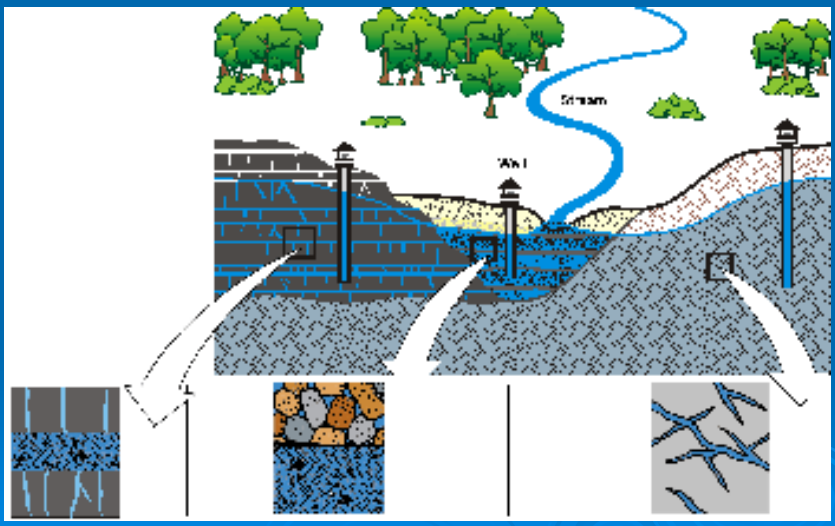
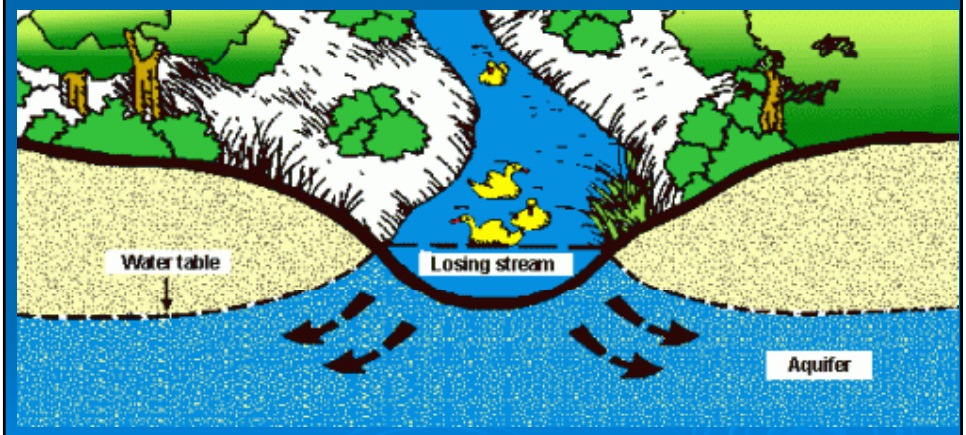
Water



