

Protecting Community Water Supply through EPA Removal Actions Involving Source Soil and Bedrock Aquifer Remediation

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Background/Objectives. EPA is conducting two removal actions (RAs) at a former dry cleaner site in Atlantic, Iowa, where releases of tetrachloroethylene (PCE) resulted in soil and groundwater contamination (up to 3,400 milligrams per kilogram [mg/kg] and 22 milligrams per liter [mg/L], respectively). A removal reassessment completed in June 2016 delineated 14,000 cubic yards of PCE contaminated soil, and a groundwater plume extending northwest that is impacting the Atlantic Municipal Utility (AMU) well field. Two of AMU's 10 municipal wells have been closed due to PCE contamination. Source contaminants occur in a 35-foot thick layer of tight silty clay which overlies coarse sands and the Dakota Sandstone formation. Recommendations for the RAs were to 1) address the source area soil and groundwater contamination using in situ thermal treatment, and 2) perform groundwater extraction and treatment closer to the well field to remove PCE and enhance the capture zone for the dissolved contaminants. Source area cleanup objectives were to reduce onsite soil concentrations to 0.060 mg/kg, and remove as much PCE as possible from the groundwater at the source. Objectives for the offsite groundwater extraction are to intercept the dissolved phase plume before it reaches the AMU well field, and treat the contaminated effluent such that the water could be reused by the AMU.

Approach/Activities. The first RA addressed source area soil and shallow groundwater contamination using electrical resistivity heating (ERH) with vapor extraction. EPA procured a contractor to install the ERH system in July of 2016. Installation of this system began in early 2017 and by early June 2017 installation of the system was complete. Components of the ERH system included 52 electrodes / co-located vapor recovery (VR) wells (including 8 angled electrodes to treat soil under a building and adjacent highway), 12 independent deep VR wells, 7 temperature monitoring points, condensers, cooling towers, pumps, carbon vessels and control units. On July 1, 2017, following electrical and vapor recovery systems connections, the system was put online. The offsite groundwater extraction and treatment (GET) system was located about 0.3 miles downgradient of the source. The design consisted of two extraction wells with variable speed drive submersible pumps capable of pumping at approximately 160 gallons per minute each. These wells will remotely communicate with the AMU SCADA system. Extracted water will be piped to a low profile air stripper with multiple sieve tray design using pressure rather than vacuum to generate airflow. The unit will have 6 trays to provide an additional factor of safety to remove PCE to below detection limits. Treated water will be either reintroduced to the AMU water supply upstream of the treatment facility or be discharged to surface water.

Results/Lessons Learned. As of August 31, 2017 (62 days of operation), the ERH system had removed over 1,000 pounds of PCE. Predictive groundwater fate and transport modeling shows a significant reduction in the timeframe necessary to remediate the offsite plume by initiating early source removal. Installation of the GET system is anticipated for early 2018. Treatment of contaminated groundwater is typically outside the realm of EPA's Removal Program; however, early initiation will protect the remainder of the well field and the technology is consistent with the likely preferred alternative to be selected by EPA's Remedial Program. Groundwater modeling is being refined under an ongoing remedial investigation to ensure adequate capture of the dissolved phase plume. If necessary, additional remedial activities may include expansion of the GET system or treatment of groundwater with in situ chemical oxidants.