Proposed Diesel Vehicle Emissions
National Environment Protection Measure
Preparatory Work

In-Service Emissions Testing – Pilot Study, Fault Identification and Effect of Maintenance

Appendices

NEPC
NATIONAL ENVIRONMENT PROTECTION COUNCIL

April 2001

Appendix 1

VEHICLE MATRIX

Number and type of vehicles tested for emission performance

Vehicle Category[1]	No of Vehicles to be Tested by Year of Manufacture			Total
	1980-89	*1990-95*	*1996-00*	**621 (615)**
[2] Passenger Cars, Off Road Vehicles, & Light Trucks & Buses <3.5 t GVM	**53(55)**	**62(55)**	**56(55)**	**171(165)**
Rigid Trucks ≥ 3.5-12 t GVM	**55(55)**	**55(55)**	**55(55)**	**165(165)**
Rigid Trucks & Buses ≥ 12 t < 25 t GVM	**55(55)**	**55(55)**	**55(55)**	**165(165)**
[2] Articulated Trucks ≥ 42.5t **GCM**	**28 (40)**	**52 (40)**	**40(40)**	**120(120)**

Notes:

GVM = gross vehicle mass; GCM = gross combination mass (vehicle + trailer)

Number anmd type of vehicles submited for diagnosis and repair

Vehicle Category	No of Vehicles Diagnosed and Repaired ( ) by age category			Total
	1980-89	***1990-95***	***1996-00***	**120 (53)**
Passenger Cars, Off Road Vehicles, & Light Trucks & Buses <3.5 t GVM	**7 (4)**	**14 (9)**	**12 (2)**	**33 (15)**
Rigid Trucks ≥ 3.5-12 t GVM	**10 (6)**	**12 (6)**	**12 (6)**	**34 (18)**
Rigid Trucks & Buses ≥ 12 t < 25 t GVM	**12 (6)**	**9 (4)**	**12 (5)**	**33 (15)**
Articulated Trucks ≥ 42.5t **GCM**	**6 (4)**	**7 (0)**	**7 (1)**	**20 (5)**

( ) vehicles selected for repair

Vehicle Manufacturer Summary

MC & NA Vehicles (< 3.5t GVM)

Category	Compliance Date	Ford	Holden	Kia	Mazda	Mitsubishi	Nissan	Toyota	Total
1	1980 - 89	1	2	0	2	0	3	45	**53**
2	1990 - 95	5	2	0	0	3	6	46	**62**
3	1996 - 00	15	1	1	1	4	5	29	**56**
									171

NB Vehicles (3.5t -12t GVM)

Category	Compliance Date	Daihatsu	Ford	Hino	International	Isuzu	Iveco	Leyland	Mazda	Mercedes Benz	Mitsubishi	OKA	Nissan	Toyota	Total
4	1980 - 89	9	2	4	1	13	0	0	5	0	9	0	1	11	**55**
5	1990 - 95	1	4	5	0	28	1	0	1	0	5	0	0	10	**55**
6	1996 - 00	1	2	12	0	7	2	1	2	4	9	1	3	11	**55**
															165

ME & NC Vehicles (12t - 25t GVM)

Category	Compliance Date	Bedford	Ford	Hino	International	Isuzu	Kenworth	Leyland	Mack	MAN	Mercedes Benz	Mitsubishi	Nissan	Scania	Volvo	Total
7	1980 - 89	2	2	11	5	7	0	1	4	0	5	7	0	0	11	**55**
8	1990 - 95	0	2	9	6	10	1	1	3	1	2	9	1	1	9	**55**
9	1996 - 00	0	0	14	2	8	0	0	0	1	1	9	8	3	9	**55**
																165

NCH Vehicles (> 25t GVM)

Category	Compliance Date	Atkinson	Ford	Freightliner	Hino	International	Isuzu	Iveco	Kenworth	Mack	Mercedes Benz	Mitsubishi	Nissan	Scania	Volvo	Western Star	Total
10	1980 - 89	1	5	0	0	9	0	0	3	3	2	2	0	1	2	0	**28**
11	1990 - 95	0	10	5	0	12	0	0	5	2	2	0	1	5	8	2	**52**
12	1996 - 00	0	2	4	1	5	3	5	3	4	0	0	0	12	1	0	**40**
																	120

Total Vehicles **621**

Appendix 2

VEHICLE GENERAL DETAILS

General Details

Test No	Vehicle Make	Vehicle Model	Engine Make	Vehicle ADR Category	Project Category	Compliance Date	GVM (kg)	Tare Weight (kg)	Odometer (km)	No of Cylinders
535	Toyota	Troop Carrier HZJ75	Toyota	MC	2	May-90	3035	2500	151892	6
536	Toyota	Troop Carrier	Toyota	MC	1	Mar-89	3035	2500	262533	6
537	Mazda	Bravo B2500	Mazda	MC	3	Oct-98	2770	1430	47800	4
539	Toyota	Hilux LN106R	Toyota	MC	2	May-93	2730	1520	261670	4
540	Toyota	Landcruiser 80 Series	Toyota	MC	2	Dec-90	2960	1870	175195	6
541	Toyota	Troop HJ75RV	Toyota	MC	1	Jul-88	3035	1980	163874	6
542	Toyota	Troop HJ75RV	Toyota	MC	2	Jun-92	3035	1989	164525	6
544	Toyota	Landcruiser HZJ80R	Toyota	MC	2	Jun-95	2960	1989	138416	6
545	Toyota	Landcruiser HZJ80P	Toyota	MC	2	May-91	2960	1989	143721	6
546	Toyota	Hilux LN65R	Toyota	MC	1	May-87	2520	1790	306875	4
547	Toyota	Landcruiser HJ60RG	Toyota	MC	1	Jun-83	2845	2400	381829	6
548	Toyota	Hilux LN106R	Toyota	MC	2	Dec-90	2730	1650	199630	4
549	Toyota	Troop Carrier HZJ75RV	Toyota	MC	2	Feb-92	3035	1989	302590	6
550	Toyota	4 Runner LN130R	Toyota	MC	2	Jan-92	2520	1670	200100	4
551	Toyota	Hilux LN111R	Toyota	MC	2	May-95	2520	1650	132545	4
553	Toyota	Landcruiser HJ60RG	Toyota	MC	1	Oct-88	2810	1980	259030	6
554	Toyota	Landcruiser HZJ80R	Toyota	MC	3	Apr-96	2960	1980	73077	6
555	Toyota	Hilux Q-LN130W	Toyota	MC	3	Apr-00	2520	1850	65552	4
557	Nissan	Terrano II	Nissan	MC	3	Apr-98	2850	1900	66288	4
560	Toyota	Landcruiser Sahara HJ61RG	Toyota	MC	1	Mar-88	2960	2340	268158	6
562	Toyota	Hilux LN106P	Toyota	MC	1	Sep-89	2730	1630	434446	4
564	Toyota	Landcruiser HJ60RG	Toyota	MC	1	Jan-83	2730	2400	307958	6
801	Nissan	Patrol	Nissan	MC	3	Nov-99	2900	2200	12033	6
802	Nissan	Turbo Diesel	Nissan	MC	3	Jul-98	2960	2350	53429	6
803	Toyota	Landcruiser	Toyota	MC	2	Jun-91	2960	2350	98344	6
804	Nissan	Patrol ST	Nissan	MC	3	Mar-99	2900	2200	13423	6
805	Nissan	Patrol	Nissan	MC	2	Oct-95	2800	2350	127832	6
806	Toyota	Landcruiser	Toyota	MC	3	May-96	2960	2150	88639	6
807	Toyota	Troop	Toyota	MC	2	Nov-93	3035	2300	171000	6
808	Toyota	Hilux	Toyota	MC	2	Nov-90	2730	1950	287280	4
809	Toyota	Troop	Toyota	MC	2	Mar-90	3035	2300	214262	6
810	Toyota	Landcruiser	Toyota	MC	1	Apr-85	3035	2300	169676	6
811	Nissan	Patrol	Nissan	MC	2	Mar-95	2800	2150	142353	6
814	Toyota	Landcruiser	Toyota	MC	1	Aug-89	3035	2300	239694	6
815	Nissan	Patrol	Nissan	MC	3	Sep-98	2960	2150	43502	6
817	Toyota	Hilux	Toyota	MC	2	May-90	2730	1650	235071	4
818	Toyota	Hilux	Toyota	MC	1	Nov-85	2520	1405	315000	4
819	Nissan	Patrol	Nissan	MC	2	Apr-91	2800	2200	198000	6

General Details

Test No	Vehicle Make	Vehicle Model	Engine Make	Vehicle ADR Category	Project Category	Compliance Date	GVM (kg)	Tare Weight (kg)	Odometer (km)	No of Cylinders
820	Toyota	80S	Toyota	MC	2	Mar-93	2960	2150	149600	6
821	Toyota	Landcruiser	Toyota	MC	2	Sep-95	3035	2700	106729	6
822	Toyota	Landcruiser	Toyota	MC	1	Jul-86	3035	2350	272748	6
909	Isuzu	NPR492A	Isuzu	NB	5	Apr-95	7300	3300	228356	4
911	Isuzu	NPR300	Isuzu	NB	5	May-95	6200	3100	44035	4
912	Isuzu	NQR450	Isuzu	NB	6	Sep-98	8500	3800	66117	4
914	Toyota	BU91	Toyota	NB	4	Jan-89	7700	2900	232376	4
916	Hino	FG	Hino	NC	9	Feb-97	15000	7800	71240	6
925	Mercedes Benz	LCV2	Mercedes	NB	6	Feb-00	4490	2500	12839	4
926	Ford	Transit	Ford	NA	3	Jul-97	3300	2450	87578	4
928	Hino	FC3J	Hino	NB	6	Oct-97	10000	4980	96222	6
930	Hino	FC3J	Hino	NB	6	Jan-99	10000	5190	72429	6
931	Hino	FC3J	Hino	NB	6	May-99	10100	4860	38051	6
933	Hino	KC3J	Hino	NB	6	Feb-00	10000	4930	9218	6
936	Hino	FC3J	Hino	NB	6	Jun-98	10100	4940	55747	6
937	Hino	FC3J	Hino	NB	6	Jun-98	10000	4960	75296	6
938	Hino	FC3J	Hino	NB	6	Jul-99	10100	4880	39807	6
939	Mitsubishi	FK417KS	Mitsubishi	NB	5	Sep-94	11000	6220	185665	6
940	Isuzu	GVRSMC	Isuzu	NCH	12	Sep-98	32000	11200	53817	6
941	Hino	FC3WLKA	Hino	NB	6	Jun-96	9700	3894	120205	4
948	Mitsubishi	Canter	Mitsubishi	NB	6	Apr-97	6300	3580	86851	4
950	Mitsubishi	FK617R1V	Mitsubishi	NB	6	Nov-99	10400	5334	22370	6
951	Mitsubishi	FE6A7EV	Mitsubishi	NB	6	Feb-99	6300	3520	34893	4
952	Isuzu	NPR	Isuzu	NB	5	Sep-94	6200	3630	185106	4
953	Mitsubishi	FE6H7EV	Mitsubishi	NB	6	Nov-98	6300	3500	35030	4
954	Mitsubishi	FK417KS	Mitsubishi	NC	8	Sep-93	12100	6200	220251	6
955	Hino	FF17SER	Hino	NC	8	Aug-90	13900	7000	248461	6
956	Nissan	PKB210	Nissan	NC	9	Jan-98	13900	7150	101188	
957	Mitsubishi	FE98A	Mitsubishi	NB	6	Feb-99	6300	3480	47183	4
958	Isuzu	NPR66	Isuzu	NB	5	Sep-92	4950	3440	185380	4
959	Mercedes Benz	LCV2	Mercedes	NB	6	Sep-99	4490	2500	25726	4
960	Mercedes Benz	LC298A	Mercedes	NB	6	Mar-00	4490	2500	7373	4
961	Mercedes Benz	Sprinter	Mercedes	NB	6	Feb-00	4490	2500	23832	4
968	Hino	FF19	Hino	NC	7	May-89	13900	7460	175988	6
969	Hino	FG	Hino	NC	8	Mar-90	15000	7600	300908	6
970	Hino	GS221	Hino	NC	8	Apr-92	22500	8900	212141	6
972	Hino	GH3HJLD	Hino	NC	9	Jan-96	15000	6660	153701	6
973	Hino	GS221Q3AN	Hino	NC	8	May-92	22500	8900	196043	6

General Details

Test No	Vehicle Make	Vehicle Model	Engine Make	Vehicle ADR Category	Project Category	Compliance Date	GVM (kg)	Tare Weight (kg)	Odometer (km)	No of Cylinders
974	Mitsubishi	FEHHHFX	Mitsubishi	NB	4	Jan-87	8000	3000	525052	4
975	Toyota	BU85	Toyota	NB	4	Feb-85	6600	2720	389699	4
976	Toyota	Hilux	Toyota	NA	1	Apr-89	2580	1500	151686	4
977	Toyota	Dyna	Toyota	NA	1	Nov-87	2750	1800	365068	4
981	Daihatsu	V100	Diahatsu	NB	4	Jun-81	5300	3000	252252	4
982	Daihatsu	Cabstar KMH 40	Diahatsu	NB	4	Mar-86	4040	2050	183065	4
983	Hino	FD3W	Hino	NB	5	Feb-94	9800	4040	312738	6
984	Hino	FD3HLLA	Hino	NB	6	Apr-96	10400	4880	122926	6
985	Hino	FD3W	Hino	NB	5	Jan-93	9800	4060	310672	6
987	Hino	Harrier GD3HJLA	Hino	NB	6	Feb-96	11900	4100	166057	6
989	Hino	GH	Hino	NC	9	Jan-96	15000	6680	64947	6
990	Nissan	-	-	NB	6	Apr-96	9800	4020	96981	6
992	Mitsubishi	FV 458K	-	NC	8	Feb-93	22500	10150	53329	6
993	Mitsubishi	FV 458K	Mitsubishi	NC	8	Jan-94	22500	10150	36948	6
998	Daihatsu	V48	Diahatsu	NB	4	Aug-82	5700	2460	571776	4
999	Hino	FF19	Hino	NC	7	Mar-89	13900	8650	164363	6
1000	Mitsubishi	FK415	Mitsubishi	NB	4	Sep-87	10500	4980	208233	6
1001	Isuzu	FSR 500	Isuzu	NB	5	Apr-90	9300	4970	434024	6
1005	Hino	FF17	Hino	NC	7	Apr-89	13900	5430	193212	6
1007	Toyota	WU90	Toyota	NB	4	May-88	7000	3050	469147	4
1008	Hino	GH	Hino	NC	9	Jan-96	15000	6700	59025	6
1009	Isuzu	SPR422	Isuzu	NB	4	May-82	9000	3940	569552	6
1010	Daihatsu	Delta	Diahatsu	NB	5	Jul-92	3750	1680	131545	4
1011	Isuzu	NPR300	Isuzu	NB	5	Jun-95	6000	2800	63236	4
1013	Mazda	TH000WG	Mazda	NB	5	Jun-92	5935	2850	244163	4
1014	Toyota	Dyna	Toyota	NB	4	Nov-85	6600	2880	397776	4
1016	Ford	Trader	Ford	NB	5	Jan-94	4994	2900	202477	4
1019	Isuzu	NPR59L5J	Isuzu	NB	5	Feb-91	6000	2800	325016	4
1020	Toyota	Dyna400	Toyota	NB	4	Apr-88	7000	3360	463758	4
1021	Toyota	Dyna	Toyota	NB	5	Jan-90	7000	3360	284727	4
1022	Hino	FC	Hino	NB	5	May-93	10670	4220	362676	6
1023	Hino	FC	Hino	NB	5	May-94	10670	4380	227735	6
1025	Toyota	Dyna	Toyota	NB	6	Apr-98	7000	3560	28981	4
1026	Toyota	Dyna300	Toyota	NB	6	Dec-98	6000	3380	13028	4
1027	Toyota	Dyna300	Toyota	NB	6	Feb-98	6000	3380	31080	4
1028	Toyota	Dyna200	Toyota	NB	5	Sep-94	4450	2140	219825	4
1029	Toyota	Dyna200	Toyota	NB	6	Apr-97	4450	2580	106176	4
1062	International	9000C	International	NCH	12	Feb-99	42000	15080	130582	8

General Details

Test No	Vehicle Make	Vehicle Model	Engine Make	Vehicle ADR Category	Project Category	Compliance Date	GVM (kg)	Tare Weight (kg)	Odometer (km)	No of Cylinders
1068	Volvo	FL10	Volvo	NCH	11	Oct-92	28900	10400	636298	6
1069	Volvo	FL10	Volvo	NCH	11	Oct-92	28900	10400	619075	6
1071	Volvo	FL10	Volvo	NCH	11	Oct-92	28900	10400	656144	6
1073	Scania	PII3M76X4	Scania	NCH	11	Jun-94	38000	15100	817861	6
1074	Kenworth	K125CR	Caterpillar	NCH	10	Mar-85	38000	14180	1883985	6
1075	International	EF36CM7	International	NCH	11	Sep-94	42500	16100	964003	6
1078	Isuzu	NPR300	Isuzu	NB	6	Mar-00	4490	2110	12577	4
1079	Isuzu	NPR400	Isuzu	NB	5	Apr-94	7300	3430	130563	4
1080	Mitsubishi	FK415F16A	Mitsubishi	NB	4	Feb-85	9300	4650	544664	4
1082	Isuzu	NPR250	Isuzu	NB	6	Jan-98	4490	2110	39814	4
1083	Mazda	T4000	Mazda	NB	6	Jan-96	5915	2780	83988	4
1084	Isuzu	NPR200	Isuzu	NB	5	Jan-95	4490	2590	55796	4
1085	Ford	Trader D409	Mazda	NB	5	May-93	4495	2110	168201	4
1086	Toyota	Dyna200	Toyota	NB	5	Oct-93	4450	2090	125210	4
1087	Mitsubishi	FM658H	Mitsubishi	NC	9	Apr-96	15000	7200	104917	6
1089	Toyota	Dyna	Toyota	NB	5	Nov-93	6000	2880	84176	4
1090	Mazda	T3500	Mazda	NB	4	Jan-88	4485	2150	72241	4
1091	Toyota	Dyna	Toyota	NB	5	Aug-92	4450	2130	115544	4
1092	Isuzu	KT26	Isuzu	NB	4	Jul-84	5600	2680	351267	4
1093	Mitsubishi	FK417HS	Mitsubishi	NB	5	Jan-95	9700	5280	184632	6
1094	Isuzu	FSR650	Isuzu	NB	4	Nov-89	11000	5280	95476	6
1096	Ford	Cargo 1313	Ford	NC	7	Feb-88	13900	6200	286585	6
1097	Scania	P113M6X4-310	Scania	NCH	11	Jul-94	38000	13160	822431	6
1099	Mack	MHR6X4	Mack	NCH	10	May-88	42500	16100	1664995	8
1100	Volvo	F16	Volvo	NCH	11	Jul-90	42100	15900	1191172	
1101	International	EF3600	International	NCH	11	Aug-93	42000	15800	707309	8
1102	International	EF3600	Cummins	NCH	11	Jul-93	42000	15950	927493	8
1103	Kenworth	NA4	Kenworth	NCH	11	May-92	42500	16050	1428616	8
1104	Iveco	-	Iveco	NB	5	Aug-95	4490	2150	160321	4
1105	Iveco	C/Cab	Iveco	NB	6	Feb-99	4050	1940	57529	4
1109	Isuzu	FSR550	Isuzu	NB	5	Jun-94	9500	5100	141337	6
1110	Isuzu	FSR450	Isuzu	NB	5	May-92	9300	4800	223959	6
1111	Nissan	PKC310	Nissan	NC	9	Jan-96	26500	9900	238357	6
1113	Isuzu	FSR450	Isuzu	NB	5	May-92	10230	4640	226099	6
1114	Nissan	PKC310	Nissan	NC	9	Apr-97	15000	8100	178117	6
1115	Isuzu	FVR900TA	-	NC	9	Mar-97	20400	9650	170454	6
1116	Isuzu	FVM1400	-	NC	8	Jan-95	22500	10890	304702	6
1118	Isuzu	FSR450	Isuzu	NB	5	Jun-92	9300	4460	225386	6

General Details

Test No	Vehicle Make	Vehicle Model	Engine Make	Vehicle ADR Category	Project Category	Compliance Date	GVM (kg)	Tare Weight (kg)	Odometer (km)	No of Cylinders
1120	Isuzu	FSR450	Isuzu	NB	5	May-92	9300	4460	232665	6
1121	Isuzu	FSR450	Isuzu	NB	5	Jun-92	9900	4630	201165	6
1122	Isuzu	FSR450	Isuzu	NB	5	May-92	10230	4710	202894	6
1123	Nissan	PKC310	-	NC	9	Jul-97	15000	8100	133616	6
1124	Isuzu	FVR900TA	Isuzu	NC	9	Jan-98	22500	10110	122670	6
1125	Isuzu	FSR450	Isuzu	NB	5	May-92	10400	4800	243968	6
1126	Isuzu	FSR500	Isuzu	NB	5	Feb-92	9300	4460	340594	6
1127	Isuzu	FSR650	Isuzu	NB	5	Oct-94	12000	5200	384719	6
1129	Mercedes Benz	405	Mercedes Benz	ME	8	Nov-93	17600	9300	413029	6
1130	Volvo	B10M	Volvo	ME	8	May-94	16500	8740	362771	6
1131	Leyland	PMC	Leyland	ME	8	Feb-91	16260	8610	279457	6
1132	Mercedes Benz	PMC-BB86	Mercedes Benz	ME	7	Jun-86	16000	8480	871964	6
1133	Volvo	B10M94A	Volvo	ME	9	Jun-98	16500	8740	124029	6
1134	Volvo	B58	Volvo	ME	7	Apr-84	16500	8740	792766	6
1136	Mercedes Benz	PMC-BB86	Mercedes Benz	ME	7	Mar-86	16000	8480	815157	6
1137	Volvo	B58	Volvo	ME	7	Feb-84	16000	8480	726200	6
1138	Volvo	B10M	Volvo	ME	8	Jul-91	17300	9160	529567	6
1140	Volvo	PMC	Volvo	ME	7	Nov-88	16500	8740	623547	6
1143	Toyota	Dyna	Toyota	NB	6	Aug-98	4495	2150	43195	4
1144	Mitsubishi	Canter	Mitsubishi	NB	6	Jun-00	4495	2929	2411	4
1145	Toyota	Dyna	Toyota	NB	6	Jul-98	4450	2130	47218	4
1146	Toyota	Hilux	Toyota	NA	1	Nov-87	2550	1480	216066	4
1147	Toyota	Hilux	Toyota	NA	1	Jan-87	2550	1480	225627	4
1148	Daihatsu	Delta	Daihatsu	NB	4	May-89	4450	2130	148366	4
1149	Toyota	Dyna	Toyota	NB	5	Jul-95	4450	2130	106383	4
1151	Toyota	Hilux	Toyota	NA	2	Nov-95	2520	1480	103700	4
1152	Daihatsu	Delta	Daihatsu	NB	6	Jan-00	4420	2340	3869	4
1153	Daihatsu	Dualcab Delta	Daihatsu	NB	4	Sep-89	3750	1980	108850	4
1154	Toyota	Dyna 200	Toyota	NB	5	Jun-91	4450	2550	137494	4
1155	Hino	FC	Hino	NB	4	Mar-87	10230	4330	332761	6
1156	Hino	FG	Hino	NC	7	May-89	15000	7800	179496	6
1157	Hino	FF	Hino	NC	7	Dec-89	13900	5580	170171	6
1158	Hino	FF	Hino	NC	7	Oct-89	13900	6530	168852	6
1159	Mitsubishi	Canter	Mitsubishi	NB	5	Apr-90	6000	3120	211797	6
1160	Hino	FC	Hino	NB	4	Jan-88	10230	3800	123488	6
1161	Daihatsu	Delta	Daihatsu	NB	4	Nov-87	6600	2800	168799	4
1162	Toyota	Dyna 200	Toyota	NB	6	Feb-98	4495	2150	40252	4
1166	Toyota	Dyna 300	Toyota	NB	5	Nov-95	6000	2880	79164	4

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Test No	Vehicle Make	Vehicle Model	Engine Make	Vehicle ADR Category	Project Category	Compliance Date	GVM (kg)	Tare Weight (kg)	Odometer (km)	No of Cylinders
1167	Mitsubishi	Canter	Mitsubishi	NB	4	Mar-87	4500	2160	178853	4
1168	Isuzu	FSR 550	Isuzu	NB	5	Jul-93	10450	4380	212011	6
1170	Mazda	T3500	Mazda	NB	4	Feb-88	4485	2330	231470	4
1171	Mitsubishi	FK617	Mitsubishi	NB	6	Oct-97	9800	5090	78060	6
1172	Ford	Trader	Ford	NB	5	Aug-92	4495	2380	109695	4
1173	Isuzu	FSR 450	Isuzu	NB	5	Mar-91	10230	5420	174315	6
1174	Mitsubishi	FM 515	Mitsubishi	NC	7	Dec-85	13900	6350	151228	6
1193	Isuzu	FVR900A	Isuzu	NC	9	Feb-00	16000	7920	6772	6
1194	Isuzu	FVR900	Isuzu	NC	7	Jul-89	13900	7640	277201	6
1196	Kenworth	T300	Kenworth (CAT)	NCH	12	May-98	42000	16000	85615	6
1197	Isuzu	FVR	Isuzu	NC	8	Aug-94	13900	8120	226327	6
1198	Volvo	FL6	Volvo	NC	9	May-96	16900	7960	189895	6
1199	Nissan	PK250	Nissan	NC	9	Apr-98	16000	8480	54869	
1200	Hino	FG	Hino	NC	9	Feb-99	15000	7980	35326	6
1203	Nissan	PKC310	Nissan	NC	9	Apr-98	16000	7700	106023	6
1204	Nissan	LK185	Nissan	NB	6	Nov-96	11900	5300	103111	6
1205	Isuzu	FVR950	Nissan	NC	9	Apr-99	16000	8190	70473	6
1206	Isuzu	FVR900	Isuzu	NC	8	Nov-93	13900	8200	235995	6
1210	Nissan	PKC310	Nissan	NC	9	Apr-98	16000	7885	64459	6
1211	Isuzu	NPR 300	Isuzu	NB	5	Jul-93	6200	3260	178413	4
1213	Isuzu	FVR 130	Isuzu	NC	8	Aug-94	16000	8120	250664	6
1214	Isuzu	FVR900 Turbo	Isuzu	NC	8	Jun-91	13900	7930	374471	6
1215	Nissan	PKC397A	Nissan	NC	9	Apr-98	16000	7700	86327	6
1217	Isuzu	FVR900TA	Isuzu	NC	9	Mar-00	16000	8050	42970	6
1218	Isuzu	FSR32HN	Isuzu	NB	5	Oct-92	10430	4970	161830	6
1221	Isuzu	FRR550	Isuzu	NB	6	Oct-97	10000	5440	136818	6
1222	Hino	FD3W	Hino	NB	5	Feb-94	10800	5200	205570	6
1223	International	Acco 1850D	Perkins	NC	7	Aug-87	13900	8320	352268	6
1225	Mitsubishi	FK	Mitsubishi	NC	8	Oct-90	13900	6780	533723	6
1226	Mitsubishi	FK417	Mitsubishi	NB	5	Sep-94	9700	4960	362296	6
1227	Nissan	CW450	Nissan	NCH	11	Apr-94	42500	15400	256015	6
1229	International	N1750	International	NC	8	Feb-90	12500	5400	771160	6
1231	Mitsubishi	FV418KS	Mitsubishi	NC	9	May-96	25400	11640	149587	6
1232	Volvo	FL10	Volvo	NCH	12	Feb-98	31600	12480	535126	6
1233	International	Acco 2350E	Cummins	NCH	11	Jun-95	31000	14410	281053	6
1234	International	Acco 1850D	Perkins	NC	8	Sep-91	16000	7440	320246	6
1235	Mitsubishi	Superframe	Mitsubishi	NC	9	Sep-97	25400	12100	104112	6
1237	OKA	LT Series	Perkins	NB	6	May-96	6000	3120	46585	4

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Test No	Vehicle Make	Vehicle Model	Engine Make	Vehicle ADR Category	Project Category	Compliance Date	GVM (kg)	Tare Weight (kg)	Odometer (km)	No of Cylinders
1239	Mazda	T4000	Mazda	NB	6	Dec-97	4495	2620	91465	4
1240	Toyota	Hiace	Toyota	NA	3	Feb-98	2850	1360	51635	4
1241	Toyota	Hiace	Toyota	NA	3	Feb-97	2850	1360	51635	4
1242	Isuzu	NKR58	Isuzu	NB	5	May-93	4400	2110	8191	4
1243	Mitsubishi	FM557	Mitsubishi	NC	8	Oct-94	15000	7800	85623	6
1244	Isuzu	NPR 300	Isuzu	NB	6	Jun-98	6000	2880	447	4
1245	Isuzu	FSS500	Isuzu	NB	5	Mar-93	10000	5200	85328	6
1246	Isuzu	FTR850	Isuzu	NC	9	May-97	13900	6670	40183	6
1248	Isuzu	NXR58	Isuzu	NB	5	Jun-93	4400	2280	7250	4
1249	Mercedes Benz	Cargo UL1700L	Mercedes Benz	NC	7	Jun-88	12600	6240	10010	6
1250	Isuzu	FTR850	Isuzu	NC	9	Nov-97	13900	7360	22613	6
1251	Isuzu	NPR200	Isuzu	NB	6	Apr-97	4490	2370	22890	4
1254	Ford	Trader	Ford	NB	5	Feb-94	6855	3630	50263	4
1255	Isuzu	FTR800	Isuzu	NC	8	Jun-93	13900	7220	86105	6
1256	Toyota	Hilux	Toyota	NA	3	Mar-00	2730	1410	471	4
1257	Isuzu	NKR58	Isuzu	NB	5	May-93	4400	2330	77094	4
1258	Toyota	Hilux	Toyota	NA	3	Jan-99	2730	1420	20660	4
1259	Volvo	B10M	Volvo	ME	8	Jan-94	17300	9150	161762	6
1260	Mitsubishi	Express SJ	Mitsubishi	NA	3	Jun-00	2505	1320	1306	4
1262	Toyota	Dyna	Toyota	NB	4	Jan-86	6600	2900	225527	4
1263	Isuzu	JCS	Isuzu	NB	4	Oct-85	11000	5830	30381	6
1264	Toyota	Landcruiser	Toyota	NA	1	Jul-81	2730	1310	394265	6
1265	Toyota	Dyna400	Toyota	NB	5	Mar-93	7700	3560	241868	4
1266	Hino	FE	Hino	NC	8	Jul-93	13900	6540	172919	6
1267	Toyota	Dyna400	Toyota	NB	4	Jan-87	7700	3400	288134	4
1269	Isuzu	FSR12FX	Isuzu	NB	4	May-86	11550	4850	349307	6
1272	Isuzu	FTR	Isuzu	NC	7	May-87	13900	5970	332146	6
1274	Leyland	45 Series	Leyland	NB	6	Nov-97	10000	5300	100872	6
1275	Toyota	Dyna400	Toyota	NB	4	Nov-87	7700	3420	320151	4
1276	Mitsubishi	Canter	Mitsubishi	NB	6	Jan-98	7500	3900	59697	4
1277	Mitsubishi	Canter	Mitsubishi	NB	6	Jun-96	7000	4940	133062	4
1278	Ford	Trader	Ford	NB	6	Oct-96	7075	3140	69055	4
1279	Ford	Trader	Ford	NB	6	Oct-96	7075	3240	134286	4
1281	Isuzu	FSR500	Isuzu	NB	5	Jan-93	10400	4870	55311	6
1284	Mitsubishi	NKR	Mitsubishi	NB	5	Aug-92	6000	3120	87652	4
1288	Isuzu	NKR	Isuzu	NB	4	Mar-87	4300	2270	396448	4
1289	Isuzu	FVR13HRA	Isuzu	NC	7	Oct-89	15000	7930	438547	6
1290	Nissan	MK235	Nissan	NB	6	Aug-97	9925	4760	49371	6

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1295	Mitsubishi	FKH15	Mitsubishi	NB	4	Sep-87	9300	4920	223894	6
1296	Hino	FT3WFKA	Hino	NB	6	Jan-96	9000	4680	155881	4
1297	Hino	UNK FQ316	Hino	NB	4	Feb-87	9300	4930	451310	6
1298	Isuzu	Forward JCR500	Isuzu	NC	7	May-84	13500	7150	178632	6
1299	Isuzu	FVR	Isuzu	NC	7	Sep-85	20800	11020	755558	6
1300	Volvo	F7	Volvo	NC	7	Sep-85	18720	9920	913963	6
1301	Hino	FF19	Hino	NC	7	Sep-85	13900	7360	663082	6
1302	Isuzu	FSR500	Isuzu	NB	4	Oct-88	10230	4950	424298	6
1305	Nissan	Patrol	Nissan	MC	2	Sep-90	2750	1960	184458	6
1306	Toyota	Landcruiser	Toyota	MC	1	Nov-87	2810	1350	238686	4
1308	Toyota	Landcruiser	Toyota	MC	3	Jan-97	2960	1540	101297	6
1309	Toyota	Landcruiser	Toyota	MC	3	Mar-98	3150	1510	80787	6
1311	Toyota	Landcruiser	Toyota	NA	3	Mar-97	3150	1510	49843	6
1312	Toyota	Hilux LN167R	Toyota	MC	3	Nov-97	2730	1280	64063	4
1314	Toyota	Landcruiser	Toyota	NA	2	Sep-93	3035	1570	140108	4
1315	Toyota	Landcruiser	Toyota	MC	1	Jun-89	2810	1460	241582	4
1319	Hino	FG1J	Hino	NC	9	Jun-00	15000	7150	2045	6
1320	Hino	FG1J	Hino	NC	9	Apr-00	15000	7100	3600	6
1321	Hino	FG1J	Hino	NC	9	May-00	15000	7100	3372	6
1323	Hino	FG1J	Hino	NC	9	May-00	15000	7080	3034	6
1324	Isuzu	FVR900	Isuzu	NC	8	Nov-92	13900	6960	332144	6
1325	Toyota	Dyna400	Toyota	NB	6	Jun-98	7000	4940	50854	4
1326	Hino	FB4J	Hino	NB	6	Feb-00	8000	4570	1504	4
1327	Toyota	Dyna86A	Toyota	NB	6	Jun-99	7000	3640	8636	4
1328	Toyota	Dyna400	Toyota	NB	5	May-95	7000	3570	90141	4
1329	Isuzu	FRR33L	Isuzu	NB	6	Aug-99	10400	5360	8720	6
1330	Toyota	Dyna400	Toyota	NB	6	Oct-97	7000	3600	70834	4
1332	Toyota	Landcruiser	Toyota	MC	1	May-89	2160	1160	299956	4
1333	Toyota	Hilux	Toyota	MC	1	Dec-88	2580	1230	227850	4
1334	Nissan	D21	Nissan	MC	1	Jan-89	2730	1280	216935	4
1336	Mazda	B2200	Mazda	MC	1	Oct-86	2470	1160	220261	4
1337	Mazda	B2200	Mazda	MC	1	Aug-88	2495	1170	184874	4
1338	Toyota	Hilux	Toyota	MC	2	Aug-93	2500	1200	221106	4
1341	Toyota	Hiace	Toyota	NA	2	Jan-94	2800	1310	155781	4
1344	Volvo	FL7	Volvo	NC	7	Aug-89	20460	8040	313100	6
1345	Volvo	FL7	Volvo	NC	9	Feb-96	24140	11680	330929	6
1346	Volvo	FL7	Volvo	NC	9	Jun-96	24140	11680	324907	6
1347	Volvo	FL7	Volvo	NC	8	Apr-95	20400	9250	292376	6

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1348	Volvo	FL7	Volvo	NC	9	Apr-96	24140	11810	335685	6
1349	Volvo	FL7	Volvo	NC	7	Jun-89	24140	11810	659926	6
1351	Scania	P11M36X4	Scania	NCH	11	Feb-95	42000	15000	582274	6
1352	Scania	P11M36X4	Scania	NCH	11	Feb-95	42000	15000	755909	6
1354	Ford	L9000	GM	NCH	11	Mar-90	38000	15100	1032621	6
1355	Mercedes Benz	2225 V Series	Mercedes Benz	NCH	11	Jun-91	38000	15000	466882	6
1356	Ford	L9000	Cummins	NCH	11	Jun-93	38000	15000	452974	6
1358	Volvo	FL7	Volvo	NCH	11	Oct-93	28900	12000	392306	6
1360	Volvo	FL10	Volvo	NCH	11	Mar-95	42000	15800	618866	6
1362	Volvo	FL10	Volvo	NCH	11	Nov-94	38000	15800	611269	6
1364	Toyota	Hilux	Toyota	NA	3	Jan-98	2730	1420	62034	4
1365	Mack	Econodyne	Mack	NC	7	Jan-84	24340	8200	1243340	6
1366	Mack	Econodyne	Mack	NC	7	Jan-84	24340	8200	685367	6
1367	Mack	R688RST	Mack	NC	7	Dec-88	24340	8200	571476	6
1368	International	2350E	International	NC	8	Mar-93	24000	8600	141737	6
1370	Mack	Econodyne	Mack	NCH	10	Oct-89	38000	15800	1228379	6
1372	Holden	Gemini	Isuzu	MC	1	Feb-82	1400	950	7000	4
1373	Mitsubishi	FM557M	Mitsubishi	NC	8	Feb-90	13900	10340	226029	6
1374	Volvo	FL7	Volvo	NC	8	Jun-90	27500	9950	531635	6
1376	Volvo	NL12	Volvo	NC	8	Sep-92	26000	9350	580310	6
1377	International	3600	Cummins	NC	8	Feb-92	22500	8340	787457	6
1380	International	Acco	International	NC	7	May-85	22500	7500	1351000	6
1381	Volvo	F7G	Volvo	NC	7	Jan-84	21400	8200	521414	6
1382	Mitsubishi	FV458	Mitsubishi	NC	7	Jan-85	23500	8500	475883	6
1383	International	2250D	-	NC	8	Jun-90	22500	7690	352867	6
1384	Kenworth	T480	Cat	NC	8	Dec-94	24100	8410	330879	6
1385	International	Acco 2350G	Cummins	NC	9	Apr-98	24350	7940	213330	6
1387	International	Acco	Cummins	NC	7	Jan-85	21900	7750	510240	8
1388	Ford	Lousiville LM800	GM	NC	7	Jan-80	22500	7800	600000	6
1389	International	1950C	Cummins	NC	7	Aug-80	21900	7300	800000	6
1390	Mack	Metroliner 2	Mack	NC	8	Jul-94	23770	8500	316450	6
1391	Mack	Econodyne	Mack	NC	7	Nov-84	24340	8500	1126677	6
1393	International	T2700	Cummins	NC	8	Dec-95	23500	8500	230000	6
1394	Kia	Ceres 97B	Kia	NA	3	Jul-99	2800	1400	23320	4
1395	Hino	FF17	Hino	NC	7	Oct-86	13900	9120	1120538	6
1401	Mercedes Benz	1442 V Series	Mercedes Benz	NC	8	Jul-91	22000	8120	260502	6
1402	Hino	GH237RQ3	Hino	NC	8	Jun-92	15000	7440	584077	6
1403	Ford	L8000	Ford	NC	8	Nov-94	20400	10040	398547	6

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1405	International	Metroliner	International	ME	7	Mar-86	14050	7300	274009	6
1407	Mack	PR100	Renault/ Mack	ME	8	Oct-90	13819	7320	664913	6
1408	Volvo	B10M	Volvo	ME	7	Nov-85	16500	8740	733430	6
1409	Hino	CM	Hino	ME	8	Jul-90	16000	7680	601553	6
1410	Mercedes Benz	OC1617	Mercedes Benz	ME	7	Aug-83	16000	8320	130105	6
1411	Leyland	680	Leyland	ME	7	Jan-82	13460	6460	1130896	6
1412	Mercedes Benz	PMC	Mercedes Benz	ME	7	Feb-87	16000	8480	560014	6
1413	Volvo	B10M	Volvo	ME	7	Sep-86	16500	8410	710858	6
1415	Bedford	YMT	Ford	ME	7	Jul-81	12192	5850	1092025	6
1416	Bedford	YMT3DJ	Ford	ME	7	Jun-80	12192	5850	1076063	6
1419	Mack	PR100	Mack	ME	8	Oct-90	16000	7680	479761	6
1420	Volvo	B10M	Volvo	ME	7	Nov-85	16500	8580	800000	6
1421	Mercedes Benz	310	Mercedes Benz	ME	9	Jul-98	14200	7380	90516	6
1423	MAN	SL200	MAN	ME	8	Feb-90	16000	8320	463047	6
1424	MAN	14190 HOCL	MAN	ME	9	Apr-97	13700	7120	136300	6
1426	Hino	FF177K	Hino	NC	7	Jul-84	13500	7020	837680	6
1427	Hino	FF173K	Hino	NC	7	Oct-85	13900	6710	484771	6
1428	Hino	FG	Hino	NC	8	Aug-90	13900	7150	193916	6
1429	Isuzu	FTR184A	Isuzu	NC	7	Oct-85	13500	6810	907814	6
1430	Mitsubishi	FM	Mitsubishi	NC	7	Jul-89	15000	7950	487712	6
1432	Mitsubishi	FM215	Mitsubishi	NC	7	Jun-81	13900	7650	554263	6
1434	Volvo	F724	Volvo	NC	7	Jan-80	24000	11280	469293	6
1436	Nissan	CPC15	Nissan	NC	8	Jul-94	16000	7250	644731	6
1437	Ford	Trader	Ford	NB	4	Oct-88	5915	3070	177960	4
1438	Toyota	Dyna	Toyota	NB	4	May-88	4450	2350	235885	4
1439	Nissan	Cabstar	Nissan	NB	4	Oct-88	4500	2160	311643	4
1440	Daihatsu	Delta	Daihatsu	NB	4	Apr-84	4450	2310	309760	4
1441	Toyota	Dyna200	Toyota	NB	4	May-89	4450	2310	327626	4
1442	Mitsubishi	Canter	Mitsubishi	NB	4	Jan-84	5500	2530	203795	4
1443	Isuzu	TL	Isuzu	NB	4	Apr-84	5000	2600	704500	4
1444	Toyota	Hiace	Toyota	NA	1	Oct-84	2446	1170	435162	4
1446	Toyota	Hiace	Toyota	NA	1	Apr-88	2446	1170	326193	4
1452	Toyota	Hilux	Toyota	NA	2	Nov-93	2580	1480	135568	4
1453	Toyota	Hilux	Toyota	NA	2	Nov-93	2580	1480	108661	4
1454	Toyota	Dyna	Toyota	NB	6	Jun-96	4450	2350	95760	4
1458	Mitsubishi	FM5186A	Mitsubishi	NC	7	Jun-85	13900	6100	465975	6
1459	Ford	Trader	Ford	NB	4	Jul-89	7740	3280	361296	4
1462	Mitsubishi	FM557J	Mitsubishi	NC	8	Jul-90	13900	7300	463469	6

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1463	Mitsubishi	FM557MA	Mitsubishi	NC	7	Jul-89	13990	7410	428917	6
1464	Isuzu	FVZ1400A	Isuzu	NC	9	Jun-98	22500	9020	78743	6
1465	Iveco	Daily	Iveco	NB	6	Oct-97	4490	2330	57650	4
1468	Ford	Transit	Ford	NA	3	Jul-00	3500	1680	241	4
1469	Ford	Transit	Ford	NA	2	Nov-95	2830	1360	70026	4
1470	Ford	Transit	Ford	NA	3	Jul-98	2830	1360	60034	4
1471	Ford	Transit	Ford	NA	3	Jun-96	2830	1360	158567	4
1472	Ford	Transit	Ford	NA	2	Nov-95	2830	1360	182948	4
1473	Ford	Transit	Ford	NA	3	May-98	2830	1360	204046	4
1474	Ford	Transit	Ford	NA	3	May-98	3500	1680	108386	4
1475	Ford	Transit	Ford	NA	3	Nov-96	2830	1360	143610	4
1476	Mazda	T3500	Mazda	NB	4	May-87	4490	2790	209569	4
1477	Mazda	T3500	Mazda	NB	4	May-87	4490	2790	206250	4
1480	Mitsubishi	FM657	Mitsubishi	NC	9	May-96	15000	7460	191073	6
1482	Mitsubishi	FM600	Mitsubishi	NC	9	Jun-96	15000	7600	258626	6
1483	Mitsubishi	FM600	Mitsubishi	NC	9	Jun-96	15000	7480	208088	6
1484	Mitsubishi	FM600	Mitsubishi	NC	9	Apr-96	15000	7500	199371	6
1485	Mitsubishi	FM657	Mitsubishi	NC	9	Jun-96	15000	7480	261011	6
1486	Mitsubishi	FM600	Mitsubishi	NC	9	Aug-96	15000	7480	223038	6
1487	Mitsubishi	FP418F	Mitsubishi	NCH	10	Feb-87	32000	12440	190166	6
1488	Mitsubishi	FTR5MF	Isuzu	NC	7	Nov-88	13500	7780	132700	6
1490	International	ACCO 2350G	Cummins	NC	9	Sep-98	24000	9120	71970	6
1491	Mitsubishi	FM55717S	Mitsubishi	NC	8	Apr-93	15000	8700	262260	6
1492	Mitsubishi	FM557	Mitsubishi	NC	8	Apr-93	15000	8700	217342	6
1493	Mitsubishi	FE	Mitsubishi	NB	4	Oct-88	6000	3120	207890	4
1495	Ford	Courier	Ford	NA	2	Feb-95	2470	1280	146973	4
1497	Ford	Louisville	Cummins	NCH	12	Jun-97	42000	15900	254248	6
1498	Volvo	FH12	Volvo	NCH	11	Sep-94	42000	15800	607741	6
1501	Ford	Aeromax L9000	Cummins	NCH	11	Sep-94	42000	15800	1215142	6
1503	Ford	Aeromax L Series	Cummins	NCH	11	May-95	42000	16000	988867	6
1504	Ford	Aeromax	Cummins	NCH	11	Apr-95	42500	16000	1395582	6
1505	Ford	L 9000	Detroit	NCH	12	Apr-96	42500	16000	782448	6
1507	Kenworth	K100E	Detroit	NCH	11	Jun-95	42400	16100	1128402	6
1509	Scania	113M6X4	Scania	NCH	11	Sep-94	42000	16000	867416	6
1510	Scania	1246X4	Scania	NCH	12	Aug-97	42500	16100	676375	6
1511	Scania	113M 6X4	Scania	NCH	12	Oct-96	42000	16000	383634	6
1512	Volvo	F12-82F	Volvo	NCH	10	Sep-85	42500	16100	1251970	6
1513	Ford	9000	Detroit	NCH	10	Oct-86	42000	16000	1390792	6

General Details

Test No	Vehicle Make	Vehicle Model	Engine Make	Vehicle ADR Category	Project Category	Compliance Date	GVM (kg)	Tare Weight (kg)	Odometer (km)	No of Cylinders
1514	Scania	144L	Scania	NCH	12	Feb-98	42500	16100	491432	6
1516	International	S-3600	Cummins	NCH	11	Oct-95	38000	15000	993717	6
1517	International	S-3600	Cummins	NCH	12	Jan-96	42500	15000	897906	6
1519	Mack	CHR 92A	Mack	NCH	11	Jul-95	42500	16100	980961	6
1520	Mack	Metro-liner	Cummins	NCH	12	Feb-99	42000	16000	78389	6
1521	Kenworth	SAR	Cummins	NCH	10	Jun-86	42000	16000	2206426	6
1523	Mack	Titan HD	Mack	NCH	12	Jan-97	42000	16000	689462	6
1525	Ford	L9000	Cummins	NCH	10	Sep-88	42000	16000	791967	6
1527	Volvo	FL7	Volvo	NC	8	Apr-94	24000	11000	199306	6
1529	Mitsubishi	FP418	Mitsubishi	NCH	10	Apr-89	32000	11000	817977	6
1530	Iveco	Eurotech 3500	Iveco	NCH	12	Jan-96	42500	16100	364072	6
1532	Mitsubishi	FK415	Mitsubishi	NB	4	Aug-85	10230	4460	266167	6
1534	Daihatsu	Delta	Daihatsu	NB	4	Dec-87	6000	3120	153430	4
1535	International	N1630	International	NB	4	Mar-86	10450	5860	282271	6
1536	Isuzu	Forward	Isuzu	NB	4	Apr-84	6400	3390	406777	6
1538	Ford	L9000	Cummins	NC	8	Feb-93	23500	10400	1400000	6
1539	Isuzu	Forward	Isuzu	NC	7	Feb-81	12850	6810	772388	6
1540	Kenworth	W923	Caterpillar	NCH	10	Jul-85	42000	16000	802172	6
1541	Scania	113M	Scania	NC	8	May-91	22500	8400	1173943	6
1543	Freightliner	FL112	Detroit	NCH	11	Oct-93	42000	16000	735116	6
1544	Freightliner	FL112	Caterpillar	NCH	11	Mar-93	42000	16000	552500	6
1545	Freightliner	FL112	Cummins	NCH	11	Jun-95	42000	16000	874960	6
1546	Freightliner	FL112	Detroit	NCH	12	Sep-96	42000	16000	752683	6
1547	Volvo	FL6	Volvo	NC	8	Oct-90	13900	8260	230918	6
1548	Ford	L9000	Detroit	NCH	11	Jul-91	42000	16000	546884	6
1550	Freightliner	FL112	Detroit	NCH	11	Jun-94	42000	16000	851452	6
1551	Freightliner	FL112	Detroit	NCH	11	May-94	42000	16000	697270	6
1553	Freightliner	FL112	Cummins	NCH	12	Aug-97	42000	16000	118178	6
1554	Volvo	FL6	Volvo	NC	8	Sep-90	16000	7680	267500	6
1556	Toyota	Hiace	Toyota	NA	1	Oct-89	2800	1340	175607	4
1557	Toyota	Hilux	Toyota	NA	3	Oct-98	2780	1330	41560	4
1558	Hino	FF	Hino	NC	7	Jun-85	13500	5960	777687	6
1559	Toyota	SR5	Toyota	NA	1	Oct-86	2520	1200	257462	4
1561	Toyota	Hilux	Toyota	NA	3	Dec-97	2730	1310	59168	4
1564	Isuzu	NKR	Isuzu	NB	4	Mar-87	5200	2490	256909	4
1565	Toyota	Hilux	Toyota	NA	2	Dec-93	2730	1310	143705	4
1567	Toyota	LN106R	Toyota	NA	2	Mar-91	2730	1310	267904	4
1568	Toyota	LN107R	Toyota	NA	3	Dec-96	2730	1310	207804	4

General Details

Test No	Vehicle Make	Vehicle Model	Engine Make	Vehicle ADR Category	Project Category	Compliance Date	GVM (kg)	Tare Weight (kg)	Odometer (km)	No of Cylinders
1569	Mazda	T4100	Mazda	NB	4	Oct-89	6838	3120	282826	4
1571	Toyota	Landcruiser	Toyota	NA	2	Feb-92	3035	1450	195007	6
1572	Ford	Maverick	Ford	NA	2	May-91	3150	1510	118402	6
1576	Toyota	Landcruiser	Toyota	NA	1	Oct-84	3035	1450	215000	6
1577	Toyota	Hilux	Toyota	NA	3	Mar-98	2730	1310	46550	4
1578	Toyota	Hilux	Toyota	NA	1	May-82	2460	1180	365442	4
1579	Toyota	Hilux	Toyota	NA	2	Jul-94	2730	1310	231150	4
1582	Toyota	Hilux	Toyota	NA	2	Oct-91	2580	1240	200537	4
1583	Toyota	Hilux	Toyota	NA	3	Jul-97	2580	1240	103324	4
1584	Toyota	Hilux	Toyota	NA	2	Jul-92	2730	1310	222977	4
1585	Toyota	LN85R	Toyota	NA	1	Apr-89	2800	1440	319952	4
1587	Toyota	Hilux	Toyota	NA	2	Mar-94	2730	1310	383469	4
1588	Toyota	SR5	Toyota	NA	1	Jan-87	2520	1200	158889	4
1590	Toyota	Hilux	Toyota	NA	3	Aug-96	2730	1310	202305	4
1591	Ford	Transit	Ford	NA	2	Aug-94	3490	1670	188434	4
1592	Toyota	Hilux	Toyota	NA	2	Apr-95	2730	1310	99496	4
1593	Ford	Courier	Ford	NA	1	Apr-88	2495	1197	269745	4
1594	Toyota	Hilux	Toyota	NA	2	Sep-93	2730	1310	156069	4
1595	Toyota	Hilux	Toyota	NA	2	Aug-94	2730	1310	160422	4
1596	Toyota	Hilux	Toyota	NA	1	Jun-85	2520	1200	248376	4
1597	Holden	Rodeo	Holden	NA	1	Sep-81	2350	1128	397282	4
1598	Toyota	Hilux	Toyota	NA	1	Mar-85	2600	1248	440398	4
1599	Toyota	Hiace	Toyota	NA	1	Jun-84	3020	1440	232271	4
1600	Mitsubishi	Canter	Mitsubishi	NB	4	Jun-84	5500	2640	293501	4
1607	Kenworth	T480	Cummins	NCH	11	Feb-95	42000	14250	748622	6
1610	Hino	FE3H	Hino	NC	8	Jan-94	20400	7040	215273	6
1611	Isuzu	FTR 800	Isuzu	NC	8	Apr-91	13500	5450	262994	6
1613	Isuzu	FTR	Isuzu	NC	8	Feb-92	13900	5500	82897	6
1614	Isuzu	FVR 900	Isuzu	NC	8	Jul-95	16000	6690	65316	6
1615	Isuzu	NKR	Isuzu	NB	4	Feb-86	4300	2500	413446	4
1616	Mitsubishi	Express	Mitsubishi	NA	2	Feb-90	2505	1550	3381	4
1617	Toyota	Hilux	Toyota	NA	3	Aug-99	2730	1650	14427	4
1619	Iveco	4500	Cummins	NCH	12	Apr-97	42000	15000	215461	6
1620	Ford	Transit	Ford	NA	3	Feb-99	3450	1650	31061	4
1635	Toyota	Hilux	Toyota	NA	3	Aug-99	2730	1650	32781	4
1636	Ford	Transit	Ford	NA	3	Mar-99	3480	1650	31922	4
1637	Toyota	LN86R	Toyota	NA	2	Oct-92	2580	1530	143439	4
1638	Ford	Transit	Ford	NA	3	Mar-99	3480	1650	24475	4

General Details

Test No	Vehicle Make	Vehicle Model	Engine Make	Vehicle ADR Category	Project Category	Compliance Date	GVM (kg)	Tare Weight (kg)	Odometer (km)	No of Cylinders
1639	Ford	Transit	Ford	NA	3	Mar-99	3480	1650	26718	4
1641	Toyota	LH113R	Toyota	NA	3	Jun-00	2800	1720	1623	4
1654	Volvo	B10BLE	Volvo	ME	9	Jan-99	16330	8490	48072	6
1655	Scania	DSC 1124	Scania	ME	9	Oct-97	19100	9930	145823	6
1656	Scania	DSC 1124	Scania	ME	9	Oct-97	19100	9930	144302	6
1657	Scania	DSC 1124	Scania	ME	9	Oct-97	19100	9930	157817	6
1658	Volvo	B10BLE	Volvo	ME	9	Sep-98	18900	9820	112374	6
1659	Volvo	B10BLE	Volvo	ME	9	May-00	16360	8490	23884	6
1660	Volvo	B10BLE	Volvo	ME	9	Dec-97	18900	9820	134924	6
1663	Scania	124L	Scania	NCH	12	Apr-99	42000	16000	56387	6
1664	Scania	124L	Scania	NCH	12	Jan-99	42000	16000	84504	6
1668	Kenworth	K10093A	Cummins	NCH	11	Jan-93	42000	16000	793829	6
1669	Kenworth	K100	Detroit	NCH	12	Mar-96	42000	16000	265768	6
1670	Kenworth	K100	Cummins	NCH	11	Jan-93	42000	16000	1105223	6
1671	Scania	124L	Scania	NCH	12	Apr-99	42000	16000	52282	6
1672	Scania	124L	Scania	NCH	12	Mar-99	42000	16000	73786	6
1674	Scania	124L	Scania	NCH	12	Apr-99	42000	16000	83462	6
1675	Ford	L9000	Cummins	NCH	10	May-89	42000	16000	434980	6
1676	International	S2600	Cummins	NCH	10	Nov-84	42500	14500	2089810	6
1677	Ford	L9000	Cummins	NCH	10	Dec-89	42000	16000	481642	6
1678	Scania	124L	Scania	NCH	12	Mar-99	42000	16000	67079	6
1680	Atkinson	4870	Cummins	NCH	10	Mar-85	42000	16000	665353	6
1681	International	3600	Cummins	NCH	11	Jan-95	42000	16000	868856	6
1682	Scania	124L	Scania	NCH	12	Dec-98	42000	16000	86920	6
1683	Scania	124L	Scania	NCH	12	Jan-99	42000	16000	89841	6
1684	Mack	FR Cruiseliner	Mack	NCH	10	Sep-84	42000	16000	900414	6
1685	International	4470 Turbostar	Fiat/ Iveco	NCH	10	Jan-89	42000	16000	729012	6
1686	Mack	R688 - Econodyne	Mack	NCH	11	Nov-90	42000	16000	860823	6
1687	Toyota	Hilux	Toyota	NA	1	Oct-80	2470	1180	542765	4
1688	Toyota	Hilux	Toyota	NA	2	May-90	2580	1240	180294	4
1689	Ford	LTL9000	Caterpillar	NCH	10	Nov-88	42000	16000	1135275	6
1690	Scania	124L	Scania	NCH	12	Dec-98	42000	16000	91545	6
1691	Holden	Rodeo	Isuzu	NA	3	Mar-98	2740	1315	83497	4
1692	Toyota	Hilux	Toyota	NA	1	Aug-88	2520	1200	197473	4
1693	Toyota	Landcruiser	Toyota	MC	2	Oct-95	3035	1460	135638	6
1694	Toyota	Hiace	Toyota	NA	3	Dec-96	2800	1340	171445	4
1695	Toyota	Hilux	Toyota	NA	3	Jan-98	2730	1310	41554	4
1696	Toyota	Hilux	Toyota	NA	3	Aug-96	2580	1240	215906	4

