

# Tennessee In-Field Sprayer Mounted Rinse System (TISMRS)

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**A Sprayer-Mounted Rinse System  
To Eliminate Or Reduce Pesticide Waste And Disposal Problems**



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## Introduction

For several years, farmers and agricultural producers have been trying to comply with EPA guidelines for proper and safe disposal of excess agricultural chemical spray materials and rinsate (rinse water) from pesticide application operations. Dumping or draining of unused concentrated agricultural chemicals which have been diluted with water or crop oils is illegal and can present a serious threat to groundwater supplies and the environment. Applications of chemicals in excess of label rates can saturate soil particles and interfere with the natural capacity of the soil to absorb and biodegrade them. Agricultural chemicals applied at or below label rates will be broken down rather quickly as part of the natural decomposition

process. Soils saturated with pesticides can be particularly hazardous near water sources used for drinking water.

Complete application of diluted pesticides is both safe and legal when the materials are applied to crops according to label directions in the field. Producers with the capability of emptying and rinsing tanks in the field while spraying crops could greatly reduce legal and safety problems associated with rinsate and excess spray material disposal.

## In-Field Sprayer Rinse System

A system that allows chemical applicators to rinse and spray unused spray dilutions in the

field is available. This system permits legal and environmentally safe use of rinse water and excess spray dilutions (see **Note 1**). The chemical applicator can leave the field with reduced concentrate to dispose (see **Note 2**) of at the farmstead rinsepads. This reduces the chance of an accidental release of concentrate at the farmstead, which is normally close to drinking water sources. Sprayer components such as hoses, nozzles, regulators, tanks and pumps will have a longer life when cleaned after each use, as many agricultural chemicals are somewhat corrosive.

***Note 1:** The TISMRS does not replace conventional sprayer rinse pads. It is an additional component to a properly designed sprayer*

# TENNESSEE IN-FIELD SPRAYER MOUNTED RINSE SYSTEM (TISMRS)

(Schematic Drawing)

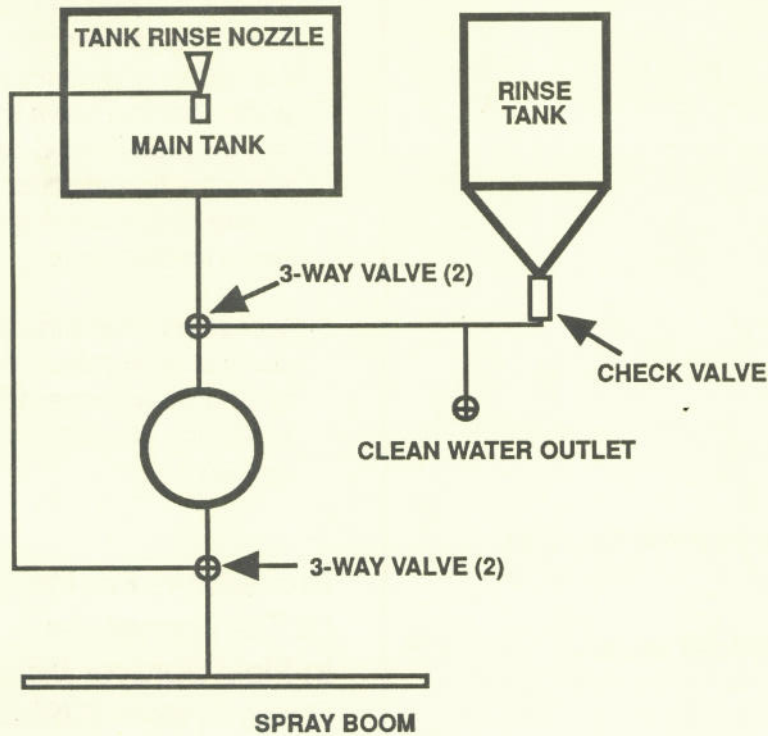


Illustration 1

clean-up and pesticide handling facility.

**Note 2:** Due to the tank shape and design on some spray systems, a small amount of spray mixture may remain in the spray tank when the sprayer is termed "empty." In some cases, this mixture can be as much as 10-15 gallons, but is more commonly about one to two gallons. Even if this spray material cannot be completely removed

during the normal spraying process, it will be significantly diluted during the rinse process, thereby presenting less potential contamination and corrosion problem for the spray applicator.

