

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

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

In the event of such an accident, an impermeable (waterproof) floor, such as concrete, helps stop fertilizer from seeping into the ground and leaching to groundwater. 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, which will minimize the amount of fertilizer seeping into the ground if a bulk liquid-fertilizer storage tank leaks.

A mixing/loading pad provides 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.

If a pesticide gets into your dry fertilizer, treat it as a pesticide. Store under cover or protected from rain.

Building a new storage facility

Although a new facility just for fertilizer storage may be expensive, it may be safer than trying to adapt areas meant for other purposes (Figure 1). Keep these principles in mind:

- Place the dry-storage building or liquid secondary containment down-slope at least 150 feet away from the well. Separation from the well should be greater in areas of sand or fractured bedrock.
- In case of a fire, contaminated surface water should drain to a confined area.
- The mixing and loading area should be close to your storage facility to minimize the distance that chemicals are carried.

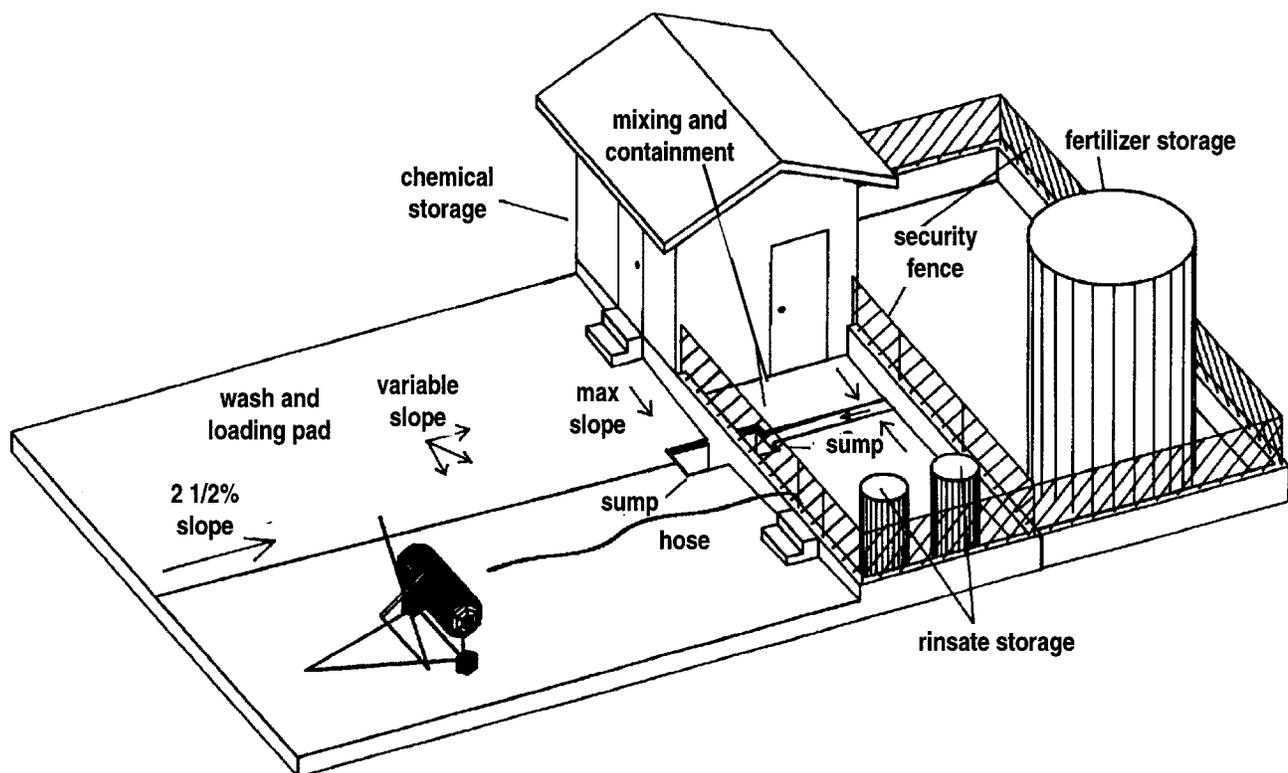


Figure 1. Farm-sized facility for fertilizer storage.

- The building foundation or secondary containment floor should be well-drained and placed above the water table. The subsoil should have a low permeability.
- Provide pallets to keep bags off the floor. Store dry products separate from liquids to prevent wetting from spills.
- If you plan to store large bulk tanks, provide a large enough containment area to confine 125 percent of the contents of the largest bulk container plus the displaced volume of any other storage tanks.
- A locked storage cabinet or building provides security. Preventing unauthorized use of fertilizer reduces the chance of accidental spills or theft. 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.
- 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 local University of Missouri Extension office or the MU Extension Agricultural Engineering program at 573-882-2731.

Modifying an existing storage facility

You may find the above principles 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.

The cheapest alternative you may have is to cut back on the amounts stored. If that option is not practical, consider how you can protect the fertilizers you keep on hand.

Sound containers are your first defense against a spill or leak. If a bag is accidentally ripped, confine fertilizers to the immediate area.

That means having a solid floor and, for liquid fertilizers, a curb. The secondary containment space should have enough volume to hold 125 percent of the contents of the largest container plus the displaced volume of any other storage tanks in the area.

Ideally, your fertilizer storage area should be separate from other activities. If the building also must 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, but you can do other things.

