Characterization and Quantification of Pneumatic Fracturing Effects at a Clay Till Site - DTU Orbit (02/01/2019)

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Environmental fracturing offers assistance to remediation efforts at contaminated, low-permeability sites via creation of active fracture networks, and hence, reduction of mass transport limitations set by diffusion in low-permeability matrices. A pilot study of pneumatic fracturing, focusing on direct documentation of fracture propagation patterns and spacing, was performed at a typical basal clay till site. The study applied a novel package of documentation methods, including injection of five tracers with different characteristics (bromide, uvitex, fluorescein, rhodamine WT, and brilliant blue), subsequent tracer-filled fracture documentation via direct and indirect methods, and geological characterization of the fractured site. The direct documentation methods consisted of Geoprobe coring, augering, and excavation. A mass balance and conceptual model have been established for the distribution of the injected tracers in the subsurface. They reveal that tracer was distributed within 2 m of the fracturing well, mainly in existing fractures above the redox boundary (2 to 4 m.b.s.; 5 to 10 cm spacing). Spacing of observed tracer-filled fractures was large (>1 m) at greater depths. The number of fractures induced/activated could possibly be increased via adjustments to the fracturing equipment design.

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Contributors: Christiansen, C. M., Riis, C., Christensen, S. B., Broholm, M. M., Christensen, A. G., Klint, K. E. S., Wood, J. S., Bauer-Gottwein, P., Bjerg, P. L.
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