FINAL
RELEASE INVESTIGATION REPORT

AREA OF CONCERN 51
CAMP STANLEY STORAGE ACTIVITY

Prepared for:

Camp Stanley Storage Activity
Boerne, Texas

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EXECUTIVE SUMMARY

Area of Concern (AOC) 51 is a 29.2-acre site located in Camp Stanley Storage Activity's (CSSA) East Pasture. There are no records of waste management occurring in a specific area within AOC-51; however, unexploded ordnance (UXO) has been found in the area. Work performed at the site included x-ray fluorescence (XRF) analysis of soils, a UXO investigation, the removal and proper disposal of soil containing contaminants above Tier 1 protective concentration levels (PCLs), and proper documentation of all activities, including preparation of this Release Investigation Report (RIR). This RIR requests No Further Action (NFA) at AOC-51.

In summary, activities at AOC-51 as described in this RIR showed the following results:

- Excavation, removal, and confirmation sampling were performed at AOC-51.
- The contaminants of concern (COCs) identified above soil background concentrations at AOC-51 were copper, lead, and zinc. Areas of contamination exceeding Tier 1 PCLs have been either excavated and removed from the site, or were used to calculate a 95% upper confidence limit (UCL) which does not exceed the Tier 1 PCL per Texas Administrative Code (TAC) §350.79(2)(A).

From the information presented in this report, the results of the investigations at AOC-51 meet the three criteria as described in Texas Commission on Environmental Quality (TCEQ) (2003) guidance *Determining Which Releases are Subject to the Texas Risk Reduction Program (TRRP)*. Thus, the following criteria were met:

- Soil found to have COC concentrations above Tier 1 PCLs were either excavated from the site or used to calculate a 95% UCL per TAC §350.79(2)(A) that does not exceed the Tier 1 PCL.
- There is no evidence of other affected or threatened environmental media (groundwater, surface water, or sediment) at AOC-51. Soil that was found to have concentrations above Tier 1 PCLs was excavated and removed, so there will be no future impact to groundwater, surface water, or sediment from AOC-51.
- AOC-51 passes the Tier 1 Ecological Exclusion Criteria Checklist (**Appendix B**).

Because these three criteria are met, AOC-51 is not subject to TRRP. Therefore, this RIR has been prepared to document the results and an NFA decision is requested from the TCEQ.

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ACRONYMS AND ABBREVIATIONS

AOC	Area of Concern
APPL	Agriculture & Priority Pollutants Laboratory, Inc.
BTOC	below top of casing
BS	Bexar Shale
CC	Cow Creek
COC	contaminant of concern
CSSA	Camp Stanley Storage Activity
DQO	Data Quality Objective
EE	Environmental Encyclopedia
FSP	Field Sampling Plan
ft	feet
$^{GW}Soil_{Ing}$	soil to groundwater ingestion pathway (PCL)
LGR	Lower Glen Rose
MCL	maximum contaminant level
MD	munitions debris
mg/L	milligrams per liter
NFA	No Further Action
PCL	protective concentration level
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RIR	Release Investigation Report
RL	reporting limit
RMU	Range Management Unit
SAP	Sampling and Analysis Plan
SWMU	Solid Waste Management Unit
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TCLP	toxicity characteristic leaching procedure
$^{Tot}Soil_{Comb}$	total soil combined pathway (PCL)
TPH	total petroleum hydrocarbons
TRRP	Texas Risk Reduction Program
UGR	Upper Glen Rose
USEPA	United States Environmental Protection Agency
UXO	unexploded ordnance
VOC	volatile organic compound
XRF	x-ray fluorescence

1.0 INTRODUCTION

Parsons is under contract to provide investigations and environmental services for waste sites located at Camp Stanley Storage Activity (CSSA) in Boerne, Texas (**Figure 1**). This contract includes characterization of selected waste disposal sites and preparation of appropriate documentation, including a Release Investigation Report (RIR) for Area of Concern (AOC) 51 (**Figure 2**). AOC-51 is located in the southeast corner of CSSA, in the East Pasture. This site covers 29.2 acres. This work was performed in accordance with requirements of the Resource Conservation and Recovery Act (RCRA) 3008(h) Order in effect for CSSA and in accordance with 30 Texas Administrative Code (TAC) §350, the Texas Risk Reduction Program (TRRP) of the Texas Commission on Environmental Quality (TCEQ). This RIR was prepared following TCEQ reporting and documentation requirements for releases that do not trigger applicability to the TRRP rule.

This report describes environmental investigation activities at AOC-51. Work included x-ray fluorescence (XRF) analysis of soils, an unexploded ordnance (UXO) investigation, environmental sampling, excavation and removal of impacted soil, waste characterization and confirmatory sampling and analysis, and proper documentation of all activities, including preparation of this closure report. All work was performed according to applicable federal, state, and local rules and regulations.

For this report, Section 1 provides the introduction and the documentation to support this RIR. Section 2 provides historical background information for CSSA and for AOC-51. Section 3 describes the objectives and rationale for preparing an RIR for AOC-51 and the findings from environmental investigations for the site. The groundwater and surface water for CSSA and the area near AOC-51 are also described in Section 3. Section 4 summarizes the findings from completing the Tier 1 Ecological Exclusion Criteria Checklist, which is included as an appendix to this RIR. Section 5 summarizes the overall findings and recommendations for the site. All figures and tables are provided at the end of this RIR (pages 8 through 16). References cited in this report can be found in the CSSA Environmental Encyclopedia (EE) (Volume 1-1, Bibliography) at www.stanley.army.mil.

2.0 HISTORICAL BACKGROUND

2.1 CAMP STANLEY STORAGE ACTIVITY

Camp Stanley Storage Activity is located in northwestern Bexar County, about 19 miles northwest of downtown San Antonio. The installation consists of approximately 4,004 acres immediately east of Ralph Fair Road, and approximately 0.5 mile east of Interstate Highway 10 (Figure 1). Camp Bullis borders CSSA on the north, east, and south.

The land where CSSA is located was used for ranching and agriculture until the 1900s. During 1906 and 1907, six tracts of land were purchased by the U.S. Government and designated the Leon Springs Military Reservation. The land included campgrounds and cavalry shelters.

In October 1917, the installation was re-designated Camp Stanley. Extensive construction was started during World War I to provide housing for temporary cantonments and support facilities. In 1931, the installation was selected as an ammunition depot, and construction of standard magazines and igloo magazines began in 1938. Land was also used to test, fire and

overhaul ammunition components. As a result of these historic activities, CSSA has several historical waste sites, including AOCs, Solid Waste Management Units (SWMUs), and Range Management Units (RMUs).

The present mission of CSSA is the receipt, storage, issue, and maintenance of ordnance as well as quality assurance testing and maintenance of military weapons and ammunition. Because of its mission, CSSA has been designated a restricted access facility. No changes to the CSSA mission and/or military activities are expected in the future.

2.2 AOC-51

2.2.1 Overview

There are no records of waste management occurring in a specific area within AOC-51. Prior uses of the site are unknown. Unexploded ordnance (UXO) items were reportedly found during past cedar clearing and land management activities. The exact locations and types of UXO found were not recorded. Core and non-core endangered species habitat is present at the site.

A series of historical aerial photos of the site are shown on **Figure 3** and photographs showing investigation activities at the site are provided in **Appendix A**. The history of the site and previous investigations at the site are discussed below.

2.2.2 Setting, Size, and Description

AOC-51 is located in the southeast corner of CSSA, in the East Pasture. This site covers 29.2 acres, and it surrounds SWMU B-9 and AOC-44 (both closed). Several zig-zag trenches are located on the southwest portion of the site. These trenches were used as World War I training devices and were most likely used in the filming of the 1926 film *Wings*. Additional background information on AOC-51 can be found in the CSSA EE (Volume 1-3, AOC-51).

2.2.3 Potential Contaminant Sources, Chemicals of Concern, and Previous Investigations

In the 1990s, two potential waste debris sites (SWMU B-9 and AOC-44) that lie within AOC-51 were closed. Both sites were found to contain only scattered surface debris and contained no evidence of subsurface waste management activities. No evidence has been found of waste management occurring within AOC-51; however, during a brush clearance and UXO sweep at AOC-51 in 1997, munitions and explosives of concern (MEC) including 20-pound intact fragmentation bombs were identified on-site.

In May 2005, nine surface soil samples (SS01-SS09) were collected in the vicinity of AOC-51 and analyzed for metals and explosives (**Figure 4**). The results were all below Tier 1 PCLs.

3.0 OBJECTIVES OF RIR FOR AOC-51

In accordance with TCEQ (2003) guidance, *Determining Which Releases are Subject to TRRP* (www.tceq.state.tx.us/assets/public/remediation/trrp/releasesTRRPrev.pdf), an RIR can be performed for a site when results of an investigation lead to the following conclusions:

- Concentrations of chemicals detected at the site do not exceed Tier 1 residential soil action levels;

- There is no evidence of other affected or threatened environmental media (groundwater, surface water, or sediment) at the site; and
- The site passes the Tier 1 Ecological Exclusion Criteria Checklist (the completed checklist is provided in **Appendix B**).

When these three criteria are met for a site, the release is not subject to TRRP. For such sites, an RIR can be submitted to document the results and a No Further Action (NFA) decision can be requested from the TCEQ.

As referred to in the criteria listed above, the Tier 1 residential soil action levels are provided by TCEQ (2010) and were selected following TCEQ guidance (TCEQ, 2007). These action levels are referred to as PCLs and are selected for each chemical detected at the site (*i.e.*, contaminants of concern [COCs]). The PCLs are based on the general size of the site, which is also referred to as the "source area" size. The source area is either 0.5 acre or less in size, or assumed to be 30 acres if the site is larger than 0.5 acre in size. Thus, the soil action levels for AOC-51 are based on a 30-acre source area, since the size of the site is 29.2 acres. The PCL is then selected based on the lower of the two PCLs listed for either (1) the total soil combined pathway ($^{Tot}Soil_{Comb}$) (*i.e.*, exposure to a COC from incidental ingestion, dermal contact, inhalation of volatiles and particulates, and vegetable consumption); or (2) the soil to groundwater pathway ($^{GW}Soil_{Ing}$) (*i.e.*, soil-to-groundwater leaching of a COC to groundwater, where the PCL is the highest concentration of COC allowed in soil to be protective of Class 1 or Class 2 groundwater).

3.1 FIELD ACTIVITIES AND INVESTIGATIONS

A summary of the soil sampling results at the sites are shown in Table 1 (detected compounds only) and **Appendix C** (all analytes), and the soil sampling locations are shown on Figure 4. Analytical results for samples collected from stockpiled soil excavated as part of this effort are shown in **Appendix F**. The data verification summary report for the sampling and analytical results is provided in **Appendix D**. Additional information about past activities and investigations at the site can be found in the CSSA EE (Volume 3-2, AOC-51).

An XRF survey for lead and zinc was conducted in December 2010. Lead and zinc XRF results have shown a strong statistical correlation with laboratory-verified samples. As such, these metals were used as indicators of potential areas of metals contamination at the site. Sample locations and results for the XRF survey are shown on **Figure 5**. The purpose of the XRF survey was to gather field screening data regarding the presence of metals above Tier 1 PCLs in surface soils. XRF analytical results showed that both lead and zinc were detected above Tier 1 PCLs. During the XRF survey, the site was visibly surveyed and possible impact craters, trenches, and a scattering of munitions debris (MD) and fragments were noted across the entire site.

Most recently, in October 2011, a UXO investigation took place in the North and East Pasture including AOC-51. A Schonstedt hand-held magnetometer was used by the UXO team to estimate the subsurface anomaly density. A low density (between 1 and 10 detections) was estimated for the majority of the site with a few medium densities (between 11 and 25 detections) and only 1 high density (26 or greater detections) estimated at AOC-51 (**Figure 6**). Three presumed UXO items including a shell, 3-inch HE trench mortar, MK1, and two unknown

smoke projectiles were encountered at two locations during the investigation of AOC-51 and their locations are also noted on Figure 6.

In February 2011, Parsons conducted further soil sampling and XRF field screening to delineate the extent of soil contamination at AOC-51. This sampling identified three areas with zinc contamination above Tier 1 PCLs. Subsequently, impacted soil was excavated and transported to the East Pasture berm.

3.1.1 Sampling and Analytical Procedures

For all sampling and analytical activities at CSSA, Parsons follows TCEQ-approved Quality Assurance (QA) and Quality Control (QC) procedures as described in the post-wide CSSA Quality Assurance Project Plan (QAPP) which can be found in the CSSA EE (Volume 1-4, QAPP). The detailed CSSA QAPP presents specific policies, organization, functions, and QA/QC requirements for environmental programs at CSSA, including TCEQ-approved analytical methods, reporting limits (RL), and QA/QC procedures.

The CSSA QAPP: (1) was prepared for use by contractors that perform environmental services at CSSA to ensure that the data are scientifically valid and defensible; (2) establishes the analytical protocols and documentation requirements to ensure that the samples are collected and analyzed, and that the data are reviewed and validated in a specified manner; and (3) provides detailed guidance for using the Data Quality Objective (DQO) process for specific investigations. The CSSA QAPP and delivery/task order specific Field Sampling Plans (FSP) constitute the CSSA Sampling and Analysis Plan (SAP). The SAP defines data quality for a specific project. Information regarding post-wide and site-specific plans and TCEQ correspondence can be found in the CSSA EE (Volume 1-1, Correspondence).

Following the CSSA-specific plans, the investigative soil analyses for RMU-5 were performed using U.S. Environmental Protection Agency (USEPA) *Test Methods for Evaluating Solid Waste* (SW-846): Method 8330B (explosives); and Method 6010 (arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, and zinc; referred to as CSSA 9 metals). Prior to soil/waste disposal, waste characterization samples were collected from the excavated material and analyzed for toxicity characteristic leaching procedure (TCLP) metals (Methods SW1311/6010B and SW1311/7470A) and total petroleum hydrocarbons (TPH) (Method TX1005). All samples were sent to Agriculture & Priority Pollutants Laboratory, Inc. (APPL) for analyses.

3.1.2 Excavation, Removal, and Confirmation Sampling at AOC-51

In November 2011, three surface soil samples were collected from within the site to confirm the elevated XRF values. These samples were analyzed for CSSA 9 metals and explosives. No explosives were detected; however, one sample (SS11) exceeded the Tier 1 PCL for copper and lead (61 milligrams per kilogram [mg/kg] and 84.5 mg/kg, respectively). In January 2012, six additional surface soil samples were collected to delineate the extent of the metal contamination. Three samples (SS15, SS17, and SS18) exceeded Tier 1 PCL for zinc (120 mg/kg) and one sample (SS17) exceeded the Tier 1 PCL for lead. In February 2012, fourteen surface soil samples were collected from within the site to confirm the proposed excavation boundary around SS11 (Figure 4). The samples were analyzed for CSSA 9 metals and explosives. Results showed concentrations of copper, lead, and zinc above Tier 1 PCLs at two of the sample locations (SS24

and SS27). Low levels of explosives were detected below Tier 1 PCLs. Twenty soil samples were collected between March 14, 2012 and March 15, 2012 to further delineate the extent of the metal contamination in the AOC-51 area. One sample (SS40) exceeded the Tier 1 PCL for lead with a concentration of 320 mg/kg.

Excavation activities to remove soils with metal concentrations above their Tier 1 PCLs were conducted between April 17 and April 24, 2012. During this period, approximately 1,300 cubic yards (CY) of contaminated soil were removed from the site. All excavation activities were conducted by USA Environment, under the supervision of a Parsons Construction Manager. The northern excavated area was 0.24 acre in size, approximately 170 feet (ft) long (northeast to southwest), and ranged from about 30 ft wide near the southwestern end to about 90 ft wide towards the northeastern end, as shown on Figure 6. The northern excavation area was excavated to a depth of 1 ft. The southern excavated area was 0.55 acre in size, approximately 220 feet (ft) long (northwest to southeast), and ranged from about 30 ft wide near the southeastern end to about 140 ft wide towards the northern end, as shown on Figure 6. The southern excavation area was excavated to a depth of 2 ft on the northern end and 1ft on the southern end (Figure 4). Following completion of the excavation, a confirmation sample from the bottom of the excavated area was collected and analyzed for lead. The results were below Tier 1 PCLs (Table 1).

Per TAC §350.79(2)(A), a 95% upper confidence limit (UCL) may be calculated to determine if there is a statistical basis for no further action on a particular COC. A 95% UCL of 12.8 mg/kg was calculated for the copper concentrations remaining in site soils, which does not exceed the Tier 1 PCL of 61 mg/kg (**Appendix G**). A 95% UCL of 38.7 mg/kg was calculated for the lead concentrations remaining in site soils, which does not exceed the Tier 1 PCL of 84.5 mg/kg (Appendix G). A 95% UCL of 113.6 mg/kg was calculated for the zinc concentrations remaining in site soils, which does not exceed the Tier 1 PCL of 120 mg/kg (Appendix G).

3.1.3 Waste Characterization and Off-Post Disposal Activities

Waste characterization efforts were performed in accordance with requirements of CSSA's *RCRA Facility Investigation (RFI) and Interim Measures (IM) Waste Management Plan (WMP) – Revised*, dated May 2006 (approved by TCEQ in August 2006) and the RFI/IM WMP Addendum for AOC-51, dated March 2012.

Excavated material was stockpiled along and adjacent to the excavation site during the excavation for waste characterization and then moved to the assigned staging area for waste characterization. TCLP results from the stockpiled soils indicated the material met non-hazardous Class 2 criteria, so approximately 1,300 CY of soils were transported to the East Pasture Berm for reuse, as per TCEQ approval December 20, 2010 (**Appendix E**).

3.2 SITE GEOLOGY/HYDROGEOLOGY

Based on the sampling results and the geological and hydrogeological characteristics of the site, surface water and groundwater have not been affected by historical activities at AOC-51. A description of the geology and hydrogeology of the area is provided below. Additional information on geology, hydrology and physiography at CSSA are also available in the CSSA EE (Volume 1-1, Background Information Report).

3.2.1 CSSA Geology/Hydrogeology

The Lower Glen Rose (LGR) is the uppermost geologic stratum in the CSSA area. The LGR is a massive, fossiliferous, vuggy limestone that grades upward into thin beds of limestone, marl, and shale. The LGR is approximately 300-330 ft thick in the CSSA area and is underlain by the Bexar Shale (BS) facies of the Hensell Sand, which is estimated to be from 60 to 150 ft thick under the CSSA area. The BS consists of silty dolomite, marl, calcareous shale, and shaley limestone. The geologic strata dip approximately 1 to 2 degrees to the south-southeast at CSSA.

The uppermost hydrogeologic layer at CSSA is the unconfined Upper Trinity aquifer, which consists of the Upper Glen Rose (UGR) Limestone. Locally at CSSA, very low-yielding perched zones of groundwater can exist in the UGR; however, it is very sporadic and seasonal. Transmissivity values are not available for the UGR. 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 of discordant static water levels in adjacent wells completed in different beds. Principal development of solution channels is limited to evaporite layers in the UGR Limestone.

The Middle Trinity aquifer functions as the primary source of groundwater at CSSA. It consists of the LGR Limestone, the BS, and the Cow Creek (CC) Limestone. The LGR Limestone outcrops north of CSSA, along Cibolo Creek, and within the central and southwestern portions of CSSA. As such, principal recharge into the Middle Trinity aquifer is via precipitation infiltration at outcrops and along creek beds during flood events. At CSSA, the BS is interpreted as a confining layer, except where it is fractured and faulted, allowing vertical flow from the up-dip CC Limestone into the overlying, down-dip LGR. Fractures and faults within the BS may allow hydraulic communication between the LGR and CC Limestones. Regional groundwater flow within the Middle Trinity aquifer is toward the south and southeast and the average transmissivity coefficient is 1,700 gallons per day per ft (CSSA EE, Volume 5, Hydrogeologic Report). In general, groundwater at CSSA flows in a northeast to southwest direction. However, local flow gradient may vary depending on rainfall, recharge, and possibly well pumping.

3.2.2 AOC-51 Groundwater and Surface Water

No site-specific information regarding groundwater is available for AOC-51. However, between October 1992 and December 2011, measured water levels at Well CS-1, which is located approximately 1,700 ft southwest of the site, have ranged from 65.5 ft below top of casing (BTOC) (December 2004) to 355.9 ft BTOC (December 2006). Groundwater samples have been collected from this well and analyzed for metals and volatile organic compounds (VOCs) since 1995. Lead has been detected slightly above its maximum contaminant level (MCL) of 0.015 milligrams per liter (mg/L) on eight occasions at concentrations ranging up to 0.029 mg/L. Although lead was a COC at AOC-51, no pattern in the lead detections has been identified, and it is very unlikely that this site is the source of the metal contamination. No other analytes have exceeded MCLs. Sporadic low concentrations of VOCs detected in CS-1 (below their respective MCLs) are attributed to contaminated groundwater from the SWMU B-3 bioreactor plume.

