



northern health

Public Health Protection
Public Health Engineering

Groundwater and Health

Update from the front lines

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Sanitary Logic 101

- **Premise A:** *Shit runs downhill.*
- **Premise B:** *Don't shit where you eat.*
- **Deductions:**
 - Don't put water intake downstream of sewer discharge.
 - Don't drill your well down-gradient of your septic field/lagoon or (leaky) sewer/tank.
- **Regulators**
 - Cannot see groundwater!
 - Assume wells can draw in water from any direction
 - Set-back separation distance between well and sewage



What setback is "safe"?

- Crypto, Giardia
 - Large (4 μm), less mobile, long-lived, low population
- Bacteria
 - Smaller (0.5 μm), mobile, short-lived, huge population
- Viruses
 - Smallest (0.05 μm), v.mobile, long-viability, low population
 - Sub-optical range \rightarrow detect with genetic methods (qPCR)
 - Found in "secure", confined aquifers in Wisconsin, BC
 - Driver for "virus-only" treatment class
 - "Standard Practice Manual v3" \rightarrow 30 metres
 - **300 m setback in unconfined aquifers**



What setback is "safe"?

- 3 consultation docs:
 - *Guidance Document for Determining Ground Water at Risk of Containing Pathogens (GARP), Version 2*
 - *Drinking Water Treatment Objectives (Microbiological) for Ground Water Supplies in British Columbia, Version 1*
 - *British Columbia Guidelines (Microbiological) for Maintaining Water Quality within **Distribution Systems** (Secondary Disinfection), Version 1*
- <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/drinking-water-quality/consultation-on-distribution-ground-water-assessment-treatment>
 - <http://tinyurl.com/gwto-consult>
- Silence implies consent.



Organoleptics 101

- Organoleptic = "properties of food or [water] that an individual experiences via the senses—including **taste, sight, smell, and touch.**"
- → customer acceptance
- Northern Health requesting assessment (opinion) on:
 - Appearance (visually clear vs cloudy)
 - Taste (sweet, salty, bitter, metallic, none)
 - Odour (sulphur, swampy, metallic, hydrocarbon, none)
 - Touch (hard/soft, temperature)
- Aesthetic objectives trigger Northern Health to declare water "**non-potable without treatment**"



T&A(&O) of water

Good	Chemical	Earthy	Offensive	Other
Great	Ammonia	Grassy	Bitter	Floral
Inoffensive	Chlorine	Musty	Fishy	Fruity
None	Paint	Swampy	Rancid	Vegetable
	Petroleum	Yeasty	Salty	(Describe ...)
	Solvent	Metallic	Septic	
	Swimming Pool		Sulphur	

Describe taste and odour of water _____.

Measure ambient temperature of water _____ °C.

(Optional) Measure turbidity of water _____ NTU.



Chemistry 101

- Organics + Chlorine → Chlorinated Organics
- Trihalomethanes (THMs), Haloacetic Acids (HAAs)
 - Disinfection By-Products (DBPs) *we can measure*
- Thousands of other compounds are formed
- Some are bad for health
- Many are bad for aesthetics (organoleptic)
- **Don't** test raw water for THMs!
- **Do** test raw water for:
 - Total Organic Carbon
 - Ammonia (includes Ammonium ion)
 - Organic Nitrogen (TKN minus Ammonia)



Northern Health 101

- Regulator administering the *Drinking Water Protection Act*
- All water supply for domestic uses (including non-potable)
 - Single family residence exempted
 - **NOT** exempt:
 - ◆ Single commercial building
 - ◆ Shared well between single family residences
 - ◆ Private businesses serving employees only
 - ◆ Private businesses providing bottled water to employees

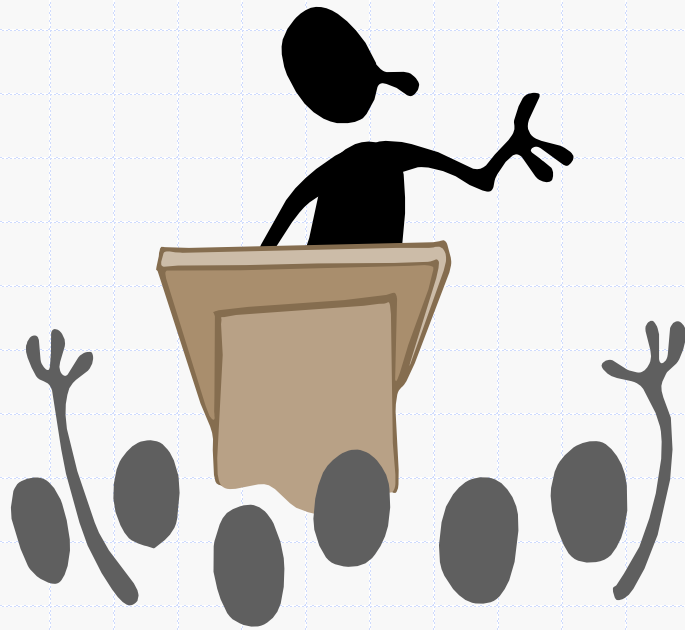


Northern Health 101

- In Northern Health, you do NOT need approval to drill well
 - **Schedule 2** must be submitted to MoE
 - GARP screening mandatory
 - Well log mandatory
 - ◆ confining layers, SWL, surface seal, well ID#, yield
- Construction Permit
 - all new sources, any changes to existing treatment
 - can be waived for minor changes, *on request*
- Operating Permit



Questions?



For any questions or comments please call...

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