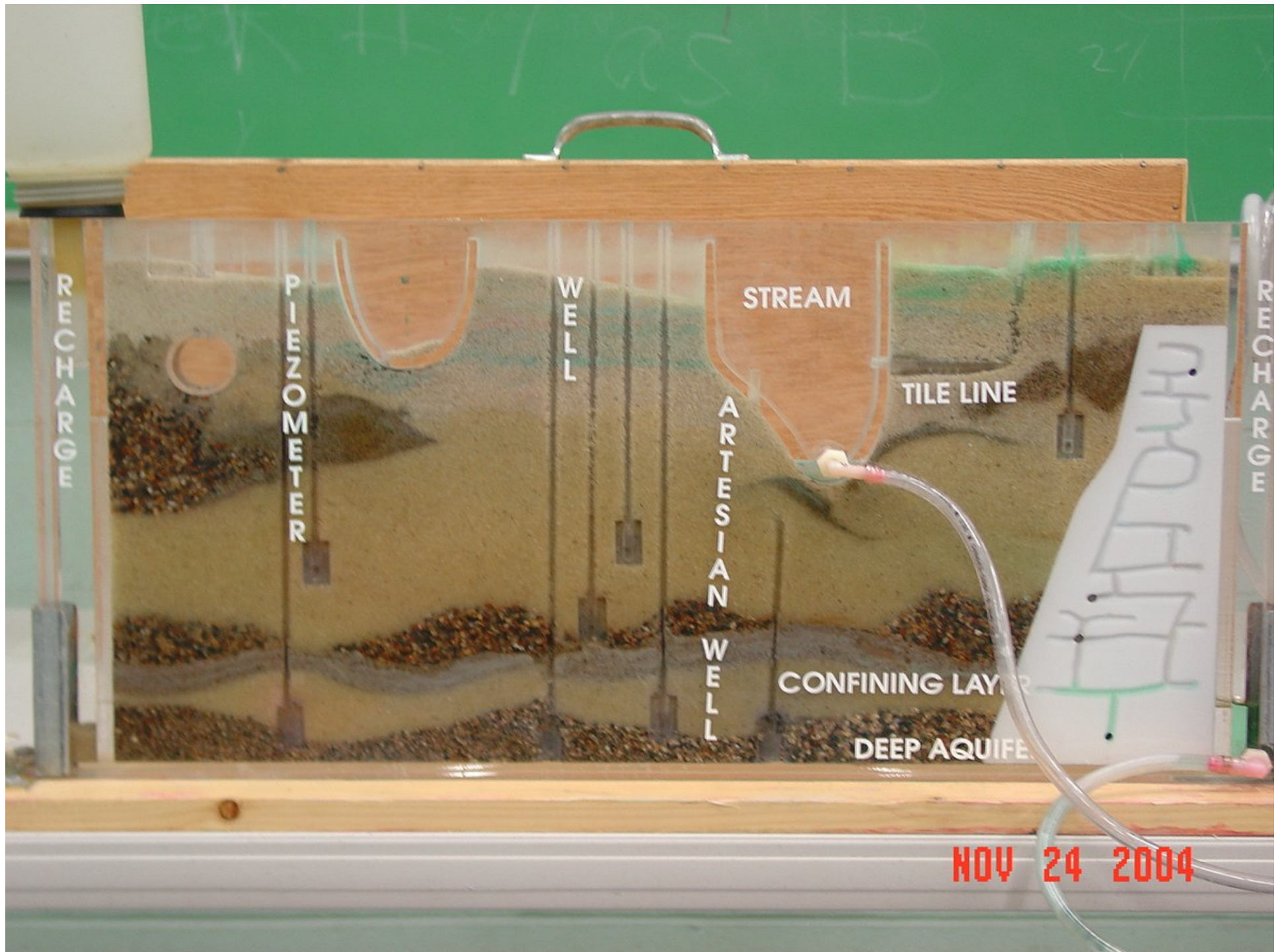


Using the Ground Water Flow Model as an Educational Tool

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Explain the model

1. Represents a cross-section of what the earth might look like if you could cut straight down into it.
2. Talk about the water cycle and the recharge system being used with the model.
3. We will use the model to show three things.
 1. Where and how water is stored
 2. How water and potential contaminants move through soil
 3. Interaction between surface and ground water.

