

**PSEP Fact Sheet:****Pesticide  
Storage  
Facility,  
Design, and  
Management  
Plan**

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Safety is the number one reason for maintaining a well-managed pesticide storage facility for workers and the environment. Protecting against spills safeguards humans and the environment. Also, insurance carriers limit policies on environmental damage caused by fires or spills involving agrochemicals. They may also require that certain practices be put in place prior to writing a policy.

A properly designed and managed pesticide facility promotes storage, handling, and disposal practices that enhance worker safety and minimize the risk of point-source contamination. An ideal facility incorporates safety features in all aspects of its design and provides reduced liability.

Proper storage of pesticides reduces the hazards of poisoning or other accidents and helps maintain usefulness. Protecting a pesticide label so it remains legible is important. The label contains the information needed to properly and safely use the product, and it has emergency information in case of an accident. Proper storage also helps reduce the need for pesticide disposal. A separate building for storing pesticides is recommended because of the risk of fire. Suggestions are presented for storage building design, management, and disposal of pesticides. Additional information is available from local UW Extension offices.

**Designing Storage Facilities*****Electrical***

All electrical service must comply with the National Electric Code (NEC) and any applicable state codes. Electrical design for a storage/handling building is covered under the NEC, also referred to as NFPA 70. Use plastic, dust-proof, water-proof electrical boxes and switches. Plastic is not subject to deterioration like metal and can be exposed to limited amounts of water without posing a safety threat. It is important to install ground fault circuit interrupter (GFCI) protection when electricity is in close proximity to water and on all exterior applications.

Use vapor-proof fluorescent or incandescent lighting fixtures. On small buildings, provide an exterior switch to control both the ventilation fan and the lights. An exterior operation light that indicates when the lights and fan are on is a convenient feature. Choose electrical equipment and wiring designed to prevent a spark from igniting a flammable vapor. Avoid sources of high temperature and sparks in storage areas. Duplex outlets, switches, fan blades, and motors are all potential sources of sparks. Use U.L. and National Electric Manufacturers Association (NEMA)-listed anti-spark equipment if available.



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## ***Fire***

To reduce the hazards associated with pesticide fires, pesticides should be stored in a separate, locked building. Mount an ABC fire extinguisher near the door. Never permit smoking, fires, or welding within the immediate area. Avoid excessive heat, flame, or ignition sources.

Treat a fire in a pesticide storage facility as though it were a flammable liquid or oil fire. Explosions of containerized pesticides are possible during fires. The smoke, fumes, vapors, dusts, and/or liquids produced by all burning pesticides are toxic. **DO NOT EXTINGUISH BURNING PESTICIDES WITHOUT PROPER PROTECTIVE CLOTHING AND A SUPPLIED AIR DEVICE OR SELF-CONTAINED BREATHING APPARATUS!**

## ***Heating***

An insulated, heated building may be needed if pesticides are subject to freezing. Provide heat by low-pressure steam, hot water, or electric heaters that are UL-listed for Class I hazardous locations. Never use or allow open flames or smoking in storage or handling areas. Install a small heating system to maintain sufficient temperatures in the winter to assure pesticide viability and extend shelf life. In some cases, a small electric heater can provide zone heat more effectively than heating a large storage structure.

## ***Mixing Areas***

Consider mixing **all** pesticide formulations outside. If too windy or wet to mix the chemicals safely, then it is too windy or wet to apply the chemicals. **Always wear a respirator when mixing chemicals as per manufacturers' instructions!** If indoor mixing is used, a down-draft ventilation hood at the back of the mixing table can be used to remove dust and vapors. Downdraft hoods are superior to updraft hoods because they prevent a user's face from being exposed to chemicals.

## ***Rinse Pad and Collection Tank***

Slope the rinse pad 2 percent to the center of the pad or far enough away from any side or end so the rinse water (rinsate) will not wash off the pad.

Use berms or curbs whenever possible to contain the rinsate. The rinse pad should have a sealed surface to provide chemical resistance.

