



# Storing Petroleum Products to Protect Groundwater

**Kristine A. Uhlman**, Extension Program Specialist—Water Resources

**Diane E. Boellstorff**, Corresponding Author; Assistant Professor and Extension Water Resources Specialist

**Mark L. McFarland**, Professor and Associate Department Head, Department of Soil and Crop Sciences

**John W. Smith**, Extension Program Specialist

Texas A&M Department of Soil and Crop Sciences, The Texas A&M University System

Liquid petroleum products such as gasoline, diesel, and heating fuels are often stored in aboveground (AST) or underground storage tanks (UST). These tanks can leak or spill, allowing contaminants to move through the soil to the groundwater that supplies your well.

As little as 1 gallon of gasoline can contaminate a million gallons of groundwater. Once contaminated, an aquifer is extremely difficult and very expensive to clean up.

According to the U.S. Environmental Protection Agency (EPA), nearly one in four USTs in the United States may now be leaking. It is much more likely that pollution can leak from a UST that is more than 15 years old and unprotected against corrosion. Newer tanks and piping can also leak, especially if they were installed improperly.

Groundwater is the source of drinking water for many Texans. Millions of gallons of groundwater may be located under a typical farm, ranch, or home site. Fuel tanks, livestock pens, septic systems, and

fertilizer and pesticide storage areas that are situated above the aquifer can be major sources of pollution.

The management decisions you make on your property can significantly affect the quality of your drinking water and your family's health. These decisions can also affect your legal liability and property value.

The Texas Commission on Environmental Quality (TCEQ) regulates all ASTs and USTs except:

- Farm or residential USTs or ASTs that have a capacity of 1,100 gallons or less and are used to store motor fuel for noncommercial purposes
- Heating oil tanks for consumptive use at the storage site

Those tanks are exempt from TCEQ regulations, registration, testing, record-keeping, and reporting. For complete lists of exemptions and regulations, see Title 30, Chapter 334, of Texas Administrative Code.

More aquifer protection requirements may apply if your tank is in a county where

**Table 1.** Questions to help landowners determine whether petroleum storage may be threatening their well water.

| YES                      | NO                       | QUESTIONS                                                                                                                   |
|--------------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | 1. Do you store liquid petroleum supplies within 100 feet of your water well?                                               |
| <input type="checkbox"/> | <input type="checkbox"/> | 2. Do you store liquid petroleum supplies within 50 feet of a building or combustible object?                               |
| <input type="checkbox"/> | <input type="checkbox"/> | 3. Do you have a bare steel tank that is more than 15 years old?                                                            |
| <input type="checkbox"/> | <input type="checkbox"/> | 4. Does your tank lack proper spill or overfill protection?                                                                 |
| <input type="checkbox"/> | <input type="checkbox"/> | 5. Are the tank pipes rusty, damaged, or sloping away from the tank?                                                        |
| <input type="checkbox"/> | <input type="checkbox"/> | 6. Is your tank unmonitored for leaks or fuel use? Was it installed without backfill or anchors, or by an untrained person? |
| <input type="checkbox"/> | <input type="checkbox"/> | 7. If your tank is aboveground, does it lack an enclosure such as a fence with a lock?                                      |
| <input type="checkbox"/> | <input type="checkbox"/> | 8. Are any storage tanks on your property unused?                                                                           |

the Edwards and Trinity Aquifers recharge. The Edwards Aquifer Authority (EAA) regulates ASTs and USTs in, above, or on the Edwards Aquifer recharge zone.

Since October 18, 2002, USTs cannot be used to store or contain petroleum products or other regulated substances. Storage tanks in the zone before that date must be registered with the EAA (<http://www.edwardsaquifer.org/recharge-zone-protection/storage-tanks>). A facility plan is required to install a permanent AST on the recharge or transition zone of the Edwards Aquifer.

This publication focuses on safely storing diesel, gasoline, kerosene, and liquid heating fuels in ASTs or USTs that are exempt from TCEQ regulation as defined above. It does not cover liquid propane gas because those leaks vaporize quickly and do not threaten groundwater.

For guidelines on non-exempt tanks, see the *Petroleum Storage Tank Super Guide: A Comprehensive Guide to Compliance in Texas*. These tanks must be registered with the TCEQ Petroleum Storage Tank Program ([http://www.tceq.texas.gov/agency/pst\\_cert.html](http://www.tceq.texas.gov/agency/pst_cert.html)).

