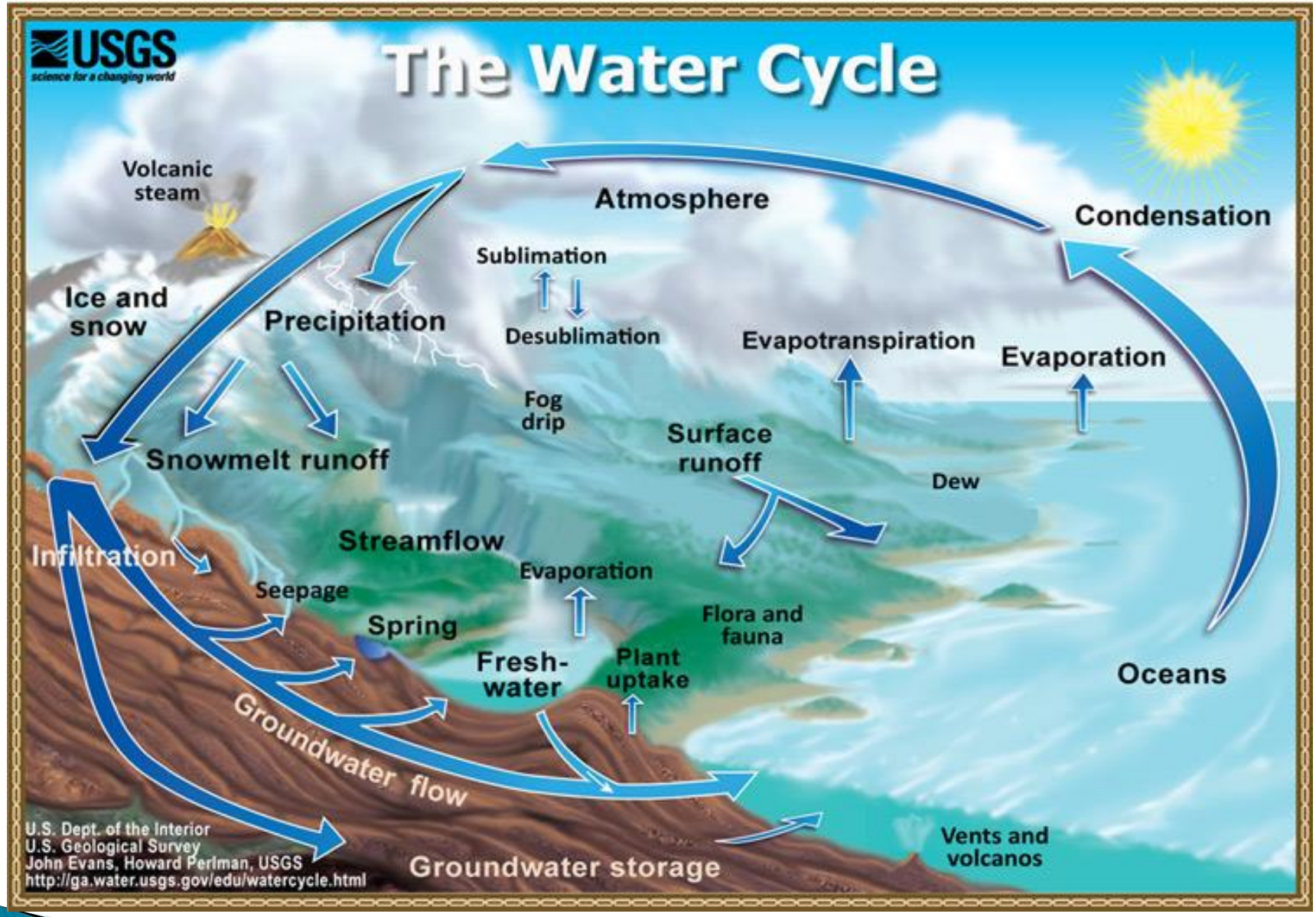
