

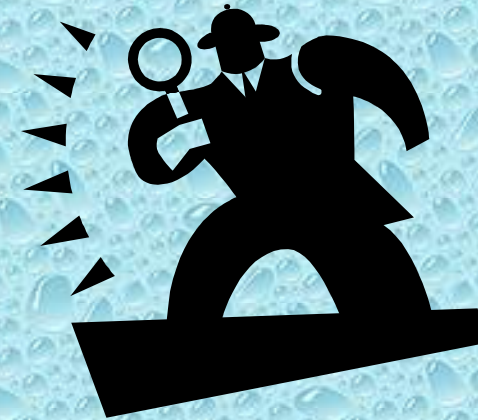
The water in the town of Fruitvale may be polluted.



Goal: Gather and organize information and data
Assess the information and draw conclusions

How will you do this?

Detective Work!



Pay attention to what is implied!

**Take notes as we read to
gather information.**

Review of Terms:

Aquifer - An underground bed or layer of earth, gravel, or porous stone that yields water.

Aquitard - A water-saturated sediment or rock whose permeability is so low it cannot transmit any useful amount of water.

Groundwater -

Water that exists beneath the earth's surface in underground streams and aquifers

Permeable -

passable; allowing fluid to penetrate or pass through it

Porosity -

A structure or part that is porous.

Paragraph 1

It is summer and you are home from college, visiting friends in fruitvale. They have a small house but a very big yard – one big enough for chickens, a vegetable garden, a pond and two horses! When you arrive, you find that they are drinking bottled water instead of water from their well. They tell you that the water in the pond, which comes from an underground aquifer, smells funny lately. They don't know whether it's safe to drink the water from their wells and are afraid that the garden may be contaminated. You're not happy about this. You've been studying about groundwater and water contamination in college and so you decide to investigate.

What are some things you could do to determine whether the water is contaminated or not?



- 1. Send the water to a lab to be tested.**
- 2. Call the water company and find out if a toxic leak has been reported nearby.**
- 3. Look at the water with a microscope to see if anything strange is there.**
- 4. Find out if neighbors or pet in the area have gotten sick.**

Paragraph 2

First you check the pond. It does smell funny – but it always smelled funny to you. Next you ask your friends' neighbors, the Andrews, whether they've noticed anything wrong with the water. Your friends and the Andrews are the only people in Fruitvale who still get their water from their own wells; everyone else uses city water. Mrs. Andrews tells you she hasn't noticed anything unusual but mentions that their dog has been sick. She wonders whether their dog drank some bad water.

So, what have you learned?

- **A dog was sick.**
- **The Andrews' didn't notice the contamination.**



Does this prove anything?

What additional evidence could you collect to find out if the Andrews' water is Contaminated?



1. Find out where the dog plays.
2. Have a veterinarian examine the dog to see what might have caused the condition.
3. Take a water sample to send to the laboratory for testing.

Paragraph 3

You begin to make a map to record what you find out. Much of the neighborhood has changed since you began to visit your friends eight years ago. There are many more houses and fewer farms. The old country school has been replaced by a large school and playing fields. The dry creek has been cleaned up since you and your friends used to make forts out of scraps of metal and wood you found there. Now the part of the creek below the highway is a park. Finally your map is complete, and you stop at Randy's filling station to have a cold drink.

