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2011 Biennial Ordnance Survey Report, Solid Waste Management Units 00-011(a, c, d, and e) and Area of Concern C-00-020, Guaje/Barrancas/Rendija Canyons Aggregate Area



Prepared by the Environmental Programs Directorate

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December 2011

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EXECUTIVE SUMMARY

Solid Waste Management Units (SWMUs) 00-011(a, c, d, and e) and Area of Concern (AOC) C-00-020 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 at least partially off U.S. Department of Energy property. Because of the potential for exposure of munitions and explosives of concern or munitions debris as a result of erosion or bioturbation at the sites, Los Alamos National Laboratory (the Laboratory) is required by the New Mexico Environment Department to conduct biennial visual surveys to identify and remove any site hazards related to historical munitions use.

Activities conducted in 2011 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 was found at any of the five sites. Several pieces of munitions debris were identified at SWMUs 00-011(a, d, and e). No evidence of munitions debris or historical impact activities was found at SWMU 00-011(c) and AOC C-00-020. All identified munitions debris was removed, photographed, and either retained for training purposes or disposed of by Laboratory Emergency Response personnel.

No munitions and explosives of concern, no munitions debris, or no evidence of historical impact activities was found at SWMU 00-011(c) or AOC C-00-020 during the 2011 ordnance survey. SWMU 00-011(c) and AOC C-00-020 were identified in the 1990 SWMU report as possible munitions impact areas because of historical signage found at the sites. However, archival searches have revealed no historical records documenting any munitions impact activities at SWMU 00-011(c) or AOC C-00-020. Additionally, despite several inspections at these sites over nearly two decades, no munitions or explosives of concern or munitions debris have ever been found, nor is there any visual evidence of munitions impact activities at the sites. Based on these results, the Laboratory recommends no further activities be conducted at SWMU 00-011(c) and AOC C-00-020.

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Acronyms and Abbreviations

AOC	area of concern
asl	above sea level
DOE	Department of Energy (U.S.)
GSA	General Services Administration
LANL	Los Alamos National Laboratory
MD	munitions debris
MEC	munitions and explosives of concern
NMED	New Mexico Environment Department
RFI	Resource Conservation and Recovery Act facility investigation
RPF	Records Processing Facility
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, c, d, and e) and Area of Concern (AOC) C-00-020 are munitions impact areas or suspected 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. 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 biennial 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 AOCs formerly part of Operable Unit 1071 within TA-00. Figure 1.1-1 shows the Guaje/Barrancas/Rendija Canyons Aggregate Area SWMUs and AOCs with respect to the Laboratory boundary and surrounding land holdings. This biennial ordnance survey report for the Guaje/Barrancas/Rendija Canyons Aggregate Area includes the following SWMUs and AOC, which are shown in Figure 1.1-2:

- SWMU 00-011(a), a mortar impact area
- SWMU 00-011(c), a suspected impact area
- SWMU 00-011(d), a bazooka firing area
- SWMU 00-011(e), an ammunition impact area
- AOC C-00-020, a suspected 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). The objective of this report is to present the results of the 2011 visual ordnance surveys conducted at these five 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 General Services Administration (GSA) land about 0.4 mi east of the Sportsmen's Club small arms firing range (SAFR)

(AOC 00-015) in Rendija Canyon. The site was a mortar impact area in the mid-1940s for 60-mm and 82-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 is used for recreational activities such as dirt-biking and target practice.

2.2 SWMU 00-011(c)

SWMU 00-011(c) (Figure 2.2-1) is suspected to be a possible munitions impact area. The site is located on GSA and U.S. Forest Service (USFS) land within a tributary of Rendija Canyon north of the Sportsmen's Club SAFR (AOC 00-015). The area is approximately 9 acres in size. It was identified as a possible munitions impact area because of historical nearly illegible signage posted at the site in the 1940s (LANL 1990, 007511). However, extensive archival searches have revealed no documentation regarding the use of this site as a munitions impact area. In addition, no field evidence of munitions operations (e.g., MD, MEC, UXO, or impact scars) has ever been found at SWMU 11-011(c). Resource Conservation and Recovery Act facility investigation (RFI) activities conducted in 1993 included an ordnance sweep followed by a geophysical sweep. Scrap metal such as bailing wire and tin cans were found, but no ordnance, MD, MEC, or UXO was located. In addition, no ordnance was found during the 2007 investigation (LANL 2007, 098670) or during the 2009 ordnance survey (LANL 2009, 108171).

SWMU 00-011(c) is within the area burned by the 2000 Cerro Grande fire and is covered with numerous downed burned trees and low weeds and shrubs. Public hiking trails run through and around the perimeter of the site. Several archaeological sites are also present in the area of SWMU 00-011(c).

2.3 SWMU 00-011(d)

SWMU 00-011(d) (Figure 2.3-1) is a bazooka firing area located largely on Los Alamos County land, except for a small section 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 only partially fenced and is open to the public.

2.4 SWMU 00-011(e)

SWMU 00-011(e) (Figure 2.4-1) is a former ammunition impact area located on 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.

