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Former U.S. Border Patrol Firing Range
Nogales, Arizona

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EXHIBIT A

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TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

TABLE OF CONTENTS (CONTINUED)

TABLE OF CONTENTS (CONTINUED)

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF ACRONYMS

ADEQ	Arizona Department of Environmental Quality
ADWR	Arizona Department of Water Resources
AMA	Active Management Area
amsl	above mean sea level
ARAR	Applicable or Relevant and Appropriate Requirement
ASTM	American Standards and Test Measurements
bgs	below ground surface
CBP	Customs and Border Protection
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CFTM	Conceptual Fate and Transport Model
CoC	contaminant of concern
DoD	U.S. Department of Defense
ESA	Environmental Site Assessment
FS	Feasibility Study
ft	foot/feet
HHA	Human Health Assessment
ISSL	Industrial Soil Screening Level
LLC	Limited Liability Corporation
NA	Not Applicable
NCP	National Contingency Plan
PAH	Polynuclear Aromatic Hydrocarbons
QAPP	Quality Assurance Project Plan
RA	Remedial Action
RAO	Remedial Action Objective
RD	Remedial Design
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RSSL	Regional Soil Screening Level
SARA	Superfund Amendments and Reauthorization Act
SSHP	Site Safety and Health Plan
SRL	Soil Remediation Level
TCLP	Toxicity Characteristic Leaching Potential
UFP-QAPP	Uniform Federal Policy- Quality Assurance Project Plan
U.S.	United States
USACE	U.S. Army Corps of Engineers
USBP	U. S. Border Patrol
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
XRF	X-ray Fluorescence

ES.0 EXECUTIVE SUMMARY

This Decision Document presents the selected remedy for mitigating potential environmental hazards remaining at the Former Unites States (U.S.) Border Patrol (USBP) Firing Range that resulted from USBP training activities conducted at the Former USBP Firing Range in Nogales, Arizona. The United States Customs and Border Protection is the lead agent for this remediation, while the Arizona Department of Environmental Quality and U.S. Environmental Protection Agency is the regulatory agency for this remediation.

ES.1 DESCRIPTION OF THE FORMER USBP FIRING RANGE

The Former USBP Firing Range occupies a one-half acre area located on the west side of Nogales, Arizona. The site consists of a small arms firing range that is no longer in use. This Decision Document addresses the soil contamination from small arms firing at the range.

ES.2 DESCRIPTION OF SELECTED RESPONSE ACTION

Lead, antimony, arsenic, and polyaromatic hydrocarbons are the contaminants of concern detected in soil samples at concentrations above background or applicable regulatory limits. The contaminants of concern have a moderate potential for migrating off-site through erosion, biological activity, or human activity. The site is exposed to wind and intermittent precipitation causing air and water borne migration of soils. The site is not restricted by fencing or containment barriers. The likelihood of encountering contaminants of concern is evaluated as moderate due to the low number of potential human receptor hours and moderate accessibility of the site.

The selected remedy consists of excavating all contaminated soils and transporting the soils to an appropriate landfill to provide a high confidence that the area is free of contaminants of concern. The remedial approach is protective of human health and the environment, complies with legally applicable federal and state requirements, and is moderately cost-effective. The estimated total present capital cost to complete the remediation is $3,766,634.

The selected remedy utilizes permanent solutions to the maximum extent practicable. Five-year reviews will be not be required, because the remedy will allow for unlimited use, unrestricted use, and unrestricted exposure of the site as defined by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

PART 1: DECLARATION STATEMENT

SITE NAME AND LOCATION

The Former United States Border Patrol (USBP) firing range is located at 1651 W. Target Range Road in Nogales, Arizona (Figure 1). The study area is a leased portion of the Arbo property (parcel no. 112-29-010B) and a portion of the Barr property (parcel no. 113-49-027) (Figure 2). The area of the Former USBP Firing Range is shown by the sixteen square grids and covers approximately 0.5 acres (Figure 3). The site on the Arbo property (113-49-010B) is surrounded on two sides by one adjacent property: the Barr property (parcel no. 113-49-027. The Former USBP Firing Range is located in a portion of Section 13, Township 24 south, Range 13 east, Santa Cruz County, Arizona with its center located at latitude of 31.347139 North and longitude of 110.969525 West.

The selected remedy described in this Decision Document addresses all of the Contaminants of Concern (CoC) - lead, antimony, arsenic and polynuclear aromatic hydrocarbons (PAHs).

BASIS AND PURPOSE

This Decision Document presents the selected remedy for the CoCs at the Former USBP Border Patrol, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and, to the extent practicable, the National Contingency Plan (NCP) 2012. The State of Arizona, through the Arizona Department of Environmental Quality (ADEQ), and the United States (U.S.) Customs and Border Protection (CBP) concur with the selected remedy.

As the management agency, CBP is responsible for executing environmental restoration of properties that were formerly owned by, leased by, or otherwise possessed by the U.S. government and under the jurisdiction of the U.S. Customs and Border Protection. From 2011 through the present, CBP conducted assessments, investigations and studies in accordance with CERCLA to determine the potential presence of contamination in environmental media at the Former USBP Firing Range that may pose a risk to human health and the environment. The remedial action decision for the Former USBP Firing Range is based on results of a Remedial Investigation and Feasibility Study (RI/FS) conducted between September 2011 and December 2013. The RI/FS characterized the site for CoCs resulting from U.S. Border Patrol use of the small arms firing range and assessed risks associated with the Former USBP Firing Range.

This Decision Document summarizes the previous investigations, RI/FS results, and the selected remedy. Detailed information supporting the selected remedial action is contained in the Administrative Record for the Former USBP Firing Range which is maintained at the Nogales Santa Cruz Library in Nogales, Arizona.

ASSESSMENT OF THE SITE

The City of Nogales, including the Former USBP Firing Range, was the site of a confrontation between the U.S. Army and the Mexican nationalist Pancho Villa in the mid-1910s (City of Nogales, 2011).

Camp Little, a U.S. military base, was established on 26 November 1910 to protect U .S interests at the border. Camp Little was a training and staging facility during World War I. Improvements to the site were made between 1910 and 1933 when the camp was under Department of Defense (DoD) controls. More than 100 buildings, including streets, sewers, utilities, hospitals, shops, stables and a theater were constructed during DoD tenancy. The site was declared surplus on 1 January 1933. The improvements to the land were offered for sale to the original land owners and it is believed that the owners bought them. The land owners then leased their land with improvements to the State of Arizona. Today, the site is mostly residential with two local government buildings, a school, a grocery store, two restaurants, farm land and commercial buildings. The former Camp Little is located approximately two and one half miles northwest of the Former USBP Firing Range.

An aerial photograph review conducted by Allwyn Environmental, LLC in a 2009 Phase I Environmental Site Assessment (ESA) of a property adjacent to the Former USBP Firing Range revealed that structures present at the Former USBP Firing Range were constructed in 1992, and that no previous development had occurred at the site. The areas immediately surrounding the Former USBP Firing Range have never been developed. The property was used as a shooting range and target practice facility for the U.S. Border Patrol after 1992. The property is currently idle. USBP discontinued use of the firing range in mid-2010. CBP continues to lease the property from the current property owner, Mr. Arbo.

The response action selected in this Record of Decision is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

The key site characterization findings for the Former USBP Firing Range are summarized as follows:

Note: all grab and composite soil samples were passed through a #8 (2.38 mm) sieve and a #50 (0.297mm) sieve prior to submission for laboratory analysis.

- *Arsenic* – Sixty out of sixty soil surface and subsurface samples, exclusive of duplicates, contained concentrations of arsenic above the U.S. Environmental Protection Agency (USEPA) Residential Soil Screening Level (RSSL) of 0.39 mg/kg. Arsenic concentrations ranged from 4.4 mg/kg (composite sample BPN-14D14, central firing range) to 22.8 mg/kg (composite sample BPN-13S, west central firing range, east side of backstop berm) (Figures 4 and 5, and Tables 1 and 2) . However, it should be noted that in the 2009 Phase II ESA of Parcel Numbers 113-49-006 and 113-49-027, Allwyn Environmental collected five background samples north of the Former USBP Firing Range (outside of the Former USBP Firing Range area), each of which contained arsenic concentrations that exceeded the USEPA RSSL of 0.39 of mg/kg.

  The Former USBP Firing Range property is located within an area that contains sediments and soils primarily derived from volcanic rocks. Shacklette and Boerngen, 1984 sampled soils derived from volcanic rocks in northern New Mexico which contained naturally-occurring levels of arsenic ranging from 10 mg/kg to 40 mg/kg. Arsenic is therefore not considered a prominent CoC for the Former USBP Firing Range, because it has been demonstrated that the concentrations of arsenic in site soils are consistent with naturally occurring levels of arsenic for the area.

- *Lead* - Fifty two out of sixty surface and subsurface soil samples, exclusive of duplicates, contained concentrations of lead above the USEPA RSSL of 400 mg/kg. Forty eight out of sixty soil samples contained concentrations of lead above the USEPA Industrial Soil Screening Levels (ISSL) (of 800 mg/kg (Figures 4 and 5, Tables 1 and 2). The highest concentration of lead was detected in a discrete 'grab' sample BPG-3S (southwest firing range, on eastern slope of backstop berm) at 49,300 mg/kg.

- *Antimony* - Twenty seven out of sixty surface and subsurface soil samples, exclusive of duplicates, contained concentrations of antimony above the USEPA RSSL of 31 mg/kg. Four out of sixty soil samples contained concentrations of antimony above the USEPA ISSL of 410 mg/kg. The highest concentrations of antimony were detected in the soil samples BPN-13S (composite, west part of the firing range on the east slope of backstop berm) and BPG-3S (discrete 'grab', southwest part of the firing range on the east slope of backstop berm) at 454 mg/kg. (Figures 4 and 5, Tables 1 and 2).

- *Polynuclear Aromatic Hydrocarbons* - PAH compounds were detected in six of the nine surface composite soil samples and in one discrete shallow 'grab' soil sample (BPG-20S) analyzed for PAHs. Five composite soil samples and the discrete 'grab' soil sample contained concentrations exceeding their respective USEPA RSSLs for at least one of the following PAH compounds: benzo (a) anthracene, benzo (a) pyrene, and benzo (b) fluoranthene (Figures 4 and 5, and Tables 1and 2). Benzo (g, h, i) perylene, a PAH which does not currently have a designated USEPA RSSL or an ADEQ RSRL, was detected in one composite surface soil sample and in the discrete 'grab' soil sample.

- *Toxicity Characteristic Leaching Potential* (TCLP) - Five soil samples were analyzed by TCLP for arsenic and lead. Each TCLP lead sample result was above the reporting limit and ranged from 3.4 milligrams per liter (mg/L) to 1,930 mg/L. Four of the five samples contained concentrations of lead above the USEPA TCLP toxicity characteristic concentration of 5 mg/L. Soil sample BPG-3S was the only TCLP sample that yielded a concentration of arsenic above the reporting limit, at a concentration of 0.27 mg/L (Figures 4 and 5, and Table 3).

- *Primary Sources* – of CoCs at the site are related to firing range operations. The primary source for CoCs is the presence of bullets and bullet fragments both on the surface and subsurface. Surface sources of PAHs are plastic shotgun wadding, and fragments of clay pigeon targets littering the ground surface. The bullets and bullet fragments present on the ground surface have contributed lead, antimony, and possibly some arsenic to site soils as they have weathered over time. Similarly, the PAH compounds present in site soils are a result of the gradual degradation of the plastic shotgun wadding and clay pigeon targets littering the ground surface (USEPA, 2003).

- *Secondary Sources* - of CoCs at the site are areas of the firing range that have been reworked by earth moving equipment and storm water runoff. The earthwork bullet trap berm and parking lot areas have been reworked by mechanized grading equipment. Therefore, CoCs from origination areas have moved to different locations across the site, both vertically and horizontally. Site surface sediments have also migrated along storm water pathways in a northeast direction from the Former USBP Firing Range.

SELECTED REMEDY

The selected remedy was chosen from among six remedial action (RA) alternatives (USACE, 2014). Each alternative was evaluated against the nine evaluation criteria developed by USEPA for conducting feasibility studies under CERCLA. Based on the remedial action alternative evaluations, it was determined that the selected remedy provides the best balance between effectiveness, regulatory compliance, cost, and stakeholder acceptance for achieving the Remedial Action Objectives (RAOs) that drive the formulation and development of response actions. The primary RAOs for Former USBP Firing Range are based on the lead, antimony, arsenic and PAH soil results presented in the RI Report. The RAOs were selected to achieve USEPA's threshold criteria of "Overall Protection of Human Health and the Environment" and "Compliance with Applicable or Relevant and Appropriate Requirements [ARARs]." The following RAO was developed as the basic requirement for the selected RA alternative at the Former USBP Firing Range: remove the potential for receptors to come in direct contact with CoCs at the Former USBP Firing Range.

The selected remedy for the Former USBP Firing Range, RA Alternative 4 in the RI/FS, includes excavation, removal and offsite disposal of CoCs and grading the site such that all precipitation and runoff moves away from the site to off-site drainage pathways. A plan will be prepared providing the detailed approach to excavation, removal, offsite disposal of CoCs and grading of the site addresses regulatory requirements; safety and health procedures; contingency actions; notification requirements; offsite disposal and other guidance for implementing the RA.

The RA will be executed in three phases as described below:

- Phase 1 will focus on the excavation and stockpiling of site soils containing CoC levels that exceed the RSSLs using X-ray diffraction (XRF) field screening techniques. Laboratory confirmation samples will be collected within the excavation area to confirm that all remaining soils at the site are below residential RSSLs as set by the USEPA and ADEQ.

- Phase 2 will focus on sampling and laboratory analysis of all soil stockpiles to determine the limits of excavation and which stockpiles may be disposed of at a hazardous waste landfill or at another approved landfill.

- Phase 3 will focus on backfilling and grading the site such that all precipitation and runoff will be directed away from the site to off-site drainage areas.

STATUTORY DETERMINATION

The selected remedy is protective of human health and the environment and complies with legally applicable federal and state requirements. The selected remedy is also compliant with applicable or relevant and appropriate requirements (ARARs).

This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. This Decision Document supports the conclusions that all known sources of contamination have been investigated. Specific CoCs identified were lead, antimony, arsenic, and PAHs for RA. The selected remedy will result in locating and removing the specific contaminants of concern at the Former USBP Firing Range and then transporting and disposing the CoCs at an approved landfill.

Because this remedy will not result in hazardous substance, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a five-year review will not be required for this remedial action.

The Former USBP Firing Range Proposed Plan was presented to the local community at a Public meeting held on 10 December 2014. Copies of the Proposed Plan were provided to the Project Information Repository, and other interested parties.

DATA CERTIFICATION CHECKLIST

The information listed in Table 4 is expanded in this Decision Document. Additional supporting information may be found in the project Administrative Record File.

Table 4
CERCLA Process Data for the Former U.S. Border Patrol Firing Range

Decision Document Information Item	Decision Document Section
CoC types and quantities	4.3
Baseline hazard/risk represented by CoCs	4.3; 6.0; 10.0
Remedial Action Objectives established and the basis for the objectives	7.0; 11.5; 12.1; 12.2
Manner in which CoCs will be addressed	8.0; 11.0
Current and reasonably anticipated future land use assumptions in the baseline risk assessment and Decision Document	5.0
Potential land use that will be available at the Former USBP Firing Range as a result of the selected remedy	5.0
Estimated capital cost estimates	11.6
Key factor(s) that led to selecting the remedy	9.0; 11.1; 12.3; 12.4; 12.5

CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
CoCs – Contaminants of Concern
USBP- United States Border Patrol

AUTHORIZING SIGNATURES

This Decision Document presents the selected response action for the Former USBP Firing Range. The U.S. Customs and Border Protection is the lead agency at the Former USBP Firing Range and developed this Decision Document consistent with CERCLA. This decision may be reviewed and modified in the future if new information becomes available that indicates the presence of previously undiscovered contamination or exposures that may cause unacceptable risk to human health or the environment.

