Gallatin Local Water Quality District

2024 Well Testing Workshop

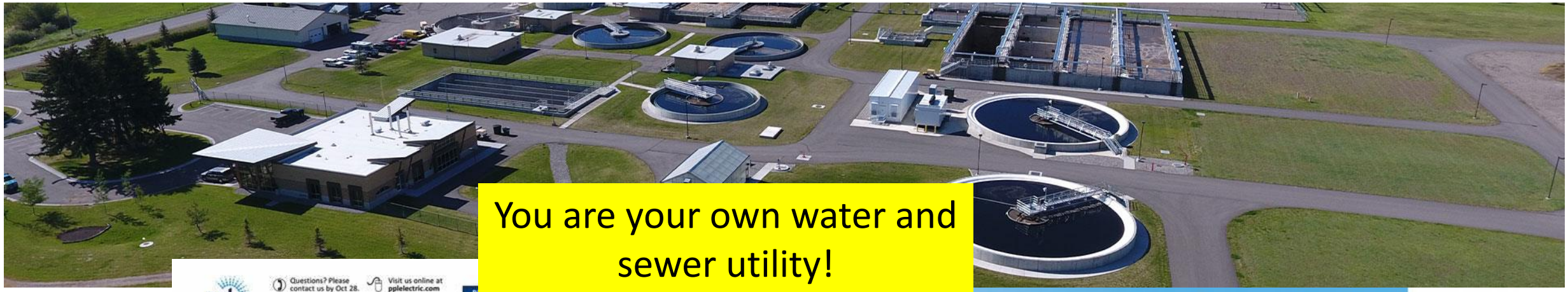
Gallatin Gateway, Montana May 23rd 2024

GALLATIN CONSERVATION DISTRICT

MONTANA STATE UNIVERSITY | EXTENSION

HEALTHY GALLATIN

GLWQD



You are your own water and sewer utility!

ppl
PPL Electric Utilities

Questions? Please contact us by Oct 28. 1-800-DIAL-PPL (1-800-342-5775) M-F: 8am to 5pm

Visit us online at pplelectric.com

00000-00000	Oct 28, 2014	$172.81

Your Electric Usage Profile

Service to:
CUSTOMER
123 MAIN ST
ANYTOWN, PA 18062

Meter: 00000000
Your next meter reading is on or about Nov 3, 2014.

This section helps you understand your year-to-year electric use by month. Meter readings are actual unless otherwise noted.

Monthly Comparison	Days Billed	kWh	Average kWh/Day	Average Temp.
Oct 2014	30	1404	47	64F
Oct 2013	30	1405	47	62F

Billing Period	Type	Reading
Oct 3	Actual	36426
Sep 3	Actual	35022
30 Days	kWh Billed	1404

Yearly Comparison	Total Use	Avg. Monthly
Nov 2013 - Oct 2014	18494	1541

Billing Summary (Billing details on back)

Balance as of Oct 7, 2014	$0.00
Charges:	
Total Electric Supplier 1234 Charges	$111.34
Total PPL Electric Utilities Charges	$61.47
Total Charges	$172.81
Amount Due By Oct 28, 2014	**$172.81**
Account Balance	$172.81

PPL Electric Utilities' price to compare for your rate is $0.08956 per kWh. This changes the 1st of Mar, Jun, Sept, and Dec. Visit **papowerswitch.com** or **www.oca.state.pa.us** for supplier offers.

Your Message Center

- Information about appliance energy use and tips on saving energy are available through the Energy Library on our Web site, **pplelectric.com/e-power**
- Before digging around your home or property, you should always call the state's One Call notification system to locate any underground utility lines. You can do this by simply dialing 811, which will connect you to the One Call system. Be safe and call 811 before you dig.
- Keep light bulbs and fixtures clean. Dust and dirt absorb light and can reduce light output by as much as half.

Payment Methods

Online at: **pplelectric.com**

By phone: **1-800-342-5775** or call BillMatrix (service fee applies) at **1-800-672-2413** to pay using Visa, MasterCard, Discover or debit card.

By Mail:
2 North 9th Street
CPC-GENN1
Allentown, PA 18101-1175

Correspondence should be sent to:
Customer Services
827 Hausman Road
Allentown, PA 18104-9392

Other important information on the back of this bill →

Return this stub in the envelope provided with a check payable to PPL Electric Utilities.

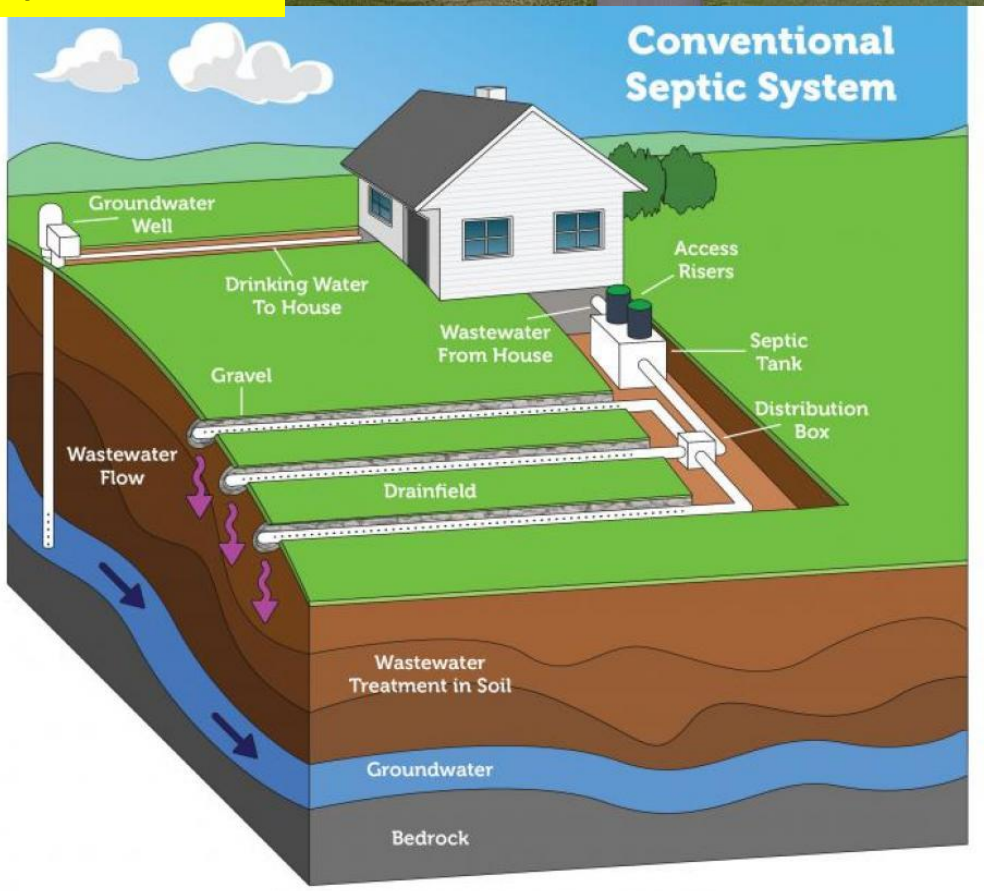
ppl
PPL Electric Utilities

Bill Acct. No.	Due Date	Amount Due
00000-00000	Oct 28, 2014	$172.81

Amount Enclosed:

CUSTOMER
123 MAIN ST
ANYTOWN, PA 18062

PPL ELECTRIC UTILITIES
2 NORTH 9TH STREET CPC-GENN1
ALLENTOWN, PA 18101-1175

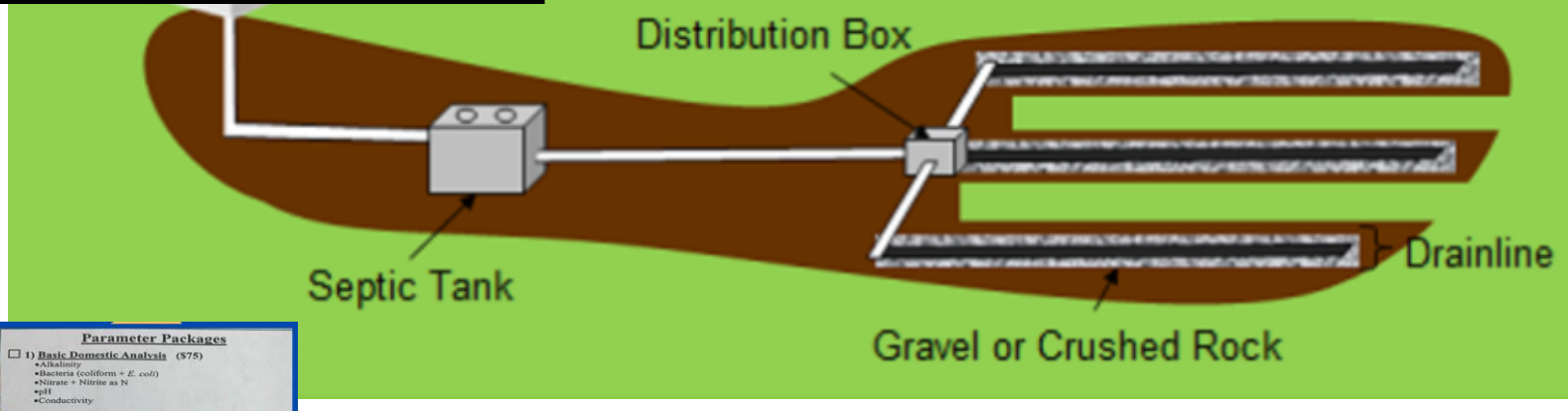


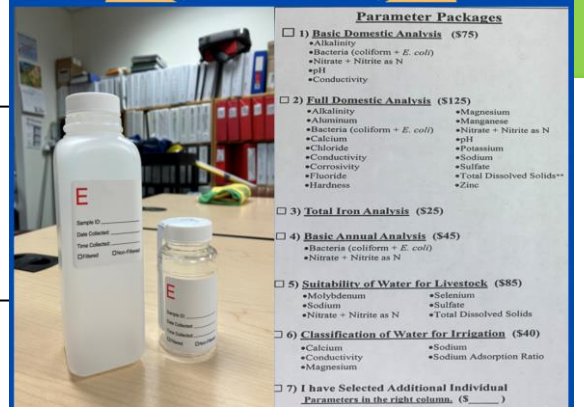
Please note: Septic systems vary. Diagram is not to scale.

Average cost of well in Gallatin Valley: $7,500 for 100ft well

Avg cost for well pump: $10,000 good for 8-20 years

Average cost of replacement for a basic septic: $15,000-$20,000





Avg cost well test:
Nitrate Coliform $45
Domestic Analysis $125

Avg Cost to pump septic system: $300-$500 every 3-5 years

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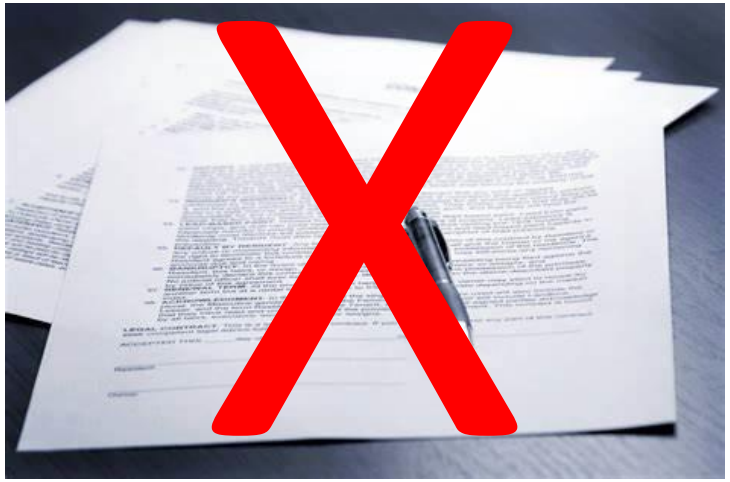

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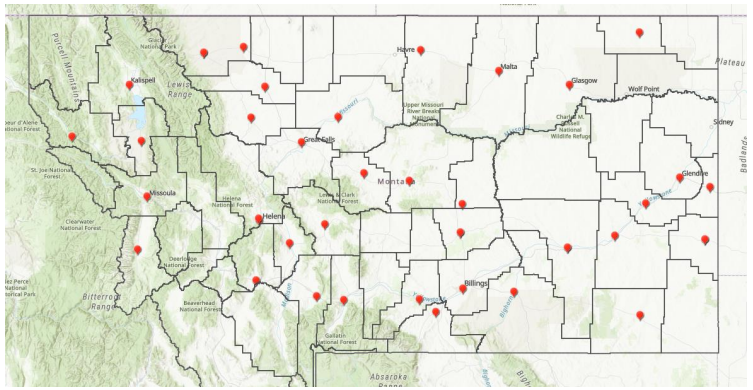
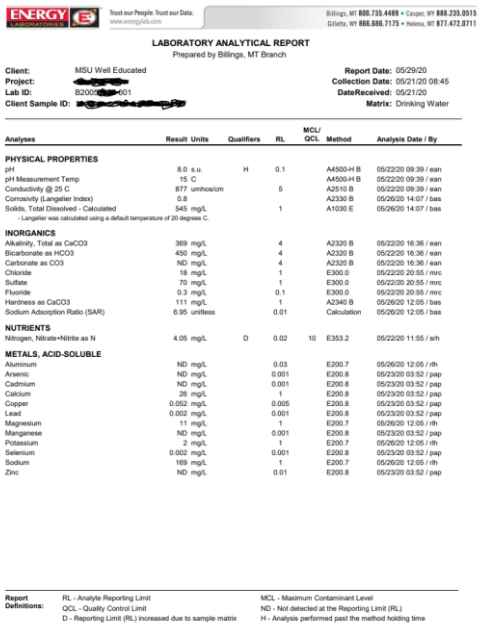




LABORATORY ANALYTICAL REPORT
Prepared by Billings, MT Branch

Client: MSU Well Educated
Project: [redacted]
Lab ID: B2009[redacted]001
Client Sample ID: [redacted]

Report Date: 05/29/20
Collection Date: 05/21/20 08:45
DateReceived: 05/21/20
Matrix: Drinking Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	8.0	s.u.	H	0.1		A4500-H B	05/22/20 09:39 / ean
pH Measurement Temp	15	C				A4500-H B	05/22/20 09:39 / ean
Conductivity @ 25 C	877	umhos/cm		5		A2510 B	05/22/20 09:39 / ean
Corrosivity (Langelier Index)	0.8					A2330 B	05/26/20 14:07 / bas
Solids, Total Dissolved - Calculated	545	mg/L		1		A1030 E	05/26/20 14:07 / bas
- Langelier was calculated using a default temperature of 20 degrees C.							
INORGANICS							
Alkalinity, Total as CaCO3	369	mg/L		4		A2320 B	05/22/20 16:36 / ean
Bicarbonate as HCO3	450	mg/L		4		A2320 B	05/22/20 16:36 / ean
Carbonate as CO3	ND	mg/L		4		A2320 B	05/22/20 16:36 / ean
Chloride	18	mg/L		1		E300.0	05/22/20 20:55 / mrc
Sulfate	70	mg/L		1		E300.0	05/22/20 20:55 / mrc
Fluoride	0.3	mg/L		0.1		E300.0	05/22/20 20:55 / mrc
Hardness as CaCO3	111	mg/L		1		A2340 B	05/26/20 12:05 / bas
Sodium Adsorption Ratio (SAR)	6.95	unitless		0.01		Calculation	05/26/20 12:05 / bas
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	4.05	mg/L	D	0.02	10	E353.2	05/22/20 11:55 / sh
METALS, ACID-SOLUBLE							
Aluminum	ND	mg/L		0.03		E200.7	05/26/20 12:05 / rh
Arsenic	ND	mg/L		0.001		E200.8	05/23/20 03:52 / pap
Cadmium	ND	mg/L		0.001		E200.8	05/23/20 03:52 / pap
Calcium	26	mg/L		1		E200.8	05/23/20 03:52 / pap
Copper	0.052	mg/L		0.005		E200.8	05/23/20 03:52 / pap
Lead	0.002	mg/L		0.001		E200.8	05/23/20 03:52 / pap
Magnesium	11	mg/L		1		E200.7	05/26/20 12:05 / rh
Manganese	ND	mg/L		0.001		E200.8	05/23/20 03:52 / pap
Potassium	2	mg/L		1		E200.7	05/26/20 12:05 / rh
Selenium	0.002	mg/L		0.001		E200.8	05/23/20 03:52 / pap
Sodium	169	mg/L		1		E200.7	05/26/20 12:05 / rh
Zinc	ND	mg/L		0.01		E200.8	05/23/20 03:52 / pap

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
D - Reporting Limit (RL) increased due to sample matrix
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)
H - Analysis performed past the method holding time

Household Use Interpretation

Well Educated

ParticipantName	LabID	ReportDate
Problems, Afew	B22090000	Fri Dec 16 2022

Parameters mentioned in this document indicate parameters of health concern and/or non-health related parameters of note (aesthetic/secondary concern) from your water sample. This means certain parameter concentrations in your water sample were outside the ideal range or threshold suggested by the EPA (Maximum Contaminant Level and Secondary Maximum Contaminant Level) or water quality research.

Human Health Related - Parameters of Concern

Parameter	YourValue	Interpretation	More Info
Fluoride	4.3	unsatisfactory - above 4.0 mg/L health threshold; risk of fluorisis and bone disease	Click here for more info
Manganese	0.4	unsatisfactory - above 0.1 mg/L health-based value for children under 6 and/or above 0.3 mg/L value for adults	Click here for more info
Nitrogen, Nitrate+Nitrite as N	11	unsatisfactory - above 10.0 mg/L health threshold; discontinue use for infants under 1 year of age and persons with cardiovascular conditions	Click here for more info

\[\[0.1in\]\]

Non-Human Health Related - Parameters of Note

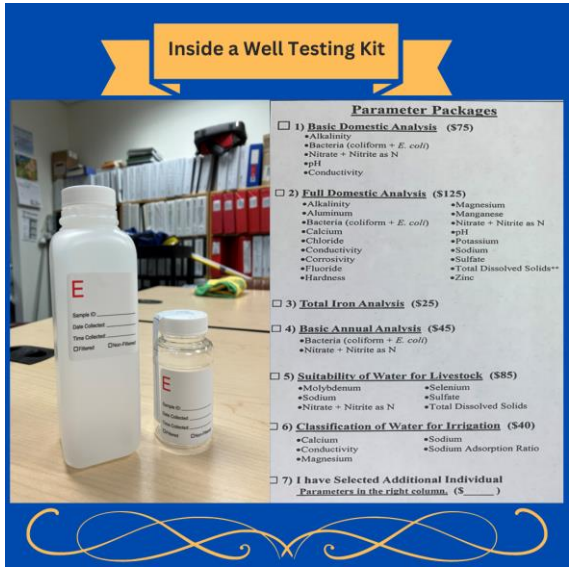
Parameter	YourValue	Interpretation
Alkalinity, Total as CaCO3	204	above ideal range of 100 to 200 mg/L - related to potential scaling
Manganese	0.4	above 0.05 mg/L guideline - may cause black or brown staining and metallic taste

\[\[0.1in\]\]

More Information

Click here for more on interpreting your results.

Click here for information on water treatment.

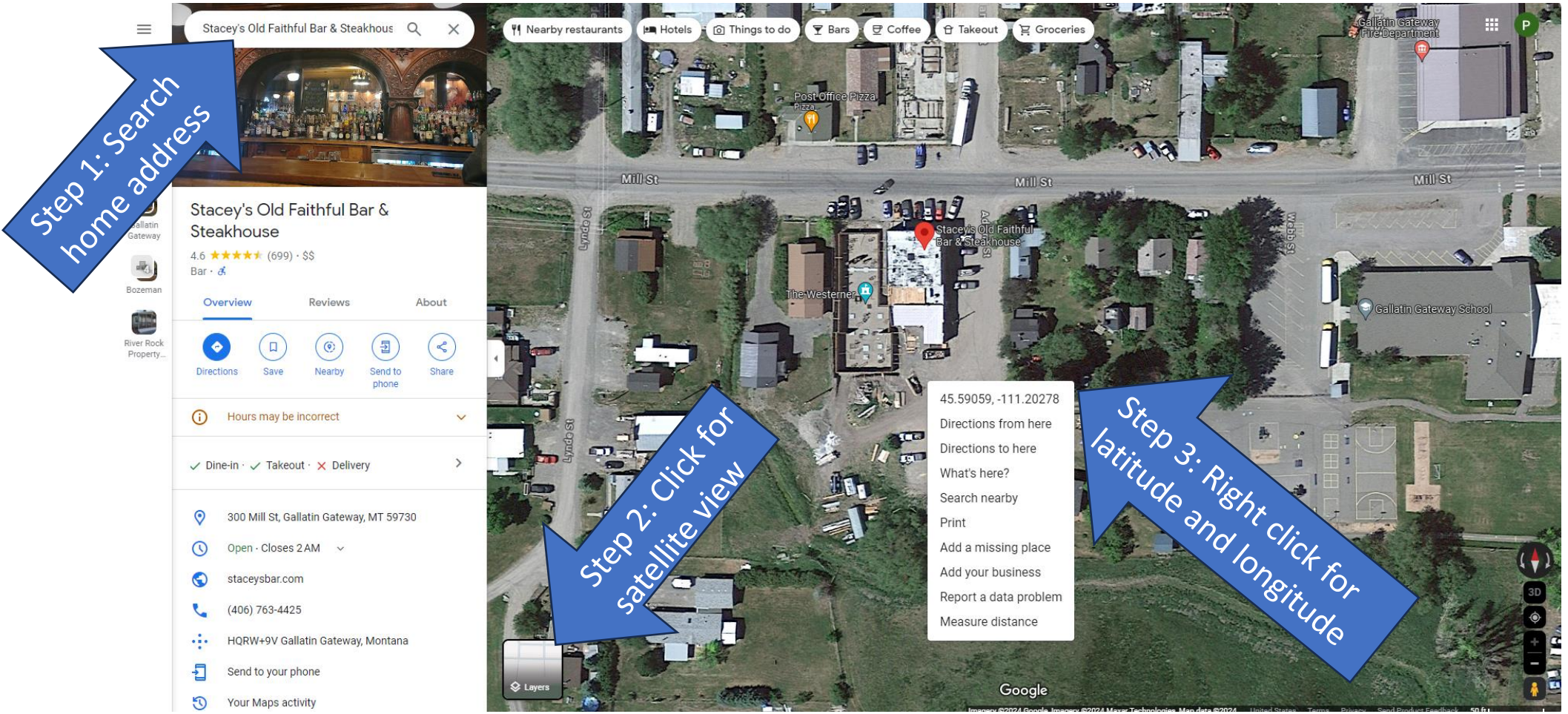


Expect your results 3 weeks after shipping

ENERGY LABORATORIES

welleducated@montana.edu

Locating Well Coordinates



Locating Well Log- Ground Water Information Center (GWIC)

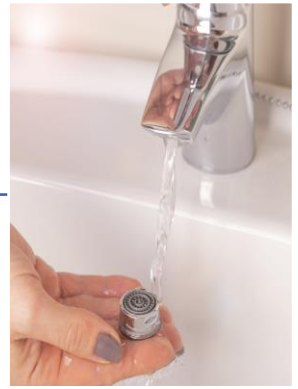
- https://www.youtube.com/watch?v=afOlyprvZTo

Where do I Sample?

What water do I want to sample?

Treated drinking water

Sample at tap



Groundwater

Sample before treatment system

Ready to sample

Sample Monday-Wednesday
NOT Holiday weeks!

Sample big bottle

Disinfect faucet

Let water run 2-3 minutes

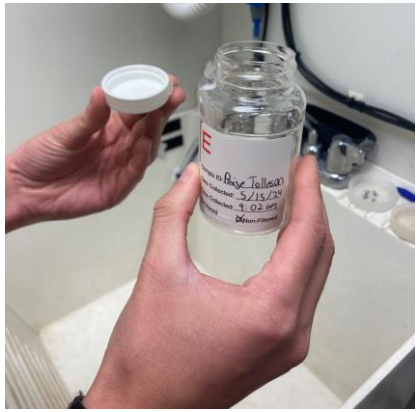
Wash your hands

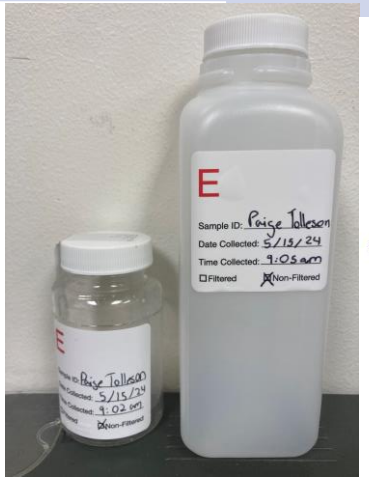
Do not touch interior or rim of bottle

Fill bottle to line

Seal and label

Ship





Shipping your Sample

$97.00 overnight

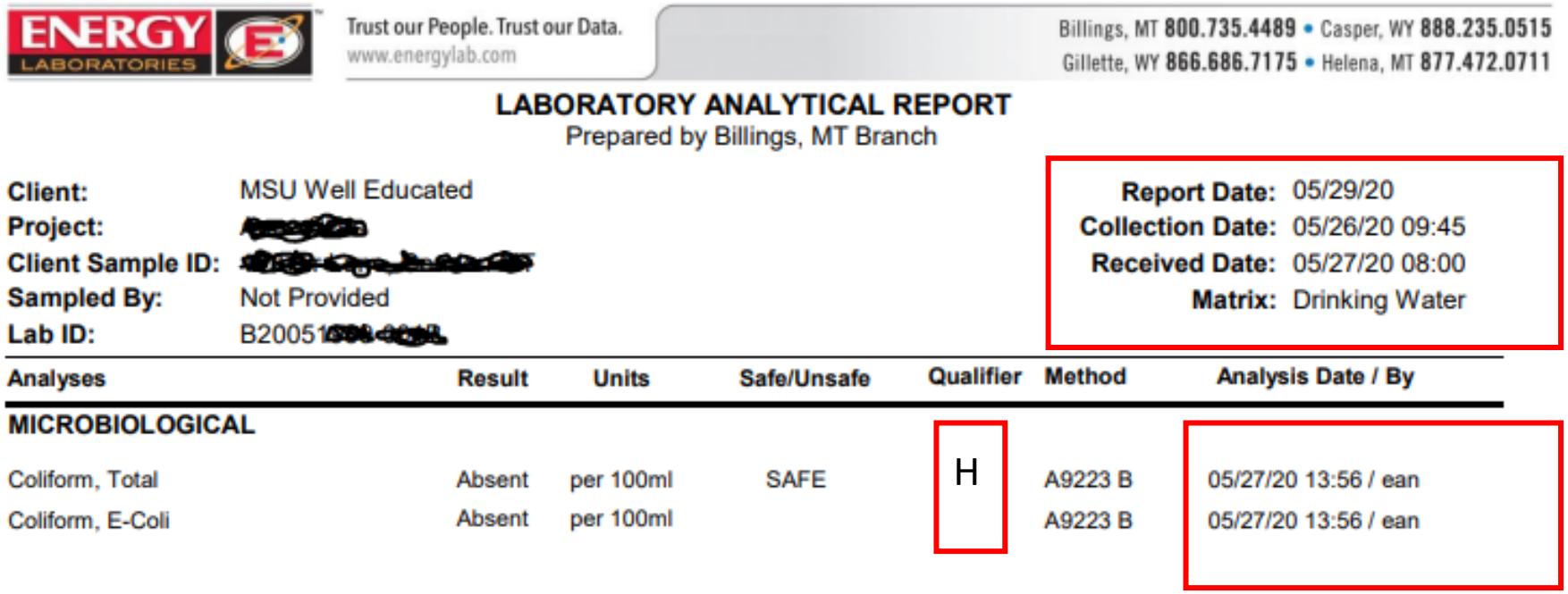
Dropoff by: 4:30pm

$15.00, next day
Overnight is $135.00

Cannot guarantee next day. 2 days guarantee $50.00

Ship sample right away after collecting sample!

