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Casual Misfueling of Catalyst Equipped Vehicles

by

James B. Long
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Technology Assessment and Evaluation Branch
U.S. Environmental Protection Agency
Motor Vehicle Emission Laboratory
2565 Plymouth Road
Ann Arbor, MI 48105

Background

The use of leaded fuel in catalyst equipped vehicles is known to cause an increase in exhaust emissions. Under 38 Federal Register 43281, which is a limited exception to 40 CFR 80.22 (a), emergency use of leaded fuel is allowed under certain conditions. Also, some catalyst vehicles are occasionally fueled with leaded fuel.[1/]

This test program was designed to evaluate the effect on emissions of one tank of leaded fuel followed by several tanks of unleaded fuel. This would be a "worst case" of "casual" misfueling since the regulations for allowing emergency use of leaded fuel stipulate that only the quantity needed to reach a gas station selling unleaded fuel may be added.

[1/] The current EPA-MSED estimate is that 7.8% of the catalyst equipped vehicles are fueled with leaded fuel.

Summary

Five vehicles were tested using two different fuels. After baseline emissions were established for each vehicle the catalysts were poisoned by driving the cars using one tank of leaded fuel. Unleaded fuel was then used for three consecutive tanks in order to investigate the recovery capacity of the catalyst. After this phase the catalysts were again poisoned in the same fashion and again allowed to recover.

In all cases the emissions increased substantially after the exposure to leaded fuel, and in all cases there was some recovery. This pattern continued through the second misfueling and recovery sequence. The immediate increase in average hydrocarbon emissions for the test vehicles was 344% of the baseline. After the second recovery sequence, hydrocarbon emissions were 214% of the baseline. For carbon monoxide, the emissions increased to 204% at the outset and recovered to 125% of the baseline value at the completion of the test program.

Test Vehicles and Fuels

Five different vehicles with two types of catalysts were selected. Three cars had pelleted catalysts; two were equipped with monoliths. One car in each group had over 30,000 miles; the others were low mileage vehicles in the 4000 to 8000 mile range. Vehicle descriptions are given in Appendix A.

The two fuels used throughout the test program were Indolene HO and Indolene 30. Table 1 gives a detailed description of their properties. Aside from the lead content the fuels are almost identical. Indolene 30 contained 3.09 g/gal lead. The average lead content found in commercial motor gasoline (from the Department of Energy fuel survey) is about half that value, with a range from 0.45 to 4.02 g/gal. The high lead content was selected for this test program because of the inital uncertainty regarding the effect of lead exposure on the catalyst.

Test Program

Prior to testing the cars were checked out and adjusted according to manufacturer's specifications. The checkout procedure is included in Appendix B.

The misfueling test program consisted of two sequences of misfueling and recovery. Three cold start FTPs were conducted on the vehicles as they were received in order to establish baseline emissions for each. One tank of leaded fuel was then used to drive one of four established road routes (Appendix C). Two cold start FTPs were performed still using leaded fuel. One FTP was conducted after the fuel was switched to unleaded.

The recovery sequence was comprised of mileage accumulation on three tanks of unleaded fuel with two cold start FTPs between each refueling. This misfueling/recovery cycle was then repeated with slight variations. After the third tank of Indolene Clear had been consumed and the car tested, it was refueled with leaded fuel and tested before any further mileage accumulation. Also, after the tank of leaded fuel and the subsequent FTP were run, the car was refueled with unleaded fuel and tested prior to the start of the second recovery sequence. Appendix D gives a detailed description of the test program.

Test Results and Discussion

The average results of the misfueling and recovery sequences on four of the vehicles are presented graphically in Figure 1. Individual vehicle data is presented graphically in Figures 2-6 (Appendix E). The data from the tests is in Appendix F. One of the 5 vehicles was excluded from the average because leaded fuel had been used before this program. The effect of leaded fuel is characterized by sharp increases in the emissions of hydrocarbons and carbon monoxide. The average increase for four of the test vehicles was more than three times the baseline values for hydrocarbons and double the baseline for carbon monoxide after one tank of leaded fuel had been used. The recovery phase shows a gradual decrease from the high levels reached after the misfueling. The second exposure again shows rapid increases in emission levels. Tests that were conducted with Indolene 30 immediately upon switching from Indolene Clear and before the mileage accumulation illustrate that some of the effect is almost instantaneous. In fact, the increase in average emissions is greater before, rather than after, an entire tank of leaded fuel is consumed. Changing from leaded to unleaded fuels also shows an immediate effect. These very sharp increases and decreases without mileage accumulation are likely a combination of the effect of lead on the combustion process and of catalyst poisoning. The second recovery phase is similar to the first. However, the emissions begin to level off further above the baseline. In the first sequence the hydrocarbon emissions recovered to 198% of the baseline, while in the second reached only 213% of the baseline after three tanks of Indolene Clear.

Figure 1 also shows a significant relative difference between the emission increases for the two pollutants. Hydrocarbon increases are much greater than carbon monoxide. This difference is nearly constant throughout the test period as clearly seen in the figure.

Table 1

Indolene Fuels Used in the Catalyst Poisoning Test Program

Sample No.	Indolene HO	Indolene 30
P.O. Number	A-0740-NNLX	A0743-NNLX
Pb, g/gal	≤ 0.001	3.09
Mn, g/gal	≤ 0.001	< 0.001
H_2O, wt%	0.002	0.003
S^2, wt%	0.010	0.010
P, wt	< 0.0002	≤ 0.0002
RON	97.3	104.6
MON	89.4	94.8
Reid Vapor Pressure	9.4	9.0
Distillation °F		
Barometer, in HG	29.51	29.51
Initial	86	82
5%	103	103
10%	116	118
15%	128	130
20%	140	143
30%	166	169
40%	196	199
50%	218	220
60%	233	234
70%	246	248
80%	267	269
85%	286	287
90%	313	313
95%	335	338
Final	381	381
Recovery %	97.5	97.6
Residue %	0.5	0.5
Loss %	2.0	1.9
FIA		
%A	24.0	24.0
%O	4.0	4.0
%S	72.0	72.0

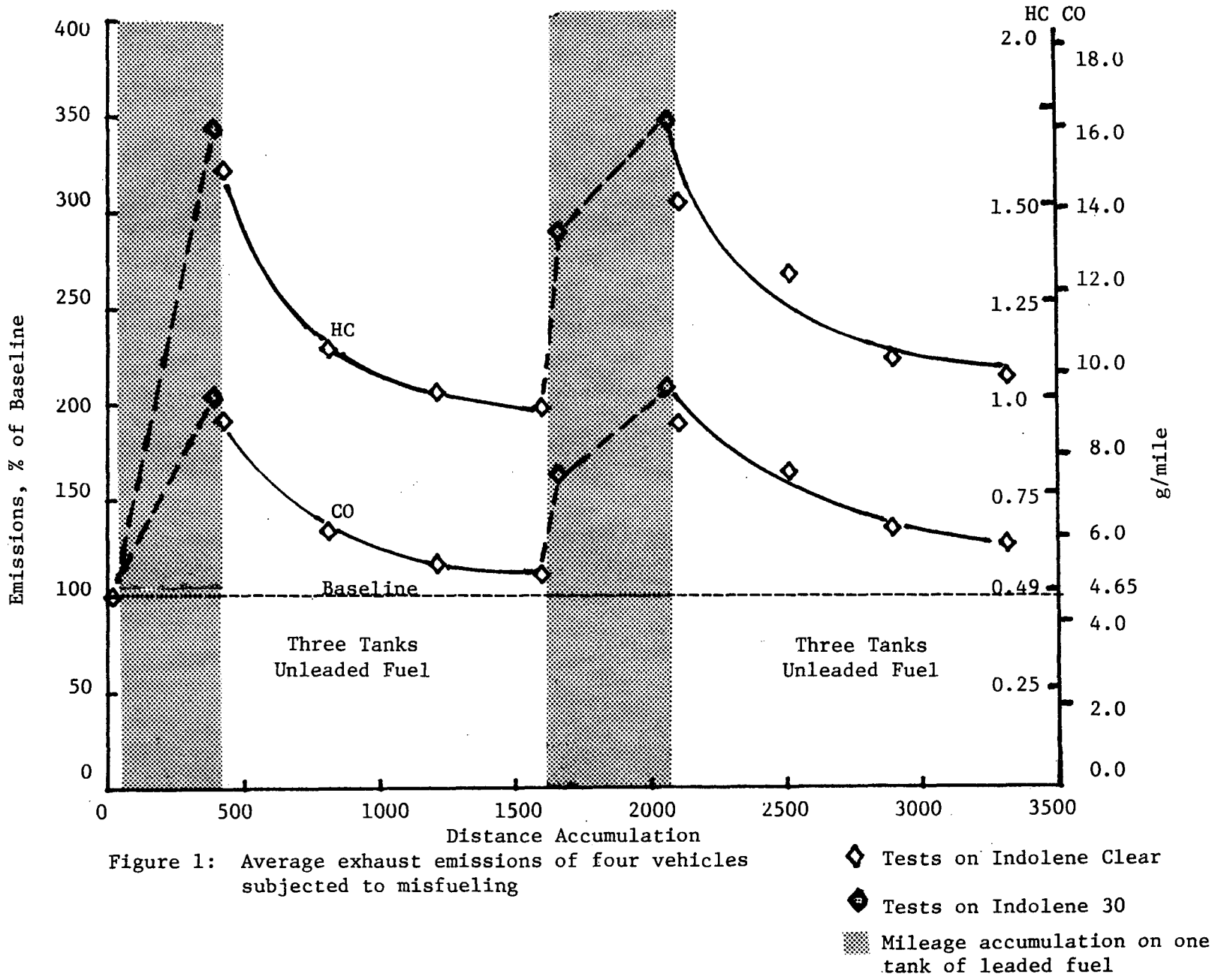


Figure 1: Average exhaust emissions of four vehicles subjected to misfueling

The figures (2-6) for the individual vehicles demonstrate the similarity in the behavior of all five catalyst equipped vehicles. The emissions for each vehicle follow the same general trend of sharp increases upon misfueling, and gradual decreases during the recovery phase that was clearly depicted in Figure 1. There are, however, exceptions to the well defined behavior of that curve. The Plymouth Fury's hydrocarbon emissions increased only 61%, but the baseline value was more than twice that of any of the other vehicles. This is possibly due to the prior misfueling. For this reason the Fury is excluded from the figure showing average emissions.

