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John Kieling, Bureau Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303

Subject: 2016 Triennial Ordnance Survey Report, Solid Waste Management Units 00-011(a, d, and e), Guaje/Barrancas/Rendija Canyons Aggregate Area

Dear Mr. Kieling:

Enclosed please find two hard copies with electronic files of the 2016 Triennial Ordnance Survey Report, Solid Waste Management Units 00-011(a, d, and e), Guaje/Barrancas/Rendija Canyons Aggregate Area.

If you have any questions, please contact Todd Haagenstad at (505) 665-2936 (hth@lanl.gov) or Cheryl Rodriguez at (505) 665-5330 (cheryl.rodriguez@em.doe.gov).

Sincerely,

Bruce Robinson, Program Director
Environmental Remediation Program
Los Alamos National Laboratory

Sincerely,

David S. Rhodes, Director
Office of Quality and Regulatory Compliance
Environmental Management
Los Alamos Field Office

BR/DH/TH:sm

Enclosures: Two hard copies with electronic files – 2016 Triennial Ordnance Survey Report, Solid Waste Management Units 00-011(a, d, and e), Guaje/Barrancas/Rendija Canyons Aggregate Area (EP2016-0155)

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LA-UR-16-29284
December 2016
EP2016-0155

2016 Triennial Ordnance Survey Report, Solid Waste Management Units 00-011(a, d, and e), Guaje/Barrancas/Rendija Canyons Aggregate Area

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EST. 1943

Prepared by the Associate Directorate for Environmental Management

Los Alamos National Laboratory, operated by Los Alamos National Security, LLC, for the U.S. Department of Energy (DOE) under Contract No. DE-AC52-06NA253 and under DOE Office of Environmental Management Contract No. DE-EM0003528, has prepared this document pursuant to the Compliance Order on Consent, signed June 24, 2016. The Compliance Order on Consent contains requirements for the investigation and cleanup, including corrective action, of contamination at Los Alamos National Laboratory.

EP2016-0155

2016 Triennial Ordnance Survey Report, Solid Waste Management Units 00-011(a, d, and e), Guaje/Barrancas/Rendija Canyons Aggregate Area

December 2016

Responsible project manager:

Printed Name	Signature	Title	Organization	Date
Todd Haagenstad	Todd Haagenstad	Project Manager	Environmental Remediation Program	12/7/16

Responsible LANS representative:

Printed Name	Signature	Title	Organization	Date
Randall Erickson	R Erickson	Associate Director	Associate Directorate for Environmental Management	12/8/16

Responsible DOE-EM-LA representative:

Printed Name	Signature	Title	Organization	Date
David S. Rhodes	H Reiser for	Office Director	Quality and Regulatory Compliance	12/13/16

EXECUTIVE SUMMARY

Solid Waste Management Units (SWMUs) 00-011(a, d, and e) are munitions impact areas or suspected munitions impact areas within the Guaje/Barrancas/Rendija Canyons Aggregate Area at Technical Area 00 that were used by the U.S. Department of Defense. These sites were not used after the 1940s and, with the exception of SWMU 00-011(a), are now located off U.S. Department of Energy property. Because of the potential for exposure of munitions and explosives of concern (MEC) or munitions debris (MD) as a result of erosion or bioturbation at the sites, Los Alamos National Laboratory (LANL or the Laboratory) is required by the New Mexico Environment Department to conduct triennial visual surveys of the ground surface to identify and remove any site hazards related to historical munitions use.

Activities conducted in 2016 included visual inspections of the sites using lines of personnel trained to recognize unexploded ordnance. The trained personnel conducted site walkovers to identify any suspect material. No unexploded ordnance (UXO) was found at sites SWMUs 00-011(a, d, and e). Laboratory UXO technicians determined that no explosive hazards were located during the visual sweep. Several pieces of munitions debris were identified at SWMUs 00-011(a and e). All identified munitions debris was removed by Laboratory Emergency Response personnel.

