Private Wells 101

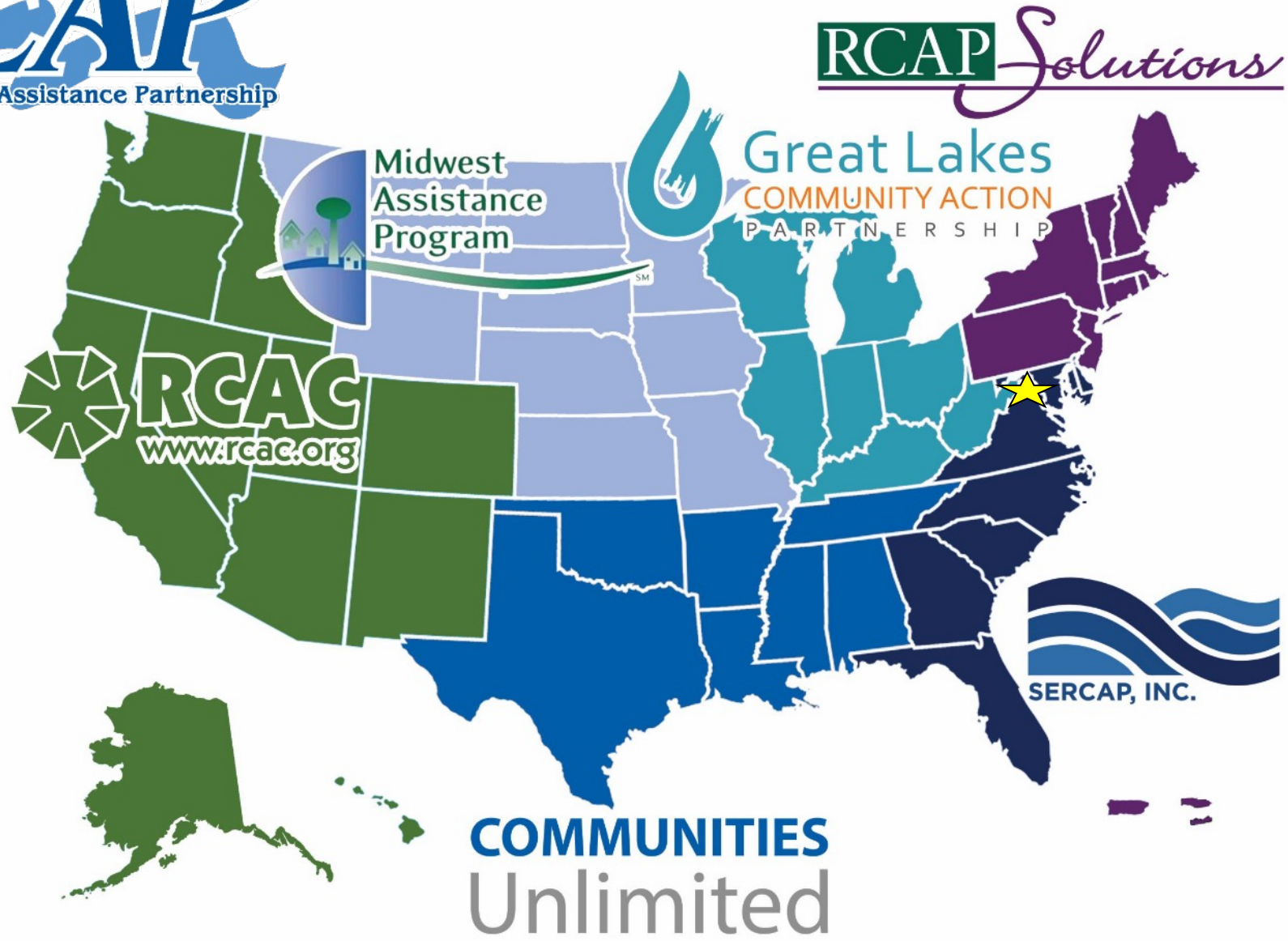
Jim Starbard

Massachusetts State Lead

RCAP Solutions

RCAP

Rural Community Assistance Partnership



RCAP National Office
1701 K St. NW, Suite 700
Washington, D.C. 20006
www.rcap.org

Western RCAP
Rural Community Assistance Corporation
www.rcac.org

Midwestern RCAP
Midwest Assistance Program
www.map-inc.org

Southern RCAP
Communities Unlimited
www.communitiesu.org

Great Lakes RCAP
Great Lakes Community Action Partnership
www.glcap.org

Southeastern RCAP
Southeast Rural Community Assistance Project
www.sercap.org

Northeastern RCAP
RCAP Solutions
www.rcapsolutions.org

"Improving Rural Quality of Life"

Poll

- How many have local Board of Health Regulations for Private Wells?
  - Have they been updated in the 2000's?
  - Testing for Property Transfer?
  - Testing for Rental Housing?
  - Any unusual requirements?

RCAP Solutions

Today's Topics

- **Aquafers**
- **Well Types and Construction**
- **Commonly Seen Well Issues**
- **Testing**

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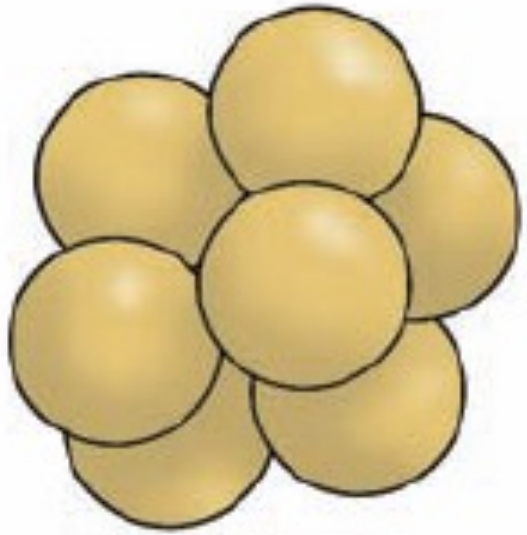
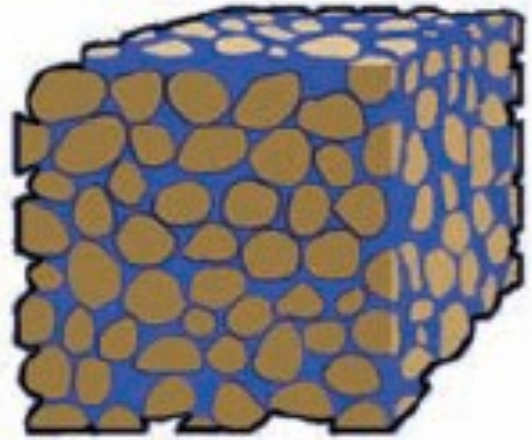
Source: University of Arizona

