

Kansas City PM Characterization Study

Final Report

Appendix HH

Round 2 Gravimetric vs Quartz Crystal Microbalance

Assessment and Standards Division
Office of Transportation and Air Quality
U.S. Environmental Protection Agency

Sponsors:

National Renewable Energy Laboratory, U.S. Department of Energy
Federal Highway Administration, U.S. Department of Transportation
STAPPA-ALAPCO Emission Inventory Improvement Program
Coordinating Research Council Inc. (Project No. E-69)

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United States
Environmental Protection
Agency

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April 2008

File No	QCM Bag1	QCM Bag2	QCM Bag3	QCM FTP (Grav Bag1	Grav Bag2	Grav Bag3	Grav Comp	Model Year	model	Vehicle Typ	odometer	stratum	replicate?	QC Code	Comment
84397	162.07	56.25	65.19	62.31	212.5	71.45	95.79	80.37	1975	Silverado 21	truck	2893		1	VPA	
84413	99.22	143.51	24.65	133.29	66.55	154.46	18.26	140.81	1979	F250	truck	5797		1	VG2	
84653	488.02	49.78	27.75	72	595.57	89.16	14.55	111.44	1977	C-20 Pu	truck	37697		1		
84680									1973	Pu	truck	57484		1	VQ,VG1,2	
84687	227.79	-1.89	9	11.23	332.21	16.49	3.39	32.49	1976	El Camino	truck	61809		1		
84700	40.9	50.33	18.22	47.55	57.92	73.77	17.41	68.93	1978	Pu	truck	73447		1		
84732	24.4	9.4	18.14	10.79	13.28	7.37	8.62	7.77	1979	Cj76	truck	8518		1		
84752	5.77	6.37	5.05	6.25	4.9	6.78	2.34	6.38	1978	F100 Pu	truck	58917		1		
84758	64.17	4.55	10.16	8.09	100.98	12.85	0.89	16.67	1979	C10 Beauvi	truck	84025		1		
Ave.	139.0425	39.7875	22.27	43.93875	172.9888	54.04125	20.15625	58.1075								
Std Dev.	159.4275	48.19483	19.01336	44.71481	203.1901	52.818	31.31825	50.53955								
84462	226.55	13.08	42.99	26.4	350.55	21.88	5.92	38.05	1989	Voyager	truck	145307		2		
84467	80.7	18.51	11.79	21.25	83.28	21	7.87	23.3	1988	Ranger Pu	truck	77528		2		
84469	595.45	69.39	127.73	100.92	701.87	105.05	140.2	138.64	1989	Caravan	truck	162878		2		
84477	253.55	32.08	25.17	43.08	320.83	64.22	17.88	74.3	1989	Ram 50	truck	133981		2		
84489	42.68	25.7	11.19	25.58	33.31	14.94	7.49	15.39	1987	Pu	truck	232098		2	FG2	
84492									1984	C-10 Silver	truck	82259		2	VG1	
84623	70.33	34.3	13.78	34.78	155.01	21	6.8	27.04	1989	Acclaim	truck	164203		2	VDP	
84626	47.92	17.32	8.76	18.39	180.85	11.16	-0.49	19.58	1987	D100 Pu	truck	23200		2	VDP	
84627	153.22	86.9	68.12	88.93	199.37	242.55	125.61	231.92	1987	F150 Pu	truck	410		2	VDP	
84632	158.01	88.87	54.11	90.17	164.9	98.61	57.38	99.33	1987	F150 Pu	truck	428		2	84627	
84634	111.43	7.5	22.16	13.9	158.59	15.51	18.7	23.15	1988	Voyager	truck	162874		2		
84648	36.46	16.01	13.44	16.9	43.37	39.15	6.84	37.09	1987	Dakota	truck	112838		2		
84650	41.42	11.22	10.76	12.73	33.87	6.46	3.21	7.63	1990	Lumina Apv	truck	136313		2		
84656	14.26	4.54	7.51	5.25	26.57	7.12	3.26	7.84	1990	Lumina Apv	truck	123632		2		
84658	43.97	3.08	-4.24	4.95	92.68	1.3	1.57	6.64	1989	Astro Lt	truck	215908		2		
84660	519.44	97.9	100.84	119.31	717.1	127.83	119.87	156.93	1988	Caravan	truck	61439		2		
84665	37.23	12.02	18.97	13.87	65.44	7.21	2.69	10.03	1989	4X4 Pu	truck	262316		2		
84666	43.5	7.55	15.02	10.03	44.44	11.29	6.4	12.76	1988	F150 Pu	truck	14075		2		
84667	74.7	7.37	16.04	11.33	76.48	9.28	5.59	12.39	1982	F250 Pu	truck	85513		2		
84673									1983	Vandura	truck	52728		2	VG	
84676	26.38	5.08	4.34	6.19	25.57	8.24	2.53	8.77	1990	Bronco	truck	25202		2		
84679	42.15	3.88	3.54	5.82	72.66	4.34	4.45	7.86	1983	Pu	truck	97635		2		
84683	20.47	12.47	7	12.52	14.38	9.07	6.53	9.18	1990	Ranger	truck	72976		2		
84685	15.5	64.08	15.52	58.25	11.5	73.85	5.79	65.97	1988	F150 Pu	truck	62947		2		
84686	97.64	-0.35	18.28	6.42	281.96	12.37	10.97	27.27	1986	F150 Pu	truck	94737		2		
84693	16.16	5.65	8.72	6.41	15.68	5.29	2.44	5.65	1988	F150 Pu	truck	97172		2		
84694	76.95	-1.61	28.27	4.3	251.79	15.92	5.16	26.67	1983	C10 Pu	truck	98799		2		
84696	199.84	18.28	7.41	26.97	371.73	35.68	14.42	51.69	1987	Pu	truck	169293		2		
84701	6.35	8.99	3.29	8.44	12.51	12.06	5.05	11.58	1990	F150	truck	38803		2		
84702	31.96	1.39	4.73	3.21	108.3	3.06	3.18	8.52	1989	G20 Van	Van	27435		2		
84703	24.87	3.03	6.88	4.46	37.37	10.3	2.38	11.18	1987	Blazer	truck	153398		2		
84709	20.74	2.73	9.3	4.12	15.14	2.78	1.94	3.36	1989	Ranger Pu	truck	28864		2		
84715	275.22	-3.08	10.72	12.67	517.14	35.17	13.32	59.2	1988	B2200 Pu	truck	220307		2		
84720	54.34	8.34	6.17	10.55	94.26	5.32	0.92	9.57	1989	1500 Pu	truck	140678		2		
84726	2.74	5.27	6.84	5.24	12.65	2.42	1.07	2.86	1990	Aerostar	truck	19648		2		
Ave.	104.913	20.83303	21.36818	25.25273	160.3379	32.16455	18.69515	37.91939								
Std Dev.	137.7096	27.84338	28.31384	30.92508	189.0099	49.56868	36.77111	51.26138								

