



Give drinking water a hand.

STUDENT ACTIVITY SHEET

Tracking Pollution - A Hazardous Whodunnit

Introduction

Riverville is a fictional town with a real problem. Each week, more citizens are complaining that their drinking water tastes bad. In many small towns like this one, there is no central water supply. Every home and most businesses have a private well. The town's mayor tested the water from several wells and found that the ground water has been contaminated with some kind of fuel. The wells that have been contaminated are marked out on the map on back of this page.

The mayor thinks the Heating Oil Company is responsible for this contamination and wants them to start investigating their fuel storage tanks which are buried underground and to check the tanks for leaks. The Heating Oil Co. says they just tested their tanks and knows they are safe. They think the Trucking Company is the source of pollution. The Trucking Co. says the source could just as likely be the Heating Oil Co. or the Gas Station, since all three places have underground tanks for storing the same kind of fuel.

So Riverville has a problem and no one is sure who is responsible. The mayor needs some way of proving who is causing the pollution and who should clean it up. You will be the "detective" who helps prove where the pollutant is coming from.

Cleaning up ground water contamination is a very expensive job. You should be very sure of the place you choose to start cleaning up, otherwise the money will be wasted. It is up to you to solve the mystery.

Objective

You will make a topographic map, use it to predict ground water flow and investigate the most likely source of ground water contamination.

General Procedures

To decide which of the suspected businesses is the most likely source of contamination, the easiest thing you can do is find out the direction that ground water flows. Since ground water generally flows downhill, following the slope of the surface of the land, you can be fairly certain that the suspected source which is farthest "upstream" is the real source of contamination.

This activity shows you how to estimate ground water flow by making a contour map. As in many very small towns,

only a few people in Riverville know the exact elevation above sea level for their property. To make a contour map, it usually helps to know the elevations of as many places as possible. But this simple procedure can be used even though you only know a few elevations.

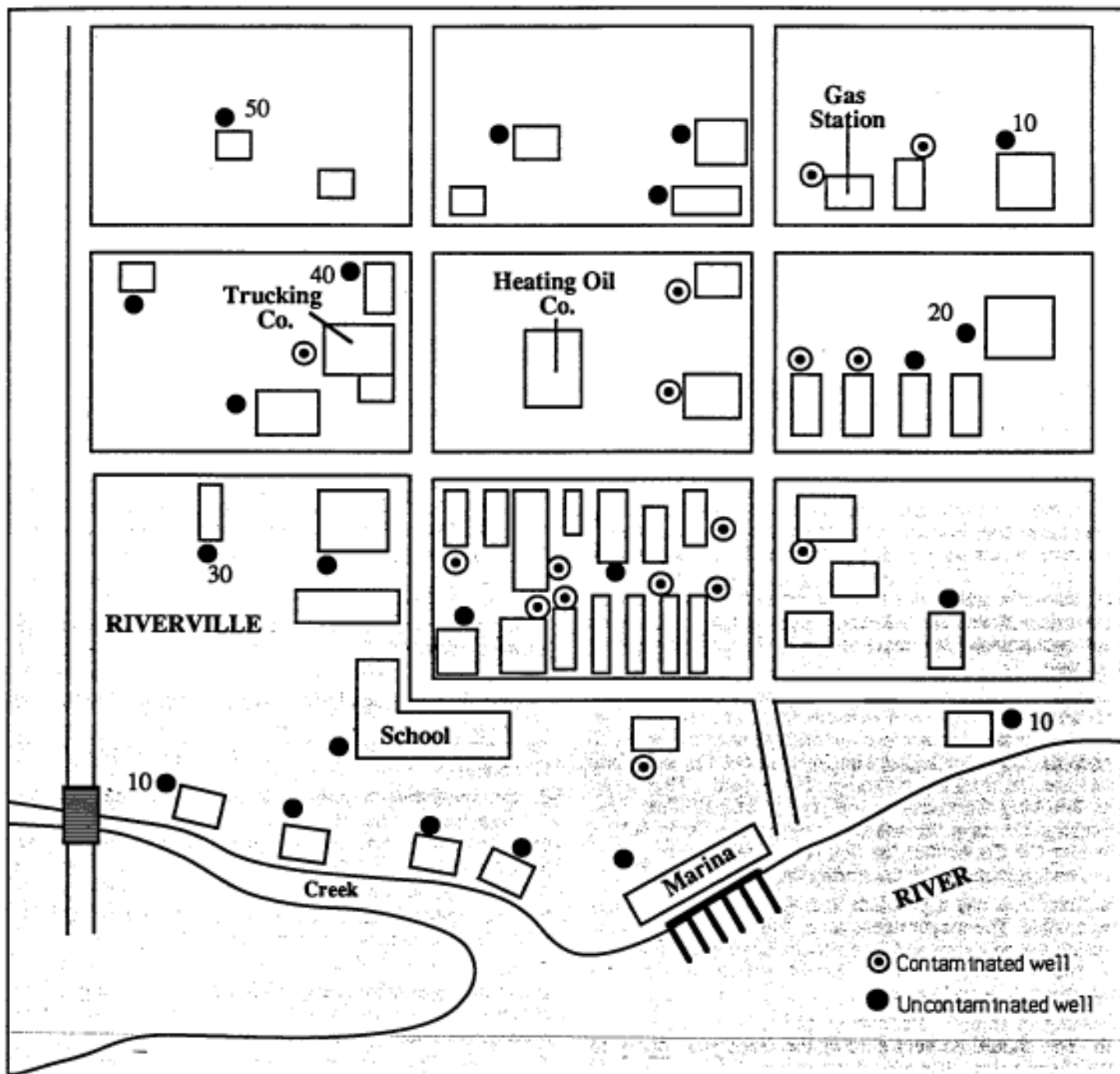
The map on back shows the elevations for seven wells and gives directions for drawing in the contours of the land. After you have finished this procedure, answer the questions below.