Pipe or plumbing must not pass through the concrete of the rinse pad.

The water supply must have back-flow prevention installed.

Catch both rinsate and precipitation from the rinse pad. The collection system must be designed to contain at least 125 percent of the volume of the largest chemical tank that will be placed on the structure.

Use steel-grated floor drains to allow drainage to concrete collection sumps. A sump is used to collect rinsate and wash water from the pad and to allow the reuse of subsequent sprayer fillings with the same chemical. Prevent the tracking of mud or chemicals off the pad by wheel traffic by properly washing the equipment and pad.

To use the rinse pad, drive the sprayer onto the concrete pad and make sure that the sump drain valve (if installed) is locked in the closed position. Any leftover, field-strength chemical and rinse water from the sprayer drain valve should be pumped into a marked rinsate tank. Any spills can be washed into the sump for later recovery. Wash water should be collected from the exterior wash of the spray equipment, tank, and plumbing clean-out.

The pad should be washed and then rinsate collected and transferred to storage or nurse tanks located on the pad before a change in pesticides or after field operations on a daily basis. Sediment that collects in the sump should be removed prior to switching from one chemical to another. The sludge contains pesticides and must be disposed of properly.

After rinsing, rinsate should be collected and pumped to above-ground storage tanks. Store the rinsate from each pesticide or crop separately. Rinsate can be stored temporarily in various types of holding tanks including mobile nurse tanks. A good choice, however, is one or more 300-gallon, cross-linked polyethylene or fiberglass tanks. Liquid levels can be easily seen through these types of tanks. Consider mounting the rinse water storage tanks three to five inches above the concrete floor to prevent corrosion and to aid in detecting leaks. Pumps and piping should be

aboveground, too, and contained within the rinse pad area.

More than one rinse water tank may be needed. By separating rinse water by pesticide use into different tanks, it can be used later as make-up water the next time the product or a compatible chemical is sprayed. Caution should be used to follow label instructions and mix only label-compatible agrochemicals. Rinsate used for make-up water should not exceed 20 percent of the volume of the spray tank.

For example, if 50 to 75 gallons of water are used to thoroughly clean a sprayer in which 6 to 10 gallons of spray may be left, the rinsate will be diluted to about 10 percent of the field strength. Diluting it again at four parts water to one part rinsate means only 1 to 2.5 percent of the original field strength.

It is recommended that storage tanks be mounted on a level area at the back of a concrete pad within concrete walls high enough to contain an amount 10 percent greater than the volume of the tank should a severe leak occur. A separate sump in the containment area is needed to handle rainfall and potential rinse-water spills. It is important to keep the sump pumped dry so rainwater and snow will not become a handling problem. Sumps should be checked and rinsed regularly.

### ***Site Selection and Site Work***

Locate a facility away from water sources that could become contaminated by an accidental spill. Choose a site that has not been used for chemical storage, mixing, loading, or equipment rinsing (there is concern about possible soil contamination). If this is not possible, take precautions to remove contaminated soil or otherwise decontaminate the site before constructing a rinse pad.

Consider removing all topsoil, organic matter, and debris from the site and excavating it to a sufficient depth to allow the concrete slab and sub-base to be situated on firm, undisturbed soil. Consider using crushed rock compacted in 6-inch layers.

Storage building construction should comply with local and state codes. Secure all necessary permits prior to construction.

### ***Ventilation***

Consider using constant, low-rate (one air change

per hour) mechanical or natural ventilation during non- occupancy and supplemental ventilation when a facility is in use. A two-speed fan can be utilized to provide base-rate ventilation during non-occupancy, and a high speed can be used for automatic, forced-air exhaust during occupancy. The high capacity of the fan(s) should provide approximately seven air changes per hour. Because of fire hazards, fan blades should be non-sparking.

Consider designing fresh-air intakes and tempering the air by drawing it through the attic, thereby reducing the heating requirements. Be careful to avoid dead-air spaces where ventilation is inadequate.

