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Options for In-field Pesticide Sprayer Rinsing and Clean Water Utilization

There's no getting around the fact that pesticide application is a dirty job. Because of the inherent toxicity of pesticides, even minute residues can present environmental, health, and regulatory problems. This fact sheet offers some practical and economical solutions for the disposal of spray tank tailings and rinsates, and some further benefits of installing a clean-water supply tank on the sprayer.

In an ideal world, pesticides could be applied to their intended target without risk of contaminating off-target areas with even the smallest amounts of product. Unfortunately, pesticide use is more complex than just putting chemicals in a tank, spraying a field, and parking the tractor when the job is finished. Each step of the handling process—from transport and storage to mixing and loading through application, cleanup, and, finally, disposal of wastes—presents a unique set of potential pollution problems.

Careful planning and conscientious work habits can minimize the potential for significant nontarget effects. Proper transport precautions, appropriate storage facilities, careful handling during mixing, responsible application practices, and appropriate inventory management should lead to a clean operation without unintended product releases to the environment.

Washdown and handling facility

Pesticide handling activities present unique problems because of the need for a convenient water source and the potential to contaminate that source with pesticide-laden water.

One solution is to install a pesticide washdown facility capable of containing and recovering the pesticide rinsates. However, such units are potentially expensive to construct correctly and are technically difficult to manage afterwards.

Pesticide tank tailings and rinsates should be applied to a labeled crop. Other methods of disposal such as flushing the tank in a barnyard or draining the “dilute” material in a convenient place are illegal, and they present a threat to surface and ground water, as well as other parts of the environment. The potential for contamination of a heavily used handling site also carries with it environmental liability that can be significant in the event of an environmental audit. Audits are routinely required by lenders and insurers as part of real estate or refinance transactions and for insurance underwriting evaluations.

Regulation of pesticides and waste products

Pesticides and their waste products (containers, rinsates, and similar materials) are regulated under different federal statutes.

Nearly all aspects of pesticide handling are regulated by the U.S. Environmental Protection Agency and a designated state lead agency under the authority of the federal pesticide law known as the amended Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). In Pennsylvania, the Pennsylvania Department of Agriculture, Bureau of Plant Industry, administers FIFRA. Most pesticide handlers are familiar with FIFRA and have come to accept the responsibilities imposed upon them by the statute.

However, when a product is no longer suitable or intended for application, and is a candidate for disposal, it may cease to be regulated under FIFRA. At this point the product is considered either a hazardous or nonhazardous solid waste (depending on the nature of the product). Pesticides and their rinse water solutions that can legally be applied under FIFRA may become regulated waste if they are combined in mixtures not approved under product labels. Compliance with waste disposal regulations, especially for hazardous wastes, is considerably more complex and expensive than compliance with FIFRA.

Disposal of hazardous wastes typically requires the services of a specially licensed hauler. It is worth the trouble to carefully manage pesticide handling activities to avoid generating hazardous wastes, thereby eliminating the need for compliance with these regulations.

Contamination of soil and water with pesticides

The soil's natural ability to hold and degrade pesticide compounds may be overcome when pesticide rinsates continually drain onto the same small area. This scenario puts vulnerable groundwater resources at risk. For example, pesticide handling activities near a water well increases the likelihood of the well becoming contaminated, especially if the well is shallow or poorly constructed.

A problem of the pesticide wash area is the continual release of pesticide rinsates over time. When the wash area doubles as a mixing site, another problem includes the one-time release of a significant volume of material at a single location. Areas for pesticide handling activities generally are located near a water source, which may put the water resource at great risk of contamination. Traveling between the wash area and a suitable application site often is impractical or unrealistic. A wash pad does not offer a complete solution to the problem if the operator cannot incorporate the rinsate into the next tank mix or is not inclined to make a special trip to apply the rinsate to an appropriate site.

The case for clean water in the field

In-field rinsing is a practical, simple, and economical alternative to a wash pad. An in-field rinse system consists of (a) a permanently mounted, small-volume, clean water tank connected (teed) into the suction line, and either (b) a pressure line connected to a garden hose and hand gun, or (c) a rotating tank rinse nozzle permanently mounted in the tank. The choice of components determines system cost, which can vary between \$100 and \$500. (See schematic diagram.)

An in-line rinsing system has additional benefits. Daily rinsing of the sprayer system with clean water can reduce buildup of suspension-formulation products such as wettable powders, flowable liquids, and dispersible granules that can clog valves, screens, and nozzles. Systems can be designed to allow cleaning of boom lines and spray nozzles without complete emptying of the sprayer. This can reduce the down-time and labor needed for manual disassembly of sprayer components.

The clean water tank also can be plumbed to allow operator access for routine or emergency personal washing. Worker Protection Standards effective in April 1994 require reasonable access to decontamination supplies for employees working around pesticides or in treated areas.

