



Assessing Your Liquid-Fuel Management

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The goal of *Home•A•Syst* is to protect your health and the environment from pollutants in and around your home.

The following checklist is designed to help you pinpoint potential problems with liquid fuels that may contribute to the contamination of your surface and groundwater. If a statement reflects the current situation in your household, check “Agree.” If the state-

ment does not describe your household, check “Disagree.”

If you disagree with any of these statements, or if you are unsure, you may have a situation in your home that could affect the environment or your health. Refer to the fact section with the same number as that statement (under the heading, “What you should know about . . .”) for more information.

Agree **Disagree**

- | | | |
|-----------------------|-----------------------|--|
| <input type="radio"/> | <input type="radio"/> | 1. I don't store fuel in my home or workshop, <i>and</i> I don't leave gas in the tanks of gas-powered machines during the off-season. |
| <input type="radio"/> | <input type="radio"/> | 2. If I do store fuel, my containers are kept in a well-ventilated area out of the reach of children. |
| <input type="radio"/> | <input type="radio"/> | 3. My petroleum storage tank is downslope from my well, <i>and</i> more than 100 feet from the well. |
| <input type="radio"/> | <input type="radio"/> | 4. It is more than 50 feet from buildings or other combustible objects. |
| <input type="radio"/> | <input type="radio"/> | 5. My tank is located in medium- or fine-textured soils, such as clays or loams, and not in corrosive or sandy soils. |
| <input type="radio"/> | <input type="radio"/> | 6. My tank is coated in nonmetallic materials which prevent corrosion. |
| <input type="radio"/> | <input type="radio"/> | 7. My tank has spill and overflow protection. |
| <input type="radio"/> | <input type="radio"/> | 8. My pipes don't show rust or damage, <i>and</i> they slope back toward the tank. |

Continued on p.2

Agree Disagree

9. My tank was installed by a trained professional with backfill, anchors, and other prescribed protections.
10. I monitor my fuel use and frequently test the tank for leaks.
11. My aboveground tank is surrounded by a locked fence.
12. I don't have any unused underground tanks on my property.

Don't be alarmed if you disagreed with many or even all of these statements. That does not automatically mean you have an environmental problem related to liquid-fuel management. It may, however, tell you that change is needed to avoid potential problems. In the same way, agreeing with every statement does not mean you are *not* at risk or cannot make improvements.

Why should you be concerned?

Groundwater is the underground water that supplies wells and springs and recharges surface water bodies. It is the source of drinking water for many Tennesseans. **Surface water** includes bodies of water such as ponds, lakes, rivers, and streams. Besides their aesthetic and recreational value, they are a vital part of the habitat of Tennessee's wildlife. Both surface and groundwater are threatened by the possibility of contamination from stored fuels. The management of liquid-fuel storage on your property can have significant consequences for the quality of Tennessee's surface and groundwater, as well as for the air you breathe.

Aboveground and underground storage of fuel presents a threat to public health and the environment. Petroleum contains many toxic compounds, including benzene, which causes cancer. Tanks that leak or spill allow these compounds to reach the soil and the groundwater that supplies wells. Low levels of fuel contamination in water, while hazardous to your health, cannot be detected by smell or by taste. Water that seems fine may in fact be dangerous to drink.

Even a small gasoline leak of one drop per second can result in the release of about 400 gallons of gasoline into the groundwater in a year. As little as

one gallon of gasoline spilled can contaminate *two to ten million gallons* of the groundwater that supplies drinking-water wells and springs. A few quarts of gasoline in the groundwater may be enough to pollute your drinking water severely.

According to the U.S. Environmental Protection Agency (EPA), nearly one out of every four underground storage tanks in the United States may now be leaking. If an underground petroleum tank is more than 15 years old, especially if it's not protected against corrosion, the potential for leaking increases dramatically. Newer tanks and piping can also leak if they aren't installed properly. Aboveground tanks, while they may seem safer, can also pollute groundwater through leaks, spills, or corrosion. Care must also be taken with basement storage tanks, because leaking fuel that finds its way into cracks in the floor is on its way to your groundwater.

Preventing tank spills and leaks is especially important because gasoline, diesel fuel, and fuel oil can move rapidly through the soil into groundwater. Also, vapors from an underground leak can collect in basements, **sumps** (drainage pits), or other underground structures and explode.