The closest surface water body to AOC-51 is an unnamed intermittent tributary of Salado Creek approximately 100 ft north of the site (**Figure 7**). The tributary, which only contains water

immediately after significant rain events, drains to Salado Creek, located approximately 1,500 ft west of AOC-51. The north-south trending creek exits the CSSA boundary approximately 1,400 ft west of the site. No significant degradation of high quality receiving waters is anticipated from AOC-51.

4.0 TIER 1 ECOLOGICAL EXCLUSION CRITERIA CHECKLIST

In accordance with TCEQ (2003) guidance, an RIR is submitted when the results of an investigation lead to a conclusion that COCs do not exceed Tier 1 residential soil action levels and there is no evidence of other affected media. The site must also pass the Tier 1 Ecological Exclusion Criteria Checklist. The checklist must be completed as part of the RIR for a site. The completed checklist is provided in **Appendix B**. Results show that the site passes the checklist and that there are no ecological exposure pathways of concern at AOC-51. Thus, based on the absence of any complete or significant ecological exposure pathways, AOC-51 may be excluded from further ecological assessment.

5.0 SUMMARY AND RECOMMENDATIONS

AOC 51 is a 29.2-acre site located in the East Pasture. There are no records of waste management occurring in a specific area within AOC-51; however, UXO has been found in the area. Prior uses are unknown.

In summary, activities at AOC-51 as described in this RIR showed the following results:

- Excavation, removal, and confirmation sampling were performed at AOC-51.
- Soils found to have COC concentrations above the Tier 1 PCLs were either excavated from the site or were used to calculate a 95% UCL per TAC §350.79(2)(A) that does not exceed the Tier 1 PCL.
- Approximately 1,300 CY of contaminated soil were excavated and properly disposed of at the East Pasture Berm.

From the information presented in this report, the results of the investigations at AOC-51 meet the three criteria as described in TCEQ (2003) guidance *Determining Which Releases are Subject to TRRP*. Thus, the following criteria were met:

- Soil found to have a COC concentrations above Tier 1 PCLs were either excavated from the site or used to calculate a 95% UCL per TAC §350.79(2)(A) that does not exceed the Tier 1 PCL;
- There is no evidence of other affected or threatened environmental media (groundwater, surface water, or sediment) at AOC-51; and
- RMU-5 passes the Tier 1 Ecological Exclusion Criteria Checklist (Appendix B).

Because these three criteria are met, AOC-51 is not subject to TRRP. Therefore, this RIR requests an NFA decision from the TCEQ.

TABLES AND FIGURES

Table 1. Summary of Chemical Constituents Remaining in Soils at AOC-51

	Metals																																	
	Arsenic CAS: 7440-38-2	Qualifier	Dilution	Barium CAS: 7440-39-3	Qualifier	Dilution	Cadmium CAS: 7440-43-9	Qualifier	Dilution	Chromium CAS: 7440-47-3	Qualifier	Dilution	Copper CAS: 7440-50-8	Qualifier	Dilution	Lead CAS: 7439-92-1	Qualifier	Dilution	Mercury CAS: 7439-97-6	Qualifier	Dilution	Nickel CAS: 7440-02-0	Qualifier	Dilution	Zinc CAS: 7440-66-6	Qualifier	Dilution
Tier 1 Soil PCLs - 30 acre[†]																																		
Residential Combined Exposure[1]	2.40E+01	n		8.10E+03	n		5.20E+01	n		2.70E+04	n		5.50E+02	n		5.00E+02	n		2.10E+00	n		8.30E+02	n		9.90E+03	n	
Residential Groundwater Exposure[2]	2.50E+00	m	>S	2.20E+02	m	>S	7.50E-01	m	>S	**1.20E+03**	m	>S	5.20E+02	a	>S	1.50E+00	a	>S	3.90E-03	m		**7.90E+01**	n	>S	1.20E+03	n	>S
Ecological Benchmark[3]	1.80E+01			3.30E+02			3.20E+01			4.00E-01			**6.10E+01**			1.20E+02			1.00E-01			3.00E+01			**1.20E+02**		
TCEQ-Approved Background Values																																		
CSSA 9 Metals Background Concentration[4]	**19.6**	††		**300**	†††		**3**	††		40.2	††		23.2	††		**84.5**	††		**0.77**	††		35.5	††		73.2	††	
Sample Locations (Date Collected)																																		
AOC51-SS01 (23-May-2005)	**3.5**	M	1	**21**	M	1	**0.21**	M	1	**8.3**	M	1	**6.1**		1	**11**		5	**0.050**	F	1	**5.3**		1	**10**		1
AOC51-SS02 (23-May-2005)	**6.4**	M	5	**72**	M	1	**0.58**	M	5	**18**	M	1	**11**		1	**21**		10	**0.040**	F	1	**13**		1	**29**		1
AOC51-SS03 (23-May-2005)	**8.7**	M	2	**130**	M	1	**0.49**	M	2	**31**	M	1	**19**		1	**32**		10	**0.050**	F	1	**23**		1	**43**		1
AOC51-SS04 (23-May-2005)	**2.0**	M	1	**21**	M	1	**0.27**	M	2	**5.1**	M	1	**4.5**		1	**24**		10	**0.050**	F	1	**2.9**		1	**14**		1
AOC51-SS05 (23-May-2005)	**5.8**	M	2	**80**	M	1	**0.44**	M	2	**18**	M	1	**13**		1	**22**		10	**0.040**	F	1	**14**		1	**30**		1
AOC51-SS06 (23-May-2005)	**3.3**	M	1	**48**	M	1	**0.21**	M	1	**12**	M	1	**8.9**		1	**13**		5	**0.020**	F	1	**7.8**		1	**13**		1
AOC51-SS07 (23-May-2005)	**4.6**	M	1	**54**	M	1	**0.31**	M	2	**15**	M	1	**11**		1	**22**		10	**0.030**	F	1	**10.0**		1	**29**		1
AOC51-SS08 (23-May-2005)	**2.6**	M	1	**30**	M	1	**0.28**	M	2	**6.5**	M	1	**5.4**		1	**29**		10	**0.030**	F	1	**4.0**		1	**18**		1
AOC51-SS09 (23-May-2005)	**2.1**	M	1	**22**	M	1	**0.13**	M	1	**7.5**	M	1	**4.8**		1	**6.5**		2	0.010	U	1	**4.3**		1	**7.5**		1
AOC51-SS10 (15-Nov-2011)	**4.1**	F	1	**16**	M	1	0.030	M	1	**5.0**	F	1	**5.4**	J	1	**26**	M	1	**0.070**	F	1	**4.8**	M	1	**8.8**	M	1
AOC51-SS10-DUP (15-Nov-2011)	**4.4**	F	1	**16**		1	0.030	UJ	1	**4.2**	F	1	**8.2**	J	1	**24**	J	1	**0.070**	F	1	**4.2**	J	1	**15**	J	1
AOC51-SS11 (15-Nov-2011)	**7.1**	F	1	**50**		1	**0.090**	F	1	**15**	F	1	**82**	J	1	**5,800**	J	50	**0.10**		1	**25**	J	1	**33**	J	1
AOC51-SS12 (15-Nov-2011)	**4.0**	F	1	**23**		1	0.030	UJ	1	**6.8**	F	1	**5.2**	J	1	**45**	J	1	**0.060**	F	1	**5.4**	J	1	**13**	J	1
AOC51-SS13 (16-Jan-2012)	**1.9**	F	1	**75**		1	0.030	UJ	1	**26**		1	**15**		1	**39**	J	1	**0.060**	F	1	**14**		1	**42**	J	1
AOC51-SS13-DUP (16-Jan-2012)	**4.5**	F	1	**68**		1	0.030	UJ	1	**23**		1	**14**		1	**35**	J	1	**0.050**	F	1	**13**		1	**38**	J	1
AOC51-SS14 (16-Jan-2012)	**4.6**	F	1	**56**		1	0.030	UJ	1	**18**	F	1	**16**		1	**73**	J	1	**0.17**		1	**12**		1	**120**	J	1
AOC51-SS15 (16-Jan-2012)	**3.8**	F	1	**28**		1	0.030	UJ	1	**10**	F	1	**6.2**		1	**27**	J	1	**0.070**	F	1	**7.5**		1	**490**	J	1
AOC51-SS16 (16-Jan-2012)	**4.7**	F	1	**110**		1	0.030	UJ	1	**36**		1	**13**		1	**78**	J	1	**0.080**	F	1	**18**		1	**62**	J	1
AOC51-SS17 (16-Jan-2012)	**2.5**	F	1	**70**		1	0.030	UJ	1	**21**		1	**8.0**		1	**100**	J	1	**0.060**	F	1	**12**		1	**170**	J	1
AOC51-SS18 (16-Jan-2012)	**2.6**	F	1	**73**		1	0.030	UJ	1	**14**	F	1	**6.2**		1	**52**	J	1	**0.070**	F	1	**8.9**		1	**280**	J	1
AOC51-SS19 (14-Feb-2012)	**6.4**	F	1	**43**		1	0.030	UJ	1	**12**	F	1	**14**		1	**38**		1	**0.090**	F	1	**8.3**		1	**34**	J	1
AOC51-SS20 (14-Feb-2012)	**12**	F	1	**57**		1	0.030	UJ	1	**23**		1	**30**		1	**92**		1	**0.070**	F	1	**18**		1	**42**	J	1
AOC51-SS21 (14-Feb-2012)	**2.9**	F	1	**12**		1	0.030	UJ	1	**3.1**	F	1	**13**		1	**77**		1	**0.030**	F	1	**3.0**		1	**10**	J	1
AOC51-SS22 (14-Feb-2012)	**8.1**	F	1	**53**		1	0.030	UJ	1	**17**	F	1	**23**		1	**53**		1	**0.080**	F	1	**14**		1	**42**	J	1
AOC51-SS23 (14-Feb-2012)	**4.1**	F	1	**26**		1	0.030	UJ	1	**7.1**	F	1	**12**		1	**44**		1	**0.050**	F	1	**4.7**		1	**22**	J	1
AOC51-SS24 (14-Feb-2012)	**4.5**	F	1	**30**		10	0.030	M	1	**7.2**	F	1	**21**		1	**370**	M	10	**0.040**	F	1	**6.8**		1	**8.2**	M	1
AOC51-SS24-DUP (14-Feb-2012)	**4.3**	F	1	**29**		10	0.030	UJ	1	**6.2**	F	1	**21**		1	**270**		10	**0.050**	F	1	**6.1**		1	**14**	J	1
AOC51-SS25 (14-Feb-2012)	**8.9**	F	1	**54**		1	0.030	UJ	1	**17**	F	1	**22**		1	**71**		1	**0.070**	F	1	**14**		1	**41**	J	1
AOC51-SS26 (14-Feb-2012)	**9.0**	F	1	**44**		1	0.030	UJ	1	**17**	F	1	**24**		1	**51**		1	**0.080**	F	1	**15**		1	**29**	J	1
AOC51-SS27 (14-Feb-2012)	**4.6**	F	1	**28**		1	0.030	UJ	1	**7.5**	F	1	**74**		1	**1,300**		10	**0.040**	F	1	**13**		1	**13**	J	1
AOC51-SS28 (14-Feb-2012)	**6.0**	F	1	**39**		1	0.030	UJ	1	**12**	F	1	**13**		1	**43**		1	**0.070**	F	1	**8.3**		1	**22**	J	1
AOC51-SS29 (14-Feb-2012)	**8.6**	F	1	**52**		1	0.030	UJ	1	**17**	F	1	**14**		1	**65**		1	**0.080**	F	1	**12**		1	**36**	J	1
AOC51-SS30 (14-Feb-2012)	**7.4**	F	1	**42**		1	0.030	UJ	1	**12**	F	1	**12**		1	**20**		1	**0.060**	F	1	**9.4**		1	**23**	J	1
AOC51-SS31 (14-Feb-2012)	**7.1**	F	1	**59**		1	0.030	UJ	1	**15**	F	1	**12**		1	**14**		1	**0.050**	F	1	**10**		1	**24**	J	1
AOC51-SS32 (14-Feb-2012)	**5.9**	F	1	**43**		1	0.030	UJ	1	**12**	F	1	**11**		1	**39**		1	**0.050**	F	1	**7.5**		1	**19**	J	1
AOC51-SS33 (15-Mar-2012)	**6.6**	F	1	**39**		2	0.030	UJ	1	**15**	F	1	**9.0**	J	2	**11**		1	**0.080**	F	1	**8.3**		2	**20**	J	2

Table 1. Summary of Chemical Constituents Remaining in Soils at AOC-51

	Metals																																	
	Arsenic CAS: 7440-38-2	Qualifier	Dilution	Barium CAS: 7440-39-3	Qualifier	Dilution	Cadmium CAS: 7440-43-9	Qualifier	Dilution	Chromium CAS: 7440-47-3	Qualifier	Dilution	Copper CAS: 7440-50-8	Qualifier	Dilution	Lead CAS: 7439-92-1	Qualifier	Dilution	Mercury CAS: 7439-97-6	Qualifier	Dilution	Nickel CAS: 7440-02-0	Qualifier	Dilution	Zinc CAS: 7440-66-6	Qualifier	Dilution
Tier 1 Soil PCLs - 30 acre†																																		
Residential Combined Exposure[1]	2.40E+01	n		8.10E+03	n		5.20E+01	n		2.70E+04	n		5.50E+02	n		5.00E+02	n		2.10E+00	n		8.30E+02	n		9.90E+03	n	
Residential Groundwater Exposure[2]	2.50E+00	m	>S	2.20E+02	m	>S	7.50E-01	m	>S	**1.20E+03**	m	>S	5.20E+02	a	>S	1.50E+00	a	>S	3.90E-03	m		**7.90E+01**	n	>S	1.20E+03	n	>S
Ecological Benchmark[3]	1.80E+01			3.30E+02			3.20E+01			4.00E-01			**6.10E+01**			1.20E+02			1.00E-01			3.00E+01			**1.20E+02**		
TCEQ-Approved Background Values																																		
CSSA 9 Metals Background Concentration[4]	**19.6**	††		**300**	†††		**3**	††		40.2	††		23.2	††		**84.5**	††		**0.77**	††		35.5	††		73.2	††	
Sample Locations (Date Collected)																																		
AOC51-SS34 (15-Mar-2012)	**12**	F	1	**93**		2	0.030	UJ	1	**26**		1	**19**	J	2	**23**		1	**0.060**	F	1	**19**		2	**41**	J	2
AOC51-SS35 (15-Mar-2012)	**5.4**	F	1	**73**		2	0.030	UJ	1	**11**	F	1	**8.6**	J	2	**46**		2	**0.020**	F	1	**8.8**		2	**92**	J	2
AOC51-SS36 (15-Mar-2012)	**5.5**	F	1	**62**		2	0.030	UJ	1	**10**	F	1	**6.5**	J	2	**15**		1	**0.030**	F	1	**8.2**		2	**25**	J	2
AOC51-SS36-DUP (15-Mar-2012)	**4.4**	F	1	**62**		2	0.030	UJ	1	**9.8**	F	1	**13**	J	2	**13**		1	**0.030**	F	1	**8.7**		2	**76**	J	2
AOC51-SS37 (14-Mar-2012)	**5.8**	F	1	**42**		2	0.030	UJ	1	**12**	F	1	**16**	J	2	**58**		2	**0.090**	F	1	**8.4**		1	**19**	J	2
AOC51-SS38 (14-Mar-2012)	**1.7**	F	1	**12**		2	0.030	UJ	1	**4.6**	F	1	**4.9**	J	2	**17**		1	**0.040**	F	1	**0.74**	F	1	0.60	UJ	1
AOC51-SS40 (14-Mar-2012)	**1.6**	F	1	**5.8**		2	0.030	UJ	1	**3.5**	F	1	**4.1**	J	1	**320**		2	**0.030**	F	1	**0.93**	F	1	**4.4**	F	1
AOC51-SS42 (14-Mar-2012)	**3.8**	F	1	**34**		2	0.030	UJ	1	**9.0**	F	1	**4.4**	J	1	**11**		1	**0.040**	F	1	**4.3**		1	**27**	J	2
AOC51-SS43 (14-Mar-2012)	**4.3**	F	1	**47**		2	0.030	UJ	1	**12**	F	1	**8.0**	J	2	**25**		1	**0.050**	F	1	**5.9**		1	**43**	J	2
AOC51-SS44 (14-Mar-2012)	**5.5**	F	1	**49**		2	0.030	UJ	1	**12**	F	1	**10.0**	J	2	**25**		1	**0.080**	F	1	**6.6**		1	**53**	J	2
AOC51-SS45 (15-Mar-2012)	**5.7**	F	1	**30**		2	0.030	UJ	1	**5.5**	F	1	**9.9**	J	2	**43**		2	**0.10**		1	**6.7**		2	**32**	J	2
AOC51-SS46 (15-Mar-2012)	**9.2**	F	1	**48**		2	0.030	UJ	1	**12**	F	1	**13**	J	2	**23**		1	**0.080**	F	1	**15**		2	**23**	J	1
AOC51-SS47 (15-Mar-2012)	**8.2**	F	1	**48**		2	0.030	UJ	1	**14**	F	1	**16**	J	2	**21**		1	**0.060**	F	1	**14**		2	**84**	J	2
AOC51-SS71 (24-Apr-2012)	--			--			--			--			**3.4**		1	**2.2**	F	1	--			--			--		
AOC51-SS71-DUP (24-Apr-2012)	--			--			--			--			**4.0**		1	**2.8**	F	1	--			--			--		
AOC51-SS72 (24-Apr-2012)	--			--			--			--			**28**		1	**32**		1	--			--			--		
AOC51-SS73 (24-Apr-2012)	--			--			--			--			--			**4.9**	F	1	--			--			--		
AOC51-SS74 (24-Apr-2012)	--			--			--			--			**4.5**		1	**6.7**	F	1	--			--			--		
AOC51-SS75 (26-Apr-2012)	--			--			--			--			--			0.18	U	1	--			--			--		
AOC51-SS76 (01-May-2012)	--			--			--			--			--			0.18	U	1	--			--			--		

NOTES:

† TCEQ, TRRP Tier 1 Soil PCLs (Last Revised: May 24, 2011).

†† CSSA Soil Background Concentrations. Second Revision, Evaluation of Background Metals Concentrations in Soils and Bedrock at CSSA. February 2002. Values from Table 3.3.

††† Texas-Specific median background concentration.

PCLs and CSSA background values coded in this table as [1, 2, 3].

[1] $^{Tot}Soil_{Comb}$ = PCL for COPC in soil for a 30 acre source area and a potential future resident (combined exposure for ingestion, dermal contact, inhalation of volatiles and particulates, and ingestion of above-ground and below-ground vegetables).

[2] $^{GW}Soil_{Ing}$ = PCL for COPC in soil for a 30 acre source area and a potential future resident (soil-to-groundwater leaching of COPC to Class 1 and 2 groundwater).

[3] TCEQ Ecological Benchmark for Soil (Last Revised: January 2006).

[4] CSSA Soil Background Concentrations.

All values are measured in milligrams per kilogram (mg/Kg) unless otherwise noted.

c = carcinogenic.
n = noncarcinogenic.
m = primary MCL-based.
a = EPA Action Level-based.
>S = solubility limit exceeded during calculation.
na = not applicable.
PCLs are shown in **blue** font.

QA NOTES AND DATA QUALIFIERS:

(NO CODE) - Confirmed identification.
U - Analyte was not detected above the indicated Method Detection Limit (MDL).
F - Analyte was positively identified, but the quantitation is an estimation above the MDL and below the Reporting Limit (RL).
J - Analyte was positively identified, but the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
M = Concentration is estimated due to a matrix effect.
Values shown in **BOLD** indicate detections above the MDL.
Values **HIGHLIGHTED** indicate detections above the PCL.

