OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
1697	I	I4	HT3	995	0.166	1.759	0.169
1698	I	I4	HT3	1,014	0.141	1.240	0.166
1699	I	I4	HT3	5,024	0.136	1.301	0.230
1700	I	I4	HT3	5,056	0.154	1.514	0.277
1701	I	I4	HT3	10,008	0.147	1.784	0.346
1702	I	I4	HT3	10,034	0.182	2.220	0.324
1703	I	I4	HT3	15,016	0.205	2.065	0.341
1704	I	I4	HT3	15,046	0.189	2.190	0.319
1705	I	I4	HT3	20,010	0.188	2.275	0.340
1706	I	I4	HT3	20,037	0.176	2.370	0.359
1707	I	I4	HT3	30,008	0.196	1.896	0.355
1708	I	I4	HT3	30,037	0.205	2.515	0.355
1709	I	I4	HT3	30,096	0.198	2.170	0.283
1710	I	I4	HT3	30,123	0.175	2.040	0.288
1711	I	I4	HT3	35,038	0.173	2.141	0.353
1712	I	I4	HT3	35,064	0.200	1.935	0.247
1713	I	I4	HT3	40,007	0.198	2.603	0.389
1714	I	I4	HT3	40,034	0.173	2.149	0.394
1715	I	I4	HT3	45,009	0.210	2.546	0.324
1716	I	I4	HT3	45,035	0.169	2.200	0.354
1717	I	I4	HT3	50,148	0.204	2.972	0.294
1718	I	I4	HT3	50,179	0.200	2.097	0.326
1719	I	I4	HT3	50,372	0.191	2.603	0.308
1720	I	I4	HT3	50,397	0.124	2.171	0.297
1721	I	I4	HT3	50,456	0.143	2.348	0.350
1722	I	I4	HT3	50,483	0.122	2.130	0.326
1723	I	I4	HT3	55,009	0.118	1.597	0.233
1724	I	I4	HT3	55,043	0.120	1.961	0.215
1725	I	I4	HT3	60,008	0.127	1.804	0.286
1726	I	I4	HT3	60,042	0.151	2.089	0.263
1727	I	I4	HT3	60,075	0.124	1.717	0.265
1728	I	I4	HT3	60,101	0.117	1.644	0.258
1729	I	I4	HT3	65,010	0.158	2.059	0.292
1730	I	I4	HT3	65,034	0.143	1.778	0.266
1731	I	I4	HT3	70,009	0.180	2.759	0.363
1732	I	I4	HT3	70,034	0.170	2.175	0.349
1733	I	I4	HT3	75,008	0.147	1.867	0.307
1734	I	I4	HT3	75,034	0.156	2.254	0.270
1735	I	I5	EEE	985	0.164	1.601	0.261
1736	I	I5	EEE	1,004	0.166	1.691	0.236
1737	I	I5	EEE	5,009	0.166	1.758	0.522
1738	I	I5	EEE	5,046	0.152	1.385	0.509
1739	I	I5	EEE	10,007	0.180	2.244	0.463
1740	I	I5	EEE	10,040	0.164	1.809	0.458
1741	I	I5	EEE	15,008	0.188	1.952	0.534
1742	I	I5	EEE	15,031	0.169	2.129	0.533
1743	I	I5	EEE	20,008	0.177	2.402	0.526
1744	I	I5	EEE	20,036	0.152	2.025	0.489
1745	I	I5	EEE	25,007	0.181	2.464	0.503
1746	I	I5	EEE	25,042	0.236	2.382	0.474
1747	I	I5	EEE	30,008	0.168	2.287	0.462
1748	I	I5	EEE	30,041	0.163	2.462	0.551
1749	I	I5	EEE	30,064	0.172	2.589	0.414

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
1750	I	I5	EEE	30,091	0.148	2.014	0.459
1751	I	I5	EEE	35,009	0.166	2.284	0.390
1752	I	I5	EEE	35,039	0.217	2.160	0.362
1753	I	I5	EEE	40,007	0.160	1.977	0.482
1754	I	I5	EEE	40,035	0.182	2.398	0.444
1755	I	I5	EEE	45,010	0.188	2.642	0.525
1756	I	I5	EEE	45,037	0.184	3.181	0.505
1757	I	I5	EEE	50,039	0.201	2.437	0.456
1758	I	I5	EEE	50,087	0.164	2.374	0.411
1759	I	I5	EEE	50,324	0.240	2.863	0.465
1760	I	I5	EEE	50,360	0.153	2.367	0.390
1761	I	I5	EEE	55,009	0.171	2.411	0.443
1762	I	I5	EEE	55,037	0.190	2.067	0.416
1763	I	I5	EEE	60,039	0.193	2.462	0.325
1764	I	I5	EEE	60,066	0.172	1.959	0.436
1765	I	I5	EEE	60,092	0.170	2.315	0.370
1766	I	I5	EEE	60,121	0.176	2.162	0.298
1767	I	I5	EEE	65,033	0.144	1.634	0.371
1768	I	I5	EEE	65,055	0.173	2.070	0.463
1769	I	I5	EEE	70,007	0.186	2.931	0.503
1770	I	I5	EEE	70,035	0.193	2.844	0.469
1771	I	I5	EEE	70,801	0.166	2.296	0.522
1772	I	I5	EEE	70,825	0.172	2.277	0.400
1773	I	I5	EEE	75,009	0.178	2.098	0.530
1774	I	I5	EEE	75,035	0.160	2.040	0.506
1775	I	I6	HT3	1,013	0.141	1.075	0.195
1776	I	I6	HT3	1,037	0.149	1.320	0.204
1777	I	I6	HT3	5,007	0.179	1.891	0.304
1778	I	I6	HT3	5,036	0.154	1.473	0.244
1779	I	I6	HT3	10,013	0.164	1.894	0.482
1780	I	I6	HT3	10,040	0.174	2.644	0.352
1781	I	I6	HT3	15,008	0.194	1.850	0.351
1782	I	I6	HT3	15,031	0.190	2.031	0.273
1783	I	I6	HT3	20,007	0.189	2.330	0.426
1784	I	I6	HT3	20,034	0.179	2.121	0.463
1785	I	I6	HT3	25,008	0.201	2.513	0.510
1786	I	I6	HT3	25,038	0.190	2.430	0.509
1787	I	I6	HT3	30,008	0.215	2.271	0.443
1788	I	I6	HT3	30,036	0.181	1.883	0.397
1789	I	I6	HT3	30,065	0.183	2.283	0.446
1790	I	I6	HT3	30,119	0.153	2.654	0.389
1791	I	I6	HT3	35,008	0.164	1.853	0.336
1792	I	I6	HT3	35,035	0.223	2.708	0.500
1793	I	I6	HT3	35,813	0.164	2.032	0.375
1794	I	I6	HT3	35,842	0.205	2.236	0.347
1795	I	I6	HT3	40,009	0.221	2.940	0.499
1796	I	I6	HT3	40,037	0.153	1.859	0.346
1797	I	I6	HT3	45,008	0.215	2.430	0.370
1798	I	I6	HT3	45,033	0.182	2.081	0.386
1799	I	I6	HT3	50,017	0.176	2.320	0.449
1800	I	I6	HT3	50,050	0.194	2.398	0.462
1801	I	I6	HT3	50,271	0.163	2.397	0.437
1802	I	I6	HT3	50,298	0.286	3.404	0.527

Data Set ETHYL4S3

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
1803	I	I6	HT3	55,033	0.141	2.381	0.386
1804	I	I6	HT3	55,061	0.163	2.177	0.496
1805	I	I6	HT3	60,009	0.136	2.380	0.401
1806	I	I6	HT3	60,034	0.159	2.347	0.277
1807	I	I6	HT3	60,064	0.135	2.039	0.418
1808	I	I6	HT3	60,091	0.145	2.154	0.372
1809	I	I6	HT3	65,035	0.123	1.843	0.370
1810	I	I6	HT3	65,061	0.162	2.623	0.334
1811	I	I6	HT3	70,009	0.161	2.875	0.481
1812	I	I6	HT3	70,035	0.157	2.421	0.565
1813	I	I6	HT3	75,008	0.166	2.629	0.507
1814	I	I6	HT3	75,035	0.129	2.114	0.510

DATA SET ETHYL4S4

Data Set ETHYL4S4 1

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
1	D	D1	EEE	998	0.272	1.579	0.608
2	D	D1	EEE	1,017	0.300	1.816	0.571
3	D	D1	EEE	5,025	0.307	1.724	0.562
4	D	D1	EEE	5,044	0.302	1.692	0.615
5	D	D1	EEE	9,974	0.356	1.238	0.477
6	D	D1	EEE	9,993	0.310	0.989	0.521
7	D	D1	EEE	15,124	0.393	2.854	0.482
8	D	D1	EEE	15,143	0.349	2.386	0.501
9	D	D1	EEE	19,920	0.408	2.972	0.435
10	D	D1	EEE	19,939	0.407	3.280	0.441
11	D	D1	EEE	25,002	0.402	2.950	0.353
12	D	D1	EEE	25,023	0.446	2.927	0.337
13	D	D1	EEE	30,109	0.534	3.558	0.387
14	D	D1	EEE	30,127	0.524	3.668	0.356
15	D	D1	EEE	35,061	0.572	4.089	0.397
16	D	D1	EEE	35,080	0.555	4.014	0.405
17	D	D1	EEE	35,126	0.510	3.446	0.336
18	D	D1	EEE	35,143	0.500	3.476	0.367
19	D	D1	EEE	39,899	0.698	5.268	0.456
20	D	D1	EEE	39,918	0.557	5.146	0.427
21	D	D1	EEE	45,064	0.596	6.083	0.473
22	D	D1	EEE	45,087	0.643	6.073	0.498
23	D	D1	EEE	49,922	0.669	5.190	0,329
24	D	D1	EEE	49,941	0.624	4.993	0.312
25	D	D1	EEE	54,970	0.678	4.950	0.505
26	D	D1	EEE	54,989	0.792	5.491	0.476
27	D	D1	EEE	59,932	0.578	5.595	0.574
28	D	D1	EEE	59,951	0.707	6.239	0.559
29	D	D1	EEE	59,970	0.707	6.285	0.516
30	D	D1	EEE	59,989	0.603	5.767	0.489
31	D	D1	EEE	65,057	0.604	6.243	0.389
32	D	D1	EEE	65,076	0.471	4.793	0.316
33	D	D1	EEE	70,084	0.659	4.438	0.365
34	D	D1	EEE	70,102	0.615	4.659	0.366
35	D	D1	EEE	74,880	0.751	4.440	0.376
36	D	D1	EEE	74,899	0.802	3.760	0.338
37	D	D2	EEE	1,005	0.278	1.624	0.496
38	D	D2	EEE	1,024	0.290	1.743	0.517
39	D	D2	EEE	4,994	0.279	1.772	0.572
40	D	D2	EEE	5,013	0.302	1.905	0.501
41	D	D2	EEE	9,944	0.355	0.986	0.343
42	D	D2	EEE	9,963	0.371	1.470	0.418
43	D	D2	EEE	15,106	0.375	2.927	0.578
44	D	D2	EEE	15,125	0.376	2.703	0.480
45	D	D2	EEE	19,953	0.467	3.531	0.400
46	D	D2	EEE	19,972	0.482	3.327	0.416
47	D	D2	EEE	25,028	0.460	3.451	0.314
48	D	D2	EEE	25,047	0.508	3.246	0.324
49	D	D2	EEE	30,132	0.606	3.839	0.264
50	D	D2	EEE	30,151	0.617	3.882	0.232
51	D	D2	EEE	35,111	0.677	4.765	0.342
52	D	D2	EEE	35,129	0.633	4.183	0.334
53	D	D2	EEE	35,168	0.559	3.554	0.261

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
54	D	D2	EEE	35,188	0.596	3.783	0.285
55	D	D2	EEE	39,911	0.583	4.707	0.361
56	D	D2	EEE	39,930	0.583	4.707	0.361
57	D	D2	EEE	45,050	0.671	5.481	0.423
58	D	D2	EEE	45,068	0.781	5.151	0.378
59	D	D2	EEE	50,090	0.689	4.862	0.346
60	D	D2	EEE	50,109	0.711	5.286	0.323
61	D	D2	EEE	54,993	0.662	4.303	0.477
62	D	D2	EEE	55,012	0.641	4.430	0.485
63	D	D2	EEE	60,068	0.559	4.202	0.570
64	D	D2	EEE	60,087	0.603	4.950	0.554
65	D	D2	EEE	60,106	0.675	6.526	0.484
66	D	D2	EEE	60,124	0.594	5.520	0.514
67	D	D2	EEE	64,966	0.644	5.939	0.456
68	D	D2	EEE	64,985	0.545	4.618	0.462
69	D	D2	EEE	69,815	0.571	3.448	0.389
70	D	D2	EEE	69,834	0.588	3.659	0.350
71	D	D2	EEE	75,126	0.591	5.431	0.430
72	D	D2	EEE	75,145	0.596	5.093	0.447
73	D	D3	EEE	985	0.286	1.657	0.656
74	D	D3	EEE	1,004	0.258	1.578	0.696
75	D	D3	EEE	4,961	0.325	1.845	0.656
76	D	D3	EEE	4,988	0.310	1.647	0.598
77	D	D4	HT3	1,007	0.293	2.048	0.759
78	D	D4	HT3	1,025	0.287	1.582	0.656
79	D	D4	HT3	5,045	0.320	1.770	0.594
80	D	D4	HT3	5,072	0.290	1.737	0.571
81	D	D4	HT3	9,996	0.390	1.389	0.427
82	D	D4	HT3	10,015	0.394	1.217	0.458
83	D	D4	HT3	14,960	0.435	2.380	0.547
84	D	D4	HT3	14,979	0.404	2.400	0.461
85	D	D4	HT3	20,048	0.529	3.370	0.427
86	D	D4	HT3	20,067	0.508	3.042	0.428
87	D	D4	HT3	24,904	0.500	3.137	0.376
88	D	D4	HT3	24,923	0.504	3.096	0.430
89	D	D4	HT3	30,073	0.608	3.405	0.408
90	D	D4	HT3	30,091	0.588	3.318	0.446
91	D	D4	HT3	35,058	0.597	3.638	0.471
92	D	D4	HT3	35,076	0.641	3.708	0.425
93	D	D4	HT3	35,123	0.746	3.700	0.359
94	D	D4	HT3	35,142	0.686	3.620	0.338
95	D	D4	HT3	40,096	0.845	5.577	0.428
96	D	D4	HT3	40,114	0.662	4.703	0.432
97	D	D4	HT3	44,750	0.716	5.061	0.395
98	D	D4	HT3	44,769	0.632	4.552	0.430
99	D	D4	HT3	50,005	0.633	4.852	0.386
100	D	D4	HT3	50,023	0.615	5.203	0.493
101	D	D4	HT3	55,047	0.702	4.356	0.425
102	D	D4	HT3	55,066	0.507	3.426	0.518
103	D	D4	HT3	60,010	0.578	4.315	0.455
104	D	D4	HT3	60,034	0.549	4.016	0.542
105	D	D4	HT3	60,053	0.556	4.147	0.367
106	D	D4	HT3	60,070	0.561	4.698	0.448

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
107	D	D4	HT3	64,900	0.525	5.239	0.480
108	D	D4	HT3	64,919	0.447	4.672	0.454
109	D	D4	HT3	69,868	0.575	3.794	0.365
110	D	D4	HT3	69,887	0.497	3.317	0.330
111	D	D4	HT3	74,904	0.776	4.484	0.295
112	D	D4	HT3	74,922	0.587	3.609	0.287
113	D	D5	HT3	986	0.270	1.565	0.616
114	D	D5	HT3	1,005	0.278	1.667	0.600
115	D	D5	HT3	5,007	0.320	1.686	0.609
116	D	D5	HT3	5,025	0.321	1.801	0.575
117	D	D5	HT3	9,975	0.340	0.916	0.467
118	D	D5	HT3	9,993	0.379	1.419	0.443
119	D	D5	HT3	14,928	0.389	2.487	0.604
120	D	D5	HT3	14,946	0.367	2.612	0.506
121	D	D5	HT3	20,023	0.522	3.417	0.466
122	D	D5	HT3	20,041	0.491	3.482	0.447
123	D	D5	HT3	24,939	0.477	3.270	0.395
124	D	D5	HT3	24,958	0.501	3.618	0.396
125	D	D5	HT3	29,973	0.633	4.000	0.410
126	D	D5	HT3	29,992	0.682	3.986	0.371
127	D	D5	HT3	35,013	0.662	4.319	0.463
128	D	D5	HT3	35,031	0.546	4.259	0.411
129	D	D5	HT3	35,079	0.583	3.642	0.348
130	D	D5	HT3	35,097	0.595	4.010	0.355
131	D	D5	HT3	40,044	0.619	3.852	0.431
132	D	D5	HT3	40,062	0.574	4.285	0.561
133	D	D5	HT3	45,107	0.680	4.785	0.464
134	D	D5	HT3	45,125	0.783	4.380	0.441
135	D	D5	HT3	49,905	0.980	5.338	0.437
136	D	D5	HT3	49,923	0.917	5.281	0.414
137	D	D5	HT3	54,985	0.658	3.913	0.403
138	D	D5	HT3	55,003	0.575	3.273	0.426
139	D	D5	HT3	60,061	0.611	4.753	0.547
140	D	D5	HT3	60,080	0.590	4.763	0.530
141	D	D5	HT3	60,098	0.513	3.913	0.437
142	D	D5	HT3	60,115	0.592	4.692	0.475
143	D	D5	HT3	65,010	0.623	5.568	0.380
144	D	D5	HT3	65,028	0.706	5.108	0.388
145	D	D5	HT3	70,005	0.664	3.334	0.366
146	D	D5	HT3	70,029	0.664	3.334	0.366
147	D	D5	HT3	75,096	0.625	4.068	0.398
148	D	D5	HT3	75,115	0.560	4.031	0.384
149	D	D6	HT3	1,035	0.264	1.938	0.544
150	D	D6	HT3	1,064	0.279	1.522	0.583
151	D	D6	HT3	5,002	0.330	1.668	0.551
152	D	D6	HT3	5,021	0.328	1.874	0.482
153	D	D6	HT3	9,980	0.342	0.935	0.433
154	D	D6	HT3	9,998	0.361	1.324	0.687
155	D	D6	HT3	14,955	0.449	3.030	0.501
156	D	D6	HT3	14,974	0.481	3.316	0.438
157	D	D6	HT3	20,055	0.528	3.793	0.381
158	D	D6	HT3	20,074	0.537	3.388	0.453
159	D	D6	HT3	24,926	0.548	3.790	0.427

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OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
160	D	D6	HT3	24,945	0.551	3.732	0.426
161	D	D6	HT3	29,904	0.621	4.387	0.394
162	D	D6	HT3	29,919	0.618	3.835	0.409
163	D	D6	HT3	35,058	0.702	4.413	0.431
164	D	D6	HT3	35,077	0.682	4.949	0.391
165	D	D6	HT3	35,115	0.621	4.199	0.409
166	D	D6	HT3	35,132	0.682	4.237	0.426
167	D	D6	HT3	40,117	0.756	5.874	0.404
168	D	D6	HT3	40,136	0.759	5.418	0.415
169	D	D6	HT3	45,068	0.703	5.378	0.416
170	D	D6	HT3	45,086	0.769	6.020	0.497
171	D	D6	HT3	49,948	0.759	5.107	0.386
172	D	D6	HT3	49,966	0.828	6.028	0.467
173	D	D6	HT3	54,966	0.618	3.876	0.440
174	D	D6	HT3	54,984	0.607	3.847	0.438
175	D	D6	HT3	60,050	0.615	4.578	0.431
176	D	D6	HT3	60,069	0.633	5.298	0.579
177	D	D6	HT3	60,088	0.576	4.581	0.451
178	D	D6	HT3	60,105	0.560	4.515	0.434
179	D	D6	HT3	64,943	0.648	6.077	0.419
180	D	D6	HT3	64,962	0.724	6.558	0.447
181	D	D6	HT3	69,975	0.671	4.360	0.389
182	D	D6	HT3	69,993	0.630	4.082	0.374
183	D	D6	HT3	75,127	0.630	4.836	0.433
184	D	D6	HT3	75,146	0.630	4.836	0.433
185	E	E1	HT3	991	0.092	1.863	0.139
186	E	E1	HT3	1,015	0.078	1.684	0.205
187	E	E1	HT3	4,952	0.150	3.132	0.212
188	E	E1	HT3	4,970	0.188	3.808	0.202
189	E	E1	HT3	9,874	0.210	4.635	0.264
190	E	E1	HT3	9,891	0.212	4.610	0.296
191	E	E1	HT3	15,061	0.179	5.489	0.374
192	E	E1	HT3	15,080	0.197	5.177	0.299
193	E	E1	HT3	19,858	0.223	5.665	0.286
194	E	E1	HT3	19,876	0.210	5.285	0.326
195	E	E1	HT3	25,127	0.213	6.231	0.348
196	E	E1	HT3	25,146	0.181	5.190	0.311
197	E	E1	HT3	30,035	0.228	5.910	0.365
198	E	E1	HT3	30,053	0.194	5.395	0.387
199	E	E1	HT3	30,072	0.228	5.510	0.388
200	E	E1	HT3	30,097	0.199	5.594	0.356
201	E	E1	HT3	34,987	0.203	5.091	0.292
202	E	E1	HT3	35,005	0.193	5.201	0.317
203	E	E1	HT3	39,967	0.168	5.066	0.320
204	E	E1	HT3	39,985	0.149	4.609	0.263
205	E	E1	HT3	45,114	0.156	4.670	0.251
206	E	E1	HT3	45,140	0.125	4.332	0.297
207	E	E1	HT3	49,974	0.151	4.506	0.221
208	E	E1	HT3	49,992	0.149	5.071	0.317
209	E	E1	HT3	55,011	0.234	5.752	0.468
210	E	E1	HT3	55,029	0.243	5.494	0.406
211	E	E1	HT3	60,040	0.260	6.307	0.444
212	E	E1	HT3	60,059	0.310	9.012	0.490

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
213	E	E1	HT3	60,078	0.247	6.393	0.474
214	E	E1	HT3	60,096	0.236	5.344	0.429
215	E	E1	HT3	64,938	0.313	8.247	0.413
216	E	E1	HT3	64,954	0.276	6.780	0.520
217	E	E1	HT3	69,844	0.257	5.722	0.363
218	E	E1	HT3	69,863	0.247	5.678	0.405
219	E	E1	HT3	74,864	0.299	6.427	0.356
220	E	E1	HT3	74,882	0.256	5.896	0.420
221	E	E2	EEE	1,019	0.113	2.167	0.130
222	E	E2	EEE	1,043	0.112	2.286	0.168
223	E	E2	EEE	4,975	0.139	2.828	0.260
224	E	E2	EEE	4,993	0.138	2.451	0.262
225	E	E2	EEE	9,984	0.158	3.062	0.238
226	E	E2	EEE	10,002	0.139	3.080	0.313
227	E	E2	EEE	15,139	0.167	3.484	0.378
228	E	E2	EEE	15,158	0.181	3.773	0.356
229	E	E2	EEE	19,927	0.177	4.032	0.320
230	E	E2	EEE	19,946	0.180	3.967	0.349
231	E	E2	EEE	25,078	0.197	4.624	0.329
232	E	E2	EEE	25,096	0.189	6.316	0.291
233	E	E2	EEE	30,054	0.178	4.123	0.455
234	E	E2	EEE	30,072	0.189	4.416	0.446
235	E	E2	EEE	30,091	0.207	4.845	0.360
236	E	E2	EEE	30,109	0.203	4.834	0.393
237	E	E2	EEE	34,946	0.181	3.222	0.276
238	E	E2	EEE	34,964	0.204	4.066	0.309
239	E	E2	EEE	40,095	0.218	6.217	0.413
240	E	E2	EEE	40,112	0.204	6.025	0.463
241	E	E2	EEE	45,054	0.224	5.570	0.447
242	E	E2	EEE	45,072	0.282	6.168	0.365
243	E	E2	EEE	49,981	0.222	5.298	0.327
244	E	E2	EEE	49,998	0.207	6.367	0.390
245	E	E2	EEE	54,961	0.276	6.256	0.587
246	E	E2	EEE	54,979	0.297	6.247	0.542
247	E	E2	EEE	59,985	0.305	6.618	0.548
248	E	E2	EEE	60,004	0.310	6.824	0.481
249	E	E2	EEE	60,022	0.366	7.355	0.466
250	E	E2	EEE	60,040	0.327	6.861	0.519
251	E	E2	EEE	64,993	0.426	8.203	0.621
252	E	E2	EEE	65,012	0.561	9.484	0.628
253	E	E2	EEE	70,047	0.337	7.812	0.553
254	E	E2	EEE	70,321	0.357	7.835	0.587
255	E	E2	EEE	75,018	0.344	7.212	0.596
256	E	E2	EEE	75,037	0.374	7.324	0.575
257	E	E3	EEE	990	0.081	1.770	0.132
258	E	E3	EEE	1,013	0.066	1.419	0.180
259	E	E3	EEE	4,929	0.116	2.825	0.261
260	E	E3	EEE	4,947	0.128	2.938	0.227
261	E	E3	EEE	9,956	0.118	3.342	0.327
262	E	E3	EEE	9,974	0.128	3.481	0.303
263	E	E3	EEE	15,123	0.135	3.587	0.289
264	E	E3	EEE	15,142	0.146	4.413	0.388
265	E	E3	EEE	19,916	0.145	3.974	0.326

