# Executive Summary

This document presents the Performance Standard Verification Plan (PSVP) for Operable Unit 2 (OU2) at Hill Air Force Base (HAFB). The PSVP establishes a monitoring program for OU2 post-Record of Decision (ROD) operations including a long-term plan to reach site closeout. The PSVP defines long-term goals, types of decisions to be made, data analysis procedures, and reporting formats. The PSVP also defines a standardized assessment and monitoring protocol to provide HAFB with an improved, documented understanding and agreement with the Regulatory Agencies and the Public. Documenting procedures and decision criteria will provide continuity during personnel turnover, lower costs by ensuring only necessary data is collected, and optimize sampling frequencies based on remediation goals.

The *Final Record of Decision and Responsiveness Summary for Operable Unit 2* (*ROD)* (CH2M HILL, 1996) requires that a PSVP be formulated as part of the remedial design. The PSVP includes both compliance and performance monitoring to determine if Remedial Action Objectives (RAOs) are being met. These monitoring requirements are meant to ensure that selected remedies achieve appropriate protection of human health and the environment, comply with regulatory requirements, and continue to pursue attainment of remediation goals. The long-term RAOs for OU2 are stated in the *ROD* and are, in general, to:

- Protect human health and the environment by minimizing the potential for exposure to contaminated media.
- Prevent migration of contaminated media.
- Restore groundwater and surface water to within maximum contaminant levels (MCLs).

RAOs were established in the *Final Feasibility Study (FS) for Operable Unit 2* (Radian, 1993) and were refined in the *Final Addendum to the Feasibility Study for Operable Unit 2* (CH2M HILL, 1994). The RAOs were to protect human health and the environment, and to address potential future unacceptable risk scenarios. Preliminary remediation goals (PRGs) were developed for soil, groundwater, and surface water, and establish media-specific concentrations for contaminants of concern. The various components of each remedial action were evaluated to determine the applicable media-specific RAOs. The remedial action components and applicable RAOs are summarized in Table ES-1.

The PSVP outlines the RAOs and data needed to address the issue of whether OU2 remedial actions are "operating properly and successfully." The phrase "operating properly and successfully" involves two separate concepts. A remedial action is operating "properly" if it is operating as designed. The system is operating "successfully" if its operation will achieve the cleanup levels or performance goals delineated in the decision document. EPA interprets the term “operating properly and successfully” to mean that the remedy is adequately protective of human health and the environment.

Evaluation of whether the OU2 remedial actions are operating properly and successfully will be presented in the OU2 Performance Standard Verification Report (PSVR). The first

PSVR will be completed after a scheduled review of the OU2 Remedial Action operations in 2006. The frequency of the first review period will allow sufficient data to be collected during OU2 operations, and provide a high degree of confidence that data collected represents true contaminant concentrations at OU2. As part of the PSVR, any needed changes to the monitoring program, data assessment methods, data collection frequency, and review frequency will be recommended. Any changes to the PSVP found to be necessary before the PSVR is implemented will be annotated by letter.

The geologic units underlying OU2 consist of the Recent Terrace Deposits, the Provo and Alpine Formations, and landslide deposits. OU2 is part of a large landslide complex that occurred following the lowering of Lake Bonneville in the Holocene. The OU2 lithology primarily consists of the Provo and Alpine Formations. The Provo Formation consists primarily of sand and gravel and overlies the Alpine Formation. The Alpine Formation consists primarily of silty clay to clay, with locally discontinuous sand and gravel lenses. These units are locally distorted as a result of landslide movement. These geologic units form the basis for the OU2 conceptual model.

The Source Area -- the chemical disposal pit and adjacent areas – is the area that is considered the source of OU2 contamination. The Non-Source Area consists of the contaminated groundwater plumes emanating from the Source Area. The goals of the Source Area remedial action are to prevent migration of contaminated groundwater and DNAPL from the Source Area, and to restore Source Area groundwater to MCLs. The Source Area remedy includes the installation of a vertical barrier to encircle the Source Area, construction of groundwater extraction wells to remove highly contaminated groundwater and DNAPLs, treatment of contaminated groundwater and DNAPLs, construction of a low-permeability cap, treatment of contaminated soils by Soil Vapor Extraction (SVE), and performance of treatability studies to further extract DNAPLs and highly contaminated groundwater. The Non-Source Area remedial action includes the construction of upgradient and downgradient groundwater extraction trenches and installation of spring/seep collection systems at springs where contamination exceeds Maximum Contaminant Levels (MCLs). The goals for the Non-Source Area remedial action are to minimize the potential for human exposure to contaminated groundwater and surface water, and to restore the groundwater and surface water to MCLs.

