YUMA PROVING GROUND
YUMA, ARIZONA

FINAL
CLOSURE PLAN
INACTIVE HAZARDOUS WASTE TREATMENT UNITS
KOFA OPEN BURN/OPEN DETONATION FACILITY
Revision 2

Submitted to:
U.S. Army Environmental Command

February 2013

Prepared by:
PARSONS
Salt Lake City, Utah

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ACRONYMS AND ABBREVIATIONS

AAC	Arizona Administrative Code
ADEQ	Arizona Department of Environmental Quality
ADOT	Arizona Department of Transportation
ANP	Abandoned North Pad
ASP	Abandoned South Pad
bgs	Below ground surface
BOG	Burn on Ground
CFR	Code of Federal Regulations
COC	Chemical of Concern
COPC	Contaminants of Potential Concern
DoD	Department of Defense
ESA	Endangered Species Act
°F	Degrees Fahrenheit
FPXRF	Field Portable X-Ray Fluorescence
ft	Foot
GPL	Groundwater Protection Level
IDW	Investigation Derived-Wastes
IU	Inactive Unit
KFR	Kofa Firing Range
MD	Munitions Debris
MEC	Munitions or Explosives of Concern
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
nrSRL	Arizona Non-Residential Soil Remediation Level
OB	Open Burn
OB/OD	Open Burn/Open Detonation
OD	Open Detonation
OSHA	Occupational Safety and Health Administration
PE	Professional Engineer
PM	Project Manager

ACRONYMS AND ABBREVIATIONS (CONTINUED)

PPE	Personal Protective Equipment
PSHO	Project Safety and Health Officer
PWS	Project Work Statement
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
QCM	Quality Control Manager
QSM	Quality Systems Manual
RCRA	Resource Conservation and Recovery Act
RDX	Hexahydro-1,3,5-trinitro-1,3,5-triazine
SAP	Sampling and Analysis Plan
SGC	Southwest Ground-water Consultants, Inc.
SLERA	Screening Level Ecological Risk Assessment
SOP	Standard Operating Procedure
SRL	Soil Remediation Level
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
SVOCs	Semivolatile Organic Compounds
TCLP	Toxicity Characteristic Leaching Procedure
TSDF	Treatment Storage, and Disposal Facility
TT	Trash Trench
USAEC	U.S. Army Environmental Command
USAGYPG	U.S. Army Garrison Yuma Proving Ground
USEPA	U.S. Environmental Protection Agency

SECTION 1.0

INTRODUCTION

This Closure Plan has been prepared in accordance with Title 40 Code of Federal Regulations (CFR) §265.112 and describes the steps necessary to achieve "Clean Closure" of the inactive hazardous waste treatment units (IUs) of the Kofa Open Burn/Open Detonation (OB/OD) Facility located at the U.S. Army Garrison Yuma Proving Ground (USAGYPG), Yuma, Arizona. The activities described in this document have been designed to meet the performance standard set forth in 40 CFR §265.111. This Closure Plan is organized into nine Sections and three Appendices:

Section 1.0 – Introduction

Section 2.0 – Project Management

Section 3.0 – Nature and Extent of Contamination

Section 4.0 – Remediation Activities

Section 5.0 – Sampling and Analysis Plan

Section 6.0 – Waste Characterization, Management, and Disposal

Section 7.0 – Schedule of Closure

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Appendix A – Site Photographs

Appendix B – Site Safety and Health Plan (SSHP)

Appendix C – Quality Assurance Project Plan (QAPP)

Appendix D – Analytical Data

Appendix E – Investigation Derived Waste (IDW) Policy

1.1 FACILITY BACKGROUND

The USAGYPG is a modern research facility that focuses on the testing of military systems and munitions. In conducting test programs, USAGYPG tests, stores, and uses significant quantities of munitions and explosives. As a result, some of this material must be

treated as waste, including out-of-date explosives and propellants, items that have failed quality assurance tests, out-of-date or excessive munitions, and any munitions or explosive considered unsafe.

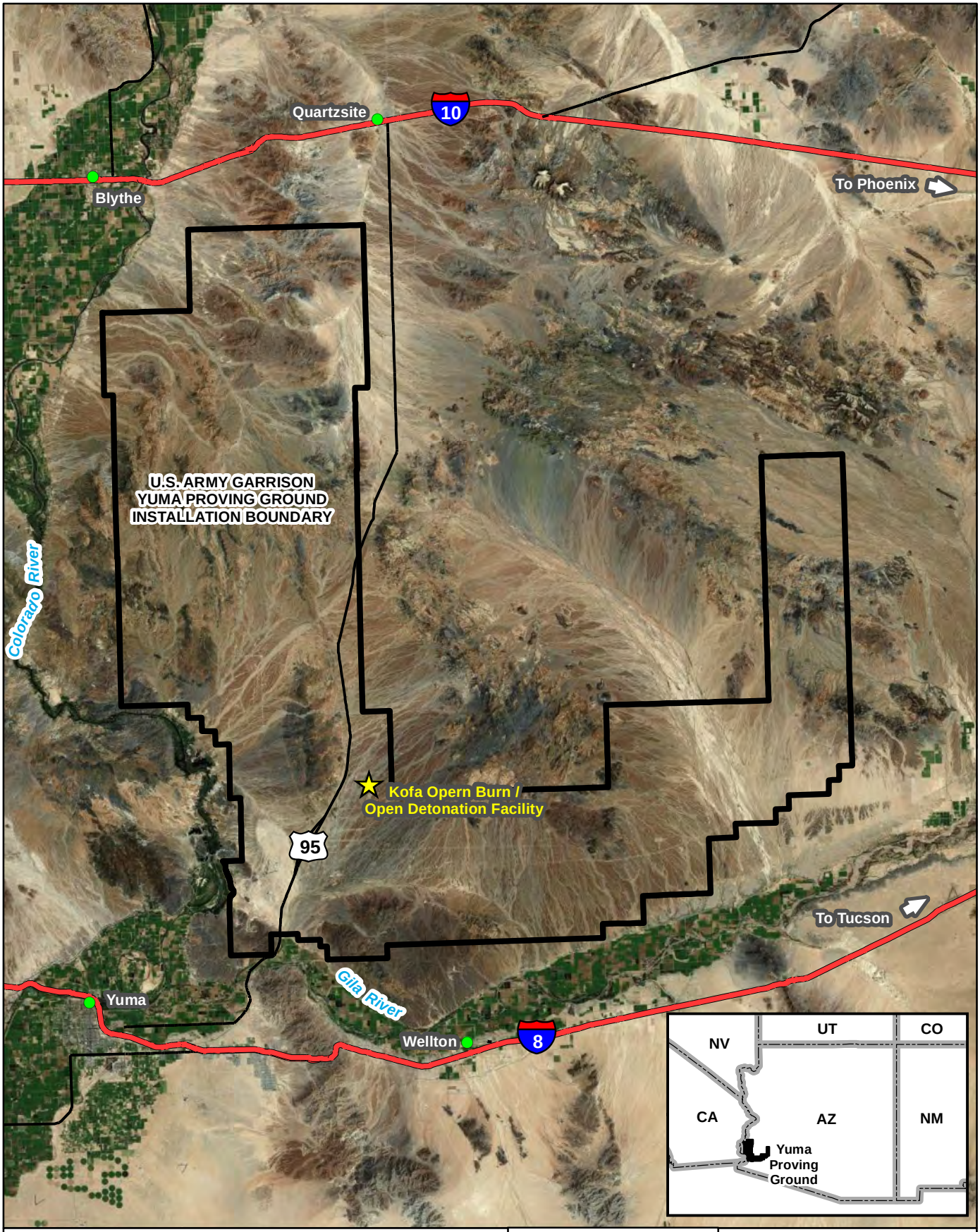
Propellants, explosives, and pyrotechnics materials were managed and treated in the area of the Kofa OB/OD Facility since the mid-1970s. At present, OB/OD is considered the safest method for effective destruction, decontamination and treatment of explosives and explosive wastes. These activities are carried out at the Kofa OB/OD Facility, which is subject to Resource Conservation and Recovery Act (RCRA) regulation. The area of the Kofa OB/OD Facility has been in operation since the mid-1970s. The facility operated under interim status from 1984 until 2007 in accordance with Arizona Administrative Code (AAC) R18-8-265A (40 CFR §265) under a Part B Permit Application, and currently operates under an RCRA Part B Permit issued to USAGYPG in 2007 (Arizona Department of Environmental Quality [ADEQ] 2007b). The IUs addressed in this Closure Plan were interim status RCRA hazardous waste treatment units per the RCRA Part B permit (ADEQ 2007b) and were previously used for open burning/open detonation from 1974 to 2000. A brief history of each unit is presented below.

1.2 SITE DESCRIPTION

This document addresses closure activities at the following IUs within the Kofa OB/OD Facility at USAGYPG:

- The Burn on Ground (BOG) Area;
- The Abandoned South Pad (ASP);
- The Abandoned North Pad (ANP); and
- The Trash Trench (TT) Area.

The four IUs are part of the Kofa OB/OD Treatment Facility, which is on the Kofa Firing Range (KFR) approximately 10 miles north-northeast of the KFR administrative complex (Figure 1.1). The Kofa OB/OD Facility is located in Sections 30 and 31, Township 5 South, Range 19 West of the Gila and Salt River Base Line and Meridian in Yuma County, Arizona. The Kofa OB/OD Facility consists of a 1-square mile area located inside a 4-foot (ft) high barbed wire fence. A cable is used as a gate to restrict access through the main entrance to the facility. The hazardous waste treatment units (both inactive and active) occupy approximately 25 acres in



LEGEND

Interstate Highway

U.S. Highway

Miles

0 5 10

0 8 16

Kilometers

FIGURE 1.1

REGIONAL LOCATION

U.S. Army Garrison Yuma Proving Ground

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the central portion of the site. The remaining land provides a safety buffer zone. Signs along the perimeter fence identify the property as an explosives disposal area. The signs, which are placed every 100 ft along the fence, contain information in both Spanish and English. Figure 1.1 presents the regional location of USAGYPG in Southwestern Arizona, northeast of the City of Yuma along U.S. Highway 95, between Interstate Highways 8 and 10. Figure 1.2 presents details of the Kofa OB/OD Facility including the location of the four IUs which are the subject of this Closure Plan. Several formal investigations have been performed at USAGYPG to identify and evaluate sites where toxic or hazardous materials potentially could be present and pose a threat to human health and the environment. Investigations that include the Kofa OB/OD Facility area include:

- *Site Characterization Report Inactive Hazardous Waste Treatment Units, December 2007* (Jason 2007);
- *Background Metal Concentrations in Soils-Boundary Northeast of the OB/OD Facility* (Jason 2006);
- *U.S. Army Yuma Proving Ground Historical Records Review, OB/OD Site,* August 2004 (Jason 2004a); and
- *Baseline Soils Investigation at the Open Burn/Open Detonation Treatment Facility.* November, 2004 (Jason 2004b).

While historical information about waste treatment activities at the IUs is limited, the current standard operating procedure (SOP No.YP-0000-K-002) limits Open Burn (OB) actions to 4,000 pounds per day and Open Detonation (OD) actions to no more than 1,000 pounds per day. During OB, bulk waste black powder and propellants (open or bagged), and other energetic materials are poured into burn pans on concrete pads and ignited.

1.2.1 Burn on Ground Area

The BOG area is an inactive portion of the Kofa OB/OD Treatment Facility where there is evidence that open burning was performed on the ground. It was used for open burning from 1974 to 1986. In 1986, operations in this area ceased and were moved to the steel pans on the North and South Pads. There is little documentation on exactly how or where the burning of propellants was performed at this IU; however, Attachment 14 of the RCRA Part B Permit (ADEQ 2007b) indicates that original OB operations were conducted on the ground, which was typical for most

OB sites of that period. Site characterization samples collected from soils in the BOG area contain concentrations of lead up to 6,360 milligrams per kilogram (mg/kg) (Jason 2007). Details regarding the nature and extent of contamination at the BOG area are provided in Section 3.1.1.

1.2.2 Abandoned South Pad

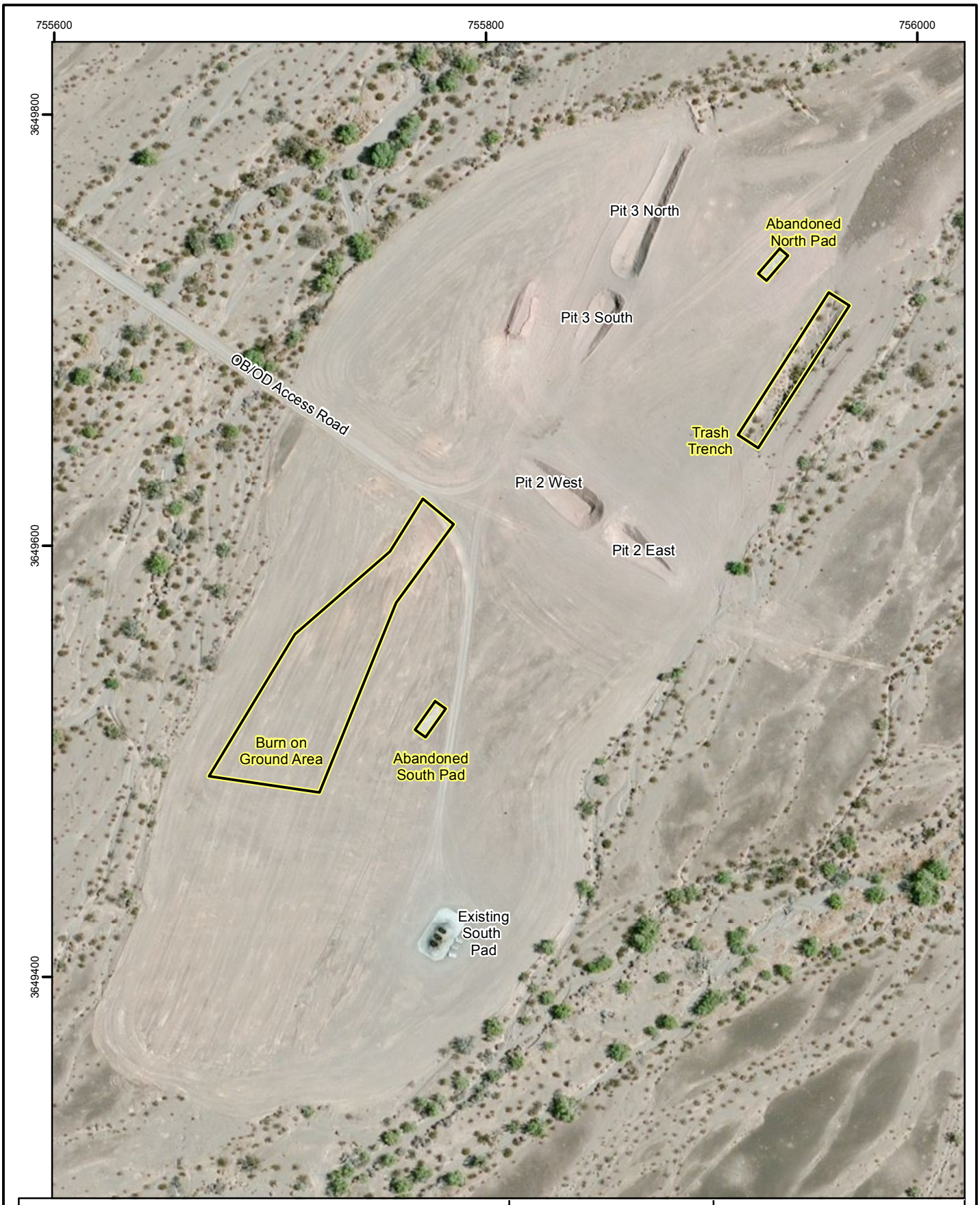
The ASP was constructed in 1986 to allow open burning in steel pans. However, the pad was damaged in 1987 and has not been used since that time. The ASP is a concrete burn pad, roughly 50 ft by 15 ft and has a short concrete berm around its edges that was damaged by the accidental detonation in 1987. This accidental detonation reportedly sent debris less than 150 ft from the pad in all directions. Soil immediately surrounding the pad has occasional discoloration spots that are believed to be the result of sparks, embers, or burning droplets being thrown off the pad. There is no additional information about the historical waste disposal activities at the ASP. Site characterization samples collected from soils in the ASP area contain concentrations of lead up to 6,790 mg/kg, and 1,3-dinitrobenzene up to 900 mg/kg. In addition, perchlorate was detected in excess of available environmental screening levels in concrete (Jason 2007). Details regarding the nature and extent of contamination at the ASP area are provided in Section 3.1.2.