84424	7.06	17.78	0.68	16.06	5.44	14.8	8.85	13.9	1995 Explorer	truck	162634	3				
84425	76.98	19.14	23.77	22.58	90.68	26.24	5.92	28.27	1995 Grand Cher	truck	179121	3				
84436	29.19	9.35	17.35	10.95	8.93	3.71	1.92	3.87	1995 S10 P/U	truck	124976	3				
84458	45.98	16.97	8.61	17.84	21.07	21.18	3.05	19.92	1993 Aerostar Mi	truck	147319	3				
84459	32.77	14.14	9.44	14.78	12.96	4.45	1.59	4.69	1992 Aerostar Mi	truck	164560	3				
84465									1994 Lumina Apv	truck	124172	3				
84468	29.73	7.32	8.85	8.6	18.83	4.61	2.73	5.22	1994 Lumina Apv	truck	124200	3	84465	RDM,VG2		
84487	85.67	18.66	12.05	21.79	152.8	15.82	6.17	22.49	1992 B2200	truck	101090	3				
84497	30.64	30.04	1.44	28.02	22.87	26.34	1.66	24.38	1995 4 Runner	truck	85898	3		RDM		
84509	74.07	9.23	14.06	13.06	125.84	8.01	4.02	14.09	1992 Astro	truck	217165	3		RDM	DOUBLE RUN?	
84510	64.47	17.9	14.43	20.13	48.11	22.36	2.14	22.32	1994 Suburban	truck	187410	3		VG2		
84519	125.6	23.42	27.13	29.04	129.18	17.42	13.14	23	1992 Caravan	truck	213493	3				
84524	26.09	6.75	0.96	7.4	30	3	-0.13	4.25	1995 Pu	truck	87225	3				
84527	40.04	20.87	3.05	20.65	30.65	15.58	1.18	15.38	1995 Ram 1500	truck	93425	3				
84531	67.4	16.59	5.52	18.45	68.02	16.98	2.14	18.6	1992 Tracker	truck	48704	3				
84554	39.44	12.01	10.53	13.34	20.78	14.29	1.71	13.75	1992 F50 Pu	truck	134791	3				
84566	49.43	37.21	23.81	36.92	108.66	33.8	20.52	36.73	1995 Odyssey	truck	109044	3				
84570	11.71	11.46	15.98	11.79	3.99	0.87	0.41	1.01	1994 S10 Pu	truck	63902	3				
84584	18.22	10.32	0.97	10.09	21.31	5.09	2.93	5.81	1995 Pu	truck	86705	3				
84591	18.41	22.93	10.84	21.83	6.77	24.35	0.93	21.77	1993 4Runner	truck	178462	3				
84600	26.8	18.62	3.26	17.97	57.28	22.16	5.48	22.82	1993 Explorer	truck	47980	3				
84618	25.8	40.61	28.4	39.01	19.44	5.71	3.82	6.31	1992 Voyager	truck	154297	3		VDP		
84620	22.34	14.77	5.19	14.45	17.55	7.94	3	8.05	1992 Ranger	truck	19758	3		VDP		
84621	11.54	23.86	17.31	22.8	8.18	4.26	5.67	4.56	1992 Ranger	truck	13586	3		VDP		
84640									1994 Explorer	truck	98974	3		VG2,3		
84649	38.46	1.9	4.1	3.98	26.97	5.6	2.06	6.48	1995 Sonoma Pu	truck	56578	3				
84689	13.02	2.51	4.18	3.19	35.1	0.58	0.39	2.41	1992 Jimmy	truck	90871	3				
84730	19.4	1.51	2.73	2.56	31.95	4.48	13.21	6.56	1995 S10 Pu	truck	75640	3				
84734	25.4	2.98	5.12	4.27	22.94	2.65	1.38	3.6	1993 Voyager	truck	166916	3				
84768									1995 F150	truck	147342	3		VQ2,HS		
84770	26.42	23.3	7.67	22.33	26.45	25.22	2.25	23.62	1995 F250	truck	52586	3				
84771	49.93	33.31	35.7	34.33	80.49	44.37	26.44	44.99	1994 Astrovan	truck	133318	3				
84772	15.49	2.92	5.23	3.73	18.48	6.07	1.56	6.4	1992 Caravan	truck	143971	3				
84774									1995 Caravan	truck	136837	3		VQ2,HS		
Ave.	38.25	16.27933	10.94533	17.06467	42.39067	13.598	4.871333	14.50833								
Std Dev.	26.55828	10.30526	9.225074	9.889951	40.84414	10.96547	6.078263	10.9622								

