Solid Waste Management Unit B-23
RCRA Facility Investigation Report

Prepared for:

Camp Stanley Storage Activity
Boerne, Texas

June 2002

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SECTION 1
INTRODUCTION

On May 5, 1999, an Administrative Consent Order was issued to CSSA pursuant to §3008(h) of the SWDA, as amended by the RCRA and further amended by the HSWA of 1984. In accordance with the RFI requirements of the Consent Order, this report has been prepared to document the environmental condition of SWMU B-23 and to recommend further investigation, if necessary, or to provide documentation necessary for site closure. The main objectives of the SWMU B-23 investigation are to determine if the site meets TNRCC requirements for closure, as described in Section 1.4, and to meet requirements of the Consent Order.

This specific RFI was performed by Parsons under U.S. Air Force AMC Contract F11623-94-D-0024, Delivery Orders RL17 and RL83. AFCEE provided technical oversight for the delivery order. Based upon the project SOW, a set of work plans was established to govern the fieldwork. These include:

- Work Plan Overview (**Volume 1-1, Work Plan Overview and RL83 Addendum**);
- Site-Specific Work Plan (**Volume 1-2, SWMU B-23**);
- Field Sampling Plan (**Volume 1-4, RL17 and RL83 Addenda**); and
- Health and Safety Plan (**Volume 1-5, RL17 and RL83 Addenda**).

For this RFI report, Section 1 provides the site-specific background and closure standard. Section 2 describes field actions and closure evaluation. Section 3 summarizes the findings, evaluates attainment of data quality objectives, provides recommendations and certifies the site closure, if applicable. References cited in this report can be found in the **Bibliography (Volume 1-1 of the Environmental Encyclopedia)**.

1.1 BACKGROUND AND SITE DESCRIPTION

1.1.1 CSSA

General information regarding the history and environmental setting of CSSA is provided in the **CSSA Environmental Encyclopedia (Volume 1-1, Background Information Report)**. In that report, data regarding the geology, hydrology, and physiography are also available for reference.

1.1.2 SWMU B-23

1.1.2.1 Site Description

SWMU B-23 contains a trench identified from a 1966 aerial photograph. During a field survey in September 1993, evidence of a northeast-southwest trending trench was apparent. The trench has filled in with locally eroded sediments. The soil eroded into the trench has

native grass cover. Several unidentified, half-buried, green canisters and a large soil mound were located towards the southernmost end of the trench. Metal banding was also littered across the surface of the trench area. UXO specialists from UXB International visually surveyed the site in 1997 and suggested that the unidentified canisters were likely Jet-Assisted Take-Off (JATO) canisters. The exact dates of usage for the trench are unknown.

Background information regarding the location, size, and known historical use of SWMU B-23 is also included in the **Environmental Encyclopedia (Volume 1-2, SWMU B-23)**. **Volume 1-2** also includes a **Chronology of Actions** and a **Site-Specific Work Plan** for SWMU B-23.

1.1.2.2 Potential Sources of Contamination

Because the trench was used for waste disposal purposes for an unknown period, multiple potential sources of contamination at SWMU B-23 could be present, including VOCs, SVOCs, explosives, and metals. The erosion of local sediments into the trench may conceal unidentified wastes. The JATO canisters and metal banding littered on the trench surface are potential sources of contamination. When in use, JATO canisters store solid rocket fuel, typically used to lift large transport planes into the air from short, rough ground runways or to propel overloaded planes from aircraft carrier decks. UXO specialists from UXB International visually surveyed the site in 1997 and found the JATO canisters appeared to be inert. Other canisters located at the site were also found to be inert. However, due to the possibility that rocket fuel may have been spilled or disposed at the site, perchlorates are also considered to be a potential contaminant of concern.

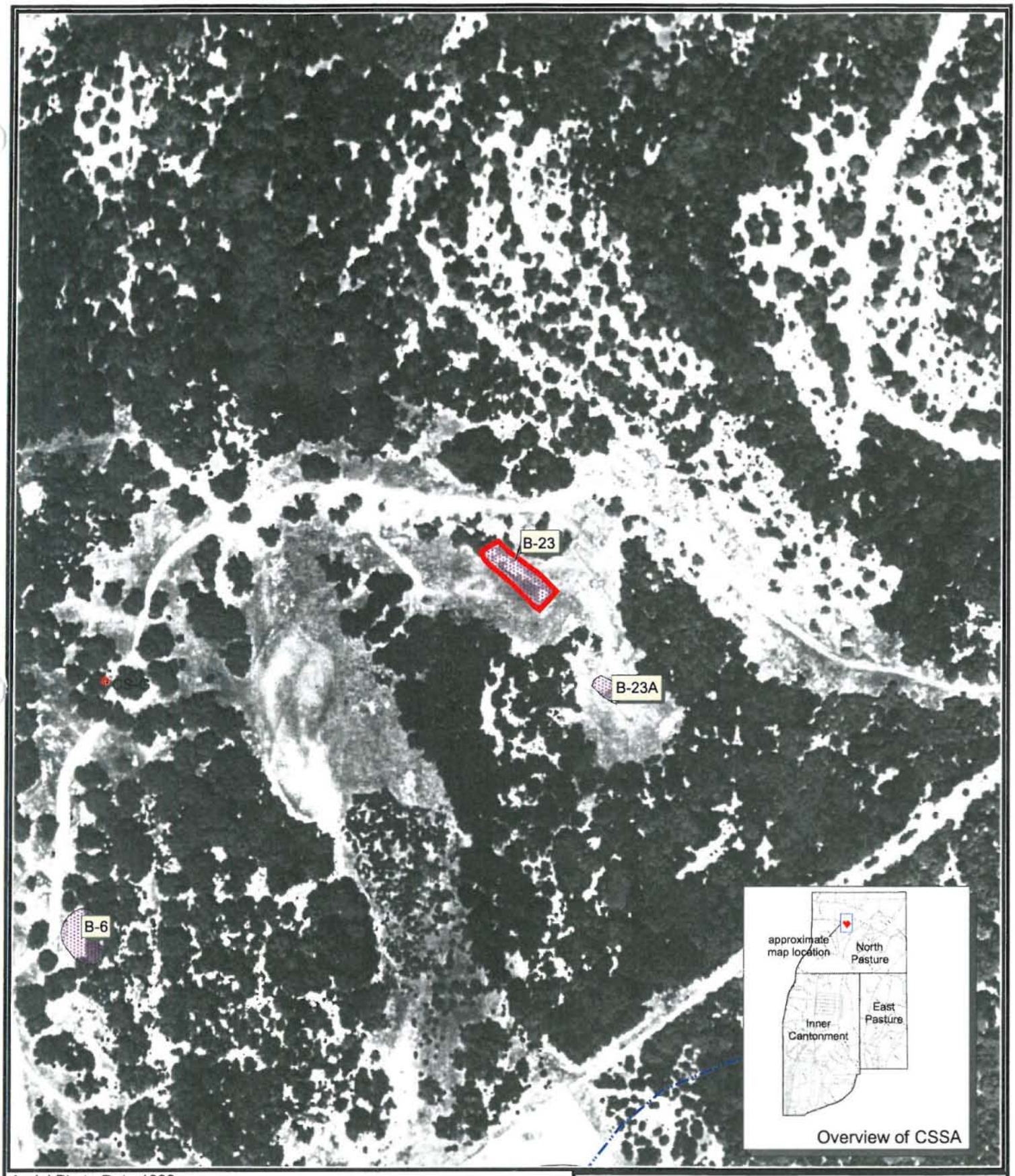
1.1.2.3 Site Location

SWMU B-23 is located in the central portion of the North Pasture at CSSA. SWMU B-23 is approximately 150 feet long by 50 feet wide with the long axis oriented northwest to southeast. It contains a small, narrow trench with soil mounded at the southernmost end. The trench is about four feet deep, twenty feet wide, and 120 feet long, covering approximately 2,400 square feet (less than 0.1 acre) in area (**Figure B23-1**, based on the 1998 CSSA aerial photograph). The site is approximately 3,000 feet from the western boundary of the base and 2,500 feet from the northern base boundary. SWMU B-23A is located about 200 feet to the southeast. No utilities exist at SWMU B-23.

1.2 SITE ENVIRONMENTAL SETTING

1.2.1 Site Soils and Topography

The single soil type present within the site area is the gently undulating Tarrant association (**Figure B23-2**). Tarrant association soils occur as nearly level and gently sloping areas of typical prairie and plateau topography. These soils occur primarily in areas not occupied by streams, such as the north-central area of the Inner Cantonment and the hills



Aerial Photo Date:1998

N

250 0 250 Feet

Creeks (Dashed where intermittent)

Water Well Locations

AOC Boundary

SWMU Boundary

Figure B23-1

Site Location Map

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north of the Inner Cantonment. The soils are typically dark colored, very shallow, calcareous, and clayey and are best suited for native grasses and range use. Soil boring logs included in Appendix A show that a pebbly, loose, dark brown (10YR4/3 on the Munsell® Soil Color chart), marly soil is present at SWMU B-23. Detailed descriptions of soil types present at CSSA are presented in the **CSSA Environmental Encyclopedia (Volume 1-1, Background Information Report, Soils and Geology)**.