Karl H. Calvo
Executive Director
Facilities Management and Engineering
U.S. Customs and Border Protection

Date

PART 2: DECISION SUMMARY

This Decision Summary provides an overview of the contaminants potentially present at the Former United States Border Patrol (USBP) Firing Range. It identifies the areas evaluated for remedial response, describes the remedial alternatives considered, and analyzes those alternatives compared to the criteria set forth in the NCP. The Decision Summary explains the rationale for selecting the remedy, and how the remedy satisfies the statutory requirements of CERCLA. The Decision Summary identifies the selected remedy, explains how the remedy fulfills statutory and regulatory requirements, and provides a substantive summary of the Administrative Record file that supports the remedy selection decision.

1.0 PROJECT NAME, LOCATION, AND BRIEF DESCRIPTION

1.1 PROJECT NAME AND LOCATION

The Former USBP Firing Range encompasses a one-half acre area located at 1651 W. Target Range Road in Nogales, Arizona (Figure 1). The Former USBP Firing Range is a leased portion of the Arbo property (parcel no. 112-29-010B) and a portion of the Barr property (parcel no. 113-49-027) (Figure 2). The Former USBP Firing Range is shown by the sixteen square grids and covers approximately 0.5 acres. The site on the Arbo property is surrounded on two sides by one adjacent property: the Barr property (parcel no. 113-49-027.

1.2 LEAD AND SUPPORT AGENCIES

CBP is responsible for executing the environmental restoration of properties that were formerly owned by, leased by, or otherwise possessed by the U.S. Border Patrol under the jurisdiction of the CBP. The United States Army Corps of Engineers (USACE) have worked in conjunction with the CBP to support the CERCLA site characterization and remediation efforts for the Former USBP Firing Range. The CBP is funding the remedy implementation.

1.3 FORMER U.S. BORDER PATROL FIRING RANGE DESCRIPTION

Site Boundaries

This Decision Document addresses only the one-half acre USBP Firing Range which includes a portion of the Barr (A.P.N. 113-49-027) and Arbo (A.P.N. 113-49-010B) Properties (Figure 2).

1.4 HISTORY OF THE FORMER USBP FIRING RANGE

Within the areas on the west and north side of the USBP Firing Range a number of “old”shell fragments have been found on the surface which are not related to activities on the USBP Firing Range. These shell fragments may be related activities from Camp little and or the Pancho Villa conflicts between Mexican and U.S. Troop and Pancho Villa forces. These adjacent sites are currently under evaluation by the USACE.

The region encompassing the City of Nogales, including the Former USBP Firing Range, has been a significant link between the Arizona and Sonora regions since before European occupation in the 16th century. The Nogales area was utilized as Native American trade route in prehistory, and was known as the “Camino Real”. The area was later used as a Spanish trade route. Following the U.S. acquisition of the area in the 1852 Gadsden Purchase, the area became an important link between Mexico and the Arizona Territory. The City of Nogales,

including the Former USBP Firing Range, was the site of a confrontation between the U.S. Army and the Mexican nationalist Pancho Villa in the mid-1910s (City of Nogales, 2011).

Camp Little, a U.S. military base, was established on 26 November 1910 to protect U .S interests at the border. Camp Little was training and staging facility during World War I. Improvements to the site were made between 1910 and 1933 when the camp was under DoD controls. More than 100 buildings, including streets, sewers, utilities, hospitals, shops, stables and a theater were constructed during DoD tenancy. The site was declared surplus on 1 January 1933. The improvements to the land were offered for sale to the original land owners and it is believed that the owners bought them. The land owners then leased their land with improvements to the State of Arizona. Today, the site is mostly residential with two local government buildings, a school, a grocery store, two restaurants, farm land and commercial buildings. The former Camp Little is located approximately two and one half miles northwest of the Former USBP Firing Range.

An aerial photograph review conducted by Allwyn Environmental, LLC in a 2009 Phase I ESA of a property adjacent to the Former USBP Firing Range revealed that the structures present at the Former USBP Firing Range were constructed in 1992, and no previous development had occurred at the site. The areas immediately surrounding the Former USBP Firing Range have never been developed. The Former USBP Firing Range property was used as a shooting range and target practice facility for the U.S. Border Patrol after 1992. The property is currently idle. The current property owner, USBP discontinued use of the firing range in mid-2010. CBP continues to lease the property from the current property owner, Mr. Arbo (Allwyn, 2009B).

1.5 PREVIOUS INVESTIGATIONS

1.5.1 2009 Phase I ESA Parcel 113-49-006

This report presents the findings of the Phase I ESA) performed in March 2009 on the La Loma Grande Property (currently the Garcia property) located adjacent to the Barr property in the Mariposa Canyon area of Nogales, Arizona. This property is northwest of the Former USBP Firing Range (Figure 2). The entire property consists of one parcel (113-49-006) and covers approximately 66.84 acres. The subject property has its center located at latitude of 31.347952 North and longitude of 110.973038 West.

The Phase I ESA was completed for Santa Cruz County to document known environmental risks and conditions associated with the property. The Phase I ESA was completed in accordance with the requirements of the *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* (American Society of Testing and Materials [ASTM] Designation: E1527-05). The objective of the Phase I ESA was to identify recognized environmental conditions (RECs) at the property (Allwyn, 2009A).

This assessment revealed evidence of the following RECs in connection with the property (Allwyn, 2009A):

- Large quantities of bullet fragments were observed throughout the northeast portion of the subject property, which is located west of a practice shooting range used by the Former USBP Firing Range.

- Bullet fragments varied in size and were found in large concentrations in the wash and hillside directly behind the shooting range.

- Bullet fragments were observed as far as 600 feet west of the shooting range.
- The bullet fragments would likely result in elevated concentrations of lead in the soil.

1.5.2 2009 Phase I ESA Parcel 113-49-027

This report presents the findings of the March 2009 Phase I ESA performed on the Barr Property adjacent to the Former USBP Firing Range in the Mariposa Canyon area of Nogales, Arizona. This property adjoins the Former USBP Firing Range on the northwest and south (Figure 2).

The Phase I ESA was completed for Santa Cruz County to document known environmental risks and conditions associated with the property. The Phase I ESA was completed in accordance with the requirements of the *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* (ASTM Designation: E1527-05). The objective of the Phase I ESA was to identify RECs at the property. Allwyn Environmental performed historical research review, environmental records and databases evaluation, site reconnaissance, and interviews with persons knowledgeable about the site.

The subject property consists of the northern portion of one parcel (113-49-027) and covers approximately 41 acres. The subject property consists of rugged and hilly undeveloped native desert land, with evidence of vehicular traffic occurring on the subject property. There are no structures located on the subject property. However, there is a parcel of interest that is entirely enclosed by the subject property. The enclosed parcel (113-49-010B) is located in the northwest portion of the subject property and contains an automobile salvage yard and the Former USBP Firing Range. The automobile salvage yard appeared to encroach onto the subject property on the small narrow strip next to the northern boundary in the northwest portion of the subject property. In the northeast portion of the subject property on the northern boundary, the fence from the Swift Trucking Company facilities appeared to encroach onto the subject property. There are dirt roads located on the subject property.

1.5.3 2009 Phase II ESA Parcel Nos. 113-49-006 and 113-49-027

A Phase II ESA was completed in December 2009 for two parcels (Parcel Nos. 113-49-006 and 113-49-027) located immediately west and adjacent to the Former USBP Firing Range. Small arms target practice activities were suspected of impacting the two parcels, potentially resulting in elevated concentrations of lead, arsenic, antimony, and PAHs. The on-site assessment activities were conducted from 19 October 2009 through 12 November 2009. The assessment was conducted in accordance with a U.S. Environmental Protection Agency (USEPA)-approved Quality Assurance Project Plan (QAPP), dated July 2, 2009, and a site-specific Sampling and Analysis Plan, dated October 6, 2009 and approved by USEPA on November 5, 2009 (Allwyn, 2009C).

Soil samples from 51 of 135 sampling cells contained lead in a concentration above the USEPA RSSL of 400 milligrams per kilogram (mg/kg) and of these, 33 contained lead in a concentration above the USEPA ISSL of 800 mg/kg. Subsurface soil samples from 28 sampling cells contained lead in a concentration above the USEPA RSSL and of these 28 sampling cells, 14 contained lead in a concentration above the USEPA ISSL.

Soil samples from one of the 135 sampling cells contained antimony in a concentration above the RSSL. Soil samples from two of the 135 sampling cells contained one PAH, benzo (a) pyrene, in a concentration above the USEPA RSSL. 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 and south of the shooting range. The vertical extent of lead impacts was not defined. Antimony and PAHs, while present in soil samples above the USEPA RSSLs in two and one sampling cells, respectively, are present only in cells in which lead is also present in soil samples in a concentration above the residential RSSLs. Therefore; lead was considered the target CoC for further assessment and/or remediation at the site.

The extent of lead impacts in the wash immediately behind the small arms shooting range was delineated. Lead is present at concentrations above the ISSL in the wash soil extending between 250 and 300 feet and above RSSLs between 450 and 500 feet northeast (downstream) of the small arms shooting range. Antimony, arsenic, and PAHs are not present in concentrations above the RSSLs in samples collected from the wash. Therefore, lead was considered to be the target CoC for further assessment and/or remediation in the wash.

Toxicity, Characteristic Leaching Potential (TCLP) analysis to evaluate the hazardous waste classification of on-site soil was performed on two samples containing lead above the ISSL (2,200 mg/kg and 3,400 mg/kg) and one containing lead above the RSSL (400 mg/kg). The samples collected for the hazardous waste classification demonstrated that the unscreened material and material passing through a #8 sieve would be classified as a hazardous waste based on lead toxicity (0008 waste code). In addition, one sample collected from material passing through a #50 sieve (WD-S) also demonstrated the hazardous waste characteristic for lead following TCLP analysis.

This assessment revealed evidence of the two following RECs in connection with the property:

- Bullet fragments were observed on the subject property (parcel no. 113-49-006), in the vicinity of the Former USBP Firing Range in the northwest portion of the subject property.

- Bullet fragments varied in size and were found in large concentrations in the wash and hillside directly behind the shooting range on subject property parcel no. 113-49-027. The bullet fragments likely result in elevated concentrations of lead in the soil. Further assessment of the soil through soil sample collection and analysis, and/or alternate means (e.g. X-ray fluorescence) should be conducted to evaluate the extent and magnitude of potential lead impact of the soil.

- There is an automobile salvage yard (parcel no. 113-49-010B) that is enclosed within the northwest portion of the subject property (parcel no. 113-49-027) and encroaches onto the subject property. The position of the wash and local topography on parcel no. 113-49-027) indicates that storm water, potentially containing petroleum hydrocarbons and metals, could run on and through the subject property from the automobile salvage yard. This report states that one of the focuses of further investigations for parcel no. 113-49-027 should be on the migratory pathways from parcel no. 113-49-010B that are most likely to represent significant sources of CoCs for parcel no. 113-49-027 (Figure 2).

1.6 SUMMARY OF CERCLA ACTIVITIES COMPLETED ON THE FORMER USBP FIRING RANGE

Table 5
Summary of CERCLA Activities Completed at the Former USBP Firing Range

Investigation Phase	Year Completed	Key Information
RI/FS	2012-2013	The RI characterized the site for lead, antimony, arsenic and PAHs in soils to a maximum depth of 42 inches. The FS evaluated remedial alternatives to reduce the potential explosives safety hazards to property owners and the general public.
Proposed Plan	2014	Summarized the RI/FS and indicated the selected remediation alternatives

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
RI/FS = Remedial Investigation/Feasibility Study

1.7 CERCLA ENFORCEMENT ACTIONS

Various environmental statutes authorize USEPA to take enforcement actions for violations of provisions contained in the laws and accompanying regulations. Three broad types of enforcement actions can be initiated: administrative, civil judicial, and criminal. No record of any CERCLA enforcement actions undertaken relative to the Former USBP Firing Range was found.

2.0 COMMUNITY PARTICIPATION

The CBP policy for management and execution of this program incorporates public participation in the response action process to promote active two-way communication between CBP and communities affected by activities at these projects. The primary objective is to foster and maintain a climate of understanding and trust with the public. USEPA applies the term "community involvement" to its commitment to early and meaningful community participation during CERCLA cleanup. The foundation of the community involvement program is the belief that members of the public affected by a cleanup site have a right to know what is being done in their community and to have a say in the decision-making process.

2.1 PUBLIC OUTREACH PROGAM

Public participation has been an important component of the restoration project at the Former USBP Firing Range in Nogales, Arizona. The community participation requirements in CERCLA were met in the remedy selection process for the Former USBP Firing Range. The following activities and documents form the major components of the Public Outreach Program aimed at informing and soliciting public input regarding the Former USBP Firing Range:

- Public Information Website - A project-specific website (hhttp://www.cbp.gov/about/environmental-cultural-stewardship/nepa-documents/docs-review) was developed to facilitate easy access by the public to obtain project information, including schedule of activities, public involvement, project summary, project documents, contact information, and a public relations record of all activities. This website will remain active and available to the public throughout the duration of the remediation project.

- Press Releases - Press releases for the Former USBP Firing Range project were prepared and submitted to the media outlet identified in Appendix A. These press releases were prepared to communicate major project activities and milestones, such as the completion of the RI/FS Report, notification that the Proposed Plan was available for public review and comment, and development of the Decision Document. If requested, the media outlet identified in Appendix A will be provided site access and escorted to the Former USBP Firing Range as approved by the CBP Project Manager, to facilitate news coverage of project activities and progress.

- Public Information Repository – Is located at the Nogales Santa Cruz Library 518 N. Grand Avenue Nogales, Arizona.

2.2 PUBLIC AND STAKEHOLDER PARTICIPATION

- Public Comment Period - A Proposed Plan (CBP, 2014) was prepared for public review and comment. In accordance with USEPA guidance, CERCLA 117(a) and (d), and NCP 40 Code of Federal Regulations (CFR) 300.430(f)(3)(i)(a), a 30-day public comment period was announced on 15 November 2014 and publicized in the Nogales International newspaper. Appendix A contains a copy of the public notice prepared and published to inform the public about availability of the Proposed Plan, the 30-day public comment period, and the public meeting held on 10 December 2014 to solicit responses to the plan. Public comments were received during the comment period and are found in Appendix B.

- Public Meetings - The CBP hosted one public meeting. The meeting was held on 10 December 2014 and provided an opportunity for the public to present written and oral comments on the Proposed Plan. The meeting was attended by members of the public. Comments were provided from community members. The comments and responses are presented in Appendix B.

3.0 SCOPE AND ROLE OF RESPONSE ACTION

Remedial Action Objectives (RAOs) drive the formulation and development of response actions USEPA 1988. The primary RAOs for the Former USBP Firing Range are based on the results presented in the RI/FS Report (USACE, 2014) to achieve USEPA's threshold criteria of "Overall Protection of Human Health and the Environment" and "Compliance with ARARs." The RAOs address chemical contamination which the RI/FS Report identifies as the potential threat to human health and the environment at the Former USBP Firing Range. Therefore, the remedy selection focuses on chemical related safety hazards. Chemical contamination in the soils will be removed to an appropriate off-site landfill. As the lead agency for managing this site the CBP has selected the proposed remedy for the Former USBP Firing Range in accordance with CERCLA (42 United States Code §9601 et seq.), as amended by SARA in 1986, and the NCP (40 CFR Part 300). The State of Arizona, represented by ADEQ, concurs with this remedy selection.

