

GARP and GWTO

How they go together

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Excellent health and care for everyone, everywhere, every time.



Overview

- Introduction
- What is GARP
- What is GWTO
- How they go together
- Questions

Introduction GARP

- Historical
 - BMP – shallow wells sometimes disinfected
 - Deep wells considered “safe” and generally not disinfected
 - 2005 MOE GWPR
- New guidance documents from MOH
 - Groundwater at Risk of Containing Pathogens
 - Groundwater Treatment Objectives

GARP

**GUIDANCE DOCUMENT FOR
DETERMINING GROUND WATER
AT RISK OF CONTAINING
PATHOGENS (GARP)**

VERSION 2

NOVEMBER 2015

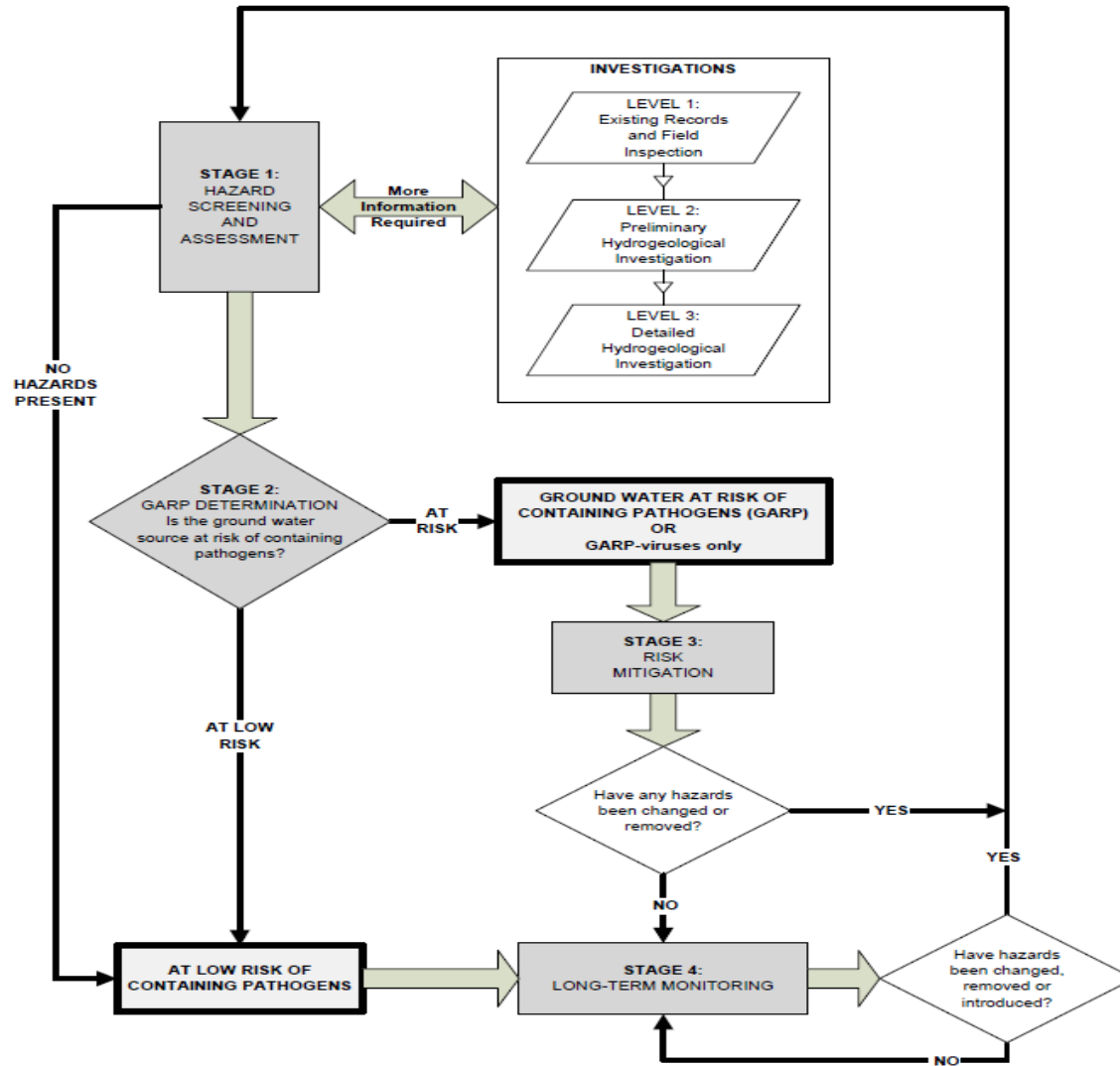
**HEALTH PROTECTION BRANCH
MINISTRY OF HEALTH**