General Details

Test No	Vehicle Make	Vehicle Model	Engine Make	Vehicle ADR Category	Project Category	Compliance Date	GVM (kg)	Tare Weight (kg)	Odometer (km)	No of Cylinders
1698	Ford	Transit	Ford	NA	3	Jan-98	3300	1585	95675	4
1700	Holden	Rodeo	Isuzu	NA	2	Mar-95	2740	1310	112077	4
1701	Ford	Transit	Ford	NA	3	Jun-97	3500	1680	236173	4
1703	Hino	FG F61J	Hino	NC	9	Mar-99	15000	7140	39645	6
1704	Hino	FG F61J	Hino	NC	9	Mar-99	15000	7140	39577	6
1705	Ford	L9000	Ford	NCH	11	Feb-95	42500	14780	121480	6
1706	Mitsubishi	Express	Mitsubishi	NA	2	Jul-94	2505	1430	281294	4
1707	Toyota	Hilux	Toyota	MC	3	Jun-99	2600	1420	88091	4
1708	Ford	L9000	Ford	NCH	11	Mar-95	42500	15140	89933	6
1709	Mitsubishi	Express	Mitsubishi	NA	3	Feb-96	2260	1200	238990	4
1710	Mitsubishi	Express	Mitsubishi	NA	3	Jan-96	2600	1450	171556	4
1711	Mitsubishi	Express	Mitsubishi	NA	2	May-95	2505	1210	240760	4
1712	Hino	FG1J	Hino	NC	9	Sep-00	15000	7800	2731	6
1713	Hino	FG	Hino	NC	9	Feb-98	15000	6580	8263	6
1715	Hino	FG	Hino	NC	9	Aug-99	15000	6870	37843	6
1717	Toyota	Hilux	Toyota	NA	1	Jul-89	2730	1310	264238	4
1719	Isuzu	FSR 11FA	Isuzu	NB	4	Jul-89	9300	4460	168268	6
1722	Isuzu	SBR478A	Isuzu	NB	4	Aug-81	9000	3920	140378	6
1723	Iveco	6500 Powerstar	Cummins	NCH	12	Jan-99	42000	16000	76765	6
1724	Hino	FD	Hino	NB	4	May-82	8770	4920	642094	6
1725	Hino	TF	Hino	NCH	12	Sep-98	42000	16000	80247	6
1726	Toyota	Hilux	Toyota	NA	1	Oct-87	2520	1200	322812	4
1727	Toyota	Dyna	Toyota	NB	4	Feb-89	4450	2140	287764	4
1728	Mercedes Benz	SK 2435	Mercedes Benz	NCH	11	Aug-95	42000	16000	201647	8
1730	Toyota	Hiace	Toyota	NA	2	Aug-92	2850	1370	158781	4
1731	Daihatsu	Delta	Daihatsu	NB	4	Jan-86	6000	2710	170674	4
1732	Toyota	Hiace	Toyota	NA	1	May-87	2750	1320	249991	4
1733	Ford	Transit	Ford	NA	3	Feb-97	3500	1680	44278	4
1737	Toyota	Hilux	Toyota	NA	1	Jul-81	2470	1185	600924	4
1738	International	S3600	Cummins	NCH	11	Jun-94	42000	16000	489447	6
1739	Toyota	Hilux	Toyota	NA	2	Oct-95	2580	1240	135811	4
1740	International	Turbostar - 4470	Cummins	NCH	11	Jan-94	42000	16000	325627	6
1741	Toyota	Hilux	Toyota	NA	2	Feb-92	2730	1310	209215	4
1743	Toyota	Hiace	Toyota	NA	3	Jul-00	2800	1344	7848	4
1744	Toyota	Hilux	Toyota	NA	1	Dec-85	2550	1225	207797	4
1746	Toyota	Hiace	Toyota	NA	3	Jun-98	2800	1344	29501	4
1747	Toyota	Hilux	Toyota	NA	2	Aug-92	2580	1240	103652	4
1749	Holden	Rodeo	Isuzu	NA	2	Feb-92	2730	1310	143310	4

General Details

Test No	Vehicle Make	Vehicle Model	Engine Make	Vehicle ADR Category	Project Category	Compliance Date	GVM (kg)	Tare Weight (kg)	Odometer (km)	No of Cylinders
1750	Ford	Transit	Ford	NA	3	Sep-97	3300	1580	67240	4
1752	Toyota	Hilux	Toyota	NA	3	Jan-98	2730	1310	58176	4
1753	Toyota	Hilux	Toyota	NA	2	May-95	2520	1200	47365	4
1754	Toyota	Hilux	Toyota	NA	1	Jul-87	2520	1200	110437	4
1755	Nissan	D21	Nissan	NA	1	Mar-86	2570	1230	181890	4
1757	Mitsubishi	Triton	Mitsubishi	NA	3	Nov-98	2620	1260	46394	4
1758	Toyota	Hiace	Toyota	NA	2	Feb-94	2800	1340	38497	4
1759	Toyota	Hilux	Toyota	NA	3	Oct-98	2730	1310	54819	4
1760	Toyota	Hilux	Toyota	NA	2	Oct-92	2730	1310	123483	4
1761	Nissan	Navara	Nissan	NA	2	Jul-95	2740	1310	13411	4
1762	Toyota	Troop Carrier	Toyota	NA	2	Mar-91	3035	1460	38890	6
1765	International	T2670	Cummins	NCH	10	Nov-84	42000	16000	487824	6
1766	International	S2600	Cummins	NCH	10	Apr-86	42000	16000	502790	6
1767	Isuzu	GVR 950	Isuzu	NCH	12	Mar-00	38000	16000	27684	6
1768	International	S3600	Cummins	NCH	12	May-98	42000	16000	230811	6
1769	International	S3600	Cummins	NCH	12	May-96	42000	16000	983143	6
1771	International	Transtar	Cummins	NCH	11	Mar-90	42000	16000	742416	6
1781	Isuzu	Custom Exy	Isuzu	NCH	12	Jun-00	42000	16000	1643	6
1783	Kenworth	K104	Cummins	NCH	12	Oct-99	42000	16000	291978	6
1785	Scania	112H	Scania	NCH	10	Jan-88	42000	16000	645470	6
1787	Toyota	Hilux	Toyota	NA	2	Oct-91	2730	1310	197006	4
1788	Nissan	Patrol	Nissan	MC	2	Aug-95	2800	1344	174186	4
1789	Toyota	Hiace	Toyota	NA	2	Mar-94	2800	1344	263810	4
1790	International	9200 Navistar	Detroit	NCH	12	Aug-99	42000	16000	130616	6
1791	Volvo	N10	Volvo	NCH	10	Feb-89	33900	12000	719065	6
1792	Iveco	Eurotech 4500	Cummins	NCH	12	May-97	42000	16000	160243	6
1793	Western Star	4964F	Caterpillar	NCH	11	Jan-94	42000	16000	642989	6
1794	Mercedes Benz	1625	Mercedes Benz	NCH	10	Oct-86	42000	16000	457249	6
1796	Western Star	4964	Cummins	NCH	11	Jan-94	42000	16000	784005	6
1800	International	S2600	Cummins	NCH	10	May-89	42000	16000	567926	6
1801	International	S2600	Cummins	NCH	10	Jun-89	42000	16000	588068	6
1802	International	S2600	Cummins	NCH	10	Dec-89	42000	16000	520348	6
1804	International	S2600	Cummins	NCH	10	May-89	42000	16000	623456	6
1805	International	S2600	Cummins	NCH	11	Jan-90	42000	16000	535864	6
1813	Ford	Aeromax	Detroit	NCH	11	Apr-95	42000	16000	1254261	6
1814	International	T2670	International	NCH	10	Apr-86	38000	14000	707084	6
1815	International	T2670	Cummins	NCH	11	Apr-93	38000	14000	942728	6
1820	Mercedes Benz	V Series	Mercedes Benz	NCH	10	May-89	42000	16000	1169619	6

General Details

Test No	Vehicle Make	Vehicle Model	Engine Make	Vehicle ADR Category	Project Category	Compliance Date	GVM (kg)	Tare Weight (kg)	Odometer (km)	No of Cylinders
1821	Ford	L9000	Detroit	NCH	11	Jun-93	42000	16000	1126956	6
1822	International	3600	Detroit	NCH	11	Oct-93	42000	16000	407513	6
1826	Mack	Metroliner	Cummins	NCH	12	Nov-99	42000	16000	103422	6
1827	Mack	Metroliner	Cummins	NCH	12	Nov-99	42000	16000	113221	6
1829	Freightliner	FL112	Cummins	NCH	12	Aug-97	42000	16000	700674	6
1844	Iveco	4500	Cummins	NCH	12	Apr-98	42000	16000	157233	6
1848	Freightliner	FL112	Caterpillar	NCH	12	Sep-00	42000	16000	1643	6
1874	Nissan	D21	Nissan	NA	1	Mar-88	2730	1310	237816	4
1886	Toyota	LN61 4 Runner	Toyota	NA	1	Mar-86	2520	1210	346659	4
1891	Toyota	Hilux	Toyota	NA	1	Nov-85	2600	1400	303420	4
1896	Toyota	Landcruiser	Toyota	MC	1	Jun-89	2810	1980	319418	6
1900	Toyota	Hilux	Toyota	NA	1	Jun-83	2460	1180	349435	4
1902	Toyota	Troupcarrier	Toyota	MC	1	Nov-87	3035	1850	364772	6

Appendix 3

Compliance Date Emission Graphs

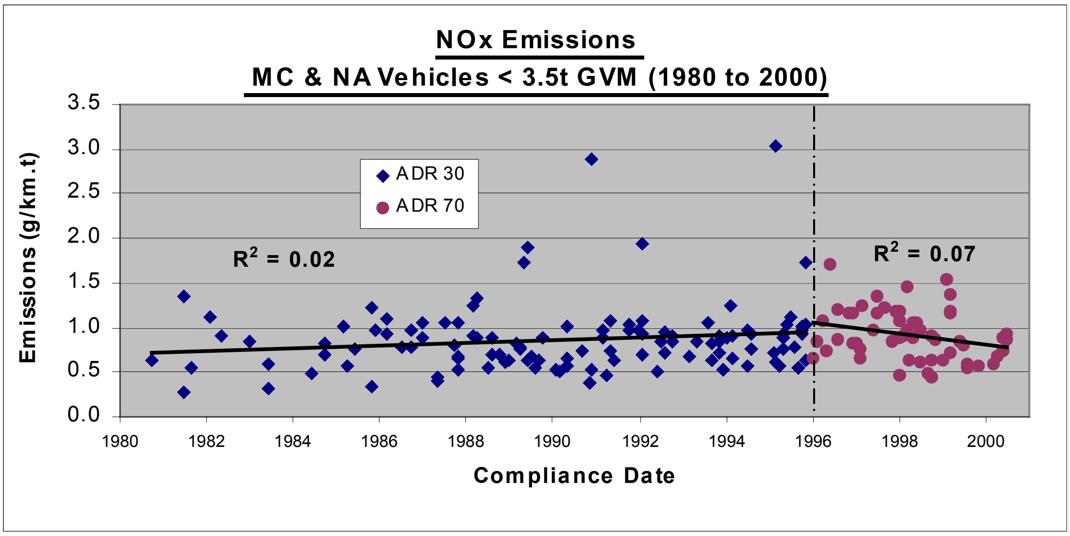


Figure A3-1

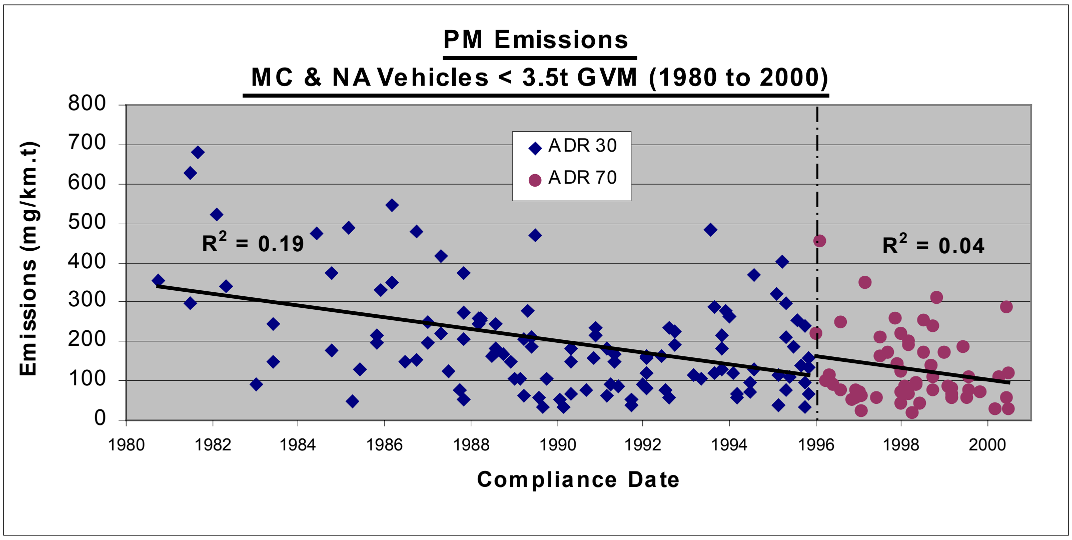


Figure A3-2

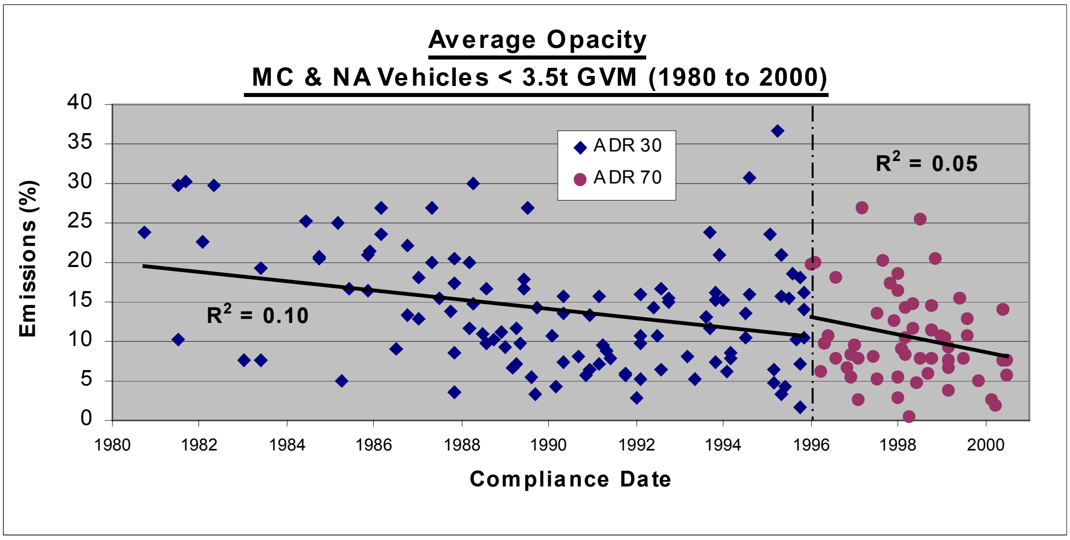


Figure A3-3

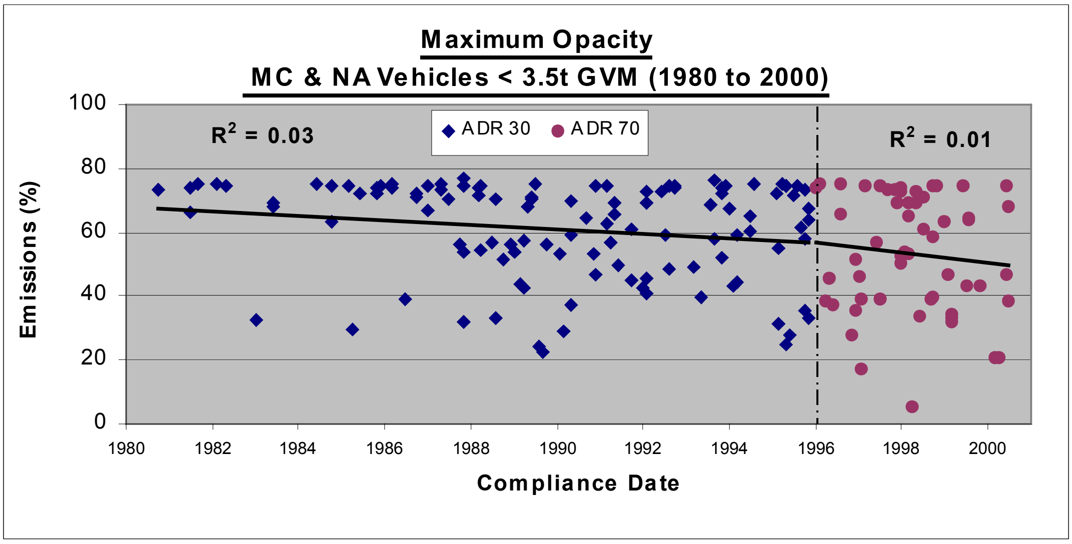


Figure A3-4

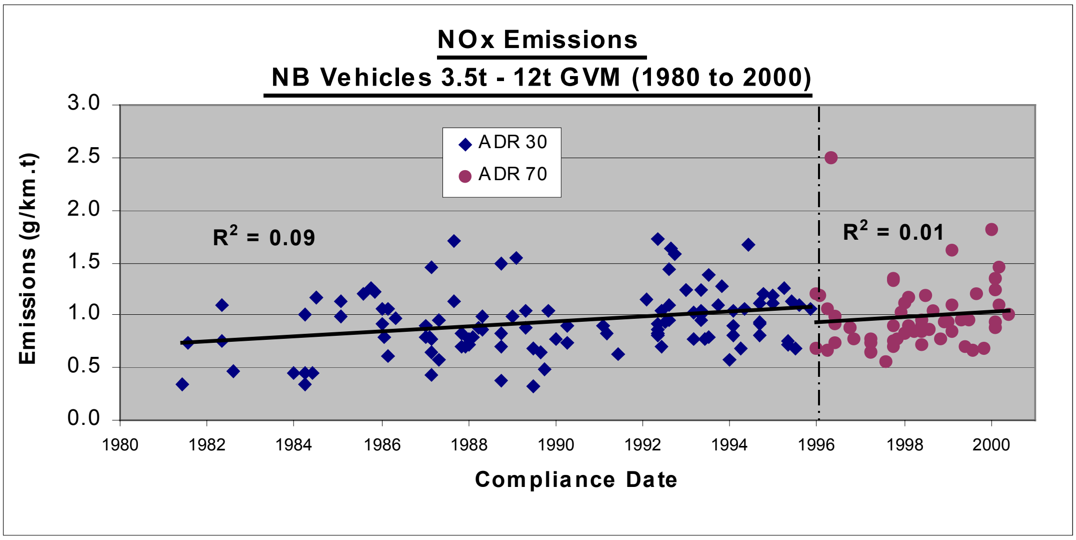


Figure A3-5

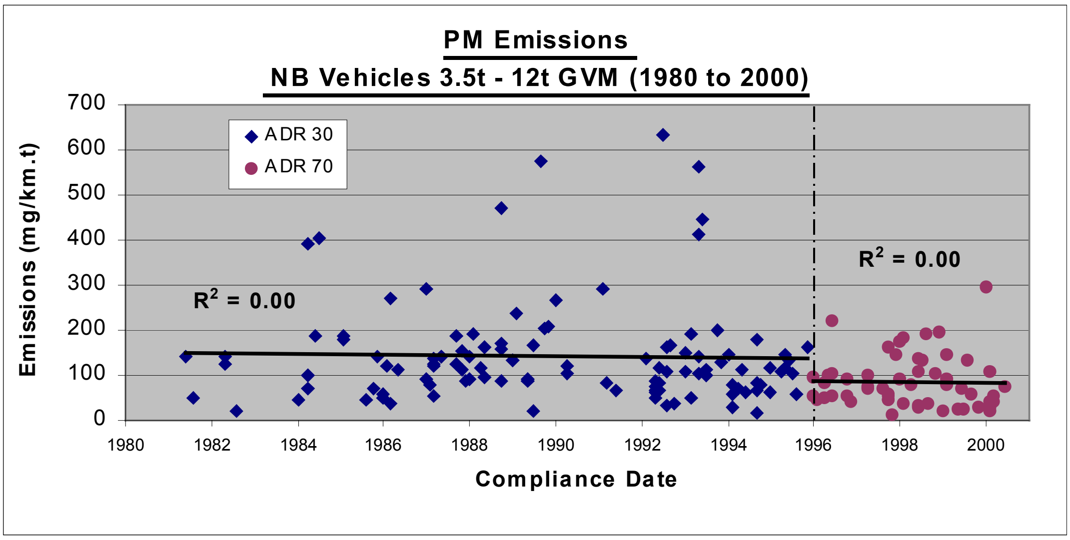


Figure A3-6

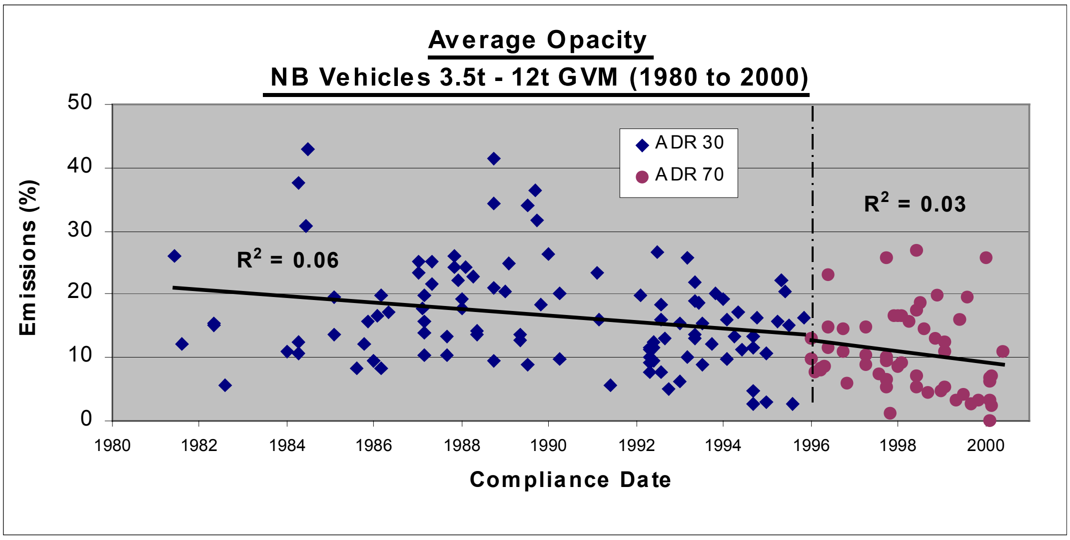


Figure A3-7

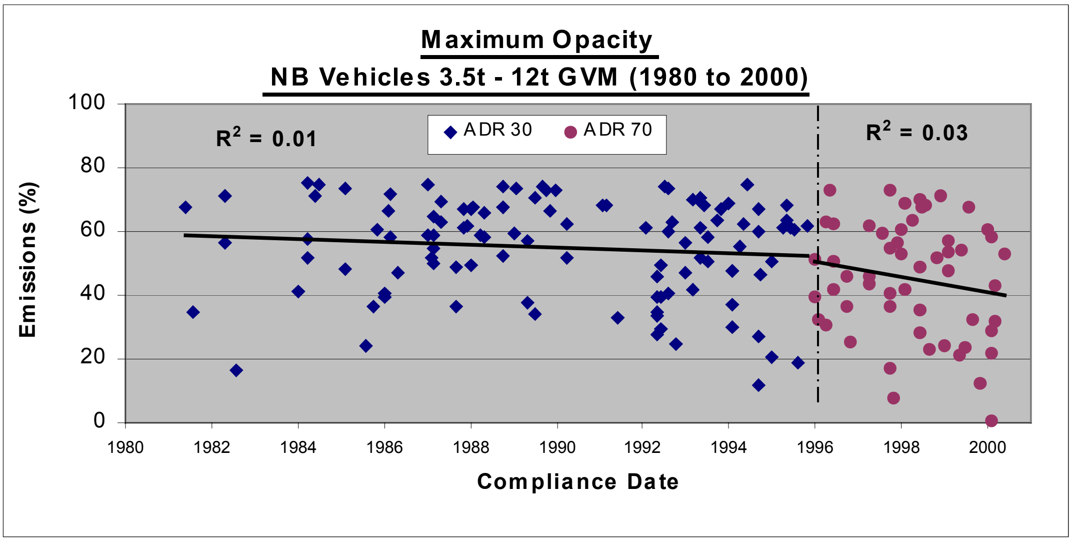
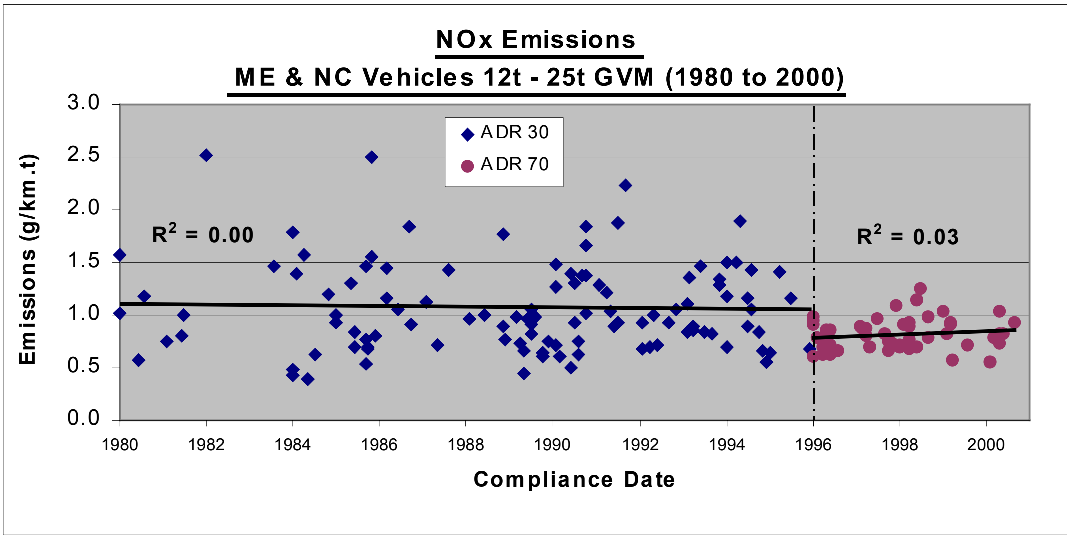


Figure A3-8



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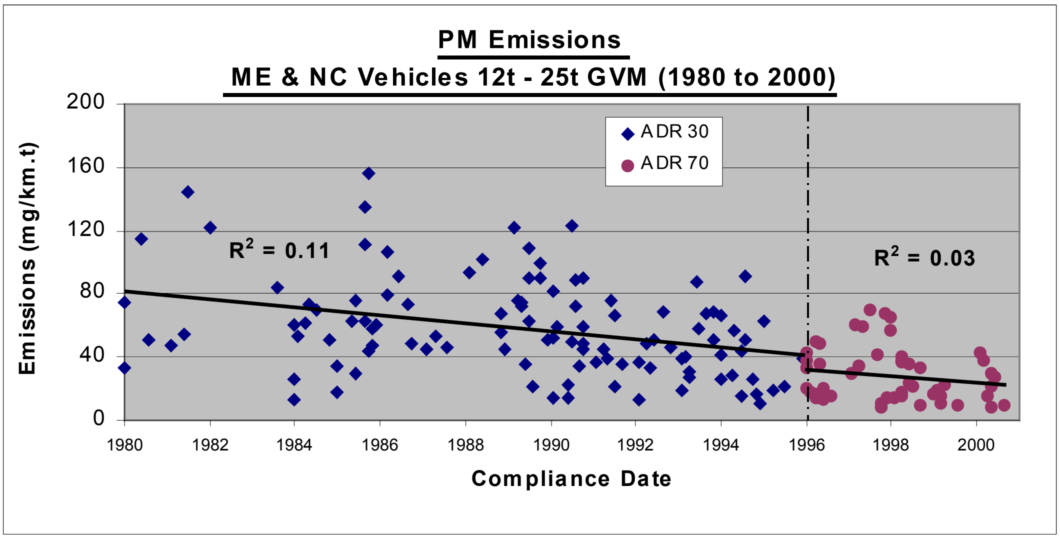


Figure A3-10

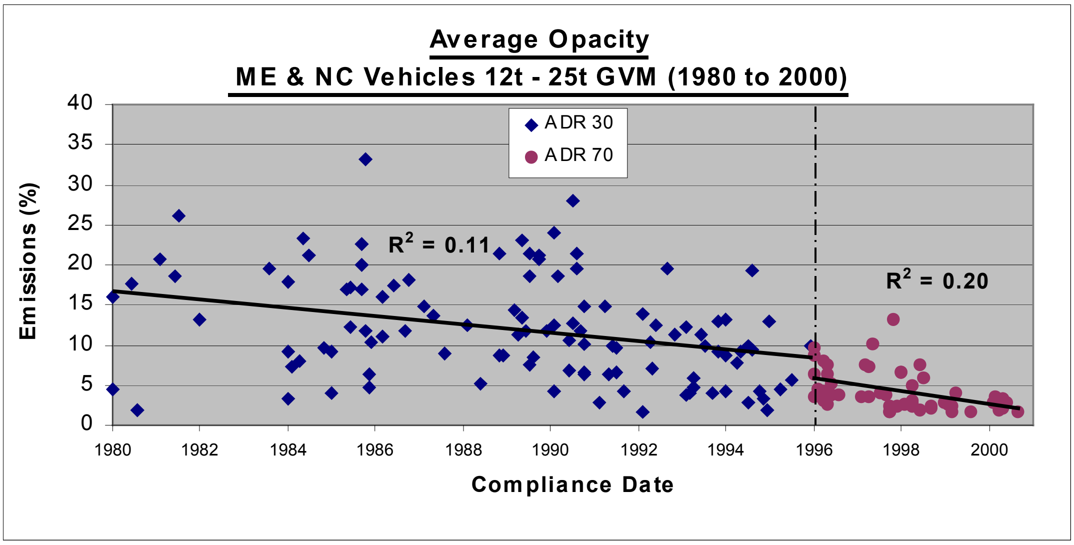


Figure A3-11

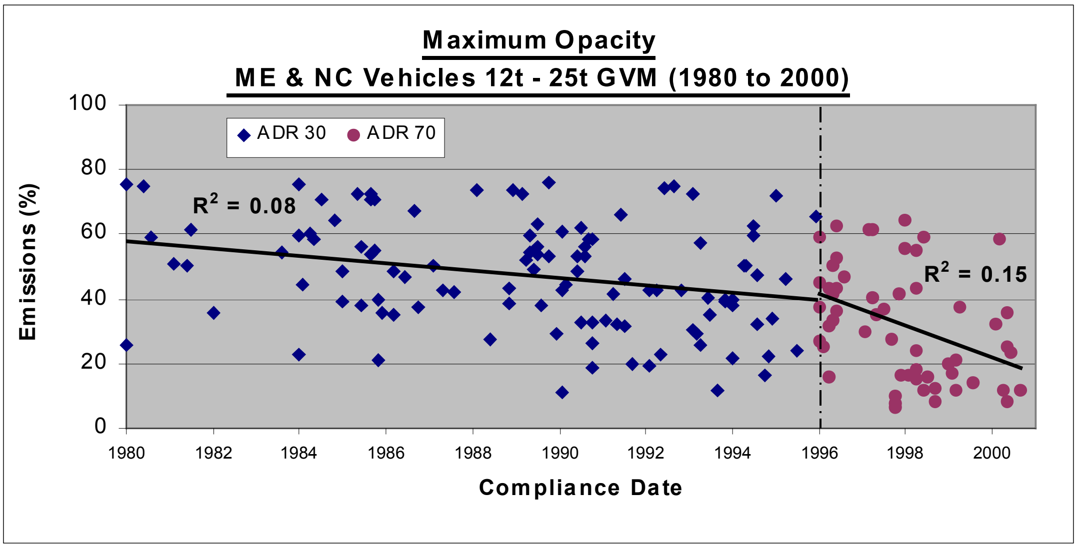


Figure A3-12

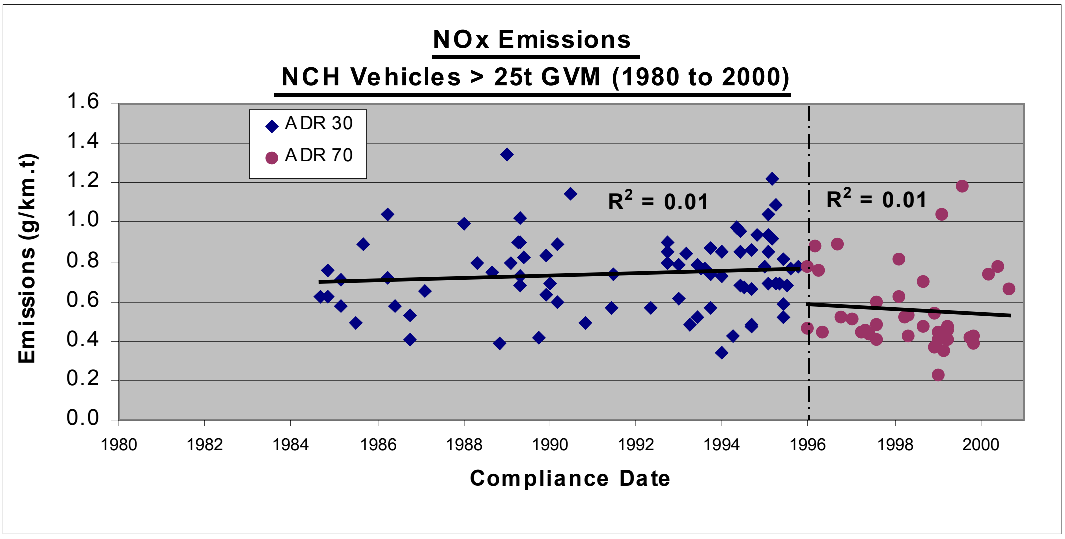


Figure A3-13

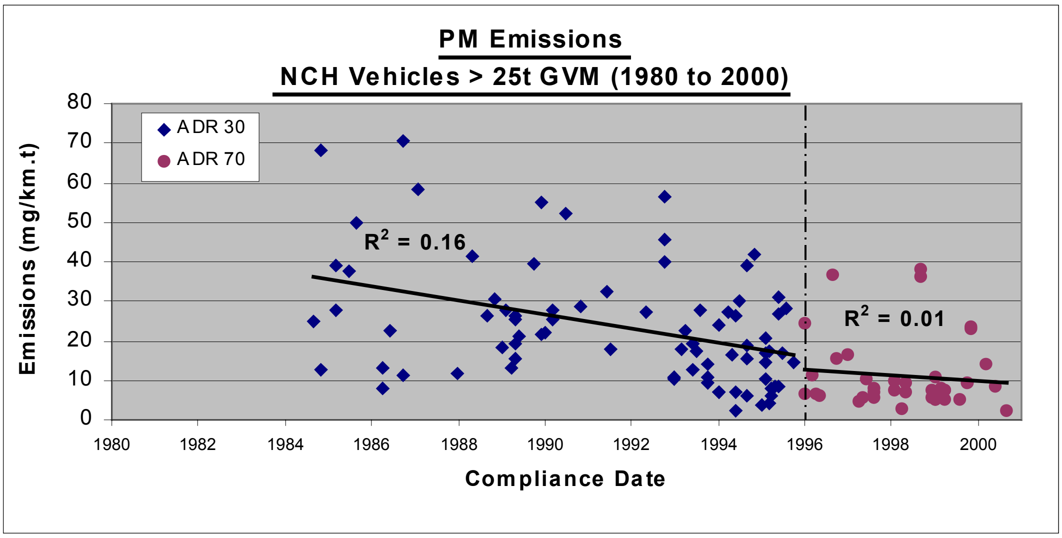


Figure A3-14

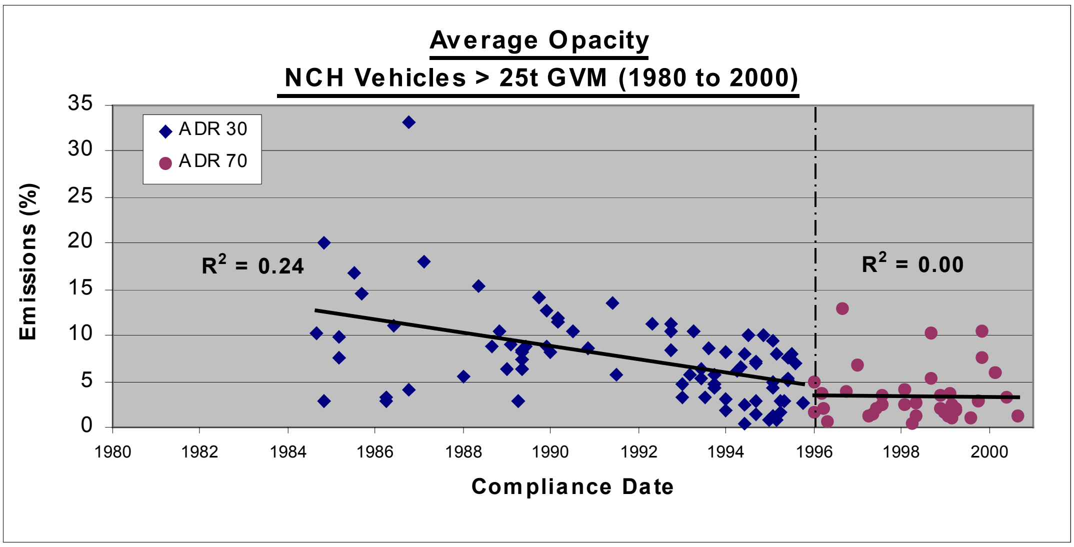


Figure A3-15

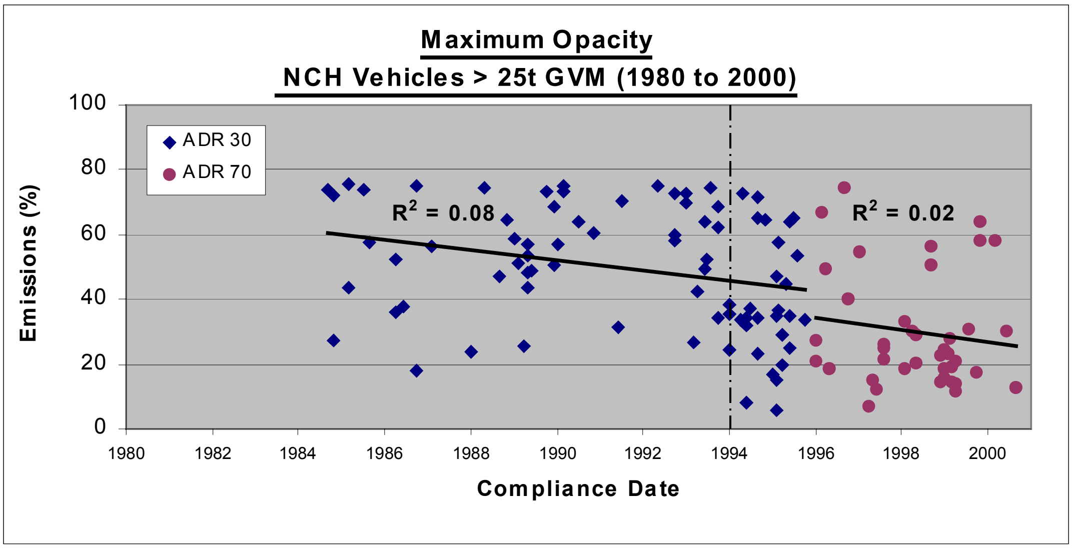

Maximum Opacity
NCH Vehicles > 25t GVM (1980 to 2000)
Emissions (%)
Compliance Date
ADR 30
ADR 70
R^2 = 0.08
R^2 = 0.02
0
20
40
60
80
100
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000

Figure A3-16

Appendix 4

ODOMETER EMISSION GRAPHS

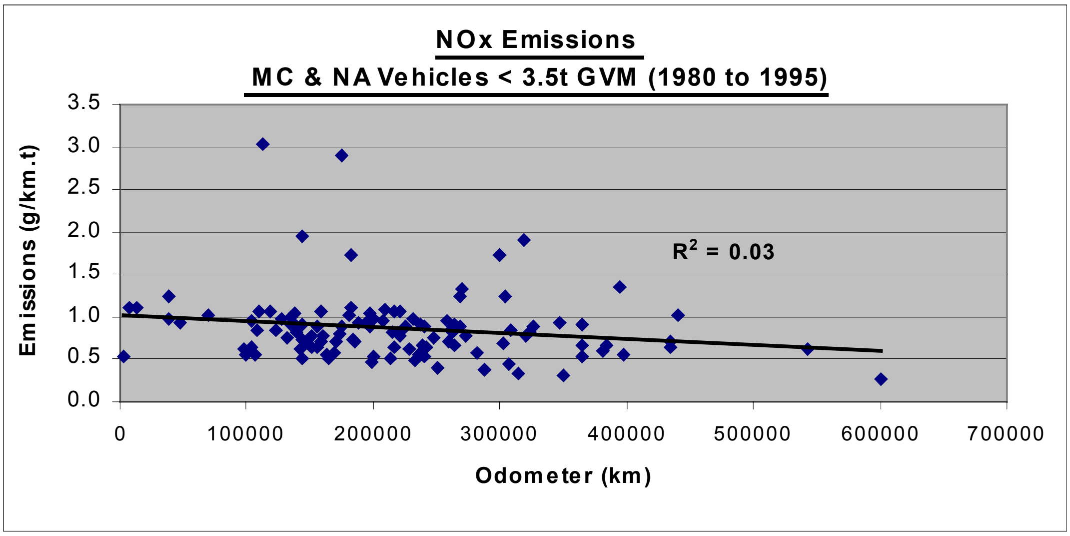


Figure A4-1

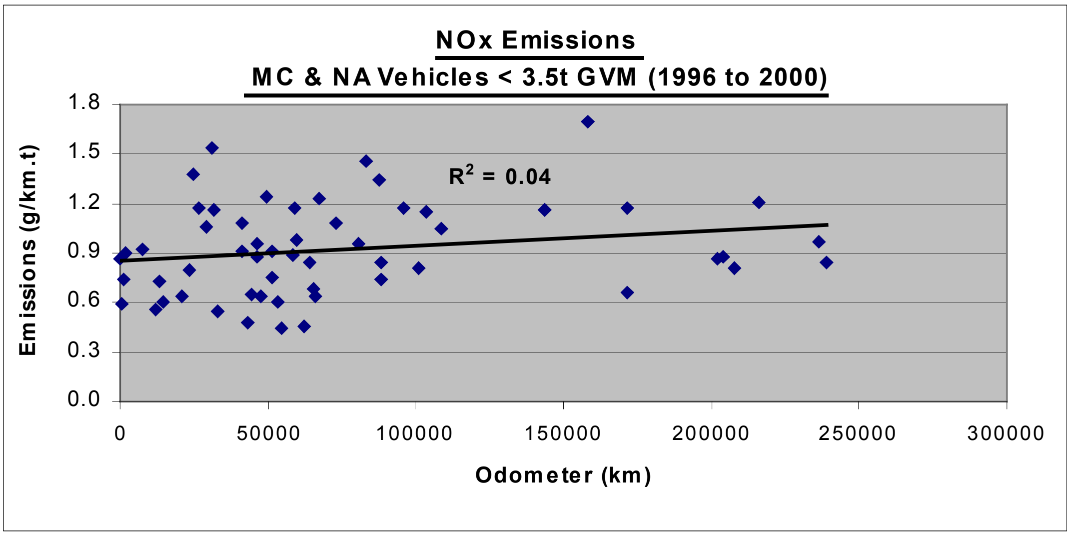


Figure A4-2

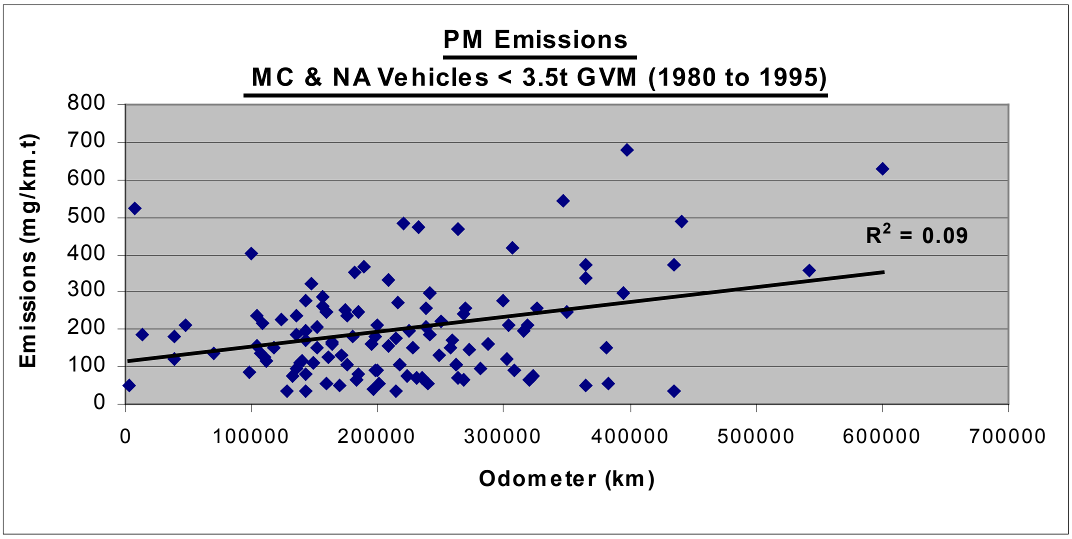


Figure A4-3

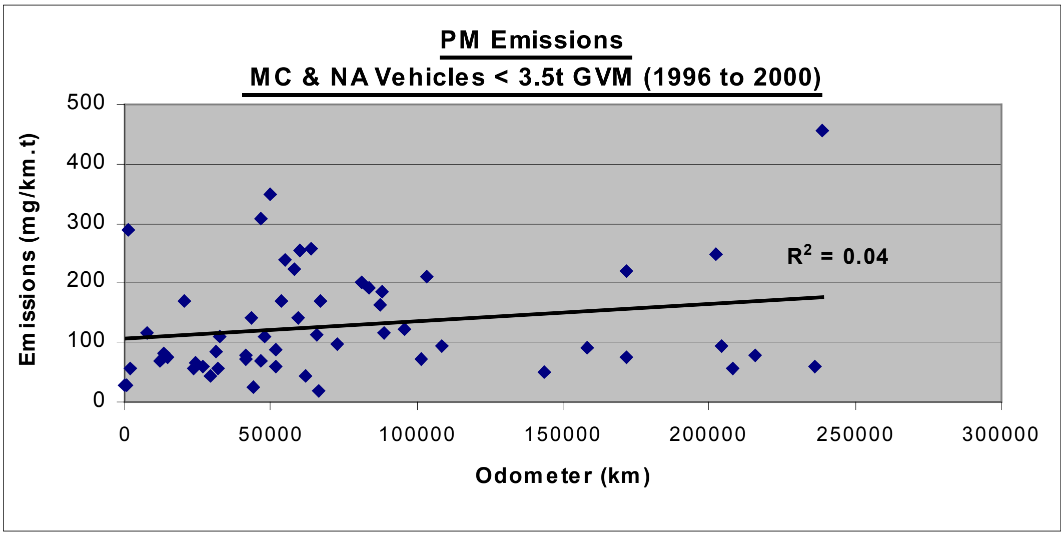


Figure A4-4

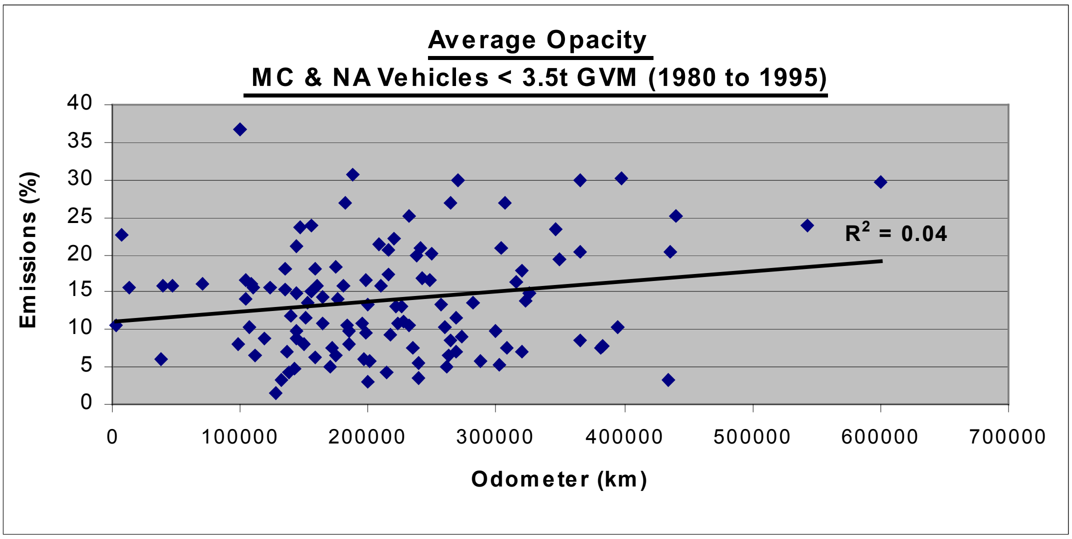


Figure A4-5

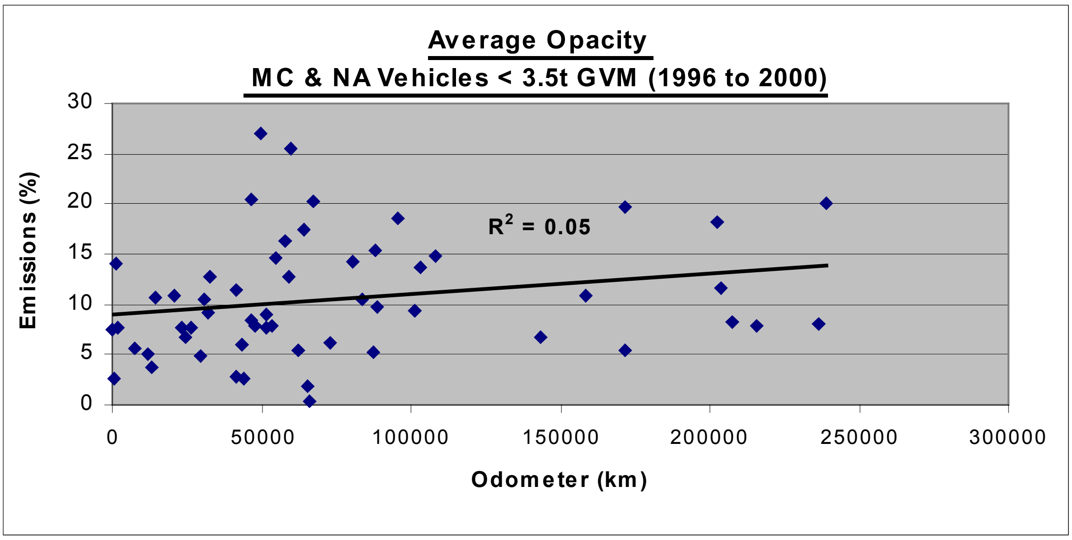


Figure A4-6

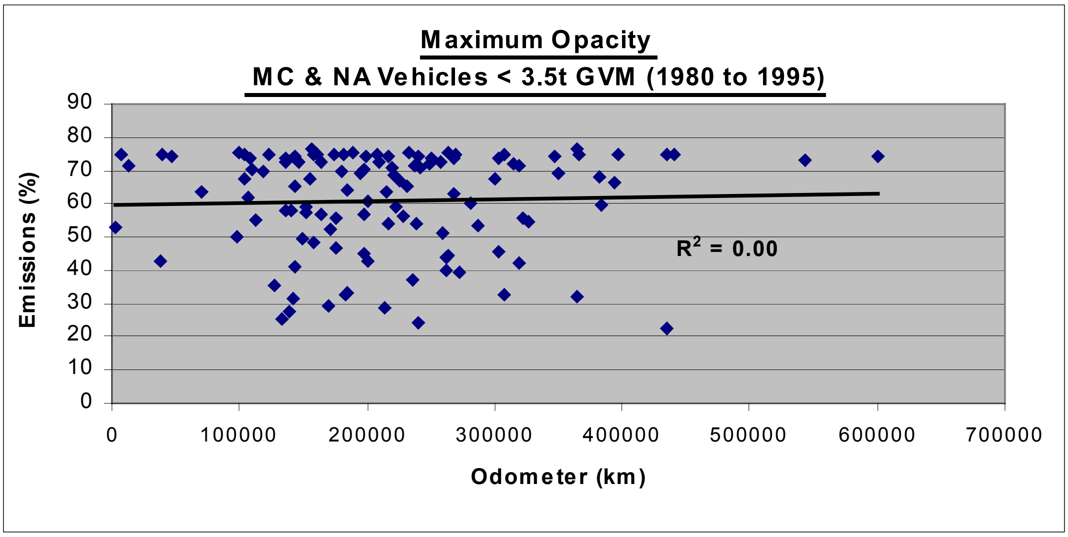


Figure A4-7

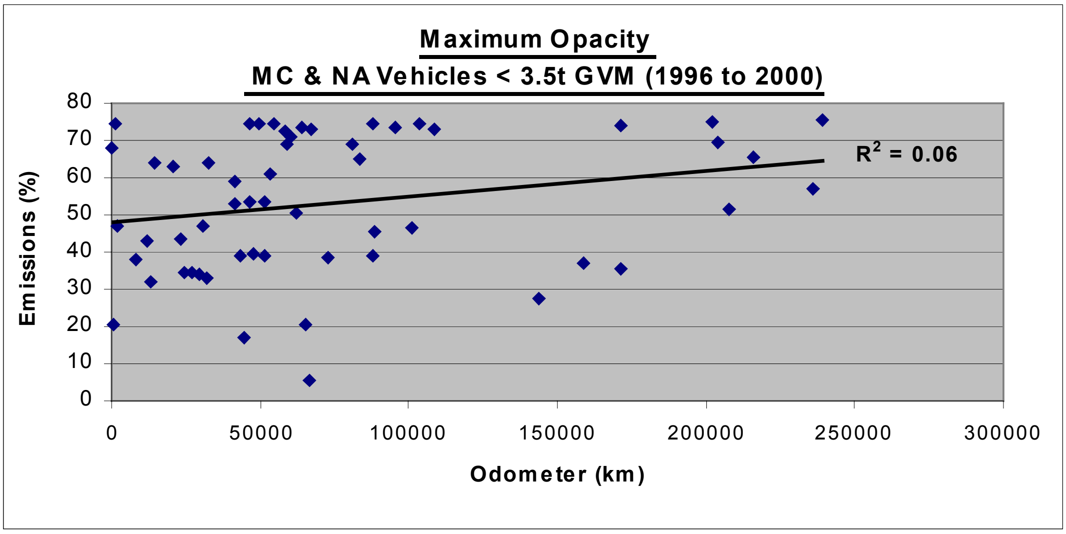


Figure A4-8

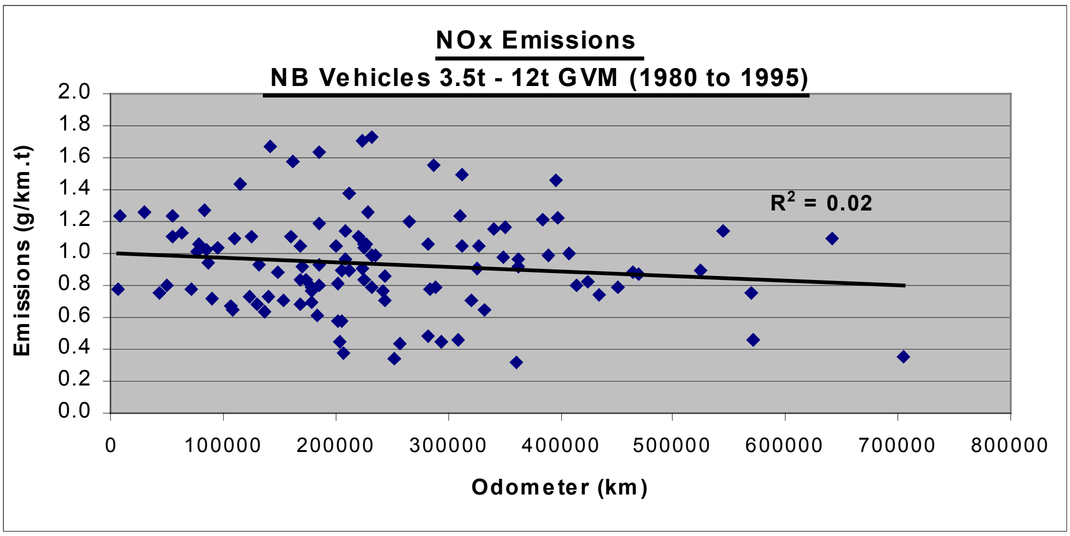


Figure A4-9

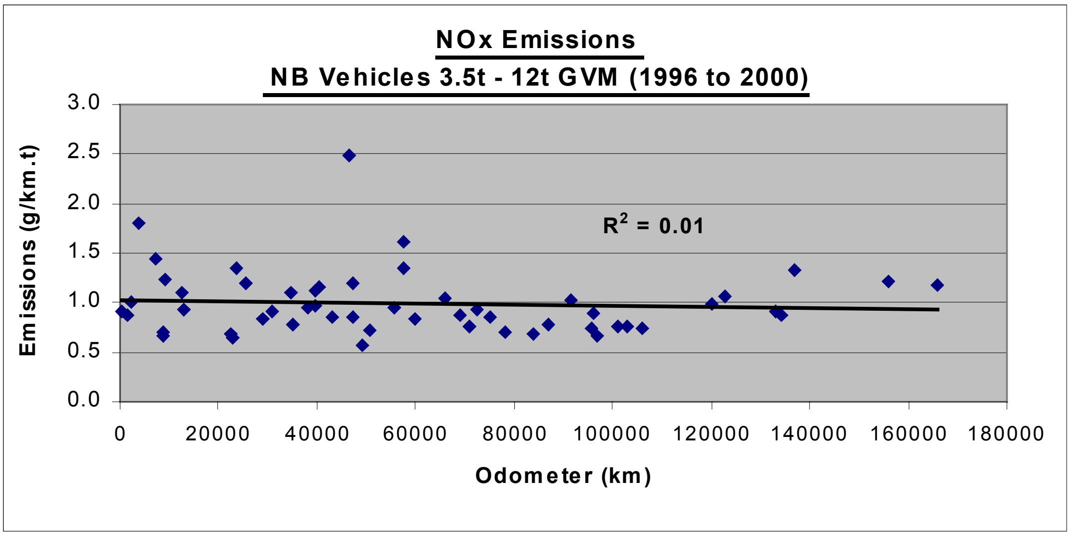


Figure A4-10

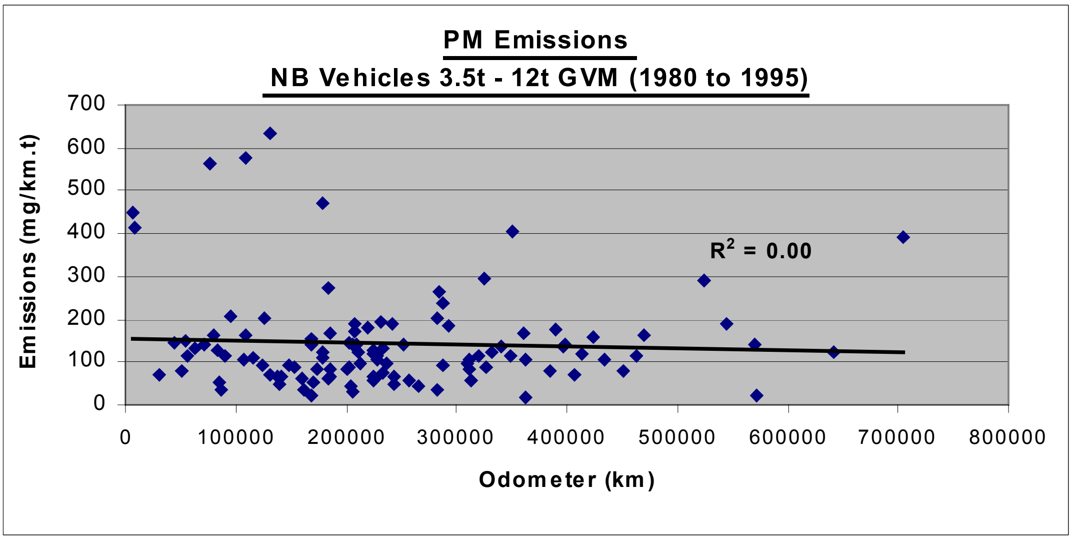


Figure A4-11

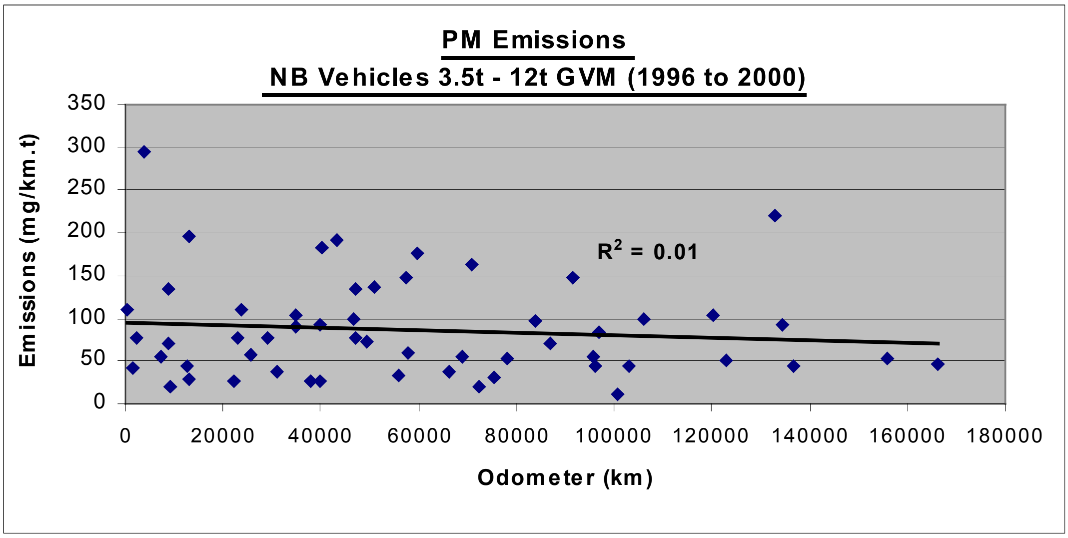


Figure A4-12

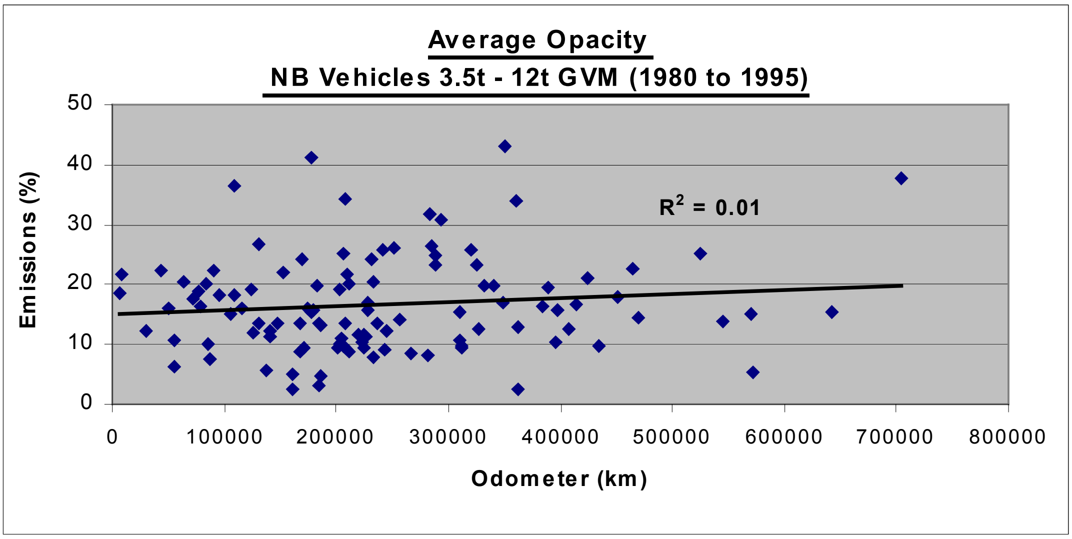
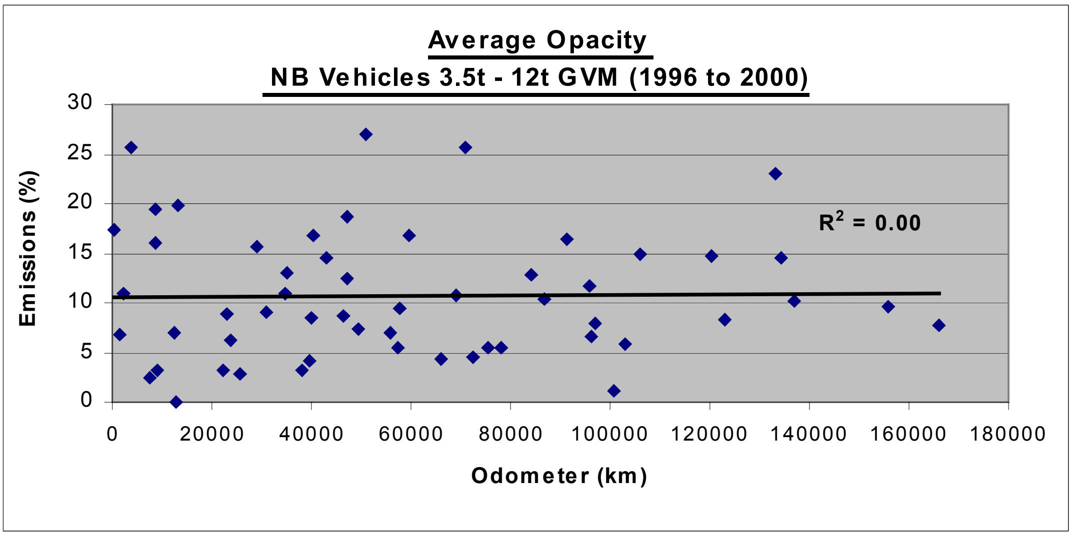


