

NEW JERSEY FARM-A-SYST

A FARMSTEAD WATER QUALITY ASSESSMENT SYSTEM

#2 Fact Sheet: Reducing the Risk of Groundwater Contamination by Improving Pesticide Storage and Handling

We'll look at five areas of pesticide management on your farmstead: 1) pesticide storage practices; 2) mixing and loading practices; 3) spill cleanup; 4) container disposal practices; and 5) other management practices.

When handling pesticides, wear proper protective clothing at all times. Personal protection is not addressed in Farm•A•Syst, because its focus is groundwater and drinking water protection. The Contacts and References section provides some safety information sources.

1. Pesticide storage practices

If stored safely in a secure location, pesticides pose little danger to groundwater. Common sense suggests keeping them dry and out of the way of activities that might knock over a jug or rip open a bag. Short-term storage (during seasonal use) poses a lower risk than year-round storage, but **any** storage, regardless of length of time stored, poses a risk to groundwater.

If a spill does occur, an impermeable (waterproof) floor, such as concrete, should virtually eliminate any seepage of chemicals into the ground. Putting a curb around the floor will prevent chemicals from spreading to other areas.

Secondary containment provides an impermeable floor and walls around the storage area, which will minimize the amount of pesticide seeping into the ground if a bulk liquid pesticide storage tank should leak.

A mixing/loading pad provides for secondary containment during the transfer of pesticides to spraying equipment or nurse tanks.

Building a new storage facility

Building a new facility just for pesticide storage may be expensive, but generally it will be safer than trying to modify areas meant for other purposes.

When building a new facility, keep in mind a few principles of safe pesticide storage:

1. Locate the building downslope and at least 100 feet away from your well. Separation from the well should be greater if the site has sandy soils or fractured bedrock near the land surface. The risk of pesticide contamination of groundwater is influenced by properties of both the pesticide and the soil on which it is spilled or applied. (Worksheet #11, *Site Evaluation*, assists you in ranking your farmstead soils and geologic conditions according to their ability to keep pesticides and other contaminants out of groundwater.) In New Jersey, it is mandated that the actual storage area be kept separate from a living area and/or work area and that restricted-use pesticides be kept in structurally separate rooms.

For glossary, see page 2 of Worksheet #2.

2. In the event of a fire, contaminated surface water should drain to a confined area.

3. The mixing and loading area should be close to your storage facility, to minimize the distance that chemicals are carried.
4. The building foundation or secondary containment floor should be well drained and high above the water table. The finished grade should be 3 inches below the floor and sloped to provide surface drainage away from the building. The subsoil should have a low permeability.
5. Provide pallets to keep large drums or bags off the floor. Shelves for smaller containers should have a lip to keep the containers from sliding off. Steel shelves are easier to clean than wood if a spill occurs. Store dry products above liquids to prevent wetting from spills.
6. If you plan to store large bulk tanks, provide a containment area large enough to confine 125 percent of the contents of the largest bulk container, plus the displaced volume of any other storage tanks in the area.
7. New Jersey law mandates that the storage enclosure be locked. Preventing unauthorized use of pesticides reduces the chance of accidental spills or theft. Signs or labels (written in at least English and Spanish) must identify the cabinet or building as a pesticide storage area. Labels on the outside of the building give firefighters information about pesticides during an emergency response for fire or a spill.
8. Provide adequate road access for deliveries and emergency equipment.
9. Keep pesticides separate to prevent cross-contamination. Herbicides, insecticides and fungicides should be kept on separate shelves or areas.
10. In New Jersey, ventilation must be sufficient to keep fumes from intruding into a living area.
11. For information on other factors to consider in the design of a storage facility—such as water access, temperature control and worker safety—contact your local NRCS district office (see introductory sheet).

Modifying an existing storage facility

Even if you decide to improve your current storage building, applying the above principles can be expensive. Compared to the cost of a major accident or a lawsuit, however, storage improvements are a bargain. (Items 5-10 above are also important points to remember for existing storage.)

The cheapest alternative you may have is to cut back on the amounts and types of pesticides stored. If that's not practical, consider how you can protect the pesticides you keep in storage. Sound containers are your first defense against a spill or leak.

If a container is accidentally ripped open or knocked off a shelf, the spill should be confined to the immediate area and cleaned up promptly. The building should have a solid floor and, for liquid pesticides, a curb. The secondary containment space should be large enough to hold 125 percent of the contents of the largest full container, plus the displaced volume of any other storage tanks in the area.

Remodeling existing facilities that serve other uses may be less expensive than building a new facility, but remodeling can be complicated. When existing buildings must accommodate other activities, using them also to store pesticides could compromise the safety of people and the environment. Storing chemicals in a separate facility reduces the risk associated with fire or accidental spills. Never store pesticides inside a wellhouse or a facility containing an abandoned well.

You can reduce damages by anticipating emergencies. Fires in a storage area present a special hazard to people and the environment. If containers are damaged, the stored chemicals may be carried away by water and spread over a large area.

Windows and doors can be labeled to alert firefighters to the presence of pesticides and other products stored in the structure. NJ Department of Environmental Protection mandates that a listing of all stored pesticides must be kept in a separate location from the storage area.

If a fire should occur, consider where the surface runoff water will go and where it might collect. For example, a curb around a floor can help confine contaminated water.

In making the storage area secure, also make it accessible, to allow getting chemicals out in a hurry.

2. Mixing and loading practices

Groundwater contamination can result even from small spills in the mixing and loading area. Small quantities spilled regularly in the same place can go unnoticed, but the chemicals can build up in the soil and eventually reach groundwater. By mixing and loading on an impermeable surface, such as concrete, you can contain and reuse most spilled pesticides.

A mixing and loading pad

Containing pesticide spills and leaks requires an impermeable (waterproof) surface for mixing and loading. The pad should be large enough to contain leaks from bulk tanks, wash water from cleaning equipment, and spills from transferring chemicals to the sprayer or spreader. (See Figure 1.)