84394										2000 Odyssey	truck	74601	4	VQ1,2,HS	Dup Rnd 1
84401										1998 Voyager	truck	168876	4	VQ2,HS	
84403	105.47	6.21	6.25	11.28	97.34	2.48	5.11	7.5		2000 Caravan	truck	85198	4		
84404	122.08	11.7	14.92	17.74	205.2	10.09	3.72	19.93		1997 Caravan	truck	96455	4	FQ3	
84415	29.7	11.23	15.66	12.53	25.17	28.74	6.4	27.01		1999 Durango	truck	95999	4		
84422	29.74	21	24.29	21.67	8.44	19.89	10.8	18.67		1998 Cherokee	truck	137053	4		
84433	13.67	22.28	-3.32	20.07	11.52	30.16	6.05	27.53		1997 Wrangler	truck	97532	4		
84444										2003 Tracker	truck	29519	4	VQ2,HS	
84446	167.98	5.14	2.35	13.43	192.59	22.59	6.06	30.29		2000 Sienna Mini	truck	137493	4		
84448	76.64	16.94	-0.14	18.87	102.58	19.29	6.46	22.74		1999 Voyager Mi	truck	79230	4	RDM	
84473	12.3	9.38	3.92	9.15	21.98	13.14	7.47	13.21		1996 Explorer	truck	109593	4		
84479										1996 Caravan	truck	118369	4	VG1	
84493	6.57	0.68	6.89	1.42	5.89	0.74	1.86	1.09		2004 Freestar Mi	truck	14714	4		
84494	11.95	7.72	1.21	7.48	11.93	2.2	2.93	2.75		1997 Ranger Pu	truck	118470	4		
84494	11.73	7.69	1.2	7.44	11.93	2.2	2.93	2.75		1997 Ranger Pu	truck	118470	4		
84495	13.54	10.26	5.46	10.1	9.37	1.7	1.41	2.08		1996 Sonoma Pu	truck	51863	4		
84498	28.01	11.42	6.66	11.95	35.14	9.21	2.8	10.1		2001 Sienna Mini	truck	59734	4		
84500	33.3	8.22	17.65	10.21	24.2	3.82	2.41	4.81		1998 Frontier Pu	truck	112521	4		
84517	108.16	17.13	19.98	22.06	124.53	17.13	3.11	21.75		1998 Caravan	truck	80989	4		
84522	17.15	7.1	2.14	7.3	10.49	5.73	2.1	5.73		1996 1500 Pu	truck	46711	4		
84532	22.58	8.6	5.49	9.14	10.92	5.83	1.61	5.81		2003 Montana	truck	49337	4		
84533	18.06	9.24	8.62	9.66	11.86	6.46	2.28	6.46		1999 Suburban	truck	88900	4		
84537										2000 Cherokee	truck	88513	4	FQ3	EXCURSION
84538	-9.87	22.12	-1.61	18.78	3.49	0.93	1.09	1.07		1998 Ranger	truck	48208	4		
84539	33.55	6.52	0.87	7.55	27.41	2.59	3.59	3.95		1996 Tahoe	truck	69010	4		
84541	75.23	8.21	5.93	11.53	64.89	3.09	3.64	6.33		1996 Caravan	truck	161280	4		
84542	48.42	4.09	19.5	7.47	48.31	2.43	3.63	4.91		1996 Caravan	truck	161308	4	84541 FQ,FPA	
84543	23.65	10.21	14.68	11.24	12.76	3.57	2.35	3.98		2000 Cherokee	truck	88541	4	84537	
84546	6.53	10.98	10.73	10.73	8.19	1.98	7.85	2.71		1999 Dakota Pu	truck	64155	4		
84551	25.25	7.84	7.75	8.77	16.48	5.21	2.67	5.64		2002 Axiom	truck	46363	4	FQ1	
84552	11.89	4.12	-1.75	4.11	8.71	1.77	0.35	2.03		2002 Silhouette	truck	61168	4		
84556	49.71	4.75	10.78	7.54	46.81	2.32	1.66	4.62		2001 Town&Cour	truck	75545	4		
84558	139.71	7.73	11.7	14.92	601.42	4.98	1.44	36.03		2001 S-10 Pu	truck	106236	4		
84560	13.09	6.26	2.47	6.35	11.2	6.1	2.25	6.1		1998 Dakota Sp	truck	49775	4		