Home•A•Syst is only for your own use and benefit. It is a voluntary program intended to provide general information about protecting your health and the environment. Information from a *Home•A•Syst* assessment will not be collected by Extension or any other outside agency and should remain in your private records.

What you should know about . . .

1. Portable fuel containers

Most people own at least one fuel-burning device (lawnmower, space heater, weed trimmer, chainsaw, etc.) and keep one to five gallons of the necessary fuel in a portable container. However, fuel stored in portable containers and in the gas tanks of gas-powered machines is a potential risk to surface and groundwater. Proper management can reduce the risk of spillage and therefore reduce the threat to water quality.

Buy only the fuel you need for a season (about six months). If you have more than a gallon left over at the end of a season, buy less the next year.

Try to use up leftovers. Drain the extra gas left in your equipment at the end of a season and reuse it. Excess gasoline can be poured into a car's gas tank (dilute one part old fuel with five parts new fuel to protect your engine) or given to someone who can use it.

If you must store fuels, it is important to use only safe, **UL-approved** containers (approved by the Underwriters' Laboratory, an industry trade group): red for gasoline, blue for kerosene and diesel fuels. Never use glass jars or milk jugs. The container should be clearly labeled to identify its contents and fitted with a spout or other device to allow pouring without spilling. For an extra measure of spill protection, fuel containers can be kept inside a bucket or other container that can prevent leaks from spreading.

Check your fuel containers and fuel-powered devices regularly for leaks, especially if they haven't been used in a while.

2. Storage location

Proper storage location of liquid fuels is crucial. To avoid fuel vapors, which are a health and fire hazard, keep containers and fuel-powered devices in secure, well-ventilated places. Storage in a shed or garage separate from your home is safer than storage in a basement or attached garage. Keep containers off the floor where they can be damaged by your car. Keep them out of the reach of children and make sure the lids are tight to prevent easy access.

3. Tank location relative to your well

The most important consideration in locating your liquid-petroleum storage tank is its distance from your drinking-water well. You should keep storage tanks and fuel-filling areas at least 100 feet from any well to avoid contamination. Also, tanks and filling areas should be downslope from the well if possible so that spills will flow away from the well. If the groundwater that your well taps is shallow, it is likely that the groundwater and any contaminants in it flow downhill.

4. Tank location relative to buildings

To safeguard against explosion and fire, tanks should be more than 50 feet from buildings and other combustible objects. Be sure to allow adequate access for emergency vehicles.

5. Soil type

The type of soil your tank is located in greatly influences the likelihood of groundwater contamination. Soil affects not only the rate of **corrosion** (rust) of your tank, but also the rate at which leaking or spilled fuel seeps down to groundwater. The soil must also be able to support your aboveground tank and allow it to be properly anchored.

Highly corrosive clays, wet soils, and **acidic** (low pH) soils can speed up the rate of corrosion of underground metal tanks and piping. Corroded tanks and pipes leak fuels directly into the soil.

Even though diesel fuel and fuel oil are more dense than gasoline and move more slowly through the soil, they can eventually reach groundwater. How quickly this happens depends on the permeability of the soil. The more porous the soil (coarse-textured soils such as sand or gravel are highly porous), the faster the rate of downward movement to groundwater. Your tank is better located in medium- or fine-textured soils such as clays or loams.

6. Type and age of tank

If a tank is not constructed of or covered with nonmetallic materials, the possibility of corrosion exists. A bare steel tank will eventually corrode—and the older your tank, the more likely it is that corrosion has already occurred. If your tank is more than 15 years old, have it checked.

All new underground storage tanks and related piping must either be constructed of nonmetallic materials like fiberglass or have some type of corrosion

protection, such as an interior liner. All aboveground tanks should be elevated at least one foot off the ground, since direct contact with the soil increases the rate of corrosion.

7. Spill and overflow protection

Spill and overflow protection are also required for all new tanks. Spill protection for underground tanks generally consists of a catch basin around the tank, preferably constructed of an impermeable (waterproof) material. Aboveground tanks should be placed within a concrete or soil dike with a catch pad able to hold 125% of the tank's capacity.

Overflow protection is usually either a warning buzzer or an automatic shutoff of the pump triggered by the level of fuel in the tank being filled.

8. Pipes

EPA studies show that piping failures cause most petroleum leaks from underground tanks.

Metallic piping should be protected from rust 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 constructed of fiberglass or another nonmetallic material. If rust is showing on your pipes, fuel may already be leaking into the ground.

