WELL INSPECTIONS

INSPECTION CERTIFICATE ASSOCIATES

For the purposes of this course, we will be focusing on water wells used as a source of potable water for the residence, but the same principles can be applied for irrigation and other types of wells.

Topics Discussed

GEOLOGY

TYPES OF WATER WELLS

COMMON WELL COMPONENTS

CONTAMINANTS IN WATER

FILTRATION AND PURIFYING

WELL INSPECTIONS

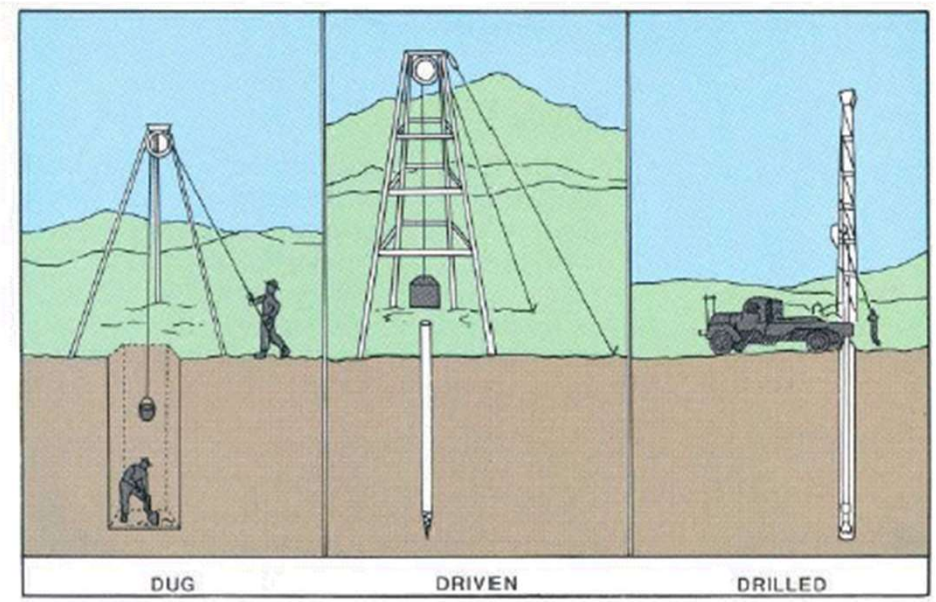
WATER TESTING

MODULE 1: GEOLOGY

