SECTION 3
HISTORY OF ENVIRONMENTAL ASSESSMENTS AT CSSA

The 1993 EA was performed to identify and describe potential environmental impacts associated with current and past operations. The EA also addressed the groundwater contamination that was first identified in 1991. Additional information regarding the EA is located in **Volume 1-1, Scoping Documents, Work Plans, Environmental Assessment** (**Parsons, September 1993**).

This section provides a brief overview of ongoing groundwater and waste management unit investigations at CSSA. **Appendix B**, a Chronology of Actions/Investigations, provides a comprehensive listing of corrective action events from 1991 to the present.

3.1 GROUNDWATER

The Trinity aquifer is the principal aquifer underlying CSSA. The Middle Trinity aquifer is composed of the Lower Glen Rose Limestone, the Bexar Shale, and the Cow Creek Limestone formations. The Middle Trinity aquifer is the primary source of drinking water in northern-most Bexar County, including the area surrounding CSSA.

Like the surrounding community, CSSA uses the Middle Trinity aquifer as its water source. During a routine screening site visit on August 9, 1991, the Texas Department of Health sampled CSSA's five water supply wells. Analytical results revealed that water supply well CS-16 contained 127 micrograms per liter (µg/L) *cis*- and *trans*-1,2-dichloroethene (DCE) (*cis*-1,2-DCE and *trans*-1,2-DCE), 151 µg/L trichloroethene (TCE), and 137 µg/L tetrachloroethene (PCE). These concentrations exceed the drinking water maximum contaminant levels (MCL) of 70 µg/L for *cis*-1,2-DCE, 100 µg/L for *trans*-1,2-DCE, 5 µg/L for TCE, and 5 µg/L for PCE. Subsequent sampling on August 23, 1991, confirmed the earlier results, and well CS-16 was taken out of service and disconnected from the potable water system. Well locations are shown in Figure E-1 in Appendix E.

Detection of contaminants above MCLs in groundwater spurred groundwater investigation and monitoring programs at CSSA. Since 1992, numerous groundwater monitoring events have been conducted at CSSA. As part of these events, all on-post wells and selected off-post wells were sampled. Quarterly monitoring began on-post in December 1999, was expanded to include off-post wells in September 2001, and currently continues to include both on- and off-post wells. Additional wells have been installed to monitor groundwater quality in various locations at CSSA.

Groundwater monitoring at CSSA includes a total of 49 wells, including potable water supply wells, agricultural water supply wells, discrete interval and standard groundwater monitoring wells, on-post. As new wells are installed in the vicinity by private landowners and utilities off-post, CSSA evaluates them for inclusion in its groundwater monitoring program, using the **Off-Post Groundwater Monitoring and Response Plan**. For detailed information pertaining to analytical results from groundwater monitoring events, refer to **Volume 5**,

Groundwater Investigation of the **CSSA Environmental Encyclopedia,** specifically the **On-post Groundwater Monitoring** and **Off-post Groundwater Monitoring** tabs.

The Edwards aquifer does not occur within CSSA boundaries. However, the Edwards Underground Water District has defined two recharge and transition zones of concern for the Edwards aquifer; one north and one south of CSSA. One recharge area is along Cibolo Creek where outcrops of the Lower Glen Rose are present. This is the only area of the Lower Glen Rose that is defined as a recharge zone to the Edwards aquifer. The Cibolo Creek recharge area is 0.5 mile north of the northeast corner of CSSA. A second recharge zone located on Edwards Limestone is about 4 or 5 miles to the south-southeast of CSSA.

3.2 WASTE MANAGEMENT UNITS

Forty-one potential solid waste management units (SWMU) were identified during the EA following a review of records and historic aerial photographs, interviews with CSSA personnel, and field CSSA investigations. The identified sites were areas used for solid waste disposal, four burn areas (B-1, B-2, B-4, and B-22), two ordnance demolition areas (B-20 and Building 43), one incinerator (I-1), one oxidation pond (O-1), and one less than 90-day waste materials storage area (F-14). Table 3.1 provides a list of waste management units at CSSA. Information specific to each site is included in **Volume 1-1**, behind the **Investigation Matrix** tab of the **CSSA Environmental Encyclopedia**.

