Wells, Groundwater, and the Drought

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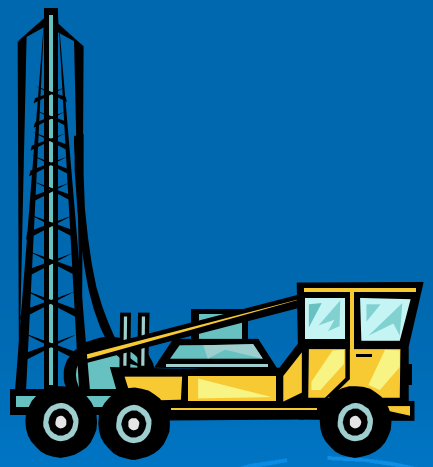
Background

- Approximately 40% of OC Population relies on groundwater for drinking water source
- Board of Health adopted well regulations for Orange County in 1980
- Expanded to groundwater protection regulations in mid 90's

Groundwater Program

- **Well regulations provide for:**
  - **Siting, specifications, construction observation, & approval**
    - **Drinking water wells**
    - **Irrigation / Agricultural**
    - **Monitoring**
    - **Geothermal**



Well Abandonment

- **Wells that are out of use**
  - **Safety hazard**
  - **Route of contamination**
  - **Liability**

- **Well Closure Program**
  - **Grant for closure incentives**
  - **75% cost up to $1500 / well**
  - **Refund of new well permit fees**

Groundwater Program

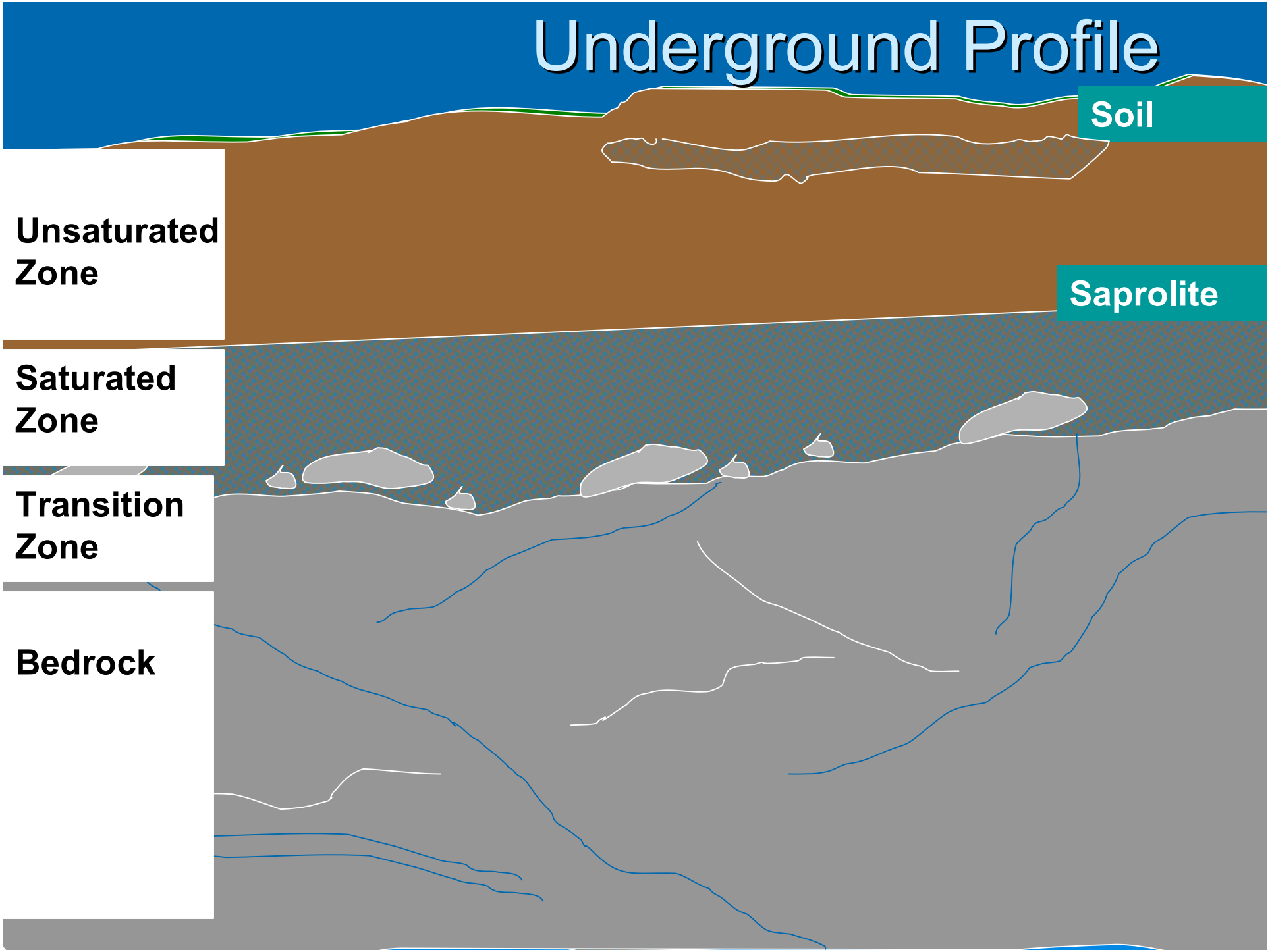
- **Orange County Health Department also provides:**
  - **Water sampling**
  - **Consultation for water treatment**
    - **Iron**
    - **Manganese**
    - **Low pH**
    - **Arsenic**

