

An Interactive Tool for Visualizing High Resolution LNAPL Characterization Results

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An active rail yard in Grand Rapids, Michigan has been used as a rail car storage and maintenance facility for the last 100 years. Impacts of diesel fuel on the subsurface during this period resulted in 7.8-acres of light non-aqueous phase liquid (LNAPL) up to 7 feet thick. The presence of LNAPL contributed to compositional risks via flux into the dissolved and vapor phases, and potential for impacts to drinking water, storm water discharges of groundwater and/or vapor intrusion.

A high-resolution characterization strategy was developed for the site, which reflects recent Michigan Department of Environmental Quality (MDEQ) regulatory changes for risk-based management of LNAPL. MDEQ now places greater emphasis on risk characterization and management, as opposed to removal of LNAPL above a given threshold.

Site characterization efforts were conducted to demonstrate, through multiple lines of evidence, a robust understanding of applicable exposure risks. The approach included the following key elements: Demonstration of LNAPL Natural Source Zone Depletion (NSZD) mechanisms (e.g., delineation with laser-induced fluorescence (LIF), LNAPL saturation estimates, and quantification of vapor flux); Evaluation of transmissivity and LNAPL recoverability; Characterization of vapor intrusion risks near an on-site building; and Evaluation of compliance with groundwater-surface water interface (GSI) criteria upgradient of a storm sewer.

The results and Conceptual Site Model (CSM) are presented and shared with stakeholders via a secure web-based interactive map tool customized for the project. This tool allows non-technical users to view the site data on desktop or mobile devices; navigate the site and select layers to view; click on site features to view associated data, charts, photographs, and documents; and print annotated views to facilitate team discussions and analysis.

An overview of the characterization approach and methods will be presented along with a demonstration of how the interactive map tool can be used to bring all stakeholders to the same well-informed table. This project highlights the importance of understanding the ever-evolving regulatory landscape whilst leveraging recent advances in characterization and visualization tools.