The Ford Mustang and the Pontiac Catalina also exhibit some anomalous behavior. The hydrocarbon emissions for the Mustang increased 130% during the FTP on Indolene 30 just prior to the mileage accumulation of the second poisoning, but decreased about 15% after one full tank of leaded fuel had been used. The carbon monoxide emissions for the Catalina display very erratic behavior and indicate a possible mechanical problem. Aside from these instances the performance of the vehicles during the different sequences of the test program is very well defined. Leaded fuel most definitely has an adverse effect on vehicle emissions. Only during the first recovery sequence do the emission levels reach or approach the baseline values, and then only for carbon monoxide. Indeed, at the end of the second recovery phase the hydrocarbon emissions remain over twice the baseline values and the average carbon monoxide emission level is 126% of the baseline. While three tanks of unleaded fuel do not result in recovery to a stable level the data do appear to indicate that complete recovery is either unlikely or would take several thousand miles of operation.

The oxides of nitrogen emissions (not presented in the figures) also varied from their baseline values. The Ford Mustang showed the greatest increase, 168% of the baseline, decreasing to 132% after the second recovery phase. The Toyota and Chevrolet Citation showed slight decreases below baseline values in NOx emissions during the test period. A summary of the test data is presented in Table 2. The data for the individual vehicles is included in the appendix.

Conclusions

The data resulting from this test program clearly indicate that use of leaded fuel diminishes the emission control capacity of vehicles equipped with oxidation catalysts. The significant increase in hydrocarbon emissions and the inability of the catalyst to control these emissions near the baseline values after the recovery phase indicates that the catalyst may be permanently damaged by misfueling. It is obvious from the results of this program that even a single instance of misfueling will cause marked increases in the emissions of both hydrocarbons and carbon monoxide.

ENVIRONMENTAL PROTECTION AGENCY
MOTOR VEHICLE EMISSION LABORATORY
ANN ARBOR, MICHIGAN

CATALYST POISONING PROGRAM DATA SUMMARY

PROCESSED: SEP 27, 1979

VEHICLES INCLUDED:

PONT. CATALINA	2L69Y8P160360
FORD MUSTANG	9S02Y189817
TOYOTA COROVA	9T134020335
CHEVY CITATION	1A117AW122243

MEANS OF ALL TESTS TEST GROUP	N	HC	CO	NOX	CO2	FE	BARO	HUM	NOXFAC
		<-------GRAMS/MILE------->				MPG	IN-HG	GR/LB	
1. BASELINE ON IND. CLEAR	(12)	0.490	4.65	1.45	432.	20.3	29.16	74.3	1.00
2. POISONING ON IND. 30	(8)	1.683	9.51	1.62	421.	20.2	29.01	75.3	1.00
3. RECOVERY ON IND. CLEAR	(4)	1.578	8.91	1.58	419.	20.4	28.97	81.0	1.03
4. RECOVERY ON IND. CLEAR	(8)	1.120	6.22	1.54	427.	20.3	29.01	78.1	1.02
5. RECOVERY ON IND. CLEAR	(8)	1.009	5.43	1.53	426.	20.4	29.09	83.4	1.04
6. RECOVERY ON IND. CLEAR	(8)	0.969	5.17	1.52	424.	20.6	29.01	73.6	0.99
7. POISONING ON IND. 30	(8)	1.418	7.59	1.58	419.	20.6	29.37	72.6	0.99
8. POISONING ON IND. 30	(8)	1.699	9.69	1.61	410.	20.8	29.05	75.7	1.00
9. RECOVERY ON IND. CLEAR	(7)	1.492	8.80	1.74	411.	20.9	29.10	75.6	1.00
10. RECOVERY ON IND. CLEAR	(8)	1.309	7.63	1.71	411.	21.0	28.97	76.4	1.01
11. RECOVERY ON IND. CLEAR	(8)	1.090	6.25	1.63	423.	20.6	28.97	74.2	1.00
12. RECOVERY ON IND. CLEAR	(8)	1.046	5.87	1.61	426.	20.4	29.07	76.1	1.01
DIFFERENCE FROM BASELINE									
GROUP 2 - BASELINE		1.194	4.86	0.16	-12.	-0.0	-0.15	1.0	0.00
GROUP 3 - BASELINE		1.088	4.26	0.12	-14.	0.2	-0.19	6.7	0.03
GROUP 4 - BASELINE		0.630	1.56	0.09	-6.	0.0	-0.15	3.9	0.02
GROUP 5 - BASELINE		0.519	0.77	0.08	-6.	0.2	-0.06	9.2	0.04
GROUP 6 - BASELINE		0.479	0.51	0.07	-7.	0.1	-0.14	-0.7	-0.00
GROUP 7 - BASELINE		0.929	2.93	0.13	-14.	0.3	0.22	-1.7	-0.01
GROUP 8 - BASELINE		1.209	5.03	0.16	-23.	0.0	-0.11	1.4	0.01
GROUP 9 - BASELINE		1.002	4.15	0.29	-21.	0.6	-0.06	1.3	0.01
GROUP 10 - BASELINE		0.819	2.97	0.26	-21.	0.7	-0.19	2.1	0.01
GROUP 11 - BASELINE		0.601	1.59	0.18	-13.	0.3	-0.16	-0.0	-0.00
GROUP 12 - BASELINE		0.556	1.21	0.16	-7.	0.2	-0.09	1.8	0.01
RATIOS OF MEANS (*)									
GROUP 2 / BASELINE X 100		343.6	204.4	111.3	97.3	99.9	99.5	101.4	100.5
GROUP 3 / BASELINE X 100		322.2	191.5	108.5	96.8	100.8	99.4	109.0	103.2
GROUP 4 / BASELINE X 100		228.5	133.5	105.9	98.7	100.2	99.5	105.2	101.8
GROUP 5 / BASELINE X 100		206.1	116.6	105.3	98.6	100.8	99.8	112.3	104.5
GROUP 6 / BASELINE X 100		197.9	111.0	104.8	97.9	101.5	99.5	99.1	99.7
GROUP 7 / BASELINE X 100		289.8	163.0	108.9	96.8	101.7	100.7	97.7	99.2
GROUP 8 / BASELINE X 100		347.0	208.2	124.5	94.8	102.9	99.8	101.9	100.7
GROUP 9 / BASELINE X 100		304.5	189.1	119.8	95.1	103.1	99.8	101.7	100.6
GROUP 10 / BASELINE X 100		267.4	163.9	117.7	95.1	103.7	99.4	102.8	101.0
GROUP 11 / BASELINE X 100		222.7	134.2	112.3	97.7	101.5	99.4	99.9	100.0
GROUP 12 / BASELINE X 100		213.8	126.0	110.4	98.5	100.9	99.7	102.4	100.8

Appendix

Appendix A

Misfueling Vehicle Data

Vehicle	Citation	Catalina	Mustang	Fury	Corona
Vehicle Identification Number	1X117AN122243	2L69Y8P160360	9502Y189817	RH41G7A239813	RT134020335
Mileage As Received	4884	34259	6665	34495	3894
Model Year	1980	1978	1979	1978	1979
Air Conditioning	NO	YES	NO	NO	YES
Tire Type	Radial	Radial	Radial	Radial	Radial
Fuel Tank Volume (gal.)	14.0	21.0	11.5	25.5	16.1
Exhaust Gas Recirculation	YES	YES	YES	YES	YES
Air Pump	Pulse Air Injection Reactor	NO	NO	NO	YES
Catalyst Manufacturer	AC Spark Plug Division	AC Spark Plug Division	Corning	Universal Oil Products	Cataler Ind. Company, Ltd.

Appendix A (cont.)

Misfueling Vehicle Data

Vehicle	Citation	Catalina	Mustang	Fury	Corona
Catalyst Type	Pellet	Pellet	Monolithic	Monolithic	Pellet
Catalyst Active Material	72% Pt. 28% Pd 1.6 g	71% Pt. 29% Pd. 1.6 g	67% Pt. 33% Pd. 1.3 g	100% Pt 1.2 g	33% Pt. 67% Pd. 1.6 g
Engine Configuration	V-6	V-8	4 cylinder inline	V-8	4 cylinder inline
Engine Displacement (cubic inches)	171	301	140	318	134
Engine Power (brake horsepower)	115	140	88	140	90
Road Load (actual horsepower)	6.6	11.3	10.4	10.4	10.0
Equivalent Inertia (pounds)	2750	4000	2750	4500	3000

Appendix B

Vehicle Checkout

1. Check and adjust to manufacturer's specifications. Perform emission function check.

2. Measure Idle HC & CO.

3. Draw sample of tank fuel. 1 quart - Label and store in chemical laboratory refrigerator.

4. Drain tank - Refuel w/Indolene Clear.

5. Take filter sample of tailpipe residue.

6. Disconnect cannister.

7. Check for disconnected hoses/plugged hoses.

8. In general, inspect for any tampering of induction system, carburetor and fuel system, ignition system, EGR system, air pump system, PCV system, or evaporative system.

