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# THE WATER ISSUE

Water is our most important resource. We can only survive three to five days without water. Whereas the average person can live four to eight weeks without food. So why is such an important resource often not in the forefront of discussion? In Alberta 80% of our water resource is located where only 20% of the population resides. Here in the North East, we do not have the allocation issues that are present in the south. The focus therefore has not been on decreasing our water footprint; reducing our consumption and waste of this resource.

There are many small things that we can do that will have a significant impact on our water quality. Installing low flow faucets and showerheads, and having dual flush toilets all reduce our water usage. Preventing contamination of ground and surface water from hazardous wastes, fuels and lubricants and pesticides. It takes a very small amount of petrol to severely pollute your drinking water source. Reducing the amount of detergents we use, proper disposal of wastes and a well designed and maintained sewage system, and ensuring that stock yards are setback from wells and dugouts all impact water quality.

Protecting sensitive areas such as riparian areas are important for water quality. Riparian area functions are essential to improve and maintain water quality, quantity and biodiversity. They trap and store sediment; build and maintain banks and shorelines; store water; recharge aquifers; filter and buffer water; reduce and dissipate energy; create primary production; and maintain biodiversity. Essentially they act like kidneys to our water systems.

Roughly 600,000 Albertans rely on well water for their household purposes. Monitoring your well for signs of contamination from backflow, unsealed casings (annular space) or damaged casings, as well as flooding around your well are all important for maintaining quality ground water. In North Eastern Alberta Arsenic and Uranium are becoming more commonly found in groundwater. Having your water testing is imperative to knowing what you may be consuming.

## Uranium in Well Water

Very small concentrations of Uranium are present in most soils. NORMs (naturally occurring radioactive materials) are found in most environments but may become concentrated due to human activities such as mineral extraction, metal recycling, coal power generation, forest product ash, oil and gas production as well as other industrial activities. Water treatments can also concentrate NORMs.

Uranium has two valence states of (IV) and (VI). In the reduced (IV) state uranium is in a stable mineral form. However when oxidized it forms uranium (VI) which is 10,000 times more soluble which is why uranium is more prevalent in shallow wells (less than 100 feet deep) where there is a higher concentration of oxygen present.

The maximum acceptable concentration (MAC) is 0.02 mg/L. In a study conducted in 1999 by



## North Saskatchewan Watershed Alliance (NSWA)

Approximately 20% of all waterbourn illnesses came from water from private sources



The North Saskatchewan Watershed runs from the western boarder of the province in the rocky mountains to the eastern boarder of the Alberta plains into Saskatchewan. The total drainage area of the basin is approximately 57,000 square kilometers in 12 sub-basins. There are over 1.2 million people residing in the basin with about 1.1 million living in the Edmonton capital region. The watershed includes 66 urban municipalities and 20 rural municipalities including the County of St. Paul. There are two hydro-electric reservoirs, 3 coal fired electricity plants and large forestry, agricultural and petro-chemical plants. Seven billion cubic meters of water flows from the watershed into Saskatchewan annually.

The North Saskatchewan Watershed Alliance (NSWA) was formed in 1997 by EPCOR and Trout Unlimited Canada with funding from the Prairie Farm Rehabilitation Administration, Trans Alta and City of Edmonton Drainage Services. In 2005, the Government of Alberta formally recognized the NSWA as a WPAC (Watershed Planning and Advisory Council). By 2010 the NSWA had 127 members supporting their vision of ‘people working together for a healthy and functioning North Saskatchewan watershed— today and tomorrow’.

The NSWA mission is: to protect and improve water quality and water quantity and the health of our watershed by: seeking, developing and sharing knowledge; facilitating partnerships and collaborative planning; and working in an adaptive management process. Currently, the NSWA is preparing an integrated watershed management plan (IWMP) which outlines several goals which include: maintain or improve water quality in the North Saskatchewan watershed (NSW); maintain or improve water quantity in the NSW; maintain or improve aquatic ecosystem health in NSW; protect groundwater quality and quantity; and water and land use planning are aligned at a regional scale.

