

An Evaluation of Three Methods for Estimating Free-product LNAPL Flow Rates through Contaminated Porous Media

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Abstract. Since the 1860's the petroleum industry has been refining crude oil into a variety of products. Best management practices at petroleum refineries over the last 100 years have resulted in large volumes of petroleum products being released onto refining property. If these releases consist of Light Non-Aqueous Phase Liquid (LNAPL) they will infiltrate the soil and come to rest at the water table.

A variety of laboratory studies have been conducted, and field techniques developed, to try and understand LNAPL lens stability. The three predominant field evaluation techniques are baildown tests, direct measurement using tracer dilution techniques, and petrophysical methods. Each of these methods are evaluated and compared in a laboratory sand tank and in the field. The limitations of each technique are discussed, and recommendations based on the relative accuracy of each technique are made.

Based on empirical data, baildown tests appear to overestimate LNAPL flow rates through soil formations by a factor of ten, depending on input parameters chosen during data analysis. Tracer dilution techniques directly measure the flow rate of LNAPL through a well. Tank studies suggest that the maximum error associated with direct measurement of LNAPL flow rates is an overestimate on the order of a factor of two. Estimations of LNAPL transmissivity based upon petrophysical methods are still in progress.

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