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A-91-46

A-91-46
IV-B-2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ANN ARBOR, MICHIGAN 48105

OFFICE OF
AIR AND RADIATION

January 3, 1992

SUBJECT: 1991 Ford/EPA FTP HC Emission Correlation

FROM; Martin E. Reineman, Manager MER
Correlation and Engineering Services

TO: Docket No. A-91-46

An examination of the Ford and EPA MVEL HC emission correlation was made for the period from January, 1991 through November 1991. I find the HC measurement agreement between Ford and EPA acceptable. This assessment is based on an examination of the monthly EPA/manufacturer certification paired test data from January through November, four EPA/MVMA correlation programs during the same period, and a special Ford/EPA correlation program during the months of May through July.

Attachments

RECEIVED
JAN - 9 1992
EPA AIR DOCKET

A-91-46
IV-B-2

R.K. MARSHALL 1/2/92

To: Marty Reineman

Re: MVMA/EPA Correlation Program
Results, Fourth Quarter, 1991

Attached are the MVMA/EPA Correlation Program's results for the Fourth Quarter of 1991. The six pages of results include: gas bottle analysis, extended coastdown times and the emissions and fuel economy summary. Please call if you have any questions.

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EPA AIR DOCKET

Thanks,
Rebecca Marshall
x594-2234

attachment

MVMA/EPA CORRELATION PROGRAM, FOURTH QUARTER, 1991

EMISSIONS AND FUEL ECONOMY RESULTS

Facility	Date	Cell	Temp	Baro	Spec Humid	CDT	CITY CH4 (g/mi)	CITY HC (g/mi)	CITY CO (g/mi)	CITY CO2 (g/mi)	CITY NOx (g/mi)	HY CO2 (g/mi)	HY NOx (g/mi)	CITY Carbon Balance F.E.	CITY Fuel Meter F.E.	CITY % by which fuel meter differs	HIGHWAY Carbon Balance F.E.	HIGHWAY Fuel Meter F.E.	HIGHWAY % by which fuel meter differs
FORD	10/22/91	1	71.58	29.45	41.20	12.26	0.065	0.357	1.198	539.420	0.615	373.730	0.667	16.433	16.060	-2.27%	23.804	23.652	-0.64%
	10/23/91	3	73.50	29.46	57.18	12.22	0.063	0.344	1.161	547.970	0.607	370.610	0.665	16.166	16.067	-0.61%	23.997	23.893	-0.43%
	10/24/91	6	71.54	29.48	68.38	12.27	0.060	0.340	1.208	547.440	0.610	370.770	0.701	16.196	15.997	-1.23%	23.998	23.926	-0.30%
	AVERAGE:		72.21	29.462	55.5889	12.251	0.062	0.347	1.189	544.943	0.611	371.703	0.678	16.265	16.041	-1.37%	23.933	23.823	-0.46%
	STD DEV:													0.146	0.038	0.84%	0.111	0.149	0.17%
	WRT EPA:		-6.75%	0.53%	10.96%	0.19%	2.29%	4.63%	-10.63%	1.32%	-8.55%	0.69%	-9.15%	-0.90%	-0.92%		-0.33%	-1.11%	

Facility	Date	Cell	Temp	Baro	Spec Humid	CDT	CITY CH4 (g/mi)	CITY HC (g/mi)	CITY CO (g/mi)	CITY CO2 (g/mi)	CITY NOx (g/mi)	HY CO2 (g/mi)	HY NOx (g/mi)	CITY Carbon Balance F.E.	CITY Fuel Meter F.E.	CITY % by which fuel meter differs	HIGHWAY Carbon Balance F.E.	HIGHWAY Fuel Meter F.E.	HIGHWAY % by which fuel meter differs
EPA	10/29/91	2	77.30	29.36	49.50	12.00	0.065	0.361	1.397	551.380	0.647	370.660	0.679	16.007	15.864	-0.89%	23.905	23.849	-0.23%
	10/30/91	1	77.80	29.32	53.00	12.34	0.059	0.325	1.191	531.990	0.673	369.720	0.769	16.588	16.416	-1.04%	23.970	24.252	1.18%
	10/31/91	3	77.20	29.24	47.80	12.34	0.059	0.309	1.403	530.190	0.684	367.130	0.790	16.642	16.290	-2.11%	24.165	24.170	0.02%
	AVERAGE:		77.43	29.307	50.10	12.23	0.061	0.331	1.331	537.853	0.668	369.170	0.746	16.412	16.190	-1.35%	24.013	24.090	0.32%
	STD DEV:													0.352	0.290	0.67%	0.136	0.213	0.75%

Facility	Date	Cell	Temp	Baro	Spec Humid	CDT	CITY CH4 (g/mi)	CITY HC (g/mi)	CITY CO (g/mi)	CITY CO2 (g/mi)	CITY NOx (g/mi)	HY CO2 (g/mi)	HY NOx (g/mi)	CITY Carbon Balance F.E.	CITY Fuel Meter F.E.	CITY % by which fuel meter differs	HIGHWAY Carbon Balance F.E.	HIGHWAY Fuel Meter F.E.	HIGHWAY % by which fuel meter differs
GM	11/5/91	3	76.10	28.99	43.60	12.07	0.069	0.365	1.517	542.800	0.735	375.700	0.785	16.290	16.266	-0.15%	23.690	23.796	0.45%
	11/6/91	4	79.70	28.70	45.90	12.25	0.062	0.393	1.479	536.900	0.728	372.600	0.810	16.470	16.209	-1.59%	23.880	23.810	-0.29%
	11/7/91	8	75.90	29.02	47.30	12.18	0.061	0.335	1.485	543.500	0.774	377.300	0.776	16.280	16.211	-0.42%	23.580	23.646	0.28%
	AVERAGE:		77.23	28.90	45.60	12.167	0.064	0.364	1.494	541.067	0.746	375.200	0.790	16.347	16.229	-0.72%	23.717	23.751	0.14%
	STD DEV:													0.107	0.032	0.76%	0.152	0.091	0.39%
	WRT EPA:		-0.26%	-1.38%	-8.98%	-0.50%	5.03%	9.92%	12.25%	0.60%	11.63%	1.63%	5.96%	-0.40%	0.24%		-1.24%	-1.41%	

rkm - 12/06/91

MVMA/EPA CORRELATION PROGRAM, FOURTH QUARTER, 1991

							CITY					HW		CITY			HIGHWAY		
Facility	Date	Cell	Temp	Baro	Spec Humid	CDT	CH4 (g/mi)	HC (g/mi)	CO (g/mi)	CO2 (g/mi)	NOx (g/mi)	CO2 (g/mi)	NOx (g/mi)	Carbon Balance F.E.	Fuel Meter F.E.	% by which fuel meter differs	Carbon Balance F.E.	Fuel Meter F.E.	% by which fuel meter differs
CHRYSLER JTE	11/13/91	2	77.00	29.13	54.70	12.16	0.055	0.377	1.547	538.300	0.677	372.600	0.774	16.510	16.150	-2.18%	23.980	23.736	-1.02%
	11/14/91	5	70.90	29.28	52.10	12.18	0.057	0.463	1.752	537.800	0.693	370.800	0.719	16.490	16.073	-2.53%	24.090	23.860	-0.95%
	11/15/91	1	71.10	29.19	56.12	12.33	0.053	0.355	1.623	526.600	0.621	365.600	0.685	16.850	16.322	-3.13%	24.420	24.217	-0.83%
	AVERAGE:		73.00	29.2	54.3067	12.223	0.055	0.398	1.641	534.233	0.664	369.667	0.726	16.617	16.182	-2.61%	24.163	23.938	-0.93%
	STD DEV:													0.202	0.128	0.48%	0.229	0.250	0.10%
	WRT EPA:		-5.73%	-0.36%	8.40%	-0.04%	-9.74%	20.15%	23.30%	-0.67%	-0.64%	0.13%	-2.66%	1.25%	-0.05%		0.62%	-0.63%	

							CITY					HW		CITY			HIGHWAY		
Facility	Date	Cell	Temp	Baro	Spec Humid	CDT	CH4 (g/mi)	HC (g/mi)	CO (g/mi)	CO2 (g/mi)	NOx (g/mi)	CO2 (g/mi)	NOx (g/mi)	Carbon Balance F.E.	Fuel Meter F.E.	% by which fuel meter differs	Carbon Balance F.E.	Fuel Meter F.E.	% by which fuel meter differs
CHRYSLER CHELSEA	11/19/91	3	75.20	29.03	68.40	12.34	0.058	0.347	1.340	535.900	0.590	370.600	0.780	16.500	16.383	-0.71%	24.000	23.835	-0.69%
	11/20/91	6	77.60	28.91	69.10	12.24	0.056	0.320	1.510	547.900	0.670	374.800	0.770	16.200	16.261	0.38%	23.800	23.953	0.64%
	11/21/91	2	77.10	29.12	54.80	12.34	0.054	0.344	1.540	545.700	0.640	368.100	0.770	16.200	16.051	-0.92%	24.200	23.867	-1.38%
	AVERAGE:		76.63	29.02	64.1	12.307	0.056	0.337	1.463	543.167	0.633	371.167	0.773	16.300	16.232	-0.42%	24.000	23.885	-0.47%
	STD DEV:													0.173	0.168	0.70%	0.200	0.061	1.03%
	WRT EPA:		-1.03%	-0.98%	27.94%	0.65%	-8.10%	1.67%	9.97%	0.99%	-5.18%	0.54%	3.69%	-0.68%	0.26%		-0.06%	-0.85%	

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MVMA/EPA CORRELATION PROGRAM, FOURTH QUARTER, 1991

							CITY					HW		CITY			HIGHWAY		
Facility	Date	Cell	Temp	Baro	Spec Humid	CDT	CH4 (g/mi)	HC (g/mi)	CO (g/mi)	CO2 (g/mi)	NOx (g/mi)	CO2 (g/mi)	NOx (g/mi)	Carbon Balance F.E.	Fuel Meter F.E.	% by which fuel meter differs	Carbon Balance F.E.	Fuel Meter F.E.	% by which fuel meter differs
FORD CONFIRM.	12/3/91	1	72.26	28.97	32.39	12.18	0.063	0.368	1.275	532.330	0.632	361.890	0.637	16.613	16.185	-2.58%	24.550	24.096	-1.85%
	12/4/91	3	73.51	29.29	36.72	12.12	0.062	0.395	1.510	532.060	0.575	362.960	0.595	16.600	16.258	-2.06%	24.482	24.141	-1.39%
	12/5/91	6	74.32	29.66	57.07	12.17	0.055	0.325	1.301	536.540	0.667	367.220	0.754	16.463	16.246	-1.32%	24.217	23.881	-1.38%
	AVERAGE:		73.36	29.31	42.06	12.16	0.060	0.363	1.362	533.643	0.625	364.023	0.662	16.559	16.230	-1.99%	24.416	24.040	-1.54%
	STD DEV:													0.083	0.039	0.63%	0.176	0.139	0.27%
	WRT EPA:		-5.26%	0.00%	-16.05%	-0.60%	-2.03%	9.44%	2.34%	-0.78%	-6.46%	-1.39%	-11.25%	0.89%	0.24%		1.68%	-0.21%	
	WRT Prev Ford Avg:		1.60%	-0.53%	-24.34%	-0.78%	-4.22%	4.59%	14.51%	-2.07%	2.29%	-2.07%	-2.31%	1.81%	1.17%		2.02%	0.91%	

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MVMA/EPA CORRELATION PROGRAM, FOURTH QUARTER, 1991

MYSTERY GAS ANALYSIS

Facility	EPA Gas Standards Measurement	Range Used	Cell	Measured	Percent Difference
FORD	0.886%	1.0%	1	0.884%	-0.26%
			3	0.888%	0.21%
			6	0.886%	-0.02%
	1.596%	4.0%	1	1.596%	0.02%
			3	1.598%	0.15%
			6	1.602%	0.36%

Facility	EPA Gas Standards Measurement	Range Used	Cell	Measured	Percent Difference
CHRYSLER JTE	0.886%	3.5%	1	0.879%	-0.79%
			2	0.890%	0.45%
			5	0.885%	-0.11%
	1.596%	3.5%	1	1.595%	-0.06%
			2	1.599%	0.19%
			5	1.604%	0.50%

Facility	EPA Gas Standards Measurement	Range Used	Cell	Measured	Percent Difference
EPA	0.886%	1.0%	1,2	0.888%	0.23%
			3	0.881%	-0.56%
	0.886%	2.5%	1,2	0.884%	-0.23%
			3	0.879%	-0.79%
	1.596%	2.5%	1,2	1.590%	-0.38%
			3	1.585%	-0.69%

Facility	EPA Gas Standards Measurement	Range Used	Cell	Measured	Percent Difference
CHRYSLER CHELSEA	0.886%	1.0%	3	0.883%	-0.34%
			6	0.882%	-0.45%
			2	0.883%	-0.34%
	1.596%	2.5%	3	1.602%	0.38%
			6	1.604%	0.50%
			2	1.604%	0.50%

Facility	EPA Gas Standards Measurement	Range Used	Cell	Measured	Percent Difference
GM	0.886%	1.5%	3	0.895%	0.98%
			4	0.893%	0.78%
			8	0.890%	0.47%
	0.886%	3.6%	3	0.898%	1.39%
			4	0.894%	0.87%
			8	0.890%	0.42%
	1.596%	3.6%	3	1.621%	1.57%
			4	1.612%	0.97%
			8	1.603%	0.41%

Facility	EPA Gas Standards Measurement	Range Used	Cell	Measured	Percent Difference
FORD CONF.	0.886%	1.0%	1	0.886%	-0.01%
			3	0.886%	-0.03%
			6	0.885%	-0.07%
	1.596%	4.0%	1	1.583%	-0.80%
			3	1.597%	0.06%
			6	1.598%	0.11%

rkm - 12/10/91

MVMA/EPA CORRELATION PROGRAM, FOURTH QUARTER, 1991

EXTENDED, LOADED COASTDOWN QUALITY CHECK

			55-45			45-35			35-25			25-15			Average/Std Dev			
Facility	Date	Cell	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	55-45	45-35	35-25	25-15
FORD	10/22/91	1	11.89	11.96	12.04	16.62	16.66	16.57	23.44	23.49	23.60	35.96	35.79	36.05	11.96	16.62	23.51	35.93
															0.08	0.05	0.08	0.13
	10/23/91	3	11.88	11.96	11.95	16.61	16.68	16.72	23.35	23.36	23.48	35.11	35.09	35.32	11.93	16.67	23.40	35.17
															0.04	0.06	0.07	0.13
	10/24/91	6	12.12	12.15	12.12	16.79	16.72	16.66	23.75	23.61	23.69	35.17	35.15	34.93	12.13	16.72	23.68	35.08
															0.02	0.07	0.07	0.13
											Overall Average:				12.01	16.67	23.53	35.40
											Difference w.r.t. EPA:				-1.01%	-0.15%	0.46%	2.42%

			55-45			45-35			35-25			25-15			Average/Std Dev			
Facility	Date	Cell	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	55-45	45-35	35-25	25-15
EPA	10/29/91	2	11.90	11.90	11.85	16.50	16.55	16.45	23.20	23.00	22.90	33.70	33.20	32.95	11.88	16.50	23.03	33.28
															0.03	0.05	0.15	0.38
	10/30/91	1	12.35	12.35	12.25	17.00	16.95	16.80	24.20	24.00	23.80	36.90	36.10	35.60	12.32	16.92	24.00	36.20
															0.06	0.10	0.20	0.66
	10/31/91	3	12.25	12.17	12.15	16.80	16.70	16.50	23.30	23.20	23.20	34.80	34.20	33.60	12.19	16.67	23.23	34.20
															0.05	0.15	0.06	0.60
											Overall Average:				12.13	16.69	23.42	34.56

			55-45			45-35			35-25			25-15			Average/Std Dev			
Facility	Date	Cell	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	55-45	45-35	35-25	25-15
GM	11/5/91	3	12.01	12.09	12.09	16.62	16.71	16.72	23.67	23.86	23.83	35.15	35.50	35.46	12.06	16.68	23.79	35.37
															0.05	0.06	0.10	0.19
	11/6/91	4	12.04	12.08	12.11	16.75	16.79	16.79	23.96	23.96	24.18	36.97	37.12	37.33	12.08	16.78	24.03	37.14
															0.04	0.02	0.13	0.18
	11/7/91	8	12.09	12.10	12.10	16.73	16.75	16.73	23.98	23.89	23.80	36.78	36.62	36.63	12.10	16.74	23.89	36.68
															0.01	0.01	0.09	0.09
											Overall Average:				12.08	16.73	23.90	36.40
											Difference w.r.t. EPA:				-0.42%	0.23%	2.05%	5.31%

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MVMA/EPA CORRELATION PROGRAM, FOURTH QUARTER, 1991

			55-45			45-35			35-25			25-15			Average/Std Dev			
Facility	Date	Cell	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	55-45	45-35	35-25	25-15
CHRYSLER JTE	11/13/91	2	12.10	12.34	12.15	16.92	17.03	17.04	23.69	23.57	23.76	36.88	36.57	36.71	12.20	17.00	23.67	36.72
															0.13	0.07	0.10	0.16
	11/14/91	5	12.15	12.19	12.20	17.04	16.95	16.81	23.84	23.82	23.96	36.43	37.18	36.73	12.18	16.93	23.87	36.78
															0.03	0.12	0.08	0.38
	11/15/91	1	12.38	12.16	12.43	17.02	16.93	17.15	23.50	23.93	23.66	36.55	36.54	36.27	12.32	17.03	23.70	36.45
															0.14	0.11	0.22	0.16
											Overall Average:				12.23	16.99	23.75	36.65
											Difference w.r.t. EPA:				0.85%	1.76%	1.39%	6.05%

			55-45			45-35			35-25			25-15			Average/Std Dev			
Facility	Date	Cell	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	55-45	45-35	35-25	25-15
CHRYSLER CHELSEA	11/19/91	3	12.44	12.39	12.39	16.60	16.46	16.31	24.40	24.25	24.40	37.00	37.00	37.00	12.41	16.46	24.35	37.00
															0.03	0.15	0.09	0.00
	11/20/91	6	12.40	12.40	12.39	16.43	16.54	16.51	24.33	24.11	24.20	36.57	36.50	36.25	12.40	16.49	24.21	36.44
															0.01	0.06	0.11	0.17
	11/21/91	2	12.46	12.47	12.43	16.63	16.46	16.47	25.30	25.07	25.20	38.50	38.33	38.50	12.45	16.52	25.19	38.44
															0.02	0.10	0.12	0.10
											Overall Average:				12.42	16.49	24.58	37.29
											Difference w.r.t. EPA:				2.38%	-1.22%	4.96%	7.91%

			55-45			45-35			35-25			25-15			Average/Std Dev			
Facility	Date	Cell	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	55-45	45-35	35-25	25-15
FORD CONF.	12/3/91	1	11.99	11.92	12.10	16.61	16.73	16.74	23.77	23.68	23.73	36.36	36.30	36.60	12.00	16.69	23.73	36.42
															0.09	0.07	0.05	0.16
	12/4/91	3	11.70	11.79	11.87	16.23	16.28	16.38	22.66	22.89	22.80	33.52	33.68	34.07	11.79	16.30	22.78	33.76
															0.09	0.08	0.12	0.28
	12/5/91	6	12.03	12.06	12.01	16.66	16.70	16.68	23.40	23.37	23.34	34.87	34.80	34.84	12.03	16.68	23.37	34.84
															0.03	0.02	0.03	0.04
											Overall Average:				11.94	14.99	23.29	35.00
											Difference w.r.t. EPA:				-1.56%	-10.19%	-0.55%	1.28%

rkm - 12/10/91

MER

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ANN ARBOR, MICHIGAN 48105

OFFICE OF
AIR AND RADIATION

December 6, 1991

MEMORANDUM

SUBJECT: Report on the Autumn 1991 Round of the EPA/MVMA Correlation Program

FROM: Robert Gilkey Robert Gilkey
Correlation and Engineering Services

TO: Eldert Bontekoe, Team Leader
Certification Branch

THRU: Martin Reineman, Manager MER
Correlation and Engineering Services

Attached are the EPA and Chrysler reports of the MVMA/EPA correlation program which was run in July through September, 1991.

Our conclusions are as follows:

1. MVMA members fuel economy and emission correlation is very good.

2. Environment Canada results for FTP and HFET fuel economy exhibited inconsistencies between carbon balance and metered fuel economy.

If you have further questions concerning this report, please call me at x8397.

Attachment

cc: R. Lawrence
J. Carpenter
J. Kargul
A. Caldwell
E. Arndt (MOD)
D. Perkins
D. Danyko
J.T. White
J. Marzen
T. Bejma

Technical Report
MVMA Correlation Program
Third Quarter, 1991

Robert K. Gilkey
Martin E. Reineman

December 6, 1991

Program Development & Quality Staff
U.S. Environmental Protection Agency
2565 Plymouth Road
Ann Arbor, MI 48105

Background:

This report summarizes the results of the Third Quarter MVMA/EPA correlation program conducted from July through September 1991. The test program is the last of four sponsored by Chrysler's JTE Division.

Program Design:

The program was conducted with a 1989 model year Dodge 600 having front wheel drive and automatic transmission. Emission repeatability has been improved by deactivating the turbocharger and isolating the evaporative emissions canister. A catalyst bypass was installed in the vehicle to increase exhaust emissions and improve repeatability. Additional equipment on the vehicle include a mass fuel meter and torque wheels.

The test program consisted of a series of three FTP, HFET, and coastdown tests--each done on a different test site at each laboratory. Normal unleaded test gasoline (96 RON) was used. All tests were driven by the same Chrysler driver.

Additional measurements performed during the program included CVS backpressure and the analysis of one NOx and three CO2 and standards supplied by Chrysler.

Data Presentation:

Attachment A presents plots of FTP exhaust emissions and HFET NOx; Attachment B displays plots of FTP and HFET fuel economy, and Attachment C presents FTP and HFET positive wheel torque, and the 55 to 45 mph quick check coastdowns. Attachment D is a summary of the gas analyses, and is taken from Chrysler's report on this program, entitled "Third Quarter 1991 MVMA/EPA Correlation Program Results". Attachment E is a summary of CVS backpressure values, also from Chrysler's report. The Appendix presents tabular summaries of the data collected during the program.

Discussion:

The mass fuel flow meter system on the vehicle did not have the ability to measure consumption for bags one and two individually. Consequently, the composite FTP fuel meter results are not weighted and cannot be compared directly with the composite carbon balance values. The difference between weighted and unweighted metered fuel economy is typically only a fraction of a percent with weighted fuel economy being lower than the unweighted. The bag 2 metered fuel economy results displayed on page 4 of the Appendix are actually unweighted values calculated as total distance for bag 1 plus bag 2 divided by the gallons consumed over this distance. Only the bag 3 metered and carbon balance results are strictly comparable.

With the exception of the Environment Canada (EC) results, the fuel economy correlation, FTP and HFET, carbon balance and metered, was acceptable. MVMA member laboratories showed higher average carbon balance FTP and HFET fuel economy of slightly less than one percent.

Higher metered fuel economy than carbon balance is unusual, and the higher variability among the metered fuel economy results suggests that previously observed problems with the

Micro-motion mass fuel meter may still exist. The high variability concern was noted by Chrysler, but not explained. The EC results would warrant some additional investigation because their FTP metered fuel economy was significantly lower (-5.0 percent), and their HFET carbon balance significantly higher (+5.5 percent) than the other participating laboratories. The corresponding EC FTP carbon balance and HFET metered fuel economies were, however, quite acceptable. The wide 95 percent confidence intervals on Attachments A and B for the EC HFET NOX and HFET fuel economy results appear because two, rather than three valid tests were completed.

At all laboratories, FTP exhaust emissions showed a reasonable scatter of results higher and lower than EPA, with most results well within ten percent of EPA values.

Other diagnostic checks at MVMA member laboratories and EPA for positive wheel torque, tailpipe backpressure, and gas cylinder analysis were acceptable. Relative to other laboratories, EC reported slightly lower values (-4.7 percent) for HFET positive integrated torque. Ambient temperature and humidity conditions at EC were more variable than results from the U.S. based laboratories.

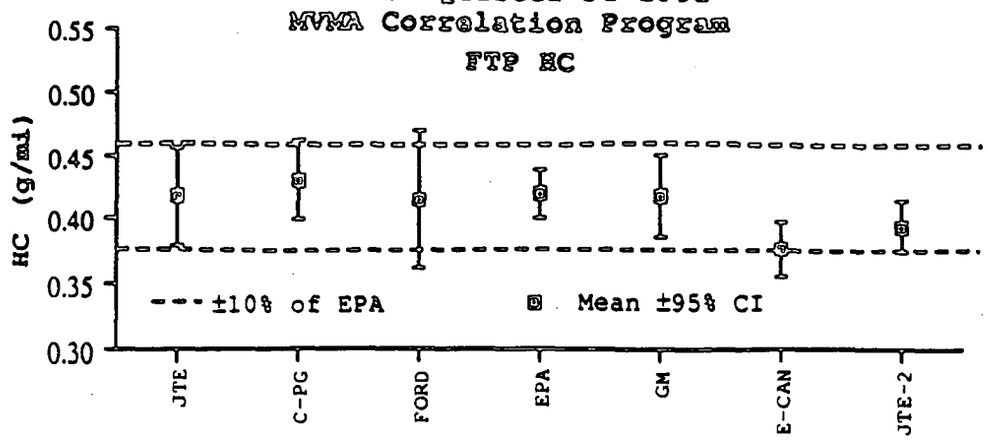
Conclusions:

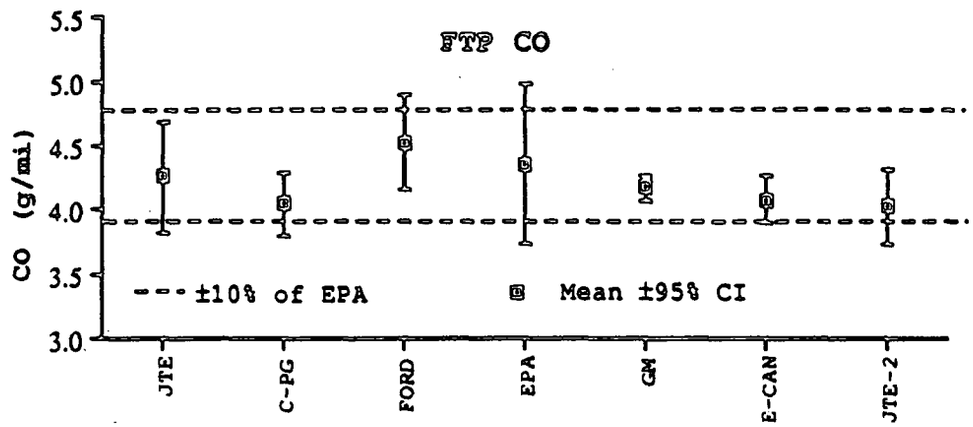
1. MVMA members fuel economy and emission correlation is very good.

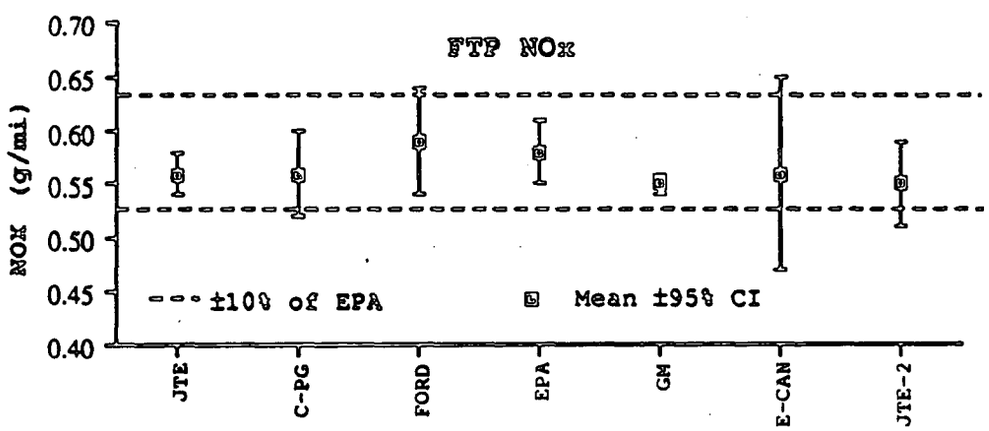
2. Environment Canada results for FTP and HFET fuel economy exhibited inconsistencies between carbon balance and metered fuel economy.

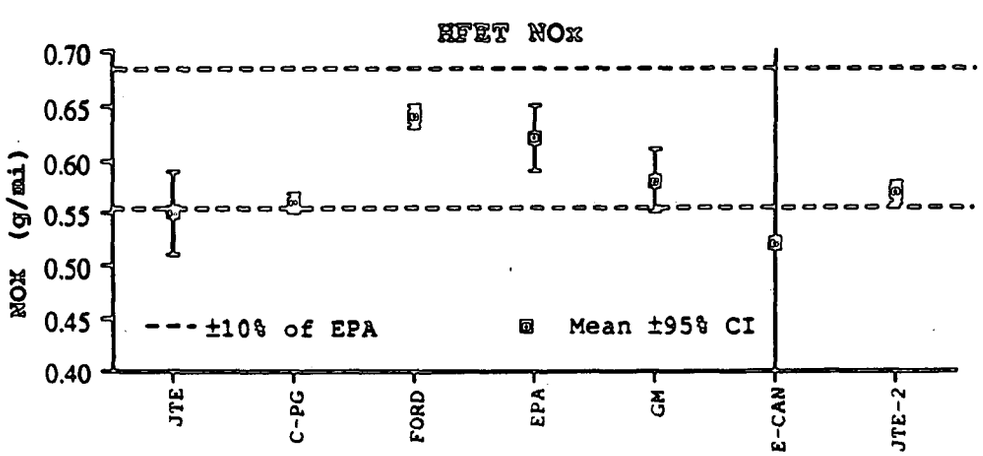
Fourth Quarter FY 1991
MVMA Correlation Program

Attachment A



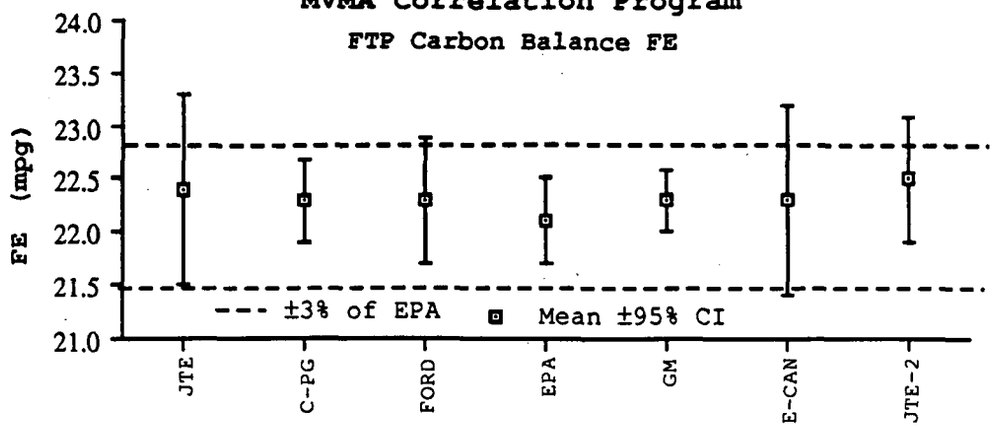


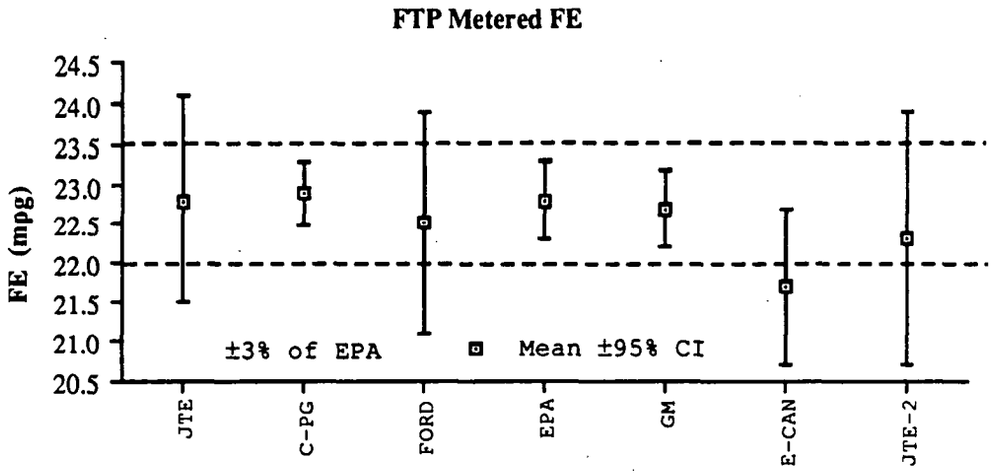


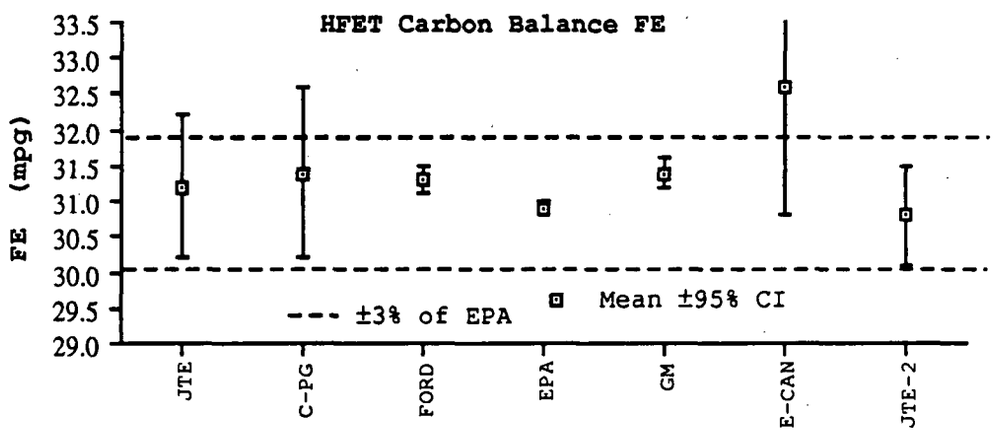


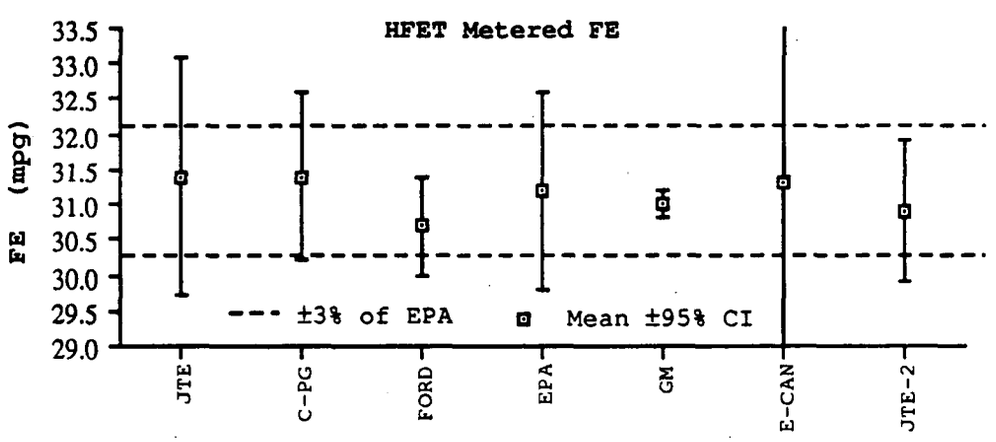
Fourth Quarter FY 1991
MVMA Correlation Program