The pressure system allows mounting of the clean water rinse tank at the most convenient location on the sprayer without regard to the level of the primary tank when self-priming type pumps

are used. The sprayer pump is then used to pump water through a system of two control valves to a discharge hose for rinsing and flushing of the sprayer tank and components. A simple backflow prevention valve is used to prevent contamination of the clean water tank by chemicals within the sprayer system. A second discharge hose can be mounted between the water supply and the sprayer system as a clean water source for hand washing or emergency use.

## System Costs

The rinse tank and most of the necessary components to construct the system can be purchased from local sources in most areas for approximately \$200 or less. The tank rinse nozzle is available from Spraying Systems Company at a cost of about \$180.

Suggested size for the clean water tank is 10 percent of the primary sprayer tank capacity or 15 gallons, whichever is larger. A minimum of 15 gallons is needed for adequate rinsing, even on smaller systems. Systems with tanks larger than 150 gallons should use a 35-gallon cone-shaped rinse tank. Both 15 and 35 gallon sizes are readily available.

## Components Needed To Add Tennessee Sprayer-Mounted Rinse System To Existing Sprayers

1. Funnel-bottom tank for clean water.

## DETAILS OF RINSE TANK CONNECTION TO EXISTING SPRAYER SYSTEM

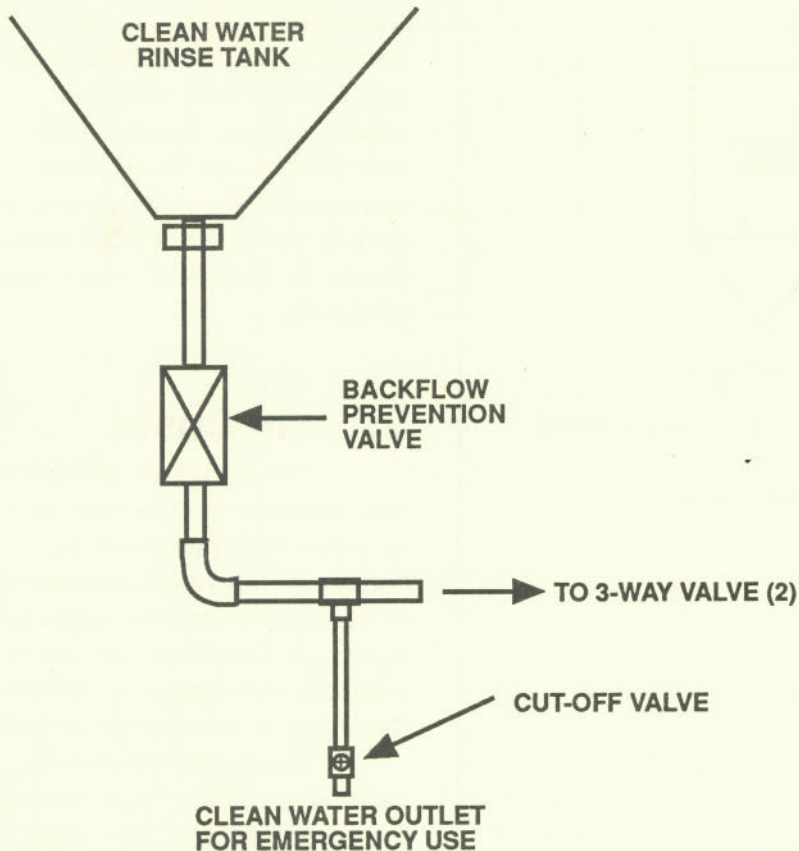


Illustration 2

**Size** - 15 gallon tank for sprayers with tanks up to 150-gallon capacity. Rinse tank should hold 10 percent as much as the main sprayer tank for tanks more than 150 gallons in size.

**2. Backflow prevention valve** (check valve) to prevent contaminated material from main tank from entering the clean water tank.

**Note:** A backflow prevention valve of 1-inch diameter or larger should be used to minimize the flow resistance to the suction side of the pump.