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
266	E	E3	EEE	19,934	0.159	4.354	0.286
267	E	E3	EEE	24,945	0.114	3.611	0.333
268	E	E3	EEE	24,964	0.130	6.292	0.349
269	E	E3	EEE	29,976	0.186	4.448	0.389
270	E	E3	EEE	29,994	0.160	4.546	0.349
271	E	E3	EEE	30,012	0.174	4.447	0.373
272	E	E3	EEE	30,030	0.265	5.528	0.312
273	E	E3	EEE	34,992	0.097	3.116	0.261
274	E	E3	EEE	35,010	0.109	3.088	0.246
275	E	E3	EEE	40,019	0.131	5.038	0.314
276	E	E3	EEE	40,036	0.135	5.652	0.380
277	E	E3	EEE	45,128	0.173	5.207	0.630
278	E	E3	EEE	45,146	0.220	5.318	0.326
279	E	E3	EEE	49,991	0.161	5.381	0.355
280	E	E3	EEE	50,009	0.150	6.386	0.300
281	E	E3	EEE	55,108	0.272	7.613	0.455
282	E	E3	EEE	55,126	0.218	6.086	0.476
283	E	E3	EEE	60,011	0.214	6.446	0.466
284	E	E3	EEE	60,030	0.214	7.582	0.466
285	E	E3	EEE	60,048	0.214	7.611	0.567
286	E	E3	EEE	60,066	0.214	6.809	0.553
287	E	E3	EEE	65,014	0.186	6.167	0.461
288	E	E3	EEE	65,033	0.195	6.114	0.420
289	E	E3	EEE	69,915	0.211	5.573	0.474
290	E	E3	EEE	69,933	0.231	5.364	0.486
291	E	E3	EEE	74,989	0.197	6.132	0.542
292	E	E3	EEE	75,008	0.178	5.382	0.516
293	E	E4	EEE	1,060	0.114	2.759	0.180
294	E	E4	EEE	1,091	0.110	2.469	0.207
295	E	E4	EEE	5,028	0.152	2.556	0.302
296	E	E4	EEE	5,046	0.111	2.333	0.299
297	E	E4	EEE	9,864	0.129	3.274	0.366
298	E	E4	EEE	9,883	0.138	3.118	0.314
299	E	E4	EEE	15,044	0.140	4.032	0.303
300	E	E4	EEE	15,062	0.128	3.315	0.327
301	E	E4	EEE	20,061	0.136	3.395	0.271
302	E	E4	EEE	20,079	0.150	3.943	0.296
303	E	E4	EEE	25,057	0.137	3.887	0.310
304	E	E4	EEE	25,075	0.130	5.977	0.333
305	E	E4	EEE	30,082	0.148	3.862	0.339
306	E	E4	EEE	30,101	0.146	4.151	0.288
307	E	E4	EEE	30,127	0.158	4.252	0.339
308	E	E4	EEE	30,145	0.179	4.614	0.257
309	E	E4	EEE	35,094	0.171	4.334	0.326
310	E	E4	EEE	35,112	0.139	4.137	0.335
311	E	E4	EEE	40,065	0.129	5.138	0.392
312	E	E4	EEE	40,083	0.127	5.758	0.403
313	E	E4	EEE	45,053	0.129	5.339	0.280
314	E	E4	EEE	45,071	0.135	5.690	0.363
315	E	E4	EEE	50,085	0.130	5.620	0.232
316	E	E4	EEE	50,104	0.169	5.680	0.254
317	E	E4	EEE	55,033	0.161	5.308	0.406
318	E	E4	EEE	55,052	0.200	6.648	0.485

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
319	E	E4	EEE	60,034	0.194	6.582	0.361
320	E	E4	EEE	60,052	0.228	8.530	0.399
321	E	E4	EEE	60,070	0.219	8.562	0.375
322	E	E4	EEE	60,089	0.242	8.106	0.370
323	E	E4	EEE	65,039	0.204	7.678	0.370
324	E	E4	EEE	65,057	0.260	9.988	0.531
325	E	E4	EEE	70,055	0.215	5.743	0.386
326	E	E4	EEE	70,073	0.198	6.487	0.515
327	E	E4	EEE	75,074	0.185	5.639	0.366
328	E	E4	EEE	75,092	0.199	6.120	0.373
329	E	E5	HT3	984	0.131	3.320	0.232
330	E	E5	HT3	1,015	0.109	2.834	0.258
331	E	E5	HT3	4,942	0.155	3.752	0.227
332	E	E5	HT3	4,960	0.165	3.756	0.236
333	E	E5	HT3	10,007	0.198	4.577	0.262
334	E	E5	HT3	10,026	0.185	4.106	0.283
335	E	E5	HT3	15,012	0.171	4.367	0.331
336	E	E5	HT3	15,031	0.193	4.791	0.303
337	E	E5	HT3	20,260	0.198	4.606	0.341
338	E	E5	HT3	20,279	0.183	4.397	0.369
339	E	E5	HT3	24,909	0.165	4.276	0.332
340	E	E5	HT3	24,927	0.180	4.650	0.327
341	E	E5	HT3	29,986	0.171	4.178	0.377
342	E	E5	HT3	30,004	0.167	4.452	0.381
343	E	E5	HT3	30,034	0.197	4.925	0.428
344	E	E5	HT3	30,051	0.196	4.455	0.407
345	E	E5	HT3	34,927	0.200	4.888	0.399
346	E	E5	HT3	34,945	0.189	5.301	0.329
347	E	E5	HT3	40,013	0.229	7.374	0.340
348	E	E5	HT3	40,031	0.235	6.118	0.352
349	E	E5	HT3	45,077	0.162	4.464	0.238
350	E	E5	HT3	45,095	0.165	5.341	0.390
351	E	E5	HT3	49,823	0.145	4.829	0.329
352	E	E5	HT3	49,842	0.130	5.060	0.330
353	E	E5	HT3	54,949	0.202	5.506	0.438
354	E	E5	HT3	54,968	0.230	5.958	0.457
355	E	E5	HT3	59,981	0.258	8.486	0.419
356	E	E5	HT3	60,000	0.225	6.973	0.541
357	E	E5	HT3	60,018	0.235	6.979	0.494
358	E	E5	HT3	60,037	0.223	6.360	0.437
359	E	E5	HT3	64,994	0.320	8.137	0.496
360	E	E5	HT3	65,013	0.309	7.160	0.440
361	E	E5	HT3	70,142	0.296	6.612	0.386
362	E	E5	HT3	70,160	0.262	6.361	0.436
363	E	E5	HT3	75,103	0.255	6.294	0.414
364	E	E5	HT3	75,122	0.226	6.089	0.413
365	E	E6	HT3	983	0.107	2.501	0.193
366	E	E6	HT3	1,007	0.107	2.289	0.197
367	E	E6	HT3	5,277	0.177	3.931	0.195
368	E	E6	HT3	5,296	0.166	3.118	0.241
369	E	E6	HT3	9,913	0.179	3.987	0.225
370	E	E6	HT3	9,932	0.205	4.289	0.294
371	E	E6	HT3	15,090	0.188	4.345	0.323

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
372	E	E6	HT3	15,108	0.212	4.336	0.425
373	E	E6	HT3	19,866	0.197	4.364	0.351
374	E	E6	HT3	19,885	0.215	4.641	0.317
375	E	E6	HT3	25,117	0.175	4.497	0.380
376	E	E6	HT3	25,136	0.191	4.970	0.350
377	E	E6	HT3	29,965	0.214	5.327	0.356
378	E	E6	HT3	29,984	0.187	4.492	0.385
379	E	E6	HT3	30,013	0.209	4.864	0.360
380	E	E6	HT3	30,031	0.218	5.071	0.332
381	E	E6	HT3	35,043	0.174	4.472	0.381
382	E	E6	HT3	35,062	0.186	4.425	0.409
383	E	E6	HT3	40,178	0.185	6.279	0.455
384	E	E6	HT3	40,196	0.205	7.313	0.446
385	E	E6	HT3	45,045	0.160	4.796	0.348
386	E	E6	HT3	45,062	0.158	4.877	0.434
387	E	E6	HT3	50,011	0.207	5.144	0.293
388	E	E6	HT3	50,022	0.150	5.350	0.329
389	E	E6	HT3	54,922	0.213	5.090	0.416
390	E	E6	HT3	54,941	0.242	5.432	0.434
391	E	E6	HT3	59,966	0.245	6.763	0.419
392	E	E6	HT3	59,984	0.223	6.582	0.465
393	E	E6	HT3	60,002	0.270	7.363	0.430
394	E	E6	HT3	60,021	0.267	7.121	0.379
395	E	E6	HT3	64,980	0.229	6.396	0.326
396	E	E6	HT3	64,998	0.221	5.833	0.365
397	E	E6	HT3	70,067	0.231	4.919	0.387
398	E	E6	HT3	70,085	0.205	3.250	0.598
399	E	E6	HT3	75,074	0.203	4.932	0.451
400	E	E6	HT3	75,093	0.206	5.710	0.559
401	F	F1	HT3	991	0.180	0.484	0.519
402	F	F1	HT3	1,015	0.173	0.606	0.418
403	F	F1	HT3	4,865	0.261	0.711	0.628
404	F	F1	HT3	4,901	0.297	0.883	0.707
405	F	F1	HT3	9,988	0.350	0.882	0.661
406	F	F1	HT3	10,006	0.366	0.924	0.717
407	F	F1	HT3	14,849	0.391	0.778	0.755
408	F	F1	HT3	14,867	0.393	0.917	0.758
409	F	F1	HT3	19,927	0.433	1.019	0.619
410	F	F1	HT3	19,945	0.404	0.813	0.654
411	F	F1	HT3	24,965	0.446	0.770	0.727
412	F	F1	HT3	24,982	0.450	1.274	0.730
413	F	F1	HT3	30,131	0.641	1.324	0.668
414	F	F1	HT3	30,149	0.617	1.314	0.655
415	F	F1	HT3	30,175	0.603	1.311	0.671
416	F	F1	HT3	30,192	0.553	1.131	0.644
417	F	F1	HT3	35,086	0.574	1.315	0.689
418	F	F1	HT3	35,103	0.588	1.269	0.703
419	F	F1	HT3	39,780	0.568	1.251	0.718
420	F	F1	HT3	39,799	0.578	1.371	0.740
421	F	F1	HT3	45,123	0.542	0.613	0.549
422	F	F1	HT3	45,142	0.582	1.070	0.555
423	F	F1	HT3	49,906	0.627	1.264	0.472
424	F	F1	HT3	49,925	0.564	1.032	0.452

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
425	F	F1	HT3	54,935	0.592	1.631	0.646
426	F	F1	HT3	54,953	0.621	2.217	0.790
427	F	F1	HT3	60,046	0.753	2.002	0.623
428	F	F1	HT3	60,065	0.660	1.213	0.759
429	F	F1	HT3	60,083	0.638	1.636	0.633
430	F	F1	HT3	60,102	0.663	1.751	0.644
431	F	F1	HT3	64,912	0.698	1.960	0.776
432	F	F1	HT3	64,930	0.712	1.652	0.843
433	F	F1	HT3	70,022	0.665	1.564	0.744
434	F	F1	HT3	70,040	0.700	1.495	0.789
435	F	F1	HT3	75,062	0.800	1.384	0.678
436	F	F1	HT3	75,081	0.597	1.304	0.656
437	F	F2	HT3	993	0.176	0.737	0.496
438	F	F2	HT3	1,017	0.175	0.645	0.465
439	F	F2	HT3	4,999	0.240	0.720	0.627
440	F	F2	HT3	5,017	0.262	0.733	0.598
441	F	F2	HT3	9,895	0.348	1.108	0.723
442	F	F2	HT3	9,913	0.382	1.365	0.801
443	F	F2	HT3	15,057	0.401	0.966	0.709
444	F	F2	HT3	15,075	0.383	0.842	0.719
445	F	F2	HT3	20,101	0.439	1.069	0.705
446	F	F2	HT3	20,119	0.421	0.985	0.688
447	F	F2	HT3	25,022	0.438	0.787	0.677
448	F	F2	HT3	25,040	0.467	0.880	0.729
449	F	F2	HT3	30,082	0.707	0.992	0.622
450	F	F2	HT3	30,099	0.662	1.267	0.656
451	F	F2	HT3	30,125	0.563	1.119	0.636
452	F	F2	HT3	30,146	0.631	1.080	0.648
453	F	F2	HT3	35,070	0.573	1.189	0.666
454	F	F2	HT3	35,087	0.560	0.972	0.701
455	F	F2	HT3	39,758	0.577	1.414	0.595
456	F	F2	HT3	39,776	0.569	1.129	0.659
457	F	F2	HT3	45,031	0.584	0.934	0.596
458	F	F2	HT3	45,050	0.529	0.752	0.626
459	F	F2	HT3	50,005	0.700	1.547	0.951
460	F	F2	HT3	50,024	0.600	1.207	0.981
461	F	F2	HT3	55,103	0.503	1.863	1.177
462	F	F2	HT3	55,122	0.532	1.736	1.258
463	F	F2	HT3	60,035	0.575	1.214	0.900
464	F	F2	HT3	60,053	0.637	0.905	0.854
465	F	F2	HT3	60,072	0.569	2.092	1.052
466	F	F2	HT3	60,090	0.493	0.925	1.003
467	F	F2	HT3	64,941	0.599	1.392	0.827
468	F	F2	HT3	64,964	0.547	1.700	1.078
469	F	F2	HT3	69,883	0.548	1.714	1.574
470	F	F2	HT3	69,901	0.483	1.607	1.531
471	F	F2	HT3	75,114	0.513	1.315	0.907
472	F	F2	HT3	75,133	0.543	1.390	0.847
473	F	F3	HT3	992	0.157	0.544	0.442
474	F	F3	HT3	1,016	0.142	0.448	0.410
475	F	F3	HT3	4,923	0.217	0.558	0.588
476	F	F3	HT3	4,941	0.241	0.675	0.620
477	F	F3	HT3	10,029	0.331	0.927	0.713

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
478	F	F3	HT3	10,048	0.350	1.213	0.743
479	F	F3	HT3	15,081	0.451	1.357	0.630
480	F	F3	HT3	15,100	0.451	1.357	0.630
481	F	F3	HT3	19,778	0.430	1.094	0.696
482	F	F3	HT3	19,797	0.404	0.989	0.652
483	F	F3	HT3	25,061	0.496	1.103	0.636
484	F	F3	HT3	25,079	0.449	0.956	0.660
485	F	F3	HT3	30,345	0.590	0.986	0.582
486	F	F3	HT3	30,364	0.597	1.041	0.566
487	F	F3	HT3	30,389	0.550	1.104	0.628
488	F	F3	HT3	30,407	0.556	1.226	0.590
489	F	F3	HT3	35,068	0.562	1.188	0.655
490	F	F3	HT3	35,085	0.597	1.176	0.593
491	F	F3	HT3	39,697	0.567	1.148	0.735
492	F	F3	HT3	39,775	0.554	1.157	0.625
493	F	F3	HT3	45,093	0.517	0.799	0.500
494	F	F3	HT3	45,111	0.633	1.089	0.554
495	F	F3	HT3	49,978	0.680	1.308	0.541
496	F	F3	HT3	49,997	0.708	1.687	0.547
497	F	F3	HT3	54,915	0.543	1.215	1.004
498	F	F3	HT3	54,934	0.538	1.359	1.045
499	F	F3	HT3	59,956	0.616	1.504	0.918
500	F	F3	HT3	59,975	0.625	1.451	0.842
501	F	F3	HT3	59,993	0.569	1.237	0.905
502	F	F3	HT3	60,011	0.572	1.364	0.897
503	F	F3	HT3	64,872	0.542	1.477	0.794
504	F	F3	HT3	64,890	0.584	1.558	0.910
505	F	F4	EEE	994	0.144	0.400	0.602
506	F	F4	EEE	1,026	0.161	0.495	0.505
507	F	F4	EEE	4,999	0.219	0.684	0.581
508	F	F4	EEE	5,018	0.223	0.699	0.637
509	F	F4	EEE	10,117	0.309	1.140	0.806
510	F	F4	EEE	10,136	0.305	0.989	0.882
511	F	F4	EEE	15,107	0.320	1.275	0.729
512	F	F4	EEE	15,125	0.343	1.132	0.827
513	F	F4	EEE	19,978	0.402	1.256	0.871
514	F	F4	EEE	19,996	0.374	1.228	0.847
515	F	F4	EEE	24,967	0.371	1.311	0.884
516	F	F4	EEE	24,985	0.406	1.453	0.872
517	F	F4	EEE	30,097	0.540	1.871	0.926
518	F	F4	EEE	30,114	0.585	1.891	0.990
519	F	F4	EEE	30,139	0.544	1.834	0.897
520	F	F4	EEE	30,158	0.564	2.248	0.897
521	F	F4	EEE	35,065	0.534	1.710	0.992
522	F	F4	EEE	35,087	0.530	1.797	0.948
523	F	F4	EEE	39,801	0.544	1.766	0.980
524	F	F4	EEE	39,844	0.544	1.766	0.980
525	F	F4	EEE	45,015	0.443	1.577	0.958
526	F	F4	EEE	45,034	0.548	1.642	1.002
527	F	F4	EEE	50,090	0.763	2.384	1.491
528	F	F4	EEE	50,108	0.583	2.316	1.512
529	F	F4	EEE	54,969	0.563	4.865	1.669
530	F	F4	EEE	54,989	0.591	4.672	1.703

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
531	F	F4	EEE	59,907	0.634	3.514	1.937
532	F	F4	EEE	59,926	0.500	2.525	1.868
533	F	F4	EEE	59,966	0.553	2.735	1.802
534	F	F4	EEE	59,984	0.569	2.515	1.786
535	F	F4	EEE	65,020	0.510	3.371	2.326
536	F	F4	EEE	65,039	0.562	3.174	2.380
537	F	F4	EEE	69,886	0.541	2.991	2.131
538	F	F4	EEE	69,904	0.556	3.011	2.057
539	F	F4	EEE	75,063	0.466	2.279	1.614
540	F	F4	EEE	75,082	0.417	2.074	1.695
541	F	F5	EEE	998	0.184	0.584	0.531
542	F	F5	EEE	1,022	0.158	0.349	0.517
543	F	F5	EEE	4,914	0.261	0.923	0.631
544	F	F5	EEE	4,933	0.257	0.884	0.689
545	F	F5	EEE	10,011	0.384	1.732	0.869
546	F	F5	EEE	10,029	0.377	1.654	0.871
547	F	F5	EEE	14,878	0.411	1.325	0.873
548	F	F5	EEE	14,896	0.407	1.236	0.865
549	F	F5	EEE	20,211	0.396	1.270	0.814
550	F	F5	EEE	20,230	0.429	1.155	0.825
551	F	F5	EEE	25,255	0.564	1.484	0.719
552	F	F5	EEE	25,273	0.520	1.694	0.773
553	F	F5	EEE	29,700	0.570	1.573	0.972
554	F	F5	EEE	29,719	0.522	1.852	0.919
555	F	F5	EEE	29,755	0.576	2.135	0.984
556	F	F5	EEE	29,772	0.555	1.700	0.912
557	F	F5	EEE	35,159	0.590	1.905	1.100
558	F	F5	EEE	35,177	0.579	1.955	1.051
559	F	F5	EEE	39,855	0.611	2.102	0.999
560	F	F5	EEE	39,873	0.600	1.907	0.971
561	F	F5	EEE	45,104	0.649	1.975	0.826
562	F	F5	EEE	45,122	0.669	1.909	0.744
563	F	F5	EEE	49,970	0.631	2.043	0.781
564	F	F5	EEE	49,990	0.599	1.755	0.839
565	F	F5	EEE	54,949	0.542	2.574	1.441
566	F	F5	EEE	54,968	0.552	2.554	1.523
567	F	F5	EEE	60,024	0.500	2.558	1.676
568	F	F5	EEE	60,043	0.509	2.726	1.514
569	F	F5	EEE	60,061	0.499	2.486	1.800
570	F	F5	EEE	60,080	0.505	2.353	1.486
571	F	F5	EEE	64,943	0.547	2.884	1.509
572	F	F5	EEE	64,963	0.522	2.659	1.533
573	F	F6	EEE	1,001	0.185	0.752	0.420
574	F	F6	EEE	1,024	0.174	0.732	0.434
575	F	F6	EEE	4,987	0.247	1.018	0.567
576	F	F6	EEE	5,006	0.269	0.995	0.656
577	F	F6	EEE	10,028	0.316	1.314	0.791
578	F	F6	EEE	10,046	0.350	1.450	0.778
579	F	F6	EEE	15,111	0.467	1.741	0.841
580	F	F6	EEE	15,130	0.368	1.036	0.861
581	F	F6	EEE	19,920	0.419	1.071	0.746
582	F	F6	EEE	19,938	0.374	1.123	0.759
583	F	F6	EEE	25,017	0.487	1.817	0.900

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
584	F	F6	EEE	25,036	0.531	1.926	0.812
585	F	F6	EEE	30,090	0.613	1.887	0.806
586	F	F6	EEE	30,108	0.640	1.783	0.806
587	F	F6	EEE	30,134	0.595	1.833	0.863
588	F	F6	EEE	30,152	0.692	2.047	0.778
589	F	F6	EEE	34,959	0.553	1.603	0.731
590	F	F6	EEE	34,977	0.546	1.282	0.783
591	F	F6	EEE	39,848	0.565	1.347	0.779
592	F	F6	EEE	39,867	0.605	1.855	0.777
593	F	F6	EEE	45,180	0.850	2.193	0.665
594	F	F6	EEE	45,198	0.691	1.768	0.625
595	F	F6	EEE	50,006	0.664	2.378	0.823
596	F	F6	EEE	50,023	0.855	2.338	0.808
597	F	F6	EEE	55,029	0.607	2.431	0.964
598	F	F6	EEE	55,048	0.539	2.340	1.008
599	F	F6	EEE	59,998	0.634	2.339	0.891
600	F	F6	EEE	60,017	0.742	3.080	0.891
601	F	F6	EEE	60,035	0.617	2.242	0.783
602	F	F6	EEE	60,053	0.688	2.183	0.784
603	F	F6	EEE	64,971	0.654	2.893	1.111
604	F	F6	EEE	64,990	0.664	2.853	1.204
605	F	F6	EEE	69,978	0.633	2.709	1.037
606	F	F6	EEE	69,996	0.601	2.902	1.020
607	F	F6	EEE	75,033	0.514	2.485	1.774
608	F	F6	EEE	75,052	0.505	2.066	1.757
609	T	T1	HT3	1,012	0.192	1.753	0.928
610	T	T1	HT3	1,038	0.191	1.670	0.964
611	T	T1	HT3	5,155	0.248	2.620	0.623
612	T	T1	HT3	5,180	0.264	2.613	0.542
613	T	T1	HT3	10,058	0.308	3.061	0.589
614	T	T1	HT3	10,076	0.288	2.979	0.552
615	T	T1	HT3	14,801	0.305	2.974	0.486
616	T	T1	HT3	14,820	0.289	3.147	0.494
617	T	T1	HT3	20,038	0.345	3.720	0.524
618	T	T1	HT3	20,056	0.335	3.569	0.495
619	T	T1	HT3	24,930	0.359	4.078	0.586
620	T	T1	HT3	24,950	0.380	2.361	0.491
621	T	T1	HT3	29,969	0.370	3.979	0.497
622	T	T1	HT3	29,987	0.471	4.934	0.543
623	T	T1	HT3	30,013	0.348	3.655	0.475
624	T	T1	HT3	30,030	0.382	3.772	0.433
625	T	T1	HT3	34,775	0.409	4.181	0.625
626	T	T1	HT3	34,794	0.415	4.562	0.554
627	T	T1	HT3	39,961	0.486	5.842	0.704
628	T	T1	HT3	39,978	0.471	5.790	0.664
629	T	T1	HT3	44,968	0.444	5.435	0.614
630	T	T1	HT3	44,986	0.527	5.776	0.624
631	T	T1	HT3	50,042	0.514	6.382	0.684
632	T	T1	HT3	50,060	0.489	7.109	0.838
633	T	T1	HT3	55,115	0.421	4.626	0.586
634	T	T1	HT3	55,132	0.398	4.803	0.655
635	T	T1	HT3	60,106	0.355	5.764	0.781
636	T	T1	HT3	60,125	0.385	5.367	0.774

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
637	T	T1	HT3	60,143	0.405	6.848	0.786
638	T	T1	HT3	60,161	0.348	5.297	0.769
639	T	T1	HT3	60,180	0.300	3.058	0.553
640	T	T1	HT3	60,199	0.344	3.841	0.634
641	T	T1	HT3	65,006	0.386	6.283	0.694
642	T	T1	HT3	65,024	0.413	6.824	0.770
643	T	T1	HT3	70,000	0.364	5.329	0.686
644	T	T1	HT3	70,018	0.384	5.405	0.719
645	T	T1	HT3	75,000	0.373	4.602	0.691
646	T	T1	HT3	75,019	0.366	5.607	0.792
647	T	T2	EEE	1,008	0.189	1.718	0.712
648	T	T2	EEE	1,050	0.200	1.589	0.601
649	T	T2	EEE	5,201	0.197	2.152	0.745
650	T	T2	EEE	5,219	0.250	2.457	0.799
651	T	T2	EEE	9,998	0.250	2.487	0.750
652	T	T2	EEE	10,017	0.252	2.563	0.740
653	T	T2	EEE	14,954	0.312	3.302	0.807
654	T	T2	EEE	14,972	0.276	3.046	0.768
655	T	T2	EEE	19,962	0.269	3.245	0.781
656	T	T2	EEE	19,979	0.252	3.102	0.795
657	T	T2	EEE	24,965	0.293	3.629	0.734
658	T	T2	EEE	24,984	0.294	3.667	0.727
659	T	T2	EEE	29,982	0.277	3.297	0.618
660	T	T2	EEE	30,001	0.264	3.155	0.507
661	T	T2	EEE	30,017	0.252	3.169	0.515
662	T	T2	EEE	30,044	0.274	3.093	0.661
663	T	T2	EEE	35,016	0.340	3.925	0.806
664	T	T2	EEE	35,034	0.319	3.792	0.774
665	T	T2	EEE	40,021	0.399	5.347	0.810
666	T	T2	EEE	40,042	0.389	4.837	0.856
667	T	T2	EEE	45,088	0.362	4.619	0.694
668	T	T2	EEE	45,106	0.432	4.888	0.660
669	T	T2	EEE	50,010	0.483	7.406	0.857
670	T	T2	EEE	50,027	0.424	5.865	0.732
671	T	T2	EEE	55,077	0.338	5.410	0.747
672	T	T2	EEE	55,094	0.382	5.560	0.706
673	T	T2	EEE	60,070	0.333	6.075	1.038
674	T	T2	EEE	60,088	0.268	4.449	0.935
675	T	T2	EEE	60,106	0.308	4.877	0.848
676	T	T2	EEE	60,124	0.295	5.165	0.943
677	T	T2	EEE	60,144	0.270	3.034	0.721
678	T	T2	EEE	60,162	0.285	4.202	0.758
679	T	T2	EEE	65,029	0.386	5.849	0.766
680	T	T2	EEE	65,047	0.332	5.615	0.723
681	T	T2	EEE	69,970	0.368	5.635	0.907
682	T	T2	EEE	69,989	0.442	6.890	1.028
683	T	T2	EEE	74,920	0.397	4.998	0.874
684	T	T2	EEE	74,942	0.410	5.623	0.948
685	T	T3	EEE	955	0.185	1.887	0.574
686	T	T3	EEE	979	0.204	1.634	0.687
687	T	T3	EEE	5,110	0.266	2.611	0.588
688	T	T3	EEE	5,128	0.243	2.431	0.524
689	T	T3	EEE	10,057	0.222	2.154	0.634

