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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
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Prepared by the Environmental Programs Directorate

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EXECUTIVE SUMMARY

Solid Waste Management Units (SWMUs) 00-011(a), 00-011(c), 00-011(d), and 00-011(e) and Area of Concern (AOC) C-00-020 are munitions impact areas or potential munitions impact areas within the Guaje/Barrancas/Rendija Canyons Aggregate Area at Technical Area 00. These sites were not used after the 1940s and, with the exception of SWMU 00-011(a), are now located at least partially off of 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 2009 included visual inspections of the sites using lines of trained personnel conducting site walkovers to identify any suspect material. Several pieces of munitions debris were identified at SWMUs 00-011(a) and 00-011(e). Only one piece of munitions debris was identified at SWMU 00-011(d). No evidence of munitions debris or historical impact activities was found at SWMU 00-011(c) and AOC C-00-020. No unexploded ordnance was found at any of the five sites.

There are no historical records of any impact activities at SWMU 00-011(c) or AOC C-00-020, which were identified as possible impact areas because of historical signage found at the sites. 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 impact 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. Continuation of biennial visual surveys is recommended for SWMUs 00-011(a), 00-011(d), and 00-011(e). The next round of visual surveys will be performed in 2011.

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Acronyms and Abbreviations

AOC	area of concern
asl	above sea level
DOE	Department of Energy (U.S.)
GSA	General Administrative Services
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	United States 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), 00-011(c), 00-011(d), and 00-011(e) and Area of Concern (AOC) C-00-020 are munitions impact areas or potential munitions impact areas within the Guaje/Barrancas/Rendija Canyons Aggregate Area at Technical Area 00. 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 that were formerly part of Operable Unit 1071 within Technical Area 00 (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 possible impact area
- SWMU 00-011(d), a bazooka firing area
- SWMU 00-011(e), an ammunition impact area
- AOC C-00-020, a possible impact area

1.2 Report Objectives

NMED's approval with direction of the 2007 Investigation Report for Guaje/Barrancas/Rendija Canyons Aggregate Area, Revision 1 (NMED 2007, 099632), directed that visual surveys be conducted at SWMUs 00-011(a), 00-011(c), 00-011(d), and 00-011(e), and AOC C-00-020 every 2 yr to identify and remove any MEC or MD. Of particular concern is the potential for the presence of unexploded ordnance (UXO), which may pose a danger to recreational users and workers in the area. The objective of this report is to present the results of the 2009 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 U.S. Forest Service (USFS) 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, and operations ceased in the late 1940s (LANL 1990, 007511).

SWMU 00-011(a) is located east of the Rendija Sportsmen's Club in a relatively flat open grassland with scattered shrubs and trees. The site is bisected east to west by an unpaved road, called Rendija Road. 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 downed trees that burned during the 2000 Cerro Grande fire. The site is fenced and posted with DOE "No Trespassing" signs. However, 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 a possible impact area located on USFS land in 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 SWMU because of historical signage found at the site in the 1940s; however, there is no documentation regarding the duration of operations, if any (LANL 1990, 007511). No field evidence of operations (e.g., MD or impact scars) has ever been found at the site.

The site 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. The area is approximately 6 acres and was used as a target area for 2.36-in. bazooka rounds in the mid-1940s; 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 east edge of the site. The southern section of the site is open and grassy with some shrubs and trees; the northern-most 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 37-mm rounds. The impact area extends north along the tributary to the top of a cliff face and is approximately 15 acres. SWMU 00-011(e) is in direct alignment with active rifle firing areas of the Sportsmen's Club SAFR (AOC 00-015), which is approximately 2000 ft to the north-northeast.

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 3-acre possible mortar impact area located along the north valley wall of Rendija Canyon on USFS land. The 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. This site was thought to be a former mortar impact area because of a “U.S. Property—No Trespassing” sign and nearly illegible, bilingual signs posted along the southern edge of the area. The signs are not currently posted (LANL 1992, 007667, p. 5-26).

The site is within an area burned by the Cerro Grande fire in 2000. 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 adjacent to the stream.

3.0 SITE CONDITIONS

Rendija Canyon is located immediately north of the Los Alamos townsite and has a drainage area of 9.5 mi^2. The watershed drains portions of Los Alamos townsite, General Services Administration (GSA) 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. SWMU 00-011(e) in particular is very steep, with grades of 40% to 50%. SWMUs 00-011(a), 00-011(c) and AOC C-00-020 were impacted by the 2000 Cerro Grande fire, and numerous downed trees and standing dead trees are present at these sites. These site conditions make the walkover visual surveys challenging and potentially hazardous.

Although stormwater samplers have been installed at all five of the sites included in the 2009 biennial survey, no stormwater samples have been collected to date. Therefore, there are no stormwater data included in this year’s survey report.

4.0 SURVEY METHODS

Surveys were accomplished by walking survey lines with 4 to 8 trained people positioned approximately arms-length apart. Once a survey line was completed in one direction, the survey line was pivoted around the individual at one end of the line to survey in the opposite direction. The individual at the “pivot point” 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.

