VOLUNTARY REMEDIATION PROGRAM WORK PLAN

U.S. CUSTOMS AND BORDER PROTECTION PROPERTIES ADJACENT TO FORMER US CBP SMALL ARMS FIRING RANGE

JULY 10, 2019

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U.S. Customs and Border Protection

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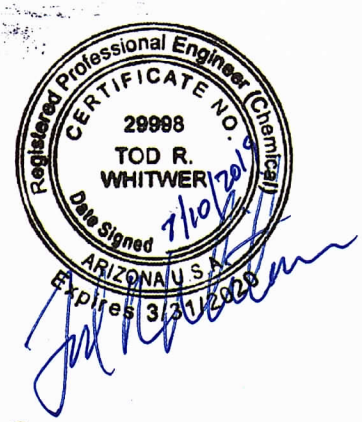

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GEOTEK PROJECT NO. 1732-PHC

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ACRONYMS AND ABBREVIATIONS	
Acronym	**Definition**
%	percent
µm	micrometer
A.A.C	Arizona Administrative Code
ADEQ	Arizona Department of Environmental Quality
ADWR	Arizona Department of Water Resources
Allwyn	Allwyn Environmental or Allwyn Consultants
AMA	Active Management Area
AOI	Area of Interest
APN	Assessor's Parcel Number
A.R.S.	Arizona Revised Statute
AUL	Activity and Use Limitation
AWQS	Aquifer Water Quality Standards
bgs	below ground surface
CATEX	Categorical Exclusion
CCW	Chase, Carson, and White
COC	Chemical of Concern
CWA	Clean Water Act
DERP	Defense Environmental Restoration
DOD	Department of Defense Program
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Environmental Site Assessment
FUDS	Formerly Used Defense Site
FY	Fiscal Year
GeoTek	GeoTek Contracting and Remediation, LLC
GPL	Groundwater Protection Level
GPS	Global Positioning System
HASP	Health and Safety Plan
HDR	HDR Environmental, Operations and Construction, Inc.
MEC	Munitions and Explosives of Concern
mg/kg	milligrams per kilogram

ACRONYMS AND ABBREVIATIONS	
Acronym	**Definition**
mg/l	milligrams per liter
mm	millimeter
NEPA	National Environmental Policy Act
NFA	No Further Action
NIWTP	Nogales International Wastewater Treatment Plan
NOI	Notice of Intent
NOT	Notice of Termination
OHWM	Ordinary High Water Mark
PAH	Polynuclear Aromatic Hydrocarbon
PPE	Personal Protective Equipment
PIKA	PIKA International, Inc.
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Condition
RI/FS	Remedial Investigation/Feasibility Study
RSL	Regional Screening Levels
SAP	Sampling and Analysis Plan
SPLP	Synthetic Precipitation Leaching Procedure
SRL	Soil Remediation Level
SWPPP	Stormwater Pollution Prevention Plan
TCLP	Toxicity Characteristic Leaching Procedure
TPMC	TerranearPMC, LLC
UCL	Upper Confidence Level
US CBP	United States Customs and Border Protection
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
UXO	Unexploded Ordnance
VOCs	Volatile Organic Compounds
VRP	Voluntary Remediation Program
XRF	X-Ray Fluorescence

1.0 PROJECT OVERVIEW

1.1 INTRODUCTION

The Site consists of privately-owned properties located adjacent to the Former United States Customs and Border Protection (US CBP) Small Arms Firing Range located at 1651 West Target Range Road in Nogales, Arizona. A Site vicinity map is provided as Figure 1. The Site is primarily undeveloped desert land with several forest roads and unimproved roads located within the Site boundary. The Site covers approximately 22.3 acres and is comprised of Santa Cruz County Assessor Parcel Numbers (APNs) 113-49-002D and 113-49-027D, and portions of APNs 113-49-002C, 113-49-006A, and 113-49-006B. The Site is located in Section 13 of Township 24 South and Range 13 East of the Gila and Salt River Baseline and Meridian System. The approximate Site boundaries and parcels locations are shown on Figure 2.

Chase, Carson, and White (CCW) was awarded Contract No. 70B01C18P00000920 by the US CBP to complete various activities at the Site. CCW contracted with GeoTek Contracting and Remediation, LLC (GeoTek) to prepare an application to be enrolled in the Arizona Department of Environmental Quality (ADEQ) Voluntary Remediation Program (VRP), conduct additional Site characterization, and prepare the VRP Work Plan, including a Sampling and Analysis Plan (SAP) and a Quality Assurance Project Plan (QAPP). The SAP is contained in Appendix A of this VRP Work Plan and the QAPP is contained in Appendix B of this VRP Work Plan.

1.2 FIRING RANGE AND SITE BACKGROUND

Based on GeoTek's review of historical documents, the adjacent firing range was used by the US CBP from approximately 1972 until June 29, 2010. The firing range was used by US CBP for agent qualification and target practice. The firing range was primarily used as a pistol range; however, US CBP also used the range for rifle and shotgun qualifications. As shown on Figure 2, the firing range proper is located on APN 113-49-035.

US CBP used the firing range with the permission of the landowner, Paul Arbo, but without a written lease from 1972 until 1979. US CBP has leased the firing range property from Mr. Arbo since 1979. US CBP has not used the firing range since 2010 but continues to lease the firing range pending remediation of the firing range property.

From 1972 to 1979, the firing range reportedly operated without a backstop berm. An earthen backstop berm was installed by US CBP in approximately 1979. The height of the backstop berm reportedly ranged from 5 to 14 feet. Targets were approximately 6 to 8 feet tall. Over time, the backstop berm moved toward the west to its current location, located on a 40-foot wide easement on APN 113-49-027D previously owned by the Barr family (see Figure 2). This easement parcel was transferred to Mr. Arbo in 2018. As previously

stated, the assessment and remediation of the firing range proper and the backstop berm are not included in this project. The former firing range and backstop berm are being assessed and remediated with the oversight of the VRP (VRP Site Code 511695-00), as shown on Figure 2.

As a result of firing range activities, stray bullets and bullet fragments landed on the adjacent properties, including the Site. Site soil has been impacted by lead and possibly other Chemicals of Concern (COCs), including antimony, arsenic, and polynuclear aromatic hydrocarbons (PAHs). Several assessments have been conducted to evaluate Site conditions and to assess Site soils. These assessment activities are detailed in Section 3.0.

1.3 VRP ACTIVITIES

GeoTek, on behalf of CBP, submitted an initial VRP application to ADEQ on November 26, 2018 that included APNs 113-49-002C and 113-49-002D (owned by Nikita Kyriakis) and APNs 113-49-006A and 113-49-006B (owned by La Loma Grande, LLC). In a letter to US CBP, ADEQ documented the Site was accepted into the VRP effective January 24, 2019 and assigned VRP Site Code 513182-00.

Mr. Arbo, who owns APNs 113-49-027D and 113-49-040 was invited to participate in this project to further assess and remediate these APNs, excluding the firing range backstop berm which is being addressed as a different project. Mr. Arbo initially declined to participate in the VRP activities for these APNs, which consists of an approximate 40-foot easement surrounding the firing range. However, following field activities, Mr. Arbo agreed to participate and signed the VRP access agreement and a portion of APN 113-49-027D is now included in the project.

The objective of the activities described in this VRP Work Plan is to remediate Site soil so that ADEQ VRP issues an unconditional determination for Site soil and groundwater that no further action is required (NFA determination) and no encumbrance (e.g. environmental use restriction or activity and use limitation [AUL]) is placed on the property title(s). Based on the historical use of the adjacent property as a shooting range, the COCs for which an NFA determination for soil and groundwater will be sought are:

- Arsenic (components of ammunition)
- Antimony (components of ammunition)
- Lead (components of ammunition)
- PAHs (constituents of shotgun wadding and clay pigeon targets)

1.4 REMEDIATION OBJECTIVES

The future Site use is likely commercial use (food storage). As such, the appropriate remedial goals to obtain the NFA determination for Site soils are the ADEQ pre-determined 10^{-5} residential soil remediation levels (SRLs) and the minimum groundwater protection levels (GPLs) for the Site COCs.

ADEQ GPL guidance allows for the calculation of an Alternative GPL using site analytical data. GeoTek calculated an Alternative GPL for lead of 111.6 milligrams per kilograms (mg/kg) using data obtained from prior Site characterization activities as further discussed in Section 3.1.9 of this VRP Work Plan. Because the calculated Alternative GPL is less than the Minimum GPL, the Minimum GPL of 290 mg/kg will be used as the remediation standard for lead.

In addition, based on a background arsenic investigation performed by HDR Environmental, Operations and Construction, Inc. (HDR) in the Site vicinity, the 95 percent upper confidence limit (95% UCL) for arsenic for the samples collected in the Site vicinity was 7.55 mg/kg and 6.63 mg/kg without a potential outlier. Based on the results of the arsenic background assessment, the remediation goal for arsenic will be the residential and non-residential SRL of 10 mg/kg (see Section 3.1.8 for more information related to the investigation performed by HDR).

1.5 AVAILABLE DOCUMENTS

Pertinent assessment activities conducted at the Site and the former arms firing range are listed below and summarized in Section 3.0. Although the former small firing range is not included in this project, the assessment activities conducted on the firing range proper are summarized in this report, as the source of impacts to the Site. Electronic copies of the previous assessment report are provided to ADEQ in Appendix C.

Phase I Environmental Site Assessment, Hazardous Substances, La Loma Grande, LLC Property, Nogales, Arizona (Parcel No. 113-49-006); Allwyn Environmental; March 10, 2009.

Phase I Environmental Site Assessment, Hazardous Substances, Trust #7659 Property LLC Property, Nogales, Arizona (Parcel No. 113-49-027-North); Allwyn Environmental; May 8, 2009.

Phase I Environmental Site Assessment, Hazardous Substances, Kyriakis Property, Nogales, Arizona (Parcel Nos. 113-49-002A, 113-48-002B and 113-49-012); Allwyn Environmental; June 8, 2009.

Phase II Environmental Site Assessment, Two Properties Impacted by Small Arms Shooting Range (Parcel Nos. 113-49-006 and 113-49-027); Allwyn Environmental; December 11, 2009.

Additional Assessment, Assessor's Parcel Nos. 113-49-002B, 113-49-027A, & 113-49-028D, Nogales, Arizona; Allwyn Consultants; July 8, 2017.

Phase I Environmental Site Assessment, La Loma Grande, LLC Property, Nogales, Arizona (Parcel No. 113-49-006A; Allwyn Consultants; November 27, 2017.

Final, Sampling and Analysis Report, Former U.S. Customs and Border Protection Small Arms Firing Range, AKA Arbo Range (AZ0047), Weapons Training Residue Tucson Sector, Nogales, Arizona; PIKA International, Inc.; May 2018.

Draft Records Research Report; Camp Stephen Little Formerly Used Defense Site (#J09AZ0287); U.S. Army Corps of Engineers; June 2012.

U.S Army Corps of Engineers, Fort Worth District, Remedial Investigation, Feasibility Study for the U.S Border Patrol Firing Range, Nogales Arizona; TerranearPMC, LLC; June 2014.

Final – Background Arsenic Investigation Report, Former U.S. Customs and Border Protection Nogales Firing Range (AZ0047/Arbo Range), Background Arsenic Soils Investigation, 1651 West Target Range Road, Nogales, Arizona; HDR Environmental, Operations and Construction, Inc.; December 2018.

Site Characterization Report, Site Code: 513182-00 – Draft; U.S. Customs and Border Protection; Properties Adjacent to Former US CBP Small Arms Firing Range; GeoTek Contracting and Remediation, LLC; April 29, 2019.

2.0 GEOLOGICAL INFORMATION

2.1 LOCAL GEOLOGY

Synthesizing geologic data for Nogales and the surrounding vicinity has significant challenges resulting from difference in scales and nomenclature across the international border into Mexico. A preliminary geologic map resulting from an attempt to merge geologic data from both sides of the border was developed by United States Geological Survey (USGS). According to the USGS, the Nogales Watershed consists of the Cretaceous rhyodacite tuffs and welded tuffs of the Pajarito (United States) and Cerro Pedregoso (Mexico) Mountains to the west overlain by basin-fill and surficial deposits. The basin-fill has been split into two distinct units. The Nogales Formation, or the lower basin-fill unit, consists of lower to middle Miocene conglomerates with minor pebbly and sandy beds. The Nogales Formation conglomerate is red to pink, poorly to moderately well consolidated, and contains clasts of mainly porphyritic volcanics with minor clasts of granite and Paleozoic sandstone and limestone. The upper basin-fill unit consists of upper Neogene to lower Pleistocene gravel and gravelly alluvium deposits that are unconsolidated to poorly consolidated. The surficial deposits of Pleistocene and Holocene age and consist of unconsolidated gravel and coarse sand alluvium in stream channels, flood plains, and terraces. On the eastern side of the Nogales Wash are the San Cayetano and Patagonia Mountains, which consist of a variety of rocks including intrusive and extrusive igneous rock, metamorphic, and sedimentary rock ranging from Precambrian to Miocene in age.

2.2 GROUNDWATER CONDITIONS

The Site lies within the boundaries of the Santa Cruz Active Management Area (AMA), principally concentrated around a 45-mile reach of the Santa Cruz River from the international border between the United States and Mexico to a few miles north of the Santa Cruz/Pima County line. The Santa Cruz AMA was designed to address groundwater overdraft in the area, whereby groundwater withdrawal is occurring at twice the rate of recharge. As a result, water management in the Santa Cruz AMA is intensive. Within the Santa Cruz AMA, groundwater can be withdrawn legally only through a groundwater right or permit unless groundwater is withdrawn from an exempt well (maximum capacity of 35 gallons per minute or less). These rights or permits take the form of grandfathered rights, service rights, or withdrawal rights.

The two major aquifers in the Santa Cruz AMA are the basin fill and the surficial deposits. According to the Arizona Department of Water Resources (ADWR), well yields are typically higher in the surficial deposits than in the basin fill.

The highly seasonal nature of surface water flow, the high transmissivity of the basin fill, and the discharge of effluent from the Nogales International Wastewater Treatment Plan

(NIWTP) complicate the analysis of water level change. According to the ADWR, the water level elevations (elevation of the water table above mean sea level) range from 3,000 to 4,000 feet above mean sea level in the Santa Cruz AMA. The Santa Cruz River serves as a major source of recharge for the basin fill by seasonal methods: mountain front recharge, irrigation seepage, effluent discharge, and natural surface water flow.

Local water table levels fluctuate with variations in weather patterns, water withdrawals within the Santa Cruz River basin (in Mexico and the United States), and incidental recharge from agricultural irrigation and NIWTP discharge. The shallow depth of the basin's aquifers and the high transmissivity of the alluvium make many portions of the AMA responsive to precipitation events and susceptible to droughts.

Information provided on the ADWR website (https://gisweb.azwater.gov) was reviewed to identify wells on and in the vicinity of the Site. ADWR records identified one registered well (Registration Number 55-636229) near the Site. The well was registered on June 7, 1982 and the principle use of water was for industrial and domestic purposes. The depth to groundwater was listed as 135 feet below ground surface (bgs). However, as discussed in Section 3.1.9, GeoTek advanced one boring to a depth of 150 feet bgs and groundwater was not encountered in the boring; therefore, the depth to groundwater at the Site is greater than 150 feet bgs.

According to ADWR, groundwater flow in the Nogales Wash portion of the Santa Cruz AMA is generally north-northwest; however, mountains and heavy groundwater pumping or recharge can locally alter groundwater flow direction. The Pajarito Mountains are located to the west of the Site and the Cerro Pedregoso Mountains are located southwest of the Site. Because of the proximity of the Site to these mountains, it is likely that groundwater flow is northeasterly and follows the terrain in the vicinity.

3.0 SUMMARY OF PREVIOUS ASSESSMENTS

Several assessments have been conducted to evaluate Site conditions and evaluate potential impacts resulting from the use of the adjacent properties as a shooting range. Although the former firing range is not included in this project, the assessment activities are summarized in this Site Characterization Report as the source of impacts to the Site. These assessment activities are detailed in the reports listed in Section 1.5 of this report. Important details of the characterization activities are summarized in Section 3.1.1 through 3.1.9.

3.1 PREVIOUS SITE ASSESSMENTS

3.1.1 Allwyn Environmental Phase I Environmental Site Assessments (ESAs) – 2009

In 2009, Allwyn Environmental (Allwyn) was contracted by Santa Cruz County to conduct assessment activities using funds from a Fiscal Year (FY) 2005 Brownfields Community-Wide Assessment grant from the Environmental Protection Agency (EPA) for Hazardous Substances. Under this grant, Allwyn conducted ten Phase I ESAs, in which three of the Phase I ESAs contained all and/or portions of the Site. Since 2009, the assessed property parcels that contain the Site have been subdivided and APNs have changed. The former APNs are discussed as the current APNs (see Figure 2 for parcel map and Site boundary). The Phase I ESA reports conducted by Allwyn in 2009 are discussed below.

Allwyn conducted a Phase I ESA on approximately 66.84 acres of vacant land and prepared a report titled *Phase I Environmental Site Assessment, Hazardous Substances, La Loma Grande, LLC Property, Nogales, Arizona (Parcel No. 113-49-006)* and was dated March 10, 2009. The property consisted of one parcel currently identified as portions of APNs 113-49-006A and 113-49-006B which included the Site within its boundary. The property was rugged and hilly undeveloped native desert land, with evidence of vehicular traffic occurring on the property. During the site reconnaissance, Allwyn observed heavy concentrations of bullet fragments near the northeast portion of the property adjacent to the US CBP shooting range. The bullet fragments varied in size and were found in large concentrations in the wash and hillside directly behind the shooting range. The fragments were observed more than 200 yards west of the shooting range. The presence of bullet fragments located near the northeast portion of the property likely resulted in elevated concentration of lead and represented a recognized environmental condition (REC) for the property. Allwyn recommended further assessment of the soil through soil sample collection and analysis, and/or alternate means to evaluate the extent and magnitude of potential lead impact to the soil.

In May 2009, Allwyn conducted a Phase I ESA on approximately 41 acres of vacant land and summarized the results in the report titled *Phase I Environmental Site Assessment, Hazardous Substances, Trust #7659 Property LLC Property, Nogales, Arizona (Parcel No. 113-49-027-North),* dated May 8, 2009. The property consisted of the northern portion of one parcel currently identified as APNs 113-49-027A, 113-49-027D, 113-49-040, and 113-49-027B. The property covered approximately 41 acres, including properties adjacent to the Site within its boundary. The property consisted of rugged and hilly undeveloped native desert land, with evidence of vehicular traffic occurring on the property. The property was not structurally developed; however, there were two excluded parcels that were entirely enclosed by the property. One excluded parcel, APN 113-49-035, was located in the northwest portion of the property and contained an automotive salvage yard and a shooting range used by US CBP. At the time of the report, the automotive salvage yard appeared to encroach onto the property. The second excluded parcel, APN 113-49-029 was located near the western boundary of the property and contained a cell tower owned by AT&T. Allwyn observed bullet fragments on the property and in the vicinity of the US CBP shooting range in the northwest portion of the property. Based on Allwyn's review, the assessment revealed evidence of two following RECs in connection with the property:

- Bullet fragments were observed on the property and in the vicinity of the US CBP shooting range. Allwyn recommended further assessment of the soil to evaluate the extent and magnitude of potential lead impacted soil.
- A salvage yard located in the excluded parcel in the northwest portion of the property encroached onto the property. The position of the wash and local topography of the property indicated that stormwater potentially containing petroleum hydrocarbons and metals could have run on and through the property from the automobile salvage yard. Allwyn indicted soils samples should be collected in the portion of the property and analyzed for PAHs, volatile organic compounds (VOCs), and metals to evaluate the potential impact to soil and/or groundwater.

In June 2009, Allwyn Environmental conducted a Phase I ESA on approximately 62.35 acres of land and their report was title, *Phase I Environmental Site Assessment, Hazardous Substances, Kyriakis Property, Nogales, Arizona (Parcel Nos. 113-49-002A, 113-48-002B and 113-49-012)* and was dated June 8, 2009. The property consisted of three parcels currently identified as APNs 113-49-002A, 113-49-002C, 113-49-002D, and 113-49-012 and covered approximately 62.35 acres which included the Site within its boundary. The property consisted of rugged and hilly undeveloped native desert land, with evidence of vehicular traffic occurring on the property. A natural gas processing plant was located near the eastern boundary of the property just north of Target Range Road and was constructed between 1972 and 1992. Bullet fragments were not observed on the property, and the assessment revealed no evidence of RECs in connection with the property.

3.1.2 Allwyn Phase II ESA– December 11, 2009

Based on the RECs identified in the previous Phase I ESAs, Allwyn conducted further assessment of the properties in which bullet fragments were observed and properties in the vicinity of the firing range; however, due to limited funding only two properties were assessed as part of the 2005 Brownfields Community-Wide Assessment grant. The findings were presented in a report titled *Phase II Environmental Site Assessment, Two Properties Impacted by Small Arms Shooting Range, (Parcel Nos. 113-49-006 and 113-49-027)*, dated December 11, 2009. At the time of the report, the assessed property consisted of two parcels currently identified as APNs 113-49-006A, 113-49-006B, 113-49-002C, 113-49-002D, and 113-49-027D which included the portions of the Site within its boundary. Allwyn observed bullet fragments of various in sizes in the wash and hillside directly west of the firing range. Allwyn indicated the small arms target practice activities were suspected of impacting the property, potentially resulting in elevated concentrations of antimony, arsenic, lead, and PAHs.

Allwyn prepared a SAP prior to the field activities to properly assess the property. Several EPA guidance documents were used to guide sampling and analysis protocol and procedures, particularly the report titled *TRW Recommendations for Performing Human Health Risk Analysis on Small Arms Shooting Ranges*; dated 2003. Based on this guidance, samples were collected for the COCs lead, antimony, arsenic, and PAHs in the fine fraction of soil (soil passing through a 250-micrometer (µm) sieve). The fine fraction is the primary source of soil ingestion and sieving removes the lead shot and large bullet fragments which are not likely to be ingested by humans. The EPA reviewed and approved the SAP.

Allwyn constructed a sampling grid consisting of 135 50-foot by 50-foot sampling cells across the property to include areas where bullet fragments were observed (see Figures 3 and 4). The sampling cells were then divided into 25-foot by 25-foot sub-cells in which one discrete soils sample was obtained from each of the four sub-cells and composited into one sample. The samples were first passed through a #8 sieve to remove rocks, vegetation, and bullet fragments. The screened material was then passed through a #50 sieve to produce the fine soil fraction from which a sample was collected for laboratory analysis. Allwyn obtained samples at various depths within the sampling cells: surface soil samples were collected from the surface to 1 inch bgs and subsurface soil samples were collected at depths between 3 to 4 inches bgs. Surface soil samples were named using the sampling cell number and the suffix S (for instance the sample name 15S was collected from 0-1 inches bgs in sampling cell 15). The subsurface soil samples were designated using the sampling cell number and the suffix D (for instance the sample name 15D was collected from 3-4 inches bgs in sampling cell 15). The location of each soil sample, sample depth, and laboratory analysis performed is summarized in Table 3.1 of this Work Plan.

Allwyn assessed soil within a dry wash adjacent to the shooting range to attempt to define the vertical and horizontal extent of the COCs in concentrations exceeding residential

SRLs. Sample locations were established within the dry wash at 100-foot intervals to a distance of approximately 1,000 feet northeast of the shooting range. Fifteen discrete soil samples and one duplicate soil sample (two samples named WASH 7 are duplicates of each other) from the dry wash located immediately west of the US CBP firing range. The samples were collected by removing approximately 6 inches of soil from the sample location in the wash bed and then collecting the sample from the bottom of the excavation. The samples were first passed through a #8 sieve to remove rocks, vegetation, and bullet fragments. The screened material was then passed through a #50 sieve to produce the fine soil fraction from which a sample was collected for laboratory analysis. The wash samples were identified with sample numbers WASH 1 through WASH 15. The wash samples were analyzed for total antimony, arsenic, and lead as shown on Table 3.1. In addition, ten of the wash samples were analyzed for PAHs as shown on Table 3.1.

Allwyn collected soil samples to evaluate whether excavated soil would be classified as a characteristic hazardous waste for lead and antimony by analyzing soil samples using the Toxicity Characteristic Leaching Procedure (TCLP). In addition, soil samples were collected to evaluate leachable PAH concentrations using the Synthetic Precipitation Leaching Procedure (SPLP). Nine soil samples were collected from three sampling cells to evaluate the concentrations of leachable antimony, arsenic, lead, and PAHS: two sampling cells (40 and 71) contained lead above the non-residential SRL (2,200 mg/kg and 3,400 mg/kg, respectively) and one sampling cell (48) containing lead above the residential SRL.

Allwyn also collected six background samples (four discrete samples and one duplicate sample consisting of two samples) to evaluate whether native or ambient levels of one or more target analytes were present above their respective SRLs (specifically, arsenic) in soil. The background sample locations were chosen because they were not located in the assessment area and appeared to be free of contamination from the site or sampling location itself, but had similar geology, hydrogeology, or other characteristics to the proposed sampling locations that may have been impacted by site activities. Background samples were identified as B-1 through B-5. Samples B-1, B-2, and B-3 were analyzed for lead, arsenic, antimony, and PAHs. Samples B-4 and B-5 were analyzed for lead, arsenic, and antimony only. The background sample locations are shown of Figure 5.

The location of each soil sample, sample depth, and laboratory analysis performed is summarized in Table 3.1. Locations of the sampling cells are shown in Figures 3 and 4. Summaries of the analytical data are provided in Tables 3.2, 3.3, 3.4, and 3.5 (antimony, arsenic, and lead), Tables 3.6, 3.7, 3.8, and 3.9 (PAHs), Table 3.10 (TCLP antimony, arsenic, and lead), and Table 3.11 (SPLP). These analytical results are compared to their respective residential and non-residential SRLs and minimum GPLs. Minimum GPLs for inorganic compounds (metals) were established by ADEQ in the document titled *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality* dated September 1996. For PAHs with an established Aquifer Water Quality Standard

(AWQS), GeoTek calculated the minimum GPL values using the Spreadsheet GPL dated January 1, 2013.

The analytical results, are summarized in the following paragraphs.

Surface Soil Samples Analytical Results (Composite Samples from Sample Cells)

As summarized in Table 3.2 and shown in Figure 3, Allwyn collected 134 surface composite soil samples from 134 of the 135 sampling cells locations and submitted the samples to the analytical laboratory for analysis of total concentrations of antimony, arsenic, and lead. The analytical results for antimony, arsenic, and lead from the surface soil samples are summarized below:

- The maximum concentration in surface soil samples was 25,000 mg/kg for lead, 12 mg/kg for arsenic, and 47 mg/kg for antimony.
- Seventy-two sampling cells contained lead concentrations below the ADEQ minimum GPL for lead of 290 mg/kg and less than the residential SRL for lead of 400 mg/kg.
- Nine sampling cells contained lead concentrations at or above the ADEQ minimum GPL for lead of 290 mg/kg but less than the residential SRL for lead of 400 mg/kg.
- Twenty-one sampling cells contained lead concentrations above the ADEQ residential SRL for lead of 400 mg/kg but less than the ADEQ non-residential for lead of 800 mg/kg.
- Thirty-two sampling cells contained lead concentrations above the ADEQ non-residential SRL for lead of 800 mg/kg.
- Arsenic was present in two surface sampling cells (5 and 6) at concentrations above the residential and non-residential SRL of 10 mg/kg; however, the concentration of arsenic within the two sampling cells were below the minimum GPL of 290 mg/kg. The sample results indicated arsenic was not present in the remaining sampling cells in concentrations above the residential and non-residential SRL of 10 mg/kg.
- Antimony was present in two surface sampling cells (15 and 77) at concentrations above the residential SRL of 31 mg/kg and minimum GPL of 35 mg/kg. The sample results indicated antimony was not present in the remaining sampling cells in concentration above its residential and non-residential SRLs or minimum GPL.

As summarized in Table 3.6, Allwyn collected 32 surface soil samples and two duplicate soil samples in the sampling cells for analysis of PAHs. Five PAH analytes, benzo(a)anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, chrysene, and pyrene, were detected above laboratory reporting limits. The analytical results for PAHs indicated one PAH, benzo(a)pyrene, was present in one primary surface sampling cell (77S) and one duplicate sample (Sample No. 210B, collected in sampling cell 41) at concentrations above the residential 10^{-6} SRL of 0.069 mg/kg, but below the residential 10^{-5} SRL, non-residential SRL, and calculated minimum GPL. No other PAH analyte was detected in surface soil

samples in concentrations above their respective residential SRL, non-residential SRL, or calculated minimum GPLs.

Subsurface Soil Samples Analytical Results (Composite Samples from Sample Cells)

As summarized in Table 3.3 and shown in Figure 4, Allwyn Environmental collected 82 subsurface composite soil samples from 82 of the 135 sampling cells locations and submitted to the analytical laboratory for analysis of total concentrations of antimony, arsenic, and lead. The analytical results for antimony, arsenic, and lead from the surface soil samples are summarized below:

- The maximum concentration in subsurface soil samples was 18,000 mg/kg for lead, 9.6 mg/kg for arsenic, and 37 mg/kg for antimony.
- Forty-seven sampling cells contained lead concentrations below the ADEQ minimum GPL for lead of 290 mg/kg and less than the residential SRL for lead of 400 mg/kg.
- Seven sampling cells contained lead concentrations at or above the ADEQ minimum GPL for lead of 290 mg/kg but less than the residential SRL for lead of 400 mg/kg.
- Fourteen sampling cells contained lead concentrations above the ADEQ residential SRL for lead of 400 mg/kg but less than the ADEQ non-residential for lead of 800 mg/kg.
- Fourteen sampling cells contained lead concentrations above the ADEQ non-residential SRL for lead of 800 mg/kg.
- Arsenic was not detected at concentrations exceeding the residential and non-residential SRL of 10 mg/kg or the minimum GPL of 290 mg/kg.
- Antimony was present in one subsurface sampling cells (82D) at a concentration above the residential SRL of 31 mg/kg and minimum GPL of 35 mg/kg. The sample results indicated antimony was not present in the remaining sampling cells in concentration above its residential and non-residential SRLs or minimum GPL.

As summarized in Table 3.7, Allwyn collected 32 subsurface soil samples soil samples in the sampling cells for analysis of PAHs. Five PAH analytes including benzo(a)pyrene, benzo(g,h,i)perylene, chrysene, 2-methylnaphthalene, and pyrene were detected above laboratory reporting limits. One PAH, benzo(a)pyrene, was present in primary subsurface sampling cell (71D) at concentrations above the residential 10^{-6} SRL of 0.069 mg/kg for benzo(a)pyrene, but below the residential 10^{-5} SRL, non-residential SRL, and calculated minimum GPL for benzo(a)pyrene. No other PAH analyte was detected in subsurface soil samples in concentrations above their respective residential SRL, non-residential SRL, or calculated minimum GPLs.

Wash Samples Sampling and Analytical Results

As summarized in Table 3.4, Allwyn collected sixteen soil samples from fifteen sample locations and submitted to the analytical laboratory for analysis of total concentrations of

antimony, arsenic, and lead. The analytical results for total antimony, arsenic, and lead are summarized below:

- The maximum concentration in the wash soil samples was 11,000 mg/kg for lead, 6.8 mg/kg for arsenic, and 30 mg/kg for antimony.
- Eight samples contained lead concentrations below the ADEQ minimum GPL for lead of 290 mg/kg and less than the residential SRL for lead of 400 mg/kg.
- One sample contained lead concentrations at or above the ADEQ minimum GPL for lead of 290 mg/kg but less than the residential SRL for lead of 400 mg/kg.
- One sample contained lead concentrations above the ADEQ residential SRL for lead of 400 mg/kg but less than the ADEQ non-residential for lead of 800 mg/kg.
- Six samples (Sample Nos. Wash 1 through Wash 6) contained lead concentrations above the ADEQ non-residential SRL for lead of 800 mg/kg.
- Concentration of antimony and arsenic did not exceed their respective residential and non-residential SRLs or minimum GPLs.

As summarized in Table 3.8, six PAH analytes including benzo(a)anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, chrysene, fluoranthene, and pyrene were detected above laboratory reporting limits. One PAH, benzo(a)pyrene, was present in three wash samples (Sample Nos. WASH 1, WASH 2, and WASH 3) at concentrations above the residential 10^{-6} SRL of 0.069 mg/kg for benzo(a)pyrene, but below the residential 10^{-5} SRL, non-residential SRL, and calculated minimum GPL for benzo(a)pyrene. No other PAH analyte was detected in wash soil samples in concentrations above their respective residential SRL, non-residential SRL, or calculated minimum GPLs.

Waste Characterization Sampling Analytical Results

As shown on Table 3.10, seven of the nine samples collected for TCLP analysis contained lead in a concentration ranging from 8.4 milligrams per liter (mg/L) to 720 mg/L, which exceeds the hazardous waste concentration of 5.0 mg/L for lead. Arsenic concentrations did not exceed its hazardous waste level for the toxicity characteristic in the waste characterization soil samples. Antimony does not have an established hazardous waste level for the toxicity characteristic.

As shown on Table 3.11, PAHs were not detected above laboratory reporting in limits in the three soil samples extracted by SPLP and analyzed for PAHs.

Based on the analytical results, Allwyn concluded the property soil containing lead in a concentration greater than the residential SRL of 400 mg/kg would likely be considered to be a hazardous waste for disposal purposes.

Background Soil Sampling Analytical Results

As shown on Table 3.9, detected concentrations of antimony, arsenic, and lead did not exceed their respective residential or non-residential SRL or minimum GPLs. The maximum concentration in the background samples was 100 mg/kg for lead, 8.4 mg/kg for arsenic, and 1.4 mg/kg for antimony. In addition, PAHs were not detected above laboratory reporting limits in the background soil samples (See Table 3.9).

Based on review of the analytical results, Allwyn concluded the horizontal extent of lead impacts in the assessment area was generally defined to the west of the shooting range but was not defined to the north or south of the shooting range. The vertical extent of lead impact was also not defined in some of the 135 grids, as shown on Figure 4. Allwyn Environmental recommended additional site assessment, consisting of further surface and subsurface sample collection and analysis, would be required to delineate the lead impact.

3.1.3 Allwyn Consultants Phase II ESA– July 8, 2017

Allwyn Consultants, formerly known as Allwyn Environmental, conducted additional soil assessment activities on behalf of Mariposa Properties, a former property owner of a portion of the Site, to further evaluate the extent of lead impacted soils in limited areas of three parcels currently identified as APNs 113-49-002A, 113-49-002C, 113-49-002D, 113-49-027A, 113-49-027D, and 113-49-029 that were not previously assessed as part of Allwyn 2009 assessment. The field assessment was conducted in three phases from April 4, 2017 through June 5, 2017.

A sampling grid consisting of 32 approximately 150-foot by 150-foot sampling grids were surveyed and marked across the additional area of suspected impact from the shooting range. Samples were named using the sampling grid number followed by the depth in inches (for instance, the sample name G15-4 was collected from 3-4 inches bgs in sampling cell 15). Three of Allwyn's new grid locations G10, G15, and G16 overlapped portions of the previous Allwyn 2009 sampling cells (See Figures 3 and 4). The sampling grids were divided into 75-foot by 75-foot sub-grids in which one discrete soils sample was obtained from each of the four sub-cells and composited into one sample for laboratory analysis. The composite samples were first screened with a 4.75 millimeter (mm) or 2.00 mm sieve to remove bulk debris, and then with a 300 µm sieve to produce the fine fraction to be submitted for analytical testing.

Allwyn conducted additional soil sampling of one grid (G19) at the request of the client, to further define the lateral extent of the lead-impacted soil. Allwyn divided G19 into nine approximately 50-foot by 50-foot sub-grids (G19-A through G19-I). The sampling grids were then divided into 25-foot by 25-foot sub-grids in which one discrete soil sample was obtained from each of the four sub-grids and composited into one sample for laboratory analysis. Allwyn obtained samples at various depths within the grid locations; surface soil

samples were collected from 0 to 1-inch bgs and subsurface soil samples were collected from depths between 3 to 4 inches bgs. The composite samples were first screened with a 4.75 mm or 2.00 mm sieve to remove bulk debris, and then with a 300 µm sieve to produce the fine fraction. Surface soil samples were named using the sampling grid number followed by the depth in inches (for instance, the sample name G9-1 was collected from 0-1 inches bgs in sampling grid G9). Subsurface soil samples were identified using the sampling grid number followed by the depth in inches (for instance, the sample name G9-4 was collected from 3-4 inches bgs in sampling grid G9).

In addition, the client requested Allwyn to collect three discrete soil samples from two berms that were reportedly used to divert the natural course of the wash (See Figure 6). The berms were purportedly constructed from materials from the shooting range and backstop berm and may contain lead in concentrations above the residential SRL and non-residential SRL and minimum GPLs. Discrete soil samples were collected at two depths (surface to 1-inch bgs and 3-4 inches bgs for six discrete samples total. The three discrete soil samples from each of the two berms were also screened as discussed above but were not composited. Surface soil samples from the northern berm were identified as BERM1-1, BERM1-2, and BERM1-3. Surface soil samples from the southern berm were identified as BERM2-1, BERM2-2, and BERM2-3. Subsurface soil samples from the northern berm were identified as BERM1-1-4, BERM1-2-4, and BERM1-3-4. Surface soil samples from the southern berm were identified as BERM2-1-4, BERM2-2-4, and BERM2-3-4.

The analytical results from the samples indicated that lead was present in the assessment areas as follows:

Surface Soil Samples Analytical Results (Composite Samples from 150-foot by 150-foot Sample Grids)

As summarized in Table 3.12 and shown on Figure 3, Allwyn collected thirty-two composite surface soil samples from the thirty-two 150-foot by 150-foot sampling grids and submitted the samples to the analytical laboratory for analysis of total concentrations of lead. The analytical results for lead from the surface composite soil samples collected in the 150-foot by 150-foot grids are summarized below:

- The maximum concentration in surface composite soil samples was 8,850 mg/kg for lead.
- Twenty-three samples contained lead concentrations below the ADEQ minimum GPL for lead of 290 mg/kg and less than the residential SRL for lead of 400 mg/kg.
- Four sampling grids contained lead concentrations above the ADEQ residential SRL for lead of 400 mg/kg but less than the ADEQ non-residential for lead of 800 mg/kg.
- Five sampling cells contained lead concentrations above the ADEQ non-residential SRL for lead of 800 mg/kg.

Subsurface Soil Samples Analytical Results (Composite Samples from 150-foot by 150-foot Sample Grids)

As shown on Figure 4 and summarized in Table 3.13, Allwyn collected sixteen subsurface composite samples from the thirty-two 150-foot by 150-foot sampling grids and submitted to the analytical laboratory for analysis of total concentrations of lead. The analytical results for lead from the subsurface composite soil samples collected in the 150-foot by 150-foot grids are summarized below:

- The maximum concentration in subsurface composite soil samples was 13,300 mg/kg for lead.
- Ten samples contained lead concentrations below the ADEQ minimum GPL for lead of 290 mg/kg and less than the residential SRL for lead of 400 mg/kg.
- Six sampling grids contained lead concentrations above the ADEQ non-residential SRL for lead of 800 mg/kg.

Grid G19 Surface Soil Samples Analytical Results (Composite Samples from 50-foot by 50-foot Sample Grids)

As shown on Figure 3 and summarized in Table 3.12, Allwyn collected nine surface soil samples soil samples from the nine 50-foot by 50-foot sampling sub-grids within grid G19 and submitted the samples to the analytical laboratory for analysis of total concentration of lead. Samples were named using the sampling grid number followed by the sub-grid designation followed by depth in inches (for instance, the sample name G19-C-1 was collected from 0-1 inches bgs in sub-grid C within sampling grid G19).

The analytical results for lead from the surface composite soil samples collected in the 50-foot by 50-foot grids with sampling grid G19 are summarized below:

- The maximum concentration in surface soil samples within sampling grid G19 samples was 1,960 mg/kg for lead.
- Two samples contained lead concentrations below the ADEQ minimum GPL for lead of 290 mg/kg and less than the residential SRL for lead of 400 mg/kg.
- Two sampling sub-grids contained lead concentrations at or above the ADEQ minimum GPL for lead of 290 mg/kg but less than the residential SRL for lead of 400 mg/kg.
- Three sampling sub-grids contained lead concentrations above the ADEQ residential SRL for lead of 400 mg/kg but less than the ADEQ non-residential for lead of 800 mg/kg.
- Two sampling sub-grids contained lead concentrations above the ADEQ non-residential SRL for lead of 800 mg/kg.

Grid G19 Subsurface Soil Samples Analytical Results (Composite Samples from 50-foot by 50-foot Sample Grids)

As shown on Figure 4 and summarized in Table 3.13, Allwyn collected nine subsurface soil samples from the nine 50-foot by 50-foot sampling grids within grid G19 and submitted the samples to the analytical laboratory for analysis of total concentrations of lead. The analytical results for lead from the surface composite soil samples collected in the 50-foot by 50-foot grids within sampling grid G19 are summarized below:

- The maximum concentration in surface soil samples within sampling grid G19 samples was 1,850 mg/kg for lead.
- Two samples contained lead concentrations below the ADEQ minimum GPL for lead of 290 mg/kg and less than the residential SRL for lead of 400 mg/kg.
- Two sampling grid contained lead concentrations at or above the ADEQ minimum GPL for lead of 290 mg/kg but less than the residential SRL for lead of 400 mg/kg.
- Three sampling grids contained lead concentrations above the ADEQ residential SRL for lead of 400 mg/kg but less than the ADEQ non-residential for lead of 800 mg/kg.
- Two sampling grids contained lead concentrations above the ADEQ non-residential SRL for lead of 800 mg/kg.

Berm Soil Samples Analytical Results

Allwyn collected six berm surface soil samples, three each from the two berms (BERM1 and BERM2), reportedly constructed to divert stormwater in washes to prevent stormwater run-on to the firing range. Soil samples were collected to assess lead concentrations in the berm materials. The berm sample locations are shown on Figure 6 and summarized in Tables 3.12 (surface) and 3.13 (subsurface). The analytical results for lead from the berm soil samples are summarized below:

- The maximum concentration of lead in berm surface soil samples was 1,710 mg/kg and 5,060 mg/kg in the berm subsurface soil samples.
- Lead concentrations from the three surface soil samples and subsurface soil samples collected from BERM1 exceeded the ADEQ non-residential SRL for lead of 800 mg/kg (See Figure 6 and Tables 3.12 and 3.13).
- One surface soil sample (BERM2-2-4) collected from BERM2 contained lead concentrations above the ADEQ residential SRL for lead of 400 mg/kg but less than the ADEQ non-residential for lead of 800 mg/kg (See Figure 6 and Table 3.12).
- One subsurface soil sample (BERM2-1-4) collected from BERM2 contained lead concentrations above the ADEQ non-residential SRL for lead of 800 mg/kg (See Figure 6 and Table 3.13).

Based on the analytical results, Allwyn concluded that the lateral extent of lead impacted had generally been defined. However, Allwyn recommended that if lead impacted grids

are not excluded and future development is planned on these sampling cells, site soil cleanup standards (i.e., residential SRL and non-residential SRL) should be established based on considerations such as future site use, deed restriction, and cost and feasibility of remediation to meet the selected cleanup standards. Allwyn recommended the development of a remedial plan and an evaluation of feasible remediation options to cleanup soil to the standards considered based on future site use, deed restriction, and cost and feasibility of remediation to meet the selected cleanup standards. Alternative remedial options such as excavation and off-site disposal, stabilization, phytoremediation, and soil washing should be considered in the evaluation. Lead should be used as the constituent of concern for the evaluation. In addition, Allwyn recommended the evaluation of remedial actions should take into account the soil containing lead in a concentration above the residential SRL of 400 mg/kg will likely require disposal as a characteristic hazardous waste under waste code D008. Allwyn also recommend that site remediation be conducted under the ADEQ VRP.

3.1.4 Allwyn Phase I ESA, La Loma Grande – November 2017

In 2017, Allwyn conducted Phase I ESA and limited soil assessment on a property located west of the shooting range and their report was titled *Phase I Environmental Site Assessment, La Loma Grande, LLC Property, Nogales, Arizona (Parcel No. 113-49-006A)*, dated November 27, 2017. According to the report, Mr. Nohe Garcia, the property owner at the time, wanted to sub-divide APN 113-49-006 into two parcels: one parcel consisting of the area of APN 113-49-006 not impacted by bullet fragments or soil with lead concentrations in excess of the lead residential SRL and one parcel comprised of the portion of APN 113-49-006 with elevated concentrations of lead in soil. Mr. Garcia contracted with Allwyn to review the 2009 data, identify areas where additional sampling was needed at APN 113-49-006 and to define the parameters of the parcel where elevated lead concentrations were present.

Based on review of the 2009 data, Allwyn concluded four additional sampling girds needed to be sampled to define the area of APN 113-49-006 with lead concentrations in excess of 400 mg/kg. These 50-foot by 50-foot sampling grids, identified as Grids 136, 137, 138, and 139, as shown in Figures 3 and 4. Similar to the Allwyn 2017 assessment, four discrete soil samples were obtained from each grid location and composited into one sample. Allwyn obtained samples at various depths within the sampling grids; surface soil samples were collected from 0 to 1 inch bgs and subsurface soil samples were collected from depths between 3 to 4 inches bgs. The composite samples were first screened with a 4.75 mm or 2.00 mm sieve to remove bulk debris, and then with a 300 µm sieve to produce the fine fraction. As shown in Table 3.14 and 3.15 and Figures 3 and 4, the composite surface and subsurface samples obtained from Grids 136, 137, 138, and 139 did not contain lead concentrations in excess of the residential SRL for lead of 400 mg/kg. The maximum lead concentration in the surface composite soil samples was 140 mg/kg and 149 mg/kg in the subsurface soil samples.

3.1.5 PIKA International Phase II ESA – May 2018

PIKA International, Inc. (PIKA) conducted sampling and analysis on behalf of US CBP for the property located south and southwest of the former US Nogales Firing Range which includes the portions of the Site. Their report was titled *Final Sampling and Analysis Report, Former U.S. Customs and Border Protection Small Arms Firing Range, AKA Arbo Range (AZ0047), Weapons Training Residue Tucson Sector, Nogales, Arizona*, dated May 2018. The purpose of this project was to replicate the sampling from a previous investigation (Allwyn 2017 Phase II ESA) and compare the data collected with date from the historical investigation at the undeveloped property adjacent to the former U.S Nogales Firing Range. PIKA indicated the investigation was approximately 3 acres of undeveloped private property immediately south and southwest of the former US CBP Nogales Firing Range. PIKA also indicated the property was formerly used by the U.S. military leading to the potential for Unexploded Ordnance (UXO) to exist.

PIKA established a sampling grid consisting of nine 150-foot by 150-foot grids replicating Allwyn's sample Grid Nos. G9 through G16 and G19 (See Figures 3 and 4). PIKA then subdivided the primary grid into four secondary grids, each measuring 75 feet by 75 feet. The secondary grids were then assigned a designation of A through D. Four discrete soil samples were then collected from the secondary grids and composited into one sample. PIKA collected fifteen soil samples; eleven composite samples (nine primary and two duplicates) were collected at 0 to 1-inch bgs and six composite samples were collected at 3 to 4 inches bgs. Two duplicated samples were also collected from 0 to 1 inch bgs. The samples were analyzed for arsenic, antimony, lead, and PAHs and the results were compared to current EPA residential and industrial regional screening levels (RSLs). However, for the purpose of this Work Plan and under the requirements of ADEQ VRP, PIKA analytical results are compared to the SRLs as shown in Tables 3.16 and 3.17 (antimony, arsenic, and lead) and Tables 3.18 and 3.19 (PAHs). The analytical results are summarized below:

- The maximum concentration in the surface soil samples was 5,200 mg/kg for lead, 11 mg/kg for arsenic, and 9.0 mg/kg for antimony.
- Two surface samples contained lead concentrations below the ADEQ minimum GPL for lead of 290 mg/kg and less than the residential SRL for lead of 400 mg/kg.
- One surface sample contained lead above the ADEQ residential SRL for lead of 400 mg/kg but less than the ADEQ non-residential for lead of 800 mg/kg
- Five surface samples and two duplicate surface samples contained lead concentrations above the ADEQ non-residential SRL for lead of 800 mg/kg.
- Two subsurface samples contained lead concentrations above the ADEQ residential SRL for lead of 400 mg/kg but less than the ADEQ non-residential for lead of 800 mg/kg.
- Four subsurface sampling grids contained lead concentrations above the ADEQ non-residential SRL for lead of 800 mg/kg.