The size of the pad depends also on the equipment you use. It should provide space around the parked equipment for washing and rinsing. Having several separate rinsate (rinse water) storage tanks allows you to keep rinsate from different chemicals separate. That way, it can be used as mixing water on subsequent loads.

Locate the pad next to the storage area. Make sure that any water from the pad moves away from the well. At sites where runoff water could reach the well, construct a diversion so runoff is directed to a safe, stable area.

If you are considering constructing a mixing and loading pad, contact your local NRCS district office (see introductory sheet).

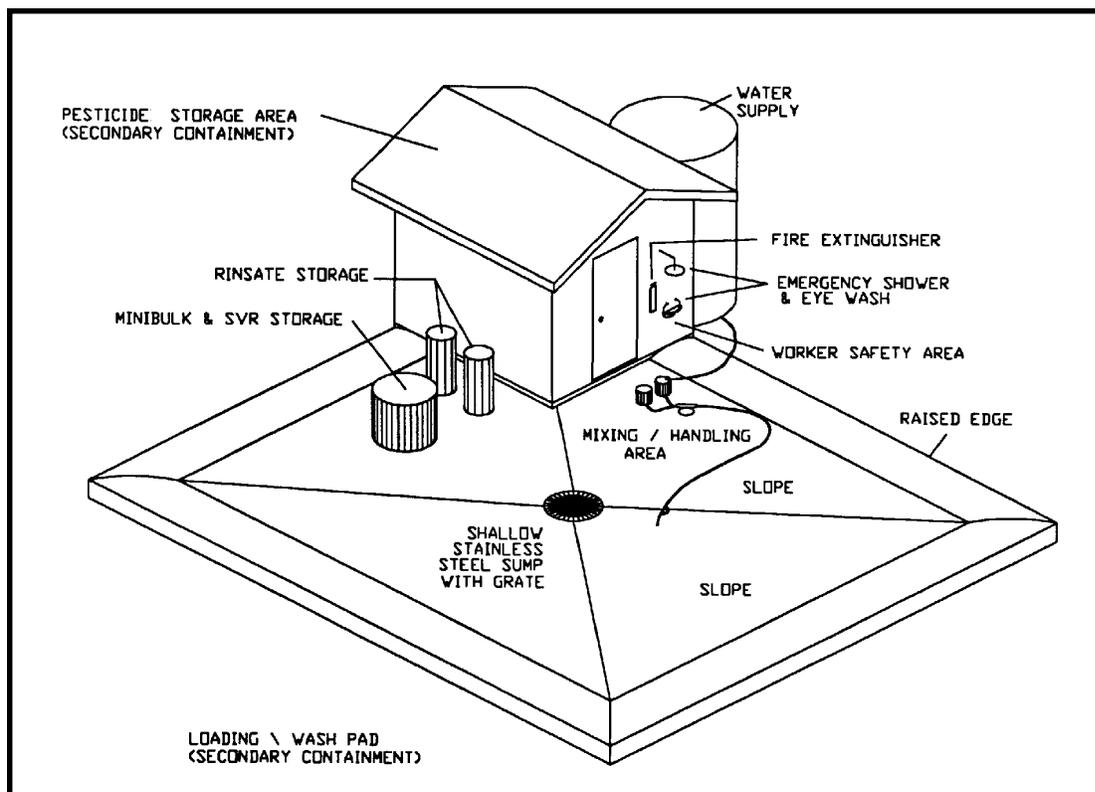


Figure 1: Farm-sized pesticide facility. Source: *Farm-Sized Mixing/Loading Pad and Agri-chemical Storage Facility*, by D.W. Kammel and D. O'Neil, presented at Summer Meeting of the American Society of Agricultural Engineers, June 24-27, 1990.

Better management on your existing mixing and loading site

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 pesticides 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 each 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.
- New Jersey law requires a backsiphon prevention device (antibackflow device) on the well or hydrants to prevent reverse flow of liquids into the water supply. Never put the hose in the sprayer tank.
- Always supervise sprayer filling. For restricted-use pesticides, a trained and certified applicator must supervise operations.
- Consider a closed handling system, which transfers the pesticide directly from storage container to applicator equipment (through a hose, for example). Humans and the environment are never inadvertently exposed to the pesticide.
- Use rinsate for mixing subsequent loads. Spray the last rinsate load on the labeled crop.

3. Spill cleanup procedures

For dry spills, promptly sweep up and reuse the pesticide as it was intended. Dry spills are usually very easy to clean up.

For liquid spills, recover as much of the spill as possible and reuse as it was intended. It may be necessary to remove and field apply some contaminated soil.

On the soil or on a mixing and loading pad, report spills greater than 1 pound of dry active ingredient or 1 gallon of liquid. Report spills of smaller quantities if they may cause damage because of the specific compound or spill location.

Registered pesticide applicators are required by state law to immediately report a spill to the NJ Department of Environmental Protection (N.J.A.C. 7:30-9.14). To report, call the 24-hour Emergency Hotline of New Jersey Department of Environmental Protection at (609) 292-7172 or the Pesticide Control Program at (609) 530-4132.

Remove the spilled material and contaminated soil no matter what the quantity, and dispose of according to recommendations you receive when you report the spill.

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

4. Container disposal practices

Unwashed and improperly stored containers can lead to groundwater contamination by allowing chemical residues to leak onto the ground. Some basic guidelines can help avoid similar problems:

- As often as possible, use returnable containers and minibulks and take them back to the dealer.
- Pressure-rinse or triple-rinse plastic containers immediately after use, since residue can be difficult to remove after it dries. Pour rinse water into the spray tank. Puncture or crush containers and store them in a covered barrel until you can take them to a permitted landfill.
- Recycle plastic and metal containers whenever possible.
- Shake out bags, bind or wrap them to minimize dust, and take them to a permitted landfill.
- Do not bury or burn pesticide containers or bags on the farm.

Your drinking water is least likely to be contaminated 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.

(For more detailed information about proper disposal of pesticide containers, refer to Worksheet and Fact Sheet #5, *Hazardous Waste Management*. Fact Sheet #5 also discusses the risks of burning these containers.)