Attachment B



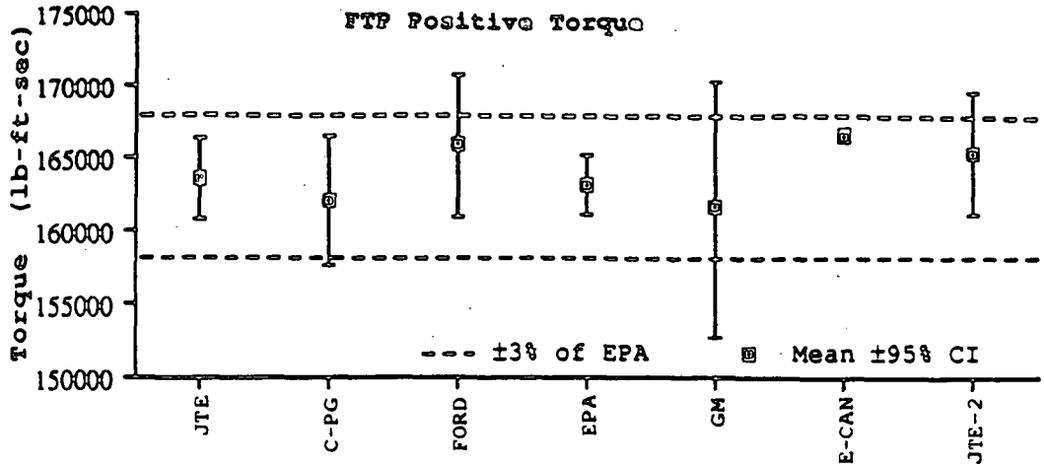


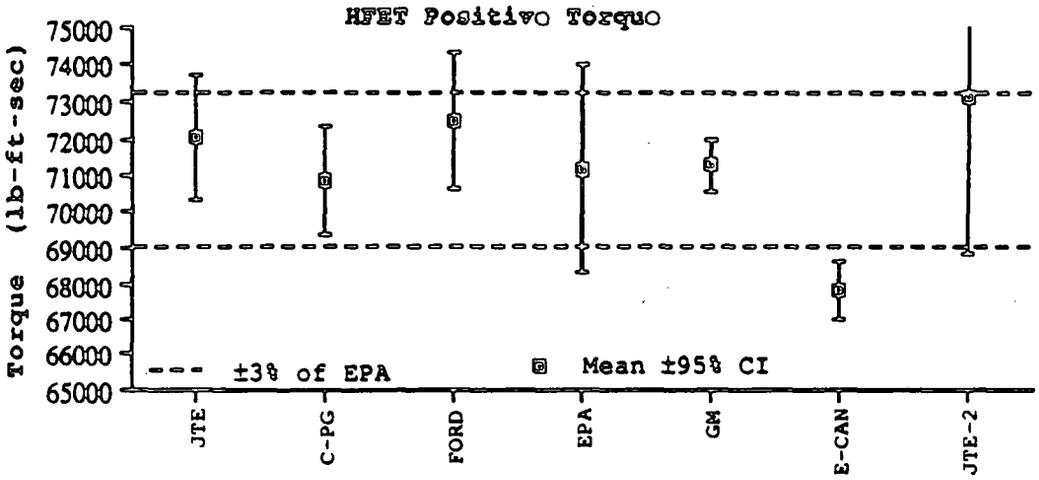


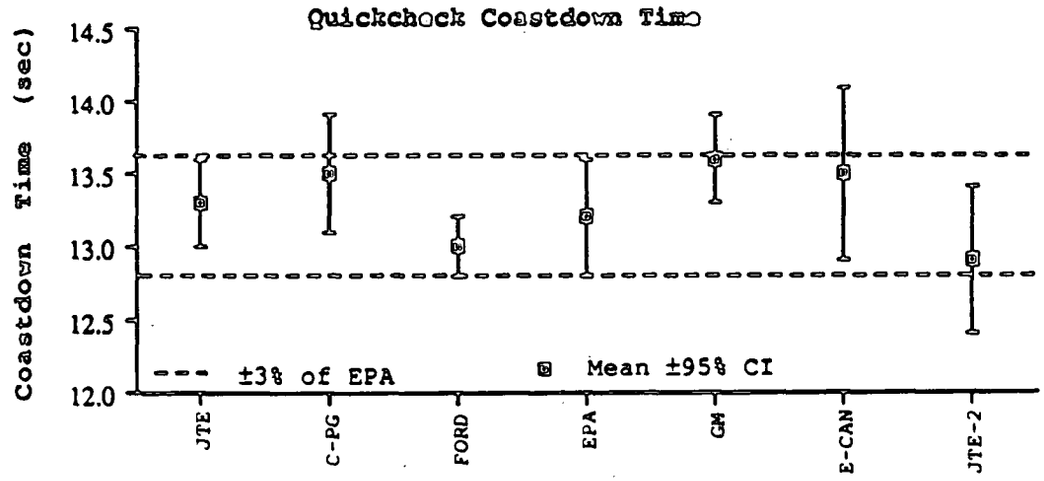


Attachment C

Fourth Quarter FY 1991
MVMA Correlation Program







ATTACHMENT D

MAXA

MYSTERY GAS ANALYSIS

3RD QUARTER 1991 — RAH 9/30/91

FACILITY	CYLINDER	CONC.	COMP.	MEAS.	RLS.RANGE	VALUE	% ERR	RLS.RANGE	VALUE	% ERR	RLS.RANGE	VALUE	% ERR
EPA	AAL2893	0.0395	CO2	%	1 R 1.0	0.0400	1.27 .	2 R 1.0	0.0390	-1.27 .			
	AAL2893	0.0395	CO2	%	1 R 2.5	0.0410	3.80 +	2 R 2.5	0.0380	-3.80 +			
	CC24883	0.6008	CO2	%	1 R 1.0	0.6020	0.20 .	2 R 1.0	0.6000	-0.13 .	EPA SITE 1 - CELLS 1 & 2		
	CC24883	0.6008	CO2	%	1 R 2.5	0.6040	0.53 .	2 R 2.5	0.5990	-0.30 .	EPA SITE 2 - CELLS 3 & 4		
	CC49330	1.1955	CO2	%	1 R 2.5	1.2000	0.38 .	2 R 2.5	1.2000	0.38 .			
	CC23175	9.348	NOX	PPM	1 R 25	9.270	-0.83 .	2 R 25	9.320	-0.30 .			
JTE	AAL2893	0.0395	CO2	%	52 R 3.5	0.0400	1.27 .	54 R 3.5	0.0400	1.27 .	55 R 3.5	0.0400	1.27 .
	CC24883	0.6008	CO2	%	52 R 3.5	0.6070	1.03 .	54 R 3.5	0.6000	-0.13 .	55 R 3.5	0.6020	0.20 .
	CC49330	1.1955	CO2	%	52 R 3.5	1.2040	0.71 .	54 R 3.5	1.1970	0.13 .	55 R 3.5	1.1990	0.29 .
	CC23175	9.348	NOX	PPM	52 R 100	9.400	0.56 .	54 R 100	9.348	0.00 .	55 R 100	9.400	0.56 .
PG	AAL2893	0.0395	CO2	%	1 R 1.0	0.0410	3.80 +	2 R 1.0	0.0390	-1.27 .	3 R 1.0	0.0390	-1.27 .
	AAL2893	0.0395	CO2	%	1 R 2.5	0.0400	1.27 .	2 R 2.5	0.0400	1.27 .	3 R 2.5	0.0390	-1.27 .
	CC24883	0.6008	CO2	%	1 R 1.0	0.6020	0.20 .	2 R 2.5	0.6060	0.87 .	3 R 2.5	0.6040	0.53 .
	CC24883	0.6008	CO2	%	1 R 2.5	0.6050	0.70 .	2 R 2.5	0.5990	-0.30 .	3 R 2.5	0.6020	0.20 .
	CC49330	1.1955	CO2	%	1 R 2.5	1.2020	0.54 .	2 R 2.5	1.2040	0.71 .	3 R 2.5	1.2090	1.13 .
	CC23175	9.348	NOX	PPM	1 R 50	9.379	0.33 .	2 R 100	9.391	0.46 .	3 R 100	9.405	0.61 .
FORD	AAL2893	0.0395	CO2	%	1 R 1.0	0.0393	-0.51 .	3 R 1.0	0.0389	-1.52 .	6 R1.0	0.0397	0.51 .
	AAL2893	0.0395	CO2	%	1 R 2.5	0.0398	0.76 .	3 R 2.5	0.0411	4.05 +	6 R 2.5	0.0406	2.78 +
	CC24883	0.6008	CO2	%	1 R 1.0	0.5990	-0.30 .	3 R 2.5	0.5999	-0.15 .	6 R 2.5	0.6037	0.48 .
	CC24883	0.6008	CO2	%	1 R 2.5	0.5990	-0.30 .	3 R 2.5	0.5964	-0.73 .	6 R 2.5	0.6006	-0.03 .
	CC49330	1.1955	CO2	%	1 R 2.5	1.1938	-0.14 .	3 R 2.5	1.1901	-0.45 .	6 R 2.5	1.1926	-0.24 .
	CC23175	9.348	NOX	PPM	1 R 50	9.4483	1.07 .	3 R 100	9.5547	2.21 +	6 R 100	9.4596	1.19 .
GM MILFORD	AAL2893	0.0395	CO2	%	4 R 1.5	0.0384	-2.78 +	9 R 1.5	0.0387	-2.13 +	3 R 1.5	0.0397	0.53 .
	AAL2893	0.0395	CO2	%	4 R 3.6	0.0418	5.72 +	9 R 3.6	0.0381	-3.49 +	3 R 3.6	0.0425	7.59 +
	CC24883	0.6008	CO2	%	4 R 1.5	0.6041	0.55 .	9 R 1.5	0.6031	0.38 .	3 R 1.5	0.6040	0.53 .
	CC24883	0.6008	CO2	%	4 R 3.6	0.6120	1.86 .	9 R 3.6	0.6026	0.29 .	3 R 3.6	0.6061	0.88 .
	CC49330	1.1955	CO2	%	4 R 3.6	1.2039	0.70 .	9 R 3.6	1.2007	0.43 .	3 R 3.6	1.1994	0.33 .
	CC23175	9.348	NOX	PPM	4 R 50	9.363	0.16 .	9 R 50	9.265	-0.89 .	3 R 50	9.181	-1.79 .
JTE RET	AAL2893	0.0395	CO2	%	52 R 3.5	0.0390	-1.27 .	54 R 3.5	0.0400	1.27 .	55 R 3.5	0.0400	1.27 .
	CC24883	0.6008	CO2	%	52 R 3.5	0.6010	0.03 .	54 R 3.5	0.6010	0.03 .	55 R 3.5	0.5960	-0.80 .
	CC49330	1.1955	CO2	%	52 R 3.5	1.1960	0.04 .	54 R 3.5	1.1970	0.13 .	55 R 3.5	1.1940	-0.13 .
	CC23175	9.348	NOX	PPM	52 R 100	9.350	0.02 .	54 R 100	9.276	-0.77 .	55 R 100	9.547	2.13 +

CALIBRATION GAS ANALYSIS FOR MAXA--3RD QUARTER 1991--
RLS. = TEST CELL ROLLS
%ERROR=TEST CELL VALUE - EPA MASTER GAS ANALYSIS/EPA MASTER GAS ANALYSIS*100%

CHRYSLER GAS ANALYSIS		INITIAL	RETURN	EPA MASTER ANALYSIS RANGE	VALUE	
AAL2893	CO2	0.0397	0.0397	R-1.0%	0.0395	= AVG OF FOUR SITE READINGS
CC8830	CO2	0.5990	0.5994	R-1.0%	0.6008	
CC49330	CO2	1.199	1.199	R-2.5%	1.1955	
CC23175	NOX	9.47	9.46	R-25	9.3480	

THE "+" MEANS VALUE IS IN EXCESS OF + OR - 2.00% OF EPA GAS VALUE

Attachment E

MVMA EMISSION FACILITY CORRELATION PROGRAM
THIRD QUARTER 1991

ARN 9/27/91

---FACILITY---	-----CVS BACKPRESSURE(IN.H2O)----				
	--- FTP ---		--- HFE ---		
	MAX	MIN	MAX	MIN	STATIC
EPA					
2 - 8/06/91	1.350	-1.000	1.000	-0.950	-0.750
1 - 8/07/91	1.600	-1.100	1.425	-0.950	-0.750
3 - 8/08/91	0.980	-1.170	1.375	-0.930	-0.730
AVERAGES	1.310	-1.030	1.267	-0.943	-0.743
JTE					
52 - 7/16/91	1.550	-0.750	1.200	-0.650	-0.375
54 - 7/17/91	1.260	-0.950	0.935	-0.830	-0.490
55 - 7/18/91	1.370	-0.830	1.000	-0.640	-0.500
AVERAGES	1.393	-0.843	1.065	-0.707	-0.455
PG - CHRYSLER					
2 - 7/23/91	1.925	-0.107	1.510	-0.025	-0.055
3 - 7/24/91	1.725	-0.360	1.565	-0.160	-0.010
1 - 7/25/91	1.940	-0.260	1.750	-0.185	0.000
AVERAGES	1.863	-0.242	1.608	-0.123	-0.022
FORD DEARBORN					
3 - 7/30/91	1.150	-1.050	0.900	-0.850	-0.750
1 - 7/31/91	1.350	-0.935	1.205	-0.735	-0.600
6 - 8/01/91	1.375	-0.965	0.975	-0.865	-0.690
AVERAGES	1.292	-0.983	1.027	-0.817	-0.680
GM MILFORD PROVING GROUNDS					
9 - 8/14/91	2.050	-0.550	2.125	-0.350	0.000
3 - 8/15/91	1.950	-0.525	1.925	-0.675	0.000
4 - 8/16/91	1.775	-0.475	1.925	-0.675	0.000
AVERAGES	1.925	-0.517	1.992	-0.567	0.000
ENVIRONMENT CANADA					
3 - 9/10/91	1.425	-0.525	1.075	-0.450	-0.500
3 - 9/12/91	1.325	-0.375	1.000	-0.250	-0.500
3 - 9/13/91	1.425	-0.400			-0.425
AVERAGES	1.392	-0.433	1.038	-0.350	-0.475
JTE RETURN					
52 - 9/24/91	1.925	-0.325	1.775	-0.275	-0.300
54 - 9/25/91	1.625	-0.325	1.775	-0.225	-0.475
55 - 9/26/91	1.825	-0.375	1.625	-0.175	-0.475
AVERAGES	1.792	-0.342	1.725	-0.225	-0.417

Engineering Operations Division
APPENDIX

LAB CORRELATION SUMMARY

PROCESSED TUE DEC 03/91 13:11:04

PROGRAM: 91 MVMA QUARTER 4 PROCEDURE:FTP VIN: MVMA-91 INERTIA WT: 2875 ACTUAL HP: 8.0

LAB	TESTDATES		FUNCTION	N	HC	CO	NOX	CO2	CFE	MFE	PTORQ	BARO	HUM	NOXFC	CDT	DB	EVAP
					|<--------- g/mi			---------->|	(mpg)	(mpg)		(in Hg)	(gr/lb)		(sec)	(degF)	(g)
JEEP/TRUCK	7/16/91	7/18/91	MEAN	3	0.417	4.25	0.559	389.1	22.40	22.84	163530	29.38	54.7	0.911	0.0	74.0	0.00
CHRYS PG	7/23/91	7/25/91	MEAN	3	0.431	4.04	0.563	392.5	22.27	22.89	161973	29.03	64.3	0.952	0.0	74.6	0.00
FORD	7/30/91	8/01/91	MEAN	3	0.416	4.52	0.587	391.7	22.26	22.52	165849	29.36	54.6	0.913	0.0	73.3	0.00
EPA	8/06/91	8/08/91	MEAN	3	0.420	4.35	0.583	394.3	22.13	23.00	163500	29.28	49.3	0.892	0.0	75.3	0.00
GM	8/16/91	8/16/91	MEAN	3	0.418	4.17	0.552	393.6	22.25	22.71	161665	28.74	48.9	0.891	0.0	76.1	0.00
ENVM'T CAN	9/10/91	9/13/91	MEAN	3	0.377	4.08	0.557	386.7	22.31	21.69	166530	29.71	57.8	0.928	0.0	72.8	0.00
R/T JEEP-T	9/24/91	9/26/91	MEAN	3	0.395	4.02	0.551	390.0	22.46	22.31	165415	29.19	51.2	0.899	0.0	73.7	0.00
JEEP/TRUCK	7/16/91	7/18/91	95 CONF	3	0.038	0.44	0.024	16.0	0.95	1.26	2773	0.38	9.9	0.042	0.0	3.7	0.00
CHRYS_PG	7/23/91	7/25/91	95 CONF	3	0.031	0.25	0.038	6.8	0.38	0.36	4423	0.05	10.9	0.045	0.0	2.8	0.00
FORD	7/30/91	8/01/91	95 CONF	3	0.054	0.37	0.052	9.4	0.56	1.41	4892	0.16	9.3	0.036	0.0	0.5	0.00
EPA	8/06/91	8/08/91	95 CONF	3	0.019	0.62	0.029	6.3	0.38	0.82	2029	0.20	2.4	0.009	0.0	2.1	0.00
GM	8/16/91	8/16/91	95 CONF	3	0.032	0.09	0.008	6.4	0.34	0.54	8841	0.10	4.2	0.016	0.0	4.5	0.00
ENVM'T_CAN	9/10/91	9/13/91	95 CONF	3	0.021	0.17	0.090	16.0	0.93	0.98	455	0.44	40.3	0.167	0.0	5.2	0.00
R/T_JEEP-T	9/24/91	9/26/91	95 CONF	3	0.020	0.28	0.041	10.6	0.60	1.58	4297	0.72	0.9	0.005	0.0	2.2	0.00
JEEP/TRUCK	7/16/91	7/18/91	STD DEV	3	0.015	0.18	0.010	6.4	0.38	0.51	1116	0.15	4.0	0.017	0.0	1.5	0.00
CHRYS_PG	7/23/91	7/25/91	STD DEV	3	0.012	0.10	0.015	2.7	0.15	0.15	1780	0.02	4.4	0.018	0.0	1.1	0.00
FORD	7/30/91	8/01/91	STD DEV	3	0.022	0.15	0.021	3.8	0.23	0.57	1969	0.06	3.8	0.014	0.0	0.2	0.00
EPA	8/06/91	8/08/91	STD DEV	3	0.008	0.25	0.012	2.5	0.15	0.33	816	0.08	1.0	0.004	0.0	0.9	0.00
GM	8/16/91	8/16/91	STD DEV	3	0.013	0.04	0.003	2.6	0.14	0.22	3558	0.04	1.7	0.006	0.0	1.8	0.00
ENVM'T_CAN	9/10/91	9/13/91	STD DEV	3	0.008	0.07	0.036	6.4	0.37	0.39	183	0.18	16.2	0.067	0.0	2.1	0.00
R/T_JEEP-T	9/24/91	9/26/91	STD DEV	3	0.008	0.11	0.017	4.3	0.24	0.64	1729	0.29	0.4	0.002	0.0	0.9	0.00
JEEP/TRUCK	7/16/91	7/18/91	% DIFF	3	-0.7	-2.3	-4.2	-1.3	1.2	-0.7	0.0	0.3	11.0	2.2	0.0	-1.7	0.0
CHRYS_PG	7/23/91	7/25/91	% DIFF	3	2.6	-7.1	-3.4	-0.5	0.6	-0.5	-0.9	-0.9	30.4	6.7	0.0	-0.9	0.0
FORD	7/30/91	8/01/91	% DIFF	3	-1.0	3.9	0.6	-0.7	0.6	-2.1	1.4	0.3	10.8	2.3	0.0	-2.7	0.0
GM	8/16/91	8/16/91	% DIFF	3	-0.6	-4.2	-5.4	-0.2	0.5	-1.3	-1.1	-1.8	-0.8	-0.1	0.0	1.1	0.0
ENVM'T_CAN	9/10/91	9/13/91	% DIFF	3	-10.2	-6.2	-4.6	-1.9	0.8	-5.7	1.9	1.5	17.2	4.1	0.0	-3.3	0.0
R/T_JEEP-T	9/24/91	9/26/91	% DIFF	3	-6.1	-7.7	-5.6	-1.1	1.5	-3.0	1.2	-0.3	3.9	0.7	0.0	-2.1	0.0
JEEP/TRUCK	7/16/91	7/18/91	% CVAR	3	3.6	4.1	1.7	1.7	1.7	2.2	0.7	0.5	7.3	1.8	0.0	2.0	0.0
CHRYS_PG	7/23/91	7/25/91	% CVAR	3	2.9	2.5	2.7	0.7	0.7	0.6	1.1	0.1	6.8	1.9	0.0	1.5	0.0
FORD	7/30/91	8/01/91	% CVAR	3	5.2	3.3	3.5	1.0	1.0	2.5	1.2	0.2	6.9	1.6	0.0	0.3	0.0
EPA	8/06/91	8/08/91	% CVAR	3	1.8	5.7	2.0	0.6	0.7	1.4	0.5	0.3	1.9	0.4	0.0	1.1	0.0
GM	8/16/91	8/16/91	% CVAR	3	3.1	0.9	0.6	0.7	0.6	1.0	2.2	0.1	3.5	0.7	0.0	2.4	0.0
ENVM'T_CAN	9/10/91	9/13/91	% CVAR	3	2.2	1.7	6.5	1.7	1.7	1.8	0.1	0.6	28.1	7.3	0.0	2.9	0.0
R/T_JEEP-T	9/24/91	9/26/91	% CVAR	3	2.1	2.8	3.0	1.1	1.1	2.9	1.0	1.0	0.7	0.2	0.0	1.2	0.0

LAB CORRELATION SUMMARY TEST DATA

PROCESSED TUE DEC 03/91 13:11:02

PROGRAM: 91 MVMA QUARTER 4 PROCEDURE:FTP VIN: MVMA-91 INERTIA WT: 2875 ACTUAL HP: 8.0

LAB	TESTDATE	TEST	DYNO	N-CH4	HC	CO	NOX	CO2	CFE	MFE	ODOM	IHP	BARO	HUM	NOXFC	CDT	DB	EVAP
				|<----------		g/mi		----------|>	(mpg)	(mpg)	(miles)	(hp)	(in Hg)	(gr/lb)		(sec)	(degF)	(g)
JEEP/TRUCK	7/16/91	701	52	0.378	0.424	4.37	0.557	396.5	21.96	23.42	42672	6.2	29.55	51.6	0.901	0.00	72.4	0.00
JEEP/TRUCK	7/17/91	703	54	0.362	0.400	4.05	0.550	386.3	22.61	22.49	42706	6.4	29.34	53.4	0.903	0.00	74.3	0.00
JEEP/TRUCK	7/18/91	705	55	0.385	0.428	4.34	0.569	384.6	22.63	22.62	42740	6.4	29.25	59.2	0.931	0.00	75.3	0.00
CHRYS PG	7/23/91	707	2	0.402	0.445	4.16	0.560	391.8	22.30	23.04	42782	6.3	29.02	66.9	0.963	0.00	75.2	0.00
CHRYS PG	7/24/91	709	3	0.382	0.421	4.00	0.550	395.5	22.10	22.87	42816	6.1	29.01	66.7	0.962	0.00	73.3	0.00
CHRYS PG	7/25/91	711	1	0.389	0.428	3.97	0.580	390.2	22.40	22.75	42849	6.2	29.05	59.2	0.931	0.00	75.3	0.00
FORD	7/30/91	713	3	0.343	0.393	4.48	0.610	389.0	22.42	23.14	42891	6.0	29.31	56.7	0.921	0.00	73.5	0.00
FORD	7/31/91	715	1	0.369	0.419	4.40	0.580	390.0	22.36	22.03	42924	6.6	29.43	56.9	0.922	0.00	73.2	0.00
FORD	8/01/91	717	6	0.386	0.436	4.69	0.570	396.0	22.00	22.39	42993	5.5	29.33	50.3	0.896	0.00	73.1	0.00
EPA	8/06/91	4681	D002	0.384	0.429	4.61	0.590	394.0	22.10	23.35	43001	6.0	29.33	48.4	0.889	0.00	75.2	0.00
EPA	8/07/91	4682	D001	0.376	0.418	4.11	0.570	392.0	22.30	22.96	43035	6.5	29.33	50.3	0.896	0.00	76.2	0.00
EPA	8/08/91	4683	D003	0.371	0.414	4.34	0.590	397.0	22.00	22.69	43069	6.1	29.19	49.2	0.892	0.00	74.5	0.00
GM	8/14/91	727	9	0.382	0.423	4.21	0.554	395.4	22.16	22.53	43147	5.5	28.79	50.8	0.898	0.00	75.6	0.00
GM	8/15/91	729	3	0.385	0.427	4.15	0.548	394.7	22.19	22.95	43184	5.9	28.72	47.5	0.886	0.00	74.6	0.00
GM	8/16/91	725	4	0.365	0.403	4.14	0.553	390.6	22.41	22.65	43219	6.3	28.72	48.4	0.889	0.00	78.1	0.00
ENVM'T CAN	9/10/91	731	3	0.000	0.384	4.14	0.595	391.8	22.02	22.09	44042	5.2	29.51	75.6	1.003	0.00	71.6	0.00
ENVM'T CAN	9/12/91	733	3	0.000	0.380	4.11	0.552	388.9	22.18	21.30	44064	5.2	29.82	54.0	0.910	0.00	75.2	0.00
ENVM'T CAN	9/13/91	735	3	0.000	0.368	4.01	0.523	379.5	22.73	21.69	44097	5.2	29.81	43.8	0.872	0.00	71.6	0.00
R/T JEEP-T	9/24/91	736	52	0.364	0.404	4.14	0.568	394.4	22.22	22.53	43392	6.2	29.51	50.9	0.897	0.00	74.7	0.00
R/T JEEP-T	9/25/91	738	54	0.351	0.389	3.91	0.535	385.9	22.70	22.81	43415	6.4	29.12	51.1	0.899	0.00	73.4	0.00
R/T JEEP-T	9/26/91	740	55	0.357	0.391	4.00	0.549	389.6	22.46	21.59	43440	6.4	28.94	51.6	0.901	0.00	73.0	0.00

LAB CORRELATION SUMMARY BAG DATA

PROCESSED TUE DEC 03/91 13:11:03

PROGRAM: 91 MVMA QUARTER 4 PROCEDURE:FTP VIN: MVMA-91 INERTIA WT: 2875 ACTUAL HP: 8.0

LAB	TEST	CH4	2	3	HC	2	3	CO	2	3	NOX	2	3	CO2	2	3	CFE	2	3
		<----------						g/mi								---------->	<---	mpg	--->
JEEP/TRUCK	701	0.063	0.039	0.044	0.938	0.269	0.332	9.26	2.91	3.44	1.252	0.298	0.521	407.9	409.9	362.7	20.9	21.4	24.1
JEEP/TRUCK	703	0.061	0.027	0.042	0.937	0.225	0.325	9.64	2.25	3.23	1.256	0.284	0.517	394.0	401.5	352.0	21.6	21.9	24.9
JEEP/TRUCK	705	0.066	0.033	0.045	0.979	0.244	0.360	10.43	2.34	3.51	1.339	0.268	0.557	400.5	396.2	350.8	21.2	22.2	24.9
CHRYS PG	707	0.063	0.034	0.045	1.002	0.261	0.371	9.66	2.40	3.33	1.290	0.280	0.520	398.4	407.0	358.2	21.4	21.7	24.5
CHRYS PG	709	0.057	0.031	0.041	0.954	0.247	0.347	9.17	2.33	3.23	1.290	0.280	0.520	409.2	408.7	360.4	20.9	21.6	24.3
CHRYS PG	711	0.059	0.030	0.043	0.995	0.244	0.349	9.40	2.15	3.31	1.330	0.300	0.550	404.9	402.9	355.0	21.1	21.9	24.7
FORD	713	0.065	0.038	0.047	0.879	0.238	0.319	10.24	2.66	3.55	1.332	0.304	0.637	397.2	403.1	355.0	21.4	21.8	24.6
FORD	715	0.065	0.039	0.047	0.929	0.256	0.341	10.27	2.53	3.51	1.304	0.297	0.535	401.2	404.3	356.2	21.2	21.8	24.6
FORD	717	0.064	0.042	0.045	0.939	0.297	0.316	10.22	2.99	3.71	1.246	0.302	0.560	407.7	409.3	361.3	21.3	21.5	24.2
EPA	4681	0.063	0.039	0.043	0.947	0.271	0.336	10.34	2.86	3.59	1.341	0.299	0.555	404.9	408.8	359.4	21.0	21.5	24.3
EPA	4682	0.063	0.034	0.041	0.978	0.239	0.332	9.76	2.28	3.31	1.283	0.282	0.574	403.9	405.6	358.6	21.1	21.7	24.4
EPA	4683	0.062	0.032	0.048	0.912	0.243	0.359	9.90	2.43	3.73	1.338	0.303	0.570	409.1	412.0	359.8	20.8	21.4	24.3
GM	727	0.061	0.032	0.043	0.940	0.253	0.353	9.69	2.38	3.52	1.245	0.302	0.505	408.8	407.1	363.2	20.9	21.7	24.2
GM	729	0.063	0.034	0.042	0.980	0.256	0.332	9.72	2.44	3.18	1.271	0.278	0.511	408.4	407.2	361.0	20.9	21.7	24.4
GM	725	0.062	0.027	0.040	0.952	0.218	0.338	10.03	2.26	3.26	1.286	0.289	0.498	404.1	403.5	357.3	21.1	21.9	24.6
ENVM'T CAN	731	0.000	0.000	0.000	0.920	0.210	0.310	10.38	2.24	3.01	1.340	0.300	0.600	412.7	403.5	353.9	20.4	21.6	24.4
ENVM'T CAN	733	0.000	0.000	0.000	0.930	0.210	0.290	10.23	2.23	3.08	1.250	0.290	0.520	423.6	397.5	346.2	19.9	21.9	25.0
ENVM'T CAN	735	0.000	0.000	0.000	0.880	0.200	0.300	9.75	2.18	3.15	1.120	0.290	0.520	401.4	388.5	345.7	21.0	22.4	25.0
R/T JEEP-T	736	0.065	0.030	0.040	0.990	0.228	0.292	10.13	2.22	3.23	1.244	0.317	0.529	405.4	407.0	362.5	21.0	21.7	24.2
R/T JEEP-T	738	0.061	0.028	0.040	0.927	0.217	0.307	9.22	2.24	3.07	1.185	0.289	0.506	399.7	397.8	353.1	21.4	22.2	24.9
R/T JEEP-T	740	0.053	0.025	0.038	0.911	0.227	0.308	9.38	2.35	3.05	1.265	0.275	0.525	402.0	401.2	358.5	21.3	22.0	24.5

LAB CORRELATION SUMMARY AUX DATA PROCESSED TUE DEC 03/91 13:11:04

PROGRAM: 91 MVMA QUARTER 4 PROCEDURE:FTP VIN: MVMA-91 INERTIA WT: 2875 ACTUAL HP: 8.0

LAB	TEST	MFE	2	3	PTORQUE	2	3	NTORQUE	2	3	DIST	2	3	VNORM	2	3	FE%	2	3
		<----- mpg		----->	<		>	<		>	<----- miles		----->						
JEEP/TR	701	0.00	23.17	23.97	0	116429	47414	0	59479	21451	3.598	3.869	3.595	0.1857	0.1853	0.1852	0.0	-8.6	0.6
JEEP/TR	703	0.00	21.54	24.74	0	116944	47513	0	59071	21698	3.604	3.874	3.612	0.1852	0.1846	0.1844	0.0	1.1	0.4
JEEP/TR	705	0.00	21.76	24.64	0	115211	47080	0	59962	21548	3.592	3.861	3.598	0.1881	0.1878	0.1877	0.0	-0.2	1.0
CHRYS P	707	0.00	22.09	25.31	0	113848	46160	0	58670	21574	3.578	3.836	3.586	0.1772	0.1763	0.1770	0.0	-2.4	-3.2
CHRYS P	709	0.00	22.07	24.70	0	116809	46670	0	58217	21620	3.593	3.843	3.592	0.1791	0.1787	0.1792	0.0	-3.7	-1.6
CHRYS P	711	0.00	21.88	24.80	0	115511	46923	0	59239	21242	3.591	3.861	3.594	0.1793	0.1783	0.1789	0.0	-1.7	-0.4
FORD	713	0.00	22.55	24.46	0	116675	47375	0	57183	20600	3.592	3.860	3.595	0.1846	0.1840	0.1845	0.0	-4.1	0.7
FORD	715	0.00	21.29	23.72	0	117916	47630	0	58683	21491	3.592	3.869	3.594	0.1858	0.1851	0.1854	0.0	0.9	3.5
FORD	717	0.00	21.62	24.16	0	119230	48723	0	55859	20497	3.599	3.852	3.592	0.1862	0.1854	0.1859	0.0	-1.2	0.1
EPA	4681	0.00	22.50	25.32	0	116281	47894	0	58129	20987	3.593	3.853	3.596	0.1863	0.1863	0.1858	0.0	-5.5	-4.0
EPA	4682	0.00	22.19	24.75	0	115427	47165	0	59825	21695	3.601	3.862	3.599	0.1850	0.1849	0.1847	0.0	-3.5	-1.4
EPA	4683	0.00	21.90	24.53	0	116858	46875	0	58358	21190	3.589	3.839	3.586	0.1915	0.1907	0.1903	0.0	-3.6	-0.9
GM	727	0.00	21.65	24.60	0	0	0	0	0	0	3.604	3.853	3.597	0.1878	0.1878	0.1876	0.0	-1.5	-1.8
GM	729	0.00	22.03	25.13	0	116701	47481	0	58774	21346	3.595	3.854	3.599	0.1869	0.1863	0.1859	0.0	-3.2	-3.1
GM	725	0.00	21.76	24.76	0	115949	43200	0	59549	21693	3.598	3.871	3.602	0.1856	0.1650	0.1846	0.0	-1.0	-0.7
ENVM'T	731	0.00	21.22	24.13	0	119047	47647	0	57527	19621	3.606	3.898	3.612	0.1822	0.1835	0.1826	0.0	-1.1	1.3
ENVM'T	733	0.00	20.34	23.63	0	118877	47688	0	58065	20873	3.611	3.914	3.609	0.1832	0.1825	0.1777	0.0	2.6	5.8
ENVM'T	735	0.00	20.85	23.69	0	118808	47524	0	57334	20860	3.608	3.903	3.603	0.1820	0.1809	0.1798	0.0	4.0	5.6
R/T JEE	736	0.00	21.64	24.60	0	116555	47613	0	59781	21751	3.600	3.856	3.604	0.1848	0.1845	0.1846	0.0	-1.2	-1.5
R/T JEE	738	0.00	22.09	24.47	0	119207	48183	0	58868	21895	3.608	3.874	3.609	0.1856	0.1852	0.1852	0.0	-1.2	1.7
R/T JEE	740	0.00	20.79	23.48	0	117037	47650	0	59715	21633	3.595	3.864	3.595	0.1890	0.1888	0.1887	0.0	4.2	4.4

LAB CORRELATION SUMMARY

PROCESSED TUE DEC 03/91 13:16:01

PROGRAM: 91 MVMA QUARTER 4 PROCEDURE:HIGHWAY VIN: MVMA-91 INERTIA WT: 2875 ACTUAL HP: 8.0

LAB	TESTDATES		FUNCTION	N	HC	CO	NOX	CO2	CFE	MFE	PTORQ	BARO	HUM	NOXFC	CDT	DB	EVAP
					|<--------- g/mi			---------->|	(mpg)	(mpg)		(in Hg)	(gr/lb)		(sec)	(degF)	(g)
JEEP/TRUCK	7/16/91	7/18/91	MEAN	3	0.176	3.34	0.547	279.0	31.25	31.43	72007	29.37	54.0	0.911	13.3	75.3	0.00
CHRYS PG	7/23/91	7/25/91	MEAN	3	0.188	3.35	0.563	278.1	31.43	31.37	70817	29.03	64.2	0.952	13.5	75.0	0.00
FORD	7/30/91	8/01/91	MEAN	3	0.177	3.63	0.637	278.7	31.25	30.66	72479	29.36	54.1	0.912	13.0	75.2	0.00
EPA	8/06/91	8/08/91	MEAN	3	0.180	3.50	0.619	281.9	30.93	31.24	71185	29.28	50.9	0.898	13.2	75.7	0.00
GM	8/13/91	8/15/91	MEAN	3	0.186	3.63	0.576	278.8	31.35	30.98	71272	28.80	48.8	0.891	13.6	76.2	0.00
ENVM'T CAN	9/10/91	9/12/91	MEAN	2	0.160	2.86	0.519	264.4	32.64	31.29	67804	29.68	75.8	1.006	13.5	79.7	0.00
R/T JEEP-T	9/24/91	9/26/91	MEAN	3	0.175	3.26	0.567	283.9	30.82	30.89	73162	29.20	52.0	0.903	12.9	74.1	0.00
JEEP/TRUCK	7/16/91	7/18/91	95 CONF	3	0.014	0.26	0.045	8.3	1.02	1.65	1707	0.37	13.4	0.053	0.3	4.2	0.00
CHRYS_PG	7/23/91	7/25/91	95 CONF	3	0.007	0.34	0.014	10.3	1.23	1.18	1481	0.07	12.5	0.053	0.4	3.2	0.00
FORD	7/30/91	8/01/91	95 CONF	3	0.014	0.57	0.014	1.4	0.21	0.69	1852	0.14	11.3	0.044	0.2	1.9	0.00
EPA	8/06/91	8/08/91	95 CONF	3	0.009	0.18	0.027	1.5	0.14	1.38	2883	0.22	1.0	0.003	0.4	2.1	0.00
GM	8/13/91	8/15/91	95 CONF	3	0.014	0.21	0.025	2.4	0.25	0.23	699	0.21	4.5	0.017	0.3	2.0	0.00
ENVM'T_CAN	9/10/91	9/12/91	95 CONF	2	0.038	1.41	0.203	17.2	1.78	4.38	794	1.84	****	0.616	0.6	57.2	0.00
R/T_JEEP-T	9/24/91	9/26/91	95 CONF	3	0.015	0.36	0.013	5.8	0.75	0.98	4285	0.67	5.5	0.021	0.5	3.1	0.00
JEEP/TRUCK	7/16/91	7/18/91	STD DEV	3	0.006	0.10	0.018	3.3	0.41	0.66	687	0.15	5.4	0.021	0.1	1.7	0.00
CHRYS_PG	7/23/91	7/25/91	STD DEV	3	0.003	0.14	0.006	4.2	0.49	0.48	596	0.03	5.0	0.021	0.2	1.3	0.00
FORD	7/30/91	8/01/91	STD DEV	3	0.006	0.23	0.006	0.6	0.09	0.28	745	0.06	4.5	0.018	0.1	0.8	0.00
EPA	8/06/91	8/08/91	STD DEV	3	0.004	0.07	0.011	0.6	0.06	0.56	1160	0.09	0.4	0.001	0.2	0.9	0.00
GM	8/13/91	8/15/91	STD DEV	3	0.006	0.09	0.010	1.0	0.10	0.09	281	0.09	1.8	0.007	0.1	0.8	0.00
ENVM'T_CAN	9/10/91	9/12/91	STD DEV	2	0.004	0.16	0.023	1.9	0.20	0.49	88	0.21	14.6	0.069	0.1	6.4	0.00
R/T_JEEP-T	9/24/91	9/26/91	STD DEV	3	0.006	0.15	0.005	2.3	0.30	0.39	1725	0.27	2.2	0.008	0.2	1.2	0.00
JEEP/TRUCK	7/16/91	7/18/91	% DIFF	3	-2.0	-4.6	-11.5	-1.0	1.0	0.6	1.2	0.3	6.1	1.4	1.0	-0.5	0.0
CHRYS_PG	7/23/91	7/25/91	% DIFF	3	4.4	-4.3	-8.9	-1.3	1.6	0.4	-0.5	-0.9	26.0	6.0	2.2	-0.8	0.0
FORD	7/30/91	8/01/91	% DIFF	3	-1.7	3.6	2.9	-1.1	1.0	-1.9	1.8	0.3	6.2	1.5	-1.3	-0.6	0.0
GM	8/13/91	8/15/91	% DIFF	3	3.5	3.5	-6.8	-1.1	1.4	-0.8	0.1	-1.6	-4.1	-0.9	2.7	0.7	0.0
ENVM'T_CAN	9/10/91	9/12/91	% DIFF	2	-11.1	-18.4	-16.1	-6.2	5.5	0.2	-4.7	1.3	48.7	12.0	2.6	5.3	0.0
R/T_JEEP-T	9/24/91	9/26/91	% DIFF	3	-2.6	-6.9	-8.4	0.7	-0.4	-1.1	2.8	-0.3	2.2	0.5	-2.1	-2.1	0.0
JEEP/TRUCK	7/16/91	7/18/91	% CVAR	3	3.3	3.1	3.3	1.2	1.3	2.1	1.0	0.5	10.0	2.3	0.9	2.2	0.0
CHRYS_PG	7/23/91	7/25/91	% CVAR	3	1.4	4.1	1.0	1.5	1.6	1.5	0.8	0.1	7.8	2.2	1.2	1.7	0.0
FORD	7/30/91	8/01/91	% CVAR	3	3.1	6.3	0.9	0.2	0.3	0.9	1.0	0.2	8.4	1.9	0.7	1.0	0.0
EPA	8/06/91	8/08/91	% CVAR	3	2.0	2.0	1.8	0.2	0.2	1.8	1.6	0.3	0.8	0.2	1.2	1.1	0.0
GM	8/13/91	8/15/91	% CVAR	3	3.0	2.4	1.8	0.4	0.3	0.3	0.4	0.3	3.7	0.7	0.9	1.1	0.0
ENVM'T_CAN	9/10/91	9/12/91	% CVAR	2	2.7	5.5	4.4	0.7	0.6	1.6	0.1	0.7	19.3	6.8	0.5	8.0	0.0
R/T_JEEP-T	9/24/91	9/26/91	% CVAR	3	3.4	4.5	0.9	0.8	1.0	1.3	2.4	0.9	4.2	0.9	1.6	1.7	0.0