Appendix C

Misfueling Project Road Routes

Title	No.	Hrs.	Miles	Average MPH
Adrian	1	3	129	43
Ohio	2	3	133	44
Around A^2	3	3-1/2	147	42
Howell	4	3-1/2	127	39

The road routes were comprised mainly of two-lane roads that connect the small towns that lie around Ann Arbor. There was stop-and-go traffic through the towns and also in Ann Arbor itself. Each route also included some divided highway travel.

Appendix D

Misfueling Test Program

Fuel	Step
Indolene Clear	1 - Vehicle checkout as per "Vehicle Checkout Sheet."
	2 - Take 1 quart fuel sample.
	3 - Take tailpipe scraping sample.
	4 - Fuel vehicle to 40% of tank capacity with Indolene Clear.
	5 - Precondition with one LA-4 cycle.
	6 - 12 to 36 hour soak.
	6.5 - Reset dyno HP and inertia weights.
	7 - Cold start FTP* and I/M sequence.
	a. I/M Sequence:
	Using I/M type analyzer, measure HC and CO with transmission in neutral, hood open, and fan on at:
	1. Idle 2. 2500 rpm 3. Idle 4. 30 mph/9AHP/1750 IWG (use pendent) 5. Idle
	8 - Repeat 4-7 twice (total of 3 FTPs).
Indolene 30	9 - Fuel vehicle with Indolene 30 as follows:
	1. Drain previous fuel from tank 2. Purge tank with 5 gallons of Indolene drain. 3. Fill tank with Indolene 30.

Appendix D (cont.)

10 - Take 1 quart fuel sample from vehicle tank.

11 - Run mileage accumulation road route until 1/8 tank remains (see note in each vehicle).

12 - Take tailpipe scraping sample.

* FTPs run in this program are non-evaporative type. Therefore, refueling and heat build immediately before the FTP are not required.

13 - Fill tank with Indolene 30 to determine the amount of fuel used during mileage accumulation. Drain tank to 40% level.

14 - Precondition one LA-4 cycle.

15 - 12-36 hour soak.

16 - Cold start FTP and I/M sequence.

17 - Repeat 13-16 once (total of 2 FTPs).

Indolene Clear

18 - Fuel vehicle with Indolene Clear as follows:

1. Drain previous fuel from tank.

2. Purge tank with 5 gallons of Indolene Clear.

3. Fill tank with Indolene Clear.

19 - Take 1 quart fuel sample from vehicle tank.

20 - Run mileage accumulation road route until 1/8 tank remains.

21 - Take tailpipe scraping sample.

22 - Fuel vehicle to 40% of tank capacity with Indolene Clear.

23 - Precondition one LA-4 cycle.

Appendix D (cont.)

24 - 12 to 36 hour soak.

25 - Cold start FTP and I/M sequence.

26 - Repeat 22 to 25 once (total of 2 FTPs).

27 - Fuel vehicle to full tank capacity with Indolene Clear.

28 - Repeat 20-27.