1.2.3 Abandoned North Pad

The ANP is a concrete burn pad, roughly 50 ft long and 15 ft wide, used in the past for OB operations. Like the ASP, it was also constructed in 1986 to allow open burning in steel pans. Use of this pad was discontinued in 2000 due to concerns over construction of its liner, and because it was considered too small for the necessary burn/detonation events at the facility. There is no additional information about the historical waste disposal activities at the ANP. Site characterization samples collected from soils in the ANP area contain concentrations of lead up to 5,770 mg/kg (Jason 2007). Details regarding the nature and extent of contamination at the ANP area are provided in Section 3.1.3.

1.2.4 Trash Trench Area

The TT is an excavated area roughly 280 ft by 30 ft wide and approximately 12 to 15 ft deep that was used for burning various ammunition boxes and potential ordnance and explosives. Wood shipping containers, treated with pentachlorophenol, were burned at this location in 1984. The bottom and sides of the trench are primarily soil, but debris can be observed occasionally.



LEGEND

Inactive Hazardous Waste Treatment Units

Feet
0 100 200
0 30 60
Meters

FIGURE 1.2

INACTIVE HAZARDOUS WASTE TREATMENT UNITS AT THE KOFA OPEN BURN/OPEN DETONATION FACILITY

U.S. Army Garrison Yuma Proving Ground

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Although its name implies otherwise, this IU is actually a "burn pit" as opposed to a landfill. Additional information about the waste treatment activities at the TT are not available. Site characterization samples collected from soils in the TT area contain concentrations of hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) up to 1,300 mg/kg (Jason 2007). Details regarding the nature and extent of contamination at the TT area are provided in Section 3.1.4.

1.3 FACILITY SETTING

1.3.1 Geology

The USAGYPG installation is located in the Sonoran Desert Basin and Range physiographic province. The Kofa OB/OD Facility is located on a broad alluvial plain bordered by pediments that surround the Middle Mountains to the west and the Castle Dome Mountains to the east. The area is composed of alluvial deposits, desert pavements, and shallow ephemeral stream systems. Additional details on the regional physiography and geology are provided in the Site Characterization Report (Jason 2007) and Attachment 14 (Closure Report) in the RCRA Part B Permit (ADEQ 2007b).

1.3.2 Soils

The Kofa OB/OD Facility is located on Quaternary alluvium of the broad Castle Dome Plain. Landforms in the area of the Kofa OB/OD Facility are characterized by dry washes, channel bars, fan aprons, flood plains and desert pavements. The following soil complexes are found in the area (Cochran 1991):

- Riverbend family – Carrizo family complex; and
- Cristobal family – Gunsight family, gypsiferous substratum complex.

These soils consist of silty loam and sandy loam mixed with gravels. They are classified as being well drained. Available water capacity is very low, and runoff in unsaturated soil is slow to moderate. Soils from these two complexes constitute a braided channel depositional environment on a complex/coalescing alluvial fan (alluvial plain). Soils from the Riverbend family are found in active drainage channels, representing naturally disturbed soils. Soils from the Cristobal family are located on channel bars and delineate areas of undisturbed soils (i.e., development of desert pavements).

1.3.3 Hydrology

Surface water resources at USAGYPG include rivers and desert washes. Two major rivers flow through the adjacent desert areas bordering USAGYPG: 1) the Colorado River, which traverses a north-south direction to the west of USAGYPG; and 2) the Gila River, which traverses an east-west direction to the south of USAGYPG. The drainage system in the western portion of USAGYPG flows west, northwest, and southwest into the Colorado River, while the central and eastern portions flow south into the Gila River. Unnamed washes located at the Kofa OB/OD Facility flow into the Castle Dome Wash and eventually into the Gila River, which is located approximately 13 miles south. Most of the surface flow occurs in lowland washes. These washes are dry during the year except during occasional periods of intense rainfall when precipitation is sufficient enough to cause overland flow into the washes. The combination of low precipitation and high evaporation in the area prevents surface water from infiltrating deeply into the soil.

Groundwater at USAGYPG is found in hydrologic basins located below the ground surface. Regional groundwater at USAGYPG flows toward the southwest. Based on groundwater elevation data obtained from upgradient Well M (approximately 1.5 miles north of the Kofa OB/OD Facility) and downgradient wells H and J (approximately 6 miles south of the facility), the depth of groundwater is projected to be between 493 and 561 ft above mean sea level (Southwest Ground-water Consultants, Inc. [SGC] 2004). Additional details on regional groundwater and surface water hydrology are provided in the Site Characterization Report (Jason 2007) and Attachment 14 (Closure Report) in the RCRA Part B Permit (ADEQ 2007b).

1.3.4 Climate

The USAGYPG is in the Sonoran Desert, and its climate is typical of a hot, arid desert at a low elevation. It is characterized by high daytime temperatures with large daily temperature variations, low relative humidity, and very low average precipitation. The average monthly air temperature ranges from a low of 42 degrees Fahrenheit (°F) in January to a high of 106°F in July. The average annual precipitation in Yuma and other nearby areas along the lower Colorado River is very low, averaging approximately 3.5 inches (Gutierrez-Palmenberg, Inc. 2001). Rainfall occurs predominantly in the form of summertime thunderstorms, which are sometimes

intense and produce local flash flooding. Evaporation in the arid climate is very high, averaging approximately 103 inches annually.

1.3.5 Ecology

Two soil conditions, hardpans and desert pavement, exist at USAGYPG that strongly affect the distribution and composition of plant communities in the area. There are large areas dominated by shrubs, such as bursage and creosote, and depending on the soil type, common plant species may include ocotillo, cholla, paloverde, and saguaro. Wash areas include willows, mesquites, hackberries, and catclaw (Gutierrez-Palmenberg, Inc. 2001).

The mammal community at USAGYPG includes numerous small herbivorous species (e.g., Arizona pocket mouse, Merriam's kangaroo rat, and black-tailed jackrabbit), a number of larger omnivores and predators (e.g., coyote, badger, and kit fox), and four large herbivores (desert bighorn sheep, mule deer, feral burro, and feral horse). The bird community is represented by more than 100 species, with particular bird communities associated with specific plant communities. Common birds include a variety of sparrows and finches, cactus wren, gila woodpecker, American kestrel, and red-tailed hawk.

The species diversity of reptiles is high at USAGYPG, which is typical of the Sonoran Desert (Argonne 2004), and includes a variety of lizards and snakes. Although many amphibian species are found at USAGYPG, these species are year-round residents, but seasonal in their appearance.

As presented in the *Integrated Natural Resources Management Plan* (U.S. Army 1998) developed for USAGYPG, there are no plants or resident animal species known to exist at USAGYPG that are protected under the Federal Endangered Species Act (ESA). The installation, in coordination with the U.S. Fish and Wildlife Service, has determined that past activities have not required consultation under Section 7 of the ESA (Gutierrez-Palmenberg, Inc. 2001). A number of species with Federal protection under the ESA are present within Yuma and La Paz counties in Arizona, but these species have not been observed on post at USAGYPG. A majority of the species currently listed for protection in Yuma and La Paz counties include species of mammals and migratory birds that exist along the Colorado River corridor and associated riparian habitats. On occasion, animals from these areas may stray onto the installation, but in such cases are identified as transient species.

A screening level ecological risk assessment (SLERA) was conducted on IU soils to evaluate the potential for Contaminants of Potential Concern (COPCs) in soil to adversely impact ecological receptors (Parsons 2010). Based on the results of the SLERA, the potential for risk from exposure to COPCs at the IUs is unlikely under current site use (i.e., use of the site as an OB/OD facility) due to the lack of suitable habitat. Should the operations plan for the Kofa OB/OD be revised in the future (i.e., the site develops habitat to support potential ecological receptors) or upon closure of the active OB/OD facility, a baseline ecological risk assessment should be conducted to further evaluate potential ecological risks.

1.3.6 Land Use

There are no residential areas within approximately 10 miles of the Kofa OB/OD Facility. Surrounding property is utilized for USAGYPG activities. The nearest public road is Castle Dome Mine Road into Kofa National Wildlife Refuge, slightly east of U.S. Highway 95. The closest point of public access is approximately 7,809 ft from the facility's active area. Use of the area within the 7,800-ft radius requires a range clearance for passage. The nearest USAGYPG boundary is also the boundary to the wildlife refuge.

1.4 MAXIMUM INVENTORY OF HAZARDOUS WASTE

Hazardous waste was not stored at the IUs at the Kofa OB/OD Facility. Rather, from 1974 to 2000 (the operational life of the subject IUs), it is estimated that 2,730,000 pounds of hazardous waste were treated. Accurate records for this time period are not available; therefore, this estimate is based on records for the years 2005 and 2006, and the knowledge that hazardous waste operations at this facility have not changed significantly since 1974.

Information provided by facility personnel suggest that during the early years of operation before the submittal of the RCRA Part A application, up to 30,000 pounds of munitions were brought to the facility and treated (burned or detonated) in a single day. These relatively large events were conducted at a frequency of once every three months (i.e. four times per year). Following submittal of the RCRA Part A application for the facility, however, OB/OD operations involve less than 3,000 pounds of munitions per single event; therefore, the frequency of OB/OD events has increased to accommodate the annual average of 105,000 pounds per year.

1.5 REMEDIATION GOALS

For the purposes of this report, COPCs are defined as any organic chemical detected in site soils, and any inorganic chemical detected at concentrations in excess of background concentrations. In contrast, chemicals of concern (COCs) are defined as chemicals targeted for remediation because they are above selected remediation goals. Based on the results of previous investigations, five constituents have been identified as COCs for the IUs: perchlorate, beryllium, lead, 1,3-dinitrobenzene, and RDX.

Remediation goals for these COCs are based on the lowest of either the Arizona non-residential soil remediation levels (nrSRLs) (ADEQ, 2007a) or the site-specific groundwater protection levels (GPLs) (ADEQ, 1996) (Table 1.1). Remediation goals based on potential ecological risks are not applicable at the IUs because adverse ecological effects are not expected based on the results of the SLERA Report (Parsons 2010). The site-specific GPLs were calculated based on the ADEQ guidance document titled *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality* (ADEQ, 1996), and were approved in an email from ADEQ dated August 28, 2012. The following paragraph describes procedures taken in developing the site-specific GPLs.

A total of 63 surface soil samples were collected from areas of the three sites where lead concentrations exceed the minimum GPL of 290 mg/kg. The samples were then analyzed for lead using methods SW-846 1311 and 6010B. Following the analysis, five representative soil samples from each site were selected to perform toxicity characteristic leachability procedure (TCLP) extraction and analysis. Laboratory results were used to calculate an R-value for each sample. The R-value is the ratio of total lead content in soil to the TCLP result. Once the R-values were calculated, the lowest R-value of the five samples collected from each site was then used to calculate Xs in the following equation:

$$X_s = (292.9)RC_w ;$$

where:

X_s is the maximum allowable total lead concentration in soil which achieves protection of groundwater quality, i.e. the site-specific GPL.

R is defined as the ratio between the total metals content in soil and the TCLP leachate result.

C_w is the maximum groundwater concentration in the mixing cell across the perforated interval of the monitor well and is equivalent to the AWQS of 0.05 milligrams per liter (mg/L).

The constant, 292.9, results from the calculations involving the mixing cell dimensions, groundwater flow rate and infiltration rate for the base case conditions.

Results of the site-specific GPL calculations for lead are presented in Table 1.1. The GPL for perchlorate was calculated using the health-based guidance level (HBGL) of 14 µg/L (ADHS, 2000) and the default value of R (20:1) as presented in Appendix C of the guidance document (ADEQ, 1996). The remediation goals for COCs based on applicable regulatory screening levels are provided in Table 1.2.

Since the 2006 site characterization, and during the development of this final Closure Plan, the Arizona soil remediation levels (SRLs) were revised (ADEQ, 2007a). These revisions effected the remediation goals for lead, 1,3-dinitrobenzene, and RDX. The nrSRL for lead was revised from 2,000 mg/kg to 800 mg/kg, the nrSRL for 1,3-dinitrobenzene was revised from 68 mg/kg to 62 mg/kg, and the nrSRL for RDX was revised from 170 mg/kg to 160 mg/kg. Due to these revisions, a number of surface and subsurface samples that did not exceed the remediation goal for lead during the 2006 site characterization now exceed the remediation goal; therefore, the horizontal and vertical delineation for lead at the IUs has been revised (Section 3.0). Revisions to nrSRLs for 1,3-dinitrobenzene and RDX did not impact site characterizations at the IUs.

1.6 CLOSURE STRATEGY

Clean closure of the IUs at this facility will be accomplished through a two step process:

1) **Remediation:** Removal of any material containing COCs at concentrations exceeding remediation goals; and
2) **Confirmation Sampling:** Additional characterization of COCs to define nature and extent of contamination and confirm successful removal of impacted features and soil.

TABLE 1.1

SITE-SPECIFIC GROUNDWATER PROTECTION LEVEL CALCULATIONS

Kofa OB/OD Inactive Units

U.S. Army Garrison Yuma Proving Ground, Arizona

Sample Number	SWMU	Total Lead Content (mg/kg)	TCLP Lead Result (mg/l)	R[1]	X_s[2,3]
MTF-SS071-020912	BOG	818	3.58	228	3346
MTF-SS011-020812	BOG	877	4.82	182	2665
MTF-SS013-020812	BOG	1060	1.83	579	8483
MTF-SS072-020912	BOG	1850	5.02	369	5397
MTF-SS012-020812	BOG	3040	19.9	**153**	**2237**
MTF-SS055-020912	ANP	896	3.88	231	3382
MTF-SS003-020712	ANP	1130	2.65	426	6245
MTF-SS060-020912	ANP	1340	5.87	**228**	**3343**
MTF-SS053-020912	ANP	2250	7.89	285	4176
MTF-SS057-020912	ANP	5170	4.84	1068	15644
MTF-SS042-020812	ASP	836	6.14	136	1994
MTF-SS034-020812	ASP	1310	0.73	1795	26281
MTF-SS044-020812	ASP	1700	14.7	116	1694
MTF-SS038-020812	ASP	3580	20.3	176	2583
MTF-SS009-020712	ASP	7000	90.8	**77**	**1129**

Definitions:

SWMU = solid waste management unit. BOG =Burn on Ground Area. ANP = Abandonded North Pad. ASP = Abandonded South Pad. TCLP = toxicity charactheristic leachability procedure. mg/kg = milligrams per kilogram. mg/L = miligrams per liter.

Notes:

[1] R is the ratio between total lead content in soil and the TCLP leachate result.

[2] X_s is the maximum allowable total lead concentration in soil which achieves protection of groundwater quality, i.e. site-specific groundwater protection level (GPL) (ADEQ, 1996).

[3] Bold values are the minimum calculated X_s for each SWMU.

TABLE 1.2

REMEDIATION GOALS
Kofa OB/OD Inactive Units
U.S. Army Garrison Yuma Proving Ground, Arizona

Chemical of Concern	Background Concentration (mg/kg)	GPL[1] (mg/kg)	nrSRL[2] (mg/kg)	Final Remediation Goal (mg/kg)
Inorganics				
Perchlorate	--	82	720	82
Beryllium	--	23	1,900	23
Lead	18.6	BOG - 2237 ANP - 3343 ASP - 1129	800	800
Explosives				
1,3-Dinitrobenzene	--	--	62	62
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	--	--	160	160

Definitions:

GPL = groundwater protection level (ADEQ, 1996). nrSRL = non-residential soil remediation level (ADEQ, 2007a). mg/kg = milligram per kilogram. -- no value. BOG = Burn on Ground Area. ANP = Abandoned North Pad. ASP = Abandoned South Pad.

Notes:

[1] Site-specific GPL calculations for the BOG, ANP, and ASP areas are presented in Section 1.5.

[2] Arizona nrSRLs fom AAC Title 18, Chapter 7, Article 2: Soil Remediation Standards (ADEQ, 2007a).