Atrazine at 40,000 Parts Per Billion: A Case Example

Staff of the Wisconsin Department of Agriculture, Trade and Consumer Protection determined that careless disposal of atrazine containers might have contaminated the water supply of a dairy farm. The atrazine concentration in the well water was above the state groundwater standard of 3.5 micrograms per liter, or parts per billion (ppb). Upon visiting the farm, the staff found a box of empty 2.5 gallon liquid atrazine containers discarded outside and beneath the drip line of a farm building. Concentrate residues were visible on the outside of the containers. Surface runoff from the livestock yard flowed past the containers, discharging near the well field. Samples of surface soil in the drainageway near the containers contained atrazine at a concentration of **more than 40,000 ppb**. Such disposal incidents greatly increase the likelihood of groundwater contamination.

5. Other management practices

Reducing pesticide 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, keeping records of what you have on hand, and using older products first.

- Buying only what you need makes long-term storage unnecessary. In addition, you avoid cold weather problems, which can make some pesticides useless.
- Recordkeeping 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.

In New Jersey, farmers certified and registered as private pesticide applicators are mandated to keep records of pesticide applications (N.J.A.C. 7:30 - 8.8) Keep records of application locations and dates, the brand or trade name of the pesticide used, the amount of pesticide used, and the dosage or rate of each pesticide used. Along with field records, you can add information such as the manufacturer's name and address, chemical types and handling precautions. This information can be important if you must respond quickly to an accident.

- Using older products first keeps your inventory current and effective. Before using chemicals that have been stored for a few years, though, check with your county Extension agent about possible restrictions on their use. (Worksheet and Fact Sheet #5, *Hazardous Waste Management*, provide information on how to safely and legally dispose of unwanted and banned pesticides.)

CONTACTS AND REFERENCES

Who to call about...

General contacts

See introductory sheet

General pesticide information

National Pesticide Telecommunication Network, 1 (800) 858-PEST (-7378). Answered 24 hours a day, 365 days a year. Provides information on recognizing and treating pesticide poisoning; pesticide products, cleanup and disposal; contacts for animal poison centers; certification and training programs; and pesticide laws.

Health effects of pesticides in water

The Pesticide Control Program, NJ Department of Environmental Protection, 380 Scotch Rd., CN 411, Trenton, NJ 08625, (609) 530-5070 (automated attendant) or (609) 530-4124. With specific questions, contact your county Extension agent, county health department, or Natural Resources Conservation Service staff.

Drinking water quality and treatment and Health Advisories

EPA Safe Drinking Water Hotline, Monday through Friday, 8:30-5:00 P.M. Eastern Standard Time. Call 1(800) 426-4791.

Health and safety information on chemicals

Chemical Referral Center, sponsored by the Chemical Manufacturers Association. Call 1 (800) CMA-8200. The Center does not answer questions but does serve as a central contact point in non-emergency situations.

Plans and recommendations for pesticide mixing and loading pads

Contact your local NRCS district office (see introductory sheet).

Pesticide spills

The 24-hour Emergency Hotline of NJ Department of Environmental Protection and Energy, at (609) 292-7172 or The Pesticide Control Program at (609) 530-4132.

Proper disposal of soil contaminated by a pesticide spill

Contact the NJ Department of Environmental Protection's Division of Solid and Hazardous Waste, Advisement and Waste Classification Unit at (609) 292-8341.

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 pesticides in groundwater

New Jersey's Water (Clean Water Information Series). NJ Department of Environmental Protection and Energy. (1)

Health effects

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

Health Advisory Summaries. 1989. U.S. Environmental Protection Agency, Washington, D.C. (2)

Specifies maximum acceptable levels of pesticide concentrations in drinking water and describes health effects that might be caused by particular pesticides in drinking water.

Pesticide handling and management

Fertilizer and Pesticide Containment Facilities Handbook. 1991. MWPS-37. (4)

Pesticide Storage Facilities. Rutgers Cooperative Extension Fact Sheet #603.(1)

Storage of Pesticides and their Containers. Rutgers Cooperative Extension Fact Sheet #320. (1)

Toxicity of Pesticides. Rutgers Cooperative Extension Fact Sheet #197.(1)

Disposal of Pesticides. Rutgers Cooperative Extension Fact Sheet #198.(1)

Cleaning Spray Equipment. Rutgers Cooperative Extension Fact Sheet #628. (1)

A Consumer's Guide To Safer Pesticide Use. 1987. (2)
Free 25-page special reprint from the EPA Journal.

Pesticides: A Community Action Guide. 1985. Concern, Inc., Washington, D.C. (3)

Chemicals in Your Community: A Guide to Emergency Planning and Right To Know Act. 1988. (2)

Contains information on implications of this law for farmers.

Citizen's Guide to Pesticides. 1989. (2)

Free 24-page publication contains information on handling, storage and disposal of pesticides, reducing exposure to pesticides and what to do in a pesticide emergency. Also provides addresses and phone numbers for EPA regional pesticide offices and state pesticide agency contacts.

Publications available from...

1. Your county offices of Rutgers Cooperative Extension (found in the blue pages of the phone book) or the Publications Distribution Center, Cook College, Rutgers University, PO Box 231, New Brunswick, NJ 08903, (732) 932-9762.
2. U.S. Environmental Protection Agency (EPA), Office of Pesticide Programs (TS-766C), 401 M Street S.W., Washington, D.C. 20460.
3. Concern, Inc., 1794 Columbia Road N.W., Washington, D.C. 20009, (202) 328-8160.
4. Midwest Plan Secretary, Agricultural Engineering Department, 460 Henry Mall, University of Wisconsin, Madison, Wisconsin 53706, (608) 262-3310.



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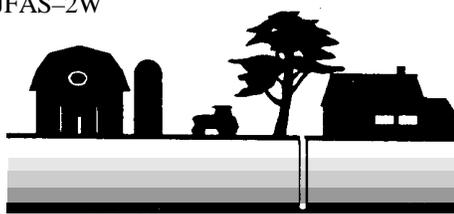
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NEW JERSEY FARM-A-SYST

A FARMSTEAD WATER QUALITY ASSESSMENT SYSTEM

#2 *Worksheet: Assessing the Risk of Groundwater Contamination from Pesticide Storage and Handling*

Why should I be concerned?

