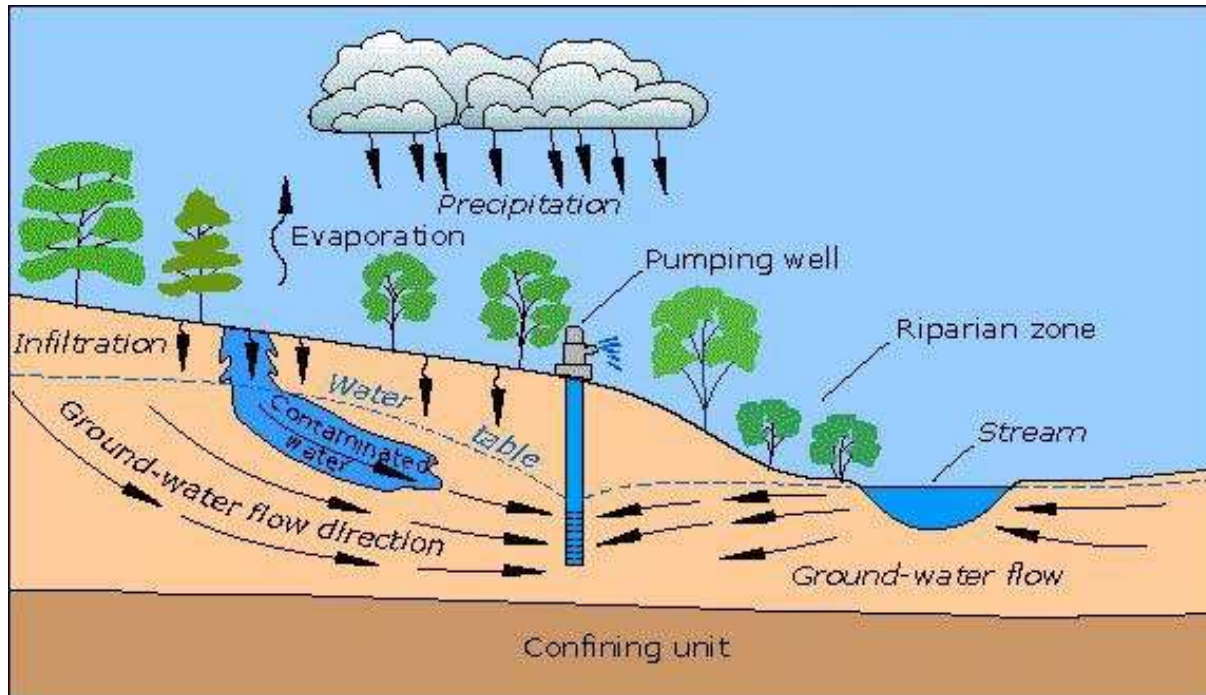




WARWS

TNC Training 2015



Ground Water Under the Direct Influence of Surface Water (GWUDISW)



