



# **Drinking Water Wells & Septics**

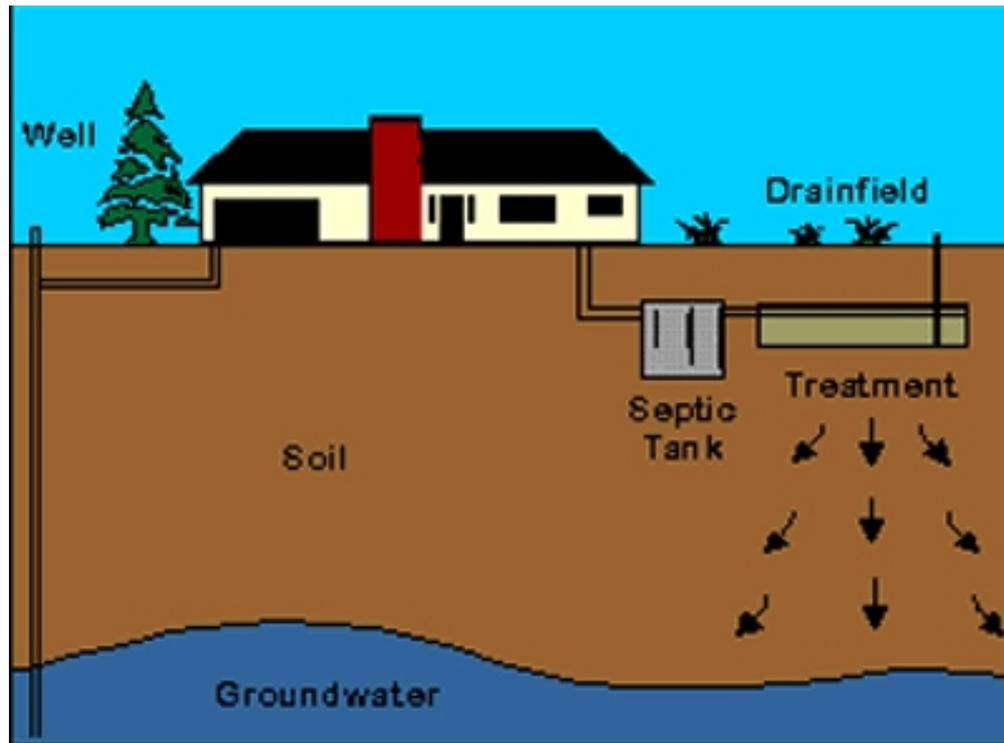
**Joe Meek, Montana Dept of Environmental Quality  
(406) 444-4806**

A vertical, semi-circular inset on the left side of the slide shows clear water being poured from a glass pitcher into a glass. The water is captured in motion, with many bubbles and ripples, creating a dynamic and refreshing visual. The background of the entire slide is a light, pale blue with a subtle, repeating pattern of water droplets and splashes.

# **What we'll cover:**

- **Introductions**
- **How the water samples handled**
- **Why do these workshops**
- **When to ask questions**
- **Handout materials**
- **Water Wells**
- **Septic Systems**

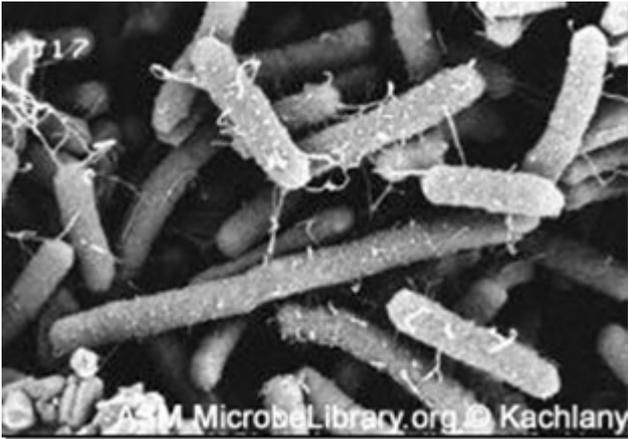
# Main Point –Septic Systems Recharge Aquifers