**3. Tank rinsing nozzle** to be mounted inside the main sprayer tank. Sprayers with more than one tank will need one nozzle for each tank that carries spray chemicals. At

least two manufacturers make several tank rinsing nozzles for various sizes and configurations of sprayer tanks.

**4. Two three-way valves.** One valve is inserted into the suction line of the sprayer to control the source of material to the pump. Another valve is inserted into the pressure side of the line to control flow to either the tank rinsing nozzle or the spray boom for discharge.

**5. Necessary plumbing fittings** to connect tank, valves, nozzle and backflow prevention valve to existing plumbing on a sprayer.

### Procedures For Installation Of The Tennessee In-Field Sprayer Mounted Rinse System (TISMRS)

**1.** Mount the clean water rinse tank to the sprayer in a convenient location for filling, but not so it will interfere with the operation of the sprayer or obstruct the operator's view.

Mounting hardware will be determined by the size of the rinse tank, the shape of the tank, the layout of the sprayer on which it is to be mounted and the construction skill of the person mounting the tank. The tank holder may be permanently welded to the existing sprayer frame or it may be constructed so it can be removed by bolting to the sprayer frame. **Design**

and construction of this mounting hardware is left to the installer of the rinse system, since so many sprayer shapes and designs are involved. The rinse tank will be connected to the sprayer pump through pipes or hoses; therefore, the installer can be very flexible as to the location of the rinse tank with respect to other sprayer components. Materials strong enough to carry a full tank of water across rough terrain should be used to construct the frame for the rinse tank.

2. Refer to the schematic drawing for the TISMRS system (Illustration 1) for the approximate location of 3-way valve (1) (see illustration 3). Between the main sprayer tank and the suction side of the pump, install a 3-way valve at a location easily accessible to the operator for operation of the valve during rinse cycles. Most sprayers will have a "rubber" hose for the suction line which can easily be cut for installation of the 3-way valve. Three-way valves with female threads on each outlet will require a "hose barb" fitting which is threaded on one end to fit the female threaded ends of the valve (Illustration 4). The opposite end of the hose barb will accept the rubber hose and is secured with a hose clamp.

One connection to the three-way valve will be to the suction line to the outlet of the cone-shaped rinse tank. A backflow prevention valve is installed in this line (Illustration 2) to protect

## DETAILS OF 3-WAY VALVE INSTALLATION ON SUCTION LINE

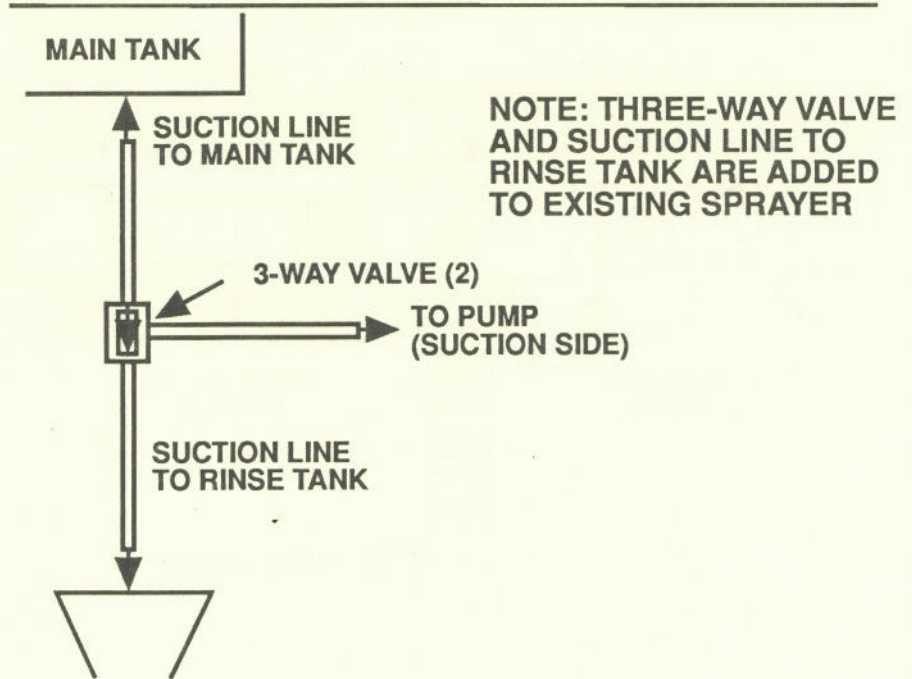


Illustration 3

the clean water from back flows contamination from the main spray tank. A second connection to this 3-way valve is the suction line from the outlet of the main spray tank. The third connection is to the suction side of the sprayer pump.

