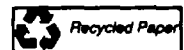


EXECUTIVE SUMMARY

This report presents the results of a Phase II Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI), or RFI-Phase II, that included environmental sampling and human health and ecological risk assessments of six suspected releases Solid Waste Management Units (SWMUs) at Tooele Army Depot South Area (TEAD-S), near Tooele, Utah. The six SWMUs investigated, designated as the Group 2 SWMUs, include chemical agent munitions storage (SWMU 9) and renovation (SWMU 3) areas, conventional munitions testing (SWMU 8) and renovation (SWMU 5) areas, a dunnage disposal area and construction debris landfill (SWMU 30), and an active RCRA-permitted open burning and open detonation area (SWMU 31). To characterize these SWMUs as to the extent of contamination and the natural receptors, the RFI included environmental sampling of soil, air, surface water and groundwater at the SWMUs, ecological and nonintrusive geophysical surveys, and unexploded ordnance surveys. The human health and ecological risk assessments will be used as a basis for corrective measures studies at these SWMUs.

TEAD-S is a 19,355-acre site approximately 45 miles southwest of Salt Lake City in north-central Utah. It is located on gently-sloping to level ground in a semiarid intermontane valley. Surface water runoff occurs infrequently as a result of seasonal snowmelt and strong thunderstorms. Most groundwater originates as precipitation in the surrounding mountains. Smaller quantities of surface water that collect in natural and man-made depressions may recharge groundwater locally. Sediments beneath the northeastern portion of TEAD-S are typically coarse-grained and can transmit large volumes of groundwater at relatively fast rates. Sediments in the southern portion of TEAD-S, including all six Group 2 SWMUs, are fine-grained and transmit smaller quantities of groundwater at much slower rates. Many economic minerals occur in the mountains adjacent to TEAD-S. Therefore, the sediments underlying TEAD-S, which were eroded from these mountains, contain relatively high levels of numerous naturally-occurring metals. Naturally-occurring or background groundwater quality is variable across TEAD-S. Groundwater is generally fresh near the mountains and is increasingly saline toward the valley floor in the western portion of TEAD-S. Groundwater beneath SWMUs 3, 5, and 9 is generally fresh, while groundwater beneath SWMUs 8, 30, and 31 is naturally brackish and generally nonpotable.



Both surface and subsurface soil samples were collected at all SWMUs; however, sampling was limited to only surficial samples near the disposal trench at SWMU 3 until procedures are established for excavation in potentially agent-contaminated areas. A total of 334 soil samples (not including quality assurance/quality control samples) were collected and analyzed under the RFI-Phase II program. Analytical results indicated low-level detections of various organic compounds, including volatile organic compounds, several types of polynuclear aromatic hydrocarbons and phthalates, and limited detections of explosives and two agent breakdown products (methylphosphonic acid and isopropylmethyl phosphonic acid). Detections of metals occurred in all SWMUs, but high concentrations were generally localized in specific areas within each SWMU, such as the drainage pond at SWMU 5.

A total of 13 groundwater monitoring wells were sampled, including 5 new wells installed as part of the RFI-Phase II program. Methylene chloride was detected in wells at SWMUs 3 and 9. Chloroform, bromodichloromethane, and trichloroethylene were detected in downgradient wells at SWMU 5. Numerous metals and phosphate were detected above background levels in all wells at SWMUs 3, 5, and 9. Upgradient wells at all three SWMUs generally contained the highest metals concentrations, possibly due to the turbid nature of the samples and the analysis for total, rather than filtered, metals.

Four surface water samples were collected in detonation pits at SWMU 31. Explosives (24DNT, RDX, HMX, and nitrobenzene) were detected in these samples, as well as several metals and cyanide. Because no background surface water samples were collected, all detections of metals are presented.

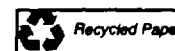
Air sampling was conducted upwind and downwind of SWMUs 3, 5, 8, 9, and 31. Several organic compounds, including benzene, toluene, carbon tetrachloride, naphthalene, and 1,1,1-trichloroethane, were detected at SWMU 5. Only di-n-butyl phthalate was detected in air samples from all five SWMUs; bis (2-ethylhexyl) phthalate was also detected in air samples from SWMUs 3, 5, 9, and 31. Chloroform was detected in air samples from SWMU 3. The total suspended particulate and metals results were not used in the RFI-Phase II because the filters supplied to the field contained high background levels of all target elements. To offset this missing data, conservative assumptions were used in the human health risk assessment to estimate ambient concentrations of metal soil COCs resuspended in airborne particulates.

The RFI report evaluates risks associated with both current uses and hypothetical future uses. However, since the Army's objective is to protect human health and the environment under planned conditions of continued military use of the area, only the results of the current-use risk assessment will be used in corrective action decision-making. If TEAD-S is planned for an alternative use in the future, the risk assessment will be reconsidered or revised to evaluate the alternative use.

The results of the human health risk assessment for current exposures to soil and groundwater at SWMUs 3, 5, 8, 9, 30, and 31 indicate that risks for current-use exposure scenarios at all of the Group 2 SWMUs are below state of Utah criteria for performing corrective action (carcinogenic risk of 10^{-4} and an HI of 1.0 for noncarcinogens). These findings indicate no potential health threats to current workers from exposure to soil or air chemicals of concern (COCs) at SWMUs 5, 8, 9, 30, and 31. The risk assessment also indicated that all of the Group 2 SWMUs were unsuitable for residential use. However, no residential use is planned.

The ecological risk assessment screened risks associated with seven metals that were selected as the only ecological COCs at all Group 2 SWMUs. A low risk rank in surficial soil was assigned for all metal COCs except arsenic, which posed a moderate risk to plants. Arsenic posed a moderate risk to plants in subsurface soil at SWMUs 3 and 30, but no risk to vertebrate animals at any of the SWMUs. High concentrations of chromium in subsurface soil at the drainage pond at SWMU 5 could pose a problem of very limited areal extent. Groundwater contaminants do not have an exposure pathway to plants and animals from any of the SWMUs, except in the wetlands west of SWMU 30, where any contamination is most likely to be attributable to the adjacent Chemical Agent Munitions Disposal System facility, or CAMDS (known releases SWMU 13), not SWMU 30. Uncertainties inherent in the ecological risk assessment may result in underestimation of risks to higher trophic level carnivores, particularly for mercury at SWMU 3. However, mercury levels at SWMU 3 were found to be attributable to background condition.

Since arsenic and mercury levels at SWMU 3 were suspected to be attributable to the presence of Mercur Creek sediments, additional surficial soil samples were collected upslope from SWMU 3 in the Mercur Creek alluvial fan. These samples indicate that high arsenic and mercury concentrations in surficial soil at the SWMU are due to elevated levels of these metals in the Mercur Creek sediments and are not caused by Army activities at the SWMU.



A Corrective Measure Study is recommended for SWMUs 3, 5, 8, 9, and 30 because of hypothetical residential risk levels greater than the state of Utah criteria that allow risk-based (clean) closure. SWMU 31 is an active site that is being operated under interim status and will not be included in the Corrective Measure Study. The Corrective Measure Study will result in recommendations for site controls or corrective action to meet the Army's objective of ensuring the safety of on-post workers and off-post residents or users of adjacent properties under conditions of continued Army use of the installation.