LAB CORRELATION SUMMARY TEST DATA PROCESSED TUE DEC 03/91 13:16:00

PROGRAM: 91 MVMA QUARTER 4 PROCEDURE:HIGHWAY VIN: MVMA-91 INERTIA WT: 2875 ACTUAL HP: 8.0

LAB	TESTDATE	TEST	DYNO	N-CH4	HC	CO	NOX	CO2	CFE	MFE	ODOM	IHP	BARO	HUM	NOXFC	CDT	DB	EVAP
				|<----------		g/mi		----------|>	(mpg)	(mpg)	(miles)	(hp)	(in Hg)	(gr/lb)		(sec)	(degF)	(g)
JEEP/TRUCK	7/16/91	702	52	0.000	0.183	3.46	0.566	282.7	30.79	0.00	42682	6.2	29.53	49.1	0.891	13.21	73.4	0.00
JEEP/TRUCK	7/17/91	704	54	0.000	0.173	3.32	0.530	276.3	31.58	30.96	42706	6.4	29.34	53.2	0.907	13.38	76.6	0.00
JEEP/TRUCK	7/18/91	706	55	0.000	0.173	3.25	0.546	277.9	31.37	31.90	42751	6.4	29.24	59.8	0.933	13.44	75.9	0.00
CHRYS PG	7/23/91	708	2	0.000	0.186	3.23	0.560	273.4	32.00	31.73	42782	6.3	29.02	68.0	0.968	13.53	76.4	0.00
CHRYS PG	7/24/91	710	3	0.000	0.191	3.33	0.560	281.4	31.10	31.55	42816	6.1	29.01	66.1	0.960	13.66	73.8	0.00
CHRYS PG	7/25/91	712	1	0.000	0.187	3.50	0.570	279.4	31.20	30.83	42849	6.2	29.06	58.5	0.928	13.33	74.9	0.00
FORD	7/30/91	714	3	0.000	0.176	3.58	0.630	278.0	31.34	30.98	42903	6.0	29.32	53.4	0.911	12.94	76.1	0.00
FORD	7/31/91	716	1	0.000	0.172	3.43	0.640	279.0	31.25	30.48	42935	6.6	29.42	58.9	0.930	13.12	75.0	0.00
FORD	8/01/91	718	6	0.000	0.183	3.88	0.640	279.0	31.17	30.52	42993	5.5	29.33	49.9	0.894	13.04	74.6	0.00
EPA	8/06/91	4684	D002	0.000	0.183	3.58	0.607	281.1	31.00	31.80	43012	6.0	29.34	51.0	0.899	13.32	76.0	0.00
EPA	8/07/91	4685	D001	0.000	0.181	3.43	0.629	282.2	30.90	31.23	43046	6.5	29.32	51.3	0.900	13.28	76.3	0.00
EPA	8/08/91	4686	D003	0.142	0.176	3.50	0.620	282.2	30.90	30.69	43080	6.1	29.18	50.5	0.897	13.03	74.7	0.00
GM	8/13/91	726	4	0.000	0.180	3.53	0.570	278.2	31.42	30.95	43122	6.3	28.89	47.2	0.885	13.51	77.1	0.00
GM	8/14/91	728	9	0.000	0.189	3.66	0.588	279.9	31.24	30.91	43158	5.5	28.79	50.8	0.898	13.71	76.1	0.00
GM	8/15/91	730	3	0.000	0.190	3.69	0.571	278.2	31.40	31.09	43195	5.9	28.72	48.5	0.889	13.48	75.5	0.00
ENVM'T CAN	9/10/91	732	3	0.000	0.163	2.75	0.535	265.8	32.50	31.64	44053	5.2	29.53	86.1	1.055	13.50	75.2	0.00
ENVM'T CAN	9/12/91	734	3	0.000	0.157	2.97	0.503	263.1	32.78	30.95	44075	5.2	29.82	65.4	0.958	13.60	84.2	0.00
R/T JEEP-T	9/24/91	737	52	0.000	0.181	3.43	0.564	285.6	30.58	30.69	43403	6.2	29.50	49.5	0.893	13.11	75.5	0.00
R/T JEEP-T	9/25/91	739	54	0.000	0.169	3.17	0.564	281.2	31.16	31.34	43426	6.4	29.11	53.5	0.908	12.99	73.1	0.00
R/T JEEP-T	9/26/91	741	55	0.000	0.176	3.18	0.573	284.8	30.73	30.63	43451	6.4	28.98	53.1	0.907	12.70	73.7	0.00

LAB CORRELATION SUMMARY BAG DATA PROCESSED TUE DEC 03/91 13:16:01

PROGRAM: 91 MVMA QUARTER 4 PROCEDURE:HIGHWAY VIN: MVMA-91 INERTIA WT: 2875 ACTUAL HP: 8.0

LAB	TEST	CH4	2	3	HC	2	3	CO	2	3	NOX	2	3	CO2	2	3	CFE	2	3
		<----------						g/mi						---------->			<---	mpg	--->
JEEP/TRUCK	702	0.000	0.000	0.000	0.183	0.000	0.000	3.46	0.00	0.00	0.566	0.000	0.000	282.7	0.0	0.0	30.8	0.0	0.0
JEEP/TRUCK	704	0.000	0.000	0.000	0.173	0.000	0.000	3.32	0.00	0.00	0.530	0.000	0.000	276.3	0.0	0.0	31.6	0.0	0.0
JEEP/TRUCK	706	0.000	0.000	0.000	0.173	0.000	0.000	3.25	0.00	0.00	0.546	0.000	0.000	277.9	0.0	0.0	31.4	0.0	0.0
CHRYS PG	708	0.000	0.000	0.000	0.186	0.000	0.000	3.23	0.00	0.00	0.560	0.000	0.000	273.4	0.0	0.0	32.0	0.0	0.0
CHRYS PG	710	0.000	0.000	0.000	0.191	0.000	0.000	3.33	0.00	0.00	0.560	0.000	0.000	281.4	0.0	0.0	31.1	0.0	0.0
CHRYS PG	712	0.000	0.000	0.000	0.187	0.000	0.000	3.50	0.00	0.00	0.570	0.000	0.000	279.4	0.0	0.0	31.2	0.0	0.0
FORD	714	0.000	0.000	0.000	0.176	0.000	0.000	3.58	0.00	0.00	0.630	0.000	0.000	278.0	0.0	0.0	31.3	0.0	0.0
FORD	716	0.000	0.000	0.000	0.172	0.000	0.000	3.43	0.00	0.00	0.640	0.000	0.000	279.0	0.0	0.0	31.3	0.0	0.0
FORD	718	0.000	0.000	0.000	0.183	0.000	0.000	3.88	0.00	0.00	0.640	0.000	0.000	279.0	0.0	0.0	31.2	0.0	0.0
EPA	4684	0.000	0.000	0.000	0.183	0.000	0.000	3.58	0.00	0.00	0.607	0.000	0.000	281.1	0.0	0.0	31.0	0.0	0.0
EPA	4685	0.000	0.000	0.000	0.181	0.000	0.000	3.43	0.00	0.00	0.629	0.000	0.000	282.2	0.0	0.0	30.9	0.0	0.0
EPA	4686	0.034	0.000	0.000	0.176	0.000	0.000	3.50	0.00	0.00	0.620	0.000	0.000	282.2	0.0	0.0	30.9	0.0	0.0
GM	726	0.000	0.000	0.000	0.180	0.000	0.000	3.53	0.00	0.00	0.570	0.000	0.000	278.2	0.0	0.0	31.4	0.0	0.0
GM	728	0.000	0.000	0.000	0.189	0.000	0.000	3.66	0.00	0.00	0.588	0.000	0.000	279.9	0.0	0.0	31.2	0.0	0.0
GM	730	0.000	0.000	0.000	0.190	0.000	0.000	3.69	0.00	0.00	0.571	0.000	0.000	278.2	0.0	0.0	31.4	0.0	0.0
ENVM'T CAN	732	0.000	0.000	0.000	0.163	0.000	0.000	2.75	0.00	0.00	0.535	0.000	0.000	265.8	0.0	0.0	32.5	0.0	0.0
ENVM'T CAN	734	0.000	0.000	0.000	0.157	0.000	0.000	2.97	0.00	0.00	0.503	0.000	0.000	263.1	0.0	0.0	32.8	0.0	0.0
R/T JEEP-T	737	0.000	0.000	0.000	0.181	0.000	0.000	3.43	0.00	0.00	0.564	0.000	0.000	285.6	0.0	0.0	30.6	0.0	0.0
R/T JEEP-T	739	0.000	0.000	0.000	0.169	0.000	0.000	3.17	0.00	0.00	0.564	0.000	0.000	281.2	0.0	0.0	31.2	0.0	0.0
R/T JEEP-T	741	0.000	0.000	0.000	0.176	0.000	0.000	3.18	0.00	0.00	0.573	0.000	0.000	284.8	0.0	0.0	30.7	0.0	0.0

LAB CORRELATION SUMMARY AUX DATA PROCESSED TUE DEC 03/91 13:16:01

PROGRAM: 91 MVMA QUARTER 4 PROCEDURE:HIGHWAY VIN: MVMA-91 INERTIA WT: 2875 ACTUAL HP: 8.0

LAB	TEST	MFE	2	3	PTORQUE	2	3	NTORQUE	2	3	DIST	2	3	VNORM	2	3	FE%	2	3
		<-----	mpg	----->	<		>	<		>	<-----	miles	----->						
JEEP/TR	702	0.00	0.00	0.00	72640	0	0	7401	0	0	10.264	0.000	0.000	0.1832	0.0000	0.0000	0.0	0.0	0.0
JEEP/TR	704	30.96	0.00	0.00	72105	0	0	7689	0	0	10.274	0.000	0.000	0.1806	0.0000	0.0000	2.0	0.0	0.0
JEEP/TR	706	31.90	0.00	0.00	71276	0	0	7615	0	0	10.256	0.000	0.000	0.1839	0.0000	0.0000	-1.7	0.0	0.0
CHRYS P	708	31.73	0.00	0.00	70130	0	0	7612	0	0	10.247	0.000	0.000	0.1735	0.0000	0.0000	0.8	0.0	0.0
CHRYS P	710	31.55	0.00	0.00	71129	0	0	7652	0	0	10.247	0.000	0.000	0.1760	0.0000	0.0000	-1.4	0.0	0.0
CHRYS P	712	30.83	0.00	0.00	71194	0	0	7336	0	0	10.240	0.000	0.000	0.1756	0.0000	0.0000	1.2	0.0	0.0
FORD	714	30.98	0.00	0.00	72345	0	0	7385	0	0	10.250	0.000	0.000	0.1804	0.0000	0.0000	1.2	0.0	0.0
FORD	716	30.48	0.00	0.00	71810	0	0	7411	0	0	10.258	0.000	0.000	0.1815	0.0000	0.0000	2.5	0.0	0.0
FORD	718	30.52	0.00	0.00	73283	0	0	7076	0	0	10.264	0.000	0.000	0.1817	0.0000	0.0000	2.1	0.0	0.0
EPA	4684	31.80	0.00	0.00	70546	0	0	7624	0	0	10.277	0.000	0.000	0.1808	0.0000	0.0000	-2.5	0.0	0.0
EPA	4685	31.23	0.00	0.00	72525	0	0	7329	0	0	10.270	0.000	0.000	0.1807	0.0000	0.0000	-1.1	0.0	0.0
EPA	4686	30.69	0.00	0.00	70485	0	0	7449	0	0	10.239	0.000	0.000	0.1847	0.0000	0.0000	0.7	0.0	0.0
GM	726	30.95	0.00	0.00	70949	0	0	7659	0	0	10.281	0.000	0.000	0.1803	0.0000	0.0000	1.5	0.0	0.0
GM	728	30.91	0.00	0.00	71463	0	0	7594	0	0	10.270	0.000	0.000	0.1842	0.0000	0.0000	1.1	0.0	0.0
GM	730	31.09	0.00	0.00	71405	0	0	7626	0	0	10.264	0.000	0.000	0.1819	0.0000	0.0000	1.0	0.0	0.0
ENVM'T	732	31.64	0.00	0.00	67742	0	0	7649	0	0	10.217	0.000	0.000	0.1786	0.0000	0.0000	2.7	0.0	0.0
ENVM'T	734	30.95	0.00	0.00	67867	0	0	7675	0	0	10.217	0.000	0.000	0.1750	0.0000	0.0000	5.9	0.0	0.0
R/T JEE	737	30.69	0.00	0.00	71672	0	0	7853	0	0	10.248	0.000	0.000	0.1829	0.0000	0.0000	-0.4	0.0	0.0
R/T JEE	739	31.34	0.00	0.00	72762	0	0	7490	0	0	10.278	0.000	0.000	0.1816	0.0000	0.0000	-0.6	0.0	0.0
R/T JEE	741	30.63	0.00	0.00	75052	0	0	7745	0	0	10.274	0.000	0.000	0.1850	0.0000	0.0000	0.3	0.0	0.0

A-91-46
IV-B-2
Attachments

ENGINEERING OPERATIONS DIVISION
FORD CORRELATION STUDY

FTP RESULTS

DATE	LAB	DYNO	HC gpm	CO gpm	CO2 gpm	NOX gpm	CBFE mpg	MFE mpg	+WORK hp-sec
7/15/91	FORD	1	0.422	4.2	329	0.34	26.21		10907
7/17/91	FORD	1	0.416	5.7	330	0.34	25.95	25.39	
7/19/91	FORD	1	0.375	5.2	329	0.26	26.10	25.07	10902
7/31/91	FORD	1	0.349	4.8	329	0.31	26.16	25.25	11031
FORD	AVERAGE		0.391	5.0	329.3	0.31	26.11	25.24	10947
DYNO	ST. DEV.		0.035	0.6	0.5	0.04	0.11	0.16	73
1	% DIFF		0.9%	-0.2%	-0.6%	2.5%	0.6%	-0.6%	1.6%
6/28/91	FORD	3	0.351	4.2	332	0.29	26.00	25.60	11170
7/2/91	FORD	3	0.382	4.4	330	0.31	26.12	25.16	10891
7/16/91	FORD	3	0.322	4.0	329	0.23	26.26	25.80	10829
8/1/91	FORD	3	0.319	4.8	326	0.27	26.40	25.60	11061
FORD	AVERAGE		0.344	4.4	329.3	0.28	26.20	25.54	10988
DYNO	ST. DEV.		0.029	0.3	2.5	0.03	0.17	0.27	156
3	% DIFF		-11.2%	-12.7%	-0.6%	-9.8%	1.0%	0.5%	2.0%
7/3/91	FORD	6	0.379	5.6	334	0.29	25.67	25.18	11144
7/8/91	FORD	6	0.432	5.4	333	0.36	25.76	24.80	11153
7/18/91	FORD	6	0.366	5.1	331	0.24	25.96	25.21	11291
FORD	AVERAGE		0.392	5.4	332.7	0.30	25.80	25.06	11196
DYNO	ST. DEV.		0.035	0.3	1.5	0.06	0.15	0.23	82
6	% DIFF FROM EPA		1.4%	7.7%	0.4%	-2.7%	-0.6%	-1.3%	3.9%
FORD	AVERAGE		0.374	4.9	330.2	0.29	26.05	25.31	11038
ALL	ST. DEV.		0.038	0.6	2.2	0.04	0.21	0.30	152
DYNOS	% DIFF FROM EPA		-3.3%	-2.6%	-0.3%	-3.4%	0.4%	-0.4%	2.4%
FORD	AVERAGE		0.367	4.7	329.3	0.29	26.15	25.41	10970
DYNOS	ST. DEV.		0.039	0.6	1.7	0.04	0.14	0.27	120
1,3	% DIFF FROM EPA		-5.1%	-6.4%	-0.6%	-3.7%	0.8%	0.0%	1.8%

*% DIFF: PERCENT DIFFERENCE RELATIVE TO EPA AVERAGE RESULT

ENGINEERING OPERATIONS DIVISION
FORD CORRELATION STUDY

FTP RESULTS

DATE	LAB	DYNO	HC gpm	CO gpm	CO2 gpm	NOX gpm	CBFE mpg	MFE mpg	+WORK hp-sec
7/23/91	EPA	2	0.406	3.9	334	0.24	25.87	25.18	10807
7/25/91	EPA	2	0.388	5.1	329	0.28	26.11	25.61	11045
7/26/91	EPA	2	0.356	4.5	331	0.26	26.04	25.68	10965
EPA DYNO 2	AVERAGE		0.383	4.5	331.3	0.26	26.01	25.49	10939
	ST. DEV.		0.025	0.6	2.5	0.02	0.12	0.27	121
7/10/91	EPA	3	0.385	4.5	333	0.28	25.88	25.34	10577
7/11/91	EPA	3	0.377	6.2	333	0.38	25.68	25.14	10644
7/24/91	EPA	3	0.409	5.7	328	0.39	26.11	25.46	10620
EPA DYNO 3	AVERAGE		0.390	5.5	331.3	0.35	25.89	25.31	10614
	ST. DEV.		0.017	0.9	2.9	0.06	0.22	0.16	34
EPA DYNOS 2,3	AVERAGE		0.387	5.0	331.3	0.31	25.95	25.40	10776
	ST. DEV.		0.020	0.9	2.4	0.06	0.17	0.22	195

ENGINEERING OPERATIONS DIVISION
FORD CORRELATION STUDY

HFET RESULTS

DATE	LAB	DYNO	HC gpm	CO gpm	CO2 gpm	NOX gpm	CBFE mpg	MFE mpg	CDT seconds	+WORK hp-sec
7/15/91	FORD	1	0.042	0.8	243	0.07	36.14	35.19	13.34	11220
7/17/91	FORD	1	0.064	0.9	241	0.05	36.40	35.52	13.20	11258
7/19/91	FORD	1	0.053	0.9	243	0.05	36.11	35.32	13.06	11301
7/31/91	FORD	1	0.055	0.9	242	0.06	36.25	35.48	13.18	11159
FORD	AVERAGE		0.054	0.88	242.3	0.058	36.23	35.38	13.20	11235
DYNO	ST. DEV.		0.009	0.05	1.0	0.010	0.13	0.15	0.11	60
1	*% DIFF		17.4%	6.0%	-1.8%	-10.8%	1.8%	0.0%	-0.2%	1.6%
6/28/91	FORD	3	0.040	0.7	248	0.06	35.43	34.84	12.77	11405
7/2/91	FORD	3	0.049	0.8	247	0.08	35.55	34.79	13.02	10964
7/16/91	FORD	3	0.052	0.9	245	0.05	35.81	35.39	12.91	11307
8/1/91	FORD	3	0.051	0.9	244	0.05	35.96	35.26	12.95	11264
FORD	AVERAGE		0.048	0.83	246.0	0.060	35.69	35.07	12.91	11235
DYNO	ST. DEV.		0.005	0.10	1.8	0.014	0.24	0.30	0.11	190
3	*% DIFF		4.3%	0.0%	-0.3%	-7.7%	0.3%	-0.8%	-2.3%	1.6%
7/3/91	FORD	6	0.054	1.0	244	0.07	35.94	34.96	13.25	11144
7/8/91	FORD	6	0.040	0.7	243	0.06	36.16	35.27	13.25	11136
7/18/91	FORD	6	0.034	0.9	244	0.06	35.97	35.64	13.10	11624
FORD	AVERAGE		0.043	0.87	243.7	0.063	36.02	35.29	13.20	11301
DYNO	ST. DEV.		0.010	0.15	0.6	0.006	0.12	0.34	0.09	279
6	*% DIFF		-6.5%	4.8%	-1.2%	-3.1%	1.2%	-0.2%	-0.2%	2.2%
FORD	AVERAGE		0.049	0.9	244.0	0.06	35.97	35.24	13.09	11253
ALL	ST. DEV.		0.009	0.1	2.0	0.01	0.29	0.28	0.17	169
DYNOS	*% DIFF		6.5%	8.4%	-0.5%	-10.4%	0.5%	-0.6%	0.5%	2.4%

*% DIFF: PERCENT DIFFERENCE RELATIVE TO EPA AVERAGE RESULT

ENGINEERING OPERATIONS DIVISION
FORD CORRELATION STUDY

HFET RESULTS

DATE	LAB	DYNO	HC GPM	CO GPM	CO2 GPM	NOX GPM	CBFE MPG	MFE	CDT SECONDS	+WORK
7/23/91	EPA	2	0.044	0.9	249	0.06	35.25	35.25	13.43	11086
7/25/91	EPA	2	0.056	0.8	247	0.06	35.55	35.38	13.41	11107
7/26/91	EPA	2	0.038	0.8	248	0.07	35.41	35.22	13.45	11190
EPA DYNO 2	AVERAGE		0.046	0.83	248.0	0.063	35.40	35.28	13.43	11128
	ST. DEV.		0.009	0.06	1.0	0.006	0.15	0.09	0.02	55
7/10/91	EPA	3	0.060	0.9	244	0.06	35.96	35.69	13.01	11001
7/11/91	EPA	3	0.037	0.8	247	0.07	35.56	35.08	13.01	10950
7/24/91	EPA	3	0.040	0.8	245	0.07	35.84	35.57	13.03	11014
EPA DYNO 3	AVERAGE		0.046	0.83	245.3	0.067	35.79	35.45	13.02	10988
	ST. DEV.		0.013	0.06	1.5	0.006	0.21	0.32	0.01	34
EPA DYNOS 2,3	AVERAGE		0.046	0.83	246.7	0.065	35.60	35.37	13.22	11058
	ST. DEV.		0.010	0.05	1.9	0.005	0.26	0.23	0.23	87

MKR

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

ANN ARBOR, MICHIGAN 48105

August 7, 1991

OFFICE OF
AIR AND RADIATION

MEMORANDUM

SUBJECT: Quarterly Report on the FY 1991 EPA/MVMA Correlation Program

FROM: Robert Gilkey Robert Gilkey
Correlation and Engineering Services

TO: Eldert Bontekoe, Team Leader
Certification Branch

THRU: Martin Reineman, Manager MKR
Correlation and Engineering Services

Attached are the EPA and Chrysler reports of the MVMA/EPA correlation program which was run in May and June.

Our conclusions are summarized as follows:

1. Fuel economy correlation was very good.

2. A positive (manufacturers higher) emissions offset was discovered. We will attempt to clarify the cause during the next round.

If you have further questions concerning this report, please call me at x397.

Attachment

cc: R. Lawrence
J. Carpenter
B. Kolowich
J. T. White
P. Reece
D. Perkins
A. Caldwell
M. Reineman
D. Danyko
J. Marzen

Technical Report
MVMA Correlation Program
Third Quarter FY 1991

Robert Gilkey
Martin E. Reineman
August 5, 1991

Program Development & Quality Staff
U.S. Environmental Protection Agency
2565 Plymouth Road
Ann Arbor, MI 48105

Background:

This report summarizes the results of the MVMA/EPA correlation program conducted from April into June 1991. The test program was sponsored by Chrysler and is the third of four rounds scheduled in FY 1991.

Program Design:

The program was conducted with a model year 1989 Dodge 600 having front wheel drive and automatic transmission. Emission repeatability has been improved by deactivating the turbocharger and isolating the evaporative emissions canister. A catalyst bypass was installed in the vehicle to increase hot start emissions and improve its repeatability. Additional equipment on the vehicle include a mass fuel meter and torque wheels.

The test program consisted of a series of three FTP, HFET, and coastdown tests--each done on different test site at each laboratory. All tests were driven by the same Chrysler driver.

Additional measurements performed for the program were: 55 to 5 mph coastdowns (recorded in 10 mph increments), CVS backpressure, CVS tracer gas injections, and the analysis of two CO2 standards and two propane standards supplied by Chrysler.

Data Presentation:

Attachment A presents plots of FTP exhaust emissions and HFET NOx. Attachment B displays plots of FTP and HFET fuel economy. Attachment C presents FTP and HFET positive wheel torque, and the 55 to 45 mph quickcheck coastdowns. The appendix presents tabular summaries of the data collected during the program.

Due to computer problems, the HFET metered fuel economy values are deleted for the "Summary Test Data" section only. Also, the EPA torque values in all tables are deleted. All plotted data are correct. Corrections are being made to prevent these errors in the future.

Chrysler's summary of the data is provided as an attachment. Page 9 of their report presents gas cylinder concentration data. Pages 16-21 present corrected tracer gas injection data. Page 22 presents CVS backpressure data.

Discussion:

Carbon balance fuel economy correlation was very good. The coastdown results, CVS backpressure results, TGI, and gas cylinder analyses were also acceptable.

The manufacturers measured higher FTP emissions (+4% to +14% for the FTP) and slightly higher CO2 values for both the FTP and HFET than EPA. The reasons are not obvious. An attempt to clarify them will be made during the next round. The generally higher manufacturer CO2 values could be related to the fact that the EPA analysis sites were reading slightly lower CO2 relative to the EPA master bench. The JAMA correlation program run with EPA just prior to this MVMA program did not show such an emissions offset.

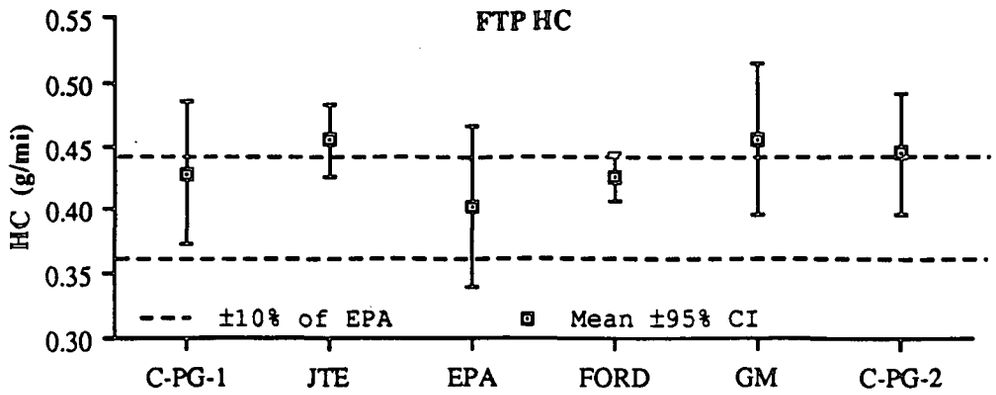
Torque values were not taken at EPA during the first test due to mechanical problems.

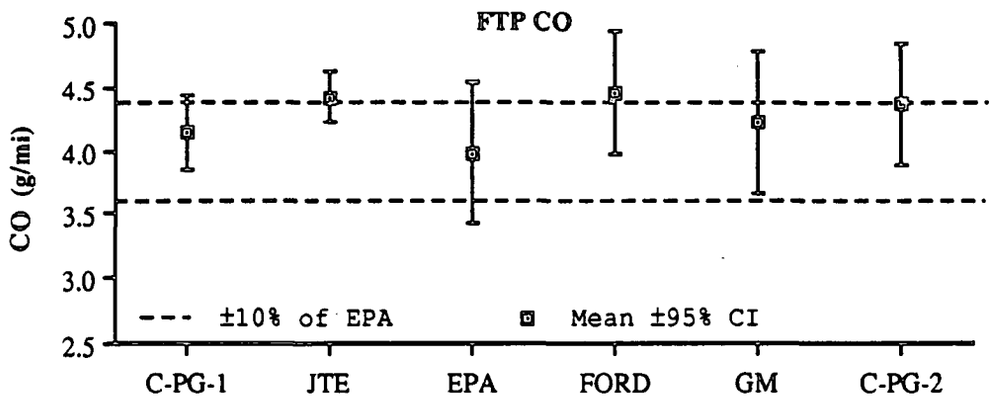
Conclusions:

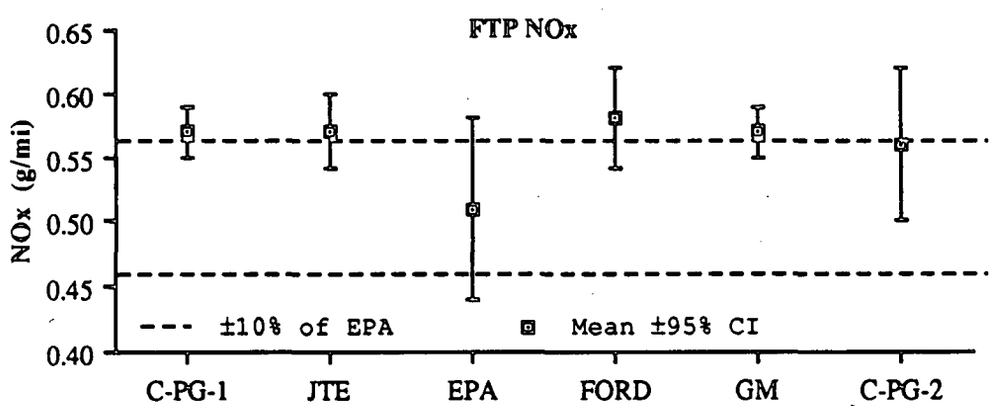
1. Fuel economy correlation was very good.

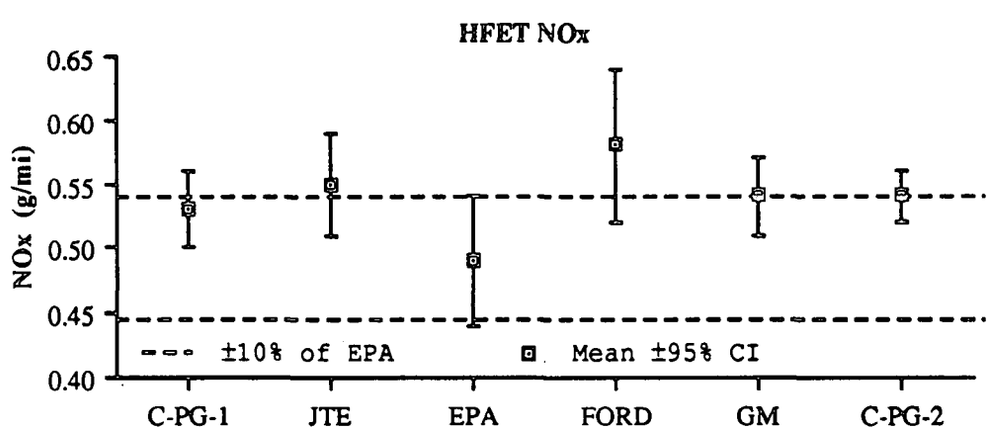
2. A positive (manufacturers higher) emissions offset was discovered. We will attempt to clarify the cause during the next round.