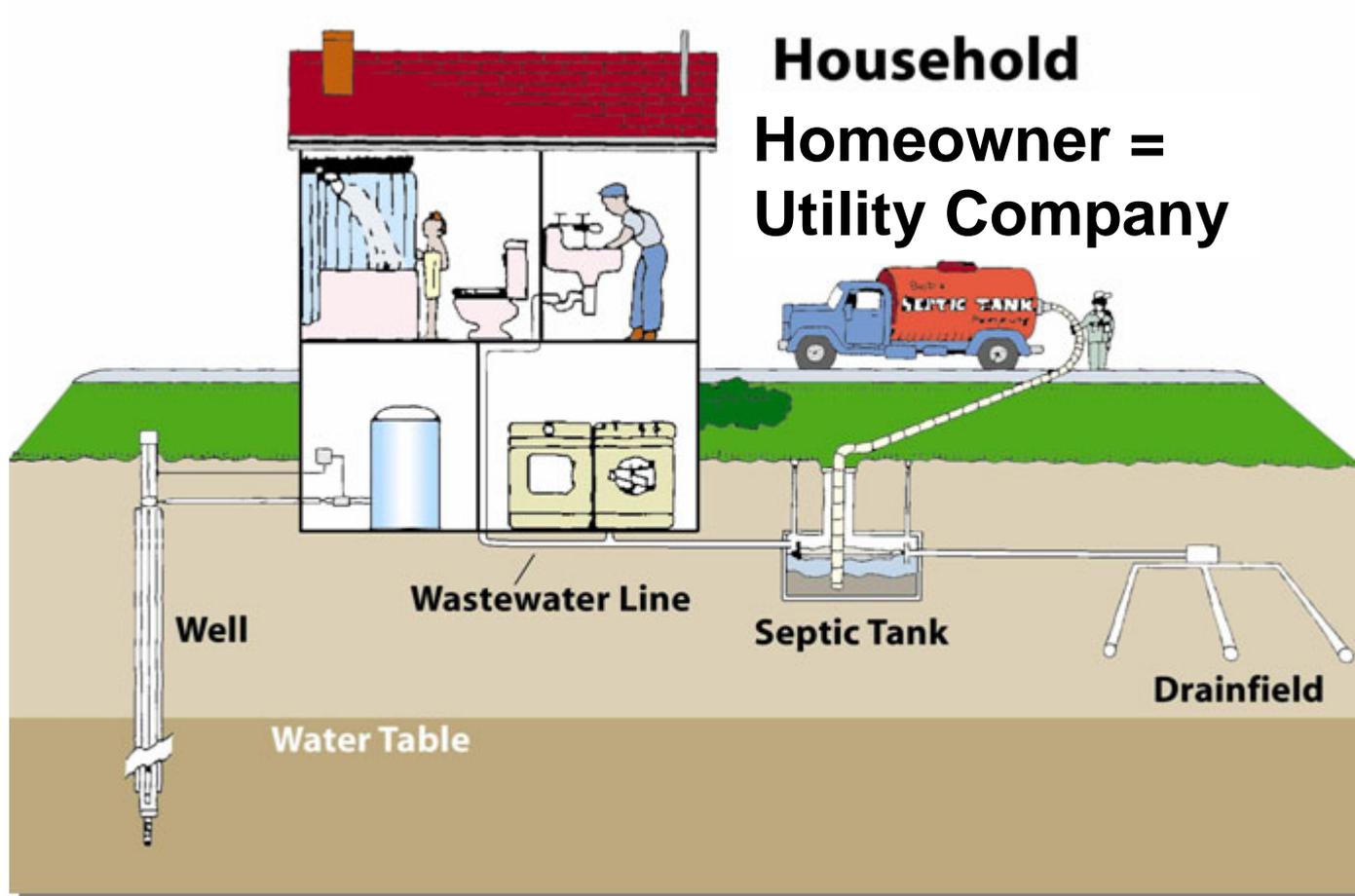
# Main Point – Wells Need Maintenance



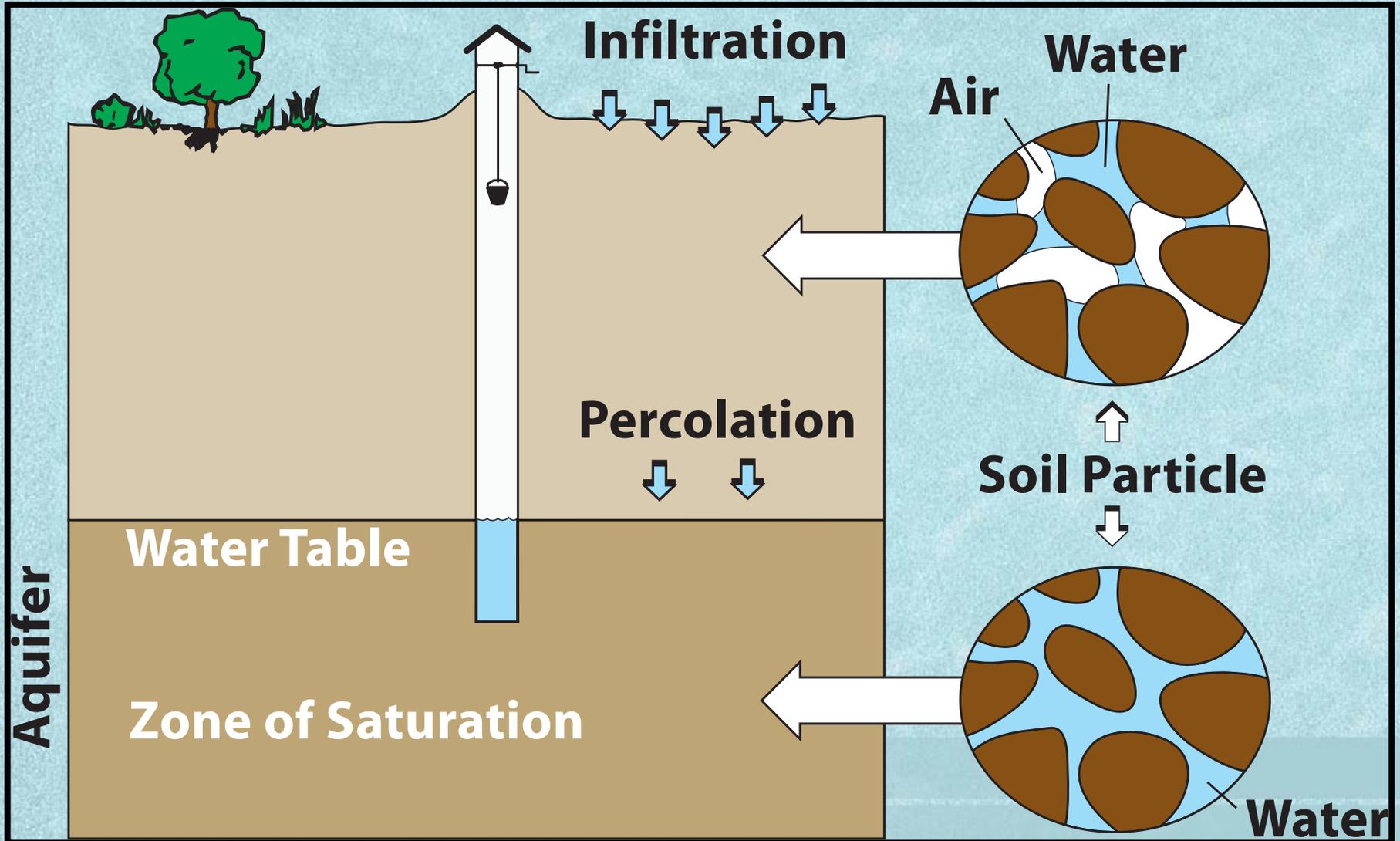
# Main Point –Water Quality Monitoring Protects Health



# Main Point – You are a Utility Company

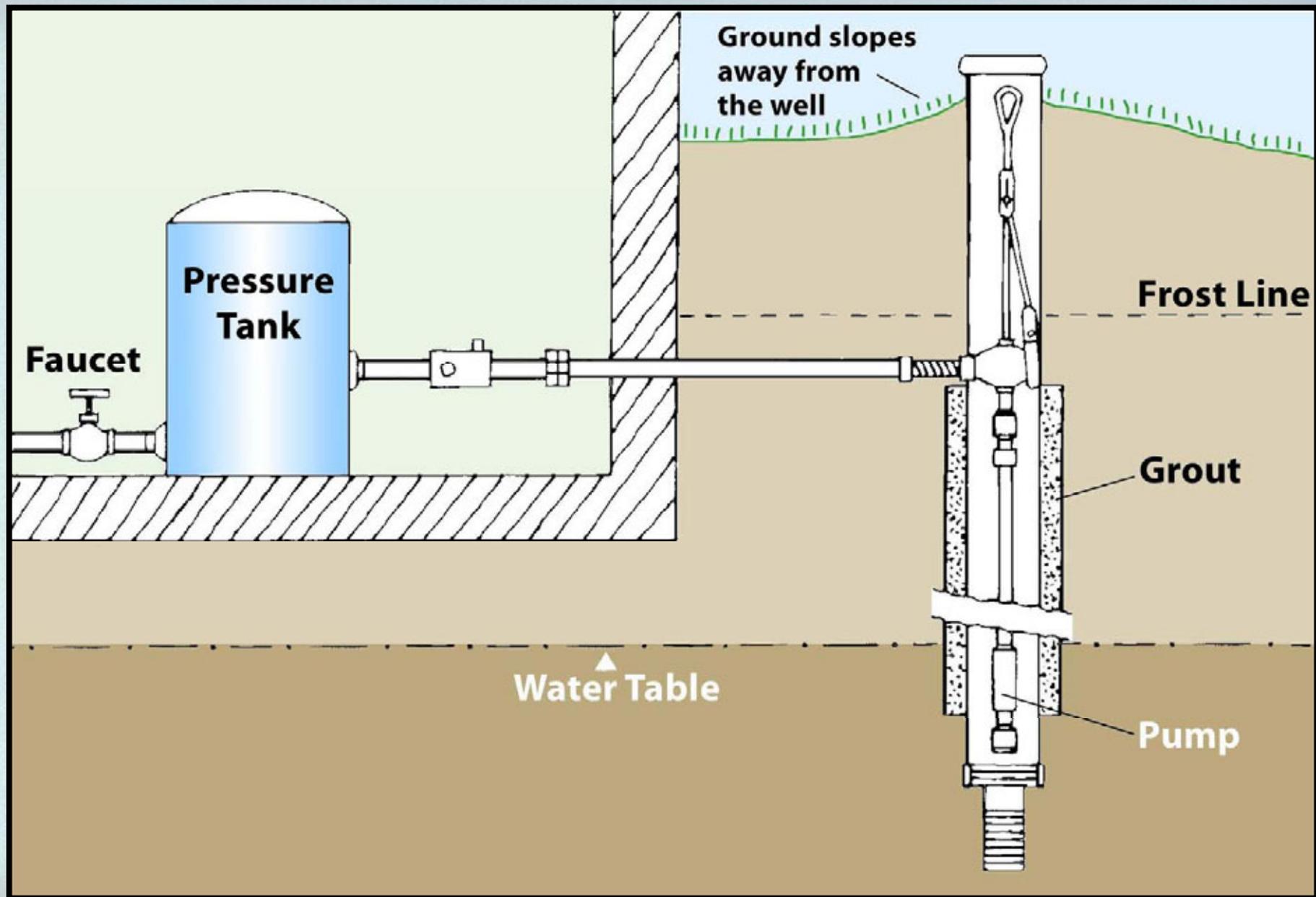


# What is a Well? Aquifer?



# Typical Well System Parts

- Well
- Supply line to house
- Pressure control and gauge
- Control box (three wire pumps)
- Pressure tank
- Gate or shut off valve
- Drain valve
- House plumbing