The questions in Table 1 may help you identify potential risks associated with petroleum storage on your property. Many of these situations can lead to

contamination of your drinking water if not managed properly.

If you answer *yes* or don't know the answer to any question, you may have a high-risk situation on your property. Information on how to address each situation follows.

### **1. Do you store liquid petroleum supplies within 100 feet of your water well?**

The most important aspect of your liquid petroleum storage tank location is the distance between it and your water well. State regulations require that petroleum storage tanks be at least 100 feet from a water well.

A new tank or filling area must be more than 100 feet away from a water well. If possible, the tank should be downslope from the well.

### **2. Do you store liquid petroleum supplies within 50 feet of a building or combustible object?**

To protect against explosion or fire, do not locate tanks (especially aboveground tanks) closer than 50 feet to any building. Vapors can accumulate in or under nearby storage buildings. These vapors are a fire hazard and can directly affect human health.

When choosing a tank site, consider these guidelines:

- Allow adequate access for refueling and emergency vehicles.
- Do not install tanks in floodways or areas where the water table is close to the surface. Tanks in these areas require special installation.
- Avoid sites that contain abandoned pipes and tanks or agricultural drainage tiles. Any metal already in the ground will increase the corrosion rates for USTs.

### **3. Do you have a bare steel tank that is more than 15 years old?**

Tanks will corrode if they are not made of or covered with nonmetallic material, such as fiberglass, or have some other type of corrosion protection, such as an interior liner. All new USTs and related piping must be made of nonmetallic materials or have some type of corrosion protection.

Protect against corrosion by using interior liners and sacrificial anodes that are connected to the tank. The older the tank, the more likely that it is corroding.

A sacrificial anode is a material that is more likely to corrode than the tank material. The anode will typically protect the tank for up to 30 years. Interior liners are made of non-corrosive synthetic materials and can also protect metal tanks.

### **4. Does your tank lack proper spill or overflow protection?**

All tanks should have spill and overflow protection.

**Spill protection** usually consists of an impermeable catch basin around the tank, preferably made of waterproof material. Place the AST in a concrete or soil dike with a catch pad that can hold 125 percent of the tank's capacity.

**Overflow protection** can be a warning device, such as a buzzer, or a prevention device, such as an automatic shutoff.

Test the tank periodically for leaks, and measure the tank level at least monthly to detect leaks before major problems develop. To monitor a tank for leaks:

- Install internal or external devices to automatically measure tanks or to monitor groundwater and vapor.

- Measure tank levels regularly. To minimize the effect of daily temperature fluctuations, always measure at about the same time of day, particularly for ASTs during the summer. Leakage becomes apparent when the level drops over time but no fuel has been withdrawn. Although this method cannot detect tiny leaks early, it may warn you to investigate further.
- Use a measuring stick to check the liquid level in the tank. However, be sure that the stick does not puncture or damage the bottom of the tank.

### **5. Are the tank pipes rusty, damaged, or sloping away from the tank?**

EPA studies show that most petroleum leaks from USTs are caused by piping failures. Metallic pipes should be protected from rusting by galvanization (coating iron or steel with zinc) or by cathodic protection (attaching a metal piece, usually zinc or magnesium, to the pipe, which prevents corrosion by reversing the electric current that causes it).

New pipes should be made of fiberglass or another nonmetallic material. If the pipes are rusty, fuel may already be leaking into the ground.

A check valve is a device placed between the tank and the pump to prevent the backflow of petroleum from the pipes into the tank, which can cause contamination. The check valve should be located immediately before the pump, not at the foot of the tank.

Piping should slope back toward the tank to drain the fuel back to the tank, leaving less petroleum in the pipe after use.

### **6. Is your tank unmonitored for leaks or fuel use? Was it installed without backfill or anchors, or by an untrained person?**

Have the fuel storage tank installed by a certified installer. Make sure that the installer follows the manufacturer's recommended installation practices as well as these guidelines:

- Check the underlying soil to make sure it can support a UST or AST.
- During installation, use clean backfill to decrease damage from surrounding soils such as highly corrosive clays, wet or acidic (low pH) soils, or soils with a large shrink/swell potential.