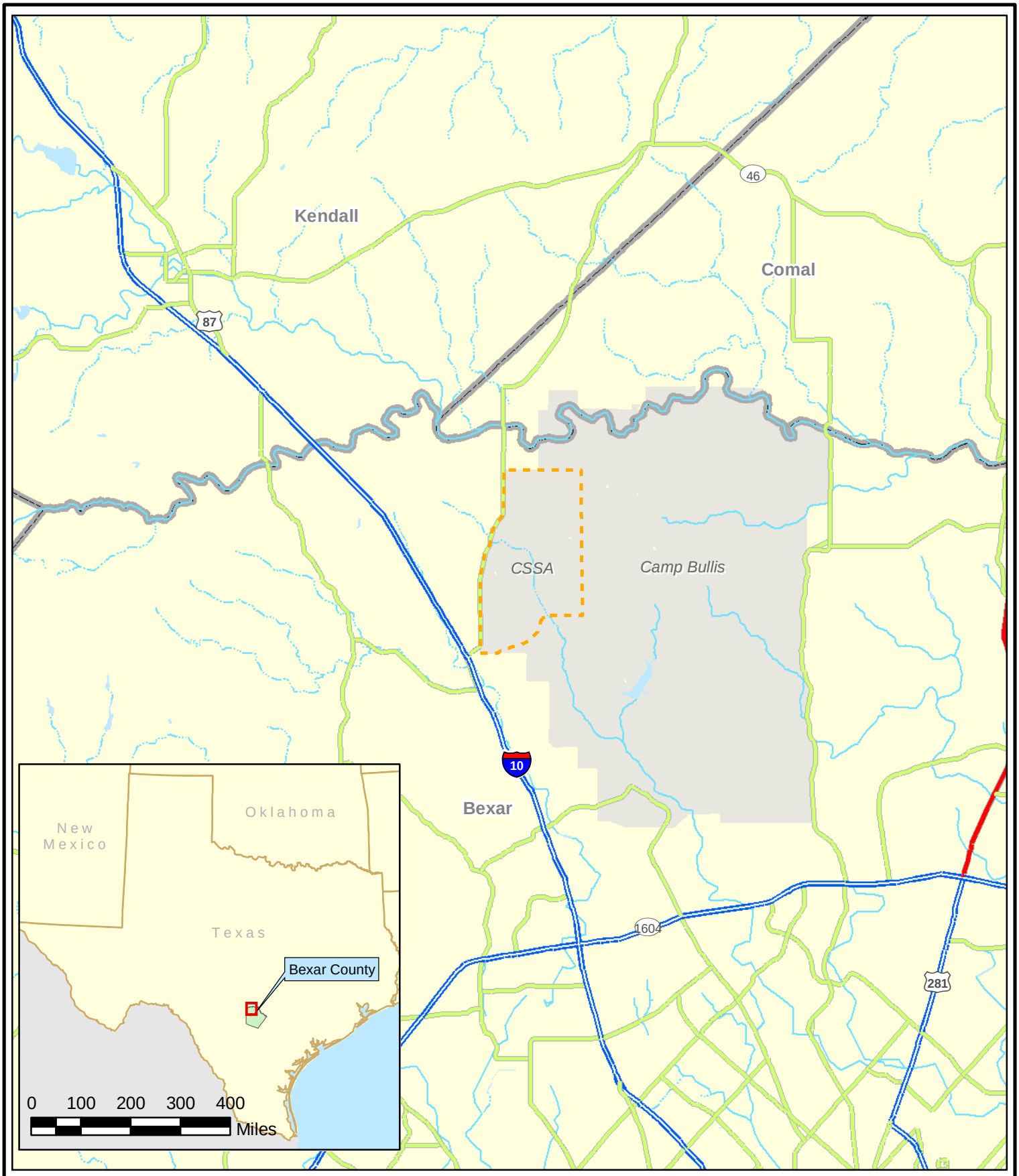

Figure 1

CSSA Location Map
Camp Stanley Storage Activity

PARSONS

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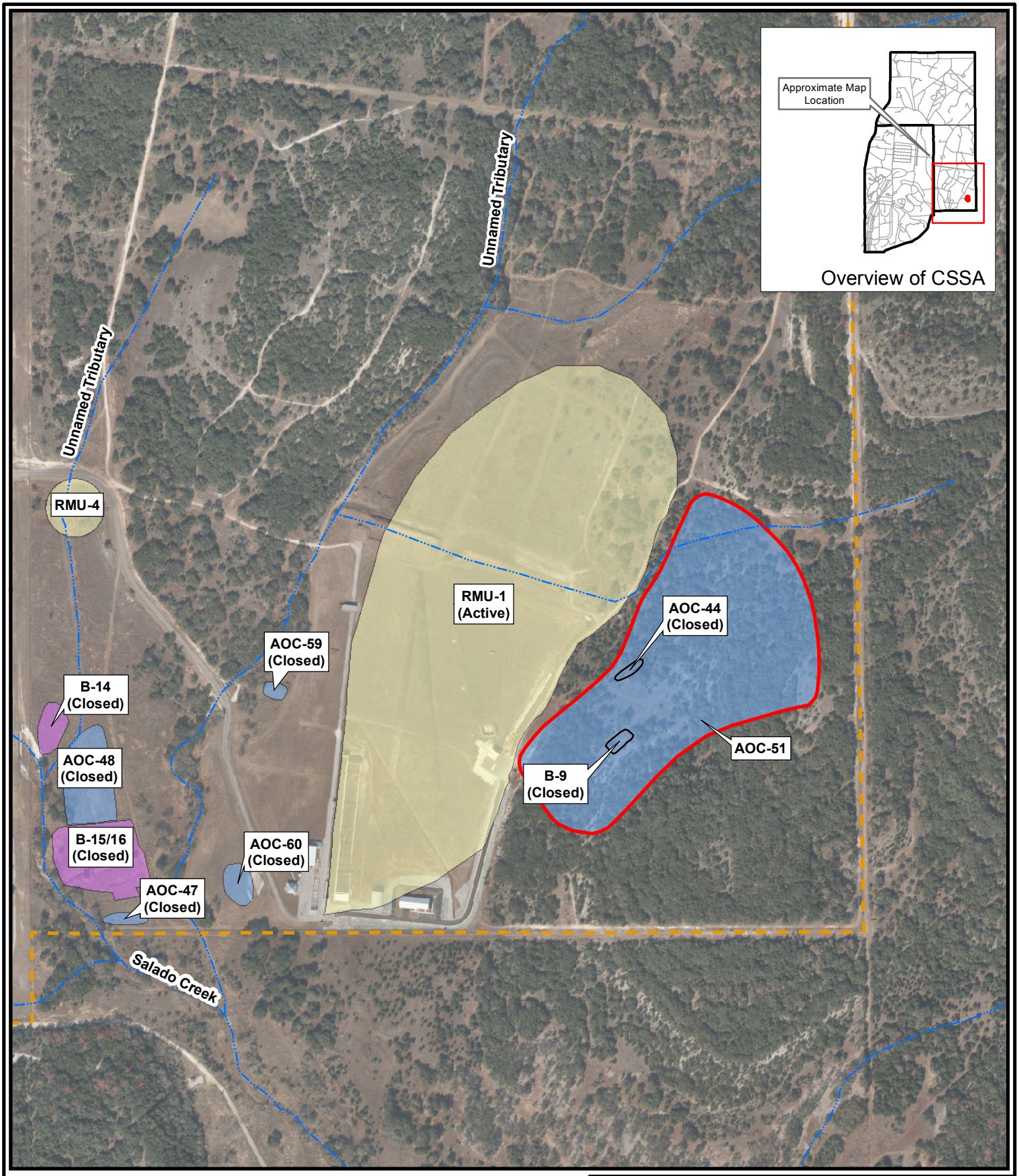

Aerial Photo Date: 2010

N
W E
S

650 325 0 650 Feet

AOC-51 Boundary
AOC Boundary
RMU Boundary
SWMU Boundary
Intermittent Stream
CSSA Outer Fence Line

Figure 2

AOC-51
Location Map
Camp Stanley Storage Activity

PARSONS

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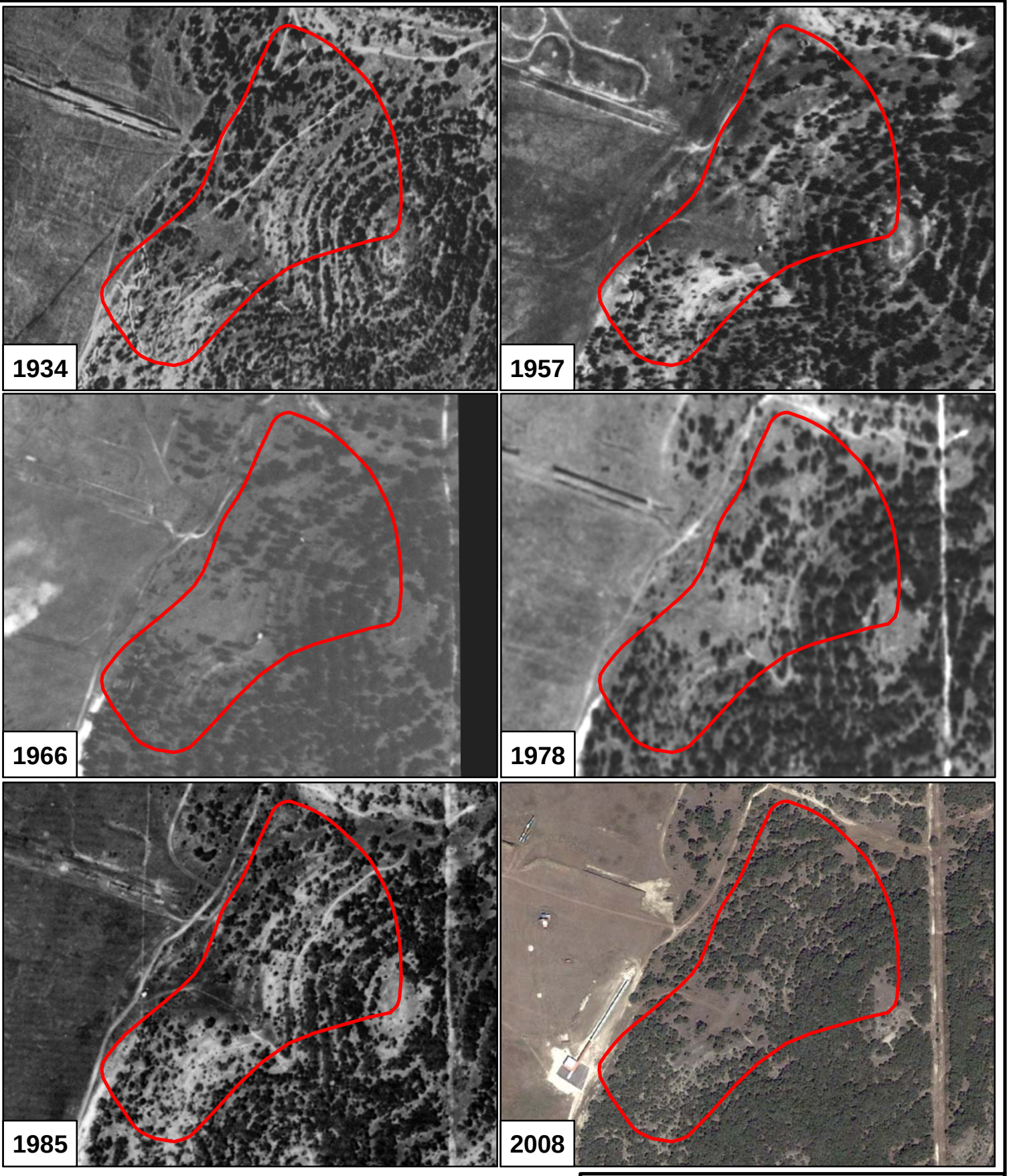

Figure 3

AOC-51
Aerial Photographs
Camp Stanley Storage Activity

PARSONS

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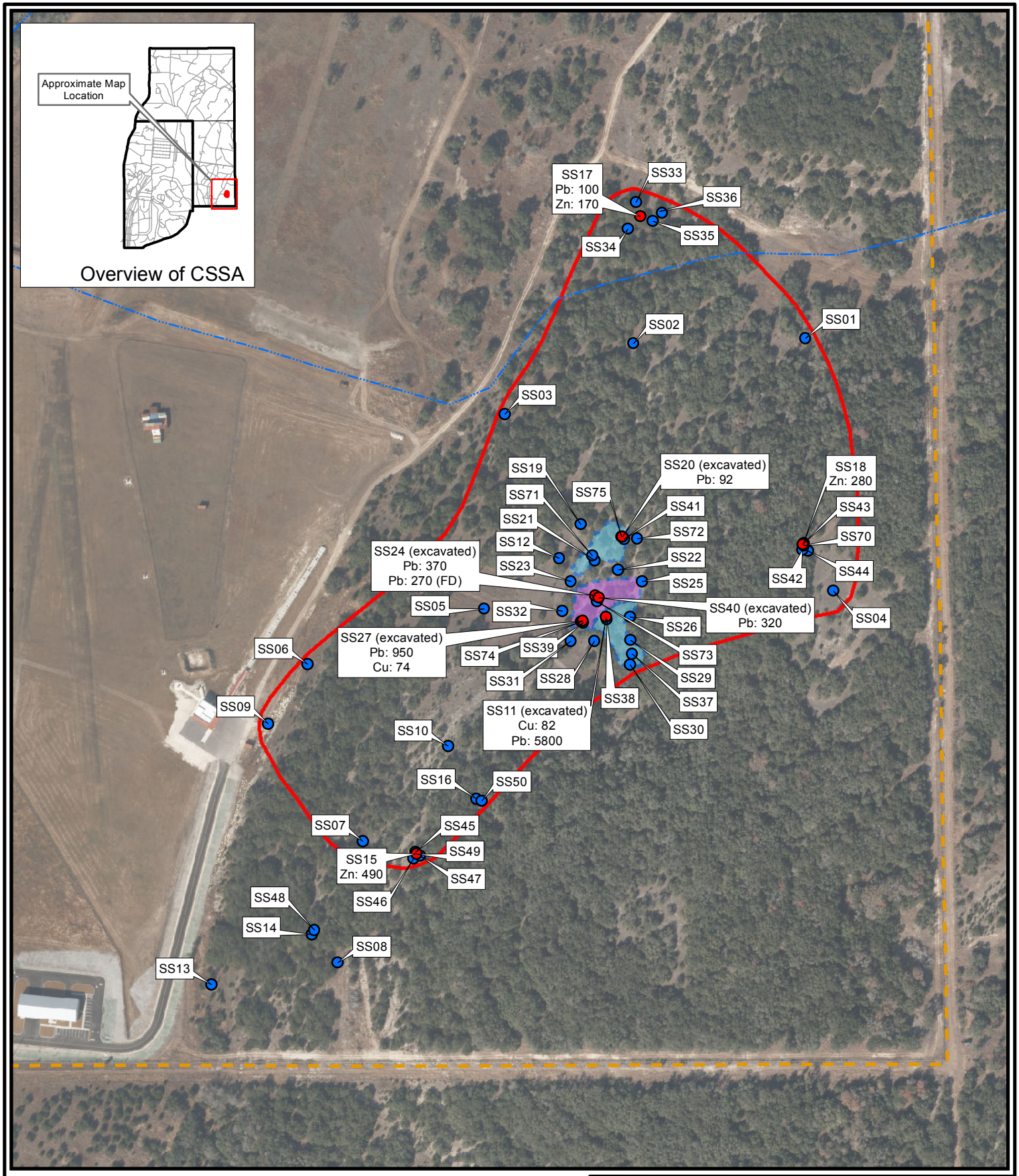

Figure 4

AOC-51
Sample and Excavation Locations
Camp Stanley Storage Activity

PARSONS

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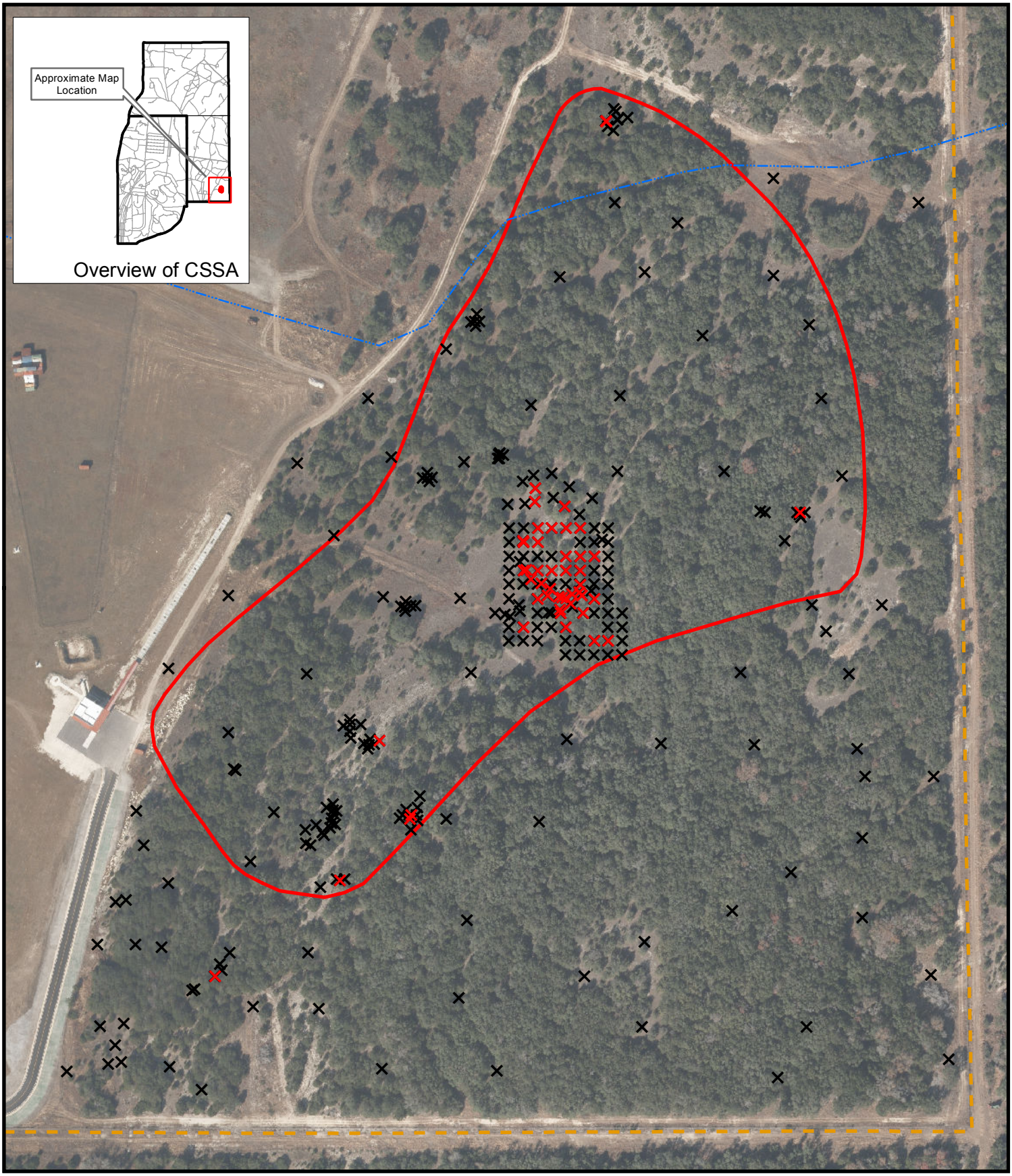

Figure 5

AOC-51
XRF Sampling Results
Camp Stanley Storage Activity

PARSONS

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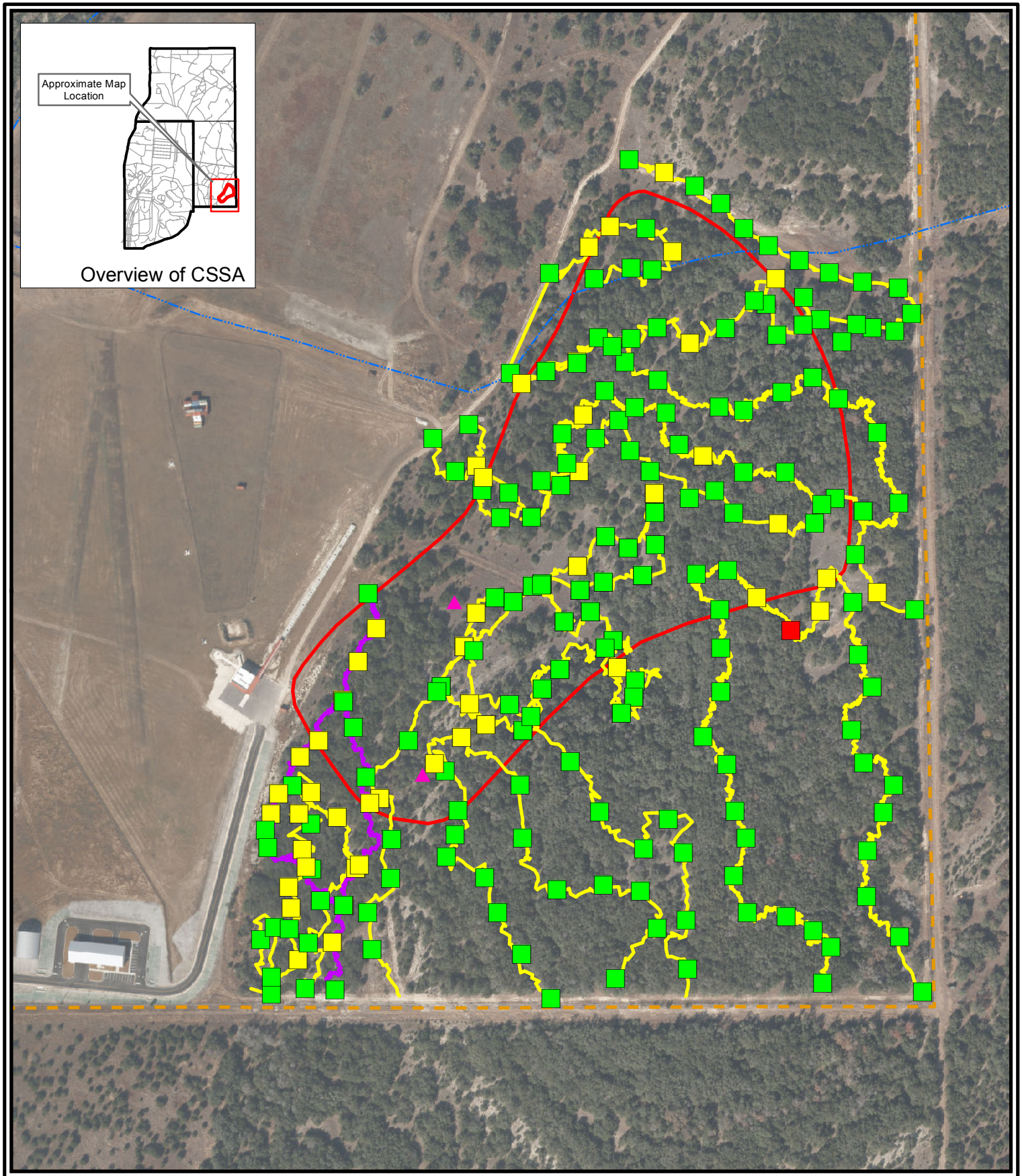