Planned Sequence of Actions

The selected remedy for the Former USBP Firing Range consists of soil remediation by removal to achieve a final determination of no further remedial action. The remedial field activities will be executed in three phases as follows:

- Phase 1 will focus on the excavation and stockpiling of site soils containing CoC levels that exceed the RSSLs using X-ray diffraction (XRF) field screening techniques. Laboratory confirmation samples will be collected within the excavation area to confirm that all remaining soils at the site are below residential RSSLs as set by the USEPA and ADEQ.

- Phase 2 will focus on sampling and laboratory analysis of all soil stockpiles to determine the limits of excavation and which stockpiles may be disposed of at a hazardous waste landfill or at another approved landfill.

- Phase 3 will focus on backfilling and grading the site such that all precipitation and runoff will be directed away from the site to off-site drainage areas.

A remedial action design and work plan will be prepared providing the detailed approach to excavation, removal, and disposal of soil containing lead, arsenic, antimony and PAHs, regulatory requirements, safety and health procedures, contingency actions; and other related guidance for implementing the RA.

4.0 FORMER USBP FIRING RANGE SITE CHARACTERISTICS

4.1 CONCEPTUAL FATE AND TRANSPORT MODEL

The Conceptual Fate and Transport model (CFTM) describes a site and its environment based on existing knowledge. This model is an effective tool for defining site dynamics, streamlining risk assessments, establishing exposure hypotheses, and developing appropriate corrective actions. The CFTM for this project describes sources of chemical contamination, actual and potentially complete or incomplete exposure pathways, current or reasonably anticipated land use, and potential site receptors.

The CFTM for the Former USBP Firing Range was created during the RI/FS project. The CFTM is presented to foster an understanding of information, data, and processes that led to development of the project and data acquisition requirements. The Former USBP Firing Range CFTM describes the natural setting, contaminant migration mechanisms, current land uses, potential human and ecological receptors, exposure pathways, access to the site, and potential contaminant sources. The CFTM for the Former USBP Firing Range is depicted in Figure 6.

4.2 OVERVIEW OF FORMER USBP FIRING RANGE

4.2.1 Former USBP Firing Range Boundaries and Areal Extent

Boundary and areal extent are discussed and presented in Section 1.1 and Figures 2 and 3.

4.2.2 Topography

The majority of the Former USBP Firing Range has been graded by heavy machinery, and is essentially flat. The topography of the remainder of the site and of the surrounding property is typical of dry desert lowlands present throughout the Basin and Range province of the western United States. The land surface is generally rugged and hilly. Several dry creek beds (arroyos) separate steep hills and ridges present throughout this area. The elevation ranges from approximately 3,960 to 4,130 feet above mean sea level (amsl) (Allwyn, 2009A).

4.2.3 Soils and Vegetation

The soils in the Former USBP Firing Range are primarily shallow and rocky with unweathered clasts of andesite and rhyolite tuffs, granites, and small areas of clay shales. The steeper slopes have numerous rock outcroppings and shallow loamy soils. Five soil associations dominate the area: Comoro-Pima, Continental-Sonoita, Caralampi-White House - Hathaway, Lampshire-Chiracahua-Graham, and Faraway-Rock Outcrop-Barkerville. The first three are typically deep soils and sandy loams with varying amounts of gravel and clay, generally appearing in or along floodplains and streambeds. The latter two are typically shallow cobbled clay or sandy loams occurring in the upper elevations on foothills and mountains (Allwyn, 2009A). Soil pH ranges from slightly acidic (pH 6) to slightly alkaline (pH 8) (USDA, 1979). Most of the ground surface is covered with vegetation; however, some portions are bare. The vegetation that grows in these soils is representative of desert shrub land. Common vegetation includes several varieties of cacti, mesquite, creosote bush, ocotillo, acacia trees, desert willow, and yucca (National Park Service, 2011). The Former USBP Firing Range vegetation did not significantly hinder the RI field activities.

4.2.4 Climate

Nogales' climate is typically sunny and dry, with low relative humidity. Average monthly high temperatures recorded at the Nogales 6 N climate station from 1952 to 2010 range from a low of 64.3 degrees Fahrenheit (°F) in January to a high of 95.3°F in June. Average monthly low temperatures range from 27.3°F in January to 63.9°F in June during the same time period (Western Regional Climate Center, 2011).

Nogales' climate is classified as arid, which is defined by average annual precipitation less than half of evaporation and mean temperature of the coldest month above freezing (32°F). The Former USBP Firing Range receives little rain or snow, averaging about 17.21 inches of precipitation per year. Most precipitation occurs during the summer monsoon season, typically from July through mid-September. The monthly average precipitation recorded at the Nogales 6 N climate station from 1952 to 2010 ranges from a low average of 0.22 inches for May to a high average of 4.38 inches for August. The summer monsoon season for regional precipitation is characterized by incidences of sudden, dramatic downpours of heavy rain within a short period of time. Such events have been known to cause flash flooding. The Nogales 6 N climate station has recorded an extreme value of 3.67 inches of precipitation within one day, occurring on the 25th of August, 1993. Hourly rainfall amounts were not available (Western Regional Climate Center, 2011). The average pH of rainwater for southern Arizona is approximately 5.4 (USGS, 2001). Prevailing wind at the Nogales Airport generally flows from the South (Western Regional Climate Center, 2011).

4.2.5 Geology

The physiography of the Former USBP Firing Range study area is characterized by mountains and basins formed by large scale normal faulting during the Basin and Range disturbance occurring from early Miocene to Pliocene time. The site is underlain by the sediments of the Tertiary-age Nogales Formation and Mesozoic-age intrusive volcanics, unconformably overlaid with a veneer of Quaternary-age sediments in the valleys. The Nogales Formation consists of mechanically deposited basin-fill volcanic conglomerate with layers of sandstone and grit. The Nogales Formation is estimated to reach a depth of 250 to 700 meters below ground surface (bgs) (USGS and ADEQ, 2011).

4.2.6 Hydrology

4.2.6.1 Hydrology

No permanent surface water features exist at the Former USBP Firing Range. An unnamed dry creek bed (arroyo) borders the site on the northwest side. Arroyos are seasonal drainage features, which drain ephemeral storm water during heavy rain events (usually during the summer monsoon rain events) and usually become dry again within a few hours or even minutes of the end of the rain event. The unnamed arroyo at the Former USBP Firing Range drains to the northeast, towards an automobile salvage yard.

4.2.6.2 Hydrogeology

Regional Groundwater Conditions

The Former USBP Firing Range lies within the boundaries of the Santa Cruz Active Management Area (AMA). The Santa Cruz AMA was designed to address groundwater

overdraft in the area; as a result, water management in this area 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 [gpm] or less) (Allwyn, 2009A).

The basin-fill sediments along the Santa Cruz River form three aquifers (listed in ascending order): the Nogales Formation, the Older Alluvium, and the Younger Alluvium. These three aquifers are shared between the U.S. and Mexico. Both alluvial units are generally unconfined, hydraulically connected, and yield water to wells. The Younger Alluvium ranging in depth from 40 to 150 feet is present along the river and some of its tributaries. According to the Arizona Department of Water Resources (ADWR), this aquifer is the most productive and widely used in the region providing about 75 percent of the total water in the Santa Cruz AMA, with some wells yielding more than 1,000 gpm (Allwyn, 2009A).

Although the Older Alluvium aquifer (ranging from a few meters to about 1,000 feet bgs is the most extensive geologic unit within the Santa Cruz AMA, its transmissivity is generally low and well yields are often small. The Nogales Formation, at least 5,000 feet thick, is not generally considered an aquifer, since groundwater occurs primarily in fracture zones and unconsolidated layers within the formation (average yields are less than 30 gpm) (Allwyn, 2009C).

The highly seasonal nature of surface water flow, the high transmissivity of the Younger Alluvium and the discharge of effluent from the Nogales International Wastewater Treatment Plant complicate the analysis of water level change. According to the Arizona Department of Water Resources, the water level elevations (elevation of the water table amsl) range from 3,000 to 4,000 feet in the Santa Cruz AMA. The Santa Cruz River serves as a major source of recharge for the Younger Alluvium by seasonal methods: mountain front recharge, irrigation seepage, effluent discharge, and natural surface water flow (Allwyn, 2009C).

Local water table levels fluctuate with variations in weather patterns, water withdrawals within the project area Santa Cruz River basin (in Mexico and the U.S.), and incidental recharge from agricultural irrigation and Nogales International Wastewater Treatment discharge. The shallow depth of the basin's aquifers and the high transmissivity of the alluvium make many portions responsive to precipitation events and susceptible to droughts (Allwyn, 2009C).

Site Groundwater

Based on the information provided in a well driller report from a well located within close proximity to the site (ADWR Well No.55-636229), the local groundwater is located approximately 135 feet bgs. This well is cased to 420 feet bgs. No perched water appears to exist in the area as no intermittent clay layers were noted in the well log. Based on site topography, the groundwater flow direction in the vicinity of the subject property is likely north to northeast.

4.2.7 Surface and Subsurface Features

4.2.8 Areas of Archaeological or Historical Importance

There are no identified prehistoric or historic cultural resources within the immediate vicinity of the Former USBP Firing Range property.

4.3 SOURCES OF CONTAMINATION

4.3.1 Site History

The past activity conducted at the Former USBP Firing Range consisted of small arms training in the form of target practice. The Former USBP Firing Range is located within a mostly open and moderately restricted area that is undeveloped property. Water, electric, and communications utilities may traverse portions of these areas. Two soil transportation mechanisms are considered valid for the Former USBP Firing Range:

- Human activity such as construction, excavation, and other earth-moving activities
- Natural processes such as aeolian (wind) transport, saltation and mass wasting.

4.3.2 Summary of Site Contamination

Chemical contaminants related to small arms range firing activities were identified at the Former USBP Firing Range. The response action for the Former USBP Firing Range is based on the presence of these chemical contaminants in the form of lead, arsenic, antimony and PAHs that may pose a health risk to human health and environment The CoC quantities are found in Tables 1, 2, and 3.

4.3.3 Investigation Strategy

Based on the Conceptual Fate, Transport and Exposure model (CFTE), and evaluation of available data, the following RI/FS approach was developed. The objective for the RI/FS was to perform a comprehensive review of existing data and implement a site characterization methodology involving subsurface soil sampling to collect sufficient data to conduct a thorough evaluation of remedial alternatives. The RI/FS Work Plan (USACE, 2011) was prepared to address data gaps regarding site conditions, and collect and evaluate sufficient data necessary to confirm the presence or absence and extent of CoCs in site soils. The RI/FS Work Plan also contained methodology for performance of composite and discrete sampling of surface and subsurface soils that were designed to yield the required data. Soil sampling field activities were conducted from 26 September to 5 October 2011. The approach for soil sampling at the Former USBP Firing Range is detailed below.

The RI/FS project field activities consisted of sampling and analysis of surface and subsurface site soils. Soil samples were analyzed to confirm the presence or absence, concentration, and horizontal and vertical extent of the following CoCs: lead, arsenic, and antimony. PAHs samples were taken only to a depth of 12 inches bgs. Previous sampling and analysis results indicated no penetration of source material for PAHs. Soil samples results that exceeded TCLP toxicity characteristic levels for lead by twenty times were selected for TCLP analysis. The sample analysis results are presented in Section 3.

Both discrete and composite soil samples were collected at the Former USBP Firing Range. Twenty two discrete “grab” samples were collected within the Former USBP Firing Range at locations determined by the Field Manager on the basis of visual evidence of soil contamination (bullet fragments, shotgun wadding, unusual soil characteristics, sediment accumulation from contaminated areas, etc.). Composite soil samples were collected from within sampling grids established within the Former USBP Firing Range. The Former USBP Firing Range was divided into sixteen 50 foot by 50 foot sampling grids. Each grid was divided into four 25 feet by

25 foot sub-grids. A sample was collected in each sub-grid at a location of visual evidence of soil contamination, and subsequently combined with samples from the other sub-grids within the parent grid to form the composite sample. Soil sample locations are presented in Figure 3.

One shallow and one deep subsurface soil sample was collected at each sampling location. Shallow subsurface soil samples were collected from 0 to 12 inches bgs using a disposable plastic scoop. Deep subsurface soil samples were collected at the shallowest depth below 12 inches bgs at which an XRF sensing instrument did not register a value for lead, arsenic, and/or antimony that was above the USEPA Region 9 RSSLs. These samples did not exceed a depth of 42 inches bgs. Subsurface soil samples were collected using a decontaminated hand auger or spud bar. All soil samples were passed through a #8 and # 50 sieve and only samples passing through the sieves were retained and sent to the laboratory for analysis.

4.3.4 Extent, Fate, and Transport of Contamination

4.3.4.1 Lateral and Vertical Extent of Contamination

The maximum vertical extent within the Former USBP Firing Range of CoCs was determined to be 42 inches below ground surface based on sampling conducted during the RI. Data from these investigations were used to develop density of CoC areas within the Former USBP Firing Range during the RI.

4.3.4.2 Constituents of Concern Persistence

CoCs expected to persist in vadose zone soils at the Former USBP Firing Range can be segregated into two categories: elemental CoCs and compound CoCs. Lead and antimony are elemental CoCs, meaning that concentrations of these CoCs will neither decrease nor increase significantly with time, unless RA is performed or another release occurs. PAHs are compound CoCs and, unlike elemental CoCs, are subject to gradual biological degradation and formation of breakdown products.

Elemental lead present in site soils is anticipated to gradually oxidize, forming a variety of oxide and carbonate minerals including Anglesite ($PbSO_4$), Massicot and Litharge (PbO), Cerrusite ($PbCO_3$), and Hydrocerrusite [$Pb_3(CO_3)_2(OH)_2$]. Each of these minerals have low solubility, and therefore are unlikely to migrate, but are still of environmental concern to on-site receptors because of the negative health effects of high concentrations of lead even when present in compounds. Metallic lead is transformed to secondary lead minerals at rate of approximately 4.8% over a period of 20-25 years. (ATSDR, 2007; Cao et. al., 2003; Hardison, 2003)

Little is known about the behavior of antimony in soil during weathering. In aerobic surface soils, oxidation generally occurs. Weathered antimony would be expected to form oxide and carbonate minerals in Former USBP Firing Range soils. However, the fraction of antimony transformed to secondary minerals would be expected to make up only a small amount of the total antimony, leaving the majority of the antimony present in the elemental metallic form, for the foreseeable future. Antimony is not readily oxidized under neutral conditions. The rate of transformation of antimony to secondary antimony minerals has not been defined, but may be expected to occur at an extremely low rate (ATSDR, 1992).

PAH compounds present in Former USBP Firing Range soils will degrade and break down over time by the process of aerobic biodegradation. Abiotic degradation is insignificant for PAHs containing four or more aromatic rings, which is the case for PAHs detected in Former USBP

Firing Range soils above USEPA RSSLs. Based on laboratory experimentation, the estimated half-lives of the CoC PAHs in firing range soils are: benzo (a) anthracene, 162-261 days; benzo (b) fluoranthene, 211-294 days; benzo (a) pyrene, 229-309 days. Although the pathways of microbial degradation are well known for benzo (a) pyrene, degradation pathways for the other CoC PAH compounds are largely unknown. Metabolism of PAHs by bacteria and eukaryotic microorganisms includes the formation of dihydrodiols and carboxylic acids. (ATSDR, 1992; Mrozik et al., 2004).

