ALABAMA A&M AND AUBURN UNIVERSITIES

ALABAMA COOPERATIVE Extension SYSTEM

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Underground Storage Tanks (USTs) And NPS Pollution

Managing Commercial And Municipal USTs: Preventing Spills And Leaks

Since the 1980s, advances in tank technology have significantly reduced the probability of spills and leaks from fuel storage tanks. However, an underground storage tank system is made up of the tank and all associated piping, fittings, filling, and dispensing equipment. Leaks or spills may occur from any of these points.

Implementing preventive and corrective actions can reduce the likelihood of leaks and spills and the associated liability of owning USTs. Good management includes overfill prevention and leak and spill detection, containment, and cleanup.

Spill And Overfill Prevention

Preventing spills from any size tank anywhere, whether it is above or below ground, is one of the best practices to eliminate the potential cleanup costs and liability associated with leaks and spills. Spill and overflow devices are required on all new USTs and, by December 22, 1998, on all existing tanks. See Table 1.

Many tanks, especially those used commercially, are now equipped with overfill prevention devices or emergency overfill containment systems. These devices may include sensors and gauges designed to detect liquid level in the tank, an alarm that sounds when the tank is almost full, automatic shutoff devices, emergency overfill containment, and special dry-disconnect couplings and transfer hoses. Spill and overflow devices should be tested and maintained according to manufacture's recommendations.

Proper training, use of uniform procedures, and limiting the number of UST users can all help control accidental spills. Local governments must ensure that written procedures for filling and dispensing operations are posted prominently at the UST site and that all personnel are adequately trained. UST owners and operators are required to follow procedures which prevent spilling and overfilling of gasoline (and other regulated substances) during transfer operations. Tank owners cannot transfer responsibility for overfills to the local supplier, even if delivery is the only procedure during which spills occur.

Table 1. Minimum Requirements For Spill And Overfill Prevention.

Tanks	Choices (one from each set)
All Tanks	Catchment Basins
	AND
	Automatic Shutoff Devices ***or*** Overfill Alarms ***or*** Ball Float Valves

Source: National Association Of Towns And Townships, 1991.

Spill And Leak Detection

Tank testing and leak detection have advanced rapidly since the mid-1980s. Leak detection devices (other than those in double-walled tanks) may be used to monitor leaks in the soil or water around the tank. There are numerous techniques for detecting leaks in tanks or piping networks. Most leaks come from fittings and pipes.

One technique uses thermal conductivity or electrical resistance to measure changes in the soil environment beneath or adjacent to a tank system. This technique can measure the presence of gasoline, for example. Another technique uses vapor detection. If the stored materials are sufficiently volatile, vapor detection devices can also be utilized in concert with monitoring wells installed immediately adjacent to the tank excavation.

An array of groundwater wells or gas monitoring wells, some equipped with automatic monitoring and alarm systems, are now installed with many of the larger commercial tank operations.

Larger operations can more easily afford the extra protection of automated or in-ground monitoring, but small towns and other owners will probably rely on manual gauging of underground storage tanks and annual tightness testing for many years to come. Manu-

al gauging is more risky because it cannot detect a slow steady leak, whereas, vapor monitoring and other in-ground detection devices can.

For smaller non-regulated tanks, the simplest method of leak detection is through good record keeping. When delivery and dispensing records show more gallons have been delivered than were either used or still in a tank, first double check the records for accuracy and then get a tank tightness test.

To provide some measure of acceptable performance, EPA regulations specify that each test method, variously known as a "precision leak test," "tank integrity test," or "tank tightness test," must be able to detect leaks as small as 0.1 gallon per hour with a 95 percent probability of detection and a 5 percent probability of a false alarm. Tanks meeting these standards could still be leaking more than 2 gallons per day. Some of the firms that test tank tightness in Alabama are listed in Appendix J.

Table 2 summarizes leak detection techniques required for tanks and piping.

