Characterisation and monitoring of in-situ remediation of chlorinated hydrocarbon contamination using an interdisciplinary approach (MIRACHL)

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There is growing concern about sites contaminated with carcinogenic chlorinated hydrocarbons spilled by from use as dry-cleaners and industrial solvents, and there are around 2000 sites in Sweden alone. The contaminants pose a threat to drinking water resources and ecosystems. Furthermore urban development demands for more housing is often addressed via densification of cities by developing housing in often contaminated derelict industrial areas, with associated problems and health issues. In order to tackle these problems remediation is needed.

The main remediation technique in Sweden is the costly and micro-ecologically damaging excavation and landfilling, i.e. moving the pollutants from one site to another. This strategy leads to large transports and the exposure of dangerous compounds. The Swedish EPA recommends the use of in-situ remediation methods, which would lead to large savings for clean-up, and contribute to EU Water Directive requirements and to reaching the national environmental objectives. Today, however, the monitoring of the remediation action and confirmation on a "good enough" outcome is very uncertain, due to the current investigation techniques with point source monitoring. There is a need of better monitoring approaches to reduce uncertainties around in-situ remediation and pave the way for more costs efficient procedures.

In the MIRACHL project, integrated monitoring with geophysical and biogeochemical methodologies is used to better understand and follow in-situ remediation processes of sites contaminated by chlorinated hydrocarbons. Direct Current resistivity and time-domain Induced Polarisation tomography (DCIP) monitoring during the remediation will together with biogeochemical sampling and analyses help follow the development underground. Degradation of the chlorinated hydrocarbons is expected to result in measurable changes in the DCIP signatures as chloride ions are split off from the polluting hydrocarbons, together with e.g. precipitation of iron compounds. With the combined monitoring approach, we aim for a comprehensive coverage of changes underground to develop an understanding of hydrological, chemical and biological processes.

MIRACHL (http://mirachl.com/) is a collaboration between universities, authorities and industry, with a multi-disciplinary team, where the methodology will be tested and calibrated in full scale on several tests sites. The first site to be monitored is Alingsåstvätten, a laundry facility where large amounts of Tetrachloroethylene (PCE) have been spilled into the ground.