2.5 AOC C-00-020

AOC C-00-020 (Figure 2.5-1) is a suspected mortar impact area located along the north valley wall of Rendija Canyon on GSA and USFS land. The 30-acre site also includes a tributary of Rendija Canyon. Most of the site lies within the Santa Fe National Forest, except for a small area on the southeastern edge that is private property. AOC C-00-020 was suspected to be a former mortar-impact area because of a “U.S. Property—No Trespassing” sign and a nearly illegible, bilingual sign posted in the area. The signs no longer remain. Extensive archival searches have revealed no documentation regarding the use of this site as a munitions impact area. In addition, no field evidence of operations (e.g., MD, MEC, UXO, or impact scars) has ever been found at AOC C-00-020. RFI activities conducted in 1993 included conducting an ordnance sweep followed by a geophysical sweep. No ordnance, MD, MEC, or UXO was located (LANL 1994, 059427). In addition, no ordnance was found during the 2007 investigation (LANL 2007, 098670) or during the 2009 ordnance survey (LANL 2009, 108171).

The site is located within an area burned by the 2000 Cerro Grande fire. The stream channel that runs through the center of the site has been widened by flooding. Currently, there are burned and live trees on the steep slopes next to the stream.

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 stormwater 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 biennial 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%. SWMUs 00-011(a) and 00-011(c) and AOC C-00-020 were 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.

4.0 SURVEY METHODS

Surveys were accomplished by using a line of 4 to 10 personnel trained to recognize UXO. Each person was positioned approximately arms-length apart from the next person to conduct the visual inspection of the entire area of each SWMU or AOC. 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 adequate coverage. The survey method is the same one used in previous investigations.

It was often necessary to warp survey lines to go around boulders and other large obstacles and to fit the terrain. At SWMU 00-011(e), survey lines were staggered so upslope personnel trailed downslope personnel to minimize the risk from falling rocks at this very steep site.

The process for establishing survey lines was somewhat hampered in areas of downed trees, boulders, and thick vegetation.

Because no UXO was recovered from the sites, no UXO waste was generated. MD and MEC recovered during the surveys were retained by Emergency Response personnel for training purposes or disposed of by the Emergency Response personnel.

5.0 2011 SCOPE OF ACTIVITIES

Before the 2011 survey activities described in this report were conducted, approval to access to each site was granted by the applicable land owner(s) through access agreements and/or special-use permits:

- SWMU 00-011(a) is located entirely on DOE land.
- SWMU 00-011(c) is located partially on DOE land and partially on USFS land.
- SWMU 00-011(d) is located primarily on Los Alamos County land, with a small portion (visible from Los Alamos County land) located on private property.
- SWMU 00-011(e) is located primarily on USFS land, with a small portion on located on DOE land.
- AOC C-00-020 is located primarily on USFS land, with a small portion on located on private land.

5.1 SWMU 00-011(a)

The site walkover and visual survey of SWMU 00-011(a) were conducted on October 18, 20, and 25, 2011. SWMU 00-011(a) is the largest of the five sites included in the 2011 biennial ordnance survey. In certain areas, the visual survey was somewhat hampered by the presence of mulch composed of downed trees and the walkover was somewhat restricted by thick brush. SWMU 00-011(a) is the flattest of the five sites, making it possible to find relatively small fragments of MD and MEC despite the previously mentioned constraints.

The 2011 ordnance survey resulted in the recovery and removal of several 60-mm and 81-mm shell fragments. Figure 5.1-1 shows some of the MD and MEC found at SWMU 00-011(a). Most of these fragments were small (less than 3 in. in the longest dimension) and were concentrated in the north-central portion of the site above the Rendija Canyon bottom. The fragments were removed, photographed, and retained by Emergency Response personnel or disposed of. Figure 2.1-1 shows the locations where MD and MEC were found at SWMU 00-011(a). The 2011 ordnance survey found no UXO at SWMU 00-011(a).

5.2 SWMU 00-011(c)

The site walkover and visual survey of SWMU 00-011(c) were conducted on November 1, 2011. The walkover at SWMU 00-011(c) was somewhat hampered by downed trees from the Cerro Grande fire. The SWMU is not heavily vegetated, and most of the slopes were accessible by foot. Rock faces and boulders too steep to walk were readily surveyed visually.

The 2011 ordnance survey found no MEC or MD at SWMU 00-011(c). Visual inspection of cliff faces, boulders, and other obvious targets at the site found no impact scars or holes present at SWMU 00-011(c).

5.3 SWMU 00-011(d)

The site walkover and visual survey of SWMU 00-011(d) were conducted on October 17, 2011. This site is relatively small and very few obstacles are present to hinder the walkover or visual inspection.

The 2011 ordnance survey resulted in the recovery and removal of two 2.38-in. expended rocket mortars with fin assemblies, one copper slug from a 2.36-in. rocket shaped-charge liner, and several pieces of MD or MEC. Figure 5.3-1 shows the rocket mortars and Figure 5.3-2 shows the MD, MEC, and copper slug. Most of the MD and MEC was found at the base of the cliff in the area designated as location 1 in Figure 2.3-1. This is consistent with the documented history of this site of firing 2.36-in. bazooka rounds into the cliff face at SWMU 00-011(d). The fragments were removed, photographed, and retained by Emergency Response personnel or disposed of. The 2011 ordnance survey found no UXO at SWMU 00-011(d). Abundant scars and holes resulting from munitions impact are present in the cliff face at SWMU 00-011(d).

5.4 SWMU 00-011(e)

The visual survey and site walkover of SWMU 00-011(e) was conducted on October 19, 2011.