It was often necessary to “warp” survey lines to go around boulders and other large obstacles and to fit the terrain. At SWMU 00-001(e), survey lines were staggered so upslope personnel trailed downslope personnel. This was necessary to minimize the risk due to falling rock at this very steep site. Although an effort was made to go through areas of downed trees and thick vegetation, the thoroughness of the surveys in these areas was somewhat diminished.

Because no UXO was recovered from the sites, no waste was generated. MD recovered during the surveys is nonhazardous and was retained by Emergency Response personnel for training purposes.

5.0 SCOPE OF ACTIVITIES

All work described in this report was subject to approval by the applicable land owner(s) through access agreements and/or special-use permits.

- SWMU 00-011(a) is located entirely on GSA land.
- SWMU 00-011(c) is located partially on GSA 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 GSA land.
- AOC C-00-020 is located entirely on USFS land.

5.1 SWMU 00-011(a)

The site walkover and visual survey at SWMU 00-011(a) were conducted on September 22, 2009. This site is the largest of the five sites included in the 2009 biennial ordnance survey. The site survey was somewhat complicated by areas of downed trees and thick brush. In addition, a large amount of trash and litter is present at this site, which posed a distraction to surveyors. However, SWMU 00-011(a) is the flattest of the five sites, which made it possible to conduct a thorough survey and find relatively small fragments of MD.

The survey resulted in the identification of several 60-mm and 81-mm shell fragments. Figures 5.1-1 through 5.1-3 show some of the MD found at SWMU 00-011(a). Most of these fragments were small (less than 2 in. in the longest dimension, Figure 5.1-3) and were concentrated in the central portion of the site, on the north side of the road above the Rendija Canyon bottom. However, the largest fragment, a 4-in. fragment of an 81-mm shell (Figure 5.1-1), was found on the south side of the road. Figure 2.1-1 shows the locations where shrapnel was found at SWMU 00-011(a); the largest fragment was found at location 4. No UXO was found 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 October 27, 2009. The effectiveness of the survey at this site was affected by downed trees from the Cerro Grande fire. In addition, one small area of north-facing slope had a light accumulation of snow. However, the site is not heavily vegetated, and most of the slopes were accessible by foot. Rock faces and boulders too steep to walk were readily visible from safe vantage points.

No MEC or MD was found on the site. Visual inspection of cliff faces, boulders, and other obvious targets at the site did not yield any evidence of use of SWMU 00-011(c) as an impact area.

5.3 SWMU 00-011(d)

The site walkover and visual survey of SWMU 00-011(d) were conducted on September 23, 2009. This site is relatively small and straightforward to survey.

Only one small piece of MD was found during the 2009 site survey. A copper slug from a 2.36-in. rocket shaped-charge liner was the only evidence of historical use as an impact site. The location of this piece of MD is shown on Figure 2.3-1. This is consistent with the documented use of this site for firing 2.36-in bazooka rounds. No UXO was identified at the site.

5.4 SWMU 00-011(e)

The site walkover and visual survey of SWMU 00-011(e) were conducted on September 24, 2009. Survey efforts were complicated by the very steep slopes, boulders, and loose materials. Given the steepness of the site and the need to keep hands free, no survey equipment was carried onto the site. Figures 5.4-1 through 5.4-3 show photographs of the site during the survey activities.

Several fragments of 50-caliber armor-piercing shells were found during the survey. Some smaller caliber shells were also found during the survey. Although no fragments of larger shells were found at the site, there was abundant evidence of impact to cliffs and boulders from larger munitions. Figures 5.4-4 and 5.4-5 show evidence of impact 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 (see Figure 5.4-4). Although the locations of the fragments could not be surveyed, there was no noticeable distribution pattern or area of significant concentration of the MD found at SWMU 00-011(e).

5.5 AOC C-00-020

The site walkover and visual survey of AOC C-00-020 were conducted on September 23, 2009. The survey focused on the drainage that runs through the middle of the site and is the area where MEC or MD is most likely to accumulate following erosion from the slopes. The lower portions of the slopes were also surveyed, although the steepness of the slopes along with downed trees from the Cerro Grande fire hindered an effective the survey of those areas.

No MEC or MD was found on the site. Visual inspection of cliff faces, boulders, and other obvious targets at the site did not yield any evidence of use of AOC C-00-020 as an impact area.

6.0 RECOMMENDATIONS

MD was identified at three of the five sites surveyed. SWMUs 00-011(a) and 00-011(e) both had several pieces of MD, consistent with the documented use of those sites as impact areas. Only one fragment, a copper slug from a 2.36-in. bazooka shaped-charge liner, was recovered at SWMU 00-011(d), which is also consistent with the documented use of this site. It is recommended that biennial visual surveys are continued at SWMUs 00-011(a), 00-011(d), and 00-011(e). The next survey will be conducted in the fall 2011.

