

## **EXECUTIVE SUMMARY**

In the summer and fall of 2001, Parsons Engineering Science conducted a groundwater tracer study within the Operable Unit 5, Tooele Army Rail Shop (TARS) Plume at Hill Air Force Base, Utah. The objectives of this study included the estimation of the flow rate of groundwater at a small area within the TARS plume, estimation of contaminant dispersivity, and to collect geotechnical soil data so that the results of this study (e.g. aquifer hydraulic conductivity and groundwater flow rate) could be qualitatively compared to other areas of the TARS plume. The tracer test was conducted within the area of highest downgradient groundwater contamination in the OU 5 TARS plume (e.g., within the 100 to 1,000  $\mu\text{g/L}$  dissolved trichloroethene contour).

The tracer study consisted of injecting five gallons of sodium bromide solution into an upgradient injection well and monitoring for bromide ion in groundwater at 17 downgradient, multi-level monitoring points. Three sets of monitoring points were constructed at 8 feet downgradient of the injection well, six sets were at 16 feet downgradient and eight sets were at 26 feet downgradient. The bromide tracer was injected into the groundwater on 27 July 2001, and groundwater samples collected initially once every two days, decreasing to once per week near the end of the study. The samples were analyzed for bromide ion concentrations only, using a hand-held ion meter that was fitted with a bromide selective electrode. The bromide concentration versus time and distance data was plotted and evaluated to determine the average and interval groundwater flow rates in the study area. Additional evaluations and modeling were done to estimate the hydraulic conductivity and contaminant dispersivity at the test site.

Based on the tracer analyses, groundwater velocities in the vicinity of the tracer test ranged from 0.1 to 0.8 foot per day. The geometric mean velocity is 0.4 foot per day. The hydraulic conductivity calculated from the tracer analyses ranged from 1 to 7 feet per day with a geometric mean of 4 feet per day. The calculated dispersivity ranged from 0.004 to 0.4 foot, with a geometric mean of 0.04 foot. The tracer test results and evaluation also led to the conclusion that the subsurface materials in the vicinity of the tracer test are very heterogeneous with numerous interbedded sand, silt and clay layers.