

VILLAGE OF PADDOCK LAKE SEWER UTILITY

FREQUENTLY ASKED QUESTIONS ABOUT CHLORIDE

The Wisconsin Department of Natural Resources is reissuing the Village's waste water discharge permit. The new permit will require lower limits on chlorides that the treatment plant discharges to the Brighton Creek. The current limit is 720 mg/liter, with new limits being reduced to 570 mg/liter. Chlorides or salts are not something we can treat at our sewer plant therefore; we must concentrate on reducing chlorides in the water coming into the sewer plant, i.e. water softeners and road salts. The Village is constantly trying to reduce the amount of road salt used on icy roads. Water softener usage, on the other hand, is entirely up to the residents.

If the Village is unsuccessful in reducing the amount of chlorides in the waste water, the alternatives are an increase in operational costs.

What is it?

Chloride is one of two components of sodium, also known as table salt or rock salt. When salt dissolves in water, it separates into sodium (Na+) ions and Chloride (Cl-) ions.

Where does Chloride come from?

Small amounts of Chloride come from soaps, detergents, and other cleaning products. Some also comes from commercial processes and road deicing operations. A significant amount of Chloride comes from self-regenerating water softeners.

Our Environment

Why should I care about Chloride?

Our freshwater streams and lakes contain low levels of naturally occurring salts, including chloride. These salts are essential to the aquatic organisms that live there. However, high concentrations of Chloride are harmful to aquatic plants and animals.

How does it get in the Environment?

From the water softener, Chloride is flushed into the sewer where it goes to the wastewater treatment plant. Treatment plants are designed to remove particles, like grit and sand, and to biologically degrade organic waste, such as food and human waste. Once Chloride is dissolved in water it cannot be removed by settling, or biologically degraded by standard treatment processes. Chloride that comes to the Village of Paddock Lake treatment plant passes through the plant to the Brighton Creek and eventually the Des Plaines River. About 1450 pounds of salt pass through the Village of Paddock Lake plant to the environment each day.

Can treatment plants be modified to remove Chloride?

The technology to remove Chloride is available, but is very costly. It would involve microfiltration and reverse osmosis, which are the same treatment processes used to produce pure water used in laboratories. One community determined that it would cost about twenty cents to add a pound of

Chloride at the water softener, and \$5.00 to remove it at the treatment plant. Households can use up to 100 lbs. of salt a month in their water softeners.

Is Potassium Chloride a better choice than Sodium Chloride for my water softener?

No. Although it consists of Potassium instead of Sodium, it still contains Chloride. There is no advantage to using Potassium Chloride as your softener salt in the Paddock Lake area. In some of the drier parts of the western U.S., crops are regularly irrigated with treated effluent wastewater. Certain crops are sensitive to sodium, and in those areas, they are promoting the use of Potassium Chloride over Sodium Chloride.

Hard Water

What makes hard water hard?

Rainwater that falls is “soft”. It does not contain any minerals. As it percolates through the soil, water dissolves minerals which can include calcium and magnesium. Water with substantial amounts of calcium and magnesium is referred to as “hard water”.

How do you measure hardness?

Hardness is measured in terms of grains per gallon (g/gal) or milligrams per liter (mg/l). If you were to evaporate one gallon of water that had a hardness of 5 g/gal, the residue would be equal to one-5-grain aspirin tablet. Laboratories often record hardness as mg/l or parts per million (ppm). One g/gal hardness is equal to 17.1 mg/l of hardness. In the example above, 5 g/gal equals 85.5 mg/l hardness. Water that is 10g/gal or more is considered very hard.

What is the problem with hard water?

The minerals in hard water can be deposited as scale on pipes and in hot water heaters. They also chemically interact with soaps and detergents and make them less efficient. For example, it takes 50% to 75% less detergent to clean laundry in soft water than hard water.

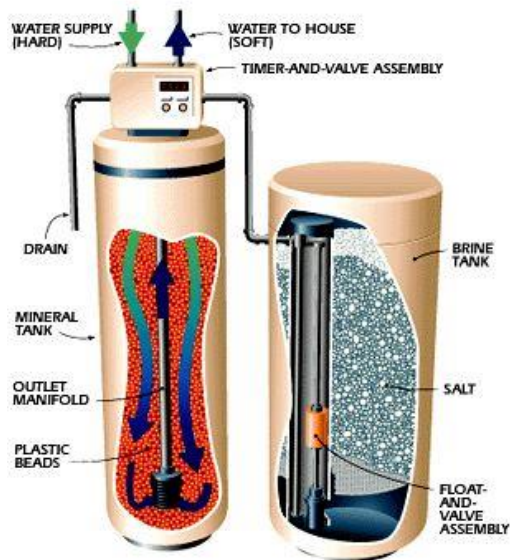
Why is my water hard?

