What are the issues?

1. **Compatibility**
   a. Metals (corrosion)
   b. Elastomers/Polymers

2. **Bio-fouling**
   a. Sludge/Slime

3. **Detecting Water Ingress**
   a. Automatic Tank Gauging
   b. SIR / Inventory Control / Manual Tank Gauging
   c. Precision Tightness Testing
COMPATIBILITY – METALS (E10)
COMPATIBILITY – METALS (E10)

“Locked”
Open
COMPATIBILITY – METALS (E10)

Copper Tube Corroded
Copper Tube Corroded
How does a corroded copper tube lead to this?
Piston Leak Detector
In “dirt” sump
Leak detector draws in water/sand from broken leak detector vent tube
Sand props open spring loaded pressure relief valve

300 gallon release occurs through broken leak detector vent tube before product is seen coming up through expansion joints
COMPATIBILITY – METALS (ULSD)

ELECTRONIC LINE LEAK DETECTORS “PLUGGED” BY CORROSION CRUD
Aluminum ATG probe corroded – Ethanol?
COMPATIBILITY – METALS

Shear valve internal corrosion

01.10.2013

[Image of shear valve with internal corrosion and another image of a fire at a gas station]
COMPATIBILITY – ELASTOMERS (E10/ULSD)?

Meter Leaks
DETECTING WATER INGRESS - ATGs
DETECTING WATER INGRESS – ATG

Water detection relies on density difference of fuel vs. water

“Traditional” system relied on water to collect at bottom of tank

Water float sinks in fuel but floats on water
DETECTING WATER INGRESS – ATG

Water detection relies on density difference of fuel vs. water

With ethanol blended fuel systems – Can we depend on water collecting at bottom of tank?

Does the water float ever float?
What about “phase separation”?
DETECTING WATER INGRESS

All of these leak detection methods must be able to detect water ingress also:

- SIR
- Inventory Control
- Manual Tank Gauging
DETECTING WATER INGRESS – PRECISION TANK TIGHTNESS TESTING
DETECTING WATER INGRESS – PRECISION TANK TIGHTNESS TESTING

“Vacuum” Precision Tank Tightness Testing

Several different scenarios possible depending on relationship between product level in tank and the groundwater conditions.

Tank is Partially Submerged by Groundwater

- Leak in ullage = hiss
- Leak below product level but above groundwater = air bubble
- Leak below product level and groundwater = water ingress

Groundwater
DETECTING WATER INGRESS – PRECISION TANK TIGHTNESS TESTING

“Vacuum” Precision Tank Tightness Testing

With Single-Walled Tanks

- When groundwater is above the bottom of the tank, must use water sensor
- Water sensor works by detecting change in conductivity

- How does water behave in a tank with ethanol blended fuel?
- Does the water go to the bottom of the tank?
- Is the water sensor able to detect water ingress?
- Should the PTT be able to detect an ingress of 0.1 gph?
- Is it a valid test if it does not?
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COMPLIANCE  TRAINING
EXPERT WITNESS
CATHODIC PROTECTION