

Airborne Geophysical Program to Evaluate the Tertiary Ogallala and White River Groups Hydrostratigraphy, Laramie County, Wyoming

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Background/ Objectives. Wood plc and Aqua Geo Frameworks (AGF) completed an airborne electromagnetic survey (AEM) investigation at a formerly used defense site (FUDS) in Laramie County, Wyoming with the objective of enhancing the current understanding of the hydrostratigraphy. Concerns over contamination in and around the FUDS area and the down-gradient transport of contaminants within the plume required the addition of an AEM survey to provide critical information on geologic formation heterogeneity. AEM data were also acquired to address current data gaps on the Ogallala Group and its contact with the White River Group. The Ogallala is very heterogeneous in its lithology due to its complex depositional environment. The fluvial nature of Ogallala Group deposition created a complex erosional surface at the White River Group contact. Previous investigations completed using traditional hydrogeologic methods were limited by the lack of information between the boreholes, access to private properties, and physical access challenges due to topography.

Approach/Activities. The U.S. Army Corps of Engineers-Omaha District and RMC requested high resolution AEM data acquisition, processing and reporting to aid in the further development of the conceptual site model (CSM). AEM was conducted to provide a wide area assessment of the geologic formations, aquifers in the survey areas, and to assist management decisions for placement of new test holes and monitoring wells. Approximately 384 line-miles of AEM data were acquired over about 18 square miles of the FUDS survey area between May 30 and June 1, 2017. The investigation included an integration of available borehole geophysical control for use in forward modeling prior to the AEM survey. This enhanced CSM was utilized to identify drilling targets to further define the down-gradient edge of a 10+-mile long chlorinated solvent plume at the site.

Results/Lessons Learned. AEM accurately reflected the resistivity structure in the subsurface. The AEM survey was successful in imaging the electrical resistivity contrasts within the Ogallala group and the contact with the White River Group.

This was verified through the correlation of borehole geophysical electrical resistivity logs with the AEM data. Accuracy of the enhanced CSM will be confirmed by drilling selected targets during the 2018 field season. Data gathered from the new boreholes will be utilized to further refine the CSM and to aid in a better understanding of the hydrostratigraphy and the nature and extent of contamination.