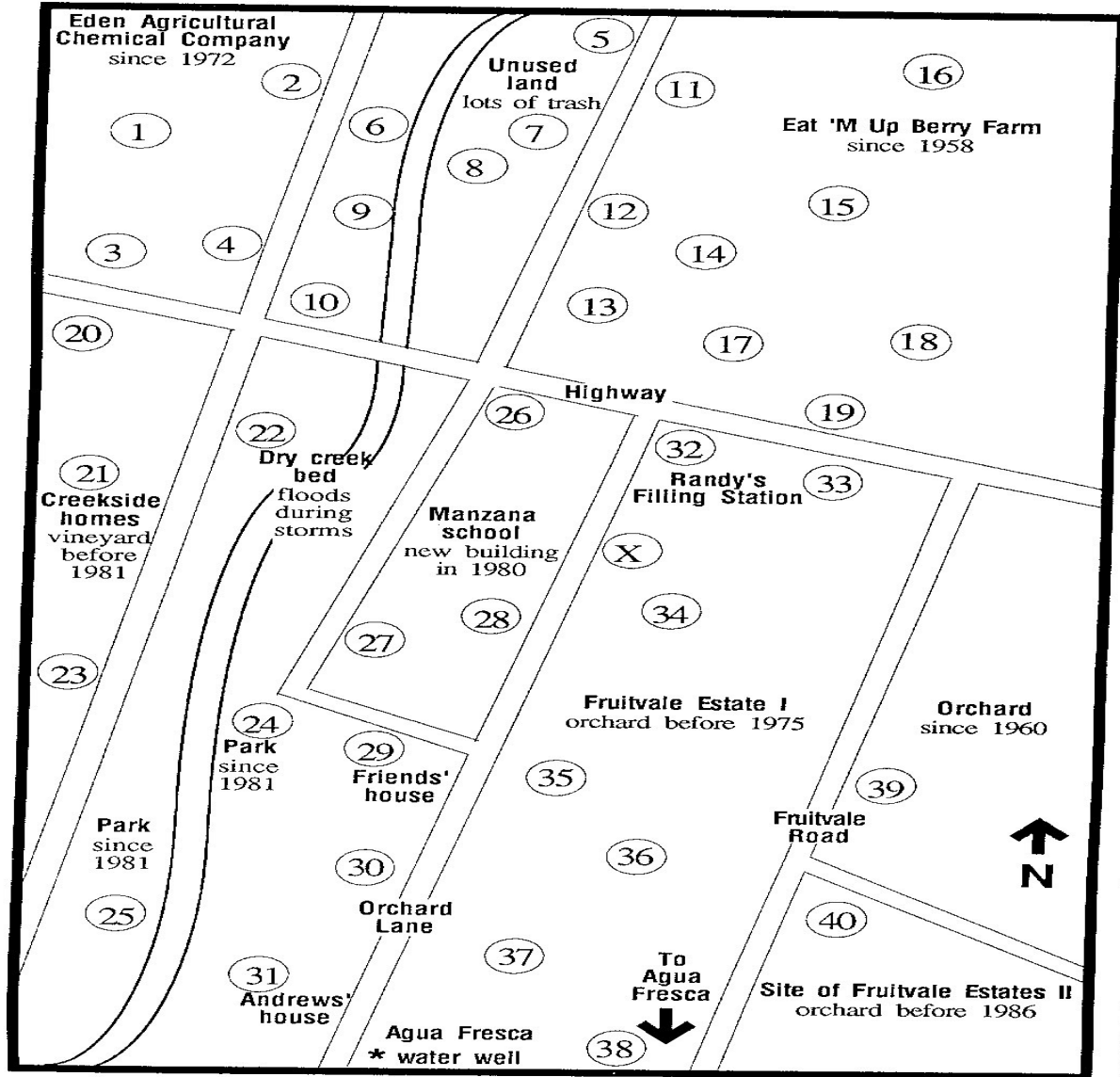
Name _____

Date _____

Period _____

STUDENT SHEET 4-1

Fruitvale Map



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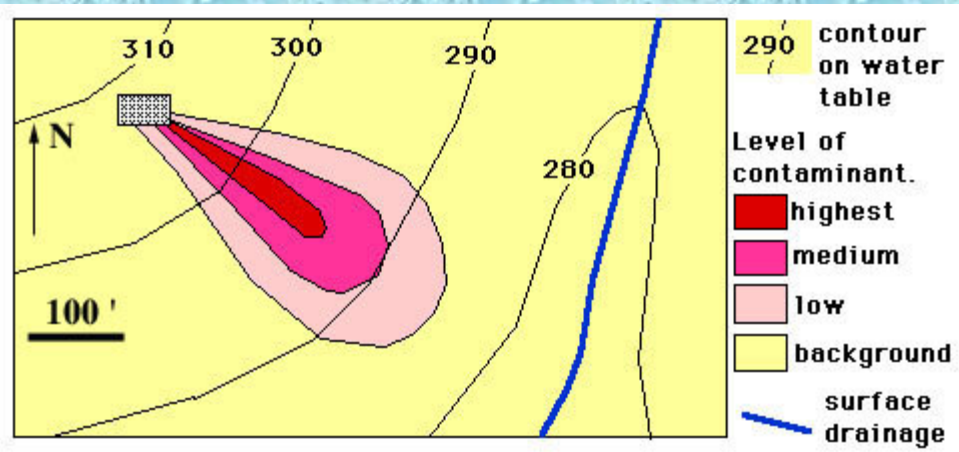
**Look at your map of Fruitvale.
Look for places that could be a
possible source of pollution.**