At SWMU 00-011(c) and AOC C-00-020, no MD was recovered, which is consistent with past surveys and inspections of these sites. There is no documented history of impact at these two sites, and based on the professional opinion of the Laboratory's hazardous devices technicians, there is no evidence of impact to any of the obvious potential targets (i.e., cliff faces, boulders, etc.) at these sties. Based on the results of the 2009 surveys, in addition to the findings of the 2007 investigation report (LANL 2007, 099954) and historical investigations at these sites, it is recommended that corrective actions at SWMU 00-011(c) and AOC C-00-020 are complete and these sites are appropriate for Certificates of Completion.

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), May 1992. "RFI Work Plan for Operable Unit 1071," Los Alamos National Laboratory document LA-UR-92-810, Los Alamos, New Mexico. (LANL 1992, 007667)

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), 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)

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.

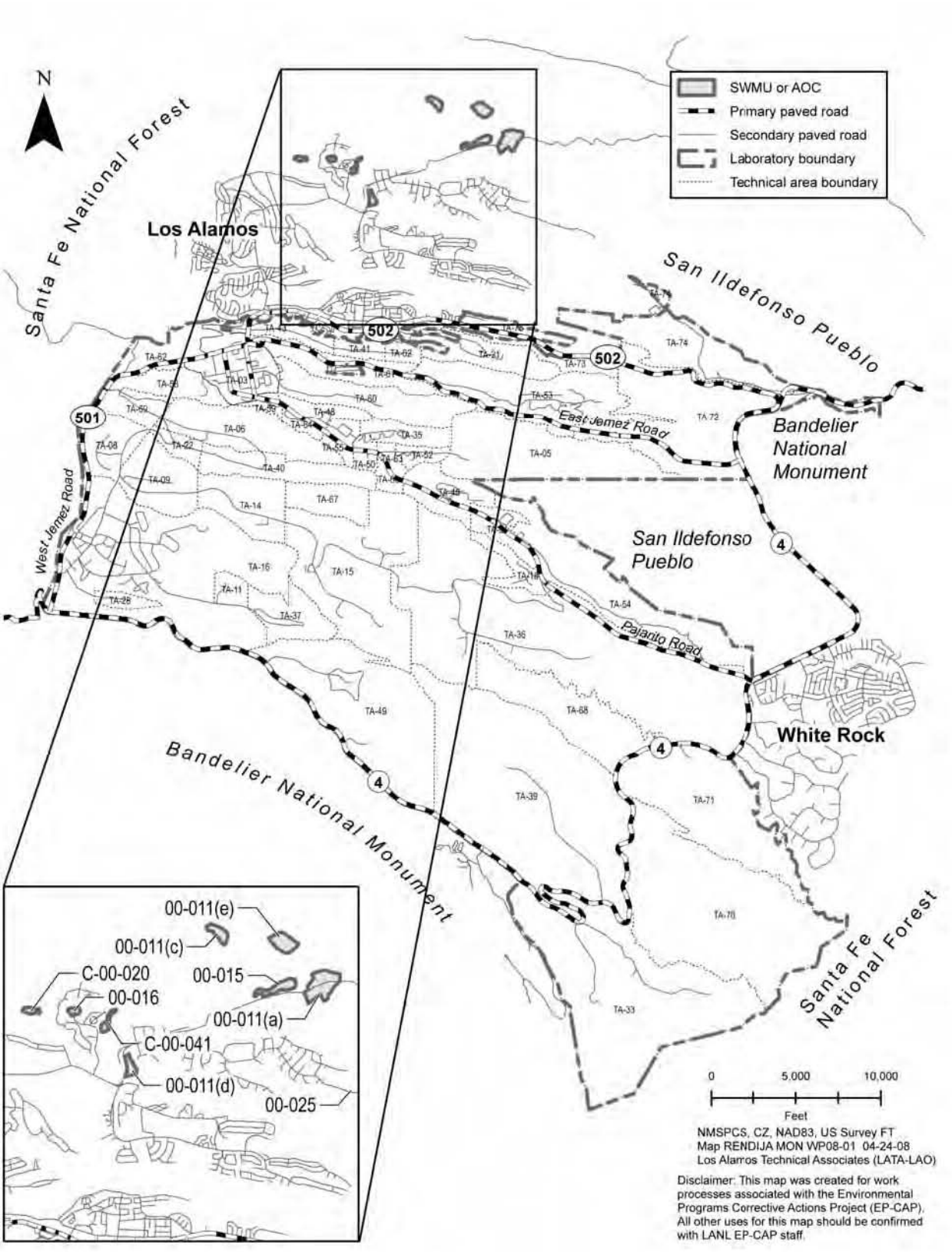

Figure 1.1-1 Guaje/Barrancas/Rendija Canyons Aggregate Area SWMUs and AOCs

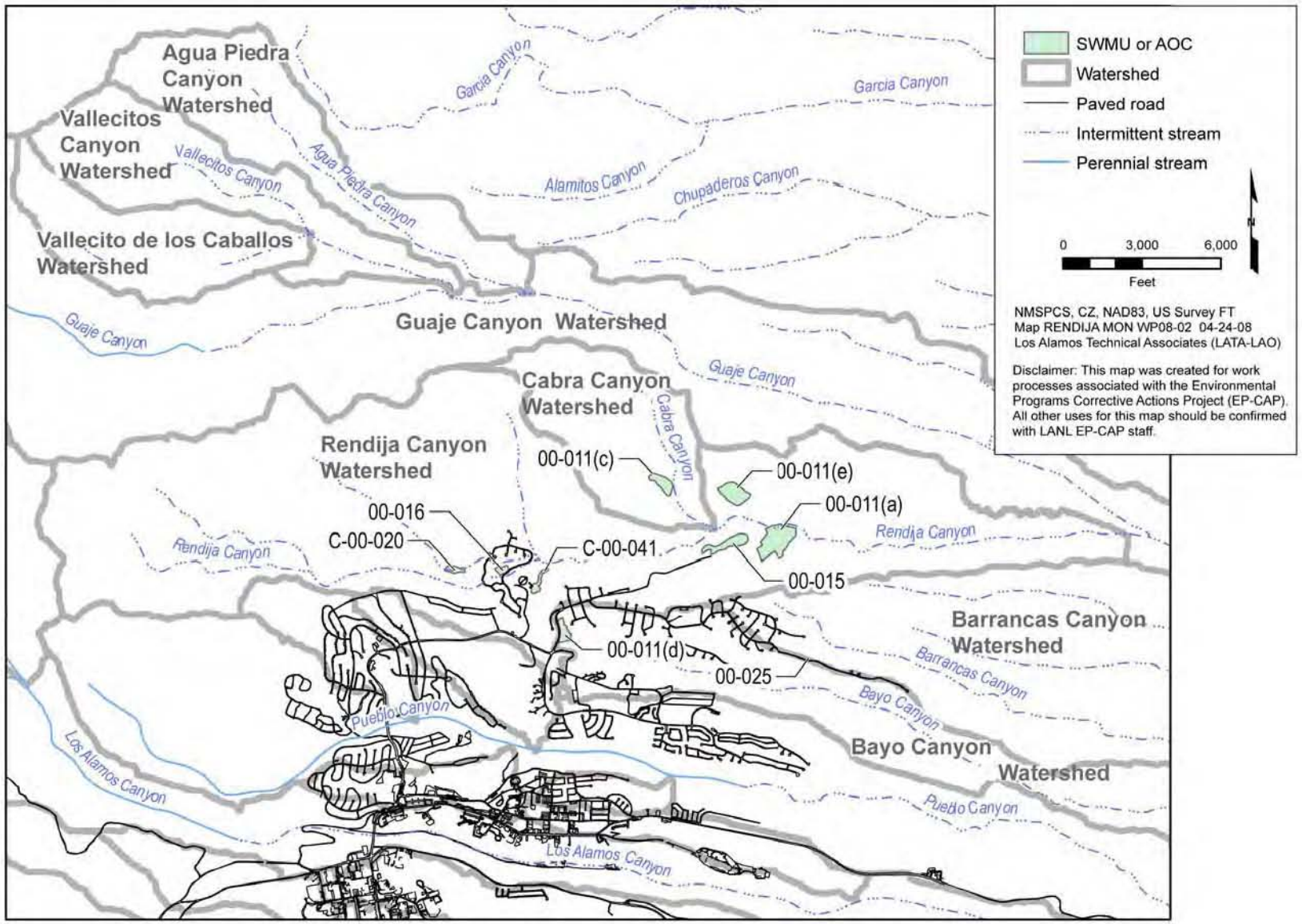

Figure 1.1-2 SWMUs 00-011(a), 00-011(c), 00-011(d), and 00-011(e) and AOC C-00-020 within the Rendija Watershed

