EXECUTIVE SUMMARY

Following conclusion of the remedial investigation field efforts, a groundwater monitoring program was implemented at the Tooele Army Rail Shop (TARS) and Bamberger Pond, Operable Unit 5 (OU 5), Hill Air Force Base, Utah (Hill AFB). Since inception of the program in the fall of 1994, the main objective has been to track the nature and extent of a trichloroethene (TCE) groundwater plume which extends from the TARS approximately 1 mile west to the city of Clinton, Utah. Another equally important objective of the OU 5 groundwater monitoring program has been to gather additional data on contaminants of concern (COCs) identified in OU 5 groundwater. In 1996, groundwater data has also been collected for the purpose of evaluating intrinsic remediation of the TCE plume at OU 5. To date, a total of six distinct groundwater sampling events have been conducted at OU 5 as part of the monitoring program, ranging from October 1994 (round 1) through March 1996 (round 4) (Radian, 1995a; 1996a). Groundwater data presented in this report includes sampling conducted from 24 July 1996 through 7 August 1996 (round 5) and 13 September 1996 through 9 October 1996 (round 6).

Groundwater data from round 5 and round 6 were used to update the existing TCE plume map at OU 5. Comparison of the updated plume map with the Fall 1995 TCE plume map indicates no significant changes in the overall shape or dimensions of the TCE plume. A review of TCE groundwater data collected from October 1993 through October 1996 revealed an order of magnitude decrease in TCE concentrations within the suspected source area. Further downgradient from the source region, the TCE concentrations have remained nearly constant or increased as much as 130 % approximately 3,600 feet from the suspected source area. Despite the apparent increase in TCE concentrations downgradient from the source region, the data indicate that the plume is not increasing in areal extent. Furthermore, the magnitude of decrease in TCE concentrations within the suspected source area suggests a reduction of mass of the TCE plume. This is supported by the lack of a similar increase in TCE concentrations further downgradient. Hill AFB should consider reducing the frequency of sampling at the TARS to once per year to detect changes in the TCE plume.

TCE degradation by-products, namely cis-dichloroethene (cis-DCE) and trans-dichloroethene (trans-DCE) were detected within the TCE plume at the TARS and have been detected over time. Cis-DCE concentrations qualitatively mirror TCE concentrations at OU 5; higher concentrations of cis-DCE are found in regions with the highest TCE concentrations. The presence of these compounds may indicate microbial degradation of the TCE plume at OU 5 by various metabolic pathways.

Specific parameters were recorded during the round 5 sampling that appear to support the hypothesis that the TCE plume is being reductively dehalogenated at OU 5. Review of the spatial relationship of these parameters with the TCE plume indicates depressed dissolved oxygen concentrations within the plume, suggesting the presence of microbial activity and thus, reductive dehalogenation of TCE. The presence of total organic carbon and methane in groundwater provide additional evidence that primary substrates exist that allow multiple metabolic pathways to exist for degradation of TCE. These data are preliminary and will require additional data gathering efforts to conclusively determine if reductive dehalogenation of the TCE plume at OU 5 is occurring.

Several other volatile organic compounds (VOCs) which are also COCs were detected in groundwater at OU 5 during the last two sampling rounds. These included 1,1,1-trichloroethane (TCA), chloroform, and 1,1-dichloroethene (DCE). None of these VOCs exceeded their respective maximum contaminant levels (MCLs). Two VOCs, carbon tetrachloride and tetrachloroethene (PCE), were detected within the TCE plume above their MCLs of 5 micrograms per liter (µg/L). Carbon tetrachloride was detected approximately 1 mile west of the suspected TCE source area at a concentration of 6.6 µg/L. PCE was also detected approximately 1 mile west of the suspected TCE source area at a concentration of 309 µg/L.

With exception of low-level detection of chloroform (less than 0.2 µg/L), VOCs were non-detect at Bamberger Pond. However, arsenic, a COC identified in groundwater at Bamberger Pond, was detected routinely and at a concentration exceeding its MCL in one well. Arsenic was detected in 7 of 9 Bamberger Pond wells and exceeded its MCL of 50 µg/L in one well, U5-112, at a concentration of 76.2 µg/L. Insufficient data are present to determine trends in arsenic data at Bamberger Pond. However, based on the limited data collected to date, an order of magnitude increase in arsenic concentrations has been observed in off-base monitor wells U5-174 and U5-176 located downgradient from Bamberger Pond. It is therefore recommended that groundwater data on arsenic be collected twice per year at Bamberger Pond. Furthermore, additional monitoring points should be considered to further define the extent of arsenic contamination at Bamberger Pond.