INSPECTION CERTIFICATE ASSOCIATES

Types of Wells

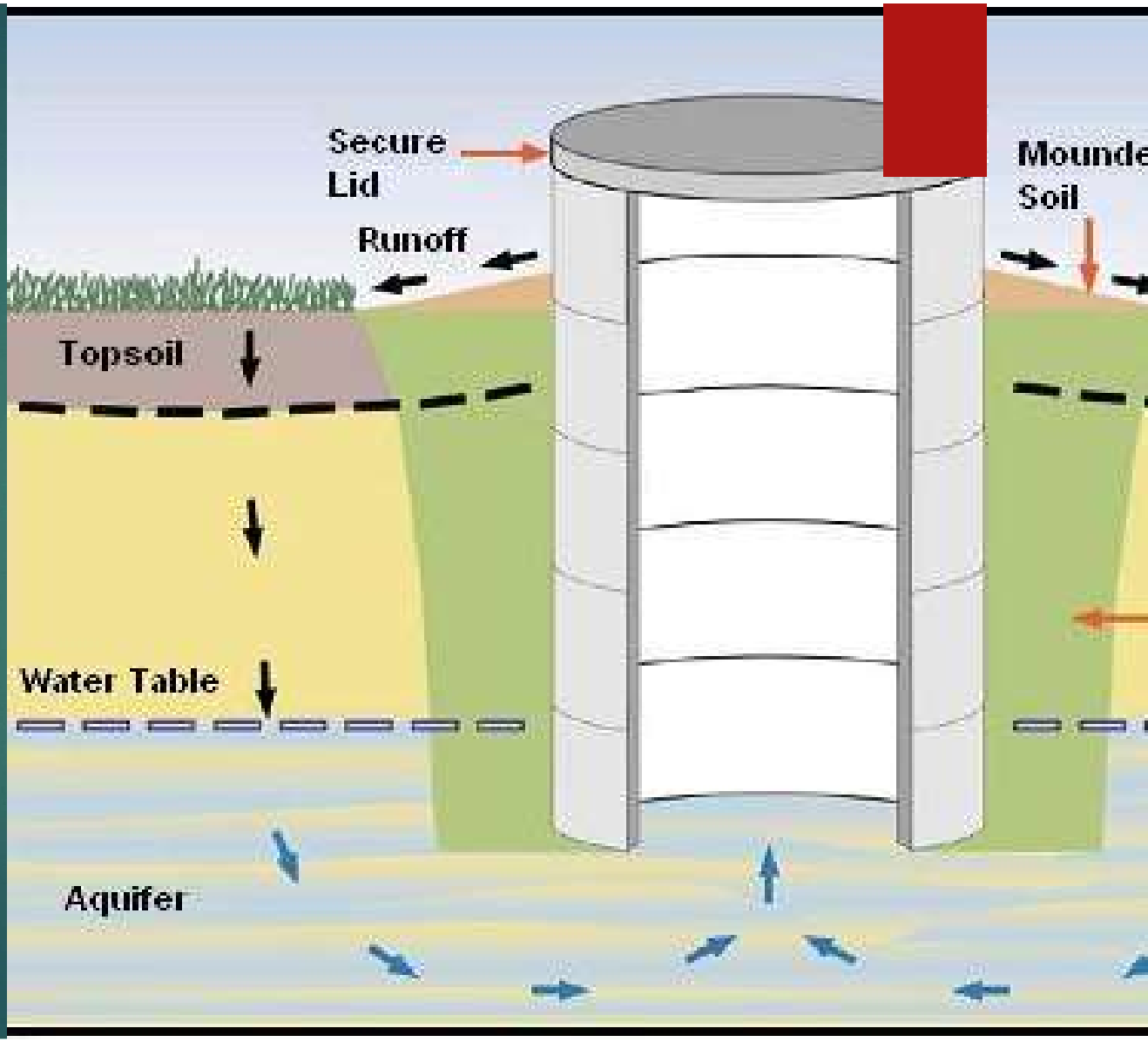
- Dug/bored wells
- Driven wells
- Drilled wells



Dug/bored well

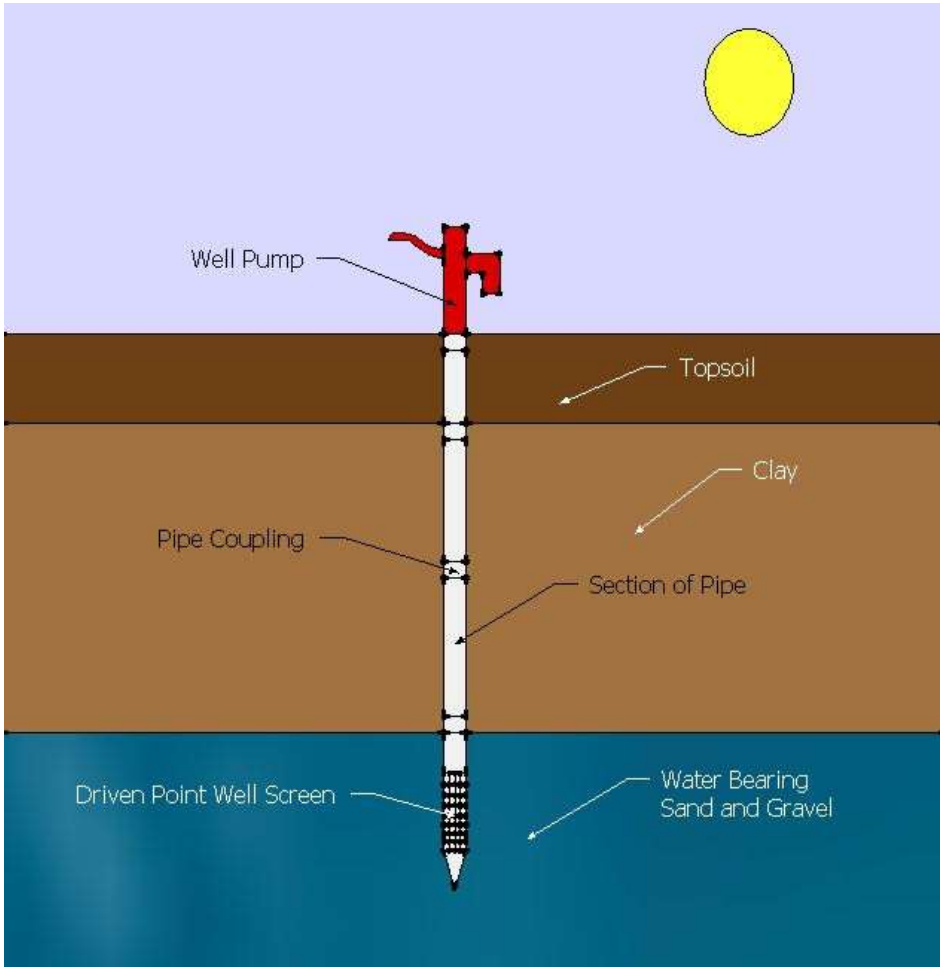
- These are holes in the ground dug by shovel or backhoe. The are lined (ceased) with stones, bricks, tile, or other material to prevent collapse. Dug wells have a large diameter, are shallow (approximately 10 – 30 feet deep) and are not cased continuously.

