

**Best Management Practices
for the Discharge of Residential
Water Softener Backwash Brine in Unsewered Areas
May 2012**

Purpose:

The Department has developed this document to encourage the adoption of best management practices for the discharge of water softener backwash brine to avoid potential problems with onsite wastewater treatment systems (OWTS) and impacts to surface water and groundwater quality. These problems are caused by high levels of chloride and other ions in the backwash brine from water softener regeneration. This guidance is intended for residential uses with water softener backwash discharges.

Background:

The most common types of water softeners use an ion exchange process to remove magnesium and calcium that cause water hardness and to remove iron and manganese from drinking water. The softeners work by pumping water through a resin matrix. This matrix traps the magnesium and calcium ions that cause hard water and other naturally occurring ions by exchanging them with sodium or potassium ions. Over time, however, the efficiency of the matrix decreases as the sodium or potassium is exhausted.

To regenerate the treatment capability of the softener, the device is backwashed with a concentrated sodium or potassium chloride solution. The frequency of regeneration cycles and volume of backwash created depends on the hardness of the water, the amount of water used in the building, and the size of the water softener. Used properly, softeners regenerate one to three times per week and produce between 40 and 150 gallons of brine per week. If the water softener is set up incorrectly the amount of brine can be much higher. Water softeners are set to regenerate based on either flow measurements or by a timed interval. Flow regulated softeners generally produce less backwash brine than timer regulated systems.

The brine used for the regeneration process must be disposed of properly. It has traditionally been directed into the septic system, discharged underground into a drywell, or simply piped out of the building to the ground surface. Regardless of where it goes, the brine can potentially impact groundwater or surface water if not properly managed. Backwash brine contains excess chloride, sodium, and potassium ions from the regeneration salts as well as naturally occurring ions removed from the source water that may have been concentrated by the water softener. The high concentrations of chloride in the backwash is a particular concern. High levels of chloride in the groundwater used for drinking water can affect water taste and corrode pipes and fixtures. Chloride laden water discharged to the ground surface may damage vegetation.

Water softener backwash brine can also adversely affect the septic system. Brine disrupts the settling of solids in the septic tank and reduces the available volume for solids separation, potentially resulting in solids and grease entering the leachfield. This can lead to clogging and failure of the leachfield. There have also been reports in other parts of the country of leachfields being clogged by naturally occurring soil minerals reacting with the brine. Some states, including Massachusetts and Connecticut, have established prohibitions on discharging backwash brine to an OWTS. Discharging water softener brine to a more advanced treatment system can disrupt the treatment process and will void the manufacturers' warranty of all of the most commonly used Alternative and Experimental technologies in Rhode Island.

Best Management Practices:

The DEM "Rules Establishing Minimum Standards Relating to Location, Design, Construction and Maintenance of Onsite Wastewater Treatment Systems" (OWTS Rules) do not prohibit the discharge of water softener backwash brine to an OWTS. However, the Department does not recommend this practice. Instead, it is recommended that the brine be discharged below the ground surface to a drywell wherever possible.

- Discharge of regeneration backwash to the subsurface or to the ground surface does not require a DEM permit for residential uses.
- The RI Department of Health rules for public wells prohibits all discharges, including water softener discharge (subsurface or surface), within 200 feet of drilled (bedrock), driven or dug public wells or within 400 feet of gravel packed or gravel developed public wells.

Homeowners are advised to take the following precautions to prevent impacts from brine discharge to their drinking water supply and their OWTS:

General Guidelines:

- You can help reduce the amount of the brine discharge by choosing a water softener that has its regeneration cycle regulated by flow (demand initiated regeneration) rather than by a timer.
- Reduce water use in the household.

If discharged to the subsurface (e.g., dry well or galley) -- This is the recommended alternative for discharge:

- Maximize the separation distance between the brine discharge point and your well and any wells on neighboring properties, recommend 100 feet or more.
- Whenever possible, place the brine discharge downgradient (generally downhill) of drinking water wells.
- When constructing the subsurface system, know the location of the OWTS components in order to avoid damage to the system.

If discharged to the surface -- Discharges to the surface are **not** recommended in order to prevent freezing of the brine discharged, prevent vegetation damage, and to prevent inadvertent exposure of people and animals to the discharge. However, if such surface discharge exists:

- Make sure the discharged brine is contained on your property.
- Direct the discharge to a non-paved area to ensure that the brine soaks into the ground.
- Maximize the distance from the point of discharge to both your well and any wells on neighboring properties, recommend 100 feet or more. In addition, direct the discharge so that it flows away from your well. The well casing should be properly sealed and there should be no surface water ponding in the area where the well is located.
- Prevent the discharge from entering nearby surface waters or wetlands.

If discharged to your septic system (OWTS):

- Make sure your OWTS is properly sized to handle the additional water volume.
- If you have an existing OWTS, have it inspected to make sure it is functioning properly and install an effluent screen on the outlet pipe of the septic tank to prevent solids from entering into the leachfield.
- Your septic tank will need to be pumped more often. The brine is heavier than water and will settle to the bottom of the tank, reducing the effective volume for solids separation and retention in the tank.
- If your house is served by an Alternative or Experimental system, check with the technology vendor to make sure you will not damage your system or void your warranty by discharging brine through your system. **Note that manufacturers of ALL of the most commonly used Alternative and Experimental technologies in Rhode Island either prohibit or strongly recommend against discharging water softener backwash brine through their treatment units.**