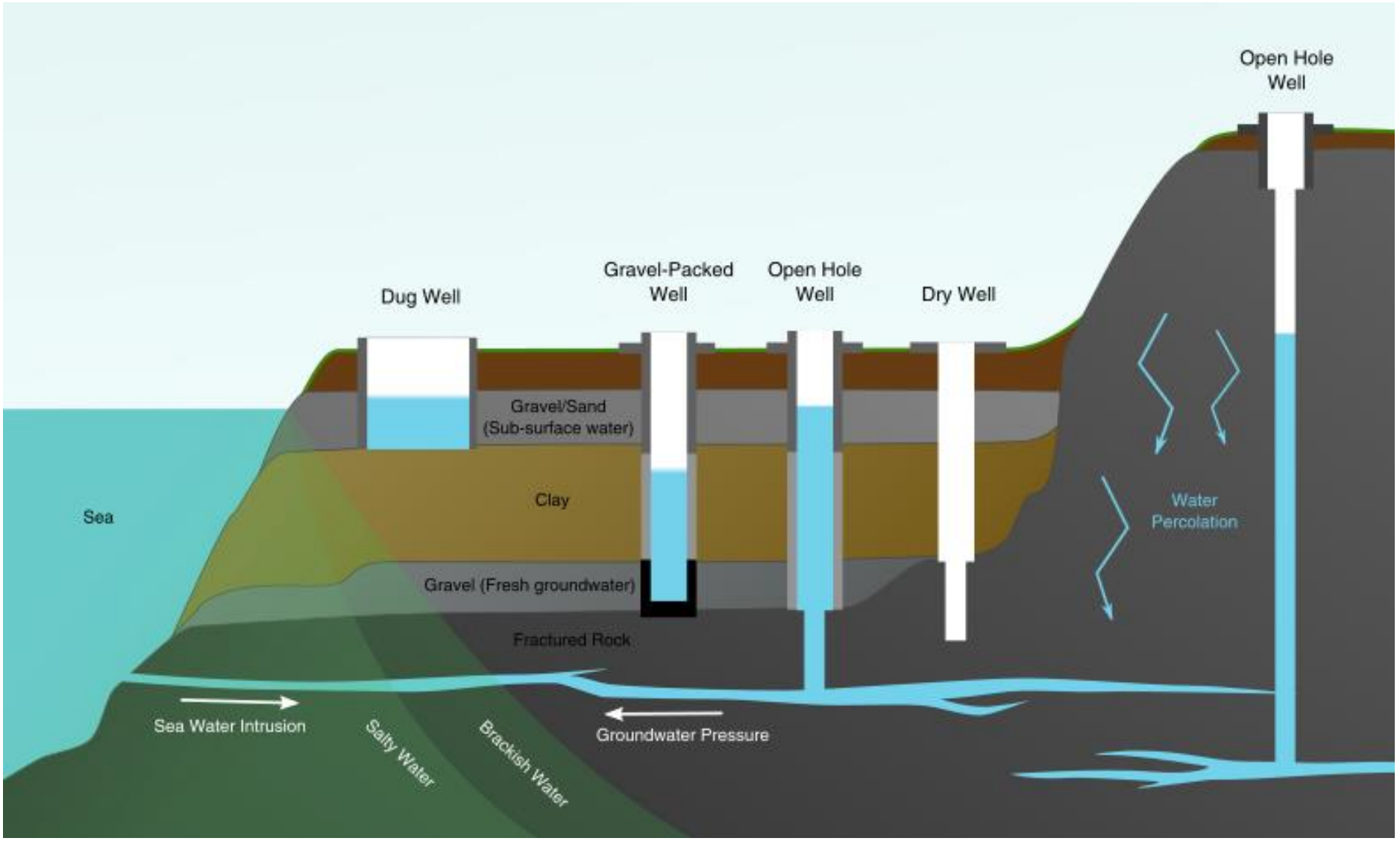
