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Underground Storage Tanks (USTs) And NPS Pollution Managing Commercial And Municipal USTs: Installing And Upgrading Tanks

Across the country, thousands of fuel storage tanks are owned and operated by industries, agribusinesses, and municipalities. Yet most owners or operators have little idea of the age or condition of these tanks even though they represent a growing threat to the environmental and financial security of their community.

There is special concern for underground storage tanks (USTs), because they may be leaking with no visible evidence until serious environmental pollution problems have occurred. Millions of gallons of groundwater and large areas of soil may become severely contaminated before a problem is ever recognized from the surface.

Most commercial and municipal USTs are governed by strict federal and state regulations. Most states are beginning to apply similar regulations to aboveground storage tanks (ASTs) as well. These regulations require owners and operators to manage and maintain tanks so that they do not severely damage the environment. By properly installing well-designed tanks and by upgrading existing tanks, commercial and municipal UST operators can greatly reduce the associated liability of owning USTs.

Installation Requirements

Certified UST installers should be used for all regulated tanks. The EPA requires that UST installers be certified by the tank and piping manufacture or by the state implementing agency. The Alabama Department Of Environmental Management (ADEM) is currently working on a certification program for UST installers.

Since practices vary from state to state, UST owners and operators should verify the procedures required by their designated state UST agency. More than half the states have their own certification procedures.

Owners or operators should make certain, in writing, that the tank system they select is compatible with the product to be stored and that the tank and

pipework meets the standards of trade associations or testing firms such as the Steel Tank Institute (STI), Association of Composite Tanks (ACT), and Underwriters's Laboratory (U.L.).

Notification. For tanks installed or upgraded since the 1986 notification deadline, owners and operators have 30 days from the beginning of operation to submit a standard form providing information on the tank's age, size, type, location, uses, contents, etc.

The owners or operators of all regulated USTs in operation after January 1, 1974 should have notified the designated state or local agency about each of their tanks by May 8, 1986. In some states this requirement applies to tanks which were abandoned or closed between 1974 and 1986. In Alabama, ADEM wants to be notified only of those tanks in use.

Inspection And Record Keeping. After tanks are installed, the installation must be inspected and approved by a registered professional engineer or by the implementing agency.

Records about tank installation, including those showing that tank specifications meet federal and state requirements, are important should you have a problem in the future. Records, service manuals, and all important documents should be in an accessible location for use when needed.

Tank Designs

Proper installation begins with well-designed tanks. All new tanks must be designed and constructed to prevent corrosion and structural failure for as long as they are used to store gasoline and other regulated substances. See Table 1 for minimum requirements for corrosion protection.

Improved tank designs include the following:

- Coated and cathodically protected steel tanks.
- Fiberglass-reinforced plastic tanks.
- Fiberglass-coated steel tanks.
- Double-walled tanks.

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Table 1. Minimum Requirements For Corrosion Protection.

Tanks And Piping	Choices
New Tanks ^a	Coated and cathodically protected steel Fiberglass Steel tank clad with fiberglass
Existing Tanks ^a	Same options as for new tanks Add cathodic protection system Interior lining Interior lining and cathodic protection
New Piping ^a	Coated and cathodically protected steel Fiberglass
Existing Piping ^a	Same options as for new piping Cathodically protected steel

^aNew tanks and piping are those installed after December 1988. Existing tanks and piping are those installed before December 1988.

Source: National Association Of Towns And Townships, 1991.

Some of the earlier fiberglass-reinforced plastic tanks failed because they did not have adequate structural strength to support heavy loads. Newer fiberglass designs are much stronger, and fiberglass will not corrode, which is a concern with steel tanks.

Double-walled tanks provide the greatest environmental protection since they consist of internal and external tank shells of steel or fiberglass with a leak detection system between the two walls. In these double-walled tanks, it is easy to detect leaks into the tank through the outer wall or leaks out of the inner tank into the internal space. However, double-walled tanks can cost 25 percent more than corrosion-protected single-wall steel tanks with leak detection.

Some states require double-walled tanks or secondary containment in environmentally sensitive areas. Alabama law requires corrosion protection and monitoring for all regulated tanks, but secondary containment is required only for those in vulnerable areas such as wellhead protection areas.

Piping And Fittings

A variety of alternative piping materials is now available to cut down on the adverse conditions of corrosion and stress. Plastic, fiberglass-reinforced plastic, stainless steel, and composite materials are now available to replace galvanized pipe, the standard for many years. Composite pipes typically consist of rubber, plastic, or epoxy-lined steel pipes. In addition, there are double-walled pipe designs, similar in concept to the double-walled tanks.

