

ETHANOL-BLENDED GASOLINE

Now that ethanol is routinely blended with gasoline in Maine (typically 10% ethanol with 90% gasoline, known as E10), UST owners and operators must pay attention to several new fuel-storage and fuel-quality-related issues. These issues may cause leaks in tanks, piping, and/or dispensers, and so have an environmental aspect to them as well.

The potential issues you should be aware of regarding storing, distributing, and dispensing ethanol blended fuels are:

- **Compatibility with system components**
- **Phase separation**
- **Mobilization of sludge and particulates**

Now that ethanol is routinely blended with gasoline in Maine (typically 10% ethanol with 90% gasoline, known as E10), UST owners and operators must pay attention to several new fuel-storage and fuel-quality-related issues.

COMPATIBILITY WITH SYSTEM COMPONENTS

Components and equipment used for storing and dispensing conventional fuels are time tested for compatibility and are readily available through your petroleum supplier. E10 has been used for 25 years or more in parts of the Midwest, and with few exceptions, experience has shown that traditional fuel storage and dispensing systems are not affected by the presence of ethanol at this level.

Experience with higher concentrations of ethanol in gasoline is much more limited. It is clear that high concentrations of ethanol such, as E85, are NOT compatible with traditional storage and dispensing systems. Storage and dispensing systems that are manufactured to be compatible with up to 100% ethanol are available, but these systems must be specially manufactured for alcohol service. You cannot store and dispense high alcohol blends, such as E85, in standard storage systems. If you are considering storing a high-ethanol blend of gasoline, there is much useful information on the Iowa Department of Natural Resources website:

www.iowadnr.gov/land/ust/technicalresources/ethanol.html

It is not known, however, whether intermediate blends of ethanol (e.g., E15, E25) can be stored and dispensed in systems that were designed for traditional gasoline without ethanol. This issue is currently being studied and debated at the national level. For the time being, however, federal fuel regulations place the maximum allowable ethanol concentration for use in vehicles designed to run on standard gasoline at 10%. There are few material-compatibility issues associated with storing E-10 gasoline in traditional storage and dispensing systems.

PHASE SEPARATION

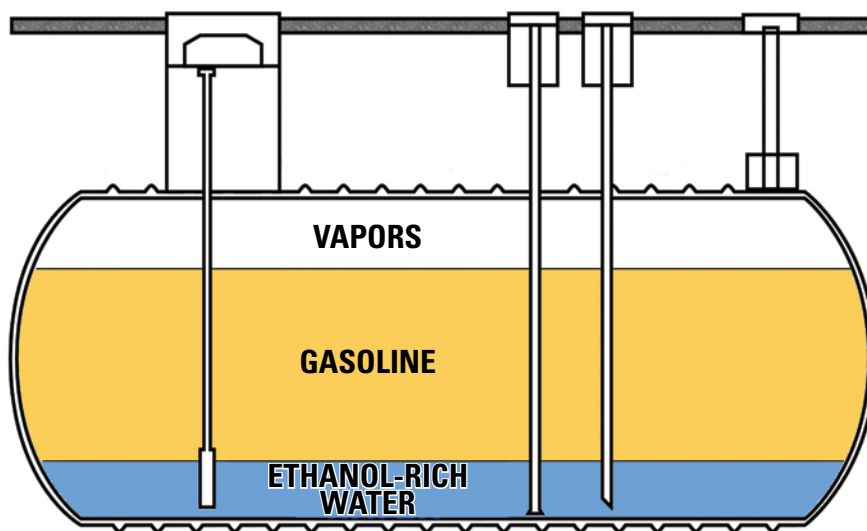
Ethanol mixes reasonably well with gasoline, but it is also highly attracted to any water in your tank and would rather be in water than in gasoline.

Ethanol mixes reasonably well with gasoline, but it is also highly attracted to any water in your tank. In fact, ethanol would rather be in water than in gasoline. So when water infiltrates a tank through spill bucket drain holes, loose manway covers, and loose tank-top fittings, the ethanol will absorb the water. If enough water is present, the ethanol/water mixture will separate out of the gasoline and settle to the bottom of the tank. This phenomenon is known as “phase separation.”

With phase separation, the tank contains a bottom layer consisting of a mixture of water and alcohol, and an upper layer consisting of gasoline that in all likelihood no longer meets specifications. If the alcohol/water layer is high enough, it will be drawn into the pump intake and dispensed into vehicles. Vehicles receiving this mixture will stall out within sight of the fuel facility and will need to have their fuel systems cleaned out before they can run again. This makes for very unhappy customers.

In addition, your fuel tank, piping, and dispensing systems now hold a concentrated alcohol/water mixture that is very corrosive. Many of these

PHASE SEPARATION IN GASOLINE/ETHANOL FUEL BLENDS



A few tens of gallons of water in a tank is enough to cause phase separation in many thousands of gallons of gasoline, resulting in hundreds of gallons of an alcohol/water mixture in the bottom of a tank. Frequent monitoring for water is necessary to protect the quality of ethanol-blended fuels.

components will not be compatible with this alcohol/water mix so it is very important that this liquid be pumped out of the tank and flushed from the piping and dispensing system as soon as possible. Call your service technician to deal with this problem immediately.

You must ensure that NO WATER can get into any tank containing E10 from any of the tank-top fittings. Water in a spill bucket should NEVER be drained into the tank. All water-intrusion problems must be corrected immediately if you are storing ethanol-blended fuel.

You should check your fuel tanks for water frequently to prevent phase-separation problems. This should be done using a gauge stick and water-finding paste specifically formulated for alcohol fuels. Read the water-finding-paste instructions carefully. The color changes that occur when water is present are different for alcohol pastes than for non-alcohol pastes. You should use a gauge stick to monitor for water, even if you have an automatic tank gauge that has water-sensing capabilities. The tank-gauge water sensor is not sensitive enough to detect the small amounts of water that can cause phase-separation problems.

NOTE: Water sufficient to cause phase separation is evidence of a possible leak, which must be reported within 24 hours to the DEP Tanks Unit at 207-287-2651 or the 24-hour Spill Hotline at 1-800-482-0777.

MOBILIZATION OF SLUDGE AND PARTICULATES

Ethanol scours or loosens scale deposits on the internal surfaces of tanks and piping and mobilizes sludge in the bottom of the tank. This means there will be a lot of crud in the fuel, especially right after the first few loads of ethanol-blended fuel are delivered. Be sure to use filters in your dispensers that are intended for use with alcohol fuels. Consult your service technician or filter manufacturer for recommendations.

Some fuel filters also contain material that will swell in the presence of water and block the flow of any water/alcohol mixture through the filter. This type of filter is recommended to protect customers' cars from receiving bad fuel if phase separation should occur.

There have been a few instances in older steel tanks where the sludge and particulates in the tank were plugging corrosion holes and preventing the tanks from leaking. When ethanol fuel was introduced, the fuel cleaned out the sludge and particulates so that the tanks began to leak. Pay particular attention to leak detection when adding ethanol fuel to a tank that has previously held non-ethanol fuel.

You must ensure that NO WATER can get into any tank containing E10 from any of the tank-top fittings.



Filtration of alcohol fuels to protect fuel quality is essential. Be sure to use filters intended for use with alcohol fuels.