Well Siting & Permitting

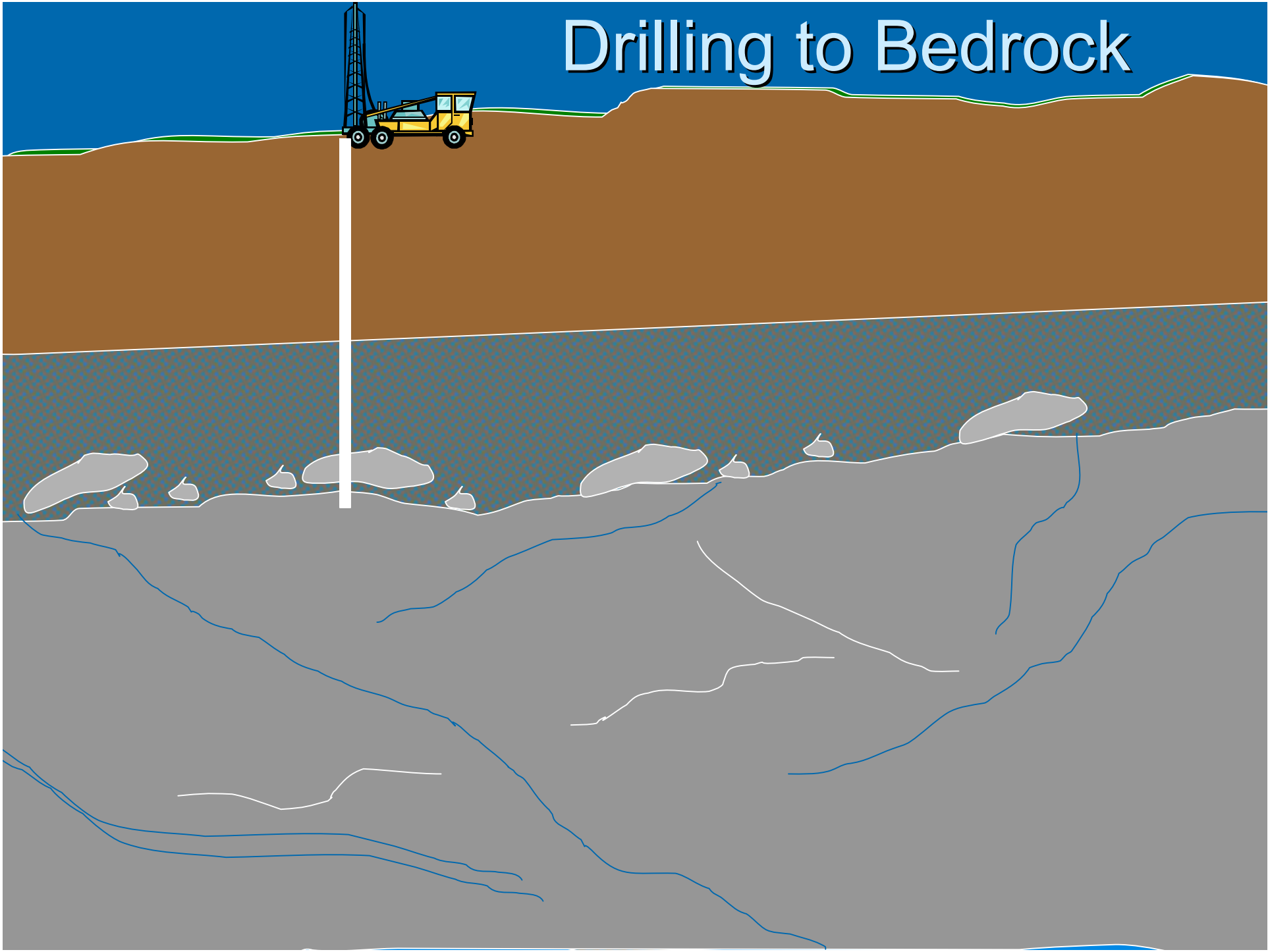
- Approximately 350 wells per year
- Average well in this area:
  - 300 feet deep
  - 60’ depth to bedrock
  - 70’ casing (63’ minimum required)
  - 18 GPM
    - First water hit averages 160 feet deep
    - Average yield of 10 GPM
- Records are on file - available on request