You can reduce the damages by anticipating such emergencies. If a fire occurs, consider where the water will go and where it might collect.

In 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. A curb around the floor can help confine contaminated water.

Alert local fire/rescue associations and your county emergency response coordinator about where and when fertilizers are stored.

Label windows and doors to alert firefighters to the presence of fertilizer stored in the structure.

Mixing and loading practices

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

A liquid fertilizer mixing and loading pad

Containing liquid fertilizer spills and leaks requires an impermeable surface 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.

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

The size of the pad depends on the equipment you use. It should have space for washing and rinsing around the parked equipment. Fertilizers and rinse water, or rinsate, should have a confined area, such as a sump, for settling before transfer to rinsate storage tanks. Having several separate rinsate storage tanks allows you to keep rinse water separate from different fertilizer chemical mixes. That way, it can be used for mixing water on subsequent loads.

If you are considering building a mixing/loading pad, more detailed information is available from local MU Extension centers or the MU Extension Agricultural Engineering program at 573-882-2731.

Better management of your existing mixing and loading site

Liquid fertilizer spills and leaks are bound to occur 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, you should move the mixing site from year to year within the field of application.
- Avoid mixing and loading on gravel driveways or other surfaces that allow spills to sink quickly through the soil. A clay surface is better than sand.

Effective spill response: a case example

The Wisconsin Department of Natural Resources (DNR) responded to a 4,500-gallon spill of liquid fertilizer from a tank that had been filled a few days earlier. The bottom of the storage container was leaking, and the remaining 28-0-0 quickly was transferred to a different tank. The liquid that leaked from the tank drained into the farmer's paved cattle yard. The farmer, through his fertilizer dealer, contacted the DNR for advice on containment methods. Dried manure already formed a berm along the lower edge of the paved lot, and straw and sawdust were used to absorb the liquid. The material then was landspread at normal application rates for the fertilizer.

Prompt discovery, placing the tank so that it drained to a paved and contained area and immediately reporting and recovering the spill let the farmer protect his water supply and reuse the spilled fertilizer.

In other cases, extremely high nitrates have been detected in private wells near sites where small amounts of liquid or solid fertilizers have been spilled repeatedly and not cleaned up.

- 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 transferred directly from the storage container to the applicator equipment through such a device as a hose. Humans and the environment are never inadvertently exposed to the chemical.
- Use rinsate for mixing subsequent loads.

Spill cleanup

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

Recover as much of liquid spills as possible and reuse as they were intended. You may be required to remove some contaminated soil and apply it to your field, if possible.

As required by Clean Water Commission design guides in the Missouri Code of State Regulations (10 CSR 20-8.500), report any amount of a spill to streams or lakes. Report spills of more than 50 gallons on the soil or a mixing/loading pad. Report smaller quantities of liquid or dry products if they could cause damage because of the nature of the specific compound or spill location.

To report fertilizer spills, call the 24-hour emergency hotline of the Missouri Department of Natural Resources (DNR) at 573-634-2436.

Remove the spilled material and contaminated soil no matter what the quantity, and dispose according to DNR recommendations.

Have an emergency response plan for the site. Know where the runoff water will go, how to handle your particular fertilizers and whom to call for help.

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

Your drinking water is least likely to be contaminated by your disposal practices if you follow appropriate management procedures or dispose of wastes in any location that is off the farm site. However, proper offsite disposal practices are essential to avoid risking contamination that could affect the water supplies and health of others.

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.

Contact your local MU Extension office or the MU Extension Agricultural Engineering program at 573-882-2731 for more information about this topic.

Resources

Missouri Code of State Regulations. <http://www.sos.mo.gov/adrules/csr/current/10csr/10csr>

Missouri Department of Natural Resources Technical Assistance Program for Secondary Containment Regulations, 800-361-4827

For information on proper disposal of soil contaminated by a fertilizer spill, contact your local MU Extension office, or a regional DNR office listed below:

- Kansas City — 816-251-0700
- Northeast (Macon) — 660-385-8000
- Southeast (Poplar Bluff) — 573-840-9750
- Southwest (Springfield) — 417-891-4300
- St. Louis — 314-416-2960

References

Iowa State University, Midwest Plan Service (MWPS-37) 1991. *Designing Facilities for Pesticide and Fertilizer Containment*. <https://www-mwps.sws.iastate.edu/>

catalog/crop-production/designing-facilities-pesticide-and-fertilizer-containment

Missouri Department of Natural Resources, Rolla, Mo.

Groundwater: An Economic Resource Worth Protecting.

<http://www.missourigeologystore.com/product.php?productid=994>

Farm•A•Syst: Farmstead Assessment System Fact Sheet: This guide, previously named MU publication WQ677 *Reducing the Risk of Groundwater Contamination by Improving Fertilizer Storage and Handling*, was originally produced as part of the Missouri Farmstead Assessment System — a cooperative project of MU Extension; MU College of Agriculture, Food and Natural Resources; and the Natural Resources Conservation Service — and was adapted from Wisconsin and Minnesota prototype versions of Farm•A•Syst.

ALSO FROM MU EXTENSION PUBLICATIONS

- EQ103 *Nitrate in Drinking Water*
- EQ679 *Reducing the Risk of Groundwater Contamination by Improving Hazardous Waste Management*
- G9808 *Nitrate and Water*

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