Appendix E

Test Results

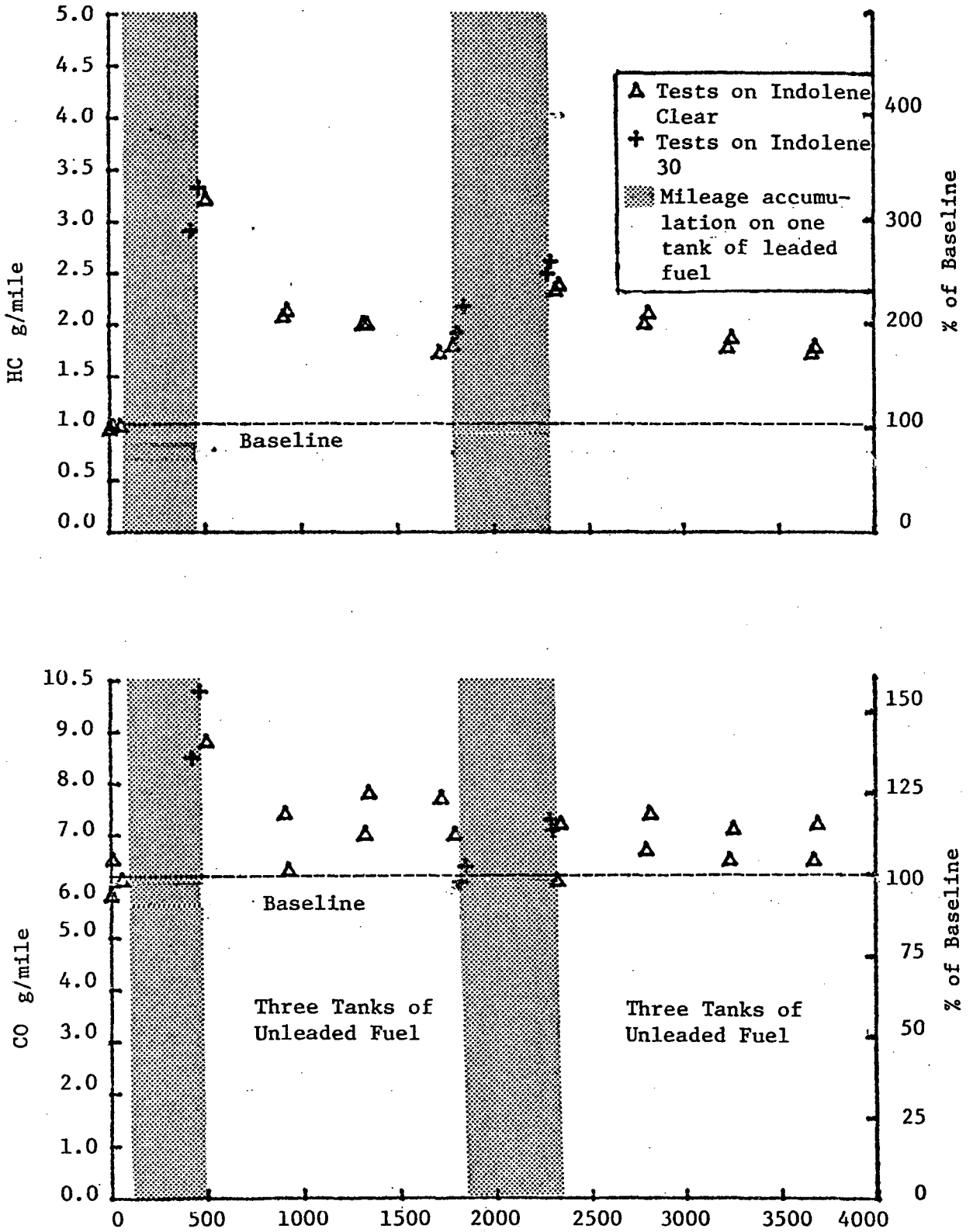


Figure 2: Emissions for Pontiac Catalina Subjected to Misfueling

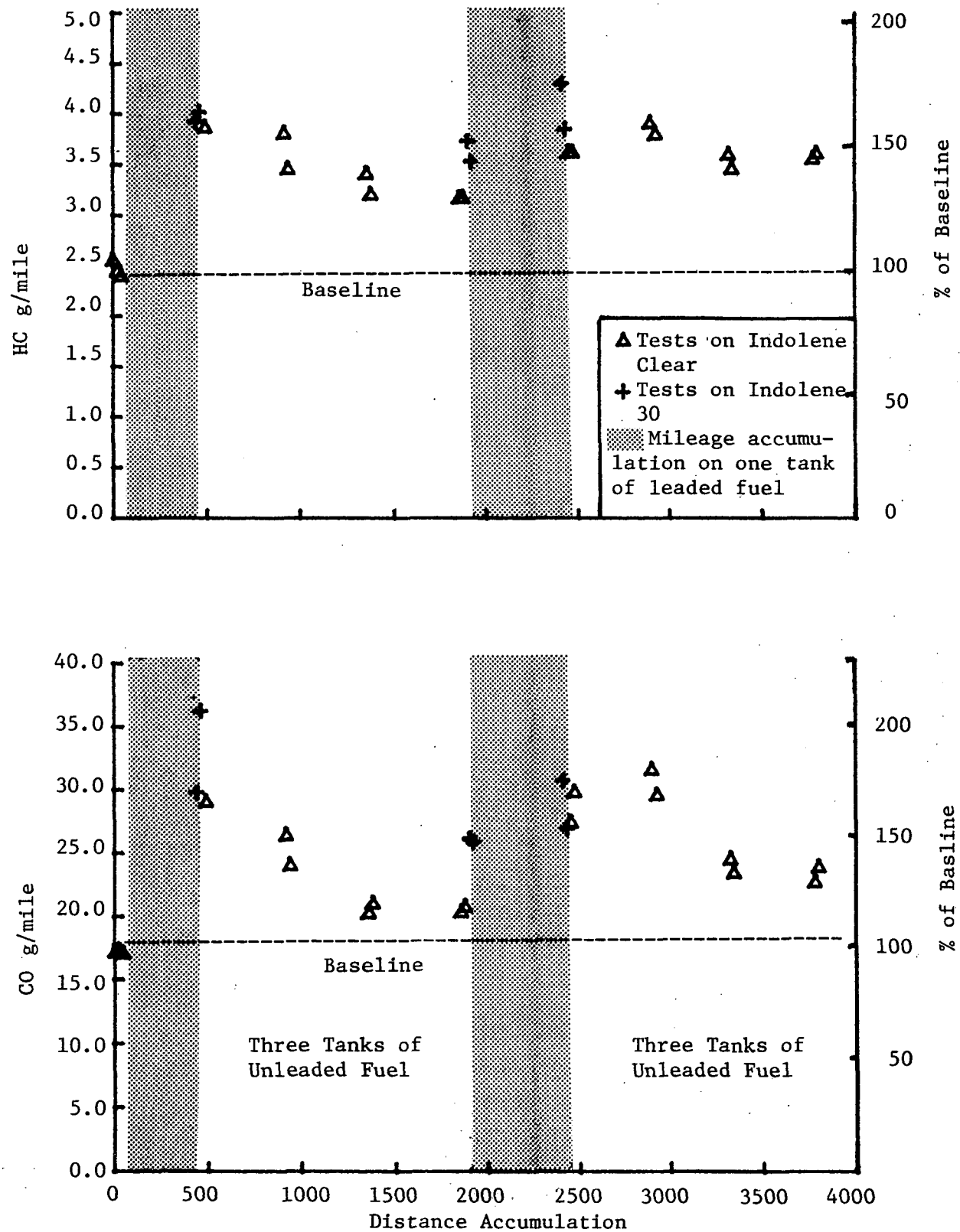


Figure 3: Emissions for Plymouth Fury Subjected to Misfueling

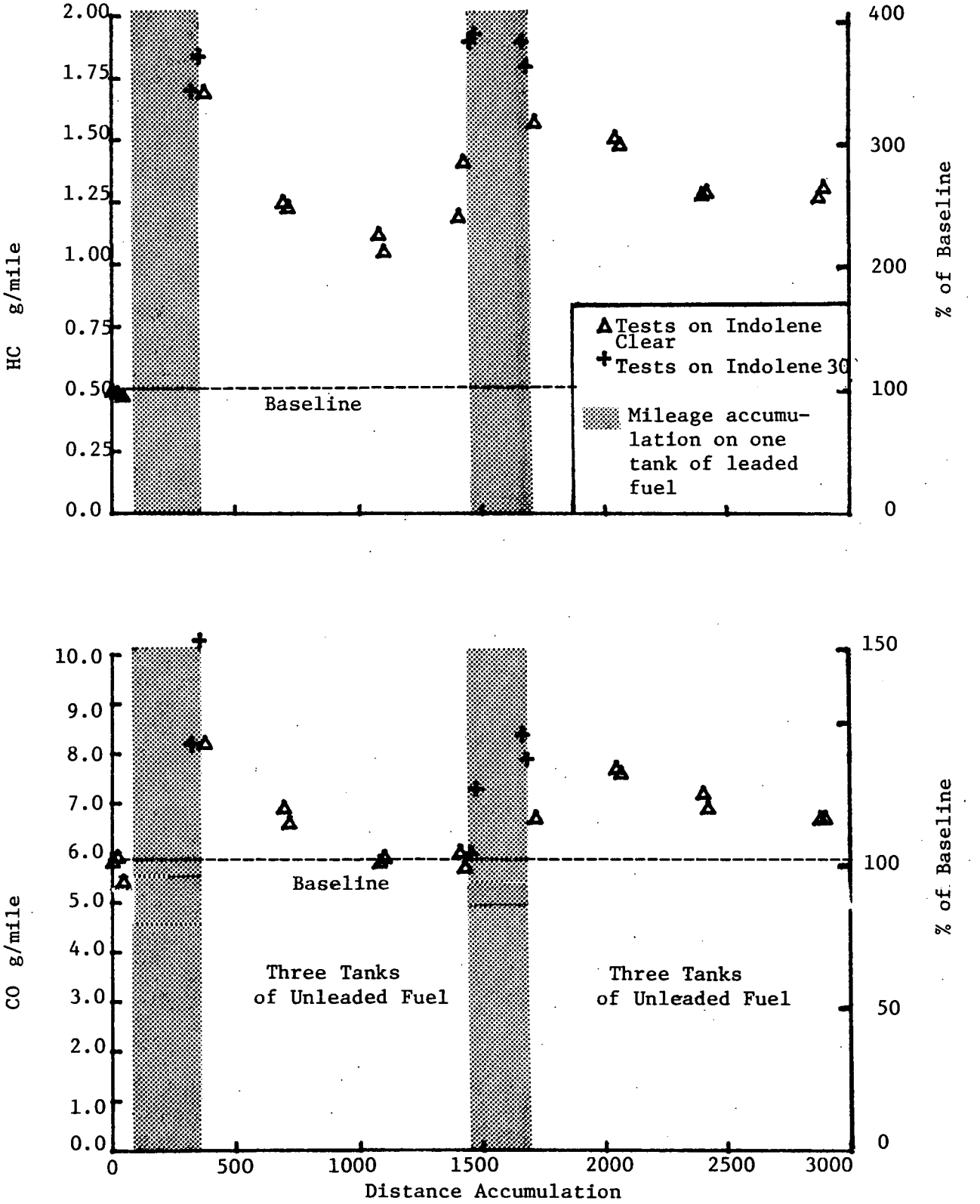


Figure 4: Emissions for Ford Mustang Subjected to Misfueling

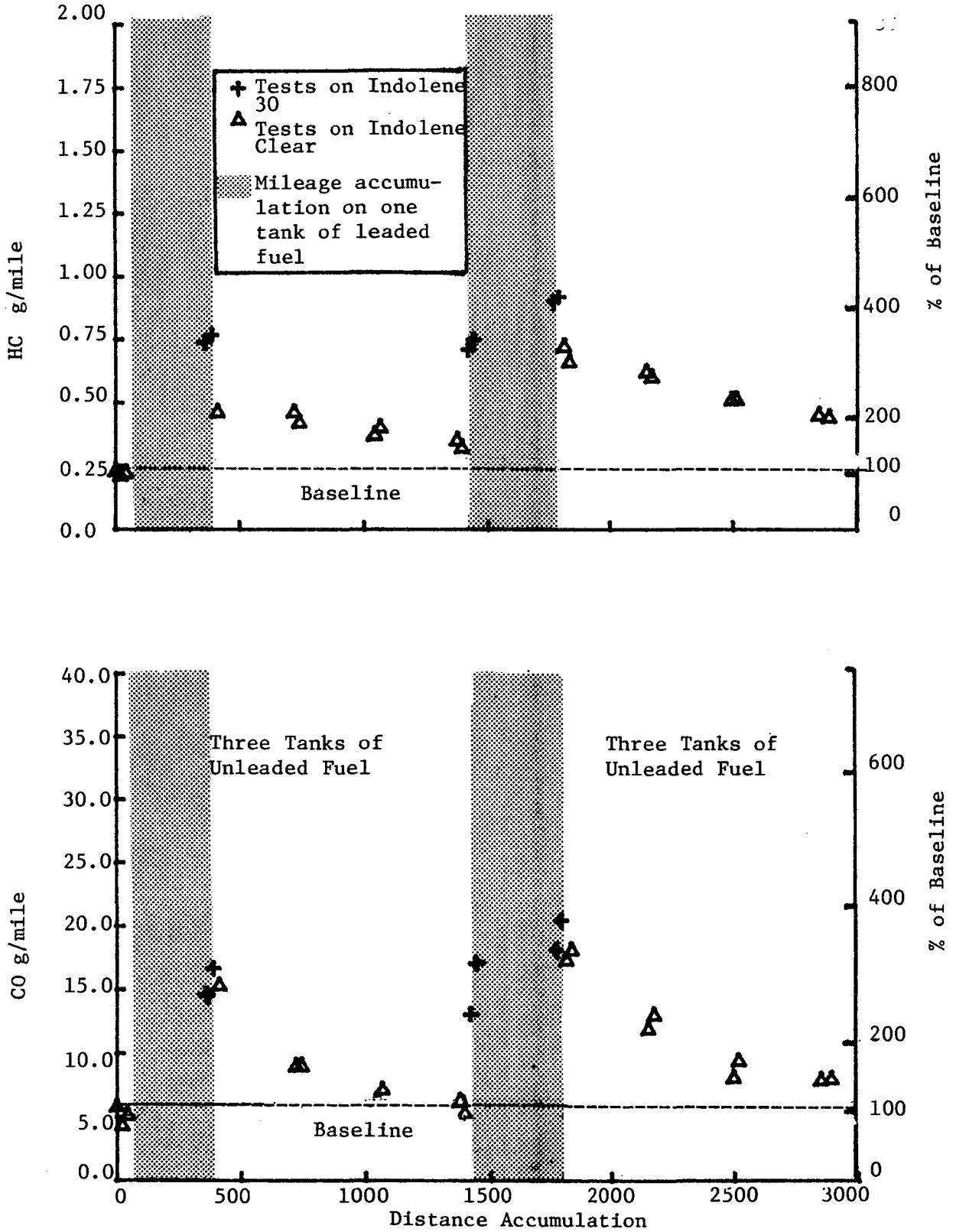
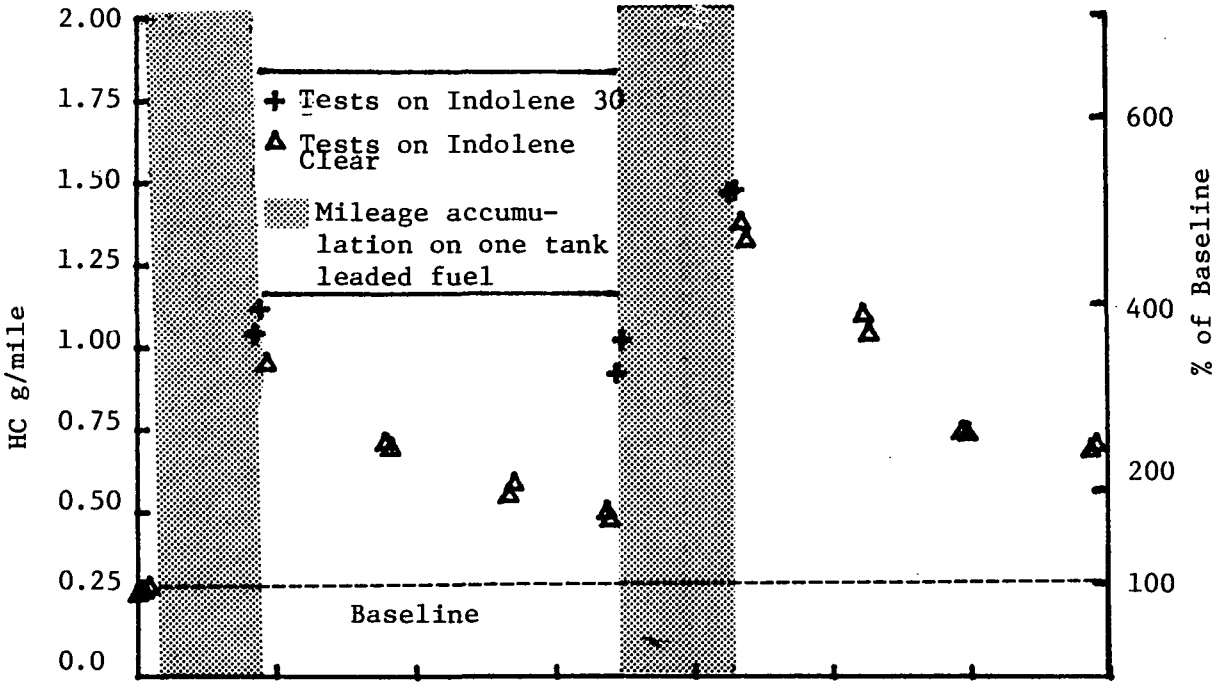


