

Tanks Down East

by W. David McCaskill

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Those Tanks in America's Backyards and Basements

Aboveground and Underground Home Heating Oil Tanks

It was a stormy March day. Mrs. Delbert Beal, warm and snug in her home along Maine's oft tempestuous coast, was troubled by the unmistakable odor of fuel oil. She put in a call to her home heating oil dealer, who dispatched a burner technician. After a brief inspection of the furnace and the outside aboveground oil tank, he assured her that things looked fine. But, Mrs. Beal continued to smell fuel oil, so she called her oil dealer again. The technician paid another visit and, after another inspection, reassured her that all was right with the world.

But being 76-years old and of stern Yankee blood, Mrs. Beal knew something was wrong and that she would have to take up this investigation herself. She crawled under the house. (Because of shallow bedrock conditions, her house has no basement, only a small crawl space.) Before long, she discovered fuel oil running along the surface of the bedrock. She called her oil dealer again and personally escorted the technician under the house for a visual inspection.

After further investigation, the technician determined that the source of the problem was a copper fuel supply line, which was covered by about 6 inches of soil, that ran along the bedrock. The oil company replaced the line and reported the leak to the Maine Department of Environmental Protection (MDEP).

To make a long story short, Mrs. Beal's well is contaminated, the MDEP has spent \$52,000, to date, on cleanup, and Mrs. Beal is still looking

at a \$700 bill from the oil dealer for service calls. At the urging of her lawyer, the oil company agreed to reimburse MDEP for cleanup.

In this edition of *Tanks Downeast*, I'll leave the realm of gasoline stations and convenience stores and move into backyards and basements to explore the domestic side of tanks and recommend a good healthy dose of leak prevention and cure. Mrs. Beal's story is true (the name has been changed to protect the innocent) and illustrates an aboveground tank (AST), rather than an UST, problem for a reason: ASTs are the source of most of our home heating oil tank cleanups...so much so, that MDEP has initiated a series of Public Service Announcements to educate the homeowner.

Politics and Permeability

Fuel oil is a mid-distillate petroleum product, which is used for home heating primarily in New England, the mid-Atlantic states, Washington, and Oregon. Other sections of the country rely more on electric power, natural gas, and liquefied petroleum gas (LPG). Under Subtitle I of RCRA, Congress exempted tank systems used for storing heating oil for consumptive use on the premises where stored. Maine, along with several other states, however, does regulate fuel oil tanks. Maine uses the same age-based removal schedule and secondary containment replacement requirements that apply to the state's gasoline storage tanks.

Physically, fuel oil is more viscous than the lighter petroleum distillates (such as gasoline) and

generally doesn't move through the soil as fast or as far as gasoline. Based on our experience, UST fuel oil contamination tends to be localized—confined to the tank owner's, and maybe the neighbor's, well. But, there are always exceptions. Fuel oil will move faster and farther if it finds a convenient conduit, such as a bedrock fracture or certain kinds of manmade contrivances.

For example, one homeowner's basement tank sprang a leak, and the fuel oil made its way through a fracture in the basement floor directly to the bedrock well outside. Basement sump pumps are notorious for pumping fuel oil from a spill directly into gravel drains around homes. Water and electric line trenches that are backfilled with sand are potential conduits. Storm sewers have also proven to be excellent fuel oil conduits.

Plumbing Particulars

Before going into the modes of fuel oil storage system failure, I'll explain to the non-fuel oil user how these systems are set up. They are designed and installed in most states according to the National Fire Protection Association (NFPA) *Code 31, Installation of Oil-Burning Equipment*. Backyard and basement aboveground tanks, usually between 275 and 330 gallons in capacity, are constructed to Underwriters Laboratories (UL) *80-Standard for Steel Inside Tanks for Oil-Burner Fuel*.

Although the capacity of basement storage tanks is limited by code to a total of 660 gallons, usually economic and space constraints dictate



the use of a single 275-gallon tank. These “275s” are oval in shape (see diagram) so they can fit through a basement door or bulkhead. Outside tanks that are larger than 660 gallons must be constructed to UL 142-Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids.

