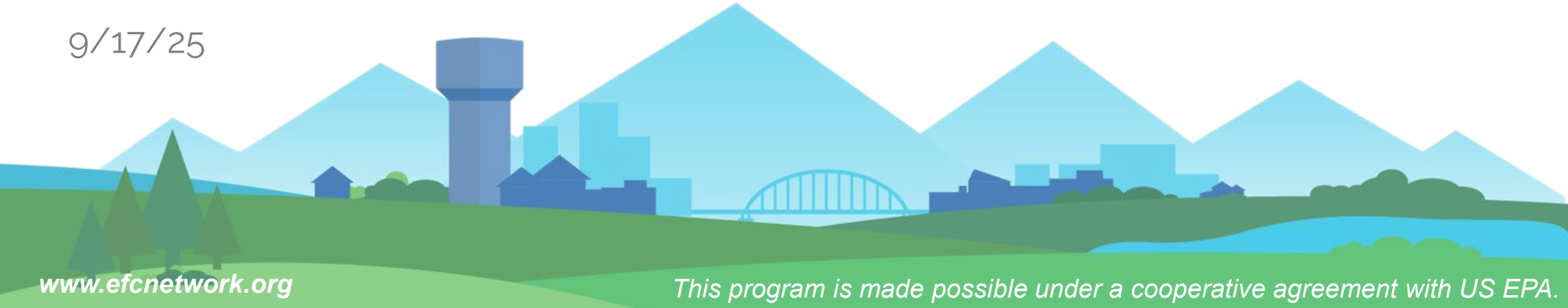
US Territories Water Operator Training Series

Session 7: Surface Water Intake Components, Well Components, and O&M

9/17/25



This program is made possible under a cooperative agreement with US EPA.

Tucker Colvin

Research Scientist

tcovin@unm.edu

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SCHOOL OF
ENGINEERING



This training series is funded by the US EPA

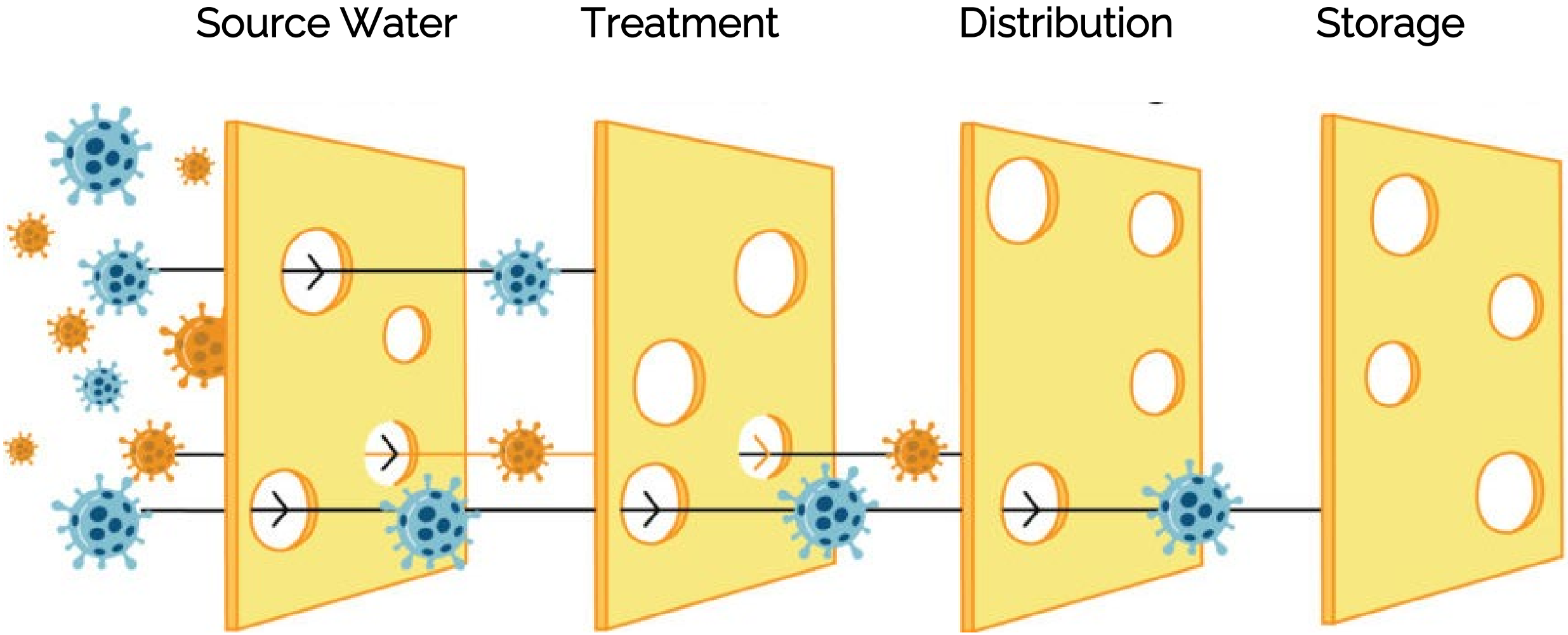
Schedule for 2025:

Date	Topic
6/25/25	Program Overview, Test Format, Study & Test Tips
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7/23/25	Basic Operator Math (+, -, /, x, Exponents and basic algebra)
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WATER SOURCE

The **first** barrier to preventing waterborne disease using the ***Multiple Barrier Approach***

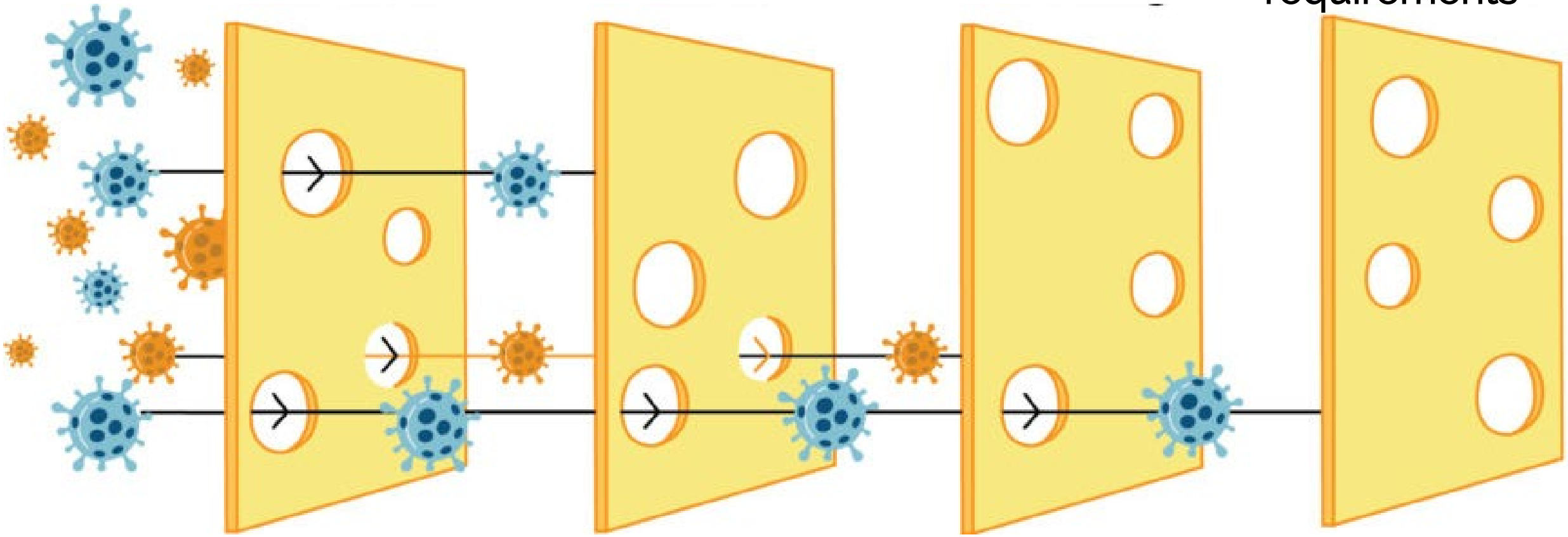

Source Water
Treatment
Distribution
Storage

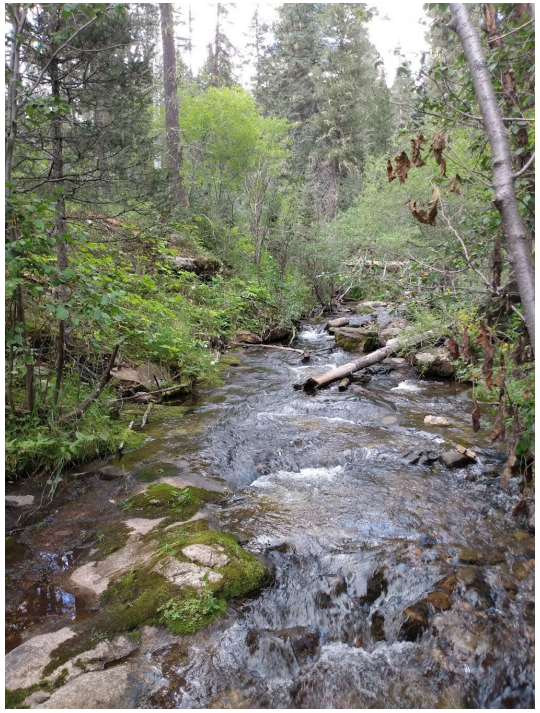
Pumps, pump facilities, and controls

Monitoring, reporting, and data verification

System management and operation

Operator compliance with state requirements







Types of Water Sources

Surface Water (SW)

Groundwater (GW)

GWUDI (or GUDI)
Groundwater Under Direct Influence of Surface water)