Water table
Gaining stream
Aquifer

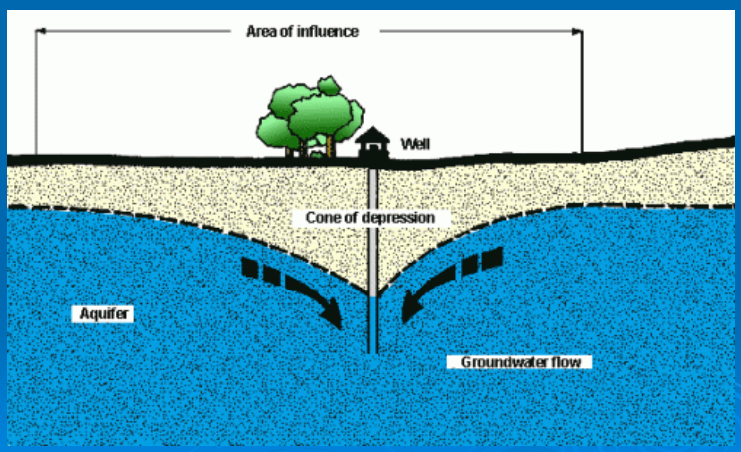

Water table
Losing stream
Aquifer

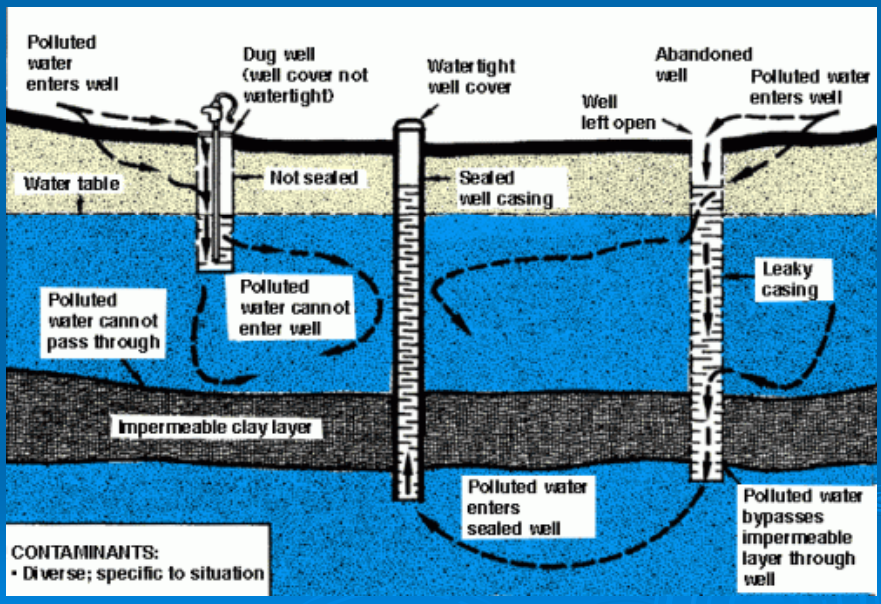
Wells

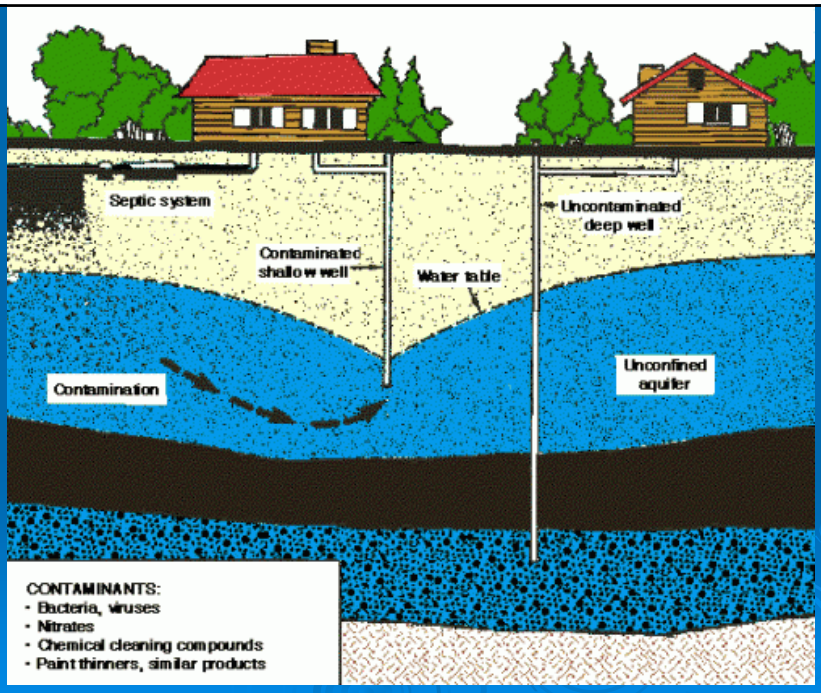
- Characteristics
- Drills for wells can go to any depth and through anything
  - Charged by foot of depth
  - Large cobbles cause the most trouble when drilling wells

Wells

- Install a casing (solid steel tube) in the dug hole
  - Has to be a minimum of 30'
  - Casing is left 1' above the ground
  - Grout sealed after completion
- Well driller required to file a well log containing:
  - Location
  - Depth
  - Static water level
  - Draw down
    - Rating in gallons/ minute @ time
    - Based on test pump rating


Area of influence
Well
Cone of depression
Aquifer
Groundwater flow


Polluted water enters well
Dug well (well cover not watertight)
Watertight well cover
Abandoned well
Polluted water enters well
Well left open
Water table
Not sealed
Sealed well casing
Leaky casing
Polluted water cannot pass through
Polluted water cannot enter well
Impermeable clay layer
Polluted water enters sealed well
Polluted water bypasses impermeable layer through well
CONTAMINANTS:
• Diverse; specific to situation



Water

- Flow rate
  - Amount of water flowing through at a given time
  - Minimum 5 gal/min; 10 gal/min preferred
- Peak use rate
  - Heaviest use of the day over two hours
- Intermediate storage may be needed

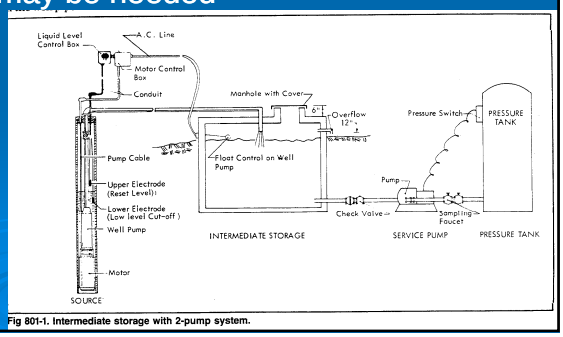


Fig 801-1. Intermediate storage with 2-pump system.

