



Technical bulletin

UNDERGROUND STORAGE TANK HOUSEKEEPING

Overview

Underground storage tanks, also known as USTs, can be a source of fuel contamination if diligent housekeeping is not maintained. Identifying and cleaning contaminated USTs can prevent many consumer product quality problems and complaints while reducing associated costs. This Technical Bulletin provides an overview of various sources of potential contamination, indicators of contamination, sampling methods, cleaning techniques, and ways to determine the success of the cleaning.

USTs are subject to accumulations of water and/or sediment over time. Though these contaminants are inherent in the distribution system from refineries to pipelines to terminals to service stations, service station owners are responsible for maintaining the cleanliness of their USTs. The service station UST is the final link in the supply chain presenting the last opportunity to prevent contaminants from impacting the consumer.

Contamination Sources

UST contamination can arise from a number of sources. Accumulation of sediment can occur from dirt entry while tank closures are not in place - such as while a load of fuel is being dropped. Additional sediment accumulation may occur with aging as rust and other oxidation products are formed. Water from rain or melting snow on the ground can leak into the UST via the tank opening. Condensation from ambient temperature changes (i.e. volume expansion and contraction) is another possible source of water. When water bottoms are allowed to accumulate in a UST, the opportunity for microbial contamination greatly increases. Microbial growth in an underground storage tank can be costly and labor-intensive to alleviate. For further information regarding microbial contamination and to see the list of approved biocides, please refer to the Technical Bulletin titled "Microbial Contamination".

A preventative maintenance schedule at a service station should include periodic inspection of tank closures and driveway conditions for proper grade for sealing. Periodic inspection and cleaning of the area surrounding the UST tank openings and should also be performed regularly. Keeping water in the UST to a minimum is a recommended best practice.

Indicators of Contamination

A dispenser requiring frequent filter change-outs is a common indicator of a contaminated tank requiring cleaning. Multiple customer complaints from the same service station may also be a strong indicator. Pump dispenser filters will foul rapidly when a high level of microbial, water, or sediment contamination is present. Never solve chronic filter plugging by removing or bypassing the filter. Contaminants could then pass unfiltered to consumer vehicles and lead to complaints and repair claims.

A sudden and large increase in the water level of a tank containing gasoline with ethanol can be an indicator of phase separation contamination. If the solubility limit of water in this gasoline is exceeded, the fuel will separate into an ethanol-water rich layer on the bottom and an ethanol deficient layer of gasoline on top. The bottom layer can grow to a level sufficient enough to be drawn in by the submersible pump and dispensed to consumer vehicles. When this occurs, the consumer frequently needs to be towed from the site. The tank contents including the top and bottom layers must be removed since the bottom layer cannot function as fuel and the top level may have insufficient ethanol to meet octane and ethanol requirements.

Note: Any amount of free water present in gasoline containing ethanol is a sign of a problem. The source of the water should be found and corrected immediately.



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Sampling Methods

The extent of tank cleaning is determined by the inspection of tank bottom samples. Preferably, samples should be drawn with a sample thief from below the tank level probe area. This area provides a more representative sample of the tank's contamination than the cleaner drop tube location. Keep in mind that tanks may be tipped one direction or another during installation, or may have settled over time, making it difficult to locate the lowest spot. Samples may indicate sediment suspended in the water, the gasoline, or both. Sediment suspended in the gasoline can be more severe and require a thorough cleaning of the tank. All remaining tanks should also be checked when one requires cleaning.

UST Cleaning Methods

A number of non-entry type UST tank cleaning methods have been evaluated by BP Global Fuels Technology. The least complex methods are to simply pump out the tank contents for reclamation or disposal as is appropriate in a phase separation. More advanced techniques pump the fuel through various filtration systems to remove sediment prior to return to the tank. The suction end is initially positioned near the submersible pump inlet where sediment tends to concentrate and is then repositioned throughout the tank as the accumulated sediment is removed. These techniques are sufficient when the fuel is suspending sediment or the accumulation has become a concern without an excessive buildup of corrosion, microbial growth, or debris on the walls of the tank. The most advanced methods are appropriate for severe sediment buildup encountered in aging tanks with infrequent maintenance or in tanks experiencing rapid corrosion from microbial growth. These methods use an agitation technology to loosen and release rust, sludge, or other contaminants sticking on the walls of the tank. These advanced methods then follow up with either a filtration step or a disposal/reclamation of the tank contents.

Extent of Cleaning

The extent of fuel cleaning achieved, especially the "polishing" mode, is highly operator dependent. The practice of intermittent tank sampling and visual inspection during the cleaning is often the most practical field determination. The use of monitors can have mixed results and may be dependent on factors such as cleaning hose location, timing, and system pressure. Maintaining a periodic tank inspection schedule and keeping water bottoms to a minimum are the best actions to prevent UST contamination.

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