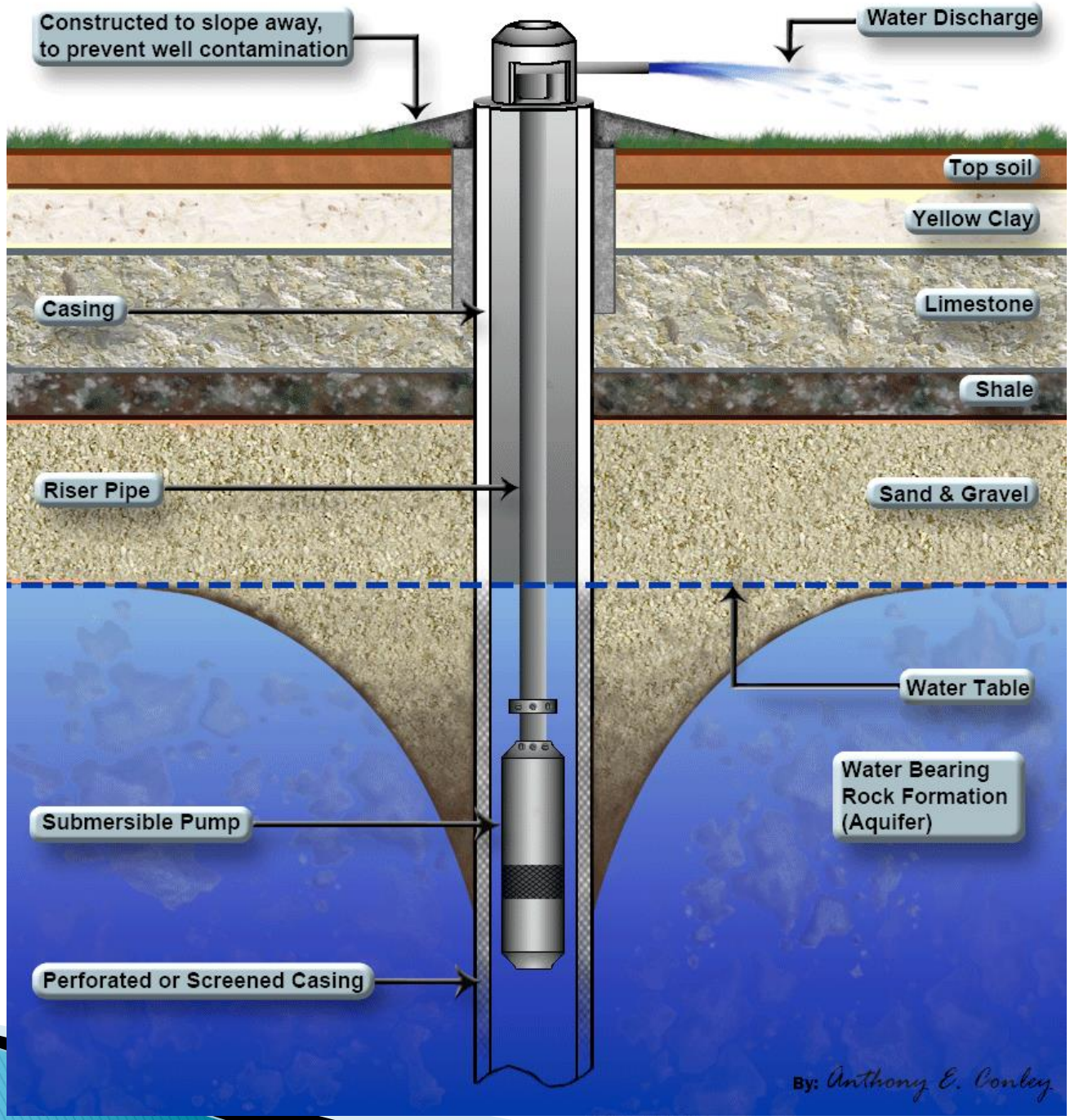