Surface Water



















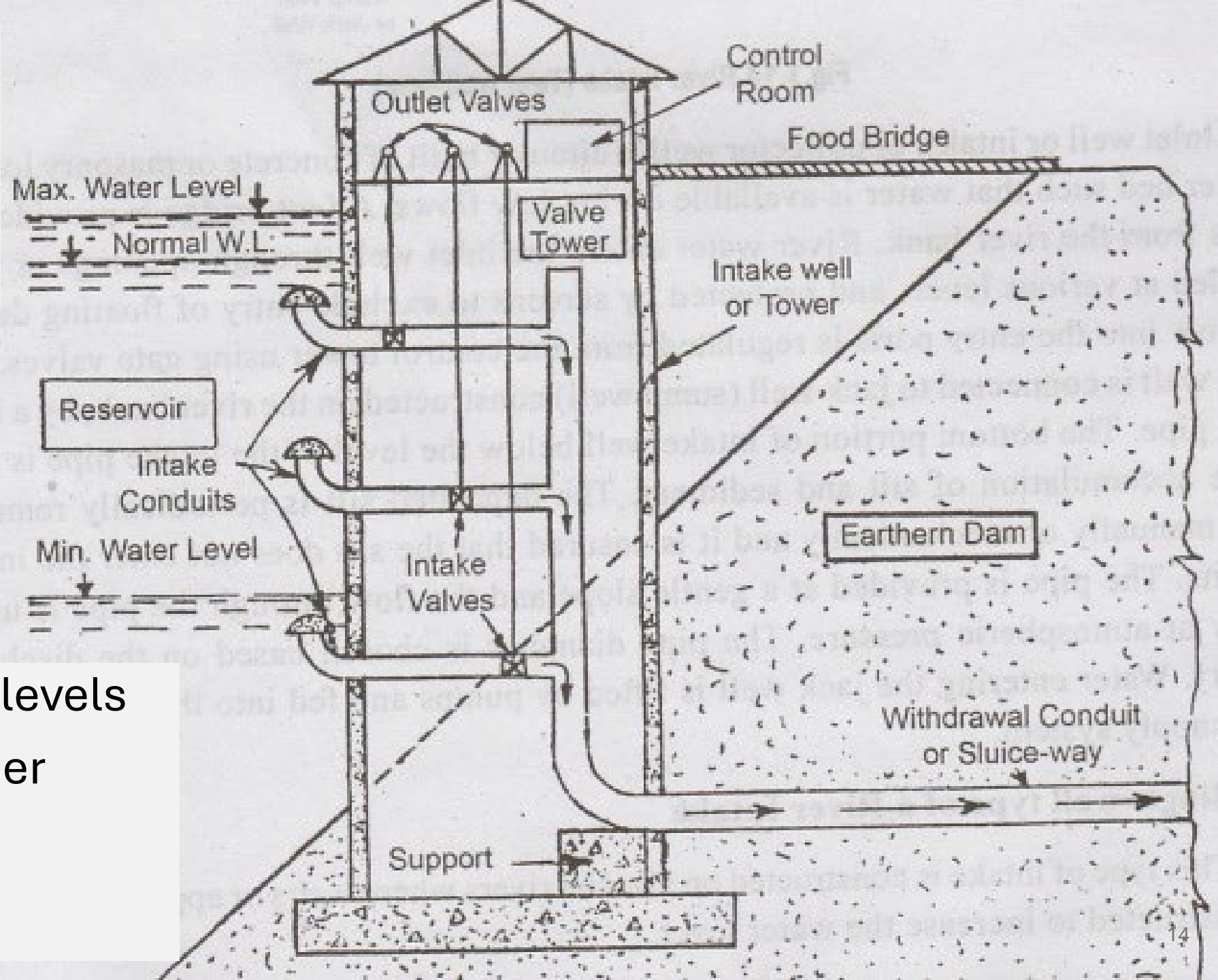





CANADIAN RIVER
MUNICIPAL WATER
AUTHORITY
HEADQUARTERS

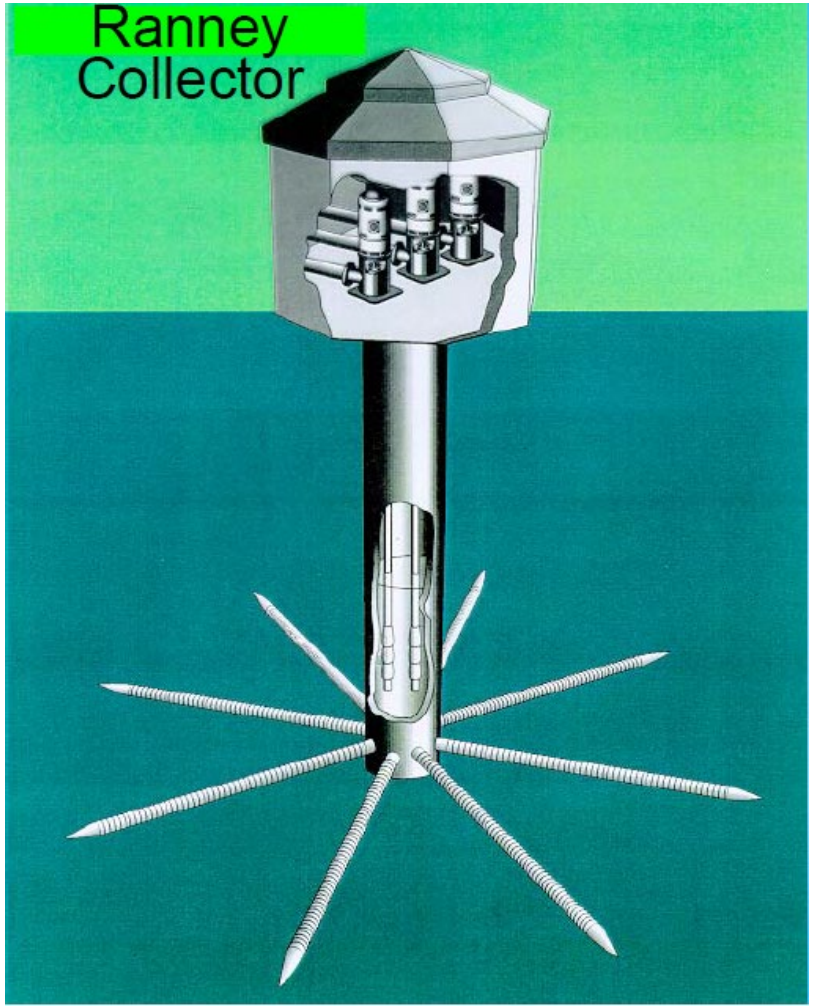


Reservoir intake

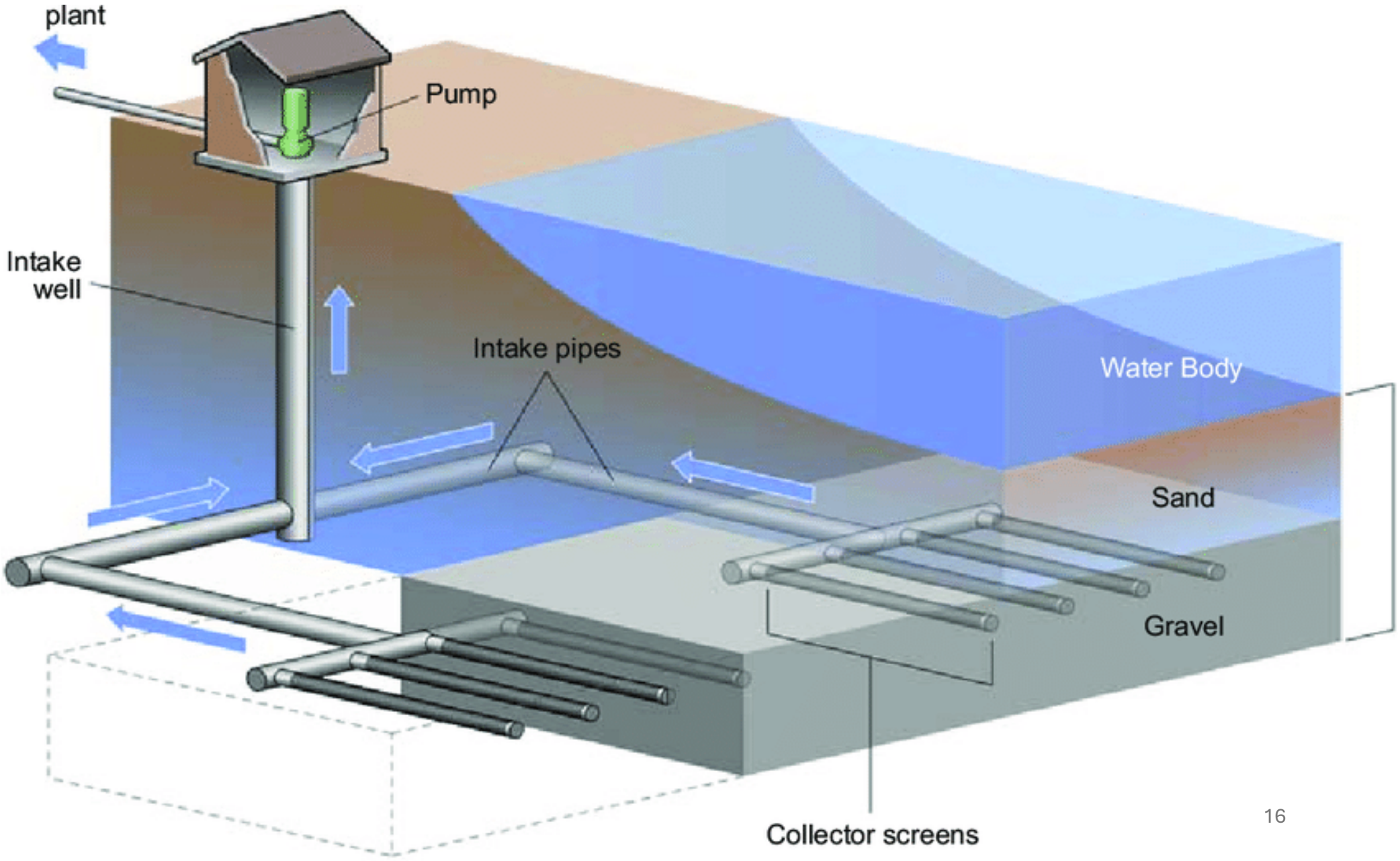


- Changing water levels
- Winter vs summer
- Water quality
- Jar test




Ranney
Collector

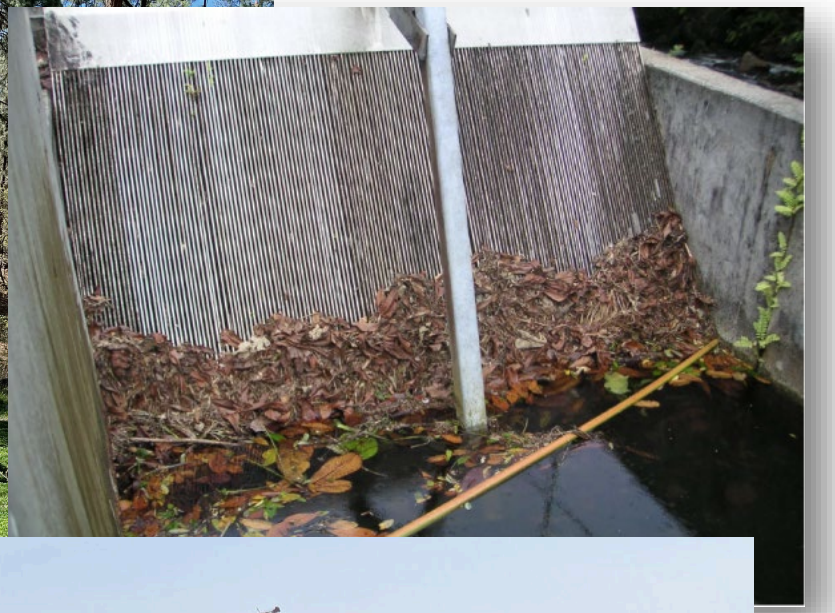
Infiltration Gallery



Surface water intake maintenance and operations

- Keeping intake below water level
- Keeping structure free of debris and sediment
- Damage from flood
- Challenging access / working locations