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
690	T	T3	EEE	10,076	0.248	2.392	0.626
691	T	T3	EEE	15,026	0.254	2.808	0.765
692	T	T3	EEE	15,044	0.259	2.951	0.713
693	T	T3	EEE	20,020	0.296	3.244	0.820
694	T	T3	EEE	20,038	0.266	3.272	0.823
695	T	T3	EEE	24,969	0.352	4.164	0.703
696	T	T3	EEE	24,987	0.293	3.498	0.716
697	T	T3	EEE	30,058	0.292	3.308	0.618
698	T	T3	EEE	30,076	0.360	3.709	0.608
699	T	T3	EEE	30,102	0.329	3.627	0.598
700	T	T3	EEE	30,120	0.313	3.918	0.655
701	T	T3	EEE	34,678	0.367	5.204	0.745
702	T	T3	EEE	34,696	0.336	4.776	0.708
703	T	T3	EEE	40,096	0.491	5.911	0.770
704	T	T3	EEE	40,120	0.499	6.233	0.827
705	T	T3	EEE	45,119	0.406	4.632	0.654
706	T	T3	EEE	45,137	0.436	4.402	0.614
707	T	T3	EEE	50,002	0.451	7.504	0.805
708	T	T3	EEE	50,019	0.455	6.642	0.807
709	T	T3	EEE	55,046	0.340	5.540	0.652
710	T	T3	EEE	55,065	0.393	5.789	0.794
711	T	T3	EEE	60,048	0.319	6.016	0.898
712	T	T3	EEE	60,066	0.312	4.703	0.778
713	T	T3	EEE	60,084	0.329	6.591	0.787
714	T	T3	EEE	60,102	0.384	6.292	0.839
715	T	T3	EEE	60,121	0.294	4.141	0.692
716	T	T3	EEE	60,140	0.278	4.060	0.669
717	T	T3	EEE	65,018	0.436	7.087	0.757
718	T	T3	EEE	65,036	0.439	5.323	0.774
719	T	T3	EEE	70,014	0.401	5.939	0.958
720	T	T3	EEE	70,033	0.366	6.403	0.938
721	T	T3	EEE	74,993	0.385	5.821	0.923
722	T	T3	EEE	75,023	0.456	6.571	0.863
723	T	T4	HT3	1,112	0.253	2.391	0.560
724	T	T4	HT3	1,131	0.186	1.548	0.490
725	T	T4	HT3	5,236	0.307	3.178	0.419
726	T	T4	HT3	5,254	0.235	2.414	0.468
727	T	T4	HT3	10,118	0.308	2.905	0.477
728	T	T4	HT3	10,136	0.282	2.649	0.502
729	T	T4	HT3	14,865	0.291	2.604	0.482
730	T	T4	HT3	14,883	0.286	2.911	0.506
731	T	T4	HT3	20,014	0.367	3.815	0.454
732	T	T4	HT3	20,033	0.341	3.957	0.460
733	T	T4	HT3	25,137	0.312	3.692	0.408
734	T	T4	HT3	25,155	0.327	3.510	0.451
735	T	T4	HT3	30,100	0.350	3.866	0.526
736	T	T4	HT3	30,117	0.308	3.405	0.499
737	T	T4	HT3	30,143	0.396	4.130	0.529
738	T	T4	HT3	30,160	0.352	3.876	0.548
739	T	T4	HT3	34,778	0.417	4.542	0.635
740	T	T4	HT3	34,795	0.427	4.501	0.569
741	T	T4	HT3	40,038	0.385	5.420	0.696
742	T	T4	HT3	40,055	0.444	5.199	0.643

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
743	T	T4	HT3	45,120	0.446	4.308	0.519
744	T	T4	HT3	45,138	0.434	4.397	0.635
745	T	T4	HT3	49,952	0.455	5.266	0.601
746	T	T4	HT3	49,970	0.430	5.117	0.541
747	T	T4	HT3	54,980	0.446	6.064	0.642
748	T	T4	HT3	54,998	0.423	5.207	0.640
749	T	T4	HT3	59,978	0.380	5.016	0.670
750	T	T4	HT3	59,997	0.365	4.763	0.640
751	T	T4	HT3	60,014	0.411	4.176	0.756
752	T	T4	HT3	60,032	0.332	3.721	0.607
753	T	T4	HT3	60,052	0.346	4.397	0.676
754	T	T4	HT3	60,070	0.387	5.271	0.686
755	T	T4	HT3	65,056	0.284	3.119	0.596
756	T	T4	HT3	65,075	0.382	5.575	0.616
757	T	T4	HT3	69,763	0.397	5.457	0.755
758	T	T4	HT3	69,782	0.401	6.065	0.788
759	T	T4	HT3	75,013	0.402	4.287	0.720
760	T	T4	HT3	75,035	0.412	4.686	0.685
761	T	T5	HT3	990	0.210	1.767	0.570
762	T	T5	HT3	1,045	0.212	1.843	0.612
763	T	T5	HT3	5,190	0.239	2.601	0.601
764	T	T5	HT3	5,208	0.250	2.526	0.491
765	T	T5	HT3	10,043	0.293	2.680	0.381
766	T	T5	HT3	10,061	0.304	2.823	0.435
767	T	T5	HT3	15,011	0.297	3.011	0.445
768	T	T5	HT3	15,030	0.275	2.989	0.486
769	T	T5	HT3	19,721	0.299	3.216	0.499
770	T	T5	HT3	19,739	0.283	3.201	0.429
771	T	T5	HT3	24,957	0.344	4.291	0.430
772	T	T5	HT3	24,976	0.354	3.726	0.436
773	T	T5	HT3	29,993	0.368	4.172	0.381
774	T	T5	HT3	30,012	0.363	4.125	0.412
775	T	T5	HT3	30,037	0.379	4.051	0.434
776	T	T5	HT3	30,055	0.374	4.265	0.433
777	T	T5	HT3	35,038	0.355	4.483	0.359
778	T	T5	HT3	35,056	0.365	4.917	0.442
779	T	T5	HT3	40,048	0.390	4.943	0.635
780	T	T5	HT3	40,065	0.444	5.044	0.520
781	T	T5	HT3	44,953	0.368	3.676	0.412
782	T	T5	HT3	44,972	0.367	4.067	0.470
783	T	T5	HT3	50,029	0.445	5.441	0.570
784	T	T5	HT3	50,047	0.392	4.339	0.541
785	T	T5	HT3	54,998	0.393	5.210	0.528
786	T	T5	HT3	55,017	0.405	4.945	0.573
787	T	T5	HT3	60,010	0.390	5.501	0.595
788	T	T5	HT3	60,028	0.352	4.384	0.520
789	T	T5	HT3	60,047	0.349	4.715	0.615
790	T	T5	HT3	60,065	0.330	4.683	0.588
791	T	T5	HT3	60,085	0.360	4.504	0.558
792	T	T5	HT3	60,104	0.439	3.760	0.475
793	T	T5	HT3	65,091	0.323	3.899	0.477
794	T	T5	HT3	65,109	0.310	3.090	0.408
795	T	T5	HT3	69,974	0.463	5.956	0.722

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
796	T	T5	HT3	69,993	0.408	6.014	0.689
797	T	T5	HT3	74,937	0.427	5.000	0.599
798	T	T5	HT3	74,959	0.429	4.697	0.551
799	T	T6	EEE	1,011	0.177	1.447	0.826
800	T	T6	EEE	1,036	0.181	1.373	0.831
801	T	T6	EEE	5,179	0.191	1.902	1.050
802	T	T6	EEE	5,197	0.240	2.058	1.049
803	T	T6	EEE	9,909	0.239	2.327	1.118
804	T	T6	EEE	9,927	0.256	2.345	1.095
805	T	T6	EEE	14,884	0.294	3.240	1.028
806	T	T6	EEE	14,902	0.270	3.080	1.009
807	T	T6	EEE	19,925	0.280	3.294	0.924
808	T	T6	EEE	19,943	0.315	3.668	0.886
809	T	T6	EEE	24,944	0.298	3.743	0.689
810	T	T6	EEE	24,963	0.299	3.437	0.714
811	T	T6	EEE	30,023	0.330	4.557	0.691
812	T	T6	EEE	30,040	0.330	4.123	0.641
813	T	T6	EEE	30,065	0.309	3.724	0.664
814	T	T6	EEE	30,085	0.291	3.797	0.718
815	T	T6	EEE	34,764	0.312	4.142	0.771
816	T	T6	EEE	34,782	0.336	3.959	0.757
817	T	T6	EEE	40,012	0.374	4.764	0.800
818	T	T6	EEE	40,029	0.353	4.596	0.770
819	T	T6	EEE	45,069	0.403	4.774	0.656
820	T	T6	EEE	45,087	0.372	4.387	0.651
821	T	T6	EEE	50,071	0.457	4.747	0.731
822	T	T6	EEE	50,089	0.405	4.779	0.740
823	T	T6	EEE	55,214	0.348	4.816	0.733
824	T	T6	EEE	55,233	0.364	5.049	0.765
825	T	T6	EEE	59,973	0.360	5.670	0.894
826	T	T6	EEE	59,991	0.323	5.282	0.952
827	T	T6	EEE	60,009	0.333	5.332	0.841
828	T	T6	EEE	60,028	0.344	6.157	0.838
829	T	T6	EEE	60,049	0.281	2.402	0.420
830	T	T6	EEE	60,067	0.332	4.427	0.832
831	T	T6	EEE	64,877	0.381	5.753	0.799
832	T	T6	EEE	64,895	0.403	6.047	0.793
833	T	T6	EEE	69,879	0.427	5.877	0.967
834	T	T6	EEE	69,898	0.414	6.928	0.926
835	T	T6	EEE	74,992	0.526	6.878	0.831
836	T	T6	EEE	75,014	0.425	5.586	0.865
837	C	C1	EEE	1,011	0.110	1.302	0.089
838	C	C1	EEE	1,034	0.115	1.159	0.098
839	C	C1	EEE	5,006	0.181	1.698	0.283
840	C	C1	EEE	5,034	0.164	1.822	0.219
841	C	C1	EEE	10,010	0.181	2.940	0.193
842	C	C1	EEE	10,040	0.202	2.619	0.282
843	C	C1	EEE	15,009	0.179	2.234	0.279
844	C	C1	EEE	15,035	0.163	2.171	0.227
845	C	C1	EEE	20,008	0.215	3.170	0.401
846	C	C1	EEE	20,032	0.178	2.810	0.339
847	C	C1	EEE	25,010	0.186	2.503	0.448
848	C	C1	EEE	25,034	0.177	2.180	0.401

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
849	C	C1	EEE	30,009	0.166	2.694	0.366
850	C	C1	EEE	30,034	0.194	2.778	0.311
851	C	C1	EEE	30,081	0.153	2.278	0.224
852	C	C1	EEE	30,111	0.157	2.049	0.341
853	C	C1	EEE	35,007	0.233	3.582	0.306
854	C	C1	EEE	35,037	0.202	3.161	0.294
855	C	C1	EEE	40,010	0.168	2.617	0.359
856	C	C1	EEE	40,037	0.193	3.402	0.332
857	C	C1	EEE	45,009	0.175	2.954	0.567
858	C	C1	EEE	45,033	0.164	2.610	0.433
859	C	C1	EEE	50,009	0.170	3.136	0.424
860	C	C1	EEE	50,036	0.166	1.968	0.494
861	C	C1	EEE	55,017	0.213	2.727	0.623
862	C	C1	EEE	55,042	0.189	2.367	0.534
863	C	C1	EEE	60,009	0.209	2.776	0.704
864	C	C1	EEE	60,035	0.183	2.643	0.687
865	C	C1	EEE	60,062	0.192	2.584	0.737
866	C	C1	EEE	60,091	0.186	2.495	0.772
867	C	C1	EEE	65,051	0.186	2.157	0.638
868	C	C1	EEE	65,087	0.173	2.583	0.437
869	C	C1	EEE	70,008	0.198	3.115	0.459
870	C	C1	EEE	70,031	0.202	3.170	0.485
871	C	C1	EEE	75,009	0.206	3.432	0.587
872	C	C1	EEE	75,033	0.187	3.511	0.614
873	C	C2	HT3	1,008	0.123	1.396	0.093
874	C	C2	HT3	1,032	0.120	1.311	0.108
875	C	C2	HT3	5,008	0.123	1.537	0.275
876	C	C2	HT3	5,033	0.163	2.033	0.200
877	C	C2	HT3	10,031	0.202	2.450	0.365
878	C	C2	HT3	10,053	0.212	2.301	0.305
879	C	C2	HT3	15,008	0.192	2.242	0.308
880	C	C2	HT3	15,030	0.209	2.816	0.230
881	C	C2	HT3	20,019	0.244	3.214	0.363
882	C	C2	HT3	20,044	0.216	2.462	0.327
883	C	C2	HT3	25,013	0.215	2.675	0.326
884	C	C2	HT3	25,038	0.198	2.256	0.298
885	C	C2	HT3	28,328	0.226	2.844	0.259
886	C	C2	HT3	28,353	0.188	2.452	0.210
887	C	C2	HT3	30,040	0.230	3.864	0.243
888	C	C2	HT3	30,070	0.206	2.448	0.191
889	C	C2	HT3	30,129	0.189	2.557	0.290
890	C	C2	HT3	30,154	0.231	3.305	0.220
891	C	C2	HT3	35,010	0.232	3.275	0.262
892	C	C2	HT3	35,039	0.221	3.203	0.209
893	C	C2	HT3	40,036	0.223	2.899	0.252
894	C	C2	HT3	40,060	0.232	3.301	0.227
895	C	C2	HT3	45,009	0.229	3.846	0.363
896	C	C2	HT3	45,034	0.229	3.098	0.244
897	C	C2	HT3	50,010	0.258	3.807	0.387
898	C	C2	HT3	50,033	0.204	3.148	0.336
899	C	C2	HT3	55,008	0.210	3.171	0.473
900	C	C2	HT3	55,032	0.194	2.681	0.318
901	C	C2	HT3	60,018	0.202	3.273	0.536

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
902	C	C2	HT3	60,046	0.189	2.888	0.475
903	C	C2	HT3	60,070	0.206	3.285	0.525
904	C	C2	HT3	60,095	0.167	1.865	0.417
905	C	C2	HT3	65,056	0.210	2.723	0.290
906	C	C2	HT3	65,081	0.184	2.199	0.487
907	C	C2	HT3	70,024	0.261	3.378	0.441
908	C	C2	HT3	70,049	0.235	3.109	0.391
909	C	C2	HT3	75,009	0.249	3.530	0.462
910	C	C2	HT3	75,033	0.218	3.435	0.362
911	C	C3	HT3	1,015	0.153	1.661	0.108
912	C	C3	HT3	1,039	0.132	1.401	0.092
913	C	C3	HT3	5,010	0.172	2.002	0.207
914	C	C3	HT3	5,037	0.171	1.888	0.170
915	C	C3	HT3	10,008	0.185	2.146	0.362
916	C	C3	HT3	10,046	0.199	1.738	0.284
917	C	C3	HT3	15,011	0.245	3.405	0.301
918	C	C3	HT3	15,038	0.209	2.792	0.184
919	C	C3	HT3	20,007	0.277	4.263	0.399
920	C	C3	HT3	20,032	0.219	2.564	0.310
921	C	C3	HT3	25,006	0.209	2.500	0.437
922	C	C3	HT3	25,031	0.248	3.306	0.327
923	C	C3	HT3	30,008	0.272	4.400	0.286
924	C	C3	HT3	30,033	0.244	3.350	0.267
925	C	C3	HT3	30,083	0.254	2.797	0.233
926	C	C3	HT3	30,107	0.188	1.846	0.227
927	C	C3	HT3	35,009	0.341	3.978	0.246
928	C	C3	HT3	35,033	0.300	3.275	0.232
929	C	C3	HT3	40,008	0.213	2.489	0.192
930	C	C3	HT3	40,038	0.310	3.562	0.205
931	C	C3	HT3	45,008	0.253	4.270	0.447
932	C	C3	HT3	45,036	0.243	3.705	0.376
933	C	C3	HT3	50,010	0.259	3.099	0.302
934	C	C3	HT3	50,038	0.205	2.375	0.279
935	C	C3	HT3	55,010	0.280	3.980	0.289
936	C	C3	HT3	55,036	0.253	3.165	0.369
937	C	C3	HT3	60,008	0.222	2.325	0.405
938	C	C3	HT3	60,045	0.242	2.585	0.349
939	C	C3	HT3	60,070	0.233	2.439	0.420
940	C	C3	HT3	60,094	0.252	2.773	0.384
941	C	C3	HT3	65,006	0.300	3.821	0.281
942	C	C3	HT3	65,030	0.212	2.172	0.445
943	C	C3	HT3	70,009	0.281	3.292	0.332
944	C	C3	HT3	70,037	0.252	2.580	0.329
945	C	C3	HT3	75,018	0.278	3.220	0.405
946	C	C3	HT3	75,041	0.253	3.544	0.498
947	C	C4	EEE	1,001	0.127	1.146	0.109
948	C	C4	EEE	1,026	0.129	1.092	0.103
949	C	C4	EEE	5,009	0.130	1.071	0.278
950	C	C4	EEE	5,036	0.141	1.301	0.218
951	C	C4	EEE	10,009	0.169	1.646	0.576
952	C	C4	EEE	10,035	0.157	1.623	0.401
953	C	C4	EEE	15,010	0.155	1.626	0.418
954	C	C4	EEE	15,036	0.158	1.961	0.243

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
955	C	C4	EEE	20,007	0.199	2.786	0.496
956	C	C4	EEE	20,033	0.162	2.086	0.368
957	C	C4	EEE	25,009	0.167	2.525	0.391
958	C	C4	EEE	25,052	0.163	2.561	0.372
959	C	C4	EEE	30,008	0.164	1.956	0.387
960	C	C4	EEE	30,036	0.160	1.955	0.324
961	C	C4	EEE	30,063	0.167	2.269	0.432
962	C	C4	EEE	30,091	0.165	2.221	0.352
963	C	C4	EEE	35,011	0.176	2.533	0.427
964	C	C4	EEE	35,034	0.169	2.035	0.460
965	C	C4	EEE	40,008	0.137	2.317	0.513
966	C	C4	EEE	40,033	0.165	2.213	0.402
967	C	C4	EEE	45,008	0.165	3.143	0.660
968	C	C4	EEE	45,032	0.159	3.306	0.588
969	C	C4	EEE	50,008	0.158	2.192	0.632
970	C	C4	EEE	50,034	0.151	1.573	0.681
971	C	C4	EEE	55,010	0.181	2.618	0.731
972	C	C4	EEE	55,036	0.175	1.968	0.659
973	C	C4	EEE	60,008	0.170	2.399	0.677
974	C	C4	EEE	60,036	0.144	1.835	0.733
975	C	C4	EEE	60,069	0.159	2.038	0.674
976	C	C4	EEE	60,095	0.144	1.523	0.541
977	C	C4	EEE	65,009	0.151	2.197	0.598
978	C	C4	EEE	65,042	0.146	1.936	0.604
979	C	C4	EEE	70,011	0.200	2.292	0.733
980	C	C4	EEE	70,039	0.181	2.123	0.844
981	C	C4	EEE	75,008	0.181	2.285	0.905
982	C	C4	EEE	75,034	0.165	2.197	0.724
983	C	C5	EEE	1,009	0.135	1.390	0.091
984	C	C5	EEE	1,032	0.121	1.341	0.062
985	C	C5	EEE	5,007	0.121	1.349	0.197
986	C	C5	EEE	5,034	0.121	1.533	0.217
987	C	C5	EEE	10,009	0.134	1.788	0.292
988	C	C5	EEE	10,035	0.154	2.241	0.245
989	C	C5	EEE	15,010	0.158	2.943	0.254
990	C	C5	EEE	15,036	0.132	1.844	0.195
991	C	C5	EEE	20,009	0.212	3.717	0.229
992	C	C5	EEE	20,038	0.171	2.737	0.225
993	C	C5	EEE	25,009	0.204	3.279	0.439
994	C	C5	EEE	25,036	0.177	2.985	0.321
995	C	C5	EEE	30,008	0.209	3.317	0.299
996	C	C5	EEE	30,036	0.190	2.750	0.263
997	C	C5	EEE	30,092	0.184	3.138	0.246
998	C	C5	EEE	30,148	0.190	2.861	0.247
999	C	C5	EEE	35,008	0.234	3.132	0.415
1000	C	C5	EEE	35,035	0.222	2.812	0.323
1001	C	C5	EEE	40,008	0.191	2.793	0.343
1002	C	C5	EEE	40,038	0.197	2.589	0.345
1003	C	C5	EEE	45,008	0.253	4.428	0.410
1004	C	C5	EEE	45,032	0.186	3.299	0.409
1005	C	C5	EEE	50,010	0.215	2.804	0.314
1006	C	C5	EEE	50,037	0.237	3.002	0.273
1007	C	C5	EEE	55,007	0.211	3.447	0.359

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
1008	C	C5	EEE	55,033	0.220	2.979	0.461
1009	C	C5	EEE	60,022	0.220	3.207	0.556
1010	C	C5	EEE	60,057	0.183	2.505	0.609
1011	C	C5	EEE	60,083	0.195	2.410	0.513
1012	C	C5	EEE	60,108	0.191	2.507	0.404
1013	C	C5	EEE	65,008	0.212	3.133	0.355
1014	C	C5	EEE	65,032	0.192	2.279	0.497
1015	C	C5	EEE	70,009	0.235	3.049	0.407
1016	C	C5	EEE	70,038	0.230	2.896	0.386
1017	C	C5	EEE	75,006	0.256	3.362	0.500
1018	C	C5	EEE	75,031	0.218	2.971	0.491
1019	C	C6	HT3	937	0.129	1.360	0.110
1020	C	C6	HT3	962	0.114	1.158	0.087
1021	C	C6	HT3	5,007	0.162	1.557	0.226
1022	C	C6	HT3	5,031	0.165	1.099	0.208
1023	C	C6	HT3	10,009	0.194	1.880	0.229
1024	C	C6	HT3	10,033	0.192	1.990	0.244
1025	C	C6	HT3	15,009	0.181	1.689	0.275
1026	C	C6	HT3	15,034	0.188	2.409	0.198
1027	C	C6	HT3	20,007	0.256	2.786	0.319
1028	C	C6	HT3	20,039	0.224	2.156	0.210
1029	C	C6	HT3	25,031	0.188	2.347	0.205
1030	C	C6	HT3	25,065	0.226	2.822	0.286
1031	C	C6	HT3	30,015	0.261	3.890	0.249
1032	C	C6	HT3	30,042	0.196	2.213	0.287
1033	C	C6	HT3	30,106	0.187	1.834	0.303
1034	C	C6	HT3	30,132	0.191	2.096	0.223
1035	C	C6	HT3	35,008	0.236	2.133	0.207
1036	C	C6	HT3	35,032	0.208	2.599	0.186
1037	C	C6	HT3	40,009	0.257	3.213	0.222
1038	C	C6	HT3	40,055	0.199	1.745	0.258
1039	C	C6	HT3	45,008	0.204	3.167	0.332
1040	C	C6	HT3	45,034	0.210	2.634	0.258
1041	C	C6	HT3	50,010	0.219	3.027	0.295
1042	C	C6	HT3	50,036	0.175	1.961	0.265
1043	C	C6	HT3	55,008	0.210	2.454	0.416
1044	C	C6	HT3	55,034	0.209	3.220	0.266
1045	C	C6	HT3	60,009	0.208	2.833	0.276
1046	C	C6	HT3	60,031	0.177	1.884	0.298
1047	C	C6	HT3	60,081	0.181	2.298	0.366
1048	C	C6	HT3	60,113	0.183	1.775	0.250
1049	C	C6	HT3	65,008	0.185	2.287	0.215
1050	C	C6	HT3	65,031	0.181	2.182	0.343
1051	C	C6	HT3	70,008	0.244	3.149	0.253
1052	C	C6	HT3	70,031	0.250	3.450	0.285
1053	C	C6	HT3	75,025	0.218	2.680	0.355
1054	C	C6	HT3	75,049	0.194	2.261	0.340
1055	G	G1	EEE	987	0.093	0.944	0.138
1056	G	G1	EEE	1,005	0.095	0.898	0.132
1057	G	G1	EEE	5,007	0.113	1.378	0.217
1058	G	G1	EEE	5,040	0.121	1.349	0.210
1059	G	G1	EEE	10,024	0.111	1.916	0.310
1060	G	G1	EEE	10,049	0.121	1.706	0.307