Pesticides are showing up where they're not wanted—in our drinking water. If pesticides are not handled carefully around the farmstead, they can seep through the ground after a leak or spill, or they can enter a well directly during mixing and loading.

Pesticides play an important role in agriculture. They have increased farm production, and they have enabled farmers to manage more acres with less labor. Taking voluntary action to prevent pesticide contamination of groundwater will help assure their continued availability for responsible use by farmers.

Pesticides work by interfering with the life processes of plants and insects. Pesticides are also toxic to people. If pesticides enter a water supply in large quantities—as can happen with spills or backsiphonage accidents—acute health effects (toxic effects apparent after only a short period of exposure) can range from moderate to severe, depending on the toxicity of the pesticide and the amount of exposure. Contaminated groundwater used for drinking water supplies may result in chronic exposure (prolonged or repeated exposure to low doses of toxic substances), which may be hazardous to people and livestock.

When found in water supplies, pesticides normally are not present in high-enough concentrations to cause acute health effects, which can include chemical burns, nausea and convulsions. Instead, they typically occur in trace levels, and the concern is primarily for their potential for causing chronic health problems from prolonged exposure.

Your drinking water is least likely to be contaminated 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.

The goal of Farm•A•Syst is to help you protect the groundwater that supplies your drinking water.

How will this worksheet help me protect my drinking water?

- It will take you step by step through your pesticide handling, storage and disposal practices.
- It will rank your activities according to how they might affect the groundwater that provides your drinking water supplies.
- It will provide you with easy-to-understand rankings that will help you analyze the “risk level” of your pesticide handling, storage and disposal practices.
- It will help you determine which of your practices are reasonably safe and effective, and which practices might require modification to better protect your drinking water.

How do I complete the worksheet?

Follow the directions at the top of the chart on the next page. It should take you about 15-30 minutes to complete this worksheet and figure out your ranking.

Information derived from Farm•A•Syst worksheets is intended only to provide general information and recommendations to farmers regarding their own farmstead practices. It is not the intent of this educational program to keep records of individual results.

Glossary

Pesticide Storage and Handling

These terms may help you make more accurate assessments when completing Worksheet #2. They may also help clarify some of the terms used in Fact Sheet #2.

Air gap: An air space (open space) between the hose or faucet and water level, representing one way to prevent backflow of liquids into a well or water supply.

Anti-backflow (anti-backsiphoning) device: A check valve or other mechanical device to prevent the unwanted reverse flow of liquids back down a water supply pipe into a well.

Backflow: The unwanted reverse flow of liquids in a piping system.

Backflow prevention device: (See **anti-backflow device**.)

Backsiphonage: Backflow caused by formation of a vacuum in a water supply pipe.

Closed handling system: A system for transferring pesticides or fertilizers directly from storage container to applicator equipment (through a hose, for example), so that humans and the environment are never inadvertently exposed to the chemicals.

Cross-connection: A link or channel between pipes, wells, fixtures or tanks carrying contaminated water and those carrying potable (safe for drinking) water. Contaminated water, if at higher pressure, enters the potable water system.

Micrograms per liter: The weight of a substance measured in micrograms contained in one liter. It is equivalent to 1 part per billion in water measure.

Milligrams per liter (mg/l): The weight of a substance measured in milligrams contained in one liter. It is equivalent to 1 part per million in water measure.

Parts per billion (ppb): A measurement of concentration of one unit of material dispersed in one billion units of another.

Parts per million (ppm): A measurement of concentration of one unit of material dispersed in one million units of another.

Rinsate: Rinse water from pesticide or fertilizer tank cleaning.

Secondary containment: Impermeable floor and walls around a chemical storage area that minimize the amount of chemical seeping into the ground from a spill or leak.

Pesticide Storage and Handling: Assessing Drinking Water Contamination Risk

1. Use a pencil. You may want to make changes.
2. For each category listed on the left that is appropriate to your farmstead, read across to the right and circle the statement that **best** describes conditions on your farmstead. (Skip and leave blank any categories that don't apply to your farmstead.)
3. Then look above the description you circled to find your "rank number" (4, 3, 2 or 1) and enter that number in the blank under "your rank."
4. Directions on overall scoring appear at the end of the worksheet.
5. Allow about 15-30 minutes to complete the worksheet and figure out your risk ranking for pesticide storage and handling practices.

	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	YOUR RANK
PESTICIDE STORAGE					
Amount stored	No pesticides stored at any time.	Less than 1 gallon or less than 10 pounds of each pesticide.	More than 1 gallon or more than 10 pounds of each pesticide.	More than 55 gallons or more than 550 pounds of each pesticide.	_____
Types stored: (ie: general-use pesticide, restricted use pesticide, fumigant)					
Leachability*	No chemicals stored.	Chemicals classified as having low leaching potential.	Chemicals classified as having medium leaching potential.	Chemicals classified as having high leaching potential.	_____
Liquid or dry formulation	No liquids. All dry.	Some liquids. Mostly dry.	Mostly liquids. Some dry.	All liquids.	_____
Spill or leak control in storage area	Impermeable surface (such as concrete) does not allow spills to soak into soil. Curb installed on floor to contain leaks and spills.	Impermeable surface with curb installed has some cracks, allowing spills to get to soil. OR impermeable surface without cracks has no curb installed.	Permeable surface (wooden floor) has some cracks. Impermeable surface has no curb. Spills could contaminate wood or soil.	Permeable surface (gravel or dirt floor). Spills could contaminate floor.	_____
Containers	Original containers clearly labeled. No holes, tears or weak seams.	Original containers old. Labels partially missing or hard to read.	Containers old but patched. Metal containers show signs of rusting.	Containers have holes or tears that allow chemicals to leak. No labels.	_____

Boldface type: Besides representing a higher-risk choice, this practice also violates New Jersey law.
 *See attached Pesticide Leachability Chart.