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Figures

Acronyms and Abbreviations

AOC	area of concern
asl	above sea level
DOE	Department of Energy (U.S.)
LANL	Los Alamos National Laboratory
MD	munitions debris
MEC	munitions and explosives of concern
NMED	New Mexico Environment Department
SAFR	small arms firing range
SWMU	solid waste management unit
TA	technical area
USFS	U.S. Forest Service
UXO	unexploded ordnance

1.0 INTRODUCTION

Los Alamos National Laboratory (LANL or the Laboratory) is a multidisciplinary research facility owned by the U.S. Department of Energy (DOE) and managed by Los Alamos National Security, LLC. The Laboratory is located in north-central New Mexico approximately 60 mi northeast of Albuquerque and 20 mi northwest of Santa Fe. The Laboratory site covers 40 mi^2 of the Pajarito Plateau, which consists of a series of finger-like mesas separated by deep canyons containing perennial and intermittent streams running from west to east. Mesa tops range in elevation from approximately 6200 to 7800 ft above sea level (asl).

Solid Waste Management Units (SWMUs) 00-011(a, d, and e) are munitions impact areas within the Guaje/Barrancas/Rendija Canyons Aggregate Area at Technical Area 00 (TA-00) that were used by the U.S. Department of Defense in the 1940s. Because of the potential for exposure of munitions and explosives of concern (MEC) or munitions debris (MD) as a result of erosion or bioturbation at the sites, the Laboratory is required by the New Mexico Environment Department (NMED) to conduct triennial visual surveys to identify and remove any site hazards related to historical munitions use.

1.1 General Site Information

The Guaje/Barrancas/Rendija Canyons Aggregate Area consists of SWMUs and areas of concern (AOCs) that were formerly part of Operable Unit 1071 within TA-00. Figure 1.1-1 shows the Guaje/Barrancas/Rendija Canyons Aggregate Area munition SWMUs with respect to the Laboratory boundary and surrounding land holdings. This triennial ordnance survey report for the Guaje/Barrancas/Rendija Canyons Aggregate Area includes the following SWMUs:

- SWMU 00-011(a), a mortar impact area
- SWMU 00-011(d), a “bazooka” firing area
- SWMU 00-011(e), an ammunition impact area

1.2 Report Objectives

NMED’s approval with direction of the 2007 investigation report for the Guaje/Barrancas/Rendija Canyons Aggregate Area (LANL 2007, 098670; NMED 2007, 099632) directed the Laboratory to conduct visual surveys at SWMUs 00-011(a, c, d, and e) and AOC C-00-020 every 2 yr to identify and remove any MEC, MD, or unexploded ordnance (UXO). NMED issued certificates of completion for SWMU 00-011(c) and AOC C-00-20 in May of 2012 and concurred with the recommendation that visual surveys are no longer required for these sites (NMED 2012, 520388). On May 7, 2013, DOE and the Laboratory received certificates of completion with controls for SWMUs 00-011 (a, d, and e) and direction to conduct one more biennial survey and then reduce the frequency of ordnance surveys and reporting from biennial to triennial (LANL 2013, 249600). This report presents the results of the first triennial survey. The objective of this report is to present the results of the 2016 visual ordnance surveys conducted at the three sites.

2.0 SITE DESCRIPTIONS AND OPERATIONAL HISTORY

2.1 SWMU 00-011(a)

SWMU 00-011(a) (Figure 2.1-1) is a 29-acre former mortar impact area located on DOE land about 0.4 mi east of the Sportsmen’s Club small arms firing range (SAFR) (AOC C-00-015) in Rendija Canyon. The

site was a mortar impact area in the mid-1940s for 60-mm and 81-mm rounds. Operations ceased in the late 1940s (LANL 1990, 007511).

SWMU 00-011(a) is located in a relatively flat open grassland with scattered shrubs and trees. The site is bisected east to west by Rendija Road (unpaved). On the north side of the road, the site has a gradual to steep slope to the ephemeral stream channel. The slope is covered by mulch consisting of downed trees that burned during the 2000 Cerro Grande fire. Although, the site is fenced and posted with DOE "No Trespassing" signs, there is evidence the site has been used for recreational activities such as dirt-biking and target practice.