Figure A4-13



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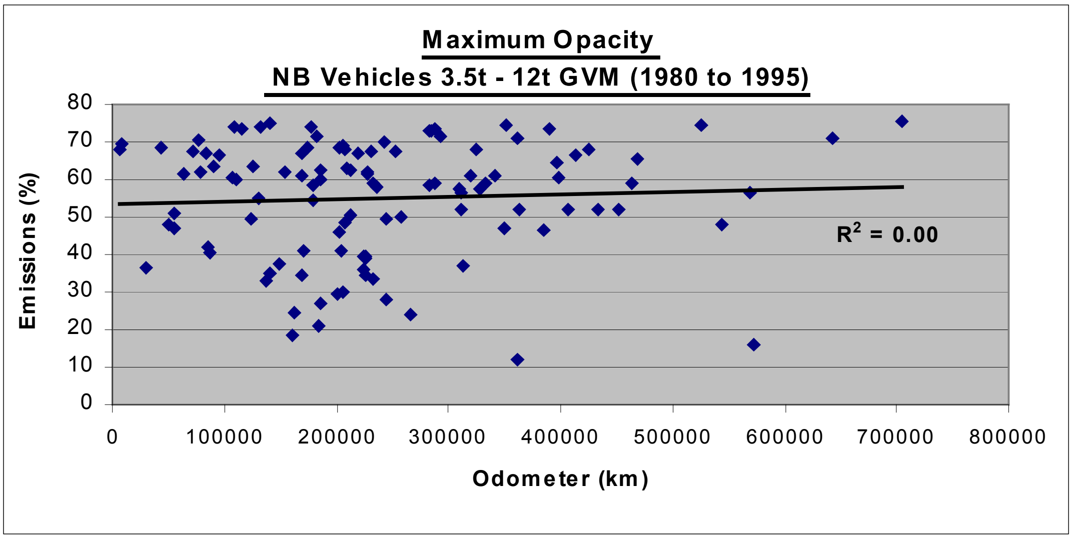


Figure A4-15

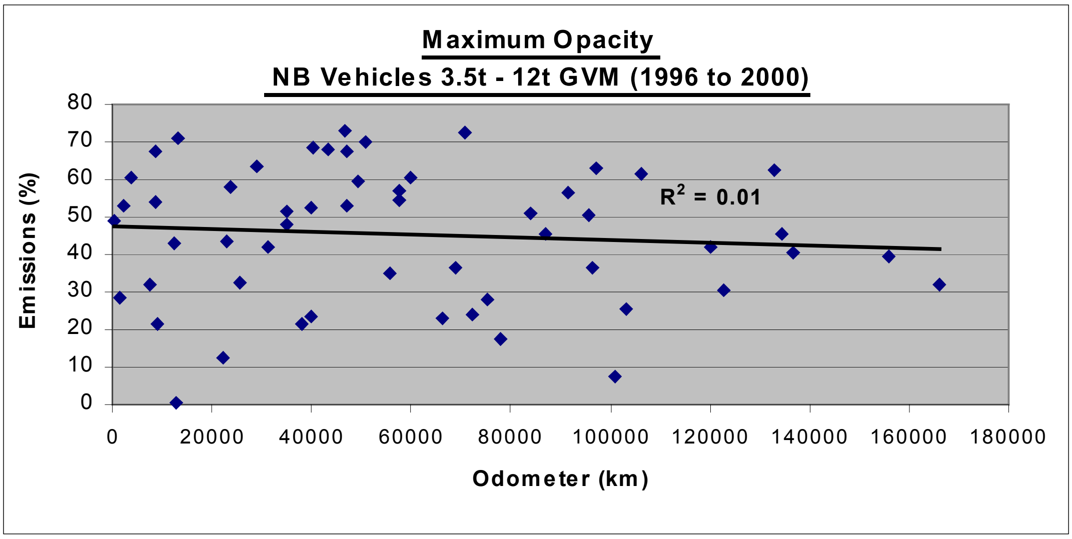


Figure A4-16

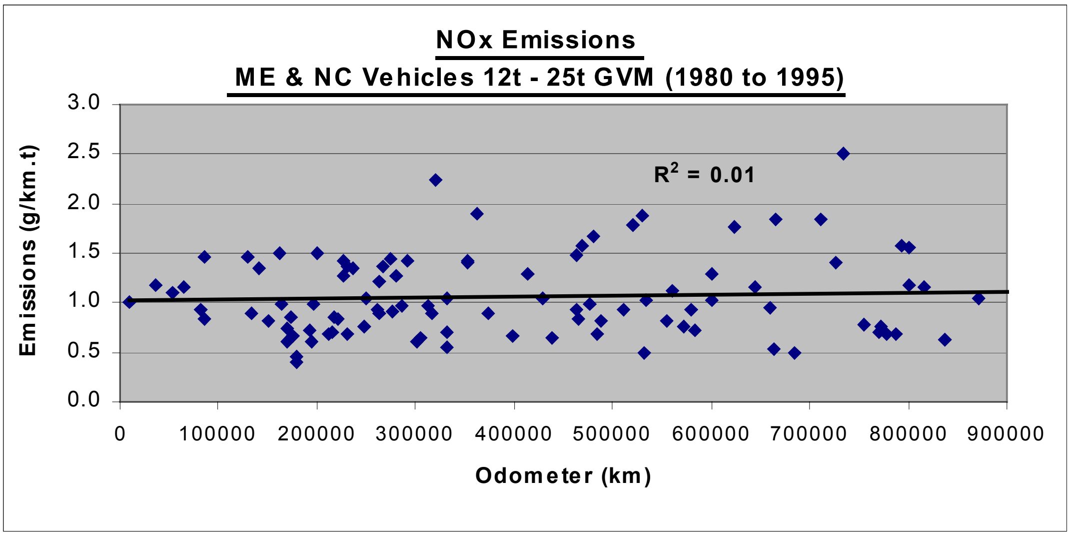


Figure A4-17

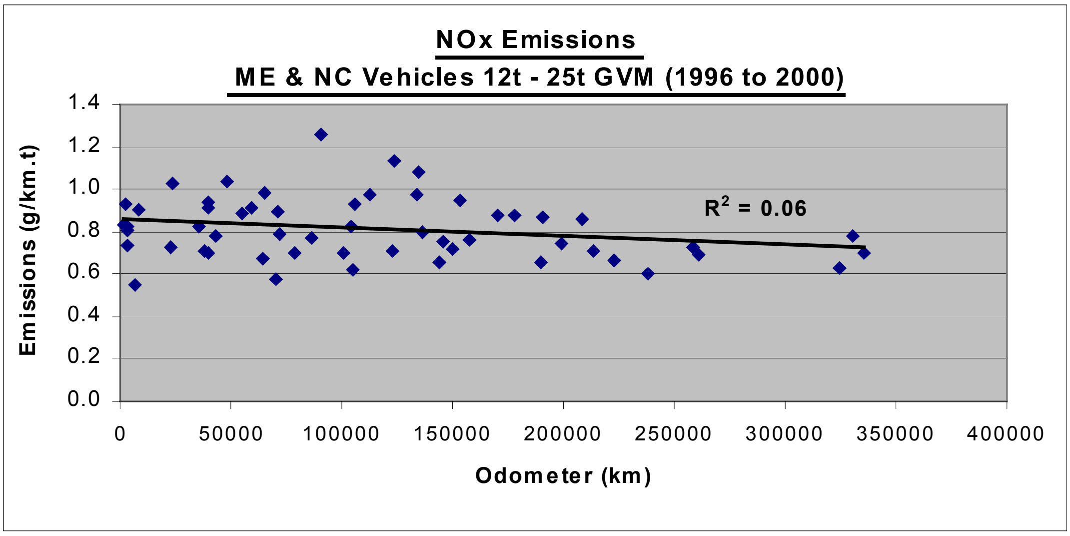


Figure A4-18

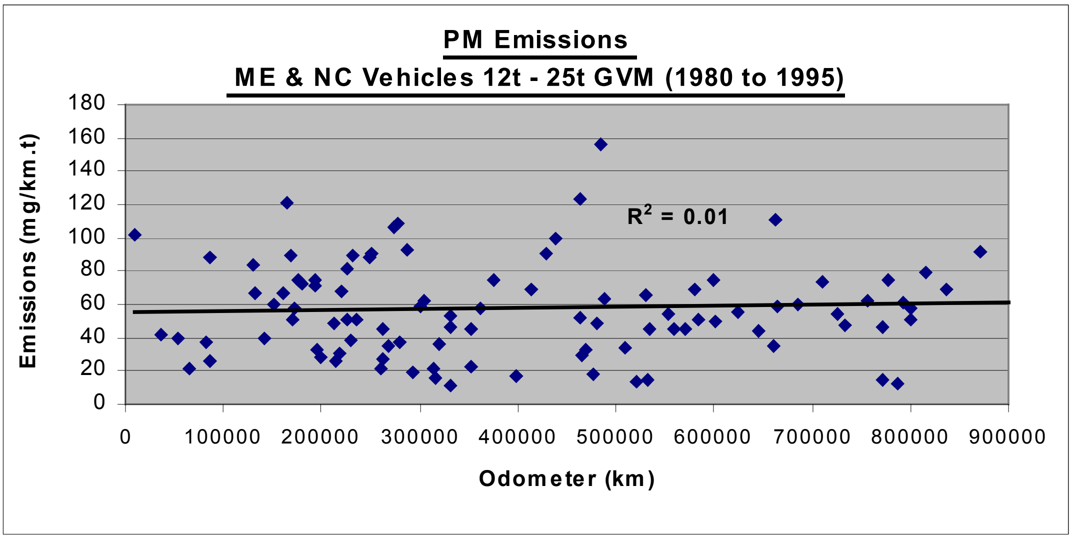


Figure A4-19

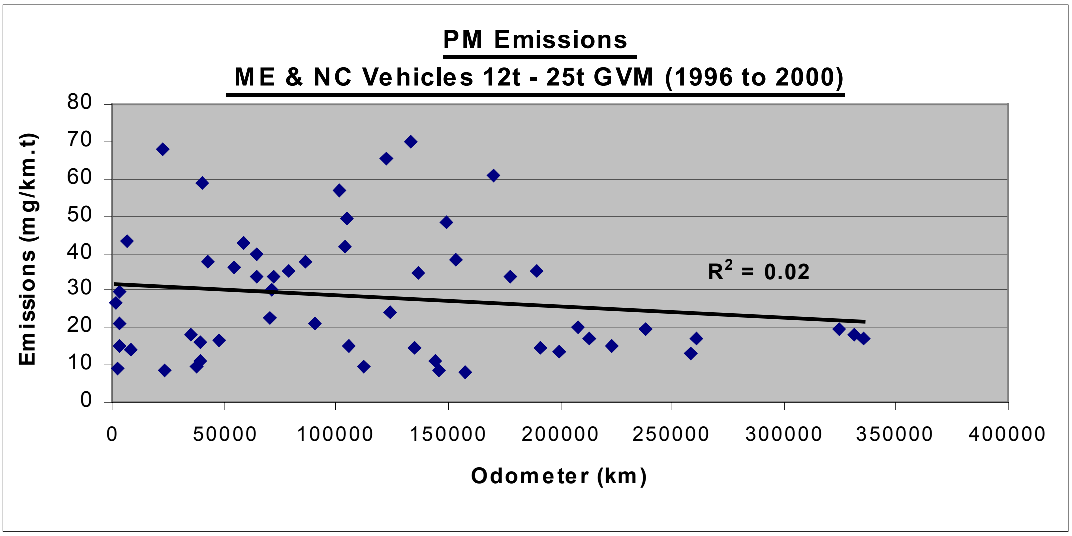


Figure A4-20

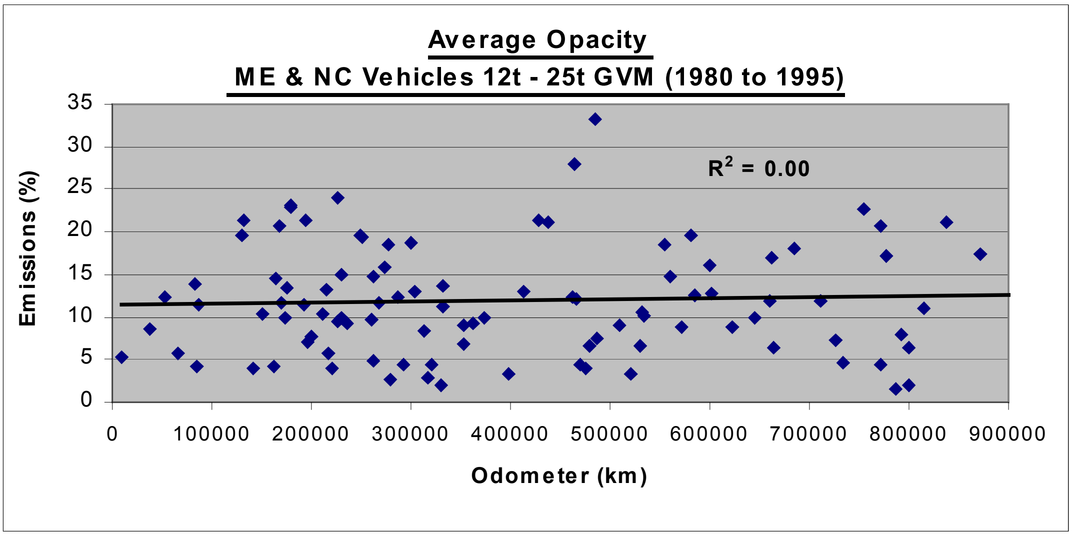


Figure A4-21

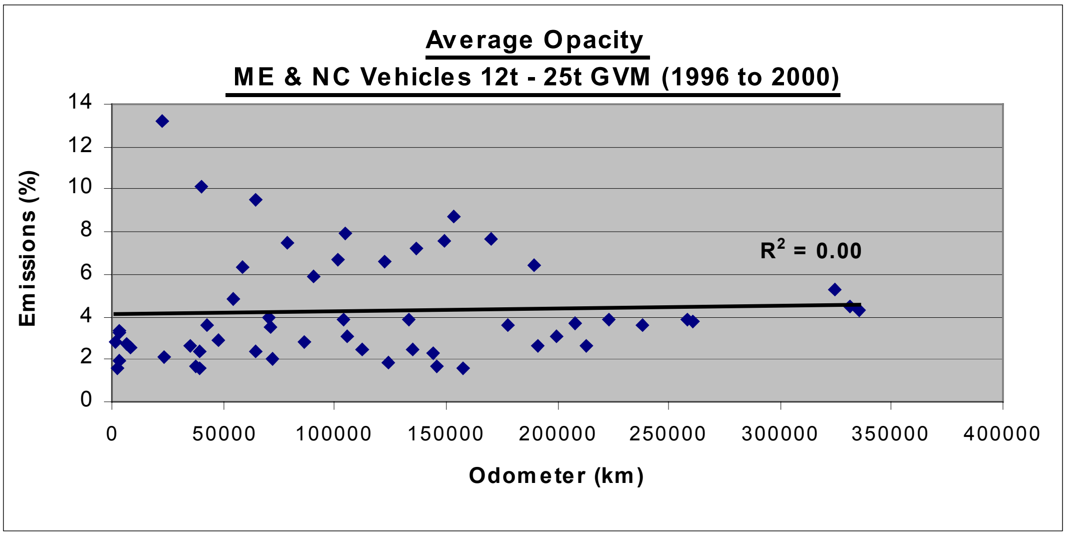


Figure A4-22

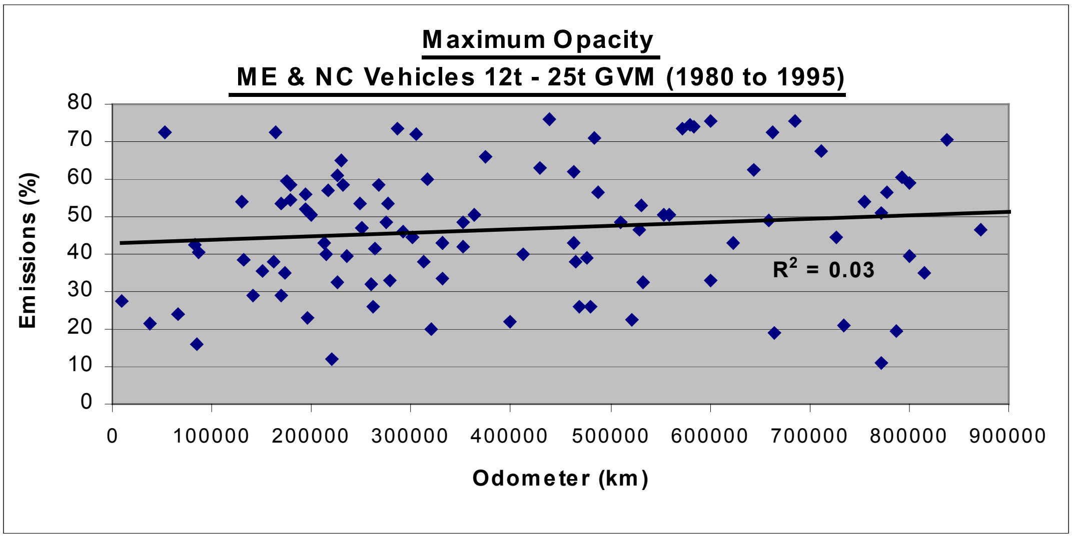


Figure A4-23

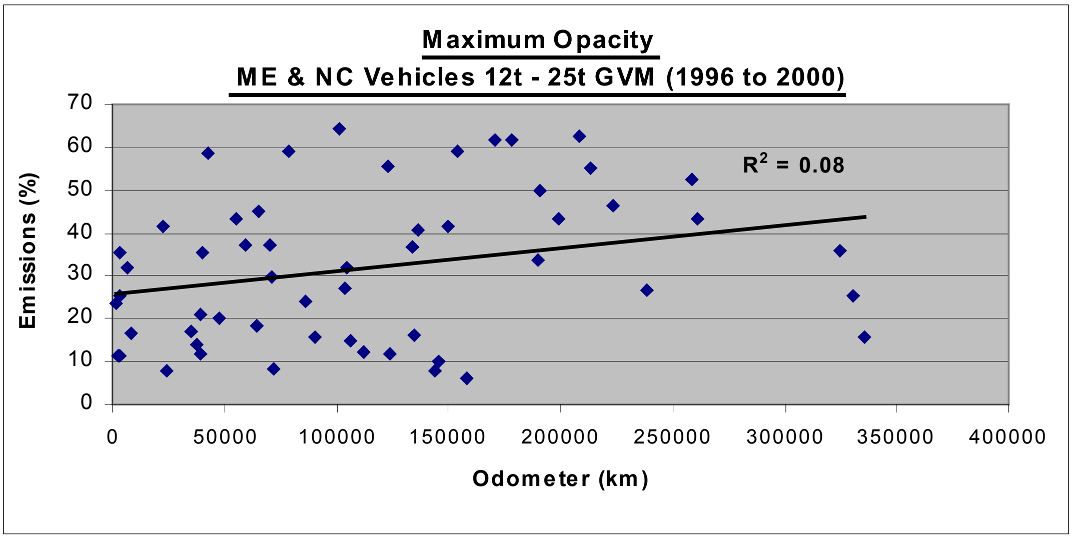


Figure A4-24

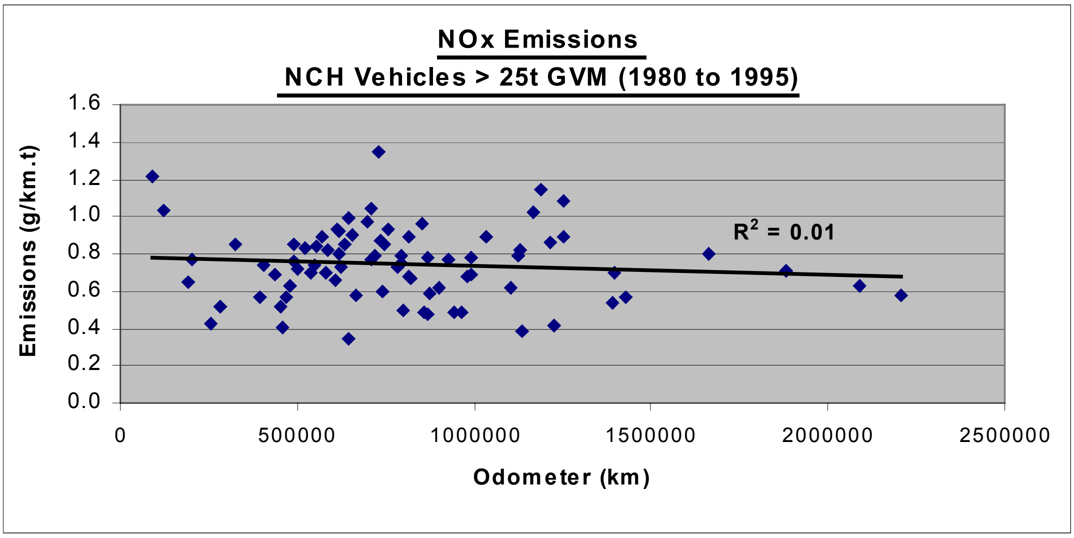


Figure A4-25

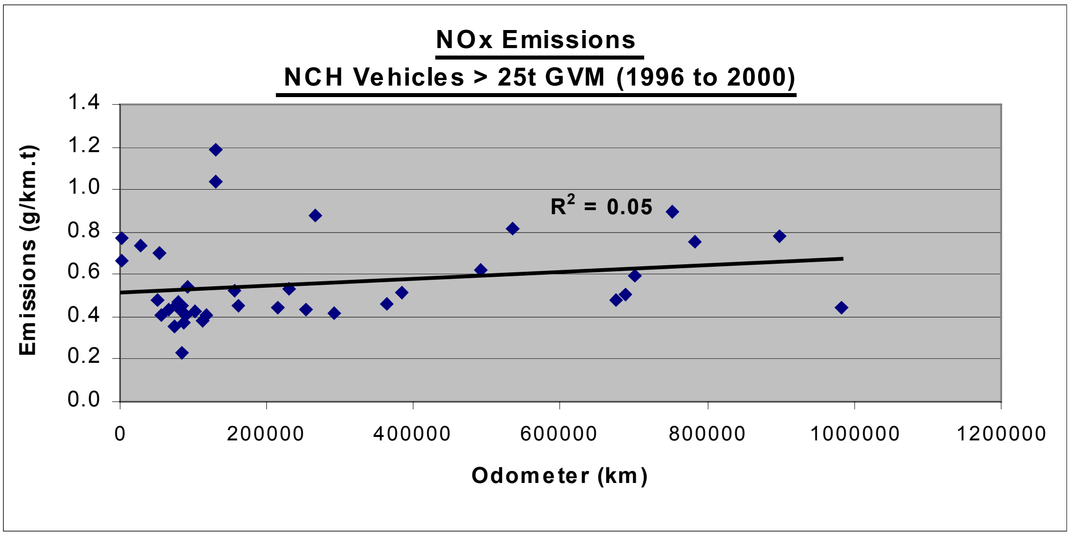


Figure A4-26

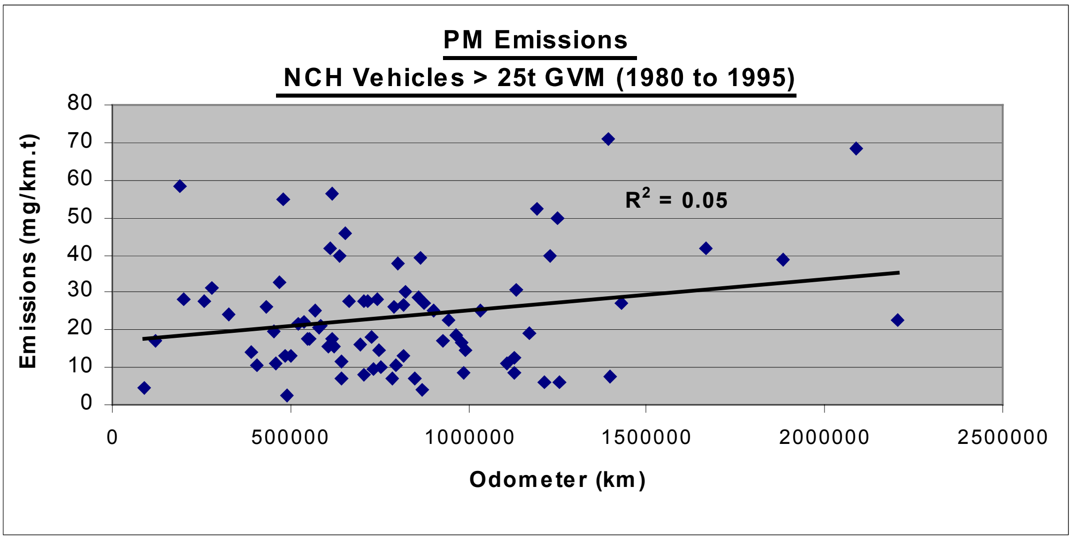


Figure A4-27

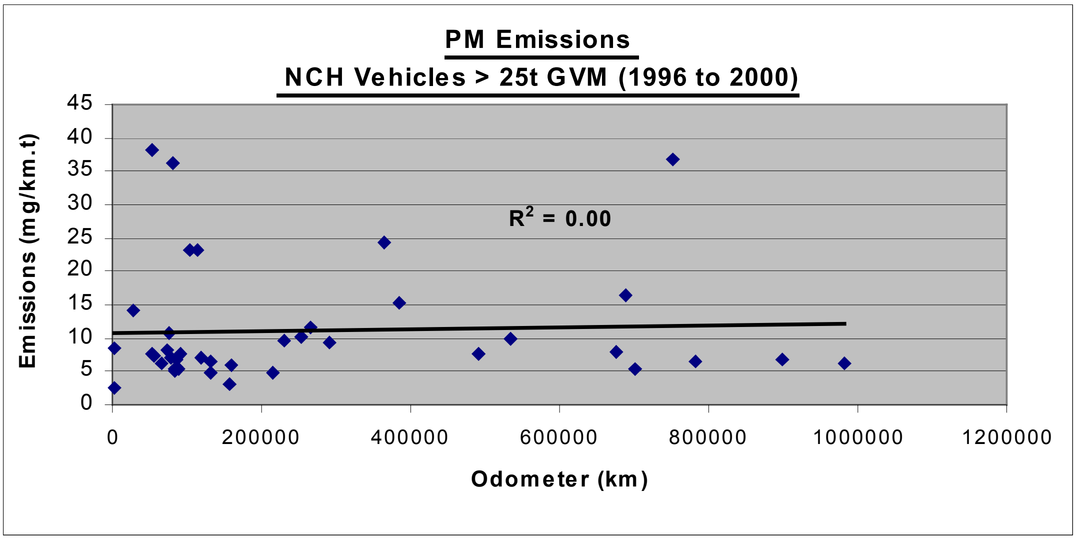


Figure A4-28

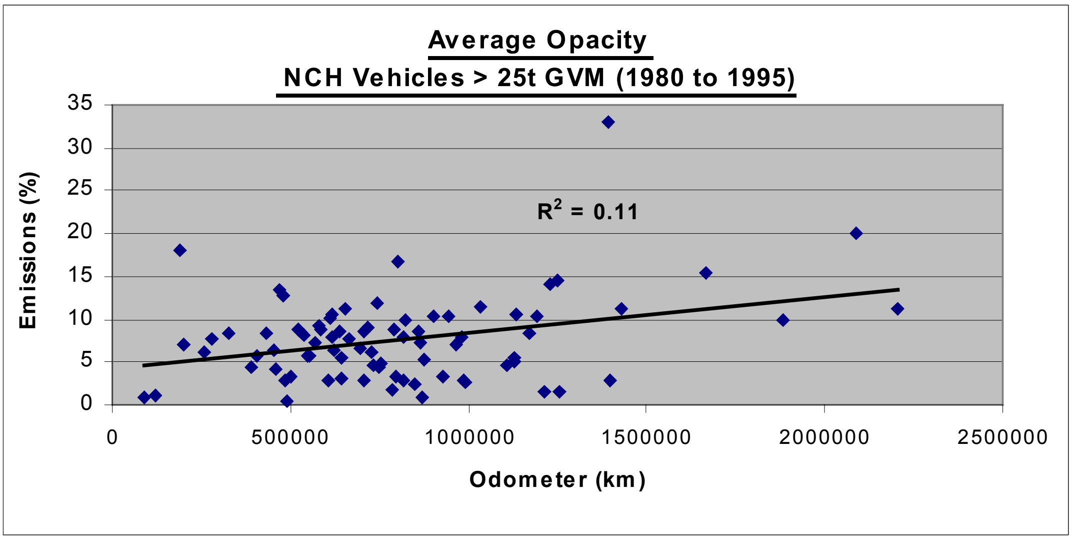


Figure A4-29

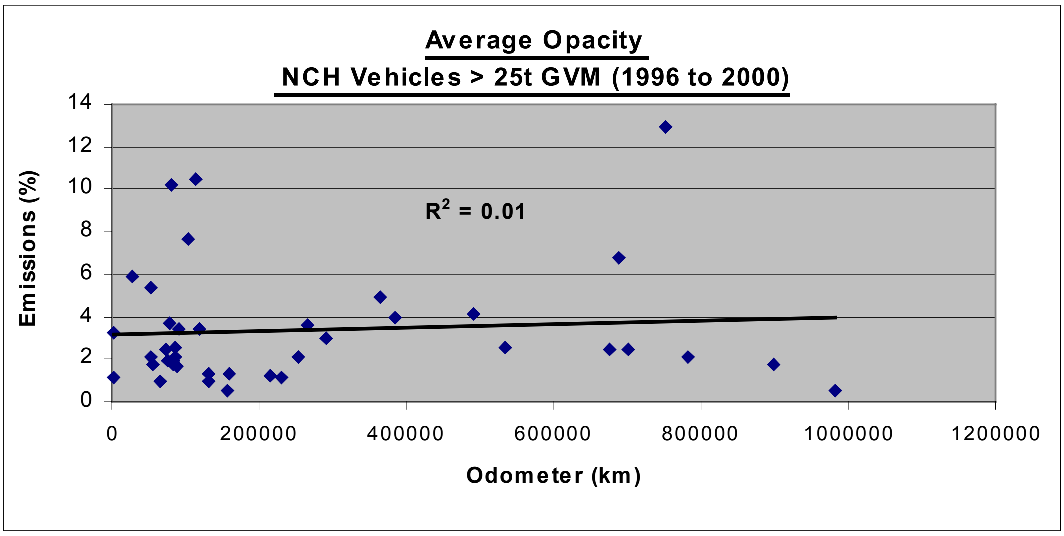


Figure A4-30

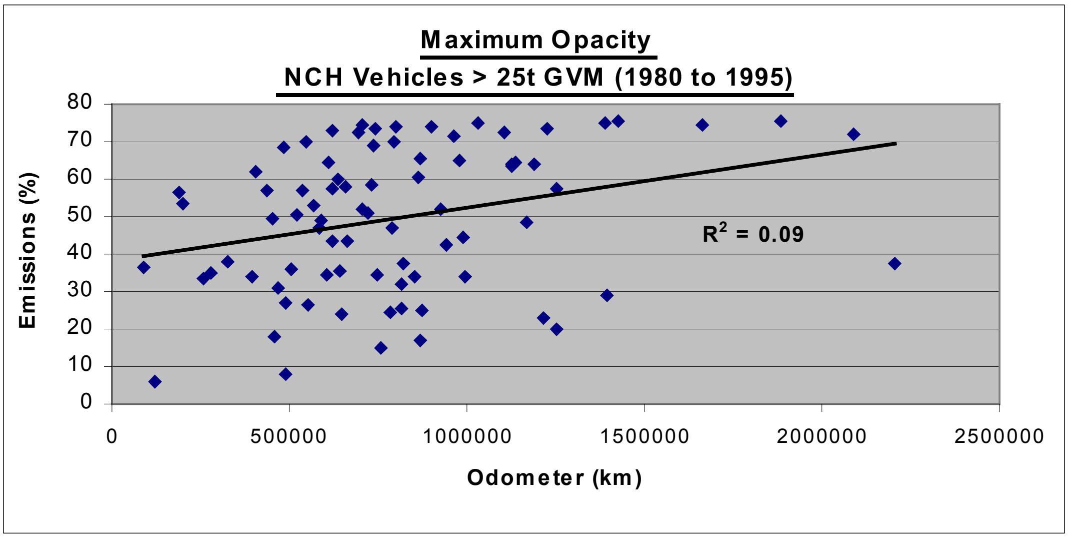


Figure A4-31

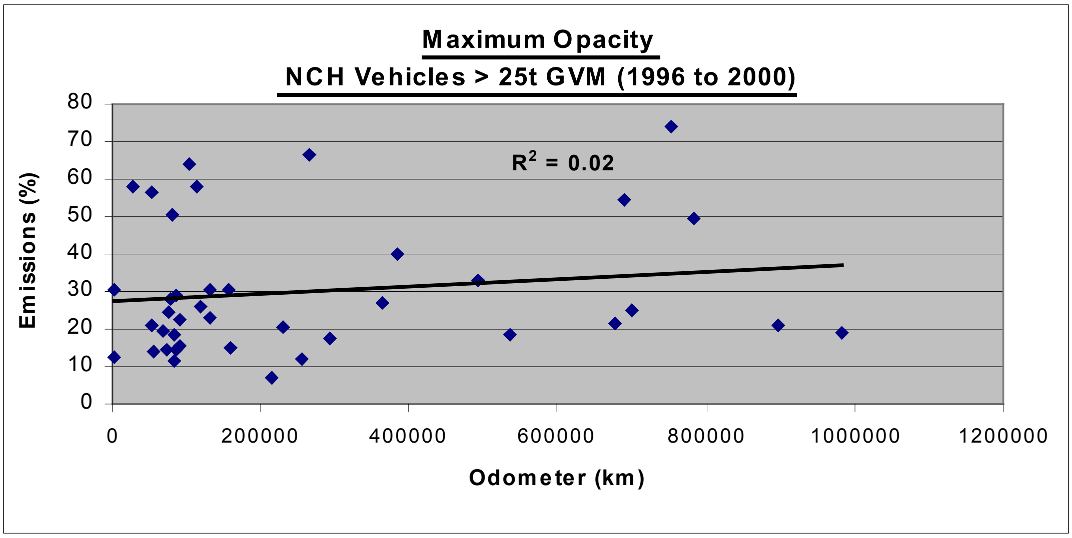


Figure A4-32

Appendix 5

CATEGORY AVERAGES GRAPHS & TABLES

Table A5-1

Vehicle Category Averages

MC & NA Vehicles (< 3.5t GVM)

Category	Age Group	No of Vehicles	NOx (g/km.t)	PM (mg/km.t)	Avg Opacity (%)	Max Opacity (%)
1&2	1980 - 95	115	0.87	198.8	14.0	60.9
3	1996 - 00	56	0.92	128.9	10.5	53.3

NB Vehicles (3.5t -12t GVM)

Category	Age Group	No of Vehicles	NOx (g/km.t)	PM (mg/km.t)	Avg Opacity (%)	Max Opacity (%)
4&5	1980 - 95	110	0.94	143.2	16.6	55.1
6	1996 - 00	55	0.99	85.9	10.7	45.3

ME & NC Vehicles (12t - 25t GVM)

Category	Age Group	No of Vehicles	NOx (g/km.t)	PM (mg/km.t)	Avg Opacity (%)	Max Opacity (%)
7&8	1980 - 95	110	1.07	58.3	12.0	47.4
9	1996 - 00	55	0.81	28.1	4.3	31.9

NCH Vehicles (> 25t GVM)

Category	Age Group	No of Vehicles	NOx (g/km.t)	PM (mg/km.t)	Avg Opacity (%)	Max Opacity (%)
10&11	1980 - 95	80	0.74	23.7	7.6	49.5
12	1996 - 00	40	0.56	11.1	3.3	29.9

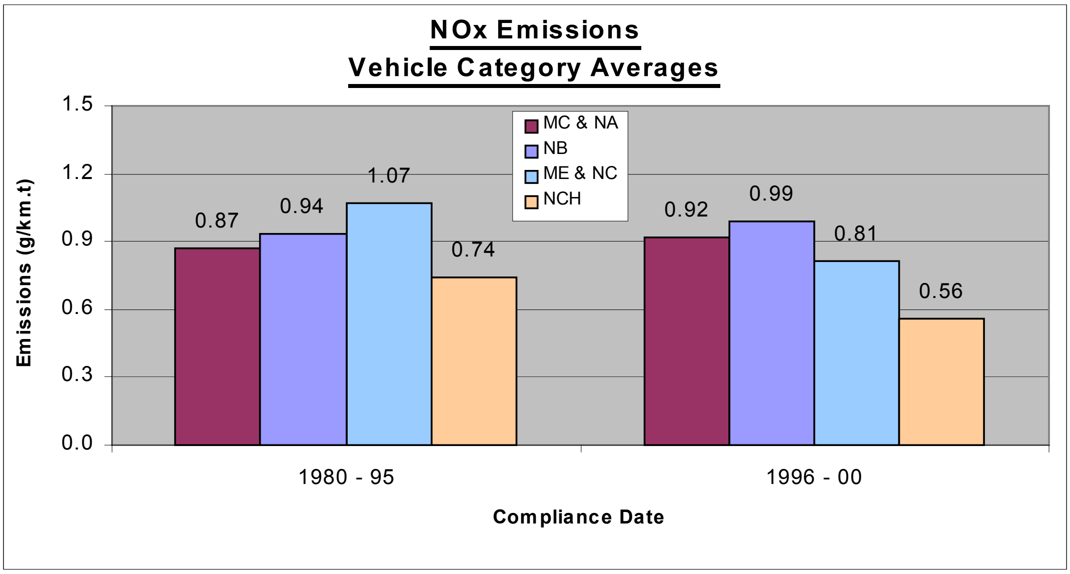


Figure A5-1

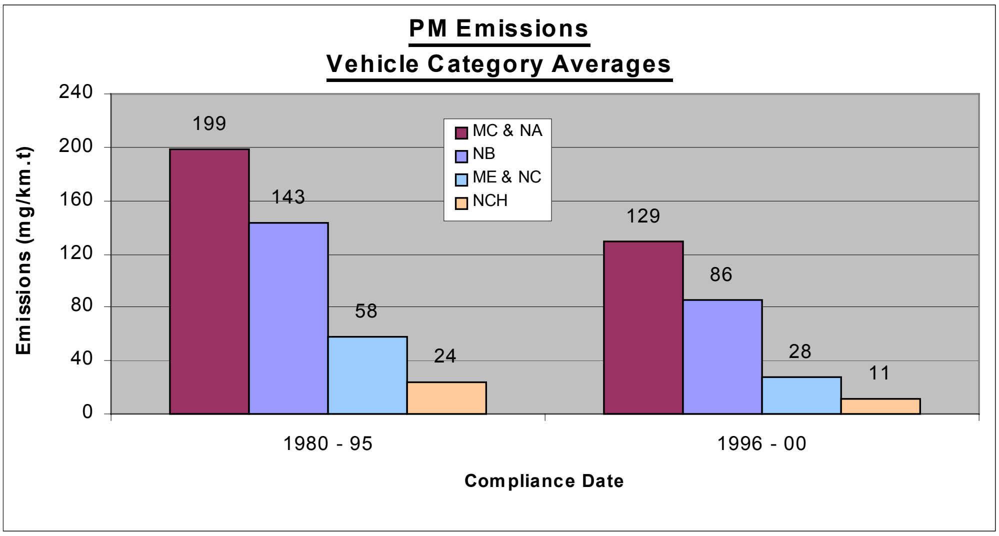


Figure A5-2

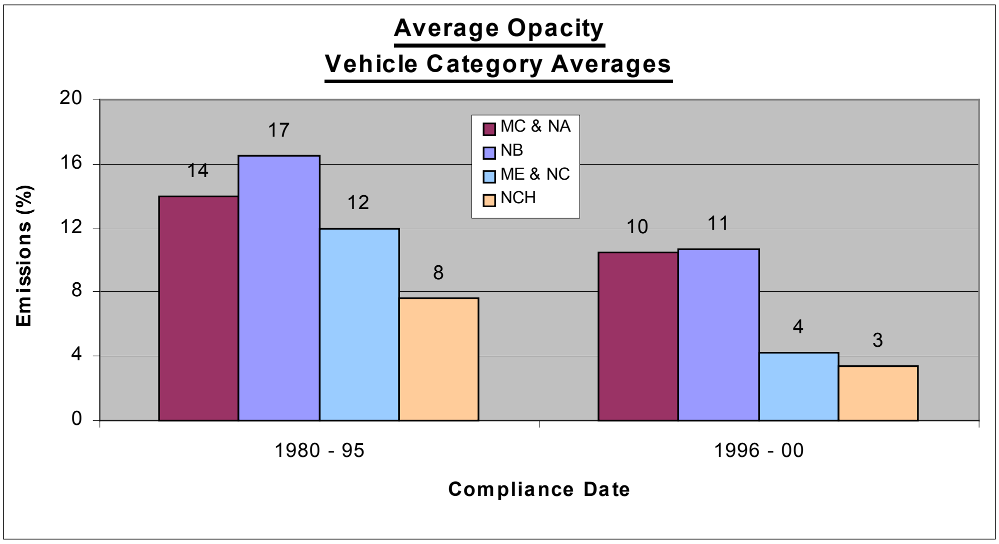


Figure A5-3

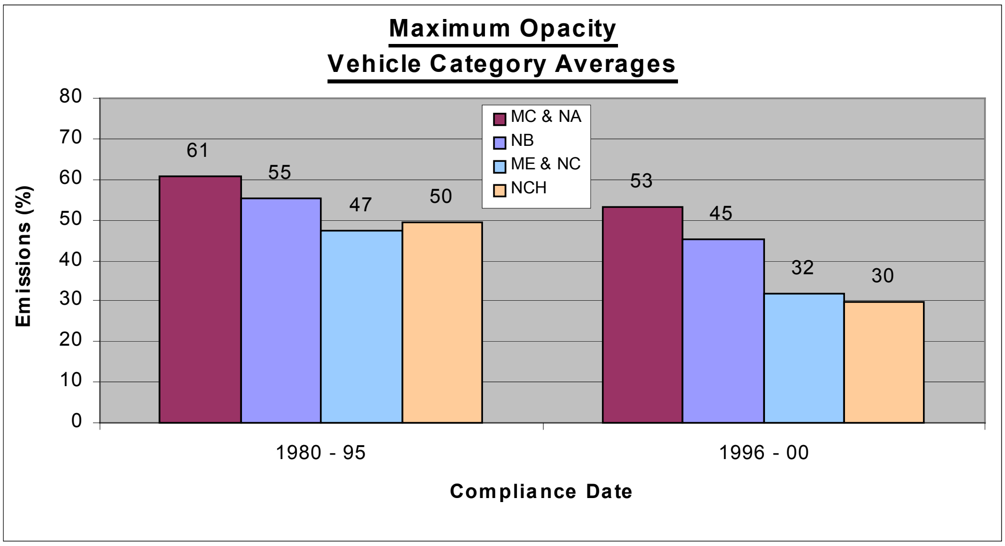


Figure A5-4

Appendix 6

FAULT DIAGNOSIS VEHICLE SELECTION

Table A6-1

Categories 1+2 Fault Diagnosis Selection

Test No	NOx (g/km.t)	PM (mg/km.t)	NOx Ranking /115	PM Ranking /115	NOx (% above average)	PM (% above average)	Sum of NOx & PM Ranking /115	Average Opacity Ranking /115	Average Opacity (% above average)
540	2.9	235	2	37	235	18	1	97	-53.7
1700	3.0	114	1	80	251	-42	2	97	-53.7
1372	1.1	522	13	4	29	163	4	16	61.8
1338	1.1	484	19	6	22	143	6	60	-7.0
1717	0.7	470	79	9	-22	136	12	8	93.4
1755	1.1	352	14	16	27	77	13	9	93.2
1744	1.0	330	32	18	11	66	18	18	52.7
1592	0.6	404	97	11	-35	103	21	1	162.2
546	0.4	415	110	10	-49	109	24	7	93.4
1711	0.9	298	46	20	3	50	26	20	49.5
1495	0.7	322	73	19	-18	62	31	14	69.2
1472	1.7	66	5	101	100	-67	34	71	-24.3
1341	0.9	262	50	26	2	32	35	49	8.4
1594	0.6	287	85	22	-26	44	39	12	70.9
1453	0.8	214	55	40	-3	8	44	38	15.9
1758	1.2	119	10	78	43	-40	48	100	-56.1
1572	1.1	150	16	67	23	-24	52	81	-36.3
976	0.8	206	63	46	-10	4	55	63	-16.5
1469	1.0	135	23	72	19	-32	58	39	15.5
1306	0.7	208	78	45	-22	5	61	111	-75.2
548	0.5	213	103	42	-40	7	64	59	-4.3

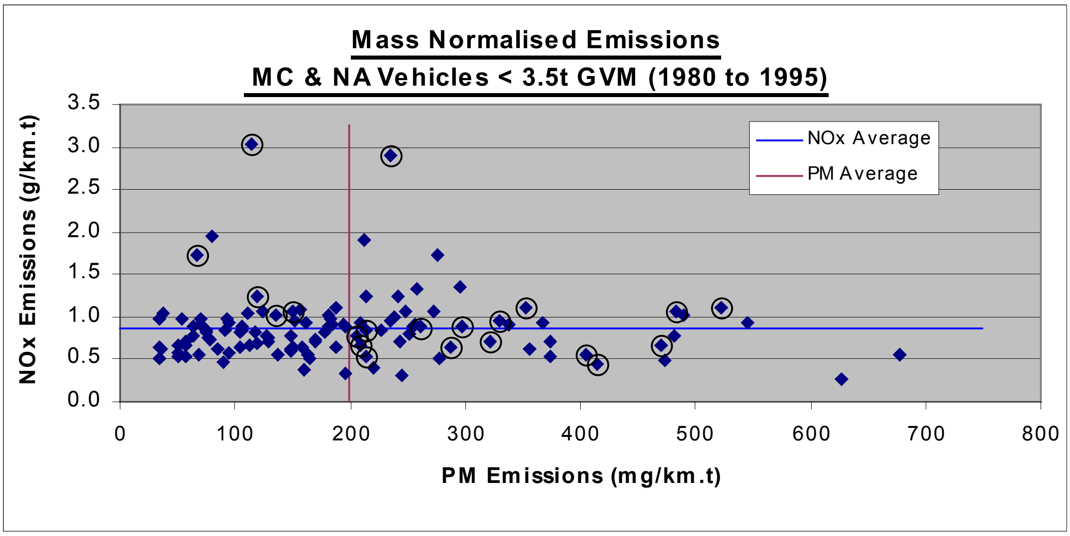


Figure A6-1

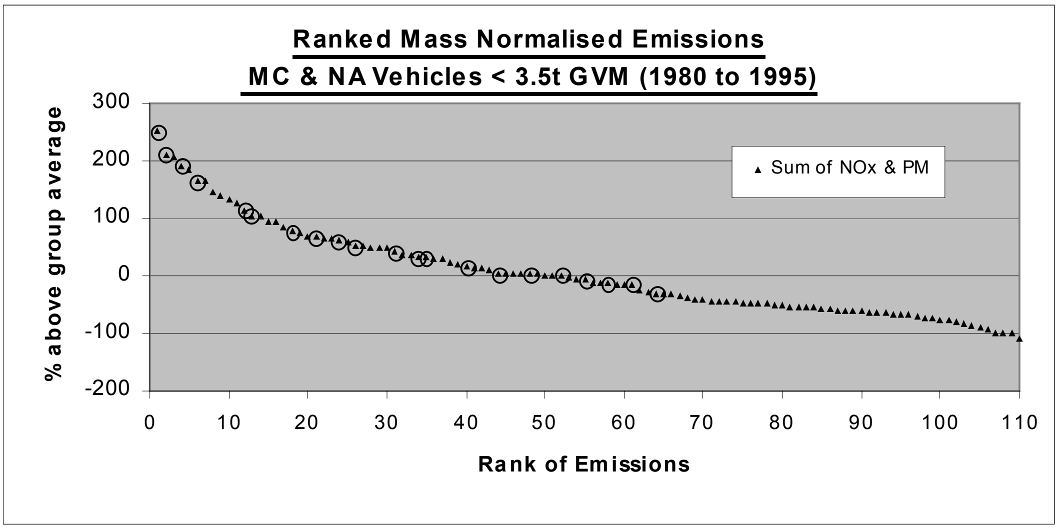


Figure A6-2

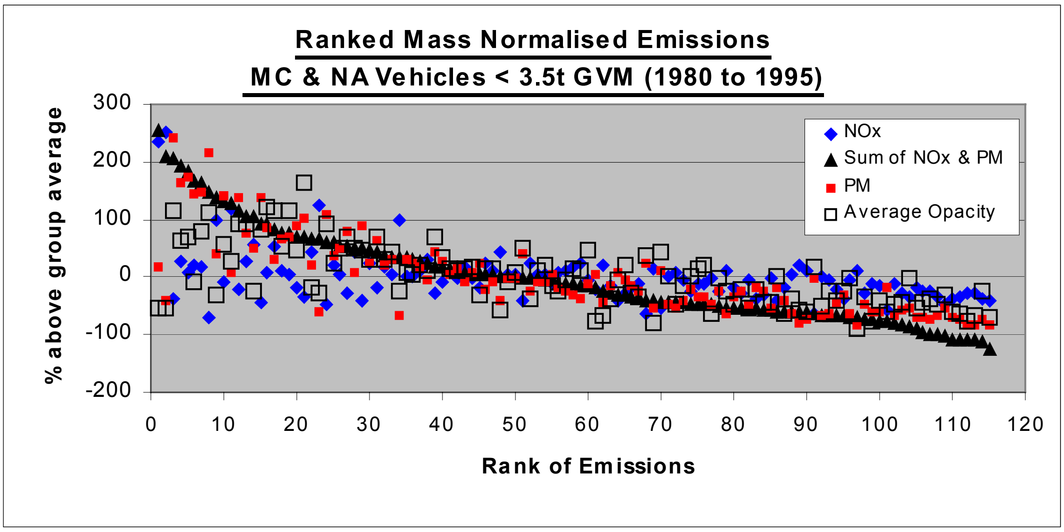


Figure A6-3

Table A6-2

Category 3 Fault Diagnosis Selection

Test No	NOx (g/km.t)	PM (mg/km.t)	NOx Ranking /56	PM Ranking /56	NOx (% above average)	PM (% above average)	Sum of NOx & PM Ranking /56	Average Opacity Ranking /56	Average Opacity (% above average)
1757	0.9	309	30	3	-5	140	3	3	95.6
1470	1.0	254	20	6	6	97	6	2	142.8
1590	0.9	250	32	7	-6	94	9	8	73.2
926	1.3	164	5	18	46	27	10	48	-50.7
1309	1.0	202	22	12	4	57	13	14	35.6
1471	1.7	91	1	30	85	-29	14	22	3.0
1707	0.8	187	34	14	-8	45	17	11	46.6
1620	1.5	85	2	32	67	-34	19	25	-0.7
802	0.6	171	49	17	-34	32	23	34	-24.7
554	1.1	99	16	27	18	-24	24	43	-40.9
1694	1.2	75	12	37	27	-42	28	46	-47.7
806	0.7	116	41	23	-20	-10	32	26	-6.7