Figure 6

AOC-51
MEC/MD Investigation Results
Camp Stanley Storage Activity

PARSONS

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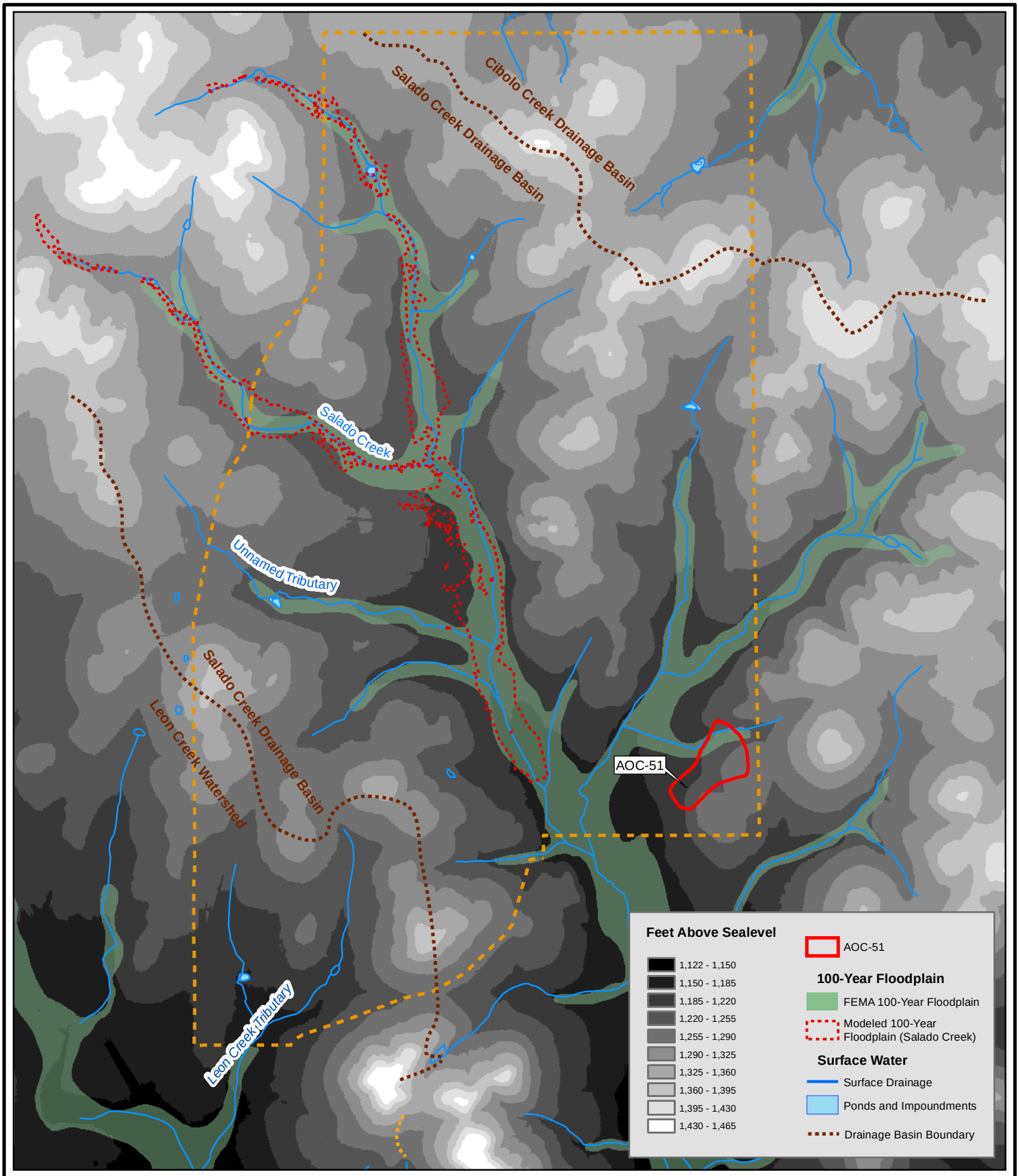

0 0.25 0.5 0.75 1 Miles

Figure 7

AOC-51 Topography, Surface Water, and Floodplains Camp Stanley Storage Activity

PARSONS

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APPENDIX A
Site Photographs

Photo 1. View of AOC-51, looking northeast (December 2001).

Photo 2. View of AOC-51, looking northwest (December 2001).

Photo 3. Excavation of AOC-51, looking northwest (March 2012).

Photo 4. AOC-51 after excavation, looking northeast (May 2012).

Photo 5. AOC-51 after excavation, looking southeast (May 2012).

Photo 6. AOC-51 after excavation, looking southeast (May 2012).

APPENDIX B

Tier 1 Ecological Exclusion Criteria Checklist

Figure: 30 TAC §350.77(b)

TIER 1: Exclusion Criteria Checklist

This exclusion criteria checklist is intended to aid the person and the TNRCC in determining whether or not further ecological evaluation is necessary at an affected property where a response action is being pursued under the Texas Risk Reduction Program (TRRP). Exclusion criteria refer to those conditions at an affected property which preclude the need for a formal ecological risk assessment (ERA) because there are **incomplete or insignificant ecological exposure pathways** due to the nature of the affected property setting and/or the condition of the affected property media. This checklist (and/or a Tier 2 or 3 ERA or the equivalent) must be completed by the person for all affected property subject to the TRRP. The person should be familiar with the affected property but need not be a professional scientist in order to respond, although some questions will likely require contacting a wildlife management agency (i.e., Texas Parks and Wildlife Department or U.S. Fish and Wildlife Service). The checklist is designed for general applicability to all affected property; however, there may be unusual circumstances which require professional judgement in order to determine the need for further ecological evaluation (e.g., cave-dwelling receptors). In these cases, the person is strongly encouraged to contact TNRCC before proceeding.

Besides some preliminary information, the checklist consists of three major parts, **each of which must be completed unless otherwise instructed.** PART I requests affected property identification and background information. PART II contains the actual exclusion criteria and supportive information. PART III is a qualitative summary statement and a certification of the information provided by the person. **Answers should reflect existing conditions and should not consider future remedial actions at the affected property.** Completion of the checklist should lead to a logical conclusion as to whether further evaluation is warranted. Definitions of terms used in the checklist have been provided and users are strongly encouraged to familiarize themselves with these definitions before beginning the checklist.

Name of Facility:

Camp Stanley Storage Activity (CSSA), Boerne, Texas.

Affected Property Location:

AOC-51 is located in the southeast corner of CSSA, located in the East Pasture. This site covers 29.2 acres.

Mailing Address:

Camp Stanley Storage Activity
25800 Ralph Fair Road
Boerne, TX 78015

TNRCC Case Tracking #s:

Water Customer No.: CN602728206.
Air Customer No.: CN600126262.

Solid Waste Registration #s:

Texas Solid Waste Registration No.: 69026.

Voluntary Cleanup Program #: **Not applicable.**

EPA I.D. #s:

USEPA Identification No.: TX2210020739.

Figure: 30 TAC §350.77(b)

Definitions[1]

Affected property - The entire area (i.e., on-site and off-site; including all environmental media) which contains releases of chemicals of concern at concentrations equal to or greater than the assessment level applicable for residential land use and groundwater classification.

Assessment level - A critical protective concentration level for a chemical of concern used for affected property assessments where the human health protective concentration level is established under a Tier 1 evaluation as described in §350.75(b) of this title (relating to Tiered Human Health Protective Concentration Level Evaluation), except for the protective concentration level for the soil-to-groundwater exposure pathway which may be established under Tier 1, 2, or 3 as described in §350.75(i)(7) of this title, and ecological protective concentration levels which are developed, when necessary, under Tier 2 and/or 3 in accordance with §350.77(c) and/or (d), respectively, of this title (relating to Ecological Risk Assessment and Development of Ecological Protective Concentration Levels).

Bedrock - The solid rock (i.e., consolidated, coherent, and relatively hard naturally formed material that cannot normally be excavated by manual methods alone) that underlies gravel, soil or other surficial material.

Chemical of concern - Any chemical that has the potential to adversely affect ecological or human receptors due to its concentration, distribution, and mode of toxicity. Depending on the program area, chemicals of concern may include the following: solid waste, industrial solid waste, municipal solid waste, and hazardous waste as defined in Texas Health and Safety Code, §361.003, as amended; hazardous constituents as listed in 40 Code of Federal Regulations Part 261, Appendix VIII, as amended; constituents on the groundwater monitoring list in 40 Code of Federal Regulations Part 264, Appendix IX, as amended; constituents as listed in 40 CFR Part 258 Appendices I and II, as amended; pollutant as defined in Texas Water Code, §26.001, as amended; hazardous substance as defined in Texas Health and Safety Code, §361.003, as amended, and the Texas Water Code §26.263, as amended; regulated substance as defined in Texas Water Code §26.342, as amended and §334.2 of this title (relating to Definitions), as amended; petroleum product as defined in Texas Water Code §26.342, as amended and §334.122(b)(12) of this title (relating to Definitions for ASTs), as amended; other substances as defined in Texas Water Code §26.039(a), as amended; and daughter products of the aforementioned constituents.

Community - An assemblage of plant and animal populations occupying the same habitat in which the various species interact via spatial and trophic relationships (e.g., a desert community or a pond community).

Complete exposure pathway - An exposure pathway where a human or ecological receptor is exposed to a chemical of concern via an exposure route (e.g., incidental soil ingestion, inhalation of volatiles and particulates, consumption of prey, etc).

De minimus - The description of an area of affected property comprised of one acre or less where the ecological risk is considered to be insignificant because of the small extent of contamination, the absence of protected species, the availability of similar unimpacted habitat nearby, and the lack of adjacent sensitive environmental areas.

Ecological protective concentration level - The concentration of a chemical of concern at the point of exposure within an exposure medium (e.g., soil, sediment, groundwater, or surface water) which is determined in accordance with §350.77(c) or (d) of this title (relating to Ecological Risk Assessment and Development of Ecological Protective Concentration Levels) to be protective for ecological receptors. These concentration levels are primarily intended to be protective for more mobile or wide-ranging ecological receptors and, where appropriate, benthic invertebrate communities within the waters in the state. These concentration levels are not intended to be directly protective of receptors with limited mobility or range (e.g., plants, soil invertebrates, and small rodents), particularly those residing within active areas of a facility, unless these receptors are threatened/endangered species or unless impacts to these receptors result in disruption of the ecosystem or other unacceptable consequences for the more

[1]These definitions were taken from 30 TAC §350.4 and may have both ecological and human health applications. For the purposes of this checklist, it is understood that only the ecological applications are of concern.

mobile or wide-ranging receptors (e.g., impacts to an off-site grassland habitat eliminate rodents which causes a desirable owl population to leave the area).

Ecological risk assessment - The process that evaluates the likelihood that adverse ecological effects may occur or are occurring as a result of exposure to one or more stressors; however, as used in this context, only chemical stressors (i.e., COCs) are evaluated.

Environmental medium - A material found in the natural environment such as soil (including non-waste fill materials), groundwater, air, surface water, and sediments, or a mixture of such materials with liquids, sludges, gases, or solids, including hazardous waste which is inseparable by simple mechanical removal processes, and is made up primarily of natural environmental material.

Exclusion criteria - Those conditions at an affected property which preclude the need to establish a protective concentration level for an ecological exposure pathway because the exposure pathway between the chemical of concern and the ecological receptors is not complete or is insignificant.

Exposure medium - The environmental medium or biologic tissue in which or by which exposure to chemicals of concern by ecological or human receptors occurs.

Facility - The installation associated with the affected property where the release of chemicals of concern occurred.

Functioning cap - A low permeability layer or other approved cover meeting its design specifications to minimize water infiltration and chemical of concern migration, and prevent ecological or human receptor exposure to chemicals of concern, and whose design requirements are routinely maintained.

Landscaped area - An area of ornamental, or introduced, or commercially installed, or manicured vegetation which is routinely maintained.

Off-site property (off-site) - All environmental media which is outside of the legal boundaries of the on-site property.

On-site property (on-site) - All environmental media within the legal boundaries of a property owned or leased by a person who has filed a self-implementation notice or a response action plan for that property or who has become subject to such action through one of the agency's program areas for that property.

Physical barrier - Any structure or system, natural or manmade, that prevents exposure or prevents migration of chemicals of concern to the points of exposure.

Point of exposure - The location within an environmental medium where a receptor will be assumed to have a reasonable potential to come into contact with chemicals of concern. The point of exposure may be a discrete point, plane, or an area within or beyond some location.

Protective concentration level - The concentration of a chemical of concern which can remain within the source medium and not result in levels which exceed the applicable human health risk-based exposure limit or ecological protective concentration level at the point of exposure for that exposure pathway.

Release - Any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment, with the exception of:

(A) A release that results in an exposure to a person solely within a workplace, concerning a claim that the person may assert against the person's employer;

(B) An emission from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel, or pipeline pumping station engine;

(C) A release of source, by-product, or special nuclear material from a nuclear incident, as those terms are defined by the Atomic Energy Act of 1954, as amended (42 U.S.C. §2011 et seq.), if the release is subject to requirements concerning financial protection established by the Nuclear Regulatory Commission under §170 of that Act;

(D) For the purposes of the environmental response law §104, as amended, or other response action, a release of source, by-product, or special nuclear material from a processing site designated under

§102(a)(1) or §302(a) of the Uranium Mill Tailings Radiation Control Act of 1978 (42 U.S.C. §7912 and §7942), as amended; and

(E) The normal application of fertilizer.

Sediment - Non-suspended particulate material lying below surface waters such as bays, the ocean, rivers, streams, lakes, ponds, or other similar surface water body (including intermittent streams). Dredged sediments which have been removed from below surface water bodies and placed on land shall be considered soils.

Sensitive environmental areas - Areas that provide unique and often protected habitat for wildlife species. These areas are typically used during critical life stages such as breeding, hatching, rearing of young, and overwintering. Examples include critical habitat for threatened and endangered species, wilderness areas, parks, and wildlife refuges.

Source medium - An environmental medium containing chemicals of concern which must be removed, decontaminated and/or controlled in order to protect human health and the environment. The source medium may be the exposure medium for some exposure pathways.

Stressor - Any physical, chemical, or biological entity that can induce an adverse response; however, as used in this context, only chemical entities apply.

Subsurface soil - For human health exposure pathways, the portion of the soil zone between the base of surface soil and the top of the groundwater-bearing unit(s). For ecological exposure pathways, the portion of the soil zone between 0.5 feet and 5 feet in depth.

Surface cover - A layer of artificially placed utility material (e.g., shell, gravel).

Surface soil - For human health exposure pathways, the soil zone extending from ground surface to 15 feet in depth for residential land use and from ground surface to 5 feet in depth for commercial/industrial land use; or to the top of the uppermost groundwater-bearing unit or bedrock, whichever is less in depth. For ecological exposure pathways, the soil zone extending from ground surface to 0.5 feet in depth.

Surface water - Any water meeting the definition of surface water in the state as defined in §307.3 of this title (relating to Abbreviations and Definitions), as amended.

PART I. Affected Property Identification and Background Information

1) Provide a description of the specific area of the response action and the nature of the release. Include estimated acreage of the affected property and the facility property, and a description of the type of facility and/or operation associated with the affected property. Also describe the location of the affected property with respect to the facility property boundaries and public roadways.

Camp Stanley Storage Activity: CSSA is located in northwestern Bexar County, about 19 miles northwest of downtown San Antonio. The installation consists of approximately 4,004 acres immediately east of Ralph Fair Road, and approximately 0.5 mile east of Interstate Highway 10 (see Figure 1 of the RIR). CSSA has several historical waste sites, including SWMUs, AOCs, and RMUs. The present mission of CSSA is the receipt, storage, issue, and maintenance of ordnance as well as quality assurance testing and maintenance of military weapons and ammunition. Because of its mission, CSSA has been designated a restricted access facility. No changes to the CSSA mission and/or military activities are expected in the future.

AOC-51: AOC-51 is located in the southeast corner of CSSA, located in the East Pasture. This site covers approximately 29.2 acres.

No site-specific information regarding groundwater is available for AOC-51. However, between October 1992 and December 2011, measured water levels at Well CS-1, which is located approximately 1,700 ft southwest of the site, have ranged from 65.5 ft below top of casing (BTOC) (December 2004) to 355.9 ft BTOC (December 2006). Groundwater samples have been collected from this well and analyzed for metals and VOCs since 1995. Lead has been detected slightly above its maximum contaminant level (MCL) of 0.015 milligrams per liter (mg/L) on eight occasions at concentrations ranging up to 0.029 mg/L. Although lead was a COC at AOC-51, no pattern in the lead detections has been identified, and it is very unlikely that this site is the source of the metal contamination. No other analytes have exceeded MCLs. Sporadic low concentrations of VOCs detected in CS-1 (below their respective MCLs) are attributed to contaminated groundwater from the SWMU B-3 bioreactor plume.

The closest surface water body to AOC-51 is an unnamed intermittent tributary approximately 100 ft north of the site (**Figure 7**). The tributary, which only contains water immediately after significant rain events, drains to Salado Creek, located approximately 1,500 ft west of AOC-51. The north-south trending creek exits the CSSA boundary approximately 1,400 ft west of the site. No significant degradation of high quality receiving waters is anticipated from AOC-51.

Attach available USGS topographic maps and/or aerial or other affected property photographs to this form to depict the affected property and surrounding area. Indicate attachments:

☐ Topo map ☐ √ Aerial photo ☐ √ Other

Aerial photos of the site and land adjacent to the site are shown on Figure 3 of the RIR. Figures 1 and 2 of the RIR show the general location of AOC-51.

2) Identify environmental media known or suspected to contain chemicals of concern (COCs) at the present time. Check all that apply:

Known/Suspected COC Location	Based on sampling data?	
☐ **NO** – Soil ≤ 5 ft below ground surface	☐ Yes	☐ √ No

☐ **NO –** Soil >5 ft below ground surface	☐ Yes	☐ √ No
☐ **NO –** Groundwater	☐ Yes	☐ √ No
☐ **NO –** Surface Water/Sediments	☐ Yes	☐ √ No

Explain (previously submitted information may be referenced):

The closest surface water body to AOC-51 is an unnamed intermittent tributary approximately 100 ft north of the site. The tributary, which only contains water immediately after significant rain events, drains to Salado Creek, located approximately 1,500 yards west of AOC-51. The north-south trending creek exits the CSSA boundary approximately 1,400 yards south-southeast of the site. No significant degradation of high quality receiving waters is anticipated from AOC-51.

Based on soil samples collected at AOC-51, there are no explosives or metals at the site that exceed their respective PCL (see Appendix C of this RIR). There is no evidence of other affected or threatened environmental media (groundwater, surface water, or sediment) at AOC-51. Over the past 19 years, there have been samples collected from the closest well to AOC-51 (CS-1, located 1,700 ft southwest of the site) and analyzed for metals and VOCs. Lead has been detected slightly above its MCL of 0.015 mg/L on eight occasions at concentrations ranging up to 0.029 mg/L. Although lead was a COC at AOC-51, no pattern in the lead detections has been identified, and it is very unlikely that this site is the source of the metal contamination. No other analytes have exceeded MCLs. Sporadic low concentrations of VOCs detected in CS-1 (below their respective MCLs) are attributed to contaminated groundwater from the SWMU B-3 bioreactor plume.

3) Provide the information below for the nearest surface water body which has become or has the potential to become impacted from migrating COCs via surface water runoff, air deposition, groundwater seepage, etc. Exclude wastewater treatment facilities and stormwater conveyances/impoundments authorized by permit. Also exclude conveyances, decorative ponds, and those portions of process facilities which are:

a. Not in contact with surface waters in the State or other surface waters which are ultimately in contact with surface waters in the State; and

b. Not consistently or routinely utilized as valuable habitat for natural communities including birds, mammals, reptiles, etc.