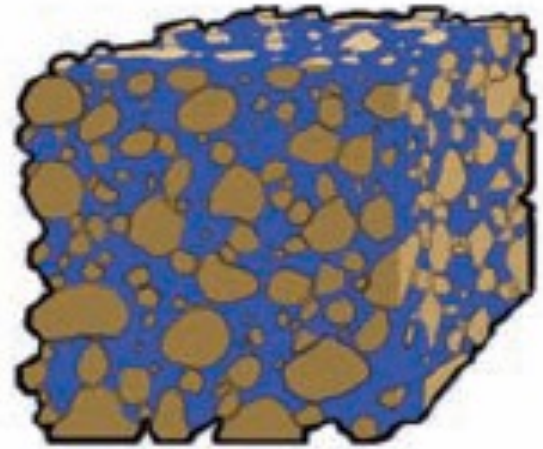
Unconsolidated Aquifer Material



Porous Material



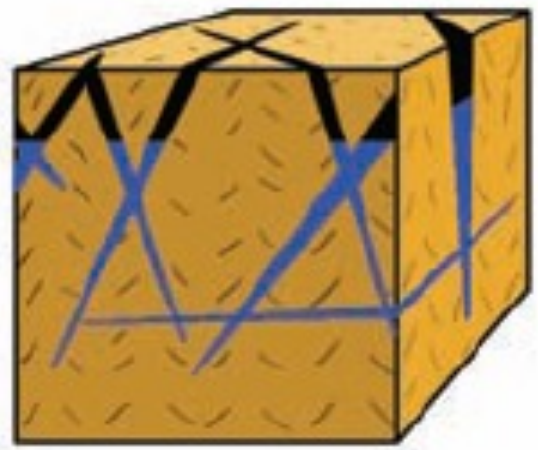
Well-Sorted Sand



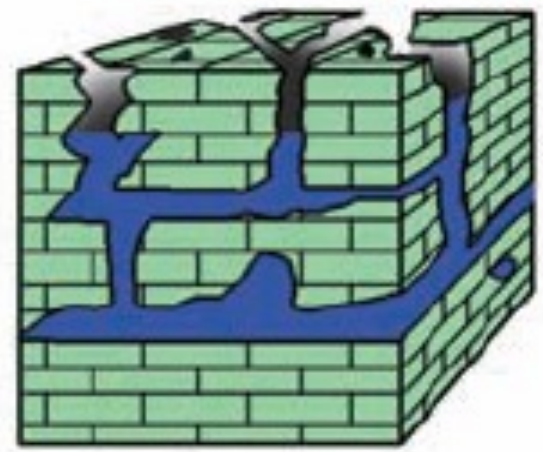
Poorly-Sorted Sand

Consolidated Aquifer Material with Secondary Porosity

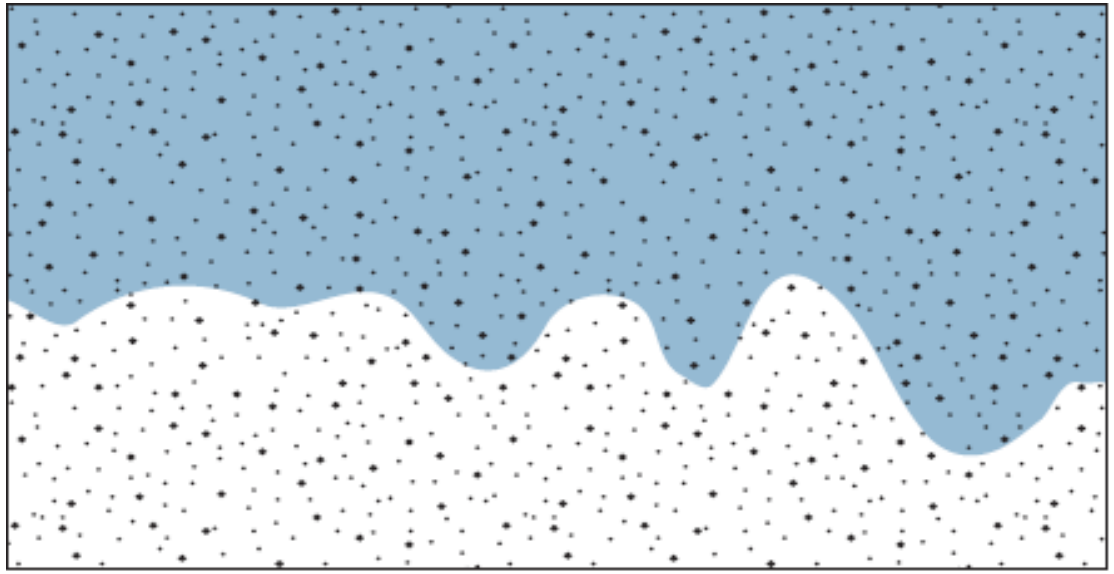
Fractured Rock



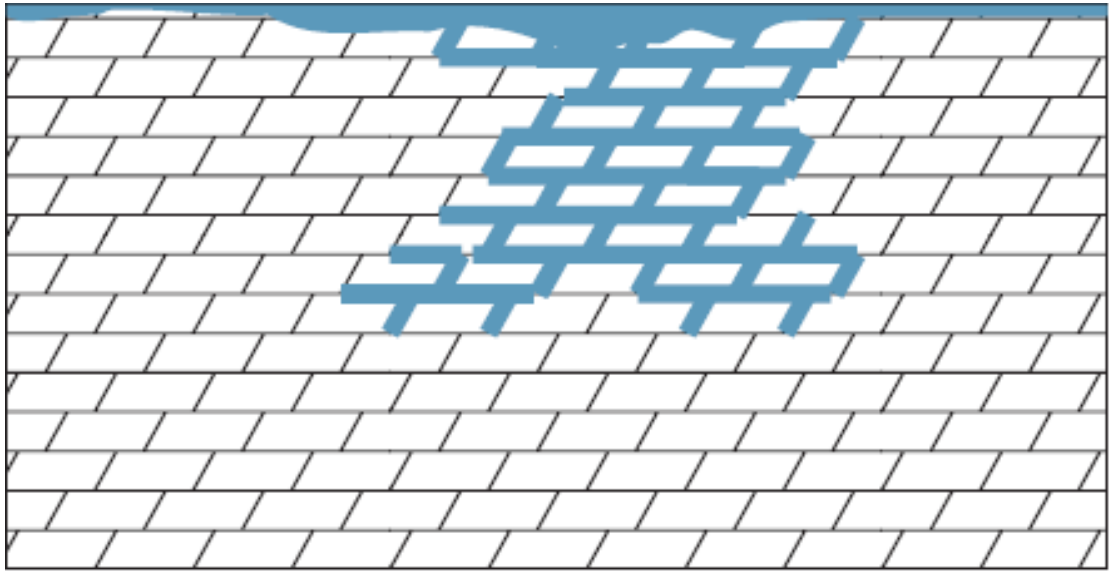
Fractures in Granite



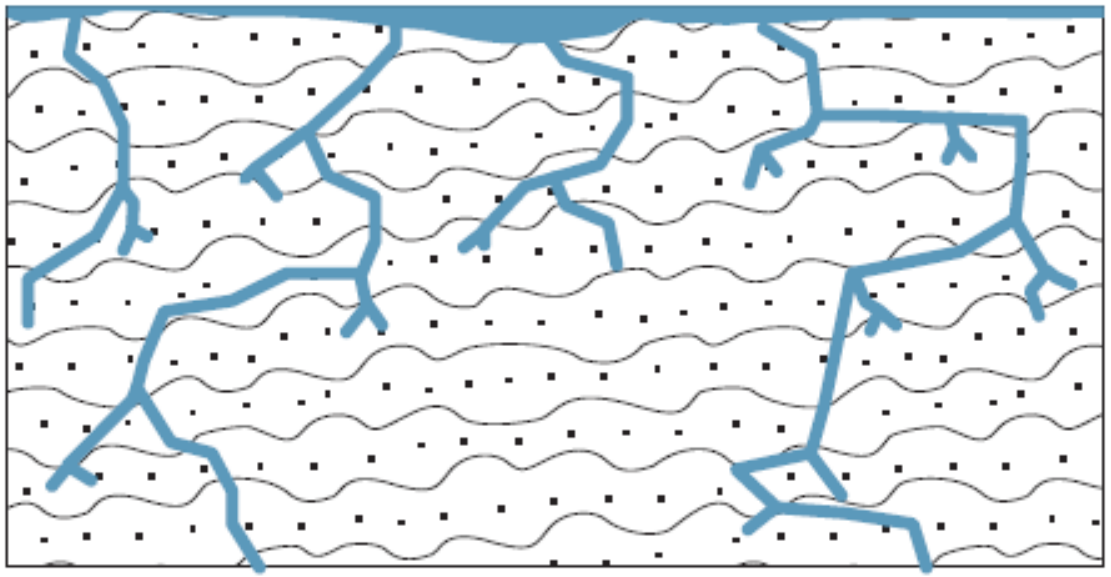
Caverns in Limestone



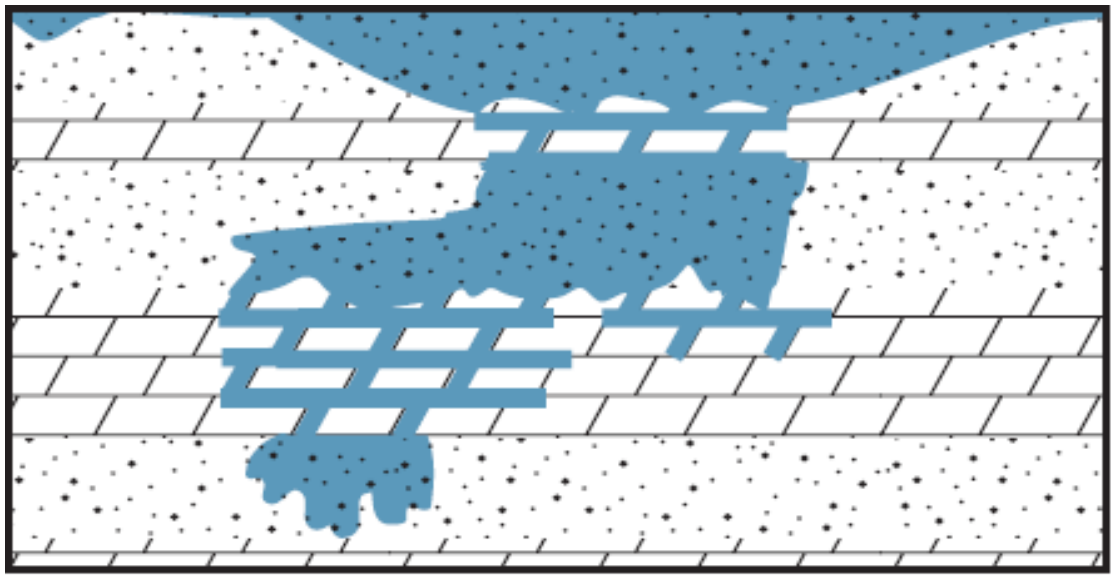
Sand & gravel aquifer



Dolomite

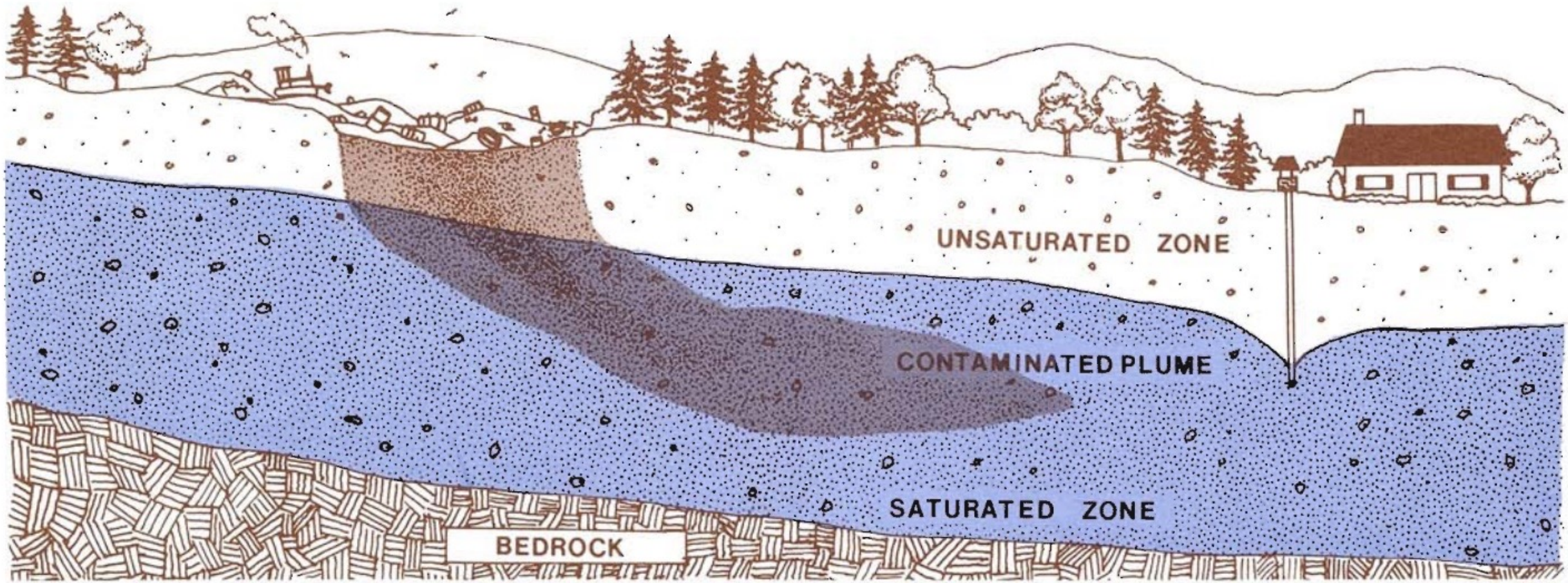


Crystalline bedrock



Sandstone & dolomite

Source: Wisconsin Department of Natural Resources


UNSATURATED ZONE
CONTAMINATED PLUME
SATURATED ZONE
BEDROCK

Well Types

- Aquifer availability (geology) determines well type:
  - Dug/bored – no "real" aquifer, or very old
  - Drilled or driven - sand & gravel aquifer
  - Drilled – consolidated rock (various types)

- In some cases, there may be choices
- You should have a log(s) to know where your water might be coming from

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Bored or Dug Well

- Large diameter
- Usually casing is concrete tile
- Water seeps in from water table or thin sand lenses

Photo: National Ground Water Association

RCAP Solutions

Dug & Bored Wells

RCAP Solutions

Dug & Bored Wells

RCAP Solutions

Dug & Bored Wells

RCAP Solutions

Sand & Gravel Wells

- Use a screen to let water in the well
- Usually casing is PVC or steel
- Size depends on amount of water needed
- Screen size must be determined, based on size of sand in formation