Understanding Bacteria Hold Times:



ENERGY LABORATORIES

Trust our People. Trust our Data.
www.energylab.com

Billings, MT 800.735.4489 • Casper, WY 888.235.0515
Gillette, WY 866.686.7175 • Helena, MT 877.472.0711

LABORATORY ANALYTICAL REPORT
Prepared by Billings, MT Branch

Client: MSU Well Educated
Project: [redacted]
Client Sample ID: [redacted]
Sampled By: Not Provided
Lab ID: B2005[redacted]

Report Date: 05/29/20
Collection Date: 05/26/20 09:45
Received Date: 05/27/20 08:00
Matrix: Drinking Water

Analyses	Result	Units	Safe/Unsafe	Qualifier	Method	Analysis Date / By
MICROBIOLOGICAL						
Coliform, Total	Absent	per 100ml	SAFE	H	A9223 B	05/27/20 13:56 / ean
Coliform, E-Coli	Absent	per 100ml			A9223 B	05/27/20 13:56 / ean

Understanding Bacteria Hold Times:

<30 hours | 32-34 hours | 34-40 hours | 40+ hours

- No false positives!
- If negative result, and passed hold time you can consider testing with Bridger Analytical

Future Testing

- Gallatin County Test I
  - Gallatin Local Water
    Mendenhall Bozema
  - Gallatin Conservatio
    104, Manhattan, MT
  - Bridger Analytical, 7
    MT 59718
- State-wide program
  - https://waterquality.

Certified Montana Drinking Water Labs

Well Educated — Montana State University Extension

Certified Drinking Water Labs in Montana

Checkmarks indicate the lab has received certification from the Montana Department of Public Health and Human Services (DPHHS) to analyze the listed parameter or parameter category. You can learn more about this quality assurance process via the DPHHS Water Laboratory Certification Program webpage.

Websites for each laboratory (if available) have been hyperlinked in the lab name.

****It is important to call the lab before sending samples to get the most up to date information on analyses, costs, and hold times****

Lab Name	Mailing Address	Phone	Bacteria: E. coli/Total Coliform	Nitrate	Inorganics[1]	Metals[2]	Organic/Synthetic Compounds[3]
Arlee, MT							
Mission Mountain Laboratories	PO Box 606 Arlee, MT 59821	(406) 745-5227	✓	✓	✓	✓	
Billings, MT							
Energy Laboratories - Billings	PO Box 30916 Billings, MT 59107	(406) 252-6325	✓	✓	✓	✓	✓
Bozeman, MT							
Bridger Analytical Lab	7539 Pioneer Way Suite B Bozeman, MT 59718	(406) 582-0822	✓	✓	✓	✓	
Butte, MT							
Montana Bureau of Mines and Geology	1300 West Park Butte, MT 59701	(406) 496-4842		✓	✓	✓	

pating Counties List

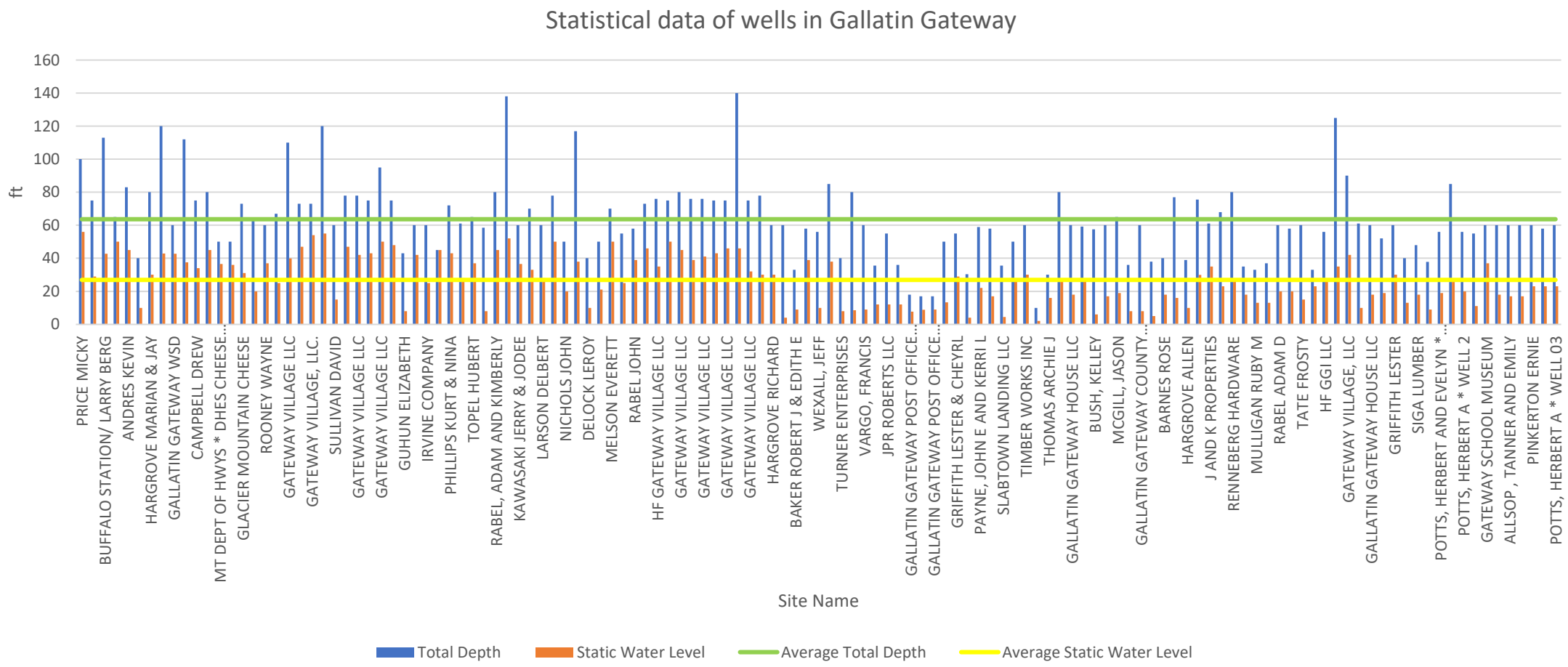
Well Educated — Montana State University Extension

Interactive Map of County Partner Locations

Educated County Contacts: Where to pick up a test kit

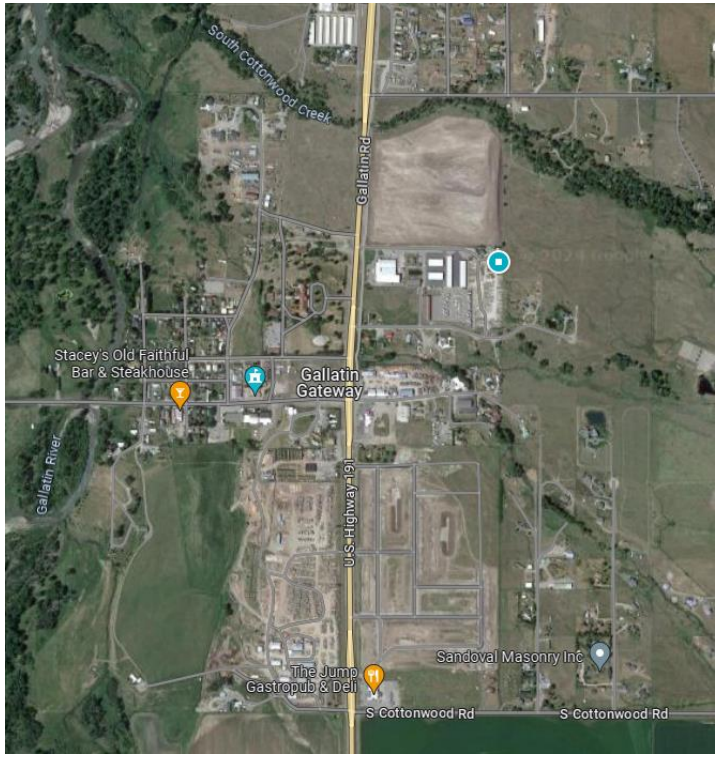
Office	Phone	Address
n Office	665-9770	317 N Custer Ave, Hardin
n Office	357-3200	420 Ohio St, Courthouse Annex, Chinook
n Office	266-9242	416 Broadway, Townsend
n Office	962-3522	202 State St., Joliet
n Office	454-6980	3300 3rd Street N.E. #9, Great Falls
n Office	622-3751	1308 Franklin St., Fort Benton
n Office	874-3370	Custer County Courthouse, 1010 Main St., Miles City
n Office	487-2861	113 Main Street, Scobey
n Office	377-4277	Dawson County Courthouse, 207 West Bell Street, Glendive
n	377-5772	207 West Bell Street, Glendive
n Office	778-7110	10 W Fallon Ave., Baker
n Office	535-3919	712 West Main Street , Lewistown
n Office	758-5553	1108 S Main St Suite 4, Kalispell
uality District	582-3168	215 West Mendenhall, Suite 300, Bozeman
ition District	282-4350	120 S. 5th St. Ste 104, Manhattan
n Office	873-2239	Courthouse Annex 1210 E Main St., Cut Bank
n Office	338-2650	640 All Chiefs Road, Browning
n Office	859-3304	220 N Sansome St., Philipsburg
n Office	400-2333	315 4th Street, Havre

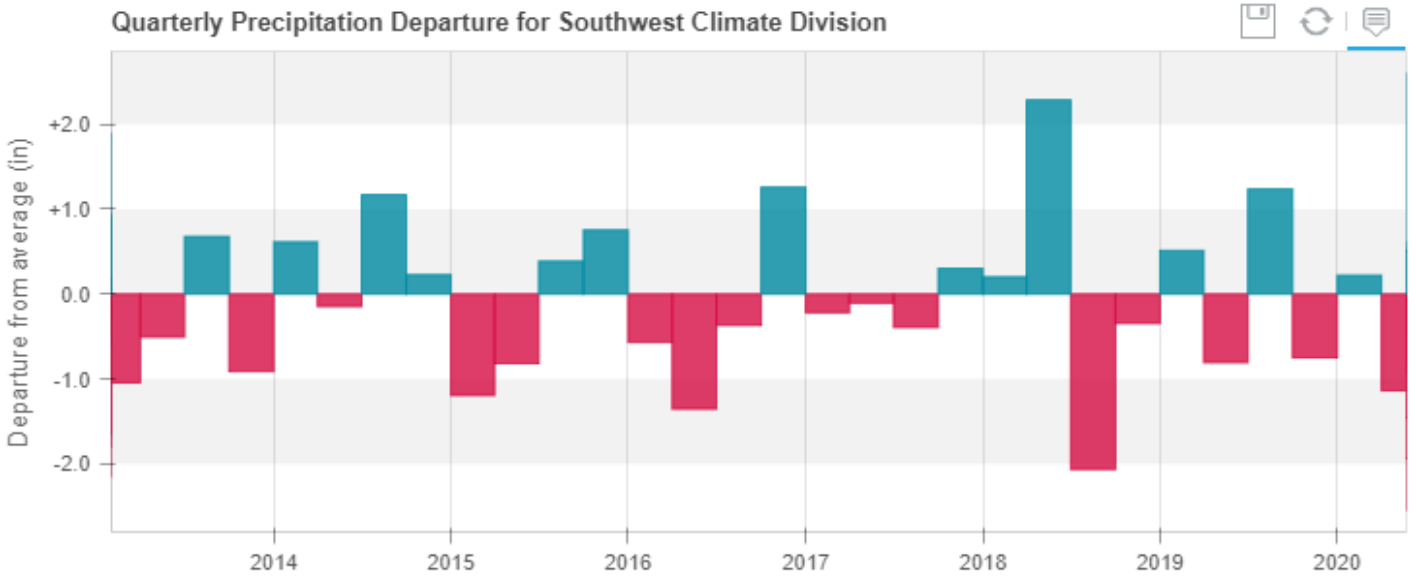
Summary of GWIC Data

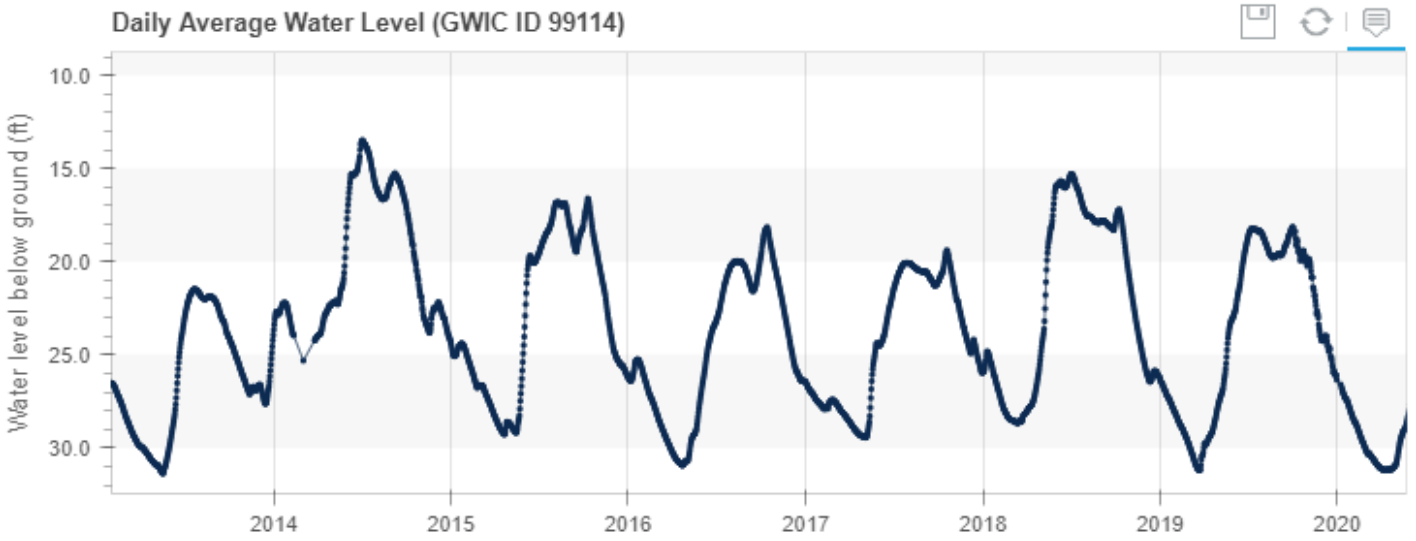


Map View of All Available GWIC Wells in Gallatin Gateway

- Potts Well







Groundwater Flow in Gallatin Valley

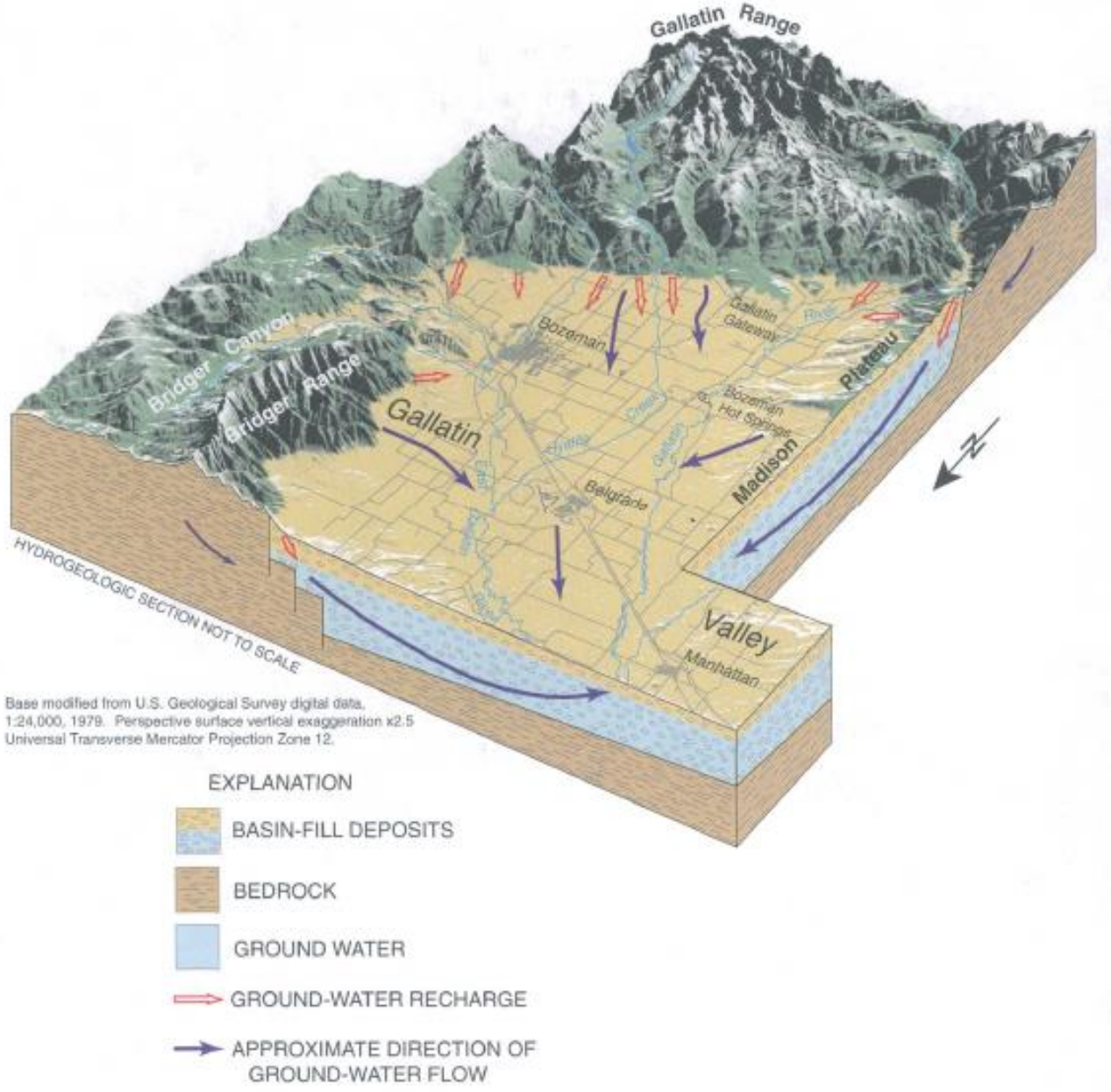
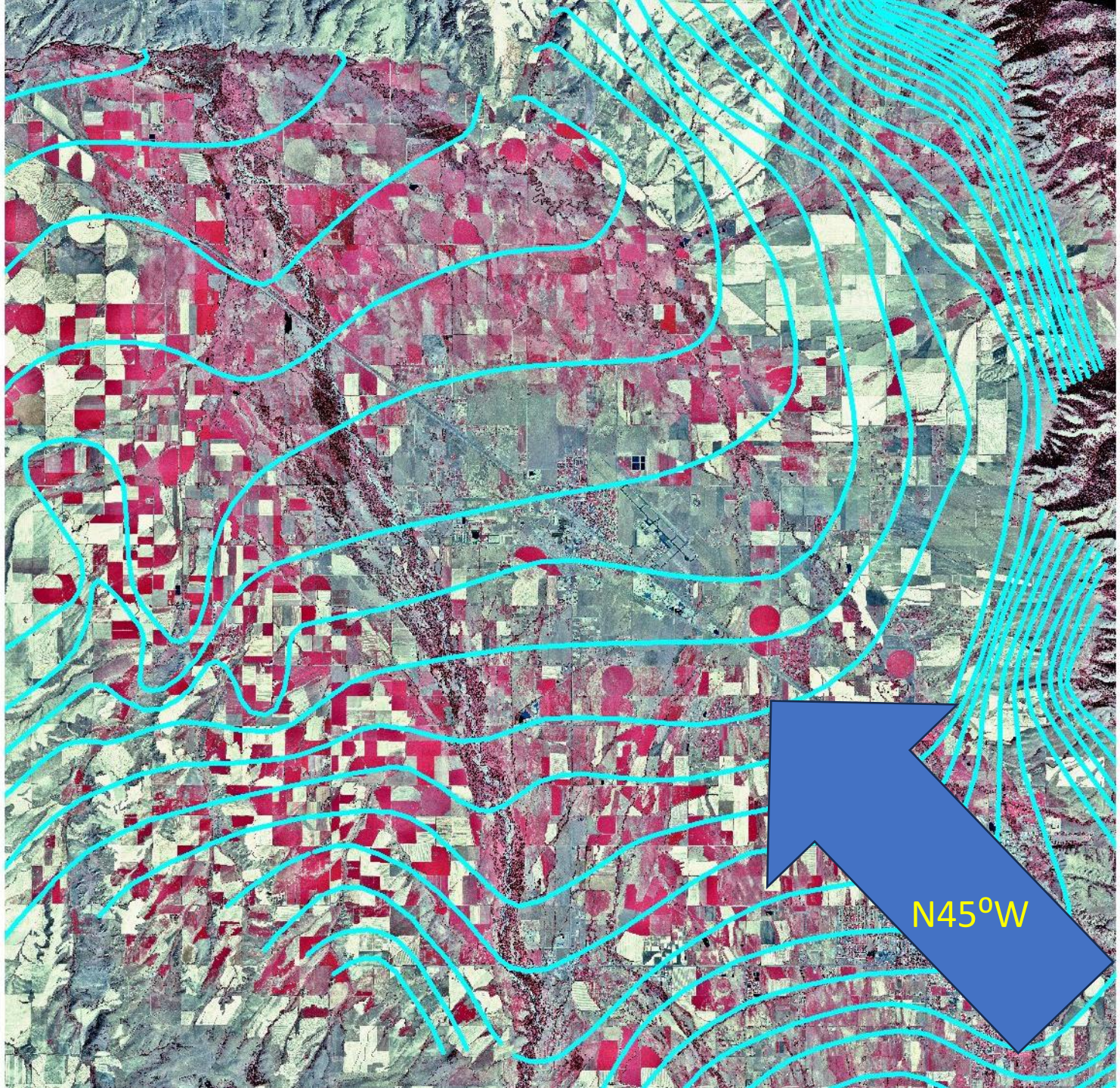


Figure 9. Perspective view and diagrammatic hydrogeologic section showing ground-water recharge and flow in the basin-fill deposits in the Gallatin Local Water Quality District, Montana.