Dug/Bored Well



Driven wells

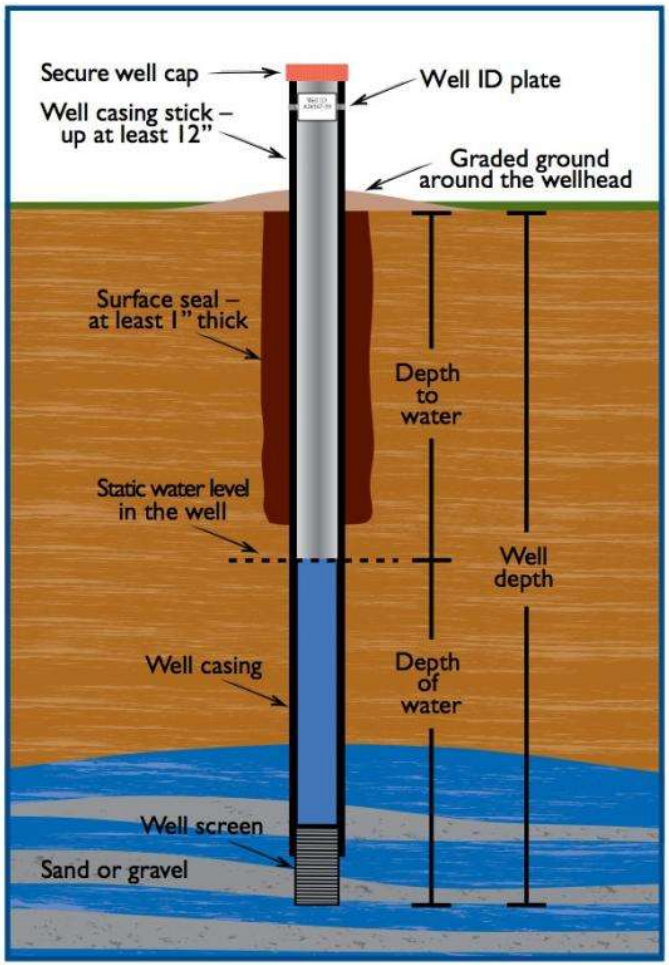
- These are constructed by driving pipe into the ground. Driven wells are cased continuously and shallow (approximately 30 to 50 feet deep). Though driven wells are cased, they can be contaminated easily because they draw water from aquifers near the surface.