4.3.5 *Physical Factors*

Physical factors affecting COC persistence in Former USBP Firing Range vadose zone soils include temperature, precipitation, soil moisture content, and soil compaction. Weathering of lead and antimony, and biodegradation of PAHs, should correlate positively with higher temperatures, the presence of water, and aeration of the Former USBP Firing Range soils. The corrosion of lead is dependent on a water layer that forms on the metal surface, which acts as a medium for the diffusion of atmospheric gases (demonstrates the importance of aeration of site soils), which attack the metal surface and leads to the formation of secondary lead minerals and subsequent dissolution of lead into solution. This process should also apply to antimony, although antimony would generally be more resistant to corrosion and weathering. Bacteria responsible for biodegradation of PAH compounds are more active in environments with greater availability of water and oxygen. Nogales' climate is typically sunny and dry, with low relative humidity. Temperatures range from 27.3°F in January to a high of 95.3°F in June.

The Former USBP Firing Range receives little rain or snow, averaging about 17.21 in of precipitation per year. Soil types present at the Former USBP Firing Range may be considered fairly aerated.

4.3.6 *Chemical Factors*

Chemical factors affecting CoC persistence in Former USBP Firing Range vadose zone soils include:

Soil pH - The transformation of lead to lead carbonates is influenced by elevation in soil pH. As soil pH increases the amount of lead that is transformed is dramatically decreased. Although little is known about the weathering processes for antimony, it is likely that the same effect would occur for the formation of antimony carbonates, but that the effect would be less dramatic due to antimony's general resistance to weathering. The soil pH at the Former USBP Firing Range ranges from slightly acidic (pH 6) to slightly alkaline (pH 8) (USDA, 1979).

Availability of Carbonate - The greater availability of carbon dioxide (CO_2) and carbonate in soil allows for a more rapid transformation of lead and antimony into secondary carbonate minerals. The soil types present at the Former USBP Firing Range contain low amounts of carbonate (~1%)

Availability of Phosphorus - High availability of phosphorus in site soils with constituents of lead would allow for the formation of the secondary lead phosphate minerals. Lead phosphate minerals, in contrast to lead carbonates, sulfates, and oxides; are extremely insoluble and are not bioavailable. The soil types present at the Former USBP Firing Range contain little to no phosphorus (USDA, 1979).

Soil Organic Matter - The absence of soil organic matter impedes the transformation of metallic lead to massicot and lead carbonates. This is most likely due to the decreased availability of CO_2 as a result of the lack of organic matter. Microbial communities oxidize organic matter in soil, producing CO_2. As a result, CO_2 in soil air is often several hundred times more concentrated that what is typically found in the earth's atmosphere. Also, organic acids (such as formic and acetic acid) have been implicated in the accelerated corrosion of lead bullets in shooting range soils. In soil rich with humus the rate of lead transformation to secondary minerals is elevated to 15.6% within a 20-25 year span, compared to a rate of 4.8% in mineral soils over that same time period.

Concentration of Lead and Antimony in Former USBP Firing Range Soil - The rate of biodegradation of PAHs may be altered by the degree of lead and antimony contamination. Half-lives of PAHs may be longer in soils containing concentrations of lead and/or antimony that are toxic to degrading microorganisms. Reduced biodegradation of PAHs have been reported in soil containing a chemical toxic to microorganisms.

4.3.7 Biological Factors

Biological factors affecting contamination persistence in USBP firing range vadose zone soils include the prevalence of vegetation and PAH-degrading microorganisms. Antimony contamination persistence is not affected by biological factors. Plants are able to take up lead into the plant tissues. The total uptake of lead into plant biomass is expected to correlate positively with the amount of plant biomass present at the Former USBP Firing Range.

The biodegradation of PAHs in the Former USBP Firing Range soils is dependent upon the presence and prevalence of microorganisms capable of degrading PAHs. Common bacterial genera with species capable of degrading PAHs include *Arthrobacter, Bacillus, Burkholderia, Mycobacterium, Pasteurella, Psuedomonas, Rhodococcous, Staphylococcus, Sphingomonas, and Terrabacter* (Seo et al., 2009).

4.3.7.1 Routes of Migration

Aeolian (wind) Transport – Former USBP Firing Range CoC particles originating from bullets, bullet fragments, clay pigeon targets and plastic shotgun wadding may be transported by wind. Migration would occur either down slope or along the prevailing wind direction. CoCs would migrate by suspension or saltation, a specific type of particle transport by which a fluid removes loose material from the ground surface, carries the material, and deposits it back onto the surface at some distance from the previous position, and then repeats. Distance of transport may range from a few inches to many miles over the course of one day.

Mass Wasting - Mass wasting is the geomorphic process by which regolith, or rock moves down slope under the force of gravity. When the gravitational force acting on a slope exceeds its resisting force, slope failure (mass wasting) occurs. This form of transport is mainly relevant to the slopes of the backstop berm, which contains CoCs that are subject to mass wasting, transporting these materials down slope. Mass wasting of such a feature may be expected to occur at a very slow rate. Mass wasting should be considered a primarily on-site form of CoC migration, but may be expected to occur at a very slow rate.

Dissolution by Storm Runoff - The Former USBP Firing Range site experiences occasional short periods of heavy precipitation during the late summer months. These storms are capable of producing flash floods. Runoff resulting from heavy precipitation may produce dissolved CoCs

from spent small arms munitions. The amount of soluble CoC metals in storm water depends upon the pH of the water and the dissolved salt content. The solubility of lead at pH>5.4 is 50 micrograms per liter (µg/L) in water of high salt content, and 200 µg/L in water with low salt content. These concentrations of lead exceed the USEPA Maximum Contaminant Level of 15 µg/l. Solubility increases as pH decreases. Because pH of rainwater at the Former USBP Firing Range may be expected to be <5.4, lead and lead compounds may be considered to be soluble in storm water discharges. Antimony is not significantly soluble in water.

The PAH compounds benzo (a) anthracene, benzo (b) fluoranthene, and benzo (a) pyrene have low solubilities (10 µg/L, 2.3 µg/L, and 1.2 µg/L, respectively), which are soluble to concentrations above their respective USEPA screening levels. Because of their low solubility and high affinity for organic carbon, PAHs in aquatic systems are primarily found sorbed to particles that have either settled to the bottom or are suspended in the water column. Lead compounds, and to a lesser degree PAHs, may be transported on-site or off-site by storm water discharges resulting from heavy precipitation. The distance of transport may range from a few meters to many miles.

Sediment Transport by Storm Runoff - CoCs and source materials may be transported in arroyos as sediments by runoff discharges following heavy precipitation. The CoCs and source media would migrate by suspension and/or saltation. This form of migration could transport CoCs downstream during rain events. Sediment transport from storm runoff may result in off-site CoC migration.

Leachate Transport - CoC leachate traveling downward through the vadose zone has the potential of migrating CoCs downward towards the phreatic zone. Leachate is any liquid that, in passing through matter, extracts solutes, suspended solids or any other component of the material through which it has passed. Firing range soil leachate may contain dissolved CoCs. TCLP samples from the Former USBP Firing Range have demonstrated that lead has the potential for entering water at concentrations above the USEPA toxicity characteristic of 5 mg/L. There is no TCLP analysis for antimony and PAHs.

Once in solution, lead is likely to precipitate as less soluble lead compounds, absorb on to mineral or organic soil components, or be taken up by plants or other organisms that inhabit the soil. Antimony is not significantly soluble in water. Dissolved lead, lead compounds, and to a much lesser degree PAHs, may be transported downward by infiltrated water towards the groundwater; however, geologic conditions at the Former USBP Firing Range limit the migration of leachate to groundwater. The soil present in the vadose zone at the Former USBP Firing Range “acts like a large sponge to hold infiltrated water and percolation increases as soils get wetter until the point of saturation, which is rare in dry areas like Nogales, where the soil mantle has the first opportunity to intercept the precipitation and little to no groundwater recharge occurs” (USGS and ADEQ, 2011). Lead, lead compounds, and PAHs are able to migrate downward through the subsurface at very slow rates (a few millimeters to a few inches every year, depending on physical and chemical factors), and are unlikely to reach the phreatic zone at approximately 40 to 100 feet bgs. (Hardison, 2003).

Volatilization - PAH compounds have a limited potential to volatilize, transporting contamination from the Former USBP Firing Range surface soils into the atmosphere. Once present in vapor form, PAHs may be transported hundreds of miles from the site by air currents. However, volatilization is not an important migration mechanism for the PAH compounds detected in the Former USBP Firing Range soils above USEPA RSSLs. Volatilization is not expected to be a

significant migration pathway for PAH contamination. Lead and antimony do not undergo volatilization and would not migrate into the atmosphere.

Biotic Uptake - Lead may be taken up in edible plants from the soil via the root system. The amount of lead in the total plant body correlates strongly with the concentration of lead in the soil. Biotic uptake is not a significant migration pathway for antimony and PAHs, as these CoCs are not readily taken up by plant life. This mode of transport is primarily on-site. Animal life may ingest CoCs present in plant tissues.

4.3.7.2 Human Receptors

Potential human receptors using the area are utility workers, ranchers, law enforcement personnel, environmental sampling personnel, firefighters (in the event of a brush fire), property owner, and occasional trespassers.

4.3.7.3 Ecological Receptors

Based on the screening level ecological risk assessment two types of stressors were noted potential chemical and physical stressores. The chemical stressors (lead, antimony, arsenic and PAHs) and shot gun pellets, wadding and casings and lead bullets were detected in surface and shallow subsurface soil samples. These chemical stressors that may have been released to the environment and potentially pose a threat to ecological habitats or wildlife. The physical stressors include habitat alteration or destruction typically associated with the implementation of remedial activities. The site is highly disturbed due to historical site activities thus; overall exposure of wildlife and destruction of habitat is low due to the generally poor quality habitat that exists within the small study area as compared to the available surrounding areas.

Threatened and endangered species are reported within the State of Arizona; however, no threatened and endangered species have been observed or are known to exist within the Former USBP Firing Range.

4.3.7.4 Exposure Pathways

Groundwater was removed from consideration in the RI planning phase as potential chemical exposure pathway, because there was no mechanisms to transport CoCs to groundwater at depth at the Former USBP Firing Range. Therefore the exposure pathway for potential receptors and the CoCs at the Former USBP Firing Range is direct contact only.

5.0 LAND AND WATER USES

5.1 CURRENT LAND AND WATER USES

According to the 2006 Census, the population of the city of Nogales was 21,017. The Former USBP Firing Range encompasses approximately one-half acre of shooting range property and empty range land. The property has been previously used as a USBP small arms firing range. This activity has since ceased. The property is currently idle. The Former USBP Firing Range property is unfenced, although there is a locked gate on the main road to the site. There is no signage at the site to indicate property boundaries or to ward off trespassers. It is possible for cattle and other livestock from surrounding properties to enter the site.

The only persons with permitted access to the Former USBP Firing Range are the USBP staff and the property owners. A potential does exist for trespassers to enter the area. Additionally, fire fighting personnel and equipment may be required to enter the site to suppress brush fires.

There is currently no residential land use immediately adjacent to, or located within, the Former USBP Firing Range.

There is currently no use of surface water or groundwater on the site.

5.2 REASONABLY FORESEEABLE FUTURE LAND USES

There are currently no known plans to develop the Former USBP Firing Range within the next 5 years.

6.0 SUMMARY OF FORMER USBP FIRING RANGE RISK EVALUATION

6.1 HUMAN HEALTH AND ECOLOGICAL RISKS

6.1.1 Human Health Risks

The Human Health Assessment (HHA) evaluated whether potential carcinogenic risks and non-carcinogenic hazards to human health posed by the site exceed acceptable threshold levels. The HHA focused on identifying whether potentially unacceptable concentrations of CoCs may exist in soil on site, the extent of potentially unacceptable concentrations of CoCs in soil, and on potential risks associated with off-site migration of CoCs. The HHA involved the identification of potential exposure scenarios and comparison of soil data to regulatory and risk-based screening criteria that are protective for the potential exposure scenarios. This phase of the assessment includes the exposure assessment and comparison of site data to screening criteria. Consistent with USEPA guidance, the HHA focused on concentrations of CoCs in the fine fraction of soil (USEPA, 2000).

6.1.2 Exposure Assessment

The exposure assessment provides a framework for problem definition and assists in the identification of potentially exposed populations and appropriate remedial technologies, if necessary. This assessment is based on the potential CoC pattern and potential migration mechanisms associated with the past use of the site as a firing range. CoCs related to Former firing range operations include lead, arsenic, antimony, and PAHs.

6.1.3 Ecological Risks

The Former USBP Firing Range is situated within the Arizona Upland region of the Sonora Desert. This area is characterized by high elevation and rugged terrain, containing diverse habitats for a variety of desert and mountain-dwelling species. The site is located within a valley of the Arizona Upland region. The acreage surrounding the site contains multiple arroyos which serve as dry riparian habitats. Because the Former USBP Firing Range property is unfenced, it is possible that local wildlife (including endangered species) from these habitats could enter the site. There are no known sensitive or threatened habitat areas in close proximity to the Former USBP Firing Range. (Arizona-Sonora Desert Museum, 2011).

6.2 BASIS FOR RESPONSE ACTION

The need for executing a CERCLA RA at Former USBP Firing Range is driven by the potential for receptor exposure to CoCs via the direct contact pathway. Based on the following RI results, the selected remedy will focus on CoC human and ecological risks:

- Evidence of the presence of small arms lead bullet fragments, clay pigeon target remains, shot gun pellets and shot gun wadding from border patrol target practice was identified;
- Evidence of small arms CoCs in the soil (lead, antimony, arsenic and PAHs) from the physical and chemical degradation of small arms firing range remains;
- There is a moderate potential for off-site migration of small arms CoCs and very low potential of small arms CoCs below 4 feet;

- The exposure pathway for potential receptors is direct contact on site;
- The data from previous investigations are sufficient to delineate the boundary for small arms remains and small arms CoCs in the soils at the Former USBP Firing Range;
- Data derived from the RI are sufficient to delineate the vertical and horizontal extent of potential of small arms remains and small arms CoCs in the soils;
- Small arms CoCs found in the soils indicate a potential chemical risk to human and ecological receptors if no remedial action occurs;
- There are no known plans to redevelop the Former USBP Firing Range within the next 5 years.

7.0 REMEDIAL ACTION OBJECTIVE

Based on the RI results, the RAO focuses on small arms remains and CoC safety hazards. The RAO for chemical contamination is based on the soil sampling and analysis results obtained in the RI. As previously discussed in this Decision Document, the small arms firing range remains and CoC exposure pathway for potential receptors is direct contact. Based on the risk assessment and the RI/FS Guidance (USEPA, 1988), the RAO shown in the text box to the right was developed for the protection of human health and the environment. This objective is considered to be the basic requirement for the selected RA alternative for the Former USBP Firing Range. This RAO addresses current and anticipated future land uses, safety concerns related to the small arms remains and CoCs that are present at the site. The RAO eliminates the direct contact exposure pathway for potential human and ecological receptors at the Former USBP Firing Range. The objective of the selected remedy is to achieve this RAO by performing remediation and sampling to ensure that all grids on the site are free of small arms remains and CoCs. For more details about the selected remedy see section 11.0 of this Decision Document. The RAO also meets regulatory requirements of Section 121(d)(l) of CERCLA which states that RAs on CERCLA sites must attain (or the Decision Document must justify the waiver of) any ARARs, which include environmental regulations, standards, criteria, or limitations promulgated under federal or more stringent state laws.

Remedial Action Objective:

Remove the potential for receptors to come in direct contact with small arms remains and CoCs at the Former USBP Firing Range.

8.0 DESCRIPTION OF ALTERNATIVES

Full details regarding the evaluation of remedial methods and approaches for the Former USBP Firing Range may be found in the RI/FS (USACE, 2014). The process for selecting a cleanup remedy began with a review and screening of the seven general response actions: no action, removal, cap and grade, stabilization, sieve, sort and removal, solidification and biodegradation of small arms remains and CoCs.