The PIKA report indicated concentrations of detected PAHs and antimony in surface and subsurface samples were less than their respective RSLs, which were also below their respective SRLs. The PIKA report indicated arsenic was present in surface and subsurface samples in concentrations greater than the industrial RSL of 3.0 mg/kg; however, only one sample grid contained arsenic in a concentration greater than the ADEQ residential and non-residential SRL of 10 mg/kg. PIKA indicated US CBP was performing additional, separate work to better document natural background levels of arsenic in the designated sampling grid area.

Based on the results of the sampling and testing, PIKA indicated their investigation corroborates the presence of lead and arsenic in soils identified by Allwyn in 2017.

3.1.6 US Army Corps of Engineers Draft Records Research Report – June 2012

GeoTek reviewed a document entitled Draft Records Research Report; Camp Stephen Little Formerly Used Defense Site (#J09AZ0287), US Army Corps of Engineers (USACE), dated June 2012[1]. The report was prepared for the USACE in support of the Defense Environmental Restoration Program (DERP) for Formerly Used Defense Sites (FUDS) at the Former Camp Stephen Little (also known as Camp U.S Troops, Nogales, Arizona; Camp Nogales, and Camp Stephen D. Little). Camp Little was used as an infantry, cavalry, and artillery troop camp by the U.S. Army from 1887 to 1936 under the Department of Defense (DoD) jurisdiction. The camp was used to house Regular Army troops at Nogales, Arizona to protect U.S. territory during Mexican revolution (1910-1920) activities. The former Camp Little is located approximately 2.5 miles northwest of the Site; however, the camp spans over approximately 1,200 acres. As part of the FUDS study, Tetra Tech, Inc. conducted a site reconnaissance to verify evidence of DoD activity, document environmental Areas of Interest (AOIs), and document the current status of the site. One AOI was identified for a Rifle Range in the Northwest Target Range that is currently used as the US CBP small arms shooting range. As documented in the study, Mr. Paul Arbo purchased a 13.46-acre parcel of land in 1970 that was formerly leased by the DoD and identified in the report as the Northwest Target Range. The report included an interview with Mr. Arbo, who stated an Army rifle range was located on the property at the time of purchase. In the early 1970s, Mr. Arbo bulldozed features associated with the rifle range to make room for metal recycling operations. The report indicated Mr. Arbo then leased the western corner of the property to the U.S. Border Patrol to build and operate a small arms shooting range. The report also indicated between the late 1960s and the early 1990s, Mr. Arbo found approximately 50 munitions items in the arroyo that extended to the southwest from the western corner of his property. The report indicated the majority of the items Mr. Arbo found were partially exploded grenades or otherwise potentially

[1] Bristol ERS and Tetra Tech, Inc.; *Draft Records Research Report; Camp Stephen Little; Formerly Used Defense Site #J09AZ0287;* June 2012.

identified as UXO. The approximate area of discovered ordnance is located in APNs 113-49-006A and 113-49-006B of the Site.

3.1.7 TerranearPMC, LLC Remedial Investigation/Feasibility Study (RI/FS) – June 2014

TerranearPMC, LLC (TPMC) prepared a Remedial Investigation/Feasibility Study (RI/FS) on the US CBP firing range, located at 1651 West Target Road in Nogales, Arizona. The report was titled *U.S Army Corps of Engineers, Fort Worth District, Remedial Investigation, Feasibility Study for the U.S Border Patrol Firing Range, Nogales Arizona* dated June 2014, and was prepared for the U.S Army Corps of Engineers. According to the report, the RI/FS report describes the methods and results of data evaluation and site characterizations performed; and presents the assessment, development, screening, and evaluation of remedial alternatives to reduce the potential risk to current and future site receptors, the general public, and the environment at the US CBP firing range in Nogales, Arizona.

TPMC indicated the study area was a leased portion of the Arbo property consisting of approximately 0.5 acres located in Santa Cruz County APN 112-29-100B currently identified as Parcel 113-49-035. The report indicated previous Phase I and II investigations were completed on properties adjoining the US CBP firing range where bullet fragments, shotgun wadding, and clay pigeon target fragments were encountered during the assessment. During the Phase II soil investigation completed on the adjoining properties, 135 soil samples were taken and analyzed for lead, antimony, arsenic, and PAHs. Results of the samples showed concentrations of lead constituents and limited antimony, arsenic, and PAHs that exceed the EPA residential RSLs. TPMC collected sixty soil samples from fifteen sampling grid locations at the US CBP firing range as part of the RI. Thirty-eight soil samples (sixteen composite and twenty-two discrete samples) were collected from the surface (0-12 inches bgs), and 22 soil samples (16 composite and 6 discrete soil samples) were collect from the subsurface (below 12 inches) where X-Ray Fluorescence (XRF) instrument reading did not exceed the EPA residential RSL for antimony, arsenic and lead. As shown in a sample location figure provided in the report, soil samples (CN-4 and CN-7) appeared to have been collected from APN 113-49-006B located within the Site boundary of this project. The report indicated all sixty soil samples were analyzed for the presence of arsenic, antimony, lead, PAHs, and TCLP lead and the results were compared to current residential and industrial RSLs. However, for the purpose of this Work Plan and under the requirements of ADEQ VRP, TMPC analytical results are compared to the SRLs and are summarized below:

- Lead (residential SRL of 400 mg/kg) was present in surface soil samples in concentrations between 198 mg/kg and 49,300 mg/kg and in subsurface soil samples in concentrations between 20.0 mg/kg and 27,000 mg/kg.

- Arsenic (residential SRL of 10 mg/kg) was present in surface soil samples in concentrations between 5 mg/kg and 22.8 mg/kg and in subsurface soil samples in concentrations between 4.4 mg/kg and 15.7 mg/kg.
- Antimony (residential SRL of 31 mg/kg) was present in surface soil samples in concentrations between less than 1.7 mg/kg and 471 mg/kg and in subsurface soil samples in concentrations between less than laboratory reporting limit and 208 mg/kg.

The analytical results for PAHs indicated that benzo(a)pyrene was present in two composite surface samples and one grab surface sample at concentrations above the residential 10^{-6} SRL of 0.069 mg/kg and benzo(b)fluoranthene was present in two composite surface sample at concentrations above the residential 10^{-6} SRL of 0.69 mg/kg. Benzo(g,h,i)perylene was detected in one composite and one grab sample; ADEQ has not established an SRL for benzo(g,h,i)perylene. In addition, benzo(g,h,i)perylene does not have an established AWQS, therefore a minimum GPL was not calculated.

Analytical results for TCLP lead and TCLP arsenic indicated that one composite sample and three grab samples exceeded the TCLP lead limit for hazardous waste of 5.0 mg/L.

According to TMPC, the COC sources at the site are related to the activities of the US CBP firing range. In addition, secondary sources of COCs at the US CBP firing range are areas of the firing range that have been reworked by earth moving equipment and stormwater runoff.

3.1.8 HDR Environmental, Operations and Construction, Inc. Background Arsenic Investigation – December 2018

HDR performed a background arsenic investigation of the soil in the vicinity of the former firing range to calculate an arsenic concentration likely attributable to the naturally occurring arsenic in soil. The report was titled *Final – Background Arsenic Investigation Report, Former U.S. Customs and Border Protection Nogales Firing Range (AZ0047/Arbo Range), Background Arsenic Soils Investigation, 1651 West Target Range Road, Nogales, Arizona* dated December 2018, and was prepared for US CBP. According to the report, the 95% UCL for arsenic for the samples collected in the Site vicinity was 7.55 mg/kg and 6.63 mg/kg without a potential outlier. In addition, HDR concluded that the naturally occurring arsenic is less than the residential and non-residential SRL of 10 mg/kg.

3.1.9 GeoTek Contracting and Remediation, Site Characterization Report, Site Code: 513182-00 – May 2019

GeoTek's Site characterization activities included the following general tasks:

- Assessed the vertical extent of impacts of the Site COCs through collection and analysis of soil samples.

- Collected soil samples to evaluate total and leachable concentrations of lead to attempt to identify a correlation between total lead concentrations and leachable lead concentrations exhibiting the toxicity hazardous waste characteristic
- Conducted a bench-scale stabilization study to evaluate the efficacy of soil stabilization to render excavated soil as non-hazardous waste for disposal purposes
- Collected soil samples for materials analysis to evaluate the soil size and weight distribution at the Site, in order to support calculations for the amount of material that may be able to remain on-Site following remediation (rock, debris, and other inert materials)
- Attempted to install temporary groundwater monitoring wells to assess groundwater for potential impacts resulting from shooting range operations from the Former US CBP Small Arms Firing Range located adjacent to the Site

Vertical Extent Sampling

GeoTek established an approximate 150-foot by 150-foot coordinate grid across the areas that required additional assessment of the vertical extent of COCs in Site soil. The approximate locations of the 150-foot by 150-foot grids are shown on Figure 7. Initially, discrete subsurface soil samples (collected from 12 inches bgs) were collected from four locations within each 150-foot by 150-foot grid. The samples were returned to the GeoTek Materials Testing Laboratory for drying, sieving, and compositing. Following processing, the samples were screened using an XRF. If the lead concentration in the composite soil, as measured by the XRF, was less than 225 mg/kg, the composite sample was submitted to the analytical laboratory for analysis of antimony, arsenic, lead, and PAHs. Based on the lead concentrations measured by the XRF, the following 12-inch bgs samples were placed into laboratory-supplied containers submitted for laboratory analysis: V-1-12, V-2-12, V-3-12, V-4-12, V-6-12, V-7-12, V-11-12, V-14-12, V-16-12, V-17-12, V-18-12, V-20-12, V-21-12, and V-22-12 and associated duplicate samples (Sample Nos. V-23-12 which is a duplicate of primary sample V-7-12 and V-25-12 which is a duplicate of primary sample V-11-12).

If the lead concentration exceeded 225 mg/kg as measured by the XRF in the 12-inch bgs sample, the composite surface sample was discarded. GeoTek then remobilized to the Site to collect samples at greater depths in the following vertical extent sampling grids: V-5, V-8, V-9, V-10, V-12, V-13, V-15, and V-19. Initially, additional samples were collected at 18-inches bgs using the same methodology described above. The samples from each of the four discrete sample locations were composited in the field and XRF readings were obtained of the un-sieved material to assess lead concentrations. Based on the field XRF results, GeoTek collected samples at 24-inches and 30-inches bgs, when possible. However, the soils in many grid samples collapsed in the boring and possibly causing lead-contaminated soil from the surface to fall into the open boring and cause inaccurate results. Therefore, sample were collected at a maximum depth of 30-inches bgs. The samples

collected at the maximum depth obtained in grids V-5, V-8, V-9, V-10, V-12, V-13, V-15, and V-19 were sieved and submitted for analysis for antimony, arsenic, lead and PAHs.

The analytical results for antimony, arsenic, and lead are summarized in Table 3.20 and the PAH results are summarized in Table 3.21. The analytical results for lead are depicted on Figures 8 through 10.

12-Inch Soil Sample Analytical Results (Composite Samples from 150-foot by 150-foot Vertical Extent Sample Grids)

GeoTek submitted 14 composite vertical extent soil samples collected from 12 inches bgs from the twenty-two 150-foot by 150-foot vertical extent sampling grids to the analytical laboratory for analysis for antimony, arsenic, lead, and PAHs. The following samples were submitted and analyzed: Sample Nos. V-1-12, V-2-12, V-3-12, V-4-12, V-6-12, V-7-12, V-11-12, V-14-12, V-16-12, V-17-12, V-18-12, V-20-12, V-21-12, and V-22-12 and associated duplicate samples (V-23-12 for primary sample V-7-12) and V-25-12 for primary sample V-11-12).

Eight additional samples collected at 12 inches bgs were tested using the XRF. The lead concentration in Sample Nos. V-5-12, V-8-12, V-9-12, V-10-12, V-12-12, V-13-12, V-15-12, and V-19-12 as measured by the XRF exceeded 225 mg/kg. Therefore, these samples were discarded and additional samples were collected from these locations at a depth of 18 inches bgs.

The analytical results for metals are compiled in Table 3.20 and PAHs are compiled in Table 3.21. The analytical results are summarized below:

- Fourteen primary samples and two duplicate samples contained lead in a concentration less than the minimum GPL for lead of 290 mg/kg, the residential SRL of 400 mg/kg, and the non-residential SRL of 800 mg/kg.
- One soil sample (V-21-12) contained arsenic in a concentration at the residential SRL and non-residential SRL of 10 mg/kg, but less than the minimum GPL of 290 mg/kg.
- Antimony was not present in a concentration greater than its residential SRL of 31 mg/kg, non-residential SRL of 410 mg/kg, or minimum GPL of 35 mg/kg.
- PAHs were not detected above their respective residential and non-residential SRLs or minimum GPLs.

18-Inch Soil Sample Analytical Results (Composite Samples from 150-foot by 150-foot Vertical Extent Sample Grids)

The lead concentration in Sample Nos. V-5-12, V-8-12, V-9-12, V-10-12, V-12-12, V-13-12, V-15-12, and V-19-12, as measured by the XRF exceeded 225 mg/kg. Therefore, additional samples were collected at a depth of 18 inches bgs and were analyzed for lead

concentration using the XRF. The lead concentration in these samples, as measured by the XRF, exceeded 225 mg/kg; therefore, these samples were discarded and additional samples were collected from these locations at a depth of 24 inches bgs.

24-Inch Soil Sample Analytical Results (Composite Samples from 150-foot by 150-foot Vertical Extent Sample Grids)

Soil samples from seven composite vertical extent soil samples collected at 24 inches bgs from the twenty-two 150-foot by 150-foot vertical extent sampling grids (six primary samples and one duplicate sample) were submitted to the analytical laboratory for analysis for antimony, arsenic, lead, and PAHs. The following samples collected from 24-inches bgs were submitted and analyzed: Sample Nos. V-5-24, V-10-24, V-12-24, V-13-24, V-15-24, V-19-24, and V-26-24 (duplicate of Sample No. V-10-24).

Two additional samples collected at 24 inches bgs were tested using the XRF. The lead concentration in Sample Nos. V-8-24 and V-9-24, as measured by the XRF exceeded 225 mg/kg. Therefore, these samples were discarded and additional samples were collected from these locations at a depth of 30 inches bgs.

The analytical results for metals are compiled in Table 3.20 and PAHs are compiled in Table 3.21. The analytical results are summarized below:

- One composite soil sample (V-10-24) and associated duplicated sample (V-26-24) contained lead in a concentration less than the minimum GPL of 290 mg/kg, the residential SRL of 400 mg/kg, and the non-residential SRL of 800 mg/kg
- One composite soil sample (V-13-24) contained lead in a concentration above the minimum GPL of 290 mg/kg, but less than the residential SRL of 400 mg/kg, and the non-residential SRL of 800 mg/kg.
- Two composite soil samples (V-12-24 and V-19-24) contained lead in a concentration above the minimum GPL of 290 mg/kg and the ADEQ residential SRL of 400 mg/kg, but less than the non-residential SRL of 800 mg/kg.
- Two composite soil samples (V-5-24 and V-15-24) contained lead in a concentration greater than the non-residential SRL of 800 mg/kg.
- Antimony and arsenic did not exceed their respective minimum GPLs, residential SRLs, or non-residential SRLs.
- PAHs were not detected in concentrations above their respective minimum GPL, residential SRLs, or non-residential SRLs.

30-Inch Soil Sample Analytical Results (Composite Samples from 150-foot by 150-foot Vertical Extent Sample Grids)

Soil samples from two composite vertical extent soil samples (V-8-30 and V-9-30) collected at 30 inches bgs from the twenty-two 150-foot by 150-foot vertical extent

sampling grids were submitted to the analytical laboratory for analysis for antimony, arsenic, lead, and PAHs.

The analytical results for metals are compiled in Table 3.20 and PAHs are compiled in Table 3.21. The analytical results are summarized below:

- Two composite soil sample (V-8-30 and V-9-30) contained lead in a concentration greater than the non-residential SRL of 800 mg/kg.
- Concentrations of antimony and arsenic did not exceed their respective minimum GPL, residential SRLs, or non-residential SRLs.
- PAHs were not detected in concentrations above their respective minimum GPL, residential SRLs, or non-residential SRLs.

Based on the analytical results from the vertical extent samples, GeoTek concluded the following:

- Soil in grids V-1, V-2, V-3, V-4, V-6, V-7, V-11, V-14, V-16, V-17, V-18, V-20, V-21, and V-22 will likely need to be excavated to depths between 4 inches and 12 inches bgs.
- Soil in grids V-5, V-10, V-12, V-13, V-15, and V-19 will likely need to be excavated to depths greater than 24 inches bgs.
- Soil in grids V-8 and V-9 will likely need to be excavated to depths greater than 30 inches bgs.

Total and Leachable Lead and Analytical Results

GeoTek collected soil samples to evaluate total and leachable concentrations of lead to attempt to identify a correlation between total lead concentrations and leachable lead concentrations exhibiting the toxicity hazardous waste characteristic. GeoTek collected one discrete surface soil sample from each of 22 vertical extent sampling grids shown on Figure 7. Soil samples were collected from the upper 6 inches of soil with a stainless-steel hand trowel and/or shovel. Following collection, the sample was screened with a ¼-inch sieve to remove bullet fragments and bulk debris. Following sieving, the samples were placed into laboratory-supplied containers submitted for laboratory analysis. The analytical results are provided in Table 3.22.

Based on review of the total and leachable lead analytical results, GeoTek concluded there was a good correlation between total lead and TCLP lead. In addition, GeoTek concluded the Site soil containing lead in a concentration greater than the residential SRL of 400 mg/kg would likely be considered to be a hazardous waste for disposal purposes and would need to be stabilized for disposal in Subtitle D landfill.

Alternative GPL Calculation

GeoTek used the analytical data obtained for the total lead and leachable lead evaluation to calculate an alternative GPL for lead. The alternative GPL was calculated using the following equation:

$$Xs = (292.9)RC_w$$

Where: Xs is the Alternative GPL which represents the maximum allowable total metals concentration in soil which achieves protection of groundwater quality.
R = ratio between the total lead content in a soil sample and the TCLP leachate result
C_w = maximum groundwater concentration in the mixing cell across the perforated interval of the monitor well and is equivalent to the AWQS of 0.015 mg/L.

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

Alternative GPLs were calculated for each of the correlation samples that had lead concentrations detected above laboratory reporting limits. Based on the calculations, the sample with the lowest ratio (R) and lowest calculated GPL was sample CS-8 with a calculated Alternative GPL of 111.6 mg/kg. Based on the results of the calculation of the Alternative GPL, the minimum GPL for lead of 290 mg/kg will be used as the remediation standard for lead.

Soil Stabilization Study Sampling and Analytical Results

GeoTek conducted a bench-scale stabilization study to evaluate the efficacy of soil stabilization to render excavated soil as non-hazardous waste for disposal purposes. Based on initial research conducted by GeoTek, soil stabilization using Portland cement was considered likely be the most cost-effective option to stabilize the excavated soil during remediation activities. Therefore, a bench-scale stabilization study was performed to evaluate the proper ratio of Portland cement to soil to render leachable lead in the soil to be non-hazardous for disposal purposes.

GeoTek collected soil samples from five locations containing lead in moderately high to high concentrations of lead. The approximate locations of the samples collected for the stabilization study are shown in Figure 11. GeoTek anticipated the highest concentrations of lead is present between the surface up to 4 inches bgs. Therefore, soil samples for the bench-scale stabilization study were collected at depths of up to 4 inches bgs. The sample locations were determined in the field and were biased to areas with high concentrations of

bullets and bullet fragments. In addition, the sample locations were guided by in-situ screening with the XRF to obtain samples that contained the highest lead concentration.

The samples were transported to the GeoTek offices for processing and sampling. Each sample was homogenized and the soil sample was screened with a ¼-inch sieve to remove bullets, bullet fragments, rocks, and vegetation, as the material less than ¼ inch will likely represent the portion of the soil that will need to be stabilized during remediation. A portion of each sample was collected prior to stabilization and submitted to the analytical laboratory for analysis for total lead by EPA method 6010C and leachable lead using TCLP extraction using EPA method 1311 and analysis by EPA method 6010C.

The remaining portion of the samples were transported to the GeoTek offices to perform the stabilization study. The study initially consisted of adding various mixtures of Portland cement to the soil to evaluate the appropriate mixture that will stabilize leachable lead. Initially, three sub-samples of each of the five samples (Sample Nos. SS-1 through SS-5) were stabilized using 4%, 5%, and 6% Portland cement. Approximately 16 ounces of each sub-sample was added to a stainless-steel mixing bowl and the appropriate amount of Portland cement was added to the sub-sample to create a 4%, 5%, or 6% ratio. Water was then added to the mixture and the soil and Portland cement was mixed.

Each sub-sample of the stabilized soil was then placed into a laboratory-supplied container and submitted for analysis for total lead by EPA method 6010D and leachable lead using TCLP extraction using EPA method 1311 and analysis by EPA method 6010D. The post-stabilization samples were named using following format: SS-#-%, where "SS" indicated soil sample from stabilization study sample, and # indicated stabilization study sample identification number, and % indicated the percentage of Portland cement mixture.

As shown on Table 3.23, the 4%, 5%, and 6% Portland cement ratios did not consistently stabilize the soil to below the hazardous waste level for the toxicity characteristic of 5 mg/L lead. Therefore, GeoTek conducted an additional stabilization study using 10%, 15%, and 20% Portland cement ratio. GeoTek selected three samples for the additional stabilization study based on the analytical results of the initial stabilization study: one sample had relatively low concentrations of total and TCLP lead (Sample No. SS-1), one sample had moderate concentrations of total and TCLP lead (Sample No. SS-2), and one sample had relatively low concentration of total and TCLP lead (Sample No. SS-3). The additional stabilization study used the same stabilization and sampling methodology as described for the initial stabilization study using a 10%, 15%, and 20% Portland cement ratio. The samples were handled and submitted to OCA for analysis for total lead by EPA method 6010D and leachable lead using TCLP extraction using EPA method 1311 and analysis by EPA method 6010D.

As shown on Table 10C, the 10%, 15%, and 20% Portland cement ratios also did not consistently stabilize the soil to below the hazardous waste level for the toxicity

characteristic of 5 mg/L. Therefore, GeoTek researched alternative stabilization methods for the Site soil. Based on GeoTek's research, GeoTek selected the possible use of ECOBOND® to stabilize the Site soil. ECOBOND® is a propriety mixture manufactured by MT2 that uses non-hazardous chemical binders to convert metals to a non-leachable form. ECOBOND® has successfully been used to stabilize soils and sediments at former shooting ranges. Two of the stabilization study samples were submitted to MT2 to perform a stabilization study of Site soils. MT2 requested one sample be submitted with relatively high concentration of total lead (Sample No. SS-2) and one sample with relatively lower concentration of total lead (Sample No. SS-1). GeoTek screened the samples with a ¼-inch sieve to remove bullets, bullet fragments, rocks, and vegetation, and submitted the samples to MT2 to perform the stabilization study using the propriety ECOBOND® mixture. The analytical results of the stabilization study performed using ECOBOND® demonstrated that a 5% ECOBOND®/soil mixture would adequately and consistently stabilized the soil such that the lead concentration in the TCLP extract did not exceed the hazardous waste characteristic of 5 mg/L.. Therefore, the remedial action will incorporate the use of ECOBOND® as the agent to be used to stabilize soil prior to off-site disposal.

Soil Size and Weight Distribution Sampling

GeoTek collected one representative soil sample for materials analysis to evaluate the soil size weight distribution at the Site and to estimate the amount of material that may require stabilization or would be able to remain on-Site following remediation (rock and other inert materials). The sample was collected from the upper 12 inches of soil and was collected at various locations throughout the Site using a shovel and placed into a 5-gallon bucket. The sample was homogenized and taken to the GeoTek Materials Testing Laboratory for grain-size and weight analysis. Approximately 1,920 grams of material was weighed and tested for material size and weight distribution, and the results are provided in Table 3.24. This data was used to estimate the amount of material that will be generated for each screen interval (+1-inch, +¼-inch to -1-inch, and -¼-inch), and subsequently stabilized for off-Site disposal or used to backfill the Site excavation. This information is provided in Section 5.2.

Temporary Monitoring Well Boring Installation

GeoTek also attempted to install temporary groundwater monitoring wells to assess groundwater for potential impacts resulting from shooting range operations from the Former US CBP Small Arms Firing Range located adjacent to the Site. According to ADWR Well Registration data, the depth to groundwater in one well located within ½ mile of the Former US CBP Firing Range was 135 feet bgs. Based on the available groundwater data in the Site vicinity, GeoTek assumed that the temporary groundwater monitoring wells would be installed to a maximum depth of 150-feet below ground surface. GeoTek attempted to install one groundwater monitoring well (MW-1); however, groundwater was not encountered at 150 feet bgs and the maximum depth of the drill rig was reached.

Therefore, the temporary groundwater monitoring was abandoned and groundwater samples were not collected. The approximate location of the temporary monitoring well boring is shown on Figure 12.

Based on the soil analytical results and limited mobility of metals in soil, GeoTek concluded it would not be cost-effective to attempt to install groundwater monitoring wells and it is extremely unlikely that the Site COCs have impacted groundwater. Based on conversations with the ADEQ VRP, the ADEQ indicated that the ADEQ may be able to issue an NFA determination for groundwater specifically related to the former firing range operations without collection of groundwater samples. Following remediation, the remediation contractor will submit a request for an NFA determination to include an NFA determination in for the Site COCs in groundwater specifically related to the former firing range operations.

4.0 FIELD PREPARATION

4.1 HEALTH AND SAFETY PLAN

A site-specific Health and Safety Plan (HASP) will be developed to assure field activities detailed in this VRP Work Plan are conducted in a manner protective of the safety and health of site workers and will be prepared in general accordance with Title 29 Code of Federal Regulations Part 1910 (29 CFR 1910). The remediation contractor will prepare a HASP as a separate plan, titled *Health and Safety Plan, U.S. Customs and Border Protection, Properties Adjacent to the Former US CBP Small Arms Firing Range*. The purpose of the HASP will be to assign responsibilities, to establish personnel protection standards and mandatory safety practices and procedures, and to provide for contingencies that may have occurred while operations were being conducted at the Site. In addition, because UXO may be present at the Site, GeoTek will develop a supplement to the HASP to address Munitions and Explosive of Concern (MEC) during remediation. This supplemental MEC Avoidance plan will detail the procedures to be followed to safely identify and respond to the potential presence of UXO at the Site, including identification, avoidance, and notification procedures for such materials.

4.2 UNDERGROUND UTILITIES LOCATE

The remediation contractor will coordinate with the property owners, US CBP, and subcontractors to prepare for field activities. Utilities will be located in the field before remediation activities. The remediation contractor staff will take precautions to reduce the possibility of damaging existing structures and utilities. Arizona 811 will locate the public utilities in the Site vicinity. The remediation contractor will also contract with a private utility locator, to conduct an electromagnetic survey to identify anomalous underground features, specifically for the presence of underground structures and utilities.

4.3 COMPLIANCE WITH PERMITS AND LEGAL REQUIREMENTS

The US CBP and its contractors will comply with applicable local, state, and federal rules and regulations related to the remediation and assessment activities at the Site. The primary regulatory requirements for this project are described below.

4.3.1 Stormwater Pollution Prevention

Construction activities, including those associated with remediation, that disturb more than 1.0 acre and have the potential to enter waters of the United States or a storm drain system must obtain authorization prior to the discharge. Construction activities disturbing more than one acre can obtain authorization through a Construction General Permit (AZG2013-001) issued by ADEQ. To obtain authorization for stormwater discharges associated with construction activity under this general permit, the operator must comply with the

requirements of the General Permit, including implementation of a Stormwater Pollution Prevention Plan (SWPPP) tailored to the site, and submission of a Notice of Intent (NOI).

Prior to field activities, the remediation contractor will prepare a SWPPP in accordance with the Construction General Permit for the remediation activities. Following preparation of the SWPPP, the remediation contractor will submit an NOI to be covered under the general permit using the ADEQ myDEQ online system, pay the applicable fees, and receive authorization to discharge from the ADEQ. Based on GeoTek's review, the Site is not within ¼ mile of impaired, not-attaining, or Outstanding Arizona Waters; therefore, submission and approval of the SWPPP to the ADEQ is not required. In addition, following completion of the remediation activities and Site stabilization the remediation contractor will submit a Notice of Termination (NOT) to ADEQ upon completion of the demolition, remediation, and assessment activities.

4.3.2 Dust Control

There are no known permits required specifically for dust control, with the exception of the Stormwater Construction General Permit which requires dust minimization practices. The controls and procedures to minimize dust including control of dust from excavation areas, stockpiles, vehicle track-out will be implemented as described in the SWPPP. In addition, erosion control, and stabilization procedures will be implemented as described in the SWPPP and Section 5.8 of this VRP Work Plan.

4.3.3 Clean Water Act Section 404

Section 404 of the Clean Water Act (CWA) regulates the discharge of dredged or fill material into waters of the United States, including wetlands. Activities in waters of the United States regulated under this program include fill for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports) and mining projects. Section 404 requires a permit before dredged or fill material may be discharged into waters of the United States, unless the activity is exempt from Section 404 regulation (e.g., certain farming and forestry activities).

Remediation activities as discussed in this Work Plan will not discharge dredged or fill material into water of United States. Disturbance of the Site washes will be minimized and fill materials will not be placed in the Site washes above the ordinary high water mark (OHWM). Therefore, based on GeoTek's research and correspondence with the United States Army Corps of Engineers (USACE), a Section 404 permit will not be needed. Excavation of the washes is allowed to remediate the Site soil; however, care must be taken by the remediation contractor to not significantly disrupt or alter natural drainage patterns of the Site washes. If at any time during remediation activities, it becomes necessary to fill a wash above the OHWM, the remediation contractor will obtain a Section 404 permit prior to filling.

4.3.4 National Environmental Policy Act Review

As the remediation activities are being conducted by the US CPB, a federal agency, the activities require a review under the National Environmental Policy Act (NEPA). The NEPA process begins when a federal agency develops a proposal to take a major federal action as defined in 40 CFR 1508.18. The environmental review under NEPA can involve the follow levels of analysis:

- **Categorical exclusion (CATEX)** – In accordance with 40 CFR 1508.4, a federal action may be "categorically excluded" from a detailed environmental analysis if the federal action does not, "individually or cumulatively have a significant effect on the human environment". The reason for the exclusion is generally detailed in the NEPA Procedures adopted by each federal agency.

- **Environmental Assessment (EA)** – A federal agency can determine that a CATEX does not apply to a proposed action. The federal agency may then prepare an EA. The EA determines whether or not a federal action has the potential to cause significant environmental effects. Each federal agency has adopted its own NEPA procedures for the preparation of EAs.

- **Environmental Impact Statement (EIS)** – Federal agencies prepare an EIS if a proposed major federal action is determined to significantly affect the quality of the human environment.

Based on correspondence with the US CBP, the US CBP will apply for a CATEX prior to remediation activities. The CATEX will consider potential effects including evaluation of possible historical, biological, and cultural effects. If it is determined that a CATEX does not apply to the remedial actions, the US CBP may then prepare an EA to determine whether a federal action has the potential to cause significant environmental effects. If the remedial actions are determined to significantly affect the quality of the human environment, the US CBP will prepare an EIS. GeoTek assumes the remedial activities will qualify for a CATEX.

4.3.5 Land Disposal Restrictions

According to Resource Conservation and Recovery Act (RCRA) provisions, land disposal includes, but is not limited to, “any placement of such hazardous waste in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, salt bed formation, or underground mine or cave”. Therefore, land disposal restrictions, generally include the “placement” of hazardous waste in a land disposal unit, defined by the RCRA provision. The EPA generally considers the placement in one of the land disposal units to mean the placement of hazardous waste into one of these units, not

movement within a unit. Therefore, in accordance with the EPA's Area of Contamination Policy[2], excavated waste that is potentially hazardous waste for the toxicity characteristic, will remain in the area of contamination until the waste is stabilized and does not meet the definition of a hazardous waste. The excavated material may then be moved and placed in a temporary stockpile area awaiting disposal of the material in a RCRA Subtitle D landfill, as discussed in Section 5.5.

4.3.6 Soil Remediation Levels and Groundwater Protection Levels

Soil remediation will be conducted under the Voluntary Remediation Program Statute (A.R.S. 49-171). The applicable standards for soil remediation are contained in A.R.S. 49-152 and the Arizona Administrative Code (A.A.C.) Title 18, Chapter 7, Article 2). The foreseeable Site use is likely commercial use (food storage). As such, the appropriate remedial goals for Site soils are the ADEQ pre-determined 10^{-5} residential SRLs and the minimum GPLs for the Site COCs.

The ADEQ GPL guidance allows for the calculation of an Alternative GPL using site analytical data. Based on evaluation of data obtained during Site characterization activities, GeoTek calculated an Alternative GPL for lead of 111.6 mg/kg as discussed in Section 2.1.9 of this Work Plan. Because the calculated Alternative GPL is less than the minimum GPL, the minimum GPL of 290 mg/kg will be used as the remediation standard for lead.

Based on a background arsenic investigation performed by HDR in the Site vicinity, the 95 percent upper confidence limit (95% UCL) for arsenic is 7.55 mg/kg and 6.63 mg/kg without a potential outlier. Based on the results of the arsenic background assessment, the likely remediation goal for arsenic will be the residential and non-residential SRL of 10 mg/kg (see Section 3.1.8 for more information).

Following remediation, the remaining soil will contain concentrations of COCs less than their applicable ADEQ pre-determined 10^{-5} residential SRLs and minimum GPLs. Therefore, following remediation the source of contamination related to former operation of the adjacent firing range will not cause or contribute to an exceedance of surface water quality standard or AWQS.

4.4 SCHEDULE

The work will be performed in accordance with the following anticipated schedule:

[2] Memorandum; *Use of the Area of Contamination (AOC) Concept During RCRA Cleanups*; United States Environmental Protection Agency, Office of Solid Waste and Emergency Response; March 13, 1995.

TABLE 4.1
ANTICIPATED REMEDIATION SCHEDULE

Activity	Completion Date
Work Plan Submitted to ADEQ	July 2019
ADEQ Work Plan Approval	September 2019
Site Mobilization	November 2019
Site Remediation Completed	February 2020
Site Remediation Report Submitted to ADEQ	April 2020
NFA Determination Report Submitted to ADEQ	July 2020
ADEQ Review and NFA Determination	October 2020

5.0 SOIL REMEDIATION

5.1 DELINEATION OF REMEDIAL EXCAVATION AREA

In general, the horizontal and vertical extent of soil containing lead above the residential SRL or minimum GPL has been delineated. Based on the cumulative analytical results from the previous Site assessments, GeoTek estimated the approximate depth of excavation of the Site soil necessary to remove soil containing COCs above the residential SRLs or minimum GPLs. The estimated area and depth of soil to be excavated is shown in Figure 13. In general, the remediation area is subdivided into 50-foot by 50-foot grids and 150-foot by 150-foot grids based on historical assessment work conducted at the Site. In addition, one area immediately south of the shooting range was not sampled during assessment activities; therefore, GeoTek estimated the sample depth based on the proximity of the former firing range and the results of lead concentrations in adjacent sample grids.

Prior to remediation, the remediation contractor will calculate the four ordinal locations of each grid (north, south, east, and west) and this data will placed into a Keyhole Markup Language (.kml) file. The .kml file will uploaded to a Global Positioning System (GPS) unit with sub-meter accuracy which will be used to mark the grid locations in the field prior to soil excavation.

5.2 SOIL EXCAVATION AND SCREENING

Prior to excavation, the area will be cleared of potential UXO as described in the HASP. Following UXO clearance, non-protected vegetation will be cleared and grubbed from the Site using an excavator, loader, and/or dozer. The vegetation waste generated during clearing and grubbing operations will be either retained on-Site to be used for mulch for the site restoration activities or removed from the Site using haul trucks and disposed as green waste. The nearest green waste acceptor to the site is Nogales Recycling and Waste Services, located approximately 3.6 miles to the northeast of the Site.

After the vegetation has been removed from the excavation area, a smooth cutting-edge excavator will be used to excavate to the estimated vertical extent of lead impact. Excavated soil will be loaded into haul trucks and transported to the soil processing area, the approximate location is shown on Figure 14. The soil processing zone will cover approximately 1.25 acres and will consist of an initial stockpile area, screening plant, soil stabilization area, and stabilized soil stockpile area.

About 1,000 tons per day of soil is expected to be excavated and stockpiled in the initial stockpile zone, and about 500 tons per day of soil is expected to be processed through the screening plant. Unprocessed soil from the stockpile area will be transported to the screening plant via loaders. The loaders will deposit unprocessed soil from the initial

stockpile area into the screening plant hopper, and soil will be conveyed to a 1-inch screen. Material that does not pass the 1-inch mesh (+1-inch material), primarily larger rocks and vegetation, will be conveyed from the screening plant and stockpiled (+1-inch stockpile). Material passing through the 1-inch screen (-1-inch material) will be conveyed to a second, ¼-inch screen. Material that does not pass through the ¼-inch screen (+¼-inch) will likely consist of bullet fragments, vegetation, and gravel. The +¼-inch material will be conveyed out of the screening plant to a separate stockpile pending further treatment (-1-inch to +¼-inch stockpile). Finally, the soil that passes through the 1/4-inch mesh (-1/4-inch) will be the fine impacted soil that will likely need to be stabilized to render the soil as non-hazardous waste. This-¼-inch material will be conveyed to a separate stockpile pending further treatment (-¼-inch stockpile).

The three distinct material stockpiles generated from the screening plant will be further handled in the following manner:

- **+1-inch Stockpile Material.** The material will be stockpiled on Site or will be used to backfill excavated areas following confirmation that excavated areas do not contain COCs in concentrations greater than the residential SRLs or minimum GPLs. This material will be free of lead fragments, will not contain soil containing lead in excess of residential SRLs or minimum GPLs, and will not be classified as a hazardous waste.

- **-1-inch to +¼-inch Stockpile Material.** The material from this stockpile will be spread over traffic-rated steel plates, a concrete pad built specifically for this project, or other hard surface. A super vacuum will be used to remove lighter-density vegetation, rocks, or other materials from the bullet fragments. Bullet fragments will remain on the steel plate or concrete pad due to the higher density of the lead fragments. The super vacuum suction rate and intensity will be adjusted to optimize the amount of removal of lighter density material, while leaving the heavier bullets fragments on the steel plates or concrete pad. Once the separation process is complete, the bullet fragments will be collected in 55-gallon drums and transported to a non-ferrous scrap metal yard such as Tucson Iron and Metal located 65 miles north of the Site. Samples of the lighter density material that was collected by the super vacuum will be analyzed to evaluate whether the material is hazardous waste due to the presence of lead following the procedures outlined in Section 3.1.2 of the SAP. The material will also be analyzed to verify the COC concentrations are less than the residential SRLs and minimum GPLs. Material that is shown to be non-hazardous and contains COCs in concentrations less than the residential SRLs and minimum GPLs will be stockpiled on Site or will be used to backfill excavated areas. Material that is shown to be a hazardous waste will be added to the -¼-inch stockpile and further treated as described below.

- **-¼-inch Stockpile Material.** The material in this stockpile will be analyzed to evaluate whether the material is classified as a hazardous waste for the lead characteristic and to verify that COCs are not present in the soil in concentrations greater than the

residential SRLs or minimum GPLs following the procedures outlined in Section 3.1.3 of the SAP. Soil that contains lead in a concentration greater than the hazardous waste characteristic for lead based on TCLP analysis will be stabilized using the procedures outlined in Section 5.3.

Based on previous Site assessments, an estimated 19,630 cubic yards of soil is expected to be excavated from the Site. Using the screening data described in Section 3.1.9 of this VRP Work Plan, the size and weight distribution of excavated soil will be:

TABLE 5.1
STOCKPILE VOLUME APPROXIMATION

Remediation Screen Size	Remediation Screen Distribution	Stockpile Volume (cubic yards)
+1-inch Stockpile Material	10%	1,930
-1-inch to +¼-inch Stockpile Material	21%	4,124
-¼-inch Stockpile Material	69%	13,546

5.3 SOIL STABILIZATION

Material requiring stabilization using the ECOBOND® additive will be transported from the screening plant area to the stabilization area via a loader equipped with a bucket scale. Approximately 100 tons will be stabilized in one batch with the appropriate amount of ECOBOND® additive, which is presumed to be about 5% by weight based on bench-scale testing. The appropriate amount of ECOBOND® additive will be added to the approximate 100-ton stockpiles and thoroughly mixed using an excavator, loader, and/or mixer.

Stabilized soil will be characterized based on the procedures outlined in Section 2.2.2 of the SAP to ensure that stabilized soil is not classified as a hazardous waste prior to removal from the area of contamination. Stabilized soil will be transported to Los Reales Landfill, a Subtitle D landfill in Tucson, and disposed as a non-hazardous waste. Transportation and disposal will be conducted in the manner described in Section 5.6 of this VRP Work Plan.

5.4 WASTE CHARACTERIZATION SAMPLING

Material containing concentration of the Site COCs above their respective residential SRLs, minimum GPLs, and/or displaying the hazardous waste characteristic of toxicity will be excavated and transported off-Site for disposal. Prior to removal of the material from the area of contamination, waste characterization samples will be collected to ensure the material is non-hazardous. Waste characterization samples will be collected and analyzed as described in Section 5.1.3 of the SAP.

5.5 NON-HAZARDOUS SOIL TEMPORARY STOCKPILE AREA

Due to Site terrain limiting the processing area, material that will be disposed off-Site will likely be transported to a stockpile area located off-Site that is owned by one of the Site owners for temporary stockpiling pending off-Site disposal. This area is shown on Figure 15. Prior to placement in the stockpile area, the material will be sampled and confirmed to be non-hazardous as discussed in Section 5.4 and the SAP. The temporary stockpile area will be lined with plastic sheeting and/or a concrete pad. The temporary stockpile area will also be surrounded by a soil berm and/or straw waddles to limit run-off and run-on to the stockpile area. In addition, the remediation contractor will ensure there is a visible crust maintained on the temporary stockpiles to mitigate potential airborne migration of dust and the Site COCs.

Due to the steep and unstable terrain of the access roads, the material will be transported to the stockpile area using end dump trucks and placed into the stockpile area. The material will be temporarily stockpiled in the area until placed into trucks that will transport the material to Los Reales Landfill, in Tucson, Arizona. The temporary stockpile area will be sub-divided into Decision Units and sampled using the methodology described in Section 5.5 of this VRP Work Plan and Section 3.1.3 of the SAP to ensure soil below the temporary stockpile area does not contain concentrations of the Site COCs above their respective SRLs or minimum GPLs. The approximate location of the temporary stockpile area is shown on Figure 15.

5.6 TRANSPORTATION AND DISPOSAL PLAN

Material containing concentrations of the Site COCs above their respective residential SRLs or minimum GPLs will be profiled for acceptance at the Los Reales Landfill in Tucson following the procedures outlined in Section 5.5 of this VRP Work Plan and Section 3.1.3 of the SAP. Once the waste is profiled and approved by the landfill, Non-Hazardous Waste Manifests will be prepared to document transportation and disposal of the stabilized soil. Manifests will have a unique serial number associated with the truck transporting the soil for disposal and will accompany each truck from the Site to the disposal landfill. Each manifest will be signed by the US CBP or the remediation contractor acting as an agent for the US CBP. Manifests signed by the generator or authorized representative, transporter, and disposal facility will be retained and copies will be included with the Site Remediation Report.

Landfill disposal records documenting the disposal date, disposal time, and disposal weight will be collected by the transporter and returned to the remediation contractor and copies will be included with the Site Remediation Report.

5.7 EXCAVATED AREA ASSESSMENT

The excavation area and adjacent areas will be assessed to verify that soil left in place after the completion of remediation activities does not contain COCs in concentrations above residential SRLs or minimum GPLs. The remediation contractor will compare organic and inorganic COCs to established minimum GPLs to further demonstrate that residual soil will be protective of groundwater. Minimum GPLs have been established by ADEQ for select organic and inorganic compounds and represent residual soil contaminant concentration that could cause, or threaten to cause, contamination of groundwater. Residential SRLs and minimum GPLs for compounds that will be evaluated by US CBP are listed in the SAP. The more conservative standard (either residential SRL or minimum GPL) will be used for decision-making associated with the request for NFA determination. Only COCs with an established SRLs and/or minimum GPL will be included in the request for an NFA determination.

Soil assessment will be conducted using an incremental sampling approach by collecting an incremental sample within each ¼-acre excavated area as shown on Figure 16. The procedures used to collect the soil samples are outlined in Section 3.1.1 of the SAP in Appendix B of this Work Plan. In addition, quality assurance/quality control (QA/QC) samples will be collected as described in the SAP and Quality Assurance Project Plan (QAPP) in Appendix C of this Work Plan.

5.8 SITE RESTORATION

Following remediation, the remediation contractor will stabilize the disturbed areas of the Site. Stabilization of the disturbed areas and slopes will be performed in accordance with the SWPPP and the Construction General Permit. GeoTek assumes the disturbed areas will be stabilized using a combination of installation of gravel and oversized material generated during excavation and revegetation. In general, the gravel and oversized material will be from the +1-inch Stockpile Material and/or the -1-inch to +¼-inch that has been determined to be non-hazardous and contain COCs in concentrations less than the residential SRLs and minimum GPLs. Portions of the Site may be revegetated using hydroseeding. The disturbed areas of the Site that will be revegetated using hydroseeding will be revegetated with a density of 70% of the native background vegetative cover on unpaved areas and areas not covered by permanent structures. The remediation contractor will conduct post-remediation monitoring until the Site has been adequately stabilized in accordance with the Construction General Permit.

6.0 DOCUMENTS AND REPORTING REQUIREMENTS

6.1 WORK PLAN DISTRIBUTION

US CBP is responsible for ensuring that each project member has access to the most current version of the project Work Plan, including all subsequent addenda or revisions.

6.2 FIELD OPERATION RECORDS

Field notes will be kept in bound field logbooks. Logbooks will be used to record pertinent field activity information. A field logbook will be dedicated to this project and will not be used for other projects. Documentation in the field logbook will be sufficient to reconstruct the field activities situation without relying on the memories of the field team members. Information recorded at the beginning of the day will include, but not be limited to the following:

- Project name
- Date and time
- Name and signature of field personnel entering information on each respective page
- Weather conditions
- Names of personnel on site, including subcontractors and site visitors
- Health and safety information, including Personal Protective Equipment (PPE) level
- Field calibration information
- GPS coordinates, including datum and accuracy

Information recorded during each sampling point will include, as applicable, but not be limited to the following:

- Sampling location (sampling point identification)
- Sample identification
- Sample depth
- Sample media
- Description of sample
- Chemical analysis requested, sample container, and preservative
- Any modifications to the sampling plan
- Sampling observations (if applicable)
- Field equipment readings
- QA/QC samples collected
- Field sketches, when appropriate

Entries will, be made in blue or black indelible ink and no erasures will be allowed. If an incorrect entry is made, the information will be crossed out with a single strike mark and the change initialed and dated by the team member making the logbook change. Each page

in the field logbook will be signed and dated at the bottom of the page by any team member making entries on the page.

The field logbooks will be identified on the cover by the project name, project number, and logbook number. The logbooks will be stored in the field project files when not in use. At completion of the field activities, the original field logbooks will be retained in the project file.

6.3 RECORDS DISPOSITION

All project files and records will be stored on site until the Site Remediation Report has been approved by US CBP. The project files will then be moved to a storage facility identified by US CBP for permanent storage.