Leak Detection Records. Federal regulations require all regulated UST owners to keep leak detection records for each UST. A wide variety of leak detection methods satisfy federal and state standards, but all require careful observation and record keeping to provide maximum protection. The records cover such areas as maintenance, repair, and results of all scheduled testing, sampling, and monitoring. The type of records kept may vary somewhat from system to system. State and local agencies determine how long these records must be kept and the frequency of reporting.

Spill And Leak Containment Systems

Containment systems are designed to contain spills aboveground and leaks from tanks and piping underground. Containment systems are necessary for some fuel tanks or other chemical storage tanks.

Aboveground systems consist of collection sumps located at transfer points and/or impervious diked areas designed to collect accidental spills. A collection sump or dike can be built by the tank owner if it meets design requirements of a professional engineer. It should have a concrete foundation with adequate containment for the total maximum volume of material stored within the aboveground tank and the volume of precipitation from a 25-year, 24-hour storm.

Table 2. Minimum Requirements For Leak Detection.

Tanks And Piping	Choices
New Tanks[a]	Monthly Monitoring[b] Monthly Inventory Control and Tank Tightness Testing Every 5 Years[c]
Existing Tanks[a]	Monthly Monitoring[b] Monthly Inventory Control and Annual Tank Tightness Testing Monthly Inventory Control and Tank Tightness Testing Every 5 Years[c]
New And Existing Pressurized Piping[a]	*(Choice Of One From Each Set)* Automatic Flow Restrictor ***or*** Automatic Shutoff Device ***or*** Continuous Alarm System AND Annual Line Testing ***or*** Monthly Monitoring[b]
New And Existing Suction Piping[a]	Monthly Monitoring[b] Line Testing Every 3 Years No Requirements[d]

[a]New tanks and piping are those installed after December 1988. Existing tanks and piping are those installed before December 1988.

[b]Monthly monitoring includes: Automatic tank gauging, vapor monitoring, interstitial monitoring (between the tank and the containment liner), groundwater monitoring, other approved methods. (Automatic tank gauging cannot be used for monthly monitoring of piping.)

[c]Very small tanks may also be able to use manual tank gauging.

[d]If the system has the characteristics described in the final federal or state regulations, no requirements may be necessary.

Source: National Association Of Towns And Townships, 1991.

Aboveground containment systems may have to comply with other federal, state, or local stormwater management regulations.

Below ground systems include clay or membrane liners installed beneath tanks and piping networks to prevent the migration of any released materials. Underground vaults that permit visual inspection may be constructed of concrete; however, these areas present certain safety hazards and must be kept well ventilated to reduce the chance of fire and explosion.

Spill And Leak Containment Procedures

The key to dealing successfully with accidental releases is to report them immediately, to follow an emergency response plan, to act swiftly in stopping the release and cleaning up the contamination, and to keep careful records of all actions taken to minimize the threat of liability.

Local governments should obtain a full set of spill and release requirements and incorporate them into local emergency response plans.

In responding to a confirmed leak, local leaders must

- Report regulated releases to state or local authorities. (Localities must report all aboveground releases and all underground releases that exceed 25 gallons or those that visibly contaminate a source of surface water.)
- Minimize threats to human health (including explosive vapors and fire hazards).
- Prevent further release.
- Determine contamination levels.
- Remove released product and contaminated soil and dispose of these materials properly.

Remediation (Cleanup) Techniques

Federal and state UST regulations require the cleanup of all leaks and spills above a certain amount. Until recently, tank operators dealt with underground releases either by excavating to recover and treat the free product and contaminated soil or by using pumping techniques to recover the floating and dissolved products from groundwater.

Other site investigation and evaluation procedures as well as remediation techniques are now available. Site investigation techniques include surface geophysical methods that indirectly assess the extent of contamination in soil and groundwater. New technologies for remediating contaminated soil and groundwater, include

- Soil washing techniques.
- Petroleum degrading bacteria (bioremediation).
- Improved groundwater pumping and treatment methods.

A number of engineering firms now deal with soil remediation and water treatment problems. These firms deal primarily with problems caused by regulated tanks.

References

National Association Of Towns And Townships. 1991. Getting Out From Under: Underground Storage Tank Alternatives For Small Towns. Washington, DC.

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