The 2011 ordnance survey resulted in the recovery and removal of several MD or MEC fragments in the form of 50-mm caliber armor-piercing shells scattered over the entire area shown in Figure 5.4-1. Some smaller-caliber shells were also found during the 2011 survey. Although no fragments of shells larger than 50-mm were found at the site, there is abundant evidence of impact to cliffs and boulders from larger munitions. Figures 5.4-2 and 5.4-3 show impact from shells larger than 50-mm at the site. In addition to the 37-mm shells that were documented to have been fired at the site, it is apparent from the impact scars that 76-mm shells were also used (Figure 5.4-2). Although the locations of the fragments could not be surveyed, no noticeable distribution pattern or area of significant MD concentration was found at SWMU 00-011(e). The fragments were removed, photographed, and retained by Emergency Response personnel or disposed of. The 2011 ordnance survey found no UXO at SWMU 00-011(e). Abundant scars and holes resulting from munitions impact are present in the cliff face and boulders at the site.

5.5 AOC C-00-020

The site walkover and visual survey of AOC C-00-020 were conducted on October 25, 2011. The survey focused on the drainage that runs through the middle of the site because this is the area where MEC, MD, or UXO is most likely to accumulate following erosion from the slopes. The lower portions of the slopes were also surveyed.

The 2011 ordnance survey found no MEC, MD, UXO at AOC C-00-020. Visual inspection of cliff faces, boulders, and other obvious targets found no impact scars or holes at AOC C-00-020.

6.0 CONCLUSIONS AND RECOMMENDATIONS

No UXO was found at any of the five surveyed sites. MD and MEC were identified at three of the five sites. Several pieces of MD and MEC were found at SWMUs 00-011(a, d, and e), consistent with the documented use of those sites as impact areas. It is recommended that biennial visual surveys continue at SWMUs 00-011(a, d, and e).

At SWMU 00-011(c) and AOC C-00-020, no MD, MEC, or UXO was recovered, which is consistent with past surveys and inspections of these sites. There is no documented history of target use at these two

sites. The findings of the 2007 investigation (LANL 2007, 099954), the results of the 2009 and 2011 ordnance surveys, and findings of previous historical investigations at SWMU 00-011(c) and AOC C-00-020 (LANL 1994, 059427) show no evidence of the use of these sites as target-impact areas. In addition, munitions impact scars and holes are not present at either SWMU 00-011(c) or AOC C-00-020. Thus, the Laboratory has demonstrated that SWMU 00-011(c) and AOC C-00-020 were never used as munitions impact areas. It is recommended that biennial surveys be discontinued at SMWU 00-011(c) and AOC C-00-020. It is also recommended that corrective actions at SWMU 00-011(c) and AOC C-00-020 are complete, and both sites are appropriate for the recommendation that corrective actions are complete without controls.

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. This information is also included in text citations. ER IDs are assigned by the Environmental Programs Directorate's Records Processing Facility (RPF) and are used to locate the document at the RPF and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the 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), March 1994. "RFI Phase Report, Operable Unit 1071, SWMU Aggregate 0-D, Ordnance Impact Areas," Los Alamos National Laboratory, Los Alamos, New Mexico. (LANL 1994, 059427)

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), November 2007. "Investigation Report for Guaje/Barrancas/Rendija Canyons Aggregate Area at Technical Area 00, Revision 1," Los Alamos National Laboratory document LA-UR-07-7820, Los Alamos, New Mexico. (LANL 2007, 099954)

LANL (Los Alamos National Laboratory), December 2009. "2009 Biennial Ordnance Survey Report, Solid Waste Management Units 00-011(a, c, d, and e) and Area of Concern C-00-020, Guaje/Barrancas/Rendija Canyons Aggregate," Los Alamos National Laboratory document LA-UR-09-8186, Los Alamos, New Mexico. (LANL 2009, 108171)

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)

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.