Figure 5: Emissions for Toyota Corona Subjected to Misfueling



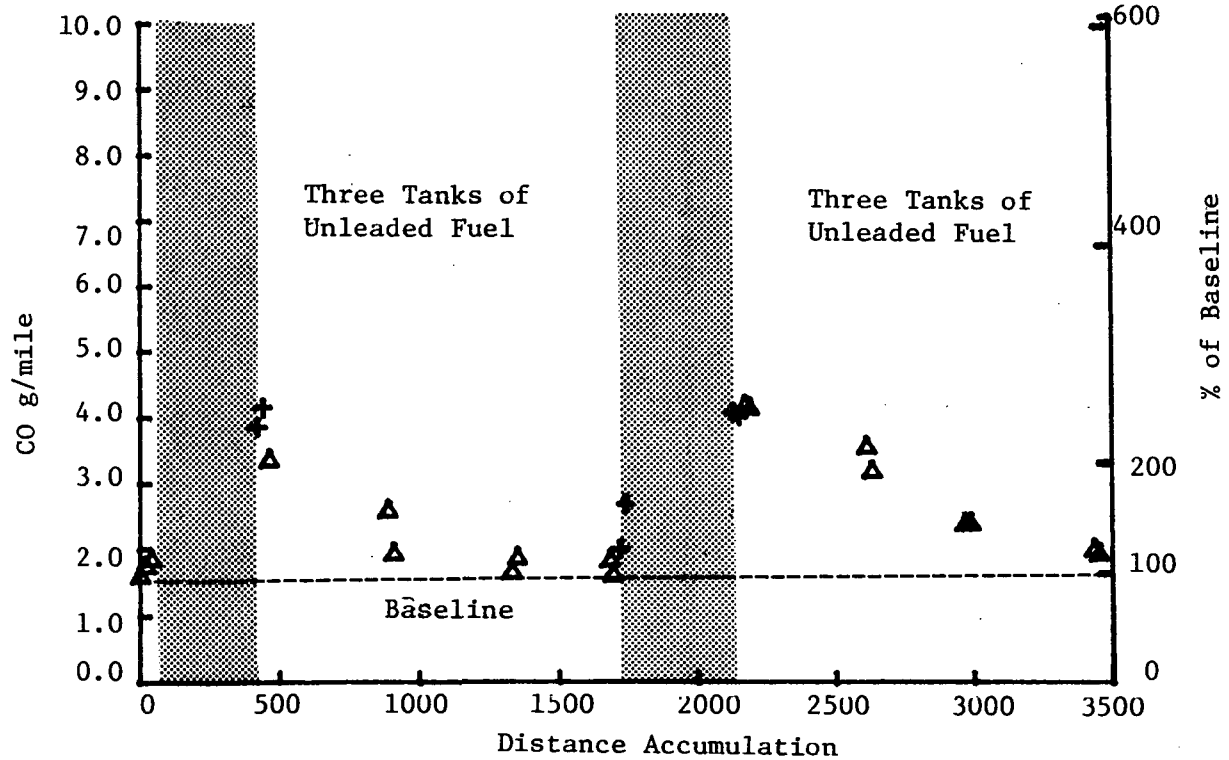


Figure 6: Emissions for Chevrolet Citation subjected to Misfueling

Appendix F

ENVIRONMENTAL PROTECTION AGENCY
MOTOR VEHICLE EMISSION LABORATORY
ANN ARBOR, MICHIGAN

MISFUEL PROGRAM
AVERAGE TEST RESULTS

PROCESSED: SEP 27, 1979

VEHICLE: PONT. CATALINA VIN: 2L69Y8P160360 INERTIA WT: 4000 ACTUAL HP: 11.3

TEST TYPE: FTP

FUEL	N		HC	CO	NOX	CO2	FE	BARO	HUM	NOXFC	ODOMETER	MILEAGE ACCUMULATION: FUEL TYPE	MILES DRIVEN	FUEL CONSUMED	FUEL ECONOMY
			<--GRAMS/MILE-->				MPG	IN-HG	GR/LB						
INDOLENE CLEAR	3	MEAN	1.000	6.13	1.71	497.	17.4	29.16	72.97	0.991	34303.2				
		STD.DEV.	0.017	0.35	.042	3.	0.1	0.026	3.705	0.017					
		C.V. %	1.7	5.7	2.4	0.6	0.6	0.1	5.08	1.72					
												IND.30	355.6	19.0 GAL	18.7 MPG
INDOLENE 30	2	MEAN	3.125	9.15	1.80	480.	17.6	29.01	71.92	0.986	34722.8				
		STD.DEV.	0.290	0.92	.021	4.	0.1	0.019	3.173	0.015					
		C.V. %	9.3	10.0	1.2	0.7	0.8	0.1	4.41	1.47					
		DIFF. %	212.5	49.2	5.2	-3.6	1.1	-0.5	-1.4	-0.5					
INDOLENE CLEAR	1	MEAN	3.210	8.80	1.91	483.	17.5	28.97	83.54	1.042	34778.0				
		DIFF. %	221.0	43.5	11.9	-2.9	0.6	-0.7	14.5	5.2					
												IND.MO	325.0	18.5 GAL	17.6 MPG
INDOLENE CLEAR	2	MEAN	2.100	6.85	1.82	487.	17.6	29.02	78.95	1.019	35191.1				
		STD.DEV.	0.042	0.78	.021	2.	0.1	0.077	1.492	0.007					
		C.V. %	2.0	11.4	1.2	0.4	0.6	0.3	1.89	0.71					
		DIFF. %	110.0	11.7	6.9	-2.2	1.1	-0.5	8.2	2.8					
												IND.MO	370.0	19.1 GAL	19.4 MPG
INDOLENE CLEAR	2	MEAN	2.000	7.40	1.81	487.	17.5	29.08	82.33	1.036	35607.1				
		STD.DEV.	0.0	0.57	.021	4.	0.2	0.162	4.150	0.021					
		C.V. %	0.0	7.6	1.2	0.9	1.2	0.6	5.04	2.02					
		DIFF. %	100.0	20.7	6.3	-2.1	0.9	-0.3	12.8	4.6					
												IND.MO	353.0	20.5 GAL	17.2 MPG
INDOLENE CLEAR	2	MEAN	1.755	7.35	1.84	484.	17.7	29.01	76.88	1.009	36030.1				
		STD.DEV.	0.049	0.49	.092	1.	0.0	0.154	1.846	0.009					
		C.V. %	2.8	6.7	5.0	0.3	0.1	0.5	2.40	0.87					
		DIFF. %	75.5	19.8	7.5	-2.7	1.7	-0.5	5.4	1.8					
INDOLENE 30	2	MEAN	2.055	6.25	1.45	500.	17.2	29.36	70.30	0.978	36103.8				
		STD.DEV.	0.177	0.21	.057	1.	0.0	0.055	1.194	0.005					
		C.V. %	8.6	3.4	3.9	0.3	0.0	0.2	1.70	0.56					
		DIFF. %	105.5	1.9	14.3	0.5	-1.1	0.7	-3.7	-1.2					
												IND.30	415.0	19.7 GAL	21.1 MPG
INDOLENE 30	2	MEAN	2.560	7.20	1.97	494.	17.3	29.04	76.12	1.005	36566.4				
		STD.DEV.	0.085	0.14	.007	5.	0.1	0.120	1.010	0.005					
		C.V. %	3.3	2.0	0.3	1.0	0.5	0.4	1.33	0.47					
		DIFF. %	156.0	17.4	15.7	-0.8	-0.6	-0.4	4.3	1.5					
INDOLENE CLEAR	2	MEAN	2.355	6.65	2.05	494.	17.3	29.12	75.00	1.000	36608.7				
		STD.DEV.	0.035	0.78	.014	2.	0.1	0.085	4.031	0.019					
		C.V. %	1.5	11.7	0.7	0.4	0.4	0.3	5.37	1.90					
		DIFF. %	135.5	8.4	20.1	-0.8	-0.3	-0.1	2.8	1.0					
												IND.MO	428.0	22.0 GAL	19.5 MPG
INDOLENE CLEAR	2	MEAN	2.060	7.05	2.01	490.	17.5	28.99	75.97	1.005	37081.1				
		STD.DEV.	0.071	0.49	.099	11.	0.4	0.091	3.149	0.015					
		C.V. %	3.4	7.0	4.9	2.3	2.4	0.3	4.20	1.51					
		DIFF. %	106.0	14.9	17.8	-1.5	0.6	-0.6	4.1	1.4					
												IND.MO	396.1	17.9 GAL	22.1 MPG
INDOLENE CLEAR	2	MEAN	1.825	6.80	1.94	501.	17.1	28.97	73.87	0.995	37520.4				
		STD.DEV.	0.064	0.42	.028	2.	0.1	0.149	1.231	0.006					
		C.V. %	3.5	6.2	1.5	0.4	0.4	0.5	1.67	0.59					
		DIFF. %	82.5	10.9	13.7	0.6	-1.4	-0.6	1.2	0.4					
												IND.MO	397.0	20.0 GAL	19.8 MPG
INDOLENE CLEAR	2	MEAN	1.750	6.85	1.98	501.	17.1	29.04	78.96	1.019	37958.9				
		STD.DEV.	0.042	0.49	.014	4.	0.1	0.112	1.739	0.008					
		C.V. %	2.4	7.2	0.2	0.7	0.6	0.4	2.20	0.83					
		DIFF. %	75.0	11.7	15.7	0.6	-1.4	-0.4	8.2	2.9					