	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	YOUR RANK
PESTICIDE STORAGE (continued)					
Security	Fenced or locked area separate from all other activities.	Fenced area separate from most other activities.	Open to activities that could damage containers or spill chemicals.	Open access to theft, vandalism and children.*	_____
MIXING AND LOADING PRACTICES					
Location of well in relation to mixing/loading area with no curbed and impermeable containment area	100 feet or more downslope from well.	50-100 feet downslope from well.	10-50 feet downslope from well, or 100-500 feet upslope.	Within 10 feet downslope or within 100 feet upslope from well.	_____
Mixing and loading pad (Spill containment)	Concrete pad with curb keeps spills contained. Sump allows collection and transfer to storage.	Concrete pad with curb keeps spills contained. No sump.	Concrete pad with some cracks keeps some spills contained. No curb or sump.	No mixing/loading pad. Permeable soil (sand). Spills soak into ground.	_____
Backflow prevention on water supply	Anti-backflow device installed or 6-inch air gap maintained above sprayer tank.	Anti-backflow device installed. Hose in tank above waterline.	No anti-backflow device. Hose in tank above waterline.	No anti-backflow device. Hose in tank below water line.	_____
Water source	Separate water tank.	Hydrant away from well.	Hydrant near well.	Obtained directly from well.	_____
Filling supervision	Constant	_____	Frequent	Seldom or never.	_____

Boldface type: Besides representing a higher-risk choice, this practice also violates New Jersey law.

* Illegal for restricted use pesticides (N.J.A.C. 7:30-9.4[a])

	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	YOUR RANK
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MIXING AND LOADING PRACTICES (continued)

Handling system	Closed system for all liquid and dry product transfers.	Closed system for most liquids. Some liquid and dry product hand poured. Sprayer fill port easy to reach.	All liquids and dry product hand poured. Sprayer fill port easy to reach.	All liquids and dry product hand poured. Sprayer fill port hard to reach.	_____
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Sprayer cleaning and rinsate (rinse water) disposal	Sprayer washed out in field. Rinsate used in next load and applied to labeled crop.	Sprayer washed out on pad at farmstead. Rinsate used in next load and applied to labeled crop.	Sprayer washed out at farmstead. Rinsate sprayed less than 100 feet from well.	Sprayer washed out at farmstead. Rinsate dumped at farmstead or in field.	_____
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CONTAINER DISPOSAL

Disposal location	Triple-rinsed containers returned to dealers or taken to licensed landfill or municipal incinerator. Bags returned to supplier or hazardous waste collection service used.	Unrinsed containers and empty bags taken to licensed landfill, municipal incinerator or dump.	Disposal of unrinsed containers or empty bags on farm. Disposal of triple-rinsed containers on farm. Burying or burning containers.	Disposal of partially filled plastic or paper containers on farm.	_____
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Boldface type: Besides representing a higher-risk choice, this practice also violates New Jersey law.

TOTAL

Use this total to calculate risk ranking on back page of worksheet.

PESTICIDE LEACHABILITY CHART

The pesticides listed on this chart are identified by **brand name, common name and rating for movement by leaching (low, medium or high)**. Identify the pesticides stored on your farmstead from the listing below. Note the “leachability factor” for each pesticide you store. Then give yourself an overall “leachability ranking” (nominal, small, medium or large), based on which ranking best represents the pesticides you store. Then use this ranking to complete the “Leachability” section on the assessment worksheet.

'D-D'	1,2-Dichloropropane	Large	Anticarie, Ceku,	hexachlorobenzene	Small	Basagran	bentazon sodium salt	Large
2 Plus 2	mecoprop (MCP) dimethylamine salt	Large	No Bunt	(AKA hcb)		Basalin	fluchloralin	Small
A-rest	ancymidol	Large	Antor	diethatyl-ethyl	Small	Basamid	dazomet	Medium
Aaprotect	ziram	Medium	Api-Luster, Arbotech,	thiabendazole	Small	Bavistin, Derosol,	carbendazim (mbc)	Large
Aatrex, Atratol, Atrazine	atrazine	Large	Merteect, TBZ, Tecto, RPH, Thibenzole			Delsend		
Abate	temephos	Small	Apron, Ridomil, Subdue	metalaxyl	Large	Baygon	propoxur	Large
Acaraben, Akar	chlorobenzilate	Small	Aqua 8 Parathion,	parathion (AKA	Small	Bayleton	triadimefon	Medium
Acaristop, Apollo, Apolo	clofentezine	Small	Phoskil	ethyl parathion)		Baytan	triadimenol	Medium
Accelerate, Aquathol	endothall (AKA endothal)	Medium	Aqua Ethion, Ethion	ethion	Small	Baytex, Baycid	fenthion	Small
Des-i-cate, Hydrothol			Aqua Kleen, Weedone,	2,4-d esters or oil-sol	Medium	Beacon, Tell, Rifle	primisulfuron-methyl	Large
Accent	nicosulfuron	Large	Emulsamine	amines		Beam, Bim, Blascide, Beam	tricyclazole	Small
Acclaim, Whip	fenoxaprop-ethyl	Nominal	Aqualin, Aqualine, Magnacide	acrolein	Large	Benlate, Tersan	benomyl	Small
Accothion, Cytel, Cyfen	fenitrothion	Small	Aquazine, Princep	simazine	Large	Benzyfluoroline, Chryson	resmethrin	Small
Folithion, Sumithion			Aresin	monolinuron	Large	Betanal	phenmedipham	Small
Actellic	pirimiphos-methyl	Small	Argold, Cinch	cinmethylin	Medium	Betanex	desmedipham	Small
Agrisil, Agritox, Phytosol	trichlorinat	Large	Arsenal, Chopper	imazapyrisopropylamine salt	Large	Bidrin	dicrotofos (AKA dicrotophos)	Large
Alanap	naptalam sodium salt	Large	Arsenal, Chopper	imazapyr acid	Large	Bladex	cyanazine	Medium
Alar, B-nine	daminozide	Large	Arsonate, Bueno, MSMA, DSMA	methanearsonic acid sodium salt	Small	Biotic, Safrotin	propetamphos	-
Aliette	fosetyl-aluminum	Small	Asana	esfenvalerate	Small	Bolero	thiobencarb	Small
Ally, Escort	metsulfuron-methyl	Large	Aspon		-	Bolstar	sulprofos	Small
Ambush, Pounce	permethrin	Small			-	Bonzi, Clipper, Cultar, Parfar	paclobutrazol	Large
Amdro	hydramethylnon (AKA amdros)	Small	Assert	imazamethabenz-methyl (p-isomer)	Large	Botran	DCNA (AKA dicloran)	Small
Amiben	chloramben	Large	Assert	imazamethabenz-methyl (m-isomer)	Large	Bravo, Daconil	chlorothalonil	Small
Amid-Thin	1-naphthaleneacetamide	Medium	Assure	quizalofop-ethyl (AKA quizalofopethyl)	Medium	Brom-O-Gas, Meth-O-Gas, Terr-O-Gas	methyl bromide	Large
Amitrol T, Amizol	amitrole (AKA aminotriazole)	Medium	Asulox	asulam sodium salt	Medium	Bromofume, Dowfume 85	EDB (ethylene dibromide)	
Ammate, Amicide	ams (AKA ammonium sulfamate)	Large	Avadex	di-allate	Medium	Bromofume, Dowfume 85	ethylene dibromide	Large
Ammo, Cymbush, Demon	cypermethrin	Small	Avenge	difenzoquate methyl- sulfate salt	Small	Broot	trimethacarb	Medium
Ansar, Bueno, Daconate	msma	Small	Azodrin	monocrotophos	Large	Buctril	bromoxynil butyrate (AKA bromoxynil butyrate ester)	Small
Ansar, Bueno, Daconate, Clout	dsma (AKA methyl- larsonic acid disodium salt)	Small	Balan, Balfin	benefin (AKA benfluralin)	Small	Buctril	bromoxynil octanoate	Nominal
			Banvel, Trooper	dicamba salt	Large	Butyrac	2,4-DB dimethylamine salt	Medium
			Barricade, Endurance	Prodiamine	Small	Butyrac Ester	2,4-DB butoxyethyl ester	Small
						Calirus	benodanil	Small