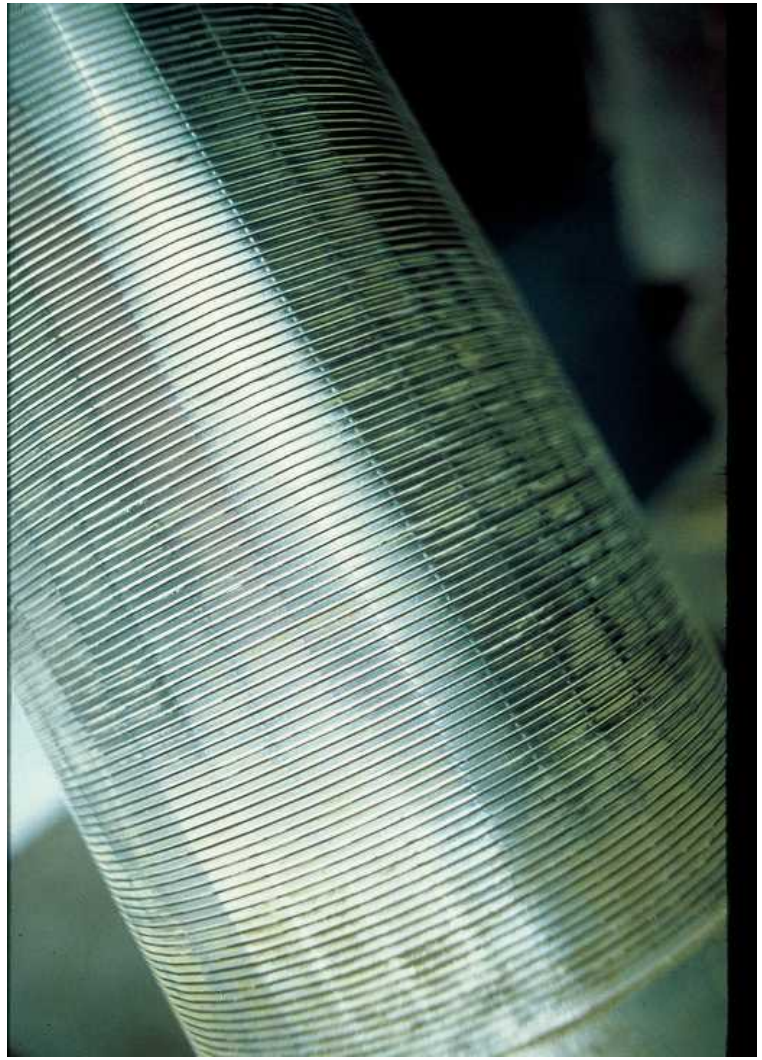


Photo: National Ground Water Association

RCAP Solutions

Bedrock Wells

- Casing seated 10-20 ft into bedrock, then open hole
- Water from cracks and fissures in rock and possibly from rock itself, depending on type of rock
- Can be influenced over large distances

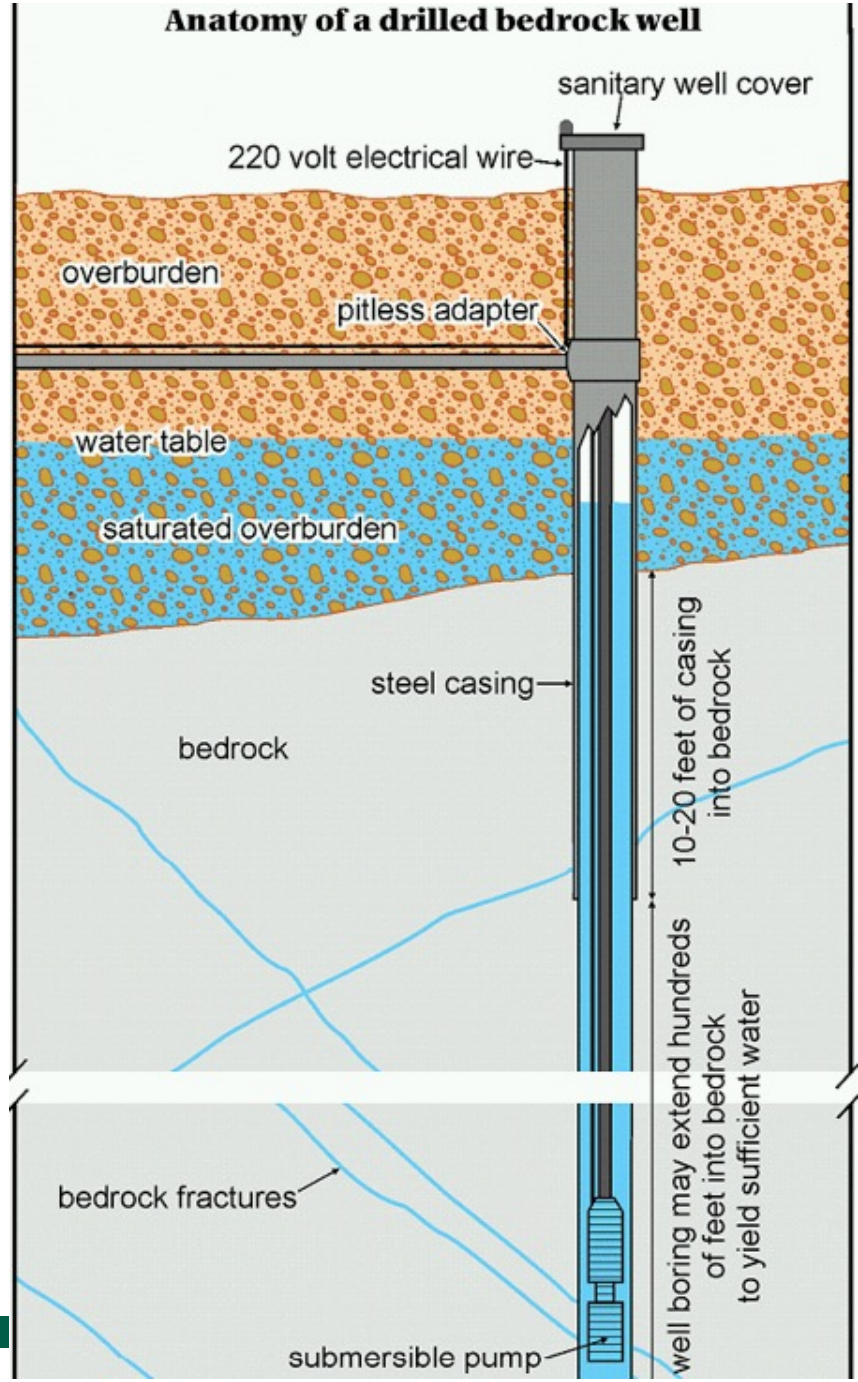
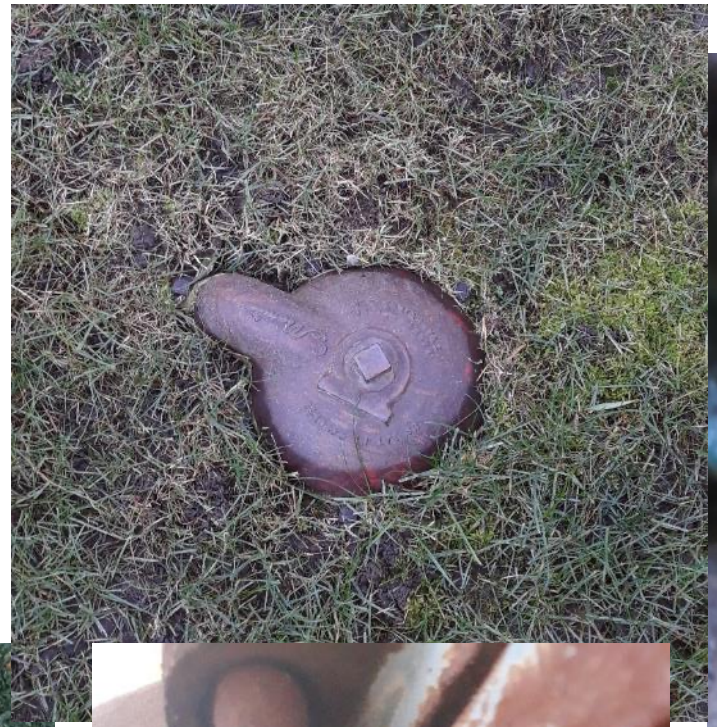
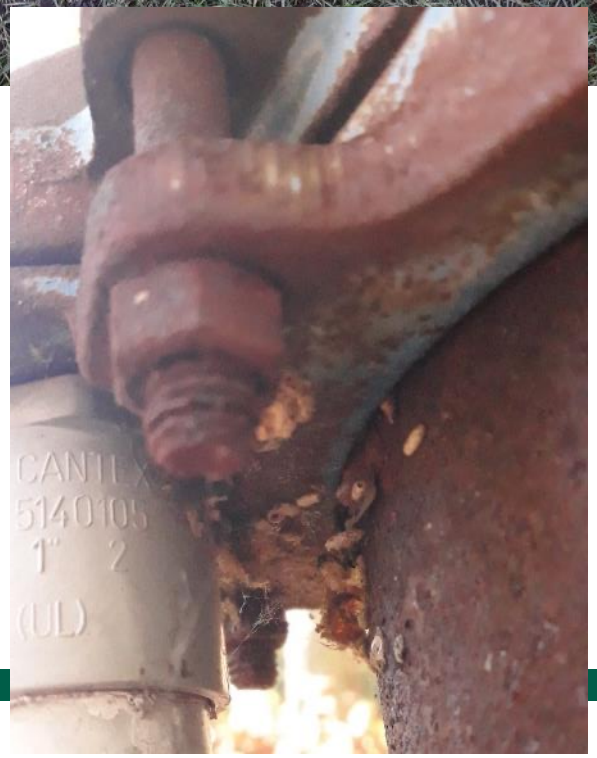


