Appendix H
Driveability Index Analysis

Table 1 shows the data on DI[*] and other gasoline properties from the sampling data reported by the Association of American Automobile Manufacturers for "Los Angeles" and "San Francisco" in the summer of 1998.

These data have been fit with two linear models:

DI (1) = a + b*RVP + b'*[1, if grade = reg] + c*T50 + d*T90   and

DI (2) = a + b*RVP + c*T50 + d*T90

The output of the regressions are:

	Coefficient	p (Significance)
DI (1), R^2=.991		
Intercept	242.3	<0.001
Regular	-3.171	0.09
RVP	-8.331	0.10
T50	3.234	<0.001
T90	0.9270	<0.001
DI (2), R^2=0.992		
Intercept	208.2	<.001
RVP	-5.510	.28
T50	3.395	<.001
T90	.8559	<.001

Although the significance values (p) for RVP are larger than is often accepted for including terms in multiple regression equations, the RVP terms have been kept as necessary surrogates for T10. The equation for DI (1) is preferable (when grade data are available) because of the lower p-value on RVP and because the coefficients for T50 and T90 are closer to their actual values, 3.0 and 1.0.

Since the coefficients for RVP are negative and actual RVPs are less than the inputs to the regressions (values in the table), using actual RVP as inputs to the equations leads to over-predicted values of DI. If the bias in the tabular RVPs is 0.36 psi, DI is over-predicted by 3 ^{o}F by DI (1).

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* Driveability Index is computed from points on the ASTM D 86 distillation curve for a gasoline: DI (^{o}F) = 1.5*T10 +3.0* T%0 + T90

Table 1
Inputs for DI Regression

RVP'	Grade	RVP	T50	T90	DI
7.1	Premium	6.84	209	306	1143
7.1	Premium	6.84	201	292	1107
7.0	Premium	6.74	215	300	1157
7.2	Premium	6.94	209	305	1142
7.0	Premium	6.74	208	302	1136
7.0	Intermed.	6.74	209	305	1142
7.1	Intermed.	6.84	198	312	1107
6.7	Regular	6.44	192	291	1076
7.0	Regular	6.74	197	306	1101
7.0	Regular	6.74	188	308	1078
7.1	Regular	6.84	189	290	1064
7.1	Regular	6.84	199	318	1119
7.0	Regular	6.74	197	297	1100
7.1	Regular	6.84	201	318	1128
7.0	Regular	6.74	199	311	1112
7.1	Regular	6.84	194	314	1094
7.1	Premium	6.84	214	312	1169
7.0	Premium	6.74	211	300	1145
7.2	Premium	6.94	207	310	1140
6.8	Premium	6.54	212	314	1169
7.1	Premium	6.84	208	314	1150
7.3	Premium	7.04	207	320	1153
7.1	Intermed	6.84	201	309	1119
7.2	Regular	6.94	200	322	1128
7.2	Regular	6.94	187	298	1065
7.2	Regular	6.94	202	315	1130
7.0	Regular	6.74	212	319	1165
7.1	Regular	6.84	199	319	1122
6.9	Regular	6.64	199	312	1118
7.1	Regular	6.84	196	315	1106
7.0	Regular	6.74	199	311	1117