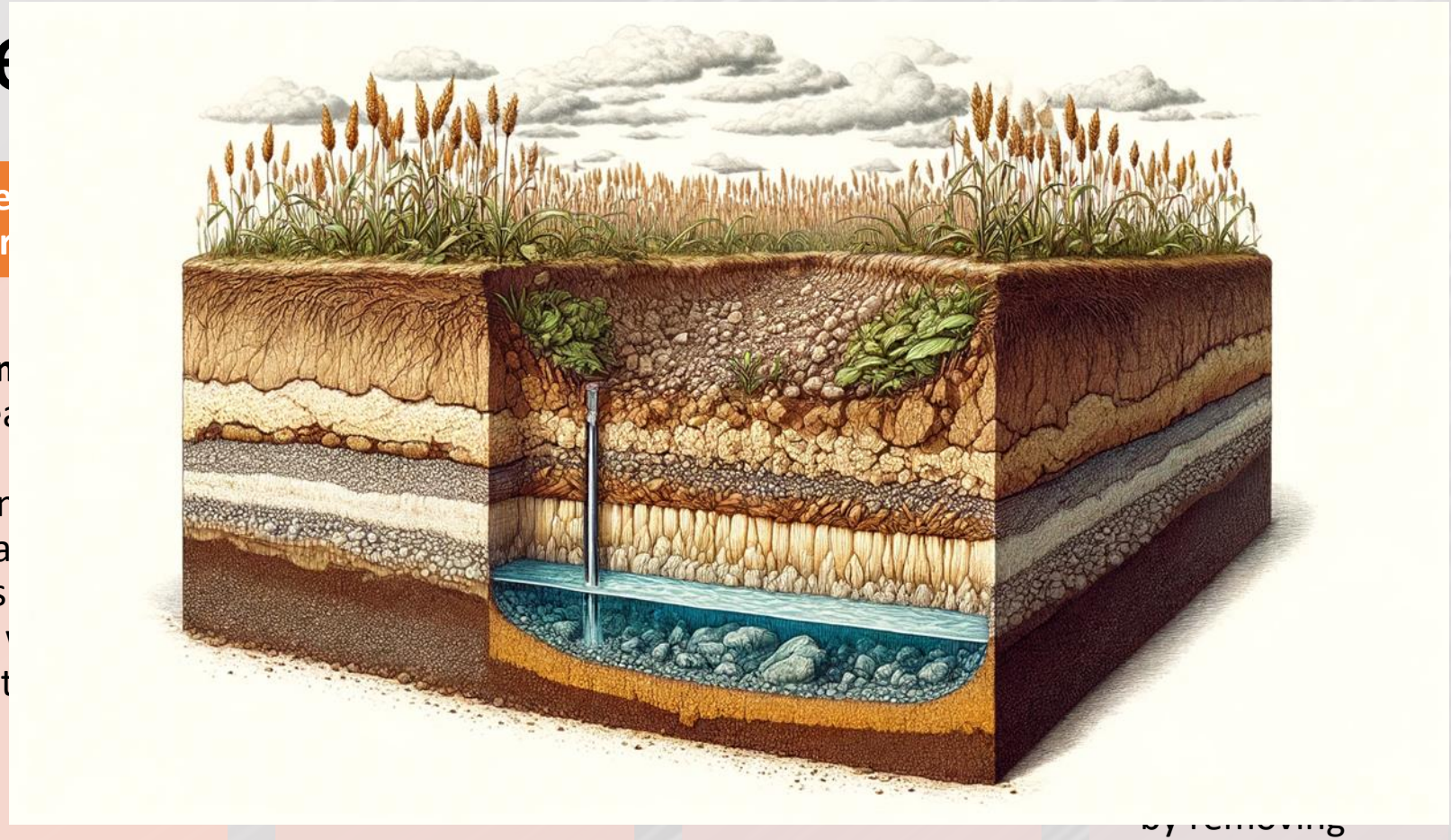
Groundwater Flow in Gallatin Valley



Movement of Water Through the Landscape Driven by Snowmelt

- **Introduction**
  - Snowmelt is a significant source of freshwater in many regions
  - It plays a critical role in the hydrological cycle
- **Processes Involved**
  - **Melting:** As temperatures rise in spring, snow begins to melt
  - **Infiltration:** Meltwater infiltrates the soil, replenishing groundwater
  - **Runoff:** Excess meltwater flows over the land surface, entering rivers and streams
- **Impacts on the Landscape**
  - **Water Availability:** Provides a crucial source of water for ecosystems and human use
  - **Flooding:** Rapid snowmelt can cause flooding, affecting communities and infrastructure
- **Factors Affecting Snowmelt**
  - **Temperature:** Warmer temperatures accelerate snowmelt
  - **Solar Radiation:** Increased sunlight in spring and summer enhances melting
  - **Snowpack Characteristics:** The depth and density of the snowpack influence melt rates
- **Environmental Considerations**
  - **Water Quality:** Runoff can carry pollutants into water bodies

Your Results Depend on When You Test for The



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Natural Disasters:

- **Floods:** Can significantly alter groundwater quality and affect well integrity

by removing protective soil cover

What to Do After the Flood

EPA United States Environmental Protection Agency

What to Do After the Flood

Drilled, driven or bored wells are best disinfected by a well or pump contractor, because it is difficult for the private owner to thoroughly disinfect these wells.

If you suspect that your well may be contaminated, contact your local or state health department or agriculture extension agent for specific advice on disinfecting your well. The suggestions below are intended to supplement flood precautions issued by State and local health authorities.

WARNING!
DO NOT TURN ON THE PUMP
There is danger of electrical shock and damage to your well or pump if they have been flooded

WARNING!
DO NOT WASH WITH WELL WATER
People drinking or washing with water from a private well that has been flooded will risk getting sick.

Shock Chlorination After a Flood

- **Objective:**
  - Sanitize water systems contaminated by floodwaters.
- **Steps:**
  - **Assessment:**
    - Determine the water system’s total volume.
  - **Chlorine Calculation:**
    - Calculate necessary chlorine amount for 50-200 ppm concentration.
  - **Application:**
    - Evenly distribute chlorine solution throughout the system.
  - **Contact Time:**
    - Allow the solution to sit for 12-24 hours for effective disinfection.
  - **Flushing and Safety:**
    - Thoroughly flush the system with clean water.
    - Test water quality to ensure safety before use.

Emergency Disinfection of Wells That Have Been Flooded

Emergency Disinfection of Wells that have been Flooded

Before Disinfection: Check the condition of your well. Make sure there is no exposed or damaged wiring. If you notice any damage, call a professional before the disinfection process.

Materials Needed:

- One gallon of non-scented household liquid bleach;
- rubber gloves;
- eye protection;
- old clothes; and
- a funnel.

Step 1

If your water is muddy or cloudy, run the water from an outside spigot with a hose attached until the water becomes clear and free of sediments.

Step 2

Determine what type of well you have and how to pour the bleach into the well. Some wells have a sanitary seal with either an air vent or a plug that can be removed (a). If it is a bored or dug well, the entire cover can be lifted off to provide a space for pouring the bleach into the well (b).

Step 3

Take the gallon of bleach and funnel (if needed) and carefully pour the bleach down into the well casing.

Step 4

After the bleach has been added, run water from an outside hose into the well casing until you smell chlorine coming from the hose. Then turn off the outside hose.

Step 5

Turn on all cold water faucets, inside and outside of house, until the chlorine odor is detected in each faucet, then shut them all off. If you have a water treatment system, switch it to bypass before turning on the indoor faucets.

Step 6

Wait 6 to 24 hours before turning the faucets back on. It is important not to drink, cook, bathe or wash with this water during the time period --- it contains high amounts of chlorine.

Step 7

Once the waiting period is up, turn on an outside spigot with hose attached and run the water into a safe area where it will not disturb plants, lakes, streams or septic tanks. Run the water until there is no longer a chlorine odor. Turn the water off.

Step 8

The system should now be disinfected, and you can now use the water.

Step 9

Have your water tested for bacteria 7 to 10 days after disinfection.

Impact of Overland Flow on Waterborne Bacterial Contamination

- **Introduction:**
  - Overland flow occurs when rainwater or snowmelt flows over the land
  - It transports bacteria from various sources to water bodies including wells
- **Sources of Contamination:**
  - **Agricultural Lands:** Manure, fertilizers
  - **Urban Areas:** Pet waste, leaky septic systems
  - **Natural Areas:** Wildlife excrement
- **Impacts:**
  - **Water Quality:** Potential to increases pathogenic bacteria
  - **Public Health:** Causes waterborne diseases such as diarrhea, giardiasis, dysentery, typhoid fever, E. Coli infection, and salmonellosis
- **Important Note:**
  - **Fecal coliform bacteria are not pathogenic:** They are an indicator for the presence of pathogenic organisms in drinking water

Conclusion

- Snowmelt Can Carry Contaminants into Water Bodies
- Your Results Can Vary Depending on When You Test
- Impact of the flood
  - What to Do After a Flood
  - Shock Chlorination After a Flood
  - Emergency Disinfection of Wells That Have Been Flooded
- Impact of Bacterial Contamination

Well Educated Data for Gallatin County
Water Quality Impacts on Human Health
Understanding Results

- Common health parameters in Gallatin County:
  - Arsenic, manganese, nitrate, Fluoride, *E. coli*, lead, copper, and corrosivity
- What you receive from Welleducated@montana.edu
- Interpretation of your results; putting your numbers into context

Chemistry Lingo

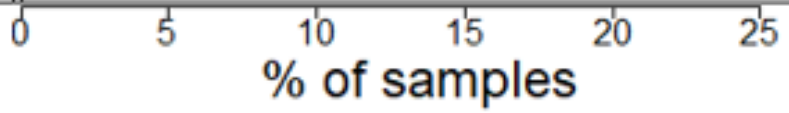
The mg/L is the fundamental unit of measuring the concentration of something, a parameter, that is dissolved in water.

- mg/L are the units reported on drinking water analysis report
- It is equivalent to 1 part per million (ppm)

METALS, ACID-SOLUBLE		
Aluminum	ND	mg/L
Antimony	ND	mg/L
Arsenic	ND	mg/L
Barium	0.05	mg/L
Beryllium	ND	mg/L
Cadmium	ND	mg/L
Calcium	76	mg/L
Chromium	ND	mg/L
Copper	ND	mg/L
Lead	ND	mg/L

Summary of human health related results 2015-2020

Parameter	Low Risk Range	% Samples that are High Risk	# of Samples
Bacteria Total Coliform	Absent	27.4	3606
Corrosivity	above -0.5 mg/L	13.8	2292
Manganese	below 0.1 mg/L	11.2	2448
Arsenic	below 0.01 mg/L	9.8	941
Nitrate N	below 10 mg/L	3.3	3921
Bacteria E-Coli	Absent	2.8	3606
Fluoride	below 4.0 mg/L	2.6	2449
Uranium	below 0.03 mg/L	2.5	279
Selenium	below 0.05 mg/L	2.2	767
Copper	below 1.3 mg/L	2.1	615
Lead	below 0.015 mg/L	1	705
Antimony	below 0.006 mg/L	0	100
Barium	below 2 mg/L	0	99
Beryllium	below 0.004 mg/L	0	92
Boron	below 1 mg/L	0	3
Cadmium	below 0.005 mg/L	0	573
Chromium	below 0.1 mg/L	0	123
Mercury	below 0.002 mg/L	0	178
Thallium	below 0.002 mg/L	0	107



What is the story with arsenic?

- Arsenic is a naturally occurring element
  - Can occur in many forms
- U.S. EPA Maximum Contaminant Level (MCL) for arsenic = **0.010 mg/L (ppm)**

  = 10 ppb
- This standard is set based on research on human health effects
- Long been known to be very toxic at high levels (> 100 ppb)
- Sprouts up in Gallatin County

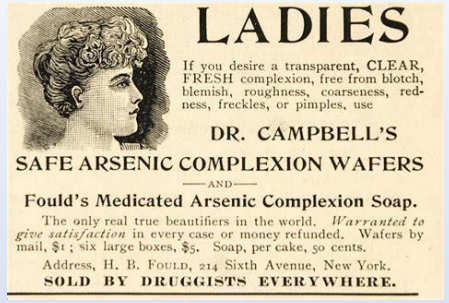
Arsenic - EPA Standard = 0.010 mg/L.

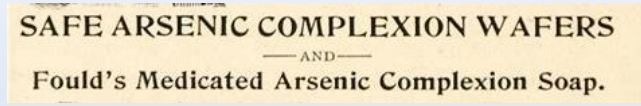
Chronic exposure can cause problems with human operating systems:

- Neurological
- Respiratory
- Cardiovascular
- Gastrointestinal

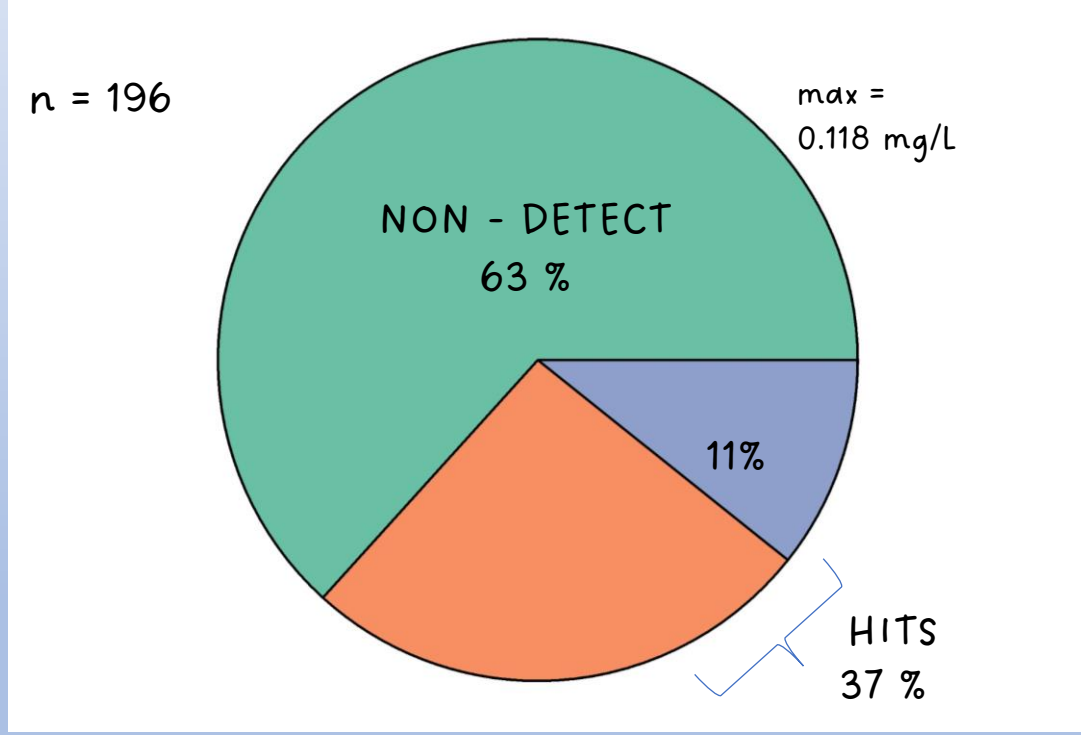
Can also cause:

- Skin problems
- Increased risk of many types of cancer
- Stomach pain, nausea, diarrhea
- Numbness in the hands and feet
- Blindness



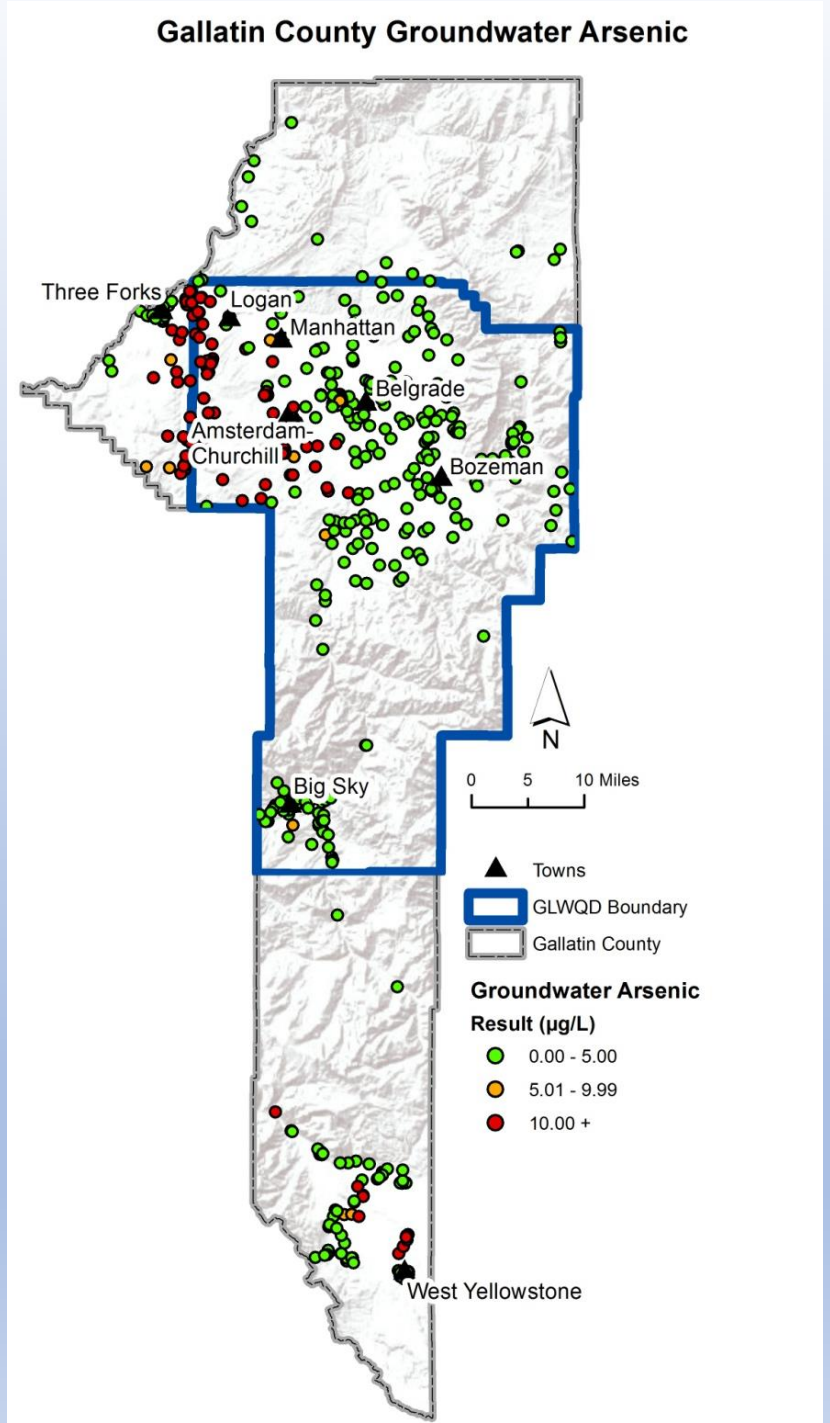


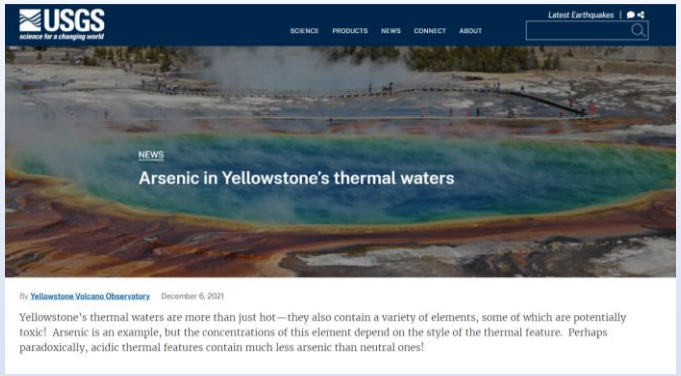
Gallatin Co. Well Educated Data '15 – '21:



~ 11% of observations in Gallatin County from 2015 - 2021 were at or above the drinking water standard of 0.010 mg/L (10 ppb)

Arsenic Distribution in Gallatin County





Arsenic Hydrogeochemistry in an Irrigated River Valley—A Reevaluation

by David A. Nimick[a]

Abstract

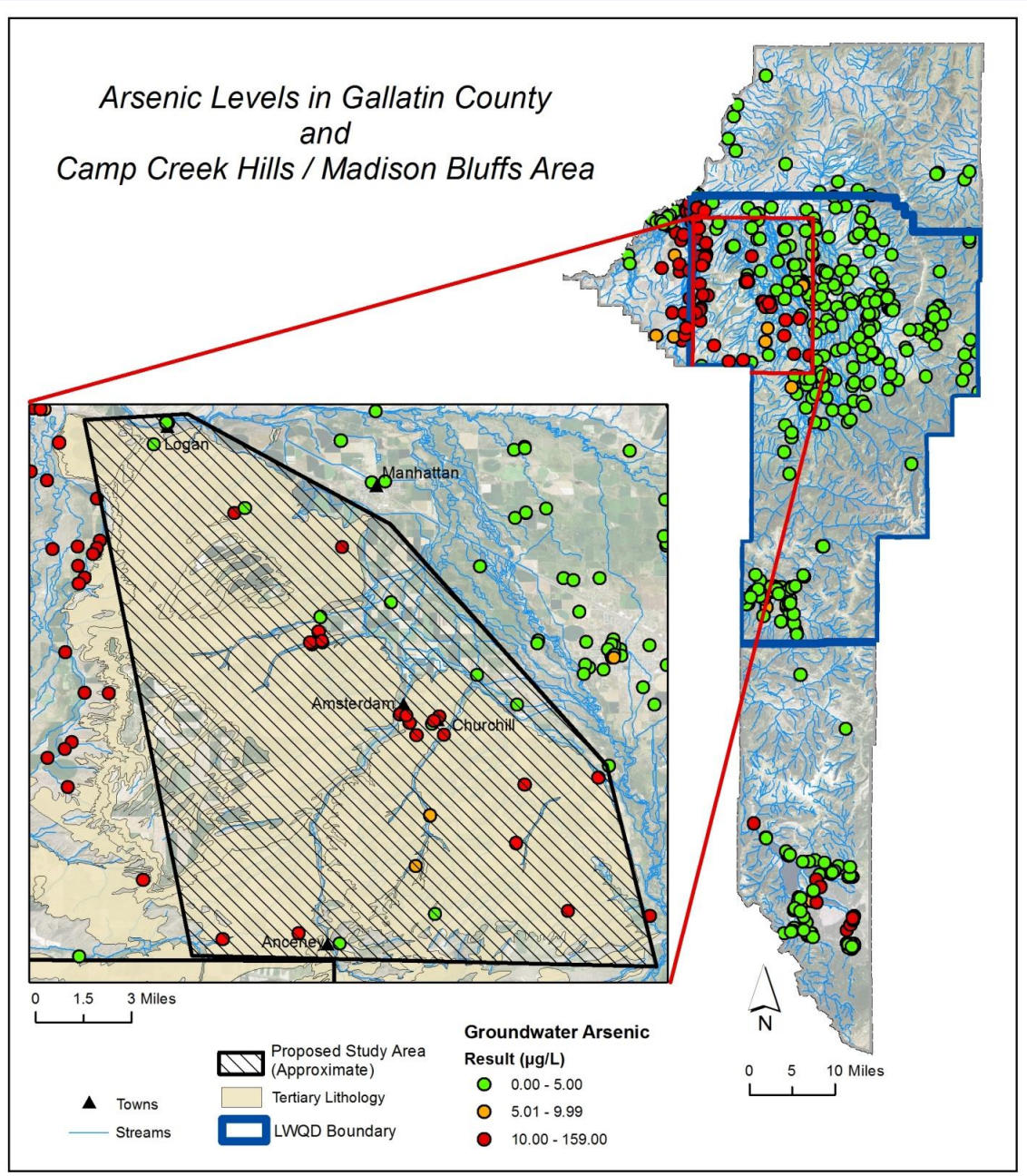
Arsenic concentrations in ground water of the lower Madison River valley, Montana, are high (16 to 176 µg/L). Previous studies hypothesized that arsenic-rich river water, applied as irrigation, was evapoconcentrated during recharge and contaminated the thin alluvial aquifer. Based on additional data collection and a reevaluation of the hydrology and geochemistry of the valley, the high arsenic concentrations in ground water are caused by a unique combination of natural hydrologic and geochemical factors, and irrigation appears to play a secondary role. The high arsenic concentrations in ground water have several causes: direct aquifer recharge by Madison River water having arsenic concentrations as high as 100 µg/L, leaching of arsenic from Tertiary volcano-clastic sediment, and release of sorbed arsenic where redox conditions in ground water are reduced. The findings are consistent with related studies that demonstrate that arsenic is sorbed by irrigated soils in the valley. Although evaporation of applied irrigation water does not significantly increase arsenic concentrations in ground water, irrigation with arsenic-rich water raises other environmental concerns.

Introduction

Understanding arsenic geochemistry in natural systems is important because arsenic occurs naturally in ground water in many parts of the western United States at concentrations commonly higher than the Federal primary drinking water regulation of 50 µg/L (Welch et al. 1988). Although naturally occurring arsenic is commonly associated with geothermal discharge or volcanic sediment, other sources of arsenic are possible, including river water that recharges the aquifer, either naturally or through irrigation. When studying the fate and transport of arsenic, site-specific geochemical factors such as pH and redox conditions that significantly affect arsenic mobility are important considerations. The lower Madison River valley (Figure 1) provides an excellent field-scale laboratory to study arsenic geochemistry because arsenic is derived from multiple sources and the geochemical conditions that control arsenic mobility vary.

The Madison and upper Missouri Rivers of Montana have of arsenic geochemistry. Objectives of the investigations were to examine arsenic transport in the Madison and Missouri Rivers (Nimick et al. in press), to determine if irrigation causes arsenic concentrations to increase in other irrigated areas along the mainstem (Tuck et al. 1997), to study the interaction of irrigated soils with arsenic in irrigation water (Keith 1995), and to reevaluate the hydrogeochemical processes controlling arsenic concentrations and transport in the ground water of the lower Madison River valley. This paper presents the results of this reevaluation, which was conducted during 1992 through 1995. The conclusions about the sources and controls of arsenic in ground water developed during these investigations differ in some respects from those previously proposed (Sonderegger and Ohguchi 1988; Sonderegger et al. 1989).

