

## ***2007 CUPA Conference***

### ***“E85 Compatibility with Retail Fueling Equipment”***



# Tanks

## Installed by Shell

- FRP
  - Tanks installed post 1990 are generally compatible with up to 100% alcohol blends
  - Tanks installed between 1984 -1990 require individual evaluation based upon manufacturer and model. Some tanks may have been installed with a optional vinylester resin for alcohol compatibility.
  - Tanks installed prior to 1984 are required to be lined with an ethanol compatible epoxy coating or replaced prior to E85 exposure.
- Steel
  - Existing tanks internally lined since '97 are generally compatible with up to 100% alcohol blends. Coatings were available for 30% and 100% alcohol blends. The manufacturer is consulted prior to introduction of alcohol.
  - Non Lined Steel Tanks which are constructed according to UL58 are compatible with E85



# Pipe-work

- FRP
  - Statement of Compatibility Provided by major pipe-work manufacturers indicating suitability for use in E85.
    - Includes single wall FRP dating back to '68
    - Includes pipe-work adhesives and FRP fittings
- Steel
  - Remove from service prior to introduction of E85
- Flexible Pipe-work
  - The pipe-work manufacturer must provide a statement of compatibility for use in E85.
  - Each Pipe-work system to be individually evaluated by compatibility statement, inhouse testing completed and performance history.
- Flexible Connections
  - Swing joints are replaced with Stainless Steel Flexible Connectors
- Submersible Pumps
  - Submersible pumps specified since '95 are 100% compatible with alcohol blends
  - Submersible pumps prior to '95 to be replaced.



# Filters, Dispensers, Overfill/Spill Protection

- **Filters**
  - 1 micron particulate glass media filters being used at test locations in Chicago. (With tank cleaning, 10 micron particulate is acceptable for E10 blend).
- **Overfill Protection, Spill Protection, and Drop Tubes**
  - Bronze Fill Adaptors
  - Drop tubes currently use anodized aluminum
  - Stainless or Polypropylene spill buckets installed
  - Flapper valves – specified for E85 use should be evaluated for long term suitability.
- **Dispensers**
  - All dispensers must be designed and warranted as E85 compatible. Only dispensers purchased for E85 use will be acceptable.



# Hanging Hardware

- Installed with new dispensers.
  - Stainless or Nickel plated Aluminum – Nozzles, Breakaways, swivels
  - Teflon coated Hoses.
  - Use only materials designed for use in E85
  - Do NOT use Zinc, Brass, Copper, or Aluminum unless plated or anodized nickel



# Leak Detection

- Shell Specified ATGs since '97 are compatible with E85 (Stainless Steel Probes with alternate fuel float kits). This is typically stamped at the top of the probe. Probe should not be removed to verify.
- All PLLD's installed are E85 compatible
- Swift check valves are removed from Service and turbines are replaced if necessary.
- All mechanical line leak detectors installed by Shell are compatible with E85.



# Labeling and Operating Procedures

- Labeling
  - Specific Dispenser labels are required at the nozzle. Fill Labels are to meet API 1637.
- Operating/Training Procedures
  - Clean Tanks
  - Routinely inspect spill containment lid/seals
  - Test Tanks
  - Monitor Slow Flow
  - Water Handling/Management Procedures
    - Phase Separation 0.50 % for E10, approx 4% for E85
    - Turbine Shutdown at 1”
    - Fuel Tested prior to re-start
  - Calibrate Meters and check fuel quality after 30 days, 60 days, and when frequent filter plugging occurs. (Conductivity and particulate content)
  - Activate E85 via entering store – Currently at test locations



# Material Clean Up and Fire Fighting

- Fire Fighting
  - E85 has wider flammability limits (1.4% to 19.0%) compared to normal gasoline (1.4% to 7.6%). Hence, it has a higher safety risks in the presence of source of ignition.
  - For E85 fires, carbon dioxide, halon or dry chemical extinguishers marked B, C, BC, or ABC is used. For larger fires, water spray, fog or foam (AFFT/ATC) can be used.
  - Runoff Control (See last slide)
- Spill Handling
  - Same Procedures as for gasoline
- Personal Protective Equipment.
  - Same types of gloves, goggles, clothing as for gasoline



# Vapor Recovery

- ORVR Canisters installed in E85 Vehicles – no need for Vapor Recovery
- Storage System isolated for standard gasoline system (no vapor manifold)



# Environmental Considerations

- Ground Water Issues

- mobilization of residual NAPL through enhanced BTEX solubility (key issue for releases occurring at sites with previous product release)
- natural attenuation (very easily degraded, causing potential for highly anaerobic conditions - methane generation)
- safety concerns over methane generation (LEL conditions developing in enclosed spaces)
- trace chemicals in ethanol (gasoline denaturants)
- enhanced plume migration (anaerobic conditions could lead to enhanced hydrocarbon plume migration -- 30 -100+% longer)
- separation/treatment (can potentially mobilize NAPL contained in NAPL/water separators)

*more information on potential groundwater issues associated with ethanol contained in API FAQ paper (<http://www.api.org/bulletins>)*

- Air Issues

- may result in increases of certain atmospheric transformation products, such as PAN (peroxyacetyl nitrate) and acetaldehyde



# Environmental Considerations

## Emergency Response Issues

- Fire Fighting
  - Water issues (may spread fire, runoff issues)
  - Ethanol compatible foams and extinguishers
  - Flame visibility
- Surface Water Impacts
  - BOD conc's > 12-35 mg/l w/ delay of 12-36 hrs result in low DO that may cause fish kills (source: E.R. Mancini and Associates)
  - Booms around surface water releases are ineffective
- Water Treatment
  - Separators are not effective
  - Possible effects from enhanced solubility