84562	10.36	5.38	7.23	5.77	7.65	4.41	1.63	4.39		2004 Dakota Pu	truck	8627	4		
84563	5.41	19.33	1.45	17.37	5.36	0.73	0	0.92		2003 Ranger 4X4	truck	18757	4		
84564	36.44	10.92	0.17	11.5	36.98	3.7	3.63	5.44		1998 Caravan	truck	127230	4		
84568	17.09	6.96	8.58	7.57	15.68	3.54	3	4.1		1999 Ranger Pu	truck	126851	4		
84577	37.8	20.59	32.26	22.28	32.78	4.65	2.62	5.96		1998 Aerostar	truck	0	4		
84580	30.78	13.16	1.44	13.18	35.21	8.1	2.37	8.97		2002 Town & Co	truck	84580	4	FD	TORQUE MISSING BAG 2
84587	96.29	6.16	7.74	10.98	148.27	4.89	1.06	12.12		1996 Villager	truck	166799	4		
84608	48.36	11.68	7.27	13.35	70.98	1.12	1.48	4.89		1996 Quest	truck	125651	4	VDP	
84612	15.04	12.31	10.42	12.32	2.94	0.56	1.49	0.74		2000 Ranger	truck	33680	4	VDP	
84616	11.02	5.88	2.34	5.89	4.65	0.78	1.82	1.05		1999 Voyager	truck	113389	4	VDP	
84617										1997 Suburban	truck	145147	4	VDP, VQ3	
84628	42.7	10.42	12.44	12.29	64.21	12.17	6.74	14.58		2002 Trailblazer	truck	77758	4		
84638	33.57	8.99	9.73	10.32	13.85	2	1.39	2.57		1996 Town And C	truck	213656	4		
84644	34.59	5.8	8.78	7.56	16.86	4.55	2.12	5.04		2001 Pathfinder	truck	66284	4		
84708	13.01	0.42	2.42	1.21	44.81	9.64	5.74	11.19		2003 Caravan	truck	10200	4		
84713	7.68	5.01	5.63	5.19	6.81	2.22	1.99	2.44		1996 Blazer	truck	94350	4		
84722	16.59	1.53	6.55	2.66	20.35	1.94	1.58	2.87		1998 Windstar	truck	99476	4		
84728	28.87	2.49	3.81	3.94	27	4.85	3.34	5.89		2002 Escape 2W	truck	36209	4		
84748	20.24	5.71	7.74	6.6	7.6	1.29	1.27	1.62		2002 Caravan	truck	60790	4		
84749	17.93	4.8	7.46	5.67	3.69	0.86	2.56	1.12		2001 Sienna	truck	80227	4		
84753	28.22	2.46	4.96	3.98	21.45	5.52	2.47	6.14		2003 Caravan	truck	47649	4		
84754	19.54	3.21	4.19	4.17	11.2	3.06	1.24	3.37		2003 Town And C	truck	20787	4		
84755	12.63	5.39	5.8	5.8	3.97	3.03	0.05	2.88		2002 Odyssey	truck	60753	4		
84757	17.26	4.27	5.63	5.05	4.42	1.93	1.3	2.02		2001 Grand Cher	truck	90011	4		
84760	10.67	3.96	4.79	4.36	3.87	1.31	1.56	1.46		2004 Escape	truck	10519	4		
84761	17.4	2.78	4.92	3.66	7.25	2.35	0.92	2.51		2004 Sedona	truck	16609	4		
84763	14.09	7.52	6.38	7.78	3.17	3.89	-1.09	3.51		2003 Odyssey	truck	44752	4		
84766	17.4	2.29	5.97	3.31	10.88	1.51	-1.87	1.76		2000 Caravan	truck	93162	4		
84767	14.93	5.11	9.1	5.88	7.85	2.88	1.34	3.03		1998 Frontier	truck	107615	4		
84773	9.39	2.8	5.13	3.32	1.88	1.61	0.54	1.54		1998 4Runner	truck	115768	4		
84775	35.58	12.33	22.22	14.23	11.64	3.68	-1.36	3.76		1997 Suburban	truck	137630	4		
Ave.	33.33339	8.380169	7.505593	9.621695	41.08492	5.748136	2.660339	7.380678							
Std Dev.	35.01278	5.315011	6.682011	5.297703	86.19264	6.641589	2.31839	8.091062							

