

Do You Know Your Site? Qualitative Characterization, Modeling, and Remediation to Predict Site Closure

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Background/Objectives. A review of the Statistical Inventory Records in August 1993 indicated a release of fuel had occurred into the environment, five (5) gasoline tanks were documented at the site and were subsequently removed in November 1993 or closed-in-place in June 2004. A series of mobile-enhanced multi-phased extraction events were completed between July 1993 and November 2008. The site is >0.25 miles from a wellhead protection area and is zone commercial and vacant. A dedicated multi-phase extraction unit was deployed at the site beginning in March 2011 and operated until August 2017. Soil gas survey points were installed and below the look-up-values and the volatilization to indoor air is not a complete pathway; however, free product was present in one on-site monitoring well and benzene remained elevated above the site-specific clean-up level (SSCL) in seven (7) monitoring wells on and off site.

Approach/Activities. A Remedial Design Characterization was conducted in September 2018 to rapidly characterize the extent of total petroleum mass in soil and groundwater at the site, emergency interim corrective action was approved for in situ remedial injections in November 2018 and was completed in December 2018. Modeling of the total mass present at the site in soil and groundwater indicated the required time to reach clean-up would be 4 to 6 years following completion of the interim measures. To evaluate the progress of the interim measures, a high-resolution site characterization (HRSC) was conducted in January 2021 using the laser-induced fluorescence (UVOST®) to identify the potential extent of remaining residual LNAPL at the site. The UVOST survey was utilized to optimize the subsequent qualitative High-Resolution Site Characterization (qHRSC) program completed in June 2021, the qHRSC Program consisted of the installation of 18 soil borings across the site to establish a new baseline for contaminant concentrations at the site and update the existing conceptual site model (CSM). Using the data from the qHRSC, a surgical injection design was developed for the site using Trap & Treat® BOS 200+®. To expedite the time to site closure, the second injection event was approved in November 2021 and was completed in March 2022. Post-injection performance monitoring of COCs and degradation biproducts were completed from baseline (RDC 2018) through the current date, microbial diagnostics were completed throughout 2022 to further evaluate conditions and progress at the site.

Results/Lessons Learned. The presentation will focus on the demonstration of the efficient use of investigative methods to expedite the time to implement a fiscally responsible remediation program, resulting in reduced time to reach site closure and cost to clean-up expenses. A review of the historical CSM, involvement of all stakeholders to update the CSM using qHRSC (HRSC + RDC methods), and implementation of in situ injection methods and technologies which enhance source zone depletion and significantly reduce the time to reach the site-specific clean-up goals to justify site closure and No Further Action will also be discussed. Remedial evolution will highlight the development, selection, and use of a new and cutting-edge application of cometabolic synergy: powdered activated carbon coupled with an enhanced biological component. Lessons learned and relevant data to be presented will include benefits of high-density indiscriminate (regardless of field screening/field observations) soil and

groundwater sampling for qualitative analysis in the laboratory, post-injection performance analytical and microbial diagnostic tools will also be provided.