NOTES: DIFF. % IS THE DIFFERENCE IN PER CENT FROM TANK #1 OF INDOLENE CLEAR. (TANK X-TANK 1)/TANK 1 X 100.

ENVIRONMENTAL PROTECTION AGENCY
MOTOR VEHICLE EMISSION LABORATORY
ANN ARBOR, MICHIGAN

MISFUEL PROGRAM
AVERAGE TEST RESULTS

PROCESSED: SEP 27, 1979

VEHICLE: PLYMOUTH FURY VIN: RH41G7Z239813 INERTIA WT: 4500 ACTUAL HP: 10.4

TEST TYPE: FTP

FUEL	N		HC	CO	NOX	CO2	FE	BARO	HUM	NOXFC	ODOMETER	FUEL TYPE	MILEAGE ACCUMULATION: MILES DRIVEN	FUEL CONSUMED	FUEL ECONOMY
			<--GRAMS/MILE-->				MPG	IN-HG	GR/LB						
INDOLENE CLEAR	3	MEAN	2.460	17.10	2.24	582.	14.4	29.14	75.29	1.001	34516.6				
		STD.DEV.	0.082	0.10	.026	1.	0.0	0.036	1.266	0.006					
		C.V. %	3.3	0.6	1.2	0.1	0.1	0.1	1.68	0.60					
												IND.30	377.5	21.9 GAL	17.2 MPG
INDOLENE 30	2	MEAN	3.970	33.05	2.45	572.	13.9	29.01	73.18	0.992	34948.0				
		STD.DEV.	0.071	4.60	.014	13.	0.5	0.016	4.162	0.019					
		C.V. %	1.8	13.9	0.6	2.2	3.5	0.1	5.69	1.94					
		DIFF. %	61.4	93.3	9.4	-1.8	-3.1	-0.4	-2.8	-1.0					
INDOLENE CLEAR	1	MEAN	3.860	29.00	2.42	559.	14.4	28.95	77.83	1.014	34986.8				
		DIFF. %	56.9	69.6	8.0	-4.0	0.0	-0.7	3.4	1.2					
												IND.HO	393.9	23.5 GAL	16.8 MPG
INDOLENE CLEAR	2	MEAN	3.625	25.20	2.38	567.	14.3	29.10	80.18	1.025	35423.4				
		STD.DEV.	0.247	1.70	.035	3.	0.2	0.047	2.505	0.012					
		C.V. %	6.8	6.7	1.5	0.5	1.5	0.2	3.12	1.20					
		DIFF. %	47.4	47.4	6.0	-2.5	-0.3	-0.1	6.5	2.4					
												IND.HO	392.3	23.3 GAL	16.8 MPG
INDOLENE CLEAR	2	MEAN	3.300	20.60	2.34	575.	14.3	29.07	80.74	1.028	35861.3				
		STD.DEV.	0.141	0.57	.0	0.	0.1	0.176	5.358	0.027					
		C.V. %	4.3	2.7	0.0	0.0	0.5	0.6	6.65	2.59					
		DIFF. %	34.1	20.5	6.7	-1.3	-0.3	-0.3	7.2	2.7					
												IND.HO	455.8	22.3 GAL	20.4 MPG
INDOLENE CLEAR	2	MEAN	3.180	20.50	2.46	573.	14.4	29.05	73.73	0.994	36361.6				
		STD.DEV.	0.0	0.28	.0	5.	0.1	0.155	1.278	0.006					
		C.V. %	0.0	1.4	0.0	0.9	0.5	0.5	1.73	0.61					
		DIFF. %	28.5	19.9	9.8	-1.7	0.3	-0.3	-2.1	-0.7					
INDOLENE 30	2	MEAN	3.630	26.05	2.58	557.	14.5	29.40	72.69	0.989	36405.9				
		STD.DEV.	0.141	0.21	.028	6.	0.2	0.071	0.566	0.003					
		C.V. %	3.9	0.8	1.1	1.0	1.5	0.2	0.78	0.28					
		DIFF. %	47.6	52.3	15.2	-4.4	1.0	0.9	-3.5	-1.2					
												IND.30	468.7	23.3 GAL	20.1 MPG
INDOLENE 30	2	MEAN	4.075	28.90	2.89	558.	14.4	29.05	96.06	1.118	36919.2				
		STD.DEV.	0.318	2.69	.191	8.	0.3	0.119	*****	0.136					
		C.V. %	7.8	9.3	6.6	1.4	2.0	0.4	24.21	12.13					
		DIFF. %	65.7	69.0	28.8	-4.3	0.0	-0.3	27.5	11.7					
INDOLENE CLEAR	2	MEAN	3.610	28.60	2.58	545.	14.8	29.12	73.13	0.991	36957.8				
		STD.DEV.	0.0	1.70	.042	3.	0.1	0.069	1.346	0.006					
		C.V. %	0.0	5.9	1.6	0.5	0.5	0.2	1.84	0.63					
		DIFF. %	46.7	67.3	15.2	-6.4	2.4	-0.1	-2.9	-1.0					
												IND.HO	399.3	23.4 GAL	17.1 MPG
INDOLENE CLEAR	2	MEAN	3.845	30.60	2.61	555.	14.4	28.97	69.97	0.977	37405.9				
		STD.DEV.	0.078	1.41	.042	13.	0.3	0.071	1.561	0.007					
		C.V. %	2.0	4.6	1.6	2.3	2.0	0.2	2.23	0.72					
		DIFF. %	56.3	78.9	16.5	-4.7	0.0	-0.6	47.1	-2.4					
												IND.HO	360.1	21.8 GAL	16.5 MPG
INDOLENE CLEAR	2	MEAN	3.520	23.95	2.70	572.	14.3	29.14	73.37	0.992	37824.1				
		STD.DEV.	0.099	0.78	.057	4.	0.1	0.084	0.609	0.003					
		C.V. %	2.8	3.2	2.1	0.7	0.5	0.3	0.83	0.30					
		DIFF. %	43.1	40.1	20.5	-1.8	-1.0	0.0	-2.6	-0.9					
												IND.HO	411.9	23.0 GAL	17.9 MPG
INDOLENE CLEAR	2	MEAN	3.575	23.30	2.55	571.	14.3	29.10	76.25	1.006	38278.3				
		STD.DEV.	0.035	0.85	.021	4.	0.1	0.049	3.612	0.017					
		C.V. %	1.0	3.6	0.8	0.7	0.5	0.2	4.74	1.71					
		DIFF. %	45.1	35.1	18.1	-1.9	-0.3	-0.2	1.3	0.5					

NOTES: DIFF. % IS THE DIFFERENCE IN PER CENT FROM TANK #1 OF INDOLENE CLEAR. (TANK X-TANK 1)/TANK 1 X 100.

ANALYSIS OF TAILPIPE RESIDUE IN AS RECIEVED CONDITION BY X-RAY FLUORESCENCE INDICATES PROBABLE MISFUELING OF THIS VEHICLE PRIOR TO THIS PROGRAM.