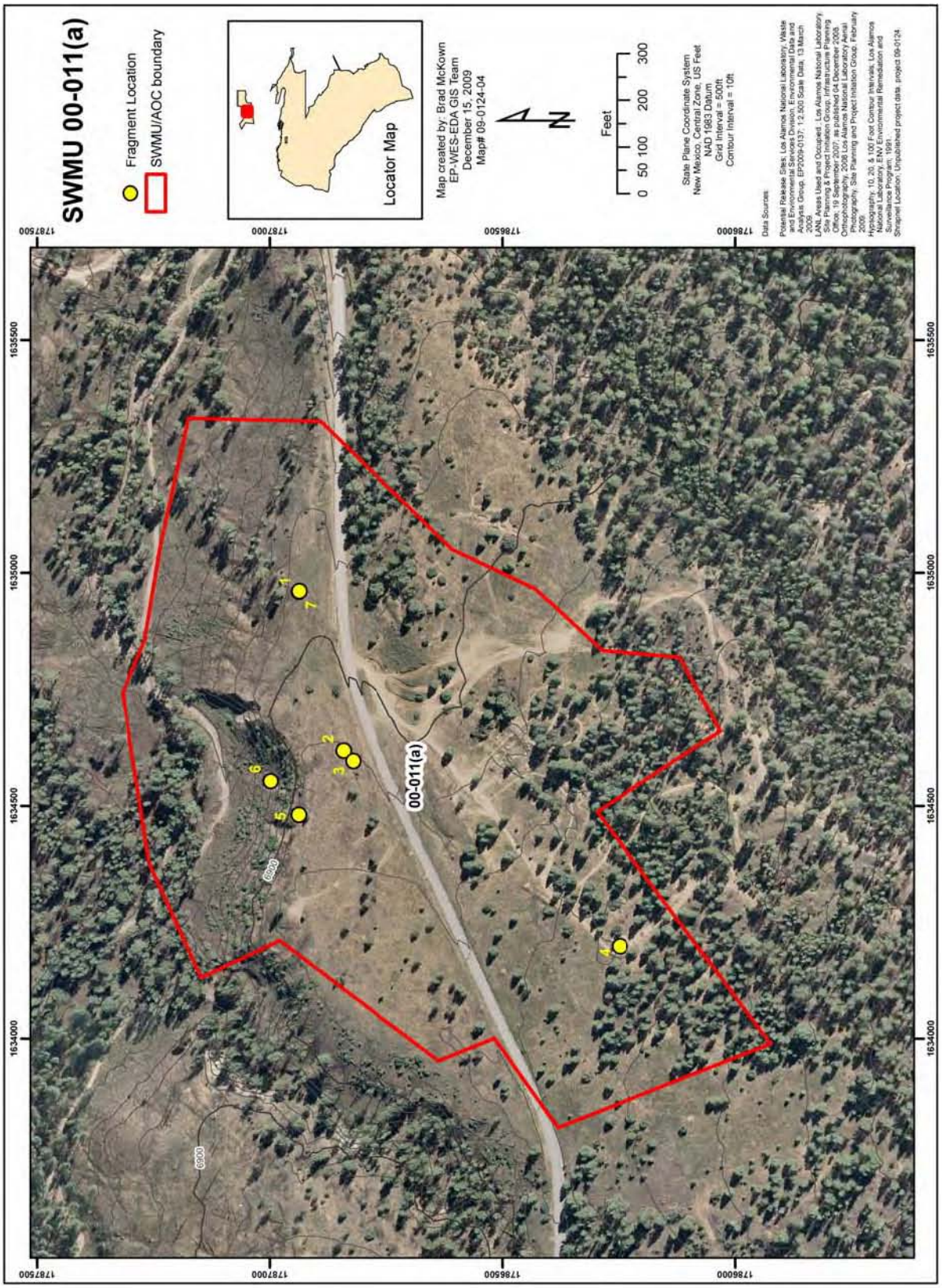

Figure 2.1-1 Aerial photograph of SWMU 00-011(a)

