Stringfellow Superfund Site: Trichloroethene Revisited

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Background/Objectives. The Stringfellow Superfund Site is located in a box canyon in Riverside, California, and overlies a complex aquifer system of alluvium and bedrock. Groundwater impacts from aerospace and other wastes include trichloroethene (TCE) and other organic compounds, acidic conditions, and various inorganic compounds, including perchlorate. Stringfellow was listed by United States Environmental Protection Agency (USEPA) on the Interim Priorities List of Hazardous Waste Sites in October 1981, and subsequently placed on the Superfund National Priorities List (NPL) on September 8, 1983. Prior to 2001, TCE was the primary chemical of concern (COC) at the site, along with chloroform, which are specified as site COCs in the most recent site Record of Decision. Following its detection in 2001 and identified greater extent than the volatile organic compounds (VOCs), perchlorate was established as an additional COC. Transport of COCs from the Stringfellow source area is generally controlled by and constrained to paleochannels, resulting in long narrow plumes within the box canyon and beyond. The TCE plume extends approximately 2.5 miles, while perchlorate is detected up to 5 miles from the source area.

Remedial systems installed to control the migration of VOCs comprise pump-and-treat extraction along the plume path with treatment at three plants as well as a subsurface hydraulic barrier wall downgradient of the source area. The groundwater pump-and-treat remediation measures have been effective, and the detected extent of the TCE plume has not significantly changed since the 1980s. Following the detection of perchlorate, the TCE plume, while still being treated, has not been the focus of ongoing investigations. However, because there are multiple other sources of perchlorate in the area and only one known source of TCE, TCE remains the best indicator of the extent and distribution of site impacts. TCE may therefore be used to calibrate the Stringfellow and other perchlorate sources and help evaluate the extent of this contaminant in groundwater.

Approach/Activities. A comprehensive evaluation of groundwater monitoring data and remedy effectiveness is performed annually for the entire site. This includes assessing groundwater data from almost 600 wells, detailed potentiometric and concentration contouring in alluvium and bedrock, mass discharge calculations along the groundwater flow path, and capture analysis of the groundwater extraction system. As a site COC, TCE occurrence and distribution is thoroughly assessed in each of these reports. Additional recent investigation activities, including well/boring installation, aquifer testing, isotopic assessment, and numerical/3-D modeling efforts have been performed to evaluate the presence of paleochannels, a groundwater divide, and a bedrock high that would limit and control contaminant migration. Concentrations of TCE in the source area suggest the presence of DNAPL, but concentrations are below 100 µg/L before the plume exits the canyon, indicating effective remediation. In addition, a TCE study was performed in 2013 to calculate the TCE migration rate and potentially back-calculate hydraulic conductivity values based on TCE transport, and although much of the recent groundwater investigative focus is on perchlorate, a large-scale vapor intrusion investigation for TCE is planned for a downgradient community area.

Results/Lessons Learned. Following the detection of perchlorate in 2001, significant effort has been spent to evaluate the extent of this compound in groundwater downgradient of the site. While this work will continue, including collection and evaluation of isotope data and other perchlorate source investigations, the TCE plume provides important constraints on the

hydraulic boundaries of the flow system and the paleochannel pathways downgradient of the site.