

Interactions between groundwater and surface water of a contaminated site: field studies and numerical modelling results

A. GIGLIUTO, R. VACCARI, C. RIGHETTI, S. VERDELOCCO, L. MORETTI & M. CREMONESI

AECOM Italy S.r.l. Via Francesco Ferrucci 17/A, Milan, Italy

andrea.gigliuto@aecom.com

Abstract This work examines a complex hydrogeological system characterized by a close relationship between groundwater and surface water, both impacted by chlorinated solvents contamination. Field studies were carried out, based on continuous water level monitoring systems, showing the interactions between groundwater–surface water, tidal fluctuations, seasonal trend of precipitation and an anthropogenic draining pump system. Tracer tests were conducted to verify the effectiveness of the ongoing emergency remedial actions and to estimate groundwater velocity and solute transfer from groundwater to surface water and their relationship with water level fluctuations. The study was supported by two 3-D flow and transport numerical models: (1) using the finite difference MODFLOW® code, and (2) using the finite element FEFLOW® code. The results showed the area is strongly influenced by sea level fluctuations and the presence of surface water drainage channels. The field and numerical studies were finally used to support remediation planning at the site.

Key words groundwater–surface water interaction; tracer test; numerical model; contamination; site remedial actions