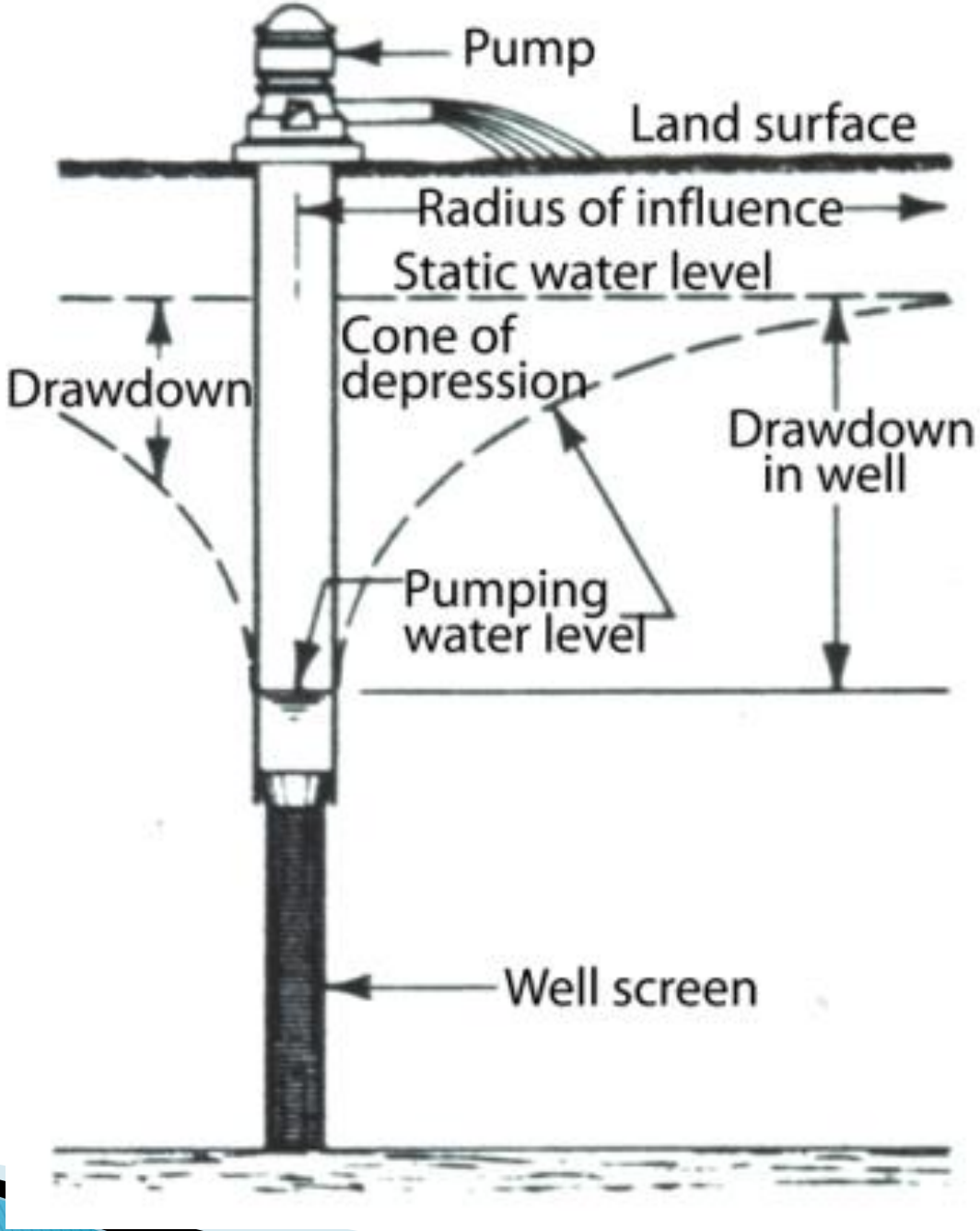
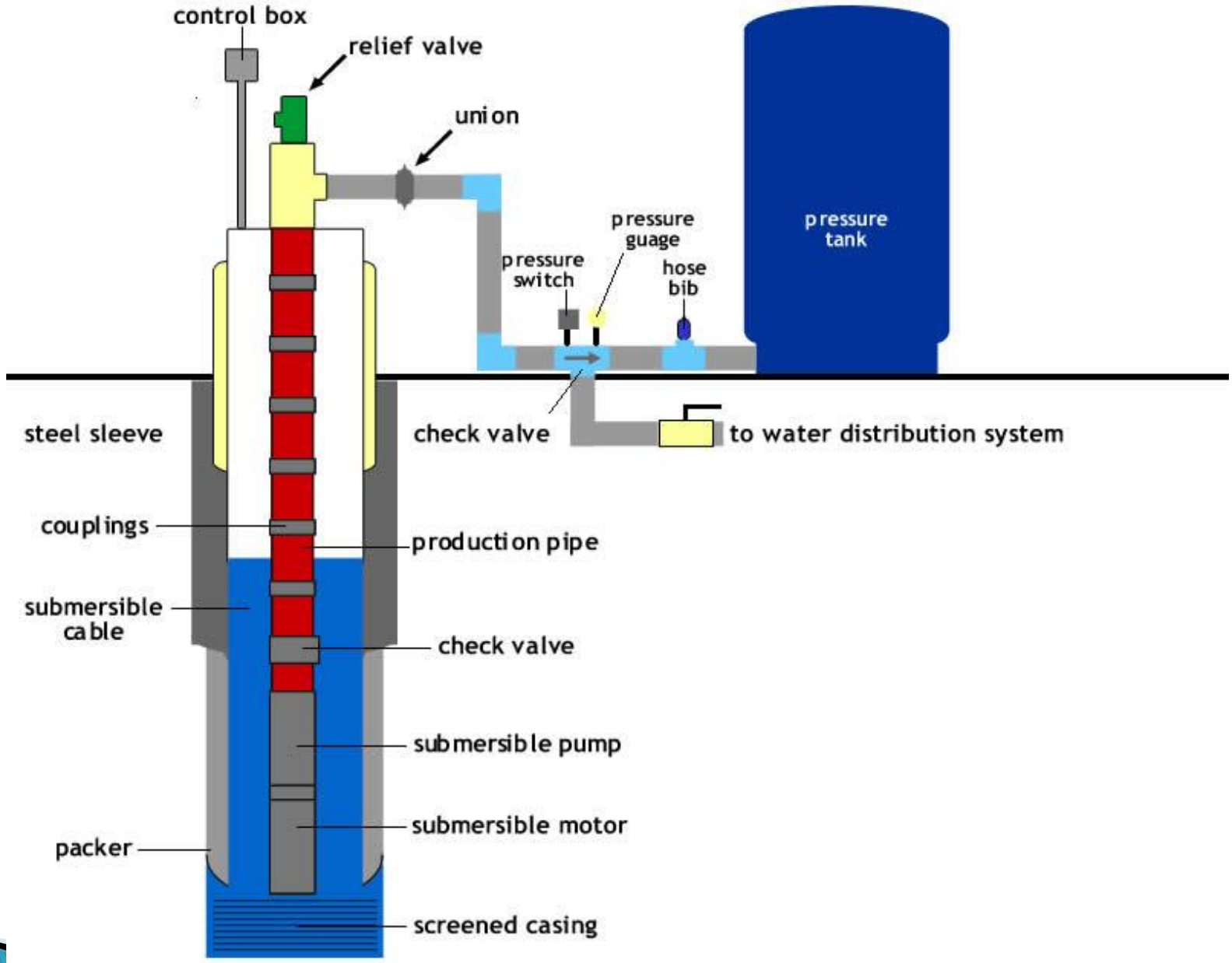
Wells, Pumps and Problems