84470										1973 280 Se	car	86134	5	VQ2,HS
84472										1977 Monte Carl	car	36999	5	FHS, VG1
84482	74.86	0.9	9.67	5.47	106.01	9.24	4.31	14.09		1979 Lasabre	car	40364	5	84482
84484	90.33	1.88	4.2	6.57	110.07	3.19	2.8	8.63		1979 Lesabre	car	40385	5	
84588	87.76	14.13	0.21	17.05	160.18	11.48	9.95	19.28		1978 Regal	car	81379	5	
84592	89.69	0.09	3.09	5.42	247.06	74.43	12.38	79.09		1979 Ltd	car	65850	5	
84601	118.11	9.25	7.76	14.77	180.11	42.54	17.75	47.9		1979 Regal	car	5864	5	
84603	31.82	3.4	10.12	5.3	32.31	6.41	2.66	7.45		1979 210 Wagon	car	47114	5	VDP
84605	4.61	52.98	13.07	47.8	148.24	48.46	12.1	50.97		1977 280Z	car	94782	5	VDP
84609	79.19	15.19	23.96	19.23	100.13	22.73	2.79	25.52		1978 Regal	car	64571	5	VDP
84614										1978 Delta 88	car	73729	5	VDP,VG1
84637										1980 Cutlass Suç	car	79420	5	VG1,2
84674	31.32	6.13	8.42	7.61	48.43	6.72	7.64	8.97		1979 Firebird	car	45370	5	
84705	59.51	-0.03	8.57	3.63	123.16	23.13	7.33	27.23		1980 Malibu	car	31253	5	
84707	129.28	20.5	15.84	24.67	284.32	72.39	26.91	77.97		1973 Impala	car	94178	5	
84712	106.5	0.09	10.54	6.34	354.43	13.71	6.81	31		1979 Nova	car	86117	5	
84717										1979 Mustang	car	45551	5	VG1,2,3
84738	71.35	1.76	8.34	6.17	69.79	12.51	4.66	15.23		1976 Gran Prix	car	60909	5	
Ave.	74.94846	9.713077	9.522308	13.07923	151.0954	26.68769	9.083846	31.79462						
Std Dev.	35.83373	14.64358	5.954041	12.34282	94.68802	24.81404	6.991913	24.91923						
84407	377.85	115.61	73.6	126.71	469.64	136.99	85.54	151.19		1989 Grandam	car	123575	6	
84430	56.04	22.37	14.78	23.58	66.34	22.17	10.35	23.62		1990 Spirit	car	93661	6	
84474	61.15	37.4	2.77	36.26	76.17	66.51	19.82	63.82		1988 Civic	car	207265	6	
84475	59.86	11.72	2.69	13.57	172.4	38.55	11.35	43.55		1986 Tempo	car	70396	6	
84512										1982 Caprice	car	88587	6	VQ2,HS,V(SMOKER
84550	127.09	3.47	4.92	9.78	125.25	17.46	8.66	22.25		1988 Continental	car	31667	6	
84582	49.85	13.5	33.41	16.79	55.78	13.04	17.45	15.56		1988 528E	car	287806	6	
84595	7.28	6.88	0.54	6.46	12.87	1.56	1.1	2.12		1988 Escort	car	133085	6	
84611	21.27	11.01	11.1	11.56	39.59	3.68	1.53	5.42		1989 Camry	car	168091	6	VDP
84613	55.42	24.63	19.63	25.87	42.71	10.9	2.42	11.96		1990 Delta 88	car	185694	6	VDP
84630	51.4	9.37	8.21	11.49	44.06	7.57	23.04	10.55		1989 Accord	car	139963	6	
84633										1987 740 Turbo	car	248178	6	VG
84635	144.85	13.35	40.6	22.22	206.33	54.97	94.76	65.81		1989 Crown Vic	car	62847	6	
84642	27.63	19.18	7.38	18.82	36.63	4.06	4	5.77		1989 Spirit	car	139488	6	
84643	322.78	70.1	22	79.59	459.03	136.44	35.84	145.92		1987 Escort	car	12845	6	
84646	17.42	10.29	7.14	10.43	15.13	6	3.12	6.27		1988 Accord	car	209194	6	
84654										1990 Cutlass Cie	car	97522	6	FDP
84655	20.85	5.92	6.08	6.73	20.71	4.73	1.48	5.35		1990 Electra Parl	car	169860	6	
84659	44.91	14.61	11.3	15.9	66.88	12.8	12.87	15.52		1988 Le Baron	car	117003	6	
84661	8.95	4.29	4.62	4.56	20.69	3.17	2.83	4.07		1990 Century	car	148959	6	
84662	53.37	9.86	15.42	12.58	57.83	17.82	4.76	19.05		1990 Eldorado	car	185384	6	
84663	25.39	4.06	9.03	5.52	63.53	19.95	19.71	22.21		1989 Corsica	car	98999	6	
84669										1990 Spirit	car	109931	6	VG1
84670	25.44	9.74	11.44	10.68	28.8	10.03	3.51	10.56		1989 Topaz	car	6137	6	
84672	15.31	5.01	0.37	5.22	14.98	4.29	5.14	4.91		1983 Tercel	car	87900	6	
84677										1988 Park Avenu	car	146833	6	VG23
84682	47.19	2.25	18.7	5.65	64.44	18.67	5.39	20.08		1990 Camry	car	138235	6	
84690	5.22	8.1	7.74	7.92	7.01	1.69	2.26	2.01		1989 Cutlass Cie	car	220970	6	
84692	20.46	17.55	20.44	17.89	12.11	20.24	9.7	19.1		1988 Century	car	94555	6	
84695	11.04	1.37	-1.82	1.65	6.83	1.86	1.84	2.12		1989 Cutlass Cie	car	220989	6	84690
84699	538.46	57.89	86.83	77.81	1038.48	124.64	116.82	158.08		1985 Caprice	car	58223	6	
84710	76.01	0.39	8.65	5.07	641.15	5.31	4.45	39.87		1984 Monte Carl	car	68810	6	
84719	11.75	2.33	4.79	2.98	8.08	0.82	1.53	1.24		1990 Cutlass Suç	car	85449	6	
84724	18.01	1.4	6.75	2.67	21.97	3.38	2.36	4.3		1990 Cutlass Cie	car	171475	6	
84727	68.5	25.24	3.17	26.07	29.57	37.38	4.53	34.76		1982 Grenada	car	64654	6	
84735	12.33	2.57	0.66	2.96	21.49	5.04	3.63	5.82		1988 Accord	car	209393	6	
84737	8.17	2.82	6.09	3.33	35.04	9.03	4.39	10.09		1984 Celebrity	car	64091	6	
84740	28.62	10.33	5.06	10.93	28.56	5.64	3.59	6.7		1990 Lesabre	car	107876	6	
84745	60.98	18.93	20.25	21.28	110.58	11.99	2.21	16.6		1990 Civic	car	133966	6	
84765	62.77	0.98	6.25	4.59	267.93	97.92	22.33	101.65		1985 Impala	car	75914	6	
84777	37	1.78	5.84	3.88	42.79	1.78	-1.83	3.65		1987 Cutlass	car	87020	6	
Ave.	71.68389	16.00833	14.0675	18.58333	123.0939	26.05778	15.34667	30.04306						
Std Dev.	112.119	22.77881	18.65997	25.51973	213.2474	38.44189	27.08784	42.85465						

