

Name: _____ Period: _____

Title: Midnight Dumpers

Background Information:

Water is stored in the ground as rain or snow sink into the soil and rock. When the water reaches a **non-permeable** layer, it can go no farther. It forms an underground layer of **saturated** rock material called an **aquifer**. Aquifers act as a very important reservoir for water in the hydrosphere. In Utah much of our drinking water comes from them.

Water is sometimes polluted as it travels through the ground. This happens because of chemical dumping, both legal and illegal. Some industries produce large amounts of waste as byproducts of their manufacturing. The Environmental Protection Agency (EPA), in cooperation with local and state governments sets limits and rules for how much waste can enter the environment and how it can be distributed. Many of these processes required by EPA are costly and time consuming for companies. This has led to an illegal practice known as “midnight dumping.” In this practice wastes are illegally dumped, sometimes far from the place they were made.

The consequences of this type of dumping are far-reaching. This is because the waste is not only harmful where it is dumped, but it often seeps into the ground, moving through the pore spaces in the soil and contaminating the underground aquifer. The pollution then spreads as it travels with the flow of the underground reservoir. Excessive fertilizers and pesticides on your lawn can also pollute the aquifer. You should never dump anything on your lawn or down your drain that you wouldn't want to drink.

Purpose:

This lab simulates the effects of midnight dumping. In this case you are a firm hired by the city to find the source of illegal dumping. You must drill wells and sample the water in each well. The cleanliness, or lack thereof, of the water is represented by the color of popcorn seeds. A green seed is polluted water and a yellow seed represents clean water. The more green seeds in a well the more polluted that water is. How will you know your team is getting closer to the source of contamination?

Materials: Map, medicine bottles with 20 seeds in them

Procedures:

1. Look at the map and find 3 small dots. The darkest is a routine well sample that shows some pollution is present. The lighter colored dot shows a smaller amount of pollution and the white dot shows a clean sample.
2. Decide on the coordinates you want to “test” first.
3. Send a person up to get a test sample of “ground water” from your teacher. You may only test one well at a time.
4. Sample each by dumping the seeds and counting the green and yellow. Calculate a percentage by dividing the total number (20) into the number of green seeds and multiplying by 100%.
5. Each well drilled will cost you \$1,000. You will be paid \$10,000 for your work. Keep track of your costs.
6. Quit when you think you have the spot located. You will be charged \$2,000 for an incorrect guess. So be very certain before you guess. Keep the site private from competing teams.

Predictions: Where (description of the site and the coordinates) do you think the contamination occurred and why.

Data:

| Location | Number of Yellow Seeds | Number of Green Seeds | % pollutant | Total Cost for this Location | Total Costs Accrued |
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Analysis:

1. What site did you identify? How many spaces off were you?
2. What direction was the water flowing underground? How did you know this?
3. You started with \$10,000. Subtract your total costs to find your profit or loss.
4. Why is it important to identify the correct spot?

5. Why does “midnight dumping” occur?
6. Where does pollution go that is dumped on the soil?
7. How could the type of soil influence the spread of pollution?
8. How does a well “attract” pollution?
9. Why is it a good idea to do more than one test on a well? What role did luck play in this lab?
10. What should you do if you see someone illegally dumping or spilling chemicals?

Conclusions: In complete sentences explain 2 concepts that you learned by completing this activity.