The nearest surface water body, **an unnamed tributary to Salado Creek,** is **approximately 100 feet north of** the affected property **AOC-51**. The water body is best described as a:

☐ freshwater stream: _____ perennial (has water all year)

__√__ intermittent (dries up completely for at least 1 week a year) **[only has water during and immediately after rain events]**

_____ intermittent with perennial pools

☐ freshwater swamp/marsh/wetland

☐ saltwater or brackish marsh/swamp/wetland

☐ reservoir, lake, or pond; approximate surface acres**:**

☐ drainage ditch

☐ tidal stream ☐ bay ☐ estuary

☐ other; specify

Is the water body listed as a State classified segment in Appendix C of the current Texas Surface Water Quality Standards; §§307.1 - 307.10?

☐ Yes Segment # _____ Use Classification:

□ √ **No**

If the water body is not a State classified segment, identify the first downstream classified segment.

Name:

Salado Creek Drainage Basin

Segment #:

Segment 1910 – From the confluence with the San Antonio River in Bexar County to Rocking Horse Lane west of Camp Bullis in Bexar County.

Use Classification:

Salado Creek is classified as an intermittent creek upstream (south) of CSSA to Loop 410 in San Antonio. The creek is classified as perennial downstream of Loop 410. Although water uses are not distinguished between the upstream intermittent and the downstream perennial sections, the designated uses of Segment 1910 as a whole are high aquatic life, contact recreation, public water supply, and aquifer protection. No significant degradation of high quality receiving waters is anticipated from AOC-51.

As necessary, provide further description of surface waters in the vicinity of the affected property:

The nearest surface water body is an unnamed tributary to Salado Creek, approximately 100 feet north of the site. This unnamed tributary is intermittent. Salado Creek is intermittent and only contains water during and immediately following rain events due to limited-duration flowing springs during the winter and spring.

PART II. Exclusion Criteria and Supportive Information

Subpart A. Surface Water/Sediment Exposure

1) Regarding the affected property where a response action is being pursued under the TRRP, have COCs migrated and resulted in a release or imminent threat of release to either surface waters or to their associated sediments via surface water runoff, air deposition, groundwater seepage, etc.? Exclude wastewater treatment facilities and stormwater conveyances/impoundments authorized by permit. Also exclude conveyances, decorative ponds, and those portions of process facilities which are:

a. Not in contact with surface waters in the State or other surface waters which are ultimately in contact with surface waters in the State; and

b. Not consistently or routinely utilized as valuable habitat for natural communities including birds, mammals, reptiles, etc.

□ Yes □√ No

Explain:

There is no evidence of affected or threatened environmental media (groundwater, surface water, or sediment) at AOC-51. Since soils that were found to have concentrations of metals above their PCLs were removed or used to calculate a 95% upper confidence limit (UCL) that does not exceed the Tier 1 PCL, there will be no impact to groundwater, surface water, or sediment from AOC-51.

If the answer is Yes to Subpart A above, the affected property does not meet the exclusion criteria. However, complete the remainder of Part II to determine if there is a complete and/or significant soil exposure pathway, then complete PART III - Qualitative Summary and Certification. If the answer is No, go to Subpart B.

Subpart B. Affected Property Setting

In answering "Yes" to the following question, it is understood that the affected property is not attractive to wildlife or livestock, including threatened or endangered species (i.e., the affected property does not serve as valuable

habitat, foraging area, or refuge for ecological communities). (May require consultation with wildlife management agencies.)

1) Is the affected property wholly contained within contiguous land characterized by: pavement, buildings, landscaped area, functioning cap, roadways, equipment storage area, manufacturing or process area, other surface cover or structure, or otherwise disturbed ground?

☐ Yes ☐ √ No

Explain:

Concentrations of chemicals detected in soil samples at AOC-51 do not exceed Tier 1 residential soil action levels. Soils found to have metals concentrations above their PCLs were excavated and removed from the site or were used to calculate a 95% UCL per TAC §350.79(2)(A) that does not exceed the Tier 1 PCL.

There is no evidence of other affected or threatened environmental media (groundwater, surface water, or sediment) at AOC-51. Since soils found to have concentrations of metals above their PCLs were excavated/removed, there will be no impact to groundwater, surface water, or sediment in the area. Between October 1992 and December 2011, measured water levels at Well CS-1, which is located approximately 1,700 ft southwest of the site, have ranged from 65.5 ft BTOC (December 2004) to 355.9 ft BTOC (December 2006). Groundwater samples have been collected from this well and analyzed for metals and VOCs since 1995. Lead has been detected slightly above its MCL of 0.015 mg/L on eight occasions at concentrations ranging up to 0.029 mg/L. Although lead was a COC at AOC-51, no pattern in the lead detections has been identified, and it is very unlikely that this site is the source of the metal contamination. No other analytes have exceeded MCLs. Sporadic low concentrations of VOCs detected in CS-1 (below their respective MCLs) are attributed to contaminated groundwater from the SWMU B-3 bioreactor plume.

Additionally, several surveys have been conducted at CSSA for T&E species. The only T&E species that have been documented at CSSA are the black-capped vireo (*Vireo atricapillus*) [BCVI] and golden-cheeked warbler (*Dendroica chrysoparia*) [GCWA]. GCWA habitat is located within AOC-51 site boundaries. Additional information can be found in the following references:

- **Parsons, 2007. *Final Integrated Natural Resource Management Plan*. Prepared for Camp Stanley Storage Activity, Boerne, Texas. October 2007. Available online: CSSA EE (Volume 1-6, Other Plans and Approaches)**
- **Parsons, 2009. *Final Species and Habitat Distributions of Black-Capped Vireos and Golden-Cheeked Warblers, 2009 Breeding/Nesting Season*. Prepared for Camp Stanley Storage Activity, Boerne, Texas. September 2009. Available online: CSSA EE (Volume 1-6, Other Plans and Approaches)**

If the answer to Subpart B above is Yes, the affected property meets the exclusion criteria, assuming the answer to Subpart A was No. Skip Subparts C and D and complete PART III - Qualitative Summary and Certification. If the answer to Subpart B above is No, go to Subpart C.

S Subpart C. Soil Exposure

1) Are COCs which are in the soil of the affected property solely below the first 5 feet beneath ground surface **or** does the affected property have a physical barrier present to prevent exposure of receptors to COCs in surface soil?

☐ √Yes **See explanation** ☐ No

Explain:

Based on Table 1 of this RIR there are no COCs at the site.

If the answer to Subpart C above is Yes, the affected property meets the exclusion criteria, assuming the answer to Subpart A was No. Skip Subpart D and complete PART III - Qualitative Summary and Certification. If the answer to Subpart C above is No, proceed to Subpart D.

Subpart D. *De Minimus* Land Area Subparts C and D skipped based on answers to Subparts A and B.

In answering "Yes" to the question below, it is understood that all of the following conditions apply:

☐ The affected property is not known to serve as habitat, foraging area, or refuge to threatened/endangered or otherwise protected species. (Will likely require consultation with wildlife management agencies.)

☐ Similar but unimpacted habitat exists within a half-mile radius.

☐ The affected property is not known to be located within one-quarter mile of sensitive environmental areas (e.g., rookeries, wildlife management areas, preserves). (Will likely require consultation with wildlife management agencies.)

☐ There is no reason to suspect that the COCs associated with the affected property will migrate such that the affected property will become larger than one acre.

1) Using human health protective concentration levels as a basis to determine the extent of the COCs, does the affected property consist of one acre or less and does it meet all of the conditions above?

☐ Yes ☐ No

Explain how conditions are met/not met:

If the answer to Subpart D above is Yes, then no further ecological evaluation is needed at this affected property, assuming the answer to Subpart A was No. Complete PART III - Qualitative Summary and Certification. If the answer to Subpart D above is No, proceed to Tier 2 or 3 or comparable ERA.

PART III. Qualitative Summary and Certification (Complete in all cases).

Attach a brief statement (not to exceed 1 page) summarizing the information you have provided in this form. This summary should include sufficient information to verify that the affected property meets or does not meet the exclusion criteria. The person should make the initial decision regarding the need for further ecological evaluation (i.e., Tier 2 or 3) based upon the results of this checklist. After review, TNRCC will make a final determination on the need for further assessment. **Note that the person has the continuing obligation to re-enter the ERA process if changing circumstances result in the affected property not meeting the Tier 1 exclusion criteria.**

Completed by: Laura Marbury, P.G. *(Typed/Printed Name)*

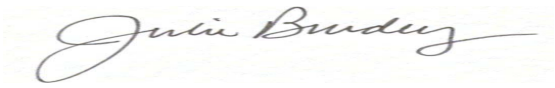
Principal Geologist *(Title)*

July 11, 2012 *(Date)*

I believe that the information submitted is true, accurate, and complete, to the best of my knowledge.

Julie Burdey, P.G. *(Typed/Printed Name of Person)*

Project Manager *(Title of Person)*



(Signature of Person)

July 11, 2012 *(Date Signed)*

APPENDIX C
Confirmation Sample Results for All Analytes at AOC-51

Appendix C. Confirmation Sample Results for All Analytes at AOC-51

	Explosives																																			
	1,3,5-Trinitrobenzene CAS: 99-35-4	Qualifier	Dilution	1,3-Dinitrobenzene CAS: 99-65-0	Qualifier	Dilution	2,4,6-Trinitrotoluene (TNT) CAS: 118-96-7	Qualifier	Dilution	2,4-Dinitrotoluene CAS: 121-14-2	Qualifier	Dilution	2,6-Dinitrotoluene CAS: 606-20-2	Qualifier	Dilution	2-Nitrotoluene CAS: 88-72-2	Qualifier	Dilution	3-Nitrotoluene CAS: 99-08-1	Qualifier	Dilution	4-Nitrotoluene CAS: 99-99-0	Qualifier	Dilution	HMX CAS: 2691-41-0	Qualifier	Dilution	Nitrobenzene CAS: 98-95-3	Qualifier	Dilution	RDX CAS: 121-82-4	Qualifier	Dilution	Tetryl CAS: 479-45-8	Qualifier	Dilution
Tier 1 Soil PCLs - 30 acre†																																				
Residential Combined Exposure[1]	2.00E+03	n		6.70E+00	n		3.30E+01	n		6.90E+00	c		6.90E+00	c		2.10E+01	c		6.70E+02	n		2.70E+02	n		1.60E+03	n		3.40E+01	c		4.30E+01	c		2.70E+02	n	
Residential Groundwater Exposure[2]	**9.10E-01**	n		**3.80E-03**	n		**8.60E-02**	n		**2.70E-03**	c		**2.40E-03**	c		**1.60E-02**	c		**9.20E-01**	n		**2.20E-01**	c		**1.20E+00**	n		**1.80E-01**	n		**1.80E-02**	c		**5.50E-01**	n	
Ecological Benchmark[3]	na			na			na			na			na			na			na			na			na			na			na			na		
TCEQ-Approved Background Values																																				
CSSA 9 Metals Background Concentration[4]	na			na			na			na			na			na			na			na			na			na			na			na		
Sample Locations (Date Collected)																																				
AOC51-SS01 (23-May-2005)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS02 (23-May-2005)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS03 (23-May-2005)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS04 (23-May-2005)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS05 (23-May-2005)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS06 (23-May-2005)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS07 (23-May-2005)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS08 (23-May-2005)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS09 (23-May-2005)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS10 (15-Nov-2011)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS10-DUP (15-Nov-2011)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS11 (15-Nov-2011)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS12 (15-Nov-2011)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS13 (16-Jan-2012)	--			--			--			--			--			--			--			--			--			--			--			--		
AOC51-SS13-DUP (16-Jan-2012)	--			--			--			--			--			--			--			--			--			--			--			--		
AOC51-SS14 (16-Jan-2012)	--			--			--			--			--			--			--			--			--			--			--			--		
AOC51-SS15 (16-Jan-2012)	--			--			--			--			--			--			--			--			--			--			--			--		
AOC51-SS16 (16-Jan-2012)	--			--			--			--			--			--			--			--			--			--			--			--		
AOC51-SS17 (16-Jan-2012)	--			--			--			--			--			--			--			--			--			--			--			--		
AOC51-SS18 (16-Jan-2012)	--			--			--			--			--			--			--			--			--			--			--			--		
AOC51-SS19 (14-Feb-2012)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS20 (14-Feb-2012)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS21 (14-Feb-2012)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS22 (14-Feb-2012)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS23 (14-Feb-2012)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS24 (14-Feb-2012)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS24-DUP (14-Feb-2012)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS25 (14-Feb-2012)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS26 (14-Feb-2012)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS27 (14-Feb-2012)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS28 (14-Feb-2012)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS29 (14-Feb-2012)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS30 (14-Feb-2012)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS31 (14-Feb-2012)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS32 (14-Feb-2012)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS33 (15-Mar-2012)	--			--			--			--			--			--			--			--			--			--			--			--		

Appendix C. Confirmation Sample Results for All Analytes at AOC-51

	Explosives																																						
	1,3,5-Trinitrobenzene CAS: 99-35-4	Qualifier	Dilution	1,3-Dinitrobenzene CAS: 99-65-0	Qualifier	Dilution	2,4,6-Trinitrotoluene (TNT) CAS: 118-96-7	Qualifier	Dilution	2,4-Dinitrotoluene CAS: 121-14-2	Qualifier	Dilution	2,6-Dinitrotoluene CAS: 606-20-2	Qualifier	Dilution	2-Nitrotoluene CAS: 88-72-2	Qualifier	Dilution	3-Nitrotoluene CAS: 99-08-1	Qualifier	Dilution	4-Nitrotoluene CAS: 99-99-0	Qualifier	Dilution	HMX CAS: 2691-41-0	Qualifier	Dilution	Nitrobenzene CAS: 98-95-3	Qualifier	Dilution	RDX CAS: 121-82-4	Qualifier	Dilution	Tetryl CAS: 479-45-8	Qualifier	Dilution
Tier 1 Soil PCLs - 30 acre[†]																																							
Residential Combined Exposure[1]	2.00E+03	n		6.70E+00	n		3.30E+01	n		6.90E+00	c		6.90E+00	c		2.10E+01	c		6.70E+02	n		2.70E+02	n		1.60E+03	n		3.40E+01	c		4.30E+01	c		2.70E+02	n	
Residential Groundwater Exposure[2]	**9.10E-01**	n		**3.80E-03**	n		**8.60E-02**	n		**2.70E-03**	c		**2.40E-03**	c		**1.60E-02**	c		**9.20E-01**	n		**2.20E-01**	c		**1.20E+00**	n		**1.80E-01**	n		**1.80E-02**	c		**5.50E-01**	n	
Ecological Benchmark[3]	na			na			na			na			na			na			na			na			na			na			na			na		
TCEQ-Approved Background Values																																							
CSSA 9 Metals Background Concentration[4]	na			na			na			na			na			na			na			na			na			na			na			na		
Sample Locations (Date Collected)																																							
AOC51-SS34 (15-Mar-2012)	--			--			--			--			--			--			--			--			--			--			--			--		
AOC51-SS35 (15-Mar-2012)	--			--			--			--			--			--			--			--			--			--			--			--		
AOC51-SS36 (15-Mar-2012)	--			--			--			--			--			--			--			--			--			--			--			--		
AOC51-SS36-DUP (15-Mar-2012)	--			--			--			--			--			--			--			--			--			--			--			--		
AOC51-SS37 (14-Mar-2012)	--			--			--			--			--			--			--			--			--			--			--			--		
AOC51-SS38 (14-Mar-2012)	--			--			--			--			--			--			--			--			--			--			--			--		
AOC51-SS40 (14-Mar-2012)	--			--			--			--			--			--			--			--			--			--			--			--		
AOC51-SS42 (14-Mar-2012)	--			--			--			--			--			--			--			--			--			--			--			--		
AOC51-SS43 (14-Mar-2012)	--			--			--			--			--			--			--			--			--			--			--			--		
AOC51-SS44 (14-Mar-2012)	--			--			--			--			--			--			--			--			--			--			--			--		
AOC51-SS45 (15-Mar-2012)	--			--			--			--			--			--			--			--			--			--			--			--		
AOC51-SS46 (15-Mar-2012)	--			--			--			--			--			--			--			--			--			--			--			--		
AOC51-SS47 (15-Mar-2012)	--			--			--			--			--			--			--			--			--			--			--			--		
AOC51-SS48 (15-Mar-2012)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS49 (15-Mar-2012)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS50 (15-Mar-2012)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS60 (15-Mar-2012)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS70 (15-Mar-2012)	0.075	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.075	U	1	0.075	U	1	0.080	U	1	0.080	U	1	0.080	U	1	0.075	U	1	0.080	U	1	0.075	U	1
AOC51-SS71 (24-Apr-2012)	--			--			--			--			--			--			--			--			--			--			--			--		
AOC51-SS71-DUP (24-Apr-2012)	--			--			--			--			--			--			--			--			--			--			--			--		
AOC51-SS72 (24-Apr-2012)	--			--			--			--			--			--			--			--			--			--			--			--		
AOC51-SS73 (24-Apr-2012)	--			--			--			--			--			--			--			--			--			--			--			--		
AOC51-SS74 (24-Apr-2012)	--			--			--			--			--			--			--			--			--			--			--			--		
AOC51-SS75 (26-Apr-2012)	--			--			--			--			--			--			--			--			--			--			--			--		
AOC51-SS76 (01-May-2012)	--			--			--			--			--			--			--			--			--			--			--			--		