84396	13.85	9.13	6.52	9.2	59.17	8.26	2.22	10.49	1995 Escort	car	106996	7	VPA	Dup Rnd 1
84402	147.93	13.11	18.21	20.37	179.87	12.27	3.98	20.3	1991 Civic	car	220022	7		
84406	132.31	24.22	8.73	28.85	212.89	57.54	11.36	62.57	1995 Corolla	car	107983	7		
84431	80.15	5.71	7.75	9.71	84.02	25.86	4.28	27.37	1991 Grand Marc	car	19292	7		
84437	17.48	5.67	-4.3	5.6	16.18	1.28	1.53	2.08	1994 Camry	car	131874	7		
84439	23.25	12.52	4.06	12.49	31.65	6.3	1.9	7.31	1995 Bonneville	car	168145	7		
84440	37.48	15.14	8.57	15.86	60.61	11.41	12.25	14.07	1995 Park Avenu	car	144956	7		
84442	17.98	5.92	-3.57	5.9	17.67	1.72	1.45	2.53	1994 Camry	car	131894	7	84437	
84443									1991 Prizm	car	132326	7	FQ2	
84449									1994 Regal	car	92177	7	VQ	CARONA CURRENT UNSTABLE
84451	33.02	11.93	5.09	12.55	39.05	2.84	1.46	4.62	1994 Regal	car	92214	7	84449	
84452	28.1	16.26	8.62	16.32	10.3	6.23	1.04	6.07	1995 Taurus	car	139316	7		
84453	55	6.51	10.6	9.36	34.83	5.19	1.89	6.52	1995 Maxima	car	181395	7		
84455	22.08	8.29	5.49	8.82	10.96	1.29	1.83	1.83	1995 Mustang	car	146289	7		
84456	81.17	30.81	22.58	32.83	70.83	36.62	20.53	37.27	1993 Grand Prix	car	177931	7		
84457	73.31	13.19	13.23	16.4	86.03	19.07	12.7	22.2	1995 Crown Vict	car	179731	7		
84463	18.79	35.72	16.33	33.47	16.75	112.52	21.48	101.1	1995 Contour	car	104083	7		
84464	98.07	6.61	2.87	11.18	96.79	31.1	7.25	32.92	1994 Intrepid	car	145950	7		
84485	76.38	5.03	7.74	8.97	94.8	16.72	4.55	20.03	1991 Fleetwood	car	97124	7		
84488	27.07	8.93	-9.96	8.58	20.17	1.63	1.57	2.58	1995 Lesabre	car	126036	7		
84490	53.4	9.08	-17.05	9.67	26.61	2.62	2.02	3.84	1991 Fleetwood	car	97144	7	84485	
84499	24.79	13.28	4.96	13.3	18.16	3.92	3.73	4.66	1995 Integra	car	80579	7		
84505	19.91	16.03	6.03	15.52	11.45	8.99	1.89	8.62	1993 Intrepid	car	210298	7		
84508	19.13	13.71	2.31	13.22	14.36	2.11	1.34	2.69	1992 Civic	car	124705	7		
84518	31.9	8.07	1.06	8.83	22.39	1.42	3.93	2.69	1994 Skylark	car	200811	7		
84526	108.49	55.15	45.99	57.32	55.35	53.61	31.08	52.13	1991 Towncar	car	188033	7		
84528	48.5	148.6	53.36	136.84	54.86	143.3	60.5	133	1994 Grand Marc	car	130521	7		
84529									1993 Sundance	car	84652	7	VG1	
84534	45.17	13.99	6.47	15.13	37.95	29.1	8.23	28.11	1993 Legacy	car	114227	7		
84547	22.28	6.68	10.49	7.76	40.24	17.2	6.38	17.66	1995 Corolla	car	103068	7		
84548	12.4	5.34	1.71	5.46	9.45	2.5	2.04	2.84	1995 Intrepid	car	138989	7	FQ	
84567	99.78	18.32	26.07	23.17	245	33.14	30.51	44.19	1992 Sedan De-V	car	155895	7		
84569	24.16	10.5	7.97	11.05	20.17	2.6	0.15	3.36	1995 Taurus	car	203067	7		
84572	47.17	23.48	-8.4	22.53	12.09	3.25	2.07	3.63	1994 Topaz	car	41482	7		
84573	39.47	8.84	5.53	10.25	38.68	3.04	4.21	5.02	1993 Park Avenu	car	74444	7	FPA	TTL
84574	9.84	7.47	11.55	7.88	4.65	0.87	0.58	1.05	1993 Taurus	car	39476	7	FPA	POST
84575	48.65	16.87	17.22	18.57	58.44	2.93	1.97	5.78	1994 Lumina	car	126825	7	FPA	TTL
84581	12.29	8.65	6.84	8.72	5.68	0.66	2.94	1.09	1995 Corsica	car	78767	7		
84585	10.05	9.92	-1.89	9.11	7.24	3.29	0.15	3.28	1993 Escort Sw	car	99988	7		
84597	18.79	11.72	-0.69	11.23	17.73	3.68	0	4.16	1994 Sunbird	car	145869	7		
84639	11.2	1.86	-0.32	2.19	7.96	1.44	1.75	1.8	1995 Cavalier	car	140500	7		
84645	29.97	16.32	2.92	16.13	23.96	5.65	1.74	6.36	1993 960	car	197094	7		
84668	10.38	4.96	-9.38	4.26	14.89	1.75	1.98	2.44	1991 Delta 88	car	139412	7		
84675	3.42	4.15	1.21	3.91	8.21	4.11	0.94	4.11	1993 Tempo	car	25053	7		
84681									1993 Tempo	car	25073	7	VG	
84688	8.47	8.45	9.27	8.51	14.49	10.55	4.65	10.34	1993 Taurus	car	92978	7		
84714	41.04	5.3	1.37	6.9	82.09	6.69	3.84	10.44	1994 Sw	car	132333	7		
84723	72.74	22.44	24.11	25.21	40.6	9.86	3.54	11.04	1991 Cavalier	car	182349	7		
Ave.	42.20023	15.99727	7.665227	16.79841	46.25614	16.27568	6.714318	17.18614						
Std Dev.	34.69293	22.58593	12.73659	20.98195	52.89274	28.34227	11.07675	26.52929						

