Using HPT-GWS Direct Push Tooling to Delineate Uranium Impacts in Groundwater at a Former Fuel Processing Facility

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Background/Objectives. The development of direct push technology and high-resolution site characterization (HRSC) techniques for site delineation and characterization has become an economic and time saving approach to site investigation. Usage of the hydraulic profiling tool-groundwater sampler (HPT-GWS) proved to be key in refining the conceptual site model at a former uranium reactor fuel production facility in Oklahoma to optimize the design of a groundwater remediation system. Groundwater was impacted with uranium above the Nuclear Regulatory Commission (NRC) unrestricted release criteria for site decommissioning and in excess of the maximum contaminant level (MCL) for drinking water. Two areas of concern had uranium plumes that could potentially impact offsite receptors and required remediation. In December 2015, a Decommissioning Plan proposed the installation of groundwater extraction wells in the alluvial zone in both the of the areas with elevated uranium (Western Alluvial Area and in Burial Area #1). The Plan proposed the installation of extraction wells to be screened through the total saturated thickness of the alluvial aquifer. In both areas, uranium in groundwater (as well as other contaminants) extends hundreds of feet downgradient from the source of the contamination. If contamination had migrated laterally through more highly permeable zones, but had not diffused throughout the saturated thickness of the aquifer, screening extraction wells throughout the saturated thickness of the aquifer could result in the extraction and treatment of significant volumes of groundwater that may not require remediation. If the distribution of chemicals of concern (COCs) in groundwater is limited to a shallow zone (or deep zone), targeting that zone may accelerate the rate at which groundwater is remediated and allow for optimization of pumping regimes.

Approach/Activities. Vertical profiling methodology utilized the HPT-GWS to collect high resolution data on stratigraphy, groundwater, and estimated hydraulic conductivity. Groundwater samples were also collected from discrete intervals in the water column of existing monitoring wells using submersible pumps. Analysis of the samples for uranium provided information needed to evaluate the vertical distribution of contaminants in groundwater, and to determine if the design of extraction wells should be revised to address uneven distribution of COCs in groundwater.

Results/Lessons Learned. The HPT-GWS was used to vertically delineate the extent of uranium impacts above the release criteria and MCL. The data provided a higher resolution delineation of impacts and physical characteristics and the potential optimization of the remedial design.