Caparol	prometryn	Medium	Ded-Weed	2,4,5-T acid	Large	Evital, Zorial, Solicam	norflurazon	Medium
Capsolane 35, Eradicane, Surpass	dichlormid	Medium	Dedevap, Nogos, Nuvan, Vapona	dichlorvos (DDVP)	Small	Express Herbicide	tribenuron methyl	Medium
Carbamate	ferbam	Medium	Derris	rotenone	Nominal	Far-Go	triallate	Small
Carbamult	promecarb	Medium	Desiccant L-10	arsenic acid	Small	Fenatrol, Fenavar, Fenamime	fenac (aka chlorfenac) salt	Large
Carbon Disulfide	carbon disulfide	Small	Destun	perfluidone	Large	Fernex	pirimiphos-ethyl	Medium
Carbyne	barban	Small	Devrinol	napropamide	Medium	Ficam, Rotate,	bendiocarb	Small
Carzol	formetanate hydrochloride salt	Small	Di-Syston	disulfoton	Medium	Multamat, Niomil, Seedox, Tattoo		
Casoron	dichlobenil	Medium	Dibrom, Ortho Fly Killer	naled	Small	Final, Total, Hoe	glufosinate ammonium salt (aka glufosinate-ammonium)	Small
Cerone, Ethrel, Florel, Prep	ethephon	Small	Dimilin	diflubenzuron	Small	Folex, Def	tribufos	Small
Chem Hoe	propham (IPC)	Small	Dioxacarb	dioxacarb	Small	Fruitone CPA	3-CPA sodium salt	Medium
Chlor-O-Pic, Telone C-17	chloropicrin	Small	Diquat, Tag	diquat dibromide salt	Small	Fruitone, NAA-800	NAA sodium salt	Medium
Cidial, Elsan	phenthoate	Small	Dithane Z-78, Tiezene, Parzate	zineb	Small	Fundal, Galecron	chlordimeform hydro- chloride	Small
Classic	chlorimuron ethyl	Large	Dithane Z-78, Tiezene, Parzate	zinc	Small	Funginex, Ortho	triforine	Small
Cobex	dinitramine	Small	Dithane, Maneb	maneb	Small	Triforine		
Cobra	lactofen	Nominal	Dithane, Manzate	mancozeb	Small	Furadan	carbofuran	Large
Comite, Omite	propargite	Small	Drinox, Heptagran, Heptamul, Heptox	heptachlor	Small	Fusilade	fluazifop-butyl	Small
Command	clomazone (AKA dimethazone)	Medium	Drop-Leaf, Drexel Defol	sodium chlorate	Large	Fusilade Super	fluazifop-p-butyl	Small
Cotoran	fluometuron	Large	Dropp	thidiazuron	Medium	Galben	benalaxyl	Small
Cotton Aide HC, Moncico, Montar, Ansar, Phytar	dimethylarsinic acid (AKA cacodylic acid)	Small	Du Ter, Duter, Suzu H, Triple Tin Tubotin	triphenyltin hydroxide	Small	Gallery, Knock Out	isoxaben	Small
Cotton Aide HC, Moncico, Montar, Ansar	cacodylic acid (dimethylarsinic)	-----	Dual	metolachlor	Large	Gardona	tetrachlorvinphos	Small
Counter	terbufos	Small	Dybar	fenuron	Large	Gesarol, Guesarol, Neocid	DDT	Large
Crossbow	triclopyrester	Medium	Dyfonate	fonofos	Small	Glean, Telar	chlorsulfuron	Large
Curacron	profenofos	Small	Dylox, Masoten	trichlorfon	Large	Goal	oxyfluorfen	Small
Cygon	dimethoate	Medium	Dynamec	abamectin (aka avermectin)	Small	Gramoxone, Prelude, Surefire	paraquat dichloride salt	Small
Cyprex	dodine acetate	Small	Dyrene	anilazine	Small	Guthion	azinphos-methyl	Small
Cythion, Malathion	malathion	Small	Elgetol	DNOC sodium salt	Large	Gy-bon	simetryn	Large
D.Z.N. Diazinon, Knox-Out	diazinon	Small	Embark, Vistar	efluidide	Small	Haipen	captafol	Small
Dacamine	2,4-D acid	Medium	Embutuox, Decamine	2,4-DB acid	Small	Harmony	thifensulfuron-methyl	Medium
Dacthal	DCPA (AKA chlorthal- dimethyl)	Small	Endrex, Hexadrin	endrin	Small	Harvade	dimethipin	Large
Dalapon	dalapon sodium salt	Large	Enide	diphenamid	Medium	Hoelon	diclofop-methyl	Small
Danitol, Herald, Meothrin	fenpropathrin	Nominal	Enilconazole, Bromazil, Freshgard	imazalil	Small	Hyvar	bromacil acid	
Dasanit, Terracurp	fensulfothion	Medium	EPN	EPN	Small	Hyvar	bromacil (lithium salt)	Large
Dechlorane	mirex	Small	Eptam, Eradicane, Eradicane Extra	EPTC	Small	Igran	terbutryn	Small
			Etazine	secbumeton	Large	Imidan	phosmet	Small
			Evik	ametryn	Medium	Degradation product of DDT	DDE	Large
			Evisect	thiocyclam-hydrogen oxalate	Small	Isotox, Lindane	lindane	Medium
						Karate	lambda-cyhalothrin	
						Karathane, Crotothane	dinocap	Small

