

Reducing the Risk of Groundwater Contamination by Improving Fertilizer Storage and Handling

Fertilizer Storage Practices

If stored safely in a secure location, fertilizers pose little danger to groundwater. Common sense suggests keeping fertilizer bags on pallets, dry and out of the way of activities that might rip a bag open or allow rain to enter a bulk container.

In the event of an accident, an impermeable (waterproof) floor, such as concrete, helps to prevent fertilizer seeping into the ground and getting into groundwater. Secondary construction such as a curb built around liquid fertilizer storage areas will prevent contaminants from spreading to other areas.

Secondary containment provides an impermeable floor and walls around the storage area, minimizing the amount of fertilizer seeping into the ground if a bulk liquid fertilizer storage tank should leak. Remember:

- ◆ A mixing/loading pad provides for secondary containment during the transfer of liquid fertilizer to application equipment or nurse tanks.
- ◆ Store piles of dry bulk fertilizer on an impermeable surface under cover or in a building.
- ◆ Treat dry fertilizer impregnated with a pesticide as a pesticide.
- ◆ Store fertilizer under cover or protected from rain.

Building a new storage facility

If you are considering building a new structure in which to store fertilizers, keep these simple principles in mind:

- ◆ Locate the dry storage building or liquid secondary containment downslope at least 100 feet away from the well. Separation from the well should be greater in areas of sand or fractured bedrock.
- ◆ In the event of a fire, contaminated surface water should drain to a confined area.

Topics Covered:

Fertilizer storage practices

- ◆ Building a new storage facility
- ◆ Modifying an existing storage facility

Mixing and loading practices

- ◆ A liquid fertilizer mixing and loading pad
- ◆ Better management of your existing mixing and loading site

Spill cleanup

Container disposal practices

Other management factors

Source Water Protection/Wellhead Protection Area

Contacts and References

- The mixing and loading area should be close to your storage facility, to minimize the distance that chemicals are carried.
- The building foundation or secondary containment floor should be well drained and located well above the water table. The finished grade should be 3 inches below the floor of the storage area and sloped away from the building to provide surface drainage. Tiles or gutters should be used to prevent roof runoff from entering the building.
- Provide pallets to keep bags off the floor. Store dry products separately from liquids to prevent wetting from spills.
- Provide adequate road access for deliveries and emergency equipment. For information on factors to consider in the design of a storage facility, such as ventilation, water access, temperature control and worker safety, contact your county Natural Resource Conservation Service (NRCS) office or the University of Maine Cooperative Extension for plans and recommendations.

A locked storage cabinet or building provides security. Provide signs or labels indicating that the cabinet or building is a fertilizer storage area. Labels on the outside of the building give firefighters important information about fertilizers during an emergency response for a fire or spill.

For glossary, see page 2 of Worksheet #3.

Modifying an existing storage facility

The above are also important points to remember for existing storage. The cheapest alternative you may have is to cut back on the amounts stored, but if that option is not practical, consider the following points.

You may find the above principles to be expensive and difficult to apply to your current storage but compared to the cost of a major accident or even a lawsuit, storage improvements are a bargain.

Sound containers are your first defense against a spill or leak. Should a bag be accidentally ripped, fertilizers should be confined to the immediate area and promptly recovered. That means having a solid floor and, for liquid fertilizers, a curb. The secondary containment space should have enough volume to hold 110 percent of the contents of the largest container.

Ideally, your fertilizer storage area should be separate from other activities. If the building must also serve as a machine shed or as housing for livestock, you may find it difficult to meet all the requirements for safe storage.

Stored fertilizers can pose a danger to firefighters and to the environment. Reducing the fire risk in the storage area may be the first step. Here are some additional things that can be done:

- If a fire should occur, consider where the water will go and where it might collect.
- When making the storage area secure, also make it accessible, allowing you to get fertilizers out in a hurry.

- ◆ If fertilizer containers are damaged, the stored nutrients may be carried away by water and spread over a large area.
- ◆ Label windows and doors to alert firefighters to the presence of fertilizers stored in the structure.
- ◆ A curb around the floor can help confine contaminated water.

Mixing and loading practices

A liquid fertilizer mixing and loading pad

Containing liquid fertilizer spills and leaks requires an impermeable surface (such as concrete) for mixing and loading. A concrete pad should be large enough to accommodate your equipment and to contain leaks from bulk tanks, wash water and spills from transferring fertilizers to the sprayer.