ENVIRONMENTAL PROTECTION AGENCY
MOTOR VEHICLE EMISSION LABORATORY
ANN ARBOR, MICHIGAN

MISFUEL PROGRAM
AVERAGE TEST RESULTS

PROCESSED: SEP 27, 1979

VEHICLE: FORD MUSTANG VIN: 9R02Y149817 INERTIA WT: 2750 ACTUAL HP: 10.2

TEST TYPE: FTP

FUEL	N		HC	CO	NOX	CO2	FE	BARO	HUM	NOX/C	ODOMETER	FUEL TYPE	MILES DRIVEN	FUEL CONSUMED	FUEL ECONOMY
			<--GRAMS/MILE-->				MPG	IN-HG	GR/LB						
INDOLENE CLEAR	3	MEAN	0.440	5.70	1.41	396.	21.6	29.16	74.71	0.999	6687.0				
		STD.DEV.	0.010	0.25	.044	3.	0.2	0.036	6.572	0.011					
		C.V. %	2.1	4.6	3.1	0.9	1.1	0.1	8.80	1.12					
												IND.30	259.0	11.0 GAL	23.5 MPG
INDOLENE 30	2	MEAN	1.770	9.25	1.48	385.	21.6	29.00	77.45	1.012	7006.5				
		STD.DEV.	0.099	1.40	.106	1.	0.1	0.0	5.128	0.025					
		C.V. %	5.6	16.1	5.7	0.4	0.3	0.0	6.62	2.44					
		DIFF. %	268.7	62.3	33.0	-2.8	0.1	-0.5	3.7	1.3					
INDOLENE CLEAR	1	MEAN	1.530	8.20	1.78	384.	22.0	29.00	81.78	1.033	7043.0				
		DIFF. %	252.1	43.9	26.2	-3.0	0.8	-0.5	9.5	4.4					
												IND.HO	296.0	10.8 GAL	27.4 MPG
INDOLENE CLEAR	2	MEAN	1.240	6.75	1.74	390.	21.9	29.01	76.64	1.008	7369.5				
		STD.DEV.	0.014	0.21	.014	1.	0.1	0.004	1.392	0.007					
		C.V. %	1.1	3.1	0.8	0.2	0.3	0.3	1.82	0.65					
		DIFF. %	156.3	18.4	23.4	-1.5	0.5	-0.5	2.5	0.9					
												IND.HO	326.0	11.0 GAL	29.6 MPG
INDOLENE CLEAR	2	MEAN	1.085	5.85	1.73	395.	22.1	29.07	83.23	1.040	7755.5				
		STD.DEV.	0.049	0.07	.014	1.	0.1	0.040	2.555	0.013					
		C.V. %	4.6	1.2	0.8	0.2	0.3	0.1	3.07	1.25					
		DIFF. %	128.8	2.6	20.6	-2.9	2.4	-0.1	11.4	4.1					
												IND.HO	284.0	11.4 GAL	24.9 MPG
INDOLENE CLEAR	2	MEAN	1.300	5.85	1.60	386.	22.2	29.04	75.30	1.002	8082.0				
		STD.DEV.	0.156	0.21	.007	3.	0.1	0.162	3.644	0.017					
		C.V. %	12.0	3.6	0.4	0.7	0.6	0.6	4.84	1.71					
		DIFF. %	170.8	2.6	13.1	-2.5	1.7	-0.4	0.8	0.2					
INDOLENE 30	2	MEAN	1.915	6.65	1.60	383.	22.3	29.35	72.65	0.989	8177.5				
		STD.DEV.	0.021	0.92	.042	5.	0.2	0.0	1.321	0.006					
		C.V. %	1.1	13.8	2.7	1.3	0.9	0.0	1.82	0.61					
		DIFF. %	299.0	16.7	13.5	-3.4	1.9	0.7	-2.8	-1.0					
												IND.30	265.0	9.9 GAL	26.8 MPG
INDOLENE 30	2	MEAN	1.950	8.15	2.36	372.	22.7	29.05	74.40	0.997	8437.5				
		STD.DEV.	0.071	0.35	.431	1.	0.1	0.141	3.356	0.016					
		C.V. %	3.6	4.3	18.2	0.4	0.5	0.5	4.51	1.57					
		DIFF. %	285.4	43.0	67.7	-6.1	4.0	-0.4	-0.4	-0.2					
INDOLENE CLEAR	1	MEAN	1.570	6.70	1.95	365.	23.3	29.04	75.64	1.003	8481.0				
		DIFF. %	227.1	17.5	39.0	-7.8	6.7	-0.4	1.2	0.4					
												IND.HO	305.0	9.7 GAL	31.4 MPG
INDOLENE CLEAR	2	MEAN	1.495	7.65	2.11	397.	23.1	28.96	75.66	1.003	8820.0				
		STD.DEV.	0.021	0.07	.021	16.	0.9	0.068	3.846	0.018					
		C.V. %	1.4	0.9	1.0	4.2	4.0	0.2	5.14	1.84					
		DIFF. %	211.5	34.2	49.3	-7.3	6.0	-0.7	1.3	0.4					
												IND.HO	311.0	11.5 GAL	27.0 MPG
INDOLENE CLEAR	2	MEAN	1.245	7.05	1.96	378.	22.6	28.99	74.34	0.997	9175.5				
		STD.DEV.	0.007	0.21	.021	1.	0.1	0.147	1.922	0.009					
		C.V. %	0.6	3.0	1.1	0.2	0.3	0.5	2.59	0.90					
		DIFF. %	167.7	21.7	39.4	-4.7	3.3	-0.6	-0.5	-0.2					
												IND.HO	336.0	11.7 GAL	28.7 MPG
INDOLENE CLEAR	2	MEAN	1.240	6.70	1.86	383.	22.3	29.07	76.78	1.008	9553.0				
		STD.DEV.	0.022	0.00	.021	2.	0.1	0.098	0.561	0.003					
		C.V. %	2.2	0.1	1.1	0.6	0.3	0.3	0.74	0.31					
		DIFF. %	168.8	17.5	32.3	-3.4	2.4	-0.3	2.8	0.9					

NOTES: DIFF. % IS THE DIFFERENCE IN PER CENT FROM TANK #1 OF INDOLENE CLEAR. (TANK X-TANK 1)/TANK 1 X 100.

ENVIRONMENTAL PROTECTION AGENCY
MOTOR VEHICLE EMISSION LABORATORY
ANN ARBOR, MICHIGAN

UNLEADED GASOLINE
AVERAGE TEST RESULTS

PROCESSED: SEP 7, 1979

VEHICLE: TOYOTA COROLLA FILE: KT1340Z033 INERTIA WT: 3000 ACTUAL HP: 10.0

TEST TYPE: FTP

FUEL	N		HC	CO	NOX	CO2	FE	BARO	HUM	NOXFC	ODOMETER	FUEL TYPE	MILES DRIVEN	FUEL CONSUMED	FUEL ECONOMY
			<--GRAMS/MILE-->				MPG	IN-HG	GR/LB						
INDOLENE CLEAR	3	MEAN	0.220	5.07	1.17	430.	20.2	29.16	75.22	1.001	3415.1				
		STD.DEV.	0.010	0.75	.040	10.	0.5	0.026	0.453	0.002					
		C.V. %	4.5	14.8	3.4	2.4	2.6	0.1	0.60	0.20					
												IND.30	295.0	12.4 GAL	23.8 MPG
INDOLENE 30	2	MEAN	0.755	15.65	1.18	410.	20.3	29.01	76.37	1.006	4269.7				
		STD.DEV.	0.021	1.48	.007	6.	0.4	0.015	0.742	0.003					
		C.V. %	2.8	9.5	0.6	1.6	2.1	0.1	0.97	0.33					
		DIFF. %	243.2	208.9	0.4	-4.8	0.5	-0.5	1.5	0.5					
INDOLENE CLEAR	1	MEAN	0.460	15.30	1.12	417.	20.0	28.97	75.74	1.003	4307.0				
		DIFF. %	109.1	202.0	-4.3	-3.1	-1.0	-0.5	0.7	0.2					
												IND.HO	287.9	13.4 GAL	21.5 MPG
INDOLENE CLEAR	2	MEAN	0.440	9.00	1.13	427.	20.1	29.02	76.80	1.009	4625.8				
		STD.DEV.	0.025	0.0	.014	2.	0.1	0.004	0.814	0.004					
		C.V. %	6.4	0.0	1.3	0.5	0.3	0.1	1.06	0.38					
		DIFF. %	100.0	77.6	-3.4	-0.9	-0.7	-0.5	2.1	0.8					
												IND.HO	273.6	13.8 GAL	19.8 MPG
INDOLENE CLEAR	2	MEAN	0.365	5.70	1.13	429.	20.1	29.05	83.53	1.042	4945.5				
		STD.DEV.	0.021	0.57	.023	1.	0.0	0.134	5.764	0.024					
		C.V. %	5.5	9.9	2.0	0.3	0.1	0.5	6.90	2.32					
		DIFF. %	75.0	32.2	-3.4	-0.3	-0.5	-0.2	11.1	4.1					
												IND.HO	286.6	13.0 GAL	22.0 MPG
INDOLENE CLEAR	2	MEAN	0.335	5.75	1.15	427.	20.3	28.99	76.72	0.980	5278.8				
		STD.DEV.	0.021	0.64	.049	1.	0.0	0.120	3.287	0.015					
		C.V. %	6.3	11.1	4.3	0.2	0.0	0.4	4.28	1.52					
		DIFF. %	52.3	13.5	-1.3	-0.9	0.5	-0.6	-6.0	-2.1					
INDOLENE 30	2	MEAN	0.730	15.10	1.28	397.	20.9	29.38	71.87	0.986	5324.1				
		STD.DEV.	0.028	2.83	.007	3.	0.1	0.056	4.181	0.019					
		C.V. %	3.9	18.7	0.6	0.7	0.3	0.2	5.82	1.94					
		DIFF. %	231.5	198.0	9.8	-7.7	3.7	0.9	-4.4	-1.5					
												IND.30	306.0	13.2 GAL	23.2 MPG
INDOLENE 30	2	MEAN	0.410	14.35	1.30	388.	21.1	29.05	74.93	1.000	5676.4				
		STD.DEV.	0.014	1.63	.042	3.	0.1	0.112	0.781	0.004					
		C.V. %	1.6	8.4	3.3	0.7	0.3	0.4	1.04	0.37					
		DIFF. %	313.6	281.9	11.1	-9.8	4.6	-0.4	-0.4	-0.1					
INDOLENE CLEAR	2	MEAN	0.690	17.70	1.26	393.	20.9	29.10	74.10	0.996	5717.6				
		STD.DEV.	0.042	0.57	.078	1.	0.1	0.105	1.517	0.007					
		C.V. %	6.2	3.2	6.1	0.2	0.3	0.4	2.05	0.71					
		DIFF. %	213.6	249.3	8.1	-8.8	3.7	-0.2	-1.5	-0.5					
												IND.HO	294.0	13.6 GAL	21.6 MPG
INDOLENE CLEAR	2	MEAN	0.610	12.45	1.20	400.	21.1	28.94	77.75	1.013	6055.6				
		STD.DEV.	0.014	0.78	.035	12.	0.6	0.047	0.108	0.001					
		C.V. %	2.3	6.2	2.9	3.0	3.0	0.2	0.14	0.07					
		DIFF. %	177.3	145.7	3.0	-7.2	4.2	-0.7	3.4	1.2					
												IND.HO	303.0	14.2 GAL	21.3 MPG
INDOLENE CLEAR	2	MEAN	0.510	8.75	1.21	410.	20.8	28.97	74.22	0.998	6400.1				
		STD.DEV.	0.001	0.92	.028	0.	0.1	0.162	1.500	0.007					
		C.V. %	0.1	10.5	2.3	0.0	0.3	0.6	2.02	0.70					
		DIFF. %	131.8	72.7	3.4	-4.7	3.2	-0.6	-1.3	-0.5					
												IND.HO	307.6	13.6 GAL	22.6 MPG
INDOLENE CLEAR	2	MEAN	0.445	7.95	1.16	420.	20.4	29.07	72.09	0.987	6762.1				
		STD.DEV.	0.007	0.07	.049	2.	0.1	0.065	7.447	0.034					
		C.V. %	1.5	0.9	4.2	0.5	0.3	0.2	10.33	3.45					
		DIFF. %	102.3	55.7	-0.4	-2.5	1.2	-0.3	-7.2	-1.4					

