**Part 5: Hanford – Groundwater and Contamination**

Note: You will need internet access for this assignment

**Procedure:**

Contamination of soils and groundwater at a location is best depicted using maps. If groundwater contamination is a concern, then one type of map is particularly useful: a groundwater flow map. Groundwater flow maps use isolines similar to contours on a topographic map, except the lines connect points of equal elevation of the water table itself. Think of the as representing the surface of the water table. Groundwater has a contour similar to that of the land surface, and it flows toward areas of lower elevation. Another type of map is called an isoconcentration map. This is also a sort of contour map, but the lines represent the concentration of a particular contaminant. With these you can easily identify the most highly contaminated areas, and with the groundwater contour maps, estimate where the contamination will flow.

1. Download the following maps:
   1. <http://www.hanford.gov/c.cfm/sgrp/GWRep10/html/popup.htm?pgImage=..%5Cimages%5Cf3-1.gif&fImage=..%5Cimages%5Cf3-1z.gif&pdfImage=..%5Cimages%5Cf3-1.pdf&flSize=284%20kb%20&caption=Figure%203-1%3A%20Groundwater%20Monitoring%20Wells%20on%20the%20Hanford%20Site>
   2. <http://www.hanford.gov/c.cfm/sgrp/GWRep10/html/popup.htm?pgImage=..%5Cimages%5Cfs-4.gif&fImage=..%5Cimages%5Cfs-4z.gif&pdfImage=..%5Cimages%5Cfs-4.pdf&flSize=116%20kb%20&caption=Figure%20S-4%3A%20The%20water%20table%20and%20inferred%20groundwater%20flow%20directions%20in%20March%202010.%20%20Groundwater%20flows%20from%20areas%20where%20the%20water%20table%20is%20high%20to%20where%20it%20is%20lower%2C%20and%20eventually%20discharges%20to%20the%20Columbia%20River>.
   3. <http://www.hanford.gov/c.cfm/sgrp/GWRep10/html/popup.htm?pgImage=..%5Cimages%5Cfs-6.gif&fImage=..%5Cimages%5Cfs-6z.gif&pdfImage=..%5Cimages%5Cfs-6.pdf&flSize=93%20kb%20&caption=Figure%20S-6%3A%20This%20map%20illustrates%20the%20distribution%20of%20the%20major%20contaminant%20plumes%20on%20the%20Hanford%20Site%20at%20concentrations%20above%20drinking%20water%20standards%20in%20approximately%20the%20upper%2010%20meters%20of%20the%20unconfined%20aquifer>.
2. The first map is the location of all the monitoring wells drilled at Hanford for the purpose of monitoring groundwater. This is mostly to see where the collection points are from which the groundwater contour map is constructed.
3. The second map is the groundwater contour/flow map. This shows the groundwater contours and arrows indicating the flow direction. The third map is like an isoconcentration map, except that it uses colors to identify the locations (plumes) of contamination. It’s less useful than an isoconcentration map because it doesn’t indicate the actual concentration levels.
4. Using the groundwater flow map, describe how groundwater flows over the Hanford site. Identify any important resources or sensitive areas that contaminated groundwater would have an impact on.
5. Using the contaminant plume map, list and identify specific contaminants and how close they are to any important resources or sensitive areas.
6. Describe how groundwater flow might carry the contamination within any of the plumes closer to any important resources or sensitive areas.
7. If you completed activity 4, do any of the contaminants contain radioactivity? What are your concerns with respect to half-life would you have with respect to how long contamination will be present?
8. Conclusion. In a paragraph, describe the contamination present and how groundwater is transporting it. Describe any threats to any important resources or sensitive areas.