

Acknowledgement:

This Fact Sheet is one of a series developed by an Interagency Committee with representatives from Saskatchewan Health, Regional Health Authorities, Saskatchewan Watershed Authority, Saskatchewan Agriculture, Agriculture and Agri-Food Canada – PFRA and Saskatchewan Environment.

Responsibility for interpretation of the content of this fact sheet rests with the user. Information in this fact sheet is provided solely for the users information and, while thought to be accurate, is provided strictly as is and with out warranty of any kind, either express or implied. The Province of Saskatchewan hereby disclaims any liability or responsibility for any injury or damage resulting from the use, directly or indirectly, of the information contained herein.

May/08



Government of
Saskatchewan

Choosing a Water Treatment System

(For Private Water and Health Regulated Public Water Supplies)

When choosing a water treatment system there are a number of factors to be considered: size of treatment system, type of contaminants you want to treat, knowledge of how the proposed treatment system works including its strengths and weaknesses, purchase price and maintenance costs, and whether or not the water treatment device is safe and effective.

Step One: Decide How Much Treated Water You Want

Home water treatment systems or devices come in two basic sizes: point-of-entry (POE) and point-of-use (POU). Point-of-entry devices treat all water entering the home and are typically connected to the main water line. Point-of-entry devices treat about 100 –300 gallons per day depending on the number of household users. Point-of-use water treatment devices treat only water for drinking and cooking and are typically installed near a kitchen or bathroom tap either above or below the counter top. Point-of-use devices only treat a few gallons of water per day.

Step Two: Identify the Contaminates You Want to Treat

When choosing a water treatment system, it is important to keep in mind that water quality can fluctuate over short periods of time. Fluctuations in the concentration of various constituents can occur for a variety of reasons such as but not limited to the length of prior pumping, height of groundwater table, rainfall timing and amount, and season of the year. Before choosing a water treatment system, it is recommended that a minimum of two trials of water quality tests for bacteria and chemical constituents (See Test packages) be taken over a period of months to gain information on contaminant levels within your source water². Water quality testing may identify your parameters of concern. Treatment goals that should be considered are:

1. Remove parameters of concern as identified from the tests to levels below the maximum acceptable concentration as defined by Health Canada or Saskatchewan Environment
2. Complete disinfection for bacteriological contaminants (such as E.Coli or Total Coliforms)
3. Removal/inactivation of 99.9% of cysts (such as Cryptosporidium and Giardia Lamblia).
4. Removal/inactivation of 99.99% of viruses

Step Three: Do Your Homework When Selecting a Water Treatment System

The type of water treatment system to be chosen will depend greatly on the number and type of contaminants or aesthetic problems identified by the water quality tests completed on your source water. Once you have determined the parameters of concern in your water, it is best to contact as many water treatment experts as possible to find out about the water treatment options that are available. When discussing water treatment options with a local water treatment expert, the following questions should be considered:

- What treatment options are used to treat my specific water quality problems?
- How do these specific treatment options work?
- What other treatment options are available?
- What specific equipment/device that will perform this treatment is recommended? Why?
- Can the treatment device be connected to additional treatment devices in the future for increasing capacity or further improving treatment?
- What treatment options are being used in the area with similar water quality problems?
- What disadvantages are common to the treatment device being considered?
- What are the installation and maintenance costs associated with the treatment devices?

- Does the treatment option involve adding chemicals to the water? If yes, what are they?
- How many treatment steps are needed? (eg. pre-filtration -> cartridge filtration -> UV disinfection)
- In what ways can the treatment device malfunction and how can these malfunctions be detected?
- What maintenance requirements are needed to ensure the treatment device operates efficiently? (eg. replacing filters, cleaning components, etc.)
- How much wastewater is produced when treating the water?

Step Four: Recognize Water Treatment Devices Have Limitations

While there are many water treatment devices available, there is not one that can perform every kind of treatment. When dealing with multiple contaminants and aesthetic problems, it is important to identify those of greatest concern and make sure you choose the appropriate treatment technology (Table 1 and 2). Under different water quality conditions, a listed treatment technology may perform to different levels of effectiveness. In some cases, it may be necessary to have more than one treatment device to meet your water quality needs. Table 1 and 2 are not complete lists of contaminants and treatment processes; therefore you should make certain that the treatment components selected remove your contaminants of concern.