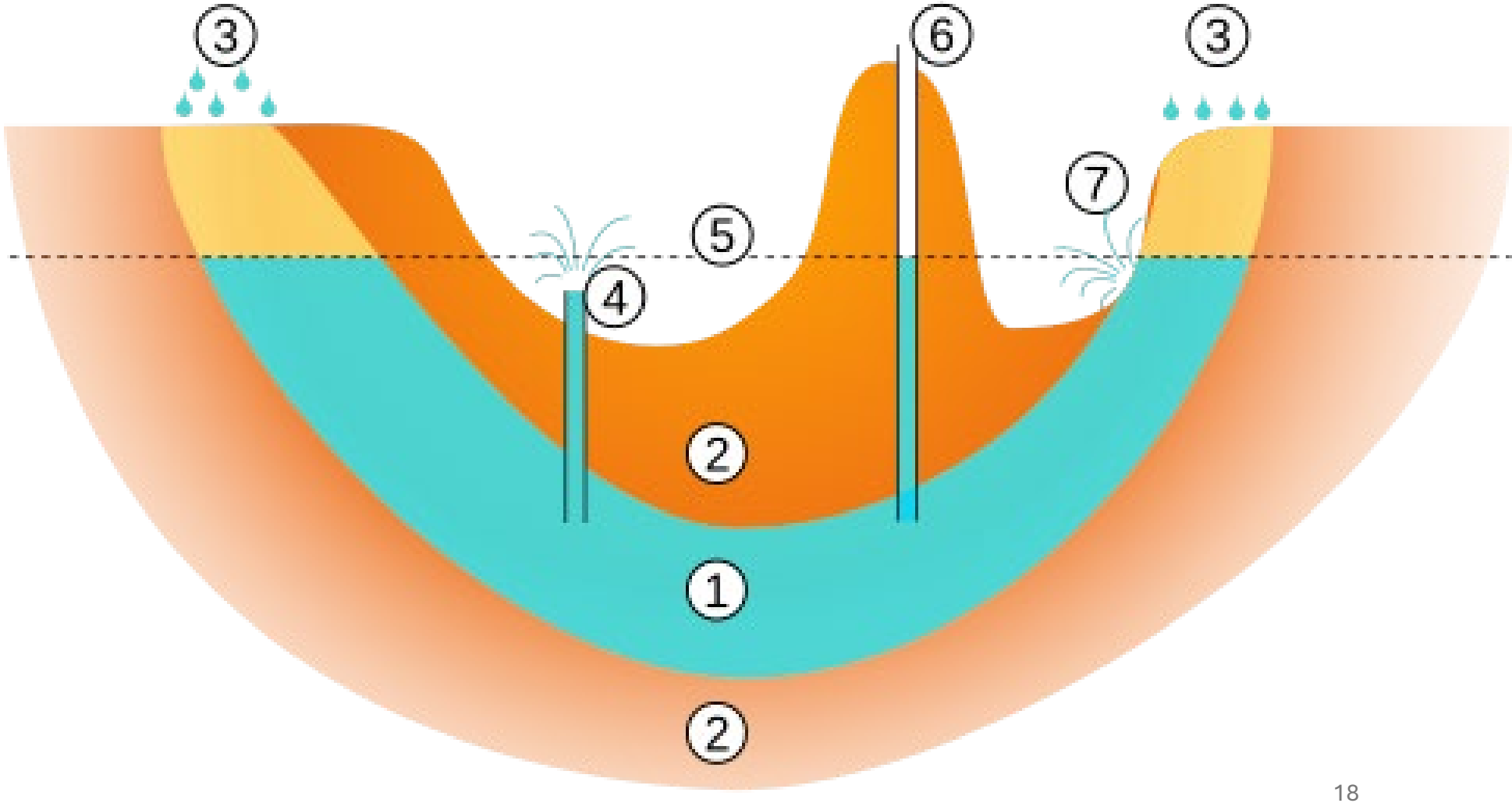






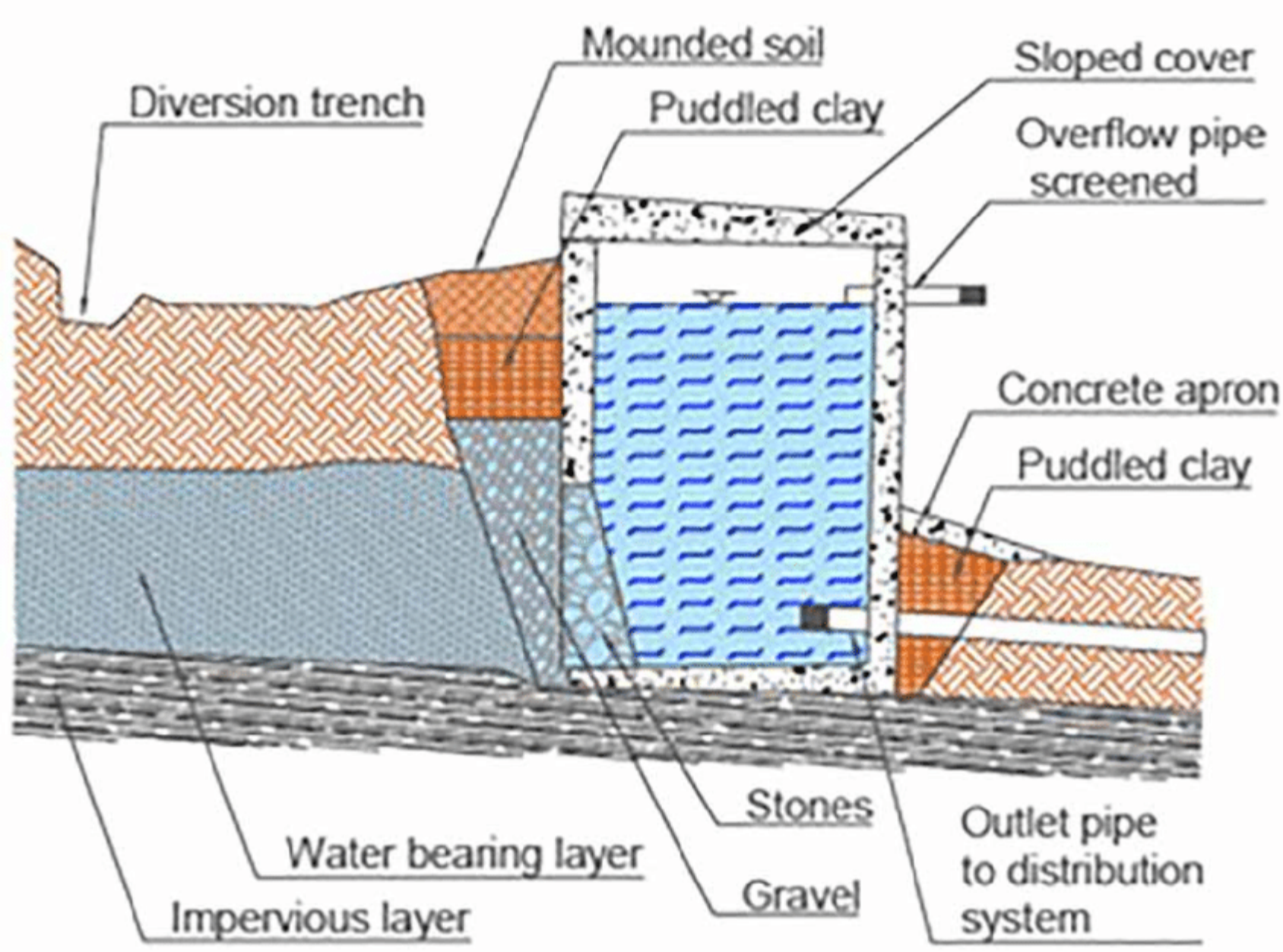
Groundwater and GWUDISI

Accessed via well or spring



Springs

- Accessed via spring box




Master







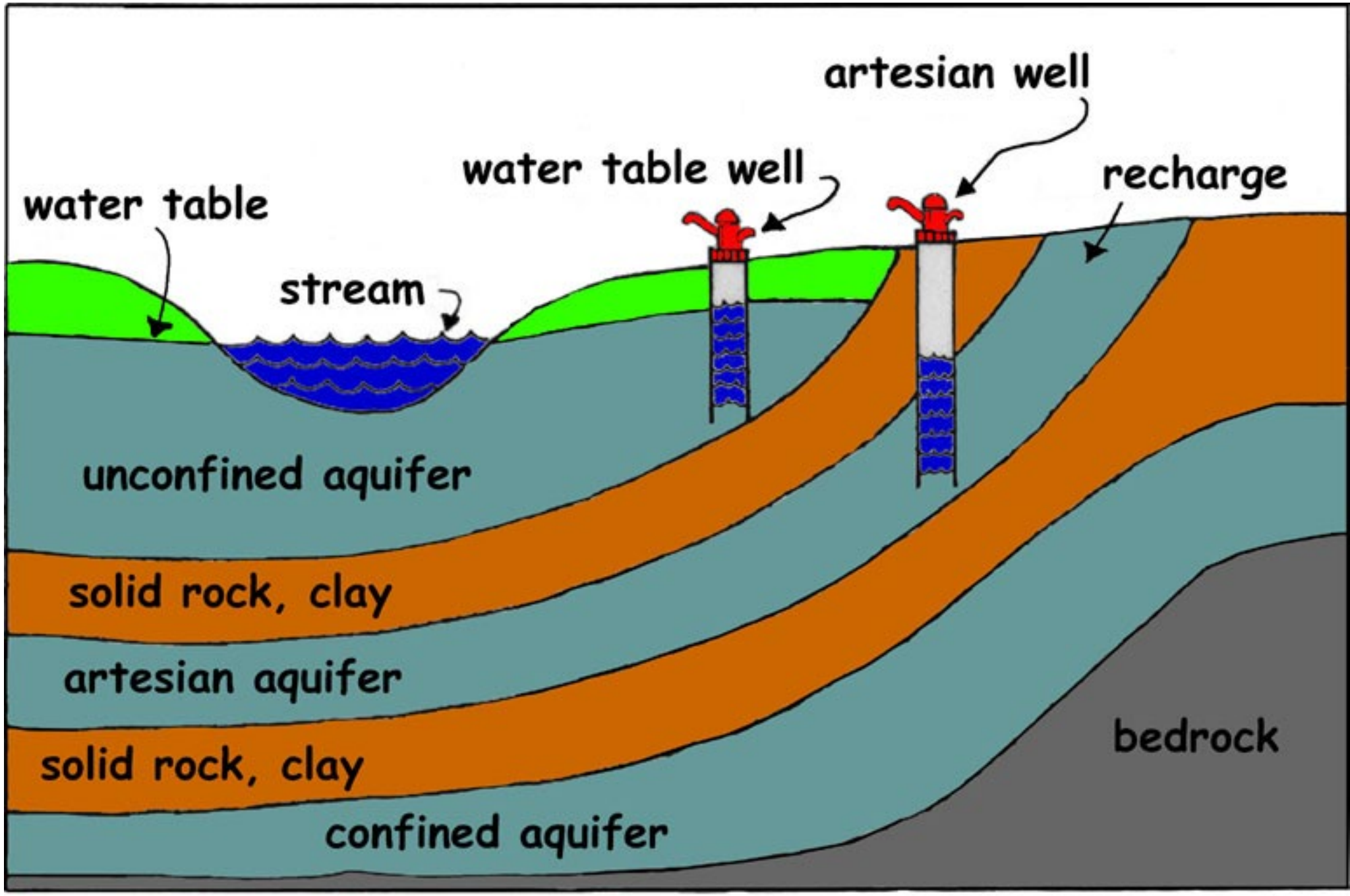




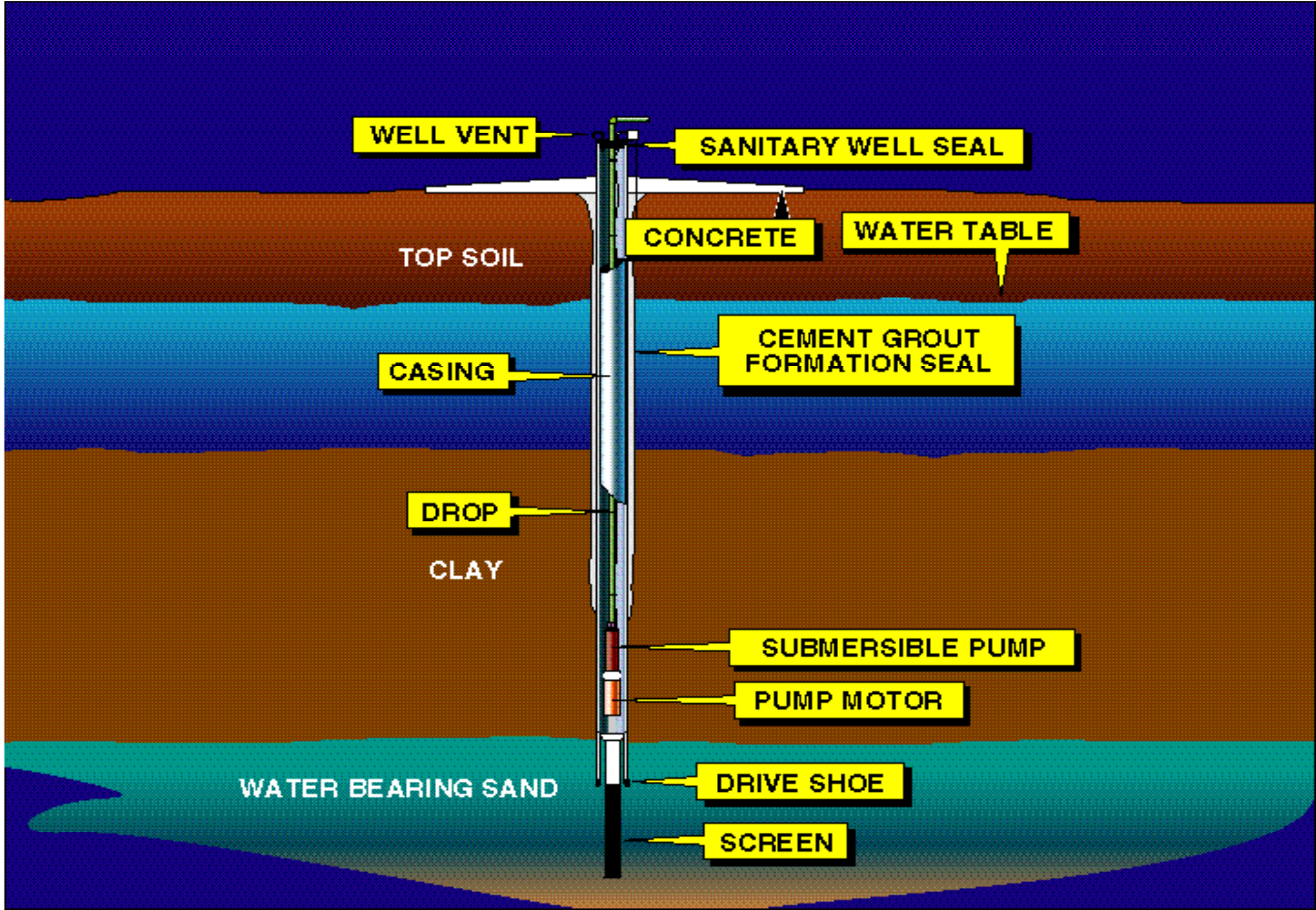




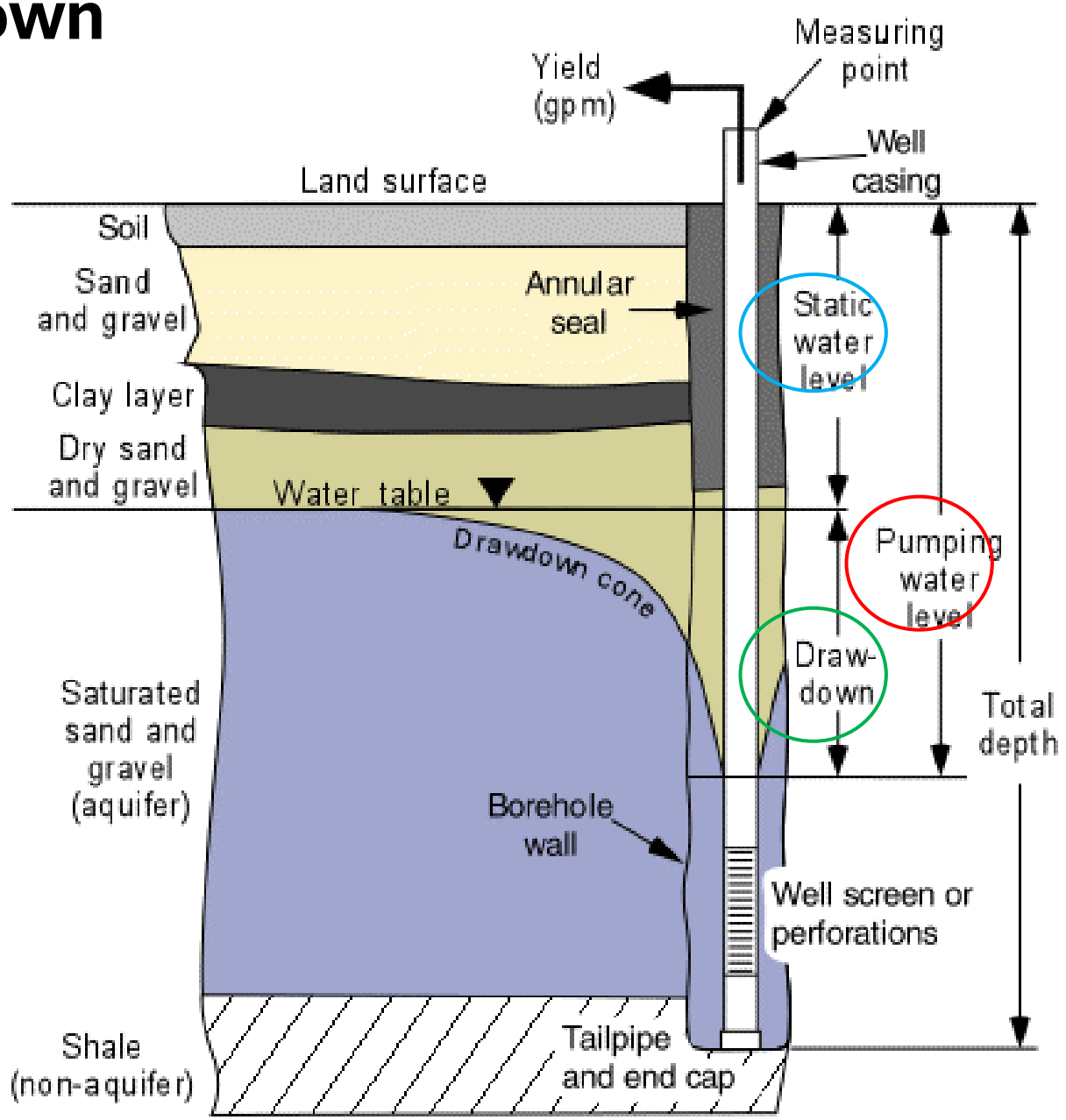
Groundwater wells

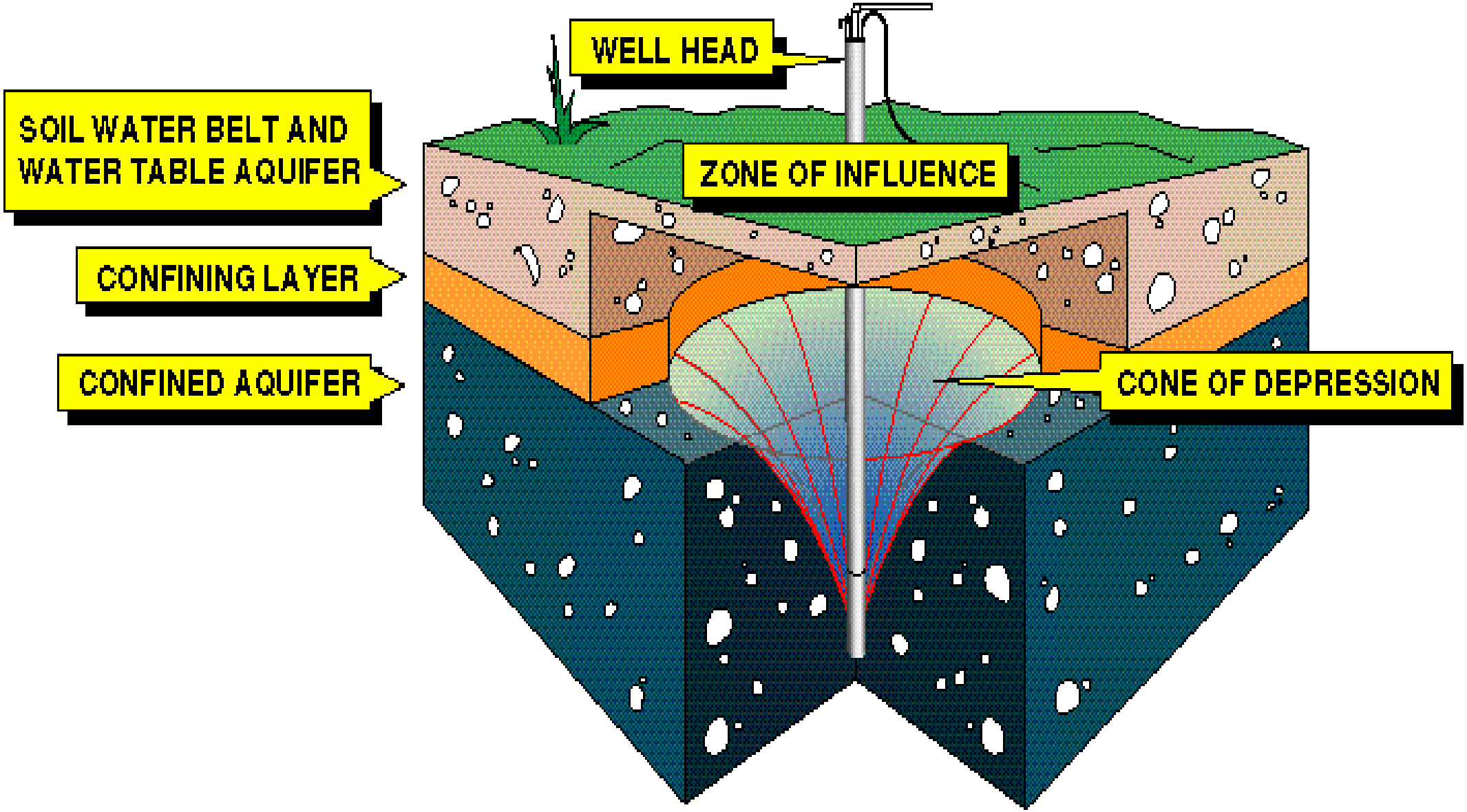


Well components