2.2 SWMU 00-011(d)

SWMU 00-011(d) (Figure 2.2-1) is a "bazooka" firing area located largely on Los Alamos County land, except for a small section along a cliff edge on private property. The area is in a small north-trending tributary of Bayo Canyon northeast of the intersection of San Ildefonso Road and Diamond Drive in the Los Alamos townsite. The approximately 6-acre area was used in the mid-1940s as a target area for 2.36-in. bazooka rounds; operations ceased in the late 1940s (LANL 1990, 007511).

SWMU 00-011(d) is located near a hiking trail at the head of Bayo Canyon. A north-south trending drainage channel bisects SWMU 00-011(d), and a cliff is located on the eastern edge of the site. The southern section of the site is open and grassy with some shrubs and trees; the northern section of the site is forested with pine trees. The site is open to the public.

2.3 SWMU 00-011(e)

SWMU 00-011(e) (Figure 2.3-1) is a former ammunition impact area located on U.S. Forest Service (USFS) land in a tributary of Rendija Canyon known as Thirty-Seven Millimeter Canyon. The site was used from the mid- to late 1940s (LANL 1990, 007511) for training of U.S. Army personnel operating tanks firing 20-mm and 37-mm rounds. The impact area extends north along the tributary to the top of a cliff face and is approximately 15 acres in size.

SWMU 00-011(e) is located within a very steep natural amphitheater with numerous loose rocks and boulders. Vegetation at the site consists of thick weeds and small shrubs. The site is fenced with barbwire and posted with "Explosives No Trespassing" signs.

3.0 SITE CONDITIONS

Rendija Canyon is located immediately north of the Los Alamos townsite. The watershed has a drainage area of 9.5 mi^2 and drains portions of Los Alamos townsite, DOE land, and USFS land. Elevations in the watershed range from 6300 to 9800 ft asl (LANL 1997, 055622, p. 3-2). Rendija Canyon and its tributaries contain ephemeral streams arising from storm water runoff and snowmelt. As the surface water flows downstream, it infiltrates the alluvium and the underlying formations or is lost to evapotranspiration.

Most of the sites included in the visual ordnance surveys have steep, rocky slopes and loose material. In particular, SWMU 00-011(e) is very steep, with grades of 40% to 50%. SWMU 00-011(a) was impacted by the 2000 Cerro Grande fire, and numerous downed trees, mulched trees, and standing dead trees are present at these sites. These site conditions make the walkover visual surveys difficult and potentially hazardous, and appropriate safety precautions are incorporated into the survey methodology.

4.0 SURVEY METHODS

Surveys were accomplished under the direction of trained Laboratory UXO technicians per established U.S. Department of Defense procedures and protocol. Surveys were conducted using a line of 4 to 10 personnel trained to recognize UXO. Each person was positioned approximately an arm's-length from the next person to conduct the visual inspection of the entire area of each SWMU. Once a survey line was completed in one direction, the line was pivoted around the individual at one end of the line to survey in the opposite direction. The individual at the pivot point visually surveyed the same area going in the opposite direction to ensure overlap of each survey line. Survey flags were placed along the ends of the survey lines to ensure appropriate coverage. The survey method is identical to the method used in previous surveys.

It was often necessary to adjust survey lines to adapt to boulders and other large obstacles and variations in the terrain. The process for establishing survey lines was also modified as appropriate in areas of downed trees and thick vegetation. At SWMU 00-011(e), survey lines were staggered so downslope personnel trailed upslope personnel to minimize the safety risks from falling rocks on this very steep site.

MD recovered during the surveys were retained by Emergency Response personnel.