The analytical laboratory will store the original hardcopy and electronic raw data of the analytical data packages produced for this project for 5 years. The level of information regarding sample analyses (calibration records, run logs, etc.) will be such that the analytical processes can be reconstructed within that time.

6.4 SITE REMEDIATION REPORT PREPARATION

A final report will be prepared within 90 days following receipt of analytical laboratory results. The report will summarize sampling and analysis activities, and evaluate generated data in comparison to applicable regulatory requirements, primarily residential SRLs and minimum GPLs. The final report will contain results, data, and sampling description necessary to assess the accuracy, completeness, and representativeness of the reported analytical results. The report will specify the type of sample (blank, waste, etc.), sampling date, sampling location, analytical method, method detection limit, and analytical result. The report will detail the amount and type of material removed, extent of excavation, final disposition of materials, and rationale for a request for a NFA determination for soil and groundwater from ADEQ. The report will be sealed by a Professional Engineer or Registered Geologist registered in the State of Arizona.

6.5 NFA REQUEST REPORT

Following ADEQ approval of the Site Remediation Report, the remediation contractor, on behalf of the US CBP, will prepare a report to request a NFA determination for soils and groundwater for the COCs at the Site. The report will illustrate the boundaries of the Site for which the NFA determination is being sought and will be prepared pursuant to A.R.S. § 49-181, which specifies requirements for the content of the report. The report will provide information in response to the specific requirements of § 49-181 (A)(1), § 49-181 (A)(2), § 49-181 (A)(3), § 49-181 (A)(4), § 49-181 (A)(5), § 49-181 (A)(6), § 49-181 (A)(7).

7.0 COMMUNITY INVOLVEMENT

Community Involvement activities will be conducted by US CBP in accordance with the requirements of ARS 49-173. Remediation will be conducted to obtain a NFA determination based on remediating the site such that remaining soil contains COCs in concentrations less than the residential SRLs and GPLs and is expected to take more than 180 days to complete. Therefore, the requirements of ARS 49-176(2) apply.

The Site owners will be notified of remediation activities via electronic mail. In addition, the US CBP will notify the surrounding community of the planned remediation activities by posting an informational sign. The informational sign notifying the public that remediation of the Site is occurring under the oversight of ADEQ's VRP will be posted near the northern entrance of the Site and adjacent to West La Quinta Road, near the temporary stockpile area shown of Figure 15. The sign will include contact information for ADEQ and US CBP. The sign will be installed at least 10 days prior to initiating site remediation. An example of the community involvement sign is provided in Appendix D.

In addition, US CBP will establish a document repository accessible to the public where information regarding the site and the remediation is available for review. The repository site will be at a location mutually-agreed upon by US CBP and ADEQ and will be accessible during normal business hours or by appointment.

Upon submittal of the request for a NFA determination from ADEQ, US CBP will provide general notice of the request to the public, make the Site Remediation Report available to the public, and provide opportunity for comment for 45 days. US CBP will conduct a public meeting prior if warranted by public response and if requested by ADEQ.

FIGURES

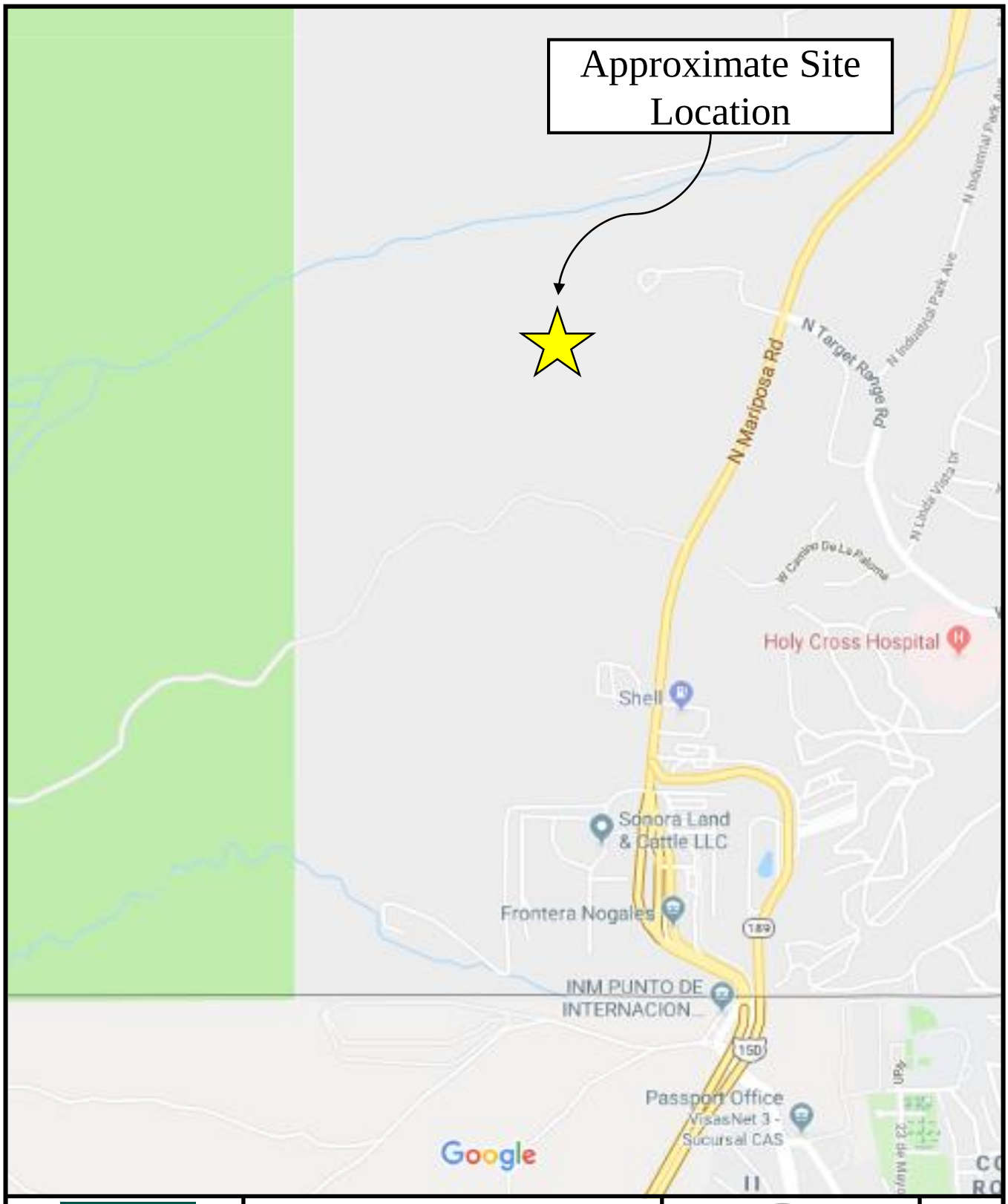

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Figure 1
Site Vicinity Map

VRP Work Plan
Properties Adjacent to Former U.S. CBP Small Arms Firing Range, Nogales, Arizona
VRP Site Code: 513182-00

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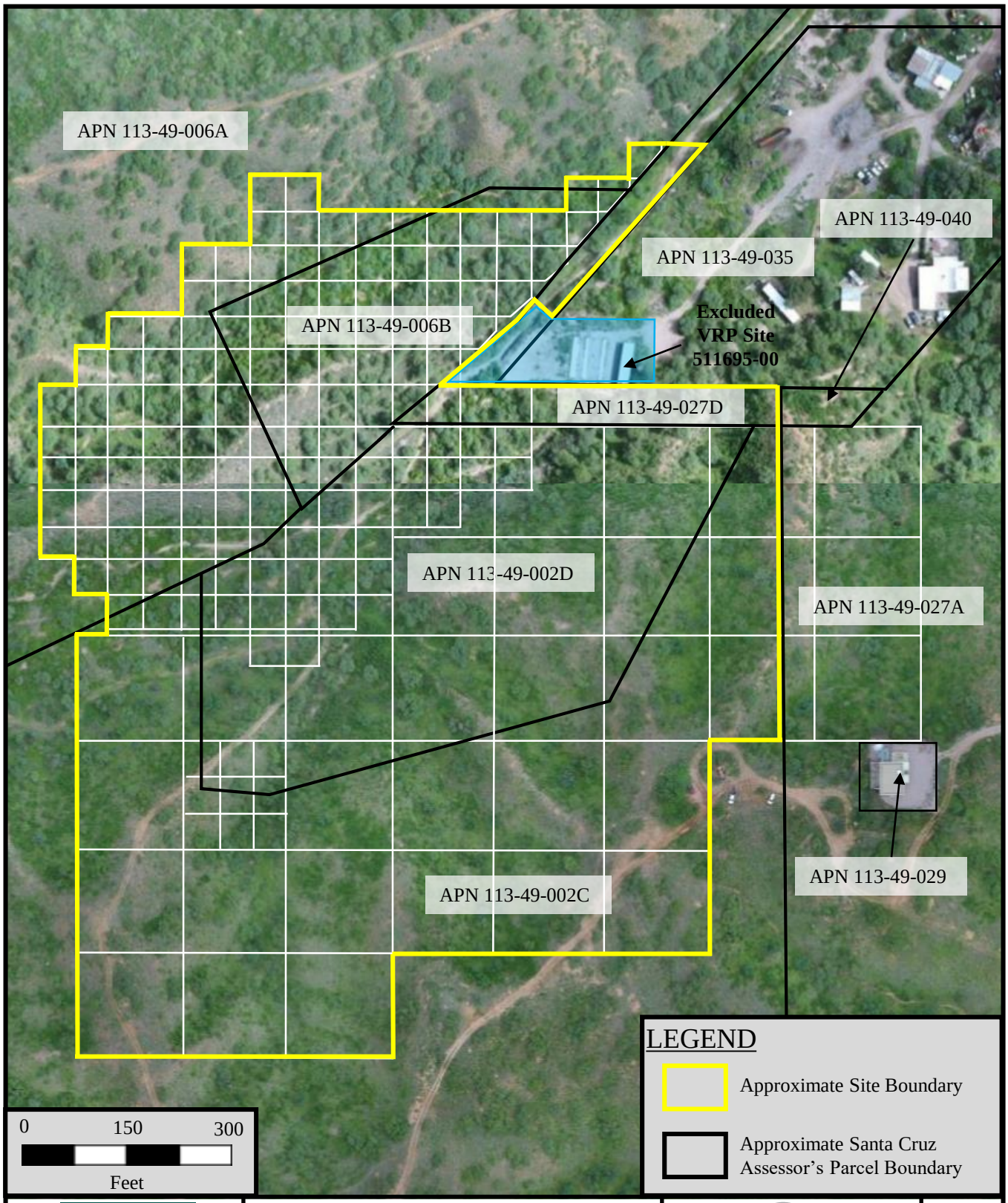

Figure 2
Parcel Map and Site Boundary

VRP Work Plan
Properties Adjacent to Former U.S. CBP Small Arms Firing Range, Nogales, Arizona
VRP Site Code: 513182-00

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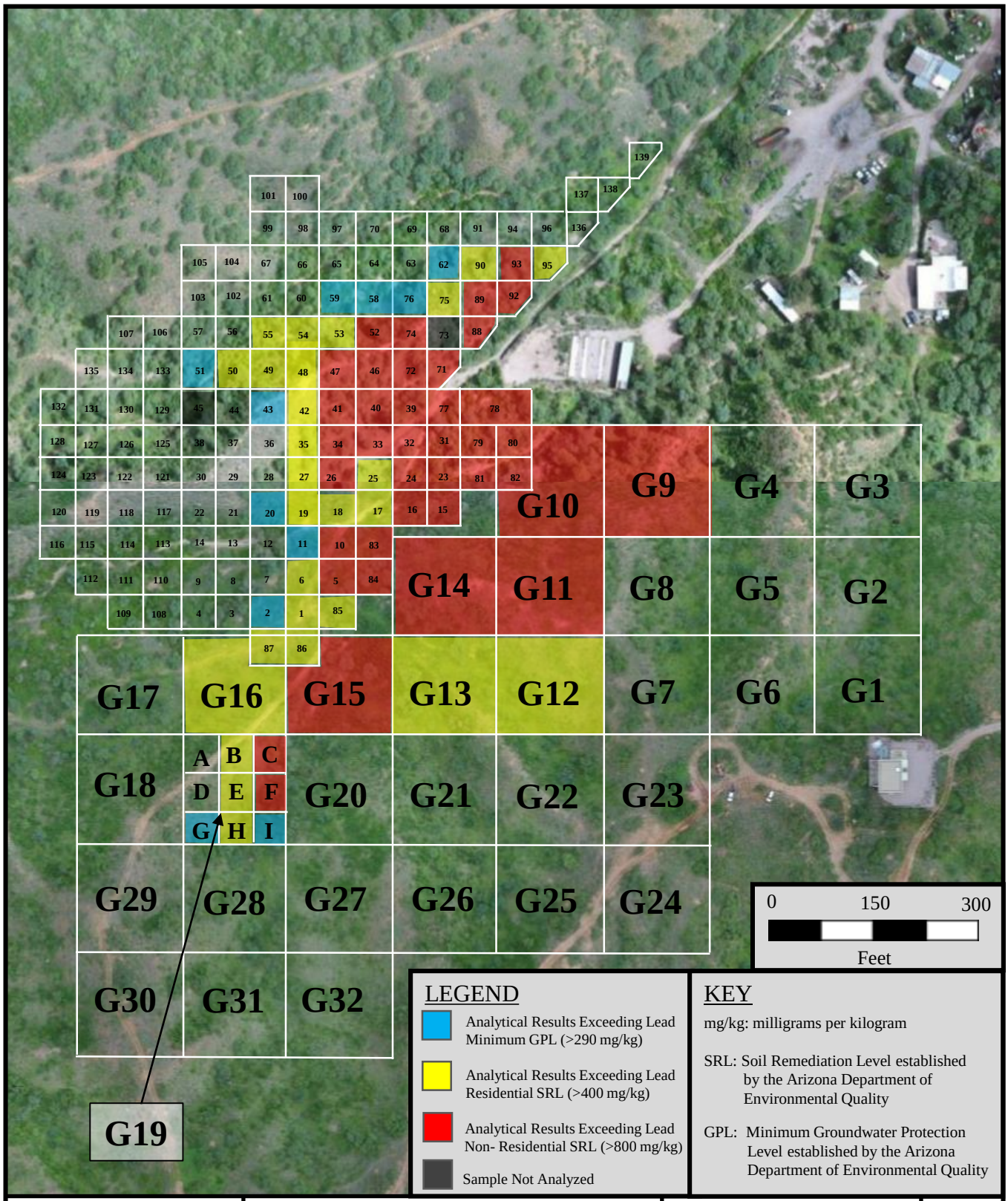

LEGEND

- Analytical Results Exceeding Lead Minimum GPL (>290 mg/kg)
- Analytical Results Exceeding Lead Residential SRL (>400 mg/kg)
- Analytical Results Exceeding Lead Non- Residential SRL (>800 mg/kg)
- Sample Not Analyzed

KEY

mg/kg: milligrams per kilogram

SRL: Soil Remediation Level established by the Arizona Department of Environmental Quality

GPL: Minimum Groundwater Protection Level established by the Arizona Department of Environmental Quality

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Figure 3
Surface Samples Containing Lead Exceeding Minimum GPLs or SRLs

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VRP Site Code: 513182-00

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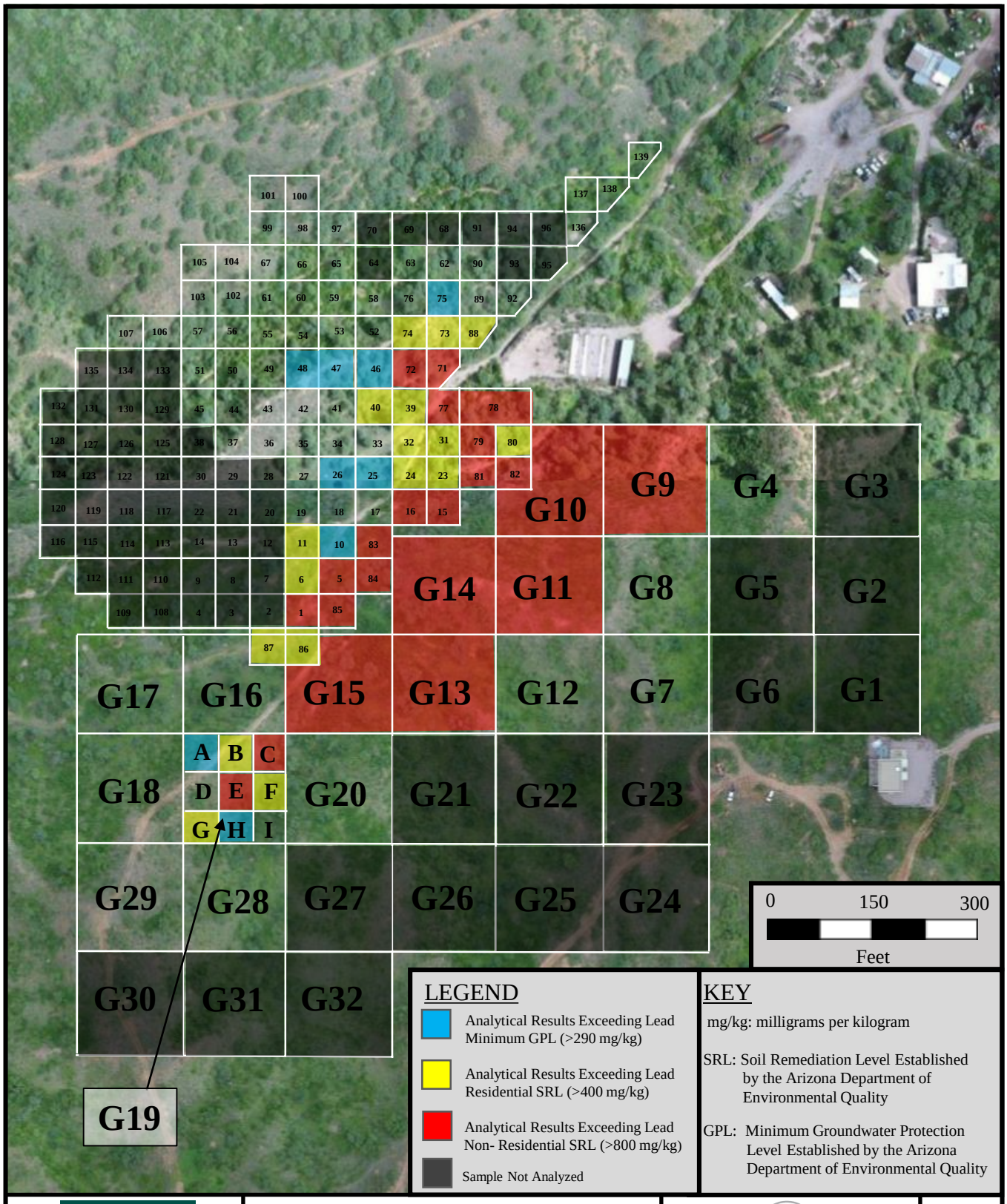

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Figure 4
Subsurface Samples Containing Lead Exceeding Minimum GPLs or SRLs

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Figure 5
Background Sample Location

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Properties Adjacent to Former U.S. CBP Small Arms Firing Range, Nogales, Arizona
VRP Site Code: 513182-00

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Figure 6
Berm Sample Locations

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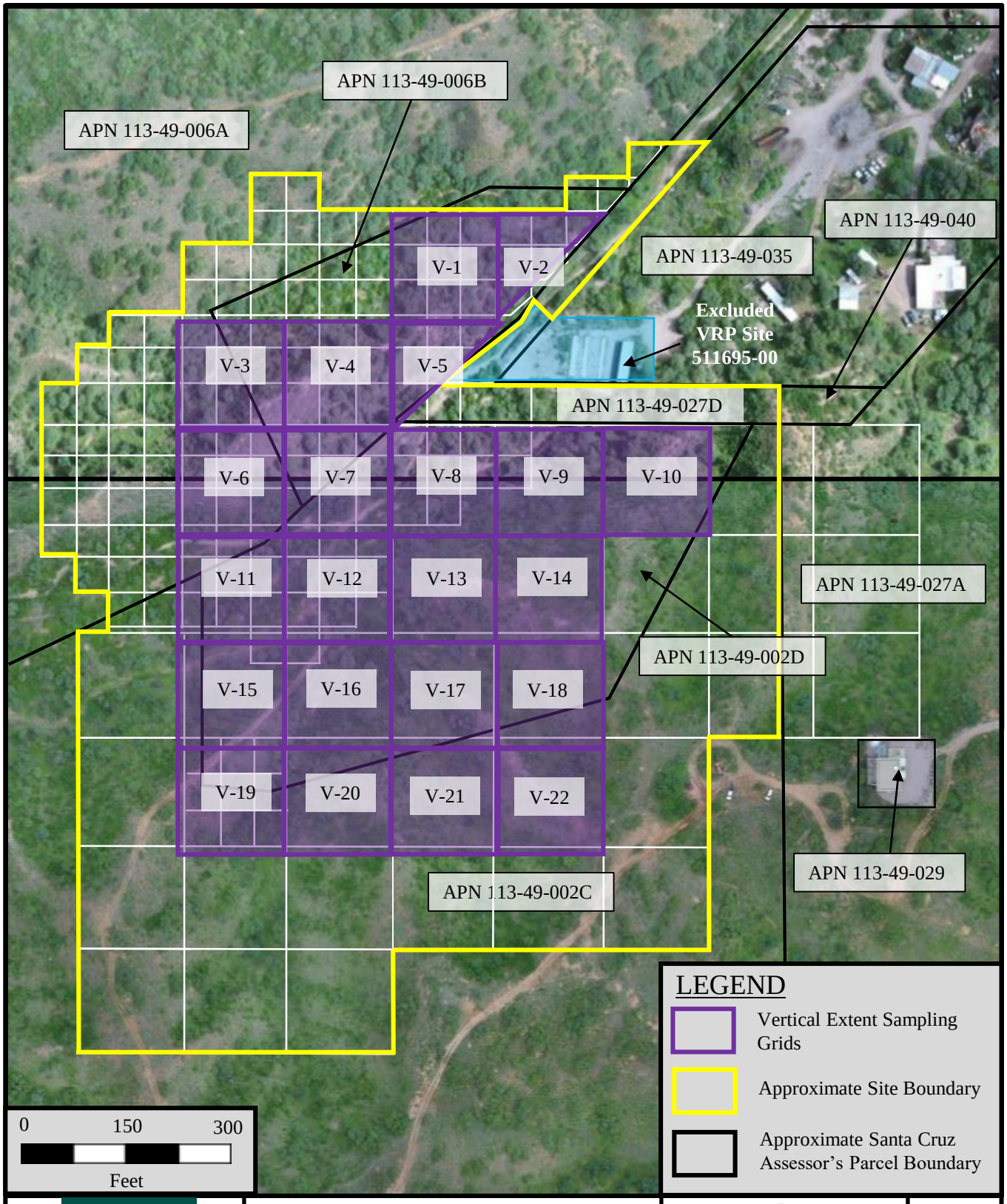

Figure 7
Vertical Extent Soil Sampling Grid Locations

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Properties Adjacent to Former U.S. CBP Small Arms Firing Range, Nogales, Arizona
VRP Site Code: 513182-00

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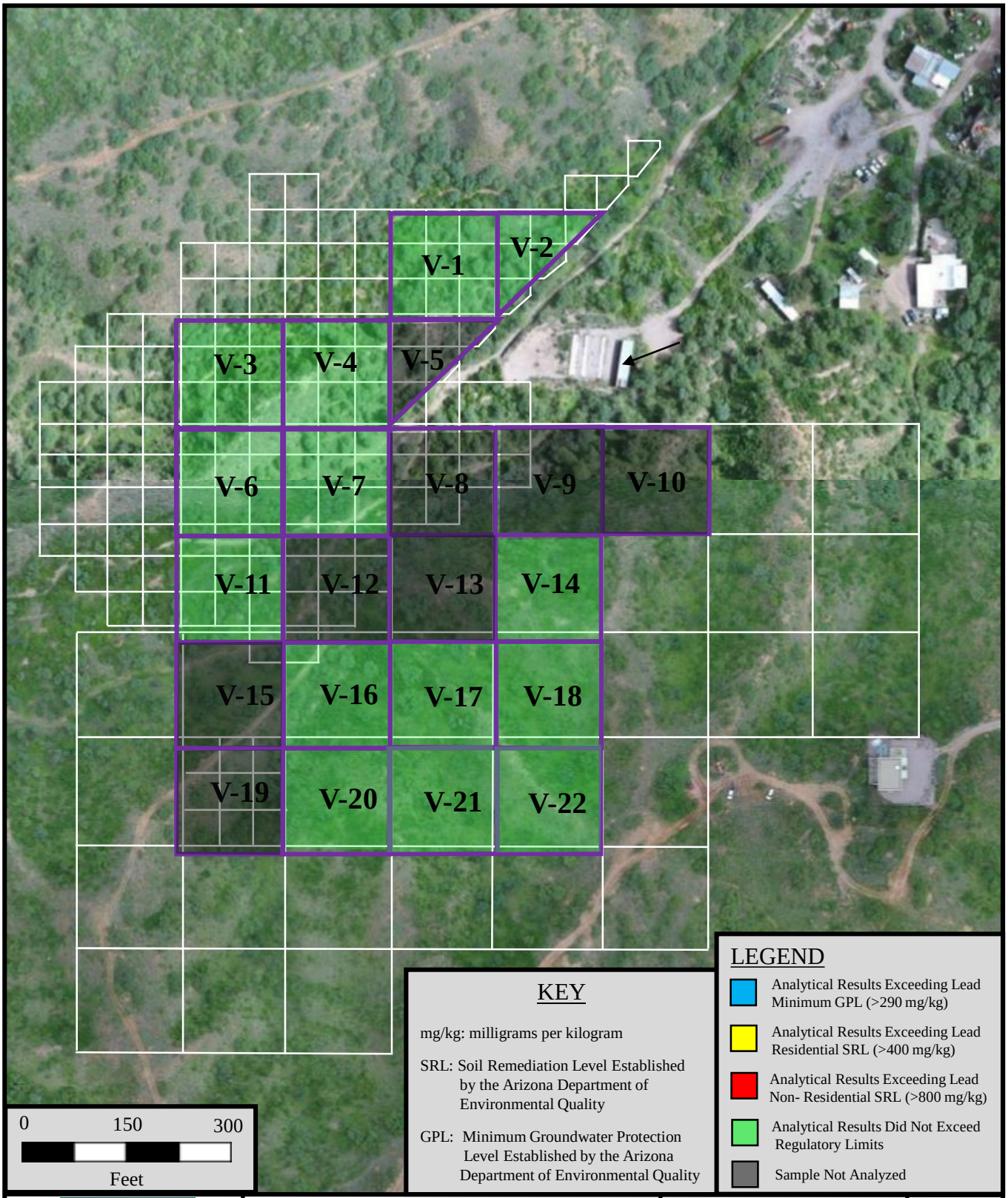

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Figure 8
12-Inch Vertical Extent Sample Locations

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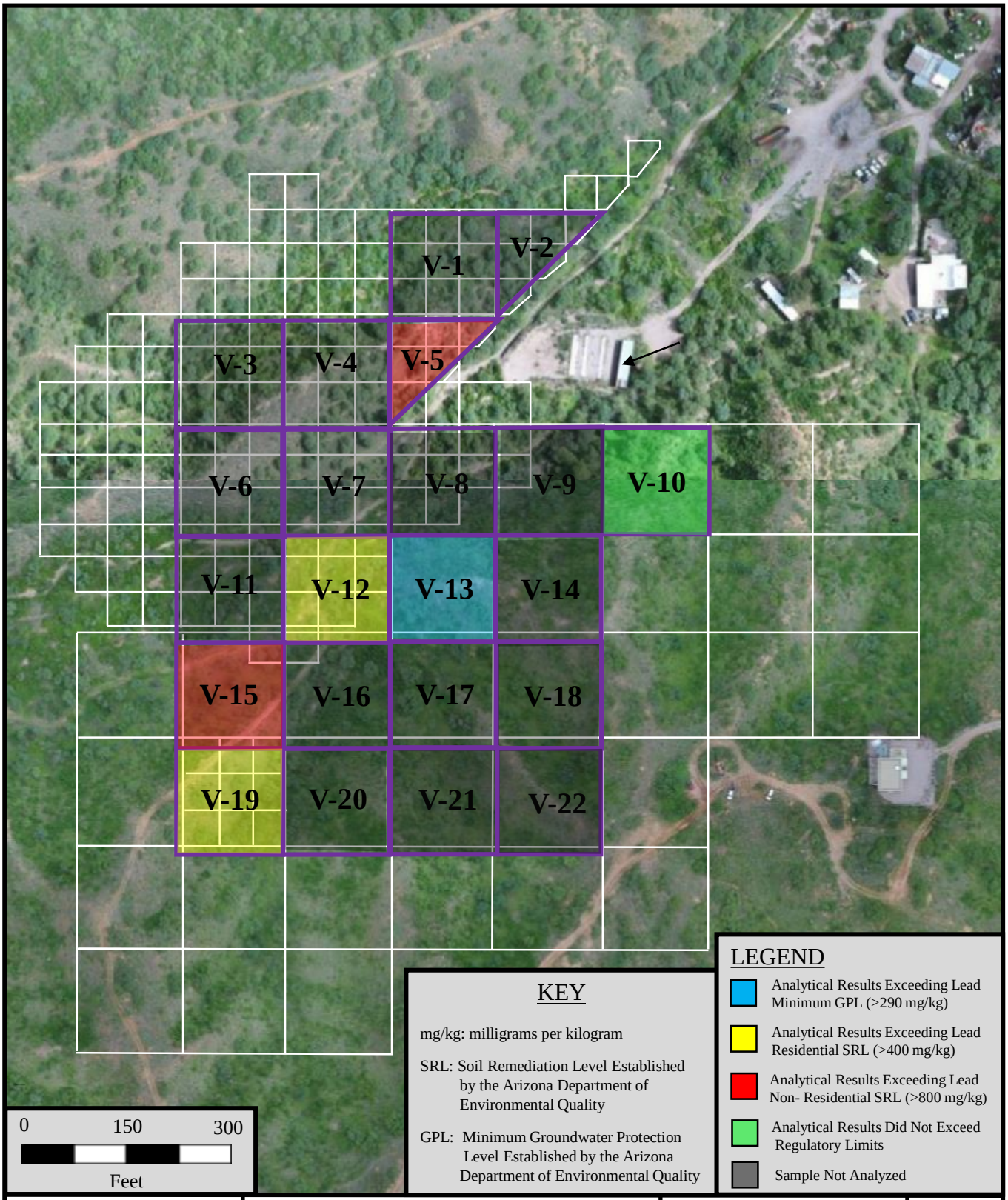

Figure 9
24-Inch Vertical Extent Sample Locations

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Properties Adjacent to Former U.S. CBP Small Arms Firing Range, Nogales, Arizona
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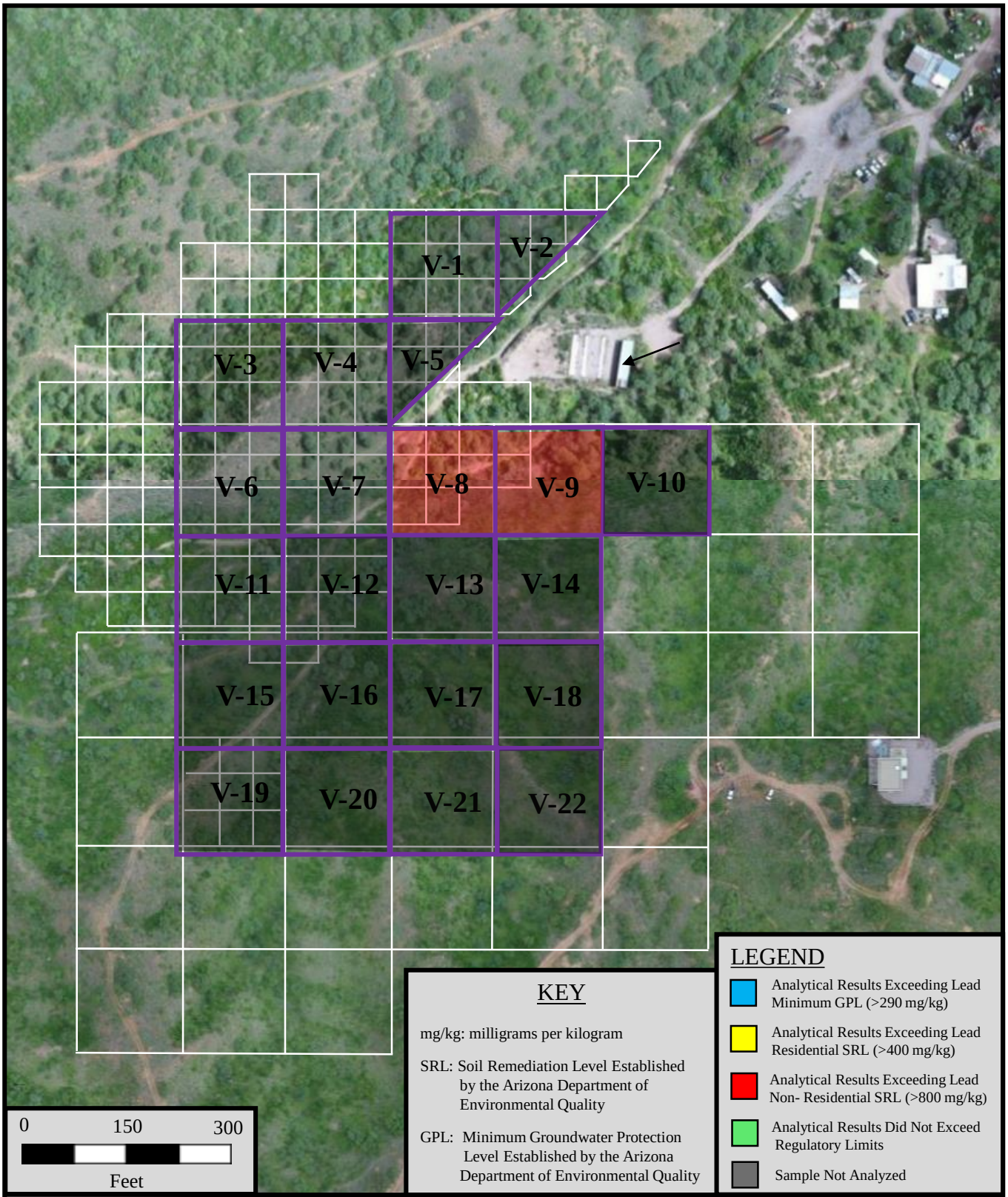

Figure 10
30-Inch Vertical Extent Sample Locations

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Properties Adjacent to Former U.S. CBP Small Arms Firing Range, Nogales, Arizona
VRP Site Code: 513182-00

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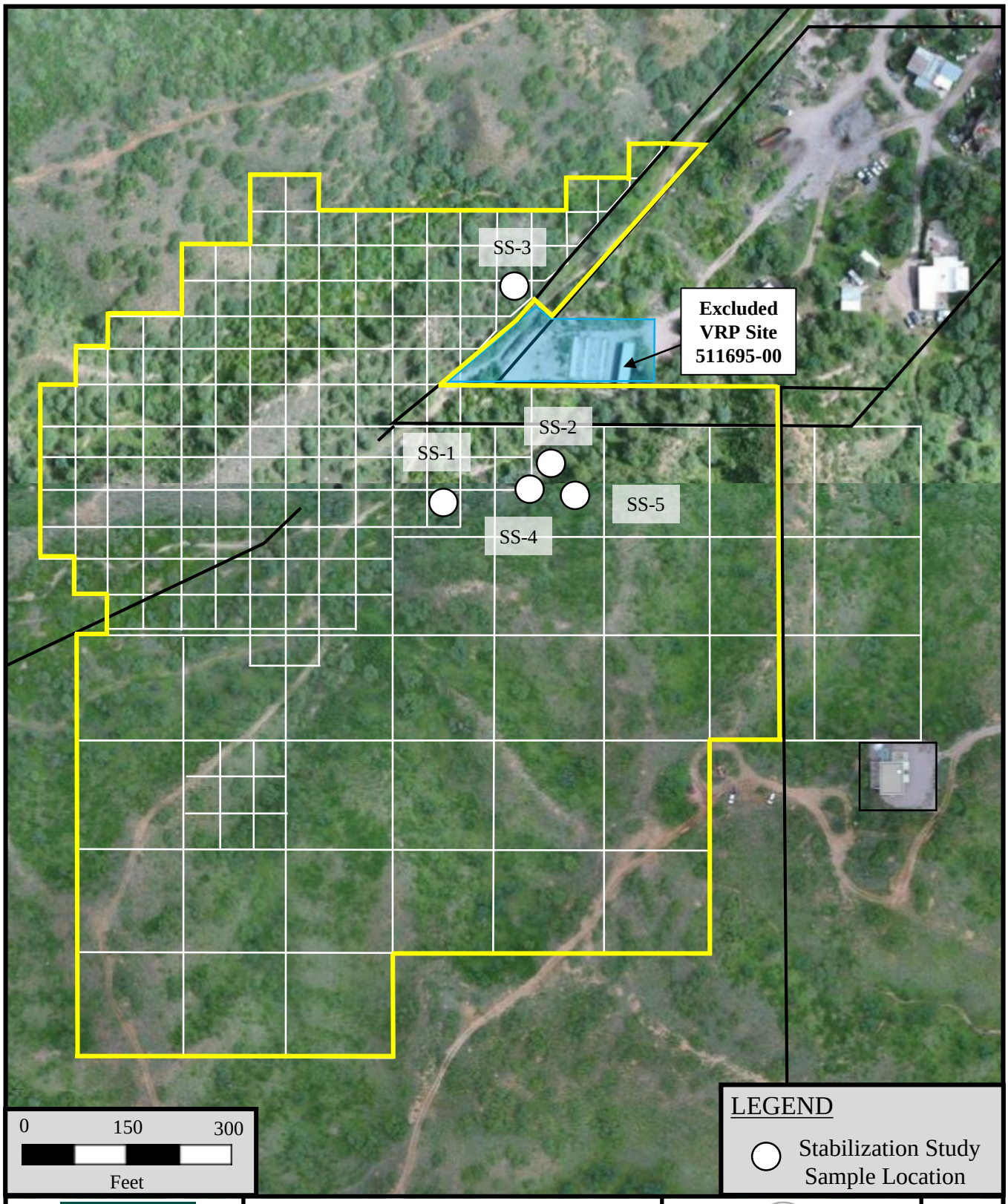

Figure 11
Stabilization Study Sample Locations

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Properties Adjacent to Former U.S. CBP Small Arms Firing Range, Nogales, Arizona
VRP Site Code: 513182-00

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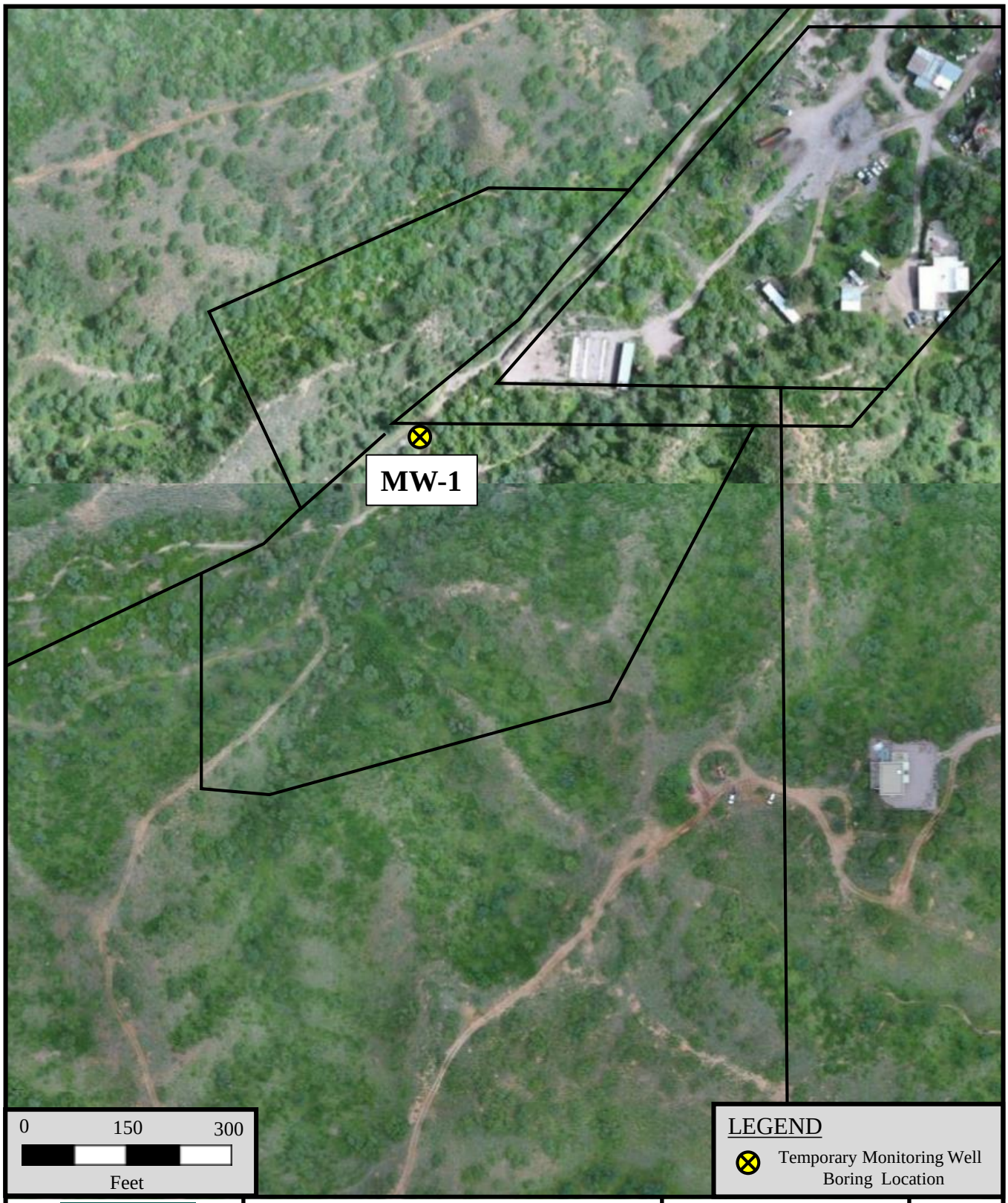

Figure 12
Groundwater Monitoring Well Boring Location

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Properties Adjacent to Former U.S. CBP Small Arms Firing Range, Nogales, Arizona
VRP Site Code: 513182-00

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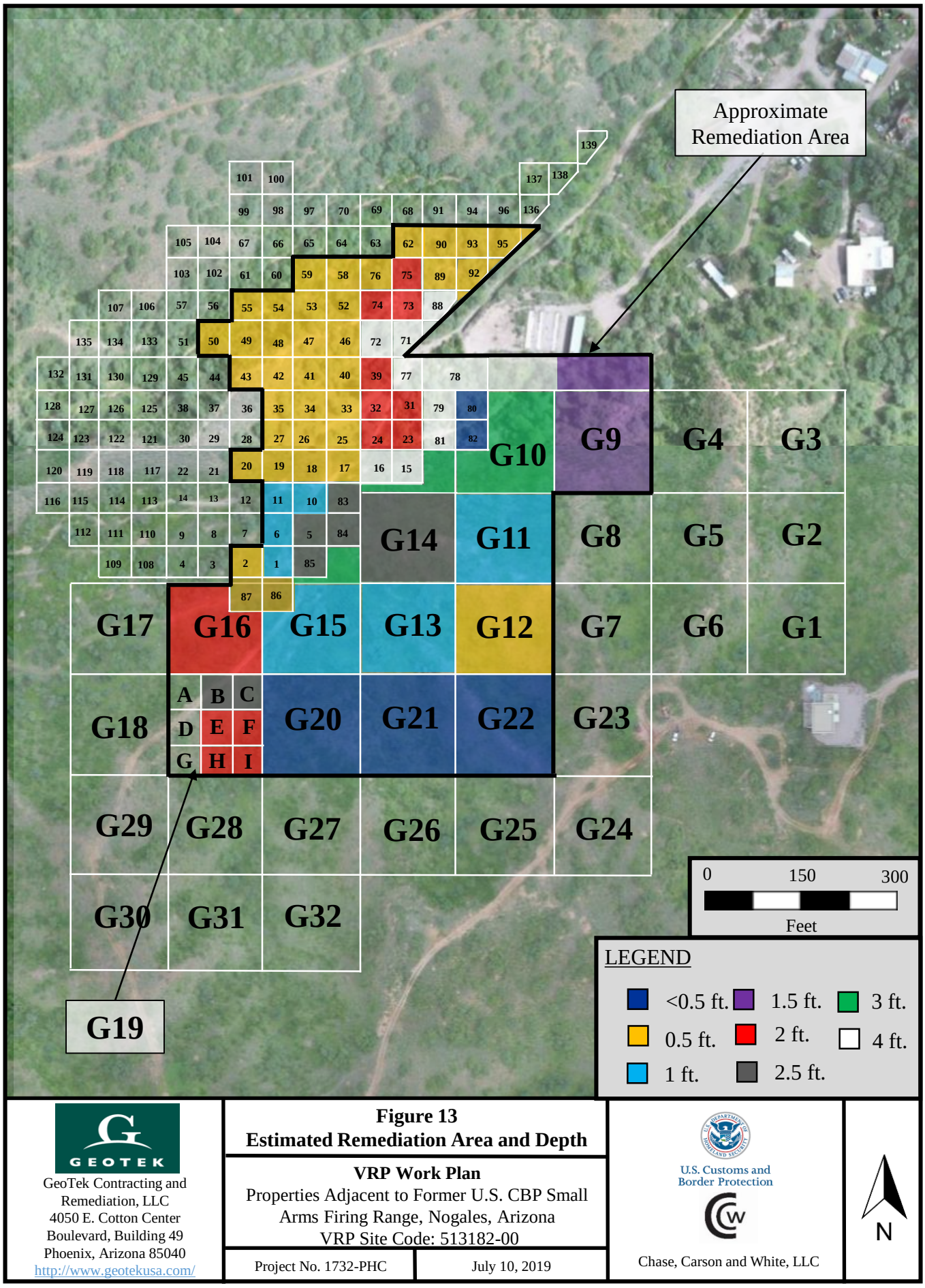

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Figure 13
Estimated Remediation Area and Depth

