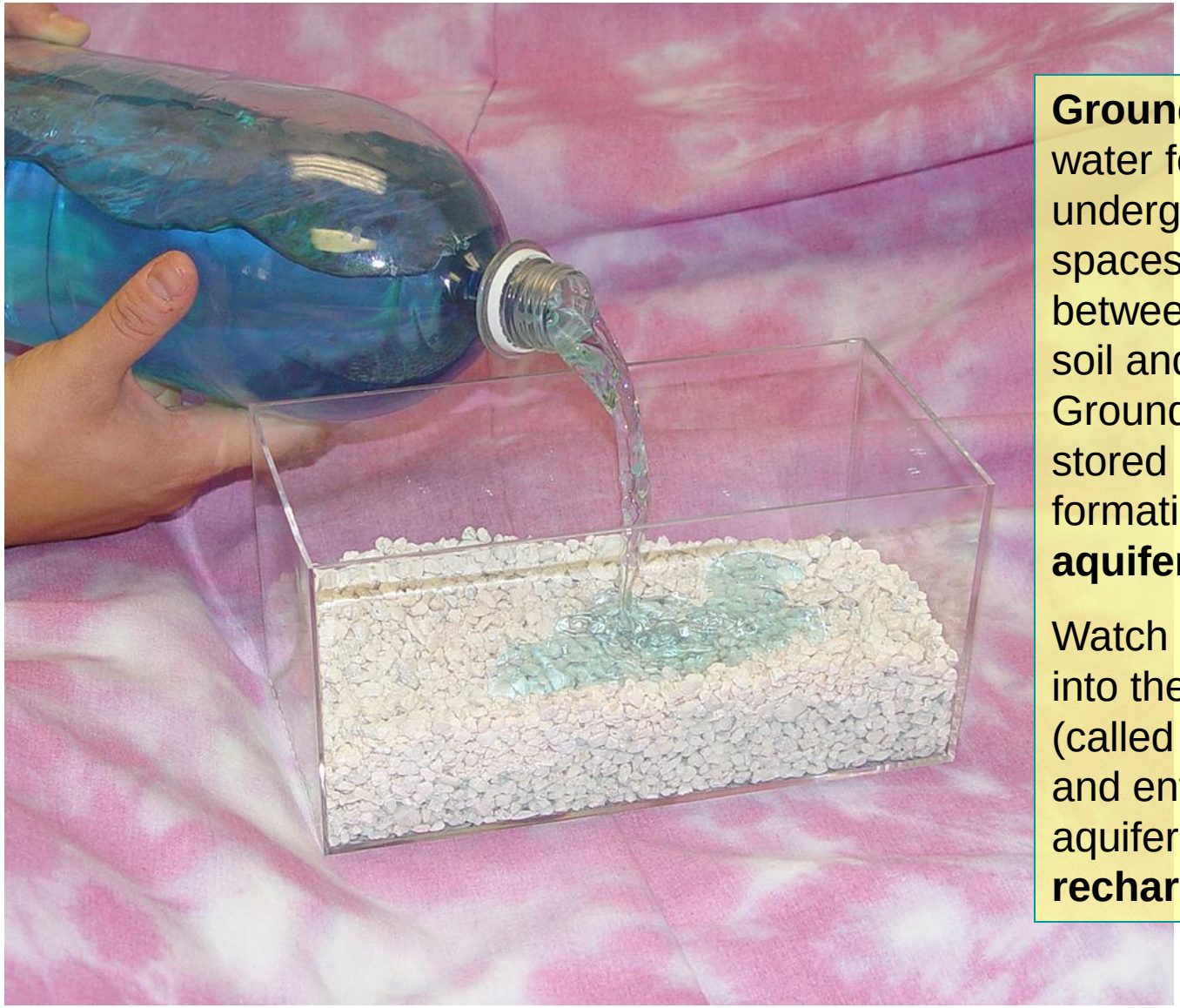
Awesome Aquifers

A DEMONSTRATION

THE GROUNDWATER FOUNDATION
www.groundwater.org



Groundwater is water found underground in the spaces and cracks between rocks, sand, soil and clay. Groundwater is stored in geologic formations called **aquifers**.

Watch as water sinks into the ground (called **infiltration**) and enters the aquifer (called **recharge**).

The water has been lightly tinted blue to increase visibility for photographing, normally it is not necessary to tint the water.

Surface water is water found above ground and is stored in geologic formations called rivers, streams, lakes, ponds, puddles, etc.

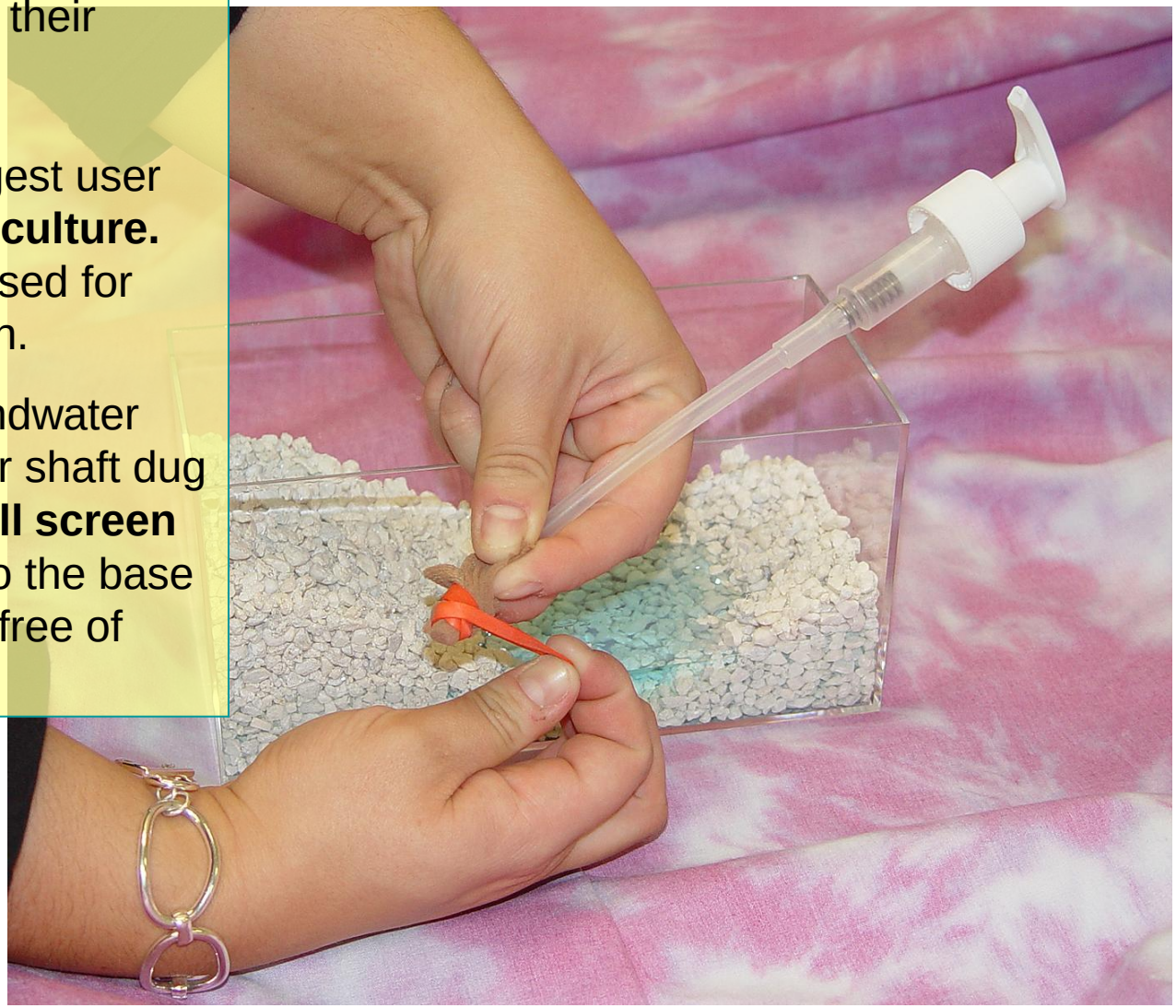
Watch as water exits the aquifer (called **discharge**) and collects to fill a lake.