Better quality pipe fittings and valves are now available that can withstand and even counter some of the pipe stresses associated with expansion, contraction, and pressure surges. Some improved valves prevent backflow of fluids from pipes and hoses during loading and dispensing operations.

Corrosion Protection

When buried, many USTs have corrosive electrical forces flowing through them or their components just like through a battery. These electrical forces accelerate corrosion. Relatively few USTs installed prior to 1980 were designed with built-in corrosion protection. They could be painted with a water resistant material, but a single crack in the coating that allowed contact with water caused corrosion to proceed.

Two types of electro-chemical protection systems are now available for underground storage tanks and piping networks to reduce corrosion. Galvanic cathodic protection systems employ "sacrificial" anodes on the outside of USTs. These protruding pieces of metal sacrifice themselves to the corrosive forces conducted through the soil before the tank itself is damaged.

The second type of protection, the impressed current system, utilizes a low powered electric current. When continuously applied to the tank or piping, it offsets the corrosive currents generated by the tank itself.

Some engineering firms now provide tank tightness testing and corrosion protection for underground tanks and pipelines. (See Appendix J.)

Testing And Inspection. EPA regulations require not only that corrosion protection be provided for the storage tank and piping but also that the system be tested regularly. In addition to inspection at the time of installation, EPA requires that

- All cathodic protection systems be tested within 6 months of installation and at 3-year intervals thereafter.
- Impressed current cathodic protection systems be inspected every 60 days;
- Inspections be conducted by a qualified "cathodic protection tester." (Local employees can qualify to be testers.)

There are no cathodic protection test requirements for fiberglass tanks, which do not corrode.

Record Keeping. UST owners must keep records of the last three inspections, as well as the results of the last two tests conducted on the cathodic protection system.

Tank Upgrading

Historically, a large proportion of all underground storage tanks were constructed of a single wall of

bare carbon steel with no protective coating, inside or out. With the constraints imposed by recent federal and state regulations, the use of bare steel tanks has virtually ceased. In fact, if you have a bare steel UST in use, your safe bet is to dig it up immediately before it causes problems. If inspection reveals that it is in a well-drained area and still in good condition, cathodic protection may more than double its useful life. However, a bare steel tank has a 100 percent chance of failure at some future date. It can be replaced by a better tank, an aboveground tank, or another fuel alternative.

Large commercially owned tanks can be upgraded to extend their useful life in some instances. These improvements may include lining the interior of the tank, replacing all pipes and fittings, and adding overfill prevention, leak and spill detection, and corrosion protection devices. It still may be less expensive in the long run to replace the entire system or find an alternative, because the useful life of the tank must be weighed against the added reduction in risk by replacing the entire tank system.

Tank Repairs

Both steel and fiberglass tanks needing preventive maintenance or other repairs must be repaired according to codes developed by nationally recognized associations of testing laboratories. Pipes and fittings must meet the manufacturer's repair standards.

Testing And Record Keeping. All tank repairs are subject to tightness testing or other EPA-accepted practices within 30 days of installation to confirm that the repairs have been completed successfully. Cathodic protection systems must be tested within 6 months of repair.

As with other areas of UST operations and maintenance, owners must maintain records which indicate their compliance with federal or state repair standards.

Tank Closure

Temporary closure requirements apply to all regulated tanks that are not used for 3 to 12 months. The

tank should be emptied of regulated substance during this time. Corrosion protection and leak detection systems must continue to be operated and monitored. All lines (except vents) must be capped and all access points to the tank (such as pumps and manways) must be secured.

If the tank is to be closed permanently, owners must notify the appropriate regulatory agency (ADEM in Alabama) at least 30 days in advance, remove all product, and clean the tank of all remaining liquid and accumulated residue. The tank must then be removed from the ground or filled in place with an inert material. Finally, owners must test the surrounding soil for contamination and, if necessary, take corrective action before closure procedures can be considered complete.

Some states require complete removal of a tank rather than allowing closure in place. Alabama allows closure in place except under certain circumstances.

Inspection And Record Keeping. In many states, closures must be inspected by state agency personnel before they become final. Tank owners must keep detailed permanent records of all actions taken in closing a UST temporarily or permanently.

References

Code Of Alabama. 1993. Alabama Underground And Aboveground Storage Tank Trust Fund Act, as amended. Sections 22-35-1 through 22-35-13. Montgomery, AL.

Code Of Alabama. 1988. Alabama Underground Storage Tank And Wellhead Protection Act Of 1988. Sections 22-36-1 through 22-36-10. Montgomery, AL.

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

Robinson, Janet E., Paul Thompson, W. David Conn, and Leon Geyer. 1993. Issues In Underground Storage Tank Management: Tank Closure And Financial Assurance. CRC Press, Inc. Boca Raton, FL.

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