In-situ geochemická stabilizace Cr(VI)

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Abstrakt: At the beginning of the 21st century society is passing through a dynamic era accompanied among other things by stormy development of new technologies designed not only for facilitation of common life, but even for such a specialized branch, as contamination hydrogeology surely is. An integral part of the environmental creation and protection process in the Czech Republic is also the removing of anthropogenic pollution from the rock environment and groundwater.

At many industrial and waste disposal locations in the Czech Republic, chromium has been released to the environment via leakage and poor storage during manufacturing or improper disposal practices. Industrial applications most commonly use chromium in the form of hexavalent Cr⁶⁺, which is actually toxic and very mobile in groundwater. Groundwater extraction and treatment has traditionally been used to remediate chromium contaminant plumes. This method, while providing interception and hydraulic containment of the plume, may require long-term application to meet Cr⁶⁺ remediation goals and may not be effective at remediating source zones.

This article discusses a case study of the innovative technology - geochemical stabilization of hexavalent chromium in groundwater. The goal of this technology is to reduce Cr(VI) in groundwater and contaminated soil to the more thermodynamically stable Cr(III) form. The reduced chromium is expected to geochemically fix onto aquifer solids. Technology is based upon the concept of extracting contaminated groundwater and treating it above ground, followed by reinjection of the treated water into the aquifer. The reinjected groundwater is mixed with a reductant to reduce any residual Cr(VI) contamination remaining in the interstitial water. The success of the in situ chromium geochemical stabilization technology depends on the ability of the applied reductant to reduce Cr(VI) in groundwater to Cr(III) and on the capacity of the reduced chromium to fix onto the aquifer solids.

Keywords: šestimocný chrom, in-situ geochemická stabilizace, částice nulamocného nanoželeza, pyrosiřičitan sodný.