Photo: Maine Department of Agriculture, Conservation, and Forestry

Well Heads

- Should have all bolts tightened
- Be at least 12” off the ground
- Not have pooling or a depressed area around well head
- No exposed wires
- No insect casings
- No holes in mesh
- Away from brush
- Sanitary Cap



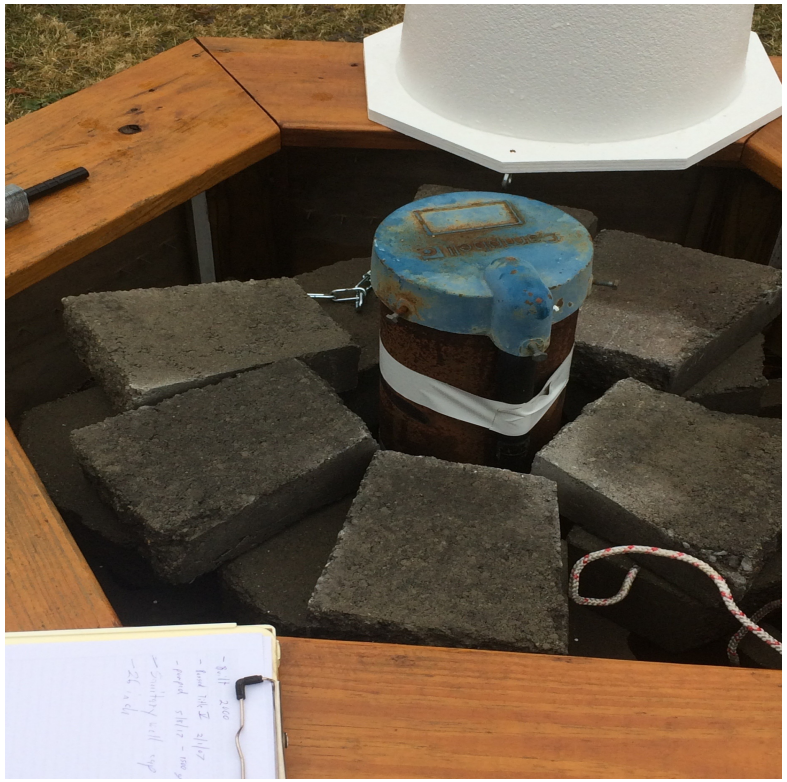


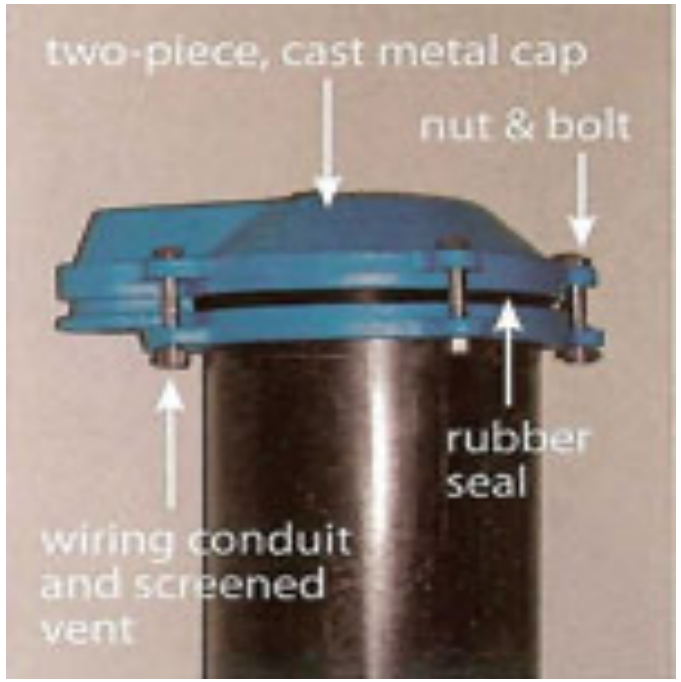
Well Heads

RCAP Solutions

Well Caps

Non-sanitary vs. Sanitary





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Non-Sanitary Well Caps

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Poor Craftsmanship

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Wells In Pits

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Wells Not High Enough Above Grade

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Springs

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Correcting Poor Construction

Well construction codes have changed Significantly in the past 30+ years.

- Existing wells were grandfathered in
- Many wells in pits still exist today
- Many hand dug wells are also still in use

Two problems

- Provide opportunity for surface contamination
- Are a safety hazard

What To Do With These Wells?

Bring them up to code, will protect water quality as well as provide a safer residence.