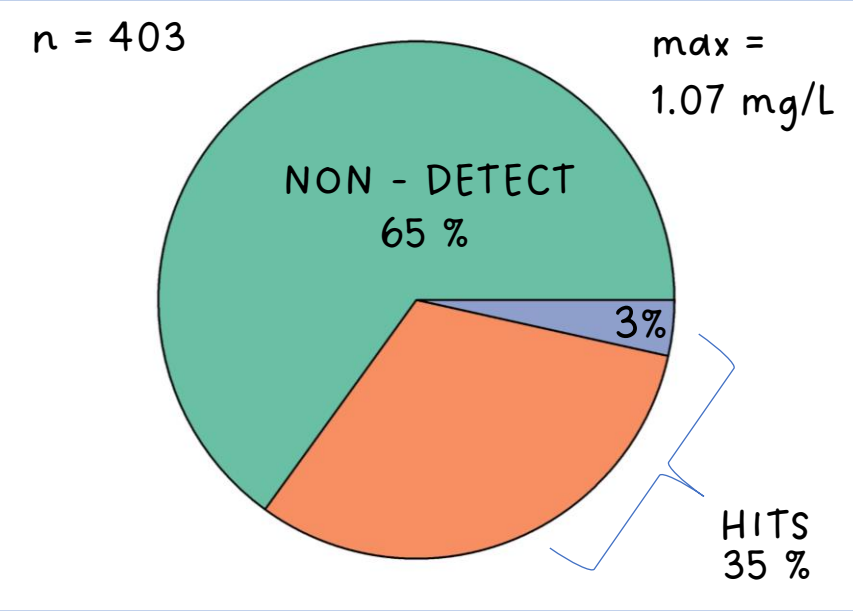
Study Area

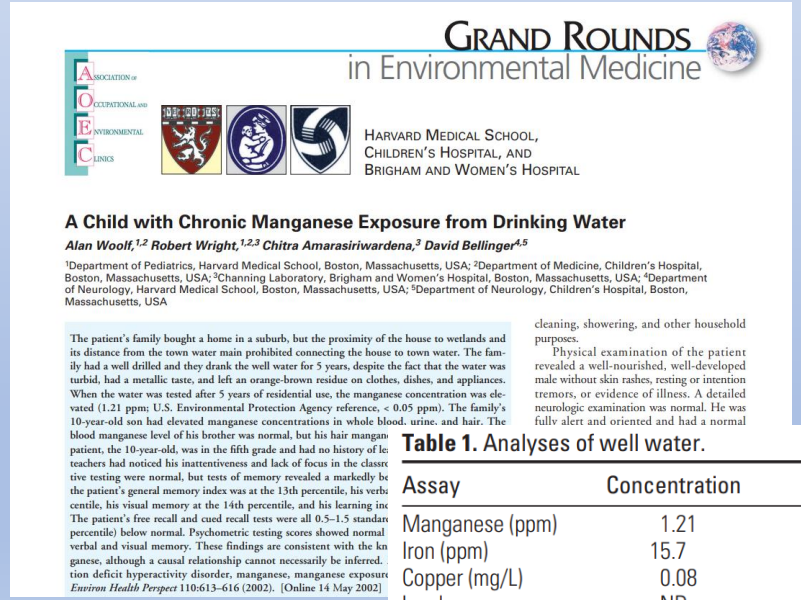


Manganese - Variation in human sensitivity

- 0.3 mg/L -protective of life-time exposure for the general population
- Infants up to 6 months: 0.3 mg/L for more than a total of 10 days per year; recent studies suggest learning impairment with childhood exposure; school age children may have effects down to 0.1 mg/L
- EPA: general population should not ingest water with manganese greater than 1 mg/L for more than a total of 10 days per year
- Much lower manganese levels in water can result in noticeable staining and taste complaints. -> "secondary" drinking water guideline of 0.05 mg/L

Gallatin Co. Well Educated Data '15 - '21:





GRAND ROUNDS in Environmental Medicine

HARVARD MEDICAL SCHOOL, CHILDREN'S HOSPITAL, AND BRIGHAM AND WOMEN'S HOSPITAL

A Child with Chronic Manganese Exposure from Drinking Water

Alan Woolf,[1,2] Robert Wright,[1,2,3] Chitra Amarasiriwardena,[3] David Bellinger[4,5]

[1]Department of Pediatrics, Harvard Medical School, Boston, Massachusetts, USA; [2]Department of Medicine, Children's Hospital, Boston, Massachusetts, USA; [3]Channing Laboratory, Brigham and Women's Hospital, Boston, Massachusetts, USA; [4]Department of Neurology, Harvard Medical School, Boston, Massachusetts, USA; [5]Department of Neurology, Children's Hospital, Boston, Massachusetts, USA

The patient's family bought a home in a suburb, but the proximity of the house to wetlands and its distance from the town water main prohibited connecting the house to town water. The family had a well drilled and they drank the well water for 5 years, despite the fact that the water was turbid, had a metallic taste, and left an orange-brown residue on clothes, dishes, and appliances. When the water was tested after 5 years of residential use, the manganese concentration was elevated (1.21 ppm; U.S. Environmental Protection Agency reference, < 0.05 ppm). The family's 10-year-old son had elevated manganese concentrations in whole blood, urine, and hair. The blood manganese level of his brother was normal, but his hair mangan
patient, the 10-year-old, was in the fifth grade and had no history of le
teachers had noticed his inattentiveness and lack of focus in the classr
tive testing were normal, but tests of memory revealed a markedly be
the patient's general memory index was at the 13th percentile, his verb
centile, his visual memory at the 14th percentile, and his learning in
The patient's free recall and cued recall tests were all 0.5–1.5 standar
percentile) below normal. Psychometric testing scores showed normal
verbal and visual memory. These findings are consistent with the kn
ganese, although a causal relationship cannot necessarily be inferred.
tion deficit hyperactivity disorder, manganese, manganese exposur
Environ Health Perspect 110:613–616 (2002). [Online 14 May 2002]

cleaning, showering, and other household purposes.

Physical examination of the patient revealed a well-nourished, well-developed male without skin rashes, resting or intention tremors, or evidence of illness. A detailed neurologic examination was normal. He was fully alert and oriented and had a normal

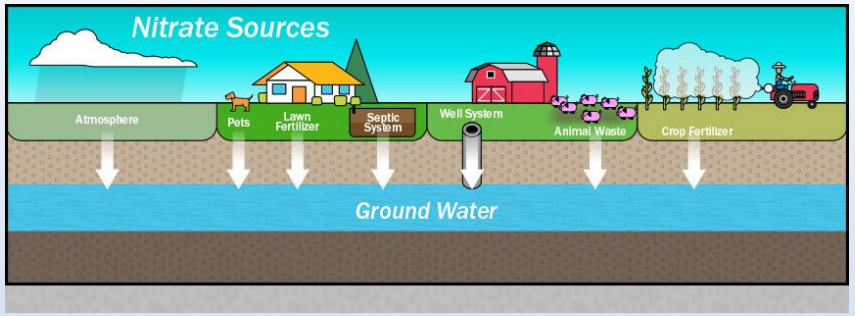
Table 1. Analyses of well water.

Assay	Concentration	MCL
Manganese (ppm)	1.21	0.05
Iron (ppm)	15.7	0.3
Copper (mg/L)	0.08	1.3
Lead	ND	0.015
Calcium (ppm)	37.98	NA
Magnesium (ppm)	15.9	NA

Woolf, Alan, et al. "A child with chronic manganese exposure from drinking water." Environmental health perspectives 110.6 (2002): 613-616.

Nitrate - 10 mg/L NO_3-N

- Nitrate is the most common chemical contaminant in the world's groundwater aquifers
- Some studies suggest linkages between high nitrate levels in drinking water with birth defects and certain types of cancer
- 1962: EPA set the drinking water standard to 10 mg/L NO3-N to prevent blue-baby syndrome



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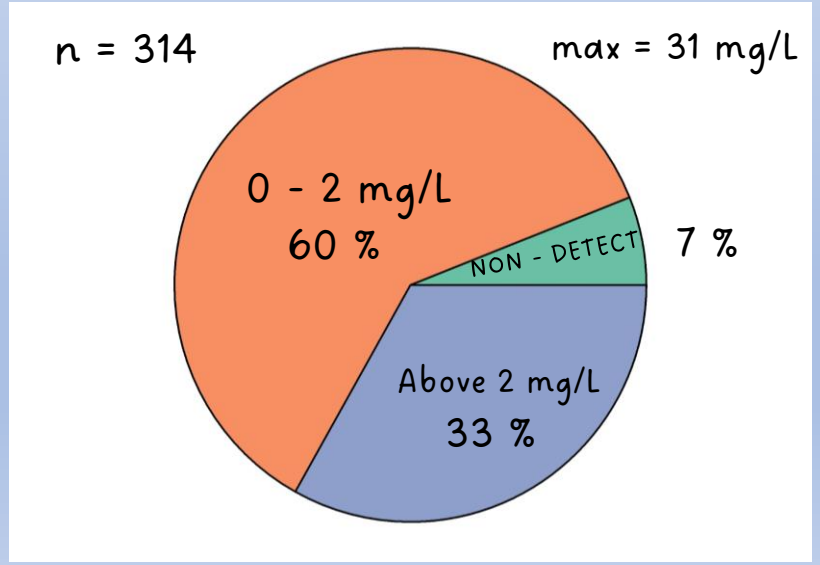
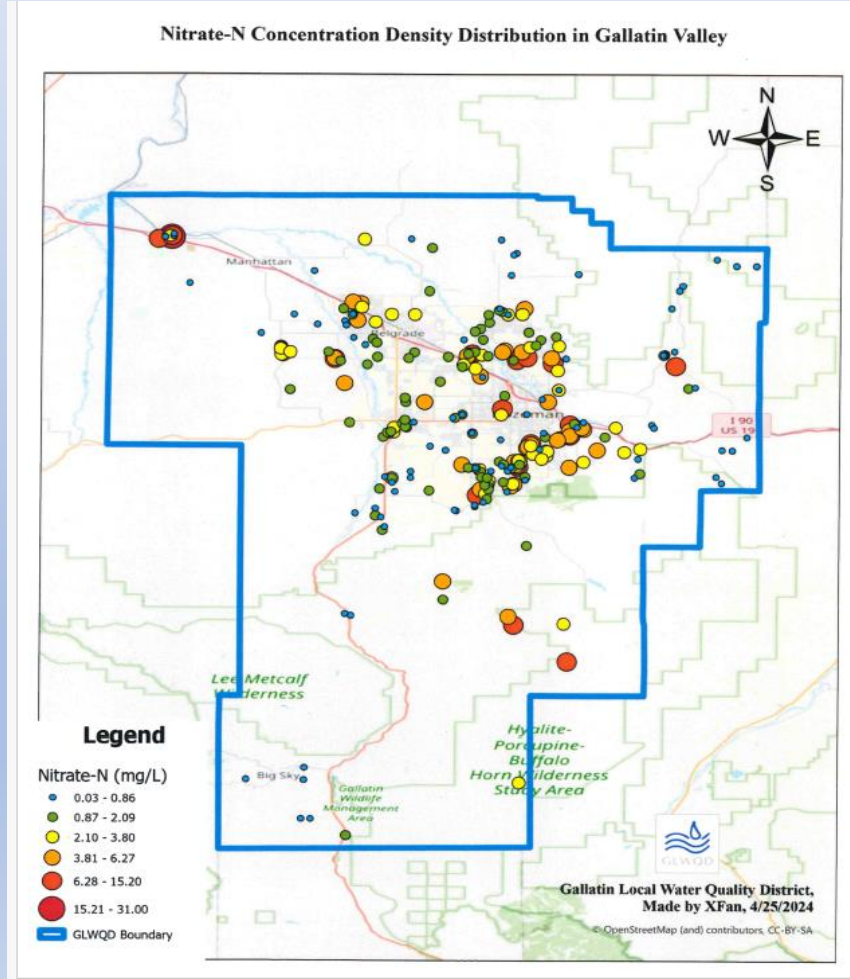
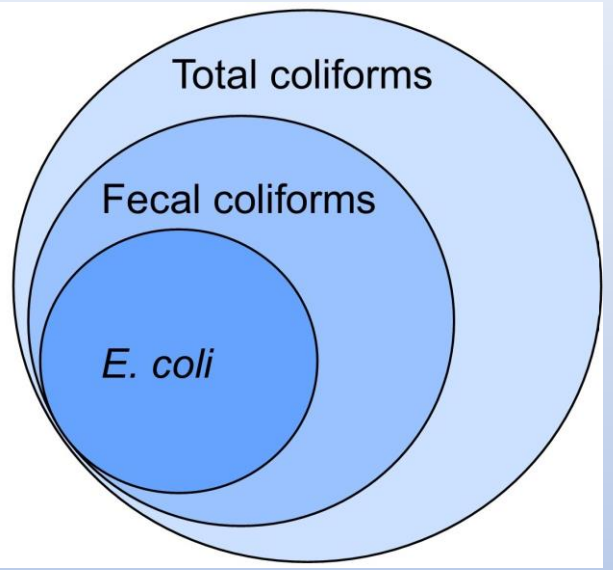




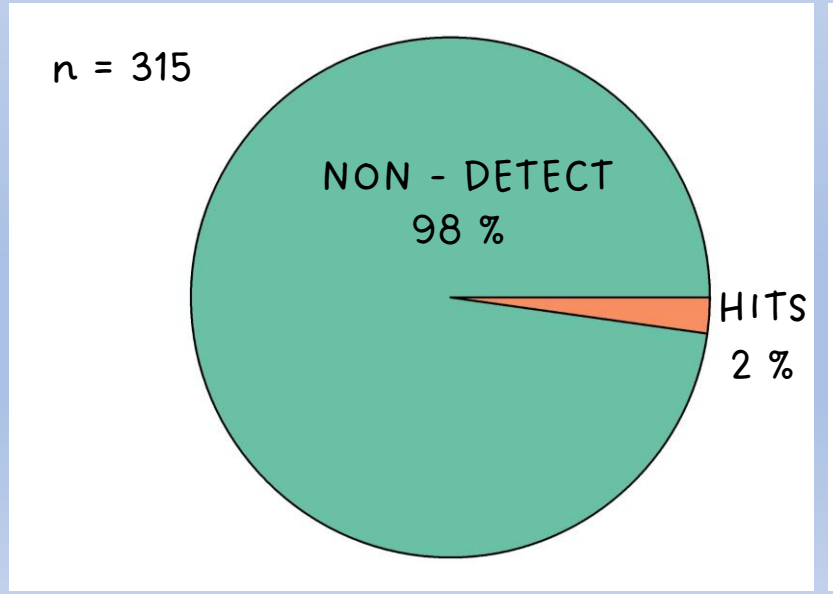
E. coli and Total Coliform bacteria

- One of hundreds of strains of the bacterium *Escherichia coli*, *E. coli* is an emerging cause of food-borne and water-borne illness
- To protect human health, EPA set the drinking water standard to ZERO *E. coli* present
- Tested because it is an easily assessed indicator for fecal source waterborne disease
- Not only concerned about it for *E. coli* itself
- 2% is roughly on par with statewide and national studies

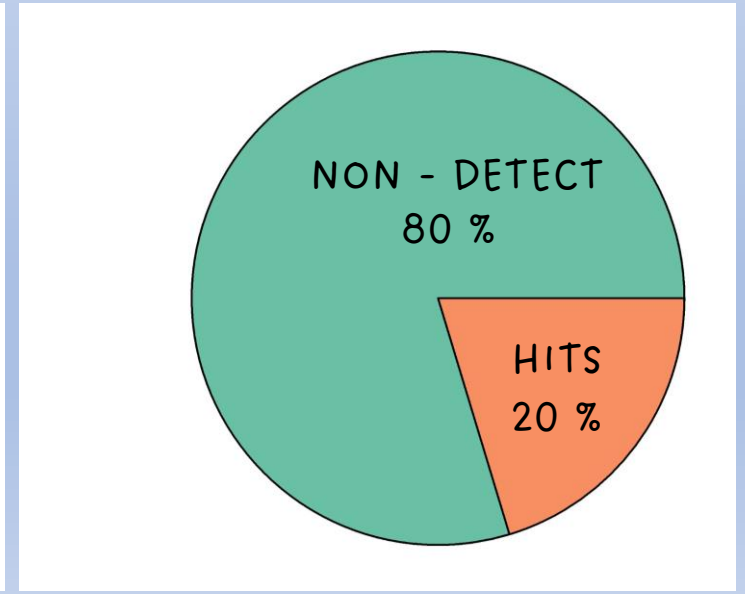


Gallatin Co. Well Educated Data '15 – '21:

E. Coli



Total Coliform



Lead - EPA MCLG = ZERO

- Nearly all lead in tap water is from corrosion of lead containing materials that contact water
- Individuals with the greatest risk are young children and pregnant women.
- Lead poisoning - irritability, weight loss, vomiting, constipation, or stomach pain may occur; damage to the brain, kidneys, and bone marrow can occur
- Reduced intelligence, impaired hearing and decreased growth, are associated with blood levels as low as 10 micrograms of lead per deciliter of blood (µg/dL)
- EPA banned lead in 1986. **To test for lead, let water sit in line for 6 hours; sample should be "first draw"**


Lead helps to guard your health

YOU wouldn't live today in a house without an adequate plumbing system. For without modern plumbing, sickness might endanger your life.

Lead concealed in the walls and under the floors of many modern buildings helps to give the best sanitation.

Lead pipe centuries old

Lead, therefore, is contributing to the health, comfort, and convenience of people today as it did when Rome was a center of civilization. Lead water and drainage pipes more than 1800 years old have been found in exactly the condition they were in when laid.

In some cities today the law specifies that lead pipe alone may be used to bring water from street mains into the building.

In drainage systems are lead traps made of lead pipe bent into the shape of the letter S, so that a little water will stay in the bend and prevent gases which collect in the pipe from getting out through the house.

The malleability of lead also makes it easy to change the direction of any pipe through the use of lead bends.

Joining the pipes

A plumber easily "wipes" a joint or repairs a pipe leak with lead and tin solder. Because this alloy melts at the low temperature of 358 degrees it can be applied without melting the lead pipe, which melts at 620 degrees.

Lead is also poured into the flanges of pipe-joints to make them absolutely tight. Pipe threads are painted with white-lead or red-lead to make a tight connection. Where vibration or movement of pipes may loosen a poured joint, lead wool is used; lead shredded into threads is packed into the joint in a dense, compact mass.

Rubber gaskets and ball washers containing lead prevent leaking at joints and faucets.

Lead is used to beautify the modern bathroom. Red-lead and litharge, both lead oxides, are important ingredients in making the glossy white enamel covering the iron bodies of tub and basin and the glazed tile walls.

Lead in paint

While lead is invaluable in assuring comfort and proper sanitation, its best-known and most widespread use is as white-lead in paint. Such materials as wood would soon deteriorate unless protected with paint. And the paints that give the most thorough protection against the weather are based on white-lead.

The loss of invested capital through failure to protect the surface of property adequately has led property owners to paint frequently and well. As days and months go by, more and more of them are learning the wisdom of the phrase, "Save the surface and you save all." And they are using white-lead paint to prolong the lives of their houses.

Look for the Dutch Boy

NATIONAL LEAD COMPANY makes white-lead and sells it mixed with pure linseed oil, under the name and trade-mark of *Dutch Boy white-lead*. The figure of the Dutch Boy is reproduced on every keg and is a guarantee of exceptional purity.

Dutch Boy products also include red-lead, linseed oil, flatting oil, babbitt metals and solder.

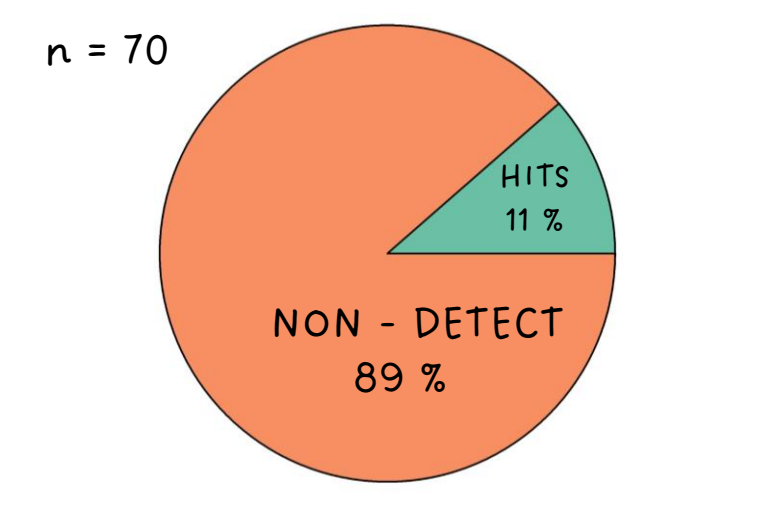
More about lead

If you use lead, or think you might use it in any form, write to us for specific information.

NATIONAL LEAD COMPANY

New York, 111 Broadway; Boston, 131 State St.; Buffalo, 116 Oak St.; Chicago, 900 West 18th St.; Cincinnati, 659 Freeman Ave.; Cleveland, 820 West Superior Ave.; St. Louis, 722 Chestnut St.; San Francisco, 485 California St.; Pittsburgh, National Lead & Oil Co. of Pa., 316 Fourth Ave.; Philadelphia, John T. Lewis & Bros. Co., 437 Chestnut St.

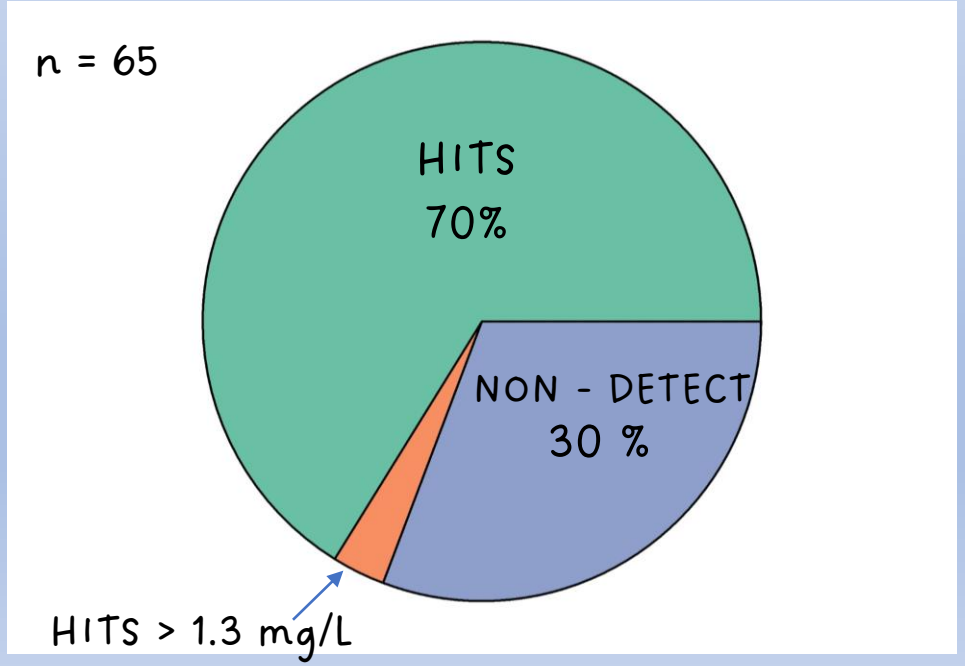
Gallatin Co. Well Educated Data '15 - '21:



EPA Copper Standard = 1.3 mg/L

- Copper is generally detectable by metallic taste at 1 to 2 mg/L; undrinkable at concentrations of 5 to 8 mg/L
- High amounts of copper may cause an upset stomach or other health issues; have been linked to liver and kidney damage
- Babies may be more sensitive to elevated copper levels

Gallatin Co. Well Educated Data '15 – '21:

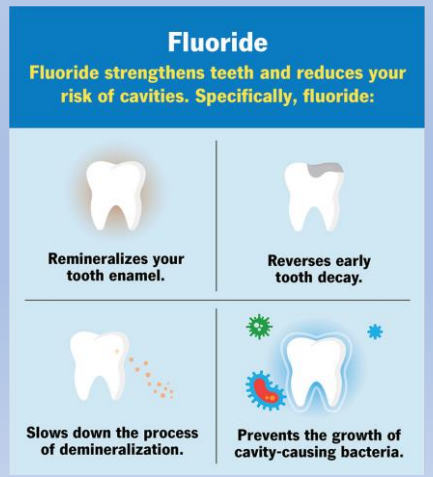


Fluoride - Good for teeth, to a degree

- Maximum allowable concentration of 4.0 mg/L fluoride in public drinking water systems to prevent adverse effects from fluoride exposure -mainly dental fluorosis

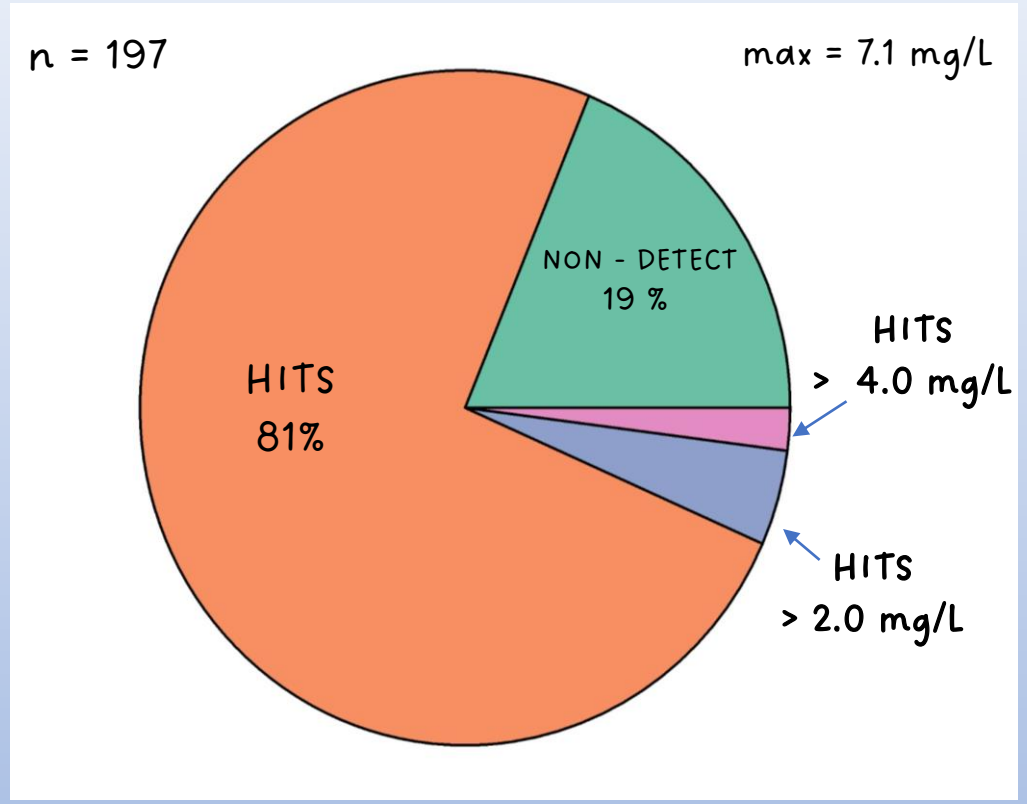
- Evidence suggests fluoride is beneficial during tooth development; prevents dental caries; recommended maximum concentration of 2.0 mg/L to prevent dental fluorosis

- Fluoride helps stimulate the formation of new bone



Fluoride Concentration	Health Effect
0.7-1.2 mg/L	Beneficial for cavity prevention
>2 mg/L	Potential for dental fluorosis
>4 mg/L	Potential for skeletal fluorosis

Gallatin Co. Well Educated Data '15 - '21:



Corrosivity -Langelier Index

Evaluates the potential for the water to be corrosive to the metal piping that is part of a water distribution system -a condition!