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
1061	G	G1	EEE	15,008	0.119	1.704	0.352
1062	G	G1	EEE	15,037	0.102	1.611	0.341
1063	G	G1	EEE	20,007	0.140	2.552	0.364
1064	G	G1	EEE	20,037	0.120	2.466	0.368
1065	G	G1	EEE	25,009	0.144	2.134	0.565
1066	G	G1	EEE	25,033	0.119	2.240	0.435
1067	G	G1	EEE	30,006	0.166	1.995	0.380
1068	G	G1	EEE	30,031	0.162	1.938	0.385
1069	G	G1	EEE	30,063	0.162	1.670	0.390
1070	G	G1	EEE	30,093	0.142	1.747	0.341
1071	G	G1	EEE	35,007	0.143	2.169	0.372
1072	G	G1	EEE	35,036	0.125	2.055	0.380
1073	G	G1	EEE	40,006	0.127	1.654	0.318
1074	G	G1	EEE	40,064	0.123	1.531	0.320
1075	G	G1	EEE	45,008	0.151	2.124	0.338
1076	G	G1	EEE	45,064	0.126	2.082	0.330
1077	G	G1	EEE	50,010	0.112	1.938	0.355
1078	G	G1	EEE	50,038	0.110	2.035	0.340
1079	G	G1	EEE	55,008	0.123	3.746	0.403
1080	G	G1	EEE	55,036	0.115	2.304	0.355
1081	G	G1	EEE	58,189	0.154	2.492	0.409
1082	G	G1	EEE	58,220	0.143	2.667	0.380
1083	G	G1	EEE	60,044	0.135	2.457	0.426
1084	G	G1	EEE	60,069	0.131	1.748	0.386
1085	G	G1	EEE	60,095	0.142	2.035	0.387
1086	G	G1	EEE	60,122	0.120	2.674	0.408
1087	G	G1	EEE	63,124	0.165	2.599	0.592
1088	G	G1	EEE	63,186	0.138	1.900	0.442
1089	G	G1	EEE	70,112	0.176	2.334	0.372
1090	G	G1	EEE	70,131	0.163	2.568	0.350
1091	G	G1	EEE	74,991	0.167	2.293	0.371
1092	G	G1	EEE	75,010	0.163	2.369	0.354
1093	G	G2	EEE	996	0.092	0.662	0.160
1094	G	G2	EEE	1,019	0.097	0.657	0.136
1095	G	G2	EEE	5,007	0.134	1.327	0.255
1096	G	G2	EEE	5,061	0.095	1.089	0.211
1097	G	G2	EEE	10,006	0.106	1.559	0.284
1098	G	G2	EEE	10,034	0.110	2.086	0.316
1099	G	G2	EEE	15,010	0.103	1.624	0.289
1100	G	G2	EEE	15,039	0.105	1.698	0.284
1101	G	G2	EEE	20,008	0.153	1.841	0.391
1102	G	G2	EEE	20,030	0.134	1.790	0.403
1103	G	G2	EEE	25,009	0.162	1.941	0.674
1104	G	G2	EEE	25,032	0.126	1.928	0.475
1105	G	G2	EEE	30,008	0.138	1.761	0.437
1106	G	G2	EEE	30,032	0.145	1.824	0.433
1107	G	G2	EEE	30,060	0.111	1.486	0.409
1108	G	G2	EEE	30,173	0.117	1.335	0.362
1109	G	G2	EEE	35,008	0.123	1.956	0.402
1110	G	G2	EEE	35,068	0.123	1.918	0.423
1111	G	G2	EEE	40,022	0.131	1.692	0.316
1112	G	G2	EEE	40,053	0.183	1.994	0.356
1113	G	G2	EEE	45,018	0.136	2.230	0.326

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
1114	G	G2	EEE	45,043	0.119	1.819	0.361
1115	G	G2	EEE	50,009	0.165	3.117	0.448
1116	G	G2	EEE	50,036	0.123	3.107	0.436
1117	G	G2	EEE	55,008	0.131	2.062	0.361
1118	G	G2	EEE	55,041	0.190	3.372	0.414
1119	G	G2	EEE	60,008	0.124	2.358	0.738
1120	G	G2	EEE	60,033	0.163	2.525	0.401
1121	G	G2	EEE	60,121	0.122	1.341	0.365
1122	G	G2	EEE	60,174	0.130	1.404	0.403
1123	G	G2	EEE	65,030	0.167	2.029	0.468
1124	G	G2	EEE	65,054	0.130	2.087	0.362
1125	G	G2	EEE	70,008	0.178	2.082	0.501
1126	G	G2	EEE	70,045	0.152	1.980	0.538
1127	G	G2	EEE	75,039	0.145	1.931	0.623
1128	G	G2	EEE	75,056	0.149	1.995	0.627
1129	G	G3	HT3	1,001	0.108	0.817	0.168
1130	G	G3	HT3	1,022	0.092	0.761	0.140
1131	G	G3	HT3	5,008	0.111	1.195	0.274
1132	G	G3	HT3	5,036	0.144	1.097	0.245
1133	G	G3	HT3	10,009	0.132	1.553	0.282
1134	G	G3	HT3	10,038	0.141	1.807	0.302
1135	G	G3	HT3	15,007	0.153	1.727	0.376
1136	G	G3	HT3	15,040	0.153	1.464	0.366
1137	G	G3	HT3	20,010	0.175	2.265	0.398
1138	G	G3	HT3	20,035	0.166	2.296	0.372
1139	G	G3	HT3	25,007	0.195	2.449	0.480
1140	G	G3	HT3	25,039	0.196	2.109	0.508
1141	G	G3	HT3	30,006	0.220	1.924	0.420
1142	G	G3	HT3	30,061	0.220	1.827	0.466
1143	G	G3	HT3	30,089	0.193	1.790	0.403
1144	G	G3	HT3	30,145	0.180	1.633	0.378
1145	G	G3	HT3	35,007	0.201	2.088	0.398
1146	G	G3	HT3	35,033	0.209	2.117	0.428
1147	G	G3	HT3	40,007	0.202	1.845	0.312
1148	G	G3	HT3	40,036	0.209	1.747	0.338
1149	G	G3	HT3	45,025	0.192	2.060	0.357
1150	G	G3	HT3	45,055	0.205	2.166	0.361
1151	G	G3	HT3	50,010	0.166	1.738	0.338
1152	G	G3	HT3	50,038	0.178	1.749	0.331
1153	G	G3	HT3	55,009	0.189	2.398	0.349
1154	G	G3	HT3	55,035	0.206	2.723	0.331
1155	G	G3	HT3	60,008	0.166	1.979	0.355
1156	G	G3	HT3	60,031	0.192	3.337	0.396
1157	G	G3	HT3	60,096	0.200	2.137	0.335
1158	G	G3	HT3	60,125	0.185	1.981	0.350
1159	G	G3	HT3	65,040	0.240	2.533	0.369
1160	G	G3	HT3	65,067	0.196	2.112	0.353
1161	G	G3	HT3	70,010	0.200	2.161	0.369
1162	G	G3	HT3	70,034	0.191	2.275	0.368
1163	G	G3	HT3	75,009	0.207	2.650	0.455
1164	G	G3	HT3	75,034	0.220	2.514	0.454
1165	G	G4	EEE	1,001	0.130	0.695	0.144
1166	G	G4	EEE	1,024	0.099	0.692	0.142

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
1167	G	G4	EEE	5,008	0.121	1.225	0.262
1168	G	G4	EEE	5,028	0.093	1.089	0.246
1169	G	G4	EEE	10,015	0.123	1.320	0.329
1170	G	G4	EEE	10,045	0.147	1.197	0.329
1171	G	G4	EEE	15,008	0.100	2.171	0.375
1172	G	G4	EEE	15,033	0.104	1.586	0.387
1173	G	G4	EEE	20,011	0.140	2.169	0.449
1174	G	G4	EEE	20,035	0.126	2.327	0.456
1175	G	G4	EEE	25,008	0.159	1.614	0.470
1176	G	G4	EEE	25,035	0.132	2.339	0.449
1177	G	G4	EEE	30,010	0.164	2.013	0.426
1178	G	G4	EEE	30,073	0.140	2.189	0.497
1179	G	G4	EEE	30,100	0.131	1.593	0.364
1180	G	G4	EEE	30,134	0.179	1.688	0.380
1181	G	G4	EEE	35,007	0.144	1.919	0.431
1182	G	G4	EEE	35,039	0.155	2.330	0.437
1183	G	G4	EEE	40,007	0.151	1.530	0.326
1184	G	G4	EEE	40,032	0.120	1.692	0.368
1185	G	G4	EEE	45,008	0.162	2.247	0.378
1186	G	G4	EEE	45,048	0.132	1.948	0.350
1187	G	G4	EEE	50,009	0.118	1.925	0.319
1188	G	G4	EEE	50,038	0.110	1.571	0.338
1189	G	G4	EEE	55,008	0.163	2.251	0.381
1190	G	G4	EEE	55,034	0.156	2.685	0.348
1191	G	G4	EEE	60,010	0.094	1.897	0.402
1192	G	G4	EEE	60,033	0.124	1.919	0.410
1193	G	G4	EEE	60,057	0.122	1.646	0.354
1194	G	G4	EEE	60,081	0.128	2.161	0.450
1195	G	G4	EEE	65,009	0.164	2.097	0.405
1196	G	G4	EEE	65,059	0.125	1.789	0.387
1197	G	G4	EEE	70,008	0.163	2.200	0.421
1198	G	G4	EEE	70,034	0.150	2.241	0.352
1199	G	G4	EEE	75,010	0.157	2.331	0.621
1200	G	G4	EEE	75,048	0.183	2.267	0.477
1201	G	G5	HT3	996	0.116	0.805	0.183
1202	G	G5	HT3	1,023	0.086	0.819	0.198
1203	G	G5	HT3	5,009	0.126	1.226	0.259
1204	G	G5	HT3	5,035	0.100	1.216	0.244
1205	G	G5	HT3	10,010	0.111	1.309	0.256
1206	G	G5	HT3	10,038	0.146	1.497	0.251
1207	G	G5	HT3	15,008	0.128	1.716	0.306
1208	G	G5	HT3	15,034	0.151	2.007	0.306
1209	G	G5	HT3	20,007	0.181	2.162	0.400
1210	G	G5	HT3	20,030	0.191	2.166	0.411
1211	G	G5	HT3	25,050	0.150	1.630	0.371
1212	G	G5	HT3	25,077	0.157	2.077	0.421
1213	G	G5	HT3	30,010	0.153	2.289	0.370
1214	G	G5	HT3	30,072	0.160	1.782	0.377
1215	G	G5	HT3	30,135	0.136	1.716	0.314
1216	G	G5	HT3	30,162	0.146	1.765	0.321
1217	G	G5	HT3	35,007	0.179	2.251	0.361
1218	G	G5	HT3	35,037	0.149	1.811	0.371
1219	G	G5	HT3	40,036	0.149	2.166	0.333

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
1220	G	G5	HT3	40,062	0.152	2.260	0.307
1221	G	G5	HT3	45,033	0.162	2.567	0.320
1222	G	G5	HT3	45,098	0.144	2.274	0.377
1223	G	G5	HT3	50,035	0.124	1.506	0.333
1224	G	G5	HT3	50,061	0.127	2.232	0.338
1225	G	G5	HT3	55,009	0.156	3.403	0.315
1226	G	G5	HT3	55,036	0.171	2.548	0.317
1227	G	G5	HT3	60,009	0.112	2.198	0.377
1228	G	G5	HT3	60,042	0.143	2.838	0.421
1229	G	G5	HT3	60,076	0.143	2.519	0.417
1230	G	G5	HT3	60,100	0.197	3.228	0.454
1231	G	G5	HT3	65,008	0.195	2.789	0.358
1232	G	G5	HT3	65,022	0.196	2.312	0.355
1233	G	G5	HT3	70,026	0.171	2.434	0.343
1234	G	G5	HT3	70,051	0.163	2.098	0.385
1235	G	G5	HT3	75,008	0.168	2.002	0.470
1236	G	G5	HT3	75,072	0.174	2.485	0.480
1237	G	G6	HT3	1,013	0.109	0.746	0.173
1238	G	G6	HT3	1,037	0.090	0.788	0.178
1239	G	G6	HT3	5,007	0.100	1.025	0.287
1240	G	G6	HT3	5,036	0.120	1.027	0.257
1241	G	G6	HT3	10,010	0.109	1.298	0.319
1242	G	G6	HT3	10,034	0.140	1.352	0.312
1243	G	G6	HT3	15,010	0.140	1.969	0.334
1244	G	G6	HT3	15,034	0.124	1.752	0.358
1245	G	G6	HT3	20,009	0.160	2.004	0.439
1246	G	G6	HT3	20,031	0.156	2.349	0.452
1247	G	G6	HT3	25,009	0.182	2.263	0.434
1248	G	G6	HT3	25,044	0.160	1.933	0.375
1249	G	G6	HT3	30,039	0.184	2.336	0.474
1250	G	G6	HT3	30,072	0.187	2.050	0.437
1251	G	G6	HT3	30,099	0.182	2.186	0.416
1252	G	G6	HT3	30,135	0.184	2.066	0.410
1253	G	G6	HT3	35,009	0.176	1.660	0.403
1254	G	G6	HT3	35,036	0.177	1.704	0.385
1255	G	G6	HT3	40,007	0.185	1.828	0.390
1256	G	G6	HT3	40,034	0.196	1.669	0.345
1257	G	G6	HT3	45,008	0.157	1.577	0.349
1258	G	G6	HT3	45,068	0.164	1.900	0.355
1259	G	G6	HT3	50,036	0.163	1.940	0.376
1260	G	G6	HT3	50,064	0.159	2.070	0.406
1261	G	G6	HT3	55,009	0.154	3.572	0.377
1262	G	G6	HT3	55,033	0.136	2.119	0.345
1263	G	G6	HT3	60,009	0.135	2.359	0.397
1264	G	G6	HT3	60,040	0.208	2.494	0.463
1265	G	G6	HT3	60,090	0.168	2.520	0.442
1266	G	G6	HT3	60,121	0.176	2.707	0.460
1267	G	G6	HT3	65,009	0.105	2.326	0.346
1268	G	G6	HT3	65,033	0.202	2.064	0.335
1269	G	G6	HT3	70,008	0.183	1.907	0.386
1270	G	G6	HT3	70,037	0.209	2.264	0.389
1271	G	G6	HT3	75,056	0.213	2.379	0.469
1272	G	G6	HT3	75,093	0.202	3.037	0.497

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
1273	H	H1	EEE	998	0.181	1.490	0.452
1274	H	H1	EEE	1,022	0.166	1.481	0.351
1275	H	H1	EEE	5,031	0.178	1.593	0.231
1276	H	H1	EEE	5,057	0.185	1.744	0.243
1277	H	H1	EEE	10,008	0.263	2.762	0.271
1278	H	H1	EEE	10,038	0.241	2.729	0.261
1279	H	H1	EEE	15,009	0.249	2.715	0.277
1280	H	H1	EEE	15,034	0.229	2.399	0.232
1281	H	H1	EEE	20,008	0.291	3.394	0.298
1282	H	H1	EEE	20,038	0.314	3.339	0.348
1283	H	H1	EEE	25,016	0.269	3.548	0.333
1284	H	H1	EEE	25,080	0.254	2.837	0.406
1285	H	H1	EEE	30,007	0.348	4.917	0.335
1286	H	H1	EEE	30,033	0.274	3.497	0.338
1287	H	H1	EEE	30,106	0.299	4.188	0.307
1288	H	H1	EEE	30,167	0.288	3.878	0.306
1289	H	H1	EEE	35,009	0.322	4.424	0.302
1290	H	H1	EEE	35,035	0.305	4.663	0.306
1291	H	H1	EEE	37,826	0.293	3.605	0.433
1292	H	H1	EEE	37,855	0.282	3.846	0.477
1293	H	H1	EEE	40,009	0.277	3.742	0.444
1294	H	H1	EEE	40,035	0.253	3.308	0.438
1295	H	H1	EEE	45,016	0.320	3.836	0.396
1296	H	H1	EEE	45,044	0.309	3.502	0.345
1297	H	H1	EEE	50,009	0.317	3.953	0.475
1298	H	H1	EEE	50,031	0.327	4.585	0.510
1299	H	H1	EEE	55,008	0.360	5.340	0.332
1300	H	H1	EEE	55,041	0.409	6.429	0.471
1301	H	H1	EEE	59,867	0.398	4.907	0.374
1302	H	H1	EEE	59,886	0.432	4.829	0.380
1303	H	H1	EEE	59,912	0.340	4.087	0.452
1304	H	H1	EEE	59,931	0.413	4.835	0.351
1305	H	H1	EEE	65,082	0.411	4.509	0.369
1306	H	H1	EEE	65,101	0.354	3.955	0.355
1307	H	H1	EEE	70,142	0.333	4.153	0.386
1308	H	H1	EEE	70,160	0.325	3.811	0.383
1309	H	H1	EEE	74,942	0.389	4.121	0.435
1310	H	H1	EEE	74,960	0.334	4.072	0.453
1311	H	H2	EEE	987	0.186	1.236	0.236
1312	H	H2	EEE	1,010	0.217	1.543	0.210
1313	H	H2	EEE	5,010	0.184	1.607	0.310
1314	H	H2	EEE	5,060	0.213	1.609	0.289
1315	H	H2	EEE	10,008	0.207	2.042	0.240
1316	H	H2	EEE	10,032	0.222	2.031	0.274
1317	H	H2	EEE	15,009	0.206	2.038	0.235
1318	H	H2	EEE	15,035	0.217	2.234	0.229
1319	H	H2	EEE	20,010	0.316	3.513	0.376
1320	H	H2	EEE	20,034	0.254	3.300	0.377
1321	H	H2	EEE	25,009	0.317	3.370	0.407
1322	H	H2	EEE	25,033	0.300	3.554	0.465
1323	H	H2	EEE	30,008	0.294	3.305	0.276
1324	H	H2	EEE	30,032	0.287	3.194	0.285
1325	H	H2	EEE	30,057	0.351	4.228	0.401

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
1326	H	H2	EEE	30,081	0.299	3.827	0.306
1327	H	H2	EEE	35,008	0.375	3.772	0.273
1328	H	H2	EEE	35,070	0.302	3.529	0.304
1329	H	H2	EEE	40,008	0.297	4.164	0.348
1330	H	H2	EEE	40,079	0.310	3.861	0.346
1331	H	H2	EEE	45,013	0.337	3.840	0.364
1332	H	H2	EEE	45,039	0.327	4.545	0.409
1333	H	H2	EEE	50,009	0.443	4.587	0.421
1334	H	H2	EEE	50,068	0.369	4.836	0.449
1335	H	H2	EEE	55,007	0.468	6.191	0.399
1336	H	H2	EEE	55,036	0.296	4.391	0.371
1337	H	H2	EEE	59,960	0.381	4.618	0.426
1338	H	H2	EEE	59,981	0.531	4.527	0.442
1339	H	H2	EEE	60,000	0.452	4.526	0.487
1340	H	H2	EEE	60,019	0.410	3.728	0.398
1341	H	H2	EEE	65,205	0.487	4.356	0.515
1342	H	H2	EEE	65,224	0.400	3.684	0.392
1343	H	H2	EEE	70,119	0.407	4.672	0.405
1344	H	H2	EEE	70,138	0.369	3.813	0.411
1345	H	H2	EEE	75,089	0.447	4.258	0.464
1346	H	H2	EEE	75,107	0.357	3.491	0.433
1347	H	H3	HT3	983	0.170	1.323	0.244
1348	H	H3	HT3	1,007	0.167	1.323	0.233
1349	H	H3	HT3	5,008	0.188	1.302	0.527
1350	H	H3	HT3	5,032	0.194	1.279	0.598
1351	H	H3	HT3	10,014	0.192	1.311	0.499
1352	H	H3	HT3	10,040	0.223	1.818	0.442
1353	H	H3	HT3	15,009	0.213	1.769	0.435
1354	H	H3	HT3	15,032	0.204	1.815	0.457
1355	H	H3	HT3	20,009	0.262	2.970	0.602
1356	H	H3	HT3	20,040	0.221	2.557	0.548
1357	H	H3	HT3	25,009	0.260	2.728	0.601
1358	H	H3	HT3	25,032	0.230	2.619	0.629
1359	H	H3	HT3	30,016	0.295	3.930	0.482
1360	H	H3	HT3	30,046	0.300	3.198	0.463
1361	H	H3	HT3	30,081	0.258	3.245	0.518
1362	H	H3	HT3	30,113	0.307	4.035	0.415
1363	H	H3	HT3	35,009	0.282	3.607	0.429
1364	H	H3	HT3	35,035	0.289	3.161	0.410
1365	H	H3	HT3	40,007	0.287	3.955	0.419
1366	H	H3	HT3	40,037	0.270	3.671	0.471
1367	H	H3	HT3	45,008	0.295	4.673	0.467
1368	H	H3	HT3	45,033	0.357	4.216	0.374
1369	H	H3	HT3	50,039	0.349	4.747	0.440
1370	H	H3	HT3	50,081	0.307	3.448	0.346
1371	H	H3	HT3	55,023	0.429	5.755	0.292
1372	H	H3	HT3	55,052	0.396	5.844	0.356
1373	H	H3	HT3	59,751	0.450	4.843	0.274
1374	H	H3	HT3	59,770	0.377	4.831	0.321
1375	H	H3	HT3	59,795	0.394	4.280	0.263
1376	H	H3	HT3	59,813	0.497	5.415	0.303
1377	H	H3	HT3	64,932	0.377	3.774	0.247
1378	H	H3	HT3	64,951	0.360	3.870	0.313

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
1379	H	H3	HT3	69,857	0.366	4.382	0.257
1380	H	H3	HT3	69,876	0.396	4.593	0.309
1381	H	H3	HT3	75,013	0.409	4.476	0.278
1382	H	H3	HT3	75,030	0.418	4.597	0.282
1383	H	H4	HT3	1,119	0.162	1.229	0.569
1384	H	H4	HT3	1,143	0.157	1.119	0.470
1385	H	H4	HT3	5,006	0.243	1.559	0.589
1386	H	H4	HT3	5,028	0.205	1.365	0.572
1387	H	H4	HT3	10,015	0.197	1.695	0.591
1388	H	H4	HT3	10,074	0.187	1.471	0.584
1389	H	H4	HT3	15,010	0.226	2.132	0.545
1390	H	H4	HT3	15,034	0.214	1.980	0.569
1391	H	H4	HT3	20,007	0.278	2.942	0.734
1392	H	H4	HT3	20,034	0.239	2.288	0.641
1393	H	H4	HT3	25,016	0.236	2.663	0.733
1394	H	H4	HT3	25,041	0.247	2.870	0.719
1395	H	H4	HT3	30,007	0.241	2.556	0.604
1396	H	H4	HT3	30,060	0.234	3.034	0.515
1397	H	H4	HT3	30,085	0.244	2.458	0.506
1398	H	H4	HT3	30,111	0.267	3.088	0.541
1399	H	H4	HT3	35,007	0.259	3.243	0.541
1400	H	H4	HT3	35,068	0.231	2.628	0.528
1401	H	H4	HT3	40,009	0.243	2.898	0.444
1402	H	H4	HT3	40,033	0.266	2.908	0.487
1403	H	H4	HT3	45,009	0.297	4.310	0.444
1404	H	H4	HT3	45,036	0.288	3.174	0.396
1405	H	H4	HT3	50,017	0.301	3.608	0.358
1406	H	H4	HT3	50,057	0.289	3.477	0.376
1407	H	H4	HT3	55,010	0.329	4.456	0.316
1408	H	H4	HT3	55,048	0.347	4.075	0.366
1409	H	H4	HT3	59,758	0.411	4.577	0.354
1410	H	H4	HT3	59,776	0.513	4.674	0.395
1411	H	H4	HT3	59,804	0.432	4.078	0.362
1412	H	H4	HT3	59,823	0.451	4.188	0.351
1413	H	H4	HT3	65,089	0.453	3.848	0.341
1414	H	H4	HT3	65,107	0.361	3.721	0.308
1415	H	H4	HT3	70,182	0.385	4.427	0.318
1416	H	H4	HT3	70,201	0.398	4.207	0.298
1417	H	H4	HT3	75,102	0.353	3.371	0.269
1418	H	H4	HT3	75,121	0.372	3.416	0.313
1419	H	H5	EEE	979	0.168	1.385	0.431
1420	H	H5	EEE	1,003	0.171	1.447	0.423
1421	H	H5	EEE	5,009	0.190	1.527	0.454
1422	H	H5	EEE	5,033	0.187	1.718	0.516
1423	H	H5	EEE	10,008	0.192	2.107	0.399
1424	H	H5	EEE	10,035	0.214	2.253	0.449
1425	H	H5	EEE	15,024	0.239	2.893	0.506
1426	H	H5	EEE	15,050	0.238	2.242	0.513
1427	H	H5	EEE	20,009	0.254	3.145	0.802
1428	H	H5	EEE	20,075	0.235	3.050	0.776
1429	H	H5	EEE	25,046	0.289	4.368	0.644
1430	H	H5	EEE	25,076	0.255	3.890	0.578
1431	H	H5	EEE	30,022	0.239	3.087	0.519