Locate the pad adjacent to the storage area. Make sure that water from the storage area moves away from the well. At sites where runoff could reach the well, construct a diversion to direct runoff to another area.

Groundwater contamination can result from small quantities spilled regularly in the same place. Spills of dry fertilizer should be promptly and completely cleaned up and placed immediately into the application equipment. Cleaning up spills of liquid fertilizers can be much more difficult.

Better management of your existing mixing and loading site

Liquid fertilizer spills and leaks are bound to happen from time to time. Even if you don't have an impermeable mixing and loading pad you can minimize contamination by following some basic guidelines:

- ◆ Avoid mixing and loading fertilizers near your well. One way to do this is to use a nurse tank to transport water to the mixing and loading site. Ideally, the mixing site should be moved from year to year within the field of application.
- ◆ Avoid mixing and loading on ledge outcrops, gravel driveways, or other surfaces that allow spills to sink quickly through the soil. A clay surface is better than sand.
- ◆ Install an anti-backsiphon device on the well or hydrants. Never put the hose in the sprayer tank. Provide an air gap of 6 inches between the hose and the top of the sprayer tank.
- ◆ Always supervise sprayer filling.
- ◆ Consider using a closed handling system, in which the fertilizer is directly transferred from the storage container to the applicator equipment, such as by a hose. Humans and the environment are never inadvertently exposed to the fertilizers.
- ◆ Use rinsate (pesticide-containing solutions that are generated by the rinsing of application equipment and tanks or pesticide containers) for mixing subsequent loads.

Spill Cleanup

For dry spills, promptly sweep up and reuse the fertilizer as it was intended. Dry spills are usually very easy to clean up. Dry impregnated fertilizer is considered a pesticide and, if spilled, should be recovered and applied to the target crop as it was intended.

Be Prepared!

- ◆ Have an emergency response plan for the site.
- ◆ Know where the runoff water will go.
- ◆ Know how to handle your particular fertilizers.
- ◆ Post emergency response phone numbers such as fire department and ME DEP.

For liquid spills, recover as much of the spill as possible and reuse as it was intended. Some contaminated soil may be required to be removed and field applied if possible.

Report spills of any amount in streams or lakes to the Maine Department of Environmental Protection at 1-800-482-0777. Report spills of more than 50 gallons on the soil or a mixing/loading pad. Smaller quantities of liquid or dry products should be reported if they could cause damage because of the nature of the specific compound or spill location.

Container Disposal Practices

Bulk deliveries of anhydrous ammonia, liquid fertilizers and dry bulk fertilizers have reduced the need to dispose of containers. Many farmers do, however, use bagged fertilizers and burn the bags in the field which is illegal. Your drinking water is least likely to be contaminated by your disposal practices if you follow appropriate management procedures or dispose of wastes off the farm site. However, proper off-site disposal practices are essential to avoid risking contamination that could affect the water supplies and health of others.

Burning bags is illegal. Bundle bags and dispose of them in an approved landfill.

Other management practices

Reducing fertilizer waste makes financial as well as environmental sense, but it means more than just reducing spills. It also means not buying more than you need to apply and keeping records of what you do have on hand. Buying only what you need makes long-term storage unnecessary.

Keeping records may seem like a task unrelated to groundwater contamination, but knowing what you've used in the past and what you have on hand allows you to make better purchasing decisions. Keep records of past field application rates and their effectiveness.

Source Water Protection/Wellhead Protection Area

Almost half of Maine's population depends on groundwater for its drinking water supply from either private or public wells. We are lucky to have some of the best water supplies in the world, and it is our job to keep them safe. Being aware of potential problems on your property that might pollute drinking water sources is important. You may not even know that there is a potential threat. Taking the time to read and fill

There are some laws that pertain to areas within a source water protection zone that don't apply to other landowners. Be sure to check with your local water district and municipality for local ordinances or if you are unsure if you live in a source water protection area.

out the applicable Farm-A-Syst sections is a great first step. From there you will sit down with a district employee or someone trained in Farm-A-Syst to discuss some possible solutions such as best management practices (BMP) that can be applied. BMPs are a method, measure, or practice that, when correctly installed or performed, will prevent, reduce, or minimize water pollution. In this case, the focus is on drinking water supplies and the areas that provide them with water.