Questions

1. If the flow of ground water and the pollutants in it follow the contour of the land, what is the most likely source of the contamination, the Heating Oil Co., the Trucking Co. or the Gas Station?
2. The contamination plume will continue to spread slowly through the ground, much like smoke from a chimney drifting with the wind. Describe where on your map you think the plume will move with time.
3. Which of the uncontaminated wells do you expect to become contaminated in the near future? Do you think the school's water well will be contaminated?
4. How do you explain the fact that one well within the plume was not contaminated? Give at least two possible reasons how this could happen. (Hint: see the Resource Management Activity)
5. Is it possible you are wrong in assuming that ground water flow follows the contour of the land? What else could you investigate to be sure?
6. Assuming that ground water flow does follow the contours of the land, is it possible that there are two sources of contamination? What would you expect to find if all three companies had leaking storage tanks and were actual sources of contamination?

Extensions

1. Get a map of your own community and use it to chart out ground water direction. Locate the community's water supply and any potential sources of contamination. What kind of precautions should be taken to keep an eye on potential sources of contamination?



1. Start with a well with a known elevation. Using ruler and pencil, **LIGHTLY** draw a line from this well to the nearest wells having at least a 20-foot difference in elevation.

2. Cut a rubber band open and lay it out flat, without stretching it, along the edge of a ruler. With a pen, make at least five marks 1/2 inch apart beginning from the middle of the rubber band. Use the marked rubber band to help you divide each line into equal segments. Your teacher will show you how this is done.

3. Label each mark on the line between the known elevations with the estimated elevations. For example, if the elevations at each end of a line are 10 and 40 feet above sea level, you should make two marks on the line, dividing the line into three equal lengths. The first mark should be labeled 20, and the next one labeled 30.

4. Connect all marks having the same elevation with a smooth line. These are **contour lines**.

5. Every half inch or so along each contour line, draw a short arrow

perpendicular from one line out towards the line having the next lowest elevation. Ground water flows in the direction of the arrows.

6. Find all the contaminated wells and draw a single loop that contains only these wells and none of the uncontaminated wells, if possible. The area inside this loop shows how far the contamination has already spread through the ground water, and is called the **contamination plume**.

7. Use your map to answer questions on page 1.