In-situ Chemical Oxidation of Diesel-Contaminations in Silt Lenses

D. HÖLLEN[1]*, R. PHILIPP[2], B.T. BOGOLTE[2], A. STAUDIGL[1], M. KULICH[1], A. FEHRER[2], J. GRABMAIR[2], G. AUSWEGER[3] AND R. POMBERGER[1]

[1]Montanuniversität Leoben, Chair of Waste Processing Technology and Waste Management, Franz-Josef-Str. 18, 8700 Leoben, Austria

[2]TERRA Umwelttechnik GmbH, Großmarktstr. 7c, 1230 Vienna, Austria

[3]Graz University of Technology, Institute of Soil Mechanics and Foundation Engineering, Rechbauerstr. 12, 8010 Graz, Austria

*correspondence: daniel.hoellen@unileoben.ac.at

In-situ remediation of contaminated sites by soil flushing is limited by the hydraulic conductivity of soils. Silt lenses which occur in alluvial sediments are therefore highly challenging with respect to this sustainable approach.

Two innovative approaches, a sub-frac method, where the injection pressure remains underneath the strength of the soil, and a multi-frac method, where a 3D network of microcracks is induced, are compared as transport system for soil flushing.

Finite element modelling of water flow and crack formation in a silty lens at different injection pressures was used to predict the critical stress at which fissures are formed.

Different additives are compared with each other with respect to the acceleration of the biologically and chemically catalyzed oxidative decomposition of diesel contaminations using laboratory tests.

Undisturbed soil samples of a silty lens of a diesel-contaminated site in Vienna, Austria, are taken and subjected to laboratory experiments to test the hypothesis regarding the critical stress and the performance of soil flushing in low-permeable soils also considering the effect of tenside addition to improve the wettability of the contaminated mineral surfaces.

Finally, a set of field tests is conducted at the above mentioned contaminated site using both the sub-frac and the multi-frac approach in order to test the predictions of soil mechanical modelling and laboratory experiments under realistic framework conditions.

The authors thank the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management which is funding the project LISA via the Kommunalkredit Public Consulting.