Exhaust fans mounted in the sidewalls should have duct work to allow exhausting air at a level 15 inches above the floor. This will allow vapor or dust to be vented away from an occupant's face.

### ***Water Source***

Consider using an elevated tank located next to a chemical storage building for filling sprayers by gravity flow. A water storage tank needs to be filled by a water line from a site away from the pad. The bottom of a storage tank should be higher than the top level of the sprayer tank to prevent back flow. Ensure that a hose bib from a sump cannot be mistaken for drinking water.

### ***Worker Safety***

Provide eyewash and deluge shower to rinse chemicals from the eyes, face, and body. Other necessary items include a first-aid kit and spill-response kit.

### ***Potential Compliance Problem Questions***

Is the drain in a storage area?

Is food or feed stored with pesticides?

Is the container cleaning area separate from the mixing area?

Is the facility built on a site previously used for mixing and loading?

Is the equipment rinse water or rinsate stored underground?

### ***Pesticide Storage Management Plan***

Pesticides come in many types and formulations.



The most common types are herbicides, insecticides, fungicides, rodenticides, and fumigants, but there are many more. Pesticides can be formulated as concentrates or as liquids that are ready to use; as solids such as dusts, wettable powders, and granules; or as gases in pressurized cylinders. Packaging materials for pesticides may include metal, glass, plastic, and paper.

### ***General Precautions***

Store pesticides in their original, labeled containers and never in beverage, food, open, or other containers that could be mistaken for something else.

Keep pesticides out of the reach of children, pets, and livestock. A well-ventilated, dry, locked, and labeled cabinet or storage room is recommended.

Separate pesticides from foods, feeds, drugs, or other edible products and their packaging materials.

Separate pesticides from protective clothing and equipment.

Keep pesticides away from sources of flame or ignition and away from sources of water. Consider the potential for flooding, fire, or other disasters.

Store pesticides with lids tightened and periodically check for leaks or other problems.

Take precautions to keep labeling intact and legible. A label is a legal document, and if it becomes illegible, legal use of the product could be compromised.

Keep different classes of pesticides separate from each other (herbicides separate from insecticides, etc.).

### ***Inventory***

Recommended storage procedures include keeping an accurate and current inventory record that indicates product storage information such as special storage and handling needs and dates of arrival. Placing dates on product packaging or labels can be useful but don't obscure label information.

Keep any applicable emergency response information with an inventory in case of poisoning, fire, or spill. Keep a copy in an area separate from the storage facility. Pay special attention to volatile agricultural chemicals both for their shelf lives and for possible contamination of other products stored in the same area. Send a copy of the emergency response information to a local fire control agency with a map showing

the locations of storage areas. Rotate the inventory to maximize shelf life.

### ***Shelf Life***

The shelf life of a pesticide is the storage time over which the product remains useful. To remain useful, a product must still be effective for its intended purpose and still be in a condition that allows it to be applied as directed. Shelf life is a function of several variables such as time, sensitivity (temperature, moisture, light), formulation stability (dry, liquid, concentrated, ready to use), and container integrity (metal, glass, plastic, paper). Shelf-life protection for pesticides includes: 1) storage in the original container tightly sealed, 2) storage in a cool, dry, and ventilated area, 3) keeping liquids above their recommended minimum temperatures, and 4) keeping solids from becoming damp.

As a general rule of thumb, two years is considered the maximum storage life for most pesticides although there are many exceptions to this. The shelf life of some specific pesticides follows:

### ***Cold Weather Precautions***

Pesticide labels have a section on "Storage and Disposal." Products that are frozen should be warmed gradually to the indicated temperature and then rolled or shaken to re-dissolve crystals and achieve proper mixing. All products that have been in prolonged storage should be rolled or shaken to obtain uniform mixing. A simple test of liquid pesticides can help determine if they have been frozen and may have reduced efficacy.

Two tablespoons of a liquid concentrate should be added to a quart jar that is about three-fourths full of water. The mixture should be shaken thoroughly and allowed to sit for an hour. If the mixture remains uniformly milky, the pesticide is probably still good. If it separates to show a layered effect, it may have reduced efficacy. Contact the manufacturer for more information.