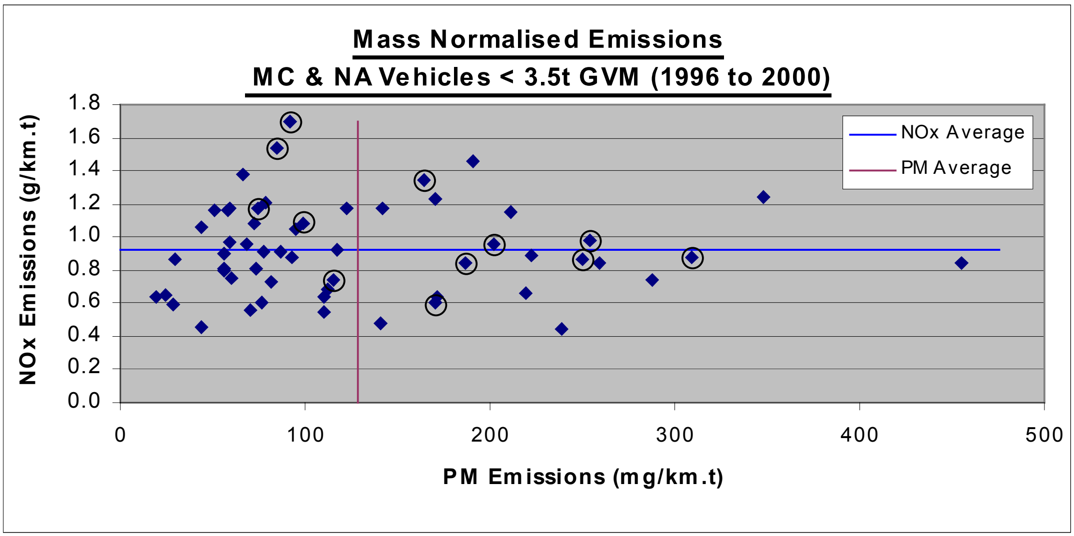


Figure A6-4

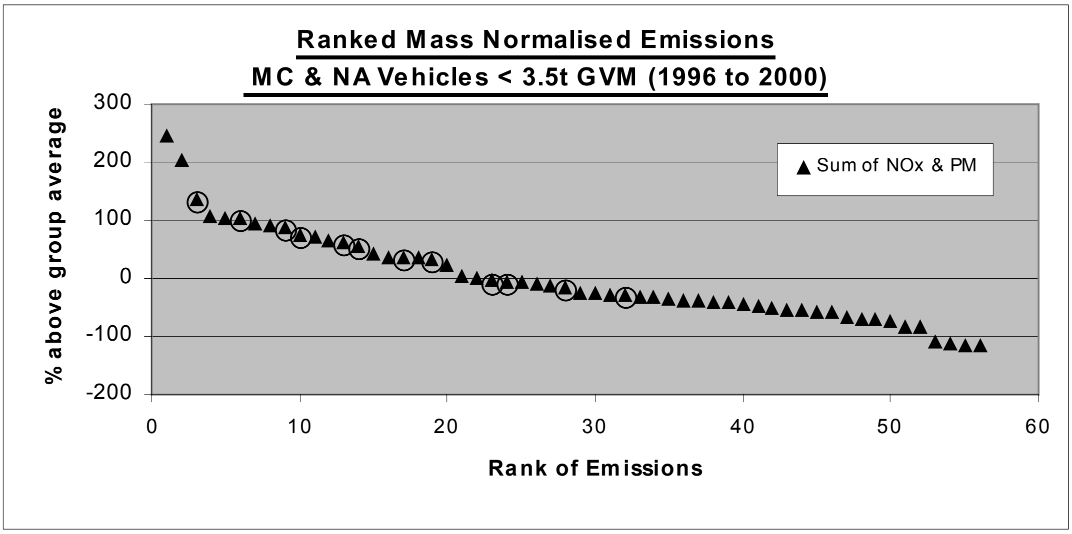


Figure A6-5

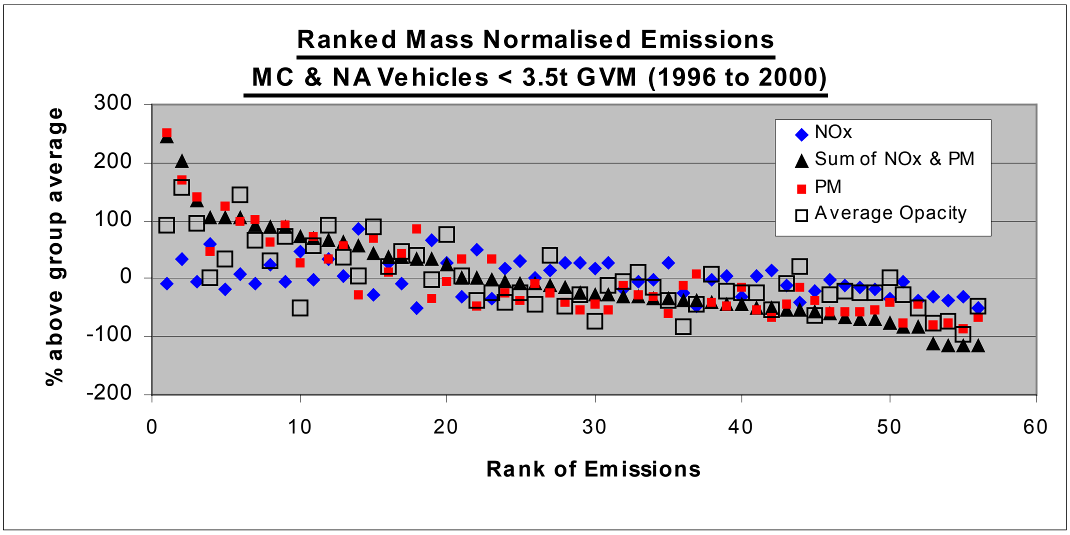


Figure A6-6
Table A6-3

Categories 4+5 Fault Diagnosis Selection

Test No	NOx (g/km.t)	PM (mg/km.t)	NOx Ranking /110	PM Ranking /110	NOx (% above average)	PM (% above average)	Sum of NOx & PM Ranking /110	Average Opacity Ranking /110	Average Opacity (% above average)
1092	1.2	406	21	7	24	184	5	1	159.9
1437	0.7	470	91	4	-26	228	6	2	149.6
1443	0.3	390	108	8	-63	173	9	3	127.0
1019	0.9	293	57	9	-4	105	10	20	40.3
958	1.6	168	4	25	75	18	12	69	-20.8
1295	1.7	127	2	47	83	-12	13	85	-36.9
1086	1.1	202	28	16	18	41	15	76	-27.2
1080	1.1	189	23	19	22	32	18	62	-17.3
1028	1.1	181	26	22	19	26	21	77	-29.8
1014	1.2	143	17	35	31	0	24	53	-5.7
1166	1.1	163	34	27	13	13	28	48	-1.4
1126	1.2	138	22	42	24	-4	31	33	19.0
1439	1.5	86	7	76	60	-40	32	93	-43.0
1085	1.0	140	38	40	12	-2	38	63	-18.2
914	1.0	133	46	45	6	-7	43	28	23.6
1218	1.6	36	5	105	69	-75	47	106	-69.7
911	0.8	147	83	33	-20	3	52	23	34.7
1269	1.0	113	48	58	4	-21	53	45	2.9
1022	1.0	106	50	65	2	-26	59	70	-21.7
1093	1.2	63	20	92	27	-56	63	108	-81.6
1615	0.8	120	72	52	-15	-16	66	46	0.1
1104	1.1	60	29	94	18	-58	71	109	-83.9

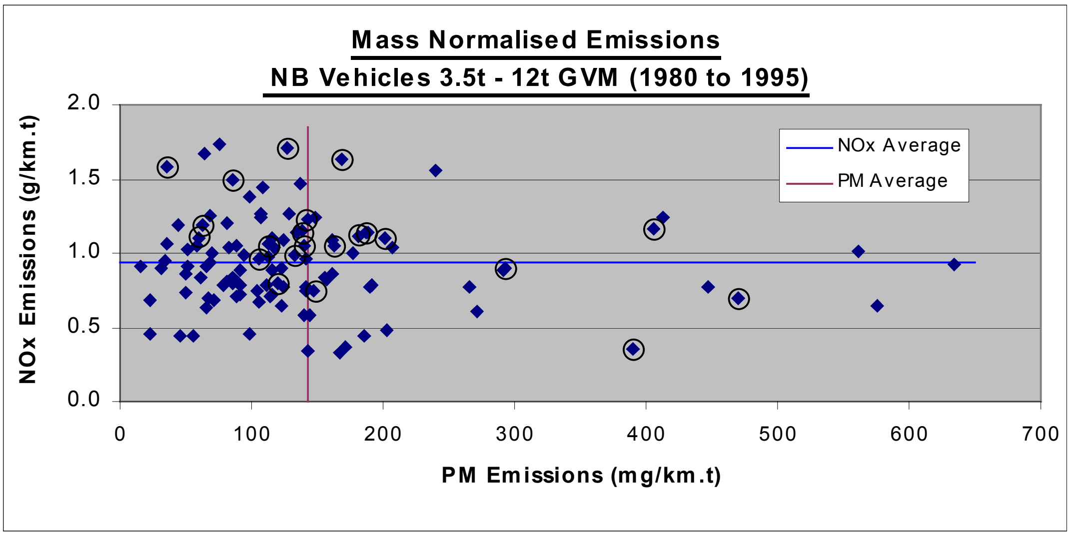


Figure A6-7

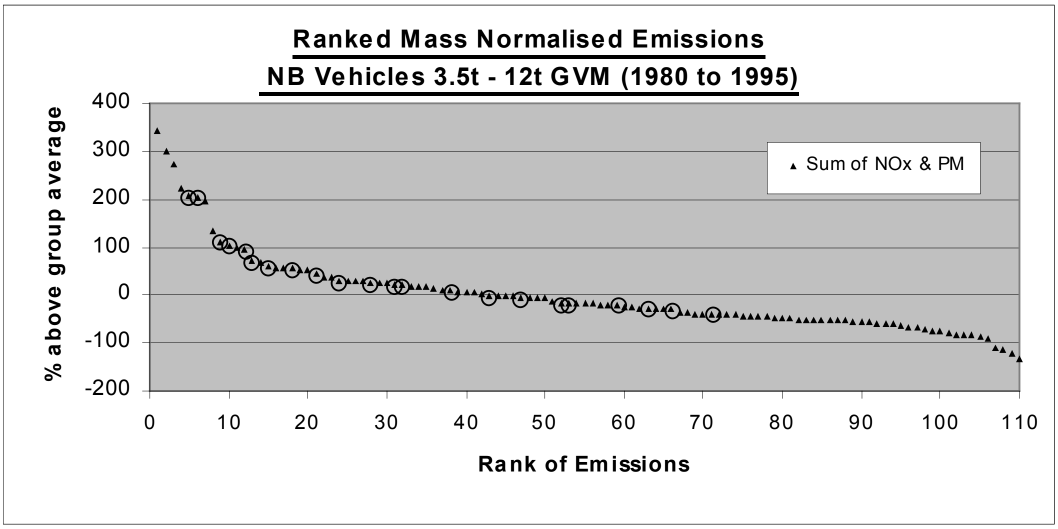


Figure A6-8

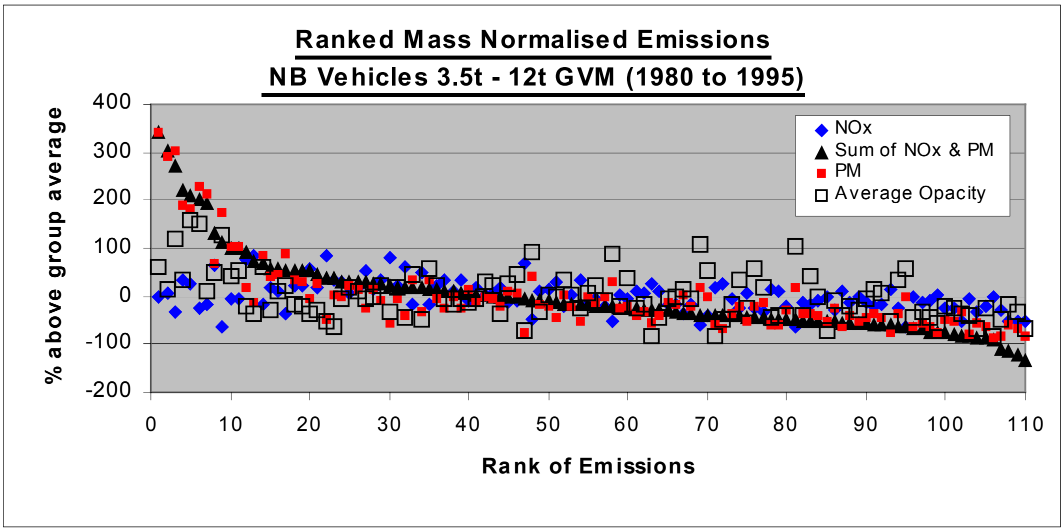


Figure A6-9

Table A6-4

Category 6 Fault Diagnosis Selection

Test No	NOx (g/km.t)	PM (mg/km.t)	NOx Ranking /55	PM Ranking /55	NOx (% above average)	PM (% above average)	Sum of NOx & PM Ranking /55	Average Opacity Ranking /55	Average Opacity (% above average)
1152	1.8	296	2	1	82	244	1	3	138.5
1105	1.6	147	3	9	63	71	4	45	-49.8
1162	1.2	182	13	5	17	112	5	9	55.6
1026	0.9	195	25	3	-5	127	6	5	83.6
1239	1.0	147	19	8	3	72	10	11	53.4
1330	0.8	162	44	7	-23	89	11	2	139.2
941	1.0	104	21	15	0	21	15	15	36.6
1244	0.9	110	29	13	-9	28	17	8	62.3
960	1.5	54	4	35	46	-37	19	53	-77.3
1221	1.3	45	7	41	34	-48	26	26	-5.1
933	1.2	19	8	54	25	-78	40	49	-69.6
1454	0.7	55	45	34	-25	-36	43	21	8.2

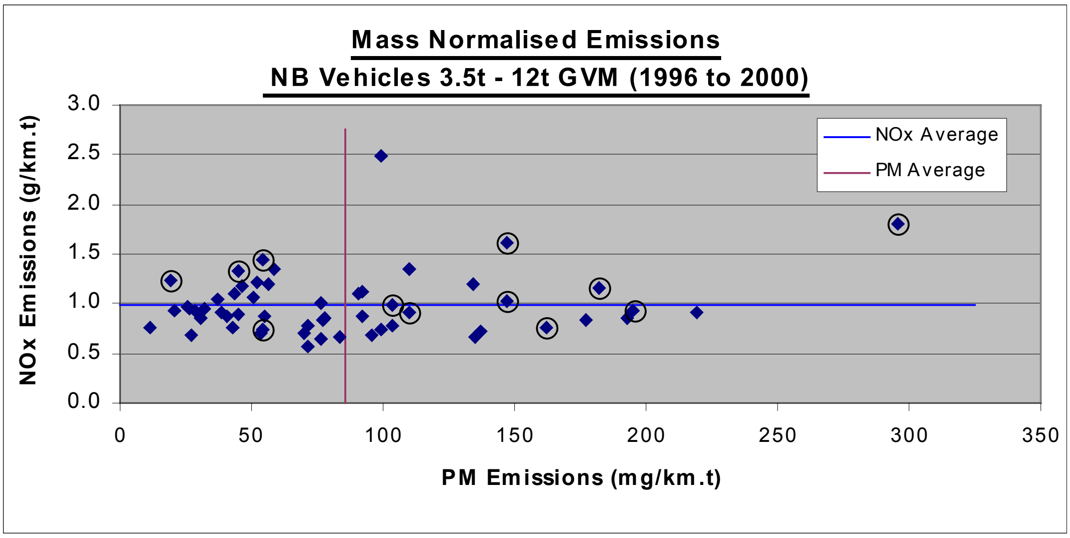


Figure A6-10

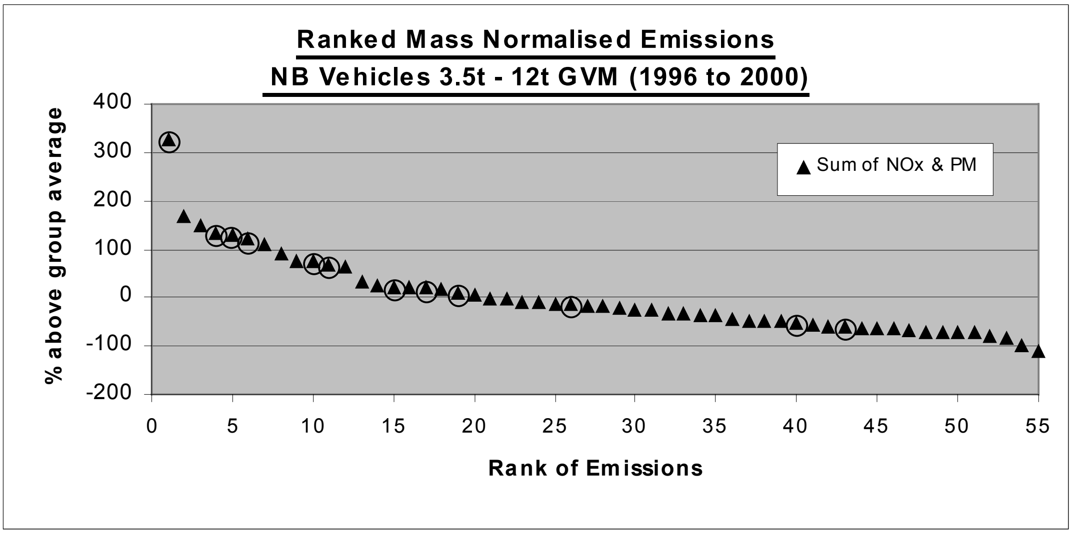


Figure A6-11

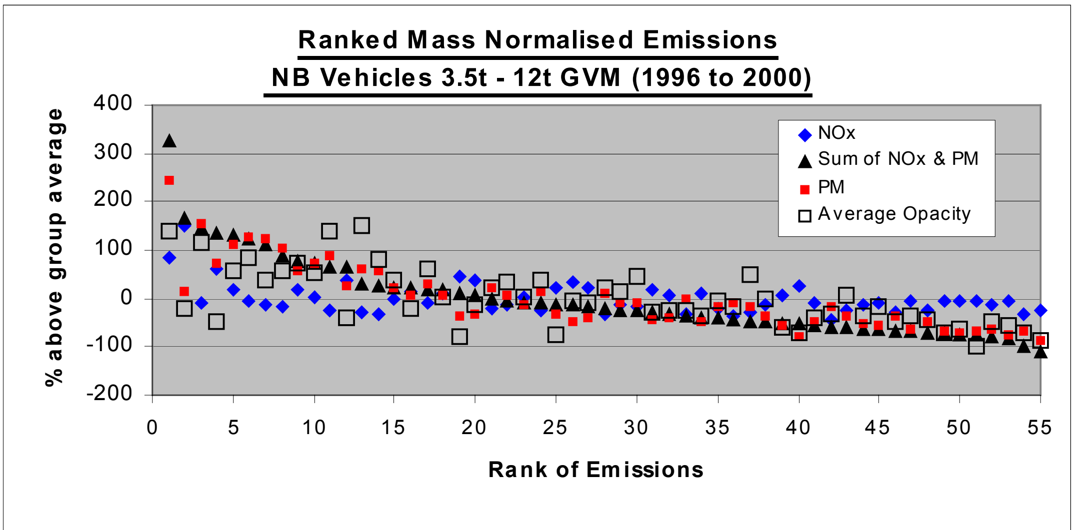


Figure A6-12

Table A6-5

Categories 7+8 Fault Diagnosis Selection

Test No	NOx (g/km.t)	PM (mg/km.t)	NOx Ranking /110	PM Ranking /110	NOx (% above average)	PM (% above average)	Sum of NOx & PM Ranking /110	Average Opacity Ranking /110	Average Opacity (% above average)
1411	2.5	121	1	5	137	108	1	39	10.5
1427	0.7	157	93	1	-37	169	4	1	176.9
1408	2.5	48	2	67	134	-18	6	93	-61.5
1413	1.8	73	7	30	72	26	9	49	-1.5
1138	1.9	66	5	39	76	13	10	84	-44.6
1255	1.5	88	18	20	37	51	11	54	-4.8
1234	2.2	36	3	84	110	-39	16	96	-63.8
1194	0.9	108	65	9	-16	86	17	22	54.2
1213	1.1	91	46	15	-2	56	23	19	61.9
1463	1.1	90	44	16	-1	55	24	9	78.6
1096	1.0	93	57	13	-10	60	27	46	3.4
1136	1.2	79	40	23	8	36	29	57	-8.1
1301	0.5	111	105	8	-50	91	30	28	40.7
1289	0.6	99	97	12	-39	70	33	12	75.9
1380	1.3	62	30	41	23	7	34	29	40.6
955	0.8	88	81	19	-30	51	38	16	63.6
1206	1.3	50	29	61	26	-13	41	69	-23.0
1409	1.3	50	31	63	22	-14	44	43	6.5
1391	1.2	50	36	62	12	-14	48	66	-18.6
1554	1.4	35	27	86	28	-41	58	53	-2.7
1436	1.2	44	39	75	9	-24	60	65	-18.2

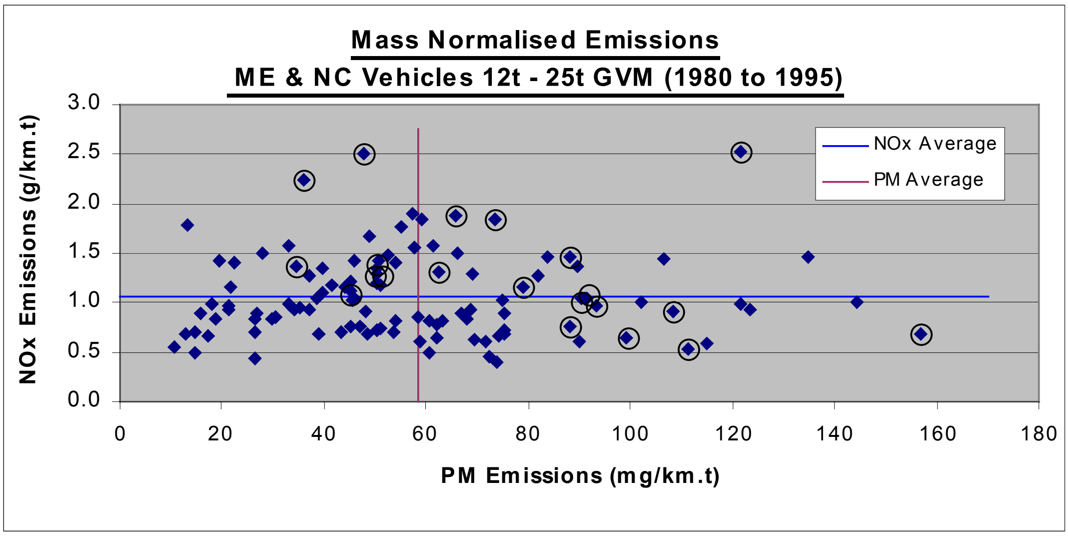


Figure A6-13

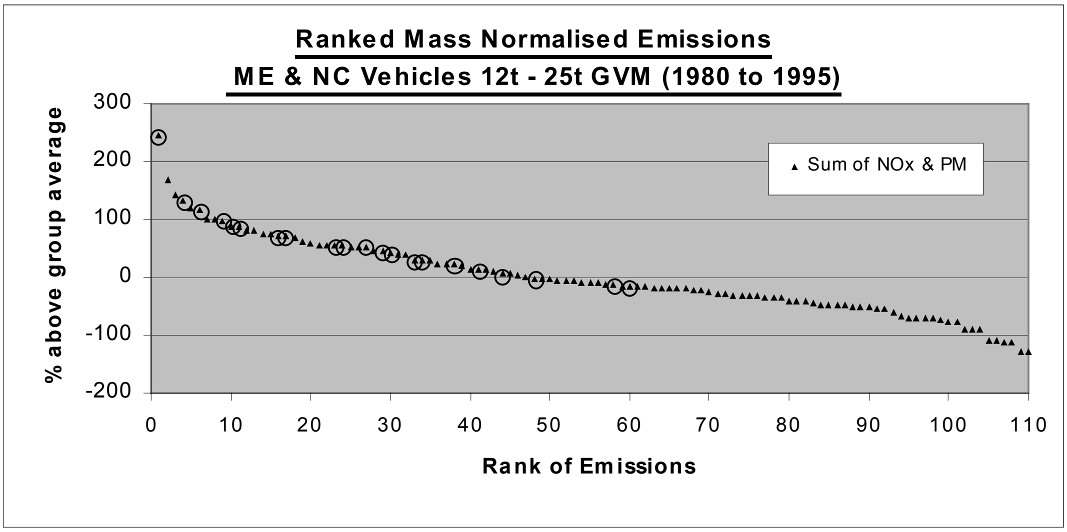


Figure A6-14

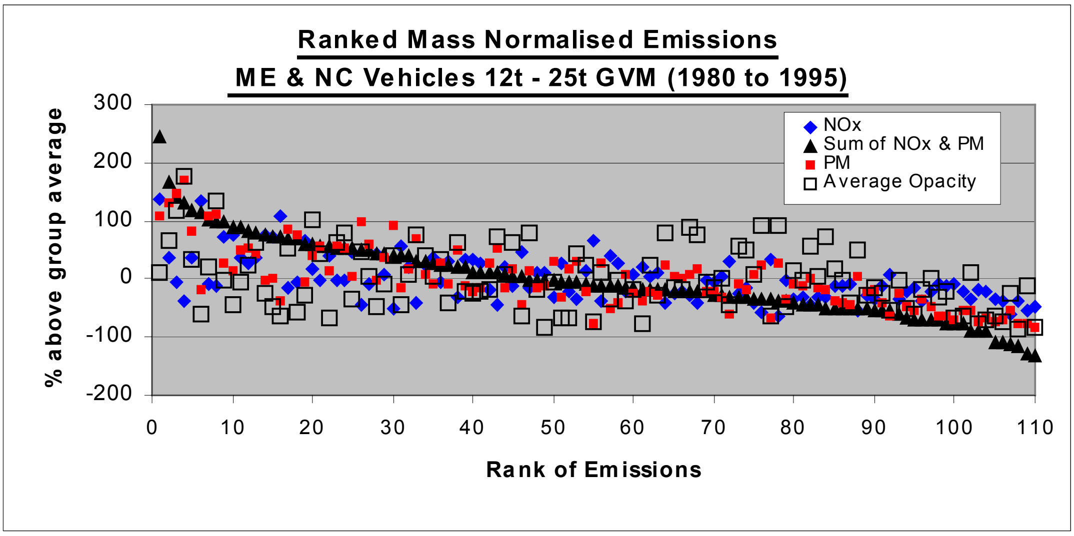


Figure A6-15

Category 9 Fault Diagnosis Selection

Test No	NOx (g/km.t)	PM (mg/km.t)	NOx Ranking /55	PM Ranking /55	NOx (% above average)	PM (% above average)	Sum of NOx & PM Ranking /55	Average Opacity Ranking /55	Average Opacity (% above average)
1123	1.0	70	8	1	20	148	1	20	-8.6
1115	0.9	61	18	4	8	115	3	6	79.3
1124	0.7	65	41	3	-13	133	4	11	54.4
956	0.7	57	45	6	-14	103	6	10	56.5
1008	0.9	43	13	10	13	52	7	13	49.9
972	0.9	38	9	13	16	36	9	4	104.6
1133	1.1	24	2	26	40	-14	18	50	-57.2
1210	0.7	40	47	12	-17	41	19	44	-43.9
1193	0.5	43	55	9	-33	53	21	37	-35.2
1323	0.8	29	25	24	1	5	26	31	-23.4
1660	1.1	15	3	43	33	-48	29	42	-42.2
1703	0.9	16	10	39	15	-44	31	45	-44.1

Table A6-6

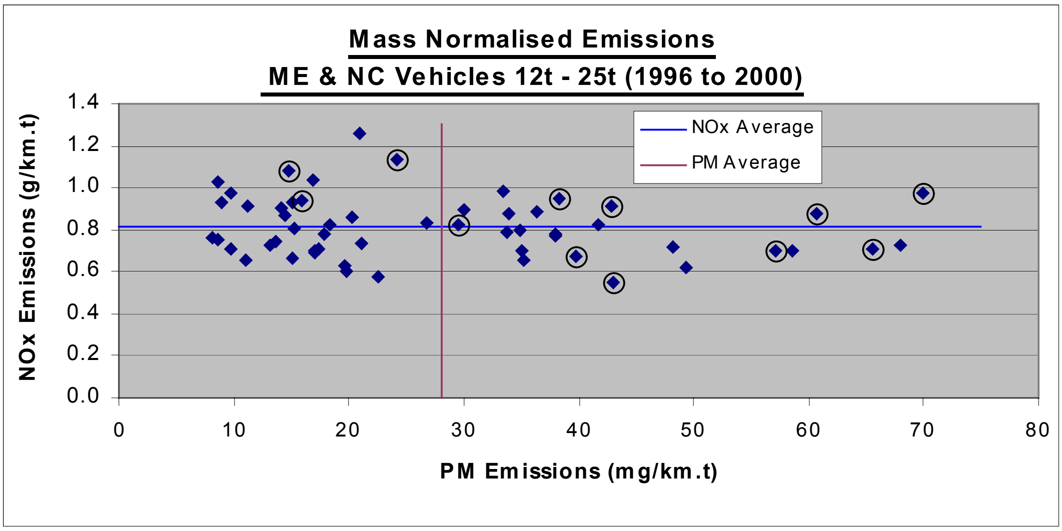


Figure A6-16

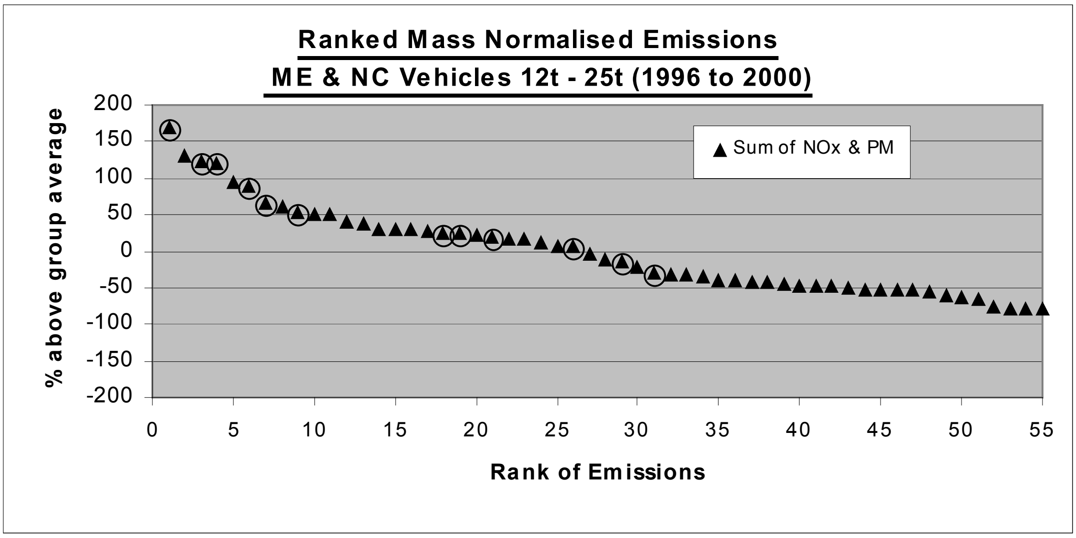


Figure A6-17

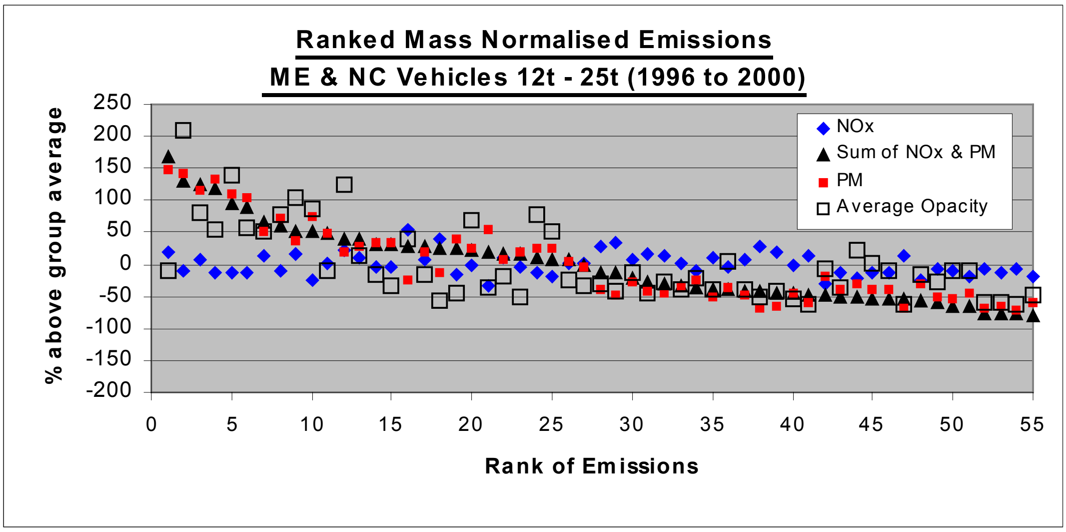


Figure A6-18

Categories 10+11 Fault Diagnosis Selection

Test No	NOx (g/km.t)	PM (mg/km.t)	NOx Ranking /80	PM Ranking /80	NOx (% above average)	PM (% above average)	Sum of NOx & PM Ranking /80	Average Opacity Ranking /80	Average Opacity (% above average)
1676	0.6	68	58	2	-16	189	2	2	163.0
1513	0.5	71	68	1	-28	199	3	1	335.0
1487	0.7	59	56	3	-12	147	5	3	137.3
1677	0.6	55	57	5	-15	132	7	9	68.1
1362	0.9	42	12	9	26	76	9	20	32.1
1685	1.3	18	1	45	81	-23	13	47	-17.7
1540	0.5	38	71	15	-33	60	17	4	119.5
1355	0.6	33	67	16	-24	38	25	8	76.5
1073	0.7	27	52	29	-8	12	29	36	4.0
1771	0.6	28	61	22	-20	18	34	10	56.4
1545	0.6	27	62	28	-21	14	37	54	-29.4
1544	0.8	18	25	47	13	-25	40	51	-25.7
1686	0.5	29	72	20	-34	22	41	28	12.5

Table A6-7

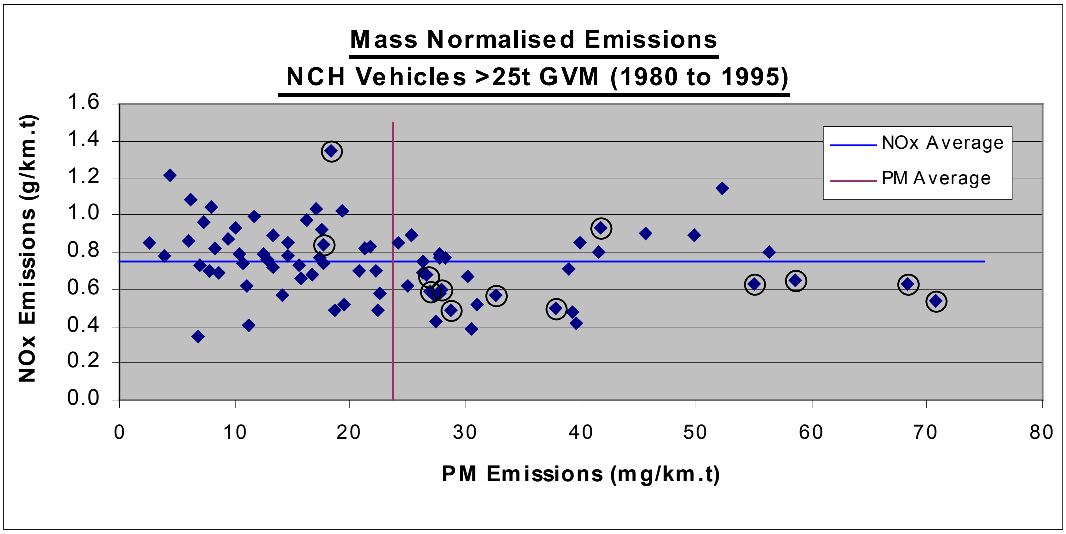


Figure A6-19

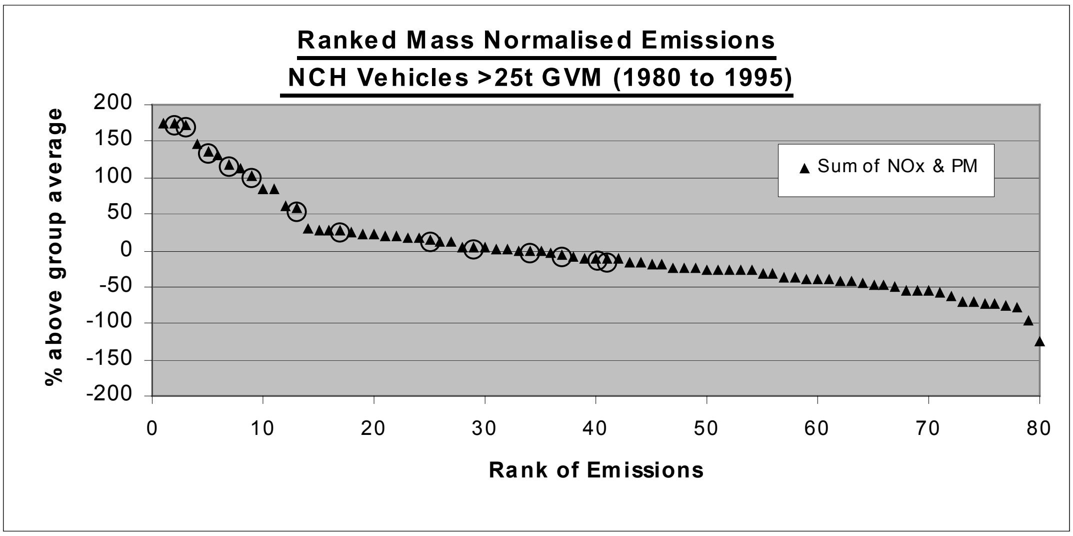


Figure A6-20

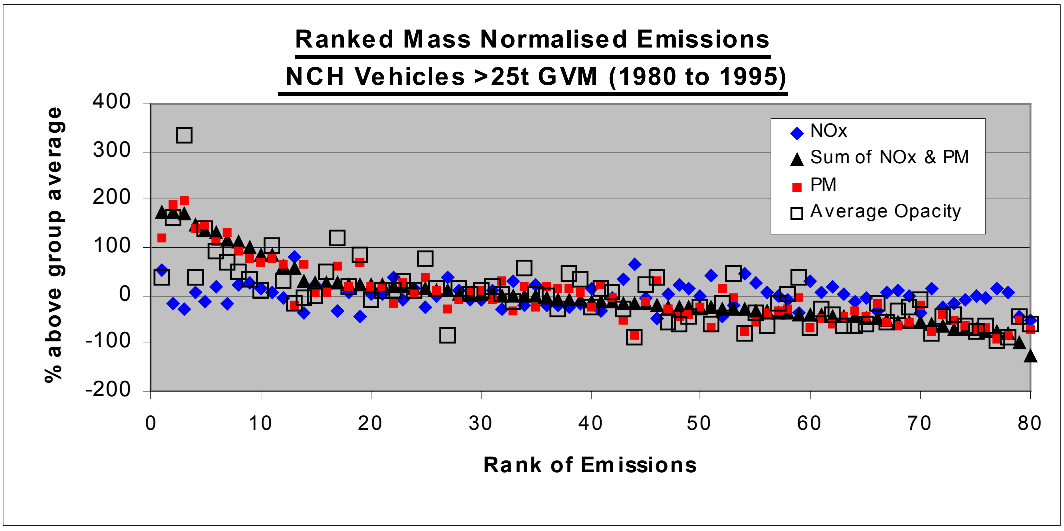


Figure A6-21

Category 12 Fault Diagnosis Selection

Test No	NOx (g/km.t)	PM (mg/km.t)	NOx Ranking /40	PM Ranking /40	NOx (% above average)	PM (% above average)	Sum of NOx & PM Ranking /40	Average Opacity Ranking /40	Average Opacity (% above average)
1546	0.9	37	3	2	60	230	1	1	287.1
940	0.7	38	10	1	26	243	2	7	60.2
1826	0.4	23	32	5	-24	110	5	4	128.7
1790	1.2	5	1	37	112	-56	9	37	-69.8
1511	0.5	15	17	8	-7	39	13	10	19.3
1517	0.8	7	6	26	39	-40	15	30	-48.3
1505	0.8	6	8	28	35	-42	16	24	-37.8

Table A6-8

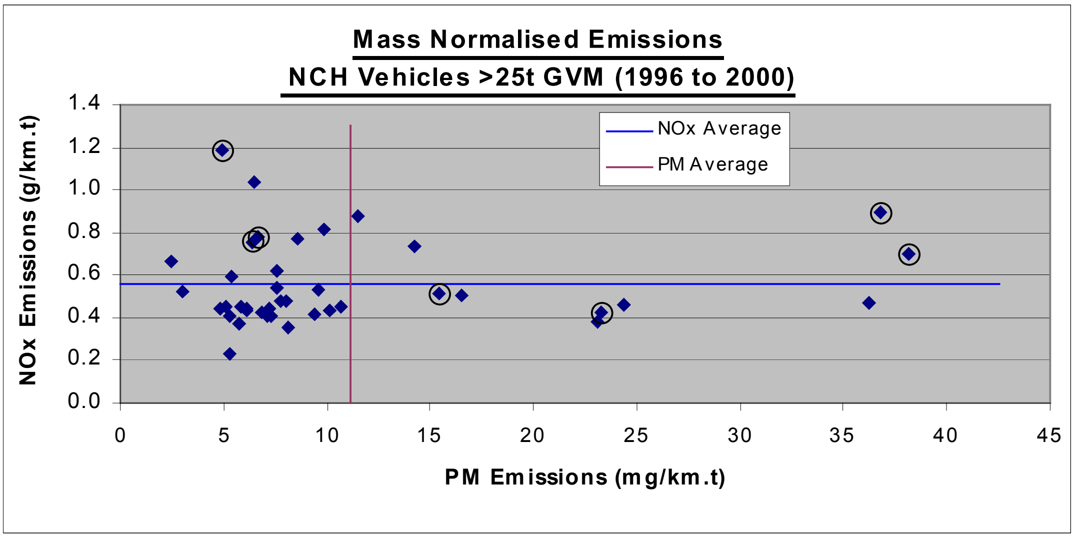


Figure A6-22

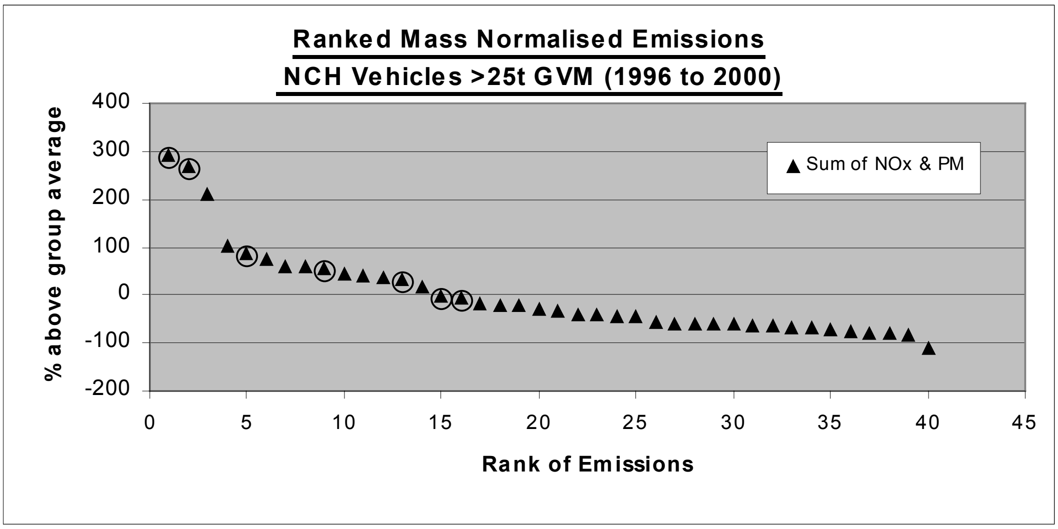


Figure A6-23

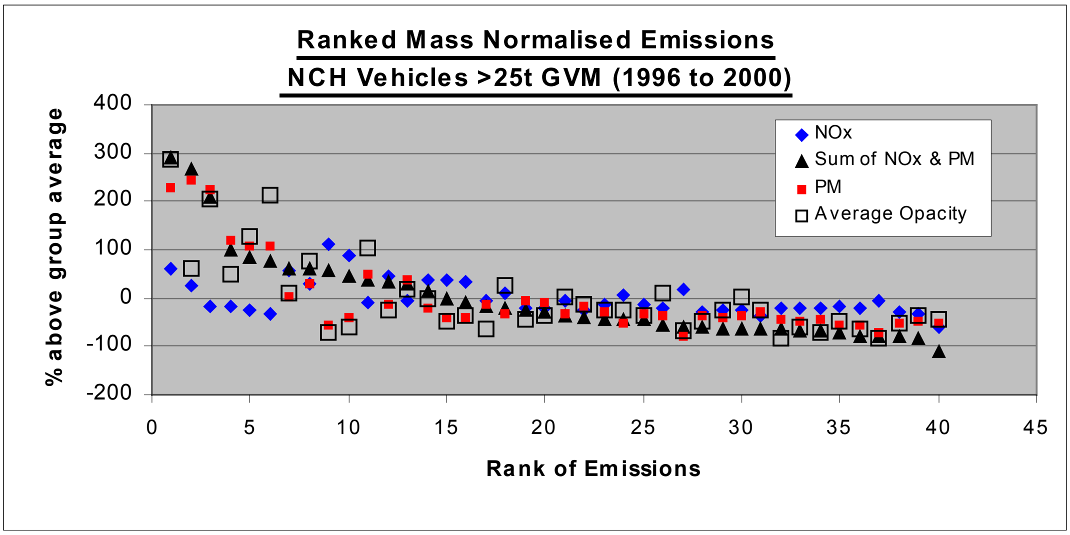


Figure A6-24

Appendix 7

MINOR REPAIR RESULTS

Table A7-1

Category 1 + 2 Minor Repair Results

		Before Repair				After Repair					
Original Test No	Rank	NOx (g/km.t)	PM (mg/km.t)	Average Opacity (%)	Vehicle Condition	NOx (g/km.t)	PM (mg/km.t)	Average Opacity (%)	Vehicle Condition	Total Cost ($)	Repair Time (hours)
1338	6	1.1	484	13	3	1.6	330	16	2	$2,619	18
1717	12	0.7	470	27	3	1.2	385	23	2	$2,007	18
1755	13	1.1	352	27	3	1.3	117	21	2.5	$772	6
1744	18	1.0	330	21	3	0.8	367	25	3	$169	1
1592	21	0.6	404	37	4	0.8	219	22	3	$2,600	19
1711	26	0.9	298	21	3	0.8	141	17	2	$596	5
1495	31	0.7	322	24	2	1.0	169	21	2	$350	4
1341	35	0.9	262	15	3	0.9	57	5	2	$1,797	18
1594	39	0.6	287	24	2	0.8	28	4	2	$414	4
1453	44	0.8	214	16	2	0.5	208	16	1.5	$414	4
1572	52	1.1	150	9	2	1.0	178	13	2	$757	6
976	55	0.8	206	12	2	1.0	140	16	2	$518	5
Average		**0.8**	**315**	**20**	**2.7**	**1.0**	**195**	**17**	**2.2**	**$1,084**	**9**