5.0 2016 SCOPE OF ACTIVITIES

Before 2016 survey activities described in this report were conducted, approval to access each site was granted by the applicable land owner(s) through access agreements and/or a permit waiver:

- SWMU 00-011(a) is located entirely on DOE land.
- SWMU 00-011(d) is located primarily on Los Alamos County land, with a small portion located on private property.
- SWMU 00-011(e) is located primarily on USFS land, with a small portion on located on DOE land.

5.1 SWMU 00-011(a)

The site walkover and visual surveys of SWMU 00-011(a) were conducted on October 31, 2016. SWMU 00-011(a) is the largest of the three sites included in the 2016 triennial ordnance survey. In certain areas, the visual survey was modified as appropriate to adapt to the presence of mulch composed of downed trees and thick brush.

The 2016 ordnance survey resulted in the recovery and removal of several 60-mm and 81-mm shell fragments. Figures 5.1-1 and 5.1.2 show the MD found at SWMU 00-011(a). Most of these fragments were small (less than 2 in. in the longest dimension); however, a mortar tail and a mortar side wall were also found and their sizes were approximately 4.5 in. in the longest dimension. Most of the small fragments were found in the southern portion of the site within a drainage, while two were found north of Rendija Road. The mortar side wall was located on the north side of Rendija Road between the road and the DOE fence. The mortar tail was located just north of the SWMU boundary. The fragments were removed, photographed, and retained by Emergency Response personnel. Figure 2.1-1 shows the locations where MD was found at SWMU 00-011(a). No UXO or MEC was discovered or recovered at SWMU 00-011(a) during the 2016 ordnance survey.

5.2 SWMU 00-011(d)

The site walkover and visual surveys of the privately owned portion of SWMU 00-011(d) were conducted on November 17, 2016. The site walkover and visual surveys of the Los Alamos County–owned portion of SWMU 00-011(d) were conducted on November 22, 2016. This site is relatively small and very few obstacles are present to hinder the walkover or visual inspection.

No UXO, MEC, or MD was discovered or recovered at SWMU 00-011(d) during the 2016 ordnance survey.

5.3 SWMU 00-011(e)

The site walkover and visual surveys of SWMU 00-011(e) were conducted on November 1, 2016.

The 2016 ordnance survey resulted in the recovery and removal of several MD fragments in the form of rotating band pieces and side-wall fragments scattered over the area shown in Figure 2.3-1. Figure 5.3-1 shows the MD found at SWMUs 00-011(a and e). All of these fragments were small (less than 2 in. in the longest dimension). In addition to fragments found at the site, there is abundant evidence of impact to cliffs and boulders from larger munitions. No noticeable distribution pattern or area of significant MD concentration was found at SWMU 00-011(e). The fragments were removed and retained by Emergency Response personnel. Abundant scars and holes resulting from munitions impact are present in the cliff face and boulders at the site. No UXO or MEC was discovered or recovered at SWMU 00-011(e) during the 2016 ordnance survey.

6.0 SUMMARY

No explosive hazards were located during the visual survey at the sites during the 2016 triennial survey. Several pieces of MD were found at SWMUs 00-011(a and e), consistent with past ordnance surveys. No UXO, MD, or MEC was found at SWMU 00-011(d).

7.0 REFERENCES AND MAP DATA SOURCES

7.1 References

The following list includes all documents cited in this report. Parenthetical information following each reference provides the author(s), publication date, and ER ID or ESH ID. This information is also included in text citations. ER IDs were assigned by the Environmental Programs Directorate's Records Processing Facility (IDs through 599999), and ESH IDs are assigned by the Environment, Safety, and Health (ESH) Directorate (IDs 600000 and above). IDs are used to locate documents in the Laboratory's Electronic Document Management System and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the ESH Directorate. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.