Well Pump
Topsoil
Clay
Pipe Coupling
Section of Pipe
Driven Point Well Screen
Water Bearing
Sand and Gravel

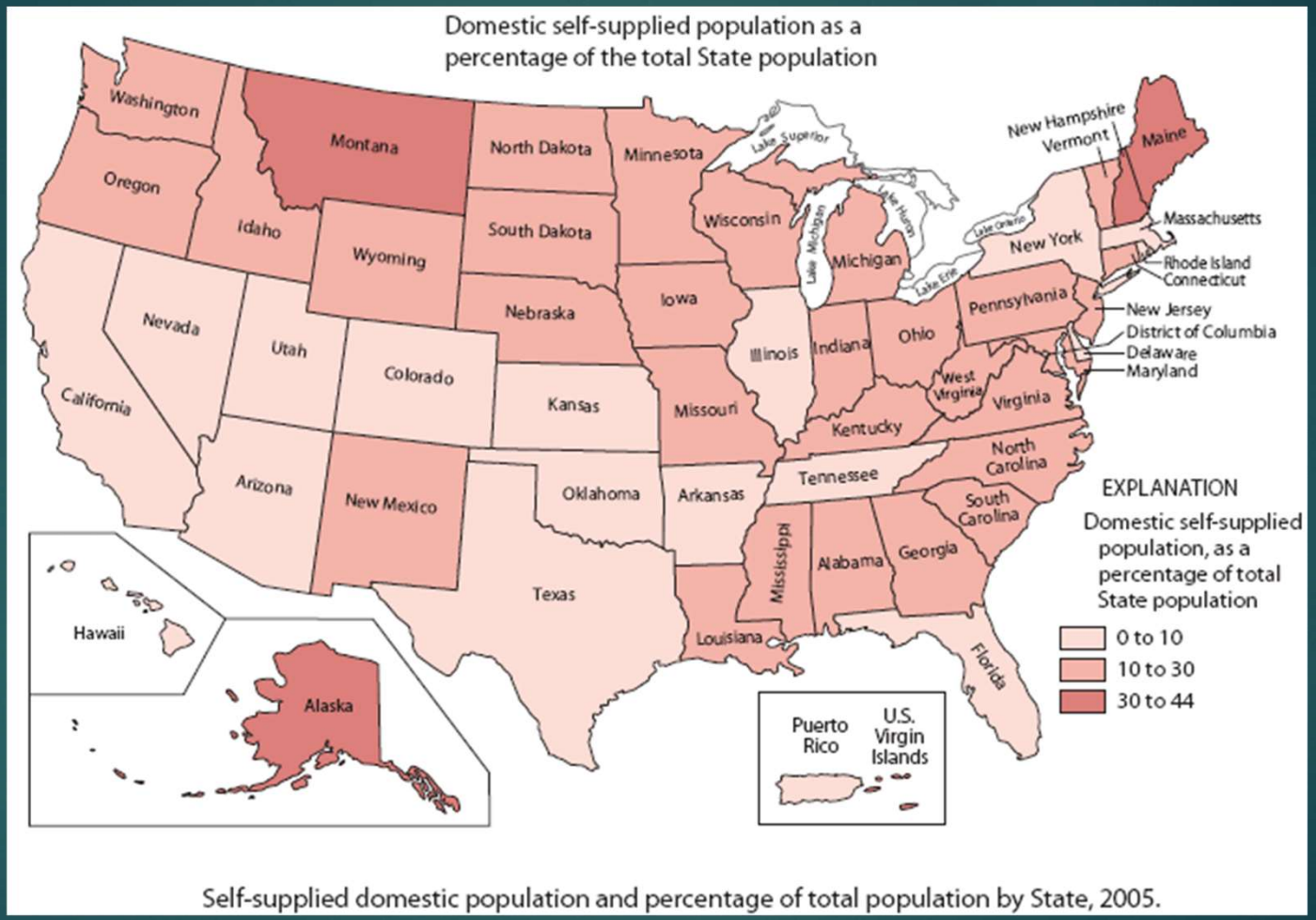
Driven Well

Drilled Wells

- These are constructed by percussion or rotary-drilling machines. Drilled wells can be thousands of feet deep and require the installation of casing. Drilled wells have a lower risk of contamination due to their depth and use of continuous casing.



