



State Fuel Quality Laws for Ethanol Blended Gasoline

Changes to Promote and Protect but Not Impede E10



**Marathon
Petroleum Company** LLC

MARATHON'S COMMITMENT TO FUEL QUALITY

- ◆ Extensive quality oversight program
- ◆ Strict adherence to ASTM D 4814 except where allowances are made by state laws for ethanol blending (e.g. NIST 130)
- ◆ Will not sell fuel that will not consistently meet state fuel quality laws



MARATHON'S COMMITMENT TO FUEL QUALITY

- ◆ No Evidence of Problems Due to Low T50 in High RVP cases (>11.0 psi)
 - CRC Report No. 584 / SAE 932672
 - Amoco Study – 1995
 - Marathon Data



CRC Report No. 584 / SAE 932672

- ◆ CRC Report No. 584 EFFECS OF RVP, T50, AND OXYGENATES ON HOT-START AND DRIVEABILITY PERFORMANCE AT HIGH AND LOW ALTITUDE, May 1993
- ◆ SAE Report No. 932672 HOT START DRIVEABILITY OF LOW T50 FUELS, Oct. 1993, Scott Jorgensen (General Motors) and Robert Reuter (Texaco, Inc.)
 - Both reports evaluate the same data set generated during a test program investigating RVP, T50, and oxygenates on hot-start and driveability performance.
 - Temperature-range means were ~70°F and ~84°F at high altitude.
 - Temperature range mean was ~99°F at the low-altitude site



CRC 584/SAE TEST FUEL PROPERTIES

	<u>Low RVP Study</u>			<u>High RVP Study</u>		
Fuel	<u>7</u>	<u>9</u>	<u>11</u>	<u>8</u>	<u>10</u>	<u>12</u>
Ethanol - Vol%	9.5	8.8	9.8	9.1	8.2	9.1
RVP (psi)	7.9	7.1	7.7	11.3	11.7	11.6
Distillation (°F), % Evaporated						
T10	127	132	132	114	113	114
T50	143	172	182	141	159	179
T90	327	337	324	322	333	322
RON	97.0	97.3	98.8	96.8	97.1	98.2
MON	89.2	89.8	89.8	89.2	89.9	90.2
TVL=20*(°F)	131	137	135	117	117	117

Fuel 8 is close to Class C characteristics, and the T50 is only 141°F (**29° F** below current D4814 minimum T50 Spec).