Remediation (i.e., removal) of materials containing COCs at concentrations exceeding regulatory cleanup levels is described in Section 4.0. Characterization of the nature and extent of COCs associated with the IUs at this facility has been accomplished through previous site characterization sampling and is summarized in Section 3.0. Sampling rationale, methods, and results are provided in detail in the Site Characterization Report (Jason 2007) and are not repeated herein. Additional confirmation sampling activities will be performed to ensure the remediation is complete. Section 5.0 contains the Sampling Analysis Plan (SAP) for collection of the confirmation samples.

SECTION 2.0
PROJECT MANAGEMENT

The organizations directly involved in this project include USAGYPG, U.S. Army Environmental Command (USAEC), ADEQ, and Parsons. Key technical contacts for the project are listed in Table 2.1.

The USAGYPG is responsible for providing review and approval of project plans and documents, communicating and working with the public, coordinating with federal, state, and local agencies on issues pertaining to implementation of this project, and protection of ecological and cultural resources. Other responsibilities include coordinating any necessary evacuations, providing proper notification to ADEQ, notifying the National Response Center and state officials in the event of release or spill, and signing hazardous waste manifests as generator of any hazardous waste. The USAEC is responsible for providing technical and contractual support on the project and is tasked with executing the contract with Parsons.

The ADEQ is the primary regulatory agency with responsibilities for administering the Closure Plan. The ADEQ will receive the Closure Report for review and approval. All applicable communication and reports for this project will be delivered from Parsons to USAGYPG for delivery to ADEQ. The USAGYPG may request Parsons to deliver documents to ADEQ with a transmittal letter signed by USAGYPG.

Parsons is responsible for preparing documents, performing fieldwork, retaining necessary subcontractors, and overall implementation of the IU closures.

2.1 PROJECT MANAGER

Mr. Ed Staes, professional engineer (PE), will serve as the Parsons Project Manager (PM) and will have overall responsibility for implementing the project. The Parsons PM will be the primary point of contact on the project for communications with USAGYPG, USAEC, and ADEQ. The Parsons PM reports to Parsons upper-level management and has the authority to direct the project and implement the Performance Work Statement (PWS) under contract to USAEC. The Salt Lake City office of Parsons is responsible for conducting the overall project

TABLE 2.1
KEY TECHNICAL CONTACTS

Kofa OB/OD Inactive Units
U.S. Army Garrison Yuma Proving Ground, Arizona

Organization	Name	Telephone/FAX
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activities (e.g., removal and confirmation sampling) and will be supported by other Parsons offices as needed.

2.2 PROJECT SAFETY AND HEALTH OFFICER

Mr. Tim Mustard will serve as the Certified Industrial Hygienist/Project Safety and Health Officer (PSHO) and is responsible for review of the SSHP (Appendix B). The PSHO reports to the Parsons Division Safety Manager but communicates directly with the PM. The PSHO will ensure that the required training has been completed and personnel records are kept for all on-site personnel. The PSHO will be responsible for implementing all project health and safety requirements throughout the life of the project. The PSHO will provide guidance to the Site Safety and Health Officer (SSHO) for implementation and monitoring of all safety and health-related issues during performance of the field work.

2.3 SITE SAFETY AND HEALTH OFFICER

The SSHO will be determined at the time of the field work and is responsible for implementing and overseeing all aspects of the health and safety program in the field and will report directly to the PSHO on all matters pertaining to project fieldwork and health and safety. The SSHO will know emergency procedures, evacuation routes, and the telephone numbers of the local hospital, poison control center, fire department, and police department. The SSHO will provide input at all field safety meetings and will ensure that all field personnel are properly trained in Parsons' health and safety procedures and that these procedures are being followed. The SSHO has the authority to stop work if any operation threatens workers, public health, or safety. The SSHO will be the primary point of contact in the field for all health and safety related issues, and will be responsible for reporting and investigating all health and safety incidents.

2.4 PROJECT QUALITY CONTROL MANAGER

Mr. Thomas Kartachak will serve as the Project Quality Control Manager (QCM). The QCM will be responsible to the PM for ensuring that the collection and reporting of

project data is in keeping with the Quality Assurance/Quality Control (QA/QC) requirements of the QAPP (Appendix C). The Project QCM will be responsible for overall quality control (QC), including field sampling, geophysics, review of QC reports, and development and implementation of QC procedures. However, laboratory QC will be the direct responsibility of the Project Chemist.

2.5 SITE MANAGER

The Site Manager will be determined at the time of the field work and will be responsible for overall field operations and safety during fieldwork. The Site Manager will ensure that field tasks are performed safely and in accordance with the Closure Plan and the SSHP. The Site Manager will be responsible for implementing site control, holding safety meetings and other field meetings as needed, determining the sequence and locations of field team activities, ensuring proper documentation of all field activities, and reporting all QC failures and related corrective actions to the PM. The Site Manager will also be responsible for controlling personnel, vehicles and equipment entering the work area. The Site Manager will be the primary on-site point of contact between Parsons and USAGYPG. The Site Manager will be familiar with the Closure Plan and related field procedures and will ensure that procedures are followed. The Site Manager is authorized to stop work if the safety of workers is in question.

2.6 PROJECT CHEMIST

Mr. John Torgensen will serve as the Project Chemist and will assist the project team and the QCM in providing coordination with the analytical laboratory to implement project specific requirements, review of analytical data as it becomes available to insure conformance with quality standards, implementation of corrective actions in accordance with specifications when review of data uncovers deficiencies, perform audits and surveillance, and serve as a point of contact for USAGYPG, USAEC, and ADEQ for issues related to environmental chemistry. The Project Chemist will also review all validation reports prepared by subcontractors for accuracy. The Project chemist will report to the PM and the QCM.

2.7 MUNITIONS OR EXPLOSIVES OF CONCERN DISPOSAL LEAD

Should munitions or explosives of concern (MEC) be identified during site activities, Mr. Mark R. Keough, head of USAGYPG's Ammo Recovery Branch, will serve as the lead in the recovery and disposal MEC items. Mr. Keough and the Ammo Recovery Branch will handle all MEC disposal operations, including the determination of disposal method to be used (e.g., burn in place or remove and transport) and the performance of MEC disposal.

SECTION 3.0

NATURE AND EXTENT OF CONTAMINATION

This section presents activities performed and results of soil sampling conducted at the Kofa OB/OD Facility IUs. Results of the previous investigations conducted at this site are summarized in this section and are presented in their entirety in their respective reports (Jason 2006 and 2007). Results of the February 2012 soil sampling event are also presented in this section, with complete analytical results presented in Appendix D.

Treatment of munitions through OB/OD has resulted in the release of COPCs into the environment at the Kofa OB/OD Facility. The following preliminary assessment of the nature and extent of COPCs in site media, specifically, in surface soils, subsurface soils, and concrete will assist in the closure of the IUs at the site.

3.1 CHEMICALS OF CONCERN IN SURFACE SOILS, SUBSURFACE SOILS, AND CONCRETE

The purpose of this section is to: 1) present results of the 2006 and 2012 soil sampling events; and 2) determine if sufficient soil sampling has been conducted to adequately characterize the nature and extent of chemicals detected in site soils to implement the remedial action proposed in this closure plan; and 3) provide data to support the closure plan. The steps used to determine whether sufficient sampling was conducted are summarized as follows:

1. Identify contaminants detected in site soils with concentrations above corresponding remediation goals (Table 1.1).

2. Use professional judgment (consisting of an evaluation of the magnitude, frequency, and spatial distributions of chemical concentrations) to determine if adequate soil sampling has been conducted to implement the remediation strategy proposed in this closure plan.

3.1.1 2006 Site Characterization

Comprehensive site characterization sampling was conducted at the IUs at the Kofa OB/OD Facility in 2006. This site characterization consisted of the collection and analysis of surface soil samples from a total of 425 discrete locations. Following the receipt of analytical

results, sample points with contaminant concentrations exceeding the respective remediation goal at that time (2,000 mg/kg; ADEQ, 1997) were sampled at depths of 1-ft and 2-ft bgs to achieve vertical delineation. Details regarding these site characterization results can be found in the document *Site Characterization Report Inactive Hazardous Waste Treatment Units* (Jason 2007). The detailed sampling and analytical procedures used during this sampling event are described in the document, *Site Characterization Plan Open Burn/Open Detonation Area Inactive Units* (Jason 2005). Specifically, the plan discusses sample locations and rationale; sample collection methods; sampling equipment; sample handling and preservation; packaging and shipping procedures; decontamination methods; waste handling; field documentation; laboratory analytical methods; and data quality objectives. Data from the two samples collected in the washes adjacent to the Kofa OB/OD Facility as part of the *Baseline Soils Investigation at the Open Burn/Open Detonation Treatment Facility* (Jason 2004b) were included in this nature and extent evaluation.

3.1.2 2012 Soil Sampling

In February 2012, a total of 81 surface soil samples were collected from the IUs at the Kofa OB/OD facility. Samples were collected concurrent to field crews collecting soil samples for TCLP lead analyses and the calculation of a site specific GPL-based remediation goal. A total of 63 surface soil samples were collected from areas where results of the 2006 sampling showed concentrations of lead exceeding the remediation goal. In addition, 18 soil samples were collected to further characterize areas containing 1,3-dinitrobenzene and RDX. Soil samples were collected and analyzed according to the QAPP (Parsons, 2010) and a letter from USAGYPG to ADEQ dated October 24, 2011 describing the protocol for establishing a site-specific GPL. Approval of the sampling protocol was documented in letter from ADEQ to USAGYPG dated December 30, 2011. Samples were analyzed for TCLP and lead using methods SW846-1311 and 6010B and explosives using method SW846-8330. Summaries of the 2006 and 2012 sampling events for each IU are presented below, and complete analytical results for both events are provided in Appendix D.

3.1.3 Burn on Ground Area

During the 2006 site characterization, samples at the BOG Area were collected from 168 distinct locations and analyzed for metals and explosives (all samples). Select samples were also analyzed for semivolatile organic compounds (SVOCs), ammonia, and nitrate/nitrites (Jason 2007). Because analytical results from five surface soil samples (Points 3002, 3006, 3010, 3026, and 3078) showed concentrations of lead exceeding the remediation goal at that time (2,000 mg/kg; ADEQ, 1997), subsurface soil samples (1ft and 2 ft bgs) were collected from the five points.

In February 2012, 15 additional surface soil samples were collected from the BOG and analyzed for metals, explosives and SVOCs. Samples were collected to further characterize the horizontal extent of lead contamination at the site.

Step 1 – Remediation Goal Comparison

Figure 3.1 illustrates sampling points from the 2006 and 2012 sampling events at the BOG Area where COPCs were detected at concentrations above the ADEQ 2007 remediation goals (Table 1.1). Lead concentration results exceeded the remediation goal of 800 mg/kg in 15 surface soil samples (Points 3000, 3002, 3006, 3010, 3018, 3026, 3037, 3067, 3078, 3079, SS011, SS012, SS013, SS071, and SS072). Two subsurface soil samples (Points 3002 and 3026 at 1 ft bgs) contained concentrations of lead exceeding the remediation goal (Figure 3.1). Lead was detected in BOG Area soils in excess of the remediation goal at concentrations ranging from 818 mg/kg (Point SS071) to 6,360 mg/kg (Point 3078). Soil sampling results also show one point with a concentration of beryllium that exceeded the remediation goal of 23 mg/kg. This surface soil sample (Point 3041) was found at a concentration of 81 mg/kg. Lead and beryllium were the only CoCs identified at the BOG Area.

Step 2 - Professional Judgment

As discussed above and shown on Figure 3.1, lead was detected in 15 surface soil samples and two subsurface soil samples in excess of the remediation goal (800 mg/kg) at the BOG Area. Concentrations of lead from both 1 and 2 ft bgs at Point 3006 (138 mg/kg at 1 ft bgs and 53 mg/kg at 2 ft bgs), Point 3010 (287 mg/kg at 1 ft bgs and 23 mg/kg at 2 ft bgs), and Point 3078 (214 mg/kg at 1 ft bgs and 120 mg/kg at 2 ft bgs) were less than the remediation goal, and

concentrations of lead from 2 ft bgs at Point 3026 (673 mg/kg; 2 ft bgs) and Point 3002 (44 mg/kg; 2 ft bgs) were also less than the remediation goal. The vertical extent of lead-impacted soil at these locations has been delineated adequately to implement the remediation strategy proposed in this closure plan.

The horizontal extent of lead-impacted soil at the BOG Area was delineated based on surface soil sample data. Lead-impacted soils were identified as areas that exceeded the remediation goal of 800 mg/kg. Delineation soil samples were collected approximately 15-20 ft away from the 15 points with concentrations exceeding the lead remediation goal (Figure 3.1).

One detection of beryllium (83 mg/kg) sampled at the BOG Area exceeded the minimum GPL of 23 mg/kg. All levels of beryllium in surrounding samples were several orders of magnitude less than this detection; and of the 431 detections of beryllium at the site, this detection was the only one greater than 1.0 mg/kg.

Based on the lines of evidence presented above, the collection of additional surface and/or subsurface soil samples at the BOG Area prior to implementing the remediation strategy proposed in this closure plan is not required.

3.1.4 Abandoned South Pad Area

During the 2006 site characterization, soil samples were collected from 116 distinct locations at the ASP Area and analyzed for metals and explosives (all samples). Select samples were also analyzed for SVOCs, ammonia, and nitrite/nitrate (Jason 2007). Analytical results from perchlorate exceeded the remediation goal at six points (Points 5020, 5027 and 5032 on the concrete pad and Points 5033, 5072 and 5073 near the concrete pad). Additional surface and subsurface soils samples were collected to determine the extent of perchlorate at these locations. 1,3-Dinitrobenzene was detected at a concentration above the remediation goal (68 mg/kg) in one surface soil sample (Point 6046) and lead was detected a concentrations above the remediation goal established for the investigation at that time (2,000 mg/kg) in two samples (Points 5021 and 5038). Additional subsurface soils samples (1ft and 2ft bgs) were collected to determine the extent of lead.

In February 2012, 22 additional surface soil samples were collected from the ASP Area and analyzed for metals, explosives and SVOCs. These samples were collected to further characterize the horizontal extent of lead concentrations exceeding the remediation goal.

FIGURE 3.1

BURN ON GROUND AREA WITH SELECT LEAD RESULTS

U.S. Army Garrison Yuma Proving Ground

SOIL SAMPLES WITH BERYLLIUM RESULTS ABOVE REMEDIATION GOAL. (BLUE POINT)

Sample	Depth	Result *
3041	Surface	81

* Results reported in mg/kg. All other beryllium results are below 1.0 mg/kg.

SOIL SAMPLES WITH LEAD RESULTS ABOVE REMEDIATION GOAL. (RED POINTS)

Sample	Depth	Result *
3000	Surface	1580
3002	Surface	2550
3002	1 ft bgs	1370
3002	2 ft bgs	44
3006	Surface	2250
3006	1 ft bgs	138
3006	2 ft bgs	53
3010	Surface	3080
3010	1 ft bgs	287
3010	2 ft bgs	23
3018	Surface	1290
3026	Surface	3090
3026	1 ft bgs	4810
3026	2 ft bgs	673
3037	Surface	961
3067	Surface	1020
3078	Surface	6360
3078	1 ft bgs	214
3078	2 ft bgs	120
3079	Surface	888
SS011	Surface	877
SS012	Surface	3040
SS013	Surface	1060
SS071	Surface	818
SS072	Surface	1850

* Results reported in mg/kg.

ADJACENT SOIL SAMPLE RESULTS FOR COMPARATIVE PURPOSES

Sample	Depth	Result
3001	Surface	669
3003	Surface	797
3004	Surface	452
3007	Surface	556
3009	Surface	468
3011	Surface	170
3017	Surface	238
3019	Surface	274
3025	Surface	26
3036	Surface	98.6
3046	Surface	13
3047	Surface	15.9
3052	Surface	68
3060	Surface	18
3080	Surface	21
3094	Surface	131
4006	Surface	22
4010	Surface	84
SS014	Surface	132
SS030	Surface	240
SS070	Surface	44.2
SS073	Surface	335
SS074	Surface	69.9
SS075	Surface	117

* Results reported in mg/kg.