4. Identify the the different areas on the model. Name them all and then go back and explain them.

1. Recharge system

2. UST

3. Lagoon

4. Aquifers

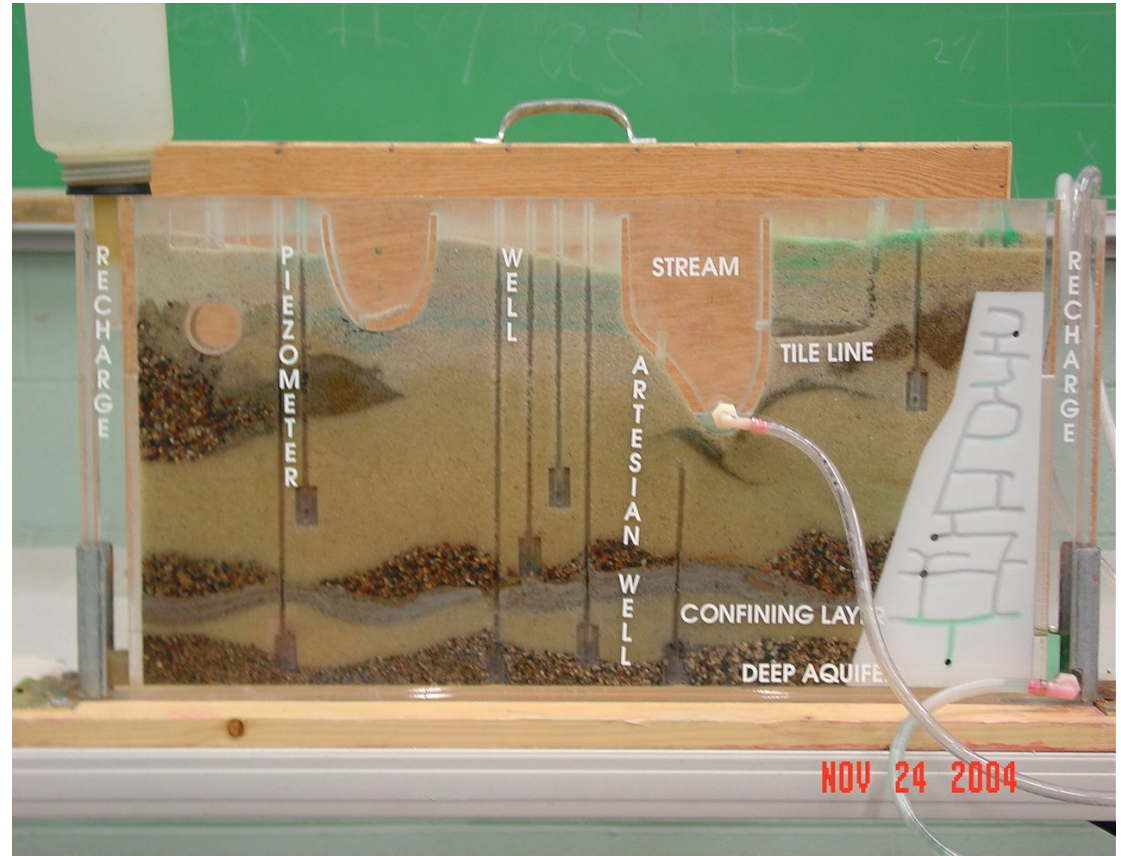
5. Confining area

6. Piezometers

7. Wells

8. Lake or stream

9. Karst Topography



Recharge System

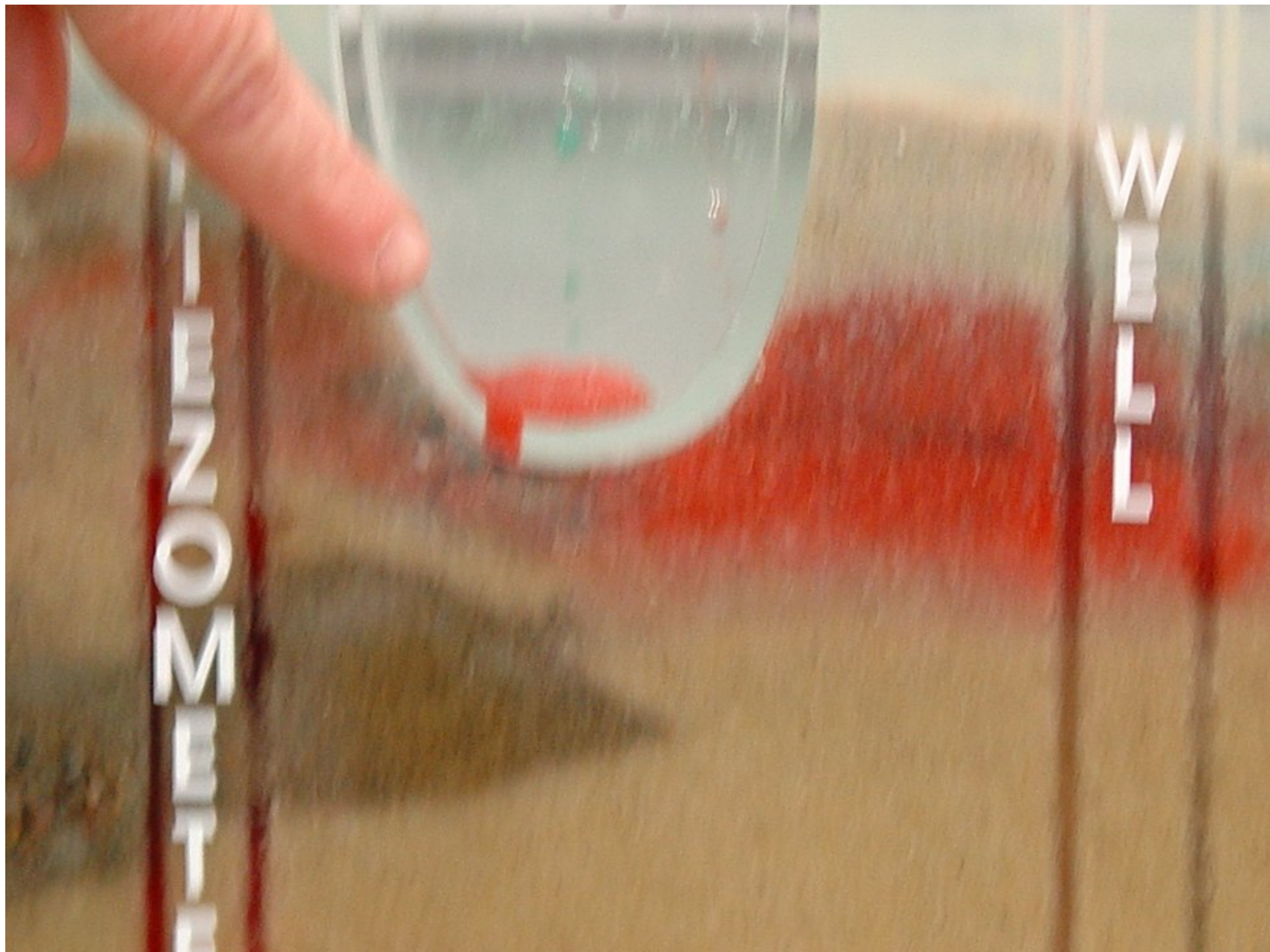
- Was explained in the water cycle but emphasize that water may come from far away to recharge the underground system, not just from the area above the aquifer.