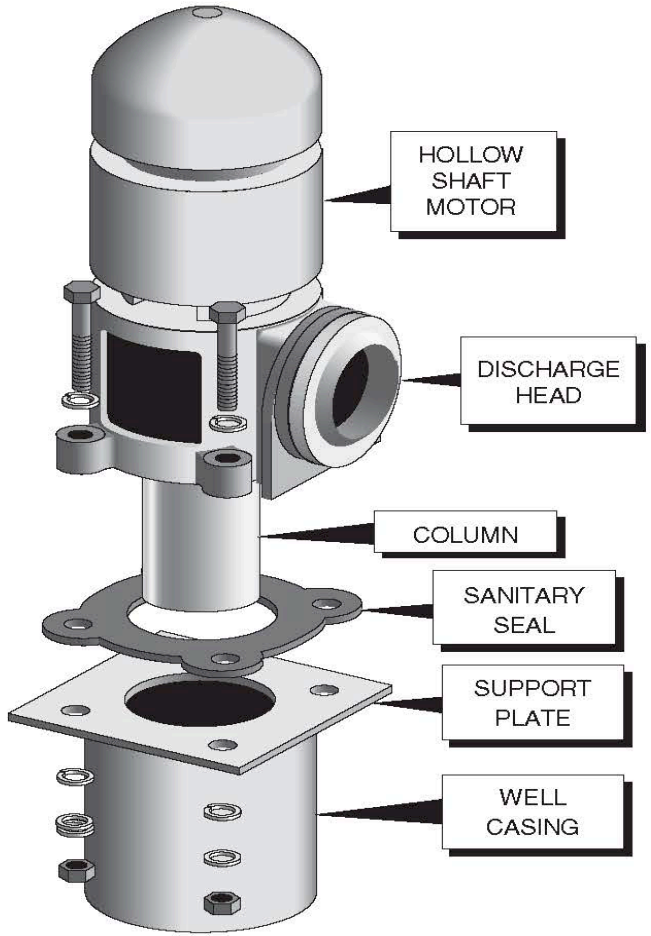


Drawdown

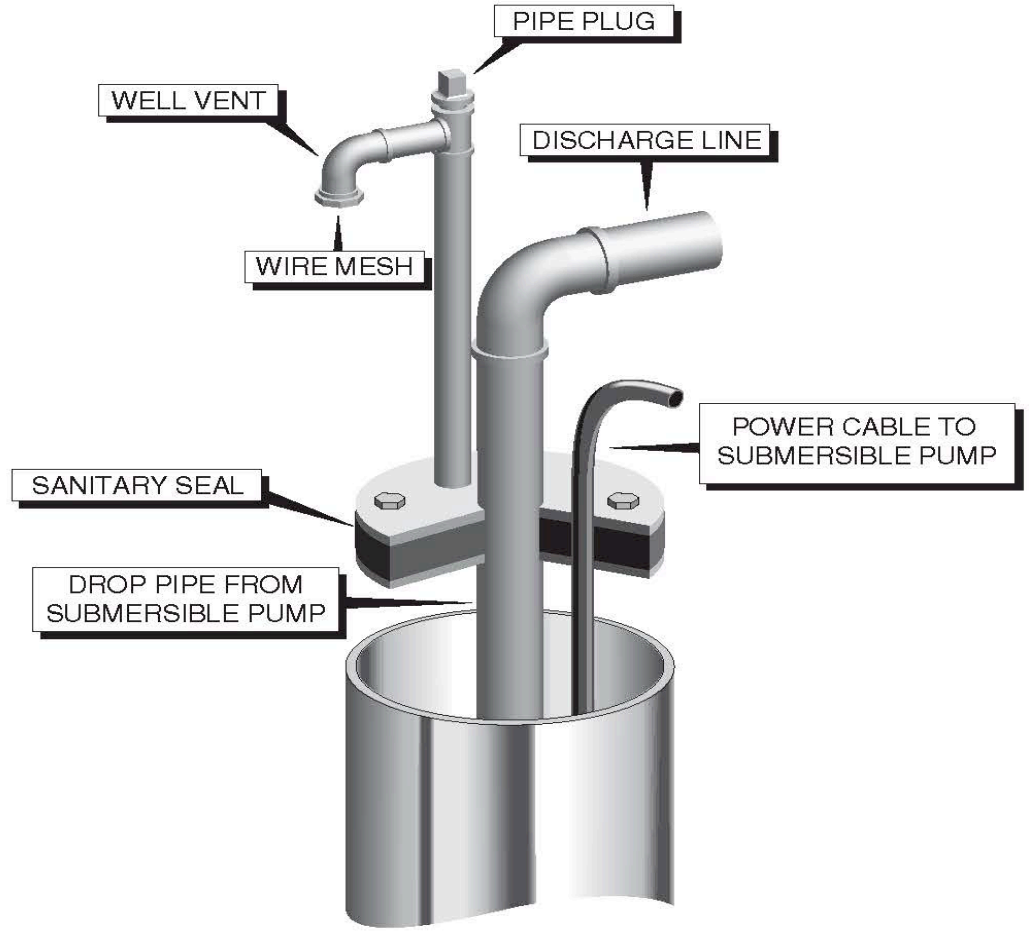

Yield
(gpm)
Measuring
point
Well
casing
Land surface
Soil
Sand
and gravel
Annular
seal
Static
water
level
Clay layer
Dry sand
and gravel
Water table
Drawdown cone
Pumping
water
level
Draw-
down
Total
depth
Saturated
sand and
gravel
(aquifer)
Borehole
wall
Well screen or
perforations
Shale
(non-aquifer)
Tailpipe
and end cap