# Typical household system

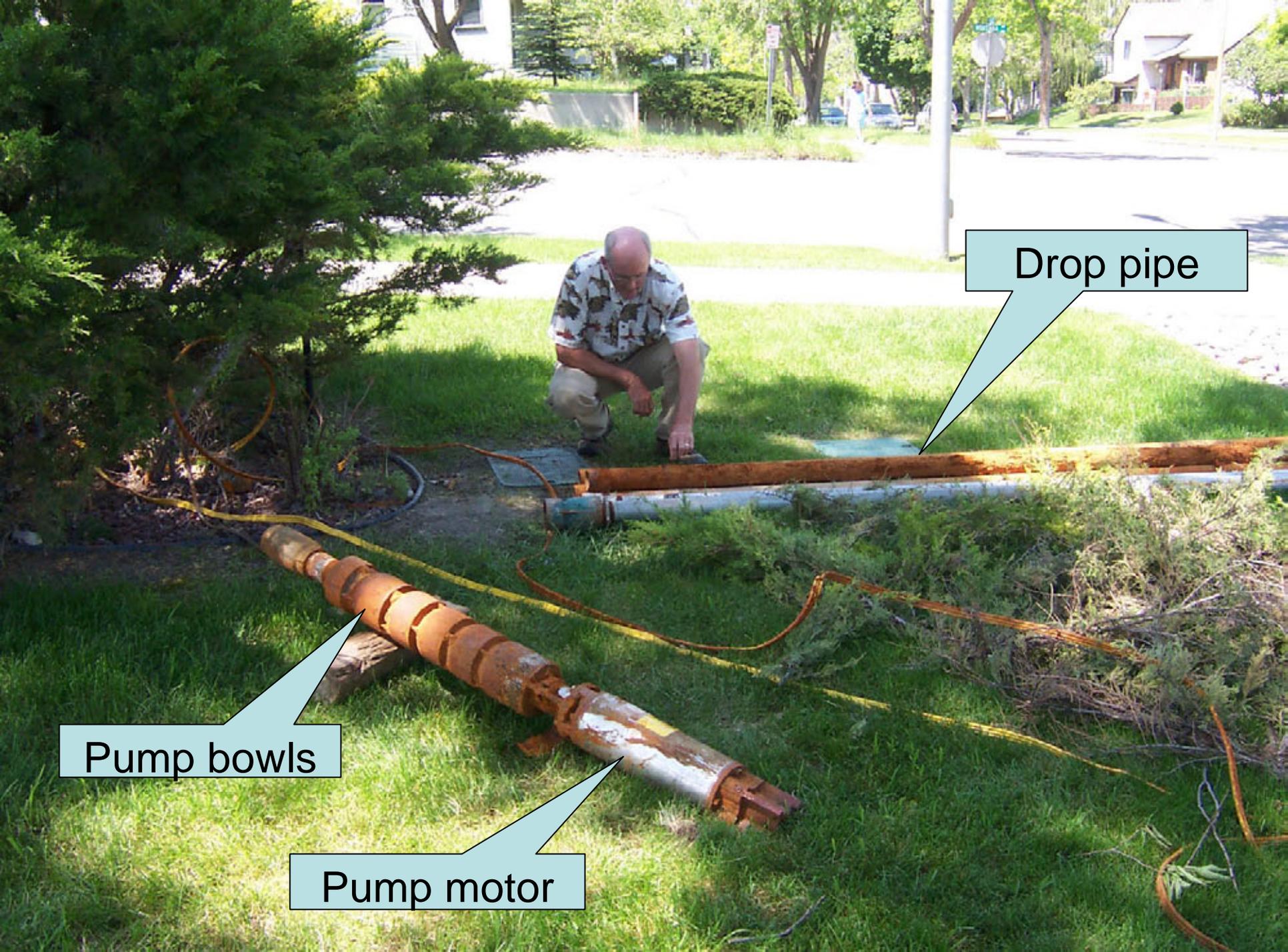


# Well System Operation

- **Pump run time > 1 minute**
- **Period between cycle > 3 minutes**
- **Checking for “waterlogged” tank**
- **Pressure ranges 20-40 or 30-50 psi are typical.**

