Up to Spec!

American Coalition for Ethanol
Annual Conference, August 9th, 2016
Kristy Moore
KMoore Consulting LLC
Today’s Presentation Topics

- Fuel Ethanol Technical Advisory Group
- Sulfates concerns of the Oil Industry.
- ASTM International efforts.
- Federal Trade Commission updates.
- Tier 3 Sulfur Implications.
- High Octane Fuels of the Future.
Introduce Fuel Ethanol Technical Advisory Group

• Voluntary collaboration of ethanol industry’s technical experts.
  – Open to ethanol industry member.
  – No financial obligation (future research planned…)
  – Regular communication on fuel quality and regulatory issues.

• Build strategy on fuel quality, performance, emissions, and regulatory efforts for advancement of the ethanol industry.
Fuel Ethanol Technical Advisory Group

• Speakers today:
  – Vice Chair: Chuck Corr, ADM
  – Advisor: Shon VanHulzen, POET
  – Chair: Jacki Fee, Cargill

• Other members:
  – Secretary: Kristy Moore
  – Advisors: Mark DeVries, POET, Chris Bliley, Growth Energy

Interested in becoming a participant?
Contact any member here or call:
Kristy Moore
P: 309.275.9433
E: fueltechservice@gmail.com
Issues Facing the Ethanol Industry

• Advancement of ethanol use.
  – Domestic use limited by state regulations. Example: CA, AZ, NV.
  – Export use limited by lack of education on benefits.

• Venue to collaborate on research projects.
  – Sulfate, driveability, ethanol emissions/ EPA MOVES model.
Sulfate Concerns of the Oil Industry

• Suggesting a linear relationship with sulfate salt precipitation with increasing ethanol content.
• Proposing reduction of sulfate specification in ASTM D4806 for increasing ethanol content in gasoline (D4814.)

• Two research projects to address this concern:
  – CRC has hired Desert Research Institute to evaluate sulfates in ethanol.
  – FETAG is working with NREL to evaluate the potential for sulfate salt precipitation in various gasoline-ethanol blends.
ASTM Standards – The Process

• Stakeholder involvement
  – Two face-to-face meetings per year, voting rights throughout the year.

• Balanced stakeholder input

• Producer not more than User + General Interest

• Levels of participation can vary

• Starts with $75 annual membership
ASTM - D02 Ethanol Related Standards

- D4806 – Denatured Fuel Ethanol Specification
- D4814 – “Gasoline” Specification
- D5798 – Ethanol Flex Fuel Specification (Formerly E85)
- D7794 – Blend Practice – Ethanol between D4814 and D5798
- D8011 – Natural Gasoline for D4806 and D5798

- Very active time at ASTM, standards and specifications changing multiple times each year, this trend is expected to continue.
Should I get involved?

- Yes!

- The outcomes of ASTM have significant impacts on your business

- ASTM (D02) has historically been (and continues to be) dominated by the oil & auto industries

- Make sure your voice is heard!

- $75 annual membership fee gets you involved
Should I get involved?

- Face-to-Face meeting are held every 6 months (June & December)
- Meeting locations move around the US and occasionally Canada
- Recommend signing up as a “Voting Member”; however, due to the balanced voting system used by ASTM D02 you will likely be put on a waiting list to get a vote – but you still have a voice!
Example Ballot

1. Specification For 100 Research Octane Number Test Fuel for Automotive Spark-Ignition Engines WK54471 PDF () (REFERENCE Z3715Z)
   TECHNICAL CONTACT: Robert McCormick, PhD
   ROBERT.MCCORMICK@NREL.GOV
   (303) 275-4432
   • Affirmative  Affirm with Comment  Negative with Statement  Abstain  Abstain with Comment

2. Revision Of D4814-2016B Specification for Automotive Spark-Ignition Engine Fuel WK54472 PDF ()
   updating terminology definition for gasoline (SEE VOLUME 5.2)
   TECHNICAL CONTACT: Lewis M Gibbs
   mr.gasoline@att.net
   (415) 381-8709
   • Affirmative  Affirm with Comment  Negative with Statement  Abstain  Abstain with Comment

   updating terminology definition for gasoline (SEE VOLUME 5.2)
   TECHNICAL CONTACT: Charles Corr
   corr@adm.com
   (563) 244-5208
   • Affirmative  Affirm with Comment  Negative with Statement  Abstain  Abstain with Comment
   • Affirmative all items, except as marked above  Abstain all items, except as marked above
Current ASTM Activity

D02.A

- **Specification For 100 Research Octane Number Test Fuel for Automotive Spark-Ignition Engines WK54471**
  - Negative adjudication currently online
Federal Trade Commission Regulations

• After nearly a 5 years process, FTC published a final rule.
• There’s a little bit of everything in this new rule…
• Published January 14, 2016
• Effective **JULY 14, 2016**

• New Automotive Fuel Ratings
• Impact on fuels with more than 10% ethanol.
FTC Ethanol Fuel Blends Labeling

E0- E10
• No changes made.