Do you think Randy's Filling station could be a source?

If it were would it be a point source or an area source?

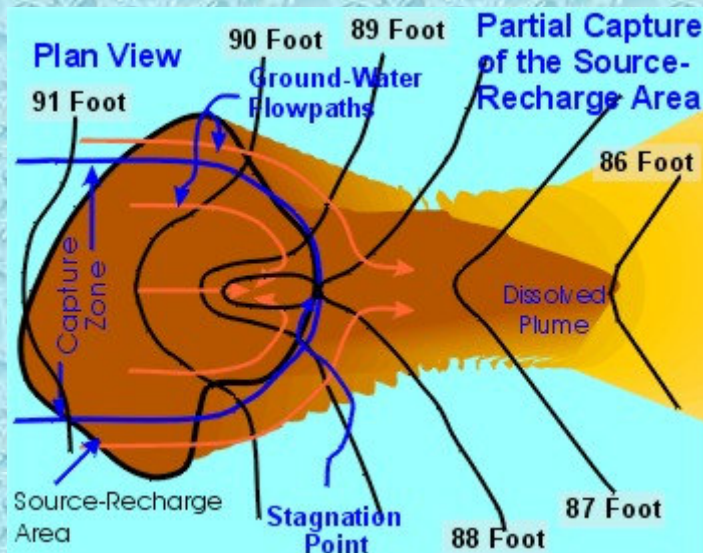
Remember:

Point Source - Pollution that comes has as its source a single or small point, which are usually spills or leaks from a storage tank.



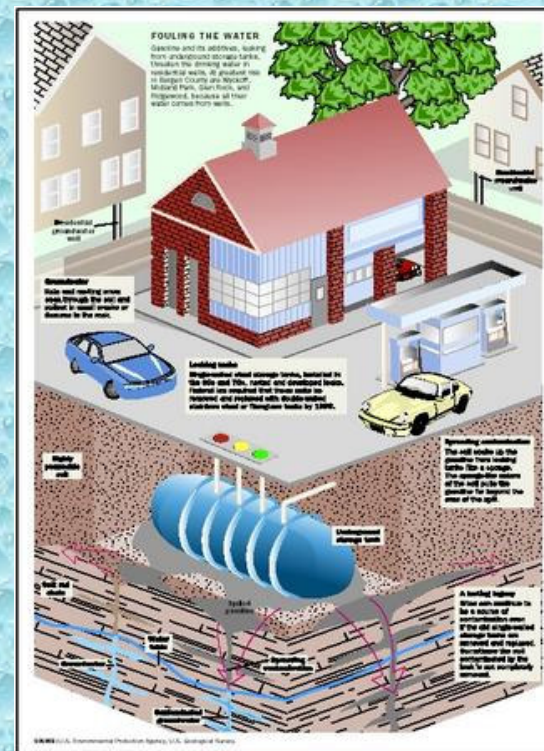
Area Source -

Pollution over a wide area, such as might come from an agricultural application. The plume would show fairly constant pollutant concentrations over the area, With no regions of extremely high or extremely low levels.



Back to Randy's Filling Station

What substances might be used or stored that could be a possible pollution source?



What are other possible sources of contamination?

Paragraph 4

As you are finishing your map, Randy Mentions that water from a well drilled In Fruitvale Estates is contaminated with A pesticide. As you are talking with Randy, city water department workers pull Into the station. Randy tells them about Your investigations and they ask to see Your map. Impressed with your careful Investigations, they ask for your help.

What could have caused the pesticide contamination?

