	Temp., ° F	Air cond.	FTP emissions, gpm			Fuel econ, mpg	
				HC	CO	NO <sub>x</sub>	FTP	HFET
1 25	1978 Buick Skyhawk 231-CID Auto 3500 lb	25		1.26	6.2	0.93	14.9	22.1
		50		0.58	4.6	1.08	15.9	22.6
		75		0.42	2.5	1.01	15.9	22.9
		100		0.39	3.4	0.90	17.8	24.4
		75	yes	0.52	3.6	1.49	15.2	21.9
		100	yes	0.50	4.3	1.79	15.2	21.1
2	1978 Pontiac Sunbird 151-CID Auto 3500 lb	25		2.45	49.0	0.57	15.0	22.6
		50		1.05	30.0	0.82	16.3	24.1
		75		0.53	11.7	1.03	17.6	25.8
		100		0.58	10.2	1.01	19.2	25.6
		75	yes	0.49	11.4	1.13	16.8	24.0
		100	yes	0.60	13.4	1.06	17.1	22.8
3	1979 Ford Turbo Mustang 2.3L Manual 3000 lb	25		4.21	30.5	3.92	13.7	24.4
		50		2.25	16.2	2.14	14.6	24.8
		75		1.01	6.3	1.76	15.6	24.7
		100		0.68	5.4	1.57	16.0	26.1
		75	yes	0.78	6.3	2.53	13.4	21.4
		100	yes	1.17	8.9	1.88	14.9	24.3
4	1979 Dodge Challenger 1.6L Manual 3000 lb	25		1.48	15.4	2.00	20.9	30.6
		50		1.11	15.6	1.93	22.5	30.7
		75		0.97	8.6	1.89	24.3	32.8
		100		0.99	11.5	1.58	24.3	33.1
		75	yes	0.84	8.4	1.95	23.5	32.0
		100	yes	0.91	15.4	1.87	21.4	31.5

## APPENDIX A

TABLE A-2. - Summary of results - production late model--Continued

Car No.	Vehicle description	Temp., ° F	Air cond.	FTP emissions, gpm			Fuel econ, mpg	
				HC	CO	NO <sub>x</sub>	FTP	HFET
5	1979 Oldsmobile Diesel 260-CID Auto 4000 lb	25		0.36	1.6	2.19	18.0	27.7
		50		0.32	1.5	2.24	18.4	27.9
		75		0.33	1.6	2.44	18.8	28.8
		100		0.32	1.6	2.10	21.2	29.8
		75	yes	0.35	1.7	2.20	17.8	27.7
		100	yes	0.46	2.0	2.54	16.6	24.7
6	1979 BMW 528i 2.8L Manual 3500 lb	25		1.20	14.4	0.58	13.5	23.9
		50		0.71	5.6	0.96	16.6	25.2
		75		0.43	3.9	1.04	17.0	26.3
		100		0.46	2.5	0.92	17.7	27.2
		75	yes	0.49	4.9	1.17	15.9	25.2
		100	yes	0.48	2.3	0.80	15.1	23.6
26	1980 VW Rabbit Diesel 1.5L Manual 2250 lb	25		0.40	1.3	1.20	32.3	39.8
		50		0.25	1.1	1.17	35.4	43.6
		75		0.28	0.9	1.20	35.9	41.9
		100		0.30	1.1	1.28	37.9	42.4
		75	yes	0.30	1.1	1.41	32.3	40.8
		100	yes	0.32	1.2	1.73	27.4	36.0

APPENDIX B. - HC EMISSIONS, GPM

## APPENDIX B

TABLE B-1. - HC emissions, gpm - baseline vehicles (1970 MY)

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
1	25	Yes	11.77	2.44	2.26	4.32	1.50	3.05	3.44
	50		7.27	2.54	2.52	3.52	1.60	2.66	4.56
	75		4.36	2.49	2.55	2.89	1.85	2.42	4.04
	100		2.73	2.38	2.40	2.46	1.73	2.15	5.06
	75		4.34	2.65	2.66	3.01	1.92	2.52	4.56
	100		3.60	2.90	3.01	3.07	2.20	2.68	5.52
28	25	Yes	10.54	2.88	2.58	4.39	1.30	3.22	4.24
	50		6.90	2.54	2.41	3.42	1.65	2.62	3.70
	75		3.38	2.49	2.44	2.66	1.72	2.24	4.37
	100		3.04	2.66	2.66	2.74	1.91	2.37	4.76
	75		4.48	2.89	2.58	3.13	1.92	2.59	5.01
	100		3.55	2.89	2.64	2.96	2.01	2.53	7.32
3	25	Yes	7.52	3.70	3.10	4.32	1.87	3.22	6.50
	50		6.05	4.24	3.14	4.31	2.03	3.28	6.39
	75		4.10	3.91	3.17	3.74	2.01	2.96	6.41
	100		3.76	3.86	3.16	3.65	2.02	2.92	6.60
	75		4.36	3.85	3.10	3.75	2.11	3.01	6.75
	100		3.70	3.67	3.05	3.51	2.02	2.84	6.48
4	25	Yes	9.24	4.30	3.83	5.20	2.30	3.90	7.86
	50		7.17	3.31	3.96	4.28	2.41	3.44	6.77
	75		5.72	3.35	3.57	3.90	2.51	3.27	9.03
	100		4.24	3.33	4.02	3.97	2.72	3.41	9.86
	75		4.95	3.60	3.58	3.87	2.64	3.32	8.62
	100		4.05	3.90	4.04	3.97	2.88	3.48	9.62
5	25	Yes	5.52	2.86	2.56	3.33	1.76	2.62	5.00
	50		3.78	2.55	2.29	2.73	1.45	2.15	4.53
	75		3.76	2.76	2.71	2.96	1.84	2.46	5.84
	100		3.30	2.43	2.75	2.72	1.89	2.35	5.85
	75		3.95	2.70	2.59	2.93	1.99	2.51	5.83
	100		4.25	3.86	3.64	3.38	2.48	3.25	3.30

## APPENDIX B

TABLE B-1. - HC emissions, gpm - baseline vehicles (1970 MY)--Continued

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
6	25	Yes	9.20	1.84	1.32	3.36	1.42	2.49	2.18
	50		3.97	1.74	1.79	2.21	1.35	1.82	2.66
	75		3.80	1.71	1.87	2.19	1.55	1.90	3.47
	100		2.06	2.40	2.47	2.35	1.58	2.00	5.03
	75		3.84	1.87	2.62	2.49	1.46	2.03	3.36
	100		2.02	1.80	2.18	1.95	1.43	1.72	5.38
7	25		5.54	1.85	1.86	2.62	1.06	1.92	2.48
	50		3.64	1.93	2.04	2.32	1.37	1.89	2.75
	75		2.70	1.72	2.04	2.01	1.38	1.73	2.82
	100		2.53	1.73	2.44	2.12	1.80	1.98	3.98
29	3	Yes	13.92	3.19	3.40	5.43	1.16	3.51	5.68
	50		8.45	2.36	2.50	3.66	0.92	2.43	5.15
	75		3.86	2.37	1.88	2.54	1.02	1.86	3.87
	100		3.75	2.14	2.33	2.52	1.09	1.88	4.90
	75		3.98	2.57	2.30	2.79	1.09	2.03	5.97
	100		3.10	2.38	2.35	2.52	1.34	1.99	8.51
9	25	Yes	6.17	3.61	3.18	4.02	1.66	2.96	10.16
	50		4.55	3.11	3.55	3.53	1.60	2.66	3.17
	75		4.24	3.54	3.33	3.63	1.73	2.73	10.47
	100		4.46	5.16	4.42	4.81	1.96	3.53	16.63
	75		4.74	3.79	3.94	4.03	1.91	3.08	9.36
	100		4.45	4.18	3.70	4.11	1.92	3.12	13.87
10	25		10.48	4.60	3.72	5.58	2.38	4.14	7.77
	50		7.42	4.78	4.11	5.14	2.69	4.04	9.65
	75		5.71	4.58	4.14	4.69	2.52	3.71	9.72
	100		4.64	4.38	4.06	4.35	2.69	3.60	9.00