Table 3.1 Site Status Summary

Status	SWMUs	AOCs	RMUs
RRS1 Closure (Approved or Pending TCEQ Approval)	23	15	
De-listed (Approved or Pending TCEQ Approval)	3	3	
NFA (Approved or Pending TCEQ Approval)		3	
Investigation or Remediation in Progress	13		1
No action to date		17	4
Total:	39	38	5

Thirty-eight potential Areas of Concern (AOC) were also identified. AOCs are those sites where field investigations and/or historical aerial photograph research indicate a possibility that waste disposal activities may have taken place, as evidenced by disturbed areas or exposed surface debris. Since there are no records at CSSA that waste activities actually took place at those AOCs, they are considered to be low priority sites.

Field surveys indicate spent ammunition at five Rifle Management Units (RMU). One RMU (RMU-1) still serves as an active firing range.

Remediation and closure activities have been initiated at most of these sites, as described in the following paragraphs.

3.3 SWMU CLOSURE

Through April 2006, CSSA environmental investigations identified 39 SWMUs, 38 AOCs, and five RMUs as potential contamination source areas. Through May 2005, the clean-up or closure strategy for CSSA's SWMUs and AOCs followed Texas Commission on Environmental Quality (TCEQ) Risk Reduction Rules (30 Texas Administrative Code [TAC] §335 Subchapter S). After May 2005 the clean-up or closure strategy for these sites fell under the Texas Risk Reduction Program (TRRP) 30 TAC §350, which became effective May 1, 2000. As of April 2006, the TCEQ approved Risk Reduction Standard 1 (RRS1) closure of 38 sites, de-listing of six sites, and No Further Action for three sites. Table 3.1 summarizes site status.

Remaining open sites (highlighted in Table 3.2) will be closed in accordance with TRRP. TRRP has three tiers of acceptable Protective Concentration Limits (PCL) which are established levels for constituents in an environmental medium considered safe for human health and the environment. Tier I PCLs are based on conservative default assumptions regarding chemical mobility or exposure risk factors about the contaminant and site conditions. Tiers II and III incorporate increasing amounts of site-specific information to calculate a PCL that is more reflective of actual site conditions. While Tiers II and III provide more accurate representations of site conditions, they are more labor intensive and thus are more expensive.

For sites where constituent levels concentrations exceed the applicable PCLs, there are two Remedy Standards available to complete the remedial action (Remedy Standards A and B). Remedy Standard A requires that constituents above the PCL be removed or decontaminated to acceptable levels in all areas. This standard is useful for small sites, sites that are being sold or transferred, and sites near the property boundaries. Remedy Standard B allows consideration of migration of the constituents to a point of exposure not necessarily at the source of the contamination. This standard will allow constituents to remain in place at concentrations greater than the PCL with controls, but will not allow the migration of contaminants off-site.

The choice of the appropriate Tier and Remedy Standard is dependent on numerous site conditions. Therefore, the choice for each site must be evaluated carefully before a decision is made.

3.3.1 SWMU Remediation

Two potential sources of hazardous waste constituents found in the contaminated wells have been identified. These potential source areas included SWMU O-1 and SWMU B-3 located near the center of CSSA (see **Figure E1, Appendix E**) and AOC-65 near the southwest corner of the post. As part of on- and off-post groundwater monitoring being conducted by CSSA, another potential source area was identified. In December 1999, CSSA sampled well LS-7, a private off-post well near the southwest corner of the post. Analytical results indicated low levels of PCE and TCE contamination. CSSA's continued monitoring of well LS-7 revealed that contamination levels increased toward the MCL (drinking water standard). Based on the sampling results, CSSA installed a granular activated carbon (GAC) filtration system at LS-7. In August 2001, CSSA extended its off-post monitoring program to include four additional private wells (LS-2, LS-3, LS-5, and LS-6) near the southwest corner of the post. Analyses of water samples from these off-post wells also found PCE and TCE contamination, and additional GAC systems were installed in accordance with the CSSA off-post monitoring and response plan. Since 2001 on- and off-post sampling has continued on a quarterly basis. Through September 2005, approximately 40 on-post and more than 30 off-post wells have been sampled per quarter.