Underground Storage Tank

- Identify this in terms they can related to
- Most common would be a septic tank or a gasoline storage tank. Ask about getting gas at a convenience store and ask where was the gasoline storage tank located.
- DNR estimates that there are over 30,000 leaking petroleum storage tanks and from on-site sewage tanks that aren't functioning properly.

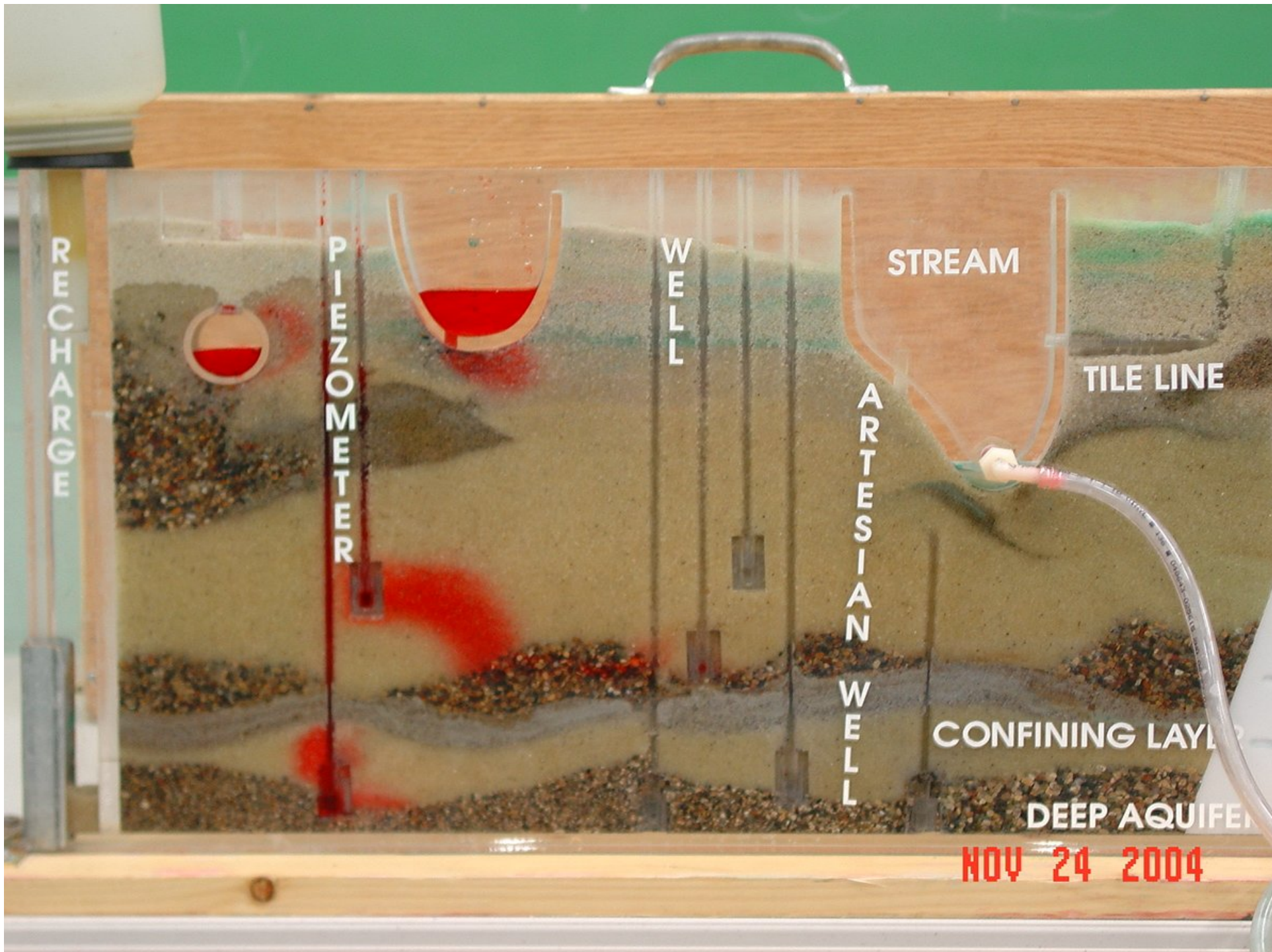
Lagoon

- Explain the purpose of a lagoon.
- Whether for livestock or human waste lagoons may leak over time. A leaking lagoon can carry bacteria, nutrients and pathogens into ground water systems.



Aquifers

- The aquifer is the place where water is stored. It is not stored underground in big holes or caves but is in the small holes/pore space found around rocks, gravel and sand in the crevices between rocks.
- There are two aquifers on the model. An upper aquifer and a lower/deep aquifer.

