GEOLOGICAL PARAMETERS INFLUENCE THE ELECTROKINETIC TREATMENT OF CONTAMINATED SOIL

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Electrokinetics are widely used in geotechnics and geochemical exploration. Focusing on environmental aspects electroremediation is an innovative in-situ technique well suited for contaminated fine grained sediments. The extraction of pollutants is based on the electrokinetic phenomena: Ion migration and electroosmosis. Electroremediation is essentially a process of soil flushing, but has several advantages over the usual pressure-driven pumping technology. The transport rate induced by an DC electric field is not adversely affected by low soil permeability, and the path followed by the contaminants is confined by the electric field to the region between the electrodes. Electroremediation is therefore advantageous in soils of low or variable permeability and in situations where dispersion of the contaminants must be prevented. The investigation of a former production plant for phenol based disinfectants focuses on the influence of soil microstructure and composition of lower permian sediments (Rotliegend formation) on electroosmotic transport. For the first time a large scale drilling was conducted in order to obtain secondary, horizontally orientated and stratiform soil cores, which have been attached to the lab equipment. The influence of variations in soil mineralogy, resistivity, saturation and microstructure on electroremediation has been investigated. In lab and pilot scale tests the electrokinetic treatment of the soil cores proof the direct impact of soil composition (e.g. carbonate content, clay mineralogy), soil structure and pore size distribution on the electroosmotic permeability, geochemistry, pore fluid composition and contaminant extraction rates. Finally numerical simulations are compared to electroremediation experiments.