### Map of the North Saskatchewan Watershed

The IWMP will try to balance economic, environmental and social needs. The NSWA is accepting reviews of the proposed IWMP which can be obtained online at <http://www.nswa.ab.ca> or by contacting the watershed at 780-496-3474. Now is the time to have your say in the planning of your watershed.



## *Arsenic in Your Groundwater*

Arsenic lately has become a more prominent issue in Northern Alberta. Many of the wells being tested in the area have been positive for this heavy metal. Arsenic has two forms, organic (arsenic five [As(v)]) which is found in plants, animals and some foods or an inorganic form (arsenic three [As(III)]) that is found in water, soil or the air. Arsenic in drinking water can be attributed to both natural sources and human activity. North Eastern Alberta has high arsenic levels in the groundwater, which may be due to the type of bedrock found here containing pyrites which are enriched with arsenic.

Arsenite (As(III)) is more toxic than organic arsenic (As(v)) and is more prevalent in groundwater due to the low oxygen concentrations. In the Beaver River area As(III) is approximately ten times more prevalent than As(v).

Generally we are exposed to low levels of organic arsenic through our food; this form of arsenic we can metabolize and excrete in our urine. The arsenic found in the groundwater is more toxic and can affect our gastrointestinal system, cardiovascular system and our nervous system. The maximum acceptable concentration (MAC) is 0.01mg/litre.

It is important to test your well water on a regular basis as levels can fluctuate. Water treatments are available to reduce the amount of arsenic or change As(III) into As(v) though oxidation. Reverse osmosis combined with a pre-treatment can remove the majority (roughly 85%) of arsenic from your water. Distillation is an effective method however you must maintain and clean your distiller and replace the carbon filter within the recommended time. Make sure that your treatment systems meet the NSF/ANSI standards. Conducting a pre-treatment and post-treatment analysis is the only way to prove the effectiveness of your system.

## *Beaver River Watershed Alliance*

There are more than 2,000 lakes in the Beaver River Basin over an area covering roughly 22,000 km<sup>2</sup>. There are about 38,000 people residing in the watershed with about half the population living in the urban centers (Cold Lake and Bonnyville). The basin includes 3 Métis Settlements, 4 First Nations Reserves, one town, one city, one village, 14 hamlets, 4 summer villages, 4 counties and one municipal district. The Beaver River Watershed Alliance (BRWA) is one of eleven Watershed Planning and Advisory Council (WPACs) in Alberta created to achieve the three goals of Alberta's Water of Life strategy of: healthy aquatic ecosystems, safe and secure drinking water supply, and reliable quality water supplies for a sustainable economy.

The BRWA vision is for the Beaver River Watershed [to be] ecologically healthy and environmentally sustainable. The mission of the BRWA is to maintain or improve the ecology of the Beaver River Watershed while respecting the diverse values of the watershed community. This will be achieved through broad community engagement, sound scientific study, education, and the support of implementing sustainable water management and land use practices.



**2.2 Million people die each year from waterborne illnesses. Over 80% of these fatalities are children.**

**1.1 Billion people do not have access to safe drinking water. That is one in every sixth person.**

## *10 Ways to Protect Your Well and Groundwater Supply*

From Working Well and Government of Alberta Fact Sheets

### **Design and Build a Good Well**

Use a licensed water well contractor and know what to ask for.

### **Get Rid of Your Well Pit**

Well pits were installed to provide a frost free location for the pressure system. Over time, well pits have proven to be a significant source of contamination to wells so they are no longer permitted for newly constructed wells. If you have a well pit, have a licensed water well contractor install a pitless adaptor on the well casing. This mechanical device provides a frost free sanitary connection to the distribution line. The well casing can then be extended above ground surface and the well pit can be filled in.

### **Plug Old Wells and Holes**

Old or unused wells and seismic holes should be plugged from bottom to top with bentonite to prevent surface water from draining into your water supply.