GARP

- Section 5 of DWPR
if ground water , in the opinion of a DWO is at risk of containing pathogens, it must be disinfected
- Requires an assessment to determine if it is at risk
- Done through GARP guidance document
- DWO may do initial screening or require operator to have it done

2 OVERVIEW OF GARP DETERMINATION PROCEDURE

Figure 1: GARP Determination Flowchart



APPENDIX D: EXAMPLE GARP DETERMINATION FIELD FORM

The following is an example of what a field form might look like for the purposes of the Stage 1 screening and assessment. Actual fields for data collection may vary according to the needs of the health authority office.

WATER SYSTEM NAME: _____

WELL NAME: _____

B.C. MoE Well Identification Plate Number: _____

B.C. MoE Aquifer: / none / unknown **Local Aquifer Name:** _____

Well Log: Examined Attached NA Site Sanitary Survey Conducted Verbal / Measured

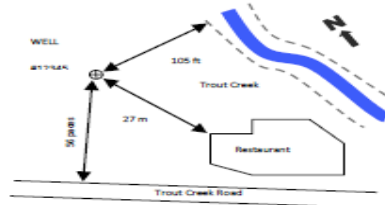
LATitude: . ° N , LONGitude: . ° W /

Well Depth: feet or metres below ground or unknown /

Water Level in Well: feet or metres below ground or unknown /

Well Casing Diameter: inches or mm or unknown /

Well Location Sketch



Sketch the well location and proximity to roads, buildings, waterways, sources of contamination, etc. Distances may be estimated in feet or metres or paced off.