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VRP Site Code: 513182-00

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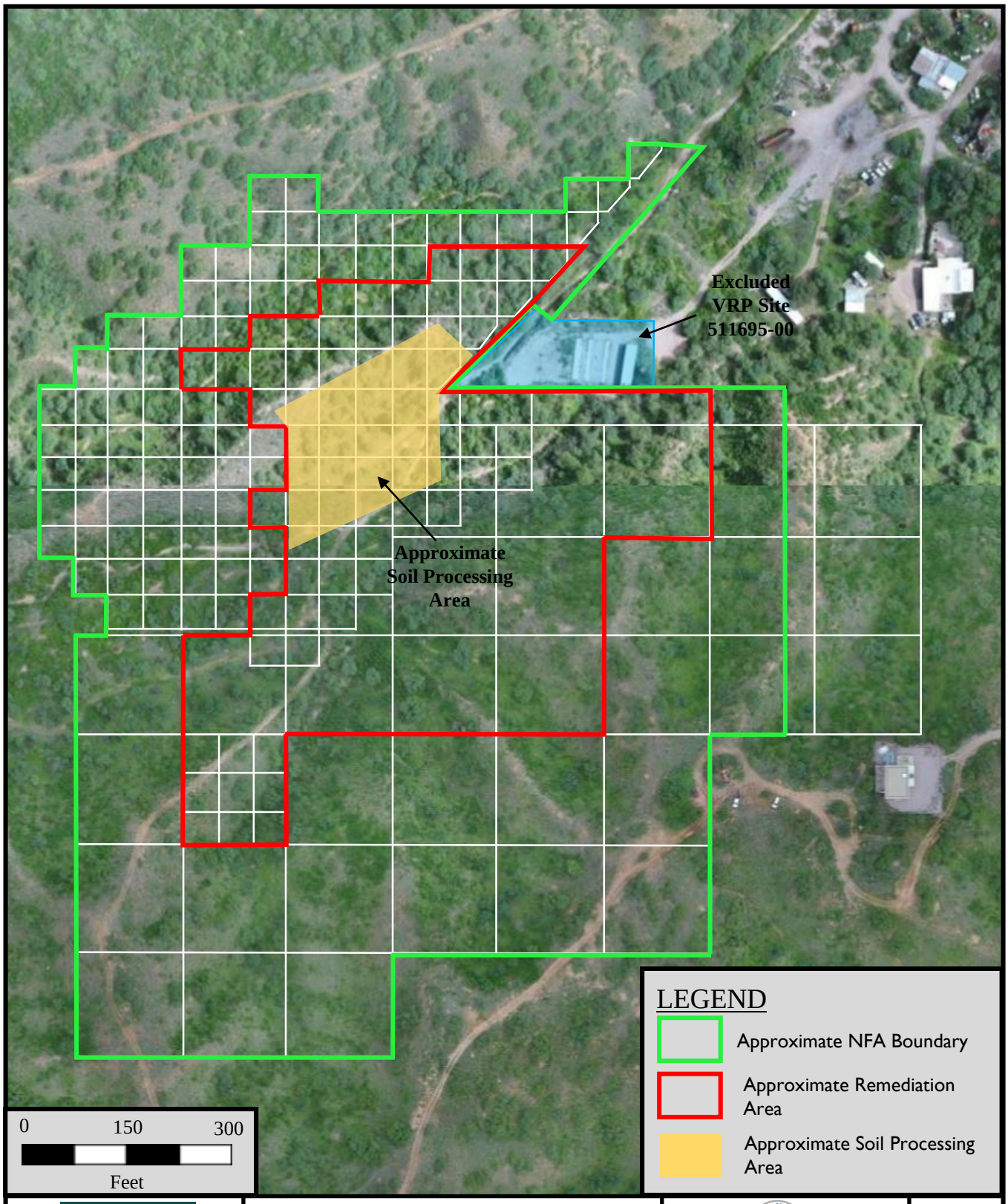

Figure 14
Approximate Processing Area Location

VRP Work Plan
Properties Adjacent to Former U.S. CBP Small Arms Firing Range, Nogales, Arizona
VRP Site Code: 513182-00

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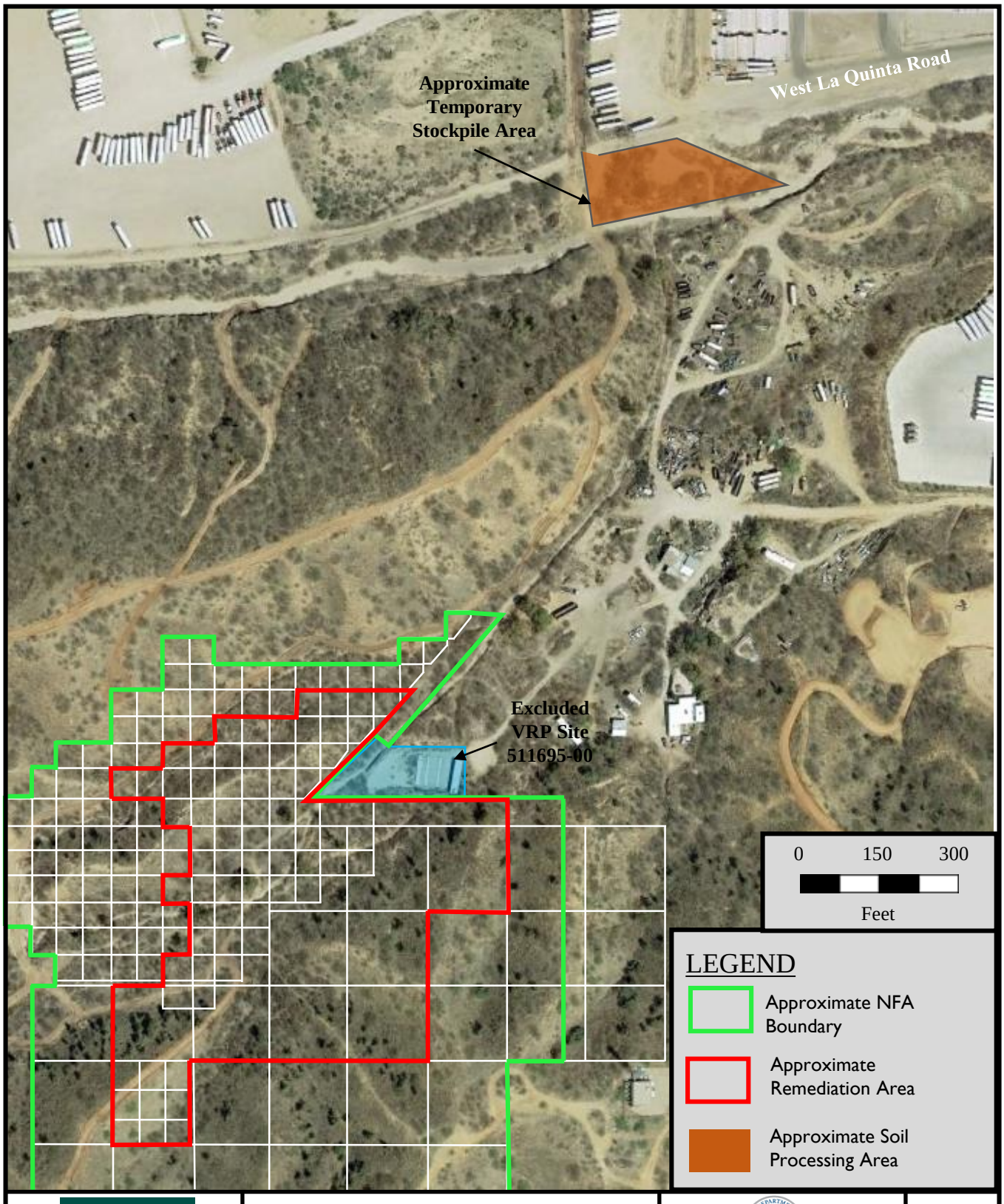

Figure 15
Approximate Temporary Stockpile Area

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VRP Site Code: 513182-00

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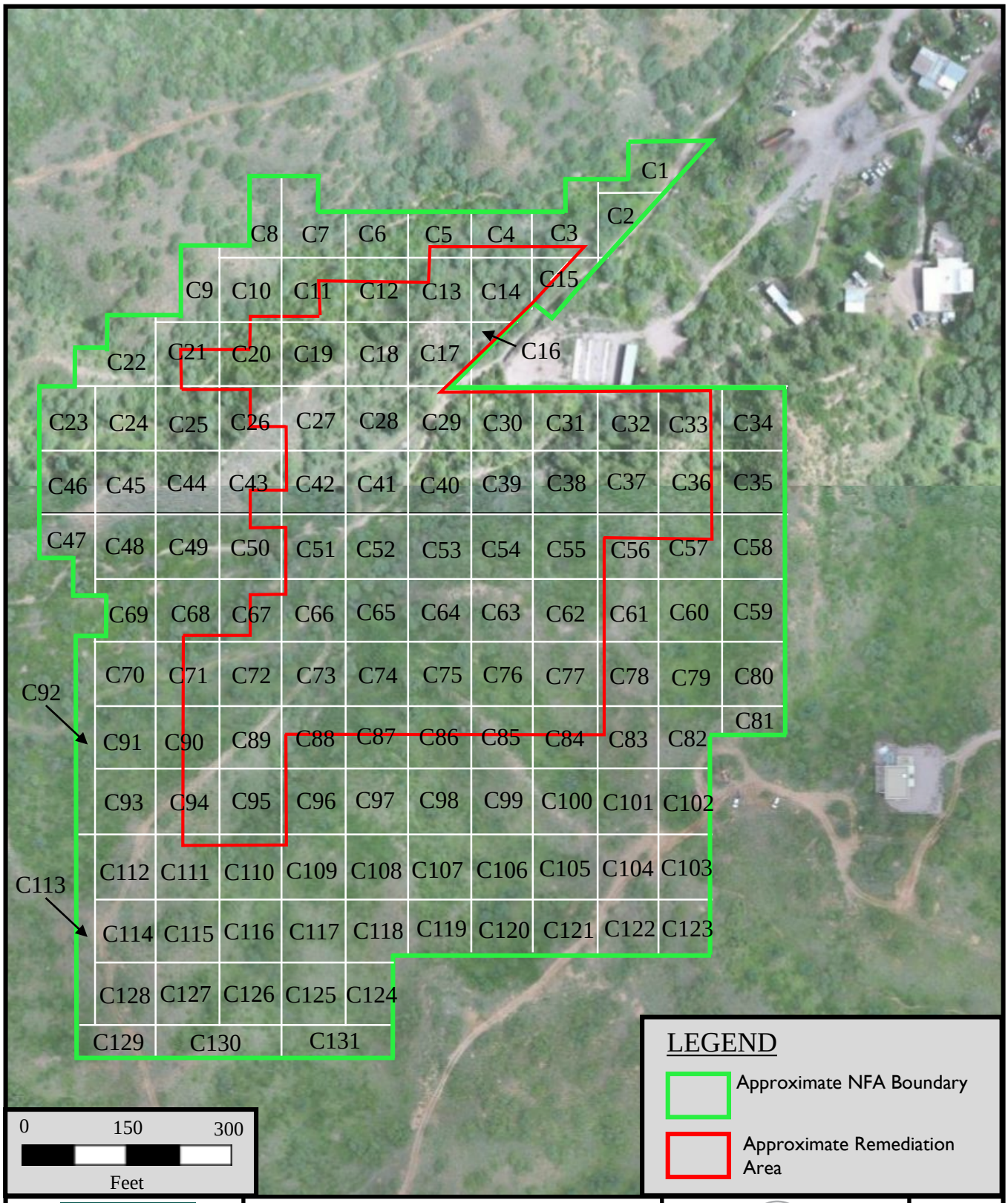

Figure 16
¼-Acre Decision Unit Locations

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Properties Adjacent to Former U.S. CBP Small Arms Firing Range, Nogales, Arizona
VRP Site Code: 513182-00

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TABLES

TABLE 3.1
SAMPLE INFORMATION – ENVIRONMENTAL SITE ASSESSMENTS

Sample Number	Depth in inches (bgs)	Sample Location	Collection Date	Laboratory Analysis
Allwyn Environmental 2009 Surface Samples				
1S	0-1	Cell 1	10/29/2009	Lead, Arsenic, Antimony
2S	0-1	Cell 2	10/29/2009	Lead, Arsenic, Antimony
3S	0-1	Cell 3	10/29/2009	Lead, Arsenic, Antimony
4S	0-1	Cell 4	10/29/2009	Lead, Arsenic, Antimony
5S	0-1	Cell 5	10/29/2009	Lead, Arsenic, Antimony
6S	0-1	Cell 6	10/29/2009	Lead, Arsenic, Antimony
7S	0-1	Cell 7	10/29/2009	Lead, Arsenic, Antimony
8S	0-1	Cell 8	10/29/2009	Lead, Arsenic, Antimony
9S	0-1	Cell 9	10/29/2009	Lead, Arsenic, Antimony
10S	0-1	Cell 10	10/29/2009	Lead, Arsenic, Antimony
11S	0-1	Cell 11	10/29/2009	Lead, Arsenic, Antimony
12S	0-1	Cell 12	10/29/2009	Lead, Arsenic, Antimony
12S	0-1	Cell 12	11/11/2009	Lead, Arsenic, Antimony
13S	0-1	Cell 13	10/29/2009	Lead, Arsenic, Antimony
14S	0-1	Cell 14	10/29/2009	Lead, Arsenic, Antimony
15S	0-1	Cell 15	10/30/2009	Lead, Arsenic, Antimony
165S	0-1	Cell 16	11/11/2009	Lead, Arsenic, Antimony
16S	0-1	Cell 16	10/30/2009	Lead, Arsenic, Antimony
17S	0-1	Cell 17	10/30/2009	Lead, Arsenic, Antimony
18S	0-1	Cell 18	10/30/2009	Lead, Arsenic, Antimony
19S	0-1	Cell 19	10/30/2009	Lead, Arsenic, Antimony
20S	0-1	Cell 20	10/30/2009	Lead, Arsenic, Antimony
21S	0-1	Cell 21	10/30/2009	Lead, Arsenic, Antimony
22S	0-1	Cell 22	10/30/2009	Lead, Arsenic, Antimony

TABLE 3.1
SAMPLE INFORMATION – ENVIRONMENTAL SITE ASSESSMENTS

Sample Number	Depth in inches (bgs)	Sample Location	Collection Date	Laboratory Analysis
23S	0-1	Cell 23	10/30/2009	Lead, Arsenic, Antimony
24S	0-1	Cell 24	10/30/2009	Lead, Arsenic, Antimony
25S	0-1	Cell 25	10/30/2009	Lead, Arsenic, Antimony
26S	0-1	Cell 26	10/30/2009	Lead, Arsenic, Antimony
27S	0-1	Cell 27	10/30/2009	Lead, Arsenic, Antimony
28S	0-1	Cell 28	10/30/2009	Lead, Arsenic, Antimony
29S	0-1	Cell 29	10/30/2009	Lead, Arsenic, Antimony
30S	0-1	Cell 30	10/30/2009	Lead, Arsenic, Antimony
31S	0-1	Cell 31	10/30/2009	Lead, Arsenic, Antimony, PAHs
32S	0-1	Cell 32	10/30/2009	Lead, Arsenic, Antimony, PAHs
33S	0-1	Cell 33	10/30/2009	Lead, Arsenic, Antimony, PAHs
34S	0-1	Cell 34	10/30/2009	Lead, Arsenic, Antimony
35S	0-1	Cell 35	10/30/2009	Lead, Arsenic, Antimony
36S	0-1	Cell 36	10/31/2009	Lead, Arsenic, Antimony
37S	0-1	Cell 37	10/31/2009	Lead, Arsenic, Antimony
38S	0-1	Cell 38	10/31/2009	Lead, Arsenic, Antimony
39S	0-1	Cell 39	10/31/2009	Lead, Arsenic, Antimony, PAHs
40S	0-1	Cell 40	10/31/2009	Lead, Arsenic, Antimony, PAHs
41S	0-1	Cell 41	10/31/2009	Lead, Arsenic, Antimony, PAHs
42S	0-1	Cell 42	10/31/2009	Lead, Arsenic, Antimony, PAHs
43S	0-1	Cell 43	10/31/2009	Lead, Arsenic, Antimony
44S	0-1	Cell 44	10/31/2009	Lead, Arsenic, Antimony
45S	0-1	Cell 45	10/31/2009	Lead, Arsenic, Antimony
46S	0-1	Cell 46	10/31/2009	Lead, Arsenic, Antimony, PAHs
47S	0-1	Cell 47	10/31/2009	Lead, Arsenic, Antimony, PAHs

TABLE 3.1
SAMPLE INFORMATION – ENVIRONMENTAL SITE ASSESSMENTS

Sample Number	Depth in inches (bgs)	Sample Location	Collection Date	Laboratory Analysis
48S	0-1	Cell 48	10/31/2009	Lead, Arsenic, Antimony, PAHs
49S	0-1	Cell 49	10/31/2009	Lead, Arsenic, Antimony
50S	0-1	Cell 50	10/31/2009	Lead, Arsenic, Antimony
51S	0-1	Cell 51	10/31/2009	Lead, Arsenic, Antimony
52S	0-1	Cell 52	10/31/2009	Lead, Arsenic, Antimony, PAHs
53S	0-1	Cell 53	10/31/2009	Lead, Arsenic, Antimony, PAHs
54S	0-1	Cell 54	10/31/2009	Lead, Arsenic, Antimony, PAHs
55S	0-1	Cell 55	11/3/2009	Lead, Arsenic, Antimony
56S	0-1	Cell 56	11/3/2009	Lead, Arsenic, Antimony
57S	0-1	Cell 57	11/3/2009	Lead, Arsenic, Antimony
58S	0-1	Cell 58	11/3/2009	Lead, Arsenic, Antimony, PAHs
59S	0-1	Cell 59	11/3/2009	Lead, Arsenic, Antimony, PAHs
60S	0-1	Cell 60	11/3/2009	Lead, Arsenic, Antimony
61S	0-1	Cell 61	11/3/2009	Lead, Arsenic, Antimony
62S	0-1	Cell 62	11/3/2009	Lead, Arsenic, Antimony, PAHs
63S	0-1	Cell 63	11/3/2009	Lead, Arsenic, Antimony, PAHs
64S	0-1	Cell 64	11/3/2009	Lead, Arsenic, Antimony, PAHs
65S	0-1	Cell 65	11/3/2009	Lead, Arsenic, Antimony
66S	0-1	Cell 66	11/3/2009	Lead, Arsenic, Antimony
67S	0-1	Cell 67	11/3/2009	Lead, Arsenic, Antimony
68S	0-1	Cell 68	11/3/2009	Lead, Arsenic, Antimony
69S	0-1	Cell 69	11/3/2009	Lead, Arsenic, Antimony
70S	0-1	Cell 70	11/3/2009	Lead, Arsenic, Antimony
71S	0-1	Cell 71	11/5/2009	Lead, Arsenic, Antimony, PAHs
72S	0-1	Cell 72	11/5/2009	Lead, Arsenic, Antimony, PAHs

TABLE 3.1
SAMPLE INFORMATION – ENVIRONMENTAL SITE ASSESSMENTS

Sample Number	Depth in inches (bgs)	Sample Location	Collection Date	Laboratory Analysis
73S	0-1	Cell 73	11/5/2009	Not Analyzed
74S	0-1	Cell 74	11/5/2009	Lead, Arsenic, Antimony, PAHs
75S	0-1	Cell 75	11/5/2009	Lead, Arsenic, Antimony, PAHs
76S	0-1	Cell 76	11/5/2009	Lead, Arsenic, Antimony, PAHs
77S	0-1	Cell 77	11/7/2009	Lead, Arsenic, Antimony, PAHs
78S	0-1	Cell 78	11/7/2009	Lead, Arsenic, Antimony, PAHs
79S	0-1	Cell 79	11/7/2009	Lead, Arsenic, Antimony, PAHs
80S	0-1	Cell 80	11/7/2009	Lead, Arsenic, Antimony, PAHs
81S	0-1	Cell 81	11/7/2009	Lead, Arsenic, Antimony
82S	0-1	Cell 82	11/7/2009	Lead, Arsenic, Antimony
83S	0-1	Cell 83	11/7/2009	Lead, Arsenic, Antimony
84S	0-1	Cell 84	11/7/2009	Lead, Arsenic, Antimony
85S	0-1	Cell 85	11/7/2009	Lead, Arsenic, Antimony
86S	0-1	Cell 86	11/7/2009	Lead, Arsenic, Antimony
87S	0-1	Cell 87	11/7/2009	Lead, Arsenic, Antimony
88S	0-1	Cell 88	11/9/2009	Lead, Arsenic, Antimony, PAHs
89S	0-1	Cell 89	11/9/2009	Lead, Arsenic, Antimony, PAHs
90S	0-1	Cell 90	11/9/2009	Lead, Arsenic, Antimony, PAHs
91S	0-1	Cell 91	11/9/2009	Lead, Arsenic, Antimony
92S	0-1	Cell 92	11/9/2009	Lead, Arsenic, Antimony, PAHs
93S	0-1	Cell 93	11/9/2009	Lead, Arsenic, Antimony
94S	0-1	Cell 94	11/9/2009	Lead, Arsenic, Antimony
95S	0-1	Cell 95	11/9/2009	Lead, Arsenic, Antimony
96S	0-1	Cell 96	11/9/2009	Lead, Arsenic, Antimony
97S	0-1	Cell 97	11/10/2009	Lead, Arsenic, Antimony, Mercury

TABLE 3.1
SAMPLE INFORMATION – ENVIRONMENTAL SITE ASSESSMENTS

Sample Number	Depth in inches (bgs)	Sample Location	Collection Date	Laboratory Analysis
98S	0-1	Cell 98	11/10/2009	Lead, Arsenic, Antimony, Mercury
99S	0-1	Cell 99	11/10/2009	Lead, Arsenic, Antimony
100S	0-1	Cell 100	11/10/2009	Lead, Arsenic, Antimony
101S	0-1	Cell 101	11/10/2009	Lead, Arsenic, Antimony
102S	0-1	Cell 102	11/10/2009	Lead, Arsenic, Antimony
103S	0-1	Cell 103	11/10/2009	Lead, Arsenic, Antimony
104S	0-1	Cell 104	11/10/2009	Lead, Arsenic, Antimony
105S	0-1	Cell 105	11/10/2009	Lead, Arsenic, Antimony
106S	0-1	Cell 106	11/10/2009	Lead, Arsenic, Antimony
107S	0-1	Cell 107	11/10/2009	Lead, Arsenic, Antimony
108S	0-1	Cell 108	11/11/2009	Lead, Arsenic, Antimony
109S	0-1	Cell 109	11/11/2009	Lead, Arsenic, Antimony
110S	0-1	Cell 110	11/11/2009	Lead, Arsenic, Antimony
111S	0-1	Cell 111	11/11/2009	Lead, Arsenic, Antimony
112S	0-1	Cell 112	11/11/2009	Lead, Arsenic, Antimony
113S	0-1	Cell 113	11/11/2009	Lead, Arsenic, Antimony
114S	0-1	Cell 114	11/11/2009	Lead, Arsenic, Antimony
115S	0-1	Cell 115	11/11/2009	Lead, Arsenic, Antimony
117S	0-1	Cell 117	11/11/2009	Lead, Arsenic, Antimony
118S	0-1	Cell 118	11/11/2009	Lead, Arsenic, Antimony
119S	0-1	Cell 119	11/11/2009	Lead, Arsenic, Antimony
120S	0-1	Cell 120	11/11/2009	Lead, Arsenic, Antimony
122S	0-1	Cell 122	11/12/2009	Lead, Arsenic, Antimony
123S	0-1	Cell 123	11/12/2009	Lead, Arsenic, Antimony
124S	0-1	Cell 124	11/12/2009	Lead, Arsenic, Antimony

TABLE 3.1
SAMPLE INFORMATION – ENVIRONMENTAL SITE ASSESSMENTS

Sample Number	Depth in inches (bgs)	Sample Location	Collection Date	Laboratory Analysis
125S	0-1	Cell 125	11/12/2009	Lead, Arsenic, Antimony
126S	0-1	Cell 126	11/12/2009	Lead, Arsenic, Antimony
127S	0-1	Cell 127	11/12/2009	Lead, Arsenic, Antimony
128S	0-1	Cell 128	11/12/2009	Lead, Arsenic, Antimony
129S	0-1	Cell 129	11/12/2009	Lead, Arsenic, Antimony
130S	0-1	Cell 130	11/12/2009	Lead, Arsenic, Antimony
131S	0-1	Cell 131	11/12/2009	Lead, Arsenic, Antimony
132S	0-1	Cell 132	11/12/2009	Lead, Arsenic, Antimony
133S	0-1	Cell 133	11/12/2009	Lead, Arsenic, Antimony
134S	0-1	Cell 134	11/12/2009	Lead, Arsenic, Antimony
135S	0-1	Cell 135	11/12/2009	Lead, Arsenic, Antimony
Allwyn Environmental 2009 Subsurface Samples				
1D	3-4	Cell 1	11/11/2009	Lead, Arsenic, Antimony
5D	3-4	Cell 5	11/11/2009	Lead, Arsenic, Antimony
6D	3-4	Cell 6	11/11/2009	Lead, Arsenic, Antimony
10D	3-4	Cell 10	11/11/2009	Lead, Arsenic, Antimony
11D	3-4	Cell 11	11/11/2009	Lead, Arsenic, Antimony
15D	3-4	Cell 15	11/7/2009	Lead, Arsenic, Antimony
16D	3-4	Cell 16	11/7/2009	Lead, Arsenic, Antimony
17D	3-4	Cell 17	11/11/2009	Lead, Arsenic, Antimony
18D	3-4	Cell 18	11/11/2009	Lead, Arsenic, Antimony
19D	3-4	Cell 19	11/11/2009	Lead, Arsenic, Antimony
23D	3-4	Cell 23	11/7/2009	Lead, Arsenic, Antimony
24D	3-4	Cell 24	11/7/2009	Lead, Arsenic, Antimony
25D	3-4	Cell 25	11/11/2009	Lead, Arsenic, Antimony

TABLE 3.1
SAMPLE INFORMATION – ENVIRONMENTAL SITE ASSESSMENTS

Sample Number	Depth in inches (bgs)	Sample Location	Collection Date	Laboratory Analysis
26D	3-4	Cell 26	11/11/2009	Lead, Arsenic, Antimony
27D	3-4	Cell 27	11/11/2009	Lead, Arsenic, Antimony
31D	3-4	Cell 31	11/7/2009	Lead, Arsenic, Antimony, PAHs
32D	3-4	Cell 32	11/7/2009	Lead, Arsenic, Antimony, PAHs
33D	3-4	Cell 33	11/7/2009	Lead, Arsenic, Antimony, PAHs
34D	3-4	Cell 34	11/7/2009	Lead, Arsenic, Antimony
35D	3-4	Cell 35	11/7/2009	Lead, Arsenic, Antimony
36D	3-4	Cell 36	11/7/2009	Lead, Arsenic, Antimony
37D	3-4	Cell 37	11/7/2009	Lead, Arsenic, Antimony
39D	3-4	Cell 39	11/7/2009	Lead, Arsenic, Antimony, PAHs
40D	3-4	Cell 40	11/7/2009	Lead, Arsenic, Antimony, PAHs
41D	3-4	Cell 41	11/7/2009	Lead, Arsenic, Antimony, PAHs
42D	3-4	Cell 42	11/7/2009	Lead, Arsenic, Antimony, PAHs
43D	3-4	Cell 43	11/7/2009	Lead, Arsenic, Antimony
44D	3-4	Cell 44	11/7/2009	Lead, Arsenic, Antimony
46D	3-4	Cell 46	11/9/2009	Lead, Arsenic, Antimony, PAHs
47D	3-4	Cell 47	11/9/2009	Lead, Arsenic, Antimony, PAHs
48D	3-4	Cell 48	11/10/2009	Lead, Arsenic, Antimony, PAHs
49D	3-4	Cell 49	11/10/2009	Lead, Arsenic, Antimony
50D	3-4	Cell 50	11/10/2009	Lead, Arsenic, Antimony
51D	3-4	Cell 51	11/10/2009	Lead, Arsenic, Antimony
52D	3-4	Cell 52	11/9/2009	Lead, Arsenic, Antimony, PAHs
53D	3-4	Cell 53	11/9/2009	Lead, Arsenic, Antimony, PAHs
54D	3-4	Cell 54	11/9/2009	Lead, Arsenic, Antimony, PAHs
55D	3-4	Cell 55	11/9/2009	Lead, Arsenic, Antimony

TABLE 3.1
SAMPLE INFORMATION – ENVIRONMENTAL SITE ASSESSMENTS

Sample Number	Depth in inches (bgs)	Sample Location	Collection Date	Laboratory Analysis
56D	3-4	Cell 56	11/9/2009	Lead, Arsenic, Antimony
57D	3-4	Cell 57	11/9/2009	Lead, Arsenic, Antimony
58D	3-4	Cell 58	11/9/2009	Lead, Arsenic, Antimony, PAHs
59D	3-4	Cell 59	11/9/2009	Lead, Arsenic, Antimony, PAHs
60D	3-4	Cell 60	11/9/2009	Lead, Arsenic, Antimony
61D	3-4	Cell 61	11/9/2009	Lead, Arsenic, Antimony
62D	3-4	Cell 62	11/9/2009	Lead, Arsenic, Antimony, PAHs
63D	3-4	Cell 63	11/9/2009	Lead, Arsenic, Antimony, PAHs
64D	3-4	Cell 64	11/9/2009	Lead, Arsenic, Antimony, PAHs
65D	3-4	Cell 65	11/9/2009	Lead, Arsenic, Antimony
66D	3-4	Cell 66	11/9/2009	Lead, Arsenic, Antimony
67D	3-4	Cell 67	11/9/2009	Lead, Arsenic, Antimony
71D	3-4	Cell 71	11/5/2009	Lead, Arsenic, Antimony, PAHs
72D	3-4	Cell 72	11/5/2009	Lead, Arsenic, Antimony, PAHs
73D	3-4	Cell 73	11/5/2009	Lead, Arsenic, Antimony, PAHs
74D	3-4	Cell 74	11/5/2009	Lead, Arsenic, Antimony, PAHs
75D	3-4	Cell 75	11/5/2009	Lead, Arsenic, Antimony, PAHs
76D	3-4	Cell 76	11/5/2009	Lead, Arsenic, Antimony, PAHs
77D	3-4	Cell 77	11/7/2009	Lead, Arsenic, Antimony, PAHs
78D	3-4	Cell 78	11/7/2009	Lead, Arsenic, Antimony, PAHs
79D	3-4	Cell 79	11/7/2009	Lead, Arsenic, Antimony, PAHs
80D	3-4	Cell 80	11/7/2009	Lead, Arsenic, Antimony, PAHs
81D	3-4	Cell 81	11/7/2009	Lead, Arsenic, Antimony
82D	3-4	Cell 82	11/7/2009	Lead, Arsenic, Antimony
83D	3-4	Cell 83	11/11/2009	Lead, Arsenic, Antimony

TABLE 3.1
SAMPLE INFORMATION – ENVIRONMENTAL SITE ASSESSMENTS

Sample Number	Depth in inches (bgs)	Sample Location	Collection Date	Laboratory Analysis
84D	3-4	Cell 84	11/11/2009	Lead, Arsenic, Antimony
85D	3-4	Cell 85	11/11/2009	Lead, Arsenic, Antimony
86D	3-4	Cell 86	11/11/2009	Lead, Arsenic, Antimony
87D	3-4	Cell 87	11/11/2009	Lead, Arsenic, Antimony
88D	3-4	Cell 88	11/9/2009	Lead, Arsenic, Antimony, PAHs
89D	3-4	Cell 89	11/9/2009	Lead, Arsenic, Antimony, PAHs
90D	3-4	Cell 90	11/9/2009	Lead, Arsenic, Antimony, PAHs
92D	3-4	Cell 92	11/9/2009	Lead, Arsenic, Antimony, PAHs
97D	3-4	Cell 97	11/10/2009	Lead, Arsenic, Antimony
98D	3-4	Cell 98	11/10/2009	Lead, Arsenic, Antimony
99D	3-4	Cell 99	11/10/2009	Lead, Arsenic, Antimony
100D	3-4	Cell 100	11/10/2009	Lead, Arsenic, Antimony
101D	3-4	Cell 101	11/10/2009	Lead, Arsenic, Antimony
102D	3-4	Cell 102	11/10/2009	Lead, Arsenic, Antimony
103D	3-4	Cell 103	11/10/2009	Lead, Arsenic, Antimony
104D	3-4	Cell 104	11/10/2009	Lead, Arsenic, Antimony
105D	3-4	Cell 105	11/10/2009	Lead, Arsenic, Antimony
106D	3-4	Cell 106	11/10/2009	Lead, Arsenic, Antimony
107D	3-4	Cell 107	11/10/2009	Lead, Arsenic, Antimony
Allwyn Environmental 2009 Wash Samples				
WASH 1	6	West of Shooting Range	11/3/2009	Lead, Arsenic, Antimony, PAHs
WASH 2	6	West of Shooting Range	11/3/2009	Lead, Arsenic, Antimony, PAHs
WASH 3	6	West of Shooting Range	11/3/2009	Lead, Arsenic, Antimony, PAHs
WASH 4	6	West of Shooting Range	11/3/2009	Lead, Arsenic, Antimony, PAHs
WASH 5	6	West of Shooting Range	11/3/2009	Lead, Arsenic, Antimony, PAHs

TABLE 3.1
SAMPLE INFORMATION – ENVIRONMENTAL SITE ASSESSMENTS

Sample Number	Depth in inches (bgs)	Sample Location	Collection Date	Laboratory Analysis
WASH 6	6	West of Shooting Range	11/3/2009	Lead, Arsenic, Antimony, PAHs
WASH 7	6	West of Shooting Range	11/3/2009	Lead, Arsenic, Antimony, PAHs
WASH 7	6	West of Shooting Range	11/5/2009	Lead, Arsenic, Antimony, PAHs
WASH 8	6	West of Shooting Range	11/5/2009	Lead, Arsenic, Antimony, PAHs
WASH 9	6	West of Shooting Range	11/5/2009	Lead, Arsenic, Antimony, PAHs
WASH 10	6	West of Shooting Range	11/5/2009	Lead, Arsenic, Antimony, PAHs
WASH 11	6	West of Shooting Range	11/5/2009	Lead, Arsenic, Antimony
WASH 12	6	West of Shooting Range	11/5/2009	Lead, Arsenic, Antimony
WASH 13	6	West of Shooting Range	11/5/2009	Lead, Arsenic, Antimony
WASH 14	6	West of Shooting Range	11/5/2009	Lead, Arsenic, Antimony
WASH 15	6	West of Shooting Range	11/5/2009	Lead, Arsenic, Antimony
Allwyn Environmental 2009 TCLP/SPLC Samples				
WD-1	Not identified	Cell 71	11/5/2009	TCLP Lead, Arsenic, Antimony SPLP PAHs
WD-2	Not identified	Cell 71	11/5/2009	TCLP Lead, Arsenic, Antimony SPLP PAHs
WD-3	Not identified	Cell 71	11/5/2009	TCLP Lead, Arsenic, Antimony SPLP PAHs
WD-4	Not identified	Cell 48	11/10/2009	TCLP Lead, Arsenic, Antimony
WD-5	Not identified	Cell 48	11/10/2009	TCLP Lead, Arsenic, Antimony
WD-6	Not identified	Cell 48	11/10/2009	TCLP Lead, Arsenic, Antimony
WD-7	Not identified	Cell 40	11/11/2009	TCLP Lead, Arsenic, Antimony
WD-8	Not identified	Cell 40	11/11/2009	TCLP Lead, Arsenic, Antimony
WD-9	Not identified	Cell 40	11/11/2009	Lead, Arsenic, Antimony
Allwyn Environmental 2009 Duplicate Samples				
210A	0-1	Cell 41	11/11/2009	Lead, Arsenic, Antimony, PAHs
210B	0-1	Cell 41	11/11/2009	Lead, Arsenic, Antimony, PAHs

TABLE 3.1
SAMPLE INFORMATION – ENVIRONMENTAL SITE ASSESSMENTS

Sample Number	Depth in inches (bgs)	Sample Location	Collection Date	Laboratory Analysis
Allwyn Environmental 2009 Background Samples				
B-1	0-1	Site Vicinity	11/5/2009	Lead, Arsenic, Antimony, PAHs
B-2	0-1	Site Vicinity	11/10/2009	Lead, Arsenic, Antimony, Mercury, PAHs
B-3	0-1	Site Vicinity	11/10/2009	Lead, Arsenic, Antimony, Mercury, PAHs
B-4	0-1	Site Vicinity	11/11/2009	Lead, Arsenic, Antimony, PAHs
B-5A	0-1	Site Vicinity	11/11/2009	Lead, Arsenic, Antimony, PAHs
B-5B	0-1	Site Vicinity	11/11/2009	Lead, Arsenic, Antimony, PAHs
Allwyn Consultants 2017 Surface Samples				
G1-1	0-1	Grid 1	4/4/2017	Lead
G2-1	0-1	Grid 2	4/4/2017	Lead
G3-1	0-1	Grid 3	4/4/2017	Lead
G4-1	0-1	Grid 4	4/4/2017	Lead
G5-1	0-1	Grid 5	4/4/2017	Lead
G6-1	0-1	Grid 6	4/4/2017	Lead
G7-1	0-1	Grid 7	4/4/2017	Lead
G8-1	0-1	Grid 8	4/4/2017	Lead
G9-1	0-1	Grid 9	4/4/2017	Lead
G10-1	0-1	Grid 10	4/4/2017	Lead
G11-1	0-1	Grid 11	4/4/2017	Lead
G12-1	0-1	Grid 12	4/4/2017	Lead
G13-1	0-1	Grid 13	4/4/2017	Lead
G14-1	0-1	Grid 14	4/4/2017	Lead
G15-1	0-1	Grid 15	4/4/2017	Lead
G16-1	0-1	Grid 16	4/4/2017	Lead
G17-1	0-1	Grid 17	4/4/2017	Lead

TABLE 3.1
SAMPLE INFORMATION – ENVIRONMENTAL SITE ASSESSMENTS

Sample Number	Depth in inches (bgs)	Sample Location	Collection Date	Laboratory Analysis
G18-1	0-1	Grid 18	5/3/2017	Lead
G19-1	0-1	Grid 19	5/3/2017	Lead
G19-A-1	0-1	Grid 19A	6/5/2017	Lead
G19-B-1	0-1	Grid 19B	6/5/2017	Lead
G19-C-1	0-1	Grid 19C	6/5/2017	Lead
G19-D-1	0-1	Grid 19D	6/5/2017	Lead
G19-E-1	0-1	Grid 19E	6/5/2017	Lead
G19-F-1	0-1	Grid 19F	6/5/2017	Lead
G19-G-1	0-1	Grid 19G	6/5/2017	Lead
G19-H-1	0-1	Grid 19H	6/5/2017	Lead
G19-I-1	0-1	Grid 19I	6/5/2017	Lead
G20-1	0-1	Grid 20	5/3/2017	Lead
G21-1	0-1	Grid 21	5/3/2017	Lead
G22-1	0-1	Grid 22	5/3/2017	Lead
G23-1	0-1	Grid 23	5/3/2017	Lead
G24-1	0-1	Grid 24	5/3/2017	Lead
G25-1	0-1	Grid 25	5/3/2017	Lead
G26-1	0-1	Grid 26	5/3/2017	Lead
G27-1	0-1	Grid 27	5/3/2017	Lead
G28-1	0-1	Grid 28	5/3/2017	Lead
G29-1	0-1	Grid 29	5/3/2017	Lead
G30-1	0-1	Grid 30	5/3/2017	Lead
G31-1	0-1	Grid 31	5/3/2017	Lead
G32-1	0-1	Grid 32	5/3/2017	Lead

TABLE 3.1
SAMPLE INFORMATION – ENVIRONMENTAL SITE ASSESSMENTS

Sample Number	Depth in inches (bgs)	Sample Location	Collection Date	Laboratory Analysis
Allwyn Consultants 2017 Subsurface Samples				
G4-4	3-4	Grid 4	6/5/2017	Lead
G7-4	3-4	Grid 7	6/5/2017	Lead
G8-4	3-4	Grid 8	6/5/2017	Lead
G9-4	3-4	Grid 9	5/3/2017	Lead
G10-4	3-4	Grid 10	5/3/2017	Lead
G11-4	3-4	Grid 11	5/3/2017	Lead
G12-4	3-4	Grid 12	5/3/2017	Lead
G13-4	3-4	Grid 13	5/3/2017	Lead
G14-4	3-4	Grid 14	5/3/2017	Lead
G15-4	3-4	Grid 15	5/3/2017	Lead
G16-4	3-4	Grid 16	5/3/2017	Lead
G17-4	3-4	Grid 17	6/5/2017	Lead
G18-4	3-4	Grid 18	6/5/2017	Lead
G19-A-4	3-4	Grid 19A	6/5/2017	Lead
G19-B-4	3-4	Grid 19B	6/5/2017	Lead
G19-C-4	3-4	Grid 19C	6/5/2017	Lead
G19-D-4	3-4	Grid 19D	6/5/2017	Lead
G19-E-4	3-4	Grid 19E	6/5/2017	Lead
G19-F-4	3-4	Grid 19F	6/5/2017	Lead
G19-G-4	3-4	Grid 19G	6/5/2017	Lead
G19-H-4	3-4	Grid 19H	6/5/2017	Lead
G19-I-4	3-4	Grid 19I	6/5/2017	Lead
G20-4	3-4	Grid 20	6/5/2017	Lead
G28-4	3-4	Grid 28	6/5/2017	Lead

TABLE 3.1
SAMPLE INFORMATION – ENVIRONMENTAL SITE ASSESSMENTS

Sample Number	Depth in inches (bgs)	Sample Location	Collection Date	Laboratory Analysis
G29-4	3-4	Grid 29	6/5/2017	Lead
Allwyn Consultants 2017 Surface Berm Samples				
BERM1-1	0-1	Northern Berm	4/4/2017	Lead
BERM1-2	0-1	Northern Berm	4/4/2017	Lead
BERM1-3	0-1	Northern Berm	4/4/2017	Lead
BERM2-1	0-1	Southern Berm	4/4/2017	Lead
BERM2-2	0-1	Southern Berm	4/4/2017	Lead
BERM2-3	0-1	Southern Berm	4/4/2017	Lead
Allwyn Consultants 2017 Subsurface Berm Samples				
BERM1-1-4	3-4	Northern Berm	5/3/2017	Lead
BERM1-2-4	3-4	Northern Berm	5/3/2017	Lead
BERM1-3-4	3-4	Northern Berm	5/3/2017	Lead
BERM2-1-4	3-4	Southern Berm	5/3/2017	Lead
BERM2-2-4	3-4	Southern Berm	5/3/2017	Lead
BERM2-3-4	3-4	Southern Berm	5/3/2017	Lead
PIKA 2018 Surface Soil Samples				
CBP-09-0-1	0-1	Grid 9	1/24/18	Lead, Arsenic, Antimony, PAHs
CBP-09-0-1 (Duplicate)	0-1	Grid 9	1/24/18	Lead, Arsenic, Antimony, PAHs
CBP-10-0-1	0-1	Grid 10	1/24/18	Lead, Arsenic, Antimony, PAHs
CBP-11-0-1	0-1	Grid 11	1/24/18	Lead, Arsenic, Antimony, PAHs
CBP-12-0-1	0-1	Grid 12	1/24/18	Lead, Arsenic, Antimony, PAHs
CBP-13-0-1	0-1	Grid 13	1/24/18	Lead, Arsenic, Antimony, PAHs
CBP-14-0-1	0-1	Grid 14	1/24/18	Lead, Arsenic, Antimony, PAHs
CBP-15-0-1	0-1	Grid 15	1/24/18	Lead, Arsenic, Antimony, PAHs

TABLE 3.1
SAMPLE INFORMATION – ENVIRONMENTAL SITE ASSESSMENTS

Sample Number	Depth in inches (bgs)	Sample Location	Collection Date	Laboratory Analysis
CBP-15-0-1 (Duplicate)	0-1	Grid 15	1/24/18	Lead, Arsenic, Antimony, PAHs
CBP-16-0-1	0-1	Grid 16	1/24/18	Lead, Arsenic, Antimony, PAHs
CBP-19-0-1	0-1	Grid 19	1/24/18	Lead, Arsenic, Antimony, PAHs
PIKA 2018 Subsurface Soil Samples				
CBP-09-3-4	3-4	Grid 9	1/24/18	Lead, Arsenic, Antimony, PAHs
CBP-10-3-4	3-4	Grid 10	1/24/18	Lead, Arsenic, Antimony, PAHs
CBP-11-3-4	3-4	Grid 11	1/24/18	Lead, Arsenic, Antimony, PAHs
CBP-13-3-4	3-4	Grid 13	1/24/18	Lead, Arsenic, Antimony, PAHs
CBP-14-3-4	3-4	Grid 14	1/24/18	Lead, Arsenic, Antimony, PAHs
CBP-15-3-4	3-4	Grid 15	1/24/18	Lead, Arsenic, Antimony, PAHs
GeoTek 2019 Correlation Study Soil Samples				
CS-1	0-6	Grid V-1	2/6/19	TCLP Lead, Total Lead
CS-2	0-6	Grid V-2	2/6/19	TCLP Lead, Total Lead
CS-3	0-6	Grid V-3	2/6/19	TCLP Lead, Total Lead
CS-4	0-6	Grid V-4	2/6/19	TCLP Lead, Total Lead
CS-5	0-6	Grid V-5	2/6/19	TCLP Lead, Total Lead
CS-6	0-6	Grid V-6	2/6/19	TCLP Lead, Total Lead
CS-8	0-6	Grid V-8	2/6/19	TCLP Lead, Total Lead
CS-9	0-6	Grid V-9	2/6/19	TCLP Lead, Total Lead
CS-9(2)	0-6	Grid V-7	2/6/19	TCLP Lead, Total Lead
CS-10	0-6	Grid V-10	2/6/19	TCLP Lead, Total Lead
CS-11	0-6	Grid V-11	2/5/19	TCLP Lead, Total Lead
CS-12	0-6	Grid V-12	2/5/19	TCLP Lead, Total Lead
CS-13	0-6	Grid V-13	2/6/19	TCLP Lead, Total Lead

TABLE 3.1
SAMPLE INFORMATION – ENVIRONMENTAL SITE ASSESSMENTS

Sample Number	Depth in inches (bgs)	Sample Location	Collection Date	Laboratory Analysis
CS-14	0-6	Grid V-14	2/6/19	TCLP Lead, Total Lead
CS-15	0-6	Grid V-15	2/5/19	TCLP Lead, Total Lead
CS-16	0-6	Grid V-16	2/5/19	TCLP Lead, Total Lead
CS-17	0-6	Grid V-17	2/6/19	TCLP Lead, Total Lead
CS-18	0-6	Grid V-18	2/6/19	TCLP Lead, Total Lead
CS-19	0-6	Grid V-19	2/5/19	TCLP Lead, Total Lead
CS-20	0-6	Grid V-20	2/6/19	TCLP Lead, Total Lead
CS-21	0-6	Grid V-21	2/6/19	TCLP Lead, Total Lead
CS-22	0-6	Grid V-22	2/6/19	TCLP Lead, Total Lead
GeoTek 2019 Vertical Extent Soil Samples				
V-1-12	12	Grid V-1	2/6/19	Total Lead, Arsenic, Antimony, PAHs
V-2-12	12	Grid V-2	2/6/19	Total Lead, Arsenic, Antimony, PAHs
V-3-12	12	Grid V-3	2/6/19	Total Lead, Arsenic, Antimony, PAHs
V-4-12	12	Grid V-4	2/6/19	Total Lead, Arsenic, Antimony, PAHs
V-5-12	12	Grid V-5	2/6/19	Not Analyzed
V-5-18	18	Grid V-5	2/11/19	Not Analyzed
V-5-24	24	Grid V-5	2/11/19	Total Lead, Arsenic, Antimony, PAHs
V-6-12	12	Grid V-6	2/6/19	Total Lead, Arsenic, Antimony, PAHs
V-7-12	12	Grid V-7	2/5/19	Total Lead, Arsenic, Antimony, PAHs
V-8-12	12	Grid V-8	2/6/19	Not Analyzed
V-8-18	18	Grid V-8	2/11/19	Not Analyzed
V-8-24	24	Grid V-8	2/11/19	Not Analyzed
V-8-30	30	Grid V-8	2/11/19	Total Lead, Arsenic, Antimony, PAHs
V-9-12	12	Grid V-9	2/6/19	Not Analyzed
V-9-18	18	Grid V-9	2/11/19	Not Analyzed