Lastly, the practice of leaving residues in the field makes economic sense. Pesticides are expensive and don't provide any pest control benefit in the barnyard or in whatever other disposal location that might be convenient. Keep them in the field where their full value can be realized.

Rinsing system design and operation (see accompanying schematic)

1. The heart of the in-field rinsing system is the clean water tank. The size will vary according to your sprayer's plumbing configuration, your personal needs, and the size of your tractor. It is impossible to recommend an appropriate formula that will properly size the tank for everyone. We recommend that you size up rather than down when deciding on a clean water tank. Most users have found the clean water supply on their sprayer valuable for a number of washing tasks besides tank rinsing.

A rotating nozzle requires about 10 gallons of water delivered at 20–40 psi to rinse a 400-gallon tank. Multiple rinses mean that 20 to 30 gallons of clean water will be required for most common farm sprayers. Multiple nozzles, and thus more water, may be required to properly rinse larger tanks. Some larger-volume pumps

may draw water too fast to limit water use. A garden hose with a handheld nozzle should use volumes of water similar to a rotating nozzle, but actual amounts will depend on the operator's technique. Additional water will be needed to flush the contaminated rinse water through the pump, lines, and booms. A 25- to 50-gallon tank should provide enough water to rinse most systems thoroughly, with a little practice.

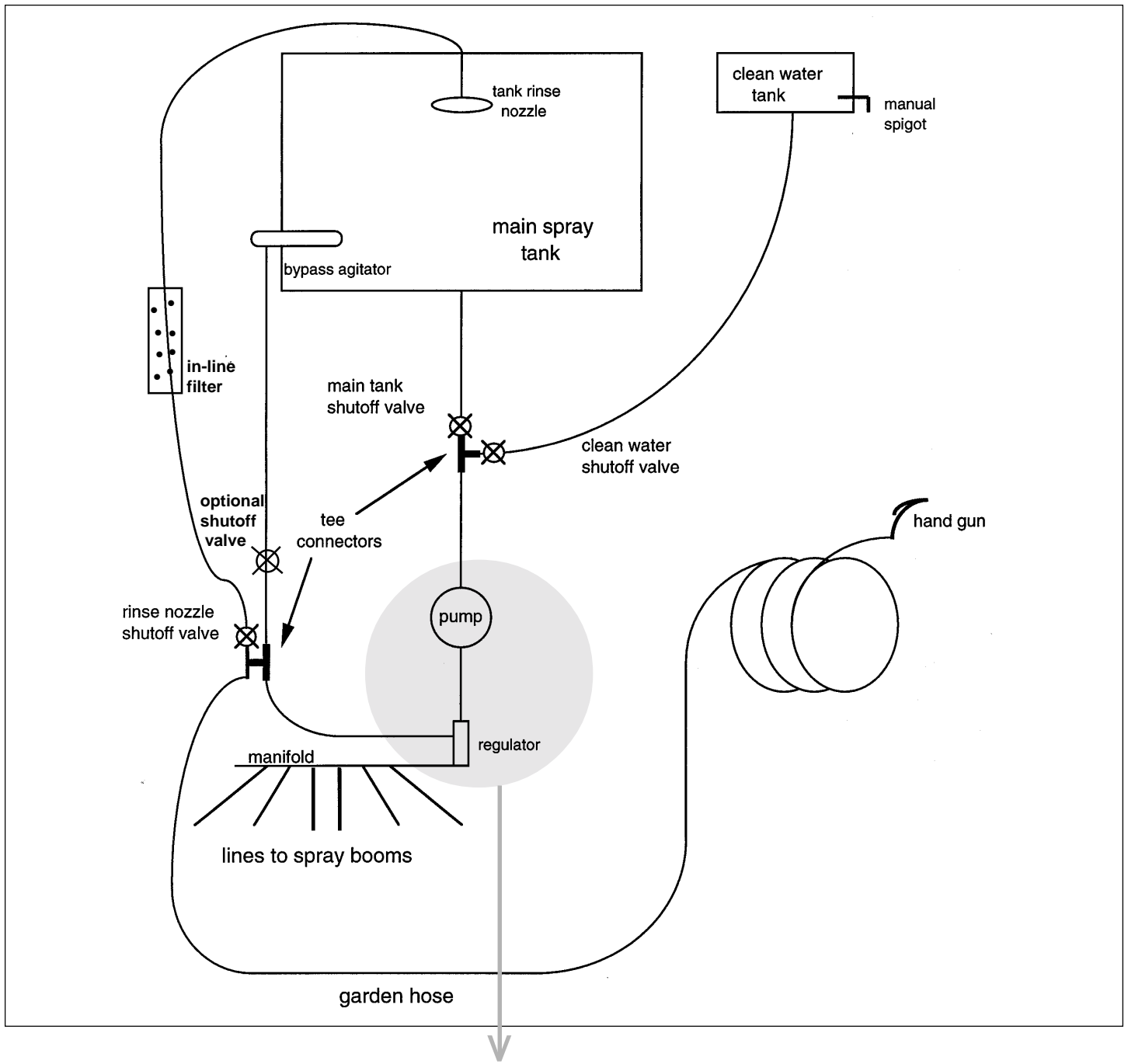
Mount the tank well above the level of the sprayer pump to readily prime the pump. The relatively small tank may not provide enough head pressure for priming if mounted too low on the frame. The tank can be mounted over the drawbar, to the side of the sprayer, on a platform built above the sprayer, or even on the tractor and connected to the sprayer with quick-change couplings.