84393	24.98	-0.23	1.2	1.18	22.64	1.2	3.6	2.48	1999 300M	car	90240	8	VPA,FG1	POWER FAILURE, Dup Rnd 1
84398	40.55	9.34	8.56	10.92	34.24	3.69	5.51	5.42	2001 Accord	car	62350	8		PA POWER RESTORED
84399									1997 Accord	car	82926	8	VG1,2	
84408	57.61	15.68	-3.28	16.54	100.25	11.41	25.13	16.89	2002 Sable	car	29501	8		
84409	27.35	13.01	5.38	13.28	27.67	3.25	3.41	4.54	1999 Malibu	car	79925	8		
84411	86.28	23.54	-0.54	24.98	206.2	81.41	18.28	83.25	1996 Sc	car	78346	8		
84412	47.73	12.12	9.91	13.8	0.69	2.96	6.57	3.09	1996 Civic	car	140479	8		
84414									2003 Impala	car	11340	8	VQ	Auto Valve off
84416	20.83	4.87	11.7	6.16	8.68	3.41	5.59	3.83	1998 Civic	car	118218	8		
84418	33.83	8	0.88	8.85	26.37	11.05	0	11.07	1997 Grand Am	car	58100	8	FQ	CONPRESSED AIR SHUT DOWN
84419	26.22	9.36	13.76	10.55	19.07	3.33	5.03	4.28	1998 Lumina	car	79187	8		
84420	50.98	10.67	1.74	12.2	80.81	13.84	8.57	17.03	2000 Accord	car	84180	8		
84421	35.8	13.62	-3.75	13.59	36.54	2.42	2.79	4.22	2000 Sedan	car	51721	8		
84426	23.46	9.84	-3.62	9.61	26.97	5.68	7.4	6.91	2001 Sedan	car	44251	8	VG3	
84427	9.74	10.45	-2.28	9.52	8.49	1.03	1.34	1.45	2001 Galant	car	51764	8	FPA	TTL SIGNAL MISSING
84428	40.77	9.33	-2.01	10.21	60.97	15.17	6.58	17	1998 Malibu	car	107047	8		
84432	40.59	2.85	2.89	4.86	47.76	4.26	3.71	6.53	1999 Sedan	car	98565	8		
84438	-1.64	8.96	-1.97	7.63	5.05	2.55	2.4	2.68	2001 Century	car	33749	8		
84445	37.62	16.15	4.58	16.45	31.16	1.68	2.45	3.24	2001 Sedan	car	67290	8		
84483	22.58	7.2	1.56	7.6	27.03	4.06	0.4	5	1996 Neon	car	79848	8		
84502	24.61	18.43	-8.38	16.89	16.06	2.96	3.72	3.7	1996 Concorde	car	111502	8		
84503	18.84	15.32	6.12	14.88	7.37	2.6	1.87	2.8	2002 Taurus	car	26406	8	RDM	
84504	17.23	7.83	-0.02	7.78	17.25	1.79	-0.08	2.45	2000 Concorde	car	65330	8		
84514	41.5	6.59	-5.26	7.6	14.73	3.32	2.41	3.85	2002 Concorde	car	34231	8	RDM	
84515	38.39	3.92	13.8	6.43	38.48	3.76	1.42	5.43	1999 Stratus	car	108838	8		
84520	25.94	10.62	6.12	11.11	15.21	2.13	0.09	2.68	2001 Taurus	car	47479	8	RDM	
84521	19.69	10.02	10.98	10.59	14.38	2	1.38	2.59	1997 Accord	car	101888	8		
84557	18.12	13.07	13.8	13.38	19.74	1.8	1.27	2.69	2000 Park Avenu	car	67099	8		
84589	18.37	5.25	12.32	6.43	599.46	1.77	0.42	32.84	2001 Sedan	car	56662	8		
84593	20.25	3.48	6.19	4.55	22.15	2.37	1.99	3.38	1998 Accord	car	75067	8		
84596	1.16	20.79	12.47	19.17	1.67	1.88	0.76	1.8	1997 Taurus	car	97601	8		
84599	72.36	2.6	0.73	6.06	87.64	8.61	2.2	12.22	1998 Avalon	car	29575	8		
84622	53.26	15.7	1.66	16.66	71.38	3.99	6.43	7.61	1999 Camry	car	64134	8	VDP	
84629	39.98	4.02	3.51	5.67	21.36	4.56	1.93	5.16	1996 TI2.5	car	117642	8		
84729	14.59	3.27	4.29	3.91	6.96	1.89	1.63	2.13	2001 Camry	car	46869	8		
84733	16.81	3.72	6.44	4.58	5.85	1.19	1.34	1.44	1998 Skylark	car	65464	8		
84739									1998 Protoge	car	88569	8	VQ1,2,HS	
84743	15.61	3.05	4.13	3.77	11.43	0.58	1.2	1.18	1999 Protoge	car	122968	8		
84751	10.56	8.72	8.04	8.77	0.73	3.23	0.56	2.92	1998 Escort	car	55309	8		
84759	5.23	3.4	3.25	3.48	2.82	0.71	0.3	0.79	2005 Focus	car	6701	8		
Ave.	29.66973	9.312432	3.916216	9.99027	47.16919	6.041622	3.772973	8.015405						
Std Dev.	18.75004	5.539727	5.857385	5.129218	100.9203	13.21436	4.972171	14.17063						