KOFA OB/OD FACILITY

UNPAVED ROAD

Feet 0 175 350

Meters 0 60 120

LEGEND

- Surface Soil Samples with Lead less than Remediation Goal
- Soil Sample Locations with Lead Exceeding Remediation Goal
- Soil Sample Locations with Beryllium Exceeding Remediation Goal

Remediation Goal for Lead = 800 mg/kg
Remediation Goal for Beryllium = 23 mg/kg

- Approximate extent of Burn on Ground Area

Notes:

Lead concentrations are shown only for those samples with concentrations in excess of the remediation goal and adjacent samples to demonstrate horizontal extent of contamination.

Samples identified with MTF-SS are those sampled in 2012; all others were sampled in 2006.

Only samples analyzed for metals are shown.

U.S. Army Garrison Yuma Proving Ground (USAGYPG)

CA

AZ

Feet 0 35 70

Meters 0 10 20

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Step 1 – Remediation Goal Comparison

Figure 3.2 illustrates the sampling points where COPCs were detected at concentrations above the 2007 remediation goals in the ASP Area. The concrete pad located at the ASP contains elevated levels of perchlorate relative to the remediation goal of 720 mg/kg at two sampling locations (Points 5027 and 5032). Concentrations of lead also exceeded the remediation goal of 800 mg/kg in 18 surface soil samples (Points 5016, 5021, 5037, 5038, SS007 SS008, SS009, SS031, SS034, SS035, SS038, SS039, SS040, SS041, SS042, SS043 SS044, and SS045) and two subsurface soil samples (Points 5021 and 5038 at 2 ft bgs). In addition, the analyte 1,3-dinitrobenzene was detected in one surface soil sample (Point 6046), at concentrations in excess of the remediation goal of 62 mg/kg. Therefore, lead, perchlorate, and 1,3-dinitrobenzene are the COCs targeted for remediation at the ASP Area.

Step 2 - Professional Judgment

Lead, perchlorate, and 1,3-dinitrobenzene were detected at concentrations in concrete or soil in excess of their respective remediation goals. The vertical extent of perchlorate is limited to the concrete pad, as demonstrated by concentrations of perchlorate below the remediation goal of 720 mg/kg in underlying surface soil samples at Points 5027 (2.5 mg/kg) and 5032 (9.2 mg/kg) (Figure 3.2). The vertical extent of 1,3-dinitrobenzene is limited to surface soils, as demonstrated by concentrations in underlying soil samples collected at Point 6046, both found to be non-detect (<0.1 mg/kg) (Figure 3.2).

As shown on Figure 3.2, concentrations of lead from 1 ft bgs at Points 5021 (496 mg/kg) and 5038 (17 mg/kg) are less than the remediation goal (800 mg/kg), and concentrations from 2 ft bgs at these points (Point 5021 at 1300 mg/kg and Point 5038 at 2 ft bgs) exceed the remediation goal. Based on this data, the vertical extent of lead has not been fully delineated; however, it should be noted that concentrations of lead from the 2 ft bgs locations were less than the remediation goal of 2,000 mg/kg at the time of the 2006 site characterization (Section 1.5). Because the nature of OB/OD operations scatter contaminants on the surface, and because low precipitation at USAGYPG limits contamination from permeating into subsoil, the vertical extent of lead-impacted soil at the ASP has been delineated adequately to implement the remediation

strategy proposed in this closure plan. Confirmation soil samples will be collected during closure activities to confirm the vertical extent of lead-impacted soil above remediation goals.

The horizontal extent of 1,3-dinitrobenzene at the ASP Area has been delineated based on adjacent surface soil samples with concentrations less than the remediation goal. These adjacent soil samples with concentrations below the remediation goal were collected approximately 5-10 ft away from Point 6046 (Figure 3.2).

The horizontal extent of lead at the ASP Area has been delineated on the north, south and west side of the concrete pad based on adjacent surface soil samples with concentrations below the remediation goal. Additional samples collected on the east side of the pad during February 2012 show lead concentrations exceeding the remediation goal. This area has not been fully delineated based on adjacent surface soil samples, however, these locations are bounded by an unpaved access road to the east.

Based on the lines of evidence presented above, the collection of additional surface and/or subsurface soil samples at the ASP Area prior to implementing the remediation strategy proposed in this closure plan is not required. Confirmation soil samples will be collected during closure activities to confirm the horizontal extent of lead-impacted soil above remediation goals.

3.1.5 Abandoned North Pad Area

During the 2006 site characterization, samples were collected from a total of 88 distinct locations at the ANP Area and analyzed for metals and explosives (all samples). Select samples were also analyzed for SVOCs, ammonia, and nitrate/nitrites (Jason 2007). Because analytical results from three surface soil samples (Points 8010, 8012, and 8021) detected concentrations exceeding the lead remediation goal established in 2006 (2,000 mg/kg), subsurface soils samples (1ft and 2ft bgs) were collected from the three points.

In February 2012, an additional 26 surface soil samples were collected from the ANP Area and analyzed for metals, explosives and SVOCs. These samples were collected to further characterize the horizontal extent of lead exceeding the newly established remediation goal of 800 mg/kg.

FIGURE 3.2

ABANDONED SOUTH PAD AREA WITH SELECT COC RESULTS

U.S. Army Garrison Yuma Proving Ground

SOIL SAMPLES WITH 1,3-DINITROBENZENE RESULTS ABOVE REMEDIATION GOAL (ORANGE POINTS)

Sample	Depth	Result *
6046	Surface	900
6046	1 ft bgs	ND
6046	2 ft bgs	ND

* Results reported in mg/kg.

ADJACENT SOIL SAMPLES WITH 1,3-DINITROBENZENE RESULTS FOR COMPARATIVE PURPOSES

Sample	Depth	Result
3067	Surface	ND
3078	Surface	ND

* Results reported in mg/kg.

SOIL SAMPLES WITH PERCHLORATE RESULTS ABOVE REMEDIATION GOAL (BLUE POINTS)

Sample	Depth	Result *
5020	Concrete	115
5020	12" bgs	25.4
5020	24" bgs	1.2
5027	Concrete	1400
5027	Surface	2.5
5032	Concrete	2020
5032	Surface	9.2
5032	12" bgs	11.5
5032	24" bgs	9.3
5033	Surface	94.9
5072	Surface	95.3
5073	Surface	90.5

* Results reported in mg/kg.

SOIL SAMPLES WITH LEAD RESULTS ABOVE REMEDIATION GOAL. (RED POINTS)

Sample	Depth	Result *
5016	Surface	984
5021	Surface	2000
5021	1 ft bgs	496
5021	2 ft bgs	1300
5022	Surface	993
5037	Surface	1170
5038	Surface	6790
5038	1 ft bgs	17
5038	2 ft bgs	1370
5070	Surface	993
5074	Surface	1320
5075	Surface	1950
SS007	Surface	2230
SS008	Surface	3090
SS009	Surface	7000
SS031	Surface	921
SS034	Surface	1310
SS035	Surface	808
SS038	Surface	3580
SS039	Surface	2760
SS040	Surface	1840
SS041	Surface	3460
SS042	Surface	836
SS043	Surface	3240
SS044	Surface	1700
SS045	Surface	1640

* Results reported in mg/kg.

ADJACENT SOIL SAMPLE WITH LEAD RESULTS FOR COMPARATIVE PURPOSES

Sample	Depth	Result
5017	Surface	348
5020	Surface	12
5024	Surface	398
5025	Surface	266
5026	Surface	8
5028	Surface	49
5033	Surface	391
5036	Surface	152
5040	Surface	111
5068	Surface	10
5069	Surface	9
5071	Surface	482
5072	Surface	383
5073	Surface	201
SS006	Surface	307
SS033	Surface	374
SS036	Surface	726
SS037	Surface	469

* Results reported in mg/kg.

KOFA OB/OD FACILITY

UNPAVED ROAD

Feet 0 175 350

Meters 0 60 120

LEGEND

- Samples with COCs less than Remediation Goal
- Soil Sample Locations with Lead Exceeding Remediation Goal
- Soil Sample Locations with 1,3-Dinitrobenzene Exceeding Remediation Goal
- Soil Sample Locations with Perchlorate Exceeding Remediation Goal

Remediation Goals:
Lead = 800 mg/kg
Perchlorate = 720 mg/kg
1,3-Dinitrobenzene = 62 mg/kg

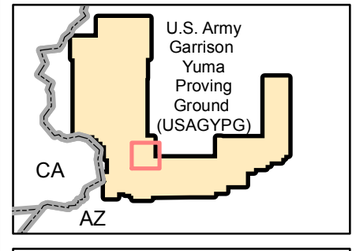
Approximate Boundary of Concrete Pad

Notes:

COC concentrations are shown only for those samples with concentrations in excess of the remediation goals and adjacent samples to demonstrate horizontal extent of contamination.

Samples identified with MTF-SS are those sampled in 2012; all others were sampled in 2006.

Only samples analyzed for metals, perchlorate, and/or explosives are shown.



Feet 0 25 50

Meters 0 8 16

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Step 1 – Remediation Goal Comparison

Figure 3.3 illustrates the sampling points where COPCs were detected at concentrations above the 2007 remediation goals at the ANP Area. Concentrations of lead exceeded the remediation goal of 800 mg/kg in 21 surface soil samples (Points 8010, 8012, 8014, 8021, 8022, SS001, SS002, SS003, SS004, SS049, SS050, SS051, SS053, SS054, SS055, SS056, SS057, SS058, SS059, SS060, and SS064). Lead was the only COPC detected in ANP Area soils in excess of the remediation goal (800 mg/kg) at concentrations ranging from 812 mg/kg (Point SS064) to 5,970 mg/kg (Point SS049); therefore, lead is the only chemical considered to be a COC at the ANP Area.

Step 2 - Professional Judgment

As discussed above and shown on Figure 3.3, lead was detected in 21 surface soil samples in excess of the remediation goal (800 mg/kg). Concentrations of lead from both 1 and 2 ft bgs at Point 8012 were less than the remediation goal, and concentrations of lead from 2 ft bgs at Points 8010 and 8021 were also less that the remediation goal. These results indicate that the vertical extent of lead-impacted soil at the ANP Area has been delineated adequately to implement the remediation strategy proposed in this closure plan.

Laterally, the extent of lead-impacted surface soil was characterized based on surrounding sample points with concentrations below the remediation goal. These adjacent soil samples with concentrations below the lead remediation goal were collected approximately 10-20 ft away from location points with lead concentrations exceeding the remediation goal (Figure 3.3).

Based on the lines of evidence presented above, the collection of additional surface and/or subsurface soil samples at the ANP Area prior to implementing the remediation strategy proposed in this closure plan is not required.

3.1.6 Trash Trench Area

During the 2006 site characterization, samples were collected from a total of 53 distinct sample locations in the TT Area and analyzed for metals and explosives (all samples). Select samples were analyzed for SVOCs, ammonia, and nitrate/nitrites (Jason 2007). Table 3.1 depicts the TT Area site characterization sample numbers by location (e.g., base of trench, sidewall of

trench, and overburden located adjacent to trench). Results of the 2006 sampling event show two points (7027 and 7039) with concentrations in excess of the remediation goal. Eight additional surface soil samples were collected from the TT Area in 2012. These samples consisted of four samples collected approximately 8 ft in each direction from points 7027 and 7039. The samples were analyzed for metals, explosives and SVOCs. Results show the only COPC with concentrations at the TT Area exceeding the remediation goal (160 mg/kg) was RDX.

TABLE 3.1

SOIL SAMPLES COLLECTED AT TRASH TRENCH AREA
Kofa OB/OD Inactive Units
U.S. Army Garrison Yuma Proving Ground, Arizona

Trench Base		Sidewall		Overburden	
7012	7020	7001	7029	7044	7041
7013	7021	7002	7030	7045	7050
7014	7022	7003	7031	7046	7051
7015	7023	7004	7032	7047	7052
7016	7024	7005	7033	7048	7042
7017	7025	7006	7034	7049	7043
7018	7026	7007	7035		
7019	7027	7008	7036		
	7028	7009	7037		
		7010	7038		
		7011	7039		
			7040		

Step 1 – Remediation Goal Comparison

As shown in Figure 3.4, RDX was the only COPC detected at concentrations greater than the 2007 remediation goal (160 mg/kg; Table 1.1) at Points 7027 (190 mg/kg), and 7039 (1300 mg/kg) during 2006 sampling, and Point SS027 (240 mg/kg) during 2012 sampling; therefore, RDX is the only chemical considered to be a COC at the TT Area.

Step 2 - Professional Judgment

The explosive RDX was detected in three surface soil samples at the TT Area (Points 7027, 7039, and SS027). The vertical extent of RDX concentrations exceeding a remediation goal is limited to the surface interval at Point 7027. RDX concentrations detected at 1 and 2 ft

FIGURE 3.3

ABANDONED NORTH PAD AREA WITH SELECT LEAD RESULTS

U.S. Army Garrison Yuma Proving Ground

SOIL SAMPLES WITH LEAD RESULTS ABOVE REMEDIATION GOAL. (**RED POINTS**)

Sample	Depth	Result *
8010	Surface	5770
8010	1 ft bgs	1620
8010	2 ft bgs	23
8012	Surface	3390
8012	1 ft bgs	20
8012	2 ft bgs	15
8014	Surface	1860
8021	Surface	4220
8021	1 ft bgs	1190
8021	2 ft bgs	457
8022	Surface	1100
SS001	Surface	2420
SS002	Surface	3900
SS003	Surface	1130
SS004	Surface	1550
SS049	Surface	5970
SS050	Surface	849
SS051	Surface	988
SS053	Surface	2250
SS054	Surface	1740
SS055	Surface	896
SS056	Surface	979
SS057	Surface	5170
SS058	Surface	2730
SS059	Surface	2610
SS060	Surface	1340
SS064	Surface	812

* Results reported in mg/kg.

ADJACENT SOIL SAMPLE RESULTS FOR COMPARATIVE PURPOSES

Sample	Depth	Result
8007	Surface	84
8008	Surface	488
8009	Surface	64
8013	Surface	9
8016	Surface	9
8018	Surface	596
8019	Surface	12
8040	Surface	9
8041	Surface	8
8044	Surface	13
8045	Surface	13
SS005	Surface	176
SS052	Surface	767
SS062	Surface	579
SS063	Surface	199
SS065	Surface	127
SS066	Surface	479
SS069	Surface	508

* Results reported in mg/kg.

LEGEND

- Surface Soil Samples with Lead less than Remediation Goal
- Sample Locations Where Lead Exceeds Remediation Goal

Remediation Goal for Lead = 800 mg/kg

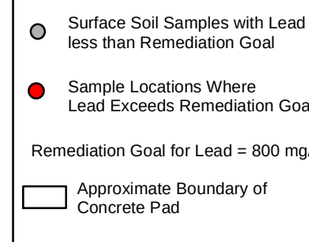
- Approximate Boundary of Concrete Pad

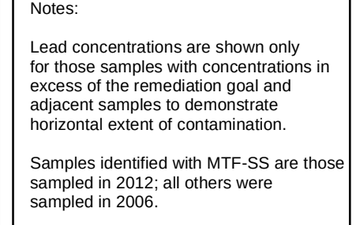
Notes:

Lead concentrations are shown only for those samples with concentrations in excess of the remediation goal and adjacent samples to demonstrate horizontal extent of contamination.

Samples identified with MTF-SS are those sampled in 2012; all others were sampled in 2006.

Only samples analyzed for explosives are shown.