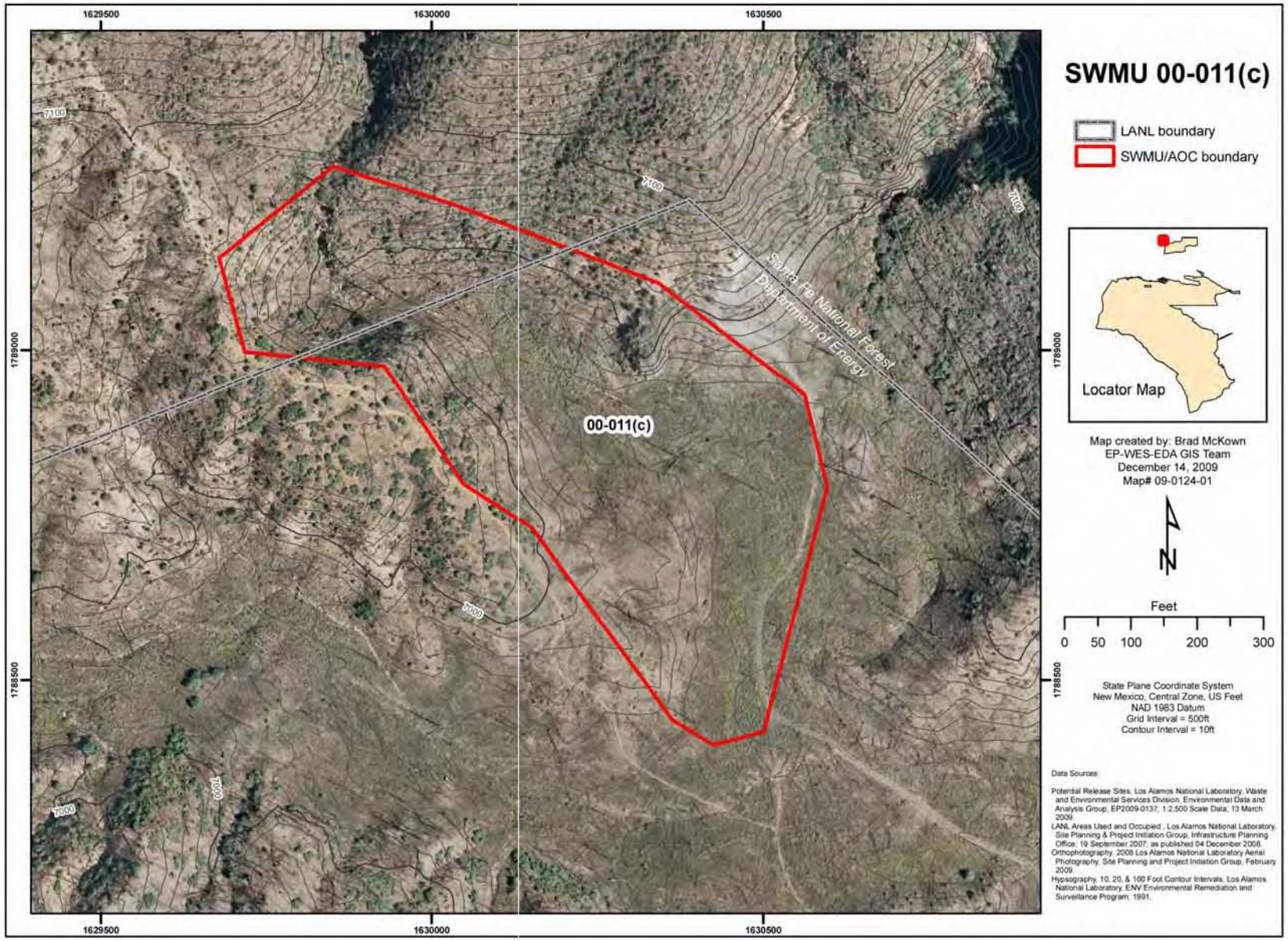

Figure 2.2-1 Aerial photograph of SWMU 00-011(c)

