Questions and Answers: Forewarning of Phase Separation

Answers in red. Questions in blue. Original email in black, page 3.

Background

Keeping in mind that the Kolor Kut Modified Water-finding Paste will be:
Brown (OK—no water or phase separation)
Red (water)
Yellow (greater than 0.3% water detected)

1. Minor amounts of water (typically less than 0.3% by volume) will be suspended in the E10 gasoline and dispensed into vehicles. Water paste is not able to detect such "suspended" water and the paste will remain its normal brown color.

2. As the amount of water suspended in the E10 gasoline exceeds 0.5% by volume, phase separation will occur. We will be able to detect phase separation using the water paste (it will turn yellow). The paste will NOT turn red because there is no "free" water—any water present is bound to the ethanol in the phase separation layer.

3. If a large amount of water enters the UST (e.g. storm water entering through a defective fill cap or groundwater entering a hole in the UST), phase separation will occur rapidly when the 0.5% threshold volume is exceeded. Water paste on the gauge stick will turn yellow at the phase separation levels and, below that, red at the excess water bottoms level.

4. If phase separation has occurred, the phase separation layer and any excess water bottoms can be pumped out of the UST. The proper amount of neat ethanol can then be added to the remaining amount of sub-octane gasoline to bring it back up to spec.

Q & A for Bob Reynolds

QUESTION: When phase separation occurs, can it happen gradually if the water intrusion rate is gradual? Or, does ALL of the ethanol drop out of the gasoline suddenly at one time regardless of the water intrusion rate? In other words, is there any possible forewarning? Or, does everything seem OK (paste stays brown)—then suddenly, you see a large yellow area of paste on the stick one day when phase separation has finally occurred?

ANSWER: The rate water is taken into the blend is not relevant to when a phase separation starts. There will be no separation until the water content exceeds 0.5% of the

blend. However, if water keeps coming in about 0.5%, it will accelerate phase separation.

Normally when a phase separation starts to occur the blend start to stratify so if tested over the course of 8 to 16 hours, you might 1st see a 1" phase sep reading on the tank gauge stick and 10 hours later see a 10" phase sep reading. So there is usually some forewarning which is why we recommend daily water paste/stick readings.

QUESTION: Are we allowed to do this based solely on mathematically computing how much neat ethanol must be added to comprise 10% of the final total volume of product in the UST? Or will we be required to also run octane tests on a sample of the product before dispensing it?

ANSWER: I cannot answer the question from a legal standpoint. This would be up to the appropriate state regulatory agency. The way I have normally handled it is to remove the phase separation bottoms, test remaining product ethanol content and then order an over blend to fix it. As an example,

Product remaining: 3000 gallons at 2% ethanol
Delivering: 2000 gallons
Total Blend: 5000 gallons

Should add 5550 @ 10% ethanol = 555 gallons of ethanol in 2000 gallons to be delivered. If properly re-blended the octane would met spec so there should be no need to retest.

QUESTION: After the needed amount of neat ethanol is poured into the UST, how would we “stir” the gasoline to ensure adequate mixing?

ANSWER: When the correction blend is delivered a truck with a pump that can suck the 3000 gallons of the tank should be utilized. Pull the product into an empty compartment, inject the corrective blend into the tank, then re-inject the original tank inventory.

-----Original Message-----
From: Robert Reynolds [mailto:rreynolds-dai@earthlink.net]
To: Maria Tome
Subject: Re: Forewarning of Phase Separation

Maria,

I'll try and explain this as best I can.

The water paste will not detect water in the 10% blend portion which normally should contain less than 0.3% water. The reasons for testing water bottoms daily are as follows:

1. There are numerous sources where water could come from if proper vigilance is not maintained (e.g. improper water run off from manhole covers, fill caps with deteriorated seals). But another source is water leaking in the bottom of the tank due to corrosion or installation flaws. As an example, many steel tank leaks occur at the tank bottom. This is because previous water bottoms (prior to ethanol use) accelerate corrosion, increasing the likelihood of leaks at the bottom of the tank. Also, absent tank bottom protectors, the metal end of the tank gauge contacts the same approximate spot of the tank daily, potentially accelerating corrosion. In the case of fiberglass tanks, if the sand or pea gravel backfill under the tank contains any hard foreign objects, the weight of the fuel tank bearing down on such an object may eventually cause a small hole. In any of these cases if the water table is above the tank bottom, the tank bottom may not leak product but instead take on water. If water bottoms build up and then a delivery is made, the bottoms are agitated and absorbed into the blend and then begin to cause phase separation.

2. The second reason for sticking tanks daily is because if a phase separation is occurring, the paste will detect the ethanol/water blend at the bottom. This may enable the bottoms to be purged off and the blend corrected with another delivery. This would minimize the amount of material to be disposed of. Also, submersible pumps pull product from the bottom of the tank, usually 4 inches or so from the bottom. So this also provides an opportunity to respond before any beginning phase separation cause down time.

Just a few other clarifications:

1. The commonly accepted 0.5% water tolerance is at 60 °F which is the approximate temperature in an underground tank. However, it is slightly higher at higher temperatures (e.g. in the tank of a car when temps exceed 60 °F).

2. Normally minor water sources such as condensation are suspended in the blend and dispensed with the product. A phase separation shouldn't occur unless there is a source of excess water.

3. For those stations using electronic water sensors, they should check with their equipment supplier and/or the manufacturer. Many of these detect the difference in electrical conductivity between water and gasoline. The electrical conductivity of ethanol is different from either. It should be verified that the unit is calibrated to pick up any variation beyond the conductivity of gasoline and E10.

Hope this helps.

Bob