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
1432	H	H5	EEE	30,049	0.293	4.405	0.533
1433	H	H5	EEE	30,140	0.304	3.536	0.444
1434	H	H5	EEE	30,167	0.251	3.097	0.456
1435	H	H5	EEE	35,007	0.306	4.094	0.442
1436	H	H5	EEE	35,033	0.315	4.364	0.438
1437	H	H5	EEE	40,010	0.337	3.974	0.455
1438	H	H5	EEE	40,038	0.306	4.172	0.417
1439	H	H5	EEE	45,009	0.294	4.059	0.443
1440	H	H5	EEE	45,034	0.282	4.207	0.447
1441	H	H5	EEE	50,093	0.319	5.078	0.491
1442	H	H5	EEE	50,132	0.292	4.004	0.372
1443	H	H5	EEE	55,009	0.424	6.138	0.377
1444	H	H5	EEE	55,035	0.384	5.607	0.578
1445	H	H5	EEE	59,750	0.443	4.164	0.469
1446	H	H5	EEE	59,769	0.382	4.665	0.405
1447	H	H5	EEE	59,787	0.467	4.949	0.427
1448	H	H5	EEE	59,805	0.389	4.913	0.492
1449	H	H5	EEE	64,939	0.482	4.734	0.484
1450	H	H5	EEE	64,955	0.407	4.935	0.447
1451	H	H5	EEE	70,034	0.395	5.332	0.486
1452	H	H5	EEE	70,053	0.437	5.341	0.468
1453	H	H5	EEE	75,247	0.431	5.019	0.425
1454	H	H5	EEE	75,265	0.376	4.697	0.436
1455	H	H6	HT3	992	0.172	1.439	0.398
1456	H	H6	HT3	1,017	0.182	1.348	0.432
1457	H	H6	HT3	5,008	0.219	1.963	0.374
1458	H	H6	HT3	5,038	0.196	1.807	0.398
1459	H	H6	HT3	10,008	0.237	2.441	0.250
1460	H	H6	HT3	10,038	0.215	2.304	0.282
1461	H	H6	HT3	15,009	0.301	3.107	0.214
1462	H	H6	HT3	15,035	0.294	3.040	0.215
1463	H	H6	HT3	20,092	0.289	3.219	0.279
1464	H	H6	HT3	20,117	0.301	3.415	0.272
1465	H	H6	HT3	25,008	0.285	3.602	0.356
1466	H	H6	HT3	25,031	0.288	3.439	0.351
1467	H	H6	HT3	30,008	0.351	4.207	0.238
1468	H	H6	HT3	30,035	0.373	4.860	0.312
1469	H	H6	HT3	30,068	0.311	3.701	0.257
1470	H	H6	HT3	30,093	0.396	3.806	0.252
1471	H	H6	HT3	32,058	0.350	3.762	0.234
1472	H	H6	HT3	32,086	0.356	3.237	0.230
1473	H	H6	HT3	35,009	0.312	4.039	0.237
1474	H	H6	HT3	35,037	0.274	3.541	0.282
1475	H	H6	HT3	40,008	0.401	4.325	0.314
1476	H	H6	HT3	40,036	0.308	4.190	0.345
1477	H	H6	HT3	45,008	0.456	4.872	0.320
1478	H	H6	HT3	45,036	0.410	4.647	0.315
1479	H	H6	HT3	50,034	0.395	3.986	0.266
1480	H	H6	HT3	50,128	0.380	4.377	0.320
1481	H	H6	HT3	55,010	0.447	4.624	0.214
1482	H	H6	HT3	55,033	0.439	4.015	0.317
1483	H	H6	HT3	59,776	0.564	5.210	0.269
1484	H	H6	HT3	59,795	0.596	4.963	0.266

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
1485	H	H6	HT3	59,821	0.571	4.822	0.326
1486	H	H6	HT3	59,840	0.517	5.034	0.352
1487	H	H6	HT3	65,099	0.666	5.536	0.398
1488	H	H6	HT3	65,118	0.542	4.433	0.299
1489	H	H6	HT3	70,200	0.387	4.234	0.284
1490	H	H6	HT3	70,218	0.516	4.490	0.291
1491	H	H6	HT3	75,065	0.473	4.627	0.284
1492	H	H6	HT3	75,083	0.447	4.148	0.292
1493	I	I1	EEE	988	0.153	1.373	0.239
1494	I	I1	EEE	1,011	0.148	1.469	0.239
1495	I	I1	EEE	5,008	0.188	2.161	0.339
1496	I	I1	EEE	5,035	0.193	2.291	0.381
1497	I	I1	EEE	10,008	0.181	2.477	0.426
1498	I	I1	EEE	10,035	0.183	2.317	0.409
1499	I	I1	EEE	15,009	0.225	2.202	0.400
1500	I	I1	EEE	15,034	0.187	2.870	0.357
1501	I	I1	EEE	20,010	0.212	2.862	0.425
1502	I	I1	EEE	20,043	0.171	2.039	0.422
1503	I	I1	EEE	25,008	0.207	3.209	0.355
1504	I	I1	EEE	25,065	0.214	2.125	0.390
1505	I	I1	EEE	30,009	0.191	2.608	0.381
1506	I	I1	EEE	30,038	0.229	2.745	0.415
1507	I	I1	EEE	30,076	0.172	2.377	0.343
1508	I	I1	EEE	30,104	0.141	1.976	0.369
1509	I	I1	EEE	35,008	0.212	2.840	0.394
1510	I	I1	EEE	35,036	0.211	2.377	0.330
1511	I	I1	EEE	40,011	0.179	2.616	0.385
1512	I	I1	EEE	40,037	0.172	2.505	0.342
1513	I	I1	EEE	45,007	0.164	2.394	0.416
1514	I	I1	EEE	45,034	0.185	3.363	0.425
1515	I	I1	EEE	50,044	0.274	2.670	0.409
1516	I	I1	EEE	50,070	0.183	2.596	0.394
1517	I	I1	EEE	55,008	0.190	2.753	0.362
1518	I	I1	EEE	55,041	0.188	2.363	0.393
1519	I	I1	EEE	60,011	0.210	2.807	0.346
1520	I	I1	EEE	60,041	0.159	1.907	0.405
1521	I	I1	EEE	60,066	0.171	2.179	0.410
1522	I	I1	EEE	60,092	0.188	2.336	0.436
1523	I	I1	EEE	65,031	0.166	1.895	0.467
1524	I	I1	EEE	65,057	0.196	2.216	0.406
1525	I	I1	EEE	70,008	0.208	3.125	0.470
1526	I	I1	EEE	70,034	0.252	3.988	0.559
1527	I	I1	EEE	75,009	0.223	3.426	0.416
1528	I	I1	EEE	75,113	0.197	2.374	0.385
1529	I	I2	HT3	1,030	0.190	1.961	0.354
1530	I	I2	HT3	1,054	0.182	1.914	0.350
1531	I	I2	HT3	5,007	0.211	2.207	0.275
1532	I	I2	HT3	5,059	0.209	2.081	0.334
1533	I	I2	HT3	10,008	0.202	2.828	0.567
1534	I	I2	HT3	10,035	0.230	2.769	0.451
1535	I	I2	HT3	15,009	0.279	3.648	0.458
1536	I	I2	HT3	15,033	0.215	3.348	0.438
1537	I	I2	HT3	20,024	0.191	2.773	0.595

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
1538	I	I2	HT3	20,053	0.197	2.555	0.503
1539	I	I2	HT3	25,092	0.190	2.552	0.346
1540	I	I2	HT3	25,160	0.190	2.638	0.433
1541	I	I2	HT3	30,009	0.238	2.742	0.421
1542	I	I2	HT3	30,037	0.176	2.391	0.378
1543	I	I2	HT3	30,106	0.210	2.255	0.306
1544	I	I2	HT3	30,136	0.268	2.915	0.338
1545	I	I2	HT3	35,006	0.199	2.816	0.346
1546	I	I2	HT3	35,034	0.196	2.866	0.398
1547	I	I2	HT3	40,008	0.202	2.540	0.417
1548	I	I2	HT3	40,034	0.218	2.502	0.340
1549	I	I2	HT3	42,655	0.214	2.437	0.399
1550	I	I2	HT3	42,682	0.223	2.193	0.305
1551	I	I2	HT3	45,009	0.235	2.775	0.401
1552	I	I2	HT3	45,037	0.206	2.676	0.401
1553	I	I2	HT3	50,010	0.192	2.537	0.413
1554	I	I2	HT3	50,040	0.198	2.936	0.403
1555	I	I2	HT3	55,007	0.217	2.308	0.306
1556	I	I2	HT3	55,042	0.202	2.403	0.321
1557	I	I2	HT3	60,008	0.179	1.970	0.307
1558	I	I2	HT3	60,033	0.246	2.898	0.241
1559	I	I2	HT3	60,059	0.190	2.305	0.340
1560	I	I2	HT3	60,087	0.222	2.783	0.289
1561	I	I2	HT3	65,046	0.218	2.742	0.361
1562	I	I2	HT3	65,073	0.197	2.545	0.375
1563	I	I2	HT3	70,008	0.217	2.813	0.520
1564	I	I2	HT3	70,033	0.212	2.938	0.533
1565	I	I2	HT3	75,038	0.244	2.815	0.497
1566	I	I2	HT3	75,065	0.253	3.058	0.524
1567	I	I3	EEE	995	0.225	1.671	0.154
1568	I	I3	EEE	1,019	0.183	1.854	0.155
1569	I	I3	EEE	5,007	0.160	1.612	0.224
1570	I	I3	EEE	5,033	0.161	1.774	0.240
1571	I	I3	EEE	10,008	0.170	2.056	0.317
1572	I	I3	EEE	10,035	0.149	2.144	0.336
1573	I	I3	EEE	15,087	0.193	2.064	0.333
1574	I	I3	EEE	15,112	0.179	2.630	0.335
1575	I	I3	EEE	20,009	0.213	3.059	0.438
1576	I	I3	EEE	20,064	0.179	2.178	0.473
1577	I	I3	EEE	25,006	0.315	2.693	0.426
1578	I	I3	EEE	25,042	0.187	2.566	0.437
1579	I	I3	EEE	30,010	0.179	2.473	0.386
1580	I	I3	EEE	30,045	0.170	2.177	0.465
1581	I	I3	EEE	30,073	0.190	2.274	0.404
1582	I	I3	EEE	30,100	0.171	2.381	0.342
1583	I	I3	EEE	35,008	0.186	2.650	0.372
1584	I	I3	EEE	35,036	0.155	2.265	0.315
1585	I	I3	EEE	40,009	0.185	2.386	0.425
1586	I	I3	EEE	40,034	0.177	2.352	0.397
1587	I	I3	EEE	45,026	0.181	2.427	0.342
1588	I	I3	EEE	45,069	0.165	2.203	0.410
1589	I	I3	EEE	50,039	0.166	2.359	0.488
1590	I	I3	EEE	50,070	0.180	3.347	0.620

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
1591	I	I3	EEE	55,008	0.169	2.896	0.645
1592	I	I3	EEE	55,037	0.171	2.792	0.618
1593	I	I3	EEE	60,008	0.179	3.316	0.677
1594	I	I3	EEE	60,035	0.165	2.522	0.634
1595	I	I3	EEE	60,061	0.223	3.946	0.486
1596	I	I3	EEE	60,088	0.198	3.083	0.584
1597	I	I3	EEE	65,038	0.167	2.656	0.712
1598	I	I3	EEE	65,094	0.221	2.756	0.807
1599	I	I3	EEE	70,007	0.236	4.161	1.059
1600	I	I3	EEE	70,050	0.212	4.070	0.965
1601	I	I3	EEE	75,036	0.186	2.916	0.798
1602	I	I3	EEE	75,063	0.173	2.645	0.773
1603	I	I4	HT3	995	0.166	1.759	0.169
1604	I	I4	HT3	1,014	0.141	1.240	0.166
1605	I	I4	HT3	5,024	0.136	1.301	0.230
1606	I	I4	HT3	5,056	0.154	1.514	0.277
1607	I	I4	HT3	10,008	0.147	1.784	0.346
1608	I	I4	HT3	10,034	0.182	2.220	0.324
1609	I	I4	HT3	15,016	0.205	2.065	0.341
1610	I	I4	HT3	15,046	0.189	2.190	0.319
1611	I	I4	HT3	20,010	0.188	2.275	0.340
1612	I	I4	HT3	20,037	0.176	2.370	0.359
1613	I	I4	HT3	30,008	0.196	1.896	0.355
1614	I	I4	HT3	30,037	0.205	2.515	0.355
1615	I	I4	HT3	30,096	0.198	2.170	0.283
1616	I	I4	HT3	30,123	0.175	2.040	0.288
1617	I	I4	HT3	35,038	0.173	2.141	0.353
1618	I	I4	HT3	35,064	0.200	1.935	0.247
1619	I	I4	HT3	40,007	0.198	2.603	0.389
1620	I	I4	HT3	40,034	0.173	2.149	0.394
1621	I	I4	HT3	45,009	0.210	2.546	0.324
1622	I	I4	HT3	45,035	0.169	2.200	0.354
1623	I	I4	HT3	50,148	0.204	2.972	0.294
1624	I	I4	HT3	50,179	0.200	2.097	0.326
1625	I	I4	HT3	55,009	0.168	1.764	0.233
1626	I	I4	HT3	55,043	0.170	2.128	0.215
1627	I	I4	HT3	60,008	0.177	1.971	0.286
1628	I	I4	HT3	60,042	0.201	2.256	0.263
1629	I	I4	HT3	60,075	0.174	1.884	0.265
1630	I	I4	HT3	60,101	0.167	1.811	0.258
1631	I	I4	HT3	65,010	0.208	2.226	0.292
1632	I	I4	HT3	65,034	0.193	1.945	0.266
1633	I	I4	HT3	70,009	0.230	2.926	0.363
1634	I	I4	HT3	70,034	0.220	2.342	0.349
1635	I	I4	HT3	75,008	0.197	2.034	0.307
1636	I	I4	HT3	75,034	0.206	2.421	0.270
1637	I	I5	EEE	985	0.164	1.601	0.261
1638	I	I5	EEE	1,004	0.166	1.691	0.236
1639	I	I5	EEE	5,009	0.166	1.758	0.522
1640	I	I5	EEE	5,046	0.152	1.385	0.509
1641	I	I5	EEE	10,007	0.180	2.244	0.463
1642	I	I5	EEE	10,040	0.164	1.809	0.458
1643	I	I5	EEE	15,008	0.188	1.952	0.534

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
1644	I	I5	EEE	15,031	0.169	2.129	0.533
1645	I	I5	EEE	20,008	0.177	2.402	0.526
1646	I	I5	EEE	20,036	0.152	2.025	0.489
1647	I	I5	EEE	25,007	0.181	2.464	0.503
1648	I	I5	EEE	25,042	0.236	2.382	0.474
1649	I	I5	EEE	30,008	0.168	2.287	0.462
1650	I	I5	EEE	30,041	0.163	2.462	0.551
1651	I	I5	EEE	30,064	0.172	2.589	0.414
1652	I	I5	EEE	30,091	0.148	2.014	0.459
1653	I	I5	EEE	35,009	0.166	2.284	0.390
1654	I	I5	EEE	35,039	0.217	2.160	0.362
1655	I	I5	EEE	40,007	0.160	1.977	0.482
1656	I	I5	EEE	40,035	0.182	2.398	0.444
1657	I	I5	EEE	45,010	0.188	2.642	0.525
1658	I	I5	EEE	45,037	0.184	3.181	0.505
1659	I	I5	EEE	50,039	0.201	2.437	0.456
1660	I	I5	EEE	50,087	0.164	2.374	0.411
1661	I	I5	EEE	55,009	0.181	2.665	0.484
1662	I	I5	EEE	55,037	0.200	2.321	0.457
1663	I	I5	EEE	60,039	0.203	2.716	0.366
1664	I	I5	EEE	60,066	0.182	2.213	0.477
1665	I	I5	EEE	60,092	0.180	2.569	0.411
1666	I	I5	EEE	60,121	0.186	2.416	0.339
1667	I	I5	EEE	65,033	0.154	1.888	0.412
1668	I	I5	EEE	65,055	0.183	2.324	0.504
1669	I	I5	EEE	70,007	0.196	3.185	0.544
1670	I	I5	EEE	70,035	0.203	3.098	0.510
1671	I	I5	EEE	70,801	0.176	2.550	0.563
1672	I	I5	EEE	70,825	0.182	2.531	0.441
1673	I	I5	EEE	75,009	0.188	2.352	0.571
1674	I	I5	EEE	75,035	0.170	2.294	0.547
1675	I	I6	HT3	1,013	0.141	1.075	0.195
1676	I	I6	HT3	1,037	0.149	1.320	0.204
1677	I	I6	HT3	5,007	0.179	1.891	0.304
1678	I	I6	HT3	5,036	0.154	1.473	0.244
1679	I	I6	HT3	10,013	0.164	1.894	0.482
1680	I	I6	HT3	10,040	0.174	2.644	0.352
1681	I	I6	HT3	15,008	0.194	1.850	0.351
1682	I	I6	HT3	15,031	0.190	2.031	0.273
1683	I	I6	HT3	20,007	0.189	2.330	0.426
1684	I	I6	HT3	20,034	0.179	2.121	0.463
1685	I	I6	HT3	25,008	0.201	2.513	0.510
1686	I	I6	HT3	25,038	0.190	2.430	0.509
1687	I	I6	HT3	30,008	0.215	2.271	0.443
1688	I	I6	HT3	30,036	0.181	1.883	0.397
1689	I	I6	HT3	30,065	0.183	2.283	0.446
1690	I	I6	HT3	30,119	0.153	2.654	0.389
1691	I	I6	HT3	35,008	0.164	1.853	0.336
1692	I	I6	HT3	35,035	0.223	2.708	0.500
1693	I	I6	HT3	35,813	0.164	2.032	0.375
1694	I	I6	HT3	35,842	0.205	2.236	0.347
1695	I	I6	HT3	40,009	0.221	2.940	0.499
1696	I	I6	HT3	40,037	0.153	1.859	0.346

OBS	Model	Vehicle ID	Fuel	Mileage	HC (g/mi)	CO (g/mi)	NOx (g/mi)
1697	I	I6	HT3	45,008	0.215	2.430	0.370
1698	I	I6	HT3	45,033	0.182	2.081	0.386
1699	I	I6	HT3	50,017	0.176	2.320	0.449
1700	I	I6	HT3	50,050	0.194	2.398	0.462
1701	I	I6	HT3	55,033	0.191	2.548	0.386
1702	I	I6	HT3	55,061	0.213	2.344	0.496
1703	I	I6	HT3	60,009	0.186	2.547	0.401
1704	I	I6	HT3	60,034	0.209	2.514	0.277
1705	I	I6	HT3	60,064	0.185	2.206	0.418
1706	I	I6	HT3	60,091	0.195	2.321	0.372
1707	I	I6	HT3	65,035	0.173	2.010	0.370
1708	I	I6	HT3	65,061	0.212	2.790	0.334
1709	I	I6	HT3	70,009	0.211	3.042	0.481
1710	I	I6	HT3	70,035	0.207	2.588	0.566
1711	I	I6	HT3	75,008	0.216	2.796	0.507
1712	I	I6	HT3	75,035	0.179	2.281	0.510

Attachment C

DETAILS ON THE STATISTICAL TESTS

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Attachment C

DETAILS ON THE STATISTICAL TESTS

INTRODUCTION

In this attachment we describe in detail the statistical tests used in this study to examine the effects of HiTEC 3000 on exhaust emissions. We describe all EPA statistical tests, SAI modifications to the EPA tests, and additional SAI tests. We also discuss the statistical assumptions underlying the analyses.

The EPA tests can be divided into four types: the initial emissions test, the adverse-effects tests based on the data as opposed to a fitted statistical model, the adverse-effects tests that are based on a regression fit to the data, and the cause-or-contribute test. The adverse-effects tests are intended to determine whether or not HiTEC 3000 has an adverse effect; the cause-or-contribute test is intended to determine whether any adverse effects detected will cause or contribute to failure to meet applicable emissions standards.

We first discuss the EPA nonregression tests and our modifications to those tests. These tests are based on assumptions of equal variances across mileages and equal variances across fuels for each model/pollutant combination. We show that the first assumption is tenable, but the data do not support the assumption of equal variances across fuels. Nevertheless, we give a mathematical proof that the failure of the latter assumption will not much affect the results of the statistical tests. We then describe the EPA rank sum test (equivalent to a Mann-Whitney Test) used for all of the nonregression comparisons. Finally, we describe the nonregression tests in detail: the initial emissions tests, the interval comparisons (e.g., 1k versus 5k test), and the integrated emissions test.

We begin our discussion of the regression based tests by describing the inherent assumptions of the regression models used, both for the linear regression model used in the EPA tests and for better-fitting quadratic regression models. Although we show that the quadratic regression model fits statistically significantly better, we nevertheless performed the linear regression tests on the 50,000 mile data, both to repeat the EPA procedures from the 1978 waiver application and because the linear fits are used as input to MOBILE4. The linear and quadratic regression tests are here described in detail: slopes and quadratic coefficient tests, deterioration factors tests, violation mileage tests, and the maximum percentage of vehicles failing standard test. Finally, we discuss the cause-or-contribute test, which has two versions depending upon whether a linear or quadratic regression model is used.

Note that in this description we frequently imply that three vehicles were tested for each fuel for each of the eight model groups. We note that for model group D one of the clear-fuel vehicle was omitted from the data set for analysis because of modifications in the emission control system; the statistical tests were appropriately modified for this special case.

NONREGRESSION TESTS

Assumptions

Assumptions of Constant Test-to-Test Variances Across Mileages

A crucial assumption in the nonregression analyses is the assumption that the variance of each emission test observation does not depend on mileage, although it will usually depend on vehicular model, fuel, and pollutant. Effectively, we do not assume that the variability increases with emissions, since emissions generally increase with mileage. In this section we discuss the plausibility of this assumption.

An examination of the data plots (Attachment B) shows that there is no apparent pattern in variability as mileage increases for mileages up to 50,000 miles. For the vehicles tested at the ECS laboratory, the variance in the measurements for each

fuel group appears to increase at mileages beyond 50,000 miles. This effect is primarily due to the effects of using different testers with quite different positive and negative biases on measured emissions. Since in most cases the same tester was used for both tests on a given vehicle at a given mileage, much of the variability at higher mileages is due to variability between vehicles (due to variability amongst testers) rather than variability between emissions tests on the same vehicle. For the vehicles tested at the ATL laboratory the variability did not increase very much beyond 50,000 miles due to the wider variety of testers used throughout the testing program at ATL.

We conclude from this analysis that the assumption of constant variance across mileages is tenable for all the ATL data and at least the first 50,000 miles of the ECS data. This statement applies whether or nor we assume equal means for each vehicle (at a given mileage) on a given fuel. Thus the assumption (approximation) of constant variance across mileages is reasonable for all the 50,000 mile analyses whether or not they are based on an equal car means assumption.

For the 75,000 mile data analyses the assumption of constant variances appears reasonable in cases where equal car means are not assumed. However, the assumption of constant variances appears to be more of an approximation for the cases where equal car means are assumed. Since it is not clear how best to objectively adjust the analyses of the 75,000 mile data to deal with the problem for the ECS data, we therefore chose to make the approximation that the assumption of equal variances across mileages (for a given model, fuel, and pollutant combination) holds for the complete mileage accumulation.

Assumptions of Equal Variances Across Fuels For Each Model/Pollutant

The majority of the modified EPA nonregression tests are based on the assumption that, for a given model and pollutant, the test-to-test variances are equal for each fuel. However, the results in this section show that in many cases the variances are

statistically significantly different for the two fuel groups for a given model and pollutant, assuming constancy of variance across intervals, as discussed above. Nevertheless, assuming constancy of variance across intervals, the result of the nine EPA tests and our modified versions are almost unchanged between the case when the assumption of equal variances is made and the case when the assumption of equal variances is not made, especially when results from all the vehicular models are combined into a single statistical test. Below we prove this result mathematically.

Comparison of Variances Across Fuels

We used the 50,000 mile data to estimate the test-to-test variance for each combination of model, fuel, and pollutant. For each model we compared the two variances using an F test. The data show that there is no consistent pattern in that the variances are sometimes lower for the EEE vehicles and are sometimes lower for the HiTEC 3000 vehicles. Further, the variances are in several cases statistically significantly different.

For this test we assume that all observations have the same variance for each model, fuel, and pollutant combination. We also assume that observations on the same vehicle at the same mileage interval have the same mean; this mean may vary across vehicles. Sample variances were computed from the observations at each mileage interval for each vehicle; and the degrees of freedom, one less than the number of emissions tests, were also calculated for each sample variance. The common variance was then estimated in the usual manner as a weighted average of the sample variances, using the degrees of freedom as weights. These pooled variance estimates are reported in Table C-1. In the final column of the table we report the results of F tests that test the hypothesis of equal variances against the alternative of unequal variances. This standard test requires the additional assumption that all observations are normally distributed. A five percent significance level was used.

The first point is that it is obvious from Table C-1 that the variances are not consistent across models. Furthermore, the table shows that the variances are different for each fuel but there is no consistent pattern. In particular the sign column shows that for CO and NO_x, four of the models have a higher HiTEC 3000 variance; for HC,

Table C-1a

Ethyl Corporation HiTEC 3000 Fleet Testing Program
Estimated Variances
50,000 Mile Analysis
Data Set: ETHYL4S2, first 50,000 miles only
Pollutant: Hydrocarbons

Model	Variance EEE	Variance HT3	Sign[a]	Significance Level (%)[b]
D	0.0014	0.0016	+	80.72
E	0.0006	0.0003	-	1.88*
F	0.0019	0.0010	-	5.18
T	0.0005	0.0007	+	21.43
C	0.0002	0.0007	+	0.13*
G	0.0003	0.0002	-	10.54
H	0.0005	0.0005	-	85.13
I	0.0007	0.0005	-	23.81

[a] Sign = "+" if the HiTEC 3000 variance is higher.

[b] Significance level for the F test described in the text. The lower the significance level, the greater the evidence of a difference in the variances for each fuel. Significant results at the 5 percent level are starred; for these models the assumption of equal variances is rejected.