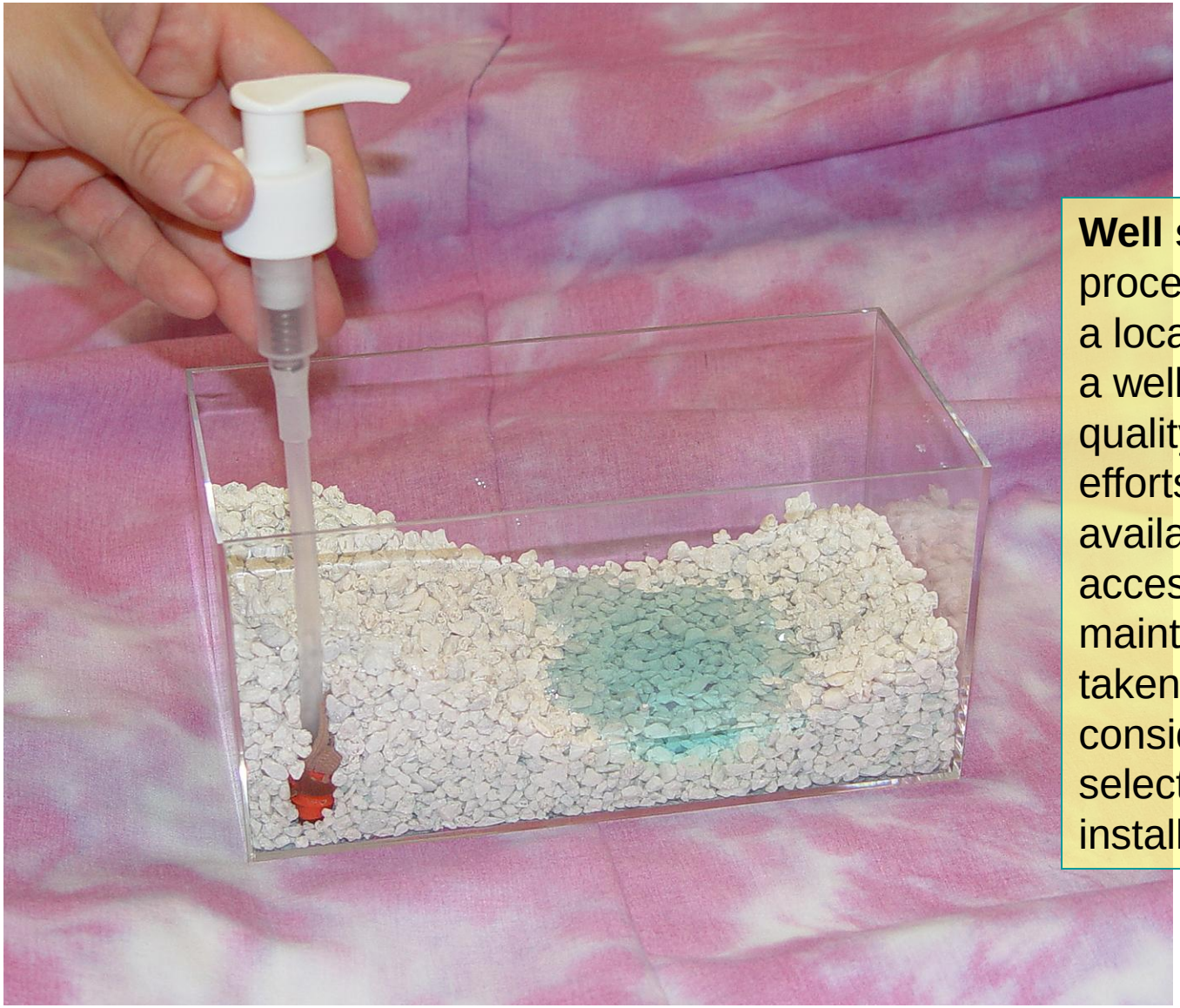
Groundwater and surface water are connected (water can move from one to the other). This lake is **under the direct influence** (UDI) of groundwater.

Groundwater uses:

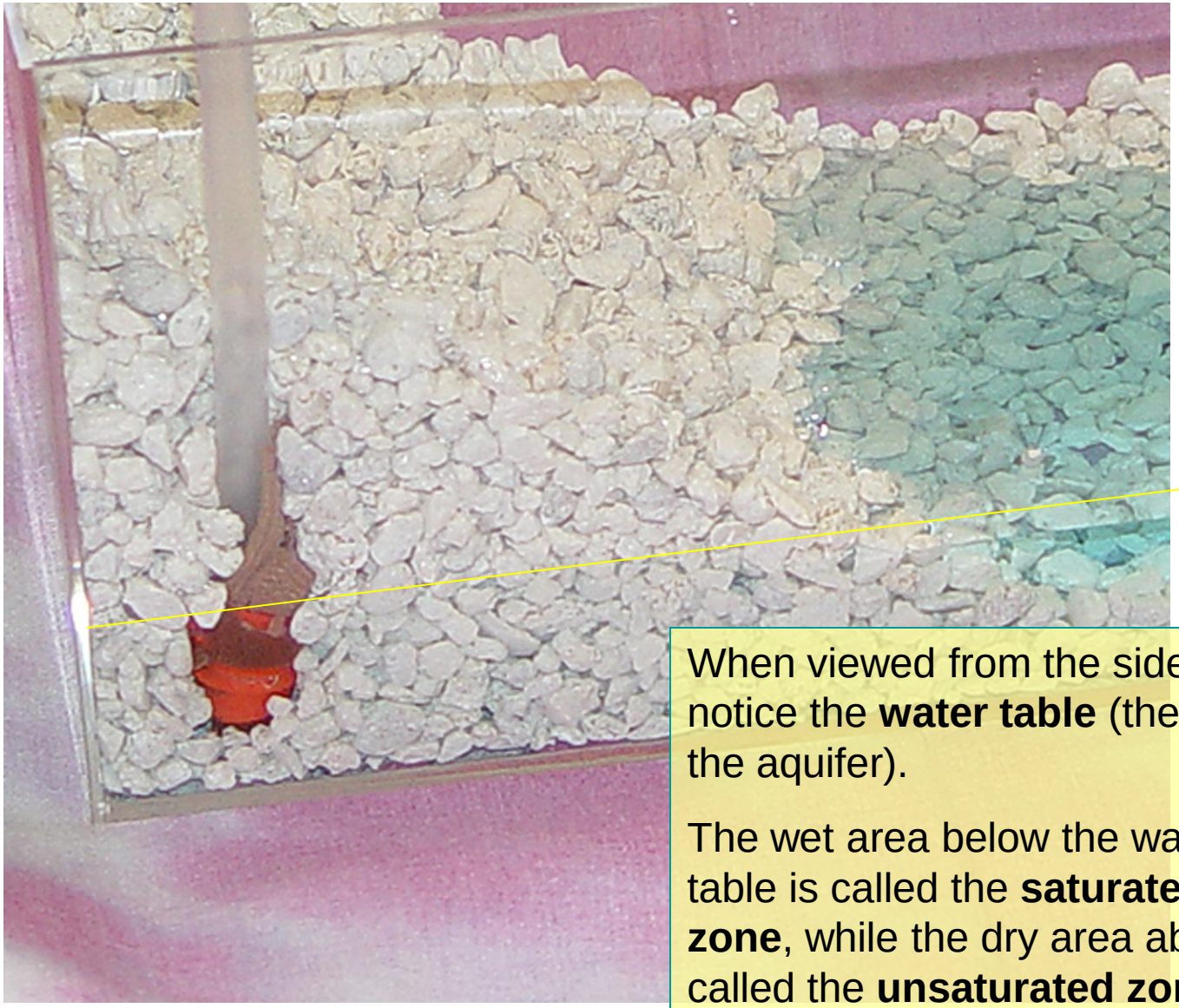
51% of Americans get their **drinking** water from groundwater (98% of Nebraskans). The largest user of groundwater is **agriculture.** Groundwater is also used for industry and recreation.

Humans access groundwater through a **well** (pipe or shaft dug into the ground). A **well screen** (small holes bored into the base of the pipe) keep well free of sand and rocks.



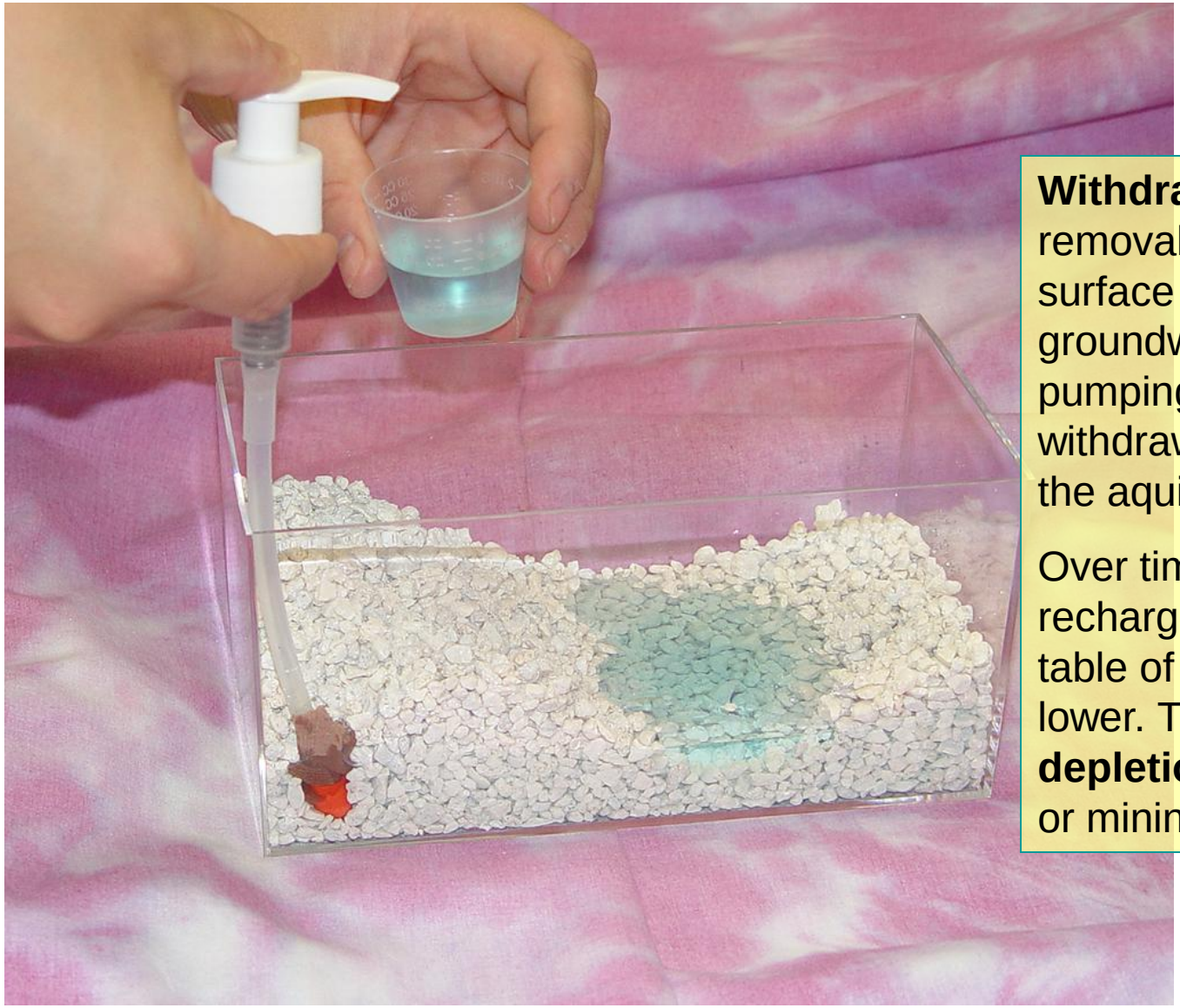


Well siting is the process of selecting a location to install a well. Water quality, protection efforts, water availability, and accessibility for well maintenance are all taken into consideration when selecting a site to install a new well.



