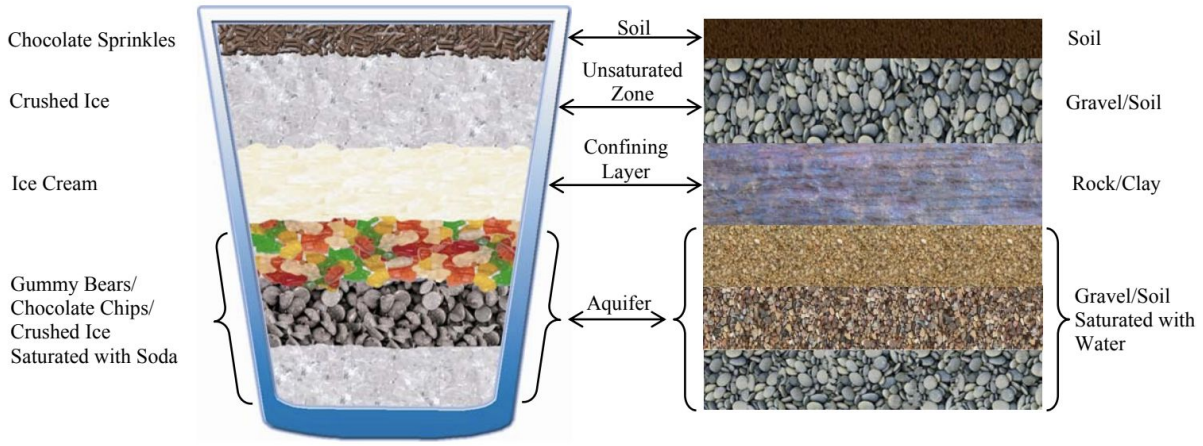
Name _____ Date _____

Ag II - Natural Resources

Aquifer Edible Lab



Materials:

Chocolate chips (4, 12 oz bags) Chocolate sprinkles (2, 3 oz containers) Clear plastic cups (12 or 16 oz) (25 - 30) Clear soda (e.g., lemon-lime) (4 liters) Crushed ice (the smaller the better) Gummy bears or worms (small) (2 lbs) Red Kool-Aid® (dry) (4 small packages) Spoons (25 - 30) Straws (clear work best) (25 - 30) Vanilla ice cream (1⁄2 gallon or 25 - 30 single serving cups)

Objective: To illustrate the geologic formation of an aquifer, how pollution can get into groundwater, and how this pollution can end up in drinking water wells. Students will come to understand how our actions can affect ground water and drinking water.

Background: Groundwater supplies 95% of the drinking water in Idaho. Wells are drilled through soil and rock into ground water aquifers to supply drinking water. Unfortunately, groundwater can become contaminated by improper use or disposal of chemicals such as fertilizers and household cleaners. These chemicals can percolate down through the soil and rock into an aquifer, and eventually into drinking water wells. This contamination can pose a significant threat to human health.

Directions:

Step 1). Fill a clear plastic cup 1/3 full (total) with a combination of gummy bears, chocolate chips, and/or crushed ice. These represent gravels and soils that make up the aquifer.

Step 2) Add enough soda to just cover the candy/ice. The soda represents groundwater. Notice that the soda fills all of the spaces among the gummy bears, chocolate chips, and ice. The aquifer is now saturated with soda; it is a "saturated zone." In an unconfined aquifer (see Step 3), the top of the saturated zone is called the "water table."

Step 3) Add a layer of ice cream. (Optional) This layer, called a "confining layer" or an "aquitard," is impermeable or significantly less permeable than the aquifer below it (it is difficult for water to soak through). It helps protect the aquifer from contamination and is usually made of rock and/or clay. An aquifer under a confining layer is called a "confined aquifer." An aquifer without a confining layer is called an "unconfined aquifer."

Some aquifers, such as the Spokane Valley-Rathdrum Prairie Aquifer in north Idaho, do not have a confining layer. If your local aquifer does not (or even if it does), consider omitting the ice cream or having half the class use ice cream and half not to compare the results.

Step 4) Add crushed ice on top of the confining layer/water table. This represents the unsaturated zone, the area where air fills most of the pores (spaces) in the soil and rock.

Step 5) Scatter chocolate sprinkles over the top. The sprinkles represent the soil, which is very porous.

The aquifer is now complete. Your aquifers will probably be messy and not look like the picture on the front page. That's OK! Real aquifers aren't neatly layered either.

Step 6) Sprinkle Kool-Aid® over the top. The Kool-Aid® represents contaminants on the ground (e.g., fertilizer). Does anything happen to the Kool- Aid® right away? (Usually nothing will happen.)

Step 7) Using a drinking straw, "drill" a "well" into the center of the aquifer. Observe the aquifer and Kool-Aid®. What, if anything, happens when the well is drilled?

Step 8). Begin to "pump" the well by slowly sucking on the straw. Watch the decline in the level of the soda and observe what happens to the contaminants. Do contaminants (Kool-Aid®) leak through the confining area (ice cream) and get sucked into the well? If so, do more contaminants get into wells in confined or unconfined aquifers? (If your class made both; see Step 3)

Step 9). Pour a small amount of soda over the top. The soda represents precipitation. It recharges the aquifer (adds new water). Watch how the Kool-Aid dissolves and moves into the aquifer. The same thing happens when contaminants are spilled on the ground. Do you think you could get

the Kool-Aid back out of the soda?

Reflection Questions:

1. What observations/results surprised you? What did not?

2. What parts of the activity were most/least like what would happen with a real aquifer? Why?

5. Do you think a contaminated aquifer can be cleaned? If so, how?

6. How can we conserve (save) ground water?

7. In what ways can we protect groundwater (keep it clean)?