Assessment

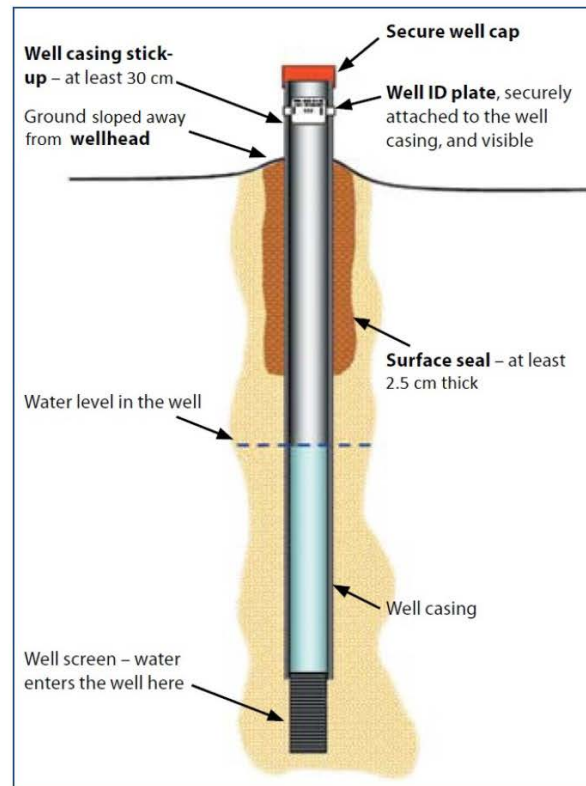
STAGE 1

Stage 1: Hazard Screening and Assessment

HAZARDS Water Supply System Well	SCREENING		ASSESSMENT		NOTES
	NOT PRESENT	PRESENT (Complete Assessment)	AT RISK (Water source potentially GARP)	AT LOW RISK	
A. Water Quality Results					
A1: Exhibits recurring presence of total coliform bacteria, fecal coliform bacteria, or <i>Escherichia coli</i> (<i>E. coli</i>).					
A2: Has reported intermittent turbidity or has a history of consistent turbidity greater than 1 NTU.					
B. Well Location					
B1: Situated inside setback distances from possible sources of contamination as per section 8 of the HHR.					
B2: Has an intake depth <15 m below ground surface that is located within a natural boundary of surface water or a flood prone area. (Fig 1)					
B3: Has an intake depth between the high-water mark and surface water bottom (or < 15 m below the normal water level), and located within, or less than 150 m from the natural boundary of any surface water. (Fig 2)					
B4: Located within 300 m of a source of probable enteric viral contamination without a barrier to viral transport.					
C. Well Construction					
C1: Does not meet GWPR (section 7) for surface sealing.					
C2: Does not meet GWPR (section 10) for well caps and covers.					
C3: Does not meet GWPR (section 11) for floodproofing.					
C4: Does not meet GWPR (section 12) for wellhead protection.					
D. Aquifer Type and Setting					
D1: Has an intake depth <15 m below ground surface.					
D2: Is situated in a highly vulnerable, unconfined, unconsolidated or fractured bedrock aquifer.					
D3: Is completed in a karst bedrock aquifer, regardless of depth.					

Well Construction GWPR

Figure 4: Basic Well that Meets the GWPR Well Construction Standards (adapted from MOE 2007c)



Determination

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2

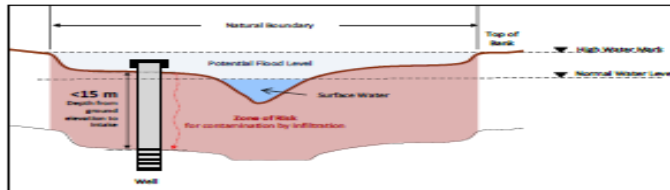


Figure 1: Hazard B2, Flood Risk

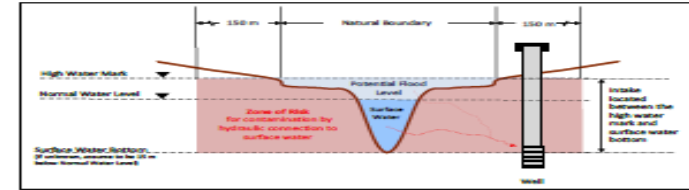


Figure 2: Hazard B3, Connection to Surface Water

Stage 2: GARP Determination

At Risk (GARP) At Risk (GARP-viruses only) At Low Risk

- If "at risk" the water supplier should undertake one or more mitigation measures (see options below).
- If "at risk" because information is unavailable or inconclusive for any hazards in the checklist, consider moving to Level 2 or 3 investigation.
- If "at low risk", indicate only "Move to Stage 4: Long-term Monitoring" below.

Stage 3: Risk Mitigation

Recommended options:

- Treatment to meet provincial drinking water objectives
- Treatment to meet only the provincial drinking water objectives for viruses
- Provide alternate source of water
- Well Alteration / correct significant deficiencies in well construction.¹⁵
- Relocate the well
- Eliminate source(s) of contamination
- Level 2 or 3 investigation
- Move to Stage 4 Long-term Monitoring
- Other

Comments:

Completed by: _____

DATE: _____

¹⁵ Deficiencies in well construction related to the Ground Water Protection Regulation must be addressed.

Determination

GARP Determination results in 3 options:

1. At Low Risk – no treatment
2. At Risk (GARP – viruses only) – 4-log removal of viruses
3. At Risk (GARP) – Must meet GWTO

Risk Mitigation

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Risk Mitigation

- Upgrade well construction
- Alternate source of water
- POE/POU
- Eliminate contamination sources
- Level 2 or 3 investigation
- Disinfection

Long-Term Monitoring

S

- Sources considered “at risk” must implement risk mitigation (Stage 3)

