

T50 and Ethanol

NCWM Petroleum Subcommittee 1/24/07 Meeting

by

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Ethanol Timeline

- **1979**: EPA grants Gas Plus Waiver w/o decision (44 FR 20777 (4/6/79)). EPA did not require gasoline-ethanol blend to meet ASTM Specification D 439 (now ASTM 4814) volatility limits. EPA has specified in all other waivers that the volatility of the finished gasoline-oxygenate blend must comply with ASTM Specification D 439 or ASTM D 4814 climatic and geographical limits. Ethanol raises RVP (0.6 to 1.2 psi), lowers T 50 10 to 35 F, and lowers V/L about 4 to 10 F, thus making it challenging to blend a fungible conventional gasoline and meet ASTM D 4814 specifications on the blended “gasohol” fuel.
- **late 1980’s**: ASTM does not give ethanol vapor pressure relief. RFA commences lobbying states and National Conference on Weights & Measures for ethanol blended fuels.
- **1989** : EPA starts to control summer RVP at retail during the summer June 1 to September 15 season. EPA gives ethanol 1.0 psi relief if the concentration of the ethanol, excluding the required denaturing agent, is at least 9 % and no more than 10 % by volume of the gasoline. Many states will adopt this language for winter conventional gasoline.
- **Winter 1992**: US EPA mandates winter use of oxygenates in CO non-attainment areas starts.
- **1995**: National Conference on Weights & Measures “Uniform Engine Fuels, Petroleum Products and Automotive Lubricants Regulation” allows gasoline blended with ethanol to meet ASTM D 4814 on either base OR blended fuel (any ethanol concentration) and gives 1.0 psi relief.
- **1996**: ASTM reduces ASTM D 4814 T 50 minimum for winter gasoline from 170 F to 150 F based on Amoco, Mobil, and Coordinating Research Council (CRC) data. Note ASTM D 4814 gasoline specification is on finished gasoline but NCWM allows ASTM to be met on base fuel OR the fuel blended with ethanol. Thus a 150 F T 50 base fuel which meets ASTM when blended with ethanol would meet NCWM specifications. .
- **August 2005**: President signs the Energy Policy Act of 2005 which establishes a Renewable Fuels Standard that requires the use of ethanol and biodiesel in gasoline and diesel beginning in 2006.

HOT VEHICLE PERFORMANCE STUDIES (ASTM 6/23/95)

CRC

- Commissioned by ASTM, participation by BOTH autos and oils
- 20 vehicles 1983-1992 models
- T50's as low as 141 F; RVP's 11-12 psi
- Ambient averaged 70 F & 84 F, high altitude
- Conclusion – vehicles insensitive to T50

Amoco 1992 Study

- 6 vehicles 1985-1991 models
- T50's as low as 146 F, RVP's 11.2-13.2 psi
- Ambient 95 F
- Conclusion – vehicles insensitive to T50

Mobil Study

- 51 vehicles 1983-1993 models
- T50's of 155 F for class D, 151 for class E
- Ambients 47 F-101 F, RVP's 13.6-15.1 psi
- Conclusion- vehicles insensitive to T50, excellent driveability performance 98% + satisfaction

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 99 F
- Conclusion-vehicle performance acceptable with T50's as low as 140 F under worst case conditions

T 50 and Ethanol

- **Winter ASTM T50 min compliance is 95 % (150 F min)**
- **With an 8 F test tolerance compliance is 99.9 % (142 F min)**

- **Summer conventional T 50 compliance is 70 % (170 F min)**
- **Problems ?**
- **Future mandated ethanol growth is conventional**

- **Need data to determine T 50 summer T50 min in current fleet**
- **CRC ?**
- **API ?**
- **Other ?**