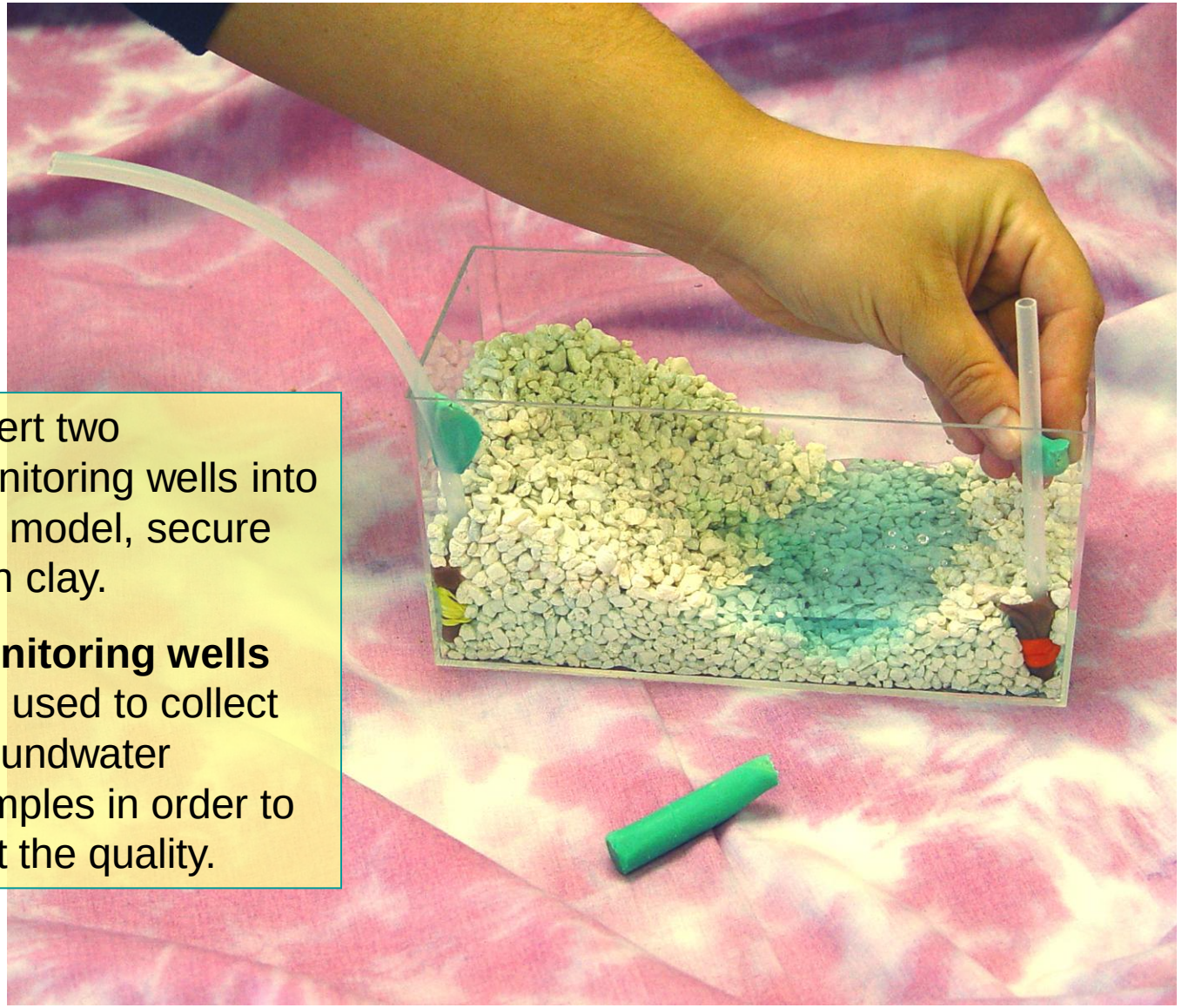
When viewed from the side, notice the **water table** (the top of the aquifer).

The wet area below the water table is called the **saturated zone**, while the dry area above is called the **unsaturated zone**.



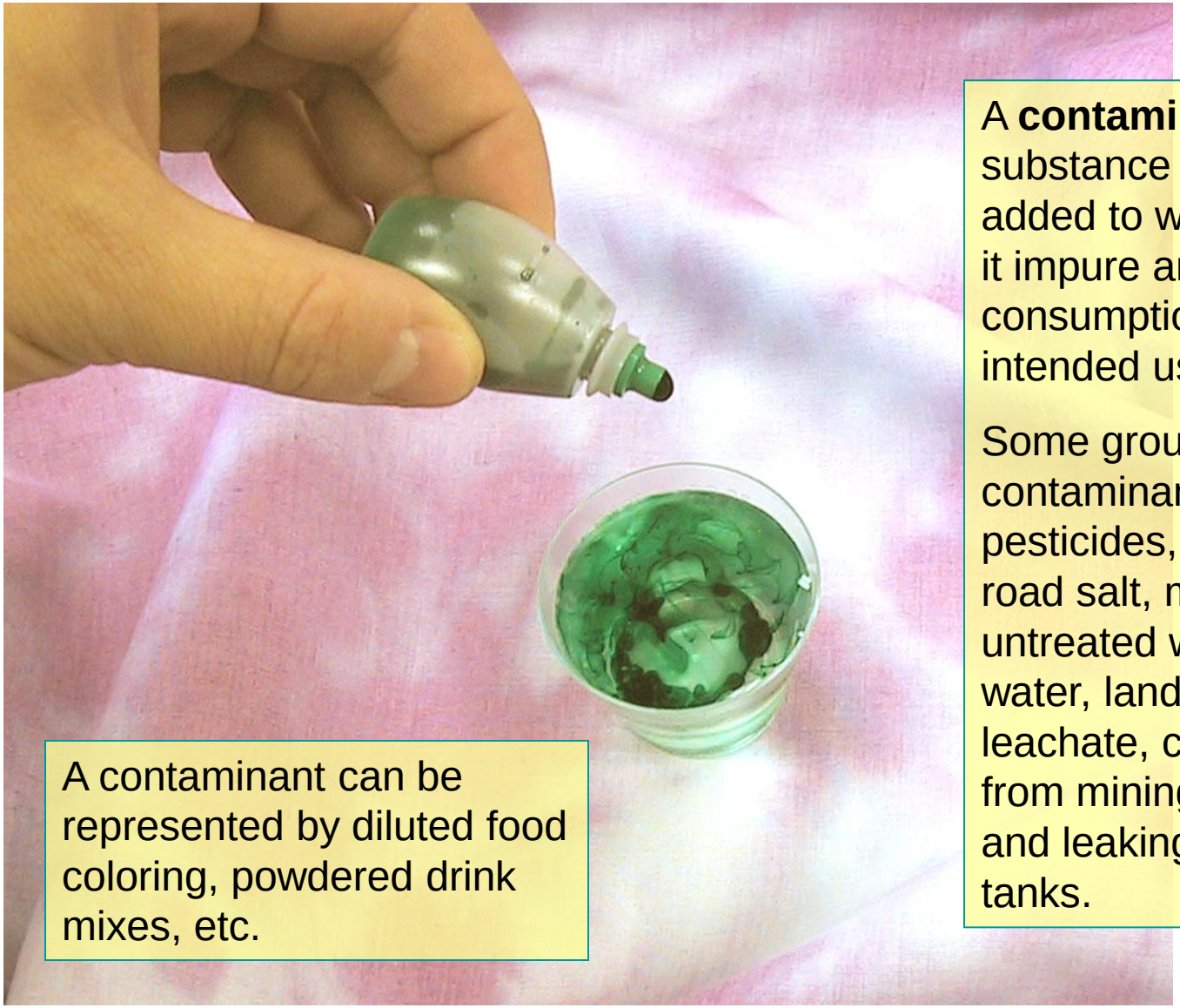
Withdrawal is the removal of water from a surface water or groundwater source, pumping a well withdrawals water from the aquifer.