LANL (Los Alamos National Laboratory), November 1990. "Solid Waste Management Units Report," Vol. I of IV (TA-0 through TA-9), Los Alamos National Laboratory document LA-UR-90-3400, Los Alamos, New Mexico. (LANL 1990, 007511)

LANL (Los Alamos National Laboratory), April 1997. "Core Document for Canyons Investigations," Los Alamos National Laboratory document LA-UR-96-2083, Los Alamos, New Mexico. (LANL 1997, 055622)

LANL (Los Alamos National Laboratory), August 2007. "Investigation Report for Guaje/Barrancas/ Rendija Canyons Aggregate Area at Technical Area 00," Los Alamos National Laboratory document LA-UR-07-5326, Los Alamos, New Mexico. (LANL 2007, 098670)

LANL (Los Alamos National Laboratory), September 16, 2013. "Request for Extension to Implement Controls/Certification of February 19, 2013, Letter Regarding the Transfer of Rendija Canyon Tracts," Los Alamos National Laboratory letter (EP2013-0211) to J.E. Keiling (NMED-HWB) from J. Mousseau (LANL) and P. Maggiore (DOE-NA-00-LA), Los Alamos, New Mexico. (LANL 2013, 249600)

NMED (New Mexico Environment Department), December 20, 2007. "Approval with Direction, Investigation Report for Guaje/Barrancas/Rendija Canyons, Revision 1," New Mexico Environment Department letter to D. Gregory (DOE-LASO) and D. McInroy (LANL) from J.P. Bearzi (NMED-HWB), Santa Fe, New Mexico. (NMED 2007, 099632)

NMED (New Mexico Environment Department), May 16, 2012. "Certificates of Completion, One Solid Waste Management Unit and One Area of Concern in the Guaje/Barrancas/Rendija Canyons Aggregate Area," New Mexico Environment Department letter to P. Maggiore (DOE-LASO) and M.J. Graham (LANL) from J.E. Kieling (NMED-HWB), Santa Fe, New Mexico. (NMED 2012, 520388)

7.2 Map Data Sources

Drainage. Modeled Surface Drainage, 1991; Los Alamos National Laboratory, ENV Environmental Remediation and Surveillance Program, ER2002-0591; 1:24,000 Scale Data; Unknown publication date. NHD Route Drainage; National Hydrography Dataset Program, United States Geological Survey; Quadrangle 13020101; 08 October 2004.

Hypsography. Los Alamos National Laboratory, ENV Environmental Remediation and Surveillance Program; 1991.

Los Alamos National Laboratory Boundaries. LANL Areas Used and Occupied; Los Alamos National Laboratory, Site Planning & Project Initiation Group, Infrastructure Planning Division; 19 September 2007. Technical Area Boundaries; Los Alamos National Laboratory, Site Planning & Project Initiation Group, Infrastructure Planning Division; 19 September 2007.

Point Feature Locations of the Environmental Restoration Project Database. Los Alamos National Laboratory, Waste and Environmental Services Division, EP2008-0189; 11 April 2008.

Potential Release Sites. Los Alamos National Laboratory, Waste and Environmental Services Division, Geotechnical Services Group, EP2008-0095; 1:2,500 Scale Data; 04 April 2008.

Roads and Trails. Forest Roads; County of Los Alamos, Information Services; as published 16 May 2006. Los Alamos County Land Parcels; County of Los Alamos, Information Services, as published 17 January 2008. Road Centerlines for the County of Los Alamos; County of Los Alamos, Information Services; as published 03 December 2007. Streets; County of Los Alamos, Information Services; as published 16 May 2006. Trails; County of Los Alamos, Information Services; as published 16 May 2006.

Watersheds. Los Alamos National Laboratory, ENV Environmental Remediation and Surveillance Program; EP2006-0942; 1:2,500 Scale Data; 27 October 2006.

