PHCs at Former Farming Site Successfully Remediated Using PersulfOx®

Petroleum Hydrocarbon Plume Remediated in Fractured Bedrock Using PersulfOx for Urban Development

Project Highlights

- Introduction of PersulfOx® resulted in reduction of PHCs in fractured bedrock, meeting site remediation goals
- High sulphate concentrations in groundwater resulted from the application of PersulfOx which is assisting natural attenuation of any residual petroleum hydrocarbons

Project Summary

A former farming facility located in Calgary, Alberta contained three above ground storage tanks (ASTs) and two pump islands. Environmental assessments related to the planned urban redevelopment of the former farming facility revealed contamination of the soil and groundwater beneath the site with petroleum hydrocarbons (PHCs) due to release(s) from the former ASTs. During a remedial excavation, PHC impacts above the applicable vapor inhalation guidelines were identified within the fractured bedrock. Given the nature and depth of the]bedrock, the remedial excavation was no longer feasible. Therefore, PersulfOx, a proprietary chemical oxidant chemical, was utilized for *in situ* treatment of soil and groundwater within the excavation to reduce the remaining PHC concentrations below the commercial vapour inhalation guidelines.

Based on the subsurface investigations and monitoring activities prior and subsequent to the chemical application, it was determined that PersulfOx was effective in remediation of PHC impacts within the fractured bedrock in an open excavation, within a short period of time and under the low groundwater temperatures. Following treatment with PersulfOx, reduction or the absence in PHC concentrations has been observed in soil or groundwater samples and all post-remediation concentrations have remained below the vapour inhalation pathway guidelines for commercial use. However, high sulphate concentrations were identified as a result of this chemical application which over the long term would assist in the natural attenuation of any residual petroleum hydrocarbons.

Technology Description

PersulfOx is a chemical oxidant that repidly reduces the mass of the contaminants. This chemical consists of 90% of sodium persulfate and 10% catalyst powder. PersulfOx is very effective in rapid oxidation of petroleum hydrocarbons in both soil and groundwater.

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Site Details

Site Type: Former Farming Facility

Contaminant of Concern: PHCs

Concentration: Soil Benzene (up to 1.53 mg/kg); Groundwater Benzene - 0.4 mg/L, F1 -2.7 mg/L and F2 - 1.7 mg/L

Remediation Approach: Chemical Oxidation to remediate Petroleum Hydrocarbons

Treatment Area: 5,000 m^3 of groundwater within excavation treated with 18,700 kg PersulfOx

Soil Type: Silt/clay underlain by sandstone and shale bedrock

Technology Used: PERSULF Ox Catalyzed Persulfate

Results

Reduction of PHC concentrations by oxidation using PersulfOx facilitated the urban development of the former farming facility. The high sulphate concentrations are expected to attenuate to background concentrations with time as sulphate is an electron acceptor in the natural attenuation process of petroleum hydrocarbons.

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