

Abandoned Uranium Mine Assessment for the Vargas-Jarmillo Site (NM0188)

FINAL REPORT

Prepared For:



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NM0188

TABLE OF CONTENTS

1.0	Introduction.....	1
1.1	Previously Known Information About the Site.....	1
1.2	Site Location and Directions.....	1
1.3	Site Geology.....	1
1.4	Site Hydrogeology.....	1
1.5	Regional Topography and Terrain.....	2
2.0	Mine Features.....	2
2.1	Mine Shafts, adits, and declines.....	2
2.2	Mining and Exploration Pits and Open Cuts.....	2
2.3	Waste and Ore Piles and Disturbances.....	2
2.4	Mining Related Buildings and Foundations.....	2
2.5	Other Mine Features.....	3
2.6	Boreholes.....	3
2.7	Reclamation Activities.....	3
3.0	Archeological Sites.....	3
4.0	Site Gamma Radiation Readings.....	3
5.0	Current Land Uses.....	3
5.1	Human Activity and Recreational Site Use.....	3
5.2	Nearby Residential, Commercial and Industrial Structures.....	3
5.3	Nearby Domestic Wells.....	3
5.4	Evidence of Grazing or Agriculture.....	3
5.5	Evidence of Wildlife.....	4
6.0	Vegetation.....	4
7.0	Potential Offsite Impacts.....	4
7.1	Erosion.....	4
7.2	Environmental Impacts.....	4
8.0	References.....	4

TABLES

Table 1	Site Features
Table 2	Gamma Radiation Survey Results

FIGURES

Figure 1	Site Location Map
Figure 2	Topographic Map
Figure 3	Aerial Photo
Figure 4a	Site Map on Aerial Photo
Figure 4b	Site Map with Surface Ownership

APPENDICES

Appendix A	Photo Log
Appendix B	Field Notes

1.0 INTRODUCTION

INTERA Incorporated (INTERA) has prepared this Abandoned Uranium Mine (AUM) Site Assessment Report for the Mining and Minerals Division (MMD) of the New Mexico Energy, Minerals and Natural Resources Department (EMNRD) in compliance with the Professional Service Agreement dated November 2, 2009. INTERA visited the Vargas-Jarmillo Mine Site (AUM Site), MMD ID: NM0188, on August 30, 2010.

1.1 PREVIOUSLY KNOWN INFORMATION ABOUT THE SITE

The AUM Site is located in the La Madera area of Rio Arriba County. According to McLemore (1983), uranium at the AUM Site occurs in Tertiary Santa Fe formation sandstones. Production of 69 ppm U_3O_8 was reported at the site, but not confirmed by U.S. AEC records (McLemore, 1983). Workings at the site reportedly consisted of a pit, a trench, and a 45-ft adit (McLemore, 1983).

1.2 SITE LOCATION AND DIRECTIONS

The Vargas-Jarmillo Mine Site is located on National Forest land in the southeast quarter of Section 11, Township 25 North, Range 8 East. This AUM Site is located in Rio Arriba County and is approximately two miles north of the town of La Madera, along State Route 111 (please see Figure 1).

To reach the AUM Site from Albuquerque, drive approximately 57 miles north on Interstate 25 and take exit 282 for US-84 W/US-285 N. Continue through Santa Fe and follow US-84 W/US-285 N approximately 26 miles north to Española. In Española, turn left on Paseo de Onate to continue following US-84 W/US-285 N. Continue 8.5 miles further to the junction of US-84 W and US-285 N, and turn right to continue following US-285 N. Go approximately 18 miles further on US-285 N and turn left at NM-111, just past Ojo Caliente. The AUM Site is approximately 7.3 miles from this turnoff, on the east side of the road.

1.3 SITE GEOLOGY

The AUM Site is located in the southern Tusas Mountains, the southernmost subrange of the Rocky Mountains. Minor sedimentary uranium deposits are found locally within strata of the Santa Fe Formation. In eastern Rio Arriba County, these sediments consist of poorly consolidated pinkish-brown to yellowish-tan fine-grained arkosic silt and sand. The Santa Fe Formation intertongues with the Tertiary Los Piños Formation in the vicinity of the AUM Site, and the sandstone and conglomerate beds of the Los Piños Formation are prominently intercalated with Santa Fe Formation siltstones (Bingler, 1968).

