Spray Irrigation of Reclaimed Wastewater: Riser Configuration

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Introduction

Reusing reclaimed wastewater through spray irrigation is an effective way to eliminate stream discharge while recycling nutrients and organic matter to grow plants. Household wastewater spray irrigation systems are small, requiring about 1,000 square feet per bedroom. One to two sprinklers per bedroom are needed to evenly distribute at most 0.2 inches of water per day. Extension Bulletin 912, “On-site Sprinkler Irrigation of Treated Wastewater in Ohio,” describes system requirements for Ohio, including step-by-step instructions for system size and layout. Extension bulletins are available through local Ohio Extension offices or can be purchased through estore.osu-extension.org.

To accommodate year-round irrigation, sprinklers are placed on risers higher than the expected maximum snow depth, and the risers are drained to protect them from freezing.

Riser Height

A minimum of 18 inches to the bottom of the spray head is recommended, but more may be needed depending on typical local snow accumulation. In addition to lifting the spray head up above the snow pack, the riser provides the ability to monitor and control the flow rate and pressure of the spray head.

Riser Protection

Protecting risers from breaking begins at the bottom of the system. A swing joint below the ground surface connects the riser to the lateral line. The 360° flexibility in the swing joint prevents a break or crack at the connection point and allows for some movement of the riser which may result from shifting soil and from human or animal contact with the above ground portion of the riser.

Protecting risers from the weather requires a stronger grade of pipe. Typically, main and lateral lines are constructed of schedule 40 PVC or poly pipe (polyethylene). The more rigid and durable schedule 80 PVC is recommended for the riser. The additional cost is minimal because the risers require only a few feet of pipe. For longer risers, place additional couplings to stiffen the riser.

Always use appropriate PVC primer and glue to connect sections of pipe. Use threaded connections where possible so that the risers can be disassembled easily to repair or replace sections as needed.
Sprinkler Management

To adjust the pressure and flow rate to the spray head, install a gate valve in each riser. This will allow adjustment of throw distances and improve the distribution uniformity of the spray heads in a zone. The valves are also useful during maintenance and repair of spray heads. Individual damaged or malfunctioning spray heads can be turned off until the service provider is able to repair the system.

To aid in sprinkler adjustment, a pressure gauge port should be placed above the gate valve to monitor and adjust the pressure at the spray head. The pressure can be measured and adjusted as needed by the homeowner or service provider. Under normal operation, the port will be plugged with a threaded PVC plug that can be easily removed and replaced with a pressure gauge.

Freeze Protection

Research at The Ohio State University shows that draining water from the spray heads and risers at the end of each irrigation event keeps the system from freezing. Any water left in the pipe network above the frost line may freeze and could damage the pipes, valves or spray heads. Two options are recommended to ensure the water drains from the system.

The first is to install the lateral lines and risers such that the water drains back to the dosing tank once the irrigation pump shuts off. This requires a weep hole or slightly opened valve in the dosing tank so the system drains. The irrigation heads themselves act as air release valves as long as no backflow preventer or check valve is in the spray head. If the spray head comes with a check valve, it must be removed to allow the spray head to drain.

The second method is to install a component called a king-drain in the lateral line below each riser to ensure that no water stays in the riser. The main and lateral lines may remain full, so they must be installed below the frost line to protect them from freezing. The king-drain closes due to the pressure created by the pump when the irrigation cycle starts but opens when the pressure drops at the termination of the irrigation event. A gravel-filled sump is necessary to allow the riser to drain quickly. Placing the king-drain directly in the soil will result in the riser draining too slowly and may result in freeze damage to the riser. See the king-drain manufacturer’s recommendations for installation instructions.