Pueblo of Laguna

# FINAL
# TARGET S-1
# SURFACE CLEARANCE REPORT

Native American Lands Environmental Mitigation Program

Pueblo of Laguna
P.O. Box 194
Laguna, New Mexico 87026

November 2017

POL Independent Services Agreement

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Arcadis U.S., Inc. prepared this Surface Clearance on Target S-1 Surface Clearance Report at the direction of the Pueblo of Laguna (POL). This report should be used only with the approval of the POL. This report is based, in part, on information provided in other documents and is subject to the limitations and qualifications presented in the referenced documents.

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Native American Lands Environmental Mitigation Program

Prepared for:

Pueblo of Laguna

Native American Land Environmental Mitigation Program

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# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| APP | Accident Prevention Plan |
| Arcadis | Arcadis U.S., Inc. |
| ARPA | Archaeological Resources Protection Act |
| ATF | Bureau of Alcohol, Tobacco, Firearms, and Explosives |
| ATV | All-terrain Vehicle |
| BIP | Blown in Place |
| CD-ROM | Compact Disk – Read only Memory |
| CEHNC | Corps of Engineers – Huntsville Center |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act of 1980 |
| CPR | Cardiopulmonary Resuscitation |
| DDESB | Department of Defense Explosives Safety Board |
| DID | Data Item Description |
| DoD | Department of Defense |
| DOT | Department of Transportation |
| EM | Engineer Manual |
| EMI | Ecosystems Management Incorporated |
| EMP | Explosives Management Plan |
| EOD | Explosive Ordnance Disposal |
| EPP | Environmental Protection Plan |
| ESS | Explosives Safety Submission |
| EZ | Exclusion Zone |
| °F | Degrees Fahrenheit |
| GIS | Geographic Information System |
| GNSS | Global Navigation Satellite System |
| GPS | Global Positioning System |
| HAZWOPER | Hazardous Waste Operations and Emergency Response |
| H&S | Health and Safety |
| H&S Manager | Corporate Health and Safety Manager |
| HMX | Cyclotetramethylenetetranitramine |

| | |
|---|---|
| HTRW | Hazardous, Toxic, and Radioactive Waste |
| IF | Investigation Finding |
| JATO | Jet-assisted Take Off |
| KAFB | Kirtland Air Force Base |
| LA | Laboratory of Anthropology |
| lb(s) | Pound(s) |
| Maxim | Maxim Technologies |
| MD | Munitions Debris |
| MDAS | Material Documented as Safe |
| MDEH | Material Documented as an Explosive Hazard |
| MEC | Munitions and Explosives of Concern |
| MPPEH | Material Potentially Presenting an Explosive Hazard |
| MSD | Minimum Separation Distance |
| MSR | Monthly Status Report |
| NAGPRA | North American Graves Protection and Repatriation Act |
| NALEMP | Native American Land Environmental Mitigation Program |
| NAVSCOLEOD | Naval School Explosive Ordnance Disposal |
| NEW | Net Explosive Weight |
| NMSHPO | New Mexico State Historic Preservation Office |
| NRHP | National Register of Historic Places |
| OESS | Ordnance and Explosive Safety Specialist |
| PBR | Precision Bombing Range |
| PETN | Pentaerythritol Tetranitrate |
| PM | Project Manager |
| POC | Point of Contact |
| POL | Pueblo of Laguna |
| PPE | Personal Protective Equipment |
| QA | Quality Assurance |
| QC | Quality Control |
| QCSR | Quality Control Summary Report |
| RI | Remedial Investigation |

| | |
|---|---|
| RDX | Cyclotrimethylenetrinitramine |
| RFP | Request for Proposal |
| SI | Site Investigation |
| Site | Approximately 576-acre Target S-1 site, located in the territory of the Pueblo of Laguna, Laguna, New Mexico |
| SOP | Standard Operating Procedure |
| SOW | Statement of Work |
| SSHP | Site Safety and Health Plan |
| SUXOS | Senior Unexploded Ordnance Supervisor |
| TNT | 2,4,6-trinitrotoluene |
| USACE | U.S. Army Corps of Engineers |
| USEPA | United States Environmental Protection Agency |
| USFWS | U.S. Fish & Wildlife Service |
| UTM | Universal Transverse Mercator |
| UXO | Unexploded Ordnance |
| UXOQCS | Unexploded Ordnance Quality Control Specialist |
| UXOSO | Unexploded Ordnance Safety Officer |
| UXOSP | Unexploded Ordnance Sweep Personnel |

# 1 INTRODUCTION

Arcadis prepared this Surface Clearance Removal Action Report for the surface clearance of 576-acres at the Target S-1 Site, under the Native American Land Environmental Mitigation Program (NALEMP). The approximately 576-acre Kirtland Air Force Base (KAFB) Precision Bombing Range (PBR) 14 Target S-1 Site (Target S-1) is located in the territory of the Pueblo of Laguna (POL), Laguna, New Mexico (site). The POL, a federally recognized Indian tribe, currently owns the site. The site is located approximately 29 miles southwest of Albuquerque in Valencia County, New Mexico (Arcadis, 2013).

This removal action was performed consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986, and follows the overall Military Munitions Response Program removal action process. The surface clearances are being conducted to address hazards from potential exposure to munitions and explosives of concern (MEC) on site.

## 1.1 Authorization

Arcadis was directed by the POL, under an Independent Services Agreement, to perform a removal action at the Target S-1 Site.

## 1.2 Objective

The purpose of this report is to provide a detailed description of the surface clearance removal action conducted at Target S-1, including the demolition of MEC and other Material Potentially Possessing an Explosive Hazard (MPPEH) located at the site. All activities involving work in areas potentially containing military munitions including: MEC, MPPEH, Material Documented as an Explosive Hazard (MDEH), Munitions Debris (MD), and Range Related Debris (RRD) were conducted in full compliance with the POL; the United States Army Corps of Engineers, Albuquerque District (USACE); the United States Environmental Protection Agency (USEPA); the Department of Defense (DoD) Explosives Safety Board (DDESB) compliant Explosives Safety Submission (ESS); and DoD requirements regarding personnel, equipment, and procedures. The POL-approved project ESS is included as Appendix B.

Activities performed as part of this removal action included safely locating, identifying and removing MD, MPPEH, and potential MEC from the ground surface of a 576-acre parcel within the Target S-1 Site. Once MD was verified as free of explosives (i.e., material documented as safe or MDAS), it was containerized for transportation to ACE Metals in Albuquerque, New Mexico (Appendix D).

## 1.3 Background

### 1.3.1 Location

The Site is in Valencia County, New Mexico approximately 29 miles southwest of Albuquerque (Figure 1-1). The approximately 576-acre site is located in the territory of POL (Arcadis, 2013).

### 1.3.2 Topography

The regional terrain of the area is made up of flat-topped mesas, steep rugged sandstone cliffs, and narrow rocky canyons. The site is located at approximately 5,000 to 6,000 feet above mean sea level (Keres Consulting, Inc. [Keres], 2012).

### 1.3.3 Climate

The climate is warm and dry, with summer temperatures averaging 91 degrees Fahrenheit (°F) and winter temperatures averaging 20 °F. The area experiences a multitude of sunny days throughout the year; most precipitation falls as rain from July through October and averages nine inches per year. Most rainfall takes place during brief, intense thunderstorms from July through October (Maxim Technologies [Maxim], 2005). The area is occasionally covered with a few inches of snow during winter storms (Keres, 2012). Winds generally predominate from the southeast in summer and from the west in winter, but local surface wind directions will vary greatly because of local topography. Significant soil erosion may take place as a result of wind in the area (Maxim, 2005).

### 1.3.4 Vegetation

Vegetation in the surrounding area is sparse and includes desert scrubland (sparse Juniper, Blue Grama Grass, Dropseed, other bunch grasses, Snakeweed, Cane Cholla, Prickly Pear, and sparse Sagebrush) and lowland desert vegetation (prairie grass and sparsely populated cedar trees) (Keres, 2012).

### 1.3.5 Geology

The uppermost geologic unit is the Quaternary alluvium, which is composed of silt, clay, sand, and gravel deposited along the Rio Grande and Tijeras Arroyo, and is up to 115 feet thick. The Quaternary and Tertiary Santa Fe Group underlies the floodplain alluvium and forms terraces and erosional surfaces west and east of the floodplain.

The Santa Fe Group is primarily composed of silt, clay, and sand with gravel lenses. In the central Rio Grande Valley, the Santa Fe Group was deposited by streams flowing into the valley from the east, west, and north. The Santa Fe Group is at least 9,000 feet thick; in an area to the south of Albuquerque, the group extends to a depth of 20,000 feet. The dominant rock types that may be exposed on and around the site may be sediment of late Jurassic, late Cretaceous, and late Tertiary age. It is assumed the site is mostly underlain by the Dakota Sandstone, Mancos Shale, and Gallup Sandstone (Upper Cretaceous). Site-specific information was obtained from the U.S. Geological Survey National Geologic Map Database (ngmdb.usgs.gov).

### 1.3.6 Hydrology

The Rio Puerco and the Rio San Jose are the major surface water bodies in the region of KAFB PBR-14 Target S-1. The Rio Puerco is a southward flowing river forming the boundary between the POL and the Pueblo of Isleta near Kirtland Air Force Base (KAFB) Precision Bombing Range (PBR)-14 Target S-1. The Rio San Jose flows in a southeasterly direction and parallels State Highway 6. Both rivers are ephemeral, they are only flowing during and for a short while after precipitation events in a typical year.

Runoff from rainfall is the primary source of water for stream flow. The rivers are heavily affected by arroyos that flow intermittently throughout the year, mainly after rain events. Based on this designation these rivers are essentially storm water and melt water confluences, which would promote heavy erosion during periods of flow. Water resources vary from some intermittent streams to perennial springs and seeps, and even a few perennial stream systems which are fed by springs and run-off from snow melt coming out of the high country (Arcadis, 2017).

### 1.3.7 Wildlife

A variety of wildlife has been observed at the site, including antelope, elk, deer, rabbits, ravens, robins, red tail hawks, rodents, and a variety of reptiles. There is no available list of threatened or endangered species on POL land. However, federal and state government agencies have identified a number of threatened and endangered species within the counties where the site is located, and some of these species may occur on or near the site. More information regarding these species may be found in the JATO Motor and Parachute Flare Removal/MEC Surface Clearance Work Plan (Arcadis, 2015).

## 1.4 General History

The site is located approximately 5 miles south of Interstate 40 and east of Lucero Mesa. Based on the findings of the Step I and Step III Site Assessment Reports (Keres, 2012), the site contains known and potential areas impacted by jet-assisted take off (JATO) motors. The area surrounding the site is remote and characteristic of high desert grasslands. The regional terrain also includes flat-topped mesas, steep rugged sandstone cliffs, and narrow rocky canyons.

KAFB, previously known as the Kirtland Army Airfield, established Target S-1 on land owned by the Pueblo of Isleta, east of the current POL JATO sites. KAFB used Target S-1 for bombardier training from 1942 (exact date unknown) until World War II ended in 1945. In December 1945, the Z Division at Los Alamos National Laboratory set up equipment on the PBR and established the Los Lunas Test Range, which would later become known as the Los Lunas Air Force Range. During this time, Sandia Base, a former DoD nuclear weapons installation, also dropped steel, nonexplosive penetrators on the site until 1946 (exact date unknown). Sandia Base retained control of the Los Lunas Air Force Range from 1946 until July 19, 1948, when it transferred the site back to KAFB. Activities on the Los Lunas Air Force Range between July 1948 and August 1956 are unknown. From February 1, 1957 to December 22, 1961, KAFB may have used the entire Los Lunas Air Force Range for practice bombing runs to study aircraft performance but other sources indicate that ordnance was not dropped past 1957 (Keres, 2012).

Prior to 1956, the Target S-1 and Los Lunas Air Force Range boundaries were located completely within the Pueblo of Isleta boundaries. In 1956, the POL approved the use of 1,661 acres of its land to be used by the U.S. Air Force to expand the Los Lunas Air Force Range boundaries. The U.S. Air Force established observation/instrumentation points on the POL land; in addition, archival documents indicate that the aircraft flight path extended southwest to northeast over the 1,661-acre tract on approach to the bombing target site on the Pueblo of Isleta property. The land was returned to the POL at the expiration of the agreement on June 30, 1960 (Keres, 2012). The U.S. Air Force conducted a clearance of the Los Lunas Air Force Range and issued a Certificate of Clearance on October 24, 1961. The POL has designated this area as the S-1 Spotting Area Site (as documented in the Native American Management System for Environmental Impacts).

### 1.4.1 Investigative History

During remedial investigation field activities, the POL and Arcadis agreed to conduct a limited visual survey of the PBR S-1 Spotting Area, and the findings and recommendations are presented in a Remedial Investigation (RI) report submitted in December 2013 (Arcadis 2013). A non-intrusive, instrument-assisted visual survey was conducted of approximately 101 acres of the PBR S-1 Spotting Area to determine if similar munitions are present in this area. Six MD items were identified during the survey. The identifiable MD items included an M38A2 100-pound practice bomb, an MD item likely associated with an M38A2, and a spoon from a smoke grenade. JATO motors were not observed in the surveyed areas of the site. Additionally, a metal monument and wooden post potentially related to the Los Lunas Air Force Range were identified during the visual survey. No MEC items were identified and soil samples were not collected at the PBR S-1 Spotting Area.

### 1.4.2 Site Inspection / Archaeological Survey

Site Inspection (SI) field activities were conducted on Target S-1 during June and August 2015 and findings and recommendations are presented in a SI report submitted in November 2015 (Arcadis,2015). Activities included archaeological survey, non-intrusive, instrument-assisted visual survey and soil sampling. The SI was conducted on 10 acres of Target S-1. Approximately 0.07 acres were not accessible due to the presence of cultural site Laboratory of Anthropology (LA) 182718 in the southern portion of the site. The SI activities at the site included a non-intrusive, instrument-assisted visual survey of 0.93 total acres (approximately 9.3% of the total site acreage), and the collection of ten discrete surficial soil samples and one duplicate sample. A summary of the visual survey and sampling results are provided below.

- Four M38A2 practice bomb components were located, likely from an individual munition. The field team verified the components were MD and there was no MPPEH on site through the visual survey.
- Analytical results for Munitions Constituents (MC) indicated no concentrations were detected above screening criteria.

During the most recent Ecosystem Management Inc. (EMI) archaeological survey (Target S-1 site, approximately 700 acres) conducted May 10 through July 3, a single previously recorded archaeological site and 17 newly discovered sites were documented. Most of the sites are prehistoric Ancestral Puebloan artifact scatters and single residences with artifact scatters. All 18 sites are recommended to eligible for listing in the National Register of Historic Places (NRHP). The site boundaries were flagged in the field and EMI recommends that a qualified archaeologist monitor the sites during project activities. EMI recommends that no motor vehicles be operated within site boundaries. If the above recommendations are followed, the undertaking will not adversely affect cultural resources within the project area. The results of this survey and a larger EMI survey in adjacent areas was used to estimate site density in the current survey area, which measures approximately 1100 acres. EMI archaeologists anticipate that they will encounter 23 archaeological sites in the current survey area, which yields a site density of one archaeological site per 47 acres (Figure 2-2).

## 1.5 Technical Approach

The scope for this effort is defined in the Independent Services Agreement issued by the POL and described in the Munitions and Explosives of Concern (MEC) and Munitions Debris (MD) Surface Clearance on Target S-1 Work Plan (Arcadis, 2017). The objective of the surface clearance removal action at this site was to locate and remove potential MEC, MPPEH, MDEH, MD, and RRD on the ground surface from the Site. Procedures for demolition operations detailed in Appendix C of the Munitions and Explosives of Concern (MEC) and Munitions Debris (MD) Surface Clearance on Target S-1 Work Plan were followed during the demilitarization of the BDU 33.

The following tasks were previously conducted during surface clearances at other Kirtland Army Airfield PBRs, and information obtained were utilized during this effort:

- Prepare ESS – The Final ESS for previous surface clearances at PBRs N-9, N-10, and N-11 were prepared in accordance with DDESB requirements and submitted and approved by the POL March 19, 2009. Based on discussions with the POL during the kickoff meeting, the ESS for these sites is applicable to the work at Target S-1, given the similarities in munitions type and planned removal actions (surface clearances). As such, the ESS was adapted for use on Target S-1, with site-specific changes made to account for the physical site conditions. The adapted ESS was provided in the Final Removal Action Work Plan and approved by the POL. Note DDESB approval of the ESS was considered optional since the project is managed by the POL.
- Archaeological and Cultural Survey, Mapping and Recordation– Ecosystems Management Incorporated completed an archaeological survey of portions of the Target S-1 subject to this removal action. An archaeological survey had not been conducted in planned surface clearance area (Task 4) to the east and up to the Rio Puerco. The NALEMP Specialist on-site during surface clearance activities monitored the area for cultural resources during field activities.

The following major tasks were conducted as part of this effort:

- Prepare Planning Documents (Work Plan) – As part of the MD / MEC Surface Clearance Work Plan tasks listed in the October 2016 Statement of Work, Arcadis developed a Munitions and Explosives of Concern (MEC) and Munitions Debris (MD) Surface Clearance on Target S-1 Work Plan detailing the specific surface clearance activities to be conducted at the site. In accordance with USACE requirements, the work plan also included corresponding component plans, including a technical management plan, field investigation plan, quality control plan, explosives management plan, and health and safety (H&S) plans (Accident Prevention Plan and Site Safety and Health Plan). The work plan was approved March 2017.
- Ancheological survey
- MEC Surface Clearance/ MD Removal – Arcadis conducted surface clearance activities on 576-acres. The surface clearance action for the 576-acre area was conducted on July 10-14, and July 17-21, 2015. MPPEH and RRD consolidation was conducted on August 4, 2017. Work included MD inspection, sorting, and certification. All work was completed as of 11 August 2017, and is detailed in this Removal Action Report.

## 1.6 Final Report Organization

This Removal Action Report generally follows the requirements of USACE Data Item Description MR-030, Site Specific Final Report. The report consists of the following six chapters and seven appendices:

**Chapter 1:** Introduction

**Chapter 2:** Discussion

**Chapter 3:** Documentation

**Chapter 4:** Tests

**Chapter 5:** Summary

**Chapter 6:** References

The removal action report also contains eight appendices:

**Appendix A:** Scope of Work

**Appendix B:** ESS

**Appendix C:** Quality Documentation and Letter of Completion

**Appendix D:** Disposal Documentation

**Appendix E:** Daily Site Activity Reports / Photographs

**Appendix F:** Ordnance Technical Data Sheets

**Appendix G:** Demolition Shot Records

**Appendix H:** Munitions Response Site Prioritization Protocol

# 2 DISCUSSION

## 2.1 Site Preparation Activities

The Arcadis field teams mobilized to the site on July 10, 2017. Site boundaries for the 576-acre surface clearance area were previously determined using the project Geographic Information Systems (GIS) data and documented in the Target S-1 Surface Clearance Work Plan (Arcadis,2017). The surface clearance boundary was placed over the portion of Target S-1 Site believed to have the greatest probability of containing higher concentration of MD.

The extents of the clearance areas were uploaded into a handheld Global Positioning System (GPS) unit (Trimble Geo7X), used by Arcadis site personnel to navigate to the planned grid corner locations. The GPS was used throughout the clearance to ensure the sweep team covered the prescribed area.

One lockable Conex container was delivered to an area on POL land. The Conex container was used for storage of equipment and for processing, inspecting, certifying, and storing MDAS recovered during the removal action. This area (the site storage area) was used for daily safety meetings and to discuss the operations to be conducted each day.

Port-a-johns were also set up at the site storage area for use during field activities. Equipment including a Utility vehicle (UTV), White's All Metals detectors, buckets, radios, and shovels were placed in the lockable roll-off container. The site layout is depicted in Figure 1-2.

## 2.2 Surface Clearance Operations

Surface clearance operations were initiated at Target S-1 on July 10, 2017. Site-specific training and operational briefs were provided to all field personnel in accordance with the work plan, Accident Prevention Plan, Site Safety and Health Plan, and ESS to provide an initial review of the project scope, reporting procedures, and H&S requirements. All personnel designated as unexploded ordnance (UXO) sweep personnel (UXOSP) were also provided UXOSP training in accordance with the requirements of DDESB Technical Paper 18 which is further described below. Daily safety tailgate meetings were held at the site storage area prior to each day's clearance activities to discuss various site hazards including explosives, slip/trip/fall situations, weather, hydration, heat-related illnesses, and biological hazards.

The sweep team consisted of a Senior UXO Supervisor (SUXOS), UXO Safety Officer/Quality Control Specialist (UXOSO/QCS), UXO Technician III (UXO III), two UXO Technician II (UXO II), and nine UXOSPs. The POL NALEMP Specialist (and qualified UXO I), Mr. Sabin Chavez, was onsite and conducted daily quality assurance (QA) oversight of the project for assessment of POL contractual requirements.

UXO technicians provided training to the UXOSP on the first day of the surface clearance operations at Target S-1. Under the direction of the SUXOS, the surface clearance crews were trained to use visual search methods. Practice surface clearances were conducted outside the range area to train the team in the level of concentration required to visually recognize potential hazards and the practical aspects of how to operate as members of a sweep team. Verbal and practical UTV safety training was also conducted.

The UXO personnel began surface clearance operations at the southern boundary of the project site, moving westward from the fence that bisects the clearance area. At the west end of the site, the team reversed direction and cleared back to the fence. On each pass, the clearance team would pick up MD and place it in buckets carried throughout the pass. The MD was then transferred to the UTV or buckets for inspection before storage of the MD. This method continued until all required clearance was complete on the west side of the fence. The team then moved to the east side of the fence and cleared the area between the fence and the Rio Puerco. A safety standoff of 30 feet from vertical walls was maintained at all times by all team members whenever the team approached the Rio Puerco.

The surface clearance teams systematically cleared the area using a minimum of a 5-foot (maximum of 15-foot) separation distance between each individual, visually inspecting the ground surface. The clearance line would expand and contract as required to meet visibility and terrain/vegetation requirements. In order to systematically clear the range, the outside UXO technician placed a white pin flag every 200-feet at the outside edge of the clearance lane to mark the end of the lane.

Once the clearance team completed the first lane, the team would shift over to line up with the previously placed white pin flags and the inside personnel would remove the white pin flags as the team progressed along the line. The outside UXO technician marked the outer edge of the new clearance lane. This process was repeated until the range area had been completely covered by clearance line personnel.

Figure 1-2 details the route taken during the entire clearance as recorded via hand carried Trimble Geo7X. The route depicted on Figure 1-2 is an approximate path because the UXO personnel carrying the Geo7X were required to move from one end of the clearance line to the other while crossing the clearance area.

A UTV or buckets were used to consolidate MD and RRD recovered from the clearance lane and transport it to the site storage area. MD and RRD were picked up by the field personnel as they were encountered. Any metallic object encountered was inspected by qualified UXO personnel to ensure the item was free from explosive material before it was loaded into the UTV or buckets. If multiple UXO personnel were engaged prosecuting suspect items, the clearance team was stopped; clearance operations were not restarted until investigation of the suspect items was complete. MD and RRD items were collected to the size specifications required by the POL NALEMP Specialist. Items small enough to require a rake for effective removal were not included in the clearance.

All munitions inspections were conducted by two qualified UXO personnel. The first inspection occurred when the item was located and before being placed in the UTV or buckets. If, after picking up the item, an additional item was located beneath the first item and it was below the ground surface, it was marked with a red pin flag and was further investigated by qualified UXO personnel.

Inspection of a minimum of 10% of the recovered MD and RDD was performed by the UXOSO/QCS to verify the inspection and verification processes were being conducted as required. At the completion of each day's surface clearance activities, recovered MD and RRD (which had received the initial inspections) was placed in the UTV or buckets and transported to the Conex storage container.

The second inspection was conducted at the sorting and inspection area at the Conex storage container by two qualified UXO personnel and certified by the SUXOS. When the inspection process was completed for the day, the Conex storage container was locked and sealed. The key was maintained by the SUXOS.

Each day, the UXOSO/QCS conducted a minimum 10% Quality Control (QC) check of the lanes swept by UXO personnel that day. The UXOSO/QCS performed this QC measure by ensuring all MEC, MPPEH, MDEH, MD, and RRD items were identified and collected from sweep lanes previously searched. QA of the surface clearance sweep lanes was conducted by the NALEMP Specialist.

Removal of debris from the subsurface was not conducted; activities were limited to surface clearance only for this effort. If, however, part of an item was located on the surface but partially or mostly covered by soil, the item was flagged and a qualified UXO technician conducted limited excavation as necessary to inspect and remove the partially covered item.

A 1,352-foot exclusion zone was maintained around site operations at all times which included the temporary sorting and inspection area when MD and RRD sorting and inspection operations were underway. Two qualified UXO technicians inspected and certified all MD and RRD as MDAS using visual inspection procedures in compliance with USACE Engineer Manual (EM) 385-1-97. MD and RRD was only transported from the surface sweep area to the sorting and inspection area after it was inspected by qualified UXO personnel and identified as acceptable to move and free from explosives. Each item was re-inspected at the sorting and inspection area by qualified UXO personnel.

MD and RRD was segregated from other metallic debris. MD and RRD that was 100% visually inspected by two qualified UXO personnel and determined to be MDAS was locked and sealed in a Conex storage container within the temporary sorting and inspection area at the end of each day. All MD and RRD was inspected, certified, and disposed of in accordance with USACE EM 200-1-15 and 385-1-97. This inspection was certified on disposal documentation with the following statement: “This certifies and verifies that the MD and RRD listed has been 100 percent properly inspected and to the best of our knowledge and belief, is free of explosive hazards”.

## 2.3 MD / MDEH Removal Operations

A single BDU-33 practice bomb was located and removed from the Task 3 areas as outlined in the MEC Surface Clearance Work Plan. MD consolidation was accomplished on August 4, 2015. Once the practice bomb was loaded in the UTV, the practice bomb was taken to the demolition area for staging. (Figure 1-2). All surficial items were recovered during the 576-acre surface clearance, subsurface clearance was not conducted. One MPPEH item, a BDU 33, was found on July 12 and was temporarily stored in the CONEX until demolition operations were conducted. Demolition of the item was conducted on August 11. Chemical Warfare Materiel is not suspected to be present on Target S-1 Site.

The demolition area was selected based on its lack of vegetation and the ability to secure the area from all approaches during demolition operations. The practice bomb was placed in a hole designed to hold it at a depth such that the top of the practice bomb was even with the ground surface. Eight-three quarter pound cast boosters placed longitudinally along the weakest axis of the practice bomb were detonated to affect the venting operations. The practice bomb was then covered with sandbags to mitigate the effects of possible fragmentation.

## 2.4 Results of the Removal Action

The surface clearance action for the 576-acre area was conducted on July 10-14, and July 17-21, 2017. All Demolition was conducted on August 11, 2017. MD items located during the clearance were associated with the BDU 33 practice bomb.

All MDAS collected on-site was transported to a qualified recycling facility, ACE Metals Recycling, for disposal. The material was transferred to the recycler on August 11, 2017 and shredded while the SUXOS was at the facility. The MDAS transfer was documented on DoD Form 1348-1A (Appendix D).

The POL NALEMP Specialist issued a letter to Arcadis confirming the surface clearance was conducted and completed in accordance with the ESS and work plan. The completion letter is provided in Appendix C.

## 2.5 Tracking and Disposition of Ordnance Found

All MD removed during surface clearance operations was given a weight estimate on-site, inspected, and containerized in the lockable Conex storage container as MDAS. The field team estimated approximately 29 pounds (lbs.) of MDAS (MD and RDD) were recovered from Target Site #1 during the surface sweep, as shown in the Daily Activity Reports provided in Appendix E. The RRD consisted of barb wire, baling wire, soup cans, and other assorted metal trash. After all site activities were completed, the MDAS was taken to ACE Metals Recycling to be recycled as scrap metal. The disposal ticket and chain-of-custody form in Appendix D indicate a total of 30 lbs. of MDAS was collected from JATO Site #1 (1 lbs) and Target Site #1 (29lbs) and turned in for recycling.

## 2.6 Demobilization

Surface clearance operations on Target Site #1 were 99% completed on July 20, 2017. The final 1% was completed on July 24 which included removal of the equipment air dropped box. All equipment and Conex storage container remained onsite to support the JATO #1 surface clearance effort and was removed once that effort was completed in August 2017.

# 3 DOCUMENTATION

## 3.1 Maps

Project maps were developed in GIS format utilizing spatial data previously generated for the POL, using aerial photography and GPS data obtained in the field. GPS units were used in the field to track progress of the surface clearance activities. Data obtained from the GPS units was processed and converted to GIS-compatible formats to be used in the project maps. Project maps are included as an attachment to this report.

## 3.2 Daily Site Activity Reports

The SUXOS completed Daily Activity Reports each day of the surface clearance activities that included the following information:

- Weather
- Personnel on-site
- Visitors
- Daily activities
- Progress of Operations
- QA/QC areas completed
- Summary of material recovered in pounds
- Daily H&S Briefing
- Inspections
- Miscellaneous notes

The Daily Activity Reports are included in Appendix E.

## 3.3 Site Quality Documentation

The UXOQCS developed a Weekly Quality Control Report (Appendix C), which included the following information:

- Date and recorder of field information
- Work accomplished
- QC sweep results
- Relevant events
- Signature of the UXOQCS

## 3.4 Site Safety Documentation

Safety documentation included:

- Date and recorder of log
- Tailgate safety briefing
- Weather conditions, significant site events relating to safety, accidents, stopping work due to safety issues, and safety audits
- Signature of UXOSO/QCS

No injuries or H&S incidents occurred during the performance of the clearance operation.

## 3.5 Ordnance Disposal

A single BDU-33 practice bomb was located and removed from the Task 3 areas as outlined in the MEC Surface Clearance Work Plan. MD consolidation was accomplished on August 4, 2015. Once the practice bomb was loaded in the UTV, the practice bomb was taken to the demolition area for staging. These items were recognizable as ordnance and required to be further demilitarized in order to turn them in to the metal recycler as MDAS. Demolition operations were conducted on August 11, 2017 to affect the demilitarization. After clearing the shot, the SUXOS directed removal of the remaining metallic debris from the detonation point. Demolition inventory, receipt and daily shot records are provided in Appendix G.

Once the demolition shot was properly cleaned of any remaining MD scrap, one soil sample was collected and delivered via FedEx to Test America in Phoenix, Arizona. The soil sample was analyzed for explosives (Method 8330A), perchlorate (method 6860) and metals (antimony, copper, lead, zinc, and iron by method 6010B). Soil concentrations were compared to the USEPA Region 6 Residential screening levels resulting in no analytical parameters over the action levels (Appendix H).

The MD and RRD collected during daily field operations was managed as described in Sections 2.2, 2.3, and 2.4. At the completion of the clearance action, the POL NALEMP Specialist conducted a QA of the sorted material prior to transport to ensure POL required contractual quality standards were met. The MDAS was transported to a recycling facility for shredding (under the supervision of the SUXOS) and recycling as scrap metal. Refer to Appendix D for MDAS disposal documentation, including DoD Form 1348-1A.

## 3.6 Photographs

Site photographs are included in a photographic log after the Daily Activity Reports in Appendix E.