### **Understand Your Water Well Drilling Report**

Licensed water well contractors are required to submit all water well drilling reports to Alberta Environment. This record contains important information that will help you manage and protect your well.

### **Manage Activities on Your Land**

If you are not careful, manure, fertilizers and chemicals can seep into your groundwater, especially if you have sandy or gravelly soils or a shallow well. Avoid over application of these materials.

### **Test Your Well Water**

Contact the Alberta Health Services district environmental health office in your area for sample bottles and information on how to collect a water sample. Do a standard coliform bacteria test twice a year (or more often if your well is less than 50 feet deep). You should also do a routine water chemistry test every two years and test your water if there are any changes in its colour, odour, taste or if you notice any new staining.

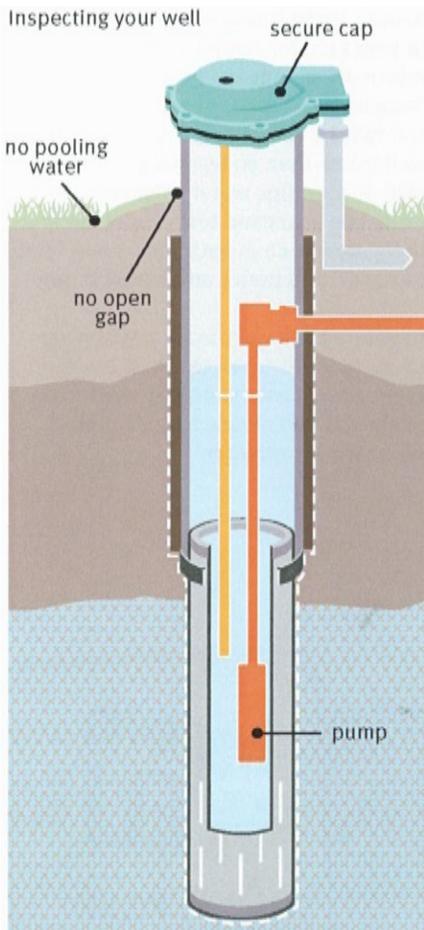
Regular shock chlorination will keep bacteria build-up in check. If biofouling is excessive, your well may need to be inspected and cleaned by a licensed water well contractor.

### **Shock Chlorinate Your Well**

If your well test positive for coliform bacteria, you may have to shock chlorinate. Regularly check your toilet tank for slime build-up, which can be a sign of iron or sulphate-reducing bacteria biofouling in your well. These bacteria won't hurt you and will not show up on a standard bacteria test. However, they can affect the taste and smell of your water, and can permanently damage well equipment or cause well plugging.

### **Inspect Your Well and Property**

Regularly check the area around your well and well system to make sure:



## 10 Ways Continued

- The well cap is secure and vents are not blocked
- There are no open gaps around the outside of the well casing
- There is no ground settling or water pooling around the well casing
- Potential contaminants such as manure storage, septic systems, chemical and fuel storage are properly managed and far enough away from your well
- The pump, pressure tank and water treatment system are operating properly
- Your septic system is working properly. Tanks should be inspected regularly and pumped out when necessary by a qualified sewage hauler.