Third Quarter FY 1991
MVMA/EPA Correlation Program

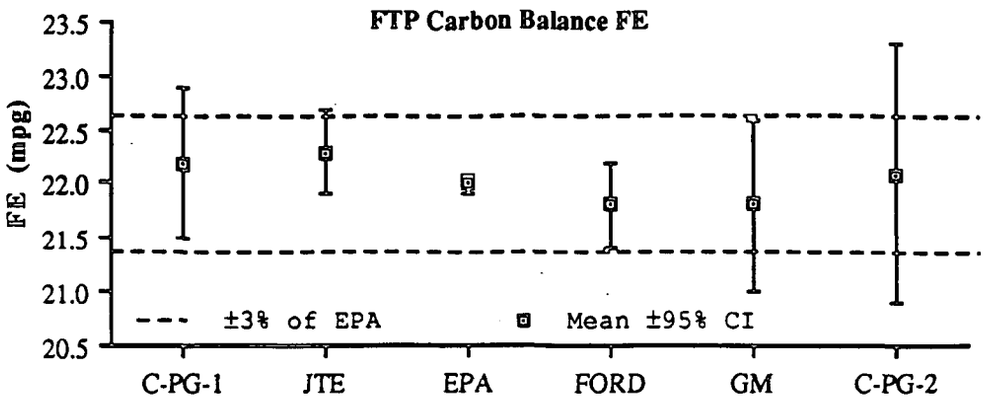


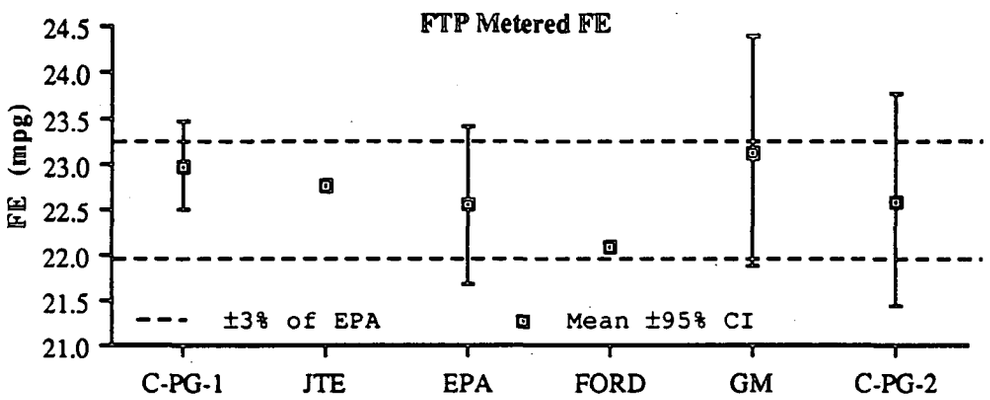


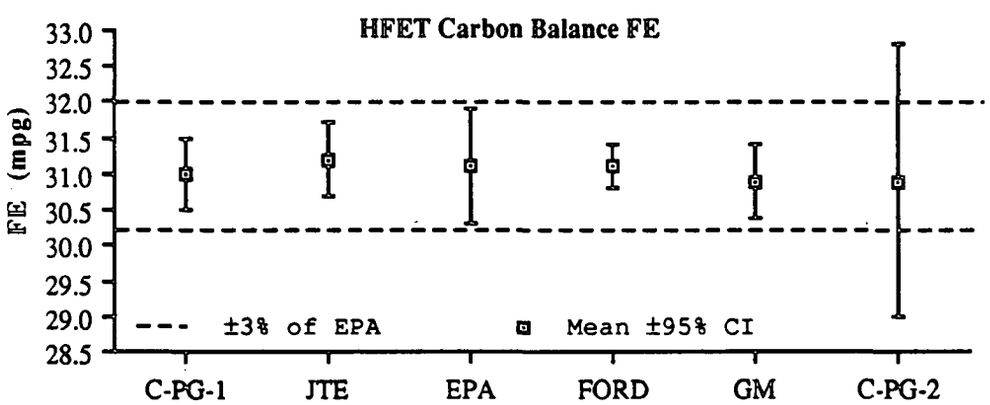


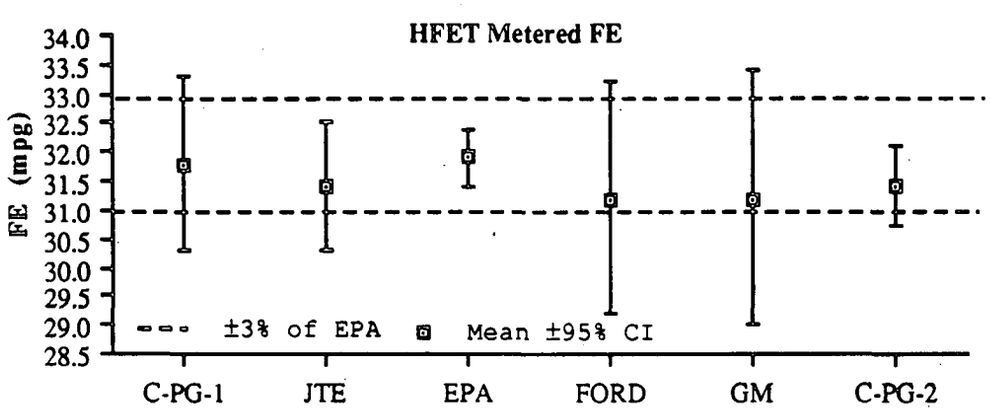


Third Quarter FY 91
MVMA/EPA Correlation Program

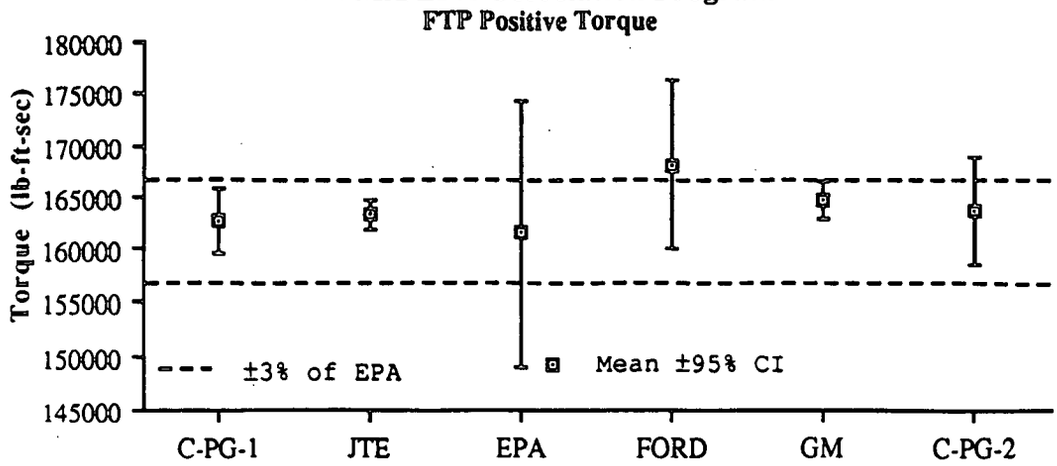


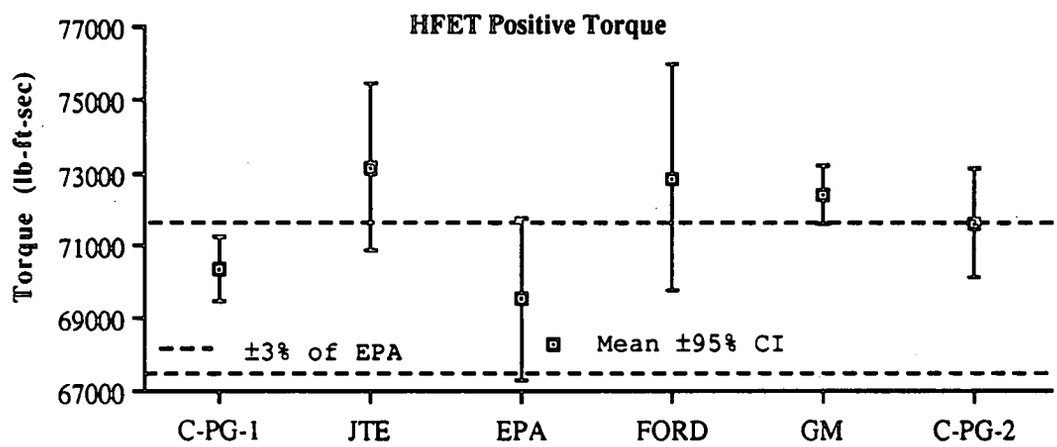


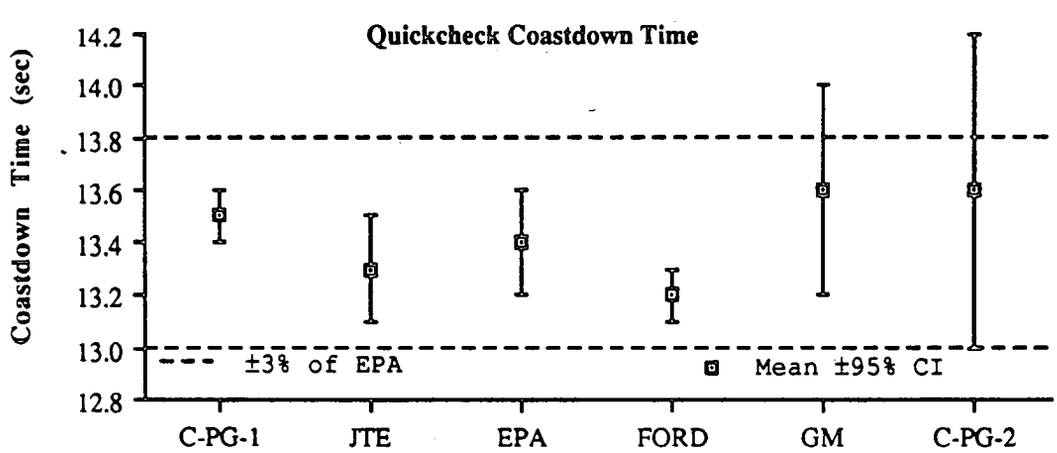




Third Quarter FY 1991
MVMA/EPA Correlation Program







Engineering Operations Division

Appendix

LAB CORRELATION SUMMARY

PROCESSED WED JUL 17/91 07:23:13

PROGRAM: 91 MVMA QUARTER 3 PROCEDURE:FTP VIN: MVMA-91 INERTIA WT: 2875 ACTUAL HP: 8.0

LAB	TESTDATES		FUNCTION	N	HC	CO	NOX	CO2	CFE	UWTD MFE	PTORQ	BARO	HUM	NOXFC	CDT	DB	EVAP
					|<--------- g/mi			---------->|	(mpg)	(mpg)		(in Hg)	(gr/lb)		(sec)	(degF)	(g)
CHRYS PG	4/23/91	4/25/91	MEAN	3	0.429	4.14	0.570	393.9	22.20	22.98	162615	28.88	52.4	0.838	0.0	76.3	0.00
JEEP/TRUCK	4/30/91	5/02/91	MEAN	3	0.455	4.42	0.569	390.8	22.34	22.76	163374	29.13	49.9	0.895	0.0	77.7	0.00
EPA	5/07/91	5/09/91	MEAN	3	0.403	3.98	0.510	393.3	22.03	22.55		29.31	46.4	0.882	0.0	75.1	0.00
FORD	5/14/91	5/17/91	MEAN	3	0.427	4.46	0.580	398.4	21.80	22.09	168132	29.21	57.7	0.925	0.0	73.2	0.00
GM	5/22/91	5/29/91	MEAN	3	0.455	4.22	0.568	401.0	21.79	23.12	164756	28.89	51.6	0.901	0.0	73.4	0.00
CHRYS PG-R	6/04/91	6/06/91	MEAN	3	0.444	4.37	0.563	396.1	22.07	22.60	163671	29.23	56.9	0.922	0.0	74.7	0.00
CHRYS_PG	4/23/91	4/25/91	95 CONF	3	0.056	0.30	0.025	11.2	0.66	0.48	3225	0.67	14.8	0.243	0.0	7.8	0.00
JEEP/TRUCK	4/30/91	5/02/91	95 CONF	3	0.028	0.20	0.031	5.7	0.37	0.02	1444	0.23	4.9	0.019	0.0	5.1	0.00
EPA	5/07/91	5/09/91	95 CONF	3	0.063	0.55	0.066	2.9	0.14	0.87		0.36	6.6	0.024	0.0	2.3	0.00
FORD	5/14/91	5/17/91	95 CONF	3	0.019	0.48	0.038	7.4	0.43	0.07	8167	0.17	5.4	0.022	0.0	1.9	0.00
GM	5/22/91	5/29/91	95 CONF	3	0.059	0.57	0.024	15.5	0.78	1.25	1773	0.22	7.2	0.029	0.0	2.2	0.00
CHRYS_PG-R	6/04/91	6/06/91	95 CONF	3	0.048	0.48	0.063	22.3	1.17	1.17	5212	0.36	15.2	0.062	0.0	6.7	0.00
CHRYS_PG	4/23/91	4/25/91	STD DEV	3	0.023	0.12	0.010	4.5	0.26	0.19	1298	0.27	5.9	0.098	0.0	3.1	0.00
JEEP/TRUCK	4/30/91	5/02/91	STD DEV	3	0.011	0.08	0.013	2.3	0.15	0.01	581	0.09	2.0	0.008	0.0	2.1	0.00
EPA	5/07/91	5/09/91	STD DEV	3	0.025	0.22	0.026	1.2	0.06	0.35		0.15	2.7	0.010	0.0	0.9	0.00
FORD	5/14/91	5/17/91	STD DEV	3	0.008	0.19	0.015	3.0	0.17	0.03	3287	0.07	2.2	0.009	0.0	0.8	0.00
GM	5/22/91	5/29/91	STD DEV	3	0.024	0.23	0.010	6.2	0.31	0.50	714	0.09	2.9	0.012	0.0	0.9	0.00
CHRYS_PG-R	6/04/91	6/06/91	STD DEV	3	0.019	0.19	0.025	9.0	0.47	0.47	2097	0.15	6.1	0.025	0.0	2.7	0.00
CHRYS_PG	4/23/91	4/25/91	% DIFF	3	6.5	4.2	11.8	0.1	0.8	1.9	-25.9	-1.5	13.0	-5.0	0.0	1.6	0.0
JEEP/TRUCK	4/30/91	5/02/91	% DIFF	3	12.9	11.2	11.6	-0.6	1.4	1.0	-25.6	-0.6	7.6	1.5	0.0	3.5	0.0
FORD	5/14/91	5/17/91	% DIFF	3	5.9	12.2	13.7	1.3	-1.1	-2.0	-23.4	-0.3	24.3	4.9	0.0	-2.5	0.0
GM	5/22/91	5/29/91	% DIFF	3	12.9	6.0	11.4	2.0	-1.1	2.5	-25.0	-1.4	11.1	2.2	0.0	-2.3	0.0
CHRYS_PG-R	6/04/91	6/06/91	% DIFF	3	10.3	10.0	10.5	0.7	0.2	0.2	-25.4	-0.3	22.7	4.6	0.0	-0.6	0.0
CHRYS_PG	4/23/91	4/25/91	% CVAR	3	5.2	2.9	1.8	1.1	1.2	0.8	0.8	0.9	11.3	11.7	0.0	4.1	0.0
JEEP/TRUCK	4/30/91	5/02/91	% CVAR	3	2.5	1.8	2.2	0.6	0.7	0.0	0.4	0.3	4.0	0.8	0.0	2.6	0.0
EPA	5/07/91	5/09/91	% CVAR	3	6.3	5.6	5.2	0.3	0.3	1.6		0.5	5.7	1.1	0.0	1.2	0.0
FORD	5/14/91	5/17/91	% CVAR	3	1.8	4.3	2.6	0.7	0.8	0.1	2.0	0.2	3.8	0.9	0.0	1.1	0.0
GM	5/22/91	5/29/91	% CVAR	3	5.2	5.4	1.7	1.6	1.4	2.2	0.4	0.3	5.7	1.3	0.0	1.2	0.0
CHRYS_PG-R	6/04/91	6/06/91	% CVAR	3	4.4	4.4	4.5	2.3	2.1	2.1	1.3	0.5	10.8	2.7	0.0	3.6	0.0

LAB CORRELATION SUMMARY TEST DATA PROCESSED WED JUL 17/91 07:23:12

PROGRAM: 91 MVMA QUARTER 3 PROCEDURE:FTP VIN: MVMA-91 INERTIA WT: 2875 ACTUAL HP: 8.0

LAB	TESTDATE	TEST	DYNO	N-CH4	HC	CO	NOX	CO2	CFE	MFE	ODOM	IHP	BARO	HUM	NOXFC	CDT	DB	EVAP
				|<----------		g/mi		----------|>	(mpg)	(mpg)	(miles)	(hp)	(in Hg)	(gr/lb)		(sec)	(degF)	(g)
CHRYS PG	4/23/91	601	1	0.407	0.451	4.27	0.560	388.9	22.50	0.00	40909	6.2	28.62	46.1	0.880	0.00	75.4	0.00
CHRYS PG	4/24/91	603	4	0.392	0.430	4.13	0.580	395.2	22.10	23.11	40944	6.0	28.86	53.3	0.907	0.00	79.8	0.00
CHRYS PG	4/25/91	605	6	0.367	0.406	4.03	0.570	397.6	22.00	22.84	41002	6.1	29.16	57.9	0.726	0.00	73.7	0.00
JEEP/TRUCK	4/30/91	607	61	0.422	0.468	4.43	0.556	393.1	22.21	22.77	41057	6.2	29.11	50.6	0.897	0.00	77.7	0.00
JEEP/TRUCK	5/01/91	609	52	0.405	0.450	4.34	0.571	388.5	22.50	22.75	41100	6.3	29.05	51.5	0.900	0.00	79.8	0.00
JEEP/TRUCK	5/02/91	611	55	0.399	0.447	4.50	0.581	390.8	22.31	22.76	41134	6.4	29.23	47.7	0.886	0.00	75.7	0.00
EPA	5/07/91	3296	D001	0.383	0.431	4.23	0.480	394.0	22.00	22.84	41176	6.5	29.16	49.4	0.893	0.00	76.1	0.00
EPA	5/08/91	3297	D003	0.343	0.382	3.88	0.520	392.0	22.10	22.64	41215	6.1	29.45	44.3	0.874	0.00	75.0	0.00
EPA	5/09/91	3364	D005	0.356	0.396	3.82	0.530	394.0	22.00	22.16	41250	6.0	29.32	45.5	0.878	0.00	74.3	0.00
FORD	5/14/91	619	1	0.382	0.432	4.65	0.582	395.9	21.95	22.07	41304	6.3	29.17	60.1	0.935	0.00	72.6	0.00
FORD	5/16/91	621	2	0.372	0.418	4.26	0.564	397.6	21.84	22.08	41361	5.8	29.29	55.9	0.918	0.00	74.1	0.00
FORD	5/17/91	623	6	0.381	0.430	4.48	0.594	401.7	21.61	22.12	41416	5.6	29.17	57.0	0.922	0.00	73.0	0.00
GM	5/22/91	625	8	0.396	0.437	4.10	0.579	403.8	21.66	23.07	41497	5.7	28.96	51.9	0.902	0.00	74.0	0.00
GM	5/23/91	627	3	0.402	0.446	4.07	0.565	405.4	21.57	23.64	41533	5.9	28.92	48.5	0.889	0.00	72.4	0.00
GM	5/29/91	629	4	0.433	0.482	4.48	0.560	393.9	22.15	22.64	41577	6.3	28.79	54.3	0.912	0.00	73.9	0.00
CHRYS PG-R	6/04/91	631	4	0.412	0.457	4.58	0.560	403.5	21.70	22.40	41622	6.0	29.08	53.8	0.910	0.00	73.9	0.00
CHRYS PG-R	6/05/91	633	3	0.411	0.454	4.34	0.590	398.7	21.90	22.25	41656	6.4	29.23	64.0	0.951	0.00	77.7	0.00
CHRYS PG-R	6/06/91	635	6	0.379	0.422	4.20	0.540	386.1	22.60	23.13	41692	6.1	29.37	53.0	0.906	0.00	72.5	0.00

LAB CORRELATION SUMMARY BAG DATA PROCESSED WED JUL 17/91 07:23:12

PROGRAM: 91 MVMA QUARTER 3 PROCEDURE:FTP VIN: MVMA-91 INERTIA WT: 2875 ACTUAL HP: 8.0

LAB	TEST	CH4	2	3	HC	2	3	CO	2	3	NOX	2	3	CO2	2	3	CFE	2	3
		<---						g/mi								--->	<---	mpg	--->
CHRYS PG	601	0.066	0.036	0.044	1.001	0.268	0.383	9.73	2.53	3.44	1.290	0.290	0.520	404.5	397.9	360.1	21.1	22.2	24.3
CHRYS PG	603	0.064	0.026	0.043	0.993	0.234	0.376	1.99	2.16	3.41	1.320	0.290	0.560	409.0	407.0	362.6	20.9	21.7	24.2
CHRYS PG	605	0.064	0.026	0.044	0.961	0.220	0.339	9.58	2.23	3.23	1.340	0.280	0.540	413.3	407.9	366.4	20.7	21.7	24.0
JEEP/TRUCK	607	0.066	0.041	0.042	1.068	0.293	0.346	10.35	2.80	3.04	1.320	0.285	0.489	401.0	408.7	357.8	21.2	21.5	24.5
JEEP/TRUCK	609	0.064	0.036	0.046	1.013	0.276	0.354	9.35	2.64	3.78	1.373	0.275	0.526	400.1	400.5	357.0	21.3	22.0	24.5
JEEP/TRUCK	611	0.063	0.042	0.047	0.934	0.281	0.392	9.54	2.98	3.69	1.370	0.269	0.565	398.4	404.8	358.6	21.4	21.7	24.4
EPA	3296	0.073	0.037	0.049	0.990	0.245	0.359	9.66	2.51	3.38	1.197	0.190	0.497	404.7	409.0	358.3	20.9	21.4	24.2
EPA	3297	0.065	0.026	0.042	0.930	0.197	0.316	9.55	2.06	3.04	1.206	0.271	0.487	407.3	405.8	356.4	20.8	21.6	24.4
EPA	3364	0.061	0.029	0.045	0.892	0.219	0.355	9.10	2.16	2.97	1.260	0.263	0.488	405.0	407.2	359.2	20.9	21.5	24.2
FORD	619	0.072	0.044	0.046	0.955	0.278	0.327	10.39	2.94	3.55	1.354	0.298	0.540	409.5	407.8	362.9	20.7	21.5	24.0
FORD	621	0.073	0.034	0.048	0.994	0.239	0.320	9.81	2.40	3.60	1.321	0.285	0.519	408.3	410.8	364.5	20.8	21.4	23.9
FORD	623	0.068	0.043	0.046	0.959	0.271	0.330	9.67	2.94	3.47	1.391	0.301	0.545	415.7	414.4	367.2	20.4	21.1	23.7
GM	625	0.068	0.030	0.042	1.006	0.248	0.362	10.19	2.34	2.84	1.361	0.289	0.536	416.2	417.5	368.8	20.5	21.1	23.8
GM	627	0.065	0.036	0.044	0.988	0.277	0.357	9.61	2.45	2.95	1.355	0.287	0.493	417.5	419.2	370.2	20.5	21.0	23.7
GM	629	0.068	0.042	0.047	1.052	0.294	0.409	9.87	2.76	3.67	1.319	0.283	0.526	406.9	405.6	361.7	20.9	21.7	24.2
CHRYS PG-R	631	0.065	0.038	0.043	1.000	0.282	0.378	10.23	2.85	3.59	1.300	0.280	0.520	418.5	416.9	366.9	20.4	21.1	23.9
CHRYS PG-R	633	0.065	0.033	0.043	1.072	0.259	0.352	9.84	2.67	3.32	1.370	0.300	0.540	404.6	413.7	366.2	21.1	21.3	24.0
CHRYS PG-R	635	0.064	0.032	0.045	0.973	0.234	0.361	9.45	2.39	3.67	1.250	0.280	0.500	407.2	391.8	359.5	21.0	22.5	24.4

LAB CORRELATION SUMMARY AUX DATA PROCESSED WED JUL 17/91 07:23:13

PROGRAM: 91 MVMA QUARTER 3 PROCEDURE:FTP VIN: MVMA-91 INERTIA WT: 2875 ACTUAL HP: 8.0

LAB	TEST	MFE	2	3	PTORQUE	2	3	NTORQUE	2	3	DIST	2	3	VNORM	2	3	FE%	2	3
		<----- mpg		----->	<		>	<		>	<----- miles		----->						
CHRYS P	601	0.00	0.00	0.00	0	116025	47171	0	60308	22251	3.584	3.873	3.600	0.1790	0.1784	0.1789	0.0	0.0	0.0
CHRYS P	603	0.00	22.31	24.99	0	115704	47818	0	60504	22223	3.592	3.854	3.598	0.1783	0.1776	0.1781	0.0	-4.5	-3.1
CHRYS P	605	0.00	22.21	24.27	0	114616	46512	0	60571	22200	3.584	3.861	3.582	0.1790	0.1781	0.1787	0.0	-4.5	-1.1
JEEP/TR	607	0.00	21.93	24.76	0	117125	46328	0	60057	21927	3.581	3.845	3.575	0.1859	0.1857	0.1857	0.0	-2.6	-1.0
JEEP/TR	609	0.00	22.16	24.09	0	115056	47701	0	61406	22142	3.577	3.851	3.580	0.1849	0.1843	0.1846	0.0	-2.2	1.6
JEEP/TR	611	0.00	21.97	24.61	0	116445	47467	0	61746	22313	3.567	3.827	3.564	0.1878	0.1877	0.1879	0.0	-1.8	-0.9
EPA	3296	0.00	22.16	24.39	0	0	0	0	0	0	3.586	3.857	3.580	0.1873	0.1870	0.1862	0.0	-4.6	-0.8
EPA	3297	0.00	21.76	24.73	0	114442	46197	0	58506	21487	3.567	3.831	3.571	0.1881	0.1876	0.1872	0.0	-2.5	-1.3
EPA	3364	0.00	21.24	24.34	0	115800	162634	0	59283	80945	3.574	3.848	3.571	0.1864	0.1857	0.1853	0.0	-0.2	-0.6
FORD	619	0.00	21.40	23.61	0	118701	48424	0	61523	22105	3.575	3.860	3.577	0.1858	0.1850	0.1883	0.0	-1.3	1.8
FORD	621	0.00	21.64	23.05	0	117352	48115	0	58270	21382	3.580	3.848	3.575	0.1843	0.1834	0.1837	0.0	-2.6	3.7
FORD	623	0.00	21.31	24.02	0	122728	49078	0	56631	21116	3.580	3.847	3.584	0.1870	0.1859	0.1864	0.0	-2.5	-1.2
GM	625	0.00	22.54	24.24	0	116517	47758	0	60620	21999	3.573	3.835	3.575	0.1848	0.1846	0.1843	0.0	-7.7	-1.8
GM	627	0.00	22.80	25.60	0	117877	47700	0	60807	21872	3.573	3.851	3.592	0.1873	0.1868	0.1864	0.0	-9.0	-7.4
GM	629	0.00	22.01	24.09	0	117042	47376	0	60519	21827	3.589	3.872	3.592	0.1854	0.1852	0.1850	0.0	-3.1	0.3
CHRYS P	631	0.00	21.57	24.36	0	118218	47875	0	59400	21822	3.584	3.852	3.588	0.1792	0.1786	0.1790	0.0	-3.8	-1.9
CHRYS P	633	0.00	21.23	24.72	0	114977	47550	0	60448	22216	3.585	3.839	3.587	0.1791	0.1786	0.1792	0.0	-0.1	-2.9
CHRYS P	635	0.00	22.57	24.37	0	115318	47077	0	60151	21948	3.580	3.856	3.583	0.1796	0.1791	0.1795	0.0	-3.6	0.1

LAB CORRELATION SUMMARY

PROCESSED WED JUL 31/91 11:43:59

PROGRAM: 91 MVMA QUARTER 3 PROCEDURE:HIGHWAY VIN: MVMA-91 INERTIA WT: 2875 ACTUAL HP: 8.0

LAB	TESTDATES		FUNCTION	N	HC	CO	NOX	CO2	CFE	MFE	PTORQ	BARO	HUM	NOXFC	CDT	DB	EVAP
					|<--------- g/mi			---------->|	(mpg)	(mpg)		(in Hg)	(gr/lb)		(sec)	(degF)	(g)
CHRYS PG	4/23/91	4/25/91	MEAN	3	0.196	3.33	0.533	282.2	31.00	31.78	70340	28.89	45.4	0.879	13.5	75.9	0.00
JEEP/TRUCK	4/30/91	5/02/91	MEAN	3	0.195	3.39	0.548	280.2	31.18	31.39	73156	29.13	49.7	0.892	13.3	76.6	0.00
EPA	5/07/91	5/09/91	MEAN	3	0.184	3.01	0.493	278.4	31.13	31.91	69525	29.31	47.5	0.886	13.4	74.5	0.00
FORD	5/14/91	5/17/91	MEAN	3	0.185	3.31	0.581	279.4	31.13	31.16	72865	29.22	58.3	0.927	13.2	74.7	0.00
GM	5/22/91	5/29/91	MEAN	3	0.217	3.29	0.537	282.3	30.94	31.16	72426	28.89	52.3	0.904	13.6	73.6	0.00
CHRYS PG-R	6/04/91	6/06/91	MEAN	3	0.196	3.31	0.540	282.6	30.93	31.43	71619	29.24	55.4	0.916	13.6	73.2	0.00
CHRYS_PG	4/23/91	4/25/91	95 CONF	3	0.011	0.10	0.029	3.9	0.50	1.55	865	0.67	14.5	0.053	0.1	7.0	0.00
JEEP/TRUCK	4/30/91	5/02/91	95 CONF	3	0.019	0.29	0.044	3.9	0.52	1.14	2315	0.23	6.2	0.017	0.2	4.2	0.00
EPA	5/07/91	5/09/91	95 CONF	3	0.022	0.22	0.047	6.8	0.76	0.52	2211	0.34	7.0	0.025	0.2	3.2	0.00
FORD	5/14/91	5/17/91	95 CONF	3	0.036	0.36	0.059	2.4	0.34	1.98	3089	0.13	5.5	0.022	0.1	1.5	0.00
GM	5/22/91	5/29/91	95 CONF	3	0.037	0.37	0.029	4.4	0.46	2.24	818	0.22	8.7	0.032	0.4	3.7	0.00
CHRYS_PG-R	6/04/91	6/06/91	95 CONF	3	0.005	0.24	0.025	17.4	1.86	0.74	1493	0.32	14.0	0.055	0.6	5.4	0.00
CHRYS_PG	4/23/91	4/25/91	STD DEV	3	0.005	0.04	0.012	1.6	0.20	0.62	348	0.27	5.9	0.022	0.0	2.8	0.00
JEEP/TRUCK	4/30/91	5/02/91	STD DEV	3	0.008	0.12	0.018	1.6	0.21	0.46	932	0.09	2.5	0.007	0.1	1.7	0.00
EPA	5/07/91	5/09/91	STD DEV	3	0.009	0.09	0.019	2.8	0.31	0.21	890	0.14	2.8	0.010	0.1	1.3	0.00
FORD	5/14/91	5/17/91	STD DEV	3	0.015	0.14	0.024	1.0	0.14	0.80	1243	0.05	2.2	0.009	0.0	0.6	0.00
GM	5/22/91	5/29/91	STD DEV	3	0.015	0.15	0.012	1.8	0.19	0.90	329	0.09	3.5	0.013	0.2	1.5	0.00
CHRYS_PG-R	6/04/91	6/06/91	STD DEV	3	0.002	0.10	0.010	7.0	0.75	0.30	601	0.13	5.7	0.022	0.2	2.2	0.00
CHRYS_PG	4/23/91	4/25/91	% DIFF	3	6.5	10.6	8.1	1.4	-0.4	-0.4	1.2	-1.4	-4.4	-0.8	0.8	2.0	0.0
JEEP/TRUCK	4/30/91	5/02/91	% DIFF	3	6.0	12.5	11.1	0.6	0.1	-1.6	5.2	-0.6	4.6	0.8	-0.5	2.9	0.0
FORD	5/14/91	5/17/91	% DIFF	3	0.7	9.9	17.7	0.4	-0.0	-2.4	4.8	-0.3	22.6	4.7	-1.1	0.3	0.0
GM	5/22/91	5/29/91	% DIFF	3	17.9	9.2	8.8	1.4	-0.6	-2.4	4.2	-1.4	10.0	2.0	1.8	-1.2	0.0
CHRYS_PG-R	6/04/91	6/06/91	% DIFF	3	6.7	9.8	9.5	1.5	-0.6	-1.5	3.0	-0.3	16.5	3.4	1.9	-1.7	0.0
CHRYS_PG	4/23/91	4/25/91	% CVAR	3	2.3	1.2	2.2	0.6	0.6	2.0	0.5	0.9	12.9	2.4	0.3	3.7	0.0
JEEP/TRUCK	4/30/91	5/02/91	% CVAR	3	4.0	3.5	3.2	0.6	0.7	1.5	1.3	0.3	5.0	0.8	0.7	2.2	0.0
EPA	5/07/91	5/09/91	% CVAR	3	4.7	2.9	3.8	1.0	1.0	0.7	1.3	0.5	5.9	1.2	0.6	1.8	0.0
FORD	5/14/91	5/17/91	% CVAR	3	7.9	4.4	4.1	0.4	0.4	2.6	1.7	0.2	3.8	1.0	0.3	0.8	0.0
GM	5/22/91	5/29/91	% CVAR	3	6.8	4.5	2.2	0.6	0.6	2.9	0.5	0.3	6.7	1.4	1.1	2.0	0.0
CHRYS_PG-R	6/04/91	6/06/91	% CVAR	3	1.1	2.9	1.9	2.5	2.4	0.9	0.8	0.4	10.2	2.4	1.6	3.0	0.0

LAB CORRELATION SUMMARY TEST DATA PROCESSED WED JUL 31/91 11:43:58

PROGRAM: 91 MVMA QUARTER 3 PROCEDURE:HIGHWAY VIN: MVMA-91 INERTIA WT: 2875 ACTUAL HP: 8.0

LAB	TESTDATE	TEST	DYNO	N-CH4	HC	CO	NOX	CO2	CFE	MFE	ODOM	IHP	BARO	HUM	NOXFC	CDT	DB	EVAP
				|<----------		g/mi		----------|>	(mpg)	(mpg)	(miles)	(hp)	(in Hg)	(gr/lb)		(sec)	(degF)	(g)
CHRYS PG	4/23/91	602	1	0.000	0.192	3.31	0.520	280.7	31.20		40909	6.2	28.62	39.5	0.857	13.44	73.1	0.00
CHRYS PG	4/24/91	604	4	0.000	0.195	3.38	0.540	282.0	31.00		40944	6.0	28.89	51.2	0.900	13.50	78.7	0.00
CHRYS PG	4/25/91	606	6	0.000	0.201	3.31	0.540	283.8	30.80		41013	6.1	29.16	45.6	0.879	13.43	76.0	0.00
JEEP/TRUCK	4/30/91	608	61	0.000	0.186	3.25	0.528	278.4	31.42		41068	6.2	29.11	48.3	0.888	13.18	78.6	0.00
JEEP/TRUCK	5/01/91	610	52	0.000	0.199	3.45	0.554	281.3	31.06		41111	6.3	29.05	52.6	0.900	13.37	75.6	0.00
JEEP/TRUCK	5/02/91	612	55	0.000	0.200	3.46	0.562	280.8	31.05		41145	6.4	29.23	48.3	0.888	13.31	75.7	0.00
EPA	5/07/91	3298	D001	0.000	0.194	3.11	0.514	281.2	30.80		41187	6.5	29.17	49.0	0.891	13.42	75.7	0.00
EPA	5/08/91	3299	D003	0.000	0.180	2.97	0.477	275.7	31.40		41226	6.1	29.44	49.3	0.892	13.38	74.6	0.00
EPA	5/09/91	3300	D005	0.000	0.178	2.95	0.489	278.3	31.20		41261	6.0	29.32	44.3	0.874	13.26	73.1	0.00
FORD	5/14/91	620	1	0.000	0.190	3.43	0.600	279.7	31.08		41304	6.4	29.15	60.8	0.938	13.24	74.0	0.00
FORD	5/16/91	622	2	0.000	0.169	3.15	0.554	278.3	31.28		41372	5.8	29.28	56.8	0.921	13.20	75.1	0.00
FORD	5/17/91	624	6	0.000	0.197	3.36	0.588	280.2	31.02		41427	5.6	29.20	57.2	0.923	13.16	74.9	0.00
GM	5/22/91	626	8	0.000	0.200	3.13	0.530	282.6	30.94		41508	5.7	28.96	52.2	0.903	13.77	74.1	0.00
GM	5/23/91	628	3	0.000	0.226	3.32	0.530	283.9	30.75		41544	5.9	28.92	48.8	0.891	13.55	71.9	0.00
GM	5/29/91	630	4	0.000	0.225	3.42	0.550	280.4	31.12		41588	6.3	28.79	55.8	0.917	13.47	74.7	0.00
CHRYS PG-R	6/04/91	632	4	0.000	0.198	3.40	0.550	289.5	30.20		41622	6.0	29.11	53.3	0.908	13.43	74.5	0.00
CHRYS PG-R	6/05/91	634	3	0.000	0.194	3.21	0.540	275.5	31.70		41656	6.4	29.23	61.8	0.941	13.86	74.4	0.00
CHRYS PG-R	6/06/91	636	6	0.000	0.197	3.31	0.530	282.7	30.90		41692	6.1	29.37	51.1	0.899	13.54	70.7	0.00

LAB CORRELATION SUMMARY BAG DATA PROCESSED WED JUL 31/91 11:43:58

PROGRAM: 91 MVMA QUARTER 3 PROCEDURE:HIGHWAY VIN: MVMA-91 INERTIA WT: 2875 ACTUAL HP: 8.0

LAB	TEST	CH4	2	3	HC	2	3	CO	2	3	NOX	2	3	CO2	2	3	CFE	2	3
		<----------						g/mi								---------->	<---	mpg	--->
CHRYS PG	602	0.000	0.000	0.000	0.192	0.000	0.000	3.31	0.00	0.00	0.520	0.000	0.000	280.7	0.0	0.0	31.2	0.0	0.0
CHRYS PG	604	0.000	0.000	0.000	0.195	0.000	0.000	3.38	0.00	0.00	0.540	0.000	0.000	282.0	0.0	0.0	31.0	0.0	0.0
CHRYS PG	606	0.000	0.000	0.000	0.201	0.000	0.000	3.31	0.00	0.00	0.540	0.000	0.000	283.8	0.0	0.0	30.8	0.0	0.0
JEEP/TRUCK	608	0.000	0.000	0.000	0.186	0.000	0.000	3.25	0.00	0.00	0.528	0.000	0.000	278.4	0.0	0.0	31.4	0.0	0.0
JEEP/TRUCK	610	0.000	0.000	0.000	0.199	0.000	0.000	3.45	0.00	0.00	0.554	0.000	0.000	281.3	0.0	0.0	31.1	0.0	0.0
JEEP/TRUCK	612	0.000	0.000	0.000	0.200	0.000	0.000	3.46	0.00	0.00	0.562	0.000	0.000	280.8	0.0	0.0	31.1	0.0	0.0
EPA	3298	0.000	0.000	0.000	0.194	0.000	0.000	3.11	0.00	0.00	0.514	0.000	0.000	281.2	0.0	0.0	30.8	0.0	0.0
EPA	3299	0.000	0.000	0.000	0.180	0.000	0.000	2.97	0.00	0.00	0.477	0.000	0.000	275.7	0.0	0.0	31.4	0.0	0.0
EPA	3300	0.000	0.000	0.000	0.178	0.000	0.000	2.95	0.00	0.00	0.489	0.000	0.000	278.3	0.0	0.0	31.2	0.0	0.0
FORD	620	0.000	0.000	0.000	0.190	0.000	0.000	3.43	0.00	0.00	0.600	0.000	0.000	279.7	0.0	0.0	31.1	0.0	0.0
FORD	622	0.000	0.000	0.000	0.169	0.000	0.000	3.15	0.00	0.00	0.554	0.000	0.000	278.3	0.0	0.0	31.3	0.0	0.0
FORD	624	0.000	0.000	0.000	0.197	0.000	0.000	3.36	0.00	0.00	0.588	0.000	0.000	280.2	0.0	0.0	31.0	0.0	0.0
GM	626	0.000	0.000	0.000	0.200	0.000	0.000	3.13	0.00	0.00	0.530	0.000	0.000	282.6	0.0	0.0	30.9	0.0	0.0
GM	628	0.000	0.000	0.000	0.226	0.000	0.000	3.32	0.00	0.00	0.530	0.000	0.000	283.9	0.0	0.0	30.8	0.0	0.0
GM	630	0.000	0.000	0.000	0.225	0.000	0.000	3.42	0.00	0.00	0.550	0.000	0.000	280.4	0.0	0.0	31.1	0.0	0.0
CHRYS PG-R	632	0.000	0.000	0.000	0.198	0.000	0.000	3.40	0.00	0.00	0.550	0.000	0.000	289.5	0.0	0.0	30.2	0.0	0.0
CHRYS PG-R	634	0.000	0.000	0.000	0.194	0.000	0.000	3.21	0.00	0.00	0.540	0.000	0.000	275.5	0.0	0.0	31.7	0.0	0.0
CHRYS PG-R	636	0.000	0.000	0.000	0.197	0.000	0.000	3.31	0.00	0.00	0.530	0.000	0.000	282.7	0.0	0.0	30.9	0.0	0.0

LAB CORRELATION SUMMARY AUX DATA PROCESSED WED JUL 31/91 11:43:59

PROGRAM: 91 MVMA QUARTER 3 PROCEDURE:HIGHWAY VIN: MVMA-91 INERTIA WT: 2875 ACTUAL HP: 8.0

LAB	TEST	MFE	2	3	PTORQUE	2	3	NTORQUE	2	3	DIST	2	3	VNORM	2	3	FE%	2	3
		<----- mpg		----->	<		>	<		>	<----- miles		----->						
CHRYS P	602	32.19	0.00	0.00	70560	0	0	7995	0	0	10.328	0.000	0.000	0.1758	0.0000	0.0000	-3.1	0.0	0.0
CHRYS P	604	32.08	0.00	0.00	69939	0	0	7879	0	0	10.249	0.000	0.000	0.1747	0.0000	0.0000	-3.4	0.0	0.0
CHRYS P	606	31.06	0.00	0.00	70523	0	0	8137	0	0	10.231	0.000	0.000	0.1754	0.0000	0.0000	-0.8	0.0	0.0
JEEP/TR	608	31.54	0.00	0.00	74007	0	0	7591	0	0	10.220	0.000	0.000	0.1822	0.0000	0.0000	-0.4	0.0	0.0
JEEP/TR	610	31.76	0.00	0.00	72160	0	0	8032	0	0	10.234	0.000	0.000	0.1825	0.0000	0.0000	-2.2	0.0	0.0
JEEP/TR	612	30.88	0.00	0.00	73303	0	0	8188	0	0	10.209	0.000	0.000	0.1843	0.0000	0.0000	0.5	0.0	0.0
EPA	3298	31.92	0.00	0.00	0	0	0	0	0	0	10.265	0.000	0.000	0.1815	0.0000	0.0000	-3.5	0.0	0.0
EPA	3299	32.12	0.00	0.00	68896	0	0	7565	0	0	10.217	0.000	0.000	0.1826	0.0000	0.0000	-2.2	0.0	0.0
EPA	3300	31.70	0.00	0.00	70155	0	0	7591	0	0	10.227	0.000	0.000	0.1795	0.0000	0.0000	-1.6	0.0	0.0
FORD	620	30.36	0.00	0.00	72644	0	0	8079	0	0	10.257	0.000	0.000	0.1812	0.0000	0.0000	2.4	0.0	0.0
FORD	622	31.95	0.00	0.00	71748	0	0	7657	0	0	10.255	0.000	0.000	0.1799	0.0000	0.0000	-2.1	0.0	0.0
FORD	624	31.17	0.00	0.00	74205	0	0	7226	0	0	10.255	0.000	0.000	0.1818	0.0000	0.0000	-0.5	0.0	0.0
GM	626	30.63	0.00	0.00	72540	0	0	7846	0	0	10.277	0.000	0.000	0.1805	0.0000	0.0000	1.0	0.0	0.0
GM	628	32.20	0.00	0.00	72055	0	0	7959	0	0	10.263	0.000	0.000	0.1822	0.0000	0.0000	-4.5	0.0	0.0
GM	630	30.65	0.00	0.00	72684	0	0	8082	0	0	10.288	0.000	0.000	0.1810	0.0000	0.0000	1.5	0.0	0.0
CHRYS P	632	31.25	0.00	0.00	72231	0	0	7855	0	0	10.236	0.000	0.000	0.1753	0.0000	0.0000	-3.4	0.0	0.0
CHRYS P	634	31.77	0.00	0.00	71598	0	0	8159	0	0	10.265	0.000	0.000	0.1762	0.0000	0.0000	-0.2	0.0	0.0
CHRYS P	636	31.26	0.00	0.00	71029	0	0	7832	0	0	10.260	0.000	0.000	0.1764	0.0000	0.0000	-1.2	0.0	0.0

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

ANN ARBOR, MICHIGAN 48105

May 7, 1991

OFFICE OF
AIR AND RADIATION

MEMORANDUM

SUBJECT: MVMA Correlation Program, Second Quarter FY 1991

FROM: Martin E. Reineman, Manager MER
Correlation and Engineering Services

TO: Eldert Bontekoe, Team Leader
Certification Branch

Attached are the EPA and Chrysler reports of the MVMA/EPA correlation program which was run in February and March.