TABLE 3.1
SAMPLE INFORMATION – ENVIRONMENTAL SITE ASSESSMENTS

Sample Number	Depth in inches (bgs)	Sample Location	Collection Date	Laboratory Analysis
V-9-24	24	Grid V-9	2/11/19	Not Analyzed
V-9-30	30	Grid V-9	2/11/19	Total Lead, Arsenic, Antimony, PAHs
V-10-12	12	Grid V-10	2/6/19	Not Analyzed
V-10-18	18	Grid V-10	2/11/19	Not Analyzed
V-10-24	24	Grid V-10	2/11/19	Total Lead, Arsenic, Antimony, PAHs
V-11-12	12	Grid V-11	2/5/19	Total Lead, Arsenic, Antimony, PAHs
V-12-12	12	Grid V-12	2/5/19	Not Analyzed
V-12-18	18	Grid V-12	2/11/19	Not Analyzed
V-12-24	24	Grid V-12	2/11/19	Total Lead, Arsenic, Antimony, PAHs
V-13-12	12	Grid V-13	2/6/19	Not Analyzed
V-13-18	18	Grid V-13	2/11/19	Not Analyzed
V-13-24	24	Grid V-13	2/11/19	Total Lead, Arsenic, Antimony, PAHs
V-14-12	12	Grid V-14	2/6/19	Total Lead, Arsenic, Antimony, PAHs
V-15-12	12	Grid V-15	2/5/19	Not Analyzed
V-15-18	18	Grid V-15	2/11/19	Not Analyzed
V-15-24	24	Grid V-15	2/11/19	Total Lead, Arsenic, Antimony, PAHs
V-16-12	12	Grid V-16	2/5/19	Total Lead, Arsenic, Antimony, PAHs
V-17-12	12	Grid V-17	2/6/19	Total Lead, Arsenic, Antimony, PAHs
V-18-12	12	Grid V-18	2/6/19	Total Lead, Arsenic, Antimony, PAHs
V-19-12	12	Grid V-19	2/5/19	Not Analyzed
V-19-18	18	Grid V-19	2/11/19	Not Analyzed
V-19-24	24	Grid V-19	2/11/19	Total Lead, Arsenic, Antimony, PAHs
V-20-12	12	Grid V-20	2/6/19	Total Lead, Arsenic, Antimony, PAHs
V-21-12	12	Grid V-21	2/6/19	Total Lead, Arsenic, Antimony, PAHs
V-22-12	12	Grid V-22	2/6/19	Total Lead, Arsenic, Antimony, PAHs

TABLE 3.1
SAMPLE INFORMATION – ENVIRONMENTAL SITE ASSESSMENTS

Sample Number	Depth in inches (bgs)	Sample Location	Collection Date	Laboratory Analysis
V-23-12	12	Grid V-7 (Duplicate sample of V-7-12)	2/5/19	Total Lead, Arsenic, Antimony, PAHs
V-25-12	12	Grid V-11 (Duplicate sample of V-11-12)	2/5/19	Total Lead, Arsenic, Antimony, PAHs
V-26-12	12	Grid V-10 (Duplicate sample of V-10-12)	2/6/19	Not Analyzed
V-26-18	18	Grid V-10 (Duplicate sample of V-10-18)	2/11/19	Not Analyzed
V-26-24	24	Grid V-10 (Duplicate Sample of V-10-24)	2/11/19	Total Lead, Arsenic, Antimony, PAHs
GeoTek 2019 Stabilization Study Soil Samples				
SS-1	0-4	Grid V-1	2/6/19	TCLP Lead, Total Lead
SS-2	0-4	Grid V-2	2/6/19	TCLP Lead, Total Lead
SS-3	0-4	Grid V-5	2/6/19	TCLP Lead, Total Lead
SS-4	0-4	Grid V-8	2/6/19	TCLP Lead, Total Lead
SS-5	0-4	Grid V-9	2/6/19	TCLP Lead, Total Lead

Notes:
bgs – Below ground surface
PAHs – Polynuclear Aromatic Hydrocarbons
SPLP – Synthetic Precipitation Leaching Procedure
TCLP – Toxicity Characteristic Lead Procedure

TABLE 3.2
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SURFACE)

Metals Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number					Carcinogen		Non-Carcinogen		
		1S	2S	3S	4S	5S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	<1.0	<1.0	<1.0	**1.2**	NE	NE	31	410	35
Arsenic	mg/kg	**8.4**	**8.0**	**7.5**	**8.0**	**11**	10	10	10	10	290
Lead	mg/kg	**700**	**380**	**260**	**160**	**2,600**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number					Carcinogen		Non-Carcinogen		
		6S	7S	8S	9S	10S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**12**	**6.6**	**8.0**	**7.8**	**9.8**	10	10	10	10	290
Lead	mg/kg	**420**	**280**	**140**	**85.0**	**1,300**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010B
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL
6.8	Sample result exceeds its Residential SRL and non-Residential SRL but is less than its Minimum GPL

TABLE 3.2
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SURFACE)

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		11S	12S	13S	14S	15S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	<1.0	<1.0	<1.0	**47**	NE	NE	31	410	35
Arsenic	mg/kg	**7.6**	**7.2**	**8.2**	**9.0**	**1.7**	10	10	10	10	290
Lead	mg/kg	**320**	**280**	**150**	**97**	**25,000**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		16S	17S	18S	19S	20S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	**2.7**	<1.0	<1.0	**1.4**	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**4.4**	**4.4**	**3.6**	**4.3**	**3.7**	10	10	10	10	290
Lead	mg/kg	**2,000**	**420**	**500**	**550**	**290**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010B
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL
6.8	Sample result exceeds its Residential SRL and non-Residential SRL but is less than its Minimum GPL

TABLE 3.2
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SURFACE)

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		21S	22S	23S	24S	25S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	<1.0	**2.0**	**1.6**	**1.5**	NE	NE	31	410	35
Arsenic	mg/kg	**3.3**	**4.4**	**4.6**	**4.0**	**4.2**	10	10	10	10	290
Lead	mg/kg	**100**	**120**	**1,500**	**870**	**550**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		26S	27S	28S	29S	30S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	**2.0**	<1.0	<1.0	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**3.4**	**3.5**	**4.4**	**5.6**	**5.5**	10	10	10	10	290
Lead	mg/kg	**970**	**550**	**240**	**150**	**140**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010B
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL
6.8	Sample result exceeds its Residential SRL and non-Residential SRL but is less than its Minimum GPL

TABLE 3.2
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SURFACE)

Metals Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number					Carcinogen		Non-Carcinogen		
		31S	32S	33S	34S	35S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	**5.7**	**4.3**	**3.2**	**1.6**	**1.1**	NE	NE	31	410	35
Arsenic	mg/kg	**4.6**	**4.4**	**3.8**	**3.3**	**4.4**	10	10	10	10	290
Lead	mg/kg	**2,000**	**1,600**	**1,300**	**870**	**480**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number					Carcinogen		Non-Carcinogen		
		36S	37S	38S	39S	40S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	<1.0	<1.0	**3.5**	**5.8**	NE	NE	31	410	35
Arsenic	mg/kg	**6.1**	**5.6**	**5.1**	**5.0**	**4.4**	10	10	10	10	290
Lead	mg/kg	**260**	**210**	**130**	**1,100**	**2,200**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010B
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL
6.8	Sample result exceeds its Residential SRL and non-Residential SRL but is less than its Minimum GPL

TABLE 3.2
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SURFACE)

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		41S	42S	43S	44S	45S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	**2.8**	<1.0	**1.4**	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**4.1**	**6.1**	**5.6**	**5.4**	**4.9**	10	10	10	10	290
Lead	mg/kg	**1,500**	**490**	**310**	**200**	**160**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		46S	47S	48S	49S	50S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	**2.7**	**3.4**	**1.7**	**1.3**	**1.2**	NE	NE	31	410	35
Arsenic	mg/kg	**6.0**	**6.4**	**5.6**	**5.3**	**4.6**	10	10	10	10	290
Lead	mg/kg	**1,300**	**890**	**560**	**410**	**430**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010B
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL
6.8	Sample result exceeds its Residential SRL and non-Residential SRL but is less than its Minimum GPL

TABLE 3.2
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SURFACE)

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		51S	52S	53S	54S	55S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	**2.1**	<1.0	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**4.9**	**5.3**	**4.6**	**5.2**	**5.6**	10	10	10	10	290
Lead	mg/kg	**370**	**880**	**490**	**420**	**560**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		56S	57S	58S	59S	60S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	**<1.0**	<1.0	<1.0	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**3.5**	**2.9**	**2.7**	**3.0**	**3.7**	10	10	10	10	290
Lead	mg/kg	**190**	**160**	**310**	**350**	**220**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010B
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
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6.8	Sample result exceeds its Residential SRL and non-Residential SRL but is less than its Minimum GPL

TABLE 3.2
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SURFACE)

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		61S	62S	63S	64S	65S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**2.9**	**2.9**	**3.8**	**3.2**	**4.1**	10	10	10	10	290
Lead	mg/kg	**110**	**290**	**250**	**140**	**130**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		66S	67S	68S	69S	70S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**3.7**	**4.3**	**3.2**	**4.1**	**4.6**	10	10	10	10	290
Lead	mg/kg	**53**	**96**	**160**	**71.0**	**100**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010B
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
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TABLE 3.2
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SURFACE)

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		71S	72S	73S	74S	75S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	**8.9**	**5.8**	**0.24**	**5.0**	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**3.6**	**5.0**	<1.0	**4.2**	**5.3**	10	10	10	10	290
Lead	mg/kg	**3,400**	**3,300**	**4.0**	**1,700**	**590**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		76S	77S	78S	79S	80S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	**46**	**5.1**	**5.0**	**3.6**	NE	NE	31	410	35
Arsenic	mg/kg	**2.9**	**6.7**	**3.9**	**3.8**	**3.8**	10	10	10	10	290
Lead	mg/kg	**380**	**8,900**	**1,200**	**3,000**	**1,600**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010B
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL
6.8	Sample result exceeds its Residential SRL and non-Residential SRL but is less than its Minimum GPL

TABLE 3.2
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SURFACE)

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		81S	82S	83S	84S	85S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	**5.5**	**28**	**3.6**	**8.3**	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**4.5**	**5.2**	**3.9**	**11.0**	**7.5**	10	10	10	10	290
Lead	mg/kg	**3,200**	**12,000**	**3,600**	**7,100**	**600**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		86S	87S	88S	89S	90S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	<1.0	**9.6**	**2.8**	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**7.6**	**3.5**	**3.7**	**2.3**	**3.4**	10	10	10	10	290
Lead	mg/kg	**530**	**620**	**4,100**	**1,200**	**530**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010B
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
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0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
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TABLE 3.2
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SURFACE)

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		91S	92S	93S	94S	95S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	**3.7**	**3.9**	**1.1**	**2.4**	NE	NE	31	410	35
Arsenic	mg/kg	**2.5**	**2.5**	**1.5**	**1.1**	<1.0	10	10	10	10	290
Lead	mg/kg	**160**	**1,600**	**870**	**130**	**590**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		96S	97S	98S	99S	100S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	**1.1**	<1.0	**1.4**	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	<1.0	**1.7**	**5.5**	**3.0**	**5.0**	10	10	10	10	290
Lead	mg/kg	**140**	**130**	**93**	**100**	**61**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010B
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
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TABLE 3.2
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SURFACE)

Metals Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number					Carcinogen		Non-Carcinogen		
		101S	102S	103S	104S	105S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**3.9**	**2.4**	**5.4**	**3.6**	**3.4**	10	10	10	10	290
Lead	mg/kg	**71**	**220**	**220**	**110**	**8.0**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number					Carcinogen		Non-Carcinogen		
		106S	107S	108S	109S	110S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	<1.0	**1.2**	**1.0**	**1.3**	NE	NE	31	410	35
Arsenic	mg/kg	**3.5**	**4.8**	<1.0	<1.0	<1.0	10	10	10	10	290
Lead	mg/kg	**140**	**200**	**96**	**76**	**71**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010B
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

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TABLE 3.2
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SURFACE)

Metals Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number					Carcinogen		Non-Carcinogen		
		111S	112S	113S	114S	115S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	**1.0**	<1.0	<1.0	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**1.0**	<1.0	<1.0	<1.0	<1.0	10	10	10	10	290
Lead	mg/kg	**87**	**44**	**79**	**54**	**46**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number					Carcinogen		Non-Carcinogen		
		116S	117S	118S	119S	120S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	<1.0	**1.1**	**5.3**	**3.7**	**3.9**	10	10	10	10	290
Lead	mg/kg	**33**	**100**	**130**	**36**	**34**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010B
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

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16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
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TABLE 3.2
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SURFACE)

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		121S	122S	123S	124S	125S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	**1.7**	**1.5**	**1.1**	**1.3**	NE	NE	31	410	35
Arsenic	mg/kg	**3.9**	<1.0	<1.0	<1.0	<1.0	10	10	10	10	290
Lead	mg/kg	**99**	**97**	**60**	**56**	**110**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		126S	127S	128S	129S	130S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	**1.2**	<1.0	<1.0	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	<1.0	**5.9**	**4.9**	**4.4**	**5.5**	10	10	10	10	290
Lead	mg/kg	**110**	**71**	**51**	**94**	**180**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010B
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
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TABLE 3.2
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SURFACE)

Metals Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number					Carcinogen		Non-Carcinogen		
		131S	132S	133S	134S	135S	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**7.7**	**6.0**	**5.0**	**7.7**	**7.0**	10	10	10	10	290
Lead	mg/kg	**250**	**120**	**200**	**140**	**130**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results		Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number		Carcinogen		Non-Carcinogen		
		210A	210B	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	**4.9**	**3.9**	NE	NE	31	410	35
Arsenic	mg/kg	**2.5**	**1.6**	10	10	10	10	290
Lead	mg/kg	**810**	**820**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010B
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL
6.8	Sample result exceeds its Residential SRL and non-Residential SRL but is less than its Minimum GPL

TABLE 3.3
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS – ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SUBSURFACE)

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		1D	5D	6D	10D	11D	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	**1.8**	**4.2**	**1.4**	**1.1**	**1.4**	NE	NE	31	410	35
Arsenic	mg/kg	<1.0	<1.0	<1.0	<1.0	**1.7**	10	10	10	10	290
Lead	mg/kg	**820**	**4,300**	**530**	**310**	**410**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		15D	16D	17D	18D	19D	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	**28.0**	**9.0**	**1.1**	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	<1.0	**4.9**	**2.1**	**1.6**	<1.0	10	10	10	10	290
Lead	mg/kg	**12,000**	**5,200**	**190**	**260**	**160**	NE	NE	400	800	290

Notes:

Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010B

Analytical results in **bold** exceed Laboratory Reporting Limit

SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007

Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.

mg/kg – milligrams per kilogram

NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
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TABLE 3.3
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS – ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SUBSURFACE)

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		23D	24D	25D	26D	27D	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	<1.0	**1.5**	**1.6**	**1.8**	NE	NE	31	410	35
Arsenic	mg/kg	**4.2**	**3.4**	**2.1**	<1.0	<1.0	10	10	10	10	290
Lead	mg/kg	**680**	**570**	**360**	**340**	**230**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		31D	32D	33D	34D	35D	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	**1.2**	**1.1**	<1.0	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**4.2**	**3.9**	**1.9**	**1.9**	**2.3**	10	10	10	10	290
Lead	mg/kg	**560**	**430**	**190**	**260**	**180**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010B
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
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TABLE 3.3
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS – ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SUBSURFACE)

Metals Analytes	Unit	Analytical Test Results Sample Number					Residential SRLs Carcinogen		Residential SRLs Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		36D	37D	39D	40D	41D	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	<1.0	**1.6**	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**2.8**	**2.2**	**3.8**	**6.2**	**7.2**	10	10	10	10	290
Lead	mg/kg	**140**	**65**	**440**	**420**	**150**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results Sample Number					Residential SRLs Carcinogen		Residential SRLs Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		42D	43D	44D	46D	47D	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**8.9**	**9.6**	**9.0**	**3.3**	**3.7**	10	10	10	10	290
Lead	mg/kg	**190**	**160**	**56**	**340**	**390**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010B
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
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TABLE 3.3
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS – ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SUBSURFACE)

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		48D	49D	50D	51D	52D	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	**1.3**	1.3	<1.0	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**2.0**	**1.3**	**1.5**	**1.7**	**2.4**	10	10	10	10	290
Lead	mg/kg	**290**	**210**	**110**	**70**	**110**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		53D	54D	55D	56D	57D	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**3.4**	**4.0**	<1.0	**2.3**	**2.4**	10	10	10	10	290
Lead	mg/kg	**73**	**100**	**130**	**74**	**98**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010B
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
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TABLE 3.3
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS – ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SUBSURFACE)

Metals Analytes	Unit	Analytical Test Results Sample Number					Residential SRLs Carcinogen		Residential SRLs Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		58D	59D	60D	61D	62D	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**1.8**	**2.0**	**3.2**	**2.7**	**2.4**	10	10	10	10	290
Lead	mg/kg	**88**	**120**	**63**	**66**	**72**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results Sample Number					Residential SRLs Carcinogen		Residential SRLs Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		63D	64D	65D	66D	67D	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**2.2**	**1.8**	**2.7**	**2.4**	**4.4**	10	10	10	10	290
Lead	mg/kg	**57**	**52**	**40**	**56**	**55**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010B
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL
6.8	Sample result exceeds its Residential SRL and non-Residential SRL but is less than its Minimum GPL

TABLE 3.3
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS – ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SUBSURFACE)

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		71D	72D	73D	74D	75D	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	**9.7**	**1.3**	<1.0	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**4.7**	**6.5**	**3.4**	**8.2**	**9.0**	10	10	10	10	290
Lead	mg/kg	**5,900**	**1,200**	**550**	**450**	**390**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		76D	77D	78D	79D	80D	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	**6.1**	**8.1**	**3.2**	**1.6**	NE	NE	31	410	35
Arsenic	mg/kg	**2.6**	<1.0	**5.3**	**4.8**	**3.9**	10	10	10	10	290
Lead	mg/kg	**210**	**1,600**	**1,800**	**2,500**	**750**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010B
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL
6.8	Sample result exceeds its Residential SRL and non-Residential SRL but is less than its Minimum GPL

TABLE 3.3
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS – ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SUBSURFACE)

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		81D	82D	83D	84D	85D	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	**3.0**	**37.0**	**5.6**	**26.0**	**2.9**	NE	NE	31	410	35
Arsenic	mg/kg	**4.0**	**6.0**	<1.0	**1.2**	**1.2**	10	10	10	10	290
Lead	mg/kg	**2,500**	**18,000**	**3,800**	**16,000**	**2,100**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		86D	87D	88D	89D	90D	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	**1.3**	**1.2**	**1.4**	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	<1.0	<1.0	**2.4**	**2.3**	**2.7**	10	10	10	10	290
Lead	mg/kg	**710**	**640**	**730**	**160**	**130**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010B
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL
6.8	Sample result exceeds its Residential SRL and non-Residential SRL but is less than its Minimum GPL

TABLE 3.3
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS – ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SUBSURFACE)

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		92D	97D	98D	99D	100D	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	<1.0	**1.2**	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**1.2**	**1.7**	**4.5**	**3.7**	**6.8**	10	10	10	10	290
Lead	mg/kg	**250**	**60**	**90**	**44**	**38**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		101D	102D	103D	104D	105D	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**5.4**	**2.0**	**7.4**	**3.0**	**3.8**	10	10	10	10	290
Lead	mg/kg	**49**	**94**	**150**	**43**	**60**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010B
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL
6.8	Sample result exceeds its Residential SRL and non-Residential SRL but is less than its Minimum GPL

TABLE 3.3
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SUBSURFACE)

Metals Analytes	Unit	Analytical Test Results		Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number		Carcinogen		Non-Carcinogen		
		106D	107D	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**3.2**	**6.4**	10	10	10	10	290
Lead	mg/kg	**150**	**140**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010B
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL
6.8	Sample result exceeds its Residential SRL and non-Residential SRL but is less than its Minimum GPL

TABLE 3.4
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS – ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (WASH)

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		WASH 1	WASH 2	WASH 3	WASH 4	WASH 5	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	**27**	**30**	**26**	**18**	**3.5**	NE	NE	31	410	35
Arsenic	mg/kg	**6.2**	**6.8**	**5.8**	**4.6**	**4.4**	10	10	10	10	290
Lead	mg/kg	**11,000**	**10,000**	**8,700**	**4,900**	**840**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		WASH 6	WASH 7	WASH 7	WASH 8	WASH 9	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	**4.5**	**1.1**	<1.0	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**1.9**	<1.0	**2.6**	**4.2**	**4.5**	10	10	10	10	290
Lead	mg/kg	**1,400**	**270**	**220**	**390**	**590**	NE	NE	400	800	290

Notes:

Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010B

Analytical results in **bold** exceed Laboratory Reporting Limit

SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007

Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.

mg/kg – milligrams per kilogram

NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL
6.8	Sample result exceeds its Minimum GPL and Residential SRL but is less than its non-Residential SRL

TABLE 3.4
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS – ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (WASH)

Metals Analytes	Unit	Analytical Test Results Sample Number					Residential SRLs Carcinogen		Residential SRLs Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		WASH 10	WASH 11	WASH 12	WASH 13	WASH 14	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**3.6**	**3.7**	**2.7**	**4.4**	**5.9**	10	10	10	10	290
Lead	mg/kg	**150**	**170**	**91**	**240**	**210**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results Sample Number	Residential SRLs Carcinogen		Residential SRLs Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		WASH 15	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**3.1**	10	10	10	10	290
Lead	mg/kg	**230**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010B
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL
6.8	Sample result exceeds its Minimum GPL and Residential SRL but is less than its non-Residential SRL

TABLE 3.5
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (BACKGROUND)

Metals Analytes	Unit	Analytical Test Results			Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number			Carcinogen		Non-Carcinogen		
		B-1	B-2	B-3	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	<1.0	**1.4**	NE	NE	31	410	35
Arsenic	mg/kg	**8.4**	**1.9**	**7.9**	10	10	10	10	290
Lead	mg/kg	**100**	**18**	**23**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results			Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number			Carcinogen		Non-Carcinogen		
		B-4	B-5A	B-5B	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.0	<1.0	<1.0	NE	NE	31	410	35
Arsenic	mg/kg	**2.2**	**3.3**	0.62	10	10	10	10	290
Lead	mg/kg	**40**	**22**	**2.2**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010B
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

TABLE 3.6
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SURFACE)

PAH Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPLs
		Sample Number					Carcinogen		Non-Carcinogen		
		31S	32S	33S	39S	40S	10^{-6} Risk	10^{-5} Risk			
Anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	22,000	240,000	1.02[a,b]
Acenaphthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	3,700	29,000	21.19[a,b]
Acenaphthylene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(a)anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	1.69[a,c]
Benzo(a)pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.069	0.69	NE	2.1	0.94[a,c]
Benzo(b)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.90[a,c]
Benzo(g,h,i)perylene	mg/kg	<.020	<.020	<.020	**0.024**	<.020	NE	NE	NE	NE	N/A
Benzo(k)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	6.9	6.9	NE	210	0.47[a,c]
Chrysene	mg/kg	**0.022**	<.020	<.020	**0.022**	<.020	68	680	NE	2,000	0.64[a,b]
Dibenz(a,h)anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.069	0.69	NE	2.1	4.75[a,c]
Fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,300	22,000	14.33[a,c]
Fluorene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,700	26,000	26.41[a,b]
Indeno(1,2,3-cd)pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.38[a,c]
Naphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	56	190	40.06[a,b]
Phenanthrene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Pyrene	mg/kg	**0.021**	<.020	<.020	**0.023**	<.020	NE	NE	2,300	29,000	14.19[a,b]
1-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
2-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A

Table Notes found at end of table

TABLE 3.6
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SURFACE)

PAH Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPLs
		Sample Number					Carcinogen		Non-Carcinogen		
		41S	42S	46S	47S	48S	10^{-6} Risk	10^{-5} Risk			
Anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	22,000	240,000	1.02[a,b]
Acenaphthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	3,700	29,000	21.19[a,b]
Acenaphthylene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(a)anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	1.69[a,c]
Benzo(a)pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.069	0.69	NE	2.1	0.94[a,c]
Benzo(b)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.90[a,c]
Benzo(g,h,i)perylene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(k)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	6.9	6.9	NE	210	0.47[a,c]
Chrysene	mg/kg	<.020	<.020	<.020	<.020	<.020	68	680	NE	2,000	0.64[a,b]
Dibenz(a,h)anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.069	0.69	NE	2.1	4.75[a,c]
Fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,300	22,000	14.33[a,c]
Fluorene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,700	26,000	26.41[a,b]
Indeno(1,2,3-cd)pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.38[a,c]
Naphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	56	190	40.06[a,b]
Phenanthrene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,300	29,000	14.19[a,b]
1-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
2-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A

Table Notes found at end of table

TABLE 3.6
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SURFACE)

PAH Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPLs
		Sample Number					Carcinogen		Non-Carcinogen		
		52S	53S	54S	58S	59S	10^{-6} Risk	10^{-5} Risk			
Anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	22,000	240,000	1.02[a,b]
Acenaphthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	3,700	29,000	21.19[a,b]
Acenaphthylene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(a)anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	1.69[a,c]
Benzo(a)pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.069	0.69	NE	2.1	0.94[a,c]
Benzo(b)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.90[a,c]
Benzo(g,h,i)perylene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(k)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	6.9	6.9	NE	210	0.47[a,c]
Chrysene	mg/kg	<.020	<.020	<.020	<.020	<.020	68	680	NE	2,000	0.64[a,b]
Dibenz(a,h)anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.069	0.69	NE	2.1	4.75[a,c]
Fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,300	22,000	14.33[a,c]
Fluorene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,700	26,000	26.41[a,b]
Indeno(1,2,3-cd)pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.38[a,c]
Naphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	56	190	40.06[a,b]
Phenanthrene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,300	29,000	14.19[a,b]
1-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
2-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A

Table Notes found at end of table

TABLE 3.6
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SURFACE)

PAH Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPLs
		Sample Number					Carcinogen		Non-Carcinogen		
		62S	63S	64S	71S	72S	10^{-6} Risk	10^{-5} Risk			
Anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	22,000	240,000	1.02[a,b]
Acenaphthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	3,700	29,000	21.19[a,b]
Acenaphthylene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(a)anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	1.69[a,c]
Benzo(a)pyrene	mg/kg	<.020	<.020	<.020	**0.049**	<.020	0.069	0.69	NE	2.1	0.94[a,c]
Benzo(b)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.90[a,c]
Benzo(g,h,i)perylene	mg/kg	<.020	<.020	<.020	<.020	**0.034**	NE	NE	NE	NE	N/A
Benzo(k)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	6.9	6.9	NE	210	0.47[a,c]
Chrysene	mg/kg	<.020	<.020	<.020	<.020	<.020	68	680	NE	2,000	0.64[a,b]
Dibenz(a,h)anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.069	0.69	NE	2.1	4.75[a,c]
Fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,300	22,000	14.33[a,c]
Fluorene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,700	26,000	26.41[a,b]
Indeno(1,2,3-cd)pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.38[a,c]
Naphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	56	190	40.06[a,b]
Phenanthrene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,300	29,000	14.19[a,b]
1-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
2-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A

Table Notes found at end of table

TABLE 3.6
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SURFACE)

PAH Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPLs
		Sample Number					Carcinogen		Non-Carcinogen		
		73S	74S	75S	76S	77S	10^{-6} Risk	10^{-5} Risk			
Anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	22,000	240,000	1.02[a,b]
Acenaphthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	3,700	29,000	21.19[a,b]
Acenaphthylene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(a)anthracene	mg/kg	<.020	<.020	<.020	<.020	**0.031**	0.69	6.9	NE	21	1.69[a,c]
Benzo(a)pyrene	mg/kg	<.020	<.020	<.020	<.020	**0.21**	0.069	0.69	NE	2.1	0.94[a,c]
Benzo(b)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.90[a,c]
Benzo(g,h,i)perylene	mg/kg	<.020	<.020	<.020	<.020	**0.055**	NE	NE	NE	NE	N/A
Benzo(k)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	6.9	6.9	NE	210	0.47[a,c]
Chrysene	mg/kg	<.020	<.020	<.020	<.020	**0.061**	68	680	NE	2,000	0.64[a,b]
Dibenz(a,h)anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.069	0.69	NE	2.1	4.75[a,c]
Fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,300	22,000	14.33[a,c]
Fluorene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,700	26,000	26.41[a,b]
Indeno(1,2,3-cd)pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.38[a,c]
Naphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	56	190	40.06[a,b]
Phenanthrene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Pyrene	mg/kg	<.020	<.020	<.020	<.020	**0.061**	NE	NE	2,300	29,000	14.19[a,b]
1-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
2-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A

Table Notes found at end of table

TABLE 3.6
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SURFACE)

PAH Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPLs
		Sample Number					Carcinogen		Non-Carcinogen		
		78S	79S	80S	88S	89S	10^{-6} Risk	10^{-5} Risk			
Anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	22,000	240,000	1.02[a,b]
Acenaphthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	3,700	29,000	21.19[a,b]
Acenaphthylene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(a)anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	1.69[a,c]
Benzo(a)pyrene	mg/kg	<.020	<.020	<.020	**0.061**	<.020	0.069	0.69	NE	2.1	0.94[a,c]
Benzo(b)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.90[a,c]
Benzo(g,h,i)perylene	mg/kg	<.020	<.020	<.020	**0.024**	<.020	NE	NE	NE	NE	N/A
Benzo(k)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	6.9	6.9	NE	210	0.47[a,c]
Chrysene	mg/kg	<.020	<.020	<.020	**0.023**	<.020	68	680	NE	2,000	0.64[a,b]
Dibenz(a,h)anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.069	0.69	NE	2.1	4.75[a,c]
Fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,300	22,000	14.33[a,c]
Fluorene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,700	26,000	26.41[a,b]
Indeno(1,2,3-cd)pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.38[a,c]
Naphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	56	190	40.06[a,b]
Phenanthrene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Pyrene	mg/kg	<.020	<.020	<.020	**0.026**	<.020	NE	NE	2,300	29,000	14.19[a,b]
1-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
2-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A

Table Notes found at end of table

TABLE 3.6
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SURFACE)

PAH Analytes	Unit	Analytical Test Results				Residential SRLs			Non-Residential SRLs	Minimum GPLs
		Sample Number				Carcinogen		Non-Carcinogen		
		90S	92S	210A	210B	10^{-6} Risk	10^{-5} Risk			
Anthracene	mg/kg	<.020	<.020	<.020	<.020	NE	NE	22,000	240,000	1.02[a,b]
Acenaphthene	mg/kg	<.020	<.020	<.020	<.020	NE	NE	3,700	29,000	21.19[a,b]
Acenaphthylene	mg/kg	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(a)anthracene	mg/kg	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	1.69[a,c]
Benzo(a)pyrene	mg/kg	<.020	**0.047**	**0.059**	**0.071**	0.069	0.69	NE	2.1	0.94[a,c]
Benzo(b)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.90[a,c]
Benzo(g,h,i)perylene	mg/kg	<.020	<.020	**0.023**	<.020	NE	NE	NE	NE	N/A
Benzo(k)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	6.9	6.9	NE	210	0.47[a,c]
Chrysene	mg/kg	<.020	**0.021**	<.020	<.020	68	680	NE	2,000	0.64[a,b]
Dibenz(a,h)anthracene	mg/kg	<.020	<.020	<.020	<.020	0.069	0.69	NE	2.1	4.75[a,c]
Fluoranthene	mg/kg	<.020	<.020	<.020	<.020	NE	NE	2,300	22,000	14.33[a,c]
Fluorene	mg/kg	<.020	<.020	<.020	<.020	NE	NE	2,700	26,000	26.41[a,b]
Indeno(1,2,3-cd)pyrene	mg/kg	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.38[a,c]
Naphthalene	mg/kg	<.020	<.020	<.020	<.020	NE	NE	56	190	40.06[a,b]
Phenanthrene	mg/kg	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Pyrene	mg/kg	<.020	**0.025**	<.020	**0.021**	NE	NE	2,300	29,000	14.19[a,b]
1-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
2-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A

Table Notes found at end of table

TABLE 3.6
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SURFACE)

Notes:
Polynuclear Aromatic Hydrocarbons (PAHs) analyzed using EPA Methods 8310
SRLs – Soil Remediation Levels established by the Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, calculated using Spreadsheet GPL dated January 1, 2013 (See Note 1)
mg/kg – milligrams per kilogram
N/A – Not Applicable
NE – Not Established
Analytical results in **bold** exceed Laboratory Reporting Limit
1 – Minimum GPLs calculated using Spreadsheet GPL. Minimum GPLs calculated for analytes with an established Aquifer Water Quality Standard (Arizona Administrative Code, Title 18, Chapter 11, Appendix A, Table 1, August 2, 2016)
a – Calculated minimum GPL based on saturation limit
b – Minimum GPL calculated using Henry's Law Constant (H'), soil organic carbon-water partitioning coefficient (Koc), and Solubility (S) from Spreadsheet GPL dated January 1, 2013, remaining constants are GPL defaults from Spreadsheet GPL dated January 1, 2013, and Aquifer Water Quality Standard (Arizona Administrative Code, Title 18, Chapter 11, Appendix A, Table 1, August 2, 2016)
c – Minimum GPL calculated using Henry's Law Constant (H'), soil organic carbon-water partitioning coefficient (Koc), and Solubility (S) from EPA Regional Screening Level (RSL) Chemical-specific Parameters Supporting Table (May 2018), remaining constants are GPL defaults from Spreadsheet GPL dated January 1, 2013, and Aquifer Water Quality Standard (Arizona Administrative Code, Title 18, Chapter 11, Appendix A, Table 1, August 2, 2016)

0.088	Sample result exceeds its 10^{-6} Residential SRL but is less than its 10^{-5} Residential and non-Residential SRLs
16	Sample result exceeds its Residential SRL but is less than its non-Residential SRL
9.8	Sample result exceeds its Residential and non-Residential SRLs

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TABLE 3.7
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SUBSURFACE)

PAH Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPLs
		Sample Number					Carcinogen		Non-Carcinogen		
		31D	32D	33D	39D	40D	10^{-6} Risk	10^{-5} Risk			
Anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	22,000	240,000	1.02[a,b]
Acenaphthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	3,700	29,000	21.19[a,b]
Acenaphthylene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(a)anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	1.69[a,c]
Benzo(a)pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.069	0.69	NE	2.1	0.94[a,c]
Benzo(b)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.90[a,c]
Benzo(g,h,i)perylene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(k)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	6.9	6.9	NE	210	0.47[a,c]
Chrysene	mg/kg	<.020	<.020	<.020	<.020	<.020	68	680	NE	2,000	0.64[a,b]
Dibenz(a,h)anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.069	0.69	NE	2.1	4.75[a,c]
Fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,300	22,000	14.33[a,c]
Fluorene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,700	26,000	26.41[a,b]
Indeno(1,2,3-cd)pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.38[a,c]
Naphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	56	190	40.06[a,b]
Phenanthrene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,300	29,000	14.19[a,b]
1-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
2-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A

Table Notes found at end of table

TABLE 3.7
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SUBSURFACE)

PAH Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPLs
		Sample Number					Carcinogen		Non-Carcinogen		
		41D	42D	46D	47D	48D	10^{-6} Risk	10^{-5} Risk			
Anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	22,000	240,000	1.02[a,b]
Acenaphthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	3,700	29,000	21.19[a,b]
Acenaphthylene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(a)anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	1.69[a,c]
Benzo(a)pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.069	0.69	NE	2.1	0.94[a,c]
Benzo(b)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.90[a,c]
Benzo(g,h,i)perylene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(k)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	6.9	6.9	NE	210	0.47[a,c]
Chrysene	mg/kg	<.020	<.020	<.020	<.020	<.020	68	680	NE	2,000	0.64[a,b]
Dibenz(a,h)anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.069	0.69	NE	2.1	4.75[a,c]
Fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,300	22,000	14.33[a,c]
Fluorene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,700	26,000	26.41[a,b]
Indeno(1,2,3-cd)pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.38[a,c]
Naphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	56	190	40.06[a,b]
Phenanthrene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,300	29,000	14.19[a,b]
1-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
2-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A

Table Notes found at end of table

TABLE 3.7
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SUBSURFACE)

PAH Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPLs
		Sample Number					Carcinogen		Non-Carcinogen		
		52D	53D	54D	58D	59D	10^{-6} Risk	10^{-5} Risk			
Anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	22,000	240,000	1.02[a,b]
Acenaphthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	3,700	29,000	21.19[a,b]
Acenaphthylene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(a)anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	1.69[a,c]
Benzo(a)pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.069	0.69	NE	2.1	0.94[a,c]
Benzo(b)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.90[a,c]
Benzo(g,h,i)perylene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(k)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	6.9	6.9	NE	210	0.47[a,c]
Chrysene	mg/kg	<.020	<.020	<.020	<.020	<.020	68	680	NE	2,000	0.64[a,b]
Dibenz(a,h)anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.069	0.69	NE	2.1	4.75[a,c]
Fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,300	22,000	14.33[a,c]
Fluorene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,700	26,000	26.41[a,b]
Indeno(1,2,3-cd)pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.38[a,c]
Naphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	56	190	40.06[a,b]
Phenanthrene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,300	29,000	14.19[a,b]
1-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
2-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A

Table Notes found at end of table

TABLE 3.7
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SUBSURFACE)

PAH Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPLs
		Sample Number					Carcinogen		Non-Carcinogen		
		62D	63D	64D	71D	72D	10^{-6} Risk	10^{-5} Risk			
Anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	22,000	240,000	1.02[a,b]
Acenaphthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	3,700	29,000	21.19[a,b]
Acenaphthylene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(a)anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	1.69[a,c]
Benzo(a)pyrene	mg/kg	<.020	<.020	<.020	**0.096**	<.020	0.069	0.69	NE	2.1	0.94[a,c]
Benzo(b)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.90[a,c]
Benzo(g,h,i)perylene	mg/kg	<.020	<.020	<.020	**0.025**	<.020	NE	NE	NE	NE	N/A
Benzo(k)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	6.9	6.9	NE	210	0.47[a,c]
Chrysene	mg/kg	<.020	<.020	<.020	**0.030**	<.020	68	680	NE	2,000	0.64[a,b]
Dibenz(a,h)anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.069	0.69	NE	2.1	4.75[a,c]
Fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,300	22,000	14.33[a,c]
Fluorene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,700	26,000	26.41[a,b]
Indeno(1,2,3-cd)pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.38[a,c]
Naphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	56	190	40.06[a,b]
Phenanthrene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Pyrene	mg/kg	<.020	<.020	<.020	**0.026**	<.020	NE	NE	2,300	29,000	14.19[a,b]
1-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
2-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A

Table Notes found at end of table

TABLE 3.7
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SUBSURFACE)

PAH Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPLs
		Sample Number					Carcinogen		Non-Carcinogen		
		73D	74D	75D	76D	77D	10^{-6} Risk	10^{-5} Risk			
Anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	22,000	240,000	1.02[a,b]
Acenaphthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	3,700	29,000	21.19[a,b]
Acenaphthylene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(a)anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	1.69[a,c]
Benzo(a)pyrene	mg/kg	<.020	<.020	<.020	<.020	**0.048**	0.069	0.69	NE	2.1	0.94[a,c]
Benzo(b)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.90[a,c]
Benzo(g,h,i)perylene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(k)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	6.9	6.9	NE	210	0.47[a,c]
Chrysene	mg/kg	<.020	<.020	<.020	<.020	<.020	68	680	NE	2,000	0.64[a,b]
Dibenz(a,h)anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.069	0.69	NE	2.1	4.75[a,c]
Fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,300	22,000	14.33[a,c]
Fluorene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,700	26,000	26.41[a,b]
Indeno(1,2,3-cd)pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.38[a,c]
Naphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	56	190	40.06[a,b]
Phenanthrene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,300	29,000	14.19[a,b]
1-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
2-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A

Table Notes found at end of table

TABLE 3.7
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SUBSURFACE)

PAH Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPLs
		Sample Number					Carcinogen		Non-Carcinogen		
		78D	79D	80D	88D	89D	10^{-6} Risk	10^{-5} Risk			
Anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	22,000	240,000	1.02[a,b]
Acenaphthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	3,700	29,000	21.19[a,b]
Acenaphthylene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(a)anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	1.69[a,c]
Benzo(a)pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.069	0.69	NE	2.1	0.94[a,c]
Benzo(b)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.90[a,c]
Benzo(g,h,i)perylene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(k)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	6.9	6.9	NE	210	0.47[a,c]
Chrysene	mg/kg	<.020	<.020	<.020	<.020	<.020	68	680	NE	2,000	0.64[a,b]
Dibenz(a,h)anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.069	0.69	NE	2.1	4.75[a,c]
Fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,300	22,000	14.33[a,c]
Fluorene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,700	26,000	26.41[a,b]
Indeno(1,2,3-cd)pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.38[a,c]
Naphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	56	190	40.06[a,b]
Phenanthrene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,300	29,000	14.19[a,b]
1-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
2-Methylnaphthalene	mg/kg	**0.020**	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A

Table Notes found at end of table

TABLE 3.7
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SUBSURFACE)

PAH Analytes	Unit	Analytical Test Results		Residential SRLs			Non-Residential SRLs	Minimum GPLs
		Sample Number		Carcinogen		Non-Carcinogen		
		90D	92D	10^{-6} Risk	10^{-5} Risk			
Anthracene	mg/kg	<.020	<.020	NE	NE	22,000	240,000	1.02[a,b]
Acenaphthene	mg/kg	<.020	<.020	NE	NE	3,700	29,000	21.19[a,b]
Acenaphthylene	mg/kg	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(a)anthracene	mg/kg	<.020	<.020	0.69	6.9	NE	21	1.69[a,c]
Benzo(a)pyrene	mg/kg	<.020	<.020	0.069	0.69	NE	2.1	0.94[a,c]
Benzo(b)fluoranthene	mg/kg	<.020	<.020	0.69	6.9	NE	21	0.90[a,c]
Benzo(g,h,i)perylene	mg/kg	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(k)fluoranthene	mg/kg	<.020	<.020	6.9	6.9	NE	210	0.47[a,c]
Chrysene	mg/kg	<.020	<.020	68	680	NE	2,000	0.64[a,b]
Dibenz(a,h)anthracene	mg/kg	<.020	<.020	0.069	0.69	NE	2.1	4.75[a,c]
Fluoranthene	mg/kg	<.020	<.020	NE	NE	2,300	22,000	14.33[a,c]
Fluorene	mg/kg	<.020	<.020	NE	NE	2,700	26,000	26.41[a,b]
Indeno(1,2,3-cd)pyrene	mg/kg	<.020	<.020	0.69	6.9	NE	21	0.38[a,c]
Naphthalene	mg/kg	<.020	<.020	NE	NE	56	190	40.06[a,b]
Phenanthrene	mg/kg	<.020	<.020	NE	NE	NE	NE	N/A
Pyrene	mg/kg	<.020	<.020	NE	NE	2,300	29,000	14.19[a,b]
1-Methylnaphthalene	mg/kg	<.020	<.020	NE	NE	NE	NE	N/A
2-Methylnaphthalene	mg/kg	<.020	<.020	NE	NE	NE	NE	N/A

Table Notes found at end of table

TABLE 3.7
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS – ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (SUBSURFACE)

Notes:

Polynuclear Aromatic Hydrocarbons (PAHs) analyzed using EPA Methods 8310

SRLs – Soil Remediation Levels established by the Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007

Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, calculated using Spreadsheet GPL dated January 1, 2013 (See Note 1)

mg/kg – milligrams per kilogram

N/A – Not Applicable

NE – Not Established

Analytical results in **bold** exceed Laboratory Reporting Limit

1 – Minimum GPLs calculated using Spreadsheet GPL. Minimum GPLs calculated for analytes with an established Aquifer Water Quality Standard (Arizona Administrative Code, Title 18, Chapter 11, Appendix A, Table 1, August 2, 2016)

a – Calculated minimum GPL based on saturation limit

b – Minimum GPL calculated using Henry's Law Constant (H'), soil organic carbon-water partitioning coefficient (Koc), and Solubility (S) from Spreadsheet GPL dated January 1, 2013, remaining constants are GPL defaults from Spreadsheet GPL dated January 1, 2013, and Aquifer Water Quality Standard (Arizona Administrative Code, Title 18, Chapter 11, Appendix A, Table 1, August 2, 2016)

c – Minimum GPL calculated using Henry's Law Constant (H'), soil organic carbon-water partitioning coefficient (Koc), and Solubility (S) from EPA Regional Screening Level (RSL) Chemical-specific Parameters Supporting Table (May 2018), remaining constants are GPL defaults from Spreadsheet GPL dated January 1, 2013, and Aquifer Water Quality Standard (Arizona Administrative Code, Title 18, Chapter 11, Appendix A, Table 1, August 2, 2016)

0.088	Sample result exceeds its 10^{-6} Residential SRL but is less than its 10^{-5} Residential and non-Residential SRLs
16	Sample result exceeds its Residential SRL but is less than its non-Residential SRL
9.8	Sample result exceeds its Residential and non-Residential SRLs

Table Notes found at end of table

TABLE 3.8
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS -
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (WASH)

PAH Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPLs
		Sample Number					Carcinogen		Non-Carcinogen		
		WASH 1	WASH 2	WASH 3	WASH 4	WASH 5	10^{-6} Risk	10^{-5} Risk			
Anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	22,000	240,000	1.02[a,b]
Acenaphthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	3,700	29,000	21.19[a,b]
Acenaphthylene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(a)anthracene	mg/kg	**0.068**	**0.075**	**0.022**	<.020	<.020	0.69	6.9	NE	21	1.69[a,c]
Benzo(a)pyrene	mg/kg	**0.59**	**0.44**	**0.19**	<.020	<.020	0.069	0.69	NE	2.1	0.94[a,c]
Benzo(b)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.90[a,c]
Benzo(g,h,i)perylene	mg/kg	**0.20**	**0.087**	**0.057**	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(k)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	6.9	6.9	NE	210	0.47[a,c]
Chrysene	mg/kg	**0.12**	<.020	**0.41**	<.020	<.020	68	680	NE	2,000	0.64[a,b]
Dibenz(a,h)anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.069	0.69	NE	2.1	4.75[a,c]
Fluoranthene	mg/kg	**0.037**	<.020	<.020	<.020	<.020	NE	NE	2,300	22,000	14.33[a,c]
Fluorene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,700	26,000	26.41[a,b]
Indeno(1,2,3-cd)pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.38[a,c]
Naphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	56	190	40.06[a,b]
Phenanthrene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Pyrene	mg/kg	**0.15**	**0.10**	**0.051**	<.020	<.020	NE	NE	2,300	29,000	14.19[a,b]
1-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
2-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A

Table Notes found at end of table

TABLE 3.8
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS -
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (WASH)

PAH Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPLs
		Sample Number					Carcinogen		Non-Carcinogen		
		WASH 6	WASH 7	WASH 7	WASH 8	WASH 9	10^{-6} Risk	10^{-5} Risk			
Anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	22,000	240,000	1.02[a,b]
Acenaphthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	3,700	29,000	21.19[a,b]
Acenaphthylene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(a)anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	1.69[a,c]
Benzo(a)pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.069	0.69	NE	2.1	0.94[a,c]
Benzo(b)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.90[a,c]
Benzo(g,h,i)perylene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(k)fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	6.9	6.9	NE	210	0.47[a,c]
Chrysene	mg/kg	<.020	<.020	<.020	<.020	<.020	68	680	NE	2,000	0.64[a,b]
Dibenz(a,h)anthracene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.069	0.69	NE	2.1	4.75[a,c]
Fluoranthene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,300	22,000	14.33[a,c]
Fluorene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,700	26,000	26.41[a,b]
Indeno(1,2,3-cd)pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	0.69	6.9	NE	21	0.38[a,c]
Naphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	56	190	40.06[a,b]
Phenanthrene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Pyrene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	2,300	29,000	14.19[a,b]
1-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A
2-Methylnaphthalene	mg/kg	<.020	<.020	<.020	<.020	<.020	NE	NE	NE	NE	N/A

Table Notes found at end of table

TABLE 3.8
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS -
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (WASH)