# 4 TESTS

## 4.1 Quality Control / Quality Assurance

QC procedures were developed for this project - driven by contractual, safety requirements, and standards - accepted in the past as industry standards. QC checks were performed internally by the project UXOSO/QCS to control and monitor work processes for the purposes of validating quality standards, as specified in the contract. QC procedures utilized in the effort are described in Section 4 of the Target S-1 Surface Clearance Work Plan (Arcadis, 2017). QA initiatives were performed by the POL to assure quality standards are in strict compliance with the contractual specifications.

## 4.2 Quality Control

The QC conducted for the project included process and product QC.

### 4.2.1 Process Quality Control

Process QC includes improving efficiency and effectiveness of the processes. Process QC is a preventative approach intended to identify inconsistencies and problems early, and, if necessary, make adjustments to the processes before submittal of the final product. The process QC for this surface clearance action included Preparatory Phase Inspections, Initial Phase Inspections, and Follow-Up Phase Inspections on the key processes.

### 4.2.2 Preparatory Phase Inspection

Preparatory phase inspections were performed before beginning each key process. The purpose of these inspections was to review applicable specifications and verify the necessary resources, conditions, and controls were in place and compliant before the start of the work. The following QC actions were performed by the UXOSO/QCS for the preparatory phase inspection:

- Verified the appropriate plans (e.g., work plan, H&S plan, ESS) and procedures had been developed, approved, and made available to the field team,
- Verified the field personnel met the requirements and qualifications for the work to be performed,
- Verified the appropriate training had been conducted prior to initiating the work,
- Verified the necessary field equipment was functional and proper for the work,
- Verified the preliminary work (e.g., establishment of MD sorting area, staking site boundaries) had been completed,
- Verified the Target S-1 Surface Clearance Work Plan had been reviewed and understood by the field team.

The UXOSO/QCS discussed the hazards associated with the work performed with the field personnel and verified the necessary safety measures were in place for the work to be performed at the site. Field equipment checks were conducted on the GPS unit and the hand-held magnetometers. Before each day

of use, the functionality of GPS equipment, relative to a known control point, was established (vertical control or topography was not confirmed).

### 4.2.3 Initial Phase Inspections

An initial phase inspection was performed the first time any technique was implemented at the site. These inspections were conducted to check preliminary work for compliance with procedures detailed in the Target S-1 Surface Clearance Work Plan and the associated Accident Prevention Plan and Site Safety and Health Plan. Initial phase inspections were also conducted to establish the acceptable level of performance and confirm safety compliance. The following were performed for each technique used during the field activities:

- Correction of any deficiencies or discrepancies identified during the preparatory phase,
- Establishment of the acceptable level of performance,
- Completion of any equipment training,
- Completion of any safety training or briefing,
- Review of the Target S-1 Surface Clearance Work Plan, and confirmation all requirements were met,
- Observation of the performance of work, and confirmation the quality of work was at the established acceptable level.

The acceptable level of performance is defined as:

- Recovery of all encountered MEC/MPPEH/MDEH and all MD/RRD (greater than two inches) from the ground surface within the 576-acre clearance area,
- Recovery of all MEC/MPPEH/MDEH from the outer clearance areas as directed by the POL NALEMP Specialist,
- Pass a 10% QC check of all clearance lanes (no MEC/MPPEH/MDEH or MD/RRD within a cleared lane),
- Inspection of 100% of recovered MD/RRD and certification as MDAS.

### 4.2.4 Follow-Up Phase Inspections

Follow-up phase inspections ensured compliance with the established acceptable level of performance for work performed at the site for the surface clearance field activities.

The UXOSO/QCS and any designees were responsible for monitoring the performance of surface clearance operations that took place. They also performed the verification of continued compliance with any specifications and requirements in the Removal Action Work Plan and applicable safety documents.

During the surface clearance activities, the UXOSO/QCS performed, at a minimum, a 10% visual surface sweep of all areas surface swept each day. The UXOSO/QCS would walk behind the surface sweep teams in a zigzag pattern, ensuring the appropriate MD and RRD had been removed from the surface, and the field activities were being performed to specifications outlined in the Munitions and Explosives of Concern (MEC) and Munitions Debris (MD) Surface Clearance on Target S-1 Work Plan . The

UXOSO/QCS, field team leader, and SUXOS would also re-inspect any collected MD and scrap at the end of each day to ensure it was all of appropriate size and did not contain an explosive hazard.

### 4.2.5 Search Effectiveness Procedure

QC procedures were incorporated into this surface clearance action to ensure effectiveness. The GPS unit and analog detection instruments were tested for viability daily and the field team received training on the proper use of the equipment. Each day's progress was checked against GPS measurements, staked site boundaries and known physical landmarks to ensure 100% coverage of the clearance area. Also, the UXOSO/QCS and designees searched the area swept by the field team to ensure an acceptable level of removal was maintained.

### 4.2.6 Demolition Quality Control

Prior to initiation of the shot the UXOSO/QCS ensured proper demolition techniques had been utilized for priming and connecting each individual item. Additionally, the location of each individual charge was scrutinized to ensure the greatest chance of successfully venting each item. The demolition team inspected each demolition pit and an area up to 250 feet in radius after the demolition shot to ensure there are no kickouts, hazardous MEC components or other hazardous items. The demolition pit was checked with a magnetometer and large metal fragments 3-inches or greater were removed. Further quality control was conducted after the shot to ensure that any residual material possibly remaining in each item had been removed by the venting procedure.

### 4.2.7 Product Quality Control

Product QC involves an inspection on the final product as a result of the surface clearance removal. The UXOSO/QCS performed surveillance and evaluation of equipment checks, clearance procedures, tailgate briefings, and daily reporting, in accordance with the Removal Action Work Plan. This documentation was submitted daily to the Project Manager, and verbally discussed with the POL NALEMP Specialist, to ensure the appropriate level of communications on project status. Product QC also consisted of the MD inspection and certification process, conducted in accordance with USACE EM 200-1-15, as described in Section 2.2.

### 4.2.8 Quality Control Acceptance Criteria

The surface clearance operations performed at Target Site #1 followed the protocols contained within the Quality Control Plan section of the Removal Action Work Plan. The 576-acres boundary was divided into sweep lanes and were swept by the field team with specified distances. The acceptance criteria included that all lanes swept by the teams passed the QC check; in the event of a QC failure, search lanes were completely re-cleared until they passed. The acceptance criteria also included the completion of clearing the entire 576-acres area, which was verified in the completion letter provided by the POL NALEMP Specialist.

### 4.2.9 Results of Quality Control

The GPS unit used on the project passed all equipment function checks each day. In the field, the UXOSO/QCS conducted a minimum 10% (and often 30%) QC check on the sweep lanes at Target S-1. All search lanes passed the QC requirements following the initial sweeps.

The UXOSO/QCS and SUXOS performed a QC check on the sorting and inspection process at the lockable roll-off container at the end of each day, to ensure MD transported to the sorting and inspection area did not possess an explosive hazard. Chain-of-custody documentation was maintained for MDAS through transportation and transfer of the material to the metal recycler. The POL NALEMP Specialist conducted project QA of the sorted material before transportation. The POL issued a completion letter confirming all surface clearance actions were completed for Target S-1.

All QC procedures are documented in the Daily Quality Control Reports provided in Appendix C.

# 5 SUMMARY

The Arcadis project team performed a surface clearance removal action for MD and MEC at Target S-1in Valencia County, New Mexico in July and August 2017. The field activities began with a mobilization of personnel to the site on July 10, 2017. Surface clearance took place from July 10, 2017 to July 21, 2017 with demolition shot conducted on August 11, 2017 after surface clearances at JATO #1 were completed. Qualified UXO personnel conducted surface sweeps across the 576-acre clearance area. The sweep teams systematically swept the area using a minimum 5-foot (maximum 15-foot) separation distance between each sweeper, visually inspecting the ground surface on either side of each individual.

A single BDU-33 practice bomb was located and removed from the Task 3 areas as outlined in the MEC Surface Clearance Work Plan. All other MD recovered from Target S-1 were classified as MDAS; no MEC, MPPEH, or MDEH was found during the surface clearance.

MD was segregated from other metallic debris. MD was only transported from the surface sweep area to the sorting and inspection area after it was inspected by qualified UXO personnel and identified as acceptable to move and free from explosives. MD was re-inspected at the sorting and inspection area by qualified UXO personnel. MD that was 100% visually inspected by two qualified UXO personnel and determined to be free of explosives was classified as MDAS. Then it was separated from other metallic debris and locked in a lockable Conex container within the temporary sorting and inspection area at the end of each day. All MDAS was inspected, certified, and disposed of in accordance with USACE EM 200-1-15.

Upon completion of this work the MDAS collected at Target Site #1 was transported to a qualified recycling facility, ACE Metals Recycling, on August 11, 2017. A total of 29 lbs. of MDAS recovered during the surface clearance and removal actions was turned over to the recycling facility. Field operations at Target S-1 were completed on August 11, 2017. The work was performed in accordance with the approved Munitions and Explosives of Concern (MEC) and Munitions Debris (MD) Surface Clearance on Target S-1 Work Plan prepared by Arcadis and under the POL-approved ESS for the site, adapted from the previously prepared ESS for PBRs N-9, N-10 and N-11. Site operations met all QA/QC requirements during the surface clearance. A letter of completion was issued by the POL NALEMP Specialist and project QA verifying the surface clearance operations on Target S-1 were satisfactorily completed.

# 6 REFERENCES

ARCADIS US, Inc., Remedial Investigation Report, Former Kirtland Army Airfield Precision Bombing Range N-9. December 2013.

ARCADIS US. Inc., JATO Motor and Parachute Flare Removal/MEC Surface Clearance Work Plan, JATO Site #2. June 2015.

Arcadis, Munitions and Explosives of Concern (MEC) and Munitions Debris (MD) Surface Clearance on Target S-1 Work Plan, April 2017.

DDESB TP-18, Minimum Qualifications for Unexploded Ordnance (UXO) Technicians and Personnel. , December 2004.

Keres. Eidson Ranch Site (No FUDS ID # Assigned), Los Lunas Air Force Range (FUDS ID # K06NM0615): Jet-Assisted Takeoff Site 1 Jet-Assisted Takeoff Site 2 (No FUDS ID # Assigned) Draft Step III Site Assessment Report. February 2012.

Maxim Technologies. Site Characterization Report, Precision Bombing Range PBR N-10, Formerly Used Defense Site K06NM45601, Former Kirtland Army Airfield, September 2005.

U.S. Army Corps of Engineers. Engineer Manual (EM) 200-1-15, Engineering and Design – Military Munitions Response Actions. December 2013.

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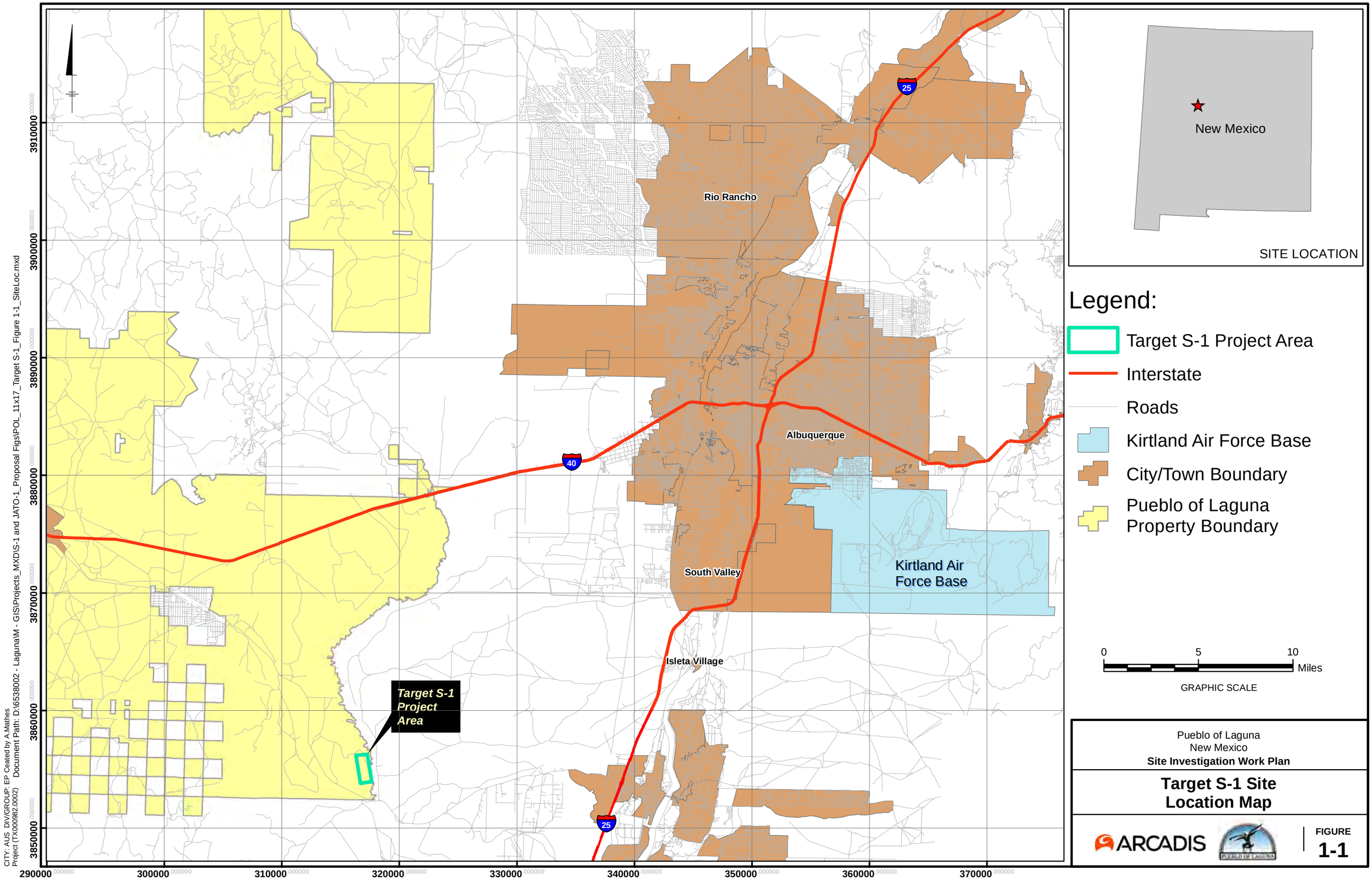
United States Geological Survey. 2015. National Geologic Map Database. http://ngmdb.usgs.gov/ngm-bin/ngm_compsearch.pl Accessed April 2015.

# FIGURES

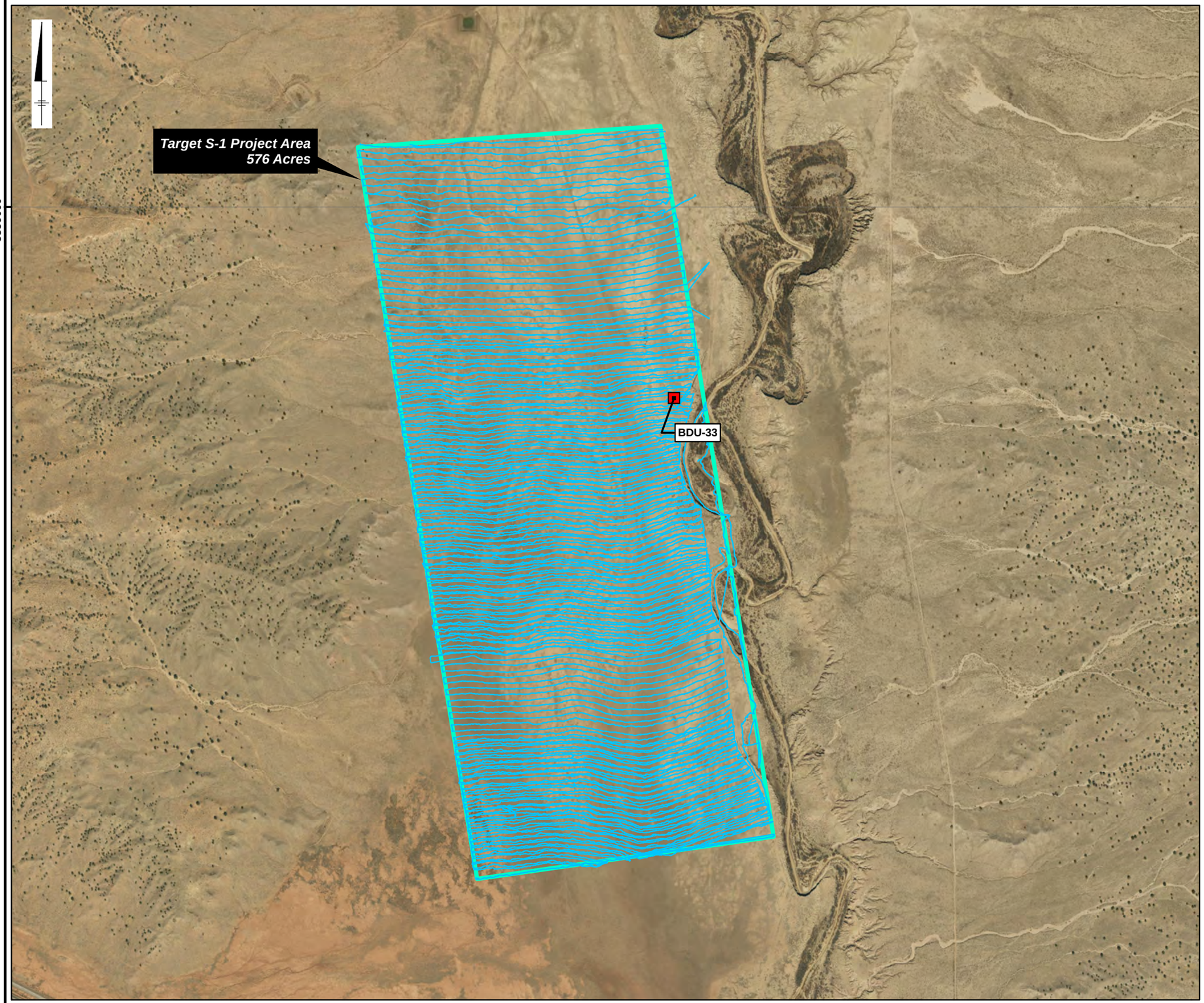



Pueblo of Laguna
New Mexico
**Site Investigation Work Plan**

**Target S-1 Site Location Map**

ARCADIS

FIGURE
**1-1**



LEGEND:

- Target S-1 Project Area
- MD Location
- Survey Transect

0 1,000 2,000 Feet

0 0.25 0.5 Miles

GRAPHIC SCALE

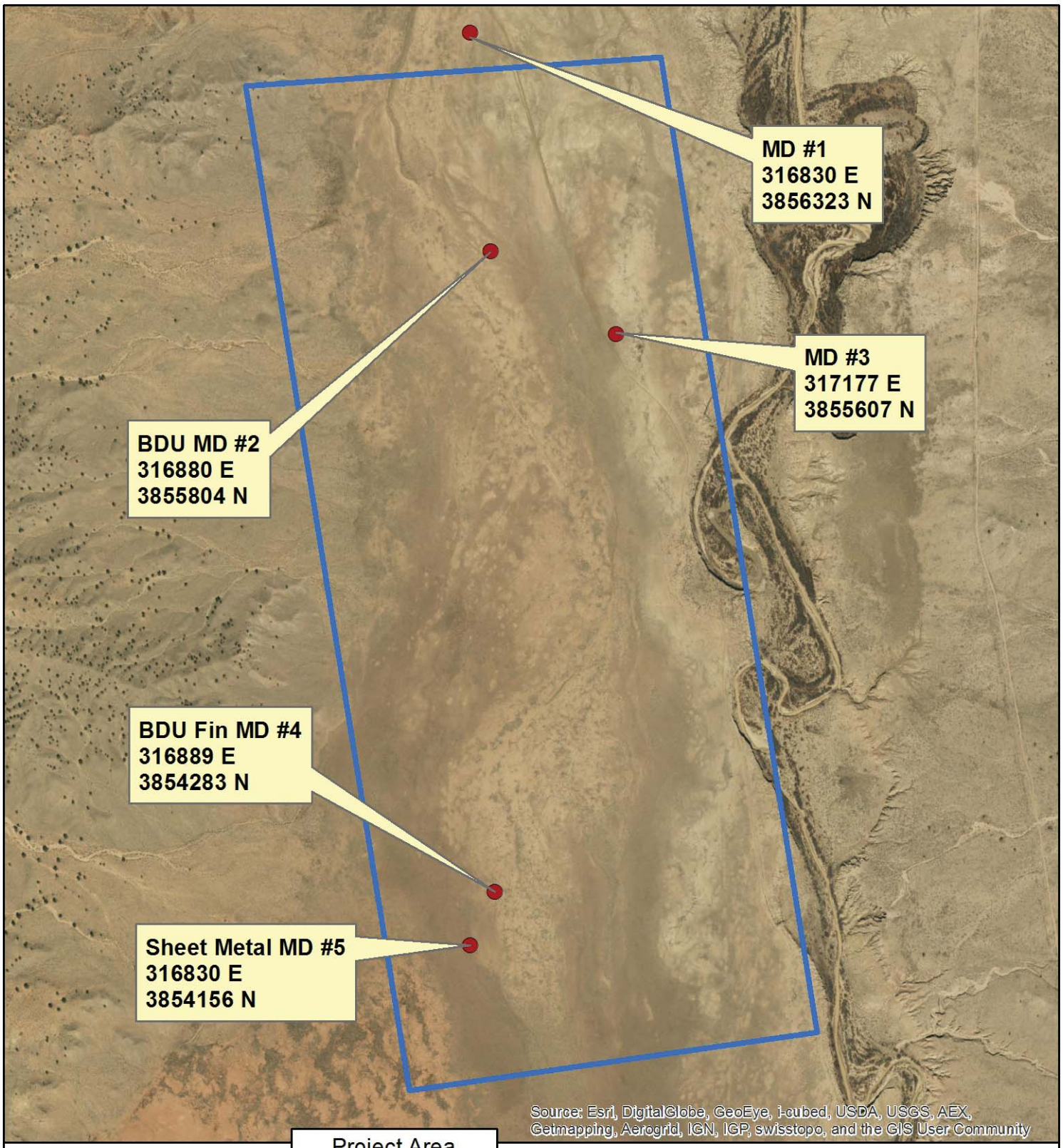
Pueblo of Laguna
New Mexico
**Site Investigation Work Plan**

**KAFB PBR-14 S-1**
**Site Layout Map**

ARCADIS

FIGURE
**1-2**

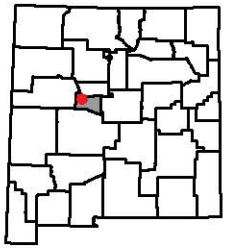
CITY: AUS DIV/GROUP: EP Ceated by A.Mathes
Project (TX000982.0002) Document Path: D:\6538002 - LagunaIM - GIS\Projects_MXD\S-1 and JATO-1_Proposal Figs\Figure 1-2_SiteLayoutMap_rev2.mxd




Arcadis Target S-1 Cultural
Project Area Map
USGS 7.5' Quadrangle:
Rio Puerco, 34106g8
South Garcia SE, 34107g1
T7N, R2W, Sections 13, 24, 25
Valencia County, NM

Projection: NAD83 UTM Zone 13N
Created 6/27/2017 by NPF

Project Area



**Legend**

UXO

Project Area

N
W E
S

ECOSYSTEM MANAGEMENT, INC.

ARCADIS

0 250 500
Meters

1:12,806

# APPENDIX A

## Scope of Work

PUEBLO OF LAGUNA

# NOTICE TO PROCEED

*Arcadis U.S., Inc.*
*630 Plaza Drive, Suite 200*
*Highlands Ranch, CO 80129*

**PROJECT**
**Pueblo of Laguna NALEMP**

***MEC and MD Surface Clearance of JATO Site No. 1 and Kirtland Air Force Base, Precision Bombing Range 14, Target S-1***

**ISA / $416,407.98**

Pursuant to the terms of the Independent Service Agreement Contract, dated January 5, 2017 for the *JATO Site 1 and KAFB PBR 14, Target S-1*, you are hereby notified to commence the process and procedures for the mitigation projects listed above and there under at the start of business on **January 17, 2017**. The timeframe for completion of the all **Final** reports is 16 months which establishes May 31, 2018 as the completion date.

Please acknowledge receipt of this Notice to Proceed by signing and dating and returning this notice to the Pueblo of Laguna, NALEMP Office.

Sincerely,

**PUEBLO OF LAGUNA**

Jim Hooper, Jr.
Chief of Operations

ACCEPTED:

Arcadis U.S., Inc.

By: _____
John P. Sparks, Vice-President

16-JAN-17
Date

# APPENDIX B

## Explosive Safety Submission

# EXPLOSIVES SAFETY SUBMISSION

# MILITARY MUNITIONS RESPONSE PROGRAM
# MUNITIONS AND EXPLOSIVES OF CONCERN (MEC) AND MUNITIONS DEBRIS (MD) SURFACE CLEARANCE

## Target S-1 Site
## PUEBLO OF LAGUNA

April 2017

**Pueblo of Laguna Tribe**

# EXPLOSIVES SAFETY SUBMISSION

## PUEBLO OF LAGUNA
## NATIVE AMERICAN LANDS ENVIRONMENTAL MITIGATION PROGRAM
## MEC AND MD SURFACE CLEARANCE
## TARGET S-1 SITE

POL Independent Services Agreement

Reviewed and Approved by:

Sabin Chavez
Pueblo of Laguna
NALEMP Specialist

Wayne Patterson, PG
Project Manager
Arcadis U.S., Inc.

Arcadis, U.S. Inc. prepared this document at the direction of the Pueblo of Laguna NALEMP Specialist, following requirements of the United States Army Corps of Engineers (USACE).

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Appendix A: Mk 83 GPLD Bomb, Minimum Separation Distance Data Sheet

## ACRONYMS

| | |
|---|---|
| amsl | above mean sea level |
| BIP | Blown in Place |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CWM | Chemical Warfare Material |
| DDESB | DoD Explosives Safety Board |
| DoD | Department of Defense |
| ESQD | Explosive Safety Quantity Distance |
| ESS | Explosive Safety Submission |
| EZ | Exclusion Zone |
| FDRF | Fragmentation Data Review Form |
| ft | Feet |
| GPLD | General Purpose Low Drag |
| HFD | Hazardous Fragment Distance |
| IAW | In Accordance With |
| JATO | Jet-Assisted Take Off |
| JIT | Just-in-Time |
| lbs | Pounds |
| MD | Munitions Debris |
| MDAS | Material Documented as Safe |
| MDEH | Material Documented as an Explosive Hazard |
| MEC | Munitions and Explosives of Concern |
| MFD | Maximum Fragment Distance |
| MFD-H | Maximum Fragment Distance – Horizontal |
| MGFD | Munition with the Greatest Fragmentation Distance |
| MPPEH | Munitions Potentially Presenting an Explosive Hazard |
| MSD | Minimum Separation Distance |
| NALEMP | Native American Land Environmental Mitigation Program |
| NM | New Mexico |
| PBR | Precision Bombing Range |
| POL | Pueblo of Laguna |
| SUXOS | Senior UXO Supervisor |
| USACE | United States Army Corps of Engineers |
| USEPA | United States Environmental Protection Agency |
| UXO | Unexploded Ordnance |

# BACKGROUND

The Target S-1 site is the focus of this selected munitions response Explosives Safety Submission (ESS) in support of the munitions and explosives of concern (MEC) and munitions debris (MD) surface clearance.

This ESS covers removal of remaining military munitions to include: MEC, munitions potentially presenting an explosive hazard (MPPEH), and MD remaining at the site. This removal effort will be conducted through the Native American Lands Environmental Mitigation Program (NALEMP).

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) compliance is not met by this action, but the framework of the process will be substantially followed throughout the project. The removal action is being conducted to address hazards from potential exposure to MEC on the Target S-1 site.

The Pueblo of Laguna (POL) holds a cooperative agreement with the U.S. Department of Defense (DoD) NALEMP for the assessment and mitigation of environmental impacts to Native American Lands resulting from former activities of the DoD. The surface clearance activities described in this ESS is funded under the contract agreement between the POL and the DoD; the Albuquerque District of the U.S. Army Corps of Engineers (USACE) works on behalf of the POL to administer this agreement. The POL will oversee Arcadis on this project.

This ESS was adapted from a previous ESS for similar work conducted in 2016 for the jet-assisted take off (JATO) #2 site. The same contractor team prepared the 2016 ESS and conducted the work at this similar former range.

## 1.1 SITE LOCATION

The Target S-1 site is located in Valencia County, NM, about 29 miles southwest of Albuquerque. The site consists of approximately 576 acres, located in the territory of POL.

## 1.2 SELECTED MUNITIONS RESPONSE ACTIONS

The munitions response action selected for the Target S-1 site is a MEC and MD surface clearance. The objective of the surface clearance is to remove MEC, MPPEH, and MD that is currently present across the area within the Target S-1 site. Site work will include surface clearance of the 576 acres that make up the Target S-1 site as indicated in the MEC and MD Surface Clearance Work Plan (Work Plan).

## 1.3 SIGNIFICANT DIFFERENCES IN MUNITIONS RESPONSE ACTIONS

Several previous investigations have been completed at the Target S-1 site (see Section 1.7 of the Work Plan). No significant differences in the current or reasonably anticipated future land use of different sections of the property are anticipated. As such, no significant differences in the types or conditions of MEC expected to be encountered are anticipated. Munitions previously identified at the site are detailed in Section 1.7. Items previously encountered at the site have generally been in poor condition due to exposure to elements and age.

## 1.4 MAPS

Figure 1-1 of the Work Plan shows the general location of the Target S-1 site and the surrounding area. Figure 1-2 of the Work Plan provides more detailed views of the site along with relevant site details.

## 1.5 EXPLOSIVE SAFETY QUANTITY-DISTANCE

Preliminary site work does not require the establishment of an MSD for explosive safety quantity distance (ESQD) purposes; however, all personnel performing site work will be escorted by qualified Unexploded Ordnance (UXO) Technician(s). During activities where munitions may be handled, the MSD for essential and nonessential personnel will be applied. The MSDs for intention detonations is 3,447 feet and the MSD for unintentional detonations is 816 feet. Essential personnel are defined as those on-site contractors and DoD personnel required to participate in the MEC actions of the removal action as well as authorized visitors. All other personnel are nonessential personnel. Positive control of the exclusion zone (EZ) will be maintained at all times when MEC operations are being conducted.

**Table 1.5-1 Minimum Separation Distances (MSDs)**

| Area | MEC[2] | MSDs (feet)[1] | | | | |
|---|---|---|---|---|---|---|
| | | Unintentional Detonations | | Intentional Detonations | | |
| | | Team Separation Distance (K40) | Hazardous Fragment Distance (HFD) | Without Engineering Controls (MFD-H) | Using Sandbag Mitigation[6] | Using Double Sandbag Mitigation |
| NALP TARGET S-1 MRS | 1000 lb MK 83 GPLD Bomb | 340 | 816 | 3,447 | Not Permitted | Not Permitted |

Notes:
[1]See **Appendix A** for the Fragmentation Data Review Forms documenting the MSDs.
[2]Based on historical documents, H-6
[6]See **Appendix A** for required sandbag thickness (HNC-ED-CS-S-98-7, Amendment 2, November 2014), if applicable.