## APPENDIX B

TABLE B-1. - HC emissions, gpm - baseline vehicles (1970 MY)--Continued

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
11	25		10.29	2.08	2.23	3.82	0.76	2.44	3.64
	50		8.62	2.43	2.38	3.71	0.55	2.29	3.95
	75		5.61	1.66	2.03	2.58	0.72	1.74	3.92
	100		3.95	1.91	2.28	2.44	0.82	1.71	4.71
12	25		10.17	3.17	3.26	4.64	2.16	3.52	4.77
	50		5.25	3.38	3.15	3.70	2.38	3.11	4.96
	75		3.69	3.05	3.02	3.17	2.00	2.64	5.37
	100		3.82	3.33	3.17	3.38	2.29	2.89	6.48
	75	Yes	4.27	3.55	3.29	3.63	2.29	3.03	5.59
	100	Yes	4.30	3.91	3.96	4.00	2.75	3.44	10.03
30	13		8.30	3.20	2.82	4.24	1.79	3.14	5.20
	50		4.55	2.73	2.76	3.12	1.80	2.53	5.73
	75		3.93	2.73	2.79	2.99	1.95	2.52	6.03
	100		3.48	2.86	3.08	3.04	1.97	2.56	5.61
	75	Yes	4.20	3.05	2.21	3.06	1.99	2.58	5.27
	100	Yes	3.35	3.23	2.97	3.18	2.23	2.75	8.64
14	25		10.54	3.56	2.76	4.76	1.16	3.14	3.43
	50		8.74	3.36	2.66	4.27	1.10	2.84	7.39
	75		3.46	2.85	2.58	2.91	1.13	2.11	9.59
	100		3.56	2.96	2.99	3.08	1.12	2.20	9.09
15	25		5.40	2.43	2.18	3.00	0.92	2.06	4.29
	50		2.55	2.11	1.33	2.12	0.87	1.56	4.54
	75		3.19	2.37	2.12	2.47	1.47	2.02	6.71
	100		2.32	2.64	2.52	2.54	1.54	2.09	6.54
	75	Yes	2.66	2.82	2.28	2.54	1.43	2.10	6.82
	100	Yes	2.47	2.70	2.49	2.59	1.53	2.11	7.57

## APPENDIX B

TABLE B-1. - HC emissions, gpm - baseline vehicles (1970 MY)--Continued

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
16	25	Yes	7.13	3.04	2.42	3.72	0.95	2.47	5.33
	50		5.82	2.89	2.25	3.31	0.76	2.16	5.06
	75		4.09	2.80	2.75	3.06	1.10	2.18	6.01
	100		3.54	3.08	2.91	3.12	1.33	2.31	6.74
	75		3.84	2.75	2.35	2.87	1.06	2.06	6.50
	100		3.32	2.70	2.73	2.88	1.28	2.16	6.10
17	25		10.44	2.50	2.49	4.14	1.61	3.00	4.41
	50		6.46	2.42	2.47	3.27	1.71	2.57	4.64
	75		5.05	2.89	2.89	3.34	1.96	2.72	5.82
	100		3.22	2.46	2.90	2.74	2.00	2.41	5.14
31	18		13.02	7.54	5.58	8.11	2.64	5.65	15.94
	50		8.33	5.30	4.84	5.80	2.84	4.47	12.57
	75		6.85	4.94	4.94	5.33	2.61	4.11	15.25
	100		5.53	4.62	4.95	4.90	2.56	3.85	15.20
19	25		4.60	2.06	2.04	2.58	1.48	2.09	2.82
	50		4.21	2.17	2.35	2.64	1.46	2.11	3.08
	75		3.25	2.51	2.35	2.62	1.63	2.17	3.34
	100		2.40	1.80	2.48	2.11	1.56	1.36	3.32
20	25	Yes	9.81	3.54	3.12	4.72	1.09	3.09	6.24
	50		5.59	3.73	3.76	4.12	1.13	2.80	5.92
	75		4.64	3.55	2.88	3.59	1.24	2.53	5.91
	100		3.05	2.43	2.50	2.60	1.00	1.88	5.46
	75		5.10	3.47	3.06	3.70	1.39	2.66	5.74
	100		3.94	3.32	3.26	3.43	1.66	2.63	5.98

## APPENDIX B

TABLE B-1. - HC emissions, gpm - baseline vehicles (1970 MY)--Continued

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
21	25		8.06	2.80	2.67	3.86	1.40	2.75	6.90
	50		7.48	2.74	3.07	3.81	1.39	2.72	6.41
	75		3.15	2.67	2.85	2.82	1.47	2.21	7.80
	100		4.42	3.38	3.42	3.59	1.68	2.73	10.03
22	25		6.39	4.20	2.48	4.17	0.70	2.61	7.10
	50		4.28	3.31	2.63	3.32	0.83	2.20	6.73
	75		2.93	3.24	2.32	3.06	0.98	2.12	9.08
	100		2.86	3.99	3.10	3.52	1.11	2.44	10.15
32	25	Yes	6.73	2.24	2.48	3.26	1.61	2.52	4.56
	50		4.92	2.46	3.20	3.18	1.66	2.50	5.97
	75		3.92	2.41	2.53	2.75	1.63	2.25	5.41
	100		3.28	3.00	3.24	3.12	1.66	2.46	5.17
	75		3.83	2.42	2.47	2.73	1.46	2.15	4.83
	100		3.49	3.27	3.52	3.38	2.00	2.76	10.96
24	25		8.62	2.04	2.12	3.39	0.76	2.21	6.85
	50		4.70	2.89	2.15	3.06	0.70	2.00	7.52
	75		3.14	2.25	2.15	2.41	0.66	1.62	6.83
	100		2.74	2.00	2.10	2.18	0.70	1.51	6.16
25	25		10.35	3.95	2.31	4.81	1.03	3.13	6.38
	50		7.97	3.29	2.36	4.01	1.23	2.76	5.10
	75		6.25	3.15	2.49	3.61	1.13	2.52	4.20
	100		4.18	3.12	2.57	3.13	1.38	2.37	6.36

## APPENDIX B

TABLE B-1. - HC emissions, gpm - baseline vehicles (1970 MY)--Continued

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
26	25	Yes	7.24	2.86	2.56	3.68	1.48	2.69	4.22
	50		2.36	2.63	2.02	3.02	1.43	2.30	5.39
	75		3.22	2.66	2.31	2.68	1.60	2.19	3.87
	100		2.70	2.32	2.64	2.48	2.12	2.32	7.95
	75		3.27	2.72	2.15	2.63	1.67	2.23	6.24
	100		2.89	2.83	2.64	2.79	1.94	2.41	5.21
27	25	Yes	14.34	3.48	2.44	5.56	1.30	3.64	4.48
	50		5.16	2.73	1.99	3.02	1.17	2.19	3.53
	75		4.21	2.33	2.34	3.00	1.40	2.28	4.23
	100		3.61	2.38	2.54	2.68	1.43	2.12	5.17
	75		4.19	2.55	2.23	2.81	1.31	2.14	4.64
	100		3.85	2.80	2.50	2.93	1.73	2.39	3.16
23	25		26.41	4.82	3.42	8.88	2.20	5.91	6.43
	50		15.49	3.33	2.38	5.59	1.46	3.73	4.32
	75		8.49	2.92	2.29	3.89	1.57	2.85	4.60
	100		3.94	2.37	2.07	2.61	1.45	2.09	4.34
29	25		3.32	2.12	1.86	2.40	1.09	1.31	4.52
	50		6.33	2.43	2.59	3.31	1.03	2.28	5.24
	75		3.14	2.24	2.09	2.38	0.95	1.74	6.75
	100		2.31	2.74	2.15	2.49	1.14	1.80	3.10
30	25	Yes	6.70	1.30	1.93	2.69	1.70	2.24	2.54
	50		5.29	1.47	2.62	2.53	2.24	2.43	4.19
	75		3.88	1.73	2.78	2.48	2.27	2.39	3.85
	100		3.77	1.39	3.01	2.58	2.56	2.57	5.63
	75		4.51	1.43	2.70	2.40	2.24	2.33	4.35
	100		3.03	2.34	3.17	2.71	2.75	2.73	7.38

## APPENDIX B

TABLE B-2. - HC emissions, gpm - production late model

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
1	25	Yes	4.89	0.30	0.35	1.26	0.06	0.72	0.38
	50		2.17	0.12	0.24	0.58	0.05	0.34	0.26
	75		1.57	0.12	0.14	0.42	0.04	0.25	0.22
	100		1.22	0.12	0.28	0.39	0.04	0.23	0.27
	75		1.94	0.12	0.22	0.52	0.03	0.30	0.15
	100		1.53	0.21	0.29	0.50	0.15	0.34	0.45
2	25	Yes	10.26	0.42	0.37	2.45	0.05	1.37	0.28
	50		4.47	0.15	0.15	1.05	0.01	0.58	0.00
	75		1.94	0.11	0.25	0.53	0.04	0.31	0.06
	100		1.60	0.10	0.68	0.58	0.06	0.35	2.38
	75		1.82	0.08	0.27	0.49	0.04	0.29	0.14
	100		1.43	0.13	0.86	0.60	0.59	0.60	3.81
34	25	Yes	16.86	0.94	0.90	4.21	0.12	2.37	1.21
	50		7.84	0.82	0.71	2.25	0.11	1.29	1.30
	75		2.72	0.47	0.76	1.01	0.03	0.59	1.75
	100		1.56	0.36	0.64	0.63	0.08	0.41	4.36
	75		2.23	0.33	0.45	0.78	0.06	0.46	2.51
	100		3.50	0.47	0.75	1.17	0.07	0.68	3.36
4	25	Yes	3.46	1.10	0.70	1.48	0.30	0.95	1.85
	50		1.66	0.94	1.02	1.11	0.26	0.73	2.05
	75		1.14	1.03	0.74	0.97	0.24	0.64	2.08
	100		1.19	0.98	0.86	0.99	0.24	0.65	2.48
	75		1.04	0.83	0.70	0.84	0.21	0.56	1.83
	100		1.17	0.77	0.99	0.91	0.24	0.61	2.32

