

Pesticide Mixing and Loading

Mixing and loading may be the most hazardous activities associated with normal pesticide use. Because of the concentrations and quantities of pesticides involved, accidental releases of pesticides at a mixing and loading site pose a high risk of ground and surface water contamination. Also, when you mix and load, you handle a pesticide in its most concentrated form and experience the greatest potential for exposure. To prevent pollution and safeguard human health, the mixing and loading of pesticide and the washing and rinsing of equipment should be conducted in a safe and environmentally responsible fashion.

WPS REGULATIONS REQUIRE:

All workers involved in any aspect of handling, mixing and/or loading pesticides must be trained as a HANDLER or have a pesticide license.

<p>MA LAW REQUIRES THAT ALL PERSONS APPLYING PESTICIDES IN A COMMERCIAL CAPACITY MUST HAVE A VALID PESTICIDE LICENSE.</p>
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Several types of licenses are available:

Applicator License. If you intend to do pesticide work using general use (non-restricted) pesticide for hire, you must obtain an applicator license.

Private Certification. If you intend to do pesticide work using restricted use pesticides on property owned or rented by you or your employer for the purpose of raising agricultural commodities, you must obtain a private certification. This is the license usually obtained by individuals working as farmers.

Commercial Certification. If you intend to do pesticide work using restricted use pesticides for hire or not for hire (barter/volunteer) on someone else's property, you must obtain a commercial certification.

Recommended Practices

Protect water sources from contamination when mixing and loading pesticides and when rinsing equipment and pesticide containers.

Mixing and loading of pesticides should not occur within 400 feet of any private or public drinking water supply or within 200 feet of surface water (DFA recommendation).

No pesticide application equipment or mix tank should be filled directly from any source waters unless a back siphon prevention device is present.

A properly designed spill containment surface should be used for all mixing and loading activities.

Protect all resources from point pollution resulting from pesticide concentrates, mixtures, or wastes. Mix and load chemicals on a treated concrete pad or other impervious surface.

Avoid pesticide spills and prevent back-siphoning into wells or surface water impoundments.

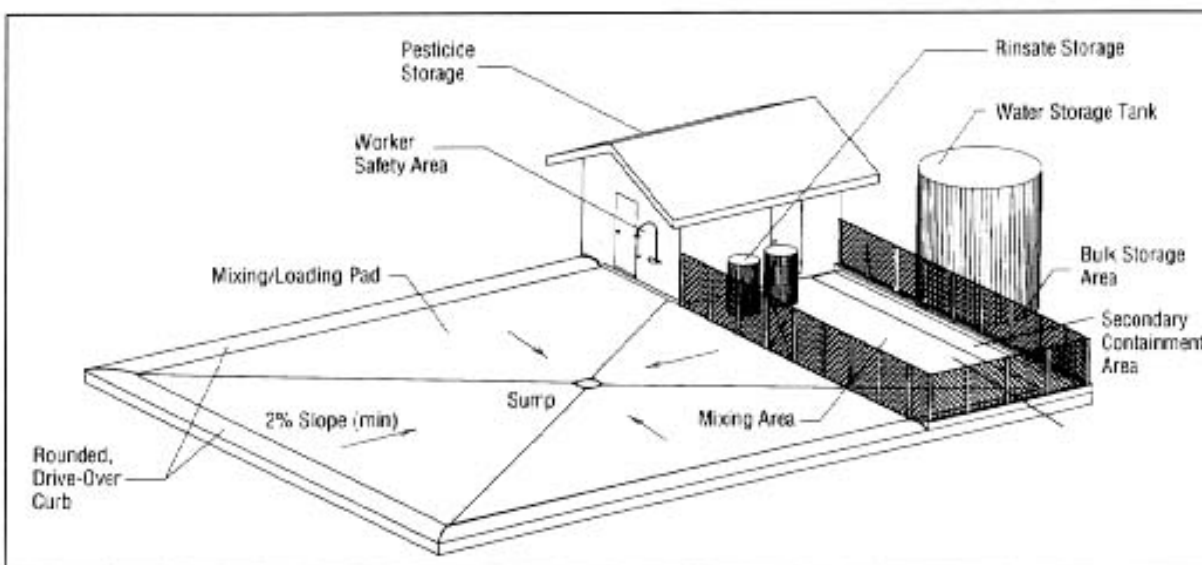
Be careful not to allow pesticides to leak from chemigation units when hoses are disconnected from injection ports.