## 1.6 LOCATIONS OF OPERATIONS

The Target S-1 site is located in remote terrain. The surface clearance of the Target S-1 site will take place across the entire site within the designated boundaries indicated in Figure 1-2 of the Work Plan. MEC and MPPEH classified as Material Documented as an Explosive Hazard (MDEH) may be consolidated within the site for disposal. In the event such items are deemed unacceptable to move, they will be blown in place (BIP). MPPEH wil be inspected, processed, certified and verified in accordance with DoD 4140.62, Department of Defense Explosives Safety Board (DDESB) 6055.9-M Vol 7, and USACE EM 385-1-97, as being free of explosives, it will be controlled and containerized for transportation to a recycling facility.

## 1.7 MUNITIONS WITH THE GREATEST FRAGMENTATION DISTANCE

The Maximum Fragment Distance – Horizontal (MFD-H) and Hazardous Fragmentation Distance (HFD) was found using fragmentation data review forms (FDRF), updated on March 7, 2016 and listed in Appendix A for the Mk 83 general purpose low drag (GPLD) Bomb. JATO motors present at the Target S-1 have been identified as Mk 7 MOD 1, however the fragmentation data review forms do not contain an entry for the Mk7 MOD 1 motor. The Mk 83 munition provides a conservative estimate for minimum safe distance (MSD) when compared to the Mk 7 Mod 1 JATO motor.

### 1.8 MAGAZINE STORAGE

Magazine storage will not be applicable to this project. Demolition of MEC and MDEH will be conducted using just-in-time (JIT) delivery of explosives.

### 1.9 PLANNED OR ESTABLISHED DEMOLITION AREAS

No dedicated demolition area is planned for this project. Acceptable to move MEC and MDEH may be moved within the site to coduct demolition operations on those items. Only items determined to be unacceptable to move by the senior UXO supervisor (SUXOS) and UXO safety officer (UXOSO) will be BIP.

## TYPES OF MEC

MEC previously located on the Target S-1 site consists of Mk 7 MOD 1 JATO motors. As stated in paragraph 1.7, the Mk 83 GPLD bomb will be used for the purpose of establishing ESQD because information on the Mk 7 JATO motor is not available and the Mk 83 provides a conservative munition with the greatest fragmentation distance (MGFD). If the MGFD changes, the ESQDs will be adjusted, per DDESB Technical Paper 16 (TP16), activities will continue, and an amendment submitted to this ESS.

## START DATE

The projected start date for the surface clearance fieldwork is May 31, 2017. This is based on the final approval of this ESS.

## MIGRATION OF MEC

Munitions and Explosives of Concern may be potentially transported through erosive forces, primarily surface water runoff generated by precipitation. Average annual snowfall is 11.0 inches, while average annual rainfall is 9.81 inches; much of that rainfall occurs during brief, intense thunderstorms. These storms are capable of causing flash floods and severe soil erosion; there are arroyos within the vicinity of the sites. However, the POL NALEMP Specialist has indicated that little MEC has been observed in arroyos adjacent to the site.

## DETECTION EQUIPMENT AND REPSONSE TECHNIQUES

### 1.10 DETECTION EQUIPMENT

Traditional detection equipment (Schonstedt GA-52CX or similar) will be used to locate MEC/MPPEH/MD on the surface.

### 1.11 MUNITIONS DEBRIS PROCESSING

After demilitarization operations are complete, two UXO Technicians will inspect and certify all MD as material documented as safe (MDAS) using a visual inspection procedure in compliance with USACE EM 1110-1-4009. Demilitarization will be accomplished in accordance with DoD Demilitarization Manual DoD 4160.21-M-1.

MD that has been independently 100% inspected by two UXO personnel and determined to be MDAS will be secured in a sealed, labeled and locked container staged for transportation to a qualified recycler.

### 1.12 REMOVAL DEPTH

There is no target removal depth for the activities that will be conducted at the site. This ESS only covers activities associated with the MEC/MPPEH and MD surface clearance.

## LIMITATIONS

### 1.13 TERRAIN AND SOIL LIMITATIONS

The regional terrain of the Target S-1 site is made up of flat-topped mesas, steep rugged sandstone cliffs, and narrow rocky canyons. Typical altitude at the site is between 5,000 and 6,000 feet (ft) above mean sea level (amsl). The Target S-1 site slopes mildly downward toward the Rio Puerco to the east and significantly more abruptly rises to the northwest. The removal team will not approach within 30 feet of any vertical or nearly vertical geologic formation that could endanger personal health due to a fall. There are no terrain or soil limitations expected to impede this project.

### 1.14 DEMOLITION AREA

No dedicated demolition areas are anticipated for this project. Demolition/disposal of MEC/MPPEH will be conducted within the site but may be relocated to a central location for ease of the operation. To limit the impact to the sites, MEC/MPPEH will be disposed of using boosters or perforators as donor charges.At the completion of demolition operations the demolition area will be restored to their natural state. The MFD-H distance for all personnel during demolition operations will be established as discussed in Section 3.2.

### 1.15 FOOTPRINT AREAS

As previously indicated, demolition activities will all be conducted within the boundary of the Target S-1 site.

## DISPOSITION TECHNIQUES

### 1.16 DEMOLITION OPERATIONS

If disposal activities are required, they will be performed by TP-18 qualified UXO personnel with in the Target S-1 site where the item was found. The MSD for the intentional detonation for the 1000 lb MK 83 GPLD Bomb is included in **Table 1.5-1**.
Sandbags (HNC-ED-CS-S-98-7, Amendment 2, November 2014) or water mitigation (HNC-ED-CS-S-00-3) may be used to reduce the intentional detonation MSD. Tamping (single or multiple items) may be used in accordance with DDESB TP16 and the Buried Explosion Module, Version 6.3.3 or later version if released by DDESB. These reports will be available on site for all mitigation methods used. In addition to single sandbag mitigation, double sandbag mitigation may be used. Note that, while sandbags are not applicable for the 1000 lb. MK 83 1000 lb GPLD bomb listed in **Table 1.5-1**, they may be applicable should other smaller munition items be identified at the Projects at the project site. As such, sandbag information was retained by reference in this ESS.

All MPPEH will be handled in accordance with DoD Instruction 4140.62 and Engineer Manual 200-1-15. All MPPEH will be assessed and its explosives safety status determined and documented prior to transfer within the DoD or release from DoD control. Prior to release to the public, MPPEH will be documented by authorized and technically-qualified personnel as material documented as safe after a 100% inspection and independent 100% re-inspection to determine that it is safe from an explosives safety perspective.

The MGFD for the Target S-1 site is indicated in **Table 1.5-1**. items with smaller mentation distances may be found. Demolition of these items may be done using the item-specific MSDs and engineering controls in accordance with DDESB TP-16 Fragmentation Database. For items not in the DDESB TP-16 Fragmentation Database, the maximum fragment distance (MFD) may be calculated in accordance with the generic equations in DDESB TP16. (Note: the Generic Equation Calculator is available on DDESB's secure website at http://www.ddesb.pentagon.mil/).

No collection point or dedicated demolition area will be established for the remedial investigation activities. MEC identified will be BIP using engineering controls (*i.e.*, Buried Explosion Module, Version 6.3.3 or later version if released by DDESB) to mitigate the hazard posed by fragments produced by the detonations. Recovered MEC will be BIP on the transect or grid where found, unless the presence of threatened and endangered species, sensitive habitat, or the proximity to buildings or structures require that the item be moved, if deemed acceptable to do so by the SUXOS and UXOSO, to another location within the MRS. If an anomaly is verified as UXO, the Project Delivery Team will be notified and the item will be secured until the disposition location is determined.

The SUXOS and the UXOSO have the authority to determine if MEC is acceptable to move.

All explosive operations will follow the procedures outlined in the site work plans, standard operating porcedures ad Enee Manual 385-1-97, Explosive Safety and Health Requirements Manual. Demolition operations will be performed daily o the items properly secured until operations can be conducted.

No explosives storage is anticipated. Rather, JIT explosives delivery will be used for disposal of any MEC items recoverd during operations. Explosives will be provided by a local vendor on an as needed basis.

### 1.17 TRANSPORTATION

No off-site transportation of explosives, MEC, or MPPEH will be conducted.

### 1.18 ALTERNATIVE DISPOSAL TECHNIQUES

No alternative disposal techniques are planned for this munitions response.

## TECHNICAL SUPPORT

POL/Arcadis qualified UXO personnel will be responsible for recovering and disposing of any MEC and MPPEH found within the Target S-1 site during the MEC and MD surface clearance. All personnel assigned to each phase of the project will meet applicable DoD, DDESB, and USACE training and experience requirements for their assigned positions.

## RESIDUAL RISK MANAGEMENT

### 1.19 LAND USE RESTRICTIONS —

Access to the Target S-1 site by land is controlled by the POL. The Target S-1 site is located in a remote area which can be accessed by traveling several miles of dirt roads. Access is limited to POL tribal members and guests who have received specific permission to be on tribal land. POL tribal members have been notified of the past use of the Target S-1 site and the types of hazards associated with residual MEC at these sites.

POL controls access to the lands where the Target S-1 site is located. Given the remote nature of the area, it is sparingly used, and only for recreational activities, hunting, and subsistence and commercial livestock purposes by tribal enterprises and independent tribal members. Hunters are required to attend a safety awareness course.

## STAKEHOLDER INVOLVEMENT

This project will be conducted under NALEMP for the POL; funding is established under a cooperative agreement between the POL and U.S. DoD. The POL will oversee the project, which will be executed by Arcadis. The USACE and the U.S. Environmental Protection Agency (USEPA) have been involved with previous efforts related to this former Precision Bombing Range (PBR). Given the Target S-1 site is in a relatively remote location controlled by the POL, a public involvement initiative should not be necessary. While not anticipated, if during the course of the munitions response actions it is deemed necessary for a public involvement initiative, an appropriate campaign will be initiated. All stakeholders will be kept informed and will be involved in the review of draft deliverables.

## CONTINGENCIES

No chemical warfare material (CWM) is suspected at these site. However, if suspect CWM is found, or if a MEC item cannot be positively identified, or a munition with an unknown filler is located, project personnel shall immediately withdraw upwind from the work area, secure the area in accordance with (IAW) USACE guidance (Interim Guidance Document 23 April 2004 *Notification Procedures for Discovery of CWM on USACE Projects*, EP 1110-1-18, and [Army Regulation] AR 360-1) and contact the on-site USACE OE Safety Specialist. The POL NALEMP Manager will also be notified.

# Appendix A:

## Mk 83 GPLD Bomb,
## Minimum Separation Distance Data Sheet

# Fragmentation Data Review Form

Database Revision Date 3/7/2016

| | |
|---|---|
| Category: | Air-Launched HE Rounds |
| Munition: | 1000 lb Mk 83 Bomb |
| Case Material: | Steel, Mild |
| Fragmentation Method: | Naturally Fragmenting |
| Secondary Database Category: | Bomb |
| Munition Case Classification: | Robust |

| | |
|---|---|
| DODIC: | E506 |
| Date Record Created: | 10/5/2009 |
| Record Created By: | SDH |
| Last Date Record Updated: | 9/14/2011 |
| Individual Last Updated Record: | SDH |
| Date Record Retired: | |

## Munition Information and Fragmentation Characteristics

| | |
|---|---|
| Explosive Type: | H-6 |
| Explosive Weight (lb): | 445 |
| Diameter (in): | 13.9400 |
| Cylindrical Case Weight (lb): | 390.13511 |
| Maximum Fragment Weight (Intentional) (lb): | 0.9877 |
| Design Fragment Weight (95%) (Unintentional) (lb): | 0.1375 |
| Critical Fragment Velocity (fps): | 8129 |

## Theoretical Calculated Fragment Distances

| | |
|---|---|
| HFD [Hazardous Fragment Distance: distance to no more than 1 hazardous fragment per 600 square feet] (ft): | 816 |
| MFD-H [Maximum Fragment Distance, Horizontal] (ft): | 3447 |
| MFD-V [Maximum Fragment Distance, Vertical] (ft): | 2727 |

## Overpressure Distances

| | |
|---|---|
| TNT Equivalent (Pressure): | 1.38 |
| TNT Equivalent Weight - Pressure (lbs): | 614.100 |
| Unbarricaded Intraline Distance (3.5 psi), K18 Distance: | 153 |
| Public Traffic Route Distance (2.3 psi); K24 Distance: | 204 |
| Inhabited Building Distance (1.2 psi), K40 Distance: | 340 |
| Intentional MSD (0.0655 psi), K328 Distance: | 2788 |

Note: Per V5.E3.2.2.1 of DoD 6055.09-M the minimum sited K328 distance may be no smaller than 200 ft.

## Sandbag and Water Mitigation Options

| | |
|---|---|
| TNT Equivalent (Impulse): | 1.15 |
| TNT Equivalent Weight - Impulse (lbs): | 511.750 |
| Kinetic Energy $10^6$ (lb-ft²/s²): | 27.9983 |

### Single Sandbag Mitigation

| | |
|---|---|
| Required Wall & Roof Thickness (in) | Not Permitted |
| Expected Max. Throw Distance (ft): | Not Permitted |
| Minimum Separation Distance (ft): | Not Permitted |

### Double Sandbag Mitigation

| | |
|---|---|
| Required Wall & Roof Thickness (in) | Not Permitted |
| Expected Max. Throw Distance (ft): | Not Permitted |
| Minimum Separation Distance (ft): | Not Permitted |

### Water Mitigation

| | |
|---|---|
| Minimum Separation Distance (ft): | Not Permitted |
| Water Containment System: | Not Permitted |

Note: Use Sandbag and Water Mitigation in accordance with all applicable documents and guidance. If a donor charge larger than 32 grams is utilized, the above mitigation options are no longer applicable. Subject matter experts may be contacted to develop site specific mitigation options.

## Minimum Thickness to Prevent Perforation

| | Intentional | Unintentional |
|---|---|---|
| 4000 psi Concrete (Prevent Spall): | 39.86 | 14.81 |
| Mild Steel: | 6.19 | 2.44 |
| Hard Steel: | 5.08 | 2.00 |
| Aluminum: | 11.84 | 4.94 |
| LEXAN: | 16.47 | 9.28 |
| Plexi-glass: | 16.67 | 7.79 |
| Bullet Resist Glass: | 15.76 | 6.76 |

## Item Notes

**Distribution authorized to the Department of Defense and U.S. DoD contractors only for Administrative-Operational Use (17 October 2002). Other requests shall be referred to the Chairman, Department of Defense Explosives Safety Board, Room 856C, Hoffman Building I, 2461 Eisenhower Avenue, Alexandria, VA 22331-0600.**

# APPENDIX C

## Quality Documentation and Letter of Completion

# Weekly Quality Control Report

10 July – 14 July 2017

Name and Location of Project: NALEMP, Pueblo of Laguna, NM. Site S-1 and JATO Site 1, Surface Clearance.

| CONTRACTOR/SUBCONTRACTORS | AREAS OF RESPONSIBILITY |
|---|---|
| ARCADIS | Prime Contractor/UXO Management/SUXOS, UXOSOQCS, UXO III, 2 UXO II Personnel and 8 UXOSP on site 10 July. |

**Work performed This Week**

07/10/2017 Conducted initial Project In Brief, Safety Brief and Site Training for all personnel. Conducted tour of jobsite for familiarization. Conducted UTV Training for all site personnel.

07/11/2017 Set up corner stakes for S-1. Team began surface sweep operations on Site S-1. I Conducted at least 30% QC of all work completed. QC was performed real time as sweeps were being done.

07/12/2017 Sweep Team performed surface clearance on Site S-1. I conducted at least 30% QC of all area covered by UXO Team today. QC was performed real time as sweeps were being done.

07/13/2017 Sweep Team performed surface clearance on Site S-1. I conducted at least 30% QC of all area covered by UXO Team today. QC was performed real time as sweeps were being done.

07/14/2017 Sweep Team performed surface clearance on Site S-1. I conducted at least 30% QC of all area covered by UXO Team today. QC was performed real time as sweeps were being done.

**Follow-up inspection (Assure control testing performed as required and all work performed continues to be in compliance with plans and specifications).**

None Required. All site work is being conducted IAW the requirements of the project Work Plan.

**Verbal instructions by Client.**

None. The client was involved with the QC audits and did not have any concerns with the quality of the work being performed.

**Equipment Data: (List items other than hand tool being used at the project site).**

2 4x4 Pickups, 1 AWD SUV and 1 4X4 UTV.

**Results of safety inspection (Note safety violations and corrective action taken. Indicate phase of work where violations occurred).**

No Safety Violations Observed.

**ARCADIS verification: The above report is complete and correct and all material and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications except as noted above.**

**Date:** 14 JUL 2017 **Jeffrey Holm**, UXOSO/QC

# Weekly Quality Control Report

17 July – 21 July
2017

Name and Location of Project: NALEMP, Pueblo of Laguna, NM. Site S-1 and JATO Site 1, Surface Clearance.

| CONTRACTOR/SUBCONTRACTORS | AREAS OF RESPONSIBILITY |
|---|---|
| ARCADIS | Prime Contractor/UXO Management/SUXOS, UXOSOQCS, UXO III, 2 UXO II Personnel and 8 UXOSP on site 10 July. |

| |
|---|
| **Work performed This Week** |
| 07/17/2017 Sweep Team performed surface clearance on Site S-1. I conducted at least 30% QC of all area covered by UXO Team today. QC was performed real time as sweeps were being done |
| 07/18/2017 Sweep Team performed surface clearance on Site S-1. I conducted at least 30% QC of all area covered by UXO Team today. QC was performed real time as sweeps were being done |
| 07/19/2017 Sweep Team performed surface clearance on Site S-1. I conducted at least 30% QC of all area covered by UXO Team today. QC was performed real time as sweeps were being done. |
| 07/20/2017 Sweep Team performed surface clearance on Site S-1. I conducted at least 30% QC of all area covered by UXO Team today. QC was performed real time as sweeps were being done. |
| 07/21/2017 Sweep Team performed surface clearance on Site S-1. I conducted at least 30% QC of all area covered by UXO Team today. QC was performed real time as sweeps were being done. Site S-1 complete. |
| **Follow-up inspection (Assure control testing performed as required and all work performed continues to be in compliance with plans and specifications).** |
| None Required. All site work is being conducted IAW the requirements of the project Work Plan. |
| |
| **Verbal instructions by Client.** |
| None. The client was involved with the QC audits and did not have any concerns with the quality of the work being performed. |
| **Equipment Data: (List items other than hand tool being used at the project site).** |
| 2 4x4 Pickups, 1 AWD SUV and 1 4X4 UTV. |
| |
| **Results of safety inspection (Note safety violations and corrective action taken. Indicate phase of work where violations occurred).** |
| No Safety Violations Observed. |

**ARCADIS verification: The above report is complete and correct and all material and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications except as noted above.**

**Date:** 21 JUL 2017 **Jeffrey Holm**, UXOSO/QC

PUEBLO OF LAGUNA

September 26, 2017

Mr. Wayne Patterson
Program Manager
Arcadis U.S. Inc.
10205 Westheimer Rd., Suite 800
Houston, TX 77042

RE: **Completion of Munitions and Explosives (MEC) and Munitions Debris (MD) Surface Clearance on Kirtland Air Force Base (KAFB) Practice Bombing Range (PBR) 14, Target S-1 Site**

Dear Mr. Patterson,

This letter serves as official notice to Arcadis U.S. Inc., MEC and MD Surface Clearance of KAFB PBR 14, Target S-1 Site, tasked in accordance with Request for Proposal provided by the Pueblo of Laguna NALEMP Program has been completed. Removal and disposal of Material Documented as Safe (MDAS) has been performed in a safe manner acceptable to Pueblo of Laguna. Quality Control (QC) performed by Pueblo of Laguna NALEMP Specialist and Arcadis U.S. Inc., Senior Unexploded Ordnance Supervisor (SUXOS) personnel verified project has been completed as tasked. On behalf of the Pueblo of Laguna, I would like to commend Arcadis U.S. Inc., team for a job well done.

Sincerely,

Sabin Chavez
Pueblo of Laguna, NALEMP Specialist

x/c: File

PO BOX 194 • LAGUNA • NEW MEXICO • 87026
PH: 505.552.6654 • FX: 505.552.6941

# APPENDIX D

## Disposal Documentation

DD FORM 1348-1A, JUL 91 (EG) ISSUE RELEASE/RECEIPT DOCUMENT

| 1. TOTAL PRICE | | 2. SHIP FROM | 3. SHIP TO |
|---|---|---|---|
| | | ARCADIS, Pueblo of Laguna S-1 and JATO 1 / Laguna, NM | ACE Metals 5711 Broadway, Alb. NM 87105 |
| | | 4. MARK FOR | |

| DOC | IDENT | RI FROM | M&S | UNIT | ISS | QUANTITY | SER | SUPPLEMENTARY ADDRESS | SIG | FUND | DISTRIBUTION | PROJECT | PRI | REQD | DEL | DATE | ADV | RI | O/P | COND | MGT | UNIT PRICE DOLLARS | UNIT PRICE CTS | DOLLARS | CTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| 5. DOC DATE | 6. NMFC | 7. FRT RATE | 8. TYPE CARGO | 9. PS |
|---|---|---|---|---|
| 2170810 | | | | |

| 10. QTY. REC'D | 11.UP | 12. UNIT WEIGHT | 13. UNIT CUBE | 14. UFC | 15. SL |
|---|---|---|---|---|---|
| 1 | | 30 lbs. | 1 Cube Foot | | |

16. FREIGHT CLASSIFICATION NOMENCLATURE

17. ITEM NOMENCLATURE

Material Documented as Safe (MDAS)/Mixed Metal

| 18. TY CONT | 19. NO CONT | 20. TOTAL WEIGHT | 21. TOTAL CUBE |
|---|---|---|---|
| 5 Gal | 1 | 30 lbs. | 1 Cube foot |

| 22. RECEIVED BY | 23. DATE RECEIVED |
|---|---|
| | 20170811 |

24. DOCUMENT NUMBER & SUFFIX (30-44)

Serial number: POL Laguna/ARDADIS/5 gallon drum 0001/2017/08/11. (No seals were used as the MDAS was 100% inspected by 2 UXO III technicians as it was loaded then escorted to ACE metals where it was inspected and accepted by the receiver before it was unloaded at the shredder).

Project number: 06538009.0000

25. NATIONAL STOCK NO. & ADD (8-22)

MDAS/mixed metal generated while conducting an MMRP Surface clearance at Target S-1 and JATO 1 Laguna NM from 07/10/2017 through 08/11/2017.

The MDAS is classified as: "Non-Hazardous Waste"

26. RIC (4-6) UI (23-24) QTY (25-29) CON CODE (71) DIST (55-56) UP (74-80)

One 5 gallon drum of MDAS moved from the project site to ACE metals under UXO escort and shredded.

"This certifies that the material listed has been 100 percent inspected and to the best of our knowledge and belief, are inert and/or free of explosive or related materials".

Certified By: Greg Peterson SUXOS _____ Date: 08/11/2017 Kevin Heald UXO III _____ Date: 08/11/2017

27. ADDITIONAL DATA

Verification that the MDAS scrap process was conducted IAW EM 385-1-97 and Project Plans.

Verified By: Jeff Holm UXOSO/QC _____ Date: 08/11/2017

PREVIOUS EDITION MAY BE USED

Adobe Designer 7.0

Date: ~~10~~ 11 August 2017

To: ACE Metals, 5711 Broadway SE, Albuquerque, NM 87105

Subject: One 5 Gallon Drum with 30 lbs. of Material Documented as Safe (MDAS), Mixed Metal, Serial Number: POL Laguna/ARCADIS/5 Gallon Drum 0001/2017/08/~~10~~ 11 – (no seal): MDAS was escorted by ARCADIS to the Shredder.

On receipt and after the material has been properly recycled as listed below please sign, and date this document and provide it to the ARCADIS SUXOS escorting the material to your facility. SUXOS Greg Peterson.

To: ARCADIS – US

RE: Receipt of MDAS

I certify that the contents of the subject 5 gallon drum of 100% inspected MDAS, serial number: POL Laguna/ARCADIS/5 Gallon Drum 0001/2017/08/~~10~~ 11, was further inspected by ACE Metals to verify that the drum was under escorted to ACE Medals by Greg Peterson when it arrived and that the MDAS was further inspected by ACE Medals and no explosive hazards were detected before it's acceptance for recycling. This material will not be sold, traded or otherwise given to another party until the entire contents have been smelted or shredded and are only identifiable by their basic content.

Name of Recycler: ACE Metals

Address: ACE Metals, 5711 Broadway SE, Albuquerque, NM 87105

Phone No.: 505-234-7396

Printed Name of receiver: Louis Duran

Signature: _____

Date material was smelted or shredded: 8/11/17

Printed name: Louis Duran

Signature: _____

# APPENDIX E

## Daily Site Activities Report / Photographs

# Daily Field Activity Report



Date: 10 May 2017

Project Name: ARC Survey POL

Project Number: 06538009.0000 Task: .00001

Weather: Rain, Wind, Hail and Lightning

Site Conditions: Poor

Visitors: None

| Work Force | | Remarks |
|---|---|---|
| ARCADIS | ARC Escort – 1 | |
| Subcontractor | EMI Archeologists – 3 | |
| Significant Equip. | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 1 | |

**Description of site activities**

On 10 May 17, an archeological survey sweep was conducted on S-1 Target area located on the Pueblo of Laguna Rio Puerco grazing range. Due to lightning, rain and hail, the sweep was cancelled with approximately one-half of a pass completed. Road conditions were quickly deteriorating and it was determined that the team should vacate the project area. The POL NALEMP representative was advised and agreed with the decision.

No MEC/ MD items were found.

The terrain is flat with some vegetation. It is hard-packed to very soft sand. Access roads are semi-rough and sandy in spots. Moisture renders the soil sticky and slick.

Start: 0700 End: 1200

Lunch Break : none taken

Safety: No safety discrepancies were noted.

Areas of concern: None

Title: UXO Escort/ Tech 2

Date: 10 May 17 Gabriel Salvador

# Daily Field Activity Report



Date: 15 May 2017

Project Name: ARC Survey POL

Project Number: 06538009.0000 Task: .00001

Weather: Sunny and Windy

Site Conditions: Good

Visitors: None

| Work Force | | Remarks |
|---|---|---|
| ARCADIS | ARC Escort – 1 | |
| Subcontractor | EMI Archeologists – 3 | |
| Significant Equip. | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 0 | |

**Description of site activities**

On 15 May 17, an archeological survey sweep was conducted on S-1 Target area located on the Pueblo of Laguna Rio Puerco grazing range. One archeological site, approximately 111m x 107m, was cataloged and recorded. Another site was identified and the outside boundaries were established.

No MEC/ MD items were found.

The terrain is flat with some vegetation. It is hard-packed to very soft sand. Access roads are semi-rough and sandy in spots. Moisture renders the soil sticky and slick.

Start: 0700 End: 1530

Lunch Break: 1200 - 1230

Safety: No safety discrepancies were noted.

Areas of concern: None

Title: UXO Escort/ Tech 2

Date: 15 May 17 Gabriel Salvador

# Daily Field Activity Report



Date: 16 May 2017

Project Name: ARC Survey POL

Project Number: 06538009.0000 Task: .00001

Weather: Sunny with possible afternoon thunderstorms

Site Conditions: Good

Visitors: None

| Work Force | | Remarks |
|---|---|---|
| ARCADIS | ARC Escort – 1 | |
| Subcontractor | EMI Archeologists – 3 | |
| Significant Equip. | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 0 | |

**Description of site activities**

On 10 May 17, an archeological survey sweep was conducted on S-1 Target area located on the Pueblo of Laguna Rio Puerco grazing range. An archeological site, approximately 79m x 59m, was cataloged and recorded. Two sweeps, from east to west, were also completed. Another archeological site boundaries were also established. Due to lightning, heavy rain and rapidly deteriorating road conditions it was determined that the team should vacate the project area.

No MEC/ MD items were found.

The terrain is flat with some vegetation. It is hard-packed to very soft sand. Access roads are semi-rough and sandy in spots. **Moisture renders the soil sticky and slick.**

Start: 0700 End: 1600

Lunch Break: 1200 to 1230

Safety: No safety discrepancies were noted.

Areas of concern: None

Title: UXO Escort/ Tech 2

Date: 10 May 17 Gabriel Salvador

# Daily Field Activity Report



Date: 17 May 2017

Project Name: ARC Survey POL

Project Number: 06538009.0000 Task: .00001

Weather: Wind w/ strong gusts

Site Conditions: Fair

Visitors: None

| Work Force | | Remarks |
|---|---|---|
| ARCADIS | ARC Escort – 1 | |
| Subcontractor | EMI Archeologists – 3 | |
| Significant Equip. | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 1 | |

**Description of site activities**

On 17 May 17, an archeological survey sweep was conducted on S-1 Target area located on the Pueblo of Laguna Rio Puerco grazing range. An archeological site, approximately 402m x 157m, was cataloged and recorded. Another site was surveyed to establish its boundaries.

No MEC/ MD items were found.

The terrain is flat with some vegetation. It is hard-packed to very soft sand. Access roads are semi-rough and sandy in spots. Moisture renders the soil sticky and slick.

Start: 0700 End: 1600

Lunch Break : 1200 to 1230

Safety: No safety discrepancies were noted.

Areas of concern: None

Title: UXO Escort/ Tech 2

Date: 17 May 17 Gabriel Salvador

# Daily Field Activity Report



Date: 18 May 2017

Project Name: ARC Survey POL

Project Number: 06538009.0000 Task: .00001

Weather: Wind w/ strong gusts

Site Conditions: Fair

Visitors: None

| Work Force | | Remarks |
|---|---|---|
| ARCADIS | ARC Escort – 1 | |
| Subcontractor | EMI Archeologists – 3 | |
| Significant Equip. | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 1 | |

**Description of site activities**

On 18 May 17, an archeological survey sweep was conducted on S-1 Target area located on the Pueblo of Laguna Rio Puerco grazing range. A survey to establish boundaries of an archeological site was completed and the cataloging and recording of artifacts, lithics and ceramic sherds, was started. The site encompasses a very large area. It will be completed tomorrow, 19 May 17.

No MEC/ MD items were found.

The terrain is flat with some vegetation. It is hard-packed to very soft sand. Access roads are semi-rough and sandy in spots. Moisture renders the soil sticky and slick.

Start: 0700 End: 1600

Lunch Break : 1200 to 1230

Safety: No safety discrepancies were noted.

Areas of concern: None

Title: UXO Escort/ Tech 2

Date: 18 May 17 Gabriel Salvador

# Daily Field Activity Report



Date: 19 May 2017

Project Name: ARC Survey POL

Project Number: 06538009.0000 Task: .00001

Weather: Cloudy w/ intermittent rain showers

Site Conditions: Fair

Visitors: None

| Work Force | | Remarks |
|---|---|---|
| ARCADIS | ARC Escort – 1 | |
| Subcontractor | EMI Archeologists – 3 | |
| Significant Equip. | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 0 | |

**Description of site activities**

On 19 May 17, an archeological survey sweep was conducted on S-1 Target area located on the Pueblo of Laguna Rio Puerco grazing range. An archeological site, approximately 480m x 175m, was cataloged and recorded. Rain and stormy conditions ended the day early.

No MEC/ MD items were found.

The terrain is flat with some vegetation. It is hard-packed to very soft sand. Access roads are semi-rough and sandy in spots. Moisture renders the soil sticky and slick. Road conditions deteriorate rapidly with moderate amounts of moisture.

Start: 0700 End: 1030

Lunch Break : None taken

Safety: No safety discrepancies were noted.