USGS
science for a changing world
The Water Cycle
Volcanic steam
Atmosphere
Condensation
Sublimation
Ice and snow
Precipitation
Desublimation
Evapotranspiration
Evaporation
Fog drip
Surface runoff
Snowmelt runoff
Dew
Streamflow
Infiltration
Evaporation
Seepage
Flora and fauna
Spring
Fresh-water
Plant uptake
Oceans
Groundwater flow
U.S. Dept. of the Interior
U.S. Geological Survey
John Evans, Howard Perlman, USGS
http://ga.water.usgs.gov/edu/watercycle.html
Groundwater storage
Vents and volcanos

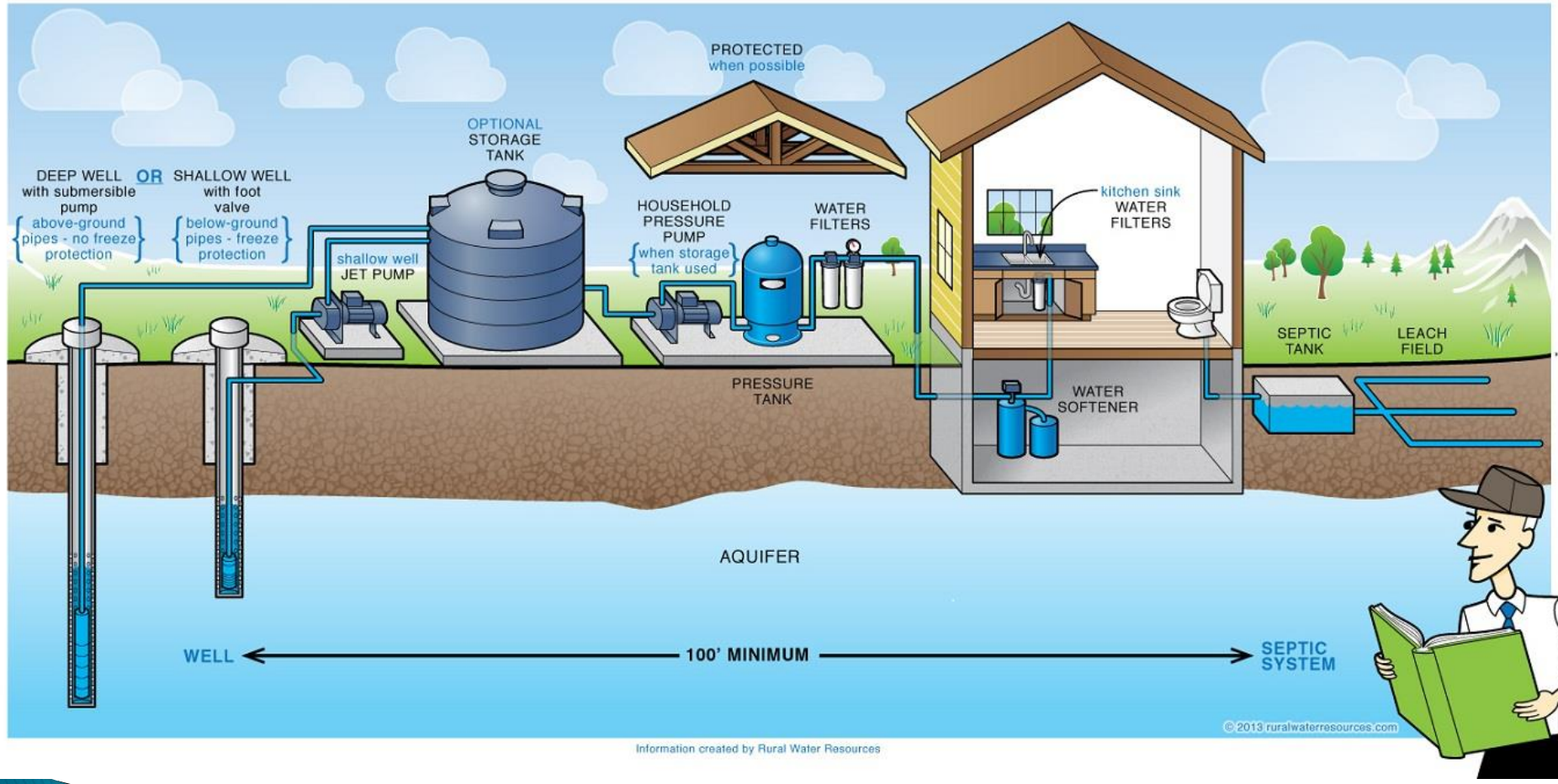

Open Hole Well
Gravel-Packed Well
Open Hole Well
Dug Well
Dry Well
Gravel/Sand (Sub-surface water)
Clay
Sea
Water Percolation
Gravel (Fresh groundwater)
Fractured Rock
Sea Water Intrusion
Salty Water
Brackish Water
Groundwater Pressure


Constructed to slope away, to prevent well contamination
Water Discharge
Top soil
Yellow Clay
Limestone
Shale
Sand & Gravel
Casing
Riser Pipe
Water Table
Water Bearing Rock Formation (Aquifer)
Submersible Pump
Perforated or Screened Casing
By: Anthony E. Conley


Pump
Land surface
Radius of influence
Static water level
Cone of depression
Drawdown
Drawdown in well
Pumping water level
Well screen


control box
relief valve
union
pressure guage
pressure switch
hose bib
pressure tank
steel sleeve
check valve
to water distribution system
couplings
production pipe
submersible cable
check valve
submersible pump
submersible motor
packer
screened casing

Typical Well Equipment Connection



Information created by Rural Water Resources

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Well Maintenance

The safety and purity of your drinking water and the efficient operation of your private well system depends on a well-organized maintenance program. Protect your investment in a quality water supply through regular inspection, testing and repair or treatment.

Create a Well Maintenance Log

Gather a comprehensive history on your well and water quality. If you don't already have a well log (also known as a water well record or drilling report), ask your well contractor or state environmental agency for a copy.