Let's look at the internal components of a well





Drop pipe

Pump bowls

Pump motor

Pump intake



ED J...  
PUMP...  
Marley CS...  
ANSA...  
06-112  
100

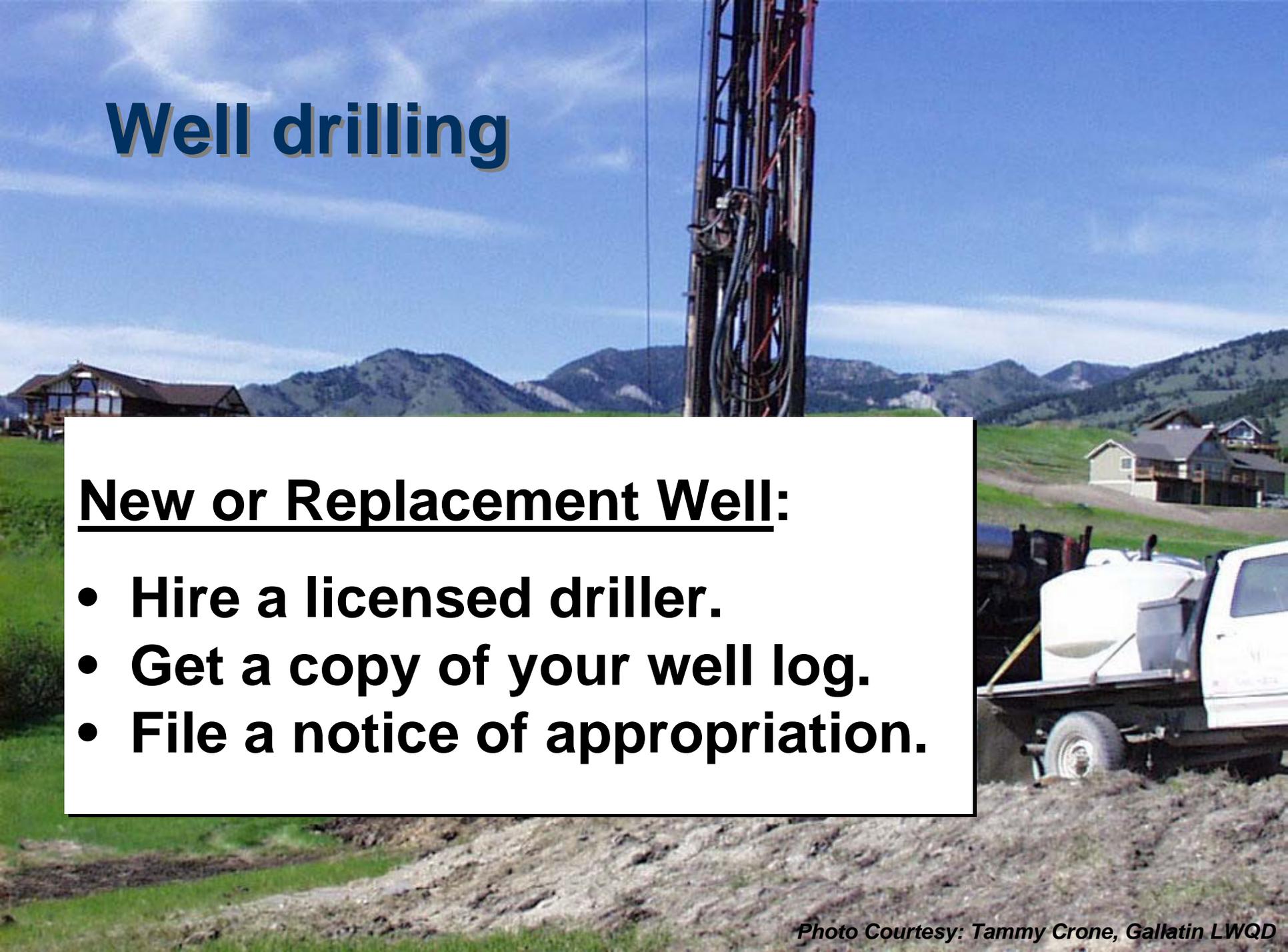
Drop pipe





A pipe leak

# Well drilling

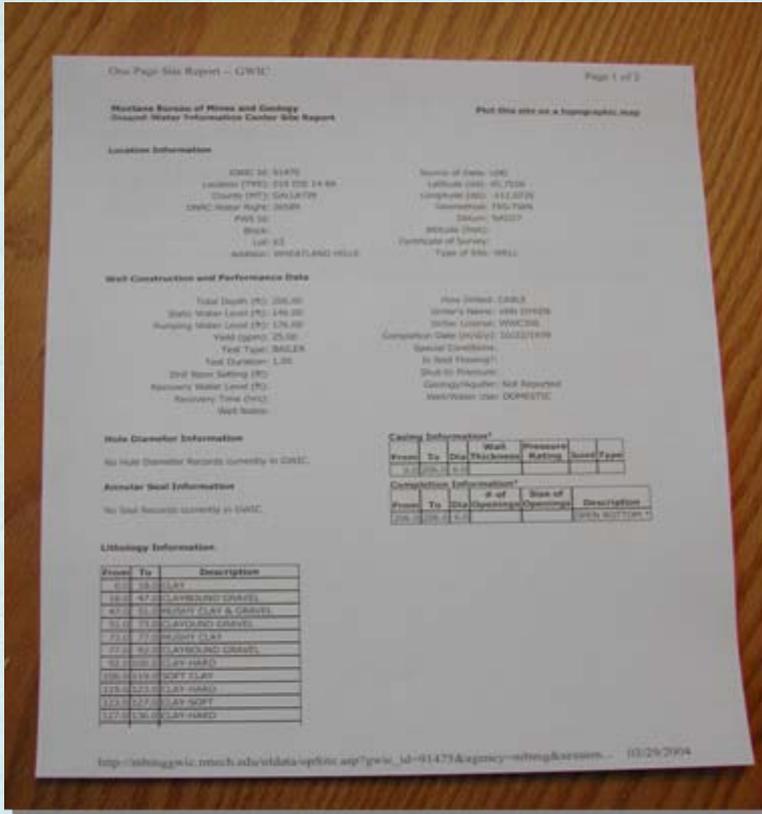


## New or Replacement Well:

- Hire a licensed driller.
- Get a copy of your well log.
- File a notice of appropriation.

# The Well Log

- Location
- Construction detail
  - gallons per minute
  - static water level
  - Geologic formations (lithology)



Log is filed with GWIC (Ground Water Information Center-MBMG) and DNRC

- By the driller
- A copy of the well log should be provided to the homeowner.

Site Name: STATE CAPITOL WELL  
GWC Id: 88689

## Section 1: Well Owner

## Owner Name

STATE OF MT C/O DEPT FISH WILDLF PKS

## Mailing Address

1420 E 6TH AVE

City	State	Zip Code
HELENA	MT	59601

## Section 2: Location

Township	Range	Section	Quarter Sections
10N	03W	32	SW¼ NW¼ SW¼ NW¼ NW¼ NW¼
County			Geocode

LEWIS AND CLARK

Latitude	Longitude	Geomethod	Datum
46.5881	112.0191	UNKNOWN	NAD27

Altitude	Method	Datum	Date
4125			

Addition	Block	Lot

## Section 3: Proposed Use of Water

IRRIGATION (1)

## Section 4: Type of Work

Drilling Method: AIR ROTARY

## Section 5: Well Completion Date

Date well completed: Wednesday, May 29, 1991

## Section 6: Well Construction Details

## Borehole dimensions

From	To	Diameter
0	215	6

## Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	10	0				STEEL
18	215	6				STEEL

## Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
90	110	6			SCREEN-CONTINUOUS-STAINLESS
155	185	6			SCREEN-CONTINUOUS-STAINLESS

## Annular Space (Seal/Grout/Packer)

There are no annular space records assigned to this well.

## Section 7: Well Test Data

Total Depth: 215  
Static Water Level: 90

## Air Test \*

\_ 20 gpm with drill stem set at \_ feet for \_ hours.  
Time of recovery \_ hours  
Pumping water level \_ feet.

## Section 8: Remarks

## Section 9: Well Log

## Geologic Source

Unassigned

From	To	Description
0	6	SOIL CLAYEY MOIST
6	10	BEDROCK(HELENA DOLOMITE)-WEATHERED BUFF ORANGE LIME-RICH
10	112	DOLOMITE-SLIGHTLY WEATHERED WEATHERED SURFACES WHI TE TO GRAY WHI TE LIME-RICH FRESH SURFACES MEDIUM GRAY. 90'-110'=40 gpm
112	117	SHALY DOLOMITE-CHIPS SMALLER BUT STILL BEAR ABUN- DANT LIMONITE STAINING(ABOUT 10% OF SURFACES STAINED):SMALL VEINS OF CaCO3 STILL OCCUR ON THE SURFACE OF LARGER CHIPS
117	212	DOLOMITIC SHALE-MED GRAY TO GRAY GREEN,CHIPS SMAL- LER MORE EQUI- DIMENSIONALDRILLING RATE DECREASING IN LOWER PART OF INTERVAL. 102'-107'=80 gpm
212	215	DOLOMITE SHALE MED GRAY TO GRAY GREEN MUCH LIMON- ITE STAINING;CHIP SIZE LARGER;WELL PRODUCES ABOUT 5 GALLONS IN 2.5 SECONDS = ABOUT 120 GPM

## Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: TERRY LINDGAY  
Company: INDSAY  
License No:  
Date Completed: 5/29/1991