Karmex	diuron	Medium	Nserve	Nitrapyrin	Small	Probe	methazole	Small
Kelthane	Dicofol	Small	Napthalene	napthalene	Small	Prowl	pendimethalin	Small
Kerb	pronamide (propyzamide)	Large	Nemacur	fenamiphos	Large	Pursuit	imazethapyr (aka	Large
Kloben, Neburea, Neburex	Neburon	Small	Nemagon, Nemaforme	DBCP	Large		AC 263, 499)	
Kocide	cupric hydroxide	-----	Nortron, Tramat	ethofumesate	Medium	Pydrin	fenvalerate	Small
Krenite	fosamine ammonium salt	Small	Octalene, HHDN, Aldrex, Aldrite,	aldrin	Small	Pyramin	pyrazon (aka chloridazon)	Medium
Kuron, Fruitgnet, (Silvex)	silvex amine salt	-----	Aldrasol			Pyrethrum, Py	pyrethrins	Small
Kuron, Fruitone T	fenoprop (aka 2,4,5-tp) (aka silvex)	Medium	Octalox	dieldrin	Small	Ramrod	propachlor	Small
Kyocide, Prokil	cryolite	mall	Octo-Klor	chlordan	Small	Randox	CDAAs (aka allidochlor)	Medium
Lambast, Rasay- ancchlor, Machete	butachlor	Small	Oftanol, Amaze	isofenphos	Medium	Reflex, Flex	fomesafen sodium salt	Large
Lambda, Cyhalothrin	cyhalothrin	Small	Ordram	molinate	Medium	Reldan	chlorpyrifos-methyl	Small
Lannate, Nudrin, Lanox	methomyl	Large	Orthene	acephate	Small	Reward, Surpass, Vernam	vernolate	Small
Larvin	hiodicarb	Small	Ortho Metaldehyde	metaldehyde	Small	Rhothane, DDD	DDD (aka TDE)	Small
Laser, Baythroid	cyfluthrin	Small	Ortho Sevin, Sevin	carbaryl	Small	Rizolex	tolclofos-methyl	Small
Lasso	alachlor	Medium	Orthocide, Captanex, Botec	captan	Small	Ro-Neet	cycloate	Medium
Lesan	fenaminosulf	Small	Oust	sulfometuron-methyl (aka sulfometuron methyl)	Medium	Ronilan, Ormalin	viniclozolin	Medium
Lexone, Sencor	metribuzin	Large	Paarlan	isopropalin	Small	Ronstar, Chipco Ronstar G	oxadiazon	Small
Logic	fenoxycarb	Small	Pano-ram	fenfuram	Medium	Roundup, Rodeo	glyphosate isopropylamine salt (aka glyphosate amine salt)	Small
Londax	bensulfuron methyl	Small	Pay-Off, Aastar	flucythrinate	Small	Rovral	iprodisone	Small
Lontrel	clopyralid amine salt	Large	Penncap-M	methyl parathion	Small	Royal MH, Royal Slo-Gro	maleic hydrazide potassium salt	Large
Lorox, Hoe	linuron	Medium	Pentac	dienochlor	Medium	Rubigan	fenarimol	Large
Lorsban	chlorpyrifos	Small	Pentacon	PCP (pentachlorophenol)	-----	Sancap 80W	dipropetryn	Small
Maloran	chlorbromuron	Medium	Pentacon	pentachlorophenol	Large	Savey	hexythiazox	Small
Many	toxaphene	Nominal	Phosdrin	mevinphos	Small	Scepter	imazaquin acid	Large
Marlate	methoxychlor	Small	Phygon	dichlone	Small	Scepter, Chopper, Image	imazaquin ammonium salt	Large
Matacil	aminocarb	Small	Pipron	piperalin	Small	Scout	tralomethrin	Small
Mavrik	fluvalinate	Small	Pirimon, Aphox	pirimcarb	Medium	Serinal, Manderol	chlozolate	Nominal
Mesurool, Slug-Geta	methiocarb (aka mercaptodimethur)	Medium	Pix	mepiquat chloride salt	Small	Sinbar	terbacil	Large
Metasystox, Metasystox 55	demeton-s-methyl	-----	Plantvax	oxycarboxin	Medium	Sonalan	ethalfuralin	Small
Metasystox-R	oxydemeton-methyl	Large	Pilcran	cyhexatin	Small	Sonar	fluridone	Small
MH-30	maleic hydrazide acid	Medium	Poast, Fervinol	sethoxydim	Small	Spike	tebuthiuron	Large
Milcurb	dimethirimol	Large	Polyram	metiram	Small	Sportak	prochloraz	Medium
Milogard	propazine	Large	Pramitol	prometon	Large	Sprout Nip	chlorpropham (aka CIPC)	Medium
Mitac	amitraz	Small	Prefar	bensulide	Medium	Stam	propanil	Small
Mocap	ethoprop (aka ethoprophos)	Large	Premerge	dinoseb	Large	Standak	aldoxycarb (aka aldicarb sulfone)	Large
Modown	bifenox	Nominal	Premerge, Dinitro, Dynamyte	dinoseb phenol	Small	Sumisclex, Sumilix	procymidone	Small
Monitor	methamidophos	Medium	Premerge, Dinitro, Dynamyte	dinoseb salts	Large	Supracide, Somanil, Suprathion, Ultracide	methidathion	Small
Morestan	oxythioquinox (aka quinomethionate)	Small	Previcur N, Banol	propamocarb (aka propa- mocarb hydrochloride)	Small	Surflan	oryzalin	Small
			Prime	flumetralin	Small	Sutan, Genate	butylate	Small