Table C-1b

Ethyl Corporation HiTEC 3000 Fleet Testing Program
Estimated Variances
50,000 Mile Analysis
Data Set: ETHYL4S2, first 50,000 miles only
Pollutant: Nitrogen Oxides

Model	Variance EEE	Variance HT3	Sign[a]	Significance Level (%)[b]
D	0.0010	0.0026	+	1.17*
E	0.0026	0.0013	-	3.52*
F	0.0014	0.0009	-	14.82
T	0.0014	0.0019	+	36.65
C	0.0028	0.0018	-	14.63
G	0.0013	0.0005	-	0.61*
H	0.0012	0.0012	+	95.93
I	0.0011	0.0022	+	3.19

[a] Sign = "+" if the HiTEC 3000 variance is higher.

[b] The lower the significance level, the greater the evidence of a difference in the variances for each fuel. Significant results at the 5 percent level are starred; for these models the assumption of equal variances is rejected.

Table C-1c

Ethyl Corporation HiTEC 3000 Fleet Testing Program
Estimated Variances
50,000 Mile Analysis
Data Set: ETHYL4S2
Pollutant: Carbon Monoxide

Model	Variance EEE	Variance HT3	Sign[a]	Significance Level (%)[b]
D	0.0692	0.0765	+	79.91
E	0.2353	0.1448	-	13.39
F	0.0281	0.0223	-	47.64
T	0.0824	0.1274	+	17.76
C	0.1182	0.3617	+	0.00*
G	0.0382	0.0317	-	56.53
H	0.1258	0.1259	+	99.84
I	0.1030	0.0829	-	49.15

[a] Sign = "+" if the HiTEC 3000 variance is higher.

[b] The lower the significance level, the greater the evidence of a difference in the variances for each fuel. Significant results at the 5 percent level are starred; for these models the assumption of equal variances is rejected.

three of the models have a higher HiTEC 3000 variance. The reported significance levels show that half of the models have statistically significantly different variances for the two fuels for NO_x. For CO, only model C shows a statistically significant difference. For HC, two models show statistically significant differences at the five percent level; also, the difference is very nearly significant for model F. There is no pattern in the signs for the statistically significant results.

The conclusion from this analysis is that assumptions of equal variances across fuels are unsupported. However, we now show that most of the results of the statistical tests will be largely unaffected by assumptions of equal or unequal variances:

Proof of the Small Effect of the Equal/Unequal Variances Assumption

We now give a mathematical argument that failure of the assumption of equal variances across fuels for each pollutant and model group combination will not substantially affect the statistical results. The general argument for all nonregression tests follows. (The same proof can be applied to the linear and quadratic regression tests as described later.)

In each case the emissions are analyzed in terms of some linear model with an even number, 2k, of parameters (k parameters for each fuel group). The emissions of a particular pollutant for a particular EEE vehicle at a given mileage are expressible as an error term plus a linear combination of the first k parameters; the coefficients depend on the pollutant, vehicle, and mileage. The error has mean zero and variance V (EEE). If the vehicle was replaced by a corresponding HiTEC 3000 vehicle of the same vehicular model, then the emissions of the same pollutant at the same mileage would be given by exactly the same linear combination of the second k parameters plus an error term with mean zero and variance V (HT3). In each case the statistical test is based on the estimated difference between a linear combination of the first k parameters and the same linear combination of the second k parameters.

For example, for the test for a single vehicular model of no difference in initial emissions assuming unequal car-means, the six parameters are the theoretical mean

emissions at 1,000 miles for each of the three vehicles on each given fuel (data at other mileages or from other models is excluded). In this case k equals 3 and the mean emissions for a given vehicle is given by a linear combination of the three parameters (for that fuel group); the coefficients are 1 for the parameter corresponding to the given vehicle and 0 for the other two parameters. The statistical test is based on comparing the mean of the three theoretical means for the EEE vehicles and the corresponding mean of the three theoretical means for the HiTEC 3000 vehicles; the coefficients of the tested linear combinations used in this comparison are all one third.

An important point is that because the EEE and HiTEC 3000 parameters are distinct, and because the same test fuel was used on a given vehicle throughout the program, the estimated variances for the estimated linear combinations are of the form

$$\text{Variance (combination EEE)} = C\,(EEE) \times V\,(EEE)$$

and similarly for HiTEC 3000. The values C (EEE) and C (HT3) depend on the design matrices, i.e., effectively the sets of test mileages, and on the linear combination tested.[1] Since the EEE and HiTEC 3000 test mileages were approximately equal, and since the same linear combination of unknown parameters is tested for each fuel, it follows that C (EEE) and C (HT3) will be approximately equal. The variance of the difference between the statistically independent linear combinations is therefore given by

$$C(EEE) \times [V(EEE) + V(HT3)] \qquad (1)$$

If unequal variances are assumed then the error variances are estimated by the mean square errors

---

[1] More precisely, if the coefficients of the linear combination are given by the vector c^T and if X is the appropriate design matrix in the standard formulation of the linear model, then

$$c(EEE) = c^T(X^TX)^{-1}c$$

$$V(EEE) = SS(\text{error EEE})/DF(\text{error EEE}) \tag{2}$$

and

$$V(HT3) = SS(\text{error HT3})/DF(\text{error HT3}) \tag{3}$$

where SS (error EEE) denotes the sum of the squared residuals (estimated errors) for the EEE data, DF (error EEE) denotes the "degrees of freedom" for the EEE errors (which depends entirely on the design matrix for the EEE data), and similarly for the HiTEC 3000 data (HT3). Thus in the unequal variance case the variance of the difference from Equation 1 is estimated by

$$C(EEE) \times \left\{ \left[\frac{SS(\text{error EEE})}{DF(\text{error EEE})}\right] + \left[\frac{SS(\text{error HT3})}{DF(\text{error HT3})}\right] \right\} \tag{4}$$

(on substituting Equations 2 and 3 into Equation 1). If equal variances are assumed for each fuel, then the error variances are estimated using the pooled estimate

$$V(EEE) = V(HT3) = \frac{SS(\text{error EEE}) + SS(\text{error HT3})}{DF(\text{error EEE}) + DF(\text{error HT3})} \tag{5}$$

(since the parameters used for the EEE statistical model and the HiTEC 3000 statistical model are distinct). Thus the variance of the difference formula (1) reduces to

$$2 \times C(EEE) \times \left[\frac{SS(\text{error EEE}) + SS(\text{error HT3})}{DF(\text{error EEE}) + DF(\text{error HT3})}\right] \tag{6}$$

in the equal variances case.

The fact that both fuel groups were tested at roughly the same set of test mileages means that C (EEE) approximately equals C (HT3) and DF (error EEE) approximately equals DF (error HT3). It follows that (4) and (6) are approximately equal.

This completes the argument that the results of the nonregression statistical tests will not be much affected by assumptions of equal or unequal variances across fuels. It should be noted, however, that the approximations used in this argument are relatively less valid for statistical tests based on relatively few data points, such as the nonregression tests for a single vehicular model. For this reason we have avoided making assumptions of equal variances across fuels for these statistical tests where possible.

Test Descriptions

Rank Sum Tests

The EPA based several of the non-regression tests on non-parametric rank sum tests for each vehicular model, which are equivalent to the Mann-Whitney or Wilcoxon tests. The EPA also combine the Mann-Whitney tests statistics for each vehicular model to obtain an overall rank sum test. In this section we describe these tests in detail using the example of the initial emissions test applied to the CO data for model group H.

The initial emissions test discussed in the next section includes a rank-sum test that compares the six observations at 1,000 miles for the EEE vehicles (two tests for each vehicle) and the six observations at 1,000 miles for the HiTEC 3000 vehicle to determine if there is a significant shift in the distribution between the two fuels. The test statistic is computed by counting the number of HiTEC 3000 observations smaller than each EEE observation and summing over the EEE observations. The calculation for the test statistic in the example is shown in Table C-2. The test statistic is 31.0. (To deal with the problem of ties, which does not happen for this particular example, each HiTEC 3000 observation exactly equal to the given EEE observation contributes 0.5 rather than one to the count, so that if there are two smaller values and three equal values then the count is 2 + 3 x 0.5 = 3.5).

Table C-2

Initial Emissions Rank Sum Test
Data Set: ETHYL4S2
Pollutant: CO
Model Group H

Emissions in Increasing Size (g/mi)	Car Number	Test Number	Fuel	Number of Smaller HiTEC 3000 Values
1.119	4	2	HiTEC 3000	
1.229	4	1	HiTEC 3000	
1.236	2	1	EEE	2
1.323	3	1	HiTEC 3000	
1.323	3	2	HiTEC 3000	
1.348	6	2	HiTEC 3000	
1.385	5	1	EEE	5
1.439	6	1	HiTEC 3000	
1.447	5	2	EEE	6
1.481	1	2	EEE	6
1.490	1	1	EEE	6
1.543	2	2	EEE	6
Rank Sum Test Statistic U				31

90025 13

If the initial emissions levels of EEE and HiTEC 3000 vehicles had the same statistical distributions then the mean value of the test statistic would be 18, since on average three HiTEC 3000 observations will be smaller than each EEE observation. In general, if there are m EEE observations and n HiTEC 3000 observations, then the mean and variance of the test statistic U are given by the standard formulae

$$E(U) = mn/2, \text{ and}$$

$$Var(U) = mn(m+n+1)/12.$$

The difference between the test statistic and the mean is 31 - 18 = 13, so that the same or greater evidence against the hypothesis of equal distributions would be found had the test statistic been greater than or equal to 31 or less than or equal to 18 - 13 = 5. The observed significance level is given in standard tables (for these small sample sizes) as 0.042, or 4.2 percent, since 0.021 is the probability of obtaining a value of at most 5 under the null hypothesis of equal distributions. (Had there been ties then the test statistic could have had fractional values; such values are rounded down for calculating the observed significance level.) Note also that standard table values were only used for the important cases m = n = 3; m = n = 6; m = 2, n = 3; m = 4, n = 6. In other cases the significance levels were estimated by the normal approximation (that assumes a normal distribution for the test statistic).

To combine the results from all the models the EPA used the test statistic given by the sum across models of the values of U. Since each U statistic is independent the mean and variance of the sum are given by the sums of the means and variances for each model. Furthermore, a reasonable approximation, used previously by the EPA, is to assume that the overall rank sum test statistic is approximately normally distributed, so that observed significance values are easily estimated (the assumption of normality is more tenable for the overall test statistic than for the test statistics for each model since the overall test statistic is expressible as the sum of eight times as many independent values).

Initial Emissions Tests

The purpose of the initial emissions test is to decide if the assumption of equal emissions levels at 1,000 miles (the mileage point at which HiTEC 3000 was introduced into half of the test fleet) was valid. The crucial issue is that if a significant initial difference is demonstrated then success or failure of some of the other statistical adverse effects tests or the cause or contribute test could simply be due to higher or lower initial emissions levels on the HiTEC 3000 vehicles compared to the EEE vehicles. Such an effect cannot be attributable to HiTEC 3000.

A two tailed statistical test is used to test the null hypothesis of no difference at 1,000 miles against the alternative of a difference (in either direction). The procedure used depends mainly upon whether or not the assumption of variability in car-means for a given model, fuel, and pollutant is made.

Equal Vehicle Effects

In the following set of statistical tests of the assumption of no difference between the two fuels at 1,000 miles, we assume that for a given model, fuel, and pollutant the true mean emissions are the same for all the emissions tests on each of the three vehicles. Thus each emissions test at 1,000 miles is weighted equally. In order to make as few assumptions as possible we have not assumed the equality of variances across fuels.

The EPA sign test of the assumption of no difference between the two fuels at 1,000 miles is based on comparing the sample means of all 1,000 miles emissions tests on a given model for the two fuels. The EPA rank sum test was described in the previous section. For a given model the ranks of the six emissions tests using HiTEC 3000 were compared with the ranks of the six emissions tests using EEE.

A more powerful statistical test of the difference in the means at 1000 miles is the Smith-Satterthwaite t test, which is a modification of the simple t test to account

for the non-assumption of equal variances for the two populations (fuels). The test statistic is the difference between the two sample means divided by the standard error of the difference.

Assume that the number of tests, mean, and sample variance for the EEE vehicles of a given model were N (EEE), Mean (EEE), and Variance (EEE) respectively. Similarly for HiTEC 3000. Then the standard error of the difference is the maximum likelihood estimate

$$s.e. = \left[\frac{\text{Variance(EEE)}}{\text{N(EEE)}} + \frac{\text{Variance (HT3)}}{\text{N(HT3)}}\right]^{\frac{1}{2}} \tag{7}$$

The test statistic T is therefore $T = \dfrac{\text{Mean(HT3)} - \text{Mean(EEE)}}{\text{s.e.}}$

The Smith-Satterthwaite test makes the approximation that this test statistic has a Student's t distribution with the random number of degrees of freedom:

$$d.f. = \frac{\dfrac{\text{Variance (EEE)}^2}{\text{N(EEE)}} + \dfrac{\text{Variance (HT3)}^2}{\text{N(HT3)}}}{\dfrac{\text{Variance (EEE)}^2}{\text{N(EEE)}^2\ [\text{N(EEE)} - 1]} + \dfrac{\text{Variance (HT3)}^2}{\text{N(HT3)}^2\ [\text{N(HT3)} - 1]}} \tag{8}$$

Thus the significance level of the observed difference in initial means is found by comparing the test statistic with the percentiles of the "random" t distribution.

The weighted average test weights the model mean differences by sales to give a weighted mean difference. The variance of the weighted mean difference is therefore estimated by the sum over vehicular models of the model weight squared times the variance of the model mean difference given by the square of Equation 7. The weighted mean difference is divided by the square root of its estimated variance and compared with a standard normal distribution.

Unequal Vehicle Effects

In this case we do not assume the equality of car means for each model, fuel, pollutant combination. It is appropriate in this case to estimate the mean of the car-means rather than the mean of all the emissions tests. Thus for each vehicle the true mean 1,000 mile emissions is estimated by averaging across emissions tests for the vehicle and the true mean of the car-means is estimated by averaging the three car-means.

First, a simple sign test comparing the eight differences in the means of the car-means for each model is carried out. Then a more powerful t test, based on dividing the difference by its standard error in a manner similar to the equal vehicle effects analysis, is carried out. In this case the standard error is more complicated since we do not assume equality of car-means but do assume equality of test-to-test variance across fuels.

For purposes of explanation, assume that vehicles 1, 2, and 3 were tested using HiTEC 3000, and vehicles 4, 5, and 6 were tested using EEE. Let X_{ij} denote the emissions for the jth 1,000 mile emissions test for vehicle i. Let n_i denote the number of tests on vehicle i.* Then the car-mean for vehicle i is given by

$$\bar{X}_i = \sum_{j=1}^{n_i} X_{ij}/n_i \qquad (9)$$

The mean of the car-means for the HiTEC 3000 vehicles is

$$M_H = \frac{\bar{X}_1 + \bar{X}_2 + \bar{X}_3}{3} \qquad (10)$$

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* The number of tests n_i is nearly always two except when there are unscheduled maintenance tests.

and the difference D in the mean of the car-means is

$$D = \frac{\bar{X}_1 + \bar{X}_2 + \bar{X}_3}{3} - \frac{\bar{X}_4 + \bar{X}_5 + \bar{X}_6}{3} \tag{11}$$

If σ^2 denotes the variance of each emissions test, assumed equal for each fuel, then the variances of the statistics in Equations 9 to 11 are given respectively by Equations 12 to 14:

$$\mathrm{Var}\ (\bar{X}_i) = \sigma^2/n_i \tag{12}$$

$$\mathrm{Var}\ (M_H) = \frac{1}{n_1} + \frac{1}{n_2} + \frac{1}{n_3}\ \frac{\sigma^2}{9} \tag{13}$$

$$\mathrm{Var}(D) = \frac{1}{n_1} + \frac{1}{n_2} + \frac{1}{n_3} + \frac{1}{n_4} + \frac{1}{n_5} + \frac{1}{n_6}\ \frac{\sigma^2}{9} \tag{14}$$

Pooling the six within-vehicle variance estimates gives the following estimate of the common variance:

$$\sigma^2 = \frac{\sum_{i=1}^{6} \sum_{j=1}^{n_i} X_{ij} - \bar{X}_i\ ^2}{\sum_{i=1}^{6} (n_i - 1)} \tag{15}$$

The t statistic is the difference D (Eq. 11) divided by its estimated standard error (the square root of Equation 14 after applying Equation 15). Since the degrees of freedom for vehicle i is $n_i - 1$, the degrees of freedom for the t statistic is given by the sum

$$\sum_{i=1}^{6} (n_i - 1) \tag{16}$$

Finally, a weighted average test using the differences (Eq. 11) and variance estimates (Eq. 14) with (Eq. 15) for each model is carried out as described in the previous subsection on equal vehicle effects.

1K Versus 5K Tests and Other Interval Comparisons

In this section we describe the statistical tests comparing the increases from 1,000 miles to 5,000 miles for the two fuels. The main idea is that if the average increase in emissions from 1,000 to 5,000 miles is significantly larger for the HiTEC 3000 vehicles, then the waiver fuel can be said to have an adverse effect on emissions over the 4,000 mile interval. As for the initial emissions tests, the statistical procedure used depends on whether or not an assumption of equal vehicle effects is made; such an assumption for this statistical analysis requires that the true mean increases for each vehicle in the same model and fuel group are equal.

Analogous statistical tests were used for other comparisons such as the 1K versus 75K tests which compare the mean changes in emissions from 1,000 to 75,000 miles.

Equal Vehicle Effects

In this subsection we assume that the average increase in emissions from 1,000 to 5,000 miles is the same for each model, fuel, and pollutant combination (thus for the three vehicles involved) but the variances are different for each fuel. Thus the three increases in mean emissions for the EEE vehicles of a given model come from the same statistical distribution; similar assumptions are made for the HiTEC 3000 vehicles.

The EPA sign test of the hypothesis of no difference in mean increases for the two fuels is based on comparing the sample means of the mean increases for the EEE and HiTEC 3000 vehicles. Thus for each vehicle we subtract the mean at 1,000 miles from the mean at 5,000 miles and then average across vehicles for each fuel and model. The EPA rank sum test is carried out in a similar manner to the procedure for the initial emissions test. In this case the rank sum test is based on comparing the ranks of the three mean increases for the EEE vehicles with the ranks of the three mean increases for the HiTEC 3000 vehicles. The individual emissions tests results are not used directly.

As a more powerful test of the hypothesis of equal mean increases, assuming that the variances of the increases for the two fuels are unequal, we also carried out a Smith-Satterthwaite test as described for the initial emissions test, equal vehicle effects case. The test statistic is the difference in the mean increases for the two fuels divided by the standard error of the difference. Equation 7 is a formula for the standard error, while Equation 8 gives the degrees of freedom for the approximate t test. Note that in this case the sample variances are based on only three observations (three mean increases) whereas for the initial emissions test all six 1,000 mile emissions tests were used for each fuel and model. A weighted average test weighting models by sales is carried out in a similar manner to the procedure for the initial emissions test.

Unequal Vehicle Effects

In this case we do not assume that the mean increases for the three vehicles of a given model on a given fuel have the same true mean. However we do assume that the six car-mean increases for a given model have the same variance.

First we use the sample mean of the three increases (i.e., mean emissions at 5,000 miles less mean emissions at 1,000 miles) for a given model, fuel, pollutant combination to estimate the true mean increase for that combination. We carry out a simple sign test using the differences in the increases for the eight models. This sign test is identical to the sign test for the equal vehicle effects case.

A more powerful test uses all the individual emissions tests results for the given vehicular model and pollutant at 1,000 and 5,000 miles. For a given model assume that vehicles 1, 2, and 3 are fueled with Hitec 3000. Let α_i be the true mean emissions at 1,000 miles and β_i be the true mean emissions at 5,000 miles, for vehicle i. The statistical model assumes that the observed emissions for each emissions test at 1,000 or 5,000 miles are given by the appropriate true mean emissions parameter (either an α or a β) plus a random error. The random errors have the same unknown variance σ^2.

The parameter of interest is the mean of the increases in the means for the HiTEC 3000 vehicles less the mean of the increases in the means for the EEE vehicles, i.e.

$$\frac{(\beta_1 - \alpha_1) + (\beta_2 - \alpha_2) + (\beta_3 - \alpha_3)}{3} - \frac{(\beta_4 - \alpha_4) + (\beta_5 - \alpha_5) + (\beta_6 - \alpha_6)}{3} \tag{17}$$

The parameter in Equation 17 is estimated by the observed difference in the mean increases, i.e., the test statistic used in the above sign test. Equivalently, the estimate is obtained by replacing each α_i or β_i in Equation 17 by the corresponding sample mean of emissions tests (usually two). The variance of the estimate is computed similarly to Equations 12 to 14 of the previous section. In particular, if exactly two emissions tests were carried out for each vehicle, mileage interval combination, then the variance of the estimate is given by

$$\left(\frac{1}{3}\right)^2 \frac{\sigma^2}{2} \tag{18}$$

assuming independence of consecutive emissions tests. The unknown test-to-test variance σ^2 is estimated analogously to Equation 15 by taking a weighted average of the 12 sample variances for the 12 vehicle, mileage interval combinations; the weights are the degrees of freedom, one less than the number of emissions tests. In

the case of two emissions tests per combination the estimated test-to-test variance reduces to the unweighted mean of the 12 sample variances.

The test statistic for each vehicular model is then computed by dividing the estimate of the parameter in Equation 17 by the square root of Equation 18, replacing σ^2 by its estimate. The degrees of freedom for the t test is the total of the degrees of freedom for the 12 vehicle, mileage interval combinations.

The weighted average z test is carried out analogously to the procedures for the initial emissions test.

Integrated Emissions Test

The idea of the integrated emissions test described in this subsection is to compare for each fuel the additional long-term emissions above the initial (1,000 mile) emissions rate. These increases are estimated using the areas under the emissions curves. The HiTEC 3000 fuel will fail this test if the increases are significantly higher on average for the HiTEC 3000 vehicles.

We describe the procedure for the 50,000 mile analysis; the 75,000 mile analysis is an obvious modification. For each vehicle the total emissions from 1,000 miles to 50,000 miles was estimated by integrating under the observed emissions curve. More precisely, for each mileage interval, the mean test mileage and the mean emissions was computed for that vehicle and a polygonal curve drawn through the 11 points. The area was found using the trapezoidal rule, i.e., if the points are (x_i, y_i) then the total area is given by

$$\sum_{i=1}^{10} (x_{i+1} - x_i)\left(\frac{y_i + y_{i+1}}{2}\right) \tag{19}$$

Equation 19 estimates the total emissions between x_1 and x_{11} miles (approximately 1,000 to 50,000 miles) for that vehicle. Thus the mean emissions rate over that

interval is found by dividing by the accumulated mileage $x_{11} - x_1$. The increase over the initial emissions rate is then found by subtracting the initial rate (y_1).

The three increases for each fuel (for a given model and pollutant) were compared in a similar manner to the 1K versus 5K test using the EPA rank sum test and the mean increases across fuels for the eight models were compared using a sign test. Assuming that the three increases for each fuel come from the same statistical distribution (with equal variances across fuels) the difference in the mean increases was also tested using a standard pooled t test. Thus if the sample variance of the increases for the three EEE vehicles is S^2 (EEE), and is S^2 (HT3) for the three HiTEC 3000 vehicles, then the pooled estimate of the variance of the difference in the two mean increases for each fuel is

$$\left[\frac{S^2(EEE) + S^2(HT3)}{2}\right]\left(\frac{1}{3} + \frac{1}{3}\right) \tag{20}$$

The difference in the mean increases is divided by the square root of Equation 20 to give a t statistic which is compared with the percentiles of a t distribution with 4 degrees of freedom. The weighted average z test is carried out analogously to the initial emissions test, using the pooled variance estimates (Eq. 20) for the eight models.

REGRESSION BASED TESTS

Regression Assumptions

In this section we shall describe and discuss the statistical assumptions used in fitting both the linear and quadratic models used in some of the EPA tests and our modified versions of those tests.

Linear Regression

In all of the linear regression tests a simple regression line with an intercept and slope is fitted separately to each combination of model, fuel, and pollutant. Thus we assume that the emissions are given by a straight line function of mileage plus a random error. The weighted average regression line fitted to each fuel and pollutant is computed by taking weighted averages (for both slope and intercept) across models, with weights proportional to 1988 sales figures. (A simple unweighted average would only estimate the emissions for a vehicle selected at random from Ethyl's stratified sample.)

In order to fit the regression lines we are implicitly assuming the constancy of error variances across mileages, as discussed in the next paragraph. Since both slope and intercept parameters vary by fuel, the lines are fitted separately for each fuel and so are unaffected by assumptions of constancy or lack of constancy of variance across fuels. As discussed in the next subsection, such choices will (slightly) affect the results of the fuel comparisons.

We assume that the errors about the true regression line are normally distributed with mean zero and a constant variance (for each model, pollutant and fuel). Thus we are effectively assuming that the regression error variability does not increase with emissions (since, generally, emissions increase with mileage). In our discussion of the assumptions used in the nonregression tests we discussed the emission test variability and argued that the test-to-test variability is independent of mileage. However, here we are considering the variability about the regression line, which is a different issue. The two types of variability will be comparable only if the linear regression model is a good statistical model for the data.

A comparison between the data plots and the fitted regression lines shows that the magnitudes of the residuals from the fitted regression lines (differences between the observations and the values predicted from the regression model) do not show any obvious patterns but the residuals are consistently negative at lower mileages. This corresponds to the fact that the fitted regression lines tend to overestimate the emissions at the lower mileages. The implication is that the simple linear regression

model may not be the best regression fit to the data, and that higher-order regression models, which allow for curvature, might perform better. We discuss the use of higher-order regressions in a later section.

Quadratic Regression

Because of the observed nonlinearities we also fit a quadratic regression model to the data. In this case the emissions are given by a quadratic function of mileage plus a random error. Although the fit of the quadratic models is superior to the fit of the linear models, many of the comments in the previous subsection apply to this case also. We will make the same assumption (approximation) that the regression error variances are constant across mileages for each vehicle model, fuel, and pollutant combination.

