What is Well Smart?

Well Smart is an education program to help private well owners protect the quality and supply of their drinking water.

Why be Well Smart?

You are your own water manager.

Proper well operation and maintenance can:

- Protect water quality
- Ensure your well yield is sustained
- Save money on costly repairs

Today we'll be covering

1. Understanding groundwater
2. Understanding your well
3. Well protection
4. Water testing
5. Water treatment

Understanding Groundwater

[Diagram showing groundwater and related concepts.]

Photo Credit: Natural Resources Canada
What kind of well do I have?

There are 3 common well installations in the RDN

- Dug Wells
- Drilled Wells
- Drilled Wells in Pits

Well Types: Dug

Large diameter/shallow

Well Types: Drilled

Small diameter/deep

Components of a Water Well

1. Borehole
   - Conduit to aquifer
2. Casing/Cribbing
   - Keep borehole open
   - Houses pumping equipment
3. Annular Seal
   - Prevents contamination from surface
   - Prevents mixing of aquifers
4. Well Intake
   - Allows groundwater into the well
   - Slotted liner/casing or screen

Components of a Water Well

5. Pitless Adaptor
   - Water-tight connection to distribution system
6. Pump
   - Properly matched to recommended pumping rate
7. Well Cap
   - Protects well from direct contamination

Well Records

Understanding your well record:

- Address and Owners
- Geology
- Construction
- Depth, Water Level, Yield
- Driller
- Location

Photo credits:
- BC MOE, VIHA
- Ontario Ministry of Agriculture, Food and Rural Affairs, Agriculture and Agri-Food Canada
- VIHA, OMAFRA
- Alberta Working Well Program
- Alberta Working Well Program
Groundwater Laws in BC

**Groundwater Protection Regulation, Water Act**
Protects groundwater supplies by requiring all wells to be properly:
- Constructed
- Maintained
- Closed at end of service

**Environmental Management Act**
Prohibits disposal of waste without a permit

**Drinking Water Protection Act**
Protects water supplies by prohibiting contamination of a water source

Water Quantity

The amount of water a well can produce is influenced by:
- Pumping
- Depth
- Geology
- Aquifer type
- Precipitation

Water Quantity: Common Problems

- Low well yields
  - ie. Yellowpoint: low producing bedrock aquifers
- Interference between adjacent well users
- Seasonal water shortages
  - ie. Gabriola: water demands exceed water supply in dry months
- Aquifer overuse or depletion

Water Quality: Common Concerns

- Bacteria
- Naturally present minerals
- Aesthetic concerns
- Human activities and contaminants

Potential Contaminants

- Bacteria
  - eg. *E. coli*, fecal coliforms, total coliforms
- Viruses
  - eg. Norovirus
- Parasites
  - eg. *Giardia lamblia*
- Chemicals
  - eg. Nitrates, pesticides, hydrocarbons, pharmaceuticals
- Minerals
  - eg. Iron and/or manganese, lead, hardness (calcium & magnesium), boron, fluoride, sodium, sulphur, chloride, arsenic, or other metals

Well Protection

Factors influencing water quality:
1. Location
2. Construction and Setup
3. Maintenance
4. Proper Closure
5. Aquifer characteristics
1. Well Location

- High elevation
- Secure, dry area
- Avoid wells in pits
- 30m/100' away from potential contaminant sources
- Not in basement

Photo credit: Ontario Ministry of Health

3. Construction & Set-up

Standards for well construction protect the health of your family and the aquifer.

- All drilled wells, and dug wells more than 15m deep, must be constructed by a provincially registered well driller.
- All pumps must be installed by a provincially registered pump installer.

2. Construction & Set-up: ID Plates

All new wells must have identification plates available from the well driller.

Photo credit: BC MOE

2. Construction & Set-up: Well Caps

Wells must have a water-tight, vermin-proof cap.

Photo credit: BC MOE

2. Construction & Set-up: Surface Seal

A surface seal prevents contaminants from entering a well along the outside of the casing.

An improper surface seal allows contaminants into the well.

Photo credit: BC MOE, Alberta Working Well Program
2. Construction & Set-up: Surface Seal

3. Well Protection: Well Types

Shallow dug wells may be higher risk than drilled wells

The safest water source:
Generally, a drilled well into a confined aquifer at a minimum depth of 15 metres (49 feet).