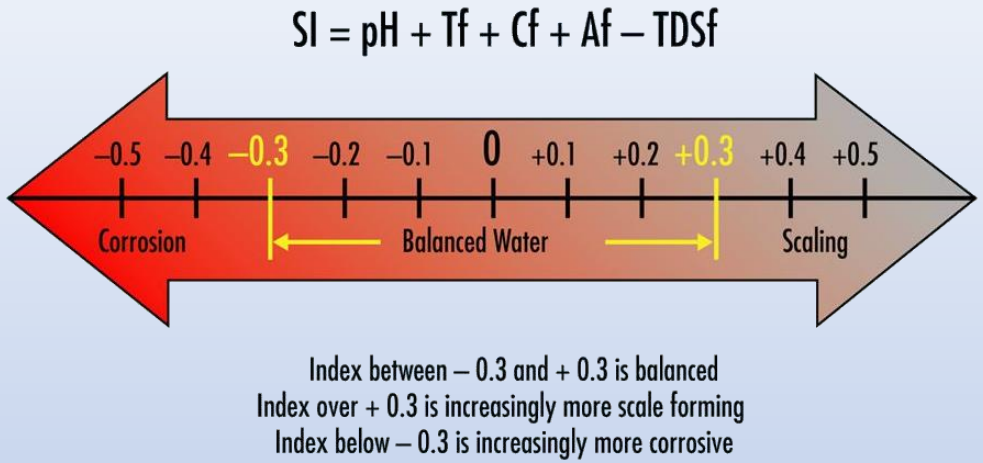
Corrosive water may leach trace metals from components of any appliances and piping that are in direct contract with the water.

Primary concerns include:

- Presence of metals in the water, such as lead and copper
- Deterioration and damage to the household plumbing
- Aesthetic problems

In soft water, corrosion occurs because of the lack of dissolved cations

In scale-forming (hard) water, a precipitate or coating "scale" forms on the inside of the piping; this is the opposite of corrosion.



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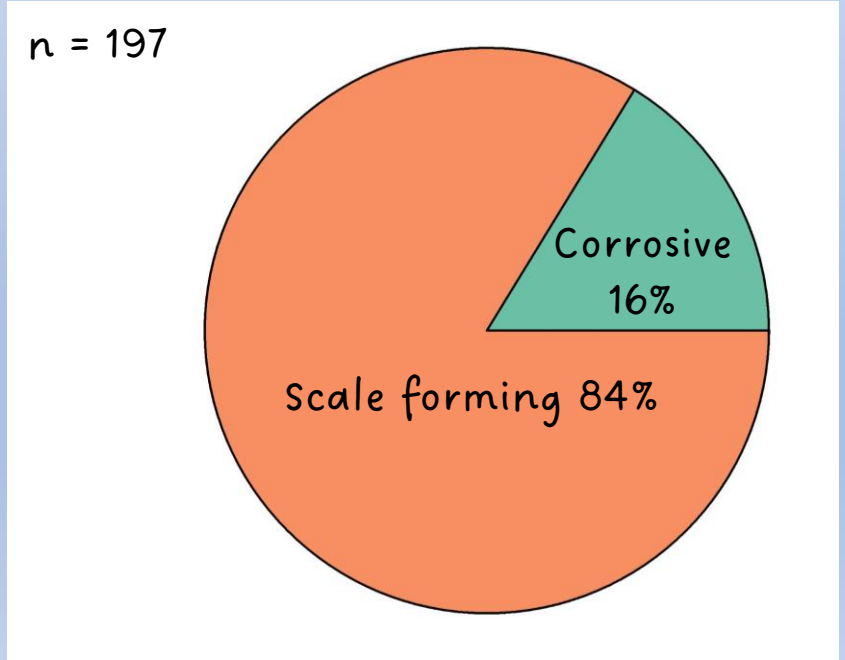

Choosing Well Educated Testing Packages

Parameter Choice List

(parameter = something in the water; pH, nitrate, bacteria, etc.)

Step 1 - Check the box next to the parameter package/s you would like your water tested for (1-6).
Step 2 - To add additional parameters from the right column, check box 7 then check the individual parameters in the right column. See MSU Extension Well Educated website for list of parameters detected at high concentrations in Montana.
Step 3 - Total the cost of your package, any individual parameters from the right column, and the additional $10.00 administrative fee. Write the total in the **"Testing Cost"** box. Use the included "Parameter Choice Guide" for more information.

Parameter Packages

☐ 1) **Basic Domestic Analysis** ($75)
- Alkalinity
- Bacteria (coliform + *E. coli*)
- Nitrate + Nitrite as N
- pH
- Conductivity

☑ 2) **Full Domestic Analysis** ($125)
- Alkalinity
- Aluminum
- Bacteria (coliform + *E. coli*)
- Calcium
- Chloride
- Conductivity
- Corrosivity
- Fluoride
- Hardness
- Magnesium
- Manganese
- Nitrate + Nitrite as N
- pH
- Potassium
- Sodium
- Sulfate
- Total Dissolved Solids**
- Zinc

☐ 3) **Total Iron Analysis** ($25)

☐ 4) **Basic Annual Analysis** ($45)
- Bacteria (coliform + *E. coli*)
- Nitrate + Nitrite as N

☐ 5) **Suitability of Water for Livestock** ($85)
- Molybdenum
- Sodium
- Nitrate + Nitrite as N
- Selenium
- Sulfate
- Total Dissolved Solids

☐ 6) **Classification of Water for Irrigation** ($40)
- Calcium
- Conductivity
- Magnesium
- Sodium
- Sodium Adsorption Ratio

☐ 7) **I have Selected Additional Individual Parameters in the right column.** ($_____)

Individual Parameters

- ☐ Antimony ($12)
- ☐ Arsenic ($12)
- ☐ Barium ($12)
- ☐ Beryllium ($12)
- ☐ Cadmium ($12)
- ☐ Chromium ($12)
- ☐ Copper* ($12)
- ☐ Fluoride ($12)
- ☐ Lead* ($12)
- ☐ Manganese ($12)
- ☐ Mercury ($12)
- ☐ Nitrate + Nitrite as N ($12)
- ☐ Selenium ($12)
- ☐ Sulfate ($12)
- ☐ Thallium ($12)
- ☐ Uranium ($12)

If you have selected additional individual parameters from this list, make sure you have checked box 8 in the left column.

Testing Cost

Total the cost of parameter packages and any individual parameters you selected and write it below.

Parameter Cost $161.00

Add $10.00 for administrative fees and write the total below.

Total Cost $171.00

Include payment for the Total Cost with your samples. Please make check payable to Energy Laboratories Inc.

* lead and copper are commonly collected with "first draw" sampling, see sampling instruction sheet (blue sheet)
** Total Dissolved Solids (TDS) is estimated using major ions

For more information on Drinking Water Standards check the EPA website at http://www.epa.gov/safewater/mcl.html#mcls

V22.02.21

☑ 2) **Full Domestic Analysis** ($125)
- Alkalinity
- Aluminum
- Bacteria (coliform + *E. coli*)
- Calcium
- Chloride
- Conductivity
- Corrosivity
- Fluoride
- Hardness
- Magnesium
- Manganese
- Nitrate + Nitrite as N
- pH
- Potassium
- Sodium
- Sulfate
- Total Dissolved Solids**
- Zinc

Individual Parameters

- ☐ Antimony ($12)
- ☑ Arsenic ($12)
- ☐ Barium ($12)
- ☐ Beryllium ($12)
- ☐ Cadmium ($12)
- ☐ Chromium ($12)
- ☑ Copper* ($12)
- ☐ Fluoride ($12)
- ☑ Lead* ($12)
- ☐ Manganese ($12)
- ☐ Mercury ($12)
- ☐ Nitrate + Nitrite as N ($12)
- ☐ Selenium ($12)
- ☐ Sulfate ($12)
- ☐ Thallium ($12)
- ☐ Uranium ($12)

If you have selected additional individual parameters from this list, make sure you have checked box 8 in the left column.

Household Use Interpretation

ParticipantName	LabID	ReportDate
Problems, Afew	B22090000	Fri Dec 16 2022

Parameters mentioned in this document indicate parameters of health concern and/or non-health related parameters of note (aesthetic/secondary concern) from your water sample. This means certain parameter concentrations in your water sample were outside the ideal range or threshold suggested by the EPA (Maximum Contaminant Level and Secondary Maximum Contaminant Level) or water quality research.

Human Health Related - Parameters of Concern

Parameter	YourValue	Interpretation	More Info
Fluoride	4.3	unsatisfactory - above 4.0 mg/L health threshold; risk of fluorisis and bone disease	Click here for more info
Manganese	0.4	unsatisfactory - above 0.1 mg/L health-based value for children under 6 and/or above 0.3 mg/L value for adults	Click here for more info
Nitrogen, Nitrate+Nitrite as N	11	unsatisfactory - above 10.0 mg/L health threshold; discontinue use for infants under 1 year of age and persons with cardiovascular conditions	Click here for more info

\[\\[0.1in]\]

Non-Human Health Related - Parameters of Note

Parameter	YourValue	Interpretation
Alkalinity, Total as CaCO3	204	above ideal range of 100 to 200 mg/L - related to potential scaling
Manganese	0.4	above 0.05 mg/L guideline - may cause black or brown staining and metallic taste

\[\\[0.1in]\]

More Information

Click here for more on interpreting your results.

Click here for information on water treatment.

ENERGY LABORATORIES

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www.energylab.com

Billings, MT 406.252.6325 • Casper, WY 307.235.0515
Gillette, WY 307.686.7175 • Helena, MT 406.442.0711

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: MSU Well Educated
Project:
Lab ID:
Client Sample ID:

Report Date: 02/12/24
Collection Date: 02/06/24 10:00
DateReceived: 02/07/24
Matrix: Drinking Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.3	s.u.	H	0.1		A4500-H B	02/07/24 09:41 / bmm
pH Measurement Temp	18.7	°C		1.0		A4500-H B	02/07/24 09:41 / bmm
Conductivity @ 25 C	450	umhos/cm		5		A2510 B	02/07/24 09:41 / bmm
Corrosivity (Langelier Index)	0.2					A2330 B	02/09/24 16:42 / bap
Solids, Total Dissolved - Calculated	275	mg/L		1.0		A1030 E	02/09/24 16:42 / bap
If a sample temperature at the time of collection is not provided, the Langelier is calculated using a default temperature of 20 degrees C.							
INORGANICS							
Alkalinity, Total as CaCO3	247	mg/L		4		A2320 B	02/07/24 13:39 / njp
Bicarbonate as HCO3	302	mg/L		4		A2320 B	02/07/24 13:39 / njp
Carbonate as CO3	ND	mg/L		4		A2320 B	02/07/24 13:39 / njp
Chloride	9	mg/L		1		E300.0	02/07/24 19:12 / caa
Sulfate	10	mg/L		1		E300.0	02/07/24 19:12 / caa
Fluoride	0.1	mg/L		0.1		E300.0	02/07/24 19:12 / caa
Hardness as CaCO3	270	mg/L		1		A2340 B	02/08/24 19:47 / bap
Sodium Adsorption Ratio (SAR)	0.19	unitless		0.01		Calculation	02/08/24 19:47 / bap
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.05	mg/L		0.01	10	E353.2	02/07/24 16:19 / krt
METALS, ACID-SOLUBLE							
Aluminum	ND	mg/L		0.03		E200.8	02/08/24 20:08 / jks
Antimony	ND	mg/L		0.001		E200.8	02/07/24 21:32 / jks
Arsenic	ND	mg/L		0.001		E200.8	02/07/24 21:32 / jks
Barium	0.05	mg/L		0.05		E200.8	02/07/24 21:32 / jks
Beryllium	ND	mg/L		0.001		E200.8	02/07/24 21:32 / jks
Cadmium	ND	mg/L		0.001		E200.8	02/07/24 21:32 / jks
Calcium	76	mg/L		1		E200.7	02/08/24 19:47 / enb
Chromium	ND	mg/L		0.005		E200.8	02/07/24 21:32 / jks
Copper	ND	mg/L		0.005		E200.8	02/07/24 21:32 / jks
Lead	ND	mg/L		0.001		E200.8	02/07/24 21:32 / jks
Magnesium	19	mg/L		1		E200.7	02/08/24 19:47 / enb
Manganese	0.206	mg/L		0.001		E200.8	02/07/24 21:32 / jks
Molybdenum	ND	mg/L		0.001		E200.8	02/07/24 21:32 / jks
Potassium	4	mg/L		1		E200.7	02/08/24 19:47 / enb
Selenium	ND	mg/L		0.001		E200.8	02/07/24 21:32 / jks
Sodium	7	mg/L		1		E200.7	02/08/24 19:47 / enb
Thallium	ND	mg/L		0.0005		E200.8	02/08/24 20:08 / jks
Uranium	0.0018	mg/L		0.0003		E200.8	02/07/24 21:32 / jks
Zinc	ND	mg/L		0.01		E200.8	02/07/24 21:32 / jks
METALS, TOTAL							
Mercury	ND	mg/L		0.0001	0.002	E245.1	02/08/24 12:33 / nrb

PHYSICAL PROPERTIES

pH	7.3	s.u.	H	0.1	A4500-H B
pH Measurement Temp	18.7	°C		1.0	A4500-H B
Conductivity @ 25 C	450	umhos/cm		5	A2510 B
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Solids, Total Dissolved - Calculated	275	mg/L		1.0	A1030 E

If a sample temperature at the time of collection is not provided, the Langelier is calculated using a default temperature of 20 degree

INORGANICS

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Bicarbonate as HCO3	302	mg/L		4	A2320 B
Carbonate as CO3	ND	mg/L		4	A2320 B
Chloride	9	mg/L		1	E300.0
Sulfate	10	mg/L		1	E300.0
Fluoride	0.1	mg/L		0.1	E300.0
Hardness as CaCO3	270	mg/L		1	A2340 B
Sodium Adsorption Ratio (SAR)	0.19	unitless		0.01	Calculation

NUTRIENTS

Nitrogen, Nitrate+Nitrite as N	0.05	mg/L		0.01	10 E353.2

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LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: MSU Well Educated
Project:
Lab ID:
Client Sample ID:

Report Date: 02/12/24
Collection Date: 02/06/24 10:00
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Matrix: Drinking Water

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Chloride	9	mg/L		1		E300.0	02/07/24 19:12 / caa
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NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.05	mg/L		0.01	10	E353.2	02/07/24 16:19 / krt
METALS, ACID-SOLUBLE							
Aluminum	ND	mg/L		0.03		E200.8	02/08/24 20:08 / jks
Antimony	ND	mg/L		0.001		E200.8	02/07/24 21:32 / jks
Arsenic	ND	mg/L		0.001		E200.8	02/07/24 21:32 / jks
Barium	0.05	mg/L		0.05		E200.8	02/07/24 21:32 / jks
Beryllium	ND	mg/L		0.001		E200.8	02/07/24 21:32 / jks
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Calcium	76	mg/L		1		E200.7	02/08/24 19:47 / enb
Chromium	ND	mg/L		0.005		E200.8	02/07/24 21:32 / jks
Copper	ND	mg/L		0.005		E200.8	02/07/24 21:32 / jks
Lead	ND	mg/L		0.001		E200.8	02/07/24 21:32 / jks
Magnesium	19	mg/L		1		E200.7	02/08/24 19:47 / enb
Manganese	0.206	mg/L		0.001		E200.8	02/07/24 21:32 / jks
Molybdenum	ND	mg/L		0.001		E200.8	02/07/24 21:32 / jks
Potassium	4	mg/L		1		E200.7	02/08/24 19:47 / enb
Selenium	ND	mg/L		0.001		E200.8	02/07/24 21:32 / jks
Sodium	7	mg/L		1		E200.7	02/08/24 19:47 / enb
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METALS, TOTAL							
Mercury	ND	mg/L		0.0001	0.002	E245.1	02/08/24 12:33 / nrb

METALS, ACID-SOLUBLE

Aluminum	ND	mg/L	0.03		E200.8
Antimony	ND	mg/L	0.001		E200.8
Arsenic	ND	mg/L	0.001		E200.8
Barium	0.05	mg/L	0.05		E200.8
Beryllium	ND	mg/L	0.001		E200.8
Cadmium	ND	mg/L	0.001		E200.8
Calcium	76	mg/L	1		E200.7
Chromium	ND	mg/L	0.005		E200.8
Copper	ND	mg/L	0.005		E200.8
Lead	ND	mg/L	0.001		E200.8
Magnesium	19	mg/L	1		E200.7
Manganese	0.206	mg/L	0.001		E200.8
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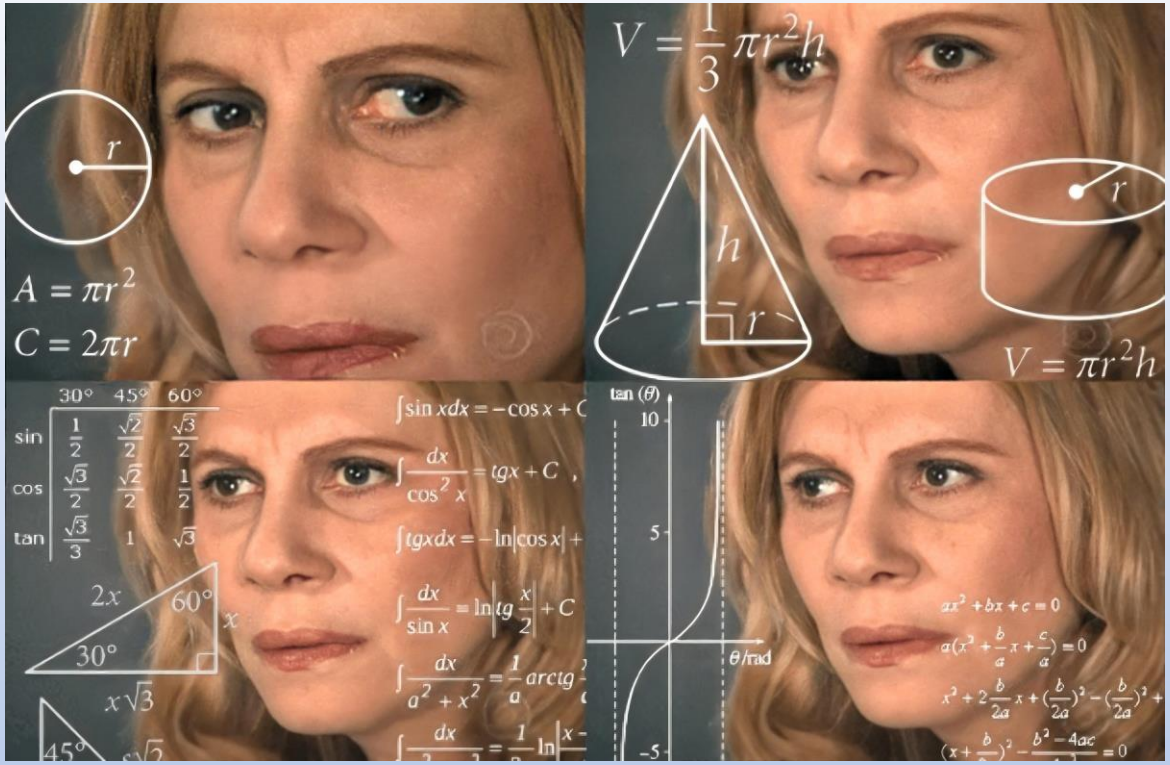
Potassium	4	mg/L	1		E200.7
Selenium	ND	mg/L	0.001		E200.8
Sodium	7	mg/L	1		E200.7
Thallium	ND	mg/L	0.0005		E200.8
Uranium	0.0018	mg/L	0.0003		E200.8
Zinc	ND	mg/L	0.01		E200.8

METALS, TOTAL

Mercury	ND	mg/L	0.0001	0.002	E245.1



Still feeling like Thinking Girl meme?

The staff of the Local Water Quality District is here to help Monday - Friday.

Offices in Downtown Bozeman. We love "Walk Ins" and helping people with their drinking water needs.

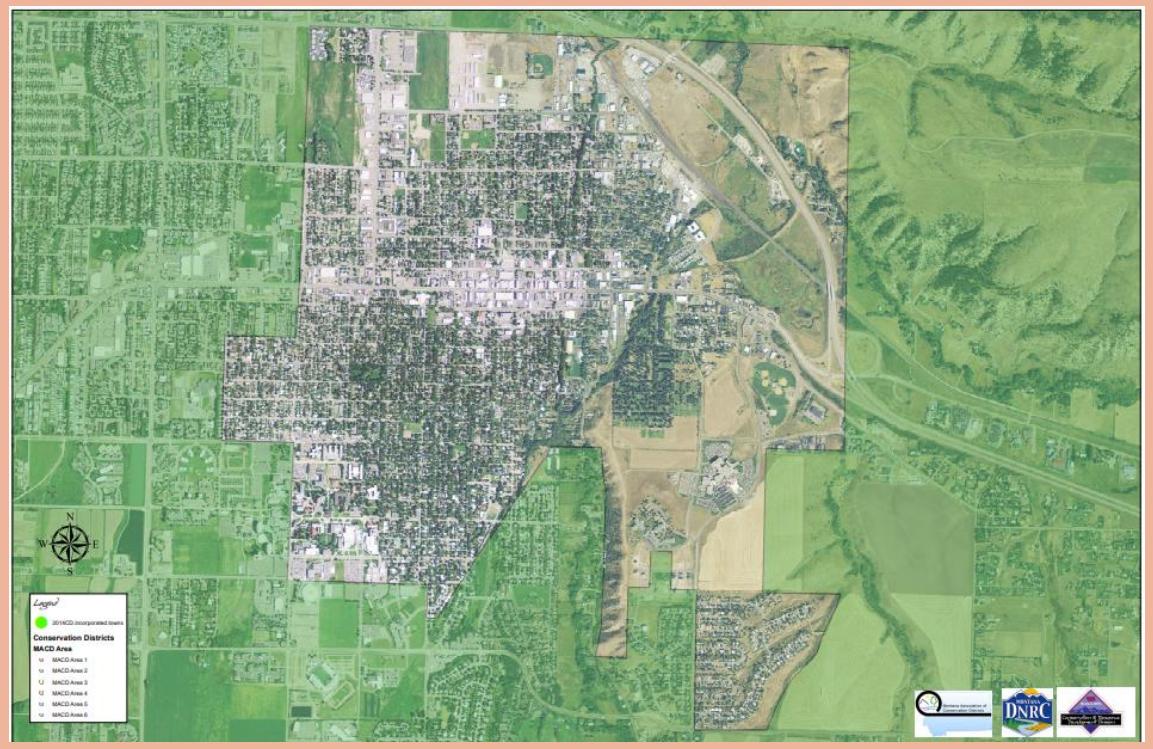
406-582-3145

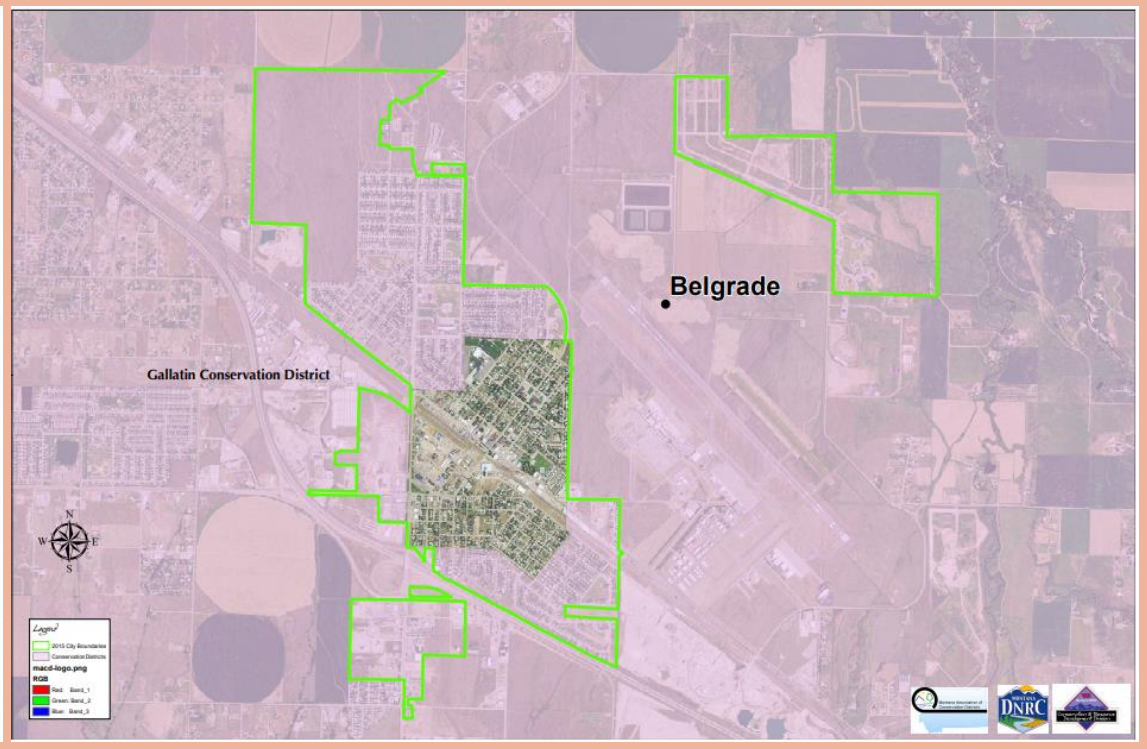
Well Educated Program
Well Testing
Cost Share

GALLATIN
CONSERVATION
DISTRICT

Bozeman 1949 Boundary

Belgrade 1949 Boundary





Sorry, residents within the main city limits of Belgrade and Bozeman

ve
Cost Share Programs
MT Conservation Seedling Nursery Orders
"Well Educated" Well Testing Kits
Manhattan Farmer's Market

Well Testing Cost Share Program

Gallatin Conservation District is offering a cost share opportunity ir ram's free well testing kits in Gallatin County. Click here to learn more about this program.

This opportunity reimburses Gallatin County residents within the C to 75% of their well testing costs using the *Well Educated* program. Cost share assistance is not available for any private wells located within the main city limits of Belgrade and Bozeman. Click here for the Bozeman map and click here for the Belgrade map.