SWMU B-23 contains little topographic relief and lies at approximately 1,320 to 1,330 feet above sea level **(Figure B23-2)**. The land surface within the site area slopes approximately three degrees to the southwest. Vegetation at the site consists of native grasses, shrubs, and trees.

1.2.2 Geology

The Upper Glen Rose Formation is the uppermost geologic stratum in the area of SWMU B-23 (**Figure B23-3**). The Upper Glen Rose Formation consists of beds of blue shale, limestone, and marly limestone, with occasional gypsum beds. Generally, it outcrops in stream valleys and at the ground surface where soils are poorly developed or eroded. Where present at CSSA, the Upper Glen Rose may be up to 150 feet thick. It is underlain by the Lower Glen Rose, which is estimated to be 300 feet thick beneath CSSA. The Lower Glen Rose is a massive, fossiliferous, vuggy limestone that grades upwards into thin beds of limestone, marl, and shale. The Lower Glen Rose is underlain by the Bexar Shale facies of the Hensell Sand, which is estimated to be from 60 to 150 feet thick under the CSSA area. The Bexar Shale consists of silty dolomite, marl, calcareous shale, and shaley limestone. The geologic strata dip approximately 10 to 12 degrees to the south-southeast at CSSA.

Based on current published information, there are two known major fault (shatter) zones at CSSA: the North Fault Zone and the South Fault Zone. SWMU B-23 is approximately 4,000 feet north of the North Fault Zone **(Figure B23-3)**. Additional information on structural geology at CSSA can be found in the **Environmental Encyclopedia (Volume 1-1, Background Information Report, Soils and Geology)**.

1.2.3 Hydrology

At CSSA, the uppermost hydrogeologic layer is the unconfined Upper Trinity aquifer, which consists of the Upper Glen Rose Limestone. Locally at CSSA, low-yielding perched zones of groundwater can exist in the Upper Glen Rose. Transmissivity values are not available for the Upper Glen Rose. Regionally, groundwater flow is thought to be enhanced along the bedding contacts between marl and limestone; however, the hydraulic conductivity between beds is thought to be poor. This interpretation is based on the observation that static well levels are discordant in adjacent wells completed in different beds. Principle development of solution channels is limited to evaporite layers in the Upper Glen Rose Limestone.

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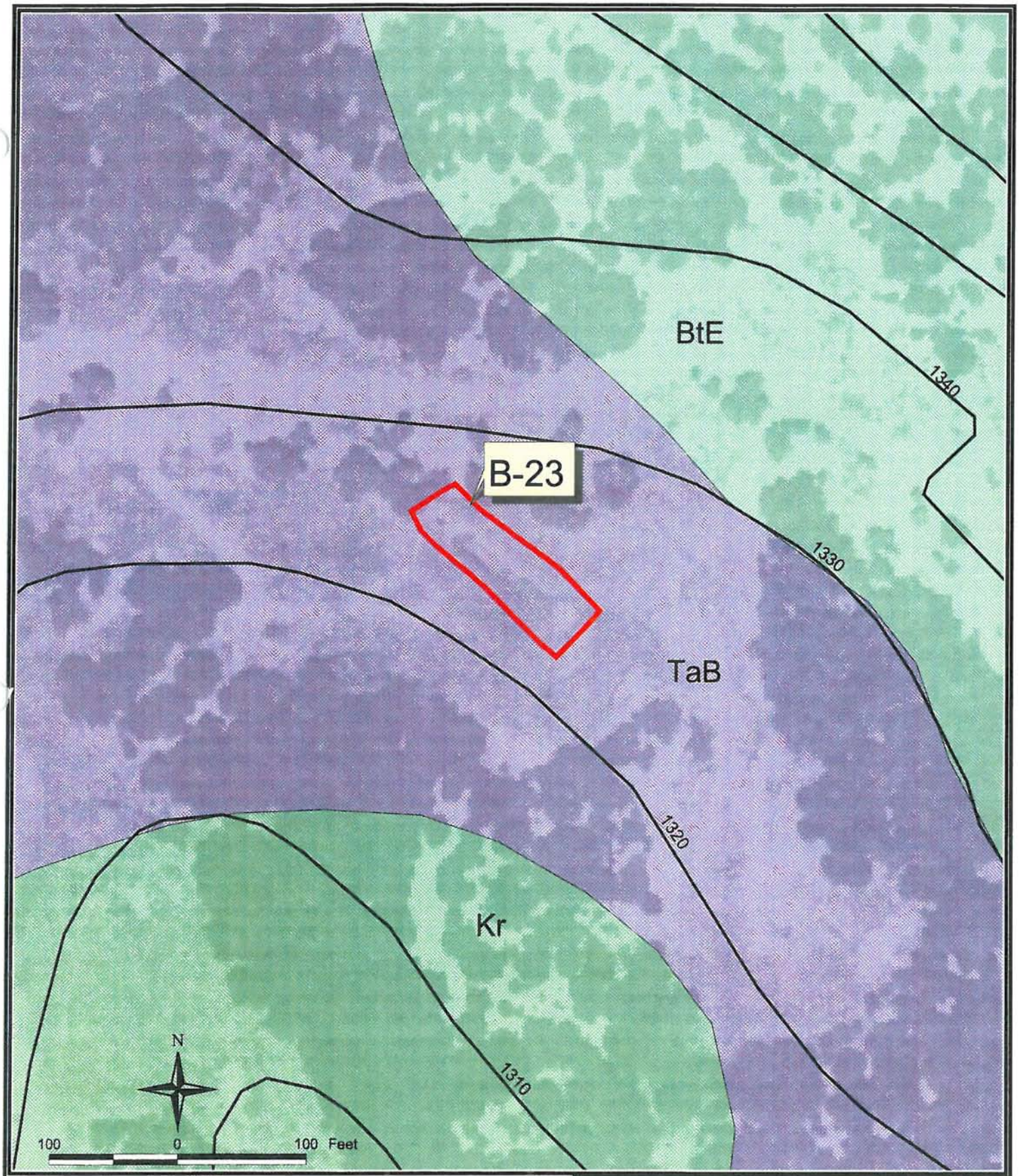

Soil Types Found at CSSA

- BrE Brackett Soils, 12-30% Slopes
- BtE Brackett-Tarrant Association, Hilly
- Cb Crawford & Bexar, Stony Soils
- Kr Krum Complex
- LvB Lewisville, Silty Clay 1-3% Slopes
- TaB Tarrant Association, Gently Undulating
- TaC Tarrant Association, Rolling
- Tf Trinity & Frio Soils, Frequently Flooded

- Water Well Locations
- Creeks
- Topographic Contour Line and Elevation (ft. MSL)

Note: Surface Topographic data from USGS. Aerial photo date: 1998.
Soil Information Digitized by Parsons from USDA Soil Conservation Service, Bexar Cnty Soil Survey, 1991.

Figure B23-2

Soils and Topographic Map

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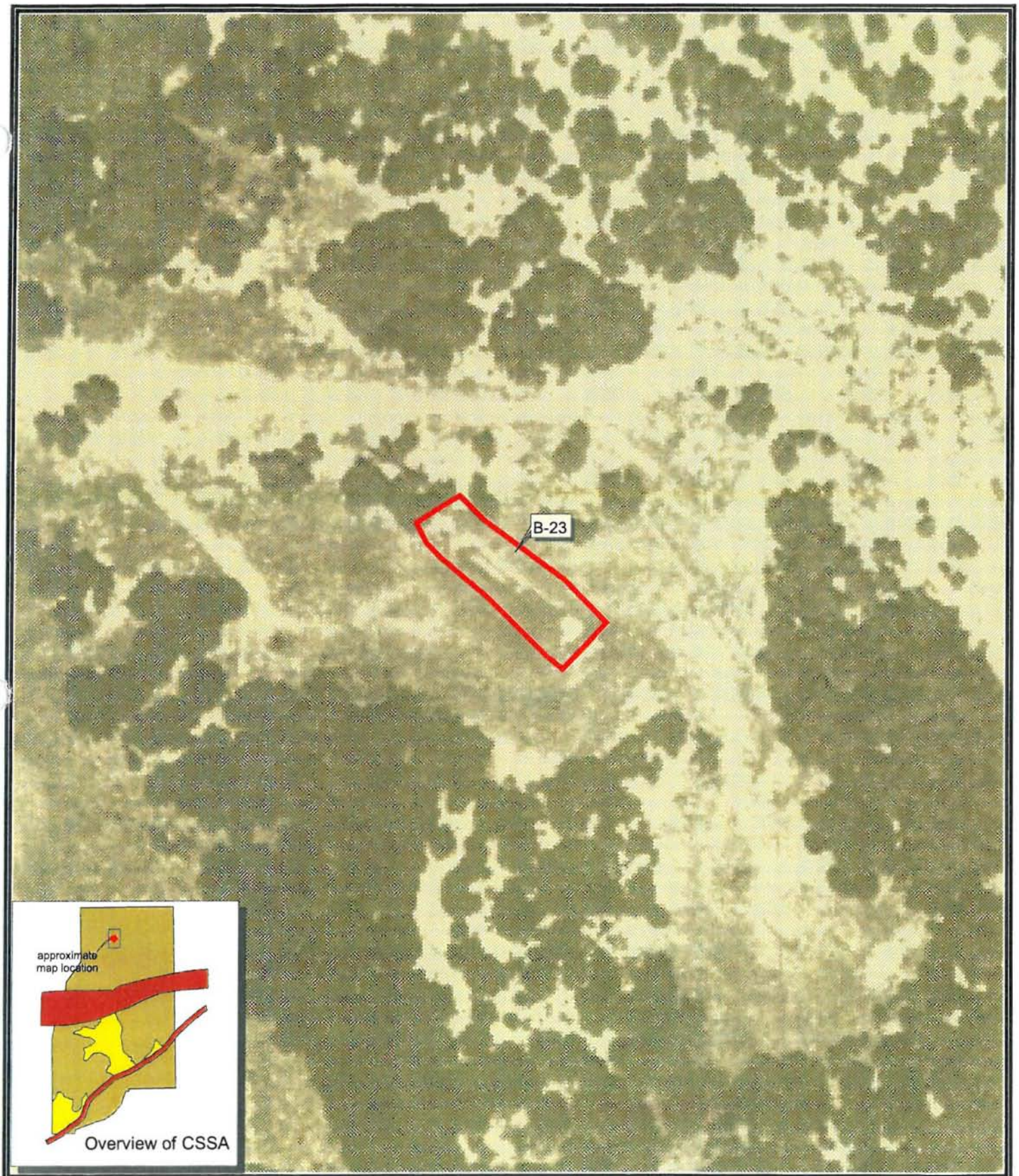

