LNAPL Program Management through Transmissivity: Investigation through IRM Completion

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Background/Objectives. Light non-aqueous phase liquid (LNAPL) transmissivity (Tn) is a recently recognized direct indicator of recoverability with increasing acceptance by regulators and professional organizations (ITRC, ASTM, state agencies). We have applied transmissivity as an investigative and remedial design and optimization tool for LNAPL recovery at a major active petroleum refinery. Historic releases at the refinery have resulted in wide-spread LNAPL accumulations across the site necessitating the use of innovative methods to achieve typical program goals of protecting receptors and reducing contaminant mass.

Approach/Activities. In this case study, we used Tn as a primary means for identifying areas for focused remediation of an LNAPL plume covering approximately 10 acres, along with typical investigative methods (borings, wells, fingerprinting, profiling, API modeling etc.). Key areas for remediation were identified through computations of Tn from baildown testing and pilot testing recovery data, and interim remedial measures (IRM) were implemented through product skimming, high-vacuum extraction (HVE) and multi-phase extraction (MPE). The Tn values for each IRM were tracked and the recovery approaches were optimized.

Results/Lessons Learned. Over time, several sub-areas within the overall plume revealed decreasing Tn, generally trending towards the practical limits of hydraulic recovery (i.e., 0.1 to 0.8 ft^2/day). Full-scale recovery in these sub-areas was 'retired' from active remediation and limited maintenance recovery through selective HVE continues. This investigative and recoverability analysis approach using Tn allowed the refinery to focus the IRMs in disparate areas within the site. In using Tn as a tool for designing IRMs, the importance of considering other factors such as fluid properties, soil types, hydrogeology, saturation levels, tidal effects, migration rates and receptor risks, will be presented.