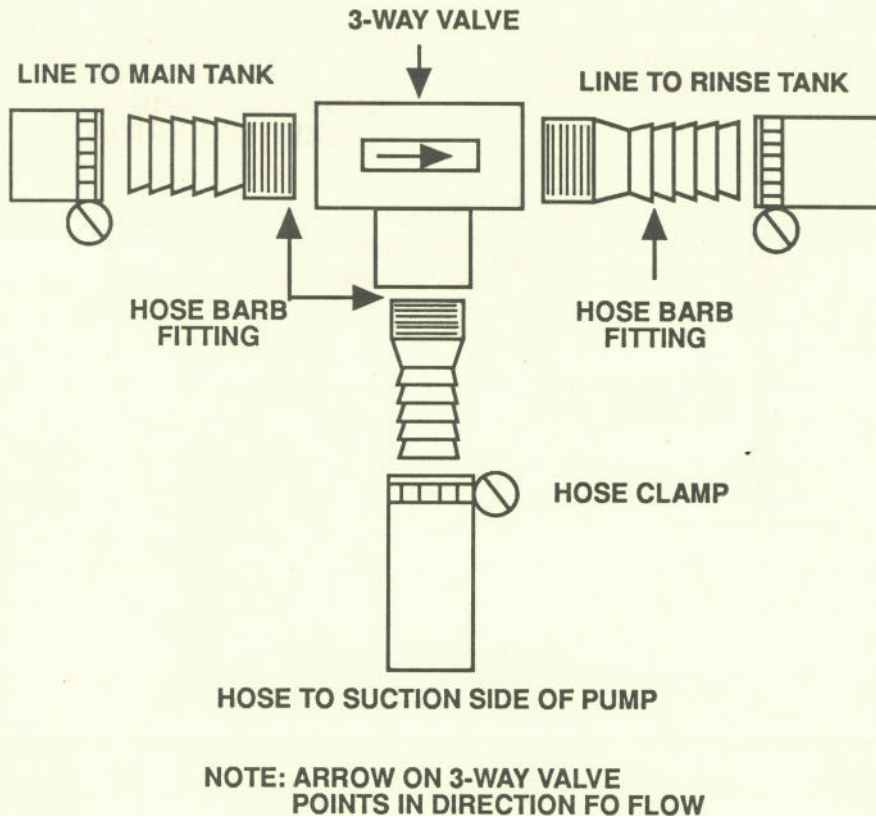
Sprayers with "hard" suction lines such as galvanized steel or a similar material will require installation in a similar manner to the above instructions with some minor changes in hardware.

Three-way valves have two positions only. When the valve

is properly installed in the suction line, the valve will direct fluid to the pump from the main tank in one position and from the rinse tank in the second position (See illustration 4).

3. The second 3-way valve (2) is installed on the pressure side of the pump, preferably near the main boom control valve which should be convenient for the operator to use (See illustration 1 or 5). Most sprayer control manifolds are made of rigid materials such as steel or hard plastic. Use of a 3-way valve with threaded female ends will usually minimize the time and

## DETAILS OF 3-WAY VALVE INSTALLATION ON SUCTION LINE



**Illustration 4**

hardware needed for installation.

4. The tank rinsing nozzle is mounted inside the tank (Illustration 6). This requires installation of a conduit through the tank wall at some point, preferably near the center of the tank. The nozzle is designed to be mounted in the center of the

tank for most efficient operation. A "bulk head" fitting is normally used to connect devices through a tank wall. Holes in polyethylene or plastic tanks can be made using a hole saw of the proper size or a sabre saw. Metal tanks will usually require a metal hole-saw with a metal cutting blade to cut out for the bulk head fitting. Locate the

bulkhead fitting slightly above the center level of the tank such that the tank rinse nozzle will be in the center of the tank when properly mounted. The line from the rinse nozzle goes to one side of 3-way valve (2) (Illustration 5). The line to the main spray boom is mounted to the opposite end of the same 3-way valve (see illustration 5). The third connection to 3-way valve (2) is the pressure line from the pump.