Our conclusions are summarized as follows:

1. No significant correlation concerns were found.

2. Fuel economy correlation between Ford and EPA using the Chrysler front wheel drive vehicle, was very good.

If you have further questions concerning this report, please call me at x430.

Attachment

cc: R. Lawrence
J. Carpenter
B. Kolowich
J.T. White
R. Gilkey
D. Perkins
D. Danyko
P. Reece
A. Caldwell
J. Marzen

0157g

Technical Report
MVMA Correlation Program
Second Quarter FY 1991

Robert K. Gilkey
Martin E. Reineman
May 1991

Program Development & Quality Staff
U.S. Environmental Protection Agency
2565 Plymouth Road
Ann Arbor, MI 48105

Background

This report summarizes the results from the MVMA/EPA correlation program conducted in February and March. The test program was similar to the previous studies sponsored by Chrysler in 1990.

Program Design

The test vehicle is a 1989 model year front wheel drive Dodge 600 with an automatic transmission. Emission levels for the vehicle have been increased by addition of a catalyst bypass. Emissions repeatability has been improved by deactivating the turbocharger and isolating the evaporative emissions canister. Additional equipment on the vehicle include a mass fuel meter and torque wheels.

The test program consisted of a three test series of FTP, HFET, and coastdowns, each done on a different test site at each laboratory. All tests were driven by the same Chrysler driver.

55 to 5 mph coastdowns (recorded in 10 mph increments), CVS backpressure measurements, and analysis of two CO2 standards supplied by Chrysler, were also performed during the program.

Data Presentation

Attachment A presents plots of FTP exhaust emissions and HFET NOX; Attachment B displays plots of FTP and HFET carbon balance fuel economy. Attachment C presents FTP and HFET positive wheel torque, and 55 - 45 mph quickcheck coastdowns. The Appendix presents tabular summaries of the data collected during the program. Chrysler's summary of the data is provided as an attachment. Page 9 of their report displays the 55 - 5 mph coastdown times and the CVS backpressure data, while page 10 summarizes the gas analyses.

Discussion

Emission and carbon balance fuel economy correlation is acceptable, as are the coastdown results, CVS backpressure results, and gas analyses.

FTP HC and CO emission results from the MVMA laboratories were 1 to 21 percent higher than EPA values. MVMA HFET HC and CO emissions were also higher than EPA emissions. NOX emissions did not exhibit this positive bias on either driving cycle. The HC and CO biases are not of a large enough magnitude to warrant special attention. These emission biases are also not observed through analysis of recent paired data.

Chrysler's fuel meter was producing erroneous results during much of the program, and therefore all metered fuel economy values were deleted from our analysis. Chrysler, however, has included in their report those tests which they believe are valid. FTP and HFET carbon balance fuel economy correlation was acceptable at all laboratories. Fuel economy differences from EPA were both positive and negative, with all participants showing fuel economy differences well within ±3 percent.

The Chrysler Chelsea laboratory reported a near two percent difference between their analysis of a 0.8 percent CO2 standard, and the concentration read by the EPA master analysis site (defined as the reference value for this program). Only one other analysis at GM showed a difference of over one percent relative to EPA. Analyses showed a good distribution of positive and negative differences, with most readings well within ±1 percent. This was also the case for EPA gas analyses at sites A001, A002 and A003.

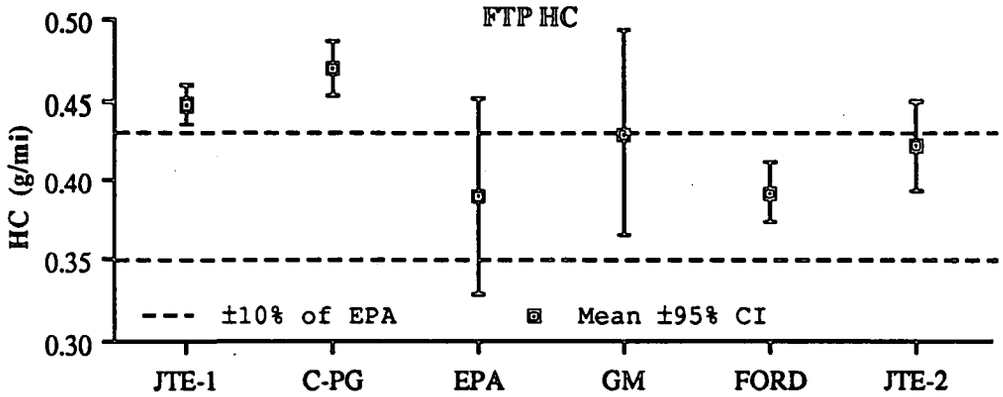
Conclusions

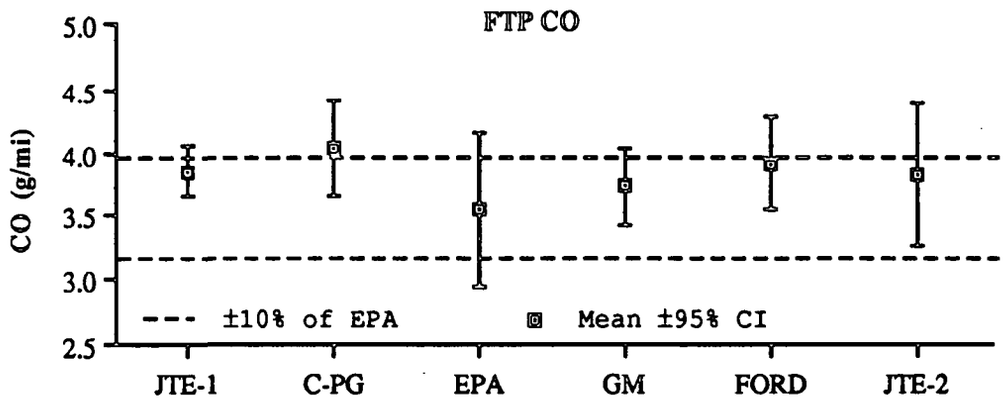
1. No significant correlation concerns were found.

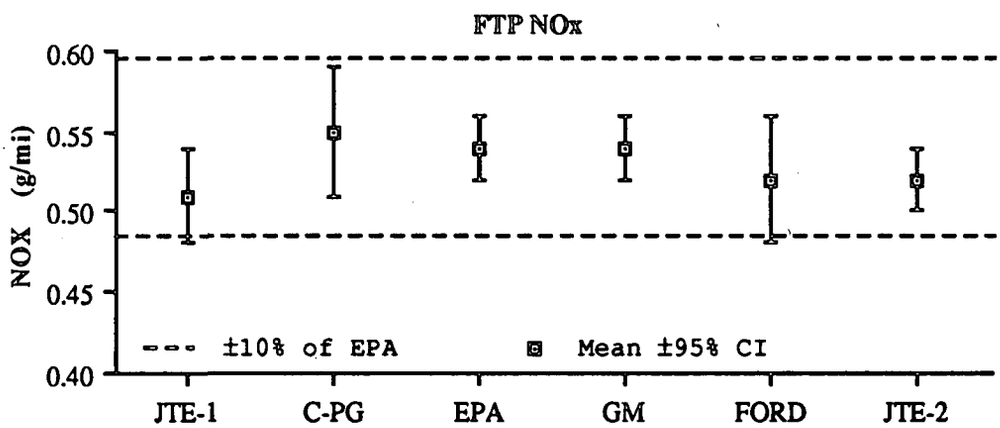
2. Fuel economy correlation between Ford and EPA using the Chrysler front wheel drive vehicle, was very good.

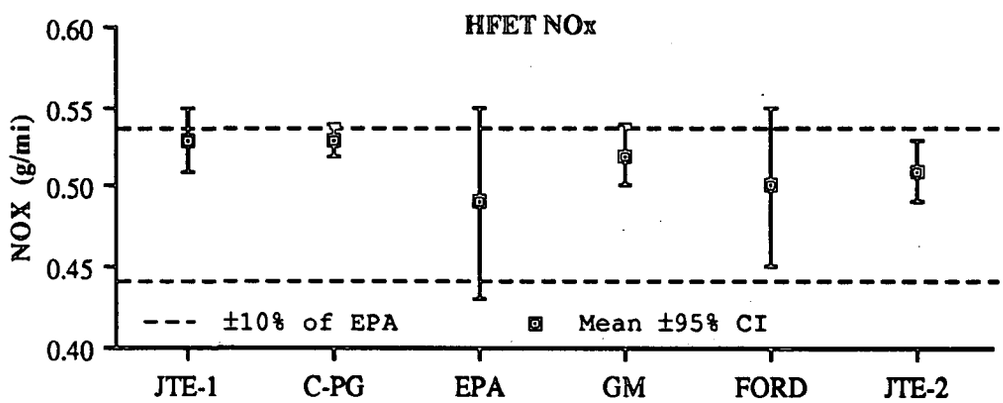
Attachment A

Second Quarter FY 1991
MVMA/EPA Correlation Program



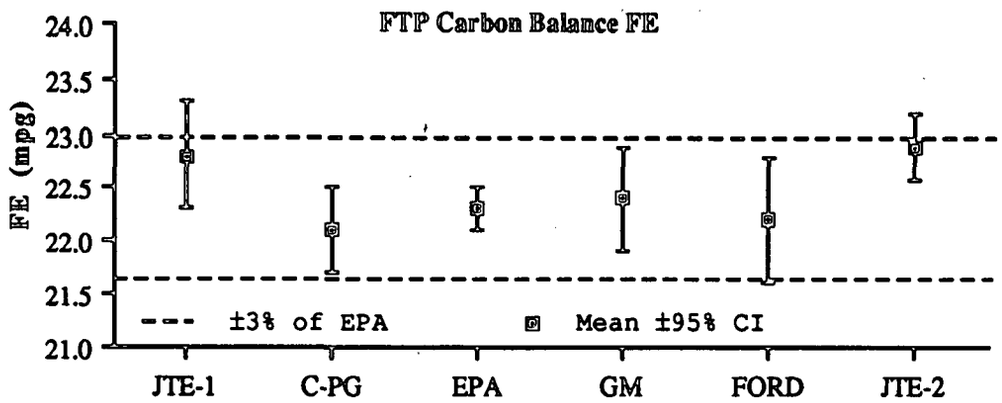


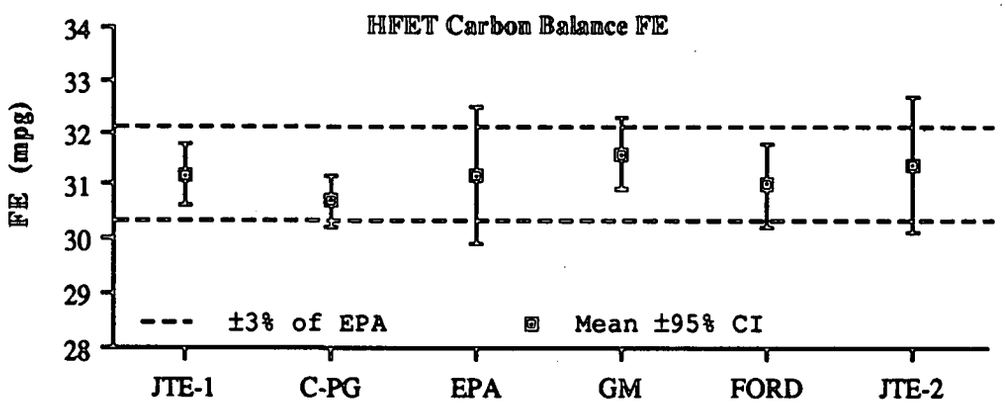




Attachment B

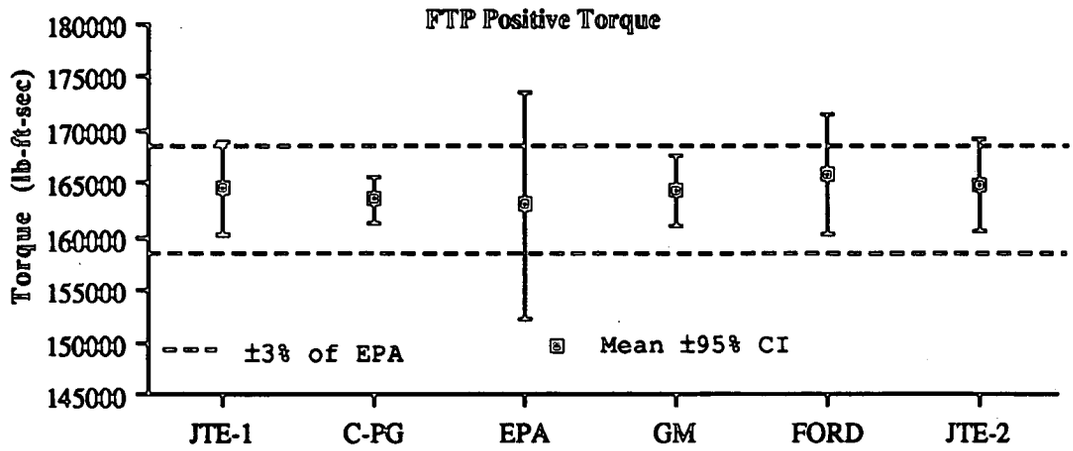
Second Quarter FY 1991
MVMA/EPA Correlation Program

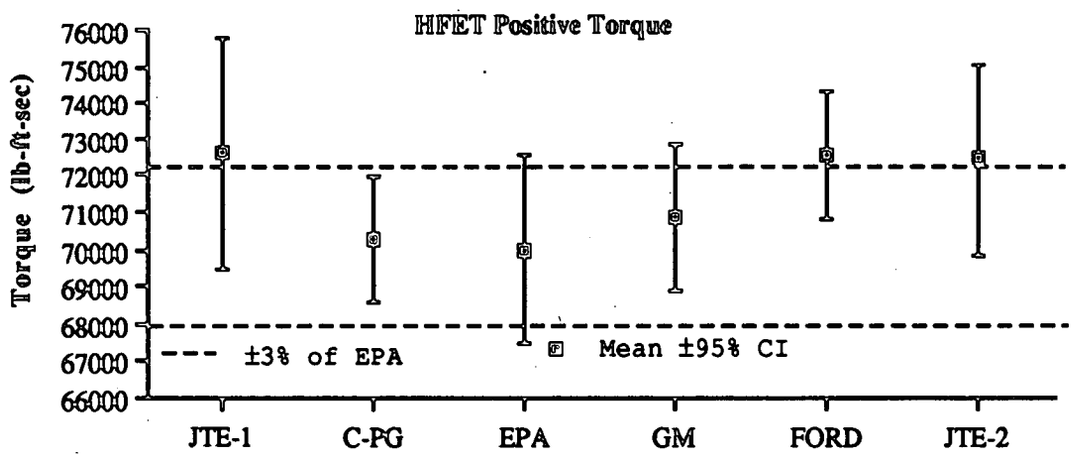


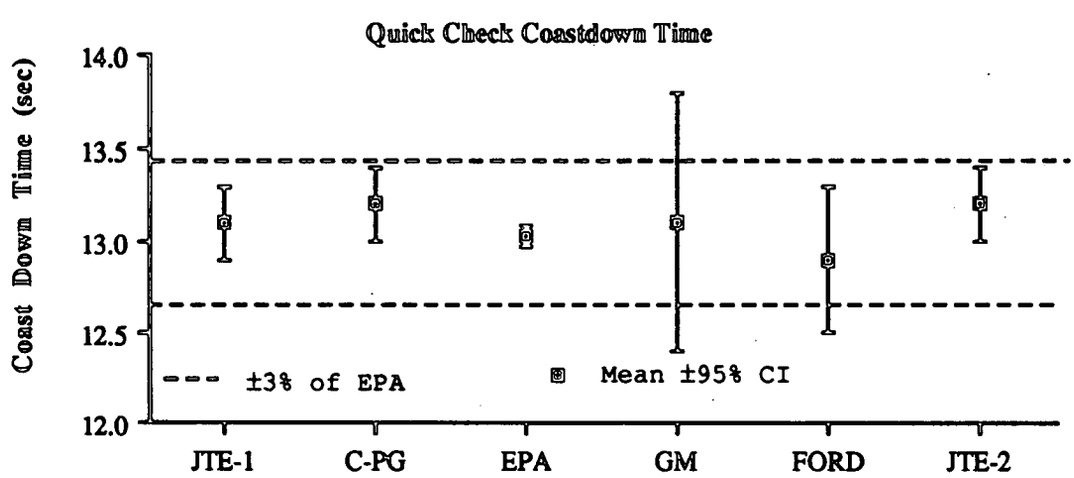


Attachment C

Second Quarter FY 1991
MVMA/EPA Correlation Program







Engineering Operations Division
APPENDIX

LAB CORRELATION SUMMARY

PROCESSED THU MAY 02/91 10:11:09

PROGRAM: 91 MVMA QUARTER 2 PROCEDURE:FTP VIN: MVMA-91 INERTIA WT: 2875 ACTUAL HP: 8.0

LAB	TESTDATES		FUNCTION	N	HC	CO	NOX	CO2	CFE	UWTD MFE	PTORQ	BARO	HUM	NOXFC	CDT	DB	EVAP
					|<--------- g/mi			---------->|	(mpg)	(mpg)		(in Hg)	(gr/lb)		(sec)	(degF)	(g)
JEEP/TRUCK	2/13/91	2/15/91	MEAN	3	0.448	3.85	0.514	382.1	22.83	0.00	164633	28.69	57.6	0.925	0.0	74.9	0.00
CHRYS PG	2/19/91	2/21/91	MEAN	3	0.470	4.04	0.553	395.8	22.10	0.00	163423	29.01	51.6	0.901	0.0	75.9	0.00
EPA	2/26/91	2/28/91	MEAN	3	0.390	3.55	0.540	389.7	22.30	0.00	162967	29.04	51.4	0.900	0.0	75.9	0.00
GM	3/05/91	3/07/91	MEAN	3	0.429	3.73	0.539	390.5	22.44	0.00	164234	28.32	49.7	0.894	0.0	74.6	0.00
FORD	3/12/91	3/15/91	MEAN	3	0.393	3.91	0.521	392.7	22.22	0.00	165780	29.43	31.4	0.830	0.0	72.9	0.00
R/T JEEP-T	3/19/91	3/21/91	MEAN	3	0.422	3.83	0.520	381.2	22.93	0.00	164797	29.14	51.7	0.898	0.0	73.9	0.00
JEEP/TRUCK	2/13/91	2/15/91	95 CONF	3	0.012	0.20	0.027	9.3	0.48	0.00	4352	0.66	13.3	0.054	0.0	2.3	0.00
CHRYS_PG	2/19/91	2/21/91	95 CONF	3	0.017	0.38	0.038	7.0	0.43	0.00	2125	0.30	6.9	0.025	0.0	4.3	0.00
EPA	2/26/91	2/28/91	95 CONF	3	0.062	0.61	0.025	3.8	0.25	0.00	10650	0.21	5.5	0.021	0.0	1.7	0.00
GM	3/05/91	3/07/91	95 CONF	3	0.064	0.30	0.016	9.4	0.55	0.00	3297	0.70	2.0	0.007	0.0	3.7	0.00
FORD	3/12/91	3/15/91	95 CONF	3	0.019	0.37	0.036	11.6	0.59	0.00	5607	0.53	14.4	0.047	0.0	1.4	0.00
R/T_JEEP-T	3/19/91	3/21/91	95 CONF	3	0.028	0.57	0.024	6.8	0.31	0.00	4338	0.35	1.4	0.019	0.0	1.2	0.00
JEEP/TRUCK	2/13/91	2/15/91	STD DEV	3	0.005	0.08	0.011	3.8	0.19	0.00	1751	0.27	5.3	0.022	0.0	0.9	0.00
CHRYS_PG	2/19/91	2/21/91	STD DEV	3	0.007	0.15	0.015	2.8	0.17	0.00	855	0.12	2.8	0.010	0.0	1.7	0.00
EPA	2/26/91	2/28/91	STD DEV	3	0.025	0.24	0.010	1.5	0.10	0.00	4287	0.09	2.2	0.008	0.0	0.7	0.00
GM	3/05/91	3/07/91	STD DEV	3	0.026	0.12	0.006	3.8	0.22	0.00	1327	0.28	0.8	0.003	0.0	1.5	0.00
FORD	3/12/91	3/15/91	STD DEV	3	0.008	0.15	0.014	4.7	0.24	0.00	2257	0.21	5.8	0.019	0.0	0.6	0.00
R/T_JEEP-T	3/19/91	3/21/91	STD DEV	3	0.011	0.23	0.010	2.7	0.13	0.00	1746	0.14	0.6	0.008	0.0	0.5	0.00
JEEP/TRUCK	2/13/91	2/15/91	% DIFF	3	14.8	8.4	-4.8	-2.0	2.4	0.0	1.0	-1.2	12.1	2.7	0.0	-1.3	0.0
CHRYS_PG	2/19/91	2/21/91	% DIFF	3	20.4	13.6	2.5	1.6	-0.9	0.0	0.3	-0.1	0.3	0.1	0.0	0.0	0.0
GM	3/05/91	3/07/91	% DIFF	3	10.0	5.1	-0.2	0.2	0.6	0.0	0.8	-2.5	-3.4	-0.7	0.0	-1.7	0.0
FORD	3/12/91	3/15/91	% DIFF	3	0.6	9.9	-3.6	0.8	-0.4	0.0	1.7	1.3	-38.9	-7.8	0.0	-4.0	0.0
R/T_JEEP-T	3/19/91	3/21/91	% DIFF	3	8.0	7.7	-3.6	-2.2	2.8	0.0	1.1	0.3	0.6	-0.2	0.0	-2.7	0.0
JEEP/TRUCK	2/13/91	2/15/91	% CVAR	3	1.1	2.1	2.2	1.0	0.8	0.0	1.1	0.9	9.3	2.4	0.0	1.2	0.0
CHRYS_PG	2/19/91	2/21/91	% CVAR	3	1.5	3.8	2.8	0.7	0.8	0.0	0.5	0.4	5.4	1.1	0.0	2.3	0.0
EPA	2/26/91	2/28/91	% CVAR	3	6.4	6.9	1.9	0.4	0.4	0.0	2.6	0.3	4.3	0.9	0.0	0.9	0.0
GM	3/05/91	3/07/91	% CVAR	3	6.0	3.3	1.2	1.0	1.0	0.0	0.8	1.0	1.6	0.3	0.0	2.0	0.0
FORD	3/12/91	3/15/91	% CVAR	3	1.9	3.8	2.8	1.2	1.1	0.0	1.4	0.7	18.5	2.3	0.0	0.8	0.0
R/T_JEEP-T	3/19/91	3/21/91	% CVAR	3	2.7	6.0	1.9	0.7	0.5	0.0	1.1	0.5	1.1	0.8	0.0	0.7	0.0

LAB CORRELATION SUMMARY TEST DATA PROCESSED THU MAY 02/91 10:11:06

PROGRAM: 91 MVMA QUARTER 2 PROCEDURE:FTP VIN: MVMA-91 INERTIA WT: 2875 ACTUAL HP: 8.0

LAB	TESTDATE	TEST	DYNO	N-CH4	HC	CO	NOX	CO2	CFE	MFE	ODOM	IHP	BARO	HUM	NOXFC	CDT	DB	EVAP
				|<----------		g/mi		----------->|	(mpg)	(mpg)	(miles)	(hp)	(in Hg)	(gr/lb)		(sec)	(degF)	(g)
JEEP/TRUCK	2/13/91	501	54	0.411	0.453	3.76	0.504	386.4	22.61	0.00	39034	6.4	28.89	54.7	0.913	0.00	73.9	0.00
JEEP/TRUCK	2/14/91	503	55	0.399	0.443	3.91	0.513	379.8	22.94	0.00	39074	6.4	28.39	63.8	0.950	0.00	75.7	0.00
JEEP/TRUCK	2/15/91	505	53	0.407	0.448	3.88	0.526	380.0	22.95	0.00	39109	5.5	28.80	54.4	0.911	0.00	75.2	0.00
CHRYS PG	2/19/91	507	6	0.428	0.474	4.12	0.550	394.2	22.20	0.00	39154	6.1	28.91	53.5	0.908	0.00	76.7	0.00
CHRYS PG	2/20/91	509	4	0.429	0.474	4.13	0.570	399.1	21.90	0.00	39199	6.0	29.14	48.4	0.889	0.00	77.1	0.00
CHRYS PG	2/21/91	511	3	0.420	0.462	3.86	0.540	394.2	22.20	0.00	39239	6.4	28.97	52.8	0.905	0.00	73.9	0.00
EPA	2/26/91	1850	D002	0.376	0.419	3.82	0.550	391.0	22.20	0.00	39285	6.0	29.14	51.2	0.899	0.00	76.4	0.00
EPA	2/27/91	1852	D003	0.333	0.372	3.50	0.540	390.0	22.30	0.00	39324	6.1	28.98	53.7	0.909	0.00	75.1	0.00
EPA	2/28/91	1854	D005	0.343	0.380	3.34	0.530	388.0	22.40	0.00	39363	6.0	29.01	49.3	0.892	0.00	76.2	0.00
GM	3/05/91	519	9	0.390	0.433	3.87	0.535	389.9	22.46	0.00	39412	5.6	28.49	50.6	0.897	0.00	74.5	0.00
GM	3/06/91	521	4	0.364	0.402	3.65	0.535	387.1	22.65	0.00	39456	6.3	27.99	49.1	0.892	0.00	73.2	0.00
GM	3/07/91	523	3	0.411	0.453	3.68	0.546	394.6	22.21	0.00	39479	5.9	28.47	49.3	0.892	0.00	76.2	0.00
FORD	3/12/91	525	5	0.353	0.396	3.99	0.528	392.9	22.19	0.00	39520	6.2	29.51	28.3	0.820	0.00	73.5	0.00
FORD	3/13/91	527	1	0.354	0.398	3.99	0.504	388.0	22.47	0.00	39545	6.3	29.19	27.8	0.818	0.00	72.7	0.00
FORD	3/15/91	529	3	0.343	0.384	3.73	0.530	397.3	22.00	0.00	39575	5.7	29.59	38.1	0.852	0.00	72.4	0.00
R/T JEEP-T	3/19/91	531	53	0.392	0.434	4.07	0.531	380.5	22.93	0.00	39590	5.9	29.13	51.7	0.901	0.00	74.1	0.00
R/T JEEP-T	3/20/91	533	54	0.376	0.419	3.80	0.512	384.2	22.80	0.00	39826	6.4	29.29	51.2	0.889	0.00	74.2	0.00
R/T JEEP-T	3/21/91	535	55	0.371	0.412	3.61	0.518	378.9	23.05	0.00	39854	6.4	29.01	52.3	0.904	0.00	73.3	0.00

LAB CORRELATION SUMMARY BAG DATA PROCESSED THU MAY 02/91 10:11:08

PROGRAM: 91 MVMA QUARTER 2 PROCEDURE:FTP VIN: MVMA-91 INERTIA WT: 2875 ACTUAL HP: 8.0

LAB	TEST	CH4	2	3	HC	2	3	CO	2	3	NOX	2	3	CO2	2	3	CFE	2	3
		<----						g/mi								---->	<---	mpg	--->
JEEP/TRUCK	501	0.066	0.031	0.044	0.996	0.277	0.372	8.99	2.03	3.04	1.145	0.263	0.473	400.8	399.2	351.7	21.3	22.1	24.9
JEEP/TRUCK	503	0.064	0.038	0.042	0.960	0.294	0.334	8.72	2.49	2.96	1.149	0.276	0.480	395.9	392.0	344.7	21.5	22.4	25.4
JEEP/TRUCK	505	0.060	0.033	0.041	0.984	0.278	0.365	9.15	2.17	3.12	1.190	0.271	0.507	390.4	392.8	348.0	21.8	22.4	25.1
CHRYS PG	507	0.071	0.038	0.043	1.079	0.292	0.362	9.90	2.44	2.91	1.280	0.280	0.520	414.2	402.0	364.5	20.6	21.9	24.1
CHRYS PG	509	0.063	0.038	0.045	1.050	0.273	0.418	9.72	2.38	3.21	1.330	0.270	0.580	414.0	410.4	366.5	20.6	21.5	23.9
CHRYS PG	511	0.067	0.032	0.041	1.099	0.272	0.338	9.43	2.19	2.82	1.250	0.280	0.510	411.4	405.6	359.9	20.8	21.8	24.4
EPA	1850	0.071	0.031	0.046	0.971	0.234	0.351	8.93	2.10	3.18	1.254	0.284	0.528	406.3	401.7	360.0	20.9	21.8	24.2
EPA	1852	0.059	0.029	0.043	0.877	0.211	0.295	8.36	2.00	2.66	1.222	0.283	0.496	403.5	405.5	351.8	21.1	21.6	24.8
EPA	1854	0.061	0.024	0.043	0.903	0.199	0.323	7.76	1.92	2.66	1.236	0.283	0.476	399.1	402.9	352.9	21.3	21.7	24.7
GM	519	0.066	0.033	0.045	0.983	0.254	0.356	9.23	2.09	3.20	1.250	0.291	0.458	403.0	401.5	358.0	21.2	22.0	24.5
GM	521	0.063	0.027	0.042	0.955	0.224	0.323	8.84	1.99	2.86	1.279	0.271	0.474	398.8	399.2	355.3	21.5	22.1	24.7
GM	523	0.067	0.031	0.045	1.091	0.258	0.338	8.86	2.10	2.76	1.280	0.274	0.506	406.6	406.6	362.9	21.1	21.7	24.2
FORD	525	0.066	0.034	0.042	0.920	0.237	0.301	9.59	2.26	3.01	1.221	0.266	0.497	408.3	402.9	362.3	20.9	21.8	24.2
FORD	527	0.065	0.036	0.044	0.899	0.241	0.315	9.35	2.29	3.17	1.156	0.264	0.465	402.7	399.3	355.6	21.1	22.0	24.6
FORD	529	0.067	0.028	0.047	0.858	0.204	0.366	9.05	2.02	2.93	1.199	0.272	0.512	410.4	410.4	363.0	20.8	21.5	24.1
R/T JEEP-T	531	0.061	0.035	0.041	0.970	0.271	0.336	8.91	2.55	3.27	1.282	0.264	0.467	392.0	391.9	350.2	21.7	22.4	24.9
R/T JEEP-T	533	0.065	0.034	0.043	0.955	0.248	0.338	9.23	2.12	2.88	1.211	0.255	0.471	396.7	397.8	349.1	21.5	22.2	25.1
R/T JEEP-T	535	0.063	0.030	0.044	0.935	0.238	0.344	9.19	1.78	2.85	1.216	0.248	0.500	393.0	389.5	348.2	21.7	22.6	25.1

LAB CORRELATION SUMMARY AUX DATA PROCESSED THU MAY 02/91 10:11:09

PROGRAM: 91 MVMA QUARTER 2 PROCEDURE:FTP VIN: MVMA-91 INERTIA WT: 2875 ACTUAL HP: 8.0

LAB	TEST	MFE	2	3	PTORQUE	2	3	NTORQUE	2	3	DIST	2	3	VNORM	2	3	FE%	2	3
		<-----	mpg	----->	<		>	<		>	<-----	miles	----->						
JEEP/TR	501	0.00	0.00	0.00	0	115203	48055	0	59020	21482	3.598	3.848	3.608	0.1860	0.1854	0.1853	0.0	0.0	0.0
JEEP/TR	503	0.00	0.00	0.00	0	116351	47686	0	58842	21119	3.594	3.856	3.589	0.1875	0.1873	0.1875	0.0	0.0	0.0
JEEP/TR	505	0.00	0.00	0.00	0	117726	48880	0	60342	21444	3.600	3.868	3.602	0.1855	0.1846	0.1851	0.0	0.0	0.0
CHRYS P	507	0.00	0.00	0.00	0	115934	46907	0	57926	21247	3.594	3.862	3.601	0.1785	0.1780	0.1781	0.0	0.0	0.0
CHRYS P	509	0.00	0.00	0.00	0	116382	48024	0	58975	21104	3.596	3.864	3.589	0.1786	0.1777	0.1782	0.0	0.0	0.0
CHRYS P	511	0.00	0.00	0.00	0	116331	46693	0	57339	21345	3.580	3.835	3.582	0.1795	0.1789	0.1794	0.0	0.0	0.0
EPA	1850	0.00	0.00	0.00	0	119680	48234	0	57806	21200	3.602	3.871	3.598	0.1866	0.1855	0.1859	0.0	0.0	0.0
EPA	1852	0.00	0.00	0.00	0	113881	46457	0	57310	20968	3.571	3.831	3.567	0.1896	0.1891	0.1887	0.0	0.0	0.0
EPA	1854	0.00	0.00	0.00	0	114289	46360	0	57759	20760	3.580	3.828	3.573	0.1856	0.1853	0.1853	0.0	0.0	0.0
GM	519	0.00	0.00	0.00	0	115761	46944	0	57537	20964	3.596	3.869	3.584	0.1872	0.1870	0.1869	0.0	0.0	0.0
GM	521	0.00	0.00	0.00	0	117623	47285	0	57578	21130	3.601	3.880	3.596	0.1852	0.1847	0.1844	0.0	0.0	0.0
GM	523	0.00	0.00	0.00	0	117746	47343	0	57681	21389	3.631	3.903	3.629	0.1866	0.1861	0.1858	0.0	0.0	0.0
FORD	525	0.00	0.00	0.00	0	116581	47474	0	56770	20678	3.594	3.855	3.600	0.1859	0.1849	0.1854	0.0	0.0	0.0
FORD	527	0.00	0.00	0.00	0	117098	47854	0	57685	21131	3.593	3.863	3.597	0.1862	0.1854	0.1858	0.0	0.0	0.0
FORD	529	0.00	0.00	0.00	0	120293	48042	0	55601	20538	3.592	3.849	3.602	0.1852	0.1845	0.1848	0.0	0.0	0.0
R/T JEE	531	0.00	0.00	0.00	0	118398	47798	0	59479	21796	3.601	3.876	3.600	0.1859	0.1854	0.1852	0.0	0.0	0.0
R/T JEE	533	0.00	0.00	0.00	0	117216	48140	0	59261	21391	3.609	3.878	3.607	0.1859	0.1856	0.1856	0.0	0.0	0.0
R/T JEE	535	0.00	0.00	0.00	0	114821	48019	0	59002	21477	3.606	3.850	3.597	0.1880	0.1879	0.1878	0.0	0.0	0.0

LAB CORRELATION SUMMARY PROCESSED THU MAY 02/91 10:52:24

PROGRAM: 91 MVMA QUARTER 2 PROCEDURE:HIGHWAY VIN: MVMA-91 INERTIA WT: 2875 ACTUAL HP: 8.0

LAB	TESTDATES		FUNCTION	N	HC	CO	NOX	CO2	CFE	MFE	PTORQ	BARO	HUM	NOXFC	CDT	DB	EVAP
					|<--------- g/mi			---------->|	(mpg)	(mpg)		(in Hg)	(gr/lb)		(sec)	(degF)	(g)
JEEP/TRUCK	2/13/91	2/15/91	MEAN	3	0.192	3.10	0.531	279.7	31.18	0.00	72608	28.70	56.5	0.920	13.1	75.8	0.00
CHRYS PG	2/19/91	2/21/91	MEAN	3	0.207	3.24	0.533	285.0	30.70	0.00	70262	29.00	49.6	0.894	13.2	76.1	0.00
EPA	2/26/91	2/28/91	MEAN	3	0.180	2.87	0.493	278.5	31.20	0.00	70002	29.03	53.2	0.907	13.0	76.2	0.00
GM	3/05/91	3/07/91	MEAN	3	0.199	3.10	0.522	277.2	31.56	0.00	70847	28.32	49.8	0.894	13.1	74.9	0.00
FORD	3/12/91	3/15/91	MEAN	3	0.184	3.24	0.503	280.7	31.05	0.00	72521	29.43	31.4	0.830	12.9	75.3	0.00
R/T JEEP-T	3/19/91	3/21/91	MEAN	3	0.188	3.15	0.512	277.8	31.40	0.00	72456	29.14	51.5	0.901	13.2	74.8	0.00
JEEP/TRUCK	2/13/91	2/15/91	95 CONF	3	0.007	0.04	0.020	5.5	0.57	0.00	3140	0.66	9.1	0.037	0.2	1.5	0.00
CHRYS_PG	2/19/91	2/21/91	95 CONF	3	0.005	0.21	0.014	4.4	0.50	0.00	1702	0.31	8.5	0.032	0.2	3.4	0.00
EPA	2/26/91	2/28/91	95 CONF	3	0.036	0.16	0.055	12.5	1.29	0.00	2519	0.21	5.1	0.020	0.1	2.4	0.00
GM	3/05/91	3/07/91	95 CONF	3	0.023	0.10	0.017	6.4	0.71	0.00	2004	0.72	1.8	0.007	0.7	1.7	0.00
FORD	3/12/91	3/15/91	95 CONF	3	0.015	0.20	0.046	7.3	0.81	0.00	1753	0.55	13.3	0.043	0.4	3.8	0.00
R/T_JEEP-T	3/19/91	3/21/91	95 CONF	3	0.005	0.15	0.023	10.5	1.29	0.00	2609	0.37	4.1	0.016	0.2	2.7	0.00
JEEP/TRUCK	2/13/91	2/15/91	STD DEV	3	0.003	0.01	0.008	2.2	0.23	0.00	1264	0.26	3.6	0.015	0.1	0.6	0.00
CHRYS_PG	2/19/91	2/21/91	STD DEV	3	0.002	0.09	0.006	1.8	0.20	0.00	685	0.12	3.4	0.013	0.1	1.4	0.00
EPA	2/26/91	2/28/91	STD DEV	3	0.015	0.07	0.022	5.0	0.52	0.00	1014	0.08	2.1	0.008	0.1	1.0	0.00
GM	3/05/91	3/07/91	STD DEV	3	0.009	0.04	0.007	2.6	0.29	0.00	806	0.29	0.7	0.003	0.3	0.7	0.00
FORD	3/12/91	3/15/91	STD DEV	3	0.006	0.08	0.019	2.9	0.32	0.00	705	0.22	5.3	0.017	0.1	1.5	0.00
R/T_JEEP-T	3/19/91	3/21/91	STD DEV	3	0.002	0.06	0.009	4.2	0.52	0.00	1050	0.15	1.6	0.006	0.1	1.1	0.00
JEEP/TRUCK	2/13/91	2/15/91	% DIFF	3	6.7	7.8	7.6	0.4	-0.1	0.0	3.7	-1.1	6.2	1.4	0.8	-0.5	0.0
CHRYS_PG	2/19/91	2/21/91	% DIFF	3	15.0	12.6	8.1	2.4	-1.6	0.0	0.4	-0.1	-6.7	-1.5	1.5	-0.2	0.0
GM	3/05/91	3/07/91	% DIFF	3	10.8	7.9	5.7	-0.4	1.2	0.0	1.2	-2.5	-6.5	-1.4	0.8	-1.7	0.0
FORD	3/12/91	3/15/91	% DIFF	3	2.4	12.9	2.0	0.8	-0.5	0.0	3.6	1.4	-41.0	-8.5	0.8	-1.2	0.0
R/T_JEEP-T	3/19/91	3/21/91	% DIFF	3	4.5	9.7	3.7	-0.2	0.6	0.0	3.5	0.4	-3.2	-0.7	1.5	-1.9	0.0
JEEP/TRUCK	2/13/91	2/15/91	% CVAR	3	1.5	0.5	1.5	0.8	0.7	0.0	1.7	0.9	6.5	1.6	0.5	0.8	0.0
CHRYS_PG	2/19/91	2/21/91	% CVAR	3	1.0	2.6	1.1	0.6	0.7	0.0	1.0	0.4	6.9	1.5	0.5	1.8	0.0
EPA	2/26/91	2/28/91	% CVAR	3	8.1	2.3	4.5	1.8	1.7	0.0	1.4	0.3	3.9	0.9	0.5	1.3	0.0
GM	3/05/91	3/07/91	% CVAR	3	4.6	1.3	1.3	0.9	0.9	0.0	1.1	1.0	1.5	0.3	2.1	0.9	0.0
FORD	3/12/91	3/15/91	% CVAR	3	3.3	2.4	3.7	1.0	1.0	0.0	1.0	0.8	17.0	2.1	1.1	2.0	0.0
R/T_JEEP-T	3/19/91	3/21/91	% CVAR	3	1.1	1.9	1.8	1.5	1.7	0.0	1.4	0.5	3.2	0.7	0.6	1.4	0.0