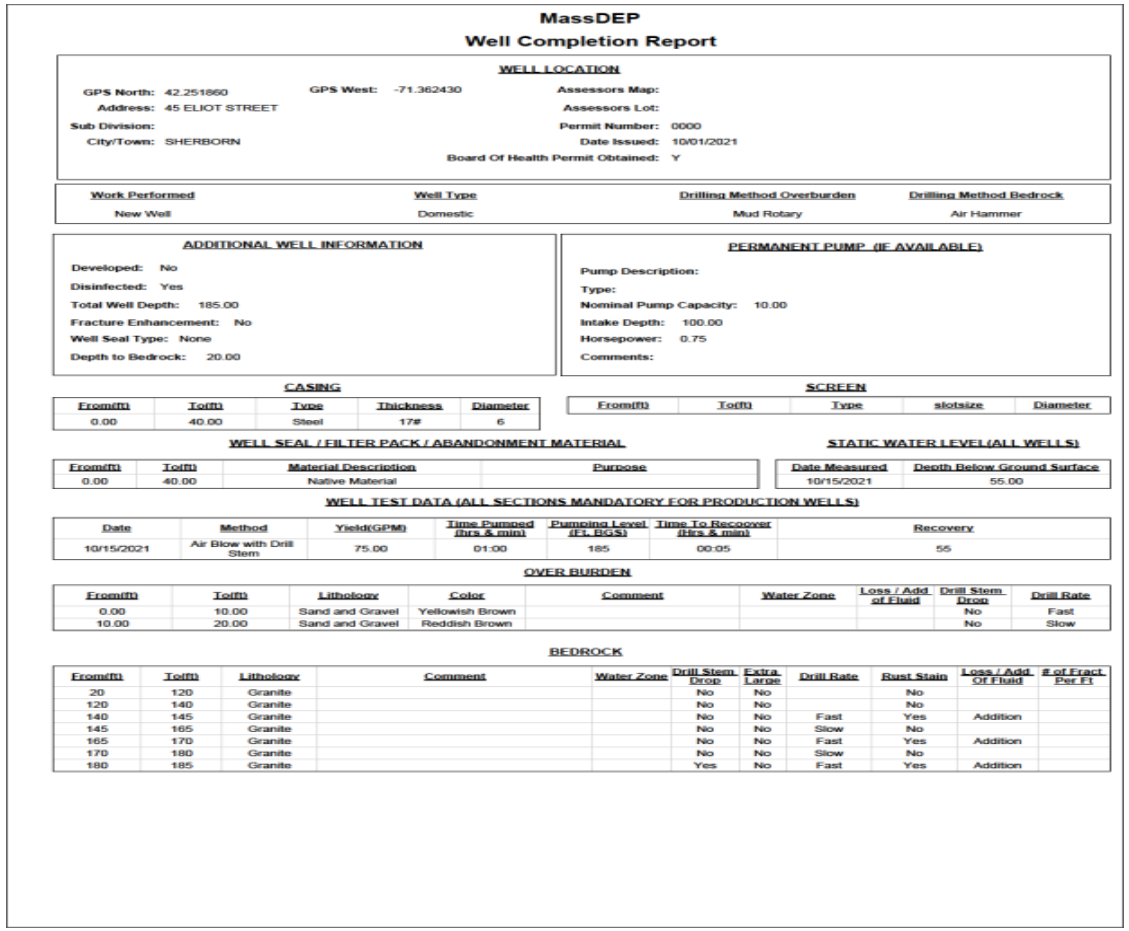
- Extend pipe to above land surface
- Fill in with clay grout
- Install pitiless adapter, if needed

Real Life Scenario

- Housing Inspection Request from a tenant of a home on a private well who has concerns about his drinking water. Local PW regulations don't require rental housing testing.

How would you ensure the owner if providing potable water as required by 105 CMR 410.180?

Well Logs Online



MassDEP

Well Completion Report

WELL LOCATION

GPS North: 42.251860 GPS West: -71.362430 Assessors Map:
Address: 45 ELIOT STREET Assessors Lot:
Sub Division: Permit Number: 0000
City/Town: SHERBORN Date Issued: 10/01/2021
Board Of Health Permit Obtained: Y

Work Performed	Well Type	Drilling Method Overburden	Drilling Method Bedrock
New Well	Domestic	Mud Rotary	Air Hammer

ADDITIONAL WELL INFORMATION

Developed: No
Disinfected: Yes
Total Well Depth: 185.00
Fracture Enhancement: No
Well Seal Type: None
Depth to Bedrock: 20.00

PERMANENT PUMP (IF AVAILABLE)

Pump Description:
Type:
Nominal Pump Capacity: 10.00
Intake Depth: 100.00
Horsepower: 0.75
Comments:

CASING

From(ft)	To(ft)	Type	Thickness	Diameter
0.00	40.00	Steel	17#	6

SCREEN

From(ft)	To(ft)	Type	slotsize	Diameter

WELL SEAL / FILTER PACK / ABANDONMENT MATERIAL

From(ft)	To(ft)	Material Description	Purpose
0.00	40.00	Native Material	

STATIC WATER LEVEL(ALL WELLS)

Date Measured	Depth Below Ground Surface
10/15/2021	55.00

WELL TEST DATA (ALL SECTIONS MANDATORY FOR PRODUCTION WELLS)

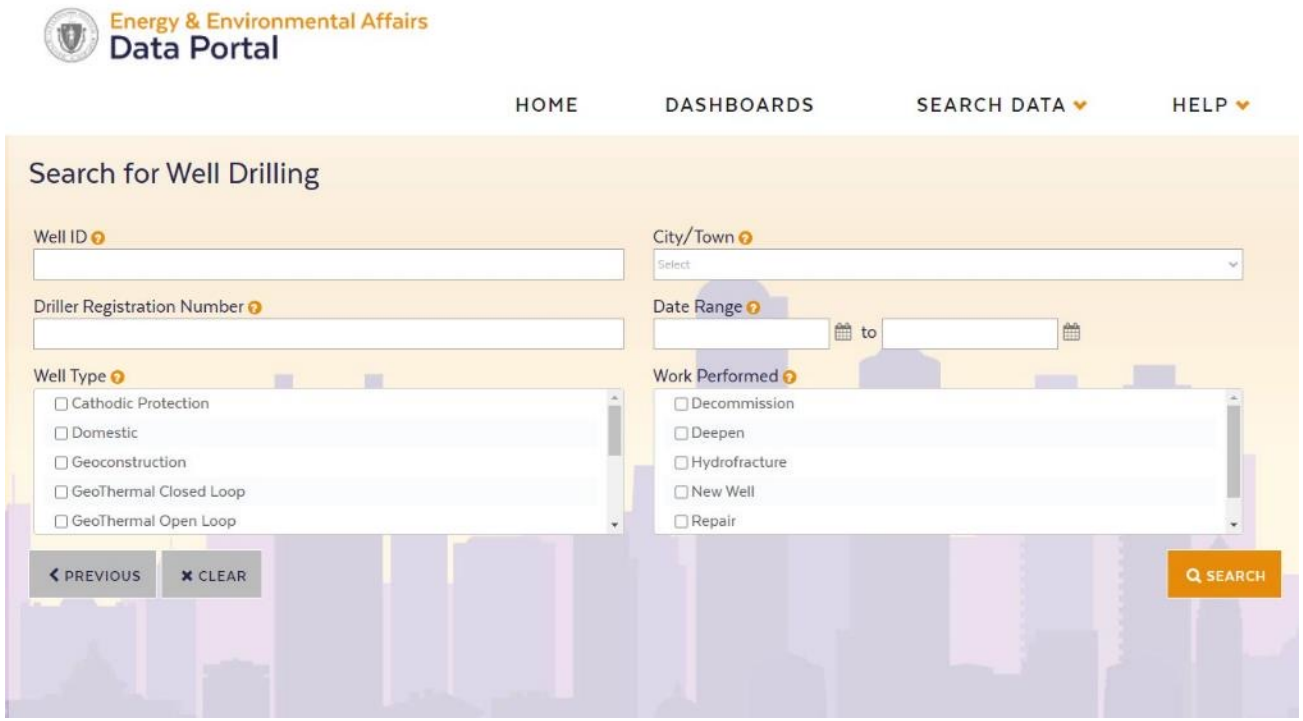
Date	Method	Yield(GPM)	Time Pumped (hrs & min)	Pumping Level (Ft. BGS)	Time To Recover (Hrs & min)	Recovery
10/15/2021	Air Blow with Drill Stem	75.00	01:00	185	00:05	55