www.H2orange.org

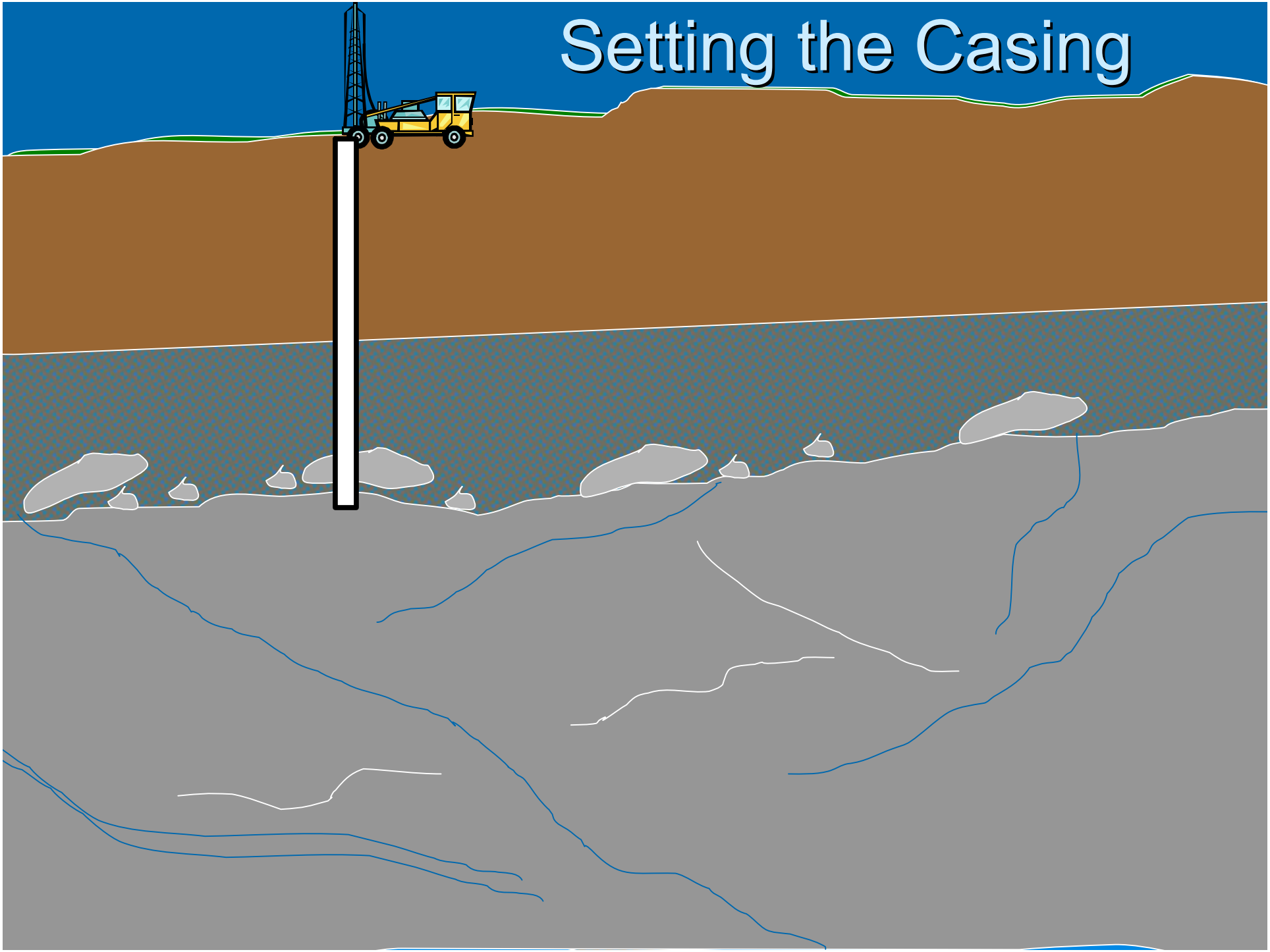
Underground Profile



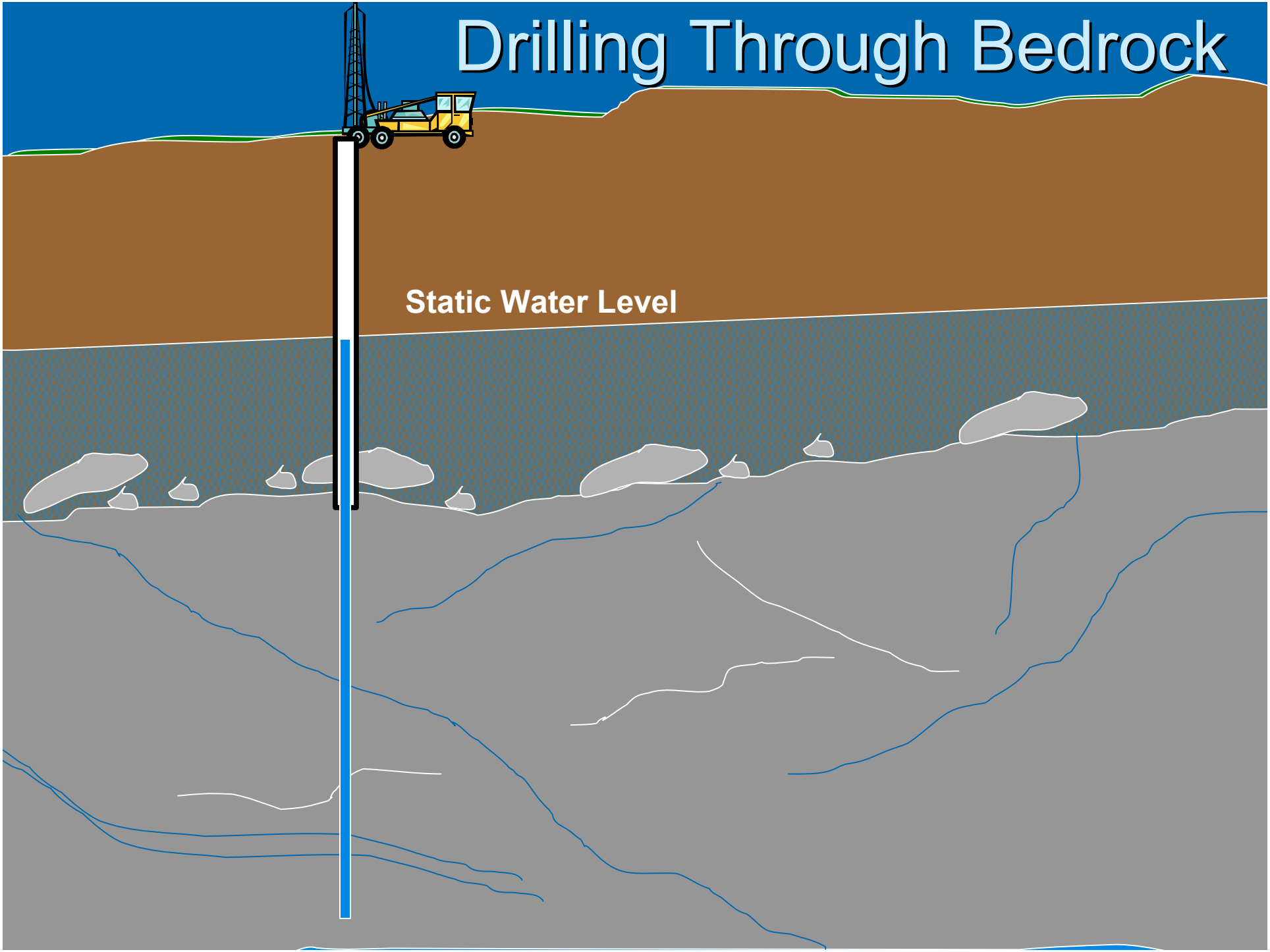
Drilling to Bedrock



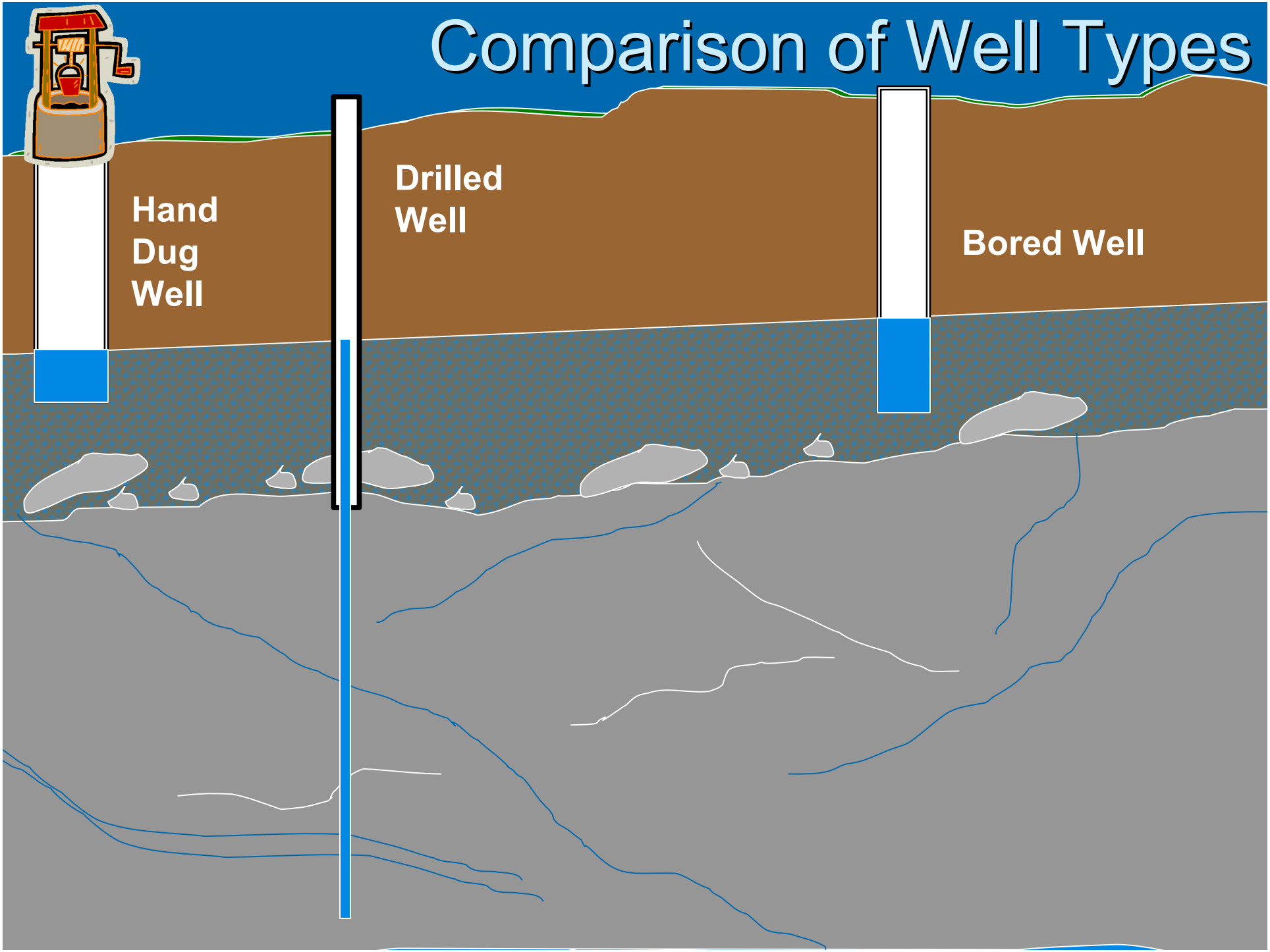