## APPENDIX B

TABLE B-2. - HC emissions, gpm - production late model--Continued

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
5	25	Yes	0.71	0.30	0.22	0.36	0.11	0.25	0.83
	50		0.56	0.27	0.22	0.32	0.13	0.23	1.03
	75		0.54	0.29	0.25	0.33	0.13	0.24	1.10
	100		0.43	0.32	0.22	0.32	0.08	0.21	1.04
	75		0.48	0.27	0.40	0.35	0.09	0.23	0.71
	100		0.68	0.43	0.37	0.46	0.10	0.30	1.08
6	25	Yes	4.18	0.40	0.42	1.20	0.16	0.73	2.05
	50		1.89	0.39	0.44	0.71	0.13	0.45	2.24
	75		0.92	0.26	0.38	0.43	0.10	0.23	0.56
	100		1.17	0.29	0.24	0.46	0.09	0.29	0.74
	75		1.26	0.31	0.27	0.49	0.09	0.31	1.00
	100		1.35	0.23	0.31	0.43	0.11	0.31	0.67
35	25	Yes	0.63	0.32	0.31	0.40	0.24	0.33	0.54
	50		0.30	0.25	0.22	0.25	0.19	0.22	0.31
	75		0.35	0.26	0.26	0.28	0.22	0.25	0.58
	100		0.30	0.23	0.33	0.30	0.32	0.31	0.60
	75		0.41	0.23	0.27	0.30	0.21	0.26	0.60
	100		0.28	0.32	0.35	0.32	0.30	0.31	0.67

**APPENDIX C. - CO EMISSIONS, GPM**

## APPENDIX C

TABLE C-1. - CO emissions, gpm - baseline vehicles (1970 MY)

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
1	25	Yes	177.0	6.8	9.0	42.3	4.2	25.2	17.3
	50		99.2	8.1	10.9	27.8	5.1	17.6	21.6
	75		39.2	8.3	12.4	15.8	6.3	11.5	26.0
	100		10.5	8.3	13.3	10.1	7.2	8.3	23.3
	75		47.6	8.0	11.5	17.2	6.5	12.4	31.5
	100		19.2	10.5	18.0	14.3	9.8	12.3	56.9
2	25	Yes	189.7	9.7	9.4	46.9	5.7	28.4	12.8
	50		136.1	9.5	8.6	35.7	5.9	22.3	14.8
	75		26.8	7.3	8.5	11.9	5.8	9.2	15.4
	100		18.8	8.6	8.8	10.8	7.0	9.1	27.5
	75		70.5	8.7	9.0	21.6	5.6	14.4	29.3
	100		19.7	8.8	10.0	11.4	7.9	9.3	38.6
37	25	Yes	107.7	15.3	14.0	34.4	12.8	24.7	39.8
	50		90.8	18.6	18.5	33.5	14.3	24.9	41.3
	75		51.2	16.9	16.9	24.0	14.5	19.7	36.7
	100		29.4	16.1	17.2	19.2	15.3	17.4	36.6
	75		53.8	18.3	21.1	26.4	20.6	23.8	39.2
	100		31.4	17.9	23.0	22.1	22.6	22.3	47.2
3	25	Yes	171.1	12.1	11.9	44.9	6.6	27.7	28.0
	50		94.3	10.4	11.1	27.9	7.4	18.7	25.2
	75		45.3	10.8	12.4	18.4	9.3	14.3	32.6
	100		21.5	13.4	18.0	16.6	14.6	15.7	69.3
	75		44.0	10.6	14.3	18.5	10.3	14.3	51.3
	100		20.1	15.9	26.3	19.6	17.6	13.7	91.0
5	25	Yes	59.5	14.0	13.5	23.3	5.7	15.4	29.1
	50		30.6	8.1	10.9	13.5	4.8	9.6	24.0
	75		29.3	11.1	20.1	17.3	10.5	14.2	44.9
	100		25.3	13.2	27.7	19.7	17.9	13.9	64.3
	75		31.9	11.3	20.6	13.1	14.0	16.3	63.9
	100		31.1	23.4	46.8	34.0	37.6	35.6	134.3

## APPENDIX C

TABLE C-1. - CO emissions, gpm - baseline vehicles (1970 MY)--Continued

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
6	25	Yes	207.1	15.5	10.9	54.1	7.4	33.1	23.6
	50		38.2	10.1	10.2	15.8	6.7	11.7	19.6
	75		18.3	10.5	9.0	11.7	6.5	9.4	22.1
	100		12.7	8.9	7.7	9.4	8.3	8.9	27.7
	75		21.5	11.6	10.3	13.3	6.1	10.1	26.5
	100		13.6	8.7	9.0	9.8	5.7	8.0	27.9
7	25		45.3	4.6	9.1	14.3	6.0	10.6	8.9
	50		26.7	4.9	11.2	11.1	9.6	10.4	10.1
	75		19.2	3.5	15.9	12.7	11.3	12.1	16.3
	100		17.3	9.3	29.4	16.5	26.0	20.8	43.8
38	25	Yes	32.7	39.3	46.8	50.3	18.6	36.0	61.3
	50		72.6	21.2	24.2	32.7	10.4	22.7	33.3
	75		42.7	18.6	15.4	22.7	14.5	19.0	23.2
	100		34.5	18.9	22.5	23.1	18.8	21.2	42.5
	75		44.5	23.0	22.0	27.2	17.0	22.6	42.8
	100		28.3	19.7	26.5	23.3	25.5	24.3	70.6
9	25	Yes	108.7	19.6	16.3	39.0	13.2	27.4	25.2
	50		33.3	22.1	25.6	36.5	15.3	27.0	30.7
	75		69.3	17.5	22.4	29.7	15.3	23.2	21.0
	100		31.7	14.6	18.0	19.0	14.3	16.9	23.9
	75		64.3	17.5	17.9	27.3	15.9	22.2	33.3
	100		41.4	13.0	21.5	21.2	13.2	17.6	27.3
10	25		165.8	17.0	8.2	45.6	4.5	27.1	12.6
	50		62.6	17.9	10.1	25.0	5.3	16.1	18.9
	75		16.0	11.4	9.2	11.7	6.1	9.2	16.5
	100		9.6	10.4	9.5	10.0	7.1	3.7	23.8

## APPENDIX C

TABLE C-1. - CO emissions, gpm - baseline vehicles (1970 MY)--Continued

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
11	25		182.5	11.0	20.6	49.4	4.5	29.2	15.7
	50		163.4	8.2	20.7	43.3	4.7	25.9	20.5
	75		120.5	9.3	18.7	34.8	3.8	20.9	23.6
	100		80.8	7.9	18.2	25.8	4.3	16.1	35.0
12	25	Yes	175.8	8.3	11.0	43.6	5.2	26.3	17.1
	50		75.1	8.7	9.4	22.6	6.6	15.4	22.9
	75		20.8	7.7	10.9	11.2	5.5	8.6	19.8
	100		17.6	9.2	11.0	11.4	8.8	10.2	36.8
	75		26.7	9.4	15.2	14.5	6.7	11.0	28.8
	100		33.8	19.1	26.4	24.1	16.7	20.3	72.0
39	13	Yes	124.5	48.5	37.0	60.9	26.9	45.6	36.0
	50		86.7	32.0	30.5	42.9	29.6	36.9	35.1
	75		68.3	31.7	29.5	38.6	31.5	35.4	29.6
	100		40.7	19.8	25.7	25.7	30.2	27.7	27.9
	75		77.5	34.4	26.7	41.2	29.9	36.1	35.7
	100		40.9	23.9	36.3	33.4	35.1	34.2	116.8
14	25		114.8	12.9	10.4	33.0	3.3	19.6	20.2
	50		110.1	13.1	15.5	33.5	3.9	20.2	27.7
	75		46.8	9.5	18.1	19.6	5.7	13.3	28.1
	100		36.2	12.5	22.3	20.0	8.5	14.3	29.4
15	25	Yes	45.2	3.5	3.9	12.2	3.6	8.3	6.8
	50		16.2	3.4	3.3	6.2	3.5	5.0	6.4
	75		16.2	3.4	4.3	6.3	3.7	5.1	3.3
	100		5.3	3.2	4.1	3.9	3.2	3.6	10.4
	75		12.4	3.6	4.3	5.6	3.7	4.7	11.2
	100		5.4	3.6	4.7	4.2	3.8	4.0	14.0