## **Cold Weather Storage and Handling of Liquid Pesticides**

Freezing of liquid pesticides can result in separation of the active ingredients from the solvents or emul-

sifiers or inactivation of emulsifiers, which may lead to crystallization or coagulation of the pesticide. Applicators should know which pesticides can be frozen and which cannot. Techniques for thawing and redissolving are also important since a pesticide, once frozen, can plug spray equipment, result in poor product performance, and/or damage crops if the proper thawing and mixing procedures are not followed.

Many pesticides can freeze with no adverse effects to the pesticide, although separation of the active ingredient and solvent will occur. Certain steps must be followed before using a pesticide that has been frozen. First, the product must be thawed. Before attempting to thaw a frozen pesticide, however, the container should be checked to make sure it is not ruptured or cracked from the expansion of the frozen liquid. If sound, the container should be brought to room temperature (placed in a heated room or the south side of a sunny building away from children, livestock, and pets) for the thawing process, which may take several days. Once the liquid has thawed, the container can be rolled, shaken, or otherwise agitated to get the contents into a uniform suspension. The container should also be inverted several times to ensure the product is completely dissolved. Pesticide manufacturers caution that if a pesticide cannot be totally redissolved (crystals are still present), the pesticide should not be used.

### ***Storage Conditions***

The freezing point of many pesticides is lower than 32 degrees Fahrenheit due to the hydro-carbon solvents or inert ingredients. Pesticides that cannot be frozen should be placed in a heated or adequately insulated area to avoid low temperatures. Wettable powders and granules, as a rule, are not affected by low temperatures. These formulations should be stored in a dry place as moisture may promote caking

or lead to certain chemical changes reducing their effectiveness. Products formulated in water-soluble bags require special winter storage. These bags have a high affinity for moisture and become brittle when frozen. They will break open if handled when brittle. It is important that they be stored in heated facilities.

Before storing pesticides for the winter, the applicators need to read the pesticide label.

## **References**

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Common (Trade)	Shelf Life	Comments
atrazine (Aatres) 80W	At least 5 years	Under proper storage conditions
atrazine (Aatres) 4L	2 years	Under proper storage conditions
bacillus thuringiensis (Di-Pel Thuricide)	2 years	Store below 105° F
barban (Carbyne)	At least 1 year	Under proper storage conditions
benlate (Benomyl) WP	2 years	Decomposes if exposed to moisture
captan (Orthocide) WP	3 years	Under proper storage conditions
carbaryl (Sevin) WP	5 years	Remains effective up to 5 years
DCPA (Dacthal) WP	At least 2 years	Under proper storage conditions
diazinon	5 to 7 years	Keep liquids sealed and solids dry
dicamba (Banvel)	At least 1 years	Under proper storage conditions
dichlobenil (Casoron) 4G	At least 2 years	Keep dry, sealed and cool
dinocap (Karathane	5 years	Under proper storage conditions
disulfoton (DiSyston)	2 years	Under proper storage conditions
fenbutatin-oxide (Vendex) WP	2 years	Under proper storage conditions
glyphosate (Roundup)	At least 2 years	Store below 140°F
malathion WP	2 years	Decomposes under high temperatures
methoxychlor WP	Indefinite	Under proper storage conditions
oryzalin (Surflan) WP	3 years	Mix well before using
oxydemeton-methyl (Meta-systox-R)	2 years	Under proper storage conditions
paraquat (Gramoxone)	Indefinite	Do not allow to freeze
phosmet (Imidan) WP	2 to 3 years	Under proper storage conditions
pronamide (Kerb) WP	At least 2 years	Under proper storage conditions
propargite (Omite)	At least 2 years	Under proper storage conditions
simazine (Princep, Aquazine)	3 to 5 years	Under proper storage conditions
thiram WP	4 years	Keep dry, sealed, below 100°F
trifluralin (Treflan)	3 years	Under proper storage conditions

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