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# Hydrogeochemical model supporting the remediation strategy of an heavily contaminated industrial site

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Delineation and understanding the geology and hydrogeology of a contaminated site is a fundamental requirement for environmental remediation. Successful environmental remedial strategies are determined by good interactive communication between different disciplines. Heterogeneous data integration contemplates aspects of geological, engineering and chemical-biological nature. The present work concerns the creation of a thematic database for integrated management, representation and analysis of heterogeneous data. The integrated geodatabase represents an effective “near real time” DSS (Decision Support System) able to manage and to release data during the different remediation phases, from the characterization to the intervention implementation. The multidisciplinary approach unites all the strengths of the different branches and considers the contamination phenomenon in all its dimensions, to obtain a high-resolution characterization. Geology can represent the link between the various disciplines, favoring the information interchangeability in the multidisciplinary nature of the elements involved. The holistic approach supports the design of targeted, effective and economically sustainable remediation interventions. The present work concerns the realization of a conceptual integrated model that guides the appropriate selection and optimization of a remediation strategy. A new technology for remediation of Dense Non-Aqueous Phase Liquid (DNAPL) aged source zone is reported in this study. The objective of the remediation is to enhance in situ bioremediation (ISB) by coupling Groundwater Circulation Wells (GCWs) with an electron donor continuous production system. The technology has been verified through a pilot test carried out in an operative industrial site located in northern Italy, heavily contaminated by Chlorinated Aliphatic Hydrocarbons (CAHs). Site characterization confirmed a complex hydrogeological situation with the occurrence of active residual sources in low permeability layers. Pilot test results have clearly demonstrated the significant mobilization of contaminant from the low permeability zone and the possibility to enhance in situ natural attenuation mechanisms based on biological reductive dechlorination. The full-scale project is designed based on the pilot experiment.