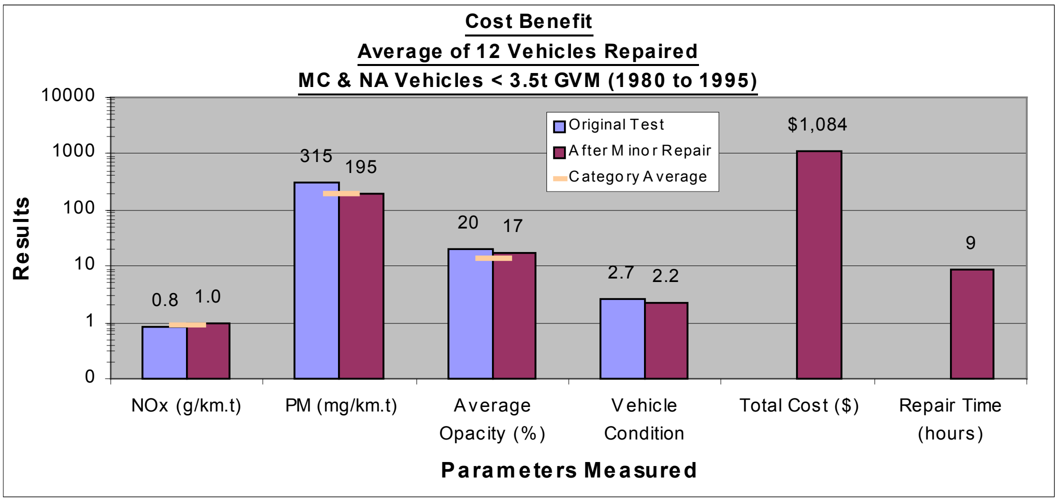


Figure A7-1

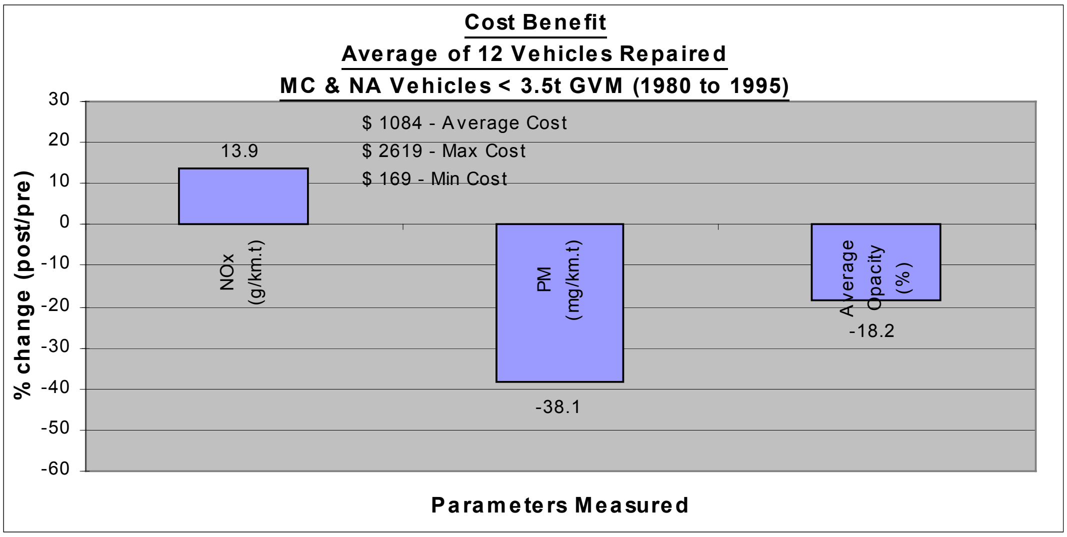


Figure A7-2

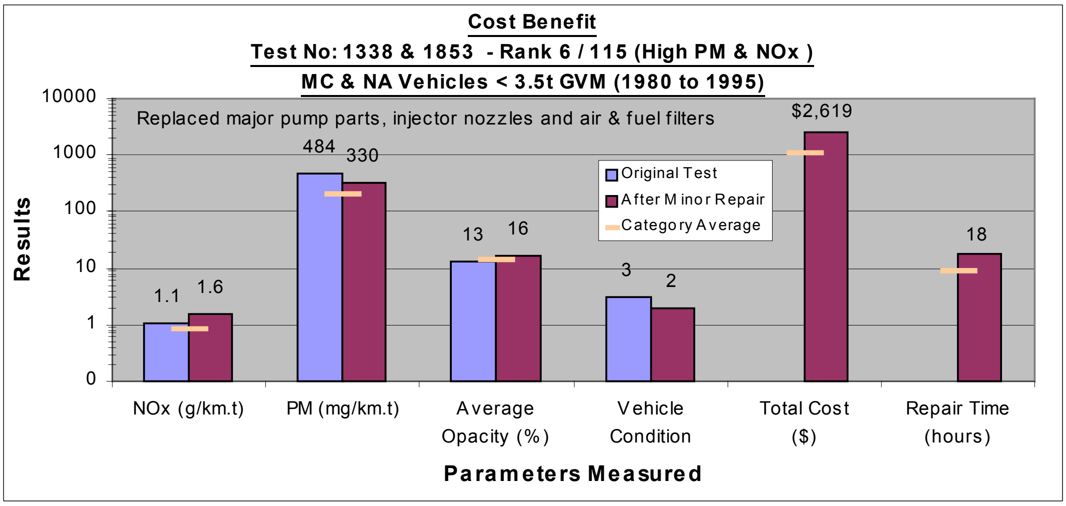


Figure A7-3

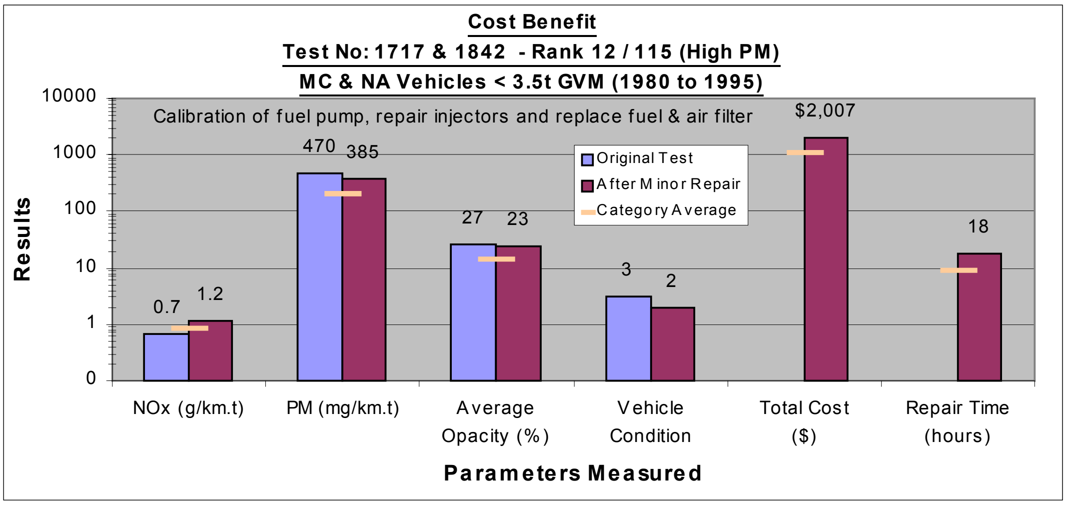


Figure A7-4

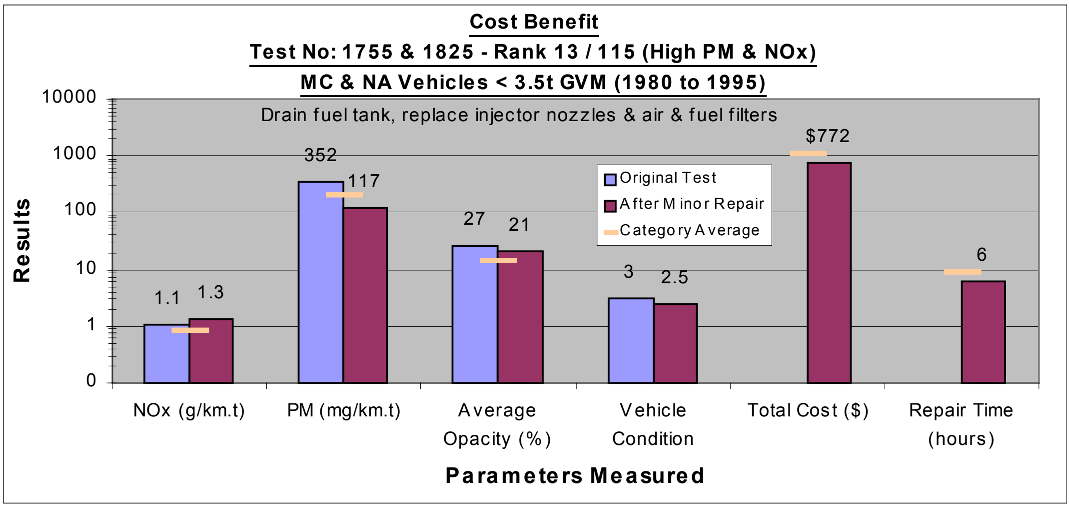


Figure A7-5

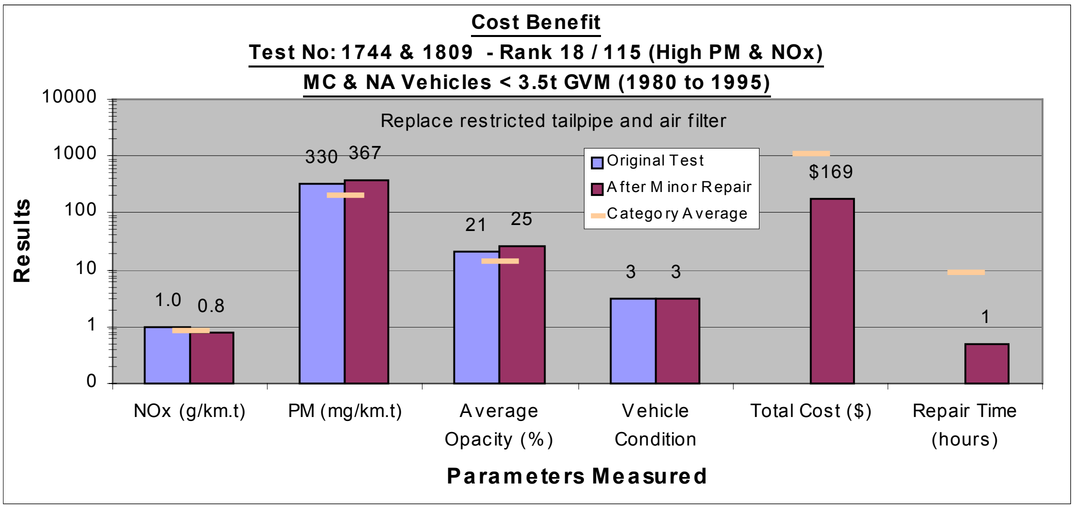


Figure A7-6

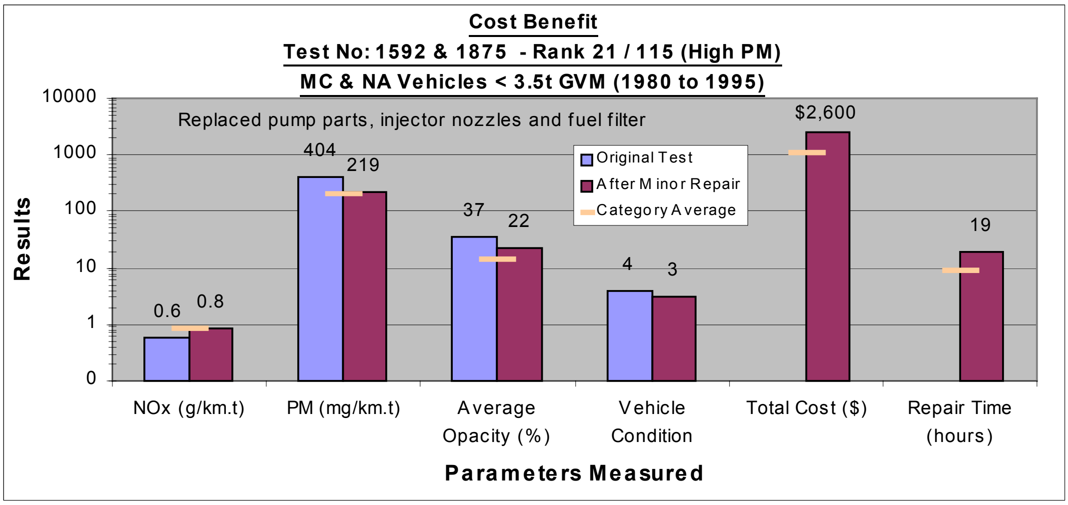


Figure A7-7

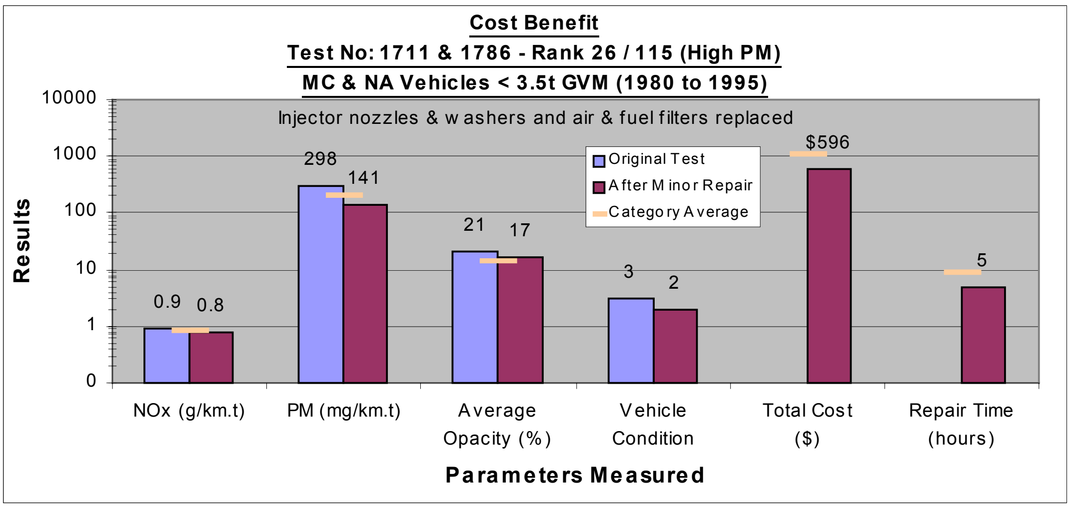


Figure A7-8

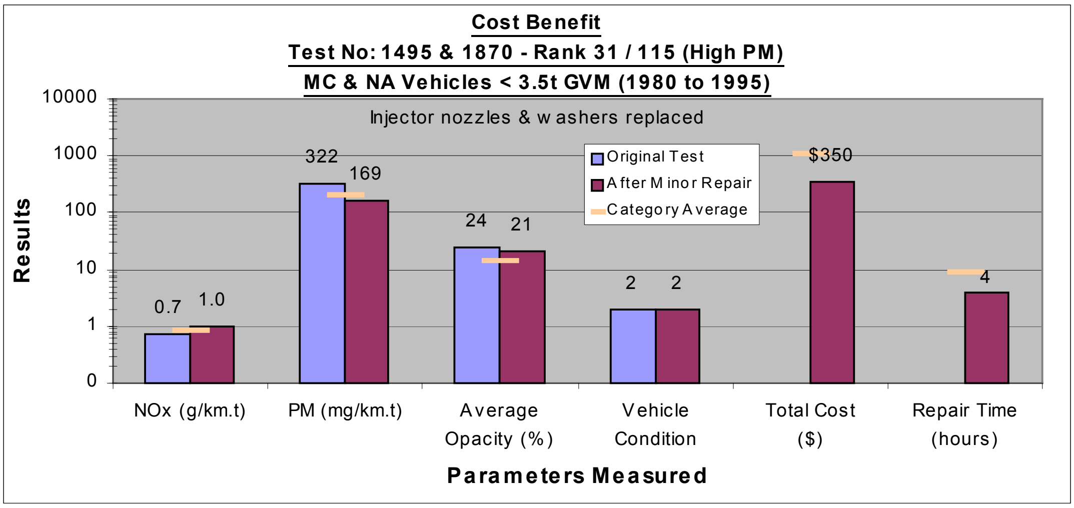


Figure A7-9

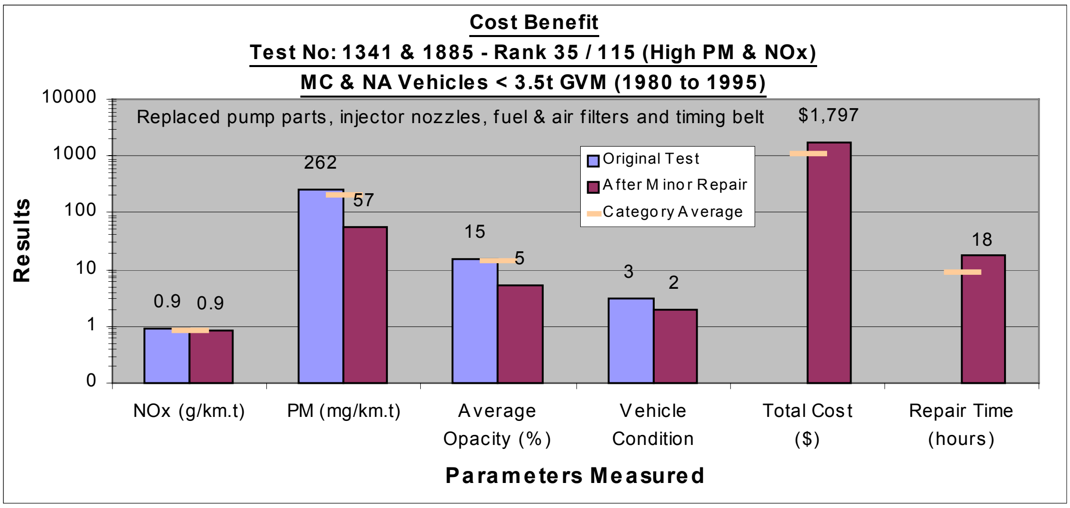


Figure A7-10

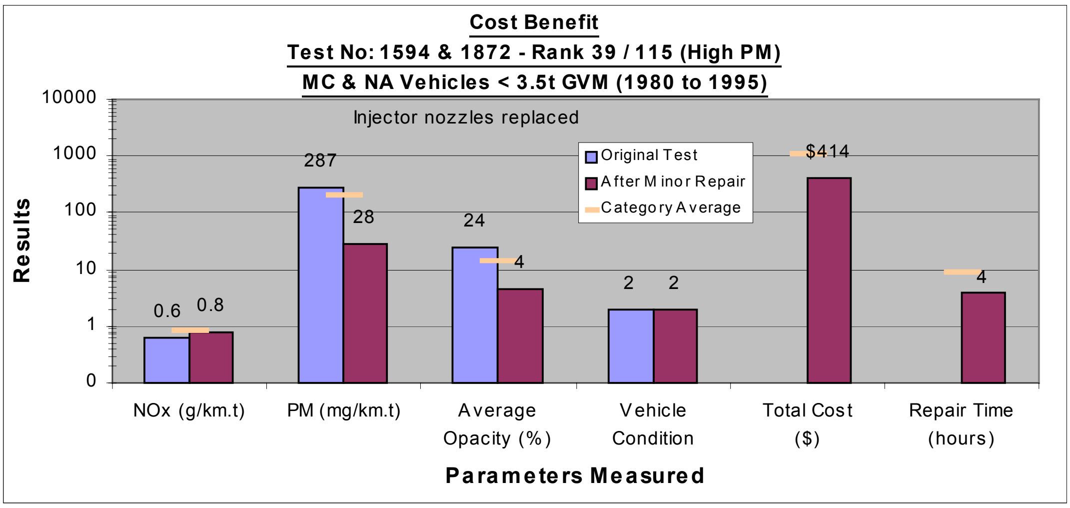


Figure A7-11

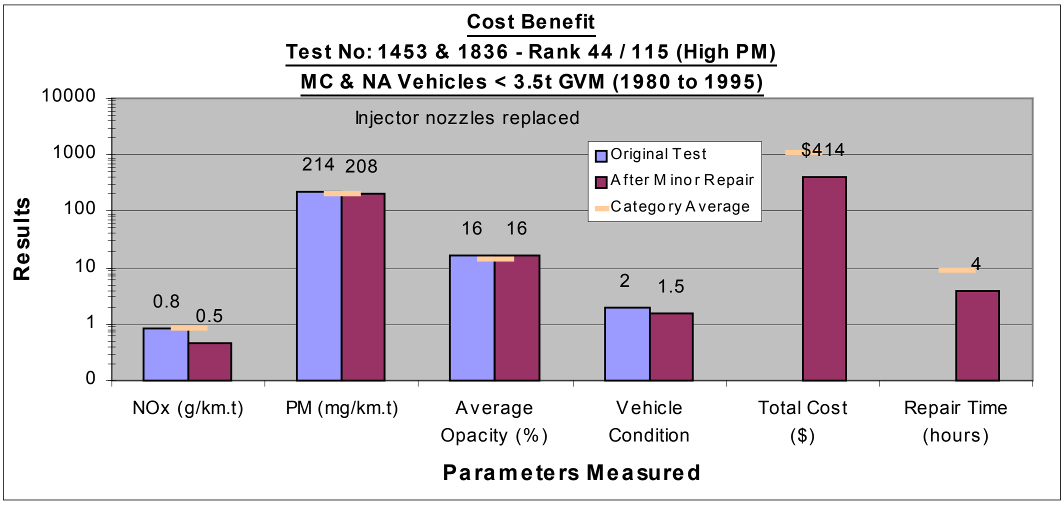


Figure A7-12

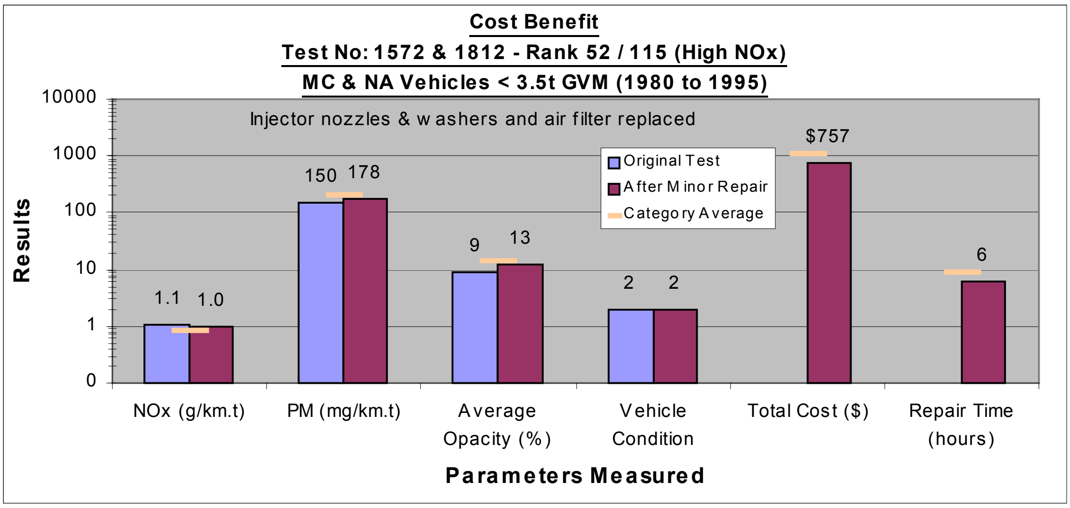


Figure A7-13

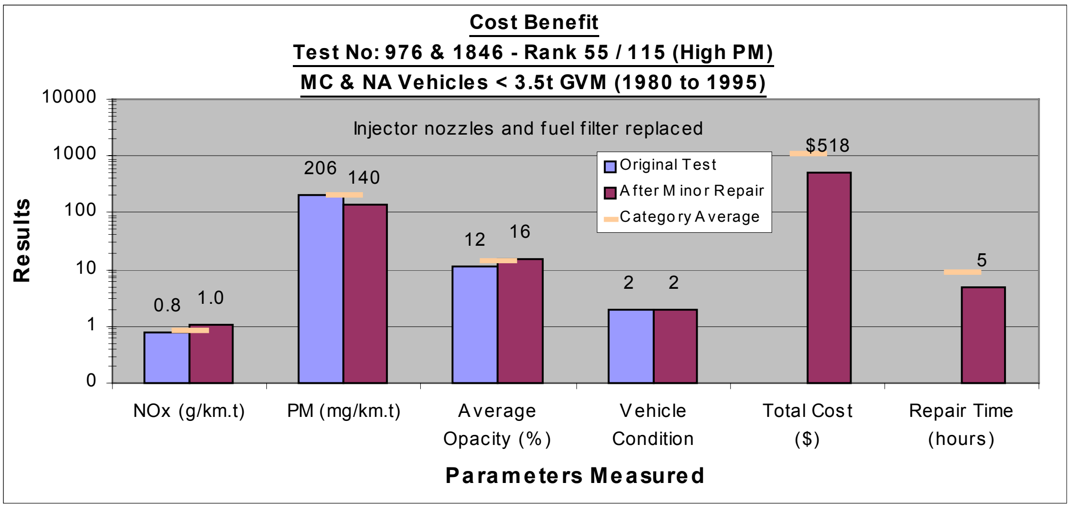


Figure A7-14

Table A7-2

Category 3 Minor Repair Results

		Before Repair				After Repair					
Original Test No	Rank	NOx (g/km.t)	PM (mg/km.t)	Average Opacity (%)	Vehicle Condition	NOx (g/km.t)	PM (mg/km.t)	Average Opacity (%)	Vehicle Condition	Total Cost ($)	Repair Time (hours)
1757	3	0.9	309	21	2	0.9	191	21	1.5	$132	1
1590	9	0.9	250	18	3	1.2	287	20	2.5	$1,431	13
Average		**0.9**	**279**	**19**	**2.5**	**1.1**	**239**	**21**	**2.0**	**$782**	**7**

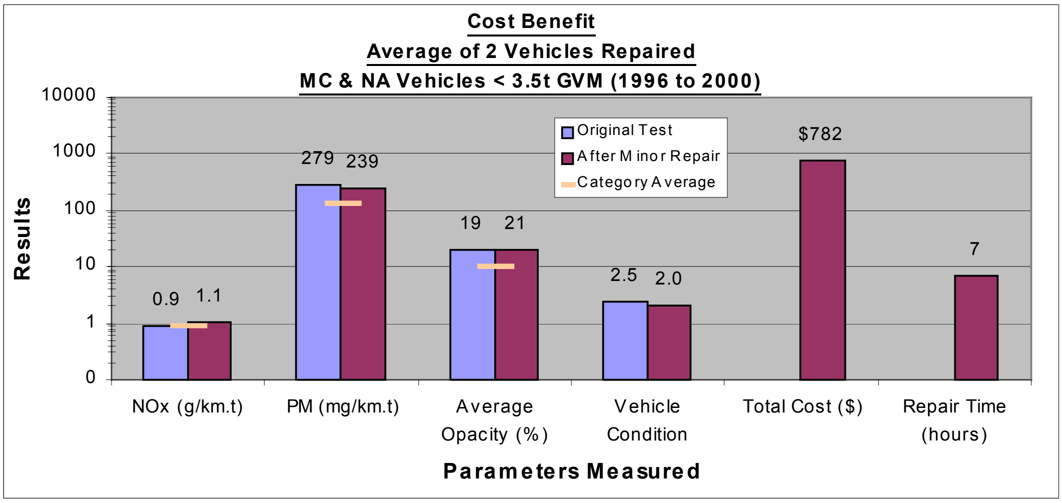


Figure A7-15

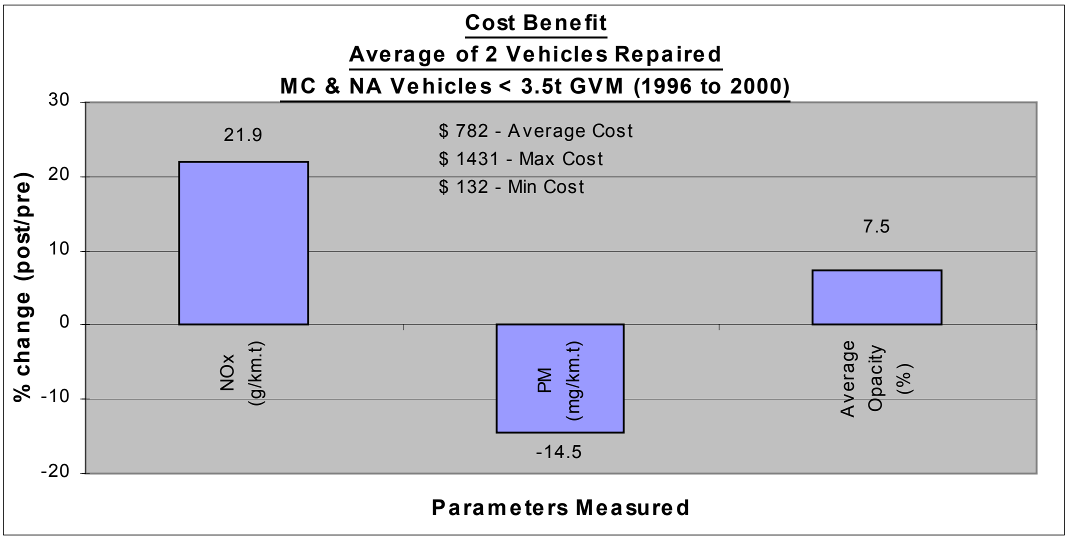


Figure A7-16

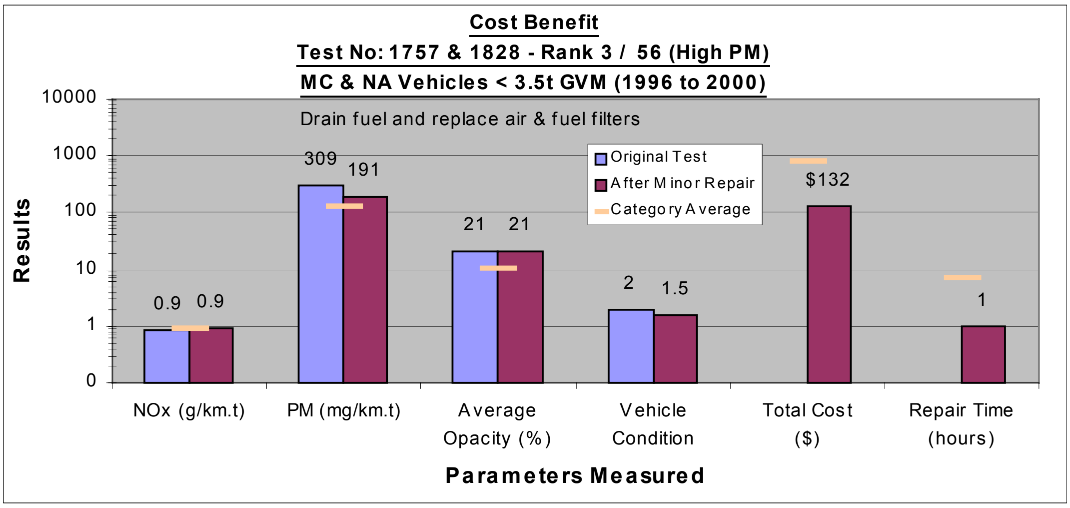


Figure A7-17

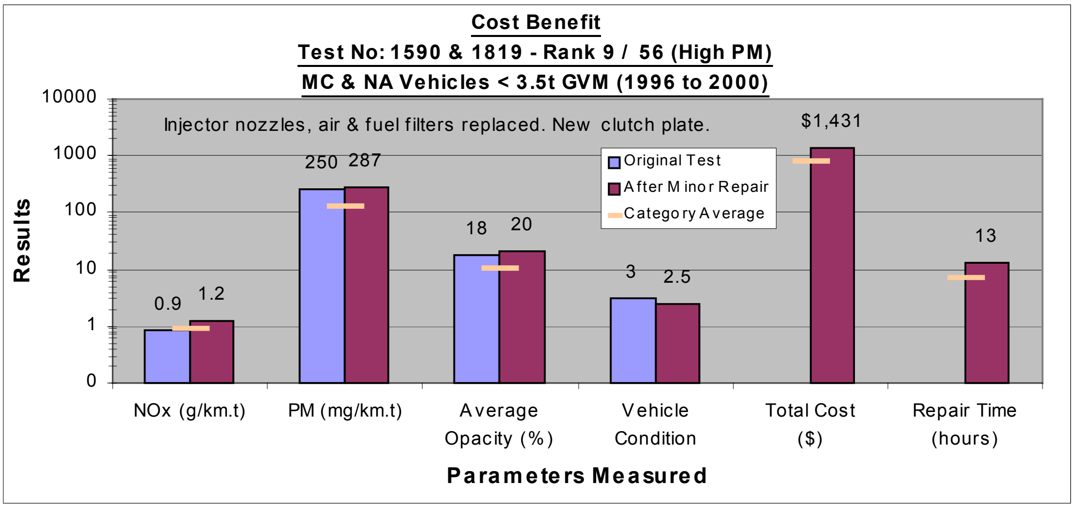


Figure A7-18

Table A7-3

Category 4 + 5 Minor Repair Results

		Before Repair				After Repair					
Original Test No	Rank	NOx (g/km.t)	PM (mg/km.t)	Average Opacity (%)	Vehicle Condition	NOx (g/km.t)	PM (mg/km.t)	Average Opacity (%)	Vehicle Condition	Total Cost ($)	Repair Time (hours)
1092	5	1.2	406	43	3	1.9	203	26	2	$945	7
1437	6	0.7	470	41	3	0.8	213	36	2	$890	6
1019	10	0.9	293	23	3	0.8	115	21	2	$770	5
958	12	1.6	168	13	3	1.3	93	17	2.5	$977	6
1086	15	1.1	202	12	3	1.4	179	18	2	$1,846	17
1080	18	1.1	189	14	2	1.3	107	11	2	$975	6
1028	21	1.1	181	12	3	1.0	91	15	2	$284	2
1439	32	1.5	86	9	3	1.3	73	15	3	$223	2
1085	38	1.0	140	14	2	0.8	93	16	2	$1,083	13
911	52	0.8	147	22	2	0.9	79	19	2	$987	5
1269	53	1.0	113	17	3	1.0	61	15	2.5	$816	7
1615	66	0.8	120	17	3	0.9	69	13	2.5	$878	10
Average		**1.1**	**210**	**20**	**2.8**	**1.1**	**115**	**18**	**2.2**	**$890**	**7**

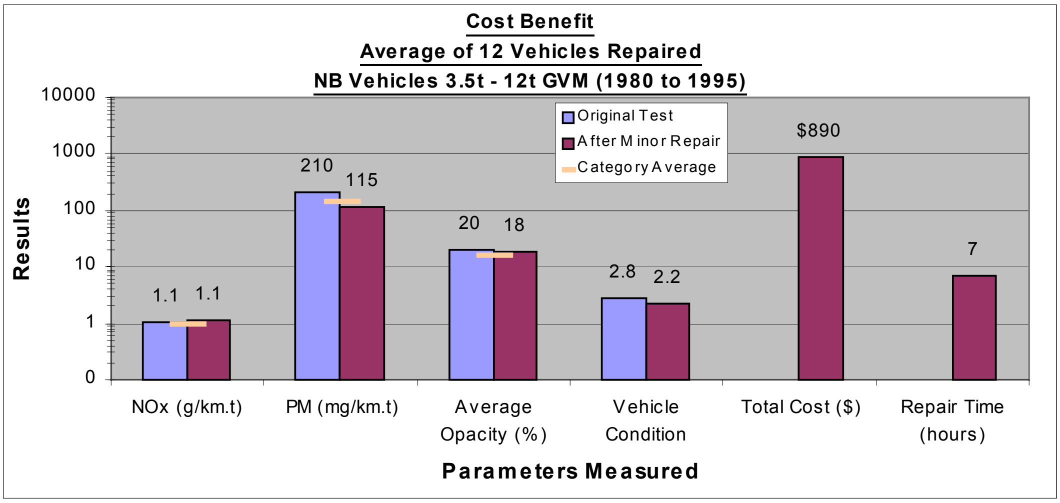


Figure A7-19

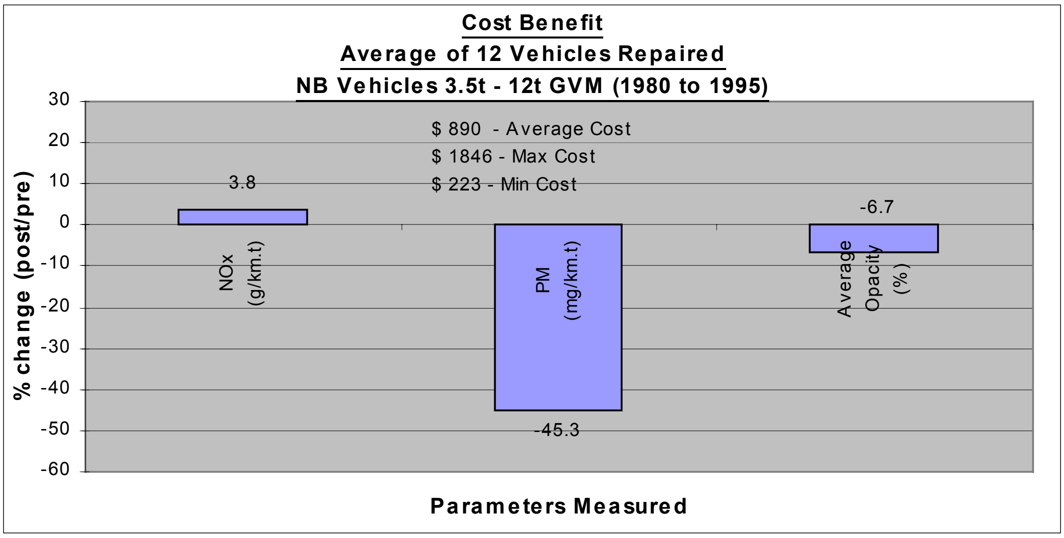


Figure A7-20

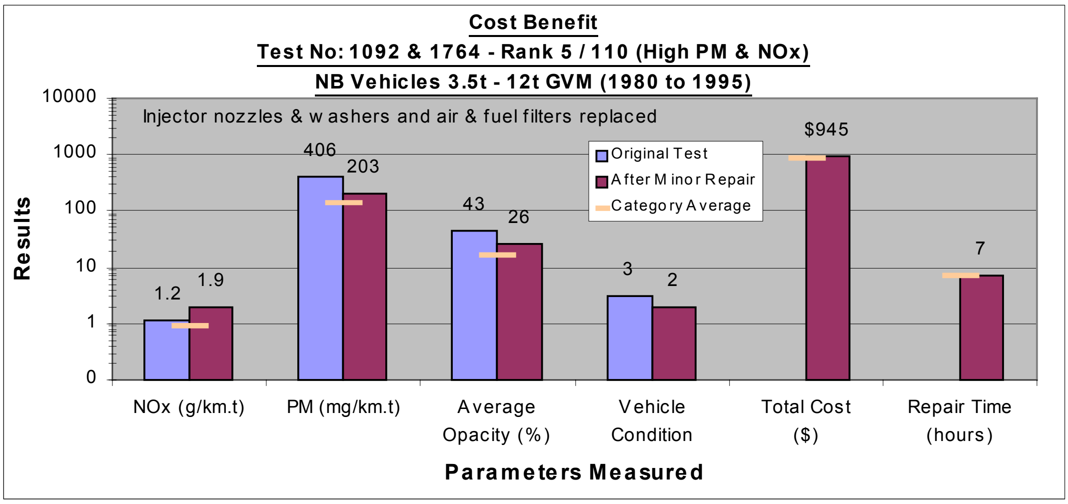


Figure A7-21

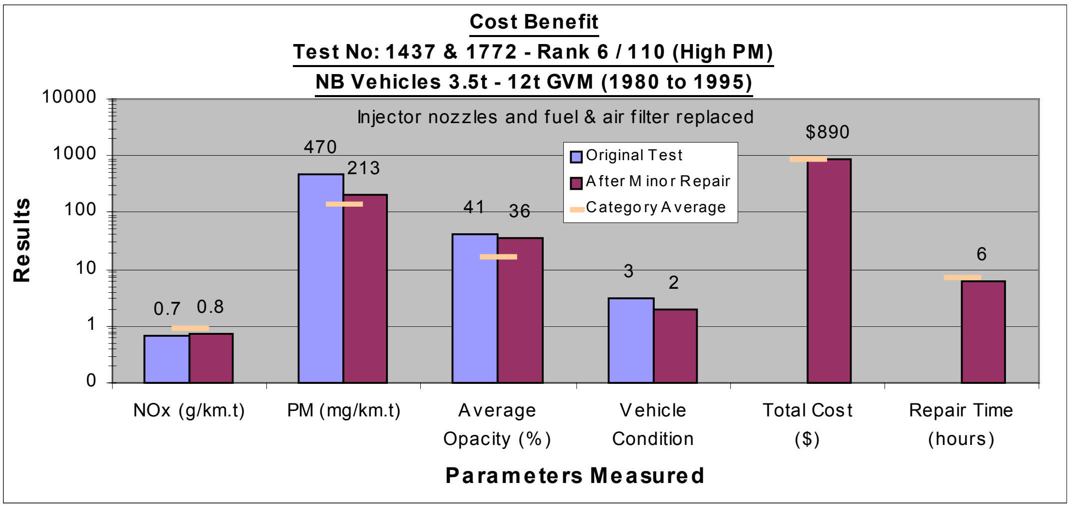


Figure A7-22

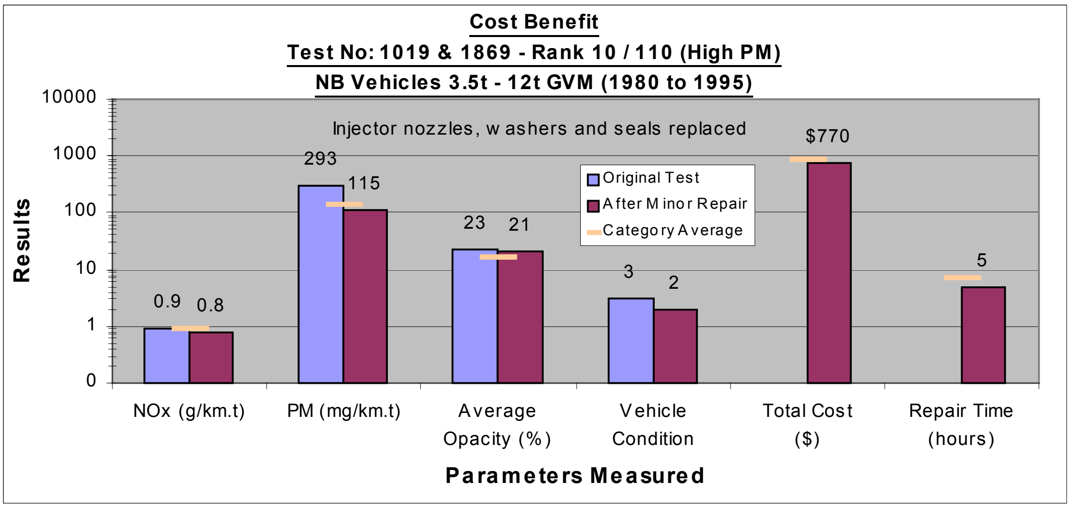


Figure A7-23

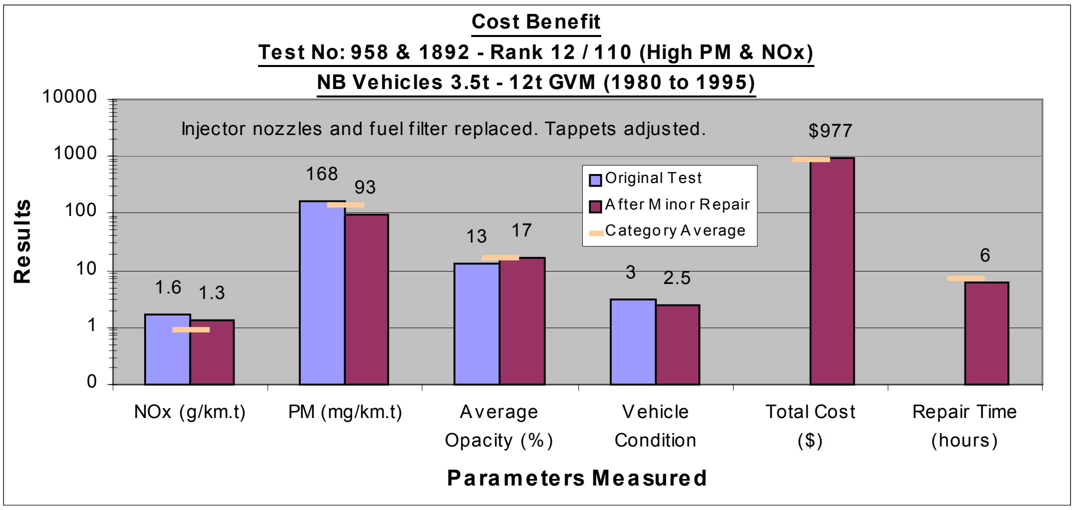


Figure A7-24

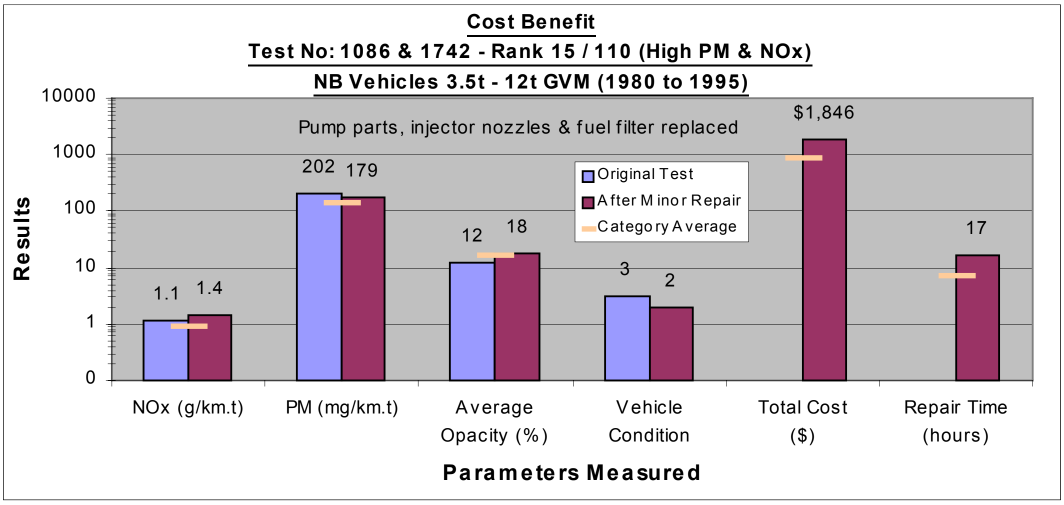


Figure A7-25

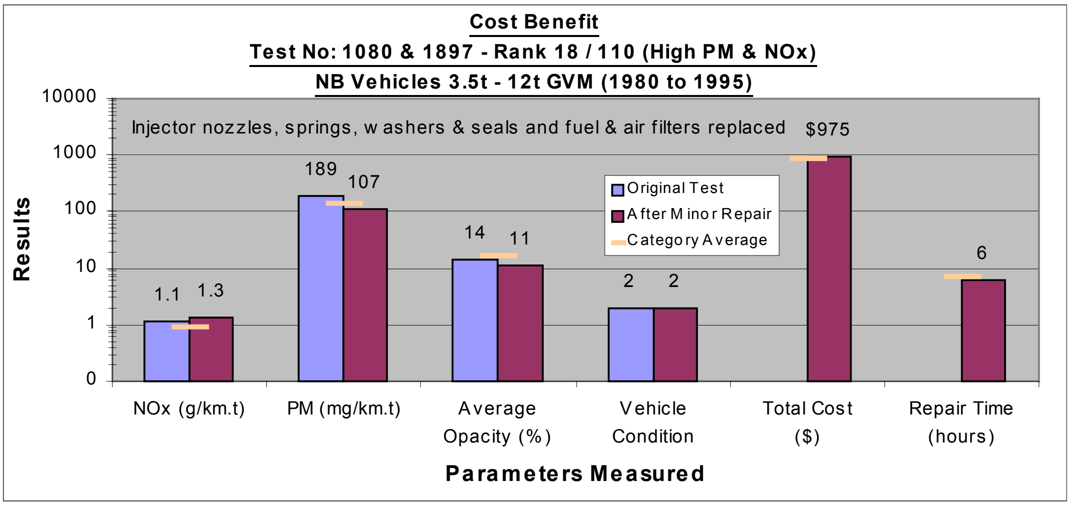


Figure A7-26

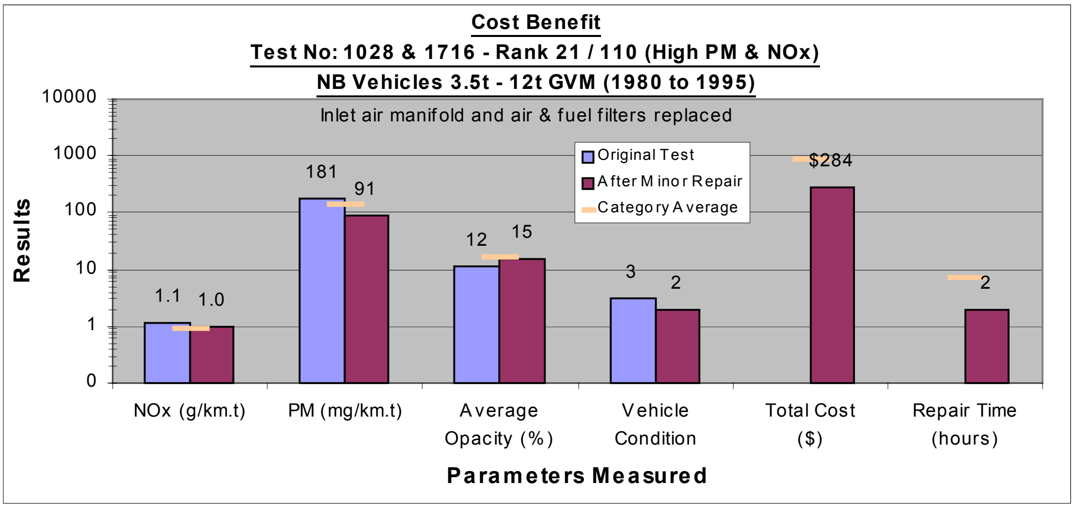


Figure A7-27

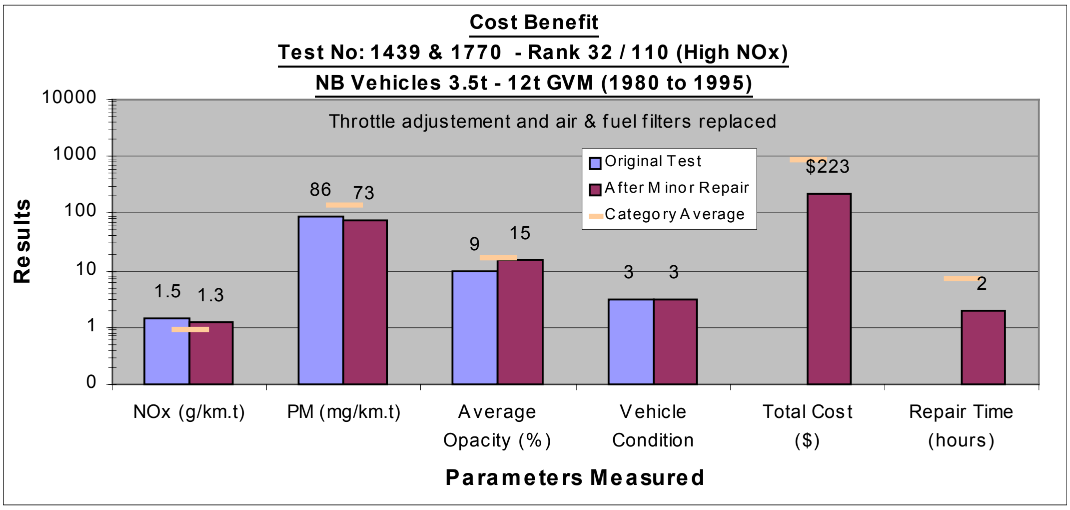


Figure A7-28

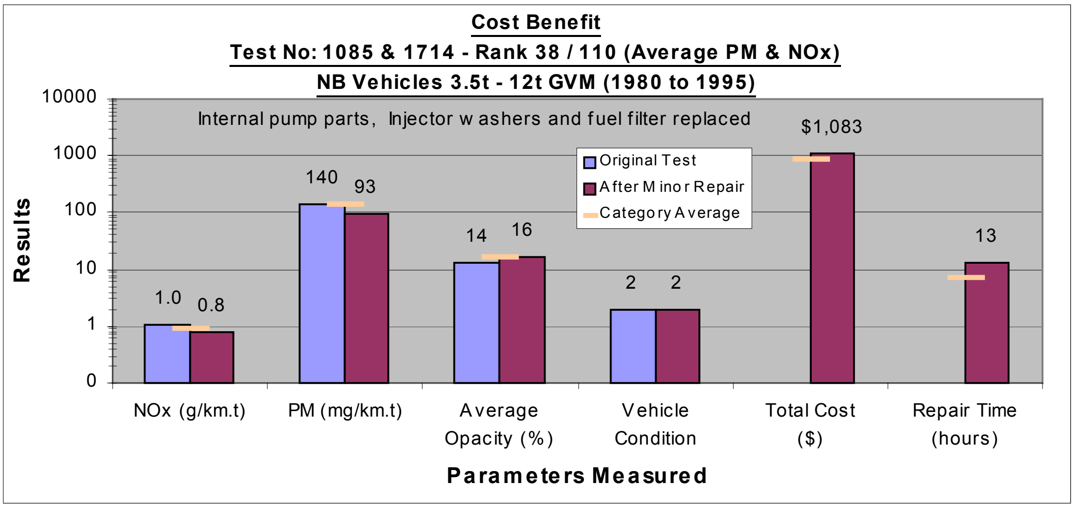


Figure A7-29

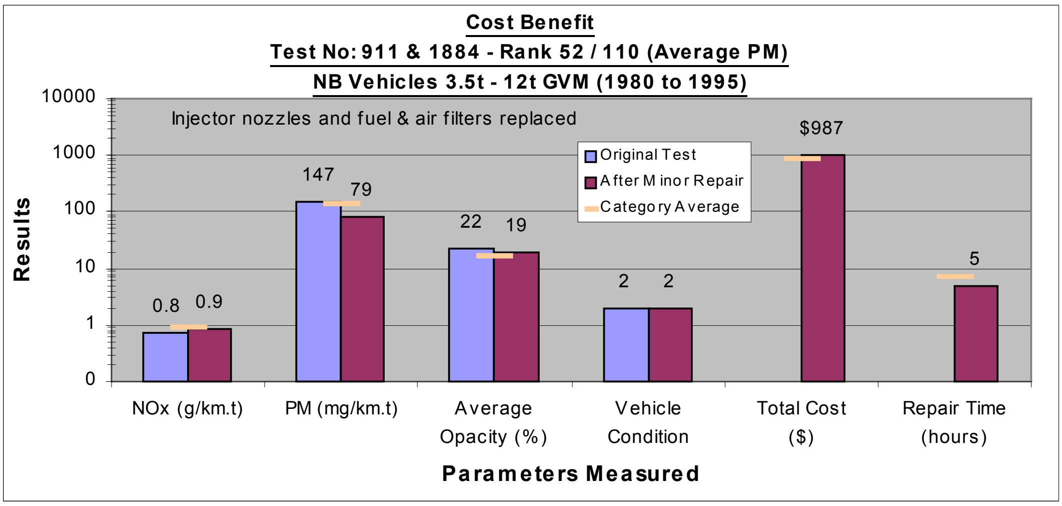


Figure A7-30

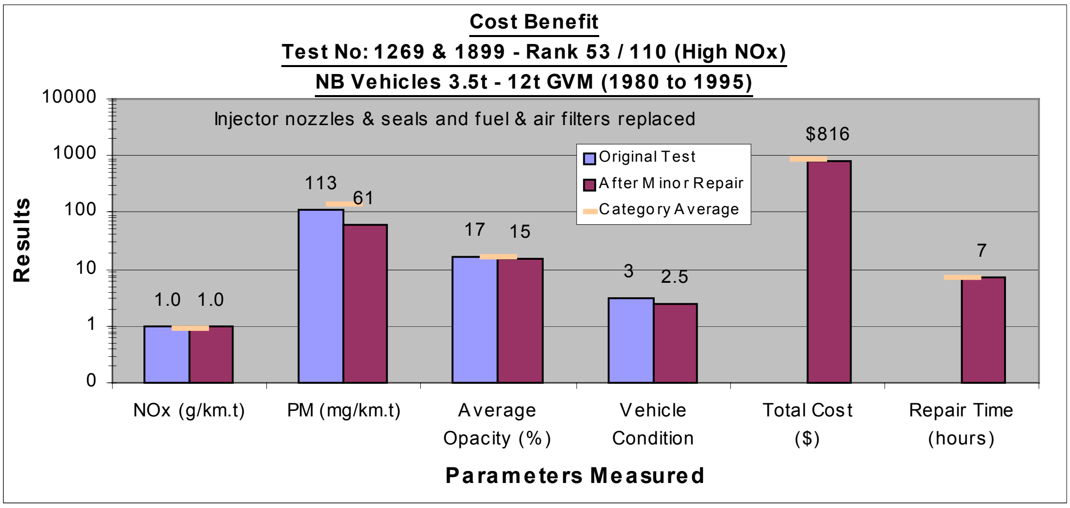


Figure A7-31

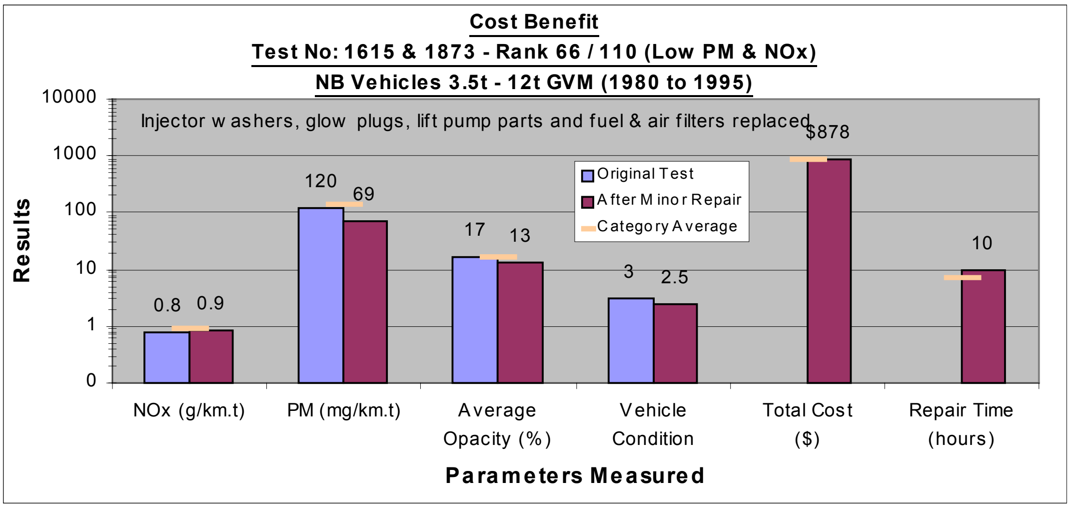


Figure A7-32

Table A7-4
Category 6 Minor Repair Results

		Before Repair				After Repair					
Original Test No	Rank	NOx (g/km.t)	PM (mg/km.t)	Average Opacity (%)	Vehicle Condition	NOx (g/km.t)	PM (mg/km.t)	Average Opacity (%)	Vehicle Condition	Total Cost ($)	Repair Time (hours)
1152	1	1.8	296	26	2	1.8	67	12	1	$1,089	15
1105	4	1.6	147	5	3	1.7	25	0	2	$134	1
1162	5	1.2	182	17	3	1.2	118	13	2	$98	1
1026	6	0.9	195	20	1	0.7	150	18	1	$963	14
1239	10	1.0	147	16	3	1.3	61	12	2	$407	4
941	15	1.0	104	15	2	1.2	42	11	2	$1,171	6
Average		**1.3**	**179**	**16**	**2.3**	**1.3**	**77**	**11**	**1.7**	**$644**	**7**

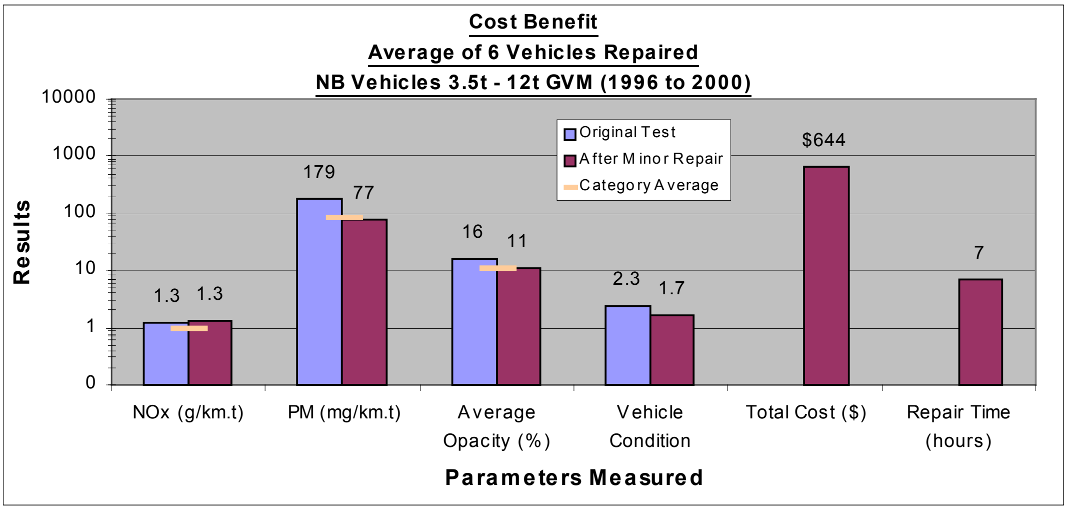


Figure A7-33

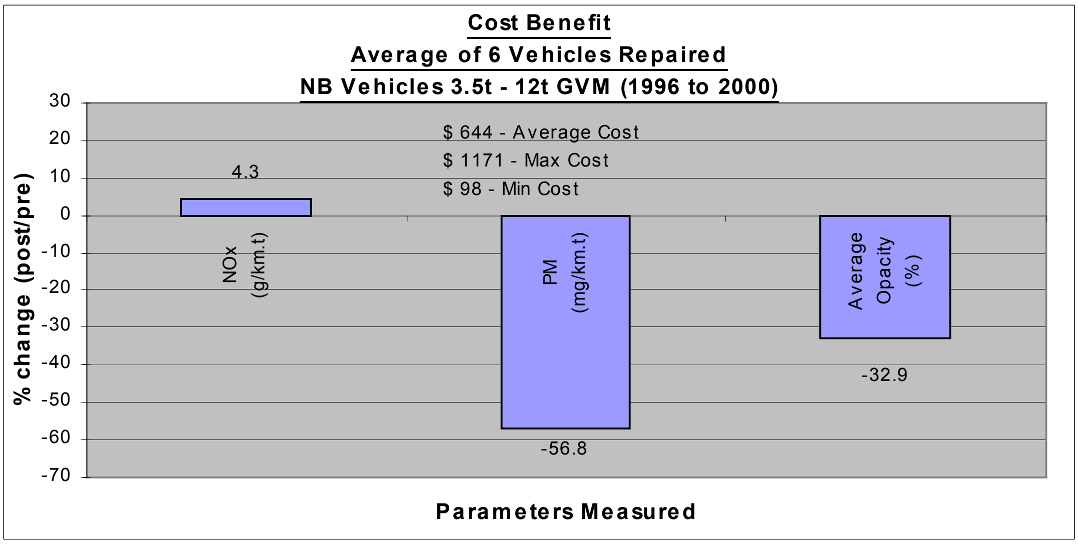


Figure A7-34

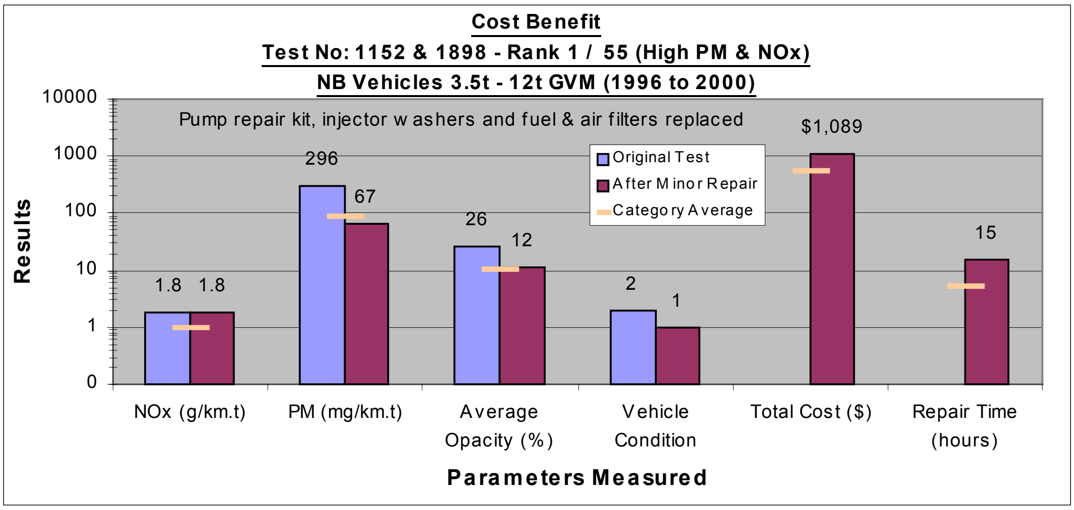


Figure A7-35

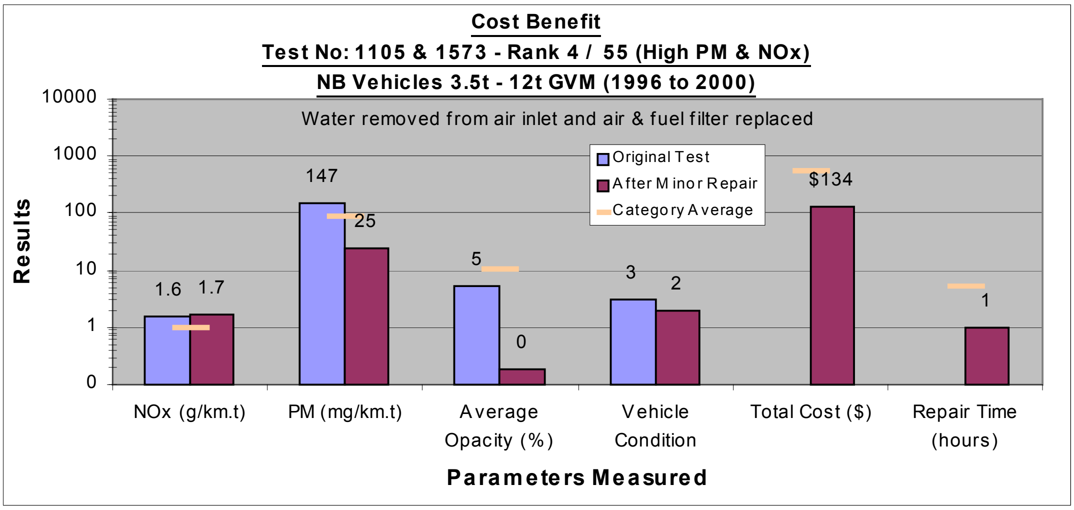


Figure A7-36

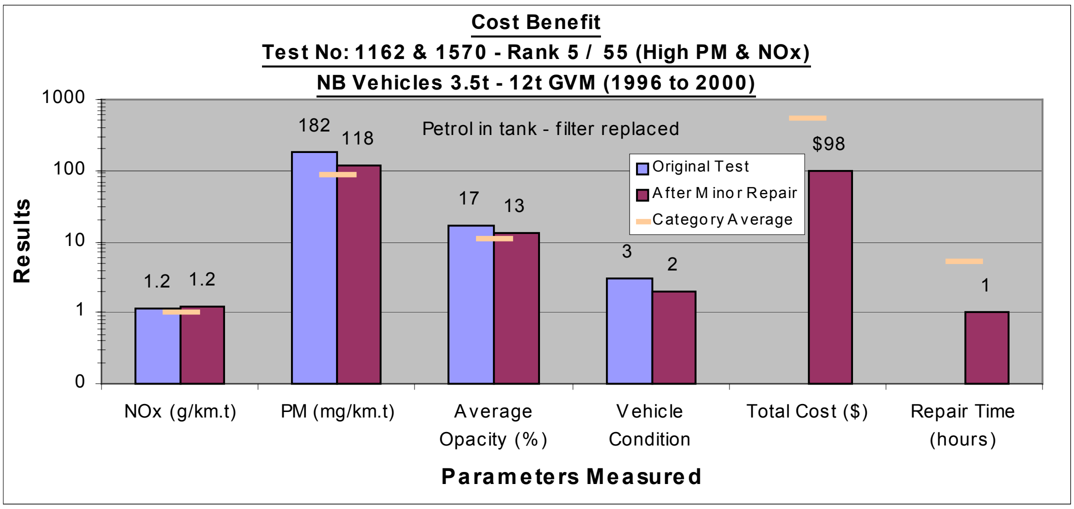


Figure A7-37

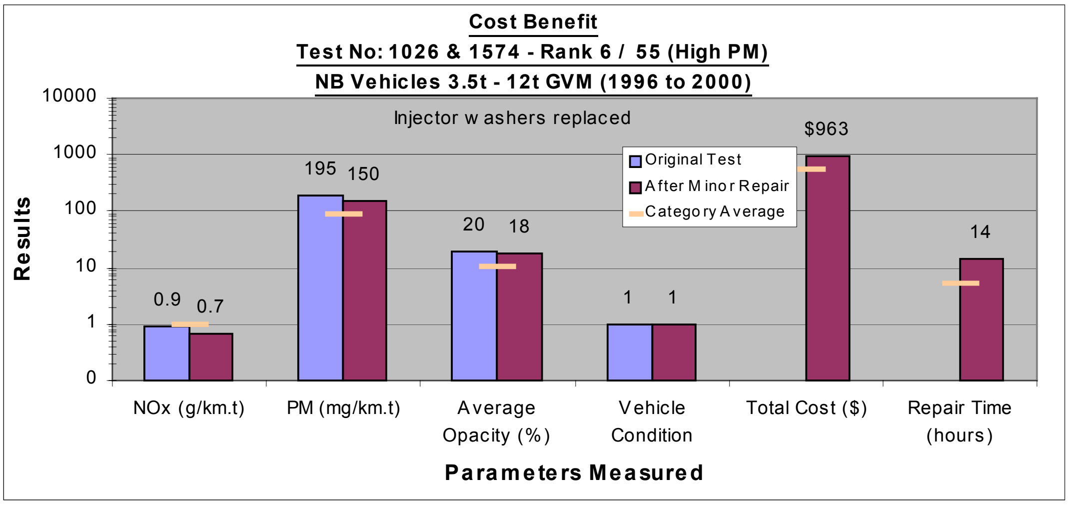


Figure A7-38

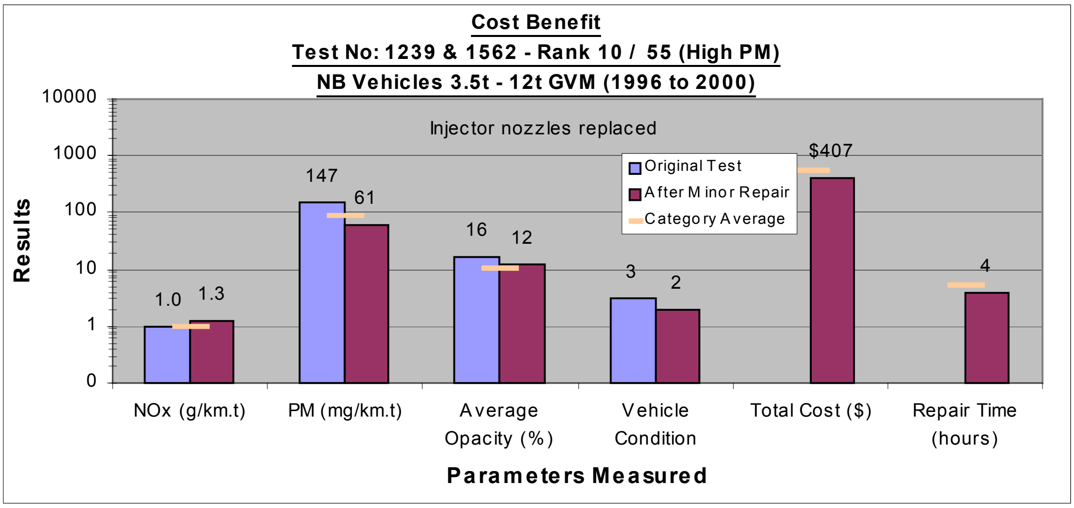


Figure A7-39

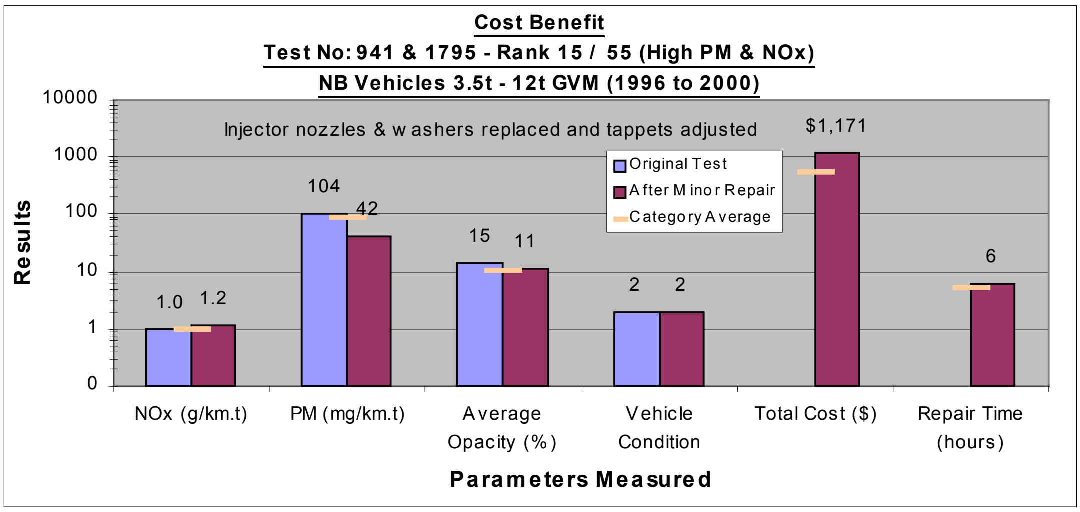


Figure A7-40

Table A7-5

Category 7 + 8 Minor Repair Results

		Before Repair				After Repair					
Original Test No	Rank	NOx (g/km.t)	PM (mg/km.t)	Average Opacity (%)	Vehicle Condition	NOx (g/km.t)	PM (mg/km.t)	Average Opacity (%)	Vehicle Condition	Total Cost ($)	Repair Time (hours)
1427	4	0.7	157	33	4	0.7	56	19	2	$915	7
1194	17	0.9	108	18	2	1.1	57	18	2	$1,043	8
1213	23	1.1	91	19	2	1.2	96	22	2	$1,224	6
1463	24	1.1	90	21	2	1.0	41	16	2	$838	7
1301	30	0.5	111	17	2	0.7	61	10	2	$60	1
1289	33	0.6	99	21	3	0.8	46	13	2	$1,038	7
1380	34	1.3	62	17	3	1.2	62	23	2.5	$2,228	24
955	38	0.8	88	20	3	0.8	57	18	2.5	$785	6
1206	41	1.3	50	9	1	1.7	27	11	1	$165	3
1554	58	1.4	35	12	3	1.4	19	7	2	$1,330	7
Average		1.0	89	19	2.5	1.0	52	16	2.0	$963	8