Appendix C. Confirmation Sample Results for All Analytes at AOC-51

	Metals																																	
	Arsenic CAS: 7440-38-2	Qualifier	Dilution	Barium CAS: 7440-39-3	Qualifier	Dilution	Cadmium CAS: 7440-43-9	Qualifier	Dilution	Chromium CAS: 7440-47-3	Qualifier	Dilution	Copper CAS: 7440-50-8	Qualifier	Dilution	Lead CAS: 7439-92-1	Qualifier	Dilution	Mercury CAS: 7439-97-6	Qualifier	Dilution	Nickel CAS: 7440-02-0	Qualifier	Dilution	Zinc CAS: 7440-66-6	Qualifier	Dilution
Tier 1 Soil PCLs - 30 acre[†]																																		
Residential Combined Exposure[1]	2.40E+01	n		8.10E+03	n		5.20E+01	n		2.70E+04	n		5.50E+02	n		5.00E+02	n		2.10E+00	n		8.30E+02	n		9.90E+03	n	
Residential Groundwater Exposure[2]	2.50E+00	m	>S	2.20E+02	m	>S	7.50E-01	m	>S	**1.20E+03**	m	>S	5.20E+02	a	>S	1.50E+00	a	>S	3.90E-03	m		**7.90E+01**	n	>S	1.20E+03	n	>S
Ecological Benchmark[3]	1.80E+01			3.30E+02			3.20E+01			4.00E-01			**6.10E+01**			1.20E+02			1.00E-01			3.00E+01			**1.20E+02**		
TCEQ-Approved Background Values																																		
CSSA 9 Metals Background Concentration[4]	**19.6** ††			**300** †††			**3** ††			40.2 ††			23.2 ††			**84.5** ††			**0.77** ††			35.5 ††			73.2 ††		
Sample Locations (Date Collected)																																		
AOC51-SS01 (23-May-2005)	**3.5**	M	1	**21**	M	1	**0.21**	M	1	**8.3**	M	1	**6.1**		1	**11**		5	**0.050**	F	1	**5.3**		1	**10**		1
AOC51-SS02 (23-May-2005)	**6.4**	M	5	**72**	M	1	**0.58**	M	5	**18**	M	1	**11**		1	**21**		10	**0.040**	F	1	**13**		1	**29**		1
AOC51-SS03 (23-May-2005)	**8.7**	M	2	**130**	M	1	**0.49**	M	2	**31**	M	1	**19**		1	**32**		10	**0.050**	F	1	**23**		1	**43**		1
AOC51-SS04 (23-May-2005)	**2.0**	M	1	**21**	M	1	**0.27**	M	2	**5.1**	M	1	**4.5**		1	**24**		10	**0.050**	F	1	**2.9**		1	**14**		1
AOC51-SS05 (23-May-2005)	**5.8**	M	2	**80**	M	1	**0.44**	M	2	**18**	M	1	**13**		1	**22**		10	**0.040**	F	1	**14**		1	**30**		1
AOC51-SS06 (23-May-2005)	**3.3**	M	1	**48**	M	1	**0.21**	M	1	**12**	M	1	**8.9**		1	**13**		5	**0.020**	F	1	**7.8**		1	**13**		1
AOC51-SS07 (23-May-2005)	**4.6**	M	1	**54**	M	1	**0.31**	M	2	**15**	M	1	**11**		1	**22**		10	**0.030**	F	1	**10.0**		1	**29**		1
AOC51-SS08 (23-May-2005)	**2.6**	M	1	**30**	M	1	**0.28**	M	2	**6.5**	M	1	**5.4**		1	**29**		10	**0.030**	F	1	**4.0**		1	**18**		1
AOC51-SS09 (23-May-2005)	**2.1**	M	1	**22**	M	1	**0.13**	M	1	**7.5**	M	1	**4.8**		1	**6.5**		2	0.010	U	1	**4.3**		1	**7.5**		1
AOC51-SS10 (15-Nov-2011)	**4.1**	F	1	**16**	M	1	0.030	M	1	**5.0**	F	1	**5.4**	J	1	**26**	M	1	**0.070**	F	1	**4.8**	M	1	**8.8**	M	1
AOC51-SS10-DUP (15-Nov-2011)	**4.4**	F	1	**16**		1	0.030	UJ	1	**4.2**	F	1	**8.2**	J	1	**24**	J	1	**0.070**	F	1	**4.2**	J	1	**15**	J	1
AOC51-SS11 (15-Nov-2011)	**7.1**	F	1	**50**		1	**0.090**	F	1	**15**	F	1	**82**	J	1	**5,800**	J	50	**0.10**		1	**25**	J	1	**33**	J	1
AOC51-SS12 (15-Nov-2011)	**4.0**	F	1	**23**		1	0.030	UJ	1	**6.8**	F	1	**5.2**	J	1	**45**	J	1	**0.060**	F	1	**5.4**	J	1	**13**	J	1
AOC51-SS13 (16-Jan-2012)	**1.9**	F	1	**75**		1	0.030	UJ	1	**26**		1	**15**		1	**39**	J	1	**0.060**	F	1	**14**		1	**42**	J	1
AOC51-SS13-DUP (16-Jan-2012)	**4.5**	F	1	**68**		1	0.030	UJ	1	**23**		1	**14**		1	**35**	J	1	**0.050**	F	1	**13**		1	**38**	J	1
AOC51-SS14 (16-Jan-2012)	**4.6**	F	1	**56**		1	0.030	UJ	1	**18**	F	1	**16**		1	**73**	J	1	**0.17**		1	**12**		1	**120**	J	1
AOC51-SS15 (16-Jan-2012)	**3.8**	F	1	**28**		1	0.030	UJ	1	**10**	F	1	**6.2**		1	**27**	J	1	**0.070**	F	1	**7.5**		1	**490**	J	1
AOC51-SS16 (16-Jan-2012)	**4.7**	F	1	**110**		1	0.030	UJ	1	**36**		1	**13**		1	**78**	J	1	**0.080**	F	1	**18**		1	**62**	J	1
AOC51-SS17 (16-Jan-2012)	**2.5**	F	1	**70**		1	0.030	UJ	1	**21**		1	**8.0**		1	**100**	J	1	**0.060**	F	1	**12**		1	**170**	J	1
AOC51-SS18 (16-Jan-2012)	**2.6**	F	1	**73**		1	0.030	UJ	1	**14**	F	1	**6.2**		1	**52**	J	1	**0.070**	F	1	**8.9**		1	**280**	J	1
AOC51-SS19 (14-Feb-2012)	**6.4**	F	1	**43**		1	0.030	UJ	1	**12**	F	1	**14**		1	**38**		1	**0.090**	F	1	**8.3**		1	**34**	J	1
AOC51-SS20 (14-Feb-2012)	**12**	F	1	**57**		1	0.030	UJ	1	**23**		1	**30**		1	**92**		1	**0.070**	F	1	**18**		1	**42**	J	1
AOC51-SS21 (14-Feb-2012)	**2.9**	F	1	**12**		1	0.030	UJ	1	**3.1**	F	1	**13**		1	**77**		1	**0.030**	F	1	**3.0**		1	**10**	J	1
AOC51-SS22 (14-Feb-2012)	**8.1**	F	1	**53**		1	0.030	UJ	1	**17**	F	1	**23**		1	**53**		1	**0.080**	F	1	**14**		1	**42**	J	1
AOC51-SS23 (14-Feb-2012)	**4.1**	F	1	**26**		1	0.030	UJ	1	**7.1**	F	1	**12**		1	**44**		1	**0.050**	F	1	**4.7**		1	**22**	J	1
AOC51-SS24 (14-Feb-2012)	**4.5**	F	1	**30**		10	0.030	M	1	**7.2**	F	1	**21**		1	**370**	M	10	**0.040**	F	1	**6.8**		1	**8.2**	M	1
AOC51-SS24-DUP (14-Feb-2012)	**4.3**	F	1	**29**		10	0.030	UJ	1	**6.2**	F	1	**21**		1	**270**		10	**0.050**	F	1	**6.1**		1	**14**	J	1
AOC51-SS25 (14-Feb-2012)	**8.9**	F	1	**54**		1	0.030	UJ	1	**17**	F	1	**22**		1	**71**		1	**0.070**	F	1	**14**		1	**41**	J	1
AOC51-SS26 (14-Feb-2012)	**9.0**	F	1	**44**		1	0.030	UJ	1	**17**	F	1	**24**		1	**51**		1	**0.080**	F	1	**15**		1	**29**	J	1
AOC51-SS27 (14-Feb-2012)	**4.6**	F	1	**28**		1	0.030	UJ	1	**7.5**	F	1	**74**		1	**1,300**		10	**0.040**	F	1	**13**		1	**13**	J	1
AOC51-SS28 (14-Feb-2012)	**6.0**	F	1	**39**		1	0.030	UJ	1	**12**	F	1	**13**		1	**43**		1	**0.070**	F	1	**8.3**		1	**22**	J	1
AOC51-SS29 (14-Feb-2012)	**8.6**	F	1	**52**		1	0.030	UJ	1	**17**	F	1	**14**		1	**65**		1	**0.080**	F	1	**12**		1	**36**	J	1
AOC51-SS30 (14-Feb-2012)	**7.4**	F	1	**42**		1	0.030	UJ	1	**12**	F	1	**12**		1	**20**		1	**0.060**	F	1	**9.4**		1	**23**	J	1
AOC51-SS31 (14-Feb-2012)	**7.1**	F	1	**59**		1	0.030	UJ	1	**15**	F	1	**12**		1	**14**		1	**0.050**	F	1	**10**		1	**24**	J	1
AOC51-SS32 (14-Feb-2012)	**5.9**	F	1	**43**		1	0.030	UJ	1	**12**	F	1	**11**		1	**39**		1	**0.050**	F	1	**7.5**		1	**19**	J	1
AOC51-SS33 (15-Mar-2012)	**6.6**	F	1	**39**		2	0.030	UJ	1	**15**	F	1	**9.0**	J	2	**11**		1	**0.080**	F	1	**8.3**		2	**20**	J	2

Appendix C. Confirmation Sample Results for All Analytes at AOC-51

	Metals																																	
	Arsenic CAS: 7440-38-2	Qualifier	Dilution	Barium CAS: 7440-39-3	Qualifier	Dilution	Cadmium CAS: 7440-43-9	Qualifier	Dilution	Chromium CAS: 7440-47-3	Qualifier	Dilution	Copper CAS: 7440-50-8	Qualifier	Dilution	Lead CAS: 7439-92-1	Qualifier	Dilution	Mercury CAS: 7439-97-6	Qualifier	Dilution	Nickel CAS: 7440-02-0	Qualifier	Dilution	Zinc CAS: 7440-66-6	Qualifier	Dilution
Tier 1 Soil PCLs - 30 acre†																																		
Residential Combined Exposure[1]	2.40E+01	n		8.10E+03	n		5.20E+01	n		2.70E+04	n		5.50E+02	n		5.00E+02	n		2.10E+00	n		8.30E+02	n		9.90E+03	n	
Residential Groundwater Exposure[2]	2.50E+00	m	>S	2.20E+02	m	>S	7.50E-01	m	>S	**1.20E+03**	m	>S	5.20E+02	a	>S	1.50E+00	a	>S	3.90E-03	m		**7.90E+01**	n	>S	1.20E+03	n	>S
Ecological Benchmark[3]	1.80E+01			3.30E+02			3.20E+01			4.00E-01			**6.10E+01**			1.20E+02			1.00E-01			3.00E+01			**1.20E+02**		
TCEQ-Approved Background Values																																		
CSSA 9 Metals Background Concentration[4]	**19.6** ††			**300** †††			**3** ††			40.2 ††			23.2 ††			**84.5** ††			**0.77** ††			35.5 ††			73.2 ††		
Sample Locations (Date Collected)																																		
AOC51-SS34 (15-Mar-2012)	**12**	F	1	**93**		2	0.030	UJ	1	**26**		1	**19**	J	2	**23**		1	**0.060**	F	1	**19**		2	**41**	J	2
AOC51-SS35 (15-Mar-2012)	**5.4**	F	1	**73**		2	0.030	UJ	1	**11**	F	1	**8.6**	J	2	**46**		2	**0.020**	F	1	**8.8**		2	**92**	J	2
AOC51-SS36 (15-Mar-2012)	**5.5**	F	1	**62**		2	0.030	UJ	1	**10**	F	1	**6.5**	J	2	**15**		1	**0.030**	F	1	**8.2**		2	**25**	J	2
AOC51-SS36-DUP (15-Mar-2012)	**4.4**	F	1	**62**		2	0.030	UJ	1	**9.8**	F	1	**13**	J	2	**13**		1	**0.030**	F	1	**8.7**		2	**76**	J	2
AOC51-SS37 (14-Mar-2012)	**5.8**	F	1	**42**		2	0.030	UJ	1	**12**	F	1	**16**	J	2	**58**		2	**0.090**	F	1	**8.4**		1	**19**	J	2
AOC51-SS38 (14-Mar-2012)	**1.7**	F	1	**12**		2	0.030	UJ	1	**4.6**	F	1	**4.9**	J	2	**17**		1	**0.040**	F	1	**0.74**	F	1	0.60	UJ	1
AOC51-SS40 (14-Mar-2012)	**1.6**	F	1	**5.8**		2	0.030	UJ	1	**3.5**	F	1	**4.1**	J	1	**320**		2	**0.030**	F	1	**0.93**	F	1	**4.4**	F	1
AOC51-SS42 (14-Mar-2012)	**3.8**	F	1	**34**		2	0.030	UJ	1	**9.0**	F	1	**4.4**	J	1	**11**		1	**0.040**	F	1	**4.3**		1	**27**	J	2
AOC51-SS43 (14-Mar-2012)	**4.3**	F	1	**47**		2	0.030	UJ	1	**12**	F	1	**8.0**	J	2	**25**		1	**0.050**	F	1	**5.9**		1	**43**	J	2
AOC51-SS44 (14-Mar-2012)	**5.5**	F	1	**49**		2	0.030	UJ	1	**12**	F	1	**10.0**	J	2	**25**		1	**0.080**	F	1	**6.6**		1	**53**	J	2
AOC51-SS45 (15-Mar-2012)	**5.7**	F	1	**30**		2	0.030	UJ	1	**5.5**	F	1	**9.9**	J	2	**43**		2	**0.10**		1	**6.7**		2	**32**	J	2
AOC51-SS46 (15-Mar-2012)	**9.2**	F	1	**48**		2	0.030	UJ	1	**12**	F	1	**13**	J	2	**23**		1	**0.080**	F	1	**15**		2	**23**	J	1
AOC51-SS47 (15-Mar-2012)	**8.2**	F	1	**48**		2	0.030	UJ	1	**14**	F	1	**16**	J	2	**21**		1	**0.060**	F	1	**14**		2	**84**	J	2
AOC51-SS48 (15-Mar-2012)	--			--			--			--			--			--			--			--			--		
AOC51-SS49 (15-Mar-2012)	--			--			--			--			--			--			--			--			--		
AOC51-SS50 (15-Mar-2012)	--			--			--			--			--			--			--			--			--		
AOC51-SS60 (15-Mar-2012)	--			--			--			--			--			--			--			--			--		
AOC51-SS70 (15-Mar-2012)	--			--			--			--			--			--			--			--			--		
AOC51-SS71 (24-Apr-2012)	--			--			--			--			**3.4**		1	**2.2**	F	1	--			--			--		
AOC51-SS71-DUP (24-Apr-2012)	--			--			--			--			**4.0**		1	**2.8**	F	1	--			--			--		
AOC51-SS72 (24-Apr-2012)	--			--			--			--			**28**		1	**32**		1	--			--			--		
AOC51-SS73 (24-Apr-2012)	--			--			--			--			--			**4.9**	F	1	--			--			--		
AOC51-SS74 (24-Apr-2012)	--			--			--			--			**4.5**		1	**6.7**	F	1	--			--			--		
AOC51-SS75 (26-Apr-2012)	--			--			--			--			--			0.18	U	1	--			--			--		
AOC51-SS76 (01-May-2012)	--			--			--			--			--			0.18	U	1	--			--			--		

NOTES:

† TCEQ, TRRP Tier 1 Soil PCLs (Last Revised: May 24, 2011).

†† CSSA Soil Background Concentrations. Second Revision, Evaluation of Background Metals Concentrations in Soils and Bedrock at CSSA. February 2002. Values from Table 3.3.

††† Texas-Specific median background concentration.

PCLs and CSSA background values coded in this table as [1, 2, 3].

[1] $^{Tot}Soil_{Comb}$ = PCL for COPC in soil for a 30 acre source area and a potential future resident (combined exposure for ingestion, dermal contact, inhalation of volatiles and particulates, and ingestion of above-ground and below-ground vegetables).

[2] $^{GW}Soil_{Ing}$ = PCL for COPC in soil for a 30 acre source area and a potential future resident (soil-to-groundwater leaching of COPC to Class 1 and 2 groundwater).

[3] TCEQ Ecological Benchmark for Soil (Last Revised: January 2006).

[4] CSSA Soil Background Concentrations.

All values are measured in milligrams per kilogram (mg/Kg) unless otherwise noted.

c = carcinogenic.
n = noncarcinogenic.
m = primary MCL-based.
a = EPA Action Level-based.
>S = solubility limit exceeded during calculation.
na = not applicable.
PCLs are shown in **blue** font.

QA NOTES AND DATA QUALIFIERS:

(NO CODE) - Confirmed identification.
U - Analyte was not detected above the indicated Method Detection Limit (MDL).
F - Analyte was positively identified, but the quantitation is an estimation above the MDL and below the Reporting Limit (RL).
J - Analyte was positively identified, but the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
M = Concentration is estimated due to a matrix effect.
Values shown in **BOLD** indicate detections above the MDL.
Values **HIGHLIGHTED** indicate detections above the PCL.

APPENDIX D
Data Verification Summary Report

DATA VERIFICATION SUMMARY REPORT

for samples collected from AOC-51

CAMP STANLEY STORAGE ACTIVITY

BOERNE, TEXAS

Data Verification by: Tammy Chang
Parsons - Austin

INTRODUCTION

The following data verification summary report covers three soil samples and four field quality control (QC) samples collected from AOC 51 at Camp Stanley Storage Activity (CSSA) on November 15, 2011. The samples were assigned to the following Sample Delivery Group (SDG):

66309

The samples in this SDG were analyzed for explosives and metals which include arsenic, barium, cadmium, chromium, copper, nickel, lead, zinc, and mercury. There was one set of parent and field duplicate (FD) samples, one set of matrix spike/matrix spike duplicate (MS/MSD) and one equipment blank (EB) collected as field QC samples.

All samples were collected by Parsons and analyzed by APPL, Inc. following the procedures outlined in the Statement of Work and CSSA QAPP, Version 1.0. The samples in this SDG were shipped to the laboratory in one cooler. The cooler was received by the laboratory at a temperature of 2.0ºC, which was within the 2-6ºC range recommended by the CSSA QAPP.

EVALUATION CRITERIA

The data submitted by the laboratory has been reviewed and verified following the guidelines outlined in the CSSA QAPP, Version 1.0. Information reviewed in the data package included sample results; field and laboratory quality control samples; calibrations; case narratives; raw data; chain-of-custody (COC) forms and the sample receipt checklist. The findings presented in this report are based on the reviewed information, and whether the guidelines in the CSSA QAPP, Version 1.0, were met.

EXPLOSIVES

General

The explosives portion of this SDG consisted of three (3) soil samples, one FD, one set of MS/MSD and one EB. These samples were collected on November 15, 2011 and were analyzed for the full list of explosives as specified in the Work Plan.

The explosives analyses were performed according to the United States Environmental Protection Agency (USEPA) SW846 Method 8330B. The sample in this SDG was analyzed following the procedures outlined in the laboratory Standard Operation Procedure (SOP) which

was approved by USACE. All samples were prepared and analyzed within the holding time required by the method.

The explosives sample was extracted in two batches (#161494 for water and #161492 for soil). All samples were analyzed under a single set of initial calibration (ICAL). All analyses were performed undiluted.

Accuracy

Accuracy was evaluated using the percent recovery (%R) obtained from the two laboratory control samples (LCSs), MS/MSD, and the surrogate spikes.

All LCS, MS, MSD, and surrogate spike recoveries were within acceptance criteria.

Precision

Precision was evaluated based on the relative percent difference (%RPD) of the MS/MSD and parent/FD sample results. SampleAOC51-SS10 was collected in duplicate and also was designated as the parent sample for the MS/MSD analyses.

All %RPDs of MS/MSD results were compliant.

None of the target compounds were detected at or higher than the reporting limits (RL), therefore, the %RPD calculation was not applicable.

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents actual site conditions. Representativeness has been evaluated by:

- Comparing the COC procedures to those described in the Work Plan;
- Comparing actual analytical procedures to those described in the Work Plan;
- Evaluating holding times; and
- Examining laboratory blank and EB for cross contamination of samples during sample collection and analysis.

The samples in this SDG were analyzed following the COC and the analytical procedures described in the Work Plan. All samples were prepared and analyzed within the holding time required by the method and the Work Plan.

- All initial calibration criteria were met.
- All secondary source verification criteria were met.
- All initial calibration verification (ICV) criteria were met.
- All continuing calibration verification (CCV) criteria were met.

There were two method blanks and one EB associated with the explosives analyses in this SDG. All target explosives were non-detect in the method blanks and EB.

Completeness

Completeness has been evaluated by comparing the total number of samples collected with the total number of samples with valid analytical data.

All explosives results for the samples in this SDG were considered usable. The completeness for the explosives portion of this SDG is 100%, which meets the minimum acceptance criteria of 95%.

ICP-AES Metals

General

The ICP-AES metal portion of this SDG consisted of three (3) soil samples, one FD, one set of MS/MSD and one EB. The samples were collected on November 15, 2011 and were analyzed for arsenic, barium, cadmium, chromium, copper, nickel, lead, and zinc.

The metal analyses were performed using USEPA SW846 Method 6010B. The samples were analyzed following the procedures outlined in the Work Plan. All samples were prepared and analyzed within the holding time required by the method and the Work Plan.

The samples were digested in two batches (#161537 for water and #161539 for soil). The samples were analyzed in two batches under one set of ICAL. All analyses were performed undiluted except lead wad analyzed with 50 fold dilution for sample AOC51-SS11.

Accuracy

Accuracy was evaluated using the percent recovery obtained from the two LCSs and MS/MSD.

The LCS recoveries for all target metals were within acceptance criteria in both batches.

All non-compliant %Rs of the MS/MSD are listed below:

AOC51-SS10

Metals	MS, %R	MSD, %R	Criteria, %R
Barium	65	72	75 - 125
Cadmium	64	65	
Chromium	(77)	74	
Lead	44	(96)	
Nickel	67	71	
Zinc	65	72	

( ) indicates the %R was compliant.

"M" flags were applied to the above listed metal results of the parent sample by the lab. However due to the minor exceedance, "M" flag applied to the chromium result was removed and replaced with "F" by Parsons data validator.

Precision

Precision was evaluated based on the relative percent difference (%RPD) of the parent/FD and MS/MSD results. %RPD calculation is only applicable when both concentrations are greater than reporting limit.

AOC51-SS10

Metals	Parent, mg/kg	FD, mg/kg	%RPD	Criteria, %RPD
Barium	16.2	16.5	1.8	
Copper	5.44	8.25	**41**	
Lead	25.84	24.39	5.8	≤20
Nickel	4.76	4.20	12	
Zinc	8.8	15.2	**53**	

"J" flag were applied to both copper and zinc results of parent and FD samples. Since "M" flag was already applied to the zinc result of the parent sample, it was not changed due to hierarchy of data qualifiers listed in the CSSA QAPP.

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents actual site conditions. Representativeness has been evaluated by:

- Comparing the COC procedures to those described in the Work Plan;
- Comparing actual analytical procedures to those described in the Work Plan;
- Evaluating preservation and holding times; and
- Examining laboratory blanks and EB for cross contamination of samples during analysis.

The samples in this SDG were analyzed following the COC and the analytical procedures described in the Work Plan. The samples were prepared and analyzed within the holding times required by the method.

- All instrument initial calibration criteria were met.
- Lead met criteria in the low-level check standard.
- All second source criteria were met. The ICV sample was prepared using a secondary source.
- All CCV criteria were met.
- All interference check (ICSA/ICSAB) criteria were met.
- The dilution test (DT) was performed on sample AOC51-SS10. This test was only applicable to barium, chromium and lead:

Metal	**%D**	**Criteria**
Barium	**23**	%D ≤ 10
Chromium	**22**	

Lead	**22**	

- The post digestion spike (PDS) was performed on the same sample as the DT. It was applicable for all metals:

Metal	%R	Criteria
Arsenic	85	75 – 125%
Barium	75	
Cadmium	**68**	
Chromium	76	
Copper	81	
Lead	**71**	
Nickel	**74**	
Zinc	**70**	

"J" flags were applied to the parent sample results of cadmium, lead, nickel and zinc. However, all of these results have already been flagged with "M". No additional flagging is needed.