1.4 SITE HYDROGEOLOGY

The AUM Site is located along a shallow drainage that flows toward the Rio Vallecitos approximately 1,000 feet to the east. The Rio Vallecitos joins the Rio Ojo Caliente two miles



south, which in turns joins the Rio Chama approximately 24 miles south-southwest of the AUM Site.

The AUM Site is located near the eastern boundary of the Rio Chama watershed, which covers most of the Rio Chama Water Planning Region (La Calandria Associates, Inc., 2006). The area surrounding the AUM Site is comprised of Precambrian crystalline rocks overlain by Tertiary volcanic and sedimentary deposits. The Precambrian rocks contain small amounts of groundwater in faults and weathered zones (La Calandria Associates, Inc., 2006). The Santa Fe Group strata exposed in the area surrounding the AUM Site constitute a shallow aquifer which covers most of the southern portion of the Rio Chama Watershed. This aquifer is composed predominantly of fluvial, deformed, slightly consolidated sedimentary rocks, and groundwater flow in this unit is to the southwest at the AUM Site (La Calandria Associates, Inc., 2006).

1.5 REGIONAL TOPOGRAPHY AND TERRAIN

The AUM Site can be found on the La Madera Quadrangle 7.5 minute United States Geological Survey topographic map at an elevation of approximately 6,700 feet above mean sea level (please see Figure 2). The AUM Site is located along the Rio Vallecitos, within a north-south trending canyon formed by the foothills of the Tusas Mountains to the west, and Mesa de la Jabita to the east. Figure 3 shows an aerial photograph of the terrain surrounding the AUM Site.

2.0 MINE FEATURES

The mine features described below are based on the features provided to INTERA by MMD in the GIS Data Dictionary (MMD, 2009). INTERA marked the locations of the AUM Site features using a Trimble Global Positioning System (GPS) and entered details about the features into the GPS using the MMD data dictionary. The AUM Site consisted of two MMD-provided polygon areas, neither of which contained any apparent mining related features. Please see the Photo Log in Appendix A for photos, Table 1 for a list of all AUM Site features, and Figures 4a and 4b for the locations of the AUM Site.

2.1 MINE SHAFTS, ADITS, AND DECLINES

No mine shafts, adits or mining related declines were evident at the AUM site.

2.2 MINING AND EXPLORATION PITS AND OPEN CUTS

No mining related exploration pits or open cuts were evident at the AUM site.

2.3 WASTE AND ORE PILES AND DISTURBANCES

No mining related waste or ore piles were evident at the AUM site.

2.4 MINING RELATED BUILDINGS AND FOUNDATIONS

No mining related buildings and foundations were evident at the AUM Site.

2.5 OTHER MINE FEATURES

No other mining related features were evident at the AUM Site.

2.6 BOREHOLES

No boreholes were evident at the AUM Site.

2.7 RECLAMATION ACTIVITIES

No evidence of ongoing or past reclamation was found at or near the AUM Site.

3.0 ARCHEOLOGICAL SITES

No apparent archeological sites were identified at or near the AUM Site.

4.0 SITE GAMMA RADIATION READINGS

The background gamma radiation readings at the AUM Site were measured approximately 500 feet from the southern edge of the site boundary. The background gamma level was measured at 12 $\mu\text{R/hr}$ (microroentgens per hour) at the ground surface and 11 $\mu\text{R/hr}$ at 4 feet above the ground surface. Please see Table 2 for all of the gamma radiation readings taken at the AUM Site.

The gamma radiation readings at the AUM Site did not vary significantly above background levels.

5.0 CURRENT LAND USES

5.1 HUMAN ACTIVITY AND RECREATIONAL SITE USE

Trash observed at the AUM Site indicates there may be occasional human activity in the area.

5.2 NEARBY RESIDENTIAL, COMMERCIAL AND INDUSTRIAL STRUCTURES

Several tracts of land used for farming and ranching are located near the site boundary, along State Route 111, and a farmhouse was observed approximately 0.2 miles south of the site (please see Figure 3).