# Example Well Log

# How to find your Well Log

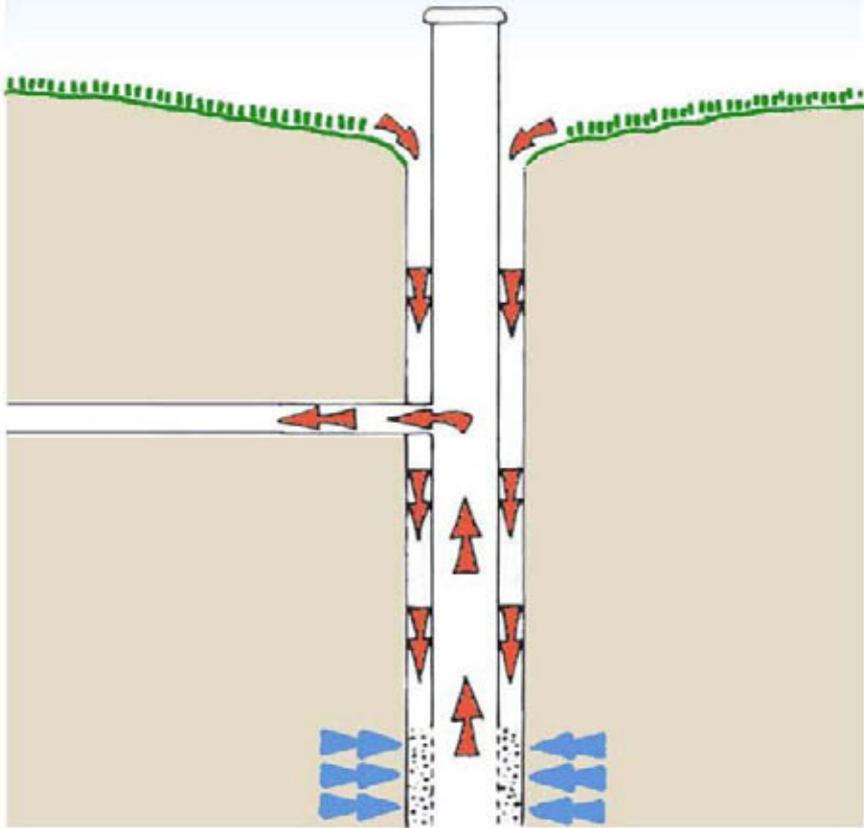
- Go on-line to <http://mbmggwic.mtech.edu/> .
- Contact local DNRC office
- Contact Joe Meek at DEQ at (406) 444-4806

**Note:** identifying your well log can be a challenge; have as much information available as possible such as:

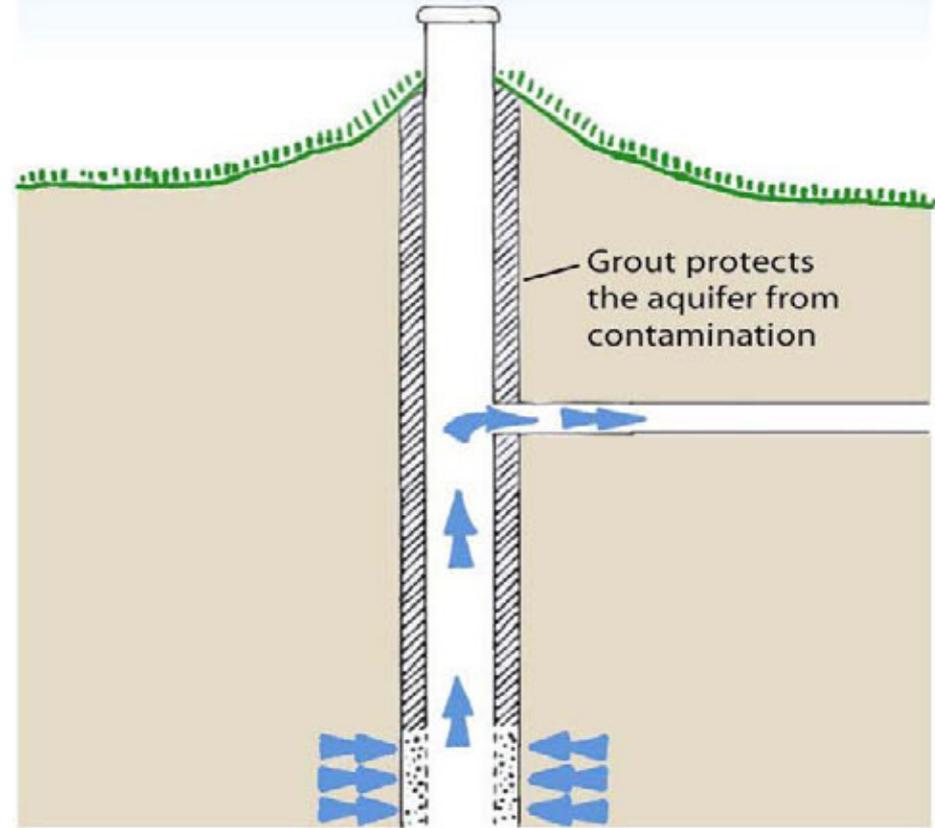
- original owner name & well location
- approximate date completed
- approximate depth

# Construction:

**POORLY PROTECTED WELL**



**PROPERLY PROTECTED WELL**



Uncontaminated water 

Contaminated water 

# Ground Water Pollution Sources



Wells, 100-foot protection zones, and septic system drainfields are too close in some of our older areas





Run-off into ground water

Break-down of wastes can leach to ground water. Diffuse sources are called “non-point pollution”



Manure should be managed to prevent heavy build up





Contaminated leachate from manure in corral will recharge ground water.



Manure dumped into  
coulee is not good  
waste management



Manure dumped into  
coulee is not good  
waste management



Is this recharging your aquifer





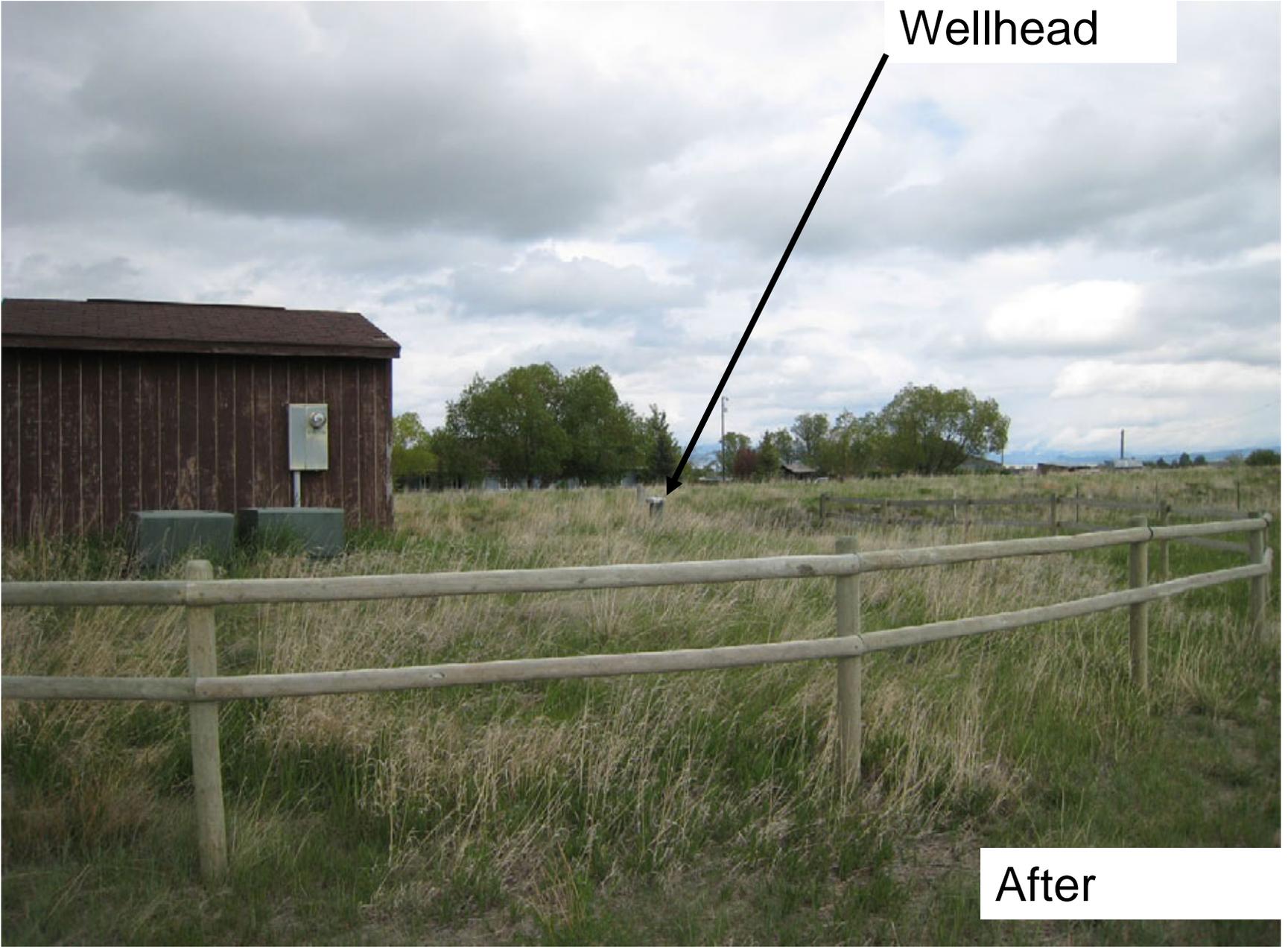
Keep livestock  
away from wells

Well head



Before

Wellhead



After

# Composting manure for use as garden fertilizer



Don't dump  
waste onto  
ground.