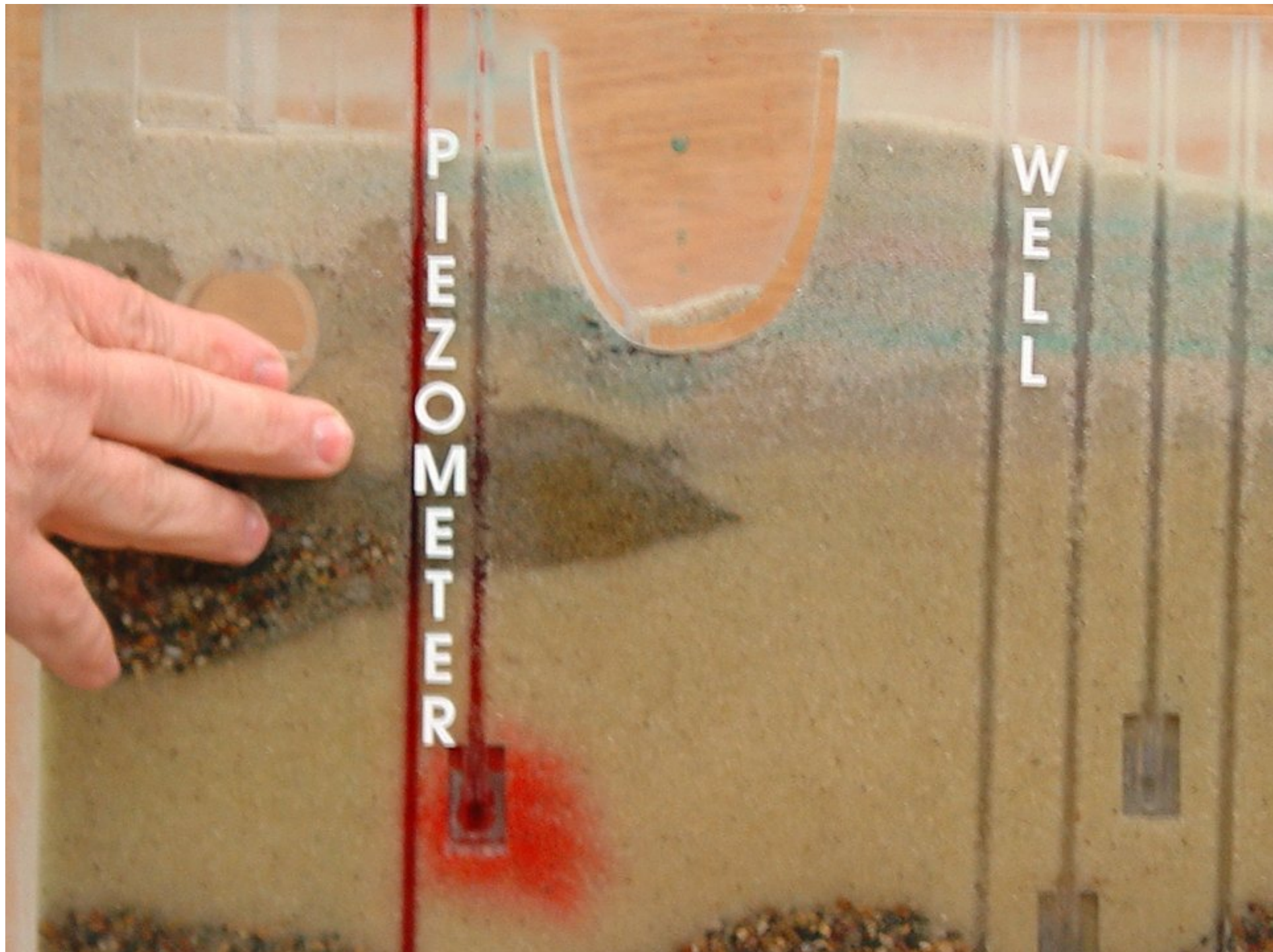


Confining Layer

- A confining layer separates the upper and lower aquifer and retards (or reduces) the movement of water from one area to the other.
- In nature a confining layer may be bed rock or clay. (try to find an example for the area you are in such as the clay pan area in mid Mo.)

Piezometers and Wells

- Piezometers are used to measure water pressure below ground level and the water table.