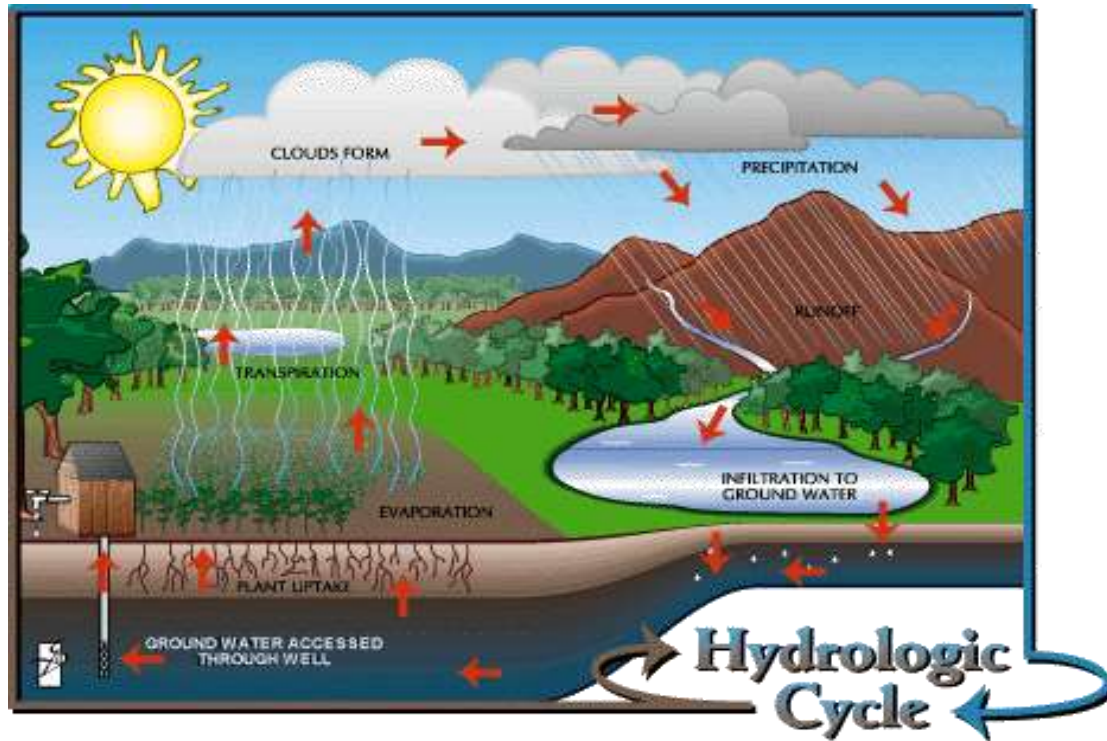
Discussion Outline:

1. Factors that contribute to SW contamination.
2. How can you protect your well or spring?
3. How is GWUDISW different than GW?
4. How does EPA Region 8 make GWUDISW determinations?
5. What is required if your source is classified as GWUDISW?



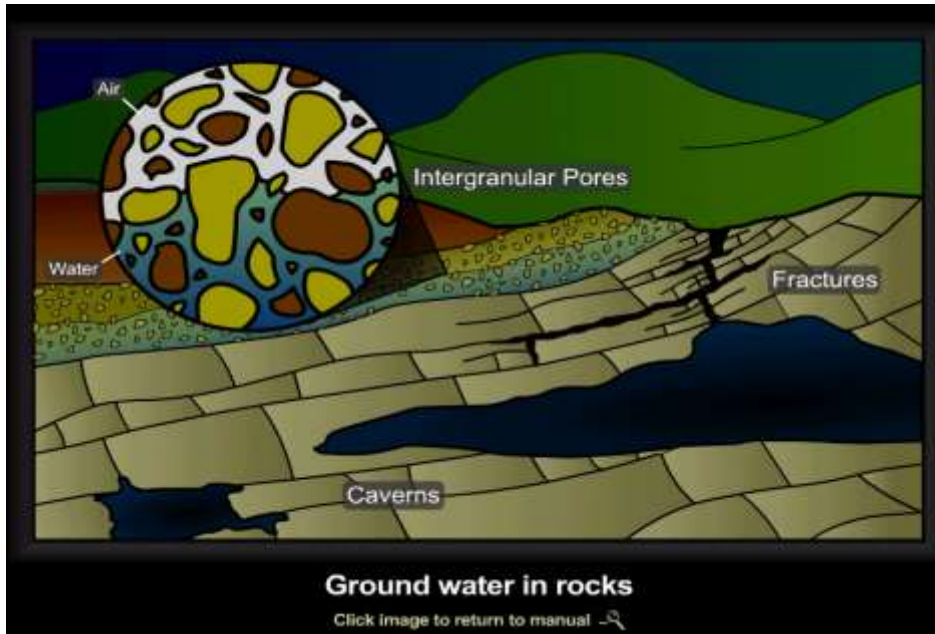
Ground Water Under the Direct Influence of Surface Water

Hydrologic Cycle – continuous circulation of water from land and sea to the atmosphere and back again (all GW was SW at some point).