4. Well Protection: Good Maintenance

- Inspect the wellhead
- Properly maintain septic system
- Have water quality tested on a regular basis
- Keep wellhead and pump house in good repair and free of contaminants
- Disinfect the well and water system if:
  - Work is done on the well
  - Water testing indicates bacterial contamination
  - After a flood if surface water entered well

5. Well Protection: Properly Close

Improperly closed wells create a direct pathway for groundwater contamination

5. Well Protection: Properly Close

Most well owners drink untreated groundwater

However, wells can contain naturally occurring contaminants, or become contaminated with harmful chemicals or pathogens

Water may taste and look fine, but contain harmful substances.
When to Test?

- **Bacteria**
  - 3 times per year
  - After any major plumbing work
  - Generally, twice in first year, and every 3-5 years after
  - ~$45

- **Chemicals and other parameters**
  - ~$155

Is there a better time to test?

- **Bacteria** - After a large rainfall (fall season, the day after a heavy rain)
- **Chemicals** - In dry period

Other considerations?

- When a new child is brought into the home
- When elderly individuals stay in the home
- If you detect changes in water quality
- If regular well users get sick
- When you move into a new home

How to Take a Water Sample

1. Contact lab to ensure they will accept sample that day
2. Use sterile bottle from lab
3. Select sample site – ideally kitchen faucet
4. Label bottle with name, date, and time sample was collected
5. Obtain sample
   - Wash hands
   - Remove aerator and other attachments
   - Disinfect tap & run cold water for 2 minutes
   - Remove bottle cap and DO NOT set down
   - Fill bottle and secure cap
6. Deliver the samples to the lab

Test Results

- **Testing: Results**
- **Certificate of Analysis**
  - Report To: Regional District of Nanaimo
  - Regional Watershed

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<th>Result</th>
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<th>Upper Limit</th>
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<td></td>
<td>Total Hardness</td>
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<tr>
<td></td>
<td>Sodium</td>
<td>20 mg/L</td>
<td>20 to 60 mg/L</td>
<td></td>
</tr>
</tbody>
</table>

STOP drinking the water and get some advice!
Addressing Bad Results

Get more information:
- What do the results really mean?
- What problems are common in your area?
- What specific problems do you have in your well?
- Is your well vulnerable to contamination?
- Call VIHA

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Addressing Bad Results

1. Improving wellhead protection
2. Well upgrade
3. Shock chlorination
4. Continuous disinfection and treatment
5. Re-sample

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Is your well vulnerable?

A poorly constructed/maintained well will be more vulnerable to contamination.

Check:
1. Location
2. Construction and Set-up
3. Maintenance
4. Proper closure

If you detect a problem, fix it!

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Wellhead Protection

What's wrong with this photo?

See MOE Brochure “Upgrading Wells in Pits”

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Wellhead Protection

What's wrong with these photos?

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Wellhead Protection

What's wrong with these photos?
Wellhead Protection

What's wrong with these photos?

Shock Chlorination

- Simple disinfection method
- Used when bacterial contamination of the well has occurred (or is likely to have occurred, such as after pump replacement)
- How to?
  - See MOE Brochure “Water Well Disinfection”

When to Shock Chlorinate?

- Immediately after installing a new well
- Whenever you repair or replace your well, pump, or distribution system
- Following change in water clarity, colour, odour, or taste
- When lab results show coliform bacteria in water
- When slime is present in toilet tank

Disinfection and Treatment

Treatments for bacteria

- Chlorinators
- UV
- Distillers
- Ozonators

No one treatment solves all problems!

Disinfection and Treatment

Treatments for chemical contamination

- Reverse osmosis
- Activated carbon filters
- Ion exchange
- Chlorine shock
- UV
- Distillers

No one treatment solves all problems!

Suspected Problems

On your property: Contact VIHA or MOE

On a neighbours’ property:
- Talk to your neighbour
- Provide information
- Discover barriers to solutions
- If the issue can’t be resolved, contact MOE or VIHA
Key Messages

- Groundwater is shared by your family, your neighbors, and the environment
- Keep good records of water levels, water testing, chlorination, and repairs
- Regularly:
  - Test your water
  - Inspect your wellhead
- ALWAYS properly close unused wells

Resources

**Vancouver Island Health Authority (VIHA)**
*Information on test results and your well*
- Nanaimo Office: 250-755-6215
- Parksville Office: 250-947-8222
- Website: [www.viha.ca](http://www.viha.ca)

**Ministry of Environment (MOE)**
*Information on local groundwater resources and your well*
- Nanaimo Regional Office: 250-751-3265
- Website: [www.gov.bc.ca/env](http://www.gov.bc.ca/env)