- Wells will be used to draw water from the under ground aquifers to supply drinking water for more than 33% of Missouri residents.

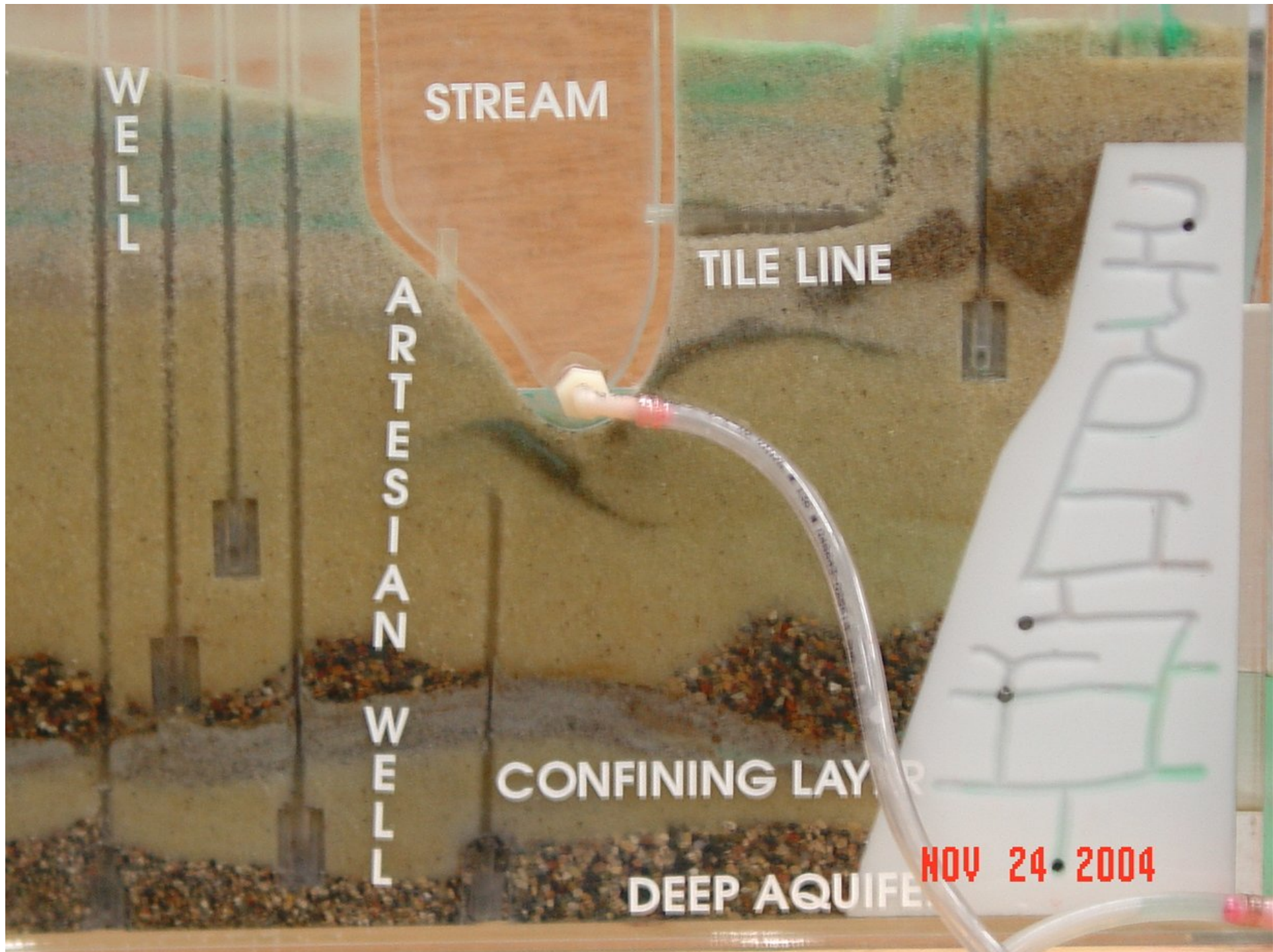


PIEZOMETER

WELL

Lake or Stream

- Explain how water always moves from an area of high pressure to and area of low pressure. Whether this is from the ground to a ditch, stream, lake or your basement.
- Ground water and surface water meet at a lake or stream. Base flow of a stream is often made up mostly of ground water.