WELL HEAD
SOIL WATER BELT AND
WATER TABLE AQUIFER
ZONE OF INFLUENCE
CONFINING LAYER
CONFINED AQUIFER
CONE OF DEPRESSION

Lineshaft Turbine



Submersible Turbine





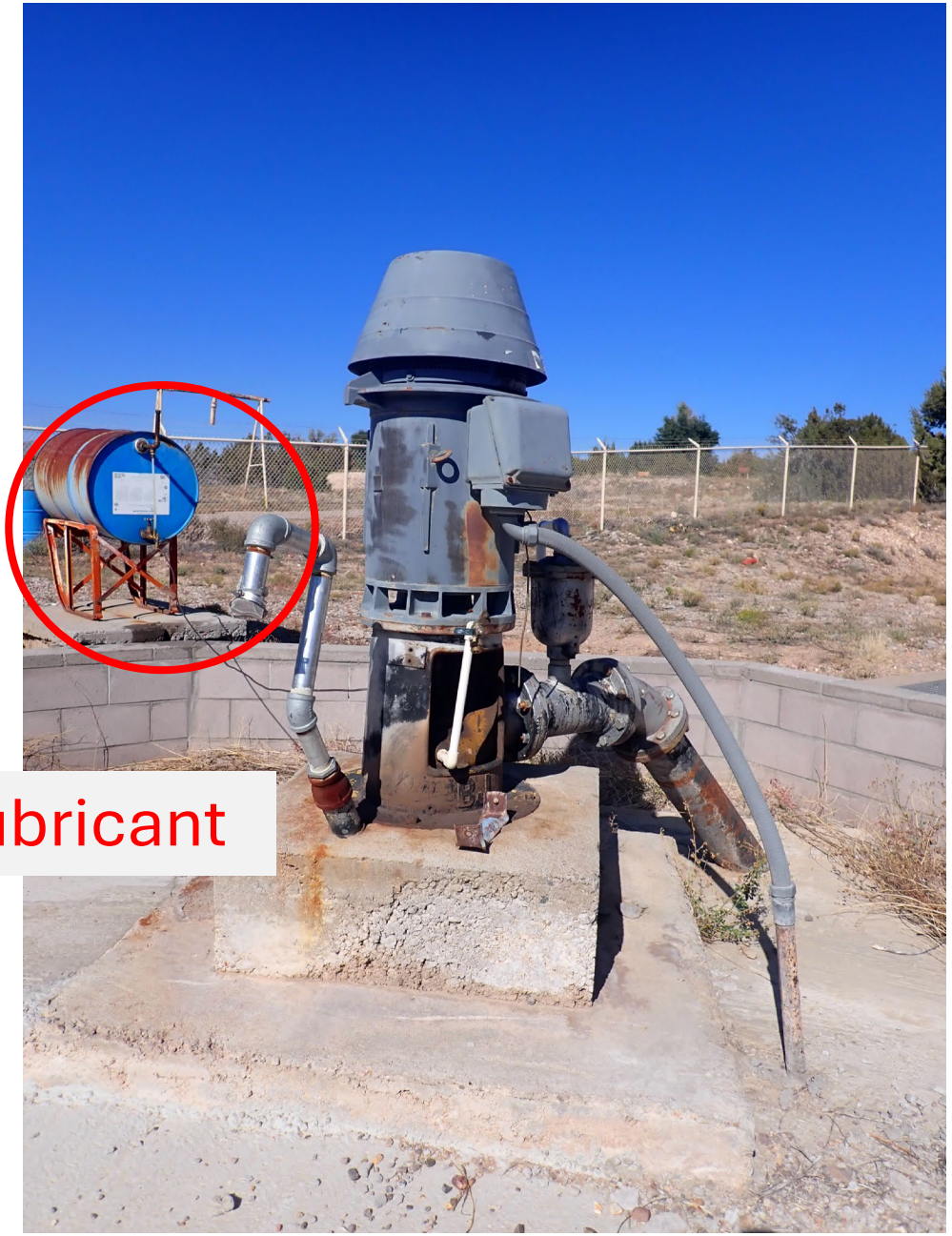



Well vent


Well vent


Power
supply


Power
supply

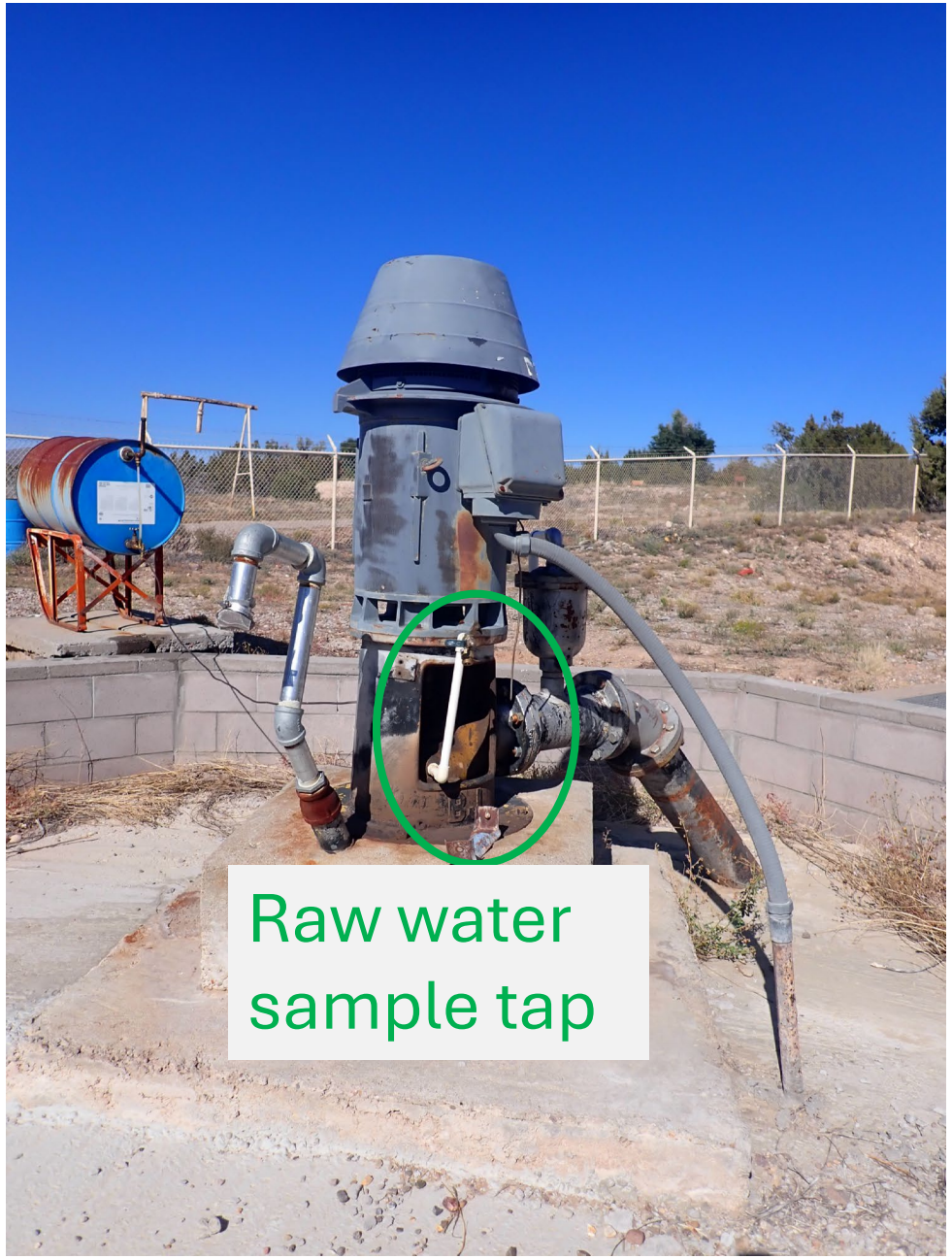

Lubricant





Air vacuum relief valve




Raw water
sample tap



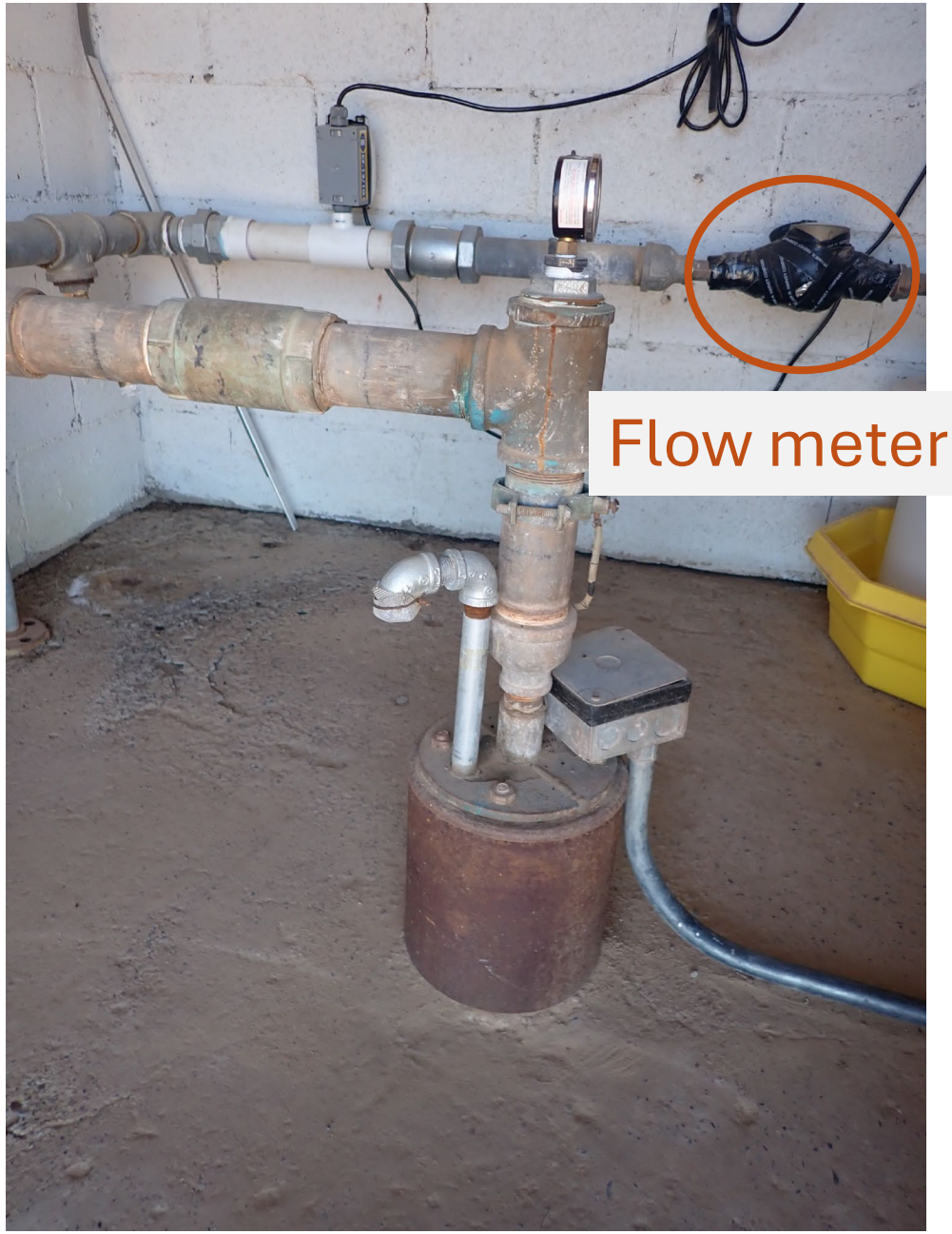



Pressure gauge



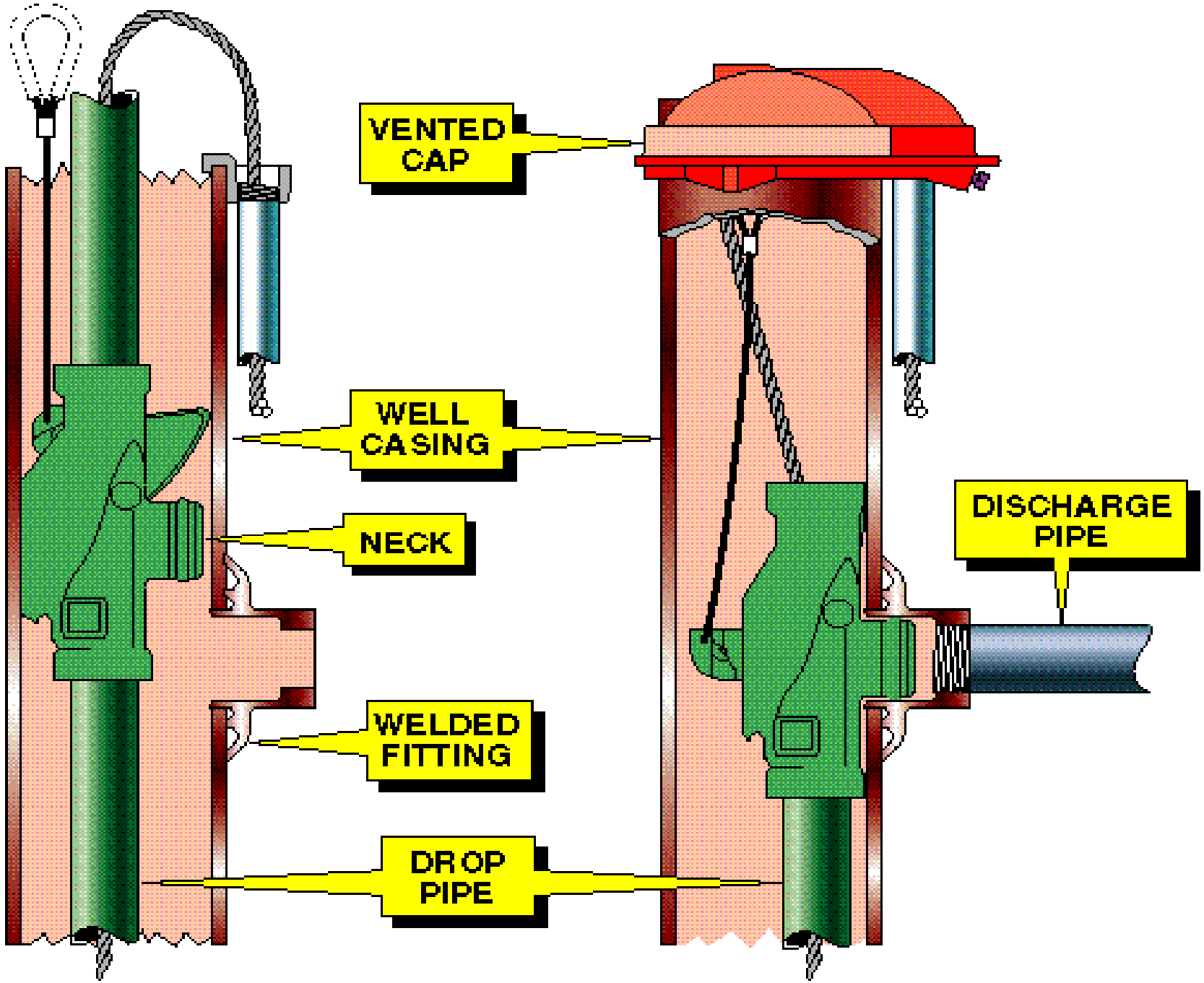

Check valve





Flow meter

Pitless Adapter







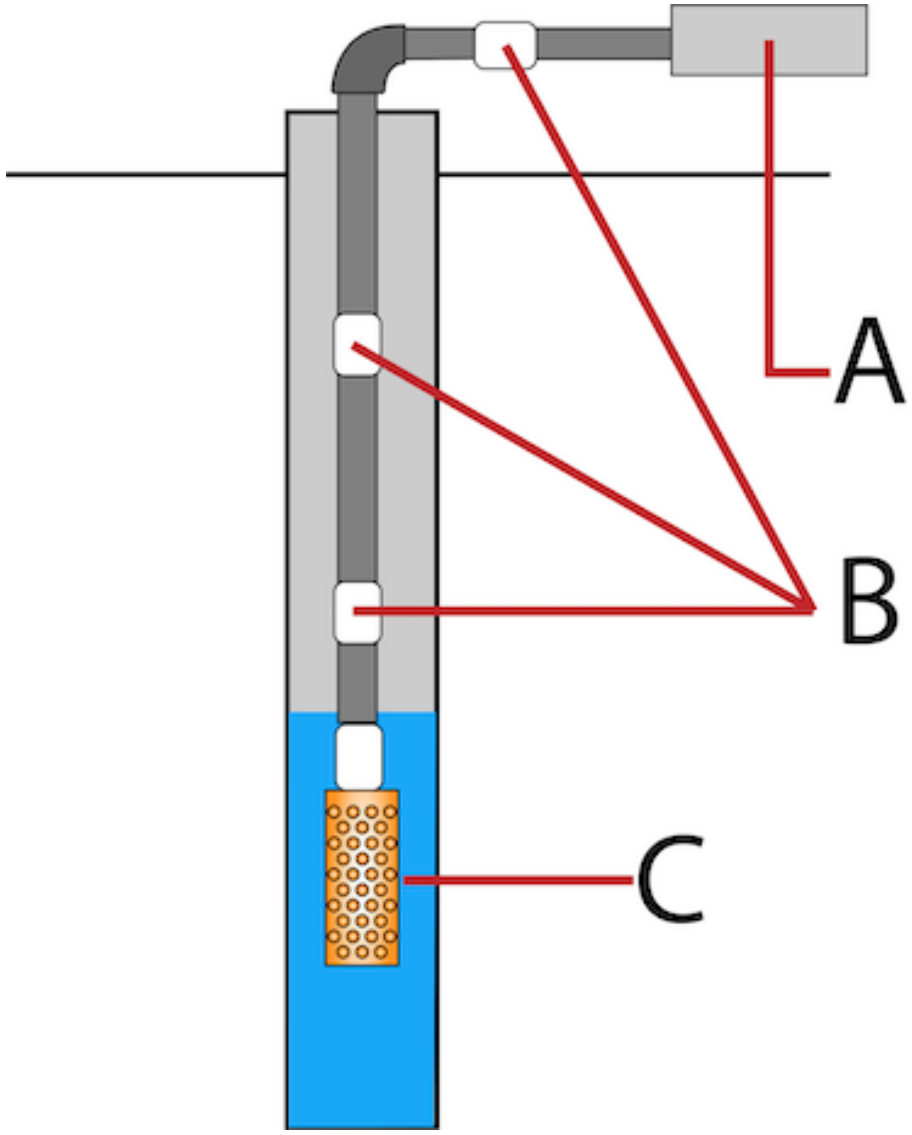
Well components

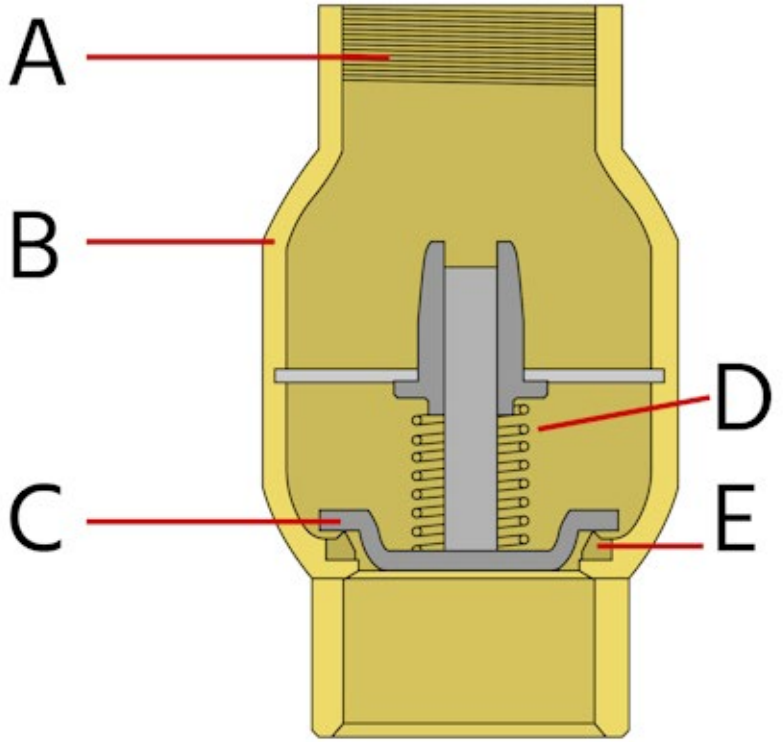


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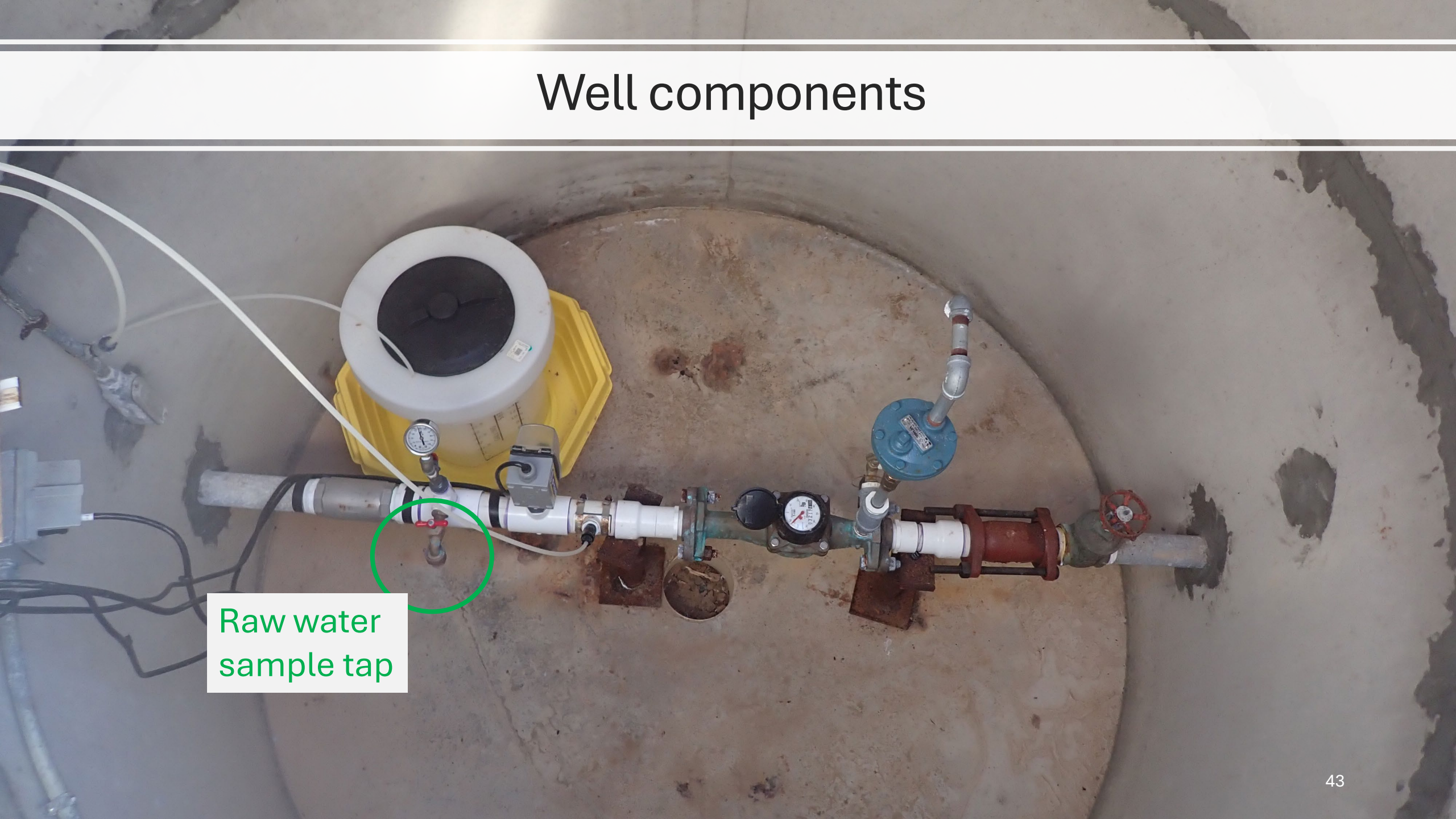