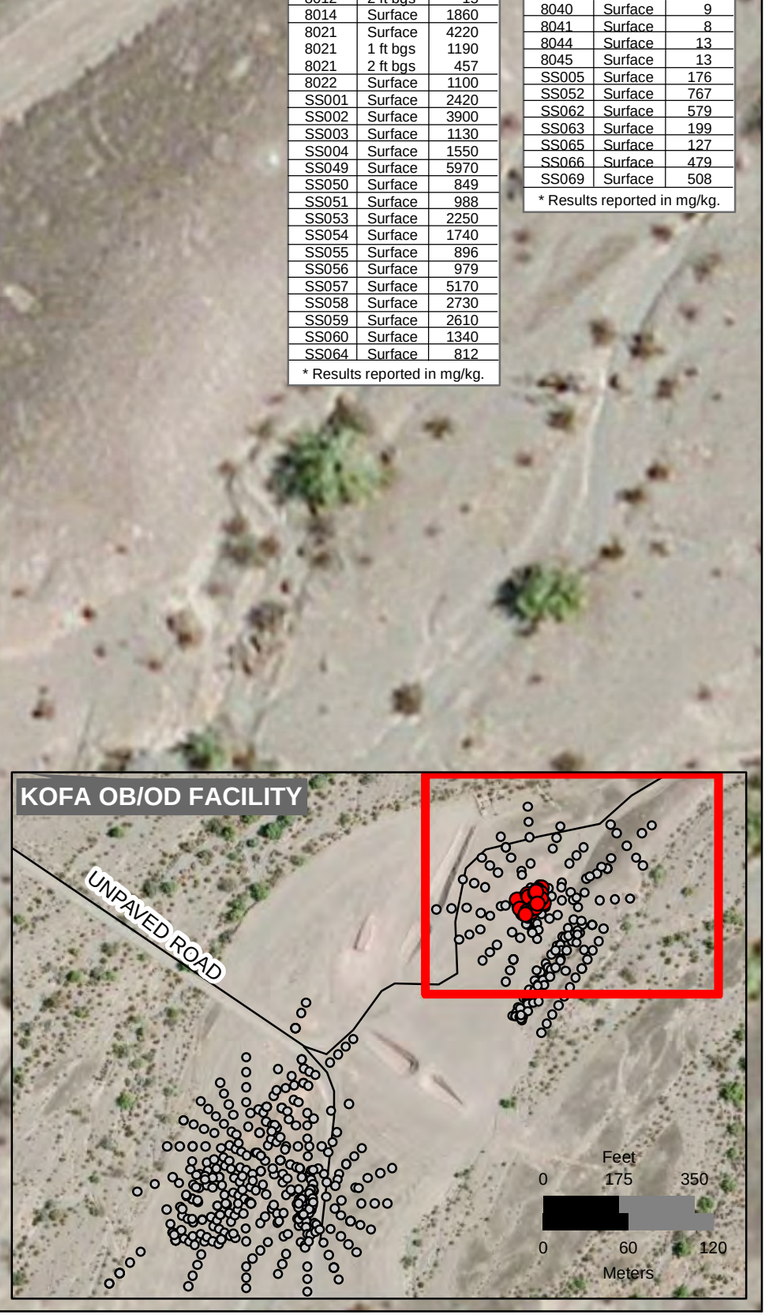


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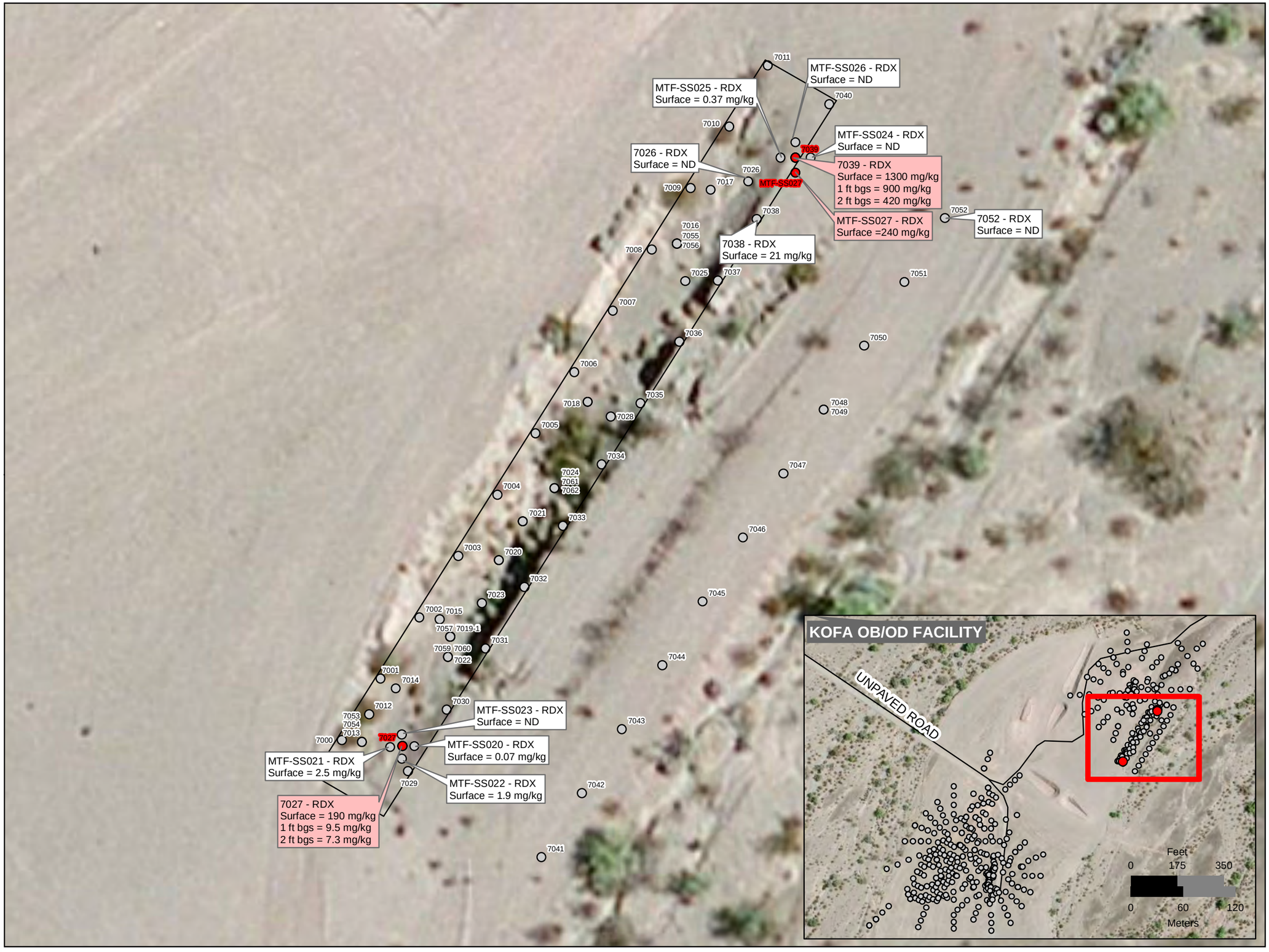
FIGURE 3.4

TRASH TRENCH AREA WITH SELECT RDX RESULTS

U.S. Army Garrison Yuma Proving Ground



LEGEND

- Surface Soil Samples with RDX less than Remediation Goal
- Sample Locations Where RDX Exceeds Remediation Goal

Remediation Goal for RDX = 160 mg/kg

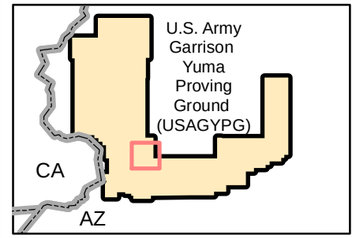
Approximate Boundary of Trash Trench

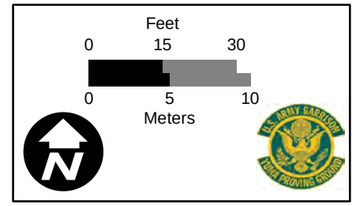
Notes:

RDX concentrations are shown only for those samples with concentrations in excess of the remediation goal and adjacent samples to demonstrate horizontal extent of contamination.

Samples identified with MTF-SS are those sampled in 2012; all others were sampled in 2006.

Only samples analyzed for metals are shown.





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bgs are less than the remediation goal (9.5 and 7.3 mg/kg, respectively). The vertical extent of RDX at Point 7039 shows elevated concentrations of RDX in both the 1 and 2 ft bgs sample (900 and 420 mg/kg) and has not been fully defined; however, adequate sampling has been conducted to implement the proposed remediation strategy presented in this closure plan. Confirmation soil samples will be collected during closure activities to confirm the vertical extent of RDX impacted soil.

The horizontal extent of RDX impacts at the TT Area has been delineated based on adjacent surface and subsurface soil samples with concentrations less than the remediation goals. These adjacent soil samples with concentrations of RDX less than the remediation goal were collected approximately 10-20 ft away from Points 7027, 7039, and SS027 (Figure 3.4).

Based on the lines of evidence presented above, additional surface and/or subsurface soil sampling is not required to implement the remediation strategy proposed in this closure plan.

3.1.7 Summary of Adequacy of Soil Characterization

As presented in Section 3.1 above, additional sampling for site characterization is not required if: 1) site concentrations were less than corresponding remediation goals; or 2) application of professional judgment and additional lines of evidence rule out the need for additional sampling.

Based on these criteria and as demonstrated above, the nature and extent of chemicals detected in soils at the BOG, ASP, and ANP Areas have been adequately characterized, and additional soil sampling is not required to implement the proposed remediation strategy. Confirmation soil samples will be collected during closure activities to confirm the vertical extent of RDX impacted soil.

3.2 SURFACE WATER

The closest surface water body (the Colorado River) is located more than 13 miles west of the Kofa OB/OD Facility and impacts from the site are highly unlikely. Ephemeral washes which carry runoff water during heavy rainfall events do traverse the OB/OD Facility. Two sediment samples were collected from the washes in 2004 and analyzed for metals, explosives, nitrate/nitrite, nitrogen as ammonia (Jason 2004b). Selected metals, nitrocellulose, nitrate/nitrites, and nitrogen as ammonia were detected at low levels, all below the State of

Arizona GPLs. Therefore, impacts to downgradient surface water bodies are not likely and further characterization of the washes or surface water are not required.

3.3 GROUNDWATER

Based on water level information obtained from wells upgradient (north) and downgradient (south) of the facility, it is estimated that groundwater is encountered at depths ranging from 470 to 580 ft bgs. OB/OD treatment operations result in distribution of COPCs in surface and shallow subsurface soils and have not been shown to migrate to deeper soils. Therefore, impact to groundwater at depths of approximately 500 ft bgs is unlikely due to the low infiltration rates. A groundwater monitoring program is being conducted as part of the RCRA Part B Permit and includes the collection of groundwater samples to detect site impacts.

Data collected during a 2004 soil investigation (Jason 2004b) were used to develop a computer model to assess infiltration rates from the surface to groundwater. Specifically, the model was designed to determine if infiltration from precipitation at the OB/OD facility would travel to groundwater in a reasonable time frame. The model calculated infiltration rates over a 100-year period using "worst-case" parameters, for soil types, soil thicknesses, and local climatological data. Based on calculations using the Hydrologic Evaluation of Landfill Performance model, infiltrating precipitation would not reach the aquifer at a depth of 470 ft bgs within a 100-year period (SGC 2004). Details of the infiltration study are provided in the document *Infiltration Study for the Open Burn/Open Detonation Treatment Facility at Yuma Proving Ground* (SGC 2004).

SECTION 4.0
REMEDIATION ACTIVITIES

Closure of the four IUs at the OB/OD facility will be accomplished through excavation and disposal of soils containing COCs at concentrations exceeding remediation goals. Excavation footprints and depths are dependent on site characterization sampling results. Section 3.0 presented evidence showing that sufficient surface and/or subsurface soil sampling has been conducted at the IUs to adequately define the horizontal and vertical extent of contamination to implement the remediation strategy proposed in this closure document. The specific plan of action for each IU is presented below. Additional discussions of confirmation sampling are included in the Sampling and Analysis Plan presented in Section 5.0. These footprints may change (i.e., expand) if sampling and/or field screening indicates impacted soil extend beyond the initial excavation footprint.

4.1 REMEDIAL ACTION PROTOCOLS AND ACTIVITIES

This section provides a description of the remediation activities methods and procedures, including necessary equipment, site accessibility, removal procedures, and waste handling.

4.1.1 Site Security / Accessibility

As discussed in Section 1.0, the four IUs are part of the Kofa OB/OD Treatment Facility, which is on the KFR approximately 10 miles north-northeast of the KFR administrative complex (Figure 1.1). The hazardous waste treatment units (both inactive and active) occupy approximately 25 acres in the central portion of the site. The remaining land provides a safety buffer zone. Signs along the perimeter fence identify the property as an explosives disposal area. The signs, which are placed every 100 ft along the fence, contain information in both Spanish and English. Given the active nature of the Kofa OB/OD facility, security is tightly regulated. In addition, the following site security measures will be implemented during removal activities:

- Visitors and employees to USAGYPG must gain access through a controlled gate onto the post.
- Work activities will be coordinated with USAGYPG personnel, who will be notified of the schedule and contacted daily.

- Site controls will be in place to control access to the IUs during the removal operations.
- The Parsons Site Manager will be responsible for controlling personnel, vehicles and equipment entering the work area.
- A sign-in post will be established at the site. Visitors and employees will be required to sign in (and out) and undergo a safety briefing before being allowed to enter the work area.

4.1.2 Equipment

The equipment to be used during the remediation activities will be determined based on the discretion of the subcontractor performing the removal action. Equipment to be used in the project may include a trackhoe, backhoe, dump trucks, and water trucks. However, the subcontractor may use alternative equipment to achieve the work as efficiently and safely as possible. Heavy equipment will have the necessary safety equipment in place, such as back-up alarms, warning lights and rollover protection systems. All combustion equipment (e.g., engines) will be clean and in good working order. The total exhaust systems and spark arrester shall be checked and repaired as needed before arriving on the job site. All units shall have fire extinguishers.

Additionally, there will be fire extinguishers onsite during field activities. Fire extinguishers will be inspected, charged, and located within close proximity to the work areas. Combustible materials will be protected from ignition sources.

4.1.3 Localized Spill and Discharged Controls

These IUs do not contain stored fuel (i.e., no bulk fuel stored on-site) or other liquids; therefore, a large scale spill control plan is not needed. Localized spill and discharge controls will be in place during remediation activities. Oils and fuel will be stored for local use in Occupational Safety and Health Administration (OSHA) approved containers. Equipment fueling will be performed by the operator as needed. The Kofa MTR is an operating OB/OD facility and oils and fuels at the site present a fire risk during OB/OD operations, therefore, containers of these materials will be removed before any OB/OD activities are performed.

4.1.4 Decontamination Area

A decontamination area will be constructed onsite, if required. A personnel decontamination station will consist of a boot wash and receptacle for used personal protective

equipment (PPE). A pad graded to a sump will be covered with two layers of 10 millimeter polyethylene and be used for equipment decontamination procedures. Rinse water associated with equipment decontamination will be collected, containerized, and handled as described in Section 6.0.

4.1.5 Dust

A primary mechanism for exposure to site workers working near demolition areas is by inhalation of dust that may contain elevated concentrations of chemicals. Dust control measures may be necessary to prevent site worker exposure to dust, and would consist of additional water spray to wet the demolition surface. If dust becomes a visibility hazard, a water truck or tank with a sprayer will be located at the work area and water will be sprayed to minimize dust per Parsons SSHP (Appendix B). Care will be taken not to produce flooding or ponding of water within work areas.

4.1.6 Waste Handling and Storage

Remediation activities at the Kofa OB/OD will include the removal and disposal of waste. Wastes generated during the removal will include concrete and soil. Waste management will follow the ADEQ IDW Policy 4013.001 (Appendix E).

Wastes generated during the removal actions include, but are not limited to, soil and concrete containing explosives, perchlorate, and lead and beryllium constituents. Other potentially hazardous materials include bulk concrete, metal, and soil. Excavated soil will be stored in closed roll-off bins and stored on-site in a secure location. The containers will be labeled with the date, type of material, source of material, and labeled awaiting analysis. A specific waste management program is presented in Section 6.0.

4.2 REMOVAL ACTIONS

4.2.1 Burn on Ground Area

Site characterization sampling results indicate lead and beryllium are the only COCs that exceed a remediation goal at the BOG Area (Section 3.1.1). Fifteen surface soil sample locations exceed the remediation goal of lead and one surface soil sample location exceeds the beryllium (Point 3041) remediation goal. Two subsurface soil locations, collocated with a surface sample

where the surface sample exceeded the remediation goal, also exceed for lead (Point 3002 at 1 ft bgs, Point 3026 at 1 ft bgs). The following 15 sampling locations have been identified as areas requiring removal;

- Point 3000
- Point 3002
- Point 3006
- Point 3010
- Point 3018
- Point 3026
- Point 3037
- Point 3041
- Point 3067
- Point 3078
- Point 3079
- Point SS011
- Point SS012
- Point SS013
- Point SS071
- Point SS072

An area surrounding each point with lead or beryllium concentrations exceeding the remediation goal will initially be excavated to a depth of 1-2 ft bgs. Excavations on isolated points will consist of a minimum 4 ft by 4ft area, and a larger area where points exceeding the remediation goal are in close proximity to each other (Figure 4.1). Eleven areas have been delineated for soil removal. Additional removal beyond the initial excavated area will be guided using a handheld field portable x-ray fluorescence (FPXRF) instrument. Once the in-situ FPXRF screening indicates sufficient removal has been completed (i.e., concentrations of lead are less than remediation goals), post-removal confirmation samples will be collected and analyzed for lead by an off-site Arizona Department of Health Services certified laboratory. Confirmation surface soil sampling activities will include collection of one subsurface soil sample from the four side walls of each excavation, and one subsurface soil sample from the floor of each excavation (totaling 5 samples per excavation). Prior to shipping, the post-removal confirmation samples will be measured for lead using the FPXRF (SOP 10, Appendix C). Measurements from the FPXRF and laboratory results will be compared for quality assurance purposes.