Setting the Casing



Drilling Through Bedrock



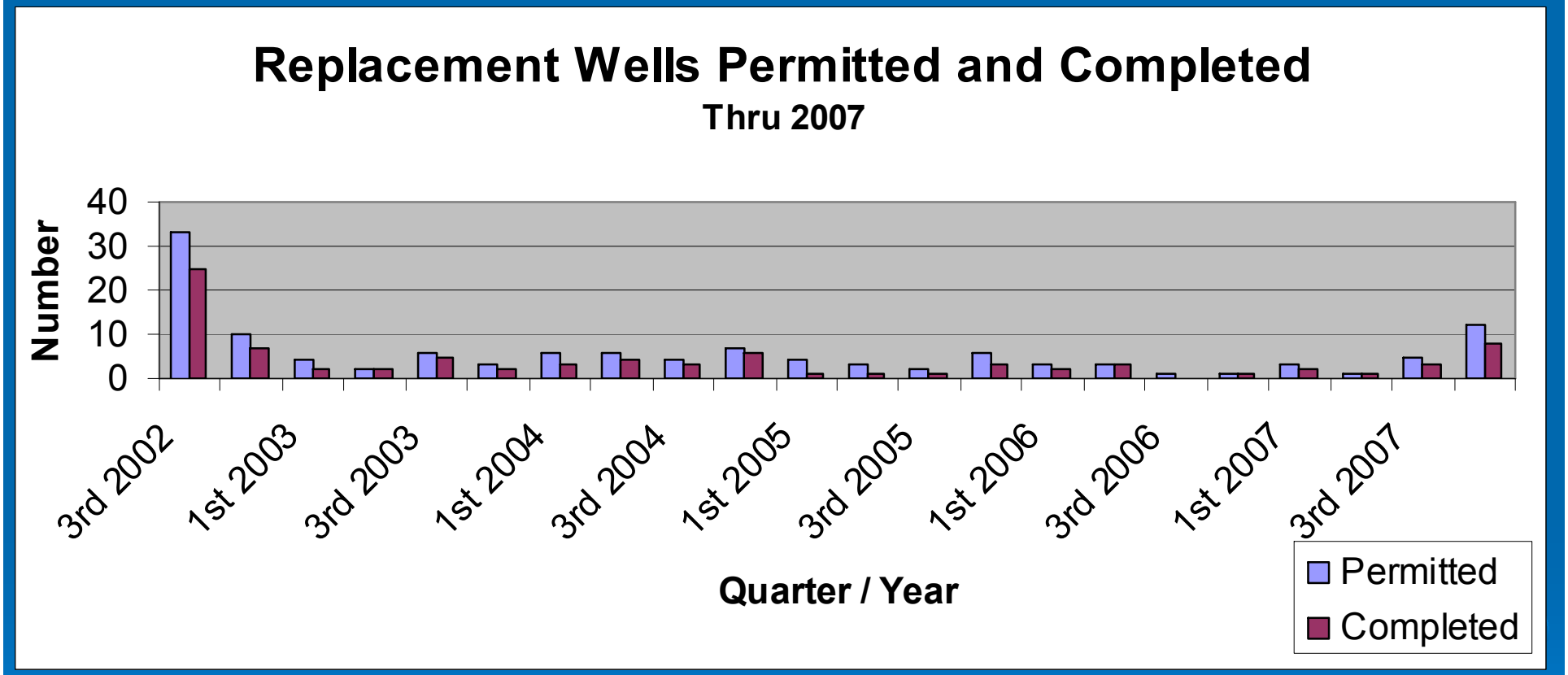
Comparison of Well Types



Well Yield vs. Withdrawal

- Yield estimated at time of drilling
- 1 to 2 GPM can sustain a household
- Generally few high yield water bearing zones >400’
- Household use = 60 gallons/person/day