## APPENDIX C

TABLE C-1. - CO emissions, gpm - baseline vehicles (1970 MY)--Continued

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
16	25	Yes	133.2	13.4	11.9	37.9	5.1	23.1	20.2
	50		103.7	11.6	11.2	31.4	5.0	19.5	18.7
	75		67.0	11.2	10.1	22.5	6.4	15.3	23.7
	100		30.0	13.7	17.0	13.0	9.4	14.1	25.6
	75		61.6	13.3	12.1	23.0	6.8	15.7	27.4
	100		41.8	17.2	15.1	21.7	10.5	16.7	40.5
17	25	Yes	170.7	9.7	6.9	42.0	4.1	24.9	11.8
	50		117.0	3.4	6.4	30.3	5.2	19.0	14.1
	75		71.8	8.5	8.8	21.6	5.3	14.3	16.7
	100		16.2	6.4	9.6	9.3	5.7	7.7	17.3
18	25	Yes	95.6	30.4	16.3	39.8	17.4	29.7	65.4
	50		77.8	22.9	33.2	37.1	25.6	31.9	43.4
	75		63.4	22.6	36.8	34.9	25.5	30.7	55.0
	100		52.4	19.3	36.3	31.0	25.8	28.7	58.9
19	25	Yes	39.1	12.0	7.3	16.3	3.4	10.5	18.9
	50		45.4	16.0	18.0	22.6	3.8	14.1	29.1
	75		19.5	14.2	10.3	14.2	3.5	9.4	13.8
	100		11.6	8.0	12.4	9.9	3.7	7.1	19.6
20	25	Yes	120.6	56.3	43.2	67.7	10.5	42.0	96.8
	50		101.1	55.6	53.2	65.7	11.4	41.3	79.2
	75		64.4	43.7	37.3	46.2	9.3	29.3	57.7
	100		45.7	20.5	40.4	31.4	10.5	22.0	85.5
	75		76.0	35.8	51.4	48.4	13.6	32.7	78.5
	100		72.5	30.3	55.8	45.9	20.9	34.7	104.1

## APPENDIX C

TABLE C-1. - CO emissions, gpm - baseline vehicles (1970 MY)--Continued

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
21	25		55.5	7.3	10.1	18.2	3.2	11.5	13.5
	50		46.8	10.5	15.6	19.4	3.6	12.3	21.6
	75		10.5	4.6	5.6	6.1	3.0	4.7	11.3
	100		21.4	10.8	13.2	13.7	2.8	9.8	30.8
22	25		61.5	4.6	10.2	17.9	2.7	11.1	10.3
	50		32.7	6.5	8.2	12.4	3.1	8.2	14.4
	75		19.0	14.4	6.7	13.2	3.6	3.9	16.2
	100		11.0	9.8	9.5	10.0	4.1	7.3	16.9
23	25		107.6	35.5	31.6	49.3	34.5	42.6	61.6
	50		87.6	33.8	34.6	45.3	33.9	40.2	71.0
	75		75.4	40.6	44.5	48.9	40.2	45.0	101.3
	100		51.3	42.0	41.8	43.9	31.6	38.4	87.0
	75	Yes	30.0	41.5	49.5	51.6	32.8	43.1	93.9
	100	Yes	49.3	46.8	57.8	50.3	37.4	44.5	127.2
24	25		59.1	18.3	16.9	26.2	4.9	16.6	37.6
	50		38.6	19.4	13.3	21.2	4.1	13.5	45.1
	75		27.2	17.6	12.8	18.3	3.9	11.8	47.8
	100		21.1	23.2	17.7	21.3	6.7	14.7	71.0
25	25		125.8	9.4	7.6	32.8	3.1	19.4	12.0
	50		104.4	7.3	6.7	27.6	3.2	16.6	13.7
	75		71.4	5.9	7.4	19.9	3.2	12.4	9.5
	100		47.1	4.1	5.1	13.3	3.0	8.7	12.9

## APPENDIX C

TABLE C-1. - CO emissions, gpm - baseline vehicles (1970 MY)--Continued

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
26	25	Yes	191.8	33.2	40.1	67.6	18.4	45.5	40.7
	50		124.0	25.7	19.3	44.4	15.9	31.5	47.9
	75		70.1	29.3	21.8	35.7	18.4	27.9	39.6
	100		35.4	23.9	30.8	28.2	31.8	29.8	51.8
	75		63.7	31.0	22.5	35.4	20.6	28.7	43.2
	100		41.1	36.7	35.7	37.4	41.6	39.3	82.6
27	25	Yes	248.9	18.2	7.9	65.9	4.0	38.1	11.7
	50		115.2	16.8	4.0	33.5	2.8	19.7	6.9
	75		39.4	12.8	7.4	16.8	3.9	11.0	16.5
	100		33.2	12.8	7.6	15.6	4.0	10.4	53.7
	75		65.1	6.3	5.6	13.1	3.2	11.4	15.0
	100		29.1	8.2	8.9	12.7	6.3	9.3	110.4
28	25		206.6	48.8	34.3	77.3	23.5	53.1	76.7
	50		164.2	21.7	18.3	50.4	8.6	31.6	42.1
	75		111.3	17.7	15.3	36.3	9.9	24.4	30.9
	100		61.0	14.1	15.2	24.1	10.3	17.9	52.3
	25		74.9	26.4	19.4	34.6	9.0	23.1	53.9
	50		73.1	34.1	27.4	40.4	8.2	25.9	71.9
29	75	Yes	48.4	31.0	19.3	31.5	6.7	20.3	58.3
	100		44.5	38.2	24.9	35.8	12.2	25.2	104.0
	25		126.5	10.6	13.8	35.2	5.0	21.6	19.9
	50		90.0	11.5	16.0	29.0	5.3	13.6	47.6
	75		51.5	13.2	13.2	21.0	6.5	14.5	49.2
	100		29.8	15.6	21.3	20.1	12.0	16.4	124.5
30	75	Yes	90.5	9.4	19.0	28.5	6.9	13.8	51.6
	100		21.5	22.8	34.0	25.6	12.5	19.7	169.4

## APPENDIX C

TABLE C-2. - CO emissions, gpm - production late model

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
1	25	Yes	23.0	1.0	3.6	6.2	0.1	3.4	0.7
	50		17.6	0.7	2.3	4.6	0.1	2.6	1.5
	75		10.5	0.3	0.7	2.5	0.1	1.4	0.5
	100		11.0	0.9	2.6	3.4	0.1	1.9	3.7
	75		14.0	0.5	1.7	3.6	0.1	2.0	0.9
	100		13.2	1.5	2.8	4.3	0.2	2.4	5.7
2	25	Yes	210.2	6.2	8.0	49.0	0.8	27.3	7.2
	50		132.9	2.7	3.9	30.0	0.7	16.3	3.3
	75		49.3	1.3	3.0	11.7	0.6	6.7	3.3
	100		33.8	1.4	9.1	10.2	1.4	6.3	58.6
	75		45.4	1.6	4.6	11.4	0.8	6.7	7.2
	100		31.7	2.3	20.6	13.4	16.9	15.0	123.9
3	25	Yes	135.4	2.7	4.2	30.5	0.2	16.9	5.5
	50		68.3	2.1	3.4	16.2	0.2	9.0	8.0
	75		19.4	1.2	6.5	6.3	0.2	3.6	12.3
	100		14.8	1.3	6.2	5.4	0.2	3.1	29.1
	75		19.7	1.4	5.7	6.3	0.2	3.6	24.1
	100		24.9	3.2	7.6	8.9	0.6	5.2	35.0
4	25	Yes	47.2	6.5	8.5	15.4	4.8	10.6	11.8
	50		37.7	6.2	16.6	15.6	2.3	9.6	16.3
	75		15.5	4.9	10.2	8.6	1.7	5.5	10.7
	100		16.1	9.1	12.5	11.5	3.2	7.7	34.9
	75		17.1	3.7	10.9	8.4	1.7	5.4	10.8
	100		24.1	9.3	20.5	15.4	5.7	11.0	53.9

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## APPENDIX C

TABLE C-2. - CO emissions, gpm - production late model--Continued

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
5	25	Yes	2.2	1.6	1.3	1.6	0.7	1.2	3.6
	50		1.8	1.6	1.3	1.5	0.7	1.2	3.6
	75		1.9	1.7	1.4	1.6	0.7	1.2	3.9
	100		1.8	1.7	1.4	1.6	0.7	1.2	4.0
	75		1.9	1.7	1.6	1.7	0.8	1.3	3.7
	100		2.3	2.0	1.7	2.0	0.9	1.5	4.2
6	25	Yes	44.5	6.3	6.4	14.4	1.7	8.7	27.6
	50		17.3	3.1	1.8	5.6	0.7	3.4	20.6
	75		7.4	3.7	1.5	3.9	0.6	2.4	2.4
	100		5.1	1.7	1.9	2.5	0.6	1.6	5.8
	75		9.2	4.1	3.2	4.9	0.6	3.0	14.3
	100		5.0	1.0	2.9	2.3	0.9	1.7	6.1
7	25	Yes	1.5	1.3	1.1	1.3	0.9	1.1	1.7
	50		1.2	1.2	0.9	1.1	0.6	0.9	1.7
	75		1.0	1.0	0.8	0.9	0.6	0.8	1.7
	100		1.1	1.1	1.1	1.1	0.8	1.0	1.9
	75		1.2	1.1	1.0	1.1	0.7	0.9	2.1
	100		1.3	1.1	1.2	1.2	0.9	1.0	2.0

