GROUNDWATER SIMULATOR MINI EXERCISE #4

Determining Groundwater Flow Velocity

Created by CREEK CONNECTIONS

Student Name: _____

Class: _____

Object: Determine the groundwater flow velocity as groundwater moves through the unconfined and confined aquifers. See if recharge affects groundwater flow velocity.

Time Needed: 20-25 minutes

Simulator Conditions: Slide the simulator aquarium pump so that the full amount of flow is being delivered to the recharge area (slide pump to the right). Close the aquifer compartment drain valve at the bottom of the simulator's back reservoir of water. Make sure the stream drain valve is open. Make sure the lake drain valve is closed.

Materials needed: color dye; pipette; squirt wash bottle; ruler; stopwatch or clock with second hand; calculator (optional).

Procedure:

1. Inject a few drops of dye into Well #1 – gently force it down to the bottom with the squirt wash bottle. Add enough for a "nickel-sized" to "quarter-sized" amount of dye. The dye will travel from right to left (recharge to discharge area).

2. Select a point in the confined aquifer, measure out a distance of at least 10cm, and time how long it takes the dye to travel the distance.

3. Determine velocity:
   (use next page for calculations)

$$\text{Velocity} = \frac{\text{Distance traveled (cm)}}{\text{Dye travel time (seconds)}}$$

4. Record your result in the data table.

5. Repeat the procedure for the simulator locations listed below. Dyed water may travel at an angle so your 10 cm measure might have to be at an angle out from the bottom of the well.
   - Inject dye into the bottom of well #2 – unconfined aquifer, gravel
   - Inject dye into the bottom of the UST (underground storage tank) – sand layer
   - Inject dye into the bottom of well #4

   Record these results in the data table

6. Now, reduce the amount of recharge (water entering the groundwater system) by sliding the aquarium pump to the left so that only ¼ inch of water is recharging into the unit. Once this is done, inject dye into well #2 and the UST again and calculate the flow velocity again. Record the results in the data table.

Continued →

Calculations:

Results:

Description of aquifer that groundwater was flowing through	**Amount of recharge (high, medium, low amount)**	**Groundwater velocity (cm/sec)**

Questions:

A. What type of soil layer had the quickest groundwater flow velocity? Slowest?

B. Did the amount of recharge affect the groundwater flow rates? If so, why? If not, why not?