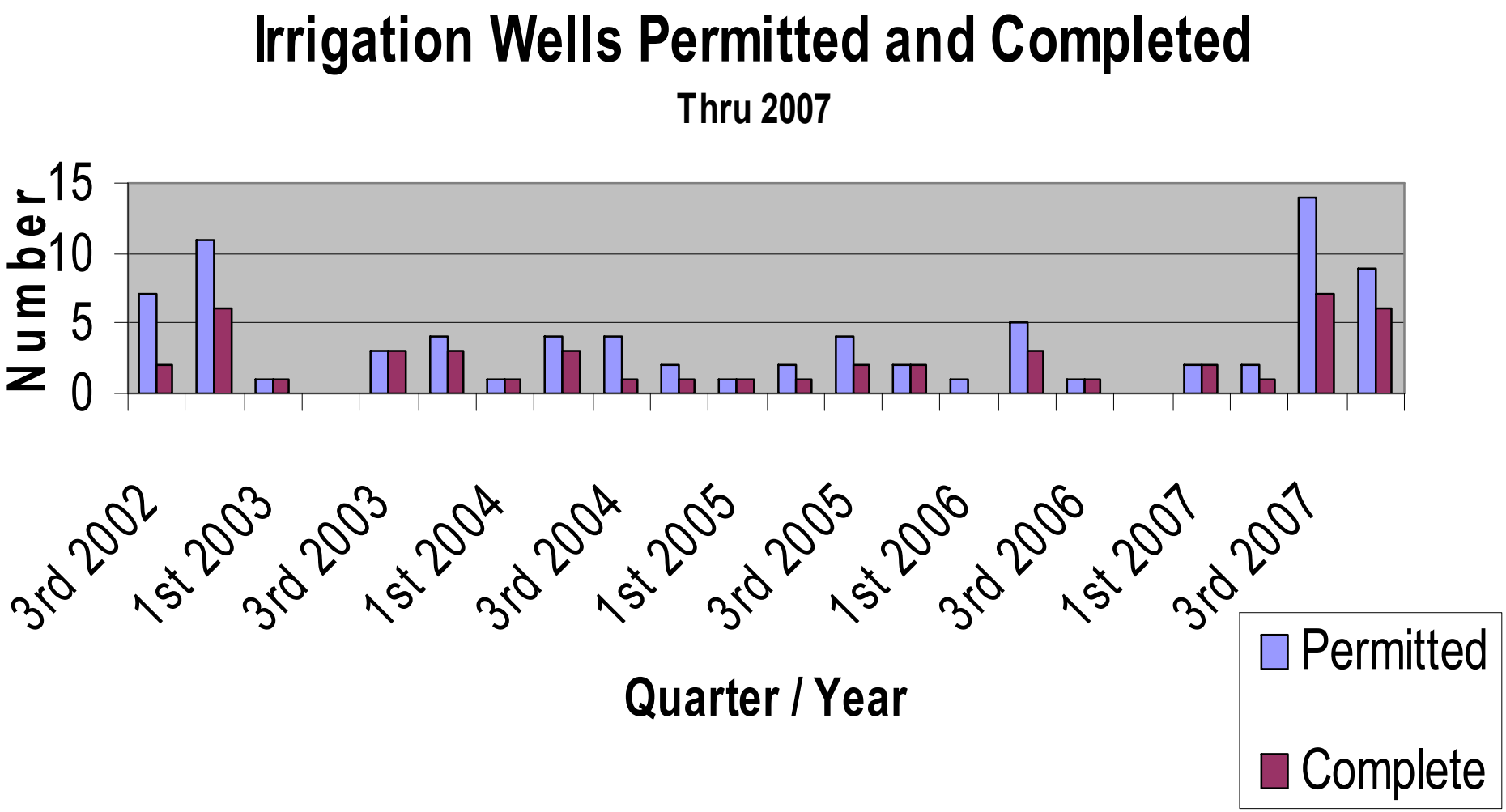
Drought Effects on Well Activities



Replacement Wells

- All water supplies that went dry were:
  - Springs
  - Shallow bored wells
  - Hand-dug wells
  - Shallow drilled wells - <75 feet in depth
- Most “borderline” wells replaced in the 2001 – 2002 drought

Drought Effects on Well Activities



Irrigation Wells

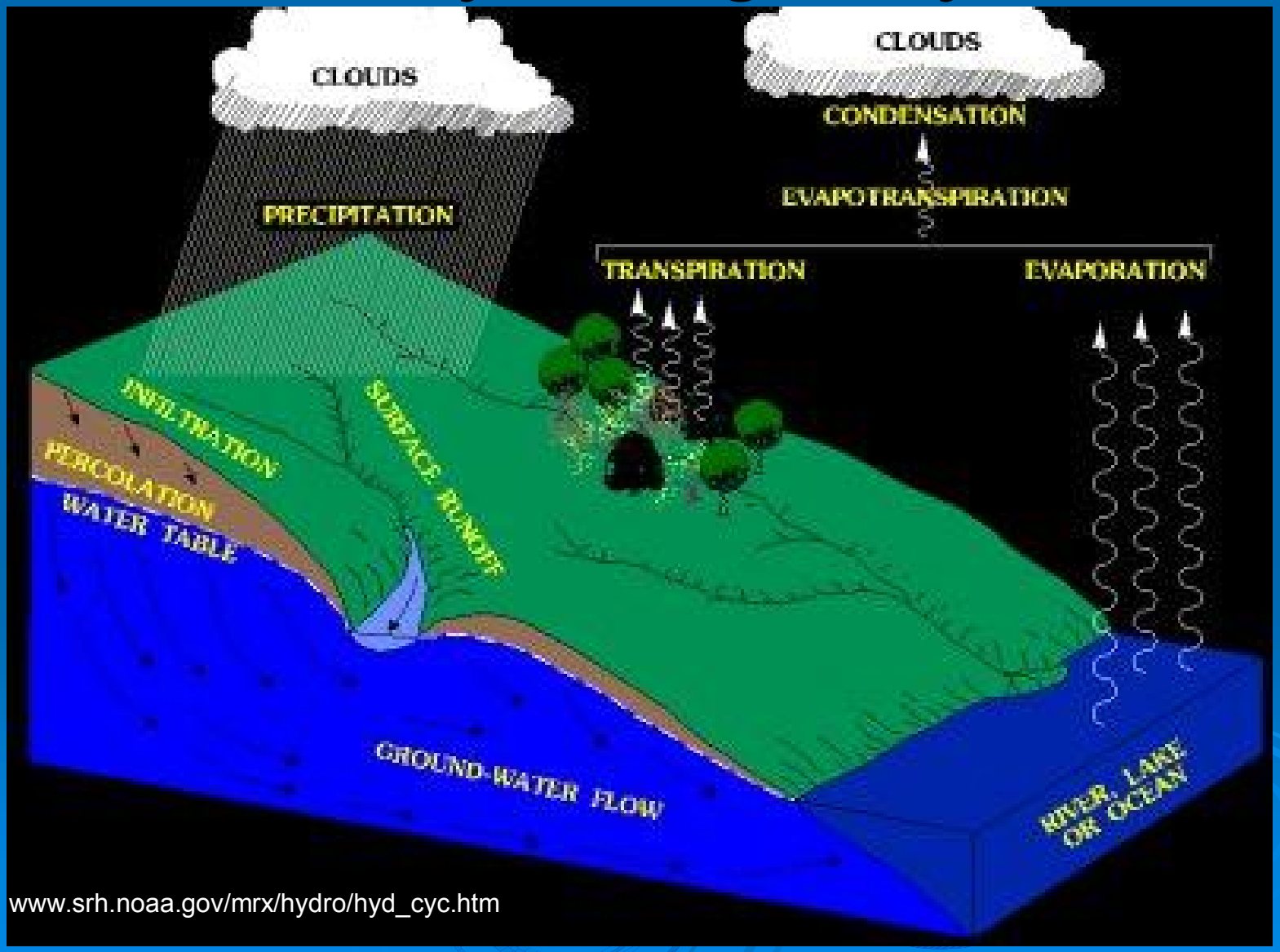
- **Marked increase in agricultural and irrigation wells in the past 6 months**
  - **Residential irrigation**
    - **Both rural and in-town**
  - **Agricultural**
    - **Replacing springs, ponds, and creeks**

