
ENVIRONMENTAL Fact Sheet



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Preventing Groundwater Contamination at Gas Stations— What Municipalities and Water Suppliers Can Do

Generations of automobile drivers have become accustomed to finding gas stations conveniently located along busy roads and highways, at intersections, and in village centers, to support our automobile-dependent lifestyles. As the environmental risks associated with gas stations—particularly the risk of gasoline leaked from underground storage tank (UST) systems—have become increasingly clear, vast improvements have been made in the design, construction, and operation of UST systems. Unfortunately, federal and state regulators and UST system designers and installers have *not* succeeded in engineering *all* of the groundwater contamination risk out of these systems. A study by the U.S. Geological Survey, which randomly sampled 225 water supply wells in Rockingham County in 2003, detected the gasoline additive MtBE in 40 percent of public wells, and found a correlation between MtBE concentration and proximity to USTs.¹

The main sources of concern with respect to double-walled USTs and groundwater contamination are vapor releases from UST facilities and small spills of fuel that routinely occur when fuel is being dispensed to vehicles. With a view to minimizing the impacts of those releases, DES maintains technical standards for the siting, design, and installation of UST systems, and an active inspection program to oversee their operation and maintenance. Unfortunately, DES does not have the resources to ensure that all UST systems comply with daily operation and maintenance requirements once they are installed, let alone ensure that these systems are leak-free. There are also many older single-walled tanks and piping systems at gas stations that are *not* required to comply with newer design standards for spill containment and stormwater management, but that must be closed no later than December 22, 2015. These must pass leak monitoring tests designed to detect leaks as slow as 0.1 gallon/hour, but could continuously leak at a less rate without detection.

In addition to vapor releases and chronic small spills, larger spills sometimes take place during the process of fueling vehicles and portable containers. Well-designed and operated gas stations incorporate a number of measures to minimize the groundwater contamination risk from routine and accidental spills. However, given the limits of DES's oversight and the state of the art, local officials need to ensure that the appropriate restrictions and oversight are in place on the local level, to the extent that communities want to ensure protection of their groundwater resources.

This fact sheet outlines a number of steps that municipal officials and water suppliers should consider taking to minimize the groundwater contamination risk of gas stations.

¹ Ayotte, J.D., Argue, D.M., and McGarry, F.J., 2005, Methyl tertiary-Butyl Ether occurrence and related factors in public and private wells in southeast New Hampshire: *Environmental Science and Technology*, vol. 39, no. 1, p. 9-16. (<http://nh.water.usgs.gov/Publications/2005/es049549e.pdf>)

Siting Restrictions

Given the likelihood that UST systems will release gasoline constituents (most commonly in the form of vapor leaks from underground piping systems or overfills of the UST, vehicle tank, or portable container) and the possibility that spilled fuel will be carried off the fueling area by stormwater, municipal officials interested in providing the highest possible level of protection for groundwater used for drinking water should consider restricting the siting of gas stations as they would any other land use that is likely to contaminate groundwater. If the municipality's zoning ordinance prohibits the location of certain high-risk land uses in wellhead protection areas, aquifer protection areas, or other areas of high-value groundwater, gas stations should be considered for inclusion in the list of prohibited land uses.

Municipal officials should also consider including setbacks in zoning ordinances or site plan review regulations to separate UST systems and gas station stormwater discharges from water supply wells, both public and private. A 2002 study of petroleum contamination travel distances at discharge sites in Maine found the *average* distance traveled was 295 feet for gasoline constituents and 140 feet for diesel/fuel oil constituents. About one-third of MtBE contamination plumes, one-quarter of other gasoline plumes, and one-sixth of diesel/fuel oil plumes traveled more than 300 feet.² DES's rules for the siting of UST systems *at new sites* (Env-Wm 1401.28 (ac)) include the following setbacks:

- ❑ 500' between gasoline USTs and public water supplies (PWSs)
- ❑ 400' between other USTs and PWSs
- ❑ 250' between gasoline USTs and private wells
- ❑ 75' between other USTs and private wells
- ❑ 75' between any UST and surface water

Municipalities that feel that these setbacks are not sufficiently protective of public or private water supplies or other water resources can establish more stringent setbacks, as well as applying setbacks to new USTs at existing sites, although DES does not recommend that local siting restrictions be applied to replacement USTs.

Whether or not municipalities establish their own UST setback requirements, they should help ensure that UST systems at new sites comply with DES's setbacks, since DES does not always have the resources to field-check information about existing wells provided to DES by UST applicants. This can be done through the local site plan review process in municipalities that have site plan review regulations, and whenever applicants for new USTs notify the municipality, as required by DES.

Site Design

The design of UST systems (the tank and underground piping) is thoroughly regulated by DES.³ DES is *not* recommending that municipalities establish additional *design* criteria for these tank systems. However, there are several aspects of gas station design that can receive additional attention during site plan review from a groundwater protection standpoint.

Spill Containment

In addition to requiring devices that are designed to contain spills that may occur when USTs are being filled, DES rules for new USTs⁴ require a concrete pad with positive limiting barriers (PLBs) to contain spills in the fuel dispensing area (Env-Wm 1401.28 (v)). PLBs are grooves in the concrete around the edge of the dispensing area; the rule requires that they be constructed *and*

² Bureau of Remediation and Waste Management, Maine Department of Environmental Protection, "Historical Oil Contamination Travel Distances in Ground Water at Sensitive Geological Sites in Maine," April 30, 2002.

