

SECTION 1 INTRODUCTION

This Interim Remedial Action (IRA) Completion report describes the partial remediation activities conducted at Solid Waste Management Unit (SWMU) B-3 at Camp Stanley Army Activity (CSSA), in Boerne, Texas. The project involved excavation and off-post disposal of contaminated soil above soil and bedrock to achieve closure under Texas Risk Reduction Rules. This report presents the project objectives, site description, summary of the remediation and sampling activities, and waste characterization and closure confirmation sampling results.

This specific IRA was performed under the U.S. Air Force Center for Environmental Excellence (AFCEE) Contract No. F41624 00-D8025, Delivery Order (DO) 23. AFCEE provided technical oversight for the DO. Based upon the project Statement of Work, a set of work plans was established to govern the fieldwork. These include:

- Work Plan (WP) Overview (**Volume 1-1, RL74 and RL83 Addendum**);
- DO 23 WP Addendum (**Volume 1-2, SWMU B-3**);
- Sampling and Analysis Plan (SAP) (**Volume 1-4, RL74 and RL83 Addendum**);
- DO 23 SAP Addendum (**Volume 1-4, Sampling and Analysis Plan**); and
- Health and Safety Plan (HSP) (**Volume 1-5, RL74 and RL83 Addendum**).

For this report, Section 1 provides the site-specific background and closure standard. Section 2 describes field actions and the closure evaluation for the eastern disposal trench. Section 3 summarizes the current environmental condition of the site and provides recommendations for further interim measures required for site closure. Field actions and the current environmental condition of the western disposal area are described in Appendix D. References cited in this report can be found in the **Bibliography (Volume 1-1, Environmental Encyclopedia)**.

1.1 PURPOSE AND SCOPE

The purpose of the SWMU B-3 IRA was to excavate all debris and soil containing volatile organic compounds (VOCs) and concentrations of metals that exceed the Texas Commission on Environmental Quality (TCEQ) Risk Reduction Standard No. 1 (RRS1) criteria in pursuit of clean closure of the land-based unit under RRS1. Removal of all wastes and contaminated media containing VOC and metals above background levels would qualify the land-based portion of the site for partial closure under TCEQ's RRS1. In addition, excavating the contaminated media in the disposal trenches (soil overlying bedrock) reduces the amount of contaminants available for migration to the groundwater at SWMU B-3 and surrounding areas. The groundwater and vadose zone under the site will be evaluated by CSSA under the groundwater investigation program.

Since the contaminants of concern (COCs) for SWMU B-3 are metals and VOCs, the RRS1 standards are the soil or rock background values for metals and the laboratory reporting limits for VOCs. Background values for metals were statistically calculated for CSSA soils and the Glen Rose Limestone, and the values are reported in the *Second Revision to the Evaluation of*

Background Metals Concentrations in Soils and Bedrock (Parsons, February 2002). TCEQ approved the report on April 23, 2002.

1.2 SITE LOCATION AND HISTORY

SWMU B-3 is located in the Inner Cantonment of CSSA south of Well CS-16 (**Figure SWMUB3-1**). This site is a former landfill area primarily used for garbage disposal and refuse burning that covers an area of approximately 2.9 acres. The site is characterized by north-south oriented dirt roads; a short downhill slope to an intermittent drainage on the west; a gradual uphill slope to the east; limestone outcrop to the east and southeast; and a small depression or "crater" in the north-central area. The landfill consisted of a series of trench areas oriented north-south that were cut into weathered limestone to take advantage of the natural slope and to provide greater disposal volume. Initial site investigations indicated the western-most trenches covered an area about 100 feet wide, 325 feet long, and 19 feet deep, while an eastern trench was encountered that was about 75 feet wide, 250 feet long, and 12 feet deep. The landfill operation was terminated in 1990-1991. The perimeter of the site is bounded by trees and other vegetation.

Disposal and burning of solid waste materials at SWMU B-3 have resulted in groundwater and soil contamination. Miscellaneous debris identified on the ground during previous field investigations includes plastic, burned wood, fuel filters, and metal bands. A water line was identified on the northern perimeter of the site that was believed to continue underground to the northwest to Well CS-16, and likely provided water to the site during burning operations. Minor amounts of surface metal were present at isolated locations between the eastern and western trench areas and at the southwest corner of the site.

Chlorinated hydrocarbons were detected in Well CS-16 in 1991 at concentrations exceeding drinking water standards, prompting several investigations to identify possible source areas that could have contributed to the contamination. Well CS-16 is located less than 1/8 mile north of SWMU B-3. Source characterization began in the vicinity of Well CS-16 with surface geophysical surveys performed in 1995 at seven potential source areas. Two large anomalous areas were detected at SWMU B-3 during these surveys. A subsequent soil gas survey of SWMU B-3 identified tetrachloroethene (PCE), trichloroethene (TCE), and occasional detection of 1,2-dichloroethene (DCE) associated with geophysical anomalies in the area of the west disposal trench. An 18-well Soil Vapor Extraction (SVE) system pilot study was installed in 1997 and operated through 2001.