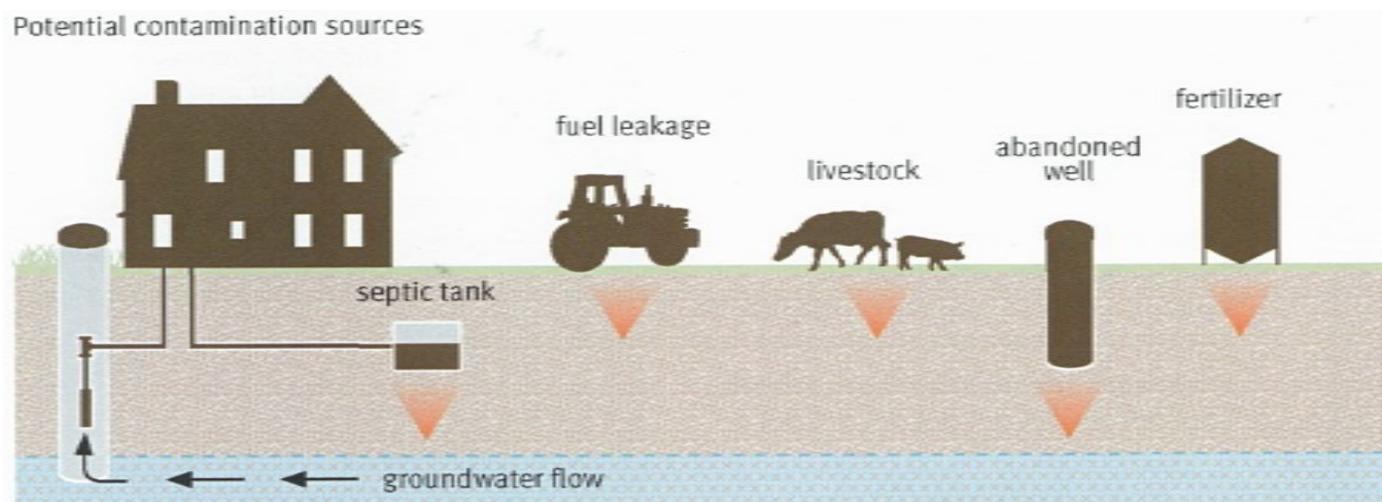
In some areas of Alberta, up to 1/3 of new wells drilled are considered marginal or poor.

### NEVER Over Pump Your Well

Over-pumping your well can cause significant problems. For new wells, make sure your licensed water well contractor does a full pump test and gives you a recommended sustainable pumping rate. Older wells may need a current pump test to determine a safe pumping rate. Be careful with low yielding wells. To avoid putting excessive stress on them, extra storage may be required to meet household needs during peak consumption periods.

### Keep Records – Build History

Track your well's performance by keeping copies of your water well drilling report, well inspections, water tests and treatments. Give this information to the new owners if you sell your property.



## How to Obtain Your Well Report

Go to <http://www.envinfo.gov.ab.ca/GroundWater>

- Click on "Find Water Wells"
- Enter search criteria by either: legal land description, owner name, or well ID
- Click on "Generate Report"
- A single report or a reconnaissance report will appear, select the well that you desire
- Can call Alberta Environment Groundwater Info centre at 780-427-2770



## Shock Chlorination of Your Well

Shock chlorination of your well is a way to treat bacteria contamination in your well water. It is recommended to shock chlorinate whenever you construct a new well, after repairs and maintenance of the well and/or pump system, if the well becomes contaminated due to flooding, if there is a change in clarity / taste / colour / smell of the water, or if you have had your water tested and there is *coliform* bacteria present. Shock chlorination can also be done on an annual basis to control biofouling. Biofouling is caused by the presence of iron or sulphate reducing bacteria which is indicated by the staining or sliming of fixtures, bad tasting water, a rotten-egg smell, or a reduction in well capacity. You can shock chlorinate your own well or have a licensed water well contractor shock chlorinate.

### Before Shock Chlorination

Find out the diameter, depth and pumping information for your well from your drilling report. If you have water treatment equipment such as iron filters, water softeners, distillation etc. determine if it needs to be bypassed or disconnected before you shock chlorinate. **Prepare chlorine mixture outside in a well vented area; wear goggles and gloves to protect yourself as it is corrosive and can give off deadly vapors. Never mix chlorine with other chemicals.**

### Shock Chlorination Procedure

Step 1.

Calculate the feet of water in your well by subtracting the non-pumping water level from the total well depth.

Step 2.

Calculate the volume of water needed for the procedure by multiplying the feet of water in your well (step 1) with the volume of water needed per foot from Table 1.

Step 3.

Calculate the volume of chlorine bleach you will need by multiplying the feet of water in your well (step 1) with the chlorine needed per foot (Table 1).

Step 4.

Siphon the chlorine solution into your well with a **clean** hose.