CSSA used PCE and TCE, which are volatile organic compounds (VOC), prior to 1995 to degrease ordnance materiel. Solvents containing both PCE and TCE were used in Building 90, which was identified as a third potential source area at the southwest corner of CSSA and identified as AOC-65 (see **Figure E1, Appendix E**). The history and current status of the three potential source areas identified at CSSA include:

- **Oxidation Pond**: The oxidation pond (SWMU O-1) was built about 1975. The pond had a vinyl plastic liner and was used for evaporation of waste liquids from the ordnance-related maintenance process. This pond was filled with dirt in 1985 after solid and liquid residues were removed. SWMU O-1 is located in the central portion of CSSA (**Figure E1, Appendix E**). Soil gas surveys conducted in 1995 identified VOCs within the pond boundaries. Subsequent soil tests have shown PCE, chromium, and cadmium to be above action levels established by the TCEQ. Geophysical surveys, surface and subsurface soil sampling, soil gas surveys, excavations, and an electrokinetics treatability study have been performed at SWMU O-1. In September 2000, CSSA excavated and removed approximately 1,515 cubic feet of non-hazardous soil and rock from the site and disposed of the material in an approved landfill. Subsequently, CSSA collected samples to confirm that no soil with concentrations above the TCEQ action levels remained in the surface soil. Low levels of chromium remained in limestone below the site, and the TCEQ concurred that these levels constituted a low risk to groundwater. Contamination in the limestone bedrock is to be addressed as part of the groundwater evaluation and continuing environmental program. Therefore, formal closure of SWMU O-1 for surface soil was received from the TCEQ on April 23, 2002. Additional information on remediation activities at SWMU O-1 is located in **Volume 3-1.2, Solid Waste Management Units**, behind the SWMU O-1 tab of the **CSSA Environmental Encyclopedia**.

- **SWMU B-3**: SWMU B-3 consists of trenches that cover approximately one-half acre and is located in the central portion of CSSA (**Figure E1, Appendix E)**. SWMU B-3 was a landfill area used for disposal and burning of waste. Tests identified PCE and TCE in the trench area, indicating that as a likely source of the VOCs detected in well CS-16. CSSA installed a soil vapor extraction (SVE) system to clean up VOCs in the trench soil and underlying limestone in 1996/97, and the system removed more than 500 pounds of VOCs while it was operating. Geophysical surveys, surface and subsurface soil and rock sampling, and soil gas surveys were conducted at SWMU B-3. The SVE system was dismantled in 2002 and CSSA excavated approximately one quarter of the contaminated soil in 2003. A new pilot SVE system was installed at SWMU B-3 in February 2004. Additional information regarding ongoing remediation activities at SWMU B-3 is located in **Volume 3-1.1, Investigation Reports, Solid Waste Management Units,** behind the **SWMU B-3** tab of the **CSSA Environmental Encyclopedia**.
- **AOC-65**: AOC-65 consists of a concrete-lined pit where the former solvent vat was located in an area in the south and west portion of Building 90 and adjacent areas at the southwest corner of CSSA (see **Figure E1, Appendix E**). Soil samples collected in April 2000 detected low levels of VOCs. Further investigation of the area near Building 90 included installation of on-post monitoring wells and conducting a soil gas survey over approximately 70 acres near the southwestern corner of the post. Results from investigations confirmed the presence of PCE and TCE in shallow soil and limestone underlying AOC-65. CSSA is completing construction of two SVE systems at AOC-65. One system was installed inside Building 90 to treat contaminated media (soil, rock, and air) underlying Building 90. The second system was installed on the west side of Building 90 where soil gas and shallow soil sampling results indicated the highest contaminant levels. The primary objectives of this SVE system test were to remove VOC contaminants from the soil, fractured limestone, and groundwater around AOC-65 (both subslab and surrounding Building 90) or at a minimum, to stop migration of contaminants. A removal action of contaminated surface soil along the west side of Building 90 and the adjacent drainage was completed as part of the SVE system construction project. Additional information on investigations, completed tasks, and planned activities at AOC-65 is located in **Volume 3-2, Areas of Concern** behind the **AOC-65** tab of the **CSSA Environmental Encyclopedia**.