PAH Analytes	Unit	Analytical Test Results	Residential SRLs			Non-Residential SRLs	Minimum GPLs
		Sample Number	Carcinogen		Non-Carcinogen		
		WASH 10	10^{-6} Risk	10^{-5} Risk			
Anthracene	mg/kg	<.020	NE	NE	22,000	240,000	1.02[a,b]
Acenaphthene	mg/kg	<.020	NE	NE	3,700	29,000	21.19[a,b]
Acenaphthylene	mg/kg	<.020	NE	NE	NE	NE	N/A
Benzo(a)anthracene	mg/kg	<.020	0.69	6.9	NE	21	1.69[a,c]
Benzo(a)pyrene	mg/kg	<.020	0.069	0.69	NE	2.1	0.94[a,c]
Benzo(b)fluoranthene	mg/kg	<.020	0.69	6.9	NE	21	0.90[a,c]
Benzo(g,h,i)perylene	mg/kg	<.020	NE	NE	NE	NE	N/A
Benzo(k)fluoranthene	mg/kg	<.020	6.9	6.9	NE	210	0.47[a,c]
Chrysene	mg/kg	<.020	68	680	NE	2,000	0.64[a,b]
Dibenz(a,h)anthracene	mg/kg	<.020	0.069	0.69	NE	2.1	4.75[a,c]
Fluoranthene	mg/kg	<.020	NE	NE	2,300	22,000	14.33[a,c]
Fluorene	mg/kg	<.020	NE	NE	2,700	26,000	26.41[a,b]
Indeno(1,2,3-cd)pyrene	mg/kg	<.020	0.69	6.9	NE	21	0.38[a,c]
Naphthalene	mg/kg	<.020	NE	NE	56	190	40.06[a,b]
Phenanthrene	mg/kg	<.020	NE	NE	NE	NE	N/A
Pyrene	mg/kg	<.020	NE	NE	2,300	29,000	14.19[a,b]
1-Methylnaphthalene	mg/kg	<.020	NE	NE	NE	NE	N/A
2-Methylnaphthalene	mg/kg	<.020	NE	NE	NE	NE	N/A

Table Notes found at end of table

TABLE 3.8
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS -
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (WASH)

Notes:

Polynuclear Aromatic Hydrocarbons (PAHs) analyzed using EPA Methods 8310

SRLs – Soil Remediation Levels established by the Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007

Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, calculated using Spreadsheet GPL dated January 1, 2013 (See Note 1)

mg/kg – milligrams per kilogram

N/A – Not Applicable

NE – Not Established

Analytical results in **bold** exceed Laboratory Reporting Limit

1 – Minimum GPLs calculated using Spreadsheet GPL. Minimum GPLs calculated for analytes with an established Aquifer Water Quality Standard (Arizona Administrative Code, Title 18, Chapter 11, Appendix A, Table 1, August 2, 2016)

a – Calculated minimum GPL based on saturation limit

b – Minimum GPL calculated using Henry's Law Constant (H'), soil organic carbon-water partitioning coefficient (Koc), and Solubility (S) from Spreadsheet GPL dated January 1, 2013, remaining constants are GPL defaults from Spreadsheet GPL dated January 1, 2013, and Aquifer Water Quality Standard (Arizona Administrative Code, Title 18, Chapter 11, Appendix A, Table 1, August 2, 2016)

c – Minimum GPL calculated using Henry's Law Constant (H'), soil organic carbon-water partitioning coefficient (Koc), and Solubility (S) from EPA Regional Screening Level (RSL) Chemical-specific Parameters Supporting Table (May 2018), remaining constants are GPL defaults from Spreadsheet GPL dated January 1, 2013, and Aquifer Water Quality Standard (Arizona Administrative Code, Title 18, Chapter 11, Appendix A, Table 1, August 2, 2016)

0.088	Sample result exceeds its 10^{-6} Residential SRL but is less than its 10^{-5} Residential and non-Residential SRLs
16	Sample result exceeds its Residential SRL but is less than its non-Residential SRL
9.8	Sample result exceeds its Residential and non-Residential SRLs

Table Notes found at end of table

TABLE 3.9
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS -
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (BACKGROUND)

PAH Analytes	Unit	Analytical Test Results			Residential SRLs			Non-Residential SRLs	Minimum GPLs
		Sample Number			Carcinogen		Non-Carcinogen		
		B-1	B-2	B-3	10^{-6} Risk	10^{-5} Risk			
Anthracene	mg/kg	<.020	<.020	<.020	NE	NE	22,000	240,000	1.02[a,b]
Acenaphthene	mg/kg	<.020	<.020	<.020	NE	NE	3,700	29,000	21.19[a,b]
Acenaphthylene	mg/kg	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(a)anthracene	mg/kg	<.020	<.020	<.020	0.69	6.9	NE	21	1.69[a,c]
Benzo(a)pyrene	mg/kg	<.020	<.020	<.020	0.069	0.69	NE	2.1	0.94[a,c]
Benzo(b)fluoranthene	mg/kg	<.020	<.020	<.020	0.69	6.9	NE	21	0.90[a,c]
Benzo(g,h,i)perylene	mg/kg	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Benzo(k)fluoranthene	mg/kg	<.020	<.020	<.020	6.9	6.9	NE	210	0.47[a,c]
Chrysene	mg/kg	<.020	<.020	<.020	68	680	NE	2,000	0.64[a,b]
Dibenz(a,h)anthracene	mg/kg	<.020	<.020	<.020	0.069	0.69	NE	2.1	4.75[a,c]
Fluoranthene	mg/kg	<.020	<.020	<.020	NE	NE	2,300	22,000	14.33[a,c]
Fluorene	mg/kg	<.020	<.020	<.020	NE	NE	2,700	26,000	26.41[a,b]
Indeno(1,2,3-cd)pyrene	mg/kg	<.020	<.020	<.020	0.69	6.9	NE	21	0.38[a,c]
Naphthalene	mg/kg	<.020	<.020	<.020	NE	NE	56	190	40.06[a,b]
Phenanthrene	mg/kg	<.020	<.020	<.020	NE	NE	NE	NE	N/A
Pyrene	mg/kg	<.020	<.020	<.020	NE	NE	2,300	29,000	14.19[a,b]
1-Methylnaphthalene	mg/kg	<.020	<.020	<.020	NE	NE	NE	NE	N/A
2-Methylnaphthalene	mg/kg	<.020	<.020	<.020	NE	NE	NE	NE	N/A

Table Notes found at end of table

TABLE 3.9
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS -
ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT (BACKGROUND)

Notes:

Polynuclear Aromatic Hydrocarbons (PAHs) analyzed using EPA Methods 8310
SRLs – Soil Remediation Levels established by the Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, calculated using Spreadsheet GPL dated January 1, 2013 (See Note 1)
mg/kg – milligrams per kilogram
N/A – Not Applicable
NE – Not Established
Analytical results in **bold** exceed Laboratory Reporting Limit
1 – Minimum GPLs calculated using Spreadsheet GPL. Minimum GPLs calculated for analytes with an established Aquifer Water Quality Standard (Arizona Administrative Code, Title 18, Chapter 11, Appendix A, Table 1, August 2, 2016)
a – Calculated minimum GPL based on saturation limit
b – Minimum GPL calculated using Henry's Law Constant (H'), soil organic carbon-water partitioning coefficient (Koc), and Solubility (S) from Spreadsheet GPL dated January 1, 2013, remaining constants are GPL defaults from Spreadsheet GPL dated January 1, 2013, and Aquifer Water Quality Standard (Arizona Administrative Code, Title 18, Chapter 11, Appendix A, Table 1, August 2, 2016)
c – Minimum GPL calculated using Henry's Law Constant (H'), soil organic carbon-water partitioning coefficient (Koc), and Solubility (S) from EPA Regional Screening Level (RSL) Chemical-specific Parameters Supporting Table (May 2018), remaining constants are GPL defaults from Spreadsheet GPL dated January 1, 2013, and Aquifer Water Quality Standard (Arizona Administrative Code, Title 18, Chapter 11, Appendix A, Table 1, August 2, 2016)

Table Notes found at end of table

TABLE 3.10
SUMMARY OF LEACHABLE METALS CONCENTRATIONS IN SOIL SAMPLES AND REGULATORY STANDARDS-ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT

Analyte	Analytical Results (mg/l) Sample Number					Toxicity Characteristic Hazardous Waste Levels (TCLP)
	WD-1	WD-2	WD-3	WD-4	WD-5	
Extraction	TCLP					NA
Antimony	**5.8**	**2.6**	**1.6**	**2.0**	**0.19**	N/E
Arsenic	**0.11**	**0.19**	**0.068**	**0.055**	<0.050	5.0
Lead	**590**	**720**	**470**	**260**	**8.4**	5.0

Analyte	Analytical Results (mg/l) Sample Number				Toxicity Characteristic Hazardous Waste Levels (TCLP)
	WD-6	WD-7	WD-8	WD-9	
Extraction	TCLP				NA
Antimony	<0.050	**1.8**	**0.39**	**0.10**	N/E
Arsenic	<.0.050	<.0.050	**.10**	<0.050	5.0
Lead	**0.85**	**210**	**30.0**	**1.9**	5.0

Notes:
Samples prepared using EPA Methods 1311 for TCLP and analyzed using EPA Method 6010B
Analytical results in **bold** exceed Laboratory Reporting Limit
TCLP – Toxicity Characteristic Lead Procedure
Toxicity characteristic established by 40 Code of Federal Regulations (CFR) §261.24
mg/l – milligrams per kilogram
NA – Not Applicable
NE – Not Established

0.088 Sample result exceeds TCLP Level for toxicity characteristic for hazardous waste

TABLE 3.11
SUMMARY OF LEACHABLE POLYNUCLEAR AROMATIC HYDROCARBON CONCENTRATIONS IN SOIL SAMPLES – ALLWYN ENVIRONMENTAL PHASE II ESA DECEMBER 2009 REPORT `

Analyte	Analytical Results (mg/l)		
	Sample Number		
	WD-1	WD-2	WD-3
Extraction	SPLP		
Anthracene	<0.0001	<0.0001	<0.0001
Acenaphthene	<0.0001	<0.0001	<0.0001
Acenaphthylene	<0.0001	<0.0001	<0.0001
Benzo(a)anthracene	<0.0001	<0.0001	<0.0001
Benzo(a)pyrene	<0.0001	<0.0001	<0.0001
Benzo(b)fluoranthene	<0.0001	<0.0001	<0.0001
Benzo(g,h,i)perylene	<0.0001	<0.0001	<0.0001
Benzo(b)fluoranthene	<0.0001	<0.0001	<0.0001
Chrysene	<0.0001	<0.0001	<0.0001
Dibenz(a,h)anthracene	<0.0001	<0.0001	<0.0001
Fluoranthene	<0.0001	<0.0001	<0.0001
Fluorene	<0.0001	<0.0001	<0.0001
Indeno(1,2,3-cd)pyrene	<0.0001	<0.0001	<0.0001
Naphthalene	<0.001	<0.001	<0.001
Phenanthrene	<0.0001	<0.0001	<0.0001
Pyrene	<0.0001	<0.0001	<0.0001
1-Methylnaphthalene	<0.001	<0.001	<0.001
2-Methylnaphthalene	<0.001	<0.001	<0.001

Notes:
Samples prepared using EPA Methods 1312 for SPLP and analyzed using EPA Method 8310
Analytical results in **bold** exceed Laboratory Reporting Limit
SPLP – Synthetic Precipitation Leaching Procedure
mg/l – milligrams per kilogram

TABLE 3.12
SUMMARY OF LEAD IN SOIL SAMPLES AND REGULATORY STANDARDS – ALLWYN CONSULTANTS PHASE II ESA JULY 2017 REPORT (SURFACE)

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		G1-1	G2-1	G3-1	G4-1	G5-1	10^{-6} Risk	10^{-5} Risk			
Lead	mg/kg	**33.8**	**29.5**	**49.8**	**110**	**47.2**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		G6-1	G7-1	G8-1	G9-1	G10-1	10^{-6} Risk	10^{-5} Risk			
Lead	mg/kg	**40.9**	**141**	**187**	**3,010**	**8,850**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		G11-1	G12-1	G13-1	G14-1	G15-1	10^{-6} Risk	10^{-5} Risk			
Lead	mg/kg	**928**	**559**	**417**	**1,850**	**1,130**	NE	NE	400	800	290

Notes:
Lead analyzed using Environmental Protection Agency (EPA) Method 6010C
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality,* September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL

TABLE 3.12
SUMMARY OF LEAD IN SOIL SAMPLES AND REGULATORY STANDARDS – ALLWYN CONSULTANTS PHASE II ESA JULY 2017 REPORT (SURFACE)

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		G16-1	G17-1	G18-1	G19-1	G19-A-1	10^{-6} Risk	10^{-5} Risk			
Lead	mg/kg	**598**	**156**	**181**	**563**	**287**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		G19-B-1	G19-C-1	G19-D-1	G19-E-1	G19-F-1	10^{-6} Risk	10^{-5} Risk			
Lead	mg/kg	**603**	**1,960**	**224**	**553**	**892**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		G19-G-1	G19-H-1	G19-I-1	G20-1	G21-1	10^{-6} Risk	10^{-5} Risk			
Lead	mg/kg	**344**	**488**	**295**	**215**	**83.6**	NE	NE	400	800	290

Notes:
Lead analyzed using Environmental Protection Agency (EPA) Method 6010C
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality,* September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL

TABLE 3.12
SUMMARY OF LEAD IN SOIL SAMPLES AND REGULATORY STANDARDS – ALLWYN CONSULTANTS PHASE II ESA JULY 2017 REPORT (SURFACE)

Metals Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number					Carcinogen		Non-Carcinogen		
		G22-1	G23-1	G24-1	G25-1	G26-1	10^{-6} Risk	10^{-5} Risk			
Lead	mg/kg	**70.7**	**47.8**	**34.5**	**37.2**	**77.6**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number					Carcinogen		Non-Carcinogen		
		G27-1	G28-1	G29-1	G30-1	G31-1	10^{-6} Risk	10^{-5} Risk			
Lead	mg/kg	**66**	**285**	**102**	**77.2**	**61.5**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number					Carcinogen		Non-Carcinogen		
		G32-1	BERM 1-1	BERM 1-2	BERM 1-3	BERM 2-1-4	10^{-6} Risk	10^{-5} Risk			
Lead	mg/kg	**39**	**1,070**	**1,330**	**1,710**	**127**	NE	NE	400	800	290

Notes:
Lead analyzed using Environmental Protection Agency (EPA) Method 6010C
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality,* September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL

TABLE 3.12
SUMMARY OF LEAD IN SOIL SAMPLES AND REGULATORY STANDARDS – ALLWYN CONSULTANTS PHASE II ESA JULY 2017 REPORT (SURFACE)

Metals Analytes	Unit	Analytical Test Results		Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number		Carcinogen		Non-Carcinogen		
		BERM2-2-4	BERM2-3-4	10^{-6} Risk	10^{-5} Risk			
Lead	mg/kg	**412**	**76.4**	NE	NE	400	800	290

Notes:
Lead analyzed using Environmental Protection Agency (EPA) Method 6010C
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality,* September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL

TABLE 3.13
SUMMARY OF LEAD IN SOIL SAMPLES AND REGULATORY STANDARDS – ALLWYN CONSULTANTS PHASE II ESA JULY 2017 REPORT (SUBSURFACE)

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		G4-4	G7-4	G8-4	G9-4	G10-4	10^{-6} Risk	10^{-5} Risk			
Lead	mg/kg	**174**	**72.5**	**239**	**2,770**	**13,300**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		G11-4	G12-4	G13-4	G14-4	G15-4	10^{-6} Risk	10^{-5} Risk			
Lead	mg/kg	**1,330**	**105**	**986**	**1,460**	**1,410**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		G16-4	G17-4	G18-4	G19-A-4	G19-B-4	10^{-6} Risk	10^{-5} Risk			
Lead	mg/kg	**258**	**116**	**129**	**298**	**586**	NE	NE	400	800	290

Notes:
Lead analyzed using Environmental Protection Agency (EPA) Method 6010C
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL

TABLE 3.13
SUMMARY OF LEAD IN SOIL SAMPLES AND REGULATORY STANDARDS – ALLWYN CONSULTANTS PHASE II ESA JULY 2017 REPORT (SUBSURFACE)

Metals Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number					Carcinogen		Non-Carcinogen		
		G19-C-4	G19-D-4	G19-E-4	G19-F-4	G19-G-4	10^{-6} Risk	10^{-5} Risk			
Lead	mg/kg	**1,850**	**249**	**965**	**507**	**531**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number					Carcinogen		Non-Carcinogen		
		G19-H-4	G19-I-4	G20-4	G28-4	G29-4	10^{-6} Risk	10^{-5} Risk			
Lead	mg/kg	**343**	**138**	**222**	**278**	**135**	NE	NE	400	800	290

Notes:
Lead analyzed using Environmental Protection Agency (EPA) Method 6010C
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL

TABLE 3.13
SUMMARY OF LEAD IN SOIL SAMPLES AND REGULATORY STANDARDS – ALLWYN CONSULTANTS PHASE II ESA JULY 2017 REPORT (SUBSURFACE)

Metals Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number					Carcinogen		Non-Carcinogen		
		BERM1-1-1-4	BERM 1-2-4	BERM 1-3-4	BERM 2-1-4	BERM 2-2-4	10^{-6} Risk	10^{-5} Risk			
Lead	mg/kg	**5,060**	**4,430**	**2,080**	**1,240**	**66.1**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results	Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number	Carcinogen		Non-Carcinogen		
		BERM2-3-4	10^{-6} Risk	10^{-5} Risk			
Lead	mg/kg	**99.8**	NE	NE	400	800	290

Notes:
Lead analyzed using Environmental Protection Agency (EPA) Method 6010C
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL

TABLE 3.14
SUMMARY OF LEAD IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN CONSULTANTS LA LOMA GRANDE PHASE I ESA NOVEMBER 2017 REPORT (SURFACE)

Metals Analytes	Unit	Analytical Test Results				Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number				Carcinogen		Non-Carcinogen		
		G136	G137	G138	G139	10^{-6} Risk	10^{-5} Risk			
Lead	mg/kg	**140**	**126**	**120**	**130**	NE	NE	400	800	290

Notes:
Lead analyzed using Environmental Protection Agency (EPA) Method 6010C
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality,* September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL

TABLE 3.15
SUMMARY OF LEAD IN SOIL SAMPLES AND REGULATORY STANDARDS –
ALLWYN CONSULTANTS LA LOMA GRANDE PHASE I ESA NOVEMBER 2017 REPORT (SUBSURFACE)

Metals Analytes	Unit	Analytical Test Results				Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number				Carcinogen		Non-Carcinogen		
		G136	G137	G138	G139	10^{-6} Risk	10^{-5} Risk			
Lead	mg/kg	**141**	**129**	**103**	**149**	NE	NE	400	800	290

Notes:
Lead analyzed using Environmental Protection Agency (EPA) Method 6010C
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL

TABLE 3.16
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS –
PIKA PHASE II ESA MAY 2018 REPORT (SURFACE)

Metals Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number					Carcinogen		Non-Carcinogen		
		CBP-9-0-1	CBP-9-0-1 Duplicate	CBP-10-0-1	CBP-11-0-1	CBP-12-0-1	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	**1.9**	<1.9	**9.0**	**0.83**	<1.6	NE	NE	31	410	35
Arsenic	mg/kg	**8.4**	**9.5**	**6.9**	**8.0**	**11**	10	10	10	10	290
Lead	mg/kg	**1,500**	**1,600**	**5,200**	**1,100**	**89**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number					Carcinogen		Non-Carcinogen		
		CBP-13-0-1	CBP-14-0-1	CBP-15-0-1	CBP-15-0-1 Duplicate	CBP-16-0-1	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	<1.2	<4.0	**1.6**	<1.3	1.5	NE	NE	31	410	35
Arsenic	mg/kg	**7.7**	**8.5**	**6.4**	**6.2**	**6.6**	10	10	10	10	290
Lead	mg/kg	**220**	**4,000**	**1,300**	**1,200**	**260**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010C
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL
6.8	Sample result exceeds its Residential SRL and non-Residential SRL but is less than its Minimum GPL

TABLE 3.16
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS –
PIKA PHASE II ESA MAY 2018 REPORT (SURFACE)

Metals Analytes	Unit	Analytical Test Results	Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number	Carcinogen		Non-Carcinogen		
		CBP-19-0-1	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	0.97	NE	NE	31	410	35
Arsenic	mg/kg	**9.2**	10	10	10	10	290
Lead	mg/kg	**670**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010C
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL
6.8	Sample result exceeds its Residential SRL and non-Residential SRL but is less than its Minimum GPL

TABLE 3.17
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS –
PIKA PHASE II ESA MAY 2018 REPORT (SUBSURFACE)

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		CBP-9-3-4	CBP-10-3-4	CBP-11-3-4	CBP-13-3-4	CBP-14-3-4	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	**1.8**	<21	**0.73**	<1.4	<4.1	NE	NE	31	410	35
Arsenic	mg/kg	**9.3**	**7.9**	**7.9**	**8.0**	**7.3**	10	10	10	10	290
Lead	mg/kg	**2,300**	**11,000**	**690**	**480**	**3,400**	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results – Sample Number	Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		CBP-15-3-4	10^{-6} Risk	10^{-5} Risk			
Antimony	mg/kg	**1.4**	NE	NE	31	410	35
Arsenic	mg/kg	**6.5**	10	10	10	10	290
Lead	mg/kg	**1,600**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010C
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL
6.8	Sample result exceeds its Residential SRL and non-Residential SRL but is less than its Minimum GPL

TABLE 3.18
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS – PIKA PHASE II MAY 2018 REPORT (SURFACE)

PAH Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPLs
		Sample Number					Carcinogen		Non-Carcinogen		
		CBP-09-0-1	CBP-09-0-1 (DUP1)	CBP-10-0-1	CBP-11-0-1	CBP-12-0-1	10^{-6} Risk	10^{-5} Risk			
Anthracene	mg/kg	<0.0025	<0.0025	<0.0024	<0.0025	<<0.0027	NE	NE	22,000	240,000	1.02[a,b]
Acenaphthene	mg/kg	<0.00027	<0.00027	<0.00026	<0.00027	<0.00029	NE	NE	3,700	29,000	21.19[a,b]
Acenaphthylene	mg/kg	<0.00067	<0.00066	<0.00065	**0.00055**	<0.00072	NE	NE	NE	NE	N/A
Benzo(a)anthracene	mg/kg	**0.0010**	**0.0011**	**0.0024**	<0.0025	**0.0010**	0.69	6.9	NE	21	1.69[a,c]
Benzo(a)pyrene	mg/kg	**0.0024**	**0.0025**	**0.0053**	**0.0030**	**0.0022**	0.069	0.69	NE	2.1	0.94[a,c]
Benzo(b)fluoranthene	mg/kg	<0.0025	**0.0031**	**0.0044**	**0.0025**	**0.0029**	0.69	6.9	NE	21	0.90[a,c]
Benzo(g,h,i)perylene	mg/kg	<0.0025	**0.0020**	**0.0027**	<0.0025	<0.0027	NE	NE	NE	NE	N/A
Benzo(k)fluoranthene	mg/kg	<0.0025	<0.0025	**0.0017**	<0.0025	<0.0027	6.9	6.9	NE	210	0.47[a,c]
Chrysene	mg/kg	**0.0021**	**0.0022**	**0.0038**	**0.0018**	**0.0018**	68	680	NE	2,000	0.64[a,b]
Dibenz(a,h)anthracene	mg/kg	<0.0025	<0.0025	<0.0024	<0.0025	<0.0027	0.069	0.69	NE	2.1	4.75[a,c]
Fluoranthene	mg/kg	**0.0023**	**0.0024**	**0.0048**	**0.0018**	**0.0024**	NE	NE	2,300	22,000	14.33[a,c]
Fluorene	mg/kg	**0.0023**	**0.0026**	**0.00089**	**0.0013**	<0.0011	NE	NE	2,700	26,000	26.41[a,b]
Indeno(1,2,3-cd)pyrene	mg/kg	**0.0018**	**0.0020**	**0.0025**	<0.0025	**0.0016**	0.69	6.9	NE	21	0.38[a,c]
Naphthalene	mg/kg	**0.00055**	**0.00056**	**0.00046**	**0.00059**	**0.00052**	NE	NE	56	190	40.06[a,b]
Phenanthrene	mg/kg	**0.0011**	**0.0011**	**0.0022**	<0.0025	**0.0014**	NE	NE	NE	NE	N/A
Pyrene	mg/kg	**0.0022**	**0.0024**	**0.0046**	**0.0017**	**0.0022**	NE	NE	2,300	29,000	14.19[a,b]
1-Methylnaphthalene	mg/kg	<0.00050	<0.00050	<0.00049	<0.00050	<0.00054	NE	NE	NE	NE	N/A
2-Methylnaphthalene	mg/kg	**0.00031**	**0.00032**	<0.00065	**0.00031**	**0.00033**	NE	NE	NE	NE	N/A

Table Notes found at end of table

TABLE 3.18
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS – PIKA PHASE II MAY 2018 REPORT (SURFACE)

PAH Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPLs
		Sample Number					Carcinogen		Non-Carcinogen		
		CBP-13-0-1	CBP-14-0-1	CBP-15-0-1	CBP-15-0-1 (DUP2)	CBP-16-0-1	10^{-6} Risk	10^{-5} Risk			
Anthracene	mg/kg	<0.0025	<0.0025	<0.0026	<0.0024	<0.0025	NE	NE	22,000	240,000	1.02[a,b]
Acenaphthene	mg/kg	<0.00027	<0.00027	**0.00083**	<0.00026	<0.00027	NE	NE	3,700	29,000	21.19[a,b]
Acenaphthylene	mg/kg	<0.00066	<0.00067	**0.00097**	<0.00065	<0.00067	NE	NE	NE	NE	N/A
Benzo(a)anthracene	mg/kg	**0.00097**	**0.00093**	**0.0016**	**0.0018**	**0.0017**	0.69	6.9	NE	21	1.69[a,c]
Benzo(a)pyrene	mg/kg	**0.0018**	**0.0018**	**0.0035**	**0.0039**	**0.0042**	0.069	0.69	NE	2.1	0.94[a,c]
Benzo(b)fluoranthene	mg/kg	**0.0023**	**0.0029**	<0.0044	**0.0045**	**0.0037**	0.69	6.9	NE	21	0.90[a,c]
Benzo(g,h,i)perylene	mg/kg	<0.0025	**0.0015**	<0.0026	<0.0024	**0.0030**	NE	NE	NE	NE	N/A
Benzo(k)fluoranthene	mg/kg	<0.0025	<0.0025	<0.0026	**0.0021**	**0.0023**	6.9	6.9	NE	210	0.47[a,c]
Chrysene	mg/kg	**0.0016**	**0.0022**	**0.0030**	**0.0033**	**0.0029**	68	680	NE	2,000	0.64[a,b]
Dibenz(a,h)anthracene	mg/kg	<0.0025	<0.0025	<0.0026	<0.0024	**0.0018**	0.069	0.69	NE	2.1	4.75[a,c]
Fluoranthene	mg/kg	**0.0017**	**0.0022**	**0.0033**	**0.0042**	**0.0026**	NE	NE	2,300	22,000	14.33[a,c]
Fluorene	mg/kg	**0.00097**	**0.0025**	**0.0028**	**0.0023**	**0.0014**	NE	NE	2,700	26,000	26.41[a,b]
Indeno(1,2,3-cd)pyrene	mg/kg	**0.0013**	**0.0016**	<0.0026	<0.0024	**0.0031**	0.69	6.9	NE	21	0.38[a,c]
Naphthalene	mg/kg	**0.00041**	**0.00095**	**0.00073**	**0.00071**	<0.00067	NE	NE	56	190	40.06[a,b]
Phenanthrene	mg/kg	<0.0025	<0.0025	**0.0015**	**0.0017**	<0.0025	NE	NE	NE	NE	N/A
Pyrene	mg/kg	**0.0016**	**0.0019**	**0.0031**	**0.0037**	**0.0025**	NE	NE	2,300	29,000	14.19[a,b]
1-Methylnaphthalene	mg/kg	<0.00050	<0.00050	<0.00051	<0.00049	<0.00050	NE	NE	NE	NE	N/A
2-Methylnaphthalene	mg/kg	<0.00066	**0.00042**	**0.00049**	**0.00039**	<0.00067	NE	NE	NE	NE	N/A

Table Notes found at end of table

TABLE 3.18
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS – PIKA PHASE II MAY 2018 REPORT (SURFACE)

PAH Analytes	Unit	Analytical Test Results	Residential SRLs			Non-Residential SRLs	Minimum GPLs
		Sample Number	Carcinogen		Non-Carcinogen		
		CBP-19-0-1	10^{-6} Risk	10^{-5} Risk			
Anthracene	mg/kg	<0.0026	NE	NE	22,000	240,000	1.02[a,b]
Acenaphthene	mg/kg	<0.00028	NE	NE	3,700	29,000	21.19[a,b]
Acenaphthylene	mg/kg	<0.00070	NE	NE	NE	NE	N/A
Benzo(a)anthracene	mg/kg	<0.0026	0.69	6.9	NE	21	1.69[a,c]
Benzo(a)pyrene	mg/kg	**0.0021**	0.069	0.69	NE	2.1	0.94[a,c]
Benzo(b)fluoranthene	mg/kg	**0.0023**	0.69	6.9	NE	21	0.90[a,c]
Benzo(g,h,i)perylene	mg/kg	<0.0026	NE	NE	NE	NE	N/A
Benzo(k)fluoranthene	mg/kg	<0.0026	6.9	6.9	NE	210	0.47[a,c]
Chrysene	mg/kg	**0.0015**	68	680	NE	2,000	0.64[a,b]
Dibenz(a,h)anthracene	mg/kg	<0.0026	0.069	0.69	NE	2.1	4.75[a,c]
Fluoranthene	mg/kg	**0.0018**	NE	NE	2,300	22,000	14.33[a,c]
Fluorene	mg/kg	**0.0011**	NE	NE	2,700	26,000	26.41[a,b]
Indeno(1,2,3-cd)pyrene	mg/kg	**0.0013**	0.69	6.9	NE	21	0.38[a,c]
Naphthalene	mg/kg	**0.00051**	NE	NE	56	190	40.06[a,b]
Phenanthrene	mg/kg	<0.0026	NE	NE	NE	NE	N/A
Pyrene	mg/kg	**0.0016**	NE	NE	2,300	29,000	14.19[a,b]
1-Methylnaphthalene	mg/kg	<0.00052	NE	NE	NE	NE	N/A
2-Methylnaphthalene	mg/kg	<0.00070	NE	NE	NE	NE	N/A

Table Notes found at end of table

TABLE 3.18
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS – PIKA PHASE II MAY 2018 REPORT (SURFACE)

Notes:

Polynuclear Aromatic Hydrocarbons (PAHs) analyzed using EPA Methods 8270D SIM

SRLs – Soil Remediation Levels established by the Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007

Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, calculated using Spreadsheet GPL dated January 1, 2013 (See Note 1)

mg/kg – milligrams per kilogram

N/A – Not Applicable

NE – Not Established

Analytical results in **bold** exceed Laboratory Reporting Limit

1 – Minimum GPLs calculated using Spreadsheet GPL. Minimum GPLs calculated for analytes with an established Aquifer Water Quality Standard (Arizona Administrative Code, Title 18, Chapter 11, Appendix A, Table 1, August 2, 2016)

a – Calculated minimum GPL based on saturation limit

b – Minimum GPL calculated using Henry's Law Constant (H'), soil organic carbon-water partitioning coefficient (Koc), and Solubility (S) from Spreadsheet GPL dated January 1, 2013, remaining constants are GPL defaults from Spreadsheet GPL dated January 1, 2013, and Aquifer Water Quality Standard (Arizona Administrative Code, Title 18, Chapter 11, Appendix A, Table 1, August 2, 2016)

c – Minimum GPL calculated using Henry's Law Constant (H'), soil organic carbon-water partitioning coefficient (Koc), and Solubility (S) from EPA Regional Screening Level (RSL) Chemical-specific Parameters Supporting Table (May 2018), remaining constants are GPL defaults from Spreadsheet GPL dated January 1, 2013, and Aquifer Water Quality Standard (Arizona Administrative Code, Title 18, Chapter 11, Appendix A, Table 1, August 2, 2016)

0.088	Sample result exceeds its 10^{-6} Residential SRL but is less than its 10^{-5} Residential and non-Residential SRLs
16	Sample result exceeds its Residential SRL but is less than its non-Residential SRL
9.8	Sample result exceeds its Residential and non-Residential SRLs

Table Notes found at end of table

TABLE 3.19
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS –
PIKA PHASE II MAY 2018 REPORT (SUBSURFACE)

PAH Analytes	Unit	Analytical Test Results					Residential SRLs			Non-Residential SRLs	Minimum GPLs
		Sample Number					Carcinogen		Non-Carcinogen		
		CBP-09-3-4	CBP-10-3-4	CBP-11-3-4	CBP-13-3-4	CBP-14-3-4	10^{-6} Risk	10^{-5} Risk			
Anthracene	mg/kg	<0.0026	<0.0024	<0.0026	<0.0025	<0.0027	NE	NE	22,000	240,000	1.02[a,b]
Acenaphthene	mg/kg	<0.00027	<0.00026	<0.00027	<0.00027	<0.00029	NE	NE	3,700	29,000	21.19[a,b]
Acenaphthylene	mg/kg	**0.00071**	<0.00064	<0.00068	<0.00067	<0.00073	NE	NE	NE	NE	N/A
Benzo(a)anthracene	mg/kg	<0.0026	**0.00092**	<0.0026	<0.0025	**0.0011**	0.69	6.9	NE	21	1.69[a,c]
Benzo(a)pyrene	mg/kg	**0.0019**	**0.0018**	<0.0026	**0.0017**	**0.0017**	0.069	0.69	NE	2.1	0.94[a,c]
Benzo(b)fluoranthene	mg/kg	**0.0028**	**0.0026**	**0.0022**	**0.0028**	**0.0047**	0.69	6.9	NE	21	0.90[a,c]
Benzo(g,h,i)perylene	mg/kg	<0.0026	**0.0014**	<0.0026	**0.0014**	**0.0021**	NE	NE	NE	NE	N/A
Benzo(k)fluoranthene	mg/kg	<0.0026	<0.0024	<0.0026	<0.0025	**0.0013**	6.9	6.9	NE	210	0.47[a,c]
Chrysene	mg/kg	**0.0018**	**0.0017**	**0.0016**	**0.0017**	**0.0024**	68	680	NE	2,000	0.64[a,b]
Dibenz(a,h)anthracene	mg/kg	<0.0026	<0.0024	<0.0026	<0.0025	<0.0027	0.069	0.69	NE	2.1	4.75[a,c]
Fluoranthene	mg/kg	**0.0018**	**0.0021**	**0.0016**	**0.0018**	**0.0016**	NE	NE	2,300	22,000	14.33[a,c]
Fluorene	mg/kg	**0.0021**	**0.00095**	**0.0011**	**0.00075**	**0.0016**	NE	NE	2,700	26,000	26.41[a,b]
Indeno(1,2,3-cd)pyrene	mg/kg	<0.0026	**0.0013**	<0.0026	**0.0016**	**0.0025**	0.69	6.9	NE	21	0.38[a,c]
Naphthalene	mg/kg	**0.0022**	**0.00032**	**0.00047**	**0.00035**	**0.00067**	NE	NE	56	190	40.06[a,b]
Phenanthrene	mg/kg	<0.0026	<0.0024	<0.0026	<0.0025	<0.0027	NE	NE	NE	NE	N/A
Pyrene	mg/kg	**0.0016**	**0.0019**	**0.0014**	**0.0017**	**0.0014**	NE	NE	2,300	29,000	14.19[a,b]
1-Methylnaphthalene	mg/kg	**0.00044**	<0.00048	<0.00051	<0.00050	<0.00054	NE	NE	NE	NE	N/A
2-Methylnaphthalene	mg/kg	**0.0010**	<0.00064	<0.00068	<0.00067	<0.00073	NE	NE	NE	NE	N/A

Table Notes found at end of table

TABLE 3.19
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS –
PIKA PHASE II MAY 2018 REPORT (SUBSURFACE)

PAH Analytes	Unit	Analytical Test Results	Residential SRLs			Non-Residential SRLs	Minimum GPLs
		Sample Number	Carcinogen		Non-Carcinogen		
		CBP-15-3-4	10^{-6} Risk	10^{-5} Risk			
Anthracene	mg/kg	<0.0025	NE	NE	22,000	240,000	1.02[a,b]
Acenaphthene	mg/kg	<0.00026	NE	NE	3,700	29,000	21.19[a,b]
Acenaphthylene	mg/kg	<0.00066	NE	NE	NE	NE	N/A
Benzo(a)anthracene	mg/kg	**0.00089**	0.69	6.9	NE	21	1.69[a,c]
Benzo(a)pyrene	mg/kg	**0.0020**	0.069	0.69	NE	2.1	0.94[a,c]
Benzo(b)fluoranthene	mg/kg	**0.0028**	0.69	6.9	NE	21	0.90[a,c]
Benzo(g,h,i)perylene	mg/kg	<0.0025	NE	NE	NE	NE	N/A
Benzo(k)fluoranthene	mg/kg	<0.0025	6.9	6.9	NE	210	0.47[a,c]
Chrysene	mg/kg	**0.0018**	68	680	NE	2,000	0.64[a,b]
Dibenz(a,h)anthracene	mg/kg	<0.0025	0.069	0.69	NE	2.1	4.75[a,c]
Fluoranthene	mg/kg	**0.0020**	NE	NE	2,300	22,000	14.33[a,c]
Fluorene	mg/kg	**0.0013**	NE	NE	2,700	26,000	26.41[a,b]
Indeno(1,2,3-cd)pyrene	mg/kg	**0.0016**	0.69	6.9	NE	21	0.38[a,c]
Naphthalene	mg/kg	**0.00075**	NE	NE	56	190	40.06[a,b]
Phenanthrene	mg/kg	<0.0025	NE	NE	NE	NE	N/A
Pyrene	mg/kg	**0.0017**	NE	NE	2,300	29,000	14.19[a,b]
1-Methylnaphthalene	mg/kg	**0.00071**	NE	NE	NE	NE	N/A
2-Methylnaphthalene	mg/kg	**0.0014**	NE	NE	NE	NE	N/A

Table Notes found at end of table

TABLE 3.19
SUMMARY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL SAMPLES AND REGULATORY STANDARDS –
PIKA PHASE II MAY 2018 REPORT (SUBSURFACE)

Notes:
Polynuclear Aromatic Hydrocarbons (PAHs) analyzed using EPA Methods 8270D SIM
SRLs – Soil Remediation Levels established by the Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, calculated using Spreadsheet GPL dated January 1, 2013 (See Note 1)
mg/kg – milligrams per kilogram
N/A – Not Applicable
NE – Not Established
Analytical results in **bold** exceed Laboratory Reporting Limit
1 – Minimum GPLs calculated using Spreadsheet GPL. Minimum GPLs calculated for analytes with an established Aquifer Water Quality Standard (Arizona Administrative Code, Title 18, Chapter 11, Appendix A, Table 1, August 2, 2016)
a – Calculated minimum GPL based on saturation limit
b – Minimum GPL calculated using Henry's Law Constant (H'), soil organic carbon-water partitioning coefficient (Koc), and Solubility (S) from Spreadsheet GPL dated January 1, 2013, remaining constants are GPL defaults from Spreadsheet GPL dated January 1, 2013, and Aquifer Water Quality Standard (Arizona Administrative Code, Title 18, Chapter 11, Appendix A, Table 1, August 2, 2016)
c – Minimum GPL calculated using Henry's Law Constant (H'), soil organic carbon-water partitioning coefficient (Koc), and Solubility (S) from EPA Regional Screening Level (RSL) Chemical-specific Parameters Supporting Table (May 2018), remaining constants are GPL defaults from Spreadsheet GPL dated January 1, 2013, and Aquifer Water Quality Standard (Arizona Administrative Code, Title 18, Chapter 11, Appendix A, Table 1, August 2, 2016)

0.088	Sample result exceeds its 10^{-6} Residential SRL but is less than its 10^{-5} Residential and non-Residential SRLs
16	Sample result exceeds its Residential SRL but is less than its non-Residential SRL
9.8	Sample result exceeds its Residential and non-Residential SRLs

Table Notes found at end of table

TABLE 3.20
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS – GEOTEK 2019 SITE ASSESSMENT (VERTICAL EXTENT SOIL SAMPLES)

Metals Analytes	Unit	Analytical Test Results Sample Number					Residential SRLs Carcinogen		Residential SRLs Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		V-1-12	V-2-12	V-3-12	V-4-12	V-5-12	10^{-6} Risk	10^{-5} Risk			
XRF Lead	mg/kg	**51.0**	**80.1**	**56.5**	**144.2**	**1,142**	NE	NE	400	800	290
Antimony	mg/kg	<5.0	<5.0	<5.0	<5.0	NA	NE	NE	31	410	35
Arsenic	mg/kg	**5.7**	**5.2**	**6.2**	**6.1**	NA	10	10	10	10	290
Lead	mg/kg	**70**	**73**	**32**	**100**	NA	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results Sample Number					Residential SRLs Carcinogen		Residential SRLs Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		V-5-18	V-5-24	V-6-12	V-7-12	V-8-12	10^{-6} Risk	10^{-5} Risk			
XRF Lead	mg/kg	**1,469**	**1,343**	**53.8**	**90.0**	**6,842**	NE	NE	400	800	290
Antimony	mg/kg	NA	**9.0**	<5.0	<5.0	NA	NE	NE	31	410	35
Arsenic	mg/kg	NA	**4.9**	**5.7**	**4.2**	NA	10	10	10	10	290
Lead	mg/kg	NA	**1,500**	**35**	**71**	NA	NE	NE	400	800	290

Notes:

Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010C

Analytical results in **bold** exceed Laboratory Reporting Limit

SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007

Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.

mg/kg – milligrams per kilogram

NA – Not Analyzed

NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL
6.8	Sample result exceeds its Residential SRL and its non-Residential SRL but is less than Minimum GPL

TABLE 3.20
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS – GEOTEK 2019 SITE ASSESSMENT (VERTICAL EXTENT SOIL SAMPLES)

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		V-8-18	V-8-24	V-8-30	V-9-12	V-9-24	10^{-6} Risk	10^{-5} Risk			
XRF Lead	mg/kg	**4,511**	**1,817**	**5,760**	**4,296**	**12,500**	NE	NE	400	800	290
Antimony	mg/kg	NA	NA	**22**	NA	NA	NE	NE	31	410	35
Arsenic	mg/kg	NA	NA	<1.0	NA	NA	10	10	10	10	290
Lead	mg/kg	NA	NA	**7,500**	NA	NA	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		V-9-30	V-10-12	V-10-18	V-10-24	V-11-12	10^{-6} Risk	10^{-5} Risk			
XRF Lead	mg/kg	**3,033**	**3,983**	**786.6**	**253.4**	**54.9**	NE	NE	400	800	290
Antimony	mg/kg	**6.8**	NA	NA	<5.0	<5.0	NE	NE	31	410	35
Arsenic	mg/kg	**4.3**	NA	NA	**7.8**	**5.5**	10	10	10	10	290
Lead	mg/kg	**3,700**	NA	NA	**240**	**30**	NE	NE	400	800	290

Notes:

Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010C

Analytical results in **bold** exceed Laboratory Reporting Limit

SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007

Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.

mg/kg – milligrams per kilogram

NA – Not Analyzed

NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL
6.8	Sample result exceeds its Residential SRL and its non-Residential SRL but is less than Minimum GPL

TABLE 3.20
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS – GEOTEK 2019 SITE ASSESSMENT (VERTICAL EXTENT SOIL SAMPLES)

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		V-12-12	V-12-18	V-12-24	V-13-12	V-13-18	10^{-6} Risk	10^{-5} Risk			
XRF Lead	mg/kg	**1,535**	**971.8**	**772.6**	**528.5**	**1,104**	NE	NE	400	800	290
Antimony	mg/kg	NA	NA	<5.0	NA	NA	NE	NE	31	410	35
Arsenic	mg/kg	NA	NA	**8.0**	NA	NA	10	10	10	10	290
Lead	mg/kg	NA	NA	**600**	NA	NA	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results – Sample Number					Residential SRLs – Carcinogen		Residential SRLs – Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		V-13-24	V-14-12	V-15-12	V-15-18	V-15-24	10^{-6} Risk	10^{-5} Risk			
XRF Lead	mg/kg	**413.2**	**138.7**	**1,235**	**941.1**	**886.2**	NE	NE	400	800	290
Antimony	mg/kg	<5.0	<5.0	NA	NA	<5.0	NE	NE	31	410	35
Arsenic	mg/kg	**8.5**	**8.1**	NA	NA	**5.0**	10	10	10	10	290
Lead	mg/kg	**320**	**110**	NA	NA	**870**	NE	NE	400	800	290

Notes:

Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010C

Analytical results in **bold** exceed Laboratory Reporting Limit

SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007

Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.

mg/kg – milligrams per kilogram

NA – Not Analyzed

NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL
6.8	Sample result exceeds its Residential SRL and its non-Residential SRL but is less than Minimum GPL

TABLE 3.20
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS – GEOTEK 2019 SITE ASSESSMENT (VERTICAL EXTENT SOIL SAMPLES)

Metals Analytes	Unit	Analytical Test Results Sample Number					Residential SRLs Carcinogen		Residential SRLs Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		V-16-12	V-17-12	V-18-12	V-19-12	V-19-18	10^{-6} Risk	10^{-5} Risk			
XRF Lead	mg/kg	**218.8**	**178.1**	**67.8**	**445.9**	**530.8**	NE	NE	400	800	290
Antimony	mg/kg	<5.0	<5.0	<5.0	NA	NA	NE	NE	31	410	35
Arsenic	mg/kg	**6.2**	**7.8**	**9.1**	NA	NA	10	10	10	10	290
Lead	mg/kg	**210**	**140**	**41**	NA	NA	NE	NE	400	800	290

Metals Analytes	Unit	Analytical Test Results Sample Number					Residential SRLs Carcinogen		Residential SRLs Non-Carcinogen	Non-Residential SRLs	Minimum GPL
		V-19-24	V-20-12	V-21-12	V-22-12	V-23-12	10^{-6} Risk	10^{-5} Risk			
XRF Lead	mg/kg	**512.4**	**78.1**	**60.5**	**57.0**	**90.0**	NE	NE	400	800	290
Antimony	mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0	NE	NE	31	410	35
Arsenic	mg/kg	**6.9**	**8.9**	**8.7**	**10**	**3.9**	10	10	10	10	290
Lead	mg/kg	**450**	**40**	**34**	**24**	**49**	NE	NE	400	800	290

Notes:

Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010C

Analytical results in **bold** exceed Laboratory Reporting Limit

SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007

Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.

mg/kg – milligrams per kilogram

NA – Not Analyzed

NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL
6.8	Sample result exceeds its Residential SRL and its non-Residential SRL but is less than Minimum GPL

TABLE 3.20
SUMMARY OF METALS IN SOIL SAMPLES AND REGULATORY STANDARDS – GEOTEK 2019 SITE ASSESSMENT (VERTICAL EXTENT SOIL SAMPLES)

Metals Analytes	Unit	Analytical Test Results		Residential SRLs			Non-Residential SRLs	Minimum GPL
		Sample Number		Carcinogen		Non-Carcinogen		
		V-25-12	V-26-24	10^{-6} Risk	10^{-5} Risk			
XRF Lead	mg/kg	**54.9**	**253.4**	NE	NE	400	800	290
Antimony	mg/kg	<5.0	<5.0	NE	NE	31	410	35
Arsenic	mg/kg	**5.1**	**8.4**	10	10	10	10	290
Lead	mg/kg	**32**	**240**	NE	NE	400	800	290

Notes:
Metals antimony, arsenic, and lead analyzed using Environmental Protection Agency (EPA) Method 6010C
Analytical results in **bold** exceed Laboratory Reporting Limit
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September, 1996.
mg/kg – milligrams per kilogram
NA – Not Analyzed
NE – Not Established

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL
6.8	Sample result exceeds its Residential SRL and its non-Residential SRL but is less than Minimum GPL

TABLE 3.23
SUMMARY OF METALS IN STABILIZATION STUDY SOIL SAMPLES AND REGULATORY STANDARDS – GEOTEK 2019 SITE ASSESSMENT

Metals Analytes	Unit	Analytical Test Results				Residential SRLs			Non-Residential SRLs	Minimum GPL	Toxicity Characteristic Hazardous Waste Levels (TCLP)
		Sample Number				Carcinogen		Non-Carcinogen			
		Pre-Stabilization	Post Stabilization			10^{-6} Risk	10^{-5} Risk				
		SS-1	SS-1-4	SS-1-5	SS-1-6						
XRF Lead	mg/kg	5,097	--	--	--	NE	NE	400	800	290	NE
Total Lead	mg/kg	6,000	5,000	3,000	2,600	NE	NE	400	800	290	NE
TCLP Lead	mg/L	72	89	65	38	N/A	N/A	N/A	N/A	N/A	5.0