Check valves & foot valves

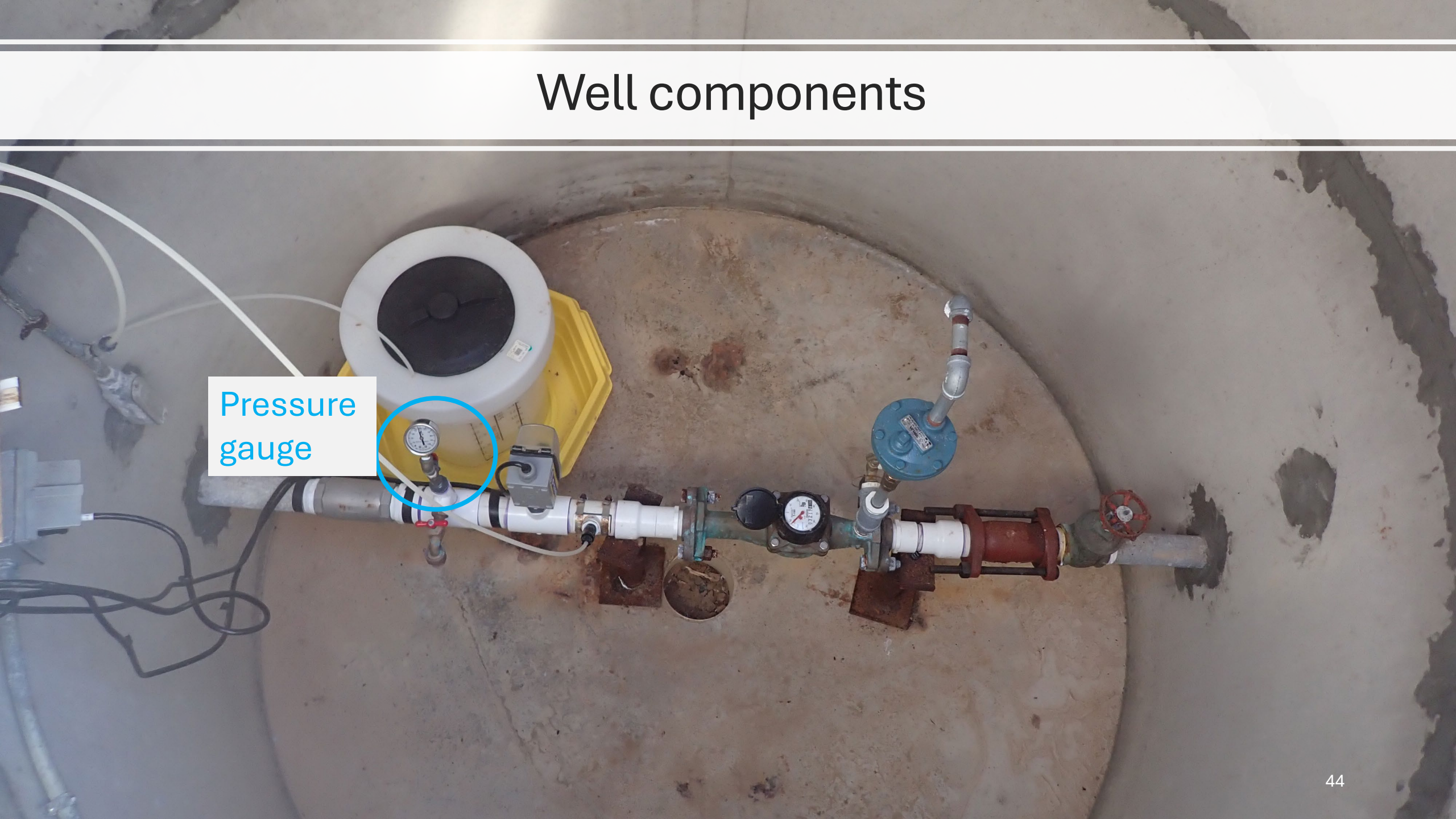




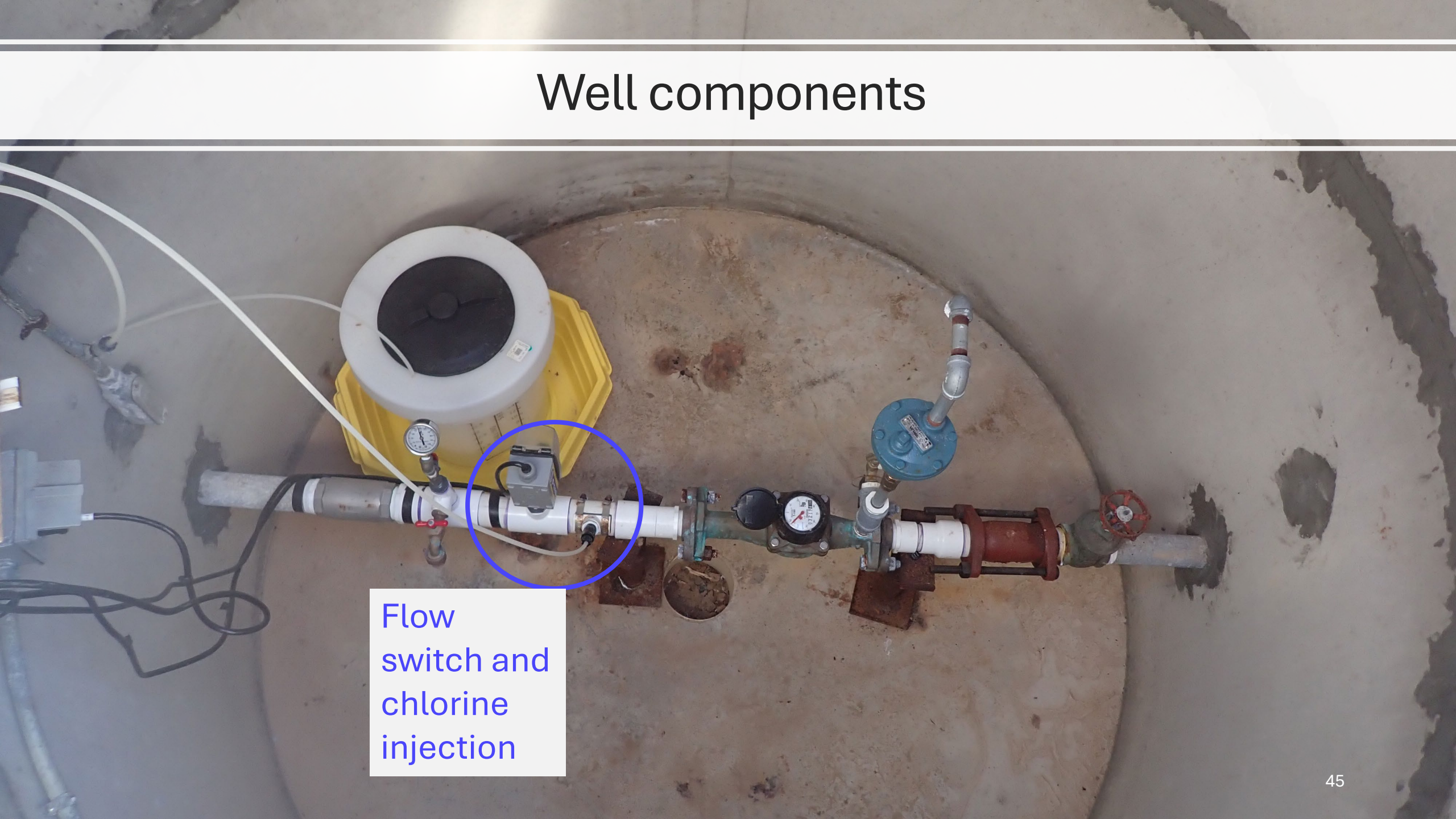
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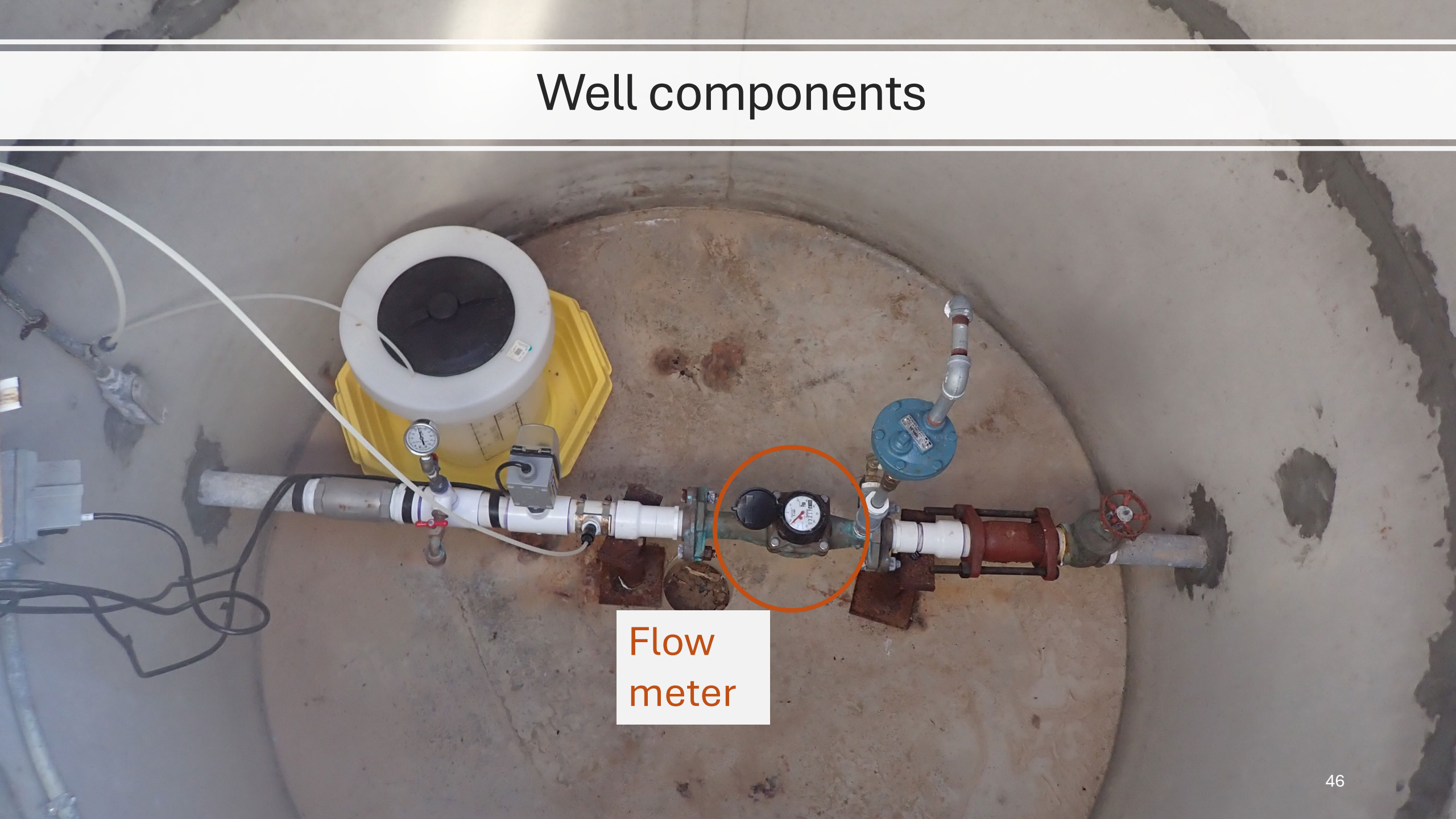
Well components



Well components

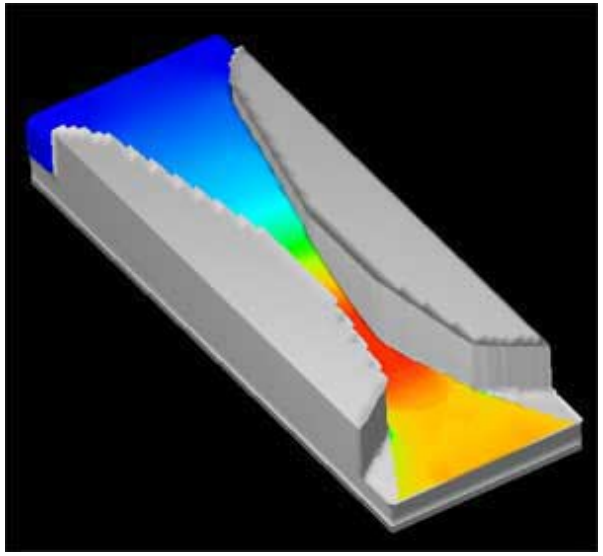


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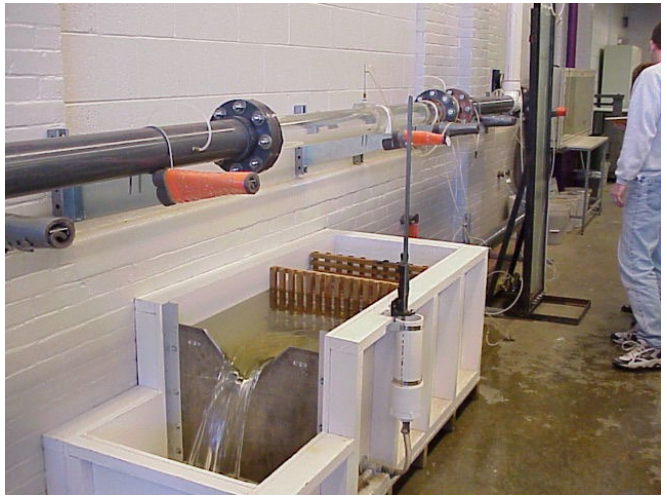
Flow measurement





