

Post In Situ Thermal Remediation Response at a Canadian Rail Yard

Jeremy Coughlin (Jeremy_Coughlin@cpr.ca) (Canadian Pacific, Minneapolis, MN, USA)
LeeAnn Thomas (Canadian Pacific, Minneapolis, MN, USA)
Peter Kornelsen (ARCADIS Canada, Calgary, Alberta, CAN)

Background/Objectives. Preliminary results of an in situ thermal remediation (ISTR) project were presented at the Battelle Conference in 2016. At that time, the ISTR system had been operating for about 2 months and was providing favorable results. ISTR was implemented to address a dense non-aqueous phase liquid (DNAPL) source zone located under an actively used railroad building. The DNAPL source had resulted in a trichloroethene (TCE) dissolved phase plume extending 3 kilometers off site. A groundwater pump, treat, and reinjection system (GPTRS) operates near the property boundary to mitigate the migration of TCE off site. The objective of the undertaking was to reach an endpoint to off-site risk and ultimately shut down the GPTRS. The technologies utilized to address the source zone were Electro-Thermal Dynamic Stripping Process (ET-DSP™) and steam enhanced extraction (SEE). Focused field assessments were used to design the remediation system to address the complexity of the site. Ultimately, the system operated for a total of 7 months during which a total of 3,438 lbs of TCE was removed during that operational period.

Approach/Activities. The ISTR system was shut down on September 1, 2016 and decommissioned and removed from the site in the 3 months following. Thirteen vapor extraction wells in the source zone were converted to groundwater monitoring wells as part of decommissioning. Concentrations of TCE in groundwater in 30 groundwater monitoring wells within and downgradient of the source zone are being measured quarterly to evaluate the effectiveness of the treatment. In addition, groundwater temperature in the source zone is being measured periodically to assess whether ambient temperature conditions are being approached. The concentration of TCE entering the GPTRS downgradient of the source zone is being measured monthly to monitor for “news of arrival” of the source zone treatment.

Results/Lessons Learned. The average TCE concentration in groundwater within the source zone has been decreased to approximately 1% of pre-treatment levels, and is approximately 15% of TCE levels in groundwater outside and downgradient of the source zone. There has been no “bounce back” of TCE levels in the source zone since cessation of heating. Source zone treatment by ISTR removed contaminant mass equivalent to approximately 65 years of GPTRS operation. The rate of subsurface cooling in the source areas has been slower than originally anticipated. It is anticipated that the “News of Arrival” at the GPTRS will take about 1 to 4 years and that the ongoing monitoring will provide visibility on a timeline to ultimately shut down the GPTRS.