Table 1: Applicability of POE and POU Treatment Technologies to Contaminant Removal

Treatment Technology	Contaminant										
	Arsenic	Copper	Lead	Other Heavy Metals	Fluoride	Nitrate	SOCs	Radium	Selenium	Uranium	Microbial
Activated Alumina	X			S	X				X	X	
Granular Activated Carbon				S			X				
Distillation	X	X	X	X		X					X
Anion Exchange	X			S		X			X	X	
Cation Exchange		X	X	S				X			
Ozonation											X
Reverse Osmosis	X	X	X	X	X	X	X	X	X	X	X
Other Adsorption Media	X										
Electrodialysis				X	X	X					
Cartridge filter (1 micron absolute)											some protozoan only
Ultraviolet Light											X

- SOC's are Synthetic Organic Chemicals; X = Treatment technology may remove the noted contaminant; S = Treatment technology may be only partially effective at removing some portion of the contaminant under limited conditions.
- Currently, POE is excluded from NSF/ANSI 58 for RO devices; issues include the generation of large quantities of reject water and potential incompatibility of product water with copper pipes.
- Other adsorption media include iron-, aluminum-, or titanium-dioxide-based media.
- Cation and anion exchange where a filter bed removes a particular parameter by exchanging the substance with one in the resin. A common example is the removal of calcium and magnesium by exchanging with sodium in a cation exchange resin found in typical water softeners.

Table 2: Applicability of POE and POU Treatment Technologies to Improving Aesthetics

Treatment Technology	Contaminant								
	Hardness	Hydrogen Sulphide	Iron/ Manganese	Sodium	TDS	Chlorine	Colour	Taste & Odour	Turbidity
Activated Alumina									X
Granular Activated Carbon		X				X	S	X	X
Distillation	X		X	X	X	X	X	X	X
Ion Exchange	X		S	S					
Ozonation							X	X	
Reverse Osmosis	S		S	X	X	X	X	X	X
Electrodialysis			S	S	S				
Cartridge filter (1 micron absolute)			S				S		S

- TDS means total dissolved solids;
- X = Treatment technology may remove the noted contaminant; S = Treatment technology may be only partially effective at removing some portion of the contaminant under limited conditions.
- Typical water jug and faucet mounted filters are often made from an activated carbon product.
- Ion exchange includes greensand and potassium permanganate treatment

Step Five: Consider the Long-Term Costs

When deciding to purchase a water treatment device or system, one should consider the long-term costs associated with maintenance and operation. Nearly all water treatment systems require some type of regular maintenance such as replacing clogged filters, removing built up water scale or sanitizing the water treatment unit. Furthermore, the cost of operation for some treatment systems may be a lot less than others. Knowledge of the maintenance and operational costs (eg. backwashing volumes, wastewater disposal, chemical usage, etc.) allows one to make practical decisions when purchasing a water treatment device.

Step Six: Look for Certification

When purchasing a water treatment device look for information indicating that it is certified for the specific purpose for which it will be used. Certification indicates a product is safe and effective and can perform to standards as established by the National Sanitation Foundation (NSF). Lists of certified water treatment devices or systems are available on NSF's drinking water treatment units online product database at <http://www.nsf.org/Certified/dwtu/> or WQA's Product Listings at <http://wqa.org/>.

Water Quality Test Packages

For sampling instructions and containers, you should contact an accredited laboratory.

Ground Water Test Package: Chloride, Hydroxide, Magnesium, pH, Potassium, Sodium, Specific Conductivity, Sulphate, Sum of Ions, Total Alkalinity, Total Hardness, Nitrate, Dissolved Organic Carbon, Aluminum, Arsenic, Barium, Boron, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Selenium, Uranium, Zinc, Fluoride, Escherichia Coliform Bacteria, Total Coliform Bacteria