Always exercise caution when adding water and pesticides.

Be extremely careful to avoid overflow when you add water to the equipment. Never leave the equipment unattended while it is being filled.

Open pesticide containers carefully. Use a knife (dedicated solely for pesticide use) to open paper products; never tear open. When you pour a liquid, keep the container below eye level to minimize exposure to your face. Use a pump to remove concentrate from a large container.

Close partially filled containers and return them immediately to storage. If you empty a container, rinse it with water and add the rinsate to the application tank.



Example of a storage shed and a mixing and loading area. <http://ohioline.osu.edu/aex-fact/0522.html>.

Personal Protection Equipment (PPE) is required for all workers involved in mixing and loading activities.

Respirators, chemically resistant (CR) gloves, CR footwear, coveralls with long sleeves, socks, protective eyewear (glasses, goggles, or faceshield), CR headgear, CR aprons, and a first-aid kit should be available immediately outside the storage area.

An eyewash station, capable of flushing the eyes for 15 minutes, should also be available. At minimum, a nozzle and a hose should be on hand.

Routine clean-up facilities, equipped with soap and water and single-use paper towels should also be available.

If no particular instructions exist, wear at least rubber gloves, a chemical-resistant apron, and protection eyewear. If mixing two or more chemicals, wear the PPE required for the most hazardous chemical involved. Wear PPE even if a product is packaged to reduce exposure (e.g., water-soluble packets, etc.).

Since pesticides are hazardous, it is best not to work alone.

If you splash or spill pesticides onto your clothes, stop work immediately and remove the contaminated clothing. Wash thoroughly with soap and water. Dispose of soiled clothes as pesticide waste. Know where the on-site emergency action plan is kept.

Develop an emergency response plan.

The plan should include:

- A list of the names and quantities of current pesticides used or kept in the storage area.
- A map with the location and directions to the work area.
- Names, addresses, and phone numbers of the owner and key employees.
- A plan of the facility should include pesticide locations, flammable materials, electrical service, water supply, fuel storage tanks, fire hydrants, storm drains and nearby wetlands, ponds, and streams. Put a copy of the emergency plan near the entrance to the facility and a second copy with your business records. Give copies to the local police and fire departments.
- Location of emergency equipment supplies such as breathing equipment and protective equipment.

If you employ non-English speaking persons, the emergency plan should also be available in their own language.

Choose an appropriately designed mixing/ loading pad.

The actual design of the pad will vary depending on the types of operations (e.g., number and types of pesticides used, etc.) that will be performed at the site. Many types of pads are available (e.g. portable rubber pads, tarps, or concrete pads). Choose the type that is most appropriate for your situation and needs.

Concrete Pad. The concrete pad should be constructed of an impervious material such as sealed concrete. Use a high quality cement (Recommended by DFA: 5-7% air entrainment; compressive strength of 4,000-4,500 psi; and a water-cement ratio of 0.40-0.45 for a stiff [1.5-3.0"] slump). The pad should stay intact during freezing conditions. Use a protective sealant (e.g., epoxies, urethanes, vinyls, polyureas, etc.) to help prevent the corrosive actions of pesticides and fertilizers on the concrete.

DFA recommends constructing walls and a roof to avoid the expense associated with the disposal of pesticide hazardous waste generated due to rainfall. A greenhouse frame covered with a durable plastic sheet can be a low-cost alternative to a roof.

Insure that the pad will properly contain any releases or discharges from mixing and loading activities.

The containment area should hold 125% of the volume of the largest container that will be filled. The pad should be curbed to contain spills, leaks or discharges and to prevent water from flowing onto or off the pad. The pad may be sloped (at least 2%) to a single liquid-tight sump (catch basin). Design the sump such that a pump can be easily placed in the basin or install a permanently mounted pump.