Note: Geologic Units were mapped by Parsons ES, 1995.
Aerial Photo Date: 1998

Figure B23-3

Geologic Setting

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The Middle Trinity aquifer is unconfined and functions as the primary source of groundwater at CSSA. It consists of the Lower Glen Rose Limestone, the Bexar Shale, and the Cow Creek Limestone. The Lower Glen Rose Limestone outcrops north of CSSA along Cibolo Creek and within the central and southwest portions of CSSA. As such, principle recharge into the Middle Trinity aquifer is via precipitation infiltration at outcrops. At CSSA, the Bexar Shale is interpreted as a confining layer, except where it is fractured and faulted, therefore allowing vertical flow from the up-dip Cow Creek Limestone into the overlying, but down-dip Lower Glen Rose. Fractures and faults within the Bexar Shale may allow hydraulic communication between the Lower Glen Rose and Cow Creek Limestones. Groundwater flow within the Middle Trinity aquifer is toward the south and southeast and the average transmissivity coefficient is 1,700 gpd/ft (Ashworth, 1983). In general, groundwater at CSSA flows in a north to south direction. However, local flow gradient may vary depending on rainfall, recharge and possibly well pumping.

No site-specific information regarding groundwater is available. However, the nearest well, Well CS-G, which is an agricultural water supply well, is located 750 feet west of SWMU B-23. Between September 1994 and June 2001, water levels within Well CS-G have ranged from 184.0 feet BTOC (March 2001) to 316.7 feet BTOC (January 1997) (**Volume 5, Introduction to Groundwater Monitoring Program, Table 3**).

The nearest surface water feature to the site is a northeast-southwest trending stream located about 1,000 feet to the south of the site area. This stream flows south, draining into Salado Creek in the South Pasture.

1.2.4 Cultural Resources

Cultural resources are prehistoric and historic sites, structures, districts, artifacts, or any other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, or religious purposes. The nearest cultural resource consists of a burned rock midden located approximately 800 feet southwest of SWMU B-23.

1.2.5 Potential Receptors

A land use survey discussing local and possible future uses of groundwater and surface water, a water well survey, and sensitive environmental areas at CSSA was completed on December 15 and 16, 1999. The results of this survey, along with results from a more in depth survey to identify potential receptors, points of human exposure, and possible constituent pathways is presented in **Section 3 of the Technical Approach Document for Risk Evaluation (Volume 1-6)**.

A small herd of cattle is maintained on CSSA by the USDA ARC. The cattle roam freely throughout the Inner Cantonment and in selected areas of the North Pasture. CSSA also manages wild game species for the purpose of hunting. White-tailed deer, axis deer, and wild turkey all roam freely throughout CSSA. A map of deer hunting stands which overlook mechanical feeders and planted food plots is located in **Figure 5.2 of the Technical Approach Document for Risk Evaluation (Volume 1-6)**. SWMU B-23 is located

approximately 500 feet northeast of hunting stand number 24. Hunting stands 25, 27, and 28 are located approximately 1,500 feet north of SWMU B-23, in a line from the west to the east.

Four water tanks are maintained at CSSA for the purpose of sport fishing. Two of the tanks are located in the northwestern and northeastern portions of the North Pasture and the other two tanks are located near the western boundary of the Inner Cantonment.

The nearest potential habitat location for local endangered species is a Golden-Cheeked Warbler habitat, which is approximately 1,200 feet west of SWMU B-23. A Black-Capped Vireo habitat is also located approximately 1,900 feet south of the site area (Parsons ES, 1993).

1.3 PREVIOUS INVESTIGATIONS

Previous investigations at SWMU B-23 include a field survey and a geophysical survey, both performed by Parsons ES. The field survey, performed during September 1993 under Order 71, confirmed the presence of the trench at SWMU B-23.

In March 1995, an EM survey was conducted at SWMU B-23 along northeast-southwest and northwest-southeast transects. The transects were spaced at 20-foot intervals in the northwest-southeast direction and at 5-foot intervals in the northeast-southwest direction. Two geophysical anomalies were identified in the trench area, both of which are suspected of being associated with waste disposal activities at the trench surface. The locations of these anomalies are shown in **Figure B23-4**. The southern anomaly corresponds the location of the JATO canisters, and the other anomaly corresponds with metal banding on the ground surface.

Additional information on the geophysical survey performed is located in the ***Technical Memorandum on Surface Geophysical Surveys, High Priority SWMUs*** **October 1995, Section 8.1**. It is important to note that this memorandum mistakenly switched the SWMU B-23 and B-23A site names.

1.4 CLOSURE STANDARD

As described in **Section 4.3 of the Risk Assessment Technical Approach Document (Volume 1-6)**, CSSA has opted to pursue closure of SWMU B-23 under the Risk Reduction Rule (30 TAC §335). If the site concentrations do not exceed background, then the site will be closed using RRS1. If the site exceeds background, then a determination will be made regarding the feasibility of cleaning the site to meet background concentrations. If the decision is made to clean the site to background, closure under RRS1 will be sought. However, if it is determined that the site cannot be closed to meet background concentrations, then the site will be closed under TRRP. A notification of intent to close sites identified to date (including SWMU B-23) in accordance with the former RRR was sent to the TNRCC on July 12, 1999. TNRCC acceptance of this notification was received on October 5, 1999.

RRS1 requires that the site be closed following removal or decontamination of waste, waste residues, and contaminated operation system components; and demonstration of

attainment of cleanup levels (30 TAC §335.554). If closure requirements under RRS1 are attained and approved by the TNRCC Executive Director, then the owner is released from the deed recordation requirement.

Since the potential COCs for SWMU B-23 are VOCs, SVOCs, metals, perchlorates, and explosives, the RRS1 standards are the soil or rock background values for metals and the RLs for VOCs, SVOCs, explosives, and perchlorates. Background metals levels were statistically calculated for CSSA soils and the Glen Rose Limestone, and are reported in the **Second Revision to the Evaluation of Background Metals Concentrations in Soils and Bedrock** (Parsons, February 2002).

