

# Sustainable Small Drinking Water Systems and Water Cooperatives in North America

By Robin Keating, Certified Water technician, President CANARM, Solution Specialist PRO H2O

**More than ever, sustainable surface and ground water supplies are essential to communities across North America and around the world. The strains of industry and agriculture on ground water are noticeable as pressures on water supplies intensify and supply patterns change. The increase of agriculture over vulnerable aquifers, climate change and hydrocarbon production are impacting our water quality.**

Some jurisdictions in North America recognize that surface and ground water are connected. Considerations of the ecosystem and in-stream flow requirements are factored into the water use decision process. In Canada, British Columbia is the only jurisdiction that does not regulate ground water. The provinces of Alberta, Manitoba, Ontario and Nova Scotia, as well as Washington State and Idaho in the United States are recognized as leaders in North America for their ground water allocation and permitting frameworks.

With the increased contamination of surface and ground water, communities are looking at ways they can protect and maintain their water supply ensuring safe drinking water for generations to come. Housing developments are forming Water Cooperatives within regulated guidelines governing a jurisdiction. Some communities (including townships and cooperatives) are incorporating as small drinking water systems (SDWS) and creating the infrastructure to govern and define how the SDWS will be maintained. These communities can now negotiate with local provincial or state governing bodies.

These organized and now incorporated users groups, have the ability to elect a board of directors who will represent the interests of the community. Federal governments, municipalities and organizations have no universal agreement on what a Small Drinking Water System is. The number of homes and individuals hooked up to the system, the amount of time the system is used per year, the amount of water distributed through the system (the flow rate), the complexity of the system and what is in the water vary within every jurisdiction. Every small drinking water system or cooperative will be unique, created by its membership.

The Government of Canada considers a very small drinking water system to serve less than 500 individuals, and a small drinking water system to serve fewer than 5000 individuals <sup>1</sup>. The United States consider a very small drinking water system serves between 25 and 500 individuals and a small drinking water system serve between 501 and 3,300 <sup>2</sup> individuals. Local jurisdictions (Provinces or States) may have amendments or conditions on the number of homes or individuals served.

One scientific definition in Canada states that safe drinking water is free of microbiological contaminants and only contains chemical contaminants at levels that do not harm human health <sup>3</sup>. The United States define safe drinking water as not containing harmful bacteria, toxic materials or chemicals. It is considered safe if it meets these criteria despite color, taste or odor <sup>4</sup>.

Every small drinking water system or cooperative has to determine if the surface or ground water in their community is affected by external sources or changes in the environment surrounding the water supply. Whether it's a new community or the community has been instructed by a local regulator to treat their water, or just upgrading an older system. The small drinking water systems membership or cooperative must get professional help to work within jurisdictional guidelines.

Small drinking water systems (SDWS) or cooperatives are looking for guidance on how to design and sustain a water treatment system within the framework of the jurisdiction. A qualified local water treatment specialist can work with the regulators in the area to ensure the community is developing a system that will meet or exceed the jurisdictional requirements. With larger communities or communities spread out over a large area. The small drinking water system administration or cooperative members will have to also retain the services of an engineer to design a water treatment system that complies with the local health rules for safe drinking water.

Some communities are under permanent or seasonal Boil Water Advisories or Notices and some communities cannot agree on treatment methods. Some members within the community do not want to treat the water at all, others may have alternate ways of treating the water and some members may have long standing disputes between them that prevent working together at all.

Treating the water can be a great area of dispute among members of a small drinking water system or cooperative. More and more people within a community oppose using chemicals such as chlorine to disinfect the drinking water. Chlorine by itself is not effective against some parasites like *Cryptosporidium* and *Giardia*. The disinfection of both *Cryptosporidium* and *Giardia* are required by most jurisdictions in North America.

*Giardia* is often found in human, beaver, muskrat, and dog feces. Cattle feces appear to be the primary source of *Cryptosporidium*, although these parasites have also been found in humans and other animals. Drinking water sources become contaminated when feces containing the parasites are deposited or flushed into water. If treatment is inadequate, drinking water may contain sufficient numbers of parasites to cause illness.

A small drinking water system should have at least two barriers of protection against infection. If the water is pristine, filtration can be used as one barrier. If the source or supply of the water is questionable then chlorination may be required. The growing choice among small water users is the Ultra Violet (UV) Microbiological water treatment system, used as the last treatment step in supplying clean safe drinking water to the community.

Some communities cannot agree on using a centralized treatment system or chlorinating the water, can now take advantage of advancements in Water treatment technology. The small water groups or cooperatives can use a point of entry (POE) UV system in each home. Attached to the water intake of the residence, the point of entry system uses filtration and/or chlorination (by injection) as the first barrier of protection and the UV microbiological system as the primary barrier of protection.

In older municipalities, some chlorinated systems have seasonal events that over tax the system and cause boil water advisories or notices in the community. Smaller communities that feed off these older municipal systems can now create their own small drinking water system using POE UV as an affordable way to upgrade an existing water system.

The UV system should be validated to meet compliance within the industry and the jurisdiction. UV Systems can be broad and varied. So industry standards using ANSI/NSF 55 CLASS A POE disinfection treatment devices are required to deliver a minimum UV dose of 38 milliJoules per square centimeter (mJ/sq.cm), or 38,000 milliWatts per second per square centimeter (mW-sec/sq.cm), at the failsafe point as determined by inactivation of *Bacillus subtilis* spores and using a sensitivity calibration curve. Class A qualification is only available to devices equipped with UV sensors for monitoring.

When a UV manufacturer makes a cyst reduction claim on a Class A device they are required to have a pre-filter that complies with ANSI/NSF Standard 53 for cyst reduction upstream of the UV device. Class A systems without a general cyst reduction device used for the treatment of untreated surface waters must

have a device found to be in conformance for cyst reduction under Standard 53 installed ahead of the system.

NSF compliance is not the same as validation. Make sure the water treatment system is designed to perform to the standards of NSF CLASS A (with revised 2015 compliance).

Small drinking water systems and cooperatives are growing all over North America. Small water users groups and cooperatives as small as 3 homes and as large as 220 homes are developing POE UV small drinking water systems and some are winning awards using innovative ways of working with local regulators.

Boswell BC had been under various boil water advisories and notices for over a decade. In 2000, a small group of 14 homeowners formed a corporation named 'The North Boswell Water Users Community Inc'. They were tired of the repeated boil water notices and advisories and set out to design a POE system using Ultra Violet Microbiological Water treatment technology.

A decade later they were recognized as one of the first communities in North America to incorporate and operate a small drinking water system using a point of entry Ultra Violet Microbiological water treatment system. The North Boswell Small drinking water system recently celebrated 15 years with 'NO' boil water advisories or notices. Some surrounding communities are under permanent boil water advisories. These communities are working with the North Boswell Water Users Cooperative to help them establish their own infrastructure to create other cooperatives that can manage and maintain small drinking water systems in their own communities.

Cooperatives and small water users groups around North America are building small drinking water systems and working with regulators to help ensure sustainable safe drinking water for generations to come. Whether, you are an engineer, a water treatment specialist, and an installer or cooperative member. Take a look around your province or state for a small drinking water system or small water user group near you and learn more about what you can do to ensure safe drinking water in every community.

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Robin Keating is a Solution Specialist with Pro H2O in Cochrane Alberta and has worked with SDWSs and Water Cooperatives across North America and continues to develop new strategies to treat water for municipal and rural water supplies. Helping government regulators, Engineers, landowners, developers and municipalities develop systems and maintenance compliance programs to treat water effectively, efficiently and economically.

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