Waste motor  
oil can be  
recycled!



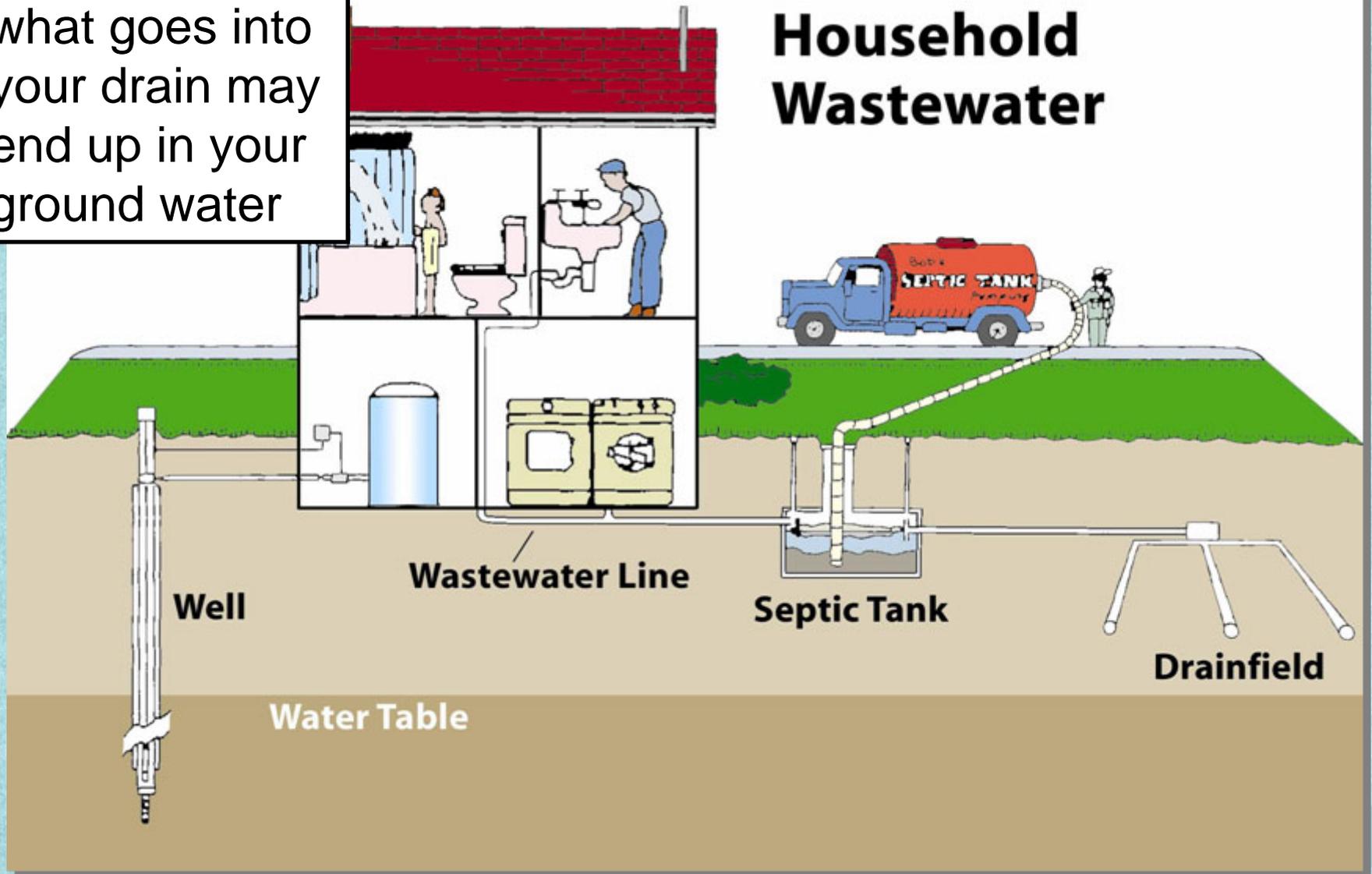
# Household Hazards

- Cleaning products
- Automotive products
- Chemicals & fertilizers
- Unused prescription and medications



Remember,  
what goes into  
your drain may  
end up in your  
ground water

# Household Wastewater





# Who Protects My Drinking Water?

- YOU...are responsible for the safety of your drinking water.
- Be aware of area conditions





## Water Quality



# Common Drinking Water Contaminants

- Biological
- Chemical
- Physical

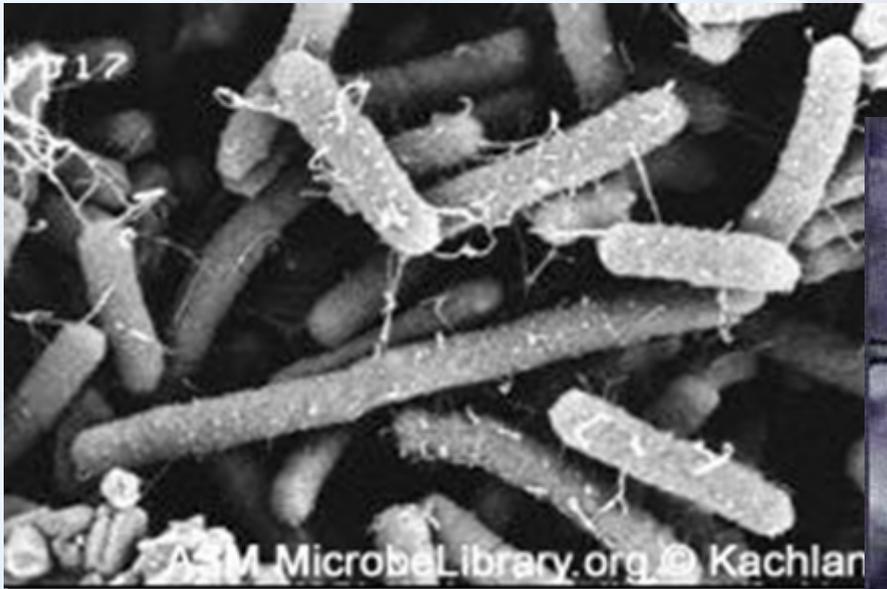


# Pathogenic Microorganisms

Fecal coliform bacteria (*E. coli*)