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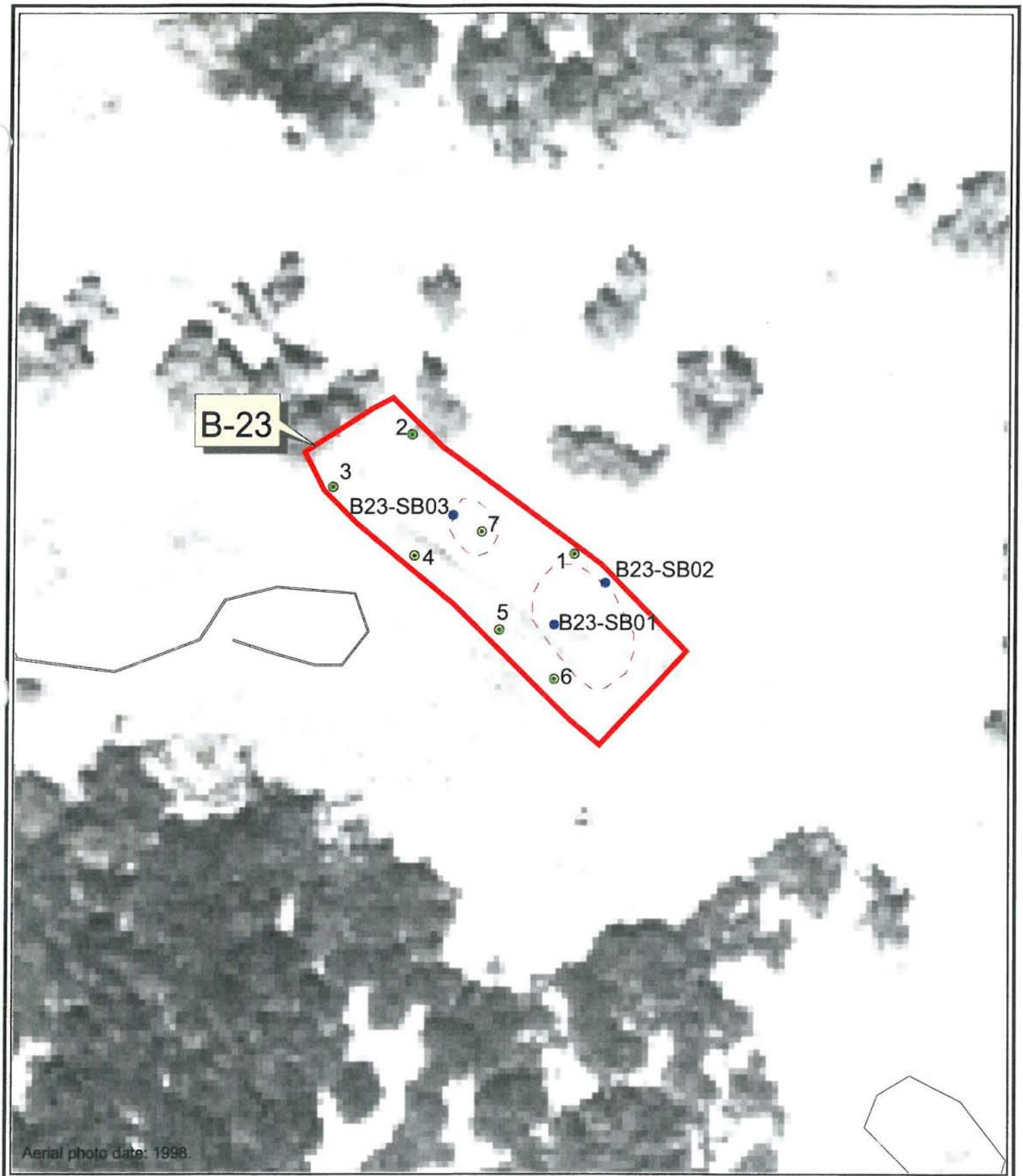

N

50 0 50 Feet

Soil Gas Survey Location
Soil Boring Location
Water Well Location
EM Anomaly

Due to different margins of error associated with the various methods utilized for data point collection, all sample locations are approximate. For more information see the 2001 amendment to the Field Sampling Plan, Vol. 1-4 of the Environmental Encyclopedia.

Figure B23-4

Sample Location Map

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SECTION 2
FIELD INVESTIGATION

2.1 FIELD ACTIONS

As outlined in the Environmental Encyclopedia site-specific work plan (**Volume 1-2, SWMU B-23**), the objectives of the site assessment were to conduct a soil gas survey and collect surface and subsurface soil samples at SWMU B-23 with the goals of characterizing the site and determining its readiness for closure under RRS1. All field activities were conducted in accordance with the Field Sampling and Analysis Plan in the CSSA Environmental Encyclopedia **(Volume 1-4, Field Sampling Plan)**.

2.1.1 Geophysical Survey

In accordance with the approved work plan, a geophysical survey was not performed during the current investigation at SWMU B-23. Results of the previous geophysical survey are described in Section 1.3 of this report.

2.1.2 Soil Gas Survey Samples

On August 26, 1996, a soil gas survey was performed at SWMU B-23. Seven soil gas points were sampled for BTEX compounds, *cis*-1,2-DCE, 1,1,1-TCA, TCE, and PCE analysis. The seven soil gas points were located across the trench area, covering the entire length of the trench. Soil gas sample locations are shown in **Figure B23-4**. Samples were collected at depths ranging from 3 to 5 feet bgs.

Samples were collected by manually driving a decontaminated ¾-inch stainless steel hollow sampling rod to the selected depth with a pneumatic hammer. The sampling rod was then backed a few inches out of the ground allowing the detachable point to drop off the sampling probe and exposing a void space of the formation. Soil vapors were then pulled from the soil through the probe into a Tedlar bag using a portable vacuum pump. The soil formation around the sample rod was purged for at least three probe volumes prior to sample collection.

The samples were then transported to the field GC temporarily located at CSSA for analysis. Samples were analyzed within four hours of collection with an HNu model 321 GC equipped with an electron-capture detector (ECD) and a PID with a 10.2 eV light source. A Spectra-Physics model 4400 dual-channel integrator was used to plot the chromatograms, to measure the size of the peaks, and to compute compound concentrations.

2.1.3 Surface and Subsurface Soil Samples

To characterize the subsurface soils surrounding the trenches, three soil borings were drilled at SWMU B-23 on March 2 and 3, 2000. Each soil boring was drilled to two feet below the estimated SWMU depth and were sampled at three discrete intervals, for a total of nine samples **(Figure B23-4)**. B23-SB01, B23-SB02, and B23-SB03 were drilled to depths

of 9.5 feet bgs, 10.5 feet bgs, and 10 feet bgs, respectively. The soil borings were located in the most probable areas of contamination. One of the soil borings (B23-SB03) was advanced near the middle of the trench, where metal banding was present. The other borings, B23-SB01 and B23-SB02, were advanced in the southernmost end of the trench, near the green canisters and the soil mound identified during the field survey effort.

Samples collected were analyzed for SVOCs, VOCs, metals, and explosives. SVOCs, VOCs, and metals samples were submitted to APPL. Explosives samples were submitted to Datachem Laboratories. Analytical methods used included SW-8260B for VOCs, SW-8270C for SVOCs, SW-8330 for explosives, SW-6010B for barium, chromium, copper, nickel, and zinc, SW-7060A for arsenic, SW-7131A for cadmium, SW-7421 for lead, and SW-7471A for mercury. A total of nine environmental samples, two field duplicates, two equipment blanks, one trip blank, and two matrix spike samples were collected. Samples were collected at the surface (0.5-1 foot bgs), at the approximate mid-point (5-6 ft bgs), and at the total depth (9-10.5 ft bgs) of each boring. A summary of analytical results is presented in Appendix B.

SWMU B-23 soil samples consisted of either Tarrant Association (gently undulating) soils or Upper Glen Rose Limestone material. The Tarrant Association soils were composed of a pebbly, loose, dark brown (10YR4/3 on the Munsell® Soil Color chart), marly material. The Glen Rose Limestone consisted of a white (2.5Y8/2), slightly friable, weathered, marly material as presented in the soil boring logs included in Appendix A. No discernible evidence of contamination was noted during field activities. The boring samples had no odor and registered no PID readings.

Equipment decontamination procedures, as well as sample collection, preparation, handling, and shipping protocols, are described in the ***Field Sampling and Analysis Plan*** **(Volume 1-5, Quality Assurance Project Plan)**. QA and QC samples were collected as described in the AFCEE QAPP **(Volume 1-4, Quality Assurance Project Plan)**. All sampling points were surveyed by Parsons ES using a Trimble Asset-grade GPS. Surveying methodology is described in the ***Amendment to the Field Sampling Plan*** (Parsons ES, 2001b). All sample locations and analytical data will be incorporated into the CSSA GIS database after it has been approved by AFCEE and CSSA.

2.1.4 Groundwater Samples

In accordance with the approved work plan, groundwater samples were not collected in association with the investigation conducted for SWMU B-23. Groundwater was not encountered in any of the borings.

2.2 RESULTS AND COMPARISONS

2.2.1 Geophysical Survey

Two anomalies were identified at the site during a 1995 geophysical survey, as described in Section 1.3. Both of these anomalies correspond with waste on the ground surface, including JATO canisters and metal banding.

2.2.2 Soil Gas Survey Samples

The soil gas survey conducted in August 1996 included seven sampling points. Samples were analyzed for BTEX compounds, *cis*-1,2-DCE, 1,1,1-TCA, TCE, and PCE. None of the seven soil gas samples reported detectable concentrations of any of the VOCs analyzed. Although the blank sample of air collected in the gas chromatograph room had a slight detection of PCE, all soil gas survey points were reported as non-detectable (U-flagged) for all analyzed compounds. Results are provided in **Table B23-1**.

2.2.3 Surface and Subsurface Soil Samples

The soil borings advanced March 2 and 3, 2000 at SWMU B-23 were sampled for VOCs, SVOCs, metals, and explosives. For comparative analysis of sample results to RRS1 standards for metals, results from all soil types were compared to a general soil background value. Several metals were detected at concentrations above RRS1 criteria. In addition, BTEX compounds were detected in two borings, and dichlorodifluoromethane was detected above the RL in B23-SB03. No SVOCs or explosives were detected in any of the samples analyzed; therefore, RRS1 criteria have been met for these compounds. Analytical results are provided in Appendix B. **Table B23-2** contains a summary of the concentrations detected.