The six remedial alternatives retained for further evaluation are divided into two classes of response:

8.1 No Action

Alternative 1. No U.S. Customs and Border Protection (CBP) Action

This alternative assumes no further action would be taken to address potential small arms remains and CoCs hazards. This alternative would not prevent migration of the CoCs vertically and horizontally or prevent direct human contact currently and in the future. This alternative is provided as a baseline for comparison to the other remedial alternatives, as required under CERCLA and the National Contingency Plan.

8.2 Site Specific Action

Alternative 2 Grade and Cap

The site will be graded utilizing the existing on site soils from the berm and other soil components of the firing range. An impervious cap of clean fill will be added and final grading completed to direct the surface runoff off and away from the capped area. The final step is to add top soil and seed with native vegetation.

Alternative 3. Soil Stabilization

Stabilization, or chemical treatment as it is often referred to, adds reagents to the contaminated soils to form less soluble compounds while controlling pH to produce a range of minimum solubility. Because stable and insoluble to less soluble compounds are formed, stabilized waste is considered to protect groundwater, reduce leaching and to some degree control the effects of leaching.

If Apatite II or other proven stabilization reagents are used, no treatability test will be required.

Alternative 4. Off-Site Landfill

An approach for the closure of firing ranges is to excavate the soils above USEPA soil screening levels, loaded onto trucks with end dumps, and transport the soil to an appropriate landfill. The contractor/owner would determine whether the soil meets the criteria to be classified as Resource Conservation and Recovery Act (RCRA) hazardous waste or not so as to determine the appropriate landfill(s). This determination is made by testing for appropriate constituents using the TCLP method.

Alternative 5. Soil Solidification

Solidification generally refers to adding pozzolanic material to a waste to reduce permeability and surface area. These pozzolans are usually alkaline materials, which can often increase the solubility of metals in many disposal environments. The most common form of solidification is a cement process. This technology involves the addition of CoC soil to cement or a cement-based mixture, with the goal of limiting solubility and mobility of the CoC contaminated materials. Solidification may be implemented *in situ* (in place mixing) or *ex situ* by excavating the materials, machine-mixing them with a cement-based agent, and depositing the solidified mass in a designated area on-site. The goal of this process is to limit the spread of contaminated material via leaching. The end product resulting from the solidification process is a monolithic block of waste with high structural integrity. Types of solidifying/stabilizing agents include Portland cement, gypsum, modified sulfur cement (consisting of elemental sulfur and hydrocarbon polymers), and grout (consisting of cement and other dry materials such as acceptable fly ash or blast furnace slag). Processes utilizing modified sulfur cement are typically performed ex situ.

If Portland cement is used as the solidification material, no treatability test will be required.

Alternative 6. Sieve, Sort and Removal

Sieve, Sort and Removal consolidates waste materials for recycling and reduces the CoC mass in the soil. The physical-sizing process uses sequential wet-screening steps, the first of which is deagglomeration (breaking up soil clumps by mechanical means). Wet screening provides dust-free operation and sharp particle-size fraction cuts. For each screening step, “plus” and “minus” fractions cuts are generated. The goal of wet screening is to partition the particulate metal contamination into narrow-size fraction cuts to facilitate effective gravity separation.

For free-flowing sandy soils with little oversize material, other than spent projectiles, simple dry screening may be sufficient to recover the bullets in a condition suitable for recycling. The practical lower limit for screen size is ¼-inch.

For soils containing measurable clay content dry screening is generally not feasible because:

- Significant volumes of soil will accumulate in the screen reject pile
- Plus-size soil fraction increases because of agglomeration of clay with CoC

9.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

9.1 EVALUATION CRITERIA

The six potential remedial alternatives retained for further evaluation for the Former USBP Firing Range were evaluated and compared to the nine criteria (Figure 7) specified in the NCP.

Figure 7
USEPA Evaluation Criteria

Threshold Criteria

Overall Protectiveness of Human Health and the Environment - considers whether the remedy has eliminated unacceptable risk to public health and the environment.

Compliance with ARARs - must meet cleanup criteria, standards of controls, or other requirements established through federal and state environmental statutes, regulations, and other pertinent requirements or a waiver must be justified.

Balancing Criteria

Long-term Effectiveness and Permanence - the ability to maintain protection of human health and the environment over time.

Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment - use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

Short-term Effectiveness - the length of time needed to implement an alternative and the risks posed to workers, residents, and the environment during implementation.

Implementability - the technical and administrative feasibility to implement the alternative, including factors such as the relative availability of goods and services.

Cost - estimated capital, operating, and maintenance costs, as well as present worth cost.

Modifying Criteria

State/Support Agency Acceptance - considers whether the state agrees with the USACE analyses and recommendation based on the RI/FS and Proposed Plan.

Community Acceptance - considers whether the local community agrees with the USACE analyses and preferred alternative. Public comments on the Proposed Plan are an important indicator of community acceptance.

9.2 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Section 121(d)(l) of CERCLA requires that remedial actions at CERCLA sites attain (or the Decision Document must justify the waiver of) any ARARs, which are cleanup criteria, standards of control, or other requirements established through environmental regulations, standards, criteria, or limitations promulgated under federal or more stringent state laws. An ARAR may be either applicable, or relevant and appropriate; regardless of whether it is applicable or relevant and appropriate, only the substantive requirements of ARARs must be met.

ARAR identification considers a number of site-specific factors: CoCs, physical characteristics, location and potential RAs. ARARs are generally divided into three categories: chemical-specific, location-specific, and action-specific:

- Chemical-Specific ARARs - For the Former USBP Firing Range, the potential medium of concern is soil. Chemical contamination was detected above USEPA RSSLs for soil, indicating a chemical hazard to human health or the environment exists at the Former USBP Firing Range. Therefore there is a requirement to establish cleanup levels and to evaluate remedial alternatives for chemical contamination.

- Location-Specific ARARs - These requirements govern activities in certain environmentally sensitive areas. This class of ARAR is triggered by the particular location and the proposed remedial activity at a site. No potential location-specific ARARs have been identified for the Former USBP Firing Range.

- Action-Specific ARARs - These ARARs define acceptable treatment and disposal procedures for hazardous substances. Hazardous waste will be generated due to remedial actions at the Former USBP Firing Range. The remedial alternatives will comply with the requirements of:

  - 40 CFR Part 262, Standards Applicable to Generators of Hazardous Waste (USEPA, 1996)

  - 40 CFR Part 266, Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities (USEPA, 1993)

40 CFR Parts 262 and 266 specify requirements for waste generators to meet if contaminated soils that require special deposal are generated during remediation.

9.3 ANALYSIS OF ALTERNATIVES

9.3.1 The Threshold and Balancing Criteria

The detailed analysis of alternatives may be thought of as proceeding in two steps: 1) an evaluation of each alternative relative to the first seven USEPA criteria, and 2) evaluation of the remedial alternatives relative to each other, based on their ability to achieve the evaluation criteria. A detailed comparison of each alternative to the first seven criteria may be found in the RI/FS Report (USACE, 2014).

During the detailed analysis, the alternatives are refined, as appropriate, and analyzed with respect to the evaluation criteria. The detailed analysis is conducted so that decision makers are provided with sufficient information to compare alternatives with respect to the evaluation criteria and to select an appropriate remedy.

The detailed analysis of alternatives consists of the analysis and presentation of the relevant information needed to allow decision makers to select a site remedy. The results of this detailed analysis of alternatives are used to compare the alternatives and identify the key tradeoffs among them. This approach to analyzing alternatives is designed to provide decision makers with sufficient information to adequately compare the alternatives, select an appropriate remedy for a site, and demonstrate satisfaction of the CERCLA requirements.

The chemical constituent hazard assessment for the Former USBP Firing Range was conducted in accordance with guidance provided by the USEPA's threshold criteria of "Overall Protection of Human Health and the Environment" and compliance with ARARs. This represents the baseline against which each alternative was compared in terms of reducing the risk posed by the presence of CoCs above USEPA RSSLs.

The RI/FS Report (USACE, 2014) provides a comprehensive analysis of the remedial alternatives based on their ability to achieve the first seven evaluation criteria specified in the USEPA RI/FS Guidance (USEPA, 1988).

9.3.2 The Modifying Criteria

State Agency Acceptance considers whether the state agrees with the USACE analyses and recommendation based on the RI/FS. The ADEQ has reviewed the RI/FS and their comments have been incorporated into the final document.

Community acceptance evaluates issues and concerns that the public may have regarding each alternative. The community has low acceptance for alternatives that do not involve surface and subsurface removal and gives a high acceptance and gives a high acceptance rating to Alternative 4 that removes the CoCs.

The final three retained remedial technologies exclusive of "No Further Action" were selected based on the overall effectiveness, implementability and cost. A combination of various technologies has provided improved results based on the synergism between technologies. Therefore, various combinations of the selected technologies were used to develop the alternatives in Table 6. No further Action is still retained as a baseline for comparison to the remedial alternatives.

Table 6
Summary of Remedial Alternative Analysis

Evaluation Criteria	**Alternative 1** No Further Action	**Alternative 2** Limited Off-Site Landfilling, Soil Stabilization and Cap and Grade	**Alternative 3** Sieving, Soil Stabilization, and Cap and Grade	**Alternative 4** Off-Site Landfill
Overall Protectiveness of Human Health and the Environment	□	◘	◘	■
Compliance with ARARs	NA	Mod	Mod	High
Long-term Effectiveness and Permanence	□	◘	◘	■
Reduction of Toxicity, Mobility and Volume Through Treatment	□	◘	◘	■
Short-term Effectiveness	□	■	■	■
Implementability	■	■	■	■
Cost (Present-Worth)	$0	1,418,000	$584,360	$3,766,634
State/suppport Agency Acceptance	Low	Low	Mod	High
Community Acceptance	Low	Low	Mod	High

Ranking:
■ High ability to meet criteria
◘ Moderate ability to meet the criteria
□ Does not meet criteria
<< - Low cost to implement compared to other criteria
ARARs = Applicable or Relevant and Appropriate Requirements
NA = Not Applicable
ft = feet

10.0 PRINCIPAL CHEMICAL CONSTITUENT THREATS

The NCP establishes an expectation that a remedy will, to the extent practicable, utilize treatment that reduces the toxicity, mobility, or volume of the principal threat. Principal threats are those source materials considered to be highly toxic or highly mobile which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. Based on the RI/FS, the principal threat at the Former USBP Firing Range consists of direct contact with CoCs at the surface and in subsurface soils. In accordance with the NCP, the selected remedy will address the principal CoCs (lead, arsenic, antimony and PAH's) threats.

11.0 SELECTED REMEDY-OFF SITE LANDFILL

11.1 SUMMARY OF REMEDIAL ACTIVITIES

This alternative will meet the RAO for the Former USBP Firing Range by removing the potential for receptors to come indirect contact with the site CoCs above the USEPA RSSLs. Thus, Alternative 4 would be protective of human health and the environment for the future receptors. This alternative would have only minor impacts to the natural resources on the site since vegetation trimming and major soil disturbance would be only required in areas area with CoC concentrations are above USEPA RSSLs..

Alternative 4 will require a low to moderate level of effort to implement from a technical perspective, because it involves soil management, excavation, stockpiling, sampling and analysis, loading, hauling, grading and vegetation replacement. The services, equipment, and skilled workers needed to implement this alternative are readily available.

11.2 DETAILED DESCRIPTION

The selected remedy for the Former USBP Firing Range consists of surface and subsurface soil remediation to achieve a final determination of no further remedial action. Surface and subsurface remediation will involve removing all CoCs down to the depth of detection of CoCs above RSSLs, which is expected to not be below the depth to which any evidence of migration has been found in previous studies (42 inches). Work plans will be prepared providing the detailed approach to conducting excavation, removal, and disposal of CoCs, regulatory requirements/agreements, safety and health procedures, contingency plans; and guidance references for implementing the remedial design and remedial action (RD/RA).

Phase 1: The first phase will focus on the removal of existing structures and concrete pads and hauling the material to a construction landfill, followed by preparing an area for stockpiling of excavated soils.

Phase 2: The second phase will focus on excavating the CoCs in soils that exceed residential USEPA RSSLs and stockpiling these soils. Confirmatory samples will then be taken from the excavation areas and stockpiled soils for analysis to determine that all CoC in soils exceeding residential standard have been excavated and stockpiled and that all soil stockpiles are eligible for transport to an appropriate landfill.

Phase 3: The third phase will focus on the transportation of all CoC soils to the appropriate landfill, followed by grading as necessary, adding addition fill or top soil and revegetating the Former USBP Firing Range site.

11.3 OVERVIEW OF THE RAO AND PERFORMANCE STANDARDS

As previously discussed in this Decision Document, the CoC exposure pathway for potential receptors is direct contact. The RAO developed for the Former USBP Firing Range prevents receptors coming into contact with CoCs that remain at the Former USBP Firing Range, thus accomplishing the basic requirement for the selected remedy. The RAO addresses current and anticipated future land uses, safety concerns related to CoCs potentially present at the site, and the hazards evaluated the CoCs at the site. It eliminates the direct contact exposure pathway for potential human and ecological receptors at the Former USBP Firing Range by providing a high degree of confidence that no CoCs remain at the site at depths indicated by the CFTM (up

to 42 inches below ground surface). The RAO meet the primary goal of the CERCLA program which is to take those actions necessary to protect human health and the environment from the hazards associated with CoCs through the implementation of effective, legally compliant, and cost-effective response actions.

11.4 ANTICIPATED OUTCOMES OF SELECTED REMEDY

The site-specific closeout goal is to make the land safe for continued use by its owners. The overall Project Closeout Statement developed by the CBP is: "Implemented remedies are protective of human health and the environment." The selected remedy will result in eliminating safety risks to human and ecological receptors posed by CoCs within the Former USBP Firing Range boundaries. In particular, the RA will mitigate, with adequate confidence, hazards that could be encountered during future land development activities and future land use scenarios by ensuring that the site area is free of site specific CoCs above the USEPA residential levels. Further, it is expected that the RA will make available approximately 0.5 acres of land for commercial use development in the future. Development of the property is projected to produce economic benefits (e.g. increased tax revenues, higher property value, jobs, etc.) for the local population and municipalities.

11.5 FINAL CLEANUP LEVELS

The exposure pathway for potential receptors and chemical constituents in soils is direct contact. A qualitative risk assessment was conducted for the Former USBP Firing Range using USEPA guidance (USEPA, 2000 and 2003) to provide a comparative assessment of potential safety hazards to human receptors at the site under current conditions and the conditions anticipated to result from implementation of the remedial alternatives evaluated. Based upon the risk assessment and the RI/FS guidance, the selected remedy was developed for the protection of human health and environment by preventing the potential for human and ecological receptors to come in direct contact with chemical constituents. The RA will support the statement that the soils are free of the contaminants of concern produced by the activities of the Former USBP Firing Range.

11.6 COST ESTIMATE FOR THE SELECTED REMEDY

Capital and annual costs were estimated for the selected remedy based on quotes for skilled labor, materials, and equipment to implement Alternative 4. These cost estimates are intended to have an accuracy of +50% or -30 %. The estimated present value cost to complete the selected remedy (Alternative 4) is $3,766.634 (Table 7).