Step 5. Open all hydrants and faucets, including dishwasher,

laundry and taps. Re-fill the hot water tank and flush toilets. Run the water until you can smell the chlorine.

Step 6.

Shut off all taps, faucets and hydrants and leave the chlorine solution in the well for 8-48 hours. The longer the wait time the greater the results.

Step 7.

To avoid damaging your septic system open an outside faucet and run the water until you can no longer smell the chlorine. Do not over pump your well. Flushing can be done slowly to prevent sediment from pumping.

Step 8.

Run hot and cold taps inside the house to flush tank and distribution system.

Step 9.

Backwash and regenerate any water treatment equipment.

Table 1. (\*Chart values are based on a 200ppm chlorine solution)

Well Casing Diameter		Volume of Water Needed / Foot of Water in Your Well		Volume of chlorine bleach (5.25%) Needed / Foot of Water in Your Well*
Inches	Millimetres	Gallons	Litres	Litres
4	100	1	5	0.02
6	150	2.5	11	0.04
8	200	4	19	0.07

### For more information on Shock Chlorination

- **Water Wells That Last For Generations** [www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/wwg404](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/wwg404)
- **Canadian Ground Water Association** [www.cgwa.org](http://www.cgwa.org)
- **Alberta Water Well Drilling Association** [www.awwda.com](http://www.awwda.com)
- **Alberta Environment Information Centre** 780-427-2700 or Toll Free 310-0000
- **Ag-Info Centre** 310-FARM (3276)

*If using chlorine pellets, make sure to dissolve them in water, otherwise they may corrode your well and pumping system.*

# Beaver River Watershed Alliance Continued



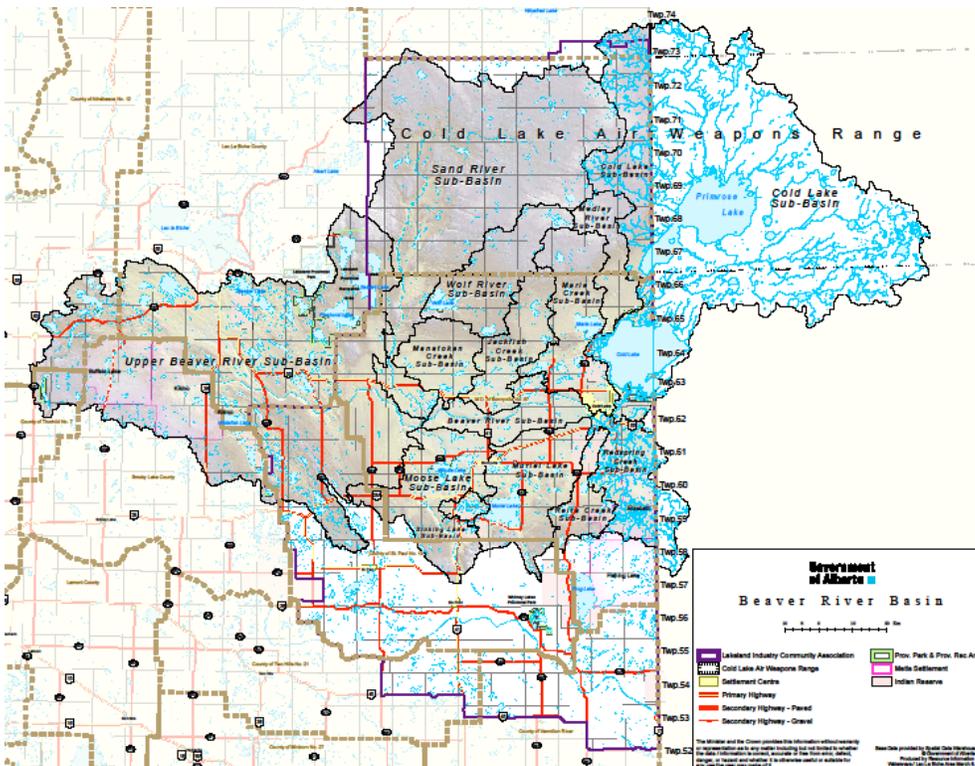
Beaver River Watershed Alliance

The BRWA is involved with numerous projects, many of which are ongoing for the next several years.