Livestock Watering

Well Over-use

- **No viable wells observed going dry**
- **Affect on other wells or surface water**
  - **“Circuit Breaker” Effect:**

The Hydrologic Cycle

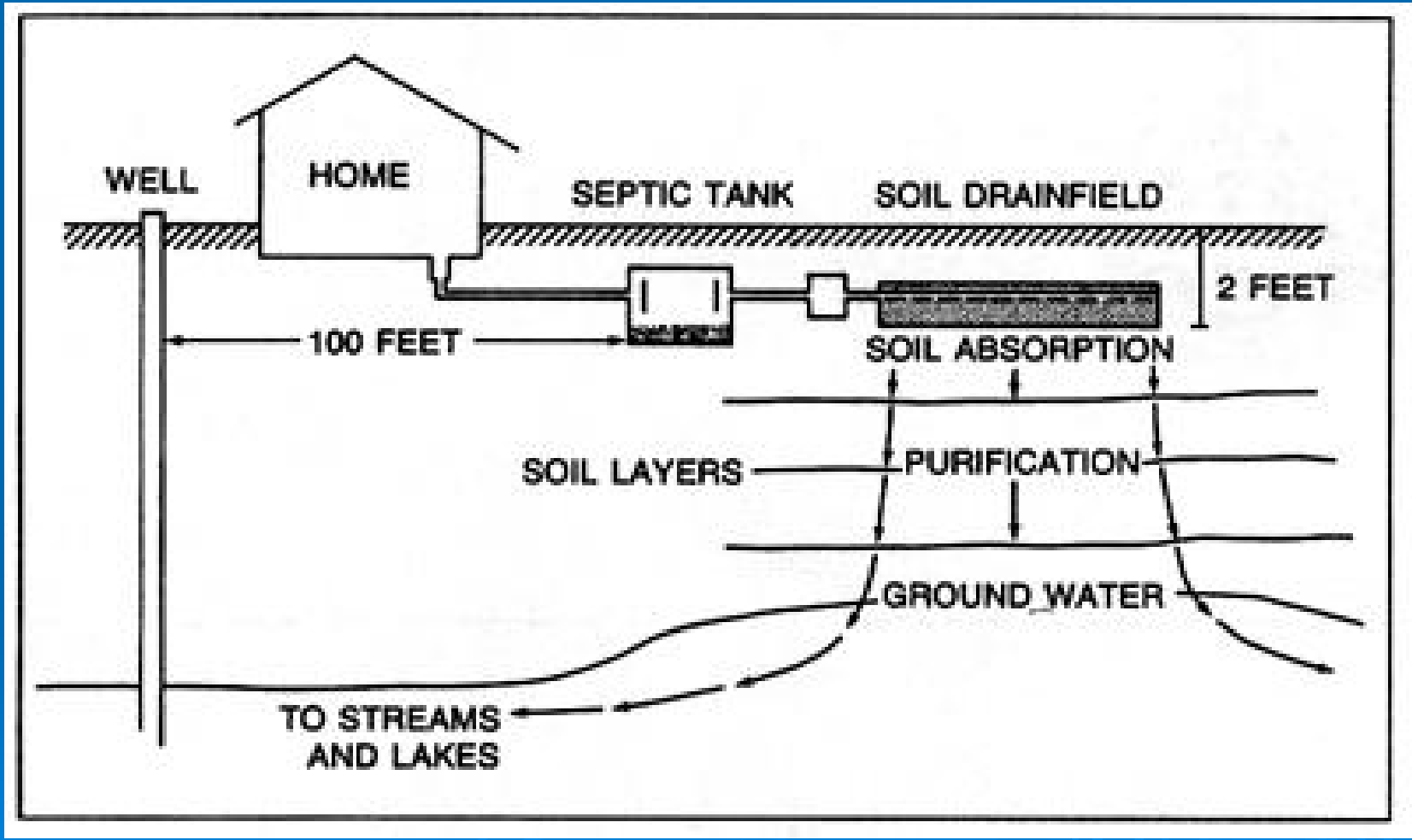


www.srh.noaa.gov/mrx/hydro/hyd_cyc.htm

Hydro - Cycle Manipulation

- Reduction of runoff
  - Landscaping for retention
  - Less curb & gutters
  - Less lawn, more natural areas
- Control withdrawal
  - Water conservation
- Return

Recharge / Recycle



Adapted from Tyler et.al., 1977

Water Conservation

- Cost savings for well
  - Electricity
  - Less wear & tear on equipment
  - Treatment system maintenance
- Septic system benefits
  - enhances performance
  - increases the life expectancy
- Ecologic responsibility