Areas of concern: None

Title: UXO Escort/ Tech 2

Date: 19 May 17 Gabriel Salvador

# Daily Field Activity Report



**Date: 22 May 17**

**Project Name:** ARC Survey POL

**Project Number**: 06538009.0000 **Task:** .00001

**Weather: Sunny and windy with gusts at 25 mph**

**Site Conditions: Dry**

**Site Visitors:** None

| Work Force | | Remarks |
|---|---|---|
| **ARCADIS** | ARC Escort – 1 | |
| **Subcontractor** | EMI Archeologists – 3 | |
| **Significant Equip.** | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 0 | |

**Description of site activities**

**Four transects were completed, each at approximately 9 acres per sweep. Three potential archeological sites were discovered.**

**No MEC/ MD was discovered.**

**Very windy throughout the day.**

**NALEMP representative will not be onsite until possibly 26 May17**

**As of this date 42 percent, approximately 245 acres, of the S-1 Target area has been swept.**

**Start Time: 0700 to 1830**

**Distance covered**: 36 acres

**Per cent completed**: Of overall site, 42%

**MD encountered**: None

**Lunch Break: 1200 to 1230**

**Safety:** No safety discrepancies were noted.

**Areas of concern:** None

**Title:** UXO Escort/ Tech 2

**Date**: 22 May 17 Gabriel Salvador

# Daily Field Activity Report



**Date: 23 May 17**

**Project Name:** ARC Survey POL

**Project Number**: 06538009.0000 **Task:** .00001

**Weather: Sunny and windy**

**Site Conditions: Dry**

**Site Visitors:** None

| Work Force | | Remarks |
|---|---|---|
| **ARCADIS** | ARC Escort – 1 | |
| **Subcontractor** | EMI Archeologists – 3 | |
| **Significant Equip.** | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 0 | |

**Description of site activities**

**Two transects were completed, each at approximately 9 acres per sweep. One large archeological sites was discovered and the Arc team began defining the site boundaries.**

**No MEC/ MD was discovered.**

**Very windy throughout the day.**

**NALEMP representative will not be onsite until possibly 26 May17**

**Start Time: 0700 to 1730**

**Distance covered**: 18 acres

**Per cent completed**: Of overall site, 42%

**MD encountered**: None

**Lunch Break: 1200 to 1230**

**Safety:** No safety discrepancies were noted.

**Areas of concern:** Road construction on Hwy 6 causes delays of 15 to 20 min. when accessing the S-1 sweep area.

**Title:** UXO Escort/ Tech 2

**Date**: 22 May 17 Gabriel Salvador

# Daily Field Activity Report



**Date: 24 May 17**

**Project Name:** ARC Survey POL

**Project Number**: 06538009.0000 **Task:** .00001

**Weather: Sunny and windy**

**Site Conditions: Dry**

**Site Visitors:** None

| Work Force | | Remarks |
|---|---|---|
| **ARCADIS** | ARC Escort – 1 | |
| **Subcontractor** | EMI Archeologists – 3 | |
| **Significant Equip.** | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 0 | |

**Description of site activities**

**The Arc team was delayed at arriving to the site due to a flat tire.**

**The Arc team conducted a site boundary assessment of the east to northeast corner of POL S-1 Target area. Operations were curtailed early as no overtime is allowed for EMI employees.**

**No MEC/ MD was discovered.**

**Very windy throughout the day.**

**NALEMP representative will not be onsite until possibly 26 May17**

**Start Time: 0700 to 1500**

**Distance covered**: N/A

**Per cent completed**: 45% of overall site acrage.

**MD encountered**: None

**Lunch Break: 1200 to 1230**

**Safety:** No safety discrepancies were noted.

**Areas of concern:** Road construction on Hwy 6 causes delays of 15 to 20 min. when accessing the S-1 sweep area.

**Title:** UXO Escort/ Tech 2

**Date**: 22 May 17 Gabriel Salvador

# Daily Field Activity Report



**Date: 25 May 17**

**Project Name:** ARC Survey POL

**Project Number**: 06538009.0000 **Task:** .00001

**Weather: Sunny and very windy**

**Site Conditions: Dry**

**Site Visitors:** None

| Work Force | | Remarks |
|---|---|---|
| **ARCADIS** | ARC Escort – 1 | |
| **Subcontractor** | EMI Archeologists – 3 | |
| **Significant Equip.** | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 0 | |

**Description of site activities**

**One large archeological site, approximately 530m x 200m, was cataloged and recorded. Boundary assessment was initiated on another very large site.**

**No MEC/ MD was discovered.**

**Very windy throughout the day w/ gusts up to 35 mph.**

**NALEMP representative will not be onsite until possibly 26 May17**

**Start Time: 0700 to 1730**

**Distance covered**: 0

**Per cent completed**: Of overall site, 42%

**MD encountered**: None

**Lunch Break: 1200 to 1230**

**Safety:** No safety discrepancies were noted.

**Areas of concern:** Road construction on Hwy 6 causes delays of 20 to 30 min. when accessing the S-1 sweep area.

**Title:** UXO Escort/ Tech 2

**Date**: 22 May 17 Gabriel Salvador

# Daily Field Activity Report



**Date: 26 May 17**

**Project Name:** ARC Survey POL

**Project Number**: 06538009.0000 **Task:** .00001

**Weather: Sunny and very windy**

**Site Conditions: Dry**

**Site Visitors:** None

| Work Force | | Remarks |
|---|---|---|
| **ARCADIS** | ARC Escort – 1 | |
| **Subcontractor** | EMI Archeologists – 3 | |
| **Significant Equip.** | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 1 | |

**Description of site activities**

**One large archeological site was established, cataloged and recorded. The site was approximately 600m x 300m.**

**No MEC/ MD was discovered.**

**Very windy throughout the day with gusts up to 30 mph as measured with a Kestrel 3000.**

**NALEMP representative and briefed on the weeks progress.**

**See map for UXO dispersion as of 26 May 17. Photos are in progression from North to South: 1,2,3.**

**Start Time: 0700 to 1730**

**Distance covered**:

**Per cent completed**: Of overall site, 42%

**MD encountered**: None

**Lunch Break: 1200 to 1230**

**Safety:** No safety discrepancies were noted.

**Areas of concern:** Road construction on Hwy 6 causes delays of 15 to 20 min. when accessing the S-1 sweep area.

**Title:** UXO Escort/ Tech 2

**Date**: 22 May 17 Gabriel Salvador

# Daily Field Activity Report



**Date: 30 May 17**

**Project Name:** ARC Survey POL

**Project Number**: 06538009.0000 **Task:** .00001

**Weather: Sunny, windy, partly cloudy**

**Site Conditions: Dry**

**Site Visitors:** None

| Work Force | | Remarks |
|---|---|---|
| **ARCADIS** | ARC Escort – 1 | |
| **Subcontractor** | EMI Archeologists – 3 | |
| **Significant Equip.** | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 0 | |

**Description of site activities**

**An archeological site, approximately 110m x 230m was delineated, cataloged and recorded.**

**No MEC/ MD was discovered.**

**Very windy throughout the day.**

**NALEMP representative was not on-site today.**

**Start Time: 0700 to 1800**

**Distance covered**: 0

**Per cent completed**: Of overall site, 42%

**MD / MEC encountered**: None

**Lunch Break: 1200 to 1230**

**Safety:** No safety discrepancies were noted.

**Areas of concern:** Road construction on Hwy 6 causes delays of 20 to 40 min. when accessing the S-1 sweep area.

**Title:** UXO Escort/ Tech 2

**Date**: 30 May 17 Gabriel Salvador

# Daily Field Activity Report



**Date: 31 May 17**

**Project Name:** ARC Survey POL

**Project Number**: 06538009.0000 **Task:** .00001

**Weather: Cloudy**

**Site Conditions: Light rain**

**Site Visitors:** None

| Work Force | | Remarks |
|---|---|---|
| **ARCADIS** | ARC Escort – 1 | |
| **Subcontractor** | EMI Archeologists – 3 | |
| **Significant Equip.** | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 0 | |

**Description of site activities**

**A previously discovered archeological site, located within the swept portion of S-1 was assessed and cataloging was begun. It appears to be another very large site. Numerous lithics, sherds and tools were found. Cataloging and recording will resume tomorrow.**

**No MEC/ MD was discovered.**

**Very windy throughout the day with light intermittent rain.**

**NALEMP representative was not on-site today.**

**Start Time: 0700 to 1730**

**Distance covered**: 0

**Per cent completed**: Of overall site, 42%

**MD / MEC encountered**: None

**Lunch Break: 1200 to 1230**

**Safety:** No safety discrepancies were noted.

**Areas of concern:** Road construction on Hwy 6 causes delays of 20 to 40 min. when accessing the S-1 sweep area.

**Title:** UXO Escort/ Tech 2

**Date**: 30 May 17 Gabriel Salvador

# Daily Field Activity Report



**Date: 1 Jun 17**

**Project Name:** ARC Survey POL

**Project Number**: 06538009.0000 **Task:** .00001

**Weather: Sunny, windy, partly cloudy**

**Site Conditions: Rain and lightning at end of day.**

**Site Visitors:** None

| Work Force | | Remarks |
|---|---|---|
| **ARCADIS** | ARC Escort – 1 | |
| **Subcontractor** | EMI Archeologists – 3 | |
| **Significant Equip.** | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 0 | |

**Description of site activities**

**An archeological site, approximately 875m x 625m was cataloged and recorded. Pictures West and North are views from eastern center of site. Lithic concentration and lithic pictures are a representative of what is normally in each arc site. Sherd concentration and sherd pictures are also typical. The overview picture shows the size of this site. The truck being in the center of the site. The three archeologists are all standing on the outside boundary of the site.**

**No MEC/ MD was discovered.**

**NALEMP representative was not on-site today.**

**Start Time: 0700 to 1730**

**Distance covered**: 0

**Per cent completed**: Of overall site, 42%

**MD / MEC encountered**: None

**Lunch Break: 1200 to 1230**

**Safety:** No safety discrepancies were noted.

**Areas of concern:** Road construction on Hwy 6 causes delays of 20 to 40 min. when accessing the S-1 sweep area.

**Title:** UXO Escort/ Tech 2

**Date**: 1 Jun 17 Gabriel Salvador

# Daily Field Activity Report



**Date: 2 Jun 17**

**Project Name:** ARC Survey POL

**Project Number**: 06538009.0000 **Task:** .00001

**Weather: Partly Cloudy and Humid**

**Site Conditions: Dry**

**Site Visitors:** None

| Work Force | | Remarks |
|---|---|---|
| **ARCADIS** | ARC Escort – 1 | |
| **Subcontractor** | EMI Archeologists – 3 | |
| **Significant Equip.** | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 1 | |

**Description of site activities**

**Another archeological site, approximately 350m x 200m, was delineated, cataloged and recorded. A smaller site, approximately 100m x 180m, was also cataloged and recorded. There is only one more site to investigate before surface sweep actions can continue.**

**No MEC/ MD was discovered.**

**Rain at the end of the day.**

**NALEMP representative was on-site briefly. He expressed his satisfaction with the progress the arc team was making**

**Start Time: 0700 to 1800**

**Distance covered**: 0

**Per cent completed**: Of overall site, 42%

**MD / MEC encountered**: None

**Lunch Break: 1200 to 1230**

**Safety:** No safety discrepancies were noted.

**Areas of concern:** Road construction on Hwy 6 causes delays of 20 to 40 min. when accessing the S-1 sweep area.

**Title:** UXO Escort/ Tech 2

**Date**: 2 Jun 17 Gabriel Salvador

# Daily Field Activity Report



**Date: 6 Jun17**

**Project Name:** ARC Survey POL

**Project Number**: 06538009.0000 **Task:** .00001

**Weather: Partly Cloudy with Strong afternoon winds.**

**Site Conditions: Dry**

**Site Visitors:** None

| Work Force | | Remarks |
|---|---|---|
| **ARCADIS** | ARC Escort – 1 | |
| **Subcontractor** | EMI Archeologists – 3 | |
| **Significant Equip.** | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 0 | |

**Description of site activities**

**An arc site, approximately 125m x 200m, was cataloged and recorded. The northern 245 acres are complete. (42%)**

**Two initial discovery sweeps, approximately 18 acres, were conducted.**

**One arc site was preliminarily investigated that was identified during the two sweeps.**

**No MEC/ MD was located during these sweeps.**

**NALEMP representative was not on-site today.**

**Start Time: 0700 to 1730**

**Distance covered**: 18 acres (preliminary)

**Per cent completed**: 42%

**MD / MEC encountered**: None

**Lunch Break: 1200 to 1230**

**Safety:** No safety discrepancies were noted.

**Areas of concern:** Road construction on Hwy 6 causes delays of 10 to 30 min. when accessing the S-1 sweep area.

**Title:** UXO Escort/ Tech 2

**Date**: 6 Jun 17 Gabriel Salvador

# Daily Field Activity Report



**Date: 7 Jun17**

**Project Name:** ARC Survey POL

**Project Number**: 06538009.0000 **Task:** .00001

**Weather: Clear and Hot**

**Site Conditions: Dry**

**Site Visitors:** None

| Work Force | | Remarks |
|---|---|---|
| **ARCADIS** | ARC Escort – 1 | |
| **Subcontractor** | EMI Archeologists – 3 | |
| **Significant Equip.** | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 0 | |

**Description of site activities**

**Four discovery sweeps, approximately 36 acres, were conducted.**

**The large Arc site investigation, began yesterday, continued today. The site is quickly becoming the largest site yet. After more sweeps, it appears that the site will continue to grow.**

**No MEC/ MD was located during these sweeps.**

**NALEMP representative was not on-site today. Sabin informed me that he might be out tomorrow with his THPO.**

**Start Time: 0700 to 1730**

**Distance covered**: 36 acres (56 total preliminary w/o archeological site categorization)

**Per cent completed**: 42% (preliminary and Arc categorization)

**MD / MEC encountered today**: None

**Lunch Break: 1200 to 1230**

**Safety:** No safety discrepancies were noted.

**Areas of concern:** Road construction on Hwy 6 causes delays of 10 to 20 min. when accessing the S-1 sweep area.

**Title:** UXO Escort/ Tech 2

**Date**: 7 Jun 17 Gabriel Salvador

# Daily Field Activity Report



**Date: 8 Jun17**

**Project Name:** ARC Survey POL

**Project Number**: 06538009.0000 **Task:** .00001

**Weather: Clear and Hot**

**Site Conditions: Dry**

**Site Visitors:** None

| Work Force | | Remarks |
|---|---|---|
| **ARCADIS** | ARC Escort – 1 | |
| **Subcontractor** | EMI Archeologists – 3 | |
| **Significant Equip.** | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 0 | |

**Description of site activities**

**Two discovery sweeps, approximately 18 acres, were conducted.**

**The large Arc site investigation, began on Tuesday, continued today. After two more sweeps a boundary can finally be established. The site measures approximately 625m x 425m.Cataloging and recording will begin tomorrow.**

**No MEC/ MD was located during these sweeps.**

**NALEMP representative was briefly on site with the THPO. They will be on-site tomorrow morning for a tour of the completed Arc survey area.**

**Start Time: 0700 to 1730**

**Distance covered**: 18 acres (74 total preliminary w/o archeological site categorization)

**Per cent completed**: 42% (preliminary and Arc categorization)

**MD / MEC encountered today**: None

**Lunch Break: 1200 to 1230**

**Safety:** No safety discrepancies were noted.

**Areas of concern:** Road construction on Hwy 6 causes delays of 10 to 20 min. when accessing the S-1 sweep area.

**Title:** UXO Escort/ Tech 2

**Date**: 8 Jun 17 Gabriel Salvador

# Daily Field Activity Report



**Date: 9 Jun17**

**Project Name:** ARC Survey POL

**Project Number**: 06538009.0000 **Task:** .00001

**Weather: Clear and Hot**

**Site Conditions: Dry**

**Site Visitors:** POL THPO Gaylord Siow

| Work Force | | Remarks |
|---|---|---|
| **ARCADIS** | ARC Escort – 1 | |
| **Subcontractor** | EMI Archeologists – 3 | |
| **Significant Equip.** | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 1 | |

**Description of site activities**

**POL THPO was brought out by POL NALEMP Rep for a site visit and tour. They were shown sites and artifacts found in the completed northern portion of S-1. Pictures: 5 – 8.**

**The large Arc site investigation, began on Tuesday, was completed today, after the site visit.**

**MD was located within the boundary of this site. The items found were shipping canisters for smoke grenades and a very large pallet with thick banding. Pictures: 4,9 & 10**

**Start Time: 0700 to 1830**

**Distance covered**: 18 acres (74 total preliminary w/o archeological site categorization)

**Per cent completed**: 42% (preliminary and Arc categorization)

**MD encountered today**: 1 plus 1 possible.

**Lunch Break: 1200 to 1230**

**Safety:** No safety discrepancies were noted.

**Areas of concern:** Road construction on Hwy 6 causes delays of 10 to 20 min. when accessing the S-1 sweep area.

**Title:** UXO Escort/ Tech 2

**Date**: 9 Jun 17 Gabriel Salvador

# Daily Field Activity Report



**Date: 13 Jun17**

**Project Name:** ARC Survey POL

**Project Number**: 06538009.0000 **Task:** .00001

**Weather: Clear and Hot**

**Site Conditions: Dry**

**Site Visitors:** None

| Work Force | | Remarks |
|---|---|---|
| **ARCADIS** | ARC Escort – 1 | |
| **Subcontractor** | EMI Archeologists – 3 | |
| **Significant Equip.** | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 0 | |

**Description of site activities**

**Two discovery sweeps, approximately 18 acres, were conducted.**

**Definition of another arc site, discovered during the morning sweeps, was initiated.**

**No MEC/ MD was located during these sweeps.**

**Site weather conditions continue to be hot and windy.**

**Start Time: 0700 to 1730**

**Distance covered**: 18 acres (92 total preliminary w/o archeological site categorization)

**Per cent completed**: 42% (preliminary and Arc categorization)

**MD / MEC encountered today**: None

**Lunch Break: 1200 to 1230**

**Safety:** No safety discrepancies were noted.

**Areas of concern:** Road construction on Hwy 6 causes delays of 10 to 20 min. when accessing the S-1 sweep area.

**Title:** UXO Escort/ Tech 2

**Date**: 13 Jun 17 Gabriel Salvador

# Daily Field Activity Report



**Date: 14 Jun17**

**Project Name:** ARC Survey POL

**Project Number**: 06538009.0000 **Task:** .00001

**Weather: Clear and Hot (102 degrees @ 4 pm)**

**Site Conditions: Dry**

**Site Visitors:** None

| Work Force | | Remarks |
|---|---|---|
| **ARCADIS** | ARC Escort – 1 | |
| **Subcontractor** | EMI Archeologists – 3 | |
| **Significant Equip.** | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 0 | |

**Description of site activities**

**Previously discovered site, approximately 1400m x 425m, was cataloged and recorded.**

**No MEC/ MD was located during these sweeps.**

**Site weather conditions continue to be hot and windy.**

**Approximately 75% of the S-1 project area is totally completed. See attached map.**

**Start Time: 0700 to 1800**

**Distance covered**: 0 acres (0 total preliminary w/o archeological site categorization)

**Per cent completed**: 75% (preliminary and Arc categorization)

**MD / MEC encountered today**: None

**Lunch Break: 1200 to 1230**

**Safety:** No safety discrepancies were noted.

**Areas of concern:** Road construction on Hwy 6 causes delays of 10 to 20 min. when accessing the S-1 sweep area.

**Title:** UXO Escort/ Tech 2

**Date**: 14 Jun 17 Gabriel Salvador

# Daily Field Activity Report



**Date: 15 Jun17**

**Project Name:** ARC Survey POL

**Project Number**: 06538009.0000 **Task:** .00001

**Weather: Clear and Very Hot**

**Site Conditions: Dry**

**Site Visitors:** None

| Work Force | | Remarks |
|---|---|---|
| **ARCADIS** | ARC Escort – 1 | |
| **Subcontractor** | EMI Archeologists – 3 | |
| **Significant Equip.** | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 0 | |

**Description of site activities**

**Four discovery sweeps, approximately 36 acres, were conducted.**

**One site, approximately 145m x 170m, was cataloged and recorded. Definition on another site was begun.**

**No MEC/ MD was located during these sweeps.**

**Site weather conditions continue to be hot and windy.**

**High today was 105 degrees.**

**Start Time: 0700 to 1730**

**Distance covered**: 36 acres (36 total preliminary w/o archeological site categorization)

**Per cent completed**: 75% (preliminary and Arc categorization)

**MD / MEC encountered today**: None

**Lunch Break: 1200 to 1230**

**Safety:** No safety discrepancies were noted.

**Areas of concern:** Road construction on Hwy 6 causes delays of 10 to 20 min. when accessing the S-1 sweep area.

**Title:** UXO Escort/ Tech 2

**Date**: 15 Jun 17 Gabriel Salvador

# Daily Field Activity Report



**Date: 26 Jun17**

**Project Name:** ARC Survey POL

**Project Number**: 06538009.0000 **Task:** .00001

**Weather: Partly Cloudy to Cloudy and Very Humid**

**Site Conditions: Dry**

**Site Visitors:** None

| Work Force | | Remarks |
|---|---|---|
| **ARCADIS** | ARC Escort – 1 | |
| **Subcontractor** | EMI Archeologists – 3 | |
| **Significant Equip.** | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 0 | |

**Description of site activities**

**Cataloged and recorded a 65m x 75m arc site.**

**Delineated another site, approximately 100m x 500m, with cataloging and recording to be completed on 27 Jun 17.**

**No MEC/ MD was located during these sweeps.**

**Site weather conditions were hot and humid.**

**Start Time: 0700 to 1800**

**Distance covered**: (0 total preliminary w/o archeological site categorization)

**Per cent completed**: 80% (preliminary and Arc categorization)

**MD / MEC encountered today**: None

**Lunch Break: 1200 to 1230**

**Safety:** No safety discrepancies were noted.

**Areas of concern:** Road construction on Hwy 6 causes delays of 10 to 20 min. when accessing the S-1 sweep area.

**Title:** UXO Escort/ Tech 2

**Date**: 26 Jun 17 Gabriel Salvador

# Daily Field Activity Report



**Date: 27 Jun17**

**Project Name:** ARC Survey POL

**Project Number**: 06538009.0000 **Task:** .00001

**Weather: Partly Cloudy and then VERY HOT and Humid**

**Site Conditions: Dry**

**Site Visitors:** None

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| Work Force | | Remarks |
|---|---|---|
| **ARCADIS** | ARC Escort – 1 | |
| **Subcontractor** | EMI Archeologists – 3 | |
| **Significant Equip.** | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 0 | |

**Description of site activities**

**Four (4) discovery sweeps, approximately 36 acres, were conducted.**

**Cataloging and recording was completed on arc site previously reported on 26 Jun 17.**

**No MEC/ MD was located during these sweeps.**

**Site weather conditions changed from partly cloudy to very hot and humid. Temperature was 107 degrees with humidity at 62% (verified with a Kestrel).**

**Approximately 91% of project area has been preliminarily swept. See attached map.**

**Start Time: 0700 to 1600**

**Distance covered**: 36 acres (36 total preliminary w/o archeological site categorization)

**Per cent completed**: 85% (preliminary and Arc categorization)

**MD / MEC encountered today**: None

**Lunch Break: 1200 to 1230**

**Safety:** No safety discrepancies were noted.

**Areas of concern:** Road construction on Hwy 6 causes delays of 10 to 20 min. when accessing the S-1 sweep area.

**Title:** UXO Escort/ Tech 2

**Date**: 27 Jun 17 Gabriel Salvador

# Daily Field Activity Report



**Date: 28 Jun17**

**Project Name:** ARC Survey POL

**Project Number**: 06538009.0000 **Task:** .00001

**Weather: Clear and Hot**

**Site Conditions: Dry**

**Site Visitors:** None

| Work Force | | Remarks |
|---|---|---|
| **ARCADIS** | ARC Escort – 1 | |
| **Subcontractor** | EMI Archeologists – 3 | |
| **Significant Equip.** | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 0 | |

**Description of site activities**

**S-1 project area has been completely initially swept. No more areas are left.**

**Definition of Arc sites has been initiated in the swept areas.**

**Two (2) items of MD were located during these sweeps. A BDU shroud and a piece of, possibly, aircraft skin was located. See attached, updated, map. Pictures will be provided 29 Jun 17.**

**Site weather conditions continue to be Hot and Humid. 100 degrees with 48% humidity (Kestrel).**

**Six (6) rattlesnakes, two (2) bull snakes, and two (2) gopher snakes were encountered in the southern-most portion of the S-1 project area.**

**Start Time: 0700 to 1730**

**Distance covered**: 100% initial archeological survey sweep complete.

**Per cent completed**: 85% (preliminary and Arc categorization)

**MD / MEC encountered today**: 2 items ( no energized items)

**Lunch Break: 1130 - 1200**

**Safety:** No safety discrepancies were noted.

**Areas of concern:** Access to the S-1 Project area is no longer impeded by road construction.

**Title:** UXO Escort/ Tech 2

**Date**: 28 Jun 17 Gabriel Salvador

# Daily Field Activity Report



**Date: 29 Jun17**

**Project Name:** ARC Survey POL

**Project Number**: 06538009.0000 **Task:** .00001

**Weather: Clear and Hot**

**Site Conditions: Dry**

**Site Visitors:** None

| Work Force | | Remarks |
|---|---|---|
| **ARCADIS** | ARC Escort – 1 | |
| **Subcontractor** | EMI Archeologists – 3 | |
| **Significant Equip.** | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 0 | |

**Description of site activities**

**Arc site definition, cataloging and recording was conducted in the remaining swept area of S-1 project area.**

**No MEC/MD were discovered.**

**Two (2) rattlesnakes were encountered today.**

**Very Hot, 103 degrees, today.**

**Started work one-half hour early today to take advantage of the cooler morning temperatures.**

**Start Time: 0630 to 1730**

**Distance covered**: 100% initial archeological survey sweep complete.

**Per cent completed**: 89% (preliminary and Arc categorization)

**MD / MEC encountered today**: none

**Lunch Break: 1130 - 1200**

**Safety:** No safety discrepancies were noted.

**Areas of concern:** Access to the S-1 Project area is no longer impeded by road construction.

**Title:** UXO Escort/ Tech 2

**Date**: 29 Jun 17 Gabriel Salvador

# Daily Field Activity Report



**Date: 30 Jun17**

**Project Name:** ARC Survey POL

**Project Number**: 06538009.0000 **Task:** .00001

**Weather: Clear and Hot**

**Site Conditions: Dry**

**Site Visitors:** None

| Work Force | | Remarks |
|---|---|---|
| **ARCADIS** | ARC Escort – 1 | |
| **Subcontractor** | EMI Archeologists – 3 | |
| **Significant Equip.** | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 0 | |

**Description of site activities**

**Delineation, cataloging and recording was completed on an arc site, approximately 250m x 320m.**

**Delineation, cataloging, and recording was initiated on another arc site discovered on the final surface sweeps conducted at the beginning of the week.**

**Two (2) rattlesnakes were encountered today. We are seeing them mostly in the morning hours of the day.**

**Start Time: 0630 to 1700**

**Distance covered**: 100% initial archeological survey sweep complete.

**Per cent completed**: 90% (preliminary and Arc categorization)

**MD / MEC encountered today**: 2 items ( no energized items)

**Lunch Break: 1130 - 1200**

**Safety:** No safety discrepancies were noted.

**Areas of concern:** Los Lunas access to the S-1 Project area is no longer impeded by road construction.

**Title:** UXO Escort/ Tech 2

**Date**: 30 Jun 17 Gabriel Salvador

# Daily Field Activity Report



**Date: 3 Jul17**

**Project Name:** ARC Survey POL

**Project Number**: 06538009.0000 **Task:** .00001

**Weather: Clear and Hot**

**Site Conditions: Dry**

**Site Visitors:** None

| Work Force | | Remarks |
|---|---|---|
| **ARCADIS** | ARC Escort – 1 | |
| **Subcontractor** | EMI Archeologists – 3 | |
| **Significant Equip.** | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 0 | |

**Description of site activities**

**Delineation, cataloging and recording was completed on an arc site extension, approximately 175m x 240m.**

**Delineation, cataloging, and recording was initiated on another arc site extension discovered on the final surface sweeps conducted last week.**

**Three (3) rattlesnakes were encountered today. We are seeing them mostly in the morning hours of the day.**

**Temperature reached a high of 103 degrees today with no wind. (Kestrel)**

**Start Time: 0730 to 1730**

**Distance covered**: 100% initial archeological survey sweep complete.

**Per cent completed**: 95% (preliminary and Arc categorization)

**MD / MEC encountered today**: none

**Lunch Break: 1200 - 1230**

**Safety:** No safety discrepancies were noted.

**Areas of concern:** Los Lunas access to the S-1 Project area is no longer impeded by road construction.

**Title:** UXO Escort/ Tech 2

**Date**: 3 Jul 17 Gabriel Salvador

# Daily Field Activity Report



**Date: 3 Jul17**

**Project Name:** ARC Survey POL

**Project Number**: 06538009.0000 **Task:** .00001

**Weather: Clear and Hot**

**Site Conditions: Dry**

**Site Visitors:** None

| Work Force | | Remarks |
|---|---|---|
| **ARCADIS** | ARC Escort – 1 | |
| **Subcontractor** | EMI Archeologists – 3 | |
| **Significant Equip.** | Hand-held metal detectors - 1 | |
| | POL NALEMP Rep: 0 | |

**Description of site activities**

**Delineation, cataloging and recording was completed on an arc site extension, approximately 150m x 175m.**

**Delineation, cataloging, and recording was completed on an arc site extension, approximately 135m x 160m, discovered on the final surface sweeps conducted last week.**

**Twoe (2) rattlesnakes were encountered today. We are seeing them mostly in the morning hours of the day.**

**Temperature reached a high of 105 degrees today with 5 mph SE wind. (Kestrel)**

**Start Time: 0700 to 1730**

**Distance covered**: 100% initial archeological survey sweep complete.

**Per cent completed**: 98% (preliminary and Arc categorization)

**MD / MEC encountered today**: none

**Lunch Break: 1200 - 1230**

**Safety:** No safety discrepancies were noted.

**Areas of concern:** Los Lunas access to the S-1 Project area is no longer impeded by road construction.

**Title:** UXO Escort/ Tech 2

**Date**: 5 Jul 17 Gabriel Salvador

# Daily Field Activity Report



Date: 10 July 2017

Project Name: Target S-1 POL  Weather: Clear, 99F, Winds 0 to 10 KTS

Project Number: 06538009.0000  Site Conditions: Dry

Visitors: None

| Work Force | | Remarks |
|---|---|---|
| ARCADIS | SUXOS – 1, UXOSO/QC 1 UXO III, – 1, UXO II – 2, UXO SP - 9 | |
| Subcontractor | N/A | |
| Significant Equip. | Field Trucks 3, Utility Vehicles – 1,<br>Hand Held Metal Detectors - 10, GPS equipment -2 | |
| | | |

**Description of site activities**

10 July 2017 – 0800 Project team met in the hotel meeting room to conduct the required administrative functions to complete the personnel hire process, conduct safety training and project operational training. Met with Sabin Chavez at 1330 at Target S-1 and he met the team and gave them a POL in brief. While on site we placed boundary stakes in the corners of the site using the NOMAD GPS, conducted UTV and sweep line training before departing the site at 1630. We will start conducting surface sweeps of Target S-1 tomorrow morning at 0700.