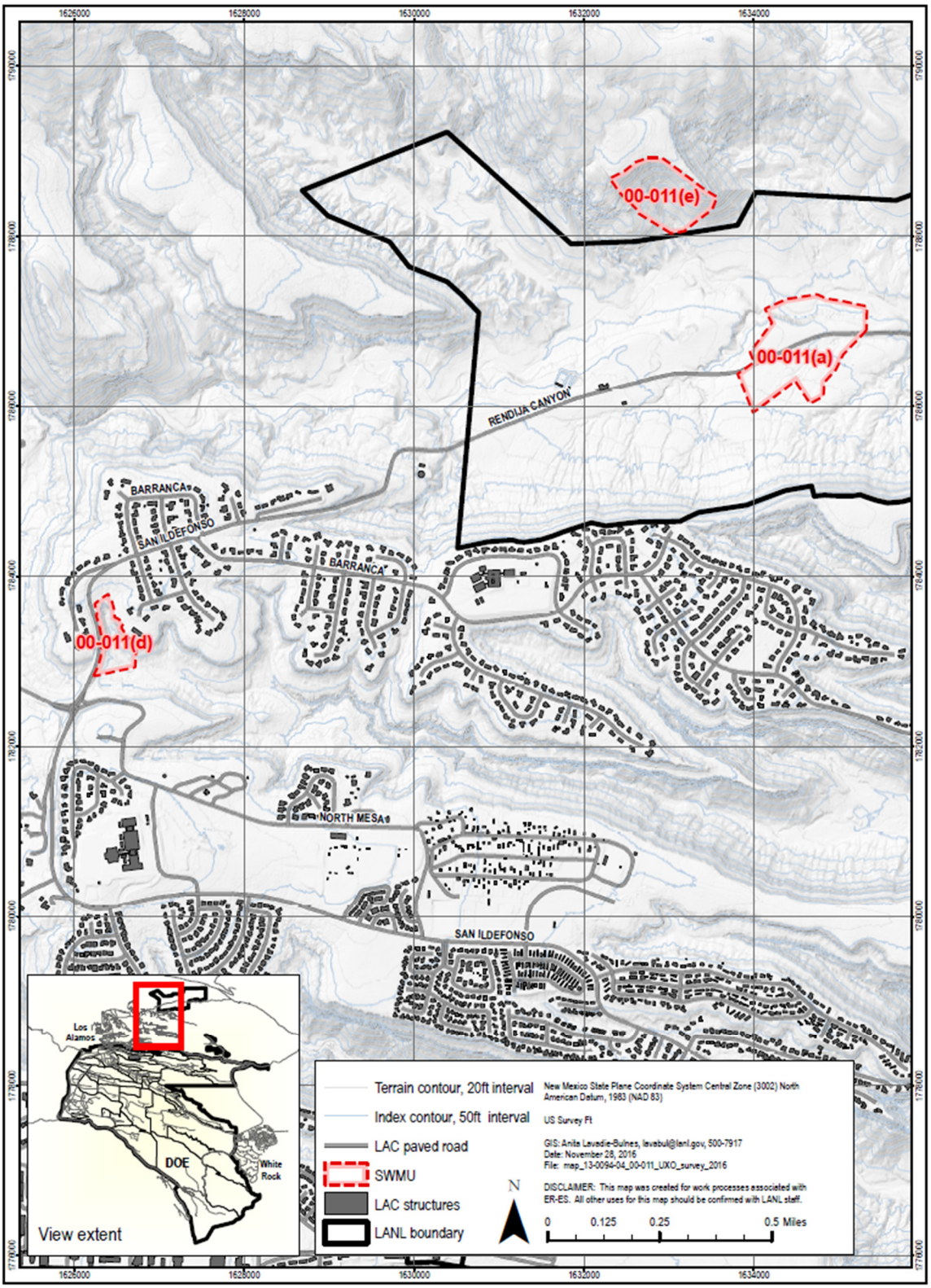

Figure 1.1-1 SWMUs 00-011(a, d, and e) within the Guaje/Barrancas/Rendija Canyons Aggregate Area

