Impacts of Remedial Techniques on Contamination Transport in Groundwater

The significance of groundwater is largely shaped by the quality of wastewater from industrial, agricultural, and municipal sources. Understanding the controlling factors is essential to prevent the spread of contamination in groundwater. These factors could be divided into physical defenses, such as grouting and slurry walls, and hydrodynamic factors, such as injection and pumping wells. In this study, the groundwater transport model (MT3D) and the flow model (MODFLOW) were used to simulate four scenarios for groundwater protection. The first and second scenarios involve grouting and constructing slurry walls to change their depth, permeability, and thickness. The third and fourth scenarios involve injection and pumping wells changing the rate of flow, screen length, and the number of wells. The results show that increasing the thickness of the grouted soil and increasing the grouting depth help to control the level of contamination. Furthermore, multi-slurry walls upstream or downstream of the contamination source are sufficient for preventing the spread of contaminants. The results also reveal that rising rates of injection or pumping wells allow for minimal contamination propagation. The growing number of wells provided greater control over the injection rather than pumping wells. The variation in the screen length of pumping wells is effective for preventing the propagation of contamination.