E15
• §306.12(a)(4)(A) and (B)
• No AFR posting required if EPA E15 label is present.
• May post AKI if “competent and reliable” criteria can be met.
FTC Ethanol Fuel Blends Labeling

E11- E50

• §306.12(a)(4)(A) and (B)
• No AFR posting required if EPA E15 label is present.
• May post exact ethanol %, or may post ethanol % rounded to the nearest 10.
• May post AKI if “competent and reliable” criteria can be met.

E51- E85

• §306.12(a)(4)(A) and (C)
• May post exact ethanol %, or
• May post ethanol % rounded to the nearest 10, or
• Post range 51-83%.
FTC Regulations – E51 to E83

E51 to E83 (formerly known as E85)

1. Post entire accurate ethanol concentration **OR**
2. Post ethanol % rounded to the nearest 10 **OR**
3. Post entire range of ethanol

![Images of ethanol concentrations](images)
What is Tier 3?

EPA’s Vehicle Emission and Fuel Standards Program

The Tier 3 program is part of a comprehensive approach to reducing the impacts of motor vehicles on air quality and public health. The program considers the vehicle and its fuel as an integrated system, setting new vehicle emissions standards and lowering the sulfur content of gasoline beginning in 2017. The vehicle standards will reduce both tailpipe and evaporative emissions from passenger cars, light-duty trucks, medium-duty passenger vehicles, and some heavy-duty vehicles. The gasoline sulfur standard will enable more stringent vehicle emissions standards and will make emissions control systems more effective.

https://www3.epa.gov/otaq/tier3.htm
Impact on DFE Producers

40 CFR Part 80 Regulation of Fuels and Fuel Additives

- §80.1610 Standards and requirements for producers and importers of denatured fuel ethanol and other oxygenates designated for use in transportation fuel.
- §80.1611 Standards and requirements for certified ethanol denaturant.
- §80.1642 Sampling and testing requirements for producers and importers of denatured fuel ethanol and other oxygenates for use by oxygenate blenders.

Tier 3 Regs take effect January 1, 2017
Additional Note: There are Tier 3 proposed rules for Ethanol Fuel Blends (E51-E83) and Mid Level Ethanol Blends (E16-E50).

The final rule is at OMB awaiting release.

EPA proposing:

- Certification of sulfur batch wise, PTD requirements, reporting/record keeping.
- Limits to vapor pressure, blending components.
- A market survey requirement (adding to the E15 survey.)
- Limits to natural gasoline used in ethanol flex fuels at 30% by volume, restricting sulfur/benzene content, vapor pressure.
Future Fuels

• Department of Energy’s Co-Optima Research Program.
• EPA’s MOVES model emissions prediction for increasing ethanol content.
• ASTM High Octane Fuel Specification Development.

Optima evaluation criteria

1. GHG reduction
2. Petroleum reduction
3. Engine/powertrain/vehicle performance
4. Incremental fuel cost
5. Incremental vehicle cost
6. Land/water use
7. Infrastructure compatibility
8. Emissions/aftertreatment
9. Health effects
10. Legacy fleet compatibility
11. Consumer acceptance
12. Scalability
13. Global product harmonization
# Ethanol’s Future Fuel

<table>
<thead>
<tr>
<th>Today’s Fuel</th>
<th>Tomorrow’s Fuel</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Primarily fossil (hydrocarbon) based.</td>
<td>• Renewable, clean burning based.</td>
</tr>
<tr>
<td>• “Regular” minimum octane offering 85, 87AKI.</td>
<td>• Octane &gt;95AKI.</td>
</tr>
<tr>
<td>• Ethanol content: 0-10%</td>
<td>• Ethanol content: 20-40%</td>
</tr>
<tr>
<td>• Thermal efficiency:</td>
<td>• Thermal efficiency: Parity!</td>
</tr>
<tr>
<td>Compression Ignition engine dominates Spark Ignition.</td>
<td>Spark Ignition achieves significant gain.</td>
</tr>
<tr>
<td>–CI:~45%</td>
<td>–CI:~50%</td>
</tr>
<tr>
<td>–SI:~30%</td>
<td>–SI:~50%</td>
</tr>
</tbody>
</table>
QUESTIONS?

THANK YOU!
Legal Disclaimer

Every effort has been made to ensure the accuracy of the information being provided, and said information is deemed reliable but is not guaranteed. Accordingly, KMoore shall not be liable for any individual’s or entity’s reliance on the information disseminated in the event the EPA disagrees or disapproves of this information. Every entity is responsible for compliance to the EPA regulations.