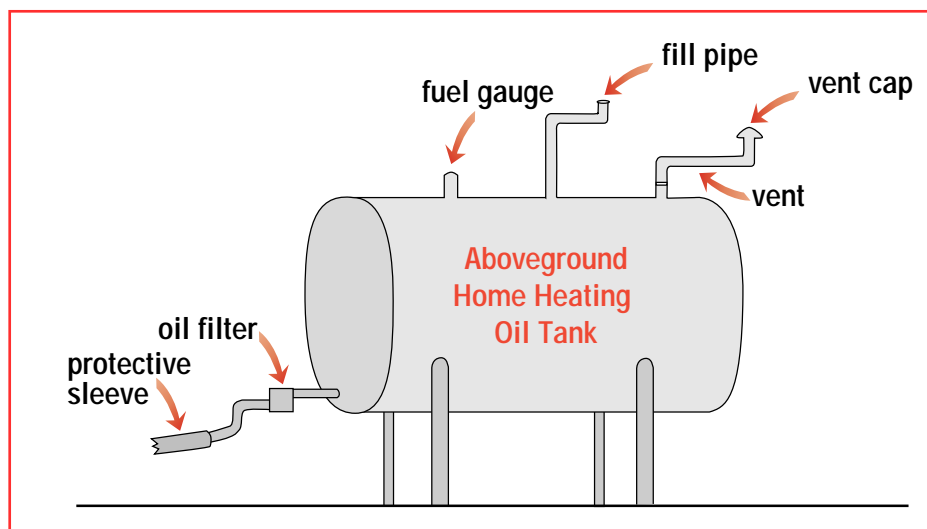
In the underground realm, fuel oil USTs are supposed to meet the UL 58-Standard for Steel Underground Tanks for Flammable and Combustible Liquids, but “midnight” variances from this standard range from 2,000-gallon boiler plate pressure vessels to 14-gauge 275s. While the pressure vessels seem like overkill, the thin-walled 275s were clearly not designed to be buried and are easy targets for corrosion.

In the past, homeowners installed fuel oil tanks in the ground for various reasons—the lack of space, no basement, or, perhaps, a failure to recognize the aesthetic value of the aboveground tank as a lawn ornament. Also, the oil “crisis” of the 1970s prompted many homeowners to install large capacity (i.e., 550 to 2,000-gallon) USTs.

The piping for both above and below ground fuel oil systems typically consists of a 3/8-inch copper supply line, which runs between the tank and the furnace. For basement installations, past practice was to run the line under the concrete floor, along with all the other “plumbing” (more of this practice later), or along the floor or walls.

Oil burners need a constant supply of fuel but can only burn it at a certain rate. Aboveground tanks, by virtue of the head pressure from the tank, provide a steady flow of fuel to the burner through a single line. UST fuel oil piping requires a two-line system, a fuel supply suction line, and a return line that “returns” the fuel that’s not used by the burner back to the tank. If the suction line leaks, the furnace starts to sputter, however, if the return line leaks you’d never know it. That’s why our rules require that both the suction and return lines be installed in secondary containment with leak detection.

In the past, here in Maine, fill lines and vent lines for both UST and AST home heating oil tanks were constructed of 1-1/4” to 1-1/2” black iron pipe (clearly not suitable for UST piping by today’s standards),



and run through the basement wall or against the house to where they could be accessed by the fuel oil delivery driver.

The driver makes a tight connection on the fill pipe and pumps product into the tank under pressure. He or she knows when the tank is full by listening to the vent whistle, an over-fill device that’s attached to the vent line at the tank. The fitting contains a tube whistle that extends into the tank at a pre-established level. As the tank is being filled the air rushes through the tube and out the vent line, producing a whistling noise that the driver can hear. As fuel rises up to the level of the tube and submerges it, the whistle is silenced. The driver then knows to terminate the delivery.

Failures and Fixes

There are a number of potential integrity problems associated with fuel oil systems, but let’s look at the main culprit—piping—and its partner in crime—corrosion. Galvanic corrosion is certainly a predator that lurks ready to pounce on buried metals given the right conditions. This type of corrosion usually involves differences between metals or differences between chemical properties of the backfill material surrounding the pipe.

The latter is likely to be the problem in Mrs. Beal’s case—copper lines resting on bedrock and covered with soil. A more ubiquitous situation exists where copper lines rest on soil and are covered by a concrete basement floor. The point where soil, concrete, and copper meet tends to be where most corrosion occurs.

When you add a little water, the corrosion circuit is complete.

The current installation practice in Maine is to sleeve the copper lines in PVC or ABS plastic pipe to prevent contact with this aggressive environment. Another way of keeping copper piping out of harms way is to run it along the basement wall. This gets it aboveground and off the floor. Slips, trips, and falls don’t do you or the piping any good, so if you must run the line across the floor, cover it with door threshold stripping.