Giardia

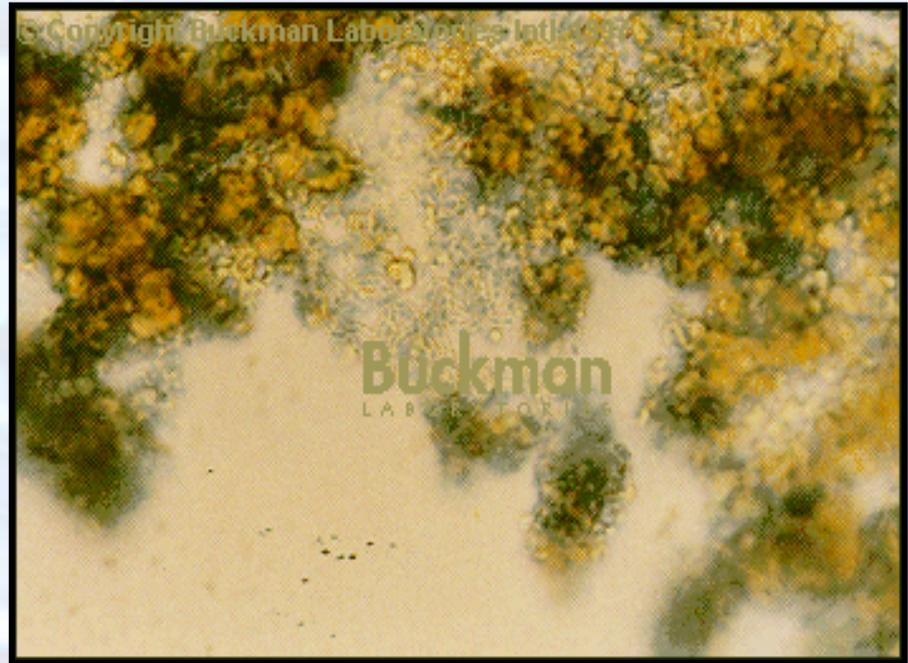
Viruses (Norovirus)



# Nuisance Bacteria

## Iron bacteria

- iron deposition
- slime in fixtures
- biofilm in plumbing



# ☐ Chemical Contaminants

- Petroleum products
- Nitrogen (nitrates)
- Metals
  - Arsenic
- PPCP



# ☐ Physical Characteristics

- Turbidity
- Taste
- Sediment
- Odor
- Color



# Water Testing

## Once a Year Test For

- coliform bacteria
- nitrate and pH (acidity)
- if pH is less than 7.0, test for lead.

Or at change in taste, odor, or appearance





If you have never had your water tested, or if you don't have any record of previous tests, test the for the following:

- **Coliform Bacteria**
- **Nitrate/nitrite**
- **pH (acidity)**
- **Chloride**
- **Iron**
- **Sulfate**
- **Hardness**
- **Alkalinity**
- **Total Dissolved Solids**
- **Manganese**

### **Bedrock well**

- **add Arsenic, Radon, Fluoride**

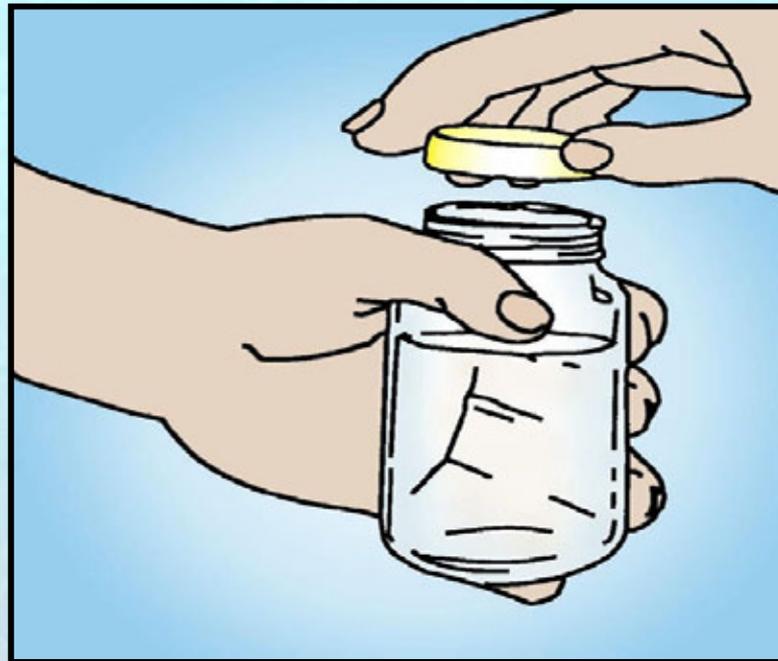


# Where Can I Have My Water Tested?

- **Some local labs:**
  - **Energy Laboratories-Billings**
  - **State Laboratory in Helena**



**Poor sampling technique is worse than not sampling**



# What Do the Results Mean?

- Compare to standards
- If high, **DO NOT DRINK THE WATER!**
- Watch trends
- Treatment or new source may be option



# Water Treatment



## Typical home treatment systems



# Sediment filter



# Sediment filter and softener



# Iron Filter or Greensand Treatment Unit.

Filter for iron,  
manganese, and/or  
sulfur odor treatment



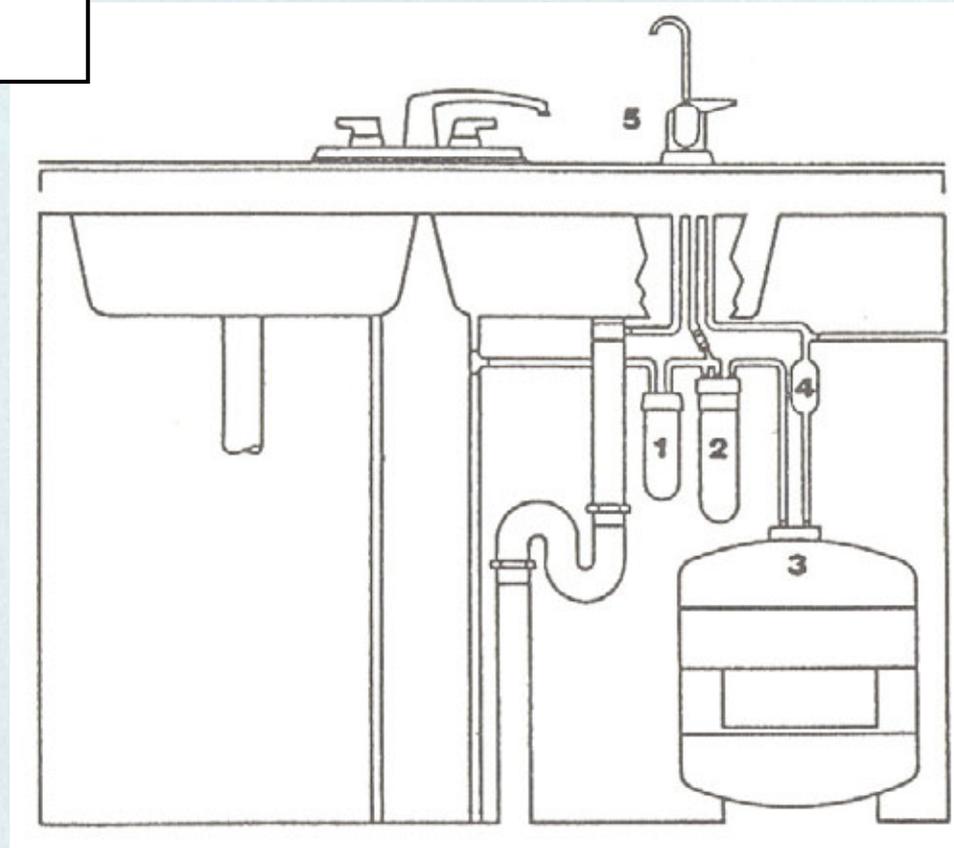
Under sink  
treatment  
system

Treated Water  
Tank

Sediment filters, reverse osmosis membrane,  
and charcoal filter.