LAB CORRELATION SUMMARY TEST DATA PROCESSED THU MAY 02/91 10:52:21

PROGRAM: 91 MVMA QUARTER 2 PROCEDURE:HIGHWAY VIN: MVMA-91 INERTIA WT: 2875 ACTUAL HP: 8.0

LAB	TESTDATE	TEST	DYNO	N-CH4	HC	CO	NOX	CO2	CFE	MFE	ODOM	IHP	BARO	HUM	NOXFC	CDT	DB	EVAP
				|<----------		g/mi		----------|>	(mpg)	(mpg)	(miles)	(hp)	(in Hg)	(gr/lb)		(sec)	(degF)	(g)
JEEP/TRUCK	2/13/91	502	54	0.000	0.190	3.08	0.538	282.2	30.93	0.00	39034	6.4	28.88	60.7	0.937	13.04	75.2	0.00
JEEP/TRUCK	2/14/91	504	55	0.000	0.190	3.11	0.522	278.0	31.37	0.00	39074	6.4	28.40	54.7	0.913	13.04	75.9	0.00
JEEP/TRUCK	2/15/91	506	53	0.000	0.195	3.10	0.533	278.9	31.25	0.00	39120	5.5	28.83	54.1	0.910	13.16	76.4	0.00
CHRYS PG	2/19/91	508	6	0.000	0.205	3.27	0.540	283.2	30.90	0.00	39154	6.1	28.90	50.1	0.895	13.16	76.6	0.00
CHRYS PG	2/20/91	510	4	0.000	0.209	3.30	0.530	286.7	30.50	0.00	39199	6.0	29.14	46.0	0.880	13.30	77.1	0.00
CHRYS PG	2/21/91	512	3	0.000	0.206	3.14	0.530	285.2	30.70	0.00	39239	6.4	28.97	52.8	0.906	13.21	74.5	0.00
EPA	2/26/91	1851	D002	0.000	0.193	2.95	0.519	284.3	30.60	0.00	39296	6.0	29.13	55.2	0.915	12.96	77.2	0.00
EPA	2/27/91	1853	D003	0.000	0.164	2.85	0.479	275.8	31.50	0.00	39334	6.1	28.98	53.3	0.907	13.06	75.3	0.00
EPA	2/28/91	1855	D005	0.000	0.182	2.82	0.482	275.3	31.50	0.00	39374	6.0	28.99	51.1	0.899	13.07	76.1	0.00
GM	3/05/91	520	9	0.000	0.191	3.06	0.515	276.8	31.63	0.00	39423	5.6	28.48	50.6	0.897	13.30	74.5	0.00
GM	3/06/91	522	4	0.000	0.197	3.14	0.521	274.9	31.81	0.00	39467	6.3	27.98	49.5	0.893	12.77	74.5	0.00
GM	3/07/91	524	3	0.000	0.209	3.11	0.529	280.0	31.25	0.00	39490	5.9	28.49	49.2	0.892	13.19	75.7	0.00
FORD	3/12/91	526	5	0.000	0.188	3.33	0.521	282.5	30.83	0.00	39530	6.2	29.50	29.1	0.822	12.78	76.7	0.00
FORD	3/13/91	528	1	0.000	0.187	3.19	0.484	277.3	31.42	0.00	39555	6.3	29.18	27.6	0.818	13.06	73.7	0.00
FORD	3/15/91	530	3	0.000	0.177	3.21	0.504	282.2	30.89	0.00	39585	5.7	29.61	37.5	0.850	12.87	75.5	0.00
R/T JEEP-T	3/19/91	532	53	0.000	0.190	3.17	0.502	281.5	30.92	0.00	39600	5.9	29.13	49.7	0.894	13.17	75.7	0.00
R/T JEEP-T	3/20/91	534	54	0.000	0.186	3.20	0.520	278.7	31.33	0.00	39826	6.4	29.30	52.9	0.906	13.25	73.6	0.00
R/T JEEP-T	3/21/91	536	55	0.000	0.187	3.08	0.513	273.2	31.95	0.00	39864	6.4	29.00	51.9	0.902	13.10	75.0	0.00

LAB CORRELATION SUMMARY BAG DATA PROCESSED THU MAY 02/91 10:52:22

PROGRAM: 91 MVMA QUARTER 2 PROCEDURE:HIGHWAY VIN: MVMA-91 INERTIA WT: 2875 ACTUAL HP: 8.0

LAB	TEST	CH4	2	3	HC	2	3	CO	2	3	NOX	2	3	CO2	2	3	CFE	2	3
		<---						g/mi								--->	<---	mpg	--->
JEEP/TRUCK	502	0.000	0.000	0.000	0.190	0.000	0.000	3.08	0.00	0.00	0.538	0.000	0.000	282.2	0.0	0.0	30.9	0.0	0.0
JEEP/TRUCK	504	0.000	0.000	0.000	0.190	0.000	0.000	3.11	0.00	0.00	0.522	0.000	0.000	278.0	0.0	0.0	31.4	0.0	0.0
JEEP/TRUCK	506	0.000	0.000	0.000	0.195	0.000	0.000	3.10	0.00	0.00	0.533	0.000	0.000	278.9	0.0	0.0	31.3	0.0	0.0
CHRYS PG	508	0.000	0.000	0.000	0.205	0.000	0.000	3.27	0.00	0.00	0.540	0.000	0.000	283.2	0.0	0.0	30.9	0.0	0.0
CHRYS PG	510	0.000	0.000	0.000	0.209	0.000	0.000	3.30	0.00	0.00	0.530	0.000	0.000	286.7	0.0	0.0	30.5	0.0	0.0
CHRYS PG	512	0.000	0.000	0.000	0.206	0.000	0.000	3.14	0.00	0.00	0.530	0.000	0.000	285.2	0.0	0.0	30.7	0.0	0.0
EPA	1851	0.000	0.000	0.000	0.193	0.000	0.000	2.95	0.00	0.00	0.519	0.000	0.000	284.3	0.0	0.0	30.6	0.0	0.0
EPA	1853	0.000	0.000	0.000	0.164	0.000	0.000	2.85	0.00	0.00	0.479	0.000	0.000	275.8	0.0	0.0	31.5	0.0	0.0
EPA	1855	0.000	0.000	0.000	0.182	0.000	0.000	2.82	0.00	0.00	0.482	0.000	0.000	275.3	0.0	0.0	31.5	0.0	0.0
GM	520	0.000	0.000	0.000	0.191	0.000	0.000	3.06	0.00	0.00	0.515	0.000	0.000	276.8	0.0	0.0	31.6	0.0	0.0
GM	522	0.000	0.000	0.000	0.197	0.000	0.000	3.14	0.00	0.00	0.521	0.000	0.000	274.9	0.0	0.0	31.8	0.0	0.0
GM	524	0.000	0.000	0.000	0.209	0.000	0.000	3.11	0.00	0.00	0.529	0.000	0.000	280.0	0.0	0.0	31.3	0.0	0.0
FORD	526	0.000	0.000	0.000	0.188	0.000	0.000	3.33	0.00	0.00	0.521	0.000	0.000	282.5	0.0	0.0	30.8	0.0	0.0
FORD	528	0.000	0.000	0.000	0.187	0.000	0.000	3.19	0.00	0.00	0.484	0.000	0.000	277.3	0.0	0.0	31.4	0.0	0.0
FORD	530	0.000	0.000	0.000	0.177	0.000	0.000	3.21	0.00	0.00	0.504	0.000	0.000	282.2	0.0	0.0	30.9	0.0	0.0
R/T JEEP-T	532	0.000	0.000	0.000	0.190	0.000	0.000	3.17	0.00	0.00	0.502	0.000	0.000	281.5	0.0	0.0	30.9	0.0	0.0
R/T JEEP-T	534	0.000	0.000	0.000	0.186	0.000	0.000	3.20	0.00	0.00	0.520	0.000	0.000	278.7	0.0	0.0	31.3	0.0	0.0
R/T JEEP-T	536	0.000	0.000	0.000	0.187	0.000	0.000	3.08	0.00	0.00	0.513	0.000	0.000	273.2	0.0	0.0	31.9	0.0	0.0

LAB CORRELATION SUMMARY AUX DATA PROCESSED THU MAY 02/91 10:52:23

PROGRAM: 91 MVMA QUARTER 2 PROCEDURE:HIGHWAY VIN: MVMA-91 INERTIA WT: 2875 ACTUAL HP: 8.0

LAB	TEST	MFE	2	3	PTORQUE	2	3	NTORQUE	2	3	DIST	2	3	VNORM	2	3	FE%	2	3
		<-----	mpg	----->	<		>	<		>	<-----	miles	----->						
JEEP/TR	502	0.00	0.00	0.00	72925	0	0	7680	0	0	10.283	0.000	0.000	0.1811	0.0000	0.0000	0.0	0.0	0.0
JEEP/TR	504	0.00	0.00	0.00	71216	0	0	7772	0	0	10.246	0.000	0.000	0.1844	0.0000	0.0000	0.0	0.0	0.0
JEEP/TR	506	0.00	0.00	0.00	73684	0	0	7579	0	0	10.272	0.000	0.000	0.1813	0.0000	0.0000	0.0	0.0	0.0
CHRYS P	508	0.00	0.00	0.00	69478	0	0	7512	0	0	10.259	0.000	0.000	0.1749	0.0000	0.0000	0.0	0.0	0.0
CHRYS P	510	0.00	0.00	0.00	70746	0	0	7459	0	0	10.250	0.000	0.000	0.1745	0.0000	0.0000	0.0	0.0	0.0
CHRYS P	512	0.00	0.00	0.00	70562	0	0	7683	0	0	10.286	0.000	0.000	0.1760	0.0000	0.0000	0.0	0.0	0.0
EPA	1851	0.00	0.00	0.00	71087	0	0	7589	0	0	10.284	0.000	0.000	0.1804	0.0000	0.0000	0.0	0.0	0.0
EPA	1853	0.00	0.00	0.00	69841	0	0	7335	0	0	10.209	0.000	0.000	0.1844	0.0000	0.0000	0.0	0.0	0.0
EPA	1855	0.00	0.00	0.00	69078	0	0	7377	0	0	10.221	0.000	0.000	0.1799	0.0000	0.0000	0.0	0.0	0.0
GM	520	0.00	0.00	0.00	70306	0	0	7400	0	0	10.243	0.000	0.000	0.1830	0.0000	0.0000	0.0	0.0	0.0
GM	522	0.00	0.00	0.00	70462	0	0	7502	0	0	10.274	0.000	0.000	0.1802	0.0000	0.0000	0.0	0.0	0.0
GM	524	0.00	0.00	0.00	71775	0	0	7386	0	0	10.360	0.000	0.000	0.1817	0.0000	0.0000	0.0	0.0	0.0
FORD	526	0.00	0.00	0.00	72564	0	0	7156	0	0	10.262	0.000	0.000	0.1809	0.0000	0.0000	0.0	0.0	0.0
FORD	528	0.00	0.00	0.00	71795	0	0	7267	0	0	10.265	0.000	0.000	0.1817	0.0000	0.0000	0.0	0.0	0.0
FORD	530	0.00	0.00	0.00	73205	0	0	7150	0	0	10.262	0.000	0.000	0.1805	0.0000	0.0000	0.0	0.0	0.0
R/T JEE	532	0.00	0.00	0.00	72776	0	0	7641	0	0	10.251	0.000	0.000	0.1818	0.0000	0.0000	0.0	0.0	0.0
R/T JEE	534	0.00	0.00	0.00	73309	0	0	7384	0	0	10.284	0.000	0.000	0.1820	0.0000	0.0000	0.0	0.0	0.0
R/T JEE	536	0.00	0.00	0.00	71283	0	0	7506	0	0	10.245	0.000	0.000	0.1844	0.0000	0.0000	0.0	0.0	0.0

MEA
A-91-46
IV-B-2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ANN ARBOR, MICHIGAN 48105

OFFICE OF
AIR AND RADIATION

December 26, 1991

MEMORANDUM

SUBJECT: Paired Data Report - November 1991

FROM: Robert Gilkey MR for RG
Correlation and Engineering Services

TO: Eldert Bontekoe, Manager
Certification Team

THRU: Martin Reineman, Manager MR
Correlation and Engineering Services

Attached is the paired data report for November 1991. The findings of this analysis are as follows:

1. Both the FTP and HFET overall fuel economy percent differences are acceptable.
2. Neither Ford nor Chrysler had enough FTP tests to allow conclusions about emission offsets identified in earlier reports.
3. Honda reduced its HC offset, but the three month offset remains negative.

If you have additional questions on this report, please contact me at X8397.

Attachments

cc: T. Ball, R. Montgomery, R. Lawrence, J.D. Carpenter, M. Caldwell, D. Danyko, D. Perkins, T. Schrodt, J.T. White

Technical Report

Paired Data Report November 1991

Robert Gilkey

December 23, 1991

Program Development & Quality Staff
U. S. Environmental Protection Agency
2565 Plymouth Road
Ann Arbor, MI 48105

This report presents the paired data for November 1991.

The data are summarized in the following attachments:

Attachment A	Monthly Paired Data Status Graphs.
Attachment B	Manufacturer Paired Data Status Graphs.
Attachment C	Data Presentation Methodology.
Appendix 1	Testing Summary.
Appendix 2	Absolute Differences and Percent Differences for the FTP.
Appendix 3	Absolute Differences and Percent Differences for the HFET.
Appendix 4	Evaporative Emission Data.
Appendix 5	Roadload Data.
Appendix 6	Absolute Differences and Percent Differences by Site.
Appendix 7	FTP MPG and HFET MPG Percent Differences by Reason for Confirmation.

Attachment A displays monthly means and three month running averages of data from the last three months. Attachment B contains monthly means and three month running averages of FTP and HFET fuel economy percent differences for Chrysler, Ford, GM and the combined averages of other manufacturers. Attachment C presents the data stratification used and screening limits applied to data for presentation in the other attachments. The Appendices present the paired data summary statistics.

Conclusions:

1. Both the FTP and HFET overall fuel economy percent differences are acceptable.

2. Neither Ford nor Chrysler had enough FTP tests to allow conclusions about emissions offsets identified in earlier reports.

3. Honda reduced its HC offset, but the three month offset remains negative.

Discussion:

Statistical Observations:

Table 1 lists manufacturers' offsets which exceeded the levels listed in Attachment C and showed a statistically significant difference from EPA.

Table 1
Three Months Ending November 1991
Percent Differences* of Manufacturers

	FTP					HFET			
Manufacturer	NUM	HC	CO	NOx	MPG	NUM	MPG	NUM	CDT
Chrysler	5			-13.6					
Ford	7	-22.0							
Honda	11	-12.2							
Volkswagen						4	2.5	4	17.7

* Percent difference = ((MFR-EPA)/EPA) x 100

Chrysler had no FTP tests in November. This month's NOx difference is therefore a carryover from September and October.

Ford had only one FTP test in November. That test did support the continuing negative HC offset with a -17.9% difference, but the absolute difference was only -0.027 g/mi.

Data from a recently completed MVMA program should be available shortly to help substantiate these emission differences.

For the three month period, Honda continued to show a low percent HC offset, but the three tests this month were acceptable so the offset is being reduced.

Volkswagen had one test rejected from Paired Data analysis this month due to a high positive coastdown time offset. The remaining two tests included in the analysis were also high with an average of +11.6%. Prior to this month, Volkswagen did not show a severe coastdown offset. The coastdown offset supports the fuel economy values for both FTP (+2.2%) and HFET (+1.6%).

The Mercedes diesel tests are unique and deserve discussion even in the absence of sufficient tests for statistical significance. The single FTP and HFET tests showed fuel economy offsets of -8.4% and -12.7% respectively. These are well outside our desired limits and are not supported by the -1.5% average FTP fuel economy difference measured with GM during D006 qualification correlation tests completed on November 19, 1991. The -86.7% particulate offset is likewise not supported by the qualification tests which showed a -3.8% offset with GM. The -32% HC offset is not contradicted by the qualification tests as measured against GM (-9.8%).

Combined Manufacturer's Results:

Attachment A shows acceptable overall FTP emission running averages.

Both the FTP and HFET MPG running averages remain well within one percent and are acceptable.

Selected Manufacturers Results:

Attachment B shows acceptable fuel economy and coastdown differences with the manufacturers. As stated before, Chrysler had no FTP tests during November and Ford had only one.

Paired Data Summary Statistics:

Table 2 lists manufacturers data which were excluded from the status summary reports for exceeding one or more of the paired data rejection criteria in Attachment C.

Table 2

November 1991
Tests Excluded for Exceeding Paired Data Rejection Criteria

Manufacturer	Vehicle I	VI	Parameter	Screening Limit	Test Result	EPA Value
Volkswagen	5022-528/92	1	%CDT	+15%	+23.6%	14.14 secs.

C&M checked our dynamometer in response to a coastdown time which was less than 87% of Volkswagen's track coastdown time (77%). No discrepancies were found. The fuel economy offset for this test was +2.4% which is an acceptable difference.

If I can be of further assistance, please call on X 8397.

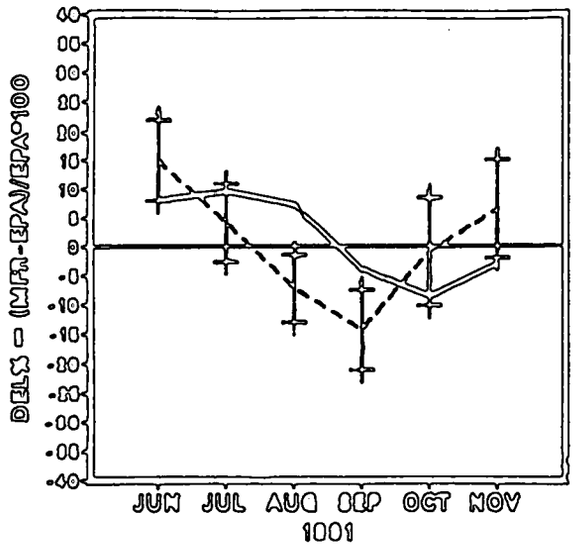
Attachments

ATTACHMENT A

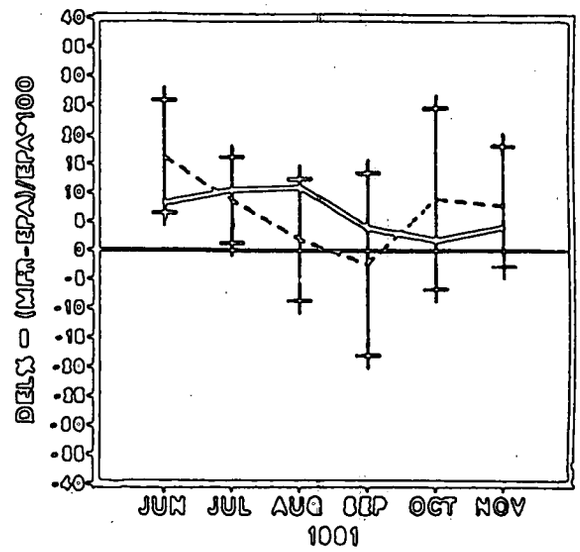
Engineering Operations Division

Monthly Period Data Status Graphs

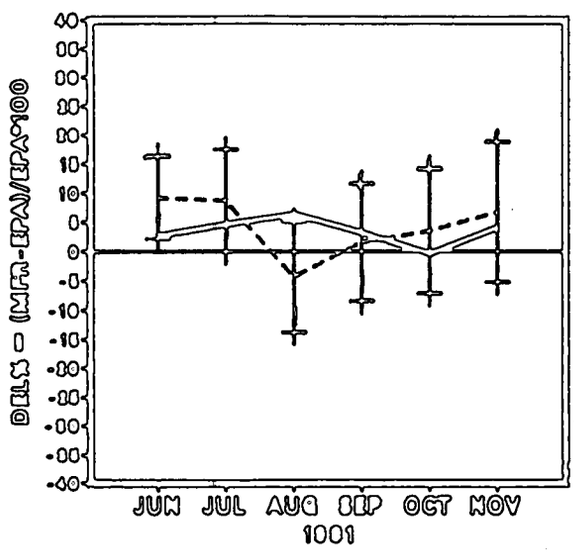
FTP HC



FTP CO



FTP NOX



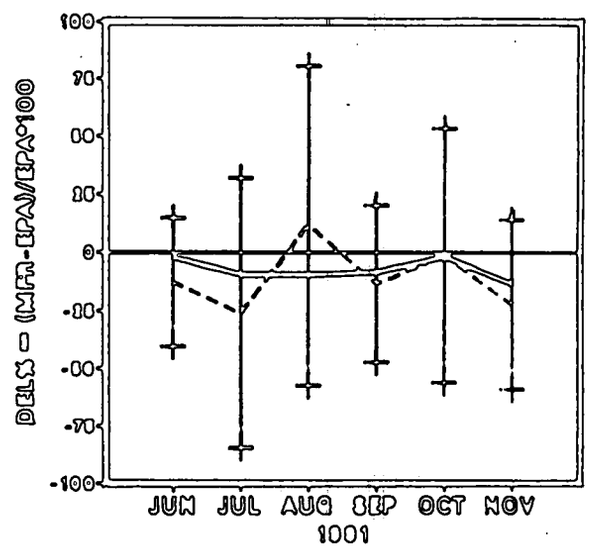
Legend

MONTHLY MEAN

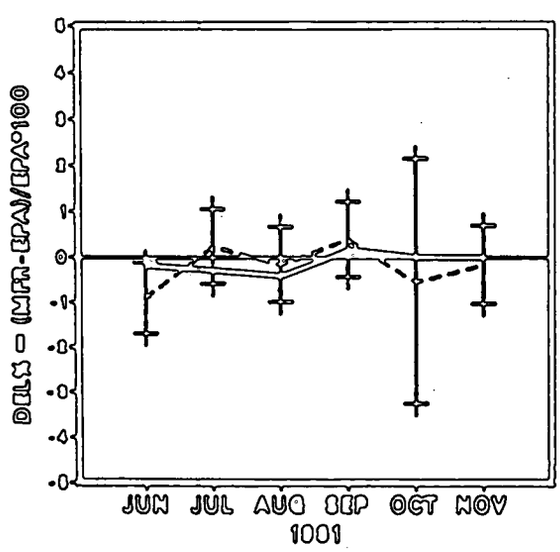
RUNNING AVERAGE

95% Confidence Interval

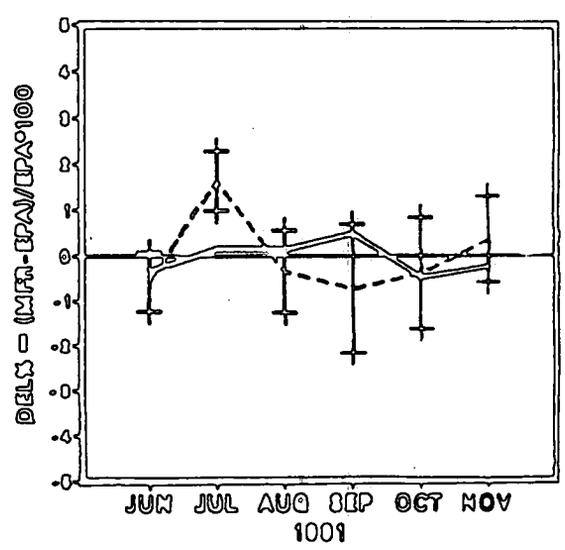
EVAPORATIVE EMISSIONS



FTP MPG



HFET MPG

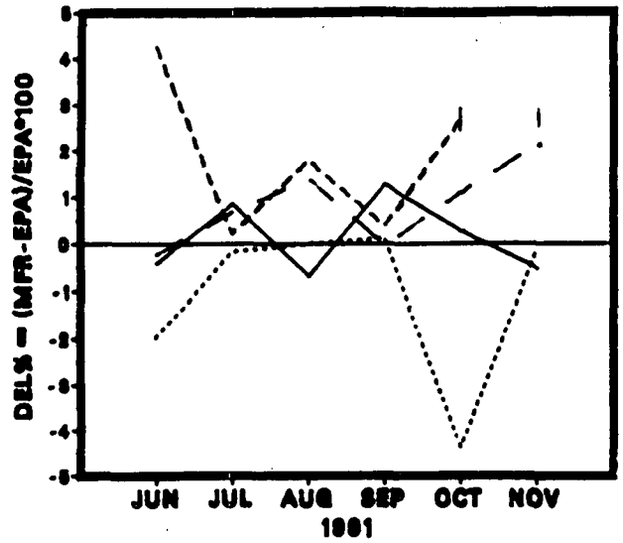


ATTACHMENT B

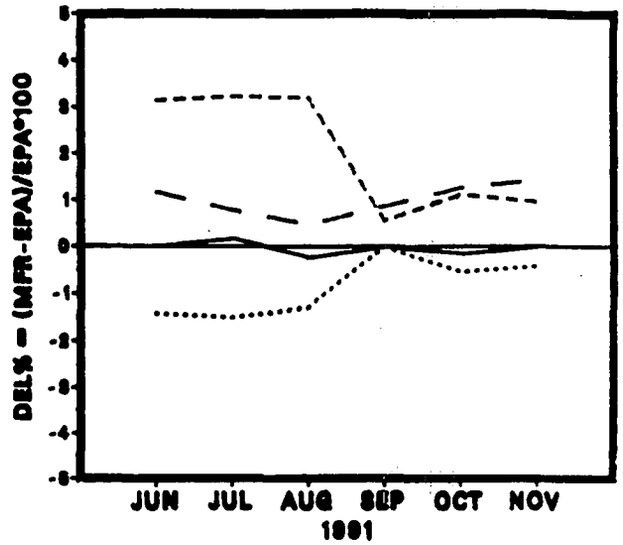
Engineering Operations Division

Manufacturer Paired Data Status Graphs

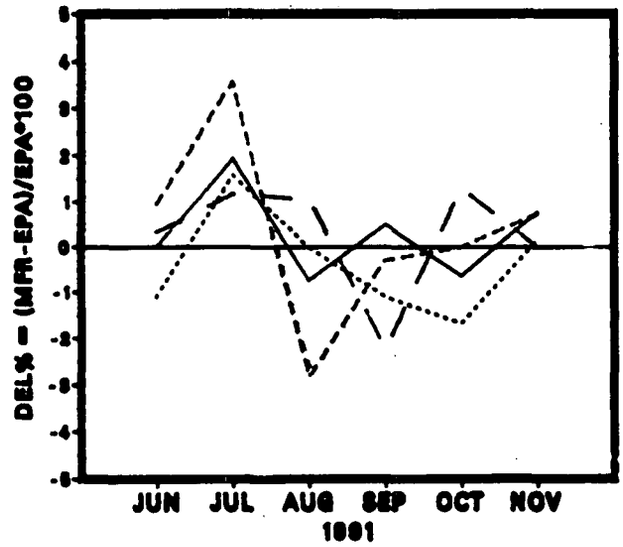
FTP MPG
MONTHLY MEANS



FTP MPG
THREE MONTH RUNNING AVERAGE

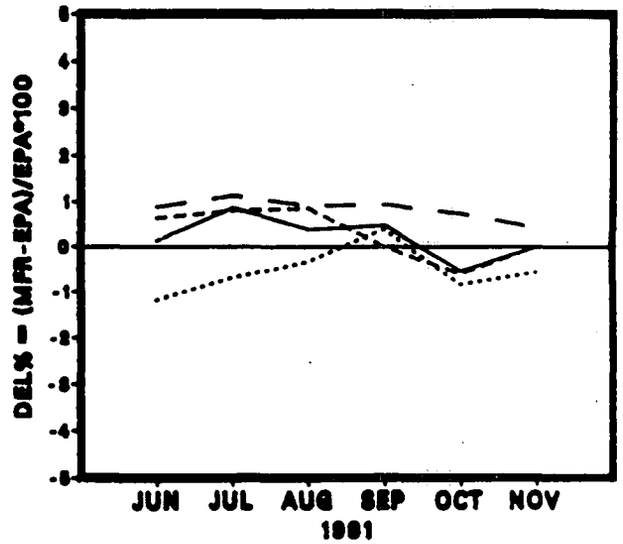


HFET MPG
MONTHLY MEANS

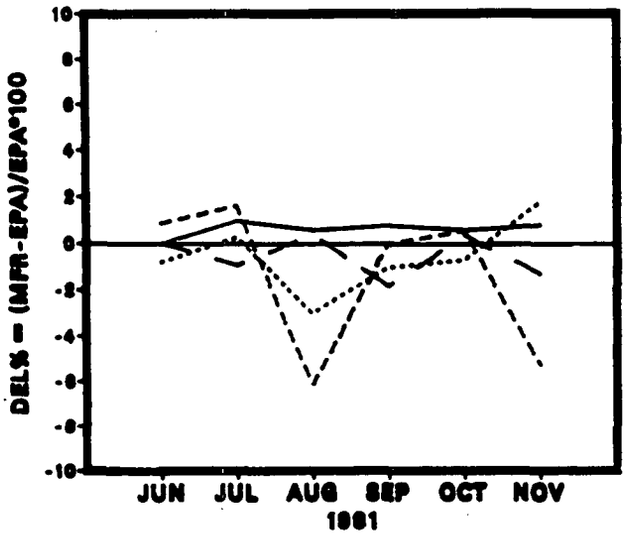


Legend
GM
FORD
CHRYSLER
OTHERS

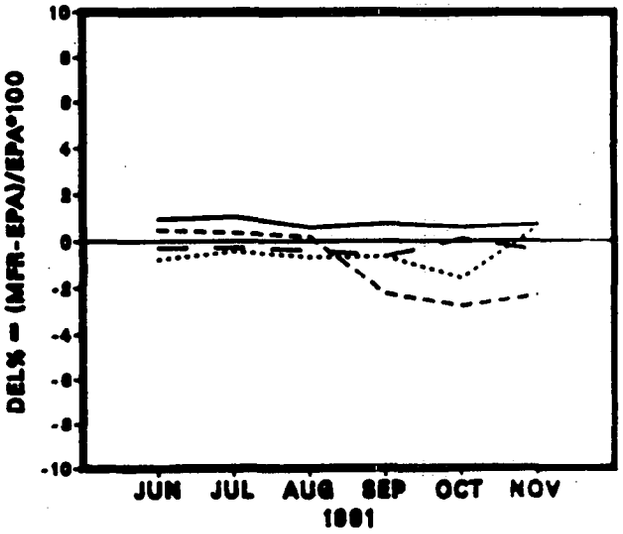
HFET MPG
THREE MONTH RUNNING AVERAGE



QUICKCHECK COASTDOWN
MONTHLY MEANS



QUICKCHECK COASTDOWN
THREE MONTH RUNNING AVERAGE



ATTACHMENT C
Engineering Operations Division
Data Presentation Methodology

Table Preparation:

Table 1 is developed using a paired t-test at the 95% confidence level on data covering the last three months. The paired t-test is based on analysis of the last test pairs with no paired data screens. All confirmation code strata are used for emission analysis, while fuel economy analysis excludes the "F.E. UP BY ONE OR MORE" reason for confirmation stratum. The table lists those tests which differ from EPA at the 95% confidence level and exceed the limits below:

HC	-10%
CO	-10%
NOx	-10%
FTP Fuel Economy	+1.5%
HFET Fuel Economy	+1.5%
Quickcheck Coastdown Time	+2.0%

Graph Preparation:

Attachment A emission status graphs are based on an analysis of last pairs and all confirmation strata. All emissions data has had tests removed which exceed screening limits. These limits are presented below. Fuel economy status graphs are prepared in a similar manner except that the "F.E. UP BY ONE OR MORE" stratum has also been deleted.

Attachment B is developed using the same methodology as is used for Attachment A. It shows the monthly means and three month's running averages for individual manufacturer's fuel economy and quick check coastdown times. The running averages for individual months are grand averages of results from the month of interest and the two preceding months.

Summary Statistics Preparation:

The data in the appendix is based on an analysis of the last test pairs of all strata, and has had pairs removed which exceed the following screening limits.

