

Contamination Clues

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How does our groundwater become contaminated?

Groundwater contamination occurs when materials (such as gasoline, chemicals, oil, etc.) get into groundwater and cause it to become unsafe and unfit for its intended use.

Key Topic: Aquifer, Contamination/pollution prevention, Earth science/geology, Groundwater, Recharge, Surface water, Water quality, Wells

Grade Level: 4 - Adult

Duration: 30 minutes

Objectives:

Learn about groundwater contaminants. Observe how a contaminant affects an aquifer.

Items Needed:

- A clear container of some sort (a plastic storage bin, food container, display box, small pet aquarium, or a 2 liter soda bottle with the top cut off)
- Aquarium gravel
- Sand
- Water
- Plastic syringe (obtain from a medical supply store or veterinarian)
- Plastic tubing (aquarium airline) or drinking straws
- Hand pump from a soap or lotion bottle
- Nylon hose, cheese cloth, or window screen
- Rubber bands
- Liquid food dye
- 2 small, plastic measuring cups
- Modeling clay
- **OR** purchase the Awesome Aquifer Kit with all of the needed materials for this activity and others from The Groundwater Foundation at www.groundwater.org



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1-800-858-4844

Activity Steps:

1. Pour gravel into the clear, plastic container and spread out evenly.
2. Slowly add the water to the container. Stop adding water when about half of the gravel is saturated.
3. Scoop gravel from the middle of the container, digging down to the water table. Push the gravel to the sides of the container allowing the water to create a lake.
4. Build two wells. Use the plastic tubing to create one well. Cut a small piece of nylon hose (about 1 inch by 2 inches), and fold in half. Cover one end of the tube with the nylon, securing it with a rubber band.

Use the hand pump for the second well. Cut a small piece of nylon hose (about 1 inch by 2 inches), and fold in half. Cover the end of the tube with the nylon, securing it with a rubber band.
5. Insert the wells in two different corners of the model on opposite sides of the lake. *The end of the tube with the nylon cover is the bottom of the well.*
6. Pump water from one of the wells. Observe the water that is pumped. *The water should be clear.* A **monitoring well** is a well that is used only to draw samples for testing water quality and water table depth.
7. Fill one of the small measuring cups with water.
8. Add 2-4 drops of liquid food dye to the cup of water. This cup of colored water will represent contamination. A **contaminant** is any substance that when added to water (or another substance) makes it impure and unfit for consumption or its intended use. Some potential groundwater contaminants include pesticides, fertilizers, road salt, motor oil, untreated waste water, landfill leachate, chemicals from mining and industry, and leaking underground storage tanks.
9. In one of the corners of the model that does not house a well, slowly pour the entire cup of contamination.
10. Observe the contaminant as it infiltrates the groundwater.
11. Pump the well on the opposite end of the model. Watch the surface water as the well is being pumped. Notice the color of the water that was pumped from this well. Collect the pumped water in a separate container.
12. Pump the well that is closest to the contamination site. Notice the color of the water that was pumped from this well. In groundwater, a pattern of concentrated contaminant created by the movement of groundwater beneath a contaminant source is called a **plume**. Generally, contaminants spread laterally in the direction of groundwater movement. The source site has the highest concentration of contamination; further away from the source the concentration is decreased.
13. How can this contamination affect humans and the environment?
14. To extend the life of the materials, be sure to rinse all parts and allow to air dry. TIP: pour gravel and sand into a mesh colander or strainer for easy rinsing.



For More Fun:

- Experiment with other ways to contaminate the groundwater that are representative of real threats to groundwater quality. *Do not use actual hazardous and harmful chemicals.* What are some potential groundwater contamination sources produced by human activities? What are examples of naturally occurring groundwater contamination sources? **Groundwater quality** is characterized by the chemical, physical, and biological characteristics of the water with respect to its suitability for a particular use.
- Demonstrate the difference between point and non-point contamination. **Point source pollution** is pollution discharged from any identifiable point, including pipes, ditches, channels, sewers, tunnels, and containers of various types. Pollution discharged over a wide land area, not from one specific location is **non-point source pollution**. Non-point source pollution is contamination that occurs when rainwater, snowmelt, or irrigation washes off plowed fields, city streets, or suburban backyards. As this runoff moves across the land surface, it picks up soil particles and pollutants, such as nutrients, road salt, and pesticides.
- What impact does a well have on groundwater quality? Demonstrate how well closure can prevent contamination of groundwater. **Well closure** or properly abandoning a well is the process of sealing a well that is no longer being used.

Learn More:

- www.groundwater.org/get-informed/groundwater/contamination.html



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