Under sink  
treatment  
system  
schematic





# Top 10 Well Maintenance Tips

- 1. Regularly test your water...coliform & nitrate**
2. Keep household hazardous materials away from your well.
  - Never dump down drain or on your property
3. Limit use of lawn & garden chemicals
  - Apply sparingly & follow application instructions

**Tips!!**

4. Take care in working around your well to prevent damage to the well casing.

- Don't pile snow, leaves, or other materials around your well.

5. Keep your well records in a safe place

- **Well log.....find it if you don't have it**



## 6. Periodically inspect well parts for damage:

- Broken or missing cap



- **Wire insulation has failed**



Be careful working at your wellhead!

- **Cracked, corroded or damaged casing**



- Watch for settling and cracking of ground surface around casing.



**Replace non-sanitary  
well cap...**

**Non-sanitary cap**



**...with one that has a  
sanitary seal.**

**Sanitary seal cap**



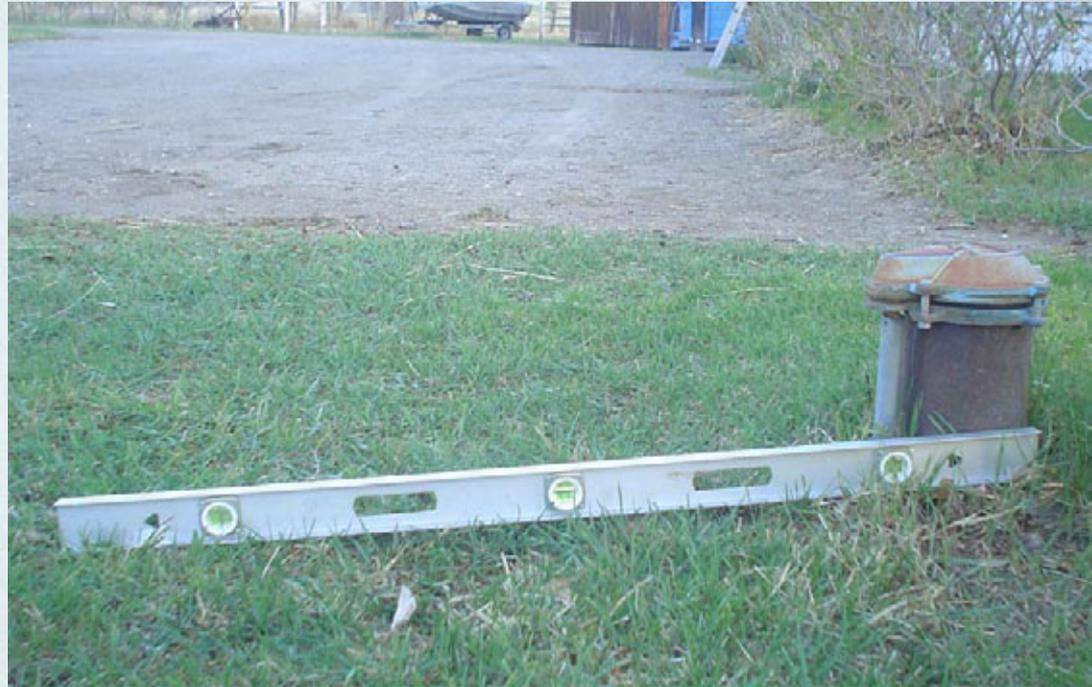
# 7. When landscaping...

**Avoid planting flowers at wellhead since they will require watering and need to be fertilized.**



# 7. When landscaping...

**Slope ground away  
from casing  
for proper drainage.**



8. Make sure top of well casing is at least 18" above ground surface.

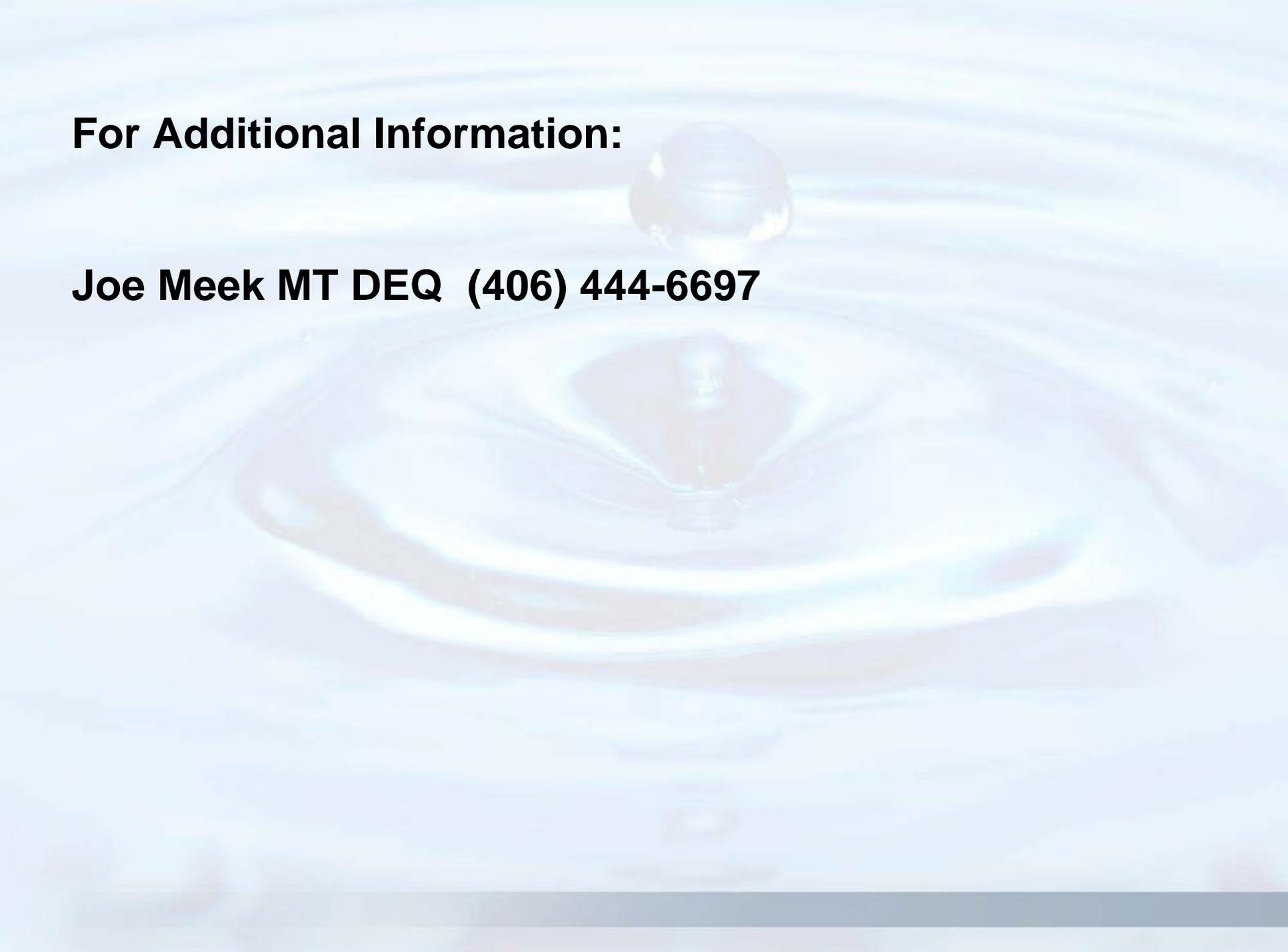


3''



- 9. Install backflow protectors on all outdoor faucets**
- 10. Hire a certified well driller for any new well construction, modification or abandonment and closure.**

**Tips!!**



**For Additional Information:**

**Joe Meek MT DEQ (406) 444-6697**