APPENDIX D. - NO<sub>X</sub> EMISSIONS, GPM

## APPENDIX D

TABLE D-1. - NO<sub>x</sub> emissions, gpm - baseline vehicles (1970 MY)

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
1	25	Yes	3.81	4.43	6.03	4.76	5.81	5.23	6.04
	50		4.90	4.68	6.14	5.13	5.92	5.49	6.44
	75		6.21	4.79	6.31	5.50	6.45	5.93	6.35
	100		6.81	5.50	6.42	6.02	6.46	6.22	9.36
	75		6.76	5.66	7.18	6.31	7.33	6.77	7.78
	100		8.74	6.73	7.96	7.49	8.36	7.88	8.38
2	25	Yes	4.38	3.48	6.40	4.47	6.94	5.53	4.06
	50		5.62	3.54	6.28	4.73	6.69	5.61	4.43
	75		5.79	3.42	6.54	4.78	7.00	5.78	4.52
	100		6.88	3.70	7.14	5.30	8.52	6.75	5.50
	75		7.47	5.31	9.60	6.66	9.72	9.04	6.81
	100		8.40	5.45	9.45	7.17	12.20	9.43	11.48
3	25	Yes	3.37	2.26	3.41	2.81	3.24	3.00	2.99
	50		3.42	2.45	3.29	2.88	3.49	3.15	3.58
	75		3.45	2.23	3.30	2.78	3.40	3.06	3.31
	100		3.42	2.27	3.38	2.81	3.68	3.20	3.68
	75		4.45	3.46	4.50	3.95	4.55	4.22	5.08
	100		4.97	4.08	5.37	4.62	5.18	4.87	6.39
4	25	Yes	5.04	5.79	7.54	6.11	7.02	6.52	12.57
	50		5.75	4.79	8.13	5.90	7.94	6.32	8.93
	75		6.69	4.96	8.20	6.21	7.73	6.89	8.69
	100		7.87	5.85	7.98	6.85	8.36	7.53	10.15
	75		8.30	6.30	9.48	7.59	9.72	9.10	9.91
	100		9.49	7.40	10.30	8.76	10.58	9.53	12.53
5	25	Yes	6.51	5.34	6.94	6.28	6.90	6.56	6.99
	50		7.18	6.35	6.38	6.67	7.02	6.83	7.29
	75		6.41	5.33	6.51	5.88	6.43	6.13	6.96
	100		6.34	5.24	6.10	5.71	5.82	5.76	5.93
	75		6.74	6.06	6.56	6.34	6.56	6.44	5.86
	100		6.94	5.10	6.08	6.27	5.80	5.06	5.86

## APPENDIX D

TABLE D-1. - NO<sub>x</sub> emissions, gpm - baseline vehicles (1970 MY)--Continued

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
6	25	Yes	4.68	2.99	5.49	4.02	5.64	4.75	3.46
	50		5.13	3.22	5.92	4.36	5.68	4.95	3.97
	75		5.84	2.96	5.73	4.32	5.53	4.86	3.93
	100		6.16	3.28	6.13	4.65	5.97	5.24	4.54
	75		6.65	4.24	6.96	5.49	6.51	5.95	5.41
	100		7.70	4.95	8.71	6.55	9.11	7.70	7.17
7	25		4.52	3.40	4.27	3.88	4.02	3.94	5.14
	50		4.63	3.74	4.57	4.14	4.31	4.22	4.58
	75		4.55	3.54	4.57	4.03	4.15	4.08	4.30
	100		4.22	3.44	3.96	3.74	3.96	3.84	4.64
8	25	Yes	3.36	2.31	2.93	2.70	2.32	2.53	3.55
	50		3.10	2.27	2.88	2.61	2.30	2.47	3.55
	75		3.24	2.22	3.86	2.60	2.21	2.42	3.47
	100		3.07	2.52	2.52	2.52	2.27	2.41	3.79
	75		4.18	3.03	3.75	3.47	3.02	3.27	4.89
	100		4.00	3.26	3.80	3.56	3.15	3.33	5.31
9	25	Yes	5.22	4.57	6.32	5.30	5.67	5.47	7.09
	50		5.92	4.66	6.64	5.45	5.62	5.53	6.94
	75		5.54	4.56	6.48	5.29	5.38	5.33	6.69
	100		7.14	4.90	7.42	6.05	6.20	6.12	9.14
	75		6.25	6.61	7.75	6.85	7.55	7.17	8.49
	100		9.57	7.03	10.29	8.48	6.66	7.66	10.15
10	25		5.04	6.03	8.38	6.48	7.36	6.38	9.54
	50		7.93	6.29	8.73	7.30	3.22	7.71	12.40
	75		9.17	6.55	9.75	7.98	8.33	8.16	12.59
	100		9.22	7.10	9.42	8.19	9.12	8.61	13.60

## APPENDIX D

TABLE D-1. - NO<sub>x</sub> emissions, gpm - baseline vehicles (1970 MY)--Continued

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
11	25		2.74	2.42	3.12	2.68	2.50	2.60	4.35
	50		2.84	2.80	3.23	2.92	2.65	2.80	3.50
	75		2.38	2.13	2.79	2.36	2.40	2.38	3.63
	100		2.80	2.44	3.06	2.68	2.36	2.76	3.76
12	25		5.34	4.95	9.18	6.30	8.37	7.23	6.74
	50		5.80	4.23	6.92	5.29	8.27	6.63	5.27
	75		6.88	4.07	6.84	5.40	6.79	6.03	6.07
	100		7.70	4.78	9.03	6.28	8.92	7.47	6.61
	75	Yes	9.94	6.91	9.92	8.36	10.56	9.35	6.94
	100	Yes	10.36	3.39	13.61	10.23	14.38	12.10	17.72
13	25		5.02	3.58	5.49	4.40	4.74	4.55	7.90
	50		4.99	3.63	5.79	4.50	4.76	4.62	7.77
	75		4.53	3.30	5.33	4.11	4.45	4.26	6.34
	100		6.24	4.62	7.03	5.61	5.34	5.94	8.72
	75	Yes	5.89	5.21	6.13	5.60	6.82	6.15	9.97
	100	Yes	8.58	3.10	10.18	8.77	8.83	3.30	17.78
14	25		2.74	3.40	4.53	3.58	4.63	4.05	4.58
	50		3.17	3.33	4.30	3.59	4.56	4.03	5.32
	75		4.00	3.62	4.52	3.94	5.01	4.42	7.15
	100		4.20	3.54	4.46	3.92	5.06	4.43	6.72
15	25		5.49	2.90	4.62	3.90	3.45	3.70	4.30
	50		5.24	2.65	4.01	3.56	3.34	3.46	4.78
	75		5.28	2.95	4.52	3.86	4.86	4.31	4.70
	100		5.96	3.53	5.44	4.60	6.15	5.30	6.64
	75	Yes	6.41	3.97	5.68	4.94	5.33	5.12	6.59
	100	Yes	7.49	5.60	7.52	6.51	7.75	7.07	8.69

## APPENDIX D

TABLE D-1. - NO<sub>x</sub> emissions, gpm - baseline vehicles (1970 MY)--Continued

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
16	25	Yes	2.21	2.06	3.16	2.40	2.42	2.41	3.60
	50		2.92	2.32	3.77	2.84	2.86	2.85	4.16
	75		3.15	2.08	3.24	2.62	2.75	2.68	3.65
	100		2.83	1.90	3.14	2.43	2.52	2.47	3.73
	75		3.90	2.73	4.31	3.41	3.30	3.36	5.28
	100		4.79	3.44	5.10	4.17	4.26	4.21	6.22
17	25		3.24	3.50	6.38	4.24	5.73	4.91	6.60
	50		4.30	3.60	6.92	4.66	6.06	5.29	6.98
	75		5.08	3.96	7.10	5.05	6.48	5.69	6.43
	100		7.19	4.34	8.05	5.94	7.13	6.50	7.74
18	25		2.76	1.50	2.79	2.12	2.63	2.37	2.20
	50		2.49	1.50	2.21	1.90	2.81	2.31	2.61
	75		2.84	1.70	2.75	2.22	2.99	2.57	3.05
	100		2.60	1.80	3.02	2.30	3.27	2.74	3.04
19	25		8.14	4.47	8.06	6.22	8.46	7.23	6.01
	50		7.84	4.52	8.43	6.27	8.74	7.38	6.78
	75		9.37	4.97	8.95	6.97	9.14	7.95	6.53
	100		9.63	5.31	10.20	7.54	10.13	8.71	7.78
20	25	Yes	6.14	4.43	5.57	5.10	5.92	5.47	6.38
	50		5.67	4.37	6.23	5.41	5.91	5.64	7.11
	75		6.37	4.98	6.55	5.70	6.47	6.05	7.69
	100		5.50	4.47	5.56	4.98	6.20	5.53	6.33
	75		5.77	5.37	5.89	5.60	6.72	6.10	6.46
	100		5.96	5.89	6.60	6.10	7.64	6.79	7.06