There were two method blanks, one EB and several calibration blanks associated with the lead analyses in this SDG. All blanks were compliant except copper was detected in the EB above the RL. Since copper were detected in all associated soil sample results significantly higher than the level showed in the EB, it is data validator's professional opinion, that no data qualifier is needed.

Completeness

Completeness has been evaluated by comparing the total number of samples collected with the total number of samples with valid analytical data.

All ICP-AES metal results for the samples in this SDG were considered usable. Therefore, the completeness for the lead portion of this SDG is 100%, which meets the minimum acceptance criteria of 95%.

MERURY

General

The mercury portion of this SDG consisted of three (3) soil samples, one FD, one pair of MS/MSD and one EB. The samples were collected on November 15, 2011. All samples were prepared and analyzed for mercury using USEPA Method SW7471B for soil and SW7470A for the EB).

All samples were analyzed following the procedures outlined in the CSSA QAPP. All samples were prepared and analyzed within the holding time required by the method.

The samples for mercury were prepared in two batches (#161564 for water and #161534 for soil). The samples were analyzed in a two batches under two sets of ICAL. All analyses were performed undiluted.

Accuracy

Accuracy was evaluated using the percent recovery obtained from the two LCSs, MS and MSD.

The LCS recovery for mercury was within acceptance criteria for both batches.

Both MS and MSD had acceptable %Rs.

Precision

Precision was evaluated based on the %RPD of MS/MSD and parent/FD results.

The %RPD of MS and MSD was compliant.

Mercury was not detected in the parent and FD samples at or above the RL, therefore, the %RPD calculation was not applicable.

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents actual site conditions. Representativeness has been evaluated by:

- Comparing the COC procedures to those described in the CSSA QAPP;
- Comparing actual analytical procedures to those described in the CSSA QAPP;
- Evaluating holding times; and
- Examining laboratory blanks for cross contamination of samples during analysis.

The sample in this SDG was analyzed following the COC and the analytical procedures described in the CSSA QAPP. All samples were prepared and analyzed within the holding time required by the method.

- All initial calibration criteria were met.
- All second source verification criteria were met. The ICV was prepared using a secondary source.
- All calibration verification criteria were met.

There were two method blanks, one EB, and several calibration blanks associated with the mercury analyses in this SDG. All blanks were free of mercury at or above the RL.

Completeness

Completeness has been evaluated by comparing the total number of samples collected with the total number of samples with valid analytical data.

All mercury results for the samples in this SDG were considered usable. The completeness for the mercury portion of this SDG is 100%, which meets the minimum acceptance criteria of 90%.

DATA VERIFICATION SUMMARY REPORT

for samples collected from AOC-51

CAMP STANLEY STORAGE ACTIVITY

BOERNE, TEXAS

Data Verification by: Tammy Chang
Parsons - Austin

INTRODUCTION

The following data verification summary report covers soil samples and the associated field quality control (QC) sample collected from Camp Stanley Storage Activity (CSSA) on January 16, 2012. The samples in the following Sample Delivery Group (SDG) included samples collected from RMU3:

66721

Samples were tested for selected metals including arsenic, barium, cadmium, chromium, copper, lead, nickel, and zinc.

There was one pair of parent/field duplicate (FD) samples collected as field QC samples.

All samples were collected by Parsons and analyzed by Agriculture & Priority Pollutants Laboratories, Inc. (APPL) in Clovis, California, following the procedures outlined in the Statement of Work and CSSA QAPP, Version 1.0.

The samples in this SDG were shipped to the laboratory in one cooler. The cooler was received by the laboratory at a temperature of 2.0°C which was within the recommended range is 2-6° C.

EVALUATION CRITERIA

The data submitted by the laboratory has been reviewed and verified following the guidelines outlined in the CSSA QAPP, Version 1.0. Information reviewed in the data packages included sample results; field and laboratory quality control results; calibrations; case narratives; raw data; COC forms and the cooler receipt checklist. The analyses and findings presented in this report are based on the reviewed information, and whether guidelines in the CSSA QAPP, Version 1.0, were met.

ICP METALS

General

The ICP metals portion of this SDG consisted of seven (7) soil samples including one FD. All samples were collected on January 16, 2012.

The ICP metals analyses were performed using USEPA SW846 Method 6010B. All samples in this SDG were analyzed following the procedures outlined in the CSSA QAPP. All samples were prepared and analyzed within the holding time required by the method.

The ICP metals samples were digested in one batch. All samples were analyzed undiluted.

Accuracy

Accuracy was evaluated using the percent recovery (%R) obtained from the laboratory control sample (LCS).

All LCS recoveries were within acceptance criteria.

Precision

Precision was evaluated based on the %RPD of the parent/FD sample results. Sample AOC51-SS13 was collected in duplicate.

%RPD calculation of the parent and FD results is only applicable when both concentrations are greater than reporting limits.

AOC51-SS13

Metals	Parent, mg/kg	FD, mg/kg	%RPD	Criteria, %RPD
Barium	75.1	68.0	9.9	
Chromium	26.3	22.6	15	
Copper	14.63	13.50	8.0	≤20
Lead	38.66	35.40	8.8	
Nickel	14.14	13.12	7.5	
Zinc	42.5	37.9	11	

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents actual site conditions. Representativeness has been evaluated by:

- Comparing the COC procedures to those described in the CSSA QAPP;
- Comparing actual analytical procedures to those described in the CSSA QAPP;
- Evaluating holding times; and
- Examining laboratory blanks for cross contamination of samples during sample analysis.

The samples in this SDG were analyzed following the COC and the analytical procedures described in the CSSA QAPP. All samples were prepared and analyzed within the holding times required by the method.

- All instrument tune criteria were met.
- All initial calibration criteria were met.
- All calibration verification criteria were met.
- All three ICVs were prepared using a secondary source.
- All second source verification criteria were met.
- All interference check criteria were met.

- All internal standard criteria were met.
- Dilution tests (DT) were analyzed on samples AOC51-SS17

AOC51-SS17

Metal	%D	Criteria
Barium	**22**	%D ≤ 10
Chromium	**23**	
Copper	**12**	
Nickel	**29**	
Lead	**30**	
Zinc	**31**	

- Post digestion spikes (PDS) were analyzed on the same samples as the DT.

AOC51-SS17

Metal	%R	Criteria, %R
Arsenic	92	75 - 125
Barium	79	
Cadmium	**74**	
Chromium	91	
Copper	97	
Nickel	84	
Lead	**73**	
Zinc	**73**	

"F" flags were applied to cadmium, lead, and zinc results of all samples in this SDG.

There were one method blanks (MB) and several calibration blanks associated with the ICP analyses in this SDG. All blanks were free of any target metals at or above the RL.

Completeness

Completeness has been evaluated by comparing the total number of samples collected with the total number of samples with valid analytical data.

All ICP results for the samples in this SDG were considered usable. The completeness for the ICP portion of this SDG is 100%, which meets the minimum acceptance criteria of 90%.

MERURY

General

The mercury portion of this SDG consisted of seven (7) soil samples including one FD. These samples were collected on January 16, 2012, prepared and analyzed for mercury using USEPA Method SW7471A.

All samples were analyzed following the procedures outlined in the CSSA QAPP, prepared and analyzed within the holding time required by the method.

All samples were digested in batch #163190. The analyses were performed undiluted.

Accuracy

Accuracy was evaluated using the percent recovery obtained from the LCS.

The LCS recovery for mercury was within acceptance criteria.

Precision

Precision could not be evaluated for mercury since there both parent and FD of AOC51-SS13 had no detection at or above the reporting limit for mercury; therefore, the %RPD calculation was not applicable.

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents actual site conditions. Representativeness has been evaluated by:

- Comparing the COC procedures to those described in the CSSA QAPP;
- Comparing actual analytical procedures to those described in the CSSA QAPP;
- Evaluating holding times; and
- Examining laboratory blanks for cross contamination of samples during analysis.

The sample in this SDG was analyzed following the COC and the analytical procedures described in the CSSA QAPP. The sample was prepared and analyzed within the holding time required by the method.

- All initial calibration criteria were met.
- All second source verification criteria were met. The ICV was prepared using a secondary source.
- All calibration verification criteria were met.

There was one method blank and several calibration blanks associated with the mercury analyses in this SDG. All blanks were free of mercury at or above the RL.

Completeness

Completeness has been evaluated by comparing the total number of samples collected with the total number of samples with valid analytical data.

The mercury result for the samples in this SDG was considered usable. The completeness for the mercury portion of this SDG is 100%, which meets the minimum acceptance criteria of 90%.

DATA VERIFICATION SUMMARY REPORT

for samples collected from AOC-51

CAMP STANLEY STORAGE ACTIVITY

BOERNE, TEXAS

Data Verification by: Tammy Chang
Parsons - Austin

INTRODUCTION

The following data verification summary report covers soil samples and associated field quality control (QC) samples collected from Camp Stanley Storage Activity (CSSA) on February 14, 2012. The samples in the following Sample Delivery Group (SDG) included samples collected from AOC51:

66980

Samples were tested for explosives and selected metals. There were one pair of parent/field duplicate (FD) samples and one set of matrix spike/matrix spike duplicate (MS/MSD) samples collected as field QC samples. All QC samples were analyzed for the same parameters as the parent sample.

All samples were collected by Parsons and analyzed by Agriculture & Priority Pollutants Laboratories, Inc. (APPL) in Clovis, California, following the procedures outlined in the Statement of Work and CSSA QAPP, Version 1.0.

The samples in this SDG were shipped to the laboratory in one cooler. The cooler was received by the laboratory at a temperature of 2.5°C which was within the recommended range is 2-6° C.

EVALUATION CRITERIA

The data submitted by the laboratory has been reviewed and verified following the guidelines outlined in the CSSA QAPP, Version 1.0. Information reviewed in the data packages included sample results; field and laboratory quality control results; calibrations; case narratives; raw data; COC forms and the cooler receipt checklist. The analyses and findings presented in this report are based on the reviewed information, and whether guidelines in the CSSA QAPP, Version 1.0, were met.

ICP METALS

General

The ICP metals portion of this SDG consisted of seventeen (17) soil samples including one FD and one pair of MS/MSD. All samples were collected on February 14, 2012. Samples were tested for arsenic, barium, cadmium, chromium, copper, lead, nickel, and zinc.

The ICP metals analyses were performed using USEPA SW846 Method 6010B. All samples in this SDG were analyzed following the procedures outlined in the CSSA QAPP. All samples were prepared and analyzed within the holding time required by the method.

The ICP metals samples were digested in two batches, #164069 and #164234. All samples were analyzed undiluted for metals except sample SS27 was diluted ten times for lead and sample SS24 and its FD were diluted ten times for barium and lead.

Accuracy

Accuracy was evaluated using the percent recovery (%R) obtained from the two laboratory control samples (LCS) and MS/MSD results. Sample AOC51-SS24 was designated as the parent sample for MS and MSD analyses.

All LCS recoveries were within acceptance criteria.

All non-compliant %Rs of MS/MSD are listed below:

AOC51-SS24

Metals	MS, %R	MSD, %R	Criteria, %R
Cadmium	55	55	
Chromium	72	(75)	
Lead	24000	0	75-125
Nickel	72	72	
Zinc	74	(75)	

( ) indicates the %R was compliant.

The amount of lead in the parent sample was greater than 7 times of the spiked amount which might contribute to the unusual %Rs in the MS and MSD analyses. Lab applied "M" flags to the above listed metals. Parsons data validator removed the "M" flag for chromium, nickel and zinc due to minor exceedances.

Precision

Precision was evaluated based on the %RPD of the MS/MSD results and parent/FD sample results. Sample AOC51-SS24 wad collected in duplicate.

%RPD of the MS/MSD for lead did not meet the criteria. Since "M" flag has already been applied due to the accuracy issue discussed above, no additional flagging is needed.

%RPD calculation of the parent and FD results is only applicable when both concentrations are greater than reporting limits.

AOC51-SS24

Metals	Parent, mg/kg	FD, mg/kg	%RPD	Criteria, %RPD
Barium	30.2	29.0	4.1	
Copper	20.91	21.31	1.9	
Lead	374.18	271.27	**32**	≤20
Nickel	6.76	6.06	11	

Zinc	8.2	13.9	**52**	

"J" flags were applied to both lead and zinc results of all samples in this SDG.

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents actual site conditions. Representativeness has been evaluated by:

- Comparing the COC procedures to those described in the CSSA QAPP;
- Comparing actual analytical procedures to those described in the CSSA QAPP;
- Evaluating holding times; and
- Examining laboratory blanks for cross contamination of samples during sample analysis.

The samples in this SDG were analyzed following the COC and the analytical procedures described in the CSSA QAPP. All samples were prepared and analyzed within the holding times required by the method.

- All instrument tune criteria were met.
- All initial calibration criteria were met.
- All calibration verification criteria were met.
- All three ICVs were prepared using a secondary source.
- All second source verification criteria were met.
- All interference check criteria were met.
- All internal standard criteria were met.
- Dilution test (DT) was analyzed on sample AOC51-SS24.

AOC51-SS24

Metal	%D	Criteria
Barium	**17**	%D ≤ 10
Chromium	**21**	
Copper	0.23	
Lead	**14**	
Nickel	**28**	

- Post digestion spike (PDS) was analyzed on the same sample as the DT.

AOC51-SS24

Metal	%R	Criteria, %R
Arsenic	80	75 - 125
Barium	89	
Cadmium	**59**	
Chromium	76	

Lead	86	
Nickel	75	
Zinc	**72**	

"J" flags were applied to both cadmium and zinc results of all samples in this SDG.

There were two method blanks (MB) and several calibration blanks associated with the ICP analyses in this SDG. All blanks were free of any target metals at or above the RL.

Completeness

Completeness has been evaluated by comparing the total number of samples collected with the total number of samples with valid analytical data.

All ICP results for the samples in this SDG were considered usable. The completeness for the ICP portion of this SDG is 100%, which meets the minimum acceptance criteria of 90%.

MERURY

General

The mercury portion of this SDG consisted of seventeen (17) soil samples. These samples were collected on February 14, 2012, prepared and analyzed for mercury using USEPA Method SW7471B.

All samples were analyzed following the procedures outlined in the CSSA QAPP, prepared and analyzed within the holding time required by the method.

All samples were digested in batch #164008. The analyses were performed undiluted.

Accuracy

Accuracy was evaluated using the percent recovery obtained from the LCS.

The LCS recovery for mercury was within acceptance criteria.

Precision

Precision was evaluated based on the %RPD of parent/FD and MS/MSD results. Sample AOC51-SS24 was collected in duplicate.

%RPD of MS/MSD was compliant.

Mercury was not detected at or above the reporting limit in the parent and FD sample set.

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents actual site conditions. Representativeness has been evaluated by:

- Comparing the COC procedures to those described in the CSSA QAPP;
- Comparing actual analytical procedures to those described in the CSSA QAPP;
- Evaluating holding times; and

- Examining laboratory blanks for cross contamination of samples during analysis.

The samples in this SDG were analyzed following the COC and the analytical procedures described in the CSSA QAPP. The samples were prepared and analyzed within the holding time required by the method.

- All initial calibration criteria were met.
- All second source verification criteria were met. The ICV was prepared using a secondary source.
- All calibration verification criteria were met.

There was one method blank and several calibration blanks associated with the mercury analyses in this SDG. All blanks were free of mercury at or above the RL.

Completeness

Completeness has been evaluated by comparing the total number of samples collected with the total number of samples with valid analytical data.

The mercury result for the samples in this SDG were considered usable. The completeness for the mercury portion of this SDG is 100%, which meets the minimum acceptance criteria of 90%.

EXPLOSIVES

General

This data package consisted of seventeen (17) soil samples. All samples were collected on February 14, 2012 and were analyzed for a full list of explosives by SW8330B.

The explosive analyses were performed using United States Environmental Protection Agency (USEPA) SW846 Method 8330B. The samples were analyzed in one analytical batch under one set of initial calibration (ICAL) curves. All samples were analyzed following the procedures outlined in the CSSA QAPP. All samples were prepared and analyzed within the holding time required by the method. All samples were analyzed undiluted.

Accuracy

Accuracy was evaluated using the percent recovery (%R) obtained from the LCS, MS, MSD, and the surrogate spikes. Sample AOC51-SS24 was designated as the parent sample for the MS/MSD analyses by Parsons.

All LCS, MS, MSD, and surrogate spike recoveries were within acceptance criteria.

Precision

Precision was evaluated based on the %RPD of MS/MSD and parent/FD. Sample AOC51-SS24 was collected in duplicate.

Neither parent nor FD had explosives detected at reporting limits; therefore, the %RPD calculation is not applicable. All %RPDs of MS/MSD were compliant.

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents actual site conditions. Representativeness has been evaluated by:

- Comparing the COC procedures to those described in the CSSA QAPP;
- Comparing actual analytical procedures to those described in the CSSA QAPP;
- Evaluating holding times; and
- Examining laboratory blanks for cross contamination of samples during sample preparation and analysis.

All samples in this data package were analyzed following the COC and the analytical procedures described in the CSSA QAPP, Version 1.0. All samples were prepared and analyzed within the holding time required by the method.

- All instrument performance check criteria were met.
- All initial calibration criteria were met.
- The LCS was prepared with a secondary source. All second source verification criteria were met.
- All initial calibration verification (ICV) criteria were met.
- All continuing calibration verification (CCV) criteria were met.

There were one MB and several calibration blanks associated with the explosive analyses in this SDG. All blanks were non-detect for all target explosives.

Completeness

Completeness has been evaluated in accordance with the CSSA QAPP. The number of usable results has been divided by the number of possible individual analyte results and expressed as a percentage to determine the completeness of the data set.

All explosive results for the samples in this SDG were considered usable. The completeness for this SDG is 100%, which meets the minimum acceptance criteria of 95%.

DATA VERIFICATION SUMMARY REPORT

for samples collected from AOC-51

CAMP STANLEY STORAGE ACTIVITY

BOERNE, TEXAS

Data Verification by: Tammy Chang
Parsons - Austin

INTRODUCTION

The following data verification summary report covers soil samples and the associated field quality control (QC) sample collected from Camp Stanley Storage Activity (CSSA) on March 14, 2012. The samples in the following Sample Delivery Group (SDG) included samples collected from AOC51:

67231

Samples were tested for explosives and/or selected metals. There was one field duplicate (FD) sample collected as field QC sample. The FD was analyzed for the same parameters as the parent sample.

All samples were collected by Parsons and analyzed by Agriculture & Priority Pollutants Laboratories, Inc. (APPL) in Clovis, California, following the procedures outlined in the Statement of Work and CSSA QAPP, Version 1.0.

The samples in this SDG were shipped to the laboratory in one cooler. The cooler was received by the laboratory at a temperature of 3.0°C which was within the recommended range is 2-6° C.

EVALUATION CRITERIA

The data submitted by the laboratory has been reviewed and verified following the guidelines outlined in the CSSA QAPP, Version 1.0. Information reviewed in the data packages included sample results; field and laboratory quality control results; calibrations; case narratives; raw data; COC forms and the cooler receipt checklist. The analyses and findings presented in this report are based on the reviewed information, and whether guidelines in the CSSA QAPP, Version 1.0, were met.

ICP METALS

General

The ICP metals portion of this SDG consisted of fourteen (14) soil samples including one FD. All samples were collected on March 14, 2012. Samples were tested for arsenic, barium, cadmium, chromium, copper, lead, nickel, and zinc.

The ICP metals analyses were performed using USEPA SW846 Method 6010B. All samples in this SDG were analyzed following the procedures outlined in the CSSA QAPP. All samples were prepared and analyzed within the holding time required by the method.

The ICP metals samples were digested in batch #165108. All samples were analyzed undiluted and two fold dilution for various metals.

Accuracy

Accuracy was evaluated using the percent recovery (%R) obtained from the laboratory control sample (LCS).

All LCS recoveries were within acceptance criteria.

Precision

Precision was evaluated based on the parent/FD sample results. Sample AOC51-SS36 wad collected in duplicate.

%RPD calculation of the parent and FD results is only applicable when both concentrations are greater than reporting limits.

AOC51-SS36

Metals	Parent, mg/kg	FD, mg/kg	%RPD	Criteria, %RPD
Barium	62.4	61.9	0.80	
Copper	6.53	12.80	**65**	
Lead	15.16	13.00	15	≤20
Nickel	8.21	8.66	5.3	
Zinc	24.9	75.8	**101**	

"J" flags were applied to both lead and zinc results of all samples in this SDG.

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents actual site conditions. Representativeness has been evaluated by:

- Comparing the COC procedures to those described in the CSSA QAPP;
- Comparing actual analytical procedures to those described in the CSSA QAPP;
- Evaluating holding times; and
- Examining laboratory blanks for cross contamination of samples during sample analysis.

The samples in this SDG were analyzed following the COC and the analytical procedures described in the CSSA QAPP. All samples were prepared and analyzed within the holding times required by the method.

- All instrument tune criteria were met.
- All initial calibration criteria were met.