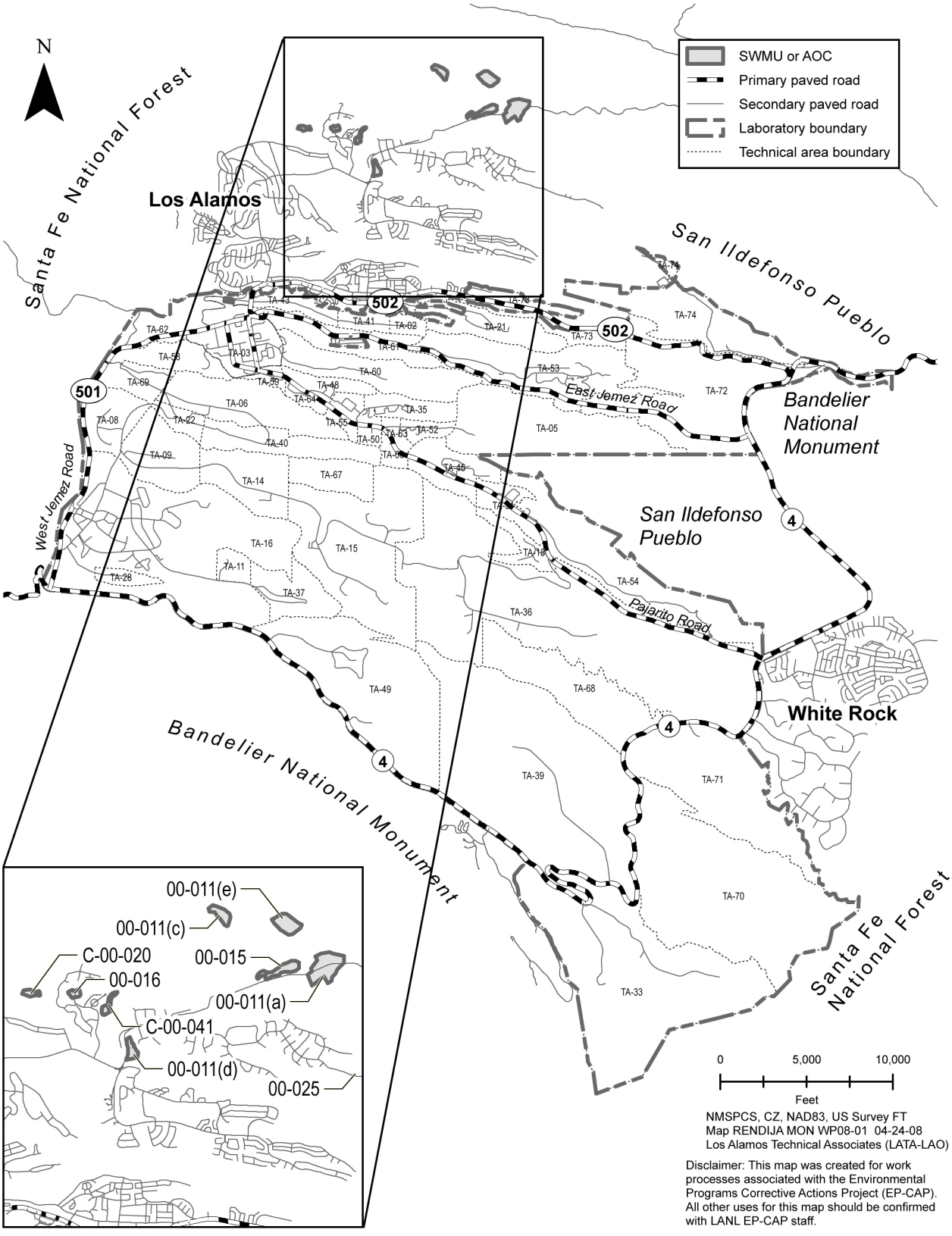


Figure 1.1-1 Guaje/Barrancas/Rendija Canyons Aggregate Area SWMUs and AOCs

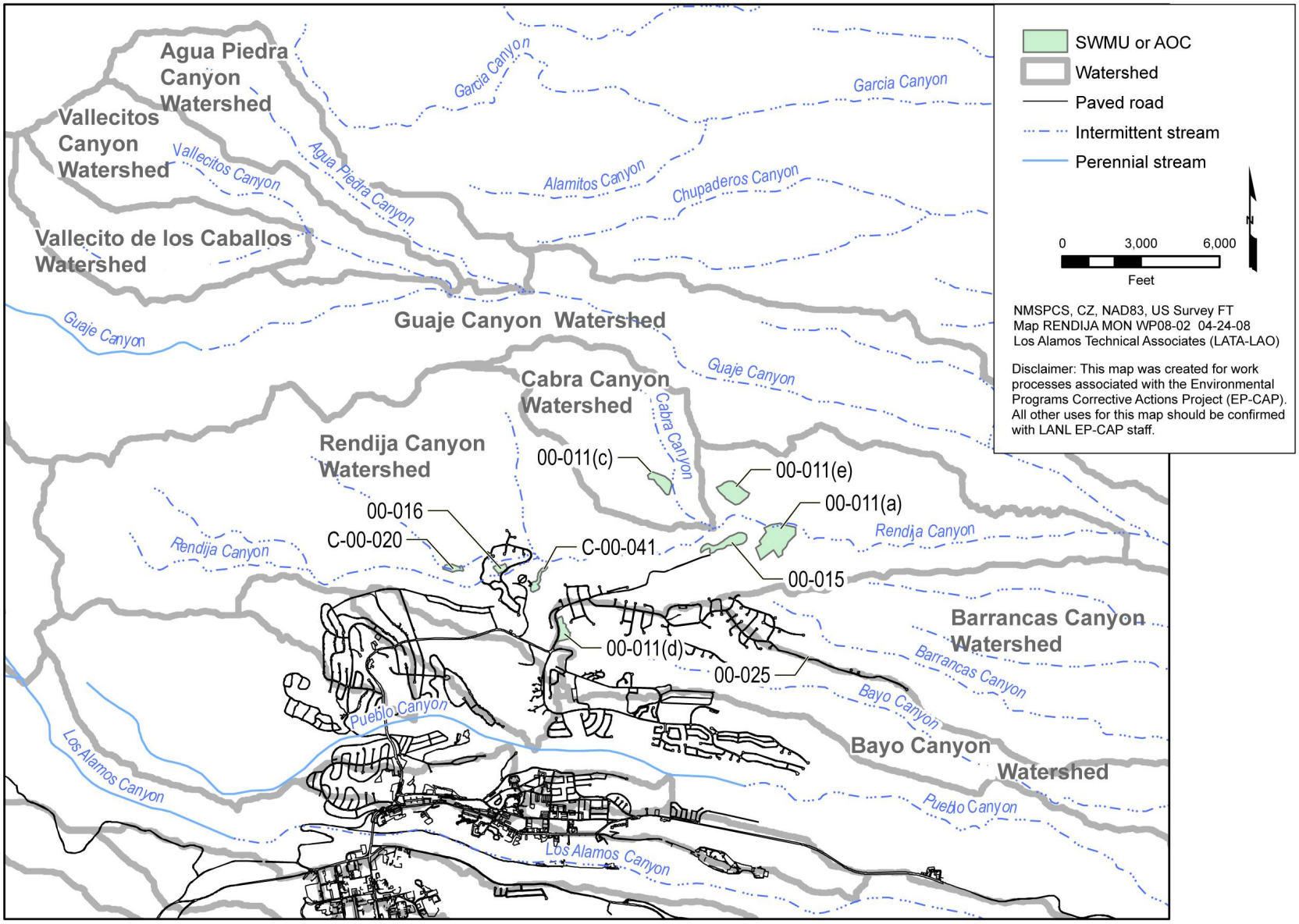


