Using Discrete Horizontal Sampling Wells to Fill Data Gaps

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Background/Objectives. Most chlorinated and fuel contaminant releases occur on developed properties. The plumes migrate beneath buildings, roadways and utilities. At many locations, a portion of the plume can be inaccessible utilizing typical assessment technologies resulting in data gaps. These data gaps often result in inadequate estimates of contaminant mass and incomplete conceptual site models (CSM). This results in additional cost, and lengthens the lifecycle of remedial projects. When addressed, data gaps have historically been filled by the use of access agreements, removal of obstacles at significant cost, and well installation inside buildings, each considered disruptive and/or invasive. Many times data gaps are not addressed and result alternatively in additional extrapolation and over-reliance on interpolation using existing data. Impediments to conventional vertical data collection include surficial or near surficial structures (utilities, buildings, roadways, railways, to name a few) and natural obstacles (water and trees). Therefore it is reasonable that a horizontal approach may offer data collection beneath data gap obstacles. The objective was to provide a tool that allowed data collection under obstacles to improve the CSM while lessening disruption.

Approach/Activities. Horizontal directional drilling (HDD) has been utilized for 30+ years. Although it is rarely used for sampling it provides a means to approach plumes in areas inaccessible through vertical methods. The EN Rx approach was to install discrete wells in a horizontal plane using HDD to allow for discrete data collection beneath obstacles. Installation of permanent individual wells allowed for repeat-ability and treatment options and scale was utilized to lessen cost. This method was attempted on several sites, where sampling was conducted beneath warehouses, busy roadways, and active enterprises with improved outcomes in each instance. This presentation will cover each of these applications and illustrate the improved data sets.

Results/Lessons Learned. Each site where the horizontal discrete wells were installed and sampled benefited from a clearer understanding of the magnitude and extent of the plume. In all cases, the contaminant load was substantially different, either higher or lower, than initially estimated using only vertical tools. Therefore our primary lesson learned is that assumptions in data gaps are often incorrect confirming a critical need for this tool.
During the activities conducted at these sites, a number of important installation specifics were honed. For instance, what is the best depth for a horizontal sampling well? What drilling location is most convenient? How do these aspects offer safer sampling locations, less business disruption, and more cost effectiveness with horizontal sampling wells?