The well log will include a reference number for the well, original site owner, location of the well, construction and contractor details, as well as the results from any water tests. The well log should help establish the location, age and condition of the well. This information will provide the basis on which to schedule regular tests of water quality and inspections of well equipment, as well as regular maintenance and repairs.

Set a Well Maintenance Schedule

Plan for the maintenance of the wellhead, well system, water quality, water treatment devices and septic system.

Well Inspection

- ☑ Inspect your wellhead several times a year. Check the condition of the well covering, casing, and well cap to make sure all are in good repair, leaving no cracks or other entry points for potential pollutants.
- ☑ Have the well system, including the pump, storage tank, pipes and valves, and water flow inspected every 10 years by a qualified well driller or pump installer.
- ☑ If you have no inspection record and cannot determine the age of the well, have it inspected immediately by a water well professional.
- ☑ When your well reaches the end of its serviceable life, usually more than 20 years, contact your water well professional to install a new system and properly close the old well.

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Well Maintenance

Water Testing

- Test drinking water immediately if you have no recent test results or any record of previous tests.
- Test drinking water for bacteria every year. Also test annually for nitrates if you live in an agricultural area or have an on-site septic system. The best time to perform these annual tests is in the spring.
- Test if you notice any change in the taste, color or odor of your water.
- Test more than once a year in special situations: someone in the household is pregnant or nursing; there are unexplained illnesses in the family; your neighbors find a dangerous contaminant in their water; or there is a spill of chemicals or fuels into or near your well.
- Test after disinfection, within one or two weeks, to make sure the water is pure.
- Test after any flooding in or near the well, to determine if flood water carried bacteria or other contaminants into the well system.

