Ethanol in Pipelines
Roadmap meeting

Producer and End User Perspective

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Chuck Corr
Archer Daniels Midland
Industry Objective
To Safely Produce & Deliver

- A liquid energy product
- Quality needed
- Volumes needed
- Where needed
- When needed
- Optimum flexibility
- Cost efficiently
HISTORIC U.S. FUEL ETHANOL PRODUCTION

*Estimated
U.S. Ethanol Biorefinery Locations

Biorefineries in Production (130)

Biorefineries under Construction (76)

Source: Renewable Fuels Association
10.4.07
US Ethanol Expansion

- Operational (136)
- Planned (330)
- Under-Construction (89)

*Alaska has one ethanol plant in the planning stage
*Hawaii has two ethanol plants in the planning stage
Geography

- Most Ethanol produced in Midwest
- Most petroleum refined in the Gulf Coast
- Both away from major markets
- Current refined products pipelines - wrong location or flow direction
Volume Affects Mode

• Petroleum Transportation
  – Wooden barrels
  – Rail cars of barrels
  – ....
  – Rail Tank cars
  – Pipelines

• Ethanol Transportation
  – Tank trucks
  – Rail cars
  – Barges
  – Unit Trains
  – Pipelines
Pipeline Type

• Multiproduct Pipeline
  – Geographic issues
  – Compatibility of materials, existing products
  – Capacity for ethanol

• Dedicated Pipeline
  – New or existing pipe – From and To?
  – Materials (nonmetallic)
  – Sizing of pipeline & infrastructure

• Combination
  – Dedicated feeders to multiproduct trunk
Stress Corrosion Cracking

• Dissolved oxygen
  – May act as light switch

• Saturated with oxygen – some SCC

• Deaerated – No SCC
  – Extreme lab conditions

• Can dissolved oxygen be **controlled** below the **critical** level?
Materials Compatibility

• Ask a terminal engineer
• Many terminals currently work with high and low ethanol concentrations
• Midwest terminals have years of excellent experience
Flexibility to Blend

• The US will go beyond E10
• Terminals need the flexibility to blend beyond E10
  – E85
  – Enhanced blends (E10 to E20)?
• Must allow best economics for local markets
Terminal Blending

Regular

Premium

Ethanol

Additives

Blender

Regular

Mid Grade

Premium

E - 85
Ethanol in Pipelines

There are No Technical Barriers to moving ethanol in pipelines.
(But we do need more research to address the operating conditions)

Ethanol in Pipelines - Economics