

A Study of Transverse Dispersion in a UK Aquifer

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Non-reactive solute dispersion in a Triassic sandstone aquifer in the UK was studied by simulating conservative chemical (chloride and fluoride) plumes transport in the subsurface. A new non-invasive imaging technique was developed to investigate plume transport in porous media at laboratory and a mathematical mode was used to simulate the process. Lab experiments show that dispersivity of a 2-D aquifer made up of glass beads is 0.063 mm. The median diameter of particles at field site is in the range 150-200 mm and groundwater velocity

is approximately 10 m/year. Field data from two monitoring boreholes which are respectively 130 m and 350 m from the source along the multilevel plume flow path were simulated. The simulation shows that the vertical dispersivity of the field site is 0.4 ~1.2 mm and this value can successfully predict the transport of other conservative chemicals. The low dispersion coefficient ($1.2 \times 10^{-10} \text{ m}^2/\text{s}$) of the field site, suggests that molecular diffusion is a significant factor accounting for vertical dispersion.