

Pathway to Closure at Sites with LNAPL: A Case Study

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Light nonaqueous-phase liquids (LNAPLs) associated with historical fuel releases are present in the subsurface at a number of railroad environmental remediation sites. At many of these sites, active LNAPL recovery systems are operated in accordance with regulatory policy, which typically mandates that all LNAPL that is recoverable or accumulates in wells be removed. However, regulatory policy at both the federal and state level has begun to shift towards establishing standards that are based on LNAPL mobility, recoverability, and the risk posed by LNAPLs to human health and the environment. Recent collaborative efforts between the Michigan Department of Environmental Quality and the regulated community have led to changes in how LNAPL sites are perceived and managed in the State of Michigan. Changes in LNAPL rules have shifted focus away from determining whether or not LNAPL is present, to understanding and managing the risks posed by LNAPLs. This paradigm shift emphasizes the development of a technically sound LNAPL conceptual site model (LCSM) to inform selection of an appropriate site management strategy. A case study is presented outlining site characterization efforts and the development of an effective LNAPL management strategy at an active rail yard in southeast Michigan, consistent with recent changes in LNAPL rules. Critical elements of the LCSM are presented, including 1) the nature and extent of impacts, based on laser-induced fluorescence (LIF) data, along with soil and groundwater sampling data; 2) LNAPL stability and recoverability, evaluated based on a combination of field LNAPL transmissivity testing and laboratory petrophysical analyses; and 3) analysis of risks to human health and the environment based on soil, groundwater, and soil gas data collected at the Site, site conditions, and consideration of current and future land use. The LCSM is then interrogated to identify risks associated with the LNAPL, and systematically evaluate applicable LNAPL management alternatives that can be employed to mitigate LNAPL concerns and meet remedial objectives in the context of site-specific LNAPL conditions. The case study serves as an example of how changes in regulatory policy with regard to remediation of LNAPLs, coupled with a technically-sound LNAPL conceptual site model is creating opportunities for more cost-effective LNAPL site management strategies.