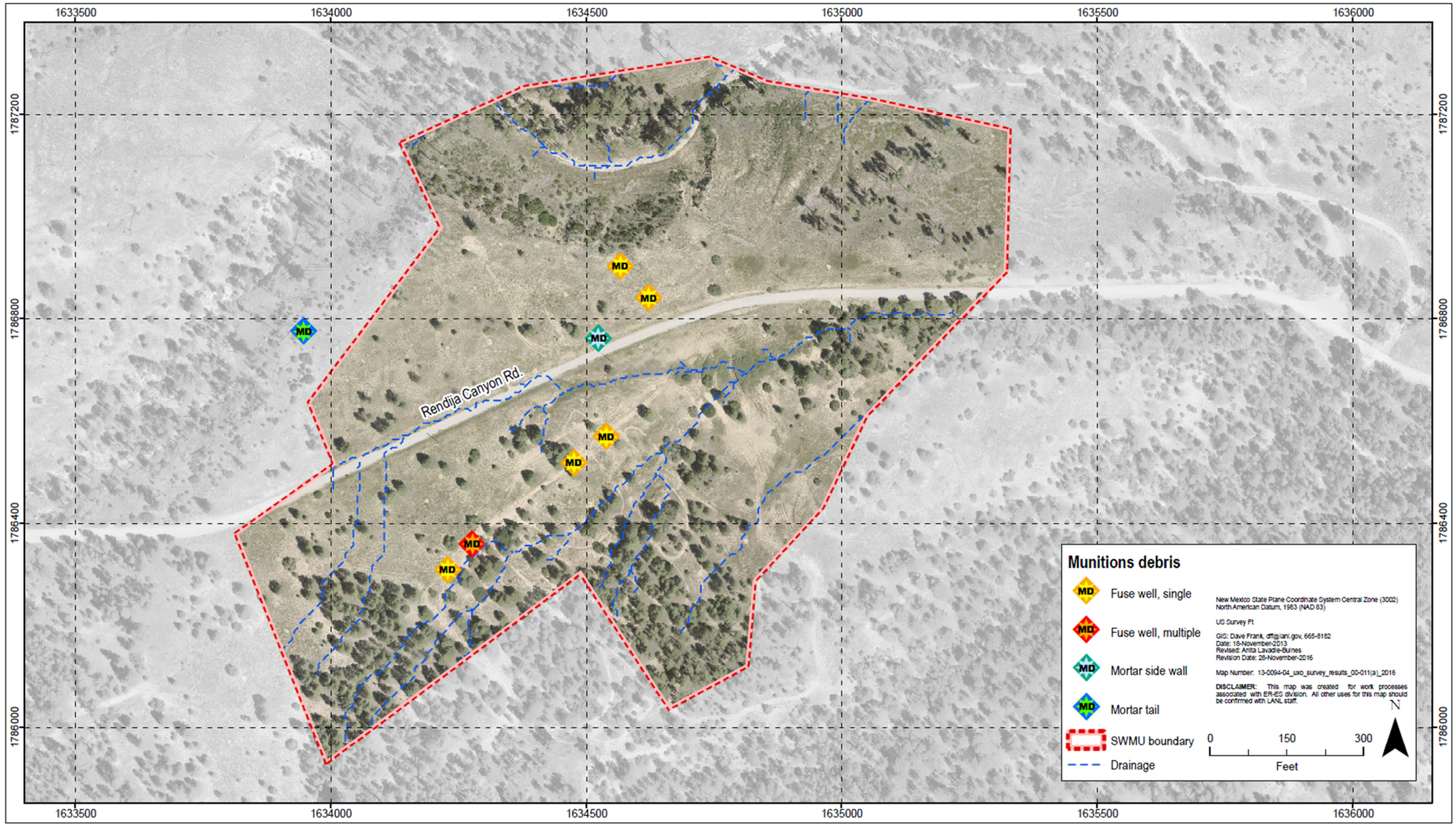

Figure 2.1-1 Aerial photograph of SWMU 00-011(a)

Figure 2.2-1 Aerial photograph of SWMU 00-011(d)