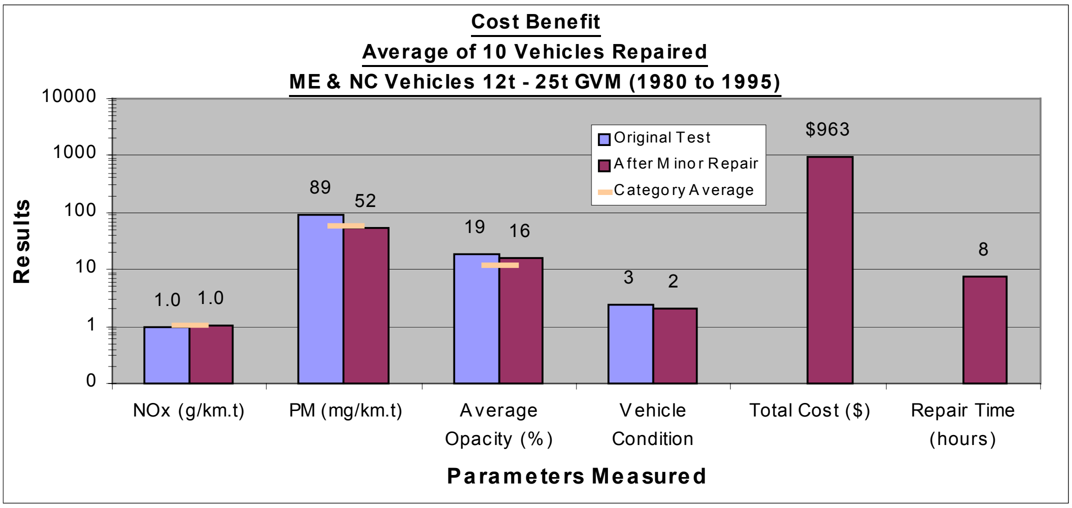


Figure A7-41

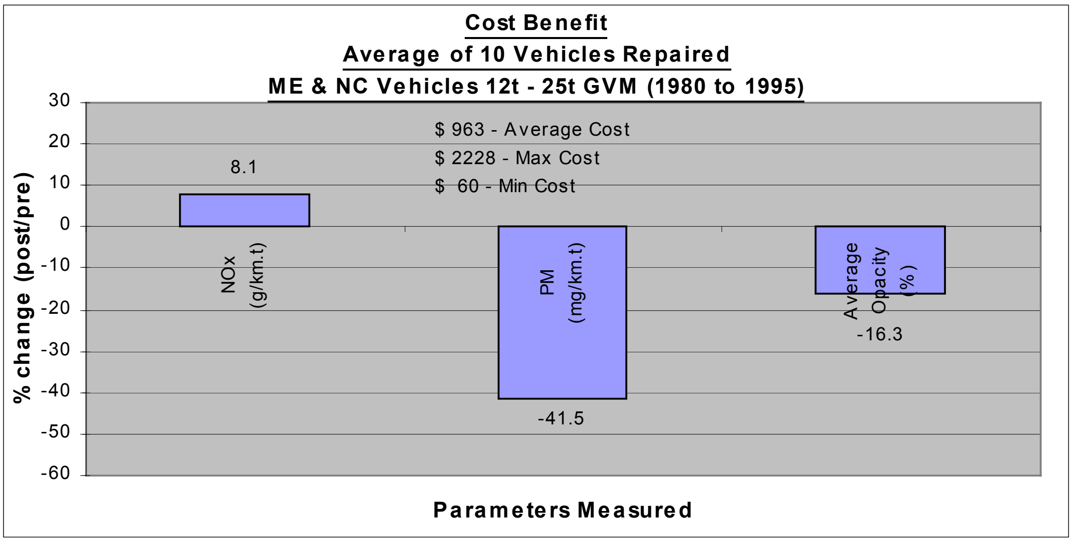


Figure A7-42

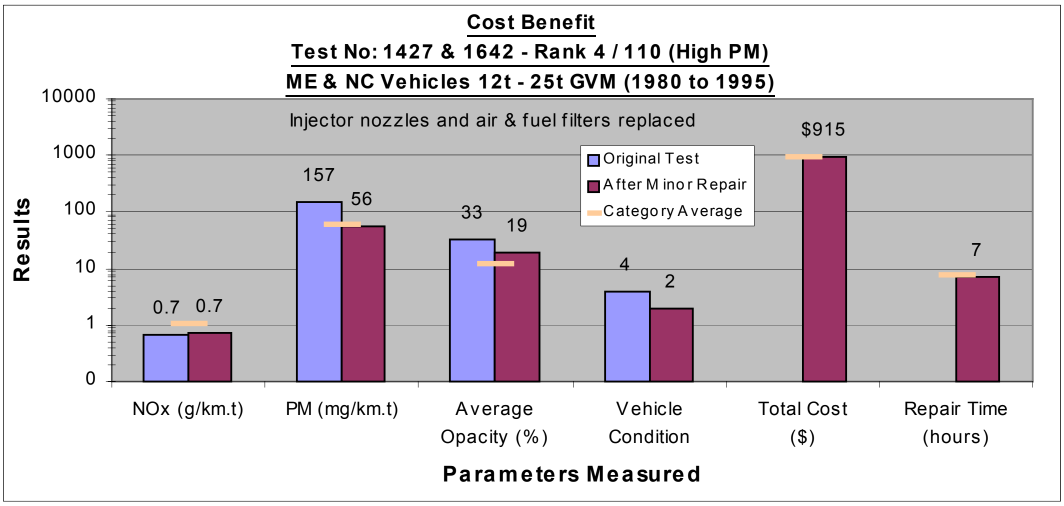


Figure A7-43

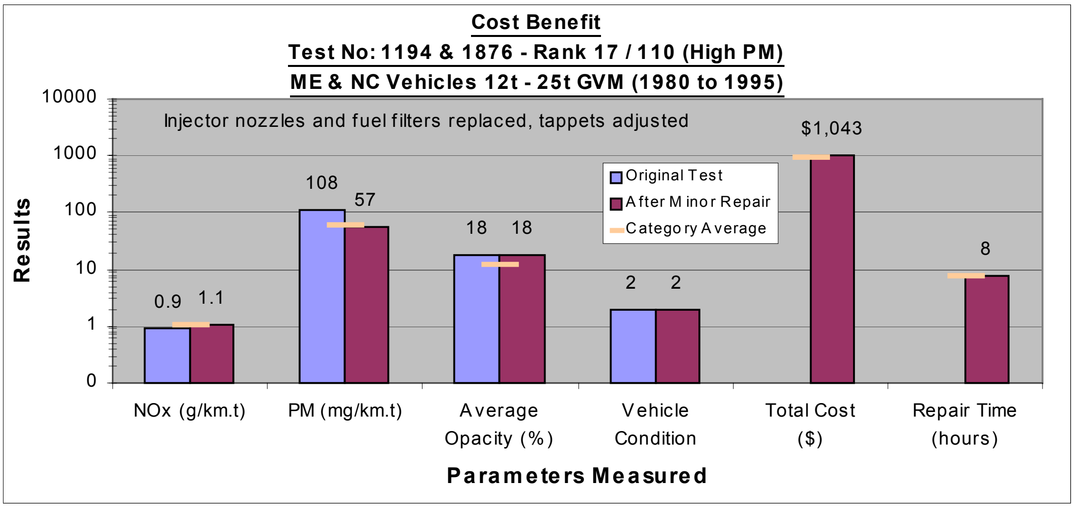


Figure A7-44

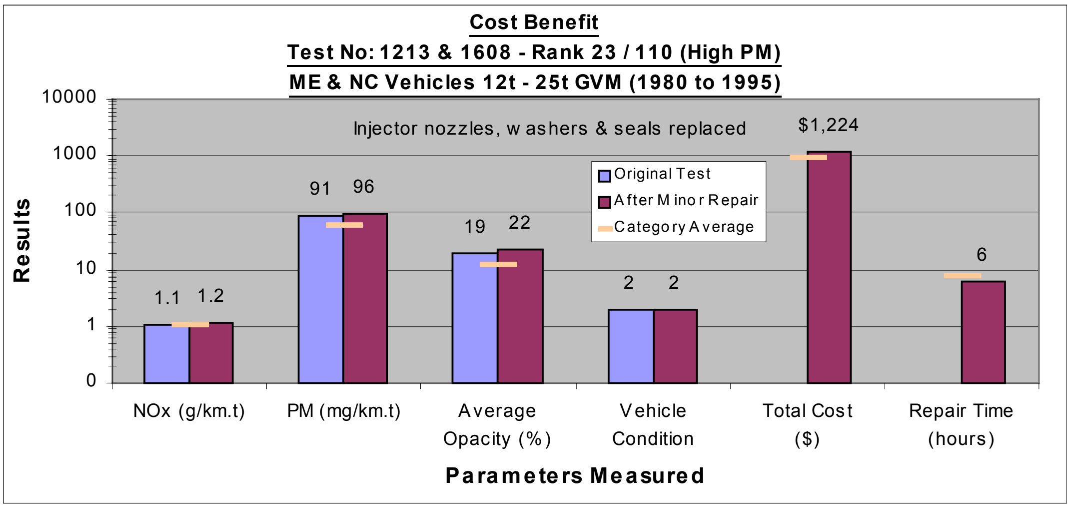


Figure A7-45

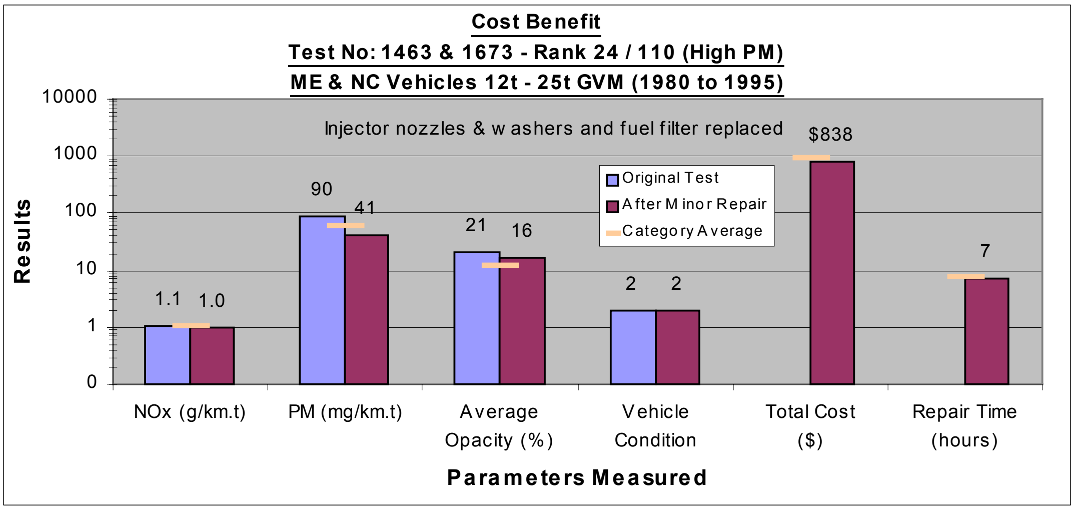


Figure A7-46

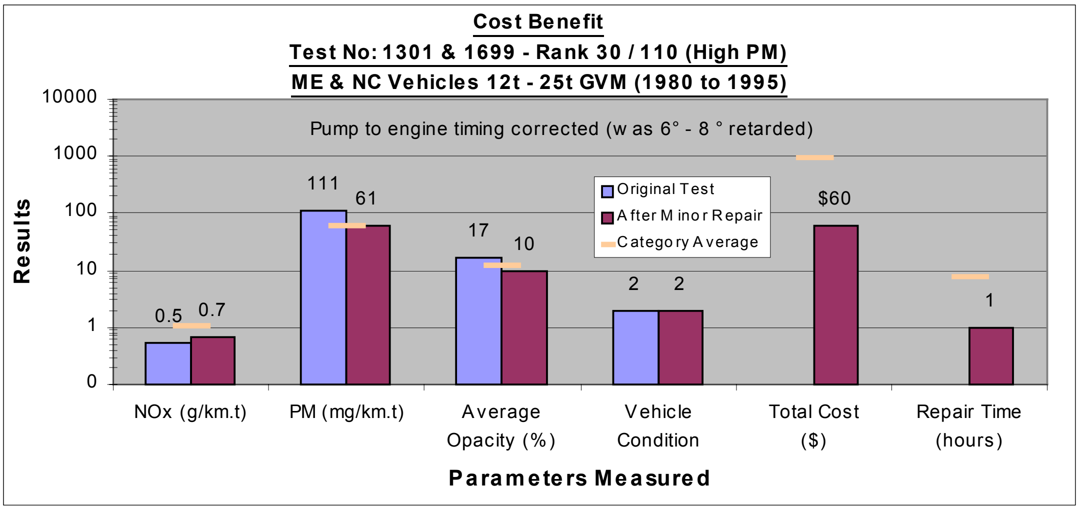


Figure A7-47

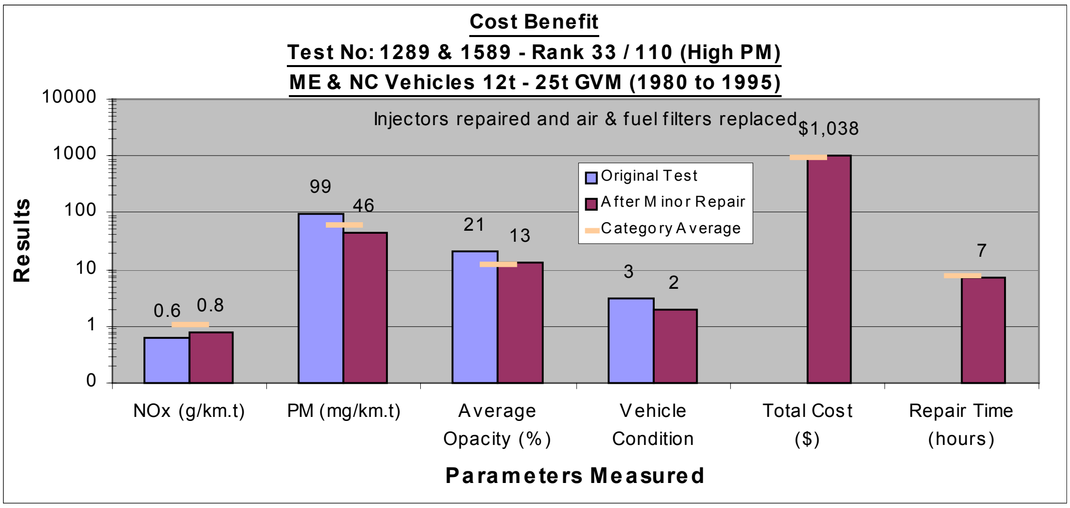


Figure A7-48

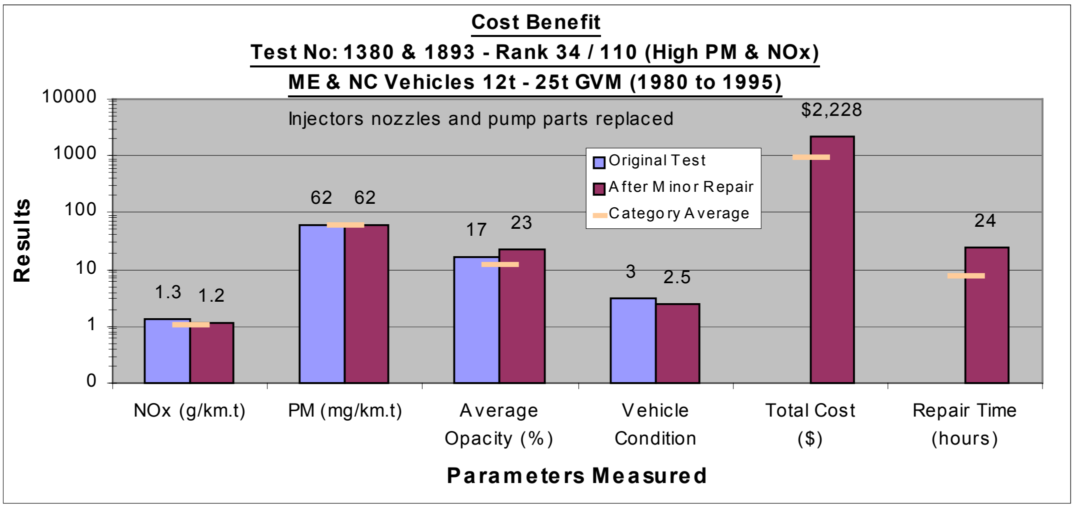


Figure A7-49

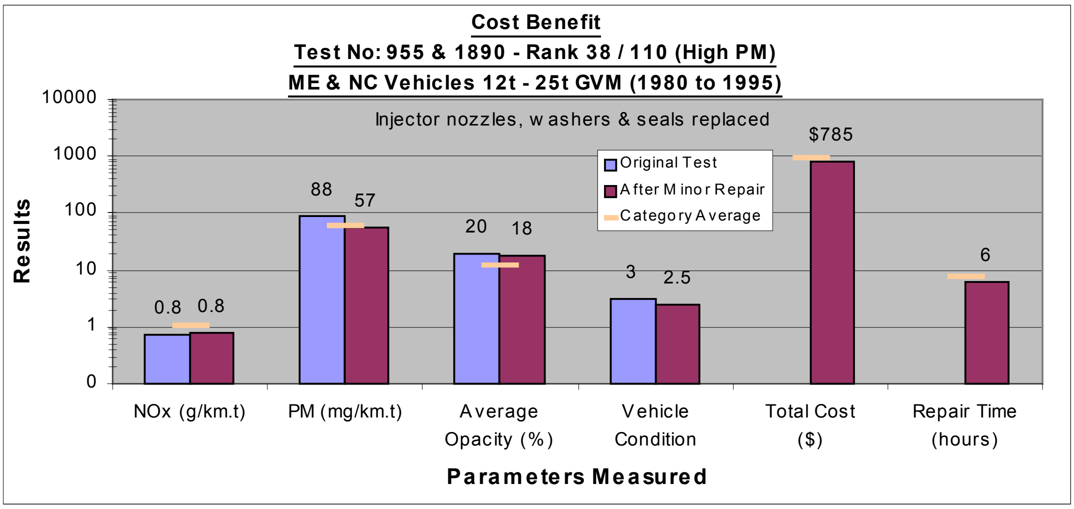


Figure A7-50

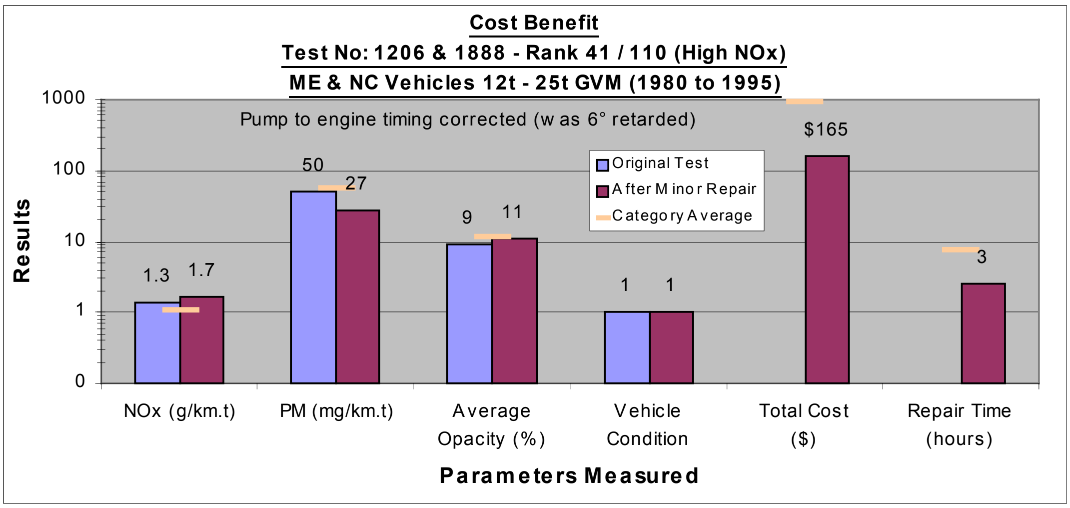


Figure A7-51

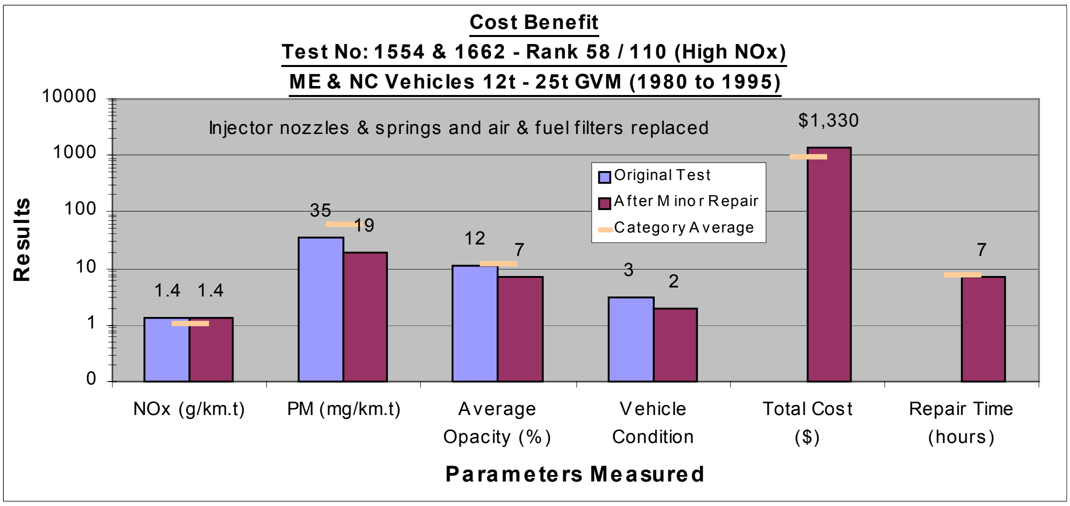

Cost Benefit
Test No: 1554 & 1662 - Rank 58 / 110 (High NOx)
ME & NC Vehicles 12t - 25t GVM (1980 to 1995)
Injector nozzles & springs and air & fuel filters replaced
$1,330
Original Test
After Minor Repair
Category Average
Results
10000
1000
100
10
1
0
1.4
1.4
35
19
12
7
3
2
7
NOx (g/km.t)
PM (mg/km.t)
Average Opacity (%)
Vehicle Condition
Total Cost ($)
Repair Time (hours)
Parameters Measured

Figure A7-52

Table A7-6

Category 9 Minor Repair Results

		Before Repair				After Repair					
Original Test No	Rank	NOx (g/km.t)	PM (mg/km.t)	Average Opacity (%)	Vehicle Condition	NOx (g/km.t)	PM (mg/km.t)	Average Opacity (%)	Vehicle Condition	Total Cost ($)	Repair Time (hours)
1115	3	0.9	61	8	2	0.9	43	7	2	$580	8
1124	4	0.7	65	7	1	0.7	45	10	1	$2,129	18
956	6	0.7	57	7	2	0.6	25	8	1	$60	1
1008	7	0.9	43	6	1	0.9	29	12	1	$211	2
972	9	0.9	38	9	2	0.9	24	8	1	$148	1
Average		**0.8**	**53**	**7**	**1.6**	**0.8**	**33**	**9**	**1.2**	**$626**	**6**

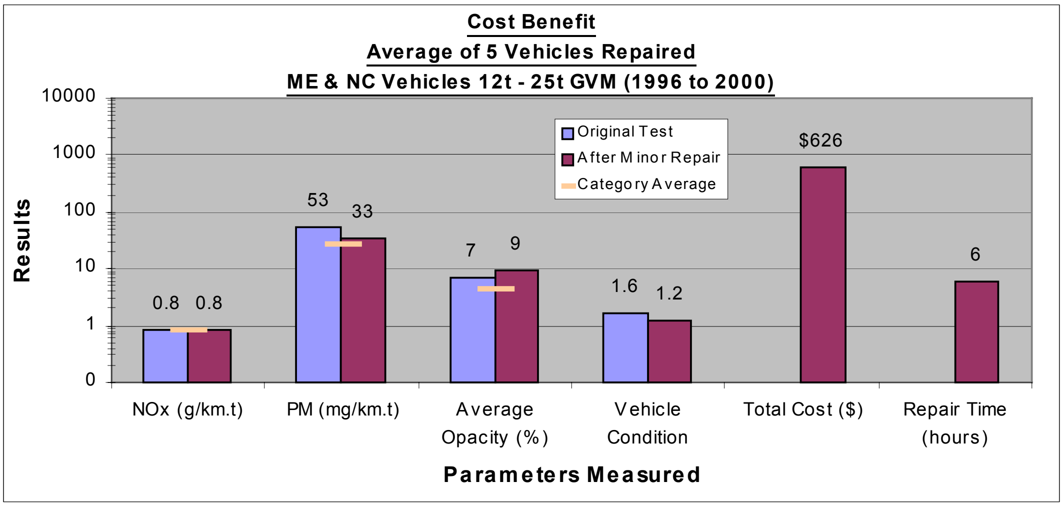


Figure A7-53

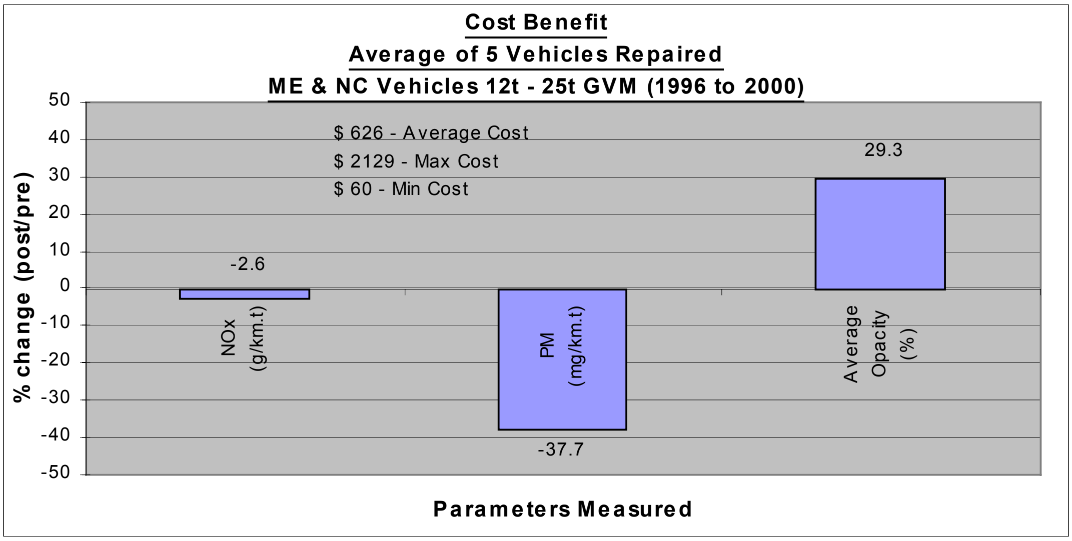


Figure A7-54

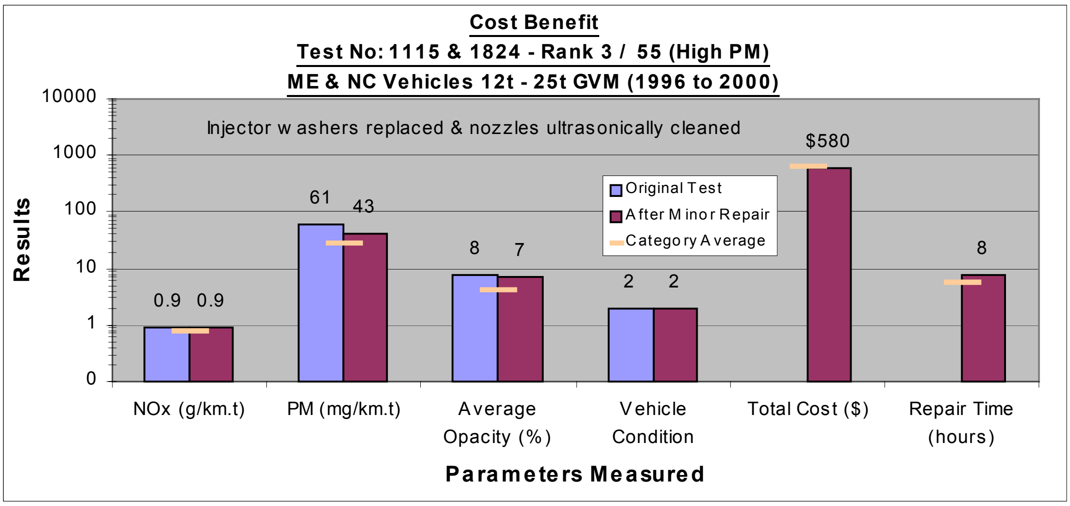


Figure A7-55

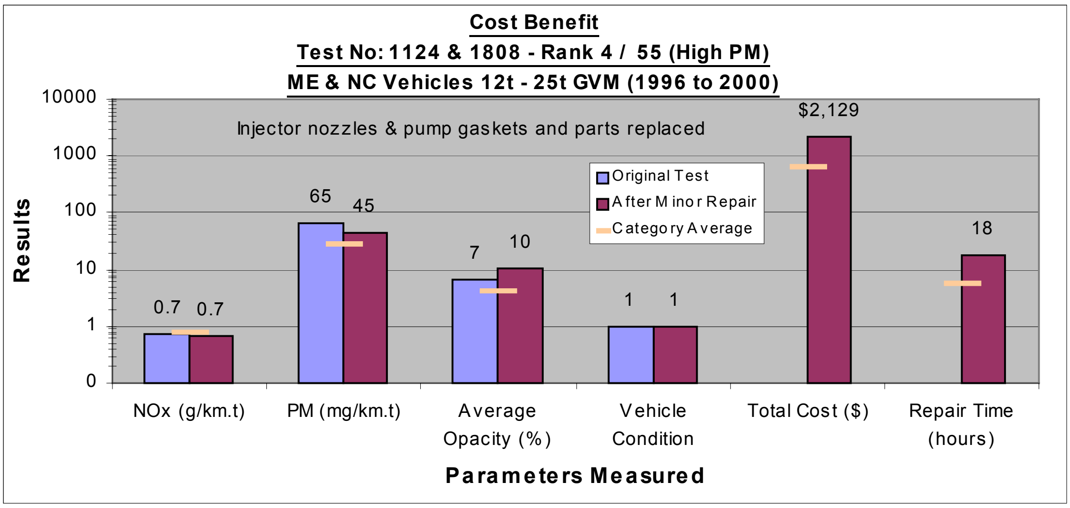


Figure A7-56

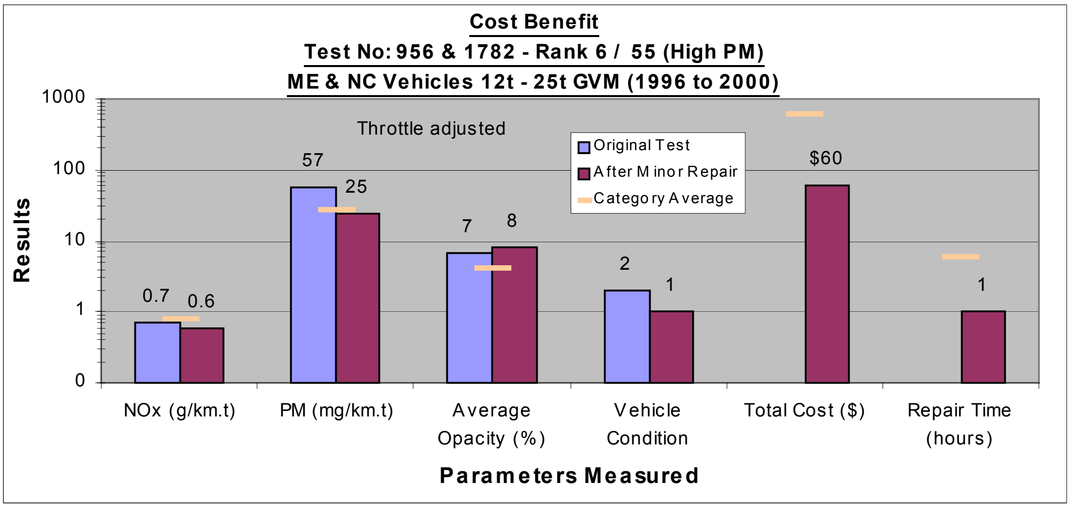


Figure A7-57

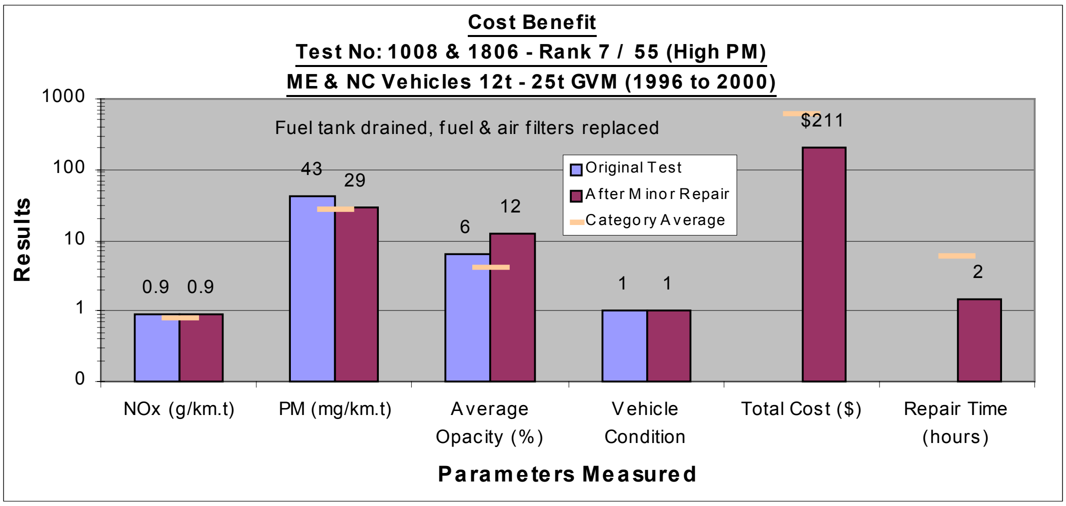


Figure A7-58

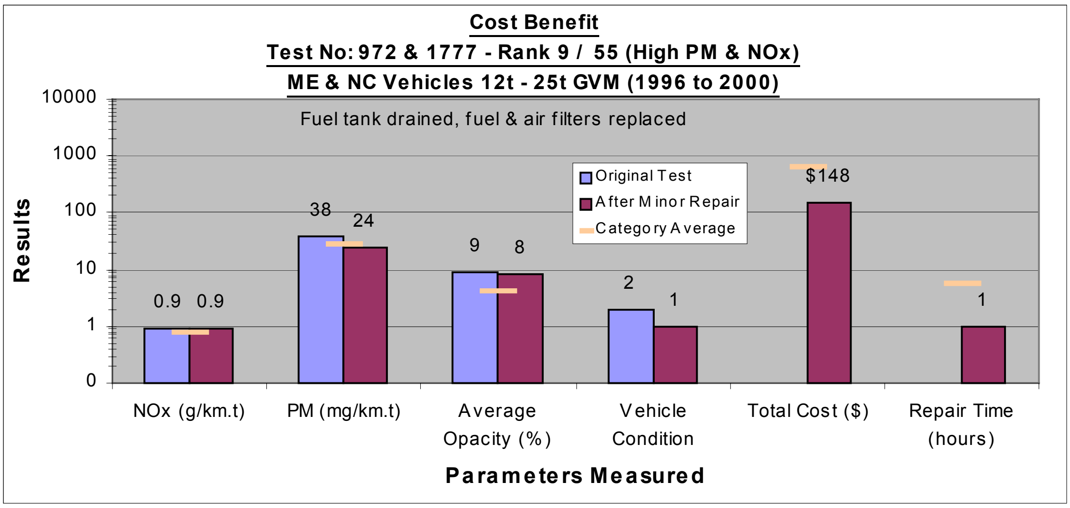


Figure A7-59

Table A7-7

Category 10 + 11 Minor Repair Results

		Before Repair				After Repair					
Original Test No	Rank	NOx (g/km.t)	PM (mg/km.t)	Average Opacity (%)	Vehicle Condition	NOx (g/km.t)	PM (mg/km.t)	Average Opacity (%)	Vehicle Condition	Total Cost ($)	Repair Time (hours)
1676	2	0.6	68	20	4	0.6	65	21	3	$1,617	10
1513	3	0.5	71	33	4	0.7	56	29	3	$2,771	19
1677	7	0.6	55	13	4	0.8	54	12	4	$1,524	11
1685	13	1.3	18	6	2	0.9	19	14	2	$2,380	20
Average		**0.8**	**53**	**18**	**3.5**	**0.8**	**49**	**19**	**3.0**	**$2,073**	**15**

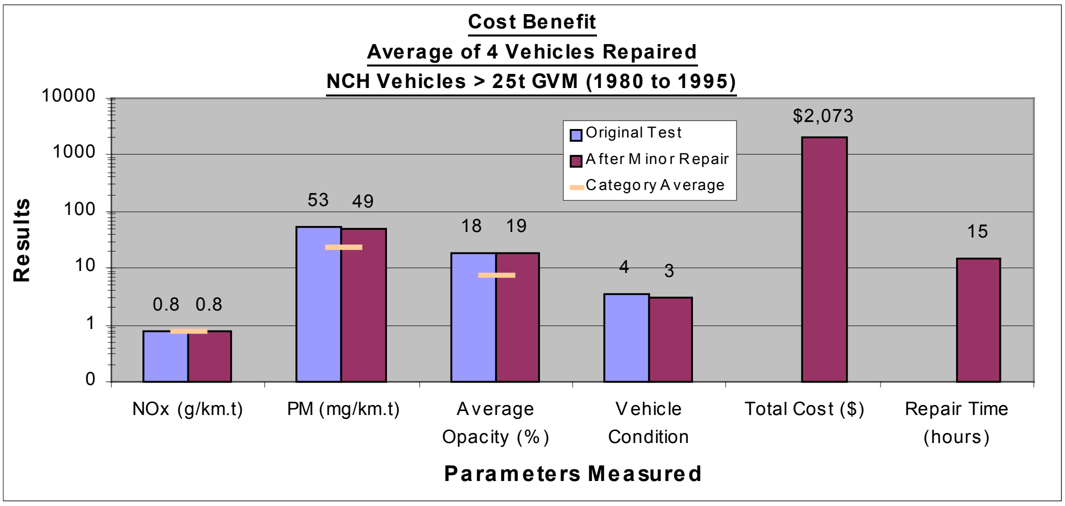


Figure A7-60

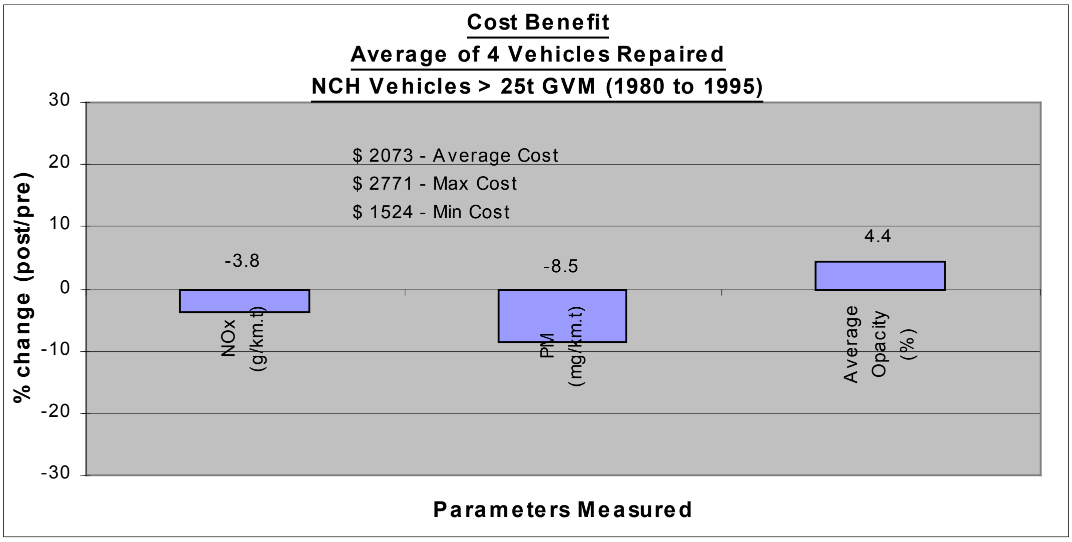


Figure A7-61

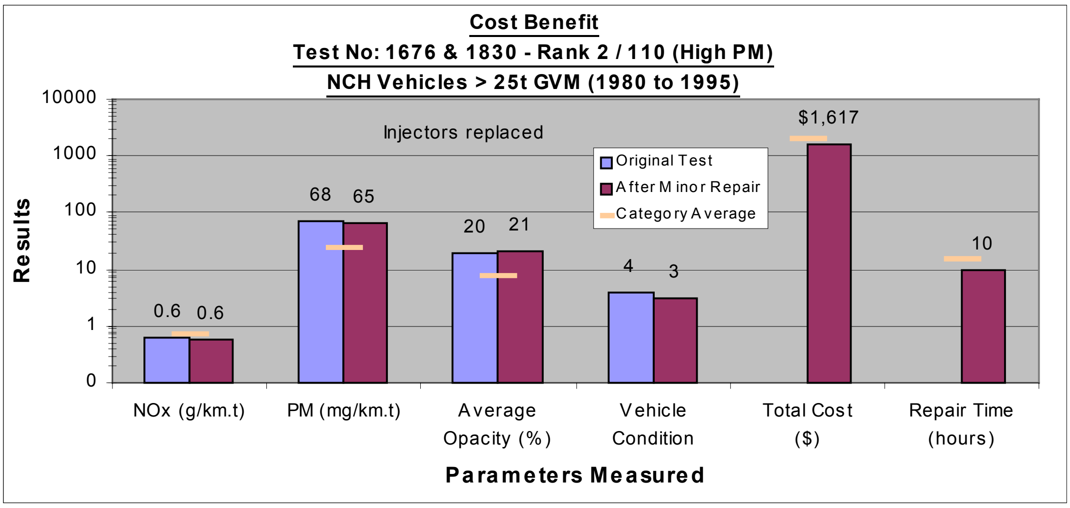


Figure A7-62

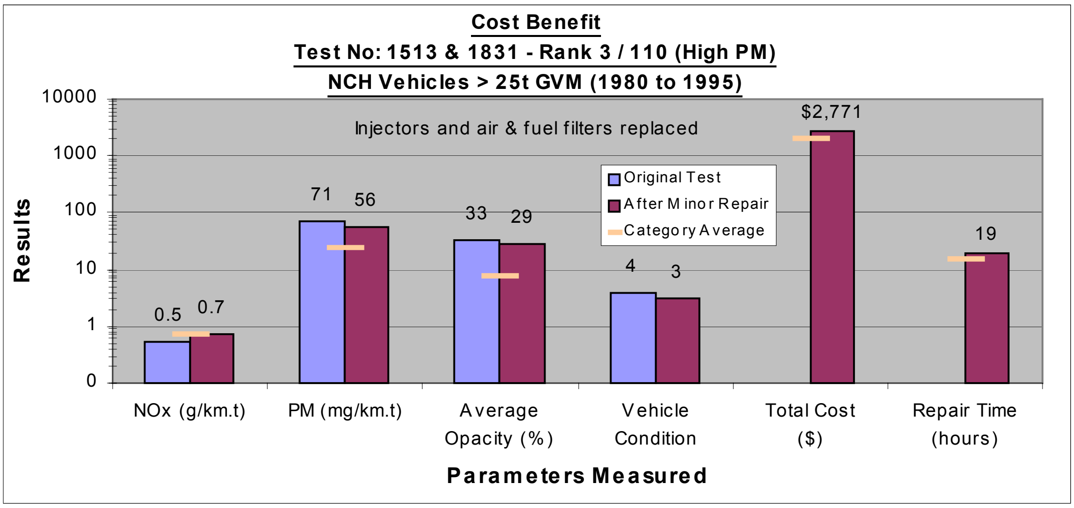


Figure A7-63

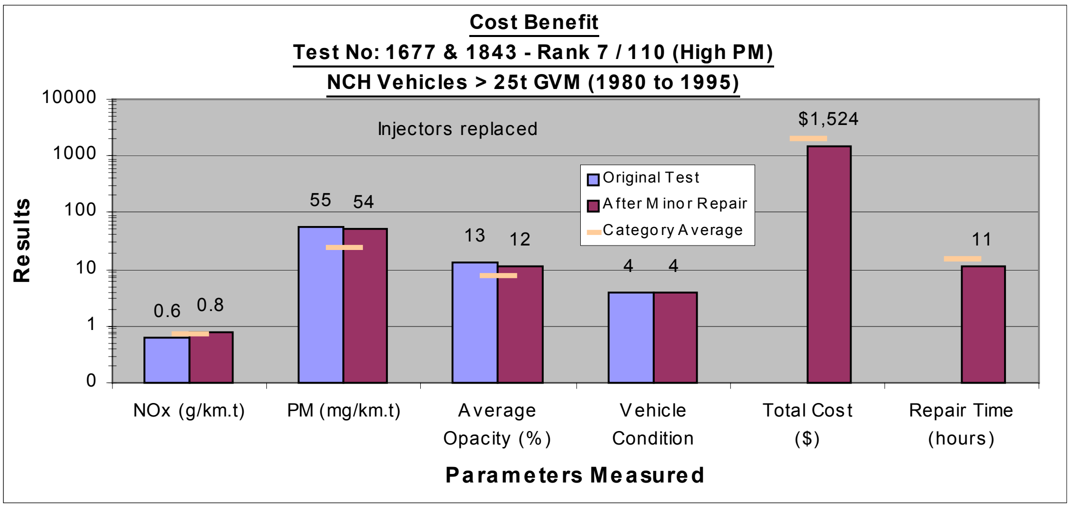


Figure A7-64

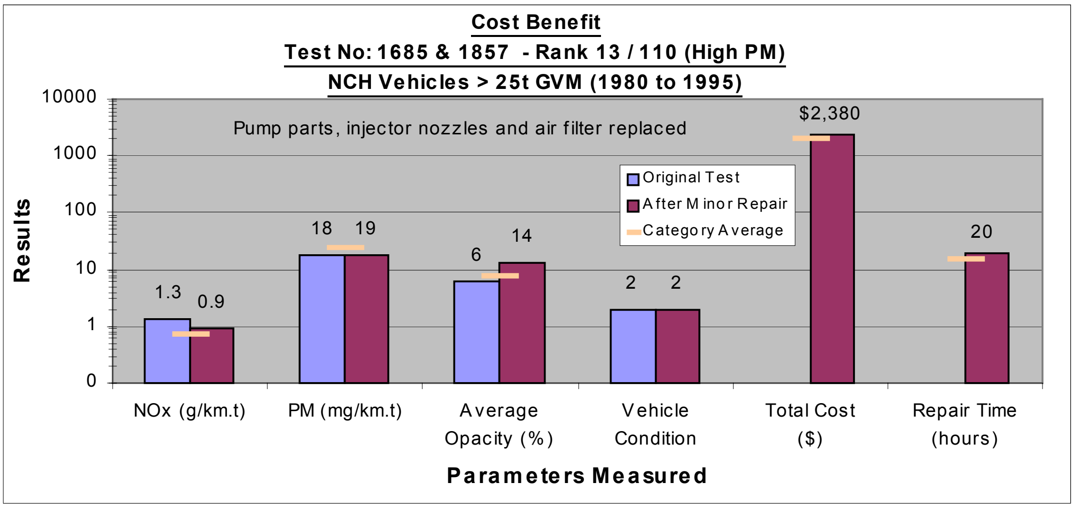

Cost Benefit
Test No: 1685 & 1857 - Rank 13 / 110 (High PM)
NCH Vehicles > 25t GVM (1980 to 1995)
Pump parts, injector nozzles and air filter replaced
Results
10000
1000
100
10
1
0
Original Test
After Minor Repair
Category Average
1.3
0.9
18
19
6
14
2
2
$2,380
20
NOx (g/km.t)
PM (mg/km.t)
Average Opacity (%)
Vehicle Condition
Total Cost ($)
Repair Time (hours)
Parameters Measured

Figure A7-65

Table A7-8

Category 12 Minor Repair Results

Original Test No	Rank	Before Repair NOx (g/km.t)	PM (mg/km.t)	Average Opacity (%)	Vehicle Condition	After Repair NOx (g/km.t)	PM (mg/km.t)	Average Opacity (%)	Vehicle Condition	Total Cost ($)	Repair Time (hours)
1511	13	0.5	15	4	1	0.6	13	4	1	$176	1
Average		**0.5**	**15**	**4**	**1.0**	**0.6**	**13**	**4**	**1.0**	**$176**	**1**

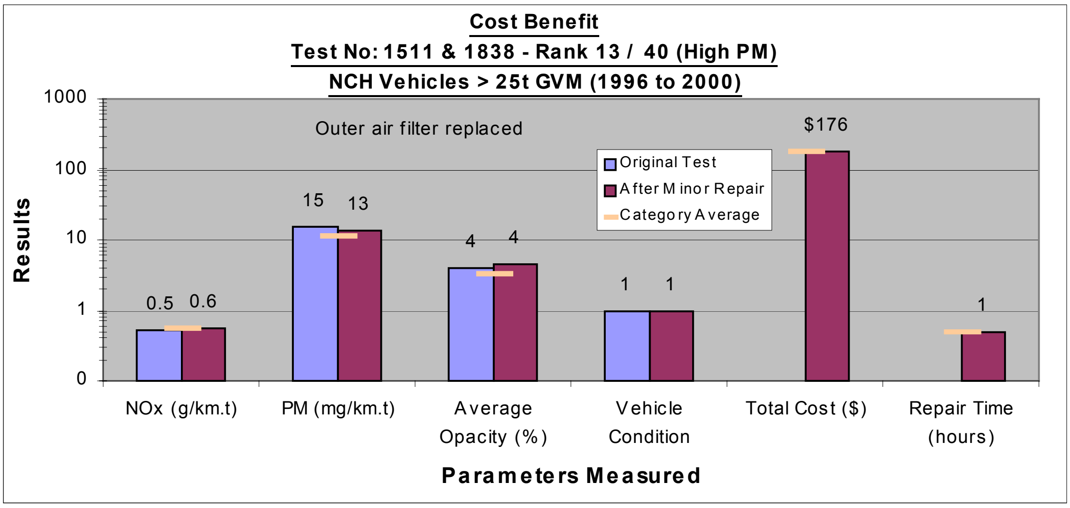


Figure A7-66

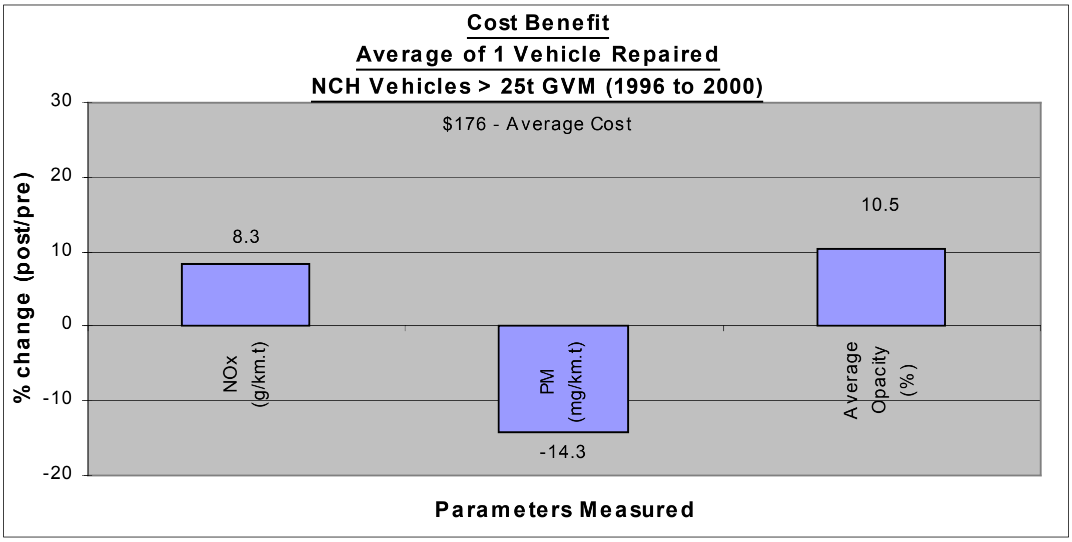


Figure A7-67

Table A7-9
Minor Repair Details

Vehicle Category	Items Replaced	Actual Total Parts Costs	Actual Total Labour Costs	Actual Total Repair Costs	Total Repair Time (hrs)
1	Tailpipe and air filter	124	30	169.4	1
1	Injector nozzles and plates, air and fuel filters	335	360	771.68	6
1	Replace pump parts, nozzles and filters	700.44	1080	2007.04	18
1	Injector nozzles and fuel filter	169.5	300	517.9	5
2	Air and fuel filters and Injector nozzles and washers	241.81	300	595.99	5
2	Replace pump parts, fuel filters. Remove crankshaft repair keyway. New clutch plate.	3533.475	2209.995	5743.47	38
2	Injector nozzles	136.28	240	413.91	4
2	Injector nozzles and washers, air filter	328.2	360	757.11	6
2	Replace major pump parts, injector nozzles, air & fuel filters.	1238.52	1080	2618.53	18
3	Injector nozzles, air & fuel filters, clutch and rear universal joint	730.96	700	1430.96	13
3	Drain fuel and replaced air & fuel filter	60.31	60	132.34	1
4	Filters	83.08	120	223.39	2
4	Injector nozzles and filters	456.6	360	889.86	6
4	Air and fuel filters, Injector nozzles and washers and water trap	439.5	420	945.45	7
5	Air + fuel filters, air cleaner hose	137.75	120	283.53	2
5	Fuel filter, internal pump parts and wahers	204.98	780	1083.48	13
5	Fuel filter, Fuel pump parts and injector nozzles	714	990	1846.37	17
6	Air & fuel filters			134.22	1
6	Injector nozzles and washers	704	360	1171.39	6
6	1 inj nozzle cleaned 3 cleaned and reset			406.75	4
6	Fuel filter			97.68	1
7	Fuel Filters, injector nozzles & washers	418	420	838	7
7	Air & Fuel Filters	524.08	420	1038.49	7
7	Air & Fuel Filters, injector nozzles	411.89	420	915.08	7
8	Air & fuel filters, injecotr nozzles, springs, int. plate	724	420	1330.23	7
8	Injector nozzles + washers and seals	750	360	1224.37	6
9	Injector washers, nozzles ultrasonically cleaned	47.7	480	580.47	8
9	Nozzles, pump parts and gaskets	800.9	1080	2128.54	18
9	Air and fuel filters	101.9	90	211.09	2
10	Pump parts, injector nozzles and air filter replaced.	893	1200	2379.68	20
10	Injectors	870	600	1617	10
10	Injectors	797.5	726	1523.5	11
10	Injectors, fuel and air filters	1709.79	1060	2771.14	19
12	Outer air filter	146	30	176	1
	34 Vehicle repairs			**$ 38,974.04**	