Safety: No safety discrepancies were noted.

Areas of concern: None at this time

Subcontractor work tickets reviewed: N/A  Approved _____  Attached _____

Prepared by: Greg Peterson  Date: 10 July 2017  Title: SUXOS  *Gregory J Peterson*

**Site Safety Meetings**
**TARGET S-1**
**Tailgate Safety Briefing Sign-in Log**
**Date:** 07/10/17 **Time:** 0800

| Briefing Conducted By: Jeff Holm | Signature: | Company Name: Arcadis |
|---|---|---|

This sign-in log documents the tailgate safety briefing conducted in accordance with 29 CFR 1910.120 "Hazardous Waste Operations and Emergency Response" as well as other applicable regulatory requirements. Personnel who perform work operations onsite are required to attend each safety briefing and acknowledge receipt of such briefings daily or as required.

**TOPICS COVERED:**

| | | |
|---|---|---|
| ✓ General PPE usage | ✓ Decontamination Procedures | ✓ Emergency Procedures |
| ~ Respiratory Protection | ✓ Smoking Eating and Drinking | ✓ Existing Work Zones |
| ~ Hearing Conservation | ✓ Slips, Trips, and Falls | ~ Lockout/Tagout |
| ✓ Personal Hygiene | ✓ Heat and Cold Stress | ~ Excavation/Confined Spaces |
| ~ Exposure Guidelines | ✓ Site Control | ✓ New Work Procedures |

**Personnel Sign-in List**

| Printed Name | Signature | Company Name |
|---|---|---|
| Gabriel Salvador | | Arcadis |
| Angel Torrens-Bonano | | Arcadis |
| KEN MEADOWS | | ARCADIS |
| Kevin Heald | | Arcadis |
| BILL SVOBODA | Bill Svoboda | ARCADIS |
| Carson Haskin | | Arcadis |
| Tucker Thiesing | | Arcadis |
| Matthew Miranda | | Arcadis |
| ALVA S. PETERSON | | " |
| Andres Prieto | | Arcadis |
| GREG PETERSON | | ARCADIS |
| JEFF JAMESON | | ARCADIS |

# Daily Field Activity Report



Date: 11 July 2017

Project Name: Target S-1 POL  Weather: Clear, 99F, Winds 0 to 10 KTS

Project Number: 06538009.0000  Site Conditions: Dry

Visitors: None

| Work Force | | Remarks |
|---|---|---|
| ARCADIS | SUXOS – 1, UXOSO/QC 1 UXO III, – 1, UXO II – 2, UXO SP - 9 | ARCADIS PM on site for 2 day site visit. |
| Subcontractor | N/A | |
| Significant Equip. | Field Trucks 3, Utility Vehicles – 1,<br>Hand Held Metal Detectors - 10, GPS equipment -2 | |
| | | |

**Description of site activities**

11 July 2017 – 0700 Project team and project PM met at Target S-1 and conducted the daily site safety and operations brief. Surface sweeps were started at 0730 at the north end of the target area conducting sweeps east and west working toward the south end of the project site. This activity will be on going until we 100% surface sweep target S-1 within the project boundary. We started the first sweep using the GPS unit to guide the sweep line from the right side of the sweep line and the last person on the left side of the line placed pin flags every 100 feet to guide the sweep line on the next pass. For the remainder of the site the sweep line tracked on the pin flags with the right side of the line picking them up and the left side place them as a guide for the next pass. This process will be used until we complete the surface sweep task on Target S-1**. One team member was having a hard time keeping up with the rest of the team. The altitude and his overall physical condition was effecting his ability to participate in the sweep activities. It became evident by the end of the day he would not be able to safely continue working at the site and after discussions with the PM it was decided he should be removed from the site for his safety. He was sent back to his home office for further assignment**. The rest of the team performed well. We completed 6 passes and located 2 lbs. of non-range debris. Secured for the day at 1700.

Safety: Unable to perform at altitude. / One team member was removed from the site, see bold text above.

Areas of concern: None at this time

Subcontractor work tickets reviewed: N/A  Approved _____  Attached _____

Prepared by: Greg Peterson  Date: 11 July 2017  Title: SUXOS *Gregory J Peterson*

ARCADIS

**Site Safety Meetings**
**TARGET S-1**
**Tailgate Safety Briefing Sign-in Log**
**Date:** 7/11/2017 **Time:** 0700

| Briefing Conducted By: Jeff Holm | Signature: | Company Name: Arcadis |
|---|---|---|

This sign-in log documents the tailgate safety briefing conducted in accordance with 29 CFR 1910.120 "Hazardous Waste Operations and Emergency Response" as well as other applicable regulatory requirements. Personnel who perform work operations onsite are required to attend each safety briefing and acknowledge receipt of such briefings daily or as required.

**TOPICS COVERED:**

| | | |
|---|---|---|
| ✓ General PPE usage | ~ Decontamination Procedures | ~ Emergency Procedures |
| ~ Respiratory Protection | ~ Smoking Eating and Drinking | ~ Existing Work Zones |
| ~ Hearing Conservation | ✓ Slips, Trips, and Falls | ~ Lockout/Tagout |
| ✓ Personal Hygiene | ✓ Heat and Cold Stress | ~ Excavation/Confined Spaces |
| ~ Exposure Guidelines | ~ Site Control | ~ New Work Procedures |

**Personnel Sign-in List**

| Printed Name | Signature | Company Name |
|---|---|---|
| JEFF JAMESON | | ARCADIS |
| Tucker Thiesing | | ARCADIS |
| KEN MEADOWS | | ARCADIS |
| Ángel Torrens-Bonano | | Arcadis |
| Curson Husjam | | Arcadis |
| Matt Micander | | Arcadis |
| Andres Prieto Estrada | | Arcadis |
| Kevin Heald | | " |
| BILL SVOBODA | Bill Svoboda | " |
| Wayne Patterson | | Arcadis |
| Don Sion | | Arcadis |
| SABIN CHAVEZ | | POL NAREMP |
| Gabe Salvador | | Arcadis |
| ALVA PETERSON | | " |
| GREG PETERSON | | ARCADIS |

# Daily Field Activity Report



Date: 12 July 2017

Project Name: Target S-1 POL  Weather: Clear, 96F, Winds 0 to 10 KTS

Project Number: 06538009.0000  Site Conditions: Dry

Visitors: None

| Work Force | | Remarks |
|---|---|---|
| ARCADIS | SUXOS – 1, UXOSO/QC 1 UXO III, – 1, UXO II – 2, UXO SP - 9 | ARCADIS PM on site for 2 day site visit. |
| Subcontractor | N/A | |
| Significant Equip. | Field Trucks 3, Utility Vehicles – 1, Porta Jon – 1, CONEX – 1,<br>Hand Held Metal Detectors - 10, GPS equipment -2 | |

**Description of site activities**

12 July 2017 – 0600 Project team and project PM met at Target S-1 and conducted the daily site safety and operations brief. Surface sweeps were started at 0630 where we left off on the 11th. CONEX and Porta Jon were delivered at 1300. The porta Jon was placed at the south end of Target S-1 and will be moved to JATO-2 when we start that site. The CONEX was placed between the two sites so it would not require to be repositioned during the project. PM departed the site at the end of the work day. We completed 7 passes, located 1 MPPEH item (BDU 33) and 1 lbs. of non-range debris. Secured for the day at 1600.

Safety: None

Areas of concern: None at this time

Subcontractor work tickets reviewed: N/A  Approved _____  Attached _____

Prepared by: Greg Peterson  Date: 12 July 2017  Title: SUXOS  Gregory J Peterson

ARCADIS

**Site Safety Meetings**
**TARGET S-1**
**Tailgate Safety Briefing Sign-in Log**
**Date:** 7/12/17 **Time:** ~~0700~~ 0600

| Briefing Conducted By: | Signature: | Company Name: |
|---|---|---|
| Jeff Holm | | Arcadis |

This sign-in log documents the tailgate safety briefing conducted in accordance with 29 CFR 1910.120 "Hazardous Waste Operations and Emergency Response" as well as other applicable regulatory requirements. Personnel who perform work operations onsite are required to attend each safety briefing and acknowledge receipt of such briefings daily or as required.

**TOPICS COVERED:**

| | | |
|---|---|---|
| ~ General PPE usage | ~ Decontamination Procedures | ~ Emergency Procedures |
| ~ Respiratory Protection | ~ Smoking Eating and Drinking | ~ Existing Work Zones |
| ~ Hearing Conservation | ~ Slips, Trips, and Falls | ~ Lockout/Tagout |
| ~ Personal Hygiene | ~ Heat and Cold Stress | ~ Excavation/Confined Spaces |
| ~ Exposure Guidelines | ~ Site Control | ~ New Work Procedures |

**Personnel Sign-in List**

| Printed Name | Signature | Company Name |
|---|---|---|
| Alva S. Peterson | | Arcadis |
| KEN MEADOWS | | ARCADIS |
| Gabe Salvador | | Arcadis |
| Andres Prieto | Andrés Prieto | Arcadis |
| Wayne Patterson | | Arcadis |
| Ángel Torrens-Bonano | | Arcadis |
| Matt Micanka | | Arcadis |
| Tucker Thiesing | | ARCADIS |
| G. PETERSON | | ARCADIS |
| Don Sion | | ARCADIS |
| Curson Haskin | | Arcadis |
| Kevin Beard | | Arcadis |
| BILL SVOBODA | BILL SVOBODA | ARCADIS |

# Daily Field Activity Report



Date: 13 July 2017

Project Name: Target S-1 POL  Weather: Clear, 98F, Winds 0 to 10 KTS

Project Number: 06538009.0000  Site Conditions: Dry

Visitors: None

| Work Force | | Remarks |
|---|---|---|
| ARCADIS | SUXOS – 1, UXOSO/QC 1 UXO III, – 1, UXO II – 2, UXO SP - 8 | |
| Subcontractor | N/A | |
| Significant Equip. | Field Trucks 3, Utility Vehicles – 1, Porta Jon – 1, CONEX – 1,<br>Hand Held Metal Detectors - 10, GPS equipment -2 | |

**Description of site activities**

13 July 2017 – 0600 Project team met at Target S-1 and conducted the daily site safety and operations brief. Surface sweeps were started at 0630 where we left off on the 12th. We completed 7 passes and located 5 lbs. of munitions debris. Secured for the day at 1600.

Safety: None

Areas of concern: None at this time

Subcontractor work tickets reviewed: N/A  Approved _____  Attached _____

Prepared by: Greg Peterson  Date: 13 July 2017  Title: SUXOS  *Gregory J Peterson*

ARCADIS

**Site Safety Meetings**
**TARGET S-1**
**Tailgate Safety Briefing Sign-in Log**
**Date:** 7/13/17 **Time:** 0600

| Briefing Conducted By: Jeff Holm | Signature: | Company Name: Arcadis |
|---|---|---|

This sign-in log documents the tailgate safety briefing conducted in accordance with 29 CFR 1910.120 "Hazardous Waste Operations and Emergency Response" as well as other applicable regulatory requirements. Personnel who perform work operations onsite are required to attend each safety briefing and acknowledge receipt of such briefings daily or as required.

**TOPICS COVERED:**

| | | |
|---|---|---|
| ~ General PPE usage | ~ Decontamination Procedures | ~ Emergency Procedures |
| ~ Respiratory Protection | ~ Smoking Eating and Drinking | ~ Existing Work Zones |
| ~ Hearing Conservation | ~ Slips, Trips, and Falls | ~ Lockout/Tagout |
| ~ Personal Hygiene | ~ Heat and Cold Stress | ~ Excavation/Confined Spaces |
| ~ Exposure Guidelines | ~ Site Control | ~ New Work Procedures |

**Personnel Sign-in List**

| Printed Name | Signature | Company Name |
|---|---|---|
| GREG PETERSON | | ARCADIS |
| TUCKER THIBSING | | ARCADIS |
| ALVA PETERSON | | " |
| Angel Torrens-Bonano | | Arcadis |
| Don Swan | | Arcadis |
| BILL SVOBODA | Bill Svoboda | ARCADIS |
| Matt Miranda | Matt Miranda | |
| KEN MEADOWS | | ARCADIS |
| Kevin Heald | Kevin W Heald | " |
| Carson Haskin | | Arcadis |
| Gabe Salvador | | Arcadis |
| Andres Prieto | Andrés Prieto | Arcadis |

# Daily Field Activity Report



Date: 14 July 2017

Project Name: Target S-1 POL Weather: Clear, 98F, Winds 0 to 10 KTS

Project Number: 06538009.0000 Site Conditions: Dry

Visitors: None

| Work Force | | Remarks |
|---|---|---|
| ARCADIS | SUXOS – 1, UXOSO/QC 1 UXO III, – 1, UXO II – 2, UXO SP - 8 | |
| Subcontractor | N/A | |
| Significant Equip. | Field Trucks 3, Utility Vehicles – 1, Porta Jon – 1, CONEX – 1,<br>Hand Held Metal Detectors - 10, GPS equipment -2 | |

**Description of site activities**

14 July 2017 – 0600 Project team met at Target S-1 and conducted the daily site safety and operations brief. Surface sweeps were started at 0630 where we left off on the 13th. We completed 7 passes and located 50 lbs. of range debris (equipment air drop box 98% wood). Site is approximately 47% complete. Secured for the day at 1600.

Safety: None

Areas of concern: None at this time

Subcontractor work tickets reviewed: N/A Approved _____ Attached _____

Prepared by: Greg Peterson Date: 14 July 2017 Title: SUXOS *Gregory J Peterson*

**Site Safety Meetings**
**TARGET S-1**
**Tailgate Safety Briefing Sign-in Log**
**Date:** 14 JUL 17 **Time:** 0600

| riefing Conducted By: Jeff Holm | Signature: | Company Name: Arcadis |
|---|---|---|

This sign-in log documents the tailgate safety briefing conducted in accordance with 29 CFR 1910.120 "Hazardous Waste Operations and Emergency Response" as well as other applicable regulatory requirements. Personnel who perform work operations onsite are required to attend each safety briefing and acknowledge receipt of such briefings daily or as required.

**TOPICS COVERED:**

| | | |
|---|---|---|
| ✓ General PPE usage | ~ Decontamination Procedures | ~ Emergency Procedures |
| ~ Respiratory Protection | ✓ Smoking Eating and Drinking | ~ Existing Work Zones |
| ~ Hearing Conservation | ✓ Slips, Trips, and Falls | ~ Lockout/Tagout |
| ~ Personal Hygiene | ✓ Heat and Cold Stress | ~ Excavation/Confined Spaces |
| ~ Exposure Guidelines | ~ Site Control | ~ New Work Procedures |

**Personnel Sign-in List**

| Printed Name | Signature | Company Name |
|---|---|---|
| Matt Miranda | | Arcadis |
| Gabe Salvador | | Arcadis |
| Lawson Haslum | | Arcadis |
| Kevin Heald | | Arcadis |
| GREG PETERSON | | ARCADIS |
| Don Slow | | ARCADIS |
| Alva Peterson | | " |
| BILL SVOBODA | | " |
| KEN MEADOWS | | ARCADIS |
| VOLKER THIESING | | ARCADIS |
| Angel Torres-Bonano | | ARCADIS |
| Andres Prieto | | Arcadis |
| SABIN CHAVEZ | | POL NALEMP |

# Daily Field Activity Report



Date: 17 July 2017

2

Project Name: Target S-1 POL Weather: Clear, 92F, Winds 0 to 10 KTS

Project Number: 06538009.0000 Site Conditions: Dry

Visitors: None

| Work Force | | Remarks |
|---|---|---|
| ARCADIS | SUXOS – 1, UXOSO/QC 1 UXO III, – 1, UXO II – 2, UXO SP - 8 | |
| Subcontractor | N/A | |
| Significant Equip. | Field Trucks 3, Utility Vehicles – 1, Porta Jon – 1, CONEX – 1,<br>Hand Held Metal Detectors - 10, GPS equipment -2 | |

**Description of site activities**

17 July 2017 – 0600 Project team met at Target S-1 and conducted the daily site safety, operations brief and weekly equipment checks. Surface sweeps were started at 0700 where we left off on the 14th. We completed 7 passes and located 2 lbs. of range debris. Secured for the day at 1600.

Safety: None

Areas of concern: None at this time

Subcontractor work tickets reviewed: N/A Approved _____ Attached _____

Prepared by: Greg Peterson Date: 17 July 2017 Title: SUXOS *Gregory J Peterson*

**Site Safety Meetings**
**TARGET S-1**
**Tailgate Safety Briefing Sign-in Log**
**Date:** 7/17/17 **Time:** 0600

| Briefing Conducted By: Jeff Holm | Signature: | Company Name: Arcadis |
|---|---|---|

This sign-in log documents the tailgate safety briefing conducted in accordance with 29 CFR 1910.120 "Hazardous Waste Operations and Emergency Response" as well as other applicable regulatory requirements. Personnel who perform work operations onsite are required to attend each safety briefing and acknowledge receipt of such briefings daily or as required.

**TOPICS COVERED:**

| | | |
|---|---|---|
| ✓ ~ General PPE usage | ~ Decontamination Procedures | ~ Emergency Procedures |
| ~ Respiratory Protection | ~ Smoking Eating and Drinking | ~ Existing Work Zones |
| ~ Hearing Conservation | ✓ ~ Slips, Trips, and Falls | ~ Lockout/Tagout |
| ~ Personal Hygiene | ✓ ~ Heat and Cold Stress | ~ Excavation/Confined Spaces |
| ~ Exposure Guidelines | ~ Site Control | ~ New Work Procedures |

**Personnel Sign-in List**

| Printed Name | Signature | Company Name |
|---|---|---|
| GREG PETERSON | | ARCADIS |
| Alva Peterson | | " |
| Carson Haskin | | " |
| Ángel Torrens-Bonano | | Arcadis |
| Kevin Heald | | " |
| Matt Miranda | | " |
| Don Siow | | Arcadis |
| Geba Salvador | | Arcadis |
| TUCKER THIESING | | ARCADIS |
| KEN MEADOWS | | ARCADIS |
| BILL SVOBODA | Bill Svoboda | ARCADIS |
| Andres Prieto | | Arcadis |

# Daily Field Activity Report



Date: 18 July 2017

2

Project Name: Target S-1 POL  Weather: Clear, 90F, Winds 0 to 10 KTS

Project Number: 06538009.0000  Site Conditions: Dry

Visitors: None

| Work Force | | Remarks |
|---|---|---|
| ARCADIS | SUXOS – 1, UXOSO/QC 1 UXO III, – 1, UXO II – 2, UXO SP - 8 | |
| Subcontractor | N/A | |
| Significant Equip. | Field Trucks 3, Utility Vehicles – 1, Porta Jon – 1, CONEX – 1,<br>Hand Held Metal Detectors - 10, GPS equipment -2 | |

**Description of site activities**

18 July 2017 – 0600 Project team met at Target S-1 and conducted the daily site safety and operations brief. Surface sweeps were started at 0630 where we left off on the 17th. We completed 7 passes and located .5 lbs. of non-range debris. Secured for the day at 1600.

Safety: None

Areas of concern: None at this time

Subcontractor work tickets reviewed: N/A  Approved _____  Attached _____

Prepared by: Greg Peterson  Date: 18 July 2017  Title: SUXOS  *Gregory J Peterson*

**Site Safety Meetings**
**TARGET S-1**
**Tailgate Safety Briefing Sign-in Log**
**Date:** 7/18/17 **Time:** 0600

| Briefing Conducted By: Jeff Holm | Signature: | Company Name: Arcadis US. |
|---|---|---|

This sign-in log documents the tailgate safety briefing conducted in accordance with 29 CFR 1910.120 "Hazardous Waste Operations and Emergency Response" as well as other applicable regulatory requirements. Personnel who perform work operations onsite are required to attend each safety briefing and acknowledge receipt of such briefings daily or as required.

**TOPICS COVERED:**

| | | |
|---|---|---|
| ✓ ~ General PPE usage | ~ Decontamination Procedures | ~ Emergency Procedures |
| ~ Respiratory Protection | ~ Smoking Eating and Drinking | ~ Existing Work Zones |
| ~ Hearing Conservation | ✓ ~ Slips, Trips, and Falls | ~ Lockout/Tagout |
| ✓ ~ Personal Hygiene | ~ Heat and Cold Stress | ~ Excavation/Confined Spaces |
| ~ Exposure Guidelines | ~ Site Control | ~ New Work Procedures |

**Personnel Sign-in List**

| Printed Name | Signature | Company Name |
|---|---|---|
| BILL SVOBODA | Bill Svoboda | ARCADIS |
| Tucker Thiesing | [illegible] | ARCADIS |
| Kevin Heald | [illegible] | " |
| GREG PETERSON | [illegible] | " |
| Matt Miranda | [illegible] | |
| Carson Haslam | [illegible] | " |
| Alva Peterson | [illegible] | " |
| Don Snow | [illegible] | Arcadis |
| Gabe Salvador | [illegible] | Arcadis |
| KEN MEADOWS | [illegible] | ARCADIS |
| Angel Torrens-Bonano | [illegible] | ARCADIS |
| Andres Prieto | Andrés Prieto | Arcadis |

# Daily Field Activity Report



Date: 19 July 2017

2

Project Name: Target S-1 POL  Weather: Clear, 97F, Winds 0 to 10 KTS

Project Number: 06538009.0000  Site Conditions: Dry

Visitors: None

| Work Force | | Remarks |
|---|---|---|
| ARCADIS | SUXOS – 1, UXOSO/QC 1 UXO III, – 1, UXO II – 2, UXO SP - 8 | |
| Subcontractor | N/A | |
| Significant Equip. | Field Trucks 3, Utility Vehicles – 1, Porta Jon – 1, CONEX – 1,<br>Hand Held Metal Detectors - 10, GPS equipment -2 | |

**Description of site activities**

19 July 2017 – 0600 Project team met at Target S-1 and conducted the daily site safety and operations brief. Surface sweeps were started at 0630 where we left off on the 18th. We completed 7 passes and located 2 lbs. of non-range debris. Secured for the day at 1600.

Safety: None

Areas of concern: None at this time

Subcontractor work tickets reviewed: N/A  Approved _____  Attached _____

Prepared by: Greg Peterson  Date: 19 July 2017  Title: SUXOS  *Gregory J Peterson*

**Site Safety Meetings**
**TARGET S-1**
**Tailgate Safety Briefing Sign-in Log**
**Date:** 7/19/17 **Time:** 0600

| Briefing Conducted By: Jeff Holm | Signature: | Company Name: Arcadis |
|---|---|---|

This sign-in log documents the tailgate safety briefing conducted in accordance with 29 CFR 1910.120 "Hazardous Waste Operations and Emergency Response" as well as other applicable regulatory requirements. Personnel who perform work operations onsite are required to attend each safety briefing and acknowledge receipt of such briefings daily or as required.

**TOPICS COVERED:**

| | | |
|---|---|---|
| ~ General PPE usage | ~ Decontamination Procedures | ~ Emergency Procedures |
| ~ Respiratory Protection | ~ Smoking Eating and Drinking | ~ Existing Work Zones |
| ~ Hearing Conservation | ~ Slips, Trips, and Falls | ~ Lockout/Tagout |
| ~ Personal Hygiene | ~ Heat and Cold Stress | ~ Excavation/Confined Spaces |
| ~ Exposure Guidelines | ~ Site Control | ~ New Work Procedures |

**Personnel Sign-in List**

| Printed Name | Signature | Company Name |
|---|---|---|
| Bill Svoboda | Bill Svoboda | ARCADIS |
| Andres Prieto | Andrés Prieto | Arcadis |
| Carson Haskin | | " |
| Tucker Thiesing | | ARCADIS |
| Angel Torrens-Bonano | | ARCADIS |
| Don Snow | Don Snow | Arcadis |
| Alva Peterson | | " |
| Matt Miranda | | " |
| Kevin Heald | Kevin W Heald | " |
| KEN MEADOWS | | ARCADIS |
| Gabe Salvador | | Arcadis |
| GREG PETERSON | | ARCADIS |

# Daily Field Activity Report



Date: 20 July 2017

2

Project Name: Target S-1 POL  Weather: Clear, 88 F, Winds 0 to 10 KTS

Project Number: 06538009.0000  Site Conditions: Dry

Visitors: None

| Work Force | | Remarks |
|---|---|---|
| ARCADIS | SUXOS – 1, UXOSO/QC 1 UXO III, – 1, UXO II – 2, UXO SP - 8 | |
| Subcontractor | N/A | |
| Significant Equip. | Field Trucks 3, Utility Vehicles – 1, Porta Jon – 1, CONEX – 1,<br>Hand Held Metal Detectors - 10, GPS equipment -2 | |

**Description of site activities**

20 July 2017 – 0600 Project team met at Target S-1 and conducted the daily site safety and operations brief. Surface sweeps were started at 0630 where we left off on the 19th. We completed 7 passes and located 1 lb. of MD and 1 lb. of non-range debris. Secured for the day at 1600.

Safety: None

Areas of concern: None at this time

Subcontractor work tickets reviewed: N/A  Approved _____  Attached _____

Prepared by: Greg Peterson  Date: 20 July 2017  Title: SUXOS  *Gregory J Peterson*

**Site Safety Meetings**
**TARGET S-1**
**Tailgate Safety Briefing Sign-in Log**
**Date:** 7/20/17 **Time:** 0600

| Briefing Conducted By: Jeff Holm | Signature: | Company Name: Arcadis |
|---|---|---|

This sign-in log documents the tailgate safety briefing conducted in accordance with 29 CFR 1910.120 "Hazardous Waste Operations and Emergency Response" as well as other applicable regulatory requirements. Personnel who perform work operations onsite are required to attend each safety briefing and acknowledge receipt of such briefings daily or as required.

**TOPICS COVERED:**

| | | |
|---|---|---|
| ~ General PPE usage | ~ Decontamination Procedures | ~ Emergency Procedures |
| ~ Respiratory Protection | ~ Smoking Eating and Drinking | ~ Existing Work Zones |
| ~ Hearing Conservation | ~ Slips, Trips, and Falls | ~ Lockout/Tagout |
| ~ Personal Hygiene | ~ Heat and Cold Stress | ~ Excavation/Confined Spaces |
| ~ Exposure Guidelines | ~ Site Control | ~ New Work Procedures |

**Personnel Sign-in List**

| Printed Name | Signature | Company Name |
|---|---|---|
| Matt Micanka | | Arcadis |
| Carson Haskin | | " |
| GREG PETERSON | | ARCADIS |
| Alva S Peterson | | " |
| Angel Torres-Bonano | | " |
| Don Scow | | Arcadis |
| Tucker Thiesing | | ARCADIS |
| Geka Salvador | | Arcadis |
| KEN MEADOWS | | ARCADIS |
| BILL SVOBODA | Bill Svoboda | ARCADIS |
| Kevin Heald | Kevin W Heald | " |
| Andres Prieto | Andrés Prieto | Arcadis |

# Daily Field Activity Report



Date: 21 July 2017

Project Name: Target S-1 POL Weather: Clear, 88 F, Winds 0 to 10 KTS

Project Number: 06538009.0000 Site Conditions: Dry

Visitors: None

| Work Force | | Remarks |
|---|---|---|
| ARCADIS | SUXOS – 1, UXOSO/QC 1 UXO III, – 1, UXO II – 2, UXO SP - 7 | One UXO SP was on a scheduled day off. |
| Subcontractor | N/A | |
| Significant Equip. | Field Trucks 3, Utility Vehicles – 1, Porta Jon – 1, CONEX – 1,<br>Hand Held Metal Detectors - 10, GPS equipment -2 | |

**Description of site activities**

21 July 2017 – 0600 Project team met at Target S-1 and conducted the daily site safety and operations brief. Surface sweeps were started at 0630 where we left off on the 20th. We completed 5 passes and reached the southern boundary in the middle with the sweep line. We then had area on both ends of the southern boundary to sweep to finish the sweeps on Target S-1. **Also, we had to complete a pass on the other side of the east fence line to cross the Target S-1 eastern project boundary. This area included desert surface area and dry river bed area approximately 30 feet below the desert surface. Some areas in the river bed could not be safely accessed do to steep terrain and heavy vegetation as indicated by the GPS transec**t (a second Tailgate Safety Brief was provided before we conducted this task). Located 3 lb. of non-range debris. Site Target S-1 is 99% complete the only remaining task is to remove the equipment air dropped box located on the 14th. Will be removed by 2 personnel using a truck next week. Secured for the day at 1600.

Safety: Steep terrain as we enter the wash out area to complete our sweeps. See bold description above.

Areas of concern: None at this time

Subcontractor work tickets reviewed: N/A Approved _____ Attached _____

Prepared by: Greg Peterson Date: 21 July 2017 Title: SUXOS *Gregory J Peterson*

**Site Safety Meetings**
**TARGET S-1**
**Tailgate Safety Briefing Sign-in Log**
**Date:** 7/21/17 **Time:** 0600

| Briefing Conducted By: Jeff Holm | Signature: | Company Name: Arcadis |
|---|---|---|

This sign-in log documents the tailgate safety briefing conducted in accordance with 29 CFR 1910.120 "Hazardous Waste Operations and Emergency Response" as well as other applicable regulatory requirements. Personnel who perform work operations onsite are required to attend each safety briefing and acknowledge receipt of such briefings daily or as required.

**TOPICS COVERED:**

| | | |
|---|---|---|
| ✓ ~ General PPE usage | ~ Decontamination Procedures | ~ Emergency Procedures |
| ~ Respiratory Protection | ~ Smoking Eating and Drinking | ~ Existing Work Zones |
| ~ Hearing Conservation | ✓ ~ Slips, Trips, and Falls | ~ Lockout/Tagout |
| ✓ ~ Personal Hygiene | ✓ ~ Heat and Cold Stress | ~ Excavation/Confined Spaces |
| ~ Exposure Guidelines | ~ Site Control | ~ New Work Procedures |

**Personnel Sign-in List**

| Printed Name | Signature | Company Name |
|---|---|---|
| GREG PETTERSON | | ARCADIS |
| Kevin Heald | Kevin W Heald | " |
| Matt Miranda | Matt Miranda | " |
| Don Snow | | Arcadis |
| Gabe Salvador | | Arcadis |
| Tucker Thiesing | | ARCADIS |
| Alva Peterson | | " |
| KEN MEADOWS | | ARCADIS |
| BILL SVOBODA | Bill Svoboda | ARCADIS |
| Angel Tovens Romano | | ARCADIS |
| Carson Haskin | | Arcadis |
| | | |

**Photograph: 1**

**Description:** S-1 Sweep team

**Photograph: 2**

**Description:** S-1 sweep team

**Photograph: 3**

**Description:**
S-1 Archeological survey

**Photograph: 4**

**Description:**
S-1 Archeological survey

**Photograph: 5**

**Description:**
Large area of lithics concentration

**Photograph: 6**

**Description:**
Large concentration of pottery sherds

**Photograph: 7**

**Description:**
Close up of pottery sherds.

**Photograph: 8**

**Description:**
Air drop equipment box

**Photograph: 9**

**Description:**
BDU 33 MPPEH Item

**Photograph: 10**

**Description:**
BDU 33 Demo Area shot hole.

**Photograph: 11**

**Description:**
Target S-1 MDAS

**Photograph: 12**

**Description:**
Target S-1 MDAS

# APPENDIX F

## Ordnance Technical Data

# Fragmentation Data Review Form

Database Revision Date 3/7/2016

| | |
|---|---|
| Category: | Air-Launched HE Rounds |
| Munition: | 1000 lb Mk 83 Bomb |
| Case Material: | Steel, Mild |
| Fragmentation Method: | Naturally Fragmenting |
| Secondary Database Category: | Bomb |
| Munition Case Classification: | Robust |

| | |
|---|---|
| DODIC: | E506 |
| Date Record Created: | 10/5/2009 |
| Record Created By: | SDH |
| Last Date Record Updated: | 9/14/2011 |
| Individual Last Updated Record: | SDH |
| Date Record Retired: | |

## Munition Information and Fragmentation Characteristics

| | |
|---|---|
| Explosive Type: | H-6 |
| Explosive Weight (lb): | 445 |
| Diameter (in): | 13.9400 |
| Cylindrical Case Weight (lb): | 390.13511 |
| Maximum Fragment Weight (Intentional) (lb): | 0.9877 |
| Design Fragment Weight (95%) (Unintentional) (lb): | 0.1375 |
| Critical Fragment Velocity (fps): | 8129 |

## Theoretical Calculated Fragment Distances

| | |
|---|---|
| HFD [Hazardous Fragment Distance: distance to no more than 1 hazardous fragment per 600 square feet] (ft): | 816 |
| MFD-H [Maximum Fragment Distance, Horizontal] (ft): | 3447 |
| MFD-V [Maximum Fragment Distance, Vertical] (ft): | 2727 |

## Overpressure Distances

| | |
|---|---|
| TNT Equivalent (Pressure): | 1.38 |
| TNT Equivalent Weight - Pressure (lbs): | 614.100 |
| Unbarricaded Intraline Distance (3.5 psi), K18 Distance: | 153 |
| Public Traffic Route Distance (2.3 psi); K24 Distance: | 204 |
| Inhabited Building Distance (1.2 psi), K40 Distance: | 340 |
| Intentional MSD (0.0655 psi), K328 Distance: | 2788 |

Note: Per V5.E3.2.2.1 of DoD 6055.09-M the minimum sited K328 distance may be no smaller than 200 ft.