Figure 1.1-2 SWMUs 00-011(a, c, d, and e) and AOC C-00-020 within the Rendija Watershed

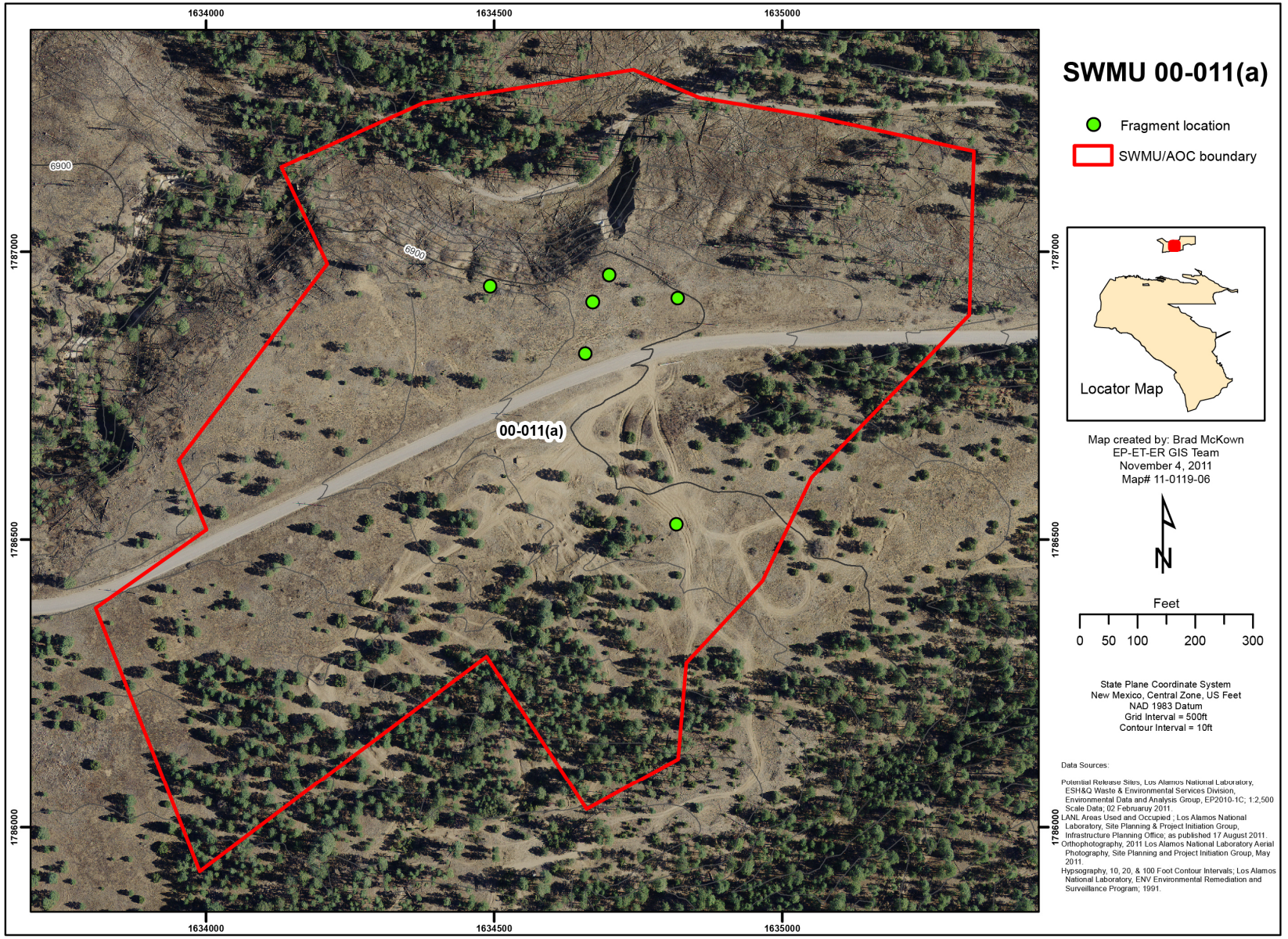


Figure 2.1-1 Aerial photograph of SWMU 00-011(a)