Over time, without recharge, the water table of the aquifer will lower. This is called **depletion** (or overdraft or mining).



Insert two monitoring wells into the model, secure with clay.

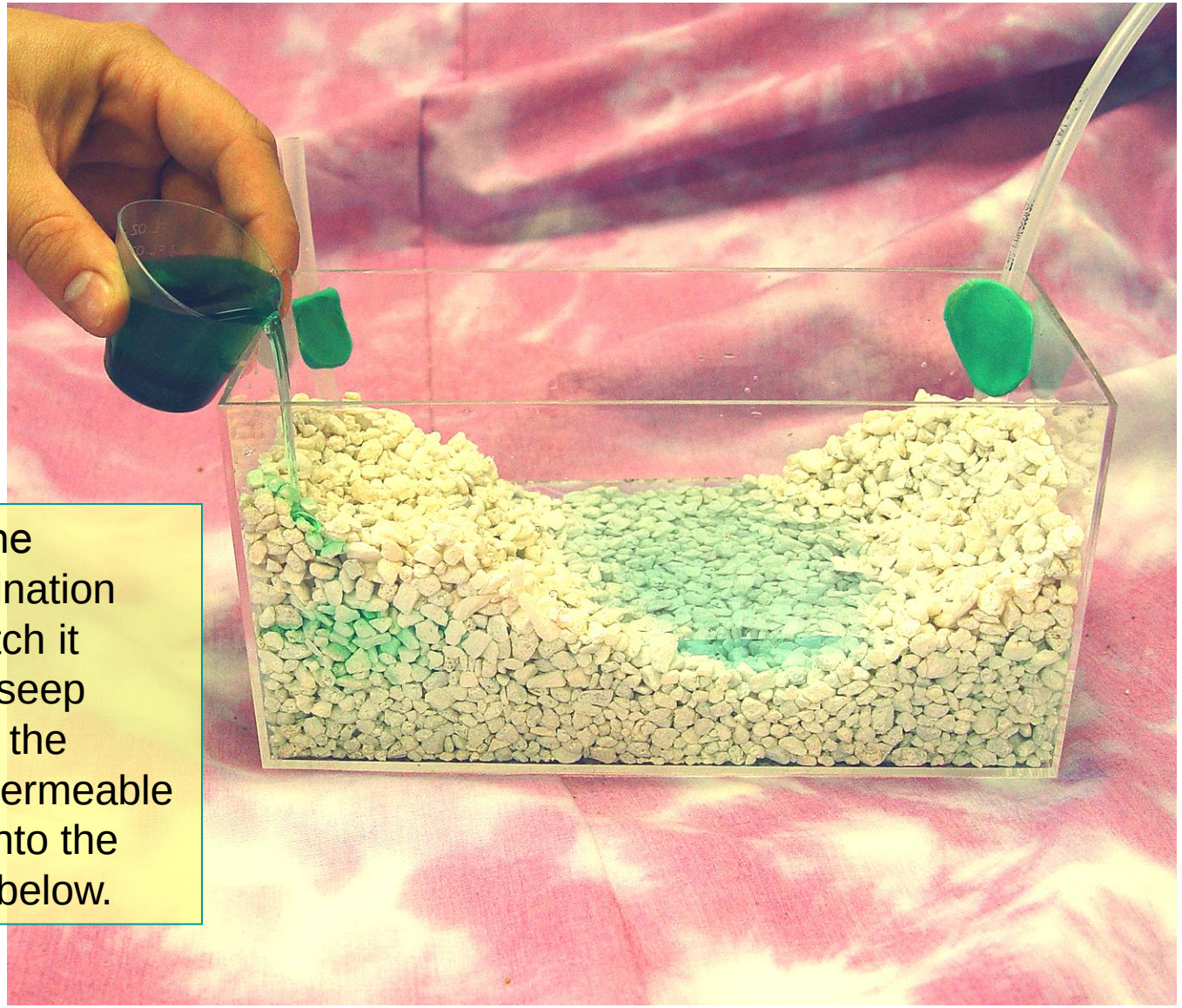
Monitoring wells are used to collect groundwater samples in order to test the quality.



A **contaminant** is any substance that when added to water makes it impure and unfit for consumption or its intended use.