Parshall Flume

V-notch Weir



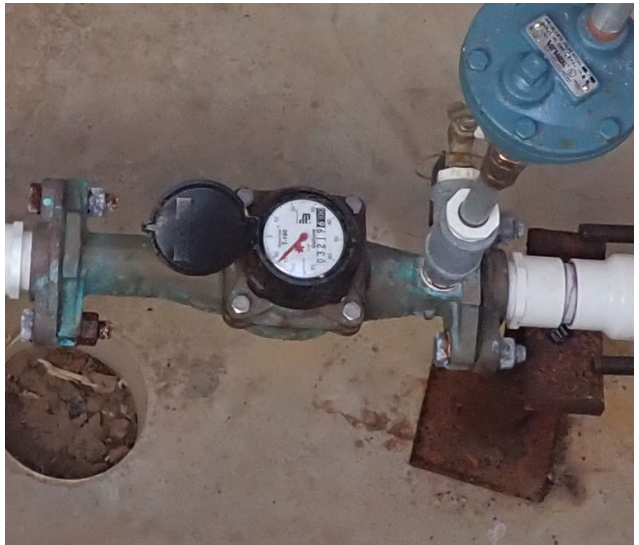




Flow measurement

Mechanical

- Nutating disk
- Piston
- Turbine
- Propeller

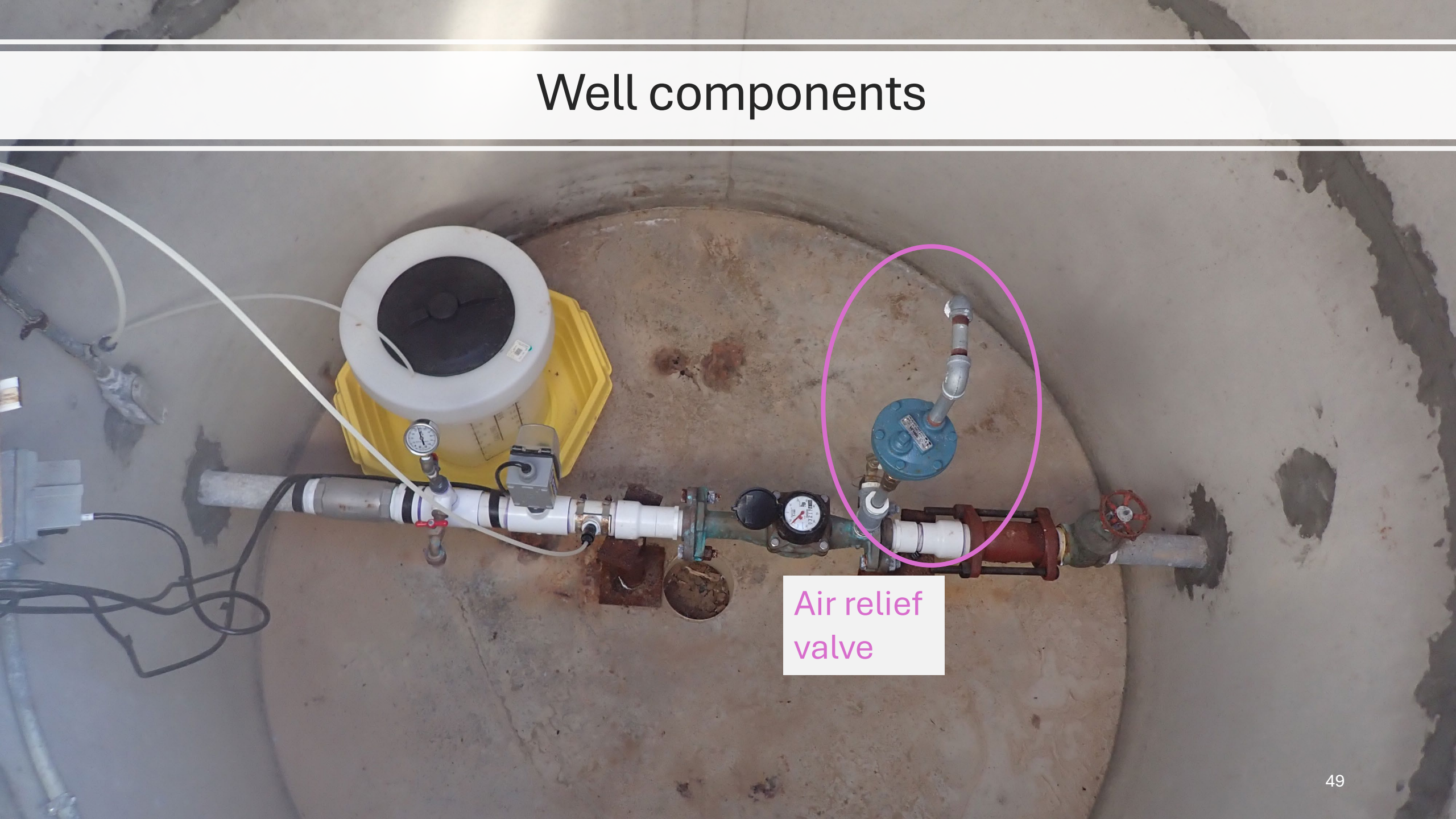


Non-mechanical

- Pressure differential (Venturi)
- Magnetic
- Ultrasonic



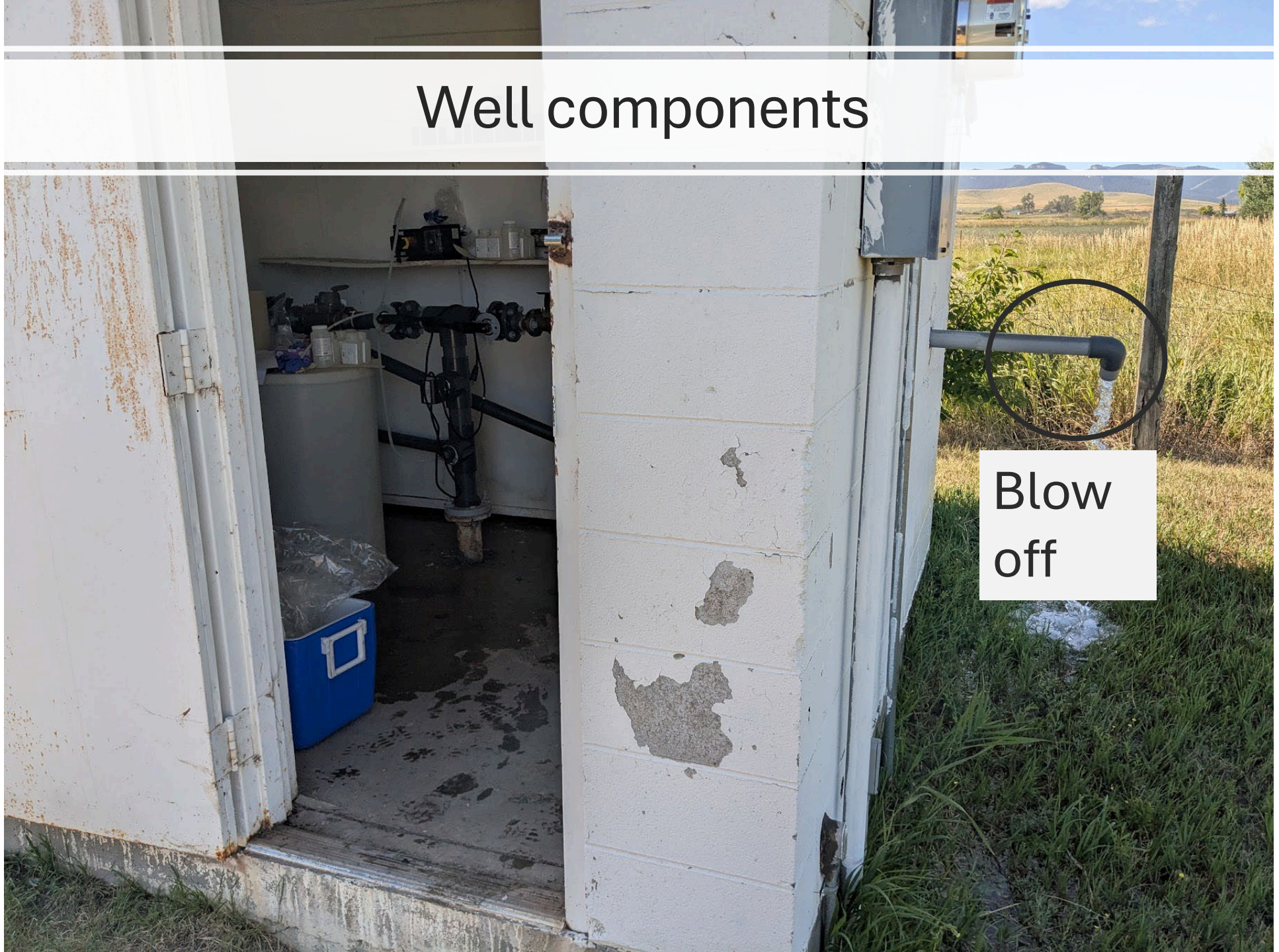
Well components



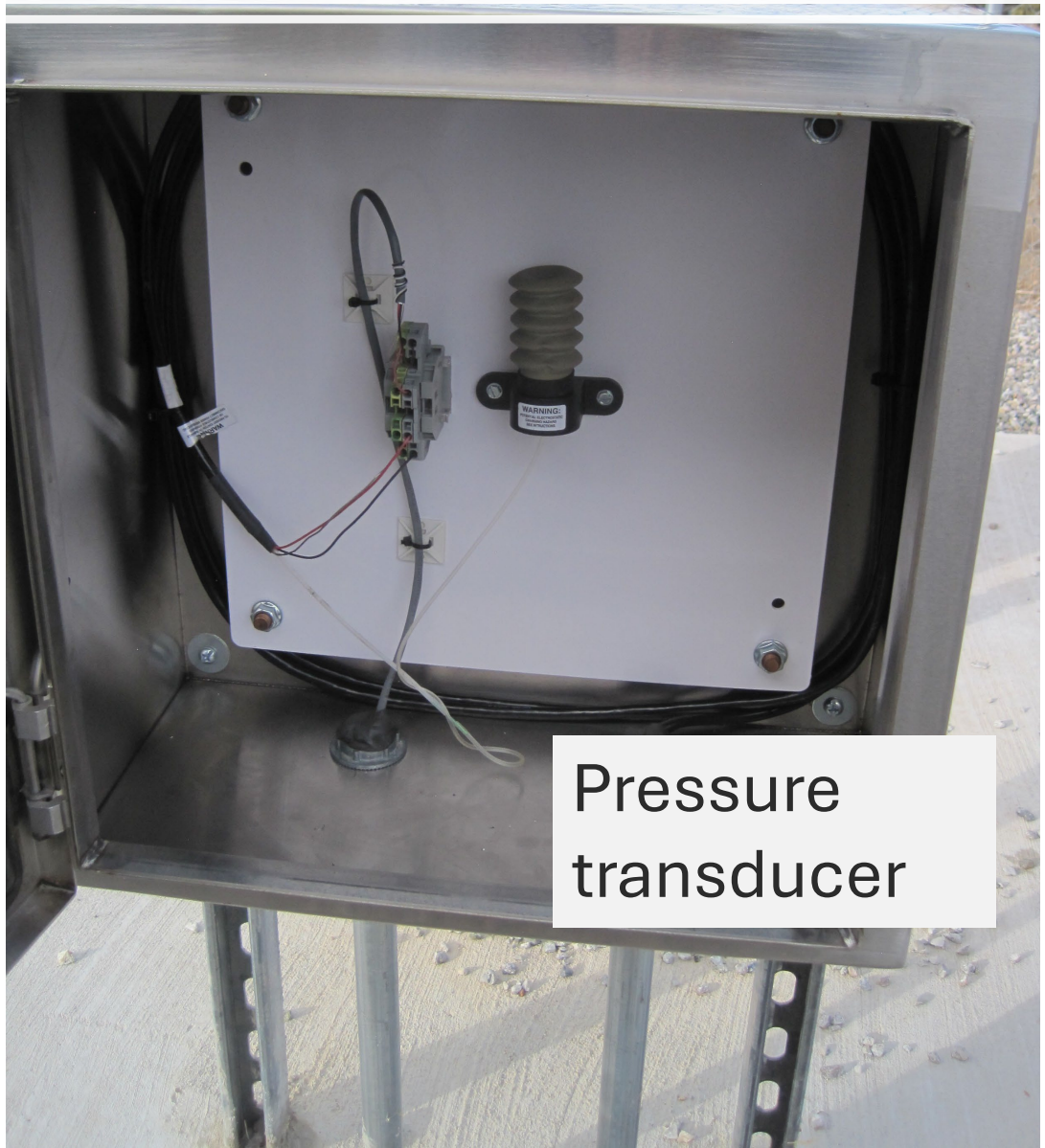
Well components



Well components



Well components



Well components



Surge protector



Surge can

Well components





Control panel and PLC (Programable Logic Controller)

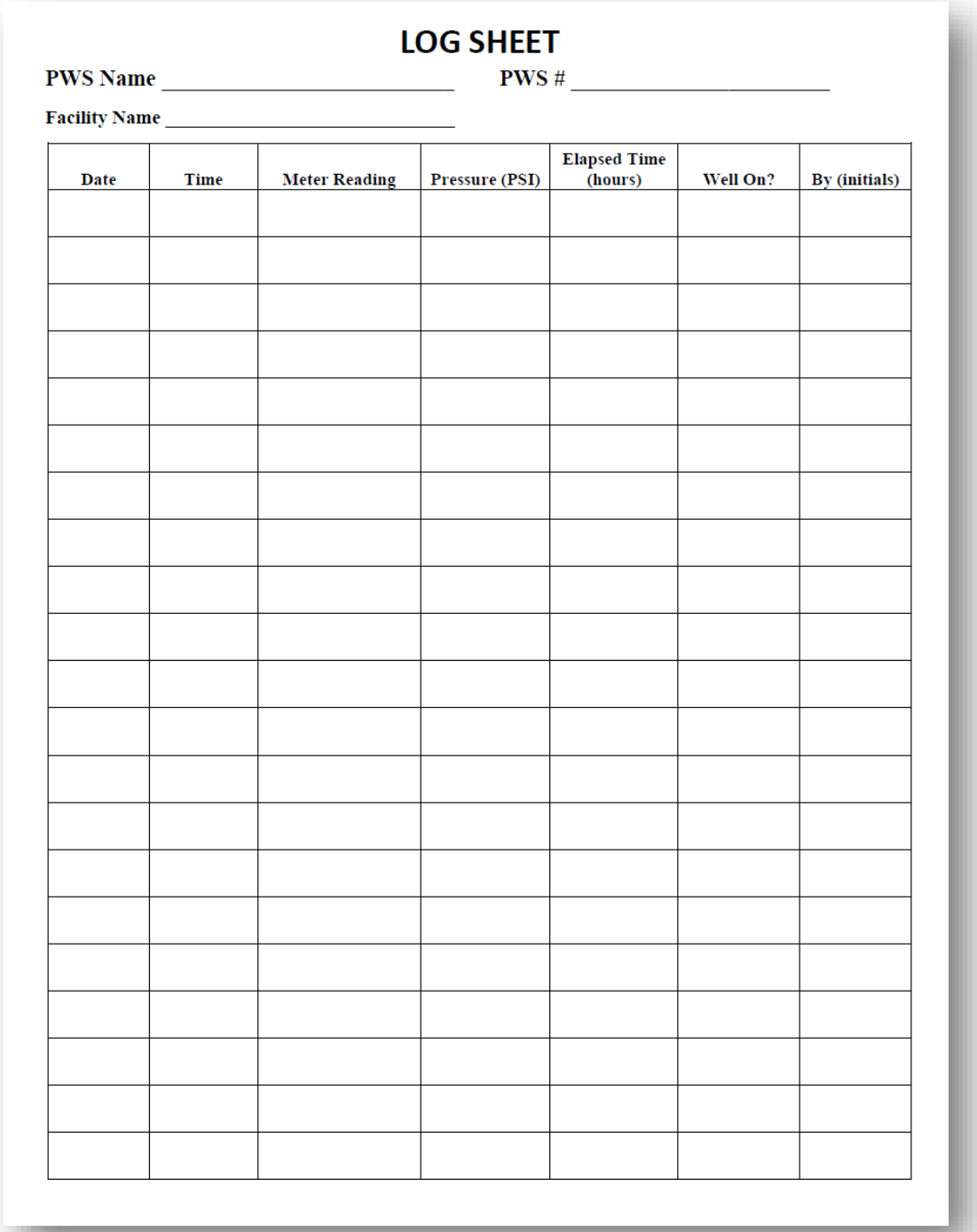
Well components



Backup power

Well O&M

- Record keeping
  - Any changes?
- Water quality changes?