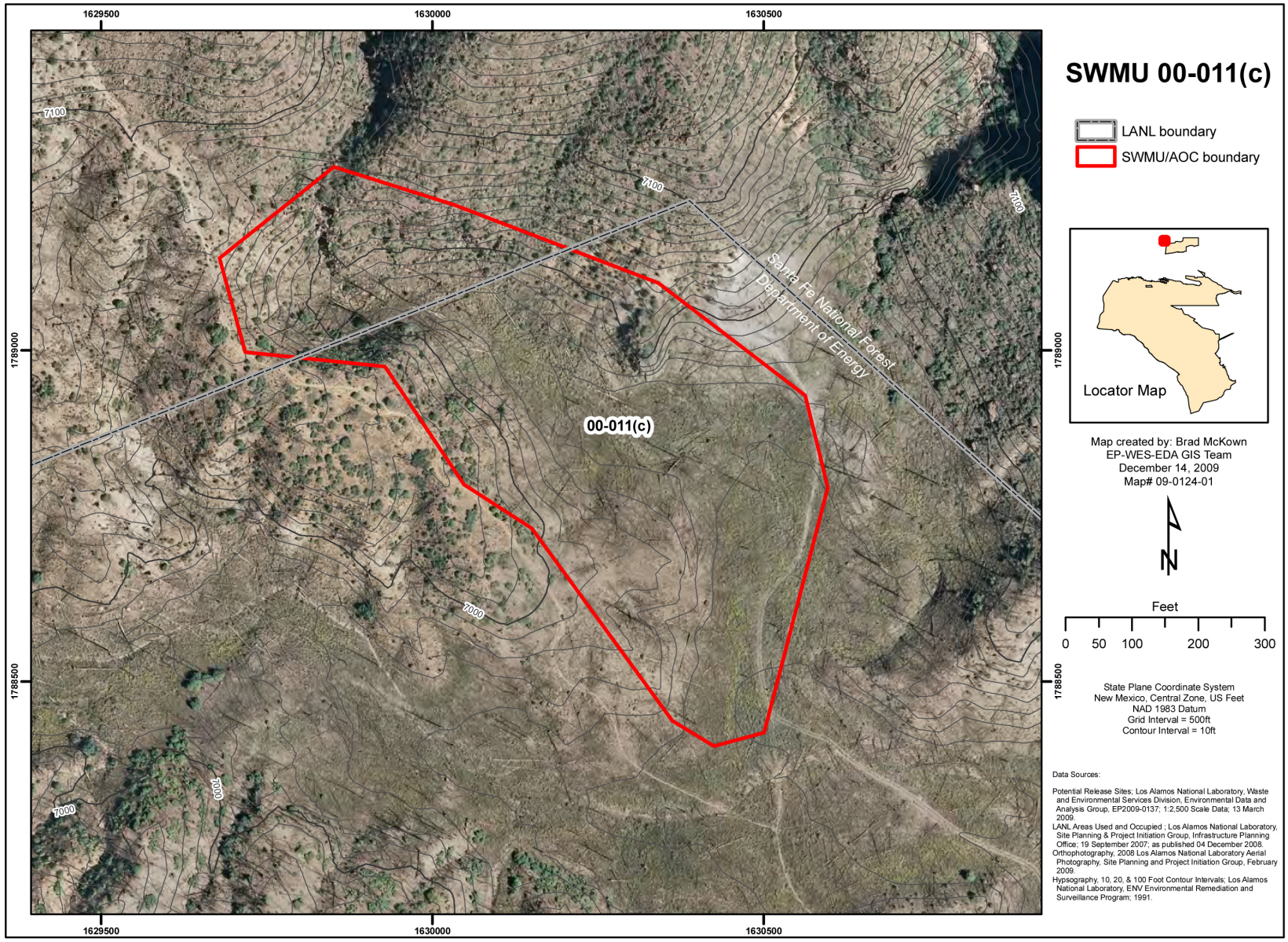


Figure 2.2-1 Aerial photograph of SWMU 00-011(c)