In February 2001 a total of 29 soil gas samples were collected at various depths at SWMU B-3. The goal was to determine VOC concentrations within the east landfill trench adjacent to, and across the road from, the west trench. The soil gas samples revealed that PCE and TCE contamination persisted in the west trench despite over 4 years of intermittent SVE operation. The soil gas data suggested that the contamination within the west (main) trench extends further south than the treatment system's southernmost vapor extraction wells. Data from the eastern trench at SWMU B-3 also demonstrated elevated concentrations of PCE and TCE greater than the levels encountered in the west trench. Refusal was encountered at much shallower depths in the eastern trench, generally at depths of 2 feet below ground surface (bgs), but as deep

as 11 feet bgs. The data indicated that additional VOC contamination existed within the east trench, with PCE as the primary COC, and confirmed that TCE is the primary VOC associated with the west (main) trench.

The presence of chlorinated hydrocarbons in soil and soil gas samples collected from this site in 1995 and 1996 implicated SWMU B-3 as a potential source area for the contamination detected in Well CS-16. The 2001 soil gas survey results at SWMU B-3 re-affirmed the presence of VOCs at the west trench and identified a potential additional source area of PCE contamination within the east trench. Potential sources of contamination include metal debris, metallic leachate from metal debris, and solvents that may have been disposed at the site. Contaminated media could include surface and subsurface soils and shallow groundwater, if present. Therefore, potential COCs associated with these wastes include metals and VOCs. Soil samples were also analyzed for total petroleum hydrocarbons (TPH) during trenching activities. The data indicated that remedial actions were necessary to address COCs in the soil at SWMU B-3. A map depicting the general site layout is found on **Figure SWMUB3-1**.

Background information regarding the location, size, and known historical use of SWMU B-3 is also presented in the **Environmental Encyclopedia (Volume 1-2, SWMU B-3)**. **Volume 1-2** also includes a **Chronology of Actions** and a **Site-Specific WP** for SWMU B-3. General information regarding the history and environmental setting of CSSA is provided in the **Environmental Encyclopedia (Volume 1-1, Background Information Report)**. In that report, data regarding the geology, hydrology, and physiography are also available for reference. Results of previous investigations for SWMU B-3 are contained in the **Environmental Encyclopedia (Volumes 3 and 4)**.

1.3 GEOLOGY AND HYDROGEOLOGY

Site geology and hydrogeology are based on results of soil borings, geophysical survey, and soil gas testing. SWMU B-3 is covered by a single soil type, the Tarrant Association soils. Gently undulating Tarrant Association soils occur as nearly level and gently sloping areas and consist of clay with white caliche and limestone fragments at the surface, progressing with depth to massive limestone. The Upper Glen Rose Formation is the uppermost geologic stratum in the area of SWMU B 3. The Upper Glen Rose consists of beds of blue shale, limestone, and marly limestone, with occasional gypsum beds. The depth to limestone is variable across the site, and the limestone immediately underlying the SWMU B-3 area appears to dip to the west. Towards the eastern portion of the site, the limestone bedrock becomes shallow and is exposed at the surface in the eastern portion of the site. Representative cross sections based on exploratory borings and initial pilot test boring logs are presented in the **Environmental Encyclopedia (Volume 4, SWMU B-3, Addendum to SVE Test WP for SWMU B-3, December 1999)**.

The fill material encountered in the western trench area consists of dark brown, reddish brown, and black clay with limestone fragments, plastic and metal debris, and charred wood mixed with poorly sorted coarse sand with non-plastic clay. Data collected at the eastern trench during the February 2001 soil gas survey confirmed that the limestone unit dips to the west. Additional soil gas survey information is presented in the **Environmental Encyclopedia (Volume 1-2, SWMU B-3, Soil Gas Survey Results, January-February 2001)**.

Outside the trench limits, the soils consisted of dark brown silty clay and clay from the surface to the top of limestone. The bedrock geology consists of highly weathered, pale yellow, marly limestone interbedded with hard, massive, white limestone. The limestone changes to a light gray color between 16 to 18 feet bgs. Intervals of vugs, some with calcite crystal growths, bedding, bioturbation, and fracturing were observed in the exposed bedrock at the site.

Additional information on CSSA soil types is available in the Soils and Geology section of the Background Information Report (**Volume 1-1**) and in the Description of Soil Types and Bedrock (**Volume 2**).