Assumptions of Equal Variances Across Fuels for Each Model/Pollutant

In our discussion of the nonregression tests we showed that the data do not support the assumption that the test-to-test variances are equal across fuels for each model/pollutant combination. We also gave a mathematical argument to show that failure of this assumption does not much change the results of the statistical comparisons. Under the assumptions of the regression models, the same conclusions apply to the regression error variances and the corresponding effect on the results of the regression based statistical tests. This is because the same general proof applies for the regression based tests.

As an example, we can consider the linear regression slopes test described in greater detail below. For a particular vehicular model and pollutant, the statistical model fits a slope and intercept parameter for each fuel. The test is based on the linear combinations of one times the slope and zero times the intercept, for each fuel. To apply the general argument based on Equations 1 to 6: The appropriate "combination" is the slope parameter; the degrees of freedom parameter DF(error EEE) equals N(EEE) - 2, where N(EEE) is the number of emissions tests performed on the EEE vehicles; the variance coefficient C(EEE) reduces to

$$C(EEE) = \frac{1}{(N(EEE) - 2)\ \text{variance}}$$

(see Equation 25 below), where "variance" is the sample variance of the test mileages for all the EEE emissions tests. Similar formulae apply for the HiTEC 3000 regression.

Note that the general proof can be applied to the deterioration factor test even though the deterioration factor is not a linear combination of the regression parameters. This is because the "delta method" used in estimating the variance of the deterioration factor is based on making a linear approximation for the deterioration factor. Thus the general proof applies to that linear approximation.

General Discussion of Linear and Quadratic Regressions

Regression Formulae

Linear Regression: Formulae for Slope, Intercept,
Sums of Squares, Variances and Covariance

Some of the original EPA tests are based on fitting a simple linear regression model that assumes a straight line relationship between mean emissions and mileage (a different straight line for each model, fuel, and pollutant combination). For convenience we list standard formulae for the regression coefficients (slope and intercept) and their variances and covariances. These formulae are available in most statistics textbooks.

Let the pairs EEE_i and $miles_i$ for i between 1 and N (EEE) represent the emissions EEE_i at the test mileage $miles_i$ for all the tests on EEE vehicles of a given model. Then

$$\text{Slope (EEE)} = \frac{\sum miles_i\ EEE_i - \sum miles_i \sum EEE_i/N(EEE)}{\sum(miles_i)^2 - (\sum miles_i)^2/N(EEE)} \qquad (21)$$

$$\text{Intercept (EEE)} = \frac{\sum \text{EEE}_i - \text{Slope(EEE)} \sum \text{miles}_i}{\text{N(EEE)}} \tag{22}$$

$$\text{SS (error EEE)} = \sum [\text{EEE}_i - \text{Intercept(EEE)} - \text{miles}_i \text{ Slope(EEE)}]^2 \tag{23}$$

$$\text{SS (miles EEE)} = \sum(\text{miles}_i)^2 - (\sum \text{miles}_i)^2/\text{N(EEE)} \tag{24}$$

$$\text{Variance (slope EEE)} = \frac{1}{\text{SS(miles EEE)}} \times \text{V(EEE)} \tag{25}$$

$$\text{Variance (intercept EEE)} = \frac{\sum(\text{miles}_i)^2/\text{N(EEE)}}{\text{SS(miles EEE)}} \times \text{V(EEE)} \tag{26}$$

$$\text{Covariance (slope EEE, intercept EEE)} = \frac{-\sum \text{miles}_i/\text{N(EEE)}}{\text{SS(miles EEE)}} \times \text{V(EEE)} \tag{27}$$

where V (EEE) is the unknown variance for the EEE observations. Formulae for the HiTEC 3000 regression lines are analogous.

In all of our analyses we assume equal variances across fuels and use an unbiased estimate of the unknown variance; the unknown variance V (EEE) is then estimated by substituting the pooled estimate

$$V\,(EEE,pooled) = V\,(HT3,pooled)$$

$$= \frac{SS(error\ EEE) + SS(error\ HT3)}{[N(EEE) - 2] + [N(HT3) - 2]} \tag{28}$$

For the maximum percentage of vehicles failing standard test and the cause or contribute test we make the same assumption about equal variances but instead use a maximum likelihood estimate. Statistical theory suggests that this estimate has better performance than the pooled estimate when functions of all the unknown parameters (slope, intercept, and variance) are estimated. That the usual pooled variance estimate is unbiased does not imply that nonlinear functions of the variance estimate are also unbiased. The maximum likelihood estimate of each parameter has the advantage of consistency and asymptotic efficiency and these useful properties also extend to most nonlinear functions of the maximum likelihood estimates. The maximum likelihood estimate (mle) is

$$V\,(EEE,mle) = V\,(HT3,\ mle)$$

$$= \frac{SS(error\ EEE) + SS(error\ HT3)}{N(EEE) + N(HT3)} \tag{29}$$

The difference between the variance estimates in Equations 28 and 29 is small for the large data sets analyzed.

Quadratic Regression

The quadratic regression model expresses mean pollutant concentration as the sum of three terms: an intercept, a slope coefficient multiplied by mileage, and a quadratic coefficient multiplied by mileage squared. Formulae for the intercept, slope coefficient, and quadratic coefficient and the variance covariance matrix may be found in standard regression texts.

Comparison of Linear and Quadratic Regression Models

In this section we discuss the fit of the linear and quadratic regression models to the data. The main result is that for most combinations of vehicular model, fuel and pollutant, the quadratic model fits statistically significantly better than the linear model. This holds for both the 50,000 and the 75,000 mile data.

For each model, fuel, and pollutant combination we fitted both linear and quadratic regressions to the data and computed the R-squared statistics. The R-squared statistic is a number between 0 and 1 that measures the goodness of fit of the regression model. R-squared values close to 1 occur when the fit of the regression line or curve is almost exact. It can also be interpreted as the proportion of the variation in emissions explained by the regression model. Mathematically, the R-squared statistic can be calculated as the square of the correlation coefficient between the data and the predicted values. Alternatively, the R-squared statistic can be computed as 1 minus the ratio of the error sum of squares to the corrected total sum of squares; for linear regression the error sum of squares is given in Equation 23, and the corrected total sum of squares is the sample variance of the emissions multiplied by the degrees of freedom.

R-squared statistics for linear and quadratic regressions for all three pollutants for the 50,000 mile data are reported in Table C-3; the results for the 75,000 mile data are reported in Table C-4. Since the linear model is a special case of the quadratic model, the R-squared statistics for the quadratic models are by definition higher. In the final column we note cases for which the improved fit is statistically significant.

The improvement in fit for the quadratic regression model over the linear regression model is tested in two mathematically equivalent ways. In terms of the R-squared statistics a two tailed t test can be based on the equation

$$t^2 = \frac{(N - 3)\,(R^2_{quad} - R^2_{lin})}{(1 - R^2_{quad})}$$

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Table C-3a

R-Squared Statistics for Linear and Quadratic Regressions
50,000 Mile Analysis
Data Set ETHYL4S2
Pollutant HC

Model Group	Fuel	R-Squared Linear	R-Squared Quadratic	Significant Improvement
D	EEE	0.85	0.87	x
D	HT3	0.81	0.84	x
E	EEE	0.47	0.47	
E	HT3	0.34	0.51	x
F	EEE	0.86	0.87	x
F	HT3	0.87	0.91	x
T	EEE	0.82	0.83	x
T	HT3	0.82	0.82	
C	EEE	0.27	0.38	x
C	HT3	0.36	0.53	x
G	EEE	0.20	0.36	x
G	HT3	0.38	0.65	x
H	EEE	0.70	0.73	x
H	HT3	0.58	0.59	
I	EEE	0.02	0.04	
I	HT3	0.10	0.15	x

Table C-3b

R-Squared Statistics for Linear and Quadratic Regressions
50,000 Mile Analysis
Data Set ETHYL4S2
Pollutant NOx

Model Group	Fuel	R-Squared Linear	R-Squared Quadratic	Significant Improvement
D	EEE	0.37	0.55	x
D	HT3	0.28	0.57	x
E	EEE	0.46	0.47	
E	HT3	0.63	0.69	x
F	EEE	0.53	0.54	
F	HT3	0.19	0.21	
T	EEE	0.03	0.03	
T	HT3	0.01	0.27	x
C	EEE	0.46	0.46	
C	HT3	0.17	0.22	x
G	EEE	0.26	0.67	x
G	HT3	0.30	0.73	x
H	EEE	0.05	0.06	
H	HT3	0.04	0.07	
I	EEE	0.18	0.25	x
I	HT3	0.09	0.21	x

Table C-3c

R-Squared Statistics for Linear and Quadratic Regressions
50,000 Mile Analysis
Data Set ETHYL4S2
Pollutant CO

Model Group	Fuel	R-Squared Linear	R-Squared Quadratic	Significant Improvement
D	EEE	0.91	0.91	
D	HT3	0.89	0.89	
E	EEE	0.78	0.78	
E	HT3	0.58	0.65	x
F	EEE	0.82	0.82	
F	HT3	0.68	0.68	
T	EEE	0.82	0.82	
T	HT3	0.80	0.80	
C	EEE	0.38	0.51	x
C	HT3	0.39	0.46	x
G	EEE	0.40	0.49	x
G	HT3	0.42	0.71	x
H	EEE	0.80	0.85	x
H	HT3	0.74	0.76	x
I	EEE	0.37	0.43	x
I	HT3	0.18	0.27	x

Table C-4a

R-Squared Statistics for Linear and Quadratic Regressions
75,000 Mile Analysis
Data Set ETHYL4S2
Pollutant HC

Model Group	Fuel	R-Squared Linear	R-Squared Quadratic	Significant Improvement
D	EEE	0.73	0.80	x
D	HT3	0.53	0.75	x
E	EEE	0.39	0.39	
E	HT3	0.50	0.52	x
F	EEE	0.49	0.80	x
F	HT3	0.64	0.84	x
T	EEE	0.66	0.70	x
T	HT3	0.53	0.73	x
C	EEE	0.26	0.31	x
C	HT3	0.18	0.33	x
G	EEE	0.27	0.28	
G	HT3	0.32	0.41	x
H	EEE	0.75	0.76	x
H	HT3	0.67	0.67	
I	EEE	0.03	0.04	
I	HT3	0.12	0.13	

Table C-4b

R-Squared Statistics for Linear and Quadratic Regressions
75,000 Mile Analysis
Data Set ETHYL4S2
Pollutant NOx

Model Group	Fuel	R-Squared Linear	R-Squared Quadratic	Significant Improvement
D	EEE	0.01	0.28	x
D	HT3	0.01	0.31	x
E	EEE	0.56	0.58	x
E	HT3	0.58	0.67	x
F	EEE	0.60	0.62	x
F	HT3	0.34	0.35	
T	EEE	0.10	0.16	x
T	HT3	0.22	0.28	x
C	EEE	0.59	0.60	
C	HT3	0.38	0.38	
G	EEE	0.31	0.36	x
G	HT3	0.29	0.40	x
H	EEE	0.07	0.08	
H	HT3	0.22	0.24	
I	EEE	0.30	0.31	
I	HT3	0.03	0.04	

Table C-4c

R-Squared Statistics for Linear and Quadratic Regressions
75,000 Mile Analysis
Data Set ETHYL4S2
Pollutant CO

Model Group	Fuel	R-Squared Linear	R-Squared Quadratic	Significant Improvement
D	EEE	0.76	0.81	x
D	HT3	0.71	0.78	x
E	EEE	0.70	0.73	x
E	HT3	0.48	0.57	x
F	EEE	0.71	0.73	x
F	HT3	0.62	0.64	x
T	EEE	0.68	0.69	x
T	HT3	0.60	0.66	x
C	EEE	0.19	0.34	x
C	HT3	0.19	0.33	x
G	EEE	0.34	0.44	x
G	HT3	0.51	0.58	x
H	EEE	0.65	0.79	x
H	HT3	0.69	0.79	x
I	EEE	0.31	0.33	
I	HT3	0.13	0.17	x

where N denotes the number of observations for the given model, fuel combination. The test statistic t has a t distribution with N - 3 degrees of freedom if the linear model is correct. An equivalent calculation of t is based on dividing the estimated quadratic coefficient from the quadratic regression by an estimate of its standard deviation as can be found in standard regression texts. The test for significant improvement in Tables C-3 and C-4 is made at the 5 percent level.

For the 50,000 mile data a general pattern is that the fit of the linear model is best for CO and is quite poor for NO_x. The worse linear fits for HC are for model groups C, G and I. For CO, model group I fits the linear model relatively poorly. For NO_x the worse of the generally poor linear fits is for model groups T and H, which show almost no correlations between emissions and mileage. For the quadratic model almost the same remarks apply except that for NO_x there are substantial improvements in the regression fit in several cases; in particular, the R-squared statistic for model T on HiTEC 3000 increased from 0.01 (for linear regression) to 0.27 (for quadratic regression), and the improvements in fit for model G are from 0.3 to 0.7 for both fuels. However the best of the quadratic regression R-squared statistics for NO_x is only 0.73 and several other cases fit substantially worse than that. Thus for NO_x both linear and quadratic regression models leave unexplained a substantial fraction of the variation in emissions. For each pollutant the quadratic model fits statistically significantly better in the majority of cases for each pollutant. Note that although the improvement is statistically significant in more cases for HC than for CO or NO_x, the size of the improvement is typically larger for the NO_x cases. For example, for model D on EEE, the improvement in R-squared value is from 0.85 to 0.87 for HC but from 0.37 to 0.55 for NO_x.

Table C-4 shows the R-squared comparisons for the 75,000 mile data. The general pattern and conclusions are essentially the same as for the 50,000 mile data. However, an important feature is that the fit of both regression models is noticeably poorer for the 75,000 data compared to the 50,000 mile data, but the improvements in fit for the quadratic model are noticeably larger (and statistically more significant). For CO the improvement is statistically significant in every case but one.

Test Descriptions

Slopes and Quadratic Coefficient Tests

The statistical tests described in this section and in the following sections are all based on regression models. For the linear regression tests the mean emissions are assumed to increase (or decrease) linearly with mileage with a constant slope, i.e., deterioration rate. For the quadratic model the mean emissions are assumed to follow a quadratic curve against mileage and hence the slope is assumed to vary with mileage; both the raw data and the fitted quadratic models generally show that the deterioration rate decreases with mileage for both fuels.

Under the assumptions of the regression models, regardless of initial emissions levels, the fuel with the higher deterioration rate (slope) is arguably the fuel with the more adverse effect. Thus in the statistical tests in this section we compare slopes to determine if the HiTEC 3000 slope is statistically significantly higher than the EEE slope. For the linear regression model the result is the same at every mileage. For the quadratic model the variation of slope with mileage means that the result of the test can vary with different mileages reflecting the possibility that the HiTEC 3000 effect might vary by mileage.

For the quadratic regression model the deterioration rate varies with mileage at a rate depending only on the quadratic coefficient. If the quadratic coefficient for HiTEC 3000 is higher than for EEE then the deterioration rate for HiTEC 3000 increases more rapidly, which would indicate an adverse effect. We therefore describe in this section a statistical test based on comparing the quadratic coefficients.

In each case a simple sign test is performed based on comparing the results for the two fuels for the eight models. In this description we focus on more powerful statistical tests of the differences in the slopes and quadratic coefficients for each model.

Linear Regression

Consider a fixed model and pollutant. The linear regression slopes test is based on the difference between the fitted regression slopes for the two fuels. The slopes are given by Equation 21 for EEE, and similarly for HiTEC 3000. Using the independence of the EEE and HiTEC 3000 observations it follows from Equation 25 that the variance of the slope difference Slope (HT3) minus Slope (EEE) is given by

$$\text{Variance (Slope difference)} = \frac{V(EEE)}{SS(\text{miles EEE})} + \frac{V(HT3)}{SS(\text{miles HT3})} \tag{30}$$

The standard error of the slope difference is the square root of Equation 30. Under the assumption of equal variances across fuels, the error variances V (EEE) and V (HT3) for each fuel are estimated by the pooled variance in Equation 28 which reduces Equation 30 to Equation 31:

$$\left[\frac{SS(\text{error EEE}) + SS(\text{error HT3})}{N(EEE) + N(HT3) - 4}\right]\left[\frac{1}{SS(\text{miles EEE})} + \frac{1}{SS(\text{miles HT3})}\right] \tag{31}$$

The test statistic for the difference in the linear regression slopes is the slope difference divided by its standard error (the square root of Equation 31). This is compared with a t distribution on N(EEE) + N(HT3) - 4 degrees of freedom.

The tests based on weighted averages across models (for each pollutant) are analogous to the procedure for the initial emissions test. The estimated slope differences for the eight models are weighted by 1988 sales in order to estimate the average slope difference, and then appropriately weighted sums of the estimated variances of the slope differences (Equation 31) are used to estimate the variance of the weighted average slope difference. The average slope difference divided by its estimated standard deviation is compared with a standard normal distribution.

Quadratic Regression

For a fixed vehicular model, fuel, and pollutant, let a, b, and c denote the estimated intercept, slope, and quadratic coefficient for the quadratic regression model. Thus the estimated mean emissions at mileage m are $a + bm + cm^2$. Denote the estimated variances of the estimates by Var (a), Var (b), and Var (c), and the covariances by Cov (a,b), etc. Just as for the linear regression model, the variance and covariance estimates use a pooled error variance estimate since equal error variances are assumed across fuels. For the quadratic model the pooled error variance estimate from Equation 28 is replaced by

$$\frac{SS(\text{error EEE}) + SS(\text{error HT3})}{[N(EEE) - 3] + [N(HT3) - 3]} \qquad (32)$$

where SS(error EEE) and SS(error HT3) are defined analogous to Equation 23.

For the quadratic model the slope varies with mileage. In particular, the slope at 25,000 miles is given by

$$b + 2c(25000) = b + 50000c \ . \qquad (33)$$

The variance of the slope in Equation 33 is therefore estimated by

$$Var(b) + 50000^2\ Var(c) + 2(50000)\ Cov(b, c) \qquad (34)$$

Thus the difference in slopes at 25,000 miles has a variance given by the sums of Equation 34 for the two fuels. The t test of slopes at 25,000 miles is based on the slope difference divided by the square root of the estimated variance of the difference. The degrees of freedom for the t test is N(EEE) + N(HT3) - 6. The calculations are similar for slopes comparisons at other mileages.

The quadratic coefficient c is also one half of the rate of change of the fitted slope. Thus a t test of the difference in the quadratic coefficients for the two fuels is used to determine if the rate of change of the HiTEC 3000 slope is significantly greater than the rate of change of the EEE slope. The difference in the estimates of c has a variance given by the sum of the Var (c) values for the two fuels. The t test is based on the difference divided by the square root of its variance. As in the slopes test, the degrees of freedom is N(EEE) + N(HT3) - 6.

Finally, both of these quadratic regression tests were applied to give overall results, weighting models by 1988 sales figures. The method is analogous to the non-regression tests and the linear regression slopes test.

Deterioration Factors Test

The deterioration factor used by the EPA in certification testing is based on the ratio of estimated emissions at 50,000 miles to estimated emissions at 4,000 miles. The deterioration factor is used to multiply emissions for vehicles tested at low mileages only in order to estimate emissions at 50,000 miles, for comparison to applicable standards. Thus the EPA developed a sign test based on comparing the deterioration factors for the two fuels for each model group, where a higher deterioration factor for HiTEC 3000 is evidence of an adverse effect. In this section we describe more powerful parametric tests that compare deterioration factors for a given model. Our results also include weighted average tests which are analogous to those described previously.

Linear Regression

The deterioration factor is the fitted mean emissions at 50,000 miles divided by the fitted mean emissions at 4,000 miles. For the linear regression model, the deterioration factor for EEE is given by

$$DF\ (EEE) = \frac{\text{Intercept(EEE)} + 50000\ \text{Slope(EEE)}}{\text{Intercept(EEE)} + 4000\ \text{Slope(EEE)}} \qquad (35)$$

using Equations 21 and 22 (for a given model, fuel, and pollutant). Since this statistic is the ratio of two normally distributed and dependent variables, the exact variance is not available in closed form. However, the variance can be estimated using the well-known delta method. Let Slope (EEE, true) and Intercept (EEE, true) denote the true unknown slope and intercept of the true regression line (rather than the regression line estimated from the data) and let DF (EEE, true) denote the true deterioration factor. Then, using the delta method, DF (EEE) is approximately given by

$$\begin{aligned} DF(EEE) = {} & DF(EEE, true) \\ & + [Slope(EEE) - Slope(EEE, true)] \times \frac{\partial DF}{\partial\ Slope} \\ & + [Intercept(EEE) - Intercept(EEE, true)] \times \frac{\partial DF}{\partial\ Intercept} \end{aligned} \tag{36}$$

where the partial derivative terms $\frac{\partial DF}{\partial\ Slope}$ and $\frac{\partial DF}{\partial\ Intercept}$ are given by

$$\frac{\partial DF}{\partial\ Slope} = \frac{46000\ Intercept\ (EEE)}{[Intercept(EEE) + 4000\ Slope(EEE)]^2} \tag{37}$$

and

$$\frac{\partial DF}{\partial\ Intercept} = \frac{-46000\ Slope(EEE)}{[Intercept(EEE) + 4000\ Slope(EEE)]^2} \tag{38}$$

Using this approximation, the variance of the estimated deterioration factor is given by the formula

$$\text{Variance (slope EEE)} \times \left(\frac{\partial DF}{\partial \text{ Slope}}\right)^2 + \text{Variance (Intercept EEE)} \times \left(\frac{\partial DF}{\partial \text{ Intercept}}\right)^2$$

$$+ 2 \text{ Covariance (slope EEE, intercept EEE)} \frac{\partial DF}{\partial \text{ Slope}} \frac{\partial DF}{\partial \text{ Intercept}} \qquad (39)$$

where the variances and covariance terms are given by Equations 25 to 27. Equation 39 is then evaluated by applying Equations 37 and 38 with estimated slopes replacing the true slopes. For each model the t test of the difference in deterioration factors is based on the observed difference divided by the square root of the variance of the difference; the variance of the difference is the sum of the variances for the two fuel deterioration factors.

Quadratic Regression

We consider the deterioration factor test based on quadratic regression for the 50,000 mile data. The similar test for the 75,000 mile data is based on the ratio of the fitted 75,000 mile emissions to the fitted 4,000 mile emissions; the procedure in that case is analogous. In this description we shall use the same notation as in our description of the quadratic regression slopes tests.

The deterioration factor for quadratic regression is given by

$$DF = \frac{a + 50000b + 50000^2c}{a + 4000b + 4000^2c} \qquad (40)$$

In this case the delta method is based on the approximation

$$\hat{DF} = DF + (\hat{a} - a)\frac{\partial DF}{\partial a} + (\hat{b} - b)\frac{\partial DF}{\partial b} + (\hat{c} - c)\frac{\partial DF}{\partial c}, \qquad (41)$$

where the hats denote estimated values, and the parameters without hats denote unknown true values. The partial derivatives are given by

$$\frac{\partial DF}{\partial a} = \frac{-46000\ (b + 54000\ c)}{(a + 4000b + 4000^2 c)^2} \tag{42}$$

$$\frac{\partial DF}{\partial b} = \frac{46000\ [a - (50000)(4000)c]}{(a + 4000b + 4000^2 c)^2} \tag{43}$$

and

$$\frac{\partial DF}{\partial c} = \frac{46000\ [54000a + (50000)(4000)b]}{(a + 4000b + 4000^2 c)^2} \tag{44}$$

and the variance of the deterioration factor (for a particular model, fuel, and pollutant) is approximately given by

$$\begin{aligned} Var(DF) = {} & \frac{\partial DF}{\partial a}^2 Var(a) + \frac{\partial DF}{\partial b}^2 Var(b) + \frac{\partial DF}{\partial c}^2 Var(c) \\ & + 2\ \frac{\partial DF}{\partial a}\ \frac{\partial DF}{\partial b}\ Cov(a,\ b) + 2\ \frac{\partial DF}{\partial a}\ \frac{\partial DF}{\partial c}\ Cov(a,\ c) \\ & + 2\ \frac{\partial DF}{\partial b}\ \frac{\partial DF}{\partial c}\ Cov(b,\ c) \end{aligned} \tag{45}$$

The t test of the difference in deterioration factors is computed using Equations 40 and 45 (substituting the values in Equations 42 to 44) in a manner similar to the linear regression case.

Violation Mileage Test

The violation mileage is intended to estimate the first mileage at which the emissions exceed the standard. The estimate is based on the regression model. The corresponding statistical test, which regards the fuel effect as adverse if the violation mileage is earlier, is described in this section.

For each model the violation mileage is in most cases the first positive mileage at which the regression line (linear regression) or regression curve (quadratic regression) meets the Federal emissions standard for the given pollutant. If, however, the zero mile emissions estimated from the regression model exceeds the standard, then the violation mileage is 0 miles. If the first exceedance mileage is after 50,000 miles (or after 75,000 miles for the 75,000 mile data analysis), or if the regression line or curve lies below the standard for all positive mileages, then the violation mileage is defined by EPA as 99,000 miles to denote no violation during the lifespan of the vehicular model. The violation mileages for each fuel on a given model are compared; the fuel effect is adverse for that model if the violation mileage for HiTEC 3000 is less than the violation mileage for EEE. Deleting models with equal violation mileages, a simple sign test is carried out based on the number of models that have an adverse fuel effect.

For the linear model the first exceedance mileage in cases where the intercept does not exceed the standard (in such cases the violation mileage is 0 miles) is given by

$$(\text{standard} - \text{intercept})/\text{slope} \tag{46}$$

unless the slope is negative (in which case the violation mileage is 99,000 miles).