The hardness of water from the wells in Paddock Lake are typically between 18 to 30 g/gal. Various minerals that are pumped from private water wells make our water hard.

Water Softeners

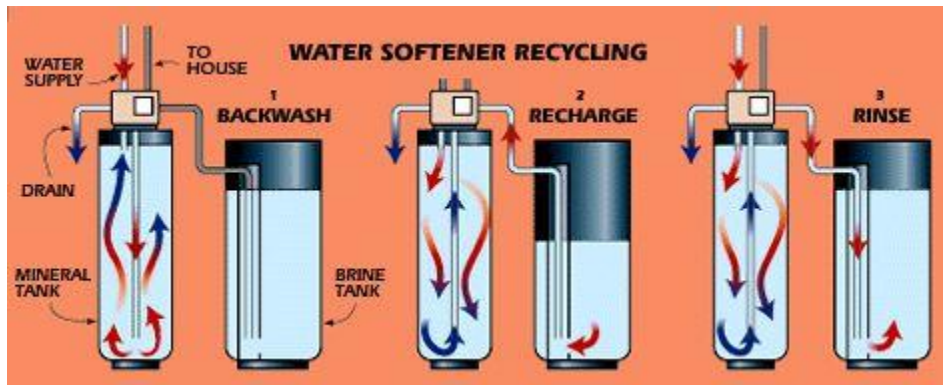
How is water Softened?

Home water softeners have two tanks: a mineral tank that contains resin in the form of small beads, and a brine tank which holds the sodium salt chloride (salt) solution. As water flows through the mineral tank, the hard minerals, magnesium (Mg⁺⁺) and calcium (Ca⁺⁺) ions, replace sodium (Na⁺) ions on the resin. This process is called ion exchange. The water that flows out is considered “soft” because sodium ions do not build up on pipes as lime or interfere with detergents and soaps.



What is the Regeneration Cycle?

Eventually, the resin reaches its limit as to how much calcium and magnesium it can hold. At this point, the resin is flushed with a strong brine solution from the brine tank. Because of its high salt concentration, the brine washes off the calcium and magnesium and replaces them with sodium. The minerals and brine wash go down the drain and into the sewer system. New salt must be added regularly to the brine tank to replace the salt that is used to regenerate the resin. The regeneration cycle can be initiated by a timer or by demand. A timer regulated softener regenerates the resin after a fixed amount of time regardless of how much water is used. A demand initiated regeneration (DIR) softener either tracks the amount of water used or utilizes a hardness sensor to indicate the resin is near capacity and needs to be regenerated. A DIR softener is the more efficient softener in terms of salt and water usage.



1. The back wash phase removes dirt from the mineral tank.
2. Recharging the mineral tank with sodium from the brine solution displaces calcium and magnesium, which is washed down the drain.
3. The final phase rinses the mineral tank with fresh water and loads the brine tank so it is ready for the next cycle.

Road Salt

How much chloride comes from road de-icing?

Road salt used to de-ice streets is also a source of chloride.

The road salt dissolves and enters the ground water; this ground water enters the Village sanitary sewer collection system through small cracks and joints of the sewer pipes. From the winter of 2001 to 2003 the Village applied 767 tons of road salt. During the 2010 to 2013 winter seasons the Village has reduced its use of road salt using 659 tons of salt.

The Village Administrator and Village Board anticipates lowering road salt use in the winters to come by 30% by upgrading existing equipment and training staff in the proper application of road salt.

What Can I Do?

Check to see how your softener is calibrated. Some softeners are preset for the highest hardness setting at the factory. This setting may be as hard as 30 grains. Reset the hardness to 20 grains.

Soften only water used inside the home. Do not treat the outside hose faucets.

Check the timer. When was it last adjusted? Many of us move into a house or purchase a water softener and never check it again. Children move out or other factors come into play that affects the amount of water we use. If your softener is regulated by a timer, you may be able to increase the interval between regeneration cycles without affecting the water quality. Increase the time by one day and see if there is any effect on dish washing and laundry during the next month.

If you are replacing your old softener, replace it with a softener that regenerates based on a meter or a sensor. The Benefits to you are a substantial cost savings from your salt and water usage reduction, with the added benefit that you are helping to protect our environment right here in the Village of Paddock Lake.

Discharge of softener

Under the State of Wisconsin plumbing code and the Village of Paddock Lake code the by-pass water from a softener may be discharge to a clear water sump pump or to the surface of the ground provided a nuisance from the discharge water is not created.

Together the residents, Village Board and the Village Staff can avert the need to construct an expensive sewer treatment plant micro filter and prevent future increases to sewer user fees.

If Village households could reduce their softener salt use by as little as 1/4th of a bag (10 lbs.) per month the Village sewer treatment plant could see a reduction of chloride by 415 pounds per day.

For Assistance or Questions:

Please Contact the Village of Paddock Lake Administrator at 262-843-2713