5.3 NEARBY DOMESTIC WELLS

No wells, domestic or otherwise, lie within a mile of the AUM Site.

5.4 EVIDENCE OF GRAZING OR AGRICULTURE

A farm containing a small pasture is located approximately 0.1 miles south of the AUM site.

5.5 EVIDENCE OF WILDLIFE

Several ravens were seen on site, as well as rabbit droppings and deer tracks.

6.0 VEGETATION

Vegetation samples were not collected and the vegetation community not analyzed due to the lack of apparent mine features at the AUM Site.

7.0 POTENTIAL OFFSITE IMPACTS

7.1 EROSION

No evidence of mine related erosion was observed on site.

7.2 ENVIRONMENTAL IMPACTS

There is no evidence of soil staining from chemicals potentially brought to the AUM Site, or from constituents present in the ore or waste rock. Gamma radiation levels at the AUM Site are not significantly above background level.

8.0 REFERENCES

Bingler, Edward C., 1968. Geology and Mineral Resources of Rio Arriba County, New Mexico. New Mexico Bureau of Mines and Mineral Resources Bulletin 91.

Dick-Peddie, William A, 1999. New Mexico Vegetation: Past, Present, and Future. University of New Mexico Press.

Mining and Minerals Division (MMD), 2009. Mine Feature Data Dictionary.

McLemore, Virginia T., 1983. Uranium and Thorium Occurrences in New Mexico: Geology, Production, and Resources, with Selected Bibliography. New Mexico Bureau of Mines and Mineral Resources Open File Report 183.

La Calandria Associates, Inc., 2006. Rio Chama Regional Water Plan. Prepared for Rio de Chama Acequias Association and Rio Arriba County.

New Mexico Office of the State Engineer (NMOSE), 2006. Rio Chama Regional Water Plan. Accessed September 7, 2010. < http://www.ose.state.nm.us/isc_regional_plans14.html>.

New Mexico Office of the State Engineer (NMOSE), 2008. Wells and Surface Diversions in New Mexico. WATERS_PODS_may08.shapfile. OSE Waters Database.

TABLES

**Table 1
Site Features**

**Vargas-Jarmillo-NM0188
Abandoned Uranium Mine Assessments**

Feature Name	On Site?	Feature Type	Associated Feature	Material	Height or Depth (ft)	Width or Diameter (ft)	Length (ft)	Open	Collapsed	Closure Type	Associated Photos	Notes
Access-1	No	Access	--	Paved	--	--	--	--	--	--	--	NM 111