Paired Data Rejection Criteria (%Δ)

	FTP						HFET		
	HC	CO	CO2	NOx	FE	Evap	CO2	FE	CDT
Upper	+135%	+200%	+15%	+160%	+15%	+150%	+15%	+15%	+15%
Lower	-100%	-100%	-15%	-100%	-15%	-100%	-15%	-15%	-15%

PROCESSED: 12:20:50 DEC 6, 1991

CCID: SN8Z

PROJECT: 7030

NAME: RKG

```
**************************
*                        *  TTTTT  EEEEE  SSSSS  TTTTT  SSSSS  U   U  M   M  SSSSS
*  PAIRED DATA ANALYSIS  *    T    E      S        T    S      U   U  MM MM  S
*                        *    T    EEE    SSSSS    T    SSSSS  U   U  M M M  SSSSS
*   SUMMARY STATISTICS   *    T    E          S    T        S  U   U  M   M      S
*                        *    T    EEEEE  SSSSS    T    SSSSS   UUU   M   M  SSSSS
**************************
```

PERIOD OF ANALYSIS: 11- 1-91 TO 11-30-91 EPA TEST TYPE(S): EMISSION DATA FUEL ECONOMY
PAIR TYPE: EPA:MFR ANALYZER(S): ALL
MODEL YEAR(S): ALL DYNAMOMETER(S): ALL
FUEL TYPES: NO LEAD (IND HO), NO. 2 DIESEL EVAP CLASS: EVAP AND NON EVAP
VEHICLE ADJUSTMENT: ALL VEHICLES HIGH ALTITUDE: NO HIGH ALTITUDE VEHICLES INCLUDED
TEST(S) EXCLUDED: TEST PAIRS THAT ARE NOT THE LATEST FOR EACH VEHICLE
TEST PAIRS EXCEEDING QC LIMITS HAVE BEEN EXCLUDED

COMMENTS:

	FTP		HWFE	
	GAS	DIESEL	GAS	DIESEL
	******	******	******	******
A. NUMBER OF VALID EPA PAIRS INCLUDED IN THE ANALYSIS	31	1	29	1
B. NUMBER OF VALID EPA PAIRS WITH EXTREME DATA EXCLUDED FROM THE ANALYSIS	0	0	2	0
C. NUMBER OF VALID EPA PAIRS NOT MEETING THE SELECTION CRITERIA	3	0	1	0
D. NUMBER OF VALID EPA TESTS WITH NO PAIRS OR NO PAIRS OF THIS PAIR TYPE	4	0	2	0
E. NUMBER OF VOID EPA TESTS	10	0	3	0
TOTAL NUMBER OF EPA TESTS IN THIS PERIOD	48	1	37	1
PAIRS MADE = (A+B+C)	34	1	32	1
POSSIBLE PAIRS = (A+B+C+D)	38	1	34	1
PERCENT PAIRED: ((A+B+C)/PPAIRS)*100%	89.5	100.0	94.1	100.0
PERCENT NOT PAIRED: (D/PPAIRS)*100%	10.5	0.0	5.9	0.0
	100.0	100.0	100.0	100.0

PROCESSED: 12:20:51 DEC 6, 1991

PERIOD OF ANALYSIS: 11- 1-91 TO 11-30-91

PAIR TYPE: EPA:MFR

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*********************************
*                               *   FFFFF  TTTTT  PPPP   DDDD   EEEEE  L
*     PAIRED DATA ANALYSIS      *   F        T    P   P  D   D  E      L
*                               *   FFF      T    PPPP   D   D  EEE    L
*      SUMMARY STATISTICS       *   F        T    P      D   D  E      L
*                               *   F        T    P      DDDD   EEEEE  LLLLL
*********************************
```

COMMENTS:

SIGNED DIFFERENCES: (MFR - EPA) - GASOLINE ONLY -

	HC			CO			CO2			NOX			MPG		
	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV
30 FORD	1	-0.027	0.000	1	0.10	0.00	1	-12.0	0.0	1	-0.330	0.000	1	0.30	0.00
40 GM	11	0.003	0.057	11	-0.06	0.88	11	1.5	11.9	11	-0.051	0.100	11	0.04	0.49
200 MBZ	6	0.000	0.050	6	-0.10	0.36	6	5.3	18.3	6	0.027	0.031	6	-0.07	0.35
260 HONDA	3	-0.003	0.028	3	0.20	0.32	3	-1.3	9.0	3	0.050	0.040	3	0.43	0.96
560 MZM	5	0.009	0.031	5	0.10	0.19	5	7.4	1.7	5	-0.014	0.021	5	-0.28	0.20
570 TOYOT	2	0.023	0.024	2	0.22	0.36	2	0.0	1.4	2	-0.015	0.007	2	0.05	0.07
590 V W	3	0.040	0.018	3	-0.09	0.35	3	-2.7	5.1	3	0.093	0.025	3	0.43	0.21
ALL	31	0.007	0.044	31	0.00	0.57	31	2.0	11.3	31	-0.013	0.097	31	0.05	0.47

SIGNED DIFFERENCES: (MFR - EPA) - DIESEL ONLY -

																PARTIC		
200 MBZ	1	-0.082	0.000	1	0.09	0.00	1	35.0	0.0	1	0.080	0.000	1	-2.30	0.00	1	-0.026	0.000
ALL	1	-0.082	0.000	1	0.09	0.00	1	35.0	0.0	1	0.080	0.000	1	-2.30	0.00	1	-0.026	0.000

PROCESSED: 12:20:51 DEC 6, 1991

PERIOD OF ANALYSIS: 11- 1-91 TO 11-30-91

PAIR TYPE: EPA:MFR

```
*******************************
*                             *   FFFFF  TTTTT  PPPP   PPPP   CCCC  TTTTT
*     PAIRED DATA ANALYSIS    *   F        T    P   P  P   P  C       T
*                             *   FFF      T    PPPP   PPPP   C       T
*     SUMMARY STATISTICS      *   F        T    P      P      C       T
*                             *   F        T    P      P       CCCC   T
*******************************
```

COMMENTS:

PERCENT DIFFERENCES: ((MFR - EPA)/EPA) X 100% - GASOLINE ONLY -

	HC			CO			CO2			NOX			MPG		
	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV
30 FORD	1	-17.9	0.0	1	14.3	0.0	1	-1.92	0.00	1	-29.5	0.0	1	2.11	0.00
40 GM	11	4.0	24.3	11	5.1	33.7	11	0.34	2.36	11	-8.0	22.0	11	0.33	2.70
200 MBZ	6	4.4	29.4	6	-2.0	25.1	6	0.67	2.71	6	14.0	16.4	6	-0.60	2.57
260 HONDA	3	0.3	22.5	3	19.3	32.2	3	-0.54	2.69	3	24.2	17.9	3	0.96	2.84
560 MZM	5	5.8	20.4	5	17.3	30.9	5	2.14	0.67	5	-9.2	12.6	5	-1.05	0.70
570 TOYOT	2	21.2	24.4	2	24.2	37.3	2	0.03	0.35	2	-9.7	2.0	2	0.21	0.29
590 V W	3	25.1	11.7	3	-3.0	23.8	3	-0.58	1.10	3	78.8	33.5	3	2.25	1.09
ALL	31	6.5	23.1	31	7.8	29.1	31	0.43	2.15	31	6.8	32.7	31	0.22	2.29

PERCENT DIFFERENCES: ((MFR - EPA)/EPA) X 100% - DIESEL ONLY -

																PARTIC		
200 MBZ	1	-32.5	0.0	1	8.3	0.0	1	9.54	0.00	1	9.6	0.0	1	-8.36	0.00	1	-86.7	0.0
ALL	1	-32.5	0.0	1	8.3	0.0	1	9.54	0.00	1	9.6	0.0	1	-8.36	0.00	1	-86.7	0.0

PROCESSED: 12:21:25 DEC 6, 1991

PERIOD OF ANALYSIS: 11- 1-91 TO 11-30-91

PAIR TYPE: EPA:MFR

```
*********************************
*                               *   H   H  W   W  FFFFF  EEEEE  DDDD   EEEEE  L
*     PAIRED DATA ANALYSIS      *   H   H  W   W  F      E      D   D  E      L
*                               *   HHHHH  W W W  FFF    EEE    D   D  EEE    L
*      SUMMARY STATISTICS       *   H   H  WW WW  F      E      D   D  E      L
*                               *   H   H  W   W  F      EEEEE  DDDD   EEEEE  LLLLL
*********************************
```

COMMENTS:

SIGNED DIFFERENCES: (MFR - EPA) - GASOLINE ONLY -

	HC			CO			CO2			NOX			MPG		
	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV
20 CHRYS	1	0.007	0.000	1	0.02	0.00	1	0.0	0.0	1	-0.030	0.000	1	0.20	0.00
30 FORD	1	-0.017	0.000	1	0.00	0.00	1	1.0	0.0	1	-0.250	0.000	1	0.00	0.00
40 GM	10	0.013	0.030	10	0.26	0.65	10	1.2	10.2	10	0.126	0.411	10	-0.05	0.80
200 MBZ	6	-0.006	0.016	6	-0.02	0.09	6	-4.5	5.3	6	-0.007	0.023	6	0.27	0.43
260 HONDA	2	-0.022	0.001	2	-0.08	0.05	2	5.0	4.2	2	0.110	0.156	2	-0.85	0.49
560 MZM	5	0.038	0.034	5	0.27	0.22	5	5.0	4.4	5	-0.016	0.015	5	-0.36	0.55
570 TOYOT	2	0.006	0.010	2	0.00	0.00	2	-1.0	2.8	2	-0.010	0.014	2	0.25	0.07
590 V W	2	-0.019	0.018	2	-0.18	0.18	2	0.5	2.1	2	0.275	0.092	2	0.50	0.28
ALL	29	0.007	0.030	29	0.11	0.41	29	0.7	7.3	29	0.056	0.258	29	-0.02	0.64

SIGNED DIFFERENCES: (MFR - EPA) - DIESEL ONLY -

200 MBZ	1	-0.030	0.000	1	0.06	0.00	1	40.0	0.0	1	0.090	0.000	1	-4.70	0.00
ALL	1	-0.030	0.000	1	0.06	0.00	1	40.0	0.0	1	0.090	0.000	1	-4.70	0.00

PROCESSED: 12:21:25 DEC 6, 1991

PERIOD OF ANALYSIS: 11- 1-91 TO 11-30-91

PAIR TYPE: EPA:MFR

```
*********************************
*                               *   H   H  W   W  FFFFF  EEEEE  PPPP    CCCC  TTTTT
*     PAIRED DATA ANALYSIS      *   H   H  W   W  F      E      P   P  C        T
*                               *   HHHHH  W W W  FFF    EEE    PPPP   C        T
*      SUMMARY STATISTICS       *   H   H  WW WW  F      E      P      C        T
*                               *   H   H  W   W  F      EEEEE  P       CCCC    T
*********************************
```

COMMENTS:

PERCENT DIFFERENCES: ((MFR - EPA)/EPA) X 100% - GASOLINE ONLY -

	HC			CO			CO2			NOX			MPG		
	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV
20 CHRYS	1	18.4	0.0	1	18.2	0.0	1	0.00	0.00	1	-4.6	0.0	1	0.73	0.00
30 FORD	1	-32.7	0.0	1	0.0	0.0	1	0.23	0.00	1	-13.1	0.0	1	0.00	0.00
40 GM	10	26.9	64.9	10	74.4	162.3	10	0.53	3.00	10	77.4	180.2	10	0.03	2.97
200 MBZ	6	-1.1	32.3	6	34.0	58.5	6	-1.15	1.53	6	-3.4	32.0	6	1.19	1.62
260 HONDA	2	-47.9	15.6	2	-55.4	27.8	2	2.12	1.82	2	366.7	518.5	2	-2.27	1.29
560 MZM	5	213.5	248.6	5	390.8	383.4	5	2.01	1.61	5	-63.3	41.5	5	-1.04	1.57
570 TOYOT	2	3.2	20.3	2	0.0	0.0	2	-0.28	0.97	2	-25.0	35.4	2	0.77	0.09
590 V W	2	-69.2	20.7	2	-82.5	1.2	2	0.15	0.73	2	733.3	235.7	2	1.60	0.83
ALL	29	37.5	133.8	29	91.2	227.4	29	0.44	2.26	29	88.6	255.5	29	0.11	2.20

PERCENT DIFFERENCES: ((MFR - EPA)/EPA) X 100% - DIESEL ONLY -

200 MBZ	1	-44.1	0.0	1	11.1	0.0	1	14.55	0.00	1	18.0	0.0	1	-12.74	0.00
ALL	1	-44.1	0.0	1	11.1	0.0	1	14.55	0.00	1	18.0	0.0	1	-12.74	0.00

PROCESSED: 12:20:53 DEC 6, 1991

PERIOD OF ANALYSIS: 11- 1-91 TO 11-30-91

PAIR TYPE: EPA:MFR

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*****************************
*                           *
*   PAIRED DATA ANALYSIS    *
*                           *
*    SUMMARY STATISTICS     *
*                           *
*****************************
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EEEEE  V   V   AAA   PPPP   DDDD    AAA   TTTTT   AAA
E      V   V  A   A  P   P  D   D  A   A    T    A   A
EEE    V   V  AAAAA  PPPP   D   D  AAAAA    T    AAAAA
E       V V   A   A  P      D   D  A   A    T    A   A
EEEEE    V    A   A  P      DDDD   A   A    T    A   A
```

COMMENTS:

DATA AND DIFFERENCES:
****

	EPA GM/TEST			(M-E) DIURNAL			(M-E) H.SOAK			(M-E) TOTAL			(M-E)/E % DIFF			EPA SOAK		
	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV
30 FORD	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.0	0.0	0	0.0	0.0
40 GM	5	0.69	0.30	5	-0.05	0.08	5	-0.08	0.37	5	-0.13	0.40	5	-13.7	43.0	5	18.6	2.5
200 MBZ	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.0	0.0	0	0.0	0.0
260 HONDA	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.0	0.0	0	0.0	0.0
560 MZM	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.0	0.0	0	0.0	0.0
570 TOYOT	1	0.34	0.00	1	-0.05	0.00	1	-0.04	0.00	1	-0.09	0.00	1	-26.5	0.0	1	19.0	0.0
590 V W	1	1.48	0.00	1	-0.71	0.00	1	-0.23	0.00	1	-0.94	0.00	1	-63.1	0.0	1	22.0	0.0
ALL	7	0.75	0.42	7	-0.15	0.26	7	-0.09	0.31	7	-0.24	0.45	7	-22.6	39.7	7	19.1	2.4

BY SHED: (EPA TESTS)
****

S001	3	0.75	0.63	3	-0.26	0.39	3	-0.05	0.18	3	-0.30	0.56	3	-20.8	45.4	3	20.3	1.5
S002	1	0.53	0.00	1	-0.15	0.00	1	-0.04	0.00	1	-0.19	0.00	1	-35.8	0.0	1	15.0	0.0
S003	2	0.69	0.30	2	-0.03	0.11	2	0.12	0.17	2	0.09	0.28	2	4.5	38.7	2	20.5	0.7
S004	1	1.10	0.00	1	-0.05	0.00	1	-0.71	0.00	1	-0.76	0.00	1	-69.1	0.0	1	17.0	0.0
ALL	7	0.75	0.42	7	-0.15	0.26	7	-0.09	0.31	7	-0.24	0.45	7	-22.6	39.7	7	19.1	2.4

PROCESSED: 12:21:26 DEC 6, 1991

PERIOD OF ANALYSIS: 11- 1-91 TO 11-30-91

PAIR TYPE: EPA:MFR

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*****************************
*                           *
*   PAIRED DATA ANALYSIS    *
*                           *
*    SUMMARY STATISTICS     *
*                           *
*****************************
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RRRR    OOO    AAA   DDDD   L      OOO    AAA   DDDD
R   R  O   O  A   A  D   D  L     O   O  A   A  D   D
RRRR   O   O  AAAAA  D   D  L     O   O  AAAAA  D   D
R  R   O   O  A   A  D   D  L     O   O  A   A  D   D
R   R   OOO   A   A  DDDD   LLLLL  OOO   A   A  DDDD
```

COMMENTS:

COASTDOWN DATA:
****

- GASOLINE TESTS -

	MFR QCHK			EPA QCHK			(MFR-EPA)			((M-E)/E)%		
	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV
20 CHRYS	1	14.32	0.00	1	15.11	0.00	1	-0.79	0.00	1	-5.23	0.00
30 FORD	1	13.76	0.00	1	13.94	0.00	1	-0.18	0.00	1	-1.29	0.00
40 GM	9	14.70	1.94	9	14.61	1.94	9	0.09	0.43	9	0.64	3.11
200 MBZ	6	17.18	1.26	6	17.28	1.07	6	-0.10	0.21	6	-0.61	1.25
260 HONDA	2	15.08	0.26	2	15.13	0.81	2	-0.06	0.56	2	-0.26	3.68
560 MZM	5	14.52	0.51	5	14.39	0.46	5	0.12	0.45	5	0.89	3.12
570 TOYOT	2	15.54	0.75	2	15.03	0.42	2	0.51	0.33	2	3.36	2.07
590 V W	2	17.43	0.93	2	15.62	1.09	2	1.81	0.16	2	11.62	1.85
ALL	28	15.43	1.73	28	15.28	1.64	28	0.16	0.61	28	1.05	4.07

COASTDOWN DATA:
****

- DIESEL TESTS -

200 MBZ	1	16.83	0.00	1	18.00	0.00	1	-1.17	0.00	1	-6.50	0.00
ALL	1	16.83	0.00	1	18.00	0.00	1	-1.17	0.00	1	-6.50	0.00

PROCESSED: 12:20:53 DEC 6, 1991

PERIOD OF ANALYSIS: 11- 1-91 TO 11-30-91

PAIR TYPE: EPA:MFR

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*******************************
*                             *   DDDD   EEEEE  L      SSSSS  III  TTTTT  EEEEE
*     PAIRED DATA ANALYSIS    *   D   D  E      L      S       I    T    E
*                             *   D   D  EEE    L      SSSSS   I    T    EEE
*     SUMMARY STATISTICS      *   D   D  E      L          S   I    T    E
*                             *   DDDD   EEEEE  LLLLL  SSSSS  III   T    EEEEE
*******************************
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COMMENTS:

SIGNED DIFFERENCES: (MFR - EPA) - ALL FUELS -

TP	SITE	HC			CO			CO2			NOX			MPG			COUNT BY MFR GROUP				
		NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	HON	CHR	FRD	GM	OTHR
FTP																					
	D001	10	-0.002	0.052	10	0.01	0.56	10	4.90	15.33	10	0.025	0.033	10	0.09	0.61	2	0	0	2	6
	D002	8	0.009	0.037	8	-0.03	0.55	8	-3.63	9.65	8	-0.075	0.141	8	0.11	0.39	1	0	1	2	4
	D003	5	-0.002	0.054	5	-0.21	0.89	5	2.40	7.50	5	0.018	0.070	5	0.02	0.44	0	0	0	3	2
	D004	8	0.022	0.034	8	0.15	0.39	8	3.63	8.37	8	-0.017	0.096	8	-0.04	0.46	0	0	0	4	4
	D005	0	0.000	0.000	0	0.00	0.00	0	0.00	0.00	0	0.000	0.000	0	0.00	0.00	0	0	0	0	0
	D006	1	-0.082	0.000	1	0.09	0.00	1	35.00	0.00	1	0.080	0.000	1	-2.30	0.00	0	0	0	0	1
	D007	0	0.000	0.000	0	0.00	0.00	0	0.00	0.00	0	0.000	0.000	0	0.00	0.00	0	0	0	0	0
	ALL	32	0.004	0.046	32	0.00	0.56	32	3.00	12.57	32	-0.010	0.097	32	-0.02	0.62	3	0	1	11	17
	A001	18	0.003	0.045	18	-0.00	0.54	18	1.11	13.48	18	-0.019	0.107	18	0.10	0.51	3	0	1	4	10
	A002	13	0.013	0.043	13	0.01	0.62	13	3.15	7.74	13	-0.004	0.085	13	-0.02	0.43	0	0	0	7	6
	A003	1	-0.082	0.000	1	0.09	0.00	1	35.00	0.00	1	0.080	0.000	1	-2.30	0.00	0	0	0	0	1
	A004	0	0.000	0.000	0	0.00	0.00	0	0.00	0.00	0	0.000	0.000	0	0.00	0.00	0	0	0	0	0
	ALL	32	0.004	0.046	32	0.01	0.56	32	3.00	12.57	32	-0.010	0.097	32	-0.02	0.62	3	0	1	11	17
HWFE																					
	D001	8	-0.009	0.015	8	-0.03	0.12	8	-0.50	3.16	8	0.029	0.075	8	0.14	0.39	1	0	0	2	5
	D002	6	0.008	0.034	6	0.06	0.16	6	2.83	7.73	6	-0.020	0.150	6	-0.35	0.75	1	0	1	0	4
	D003	8	0.000	0.033	8	-0.09	0.33	8	5.50	6.70	8	0.144	0.463	8	-0.35	0.66	0	1	0	4	3
	D004	7	0.031	0.022	7	0.56	0.56	7	-5.29	7.48	7	0.050	0.133	7	0.44	0.45	0	0	0	4	3
	D005	0	0.000	0.000	0	0.00	0.00	0	0.00	0.00	0	0.000	0.000	0	0.00	0.00	0	0	0	0	0
	D006	1	-0.030	0.000	1	0.06	0.00	1	40.00	0.00	1	0.090	0.000	1	-4.70	0.00	0	0	0	0	1
	D007	0	0.000	0.000	0	0.00	0.00	0	0.00	0.00	0	0.000	0.000	0	0.00	0.00	0	0	0	0	0
	ALL	30	0.006	0.030	30	0.11	0.41	30	2.00	10.15	30	0.057	0.254	30	-0.18	1.06	2	1	1	10	16
	A001	14	-0.001	0.025	14	0.01	0.14	14	0.93	5.59	14	0.008	0.111	14	-0.07	0.60	2	0	1	2	9
	A002	15	0.015	0.032	15	0.21	0.55	15	0.47	8.80	15	0.100	0.342	15	0.02	0.69	0	1	0	8	6
	A003	1	-0.030	0.000	1	0.06	0.00	1	40.00	0.00	1	0.090	0.000	1	-4.70	0.00	0	0	0	0	1
	A004	0	0.000	0.000	0	0.00	0.00	0	0.00	0.00	0	0.000	0.000	0	0.00	0.00	0	0	0	0	0
	ALL	30	0.006	0.030	30	0.11	0.41	30	2.00	10.15	30	0.057	0.254	30	-0.18	1.06	2	1	1	10	16

PROCESSED: 12:20:53 DEC 6, 1991

PERIOD OF ANALYSIS: 11- 1-91 TO 11-30-91

PAIR TYPE: EPA:MFR

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*********************************
*                               *
*     PAIRED DATA ANALYSIS      *
*                               *
*     SUMMARY STATISTICS        *
*                               *
*********************************
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PPPP    CCCC  TTTTT  SSSSS   III   TTTTT  EEEEE
P   P  C        T    S       I      T    E
PPPP   C        T    SSSSS   I      T    EEE
P      C        T        S   I      T    E
P       CCCC    T    SSSSS  III     T    EEEEE
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COMMENTS:

PERCENT DIFFERENCES: ((MFR - EPA)/EPA) X 100% - ALL FUELS -

TP	SITE	HC			CO			CO2			NOX			MPG			COUNT BY MFR GROUP				
		NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	HON	CHR	FRD	GM	OTHR
FTP																					
	D001	10	-1.3	27.2	10	-0.7	30.2	10	0.68	2.72	10	20.2	37.8	10	-0.15	2.71	2	0	0	2	6
	D002	8	11.7	23.4	8	12.2	25.7	8	-0.41	1.98	8	-6.0	24.9	8	0.97	2.12	1	0	1	2	4
	D003	5	6.1	25.4	5	13.9	47.3	5	0.60	1.76	5	2.1	21.9	5	0.23	2.11	0	0	0	3	2
	D004	8	11.1	16.8	8	10.3	18.7	8	0.83	1.84	8	5.6	37.1	8	-0.06	2.22	0	0	0	4	4
	D005	0	0.0	0.0	0	0.0	0.0	0	0.00	0.00	0	0.0	0.0	0	0.00	0.00	0	0	0	0	0
	D006	1	-32.5	0.0	1	8.3	0.0	1	9.54	0.00	1	9.6	0.0	1	-8.36	0.00	0	0	0	0	1
	D007	0	0.0	0.0	0	0.0	0.0	0	0.00	0.00	0	0.0	0.0	0	0.00	0.00	0	0	0	0	0
	ALL	32	5.2	23.8	32	7.8	28.6	32	0.71	2.65	32	6.9	32.1	32	-0.04	2.71	3	0	1	11	17
	A001	18	4.5	25.7	18	5.0	28.3	18	0.20	2.42	18	8.6	34.5	18	0.35	2.46	3	0	1	4	10
	A002	13	9.2	19.6	13	11.7	30.9	13	0.75	1.74	13	4.2	31.1	13	0.05	2.10	0	0	0	7	6
	A003	1	-32.5	0.0	1	8.3	0.0	1	9.54	0.00	1	9.6	0.0	1	-8.36	0.00	0	0	0	0	1
	A004	0	0.0	0.0	0	0.0	0.0	0	0.00	0.00	0	0.0	0.0	0	0.00	0.00	0	0	0	0	0
	ALL	32	5.2	23.8	32	7.8	28.6	32	0.71	2.65	32	6.9	32.1	32	-0.04	2.71	3	0	1	11	17
HWFE																					
	D001	8	-23.6	34.2	8	-11.3	35.2	8	-0.07	1.00	8	106.8	324.3	8	0.51	1.21	1	0	0	2	5
	D002	6	50.9	147.3	6	120.8	249.8	6	1.25	2.73	6	101.4	310.7	6	-0.88	2.35	1	0	1	0	4
	D003	8	62.1	212.3	8	82.0	333.0	8	1.84	2.09	8	63.4	214.1	8	-1.10	2.27	0	1	0	4	3
	D004	7	67.7	67.0	7	193.4	176.9	7	-1.29	2.05	7	85.6	215.8	7	1.87	1.86	0	0	0	4	3
	D005	0	0.0	0.0	0	0.0	0.0	0	0.00	0.00	0	0.0	0.0	0	0.00	0.00	0	0	0	0	0
	D006	1	-44.1	0.0	1	11.1	0.0	1	14.55	0.00	1	18.0	0.0	1	-12.74	0.00	0	0	0	0	1
	D007	0	0.0	0.0	0	0.0	0.0	0	0.00	0.00	0	0.0	0.0	0	0.00	0.00	0	0	0	0	0
	ALL	30	34.8	132.3	30	88.5	223.9	30	0.91	3.40	30	86.2	251.4	30	-0.32	3.19	2	1	1	10	16
	A001	14	8.3	102.1	14	45.3	171.1	14	0.50	1.96	14	104.5	306.2	14	-0.08	1.85	2	0	1	2	9
	A002	15	64.7	156.4	15	134.0	268.6	15	0.38	2.57	15	73.8	207.4	15	0.29	2.53	0	1	0	8	6
	A003	1	-44.1	0.0	1	11.1	0.0	1	14.55	0.00	1	18.0	0.0	1	-12.74	0.00	0	0	0	0	1
	A004	0	0.0	0.0	0	0.0	0.0	0	0.00	0.00	0	0.0	0.0	0	0.00	0.00	0	0	0	0	0
	ALL	30	34.8	132.3	30	88.5	223.9	30	0.91	3.40	30	86.2	251.4	30	-0.32	3.19	2	1	1	10	16

PROCESSED: 12:20:53 DEC 6, 1991

PERIOD OF ANALYSIS: 11- 1-91 TO 11-30-91

PAIR TYPE: EPA:MFR

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*****************************
*                           *   FFFFF  TTTTT  PPPP        RRRR   FFFFF   CCCC
*   PAIRED DATA ANALYSIS    *   F        T    P   P       R   R  F      C
*                           *   FFFF     T    PPPP        RRRR   FFFF   C
*    SUMMARY STATISTICS     *   F        T    P           R  R   R      C
*                           *   F        T    P           R   R  R       CCCC
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COMMENTS:

PERCENT DIFFERENCE: ((MFR - EPA)/EPA) X 100 % - GASOLINE ONLY -

MPG PERCENT DIFFERENCE BY REASON FOR CONFIRMATION CODE

	RANDOM AUDIT			FAILURE AT MFR			FE UP BY 1 OR MORE			NEW VEHICLE			FE CORR OFFSET			ALL OTHERS		
	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV
30 FORD	1	2.11	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
40 GM	3	-0.24	2.74	1	1.84	0.00	2	4.23	0.66	0	0.00	0.00	0	0.00	0.00	5	-1.18	1.77
200 MBZ	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	1	1.77	0.00	0	0.00	0.00	5	-1.08	2.57
260 HONDA	1	-2.30	0.00	0	0.00	0.00	1	2.88	0.00	1	2.31	0.00	0	0.00	0.00	0	0.00	0.00
560 MZM	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	4	-1.12	0.78	0	0.00	0.00	1	-0.77	0.00
570 TOYOT	2	0.21	0.29	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
590 V W	1	2.48	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	2	2.13	1.52
ALL	8	0.25	2.09	1	1.84	0.00	3	3.78	0.91	6	-0.07	1.75	0	0.00	0.00	13	-0.60	2.22

PERCENT DIFFERENCE: ((MFR - EPA)/EPA) X 100 % - DIESEL ONLY -

200 MBZ	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	1	-8.36	0.00	0	0.00	0.00	0	0.00	0.00
ALL	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	1	-8.36	0.00	0	0.00	0.00	0	0.00	0.00

PROCESSED: 12:21:26 DEC 6, 1991

PERIOD OF ANALYSIS: 11- 1-91 TO 11-30-91

PAIR TYPE: EPA:MFR

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*****************************
*                           *   H   H  W   W  FFFFF  EEEEE        RRRR   FFFFF   CCCC
*   PAIRED DATA ANALYSIS    *   H   H  W   W  F      E            R   R  F      C
*                           *   HHHHH  W W W  FFFF   EEEE         RRRR   FFFF   C
*    SUMMARY STATISTICS     *   H   H  WW WW  F      E            R  R   R      C
*                           *   H   H  W   W  F      EEEEE        R   R  R       CCCC
*****************************
```

COMMENTS:
PERCENT DIFFERENCE: ((MFR - EPA)/EPA) X 100 % - GASOLINE ONLY -
****

MPG PERCENT DIFFERENCE BY REASON FOR CONFIRMATION CODE

	RANDOM AUDIT			FAILURE AT MFR			FE UP BY 1 OR MORE			NEW VEHICLE			FE CORR OFFSET			ALL OTHERS		
	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV
20 CHRYS	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	1	0.73	0.00	0	0.00	0.00	0	0.00	0.00
30 FORD	1	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
40 GM	2	3.29	1.92	1	0.00	0.00	1	-5.06	0.00	0	0.00	0.00	0	0.00	0.00	6	-0.20	2.37
200 MBZ	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	1	3.02	0.00	0	0.00	0.00	5	0.82	1.50
260 HONDA	1	-3.18	0.00	0	0.00	0.00	0	0.00	0.00	1	-1.35	0.00	0	0.00	0.00	0	0.00	0.00
560 MZM	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	4	-1.56	1.23	0	0.00	0.00	1	1.02	0.00
570 TOYOT	2	0.77	0.09	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
590 V W	1	2.19	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	1	1.01	0.00
ALL	7	1.02	2.39	1	0.00	0.00	1	-5.06	0.00	7	-0.55	1.98	0	0.00	0.00	13	0.38	1.85

PERCENT DIFFERENCE: ((MFR - EPA)/EPA) X 100 % - DIESEL ONLY -
****

200 MBZ	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	1	-12.74	0.00	0	0.00	0.00	0	0.00	0.00
ALL	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	1	-12.74	0.00	0	0.00	0.00	0	0.00	0.00

A-91-46 MER
IV-B-2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ANN ARBOR, MICHIGAN 48105

December 4, 1991

OFFICE OF
AIR AND RADIATION

MEMORANDUM

SUBJECT: Paired Data Report - October 1991

FROM: Robert Gilkey
Correlation and Engineering Services

TO: Eldert Bontekoe, Team Leader
Certification Branch

THRU: Martin Reineman, Manager
Correlation and Engineering Services

Attached is the paired data report for October 1991. The findings of this analysis are as follows:

1. Both the FTP and HFET overall fuel economy percent differences are acceptable.

2. Ford shows a larger negative (manufacturer lower) HC offset than desired for the second consecutive month. Ford also shows a larger than desired negative CO offset. Low absolute values mitigate the impact somewhat, but this trend will be watched closely.

3. Chrysler shows a larger negative NOx offset than desired.

If you have additional questions on this report, please contact me at X8397.

Attachments

cc. T. Ball
R. Montgomery
R. Lawrence
J.D. Carpenter
M. Caldwell
D. Danyko
D. Perkins
T. Schrodt
J.T. White

Technical Report

Paired Data Report October 1991

Robert K.Gilkey
November 22, 1991

Program Development & Quality Staff
U.S. Environmental Protection Agency
2565 Plymouth Road
Ann Arbor, MI 48105

This report presents the paired data for October 1991.

The data are summarized in the following attachments:

Attachment A	Monthly Paired Data Status Graphs.
Attachment B	Manufacturer Paired Data Status Graphs.
Attachment C	Data Presentation Methodology.
Appendix 1	Testing Summary.
Appendix 2	Absolute Differences and Percent Differences for the FTP.
Appendix 3	Absolute Differences and Percent Differences for the HFET.
Appendix 4	Evaporative Emission Data.
Appendix 5	Roadload Data.
Appendix 6	Absolute Differences and Percent Differences by Site.
Appendix 7	FTP MPG and HFET MPG Percent Differences by Reason for Confirmation.

Attachment A displays monthly means and three month running averages of data from the three months ending October 1991. Attachment B contains monthly means and three month running averages of FTP and HFET fuel economy percent differences for Chrysler, Ford, GM and the combined averages of other manufacturers. Attachment C presents the data stratification used and screening limits applied to data for presentation in the other attachments. The Appendices present the paired data summary statistics.

Conclusions:

1. Both the FTP and HFET overall fuel economy percent differences are acceptable.

2. Ford shows a larger negative (manufacturer lower) HC offset than desired for the second consecutive month. Ford also shows a larger than desired negative CO offset. Low absolute values mitigate the impact somewhat, but this trend will be watched closely.

3. Chrysler shows a larger negative NOx offset than desired.

Discussion:

Statistical Observations:

Table 1 lists manufacturers' offsets which exceeded the levels listed in Attachment C and showed a statistically significant difference from EPA.

Table 1
Three Months Ending October 1991
Percent Differences* of Manufacturers

	FTP					HFET			
Manufacturer	NUM	HC	CO	NOx	MPG	NUM	MPG	NUM	CDT
Chrysler	6			-17.0					
Ford	10	-18.0	-16.4						
Honda	8	-17.0							

* Percent difference = ((MFR-EPA)/EPA) x 100

CPG NOx differences averaged -0.175 g/mi or -28.6% for two tests while JTE averaged -0.020 g/mi or -11.2% for four tests. October's overall NOx difference is -0.090 g/mi or -11.5% for two tests. The MVMA Correlation Program round completed in September indicates that Chrysler is measuring slightly lower (-3.2% to -5.6%) NOx than EPA at their facilities.

This is the second consecutive month that Ford has negative HC percent difference. The CO percent difference is new. The -0.030 g/mi (-19.4%) HC and -0.310 g/mi (-16.5%) CO absolute differences for this month are less than ten percent of the lowest current standards (0.41 g/mi HC and 3.4 g/mi CO) for the emissions. The MVMA Correlation Program round started in October does not support the low HC offset for Ford but does support the low CO offset. During this round, Ford measured 4.6% higher HC than EPA but 10.6% lower CO. Ford will be confirming their results back at their facility late in November.

Honda HC is showing up for the first time this month. Honda did not test this month, so this is a carry over from previous months. The average HC offset for the last three months in which Honda had tests (June, July and September) is -5.0% for 19 tests -- well within our desired bounds.

Combined Manufacturer's Results:

Attachment A shows acceptable overall FTP emission running averages.

Both the FTP and HFET MPG running averages remain well within one percent and are acceptable.

Selected Manufacturers Results:

Attachment B shows acceptable fuel economy and coastdown differences with the manufacturers. Both Ford and Chrysler running averages remain slightly positive for FTP fuel economy. Ford results are slightly negative for HFET fuel economy.

Paired Data Summary Statistics:

No vehicles were excluded from the summary statistics for exceeding the screening limits in Appendix C.

If I can be of further assistance, please call on X 8397.