A statistical method was developed to evaluate data and to determine whether the OU2 remedial action is making progress toward achieving the RAOs. The statistical method uses a comparison to the PRGs to determine whether concentrations of a particular constituent are above unacceptable levels for a monitoring well or group of monitoring wells (plume mean). The goal of the RAO comparisons is to determine whether average onsite concentrations for a given constituent exceed a standard. Since only a finite number of samples are available to estimate true onsite concentrations, there is some uncertainty in this estimate. Based upon the sample size, the variability in measurements, and the assumed distribution of the target population, confidence limits can be calculated which bound the true concentration mean (or median) with a 95 percent confidence level. The 95 percent upper confidence limit (UCL) represents the one-sided upper confidence bound for the true mean (or median), while the 95 percent lower confidence limit (LCL) represents the one-sided lower confidence bound for the true mean (or median).

Where contaminant concentrations have exceeded MCLs, the UCL will be compared to the standard to ensure (with 95 percent confidence) that the true mean concentration is below the standard (MCL). If the UCL exceeds the standard, then the conclusion is made that the site, as a whole, is still contaminated at a level exceeding the standard. On the other hand, if the site is undergoing performance monitoring in areas below MCLs, then the LCL is compared to the standard (MCL). If the LCL is below the MCL, then the site is considered clean. This provides a reasonable level of confidence, for a location presumed clean, that the standard is not exceeded.

The remediation for OU2 has been divided into the following seven distinct remedial actions:

- Source Area DNAPL/Contaminated Groundwater Extraction and Treatment.
- Source Area Containment Wall.
- Source Area Low-Permeability Cap.
- Source Area Treatability Studies.
- Non-Source Area Extraction and Treatment of Contaminated Groundwater.
- Non-Source Spring Remediation Systems.
- Overall Operable Unit Institutional Engineering Controls.

Performance monitoring parameters are established for direct measurement of performance of the remedial actions in achieving the RAOs. The performance monitoring criteria include measurement of groundwater elevations, analytical sampling of groundwater, surface water, and effluent, measurement of surface water flow rates, and visual inspection of institutional and engineering controls.

The performance indicators, monitoring network, monitoring frequency, data evaluation, and anticipated timeframe for achieving the RAO have been identified for each of the remedial actions. These indicator criteria will be used to assess whether the treatment system is performing as anticipated. Exceedances of these criteria are not considered proof that the RAO is not being achieved. However, exceedance of these criteria will be reviewed to determine if modification to the system operation is warranted. Remedial action closure criteria were also developed for each remedial action. An OU2 Annual Report will be prepared to summarize monitoring activities conducted during the preceding 12 months. The OU2 Annual Report will be made up of three subreports:

- Treatment System Operation Report (TSOR).
- Inspection, Monitoring, and Maintenance Report (IMMR).
- Annual Groundwater Sampling Report.

The intent of the OU2 Annual Report will be to document the preceding year's monitoring results. The annual report will serve as a repository for the monitoring criteria result database including water level measurements, groundwater recovery volumes, water quality field measurements and analytical reports, and total Operation and Maintenance (O&M) costs. The data documented in the annual reports will be interpreted in the PSVR. The PSVR process will thoroughly evaluate the performance of the OU2 system operation performance and progress toward RAOs. General evaluations regarding the effectiveness and efficiency of each remedial component of the selected remedy, as well as the cumulative effect of all components of the selected remedy, will be included in the PSVR report.

**TABLE ES-1**
Simplified Remedial Action Objective Matrix
*OU2 Performance Standard Verification Plan*

| | | REMEDY | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Source Area | | | | Non-Source Area | | Both |
| | **Remedial Action Objective** | ***ROD* Paragraph** | **DNAPL/Groundwater Extraction and Treatment** | **Containment Wall** | **Low-Permeability Cap** | **Treatability Studies** | **Extraction and Treatment of Contaminated Groundwater** | **Spring Remediation** | **Institutional Controls** |
| RAO 1 | Restore groundwater and surface water to MCLs. | 5.1 | X | | | X | X | X | |
| RAO 2 | Remove as much DNAPL and other contamination sources as practicable. | 5.1 | X | | | X | X | X | |
| RAO 3 | Prevent migration of contaminated groundwater and DNAPL from the Source Area. | 5.1 | X | X | X | | | | |
| RAO 4 | Minimize the potential for human exposure to contaminated groundwater and surface water. | 5.1 | | | X | | | | X |