Appendix 8

VEHICLE CONDITION GRAPHS

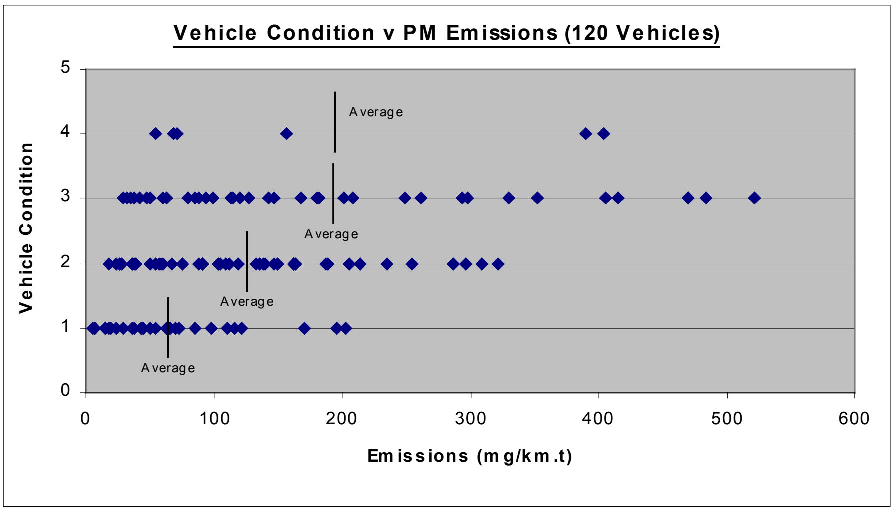


Figure A8-1

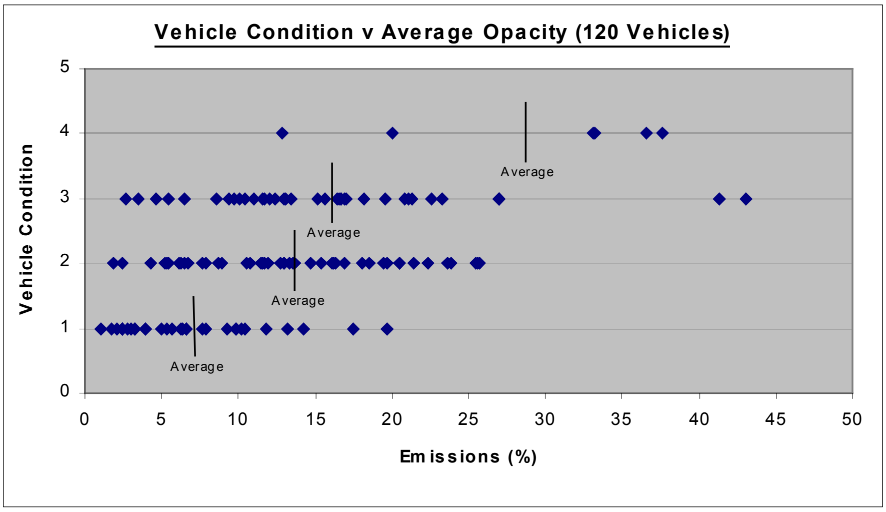


Figure A8-2

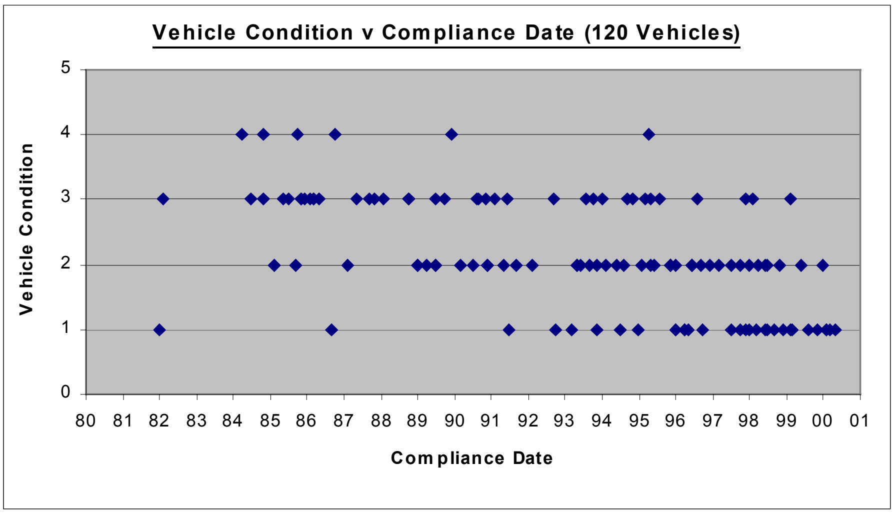
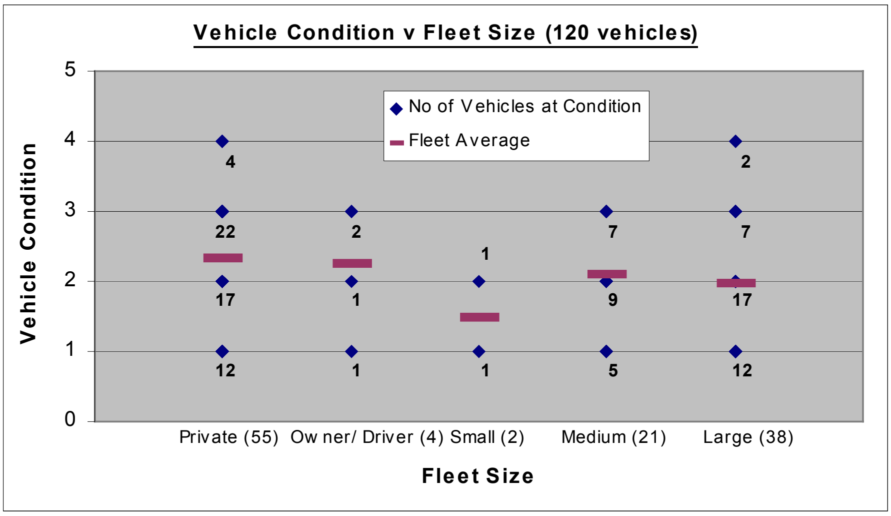


Figure A8-3



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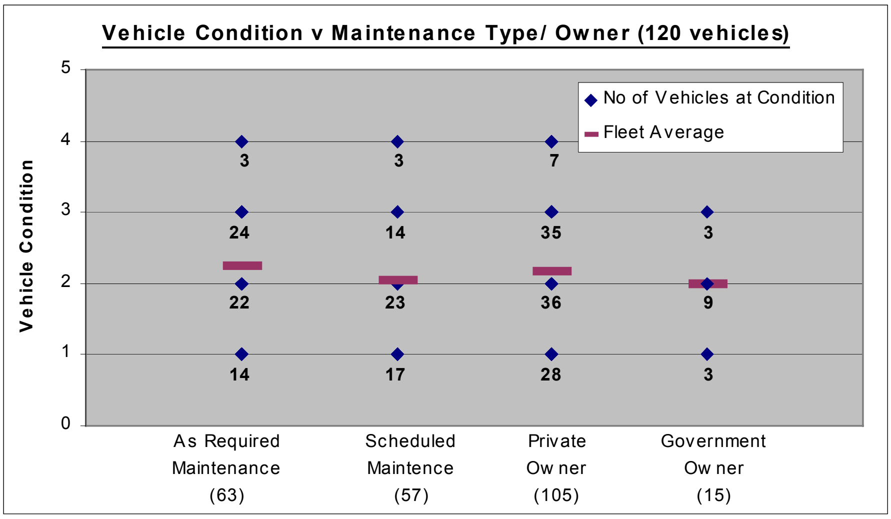


Figure A8-5

Appendix 9

REPAIR THRESHOLD GRAPHS AND TABLES

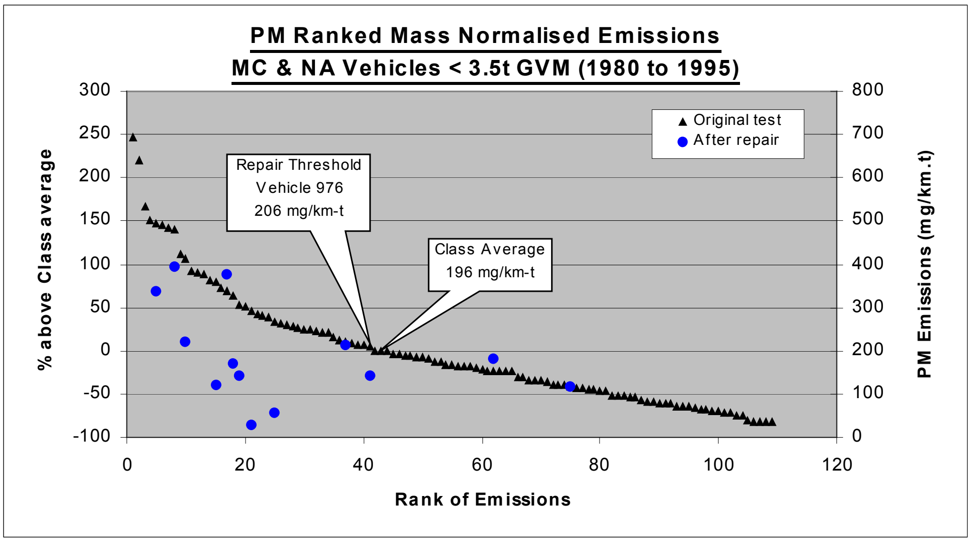


Figure A9-1

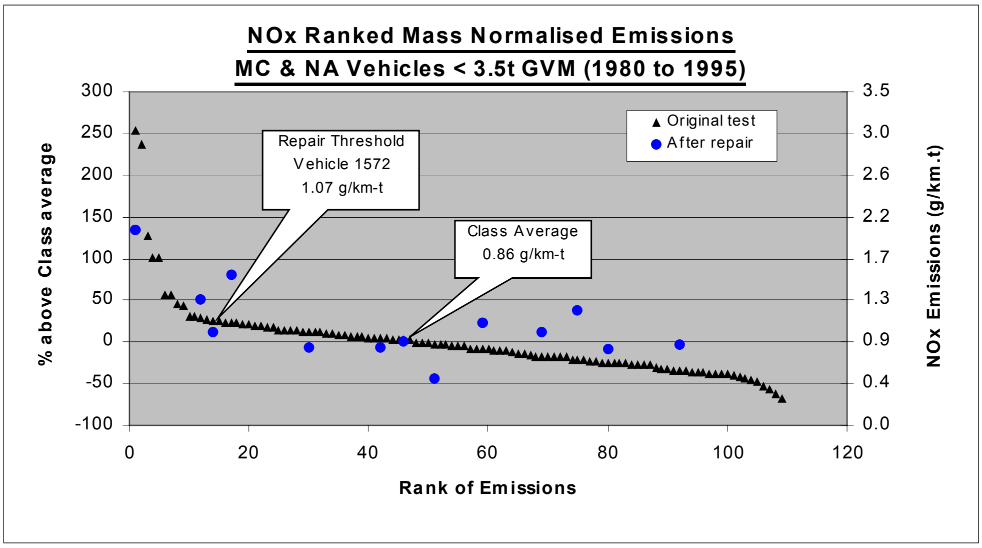


Figure A9-2

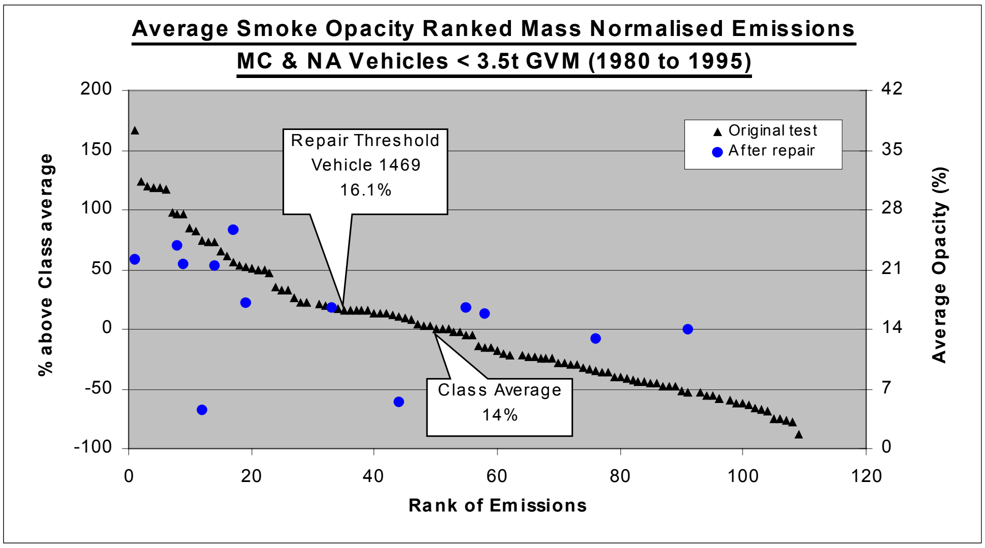
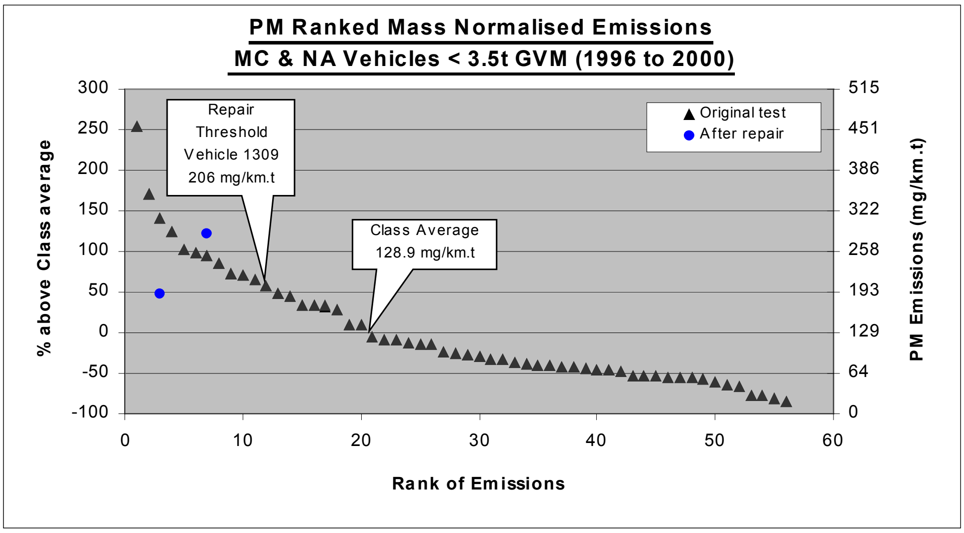


Figure A9-3



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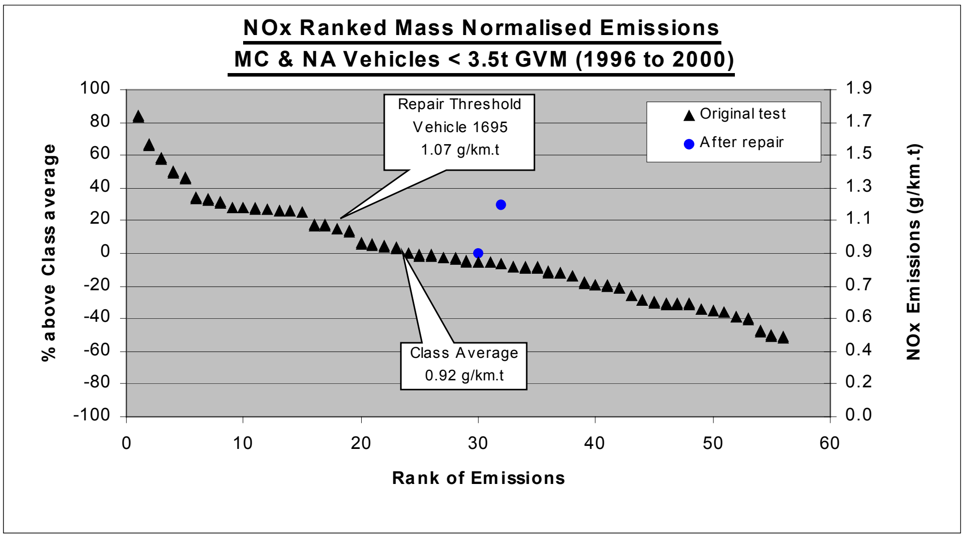
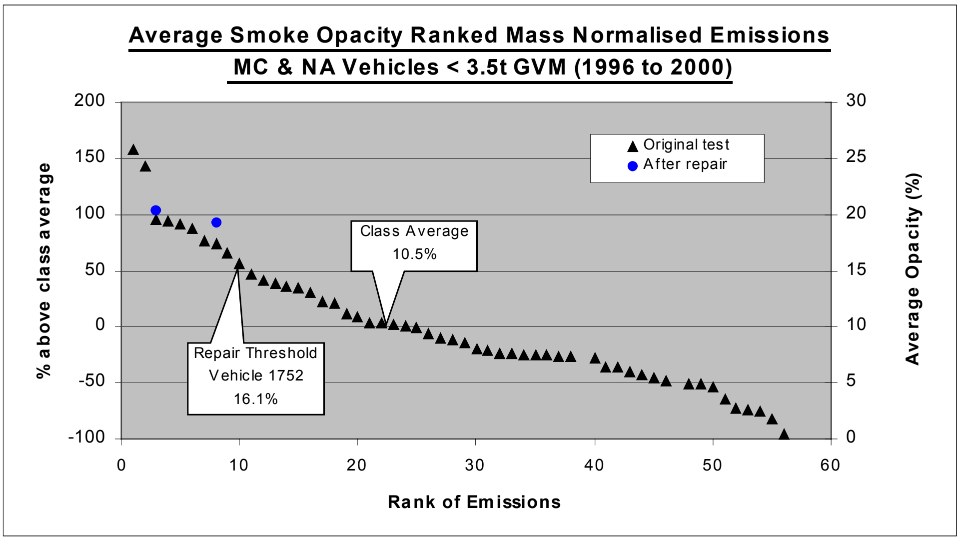


Figure A9-5



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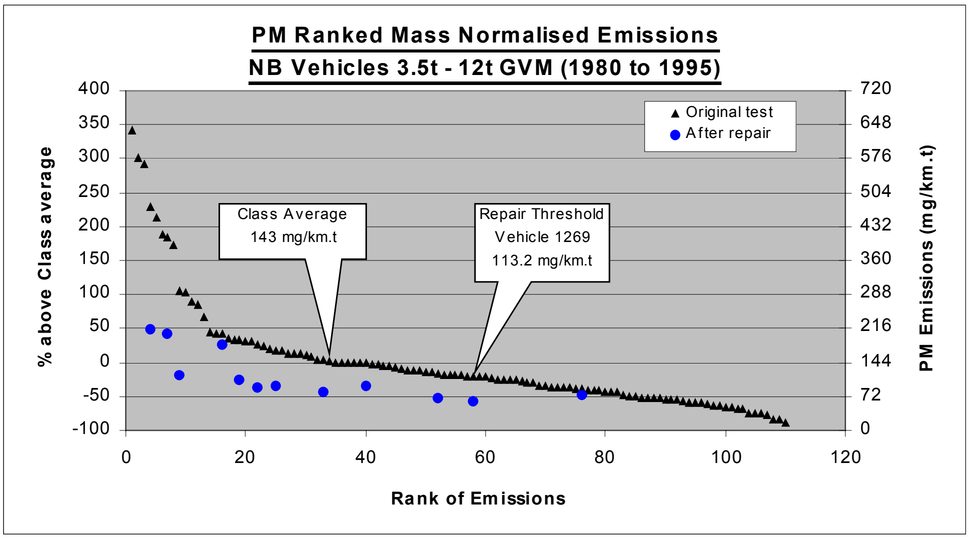

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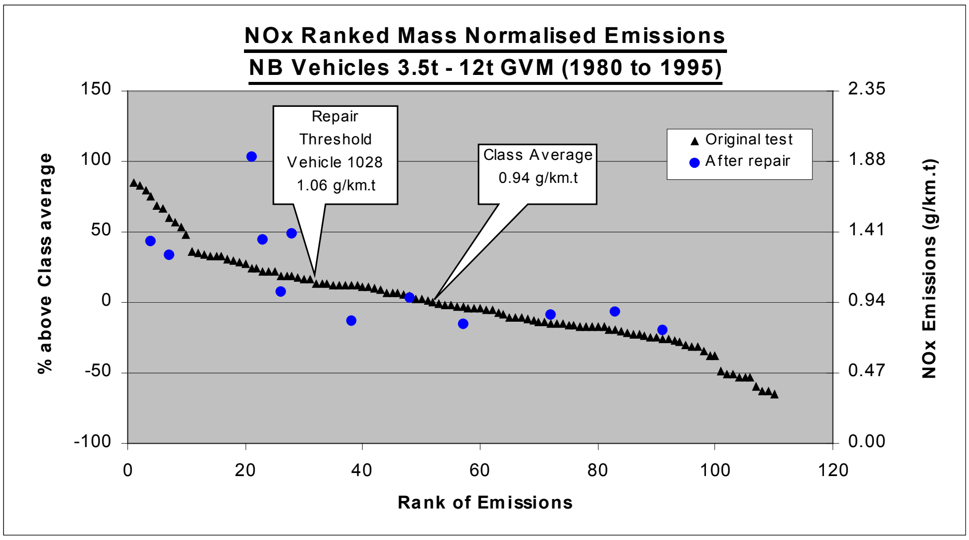

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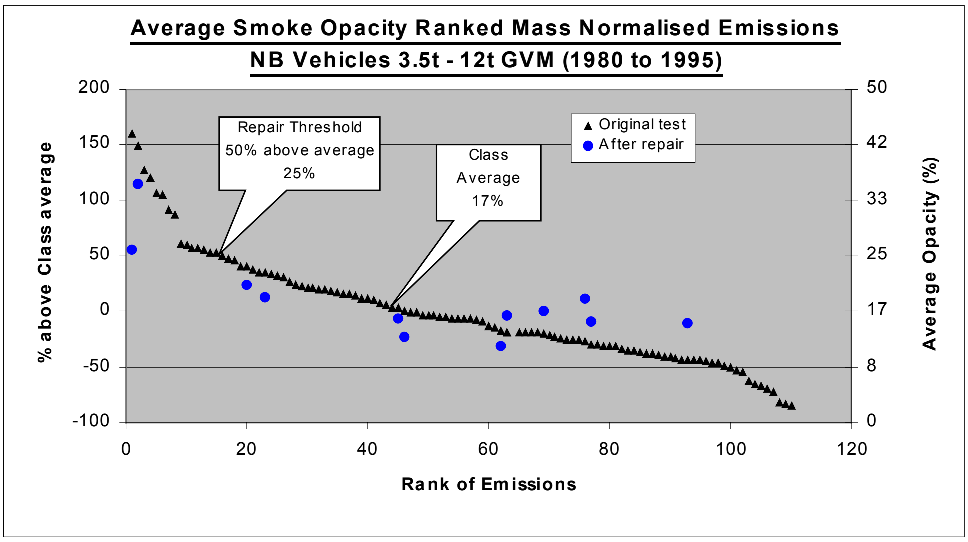


Figure A9-9

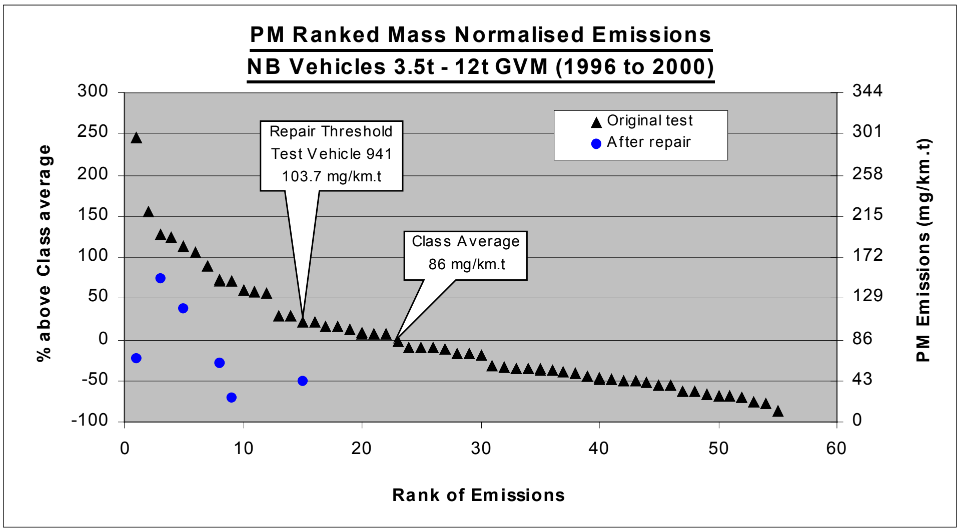


Figure A9-10

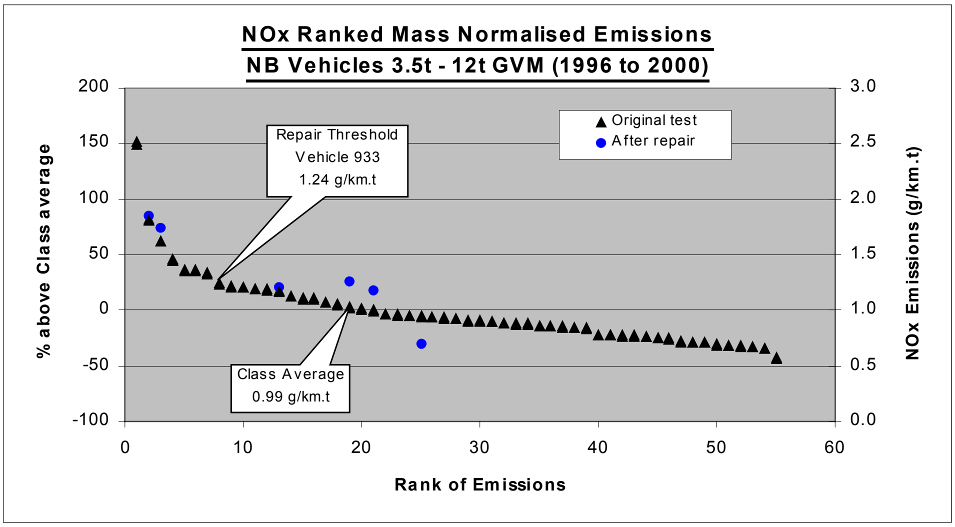


Figure A9-11

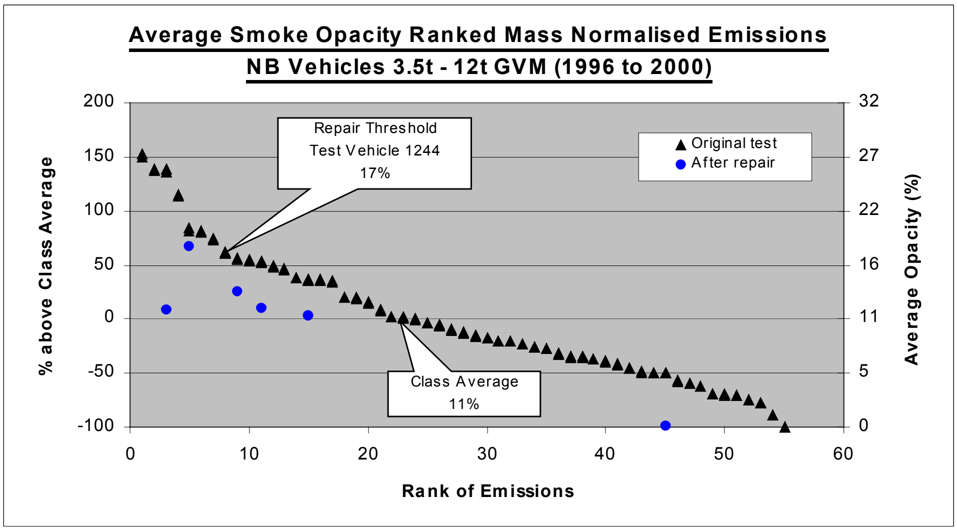


Figure A9-12

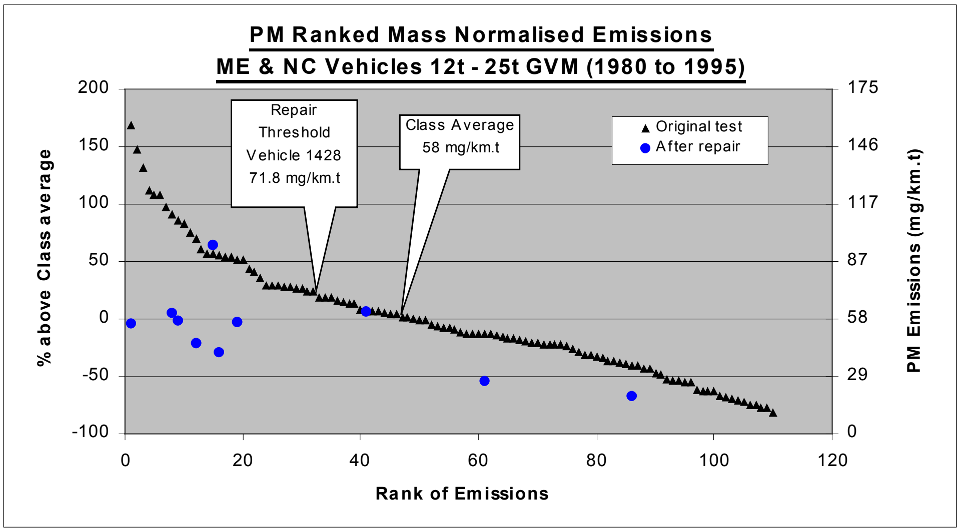


Figure A9-13

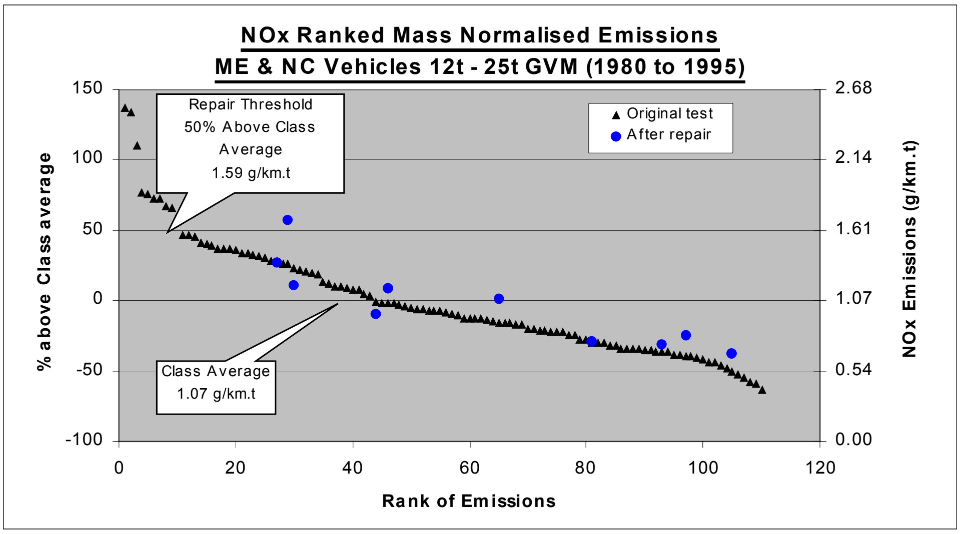


Figure A9-14

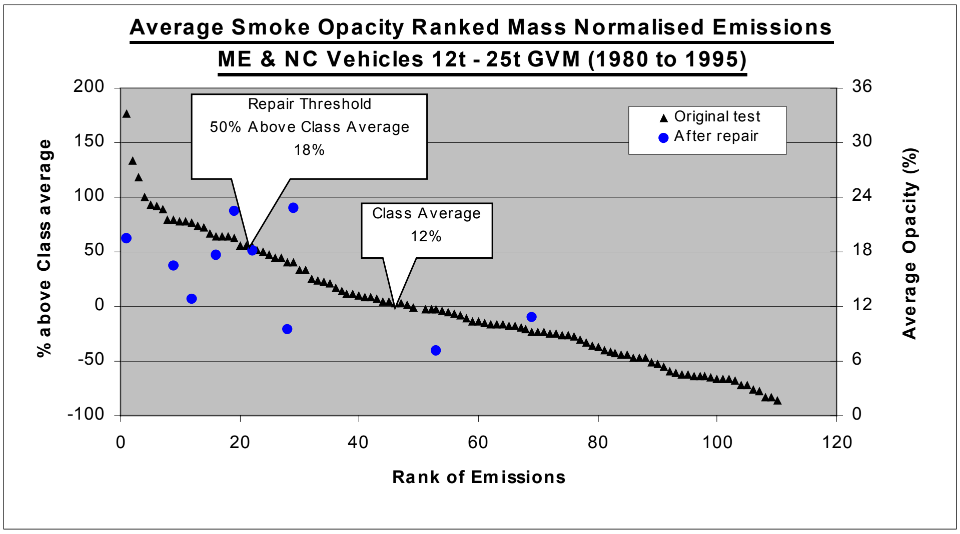


Figure A9-15

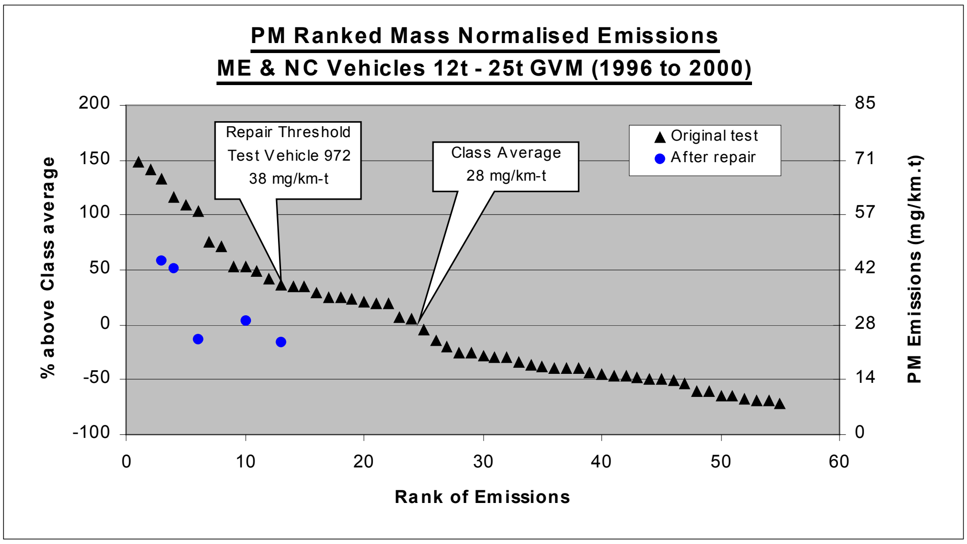


Figure A9-16

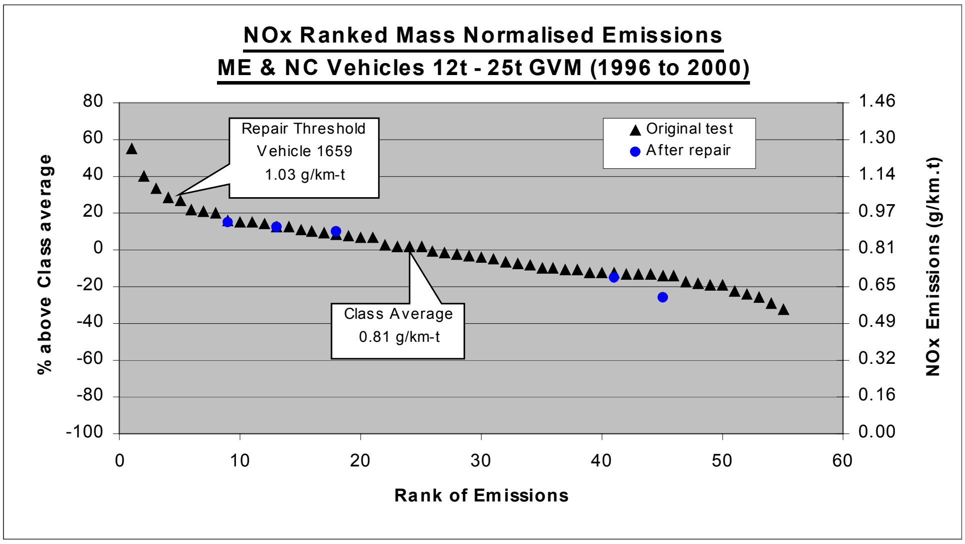


Figure A9-17

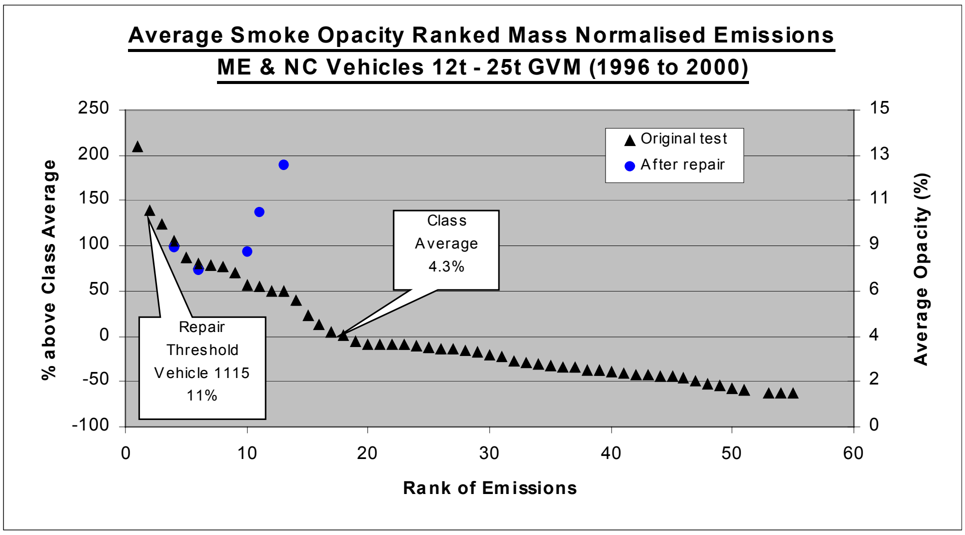


Figure A9-18

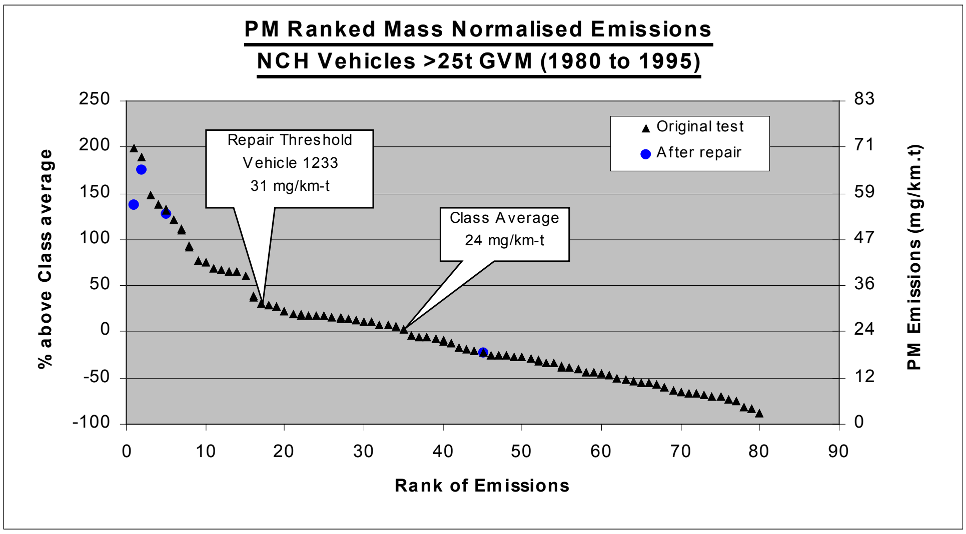


Figure A9-19

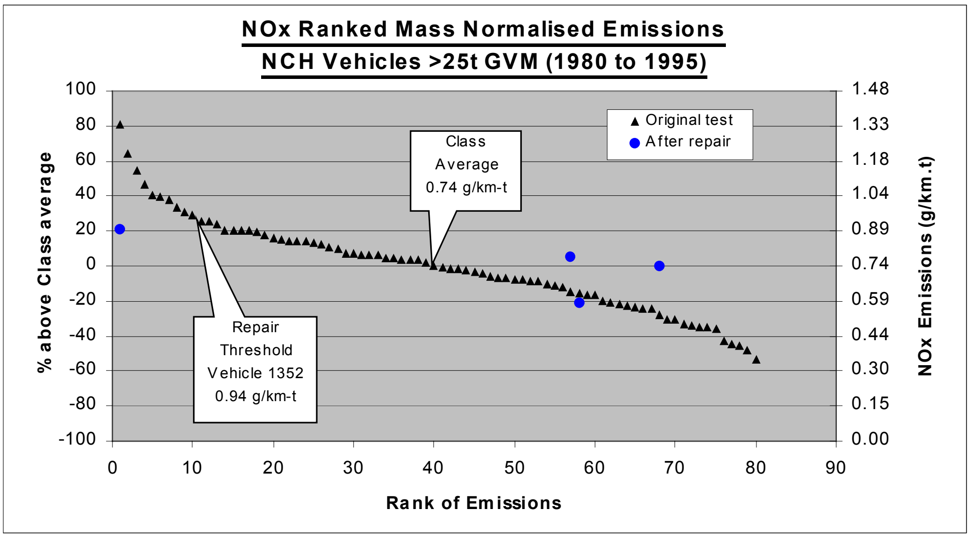


Figure A9-20

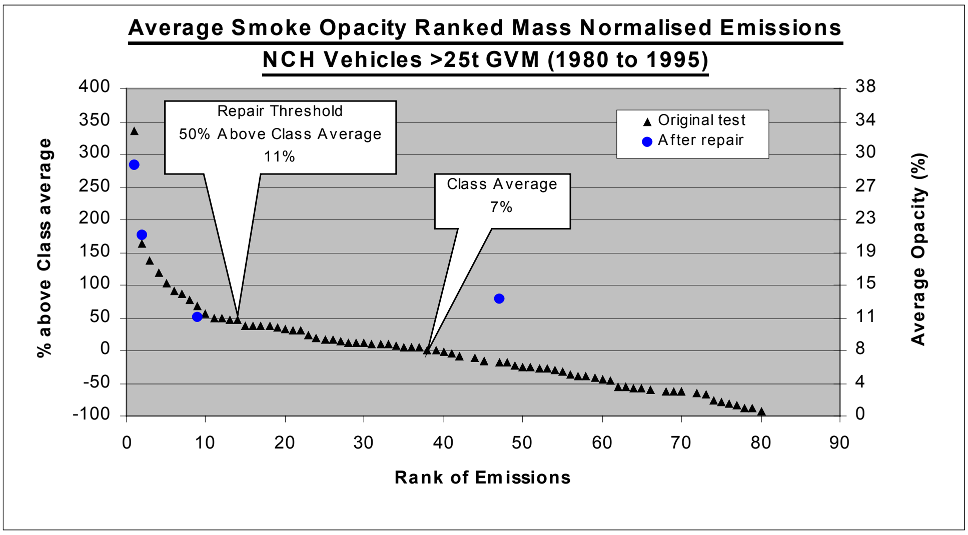


Figure A9-21

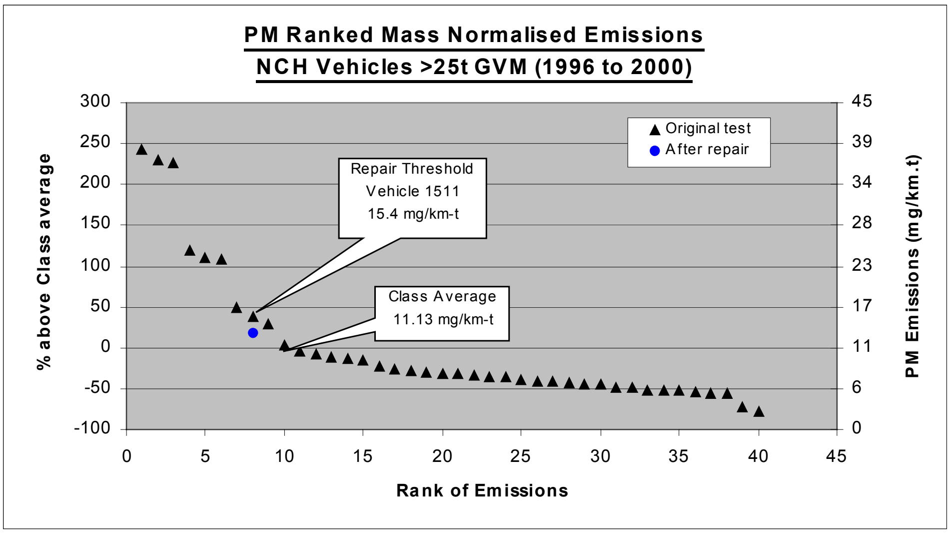


Figure A9-22

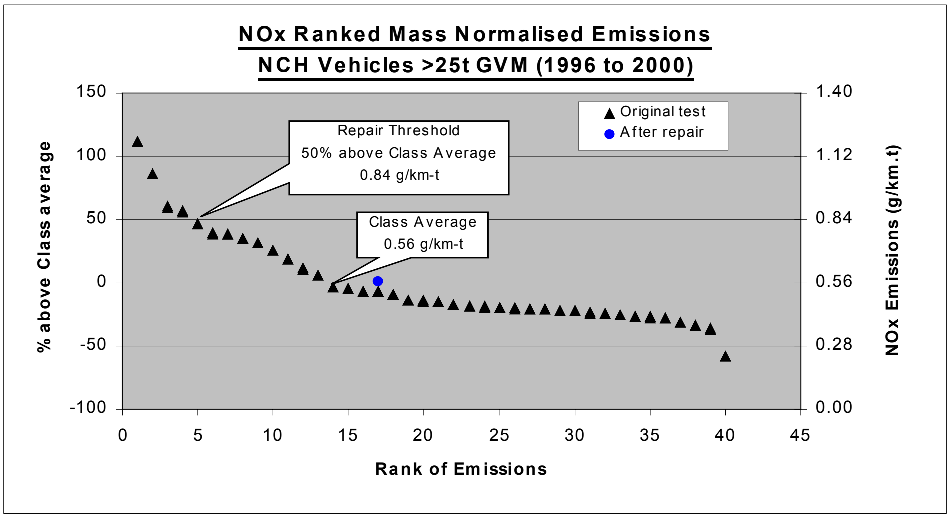


Figure A9-23

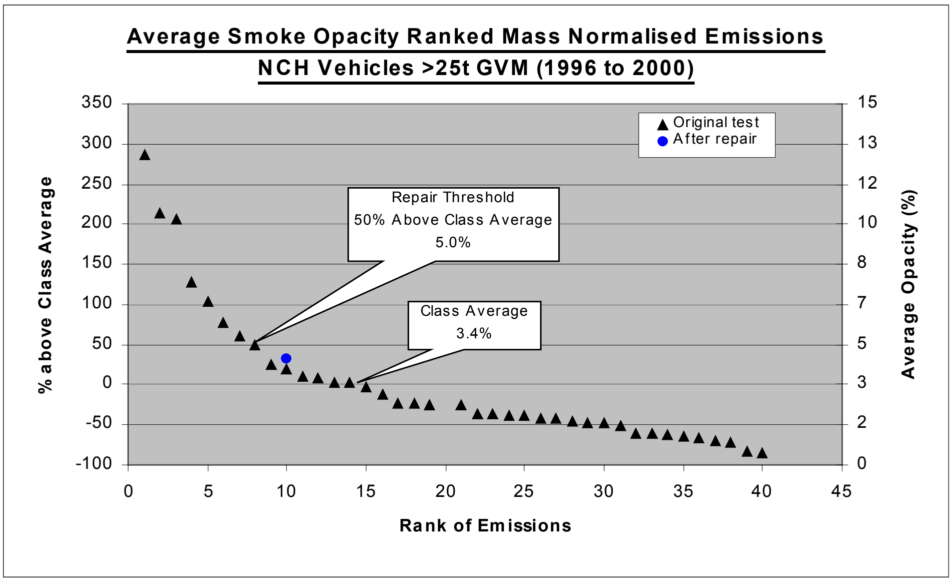


Figure A9-24

Table A9-1
Change In Emissions Due To Exceeding The Nox Repair Threshold

NOx Repairs				
Vehicle Class	**Repair Threshold**	**NOx Change g/km-t**	**PM Change g/km-t**	**Average Opacity Change %**
1&2	>1.07 g/km-t based on repair of test vehicle 1572	-0.57	+-68	-5
3	>1.07 g/km-t based on repair of test vehicle 1695	-0.18	-50	-8
4&5	>1.06 g/km-t based on repair of test vehicle 1023	-0.23	-26	-3
6	>1.24 g/km-t based on repair of test vehicle 933	-0.34	-84	-6
7&8	>1.59 g/km-t based on 50% above class average	-0.33	-9	-1
9	>1.03 g/km-t based on repair of test vehicle 1659	-0.08	-8	-1
10&11	>0.94 g/km-t based on repair of test vehicle 1352	-0.13	-5	0
12	>0.84 g/km-t based on 50% above class average	-0.15	-4	-2

Table A9-2
Change In Emissions Due To Exceeding The Smoke Repair Threshold

Average Opacity Repairs				
Vehicle Class	**Repair Threshold**	**NOx Change g/km-t**	**PM Change g/km-t**	**Average Opacity Change %**
1&2	>16% based on repair of test vehicle 1469	+0.25	-193	-6
3	>16% based on repair of test vehicle 1752	-0.07	-38	-4
4&5	>25% based on 50% above class average	+0.16	-81	-8
6	>17% based on repair of test vehicle 1244	+0.05	-46	-5
7&8	>18% based on 50% above class average	+0.4	-25	-4
9	>11% based on repair of test vehicle 1115	+0.07	+9	-2
10&11	>11% based on 50% above class average	+0.24	-20	-5
12	>5% based on 50% above class	-0.03	-10.6	-3