Leachate (solution produced from passing a liquid through a solid) from the farms and orchards



Roadside or workplace spills, illegal dumping



Improper residential applications

Leaks from holding tanks at the Eden Agricultural Chemical Company



Paragraph 5

A pesticide has been found in the Fruitvale Estates well At 5ppb, five times its safe level. (This well is marked With an X on the map.) The manufacturers of this pesticide Originally thought that it would be safe if used properly Because the chemicals would break down in the soil. Later tests showed the pesticide did not decompose As expected, and it was banned in the United States 8 Years ago. City officials are worried that the pesticide may Have reached the main wells, located near the bottom of The map. Your help is needed to decide where test wells Should be drilled to determine the source of the Pesticide and the extent of its spread.

Look on your Fruitvale map. Find the X and mark a 5 next to it to make the test well in mentioned in the story.

What additional information did you receive in this last paragraph?

Pesticide of interest was banned in 1981. Either it has taken some time for it to show up in the water, or it is being used and disposed of illegally.

Look at your map.

What do you think would happen if floodwater that picked up a pesticide was moving through the dry creek bed?

Think

It probably contains sediments, boulders, gravel, and coarse sand.

This combination would have high porosity and high permeability. And would allow water containing a pesticide to penetrate it easily And be a possible cause of underground stream contamination.

Students Sheet 3.2

Problem 1

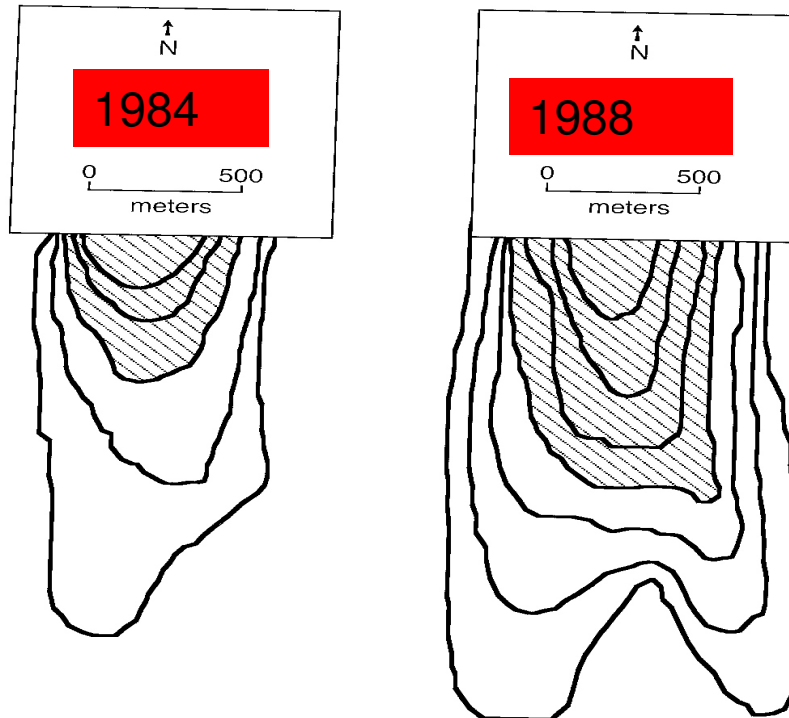
If the contamination came from putting pesticide on the land in Frutivale Estates 1, what might the shape of the contaminated area look like?

Problem 2

If the contamination came from a leak in a pipe at Eden Agricultural Chemical Company, what might the shape of the plume look like?

TRANSPARENCY MASTER

Contamination Plumes



University of California

Compare the two plumes. What are the differences?

What is known?

- **Groundwater flows toward Aqua Fresca sediments around and directly under the river are made of coarse sandstone.**
- **Sediment on surface is finer, lower permeability.**
- **Earth fractures from earthquakes exist so there is some danger of contamination of deeper aquifers.**

Task

You must gather information about the source of the contamination and spread of pollution without excavating all of Fruitvale.

Student Sheet 3.3

- 1. Review maps and notes.**
- 2. Pick three well sites you would like to test to determine contamination source and spread.**
- 3. Record # of wells picked, record and give reasons for selecting these wells.**