Means by car Fuel Injected cars

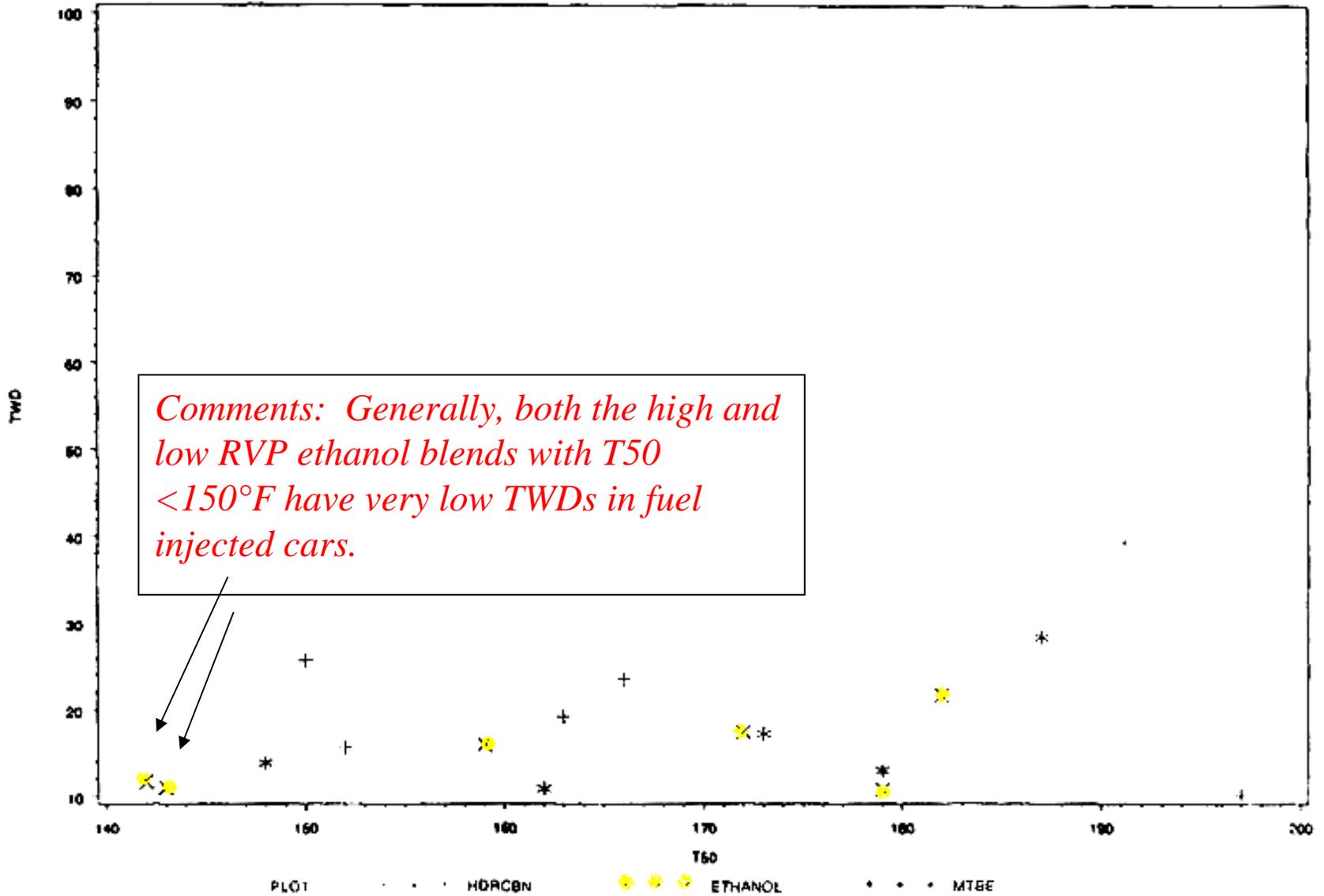


Figure 8



CRC 584/SAE CONCLUSIONS

Fuel-Injected Vehicles

- ◆ Decreasing T50 caused a small degradation of driveability in two **low-RVP** fuel, high-altitude cases.
- ◆ Changes in T50 had no significant effect with **high-RVP** fuels.

Carbureted Vehicles

- ◆ Decreasing T50 caused degradation of driveability in most **low-RVP** cases.
- ◆ Changes in T50 had no significant effect with **high-RVP** fuels.



AMOCO 1995 STUDY

- ◆ 3 vehicles (2 returnless fuel injection) 1994-1995 models
- ◆ T50's of 134°F-148°F, RVP's 12.9-13.9 psi
- ◆ Ambient 90°F
- ◆ Conclusion -- vehicle performance acceptable with T50's as low as 140°F under worst case conditions.



MARATHON DATA

Minimum T50 values for Marathon E10 in 2006 in NIST 130 Marketplace

Class	Min T50 of E10, °F	D4814 Min T50 Spec, °F
A	185	170
C	149	170
D	144	150
E	140	150

- ◆ Current data indicates an approximate 10° F depression in Tv/l from the neat gasoline to the E10 for regular (87) gasoline; perhaps a substantially greater depression for premium.
- ◆ Marathon is one of the largest retailers of ethanol blended gasoline with over one half billion gallons sold annually over the last few years.
- ◆ Marathon is unaware of any driveability problems associated with lower T50 and T V/L values in its market place.



CONCLUSIONS

- ◆ Marathon supports the NIST Handbook 130 as currently written.
 - Available E10 data suggests T50s below ASTM minimums are not detrimental to driveability.
- ◆ States that adopted NIST Handbook 130 have protected the consumer from driveability problems.
- ◆ State fuel quality laws should not impede ethanol blended gasoline from expanding into new markets.