Table 7
Cost Breakdown for Selected Remedy

Action Item Description	Estimated Cost	Assumptions
Former USBP Firing Range Chemical Constituent Remediation Costs		
Site Visit and Project Management	$29,304	Gather information required to assemble an acceptable and executable Work Plan
Draft Remedial Action Work Plan, UFP-QAPP, and SSHP	$24,450	No change in remediated area
Final Remedial Action Work Plan, UFP-QAPP, and SSHP	$12,610	No change in remediated area
Excavation, stock piling, land filling, hauling/transportation, grading and vegetation	$3,644,717	6,900 Cubic yards of soil estimated to be excavated and backfill as necessary
Confirmatory sampling and analysis of excavated area and soil stock piles	$1,150	After confirmatory soil sampling no further soil excavation will be done.
Data Validation	$5,735	After Data Validation no further soil samples will be collected.
Draft Remedial Action Report	$25,598	Moderate complexity report
Draft Final Remedial Action Report	$14,549	Moderate complexity report
Final Remedial Action Report	$8,521	Moderate complexity report
Total Capital Costs	**$3,766,634**	

12.0 STATUTORY DETERMINATIONS

The selected remedy satisfies the requirements under Section 121 of CERCLA and the NCP. Because this remedy will not result in hazardous substance, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a five-year review will not be required for this remedial action.

The following section discusses how the selected remedy meets these requirements.

12.1 PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT

The selected remedy is protective of human health and the environment. The current and future exposure pathway is direct contact with CoCs by human and ecological receptors. The selected remedy, by identifying and removing CoCs, will reduce or eliminate the exposure pathway and result in mitigating the risk for exposed receptors at the Former USBP Firing Range.

This remedy uses permanent solutions and treatment technologies to the maximum extent practicable. Chemical constituents were identified at concentrations above background or existing regulatory limits. Thus, chemical-specific ARARs are identified for the site. No environmentally sensitive areas are located within the Former USBP Firing Range boundaries. Therefore, no location-specific ARARs have been identified for the Former USPB Firing Range. There are action-specific ARARs relevant at the site. The generation of hazardous waste due to remedial actions at the Former USBP Firing Range is anticipated. If hazardous waste is encountered or generated at the site, all activities will comply with the requirements of:

- 40 CFR Part 262, *Standards Applicable to Generators of Hazardous Waste*
- 40 CFR Part 266, *Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities*.

40 CFR Parts 262 and 266 specify requirements for waste generators to consider if any contaminated soils are generated during remediation that require disposal.

Cost Effectiveness

The selected remedy represents the most cost-effective alternative that will fully meet the RAO performance standards and fully comply with the ARARs identified for the Former USBP Firing Range site. The selected remedy provides the optimum long-term permanence and risk protection by identifying and removing, to the maximum extent possible with current technology, CoCs that present a safety risk to human and ecological receptors. CoC remediation activities could be completed in one field season, reducing the need for additional site visits and mobilization costs. This remedial alternative provides a good trade-off of cost versus long-term effectiveness to protect future workers conducting intrusive activities and future land tenants.

12.2 UTILIZES PERMANENT SOLUTIONS OR RESOURCE RECOVERY TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE

CBP has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be used in a cost effective manner at the Former USBP Firing Range. Chemical constituent removal or destruction is generally considered to be the most effective method of protecting the public from exposure to potential

chemical constituents; if chemical constituents present at the site are removed, they cannot present a hazard to the public.

12.3 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

The selected remedy involves identification, recovery, removal and transportation and disposal to an approved landfill of chemical constituents found in contaminated soil within the Former USBP Firing Range. Off-site removal, transport and disposal will be supervised by authorized and qualified personnel who will inspect and document all soils containing chemical constituents as Material Documented prior to transporting for off-site resource recovery.

12.4 STATE ACCEPTANCE

This criterion considers whether the State of Arizona agrees with, opposes, or has no comment on the selected remedy. ADEQ has participated in discussions and concurs with the selected alternative.

12.5 COMMUNITY ACCEPTANCE

This criterion considers whether the local community agrees with the selected remedy. Comments received during the Public Comment Period are an important indicator of community acceptance and have been reviewed and incorporated where appropriate. Based on this input, community acceptance of the selected alternative is considered high (Table 7).

PART 3: RESPONSIVENESS SUMMARY

This section provides a summary of the public comments regarding the Proposed Plan for the remedial action at the Former USBP Firing Range and the CBP responses to comments. CBP did not receive written or verbal comments that altered the planned RD/RA decision-making process.

STAKEHOLDER AND LEAD AGENCY RESPONSES

CBP reviewed the Proposed Plan and provided comments concerning the selected remedy for the Former USBP Firing Range. The ADEQ has reviewed the CBP decision process. Both CBP and the ADEQ concur with the selected alternative.

TECHNICAL AND LEGAL ISSUES

No technical or legal issues have been identified.

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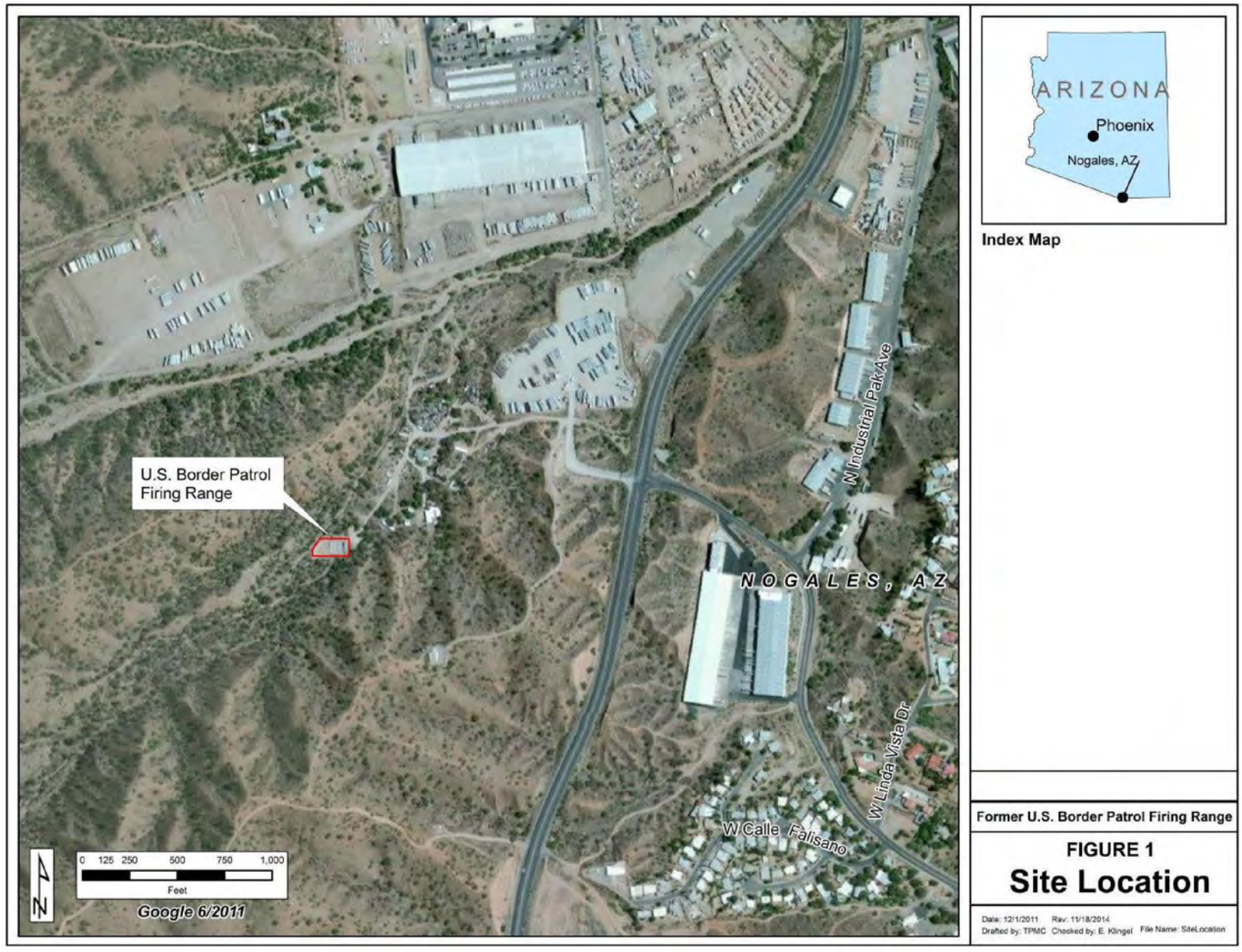
FIGURES