- On hillsides, anchor the tank properly.
- Set an AST on an impermeable liner made of concrete or one of the newer synthetic fabrics. Build a collection basin for spills.
- New USTs and related piping must have corrosion protection or be made of non-metallic materials such as fiberglass.
- Be sure that pipes cannot twist or break if the tank is bumped or disturbed.
- Avoid scratching a metal tank, which can increase corrosion and tank deterioration.

### **7. If your tank is aboveground, does it lack an enclosure such as a fence with a lock?**

Enclose each AST within a secure 6-foot-tall fence or well-ventilated building made of non-combustible materials. Build a firewall between the tank and the fuel dispensing area.

Place the AST within a secondary containment structure consisting of a dike and a pad. To prevent corrosion, use coated steel piping.

Below-ground piping may be steel or fiberglass; if it is steel, it must be coated and cathodically protected.

### **8. Are any storage tanks on your property unused?**

Unused USTs can contaminate groundwater for years. The tank will continue to corrode, and even a small amount of remaining product can contaminate an aquifer. The metal in an unused UST will also make nearby new tanks corrode faster.

Determine the locations of any unused USTs on your property. No tank should be within 100 feet of a water well. Also, check the tanks for holes or remaining product. Pull such tanks from the ground and dispose of them at a landfill or scrap dealer.

According to state law, only a certified person can legally remove a regulated UST. Improper tank closure can contaminate groundwater.

At least a month before removing a regulated tank, notify the TCEQ and the local fire department so they can take precautions to prevent explosions or other problems.

## **Summary**

Following these guidelines will help you keep petroleum storage tanks from contaminating your well water:

- Locate the tank at least 100 feet and downslope of any water well.
- Be sure that the tank is more than 50 feet from buildings.
- Have the tank installed and anchored properly by a certified installer.
- Make sure that the pipes will not twist or break if the tank is disturbed.
- Locate the tank to allow easy access for maintenance and for refueling vehicles.
- Protect the piping from collisions with farm and fuel vehicles.
- Register tanks of more than 1,100 gallons with the TCEQ Petroleum Storage Tank Program ([http://www.tceq.texas.gov/agency/pst\\_cert.html](http://www.tceq.texas.gov/agency/pst_cert.html)).
- Install spill and overfill protections.
- Test all tanks regularly for leaks, and measure the tank level every month.
- Build a soil dike and pad under ASTs to contain spills and leaks.
- Have a certified installer remove unused USTs or fill them in place.

## **For more information**

- Assessing Your Petroleum Product Storage.* By R. T. Burns. 1996. The University of Tennessee, Knoxville, SP484 G, 6 pp.
- Petroleum Storage Tank Super Guide: A Comprehensive Guide to Compliance in Texas.* Texas Commission on Environmental Quality. 2012. RG-475, 92 pp. <http://www.tceq.texas.gov/publications/rg/rg-475.html>.
- Texas Commission on Environmental Quality:  
P. O. Box 13087, Austin, TX 78711-3087,  
Phone: 512.239.2160
- Petroleum Storage Tank Program: [http://www.tceq.texas.gov/agency/pst\\_cert.html](http://www.tceq.texas.gov/agency/pst_cert.html)
  - Leaking Underground Storage Tank [LUST] Program: [http://www.tceq.texas.gov/remediation/pst\\_rp/pst.html](http://www.tceq.texas.gov/remediation/pst_rp/pst.html)
  - Office of Permitting, Remediation, and Registration

- Permitting and Remediation Support, Petroleum Storage Tanks

Texas Ground Water Protection Committee:  
[http:// www.tgpc.state.tx.us/index.php](http://www.tgpc.state.tx.us/index.php).

*TEX-A-SYST: Reducing the Risk of Ground Water Contamination by Improving Petroleum Product Storage.* By B. L. Harris, D. W. Hoffman and F. J. Mazac Jr. 1997. Texas A&M AgriLife Extension publication B-6027, 8 pp.

Texas Well Owner Network: <http://twon.tamu.edu/>  
*Texas Well Owner Network: Texas Well Owner's Guide to Water Supply.* By K. Uhlman, D. Boellstorff, M. L. McFarland, B. Clayton, and J. W. Smith. 2013. Texas A&M AgriLife Extension publication B-6257, 96 pp.

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