Targeting Conservation

Water Conservation Strategies

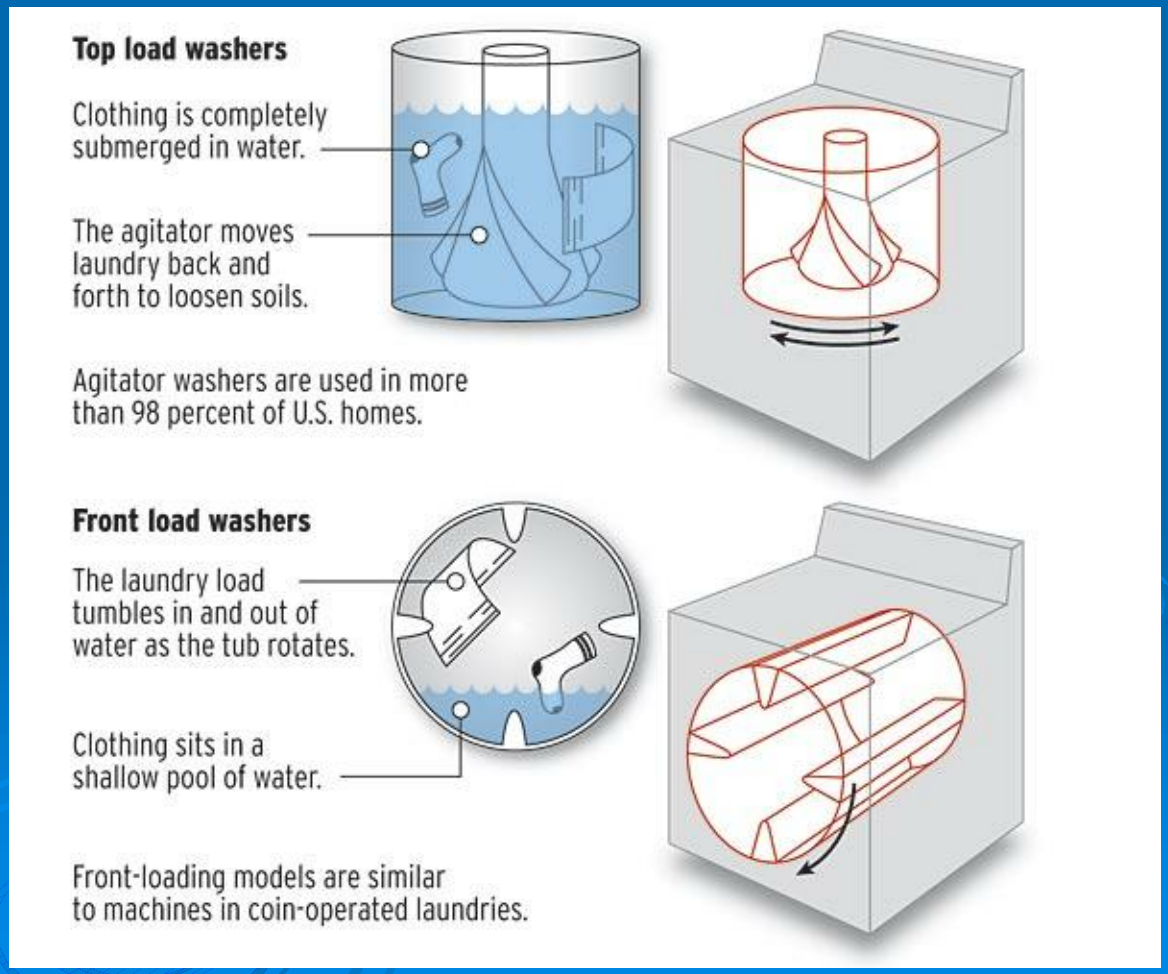
- **Replacement**
- **Maintenance / Upgrades**
- **Behaviors**

When upgrading fixtures …..

- **Water conserving fittings**
  - **Low flow shower heads**
  - **Aerators**

When replacing appliances …

- **Water conserving appliances**
  - **Front load washers**



When replacing toilets…

- **Water conserving appliances**
  - **Air assist toilets - .6 gal/flush**

When replacing toilets…

- **Water conserving appliances**
  - **Dual Flush toilets - .6 – 1.6 gal/flush**

Maintenance -Toilets

- Water Line
- Float adjustment
- 100+ gpd

- Leaking flapper
- Chain interference
- Hanging open
- 15-100+ gpd

Maintenance -Toilets

- Leak testing
  - Listen
  - Dye testing
- Replace faulty or leaking equipment
  - don’t bend the rod
- Retrofit dams or ½ gallon jug
  - no bricks
- Early close flappers

Behaviors

- Laundry
  - Wash or wear?
  - Select load size
- In the kitchen
  - Pre-scrap thoroughly before washing
  - Compost – don’t grind
  - Full loads in dishwasher
  - Wash basin insert in sink

Behaviors

- In the Bath:
  - Navy shower – use cutoff valve
  - Shaving & teeth brushing practices
  - Limit flushing

Behaviors

- **Outdoors:**
  - Limit / substantially reduce outdoor water use
  - If you must water…
    - Capture tap water while waiting for hot water
    - Capture water used to wash fruit and vegetables
    - Use aquarium water
    - Capture roof drainage in cisterns
    - Exercise care in storage of water in buckets around children & pets