U.S. Border Patrol
Firing Range
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NOGALES, AZ
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0 125 250 500 750 1,000
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ARIZONA
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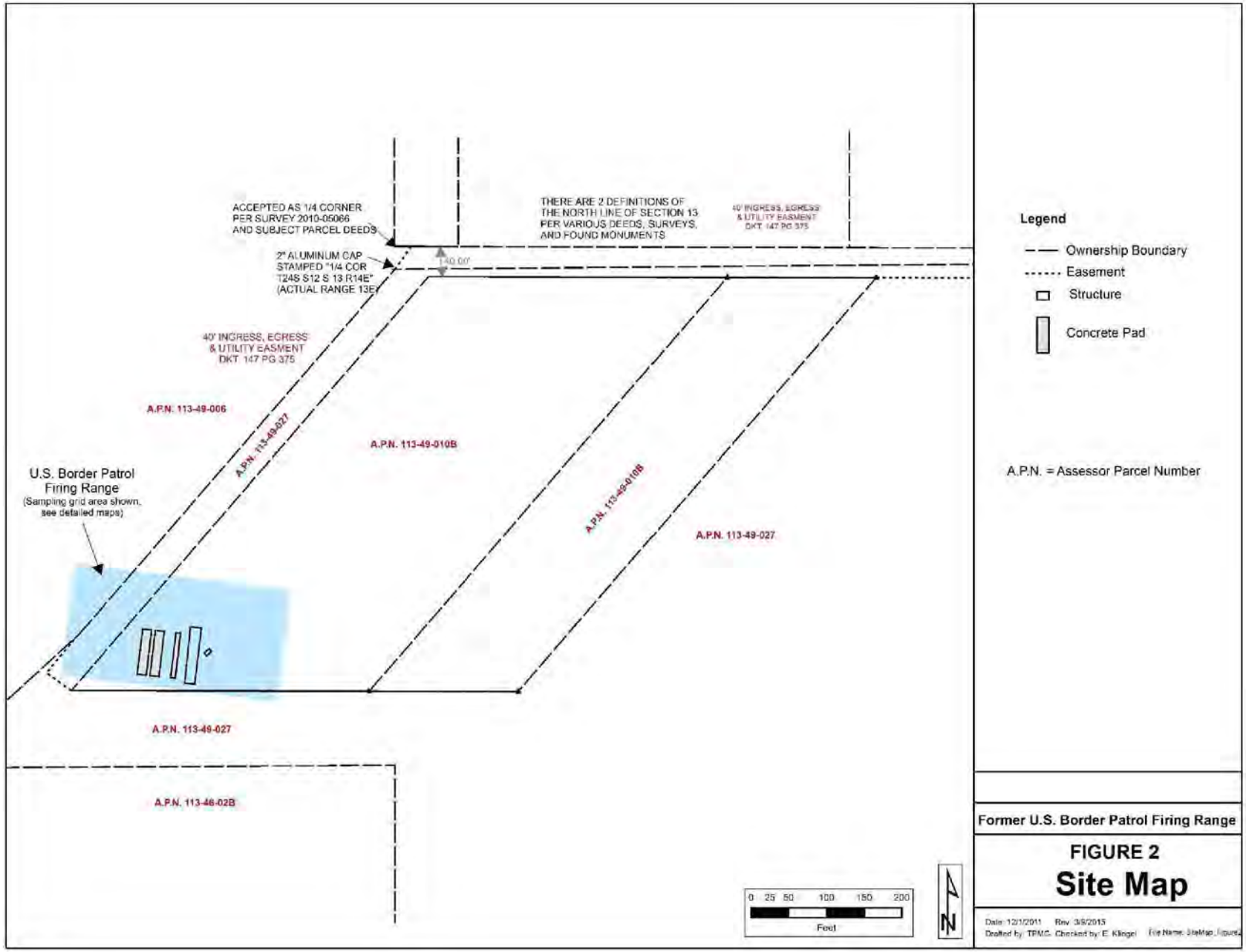
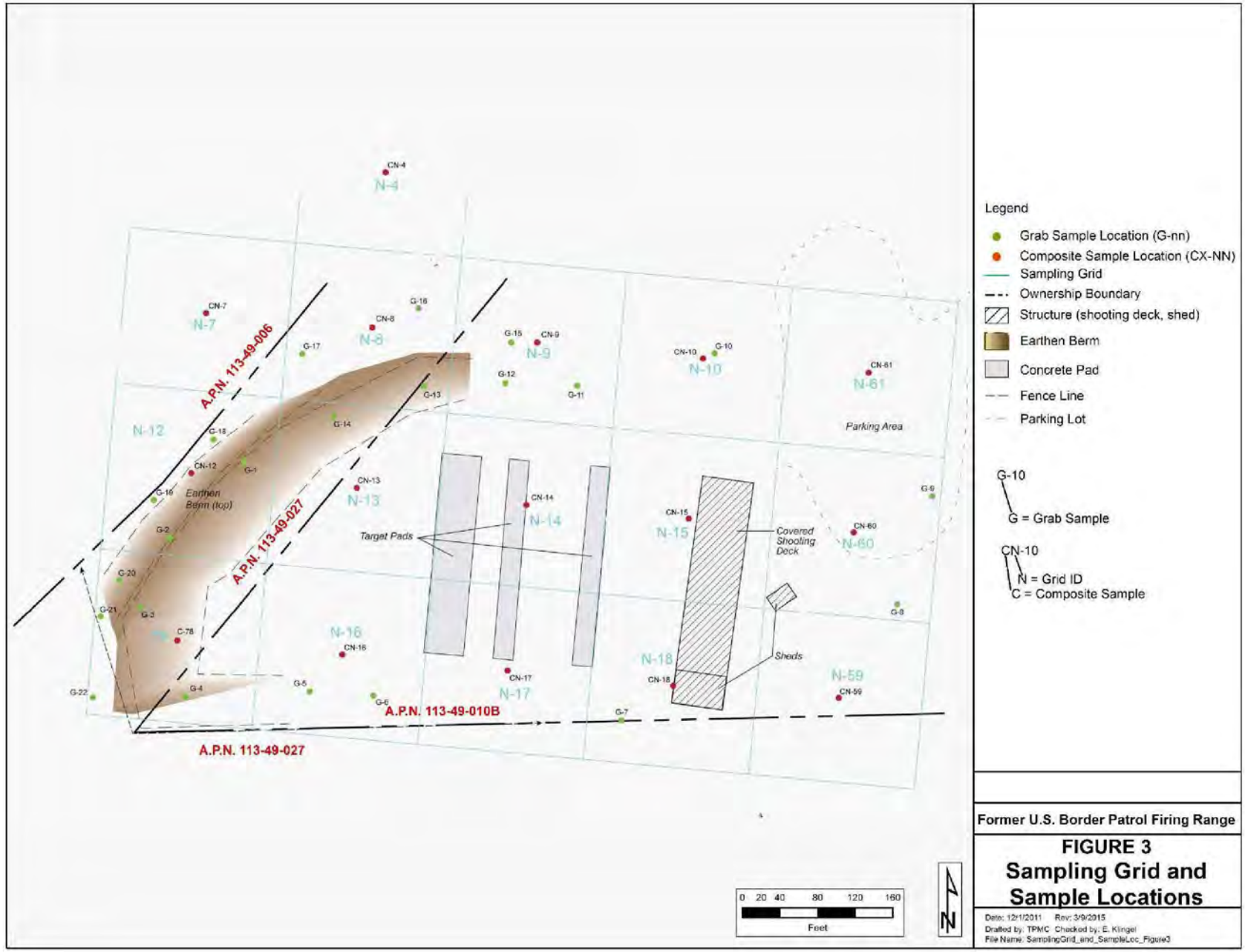
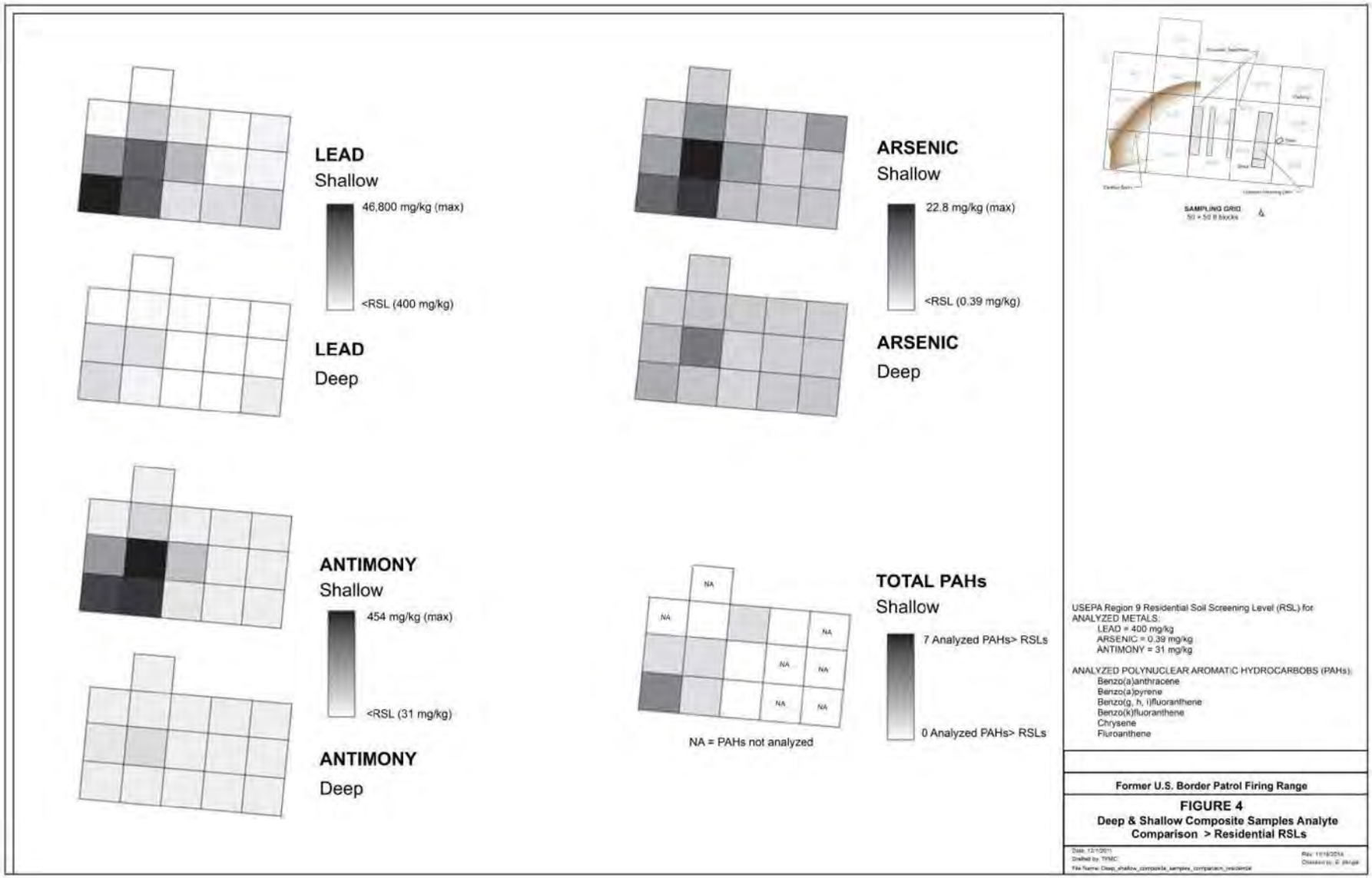
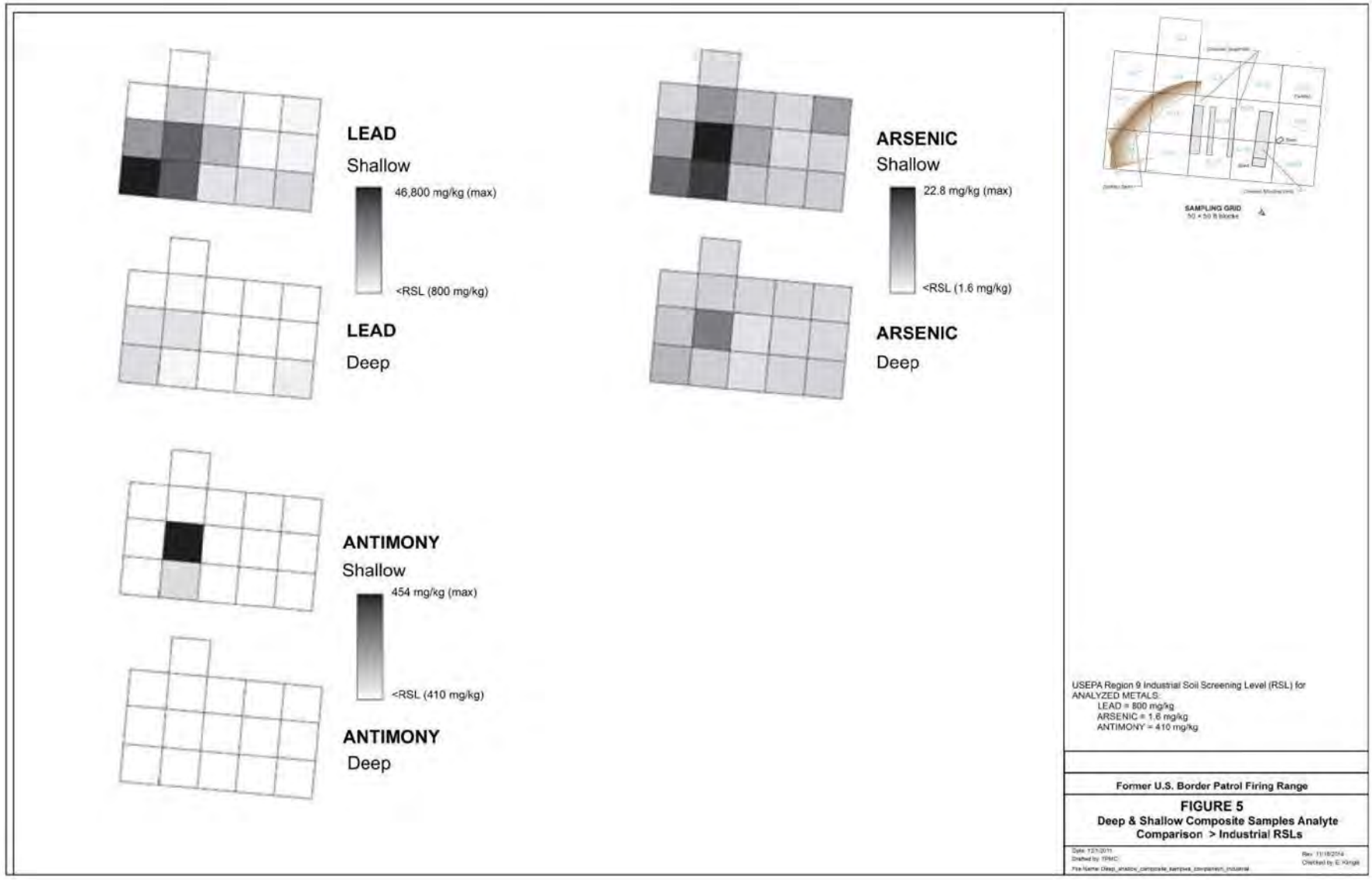
Index Map
Former U.S. Border Patrol Firing Range
FIGURE 1
Site Location
Date: 12/1/2011 Rev: 11/18/2014
Drafted by: TPMC Checked by: E. Klingel File Name: SiteLocation


ACCEPTED AS 1/4 CORNER
PER SURVEY 2010-05066
AND SUBJECT PARCEL DEEDS
2" ALUMINUM CAP
STAMPED "1/4 COR
T24S S12 S 13 R14E"
(ACTUAL RANGE 13E)
140.00'
THERE ARE 2 DEFINITIONS OF
THE NORTH LINE OF SECTION 13
PER VARIOUS DEEDS, SURVEYS,
AND FOUND MONUMENTS
40' INGRESS, EGRESS
& UTILITY EASEMENT
DKT 147 PG 375
40' INGRESS, EGRESS
& UTILITY EASEMENT
DKT 147 PG 375
A.P.N. 113-49-006
A.P.N. 113-49-027
A.P.N. 113-49-010B
A.P.N. 113-49-010B
A.P.N. 113-49-027
U.S. Border Patrol
Firing Range
(Sampling grid area shown,
see detailed maps)
A.P.N. 113-49-027
A.P.N. 113-46-02B
0 25 50 100 150 200
Feet
N
Legend
Ownership Boundary
Easement
Structure
Concrete Pad
A.P.N. = Assessor Parcel Number
Former U.S. Border Patrol Firing Range
FIGURE 2
Site Map
Date: 12/1/2011 Rev: 3/5/2015
Drafted by: TPMC Checked by: E. Klingel File Name: SiteMap_figure2


Legend
Grab Sample Location (G-nn)
Composite Sample Location (CX-NN)
Sampling Grid
Ownership Boundary
Structure (shooting deck, shed)
Earthen Berm
Concrete Pad
Fence Line
Parking Lot
G-10
G = Grab Sample
CN-10
N = Grid ID
C = Composite Sample
A.P.N. 113-49-006
A.P.N. 113-49-027
A.P.N. 113-49-010B
Earthen Berm (top)
Target Pads
Covered Shooting Deck
Sheds
Parking Area
N-4
N-7
N-8
N-9
N-10
N-61
N-12
N-13
N-14
N-15
N-60
N-16
N-17
N-18
N-59
0 20 40 80 120 160
Feet
Former U.S. Border Patrol Firing Range
FIGURE 3
Sampling Grid and Sample Locations
Date: 12/1/2011 Rev: 3/9/2015
Drafted by: TPMC Checked by: E. Klingel
File Name: SamplingGrid_and_SampleLoc_Figure3

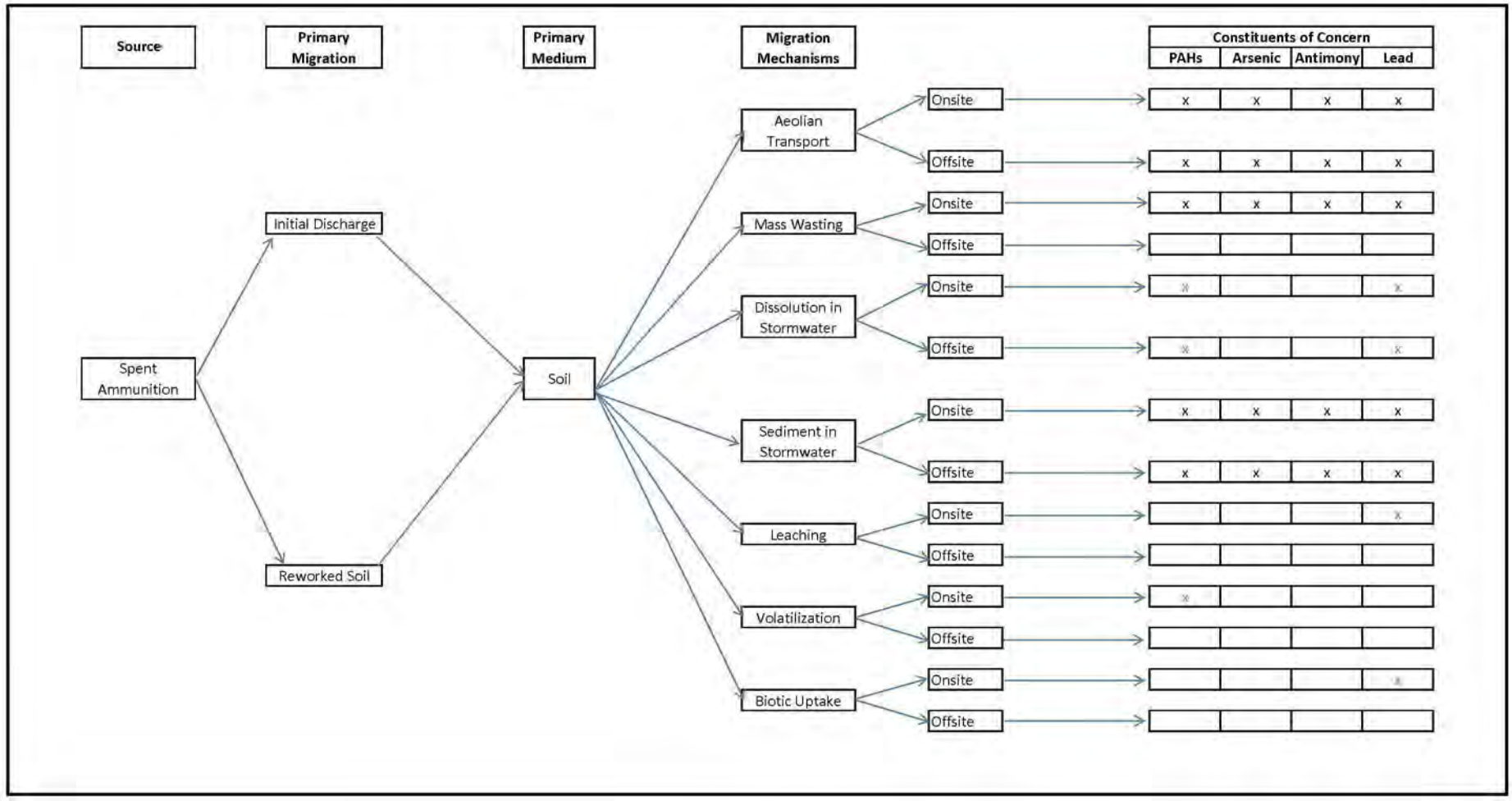

LEAD
Shallow
46,800 mg/kg (max)
<RSL (400 mg/kg)
LEAD
Deep
ARSENIC
Shallow
22.8 mg/kg (max)
<RSL (0.39 mg/kg)
ARSENIC
Deep
ANTIMONY
Shallow
454 mg/kg (max)
<RSL (31 mg/kg)
ANTIMONY
Deep
NA
NA = PAHs not analyzed
TOTAL PAHs
Shallow
7 Analyzed PAHs> RSLs
0 Analyzed PAHs> RSLs
SAMPLING GRID
USEPA Region 9 Residential Soil Screening Level (RSL) for
ANALYZED METALS:
LEAD = 400 mg/kg
ARSENIC = 0.39 mg/kg
ANTIMONY = 31 mg/kg
ANALYZED POLYNUCLEAR AROMATIC HYDROCARBOBS (PAHs):
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(g, h, i)fluoranthene
Benzo(k)fluoranthene
Chrysene
Fluroanthene
Former U.S. Border Patrol Firing Range
FIGURE 4
Deep & Shallow Composite Samples Analyte Comparison > Residential RSLs

CBP14_00061


LEAD
Shallow
46,800 mg/kg (max)
<RSL (800 mg/kg)
LEAD
Deep
ARSENIC
Shallow
22.8 mg/kg (max)
<RSL (1.6 mg/kg)
ARSENIC
Deep
ANTIMONY
Shallow
454 mg/kg (max)
<RSL (410 mg/kg)
ANTIMONY
Deep
SAMPLING GRID
USEPA Region 9 Industrial Soil Screening Level (RSL) for ANALYZED METALS:
LEAD = 800 mg/kg
ARSENIC = 1.6 mg/kg
ANTIMONY = 410 mg/kg
Former U.S. Border Patrol Firing Range
FIGURE 5
Deep & Shallow Composite Samples Analyte Comparison > Industrial RSLs

