

# The Challenge:

Ethanol / Ethanol blended fuels

What does this mean to the Fire Service?

*Presented to the  
Reebok foam seminar  
by:*

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# The Challenge: Ethanol

- How does the fire protection community deal with ethanol / ethanol blends?
- Dealing with ethanol logistics
- Choosing the correct foam agents
- Loading Racks / ethanol plants
  - Fire suppression system design considerations

# The Challenge: Ethanol

- **The search for alternative fuels / additives is stronger than ever!**
- **Fuel additives / blends challenge fire protection requirements on an ongoing basis!**
- **Various testing programs are ongoing to determine proper application rates and foam concentrate types**

# The Challenge: Ethanol

## Ethanol Industry Today

- Production boom driven by Renewable Fuels Standard mandate
- MTBE phase out
- E85 market development

# The Challenge: Ethanol

**Ethanol Global Market – \$46.5 Billion Liters**

**North and Central  
America  
37%**

**(6+ Billion Gals. 06')**

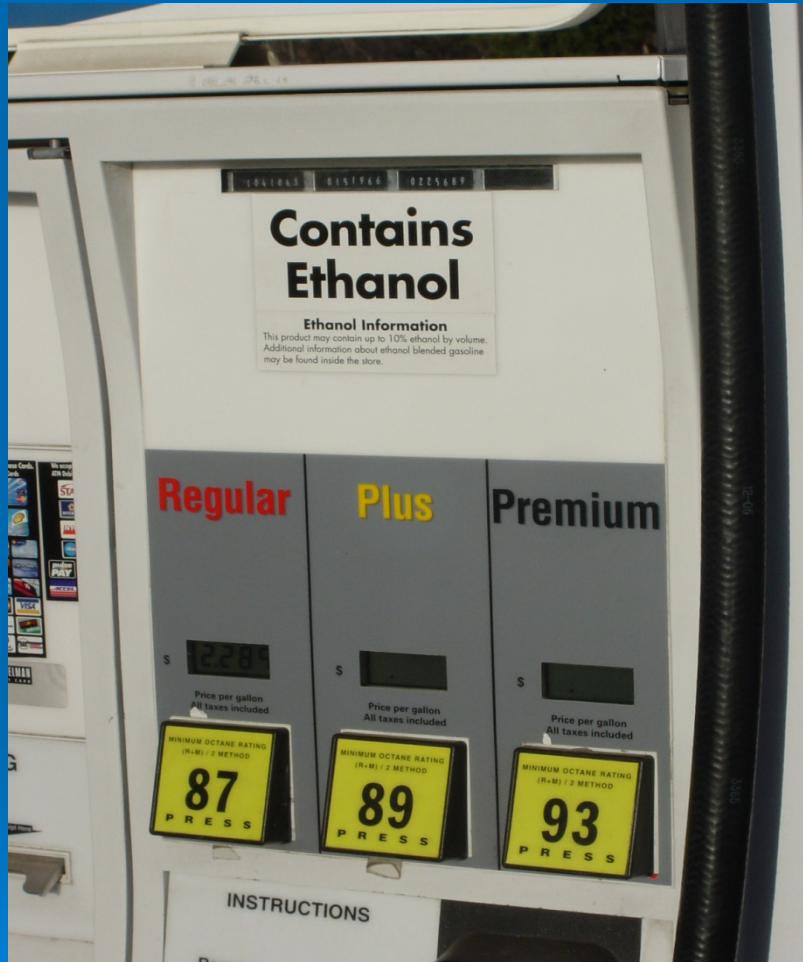
**South America  
38%**

**Europe  
9.8%**

**Asia  
15.2%**



# The Challenge: Ethanol



- Most gasoline manufacturers / marketers are incorporating ethanol into their fuels

# The Challenge: Ethanol



- Ethanol blend information is found at most gasoline pumps

# The Challenge: Ethanol

- **Ethanol is rapidly becoming the fuel additive of choice**
- **Used in various blends**
  - Used in gasoline blends from 10% - 30% by volume
  - Gasohol (Typically considered E-10)
  - E-85 Alternative fuel (85% ethanol; E-95 also)
  - Pure ethanol stored in tanks at loading terminals & Mfg. Facilities



# The Challenge: Ethanol

- Various foam concentrate manufacturers are involved in test programs
  - E-85, E-90, E-10
- EERC (US Ethanol Emergency Response Coalition) was formed in response to the increased use of ethanol / blends
  - Assist in evaluating proper foam type / rates

# The Challenge: Ethanol

## Ethanol Logistics:

- Trucking
- Rail
- Storage
- Terminal Blending
- Barge

**First Responders need to be aware of the dynamics regarding ethanol fires / spills**

# The Challenge: Ethanol

## Do you have proper equipment to handle the spill?

- Nozzles (aspirated generally better than non- air aspirated)
- Portable foam system, eductors, etc.
- Adequate foam supplies available?
  - Be prepared to apply foam at a higher rate in some circumstances
- Correct type of foam concentrate

# Ethanol: The Challenge

- **Foam Concentrate Selection:**
  - Ethanol is water miscible, therefore a polar solvent
    - Alcohol Resistant foams would be required
      - (3x6; 3x3; 1x3)
  - Ethanol blends over 10% (E-85, etc.)
    - Require Alcohol Resistant foams
  - Ethanol blends 10% and under
    - Standard AFFF may be acceptable for extinguishment (3%, 6%, 1%)
    - Testing has shown that burn back resistance will suffer

# Ethanol: The Challenge



Various foam agents can be used based on the fuel blend or type of fuel protected

# Ethanol: The Challenge

- **Fire Suppression System design considerations:**
  - **Variety of Design Criteria**
    - Various world-wide approvals
    - UL Listings
    - NFPA
    - FM
    - Authority Having Jurisdiction (AHJ)

# Ethanol: The Challenge



- Typical non aspirating sprinkler heads & B-1 aspirating sprinklers

# Ethanol: The Challenge



- **UL Testing of Ethanol fuels**



# Ethanol: The Challenge

- **Loading terminals**
  - Design application rates (Typ. 0.16 - 0.30 gpm / ft<sup>2</sup>)
  - Discharge Duration (Typ. 10-30 minutes)
  - Foam proportioning equipment, concentrate, devices
  - Various detection and control options
    - Manual, thermal, optical

# Ethanol: The Challenge



Loading Rack  
Foam System  
Discharge

# Ethanol: The Challenge



Loading Rack  
Foam System  
Discharge

# Ethanol: The Challenge

## In Summary:

- Alcohol Resistant AFFF's are desirable for the best extinguishment and securement of ethanol / ethanol blended fuel fires
  - (1x3, 3x3, 3x6, etc.)
- When designing for ethanol foam systems
  - Review approvals / listings, etc. to ensure proper application rate, discharge time, etc.

# Thank You For Your Time!

## Questions?

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