

## Can you Dig it?

### Background:

Throughout history, waste has been stored in dumps, deposited in oceans, burned, and buried. Many years ago it became a practice to bury storage tanks underground. These tanks were used, and continued to be used, to store petroleum products, chemicals, and chemical waste products for manufacturers, industries, and businesses. However, many underground storage tanks have eroded, leaking their contents into ground water. When a pollutant is identified as coming from a single source, it is referred to as *point source pollution*.

### Pre-Activity Questions:

1. In the movie *Civil Action*, what led the residents of Woburn to believe that their drinking water was contaminated?
2. What is a possible point source pollutant that might lead to poor water quality where you live?

### Problem:

A nearby Manufacturing Corporation is suspected of abandoning a large storage tank filled with a vile, unsweetened lemonade product that has leaked into the local drinking water supply, causing a change in pH. With limited resources, you must track down and describe the extent of the spreading chemicals before the entire town is affected!

**Purpose:** Conduct water quality tests and locate the leaking underground storage tank.

### Materials:

- baking pan
- Kool-Aid mix (pollutant)
- Misting bottle
- Book (to elevate pan)
- sand
- straw (testing drill)
- 9 pieces of pH paper (testing laboratory)
- beaker with water (sanitation station)

### Procedure:

#### Part I: Hiding

- Fill your baking pans evenly with 6 cm of sand
- Bury a small pile of Kool-Aid mix somewhere in the sand and cover it up with sand.
- Place an "X" on the end of the baking pan that is to be elevated
- Sketch your pan including where you buried your point source on the "hidden" portion of the *site map*
- Give your pan to another lab group... **Don't tell them where the point source is located!**

#### Part II: Seeking

- Sketch a picture of the site you received under "seek" portion of the site map.
- Test the pH of the water in the misting bottle and record in the data table and record any other observations you can make about the misting water.
- Elevate the end of the pan that is marked with an "X"
- Simulate a gentle rain by misting the site with water. **MIST SLOWLY, no surface runoff should occur.** This may take up to 5 minutes until the sand is saturated.
- Place drill (straw) over the most likely location of the point source.
- Press the drill into soil and plug the top of the drill with your finger

- Lift the drill from the soil and place a **small** quantity on a piece of pH paper, record pH in table along with any other observations you can make about the sample
- Draw a dot on the site map that represents where you approximately took your first sample, write "sample 1" next to it.
- Continue drilling, testing pH, and recording sample sites until you run out of pH paper.

Data:

**Site Map**

Hidden Point Source Site Map	Raised Point Source Site Map

	pH	Observations
Misting Water		
Sample 1		
Sample 2		
Sample 3		
Sample 4		

	pH	Observations
Sample 5		
Sample 6		
Sample 7		
Sample 8		
Sample 9		

**Findings:**

- Draw an "X" on your site map where you believe the point source pollutant was located.
- Check with the group that gave you the "site," did you indeed find the point source? If not, how far were you off?
- On your seeking site map, indicate the direction of water flow and illustrate the formation of the underground plume (the continued spread of contaminant over time).

**Questions:**

1. How did you use the results of the pH tests to locate the contaminant?
2. Why do you suppose you were given a limit on the amount of resources you had to determine where the point source was?
3. How might the type of land area affect the cost of testing groundwater in different regions?
4. If you were given an unlimited supply of resources, could you guarantee the town residents that you found the point source? Explain.