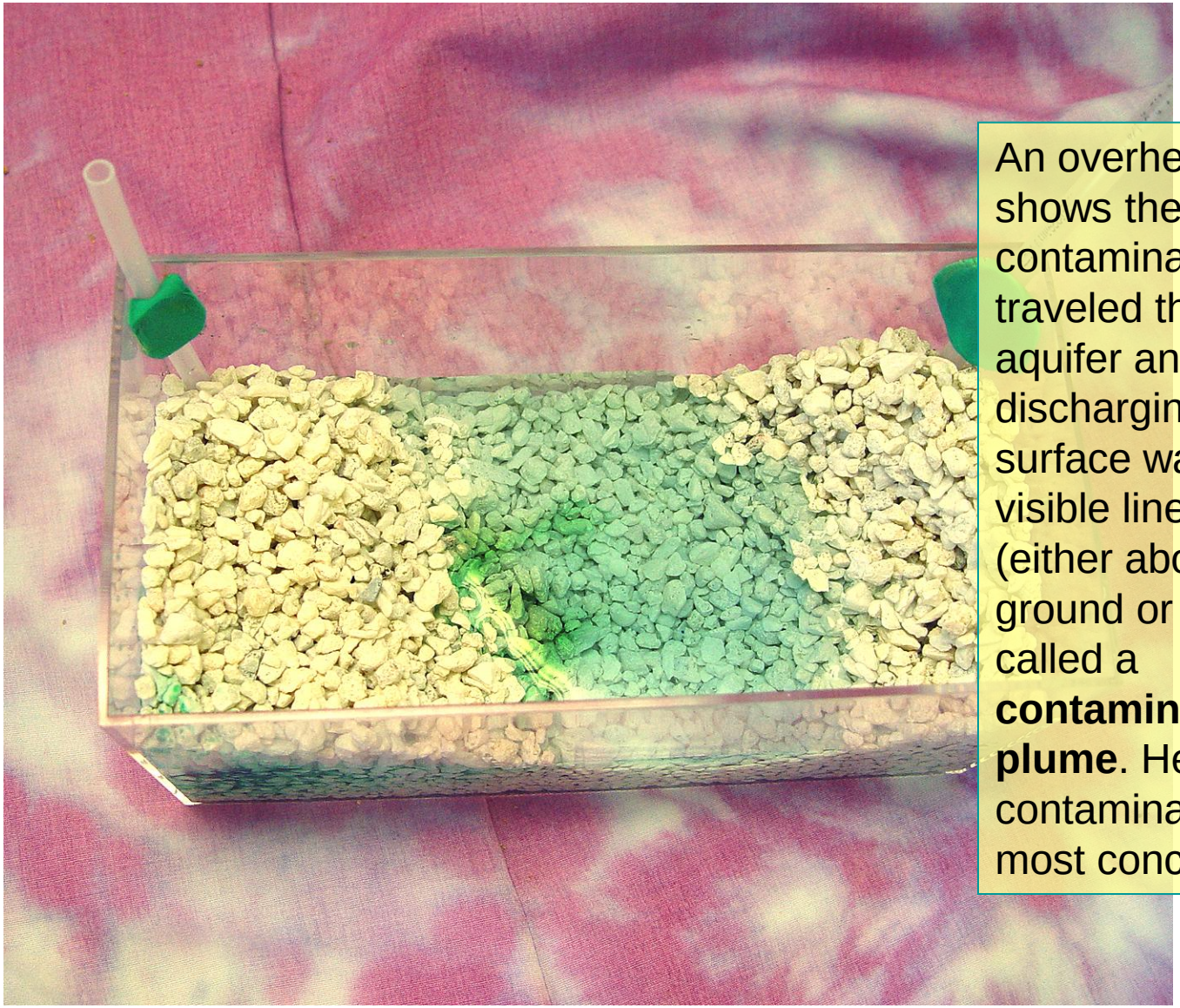
Some groundwater contaminants include pesticides, fertilizers, road salt, motor oil, untreated waste water, landfill leachate, chemicals from mining, industry and leaking storage tanks.

A contaminant can be represented by diluted food coloring, powdered drink mixes, etc.

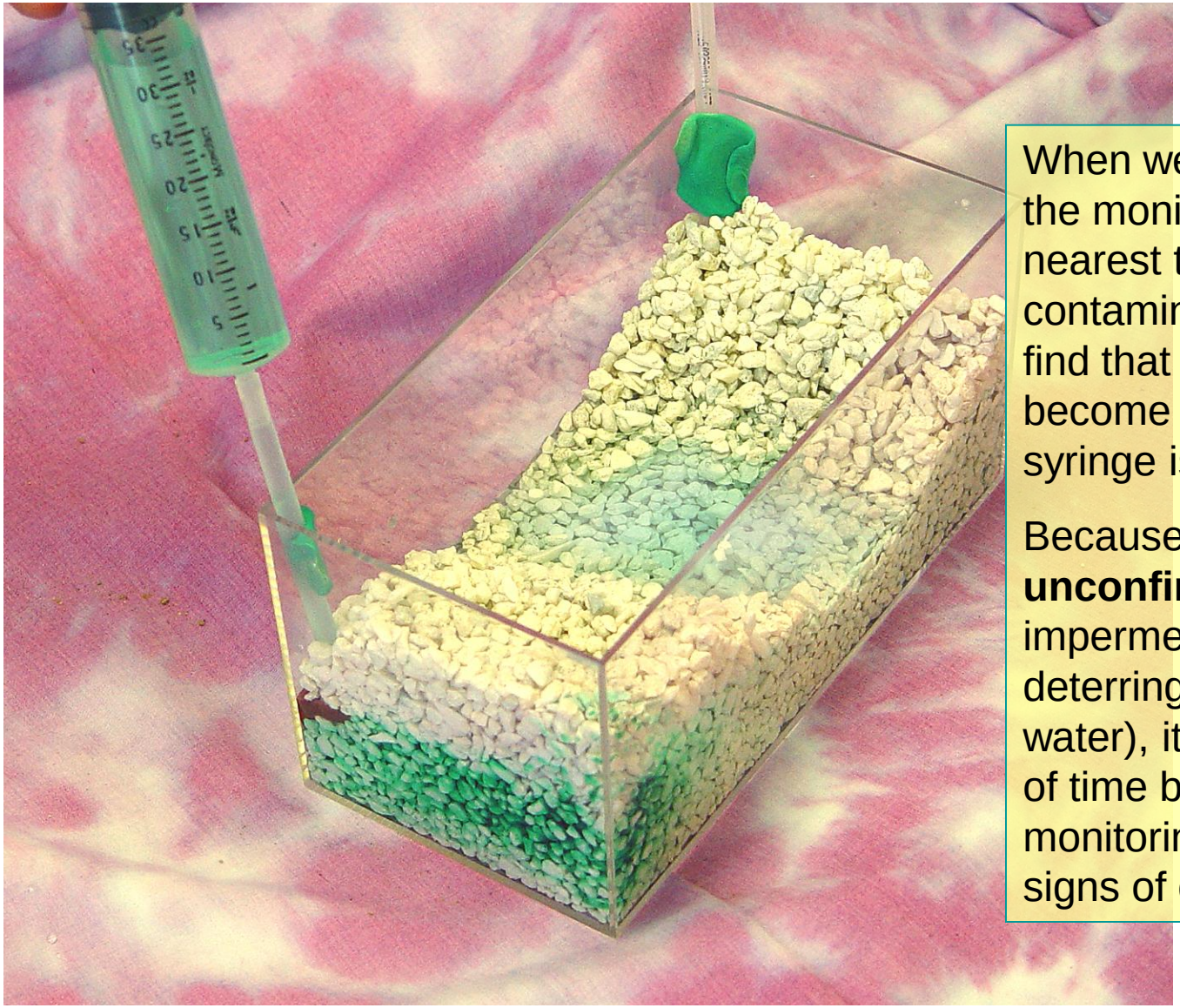


"Spill" the contamination and watch it quickly seep through the highly permeable gravel into the aquifer below.