If mixing non-liquid pesticides, the containment surface may consist of a tarp made of non-absorbent materials of adequate thickness to withstand all foreseeable loading conditions.

Safety is of the utmost importance when mixing chemicals!

- Wear protective equipment.

- Work in pairs whenever possible (radio communication is a plus).
- Be sure pump is running before starting to mix.
- Mix in a well-ventilated area.
- Have good lighting available.
- Be on solid footing when mixing.
- When pouring, turn the jug on the side to minimize stuttered delivery.
- Pour pesticide down the interior side of the tank to minimize splashing.
- Do not submerge the water supply hose in the pesticide solution.
- Water supply hose must have check valve to prevent backflow (required by law!).
- Rinse jugs, measuring cups, and mixing stick into the tank so rinsate goes onto the bog.
- Wash your gloves BEFORE you take them off.

Dilution and mixing of chemicals may vary depending on the application method and the product formulations.

It is recommended to mix the ingredients in the following priority: 1) water 2) pesticide 3) adjuvants 4) rest of the water. However, if you are using a suspending agent, put it in the water and agitate for 15 minutes prior to adding anything else.

Mixing Order for Liquids. Add 25-35% of total water first, then add the pesticide. Add the rinse water from the containers. Add the rest of the water.

Mixing Order for Dry Formulations. Add 50% of the total water first, then add the pesticide. Mix in the rest of the water.

For aerial applications, the applicator is responsible for mixing and loading chemicals.

Do not inject liquid pesticides directly from the container into the irrigation system.

To insure uniform delivery of the pesticide to the irrigation system, maintain continuous agitation in the chemical tank. Agitation (i.e., stirring with a stick paddle) is particularly important for materials of low solubility, like chlorothalonil.

Triple-rinse all empty pesticide containers before disposal.

Federal law prohibits re-use of pesticide containers. Liquid containers should be triple rinsed or preferably, pressure rinsed. The rinsate should be added to the spray tank. The pesticide label and MSDS contain instructions for safe container disposal. Do not store empty containers in your pump house, even temporarily. Inquire if your pesticide supplier will recycle clean, empty containers. Additionally, any container used for any pesticide purpose must be labeled appropriately.

Significant portions of this BMP were excerpted from:

Kennedy, G. 1999. **Storage, mixing and loading of pesticide guidelines.** MA Dept. of Food and Agriculture Pesticide Bureau.

Prepared by Carolyn DeMoranville and Hilary Sandler, 2000.

Pesticide Mixing and Loading Checklist

✓ **IMPORTANT PHONE NUMBERS**

Massachusetts Poison Control System. 1-800-222-2221. Chemtrec. 1-800-424-9300

Prior to the Application

✓ **Worker Protection:**

Have all appropriate Personal Protection Equipment (PPE) ready to use. Have labels and MSDS on-hand Have decontamination kit stocked and ready for use.

✓ **Appropriate notification:**

Neighbor relations. Sign-posting. WPS and REI notification.

✓ **Environmental concerns:**

Address any public drinking water recharge area restrictions. Check to see that the planks are in place. Check the weather forecast.

Transport the pesticide in a legal manner. Applicator must have the appropriate license for application. Verify that all equipment is working properly. Observe pre-harvest intervals. Have your Emergency Action Plan on-site.

✓ **After the Application Record keeping done? Containers rinsed and disposed of appropriately? Excess pesticides properly stored? Clothes properly washed after application?**

✓ **Equipment that may be helpful to have on hand:**

- 5-gallon bucket
- Knife
- Measuring cup
- Duct tape
- Injection port rinse device
- Stopwatch
- Mixing stick
- Portable communication devices (e.g., cellular phones)
- Bungee cords (to hold hose, etc.)
- Assorted tools (pliers, screwdriver, wrench, etc.)
- Clean water in jugs
- Pesticide clean-up kit (5-gallon is good)
- WPS decontamination kit