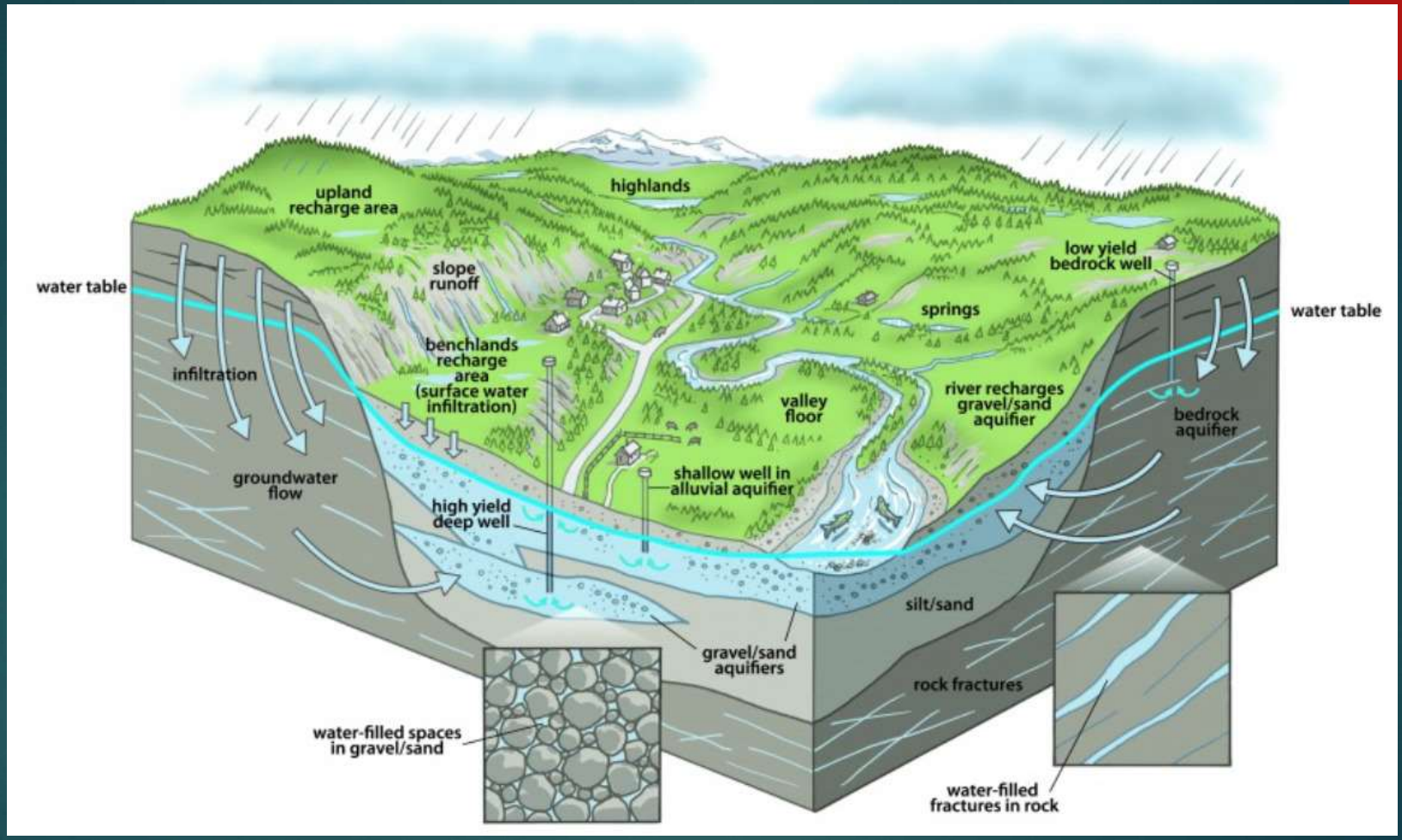
Drilled Well



Self-supplied domestic population and percentage of total population by State, 2005.