T

A

- For a source to be considered “low risk” all hazards must be removed

G

- Once a system is considered “low risk” can move to Stage 4: Long Term

E

Monitoring

4

GWTO

**DRINKING WATER TREATMENT
OBJECTIVES (MICROBIOLOGICAL)
FOR GROUND WATER SUPPLIES
IN BRITISH COLUMBIA**

VERSION 1

NOVEMBER 2015

**HEALTH PROTECTION BRANCH
MINISTRY OF HEALTH**

Introduction GWTO

GWTO is intended to provide guidance on:

1. Treatment necessary to address microbe contaminants of GARP sources, and;
2. The application of subsurface (riverbank) filtration treatment credits

Process

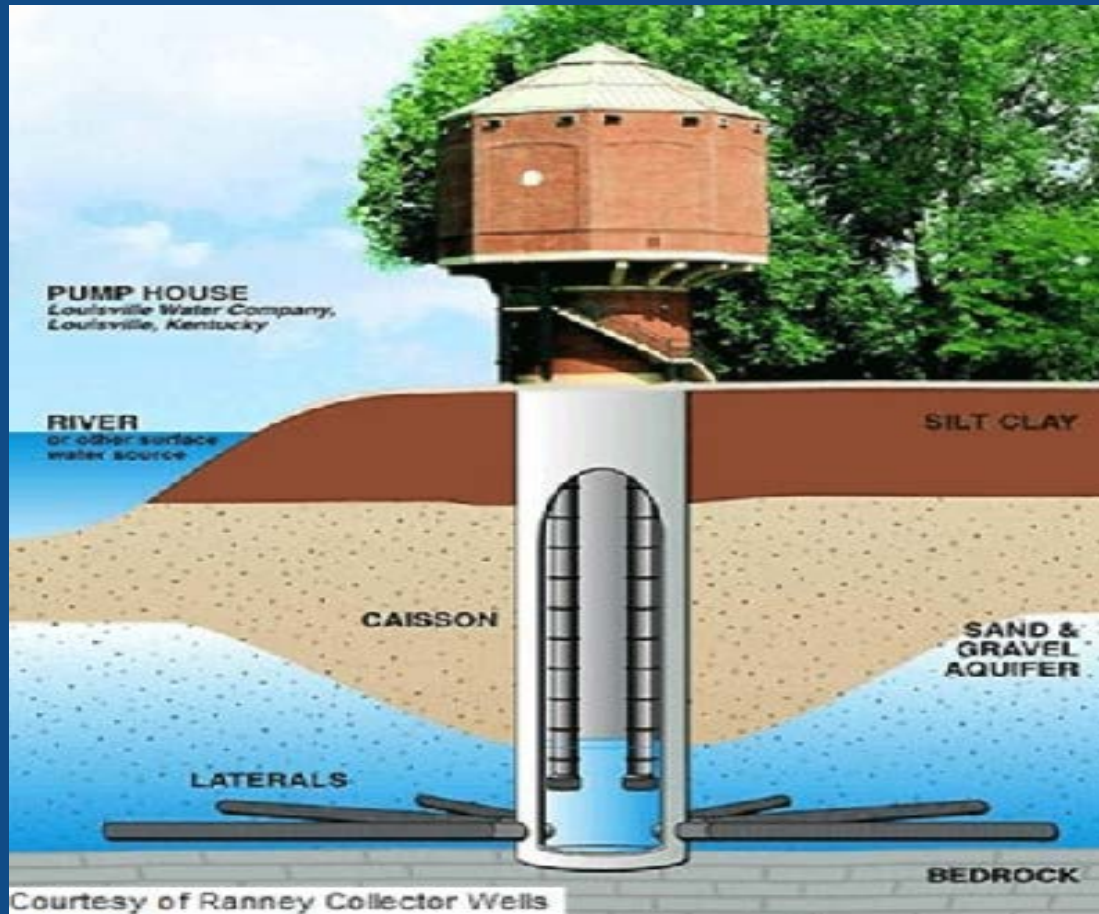
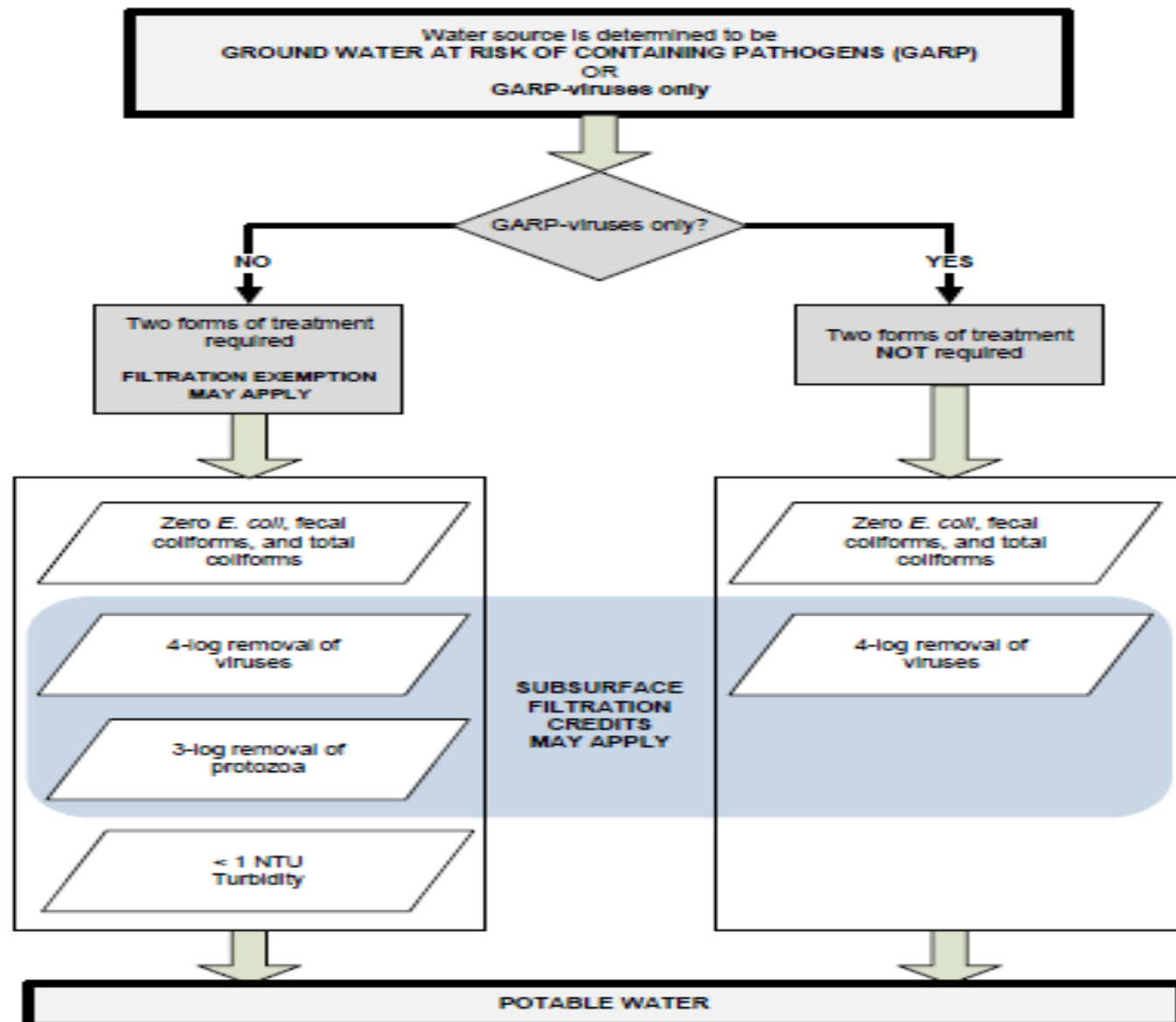


Figure 1. Microbiological Treatment Objectives for GARP Sources



Filtration Exemption Credits

Filtration Exemption

- GARP source must meet 4.3 of SWTO
- Average Turbidity (taken prior disinfection) should be ~1NTU, but not exceed 5 NTU for more than 2 days out of one year
- Well is properly constructed, protected and has a Wellhead Protection Plan

Questions



<http://www.viha.ca/mho/water/>