The excavated soil will be managed and disposed of in accordance with the waste management program presented in Section 6.0. Figure 4.1 illustrates the excavation plan for the BOG Area and a detailed sampling and analysis plan is provided as Section 5.0.

4.2.2 Abandoned South Pad Area

At the ASP Area, elevated levels of lead, 1,3-dinitrobenzene, and perchlorate were identified in the concrete pad, as well as the surrounding soil. Two concrete samples (Points 5027 and 5032) contain concentrations of perchlorate in excess of the remediation goal of 720

FIGURE 4.1

BURN ON GROUND AREA INITIAL SOIL EXCAVATION FOOTPRINTS

U.S. Army Garrison Yuma Proving Ground

SOIL SAMPLES WITH BERYLLIUM RESULTS ABOVE REMEDIATION GOAL. (BLUE POINT)

Sample	Depth	Result *
3041	Surface	81

* Results reported in mg/kg. All other beryllium results are below 1.0 mg/kg.

SOIL SAMPLES WITH LEAD RESULTS ABOVE REMEDIATION GOAL. (RED POINTS)

Sample	Depth	Result *
3000	Surface	1580
3002	Surface	2550
3002	1 ft bgs	1370
3002	2 ft bgs	44
3006	Surface	2250
3006	1 ft bgs	138
3006	2 ft bgs	53
3010	Surface	3080
3010	1 ft bgs	287
3010	2 ft bgs	23
3018	Surface	1290
3026	Surface	3090
3026	1 ft bgs	4810
3026	2 ft bgs	673
3037	Surface	961
3067	Surface	1020
3078	Surface	6360
3078	1 ft bgs	214
3078	2 ft bgs	120
3079	Surface	888
SS011	Surface	877
SS012	Surface	3040
SS013	Surface	1060
SS071	Surface	818
SS072	Surface	1850

* Results reported in mg/kg.

ADJACENT SOIL SAMPLE RESULTS FOR COMPARATIVE PURPOSES

Sample	Depth	Result
3001	Surface	669
3003	Surface	797
3004	Surface	452
3007	Surface	556
3009	Surface	468
3011	Surface	170
3017	Surface	238
3019	Surface	274
3025	Surface	26
3036	Surface	98.6
3046	Surface	13
3047	Surface	15.9
3052	Surface	68
3060	Surface	18
3080	Surface	21
3094	Surface	131
4006	Surface	22
4010	Surface	84
SS014	Surface	132
SS030	Surface	240
SS070	Surface	44.2
SS073	Surface	335
SS074	Surface	69.9
SS075	Surface	117

* Results reported in mg/kg.

LEGEND

- Proposed Confirmation Sample
- Surface Soil Samples with Lead less than Remediation Goal
- Soil Sample Locations with Lead Exceeding Remediation Goal
- Soil Sample Locations with Beryllium Exceeding Remediation Goal

Remediation Goal for Lead = 800 mg/kg
Remediation Goal for Beryllium = 23 mg/kg

- Approximate extent of Burn on Ground Area
- Initial Soil Excavation Footprint

Notes:

Lead concentrations are shown only for those samples with concentrations in excess of the remediation goal and adjacent samples to demonstrate horizontal extent of contamination.

Samples identified with MTF-SS are those sampled in 2012; all others were sampled in 2006.

KOFA OB/OD FACILITY

UNPAVED ROAD

U.S. Army Garrison Yuma Proving Ground (USAGYPG)

CA

AZ

Feet
0 15 30
0 5 10
Meters

Feet
0 175 350
0 60 120
Meters

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mg/kg. One surface soil sample (Point 6046) contains the analyte 1,3-dinitrobenzene at concentrations above the remediation goal of 62 mg/kg. Two subsurface soil samples (Points 5021 at 2 ft bgs and 5038 at 2 ft bgs) and the following 22 surface soil samples contained concentrations of lead in excess of the remediation goal of 800 mg/kg:

- Point 5016
- Point 5021
- Point 5022
- Point 5037
- Point 5038
- Point 5070
- Point 5074
- Point 5075
- Point SS007
- Point SS008
- Point SS009
- Point SS031
- Point SS034
- Point SS035
- Point SS038
- Point SS039
- Point SS040
- Point SS041
- Point SS042
- Point SS043
- Point SS044
- Point SS045

Closure of this unit will include removal and disposal of the perchlorate-impacted concrete pad in accordance with the waste management program presented in Section 6.0. In addition to concrete removal, lead-impacted soils will also be excavated in the areas of points listed above.

Given the relatively localized nature of elevated lead concentrations, the area on the southeast side of the concrete pad (measuring approximately 50 ft by 15 ft) and areas surrounding Points SS007, SS031, SS034, SS035, and 5016 (measuring approximately 4 ft by 4 ft) will be excavated to a depth of 1-2 ft bgs (Figure 4.2). Any further removal beyond these areas will be guided using a handheld FPXRF instrument. Once the in-situ FPXRF screening indicates sufficient removal has been completed (i.e., concentrations of lead are less than remediation goals), post-removal confirmation samples will be collected and analyzed for lead by an off-site, Arizona Department of Health Services certified laboratory. Confirmation soil sampling activities from the smaller excavations will include collection of one soil sample from the four sides of each excavation (i.e., four samples per excavation), and one subsurface soil sample from each excavation floor. Confirmation soil sampling from the larger excavations will include collection of soil samples from the sides at intervals of 10 ft and subsurface soils samples from the excavation floor at intervals of 10 ft. In addition to traditional confirmation analysis at a fixed laboratory, post-removal confirmation samples will analyzed in the field by FPXRF as described in SOP 10 (Attachment 3 to the QAPP presented in Appendix C).

At Point 6046, where the only COC is 1,3-dinitrobenzene, four surface soil samples will be collected approximately 3 feet in each direction prior to commencement of soil removal. These samples are proposed to confirm the adequacy of the initial excavation footprint of 6-ft by 6-ft by 1 ft, based on non-detect 1,3-dinitrobenzene results at adjacent BOG sample Points 3067 (located approximately 3 ft to the west-northwest) and 3078 (located approximately 11 ft to the southwest). Following the soil and concrete removal, one additional subsurface soil sample will be collected from the excavation floor. Further removal (if needed) will be conducted if any of the confirmation samples contain concentrations of 1,3-dinitrobenzene above the remediation goal. This excavation cycle will continue until all confirmation samples have concentrations below remediation goals.

The removed soil will be disposed of in accordance with the waste management program presented in Section 6.0. Figure 4.2 illustrates the excavation plan for the ASP Area and a detailed sampling and analysis plan is provided in Section 5.0 of this report.

4.2.3 Abandoned North Pad Area

Site characterization sampling results indicate lead is the only COC exceeding a remediation goal at the ANP Area (Section 3.1.3). Twenty-one surface soil locations exceed the remediation goal of lead. Two subsurface soil location, collocated with a surface sample where the surface sample exceeded the remediation goal, also exceed for lead (Point 8010 at 1 ft bgs and Point 8021 at 1 ft bgs). , The following 21 surface soil locations where lead concentrations exceeded the remediation goal (800 mg/kg) have been identified as areas requiring removal:

- Point 8010
- Point 8012
- Point 8014
- Point 8021
- Point 8022
- Point SS001
- Point SS002
- Point SS003
- Point SS004
- Point SS049
- Point SS050
- Point SS051
- Point SS053
- Point SS054
- Point SS055
- Point SS056
- Point SS057
- Point SS058
- Point SS059
- Point SS060
- Point SS064

The concrete did not contain elevated concentrations of any COCs. However, closure of this unit will include removal and disposal of the concrete pad in accordance with Federal, State and local regulations.

FIGURE 4.2

ABANDONED SOUTH PAD AREA EXCAVATION AND SAMPLING PLAN

U.S. Army Garrison Yuma Proving Ground

SOIL SAMPLES WITH 1,3-DINITROBENZENE RESULTS ABOVE REMEDIATION GOAL (ORANGE POINTS)

Sample	Depth	Result *
6046	Surface	900
6046	1 ft bgs	ND
6046	2 ft bgs	ND

* Results reported in mg/kg.

ADJACENT SOIL SAMPLES WITH 1,3-DINITROBENZENE RESULTS FOR COMPARATIVE PURPOSES

Sample	Depth	Result
3067	Surface	ND
3078	Surface	ND

* Results reported in mg/kg.

SOIL SAMPLES WITH PERCHLORATE RESULTS ABOVE REMEDIATION GOAL (BLUE POINTS)

Sample	Depth	Result *
5027	Concrete	1400
5027	Surface	2.5
5032	Concrete	2020
5032	Surface	9.2
5032	12" bgs	11.5
5032	24" bgs	9.3

* Results reported in mg/kg.

NO ADJACENT PERCHLORATE SAMPLES ARE LISTED BECAUSE SAMPLES EXCEEDING THE REMEDIATION GOAL ARE LIMITED TO THE CONCRETE PAD WHICH WILL BE REMOVED.

SOIL SAMPLES WITH LEAD RESULTS ABOVE REMEDIATION GOAL. (RED POINTS)

Sample	Depth	Result *
5016	Surface	984
5021	Surface	2000
5021	1 ft bgs	496
5021	2 ft bgs	1300
5022	Surface	993
5037	Surface	1170
5038	Surface	6790
5038	1 ft bgs	17
5038	2 ft bgs	1370
5070	Surface	993
5074	Surface	1320
5075	Surface	1950
SS007	Surface	2230
SS008	Surface	3090
SS009	Surface	7000
SS031	Surface	921
SS034	Surface	1310
SS035	Surface	808
SS038	Surface	3580
SS039	Surface	2760
SS040	Surface	1840
SS041	Surface	3460
SS042	Surface	836
SS043	Surface	3240
SS044	Surface	1700
SS045	Surface	1640

* Results reported in mg/kg.

ADJACENT SOIL SAMPLE WITH LEAD RESULTS FOR COMPARATIVE PURPOSES

Sample	Depth	Result
5017	Surface	348
5020	Surface	12
5024	Surface	398
5025	Surface	266
5026	Surface	8
5028	Surface	49
5033	Surface	391
5036	Surface	152
5040	Surface	111
5068	Surface	10
5069	Surface	9
5071	Surface	482
5072	Surface	383
5073	Surface	201
SS006	Surface	307
SS033	Surface	374
SS036	Surface	726
SS037	Surface	469

* Results reported in mg/kg.

LEGEND

- Proposed Confirmation Sample
- Samples with COCs less than Remediation Goal
- Soil Sample Locations with Lead Exceeding Remediation Goal
- Soil Sample Locations with 1,3-Dinitrobenzene Exceeding Remediation Goal
- Soil Sample Locations with Perchlorate Exceeding Remediation Goal

Remediation Goals:
Lead = 800 mg/kg
Perchlorate = 720 mg/kg
1,3-Dinitrobenzene = 62 mg/kg

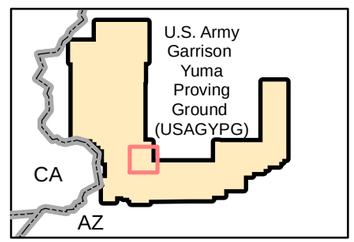
- Initial Soil Excavation Footprint
- Concrete Pad Removal

Notes:

COC concentrations are shown only for those samples with concentrations in excess of the remediation goals and adjacent samples to demonstrate horizontal extent of contamination.

Samples identified with MTF-SS are those sampled in 2012; all others were sampled in 2006.

Only samples analyzed for metals, perchlorate, and/or explosives are shown.



Feet
0 10 20
0 3 6
Meters

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Given the relatively localized nature of elevated lead concentrations, the area immediately surrounding the concrete pad (as delineated in Figure 4.3) and a 4 ft by 4ft area surrounding Points 8012, 8022, SS054 and SS064 will be excavated to a depth of 1-2 ft bgs (Figure 4.3). Any further removal beyond the excavated areas will be guided using a handheld FPXRF instrument. Once in-situ FPXRF screening indicates sufficient removal has been completed (i.e., concentrations of lead are less than remediation goals), post removal confirmation samples will be collected and analyzed for lead by an off-site, certified laboratory. Confirmation soil sampling activities for the three smaller excavations will include collection of one soil sample from the four sides of each excavation (i.e., four samples per excavation), and one subsurface soil sample from each excavation floor. Confirmation soil sampling from the larger excavations will include collection of soil samples from the sides and excavation floor at 10 ft.

Prior to shipping, the post-removal confirmation samples will be measured for lead using the FPXRF (SOP 10, Appendix C). Measurements from the FPXRF and laboratory results will be compared for quality assurance purposes.

The removed soil and concrete will be disposed of in accordance with the waste management program presented in Section 6.0. Figure 4.3 illustrates the excavation plan for the ANP Area and a detailed sampling and analysis plan is provided in Section 5.0 of this report.

4.2.4 Trash Trench Area

The explosive RDX was detected during the site characterization at three sample locations at concentrations greater than the remediation goal at Points 7027 (190 mg/kg), 7039 (1,300 mg/kg), and SS027 (240 mg/kg).

Based on the results of adjacent (e.g., Points SS020 through SS023) and vertical samples, an area of approximately 4-ft by 4-ft by 1 ft will be excavated from Point 7027, (Figure 4.4). Following excavation, one confirmation soil sample from the four sides of each excavation (i.e., four samples per excavation) and one sample from the excavation floor will be collected and analyzed. Any additional excavation beyond this initial 4-ft by 4-ft area will be guided based on confirmation sample results. If any of the confirmation samples contain concentrations of RDX above the remediation goal, an additional cycle of excavation and sampling will be performed.

This excavation cycle will continue until all confirmation samples have concentrations below the remediation goal.

Based on the results of adjacent (e.g., Points SS024 through SS027) and vertical samples, an area of approximately 10-ft by 10-ft by 4 ft will be excavated from Point 7039 (Figure 4.4). In addition to the remediation goal exceedance in surface soil, RDX was also detected in the deepest sample collected at Point 7039 (2 ft bgs) above the remediation goal; thus the vertical extent of contamination was not fully characterized at this location (Section 3.0). Soils at this location will be excavated to a depth of 4 ft bgs. Following excavation, one confirmation soil sample from each of the four sides of the excavation and one sample from the excavation floor will be collected and analyzed. If any of the confirmation samples contain concentrations of RDX above the remediation goal, an additional cycle of excavation and sampling will be performed. This excavation cycle will continue until all confirmation samples have concentrations below the remediation goal.

Excavated soils will be disposed of in accordance with the waste management program presented in Section 6.0. Figure 4.4 illustrates the excavation plan for the TT Area and a detailed sampling and analysis plan is provided in Section 5.0 of this report.

4.3 BACKFILLING

Once removal of contaminated soils and concrete pads is completed, backfilling and site grading will be performed. Three of the four sites (North Pad, South Pad and Burn on Ground) will be excavated to less than one foot and compaction of backfill will not be required. The Trash Trench will require backfilling and compaction, as the depth of the trench is between six and eight feet. All sites will be graded to existing site conditions at completion.