WELL

STREAM

TILE LINE

ARTESIAN WELL

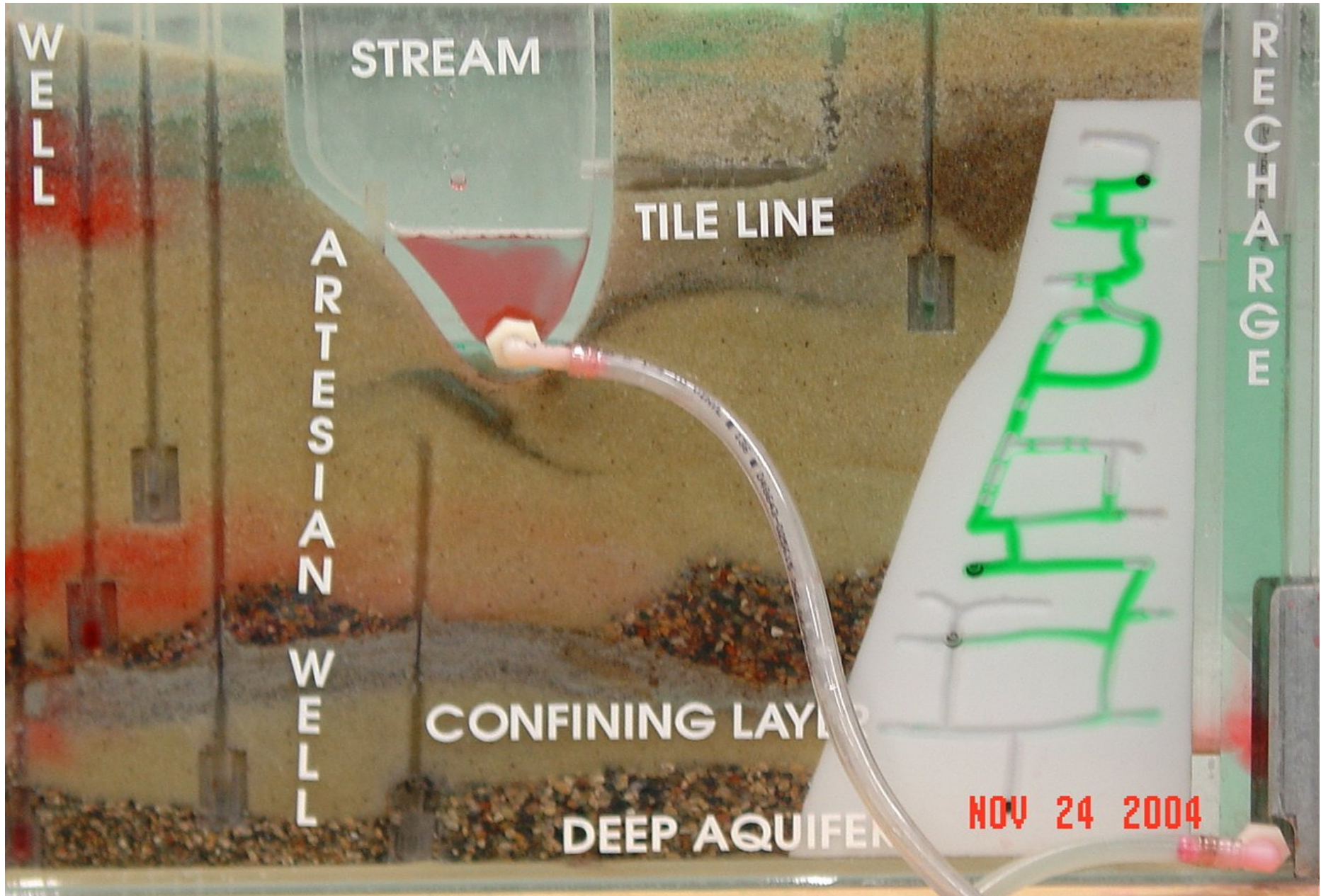
CONFINING LAYER

DEEP AQUIFER

NOV 24 2004

Karst or Fractured Limestone

- Explain what is meant by Karst or fractured limestone and where it is most likely found.
- Explain that this is important for the development of caves in Missouri.
- Unique threat of ground water in Karst areas due to septic tanks, abandoned wells, landfills, etc.