average

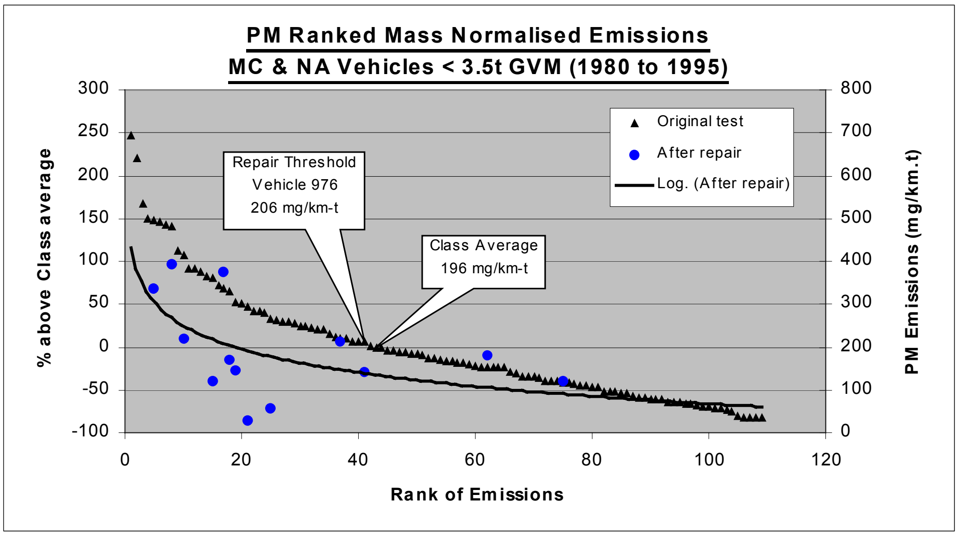


Figure A9-25

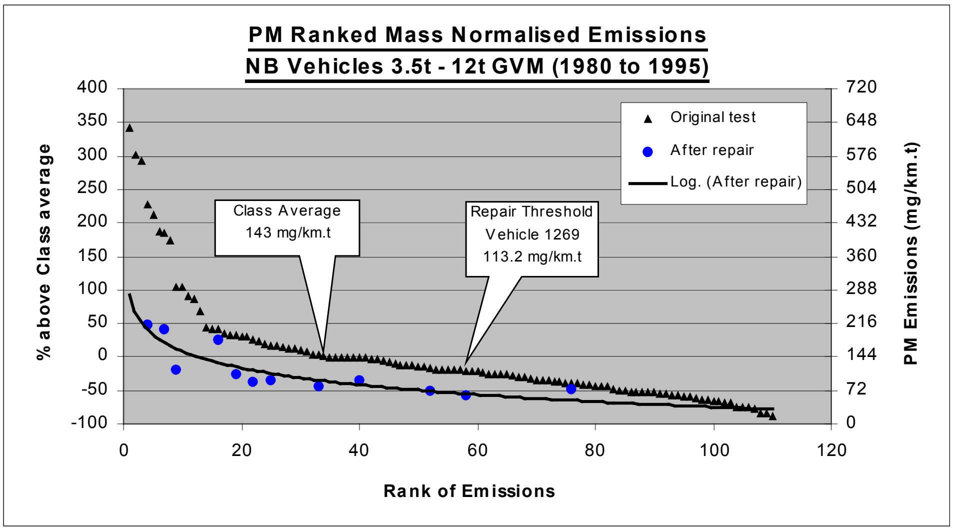


Figure A9-26

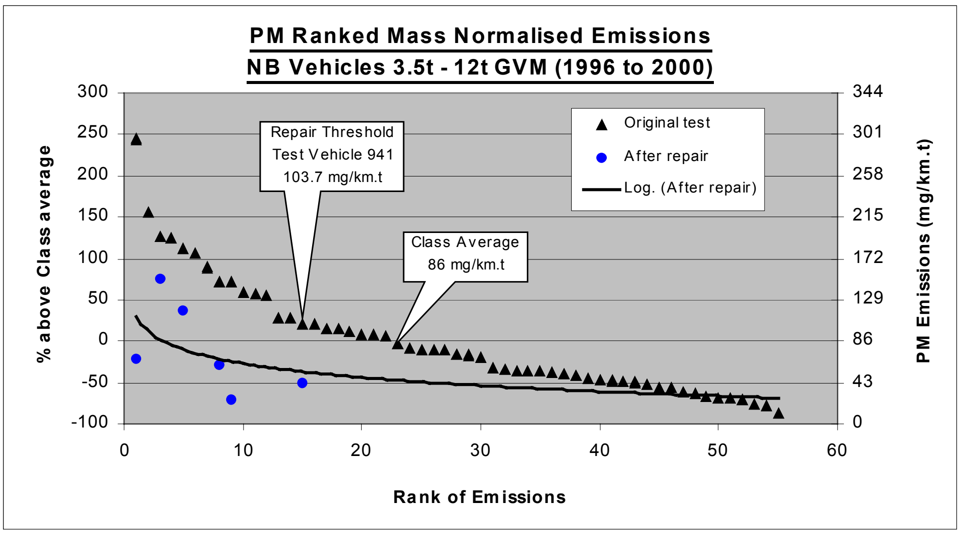


Figure A9-27

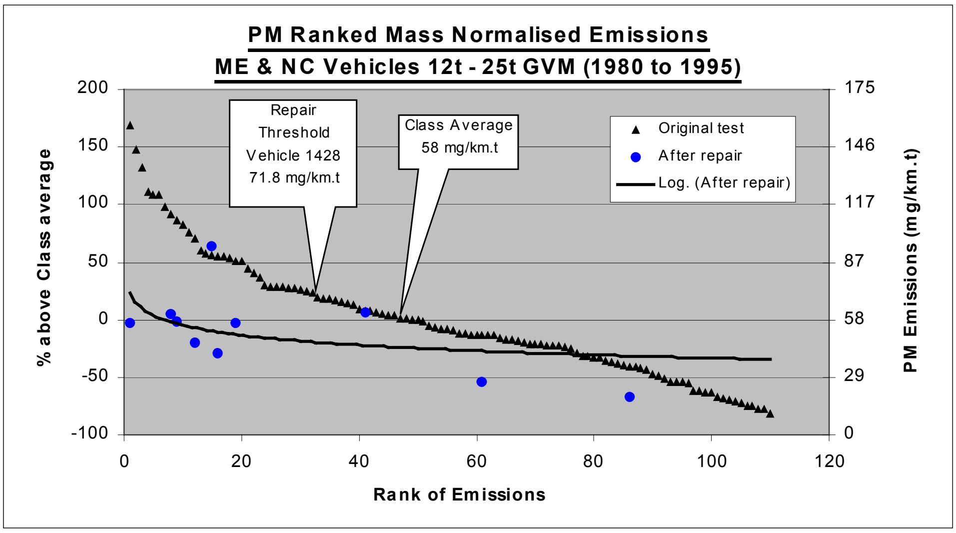


Figure A9-28

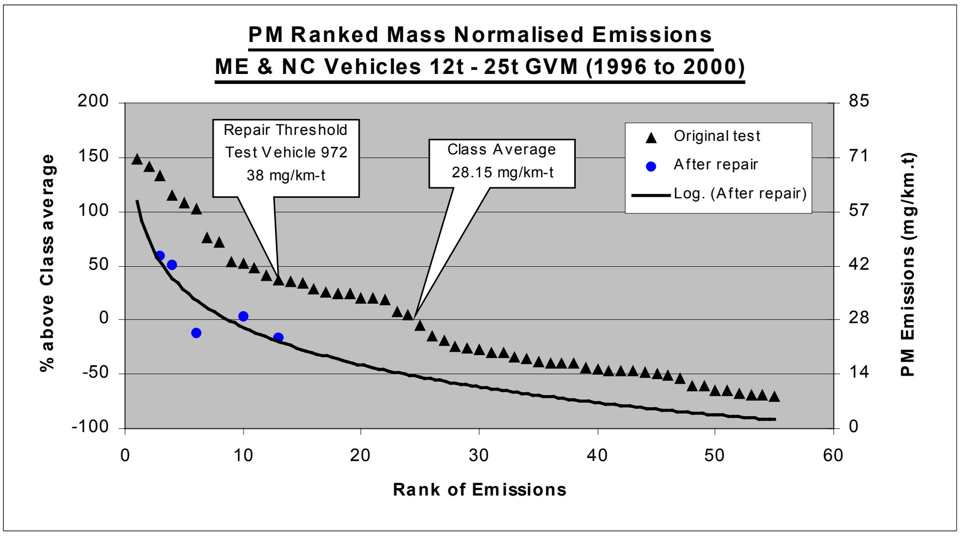


Figure A9-29

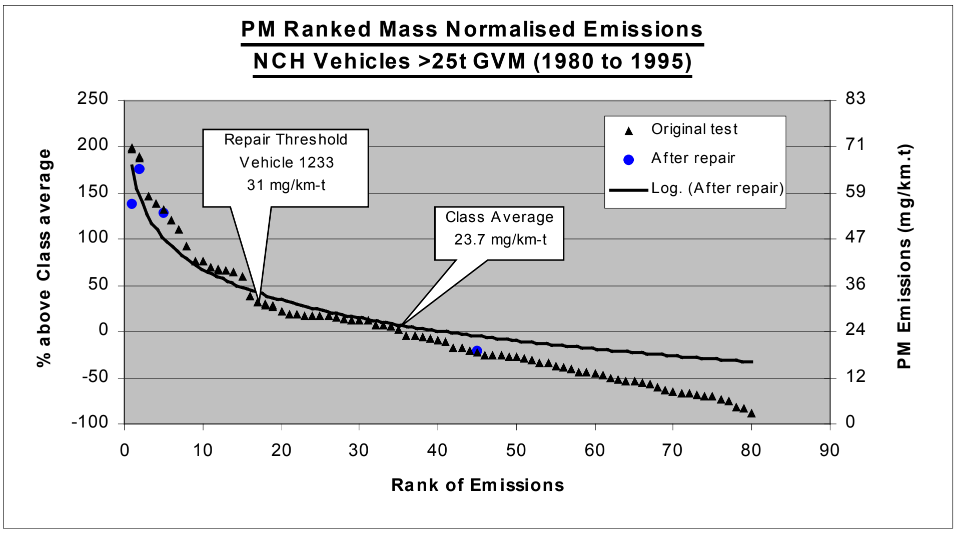


Figure A9-30

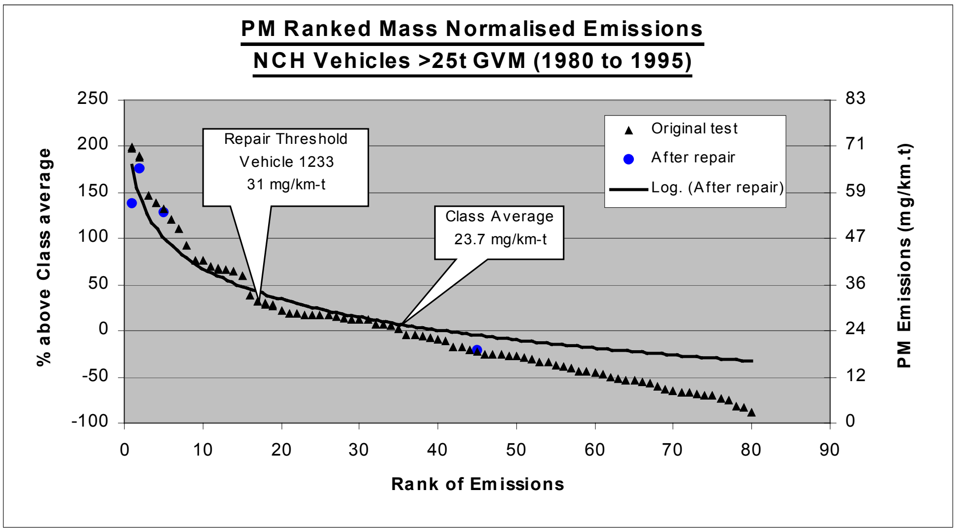


Figure A9-31

Appendix 10

EMISSION HISTOGRAMS

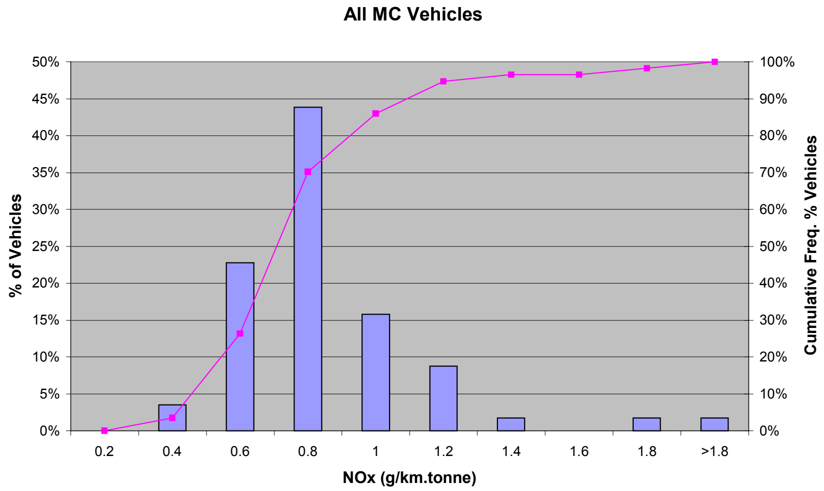


Figure A10.1

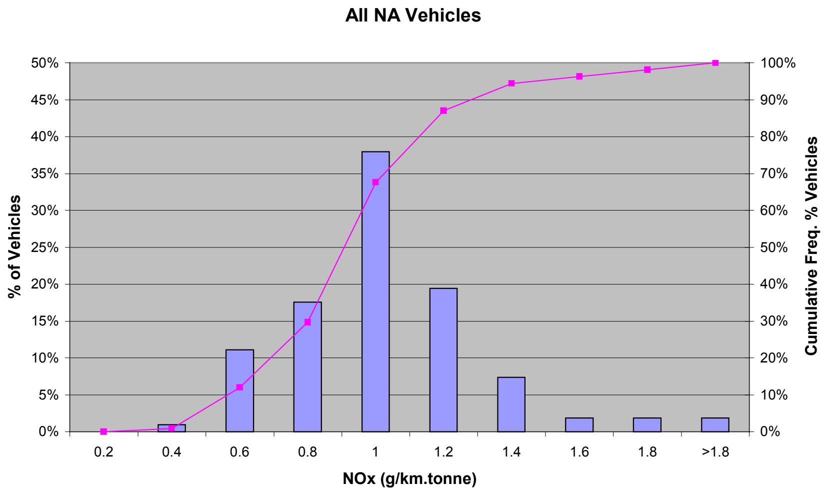


Figure A10.2

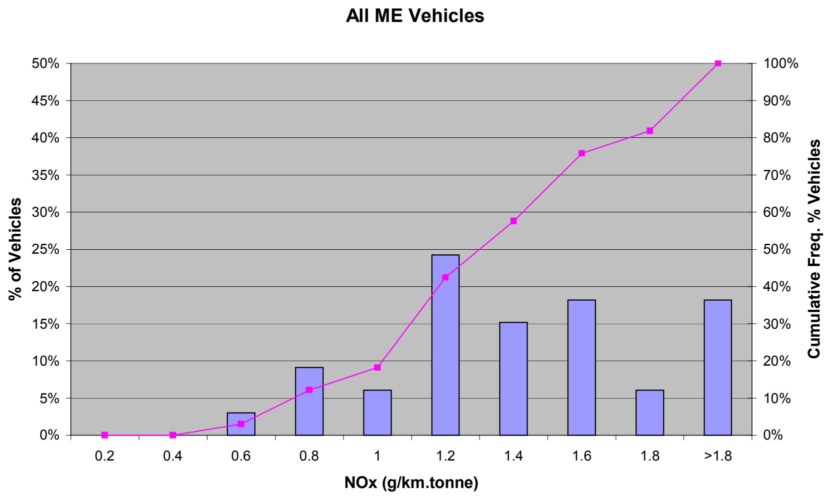


Figure A10.3

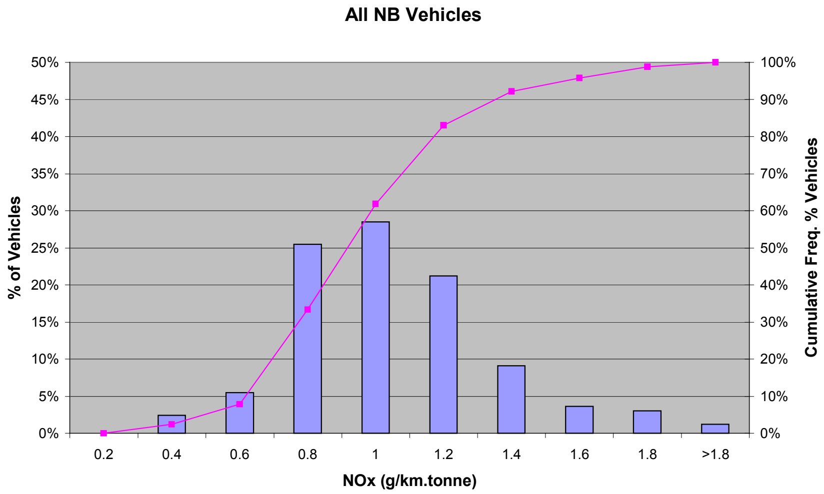


Figure A10.4

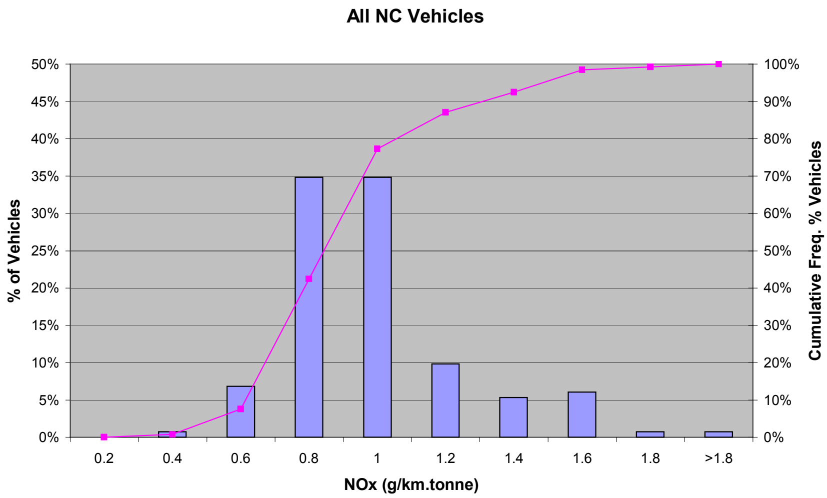


Figure A10.5

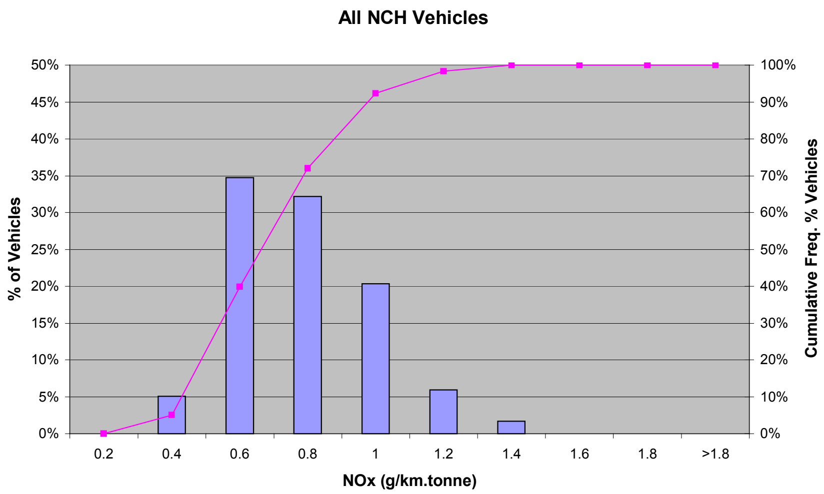
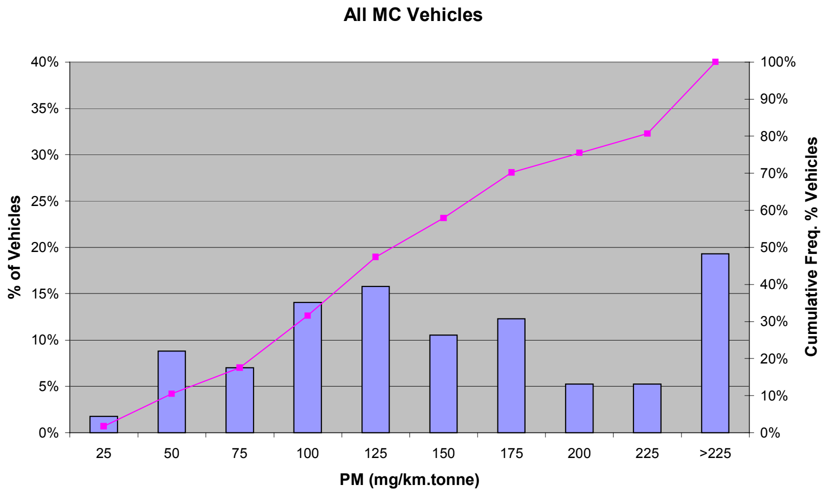


Figure A10.6



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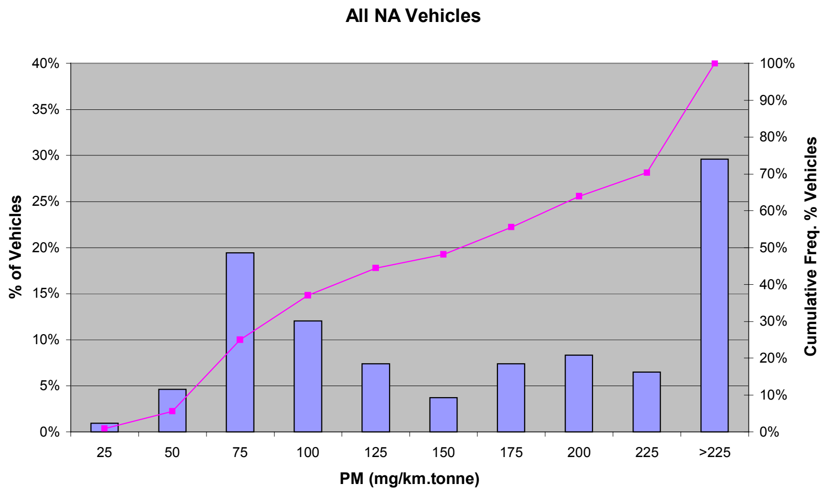

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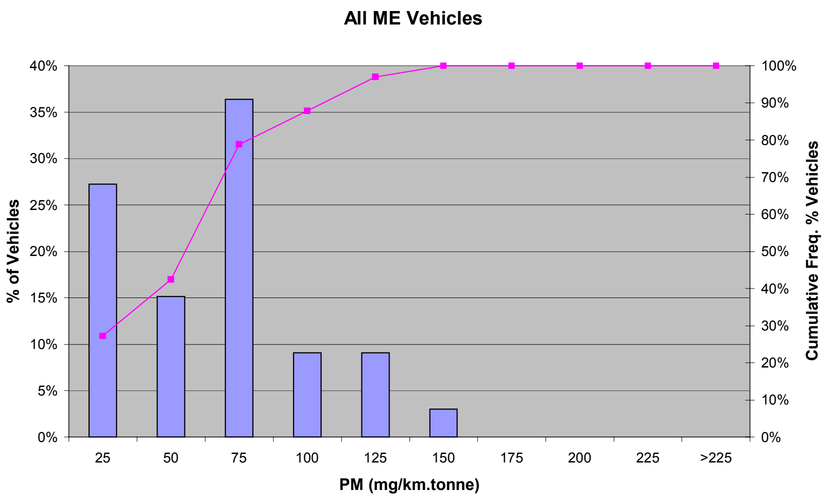

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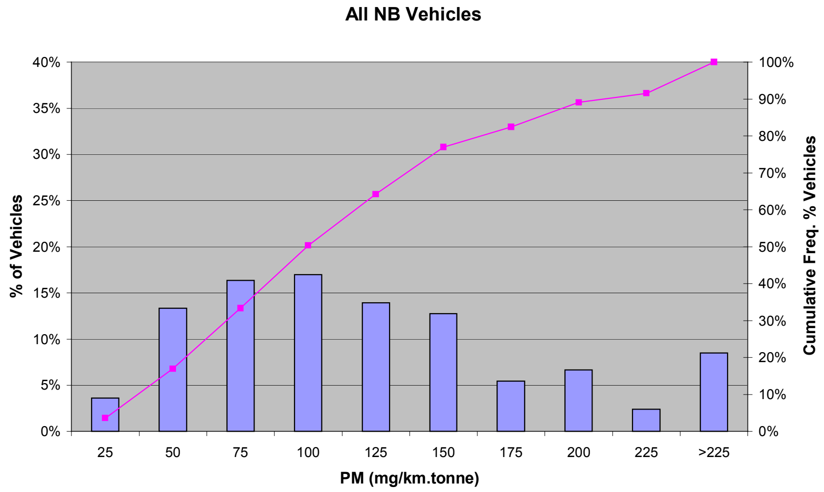

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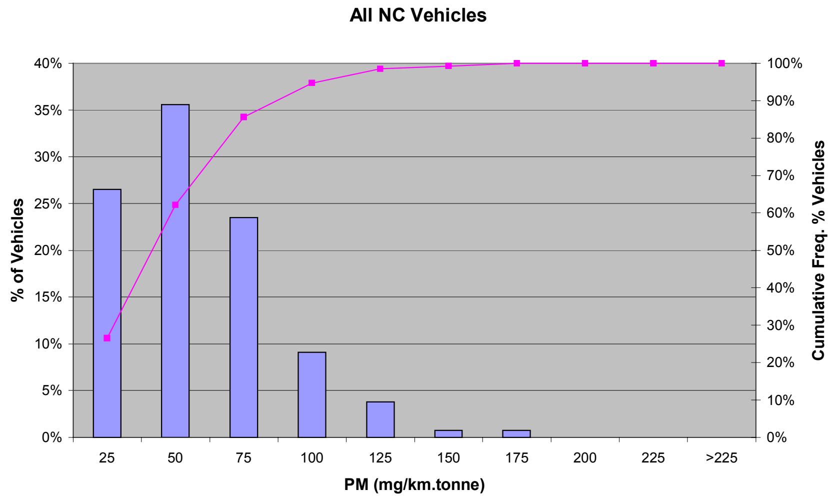


Figure A10.11

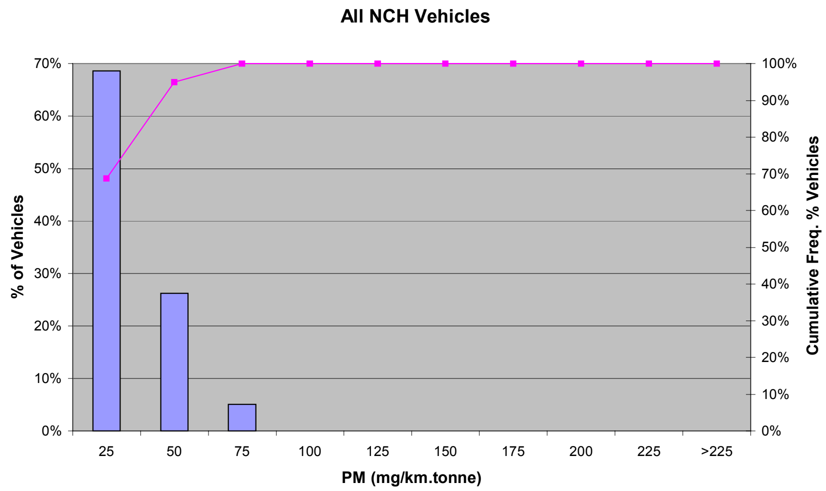


Figure A10.12

Appendix 11

VEHICLE SPECIFICATION WORKSHEET

Table A11-1

TEST NO: DATE:

Parsons Australia

Ownership Details

Name	
Contact Number	
Type of operation	Private use Owner/Driver Small Fleet (less than 10 vehicles) Medium Fleet (10 to 50 vehicles) Large Fleet (50 or more vehicles)
Ownership Status	Private Government
Maintenance Regime	Scheduled maintenance program Repair as required

Vehicle Details

Rego Number	
Vehicle ADR Category	
Tare Weight	kg
GVM	kg
Vehicle Make	
Vehicle Model	
*Compliance Plate Date	/ /
Vehicle Type	Prime mover Rigid truck Ute Light commercial van Minibus Route service bus Other bus Passenger car Offroad vehicle
*Engine Make	
*Engine Model	
Odometer Reading	km (or km since last engine rebuild)
*Engine displacement	L
*No of cylinders	4/ 6/ 8/ 12
*Turbocharged	Yes No
*Intercooled	Yes No
*Fuel System	Direct injection Indirect injection
*Air Filter Condition	Clean Moderate Needs Replacing
* Tampering	Yes No

Pre-test Safety Checks

Tyres	Suitable for testing? Yes No
Drive Line	Safe for test Unsafe for test
Brakes	Safe for test Unsafe for test
Exhaust system	Security - Secure Loose Leakage - Not leaking Leaking
Overall Safety	Is the vehicle in satisfactory condition for testing Yes No

General Comments

Vehicle – on time (min):	Vehicle – off time (min):

Appendix 12

RESULTS SHEET

Table A12-1

PARSONS

Parsons Australia Pty Ltd

1 Short Street , Auburn, 2144, NSW Australia

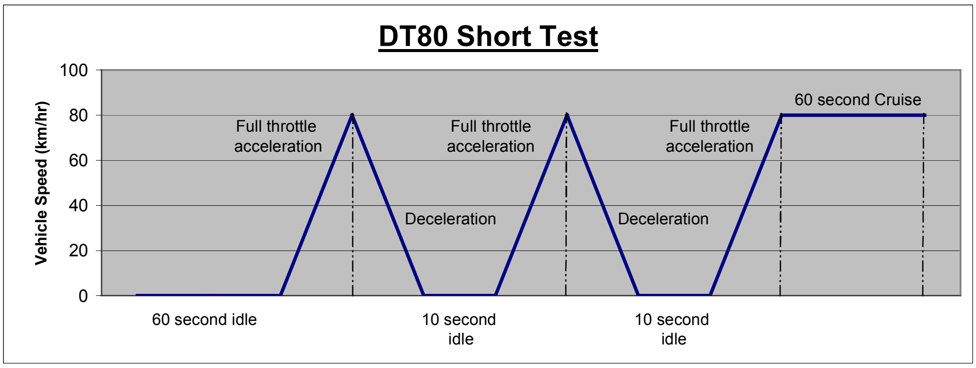
Tel: (+61) 9648 1022 Fax: (+61) 9648 1055

DT 80 (Diesel Short Emissions Test)

Test Date: 1-Jan-01

Test No: 1000

Vehicle Registration No: ABC 123



	NOx (g/s)	Particulate Matter (mg/s)	Average Opacity (%)	Maximum Opacity (%)
DT80 Results	**0.021**	**1.696**	**3.32**	**25.10**

Emission Description

The vehicles exhaust gases are sampled and analysed during the DT80 Short Test to determine the level of NOx, PM and Smoke Opacity. The lower the level of each of these emissions the cleaner the vehicle is.

A brief explanation of each emission is provided below;

Oxides of Nitrogen (NOx)

- Consists of Nitric Oxide (colourless gas) and Nitrogen Dioxide (red/brown gas)
- Are created in the engine during the combustion process when the oxygen and nitrogen in the intake air combine under high temperatures and pressures
- Upon entering the atmosphere from the tailpipe they react with hydrocarbons in the presence of sunlight to form photochemical smog (white haze)
- They are known to adversely effect human health including respirative problems

Particulate Matter (PM)

- Consists of a carbon (soot) core surrounded by various hydrocarbons compounds
- Is created in the engine when there is incomplete combustion of the fuel
- Once emitted from the vehicle they remain suspended in the atmosphere contributing to air pollution in the form of a brown haze
- The very small particles (smaller than the eye can see) can be inhaled causing respirative problems and cancer.

Appendix 13

FAULT DIAGNOSIS & MINOR REPAIR WORKSHEETS

Table A13-1

Fault Diagnosis & Minor Repair Sheet - Black/ White Smoke

Date: ____________ Cook's D&E Job No. __________

Parsons Test No. __________

Vehicle Details

Registration Number: ______________________ Odo (km): ____________________

Vehicle Type: ____

Engine Model: ____

Emissions: NOx: ____________ PM/ Opacity: __________

Fault Diagnosis

	Checklist	Condition 1-Best 5-Worst	Priority to fix 1-Most 5-Least	Estimated Parts Cost ($Retail)	Estimated Labour Cost ($Retail)	Estimated Time (hours)	Settings
1	Engine start						
2	Exhaust Colour						
3	Air filter						
4	Exhaust system						
5	Fuel filter						
6	Fuel pump at full throttle						
7	Glow plug						
8	Pump to engine timing						
9	Fuel injectors						
10	Check tappets						
			Total				

Comments

Vehicle condition before repair (1-best 5-worst)	
Recommended repairs:	
Estimated repair cost ($):	
Vehicle tampering	

Minor Repair

	Checklist	Fixed (yes/ no)	Replaced Items	Actual Parts Cost ($Retail)	Actual Labour Cost ($Retail)	Actual Time (hours)	Settings
1	Engine start						
2	Exhaust Colour						
3	Air filter						
4	Exhaust system						
5	Fuel filter						
6	Fuel pump at full throttle						
7	Glow plug						
8	Pump to engine timing						
9	Fuel injectors						
10	Check tappets						
			Total				

Comments

Vehicle condition after repair (1-best 5-worst)	
Items replaced	
Actual repair cost ($):	
Further repairs required & estimated cost ($):	

Table A13-2

Fault Diagnosis & Minor Repair Sheet - No Smoke

Date: ____________ Cook's D&E Job No. __________
Parsons Test No. __________

Vehicle Details

Registration Number: ______________ Odo (km): ______________
Vehicle Type: ______________
Engine Model: ______________
Emissions: NOx: __________ PM/ Opacity: __________

Fault Diagnosis

	Checklist	Condition 1-Best 5-Worst	Priority to fix 1-Most 5-Least	Estimated Parts Cost ($Retail)	Estimated Labour Cost ($Retail)	Estimated Time (hours)	Settings
1	Engine start						
2	Exhaust Colour						
3	Fuel filter						
4	Fuel pump at full throttle						
5	Glow plug						
6	Pump to engine timing						
7	Fuel injectors						
8	Check tappets						
			Total				

Comments

Vehicle condition before repair (1-best 5-worst)	
Recommended repairs:	
Estimated repair cost ($):	
Vehicle tampering	

Minor Repair

	Checklist	Fixed (yes/ no)	Replaced Items	Actual Parts Cost ($Retail)	Actual Labour Cost ($Retail)	Actual Time (hours)	Settings
1	Engine start						
2	Exhaust Colour						
3	Fuel filter						
4	Fuel pump at full throttle						
5	Glow plug						
6	Pump to engine timing						
7	Fuel injectors						
8	Check tappets						
			Total				

Comments

Vehicle condition after repair (1-best 5-worst)	
Items replaced	
Actual repair cost ($):	
Further repairs required & estimated cost ($):	

Table A13-3

Fault Diagnosis & Minor Repair Sheet - Blue Smoke

Date: ____________ Cook's D&E Job No. __________
Parsons Test No. __________

Vehicle Details
Registration Number: ____________________ Odo (km): ____________________
Vehicle Type: ____
Engine Model: ____
Emissions: NOx: ____________ PM/ Opacity: __________

Fault Diagnosis

	Checklist	Condition 1-Best 5-Worst	Priority to fix 1-Most 5-Least	Estimated Parts Cost ($Retail)	Estimated Labour Cost ($Retail)	Estimated Time (hours)	Settings
1	Engine start						
2	Exhaust colour						
3	Compression test						
			Total				

Comments

Vehicle condition before repair (1-best 5-worst)	
Recommended repairs:	
Estimated repair cost ($):	
Vehicle tampering	

Minor Repair

	Checklist	Fixed (yes/ no)	Replaced Items	Actual Parts Cost ($Retail)	Actual Labour Cost ($Retail)	Actual Time (hours)	Settings
1	Engine start						
2	Exhaust colour						
3	Compression test						
			Total				

Comments

Vehicle condition after repair (1-best 5-worst)	
Items replaced	
Actual repair cost ($):	
Further repairs required & estimated cost ($):	

Appendix 14

TESTING QUESTIONARE

Diesel Vehicle - Emissions Testing - Pilot Project

Thank you for taking part in this project.

The Government is considering a diesel vehicle emissions testing program as one way to reduce air pollution. We want to know whether testing diesel vehicles for pollutant emissions (and then repairing them if needed) is a good way to reduce air pollution.

Please take a few minutes to complete this questionnaire. Your answers are confidential and will help us to design an effective testing program.

Your vehicle

1. Please indicate (✓) each applicable vehicle category

privately owned passenger vehicle	[ ]
employee driver	[ ]
owner/driver subcontractor (1 truck)	[ ]
small fleet (2-5 trucks)	[ ]
medium fleet (6-20 trucks)	[ ]
large fleet (20-100 trucks)	[ ]
government fleet	[ ]
private fleet	[ ]

other: ……………………………………………

Voluntary testing

2. Would you be prepared to voluntarily bring your vehicle to a facility for an emissions test (and possible repair) if it helped to reduce the amount of pollutants entering the atmosphere?

(please circle one) Yes No Unsure

3. Would you be prepared to voluntarily bring your vehicle to a facility for an emissions test (and possible repair) **if it could improve your fuel efficiency**?

(please circle one) Yes No Unsure

Compulsory Testing

Convenience factors.

If you were required to bring your vehicle in for testing, which day would be most convenient and what time of the day?

4a. Which day(s): ……………………………………………………………………….

4b. What time(s): ………………………………………………………………………

4c. What would be a reasonable distance or time you would travel to a testing centre?

Distance: ……………………… km ***or*** Time: ………………………………

4d. Are there any other things that need to be considered to make it easy for you to bring your vehicle in for testing? ***(please list)***

……………………………………………………………………………………

……………………………………………………………………………………

……………………………………………………………………………………

5. A test facility would need to be at a fixed site - what would be the most convenient location for you? ***(please ✓ one)***

Near a major arterial road or highways [ ]

Near diesel vehicle service facilities [ ]

Near diesel fuel outlet [ ]

In light industrial areas [ ]

Near a weighbridge station [ ]

At vehicle safety inspection facility [ ]

Other, ***please specify*** ……………………………………………………………

6. How often do you think such a vehicle emissions test should be carried out? ***(please ✓ one)***

Each year [ ]

Every 2 years [ ]

Every 3 years [ ]

Cost factors

7. What do you believe to be a reasonable cost for a compulsory vehicle emissions test?

(please ✓ one) $30-$50 [ ] $50-$70 [ ] $70-$100 [ ]

8. How much would you be prepared to spend to repair your vehicle to improve its fuel consumption?

$…………………. ***or*** $ ……………… for every litre per 100 km improvement

9. What cost, financial and/or time, have you incurred in participating in this pilot programme?

Cost $………………………… Time ……………………. minutes

Testing procedure

10. Is it important that you are informed of the purpose and details of the programme *before* your vehicle is tested?

(please circle one) Yes No

Why? ……………………………………………………………………………

………………………………………………………………………………………

………………………………………………………………………………………

11. Are you satisfied with the way you and your vehicle have been looked after by the staff while you were here?

(please circle one) Yes No

(If no) Why not? ……………………………………………………………….

………………………………………………………………………………………

………………………………………………………………………………………

12. Were the results from the inspection

a. well explained to you Yes No

b. useful for you? Yes No

Comments: ………………………………………………………………………

13. Are you satisfied with the time taken to undertake an emissions test of your vehicle?

(please circle one) Yes No

Comments: ………………………………………………………………………

14. Do you see any particular hurdles to introducing an ongoing diesel vehicle emissions testing programme?

…………………………………………………………………………………

…………………………………………………………………………………

15. Do you have any other comments or concerns about the vehicle emissions test procedure?

…………………………………………………………………………………

…………………………………………………………………………………

16. If you had to show that your vehicle does not pollute, which of the following options would you prefer, to show that your vehicle is clean?

(please ✓ one or more)

Undergo regular vehicle emission testing [ ]

Submit audited records of regular vehicle maintenance [ ]

Retrofit vehicle with pollution control technology [ ]

Undergo training for fuel efficient driving [ ]

Other, ***please specify*** ……………………………………

(Optional) For survey verification purposes only, may we have your contact details

Name: ………………………………………… Telephone contact: ………………..…...

Thank you for your time in completing this questionnaire. It really is appreciated. If you have any questions about the testing project, or this survey, you may contact Mr Marc Thompson at the National Environment Protection Council Service Corporation on 08 8419 1202.

Please return your completed questionnaire to the testing facility staff member.

THANK YOU!

Appendix 15

TEST EQUIPMENT SPECIFICATIONS

TEST EQUIPMENT SPECIFICATIONS

A15.1 DYNAMOMETER

A15.1.1 Dynamometer Identification

All dynamometers shall have an identification plate permanently affixed showing, as a minimum, Dynamometer Manufacturer's Name, Production Date, Model Number, Serial Number, Dynamometer Type, Maximum Axle Mass, Maximum kW Absorbed, Roller Diameter, Roller Width, Base Inertia Mass, Electrical Requirements (including Voltage and Amperage).

A15.1.2 Axle Configuration

The dynamometer shall be suitable for testing the following vehicle types:

- two-wheel drive (front or rear axle)
- dual axle drive vehicles that have a differential lock or equivalent device allowing power to be transmitted through a single axle without damage to the vehicle.

A15.1.3 Axle Mass and Vehicle GVM

The dynamometer rollers, bearings and other structural components shall accommodate vehicles with a maximum individual axle mass (with the vehicle in the as-tested condition) of 7,000kg and a maximum Gross Vehicle Mass (GVM) or Gross Combination mass (GCM) of 45,000kg..

The strength of the dynamometer's structural components shall take full account of any additional loads likely to be imposed by vehicles being driven over the rollers; braking, acceleration and restraint forces; or any other externally or internally applied loads arising from reasonably foreseeable test lane operations.

A15.1.4 Track and Wheelbase

- The dynamometer shall have a useable track width of at least 2,500mm.
- The dynamometer rollers shall have a minimum overall width of 2,600mm.
- The space between split rollers shall not exceed 750mm.
- Vehicle restraints and dynamometer structure adjacent to the rollers shall be configured and located so as to minimise the potential for tyre damage. Tyre damage includes, but is not limited to, excessive scrubbing or cuts to tread or sidewall caused by contact with either the dynamometer or the restraints.
- The dynamometer and any ancillary equipment shall be designed to minimise the potential for damage to any part of the vehicle during testing, ingress or egress under normal operation.

A15.1.5 Maximum Vehicle Speed

The dynamometer shall be designed to accommodate vehicle speeds of up to 100km/h.

A15.1.6 Power Absorption

The dynamometer's power absorption system shall be capable of accurately applying steady-state and transient loads for vehicles with a test mass of up to 45,000kg GVM or GCM when driven on a range of user-defined drive cycles.

A15.1.7 Power Absorption Modes

For vehicles with a test mass of 1,400kg to 30,000kg the dynamometer shall be capable of applying loads equivalent to the net sum of:

(a) aerodynamic and tyre rolling resistance loads for speeds up to 100km/h;
(b) positive acceleration rates up to 1.0 m/sec^2
(c) deceleration rates up to the equivalent effect of the fixed mechanical inertia of the dynamometer's rotating components.

Note: *The power absorber is not required to provide overrun inertia simulation by "motoring" during periods of* ***deceleration****. Deceleration inertia loads will be limited to those incidentally applied by the mechanical inertia of the dynamometer rotating components, including the fixed flywheel. Aerodynamic and tyre rolling resistance loads should, however, be partially or completely removed, as appropriate, during periods of deceleration in order to maximise the accuracy and effect of the mechanical inertia.*

A15.1.8 Power Absorber Resolution & Accuracy

The power absorber control commands shall have a resolution equivalent to increments of tractive effort not exceeding 50N

A15.1.9 Base Inertia

The dynamometer shall be equipped with a mechanical flywheel(s) providing a total base inertia mass for the dynamometer system of 1,400kg ±40kg (This may be increased to 2,500kg if it is intended that the facility shall measure emissions only from medium and heavy duty vehicles with a GVM exceeding 3.5 tonnes). The actual inertia mass ±10kg shall be marked on the dynamometer ID plate. The principal function of the mechanical inertia is to assist with system stability and to avoid excessive rotational speed loss during gearchanges.

A15.1.10 Inertia Simulation

The dynamometer shall be capable of applying transient inertia loads, during **acceleration** phases only, equivalent to an acceleration rate between 0 to 1.0m/sec^2 for a vehicle test mass range 3,500 to 30,000kg. This requirement is subject to the total dynamometer load not exceeding the power envelope of vehicles under test.
For acceleration inertia simulation above the fixed base inertia, mechanical or electrical inertia simulation, or a combination of both, may be used.

A15.1.11 System Response

The torque response to a step change (increasing load) shall be at least 90% of the command value within 300 milliseconds. The dynamometer shall be designed to shed residual load during step change decelerations as quickly as possible, preferably in less than 100 milliseconds. The equipment manufacturer shall state the time required to reduce power absorber load from 50% of maximum torque down to 10% of maximum torque.

A15.1.12 Rollers

Size and Type:

- The dynamometer roller diameter shall be between 250 and 400 mm.
- The dynamometer shall be equipped with twin rollers, which may optionally be laterally split..
- Laterally split rollers shall be electrically or mechanically coupled such that their speed is synchronised to within 0.2km/h.

- The nominal centreline spacing between the front and rear rollers shall be determined by the following equation.

  Roller Spacing = (620 + D) × Sin 31.52°, where D = Roller Diameter (mm)

- The actual spacing shall be within +12 and -6 mm of the calculated value.
- The front and rear rollers shall be parallel to within 2 mm as measured by the centreline differential across the maximum roller width.
- Other configurations may be considered by the Client.

Roller Speed Measurement

Roller speed measurement shall be accurate to within 0.2 km/h for speeds between 5km/h and 100km/h.

Roller Characteristics

The roller size, surface finish, and hardness shall be such that tyre slippage is minimized, that water removal is maximized, that the specified accuracy of distance and speed measurements are maintained, and that tyre wear and noise are minimized.

A15.1.13 Axle Pull-Down

The dynamometer shall have facilities for applying a vertical load of not less than 3.0tonnes on the drive axle in order to minimise tyre slippage. The design and materials used shall minimise the potential for damage to hoses or any fittings located on or around the axle. Interlocked control switches for applying the load shall be positioned such that the potential for injury to operators is also minimised.

A15.1.14 Other Requirements

Vehicle Restraint

The dynamometer system shall be equipped with a means or device for restraining vehicles under test. Its primary function shall be to limit the vehicle's side-to-side movement on the dynamometer rollers. The restraint system shall be designed to minimise unintended vertical and horizontal force on the drive wheels.

The restraint system shall allow unobstructed vehicle ingress and egress and shall be capable of safely restraining the vehicle under all reasonable operating conditions.

Level Operation Surface

Vehicles shall be approximately level (not to exceed ±5°) while being tested on the dynamometer.

A15.1.15 Lift Platform and Roller Brakes

- A lift platform situated between the rollers shall be installed
- A roller brake which securely locks the rollers shall be installed.
- When the lift platform is raised and the roller brake is actuated, the vehicle shall enter and leave the dynamometer without causing roller spin.
- Operation of the roller brake shall be independent of the lift platform.
- The lift platform shall be capable of being activated by a driver seated in the vehicle.

- The lift platform shall be operable only when the rollers are not rotating. A roller speed interlock system shall prevent raising of the lift platform and non-emergency engagement of the roller brakes while the roller(s) are rotating

A15.1.16 Driver's Aid

The dynamometer system shall be equipped with a driver's aid that shall be clearly visible to the driver during the loaded-mode test. The aid shall continuously display the required speed, the number of seconds into the test mode, driver's actual speed/time performance (a display showing deviation between set-point and actual drive trace), and necessary prompts and alerts. The driver's aid shall also be capable of displaying test and equipment status and other messages as required.

Display meters shall be installed to provide simultaneous speed, force and power readings for both the vehicle driver and the operator console, viz:

- Roller speed (km/h)
- Tractive force (N)
- Tractive power (kW)

A15.1.17 Driver's Remote Control

Each dynamometer system shall be equipped with a means of allowing the driver to start the test, perform an emergency stop, and perform other necessary and convenient functions related to the test, while seated at the driving position inside the vehicle.

A15.1.18 Engine Cooling Fan

A fan shall be provided for cooling the engine of the vehicle under test. It shall be mobile or positionable in front of the vehicle, and adjustable in such a manner that the catalyst is not cooled abnormally. The fan shall have a maximum outer diameter of 1,000mm. The fan must provide at least 10,000m^3/h or at least 5 m/s air velocity averaged over the cross section of the fan, whichever is greater. The fan shall have an on/off switch. In addition, an optional remote control shall be offered which allows the technician to activate the fan from the driver's seat. The remote control may use software and/or hardware to activate the fan.

A15.1.19 Safety Provisions

The dynamometer shall provide a means of facilitating the removal of the vehicle in case of system failure or power outage.

A15.2 DYNAMOMETER CONTROL SYSTEM

15.2.1 Drive Cycles.

The dynamometer control system shall be supplied with the capability to run an unlimited number of user-defined driving cycles, which shall be readily loaded and stored by the system manager, through password access.

The dynamometer control software shall be designed with a simple and intuitive "user friendly" interface for setting up load, speed, time, drivers aid and tolerance band parameters to define alternative test protocols. Proposals should provide graphical examples of the operation of the user interface, including screen captures if possible.

The dynamometer control software shall be capable of loading an Excel spreadsheet or comma delimited file containing a speed-time profile (in one second increments) and translating this data into a graphical drive trace on the Driver's Aid monitor as well as continuously generating, monitoring and correcting dynamometer load commands.

Tolerance bands or "Tramlines" shall clearly show on the Driver's Aid screen the allowable speed tolerances relative to the nominal drive trace. The error bands (positive and negative) shall be capable of being inputted, together with the nominal speed-time trace data, in any of the following forms:

- constant value (km/h)
- constant percentage of nominal drive trace speed
- mathematical algorithm based on drive trace speed
- directly inputted numerical values
- any combination of the above

The system shall be capable of determining, and recording the distance travelled at any point in the test cycle, elapsed time in test cycle, and all errors in the performance of the driver in following the required drive cycle trace.

A15.2.2 Load Calculations and Update

The retardation load applied to the vehicle under test will be continuously monitored and adjusted to provide the correct road load for the type, mass and the speed of the vehicle under test, when any valid drive trace is driven (*see loading and inertia error sections above*).

The equipment manufacturer shall describe the proposed dynamometer load control algorithms and how they take account of:

* rolling resistance
* aerodynamic drag (including drag coefficient and vehicle frontal area)
* air density,

and what provisions are made to alter these values.

Load commands shall be updated at least ten times per second.

Actual dynamometer load and speed shall be recorded in the vehicle test file on the same time base as the emission measurements (at least once every second).

The software shall also provide facilities for the emissions measuring system operator to load vehicle-specific data, including registration number, VIN and other similar data (to be defined by the Client). Input systems shall be designed to minimise entry time and the potential for input errors.

A15.3 EXHAUST SAMPLE HANDLING AND PRE-CONDITIONING

A15.3.1 General

The emissions measuring system shall include exhaust sample handling arrangements that allow accurate measurements to be made of exhaust emissions on a g/km basis (plus smoke opacity of the raw exhaust), for any drive cycle.

The system shall be designed to ensure durable, leak free operation and be easily maintained.

Materials that are in contact with the gases sampled shall not contaminate or change the character of the gases to be analysed.

The sample temperature at which particulate matter is be measured must be below 51.7C and the dew point of the sample shall be at least 10^{o}C less than the temperature of the sample and any surfaces in contact with the sample.

The sampling system shall be designed to withstand typical vehicle exhaust temperatures when the range of vehicles are driven through the DT80 test cycle.

A15.3.2 Total Mass Flow

CVS System (Optional)

If a constant volume sampling (CVS) system is employed, the equipment manufacturer shall provide documentary evidence that the total mass flow of exhaust (including the diluent stream) at the point of emission sample take-off is controlled so as to maintain the equipment's nominated volumetric flow rate to within an accuracy of ±3.0% (normalised to standard temperature and pressure).

Non-CVS Systems (Optional)

If a sample handling system other than a CVS is employed, validated methods shall be utilised to convert gaseous and particulate sample instrument readings to determinations of total exhaust mass emission rates of each pollutant expressed in g/km, g/kWh, g/kg fuel used, or as required by the client. Total exhaust mass flow determinations performed under this option shall not introduce additional measurement errors greater than 3%. Exhaust flow determinations shall be logged on the same time base as the emission measurements for the duration of the complete drive cycle.

Ambient Condition Recording

Humidity

The humidity measuring device shall have the following minimum characteristics:

- Range: 5% - 95% Relative Humidity
- Sensor Accuracy: ±3% of full scale or better
- Operating Temperature Range: 2°C- 43°C

The relative humidity reading shall be recorded in the *Relative Humidity* field of the test record.

Ambient Temperature Measurement

Ambient temperature shall be measured continuously and shall be recorded in the *Ambient Temperature* field of the test record. The temperature measuring device shall have the following minimum characteristics:

- Range: 0 - 60°C
- Accuracy: ±1.7°C

Barometric Pressure

Barometric pressure shall be measured continuously and shall be recorded in the *Barometric Pressure* field of the test record. The barometric measuring device shall have the following minimum characteristics:

- Range: 60 - 81 mm. Hg absolute
- Accuracy: ± 3% of point or better
- Operating Temperature Range: 2°C - 43°C

Water Removal and Sample Filtration

The particulate filter shall be capable of trapping 97% of all particulates and aerosols 5 microns or larger from entering the gaseous analysers. *Note: The particulate sampling elements of the system shall have no particulate filtration upstream of the particulate measuring sub-system.*

The filter element(s) in the gaseous sampling stream shall not absorb or adsorb hydrocarbons.
The water trap shall be sized to remove exhaust sample water from vehicles fuelled with diesel, diesohol, petrol, petrohol, propane/butane (LPG), compressed natural gas (CNG), as well as a combination of fuels such as diesel/CNG. The filter element, bowl and housing shall be inert to these fuels as well as to the exhaust gases from vehicles burning these fuels. Condensed water shall be continuously drained from the water trap's bowl. Sufficient water shall be trapped, regardless of fuel, to prevent condensation in the sample system or in the optical bench's sample cell.

A15.4 GASEOUS EMISSIONS MEASUREMENT

This section defines the requirements for the equipment needed to determine the concentrations of the exhaust gases of interest during the tests. It covers the analysers/sensors, calibration and the sample handling system.

A15.4.1 General

The analyser shall be compatible with all types of Diesel, Petrol and alternative fuel automotive service operating environments. The necessary hardware and software connectivity details shall be sufficient to allow a seamless interface between the exhaust measuring system and the dynamometer control system that meets all of the requirements of the specification. The system must generate a result, (corrected for atmospheric conditions) in "real time" on a mass flow basis and report, by printout the results in units of grams/km-tonne and % opacity.

A15.4.2 Tamper Resistance

Except for calibration and maintenance, the emission analyser and the sampling system shall also be made tamper-resistant.
System operators shall be prevented from creating or changing any test results, programs or data files contained in the emissions measuring system except as specifically provided for elsewhere in this specification.
Access to the system software and/or hardware shall be controlled via a hierarchy of passwords.

A15.4.3 Measured Emissions

Gases and other emissions to be measured are:

- total hydrocarbons (THC), parts per million as hexane (ppmh);
- methane (CH4) ppm;
- carbon monoxide (CO), percent;
- carbon dioxide (CO_2), percent;
- oxygen (O_2), percent;
- nitric oxide (NO), ppm;
- particulate matter less than 2.5 micron nominal diameter($PM_{2.5}$), mg,
- smoke opacity, %

- Oxides of nitrogen are to be calculated from the measured NO concentration using sample condition corrections and USEPA specified formulae.

A15.4.4 Emissions AnalyserS

Range and Accuracy

The range and accuracy of emission analysers that are used to sample raw gas shall be consistent with the values in the table below. Where the emissions measuring system utilises dilution air, the range and accuracy of the analysers shall be selected such that the diluted flow is measured to the same overall degree of accuracy. Equipment manufacturers shall provide calculations and/or test data to verify that this condition is met.

Range and Accuracy

Gas	Range	Accuracy, % of point	Accuracy, absolute	Range	Accuracy, % of point	Accuracy absolute
HC	0-2000ppmh	±3%	4ppmh	2001-5000ppmh 5001-9999ppmh	±5% ±10%	N/A N/A
CO	0-10.00%	±3%	0.02%CO	10.01-14.00%	±5%	N/A
CO_2	0-16%	±3%	0.3%CO_2	16.1-18%	±5%	N/A
NO	0-4000ppm	±4%	35ppm	4001-5000ppm	±8%	N/A
O_2	0-25%	±5%	0.1%O_2			-
CH_4						
Opacity **	0-100%	N/A	±2%			
PM2.5	0.001~100 mg/m^3					

** *Opacity to be measured in raw gas stream, regardless of dilution for other emissions.*

Analyser/Sensor Response Times

Analyser/sensor response times are defined as follows:
Rise time: When a gas is introduced to a sensor's sample cell inlet or inlet port (t_0), the time required by the sensor's output to rise from first indication of response to the input gas to a given percentage of the final stable reading of a gas's concentration. Two rise times are specified:
T_{90}: The time required to reach 90% of the final gas concentration reading from first indication of response to the input gas.
T_{95}: The time required to reach 95% of the final gas concentration reading from first indication of response to the input gas.
Fall Time: When a gas is removed from a sensor's sample cell inlet or inlet port (t_S), the time required by the sensor's output to fall from first indication of withdrawal of the gas to a given percentage of the final stable reading of a gas's concentration. Two fall times are specified:
T_{10}: The time required to fall to 10% of the stable gas concentration reading from first indication of withdrawal of the gas.
T_5: The time required to fall to 5% of the stable gas concentration reading from first indication of withdrawal of the gas.

Requirements

	Maximum Response Time in Seconds For Each Channel

	HC, CO, CO_2	NO	CH_4	Opacity	PM
T_{90}	3.5	4.5	3.5	2.0	3.5
T_{95}	4.5	5.5	4.5		4.5
T_{10}	3.7	4.7	3.7		3.7
T_{5}	4.7	5.7	4.7		4.7

A15.5 OPACITY

The opacity meter used shall be a partial-flow device, meeting the performance requirements of ISO 11614, and shall interface seamlessly with the analyser software via an RS232C or Universal serial Bus (USB) port. Adjustments such as electronic signal filtering shall be incorporated so as to correlate with other opacity-measuring devices and standards. Other methods of measuring opacity may be submitted for consideration. The devices shall be calibrated by a method and at a frequency approved by Client.

A15.6 ANALYSER OUTPUTS

Analysers are required to provide a continuous electrical output signal to allow continuous recording and calculating of the exhaust emissions.

A15.7 TESTING THROUGHPUT CAPABILITY

The emissions analyser shall be designed so that it is capable of performing at least 10 tests per hour for eight consecutive hours without experiencing excessive hangup or other deleterious effects.

A15.8 PARTICULATE EMISSIONS MEASUREMENT

The emissions measuring system shall be capable of measuring fine particulate emissions, using a sample stream collected on the same time-base as measurements of other emissions and system parameters.

A15.8.1 Particulate size

The particulate measuring sub-system shall be capable of continuously measuring emission rates of fine particulate matter with a nominal diameter of less than 2.5 microns ($PM_{2.5}$). The equipment manufacturer shall also indicate whether the system is capable of measuring other particulate size ranges (ie TSP, PM_{10}, $PM_{1.0}$).

A15.8.3 Measurement Range

The particulate measuring sub-system shall be capable of measuring exhaust particulate emission concentrations (normalised to raw exhaust conditions if dilution is employed) over a range of at least 0.01 to 200 mg/m^3 (ie, if the exhaust sample is diluted at a nominal ratio of 4:1, then the actual measuring range of the system shall be 0.002 to 40 mg/m^3.

A15.8.4 Measurement Accuracy

The measurement accuracy of the system shall be validated by back-to back testing with a standard gravimetric filter method (eg. using equipment and sample preconditioning procedures meeting the US Code of Federal Regulations (CFR) for light duty vehicles, part 86.110-94). For this testing, both measuring systems shall measure from the same sample stream simultaneously and over the same period of time. The equipment manufacturer shall provide documentary evidence that the system proposed has an overall (R^2) correlation of at least 0.85 with the reference filter .

A15.9 SAMPLE PRECONDITIONING

The particulates sample shall have a temperature not exceeding 51.7^{0}C at the point of measurement. The sample shall have a dew point at least 5^{0}C below the temperature of the sample or any surfaces with which the sample comes into contact that could cause precipitation of particulate matter from the sample. If the sample is diluted prior to measurement, the dilution gas shall be zero or filtered air or inert gas that will not introduce measurement errors.

A15.9.1 Calibration & Maintenance

The particulate measuring sub-system shall be suitable for use in a workshop environment and for transportation without special handling procedures. Any components requiring routine replacement, cleaning or adjustment shall be readily accessible. All routine maintenance, cleaning and consumable replacements shall be capable of being performed by a trained, semi-skilled operator.

A15.10 SYSTEM INTEGRATION, DATA MANAGEMENT AND STORAGE

A15.10.1 System Integration

The dynamometer, dynamometer control systems, sample handling, analysers and ancillary systems shall operate as a single, integrated system. If more than one control computer or software package are employed, they shall be linked such that lane operations personnel have a single, simple interface.

All computer systems shall, unless specifically approved by the Client, be IBM PC-compatible and shall have standard input and output interfaces for operator inputs or for communicating with external devices. Unless otherwise approved, all software shall run under MS-DOS or Microsoft Windows operating systems.

A15.10.2 System Inputs

Operator Level

Operator inputs shall be limited to:

- vehicle license plate
- VIN
- make and model
- plated tare mass and GVM, if applicable

- comments on test report (ie reasons for rejection on safety grounds, etc).

To the greatest extent possible, automated or semi-automated responses should be provided, via touch screens, menu choices, bar-coding and the like.

System Manager Level

Using a hierarchical password structure, system managers and technical specialists shall have the capability to modify, update or replace

- calibration settings
- test cycle profiles and error bands
- dynamometer road load algorithms
- lock-out values
- communication protocols and auto-dial numbers, and similar

A15.10.3 Input/Output File Formats

All test data relating to vehicle identification, test conditions, test results and any operator comments shall be stored and exported in Microsoft Excel, Microsoft Access, or comma delimited format, to a structure defined by and agreed with the Client.

Calibration data shall be stored in the emissions measuring system using date and time-stamped files of a similar structure to those used for test results.

A15.10.4 Local Data Storage and Backup

All test and calibration data shall be stored locally on the emission measuring system's computer and shall be mirrored on a second hard disk. Automatic daily backups shall be performed and stored off-site in a secure, fire protected environment. Backups may use tape, CD-ROM or other reliable removable media for data storage. Provision shall also be made for archiving data beyond a pre-determined date.

A15.10.5 Communications

External communications shall be via standard modem links and protocols (land-line or wireless). The communications system shall also be capable of operating via a local area network (LAN) or wide area network (WAN).

A15.11 ELECTRICAL POWER SUPPLY, UTILITIES, SAFETY

A15.11.1 Electric Power

The test equipment shall operate with the following electrical supply voltages:

- 240 Volt (±10%) 50Hz and/or
- 415 Volt (±10%) 50Hz (three phase, four wire)

Installation shall conform to the latest editions of the relevant Australian Standards. All power points shall be protected by residual current devices (30 mA protected)

The controls at the electronic and display section shall include, as a minimum:

- Emergency stop switch
- Operator interface and displays.

Two switches shall be accessible from the drivers seat

- Lift platform switch
- Roller brake switch

If these switches are operable from control console a safety interlock or alert to the driver shall be installed.

The minimum requirements for controls and instrumentation at the power section are as follows

- Emergency stop switch (palm push – mechanical release.
- Main power switch (lockable in the off position)
- Running-time (hour) meter
- Fault protection circuit(s)

A15.11.2 SAFETY DEVICES.

All safety devices for protection of the equipment shall be as independent of the processor as practical.

Warning lights on the dynamometer indicating the status of the lift platform and roller brakes shall be visible to the driver of the vehicle.

The dynamometer shall have the following personnel safety devices:

* A safety barrier to prevent personal contact with the rollers during vehicle testing and during dynamometer roller operation without a vehicle. If a twin roller cradle consists of four roller cylinders, the area between the rollers/cylinders shall be covered to provide a surface that facilitates personal safety and allows vehicle movement.
* Emergency stop switches in the dynamometer test cell, accessible to the driver, and at the electronic and display cabinet, and also at the power cabinet if it is separate. The emergency stop function shall cause shutdown (braking) of the dynamometer using the electric motor absorber working at the maximum current limits. In the event the electric motor-absorber is unable to decelerate the rollers to zero, the roller brake may be used.

All emergency stop switches shall be of the palm operated – mechanical release type.

An emergency warning function shall be triggered automatically by the processor when any of the following limits are detected:

- Dynamometer's maximum speed (fixed speed).
- Vehicle's maximum speed (value input during calibration).

These conditions do not warrant an immediate shutdown of the dynamometer system but rather a warning of a condition that requires immediate attention.

An emergency shutdown function shall be triggered automatically by the processor when any of the following are exceeded:

- Excessive armature or field current of the power absorber
- Overheating of the power absorber.
- Malfunction of the power transfer system
- Power failure
- Other conditions needed to protect the dynamometer or personnel.

An indicator of the activation of the emergency stop shutdown or warning functions shall be installed in a position where it is visible to from the driver's seat and from the operator's console. The indicator(s) shall be operational at all times, including during power failures.

A15.12 LANE NETWORKING AND DATA COMMUNICATIONS

All test equipment shall have the capability to automatically control and monitor the inspection/testing procedures to ensure compliance with test protocols and to record test results without human intervention.

Using standard commercial networking protocols and hardware, all equipment in a test/inspection lane shall be linked such that the results of each stage of the test/inspection process is automatically recorded and consolidated into a single computer record uniquely assigned to each vehicle passing through the lane. Any observations or remarks entered into the computer system by lane inspectors shall also be merged into the test/inspection record for each vehicle.

The computer system shall be capable of automatically applying pass/fail criteria to the results of each test/inspection element and, based on these criteria, automatically determine an overall pass/fail result. Test records shall be available both as an electronic and printed record, incorporating the numerical results of each test, plus any observations and remarks and outcomes of visual inspections. The test record shall include an overall pass/fail result that clearly identifies the reason(s) for a failure decision.

Using either real-time or agreed batch transmission methods, all data in the lane shall be transmitted to a local data storage computer within the test facility and thence to program headquarters.

A15.13 BUILDING AND LAND REQUIREMENTS

A15.13.1 Building

Although construction materials and architectural styles will vary, it is important that some key performance requirements are met if utilisation efficiency and safety requirements are to me achieved.

For a high-volume vehicle test lane, it is important to balance the work performed at each stage of the process, so that vehicles do not spend an inordinately long time at one position, while other vehicles stand idle because the work in that section is completed quickly. Ideally (though not always possible to achieve), the tasks performed at each position should take roughly the same time to complete.

The total throughput of each test lane is determined by the longest time spent at a single position in the lane. It therefore follows that a facility with a larger number of short stages will deliver a higher throughput than one with a small number of stages, where the vehicle spends a longer time at each stage. These factors are illustrated in the following table

	Time Spent at:				
Number of Positions in Lane	Pos 1 (min)	Pos 2 (min)	Pos 3 (min)	Total Time in Lane (min)	Lane Throughput (veh/hr)
1	15	-	-	15	4
2	7	8	-	15	7.5
3	4	8	3	15	7.5
3	5	5	5	15	12

In this example, a balanced lane with 3 positions can process three times as many vehicles as a lane with only one position. Note, however, that a lane that has 3 positions but one of which is out of balance (example 3), has only the same through put as a balanced 2 position lane. In each example, every vehicle spends the same total time in the lane.

In the end, decisions on layout and number of lanes will depend on the size and shape of available land, together with the characteristics of any existing buildings which may be adapted for this application.

A15.13.2 Key Building Dimensions

Regardless of the detail layout of the building, the following dimensions should be treated as practical minima for a facility capable of testing any road vehicle (excluding some individually constructed or "permit-only" vehicles).

Lane length (per position)	20m
Lane width	5.0m
Clearance Height	5.5m

Additional ceiling height may be required to accommodate fume extraction fans/ducting and acoustic shielding.

These dimensions allow safe pedestrian movement alongside or between vehicles in the facility (all reasonable steps should also be taken to guard or fence machinery and alert lane personnel to any vehicle movements).

Separate enclosed space is also required for

- Customer waiting areas
- Customer transactions
- Administrative office
- Computer room
- Store rooms (calibration gases, maintenance equipment, general supplies)
- Toilets and locker rooms.

Depending on the building location and size of surrounding land, sufficient acoustic enclosure or shielding must be provided to meet OH&S and EPA noise regulations.

A15.13.3 Land Requirements

To satisfy local government requirements and avoid on-site congestion, vehicle emission (and safety) testing facilities tend to have a fairly low plot ratio (ie, the ratio between building area and land area).

The most significant non-building factors are:

- Queuing space
- Entry and departure alignment
- Parking (customer and personnel)
- Boundary clearance and set-backs
- Landscaping

From a performance standpoint, the following conditions should be satisfied:

- Queuing space for at least 45 minutes facility throughput (ie, 4 lanes each operating at a maximum throughput of 6 vehicles/hour = queuing space for 18 vehicles)

- 15m (min) aligned path for entry to and departure from the lane
- Short-term parking spaces for 25% of max throughput for 20 minutes each (ie, for a 24 vehicle/hr max throughput, provide a minimum of 8 truck parking spaces)
- Long-term parking for employees, unless alternative parking is available (including "bulge" provisions for shift changes, if applicable).

The above factors will then determine the basic area needed, around which any other local authority requirements for set-backs, clearances and landscaping will need to be added, consistent with the shape and size of the land parcel used for the facility.