## Sandbag and Water Mitigation Options

| | |
|---|---|
| TNT Equivalent (Impulse): | 1.15 |
| TNT Equivalent Weight - Impulse (lbs): | 511.750 |
| Kinetic Energy $10^6$ (lb-ft²/s²): | 27.9983 |

### Single Sandbag Mitigation

| | |
|---|---|
| Required Wall & Roof Thickness (in) | Not Permitted |
| Expected Max. Throw Distance (ft): | Not Permitted |
| Minimum Separation Distance (ft): | Not Permitted |

### Double Sandbag Mitigation

| | |
|---|---|
| Required Wall & Roof Thickness (in) | Not Permitted |
| Expected Max. Throw Distance (ft): | Not Permitted |
| Minimum Separation Distance (ft): | Not Permitted |

### Water Mitigation

| | |
|---|---|
| Minimum Separation Distance (ft): | Not Permitted |
| Water Containment System: | Not Permitted |

Note: Use Sandbag and Water Mitigation in accordance with all applicable documents and guidance. If a donor charge larger than 32 grams is utilized, the above mitigation options are no longer applicable. Subject matter experts may be contacted to develop site specific mitigation options.

## Minimum Thickness to Prevent Perforation

| | Intentional | Unintentional |
|---|---|---|
| 4000 psi Concrete (Prevent Spall): | 39.86 | 14.81 |
| Mild Steel: | 6.19 | 2.44 |
| Hard Steel: | 5.08 | 2.00 |
| Aluminum: | 11.84 | 4.94 |
| LEXAN: | 16.47 | 9.28 |
| Plexi-glass: | 16.67 | 7.79 |
| Bullet Resist Glass: | 15.76 | 6.76 |

## Item Notes

**Distribution authorized to the Department of Defense and U.S. DoD contractors only for Administrative-Operational Use (17 October 2002). Other requests shall be referred to the Chairman, Department of Defense Explosives Safety Board, Room 856C, Hoffman Building I, 2461 Eisenhower Avenue, Alexandria, VA 22331-0600.**

# APPENDIX G

## Demolition Shot Records

**FOR CHEMICAL EMERGENCY**
Spill, Leak, Fire, Exposure or Accident
**CALL CHEMTREC 800-424-9300**
**Account Number 24373**

**WESTERN EXPLOSIVES SYSTEMS COMPANY**
3135 S Richmond St
Salt Lake City, UT 84106
(801) 484-6557

WESCO ground breaking service.

| | | |
|---|---|---|
| ☐ Morristown BATF 9-AZ-013-20-8E-00280 | ☐ Ocotillo BATF 9-CA-025-20-6H-12164 | ☐ El Segundo/lee R 5-NM-031-20-7L-12061 |
| ☐ Clarkdale BATF 9-AZ-025-20-7F-11321 | ☐ Las Vegas BATF 9-NV-003-20-7L-00082 | ☐ Kayenta BATF 9-AZ-017-20-9C-12105 |
| ☐ Rillito BATF 9-AZ-019-20-9D-00205 | ☒ Milan BATF 5-NM-006-20-8A-12063 | ☐ Saratoga Springs 9-UT-049-20-7D-00460 |
| ☐ Mayer BATF 9-AZ-025-20-7D-00378 | ☐ Winnemucca 9-NV-013-20-7D-00288 | ☐ Bingham Canyon 9-UT-035-20-7D-00459 |
| ☐ Nucla BATF 5-CO-085-20-7D-00705 | ☐ BHP BATF 5-NM-045-20-8M-00275 | ☐ Midvale Importer 9-UT-035-23-8A-12109 |
| ☐ Moab BATF 9-UT-019-20-7D-00458 | ☐ Rigby BATF 9-ID-051-20-7D-00366 | ☐ Milford BATF 9-UT-001-20-9E-00494 |

**Delivery Ticket #** 36215

TO: ALCADIS
EXIT 131
I-40
☐ Customer Pick Up

Shipping date: 8-11-17
Customer PO #
ROUTE PLAN: I-40 EAST TO EXIT 131

FROM: WESCO
GRANTS-MILAN
☒ Delivery ☐ Shot Service ☐ Stock Transfer

RETURN ROUTE PLAN: Reverse Route

| SHIPPING DESCRIPTION<br>X = HAZARDOUS MATERIALS | | | | Shipped NO. PKGS. | Shipped NEC* | Returned NO. PKGS. | Returned NEC* | TYPE PKGS | Special Permit Number |
|---|---|---|---|---|---|---|---|---|---|
| X | UN 0081 | Explosive, blasting, type A | 1.1D II | | | | | | |
| X | UN 0042 | Boosters | 1.1D II | 1 | | | | CS | |
| X | UN 0241 | Explosive, blasting, type E | 1.1D II | | | | | | |
| X | UN 0065 | Cord, detonating | 1.1D II | 1 | | | | Roll | |
| X | UN 0030 | Detonators, electric | 1.1B II | | | | | | |
| X | UN 0029 | Detonators, non-electric | 1.1B II | | | | | | |
| X | UN 0360 | Detonator assemblies, non-electric | 1.1B II | | | | | | |
| X | UN 0255 | Detonators, electric | 1.4B II | | | | | | |
| X | UN 0361 | Detonator assemblies, non-electric | 1.4B II | | | | | | |
| X | UN 0349 | Articles, explosives, N.O.S. (HMX, Aluminum powder) | 1.4S II | 1 | 24.75 | | | Roll | |
| X | UN 0331 | Explosives, blasting, type B | 1.5D II | | | | | | |
| X | UN 0332 | Explosives, blasting, type E | 1.5D II | | | | | | |
| X | NA 0331 | Ammonium nitrate-fuel oil mixture | 1.5D II | | | | | | SP-11156 |
| X | UN 3375 | Ammonium Nitrate Emulsion | 5.1 II | | | | | | IME SLP 23 |
| X | UN 1942 | Ammonium nitrate | 5.1 III | | | | | | |
| X | UN 1993 | Combustible Liquid N.O.S. (Fuel Oil) | 3 III | | | | | | |
| X | | | | | | | | | |
| X | | | | | | | | | |

This is to certify that the above named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulation of the department of transportation
* NEC = Net Explosive Content

SHIPPER'S SIGNATURE [signature]
This shipment is within limitations prescribed for cargo aircraft.

Buyer assumes all risk and liability for results obtained by the use of the material covered by this order. Buyer acknowledges that there may be federal, and/or state laws regulating the use and/or possession of the material covered by this order and buyer assumes full responsibility for compliance with said laws.

| PRODUCT DESCRIPTION | UNIT | CODE DATE | QTY SHIPPED | QTY RETURNED | QTY SOLD |
|---|---|---|---|---|---|
| AUSTIN BLACK CAP BOOSTER | EA | 250C16 | 8 | 0 | 8 |
| PRIMACORD 10 50gr. CORD | FT | 23N015 | 2000' | 1900 | 100' |
| NONEL LEADLINE | FT | 13FL17 | 2500' | 0 | 2500 |
| NONEL MS 80' 500 | EA | 285L15 | 8 | 0 | 8 |
| CHARGE 3 3/8" 21G RDX | EA | 093013 | 38 | 34 | 4 |

☐ CUSTOMERS FUEL Gallons used _____ Cost per Gallon _____ ☐ WESCO Fuel

Mileage X 53 ☐ ROUNDTRIP MILES Stand by Hours _____ Bulk Truck Hours _____

We certify that the above articles were received in good condition. I will heed the IME recommendations and warnings on the use and handling of explosives.
This document subject to the "Terms and Conditions" posted on www.wescoexplosives.com

**CUSTOMERS ATF LICENSE #** **EXP DATE**

**Photo ID #** 21312550 **COSIGNEE-RECEIVER** X [signature] **DATE** 11 AUG 2017

WHITE - SLC OFFICE YELLOW - PLANT PINK - CUSTOMER

**ARCADIS EXPLOSIVES**

**PURCHASE/ RECEIPT/ TRANSPORTATION**

**AUTHORIZATION FORM**

Address and County (Home Office): ARCADIS, 10205 WESTHEIMER RD, SUITE 800 HOUSTON, TX 77042 USA

Address and County: (Field Office) POL LAGUNA SITE S-1 & JATO 1, NM 87026 USA

Federal License #: 8-MD-003-33-9K-00365 Expiration Date:

The following persons are agents, employees, or representatives of the undersigned, and are authorized to order or acquire explosive materials on behalf of ARCADIS U.S., INC:

| Name and Home Address | Driver's License No. | Soc. Sec. Number | Place of Birth |
|---|---|---|---|
| GREG PETERSON | 01512550 (SD) | 475-68-6973 | MANKATO MN USA |
| 110 E. CENTER ST | | | |
| MADISON, SD | | | |
| 57042 | | | |
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The undersigned certifies the foregoing information to be true and correct to the best of his knowledge and believe, and that he will communicate any additions or deletions to the foregoing list to ARCADIS.

| Corporate Officer | Date |
|---|---|



& SITE-S-1

# ARCADIS

## Demo Safety Brief

Date: 08 / 11 / 2017 Location: P.O.L. JATO-1
Time: 0800 AM PM Team #: 1

| Demo Team Assignments: | |
|---|---|
| Team Leader | Kevin Heald |
| UXO Tech SUXOS/DEM SUP. | GREG PETERSON |
| UXO Tech | Gabe Salvador |
| UXO Safety | Jeff Holm |
| Perimeter Safety | Slow, Don |
| Perimeter Safety | Alva Peterson |
| Perimeter Safety | |

| Safety Brief | | |
|---|---|---|
| General: | | Phases of operation |
| ✓ Notifications Made | ✓ | Shot Preparations |
| ✓ Communications | ✓ | UXO/MEC Involved |
| ✓ Explosive handling/precautions | ✓ | BIP or De-Mil |
| ✓ Caps 50' downwind from explosives | ✓ | Placement and quantity of charge |
| ✓ No radio or cell phone within 20 ft | ✓ | Donor Explosives |
| ✓ Emergency notification procedures \ | ✓ | Priming |
| ✓ Site specific characteristics | ✓ | Unnecessary Personnel |
| ✓ Location of safe area | ✓ | Clear area |
| ✓ Location of vehicle | ✓ | Request Permission |
| ✓ Location of 1st aid/fire extinguisher | ✓ | Firing |
| ✓ Wind direction | ✓ | Prepare Initiator |
| ✓ Personal hygiene | ✓ | Request Permission |
| ✓ Two man rule | ✓ | Warning on Radio |
| ✓ Potential trip/fall hazards | ✓ | Sound 3 3-second Blasts on Vehicle Horn |
| ✓ Post-detonation clean up of site | ✓ | Sound 3 Verbal "Fire in The Hole" |
| ✓ Other: SLIPS/TRIPS/FALLS → | ✓ | When given Permission, Fire Shot |
| DEMO AREA IS ROCKY | ✓ | Clear Shot (Wait 5 Min.) |
| | ✓ | Team Leader - Investigate |
| | ✓ | Safety – Stand-by at Safe Distance |

Misfire procedures: NonEI Firing Systems

Step 1. If the shock tube fails to propagate remove the shock tube from the firing device, cut off six inches of the shock tube, insert a new primer, re-insert the shock tube ensuring that it is properly seated and re-fire. If when you activate the firing device and the shock tube gets blown out of the firing device without activating, cut off six inches of the shock tube, replace the primer and re-insert the shock tube into the firing device.

Step 2. If the primer functioned properly and the shock tube was heard and/or seen to fire, observe the standard one-hour waiting period prior to going downrange.

Step 3. After the one-hour waiting period has passed, proceed downrange and check the first component in the priming train, i.e. splice, bunch block or detonator assembly. Repeat this process till you reach the detonator assembly. As you conduct this inspection and discover the problem, replace the firing train, which malfunctioned with a new one and ensure that all the connections are correct and secure.

Step 4. After the system has been checked and repaired/replaced return to the firing point and repeat the firing process.

# ARCADIS DEMOLITION SHOT RECORD

| | | |
|---|---|---|
| Site Name/Location: P.O.L. JATO Site-1 | | Date: 8 · 11 · 2017 |
| Shot Location (Anomaly ID No./GPS Coord.) | Demolition Supervisor: Kevin Heald | State License # (if applicable): N/A |
| Type of MEC, UXO, MPPEH Destroyed, Vented, or Burned: BDU-33 and Practice Rocket Warhead | Firing Method: Nonel | Time of Shot: 1025 |
| Direction and Distance to Nearest Building, Road, Utility Line, etc.: 6 miles to Road | Temp: 85 Wind Dir./Speed: 5-7mph<br>Ceiling: Unlimited Clouds/$ Sun: Sun | |
| Type and Amount of Tamping Used: None | | Mat or Other Protection Used (list): None |
| Seismographic/Sound Level Meter Used: Yes ☐ No ☒ | Readings/Results: N/A | |

Demolition Materials Used

| Description | Amount | Description | Amount |
|---|---|---|---|
| Perforator 21 GRAM. | 4 EA | NONEL LEAD LINE ~~Time Fuze~~ | 2500' |
| Det Cord | 100' 50 GR. | ~~Squibs~~ 3/4 lb BOOSTERS | 8 EA |
| Electric Detonator | | Black/Smokeless Powder | |
| Non-Electric Detonator | | Two Component | |
| Non-El Detonator | 8 EA | Other (list) | |

Certification

I certify that the explosives listed were used for their intended purpose, and that the MEC, UXO, MPPEH listed were rendered inert/destroyed.

Signature of Demolition Supervisor: GREG PETERSON Date: 8-11-2017

| | | |
|---|---|---|
| Site Name/Location: | | Date: |
| Shot Location (OB/OD Range or Grid No.): | Demolition Supervisor: | State License # (if applicable): |
| Type of MEC, UXO, MPPEH Destroyed, Vented, or Burned: | Firing Method: | Time of Shot: |
| Direction and Distance to Nearest Building, Road, Utility Line, etc.: | Temp: _____ Wind Dir./Speed: _____<br>Ceiling: _____ Clouds/% Sun: _____ | |
| Type and Amount of Tamping Used: | | Mat or Other Protection Used (list): |
| Seismographic / Sound Level Meter Used: Yes ☐ No ☐ | Readings/Results: | |

Demolition Materials Used

| Description | Amount | Description | Amount |
|---|---|---|---|
| Perforator | | Time Fuze | |
| Det Cord | | Squibs | |
| Electric Detonator | | Black/Smokeless Powder | |
| Non-electric Detonator | | Two Component | |
| Non-El Detonator | | Other (list) | |

Certification

I certify that the explosives listed were used for their intended purpose, and that the MEC, UXO, MPPEH listed were rendered inert/destroyed.

Signature of Demolition Supervisor: _____ Date: _____

# APPENDIX H

## Laboratory Analytical Data – Demolition Shot

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

# ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Phoenix
4625 East Cotton Ctr Blvd
Suite 189
Phoenix, AZ 85040
Tel: (602)437-3340

TestAmerica Job ID: 550-88044-1
Client Project/Site: 06538009.0000

For:
ARCADIS U.S., Inc.
10250 Westheimer Rd
Suite 800
Houston, Texas 77042

Attn: Mr. Wayne Patterson

*Authorized for release by:*
*8/31/2017 7:54:19 PM*

Carlene McCutcheon, Project Manager II
(602)659-7612
carlene.mccutcheon@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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## Qualifiers

### HPLC/IC

| Qualifier | Qualifier Description |
|---|---|
| C8 | Sample RPD between the primary and confirmatory analysis exceeded 40% Per EPA Method 8000C, the lower value was reported as there was no evidence of chromatographic problems. |
| M1 | Matrix spike recovery was high, the associated blank spike recovery was acceptable. |

### LCMS

| Qualifier | Qualifier Description |
|---|---|
| M1 | Matrix spike recovery was high, the associated blank spike recovery was acceptable. |
| E4 | Concentration estimated. Analyte was detected below laboratory minimum reporting level (MRL) but above MDL. |

### Metals

| Qualifier | Qualifier Description |
|---|---|
| M2 | Matrix spike recovery was low, the associated blank spike recovery was acceptable. |
| M1 | Matrix spike recovery was high, the associated blank spike recovery was acceptable. |
| B7 | Target analyte detected in method blank at or above method reporting limit. Concentration found in the sample was 10 times above the concentration found in the blank. |
| M3 | The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The associated blank spike was acceptable. |
| B1 | Target analyte detected in method blank at or above the method reporting limit. |

## Glossary

| Abbreviation | These commonly used abbreviations may or may not be present in this report. |
|---|---|
| ¤ | Listed under the "D" column to designate that the result is reported on a dry weight basis |
| %R | Percent Recovery |
| CFL | Contains Free Liquid |
| CNF | Contains No Free Liquid |
| DER | Duplicate Error Ratio (normalized absolute difference) |
| Dil Fac | Dilution Factor |
| DL | Detection Limit (DoD/DOE) |
| DL, RA, RE, IN | Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample |
| DLC | Decision Level Concentration (Radiochemistry) |
| EDL | Estimated Detection Limit (Dioxin) |
| LOD | Limit of Detection (DoD/DOE) |
| LOQ | Limit of Quantitation (DoD/DOE) |
| MDA | Minimum Detectable Activity (Radiochemistry) |
| MDC | Minimum Detectable Concentration (Radiochemistry) |
| MDL | Method Detection Limit |
| ML | Minimum Level (Dioxin) |
| NC | Not Calculated |
| ND | Not Detected at the reporting limit (or MDL or EDL if shown) |
| PQL | Practical Quantitation Limit |
| QC | Quality Control |
| RER | Relative Error Ratio (Radiochemistry) |
| RL | Reporting Limit or Requested Limit (Radiochemistry) |
| RPD | Relative Percent Difference, a measure of the relative difference between two points |
| TEF | Toxicity Equivalent Factor (Dioxin) |
| TEQ | Toxicity Equivalent Quotient (Dioxin) |

## Job ID: 550-88044-1

### Laboratory: TestAmerica Phoenix

**Narrative**

**Job Narrative**
**550-88044-1**

**Comments**
No additional comments.

**Receipt**
The samples were received on 8/15/2017 9:40 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.1º C.

**Metals**
Method(s) 6010B: The method blank for preparation batch 550-125762 and analytical batch 550-125885 contained Iron (Fe) above the reporting limit (RL). Associated sample(s) were not re-extracted and/or re-analyzed because results were greater than 10X the value found in the method blank.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

**LCMS**
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

**Organic Prep**
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

# Sample Summary

Client: ARCADIS U.S., Inc.
Project/Site: 06538009.0000

TestAmerica Job ID: 550-88044-1

| Lab Sample ID | Client Sample ID | Matrix | Collected | Received |
|---|---|---|---|---|
| 550-88044-1 | POL-S1/SATO1-08142017-01A,01B | Solid | 08/14/17 09:00 | 08/15/17 09:40 |
| 550-88044-2 | POL-S1/SATO1-08142017-02A,02B | Solid | 08/14/17 09:20 | 08/15/17 09:40 |
| 550-88044-3 | POL-S1/SATO1-08142017-03A,03B | Solid | 08/14/17 09:40 | 08/15/17 09:40 |

# Detection Summary

Client: ARCADIS U.S., Inc.
Project/Site: 06538009.0000

TestAmerica Job ID: 550-88044-1

## Client Sample ID: POL-S1/SATO1-08142017-01A,01B — Lab Sample ID: 550-88044-1

| Analyte | Result | Qualifier | RL | MDL | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|
| RDX | 0.49 | | 0.26 | | mg/Kg | 1 | | 8330A | Total/NA |

## Client Sample ID: POL-S1/SATO1-08142017-02A,02B — Lab Sample ID: 550-88044-2

| Analyte | Result | Qualifier | RL | MDL | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|
| Perchlorate | 0.81 | M1 | 0.47 | | ug/Kg | 1 | | 6860 | Total/NA |

## Client Sample ID: POL-S1/SATO1-08142017-03A,03B — Lab Sample ID: 550-88044-3

| Analyte | Result | Qualifier | RL | MDL | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|
| Copper | 37 | M1 | 2.5 | | mg/Kg | 1 | | 6010B | Total/NA |
| Lead | 19 | | 1.0 | | mg/Kg | 1 | | 6010B | Total/NA |
| Zinc | 42 | | 5.0 | | mg/Kg | 1 | | 6010B | Total/NA |
| Iron | 18000 | B7 M3 | 10 | | mg/Kg | 1 | | 6010B | Total/NA |

This Detection Summary does not include radiochemical test results.

# Client Sample Results

Client: ARCADIS U.S., Inc.
Project/Site: 06538009.0000

TestAmerica Job ID: 550-88044-1

## Client Sample ID: POL-S1/SATO1-08142017-01A,01B — Lab Sample ID: 550-88044-1

**Date Collected: 08/14/17 09:00**
**Date Received: 08/15/17 09:40**
**Matrix: Solid**

### Method: 8330A - Nitroaromatics and Nitramines

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 2-Amino-4,6-dinitrotoluene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/25/17 01:26 | 1 |
| 4-Amino-2,6-dinitrotoluene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/25/17 01:26 | 1 |
| 2,4-Dinitrotoluene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/25/17 01:26 | 1 |
| 2,6-Dinitrotoluene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/25/17 01:26 | 1 |
| 2,4,6-Trinitrotoluene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/25/17 01:26 | 1 |
| m-Nitrotoluene | ND | | 0.50 | | mg/Kg | | 08/22/17 21:34 | 08/27/17 07:49 | 1 |
| o-Nitrotoluene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/27/17 07:49 | 1 |
| p-Nitrotoluene | ND | | 0.40 | | mg/Kg | | 08/22/17 21:34 | 08/27/17 07:49 | 1 |
| Nitrobenzene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/25/17 01:26 | 1 |
| 1,3,5-Trinitrobenzene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/25/17 01:26 | 1 |
| 1,3-Dinitrobenzene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/25/17 01:26 | 1 |
| HMX | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/25/17 01:26 | 1 |
| **RDX** | **0.49** | | 0.26 | | mg/Kg | | 08/22/17 21:34 | 08/27/17 07:49 | 1 |
| Tetryl | ND | | 0.50 | | mg/Kg | | 08/22/17 21:34 | 08/25/17 01:26 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *1,2-Dinitrobenzene* | *103* | | *83 - 122* | *08/22/17 21:34* | *08/25/17 01:26* | *1* |

## Client Sample ID: POL-S1/SATO1-08142017-02A,02B — Lab Sample ID: 550-88044-2

**Date Collected: 08/14/17 09:20**
**Date Received: 08/15/17 09:40**
**Matrix: Solid**

### Method: 6860 - Perchlorate by IC/MS or IC/MS/MS

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| **Perchlorate** | **0.81** | **M1** | 0.47 | | ug/Kg | | 08/17/17 23:39 | 08/30/17 17:46 | 1 |

## Client Sample ID: POL-S1/SATO1-08142017-03A,03B — Lab Sample ID: 550-88044-3

**Date Collected: 08/14/17 09:40**
**Date Received: 08/15/17 09:40**
**Matrix: Solid**

### Method: 6010B - Metals (ICP)

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Antimony | ND | M2 | 5.0 | | mg/Kg | | 08/24/17 17:59 | 08/26/17 19:18 | 1 |
| **Copper** | **37** | **M1** | 2.5 | | mg/Kg | | 08/24/17 17:59 | 08/26/17 19:18 | 1 |
| **Lead** | **19** | | 1.0 | | mg/Kg | | 08/24/17 17:59 | 08/26/17 19:18 | 1 |
| **Zinc** | **42** | | 5.0 | | mg/Kg | | 08/24/17 17:59 | 08/26/17 19:18 | 1 |
| **Iron** | **18000** | **B7 M3** | 10 | | mg/Kg | | 08/24/17 17:59 | 08/26/17 19:18 | 1 |

# Surrogate Summary

Client: ARCADIS U.S., Inc.
Project/Site: 06538009.0000

TestAmerica Job ID: 550-88044-1

## Method: 8330A - Nitroaromatics and Nitramines

**Matrix: Solid** **Prep Type: Total/NA**

| | | Percent Surrogate Recovery (Acceptance Limits) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Lab Sample ID** | **Client Sample ID** | **12DNB1 (83-122)** | | | | | | | |
| 280-100292-A-1-W MS | Matrix Spike | 103 | | | | | | | |
| 280-100292-A-1-X MSD | Matrix Spike Duplicate | 105 | | | | | | | |
| 550-88044-1 | POL-S1/SATO1-08142017-01A ,01B | 103 | | | | | | | |
| LCS 280-385213/2-A | Lab Control Sample | 106 | | | | | | | |
| LCS 280-385213/2-A | Lab Control Sample | 107 | | | | | | | |
| MB 280-385213/1-A | Method Blank | 108 | | | | | | | |
| MB 280-385213/1-A | Method Blank | 106 | | | | | | | |

**Surrogate Legend**

12DNB = 1,2-Dinitrobenzene

## Method: 8330A - Nitroaromatics and Nitramines

**Lab Sample ID: MB 280-385213/1-A**
**Matrix: Solid**
**Analysis Batch: 385487**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**
**Prep Batch: 385213**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 2-Amino-4,6-dinitrotoluene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/24/17 23:31 | 1 |
| 4-Amino-2,6-dinitrotoluene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/24/17 23:31 | 1 |
| 2,4-Dinitrotoluene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/24/17 23:31 | 1 |
| 2,6-Dinitrotoluene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/24/17 23:31 | 1 |
| 2,4,6-Trinitrotoluene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/24/17 23:31 | 1 |
| m-Nitrotoluene | ND | | 0.50 | | mg/Kg | | 08/22/17 21:34 | 08/24/17 23:31 | 1 |
| o-Nitrotoluene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/24/17 23:31 | 1 |
| p-Nitrotoluene | ND | | 0.40 | | mg/Kg | | 08/22/17 21:34 | 08/24/17 23:31 | 1 |
| Nitrobenzene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/24/17 23:31 | 1 |
| 1,3,5-Trinitrobenzene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/24/17 23:31 | 1 |
| 1,3-Dinitrobenzene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/24/17 23:31 | 1 |
| HMX | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/24/17 23:31 | 1 |
| RDX | ND | | 0.26 | | mg/Kg | | 08/22/17 21:34 | 08/24/17 23:31 | 1 |
| Tetryl | ND | | 0.50 | | mg/Kg | | 08/22/17 21:34 | 08/24/17 23:31 | 1 |

| *Surrogate* | *MB %Recovery* | *MB Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *1,2-Dinitrobenzene* | *108* | | *83 - 122* | *08/22/17 21:34* | *08/24/17 23:31* | *1* |

**Lab Sample ID: MB 280-385213/1-A**
**Matrix: Solid**
**Analysis Batch: 385719**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**
**Prep Batch: 385213**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 2-Amino-4,6-dinitrotoluene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/27/17 04:54 | 1 |
| 4-Amino-2,6-dinitrotoluene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/27/17 04:54 | 1 |
| 2,4-Dinitrotoluene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/27/17 04:54 | 1 |
| 2,6-Dinitrotoluene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/27/17 04:54 | 1 |
| 2,4,6-Trinitrotoluene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/27/17 04:54 | 1 |
| m-Nitrotoluene | ND | | 0.50 | | mg/Kg | | 08/22/17 21:34 | 08/27/17 04:54 | 1 |
| o-Nitrotoluene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/27/17 04:54 | 1 |
| p-Nitrotoluene | ND | | 0.40 | | mg/Kg | | 08/22/17 21:34 | 08/27/17 04:54 | 1 |
| Nitrobenzene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/27/17 04:54 | 1 |
| 1,3,5-Trinitrobenzene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/27/17 04:54 | 1 |
| 1,3-Dinitrobenzene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/27/17 04:54 | 1 |
| HMX | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/27/17 04:54 | 1 |
| RDX | ND | | 0.26 | | mg/Kg | | 08/22/17 21:34 | 08/27/17 04:54 | 1 |
| Tetryl | ND | | 0.50 | | mg/Kg | | 08/22/17 21:34 | 08/27/17 04:54 | 1 |

| *Surrogate* | *MB %Recovery* | *MB Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *1,2-Dinitrobenzene* | *106* | | *83 - 122* | *08/22/17 21:34* | *08/27/17 04:54* | *1* |

**Lab Sample ID: LCS 280-385213/2-A**
**Matrix: Solid**
**Analysis Batch: 385487**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**
**Prep Batch: 385213**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| 2-Amino-4,6-dinitrotoluene | 2.50 | 2.62 | | mg/Kg | | 105 | 80 - 120 |

## Method: 8330A - Nitroaromatics and Nitramines (Continued)

**Lab Sample ID: LCS 280-385213/2-A**
**Matrix: Solid**
**Analysis Batch: 385487**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**
**Prep Batch: 385213**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| 4-Amino-2,6-dinitrotoluene | 2.50 | 2.60 | | mg/Kg | | 104 | 80 - 120 |
| 2,4-Dinitrotoluene | 2.50 | 2.57 | | mg/Kg | | 103 | 80 - 120 |
| 2,6-Dinitrotoluene | 2.50 | 2.51 | | mg/Kg | | 100 | 80 - 120 |
| 2,4,6-Trinitrotoluene | 2.50 | 2.39 | | mg/Kg | | 96 | 80 - 120 |
| Nitrobenzene | 2.50 | 2.90 | | mg/Kg | | 116 | 80 - 120 |
| 1,3,5-Trinitrobenzene | 2.50 | 2.25 | | mg/Kg | | 90 | 80 - 120 |
| 1,3-Dinitrobenzene | 2.50 | 2.62 | | mg/Kg | | 105 | 80 - 120 |
| HMX | 2.50 | 2.85 | | mg/Kg | | 114 | 80 - 120 |
| RDX | 2.50 | 2.49 | | mg/Kg | | 99 | 80 - 120 |
| Tetryl | 2.50 | 2.83 | | mg/Kg | | 113 | 80 - 120 |

| *Surrogate* | *LCS %Recovery* | *LCS Qualifier* | *Limits* |
|---|---|---|---|
| *1,2-Dinitrobenzene* | *106* | | *83 - 122* |