WELL

STREAM

TILE LINE

RECHARGE

ARTESIAN WELL

CONFINING LAYER

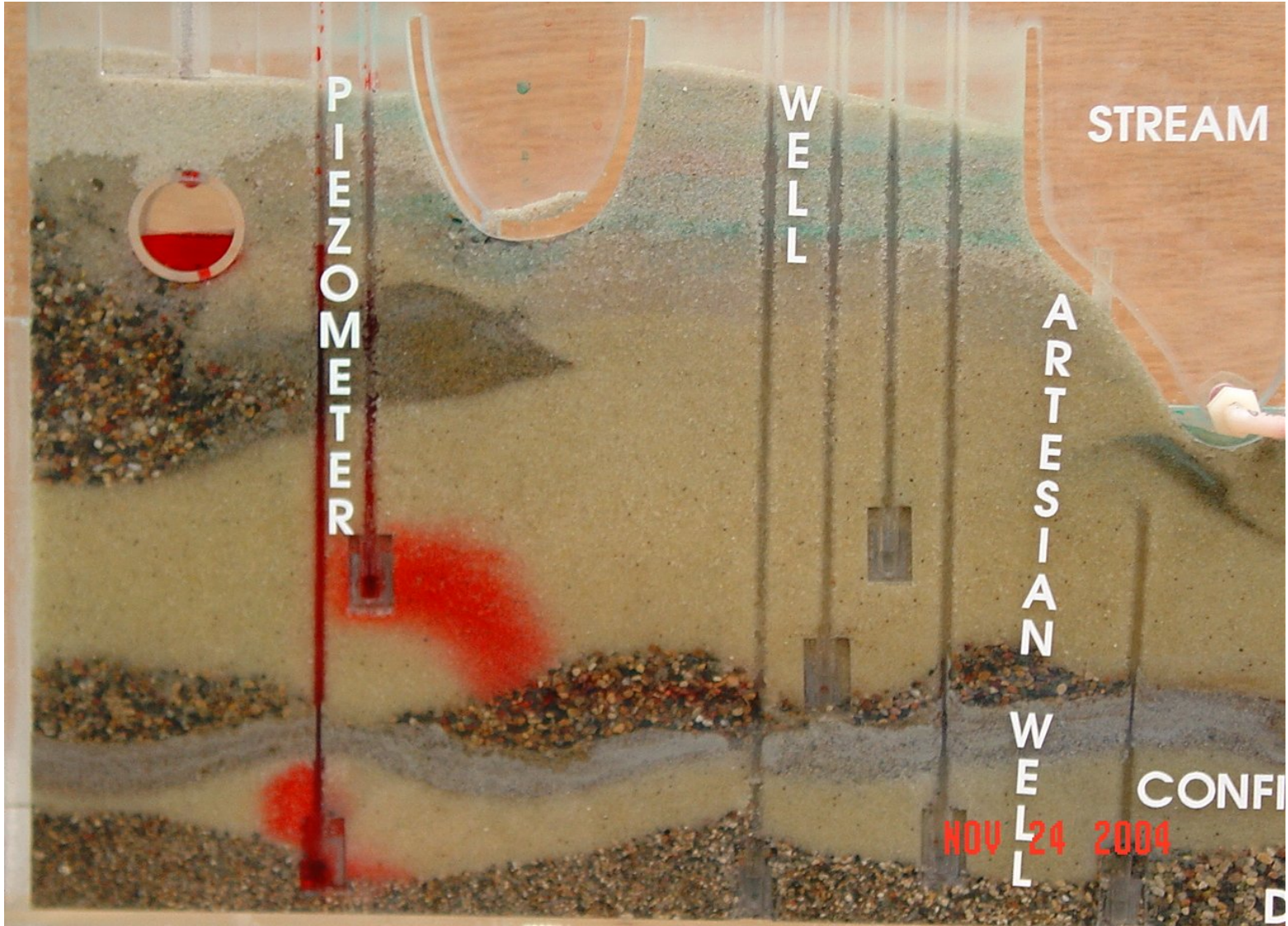
DEEP AQUIFER

NOV 24 2004

Using red dye, fill up the first two piezometers, the lagoon and UST. As the dye spreads you will see it move in the direction of the lake or stream (a low pressure area).