Notes:
-- designates no information



Table 2
Gamma Radiation Survey Results

Vargas-Jarmillo-NM0188
Abandoned Uranium Mine Assessments

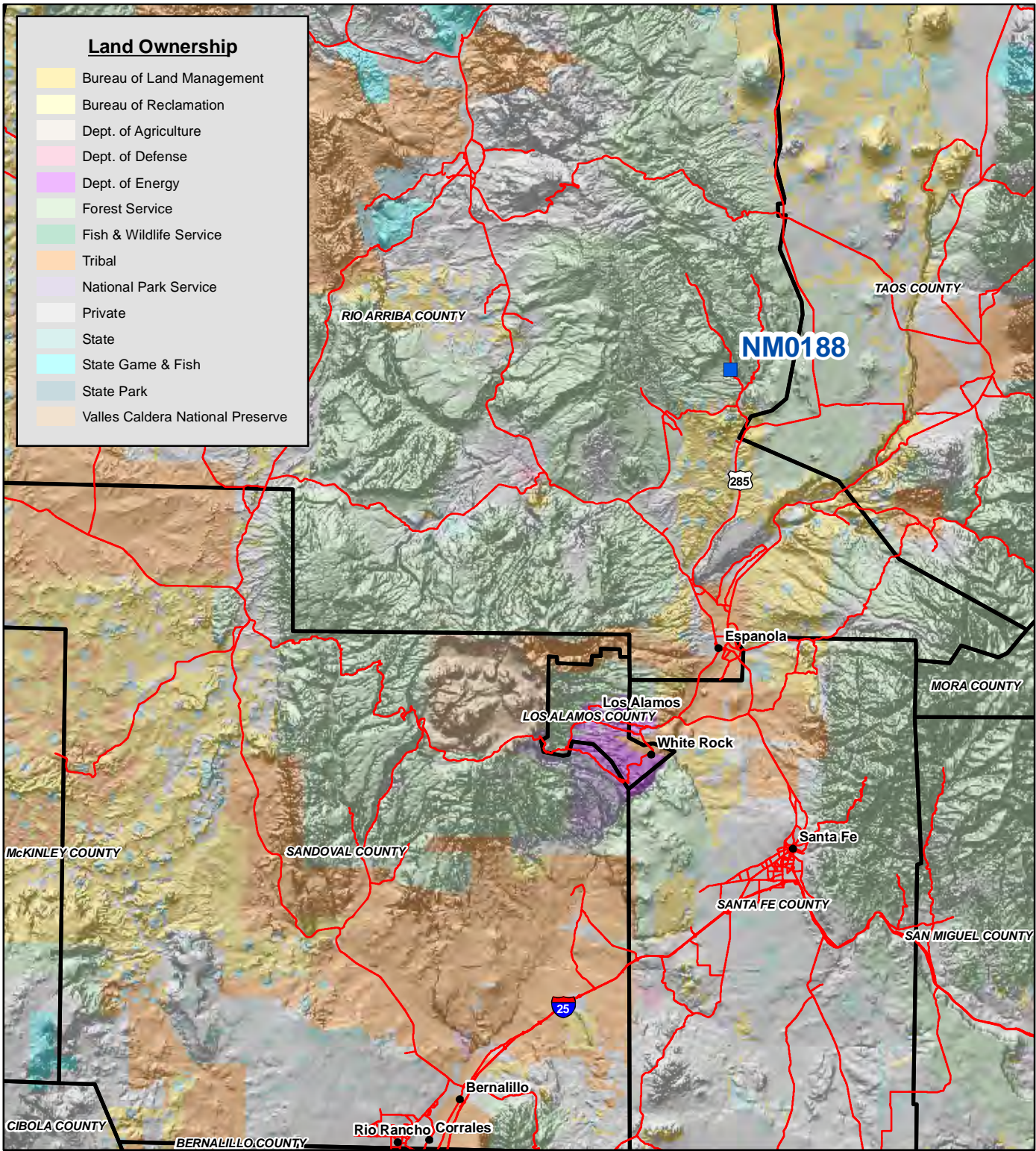
Reading ID	Associated Features	0 ft (μ R/hr)	4 ft (μ R/hr)	Associated Photos
Rad-1	--	7	7	--
Rad-2	--	10	10	--
Rad-3	--	10	10	--
Rad-4	--	11	10	--
Rad-5	--	10	9	--
Rad-6	--	12	12	--
Rad-7	--	12	11	--
Rad-8	--	13	11	--
Rad-9	--	11	10	--
Rad-10	--	12	11	--
RadBack-1	--	12	11	--

Notes:

All gamma readings at this site taken by Ludlum 192 μ R/Ratemeter
 μ R/hr=microroetgens per hour



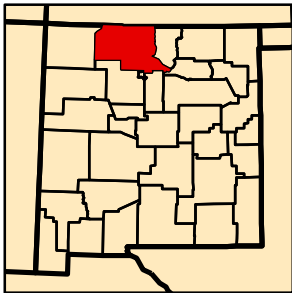
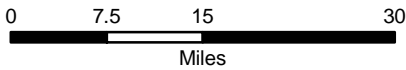
FIGURES



Land Ownership

Yellow	Bureau of Land Management
Light Yellow	Bureau of Reclamation
Light Green	Dept. of Agriculture
Pink	Dept. of Defense
Purple	Dept. of Energy
Light Green	Forest Service
Green	Fish & Wildlife Service
Orange	Tribal
Light Purple	National Park Service
White	Private
Light Blue	State
Cyan	State Game & Fish
Dark Blue	State Park
Light Orange	Valles Caldera National Preserve