OVER BURDEN

From(ft)	To(ft)	Lithology	Color	Comment	Water Zone	Loss / Add of Fluid	Drill Stem Drop	Drill Rate
0.00	10.00	Sand and Gravel	Yellowish Brown				No	Fast
10.00	20.00	Sand and Gravel	Reddish Brown				No	Slow

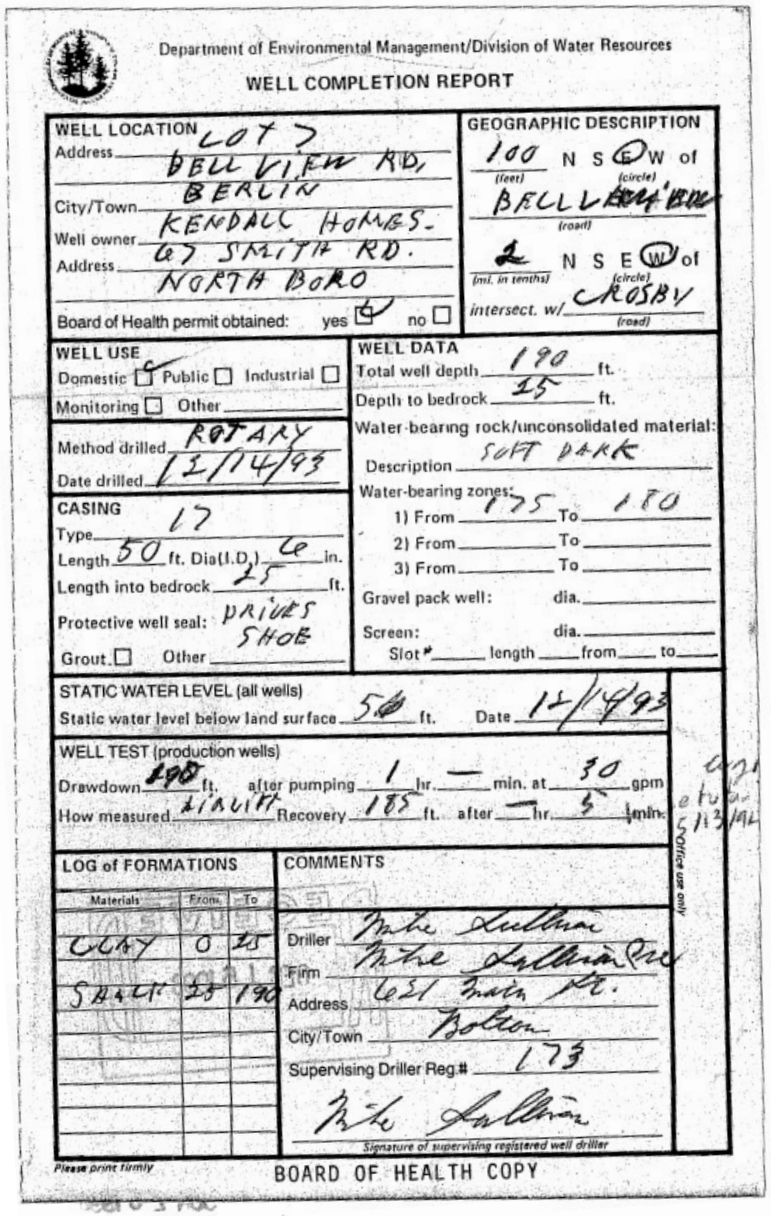
BEDROCK

From(ft)	To(ft)	Lithology	Comment	Water Zone	Drill Stem Drop	Extra Large	Drill Rate	Rust Stain	Loss / Add Of Fluid	# of Fract Per Ft
20	120	Granite			No	No		No		
120	140	Granite			No	No		No		
140	145	Granite			No	No	Fast	Yes	Addition	
145	165	Granite			No	No	Slow	No		
165	170	Granite			No	No	Fast	Yes	Addition	
170	180	Granite			No	No	Slow	No		
180	185	Granite			Yes	No	Fast	Yes	Addition	



[Energy & Environmental Affairs Data Portal (state.ma.us)](#) Link in materials

Well Logs



Department of Environmental Management/Division of Water Resources

WELL COMPLETION REPORT

WELL LOCATION
Address: LOT 7 BELL VIEW RD,
City/Town: BERLIN
Well owner: KENDALL HOMES
Address: 67 SMITH RD. NORTH BORO
Board of Health permit obtained: yes ☑ no ☐

GEOGRAPHIC DESCRIPTION
100 (feet) N S E W of (circle) BELL [illegible] (road)
2 (mi. in tenths) N S E W of (circle) intersect. w/ CROSBY (road)

WELL USE
Domestic ☑ Public ☐ Industrial ☐
Monitoring ☐ Other
Method drilled: ROTARY
Date drilled: 12/14/93

WELL DATA
Total well depth: 190 ft.
Depth to bedrock: 15 ft.
Water-bearing rock/unconsolidated material:
Description: SOFT DARK
Water-bearing zones:
1) From 175 To 180
2) From To
3) From To
Gravel pack well: dia.
Screen: dia.
Slot # length from to

CASING
Type: 17
Length: 50 ft. Dia(I.D.) 6 in.
Length into bedrock: 15 ft.
Protective well seal: DRIVER SHOE
Grout ☐ Other

STATIC WATER LEVEL (all wells)
Static water level below land surface: 50 ft. Date: 12/14/93

WELL TEST (production wells)
Drawdown: 140 ft. after pumping 1 hr. — min. at 30 gpm
How measured: BAILER Recovery 185 ft. after — hr. 5 min.

