# High-Resolution Quantification of LNAPL Transmissivity in Fractured Media

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**Background/Objectives.** Light non-aqueous phase liquid (LNAPL) transmissivity is a metric to quantify the hydraulic recoverability of LNAPL. Existing methods developed to measure LNAPL transmissivity within granular porous media have often failed to reliably quantify LNAPL transmissivity in fractured porous media. These failures in LNAPL transmissivity calculations in fractured porous media neglected key measurements of the NAPL hydrogeologic condition and the geometry and discharge rate for individual fractures containing mobile LNAPL. In addition, methodologies to identify individual fractures with mobile NAPL have often required intrusive, time-consuming and expensive techniques.

**Approach/Activities.** NAPL in fractured media typically behaves as either confined or perched NAPL, but may exhibit unconfined behavior in highly fractured media. In order to evaluate the hydrogeologic condition of the NAPL, well conceptual models (WLCMs) incorporating hydrostratigraphs (HSGs) and diagnostic gauge plots (DGPs) as well as lithology and other available well characterization data are created. Following removal of the NAPL (either as a baildown test, or following manual skimming, or any other extraction of NAPL from a well), high resolution NAPL recharge into the well is gauged until it returns to equilibrium. This data is then used to create a Discharge versus Drawdown (DvD) plot. LNAPL transmissivity for each individual fracture as well as the well in the aggregate is then calculated from the DvD data. In addition, the vertical location and aperture for each fracture with LNAPL is identified to strengthen the LNAPL conceptual site model (LCSM).

**Results/Lessons Learned.** This new methodology substantially improves the accuracy and reliability of LNAPL transmissivity calculations in fractured media. A comparison of values obtained using methodologies for granular porous media versus this new method for fractured porous media indicates that the granular porous media approach may be in error by up to more than an order of magnitude. Armed with the vertical location, aperture and LNAPL transmissivity value for each individual fracture with mobile LNAPL as well as the aggregate value for each well, practitioners can target individual fractures with recoverable LNAPL for more efficient remediation design and optimization, and can also more accurately determine whether or not LNAPL is hydraulically recoverable at any scale. Improved accuracy should lead to better designs, more efficient operations, and increased trust and reliability on LNAPL transmissivity in fractured porous media by all stakeholders.