Metals exceeded background levels in four of the nine samples collected at SWMU B23. At B23-SB01 (0.5-1 ft), copper was detected at 103.3 mg/kg, exceeding the soil background of 23.2 mg/kg. At B23-SB02, barium was detected at 23.63 mg/kg in the samples collected between 5.5 and 6 feet bgs, and zinc was detected at 17.35 mg/kg in the sample collected between 10 and 10.5 feet bgs. Finally, at B23-SB03 (9.5-10 ft), barium, lead, nickel, and zinc concentrations slightly exceeded background levels. Background levels for barium, lead, nickel and zinc in Glen Rose Limestone are 10.0 mg/kg, 5.5 mg/kg, 6.8 mg/kg and 11.3 mg/kg, respectively.

BTEX compounds were detected above RRS1 criteria in four samples collected from B23-SB01 and B23-SB02. The highest concentrations were detected at B23-SB02 (0.5-1 ft). In that sample, benzene was reported at a concentration of 0.0262 mg/kg, ethylbenzene at 0.0073 mg/kg, toluene at 0.0286 mg/kg, and m,p-xylenes at 0.0091 mg/kg. The RLs for benzene, ethylbenzene, toluene, and m,p-xylenes were 0.002 mg/kg, 0.003 mg/kg, 0.005 mg/kg, and 0.007 mg/kg, respectively.

Finally, the compound dichlorodifluoromethane was detected in each of the samples collected from B23-SB03. The sample collected from 0.5-1.0 feet bgs had a reported concentration of 0.0145 mg/kg, the 5.0-5.5 ft bgs sample contained 0.049 mg/kg, and the sample collected from 9.5-10 feet bgs contained 0.0319 mg/kg dichlorodifluoromethane.

Table B23-1
Summary of Chemical Constituents Detected in Soil Gas, August 1996
Solid Waste Management Unit B-23

Sample ID	Argcrm		#1		#2		#3		#4		#5		#5		#6		#7		Sysblk	
Sample Date	26-Aug-96		26-Aug-96		26-Aug-96		26-Aug-96		26-Aug-96		26-Aug-96		26-Aug-96		26-Aug-96		26-Aug-96		26-Aug-96	
Sample Type	QC		N1		N1		N1		N1		N1		DUP		N1		N1		QC	
Depth (ft)	NA		4		4		5		4		5		5		4.5		3		NA	
	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
Benzene	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
Toluene	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
Ethyl Benzene	0.35	U	0.35	U	0.35	U	0.35	U	0.35	U	0.35	U	0.35	U	0.35	U	0.35	U	0.35	U
Total Xylenes	0.35	U	0.35	U	0.35	U	0.35	U	0.35	U	0.35	U	0.35	U	0.35	U	0.35	U	0.35	U
cis-1,2-DCE	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
1,1,1-TCA	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
TCE	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
PCE	0.03		0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U

Concentrations reported in ug/L

Abbreviations/Notes:

Argcrm	Air GC Room (background sample)
Sysblk	System blank
N1	Environmental sample
QC	Quality control
NA	Not applicable

Data Qualifiers:

U	The analyte was analyzed for, but not detected.

Table B23-2
Summary of Chemical Constituents Detected in Soils, March 2000
Solid Waste Management Unit B-23

						Sample ID	B23-SB01				B23-SB01				B23-SB01				B23-SB02				B23-SB02			
						Sample Date	03/02/00				03/02/00				03/02/00				03/02/00				03/02/00			
						Sample Type	N1				N1				N1				N1				N1			
						Soil Type	Soil (TaB)				GR				GR				Soil (TaB)				GR			
						Beginning Depth	0.5				5.5				9.				0.5				5.5			
						Ending Depth	1.				6.				9.5				1.				6.			
						Lab ID	AP89334				AP89335				AP89336				AP89338				AP89339			
	Soil Comparison Criteria																									
	Lab MDL	Lab RL	Background[a] Soil	Background[a] GR	RRS2-GWP (Ind.)	RRS2-SAI (Ind.)	Results	Flags	Dilution	SQL	Results	Flags	Dilution	SQL	Results	Flags	Dilution	SQL	Results	Flags	Dilution	SQL	Results	Flags	Dilution	SQL
Moisture							9.8				6.5				6.8				16.1				3.6			
SW6010B (mg/kg)																										
Barium	0.06	1.	186.	10	200.	59,000.	58.2	J	1	1	7.18	J	1	1	7.19	J	1	1	38.81	J	1	1	**23.63**	**J**	**1**	**1**
Chromium	0.1	20.	40.2	8.1	10.	350,000.	10.2	F	1	20	3.9	F	1	20	3.7	F	1	20	6.7	F	1	20	6.8	F	1	20
Copper	0.19	2.	23.2	13.1	130.	74,000.	**103.3**	**J**	**1**	**2**	3.66	J	1	2	4.19	J	1	2	5.96	J	1	2	4.74	J	1	2
Nickel	0.12	2.	35.5	6.8	200.	12,000.	7.47	J	1	2	2.57	J	1	2	3.19	J	1	2	5.22	J	1	2	4.78	J	1	2
Zinc	0.63	5.	73.2	11.3	3,100.	41,000.	17.83		1	5	4.12	F	1	5	5.14		1	5	18.79		1	5	8.64		1	5
SW7060A (mg/kg)																										
Arsenic	0.04	0.5	19.6	3.6	5.	200.	2.23		1	0.5	0.04	U	1	0.5	0.04	U	1	0.5	0.38	F	1	0.5	0.04	U	1	0.5
SW7131A (mg/kg)																										
Cadmium	0.01	0.1	3.00	0.1	0.5	410.	0.69		5	0.5	0.01	U	1	0.1	0.01	U	1	0.1	0.24		1	0.1	0.01	U	1	0.1
SW7421 (mg/kg)																										
Lead	0.13	0.5	84.5	5.5	1.5	1,000.	18.49		15	0.5	2.00		1	0.5	2.39		1	0.5	12.96		5	2.5	2.67		1	0.5
SW7471A (mg/kg)																										
Mercury	0.01	0.1	0.77	0.1	0.2	9.6	0.02	F	1	0.1	0.01	U	1	0.1	0.01	U	1	0.1	0.05	F	1	0.1	0.02	F	1	0.1
SW8260B (mg/kg)																										
Benzene	0.0003	0.002	--	--	0.5	1.5	**0.0074**		**1**	**0.002**	0.0009	F	1	0.002	0.0012	F	1	0.002	**0.0262**		**1**	**0.002**	0.0009	F	1	0.002
Dichlorodifluoromethane	0.0008	0.005	--	--	2000	3100	0.0008	U	1	0.005	0.0008	U	1	0.005	0.0008	U	1	0.005	0.0008	U	1	0.005	0.0008	U	1	0.005
Ethylbenzene	0.0004	0.003	--	--	70.	6,900	0.0021	F	1	0.003	0.0022	F	1	0.003	0.0027	F	1	0.003	**0.0073**		**1**	**0.003**	**0.0037**		**1**	**0.003**
Isopropylbenzene	0.0004	0.008	--	--	1000	9000	0.0004	U	1	0.008	0.0004	U	1	0.008	0.0004	U	1	0.008	0.0008	F	1	0.008	0.0004	U	1	0.008
Methylene chloride	0.0007	0.005	--	--	0.5	16.	0.0014	F	1	0.005	0.0009	F	1	0.005	0.0008	F	1	0.005	0.0011	F	1	0.005	0.0007	U	1	0.005
Naphthalene	0.001	0.02	--	--	200	270	0.001	U	1	0.02	0.002	F	1	0.02	0.002	F	1	0.02	0.005	F	1	0.02	0.002	F	1	0.02
Toluene	0.0003	0.005	--	--	100.	2,400.	**0.0103**		**1**	**0.005**	0.0041	F	1	0.005	0.0046	F	1	0.005	**0.0286**		**1**	**0.005**	**0.0051**		**1**	**0.005**
Trimethylbenzene, 1,2,4-	0.0004	0.007	--	--	NA	NA	0.0008	F	1	0.007	0.0010	F	1	0.007	0.0013	F	1	0.007	0.0039	F	1	0.007	0.0011	F	1	0.007
Trimethylbenzene, 1,3,5-	0.0004	0.003	--	--	NA	NA	0.0004	U	1	0.003	0.0004	U	1	0.003	0.0004	U	1	0.003	0.0009	F	1	0.003	0.0004	U	1	0.003
Xylene, m,p-	0.0006	0.007	--	--	1,000.	3,300.	0.0023	F	1	0.007	0.0014	F	1	0.007	0.0016	F	1	0.007	**0.0091**		**1**	**0.007**	0.0016	F	1	0.007
Xylene, o-	0.0004	0.005	--	--	1,000.	48,000.	0.0011	F	1	0.005	0.0006	F	1	0.005	0.0007	F	1	0.005	0.0045	F	1	0.005	0.0007	F	1	0.005
SW8270C (mg/kg)																										
Bis(2-ethylhexyl)phthalate	0.03	0.7	--	--	0.6	65.	0.27	F	1	0.7	0.28	F	1	0.7	0.03	U	1	0.7	0.12	F	1	0.7	0.08	F	1	0.7

Tables present all laboratory results for analytes detected above the method detection limit.
Results from all laboratory analysis are presented in Appendix B.
All samples were analyzed by APPL Inc. Laboratories. Referenced laboratory package numbers: APPL Inc.: 32129, 32133
All MS/MSD results are presented in the Data Verification Report, Appendix D.