Contact your local health department, cooperative extension office, state environmental agency or the wellcare® Hotline at 888-395-1033 for other water testing guidelines and to find a state-certified water testing laboratory in your area.

Water Treatment System

- Test drinking water before installing any water treatment device.
- Test water every year to make sure the device is working properly.
- Follow the inspection and maintenance schedule provided by your water treatment device manufacturer or water systems professional.

Review the Water Systems Council information sheet, "Well Water Treatment Options and Costs."

Septic System Testing

- Inspect the septic tank each year for capacity and leaks.
- Pump out the tank as needed, usually every three to five years, based on the number of people in the household and the size of the tank.
- Repair the tank or drainfield system as needed to prevent leaks of bacteria and nutrients into groundwater.
- A poorly maintained wastewater treatment system poses a serious threat to the quality of your drinking water and can require expensive repairs. The cost of pumping a septic tank is far less than the expense of replacing a drainfield clogged by solids.

Review the Water Systems Council information sheet, "Your Septic System."

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Water Well Testing

Table 1: Tests for Specific Conditions

Conditions or Nearby Activities	Recommended Test
Recurrent gastrointestinal distress	Coliform bacteria
Household plumbing contains lead	Copper, hardness, lead, pH, salts
Radon present in indoor air or region	Radon
Scaly residues, soaps don't lather	Chloride, hardness, sodium
Water softener to treat hardness	Iron, manganese (before purchase)
Stained plumbing fixtures, laundry	Iron, manganese, sulfate, tannins
Objectionable taste or smell	Hydrogen sulfide, pH, hardness, metals
Water is cloudy, frothy or colored	pH, salts, tannins, turbidity
Corrosion of pipes, plumbing	Copper, lead, pH, salts
Rapid wear of water treatment equipment	Hardness, iron, manganese, pH, salts
Nearby areas of intensive agriculture	Coliform bacteria, nitrate, pesticides
Nearby coal, other mining operation	Metals, pH, TDS
Gas drilling operation nearby	Barium, chloride, sodium, strontium
Gasoline or fuel oil odor	Volatile organic compounds (VOCs)
Dump, landfill, factory or dry cleaning operation nearby	Metals, pH, salts, VOCs
Salty taste and seawater or a heavily salted road nearby	Boron, chloride, sodium, TDS

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Water Well Testing

Table 2: Tests for Specific Contaminants

Contaminant	When to Test	How to Test	When to Treat/ Max. Limits
Arsenic	Baseline test in areas prone to arsenic/annually after treatment	State laboratory	10 parts/billion
Bacteria	Annually in spring; newborn in house; well equipment installed	Local health department test of total coliforms	Positive test of total coliforms; presence of fecal coliforms
Chromium	Near steel/pulp mills or in at-risk states*	State laboratory	100 parts/billion
Iron	Water colored or leaving stains of orange, red, rusty	State laboratory	300 parts/billion
MTBE (methyl tertiary butyl ether)	Water has oil/gas smell or oily film in area where MTBEs used	State laboratory	20 parts/billion
Nitrate	Annually in farm areas; pregnant woman/infant in house	State laboratory	10 parts per million
Radium	Area with high radium in bedrock	State laboratory	5 picocuries per liter
Radon	Before buy/move into new home	State laboratory	Check with State Radon Office
Sulfur & Manganese	Bitter taste, rotten egg odor, black/ brown water or staining	Local health dept.	Sulfur: 250 parts/ million Manganese: 50 parts/billion
TCE (trichloroethylene)	Near factories/dry cleaners or in at-risk states**	State laboratory	5 parts/billion

** Chromium at-risk states: California, Connecticut, Delaware, Illinois, Indiana, Maryland, New York, New Jersey, Pennsylvania, Texas, Wisconsin*

*** TCE at-risk states: Pennsylvania, Illinois, Georgia, Texas, Massachusetts, West Virginia*


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