Surface Water Test Package: Bicarbonate, Calcium, Carbonate, Chloride, Hydroxide, Magnesium, pH, Potassium, Sodium, Specific Conductivity, Sulphate, Sum of Ions, Total Alkalinity, Total Hardness, Ammonia, Nitrate, Ortho-Phosphate, Phosphorous, Dissolved Organic Carbon, Iron, Manganese, Mercury, True Colour, Turbidity, Escherichia Coliform Bacteria, Plate Count, Total Coliform Bacteria, Chlorophyll a

References:

1. AquaVic Water Solutions Inc. (2007). Application of "Point of Entry" and "Point of Use" Water Treatment Technology in British Columbia. http://www.health.gov.bc.ca/protect/poureport_main.pdf
2. New Hampshire Department of Environmental Services. (2005). Considerations When Purchasing Water Treatment Equipment. <http://www.des.state.nh.us/factsheets/ws/inc/2-5.html>
3. U.S. Environmental Protection Agency. (2006). Point-of-Use or Point-of-Entry Treatment Options for Small Drinking Water Systems http://epa.gov/safewater/smallsys/pdfs/guide_smallsystems_pou-poe_june6-2006.pdf
- 4 Alberta Health and Wellness, Environmental Public Health Field Manual for Private, Public and communal Drinking Water Systems in Alberta Second Edition 2004.

Need More Information?

Health Regulated Public Water Supply

For more information on this fact sheet and/or other water quality issues relating to health regulated public water supplies contact your local health region public health inspector.

Private Water Supply

For more information on how **parameter** impacts on human health contact your local health region office. For information on how **Parameter** impacts agricultural operations contact Saskatchewan Ministry of Agriculture through your Regional Office or the Agricultural Knowledge Centre at 1-866-457-2377 or on the internet (<http://www.agriculture.gov.sk.ca/AKC>).

<p>Government of Saskatchewan Water Information website www.SaskH2O.ca</p>	<p>Water Inquiry Line Questions about water? Call 1-866-SASK H2O (1-866-727-5420) to be referred to proper agency.</p>
<p>Saskatchewan Ministry of Health http://www.health.gov.sk.ca/environmental-health Regional Health Offices Saskatoon: Saskatoon (306) 655-4605 Sunrise: Yorkton (306) 786-0600 Kelsey Trail: Melfort (306) 752-6310 Five Hills: Moose Jaw (306) 691-1500 Sun Country: Weyburn (306) 842-8618 Heartland: Rosetown (306) 882-6413 Prairie North: North Battleford (306) 446-6400 Prince Albert Parkland: Prince Albert (306) 765-6600 Cypress: Swift Current (306) 778-5280 Regina Qu'Appelle: Regina (306) 766-7755 Mamawetan Churchill River: La Ronge (306) 425-8512 Keewatin Yatthe: Buffalo Narrows (306) 235-5811</p>	<p>Saskatchewan Watershed Authority, Head Office, Moose Jaw (306) 694-3900 Website: www.swa.ca <i>Regional Offices:</i> http://www.swa.ca/AboutUs/Contact.asp?type=Offices</p> <p>Sask Water Corporation Head Office, Moose Jaw Customer Service 1-888-230-1111 Website: http://www.saskwater.com</p> <p>Prairie Farm Rehabilitation Administration (PFRA) - Agriculture and Agri-Food Canada Website http://www.agr.gc.ca/pfra/water/intro_e.htm <i>Regional Offices:</i> http://www.agr.gc.ca/pfra/sask_e.htm</p>
<p>Saskatchewan Ministry of Health Saskatchewan Disease Control Laboratory, Regina General Inquiry 1-866-450-0000 Phone: (306) 798-2125 // Fax (306) 798-0071 Website: http://www.health.gov.sk.ca/lab</p>	<p>Saskatchewan Ministry of Agriculture General Inquiry 1-866-457-2377 Agricultural Operations Regina (306) 787-4680 Irrigation Development Outlook (306) 867-5500 Website: www.agriculture.gov.sk.ca</p>
<p>Health Canada First Nation and Inuit Health Branch, Regina (306) 780-5434 Website: http://www.hc-sc.gc.ca</p>	<p>Saskatchewan Ministry of Environment Toll-Free 1-800-567-4224 Spill Emergency Toll-Free 1-800-667-7525 Website: http://www.environment.gov.sk.ca</p>