Install a small spigot at the tank's base if the clean water supply will double as an emergency wash station. Also, add a check valve to prevent backflow of chemicals into the clean water supply.

2. Connect the clean water feed hose to the sprayer suction line with a tee. Install gate or ball valves on both the clean water tank and spray tank sides of the tee connector in order to regulate from which tank the pump draws. Ball valves are more expensive than gate valves but are considerably easier to use and much more durable.

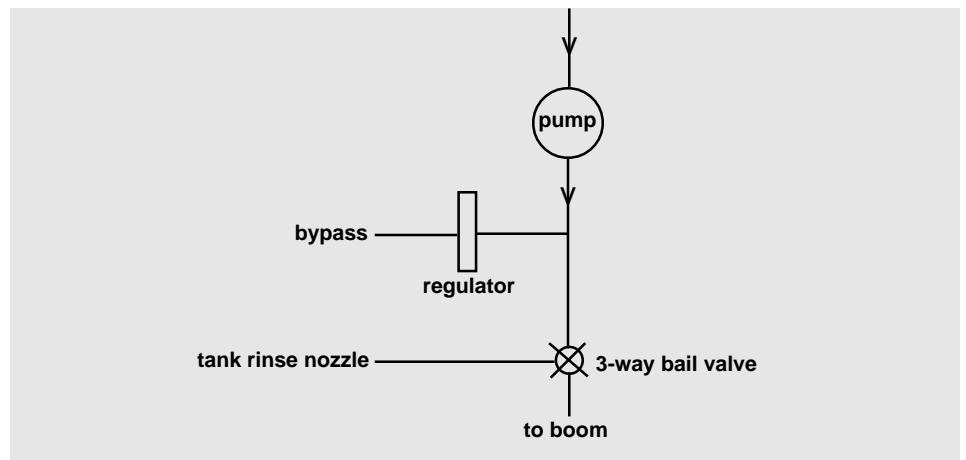
3. If possible, add another pressure line to the manifold for the tank rinse nozzle. If outlets are unavailable, install a tee and a shutoff valve between the bypass agitation line and the regulator, or in the pressure line on either side of the regulator (see diagram for details). Regardless of the configuration you choose, it may be necessary to add a shutoff valve for the bypass agitator because it may draw too much water to properly pressurize a commercial rinse nozzle or even a garden hose nozzle. In addition, high pressure or constant displacement pumps may require a throttling valve on the tank rinse line to prevent damaging the rotating nozzle.

Suggested Design for Sprayer Rinse System



4. A second, dedicated pump can be installed to power the rinse system if you do not want to use the existing plumbing. A dedicated pump can simplify design and installation of the system and may provide more flexibility in placement of the clean water tank. You will need to split the pressure line from this pump between the rinse nozzle and the boom controls, if you want to be able to flush your spray booms independent of the spray tank.

Alternative Design for Sprayer Rinse System



Rinse procedure

1. Make sure appropriate personal protective equipment is used when working around pesticides or contaminated equipment.
2. Apply the entire contents of the sprayer to a field before attempting to rinse the tank. Field strength pesticide solutions will quickly contaminate the rinse water and render the rinse operation ineffective.
3. With the pump stopped, close the suction line for the main spray tank and open the feed line for the clean water supply.
4. With the pump running, rinse the inside of the spray tank. Use as little water as possible for the initial rinse. If necessary, close the bypass agitator to properly operate the rinse nozzle.
5. Reverse the tank valves, open the bypass agitator, and spray the rinsate onto the target area.
6. Repeat steps 1, 2, and 3. If using a garden hose and nozzle, perform the rinse and flush procedure three times, much like the triple rinsing of a pesticide container. Thoroughly empty the main tank after each rinse. If a rotating nozzle has been installed, leave the clean water tank open after the second rinse and allow the water to thoroughly flush the pump, lines, and booms.

Operating suggestions

1. Permanently mark the clean water tank so that nobody makes a mistake. *Put only clean water in the clean water tank.* A life could depend on it!
2. Operate the sprayer until the nozzles stop flowing and then perform the rinsing procedure. Less residue in the tank will result in more thorough tank cleaning.
3. Spray the rinse water on the intended target, even if the operation was just completed. For the vast majority of spray jobs, this will not result in overapplication or excessive runoff of material. Use common sense. There are exceptions to every rule.
4. Practice the rinse procedure with a spray marker dye or food coloring until you are able to get clear water from the nozzles with the limited amount of water available.

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