Factors affecting surface water influence in a well or spring:



Permeability

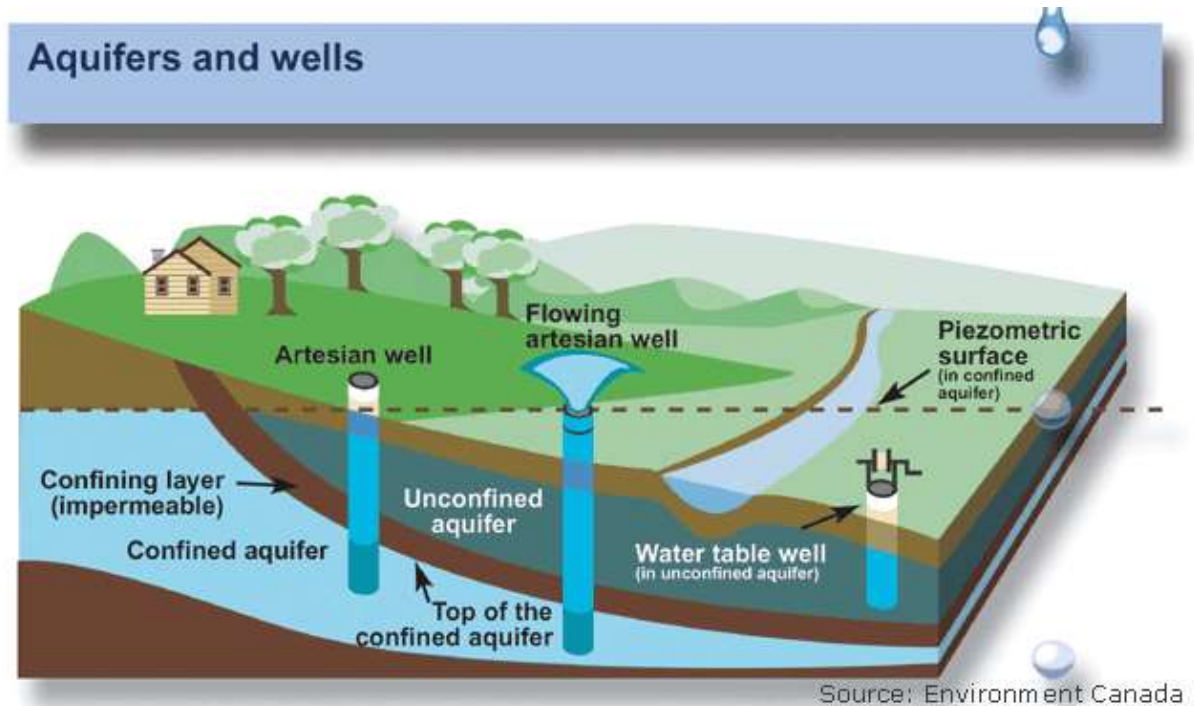
How fast does water travel through the source aquifer? This is also affected by the amount of head pressure in the aquifer.



Factors affecting surface water influence in a well or spring:

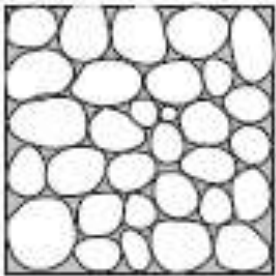
Location & Depth

How close to a re-charge point (for the source aquifer) or surface water body is your well or spring? Is the aquifer confined or un-confined?

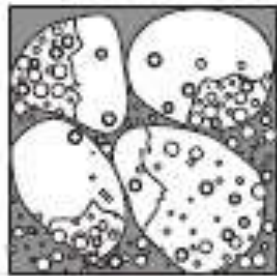




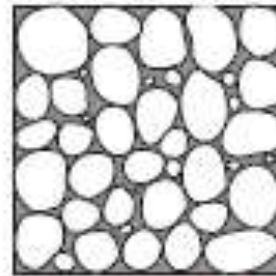
Factors affecting surface water influence in a well or spring:



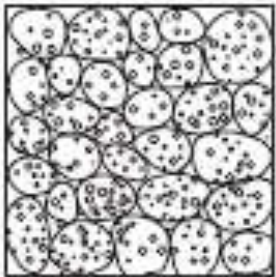
consolidated sediment



dissolution of rock



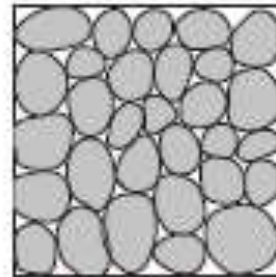
poorly sorted sediment



porous sediment



rock fractures



well-sorted sediment

Aquifer composition

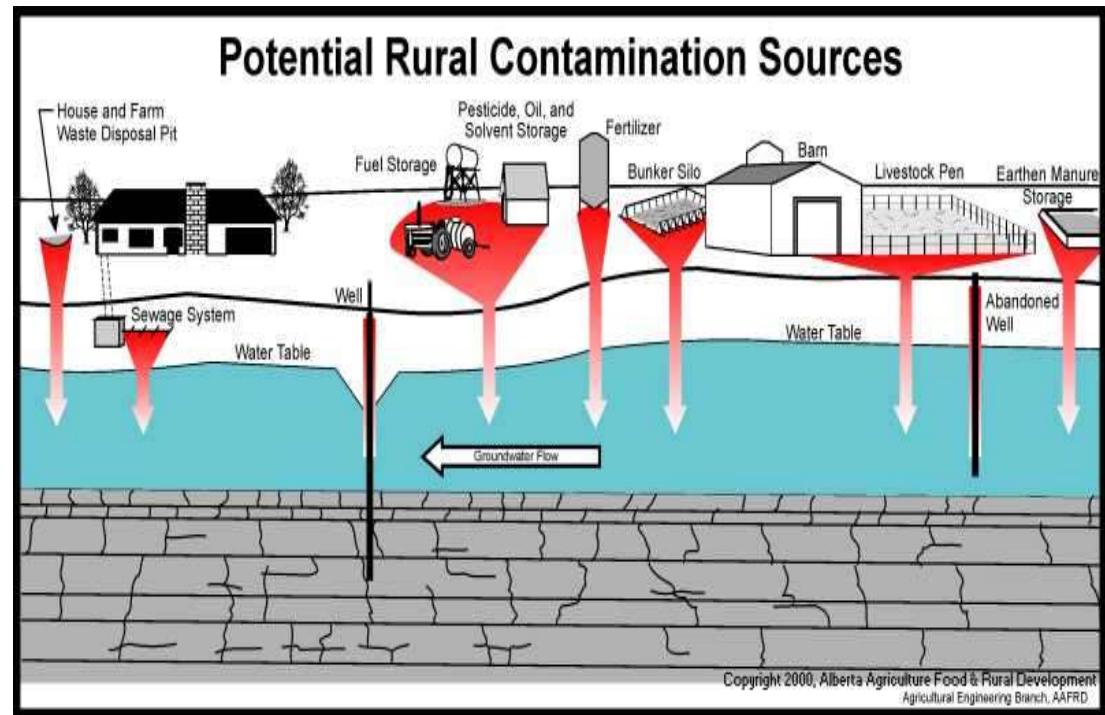
The size and uniformity of the particles in the aquifer can affect the level of filtration. Some tight formations may have fractures that provide very little filtration.



Factors affecting surface water influence in a well or spring:

Proximity to Pollution Sources

The proximity to sources of pollution is particularly important for wells and springs that are poorly constructed and / or completed into an unconfined aquifer.





Factors affecting surface water influence in a well or spring:

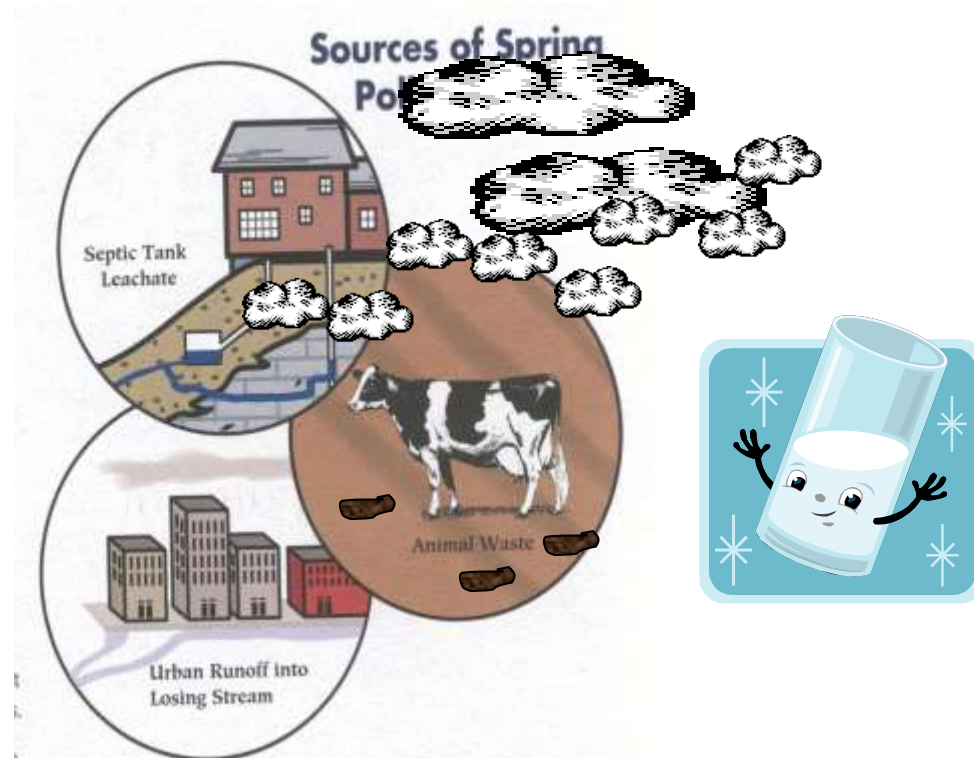


Well and Spring Construction

Does the construction of your well or spring limit the potential for contamination?
(adequately grouted, surface casing sealed, etc)



Factors affecting surface water influence in a well or spring:





Protecting your spring source:

- Is there standing water and surface drainage around spring?
- Is there deep rooted vegetation in the spring collection area?
- Is there a locked fence around the collection area to keep away vandals and animals?
- Is there a diversion channel capable of diverting surface water away from the collection area?
- Are there outhouses, septic systems, underground storage tanks and barnyards near the spring?
- Is the area around the spring sloped to drain surface runoff from the spring?
- Is the spring box watertight with a locking, watertight (Rubber gasket) overlapping lid?
- Does the spring box have a screened overflow?



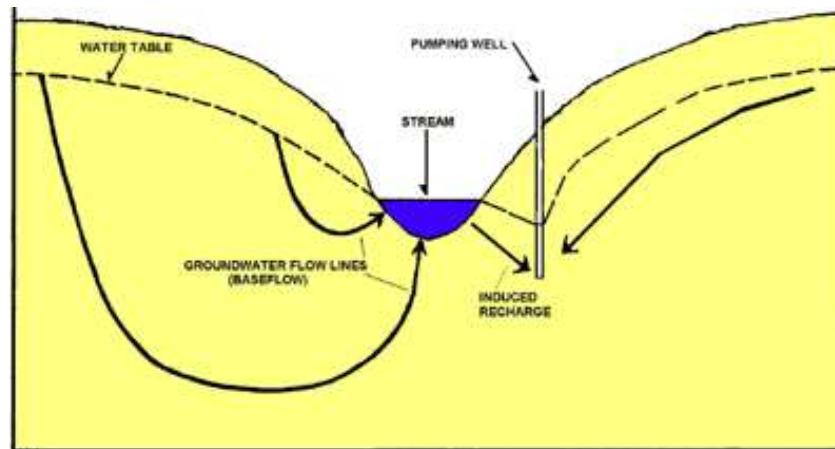
Protecting your well source:

- Is the well head adequately protected from animals, traffic accidents and vandalism?
- Is the well house properly sealed to prevent the entrance of animals?
- Does the well have a sanitary seal and all openings are properly sealed?
- Does the well vent terminate in a downturned position and is it screened with #24-mesh screen?
- Does the permanent casing project at least 12 inches above the pump house floor/concrete apron surface or at least 18 inches above final ground surface?
- Is the area surrounding the well drain surface water away from the well head?



Ground Water Under the Direct Influence of Surface Water-

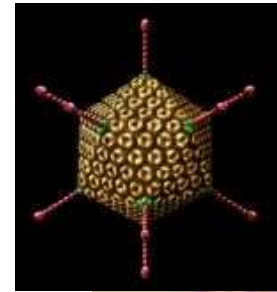
Any water beneath the surface of the ground with significant occurrence of insects or other macro-organisms, algae, or large-diameter pathogens such as *Giardia lamblia* or *Cryptosporidium*, or significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH which closely correlate to climatological or surface water conditions.





