Hydrogelogy C

Part 2 – 25% of total score

RUBRIC

Please submit your answers online for this portion of the event. **It is a good idea to write down your calculated values as you work through the Hydrogeology Challenge just in case you need to refresh the page or have computer issues.**

Directions:

1) Complete the Hydrogeology Challenge Scenario in static (non-pumping) conditions using wells **C, E, and G.** The _____ Tournament can be found at URL:

http://groundwater.beehere.net/#test/2d72aa2b-383d-422a-b994-601ce61321c5

2) When submitting your answers:

Part II

Note:
V = 3.11 ft/sec
n = 0.36
K = 103.8 ft/day
Direction => 151 ± 10°

Name: [Your name and collaborator's name]

Location: **Obtain from TGF prior to tournament**

Part 3 – 50% of total score

25 points available.

NOTE: COMPUTER GRADED

The Situation:

Residents in the community recently became concerned over their potential sources of groundwater contamination. An older unlined landfill that is still in use located near well D was identified as a major potential hazard. Water quality testing found pollutants associated with landfills including MTBE in well D. The community has hired you and your team to address their concerns and prepare a table of possible remediation techniques.

The Facts

- Pollutants associated with landfills (MTBE) have been found in well D
- Well A is currently being pumped as a private drinking water source
- No other wells are currently pumping water

1) Name three pollutants other than MTBE associated with landfills. (3 Points)

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Cadmium, Lead, Nickel, Chromium, Iron, Aluminum, BTEX

Carbon Tetrachloride, TCE, Freon 11, Acetone, Polychloronated Biphenyls (PCBs)

2) Which of the following is **NOT** another source of MTBE

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b) Leaks from Compost pile

a. Leaks in underground and aboveground storage tanks
b. ~~Leaching from treated wood products~~ Compost
c. Fuels spills
d. Pipeline leaks

3) Using the Flow Direction calculated in part 2, what other well(s) are at risk of contamination? (1 Point)

~~A, B and C~~ E (2)

4) Using Horizontal velocity calculated in part 2, approximately how long (in years) will it take for the pollutants to reach the nearest at risk well? (2 Points) Which is nearest? (3)

~~~ 8 (+ or - 2 years) actual=7.8 years~~ 128.6 days (E)

appx $\frac{400'}{3.11}$ =

5) Assuming the Hydrogeology Challenge's assumptions are correct, how would the velocity of the groundwater be affected if wells E, ~~F, and G began~~ pumping? (1 Point)

The velocity of the groundwater would ~~decrease~~ increase (1)

6) If the community only discontinues the use of this landfill will it eliminate the risk of contaminating other wells, why or why not? (2 Points)

The risk would not be completely eliminated because the ~~landfill is not lined and there are still sources of contaminants in the~~ landfill that can leak out and add to what is already in the groundwater. (2)

has already contaminated some of the groundwater, and even if source is removed, some of contaminant can still move with flow
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12/12

4/4 2/2 4/4 2/2

Remediation Technique	Definition (1 Point)	In or Ex-situ (1/2 Point)	Type (Biological, physical, chemical, ect.) (1 Point)	Applicable to landfill associated pollutants (1/2 Point)
Permeable Reactive Barrier	A zone created below ground which the polluted water must flow through to be treated. The reactive materials that make up the zone either trap harmful contaminants or make them less harmful.	In-situ	Biological/ Chemical and Physical	Yes
Phytoremediation	Uses plants to clean up contaminated environments	In-situ	Biological	Yes
Thermal Treatment	Uses heat to move or 'mobilize' harmful chemicals in groundwater toward wells where they are collected and piped to the surface to be treated using other methods	In-situ	Thermal	Yes ?
Vertical Engineered Barriers (VEB)	A wall built below ground to control the flow of groundwater. Used to divert the direction of contaminated groundwater flow to keep it from reaching drinking water wells, wetlands, or streams	In-situ	Containment only	Yes