LOG SHEET

PWS Name _____ PWS # _____

Facility Name _____

Date	Time	Meter Reading	Pressure (PSI)	Elapsed Time (hours)	Well On?	By (initials)

Well components evaluation

Above Ground

- Well Casing
- Concrete Pad
- Sanitary Seal*
- Well Vent
- Electrical Supply
- Check valve
- Pressure gauge
- Etc.

Below Ground

- Sanitary Seal*
- Depth of casing
- Depth of grout
- Depth of pump
- Screened interval
- Static water level
- Drawdown

Well components

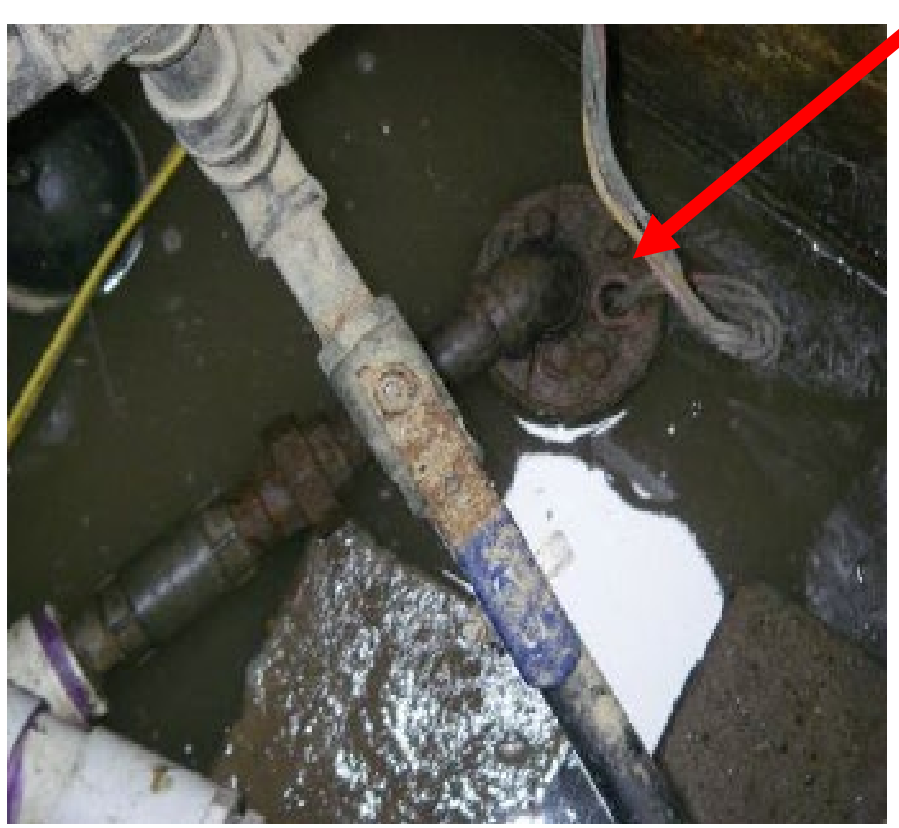


Evaluating

Source Location

- Is the well subject to flooding?
- Is it in a depression or at the bottom of a hill?
- Is it in a pit?














LISTER



well




well





Evaluating

Sanitary Seals

- Are there direct openings into the well?
- Are there loose or missing bolts on the well





Evaluating





Well Vent

- Is there a well vent?
- Does it terminate at least 18 inches above the ground floor

or

3 feet above maximum flood level?

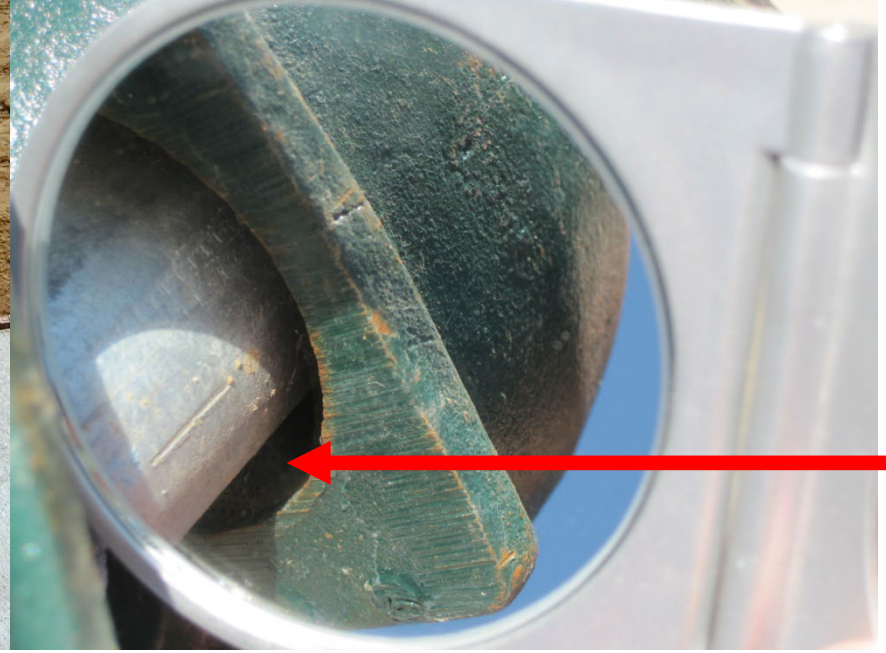
- Does the vent opening point toward the ground?
- Is it screened?

Missing or Compromised Well Vent









24 mesh screen







Evaluating

Casing

- Does the casing extend at least 18” above the ground?
- Is it protected from flooding?
- Is the upper termination of the well protected?











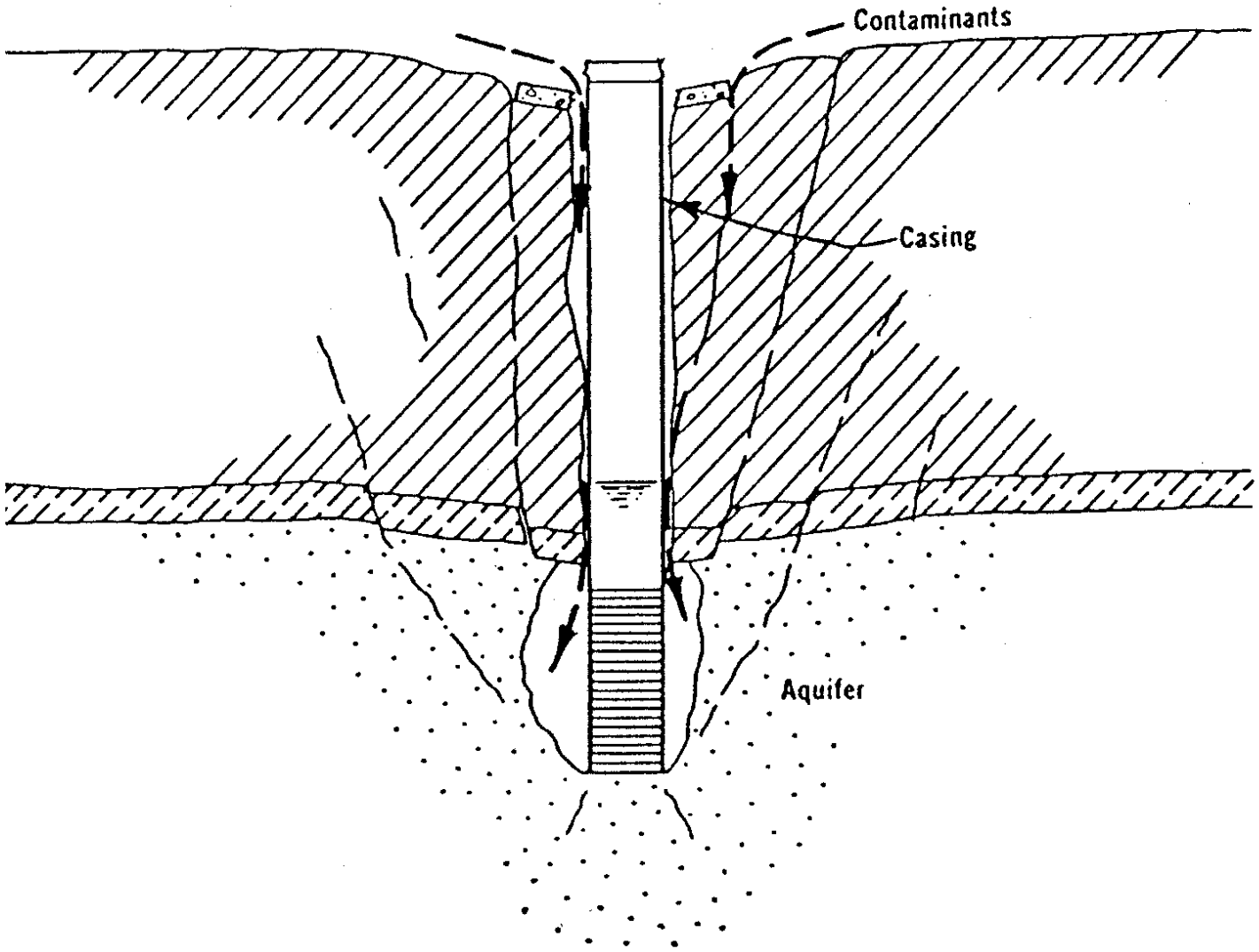
Evaluating

Concrete Pad

- Is there a concrete pad around the well?
  - 3 ft radius
- Is it sloped away from the well?
- Is it intact?

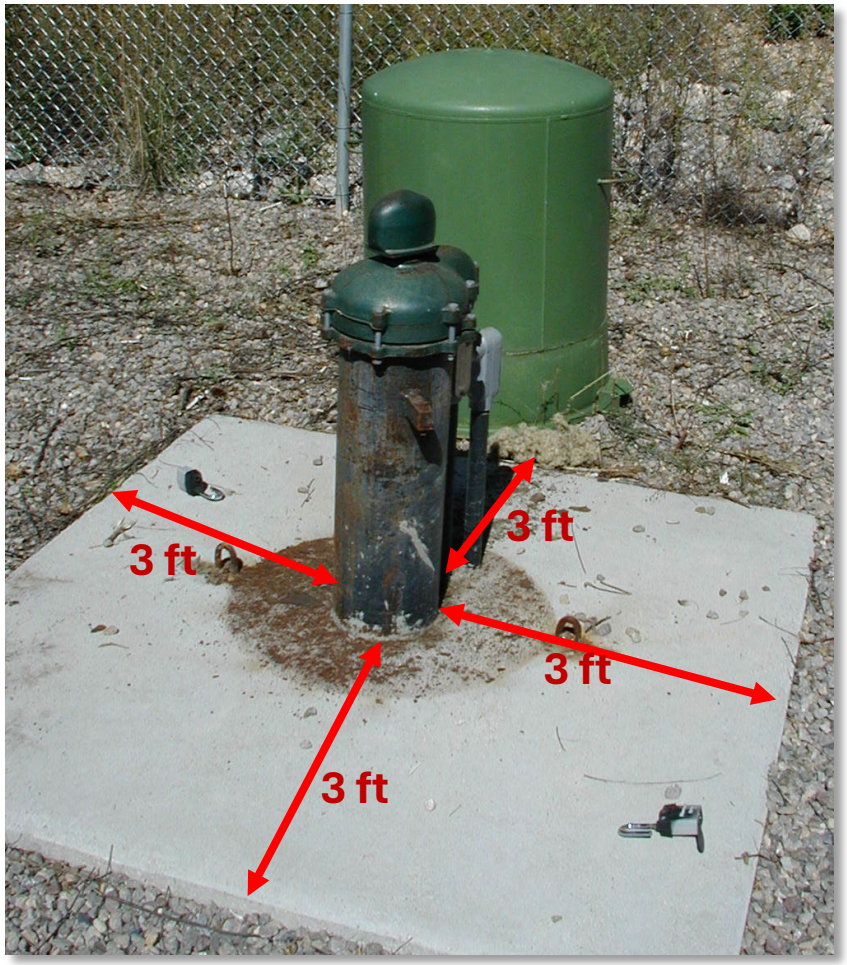


Why have an intact concrete pad?



Concrete pad





concrete pad



Concrete Pad



Evaluating

Electrical Supply

- Should be enclosed inside a conduit





Electrical supply in a conduit







Evaluating

Site Security

- ✓Is the well protected with a locked fence?
- ✓Is the fence completely topped with razor/barbed wire?
- ✓Are there warning signs?



Secure?





Intact fence?




WARNING!
TAMPERING WITH THIS FACILITY IS A
FEDERAL OFFENSE!
US CODE Title 42, Section 2000-a
SUNNY FENCE

Remember to lock the gate!



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CONTACT INFORMATION



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