The **check valve** (a device to prevent the backflow of petroleum into the tank from the pipes, which can cause fuel contamination) should be located at the pump, not at the foot of the tank. Piping should slope back toward the tank so that fuel will drain back to the tank, decreasing the amount of petroleum left sitting in the pipe after use. This reduces the risk that petroleum will leak through rusted pipes into groundwater.

9. Tank installation

When a tank is installed, the manufacturer's recommended practices should be followed closely to minimize the leaking potential of the tank and its piping system. Tennessee law requires that the tank must have spill and overflow protection, corrosion protection, and a method of leak detection. Installation should be performed only by a certified installer. Even small scratches in a metal tank caused by careless installation can speed up the corrosion and eventual deterioration of the tank.

10. Tank testing and leak detection

Regulations for new underground tanks require that all tanks have a method of detecting leaks. If you already have a tank, especially if it is more than 15 years old, you need to establish some sort of leak-detection method and use it regularly. Cleanup of gasoline leaks is always expensive and often ineffective. It is best to catch leaks while they are still minor.

A list of approved tank-testing methods and suppliers' phone numbers is available from the Tennessee Division of Underground Storage Tanks (TDUST). Even if your tank has already been tested and proven tight, you should install an internal or external monitoring method such as a groundwater monitoring well, vapor monitor, or automatic tank gauge.

The simplest way to start looking for leaks is to use your senses of sight, smell, and taste. Do streams or wet places near the tank appear oily? Is nearby soil stained with petroleum? Is there a strong, constant smell of petroleum near your tank? Have you or your neighbors smelled fuel odors near plumbing or sewer line openings, or in basements? Can you taste oil in your drinking water? Be aware of mechanical changes in the way your pump operates. Does it rattle? Does fuel flow unevenly? Does the pump hesitate too long before dispensing? These may be signs of leaks or damage to the piping.

Measuring tank inventory is also an inexpensive and easy way to help detect leaks. Any unexplained decrease in the fuel level in the tank indicates a leak. This method won't detect very small leaks, but it can alert you to potential problems quickly.

If you find a leak or spill which exceeds 25 gallons (except spills caught in the confinement basin of an aboveground tank), state law requires you to report it to the Tennessee Emergency Management Agency (TEMA) at (800)262-3300.

11. Aboveground tank enclosure

Aboveground tanks should be surrounded by a locked metal fence, preferably no shorter than six feet. This prevents unauthorized access and collisions with vehicles. At the very least, lock your pump.

12. Unused underground tanks

Unused underground tanks can cause problems as long as they remain in the ground. First, any metal already in the ground increases the corrosion rate for new tanks placed there. In other words, your old tank

can interfere with your new tank's resistance to corrosion. Unused tanks can also continue to corrode. If they contain gas or oil, they can be a safety hazard and a threat to groundwater.

If you suspect that your unused underground tank is leaking, consult an authority. For commercial tanks, report a possible spill to TDUST at (615)532-0945. For private tanks with a capacity of less than 1100 gallons, call the Tennessee Department of Conservation, Division of Solid Waste, at (615)532-0780. If there is groundwater pollution in your area, your neighbors may point to your tank as the cause. Document the steps you take to remedy the situation so that if groundwater problems occur, you will be protected from legal action. *You are financially responsible for leaks from a tank on your property, even if you are unaware of the tank's existence. Standard homeowner's insurance does not usually cover the costly cleanup.*

Unused tanks should be removed from the ground. Notify the local fire department at least one month before you have a tank pulled, so that precautions can be taken to prevent an explosion or other problem. Lives have been lost because of the improper removal of underground tanks. Dispose of pulled tanks at a landfill or take them to a scrap dealer.

If you can't remove the tank from the ground, it should be filled with an **inert** material (one that doesn't tend to react with other substances). In either case, the site should be checked for signs of tank leakage: odors, soil stains, or visible pools of petroleum.

Unused aboveground tanks should be emptied, marked as not to be used, and protected from being refilled by covering the fill ports. If you don't dispose of these tanks away from your property, store them so that water does not get inside.

Make a note:

The table on page 6 of SP508M, *Assessing Your Homesite*, provides a space for you to list all the problem areas in your home that you find while completing *Home•A•Syst*. Take a few minutes now to list any liquid-fuel problems you discovered as you completed *Assessing Your Liquid-Fuel Management*. Later, when you complete *Assessing Your Homesite*, you will include these items on the map you draw of your property.