We do require that all residents seeking cost share assistance agree to share their testing results with all three information avenues listed on the Well Educated registration form (items I – N). We wish to promote the sharing of these results with water resource managers and water quality databases so that these resources can be used to further understand the water quality of Gallatin County and what we can do to protect our water.

Required Forms and Deadlines for *Well Educated* program Cost Share Opportunity

- Residents seeking cost share assistance for the *Well Educated* program must fill out the *Well Educated* Program Well Testing Cost Share Application form.
- Provide the following to the Gallatin Conservation District by the second Thursday of the month.
  - *Well Educated* Program Well Testing Cost Share Application form
  - *Well Educated* Registration Form
  - Test Results from Energy Laboratories
- If approved, the Gallatin Conservation District reimburses the landowner up to 75% of the costs paid.

Well Educated Program Well Testing Cost Share Application form

gallatincd.org

GALLATIN CONSERVATION DISTRICT

WELL EDUCATED PROGRAM WELL TESTING COST SHARE APPLICATION

Name: Date:

Address: _____

City: _____ State: _____ Zip Code: _____

Phone: _____ E-Mail Address: _____

Are you a resident of Gallatin County? _____Length of residency in Gallatin County: _____

Landowner and/or lessee name, address, telephone (if other than applicant):

_____

How did you hear about this Cost Share opportunity?

_____

Well Location: ___ 1/4, ___1/4, ___1/4, Section ____, Township ____, Range ____

Nearest Town_____ OR Latitude/Longitude Coordinates: _____

Are you willing to share your *Well Educated* test results and well location with county health and research organizations and databases? (Items I – N on the *Well Educated* Registration Form): Yes No

Which parameter package(s) will you be testing for? _____

Total cost incurred by the well owner: **(= Total Cost on Parameter Choice List)** _____

Total cost requested for reimbursement by GCD (up to 75% of total costs): _____

Well Educated

Tracking Number

Registration Form

Please Print Legibly

For Lab Use

Sample ID:

Date Sample: Date Received:

Temp: Check #:

Notes:

A) Last Name: **First Name:**

For Office Use Only **B) Well Code:**
(leave blank if this is the first time the well has been tested)

C) Write a 5 word description for this sample: _____

Are you submitting multiple sets of samples? *(both bottles from the kit = 1 set)* ☐ Yes ☐ No If yes, how many _____

D) Mailing Address:

Zip code:

E) Physical Address of Well: (write NA if same as mailing)

Zip code:

F) Phone Number

G) County Well is In

H) Email ***(print clearly, results emailed)***

I) May we share your results with your county extension agent and/or sanitarian? ☑ Yes ☐ No

J) Would you like your results included on a map of water quality in your county? ☑ Yes ☐ No

K) Location of Well *(decimal degrees)* **- Lat** _ _ . _ _ _ _ _ _ ° **Long** _ _ _ . _ _ _ _ _ _ °

(Guidance available on the MSU Extension Well Educated website for finding your coordinates.)

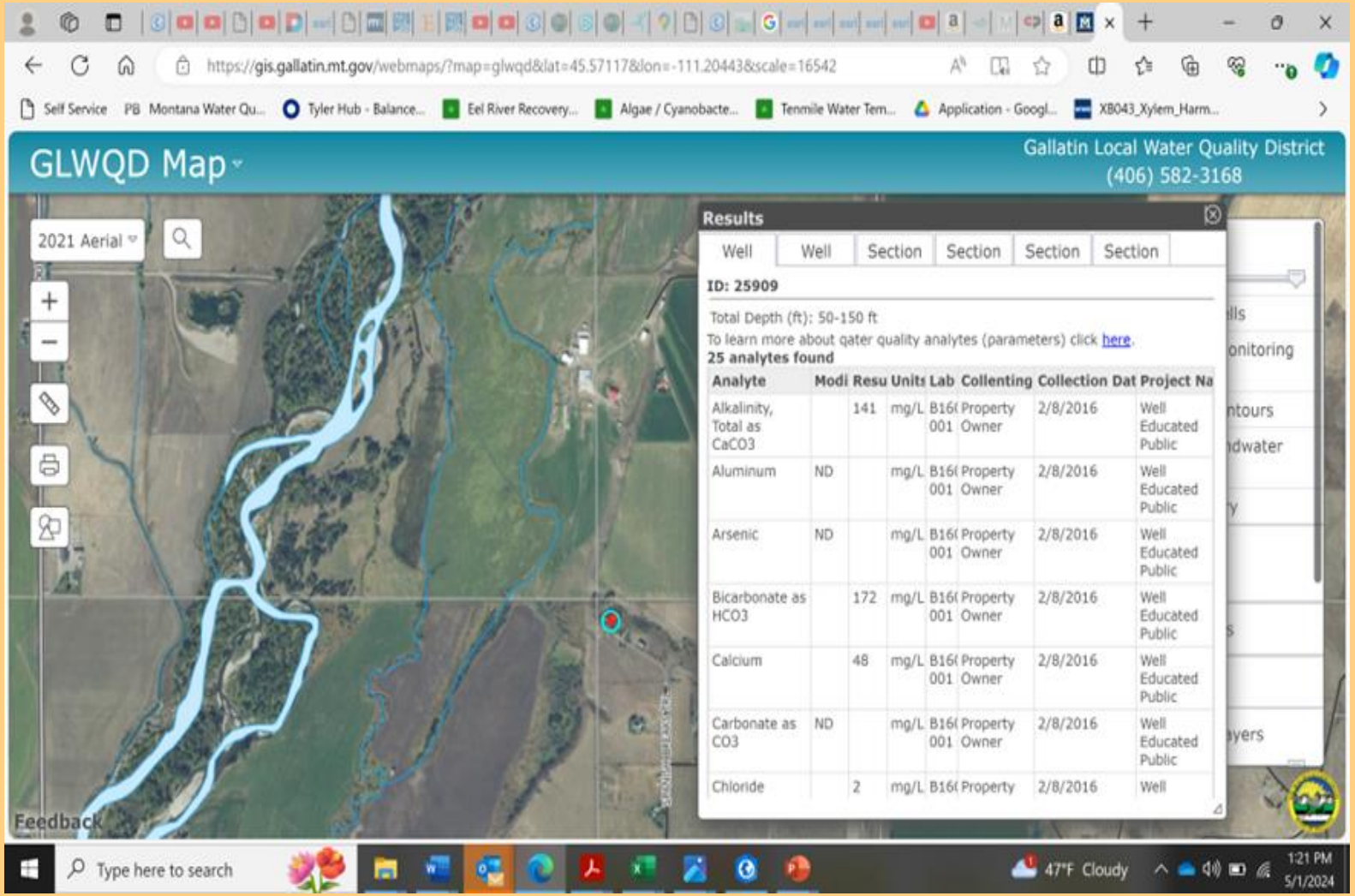
L) Method used to find latitude and longitude Google Earth ☐ GWIC ☐ GPS ☐

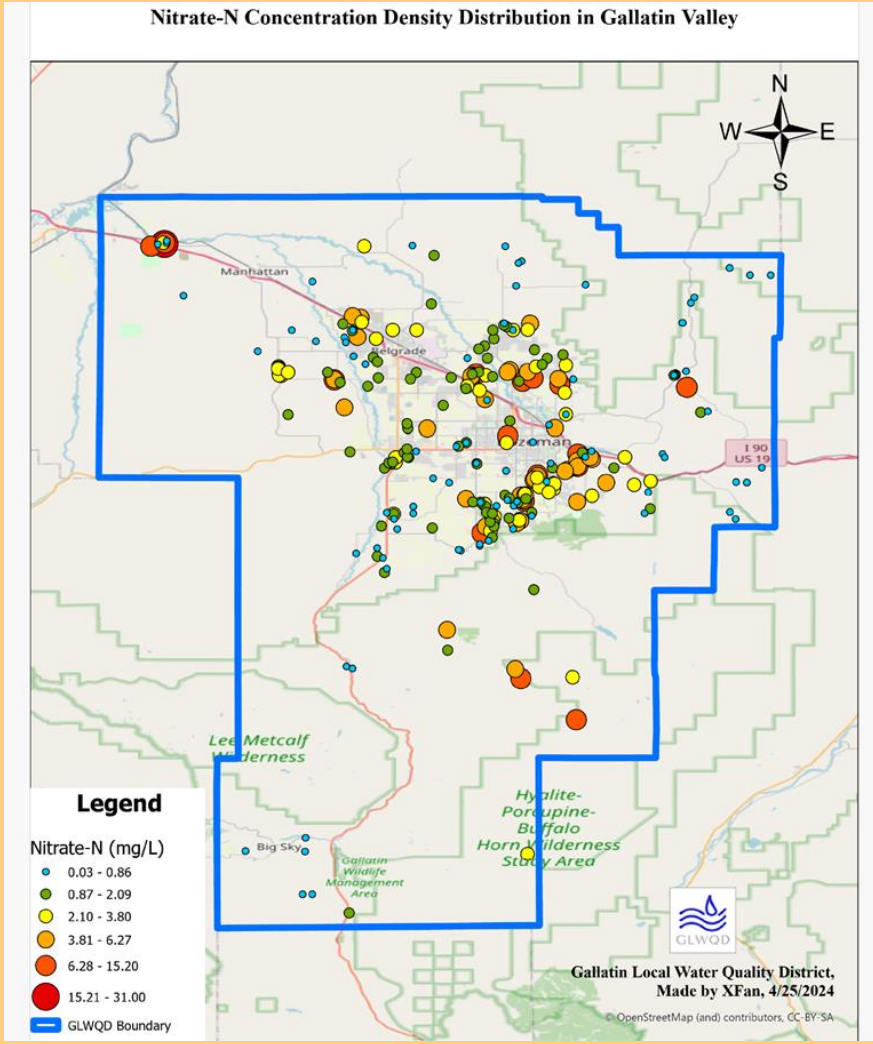
M) Are you interested in sharing your results in Montana Bureau of Mines and Geology's online database? ☑ Yes ☐ No

N) If Available, enter GWIC Id here _____

(GWIC instructions included. You can opt to share data without providing your GWIC code.)

What does it mean to share your data?





SIGNATURE

I hereby declare that the information and all statements attached to this application are true, complete, and accurate to the best of my knowledge.

Applicant: _____

Date: _____

Applications can be submitted to Elizabeth Emeline at elizabeth@gallatincd.org, mailed to the GCD office at Gallatin Conservation District, PO Box 569, Manhattan, MT 59741, or physically dropped off at the office drop box (or inside the office) at 120 S 5th St, Suite B104, Manhattan, MT 59741.

A copy of your *Well Educated* well test results must be turned into the GCD before receiving reimbursement.

Timeline:

Email - Within a few days

USPS - Within a week

Send:

- Well Educated Well Testing Cost Share Application form
- Well Educated Registration Form & Parameter Choice List
- Test Results from Energy Laboratories

If approved, reimbursement check for up to 75% of the total testing cost will be mailed to the mailing address on the Registration Form.

Gallatin Conservation District
120 S. 5th St Suite 104
Manhattan, MT 59741

Gallatin Conservation District
PO Box 569
Manhattan, MT 59741

Elizabeth Emeline
Natural Resource Specialist
elizabeth@gallatincd.org
(406) 282-4350

Comments? Questions?

Gallatin Well Testing Clinics

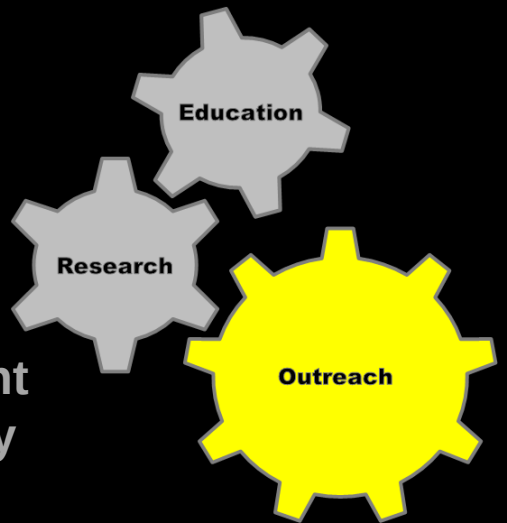
Water Treatment
&
Well Owner Responsibilities

Dr. Adam Sigler

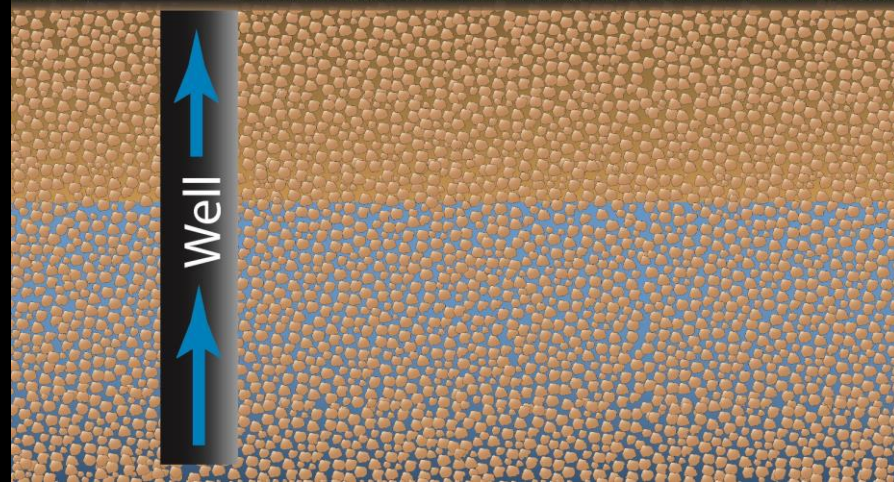
Extension Water Quality Specialist, Assistant Professor

Land Resources & Environmental Sciences, MSU

MONTANA STATE UNIVERSITY EXTENSION



Land Grant University



Treatment

Point of Entry (whole house)

Point of Use

Common Treatment

Health Related

- Reverse Osmosis – removes dissolved material
- Activated Carbon – adsorbs (sticks) to organics & some other contaminants
- Ultraviolet or Chlorination - for pathogens

Non-Health Related (aesthetic/secondary)

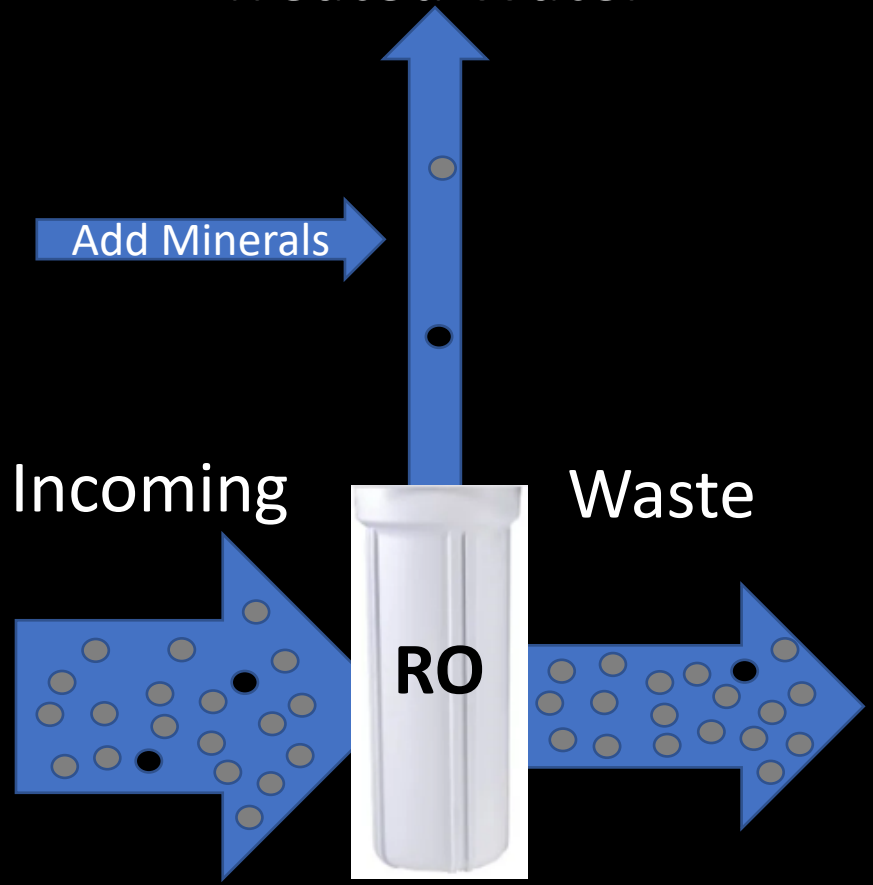
- Water Softeners (not necessary below about 100-120 mg/L as $CaCO_3$)
  - To reduce hardness
  - Will also remove some manganese (black staining)
- Iron Removal
  - To reduce red staining
  - Sometimes accompanied by iron bacteria

Reverse Osmosis

Pre-Treatment

Water Softener

Post-Treatment



More Information and Providers

MONTANA STATE UNIVERSITY

Search pages & people

- Home
- Educational Videos
- Energy
- Farm & Ranch Resources
- Judith Basin Nitrogen Project
- Resources
- Tribal Outreach
- Volunteer Monitoring
- Well Educated
- Lives & Landscapes Magazine

MSU Extension Water Quality Program
Montana State University
P.O. Box 173120
Bozeman, MT 59717-3120

Tel: (406) 994-7381
Fax: (406) 994-3933
E-mail:
ExtensionWater@montana.edu
Location: Marsh Labs, Room 2

Private Well Testing:
welleducated@montana.edu

Water Quality Specialist:
W. Adam Sigler

Student Employees:
Meghan Robinson

Affiliates:
Kyle Johnson

James Bauder

About Us

Water Treatment

If yo
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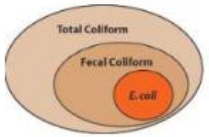
findi

1. Certified Professional Listings
2. Ask friends and neighbors about their experiences

Water Treatment Factsheet

Total Coliform and E. Coli Bacteria



NSF Certified Water Treatment Units

NSF

Find Certified Professionals

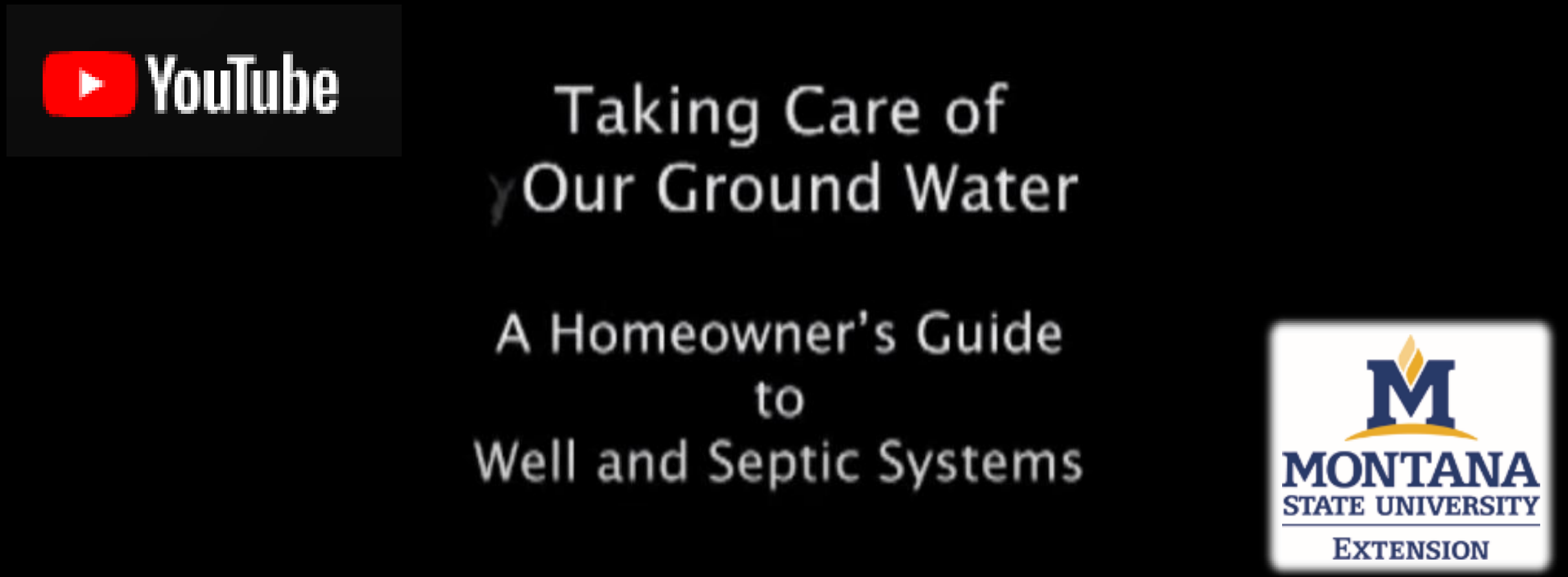
Water Quality Association

Video Guidance:

Water Treatment Basics Video

Shock Chlorination of a Private Well

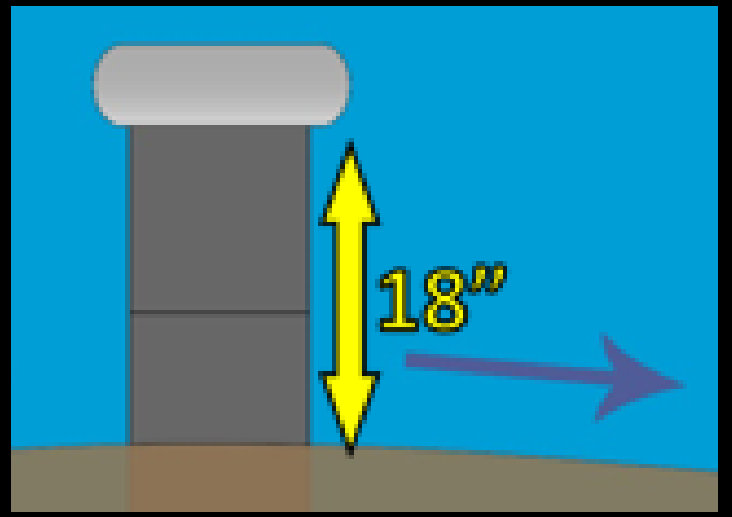
Video on Well and Septic Systems in the Water Cycle



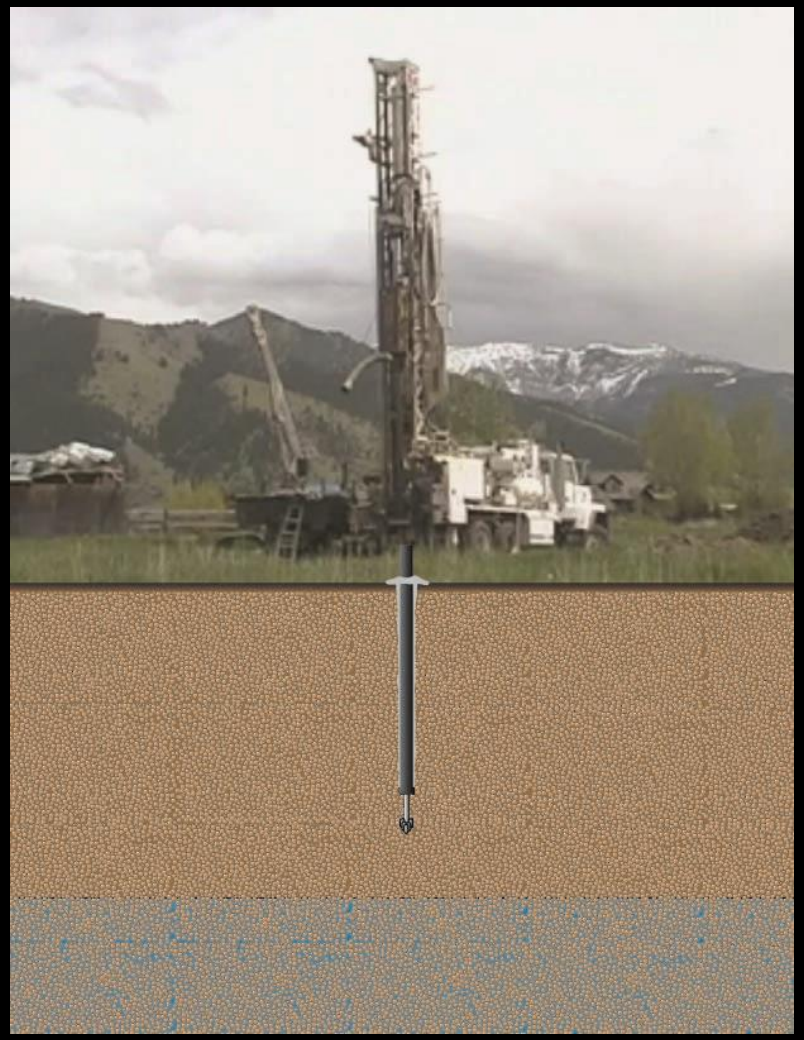
https://youtu.be/F5rnHSZCYHA?si=q7YPrQhccwS8xKR6&t=45

Well Head Protection Tips/Responsibilities

1. Keep well records
2. Have a copy of well log
3. Test water regularly
4. Hazardous materials away from well
5. Limit use of lawn & garden chemicals
6. Prevent damage to well casing
7. Slope ground away from casing
8. Make sure top of casing is 18 inches above ground surface and above flood prone elevation
9. Install backflow protectors
10. Certified well driller new well, modification or abandonment