## APPENDIX D

TABLE D-1. - NO<sub>x</sub> emissions, gpm - baseline vehicles (1970 MY)--Continued

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
50	25	Yes	3.04	2.22	3.18	2.66	2.98	2.80	3.56
	50		3.24	2.13	3.05	2.61	3.43	2.98	3.66
	75		3.75	2.23	3.36	2.86	3.40	3.10	3.85
	100		3.20	2.36	3.12	2.74	3.85	3.24	4.08
	25		3.64	2.81	4.06	3.32	3.55	3.42	4.38
	50		4.34	3.06	4.47	3.72	4.16	3.92	4.05
21	75		4.73	3.07	5.17	3.99	4.35	4.15	5.10
	100		4.91	3.21	4.88	4.02	4.66	4.31	5.92
	25		4.20	2.52	3.50	3.14	2.50	2.85	4.46
	50		3.93	2.39	3.34	2.97	2.44	2.73	3.69
23	75		3.80	2.40	3.61	3.03	2.52	2.80	5.72
	100		3.85	2.42	3.64	3.06	2.80	2.94	4.24
	75		4.61	3.51	4.64	4.05	3.80	3.94	4.68
	100		5.12	3.74	4.91	4.35	4.00	4.19	4.83
	25		4.08	2.92	4.48	3.58	4.46	3.98	3.14
	50		4.66	2.60	4.01	3.42	3.80	3.59	3.05
24	75		4.82	2.68	3.92	3.47	4.37	3.38	3.79
	100		4.71	2.66	4.18	3.51	4.48	3.95	3.60
	25		3.52	1.66	3.12	2.44	2.98	2.68	2.69
	50		3.71	1.64	3.35	2.54	3.09	2.79	3.26
25	75		3.43	1.65	3.55	2.54	3.13	2.83	3.24
	100		3.23	1.74	3.63	2.60	3.67	3.08	3.89

## APPENDIX D

TABLE D-1. - NO<sub>x</sub> emissions, gpm - baseline vehicles (1970 MY)--Continued

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
26	25	Yes	3.34	3.74	5.45	4.22	5.82	4.94	4.43
	50		4.65	3.28	5.10	4.07	5.36	4.65	4.17
	75		5.62	3.96	6.39	4.97	5.91	5.39	4.31
	100		5.56	3.29	5.42	4.34	4.85	4.57	4.01
	75		6.07	4.20	6.33	5.17	5.99	5.54	4.90
	100		6.46	4.46	6.41	5.41	5.67	5.53	4.88
27	25	Yes	2.79	4.45	6.56	4.68	5.67	5.13	5.64
	50		4.10	3.75	5.86	4.40	5.43	4.86	6.29
	75		6.71	5.51	6.51	6.03	5.94	5.99	7.41
	100		6.10	5.16	7.75	6.06	6.42	6.22	7.86
	75		6.15	4.84	7.52	5.84	6.75	6.25	8.61
	100		6.93	5.96	8.03	6.71	7.77	7.19	11.77
28	25		4.28	6.22	7.98	6.30	7.22	6.71	8.48
	50		5.69	6.70	7.76	6.79	7.52	7.12	7.23
	75		7.18	6.69	7.73	7.09	7.98	7.49	7.97
	100		8.14	7.12	9.20	7.90	9.55	8.64	8.34
	25		2.78	2.05	3.87	2.72	4.26	3.41	2.83
	50		2.12	2.12	3.26	2.43	3.89	3.09	2.87
	75		3.47	2.62	3.44	3.02	4.21	3.56	3.31
	100		3.19	1.72	3.56	2.54	4.16	3.27	2.52
30	25	Yes	5.36	3.67	6.05	4.77	5.60	5.14	6.62
	50		5.38	3.32	6.17	4.89	6.00	5.39	7.21
	75		6.09	4.42	7.01	5.47	6.79	6.05	7.22
	100		6.32	4.65	7.04	5.64	7.14	6.32	7.05
	75		6.19	4.68	7.38	5.72	7.23	6.42	8.31
	100		6.32	4.99	6.93	5.90	7.47	6.61	6.68

## APPENDIX D

TABLE D-2. - NO<sub>x</sub> emissions, gpm - production late model

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
1	25	Yes	2.24	0.43	0.81	0.93	0.93	0.93	1.88
	50		2.72	0.39	1.15	1.08	1.24	1.15	1.81
	75		2.00	0.50	1.25	1.01	1.30	1.14	2.53
	100		2.14	0.40	0.94	0.90	0.96	0.93	1.28
	75		2.28	1.03	1.76	1.49	1.37	1.44	6.93
	100		2.34	1.56	1.31	1.79	1.45	1.64	1.44
2	25	Yes	0.57	0.58	0.55	0.57	0.68	0.62	1.00
	50		1.02	0.77	0.77	0.82	0.78	0.30	1.71
	75		1.80	0.77	0.92	1.03	0.70	0.88	1.66
	100		2.08	0.76	0.68	1.01	0.62	0.83	0.70
	75		1.99	0.93	0.35	1.13	0.79	0.98	1.70
	100		2.15	0.89	0.55	1.06	0.78	0.93	1.17
3	25	Yes	3.38	4.04	4.08	3.92	1.96	3.04	2.44
	50		3.02	1.91	1.92	2.14	2.08	2.11	2.25
	75		1.64	1.69	1.99	1.76	1.94	1.34	2.17
	100		1.47	1.46	1.34	1.57	1.98	1.75	1.75
	75		2.06	2.58	2.78	2.53	2.42	2.48	3.13
	100		1.45	1.93	2.02	1.88	1.39	1.93	2.44
4	25	Yes	3.36	1.46	2.01	2.00	2.08	2.04	1.78
	50		2.90	1.47	2.07	1.93	2.59	2.23	1.46
	75		2.91	1.38	2.05	1.89	2.15	2.01	1.75
	100		2.43	1.13	1.74	1.58	1.96	1.75	1.58
	75		2.91	1.43	2.21	1.95	2.17	2.05	1.77
	100		2.52	1.50	2.03	1.87	1.97	1.92	1.75

## APPENDIX D

TABLE D-2. - NO<sub>x</sub> emissions, gpm - production late model--Continued

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Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
5	25	Yes	2.20	2.28	2.01	2.19	1.80	2.01	3.72
	50		2.17	2.35	2.08	2.24	1.82	2.05	3.40
	75		2.35	2.58	2.24	2.44	1.87	2.18	2.50
	100		2.10	2.12	2.05	2.10	1.79	1.96	3.40
	75		2.19	2.22	2.19	2.20	1.75	2.00	3.67
	100		2.71	2.56	2.35	2.54	1.87	2.24	4.23
6	25	Yes	0.54	0.42	0.90	0.58	0.50	0.54	1.26
	50		0.60	0.33	1.47	0.96	0.73	0.38	1.97
	75		0.79	0.64	1.98	1.04	0.57	0.33	1.84
	100		1.12	0.72	1.34	0.92	0.59	0.77	1.20
	75		1.10	1.10	1.36	1.17	0.54	0.39	1.37
	100		0.95	0.62	1.00	0.80	0.39	0.62	1.48
7	25	Yes	1.21	1.29	1.03	1.20	0.82	1.03	2.26
	50		1.13	1.23	1.03	1.17	0.80	1.00	2.22
	75		1.07	1.33	1.06	1.20	0.83	1.03	2.64
	100		1.14	1.39	1.16	1.23	0.92	1.12	2.46
	75		1.26	1.58	1.23	1.41	0.93	1.19	2.97
	100		1.47	1.96	1.49	1.73	1.06	1.43	3.43

**APPENDIX E. - FUEL ECONOMY, MPG**

## APPENDIX E

TABLE E-1. - Fuel economy, mpg - baseline vehicles (1970 MY)