Potential items from this factsheet include:

- gas in tanks of idle equipment (that is, during the off-season)
- stored fuel in the home or workshop
- underground tanks (both used and unused)
- aboveground tanks (both used and unused)

Remember:

- If you have fuel-burning devices, buy only the fuel you need for a season. Try to use up the leftovers.
- Store fuels only in UL-approved containers.
- Store fuels only in secure, well-ventilated areas, preferably separate from your home.
- Locate any petroleum storage tank at least 100 feet from your drinking-water well, downslope, in soils that slow the penetration of contaminants.
- Make sure the tank is more than 50 feet away from buildings.
- Be sure that your tank is installed and anchored properly by a certified installer, and that pipes cannot twist or break if the tank is disturbed.
- Determine whether the location of the tank will cause it to block movement of vehicles during refueling or make maintenance work on the tank difficult. Protect your piping from collisions with vehicles.
- Use an aboveground tank instead of an underground tank if your home is in a low-lying area or an area with a shallow water table.
- Register all underground tanks of 1100 gallons or more with TDUST at (615)532-0945.
- Install spill and overfill protection on new underground tanks; old tanks must have this protection by December 22, 1998.
- Construct a soil dike and pad under aboveground tanks to contain spills and leaks.

- When rainwater gets in the catch basin, skim off any spilled fuel before dumping the water, and recycle or burn it.
- Test the tank regularly for leaks, and measure the tank inventory every month.
- Report spills of more than 25 gallons to TEMA. Registered tanks can qualify for spill cleanup reimbursement from the Petroleum Storage Tank Trust Fund.
- Have unused tanks pulled or filled by a certified installer.
- Assess your basement heating-oil tank as well, if you have one. These tanks are exempt from most federal tank requirements, but they carry the same risks of liability. Liquid-propane tanks, on the other hand, do not threaten groundwater because the gas vaporizes quickly.

If you want more information . . .

Contact:

- Your local Extension office
- Tennessee Department of Environment and Conservation
Division of Underground Storage Tanks
401 Church Street
L&C Tower, 4th Floor
Nashville, TN 37243-1541
(615)532-0945

Division of Solid Waste
401 Church Street
L&C Tower, 5th Floor
Nashville, TN 37243-1535
(615)532-0780
- Tennessee Emergency Management Agency (TEMA)
(800)262-3300
- Your local fire department
- A certified tank installer

Read:

- *Musts for USTs: A Summary of New Regulations for UST Systems.* U.S. Environmental Protection Agency, 1988.
- *Dollars and Sense: A Summary of Financial Responsibility for UST Systems.* U.S. Environmental Protection Agency, 1988.

The above publications are available from the U.S. Environmental Protection Agency at:

401 M Street SW
Washington, DC 20460

Also from the EPA:

- *Guide to EPA Materials on Underground Storage Tanks.* Order number EPA510 B94007.
- *Underground Storage Tanks: General Information Packet.* Order number EPA510 E93001.

For copies, write the National Center for Environmental Publications and Information at

PO Box 42419
Cincinnati OH 45242-2419

Download:

- <http://funnelweb.utcc.utk.edu/~utext>
The University of Tennessee Agricultural Extension Service home page.
- <http://www1.mhv.net/~dfriedman/tanks.html>
Underground Tank Problems and Solutions. Legal, environmental, and technical information and resources.
- <http://abwam.com/grossing/refrust.html>
Underground Storage Tanks. Health hazards, testing methods, and cleanup steps.
- <http://www.webdirectory.com>
Comprehensive environmental search engine/bulletin board—a great way to find information about any environmental topic.
- <http://www.epa.gov>
The U.S. Environmental Protection Agency home page.
- <http://www.usda.gov>
The U.S. Department of Agriculture home page.

- <http://h2o.usgs.gov>
The U.S. Geological Survey home page.
- <http://www.dtnnsh.er.usgs.gov>
The Tennessee division of U.S. Geological Survey.
- <http://hermes.ecn.purdue.edu:8001/server/water/water.html>
The National Extension Water Quality Database Website, Purdue University.

This *Home•A•Syst* assessment does not cover all potential health or environmental risks related to liquid-fuel storage. It is meant to be a starting point for identifying and addressing the most apparent risks.

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Agricultural Extension Service

Billy G. Hicks, Dean