³ This fact sheet deals only with USTs used to store motor fuel at gas stations. For state regulatory requirements for other UST types, please refer to DES fact sheet WMD-REM-20. For information on above-ground storage tanks, please refer to WMD-REM-5.

⁴ The rules apply where the concrete pad is disrupted for tank or piping installation after February 2005.

maintained to contain five gallons *for each dispenser*—each dispenser typically has two dispensing hose. The rule also states that dispensing nozzles may not extend beyond the PLBs.

Additional Sump Requirement

Municipalities could drastically reduce the probability of releases by requiring that all tank top connections—including fill, pump, and automatic tank gauging (ATG) risers—occur within full-depth or collared sumps, and by requiring double-walled piping for the underground portion of vent pipes.⁵

Stormwater Management

The guiding principle of stormwater management at gas stations is to keep clean water clean. Relatively clean stormwater, such as from roofs and areas other than the fueling area, may not be allowed to run onto the fuel dispensing area (Env-Wm 1401.28 (al)). The relatively clean stormwater can be managed the same as stormwater from any parking area; it should be directed as sheet flow over grassed areas and/or collected and treated according to accepted stormwater best management practices (BMPs).⁶ With this in mind, the site should be designed and maintained with a snow removal plan and designated snow storage areas that do not interfere with the intended stormwater flow.

If the municipality has an opportunity to review the site plan for an existing facility, such as in the case of site alteration or expansion, the design goal should be to keep stormwater off the dispensing pad. Whenever practical, stormwater management at an existing facility should be brought up to date with a canopy draining outside the dispensing area, a properly pitched, impervious concrete dispensing pad, and properly sized PLBs.

Groundwater Protection Plan

Municipalities should require applicants to submit a plan to minimize the potential for groundwater contamination. Implementation of the plan should be a condition of site plan review approval. The plan should cover the following items:

- ❑ A complete description of spill prevention and control measures for the facility. Spill prevention begins with the customer. Signs should be posted at the pump instructing customers not to top off fuel tanks and to notify an employee in the event of a spill. Emergency shutoff switches should be plainly labeled.
- ❑ An estimate of the maximum quantity of fuel that could be spilled in the event of an equipment failure, along with an analysis of its fate and a plan for preventing it from reaching groundwater or surface water. The plan should include descriptions of containment and/or diversionary structures or equipment needed in the event of a spill, and a demonstration that the needed equipment, personnel, and other resources would be available to respond to a spill.
- ❑ A notification list, including the names and phone numbers of local management, remote management, fire and police, local and state agencies needing to be notified, and spill response contractors.
- ❑ Routine spot cleaning of small spills at fueling areas with dry methods. Dry methods include using rags or absorbents. Fueling areas should never be washed down unless the water is collected and disposed of properly. The plan should specify that an adequate supply of absorbent materials be kept readily available.
- ❑ Storage and disposal of used sorbents and/or rags.
- ❑ Maintenance of PLBs and the stormwater management system, including BMPs.
- ❑ Provisions to ensure that snow plowing and other maintenance will not interfere with the proper functioning of stormwater management, spill containment, and leak detection systems.

⁵ DES plans to propose adding these additional requirements to Env-Wm 1401 during 2012.

⁶ For more information, please see DES report R-WSPCD-95-3, Best Management Practice for Urban Stormwater Runoff.

- Employee training: Employees should be trained (upon hiring and annually thereafter) in all aspects of routine operation and maintenance, including routine spill cleaning and containment of contaminated stormwater, as well as spill response and other emergency procedures.

Existing Gas Stations—Local Regulatory Options

Several options exist for local oversight of existing gas stations. Of the approaches listed above, siting restrictions clearly would not apply to existing UST systems at existing gas stations. However, some aspects of site design (stormwater management, PLBs) could be corrected at existing gas stations, and the implementation of a groundwater protection plan is certainly achievable at existing sites. While existing operations would be exempt from requirements enacted in zoning or site plan review regulations, municipalities can institute these requirements through a general bylaw under RSA 31:39, or a health regulation or health ordinance enacted under RSA 147:1, I, if the purpose is to protect public health.

Existing Gas Stations—Non-Regulatory Options

According to a 2001 report by the U.S. Government Accounting Office, 29 percent of regulated USTs nationally are not being operated and maintained properly. The most important non-regulatory role for water suppliers and municipal officials with respect to existing gas stations is to ensure compliance with state requirements with respect to stormwater management, spill containment, and periodic inspection of release prevention and detection systems. DES strongly urges municipalities and/or water suppliers to visit gas stations annually (subject to the voluntary cooperation of owners) to verify that the owners are complying with these requirements, as well as any local site plan review conditions. Municipalities may also wish to offer incentives to owners of single-walled tanks or piping to close them prior to the December 22, 2015, deadline.

For Additional Information

For more information on local groundwater protection measures, please visit www.des.nh.gov, click on A to Z List and choose Drinking Water Source Protection Program., or call (603) 271-7061.

For additional information, please contact the Drinking Water and Groundwater Bureau at (603) 271-2513 or dwgbinfo@des.nh.gov or visit www.des.nh.gov, click on A to Z List and choose Drinking Water and Groundwater Bureau. All of the bureau's fact sheets are online at <http://des.nh.gov/organization/commissioner/pip/factsheets/dwgb/index.htm>.

Note: This fact sheet is accurate as of December 2011. Statutory or regulatory changes or the availability of additional information after this date may render this information inaccurate or incomplete.