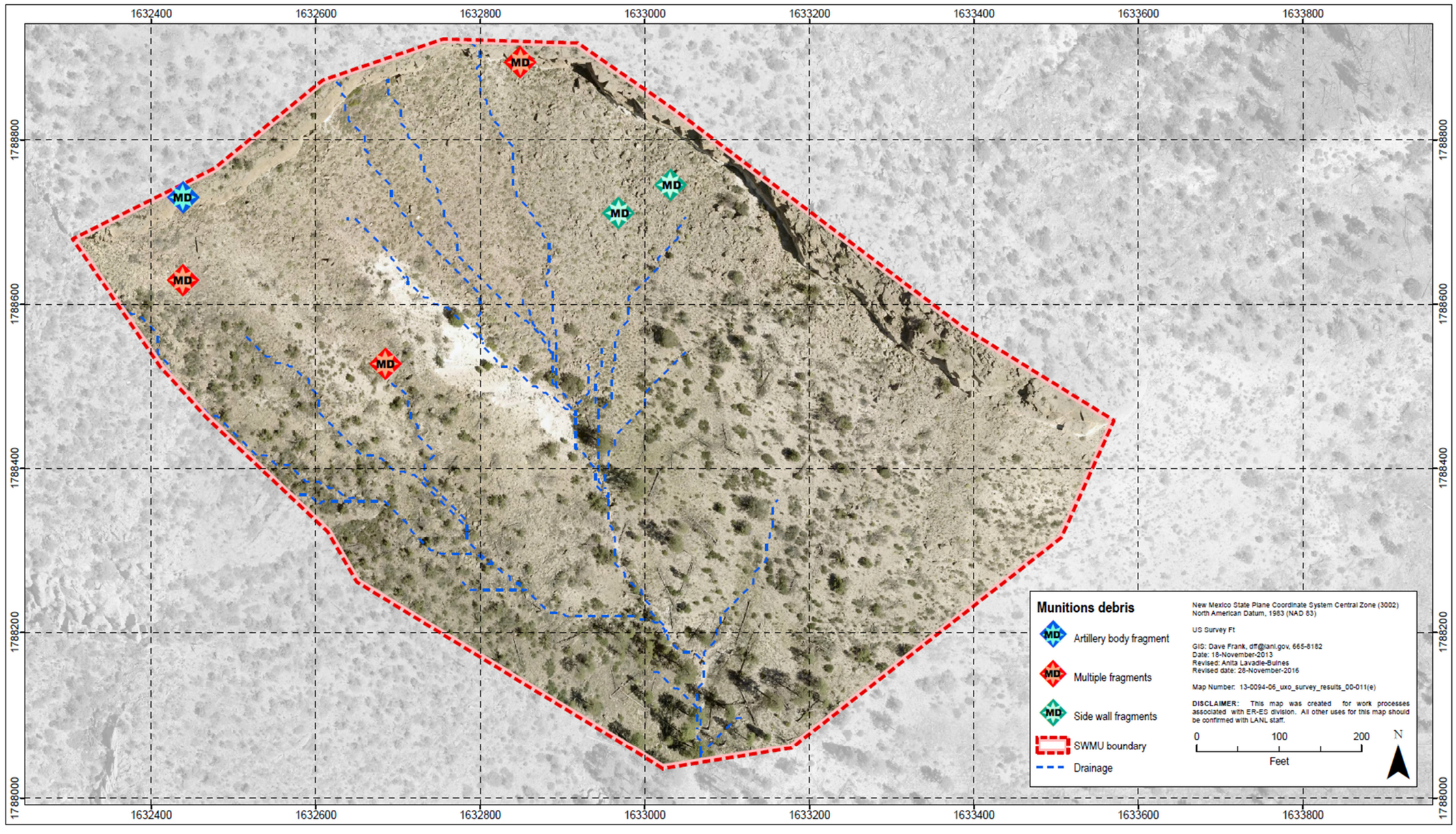

Figure 2.3-1 Aerial photograph of SWMU 00-011(e)

Figure 5.1-1 Fragments of MD found at SWMU 00-011(a) in 2016

Figure 5.1-2 Fragment of MD found at SWMU 00-011(a) in 2016

Figure 5.3-1 Fragments of MD found at SWMUs 00-011(a and e) in 2016