Metals Analytes	Unit	Analytical Test Results				Residential SRLs			Non-Residential SRLs	Minimum GPL	Toxicity Characteristic Hazardous Waste Levels (TCLP)
		Sample Number				Carcinogen		Non-Carcinogen			
		Pre-Stabilization	Post Stabilization			10^{-6} Risk	10^{-5} Risk				
		SS-1	SS-1-10	SS-1-15	SS-1-20						
XRF Lead	mg/kg	5,097	--	--	--	NE	NE	400	800	290	NE
Total Lead	mg/kg	6,000	3,600	3,600	3,600	NE	NE	400	800	290	NE
TCLP Lead	mg/L	72	<0.080	94	2.7	N/A	N/A	N/A	N/A	N/A	5.0

Table Notes found at end of table

TABLE 3.23
SUMMARY OF METALS IN STABILIZATION STUDY SOIL SAMPLES AND REGULATORY STANDARDS – GEOTEK 2019 SITE ASSESSMENT

Metals Analytes	Unit	Analytical Test Results				Residential SRLs			Non-Residential SRLs	Minimum GPL	Toxicity Characteristic Hazardous Waste Levels (TCLP)
		Sample Number				Carcinogen		Non-Carcinogen			
		Pre-Stabilization	Post Stabilization			10^{-6} Risk	10^{-5} Risk				
		SS-2	SS-2-4	SS-2-5	SS-2-6						
XRF Lead	mg/kg	22,200	--	--	--	NE	NE	400	800	290	NE
Total Lead	mg/kg	30,000	67,000	22,000	74,000	NE	NE	400	800	290	NE
TCLP Lead	mg/L	1,500	180	37	310	N/A	N/A	N/A	N/A	N/A	5.0

Metals Analytes	Unit	Analytical Test Results				Residential SRLs			Non-Residential SRLs	Minimum GPL	Toxicity Characteristic Hazardous Waste Levels (TCLP)
		Sample Number				Carcinogen		Non-Carcinogen			
		Pre-Stabilization	Post Stabilization			10^{-6} Risk	10^{-5} Risk				
		SS-2	SS-2-10	SS-2-15	SS-2-20						
XRF Lead	mg/kg	22,200	--	--	--	NE	NE	400	800	290	NE
Total Lead	mg/kg	30,000	35,000	32,000	33,000	NE	NE	400	800	290	NE
TCLP Lead	mg/L	1,500	1,200	1,300	<0.080	N/A	N/A	N/A	N/A	N/A	5.0

Table Notes found at end of table

TABLE 3.23
SUMMARY OF METALS IN STABILIZATION STUDY SOIL SAMPLES AND REGULATORY STANDARDS – GEOTEK 2019 SITE ASSESSMENT

Metals Analytes	Unit	Analytical Test Results				Residential SRLs			Non-Residential SRLs	Minimum GPL	Toxicity Characteristic Hazardous Waste Levels (TCLP)
		Sample Number				Carcinogen		Non-Carcinogen			
		Pre-Stabilization	Post Stabilization			10^{-6} Risk	10^{-5} Risk				
		SS-3	SS-3-4	SS-3-5	SS-3-6						
XRF Lead	mg/kg	1,208	--	--	--	NE	NE	400	800	290	NE
Total Lead	mg/kg	15,000	1,100	380	8,800	NE	NE	400	800	290	NE
TCLP Lead	mg/L	56	62	46	19	N/A	N/A	N/A	N/A	N/A	5.0

Metals Analytes	Unit	Analytical Test Results				Residential SRLs			Non-Residential SRLs	Minimum GPL	Toxicity Characteristic Hazardous Waste Levels (TCLP)
		Sample Number				Carcinogen		Non-Carcinogen			
		Pre-Stabilization	Post Stabilization			10^{-6} Risk	10^{-5} Risk				
		SS-3	SS-3-10	SS-3-15	SS-3-20						
XRF Lead	mg/kg	1,208	--	--	--	NE	NE	400	800	290	NE
Total Lead	mg/kg	15,000	1,100	4,600	610	NE	NE	400	800	290	NE
TCLP Lead	mg/L	56	70	41	<0.080	N/A	N/A	N/A	N/A	N/A	5.0

Table Notes found at end of table

TABLE 3.23
SUMMARY OF METALS IN STABILIZATION STUDY SOIL SAMPLES AND REGULATORY STANDARDS – GEOTEK 2019 SITE ASSESSMENT

Metals Analytes	Unit	Analytical Test Results				Residential SRLs			Non-Residential SRLs	Minimum GPL	Toxicity Characteristic Hazardous Waste Levels (TCLP)
		Sample Number				Carcinogen		Non-Carcinogen			
		Pre-Stabilization	Post Stabilization			10^{-6} Risk	10^{-5} Risk				
		SS-4	SS-4-4	SS-4-5	SS-4-6						
XRF Lead	mg/kg	18,600	--	--	--	NE	NE	400	800	290	NE
Total Lead	mg/kg	13,000	8,800	8,800	7,100	NE	NE	400	800	290	NE
TCLP Lead	mg/L	170	10	10	170	N/A	N/A	N/A	N/A	N/A	5.0

Metals Analytes	Unit	Analytical Test Results				Residential SRLs			Non-Residential SRLs	Minimum GPL	Toxicity Characteristic Hazardous Waste Levels (TCLP)
		Sample Number				Carcinogen		Non-Carcinogen			
		Pre-Stabilization	Post Stabilization			10^{-6} Risk	10^{-5} Risk				
		SS-5	SS-5-4	SS-5-5	SS-5-6						
XRF Lead	mg/kg	19,600	--	--	--	NE	NE	400	800	290	NE
Total Lead	mg/kg	33,000	65,000	52,000	49,000	NE	NE	400	800	290	NE
TCLP Lead	mg/L	1,000	130	0.14	400	N/A	N/A	N/A	N/A	N/A	5.0

Table Notes found at end of table

TABLE 3.23
SUMMARY OF METALS IN STABILIZATION STUDY SOIL SAMPLES AND REGULATORY STANDARDS – GEOTEK 2019 SITE ASSESSMENT

Notes:
Metal lead analyzed using Environmental Protection Agency (EPA) Method 6010D
Samples prepared using EPA Methods 1311 for TCLP and analyzed using EPA Method 6010D
Analytical results in **bold** exceed Laboratory Reporting Limit
TCLP – Toxicity Characteristic Lead Procedure
Toxicity characteristic established by 40 Code of Federal Regulations (CFR) §261.24
SRLs – Soil Remediation Levels established by Arizona Department of Environmental Quality, Arizona Administrative Code, Title 18, Chapter 7, Appendix A, January 19, 2007
Minimum GPL – Groundwater Protection Levels, established by the Arizona Department of Environmental Quality, *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality*, September 1996.
mg/kg – milligrams per kilogram
mg/L – milligrams per Liter
NE – Not Established
N/A – Not Applicable

0.088	Sample result exceeds its Residential SRL, Minimum GPL, and non-Residential SRL
16	Sample result exceeds its Residential SRL and Minimum GPL but is less than its non-Residential SRL
9.8	Sample result exceeds its Minimum GPL but is less than its Residential SRL and non-Residential SRL
6.8	Sample result exceeds TCLP Level for toxicity characteristic for hazardous waste

TABLE 3.24
SOIL SIZE AND WEIGHT DISTRIBUTION SUMMARY

Screen Size (inches)	Weight Retained on Screen (grams)	Percentage Retained on Screen (%)	Remediation Screen Size	Approximate Remediation Screen Distribution
1	189.6	9.87	+1 inch material	10%
0.75	107.5	5.60	-1-inch to +¼-inch material	21%
0.5	121.7	6.34		
0.375	68.7	3.58		
0.25	105	5.47		
0.187	87.6	4.56	-¼-inch material	69%
0.0937	251	13.08		
0.0787	45	2.34		
0.0469	210.6	10.96		
0.0234	276.7	14.42		
0.0165	128.3	6.68		
0.0117	99.3	5.17		
0.0059	143.3	7.47		
0.0029	66	3.44		
<0.0029	20.6	1.08		
Total	**1920.9**	**100.00**		

APPENDIX A

SAMPLING AND ANALYSIS PLAN

TABLE OF CONTENTS

TABLES

LIST OF ACRONYMS	
Acronym	**Definition**
°C	Degrees Celsius
°F	Degrees Fahrenheit
µm	micrometer
mm	millimeter
ADEQ	Arizona Department of Environmental Quality
ADHS	Arizona Department of Health Services
ARAR	Applicable or Relevant and Appropriate Requirements
AUL	Activity and Use Limitation
COC	Chemical of Concern
DQO	Data Quality Objective
EPA	United States Environmental Protection Agency
GPL	Groundwater Protection Level
GPS	Global Positioning System
HASP	Health and Safety Plan
IDW	Investigation-Derived Waste
.kml	Keyhole Markup Language
LCS	Laboratory Control Sample
mg/kg	Milligrams per kilogram
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NFA	No Further Action
PAH	Polynuclear Aromatic Hydrocarbon
PPE	Personal Protective Equipment
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RSD	Relative Standard Deviation
SAP	Sampling and Analysis Plan

LIST OF ACRONYMS	
Acronym	**Definition**
SOP	Standard Operating Procedure
SRL	Soil Remediation Level
TCLP	Toxicity Characteristic Leaching Procedure
US CBP	United States Customs and Border Protection
UXO	Unexploded Ordnance
VRP	Voluntary Remediation Program
XRF	X-Ray Fluorescence

1.0 PURPOSE OF SAMPLING AND ANALYSIS PLAN

This Sampling and Analysis Plan (SAP), in conjunction with the Voluntary Remediation Program (VRP) Work Plan and Quality Assurance Project Plan (QAPP), presents the functions, procedures, and specific quality assurance (QA) and quality control (QC) activities designed to achieve the data quality objectives (DQOs) associated with additional assessment of privately-owned properties located adjacent to the Former United States Customs and Border Protection (US CBP) Small Arms Firing Range located at 1651 West Target Range Road in Nogales, Arizona (Site). Guidelines followed to prepare this SAP included the United States Environmental Protection Agency (EPA) document *EPA Region 9 Template for Sampling and Analysis Plan; Version 3 – Brownfields Projects (R9QA/006);* United States Environmental Protection Agency; June 2004.

The goal of the activities described in the VRP Work Plan, SAP, and QAPP is to obtain additional data to obtain an unconditional No Further Action (NFA) determination for Site soil and groundwater from the ADEQ VRP without an encumbrance (e.g. environmental use restriction or activity and use limitation [AUL]) on the property title(s). The foreseeable Site use is likely commercial use (food storage). As such, the appropriate remedial goals for Site soils are the ADEQ pre-determined 10^{-5} residential soil remediation levels (SRLs) and the minimum groundwater protection levels (GPLs) for the Chemicals of Concern (COCs). Based on the historical use of the adjacent property as a shooting range, the Site COCs are:

- Antimony (components of ammunition)
- Arsenic (components of ammunition)
- Lead (components of ammunition)
- Polynuclear Aromatic Hydrocarbons (PAHs) (constituents of shotgun wadding and clay pigeon targets)

The primary exposure routes of these constituents are:

- Inhalation of airborne particles containing contaminants, mists, or vapors
- Skin Absorption
- Incidental ingestion through improper hygiene
- Skin contact

The SAP will be distributed to those individuals who will participate in the project, including those with US CBP, the remediation contractor, and other significant subcontractors involved in the project. Addenda and/or revisions to the SAP can be initiated by US CBP or the remediation contractor. In general, an addendum will be written when unforeseen or significant changes have occurred. A revision will not be required for minor changes in scope.

2.0 SAMPLE SELECTION

2.1 EXCAVATED AREA ASSESSMENT

Soil suspected of containing COCs in concentrations greater than the minimum GPLs or residential SRLs will be excavated in accordance with the procedures outlined in Section 4.2 of the VRP Work Plan. Assessment of the excavated area will be conducted by collecting confirmatory soil samples from the excavation floor to verify remaining soil does not contain COCs in concentrations greater than the minimum GPLs or residential SRLs. Soil samples will be collected using an incremental soil sampling methodology following the procedures outlined in this section.

The remediation contractor will establish an approximate ¼-acre coordinate grid across the areas that require confirmation assessment. These ¼-acre grids will represent incremental sampling Decision Units. The approximate locations of the proposed ¼-acre grids are shown on Figure 6. Prior to field activities, the locations of each corner of the Decision Unit will be calculated and placed into a Keyhole Markup Language (.kml) file. The .kml file will be uploaded to a Global Positioning System (GPS) unit with sub-meter accuracy which will be used to mark the corner points (north, south, east, and west) of the Decision Unit in the field.

The sample locations will be cleared of potential unexploded ordnance (UXO) prior to field activities as described in the Health and Safety Plan (HASP). Once cleared of potential UXO, the corner points of the Decision Unit will be marked with wood stakes or rebar stakes, as applicable. The boundaries of the locations will be identified as:

DU#-X

Where: DU# – Decision Unit number
X – corner point direction (north, south, east, or west)

A systematic random grid will be established within each Decision Unit using five rows with at least ten sampling points per row (at least 50 total sample locations per Decision Unit). Incremental soil samples will be collected directly from the soil location using a stainless steel trowel using the following procedure. Approximately 2 inches of soil will be removed from the soil surface using a precleaned trowel or spade. A thin layer of the soil that came into contact with the trowel or spade will be removed and discarded using a second precleaned, stainless-steel scoop, spoon, trowel, or plastic spoon. Approximately 55 grams of soil will be collected using a stainless-steel, plastic lab spoon, or equivalent and placed into a plastic bag or plastic bucket until all incremental samples are collected from the Decision Unit, providing a sample mass of approximately 2,750 grams.

Replicate samples (two additional samples) will be collected from two Decision Units for quality assurance purposes and submitted to the analytical laboratory for analysis of antimony, arsenic, lead, and PAHs. Replicate samples will be collected along the same rows used for the initial samples, but the sampling points will be varied from the initial sampling point along each row. Replicate samples will be collected in the same manner as the initial samples. The analytical results from the initial sample and the two replicate samples will be used to calculate the Relative Standard Deviation (RSD) for the Decision Unit. The RSD is calculated in order to test the assumption that the data is normally distributed and, therefore, the incremental sampling approach is valid. It is assumed that the data is normally distributed if the RSD is 35% or less. The RSD is calculated using the following equation:

$$RSD\% = \frac{100s}{\bar{x}}$$

Where: $\bar{x}$ = mean
s = standard deviation

The incremental samples from the Decision Unit will be thoroughly mixed and then screened twice as recommended in *TRW Recommendations for Performing Human Health Risk Analysis on Small Arms Shooting Ranges*. The composite sample will first be screened with a No. 4 (4.75 millimeter (mm)) or No. 10 (2.00 mm) sieve to remove bulk debris and then with a No. 50 (300 micrometer (µm)) sieve to produce the fine fraction.

The remediation contractor will estimate the lead concentration in the incremental sample using a hand-held, portable X-Ray Fluorescence (XRF) analyzer following the procedures outlined in Section 5.2 of this SAP. Based on previous assessment work conducted at the site, it is likely that the lead concentration in soil, as determined by the analytical laboratory using EPA Method 6010C, will be less than the minimum GPL or residential SRL if the estimated lead concentration, as determined by the XRF analyzer, is less than 225 milligrams per kilogram (mg/kg). Therefore, if the lead concentration measured by the XRF analyzer is less than 225 mg/kg, the sample will be prepared in accordance with the procedure discussed in the following paragraph and the sample will be submitted to the analytical laboratory for analysis of lead, arsenic, and antimony using EPA Method 6010C and PAHs using Environmental Protection Agency (EPA) Method 8270. No further excavation will be conducted within this Decision Unit unless the results from the analytical laboratory demonstrate that lead is present in the sample at a concentration greater than the minimum GPL or residential SRL. In the event that the lead concentration measured by the XRF analyzer is greater than 225 mg/kg or the lead concentration in the sample analyzed using EPA Method 6010C is greater than the minimum GPL or residential SRL, the remediation contractor will excavate additional soil from the Decision Unit, the

depth of which will be determined based on professional judgment of the remediation contractor, and the lead concentration in soil will be reevaluated using the XRF analyzer and/or additional analytical laboratory testing using EPA Method 6010C.

A Decision Unit soil sample to be submitted to the analytical laboratory for analysis using EPA Method 6010C will be screened using a #10 sieve (2 mm). Once the greater than 2 mm fraction is removed from the sample, the remaining soil will be evenly spread on a steel tray at approximately ½-inch in depth. The soil in the tray will be divided into 50 sections and a small spatula will be used to collect approximately 5 grams total for analysis of lead, antimony, arsenic, and lead using EPA Method 6010 and 30 grams total for analysis of PAHs using EPA Method 8270. The samples will be placed in 2-ounce (oz) clear glass jar. The jar screw threads will be wiped with a clean, unused tissue to remove any sample residue that may adhere to the jar thread and that could affect the seal. The jar will be capped with a Teflon-lined cap (Teflon side down) or an appropriate lid provided by the analytical laboratory.

The jars containing the samples will be labeled with unique sample numbers as specified in Section 5.4. Non-disposable sampling equipment will be decontaminated after each use following the procedures outlined in Section 5.5.

2.2 STOCKPILE ASSESSMENT

The procedures of EPA SW-846 and *Methods for Evaluating the Attainment of Cleanup Standards, Volume 1, Soils and Solid Media* will be used to calculate the number of Decision Units required to be collected and analyzed for antimony, arsenic, lead, and PAHs to properly characterize the excavation area or stockpiled soils. The following schedule will be used to estimate the number of samples necessary to meet the statistical requirements of SW-846:

TABLE 2.1
SOIL STOCKPILE SAMPLE REQUIREMENTS

Stockpile Size (cu yds)	Samples Required
Less than 500	1 sample for every 25 cu. yd.
500 to 1,000	20 samples plus one sample for every 100 cu. yd in excess of initial 500 cu. yd.
1,000 to 10,000	25 samples plus one sample for every 500 cu.yd. in excess of initial 1,000 cu. yd.
Greater than 10,000	43 samples plus one sample for every 5,000 cu. yd. in excess of initial 10,000 cu. yd.

Using this table and based on the preliminary amount of soil calculated to be excavated and screened, the number of Decision Units required for the two stockpiles that will be characterized are:

TABLE 2.2
DECISION UNITS REQUIRED AND SAMPLE FREQUENCY

Area to be Characterized	Percentage of Total Volume of Excavated Soil	Stockpile Volume (yd^3)	Decision Units Required	Sample Frequency (sample per yd^3)
-1-inch to +¼-inch Stockpile Material	25%	4,907	32	153
Stabilized Soil	60%	11,778	44	267

If the analytical results from the -1-inch to +¼-inch Stockpile Material demonstrate that concentrations of these parameters are less than the residential SRLs, then it will be assumed that the soil in the stockpile meets minimum GPL or residential SRL standards and the material can be re-used on site. If any single analyte exceeds its respective minimum GPL or residential SRL, then the material cannot be used on-site and the material will be stabilized using the ECOBOND® additive, added to the Stabilized Soil stockpile, and characterized in the same manner as soil in the Stabilized Soil stockpile.

If the analytical results from the Stabilized Stockpile Material demonstrate that concentrations of these parameters are less than the hazardous waste characteristic concentrations for lead, arsenic, and antimony, then it will be assumed that the soil in the stockpile is a non-hazardous waste and the material can disposed off site as a non-hazardous waste. If any single analyte exceeds its hazardous waste characteristic concentration, Stabilized Soil: Material will be further stabilized using the ECOBOND® additive and re-characterized. If the material cannot be stabilized such that the hazardous waste characteristic concentrations are not exceeded, the soil will be disposed off site as a hazardous waste.

2.2.1 Assessment of -1-inch to +¼-inch Stockpile Material

As discussed in Section 4.2 of the VRP Work Plan, approximately 4,907 cubic yards of material sized -1-inch to +¼-inch will be generated during the screening process. This material will be spread over traffic-rated steel plates, a concrete pad built specifically for this purpose, or other hard surface. A super vacuum will be used to remove lighter-density vegetation, rocks, or other materials from the bullet fragments which will remain on the steel plate or concrete pad due to the higher density of the lead fragments. Samples of the lighter density material that was collected by the super vacuum will be stockpiled and analyzed to evaluate whether the material is a hazardous waste due to the presence of lead

and to verify the COC concentrations are less than the residential SRLs and minimum GPLs. The number of Decision Units and sampling frequency necessary to adequately characterize this soil stockpile are provided in Section 2.2.1 of this SAP.

Samples of the lighter-density stockpiled material will be collected using the incremental sampling method. For each Decision Unit, approximately 50 samples of approximately equally-weighted stabilized soil will be collected directly from the lighter-density material stockpile. The incremental samples from the Stabilized Soil Decision Unit will be thoroughly mixed and then screened twice as recommended in *TRW Recommendations for Performing Human Health Risk Analysis on Small Arms Shooting Ranges*. The composite sample will first be screened with a No. 4 (4.75 mm) or No. 10 (2.00 mm) sieve to remove bulk debris and then with a No. 50 (300 micrometer (µm)) sieve to produce the fine fraction. Once the greater than 2 mm fraction is removed from the sample, the remaining soil will be evenly spread on a steel tray at approximately ½-inch in depth. The soil in the tray will be divided into 50 sections and a small spatula will be used to collect approximately 5 grams total for analysis of lead, arsenic, and antimony using EPA Method 6010 and 30 grams total for analysis of PAHs using EPA Method 8270. The samples will be placed in 2-ounce (oz) clear glass jar. The jar screw threads will be wiped with a clean, unused tissue to remove any sample residue that may adhere to the jar thread and that could affect the seal. The jar will be capped with a Teflon-lined cap (Teflon side down) or an appropriate lid provided by the analytical laboratory.

The jars containing the samples will be labeled with unique sample numbers as specified in Section 5.4. Non-disposable sampling equipment will be decontaminated after each use following the procedures outlined in Section 5.5.

2.2.2 Assessment of Stabilized Soil

As discussed in Section 4.2 of the VRP Work Plan, approximately 11,778 cubic yards of -¼-inch material will be generated during the screening process. Material in the -¼-inch stockpile will likely require stabilization using the ECOBOND® additive as described in Section 4.3 of the Work Plan. Based on previous assessment work conducted at the Site, approximately 19,000 tons of stabilized soil will be generated during the remediation process. The number of Decision Units and sampling frequency necessary to adequately characterize this soil stockpile are provided in Section 5.3 of this SAP.

Waste characterization samples will be collected using an incremental sampling method. For each Decision Unit, approximately 50 samples of approximately equally-weighted stabilized soil will be collected directly from discharge of the equipment used to mix the soil and ECOBOND® additive. The incremental samples from the Stabilized Soil Decision Unit will be thoroughly mixed and then screened twice as recommended in *TRW Recommendations for Performing Human Health Risk Analysis on Small Arms Shooting*

Ranges. The composite sample will first be screened with a No. 4 (4.75 mm) or No. 10 (2.00 mm) sieve to remove bulk debris and then with a No. 50 (300 micrometer (µm)) sieve to produce the fine fraction. Once the greater than 2 mm fraction is removed from the sample, the remaining soil will be evenly spread on a steel tray at approximately ½-inch in depth. The soil in the tray will be divided into 50 sections and a small spatula will be used to collect approximately 5 grams total for analysis of lead, arsenic, and antimony using EPA Method 6010 and 30 grams total for analysis of PAHs using EPA Method 8270. The samples will be placed in 2-ounce (oz) clear glass jar. The jar screw threads will be wiped with a clean, unused tissue to remove any sample residue that may adhere to the jar thread and that could affect the seal. The jar will be capped with a Teflon-lined cap (Teflon side down) or an appropriate lid provided by the analytical laboratory.

The jars containing the samples will be labeled with unique sample numbers as specified in Section 5.4. Non-disposable sampling equipment will be decontaminated after each use following the procedures outlined in Section 5.5.

2.2.3 Quality Assurance/Quality Control Assessment

Quality Assurance/Quality Control samples will be collected in accordance with Section 4.1 of the QAPP.

2.3 XRF SCREENING METHODOLOGY

The remediation contractor will use a Thermo-Scientific Niton XLp 300 Series portable XRF analyzer, or equivalent, to screen the samples for lead concentrations in general accordance with EPA Method 6200 (*Field Portable X-ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment*) and ASTM E-1727-16 (*Standard Practice for Field Collection of Soil Samples for Subsequent Lead Determination)*. The XRF will be calibrated each day before beginning fieldwork (at a minimum) in accordance with manufacturer directions and the QAPP requirements. The samples will be prepared in general accordance with the User's Guide, modified slightly to obtain site-specific data. As discussed in Section 5.1.3 above, the composite sample will first be screened with a No. 4 (4.75 mm) or No. 10 (2.00 mm) sieve to remove bulk debris and then with a No. 50 (300 µm) sieve to produce the fine fraction. Once screened, approximately 5 grams of the material less than 300 µm will be screened with the XRF for lead concentrations as described below.

1. Place a circle of Mylar Film on top of the disposable sample cup. This film goes on the end of the cup with the indented ring.
2. Secure the film with the collar. The flange inside the collar faces down and snaps into the indented ring of the cup. Inspect the installed film window for continuity and smooth, taut appearance.

3. Set the cup on a flat surface with the film-window side down. Fill the sample cup with at least five grams of prepared sample, making sure that there are no voids or uneven layers of soil.
4. Lightly tamp the sample into the sample cup.
5. Place a filter-paper disk on the sample after tamping it.
6. Fill the rest of the sample cup with polyester fiber to prevent sample movement.
7. Cap the sample cup.
8. Place a label on the cup to identify the grid number.
9. Place the sample cup into the sampling stand and analyze the sample using the Standard Soil Mode by pressing the trigger.
10. The XRF will be set to continue reading for a minimum of 30 seconds. The time may be extended based on the accuracy reading of the instrument.

During XRF operation, the following QC guidelines will be followed to assess accuracy and precision:

1. During operation, the ambient air temperature will be recorded for each measurement and if the ambient temperature changes by more than 10 degrees Fahrenheit (°F), the instrument will be recalibrated.
2. While the instrument is being used, quality assurance checks using the reference standards and the blank will be performed once each hour or every twenty samples, and at the end of the period of operation, prior to turning the instrument off.
3. For every twenty samples, or at least once a day, a duplicate sample will be analyzed using the main sampling technique.
4. Once per day, instruments precision will be checked by analyzing one of the Site samples at least seven times in replicate.

XRF data precision will be verified by calculating the relative standard deviation (RSD) of the seven replicate sample using the equation below. A calculated RSD of 20% of less than 20% indicates adequate precision. The RSD is determined from the following equation:

$$RSD\% = \frac{100s}{\bar{x}}$$

Where: $\bar{x}$ = mean
s = standard deviation

3.0 SAMPLE HANDLING AND METHODOLOGY

3.1 SAMPLE DESIGNATION

The sample designation system is defined in the following subsections for proper identification and tracking of samples in the field and analytical laboratory. This sample designation system is designed such that each sample receives a unique identifier. A label will be affixed to each container and will include the identification, sampler's initials, collection date and time, location, requested analysis, preservative, and client name.

3.1.1 Excavation Decision Unit Sample Designation

The soil samples collected from the Excavation Decision Units will be identified as follows:

EX-DU#

Where: EX - Excavation
DU# – Decision Unit number

Field duplicate samples collected from the Excavation Decision Units will be designated as follows:

EX-DU#

Where: EX - Excavation
DU# – where # begins with 30 and is sequentially increases by 1 for each duplicate collected (i.e., DU30, DU31, etc.)

3.1.2 Lighter-Density Material in the -1-inch to +¼-inch Stockpile Sample Designation

The soil samples collected from the Lighter-Density Material in the -1-inch to +¼-inch Stockpile will be identified as follows:

LDM-DU#

Where: LDM – Lighter-Density Material Soil Stockpile
DU# – Decision Unit number

3.1.3 Stabilized Soil Decision Unit Sample Designation

The soil samples collected from the Stabilized Soil Decision Units stockpiles will be identified as follows:

SS-DU#

Where: SS – Stabilized Soil
DU# – Decision Unit number

3.1.4 Equipment Blank Unit Sample Designation

Equipment blank samples will be designated as follows: EB-#-mmddyy

Where: EB – Equipment Blank
- sample identification number
mmddyy – month, day, and year of collection

3.2 DECONTAMINATION PROCEDURES

Decontamination procedures will be conducted in accordance with ASTM D5088-90, *Standard practice for Decontamination of Field Equipment Used at Nonradioactive Waste Sites*. All non-disposable sampling equipment will be decontaminated after each use by washing with non-phosphate detergent and tap water, then given a final rinse in either distilled or deionized water and allowed to air dry. Spent wash waters used to clean sampling equipment, will be poured onto an area of the Site with soil concentrations of lead exceeding the non-residential SRL and allowed to evaporate. Care will be taken not to allow this water to run off to unimpacted portions of the Site. Disposable gloves will be changed between each sample location.

3.3 CHAIN-OF-CUSTODY PROCEDURES

Custody of samples will be maintained and documented from the time of sample collection to completion of the analyses. A sample is under a person's custody if one or more of the following conditions are met:

- In the person's physical possession
- In view of the person after that person has taken possession
- Secured by that person so that no one can tamper with the sample
- Secured by that person in an area that is restricted to authorized personnel

The sampler(s) will be responsible for the care and custody of the samples until they are

relinquished for delivery to the laboratory or accepted by a laboratory representative.

The analytical laboratory will provide chain-of-custody forms, cooler custody seals, and sample labels which will be completed by the sampler(s).

The chain-of-custody will be submitted to the analytical laboratory with all samples and will contain the following information:

- Project number
- Date and time of sample collection
- Sample matrix description
- Analyses requested
- Preservation, if applicable
- Number and type of containers used
- Any special handling or analysis requirements
- Signature of person collecting the samples
- Signature(s) of persons involved in the sample custody
- Sample identification

The chain-of-custody form will be filled out using a pen with indelible ink capable of making carbon copies. When the samples are transferred from one party to another, the individuals will sign, date, and note the time on the form. The original form will accompany the samples to the laboratory in the shipping cooler. Sampling personnel will retain a copy of the chain-of-custody when samples are relinquished.

The following procedures will be used as applicable when packing and transporting samples to laboratory staff:

- Use of watertight ice chests and coolers
- Use of ice (for example, cubes, shaved) to maintain proper refrigeration of the samples (4°C)
- Packing material placed within the cooler to ensure container integrity
- Paperwork placed inside a waterproof bag inside the cooler
- Cooler lid taped closed with packaging tape and signed custody seal if transported by entity other than sampling or laboratory staff.

After collection, samples will be transported in a timely manner to the laboratory for analysis. The analytical laboratory will be notified in advance of sample delivery. Sample coolers will be delivered to the laboratory by sampling personnel or courier or sent via commercial carrier.

The chain-of-custody will list the primary and field QA/QC samples identifiers. For

duplicates, a separate sample number will be assigned and submitted blind to the analytical laboratory. The duplicate sample identification will be recorded in the field logbook or sampling forms. Equipment blanks will be identified as "EB" and numbered sequentially and with the date of collection. Samples collected for QA/QC purposes will be specified for analysis by a notation on the sample container label and the chain-of-custody.

3.4 ANALYTICAL LABORATORY CUSTODY PROCEDURES

Upon receipt, the analytical laboratory will check samples for label identifications and complete chain-of-custody documentation. The sample integrity will be confirmed and the temperature will be measured immediately after the cooler is opened and recorded on the chain-of-custody. Any discrepancies between the chain-of-custody documentation and sample labels, or any problem encountered that may affect the sample integrity must be noted and communicated to the remediation contractor. Problems that may affect the sample integrity include:

- Inadequate sample preservation
- Sample containers broken, leaking, or containing insufficient volume
- Holding time exceeded
- Temperature blank, if included, less than 2 degrees centigrade (° C) or greater than 6° C (when time since sample was collected is greater than 2 hours)

A unique identification number will be assigned by the analytical laboratory. This number will be cross-referenced to the field sample designation to reduce the possibility of reporting errors. Access to the sample control area will be restricted to prevent unauthorized contact with samples, extracts, or documentation. Samples and sample extracts will be retained by the laboratory a minimum of 30 days following the issuance of the final laboratory analytical report.

3.5 HANDLING AND PACKAGING

Assessment samples will be stored in a portable cooler preserved with wet ice between 2^{o} and 6^{o} C until received by the laboratory. Adequate packing materials will be used to protect sample container integrity and preservation. Samples stored overnight will be secured to prevent tampering.

For samples that are shipped via commercial carrier, samples will be placed in a rigid shipping container (for example, an insulated cooler). The following outlines the packaging procedures that will be followed for shipment of samples.

- If the cooler has a drain plug, it will be sealed to prevent leaking.
- The bottom of the cooler will be lined with bubble wrap to prevent breakage during

shipment.
- Container lids will be checked for tightness.
- Glass sample containers will be wrapped in bubble wrap to prevent breakage.
- Samples will be placed in sturdy coolers lined with large plastic trash bags that will serve as secondary containment. The appropriate chain-of-custody forms will be enclosed in a plastic zip-lock bag.
- Empty space in the cooler will be filled with packing material to prevent movement and breakage during shipment.
- Ice used to preserve samples will be double sealed in two plastic zip-lock bags and placed on top and around the samples to chill them to the required temperature.
- If samples are shipped via commercial carrier, each cooler will be securely taped shut and a custody seal will be affixed so as to seal the interface of lid and body of the cooler.

For shipped samples, the following information will be recorded and maintained:

- Project number
- Total number of samples shipped to the analytical laboratory
- Carrier, air bill numbers, method of shipment (for example, priority next day)
- Shipment date and when it should be received by the analytical laboratory
- Irregularities or anticipated problems associated with the samples

Appropriate shipping regulations and guidelines will be followed when shipping samples.

4.0 REQUESTS FOR ANALYSIS

Samples will be submitted to an Arizona Department of Health Services (ADHS)-certified laboratory. A final analytical laboratory data package will be provided by the subcontracted analytical laboratory and will meet the applicable requirements of *Laboratory Documentation Required for Data Evaluation* (R9QA/004.2); EPA Region 9; August 2001. The remediation contractor will perform data verification of the entire data package in accordance with Section 9.0 of the QAPP. Data outliers and anomalies will be evaluated by the analytical laboratory and data flags and/or discussions will be placed in an analytical report in accordance with Arizona Laboratory Data Qualifiers, Revision 3.0 (September 20, 2007). After verification is completed, qualifiers will be assigned to the data points that are affected by the quality control outliers. The qualifiers will indicate the analyte concentrations that may be affected by laboratory or field contamination, unusable because of quality control deficiencies, and/or estimated due to possible bias or reduced confidence in the results.

Samples will be collected in accordance with the procedures described in the Work Plan, SAP, and this QAPP to meet the project DQOs. In general, the sample process design will include the factors described in the following paragraphs.by previous sampling events.

The sample locations, locations and quantities with the associated analytical methods are identified in the SAP. Soil samples will be analyzed for arsenic, antimony, lead, and PAHs. The analytical methods, sample container, preservative, and holding times are listed for these analytical parameters are presented in Table 4.1 and Table 4.2. The analytical laboratory will provide new, pre-preserved sample bottles as needed for sample collection. In addition, the analytical laboratory will maintain the "certificate of cleanliness" for the containers should any questions arise in the future.

Samples that require preservation will be preserved according to established EPA requirements for each EPA method used for analysis. Suitable measures will be taken to ensure that storage requirements (i.e., temperature) are maintained in the field, during transport to the laboratory, and during storage at the laboratory. Sample temperature will be recorded by the laboratory upon receipt.

TABLE 4.1
SAMPLE ANALYTICAL METHODS, CONTAINERS, PRESERVATIVES, AND HOLDING TIMES – SOLID MEDIA

CONTAMINANT	ANALYTICAL METHOD	CONTAINER[1]	PRESERVATIVE	HOLDING TIME
Total Arsenic, Antimony, and Lead	6010	8-ounce clear glass jar	Cool to 4°C	28 days

TABLE 4.1
SAMPLE ANALYTICAL METHODS, CONTAINERS, PRESERVATIVES, AND HOLDING TIMES – SOLID MEDIA

CONTAMINANT	ANALYTICAL METHOD	CONTAINER[1]	PRESERVATIVE	HOLDING TIME
Toxicity Characteristic Leaching Procedure (TCLP) Lead	1311 (extraction) / 6010 (analysis)	8-ounce clear glass jar	Cool to 4°C	6 months
PAHs	8270 SIM	4-ounce clear glass jar	Cool to 4°C	14 days extraction; 40 days after extraction for analysis

TABLE 4.2
SAMPLE ANALYTICAL METHODS, CONTAINERS, PRESERVATIVES, AND HOLDING TIMES - WATER MEDIA (EQUIPMENT BLANKS)

CONTAMINANT	ANALYTICAL METHOD	CONTAINER	PRESERVATIVE	HOLDING TIME
Total Arsenic, Antimony, and Lead	200.7	250 mL plastic	Nitric Acid (HNO_3) to pH<2	6 months
Dissolved Arsenic, Antimony, and Lead[2]	200.7	250 mL plastic	HNO_3 to pH<2	6 months
PAHs	8270 SIM	1-Liter Amber Glass	Cool to 4°C	7 days extraction; 40 days after extraction for analysis

Notes:
1 – Sample containers may be combined, as applicable

5.0 FIELD EQUIPMENT AND CALIBRATION

This Section describes the equipment and calibration of field equipment that will be used to collect soil and groundwater samples at the Site following the Sampling Rationale described in Section 5.0. The soil samples will be collected and analyzed in accordance with the analytical methods described in Section 5.0. Sample tracking and shipping will be conducted in accordance with Section 10.0.

5.1 FIELD EQUIPMENT

5.1.1 List of Equipment Needed

The following equipment, including decontamination equipment, will be used in the field to collect soil samples:

- VRP Work Plan, SAP, and QAPP
- Maps/site plans
- Calculator
- Safety equipment and personal protective equipment (PPE) (as specified in HASP)
- GPS unit
- Tape measure
- Survey stakes/rebar and flags
- Camera
- Sample containers
- Logbooks
- Ball point pens and permanent marker pens
- Permanent marker pens
- Sample container labels
- Chain-of-custody forms and custody seals
- Sample coolers and ice
- Plastic buckets (5-gallon)
- Non-phosphate detergent
- Decontamination brushes
- Nitric acid
- Distilled/deionized water
- Disposable bailers
- String for disposal bailers
- Plastic sheeting
- No. 4 (4.75 mm) or No. 10 (2.00 mm)
- No. 50 (300 µm) sieve
- Trash bags
- Stainless steel trowels or spoons

- Shovels
- Stainless steel mixing bowls
- Ziplock bags
- Paper towels
- XRF with accessories
- Mylar film (XRF)
- XRF disposable sampling cups
- Polyester fiber (XRF)
- XRF Soil Standards

5.1.2 Field Instrument Calibration

Field instrumentation is anticipated to include an XRF analyzer. Field equipment will be calibrated each day before beginning fieldwork (at a minimum) in accordance with manufacturer directions. Calibration information will be recorded in a logbook or on forms that will be maintained in the project files.

The following information will be recorded:

- Equipment type (for example, XRF)
- Manufacturer and model number
- Date of latest calibration
- Calibration standard type, concentration, manufacturer lot number, date, pressure (if gas), as applicable
- Dates of use
- Name of person who calibrated instrument
- Corrective action if necessary

Entries will be recorded when each instrument is calibrated. Entries will be made in ink. Corrections will be made by crossing a line through the error and entering the correct information. Changes will be dated and initialed. No entries will be obliterated or rendered unreadable.

5.2 SAMPLING LOCATIONS

Soil sample locations will be recorded in the field logbook as sampling is completed. A sketch of the sampling location will be entered into the logbook and physical reference points will be labeled. If possible, distances to the reference points will be given. Sample locations will also be surveyed using a hand-held GPS unit. The sampling locations will be indicated on a site map that will be prepared as part of the final report summarizing field activities and analytical results.

6.0 DISPOSAL OF RESIDUAL MATERIALS

In the process of collecting environmental samples at the Site during field activities, sampling personnel will generate different types of potentially contaminated investigation-derived waste (IDW) that will include the following:

- Used PPE
- Disposable sampling equipment
- Excess soil from sampling
- Decontamination water

The EPA's National Contingency Plan (NCP) requires that management of IDW generated during sampling comply with all applicable or relevant and appropriate requirements (ARARs) to the extent practicable. The sampling plan will follow the *Office of Emergency and Remedial Response (OERR) Directive 9345.3-02* (May 1991), which provides the guidance for the management of IDW. In addition, other legal and practical considerations that may affect the handling of IDW will be considered. Used PPE and disposable equipment will be double bagged and placed in a municipal refuse dumpster. These wastes are not considered hazardous and can be sent to a municipal landfill. PPE and disposable equipment that is to be disposed that can still be reused will be rendered inoperable before disposal in the refuse dumpster.

Excess soil from sampling activities will be stockpiled and placed in an area of the Site with soil concentrations of lead exceeding the non-residential SRL for disposal during remediation.

Spent wash waters used to clean sampling equipment, will be poured onto an area of the Site with soil concentrations of lead exceeding the non-residential SRL and allowed to evaporate. Care will be taken not to allow this water to run off to unimpacted portions of the Site.

7.0 SAMPLE DOCUMENTATION AND DELIVERY

7.1 FIELD NOTES

This section discusses recordkeeping in the field that may occur through a combination of logbooks, preprinted forms, photographs, or other documentation.

7.1.1 Field Logbooks

Field logbooks will be used to document where, when, how, and from whom vital project information is obtained. Documentation in the field logbook will be sufficient to reconstruct the field activities without relying on the memories of the field team members. Field notes will be kept in bound field logbooks. Logbooks will be used to record pertinent field activity information. A field logbook will be dedicated to this project and will not be used for other projects. Information recorded each day will include the following:

- Project name
- Date and time
- Name and signature of field personnel entering information on each respective page
- Weather conditions
- Names of personnel on site, including subcontractors and site visitors
- Health and safety information, including PPE level
- GPS coordinates, including datum and accuracy
- Deviations from VRP Work Plan, SAP, HASP, or QAPP procedures will be recorded in the logbook with an explanation of the reason for the deviation

Information recorded during each sampling point will include the following:

- Sampling location (sampling point identification)
- Sample identification
- Sample depth
- Sample media
- Description of sample
- Sampler name(s)
- Chemical analysis requested, sample container, and preservative
- Any modifications to the sampling plan
- Sampling observations (if applicable)
- QA/QC samples collected (as applicable)
- Field sketches, when appropriate

Entries will be made in blue or black indelible ink, and no erasures will be allowed. If an incorrect entry is made, the information will be crossed out with a single strike mark, and

the change initialed and dated by the team member making the logbook change. Each page in the field logbook will be signed and dated at the bottom of the page by any team member making entries on the page. Pages in the logbook will be consecutively numbered.

The field logbooks will be identified on the cover by the project name, project number, and logbook number. The logbooks will be stored in the field project files when not in use. At completion of the field activities, the original field logbooks will be retained in the project file.

7.1.2 Photographs

Photographs will be taken at the sampling locations and at other areas of interest on the Site. Photographs will serve to verify information entered in the field logbook. For each photograph taken, the following information will be written in the logbook or recorded in a separate field photography log:

- Time, date, location, and weather conditions
- Description of the subject photographed
- Name of person taking the photograph

7.2 LABELING

Samples will be clearly and precisely labeled for proper identification in the field and for tracking in the analytical laboratory. The samples will have pre-assigned, identifiable, and unique numbers. At a minimum, the sample labels will contain the following information: sample designation, date of collection, analytical parameter(s), and method of preservation.

7.3 SAMPLE CHAIN-OF-CUSTODY FORMS AND CUSTODY SEALS

As discussed in Section 3.3 of the QAPP, custody of samples will be maintained and documented from the time of sample collection to completion of the analyses. A sample is under a person's custody if one or more of the following conditions are met:

- In the person's physical possession
- In view of the person after that person has taken possession
- Secured by that person so that no one can tamper with the sample
- Secured by that person in an area that is restricted to authorized personnel

The sampler(s) will be responsible for the care and custody of the samples until they are relinquished for delivery to the laboratory or accepted by a laboratory representative.

The analytical laboratory will provide chain-of-custody forms, cooler custody seals, and

sample labels which will be completed by the sampler(s).

The chain-of-custody will be submitted to the analytical laboratory with all samples and will contain the following information:

- Project number
- Date and time of sample collection
- Sample matrix description
- Analyses requested
- Preservation, if applicable
- Number and type of containers used
- Any special handling or analysis requirements
- Signature of person collecting the samples
- Signature(s) of persons involved in the sample custody
- Sample identification

The chain-of-custody form will be filled out using a pen with indelible ink capable of making carbon copies. When the samples are transferred from one party to another, the individuals will sign, date, and note the time on the form. The original form will accompany the samples to the laboratory in the shipping cooler. Sampling personnel will retain a copy of the chain-of-custody when samples are relinquished.

The following procedures will be used as applicable when packing and transporting samples to laboratory staff:

- Use of watertight ice chests and coolers
- Use of ice to maintain proper refrigeration of the samples (4° C)
- Packing material placed within the cooler to ensure container integrity
- Paperwork placed inside a waterproof bag inside the cooler
- Cooler lid taped closed with packaging tape and signed custody seal if transported by entity other than sampling or laboratory staff.

After collection, samples will be transported in a timely manner to the laboratory for analysis. The analytical laboratory will be notified in advance of sample delivery. Sample coolers will be delivered to the laboratory by sampling personnel or courier or sent via commercial carrier.

The chain-of-custody will list the primary and field QA/QC samples identifiers. For duplicates, a separate sample number will be assigned and submitted blind to the analytical laboratory. The duplicate sample identification will be recorded in the field logbook or sampling forms. Samples collected for QA/QC purposes will be specified for analysis by a notation on the sample container label and the chain-of-custody.

7.4 SAMPLE DELIVERY TO LABORATORY

Sample containers will be placed in a secure location and delivered to the subcontracted analytical laboratory. At that time, the remediation contractor will sign over custody of the samples to the analytical laboratory on the chain-of-custody form. the subcontracted analytical laboratory will then provide the remediation contractor with a copy of the chain-of-custody form for our records. The samples will be shipped per the subcontracted analytical laboratory Quality Assurance Manual and/or Standard Operating Procedures (SOPs).

7.5 LABORATORY DATA REPORTING FORMAT AND CONTENT

Analytical reports will contain the sample results and QA/QC data to evaluate the DQOs defined for the project. Data generated by the laboratory will be retained and submitted by the remediation contractor in electronic format. Analytical results will include appropriate elements identified in the EPA Region 9 January 1990 document titled *Laboratory Documentation Requirements for Data Validation* and will include, at a minimum, the following:

- Analytical laboratory name and Arizona Department of Health Services license number
- Case narrative
- Cross-reference of sample identification number and analytical laboratory number
- Chain-of-custody
- Dates of sample collection and analysis
- Analytical results and method references
- Analytical method detection limits (MDLs) and laboratory reporting limits
- Surrogate recoveries (as applicable), method blanks, laboratory duplicates
- Calibration summary
- Matrix Spike/Matrix Spike Duplicate (MS/MSD), Laboratory Control Sample/Laboratory Control Duplicate (LCS/LCSD), and blank spike references
- Data outlier summary
- Analytical laboratory approval

The analytical laboratory will typically provide the analytical reports within 15 working days of sample receipt. Omissions or insufficient levels of detail will be corrected by the analytical laboratory.

7.6 RECORDS DISPOSITION

Project files and records will be stored by the remediation contractor until the NFA determination has been issued by the Arizona Department of Environmental Quality

(ADEQ). The project files will then be moved to a facility designated by the US CBP for permanent storage if the records need to be retained for a longer period of time.

The analytical laboratory will store the original hardcopy and electronic raw data of the analytical data packages produced for this project for three years. The level of information regarding sample analyses (calibration records, run logs, etc.) will be such the analytical processes can be reconstructed within that time.