Abbreviations and Notes:

Highlighted and bolded sample concentrations exceed RRS1 (background) standards.

-- No risk reduction standard or background level available

a Background values from Second Revision to the Evaluation of Background Metals in Soils and Bedrock at CSSA (Parsons, February 2002)

DL Dilution
FD1 Field Duplicate
GR Glen Rose
GWP-Ind Soil MSC based on groundwater protection
Kr Krum Complex
MDL Method Detection Limit
N1 Environmental Sample
NA Not Available
RL Reporting Limit
SAI-Ind Soil MSC for industrial use based on inhalation, ingestion, and dermal contact
SQL Sample Quantitation Limit
TaB Tarrant Association, gently undulating

Data Qualifiers:

F- The analyte was positively identified, but the associated numerical value is below the RL
J - The analyte was positively identified, the quantitation is an estimation
M - A matrix effect was present
U - The analyte was analyzed for, but not detected. The associated numerical value is the MDL

Table B23-2
Summary of Chemical Constituents Detected in Soils, March 2000
Solid Waste Management Unit B-23

						Sample ID	B23-SB02				B23-SB03				B23-SB03				B23-SB03				B23-SB03			
						Sample Date	03/02/00				03/03/00				03/03/00				03/03/00				03/03/00			
						Sample Type	N1				N1				FD1				N1				N1			
						Soil Type	GR				Soil (TaB)				Soil (TaB)				GR				GR			
						Beginning Depth	10.				0.5				0.5				5.				9.5			
						Ending Depth	10.5				1.				1.				5.5				10.			
						Lab ID	AP89340				AP89369				AP89370				AP89373				AP89374			
	Soil Comparison Criteria																									
	Lab MDL	Lab RL	Background[a] Soil	Background[a] GR	RRS2-GWP (Ind.)	RRS2-SAI (Ind.)	Results	Flags	Dilution	SQL	Results	Flags	Dilution	SQL	Results	Flags	Dilution	SQL	Results	Flags	Dilution	SQL	Results	Flags	Dilution	SQL
Moisture							6.1				11.1				10.6				6.1				9.1			
SW6010B (mg/kg)																										
Barium	0.08	1.	186.	10	200.	59,000.	2.49	J	1	1	54.31	M	1	1	52.13	M	1	1	7.57	J	1	1	**10.75**	**J**	**1**	**1**
Chromium	0.1	20.	40.2	8.1	10.	350,000.	1.6	F	1	20	11.4	M	1	20	9.9	M	1	20	3.8	F	1	20	5.9	F	1	20
Copper	0.19	2.	23.2	13.1	130.	74,000.	1.97	F	1	2	6.08	M	1	2	6.09	M	1	2	3.59		1	2	5.88		1	2
Nickel	0.12	2.	35.5	6.8	200.	12,000.	2.38	J	1	2	7.75	M	1	2	7.54	M	1	2	3.35	J	1	2	**7.83**	**J**	**1**	**2**
Zinc	0.63	5.	73.2	11.3	3,100.	41,000.	**17.35**		**1**	**5**	42.26	M	1	5	48.19	M	1	5	7.72	J	1	5	**28.64**	**J**	**1**	**5**
SW7060A (mg/kg)																										
Arsenic	0.04	0.5	19.6	3.8	5.	200.	0.04	U	1	0.5	1.25	M	1	0.5	2.74	M	1	0.5	0.52		1	0.5	3.12		1	0.5
SW7131A (mg/kg)																										
Cadmium	0.01	0.1	3.00	0.1	0.5	410.	0.01	U	1	0.1	0.17		1	0.1	0.19		1	0.1	0.01	U	1	0.1	0.01	U	1	0.1
SW7421 (mg/kg)																										
Lead	0.13	0.5	84.5	5.5	1.5	1,000.	1.18		1	0.5	9.45	M	5	2.5	10.29		5	2.5	2.77		1	0.5	**6.17**	**M**	**5**	**2.5**
SW7471A (mg/kg)																										
Mercury	0.01	0.1	0.77	0.1	0.2	9.6	0.01	U	1	0.1	0.03	F	1	0.1	0.03	F	1	0.1	0.02	F	1	0.1	0.02	F	1	0.1
SW8260B (mg/kg)																										
Benzene	0.0003	0.002	–	–	0.5	1.5	0.0016	F	1	0.002	0.0003	U	1	0.002	0.0003	U	1	0.002	0.0003	U	1	0.002	0.0003	U	1	0.002
Dichlorodifluoromethane	0.0008	0.005	–	–	2000	3100	0.0008	U	1	0.005	0.0040	M	1	0.005	**0.0145**	**M**	**1**	**0.005**	**0.0490**		**1**	**0.005**	**0.0319**		**1**	**0.005**
Ethylbenzene	0.0004	0.003	–	–	70.	8,900.	0.0027	F	1	0.003	0.0004	U	1	0.003	0.0004	U	1	0.003	0.0004	U	1	0.003	0.0004	U	1	0.003
Isopropylbenzene	0.0004	0.008	–	–	1000	9000	0.0004	U	1	0.008	0.0004	U	1	0.008	0.0004	U	1	0.008	0.0004	U	1	0.008	0.0004	U	1	0.008
Methylene chloride	0.0007	0.005	–	–	0.5	16.	0.0007	U	1	0.005	0.0007	U	1	0.005	0.0019	F	1	0.005	0.0020	F	1	0.005	0.0013	F	1	0.005
Naphthalene	0.001	0.02	–	–	200	270	0.002	F	1	0.02	0.001	M	1	0.02	0.001	M	1	0.02	0.001	U	1	0.02	0.001	U	1	0.02
Toluene	0.0003	0.005	–	–	100.	2,400.	**0.0051**		**1**	**0.005**	0.0030	F	1	0.005	0.0003	U	1	0.005	0.0003	U	1	0.005	0.0003	U	1	0.005
Trimethylbenzene, 1,2,4-	0.0004	0.007	–	–	NA	NA	0.0014	F	1	0.007	0.0004	U	1	0.007	0.0004	U	1	0.007	0.0004	U	1	0.007	0.0004	U	1	0.007
Trimethylbenzene, 1,3,5-	0.0004	0.003	–	–	NA	NA	0.0004	U	1	0.003	0.0004	U	1	0.003	0.0004	U	1	0.003	0.0004	U	1	0.003	0.0004	U	1	0.003
Xylene, m,p-	0.0008	0.007	–	–	1,000.	3,300.	0.0019	F	1	0.007	0.0008	U	1	0.007	0.0008	U	1	0.007	0.0008	U	1	0.007	0.0008	U	1	0.007
Xylene, o-	0.0004	0.005	–	–	1,000.	48,000.	0.0009	F	1	0.005	0.0004	U	1	0.005	0.0004	U	1	0.005	0.0004	U	1	0.005	0.0004	U	1	0.005
SW8270C (mg/kg)																										
Bis(2-ethylhexyl)phthalate	0.03	0.7	–	–	0.6	65.	0.05	F	1	0.7	0.04	F	1	0.7	0.03	U	1	0.7	0.05	F	1	0.7	0.03	U	1	0.7

Tables present all laboratory results for analytes detected above the method detection limit.
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All samples were analyzed by APPL Inc. Laboratories. Referenced laboratory package numbers: APPL Inc.: 32129, 32133
All MS/MSD results are presented in the Data Verification Report, Appendix D.

Abbreviations and Notes:

Highlighted and bolded sample concentrations exceed RRS1 (background) standards.

– No risk reduction standard or background level available
a Background values from Second Revision to the Evaluation of Background Metals in Soils and Bedrock at CSSA (Parsons, February 2002)
DL Dilution
FD1 Field Duplicate
GR Glen Rose
GWP-Ind Soil MSC based on groundwater protection
Kr Krum Complex
MDL Method Detection Limit
N1 Environmental Sample
NA Not Available
RL Reporting Limit
SAI-Ind Soil MSC for industrial use based on inhalation, ingestion, and dermal contact
SQL Sample Quantitation Limit
TaB Tarrant Association, gently undulating

Data Qualifiers:

F - The analyte was positively identified, but the associated numerical value is below the RL.
J - The analyte was positively identified, the quantitation is an estimation.
M - A matrix effect was present.
U - The analyte was analyzed for, but not detected. The associated numerical value is the MDL.

Because the concentrations slightly exceed RRS1 criteria, an initial comparison to TRRP Tier 1 protective concentration levels (PCLs) for residential sites with a 0.5 acre source area [Figure 30 TAC §350.75(b)(1)] has also been made. For this preliminary comparison, the most stringent criteria for each compound has been used. The most stringent is either the combined soil PCL ($^{Tot}Soil_{Comb}$) or the groundwater protective soil PCL ($^{GW}Soil$), depending on the constituent being compared. For the five metals exceeding RRS1 criteria (barium, copper, nickel, lead, and zinc), the most stringent of the two PCLs is the $^{GW}Soil$ PCL for all of the metals except copper, and none of these metals concentrations exceed the Tier 1 PCLs. For copper, the most stringent is the $^{Tot}Soil_{Comb}$ PCL (550 mg/kg) and the detected concentration is well below this applicable TRRP PCL.