Fuel filters and shut-off valves can also corrode if partially buried. These items, as well as the exposed portion of the piping are susceptible to damage, especially in outside situations. For example, at another coastal, shallow bedrock site, a snow plow clipped the fuel line and filter. The fuel leaked out and the owner thought she was simply out of fuel. The oil company filled the tank up and in a few days the fuel was gone. As a result, seven homes have contaminated wells. If MDEP were to install a community water supply (they are on carbon filter systems for now) the cost would be \$1.1M...all because of a little 275-gallon home heating oil AST.

Steel USTs fail, for the most part, because of corrosion, but aboveground 275s fail in more “comical” ways. The spindly steel legs rust out, frost heave tips tanks over, snow and ice falling from roofs break lines, and ruptures from vent restrictions occur frequently. This latter example seems to happen to a lot of manifold tanks—the first one fills up and

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ruptures, probably because of inadequate venting of the tank. ASTs can also fail because of corrosion, especially if they have water in the bottom or if they are sitting right on the ground.

In some cases, secondary containment for home heating oil ASTs would be a good idea. Most national codes don't mandate secondary containment unless storage capacity exceeds 660 gallons for a single tank or 1,320 gallons aggregate. I would recommend secondary containment if the tank is located in a basement with an unfinished (dirt or bedrock) floor or if the tank is outside in an area with sandy soils and within 50 feet of a well. You can buy, for a price, tanks contained in attached steel dikes. I've also seen tanks with secondary containment consisting of the bottom half of a concrete septic tank.

Famous Last Words

One last word on UST home heating oil tanks. Because USTs are concealed, in my opinion, they are not for home use, unless secondarily contained with continuous leak detection. If you are a home heating oil UST owner in a state that does not regulate home heating oil USTs, it doesn't mean there is nothing to worry about. If you have a buried 275, remove it...now!

You may say to yourself, "Why should I be concerned, I live in town and have city water?" Just wait until you try to sell or refinance your home. Lending institutions and prospective buyers are very leery about USTs. We find dozens of unregistered home heating oil USTs each year as a result of property transfers.

So, now that you know what can happen to that innocuous looking tank in your basement, backyard, or in the ground, you are halfway to winning the battle. Environmental awareness begins at home, so pay attention to your heating oil system. For heaven's sake, if you start using more fuel than normal, don't keep filling up the tank... investigate. ■

Self Inspection Checklist for Basement and Backyard Aboveground Home Heating Oil Tanks

If you answer "YES" to any of the following questions, call your oil burner technician for a more detailed inspection and corrective measures. This is a list of items that you can easily observe. But remember, look, don't touch. Even if you can see rust or an oily area, don't touch. It's best to call a licensed oil heat technician, and let a professional take care of it.

- Are the tank legs unstable or on a precarious foundation?
- Are there any signs of rust, weeps, wet spots, or excessive dents on the tank's surface?
- Are there any drips or signs of leakage around the filter or valves?
- Do the oil lines between the tank and the furnace run either under concrete or aboveground without being encased in protective tubing?
- Is there danger of snow or ice falling on the tank?
- Is the tank vent clogged or restricted because of ice, snow, or insect nests? (Screened vents can be used to prevent insect nest problems.)
- Is the overfill whistle silent when the tank is being filled? (Ask your delivery person.)
- Are there signs of spills around the fill pipe or the vent pipe?
- Is the fuel-level gauge cracked, stuck, or frozen...or are there signs of oil around it?
- Are you using more oil than normal?

Self Inspection Checklist for Home Heating Oil USTs

If you answer "YES" to any of the following questions, call your oil burner technician for a more detailed inspection and corrective measures. (Of course, the best thing to do is to remove your UST and switch to above-ground storage.)

- Are you using more fuel than normal?
- Is your tank taking on water—a rise in water level greater than 1/2" for an 8-to 12-hour period? (Your oil-burner technician can check for water or provide you with water-finding paste so you can check yourself.)
- Are there signs of oil sheens in nearby streams, wetlands, or drainage ditches?
- Are there signs of distressed (withered) vegetation over or down slope of the tank?
- Is the tank vent clogged or restricted because of ice, snow, or insect nests? (Screened vents can be used to prevent insect nest problems.)
- Is the overfill whistle silent when the tank is being filled? (Ask your delivery person.)
- Are there signs of spills around the fill pipe or the vent pipe?