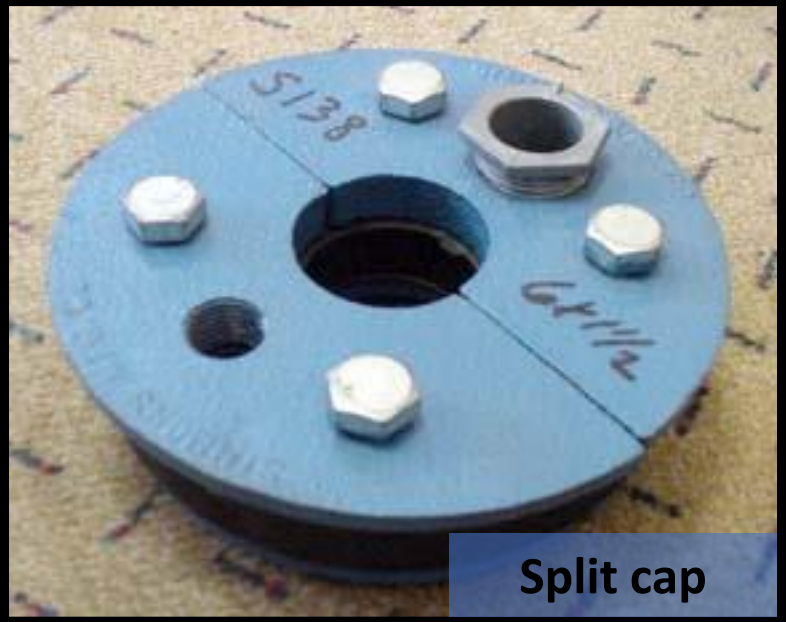
Problems with Wellheads



Well Caps

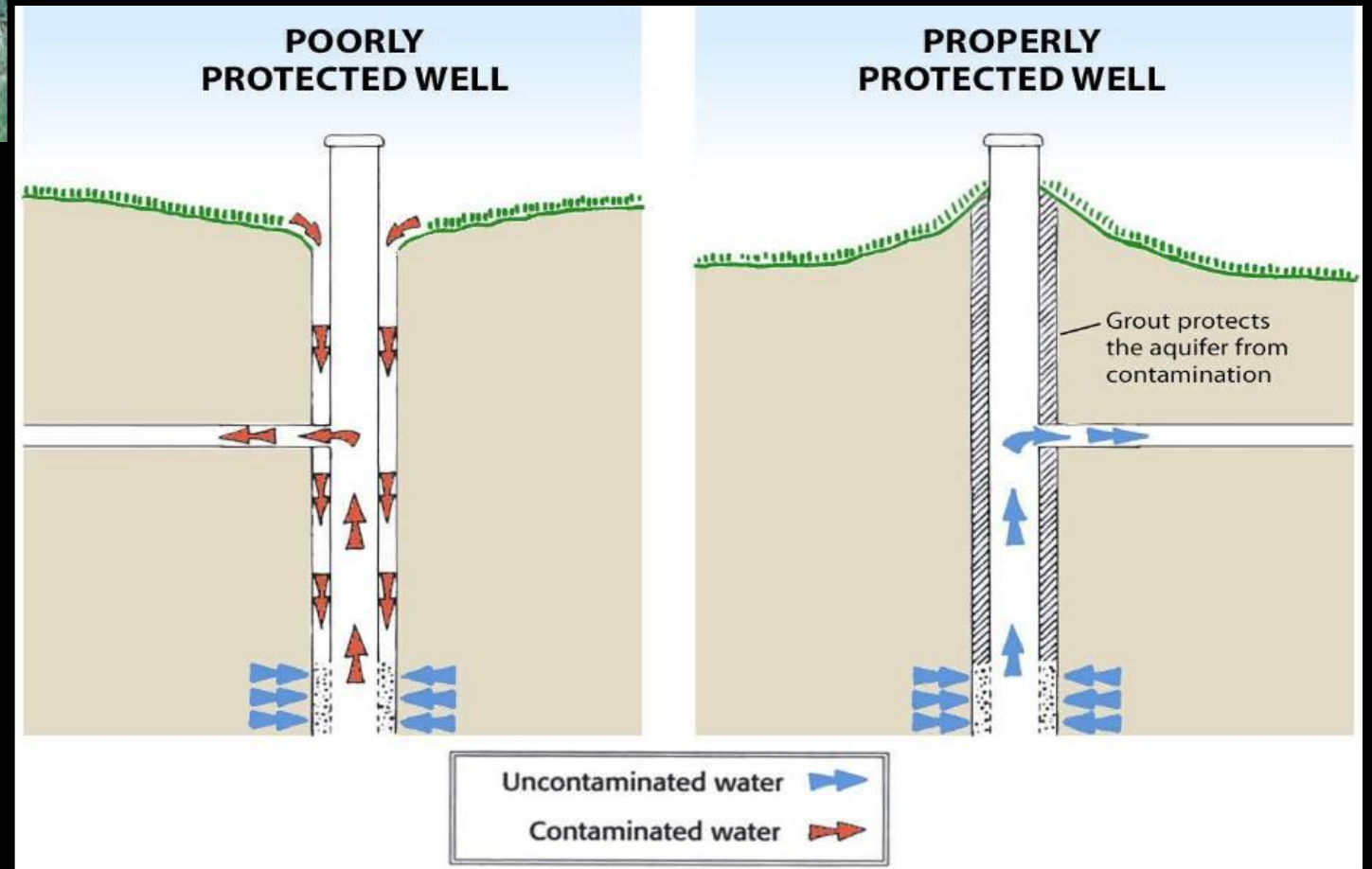
Standard Cap

Sanitary seal well cap

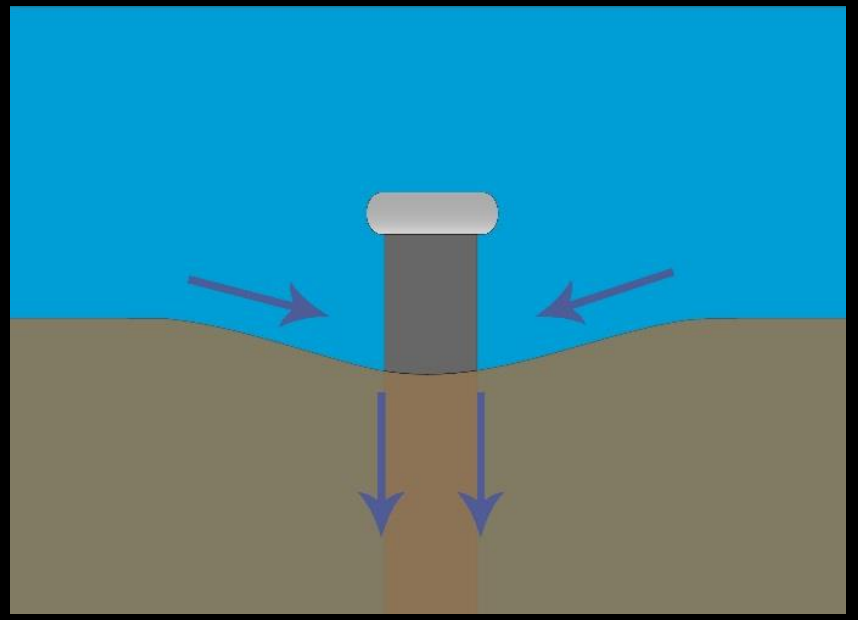


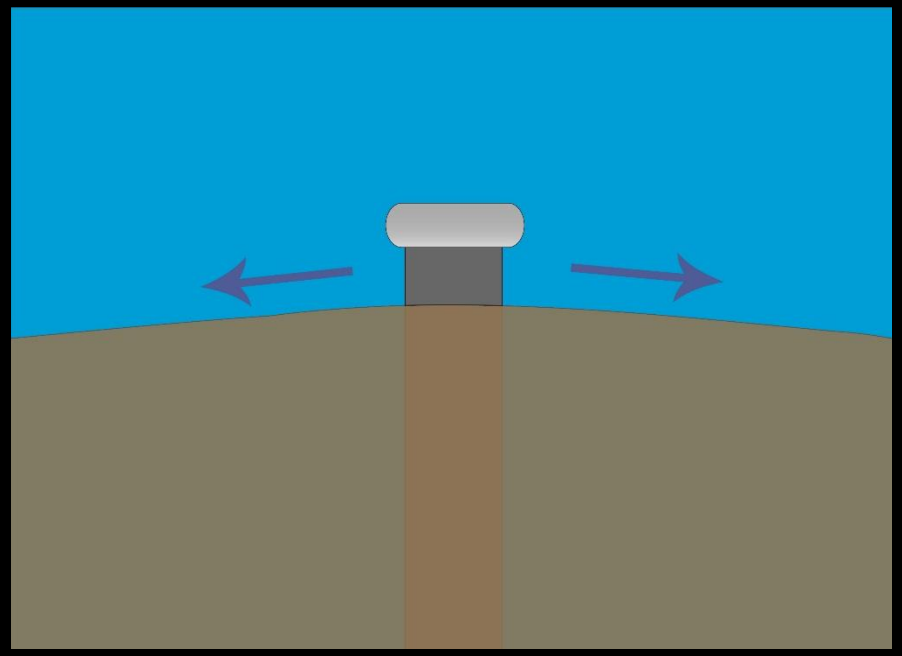
Split cap

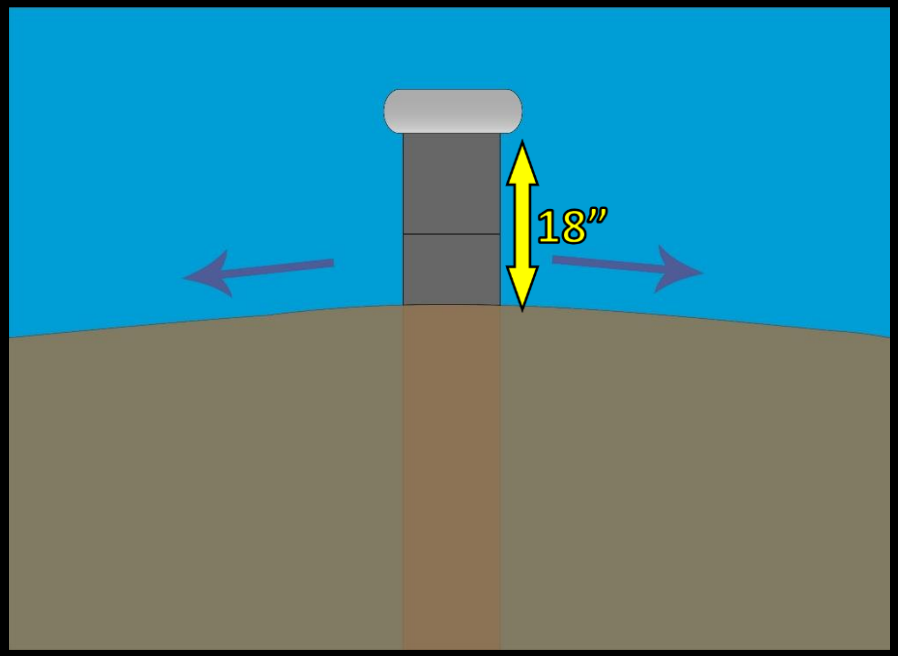
Slope near Well



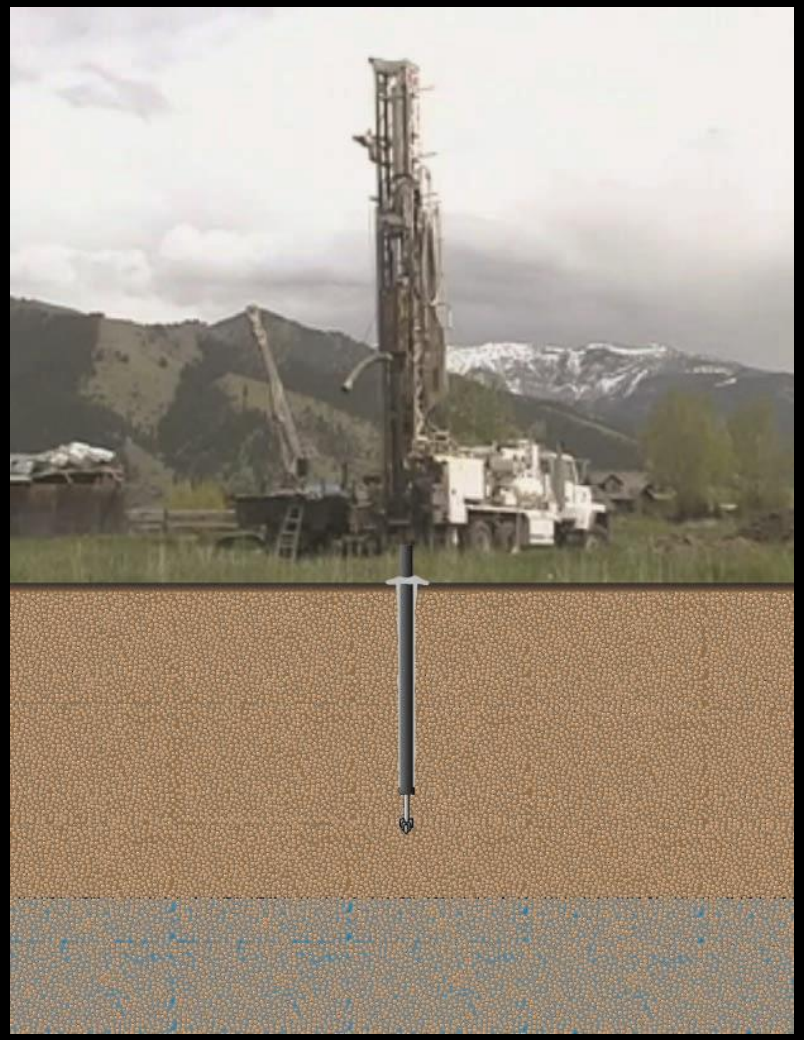
Slope and Casing Height





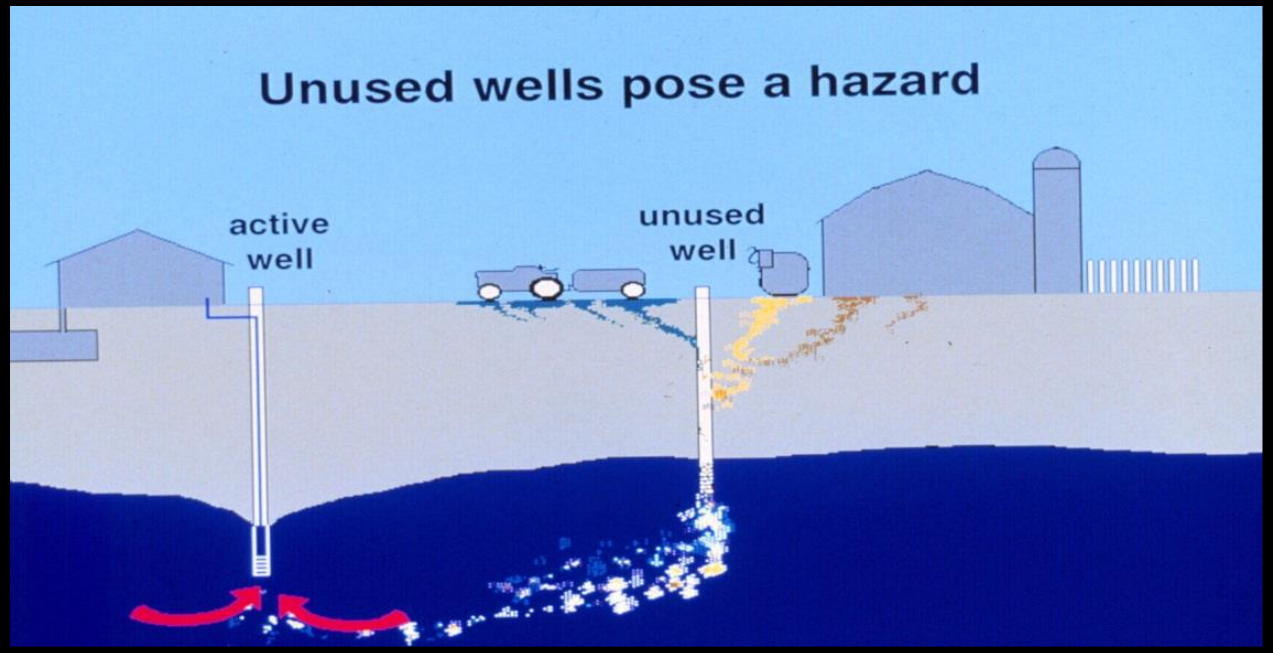


Problems with Wellheads

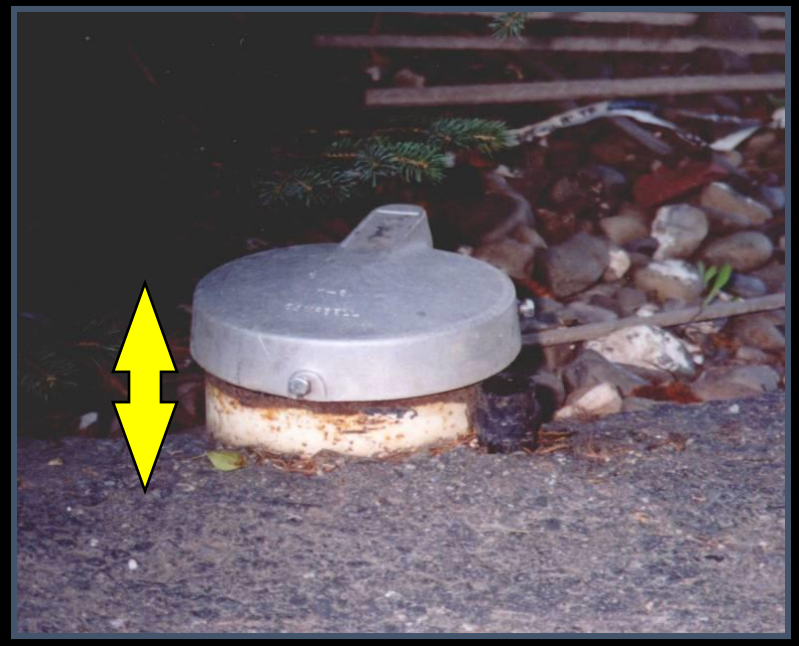


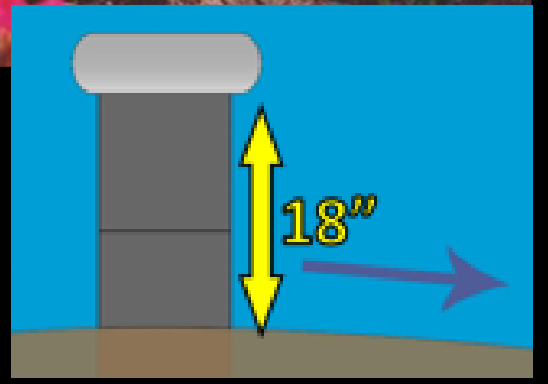
Flooding Around Wellhead

Abandoned Wells



Height of Casing above Ground



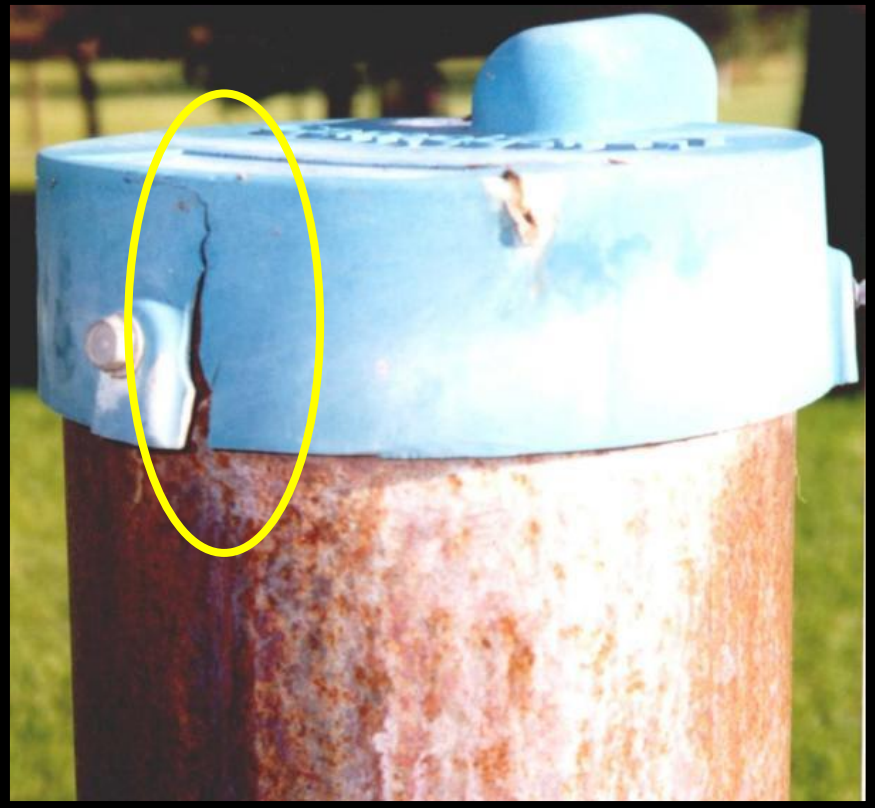


Uncapped Wells

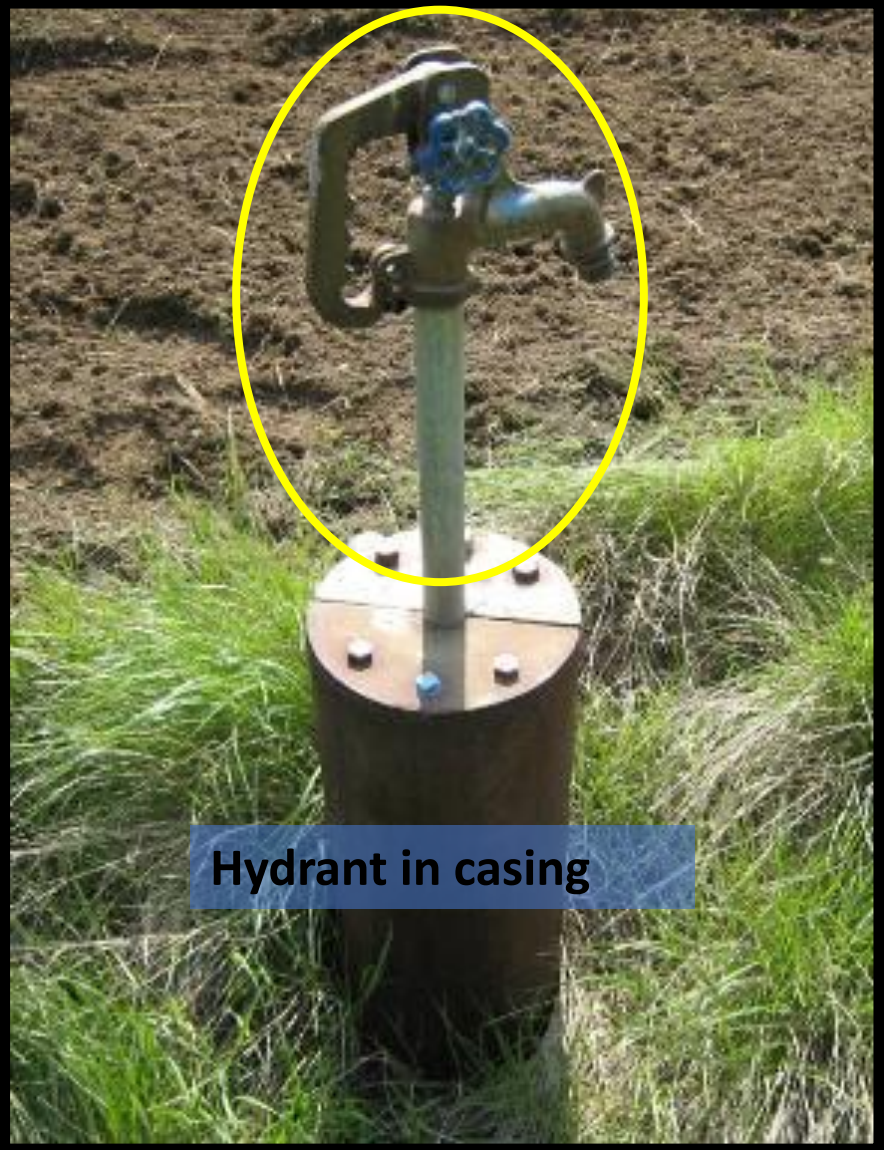
Uncapped Well

Damaged Casing

Cracked or Unsealed Well Cap

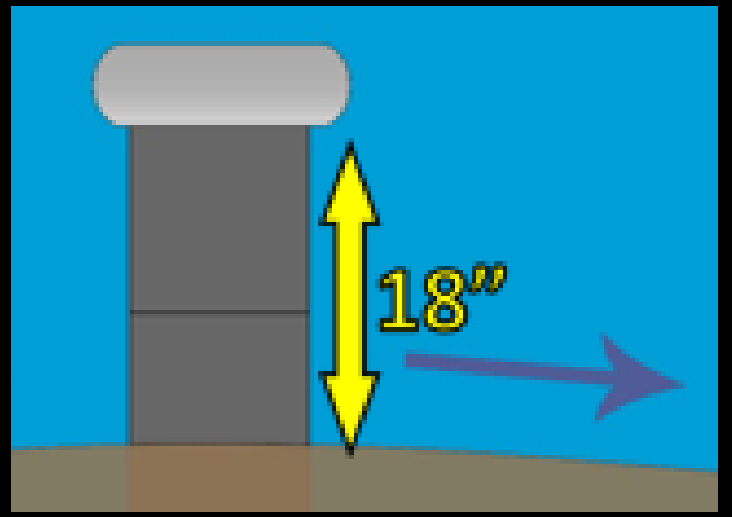


Wellheads with Problems



Well Head Protection Tips/Responsibilities

1. Keep well records
2. Have a copy of well log
3. Test water regularly
4. Hazardous materials away from well
5. Limit use of lawn & garden chemicals
6. Prevent damage to well casing
7. Slope ground away from casing
8. Make sure top of casing is 18 inches above ground surface and above flood prone elevation
9. Install backflow protectors
10. Certified well driller new well, modification or abandonment