For the VOCs that exceeded RRS1 criteria (BTEX compounds and dichlorofluoromethane), the most stringent PCLs are the $^{GW}Soil$ PCLs. None of these VOCs exceeded their applicable PCLs, except the benzene concentration detected at B23-SB02 (0.5-1.0 ft bgs) was 0.0262 mg/kg, and the $^{GW}Soil$ PCL is 0.026 mg/kg. This represents an exceedance of only 0.002 mg/kg.

2.2.4 Groundwater Samples

In accordance with the approved work plan, groundwater samples were not collected in association with the investigation conducted for SWMU B-23. Groundwater was not encountered in any of the borings.

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SECTION 3
CONCLUSIONS AND RECOMMENDATIONS

3.1 CONCLUSIONS

Evidence of past ground disturbance at SWMU B-23 indicates that a trench potentially used for disposal of solid waste is present at the site. Some solid waste, including metal banding and JATO canisters, is on the ground surface and partially buried in what remains of the trench. The presence of a soil mound on one end of the trench and a ground depression suggests that the trench was never intentionally filled in and graded. However, the trench walls have apparently slumped, partially filling in the trench. It is unknown if any additional waste is buried at the site, and the dates that the trench was excavated and potentially used are unknown. Although results of the geophysical survey indicated two anomalies at the site, the anomaly locations corresponded with metal debris on the ground surface. Therefore, it is not possible to determine if any buried metal debris is present.

Results of surface and subsurface soil and rock samples collected at SWMU B-23 indicate that metals and VOCs concentrations exceed RRS1 standards. However, all of the detected concentrations, except for a very slight exceedance of benzene, were below the most stringent TRRP Tier 1 PCLs for residential sites less than 0.5 acre in size.

3.2 EVALUATION OF DATA QUALITY OBJECTIVES ATTAINMENT

Overall data quality objectives (DQOs) for the investigations at CSSA are provided in Volume 1-1 behind the **RFI Addendum tab (Section 11 of the Work Plan Overview)**. A detailed list of DQOs for SWMU B-23, along with an evaluation of whether each DQO has been attained, is provided in Appendix C. As described in Section 1, the main objectives of the SWMU B-23 investigation are to determine if the site meets TNRCC requirements for RRS1 closure and to meet requirements of the 3008(h) Administrative Consent Order.

All data generated during the SWMU B-23 investigation were reviewed to confirm conformance with the AFCEE QAPP; the data verification reports are included in Appendix D. All data are considered usable for site characterization purposes. Although several results are flagged with an "M", these results are considered useable because the matrix interference is minimal and does not significantly affect the sample results. Results for one analyte, chloroform, were flagged with "B". All of the initial calibration, second source verification and internal standard criteria were within quality control limits, as described in the data verification report (Appendix D).

Because of visible waste on the ground surface and the possibility of buried waste in the trench remains, the site does not meet the TNRCC RRS1 requirement for removal of all waste.

3.2 RECOMMENDATIONS

The exposed waste materials (JATO canisters and metal debris) should be cleared from the trench area and disposed of properly. Additional investigation of the geophysical anomalies identified in the March 1995 geophysical survey should be conducted. Once the surface metal debris has been removed, this additional investigation could be conducted with a hand-held magnetometer to confirm that no buried waste remains at the site. If the magnetometer indicates buried metal, this waste should also be excavated and properly disposed. The trench is approximately 150 feet long by 30 feet wide. With an assumed depth of 10 feet, approximately 1,700 cubic yards of waste and soil could potentially require excavation and disposal.

After the waste is removed, confirmation samples should be collected and analyzed for barium, copper, nickel, and zinc (SW-6010B); lead (SW-7421), VOCs (SW-8260B), and perchlorates (EPA 314.0, modified for soil), and the excavated area should be surveyed. The number of confirmation samples that will be necessary depends on the size of the excavation and the success of initial excavation in removing all contaminated media. However, the number of samples is not anticipated to exceed 25. Upon completion of the waste removal and confirmation sampling, closure under RRS1 should be pursued, and the site should be brought back to grade with clean fill material.

APPENDIX A
SOIL BORING LOGS

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SOIL BORING LOG

CAMP STANLEY STORAGE ACTIVITY

SITE LOCATION: B23	BORING NUMBER: B23-SB01
CLIENT: CAMP STANLEY STORAGE ACTIVITY	CONTRACTOR: PARSONS ENGINEERING SCIENCE, INC.
PROJECT: RL83	DRILLING CONTRACTOR: JEDI
LOGGED BY: WB MARTIN	REF. LOGBOOK: 736071
BORING DEPTH (ft-BGL): 9.5	DRILLER: D. CASTILLO
BORING ELEVATION (ft-MSL): NA	DRILLING RIG: MOBILE B-61
EAST COORDINATE: 537390	DRILLING METHOD: CORE BARREL
NORTH COORDINATE: 3288189	SAMPLING METHOD: SPLIT SPOON
BEGIN DRILLING: 3/2/00	END DRILLING: 3/2/00

DEPTH (feet)	SAMPLE RECOVERY	ANALYTICAL SAMPLE	PID (ppm)	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
	2.5/2.5	X	0.0	LIMESTONE, pebbly, loose to soft, dark yellowish-brown 10YR 4/4, dry, no odor.			
	0/3			No recovery.			
5						5	
	4/4	X	0.0	LIMESTONE (packstone), white 10YR N8/, dry, 5.5-7' packstone, 7-9.5' weathered limestone, slightly friable, moist at 8', no odor.			Refusal at 5.5'
		X					
10				*TOTAL DEPTH = 9.5 FT.*		10	
15						15	
20						20	
25						25	
30						30	

SOIL BORING LOG — CAMP STANLEY STORAGE ACTIVITY

SITE LOCATION: B23	BORING NUMBER: B23-SB02
CLIENT: CAMP STANLEY STORAGE ACTIVITY	CONTRACTOR: PARSONS ENGINEERING SCIENCE, INC.
PROJECT: RL83	DRILLING CONTRACTOR: JEDI
LOGGED BY: WB MARTIN	REF. LOGBOOK: 736071
BORING DEPTH (ft-BGL): 10.5	DRILLER: D. CASTILLO
BORING ELEVATION (ft-MSL): NA	DRILLING RIG: MOBILE B-61
EAST COORDINATE: 537396	DRILLING METHOD: CORE BARREL
NORTH COORDINATE: 3288189	SAMPLING METHOD: SPLIT SPOON
BEGIN DRILLING: 3/2/00	END DRILLING: 3/2/00

DEPTH (feet)	SAMPLE RECOVERY	ANALYTICAL SAMPLE	PID (ppm)	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
	1.5/2		0.0	CLAY/FILL, brown 7.5YR 5/3, dry, clay fill, wood scraps, some fossils, no odor.	OH		
	3/3.5		0.0	CLAY/MARL, slightly hard, white 2.5Y 8/2, dry, fossils, no odor.	OH		
5							5
	5/5		0.0	LIMESTONE (mudstone), slightly hard, white 2.5Y 8/2, very hard 5.5-6.5', slightly friable and weathered 6.5-10.5', hard rock in core shoe, no odor.			
10							10
				TOTAL DEPTH = 10.5 FT.			
15							15
20							20
25							25
30							30

SOIL BORING LOG

CAMP STANLEY STORAGE ACTIVITY

SITE LOCATION: B23	BORING NUMBER: B23-SB03
CLIENT: CAMP STANLEY STORAGE ACTIVITY	CONTRACTOR: PARSONS ENGINEERING SCIENCE, INC.
PROJECT: RL83	DRILLING CONTRACTOR: JEDI
LOGGED BY: WB MARTIN	REF. LOGBOOK: 736071
BORING DEPTH (ft-BGL): 10	DRILLER: D. CASTILLO
BORING ELEVATION (ft-MSL): NA	DRILLING RIG: MOBILE B-61
EAST COORDINATE: 537378	DRILLING METHOD: CORE BARREL
NORTH COORDINATE: 3288197	SAMPLING METHOD: SPLIT SPOON
BEGIN DRILLING: 3/3/00	END DRILLING: 3/3/00

DEPTH (feet)	SAMPLE RECOVERY	ANALYTICAL SAMPLE	PID (ppm)	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
0	1/2.5		0.0	SILT/CLAY (maybe fill), pebbly, loose, dark brown 10YR 4/3, dry to damp, no odor.	OH		
			0.0	LIMESTONE/MARL, 5% pebbly, soft, white 10YR 8/2, dry, marl weathered limestone, no odor.			Refusal at 2.5'
				LIMESTONE/MARL 5% pebbly, very hard, white 10YR 8/2, dry, alternating layers of mudstone rock and marl, no odor.			
5	6/7.5		0.0				
10				*TOTAL DEPTH = 10 FT.*			
15							
20							
25							
30							