Watch as the contamination begins to mix and disperse in the aquifer.

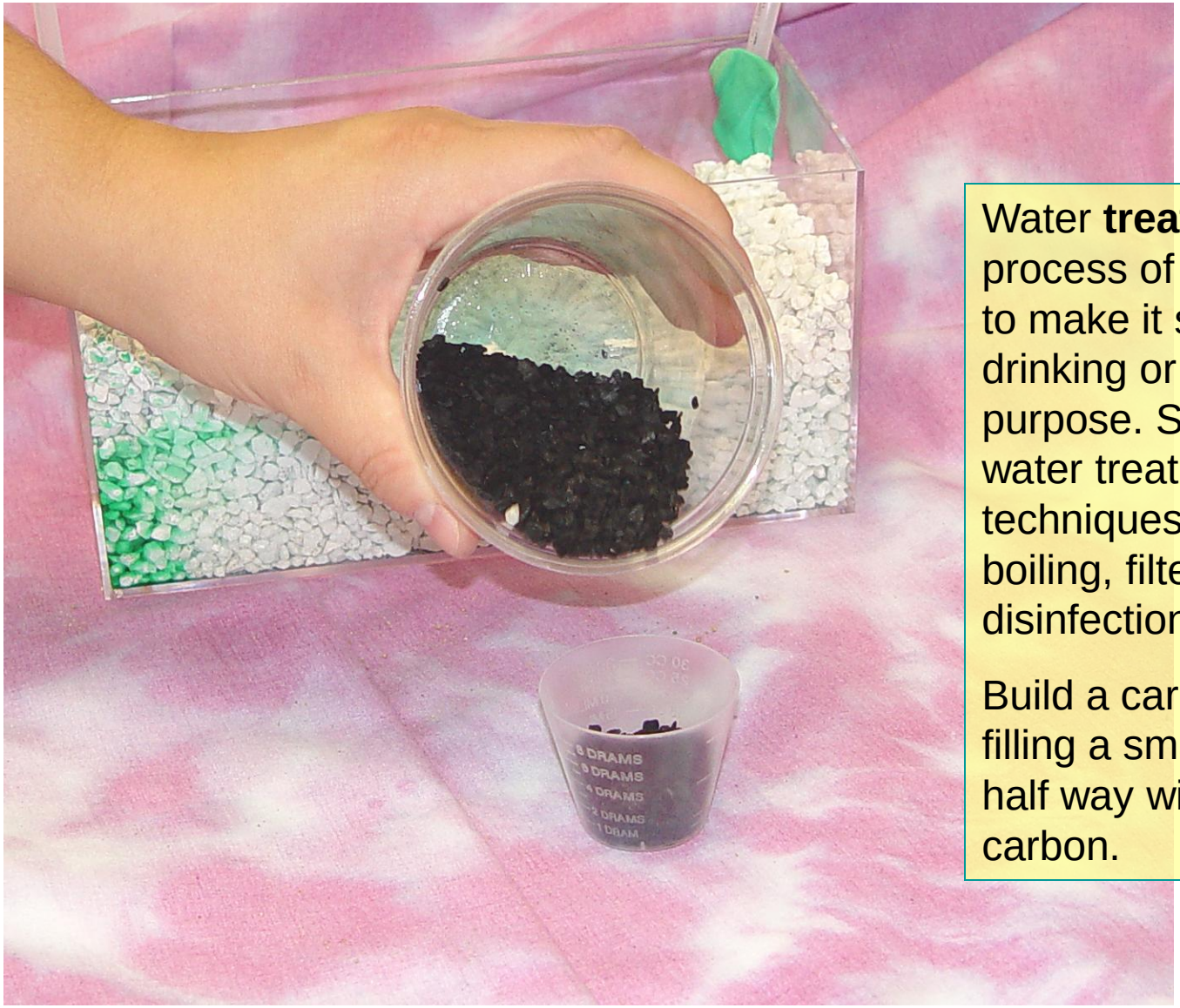


An overhead view shows the contamination has traveled through the aquifer and is discharging into the surface water. This visible line of travel (either above ground or below) is called a **contamination plume**. Here the contaminant is the most concentrated.



When we begin to pump the monitoring well nearest to the contamination site, we find that the well has become polluted (water in syringe is tinted green).

Because this aquifer is **unconfined** (there is no impermeable layer deterring the flow of water), it is only a matter of time before the second monitoring well shows signs of contamination.



