Integrated characterization of perchloroethene plume natural attenuation after thermal source zone remediation - molecular biology tools and dual isotope analysis

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PCE DNAPL contamination at the former central dry cleaning facility in Rødekro, Denmark, was subjected to thermal (steam) source zone remediation in late 2006. A > 2 km long plume of chlorinated ethenes (PCE and chlorinated degradation products) that has migrated downgradient from the source zone has not undergone active remediation. Natural degradation of PCE, TCE, cDCE and VC within the plume prior to source treatment was documented by lines of evidence including stable isotopes in 2006(-2007) (Hunkeler et al., JCH, 2011). Enhanced degradation within the plume caused by the release of dissolved organic carbon during thermal remediation of the source zone was documented in an integrated approach including dual compound specific stable isotopes and molecular biological techniques in 2014 (Badin et al., JCH, 2016).

The analysis for microbial composition and specific degraders and their activity as well as dual stable isotopes has revealed high complexity in degradation processes and played an important role to substantiate the natural attenuation of the plume.

The current study (2017) focusses on further understanding of the degradation processes, including the relative importance of the activity of the specific degraders *Dehalogenimonas* and *Dehalococcoides*, and potential competing organisms (iron and sulphate reducers), as well as the evolution in natural attenuation and risk of the plume. This project is unique in the integrated characterization approach for evaluation of the natural attenuation of cDCE and VC in the cDCE dominated plume and forthe monitoring of the effects of source remediation on plume natural attenuation.