NOTES: DIFF. % IS THE DIFFERENCE IN PER CENT FROM LINE #1 OF INDOLENE CLEAR. (TANK X-TANK 1)/TANK 1 * 100.

ENVIRONMENTAL PROTECTION AGENCY
MOTOR VEHICLE EMISSION LABORATORY
ANN ARBOR, MICHIGAN

M15FUEL PROGRAM
AVERAGE TEST RESULTS

PROCESSED: SEP 27, 1979

VEHICLE: CHEVY CITATION VIN: 1A11AM122243 INERTIA WT: 2750 ACTUAL HP: 6.6

TEST TYPE: FTP

FUEL	N		HC	CO	NOX	CO2	FE	BARO	HUM	NOXFC	ODOMETER	FUEL TYPE	MILES DRIVEN	FUEL CONSUMED	FUEL ECONOMY
			<--GRAMS/MILE-->				MPG	IN-HG	GR/LB						
INDOLENE CLEAR	3	MEAN	0.259	1.72	1.53	406.	21.6	29.15	76.29	0.997	4904.7				
		STD.DEV.	0.011	0.13	.010	3.	0.2	0.051	3.310	0.016					
		C.V. %	4.3	7.3	0.7	0.7	0.7	0.2	4.46	1.57					
												IND.30	362.2	13.4 GAL	27.0 MPG
INDOLENE 30	2	MEAN	1.093	4.01	1.03	409.	21.2	29.00	75.57	1.003	5318.9				
		STD.DEV.	0.054	0.21	.127	11.	0.6	0.0	0.480	0.002					
		C.V. %	5.0	5.3	7.8	2.6	2.7	0.0	0.64	0.22					
		DIFF. %	318.7	133.1	6.5	0.8	-2.0	-0.5	1.7	0.6					
INDOLENE CLEAR	1	MEAN	0.951	3.35	1.50	391.	22.2	28.93	43.01	1.039	5349.0				
		DIFF. %	267.7	94.3	-2.0	-3.7	2.8	-0.8	11.7	4.2					
												IND.HO	401.0	13.6 GAL	29.5 MPG
INDOLENE CLEAR	2	MEAN	0.700	2.26	1.47	405.	21.6	28.98	90.19	1.025	5782.3				
		STD.DEV.	0.012	0.46	.044	0.	0.0	0.065	4.452	0.022					
		C.V. %	1.7	20.3	3.4	0.0	0.1	0.2	5.55	2.14					
		DIFF. %	170.8	31.7	-4.2	-0.2	-0.2	-0.6	7.9	2.9					
												IND.HO	374.0	13.0 GAL	28.8 MPG
INDOLENE CLEAR	2	MEAN	0.566	1.75	1.48	405.	21.7	29.13	84.70	1.048	6223.0				
		STD.DEV.	0.026	0.15	.028	5.	0.3	0.048	5.547	0.034					
		C.V. %	4.6	8.5	1.9	1.2	1.3	0.3	7.73	3.22					
		DIFF. %	119.0	2.0	-3.3	-0.4	0.3	-0.1	14.0	5.2					
												IND.HO	307.7	12.7 GAL	24.2 MPG
INDOLENE CLEAR	2	MEAN	0.486	1.72	1.51	398.	22.1	28.94	71.46	0.964	6570.6				
		STD.DEV.	0.019	0.16	.041	1.	0.0	0.105	3.125	0.014					
		C.V. %	3.9	9.0	2.1	0.2	0.0	0.4	4.37	1.45					
		DIFF. %	86.1	0.0	-1.3	-2.1	2.2	-0.5	-3.8	-1.3					
INDOLENE 30	2	MEAN	0.473	2.35	1.50	395.	22.1	29.39	75.64	1.003	6611.1				
		STD.DEV.	0.074	0.48	.014	3.	0.1	0.077	1.629	0.008					
		C.V. %	7.8	20.5	0.9	0.7	0.3	0.3	2.15	0.76					
		DIFF. %	276.2	36.5	-2.0	-2.7	1.9	0.8	1.8	0.6					
												IND.30	364.0	14.4 GAL	25.3 MPG
INDOLENE 30	2	MEAN	1.476	4.08	1.60	386.	22.3	29.05	77.49	1.012	7020.1				
		STD.DEV.	0.096	0.04	.014	1.	0.1	0.141	1.733	0.008					
		C.V. %	6.4	1.0	0.9	0.2	0.3	0.5	2.24	0.82					
		DIFF. %	+70.6	130.0	4.6	-5.0	3.3	-0.3	4.3	1.5					
INDOLENE CLEAR	2	MEAN	1.352	4.16	1.69	394.	21.9	29.12	77.59	1.012	7060.6				
		STD.DEV.	0.037	0.03	.073	6.	0.4	0.065	1.156	0.015					
		C.V. %	2.7	0.7	4.6	1.6	1.6	0.2	4.07	1.50					
		DIFF. %	+22.7	141.9	10.3	-3.1	1.5	-0.1	4.4	1.6					
												IND.HO	400.3	14.0 GAL	28.6 MPG
INDOLENE CLEAR	2	MEAN	1.071	3.36	1.52	349.	22.3	28.98	78.23	1.006	7505.1				
		STD.DEV.	0.043	0.26	.021	13.	0.8	0.098	1.918	0.009					
		C.V. %	4.0	7.8	1.4	3.6	3.6	0.3	2.52	0.91					
		DIFF. %	314.2	95.6	-0.3	-4.3	3.3	-0.5	2.6	0.9					
												IND.HO	311.3	15.9 GAL	19.6 MPG
INDOLENE CLEAR	2	MEAN	0.741	2.39	1.41	403.	21.7	28.98	74.57	0.998	7860.4				
		STD.DEV.	0.004	0.0	.035	1.	0.0	0.134	2.552	0.012					
		C.V. %	0.6	0.0	2.5	0.2	0.1	0.5	3.42	1.20					
		DIFF. %	186.3	14.8	-7.5	-0.9	0.3	-0.0	0.4	0.1					
												IND.HO	423.0	14.8 GAL	28.6 MPG
INDOLENE CLEAR	2	MEAN	0.698	1.97	1.44	401.	21.8	29.08	76.39	1.007	8325.9				
		STD.DEV.	0.011	0.05	.001	1.	0.1	0.047	1.692	0.008					
		C.V. %	1.6	2.5	0.1	0.2	0.3	0.2	2.22	0.79					
		DIFF. %	169.8	14.2	-5.9	-1.4	1.0	-0.2	2.8	1.0					

NOTES: DIFF. % IS THE DIFFERENCE IN PER CENT FROM TANK #1 OF INDOLENE CLEAR. (TANK X-TANK 1)/TANK 1 X 100.

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