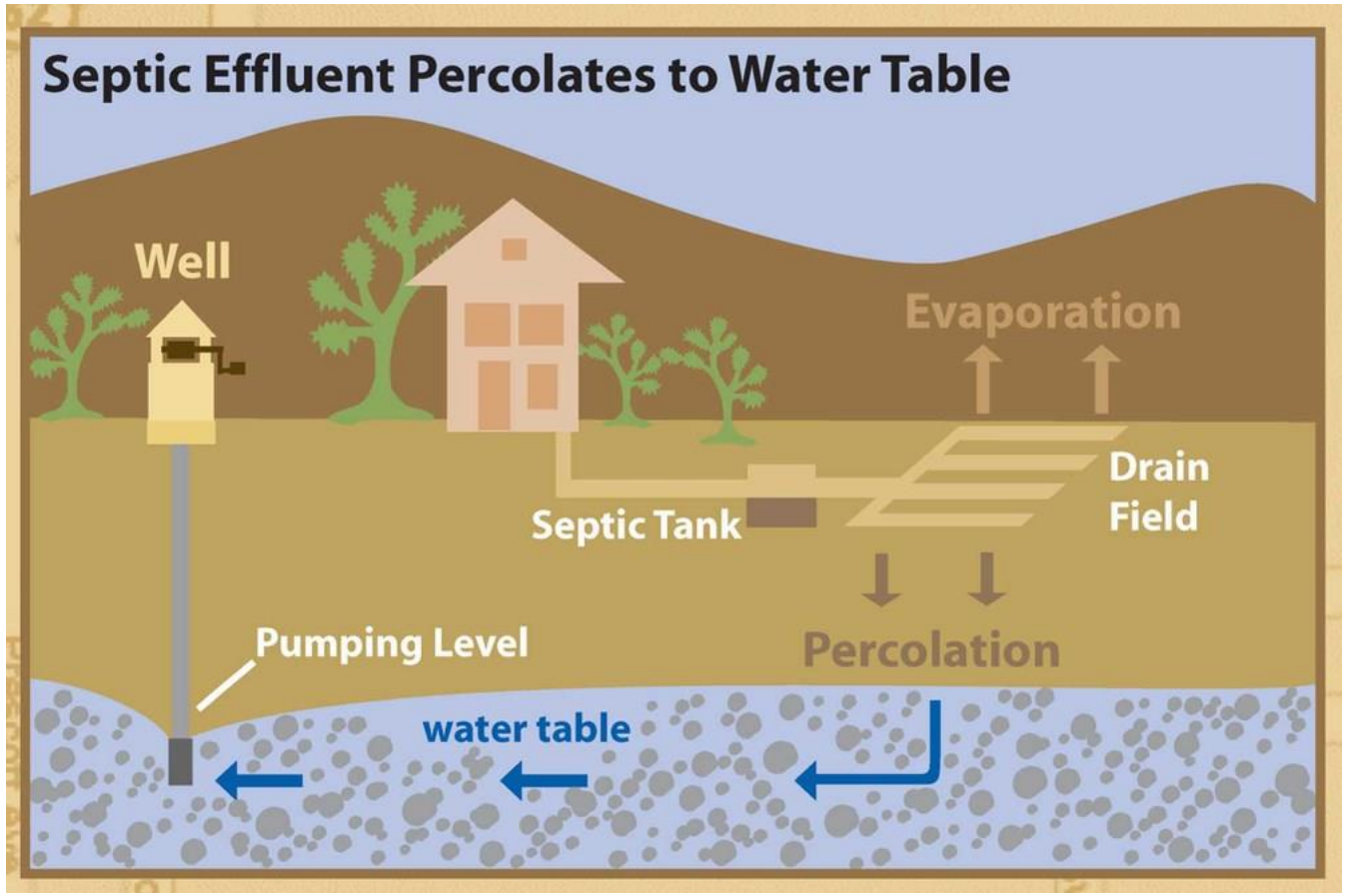


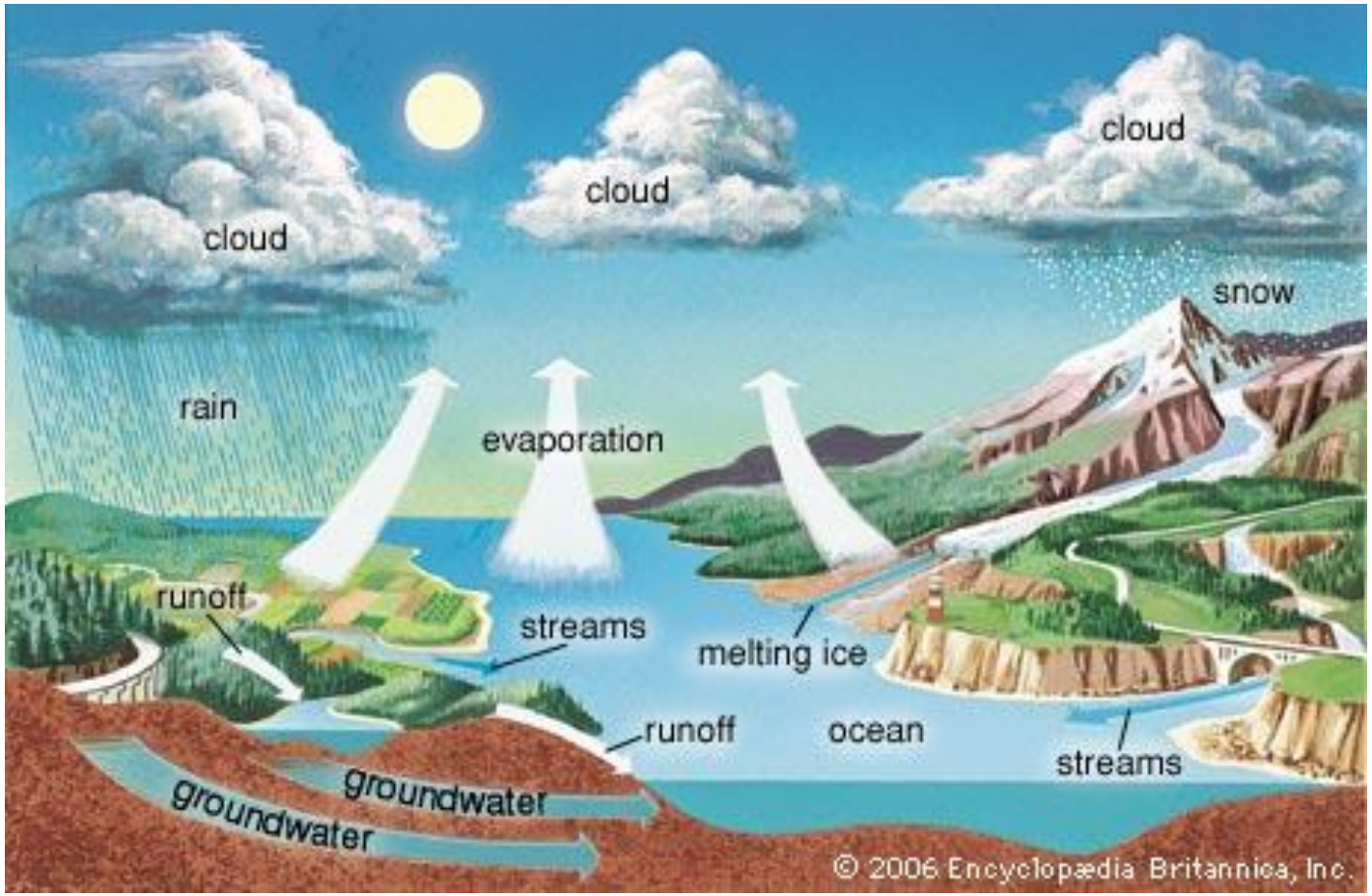
Wastewater Treatment

Brittney Krahn, R.S.
Environmental Health Specialist
brittney.krahn@gallatin.mt.gov


HOW THE TOILET
CHANGED HISTORY

Why is it important?




cloud
cloud
cloud
cloud
snow
rain
evaporation
runoff
streams
melting ice
runoff
ocean
streams
groundwater
groundwater
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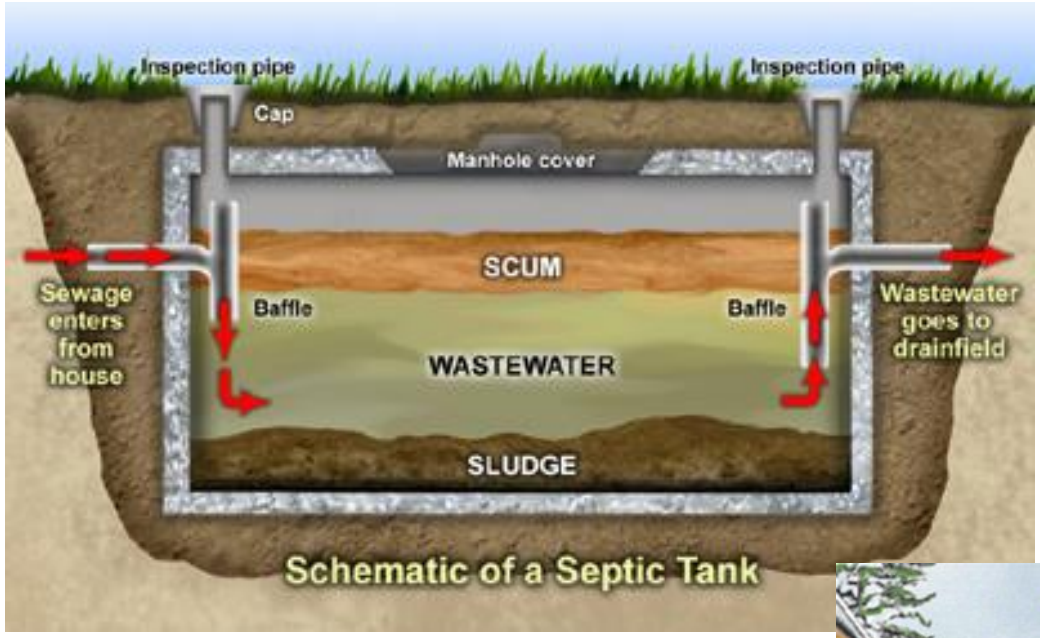
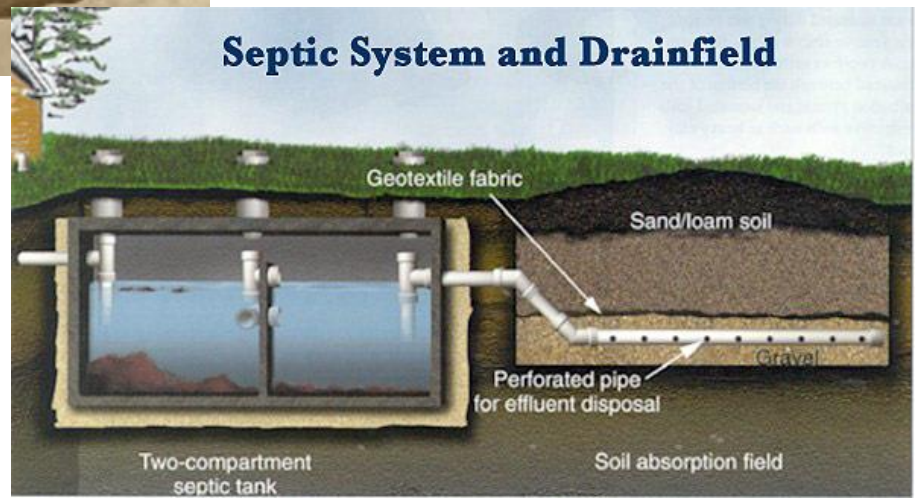
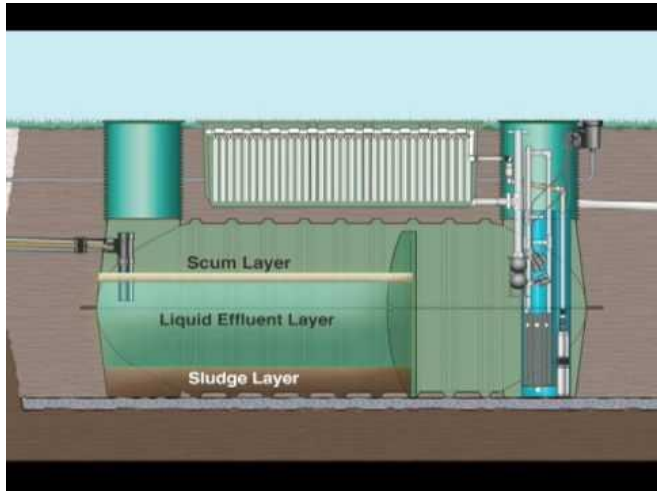
Saskatchewan River
Hudson Bay Divide
Red River of the North
Triple Divide Peak
Columbia River and Northwestern United States
CANADA
Great Divide
Missouri River
Great Lakes and St. Lawrence River
North Atlantic
Mississippi River
Ohio River
Great Basin
California
Mississippi-Missouri Drainage Basin
Tennessee River
Arkansas River
Colorado River
Rio Grande
South Atlantic-Gulf
ATLANTIC OCEAN
PACIFIC OCEAN
Gulf Coast
MEXICO
Gulf of Mexico
Watersheds


Inspection pipe
Inspection pipe
Cap
Manhole cover
SCUM
Sewage enters from house
Baffle
Baffle
Wastewater goes to drainfield
WASTEWATER
SLUDGE
Schematic of a Septic Tank


Septic System and Drainfield
Geotextile fabric
Sand/loam soil
Gravel
Perforated pipe for effluent disposal
Two-compartment septic tank
Soil absorption field

Specialty Systems



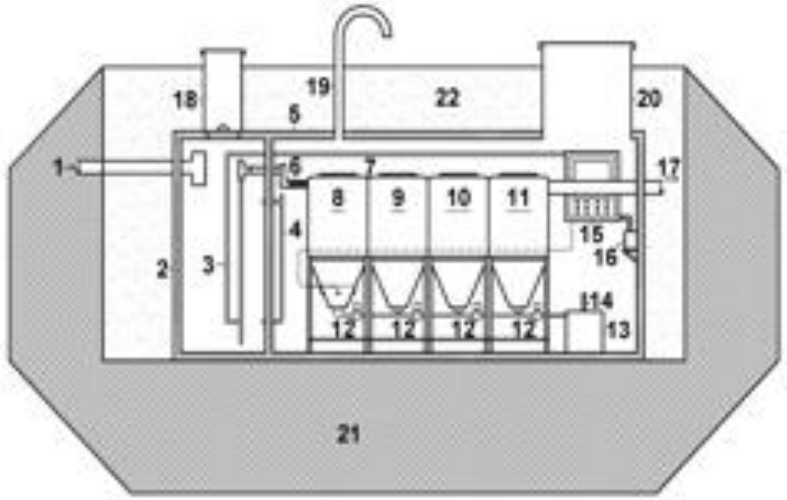
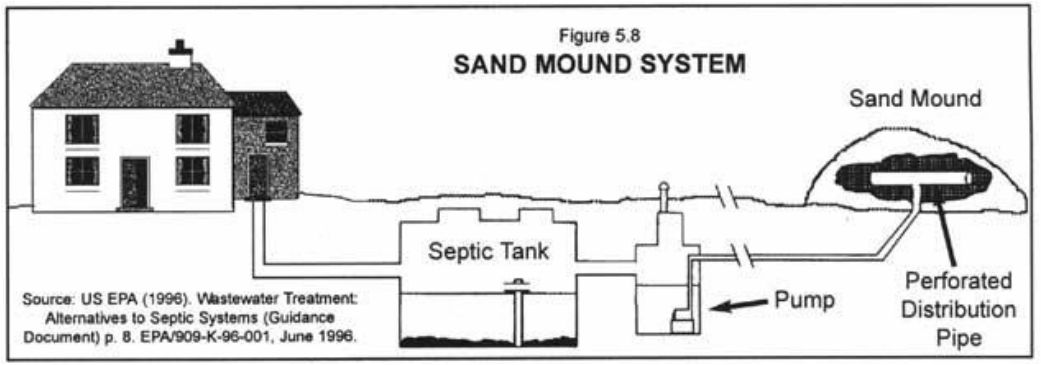
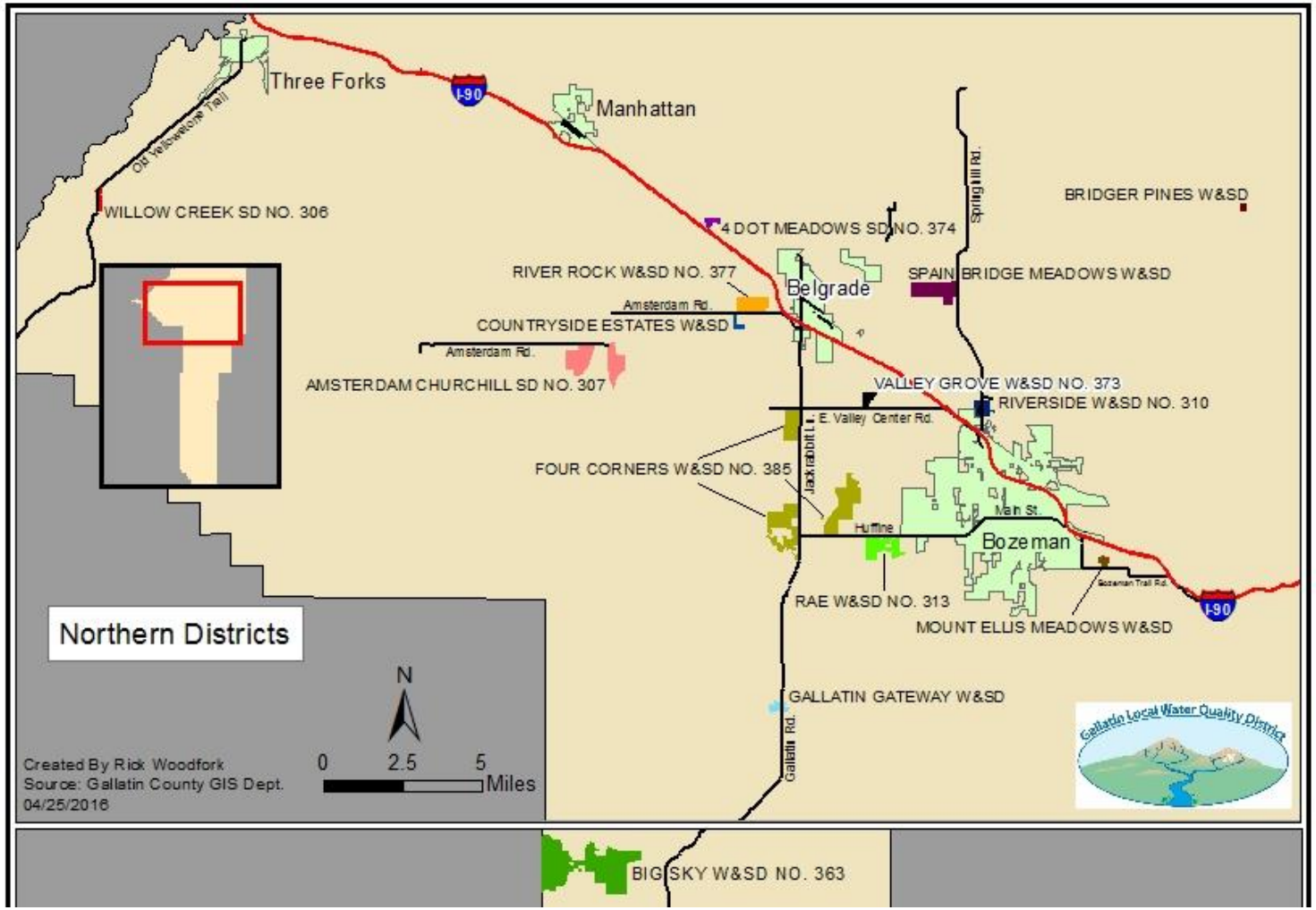


FIG. 1



Distribution of Municipal and Public Systems

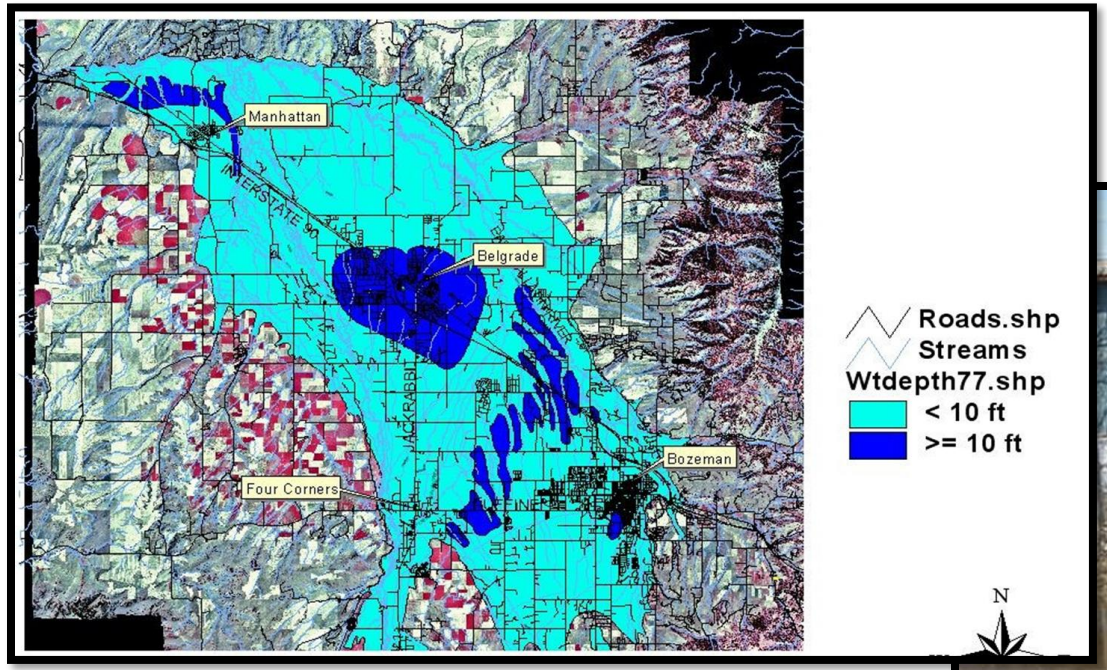


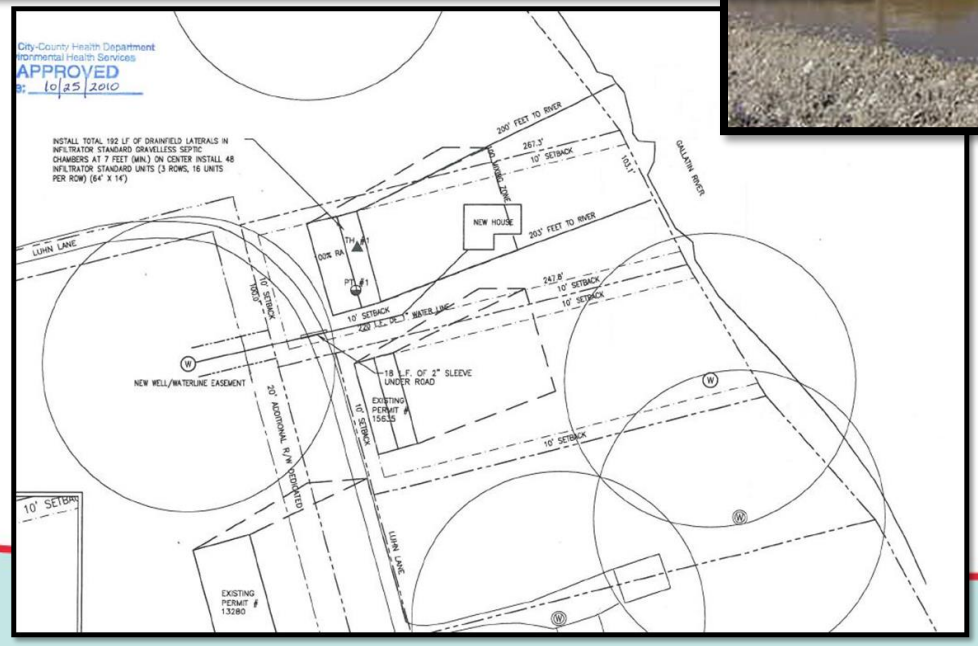
Local Permit Process

1. Is it less than 20 acres?
   - If yes, is there an RSR?
2. If no RSR or parcel >20 acres, must hire PE/SE for site evaluation.
   - Soil work must be within 25’ of proposed drain field location.
3. Apply for local permit.
   - GCCHD has 30 days to review
4. System installed by Registered Installer
   - As-Built due in 30 days from installation
5. GCCHD review of as-built. If approvable, then system is given a Permit to Operate.

Items of concern

- Soils
- Slope
  - Anything 25%-35% requires a Professional Engineer certification. >35% not allowable.
- Floodplain
  - 100’ setback to 100 year base flood elevation
- High groundwater or bedrock
  - Monitoring required if seasonal high groundwater is <7’ below ground surface at any time of year
  - State requires 48” of separation from the bottom of the trench to top of seasonal high groundwater or bedrock layer


Manhattan
Belgrade
Bozeman
Four Corners
INTERSTATE 90
Roads.shp
Streams
Wtdepth77.shp
< 10 ft
>= 10 ft
N


City-County Health Department
Environmental Health Services
APPROVED
By: 10/25/2010
INSTALL TOTAL 192 LF OF DRAINFIELD LATERALS IN INFILTRATOR STANDARD GRAVELLESS SEPTIC CHAMBERS AT 7 FEET (MIN.) ON CENTER INSTALL 48 INFILTRATOR STANDARD UNITS (3 ROWS, 16 UNITS PER ROW) (64' X 14')
LUHN LANE
NEW HOUSE
200' FEET TO RIVER
205' FEET TO RIVER
267.3'
101.1'
GALLATIN RIVER
10' SETBACK
100.0'
247.8'
NEW WELL/WATERLINE EASEMENT
18 L.F. OF 2" SLEEVE UNDER ROAD
EXISTING PERMIT # 156135
20' ADDITIONAL R/W DEDICATED
EXISTING PERMIT # 13280

What if it is non-compliant?

- Fix it!
  - Likely will require the services of a Professional Engineer or Site Evaluator to get the project going.
  - May be expensive, time consuming or both.
- Generally this can be ironed out in the negotiation, but if the issue is left unresolved it can cause significant issues down the road...
- GCCHD does pursue formal enforcement when there is a complaint or it comes to our attention during the normal course of business.

HEALTHY
GALLATIN

check out our new website

healthygallatin.org

Your online resource for Healthy Living in Gallatin Valley.