

Field Measurement of LNAPL Mobility For Rapid Site Characterization

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Obtaining regulatory closure at railroad facilities impacted by non-aqueous-phase liquid (LNAPL) has been historically difficult to achieve. Regulatory agencies are often reluctant to close sites where LNAPL is present regardless of the removal actions completed at the facility. As a result, many project sites end up with long-term monitoring requirements with no reasonable end point. The use of LNAPL mobility analyses offers a practical approach to define remedial action objectives at these sites and provides a path for site closure.

LNAPL mobility analyses has been applied at several of Union Pacific Railroad's sites over the past few years and has included the collection of intact soil cores in LNAPL-impacted areas for petrochemical analysis and the analysis of pore space characteristics to determine whether the LNAPL is potentially mobile or at residual saturation. In the event that a determination is made that the LNAPL is at residual saturation, the technical data that supports site closure can be presented to the regulator and may ultimately lead to site closure. However, if the mobility analyses suggest mobile LNAPL, the remedial actions in place at the site can be streamlined to more effectively remove LNAPL to residual saturations.

This presentation describes the use of a mobile laboratory deployed at the UPRR Nampa, ID rail yard that is equipped with a small centrifuge to perform LNAPL mobility analyses at the same time soil and groundwater investigations are performed. A sample from an intact soil core is collected and spun in the field centrifuge which applies forces that are representative of ambient conditions and conditions likely to be encountered during the remediation of mobile LNAPL. Using this approach, LNAPL is defined as mobile when pore fluids are extracted from the sample using the field centrifuge. Direct field measurement of LNAPL mobility allows for rapid field decisions on soil boring locations, and ultimately the delineation of a mobile plume, based on direct measurements of mobility and not just visual indication of LNAPL presence. In the event that additional confirmation is needed to make a LNAPL mobility determination, a duplicate sample from an adjacent soil boring can be collected and analyzed by a fixed laboratory specializing in NAPL mobility analytical techniques.

This presentation presents an overview of the LNAPL mobility field method and the results of a field investigation at the Nampa rail yard impacted with LNAPL. The findings of the field investigation resulted in limiting LNAPL recovery efforts to a single location and demonstrated that the LNAPL was not migrating offsite.