- All calibration verification criteria were met.
- All three ICVs were prepared using a secondary source.
- All second source verification criteria were met.
- All interference check criteria were met.
- All internal standard criteria were met.
- Dilution test (DT) was analyzed on sample AOC51-SS45.

AOC51-SS45

Metal	%D	Criteria
Barium	**11**	%D ≤ 10
Chromium	**18**	
Copper	**28**	
Lead	**12**	
Nickel	**18**	
Zinc	**12**	

- Post digestion spike (PDS) was analyzed on the same sample as the DT.

AOC51-SS45

Metal	%R	Criteria, %R
Arsenic	86	75 - 125
Barium	85	
Cadmium	**66**	
Chromium	80	
Copper	90	
Lead	86	
Nickel	88	
Zinc	86	

"J" flags were applied to cadmium results of all samples in this SDG.

There were one method blank (MB) and several calibration blanks associated with the ICP analyses in this SDG. All blanks were free of any target metals at or above the RL.

Completeness

Completeness has been evaluated by comparing the total number of samples collected with the total number of samples with valid analytical data.

All ICP results for the samples in this SDG were considered usable. The completeness for the ICP portion of this SDG is 100%, which meets the minimum acceptance criteria of 90%.

MERURY

General

The mercury portion of this SDG consisted of fourteen (14) soil samples. These samples were collected on March 14, 2012, prepared and analyzed for mercury using USEPA Method SW7471B.

All samples were analyzed following the procedures outlined in the CSSA QAPP, prepared and analyzed within the holding time required by the method.

All samples were digested in batch #165034. The analyses were performed undiluted.

Accuracy

Accuracy was evaluated using the percent recovery obtained from the LCS.

The LCS recovery for mercury was within acceptance criteria.

Precision

Precision was evaluated based on the %RPD of parent/FD. Sample AOC51-SS36 was collected in duplicate.

Mercury was not detected at or above the reporting limit in the parent and FD sample set.

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents actual site conditions. Representativeness has been evaluated by:

- Comparing the COC procedures to those described in the CSSA QAPP;
- Comparing actual analytical procedures to those described in the CSSA QAPP;
- Evaluating holding times; and
- Examining laboratory blanks for cross contamination of samples during analysis.

The samples in this SDG were analyzed following the COC and the analytical procedures described in the CSSA QAPP. The samples were prepared and analyzed within the holding time required by the method.

- All initial calibration criteria were met.
- All second source verification criteria were met. The ICV was prepared using a secondary source.
- All calibration verification criteria were met.

There was one method blank and several calibration blanks associated with the mercury analyses in this SDG. All blanks were free of mercury at or above the RL.

Completeness

Completeness has been evaluated by comparing the total number of samples collected with the total number of samples with valid analytical data.

The mercury results for the samples in this SDG were considered usable. The completeness for the mercury portion of this SDG is 100%, which meets the minimum acceptance criteria of 90%.

EXPLOSIVES

General

This data package consisted of five (5) soil samples. All samples were collected on March 14, 2012 and were analyzed for a full list of explosives by SW8330B.

The explosive analyses were performed using United States Environmental Protection Agency (USEPA) SW846 Method 8330B. The samples were analyzed in one analytical batch under one set of initial calibration (ICAL) curves. All samples were analyzed following the procedures outlined in the CSSA QAPP. All samples were prepared and analyzed within the holding time required by the method. All samples were analyzed undiluted.

Accuracy

Accuracy was evaluated using the percent recovery (%R) obtained from the LCS and the surrogate spikes.

All LCS and surrogate spike recoveries were within acceptance criteria.

Precision

Precision could not be evaluated due to the lack of duplicate analysis in this SDG.

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents actual site conditions. Representativeness has been evaluated by:

- Comparing the COC procedures to those described in the CSSA QAPP;
- Comparing actual analytical procedures to those described in the CSSA QAPP;
- Evaluating holding times; and
- Examining laboratory blanks for cross contamination of samples during sample preparation and analysis.

All samples in this data package were analyzed following the COC and the analytical procedures described in the CSSA QAPP, Version 1.0. All samples were prepared and analyzed within the holding time required by the method.

- All instrument performance check criteria were met.
- All initial calibration criteria were met.
- The LCS was prepared with a secondary source. All second source verification criteria were met.
- All initial calibration verification (ICV) criteria were met.
- All continuing calibration verification (CCV) criteria were met.

There were one MB and several calibration blanks associated with the explosive analyses in this SDG. All blanks were non-detect for all target explosives.

Completeness

Completeness has been evaluated in accordance with the CSSA QAPP. The number of usable results has been divided by the number of possible individual analyte results and expressed as a percentage to determine the completeness of the data set.

All explosive results for the samples in this SDG were considered usable. The completeness for this SDG is 100%, which meets the minimum acceptance criteria of 95%.

DATA VERIFICATION SUMMARY REPORT

for samples collected from AOC-51

CAMP STANLEY STORAGE ACTIVITY

BOERNE, TEXAS

Data Verification by: Tammy Chang
Parsons - Austin

INTRODUCTION

The following data verification summary report covers soil samples and the associated field quality control (QC) samples collected from Camp Stanley Storage Activity (CSSA) on March 14, 2012. The samples in the following Sample Delivery Group (SDG) included samples collected from AOC51:

67231

Samples were tested for TCLP-metals or total metals. There was one field duplicate (FD) sample and one matrix spike/matrix spike duplicate pair collected as field QC samples. The QC samples were analyzed for the same parameters as the parent sample.

All samples were collected by Parsons and analyzed by Agriculture & Priority Pollutants Laboratories, Inc. (APPL) in Clovis, California, following the procedures outlined in the Statement of Work and CSSA QAPP, Version 1.0.

The samples in this SDG were shipped to the laboratory in one cooler. The cooler was received by the laboratory at a temperature of 2.0°C which was within the recommended range is 2-6° C.

EVALUATION CRITERIA

The data submitted by the laboratory has been reviewed and verified following the guidelines outlined in the CSSA QAPP, Version 1.0. Information reviewed in the data packages included sample results; field and laboratory quality control results; calibrations; case narratives; raw data; COC forms and the cooler receipt checklist. The analyses and findings presented in this report are based on the reviewed information, and whether guidelines in the CSSA QAPP, Version 1.0, were met.

ICP METALS

General

The ICP metals portion of this SDG consisted of six (6) soil samples for TCLP-metals and seven (7) soil samples for total metals. All samples were collected on April 24, 2012. TCLP-metals include arsenic, barium, cadmium, chromium, lead, selenium, and silver. Total metals include copper and lead, except AOC51-SS73 was analyzed for lead only.

The TCLP process was performed using USEPA SW846 method 1311, followed by SW3010A for digestion and 6010B for instrument analyses. The ICP total metals analyses were performed using 3050B for digestion and 6010B for instrument analyses. All samples in this SDG were analyzed following the procedures outlined in the CSSA QAPP. All samples were prepared and analyzed within the holding time required by the method.

The ICP TCLP metals samples were prepared in batch #166336 and total metals were prepared in batch #166451. All samples were analyzed undiluted.

Accuracy

Accuracy was evaluated using the percent recovery (%R) obtained from the two laboratory control samples (LCSs) and MS/MSD. Sample AOC51-SS72 was designated for MS/MSD analyses on the CoC

All LCSs, MS, and MSD recoveries were within acceptance criteria.

Precision

Precision was evaluated based on the parent/FD sample results and MS/MSD results. Sample AOC51-SS71 wad collected in duplicate.

%RPD calculation of the parent and FD results is only applicable when both concentrations are greater than reporting limits.

AOC51-SS71

Metals	Parent, mg/kg	FD, mg/kg	%RPD	Criteria, %RPD
Copper	3.44	4.03	16	≤20

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents actual site conditions. Representativeness has been evaluated by:

- Comparing the COC procedures to those described in the CSSA QAPP;
- Comparing actual analytical procedures to those described in the CSSA QAPP;
- Evaluating holding times; and
- Examining laboratory blanks for cross contamination of samples during sample analysis.

The samples in this SDG were analyzed following the COC and the analytical procedures described in the CSSA QAPP. All samples were prepared and analyzed within the holding times required by the method.

- All instrument tune criteria were met.
- All initial calibration criteria were met.
- All calibration verification criteria were met.
- Both ICVs were prepared using a secondary source.
- All second source verification criteria were met.

APPENDIX E

TCEQ Approval for Non-Hazardous Soils Reuse, December 20, 2010

DEPARTMENT OF THE ARMY
CAMP STANLEY STORAGE ACTIVITY, RRAD
25800 RALPH FAIR ROAD, BOERNE, TX 78015-4800

December 3, 2010

U-029-10

Mr. Kirk Coulter, P.G., Project Manager
Texas Commission on Environmental Quality
Corrective Action Team 1, VCP-CA Section
Remediation Division
PO Box 13087 (MC-127)
Austin, TX 78711-3087

SUBJECT: Movement of Non-Hazardous Metals Impacted Soils from SWMU/AOC Closure Efforts to East Pasture Firing Range, Camp Stanley Storage Activity, Boerne, Texas TCEQ Industrial Solid Waste Registration #69026, EPA Identification Number TX2210020739

Dear Mr. Coulter:

The Camp Stanley Storage Activity (CSSA), McAlester Army Ammunition Plant, U.S. Army Field Support Command, Army Material Command, U.S. Army, is providing this letter to notify the TCEQ of CSSA's plan to move and manage non-hazardous metals-impacted soils generated during remedial actions at CSSA's Solid Waste Management Units (SWMU) and Area of Concerns (AOC) to CSSA's East Pasture Firing Range Berm located in Range Management Unit 1 (RMU-1).

CSSA currently has a need for additional soils on the small arms firing range berm in the east pasture. In recent years, this berm has been modified with non-hazardous soils generated from various SWMUs and AOCs remedial actions. The non-hazardous soil movement and management within the east pasture RMU-1 was authorized by TCEQ and USEPA during a Technical Interchange Meeting held on April 19, 2006 and subsequent letter by Mr. Sonny Rayos, TCEQ Project Manager, dated May 7, 2008. This letter is provided to TCEQ to reaffirm regulatory agreement with this practice.

To verify the generated remediation soils are non-hazardous prior to movement to the east pasture, soil samples will be collected and analyzed for TCLP metals in accordance with CSSA's approved RFI/IM Waste Management Plan dated May 2006. Movement of the non-hazardous metals-impacted soils from CSSA SWMUs and AOCs to the East Pasture Firing Range Berm is expected to occur on an as needed basis as determined by CSSA.

If you have any questions regarding this notification, please contact Gabriel Moreno-Fergusson at (210) 698-5208 or Mr. Ken Rice, Parsons, at (512) 719-6050.

Sincerely,

Jason D. Shirley
Installation Manager

cc: Mr. Greg Lyssy, EPA Region 6
Mr. Jorge Salazar, TCEQ Region 13
Ms. Julie Burdey, Parsons

Schoepflin, Shannon

From: Kirk Coulter [KCoulter@tceq.state.tx.us]
Sent: Monday, December 20, 2010 2:40 PM
To: Rice, Ken R
Subject: Re: Revised workplan fo Vapor Intrusion Survey Investigation at AOC-65

Hi Ken

On the movement of non-haz waste letter. I am sending this E-Mail to you as an informal approval of the letter sent to me on December 3, 2010. I understand that this procedure was approved during Technical meeting held on April 19, 2006 between Camp Stanley, Mr. Sonny Rayos (TCEQ), Parsons Engineeriong and Mr. Greg Lyssy (EPA).

If you have any questions, please call me

Thanks

Kirk

>>> "Rice, Ken R" <Ken.R.Rice@parsons.com> 12/7/2010 4:48 PM >>>
Greg,

I was preparing for our upcoming meeting in January and realized I have not set you the attached revised vapor intrusion survey work plan you requested from our last meeting. This was revised to include that three additional soil gas samples within AOC-65 southwest of building 90 for
TO-15 PCE SIM analysis. We have collected soil gas samples directly west of building 90 (at CSSA's fence line) and indoor air samples within building 90. The remaining effort is to collect soil gas data similar to what may be present off-post. That is, the groundwater PCE concentrations within the LGR aquifer in the southern portion of AOC-65 are conservatively similar in off-post groundwater PCE concentrations.
Therefore soil gas samples collected in the southern portion of AOC-65 may be more representative of the off-post soil gas present above similar LGR contaminated groundwater. We intend to take the soil gas samples for TO-15 PCE SIM analysis prior to our meeting so that all results may be discussed and finalization of the Vapor Intrusion Survey Report initiated. If you have any questions or concerns please do not
hesitate to call or contact me.

Regards,

Ken Rice
Parsons
512-719-6050 (Austin)
512-497-0075 (mobile)

Safety - Make it Personal !

APPENDIX F
Waste Characterization Sampling Results for AOC-51

Appendix F. Waste Characterization Sampling Results for AOC-51

SAMPLE ID:		AOC51-WC01		AOC51-WC02		AOC51-WC03		AOC51-WC04		AOC51-WC05		AOC51-WC06	
DATE SAMPLED:		4/24/2012		4/24/2012		4/24/2012		4/24/2012		4/24/2012		4/24/2012	
LAB SAMPLE ID:		AY59791		AY59792		AY59793		AY59794		AY59795		AY59796	
	Units												
TCLP Metals - SW6010B/SW7470A													
Arsenic	mg/L	0.0020	U	0.0020	U	0.0020	U	0.0020	U	0.0020	U	0.0020	U
Barium	mg/L	**0.10**		**0.22**		**0.29**		**0.25**		**0.19**		**0.28**	
Cadmium	mg/L	**0.0013**	F	0.00030	U	0.00030	U	0.00030	U	0.00030	U	0.00030	U
Chromium	mg/L	0.0010	U	0.0010	U	0.0010	U	0.0010	U	0.0010	U	0.0010	U
Lead	mg/L	**0.0030**	F	**0.0018**	F	0.0012	U	0.0012	U	**0.016**	F	**0.0092**	F
Mercury	mg/L	0.00010	U	0.00010	U	0.00010	U	0.00010	U	0.00010	U	0.00010	U
Selenium	mg/L	0.0020	U	0.0020	U	0.0020	U	0.0020	U	0.0020	U	0.0020	U
Silver	mg/L	**0.020**		**0.021**		**0.021**		**0.019**		**0.019**		**0.020**	

QA NOTES AND DATA QUALIFIERS:

(NO CODE) - Confirmed identification.

U - Analyte was not detected above the indicated Method Detection Limit (MDL).

F - Analyte was positively identified, but the quantitation is an estimation above the MDL and below the Reporting Limit (RL).

Detections are **bolded**.

APPENDIX G

ProUCL Statistical Calculation Summaries for Copper, Lead, and Zinc in AOC-51 Soils

General UCL Statistics for Full Data Sets

User Selected Options

From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Copper

General Statistics

Number of Valid Observations	43	Number of Distinct Observations	28

Raw Statistics		Log-transformed Statistics	
Minimum	3.4	Minimum of Log Data	1.224
Maximum	28	Maximum of Log Data	3.332
Mean	11.15	Mean of log Data	2.276
Median	11	SD of log Data	0.535
SD	5.887		
Std. Error of Mean	0.898		
Coefficient of Variation	0.528		
Skewness	0.975		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.915	Shapiro Wilk Test Statistic	0.966
Shapiro Wilk Critical Value	0.943	Shapiro Wilk Critical Value	0.943
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	12.66	95% H-UCL	13.17
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	15.39
95% Adjusted-CLT UCL (Chen-1995)	12.77	97.5% Chebyshev (MVUE) UCL	17.2
95% Modified-t UCL (Johnson-1978)	12.68	99% Chebyshev (MVUE) UCL	20.77

Gamma Distribution Test		Data Distribution
k star (bias corrected)	3.601	Data appear Gamma Distributed at 5% Significance Level
Theta Star	3.095	
MLE of Mean	11.15	
MLE of Standard Deviation	5.874	
nu star	309.7	
Approximate Chi Square Value (.05)	269.9	**Nonparametric Statistics**
Adjusted Level of Significance	0.0444	95% CLT UCL 12.62
Adjusted Chi Square Value	268.7	95% Jackknife UCL 12.66
		95% Standard Bootstrap UCL 12.6
Anderson-Darling Test Statistic	0.416	95% Bootstrap-t UCL 12.8
Anderson-Darling 5% Critical Value	0.753	95% Hall's Bootstrap UCL 12.81
Kolmogorov-Smirnov Test Statistic	0.0888	95% Percentile Bootstrap UCL 12.68
Kolmogorov-Smirnov 5% Critical Value	0.135	95% BCA Bootstrap UCL 12.77
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 15.06
		97.5% Chebyshev(Mean, Sd) UCL 16.75
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 20.08
95% Approximate Gamma UCL	12.79	
95% Adjusted Gamma UCL	12.85	

Potential UCL to Use — Use 95% Approximate Gamma UCL 12.79

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

General UCL Statistics for Full Data Sets

User Selected Options

From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Lead

General Statistics

Number of Valid Observations	46	Number of Distinct Observations	35

Raw Statistics		Log-transformed Statistics	
Minimum	0.18	Minimum of Log Data	-1.715
Maximum	100	Maximum of Log Data	4.605
Mean	30.4	Mean of log Data	2.956
Median	24	SD of log Data	1.309
SD	22.94		
Std. Error of Mean	3.382		
Coefficient of Variation	0.755		
Skewness	1.019		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.917	Shapiro Wilk Test Statistic	0.799
Shapiro Wilk Critical Value	0.945	Shapiro Wilk Critical Value	0.945
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	36.08	95% H-UCL	76.35
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	90.36
95% Adjusted-CLT UCL (Chen-1995)	36.51	97.5% Chebyshev (MVUE) UCL	110.5
95% Modified-t UCL (Johnson-1978)	36.17	99% Chebyshev (MVUE) UCL	150.1

Gamma Distribution Test		Data Distribution
k star (bias corrected)	1.165	Data appear Gamma Distributed at 5% Significance Level
Theta Star	26.11	
MLE of Mean	30.4	
MLE of Standard Deviation	28.17	
nu star	107.1	
Approximate Chi Square Value (.05)	84.25	**Nonparametric Statistics**
Adjusted Level of Significance	0.0448	95% CLT UCL 35.96
Adjusted Chi Square Value	83.59	95% Jackknife UCL 36.08
		95% Standard Bootstrap UCL 35.99
Anderson-Darling Test Statistic	0.685	95% Bootstrap-t UCL 36.54
Anderson-Darling 5% Critical Value	0.773	95% Hall's Bootstrap UCL 36.88
Kolmogorov-Smirnov Test Statistic	0.125	95% Percentile Bootstrap UCL 36.11
Kolmogorov-Smirnov 5% Critical Value	0.134	95% BCA Bootstrap UCL 36.52
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 45.14
		97.5% Chebyshev(Mean, Sd) UCL 51.52
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 64.05
95% Approximate Gamma UCL	38.66	
95% Adjusted Gamma UCL	38.96	

Potential UCL to Use — Use 95% Approximate Gamma UCL 38.66

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

General UCL Statistics for Full Data Sets

User Selected Options

From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Zinc

General Statistics

Number of Valid Observations	39	Number of Distinct Observations	30

Raw Statistics		Log-transformed Statistics	
Minimum	0.6	Minimum of Log Data	-0.511
Maximum	490	Maximum of Log Data	6.194
Mean	52.66	Mean of log Data	3.358
Median	29	SD of log Data	1.089
SD	87.26		
Std. Error of Mean	13.97		
Coefficient of Variation	1.657		
Skewness	4.01		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.491	Shapiro Wilk Test Statistic	0.921
Shapiro Wilk Critical Value	0.939	Shapiro Wilk Critical Value	0.939
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	76.22	95% H-UCL	80.84
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	96.54
95% Adjusted-CLT UCL (Chen-1995)	85.23	97.5% Chebyshev (MVUE) UCL	116.4
95% Modified-t UCL (Johnson-1978)	77.72	99% Chebyshev (MVUE) UCL	155.3

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.9	Data do not follow a Discernable Distribution (0.05)	
Theta Star	58.49		
MLE of Mean	52.66		
MLE of Standard Deviation	55.5		
nu star	70.23		
Approximate Chi Square Value (.05)	51.93	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0437	95% CLT UCL	75.65
Adjusted Chi Square Value	51.31	95% Jackknife UCL	76.22
		95% Standard Bootstrap UCL	75.64
Anderson-Darling Test Statistic	2.24	95% Bootstrap-t UCL	119.8
Anderson-Darling 5% Critical Value	0.78	95% Hall's Bootstrap UCL	165.8
Kolmogorov-Smirnov Test Statistic	0.232	95% Percentile Bootstrap UCL	75.25
Kolmogorov-Smirnov 5% Critical Value	0.146	95% BCA Bootstrap UCL	89.99
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	113.6
		97.5% Chebyshev(Mean, Sd) UCL	139.9
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	191.7
95% Approximate Gamma UCL	71.21		
95% Adjusted Gamma UCL	72.07		

Potential UCL to Use — Use 95% Chebyshev (Mean, Sd) UCL 113.6

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.