**Lab Sample ID: LCS 280-385213/2-A**
**Matrix: Solid**
**Analysis Batch: 385719**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**
**Prep Batch: 385213**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| 2-Amino-4,6-dinitrotoluene | 2.50 | 2.49 | | mg/Kg | | 99 | 80 - 120 |
| 4-Amino-2,6-dinitrotoluene | 2.50 | 2.61 | | mg/Kg | | 104 | 80 - 120 |
| 2,4-Dinitrotoluene | 2.50 | 2.59 | | mg/Kg | | 104 | 80 - 120 |
| 2,6-Dinitrotoluene | 2.50 | 2.47 | | mg/Kg | | 99 | 80 - 120 |
| 2,4,6-Trinitrotoluene | 2.50 | 2.22 | | mg/Kg | | 89 | 80 - 120 |
| m-Nitrotoluene | 2.50 | 2.73 | | mg/Kg | | 109 | 80 - 120 |
| o-Nitrotoluene | 2.50 | 2.99 | | mg/Kg | | 120 | 80 - 120 |
| p-Nitrotoluene | 2.50 | 2.92 | | mg/Kg | | 117 | 80 - 120 |
| Nitrobenzene | 2.50 | 2.61 | | mg/Kg | | 104 | 80 - 120 |
| 1,3,5-Trinitrobenzene | 2.50 | 2.41 | | mg/Kg | | 96 | 80 - 120 |
| 1,3-Dinitrobenzene | 2.50 | 2.72 | | mg/Kg | | 109 | 80 - 120 |
| HMX | 2.50 | 2.36 | | mg/Kg | | 94 | 80 - 120 |
| RDX | 2.50 | 2.31 | | mg/Kg | | 92 | 80 - 120 |
| Tetryl | 2.50 | 2.71 | | mg/Kg | | 108 | 80 - 120 |

| *Surrogate* | *LCS %Recovery* | *LCS Qualifier* | *Limits* |
|---|---|---|---|
| *1,2-Dinitrobenzene* | *107* | | *83 - 122* |

**Lab Sample ID: 280-100292-A-1-W MS**
**Matrix: Solid**
**Analysis Batch: 385487**

**Client Sample ID: Matrix Spike**
**Prep Type: Total/NA**
**Prep Batch: 385213**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| 2-Amino-4,6-dinitrotoluene | ND | | 2.50 | 2.56 | | mg/Kg | | 102 | 80 - 120 |
| 4-Amino-2,6-dinitrotoluene | ND | | 2.50 | 2.49 | | mg/Kg | | 100 | 80 - 120 |
| 2,4-Dinitrotoluene | ND | | 2.50 | 2.50 | | mg/Kg | | 100 | 80 - 120 |
| 2,6-Dinitrotoluene | ND | | 2.50 | 2.41 | | mg/Kg | | 96 | 80 - 120 |
| 2,4,6-Trinitrotoluene | ND | | 2.50 | 2.33 | | mg/Kg | | 93 | 80 - 120 |
| Nitrobenzene | ND | | 2.50 | 2.80 | | mg/Kg | | 112 | 80 - 120 |

## Method: 8330A - Nitroaromatics and Nitramines (Continued)

**Lab Sample ID: 280-100292-A-1-W MS** — **Client Sample ID: Matrix Spike**
**Matrix: Solid** — **Prep Type: Total/NA**
**Analysis Batch: 385487** — **Prep Batch: 385213**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| 1,3,5-Trinitrobenzene | ND | | 2.50 | 2.17 | | mg/Kg | | 87 | 80 - 120 |
| 1,3-Dinitrobenzene | ND | | 2.50 | 2.54 | | mg/Kg | | 101 | 80 - 120 |
| HMX | ND | M1 | 2.50 | 3.20 | C8 M1 | mg/Kg | | 128 | 80 - 120 |
| RDX | ND | | 2.50 | 2.28 | | mg/Kg | | 91 | 80 - 120 |
| Tetryl | ND | | 2.50 | 2.77 | | mg/Kg | | 111 | 80 - 120 |

| *Surrogate* | *MS %Recovery* | *MS Qualifier* | *Limits* |
|---|---|---|---|
| *1,2-Dinitrobenzene* | *103* | | *83 - 122* |

**Lab Sample ID: 280-100292-A-1-W MS** — **Client Sample ID: Matrix Spike**
**Matrix: Solid** — **Prep Type: Total/NA**
**Analysis Batch: 385719** — **Prep Batch: 385213**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| m-Nitrotoluene | ND | | 2.50 | 2.70 | | mg/Kg | | 108 | 80 - 120 |
| o-Nitrotoluene | ND | | 2.50 | 2.95 | | mg/Kg | | 118 | 80 - 120 |
| p-Nitrotoluene | ND | | 2.50 | 2.88 | | mg/Kg | | 115 | 80 - 120 |

**Lab Sample ID: 280-100292-A-1-X MSD** — **Client Sample ID: Matrix Spike Duplicate**
**Matrix: Solid** — **Prep Type: Total/NA**
**Analysis Batch: 385487** — **Prep Batch: 385213**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2-Amino-4,6-dinitrotoluene | ND | | 2.50 | 2.60 | | mg/Kg | | 104 | 80 - 120 | 2 | 20 |
| 4-Amino-2,6-dinitrotoluene | ND | | 2.50 | 2.51 | | mg/Kg | | 100 | 80 - 120 | 1 | 20 |
| 2,4-Dinitrotoluene | ND | | 2.50 | 2.51 | | mg/Kg | | 101 | 80 - 120 | 1 | 20 |
| 2,6-Dinitrotoluene | ND | | 2.50 | 2.46 | | mg/Kg | | 98 | 80 - 120 | 2 | 20 |
| 2,4,6-Trinitrotoluene | ND | | 2.50 | 2.37 | | mg/Kg | | 95 | 80 - 120 | 2 | 20 |
| Nitrobenzene | ND | | 2.50 | 2.84 | | mg/Kg | | 113 | 80 - 120 | 1 | 20 |
| 1,3,5-Trinitrobenzene | ND | | 2.50 | 2.21 | | mg/Kg | | 88 | 80 - 120 | 2 | 20 |
| 1,3-Dinitrobenzene | ND | | 2.50 | 2.57 | | mg/Kg | | 103 | 80 - 120 | 1 | 20 |
| HMX | ND | M1 | 2.50 | 2.81 | | mg/Kg | | 113 | 80 - 120 | 13 | 20 |
| RDX | ND | | 2.50 | 2.32 | | mg/Kg | | 93 | 80 - 120 | 2 | 20 |
| Tetryl | ND | | 2.50 | 2.80 | | mg/Kg | | 112 | 80 - 120 | 1 | 20 |

| *Surrogate* | *MSD %Recovery* | *MSD Qualifier* | *Limits* |
|---|---|---|---|
| *1,2-Dinitrobenzene* | *105* | | *83 - 122* |

**Lab Sample ID: 280-100292-A-1-X MSD** — **Client Sample ID: Matrix Spike Duplicate**
**Matrix: Solid** — **Prep Type: Total/NA**
**Analysis Batch: 385719** — **Prep Batch: 385213**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| m-Nitrotoluene | ND | | 2.50 | 2.68 | | mg/Kg | | 107 | 80 - 120 | 1 | 20 |
| o-Nitrotoluene | ND | | 2.50 | 2.90 | | mg/Kg | | 116 | 80 - 120 | 2 | 20 |
| p-Nitrotoluene | ND | | 2.50 | 2.93 | | mg/Kg | | 117 | 80 - 120 | 2 | 20 |

# QC Sample Results

Client: ARCADIS U.S., Inc.
Project/Site: 06538009.0000

TestAmerica Job ID: 550-88044-1

## Method: 6860 - Perchlorate by IC/MS or IC/MS/MS

**Lab Sample ID: MB 280-384726/1-A** — **Client Sample ID: Method Blank**
**Matrix: Solid** — **Prep Type: Total/NA**
**Analysis Batch: 386114** — **Prep Batch: 384726**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Perchlorate | ND | | 0.50 | | ug/Kg | | 08/17/17 23:39 | 08/30/17 17:15 | 1 |

**Lab Sample ID: LCS 280-384726/2-A** — **Client Sample ID: Lab Control Sample**
**Matrix: Solid** — **Prep Type: Total/NA**
**Analysis Batch: 385947** — **Prep Batch: 384726**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Perchlorate | 0.500 | 0.490 | E4 | ug/Kg | | 98 | 70 - 130 |

**Lab Sample ID: LCSD 280-384726/3-A** — **Client Sample ID: Lab Control Sample Dup**
**Matrix: Solid** — **Prep Type: Total/NA**
**Analysis Batch: 385947** — **Prep Batch: 384726**

| Analyte | Spike Added | LCSD Result | LCSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|
| Perchlorate | 0.500 | 0.496 | E4 | ug/Kg | | 99 | 70 - 130 | 1 | 15 |

**Lab Sample ID: 550-88044-2 MS** — **Client Sample ID: POL-S1/SATO1-08142017-02A,02B**
**Matrix: Solid** — **Prep Type: Total/NA**
**Analysis Batch: 385947** — **Prep Batch: 384726**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| Perchlorate | 0.81 | M1 | 0.500 | 1.63 | M1 | ug/Kg | | 163 | 70 - 130 |

**Lab Sample ID: 550-88044-2 MSD** — **Client Sample ID: POL-S1/SATO1-08142017-02A,02B**
**Matrix: Solid** — **Prep Type: Total/NA**
**Analysis Batch: 385947** — **Prep Batch: 384726**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Perchlorate | 0.81 | M1 | 0.500 | 1.52 | M1 | ug/Kg | | 142 | 70 - 130 | 7 | 15 |

**Lab Sample ID: DLCK 280-386113/12** — **Client Sample ID: Lab Control Sample**
**Matrix: Solid** — **Prep Type: Total/NA**
**Analysis Batch: 386113**

| Analyte | Spike Added | DLCK Result | DLCK Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Perchlorate | 0.0500 | ND | | ug/L | | 98 | 70 - 130 |

**Lab Sample ID: DLCK 280-386304/12** — **Client Sample ID: Lab Control Sample**
**Matrix: Solid** — **Prep Type: Total/NA**
**Analysis Batch: 386304**

| Analyte | Spike Added | DLCK Result | DLCK Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Perchlorate | 0.0500 | 0.0504 | | ug/L | | 101 | 70 - 130 |

# QC Sample Results

Client: ARCADIS U.S., Inc.
Project/Site: 06538009.0000

TestAmerica Job ID: 550-88044-1

## Method: 6010B - Metals (ICP)

**Lab Sample ID: MB 550-125762/1-A** — **Client Sample ID: Method Blank**
**Matrix: Solid** — **Prep Type: Total/NA**
**Analysis Batch: 125885** — **Prep Batch: 125762**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Antimony | ND | | 4.9 | | mg/Kg | | 08/24/17 17:59 | 08/26/17 18:54 | 1 |
| Copper | ND | | 2.5 | | mg/Kg | | 08/24/17 17:59 | 08/26/17 18:54 | 1 |
| Lead | ND | | 0.98 | | mg/Kg | | 08/24/17 17:59 | 08/26/17 18:54 | 1 |
| Zinc | ND | | 4.9 | | mg/Kg | | 08/24/17 17:59 | 08/26/17 18:54 | 1 |
| Iron | 10.4 | B1 | 9.8 | | mg/Kg | | 08/24/17 17:59 | 08/26/17 18:54 | 1 |

**Lab Sample ID: LCS 550-125762/2-A** — **Client Sample ID: Lab Control Sample**
**Matrix: Solid** — **Prep Type: Total/NA**
**Analysis Batch: 125885** — **Prep Batch: 125762**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Antimony | 49.2 | 47.7 | | mg/Kg | | 97 | 80 - 111 |
| Copper | 49.2 | 51.4 | | mg/Kg | | 104 | 85 - 114 |
| Lead | 49.2 | 46.6 | | mg/Kg | | 95 | 83 - 108 |
| Zinc | 49.2 | 47.4 | | mg/Kg | | 96 | 83 - 113 |
| Iron | 49.2 | 53.5 | | mg/Kg | | 109 | 75 - 125 |

**Lab Sample ID: LCSD 550-125762/3-A** — **Client Sample ID: Lab Control Sample Dup**
**Matrix: Solid** — **Prep Type: Total/NA**
**Analysis Batch: 125885** — **Prep Batch: 125762**

| Analyte | Spike Added | LCSD Result | LCSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|
| Antimony | 49.3 | 47.3 | | mg/Kg | | 96 | 80 - 111 | 1 | 20 |
| Copper | 49.3 | 51.5 | | mg/Kg | | 105 | 85 - 114 | 0 | 20 |
| Lead | 49.3 | 46.3 | | mg/Kg | | 94 | 83 - 108 | 1 | 20 |
| Zinc | 49.3 | 46.5 | | mg/Kg | | 94 | 83 - 113 | 2 | 20 |
| Iron | 49.3 | 55.6 | | mg/Kg | | 113 | 75 - 125 | 4 | 20 |

**Lab Sample ID: 550-88044-3 MS** — **Client Sample ID: POL-S1/SATO1-08142017-03A,03B**
**Matrix: Solid** — **Prep Type: Total/NA**
**Analysis Batch: 125885** — **Prep Batch: 125762**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| Antimony | ND | M2 | 49.6 | 11.2 | M2 | mg/Kg | | 23 | 75 - 125 |
| Copper | 37 | M1 | 49.6 | 107 | M1 | mg/Kg | | 141 | 75 - 125 |
| Lead | 19 | | 49.6 | 62.5 | | mg/Kg | | 88 | 75 - 125 |
| Zinc | 42 | | 49.6 | 88.1 | | mg/Kg | | 93 | 75 - 125 |
| Iron | 18000 | M3 B7 | 49.6 | 20400 | M3 | mg/Kg | | 4199 | 75 - 125 |

**Lab Sample ID: 550-88044-3 MSD** — **Client Sample ID: POL-S1/SATO1-08142017-03A,03B**
**Matrix: Solid** — **Prep Type: Total/NA**
**Analysis Batch: 125885** — **Prep Batch: 125762**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Antimony | ND | M2 | 49.5 | 10.7 | M2 | mg/Kg | | 22 | 75 - 125 | 4 | 20 |
| Copper | 37 | M1 | 49.5 | 105 | M1 | mg/Kg | | 137 | 75 - 125 | 2 | 20 |
| Lead | 19 | | 49.5 | 60.3 | | mg/Kg | | 83 | 75 - 125 | 4 | 20 |
| Zinc | 42 | | 49.5 | 90.1 | | mg/Kg | | 97 | 75 - 125 | 2 | 20 |
| Iron | 18000 | M3 B7 | 49.5 | 20400 | M3 | mg/Kg | | 4303 | 75 - 125 | 0 | 20 |

# QC Association Summary

Client: ARCADIS U.S., Inc.
Project/Site: 06538009.0000

TestAmerica Job ID: 550-88044-1

## HPLC/IC

### Drying Batch: 385066

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 550-88044-1 | POL-S1/SATO1-08142017-01A,01B | Total/NA | Solid | Prep/Air Dry | |
| 280-100292-A-1-W MS | Matrix Spike | Total/NA | Solid | Prep/Air Dry | |
| 280-100292-A-1-X MSD | Matrix Spike Duplicate | Total/NA | Solid | Prep/Air Dry | |

### Prep Batch: 385213

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 550-88044-1 | POL-S1/SATO1-08142017-01A,01B | Total/NA | Solid | Sieve/Ultrasoni | 385066 |
| MB 280-385213/1-A | Method Blank | Total/NA | Solid | Sieve/Ultrasoni | |
| LCS 280-385213/2-A | Lab Control Sample | Total/NA | Solid | Sieve/Ultrasoni | |
| 280-100292-A-1-W MS | Matrix Spike | Total/NA | Solid | Sieve/Ultrasoni | 385066 |
| 280-100292-A-1-X MSD | Matrix Spike Duplicate | Total/NA | Solid | Sieve/Ultrasoni | 385066 |

### Analysis Batch: 385487

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 550-88044-1 | POL-S1/SATO1-08142017-01A,01B | Total/NA | Solid | 8330A | 385213 |
| MB 280-385213/1-A | Method Blank | Total/NA | Solid | 8330A | 385213 |
| LCS 280-385213/2-A | Lab Control Sample | Total/NA | Solid | 8330A | 385213 |
| 280-100292-A-1-W MS | Matrix Spike | Total/NA | Solid | 8330A | 385213 |
| 280-100292-A-1-X MSD | Matrix Spike Duplicate | Total/NA | Solid | 8330A | 385213 |

### Analysis Batch: 385719

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 550-88044-1 | POL-S1/SATO1-08142017-01A,01B | Total/NA | Solid | 8330A | 385213 |
| MB 280-385213/1-A | Method Blank | Total/NA | Solid | 8330A | 385213 |
| LCS 280-385213/2-A | Lab Control Sample | Total/NA | Solid | 8330A | 385213 |
| 280-100292-A-1-W MS | Matrix Spike | Total/NA | Solid | 8330A | 385213 |
| 280-100292-A-1-X MSD | Matrix Spike Duplicate | Total/NA | Solid | 8330A | 385213 |

## LCMS

### Prep Batch: 384726

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 550-88044-2 | POL-S1/SATO1-08142017-02A,02B | Total/NA | Solid | 6860 | |
| MB 280-384726/1-A | Method Blank | Total/NA | Solid | 6860 | |
| LCS 280-384726/2-A | Lab Control Sample | Total/NA | Solid | 6860 | |
| LCSD 280-384726/3-A | Lab Control Sample Dup | Total/NA | Solid | 6860 | |
| 550-88044-2 MS | POL-S1/SATO1-08142017-02A,02B | Total/NA | Solid | 6860 | |
| 550-88044-2 MSD | POL-S1/SATO1-08142017-02A,02B | Total/NA | Solid | 6860 | |

### Analysis Batch: 385947

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| LCS 280-384726/2-A | Lab Control Sample | Total/NA | Solid | 6860 | 384726 |
| LCSD 280-384726/3-A | Lab Control Sample Dup | Total/NA | Solid | 6860 | 384726 |
| 550-88044-2 MS | POL-S1/SATO1-08142017-02A,02B | Total/NA | Solid | 6860 | 384726 |
| 550-88044-2 MSD | POL-S1/SATO1-08142017-02A,02B | Total/NA | Solid | 6860 | 384726 |

### Analysis Batch: 386113

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| DLCK 280-386113/12 | Lab Control Sample | Total/NA | Solid | 6860 | |

## LCMS (Continued)

### Analysis Batch: 386114

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 550-88044-2 | POL-S1/SATO1-08142017-02A,02B | Total/NA | Solid | 6860 | 384726 |
| MB 280-384726/1-A | Method Blank | Total/NA | Solid | 6860 | 384726 |

### Analysis Batch: 386304

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| DLCK 280-386304/12 | Lab Control Sample | Total/NA | Solid | 6860 | |

## Metals

### Prep Batch: 125762

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 550-88044-3 | POL-S1/SATO1-08142017-03A,03B | Total/NA | Solid | 3050B | |
| MB 550-125762/1-A | Method Blank | Total/NA | Solid | 3050B | |
| LCS 550-125762/2-A | Lab Control Sample | Total/NA | Solid | 3050B | |
| LCSD 550-125762/3-A | Lab Control Sample Dup | Total/NA | Solid | 3050B | |
| 550-88044-3 MS | POL-S1/SATO1-08142017-03A,03B | Total/NA | Solid | 3050B | |
| 550-88044-3 MSD | POL-S1/SATO1-08142017-03A,03B | Total/NA | Solid | 3050B | |

### Analysis Batch: 125885

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 550-88044-3 | POL-S1/SATO1-08142017-03A,03B | Total/NA | Solid | 6010B | 125762 |
| MB 550-125762/1-A | Method Blank | Total/NA | Solid | 6010B | 125762 |
| LCS 550-125762/2-A | Lab Control Sample | Total/NA | Solid | 6010B | 125762 |
| LCSD 550-125762/3-A | Lab Control Sample Dup | Total/NA | Solid | 6010B | 125762 |
| 550-88044-3 MS | POL-S1/SATO1-08142017-03A,03B | Total/NA | Solid | 6010B | 125762 |
| 550-88044-3 MSD | POL-S1/SATO1-08142017-03A,03B | Total/NA | Solid | 6010B | 125762 |

# Lab Chronicle

Client: ARCADIS U.S., Inc.
Project/Site: 06538009.0000

TestAmerica Job ID: 550-88044-1

## Client Sample ID: POL-S1/SATO1-08142017-01A,01B — Lab Sample ID: 550-88044-1

**Date Collected: 08/14/17 09:00** — **Matrix: Solid**
**Date Received: 08/15/17 09:40**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Drying | Prep/Air Dry | | | 385066 | 08/21/17 22:11 | CDC | TAL DEN |
| Total/NA | Prep | Sieve/Ultrasoni | | | 385213 | 08/22/17 21:34 | CDC | TAL DEN |
| Total/NA | Analysis | 8330A | | 1 | 385719 | 08/27/17 07:49 | ASC | TAL DEN |
| Total/NA | Drying | Prep/Air Dry | | | 385066 | 08/21/17 22:11 | CDC | TAL DEN |
| Total/NA | Prep | Sieve/Ultrasoni | | | 385213 | 08/22/17 21:34 | CDC | TAL DEN |
| Total/NA | Analysis | 8330A | | 1 | 385487 | 08/25/17 01:26 | ASC | TAL DEN |

## Client Sample ID: POL-S1/SATO1-08142017-02A,02B — Lab Sample ID: 550-88044-2

**Date Collected: 08/14/17 09:20** — **Matrix: Solid**
**Date Received: 08/15/17 09:40**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Prep | 6860 | | | 384726 | 08/17/17 23:39 | CDC | TAL DEN |
| Total/NA | Analysis | 6860 | | 1 | 386114 | 08/30/17 17:46 | HKF | TAL DEN |

## Client Sample ID: POL-S1/SATO1-08142017-03A,03B — Lab Sample ID: 550-88044-3

**Date Collected: 08/14/17 09:40** — **Matrix: Solid**
**Date Received: 08/15/17 09:40**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Prep | 3050B | | | 125762 | 08/24/17 17:59 | EXZ | TAL PHX |
| Total/NA | Analysis | 6010B | | 1 | 125885 | 08/26/17 19:18 | TC1 | TAL PHX |

**Laboratory References:**

TAL DEN = TestAmerica Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

# Accreditation/Certification Summary

Client: ARCADIS U.S., Inc.
Project/Site: 06538009.0000

TestAmerica Job ID: 550-88044-1

## Laboratory: TestAmerica Phoenix

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

| Authority | Program | EPA Region | Identification Number | Expiration Date |
|---|---|---|---|---|
| Arizona | State Program | 9 | AZ0728 | 06-09-18 |

| Analysis Method | Prep Method | Matrix | Analyte |
|---|---|---|---|

## Laboratory: TestAmerica Denver

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

| Authority | Program | EPA Region | Identification Number | Expiration Date |
|---|---|---|---|---|
| A2LA | DoD ELAP | | 2907.01 | 10-31-17 |
| A2LA | ISO/IEC 17025 | | 2907.01 | 10-31-17 |
| Alabama | State Program | 4 | 40730 | 09-30-12 * |
| Alaska (UST) | State Program | 10 | UST-30 | 04-05-18 |
| Arizona | State Program | 9 | AZ0713 | 12-20-17 |
| Arkansas DEQ | State Program | 6 | 88-0687 | 06-01-18 |
| California | State Program | 9 | 2513 | 01-08-18 |
| Connecticut | State Program | 1 | PH-0686 | 09-30-18 |
| Florida | NELAP | 4 | E87667 | 06-30-18 |
| Georgia | State Program | 4 | N/A | 01-08-18 |
| Illinois | NELAP | 5 | 200017 | 04-30-18 |
| Iowa | State Program | 7 | 370 | 12-01-18 |
| Kansas | NELAP | 7 | E-10166 | 04-30-18 |
| Louisiana | NELAP | 6 | 02096 | 06-30-18 |
| Maine | State Program | 1 | CO0002 | 03-03-19 |
| Minnesota | NELAP | 5 | 8-999-405 | 12-31-17 |
| Nevada | State Program | 9 | CO0026 | 07-31-18 |
| New Hampshire | NELAP | 1 | 205310 | 04-28-18 |
| New Jersey | NELAP | 2 | CO004 | 06-30-18 |
| New York | NELAP | 2 | 11964 | 04-01-18 |
| North Carolina (WW/SW) | State Program | 4 | 358 | 12-31-17 |
| North Dakota | State Program | 8 | R-034 | 01-09-18 |
| Oklahoma | State Program | 6 | 8614 | 08-31-17 * |
| Oregon | NELAP | 10 | 4025 | 01-08-18 |
| Pennsylvania | NELAP | 3 | 68-00664 | 07-31-18 |
| South Carolina | State Program | 4 | 72002001 | 01-08-18 |
| Texas | NELAP | 6 | T104704183-16-12 | 09-30-17 |
| USDA | Federal | | P330-16-00397 | 12-15-19 |
| Utah | NELAP | 8 | CO00026 | 07-31-18 |
| Virginia | NELAP | 3 | 460232 | 06-14-18 |
| Washington | State Program | 10 | C583 | 08-03-18 |
| West Virginia DEP | State Program | 3 | 354 | 11-30-17 |
| Wisconsin | State Program | 5 | 999615430 | 08-31-18 |
| Wyoming (UST) | A2LA | 8 | 2907.01 | 10-31-17 |

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

# Method Summary

Client: ARCADIS U.S., Inc.
Project/Site: 06538009.0000

TestAmerica Job ID: 550-88044-1

| Method | Method Description | Protocol | Laboratory |
|---|---|---|---|
| 8330A | Nitroaromatics and Nitramines | SW846 | TAL DEN |
| 6860 | Perchlorate by IC/MS or IC/MS/MS | EPA | TAL DEN |
| 6010B | Metals (ICP) | SW846 | TAL PHX |

**Protocol References:**

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

**Laboratory References:**

TAL DEN = TestAmerica Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

TAL-0013-550 (0116)

# CHAIN OF CUSTODY FORM

[ ] Phoenix - 4625 E. Cotton Center Blvd., Suite 189, Phoenix, AZ 85040 (602) 437-3340

8/31/2017

* LAB PROJECT # - 550033305 88044

Page 1 of 1

Client Name/Address: ARCADIS-US, 10205 WESTHEIMER RD, SUITE 800, HOUSTON, TX 77042

Project/PO Number: 06538009.0000 / 001A

Project Manager: WAYNE PATTERSON

Phone Number: 713-953-4725

Sampler: GREG PETERSON

Email Address: WAYNE.PATTERSON@ARCADIS.COM

Analysis Required

| Sample Description | Sample Matrix | Container Type | # of Cont. | Sampling Date | Sampling Time | Preservatives | US EPA METHOD 8330A | | US EPA METHOD 6850 | | US EPA METHOD 6010C - MEC INDICATOR METALS: ANTIMONY, COPPER, IRON, LEAD, AND ZINC | | | | Special Instructions |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| POL-S1/SAT01-08142017-01A | SOLID | 4 oz JAR | 1 | 14/AUG/17 | 0900 | N/A | X | | | | | -01 | | | (2) 4 oz JARS |
| POL-S1/SAT01-08142017-01B | SOLID | 4 oz JAR | 1 | 14/AUG/17 | 0900 | N/A | X | | | | | -01 | | | = 1 SAMPLE |
| | | | | | | | | | | | | | | | |
| POL-S1/SAT01-08142017-02A | SOLID | 4 oz JAR | 1 | 14/AUG/17 | 0920 | N/A | | | X | | | -02 | | | (2) 4 oz JARS |
| POL-S1/SAT01-08142017-02B | SOLID | 4 oz JAR | 1 | 14/AUG/17 | 0920 | N/A | | | X | | | -02 | | | = 1 SAMPLE |
| | | | | | | | | | | | | | | | |
| POL-S1/SAT01-08142017-03A | SOLID | 4 oz JAR | 1 | 14/AUG/17 | 0940 | N/A | | | | | X | -03 | | | (2) 4 oz JARS |
| POL-S1/SAT01-08142017-03B | SOLID | 4 oz JAR | 1 | 14/AUG/17 | 0940 | N/A | | | | | X | -03 | | | = 1 SAMPLE |

550-88044 Chain of Custody

| Relinquished By: | Date/Time: | Received By: | Date/Time: | Turnaround Time: (Check) |
|---|---|---|---|---|
| GREG PETERSON | 14/AUG/2017-1600 | | | same day ____ 72 hours ____ |
| Relinquished By: | Date/Time: | Received By: | Date/Time: | 24 hours ____ 5 days ____ |
| | | | | 48 hours ____ normal X |
| Relinquished By: | Date/Time: | Received in Lab By: | Date/Time: 8-15-17 0940 | Sample Integrity: (Check) |
| | | | | intact ____ on ice X |

**Note:** By relinquishing samples to TestAmerica, client agrees to pay for the services requested on this chain of custody form and any additional analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 30 days.

**TestAmerica Phoenix**
4625 East Cotton Ctr Blvd Suite 189
Phoenix, AZ 85040
Phone (602) 437-3340 Fax (602) 454-9303

# Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

| | | | | |
|---|---|---|---|---|
| **Client Information (Sub Contract Lab)** | Sampler: | Lab PM: McCutcheon, Carlene | Carrier Tracking No(s): | COC No: 550-18543.1 |
| Client Contact: Shipping/Receiving | Phone: | E-Mail: carlene.mccutcheon@testamericainc.com | State of Origin: Arizona | Page: Page 1 of 1 |
| Company: TestAmerica Laboratories, Inc. | | Accreditations Required (See note): State Program - Arizona | | Job #: 550-88044-1 |
| Address: 4955 Yarrow Street, , | Due Date Requested: 8/22/2017 | | | |
| City: Arvada | TAT Requested (days): | | | |
| State, Zip: CO, 80002 | | | | |
| Phone: 303-736-0100(Tel) 303-431-7171(Fax) | PO #: | | | |
| Email: | WO #: | | | |
| Project Name: 6538009 | Project #: 55003305 | | | |
| Site: | SSOW#: | | | |

**Analysis Requested**

**Preservation Codes:**

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

Other:

| Sample Identification - Client ID (Lab ID) | Sample Date | Sample Time | Sample Type (C=comp, G=grab) | Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air) | Field Filtered Sample (Yes or No) | Perform MS/MSD (Yes or No) | 8330A/8330_P_2g Explosives | 6860/6860_Prep Standard 6860 list | Total Number of containers | Special Instructions/Note: |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Preservation Code: | | | | | | | |
| POL-S1/SATO1-08142017-01A,01B (550-88044-1) | 8/14/17 | 09:00 Arizona | | Solid | | | X | | 1 | |
| POL-S1/SATO1-08142017-02A,02B (550-88044-2) | 8/14/17 | 09:20 Arizona | | Solid | | | | X | 1 | |

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to TestAmerica Laboratories, Inc.

| | |
|---|---|
| ***Possible Hazard Identification*** *Unconfirmed* | ***Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)*** ☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months* |
| Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2 | Special Instructions/QC Requirements: |

| | | | | | |
|---|---|---|---|---|---|
| Empty Kit Relinquished by: | Date: | Time: | | Method of Shipment: | |
| Relinquished by: [illegible] 8-16-17 | Date/Time: 14:35 TA PHX | Company: LAB | Received by: [illegible] | Date/Time: 8/17/17 0845 | Company: TA |
| Relinquished by: | Date/Time: | Company: | Received by: | Date/Time: | Company: |
| Relinquished by: | Date/Time: | Company: | Received by: | Date/Time: | Company: |
| Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | | Cooler Temperature(s) °C and Other Remarks: 1.3+0.1 IR#7 transfered by JT 8/17/17 | | |

# Login Sample Receipt Checklist

Client: ARCADIS U.S., Inc.

