

Performance of In-Situ Chemical Oxidation and Aerobic Biodegradation to Attenuate Petroleum Hydrocarbons in Groundwater

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Summary

In-situ chemical oxidation (ISCO) and aerobic biodegradation are some of several innovative technologies that are effective at destroying or degrading various hazardous contaminants in soil and groundwater. The results of several remedial applications of ISCO and aerobic biodegradation indicate that compounds of concerns, specifically petroleum hydrocarbons, are effectively attenuated over the short and long term via applications of percarbonate and oxygen release materials. This presentation will focus on the full-scale groundwater remedial application of ISCO and aerobic biodegradation at a site in southern Alberta, Canada. The design, application and performance of the remedial approach will be used to illustrate the effectiveness and limitations of this technology.

Introduction

Subsurface investigations at a former petroleum fueling station in southern Alberta, Canada, identified petroleum hydrocarbon impacted soil and groundwater above the applicable Alberta Environment Tier 1 Guidelines. An in-situ remedial program using a combination of enhanced bioremediation and ISCO was implemented to address the petroleum hydrocarbon impacted groundwater. The program involved the injection of the chemical oxidant percarbonate and an oxygen releasing material into the subsurface which led to an increase in the dissolved oxygen content in groundwater which was utilized by the native micro-organisms as well as the chemical oxidation of the petroleum hydrocarbons.

Method

The full-scale groundwater remedial application of ISCO and aerobic bioremediation involved the seeding of open excavations with chemical oxidants and oxygen releasing compounds as well as a series of injections using direct push technology.

Conclusions

Results from of the full-scale application indicate a ninety-six percent (96%) overall decrease in contaminant concentrations to levels below the Alberta Environment Tier 1 Guidelines applicable to the site. The results show that the combination of ISCO and aerobic bioremediation is an innovative technology that is effective at attenuating petroleum hydrocarbons in groundwater and soil.

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