For the quadratic model, using the above notation in our description of the quadratic regression slope test, the violation mileage is 0 miles if a exceeds the standard. Suppose the estimated intercept a does not exceed the standard. Then the first exceedance mileage is the smallest positive root, if any, of the quadratic equation $a + bm + cm^2 = std$. If c equals zero then the violation mileage is found as in the linear regression model. If c is negative and b is not positive, then the regression curve lies below the standard for all positive mileages and the violation mileage is 99,000. If c is negative, b is positive, and the determinant $b^2-4c(a-std)$ is negative, then the curve never exceeds the standard and the violation mileage is also 99,000. Otherwise, the first exceedance mileage is

$$\frac{-b + \sqrt{[b^2 - 4c(a - \text{standard})]}}{2c} \qquad (47)$$

The violation mileage is the first exceedance mileage (Equation 47) or is 99,000 depending upon whether or not the first exceedance mileage is less than 50,000 miles.

Because the violation mileage is not a continuous function of the data, it is not practicable to get a good estimate of its variance. Thus a more powerful version of this test was not developed.

Maximum Percentage of Vehicles Failing Standard Test

The idea of the statistical test described in this section is to compare the failure rates for the two fuels, interpreting failure as exceedance of the standard. The failure rates are estimated using the regression models. Since the failure rate varies with mileage, the maximum estimated failure rate over the mileage accumulation interval is used for the comparison.

More precisely, the regression model (linear or quadratic) is used as described below to give an estimate of the percentage failures (vehicles with emissions above the

standard) at each mileage. The maximum over all mileages from zero to 50,000 miles is then computed (for the 75,000 mile data analysis substitute 75,000 for 50,000). This procedure is carried out for each model, fuel, and pollutant combination and the results for the eight models are compared using a sign test in a similar manner to the violation mileage test already discussed. HiTEC 3000 is assumed to have an adverse effect for a given model if the estimated maximum percentage for the HiTEC 3000 vehicles exceeds the estimated maximum percentage for the EEE vehicles.

Linear Regression

The linear regression model assumes that emissions at a given mileage m are given by

$$\text{Intercept} + m \times \text{Slope} + \text{error} \tag{48}$$

where the error is normally distributed with mean zero and variance σ^2. Thus the probability that the emissions of a particular vehicle exceed the standard at mileage m is

$$\Phi\,[(\text{Intercept} + m \times \text{Slope} - \text{std})/\sigma] \tag{49}$$

where Φ denotes the cumulative distribution function of the standard normal distribution. This follows easily from the assumed normality of the errors. The estimated percentage failures are found by multiplying Equation 49 by 100 to give the equation

$$100 * \Phi\,[(\text{Intercept} + m \times \text{Slope} - \text{std})/\sigma] \tag{50}$$

Suppose that the slope is positive. Since the term inside the parentheses of Equation 49 is strictly increasing with mileage, the maximum estimated percentage failures over the first 50,000 miles occurs at 50,000 miles. Similarly, if the slope is negative, then the maximum occurs at 0 miles. The maximum estimated percentage failures is found from Equation 50, substituting the values from Equations 21 and 22 for the slope and intercept, Equation 29 for the variance σ^2, and either 0 or 50,000 for the

mileage, according to the sign of the slope. The maximum likelihood estimate in Equation 29 is used instead to estimate σ^2 rather than Equation 28 so that the estimate of the maximum percentage failures has the desirable statistical properties of a maximum likelihood estimator.

Quadratic Regression

In a similar manner to the linear regression case, the estimated percentage failures at mileage m is given by the equation

$$100 \times \Phi\,[(a + bm + cm^2 - std)/\sigma] \qquad (51)$$

using the previous notation.

The maximum of the quadratic expression inside the parentheses of Equation 51 occurs at -b/2c provided that c is negative and this mileage lies between 0 and 50,000. Otherwise the maximum over that interval occurs at one of the endpoints and can be simply obtained by comparing the values of the expression at the endpoint mileages 0 and 50,000. The estimated maximum percentage failures is computed by substituting into Equation 51 the quadratic regression estimates for a, b, and c, the variance estimate (Eq. 29) for σ^2, and the mileage at which the maximum occurs for m.

Cause-or-Contribute Test

The intent of the final EPA test, called the cause-or-contribute test, is to determine if any adverse effects detected result in more failures of emissions standards for the waiver fuel than for clear fuel. In a similar manner to the maximum percentage of vehicles failing standard test, the percentage failures at each mileage for each fuel estimated from the regressions are compared and the fuel with a higher percentage at a given mileage is regarded as having an adverse effect. Failure rates lower than 10 percent are regarded as having no practical importance, for the purpose of applying this test.

The calculation is based on Equations 50 or 51 in the previous section, depending on whether linear or quadratic regression is used. For each mileage m in the mileage accumulation interval (either 0 to 50,000 miles or 0 to 75,000 miles) these formulae give the estimated percentage failures at that mileage for a given vehicular model, fuel and pollutant. For a fixed model and pollutant, the estimates for each fuel and at each mileage are compared to determine whether the estimated percentage failures for HiTEC 3000 exceed both 10 percent and the estimated percentage failures for EEE. (The numerical comparison was made at every multiple of 1,000 miles inside the mileage accumulation interval. For consistency we also made the numerical comparison at the two exact mileages at which the estimated maximum percentage failures, as calculated in the maximum percentage failing standard test, occurred; one for each fuel.) The effect is regarded as adverse for the given model in such a situation. The results are used in a sign test of the number of models with an "adverse" effect out of the eight models in the test fleet.

Attachment D

TABULATED RESULTS FOR ALL STATISTICAL ANALYSES OF 50,000 MILE DATA

Attachment D
Table of Contents

Description	Version	Data Set	Page Number HC	NO_x	CO
Initial emissions test	Equal car means	ETHYL4S2	D-1	D-2	D-3
	Unequal car means	ETHYL4S2	D-4	D-5	D-6
1K to 5K test	Equal car effects	ETHYL4S2	D-7	D-8	D-9
	Unequal car effects	ETHYL4S2	D-10	D-11	D-12
1K to 50K test	Equal car effects	ETHYL4S2	D-13	D-14	D-15
	Unequal car effects	ETHYL4S2	D-16	D-17	D-18
Integrated emissions test	1K - 50K	ETHYL4S2	D-19	D-20	D-21
	5K - 50K	ETHYL4S2	D-22	D-23	D-24
Mean effects (50,000 miles and 75,000 miles analyses)		ETHYL4S2	D-25	D-26	D-27
		ETHYL4S	D-28	D-29	D-30
		ETHYL4S3	D-31	D-32	D-33
		ETHYL4S4	D-34	D-35	D-36
Linear regression slopes test		ETHYL4S2	D-37	D-38	D-39
Deterioration factors test	Linear regression	ETHYL4S2	D-40	D-41	D-42
Violation mileage test	Linear regression	ETHYL4S2	D-43	D-44	D-45
Maximum percentage of vehicles failing standard test	Linear regression	ETHYL4S2	D-46	D-47	D-48
Quadratic regression slopes test	25K miles	ETHYL4S2	D-49	D-50	D-51
	50K miles	ETHYL4S2	D-52	D-53	D-54
Quadratic coefficient test	Quadratic regression	ETHYL4S2	D-55	D-56	D-57
Deterioration factors test	Quadratic regression	ETHYL4S2	D-58	D-59	D-60
Violation mileage test	Quadratic regression	ETHYL4S2	D-61	D-62	D-63
Maximum percentage of vehicles failing standard test	Quadratic regression	ETHYL4S2	D-64	D-65	D-66
Cause or contribute test	Linear regression	ETHYL4S2	D-67	D-68	D-69
	Quadratic regression	ETHYL4S2	D-70	D-71	D-72

Ethyl Corporation HiTEC 3000 Fleet Testing Program

Initial Emissions Test
(assuming equal car-means)
Data Set ETHYL4S2
Pollutant Hydrocarbons

Model	Emissions at 1000 mi (g/mi)			------ Rank Sum Test ------			T-test
	EEE	(a) HT3	Sign	Test Statistic	Mean	Sig.Level (%)(b)	Sig.Level (%)(b)
D	0.285	0.279	-	15.5	12.0	61.00	40.15
E	0.099	0.104	+	21.0	18.0	70.00	68.38
F	0.168	0.167	-	20.0	18.0	81.80	95.63
T	0.189	0.207	+	7.0	18.0	9.40	13.33
C	0.123	0.129	+	14.5	18.0	58.80	41.94
G	0.101	0.100	-	20.5	18.0	81.80	91.65
H	0.182	0.168	-	26.0	18.0	24.00	15.41
I	0.173	0.162	-	22.5	18.0	58.80	43.62
Weighted Average(c)	0.162	0.159	-				57.30
Total				147.0	138.0	60.03	

EPA Sign Test: Observation of 3 '+' sign(s) in 8 trials rejects the hypothesis of no difference in initial emission levels between the fuels at the 72.66 percent significance level(b).

EPA Overall Rank Sum Test: The hypothesis of no difference in initial emission levels between the fuels is rejected at the 60.03 percent significance level(b).

Weighted Average Test: The hypothesis of no difference in initial emission levels between the fuels is rejected at the 57.30 percent significance level(b).

Notes:
a. Each figure is the mean of the 1,000 mile emissions tests.
b. The lower the significance level, the greater the evidence of a difference in initial emission levels between the fuels.
c. The weights for the weighted averages are proportional to 1988 sales figures.

Ethyl Corporation HiTEC 3000 Fleet Testing Program

Initial Emissions Test
(assuming equal car-means)
Data Set ETHYL4S2
Pollutant Nitrogen Oxides

Model	Emissions at 1000 mi (g/mi) EEE	(a) HT3	Sign	------ Rank Sum Test ------ Test Statistic	Mean	Sig.Level (%)(b)	T-test Sig.Level (%)(b)
D	0.55	0.63	+	4.0	12.0	11.40	10.69
E	0.17	0.20	+	7.0	18.0	9.40	9.49
F	0.50	0.46	-	26.0	18.0	24.00	21.43
T	0.71	0.69	-	22.0	18.0	58.80	85.41
C	0.09	0.10	+	13.0	18.0	48.40	35.38
G	0.14	0.17	+	3.0	18.0	1.60	0.53
H	0.35	0.39	+	13.0	18.0	48.40	56.80
I	0.21	0.24	+	16.0	18.0	81.80	54.35
Weighted Average(c)	0.34	0.35	+				46.31
Total				104.0	138.0	4.78	

EPA Sign Test: Observation of 6 '+' sign(s) in 8 trials rejects the hypothesis of no difference in initial emission levels between the fuels at the 28.91 percent significance level(b).

EPA Overall Rank Sum Test: The hypothesis of no difference in initial emission levels between the fuels is rejected at the 4.78 percent significance level(b).

Weighted Average Test: The hypothesis of no difference in initial emission levels between the fuels is rejected at the 46.31 percent significance level(b).

Notes:
a. Each figure is the mean of the 1,000 mile emissions tests.
b. The lower the significance level, the greater the evidence of a difference in initial emission levels between the fuels.
c. The weights for the weighted averages are proportional to 1988 sales figures.

Ethyl Corporation HiTEC 3000 Fleet Testing Program

Initial Emissions Test
(assuming equal car-means)
Data Set ETHYL4S2
Pollutant Carbon Monoxide

Model	Emissions at 1000 mi (g/mi)			------ Rank Sum Test ------			T-test
	EEE	(a) HT3	Sign	Test Statistic	Mean	Sig.Level (%)(b)	Sig.Level (%)(b)
D	1.69	1.72	+	13.0	12.0	91.40	80.96
E	2.14	2.42	+	12.0	18.0	39.40	41.49
F	0.55	0.58	+	16.0	18.0	81.80	76.18
T	1.61	1.83	+	9.0	18.0	18.00	15.04
C	1.24	1.38	+	7.0	18.0	9.40	11.70
G	0.76	0.79	+	12.0	18.0	39.40	57.25
H	1.43	1.30	-	31.0	18.0	4.20	6.04
I	1.61	1.54	-	19.0	18.0	93.80	71.00
Weighted Average(c)	1.38	1.41	+				51.74
Total				119.0	138.0	26.86	

EPA Sign Test: Observation of 6 '+' sign(s) in 8 trials rejects the hypothesis of no difference in initial emission levels between the fuels at the 28.91 percent significance level(b).

EPA Overall Rank Sum Test: The hypothesis of no difference in initial emission levels between the fuels is rejected at the 26.86 percent significance level(b).

Weighted Average Test: The hypothesis of no difference in initial emission levels between the fuels is rejected at the 51.74 percent significance level(b).

Notes:
a. Each figure is the mean of the 1,000 mile emissions tests.
b. The lower the significance level, the greater the evidence of a difference in initial emission levels between the fuels.
c. The weights for the weighted averages are proportional to 1988 sales figures.

Systems Applications Inc.
March 16, 1990

Ethyl Corporation HiTEC 3000 Fleet Testing Program

Initial Emissions Test
(not assuming equal car-means)
Data Set ETHYL4S2
Pollutant Hydrocarbons

Model	Emissions at 1000 mi.(g/mi)(a) EEE	HT3	Sign ('+'= adverse HT3 effect)	T-test Significance Level (%)(b)
D	0.285	0.279	-	40.96
E	0.099	0.104	+	39.20
F	0.168	0.167	-	93.78
T	0.189	0.207	+	17.72
C	0.123	0.129	+	30.03
G	0.101	0.100	-	92.37
H	0.181	0.168	-	7.34
I	0.173	0.162	-	21.47
Weighted Average(c)	0.162	0.159	-	42.90

EPA Sign Test: Observation of 3 '+' sign(s) in 8 trials rejects the hypothesis of no difference in intital emission levels between the fuels at the 72.66 percent significance level(b).

Weighted Average Test: The hypothesis of no difference in initial emission levels between the fuels is rejected at the 42.90 percent significance level(b).

Notes:
a. Each figure is the mean of the car-means at 1,000 miles.
b. The lower the significance level, the greater the evidence of a difference in initial emission levels between the fuels.
c. The weights for the weighted averages are proportional to 1988 sales figures.

Systems Applications Inc.
March 18, 1990

Ethyl Corporation HiTEC 3000 Fleet Testing Program

Initial Emissions Test
(not assuming equal car-means)
Data Set ETHYL4S2
Pollutant Nitrogen Oxides

Model	Emissions at 1000 mi.(g/mi)(a) EEE	HT3	Sign ('+'= adverse HT3 effect)	T-test Significance Level (%)(b)
D	0.55	0.63	+	2.34
E	0.17	0.20	+	5.90
F	0.50	0.46	-	13.13
T	0.71	0.69	-	57.78
C	0.09	0.10	+	33.97
G	0.14	0.17	+	0.36
H	0.35	0.39	+	15.26
I	0.21	0.24	+	0.13
Weighted Average(c)	0.34	0.35	+	4.56

EPA Sign Test: Observation of 6 '+' sign(s) in 8 trials rejects the hypothesis of no difference in intital emission levels between the fuels at the 28.91 percent significance level(b).

Weighted Average Test: The hypothesis of no difference in initial emission levels between the fuels is rejected at the 4.56 percent significance level(b).

Notes:
a. Each figure is the mean of the car-means at 1,000 miles.
b. The lower the significance level, the greater the evidence of a difference in initial emission levels between the fuels.
c. The weights for the weighted averages are proportional to 1988 sales figures.

Systems Applications Inc.
March 18, 1990

Ethyl Corporation HiTEC 3000 Fleet Testing Program

Initial Emissions Test
(not assuming equal car-means)
Data Set ETHYL4S2
Pollutant Carbon Monoxide

Model	Emissions at 1000 mi.(g/mi)(a) EEE	HT3	Sign ('+'= adverse HT3 effect)	T-test Significance Level (%)(b)
D	1.69	1.72	+	83.98
E	2.14	2.42	+	6.85
F	0.55	0.58	+	64.32
T	1.61	1.83	+	19.15
C	1.24	1.38	+	6.29
G	0.76	0.79	+	6.93
H	1.43	1.30	-	5.89
I	1.61	1.54	-	55.15
Weighted Average(c)	1.38	1.41	+	31.64

EPA Sign Test: Observation of 6 '+' sign(s) in 8 trials rejects the hypothesis of no difference in intital emission levels between the fuels at the 28.91 percent significance level(b).

Weighted Average Test: The hypothesis of no difference in initial emission levels between the fuels is rejected at the 31.64 percent significance level(b).

Notes:
a. Each figure is the mean of the car-means at 1,000 miles.
b. The lower the significance level, the greater the evidence of a difference in initial emission levels between the fuels.
c. The weights for the weighted averages are proportional to 1988 sales figures.

Systems Applications Inc.
March 18, 1990

Ethyl Corporation HiTEC 3000 Fleet Testing Program

Change in Emissions From 1,000 to 5,000 Miles
(assuming equal car effects)
Data Set ETHYL4S2
Pollutant Hydrocarbons

Model	Change in Emissions (g/mi) from 1,000 to 5,000 mi(a) EEE	HT3	Sign	------ Rank Sum Test ------ Test Statistic	Mean	Sig.Level (%)(b)	T-test Sig.Level (%)(b)
D	0.012	0.040	+	1.0	3.0	20.00	7.93
E	0.031	0.057	+	2.0	4.5	20.00	10.05
F	0.078	0.086	+	3.0	4.5	35.00	25.27
T	0.042	0.050	+	3.0	4.5	35.00	28.53
C	0.020	0.031	+	3.0	4.5	35.00	32.92
G	0.012	0.017	+	4.0	4.5	50.00	34.60
H	0.008	0.039	+	0.0	4.5	5.00	6.04
I	-0.003	0.012	+	4.0	4.5	50.00	30.05
Weighted Average(c)	0.024	0.041	+				0.53
Total				20.0	34.5	1.07	

EPA Sign Test: Observation of 8 '+' sign(s) in 8 trials rejects the hypothesis of no adverse HiTEC 3000 effect at the 0.39 percent significance level(b).

EPA Overall Rank Sum Test: The hypothesis of no adverse HiTEC 3000 effect is rejected at the 1.07 percent significance level(b).

Weighted Average Test: The hypothesis of no adverse HiTEC 3000 effect is rejected at the 0.53 percent significance level(b).

Notes:
a. Each figure is the mean of the car-means at 5,000 miles minus the mean of the car-means at 1,000 miles.
b. The lower the significance level, the greater the evidence of an adverse HiTEC 3000 effect
c. The weights for the weighted averages are proportional to 1988 sales figures.

Systems Applications Inc.
March 18, 1990

Ethyl Corporation HiTEC 3000 Fleet Testing Program

Change in Emissions From 1,000 to 5,000 Miles
(assuming equal car effects)
Data Set ETHYL4S2
Pollutant Nitrogen Oxides

Model	Change in Emissions (g/mi) from 1,000 to 5,000 mi(a) EEE	HT3	Sign	------ Rank Sum Test ------ Test Statistic	Mean	Sig.Level (%)(b)	T-test Sig.Level (%)(b)
D	0.01	-0.06	-	6.0	3.0	100.00	93.51
E	0.10	0.01	-	9.0	4.5	100.00	99.50
F	0.13	0.17	+	3.0	4.5	35.00	18.65
T	0.09	-0.16	-	8.0	4.5	95.00	93.33
C	0.14	0.11	-	8.0	4.5	95.00	91.48
G	0.09	0.09	-	5.0	4.5	65.00	58.40
H	-0.01	0.12	+	3.0	4.5	35.00	19.35
I	0.16	0.04	-	8.0	4.5	95.00	90.93
Weighted Average(c)	0.09	0.06	-				78.31
Total				50.0	34.5	99.30	

EPA Sign Test: Observation of 2 '+' sign(s) in 8 trials rejects the hypothesis of no adverse HiTEC 3000 effect at the 96.48 percent significance level(b).

EPA Overall Rank Sum Test: The hypothesis of no adverse HiTEC 3000 effect is rejected at the 99.30 percent significance level(b).

Weighted Average Test: The hypothesis of no adverse HiTEC 3000 effect is rejected at the 78.31 percent significance level(b).

Notes:
a. Each figure is the mean of the car-means at 5,000 miles minus the mean of the car-means at 1,000 miles.
b. The lower the significance level, the greater the evidence of an adverse HiTEC 3000 effect
c. The weights for the weighted averages are proportional to 1988 sales figures.

Systems Applications Inc.
March 18, 1990

Ethyl Corporation HiTEC 3000 Fleet Testing Program

Change in Emissions From 1,000 to 5,000 Miles
(assuming equal car effects)
Data Set ETHYL4S2
Pollutant Carbon Monoxide

Model	Change in Emissions (g/mi) from 1,000 to 5,000 mi(a) EEE	HT3	Sign	------ Rank Sum Test ------ Test Statistic	Mean	Sig.Level (%)(b)	T-test Sig.Level (%)(b)
D	0.08	0.04	-	4.0	3.0	80.00	67.38
E	0.51	1.07	+	2.0	4.5	20.00	17.74
F	0.32	0.14	-	8.0	4.5	95.00	94.45
T	0.66	0.83	+	1.0	4.5	10.00	3.79
C	0.22	0.30	+	4.0	4.5	50.00	34.91
G	0.48	0.34	-	9.0	4.5	100.00	96.80
H	0.20	0.25	+	3.0	4.5	35.00	39.51
I	0.22	0.20	-	5.0	4.5	65.00	52.27
Weighted Average(c)	0.33	0.39	+				26.41
Total				36.0	34.5	59.40	

EPA Sign Test: Observation of 4 '+' sign(s) in 8 trials rejects the hypothesis of no adverse HiTEC 3000 effect at the 63.67 percent significance level(b).

EPA Overall Rank Sum Test: The hypothesis of no adverse HiTEC 3000 effect is rejected at the 59.40 percent significance level(b).

Weighted Average Test: The hypothesis of no adverse HiTEC 3000 effect is rejected at the 26.41 percent significance level(b).

Notes:
a. Each figure is the mean of the car-means at 5,000 miles minus the mean of the car-means at 1,000 miles.
b. The lower the significance level, the greater the evidence of an adverse HiTEC 3000 effect
c. The weights for the weighted averages are proportional to 1988 sales figures.

Systems Applications Inc.
March 18, 1990

Ethyl Corporation HiTEC 3000 Fleet Testing Program

Change in Emissions from 1,000 to 5,000 Miles
(not assuming equal car effects)
Data Set ETHYL4S2
Pollutant Hydrocarbons

Model	Change in Emissions from 1,000 to 5,000 mi (g/mi)(a) EEE	HT3	Sign ('+'= adverse HT3 effect)	T-test Significance Level (%)(b)
D	0.012	0.040	+	1.43
E	0.031	0.057	+	3.92
F	0.078	0.086	+	25.12
T	0.042	0.050	+	35.67
C	0.020	0.031	+	12.96
G	0.012	0.017	+	36.78
H	0.008	0.039	+	0.70
I	-0.003	0.012	+	7.66
Weighted Average(c)	0.024	0.041	+	0.02

EPA Sign Test: Observation of 8 '+' sign(s) in 8 trials rejects the hypothesis of no adverse HiTEC 3000 effect at the 0.39 percent significance level(b).

Weighted Average Test: The hypothesis of no adverse HiTEC 3000 effect is rejected at the 0.02 percent significance level(b).

Notes:
a. Each figure is the mean of the car-means at 5,000 miles minus the mean of the car-means at 1,000 miles.
b. The lower the significance level, the greater the evidence of an adverse HiTEC 3000 effect.
c. The weights for the weighted averages are proportional to 1988 sales figures.

Systems Applications Inc.
March 18, 1990

Ethyl Corporation HiTEC 3000 Fleet Testing Program

Change in Emissions from 1,000 to 5,000 Miles
(not assuming equal car effects)
Data Set ETHYL4S2
Pollutant Nitrogen Oxides

Model	Change in Emissions from 1,000 to 5,000 mi (g/mi)(a) EEE	HT3	Sign ('+'= adverse HT3 effect)	T-test Significance Level (%)(b)
D	0.01	-0.06	-	97.55
E	0.10	0.01	-	99.99
F	0.13	0.17	+	11.57
T	0.09	-0.16	-	100.00
C	0.14	0.11	-	89.18
G	0.09	0.09	-	61.55
H	-0.01	0.12	+	0.05
I	0.16	0.04	-	100.00
Weighted Average(c)	0.09	0.06	-	99.67

EPA Sign Test: Observation of 2 '+' sign(s) in 8 trials rejects the hypothesis of no adverse HiTEC 3000 effect at the 96.48 percent significance level(b).

Weighted Average Test: The hypothesis of no adverse HiTEC 3000 effect is rejected at the 99.67 percent significance level(b).

Notes:
a. Each figure is the mean of the car-means at 5,000 miles minus the mean of the car-means at 1,000 miles.
b. The lower the significance level, the greater the evidence of an adverse HiTEC 3000 effect.
c. The weights for the weighted averages are proportional to 1988 sales figures.

Systems Applications Inc.
March 18, 1990

Ethyl Corporation HiTEC 3000 Fleet Testing Program

Change in Emissions from 1,000 to 5,000 Miles
(not assuming equal car effects)
Data Set ETHYL4S2
Pollutant Carbon Monoxide

Model	Change in Emissions from 1,000 to 5,000 mi (g/mi)(a) EEE	HT3	Sign ('+'= adverse HT3 effect)	T-test Significance Level (%)(b)
D	0.08	0.04	-	61.93
E	0.51	1.07	+	4.22
F	0.32	0.14	-	99.26
T	0.66	0.83	+	21.49
C	0.22	0.30	+	28.81
G	0.48	0.34	-	99.22
H	0.20	0.25	+	29.06
I	0.22	0.20	-	55.40
Weighted Average(c)	0.33	0.39	+	14.53

EPA Sign Test: Observation of 4 '+' sign(s) in 8 trials rejects the hypothesis of no adverse HiTEC 3000 effect at the 63.67 percent significance level(b).

Weighted Average Test: The hypothesis of no adverse HiTEC 3000 effect is rejected at the 14.53 percent significance level(b).

Notes:
a. Each figure is the mean of the car-means at 5,000 miles minus the mean of the car-means at 1,000 miles.
b. The lower the significance level, the greater the evidence of an adverse HiTEC 3000 effect.
c. The weights for the weighted averages are proportional to 1988 sales figures.

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