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
1	25	Yes	8.2	10.5	12.6	10.4	17.9	12.8	5.6
	50		10.0	10.9	13.8	11.4	18.8	13.3	5.7
	75		11.5	11.2	14.3	12.0	19.0	14.3	5.9
	100		12.7	11.2	14.2	12.2	19.2	14.6	5.5
	75		10.7	10.7	13.2	11.3	17.8	13.5	5.8
	100		11.4	10.8	13.3	11.5	17.6	13.6	5.7
2	25	Yes	8.6	12.2	14.2	11.6	19.9	14.3	7.1
	50		10.0	12.6	14.5	12.4	21.2	15.2	7.0
	75		13.0	13.6	15.3	13.9	21.4	16.5	7.1
	100		13.3	13.6	15.5	14.0	20.7	16.4	6.6
	75		11.2	12.4	13.8	12.4	18.8	14.6	6.8
	100		12.5	12.0	13.3	12.6	19.1	14.5	6.3
3	25	Yes	10.6	12.9	14.8	12.8	20.5	15.4	6.6
	50		11.9	13.1	16.1	13.5	20.9	16.1	6.3
	75		13.3	13.4	16.6	14.1	21.3	16.7	6.9
	100		14.6	14.0	16.9	14.8	21.7	17.3	7.0
	75		12.0	11.9	14.7	12.6	19.6	14.7	6.5
	100		13.0	12.3	14.3	13.1	18.8	15.1	6.9
4	25	Yes	7.9	9.9	12.7	10.2	17.9	12.6	5.2
	50		9.7	11.7	13.0	11.4	17.7	13.5	5.6
	75		11.7	12.1	13.3	12.3	19.0	14.6	6.0
	100		12.5	11.9	13.8	12.4	18.5	14.5	5.3
	75		11.0	11.6	13.0	11.7	17.6	13.7	5.7
	100		11.4	10.3	12.4	11.2	16.7	13.1	5.3
5	25	Yes	11.1	13.7	15.1	13.6	20.2	16.0	7.8
	50		12.3	13.3	16.0	13.9	20.9	16.3	7.5
	75		13.9	14.3	15.9	14.9	21.3	17.2	7.8
	100		15.2	15.4	16.6	15.5	22.1	17.9	8.1
	75		13.5	14.3	16.1	14.3	20.6	16.6	8.0
	100		14.1	14.0	15.2	14.3	19.6	16.3	6.8

## APPENDIX E

TABLE E-1. - Fuel economy, mpg - baseline vehicles (1970 MY)--Continued

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
6	25	Yes	7.3	9.7	11.7	9.5	17.0	11.9	5.3
	50		10.2	10.6	12.3	11.0	18.4	13.4	5.7
	75		11.3	10.9	13.0	11.5	19.2	14.0	5.9
	100		11.5	11.2	13.4	11.8	19.7	14.4	5.7
	75		10.5	10.1	11.9	10.6	17.3	12.8	5.2
	100		10.9	10.3	11.8	10.8	16.5	12.8	5.3
7	25		11.8	13.6	16.0	13.8	21.7	16.5	6.8
	50		12.8	12.8	16.0	13.3	21.3	16.0	7.2
	75		14.0	13.3	15.8	14.3	22.5	17.1	7.5
	100		15.1	14.4	16.8	14.9	21.7	17.4	7.2
	25		9.0	10.5	12.2	10.5	17.3	12.8	6.1
8	50	Yes	10.7	11.5	14.0	11.9	18.5	14.2	6.8
	75		11.5	11.5	14.3	12.2	17.9	14.2	6.9
	100		12.6	12.1	14.5	12.8	18.4	14.8	6.6
	75		10.9	10.9	12.9	11.4	16.5	13.2	6.3
	100		12.1	11.1	13.3	11.9	16.7	13.6	6.3
	25		10.0	12.2	14.2	12.4	18.3	14.7	6.7
9	50	Yes	10.9	12.7	14.0	12.6	19.9	15.0	7.1
	75		12.2	13.1	14.7	13.2	20.1	15.6	7.4
	100		13.5	13.5	15.6	13.8	20.0	16.1	7.1
	75		12.8	12.2	14.6	12.9	18.0	14.3	6.8
	100		12.1	12.5	14.0	12.8	19.0	15.0	7.1
	25		9.4	12.9	15.4	12.5	20.6	15.2	7.5
10	50		11.7	13.3	16.3	13.9	20.9	16.3	8.7
	75		13.9	14.1	15.9	14.5	22.4	17.2	7.1
	100		15.3	14.5	17.3	15.3	21.7	17.7	7.0

## APPENDIX E

TABLE E-1. - Fuel economy, mpg - baseline vehicles (1970 MY)--Continued

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
11	25		9.3	13.6	15.9	13.0	21.2	15.7	7.6
	50		10.5	13.6	15.0	13.0	21.7	15.9	8.1
	75		12.5	15.8	17.9	15.2	23.5	18.1	8.5
	100		13.8	15.8	18.0	15.6	23.9	18.5	8.7
12	25		7.8	10.4	11.4	10.0	17.5	12.4	5.9
	50		11.0	12.3	14.4	12.5	18.5	14.6	6.5
	75		12.7	12.8	14.6	13.2	20.8	15.8	6.2
	100		12.8	12.7	14.9	13.2	20.0	15.6	6.5
	75	Yes	10.8	11.0	13.2	11.4	17.6	13.6	6.4
	100	Yes	10.4	10.5	11.9	10.9	15.9	12.7	5.8
13	25		9.9	12.8	14.8	12.5	20.9	15.2	7.0
	50		12.0	14.2	15.5	14.0	20.7	16.4	7.0
	75		13.5	14.5	16.4	14.7	22.0	17.3	7.7
	100		14.3	14.9	16.6	15.2	20.4	17.2	8.2
	75	Yes	12.0	12.9	17.9	13.8	19.2	15.8	7.4
	100	Yes	12.5	12.1	13.6	12.6	18.4	14.7	5.5
14	25		12.3	16.4	18.4	16.1	24.9	19.2	9.5
	50		13.5	17.5	20.8	17.0	26.3	20.3	9.7
	75		17.3	18.6	21.3	18.7	27.4	21.8	9.0
	100		18.3	19.3	21.6	19.4	28.1	22.5	9.9
15	25		12.8	16.0	17.4	15.5	22.0	17.9	8.9
	50		15.4	17.2	20.1	17.5	24.3	20.0	9.4
	75		17.3	13.6	20.0	13.6	25.2	21.1	10.3
	100		18.7	19.5	21.6	19.8	26.5	22.4	10.5
	75	Yes	16.5	17.8	19.4	17.9	25.3	20.6	9.9
	100	Yes	17.0	17.7	18.9	17.8	23.8	20.1	9.8

## APPENDIX E

TABLE E-1. - Fuel economy, mpg - baseline vehicles (1970 MY)--Continued

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
16	25	Yes	9.6	11.7	13.7	11.7	13.8	14.1	6.4
	50		10.5	12.2	13.7	12.2	19.3	14.6	6.9
	75		12.0	13.0	14.9	13.2	19.8	15.6	6.8
	100		13.4	13.1	14.9	13.6	20.3	16.0	7.1
	75		11.5	12.2	13.9	12.4	19.4	14.8	6.5
	100		11.8	11.6	13.5	12.1	18.0	14.2	6.2
17	25	Yes	9.0	11.4	13.4	11.2	18.6	13.7	6.3
	50		10.6	12.7	14.2	12.6	19.6	15.0	6.5
	75		12.2	12.8	14.7	13.1	19.7	15.5	6.8
	100		13.5	12.9	14.3	13.5	20.1	15.9	6.8
18	25	Yes	10.1	10.8	14.1	11.7	19.7	14.3	6.2
	50		13.0	13.4	16.6	14.0	21.0	16.5	6.5
	75		13.7	13.5	16.3	14.0	21.5	16.6	6.7
	100		14.9	14.0	16.3	14.5	22.0	17.2	6.6
19	25	Yes	7.9	9.6	11.6	9.6	16.0	11.7	5.3
	50		9.4	10.3	11.8	10.5	16.7	12.6	5.2
	75		10.0	10.4	12.7	10.8	17.3	13.0	5.7
	100		11.0	10.8	12.9	11.3	17.8	13.5	5.8
20	25	Yes	8.5	10.5	11.9	10.3	17.4	12.6	5.6
	50		10.0	10.8	11.7	10.8	18.3	13.3	5.7
	75		11.4	11.4	12.8	11.7	18.1	13.9	5.6
	100		12.3	12.0	13.5	12.5	19.4	14.9	5.3
	75		10.7	10.9	12.3	11.2	17.3	13.3	5.9
	100		11.2	11.2	12.4	11.5	17.2	13.5	5.5

## APPENDIX E

TABLE E-1. - Fuel economy, mpg - baseline vehicles (1970 MY)--Continued

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
21	25		14.9	16.4	21.1	17.1	28.5	20.9	9.0
	50		17.2	19.7	23.2	19.9	28.5	23.0	10.6
	75		20.6	19.6	23.5	20.8	30.9	24.4	10.8
	100		22.1	21.6	25.1	22.6	33.8	26.6	11.2
22	25		13.2	16.6	18.2	16.1	24.0	18.9	9.5
	50		15.7	17.1	20.9	17.7	25.0	20.4	10.6
	75		18.9	18.9	20.1	19.2	25.6	21.7	9.9
	100		20.3	19.7	21.3	20.2	26.3	22.6	10.5
23	25	Yes	7.6	9.3	11.1	9.3	14.8	11.2	5.2
	50		9.0	10.0	12.0	10.2	15.5	12.1	5.3
	75		9.7	9.3	11.1	10.1	15.1	11.9	4.6
	100		10.5	10.3	11.8	10.7	16.1	12.6	5.3
	75		9.0	9.5	10.5	9.6	14.1	11.2	5.6
	100		9.5	9.5	10.3	9.7	14.2	11.3	5.3
24	25		17.5	22.1	23.9	21.4	32.2	25.2	13.1
	50		20.8	22.7	26.8	23.3	33.5	27.0	14.0
	75		23.5	22.3	27.4	24.1	34.4	27.3	12.8
	100		24.0	23.2	27.1	24.3	35.1	23.2	12.9
25	25		10.7	13.3	16.6	13.4	23.8	16.6	7.7
	50		12.3	13.9	18.2	14.4	25.3	17.9	8.2
	75		14.3	15.4	18.3	15.3	25.8	19.1	8.3
	100		15.8	15.5	19.2	16.5	26.1	19.8	9.4