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APPENDIX C
EVALUATION OF DATA QUALITY OBJECTIVES ATTAINMENT

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APPENDIX C

EVALUATION OF DATA QUALITY OBJECTIVES ATTAINMENT

Activity	Objectives	Action	Objective Attained?	Recommendations
Objective 1: Meet TNRCC Requirements for Site Closure				
Attainment of Risk Reduction Standard Number 1: Closure/Remediation to Background				
Attainment of Risk Reduction Standard 1	Remove all hazardous and nonhazardous waste and waste residues and contaminated design and operating system components such as liners, leachate collection systems, and dikes from the unit or area of the unauthorized discharge. For remediation of media that have become contaminated by releases from a waste management unit or by other unauthorized discharge of hazardous or nonhazardous waste, the contaminated media must be removed or decontaminated to cleanup levels specified in this section (30 TAC 335.554(b) and (c)).	A geophysical survey and subsurface sampling were conducted to determine if there is evidence of buried waste at the site. The geophysical survey indicated two anomalies which may be locations of buried waste. Analytical results for surface and subsurface samples collected indicate exceedances of RRS1 closure criteria.	No. Since there is evidence that waste may be buried at the site, this objective has not been attained.	Remove waste materials and recycle or properly dispose of them. Use magnetometer to determine if evidence of buried metal remains. If there is, excavate to remove and dispose of debris. Conduct confirmation sampling to verify that all waste residue has been removed. Prepare APAR and close under TRRP Tier 1.
	Determine compliance with RRS1 closure requirements by comparing to background as represented by results of analyses of samples taken from media that are unaffected by waste management or industrial activities. If the practical quantitation limit (PQL) is greater than background, then the PQL rather than background shall be used as the cleanup level provided that the person satisfactorily demonstrates to the executive director that lower levels of quantitation of a contaminant are not possible (30 TAC 335.554(d)).	Contaminant concentrations were compared to revised background levels (Parsons, February 2002) or RLs, which are equivalent to PQLs.	Surface and subsurface soil samples exceeded background levels and RLs.	See above.

Activity	Objectives	Action	Objective Attained?	Recommendations
	Attainment of cleanup levels shall be demonstrated by collection and analysis of samples from the media of concern (30 TAC 335.554(e)).	Subsurface soil samples were collected at the site.	No. Since results of the geophysical survey indicate that there may be buried waste at the site, further subsurface investigation and sampling is necessary.	Waste material should be excavated to determine if there is buried waste at the site. Surface and subsurface sampling should be conducted to verify that cleanup levels have been attained.
Objective 2: Meet Requirements of 3008(h) Order for RFI				
RFI Workplan Requirements				
Field Sampling *(Detailed listing of methods and procedures are provided in project plans which are incorporated by reference).*	Conduct field sampling in accordance with procedures defined in the project work plan, SAP, QAPP, and HSP.	All sampling was conducted in accordance with the procedures described in the project plans.	Yes.	NA
Facility Investigation				
Characterization of Environmental Setting - Hydrogeology (B.3.A.1)	Evaluate hydrogeologic conditions at the site.	Not included in this phase of the RFI at SWMU B-23. Shallow groundwater was not encountered during drilling at the site. Groundwater of the Trinity Aquifer is being addressed through the Groundwater Investigation.	NA	NA
Characterization of Environmental Setting- Soils (B.3.A.2)	Characterize soils in accordance with USCS soil classification system (B.3.A.2(a)).	Soil types at the site are based on the SCS Bexar County Soil Survey (USDA, 1991) and are described in Section 1.2.1.	Yes.	NA
	Determine soil pH (B.3.A.2(e)).	The pH of each of the soil types evaluated as part of the background metals concentration study was determined through laboratory analysis. According to those analyses, the pH of Tarrant Association (undulating) soils is 8.08.	Yes.	NA
	Determine moisture content (B.3.A.2(g)).	The moisture content of each sample was analyzed. Moisture content values are provided in laboratory analytical packages.	Yes.	NA

Activity	Objectives	Action	Objective Attained?	Recommendations
Characterization of Environmental Setting – Surface Water and Sediment (B.3.A.3)	Characterize marshes, creeks, wetland areas, or ditches at the site.	No marshes, creeks, wetland areas, or ditches are present at the site. Direction of runoff flow has been evaluated in Section 1.2.1.	Yes	NA
Source Characterization (B.3.B)	Identify the source area (B.3.B.1).	A description of the source area is provided in Section 1.1.2.2.	No. It is unknown if there is buried waste at the site.	Excavation of suspected waste disposal areas, if magnetometer results indicate buried metal at the site.
	Identify the location of the unit/disposal area (B.3.B.2(a)).	In 1999, points along the boundary of each site were surveyed with a Rockwell Plugger GPS unit (estimated accuracy of ±25 feet). The points were identified by the CSSA Environmental Coordinator. The boundary of the site was established during field investigation, as shown on the figures.	Yes. Although the accuracy of the boundary survey of the site is estimated to have an approximate error of 25 feet, this accuracy is sufficient for closure under RRS1 or TRRP Tier 1.	NA
	Identify the type of unit/disposal area (B.3.B.2(b)).	The type of unit/disposal area was identified in the Environmental Assessment (ES, 1992) and by visual observation of waste in the field.	Partially. Waste was observed on the ground surface but it is unknown if there is buried waste.	Excavation of suspected waste disposal areas, if magnetometer results indicate buried metal.
	Identify design features (B.3.A.2(c)).	Information regarding design features was obtained during the Environmental Assessment (ES, 1992) and through visual observation during the field investigation. All available information regarding the design of the disposal site is provided in Section 1.1.2.1.	No. See above.	Excavation of suspected waste disposal areas, if magnetometer results indicate buried metal.
	Identification of past and present operating practices, period of operation, age of unit/disposal area, and method used to close the unit/disposal area (B.3.B.2(d), (e), (f), and (h)).	All known information regarding these items is provided in Section 1.1.2.1. This information is from the Environmental Assessment, records review, interviews, and visual observations.	To the extent possible with data available.	NA

Activity	Objectives	Action	Objective Attained?	Recommendations
	Determine general physical conditions of the site (B.3.B.2(g))	The general physical condition of the site was determined during the field investigation. This information is presented in Section 1.1.2.3.	Yes.	NA
	Identify waste characteristics, including type of waste placed in the unit, physical and chemical characteristics of the wastes, and migration and dispersal characteristics of the waste (B.3.B.3).	Records regarding historic waste disposal practices at CSSA are very limited. All known information, derived from the Environmental Assessment (if appropriate for your site), records review, interviews, and visual observations at the site is provided in Section 1.3.	Yes, to the extent possible with the data available.	NA
Contamination Characterization – Soil (B.3.C.2)	Determine vertical and horizontal extent of contamination (B.3.C.2(a)).	Surface and subsurface samples were collected. Surface and subsurface samples exceeded RRS1 closure standards.	No.	Removal of waste, followed by confirmation sampling is recommended.
	Identify the direction of contaminant movement (B.3.C.2(d)).	No actions taken due to limited amount of contamination.	NA	NA
	Extrapolate future contaminant movement (B.3.C.2(e)).	No actions taken due to limited amount of contamination.	NA	NA
	Implement a soil boring investigation to determine the extent of soil contamination. Soil gas monitoring will be performed during drilling of all borings. Laboratory analysis of borings for contaminants of potential concern will be performed on soils at depths where either visual contamination is evident, or soil gas concentrations indicate contamination. All boreholes shall be properly abandoned.	Surface and subsurface sampling to define potential contamination.	Yes.	Excavation in the area of the anomalies is recommended. Subsurface soil samples can be collected at that time to determine the vertical extent of contamination, and/or to verify that all waste and contaminated material has been removed.
	Prepare a map of all areas included in the investigation (B.3.C.2(i)).	Figures included in this report show all areas included in the investigation.	Yes.	NA

Activity	Objectives	Action	Objective Attained?	Recommendations
	All reporting limits should be below regulatory criteria.	RLs were approved by TNRCC on October 5, 1999. RLs are considered RRS1 standards for all analytes except metals. Values from the Second Revision to the Evaluation of Background Metals Concentration in Soils and Bedrock (Parsons, February 2002) were used as RRS1 comparison criteria for metals.	Yes	Background metals concentrations were approved by TNRCC in April 2002.
	Perform all analyses in accordance with the AFCEE QAPP.	All analyses were performed in accordance with the AFCEE QAPP and approved variances.	Yes	NA
		All data flagged with "U," "F," "M," and "J" are considered usable for site characterization purposes.	Yes "M" flagged data are also considered usable. The matrix interference is minimal and does not significantly affect the sample results.	NA
		All data flagged with "R" are considered unusable.	Only one lead sample result was flagged with an "R."	NA
Contaminant Characterization – Sediment and Surface Water (B.3.C.3)	Conduct a surface water and sediment investigation to characterize contamination resulting from releases at the Facility.	No surface water features are present on SWMU B-23. Therefore, surface water and stream sediments were not sampled as part of the SWMU B-23 investigation.	NA	NA
Potential Receptors (B.3.D)	Collect the information necessary to describe the human populations and environmental systems that are susceptible to contaminant exposure from the Facility.	Information regarding receptors is provided in the Risk Assessment Technical Approach Document (Volume 1-6). In addition, the Well Research Report identifies private groundwater users within 0.25-mile and public water suppliers within 0.5-mile of CSSA.	Yes	NA

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