

## **Plume Delineation Exercise**

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**Course:** Undergraduate course in Environmental Geology 300-level

**Concepts and Skills:** Basic groundwater flow (Darcy's Law), concept of contour maps, physical properties of common groundwater contaminants (VOCs, SVOCs)

**Activity Goals:** Students will use their knowledge of groundwater flow and contaminant properties to delineate the extent of a groundwater contaminant plume from well data. They will also make a judgment as to any potential health risk based on the location of the plume and associated drinking water wells.

## Plume Delineation Exercise

The residents in contaminantville have a history of liver and kidney disease and have been complaining that their water is contaminated. Recently, a remedial investigation was completed and all the existing wells were sampled for volatile organic compounds. The results are listed on the attached sheet. Your task is to create a plume delineation map and determine if there is a contaminant source, where it is and who is being most affected by the plume.

<i><b>Well ID</b></i>	<i><b>X</b></i>	<i><b>Y</b></i>	<i><b>Benzene (ppm)</b></i>	<i><b>PCE (ppm)</b></i>
DW-1	3	19	nd	nd
DW-2	6	19	nd	1
DW-3	9	19	nd	4
DW-4	12	19	nd	4
DW-5	2	9	nd	4
DW-6	5	14	nd	40
DW-7	5	11	nd	120
DW-8	5	8	nd	1030
DW-9	4	16	nd	nd
DW-10	4	14	nd	5
DW-11	14	8	2100	12
DW-12	14	13	250	10
DW-13	11	13	nd	50
DW-14	11	10	115	120
DW-15	11	8	875	130
GST-01	9	4	nd	13
GST-02	12	5	10000	9
DC-01	5	4	nd	50000
DC-02	3	4	nd	nd

DW = drinking water well

In addition to the defining the plume and the source of the contaminants it would be helpful to determine how long the contaminants have been in the aquifer. Use the following data and Darcy's law to make that determination.

Depth to groundwater table at DW-4 is 22 m bgs

Depth to groundwater table at DC-01 is 13 m bgs

The hydraulic conductivity for the contaminantville aquifer 0.1 cm/sec

# Base Map