CBP14_00062

Figure 6
Conceptual Fate and Transport Model
Former U.S. Border Patrol Firing Range
Nogales, Arizona



Notes:

x - Potentially Significant Transport Mechanisms for COC
x - Potential but Not Significant Transport Mechanisms for COC
Blank - Insignficant Transport Mechanism for COC

TABLES

Table 1
Sample Analytical, Result Detections and Human health Risks Screening Shallow Composite and Grab Soil Samples

Composite Soil Samples mg/kg, 0 to 6 Inches Below Ground Surface

Constituent	USEPA RSSL mg/kg	USEPA ISSL mg/kg	ADEQ RSRLs mg/kg	ADEQ non-RSRLs mg/kg	Accut. DL mg/kg	Accut. RL mg/kg	BPN-4s	BPN-7s	BPN-8s	BPN-9s	BPN-10s	BPN-12s	BPN-13s	BPN-14s	BPN-15s	BPN-16s	BPDN-16s	BPN-17s	BPN-18s	BPN-59s	BPN-60s	BPN-61s	BP-78s
Antimony	31	410	31	410	0.07	2	<1.7	4.6	[redacted]	27.5	5.9	[redacted]	[redacted]	[redacted]	11.2	[redacted]	[redacted]	[redacted]	19.7	27.9	7.1	25.8	[redacted]
Arsenic	0.39	1.6	10	10	0.07	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Lead	400	800	400	800	0.054	2	198	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Benzo(a)anthracene	0.15	2.1	0.69	21	0.023	0.17	NA	NA	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	NA	NA	NA	NA	[redacted]
Benzo(a)pyrene	0.015	0.21	0.069	2.1	0.017	0.3	NA	NA	ND	[redacted]	ND	[redacted]	ND	ND	NA	ND	ND	ND	NA	NA	NA	NA	[redacted]
Benzo(g,h,i)perylene	NS	NS	NS	NS	0.05	0.17	NA	NA	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	NA	NA	NA	NA	0.267
Benzo(b)fluoranthene	0.15	0.21	0.69	21	0.02	0.17	NA	NA	ND	0.0345	ND	ND	[redacted]	ND	NA	[redacted]	ND	ND	NA	NA	NA	NA	[redacted]
Chrysene	15	210	68	2,000	0.033	0.17	NA	NA	ND	0.0529	ND	0.226	2.14	ND	NA	1.180	1.780	ND	NA	NA	NA	NA	0.359
Fluoranthene	2,300	22,000	2,300	22,000	0.033	0.17	NA	NA	ND	ND	ND	ND	1.780	ND	NA	0.765	ND	ND	NA	NA	NA	NA	ND
Benzo(k)fluoranthene	1.5	21	6.9	210	0.04	0.17	NA	NA	ND	ND	ND	ND	1.240	ND	NA	ND	ND	ND	NA	NA	NA	NA	ND
TCLP Lead	N/A	N/A	N/A	N/A	N/A	1.3	NA	NA	NA	NA	NA	NA	NA	511	NA	NA	NA	NA	NA	NA	NA	NA	NA
TCLP Arsenic	N/A	N/A	N/A	N/A	N/A	0.25	NA	NA	NA	NA	NA	NA	NA	<0.25	NA	NA	NA	NA	NA	NA	NA	NA	NA

Grab Soil Samples mg/kg, 0 to 6 Inches Below Ground Surface

	USEPA RSSL mg/kg	USEPA ISSL mg/kg	ADEQ RSRLs mg/kg	ADEQ non-RSRLs mg/kg	Accut. DL mg/kg	Accut. RL mg/kg	BPG-1s	BPG-2s	BPG-3s	BPDG-3s	BPG-4s	BPG-5s	BPG-6s	BPG-7s	BPG-8s	BPG-9s	BPG-10s	BPG-11s	BPG-12s	BPG-13s	BPG-14s	BPG-15s	BPG-16s	BPG-17s	BPG-18s	BPG-19s	BPDG-19s	BPG-20s	BPG-21s	BPG-22s
Antimony	31	410	31	410	0.07	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	29.2	4.2	10	16	2	5.4	7.7	[redacted]	[redacted]	10.9	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Arsenic	0.39	1.6	10	10	0.07	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Lead	400	800	400	800	0.054	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Benzo(a)anthracene	0.15	2.1	0.69	21	0.023	0.17	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	[redacted]	NA	NA
Benzo(a)pyrene	0.015	0.21	0.069	2.1	0.017	0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	[redacted]	NA	NA
Benzo(g,h,i)perylene	NS	NS	NS	NS	0.05	0.17	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.590	NA	NA
Benzo(b)fluoranthene	0.15	0.21	0.69	21	0.02	0.17	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	[redacted]	NA	NA
Chrysene	15	210	68	2,000	0.033	0.17	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.844	NA	NA
Fluoranthene	2300	22,000	2,300	22,000	0.033	0.17	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	NA
TCLP Lead	N/A	N/A	N/A	N/A	N/A	1.3	NA	NA	1,930	NA	NA	NA	NA	3.4	9.2	NA	NA	NA	NA	NA	NA	NA	158	NA	NA	NA	NA	NA	NA
TCLP Arsenic	N/A	N/A	N/A	N/A	N/A	0.25	NA	NA	0.27	NA	NA	NA	NA	<0.25	<0.25	NA	NA	NA	NA	NA	NA	NA	<0.25	NA	NA	NA	NA	NA	NA

RSSL USEPA Region 9 Residential Soil Screening Level
[redacted] Analysis Greater Than USEPA Region 9 Residential Soil Screening Levels 2011
BPN Border Patrol New Composite Soil Sample
USEPA United States Environmental Protection Agency
BPDN Border Patrol Duplicate Composite Soil Sample
DL Detection Limit
< Less than
mg/kg milligrams per kilogram
N/A Not Applicable

ISSL USEPA Region 9 Industrial Soil Screening Level
BPG Border Patrol Grab Soil Sample
BPDG Border Patrol Duplicate Grab Soil Sample
NA Not Analyzed
ND Non Detect
ADEQ Arizona Department of Environmental Quality
RL Reporting Limit
Arizona RSRL Residential Soil Remediation Level
Arizona non-RSRL residential Soil Remediation Level

Table 2
Sample Analytical Result Detections Deep Composite and Grab Soil Samples

Composite Soil Samples mg/kg, Ranging from 12 to 30 Inches Below Ground Surface

Constituent	USEPA RSSL mg/kg	USEPA ISSL mg/kg	ADEQ RSRLs mg/kg	ADEQ non R SRLs mg/kg	AccutestDL mg/kg	Accutest RL mg/kg	BPN-4D18	BPDN-4D18	BPN7D18	BPN8D18	BPN-9D24	BPN-10D18	BPN-12D18	BPN-13D18	BPN-14D14	BPN-15D14	BPN-16D18	BPN-17D18	BPN-18D30	BPDN-18D30	BPN-59D30	BPN-60D18	BPN-61D14	BP-78D25
Antimony	31	410	31	410	0.07	2	<1.8	<1.8	<1.7	10.2	4.9	<1.8	[illegible]	[illegible]	2.9	<1.8	28.5	2.1	<1.9	<1.8	6.6	<1.8	3	[illegible]
Arsenic	0.39	1.6	10	10	0.07	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Lead	400	800	400	800	0.054	2	19.8	19.6	70.2	[illegible]	[illegible]	347	[illegible]	[illegible]	[illegible]	197	[illegible]	378	315	301	[illegible]	345	[illegible]	[illegible]

Grab Soil Samples mg/kg, Ranging 12 to 42 Inches Below Ground Surface

	USEPA RSSL mg/kg	USEPA ISSL mg/kg	ADEQ RSRLs mg/kg	ADEQ non R SRLs mg/kg	AccutestDL mg/kg	Accutest RL mg/kg	BPG-1D18	BPG-1D18 XRF	BPG-3D30	BPG-3D30 XRF	BPG-13D30	BPG-13D30 XRF	BPG-16D30	BPG-16D30 XRF	BPDG-16D30	BPDG-16D30 XRF	BPG-18D30	BPG-18D30 XRF	BPG-21D42	BPG-21D42 XRF	BPDG-21D42	BPDG-21D42 XRF
Antimony	31	410	31	410	0.07	2	30.6		[illegible]		5.3		19.4		20.1		[illegible]		[illegible]		[illegible]	
Arsenic	0.39	1.6	10	10	0.07	2	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
Lead	400	800	400	800	0.054	2	[illegible]	74	[illegible]	9,645	[illegible]	99	[illegible]	559	[illegible]	NS	[illegible]	642	[illegible]	9,507	[illegible]	NS

RSSL	USEPA Region 9 Residential Soil Screening Level
	Analysis Greater Than USEPA Region 9 Residential Soil Screening Levels 2011
BPN	Border Patrol New Composite Soil Sample
BPDN	Border Patrol Duplicate Composite Soil Sample
NS	Not Sampled
ADEQ	Arizona of Environmental Quality
RSRL	Residential Soil Remediation Level
RL	Reporting Limit

ISSL	USEPA Region 9 Industrial Soil Screening Level
BPG	Border Patrol Grab Soil Sample
BPDG	Border Patrol Duplicate Grab Soil Sample
USEPA	United States Environmental Protection Agency
mg/kg	milligrams per kilogram
non-R RSL	Non-residential Soil Remediation Level

Table 3
Sample Analytical Result Detections
Toxicity Characteristic Leaching Potential (TCLP) Samples
U. S. Border Patrol Firing Range
Nogales, Arizona

Constituent	USEPA Toxicity Characteristic Concentration	Units	BPN-13S	BPG-3S	BPG-7S	BPG-8S	BPG-17S
Arsenic	5	mg/L	<0.25	0.27	<0.25	<0.25	<0.25
Lead	5	mg/L	511	1930	3.4	9.2	158

Notes:

LOD	Limit of Detection	BPN	Composite Samples
mg/L	milligrams per Liter	BPG	Grab Samples
<	Less Than	USEPA	U.S. Environmental Protection Agency

APPENDIX A
NOTICE OF PROPOSED PLAN AND PUBLIC MEETING

Nogales International News Paper

Proposed Plan for the Former U.S. Border Patrol Firing Range
Nogales, Arizona

The Department of Homeland Security (DHS), U.S. Customs and Border Protection (CBP) announces the availability of and invites public comment on a Proposed Plan resulting from a Remedial Investigation and Feasibility Study (RI/FS) performed at a Former Border Patrol firing range site located on Target Range Road in Nogales, Arizona 85628. The RI/FS discusses the risks posed by the site and presents an evaluation of cleanup alternatives. The Proposed Plan identifies a preferred cleanup alternative and alternatives considered. Comments can be provided on the proposed plan and RI/FS verbally or in writing.

CBP evaluated the following alternatives for addressing the contaminated soil at the site:

1. Limited off-site landfilling, soil stabilization, and cap and grade;
2. Sieving, soil stabilization and cap and grade; and
3. Excavation and off-site land filling.

CBP welcomes the public's comments on all the alternatives listed above. CBP will choose the final remedy after the comment period ends and may select any one of the alternatives after taking public comment into account.

The public comment period is from November 26th through December 29th, 2014. The Proposed Plan and corresponding RI/FS have been placed at the reference desk at the Nogales-Rochlin Library located at 518 N. Grand Ave, Nogales, AZ 85621. Copies of the Proposed Plan and RI/FS can also be downloaded at http://www.cbp.gov/about/environmentalcultural-stewardship/nepa-documents/docsreview.

In order to be considered, comments on the Proposed Plan and RI/FS must be received by December 29th, 2014. Please provide comments using only one of the following methods:

a) By U.S. mail: US Customs and Border Protection, c/o Paul Enriquez, 24000 Avila Road, Suite 5020, Laguna Niguel, CA 92677; or
b) By email: Nogales-Firing-Range@cbp.dhs.gov.;

A public meeting will be held on December 10th, 2014 from 6:30 PM through 9:30 PM at:
Holiday Inn Express
850 W. Shell Road, Nogales, AZ 85621

Pub. 11/25, 11/28/14

APPENDIX B
RESPONSES TO COMMUNITY COMMENTS ON THE PROPOSED PLAN DOCUMENT

Comments from Mr. Joe Barr Concerning the Former U.S. Border Firing Range in Nogales, Arizona and Answers to Comments 1/7/2015

1. Scope RI:
Original Scope, as described by Border Patrol in meetings with the adjacent property owners prior to the start of the clean-up, was to confirm the results of the Allwyn study on the adjacent parcels and find the limits of where the lead contamination exceeds the residential limits. For example the Southeast limits of the Allwyn study (grids 15, 80, 81, 82, 83 and 84) had lead limits above the commercial maximum indicating that the horizontal limits have not been located. The original scope of work should be included in this RI/FS.

Answer: The work scope was changed during the Remedial Investigation field work, because of the discovery of Munition Debris on the properties adjacent to the Former U.S. Border Patrol Firing Range in Nogales, Arizona. The discovery of the Munitions Debris required permission from the Formerly Used Defense Site Program to continue further remedial investigation work outside the boundaries of the Former U. S. Border Patrol Firing Range in Nogales, Arizona. This permission has not been granted to date.

The Modified Scope was discussed in the field notes on dates 9/26/11 and 9/27/11. The report does not discuss this change in scope and its impact to the overall clean up of the BP's contamination. The funds not used due to reduced scope should remain available for completion the original scope by others. Any remaining funds will be allocated by U.S. Customs and Border Protection.

Answer: The funds, if any remain, will be allocated by U.S. Customs and Border Protection.

2. Reestablish the wash location through the range as it was prior to being diverted by the shooting range development. This report does not discuss the wash that passes through the middle of the shooting range. This wash was, which is shown on the USGS maps, was diverted with landing mats, tires and contaminated soil so it passed on the West side of the Arbo parcel.

Answer: During the Remedial Action the “wash” will be reconstructed, if required by the property owner Mr. Arbo and/or it is determined to be beneficial to the human health and environment concerning the on-site chemical constituents (lead, antimony, arsenic and PAHs)

3. Migration from the range to adjacent properties by ricochet and loader.
The report does not address the loss of bullets by ricocheting off the backstop berm. The obtuse angle of the face of the backstop allows the bullets to ricochet off of it and continue westward. The angle is even flatter when shooting from a kneeling position or prone position. Shooting up to the target would result in more ricochets and also direct fire over the berm.

Answer: While it is recognized that the bullets originating on the Former U.S. Border Patrol Firing Range have been found off-site, the project work scope was changed in the field during the Remedial Investigation, because of the discovery of Munitions Debris. At that time, the Remedial Investigation team was instructed by Formerly Used

Defense Site Personnel to change the work scope and not to continue any investigation outside the Former U.S. Border Patrol Firing Range.

Volume II, Feasibility Study

1. Section 1.0 says: "This FS report only addresses the one-half acre Former USBP Firing Range proper and not the adjoining properties. This RI/FS meets the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)."
In my pursing of the CERCLA, all 167 pages of it, left me with the impression that the cleanup for the "Facility" is to include environmental damages inflicted on adjacent properties.

The bottom line is that we were expecting the hazardous materials generated from the leased facility to be cleaned up. That is not what is being proposed.

Answer: The Feasibility Study for the Former U.S. Border Patrol Firing Range in Nogales, Arizona does not exclude further remedial investigative work on adjacent properties, which required that the Remedial Investigation and Feasibility Study be completed only on the Former U.S. Border Patrol Firing Range. A decision is pending by the Formerly Used Defense Site Program and the Customs and Border Protection Agency on how to proceed with the Remedial Investigation and Feasibility Study on the adjacent properties.