Job Number: 550-88044-1

**Login Number: 88044**
**List Number: 1**
**Creator: Gravlin, Andrea**

**List Source: TestAmerica Phoenix**

| Question | Answer | Comment |
|---|---|---|
| Radioactivity wasn't checked or is </= background as measured by a survey meter. | True | |
| The cooler's custody seal, if present, is intact. | True | |
| Sample custody seals, if present, are intact. | True | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | True | |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| Is the Field Sampler's name present on COC? | True | |
| There are no discrepancies between the containers received and the COC. | True | |
| Samples are received within Holding Time (excluding tests with immediate HTs) | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| Sample Preservation Verified. | True | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | True | |
| Containers requiring zero headspace have no headspace or bubble is <6mm (1/4"). | True | |
| Multiphasic samples are not present. | True | |
| Samples do not require splitting or compositing. | True | |
| Residual Chlorine Checked. | N/A | No volume available, unable to check residual chlorine. |

# Login Sample Receipt Checklist

Client: ARCADIS U.S., Inc.

Job Number: 550-88044-1

**Login Number: 88044**
**List Number: 2**
**Creator: Gomez, Alyssa I**

**List Source: TestAmerica Denver**
**List Creation: 08/17/17 03:20 PM**

| Question | Answer | Comment |
|---|---|---|
| Radioactivity wasn't checked or is </= background as measured by a survey meter. | N/A | |
| The cooler's custody seal, if present, is intact. | True | |
| Sample custody seals, if present, are intact. | True | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | True | |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| Is the Field Sampler's name present on COC? | True | |
| There are no discrepancies between the containers received and the COC. | True | |
| Samples are received within Holding Time (excluding tests with immediate HTs) | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| Sample Preservation Verified. | N/A | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | True | |
| Containers requiring zero headspace have no headspace or bubble is <6mm (1/4"). | N/A | |
| Multiphasic samples are not present. | True | |
| Samples do not require splitting or compositing. | True | |
| Residual Chlorine Checked. | N/A | |

Pueblo of Laguna

# DATA REVIEW

## Laguna, New Mexico

Explosives, Perchlorate, and Metals Analyses

SDG #550-88044

Analyses Performed By:
TestAmerica Laboratories, Inc.
Phoenix, Arizona
and Denver, Colorado

Report #28422R
Review Level: Tier II
Project: 06538009.0000.0001B and 0002B

# SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) #550-88044 for samples collected in association with the Pueblo of Laguna Site. The review was conducted as a Tier II evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets, and chain of custody. Analyses were performed on the following samples:

| Sample ID | Lab ID | Matrix | Sample Collection Date | Parent Sample | Analysis | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | VOC | SVOC | EXP | MET | PERC |
| POL-S1/SATO1-08142017-01A,01B | 550-88044-1 | Solid | 8/14/2017 | | | | X | | |
| POL-S1/SATO1-08142017-02A,02B | 550-88044-2 | Solid | 8/14/2017 | | | | | | X |
| POL-S1/SATO1-08142017-03A,03B | 550-88044-3 | Solid | 8/14/2017 | | | | | X | |

Note:

1. The analyses for explosives and perchlorate was performed by TestAmerica Denver.
2. The analysis for metals was performed by TestAmerica Phoenix.

## ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

| Items Reviewed | Reported | | Performance Acceptable | | Not Required |
|---|---|---|---|---|---|
| | No | Yes | No | Yes | |
| 1. Sample receipt condition | | X | | X | |
| 2. Requested analyses and sample results | | X | | X | |
| 3. Master tracking list | | X | | X | |
| 4. Methods of analysis | | X | | X | |
| 5. Reporting limits | | X | | X | |
| 6. Sample collection date | | X | | X | |
| 7. Laboratory sample received date | | X | | X | |
| 8. Sample preservation verification (as applicable) | | X | | X | |
| 9. Sample preparation/extraction/analysis dates | | X | | X | |
| 10. Fully executed Chain-of-Custody (COC) form | | X | | X | |
| 11. Narrative summary of QA or sample problems provided | | X | | X | |
| 12. Data Package Completeness and Compliance | | X | | X | |

Note:
QA - Quality Assurance

## ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) SW-846 Method 8330A. Data were reviewed in accordance with USEPA National Functional Guidelines of October 1999 and Appendix B of the Pueblo of Laguna Quality Assurance Project Plan (QAPP) of June 2015.

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers

  U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.

  B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.

- Quantitation (Q) Qualifiers

  E The compound was quantitated above the calibration range.

  D Concentration is based on a diluted sample analysis.

- Validation Qualifiers

  J The compound was positively identified; however, the associated numerical value is an estimated concentration only.

  UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.

  JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.

  UB Compound considered non-detect at the listed value due to associated blank contamination.

  N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.

  R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

## EXPLOSIVES ANALYSES

### 1. Holding Times

The specified holding times for the following methods are presented in the following table.

| Method | Matrix | Holding Time | Preservation |
|---|---|---|---|
| SW-846 8330A | Water | 7 days from collection to extraction and 40 days from extraction to analysis | Cool to <6 °C |
| | Soil | 14 days from collection to extraction and 40 days from extraction to analysis | Cool to <6 °C |

All samples were analyzed within the specified holding time criteria.

### 2. Blank Contamination

Quality assurance (QA) blanks (i.e., method and rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank is calculated for QA blanks containing concentrations greater than the reporting limit (RL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the RL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

### 3. Surrogates/System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. Explosives analysis requires that the surrogate exhibit recoveries within the DoD QSM 5.0 control limits.

All surrogate recoveries were within control limits.

### 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within the DoD QSM 5.0 control limits. The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within the DoD QSM 5.0 control limits.

A MS/MSD analysis was not performed on a sample location associated with this SDG.

### 5. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS analysis must exhibit a percent recovery within the DoD QSM 5.0 control limits.

All compounds associated with the LCS analysis exhibited recoveries within the control limits.

## 6. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 35% for water matrices and 50% for soil matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for water matrices or three times the RL is applied for soil matrices.

A field duplicate was not collected on a sample location associated with this SDG.

## 7. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

## DATA VALIDATION CHECKLIST FOR EXPLOSIVES

| EXPLOSIVES: SW-846 8330A | Reported | | Performance Acceptable | | Not Required |
|---|---|---|---|---|---|
| | No | Yes | No | Yes | |
| **LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS)** | | | | | |
| **Tier II Validation** | | | | | |
| Holding times | | X | | X | |
| Reporting limits (units) | | X | | X | |
| Blanks | | | | | |
| A. Method blanks | | X | | X | |
| B. Equipment blanks | X | | | | X |
| Laboratory Control Sample (LCS) %R | | X | | X | |
| Laboratory Control Sample Duplicate(LCSD) %R | X | | | | X |
| LCS/LCSD Precision (RPD) | X | | | | X |
| Matrix Spike (MS) %R | X | | | | X |
| Matrix Spike Duplicate(MSD) %R | X | | | | X |
| MS/MSD Precision (RPD) | X | | | | X |
| Field Duplicate (RPD) | X | | | | X |
| Surrogate Spike Recoveries | | X | | X | |
| Dilution Factor | | X | | X | |
| Moisture Content | X | | | | X |

Notes:

%R Percent recovery
RPD Relative percent difference

## INORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) SW-846 Methods 6010B and 6860. Data were reviewed in accordance with USEPA National Functional Guidelines of July 2002 and Appendix B of the Pueblo of Laguna Quality Assurance Project Plan (QAPP) of June 2015.

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and that it was already subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with the USEPA National Functional Guidelines:

- Concentration (C) Qualifiers
  - U The analyte was analyzed for but not detected. The associated value is the analyte instrument detection limit.
  - J The reported value was obtained from a reading less than the reporting limit (RL), but greater than or equal to the method detection limit (MDL).
- Quantitation (Q) Qualifiers
  - E The reported value is estimated due to the presence of interference.
  - N Spiked sample recovery is not within control limits.
  - * Duplicate analysis is not within control limits.
- Validation Qualifiers
  - J The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
  - J+ The analyte was positively identified; however, the associated numerical value is an estimated concentration only; result may be biased high.
  - J- The analyte was positively identified; however, the associated numerical value is an estimated concentration only; result may be biased low.
  - UJ The analyte was not detected above the reporting limit. However, the reported limit is approximate and may or may not represent the actual limit of detection.
  - UB Analyte considered non-detect at the listed value due to associated blank contamination.
  - R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

## METALS ANALYSES

### 1. Holding Times

The specified holding times for the following methods are presented in the following table.

| Method | Matrix | Holding Time | Preservation |
|---|---|---|---|
| SW-846 6010B | Water | 180 days from collection to analysis | Preserved to a pH of less than 2. |
| | Soil | 180 days from collection to analysis | Cool to <6 °C. |

All samples were analyzed within the specified holding times.

### 2. Blank Contamination

Quality assurance (QA) blanks (i.e., method and rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Iron was detected in the associated QA blanks; however, the associated sample results were greater than the BAL. Therefore, sample results greater than the BAL resulted in the removal of the laboratory qualifier (B7). No other qualification of the sample results was required.

### 3. Matrix Spike/Matrix Spike Duplicate (MS/MSD)/Laboratory Duplicate Analysis

MS/MSD and laboratory duplicate data are used to assess the precision and accuracy of the analytical method.

### 3.1 MS/MSD Analysis

All metal analytes must exhibit a percent recovery within the established DoD QSM 5.0 control limits. The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the analyte's concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

All analytes associated with MS/MSD recoveries were within control limits with the exception of the following analytes present in the table below.

| Sample Location | Analyte | MS Recovery | MSD Recovery |
|---|---|---|---|
| POL-S1/SATO1-08142017-03A,03B | Antimony | 23% | 22% |
| | Copper | 141% | 137% |

The criteria used to evaluate MS/MSD recoveries are presented in the following table. In the case of an MS/MSD deviation, the sample results are qualified. The qualifications are applied to all sample results associated with this SDG.

| Control limit | Sample Result | Qualification |
|---|---|---|
| MS/MSD percent recovery 30% to 74% | Non-detect | UJ- |
| | Detect | J- |
| MS/MSD percent recovery <30% | Non-detect | R |
| | Detect | J- |
| MS/MSD percent recovery >125% | Non-detect | No Action |
| | Detect | J+ |

The MS/MSD recoveries for iron was not evaluated as the sample result was greater than four times the spike concentration.

### 3.2 Laboratory Duplicate Analysis

The laboratory duplicate relative percent difference (RPD) criterion is applied when parent and duplicate sample concentrations are greater than or equal to 5 times the RL. A control limit of 20% for water matrices and 35% for soil matrices is applied when the criteria above is true. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of one times the RL is applied for water matrices and two times the RL for soil matrices.

MS/MSD analysis was performed in replacement of the laboratory duplicate analysis. The MS/MSD recoveries exhibited acceptable RPD.

## 4. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 35% for water matrices and 50% for soil matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for water matrices or three times the RL is applied for soil matrices.

A field duplicate analysis was not collected for a sample location associated with this SDG.

## 5. Laboratory Control Sample/ Laboratory Control Sample Duplicate (LCS/LCSD) Analysis

The LCS/LCSD analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The analytes associated with the LCS/LCSD analysis must exhibit a percent recovery within the DoD QSM 5.0 control limits.

The LCS/LCSD analysis exhibited recoveries within the control limits.

## 6. Serial Dilution

The serial dilution analysis is used to assess if a significant physical or chemical interference exists due to sample matrix. Analytes exhibiting concentrations greater than 50 times the MDL in the undiluted sample are evaluated to determine if matrix interference exists. These analytes are required to have less than a 10% difference (%D) between sample results from the undiluted (parent) sample and results associated with the same sample analyzed with a five-fold dilution.

A serial dilution was not reported in the submitted lab analytical report format.

## 7. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

## DATA VALIDATION CHECKLIST FOR METALS

| METALS; SW-846 6010B | Reported | | Performance Acceptable | | Not Required |
|---|---|---|---|---|---|
| | No | Yes | No | Yes | |
| Inductively Coupled Plasma-Atomic Emission Spectrometry (ICP-AES) | | | | | |
| **Tier II Validation** | | | | | |
| Holding Times | | X | | X | |
| Reporting limits (units) | | X | | X | |
| Blanks | | | | | |
| A. Instrument Blanks | | | | | X |
| B. Method Blanks | | X | X | | |
| C. Equipment/Field Blanks | | | | | X |
| Laboratory Control Sample (LCS) %R | | X | | X | |
| Matrix Spike (MS) %R | | X | X | | |
| Matrix Spike Duplicate (MSD) %R | | X | X | | |
| MS/MSD Precision (RPD) | | X | | X | |
| Field Duplicate (RPD) | X | | | | X |
| ICP Serial Dilution %D | X | | | | X |
| Moisture Content | X | | | | X |

Notes:

%R Percent recovery
RPD Relative percent difference

# PERCHLORATE ANALYSIS

## 1. Holding Times

The specified holding times for the following methods are presented in the following table.

| Method | Matrix | Holding Time | Preservation |
|---|---|---|---|
| SW-846 6860 | Soil | 28 days from collection to analysis | Cool to <6 °C. |

All samples were analyzed within the specified holding times.

## 2. Blank Contamination

Quality assurance (QA) blanks (i.e., method and rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the RL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

## 3. Matrix Spike/Matrix Spike Duplicate (MS/MSD)/Laboratory Duplicate Analysis

MS/MSD and laboratory duplicate data are used to assess the precision and accuracy of the analytical method.

### 3.1 MS/MSD Analysis

All metal analytes must exhibit a percent recovery within the established DoD QSM 5.0 control limits. The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the analyte's concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

All analytes associated with MS/MSD recoveries were within control limits with the exception of the following analytes present in the table below.

| Sample Location | Analyte | MS Recovery | MSD Recovery |
|---|---|---|---|
| POL-S1/SATO1-08142017-02A,02B | Perchlorate | 163% | 142% |

The criteria used to evaluate MS/MSD recoveries are presented in the following table. In the case of an MS/MSD deviation, the sample results are qualified.

| Control limit | Sample Result | Qualification |
|---|---|---|
| MS/MSD percent recovery 30% to 74% | Non-detect | UJ- |
| | Detect | J- |
| MS/MSD percent recovery <30% | Non-detect | R |
| | Detect | J- |
| MS/MSD percent recovery >125% | Non-detect | No Action |
| | Detect | J+ |

### 3.2 Laboratory Duplicate Analysis

The laboratory duplicate relative percent difference (RPD) criterion is applied when parent and duplicate sample concentrations are greater than or equal to 5 times the RL. A control limit of 20% for water matrices and 35% for soil matrices is applied when the criteria above is true. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of one times the RL is applied for water matrices and two times the RL for soil matrices.

MS/MSD analysis was performed in replacement of the laboratory duplicate analysis. The MS/MSD recoveries exhibited acceptable RPD.

## 4. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 35% for water matrices and 50% for soil matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for water matrices or three times the RL is applied for soil matrices.

A field duplicate analysis was not collected for a sample location associated with this SDG.

## 5. Laboratory Control Sample/ Laboratory Control Sample Duplicate (LCS/LCSD) Analysis

The LCS/LCSD analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The analytes associated with the LCS/LCSD analysis must exhibit a percent recovery within the DoD QSM 5.0 control limits.

The LCS/LCSD analysis exhibited recoveries within the control limits.

## 6. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

## DATA VALIDATION CHECKLIST FOR PERCHLORATE

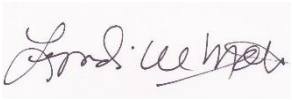
| PERCHLORATE; SW-846 6860 | Reported | | Performance Acceptable | | Not Required |
|---|---|---|---|---|---|
| | No | Yes | No | Yes | |
| Ion Chromatography/Mass Spectrometry (IC/MS) | | | | | |
| **Tier II Validation** | | | | | |
| Holding Times | | X | | X | |
| Reporting limits (units) | | X | | X | |
| Blanks | | | | | |
| A. Instrument Blanks | | | | | X |
| B. Method Blanks | | X | | X | |
| C. Equipment/Field Blanks | | | | | X |
| Laboratory Control Sample (LCS) %R | | X | | X | |
| Matrix Spike (MS) %R | | X | X | | |
| Matrix Spike Duplicate (MSD) %R | | X | X | | |
| MS/MSD Precision (RPD) | | X | | X | |
| Field Duplicate (RPD) | X | | | | X |
| Moisture Content | X | | | | X |

Notes:

%R Percent recovery
RPD Relative percent difference

**DATA REVIEW REPORT**

VALIDATION PERFORMED BY: Lyndi Mott

SIGNATURE: 

DATE: September 28, 2017

PEER REVIEW: Dennis Capria

DATE: September 29, 2017

# CHAIN OF CUSTODY

# CORRECTED SAMPLE ANALYSIS DATA SHEETS

# Client Sample Results

Client: ARCADIS U.S., Inc.
Project/Site: 06538009.0000

TestAmerica Job ID: 550-88044-1

## Client Sample ID: POL-S1/SATO1-08142017-01A,01B — Lab Sample ID: 550-88044-1

**Date Collected: 08/14/17 09:00** — **Matrix: Solid**
**Date Received: 08/15/17 09:40**

### Method: 8330A - Nitroaromatics and Nitramines

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 2-Amino-4,6-dinitrotoluene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/25/17 01:26 | 1 |
| 4-Amino-2,6-dinitrotoluene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/25/17 01:26 | 1 |
| 2,4-Dinitrotoluene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/25/17 01:26 | 1 |
| 2,6-Dinitrotoluene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/25/17 01:26 | 1 |
| 2,4,6-Trinitrotoluene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/25/17 01:26 | 1 |
| m-Nitrotoluene | ND | | 0.50 | | mg/Kg | | 08/22/17 21:34 | 08/27/17 07:49 | 1 |
| o-Nitrotoluene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/27/17 07:49 | 1 |
| p-Nitrotoluene | ND | | 0.40 | | mg/Kg | | 08/22/17 21:34 | 08/27/17 07:49 | 1 |
| Nitrobenzene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/25/17 01:26 | 1 |
| 1,3,5-Trinitrobenzene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/25/17 01:26 | 1 |
| 1,3-Dinitrobenzene | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/25/17 01:26 | 1 |
| HMX | ND | | 0.25 | | mg/Kg | | 08/22/17 21:34 | 08/25/17 01:26 | 1 |
| **RDX** | **0.49** | | 0.26 | | mg/Kg | | 08/22/17 21:34 | 08/27/17 07:49 | 1 |
| Tetryl | ND | | 0.50 | | mg/Kg | | 08/22/17 21:34 | 08/25/17 01:26 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *1,2-Dinitrobenzene* | *103* | | *83 - 122* | *08/22/17 21:34* | *08/25/17 01:26* | *1* |

## Client Sample ID: POL-S1/SATO1-08142017-02A,02B — Lab Sample ID: 550-88044-2

**Date Collected: 08/14/17 09:20** — **Matrix: Solid**
**Date Received: 08/15/17 09:40**

### Method: 6860 - Perchlorate by IC/MS or IC/MS/MS

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| **Perchlorate** | **0.81** | ~~M1~~ J+ | 0.47 | | ug/Kg | | 08/17/17 23:39 | 08/30/17 17:46 | 1 |

## Client Sample ID: POL-S1/SATO1-08142017-03A,03B — Lab Sample ID: 550-88044-3

**Date Collected: 08/14/17 09:40** — **Matrix: Solid**
**Date Received: 08/15/17 09:40**

### Method: 6010B - Metals (ICP)

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Antimony | R ~~ND~~ | ~~M2~~ | ~~5.0~~ | | mg/Kg | | 08/24/17 17:59 | 08/26/17 19:18 | 1 |
| **Copper** | **37** | ~~M1~~ J+ | 2.5 | | mg/Kg | | 08/24/17 17:59 | 08/26/17 19:18 | 1 |
| **Lead** | **19** | | 1.0 | | mg/Kg | | 08/24/17 17:59 | 08/26/17 19:18 | 1 |
| **Zinc** | **42** | | 5.0 | | mg/Kg | | 08/24/17 17:59 | 08/26/17 19:18 | 1 |
| **Iron** | **18000** | ~~B7 M3~~ | 10 | | mg/Kg | | 08/24/17 17:59 | 08/26/17 19:18 | 1 |

## Qualifiers

### HPLC/IC

| Qualifier | Qualifier Description |
|---|---|
| C8 | Sample RPD between the primary and confirmatory analysis exceeded 40% Per EPA Method 8000C, the lower value was reported as there was no evidence of chromatographic problems. |
| M1 | Matrix spike recovery was high, the associated blank spike recovery was acceptable. |

### LCMS

| Qualifier | Qualifier Description |
|---|---|
| M1 | Matrix spike recovery was high, the associated blank spike recovery was acceptable. |
| E4 | Concentration estimated. Analyte was detected below laboratory minimum reporting level (MRL) but above MDL. |

### Metals

| Qualifier | Qualifier Description |
|---|---|
| M2 | Matrix spike recovery was low, the associated blank spike recovery was acceptable. |
| M1 | Matrix spike recovery was high, the associated blank spike recovery was acceptable. |
| B7 | Target analyte detected in method blank at or above method reporting limit. Concentration found in the sample was 10 times above the concentration found in the blank. |
| M3 | The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The associated blank spike was acceptable. |
| B1 | Target analyte detected in method blank at or above the method reporting limit. |

## Glossary

| Abbreviation | These commonly used abbreviations may or may not be present in this report. |
|---|---|
| ¤ | Listed under the "D" column to designate that the result is reported on a dry weight basis |
| %R | Percent Recovery |
| CFL | Contains Free Liquid |
| CNF | Contains No Free Liquid |
| DER | Duplicate Error Ratio (normalized absolute difference) |
| Dil Fac | Dilution Factor |
| DL | Detection Limit (DoD/DOE) |
| DL, RA, RE, IN | Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample |
| DLC | Decision Level Concentration (Radiochemistry) |
| EDL | Estimated Detection Limit (Dioxin) |
| LOD | Limit of Detection (DoD/DOE) |
| LOQ | Limit of Quantitation (DoD/DOE) |
| MDA | Minimum Detectable Activity (Radiochemistry) |
| MDC | Minimum Detectable Concentration (Radiochemistry) |
| MDL | Method Detection Limit |
| ML | Minimum Level (Dioxin) |
| NC | Not Calculated |
| ND | Not Detected at the reporting limit (or MDL or EDL if shown) |
| PQL | Practical Quantitation Limit |
| QC | Quality Control |
| RER | Relative Error Ratio (Radiochemistry) |
| RL | Reporting Limit or Requested Limit (Radiochemistry) |
| RPD | Relative Percent Difference, a measure of the relative difference between two points |
| TEF | Toxicity Equivalent Factor (Dioxin) |
| TEQ | Toxicity Equivalent Quotient (Dioxin) |

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

TAL-0013-550 (0116)

# CHAIN OF CUSTODY FORM

[ ] Phoenix - 4625 E. Cotton Center Blvd., Suite 189, Phoenix, AZ 85040 (602) 437-3340

8/31/2017

* LAB PROJECT # - 550033305 88044

Page 1 of 1

Client Name/Address: ARCADIS-US, 10205 WESTHEIMER RD, SUITE 800, HOUSTON, TX 77042

Project/PO Number: 06538009.0000 / 001A

Project Manager: WAYNE PATTERSON

Phone Number: 713-953-4725

Sampler: GREG PETERSON

Email Address: WAYNE.PATTERSON@ARCADIS.COM

Analysis Required

| Sample Description | Sample Matrix | Container Type | # of Cont. | Sampling Date | Sampling Time | Preservatives | US EPA METHOD 8330A | | US EPA METHOD 6850 | | US EPA METHOD 6010C - MEC INDICATOR METALS: ANTIMONY, COPPER, IRON, LEAD, AND ZINC | | | | Special Instructions |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| POL-S1/SAT01-08142017-01A | SOLID | 4 oz JAR | 1 | 14/AUG/17 | 0900 | N/A | X | | | | | -01 | | | (2) 4 oz JARS |
| POL-S1/SAT01-08142017-01B | SOLID | 4 oz JAR | 1 | 14/AUG/17 | 0900 | N/A | X | | | | | -01 | | | = 1 SAMPLE |
| | | | | | | | | | | | | | | | |
| POL-S1/SAT01-08142017-02A | SOLID | 4 oz JAR | 1 | 14/AUG/17 | 0920 | N/A | | | X | | | -02 | | | (2) 4 oz JARS |
| POL-S1/SAT01-08142017-02B | SOLID | 4 oz JAR | 1 | 14/AUG/17 | 0920 | N/A | | | X | | | -02 | | | = 1 SAMPLE |
| | | | | | | | | | | | | | | | |
| POL-S1/SAT01-08142017-03A | SOLID | 4 oz JAR | 1 | 14/AUG/17 | 0940 | N/A | | | | | X | -03 | | | (2) 4 oz JARS |
| POL-S1/SAT01-08142017-03B | SOLID | 4 oz JAR | 1 | 14/AUG/17 | 0940 | N/A | | | | | X | -03 | | | = 1 SAMPLE |

550-88044 Chain of Custody

| Relinquished By: | Date/Time: | Received By: | Date/Time: | Turnaround Time: (Check) |
|---|---|---|---|---|
| GREG PETERSON | 14/AUG/2017-1600 | | | same day ____ 72 hours ____ |
| Relinquished By: | Date/Time: | Received By: | Date/Time: | 24 hours ____ 5 days ____ |
| | | | | 48 hours ____ normal X |
| Relinquished By: | Date/Time: | Received in Lab By: | Date/Time: 8-15-17 0940 | Sample Integrity: (Check) |
| | | | | intact ____ on ice X |

**Note:** By relinquishing samples to TestAmerica, client agrees to pay for the services requested on this chain of custody form and any additional analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 30 days.

**TestAmerica Phoenix**
4625 East Cotton Ctr Blvd Suite 189
Phoenix, AZ 85040
Phone (602) 437-3340 Fax (602) 454-9303

# Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

| | | | | |
|---|---|---|---|---|
| **Client Information (Sub Contract Lab)** | Sampler: | Lab PM: McCutcheon, Carlene | Carrier Tracking No(s): | COC No: 550-18543.1 |
| Client Contact: Shipping/Receiving | Phone: | E-Mail: carlene.mccutcheon@testamericainc.com | State of Origin: Arizona | Page: Page 1 of 1 |
| Company: TestAmerica Laboratories, Inc. | | Accreditations Required (See note): State Program - Arizona | | Job #: 550-88044-1 |
| Address: 4955 Yarrow Street, , | Due Date Requested: 8/22/2017 | | | |
| City: Arvada | TAT Requested (days): | | | |
| State, Zip: CO, 80002 | | | | |
| Phone: 303-736-0100(Tel) 303-431-7171(Fax) | PO #: | | | |
| Email: | WO #: | | | |
| Project Name: 6538009 | Project #: 55003305 | | | |
| Site: | SSOW#: | | | |

**Analysis Requested**

**Preservation Codes:**

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

Other:

| Sample Identification - Client ID (Lab ID) | Sample Date | Sample Time | Sample Type (C=comp, G=grab) | Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air) | Field Filtered Sample (Yes or No) | Perform MS/MSD (Yes or No) | 8330A/8330_P_2g Explosives | 6860/6860_Prep Standard 6860 list | Total Number of containers | Special Instructions/Note: |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Preservation Code: | | | | | | | |
| POL-S1/SATO1-08142017-01A,01B (550-88044-1) | 8/14/17 | 09:00 Arizona | | Solid | | | X | | 1 | |
| POL-S1/SATO1-08142017-02A,02B (550-88044-2) | 8/14/17 | 09:20 Arizona | | Solid | | | | X | 1 | |

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to TestAmerica Laboratories, Inc.

| | |
|---|---|
| ***Possible Hazard Identification*** *Unconfirmed* | ***Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)*** ☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months* |
| Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2 | Special Instructions/QC Requirements: |

| | | | | | |
|---|---|---|---|---|---|
| Empty Kit Relinquished by: | Date: | Time: | | Method of Shipment: | |
| Relinquished by: [illegible] 8-16-17 | Date/Time: 14:35 TA PHX | Company: LAB | Received by: [illegible] | Date/Time: 8/17/17 0845 | Company: TA |
| Relinquished by: | Date/Time: | Company: | Received by: | Date/Time: | Company: |
| Relinquished by: | Date/Time: | Company: | Received by: | Date/Time: | Company: |
| Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | | Cooler Temperature(s) °C and Other Remarks: 1.3+0.1 IR#7 transfered by JT 8/17/17 | | |

# Login Sample Receipt Checklist

Client: ARCADIS U.S., Inc.

Job Number: 550-88044-1

**Login Number: 88044**
**List Number: 1**
**Creator: Gravlin, Andrea**

**List Source: TestAmerica Phoenix**

| Question | Answer | Comment |
|---|---|---|
| Radioactivity wasn't checked or is </= background as measured by a survey meter. | True | |
| The cooler's custody seal, if present, is intact. | True | |
| Sample custody seals, if present, are intact. | True | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | True | |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| Is the Field Sampler's name present on COC? | True | |
| There are no discrepancies between the containers received and the COC. | True | |
| Samples are received within Holding Time (excluding tests with immediate HTs) | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| Sample Preservation Verified. | True | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | True | |
| Containers requiring zero headspace have no headspace or bubble is <6mm (1/4"). | True | |
| Multiphasic samples are not present. | True | |
| Samples do not require splitting or compositing. | True | |
| Residual Chlorine Checked. | N/A | No volume available, unable to check residual chlorine. |

# Login Sample Receipt Checklist

Client: ARCADIS U.S., Inc.

Job Number: 550-88044-1

**Login Number: 88044**
**List Number: 2**
**Creator: Gomez, Alyssa I**

**List Source: TestAmerica Denver**
**List Creation: 08/17/17 03:20 PM**

| Question | Answer | Comment |
|---|---|---|
| Radioactivity wasn't checked or is </= background as measured by a survey meter. | N/A | |
| The cooler's custody seal, if present, is intact. | True | |
| Sample custody seals, if present, are intact. | True | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | True | |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| Is the Field Sampler's name present on COC? | True | |
| There are no discrepancies between the containers received and the COC. | True | |
| Samples are received within Holding Time (excluding tests with immediate HTs) | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| Sample Preservation Verified. | N/A | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | True | |
| Containers requiring zero headspace have no headspace or bubble is <6mm (1/4"). | N/A | |
| Multiphasic samples are not present. | True | |
| Samples do not require splitting or compositing. | True | |
| Residual Chlorine Checked. | N/A | |

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