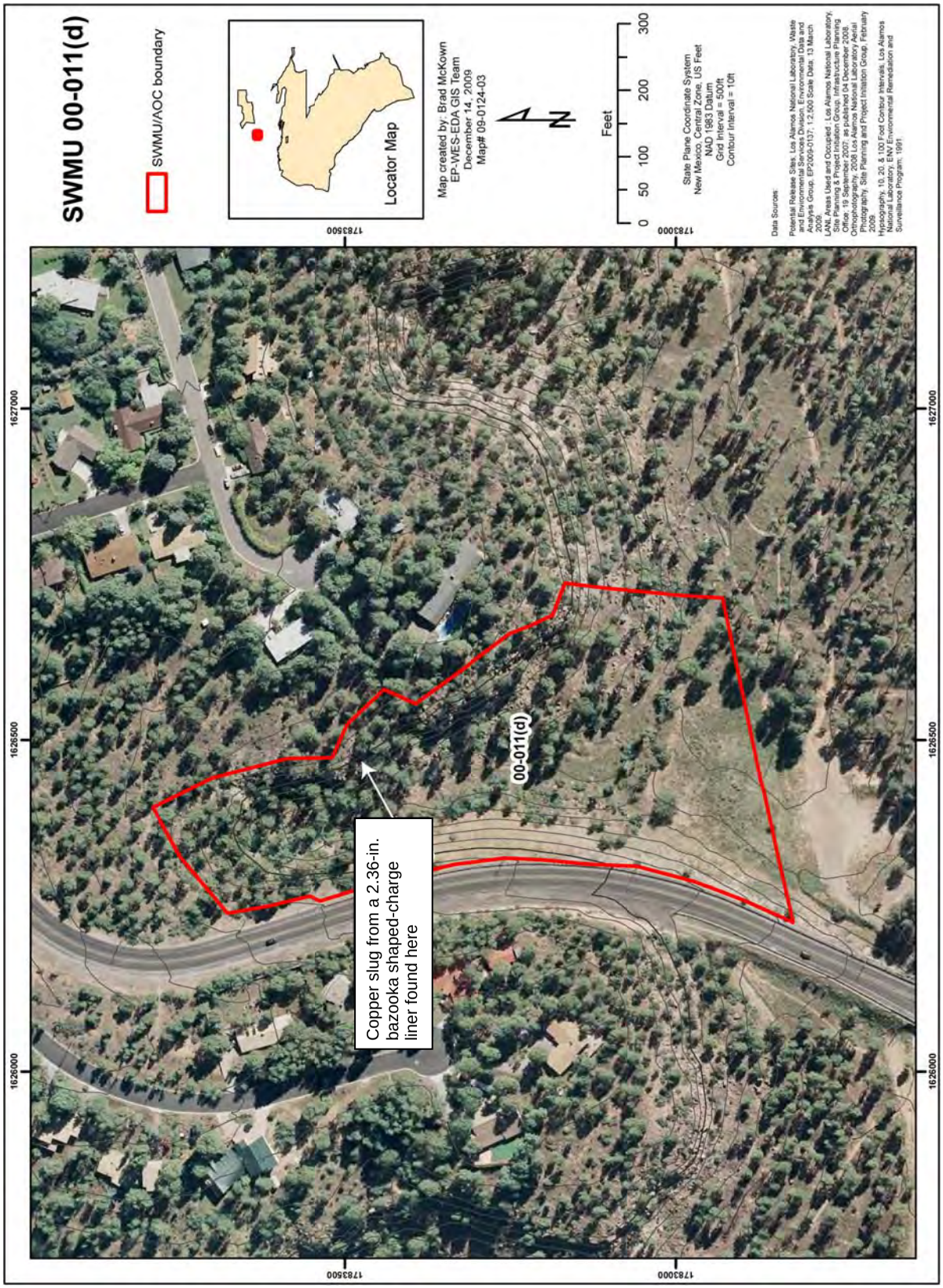

Figure 2.3-1 Aerial photograph of SWMU 00-011(d)

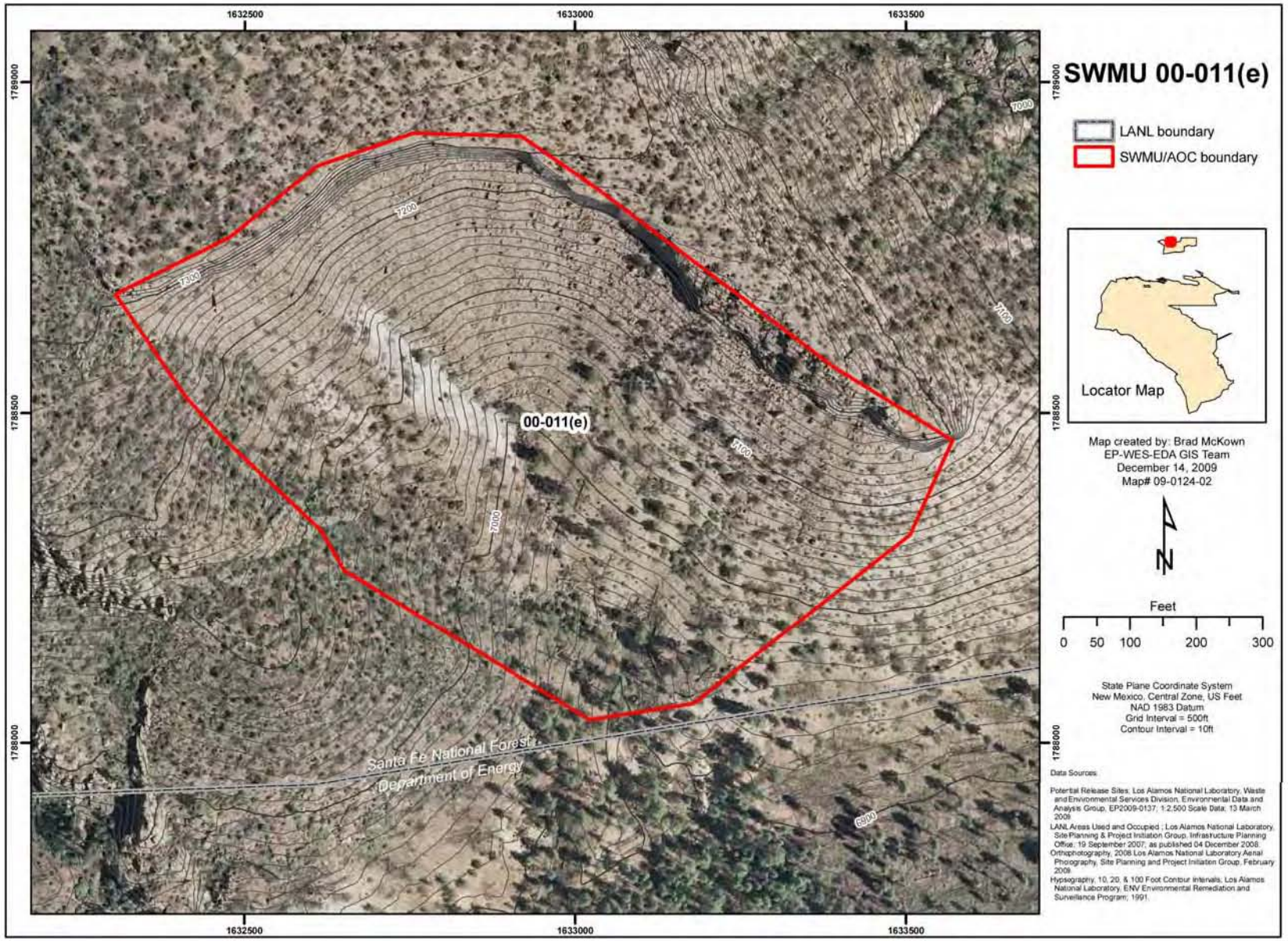

Figure 2.4-1 Aerial photograph of SWMU 00-011(e)