It is the landowner's responsibility to know local and state laws pertaining to their land, although it is hard to navigate sites and wade through the legal jargon of written laws.

If you are living or operating in a source water protection area (the surface and subsurface areas surrounding a drinking water supply for a public water system where activities can contaminate the supply) or wellhead protection area (an area used to protect groundwater, a form of source water) you should pay extra special attention. We have tried to find pertinent information pertaining to this section. You can find links to these laws along with helpful information in the following Contact & Reference section as well as in appendices A: Law and Regulations & B: Resources.

The following , authored by Maine Drinking water program, is excerpted from the document "Best Management practices for Groundwater Protection". This manual is intended for the use of local officials, public water suppliers and landowners in Maine. It is intended to encourage educated decisions, informed practice, and directed planning in regard to groundwater protection, particularly in the vicinity of public drinking water supply wells. <http://www.maine.gov/dhhs/eng/water/forms/Sections/BMPv2%200A.htm>

A. Chemical Storage

1. Store all chemicals under cover, and on impervious working surfaces, without floor drains. Design storage space so that failures, emergencies, extreme storm events or routine site clearing will not cause material or wash water to run on bare ground.
2. All containers shall be clearly labeled with name of chemical, and date of purchase (or generation of waste).

C. Chemical Spreading or Spraying

Major potential problems: Some agricultural chemicals are very soluble. If they are applied during a seasonal period of groundwater recharge (principally during the rainy spring season), much of the chemical applied will contaminate groundwater rather than being agriculturally useful.

BMPs for spreading of agricultural chemicals:

1. All agricultural fertilizers shall be applied in accordance with label directions and must be applied in accordance with an approved Nutrient Management Plan.

BMPs for spreading of organic materials in agriculture:

1. Only Class "A" composted residuals may be used within Wellhead Protection Area (WHPA). These residuals must have an approved Program License from the Maine Department of Environmental Protection, and must be used in strict accordance with all license provisions. Any non-composted residual or a residual not meeting the Class "A" pathogen reduction standard should not be spread within the WHPA.

CONTACTS AND REFERENCES

Who to call about...

Plans and recommendations for fertilizer mixing and loading pads

Your county NRCS office or your county Extension office. Check your phone book for numbers.

Fertilizer spills

The Maine Department of Environmental Protection	1-800-482-0777
The Maine Department of Agriculture	207-287-3871

Proper disposal of soil contaminated by a fertilizer spill

Call the Maine Department of Environmental Protection	1-800-482-0777
The Maine Department of Agriculture	207-287-3871

Health Effects

The Maine Bureau of Health	207-287-3201
----------------------------	--------------

What to read about...

Publications are available from sources listed at the end of the reference section. (Refer to number in parentheses after each publication.)

Groundwater and nitrates in groundwater

Health Effects of Drinking Water Contaminants. University of Maine Cooperative Extension Water Quality Fact Sheet #2. Publication #7032. (1)

Health effects

The product label. Read your product labels carefully for specific information on fertilizer health effects.

Nitrate: Health Effects in Drinking Water. University of Maine Cooperative Extension Water Quality Fact Sheet #22, Publication # 7107. (1)

Fertilizer handling and management

Best Management Practices Manual. University of Maine Cooperative Extension Publication #20 14. (\$5.00) (1)

Nitrogen Fertilizer Choices: Maine Soil Nitrate Test For Corn. UMCE Publication #7097. (1)

The Maine Nitrogen Soil Test for Corn: Key to Economical, Environmentally Sound Nitrogen Fertilizer Use. UMCE Publication #7098. (1)

Best Management Practices for Maine Agricultural Producers: Protecting Groundwater from Nutrients and Pesticides. 1989. University of Maine Cooperative Extension Publication #2014. (1)

Community Right-to-Know and Agricultural Operations: A Guide to Understanding the Reporting Requirements of the Maine Emergency Planning and Community Right-to-Know Act. 1991. Maine Board of Pesticides Control. (2)

Fertilizer storage

Designing Facilities for Pesticide and Fertilizer Containment. UMCE Publication

#1154. (\$15.00)(1)