Year	Emission Rates from the QCM				Emission Rates from the Gravimetric Filter			
	Bag 1 mg/mile	Bag 2 mg/mile	Bag 3 mg/mile	FTP Composite mg/mile	Bag 1 mg/mile	Bag 2 mg/mile	Bag 3 mg/mile	FTP Composite mg/mile
TRUCKS								
1970-1980	139.04	39.79	22.27	43.94	172.99	54.04	20.16	58.11
1981-1990	104.91	20.83	21.37	25.25	160.34	32.16	18.70	37.92
1991-1995	38.25	16.28	10.95	17.06	42.39	13.60	4.87	14.51
1996-2005	33.33	8.38	7.51	9.62	41.08	5.75	2.66	7.38
CARS								
1970-1980	74.95	9.71	9.52	13.08	151.10	26.69	9.08	31.79
1981-1990	71.68	16.01	14.07	18.58	123.09	26.06	15.35	30.04
1991-1995	42.20	16.00	7.67	16.80	46.26	16.28	6.71	17.19
1996-2005	29.67	9.31	3.92	9.99	47.17	6.04	3.77	8.02

Composite Check		Nom. Dst. mi.	Emissions mg/mi.	FTP mg/mi.
Bag 1		1.19	29.28	
Bag 2		8.64	9.33	
Bag 3		1.19	3.63	0.0099772

Bin	QCM Bag 1 mg/mile	QCM Bag 2 mg/mile	QCM Bag 3 mg/mile	QCM FTP Composite mg/mile	Grav Bag 1 mg/mile	Grav Bag 2 mg/mile	Grav Bag 3 mg/mile	Gravimetric FTP Composite mg/mile
1/Average	139.04	39.79	22.27	43.94	172.99	54.04	20.16	58.11
Std. Dev.	159.43	48.19	19.01	44.71	203.19	52.82	31.32	50.54
2/Average	104.91	20.83	21.37	25.25	160.34	32.16	18.70	37.92
Std. Dev.	137.71	27.84	28.31	30.93	189.01	49.57	36.77	51.26
3/Average	38.25	16.28	10.95	17.06	42.39	13.60	4.87	14.51
Std. Dev.	26.56	10.31	9.23	9.89	40.84	10.97	6.08	10.96
4/Average	33.33	8.38	7.51	9.62	41.08	5.75	2.66	7.38
Std. Dev.	35.01	5.32	6.68	5.30	86.19	6.64	2.32	8.09
5/Average	74.95	9.71	9.52	13.08	151.10	26.69	9.08	31.79
Std. Dev.	35.83	14.64	5.95	12.34	94.69	24.81	6.99	24.92
6/Average	71.68	16.01	14.07	18.58	123.09	26.06	15.35	30.04
Std. Dev.	112.12	22.78	18.66	25.52	213.25	38.44	27.09	42.85
7/Average	42.20	16.00	7.67	16.80	46.26	16.28	6.71	17.19
Std. Dev.	34.69	22.59	12.74	20.98	52.89	28.34	11.08	26.53
8/Average	29.67	9.31	3.92	9.99	47.17	6.04	3.77	8.02
Std. Dev.	18.75	5.54	5.86	5.13	100.92	13.21	4.97	14.17