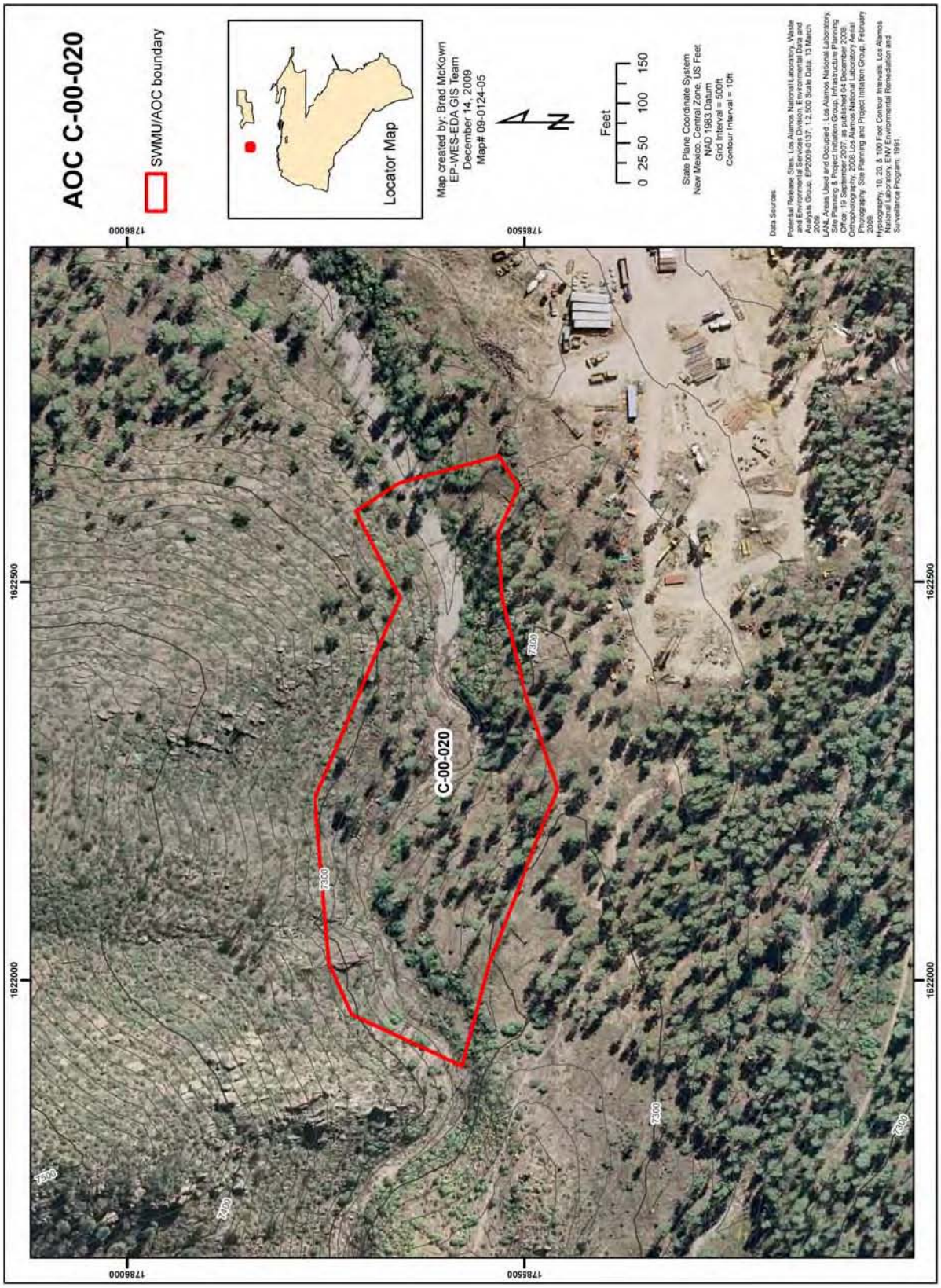

Figure 2.5-1 Aerial photograph of AOC C-00-020

Figure 5.1-1 Fragment of 81-mm shell found at SWMU 00-011(a)

Figure 5.1-2 Fragment of 81-mm shell found at SWMU 00-011(a)

Figure 5.1-3 Miscellaneous small shell fragments found north of the road at SWMU 00-011(a)

Figure 5.4-1 View from west end of SWMU 00-011(e) looking southeast

Note: The bright pink flag at the right end of the photograph marks the end of a survey line.

Figure 5.4-2 View of SWMU 00-011(e) from the east end of the site looking northwest

Note: Because of the steepness of the site, survey lines were staggered to avoid striking downslope personnel with dislodged rocks.

Figure 5.4-3 Surveyors conducting walkover at SMWU 00-011(e)

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 5.4-4 Impact hole resulting from a 76-mm shell at SWMU 00-011(e)

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

Figure 5.4-5 Impact scars in the cliff face at SWMU 00-011(e)