- A wetland inventory was conducted in partnership with Ducks Unlimited, LICA and Alberta Environment and mapped and classified wetlands in the basin.
- The Aquatic Ecosystem Health Assessment Program looks at the overall health of the ecosystem by characterizing and assessing the sub-basins and uses historical fish survey data comparing to present index of biological integrity of current fish populations to model the current health of the ecosystem.
- The Lakeland Uranium study is examining the sources and reasons for the elevated uranium levels in shallow ground water in the basin.
- The Community Groundwater Monitoring Program, which was in conjunction with the Lakeland Uranium study, sampled well water and tested for 18 routine chemicals and 23 trace metals (which include arsenic and uranium). In 2009, Alberta Health and Wellness tested 151 wells, and in 2010 the BRWA tested an additional 47 wells. Over half of the 151 wells tested had over the maximum acceptable concentration (MAC) level of arsenic. From 2008 to 2012 the BRWA is conducting a winter lake level study, which measures lake levels from fall to spring thaw as well as monitors isotopes which are indicative of groundwater exchange.

Currently the BRWA is drafting the State of the Watershed report. This report will incorporate all the studies and projects that are being conducted, as well as historical watershed data. The state of the watershed report will establish thresholds using core indicators that are unique to the basin as well as ones that are commonly shared between other WPACs. After the State of the Watershed report is complete it will provide the foundation for the Integrated Watershed Management Plan (IWMP). The IWMP will have impacts on future land use; balancing recreation, industry, and economic growth with the environment, ecosystems and preserving water quality.

Watch for future public consultations regarding the Beaver River Basin IWMP.



**There are 12 (known) Water Stewardship Groups in the Beaver River Basin. On August 6th, 2011 there will be a Water Stewardship Group Show and Share Day**



## LAKELAND AGRICULTURAL RESEARCH ASSOCIATION

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Sustainable farming encompasses a wide range of practices and principles; combining environmental stewardship with profitability and ensuring that the family farm will be there for generations to come.



<http://www.areca.ab.ca/site/lara/index.php>

## *Environmental Farm Plans*

The environment is becoming a more prominent issue. It is a large factor in marketing agriculture and food products in today's markets. Consumers are demanding more transparency and are demanding high quality and safe products. Reputation of food safety is critical to retain and gain access to domestic and international markets.

Environmental Farm Plans (EFP) provide a tool for producers to self analyze their operation and identify environmental risks, current standards, areas for improvement and highlight what they are doing well.

Having a completed EFP allows producers to access different funding opportunities, such as the Growing Forward Stewardship Program. It is also useful in product branding that demonstrates specific environmental standards.

### **The EFP Process**

An EFP can be completed through workshops or one-on-one session(s). The EFP first identifies the soil and farm site characteristics. Following this, the producer completes only the relevant chapters that apply to their operation; such as wintering sites, fertilizer, pesticides, crop management etc.

Upon completion the EFP is submitted to a Technical Assistant for review. Once reviewed the EFP will be returned along with a letter of completion.

The EFP is a living document and should be reviewed and updated periodically.

If you wish to complete an EFP or have any questions regarding EFP please contact the LARA office

## *Uranium continued*

Alberta Health and Wellness 17% of wells in the Bonnyville area exceeded guidelines.

Uranium has been linked to inflammation or damage of the kidneys and has the potential for other radiotoxic effects. It can accumulate in the human skeleton and replaces calcium in the bones.

Depending on other factors such as pH, water hardness, other minerals etc., there are several water treatments that are effective at removing uranium (and arsenic). Reverse osmosis (usually paired with a pre-treatment) is effective, however requires a large quantity of water to back-flush the system. Distillation is effective but only if the system is properly maintained and cleaned. The distillation system may have to be vented due to other volatile compounds that could cause the system to explode. For more information or to find out what treatment system works best for your water contact your local water specialist.