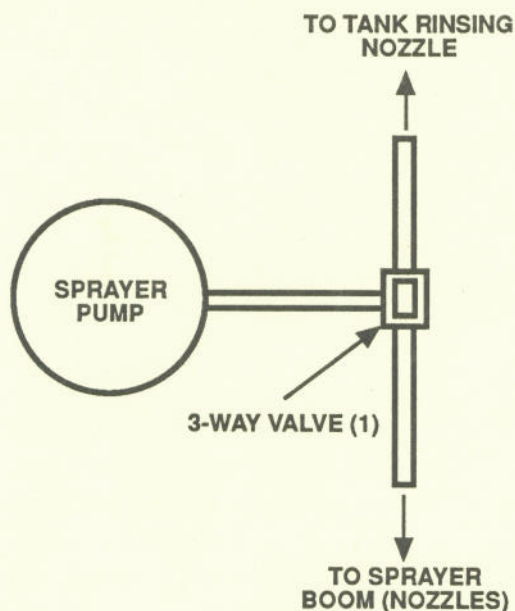
5. A clean wash water line can be installed for emergency use in the field. A "T" fitting is installed on the suction line from the rinse tank. A short length of hose or rigid pipe can be installed in the third side of the "T" with a ball valve or gate valve. This water source will be gravity flow only and should be mounted below the bottom elevation of the rinse tank for adequate flow.

## Procedures For Using The Tennessee In-Field Sprayer Mounted System

The main tank on the sprayer should be empty or nearly empty before a rinse cycle is initiated. Only clean water should be used in the rinse tank. To accomplish a triple rinse as recommended by disposal experts, follow the simple procedures listed below to properly rinse a sprayer tank.

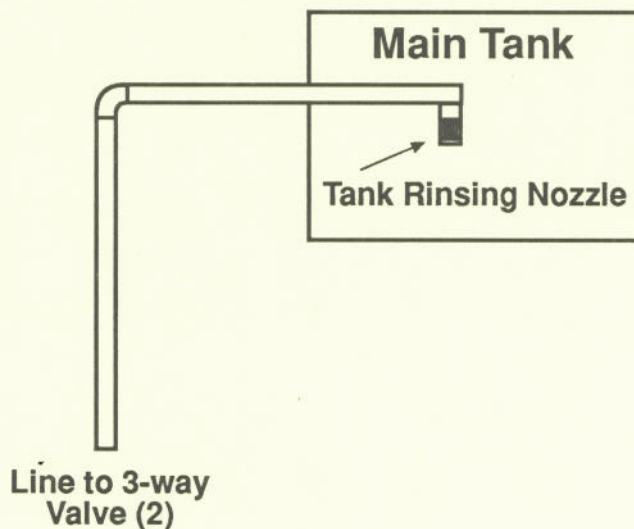
1. Turn the 3-way valve (1) to direct flow to the tank rinse nozzle.

**DETAILS OF 3-WAY VALVE  
INSTALLATION ON PRESSURE  
SIDE OF PUMP**



**Illustration 5**

**VIEW OF TANK RINSING  
NOZZLE IN MAIN TANK**



**Illustration 6**

2. Turn the 3-way valve (2) to direct flow from the clean water rinse tank.
3. Start the sprayer and allow one-third of the water in the rinse tank to be pumped through the tank rinse nozzle to the main tank.
4. Turn the 3-way valve (2) back to the main tank flow.
5. Allow the water in the main tank to circulate for at least one minute.

6. Turn the 3-way valve (1) to direct flow back to the boom. Apply rinsate with the sprayer moving in the desired rinsate disposal area until the main spray tank is empty.
7. Repeat steps 1 thru 7 to accomplish three separate rinse cycles.

**Note:** For stubborn chemicals that are difficult to rinse from tanks, you can increase the length of the rinse cycle in step 5 to allow extra rinse

*time during each cycle. Research is in progress in the Agricultural Engineering Department at The University of Tennessee to evaluate effective rinse times. As data become available, the above instructions will be updated accordingly.*



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