8.0 FIELD VARIANCES

As conditions in the field may vary, it may become necessary to implement minor modifications to sampling as presented in this plan. When appropriate, the QA Manager will be notified, and a verbal approval will be obtained before implementing the changes. Modifications to the approved plan will be documented in the sampling project report.

APPENDIX B

QUALITY ASSURANCE PROJECT PLAN

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LIST OF ACRONYMS	
Acronym	**Definition**
%R	Percent Recovery
ADEQ	Arizona Department of Environmental Quality
ADHS	Arizona Department of Health Services
AUL	Activity and Use Limitation
AWQS	Arizona Water Quality Standard
CCV	Continuing Calibration Verification
CCW	Chase, Carson & White, LLC
COC	Contaminant of Concern
DQO	Data Quality Objective
EDD	Electronic Data Deliverable
EPA	United States Environmental Protection Agency
GPL	Groundwater Protection Level
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
ICP	Inductively Coupled Plasma
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MDL	Method Detection Limit
MS	Matrix Spike

LIST OF ACRONYMS	
Acronym	**Definition**
MSD	Matrix Spike Duplicate
NFA	No Further Action
NIST	National Institute of Standards and Technology
PAH	Polynuclear Aromatic Hydrocarbon
PE	Performance Evaluation
PPE	Personal Protective Equipment
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RPD	Relative Percent Difference
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
SRL	Soil Remediation Level
TCLP	Toxicity Characteristic Leaching Procedure
US CBP	United States Customs and Border Protection
VOC	Volatile Organic Compound
VRP	Voluntary Remediation Program
XRF	X-Ray Fluorescence

1.0 PURPOSE OF QUALITY ASSURANCE PROJECT PLAN

Arizona Department of Environmental Quality (ADEQ) policy mandates environmental data collection activities and evaluation of analytical results be addressed in a Quality Assurance Project Plan (QAPP). This QAPP, in conjunction with the Voluntary Remediation Program (VRP) Work Plan and Sampling and Analysis Plan (SAP), presents the functions, procedures, and specific quality assurance (QA) and quality control (QC) activities designed to achieve the data quality objectives (DQOs) associated with additional assessment of privately-owned properties located adjacent to the Former United States Customs and Border Protection (US CBP) Small Arms Firing Range located at 1651 West Target Range Road in Nogales, Arizona (Site). Guidelines followed to prepare this SAP included the United States Environmental Protection Agency (EPA) document *EPA Region 9 Template for Sampling and Analysis Plan; Version 3 – Brownfields Projects (R9QA/006);* United States Environmental Protection Agency; June 2004.

The goal of the VRP Work Plan, this SAP, and associated QAPP is to obtain additional data to obtain an unconditional No Further Action (NFA) determination for Site soil and groundwater from the ADEQ VRP without an encumbrance (e.g. environmental use restriction or activity and use limitation [AUL]) on the property title(s). The foreseeable Site use is likely commercial use (food storage). As such, the appropriate remedial goals for Site soils are the ADEQ pre-determined 10^{-5} residential soil remediation levels (SRLs) and the minimum groundwater protection levels (GPLs) for the Chemicals of Concern (COCs).

Based on the historical use of the adjacent property as a shooting range, the Site chemicals of concern (COCs) include:

- Arsenic (components of ammunition)
- Antimony (components of ammunition)
- Lead (components of ammunition)
- Polynuclear Aromatic Hydrocarbons (PAHs) (constituents of shotgun wadding and clay pigeon targets)

The primary exposure routes of these constituents are:

- Inhalation of airborne particles containing contaminants, mists, or vapors
- Skin Absorption
- Incidental ingestion through improper hygiene
- Skin contact

The SAP will be distributed to those individuals who will participate in the project, including those with US CBP, the remediation contractor, and other significant

subcontractors involved in the project. Addenda and/or revisions to the SAP can be initiated by US CBP or the remediation contractor. In general, an addendum will be written when unforeseen or significant changes have occurred. A revision will not be required for minor changes in scope.

2.0 DATA QUALITY OBJECTIVES AND DATA QUALITY INDICATORS

2.1 DATA QUALITY OBJECTIVES

DQOs have been developed as part of this QAPP to outline the overall purpose and approach the analytical data are intended to support. DQOs have been prepared according to the EPA "seven-step" process and are detailed below. To achieve these objectives, a data quality management program will be an integral part of the investigation.

Step 1: Problem Statement

1) The Site soils have been impacted by the historical use of the adjacent property as a shooting range.
2) The horizontal extent of lead impacts has been defined at the Site.
3) The vertical extent of lead impacts has not been fully defined in some areas of the Site.
4) COCs may have impacted soil at levels above the residential SRLs, non-residential SRLs, or minimum GPLs.
5) COCs may have impacted groundwater at levels above the State of Arizona Aquifer Water Quality Standards (AWQS).
6) Excavated soil may contain COCs that would cause the soil to be classified as a hazardous waste.
7) Screened soil may contain contaminants that would render the soil unusable for Site reuse.

Step 2: Identify the Decision

1) Define appropriate investigation procedures and soil and groundwater sample collection methods to further assess the vertical extent of soil impacted by the COCs and to assess potential impacts to groundwater.
2) Evaluate the vertical extent of impacts of the COCs above the minimum GPLs, residential SRLs, and non-residential SRLs.
3) Evaluate whether groundwater has been impacted the COCs, possibly from the historical use of the adjacent property as a shooting range and whether further assessment or remediation of groundwater is necessary.
4) Evaluate the efficacy of soil stabilization and proper mixture to render excavated soil as non-hazardous waste for disposal purposes.
5) Evaluate screened soil for reuse on the Site.

Step 3: Identify Inputs to the Decision

1) Results of the previous assessments conducted at the Site.
2) Analytical results from samples collected from the -1-inch to +¼-inch and ¼-inch soil stockpiles.
3) Analytical results from soil samples collected from the excavation floor.
4) Soil and groundwater cleanup standards that are applicable to the Site and COCs.
5) Analytical results from Toxicity Characteristic Leaching Procedure (TCLP) for hazardous waste determination.

Step 4: Define the Boundaries of the Study

1) Soil samples will be collected from the excavation floor using an incremental sampling approach and analyzed for COCs.
2) Soil samples will be collected from the from the -1-inch to +¼-inch soil stockpile using an incremental sampling approach and analyzed for COCs.
3) Soil samples will be collected from the from the -¼-inch and soil stockpile using an incremental sampling approach and analyzed for COCs and hazardous waste characteristic following stabilization.

Step 5: Develop a Decision Rule

1) The results from the soil samples collected from the excavation floor will be compared to minimum GPLs and residential SRLs for COCs to verify adequate soil removal has occurred. If COCs are present in concentrations below the residential SRLs and minimum GPKs for the COCs in soil remaining on the Site, no further excavation in the area will be conducted and a NFA can be requested from ADEQ. Otherwise, additional excavation will completed such that soil remaining on the Site will contain COCs in concentrations less than the residential SRLs and minimum GPLs.
2) The results from soil samples from the -1-inch to +¼-inch soil stockpile will be compared to minimum GPLs and residential SRLs for COCs to determine whether soil can be reused on the Site or requires stabilization and off-Site disposal. If COC concentrations are less than the minimum GPLs and residential SRLs, soil will be returned to the Site and used to backfill excavated areas. Otherwise, soil will be placed into the +¼-inch soil stockpile, stabilized, and disposed off-Site as a non-hazardous waste.
3) The results from soil samples collected following stabilization of the -¼-inch soil stockpile will be compared to characteristic hazardous waste standards to verify stabilized Soil can be disposed off-Site as a non-hazardous waste or if further stabilization is required. If the analytical results demonstrate the stabilized soil is a non-hazardous waste, then the Soil will be transported and disposed off-Site.

Otherwise, the soil will be further stabilized until the additional analytical results demonstrate the soil is not classified as a hazardous waste.

Step 6: Specify Tolerable Limits on Decision Errors

1) If the Site is not adequately characterized and/or remediated, remaining contaminants may pose a potential source of soil contamination, leave unresolved concerns about the nature and extent of contamination at the Site.
2) A false negative is defined as considering soil remaining on the Site to meet applicable SRLs, minimum GPLs or alternative GPL, when analytes are actually present in these areas above applicable SRLs, minimum GPLs, and/or applicable alternative GPL in concentrations which could contribute to risk to human health and the environment.
3) A false negative is defined as considering concentrations of COCs in groundwater being less than an applicable AWQS, when analytes are actually present in groundwater above AWQSs concentrations which could contribute to risk to human health and the environment.
4) A false positive is defined as considering the soil to contain analytes above SRLs, minimum GPLs, and/or alternative GPL concentrations, when the converse is true. This may result in additional expense for soil remediation.

Step 7: Optimize the Data

1) The actions described in the VRP Work Plan, SAP, and this QAPP will be taken to assess the Site soil to further to verify Site soils contain COCs in concentrations below the applicable SRL and minimum GPLs.
2) The actions described in the Work Plan, SAP, and QAPP will be taken to evaluate potential impacts to groundwater above the ADEQ AWQS and determine whether further assessment and/or remediation is necessary.
3) Additional assessment and remediation planning samples will be collected and analyzed as described in the VRP Work Plan, SAP, and QAPP to optimize the data.

2.2 DATA QUALITY INDICATORS FOR MEASUREMENT OF DATA

This section identifies the data quality indicators for the DQOs and defines the elements of the QA/QC program for field operations and laboratory analyses. In addition, the requirements for precision, accuracy, completeness, representativeness, comparability, and sensitivity are defined. Acceptable results are those values that fall within the range specified. Corrective actions for unacceptable results are detailed in Section 10.0 of this QAPP.

2.2.1 Precision

Precision measures the reproducibility of repetitive measurements. It is strictly defined as the degree of mutual agreement among independent measurements as the result of repeated application of the sample process under similar conditions. Precision is evaluated by measuring the agreement among individual measurements of the same Site under similar conditions. Duplicate results are assessed using the relative percent difference (RPD) between duplicate measurements. The RPD will be calculated as follows:

$$RPD = \left(\frac{|X1 - X2|}{\overline{X}}\right) \times 100$$

Where: $X1$ = value of Sample 1
$X2$ = value of Sample 2
$\overline{X}$ = mean value of $X1$ and $X2$.

Field precision is measured through the collection and analysis of duplicate samples. Duplicates will be collected at a frequency of 10 percent of primary assessment samples. Water samples can be readily duplicated because of the homogeneous nature of the matrix; however, the duplication of soil samples is much more difficult due to the non-homogeneous nature of soil. Consequently, target water RPDs will be less than or equal to 35 percent and target soil RPDs will be less than or equal to 50 percent of the original result. Duplicate recoveries beyond these ranges may require further qualification of associated data, but data will not be rejected unless determined unusable by further data validation.

Laboratory precision is also measured through the analysis of laboratory control samples (LCS) and matrix spike/matrix spike duplicates (MS/MSD). The laboratory will perform MS/MSD analyses at a rate of one for every 20 samples. If one or more sample results fall outside the acceptance criteria, they will be flagged. Samples will not be re-extracted and analyzed unless the results also fall outside the laboratory-derived limits based on historical data and EPA recommended limits.

2.2.2 Accuracy

Accuracy is a statistical measurement of correctness and includes components of random error (variability due to imprecision) and systematic error. It reflects the total error associated with a measurement. Simply put, accuracy is the measure of closeness of data to the true values. A measurement is accurate when the value reported does not differ beyond acceptable limits from the true value or known concentration of the spike or standard. Laboratory accuracy is expressed as the percent recovery (%R), which is

calculated as follows:

$$\% \ R = \left(\frac{Xs - Xu}{T}\right) x100$$

Where: Xs = measured value of the spiked sample
Xu = measured value of the unspiked sample
T = true value of the spike solution added.

Sampling field accuracy is generally assessed through the analysis of field equipment blanks. Equipment blanks will be collected at a frequency of one equipment blank sample per every 20 samples of the primary samples collected or once per sampling day, whichever is more frequent. Field blanks help assess contamination from ambient conditions, sample containers, transit, and the laboratory. Trip blanks are prepared by the laboratory and shipped to and from the field. They help assess contamination from shipping and the laboratory and are for volatile organic compounds only. Unless high levels of volatile organic compounds VOCs are anticipated, trip blanks are not expected to provide useful information. Because VOCs are not considered to be COCs at the Site and soil samples for VOCs will not be collected, trip blanks and field blanks will not be collected during this project.

Accuracy of laboratory analyses will be assessed by LCS, surrogate standards (where applicable), MS, initial and continuing calibration of instruments. Where applicable, evaluation of the %R for the MS/MSD, LCS/LCDS, and surrogate will be based on the historical statistical lab data or guidelines within the methods for organic and inorganic analyses.

2.2.3 Completeness

Completeness is the amount of valid data obtained compared to the amount that could be expected under ideal conditions. The number of valid results divided by the number of possible results, expressed as a percentage, determines the completeness of the data set. The formula for calculation of completeness is as follows:

$$\% \ Completeness = \left(\frac{Number\ of\ Valid\ \text{Results}}{Number\ of\ Possible\ \text{Results}}\right)$$

Acquiring 100 percent of the data planned is difficult due to unexpected circumstances, adverse weather conditions, equipment problems, laboratory error, and loss of samples or samples that are invalid because they do not meet all of the laboratory sample acceptance criteria. Field completeness will be 80 percent or better for non-critical samples and 90 percent or better for critical samples. Samples will be considered critical if they are

subject to definitive analyses and compared to cleanup levels. Non-critical samples will involve field screening samples used to direct the exploration in the field. The laboratory completeness objective is for 100 percent of the field samples to be analyzed, with greater than 90 percent meeting QA/QC objectives.

2.2.4 Representativeness

Representativeness is the degree to which data accurately and precisely represent selected characteristics of the media sampled. The following factors determine the representativeness of the data: location, frequency, type, collection methods, preservation, holding times, and analytical methods used. Representativeness of data collection is addressed by careful preparation of an SAP.

This QAPP, together with the site-specific SAP, addresses representativeness of field data by specifying sufficient and proper numbers and locations of samples incorporating appropriate sampling methodologies specifying proper sample collection techniques and decontamination procedures and establishing proper field QA/QC procedures. Proper field techniques and procedures will be adhered to. Any deviation from the SAP will be noted in the field notes.

Representativeness in the laboratory is ensured by using proper analytical procedures and appropriate methods, meeting analytical holding times, and meeting QC criteria for each method. It is the laboratory project and QA manager's responsibility to ensure the proper methods and criteria are employed by the laboratory. Any deviation from the QAPP or laboratory standard operating procedures (SOPs) will be documented in the case narrative.

2.2.5 Comparability

Comparability is an expression of confidence with which one data set can be compared to another. The objective of comparability is to ensure data developed during the investigation are comparable to Site knowledge and adequately address applicable criteria or standards established by the appropriate regulatory agency.

The comparability goal is achieved using standard field techniques. These include, but are not limited to, the project prescribed techniques for sample collection and field parameter measurements as defined in the SAP. A detailed description of field techniques are described in the SAP. Proper field techniques and procedures will be adhered to, and any deviation from the SAP will be noted in the field notes.

The comparability of laboratory data will be ensured by the laboratory personnel having reviewed the QAPP and having a working knowledge of the analytical SOPs. The laboratory QA manager, or designee, will also ensure comparable data by reviewing data

generated and verifying the correct methods have been used. The data reviewer will also review the data to verify compliance with the various method requirements.

2.2.6 Sensitivity

Sensitivity is a measure of the analytical detection or quantification limits. A detection is the minimum amount of analyte that can be consistently measured and reported with a high degree of confidence that the analyte concentration is above background response. A quantification limit is that amount that can be consistently quantified with acceptable precision and accuracy. This is also referred to as a practical quantitation limit.

The analytical laboratory reporting limits will be established and verified as outlined in the analytical methods and in accordance with licensure rules. Where applicable, the laboratory quantitation limits required for each project must be at or below the applicable residential SRLs, minimum GPLs, or AWQSs. Failure of the analytical laboratory to achieve the quantitation limits specified in this QAPP may result in the qualification or rejection of data and initiate repeat sampling and analysis.

3.0 QUALITY ASSURANCE /QUALITY CONTROL MEASUREMENT

The overall QA objective is to implement QC procedures during field and laboratory activities that will provide data with the degree of quality consistent with the intended use. Internal QC checks are used to determine if analytical activities are in control and to determine the effect a sample matrix may have on data being collected. This section describes both the field and laboratory QC checks that will be used for the evaluation of data.

3.1 FIELD QC CHECKS

The data quality indicators for the assessment of data quality, including the field objectives for precision, accuracy, completeness, representativeness, comparability, and sensitivity, are outlined in Section 1.6.

3.1.1 Field Duplicate Samples

A field duplicate is a second sample collected at the same location as the primary sample. Duplicate samples are collected simultaneously or in immediate succession, following identical collection procedures, and treated in the same manner during shipment, storage, and analysis. The field duplicates are submitted "blind" and numbered such that they cannot be readily identified by laboratory personnel. The primary and duplicate sample identifiers must be recorded in the field logbook or on the field sampling forms to facilitate comparison of analytical results.

Samples to be analyzed for arsenic, antimony, lead, and PAHs metals will be homogenized in a stainless-steel mixing bowl or zip-lock bag. Homogenized soil from the mixing bowl or zip-lock bag will be transferred to the appropriate sample container for primary and duplicate sample analysis.

Results from duplicate sampling are used to evaluate sampling and analytical precision. Agreement between duplicate sample results generally indicates good sampling and analytical precision. Conversely, poor agreement between results may indicate sample heterogeneity, especially soil samples. Field duplicates will be collected at a frequency of 10 percent of the primary assessment samples collected or once per sampling day, whichever is more frequent. The duplicate sample will be analyzed for all laboratory analyses requested for the primary sample.

The duplicate and original sample results will be compared and the RPD will be calculated. The result will then be compared to the RPD limits specific to the aliquot matrix. If the RPD is exceeded, corrective action will be conducted by reviewing the field logbook to evaluate whether the sample matrix was likely homogeneous or heterogeneous and reviewing the analytical laboratory quality control data to qualitatively

assess overall laboratory performance. The result from the primary sample will be the value incorporated in the final report and used for assessment activities.

3.1.2 Equipment Blanks

Non-disposable sampling equipment that is used repeatedly throughout the project will be decontaminated between sample locations and depths. After the equipment is decontaminated and allowed to air dry, an equipment blank will be collected by pouring distilled or de-ionized water over and over the sampling equipment and into sample containers provided by the analytical laboratory. Equipment blanks will be collected at a frequency of one equipment blank sample per every 20 samples of the primary samples collected or once per sampling day, whichever is more frequent. The equipment blanks will then be submitted to the laboratory for analyses of the COCs associated with the samples collected using the decontaminated equipment.

3.1.3 Inspection and Acceptance Requirements for Supplies and Consumables

Field sampling supplies and consumables will be inspected and evaluated for use by the remediation contractor. Sample jars provided by the laboratory will be provided in a box sealed by the manufacturer and the seal will be visually inspected to ensure the integrity. The remediation contractor will verify preserved containers obtained from the laboratory have not been tampered with since preservation. Potable and deionized decontamination water will be inspected to ensure the supplier's seal is intact.

To ensure supplies and consumables are free of defects and are acceptable for use in a project, supplies and consumables will be received in their original packaging and visually inspected by the field technician for defects or tampering. Where applicable, laboratory or vendor calibration sheets will be reviewed and placed in the job file.

No standard solutions, buffers, or other chemical additives should be used if the expiration date has passed. It is the responsibility of the sampling manager or designee to verify the suitability of supplies and consumables and restock as necessary.

3.2 LABORATORY QUALITY CONTROL CHECKS

The data quality indicators for the measurement of laboratory data including the objectives for precision, accuracy, completeness, representativeness, comparability, and sensitivity are outlined in Section 1.6. The laboratory QC samples have been selected based on the DQOs for this project and established analytical method requirements and are outlined below. However, additional QC samples may be required by the analytical laboratory to satisfy the laboratory internal QC policies.

3.2.1 Method Blank

A method blank is a sample of ASTM Type II or analyte free (deionized) water that is carried through each step of the preparation and analytical method. Method blank samples are used to assess potential contamination attributed to laboratory operations during sample preparation and analysis. A method blank sample is required for each analytical batch of 20 or fewer samples.

3.2.2 Instrument Blank

An instrument blank is a sample of ASTM Type H or analyte-free (deionized) or non-contaminated solid that is analyzed with associated calibrations of laboratory instruments. Instrument blank results are used to assess potential contamination attributed to calibration procedures.

3.2.3 Surrogate Spikes

Surrogate spikes (also known as System Monitoring Compounds) are compounds added to every blank, standard, sample, and matrix spike sample as specified in the analytical methodology. Surrogate compounds are generally brominated, fluorinated, or isotopically labeled compounds not expected to be present in environmental samples. The results of the surrogate spike compounds are used to evaluate the accuracy of the analytical measurement on a sample-specific basis. Surrogate spikes are generally added for organic analyses only.

3.2.4 Internal Standards

An internal standard is a standard of known concentration added to each sample and carried through the entire determination procedure as a reference for calibrating and controlling the precision bias of the analytical method. Internal standards are generally used for organic analyses only.

3.2.5 Matrix Spikes and Matrix Spike Duplicates

Matrix spikes are known concentrations of analytes added to a sample and carried through each step of the preparation and analytical method. Matrix spikes are typically analyzed in duplicate for organic analyses. The results of matrix spikes are reported in %R and are evaluated to assess potential matrix interferences. The results of MSDs are reported as RPD and are evaluated to assess laboratory and method precision.

3.2.6 Matrix Duplicates

A matrix duplicate (or laboratory duplicate) is a separate aliquot of a sample taken from the sample container and carried through each step of the preparation and analytical method. The results of matrix duplicates are reported as RPD and are evaluated to assess laboratory and method precision.

3.2.7 Laboratory Control Samples/Laboratory Control Sample Duplicates

LCSs and Laboratory Control Sample Duplicates (LCSDs) are laboratory-generated samples used to monitor the day-to-day performance of analytical methods (sensitivity, calibration, and memory effects). An LCS may be a purchased standard or a method blank spiked with known concentrations of target analytes. The LCS is carried through each step of the preparation and analytical method. LCSs should be reported in percent recoveries and used to assess the accuracy and precision of the analytical process independent of matrix effects. Controlling analytical laboratory operations with LCSs (rather than surrogates or matrix spikes) offers the advantage of being able to differentiate low recoveries due to procedural errors with those because of matrix effects.

3.2.8 Continuing-Calibration Verification

Continuing calibration verification (CCV) is achieved by the routine analysis of a standard of known concentration. The verification standard concentration is usually at or near the midpoint of the linear calibration curve. CCV for linear calibrations involves the calculation of the percent drift or percent difference of the instrument response between the initial calibration and each subsequent analysis of the verification standard.

3.2.9 Performance Evaluation Samples

Blind performance evaluation (PE) samples may be submitted to the analytical laboratory at the direction of ADEQ or the US CBP. QC issues that may trigger the need for the submission of PE samples include confirmed quality issues detected through data validation or unexpected or unexplained sample results.

If requested, blind PE samples will be prepared in similar sample containers as the project field samples and shipped from the field to the laboratory for analysis. The blind PE samples will be prepared using National Institute of Standards and Technology (NIST) or EPA certified standards. The project-specific PE samples will contain known concentrations of the analytes of interest. Laboratory results will be evaluated against the original Certificates of Analyses for precision and accuracy.

3.3 DATA ANALYSIS

Final analytical laboratory data packages will be provided by an Arizona Department of Health Services (ADHS)-certified laboratory and will meet the applicable requirements of *Laboratory Documentation Required for Data Evaluation* (R9/QA004.2); EPA Region 9; August 2001.

Data verification will be performed, consisting of a Tier 1A evaluation. Data verification will be used to evaluate whether the project data satisfy the projects data quality objectives and data use requirements. Data verification will be performed after the analytical laboratory have completed its own in-house quality control checks. Data outliers and anomalies will be evaluated by the analytical laboratory and data flags and/or discussions will be placed in the analytical report in accordance with *Arizona Laboratory Data Qualifiers, Revision 3.0 (September 20, 2007)*. After verification is completed, qualifiers will be assigned to the data points that are affected by the quality control outliers. The qualifiers will indicate the analyte concentrations may be affected by the laboratory or field contamination, unusable because of quality control deficiencies, and/or estimated due to possible bias or reduced confidence in the results.

4.0 PREVENTATIVE MAINTENANCE

Preventative maintenance of field and laboratory equipment and instrumentation is conducted to prevent loss of data due to malfunctions or delay and to ensure that analytical data are reliable.

4.1 FIELD INSTRUMENT INSPECTION AND MAINTENANCE

X-Ray Fluorescence (XRF) is a non-destructive analytical technique used to determine the elemental composition of materials and will be used to screen soil samples for lead as described in the SAP. The instrument will be inspected daily, before field sampling activities begin. Preventive maintenance may include the following:

- Cleaning the outside of the system, including face plate and Kapton window
- If the Kapton window becomes frayed, ripped, or contaminated with metal particulates, the Kapton window will be replaced.
- Cleaning and lubrication of any X-Y-Z leads screws, if applicable
- Except exterior cleaning and Kapton window replacement, preventative maintenance will be performed by Thermo Scientific or an Authorized Service Centers

4.2 LABORATORY INSTRUMENT PREVENTATIVE MAINTENANCE

The Quality Assurance Manual and SOPs for the selected analytical laboratory will outline a formal preventative maintenance program, including contingencies for sending samples to an ADHS-approved back-up analytical laboratory if samples requiring analysis within holding times are going to be compromised. Preventative maintenance will be performed for each analytical instrument to minimize improper performance or interruption of the analytical process. General inspection and maintenance will be conducted in accordance with manufacturer's recommendations. Designated laboratory personnel or outside service firms will be responsible for this maintenance. The laboratory will maintain a stock of spare parts and consumables for analytical equipment. Routine maintenance and specialized repairs will be documented. Each analytical instrument will have its own maintenance notebook. Entries will be initialed, dated, and periodically reviewed.

5.0 CALIBRATION PROCEDURES AND FREQUENCY

5.1 FIELD INSTRUMENT CALIBRATION

Field instrumentation is anticipated to include an XRF analyzer. Field equipment will be calibrated each day before beginning fieldwork (at a minimum) in accordance with manufacturer directions. Calibration information will be recorded in a logbook or on forms that will be maintained in the project files.

The following information will be recorded:

- Equipment type (for example, XRF)
- Manufacturer and model number
- Date of latest calibration
- Calibration standard type, concentration, manufacturer lot number, date, pressure (if gas), as applicable
- Dates of use
- Name of person who calibrated instrument
- Corrective action if necessary

Entries will be recorded when each instrument is calibrated. Entries will be made in ink. Corrections will be made by crossing a line through the error and entering the correct information. Changes will be dated and initialed. No entries will be obliterated or rendered unreadable.

5.2 LABORATORY INSTRUMENT CALIBRATION

Instrumentation and equipment used during sample analysis will be operated, calibrated, and maintained according to the manufacturer's guidelines and recommendations, as well as criteria set forth in the applicable analytical methodology references. Operation, calibration, and maintenance will be performed by personnel properly trained in these procedures. Analytical laboratory capabilities will be demonstrated initially for instrument and reagent/standards performance as well as accuracy and precision of analytical methodology.

Calibration will be required to ensure the analytical system is operating correctly and functioning at the proper sensitivity to meet required reporting limits. Instruments will be calibrated with standard solutions appropriate to the type of instrument and the linear range required for the DQOs for this project. The frequency of initial calibration and calibration verification will meet the requirements of the analytical method. Samples must be bracketed by passing calibration check standards where required by the method.

Calibration standards and acceptance criteria vary depending on the instrument and

analytical method. The general principles of calibration will apply uniformly. Initial calibration will demonstrate the reporting limits, the dynamic range of the detection system, and the retention windows. EPA procedures outline each system's acceptance criteria for calibration before analyses. Initial calibration consists of the analysis of at least five calibration standards at varying concentrations. The low calibration standard will be at a concentration below or at the reporting limit. The other standards will be at concentrations in the expected range of the detection system. The results will be used to determine a calibration curve and response factors for each analyte. The sample concentration (diluted or undiluted) will not exceed the linear range determined by the initial calibration.

CCV standards are analyzed before analysis of field samples and after every 10 samples to verify the initial calibration curve and response factors or at a frequency as required in the method. Initial calibration and CCV standards must meet calibration criteria. The ending or bracketing calibration standards also must meet the criteria where required by the method.

5.3 STANDARD REAGENT PREPARATION

A critical element in the generation of quality data is the purity/quality and traceability of the standard solutions and reagents used in the analytical operations. The preparation and maintenance of standards and reagents will be performed per the analytical method requirements and those described below. Standards preparation will incorporate the following items:

- Documentation and labeling of date received, lot number, date opened, and expiration date
- Documentation of traceability certificates
- Preparation, storage, and labeling of stock and working solutions
- Establishing and documenting expiration dates and disposal of unusable standards

Primary reference standards and initial calibration standard solutions used by the laboratory will be obtained from commercial sources supplying the highest purity possible, (that is, NIST traceable with Certificates of Analysis). Standards and standard solutions will be catalogued to identify the supplier, lot number, purity/concentration, receipt/preparation date, preparer's name, method of preparation, expiration date, and other pertinent information.

6.0 ASSESSMENT AND OVERSIGHT

6.1 PROCEDURES

Before the beginning of fieldwork, the remediation contractor Project Manager will review this QAPP, the Health and Safety Plan, and the SAP and will assemble the necessary field gear. The Project Manager will contact the analytical laboratory in advance to schedule the analyses and will arrange for shipping or delivery. The Project Manager will also be responsible for ensuring that fieldwork is performed in accordance with this QAPP and SAP, including sampling activities; documentation accuracy, completeness, and consistency; packaging and shipping of samples to the laboratory; and field instrument monitoring and calibration.

The Project Manager will communicate to the Program Manager regarding field activities, and any adjustments or corrections will be implemented as appropriate. During and following the fieldwork, the Program Manager, or designee, will review field documentation and laboratory data for accuracy and completeness and will provide the information to the QA Manager for additional review.

The QA Manager will audit field activities during the initial day of field activities. This audit will evaluate adherence to specified methods for sample collection, decontamination, documentation, packaging, and other field activities. The analytical reports will be reviewed by the Project and QA Managers to ensure the sample information is correct and complete. The QA Manager has the authority to verify the effectiveness of corrective actions, if necessary.

6.2 REPORTS TO MANAGEMENT

The Program Manager may request status reports on the performance of the project-specific SAPs as necessary during performance of these tasks. Report contents may include, as applicable:

- Changes to the QAPP
- Summary of QA/QC programs, training, and accomplishments
- Results of technical systems and performance evaluation audits
- Significant QA/QC problems, recommended solutions, and results of corrective actions
- Summary of data quality assessment for precision, accuracy, representativeness, completeness, comparability, and laboratory reporting limits
- Discussion of whether QA objectives were met and the resulting impact on technical and enforcement issues
- Limitations on the use of data and discussion of the effects of such limitations on the defensibility of the data

7.0 DATA MANAGEMENT

7.1 FIELD DATA

Data measured by field instruments will be recorded in field notebooks and/or on required field forms. The field data will be reviewed to evaluate completeness of the field records and appropriateness of the field methods employed. All field records will be retained in the project files for the required length of time.

7.2 LABORATORY DATA

Data generated by the analytical laboratory will be retained in hardcopy and electronic format at the laboratory. Data generated by the analytical laboratory will be submitted to the remediation contractor in hardcopy and electronic format. The following sections outline the requirements for their submission and the handling of these deliverables.

7.2.1 Hardcopy Data

Analytical data will contain the necessary sample results and quality control data to evaluate the DQOs defined for this project. The analytical laboratory report will be submitted to the remediation contractor for use in the data verification/validation process. The hardcopy data will be an exact copy of the original data, which will be secured at the analytical laboratory and will include, at a minimum the following:

- Narrative, cross-reference, chain of custody, and method references
- Analytical results with cross-references to analytical batch
- Surrogate recoveries (as applicable)
- Calibration summary
- Blank results
- Analytical laboratory control sample recoveries
- Duplicate sample results or duplicate spike recoveries
- Sample spike recoveries
- Instrument tuning summary
- Associated raw data
- Data outliers

7.2.2 Electronic Data Format

The electronic data deliverable (EDD) will be submitted by the analytical laboratory to the remediation contractor. The remediation contractor will verify that the deliverable is in an acceptable format and that all elements needed are present before importing the data into the database. Problems incurred during the import will be remedied before the data is used.

For analytes that are assigned an "R" or rejected validation code, the numeric fields containing concentration and detection limit information are assigned a null value. This is to ensure that rejected data are not inadvertently used during future data analyses. In addition to changes based on rejected results as described above, other changes to the reported laboratory results (detection limits, concentrations, etc.) may be required as a result of data validation activities. For example, detection limits reported by the laboratory may be increased during data validation for some results that do not meet specific quality assurance guidelines. In these cases, changes to the database will be performed in accordance with the data validation report during data validation entry. After any required changes are completed, 100 percent of the changes will be quality checked.

8.0 DATA REVIEW, VERIFICATION, AND REPORTING

8.1 PROCEDURES TO CHECK DATA INTEGRITY

The criteria used to check data integrity during field activities are inspection and calibration of sampling equipment, supervision of field personnel and subcontractors by qualified staff, adherence to specifications, and proper completion of the sampling documentation associated with this project.

The criteria to ensure data integrity during analytical laboratory and report activities are those detailed in this QAPP. These criteria include, but are not limited to:

- Verbal and written communication with the analytical laboratory
- Completion and review of the QC Summary Report
- Review and validation of the data generated from the sample analysis
- Referencing of the chain-of-custody documentation with the associated data package to check that the appropriate analyses were performed

8.2 DATA REVIEW

The review of field data will include an evaluation of the information provided in the field logbook and required support documentation for all sample analyses, including chain-of-custody and field instrument calibration and performance check documentation.

The analytical laboratory data will be reviewed for compliance with meeting the QA/QC specifications outlined in the analytical methods and this QAPP. The review of data packages will include an evaluation of the information provided on the analytical data sheets and required sample documentation of all analyses and supporting sample collection documentation, including chain-of-custody documentation. Data will be accepted, rejected, or qualified based on the data review. The following summarizes the areas of data review, where applicable:

- Data completeness including chain-of-custody documentation
- Holding times and sample preservation
- Blanks
- LCS/LCSD
- MS/MSD
- Other laboratory duplicates
- Surrogates
- Blind field duplicates
- Other QA/QC issues documented in the data deliverable

8.3 DATA VERIFICATION AND VALIDATION METHODS

The analytical laboratory will internally perform data review and reporting. Due to the limited scope, limited duration, and investigative nature of anticipated project, data validation is not expected to be performed for this project. Data verification will be performed by a qualified member of the remediation contractor. The data verification will consist of the elements discussed below and will be performed on 100 percent of the data. Other QA/QC assessments (such as surveillance, peer review, management systems review, readiness review, technical systems audit, performance evaluation, etc.) will not be performed for this project since sampling activities are of limited scope and duration.

8.3.1 Completeness Check

A completeness check will be performed upon receipt of the data and will include a review of:

- Case narrative;
- Chain-of-custody; and
- Sample condition upon receipt.

The completeness check will ensure that:

- All compounds and environmental samples are reported
- QA/QC results are provided for every analysis
- The most technically valid result is reported for each compound

8.3.2 Data Verification Criteria

Additional data verification may include reviewing the following:

- Completeness, as defined above
- Case narrative, including but not limited to, a description of non-conformances and corrective actions that were taken, plus anomalies, deficiencies, and QC problems that have been identified
- Chain-of-custody documentation and original chain-of-custody forms with identification numbers and laboratory receipt signatures, dates, and times
- Sample condition upon receipt, including cooler temperature, and shipping documentation
- Timeliness and a check for errors, including requested deliverables, preservation, and holding times
- Sample analysis results, with quantitation limits and checking that reporting limits are checked against the contract required limits, and verifying dry weights, and dilutions
- QC summary including but not limited to, method blanks, continuing calibration

blanks, and preparation blanks, surrogate percent recoveries, spike percent recoveries and relative percent differences, and laboratory QC check sample and LCS recoveries;
- Field duplicates, if identified, for which reproducibility will be evaluated
- Reporting Limits
- Laboratory duplicates

8.3.3 Data Validation Criteria

Although not anticipated, if data validation is performed, data validation will include reviewing the following:

- Completeness, as defined above;
- Case narrative, including corrective actions taken. The case narrative will be reviewed for anomalies, deficiencies, and QC problems that have been identified;
- Chain-of-custody forms with identification numbers and laboratory receipt signatures and copies of any internal tracking documents;
- Sample condition upon receipt, including sample temperature, and shipping documentation;
- Analytical results with quantitation limits (including dilutions and reanalysis);
- QC summary including:
  - Initial and continuing calibrations
  - Method blanks, continuing calibration blanks, and preparation blanks
  - Surrogate percent recoveries
  - Internal Standard percent recoveries and retention times
  - Accuracy percent recoveries
  - RPDs
  - Laboratory QC check sample, laboratory control sample recoveries
  - Gas chromatograph breakdown products
  - Retention times and acceptance windows
  - Method Detection Limits (MDLs)
- Raw data, chromatograms and area/quantitation reports, sequential measurement readout records for inductively-coupled plasma (ICP), graphite furnace atomic absorption, flame atomic absorption, cold vapor mercury atomic absorption, cyanide, and/or other inorganic analyses including:
  - Results including dilutions and reanalysis
  - Instrument tuning, for analyses by gas chromatography/mass spectrometry
  - Initial calibration and continuing calibrations
  - Method blanks and preparation blanks
  - Surrogate recoveries and internal standard recoveries, where applicable
  - LCS/LCSD and MS/MSD
  - Retention time windows

  - Sample extraction and clean-up logs
  - Enhanced spectra of target analytes and tentatively identified compounds with the associated best match spectra for MS data
  - Sample digestion and/or sample preparation logs
  - Instrument analysis log for each instrument used
  - Post digestion spikes, where applicable
  - Method of standard additions, when applicable
  - ICP serial dilution
  - Instrument tuning for ICP/MS, when applicable
- Items specifically reviewed will include but not be limited to:
  - Timeliness and a check for errors, including requested deliverables, preservation, holding times, and chain-of-custody
  - Duplicate sample, MS/MSD, post-digest spikes, reviewed against precision and accuracy criteria specified by the method or by project DQOs
  - Compound quantitation and MDLs, checking reporting limits, verifying dry weights, calculations, and dilutions
  - Target list compound identification, indicating proper identification of analytes
  - Sample result verification, in which the final reports are reviewed against raw instrument data and logs and applicable worksheets to check anomalies, data reduction/calculations, transcription, linear ranges, and dilutions
- A review will include the following:
  - Tentatively identified compounds are not a result of the laboratory or field process
  - Qualitative identification criteria as defined in the method and EPA Functional Guidelines are met
  - The most technically valid result is reported for each compound

8.3.4 Data Qualifier Flags

The guidance documents used for data verification are the EPA *National Functional Guidelines for Organic Superfund Methods Data Review* and *National Functional Guidelines for Inorganic Superfund Methods Data Review,* as revised. The data qualification process is the basis for determining whether sample results should be qualified, but the reviewer's judgment is also critical in determining whether data quality and usability have been systematically influenced and whether data points require qualification. The staff performing the assessment must understand the analytical procedures being reviewed, understand how the data will be used, and be experienced with laboratory procedures. If QC results are outside of acceptance criteria, the data will be qualified using the standard Arizona data qualifiers.

Problems or questions about analytical data quality that may require corrective action will be brought to the attention of the laboratory in writing from the data reviewer. The data verification Project Manager may initiate the request if QC results exceed method or

project criteria, if reporting or flagging errors are identified, or to request information that has not been reported. The laboratory's response will include a written explanation of the problem, a plan and a schedule for corrective action as appropriate, and/or re-issuance of laboratory reports. If significant data quality problems have occurred and the data are critical to decision making, samples may be required to be reanalyzed, or recollected and reanalyzed at the discretion of the consultant.

The ADHS has published standardized data qualifier flags identified in the document *Arizona Laboratory Data Qualifiers, Revision 3.0 (September 20, 2007)* that will be used by the laboratory in qualifying analytical results for use in Arizona, as appropriate. Data associated with a QC exceedance must be designated by the laboratory using the Arizona Data Qualifier flags to flag the sample results associated with the exceedance. For example, if a LCS is out of criteria for iron, then, in addition to the LCS result being flagged, iron in the samples associated with that LCS must also be flagged.

8.3.5 Data Verification and Validation Reports

The reviewer will prepare a report for each sample delivery group that will include:

- A case narrative with a list of recommended flags; a listing of the items reviewed and the criteria used to evaluate them; a discussion of problems or QC exceedances associated with the actual analysis which might impact the sample integrity or data quality; and a summary of laboratory contacts, if any; and
- The marking of recommended qualifier flags on the laboratory reports and/or in electronic data deliverables. Flags that are marked on hard copy will be marked directly on copies of the laboratory reports in a contrasting color for ease in performing data entry.

8.4 DATA QUALITY ASSESSMENT

Based upon the data verification or validation, an evaluation of the project may be performed to determine if the data satisfy the DQOs and are usable for the purposes for which they were intended.

8.5 DATA REPORTING

The results of the data review, verification, and validation will be documented and summarized. Data reporting will be in a clear format and will contain the following information:

- A general discussion of the sample types received, tests performed, problems encountered, and general comments, along with a table of sample data and any failed QC parameters

- Analytical data, presented by sample number or by test
- Calibration verification information
- Laboratory performance and matrix-specific information including surrogates, MS/MSD results and LCS/LCSD
- Other pertinent information, including receipt forms and corrective action forms

Raw data will be stored at the analytical laboratory according to the requirements of its QC Manual. Raw data will be made available upon request.

9.0 CORRECTIVE ACTIONS

The following section identifies the corrective actions necessary to address field, laboratory, and data verification/validation problems. In general, corrective actions will be initiated whenever data quality indicators suggest DQOs have not been met. Corrective actions will begin with identifying the source of the problem. Potential problem sources include failure to adhere to method procedures, improper data reduction, equipment malfunctions, or systemic contamination. The first level of responsibility for identifying problems and initiating corrective action is with the laboratory analysts and field personnel. The second level of responsibility lies with any person reviewing the data. Corrective actions may include more staff training, equipment repair followed by a preventive maintenance program, or removal of the source of systemic contamination. Once resolved, the corrective action procedure will be documented, and if DQOs were not met, the samples in question may need to be collected again and reanalyzed using a properly functioning system.

Any corrective action that requires changes to the Work Plan, SAP, or QAPP are defined as major corrective actions. Major corrective actions include, but are not limited to, measures that change the number of samples collected, alter previously selected sampling locations, or impact the project QC objectives. In addition, some re-sampling activities may be considered a major corrective action (e.g., re-sampling of a complete monitoring round). The remediation contractor will be responsible for contacting the US CBP and discuss all major corrective actions. Major corrective actions will be approved by the US CBP before implementation by the remediation contractor.

9.1 FIELD CORRECTIVE ACTION

Corrective action in the field relates to inspection of equipment, procedures, and problems found during data review. The remediation contractor responsible for the initiation and implementation of corrective actions with respect to the field sampling operations and responsible for ensuring field sampling procedures are followed. Corrective actions may include training field personnel, modifying field procedures, and re-sampling.

9.2 LABORATORY CORRECTIVE ACTION

Corrective action will be taken in the laboratory if method-specific QC or project-specific DQOs are not met or as a result of problems identified during data review. The analytical laboratory will notify the remediation contractor if a transportation problem (for example, broken sample container, nonconforming temperature blanks) has occurred. The analytical laboratory's QA officer, in consultation with the remediation contractor, is responsible for implementing corrective actions in the laboratory, from sample receipt to final data deliverable. It is the analytical laboratory's QA officer and the remediation

contractor's combined responsibility to see that analytical and sampling procedures are followed as specified and the data generated meet the acceptance criteria. Corrective actions for the laboratory may include the following:

- Reanalyzing and/or re-extracting samples
- Correcting laboratory procedures
- Recalibrating instruments using freshly prepared standards
- Replacing QA/QC materials, as appropriate
- Training laboratory personnel in correct sample preparation and analysis

Whenever corrective action is deemed necessary, the analytical laboratory will verify the following steps are taken:

- The problem is defined
- The cause of the problem is identified
- Appropriate corrective action is determined
- Corrective action is implemented and its effectiveness verified
- Control is reestablished

The corrective actions will be documented according to the analytical laboratory's Quality Assurance Manual and SOPs.

9.3 DATA VALIDATION AND VERIFICATION CORRECTIVE ACTION

During data review, results may be encountered that do not correlate well with expectations, with other results, or with results from other methods performed on the same samples. Such situations may trigger inquiries into raw data. The remediation contractor is responsible for initiating, overseeing implementation, and documenting corrective actions required during the data verification process. Some examples of discrepancies noted during data verification include missed holding time, QC samples outside evaluation criteria, and sample dilution problems. Corrective actions may require re-sampling by field personnel or re-analysis by the laboratory. Each corrective action must be documented.

10.0 PERFORMANCE AND SYSTEM AUDITS

Audit activities are established and directed by the remediation contractor to ensure field and laboratory activities are performed in compliance with project requirements. This section describes responsibilities and methods for scheduling, conducting, and documenting audits of field and laboratory activities.

10.1 FIELD PERFORMANCE AND SYSTEMS AUDITS

The remediation contractor will be responsible for data integrity during field sampling activities. Corrective actions and the results of those actions, if any, will be documented in the field logbook or on field forms.

Criteria to ensure data integrity during field sampling events are those detailed in this QAPP. The field assessment activities include the following inspections:

- Field screening activities
- Decontamination procedures and frequency of decontamination
- Sample collection and handling (for example, method of collecting samples, use of personal protective equipment (PPE), sample packing)
- Chain-of-custody documents

Field audits are not required but may be performed in the event significant discrepancies are identified that warrant evaluation. These discrepancies may include continued field contamination problems or continued sample handling concerns.

Assessment activities and associated corrective action, if any, will be documented by the remediation contractor. ADEQ or US CBP may elect, at their discretion, to assess field activities.

10.2 LABORATORY PERFORMANCE AND SYSTEMS ASSESSMENTS

Analytical laboratory audits generally include reviews of sample handling procedures, internal sample tracking, SOPs, analytical data documentation, adherence to QA/QC protocols, and data reporting. The analytical laboratory will be responsible for the policies and procedures associated with internal assessments including data review procedures. The analytical laboratory's QA Manager is responsible for the initiation, implementation, and documentation of assessment activities and corrective actions, if any.

11.0 TRAINING AND CERTIFICATION

Sampling personnel are required to successfully complete a 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) safety course and applicable refresher training in accordance with federal regulations. Staff are also expected to be trained on sampling for hazardous materials as well as to have read and be familiar with this QAPP, the Health and Safety Plan (HASP), and SAP. Management will ensure and provide for the protection of the personal safety and health of workers on site, including the selection, provision, testing, decontamination, and disposal of PPE and required medical monitoring. Personnel will comply with applicable worker safety, health laws and regulations. Field staff will exercise reasonable professional judgment regarding safety and possible cessation of services for safety reasons.

Documents containing interpretation of results and conclusions will be sealed by an Arizona-registered professional qualified to perform the subject work.

Specific training requirements may be necessary for personnel operating field analytical or sampling equipment or specialized equipment, such as the XRF, global positioning system, or other instruments. Manufacturer's requirements and recommendations should be followed.

Full Health and Safety training requirements are detailed in the Site-specific HASP.

APPENDIX C

PREVIOUS DOCUMENTS

APPENDIX D

SAMPLE COMMUNITY NOTIFICATION SIGN

Voluntary Remediation Program Site

Site Code: 513182-00

The United States Customs and Border Protection will be conducting Soil Remediation

This work will be performed under the Arizona Department of Environmental Quality (ADEQ) Voluntary Remediation Program

For more Information please contact:

Site Contact: TBD
ADEQ Contact: Nichole Osuch (602) 771-2300