LOG of FORMATIONS

Materials	From	To
CLAY	0	25
SAND	25	190

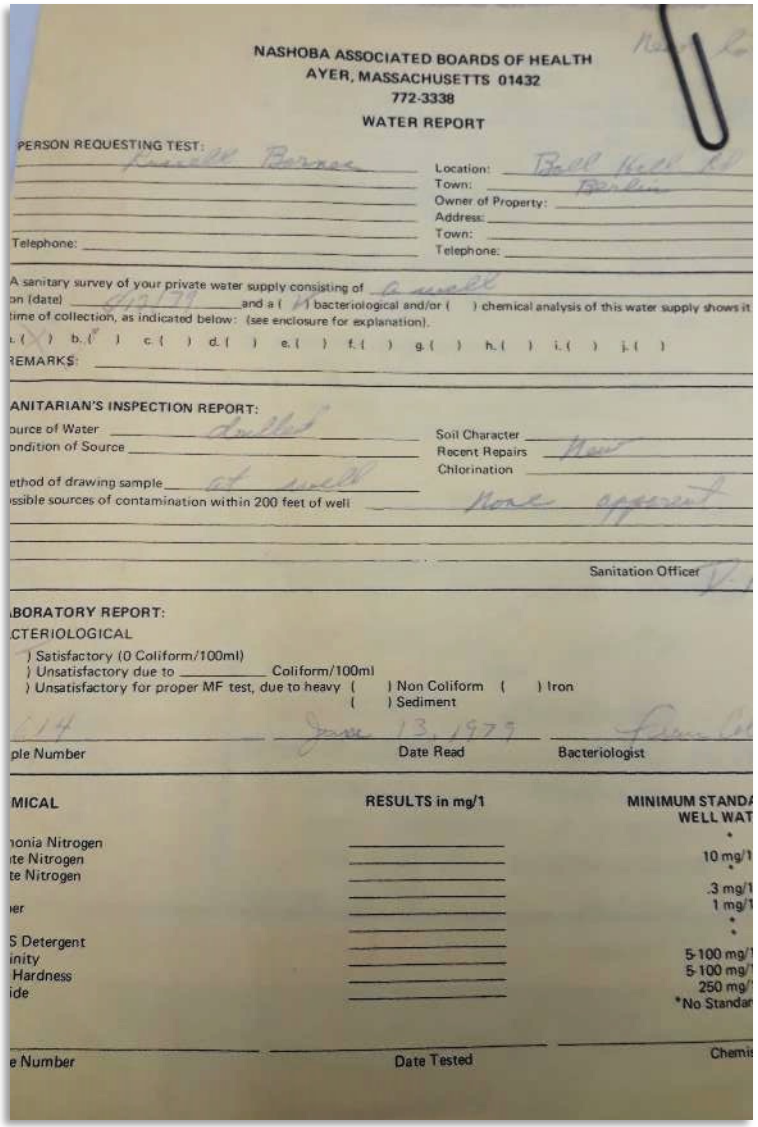
COMMENTS

Driller: Mike Sullivan
Firm: Mike Sullivan Co
Address: 621 Main St.
City/Town: Bolton
Supervising Driller Reg.#: 173
Mike Sullivan
Signature of supervising registered well driller

Office use only 12/13/93

Please print firmly

BOARD OF HEALTH COPY



NASHOBA ASSOCIATED BOARDS OF HEALTH
AYER, MASSACHUSETTS 01432
772-3338

WATER REPORT

PERSON REQUESTING TEST: Russell Barnes
Location: Bell Hill Rd
Town: Berlin
Owner of Property:
Address:
Town:
Telephone:
Telephone:

A sanitary survey of your private water supply consisting of a well
on (date) April and a ( ) bacteriological and/or ( ) chemical analysis of this water supply shows it
time of collection, as indicated below: (see enclosure for explanation).
a.( ) b.( ) c.( ) d.( ) e.( ) f.( ) g.( ) h.( ) i.( ) j.( )
REMARKS:

SANITARIAN'S INSPECTION REPORT:
Source of Water drilled
Condition of Source
Soil Character
Recent Repairs new
Chlorination
Method of drawing sample at well
Possible sources of contamination within 200 feet of well None apparent

Sanitation Officer

LABORATORY REPORT:
BACTERIOLOGICAL
( ) Satisfactory (0 Coliform/100ml)
( ) Unsatisfactory due to _____ Coliform/100ml
( ) Unsatisfactory for proper MF test, due to heavy ( ) Non Coliform ( ) Iron
( ) Sediment

C14 June 13, 1979 Jean C.
Sample Number Date Read Bacteriologist

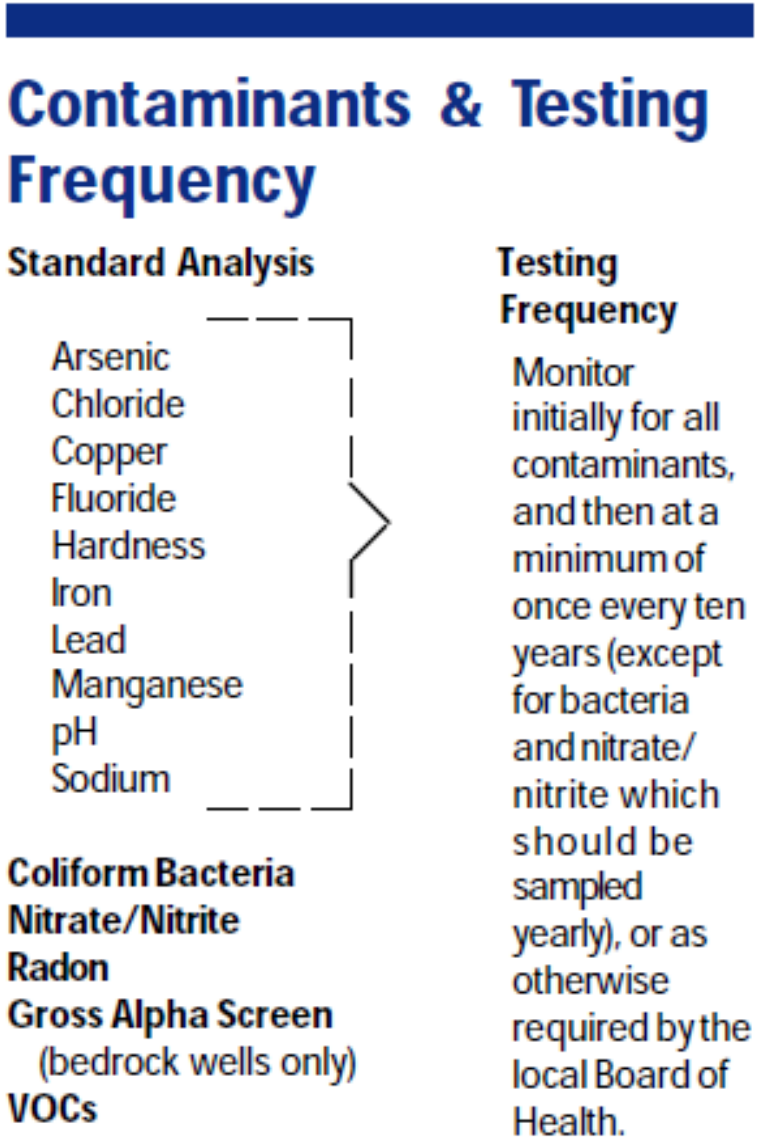
CHEMICAL RESULTS in mg/1 MINIMUM STANDARDS WELL WATER
Ammonia Nitrogen *
Nitrate Nitrogen 10 mg/l
Nitrite Nitrogen *
.3 mg/l
Iron 1 mg/l
Manganese *
MBAS Detergent 5-100 mg/l
Alkalinity 5-100 mg/l
Total Hardness 250 mg/l
Chloride *No Standard

Sample Number Date Tested Chemist

Testing -Well Water Quality

Lots of questions when it comes to sampling:

- Where do I collect the sample?
- What to test for?
- How often should I test?
- Where do I get it analyzed?
- Is one sample enough?
- What do I do with the results?



How to find a MassDEP-certified laboratory for testing your tap water:

https://www.mass.gov/how-to/find-a-certified-laboratory-for-water-testing

RCAP Solutions

Be Well Informed Tool

https://www.mass.gov/service-details/understanding-my-laboratory-results

Real Life Scenario

- A summer camp does not meet the public water system definition and is not connected to public water. Local PW regulations don't require testing.

How would you ensure they are providing potable water to operate under the permit(s) you will be granting?

RCAP Solutions

More Information & Questions

- www.rcapsolutions.org/ma-private-wells/

- Jim Starbard, MA State Lead

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(978)-502-0227

RCAP Solutions