Benefits of High-Resolution Fluid Interface Data Collection for LNAPL Sites

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Background/Objectives. Air/LNAPL and LNAPL/groundwater interface elevations in monitoring wells are often measured as a part of routine data collection at sites affected by LNAPL. These data and the LNAPL density are used to calculate the thickness of LNAPL accumulations in wells and the potentiometric surface elevation. Additionally, LNAPL transmissivity field testing has become a desired component of LNAPL conceptual site models (CSM) for many sites, which requires intensive fluid elevation data collection over a short period of time.

The industry standard practice of manually measuring fluid elevations using an interface probe has inherent challenges related to health and safety hazards posed to field staff, site and/or well inaccessibility, labor costs, resource availability, potential for human error, and related data quality issues. Furthermore, manual fluid elevation measurement for LNAPL transmissivity tests in areas with limited access (e.g., roadways with high vehicle traffic) or sites with fixed working hours (e.g., no nights or weekends) undermines high-quality, accurate data interpretation. These challenges can be readily overcome through automated collection of the fluid elevation data.

Beyond the benefits for LNAPL transmissivity testing, the ability to deploy an automated system to collect high-frequency data over the course of weeks and months provides an enhanced understanding of LNAPL behavior in the subsurface, including quickly identifying hydrogeologic conditions (perched, confined, and unconfined), clearly defining the mobile NAPL interval, understanding LNAPL thickness fluctuations in tidal settings, and long-term monitoring and optimization of active LNAPL recovery systems.

Approach/Activities. A unique tool was developed and deployed at LNAPL-affected sites to automatically collect high-resolution fluid elevation data. This tool is different than other automated data collection solutions because it can readily accommodate large LNAPL thicknesses and dynamic potentiometric surface fluctuations without manual adjustment.

Results/Lessons Learned. Tidal studies, LNAPL transmissivity tests in confined, perched, and unconfined aquifers and fractured rock, and routine fluid-level elevation monitoring are technically more sound, less expensive to conduct, and safer with automated fluid elevation data collection. This presentation will include cases studies of transient conditions that were identified through automated data collection that would have been missed using traditional manual methods. Automated data collection resulted in improved LNAPL CSMs at the sites where the tool was deployed.