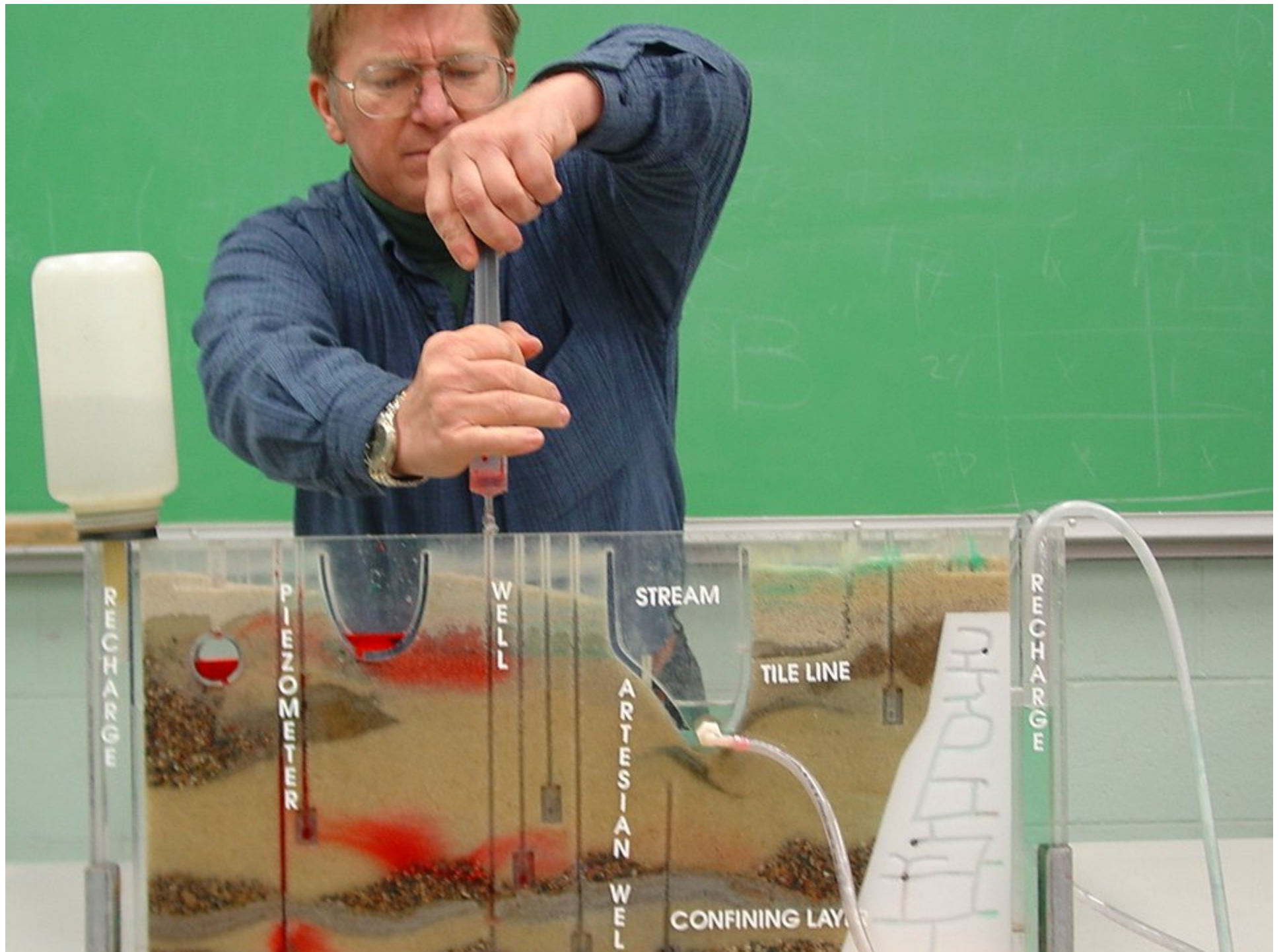
Ask the students where is water stored to reinforce the concept of an aquifer. Allow the dye to show how the water is moving and ask why is it moving towards the lake.

The piezometers will never stay above the water level in the recharge area of the model. Have the kids respond about what the function is and how high is the water table.



The wells can be used to show several different features.

1. Cover the syringe with your hand so kids can't see what is in it and draw water from the well. Ask the kids what color will the well water be. We didn't put any dye in the area that would show us any problems with the local water. When the water comes out reddish, we again talk about how water moves through the soil and is called the universal solvent. The red may represent the minerals that have been dissolved in the rock or the products from the leaking UST and lagoon.
2. Ask the kids to watch the piezometers and determine if they will both be effected when pulling water from the well. Pull water from the shallow well and have the kids tell what happened. Then pull from the deep well and have the kids explain what happened. Ask what caused the difference. The confining layer is the reason.



Look at the lake. How did it get so red since we didn't put any dye in that area. Have students help explain this and then talk about how the water table effects the movement of water into or out of a lake or stream.

Karst or fractured Limestone

Explain that soil is an excellent buffer and can remove some potential contaminants from the water as it moves through it. In areas with lots of Karst, the soil is generally very shallow and the fractures in the rock act like a straight conduit to allow contaminants to get into ground water supplies. Ask kids where they see this type of rock in their local area.

Shoot dye down through the Karst area to show the speed that water runs into the model without soil as a buffer to slow it down or remove contaminants.

Have interesting information available about water quality and the environment that you can use to enhance your teaching.

70% of earth's surface is covered with water

97% of the world's water is found in oceans and is non-drinkable – 3% is fresh water. Of the 3%, 75% is in ice at the N and S poles. Only $\frac{3}{4}$ of 1% of all water is available to us for drinking.

Americans use over 900 billion gallons each year.

Quantity of water world wide doesn't really change (water cycle shows this) only the location and quality changes. We are drinking the same water that the dinosaurs could have drank millions of years ago.

5 gallon of gasoline can destroy 1 million gallons of drinking water

Questions to ask for further discussion and study

How important is water to life

How do each of us protect our water

Where do you get your water, from the ground or a surface supply

How much water does the average person use everyday

What can be done to conserve water

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Cleaning Flow Model