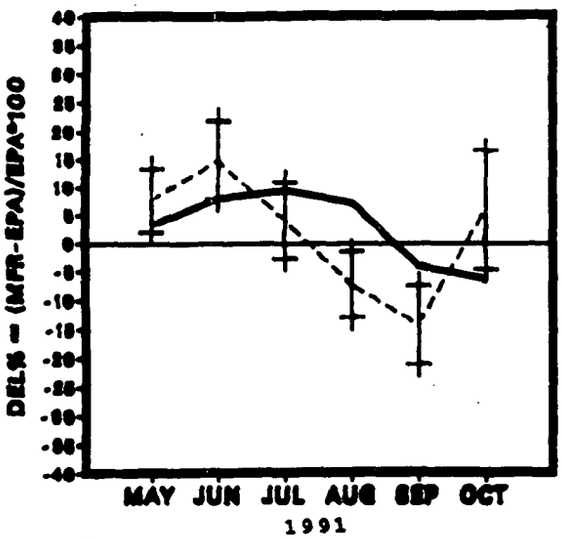
Attachments

ATTACHMENT A

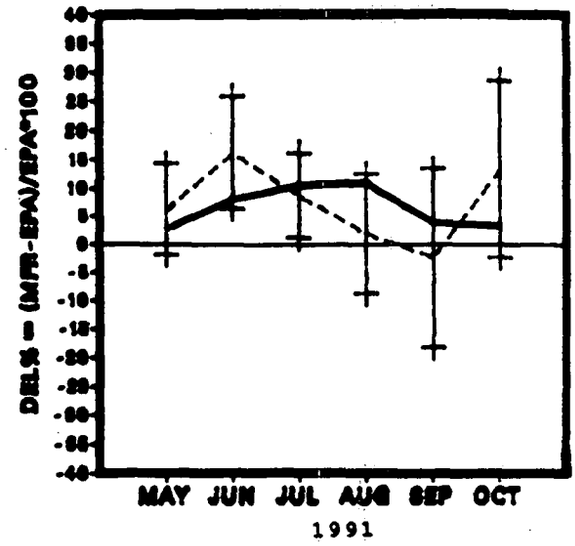
Engineering Operations Division

Monthly Paired Data Status Graphs

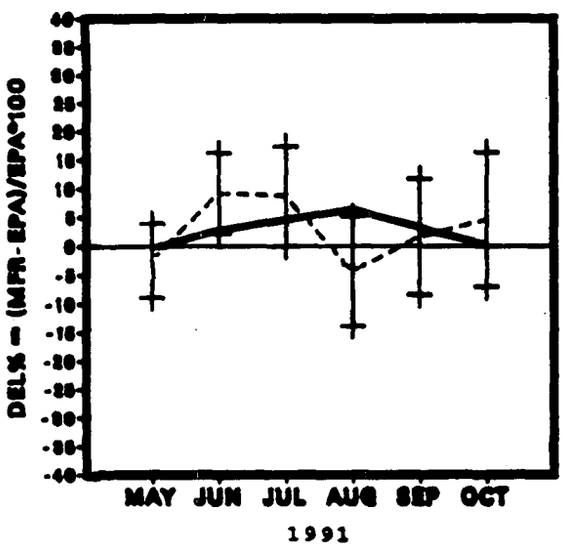
FTP HC



FTP CO



FTP NOX



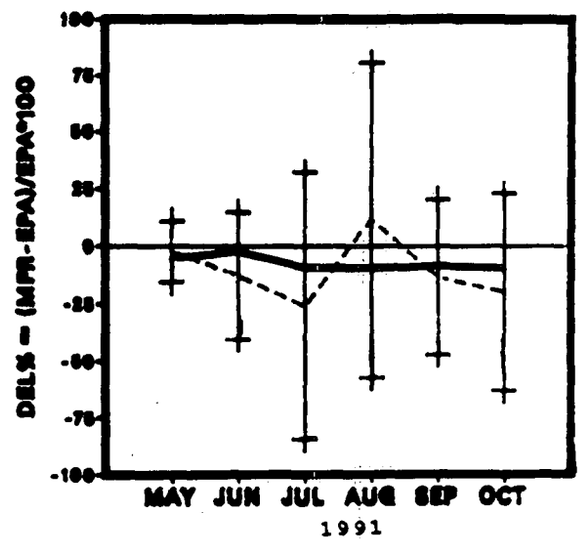
Legend

MONTHLY MEAN

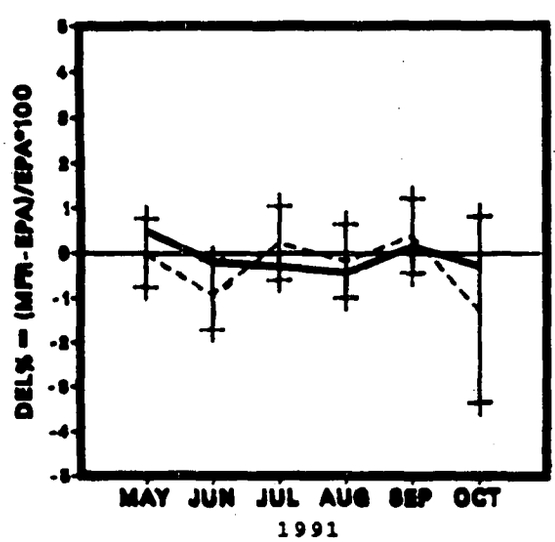
RUNNING AVERAGE

95% = Confidence Interval

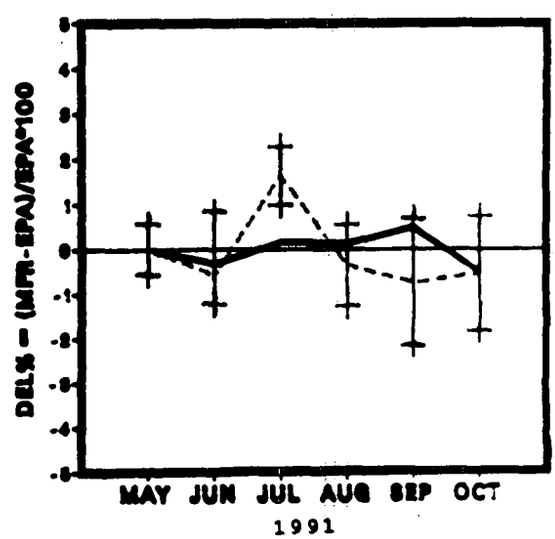
EVAPORATIVE EMISSIONS



FTP MPG



HFET MPG

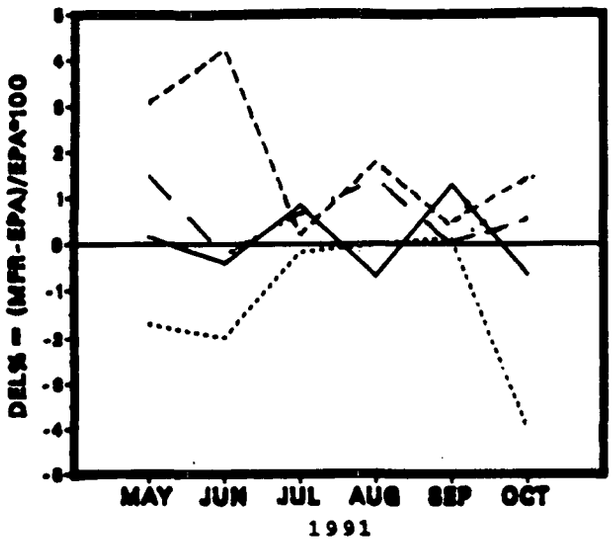


ATTACHMENT B

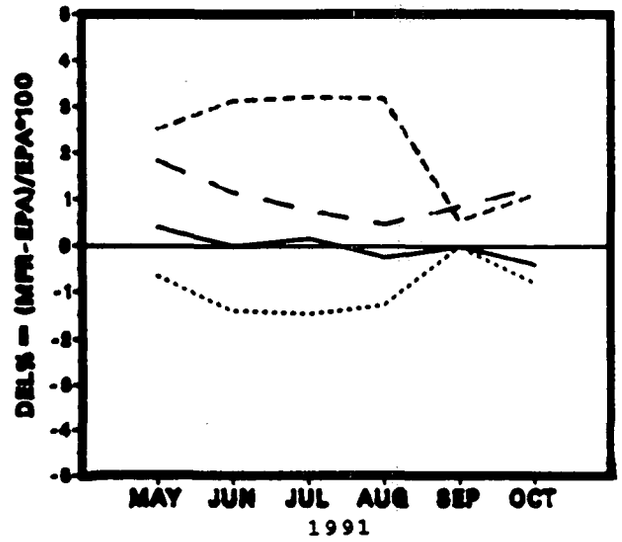
Engineering Operations Division

Manufacturer Paired Data Status Graphs

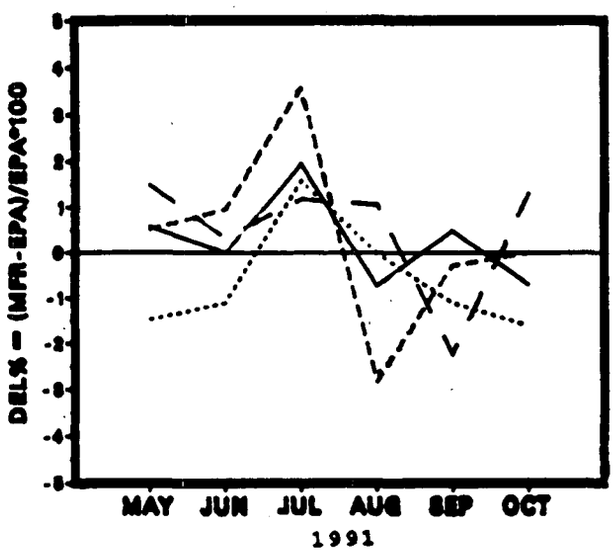
FTP MPG
MONTHLY MEANS



FTP MPG
THREE MONTH RUNNING AVERAGE

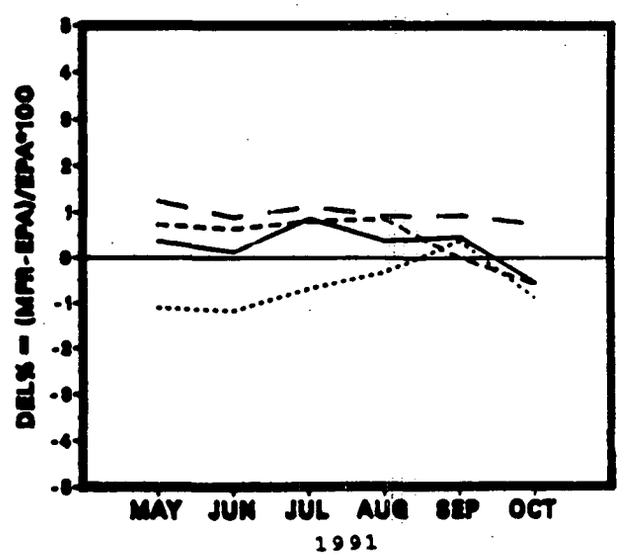


HFET MPG
MONTHLY MEANS

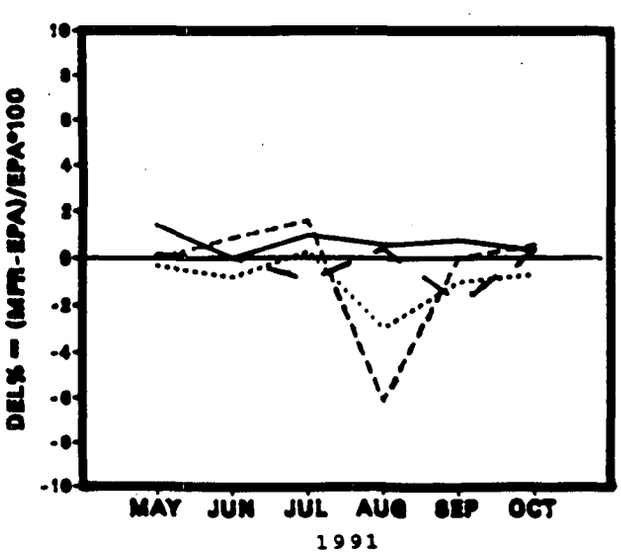


Legend
GM
FORD
CHRYSLER
OTHERS

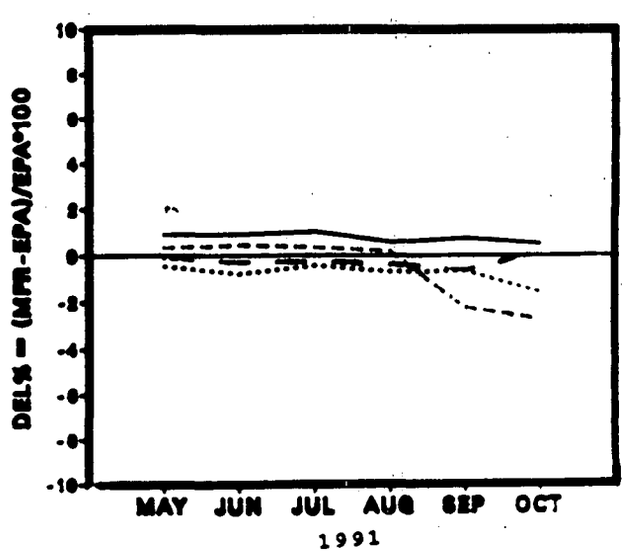
HFET MPG
THREE MONTH RUNNING AVERAGE



QUICKCHECK COASTDOWN
MONTHLY MEANS



QUICKCHECK COASTDOWN
THREE MONTH RUNNING AVERAGE



ATTACHMENT C
Engineering Operations Division
Data Presentation Methodology

Table Preparation:

Table 1 is developed using a paired t-test at the 95% confidence level on data covering the last three months. The paired t-test is based on analysis of the last test pairs with no paired data screens. All confirmation code strata are used for emission analysis, while fuel economy analysis excludes the "F.E. UP BY ONE OR MORE" reason for confirmation stratum. The table lists those tests which differ from EPA at the 95% confidence level and exceed the limits below:

HC	-10%
CO	-10%
NOx	-10%
FTP Fuel Economy	+1.5%
HFET Fuel Economy	+1.5%
Quickcheck Coastdown Time	+2.0%

Graph Preparation:

Attachment A emission status graphs are based on an analysis of last pairs and all confirmation strata. All emissions data has had tests removed which exceed screening limits. These limits are presented below. Fuel economy status graphs are prepared in a similar manner except that the "F.E. UP BY ONE OR MORE" stratum has also been deleted.

Attachment B is developed using the same methodology as is used for Attachment A. It shows the monthly means and three month's running averages for individual manufacturer's fuel economy and quick check coastdown times. The running averages for individual months are grand averages of results from the month of interest and the two preceding months.

Summary Statistics Preparation:

The data in the appendix is based on an analysis of the last test pairs of all strata, and has had pairs removed which exceed the following screening limits.

Paired Data Rejection Criteria (%Δ)

	FTP						HFET		
	HC	CO	CO2	NOx	FE	Evap	CO2	FE	CDT
Upper	+135%	+200%	+15%	+160%	+15%	+150%	+15%	+15%	+15%
Lower	-100%	-100%	-15%	-100%	-15%	-100%	-15%	-15%	-15%

PROCESSED: 14:56:48 NOV 7, 1991

CCID: SN8Z

PROJECT: 7030

NAME: RKG

```
*************************
*                       *  TTTTT  EEEEE  SSSSS  TTTTT  SSSSS  U   U  M   M  SSSSS
*  PAIRED DATA ANALYSIS *    T    E      S        T    S      U   U  MM MM  S
*                       *    T    EEE    SSSSS    T    SSSSS  U   U  M M M  SSSSS
*   SUMMARY STATISTICS  *    T    E          S    T        S  U   U  M   M      S
*                       *    T    EEEEE  SSSSS    T    SSSSS   UUU   M   M  SSSSS
*************************
```

PERIOD OF ANALYSIS: 10- 1-91 TO 10-31-91 EPA TEST TYPE(S): EMISSION DATA FUEL ECONOMY
PAIR TYPE: EPA:MFR ANALYZER(S): ALL
MODEL YEAR(S): ALL DYNAMOMETER(S): ALL
FUEL TYPES: NO LEAD (IND HO), NO. 2 DIESEL EVAP CLASS: EVAP AND NON EVAP
VEHICLE ADJUSTMENT: ALL VEHICLES HIGH ALTITUDE: NO HIGH ALTITUDE VEHICLES INCLUDED
TEST(S) EXCLUDED: TEST PAIRS THAT ARE NOT THE LATEST FOR EACH VEHICLE
TEST PAIRS EXCEEDING QC LIMITS HAVE BEEN EXCLUDED

COMMENTS: OCTOBER 1991 PAIRED DATA, LAST ONLY

	FTP		HWFE	
	GAS	DIESEL	GAS	DIESEL
	******	******	******	******
A. NUMBER OF VALID EPA PAIRS INCLUDED IN THE ANALYSIS	20	0	21	0
B. NUMBER OF VALID EPA PAIRS WITH EXTREME DATA EXCLUDED FROM THE ANALYSIS	0	0	0	0
C. NUMBER OF VALID EPA PAIRS NOT MEETING THE SELECTION CRITERIA	4	0	2	0
D. NUMBER OF VALID EPA TESTS WITH NO PAIRS OR NO PAIRS OF THIS PAIR TYPE	3	0	4	0
E. NUMBER OF VOID EPA TESTS	4	0	1	0
TOTAL NUMBER OF EPA TESTS IN THIS PERIOD	31	0	28	0
PAIRS MADE = (A+B+C)	24	0	23	0
POSSIBLE PAIRS = (A+B+C+D)	27	0	27	0
PERCENT PAIRED: ((A+B+C)/PPAIRS)*100%	88.9	0.0	85.2	0.0
PERCENT NOT PAIRED: (D/PPAIRS)*100%	11.1	0.0	14.8	0.0
	100.0	0.0	100.0	0.0

Appendix 2

PROCESSED: 14:56:49 NOV 7, 1991

PERIOD OF ANALYSIS: 10- 1-91 TO 10-31-91

PAIR TYPE: EPA:MFR

```
*********************************
*                               *   FFFFF  TTTTT  PPPP   DDDD   EEEEE  L
*     PAIRED DATA ANALYSIS      *   F        T    P   P  D   D  E      L
*                               *   FFF      T    PPPP   D   D  EEE    L
*      SUMMARY STATISTICS       *   F        T    P      D   D  E      L
*                               *   F        T    P      DDDD   EEEEE  LLLLL
*********************************
```

COMMENTS: OCTOBER 1991 PAIRED DATA, LAST ONLY

SIGNED DIFFERENCES: (MFR - EPA) - GASOLINE ONLY -

	HC			CO			CO2			NOX			MPG		
	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV
20 CHRYS	2	0.006	0.035	2	-0.07	0.25	2	-5.5	9.2	2	-0.090	0.127	2	0.20	0.28
30 FORD	4	-0.030	0.024	4	-0.31	0.42	4	-3.5	3.8	4	0.000	0.018	4	0.10	0.14
40 GM	9	0.024	0.028	9	0.33	0.39	9	4.4	11.8	9	0.009	0.065	9	-0.11	0.51
266 ICIIN	2	0.078	0.035	2	0.42	0.44	2	13.5	7.8	2	0.025	0.078	2	-0.45	0.21
347 LIPHT	1	0.014	0.000	1	0.00	0.00	1	66.0	0.0	1	0.000	0.000	1	-1.70	0.00
560 MZM	1	-0.008	0.000	1	0.63	0.00	1	26.0	0.0	1	0.210	0.000	1	-1.00	0.00
570 TOYOT	1	-0.014	0.000	1	-0.25	0.00	1	-16.0	0.0	1	0.020	0.000	1	0.60	0.00
ALL	20	0.013	0.039	20	0.14	0.45	20	5.9	18.6	20	0.009	0.079	20	-0.16	0.59

PROCESSED: 14:56:49 NOV 7, 1991

PERIOD OF ANALYSIS: 10- 1-91 TO 10-31-91

PAIR TYPE: EPA:MFR

```
*******************************
*                             *   FFFFF  TTTTT  PPPP   PPPP    CCCC  TTTTT
*     PAIRED DATA ANALYSIS    *   F        T    P   P  P   P  C        T
*                             *   FFF      T    PPPP   PPPP   C        T
*      SUMMARY STATISTICS     *   F        T    P      P      C        T
*                             *   F        T    P      P       CCCC    T
*******************************
```

COMMENTS: OCTOBER 1991 PAIRED DATA, LAST ONLY

PERCENT DIFFERENCES: ((MFR - EPA)/EPA) X 100% - GASOLINE ONLY -

	HC			CO			CO2			NOX			MPG		
	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV
20 CHRYS	2	-1.7	17.5	2	-12.2	21.2	2	-0.87	1.67	2	-11.5	16.3	2	1.33	1.89
30 FORD	4	-19.4	14.6	4	-16.5	20.7	4	-0.77	0.76	4	-4.2	10.2	4	0.54	0.77
40 GM	9	12.0	13.3	9	22.2	20.4	9	0.96	2.59	9	1.7	18.3	9	-0.57	2.65
266 ICIIN	2	47.8	25.2	2	54.4	57.2	2	2.30	1.33	2	26.4	65.6	2	-3.44	1.61
347 LIPHT	1	6.5	0.0	1	0.0	0.0	1	11.83	0.00	1	0.0	0.0	1	-11.41	0.00
560 MZM	1	-4.4	0.0	1	61.8	0.0	1	6.09	0.00	1	52.5	0.0	1	-4.83	0.00
570 TOYOT	1	-7.3	0.0	1	-16.4	0.0	1	-3.46	0.00	1	11.8	0.0	1	3.14	0.00
ALL	20	5.9	22.7	20	13.2	33.0	20	1.14	3.59	20	4.6	24.9	20	-1.01	3.54

```
PROCESSED: 14:57:05  NOV  7, 1991

PERIOD OF ANALYSIS: 10- 1-91 TO 10-31-91

PAIR TYPE: EPA:MFR

COMMENTS: OCTOBER 1991 PAIRED DATA, LAST ONLY
```

```
*******************************
*                             *   H   H  W   W  FFFFF  EEEEE  DDDD   EEEEE  L
*     PAIRED DATA ANALYSIS    *   H   H  W   W  F      E      D   D  E      L
*                             *   HHHHH  W W W  FFF    EEE    D   D  EEE    L
*     SUMMARY STATISTICS      *   H   H  WW WW  F      E      D   D  E      L
*                             *   H   H  W   W  F      EEEEE  DDDD   EEEEE  LLLLL
*******************************
```

SIGNED DIFFERENCES: (MFR - EPA) - GASOLINE ONLY -

	HC			CO			CO2			NOX			MPG		
	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV
20 CHRYS	2	-0.008	0.013	2	-0.02	0.02	2	-1.5	9.2	2	0.000	0.000	2	-0.20	0.99
30 FORD	4	-0.007	0.003	4	0.03	0.14	4	-3.5	1.7	4	-0.025	0.072	4	0.32	0.17
40 GM	10	0.001	0.009	10	0.07	0.09	10	3.2	4.2	10	0.004	0.044	10	-0.21	0.41
266 ICIIN	2	0.019	0.002	2	0.06	0.01	2	3.5	31.8	2	-0.040	0.042	2	-0.30	1.27
347 LIPHT	1	-0.036	0.000	1	0.18	0.00	1	20.0	0.0	1	0.010	0.000	1	-1.70	0.00
560 MZM	1	-0.015	0.000	1	0.19	0.00	1	8.0	0.0	1	0.090	0.000	1	-0.60	0.00
570 TOYOT	1	-0.003	0.000	1	0.00	0.00	1	-11.0	0.0	1	-0.010	0.000	1	1.00	0.00
ALL	21	-0.003	0.013	21	0.06	0.10	21	1.9	9.9	21	-0.002	0.049	21	-0.15	0.68

PROCESSED: 14:57:05 NOV 7, 1991

PERIOD OF ANALYSIS: 10- 1-91 TO 10-31-91

PAIR TYPE: EPA:MFR

```
*********************************
*                               *   H   H  W   W  FFFFF  EEEEE  PPPP    CCCC  TTTTT
*     PAIRED DATA ANALYSIS      *   H   H  W   W  F      E      P   P  C        T
*                               *   HHHHH  W W W  FFF    EEE    PPPP   C        T
*      SUMMARY STATISTICS       *   H   H  WW WW  F      E      P      C        T
*                               *   H   H  W   W  F      EEEEE  P       CCCC    T
*********************************
```

COMMENTS: OCTOBER 1991 PAIRED DATA, LAST ONLY

PERCENT DIFFERENCES: ((MFR - EPA)/EPA) X 100% - GASOLINE ONLY -

	HC			CO			CO2			NOX			MPG		
	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV
20 CHRYS	2	-0.4	18.3	2	-37.5	53.0	2	0.18	3.05	2	0.0	0.0	2	0.07	3.15
30 FORD	4	-18.5	5.9	4	31.5	56.7	4	-1.22	0.55	4	-18.5	32.6	4	1.04	0.55
40 GM	10	12.2	54.1	10	50.3	68.8	10	1.09	1.41	10	1.6	29.0	10	-0.69	1.36
266 ICIIN	2	111.2	54.9	2	525.0	530.3	2	0.98	7.49	2	-75.0	35.4	2	-1.53	7.01
347 LIPHT	1	-64.3	0.0	1	37.5	0.0	1	6.14	0.00	1	20.0	0.0	1	-6.64	0.00
560 MZM	1	-50.0	0.0	1	271.4	0.0	1	2.81	0.00	1	18.4	0.0	1	-1.92	0.00
570 TOYOT	1	-12.5	0.0	1	0.0	0.0	1	-3.51	0.00	1	-33.3	0.0	1	3.52	0.00
ALL	21	6.8	56.2	21	91.1	202.6	21	0.65	2.77	21	-9.6	35.0	21	-0.51	2.69

PROCESSED: 14:56:52 NOV 7, 1991

PERIOD OF ANALYSIS: 10- 1-91 TO 10-31-91

PAIR TYPE: EPA:MFR

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*                       *
*  PAIRED DATA ANALYSIS *
*                       *
*  SUMMARY STATISTICS   *
*                       *
*************************
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EEEEE  V   V   AAA   PPPP   DDDD    AAA   TTTTT   AAA
E      V   V  A   A  P   P  D   D  A   A    T    A   A
EEE    V   V  AAAAA  PPPP   D   D  AAAAA    T    AAAAA
E       V V   A   A  P      D   D  A   A    T    A   A
EEEEE    V    A   A  P      DDDD   A   A    T    A   A
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COMMENTS: OCTOBER 1991 PAIRED DATA, LAST ONLY

DATA AND DIFFERENCES:

	EPA GM/TEST			(M-E) DIURNAL			(M-E) H.SOAK			(M-E) TOTAL			(M-E)/E % DIFF			EPA SOAK		
	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV
20 CHRYS	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.0	0.0	0	0.0	0.0
30 FORD	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.0	0.0	0	0.0	0.0
40 GM	5	1.04	1.14	5	-0.48	1.26	5	0.04	0.01	5	-0.44	1.27	5	-0.4	53.8	5	18.0	2.3
266 ICIIN	1	1.70	0.00	1	0.05	0.00	1	-1.37	0.00	1	-1.32	0.00	1	-77.6	0.0	1	15.0	0.0
347 LIPHT	1	0.54	0.00	1	-0.11	0.00	1	-0.18	0.00	1	-0.29	0.00	1	-53.7	0.0	1	20.0	0.0
560 MZM	1	0.54	0.00	1	-0.29	0.00	1	0.13	0.00	1	-0.16	0.00	1	-29.6	0.0	1	17.0	0.0
570 TOYOT	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.0	0.0	0	0.0	0.0
ALL	8	1.00	0.93	8	-0.34	0.98	8	-0.15	0.50	8	-0.50	1.02	8	-20.4	50.8	8	17.8	2.3

BY SHED: (EPA TESTS)

S001	3	0.47	0.06	3	-0.03	0.08	3	-0.03	0.13	3	-0.06	0.20	3	-9.4	38.5	3	17.7	2.1
S002	1	3.07	0.00	1	-2.73	0.00	1	0.03	0.00	1	-2.70	0.00	1	-87.9	0.0	1	18.0	0.0
S003	3	0.98	0.62	3	0.11	0.18	3	-0.43	0.81	3	-0.32	0.89	3	-5.7	68.6	3	18.0	3.6
S004	1	0.54	0.00	1	-0.29	0.00	1	0.13	0.00	1	-0.16	0.00	1	-29.6	0.0	1	17.0	0.0
ALL	8	1.00	0.93	8	-0.34	0.98	8	-0.15	0.50	8	-0.50	1.02	8	-20.4	50.8	8	17.8	2.3

PROCESSED: 14:57:06 NOV 7, 1991

PERIOD OF ANALYSIS: 10- 1-91 TO 10-31-91

PAIR TYPE: EPA:MFR

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*                           *
*   PAIRED DATA ANALYSIS    *
*                           *
*    SUMMARY STATISTICS     *
*                           *
*****************************
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RRRR    OOO    AAA   DDDD   L       OOO    AAA   DDDD
R   R  O   O  A   A  D   D  L      O   O  A   A  D   D
RRRR   O   O  AAAAA  D   D  L      O   O  AAAAA  D   D
R  R   O   O  A   A  D   D  L      O   O  A   A  D   D
R   R   OOO   A   A  DDDD   LLLLL   OOO   A   A  DDDD
```

COMMENTS: OCTOBER 1991 PAIRED DATA, LAST ONLY

COASTDOWN DATA: - GASOLINE TESTS -

	MFR QCHK			EPA QCHK			(MFR-EPA)			((M-E)/E)%		
	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV
20 CHRYS	1	14.43	0.00	1	14.35	0.00	1	0.08	0.00	1	0.56	0.00
30 FORD	4	16.90	0.64	4	16.89	0.46	4	0.01	0.22	4	0.04	1.28
40 GM	10	17.15	1.77	10	17.12	1.91	10	0.03	0.34	10	0.30	1.94
266 ICIIN	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
347 LIPHT	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
560 MZM	1	15.94	0.00	1	16.41	0.00	1	-0.47	0.00	1	-2.86	0.00
570 TOYOT	1	15.00	0.00	1	14.78	0.00	1	0.22	0.00	1	1.49	0.00
ALL	17	16.73	1.58	17	16.72	1.67	17	0.01	0.30	17	0.14	1.77

PROCESSED: 14:56:53 NOV 7, 1991

PERIOD OF ANALYSIS: 10- 1-91 TO 10-31-91

PAIR TYPE: EPA:MFR

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*******************************
*                             *   DDDD   EEEEE  L      SSSSS  III   TTTTT  EEEEE
*     PAIRED DATA ANALYSIS    *   D   D  E      L      S       I     T    E
*                             *   D   D  EEE    L      SSSSS   I     T    EEE
*     SUMMARY STATISTICS      *   D   D  E      L          S   I     T    E
*                             *   DDDD   EEEEE  LLLLL  SSSSS  III    T    EEEEE
*******************************
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COMMENTS: OCTOBER 1991 PAIRED DATA, LAST ONLY

SIGNED DIFFERENCES: (MFR - EPA) - ALL FUELS -

TP	SITE	HC			CO			CO2			NOX			MPG			COUNT BY MFR GROUP				
		NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	HON	CHR	FRD	GM	OTHR
FTP																					
	D001	6	-0.006	0.039	6	-0.13	0.44	6	12.17	26.63	6	-0.023	0.083	6	-0.32	0.69	0	1	2	1	2
	D002	9	0.024	0.044	9	0.18	0.48	9	0.78	11.92	9	0.003	0.044	9	0.01	0.45	0	0	2	5	2
	D003	4	0.022	0.030	4	0.34	0.24	4	3.00	17.78	4	0.020	0.083	4	-0.10	0.70	0	1	0	3	0
	D004	1	-0.008	0.000	1	0.63	0.00	1	26.00	0.00	1	0.210	0.000	1	-1.00	0.00	0	0	0	0	1
	D005	0	0.000	0.000	0	0.00	0.00	0	0.00	0.00	0	0.000	0.000	0	0.00	0.00	0	0	0	0	0
	D006	0	0.000	0.000	0	0.00	0.00	0	0.00	0.00	0	0.000	0.000	0	0.00	0.00	0	0	0	0	0
	D007	0	0.000	0.000	0	0.00	0.00	0	0.00	0.00	0	0.000	0.000	0	0.00	0.00	0	0	0	0	0
	ALL	20	0.013	0.039	20	0.14	0.45	20	5.90	18.56	20	0.009	0.079	20	-0.16	0.59	0	2	4	9	5
	A001	15	0.012	0.043	15	0.05	0.47	15	5.33	19.18	15	-0.007	0.061	15	-0.12	0.56	0	1	4	6	4
	A002	5	0.016	0.029	5	0.40	0.24	5	7.60	18.51	5	0.058	0.111	5	-0.28	0.73	0	1	0	3	1
	A003	0	0.000	0.000	0	0.00	0.00	0	0.00	0.00	0	0.000	0.000	0	0.00	0.00	0	0	0	0	0
	A004	0	0.000	0.000	0	0.00	0.00	0	0.00	0.00	0	0.000	0.000	0	0.00	0.00	0	0	0	0	0
	ALL	20	0.013	0.039	20	0.14	0.45	20	5.90	18.56	20	0.009	0.079	20	-0.16	0.59	0	2	4	9	5
HWFE																					
	D001	8	-0.000	0.010	8	0.03	0.09	8	-1.13	8.74	8	-0.007	0.040	8	0.01	0.49	0	0	3	4	1
	D002	7	-0.005	0.016	7	0.09	0.09	7	4.71	13.44	7	-0.014	0.067	7	-0.21	0.95	0	0	1	3	3
	D003	4	-0.002	0.017	4	0.06	0.12	4	0.50	7.23	4	0.005	0.010	4	-0.05	0.58	0	1	0	3	0
	D004	2	-0.007	0.011	2	0.08	0.16	2	6.50	2.12	2	0.045	0.064	2	-0.75	0.21	0	1	0	0	1
	D005	0	0.000	0.000	0	0.00	0.00	0	0.00	0.00	0	0.000	0.000	0	0.00	0.00	0	0	0	0	0
	D006	0	0.000	0.000	0	0.00	0.00	0	0.00	0.00	0	0.000	0.000	0	0.00	0.00	0	0	0	0	0
	D007	0	0.000	0.000	0	0.00	0.00	0	0.00	0.00	0	0.000	0.000	0	0.00	0.00	0	0	0	0	0
	ALL	21	-0.003	0.013	21	0.06	0.10	21	1.86	9.90	21	-0.002	0.049	21	-0.15	0.68	0	2	4	10	5
	A001	15	-0.002	0.013	15	0.06	0.09	15	1.60	11.17	15	-0.011	0.053	15	-0.09	0.72	0	0	4	7	4
	A002	6	-0.003	0.014	6	0.06	0.11	6	2.50	6.47	6	0.018	0.036	6	-0.28	0.58	0	2	0	3	1
	A003	0	0.000	0.000	0	0.00	0.00	0	0.00	0.00	0	0.000	0.000	0	0.00	0.00	0	0	0	0	0
	A004	0	0.000	0.000	0	0.00	0.00	0	0.00	0.00	0	0.000	0.000	0	0.00	0.00	0	0	0	0	0
	ALL	21	-0.003	0.013	21	0.06	0.10	21	1.86	9.90	21	-0.002	0.049	21	-0.15	0.68	0	2	4	10	5

PROCESSED: 14:56:53 NOV 7, 1991

PERIOD OF ANALYSIS: 10- 1-91 TO 10-31-91

PAIR TYPE: EPA:MFR

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*********************************
*                               *   PPPP    CCCC  TTTTT  SSSSS   III   TTTTT  EEEEE
*     PAIRED DATA ANALYSIS      *   P   P  C        T    S        I     T    E
*                               *   PPPP   C        T    SSSSS    I     T    EEE
*      SUMMARY STATISTICS       *   P      C        T        S    I     T    E
*                               *   P       CCCC    T    SSSSS   III    T    EEEEE
*********************************
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COMMENTS: OCTOBER 1991 PAIRED DATA, LAST ONLY

PERCENT DIFFERENCES: ((MFR - EPA)/EPA) X 100% - ALL FUELS -

TP	SITE	HC			CO			CO2			NOX			MPG			COUNT BY MFR GROUP				
		NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	HON	CHR	FRD	GM	OTHR
FTP																					
	D001	6	-4.7	22.8	6	-4.9	29.3	6	2.16	4.79	6	-5.0	18.5	6	-2.20	4.62	0	1	2	1	2
	D002	9	11.4	25.7	9	17.9	37.8	9	0.08	2.40	9	5.2	27.8	9	-0.09	2.68	0	0	2	5	2
	D003	4	11.8	15.0	4	17.4	11.6	4	0.80	3.80	4	5.7	18.4	4	-0.37	3.72	0	1	0	3	0
	D004	1	-4.4	0.0	1	61.8	0.0	1	6.09	0.00	1	52.5	0.0	1	-4.83	0.00	0	0	0	0	1
	D005	0	0.0	0.0	0	0.0	0.0	0	0.00	0.00	0	0.0	0.0	0	0.00	0.00	0	0	0	0	0
	D006	0	0.0	0.0	0	0.0	0.0	0	0.00	0.00	0	0.0	0.0	0	0.00	0.00	0	0	0	0	0
	D007	0	0.0	0.0	0	0.0	0.0	0	0.00	0.00	0	0.0	0.0	0	0.00	0.00	0	0	0	0	0
	ALL	20	5.9	22.7	20	13.2	33.0	20	1.14	3.59	20	4.6	24.9	20	-1.01	3.54	0	2	4	9	5
	A001	15	5.0	25.1	15	8.8	35.4	15	0.91	3.55	15	1.1	24.3	15	-0.93	3.59	0	1	4	6	4
	A002	5	8.6	14.9	5	26.2	22.3	5	1.86	4.05	5	15.0	26.3	5	-1.26	3.79	0	1	0	3	1
	A003	0	0.0	0.0	0	0.0	0.0	0	0.00	0.00	0	0.0	0.0	0	0.00	0.00	0	0	0	0	0
	A004	0	0.0	0.0	0	0.0	0.0	0	0.00	0.00	0	0.0	0.0	0	0.00	0.00	0	0	0	0	0
	ALL	20	5.9	22.7	20	13.2	33.0	20	1.14	3.59	20	4.6	24.9	20	-1.01	3.54	0	2	4	9	5
HWFE																					
	D001	8	18.4	61.7	8	65.3	80.6	8	-0.16	2.34	8	-19.1	24.5	8	0.19	1.95	0	0	3	4	1
	D002	7	4.3	67.9	7	151.2	331.0	7	1.20	3.74	7	-11.2	54.9	7	-1.16	3.94	0	0	1	3	3
	D003	4	0.8	38.3	4	33.8	67.6	4	0.37	2.26	4	2.5	5.0	4	-0.01	2.07	0	1	0	3	0
	D004	2	-18.8	44.2	2	98.2	245.0	2	2.57	0.33	2	9.2	13.0	2	-2.04	0.17	0	1	0	0	1
	D005	0	0.0	0.0	0	0.0	0.0	0	0.00	0.00	0	0.0	0.0	0	0.00	0.00	0	0	0	0	0
	D006	0	0.0	0.0	0	0.0	0.0	0	0.00	0.00	0	0.0	0.0	0	0.00	0.00	0	0	0	0	0
	D007	0	0.0	0.0	0	0.0	0.0	0	0.00	0.00	0	0.0	0.0	0	0.00	0.00	0	0	0	0	0
	ALL	21	6.8	56.2	21	91.1	202.6	21	0.65	2.77	21	-9.6	35.0	21	-0.51	2.69	0	2	4	10	5
	A001	15	11.8	62.7	15	105.4	228.4	15	0.48	3.04	15	-15.4	40.1	15	-0.44	3.01	0	0	4	7	4
	A002	6	-5.7	37.1	6	55.3	125.9	6	1.10	2.09	6	4.7	7.8	6	-0.69	1.92	0	2	0	3	1
	A003	0	0.0	0.0	0	0.0	0.0	0	0.00	0.00	0	0.0	0.0	0	0.00	0.00	0	0	0	0	0
	A004	0	0.0	0.0	0	0.0	0.0	0	0.00	0.00	0	0.0	0.0	0	0.00	0.00	0	0	0	0	0
	ALL	21	6.8	56.2	21	91.1	202.6	21	0.65	2.77	21	-9.6	35.0	21	-0.51	2.69	0	2	4	10	5

PROCESSED: 14:56:51 NOV 7, 1991

PERIOD OF ANALYSIS: 10- 1-91 TO 10-31-91

PAIR TYPE: EPA:MFR

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*****************************
*                           *   FFFFF  TTTTT  PPPP        RRRR   FFFFF   CCCC
*   PAIRED DATA ANALYSIS    *   F        T    P   P       R   R  F       C
*                           *   FFFF     T    PPPP        RRRR   FFFF    C
*    SUMMARY STATISTICS     *   F        T    P           R  R   R       C
*                           *   F        T    P           R   R  R        CCCC
*****************************
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COMMENTS: OCTOBER 1991 PAIRED DATA, LAST ONLY
PERCENT DIFFERENCE: ((MFR - EPA)/EPA) X 100 % - GASOLINE ONLY -
****

MPG PERCENT DIFFERENCE BY REASON FOR CONFIRMATION CODE

	RANDOM AUDIT			FAILURE AT MFR			FE UP BY 1 OR MORE			NEW VEHICLE			FE CORR OFFSET			ALL OTHERS		
	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV
20 CHRYS	2	1.33	1.89	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
30 FORD	1	0.00	0.00	0	0.00	0.00	1	0.00	0.00	0	0.00	0.00	0	0.00	0.00	2	1.08	0.78
40 GM	2	0.27	0.38	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	7	-0.81	3.00
266 ICIIN	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	2	-3.44	1.61	0	0.00	0.00	0	0.00	0.00
347 LIPHT	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	1	-11.41	0.00
560 MZM	1	-4.83	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
570 TOYOT	1	3.14	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
ALL	7	0.22	2.59	0	0.00	0.00	1	0.00	0.00	2	-3.44	1.61	0	0.00	0.00	10	-1.49	4.34

PROCESSED: 14:57:06 NOV 7, 1991

PERIOD OF ANALYSIS: 10- 1-91 TO 10-31-91

PAIR TYPE: EPA:MFR

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*************************
*                       *   H   H  W   W  FFFFF  EEEEE        RRRR   FFFFF   CCCC
*  PAIRED DATA ANALYSIS *   H   H  W   W  F      E            R   R  F      C
*                       *   HHHHH  W W W  FFFF   EEEE         RRRR   FFFF   C
*   SUMMARY STATISTICS  *   H   H  WW WW  F      E            R  R   R      C
*                       *   H   H  W   W  F      EEEEE        R   R  R       CCCC
*************************
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COMMENTS: OCTOBER 1991 PAIRED DATA, LAST ONLY
PERCENT DIFFERENCE: ((MFR - EPA)/EPA) X 100 % - GASOLINE ONLY -
****

MPG PERCENT DIFFERENCE BY REASON FOR CONFIRMATION CODE

	RANDOM AUDIT			FAILURE AT MFR			FE UP BY 1 OR MORE			NEW VEHICLE			FE CORR OFFSET			ALL OTHERS		
	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV	NUM	AVG	STDEV
20 CHRYS	2	0.07	3.15	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
30 FORD	1	1.48	0.00	0	0.00	0.00	1	0.27	0.00	0	0.00	0.00	0	0.00	0.00	2	1.21	0.23
40 GM	2	-2.08	0.69	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	8	-0.35	1.28
266 ICIIN	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	2	-1.53	7.01	0	0.00	0.00	0	0.00	0.00
347 LIPHT	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	1	-6.64	0.00
560 MZM	1	-1.92	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
570 TOYOT	1	3.52	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
ALL	7	-0.14	2.49	0	0.00	0.00	1	0.27	0.00	2	-1.53	7.01	0	0.00	0.00	11	-0.64	2.35

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ANN ARBOR, MICHIGAN 48105

OFFICE OF
AIR AND RADIATION

November 8, 1991

MEMORANDUM

SUBJECT: Paired Data Report - September 1991

FROM: Robert Gilkey
Correlation and Engineering Services

TO: Eldert Bontekoe, Team Leader
Certification Branch

THRU: Martin Reineman, Manager MER
Correlation and Engineering Services

This is the first report using a revised Paired Data program. The revisions will affect the results somewhat, but are not likely to alter conclusions based on them. A few of the more significant changes are described in this report.

The findings of this analysis are as follows:

1. Except for Ford HC, FTP emission differences are acceptable.

2. No significant fuel economy offsets were observed for either Ford or Chrysler based on the limited data available.

3. All other manufacturer's FTP and HFET fuel economy percent differences are acceptable.

If you have additional questions on this report, please contact me at X8397.

Attachments

cc: T. Ball
R. Montgomery
R. Lawrence
J.D. Carpenter
M. Caldwell
D. Danyko
D. Perkins
T. Schrodt
J.T. White
J. Kargul

Technical Report

Paired Data Report September 1991

Robert Gilkey
November 6, 1991

Program Development & Quality Staff
U.S. Environmental Protection Agency
2565 Plymouth Road
Ann Arbor, MI 48105