## APPENDIX E

TABLE E-1. - Fuel economy, mpg - baseline vehicles (1970 MY)--Continued

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
26	25	Yes	8.6	11.4	12.7	11.0	18.7	13.5	6.0
	50		10.6	12.4	14.8	12.5	20.0	15.1	6.6
	75		11.5	11.9	13.9	12.3	19.3	14.7	6.8
	100		13.8	13.5	15.1	14.0	20.0	16.1	6.8
	75		11.3	11.6	13.9	12.1	19.1	14.5	6.5
	100		12.3	11.7	13.6	12.3	17.8	14.3	6.2
27	25	Yes	8.0	11.5	13.1	10.9	18.8	13.4	6.6
	50		11.0	12.7	14.9	12.8	19.7	15.2	6.2
	75		12.1	12.6	15.1	13.0	20.6	15.6	7.0
	100		13.2	13.2	14.8	13.6	21.0	16.2	6.8
	75		11.8	12.2	14.2	12.6	19.7	15.0	6.8
	100		12.3	12.3	14.2	12.8	18.9	15.0	5.3
28	25		10.2	16.1	17.3	14.7	21.8	17.2	9.8
	50		12.0	17.9	20.3	16.7	25.8	19.9	11.5
	75		14.7	19.3	21.8	18.7	25.5	21.2	11.6
	100		17.8	19.8	21.3	19.7	26.5	22.3	11.2
29	25		16.2	19.2	22.0	19.2	32.6	23.6	12.0
	50		20.8	23.5	26.3	23.5	36.8	23.1	12.8
	75		21.9	24.7	26.3	24.5	36.3	23.3	12.1
	100		21.7	20.7	25.6	22.1	36.7	26.9	12.5
30	25	Yes	7.3	3.9	10.9	9.0	16.4	11.3	4.9
	50		3.7	9.5	11.3	9.9	16.9	12.1	5.1
	75		9.9	9.6	12.1	10.3	17.7	12.5	5.1
	100		10.3	9.7	12.0	10.5	17.1	12.7	4.9
	75		9.2	9.5	11.3	9.8	15.3	12.0	4.7
	100		10.2	9.2	11.3	9.9	15.9	11.9	4.7

## APPENDIX E

TABLE E-2. - Fuel economy, mpg - production late model

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
19	25	Yes	12.2	15.5	16.6	14.9	22.1	17.4	9.1
	50		13.9	16.1	17.2	15.9	22.6	13.3	9.4
	75		14.5	16.0	17.1	15.9	22.9	13.4	9.1
	100		16.2	17.7	19.6	17.8	24.4	20.3	9.9
	75		14.4	14.9	16.5	15.2	21.9	17.6	7.8
	100		15.0	14.7	16.2	15.2	21.1	17.3	7.3
	25	Yes	10.3	17.1	17.1	15.0	22.6	17.7	10.9
	50		12.6	17.5	18.1	16.3	24.1	19.1	9.5
	75		15.9	19.3	17.9	17.6	25.8	20.5	9.6
	100		17.2	19.5	20.2	19.2	25.6	21.6	10.0
	75		15.0	16.7	18.4	16.8	24.0	19.4	9.4
	100		15.9	17.2	18.1	17.1	22.8	19.3	9.3
4	25	Yes	11.9	13.4	16.2	13.7	24.4	17.1	8.7
	50		12.9	14.2	17.2	14.6	24.8	17.9	8.3
	75		14.7	15.0	17.6	15.6	24.7	13.7	8.7
	100		16.2	15.1	18.0	16.0	26.1	19.4	3.6
	75		12.5	13.1	14.8	13.4	21.4	16.1	7.9
	100		15.4	14.1	16.5	14.9	24.3	18.1	3.0
	25	Yes	17.0	21.6	23.4	20.9	30.6	24.4	14.8
	50		19.5	23.4	23.7	22.5	30.7	25.6	15.9
	75		22.7	24.0	26.4	24.3	32.3	27.5	15.8
	100		23.5	24.0	25.7	24.3	33.1	27.6	14.2
	75		22.3	23.6	24.4	23.5	32.0	26.7	15.2
	100		21.4	20.7	23.0	21.4	31.5	25.0	12.1

## APPENDIX E

TABLE E-2. - Fuel economy, mpg - production late model--Continued

Car No.	Temp., ° F	Air cond.	Urban FTP				55/45		
			CT	ST	HT	Urban	HFET	Comp.	NYCC
5	25	Yes	14.7	18.4	20.6	18.0	27.7	21.4	9.6
	50		16.3	18.3	20.3	18.4	27.9	21.7	10.2
	75		17.4	18.5	20.6	18.8	28.8	22.3	11.0
	100		19.8	21.2	22.6	21.2	29.8	24.4	11.0
	75		16.5	17.7	19.1	17.8	27.7	21.2	9.1
	100		15.6	16.3	8.2	16.6	24.7	19.5	8.1
6	25	Yes	12.0	13.0	16.0	13.5	23.9	16.3	7.0
	50		14.5	16.3	19.3	16.6	25.2	19.6	8.0
	75		16.4	15.9	20.1	17.0	26.3	20.2	9.7
	100		17.7	16.5	20.7	17.7	27.2	21.0	8.5
	75		15.3	15.2	18.0	15.9	25.2	19.1	7.9
	100		15.1	14.2	17.3	15.1	23.6	18.0	7.1
62	25	Yes	27.1	26.9	33.9	32.3	39.8	35.3	22.6
	50		31.6	36.4	37.1	35.4	43.6	38.7	24.5
	75		32.1	37.3	36.4	35.9	41.9	38.4	20.5
	100		35.0	39.0	38.2	37.9	42.4	39.8	24.0
	75		29.9	32.5	34.0	32.3	40.8	35.6	19.8
	100		26.7	27.1	28.4	27.4	36.0	30.7	17.6

APPENDIX F. - ALDEHYDES, MGPM - PRODUCTION RATE MODEL

## APPENDIX F

TABLE F-1. - Aldehydes, mgpm - production late model

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Car No.	Temp., ° F	Air cond.	Urban FTP			
			CT	ST	HT	Urban
1	25	Yes	36.6	0.0	0.0	7.6
	50		36.4	10.4	5.6	14.4
	75		22.4	0.0	2.8	5.4
	100		29.8	4.0	2.8	9.0
	75		25.1	2.6	2.8	7.3
	100		22.5	0.0	3.6	5.7
2	25	Yes	41.4	0.0	0.0	8.6
	50		33.4	0.0	0.0	6.9
	75		24.6	0.0	0.0	5.1
	100		31.2	4.6	4.9	10.2
	75		34.2	10.8	4.1	13.8
	100		26.3	3.0	5.5	8.5
3	25	Yes	98.2	29.4	23.4	43.3
	50		66.6	19.7	22.5	30.2
	75		31.4	7.9	17.9	15.5
	100		36.8	1.6	7.3	10.4
	75		18.8	0.0	0.0	3.9
	100		54.5	4.3	5.6	14.9
4	25	Yes	37.7	19.3	16.2	22.2
	50		16.4	14.3	4.5	11.9
	75		30.8	23.1	23.1	27.3
	100		17.6	14.1	14.9	15.0
	75		34.6	36.4	30.9	34.5
	100		12.3	4.3	8.3	7.0

## APPENDIX F

TABLE F-1. - Aldehydes, mgpm - production late model--Continued

Car No	Temp., ° F	Air cond.	Urban FTP			
			CT	ST	HT	Urban
5	25	Yes	29.1	23.2	18.1	23.0
	50		27.9	25.3	16.7	23.8
	75		25.4	23.1	22.4	26.0
	100		33.9	33.2	29.5	34.6
	75		34.8	34.8	31.7	33.9
	100		25.4	31.1	25.9	28.5
6	25	Yes	20.0	4.2	2.9	7.2
	50		13.3	2.6	2.2	4.7
	75		9.2	0.0	0.0	1.9
	100		14.1	0.0	0.0	2.6
	75		16.4	0.0	0.0	3.3
	100		29.5	9.6	5.0	12.4
65	25		0.0	0.0	0.0	0.0
	50		0.0	0.0	0.0	0.0
	75		35.3	33.5	32.7	33.7
	100		0.0	0.0	0.0	0.0