Microbial Differences Between GW and GWUDISW

- GWUDISW can contain disease-causing microorganisms (pathogens) associated with surface water (Giardia, Cryptosporidium, viruses). Some of these pathogens can also come from below-ground sources (leaking underground septic systems)
- These surface water pathogens can be very resistant to simple disinfection - in other words, chlorine won't easily kill them.





EPA Region 8 GWUDISW Determination Process

During every sanitary survey, a Ground Water Under the Direct Influence of Surface Water Assessment is performed on all ground water sources (except those GW sources that are already determined to be GWUDISW).



EPA Region 8 GWUDISW Determination Process

- The EPA contractor will assess some of the items in the field while conducting the sanitary survey:
 - Type of ground water source
 - If surface water drains towards the ground water source
 - The structural features of the ground water source
- A Geologist with EPA:
 - Obtains well logs (if available) to determine the well screening depth
 - Reviews the microbial history of the system
 - Utilizes Arc GIS database to determine some of the hydrogeological features of the ground water source-
 - Proximity to a surface water source
 - Whether the ground water source is located within a floodplain
 - The porosity of the aquifer

Assessment of Ground Water Under The Direct Influence Of Surface Water (GWUDISW) Form

Environmental Protection Agency, Region VIII
1595 Wynkoop Street (8P-W-DW)
Denver, Colorado 80202-2466

2012 Assessment of Ground Water Under The Direct Influence of Surface Water (GWUDISW)
(ONLY the first page is to be completed by surveyor)

Public Water System Name: Town of Example **PWS# WY5600000**
Well/Spring/Infiltration Gallery Name: Example Spring **County: Example**
State Engineer's Office Ground Water Permit #: NA
Department of Environmental Quality Construction Permit #: NA
Date of Assessment: 2/26/13 **Analyst: Thomas Lutherer**

	<u>Index Points</u>	<u>Score</u>
A. TYPE OF SUBSURFACE WATER SOURCE (Circle One)		
Spring	10	10
Infiltration Gallery more than 2 ft deep	10	
Infiltration Gallery at or < 2 ft deep	25	
B. HYDROGEOLOGICAL FEATURES (Circle)		
Surface runoff drains toward well, spring, or infiltration gallery	15	
C. STRUCTURAL FEATURES (Circle)		
<u>WELLS (includes wells collecting water from infiltration galleries)</u>		
Uncased or Unsealed (lacking annular seal) Well	40	
Lack of watertight sanitary seal on well casing cap, (including lack of watertight bolt-holes, watertight pump support openings, watertight electrical cable openings, etc.)	15	
Well height not properly terminated (well, including the pitless adapter units, does not terminate a minimum of 18 inches above the final ground level, 12 inches above the pump house floor or 3 feet above the highest known flood elevation, whichever is higher – measurements should be taken from the pump house floor, not the bottom of a pit which may be located within the pump house)	15	
<u>SPRING COLLECTION BOX</u>		
<u>(includes collection vaults collecting water from infiltration galleries)</u>		
Deep-rooted vegetation (e.g. trees, shrubs) around springbox, providing conduit for surface water into spring water	15	
Springbox is not watertight, with watertight overlapping lid or cover	15	
Overflows or drains open to atmosphere or allow entrance of animals (unscreened)	15	
Marshy (standing water) around spring collection area	30	

1st page Total-10

Assessment of Ground Water Under The Direct Influence Of Surface Water (GWUDISW) Form

GWUDISW ASSESSMENT, CONTINUED (PG. 2)
(Second page to be completed by EPA Region VIII)

PWS ID# 5600000

DATE _____

	<u>Index Points</u>	<u>Score</u>
A. TYPE OF SUBSURFACE WATER SOURCE (Circle One)		
Well, with depth to first screen or perforation, equal to or greater than 50 ft. deep	0	0
Well, with depth to first screen or perforation for groundwater entry less than 50 ft. deep	5	
B. HISTORICAL MICROBIOLOGICAL CONTAMINATION (Circle)		
History or suspected outbreak of Giardia or other pathogenic organisms associated with surface water with current system configuration	50	0
Record of total coliform (TC+) acute MCL violations over last 3 years (These violations will be reported as "MCL (TCR), ACUTE")	30	0
Ground water Rule triggered Source sample(s) over the last 3 years.		
TC+ in source water:		
1 TC+	20	
2 TC+	25	25
3 TC+	30	
E. Coli+ in source water	40	0
Regulatory agency verifies complaints about turbidity or suspected waterborne disease	10	0
C. HYDROGEOLOGICAL FEATURES (Circle)		
Distance between a surface water source and the groundwater collector (vertical well, spring box or infiltration gallery)		
Over 200 ft	0	0
100 - 200 ft	5	
Less than 100 ft	10	
Well, spring, or infiltration gallery located on floodplain at approximate altitude of stream	20	0
Source aquifer that is alluvial material, cavernous, or fractured	15	15
TOTAL SCORE (**)		50