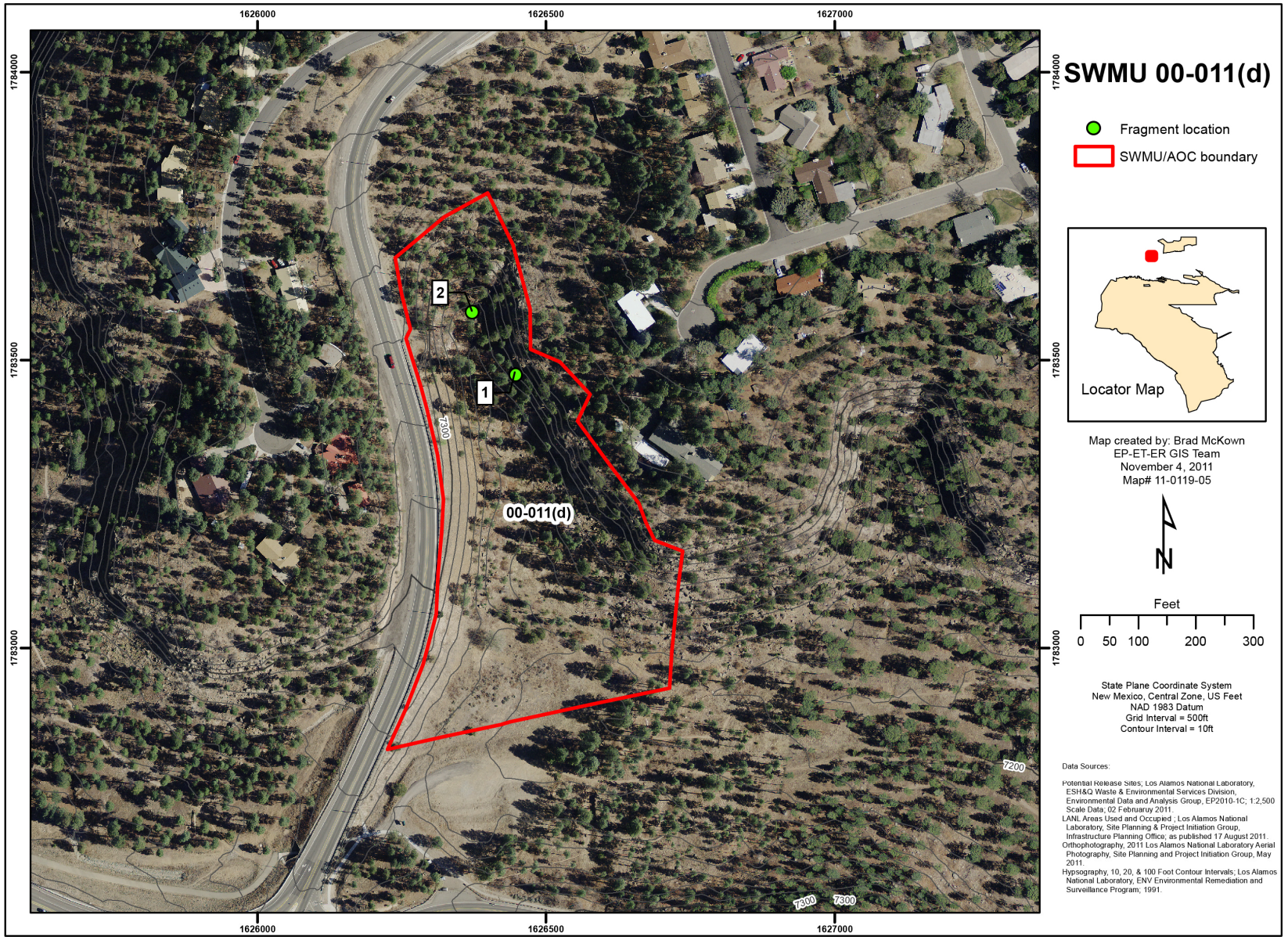


Figure 2.3-1 Aerial photograph of SWMU 00-011(d)

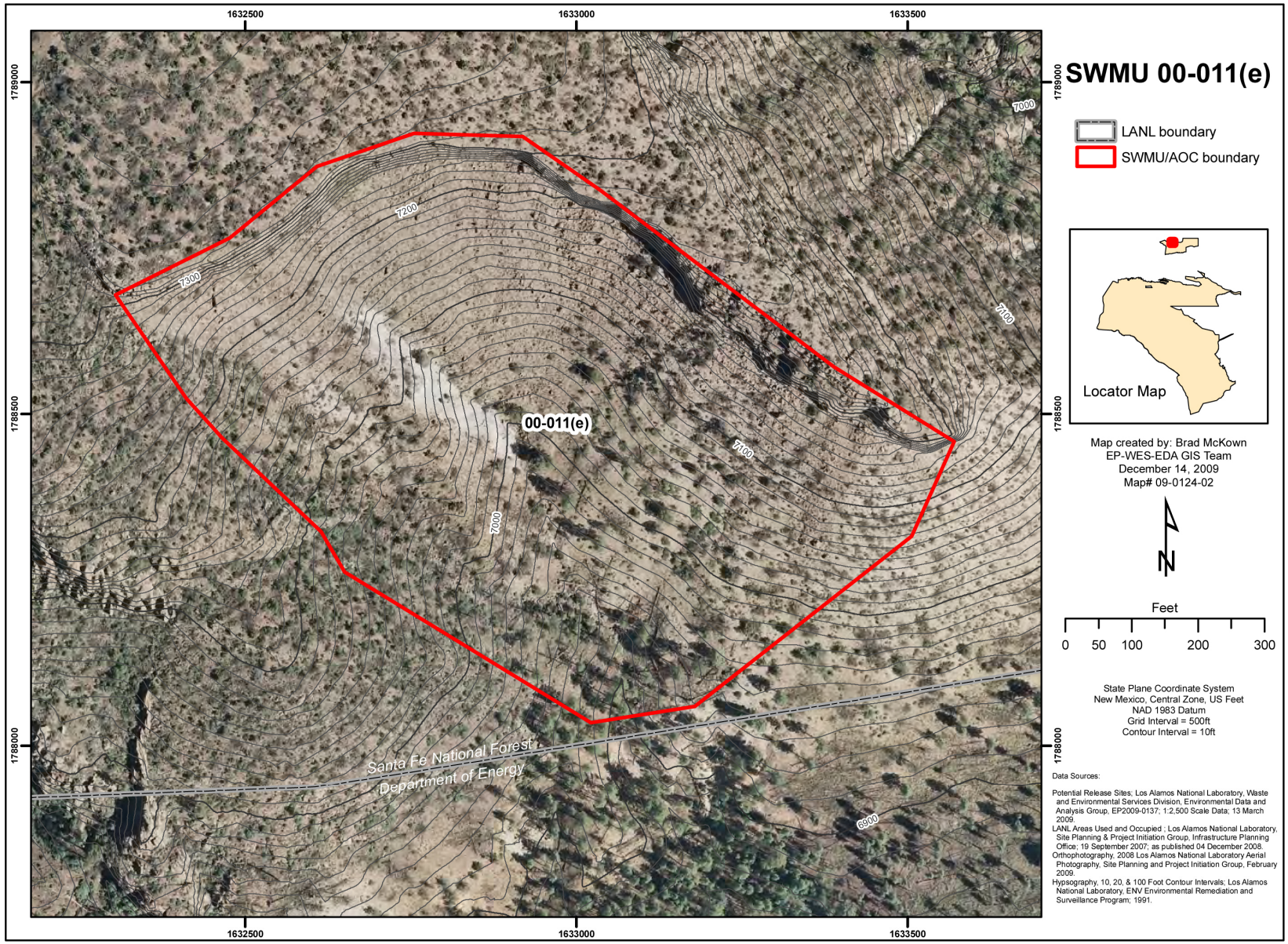


Figure 2.4-1 Aerial photograph of SWMU 00-011(e)