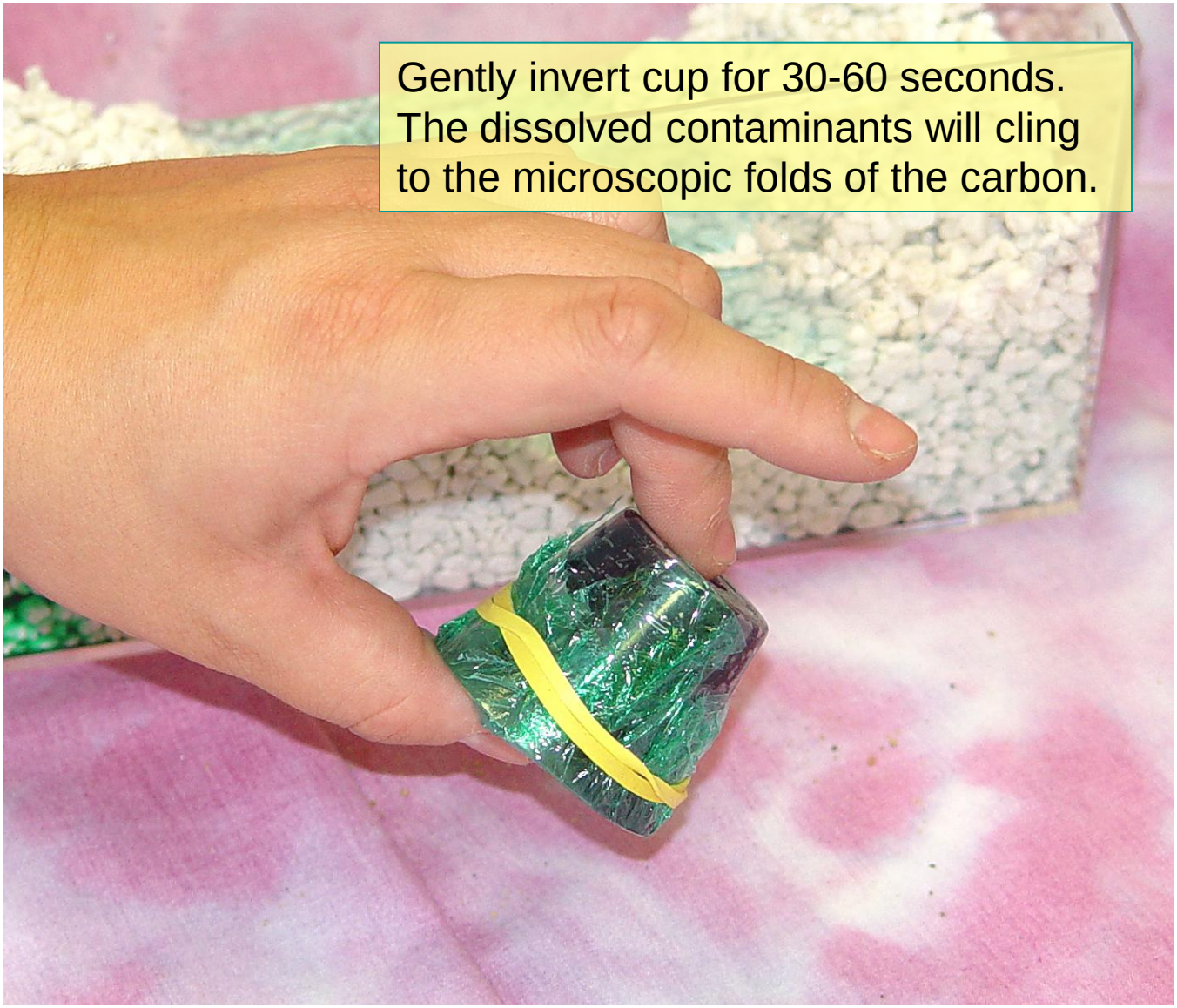
Water **treatment** is the process of purifying water to make it suitable for drinking or other intended purpose. Some common water treatment techniques include boiling, filtering, and disinfection.

Build a carbon filter by filling a small container half way with activated carbon.

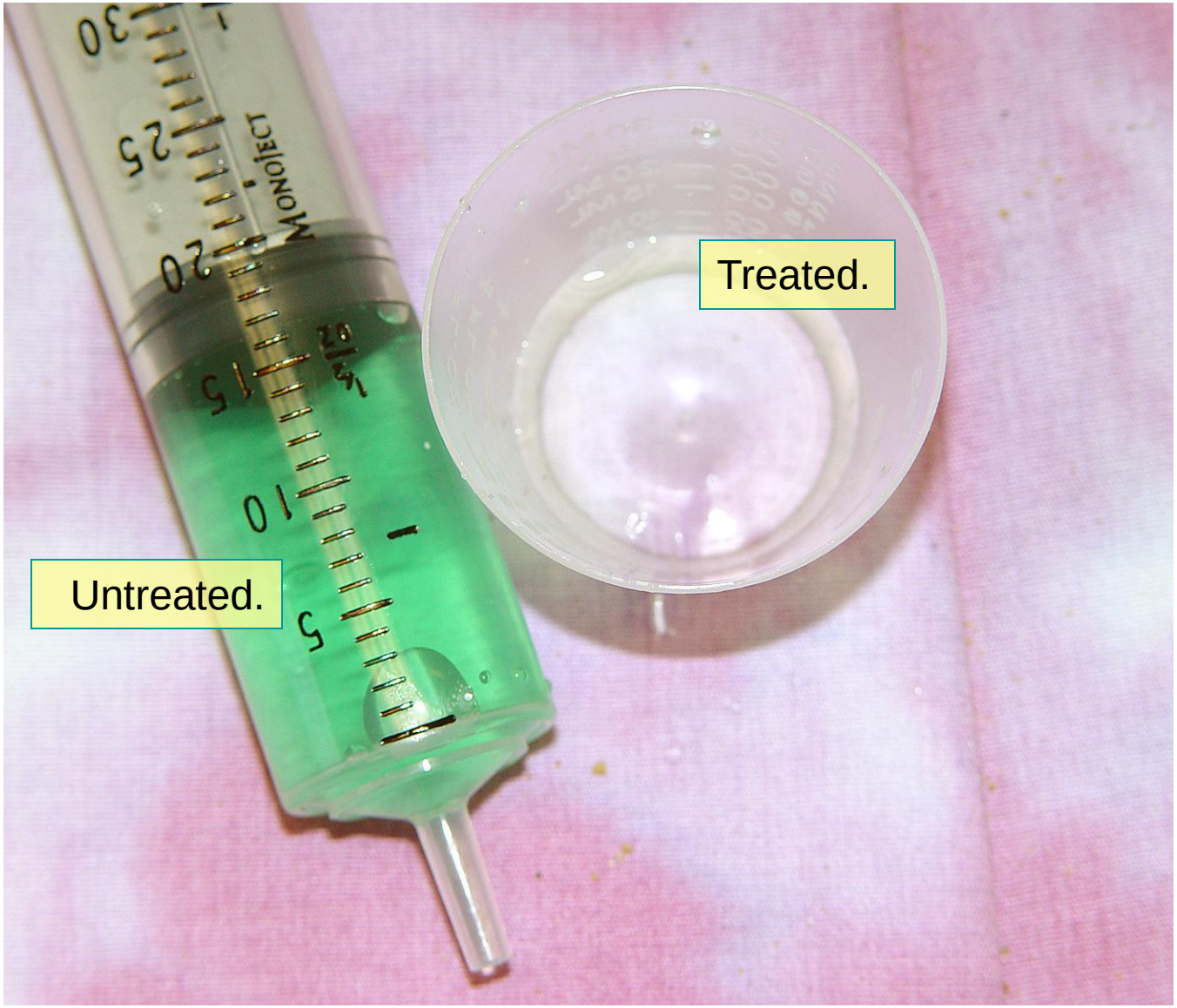

Add some contaminated water (green) to the cup of carbon.

Make a lid with cling wrap. This represents a groundwater remediation plant.

Remediation means the containment, treatment, and/or removal of contaminated groundwater and can also include the containment, treatment and/or removal of contaminated soils near the aquifer.


Gently invert cup for 30-60 seconds.
The dissolved contaminants will cling
to the microscopic folds of the carbon.


Strain
through
filter.


Treated.
Untreated.
MONOJECT

Try It Yourself

- Supplies can be found in home improvement stores, pharmacies and department stores.
- Or purchase a complete kit with written activity instructions from The Groundwater Foundation: www.groundwater.org