(**) total score of >= 40 indicates further assessment is needed

COMMENTS:



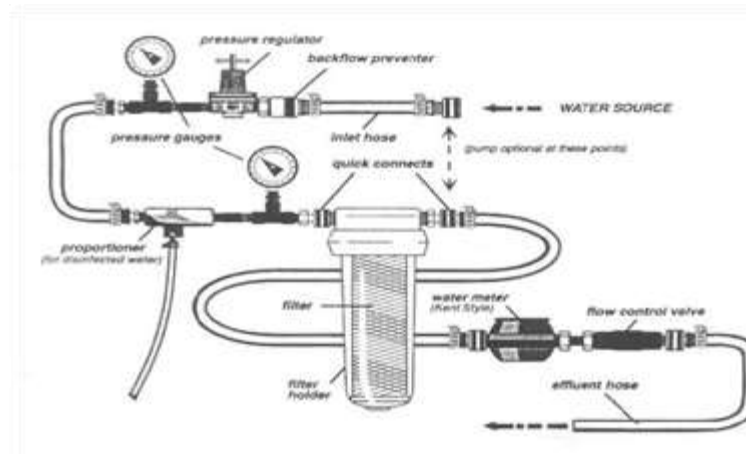
EPA Region 8 GWUDISW Determination Process

- If the initial screening suggests the source is potentially GWUDISW (a score of 40 or more) and the system is unable to make improvements to bring the score under 40 (e.g. installing a proper sanitary seal on the well), a significant deficiency requiring microscopic particulate analysis (MPA) of the source is cited in the sanitary survey.
- In most cases, the EPA will send a contractor to collect the MPA samples, however the water system (you) will be required to pay for the lab analysis.
- One MPA analysis averages a cost of \$350
- Normally two MPAs are needed to make a final determination. However, if any of the MPA risk factors come back moderate risk, a third MPA may be required.



EPA Region 8 GWUDISW Determination Process

- MPA involves the collection of raw water at a low rate (1 gpm) through a filter for a total of 8-24 hours.
- The filter is sent to a lab where it is washed, processed, and the resulting sediments are analyzed under a microscope by a trained microbiologist or technician.





EPA Region 8 GWUDISW Determination Process

- The presence of all surface water bio-indicators (like Cryptosporidium, Giardia, algae, certain insects) are noted by the lab and a risk factor for GWUDISW is assigned.
- Your source will remain classified as ground water if:
 - Two MPA risk factors are 9 points or less
 - Three MPA risk factors are less than 15
- Your source will be classified as GWUDISW if:
 - Two or more MPAs risk factors are 15 or above
 - Any of your MPAs risk factor is 20 or higher



What happens if your well or spring is classified as GWUDISW?

You will receive a letter from the EPA indicating that you have 18 months to install treatment to meet the requirements of the Surface Water Treatment Rules (or dis-connect the source):

- Filter and Disinfect (credit for 99.9% Giardia reduction, 99% Cryptosporidium reduction, 99.99% virus reduction)
- Monitor daily or more frequently (based on treatment type and system size), report to EPA Monthly
- Must have a qualified/certified operator
- Do one year of raw water monitoring (Round 1 and Round 2) for E. coli under the LT2 Enhanced Surface Water Treatment Rule (additional treatment may be required based on results)

**If Your Ground Water Source
is GWUDISW, Different Drinking Water
Regulations Apply**

=

**Additional Costs
(Routine Costs and Capital Improvements Costs)**





Thanks!

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Ground Water Rule Manager

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Surface Water Treatment Rule Manager

303.312.6389

crosby.jake@epa.gov