

Research project on the field investigation and 2D-vertical mathematical modelling at key contaminated sites in Germany

Project Location:	Research Project, Germany
Client(s):	Umweltbundesamt, Berlin (German EPA)
Date Completed:	1996
Project Budget:	DM 155,000

Project Summary

Traditionally, contamination studies concern themselves primarily with the occurrence and chemical changes of contaminants. The direction of groundwater flow is often ignored and assumed to be lateral, parallel to the groundwater table. This is the reason many groundwater monitoring designs spend large amounts of money unnecessarily on piezometer construction and chemical sampling.

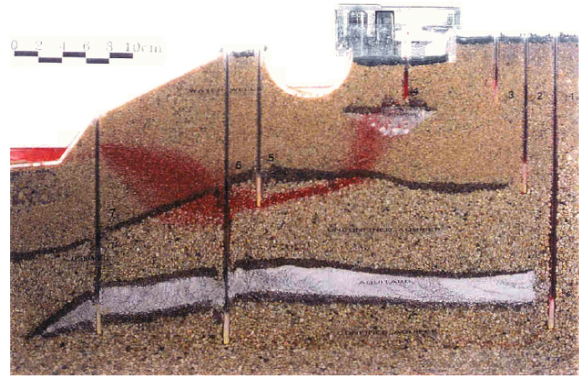
Within the above research project the physics of groundwater dynamics, including the flow through aquitards, has been dealt with in detail. Methods were developed to determine the extent of regional flow systems and their influence on local flow at contaminated sites. The methods were applied to the two main German pollution sites (similar in public impact to the Love Canal in the United States) and led to surprisingly different conclusions about the application of thorough and cost-efficient remediation measures. In both cases the applied remediation system proved to be mostly unnecessary due to hydraulic reasons, although more than about DM 10,000,000 had been spent on each site for so-called "remediation measures". At one site more than DM 1,000,000 had been spent upon unnecessarily repeated chemical analyses.

Services Provided

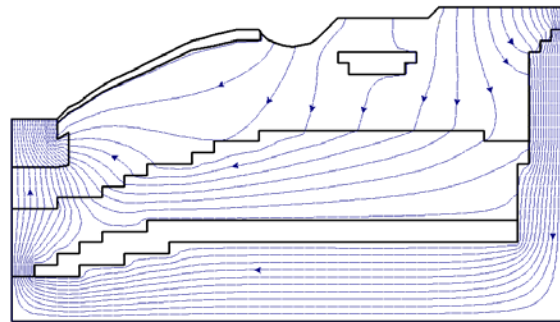
- * Treatise on the basics of groundwater dynamics as it applies to the migration of dissolved contaminants.
- * Application of available mathematical (2D-vertical) and sand models to visualize the vertical extent of groundwater flow systems and their influence on groundwater monitoring design.

Deliverables or Results

- * 205 page report on the effects of physically-consistent groundwater dynamics on the migration of dissolved contaminants [report in German].



Well defined plume of groundwater contamination (red) migrating towards creek from source of contaminants. Size of sand model 49 x 28 cm.



The corresponding flowlines in a simple vertical 2D mathematical model.