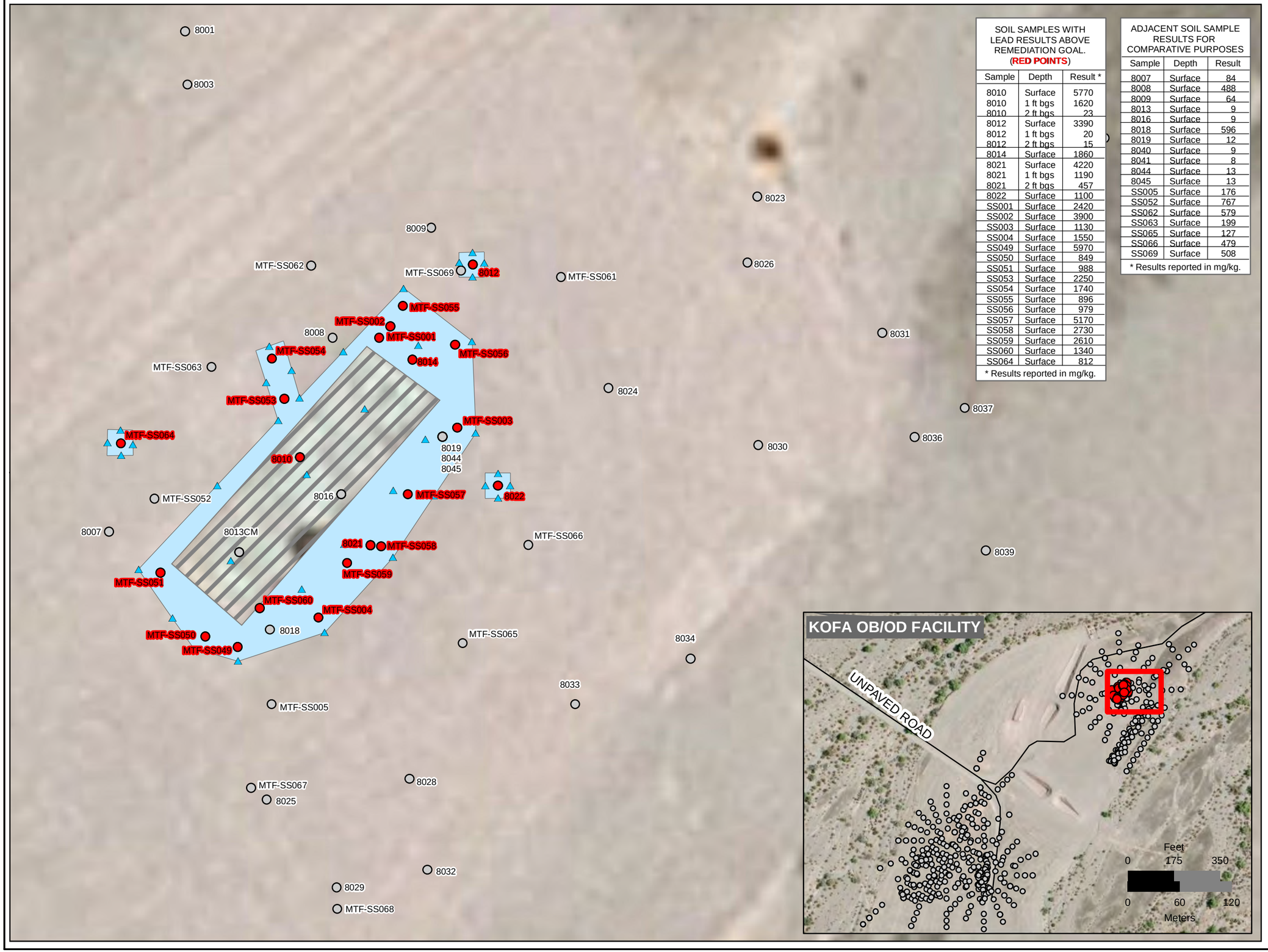
4.3.1 Material

Backfill material approved for use at the site will be obtained through the nearby established borrow soil pit. The borrow pit is located near the intersection of the Kofa OB/OD access road and the main north-south road. Material from this borrow pit has been tested and approved for use at this site.

FIGURE 4.3

ABANDONED NORTH PAD AREA EXCAVATION AND SAMPLING PLAN

U.S. Army Garrison Yuma Proving Ground



SOIL SAMPLES WITH LEAD RESULTS ABOVE REMEDIATION GOAL. (**RED POINTS**)

Sample	Depth	Result *
8010	Surface	5770
8010	1 ft bgs	1620
8010	2 ft bgs	23
8012	Surface	3390
8012	1 ft bgs	20
8012	2 ft bgs	15
8014	Surface	1860
8021	Surface	4220
8021	1 ft bgs	1190
8021	2 ft bgs	457
8022	Surface	1100
SS001	Surface	2420
SS002	Surface	3900
SS003	Surface	1130
SS004	Surface	1550
SS049	Surface	5970
SS050	Surface	849
SS051	Surface	988
SS053	Surface	2250
SS054	Surface	1740
SS055	Surface	896
SS056	Surface	979
SS057	Surface	5170
SS058	Surface	2730
SS059	Surface	2610
SS060	Surface	1340
SS064	Surface	812

* Results reported in mg/kg.

ADJACENT SOIL SAMPLE RESULTS FOR COMPARATIVE PURPOSES

Sample	Depth	Result
8007	Surface	84
8008	Surface	488
8009	Surface	64
8013	Surface	9
8016	Surface	9
8018	Surface	596
8019	Surface	12
8040	Surface	9
8041	Surface	8
8044	Surface	13
8045	Surface	13
SS005	Surface	176
SS052	Surface	767
SS062	Surface	579
SS063	Surface	199
SS065	Surface	127
SS066	Surface	479
SS069	Surface	508

* Results reported in mg/kg.

LEGEND

- Proposed Confirmation Sample
- Surface Soil Samples with Lead less than Remediation Goal
- Sample Locations Where Lead Exceeds Remediation Goal

Remediation Goal for Lead = 800 mg/kg

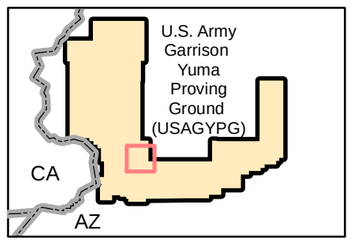
- Initial Soil Excavation Footprint
- Concrete Pad Removal

Notes:

Lead concentrations are shown only for those samples with concentrations in excess of the remediation goal and adjacent samples to demonstrate horizontal extent of contamination.

Samples identified with MTF-SS are those sampled in 2012; all others were sampled in 2006.

Only samples analyzed for explosives are shown.



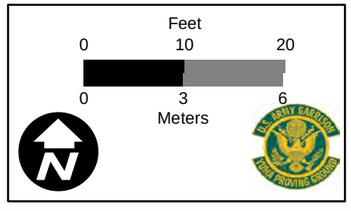


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FIGURE 4.4

TRASH TRENCH AREA EXCAVATION AND SAMPLING PLAN

U.S. Army Garrison Yuma Proving Ground

MTF-SS025 - RDX
Surface = 0.37 mg/kg

MTF-SS026 - RDX
Surface = ND

MTF-SS024 - RDX
Surface = ND

7026 - RDX
Surface = ND

7039 - RDX
Surface = 1300 mg/kg
1 ft bgs = 900 mg/kg
2 ft bgs = 420 mg/kg

MTF-SS027 - RDX
Surface =240 mg/kg

7052 - RDX
Surface = ND

7038 - RDX
Surface = 21 mg/kg

MTF-SS023 - RDX
Surface = ND

MTF-SS020 - RDX
Surface = 0.07 mg/kg

MTF-SS021 - RDX
Surface = 2.5 mg/kg

MTF-SS022 - RDX
Surface = 1.9 mg/kg

7027 - RDX
Surface = 190 mg/kg
1 ft bgs = 9.5 mg/kg
2 ft bgs = 7.3 mg/kg

7011 7040 7010 7026 MTF-SS027 7039 7017 7009 7052 7038 7016 7055 7056 7008 7025 7037 7051 7007 7036 7050 7006 7035 7018 7028 7048 7049 7005 7034 7047 7024 7061 7062 7004 7021 7033 7046 7003 7020 7032 7045 7023 7002 7015 7057 7019-1 7031 7059 7060 7022 7044 7001 7014 7030 7012 7053 7054 7013 7043 7000 7027 7029 7042 7041

KOFA OB/OD FACILITY

UNPAVED ROAD

Feet
0 175 350
0 60 120
Meters

LEGEND

- Proposed Confirmation Sample
- Surface Soil Samples with RDX less than Remediation Goal
- Sample Locations Where RDX Exceeds Remediation Goal

Remediation Goal for RDX = 160 mg/kg

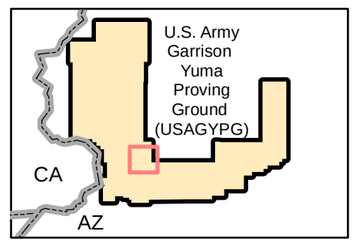
- Approximate Boundary of Trash Trench
- Initial Soil Excavation Footprint

Notes:

RDX concentrations are shown only for those samples with concentrations in excess of the remediation goal and adjacent samples to demonstrate horizontal extent of contamination.

Samples identified with MTF-SS are those sampled in 2012; all others were sampled in 2006.

Only samples analyzed for metals are shown.



Feet
0 15 30
0 5 10
Meters

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4.3.2 Placement and Grading

Upon receipt of confirmation sample results indicating that remaining soils are below the established remediation levels, backfilling and grading of the site will occur. Excavation of the areas within the North Pad, South Pad and the Burn on Ground sites is expected to be less than one foot, and compaction of backfilled materials is not needed. Backfill material at these sites will be spread over the excavated area and grading will be performed contouring to the existing terrain conditions. Areas will be graded to drain water along natural flow paths and prevent subsidence and ponding.

Prior to backfilling of the Trash Trench, the base of the pit will be cleared and grubbed of small shrubs that have grown in the trench. Backfilling will be performed in 6-inch lifts and compacted using either a mechanical compactor or tamper. Backfilling and compacting will continue until the trench has been filled to the ground surface. Similar to the other sites, grading will be performed contouring to the existing terrain conditions. The ground surface will be graded to drain water along natural flow paths and prevent subsidence and ponding.

SECTION 5.0
SAMPLING AND ANALYSIS PLAN

Closure of the four IUs at the OB/OD facility will be accomplished through excavation and disposal of material containing COCs at concentrations exceeding remediation goals. Confirmation samples will be collected from each excavation to ensure adequate soil removal to concentrations less than remediation goals. This sampling and analysis plan includes a discussion of the sampling objectives, analytical parameters and methods, expected sampling time frames, and techniques locations, types, and quantities for confirmation samples to be collected to support closure of each IU.

Sampling activities are summarized in Table 5.1. Confirmation samples will consist of surface soil and shallow subsurface soil samples in support of corrective action at the IUs. Five samples will be collected from each excavation area, centered on the site-characterization sampling point with concentrations of COCs in excess of remediation goals (Section 4.0). For each excavation point (Section 3.0), one confirmation soil sample will be collected from each of the four sidewalls of the excavation (i.e., four samples), and one subsurface soil sample will be collected from each excavation floor. In total, 144 confirmation samples are proposed (plus field QC, i.e., field duplicates, matrix spikes, and matrix spike duplicates): 129 samples to be analyzed for metals, five samples to be analyzed for 1,3-dinitrobenzene, and ten samples to be analyzed for RDX. One soil waste characterization sample per roll-off bin, composed of aliquots from each excavation area, will be collected and analyzed for TCLP lead, TCLP 2,4-dinitrotoluene, and ignitibility. One concrete waste characterization sample will be collected from each concrete removal location.

5.1 SAMPLING OBJECTIVES

The objective of confirmation sampling activities at each IU is to confirm the adequacy of soil and concrete removals described in Section 4.0. Corrective actions are intended to remove contaminated soil and concrete with concentrations above remediation goals to achieve closure of these IUs.

Specifically, the objective for collecting samples at the IUs is to confirm that soils with lead, beryllium, 1,3-dinitrobenzene, and RDX concentrations above remediation goals have been

TABLE 5.1

PROPOSED SCREENING AND CONFIRMATION SAMPLES
Kofa OB/OD Inactive Units
U.S. Army Garrison Yuma Proving Ground, Arizona

Features Proposed for Removal	Proposed Excavation Depth (ft bgs)	Field Screening Activities	Confirmation Samples			
			Number of Confirmation Samples	Metals/ Lead (6010B)	RDX (8330B)	1,3-Dinitrobenzene (8330B)
Burn on Ground Area						
Soil - Point 3000	1 - 2	FPXRF[1]	5	x[2]	--[3]	--
Soil - Point 3002	1 - 2	FPXRF	5	x	--	--
Soil - Point 3006	1 - 2	FPXRF	5	x	--	--
Soil - Points 3010, SS013 and SS072	1 - 2	FPXRF	5	x	--	--
Soil - Point 3018	1 - 2	FPXRF	5	x	--	--
SS071	1 - 2	FPXRF	5	x	--	--
Soil - Point 3041 (Beryllium)	1-2	--	5	x	--	--
Soil - Points 3067 and 3078	1 - 2	FPXRF	5	x	--	--
Soil - Point 3079	1 - 2	FPXRF	5	x	--	--
Soil - Point SS011	1 - 2	FPXRF	5	x	--	--
Soil - Point SS012	1 - 2	FPXRF	5	x	--	--
Abandoned South Pad Area						
Concrete	NA	--	--	--	--	--
Soil Under Concrete Pad	--	FPXRF	3	x	--	--
Soil Surrounding Southeast Side of Concrete Pad	1 - 2	FPXRF	16	x	--	--
Soil - Point SS007	1 - 2	FPXRF	5	x	--	--
Soil - Points SS035 and 5016	1 - 2	FPXRF	5	x	--	--
Soil - Point SS034	1 - 2	FPXRF	5	x	--	--
Soil - Point SS031	1 - 2	FPXRF	5	x	--	--
Soil - Point 6046 (1,3-dinitrobenzene)	1	--	5	--	--	x
Abandoned North Pad Area						
Concrete	NA	--	--	--	--	--
Soil Under Concrete Pad	--	FPXRF	3	x	--	--
Soil Surrounding Concrete Pad	1 - 2	FPXRF	17	x	--	--
Soil - Point SS054	1 - 2	FPXRF	5	x	--	--
Soil - Point 8012	1 - 2	FPXRF	5	x	--	--
Soil - Point SS057	1 - 2	FPXRF	5	x	--	--
Trash Trench Area						
Soil - Point 7027 (RDX)	1	--	5	--	x	--
Soil - Point 7039 (RDX)	3	--	5	--	x	--
Total Confirmation Samples			144			
Rinse/Decontamination Water	NA	--	--	--	--	--

Definitions:
ft bgs = feet below ground surface. RDX = royal demolition explosive. FPXRF = field portable x-ray fluorescence. NA = not applicable.

Notes:
[1] FPXRF will only be used for lead to guide removal activities.
[2] "x" = Analysiswill be performed.
[3] "--" = Analysis will not be performed.

removed, and remaining soils do not have concentrations of COCs greater than the remediation goals. Samples from the excavation sidewalls and at the base of the excavation (see Section 4.0 for details) will be collected to ensure that impacted soils have been adequately removed both horizontally and vertically. Table 5.1 depicts the number of samples to be collected at each removed feature within the Kofa OB/OD IUs.

The objective of sampling of waste material is for the purposes of waste determination. Removed soil/concrete and rinse/decontamination water will be characterized as hazardous or non-hazardous based on the results of waste-characterization sampling. Scrap metal found at the IUs will be characterized as hazardous or nonhazardous and taken to a disposal facility. Section 6.0 provides a detailed discussion of waste characterization and disposal.

5.2 ANALYTICAL PARAMETERS AND METHODS

Proposed analytical parameters for each sample, along with analytical methods, are provided in Table 5.1. Laboratory analyses will be conducted using U.S. Environmental Protection Agency (USEPA) analytical methods published in *Test Methods for Evaluating Solid Waste Physical/Chemical Methods* (SW-846) (USEPA 1986). All samples will be prepared and analyzed based on the requirements of the Department of Defense (DoD) (2009) Quality Systems Manual (QSM) Version 4.1, the QAPP (Appendix C) and in accordance with the laboratory's SOPs.

Soil confirmation samples will be analyzed for lead (method 6010B), RDX (method 8330B), and/or 1,3-dinitrobenzene (method 8330B). Soil and concrete waste characterization samples will be analyzed using TCLP methods according to ADEQ Policy 4013.001 on IDW. Rinse/decontamination water will be analyzed for RCRA TCLP metals (methods 6010B) and SVOCs (method 8270C) for the purposes of waste characterization.