Types of Water Sources

- Water Table
- Unconfined Aquafer
- Confined Aquafer


upland
recharge area
highlands
low yield
bedrock well
water table
slope
runoff
springs
water table
benchlands
recharge
area
(surface water
infiltration)
infiltration
valley
floor
river recharges
gravel/sand
aquifier
bedrock
aquifier
groundwater
flow
shallow well in
alluvial aquifier
high yield
deep well
silt/sand
gravel/sand
aquifiers
rock fractures
water-filled spaces
in gravel/sand
water-filled
fractures in rock

Seasonal Changes

- In latitudes where freezing is common, there is less recharge from rain or snowmelt during winter, which causes the water table to fall. Sporadic or differential freezing of the soil in the fall and winter inhibits recharge to the saturated zone, and the complete freezing of the soil in winter prevents all recharge until the soil thaws in the spring.

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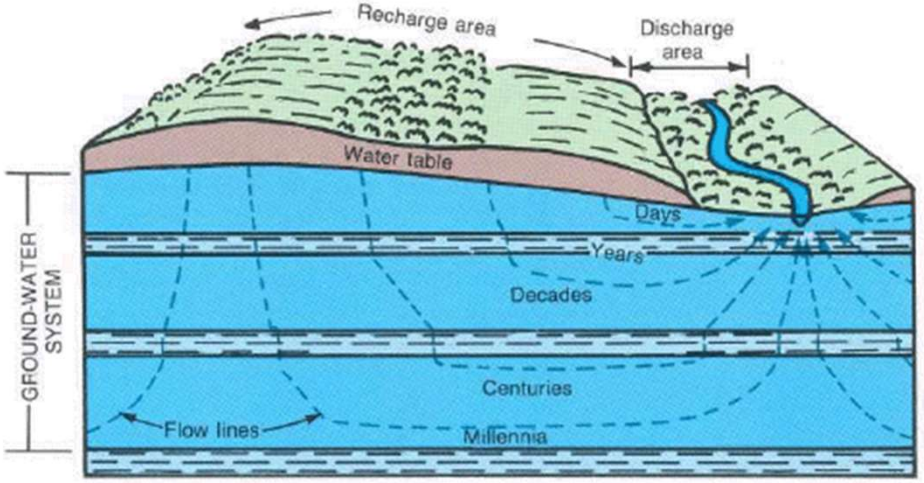
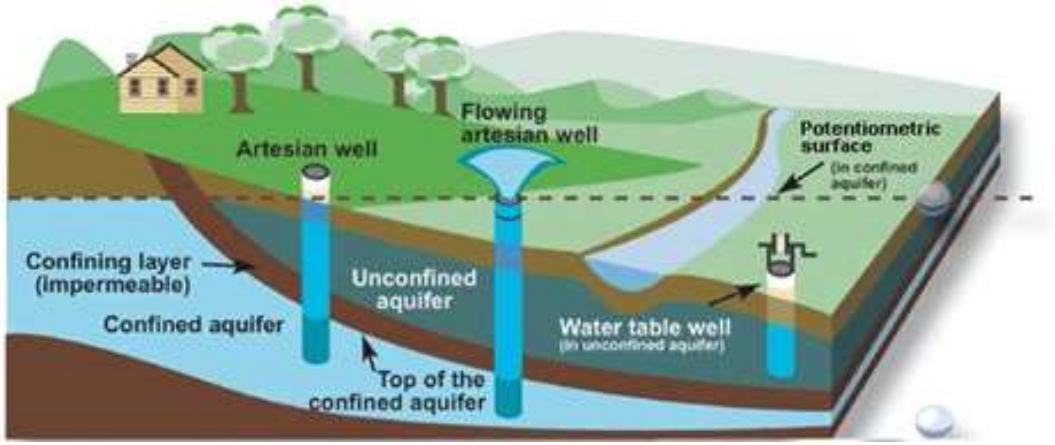




Aquafers and Wells

The Water Table

- This source is the closest to the surface and the most susceptible to contamination. It can also be a season source and fluctuate from season, year, and amount of rain. This source is the least reliable.

The Unconfined Aquifer

- The unconfined aquifer is the next closest source of water. It can also be contaminated by surface pollutants. This aquifer can fluctuate in amount but is less so than the seasonal water table. This source is also not under internal pressure.

