

## EXECUTIVE SUMMARY

This report presents an assessment of the risks to human health and environment attributable to the wastes disposed at Operable Unit 2 on Hill Air Force Base (Hill AFB), Utah. Hill AFB was placed on the National Priorities List in July of 1987, and Operable Unit 2 (OU 2) is one of seven operable units being investigated for contamination associated with the past disposal of hazardous waste. Operable Unit 2 has been defined as consisting of the former Chemical Disposal Pit 3 (Chem Pit 3) area and the Perimeter Road area. The Perimeter Road area has been investigated and found free of contamination, except in areas currently being investigated with other operable units. Therefore, while the title of this report refers to Operable Unit 2, this report focuses on risks attributable to conditions at Chem Pit 3. The Chem Pit 3 site was used for the disposal of spent chlorinated solvents, primarily trichloroethene, from solvent recovery units and sludge from vapor degreasers into two unlined earthen trenches.

This risk assessment is based on currently available data. Several data gaps have been identified and additional field investigations are planned. The risk assessment will be amended accordingly when new data become available.

The objectives of this risk assessment are to determine the average and reasonable maximum carcinogenic and noncarcinogenic risks associated with the OU 2 site. In order to achieve these objectives, the following steps are required: 1) identify the average and reasonable maximum concentrations for the chemicals of potential concern at the site; 2) conduct an exposure assessment to estimate the magnitude, frequency, duration, and route of human exposure to the previously identified chemicals of potential concern; 3) compile all available toxicity information into a toxicity assessment; and 4) develop numerical values (risk characterization) representing the combination of: the concentrations/toxicity of the chemicals present at the site and the manner in which nearby populations are exposed to these chemicals.

This risk assessment considers three populations: 1) off-site residents in areas downwind and downgradient from OU 2; 2) future on-site residents assuming that the Base is closed and residential development occurs prior to complete site remediation; and 3) future on-site construction workers, again assuming that the Base closes and residential development occurs prior to complete site remediation. For off-site residents, this assessment evaluates both the current exposures and exposures that may occur in the future; therefore, a total of four exposure scenarios have been evaluated in this assessment: 1) Current Off-Site Residential Subchronic Exposure; 2) Future Off-Site Residential Chronic Exposure; 3) Future On-Site Residential Chronic Exposure; and 4) Future On-Site Construction Worker Exposure.

Human exposure to contaminants originating at OU 2 and migrating off-Base may be occurring currently via: 1) inhalation of contaminated ambient air in areas close to the site or immediately downwind; 2) using the shallow groundwater to irrigate food crops or

home-grown vegetables and fruits; and 3) using the shallow groundwater or hydraulically connected seeps and springs as stock water for beef and dairy cattle and/or to irrigate feed crops consumed by cattle. At the present time, all residences known to be affected by contamination from OU 2 have been connected to a municipal water supply.

However, while the future use of contaminated groundwater can be limited by providing alternative supplies, such use cannot be restricted. Also, the groundwater plume may someday reach the Weber River. Therefore, in addition to the current exposures listed above, off-site human exposures that may occur in the future include: 1) ingestion of and dermal contact with contaminated residential groundwater; 2) inhalation of chemicals that volatilize from the water use home use; and 3) ingestion of fish from Weber River. Future on-site residents and construction workers may be exposed to contaminants in the surface or subsurface soils if the Base closes and residential development occurs prior to complete site remediation.

The following table summarizes (by subpopulation) the carcinogenic risks for the four exposure scenarios which were evaluated.

**Summary of Carcinogenic Risks by Exposure Scenario**

Scenario	Carcinogenic Risk			
	Birth to 30 Years		Adult	
	Average	Reasonable Maximum	Average	Reasonable Maximum
Current Off-Site Residential	5E-10	1E-09	2E-10	3E-10
Future Off-Site Residential	5E-03	1E-01	7E-04	4E-02
Future On-Site Residential	1E-02	1E-01	2E-03	5E-02
Future On-Site Construction Worker	NA	NA	2E-05	5E-05

Carcinogenic risk values for the Current Off-site Residential Scenario are below the Superfund site remediation goal of  $10^{-4}$  (1 in 10,000) to  $10^{-6}$  (1 in 1,000,000). Estimated carcinogenic risk values for the future residential scenarios exceed the Superfund risk range site remediation goal. The risks are generally driven by trichloroethene via inhalation of vapor phase chemicals while showering and ingestion of contaminated groundwater. Interpretation of these results should be qualified by the likelihood that assumed future on-site trichloroethene concentrations and modeled trichloroethene concentrations at off-site locations are overestimated. Modeled concentrations of trichloroethene in the air of the shower stall are also likely overestimated due to a

variety of conservative assumptions, including 100% volatilization. Finally, these results assume use of the shallow groundwater for drinking water and other domestic purposes despite the availability of other uncontaminated water sources (municipal water supply and the deeper regional aquifer).

The estimated carcinogenic risk values for the future on-site construction worker are within the Superfund site remediation goal of  $10^{-4}$  (1 in 10,000) to  $10^{-6}$  (1 in 1,000,000); however, the risk values to exceed  $10^{-6}$ , the expected point of departure in determined remediation goals.

The following table summarizes (by subpopulation) the noncarcinogenic risks for the current and future, subchronic exposure scenarios which were evaluated.

**Summary of Noncarcinogenic Risks for Subchronic Exposure Scenarios**

Scenario	Subchronic Hazard Index			
	Children		Adult	
	Average	Reasonable Maximum	Average	Reasonable Maximum
Current Off-Site Residential	0.8	0.8	0.2	0.3
Future On-Site Construction Worker	NA	NA	3	6

The subchronic hazard indices (a numerical value for noncarcinogenic risk) for the current off-site residential scenario are below the Superfund site remediation goal of 1, indicating that adverse noncarcinogenic effects are not likely to occur. The subchronic hazard indices for the on-site construction worker scenario exceed 1. These indices are dominated by the inhalation of chromium VI in fugitive dust generated by construction activities. Interpretation of the results for both scenarios should be qualified by the large number of uncertainties in the methodologies used to estimate exposure concentrations for inorganic chemicals in general, and chromium VI in particular.

The following table summarizes (by subpopulation) the noncarcinogenic risks for the future, chronic exposure scenarios which were evaluated.

**Summary of Noncarcinogenic Risks for Chronic Exposure Scenarios**

Scenario	Chronic Hazard Index			
	Children		Adult	
	Average	Reasonable Maximum	Average	Reasonable Maximum
Future Off-Site Residential	20	60	7	20
Future On-Site Residential	30	70	9	30

The chronic hazard indices are all above the Superfund site remediation goal of 1. The dominant chemical and exposure pathway is ingestion of chromium VI in drinking water. If trichloroethene is considered using an unverified reference dose (RfD), ingestion of trichloroethene in drinking water and inhalation of the chemical while showering overwhelm the contribution of other chemicals. Interpretation of these results should be qualified by the same uncertainties discussed above with respect to carcinogenic risk estimates and noncarcinogenic subchronic hazard indices.

The qualitative evaluation of potential adverse impacts of contamination from OU 2 on critical habitats and endangered species in the area indicates that deleterious effects from the site contaminants are not likely. A quantitative evaluation of potential adverse impacts on alfalfa and cattle also indicates that deleterious effects from site contaminants are not likely.