5.3 SAMPLING TIME FRAME

The project schedule is designed to perform corrective action activities and soil sampling in one mobilization, if possible. Surface soil samples to confirm the adequacy of excavation footprints at each IU will be collected and sent to an offsite laboratory to allow for analytical laboratory turnaround time during the excavation at the subsequent IU. If analytical results show

confirmation soil samples exceed the remediation goal at an IU, the field crew will return for further excavation and additional confirmation soil sampling.

In areas were soil is contaminated with lead, soil removal will be guided using in situ FPXRF screening data. Backfilling and site grading will be the final field activity in support of closure of the Kofa OB/OD IUs. Table 5.2 provides the proposed schedule for soil/concrete removal and confirmation sampling. The overall schedule of closure is provided as Section 7.0.

TABLE 5.2

PROJECT SEQUENCE
Kofa OB/OD Inactive Units
U.S. Army Garrison Yuma Proving Ground, Arizona

Project Activity	Duration (days)
Concrete Demolition	
Abandoned North Pad Concrete Demolition	1.5
Abandoned South Pad Concrete Demolition	1.5
Soil Excavation	
Burn on Ground Area Soil (lead)	1
Abandoned North Pad Soil (lead)	3
Abandoned South Pad Soil (lead)	3
Abandoned South Pad (1,3-dinitrobenzene) and Trash Trench Area (RDX) Soil	1
Final Confirmation Soil Sampling	3
Off-site Analytical	7
Soil/Concrete Disposal	
Abandoned North Pad Concrete	0.5
Abandoned South Pad Concrete	0.5
Soil	3

Note: The project duration presented in this table is based on contaminant concentrations of the confirmation samples being found below the corresponding remediation goal. If contaminants are detected in confirmations soil samples above the corresponding remediation goal, additional excavation and confirmation soil sampling will be performed.

5.4 SAMPLING TECHNIQUES

Surface soil sampling techniques will be used to collect confirmation samples, as specified in the SOPs provided as Attachment 2 to the QAPP (Appendix C). Representative waste characterization samples will be collected from soil and concrete removed from the site. Waste types with similar constituents (i.e., lead-contaminated soils versus explosives-contaminated soils) will be loaded together into roll-off bins and characterized for disposal. A separate roll-off bin will be used for each waste type. For each roll-off bin containing soil waste, an aliquot from each removal location (Table 5.1) will be collected and homogenized in a stainless steel bowl. For concrete waste, one concrete sample will be collected from each removal location (Table 5.1).

5.5 SAMPLING LOCATIONS

Figures 4.1 through 4.4 illustrate the four IUs with proposed sampling locations. These proposed locations may shift slightly (i.e., if the excavation footprint expands), depending on the results of the FPXRF screening results (lead) and/or initial analytical laboratory results (1,3-dinitrobenzene and RDX). However, the overall sampling approach of collecting four sidewall and one subsurface soil samples to demonstrate adequacy of horizontal and vertical extent of the excavation will remain the same.

SECTION 6.0

WASTE CHARACTERIZATION AND DISPOSAL

All waste generated or scrap metal collected during removal and investigation activities will be managed according to applicable State, Federal, and local regulations.

6.1 CHARACTERIZATION OF SCRAP METAL

Scrap metal collected during investigation activities will be characterized as hazardous or nonhazardous prior to disposal. Scrap metal items (i.e. drums or containers) containing liquid will be considered hazardous until liquid can be analyzed. Although historical information indicates that munitions were not tested at the Kofa OB/OD IUs, USAGYPG has a history of munitions testing, and it is possible that MEC and munitions debris (MD) could exist in the area. If munition-related debris is identified during investigation activities, the USAGYPG ammo recovery branch will be notified, and the items will be disposed of according to USAGYPG policy.

6.2 WASTE GENERATION

Wastes generated during the removal actions at Kofa OB/OD IUs include, but are not limited to, explosives in soil, lead in soil, lead in concrete, and explosives in concrete. Four types of waste are anticipated to be generated at the IUs: non-hazardous, hazardous, rinse/decontamination water, and recyclable metal.

6.3 WASTE HANDLING AND STORAGE

Excavated soil will be stored in covered and secured roll-off containers onsite pending the results of waste characterization sampling. While awaiting waste characterization results, concrete will be demolished and stored on-site. Once waste characterization has been determined, excavated soil and concrete will be disposed of according to ADEQ policy on IDW as described in the following subsections. Any potential scrap metal will be assumed to be non-hazardous and will be stored on-site until it can be transported to the Base recycling facility (Section 6.6).

Individual waste types will be characterized separately (i.e., soil versus concrete). As discussed in Section 5.4, waste types with similar constituents (i.e., lead-contaminated soils versus explosives-contaminated soils) will be loaded together into roll-off bins and characterized for waste disposal. A separate roll-off bin will be used for each waste type. As discussed in Section 5.4, for each roll-off bin containing soil waste, an aliquot from each removal location will be collected and homogenized in a stainless steel bowl. For concrete waste, one concrete sample will be collected from each removal location. Rinse/decontamination water may be generated during the removal and sampling of the sites. The water will be placed in appropriate drums, sampled for RCRA TCLP metals, and SVOCs for the purposes of waste characterization (Section 6.3), and managed according to ADEQ Policy 4013.001 on IDW.

The estimated volume of material that will be excavated from each IU are listed in Table 6.1. Volume estimates were derived using site characterization sampling results in conjunction with the proposed excavation plan for each unit.

6.4 ANALYTICAL PARAMETERS AND METHODS

As discussed in Section 5.2, soil and concrete waste characterization samples will be analyzed using the TCLP according to ADEQ Policy 4013.001 on IDW. Based on the results of site characterization soil sampling discussed in Section 3.0 (Appendix C), site history, and generator knowledge; lead, beryllium and 2,4-dinitrotoluene may be present in waste soil and/or concrete at concentrations above TCLP hazardous waste regulatory limits. All other constituent concentrations from samples in the proposed removal areas are below the 20 times TCLP limit, indicating they are below concentrations that would require TCLP analysis. However TCLP metals and SVOCs will be analyzed for the purpose of waste characterization as documented in *Test Methods for Evaluating Solid Waste Physical/Chemical Methods* (SW-846). Rinse/decontamination water will be analyzed for TCLP lead and TCLP 2,4-dinitrotoluene (methods 6010B and 8270C, respectively) for the purposes of waste characterization.

6.5 HAZARDOUS WASTE TRANSPORTER

Waste which could potentially be hazardous includes soil, concrete and scrap metal from the IUs. Any waste determined to be hazardous will be transported off-site to a Treatment,

TABLE 6.1

ESTIMATED MINIMUM WASTE VOLUMES
Kofa OB/OD Inactive Units
U.S. Army Garrison Yuma Proving Ground, Arizona

Feature and Chemical of Concern	Minumum Excavation Size[1]	Minimum Soil Waste Volume (cubic yards)	Minimum Concrete Waste Volume (cubic yards)
Burn on Ground Area (Lead)			
Point 3000	4 ft x 4 ft x 1 ft	0.6	--
Point 3002	4 ft x 4 ft x 1 ft	0.6	--
Point 3006	4 ft x 4 ft x 1 ft	0.6	--
Points 3010, SS013 and SS072	25 ft x 4-12 ft x 1 ft	7.4	--
Point 3018	4 ft x 4 ft x 1 ft	0.6	--
Points 3026, 3037 and SS071	30 ft x 4-12 ft x 1 ft	8.9	--
Point 3041 (Beryllium)	4 ft x 4 ft x 1 ft	0.6	--
Point 3067 and 3078	4 ft x 4 ft x 1 ft	0.6	--
Point 3079	4 ft x 4 ft x 1 ft	0.6	--
Point SS011	4 ft x 4 ft x 1 ft	0.6	--
Point SS012	4 ft x 4 ft x 1 ft	0.6	--
	Minumum Total Volume	22	--
Abandoned South Pad			
Concrete	50 ft x 16 ft x 1 ft	--	30
Soil Surrounding Southeast Side of Concrete Pad (Lead)	10-20 ft x 50 ft x 1 ft	21	
Point 5070 (Lead)	4 ft x 4 ft x 1 ft	0.6	--
Point SS035 and 5016 (Lead)	8 ft x 4 ft x 1 ft	1.2	--
Point SS034 (Lead)	4 ft x 4 ft x 1 ft	0.6	--
Point SS031 (Lead)	4 ft x 4 ft x 1 ft	0.6	--
Point 6046 (1,3-Dinitrobenzene)	4 ft x 4 ft x 1 ft	0.6	--
	Minumum Total Volume	25	30
Abandoned North Pad (Lead)			
Concrete	50 ft x16 ft x 1 ft	--	30
Soil Surrounding Concrete Pad	10 ft x 100 ft x 1 ft	37	--
Point SS054	4 ft x 4 ft x 1 ft	0.6	--
Point 8012	4 ft x 4 ft x 1 ft	0.6	--
Point SS057	4 ft x 4 ft x 1 ft	0.6	--
	Minumum Total Volume	39	30
Trash Trench Area (RDX)			
Point 7027	4 ft x 4 ft x 1 ft	0.6	--
Point 7039	10 ft x 10 ft x 4 ft	14.8	--
	Minumum Total Volume	15	--

[1] Minimum excavation footprints are based on initial planned excavation. For lead impacted soils, additional excavation beyond the initial excavation size will be guided by handheld FPXRF screening. For explosives, pre-removal sampling at the initial excavation footprint perimeter will be used to confirm the adequacy of the proposed excavation.

Storage, and Disposal, Facility (TSDF). The transporter for waste will be an Arizona Department of Transportation (ADOT) licensed hazardous waste hauler. This transporter will also provide the roll-off containers and will be required to supply blank hazardous waste manifest forms to be completed and signed by USAGYPG certified personnel.

6.6 RECEIVING FACILITY FOR HAZARDOUS WASTE

The receiving facility will provide certification that the facility is permitted by the ADEQ or receiving state for RCRA listed hazardous waste. Analytical results will be provided to the waste disposal facility to ensure the facility is in agreement to accept the waste. The facility will be required to: 1) provide laboratory results of tests performed on incoming waste materials as required by their operating permit; 2) receive and dispose of the waste in accordance with their operating permit; 3) sign and return copies of hazardous waste manifests noting the final disposition for the waste in accordance with their operating permit.

6.7 RECEIVING FACILITY FOR NON-HAZARDOUS WASTE

Steel recovered from the removal operation will be transported to the USAGYPG recycling facility for processing. Nonhazardous concrete and soil will be transported to the USAGYPG landfill for disposal. Any non-hazardous rinsate will be disposed of at the site in accordance with applicable regulations.

6.8 WASTE TRANSPORTATION

Materials, equipment, and waste will be transported according to the following procedures:

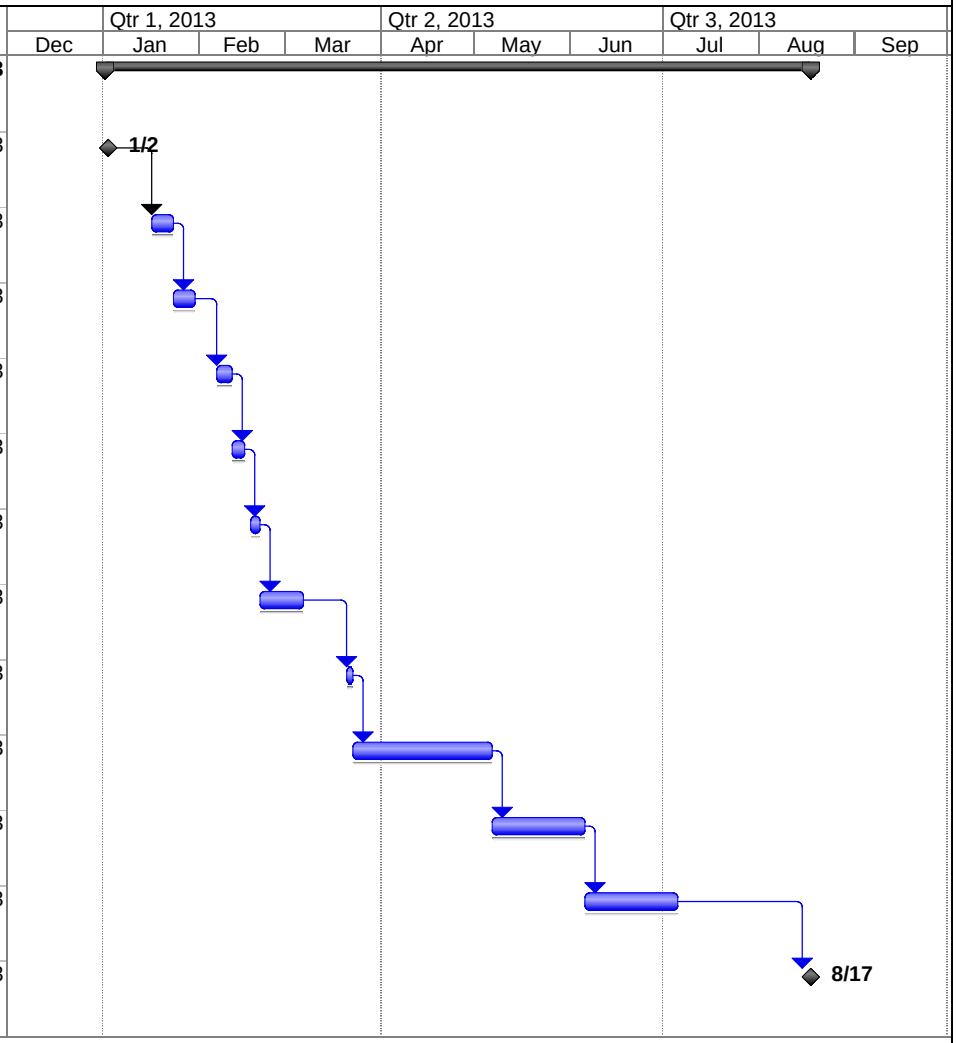
- Roll-offs will be covered.
- The driver will visually inspect roll-offs after loading and prior to departing the site to ensure that the loads are secure and no loose material is present.
- For waste disposed of at the USAGYPG landfill, an estimate will be made based on the type of waste and size of truck bed/roll-off to determine the quantity of waste entering the landfill.
- For waste disposed off site, the truck and its contents will be weighed prior to leaving USAGYPG to determine the quantity of waste for proper waste manifesting.

SECTION 7.0
SCHEDULE OF CLOSURE

The schedule of closures is presented in Figure 7.1. Following ADEQ approval of this closure plan, USAGYPG will complete the excavation and disposal activities at each IU, as discussed in previous sections of this plan. USAGYPG expects to complete removal and sampling activities approximately 90 days after approval of the closure plan. Final Documentation/Certification of Achieving Closure will be submitted to the ADEQ within approximately 110 days of the completion of field activities (i.e., approximately 200 days following Closure Plan approval). The Certification will be signed by appropriate USAGYPG personnel and an independent registered professional engineer.

Figure 7.1
Schedule of Closure Kofa OB/OD Inactive Units
US Army Garrison Yuma Proving Ground

ID	Task Name	Duration	Start	Finish
1	**Kofa OB/OD Closure**	**163 days**	**1/2/13**	**8/17/13**
2	ADEQ approval of Closure Plan	1 day	1/2/13	1/2/13
3	Pre-Removal Sampling	5 days	1/17/13	1/23/13
4	Off-site analytical	5 days	1/24/13	1/30/13
5	Demolition of concrete	3 days	2/7/13	2/11/13
6	Excavation of soil	4 days	2/12/13	2/15/13
7	Final Confirmation Soil Sampling	3 days	2/18/13	2/20/13
8	Off-site analytical	10 days	2/21/13	3/6/13
9	Soil/Concrete Disposal	2 days	3/21/13	3/22/13
10	Draft Closure Certification	45 edays	3/22/13	5/6/13
11	Army/Regulator Review	30 edays	5/6/13	6/5/13
12	Final Closure Certification	30 edays	6/5/13	7/5/13
13	ADEQ Approval of Certification	1 eday	8/16/13	8/17/13



Project: Kofa IU Schedule
Date: 11/12/12

Task
Progress
Milestone
Summary
Project Summary
External Milestone
Deadline

SECTION 8.0

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