The Unconfined Aquifer

- This type of well is also called an unconsolidated well and are drilled into a formation consisting of soil, sand, gravel or clay material that collapses upon itself.

The Confined Aquifer

- This is the deepest source reaching sometimes several thousand feet. This source is typically below bed rock and in a rock substrate. Often called artesian aquifers because they are under pressure from being confined. This source can be contaminated but usually from old sources of contamination.

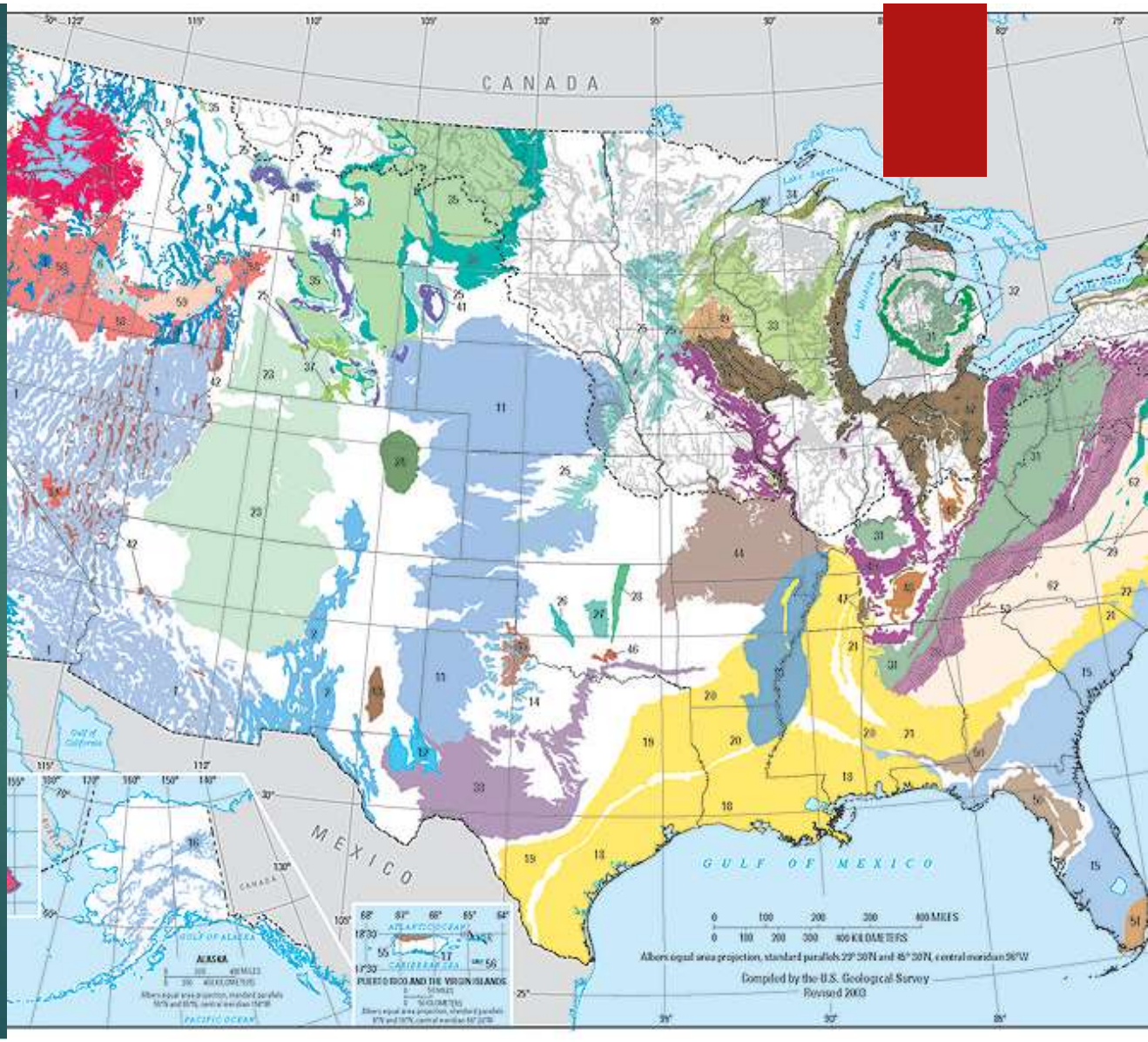
The Confined Aquifer

- This type is also called the consolidated well and are drilled into a formation consisting entirely of a natural rock formation that contains no soil and does not collapse. Their average depth is about 250 feet.