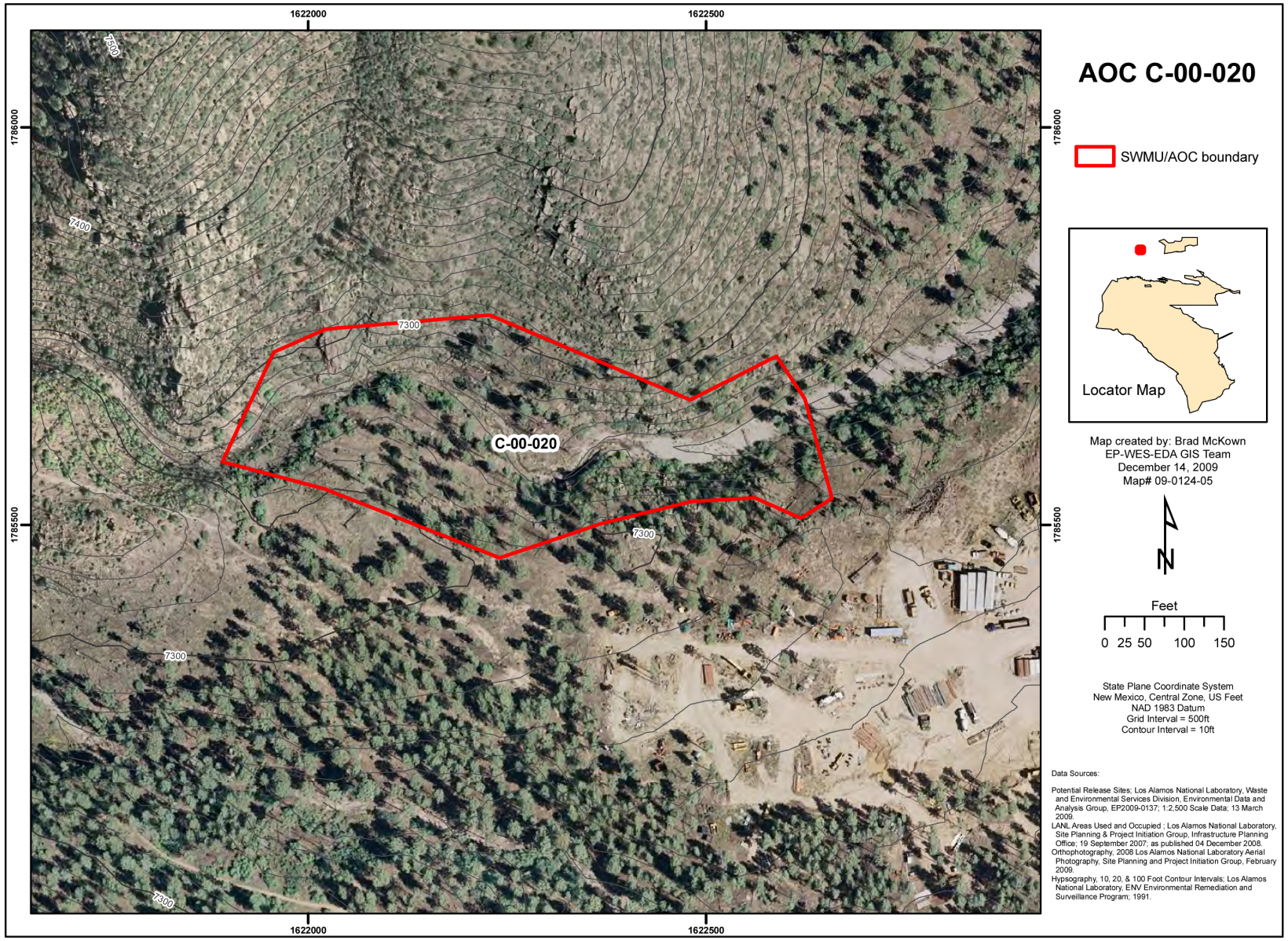


Figure 2.5-1 Aerial photograph of AOC C-00-020



Figure 5.1-1 Fragments of MD and MEC found at SWMU 00-011(a) in 2011



Figure 5.3-1 Fragment of 2.38-in. expended rocket mortars with fin assemblies found at SWMU 00-011(d) in 2011



Figure 5.3-2 Miscellaneous small shell fragments and copper slug found at SWMU 00-011(d) in 2011



Figure 5.4-1 MD found at SWMU 00-011(e) in 2011



Note: A neighborhood on Barranca Mesa is visible in the background through the hole, and the Sportsman's Club (AOC 00-015) is visible in the background to the right.

Figure 5.4-2 Impact hole resulting from a 76-mm shell at SWMU 00-011(e)



Note: No shells were found lodged in the cliff face.

Figure 5.4-3 Impact scars in the cliff face at SWMU 00-011(e)