

## EFFECTS OF A GASOHOL RELEASE ON AN OLD CASE FILE

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Petroleum releases from underground storage tanks (USTS) continue to occur at retail gasoline facilities in the United States, largely due to third party damage and/or poor installation and maintenance practices. These releases can impact human health and the environment. Over the decades of investigating and remediating these releases, environmental professionals have encountered various difficulties with changes in gasoline blends and additives and their effects on the environment. From Lead to Benzene to MtBE and now Ethanol, different challenges arise with each to assess and remediate environmental impacts associated with these additives. These challenges typically result from the differences in absorption ability, solubility, and transport through soil and groundwater that have made each additive unique.

With the recent switch to Ethanol as a gasoline fuel oxygenate (“Gasohol”) after MtBE became problematic to the groundwater systems across the United States, we are embarking into a new era. It has been theorized that Gasohol can: a) cause light non-aqueous phase liquid (LNAPL) to become more mobile; b) increase the solubility of BTEX in groundwater; c) create a significant demand on oxygen and other electron acceptors to reduce natural attenuation abilities of the groundwater system and increase dissolved phase plumes; d) increase levels of methane in groundwater and soil as aerobic processes are changed to anaerobic; and e) reduce the hydrocarbon absorption ability of soil in the unsaturated zone. In addition, Ethanol put UST systems to the test with equipment compatibility, increased loose scale build up, increased loose sediment, and water. Most issues were handled through research, cleaning, increased filter changes and water management practices. However, the alcohol can put a strain on weak portions of an UST system, resulting in a release.

During a Gasohol release, Ethanol dissolves into residual soil moisture and can displace older hydrocarbon impacts, causing an increased hydrocarbon flux into groundwater. The increased hydrocarbon flux, in large enough concentration, can create, reestablish or increase LNAPL. A case that demonstrates the effects of a Gasohol (10 % Ethanol additive) release on top of an old case file (1988) is presented herein.

In one particular case, a “T” fitting on the UST system failed and resulted in the release of Gasohol on top of previous petroleum impacts that were documented in an open case file from 1988. According to the old case file, historic remedial efforts included LNAPL recovery from 1988 to 2001 and subsequent deployment of Oxygen Release Compound® (ORC®) socks. Historic groundwater monitoring (up to 2007) indicated stable dissolved phase concentrations, enabling the site to be a candidate for risk based closure. However, LNAPL returned in the recovery wells with a thickness of 5.51 feet due to the Gasohol release. A distinct variation in the color and density of the returned LNAPL was visually observed, indicating that two distinct LNAPL plumes were present. A review of the old case file revealed that the 1988 release occurred in the same location as the more-recent Gasohol release and significant soil impact remained. The old case file indicated that the soil impacts were in equilibrium in soil absorption and desorption to groundwater. However, the Gasohol release apparently caused residual

adsorbed phase hydrocarbons to desorb from the soil resulting in the re-establishment of a LNAPL plume.

To date, LNAPL recovery has been implemented via mobile vacuum extraction events while the dissolved phase concentrations are monitored to ensure additional remedial efforts are not warranted.