Fertilizer and Pesticide Containment Facilities Handbook. Midwest Plan Service, Ames, Iowa. MWPS-37. (3)

Publications available from

1. Your county Conservation District or NRCS office.
2. Your county Extension office. There may be charges for the publications, postage and sales tax.
3. Maine Board of Pesticides Control, Station #28, Augusta, ME 04333-0028.
4. Midwest Plan Service Secretary, Agricultural Engineering Department, 460 Henry Mall, University of Wisconsin, Madison, Wisconsin 53706, (608) 262-3310

Websites:

This link will take you to the Natural Resources Conservation Service (NRCS) Conservation Practice Standards. Here you can find technical guides that are the primary scientific references for NRCS. They contain technical information about the conservation of soil, water, air, and related plant and animal resources.

<http://efotg.nrcs.usda.gov/treemenuFS.aspx>

Below is a link to "Manual of Best Management Practices for Maine Agriculture" put out by the Maine Department of Agriculture, Food & Rural Resources Division of Animal Health & Industry. January 2007. This resource has links to many different BMPs that apply to a farm.

<http://mainegov-images.informe.org/agriculture/narr/documents/BMPManual2007.pdf>

This manual doesn't have any of the actual BMPs written out. It is literally a guide that will lead you to other links. To make things a little easier you will find direct links to BMPs suggested by the manual that pertain to this specific section.

- ◆ **50 Ways Farmers Can Protect Their Groundwater.** University of Illinois Extension, North Central Regional Extension publication 522.
www.thisland.uiuc.edu
- ◆ **CORE4 Conservation Practices Reference Manual.** USDA, NRCS, (printed manual plus CD ROM available).
<http://www.wsi.nrcs.usda.gov/products/buffers.html>
- ◆ **Barn and Manure Storage Safety.** University of Maine Cooperative Extension Bulletin 2304.
<http://www.cdc.gov/nasd/docs/d000901-d001000/d000905/d000905.pdf>
- ◆ **Manure Utilization Guidelines, February 1, 2001.** Maine Dept. of Agriculture, Food & Rural Resources, (Craig Leonard's BMP Manual).
<http://maine.gov/agriculture/narr/nutrientmanagement.html>
- ◆ **Methods and Timing for Manure Applications.** Minnesota Dept. of Agriculture. www.landwise.ca/Nutrient/Step4MethodsandTiming.htm
- ◆ **The Perishability and Profitability of Manure.** McGill University.

www.eap.mcgill.ca/MagRack/SF/July%2087%20B.htm

Maine Bureau of Health

<http://www.maine.gov/dhhs/index.shtml>

Maine Department of Environmental Protection

<http://www.maine.gov/dep/rwm/>

Maine Department of Agriculture

<http://www.maine.gov/agriculture/index.shtml>

Check Before You Choose a Fertilizer

http://www.mgsp.msu.edu/Marketing_and_Outreach/Check%20Before%20You%20Choose%20a%20Fertilizer.pdf

Best management Practices for Groundwater Protection

<http://www.maine.gov/dhhs/eng/water/forms/Sections/BMPv2%200A.htm>

See “Appendix A: Laws and Regulations” and “Appendix B: Resources” for additional links.

Acknowledgments

Update by Androscoggin Valley Soil & Water Conservation District partnered with Maine CDC Drinking Water Program. 2007-2008.

Revision Editors of Farm-A-Syst Fact Sheet #3: Megan Wooster, AVSWCD; Susan Gammon, AVSWCD; Andrews Tolman, State of Maine CDC Drinking Water Program; Mark F. Hedrich, Department of Agriculture; Susan Breau-Kelley, Maine Rural Water Association. 2007-2008.

Original Farm-A-Syst team members: John M. Jemison, Jr., University of Maine Cooperative Extension; Marianne DuBois, Maine Department of Environmental Protection, Tammy Gould; Board of Pesticides Control; Chris Jones, Natural Resources Conservation Service; Lisa Krall, Natural Resources Conservation Service; Craig Leonard, Maine Department of Agriculture; Craig Neil, Maine Geological Survey; David Rocque, Maine Soil and Water Conservation Commission; and David Lytle, University of Maine Cooperative Extension.

Original Fact Sheet #3 Adapted by John Jemison, Jr., University of Maine Cooperative Extension. 1995.