Comments on
Fuel Rating Rule Review, R811005

Comment 1

This comment deals with the value (or energy content) of the fuel received by the public based on its composition and price. See section below " Fuel Economy Decline with Increasing Ethanol Blend Level in Gasoline". **Based on the information provided in this section it is proposed that the labeling for Mid-Level Ethanol blends state the maximum percentage of ethanol that will be dispensed at the stated price.** (e.g. maximum ethanol % of E30 or 30% ETHANOL Maximum.) By this method the consumer will know lowest energy that may be received at the stated price. If the retailer provides a lower percentage of ethanol than the 30% in the example then the consumer would benefit from the increased energy content and therefore increased fuel economy. The consumer must know the relative energy content of the fuel in order to make an informed purchase decision.

[IV. B. 3. Labeling
The proposed amendments provide labeling requirements for Mid-Level Ethanol blends and amend the labeling requirements for E85.[59] The proposed requirements provide retailers flexibility to comply with the law while giving consumers critical information to avoid placing their warranties at risk. Specifically, the proposed Mid-Level Ethanol blend requirements provide that retailers must post either: 1) the precise concentration of ethanol (e.g., "20% ETHANOL"); or 2) a disclosure that the blend's concentration is between 10 and 70 percent ("10% - 70% ETHANOL"), or within a narrower range (e.g., "30% - 40% ETHANOL"). These content disclosures will alert consumers to the presence of more than 10 percent ethanol, thereby helping them avoid placing their warranties at risk.

The proposed amendment does not, however, require labels to disclose an exact blend percentage or a range narrower than 10 - 70 percent. Requiring retailers to post such a disclosure would likely impose a significant burden because, as Downstream and IRFA noted, retailers currently create Mid- Level Ethanol blends through blender pumps.]

Comment 2

This comment relates to the section on labeling as noted below. The concern with fueling vehicles with blends higher than 10% Ethanol deals with the potential failure of the fuel system on the vehicle due to degradation of the elastomers and galvanic corrosion due to dissimilar materials used in its construction. It is well know by the automotive industry that vehicular fuel systems must be modified in order to safely accommodate ethanol blends higher than the existing 10%. **It is proposed that the labeling noted below actually state:**
FOR FLEX FUEL VEHICLE USE ONLY
CHECK OWNER'S MANUAL

If and when the EPA may approve the wider use of ethanol blends up 15% Ethanol, it will only be for a subset of newer vehicles and may be restricted from use for other applications (e.g. off road engines).

[In addition, labels for all ethanol blends above 10 percent would state:
MAY HARM SOME VEHICLES
CHECK OWNER'S MANUAL

This additional information should assist consumers in identifying the proper fuel for their vehicles. As noted above, AAM reported that consumers place their warranties at risk if they use Mid-Level Ethanol blends and E85 in conventional cars because ''virtually all conventional vehicles built to date have been validated for gasoline containing only up to 10% ethanol.''61 This comment raises a question concerning whether ethanol blends above 10 percent concentration will damage conventional vehicles, and the Commission invites comment on that question.}

Fuel Economy Decline with Increasing Ethanol Blend Level in Gasoline

Ethanol has a lower volumetric energy density than gasoline. A blend of ethanol in gasoline will have a lower energy density than the base gasoline by an amount proportional to the volume-% ethanol in the blended fuel. Ethanol is a single component, oxygenated hydrocarbon fuel (C_2H_5OH) and has an energy density of approximately 76,000 BTU/gallon @ 60°F.[1] Gasoline is a multi-component, highly-variable hydrocarbon fuel with an energy density generally measured in the range of 109,000 to 119,000 BTU/gallon @ 60°F.[2] Based on a linear relationship between these blend components, for every 1% addition of ethanol in gasoline, the energy density of the fuel blend will drop by about 0.33%. On a volumetric basis; a 10% blend of ethanol in gasoline (E10) will have about 3.3% less energy than the base gasoline, a 20% blend of ethanol in gasoline (E20) will have about 6.6% less energy than the base gasoline, and an 80% blend of ethanol in gasoline (nominal E85) will have about 26% less energy than the base gasoline.

Fuel economy for a vehicle is measured on a volumetric basis and is directly related to the volumetric energy density of the fuel being used to propel the vehicle. As the volumetric energy density of the fuel goes down, so does the vehicle's fuel economy. The fuel economy (i.e., energy density) decline with ethanol predicted above has been well documented in recent studies. Knoll, et. al.[3] tested 16 conventional vehicles using splash blends of ethanol in certification gasoline and showed a linear fuel economy decline with ethanol. E10 resulted in a 3.7% decline in fuel economy and E20 resulted in a 7.7% decline. The energy density of the certification gasoline used in this study was slightly higher than nominal which resulted in a slightly higher fuel economy reduction than predicted above. These data are shown in the figure below. Yanowitz and McCormick[4] compiled the available literature data for flexible fuel vehicles operating on both conventional gasoline and nominal E85. The fuel economy reduction averaged for all available test data showed a 25% reduction in fuel economy. This compares well with the 26% reduction suggested above.

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[1] "Alcohols and Ethers; A Technical Assessment of Their Application as Fuels and Fuel Components," API Publication 4261, 3rd Edition, June 2001.
[2] Ibid.
[3] K. Knoll, B. West, W. Clark, R. Graves, J. Orban, S. Przesmitzki, T. Theiss, "Effects of intermediate Ethanol Blends on Legacy Vehicles and Small Non-Road Engines, Report 1 – Updated," NREL/TP-540-43543 and ORNL/TM-2008/117, February 2009.
[4] J. Yanowitz and R. L. McCormick, "Effect of E85 on Tailpipe Emissions from Light-Duty Vehicles," Journal of Air & Waste Management, Vol. 59, 172-182, 2009.

Fuel Economy Change with Ethanol Blended Gasoline
Predicted vs. Measured from NREL/ORNL Vehicle Emissions Study