Water

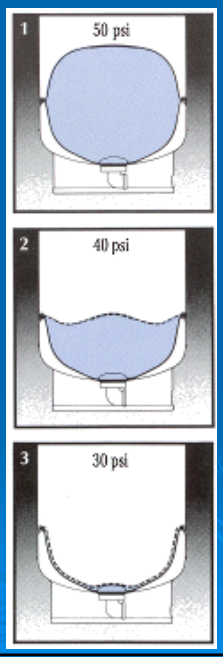
- Home and outdoor living needs
  - Outside hose faucet about 5 gal/min; larger hose for slab washing about 10 gal/min
- Farm needs

Water

- Water pressure
  - PSI=pressure = pounds/inch^2 or pascals
  - Generally 20 to 60 psi is customary use pressure

Pressure Tank

- Pump starts and fills tank when pressure falls to a pre-set minimum level
- Air above water compresses as tank fills-pushes water to outlet



Pressure Tank

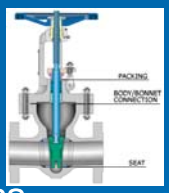
- Some have separation between water and air (rubber bladder, diaphragm), some don't
- Water-logged tank (w/o separation)
  - Pump starts and stops more frequently
  - Air has dissolved in the water used and no longer pushes against the water
  - Drain completely and refill or pump in compressed air

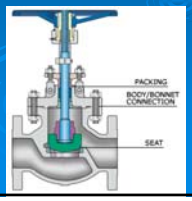
Water Pipe

- Galvanized threaded pipe most used
  - Durable, rigid
  - Galvanized doesn't work loose with small jerks when pump starts and stops
- Copper and plastic
  - For domestic inside use
  - Small pipes that feed water to various uses
- PVC
  - Variety of sizes
  - Works well for buried connections from well to various places
    - House, barn, etc.

Valves

- Ball valve
  - Turn ¼ turn
  - Allows water through with least friction loss
- Gate valve
  - Drop gate between flow of water
- Globe valve
  - Least desirable in terms of friction loss
  - Two dividers within valve





Effects on Pressure

- Elevation (Head) creates pressure
  - Distance between water surface in well (below) or above user (elevation difference)
    - Above the user – adds to pressure
    - Below user – must lift the water or increase the pressure
  - Head (feet) will be larger than pressure (psi)
    - Head in feet x 0.434 = pressure psi
    - Pressure psi x 2.31 = Head in feet

Friction losses

- Friction as water passes through pipe
  - Affected by flow rate (gpm), pipe material, and distance traveled
- Friction loss tables
- Max. 5 psi from tank to service entry, 10 psi from tank to remote outlet
  - Reduce flow rate or increase pipe size

Example

- Lift - 20' x .434 = 8.7 psi or a pump that has more than a 20' head rating
- Pressure tank
- Elevation loss –

40' x .434 = 17.4 psi

- Friction loss – from tables
  - psi or head per 100'

Another example

- 115' net elevation change (120'-5') x .434 = 49.9 psi gain
- Globe valve friction = 25' steel pipe

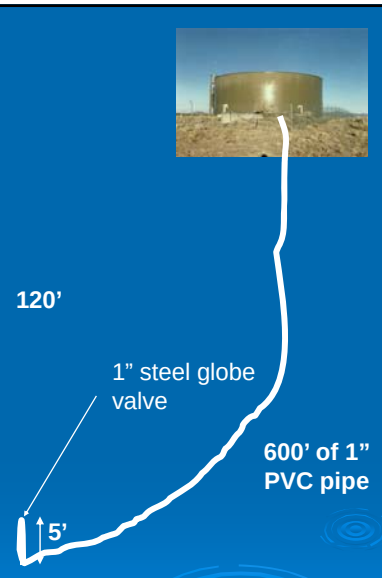
1.4 x 25/100 = .35 psi loss

- 6 - 100' lengths of PVC

0.8 x 6 = 4.8 psi loss

- So pressure at faucet

49.9 - .35 - 4.8 = 44.8 psi



Safety Measures

- Make sure to find acceptable water quality guide
  - Species specific
    - Horses, poultry sensitive
- Water quality problems and solutions
- Surface water is riskier than ground water
- Test annually

Wellwater.oregonstate.edu