Swat	phosphamidon	Large	Triumph, Brace, Miral	isazofos	Large
Sythene, Nova, Rally	myclobutanil	Medium	Tupersan	siduron	Medium
Systox	demeton	Medium	Turflon	tricypyr amine salt	Large
Tackle, Blazer	acifluorfen sodium salt	Medium	Vapam	metham (metam) sodium salt	Medium
Talstar, Capture	befenthrin	Small			
Tandem	tridiphane	Small	Varitox	TCA	Large
Telone II, Vortex, Telone C-17	1,3-dichloropropene	Medium	Velpar	hexazinone	Large
Telvar	monuron	Large	Vendex	fenbutatin oxide	Small
Temik	aldicarb	Large	Verdict, Gallant	haloxyfop-methyl	Large
Tenoran	chloroxuron	Small	Vitavax, Abravit	carboxin	Small
Terractor, Turfcide	PCNB	Small	Volck oils, White oils	petroleum oil	Small
Terraneb	chloroneb	Small	Vorlex	methylisothiocyanate	Large
Terrazole	etridiazole	Small	Vydate	oxamyl	Small
Thimet	phorate	Small	Weedar	2,4-D dimethylamine salt	Medium
Thiodan	endosulfan	Small	Weedar, Veon, Brush-Rhap	2,4,5-T amine(o) salts	Large
Thiram	thiram	Small	Weedone	dichlorprop(2,4-DP) ester	Small
Thistrol	MCPB sodium salt	Large	Weedone, LO-VOL 4T, Estron 245, Brush-Rhap LV-OXY-4T	2,4,5-T esters	Large
Tillam	pebulate	Small			
Tilt, Orbit	propiconazole	Medium	Weedone, Weedar, Promene	MCPA soluble salt	----
Tok, Tokkron	nitrofen	Small	Weedone, Weedar, Rhomene	MCPA dimethylamine salt	Large
Tolban, Pregard	profluralin	Small	Weedone, Weedar, Rhonox, Stampede (with propanil)	MCPA ester	Small
Topsin, Fungo	thiophanate-methyl	Small			
Tordon	picloram salt	Large			
Tre-Hold	NAA ethyl ester	Small			
Treflan	trifluralin	Small			
Trifmine	triflumizole	Medium			
Trigard, Larvadex	cyromazine	Large	Zectran	mexacarbate	Small
Trithion	carbophenothion	Small	Zolone	phosalone	Small

Adapted from Becker, R.L., et al. 1990, **Pesticides: Surface Runoff, Leaching, and Exposure Concerns**. Minnesota Extension Service. Data were derived from U.S. Dept. of Agriculture SCS/ARS Pesticides Properties Data Base, Version 1.9, August 1989, developed by R.D. Wauchope et al., and ratings derived by D.W. Goss.

Chart modified annually. Contact your Natural Resources Conservation Service or county Extension office for the most recent version.

What do I do with these rankings?

Step 1: Begin by determining your overall pesticide management risk ranking. Total the rankings for the categories you completed and divide by the number of categories you ranked:

_____ divided by _____ equals	<input type="text"/>
total of rankings	# of categories ranked
	risk ranking

*Carry your answer out to one decimal place.

3.6–4=low risk, 2.6–3.5=low to moderate risk, 1.6–2.5=moderate to high risk, 1–1.5=high risk

This ranking gives you an idea of how your pesticide management practices **as a whole** might be affecting your drinking water. This ranking should serve only as a **very general guide, not a precise diagnosis**. Because it represents an **averaging** of many individual rankings, it can mask any **individual** rankings (such as 1's or 2's) that should be of concern. (See Step 2.)

Enter your boxed pesticide management risk ranking on page 1 of Worksheet #12. Later you will compare this risk ranking with other farmstead management rankings. Worksheet #11 will help you identify your farmstead's site conditions (soil type, soil depth and bedrock characteristics), and Worksheet #12 will show you how these site conditions affect your risk rankings.

Step 2: Look over your rankings for individual activities:

- **Low-risk** practices (4's): ideal; should be your goal despite cost and effort
- **Low-to-moderate-risk** practices (3's): provide reasonable groundwater protection
- **Moderate-to-high-risk** practices (2's): inadequate protection in many circumstances
- **High-risk** practices (1's): inadequate; pose a high risk of polluting groundwater

Regardless of your overall risk ranking, any individual rankings of "1" require immediate attention. Some concerns you can take care of right away; others could be major—or costly— projects, requiring planning and prioritizing before you take action.

Find any activities that you identified as 1's and list them under "High-Risk Activities" on pages 6-7 of Worksheet #12.

Step 3: Read Fact Sheet #2, *Improving Pesticide Storage and Handling*, and consider how you might modify your farmstead practices to better protect your drinking water.



The Farmstead Assessment System is a cooperative project of the USDA Natural Resources Conservation Service, Rutgers Cooperative Extension, and New Jersey Department of Environmental Protection.

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