The Best Source

Typically, the purest, most abundant, and source that is already under pressure is usually an artesian confined aquifer. This will require less filtration and guarantee the most reliability to supply the needs of the residence. Because though it is the deepest, these wells can often cost over $10,000, go sometimes 1000 feet down with out the guarantee of getting water.

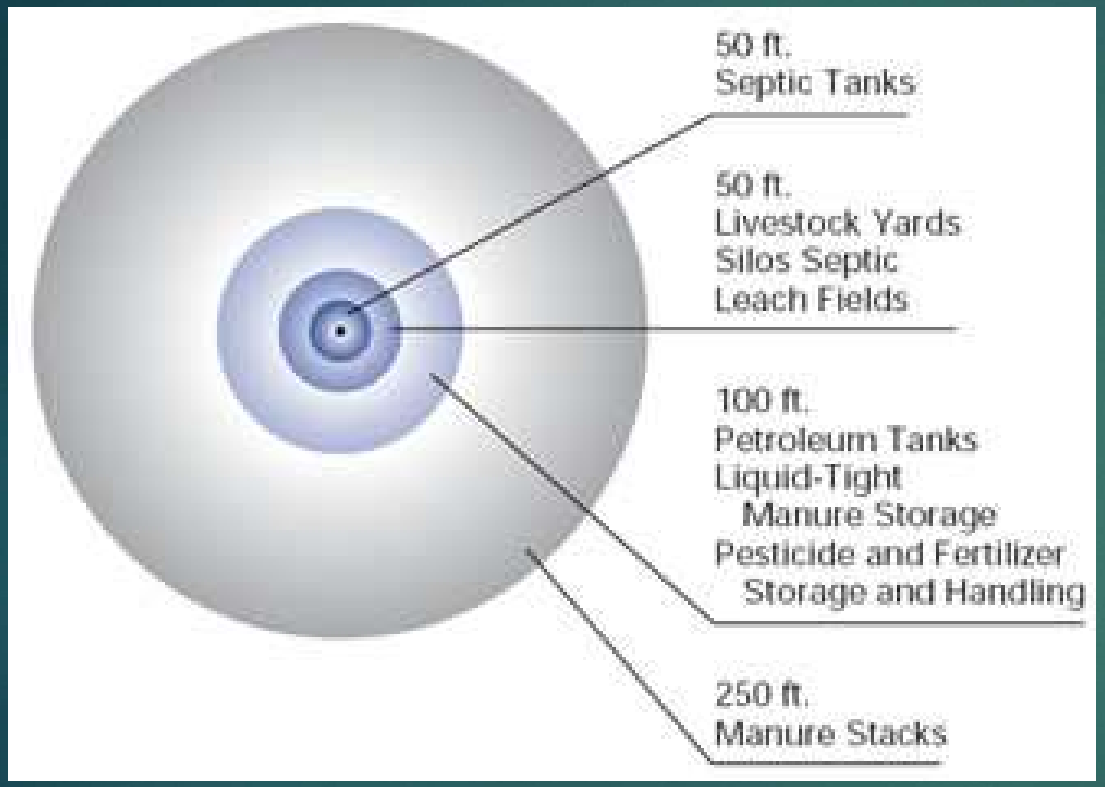
US Principal Aquifers



Well Location

- Proper well location and construction are key to the safety of your well water. The well should be located so rainwater flows away from it. Rainwater can pick up harmful bacteria and chemicals on the land's surface. If this water pools near your well, it can seep into it and potentially cause health problems.

Setbacks from Source Contamination



Septic Tanks and Water Wells

- It is recommended that a septic system get inspected every 1-2 years when pumped off to ensure it is not contaminating the ground water and the private well.