Map Source(s):
Ownership - BLM, 2008

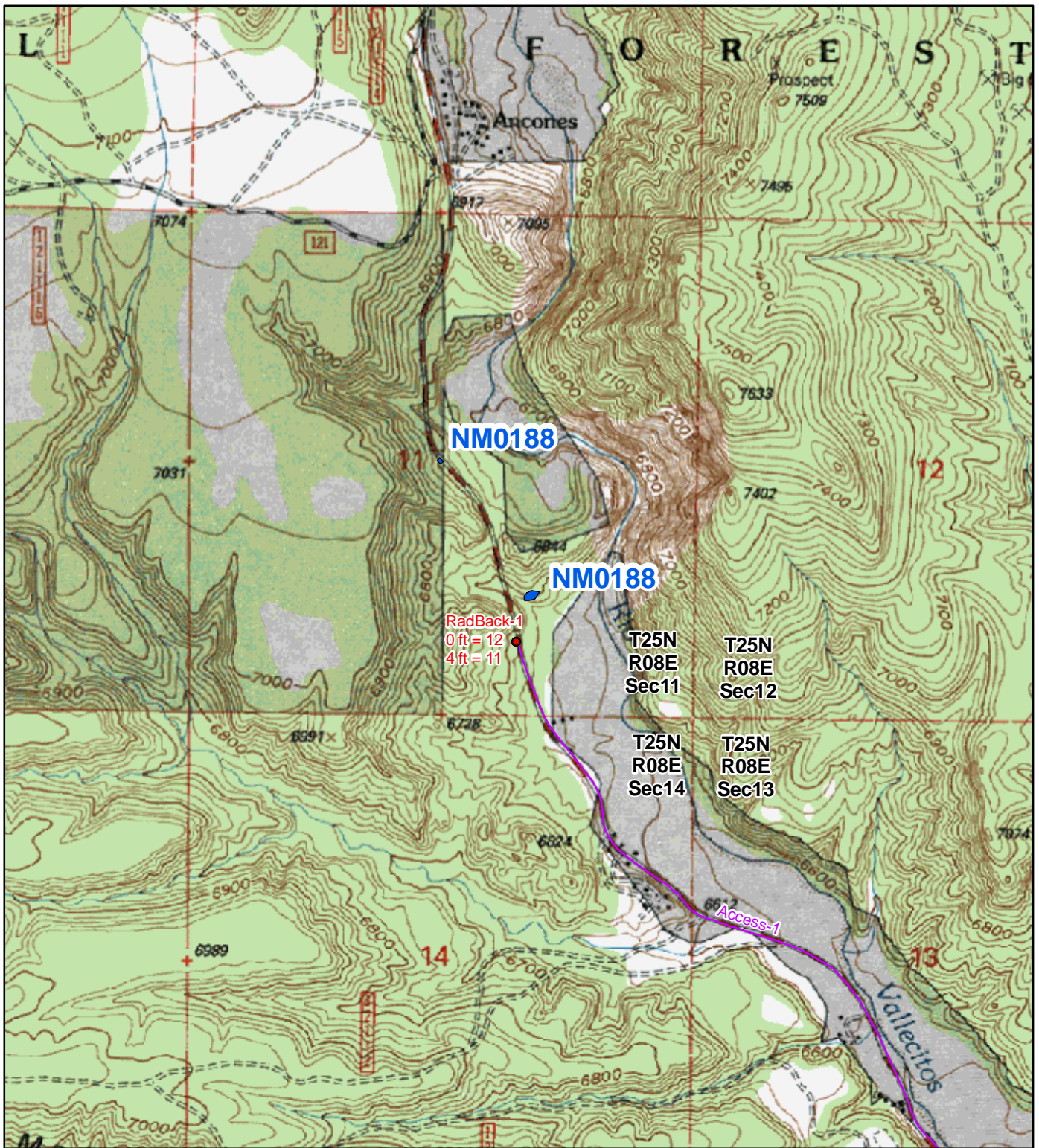


Legend

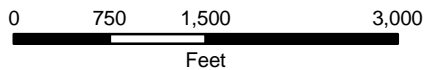
Blue square	AUM Location
Red line	Road
Black outline	County Boundary

Figure 1
Site Location Map
NM0188-Vargas-Jarmillo
Abandoned Uranium
Mine Assessment





Map Source(s):
 U.S. Geological Survey 7.5-Minute
 Topographic Map
 -La Madera, 1995



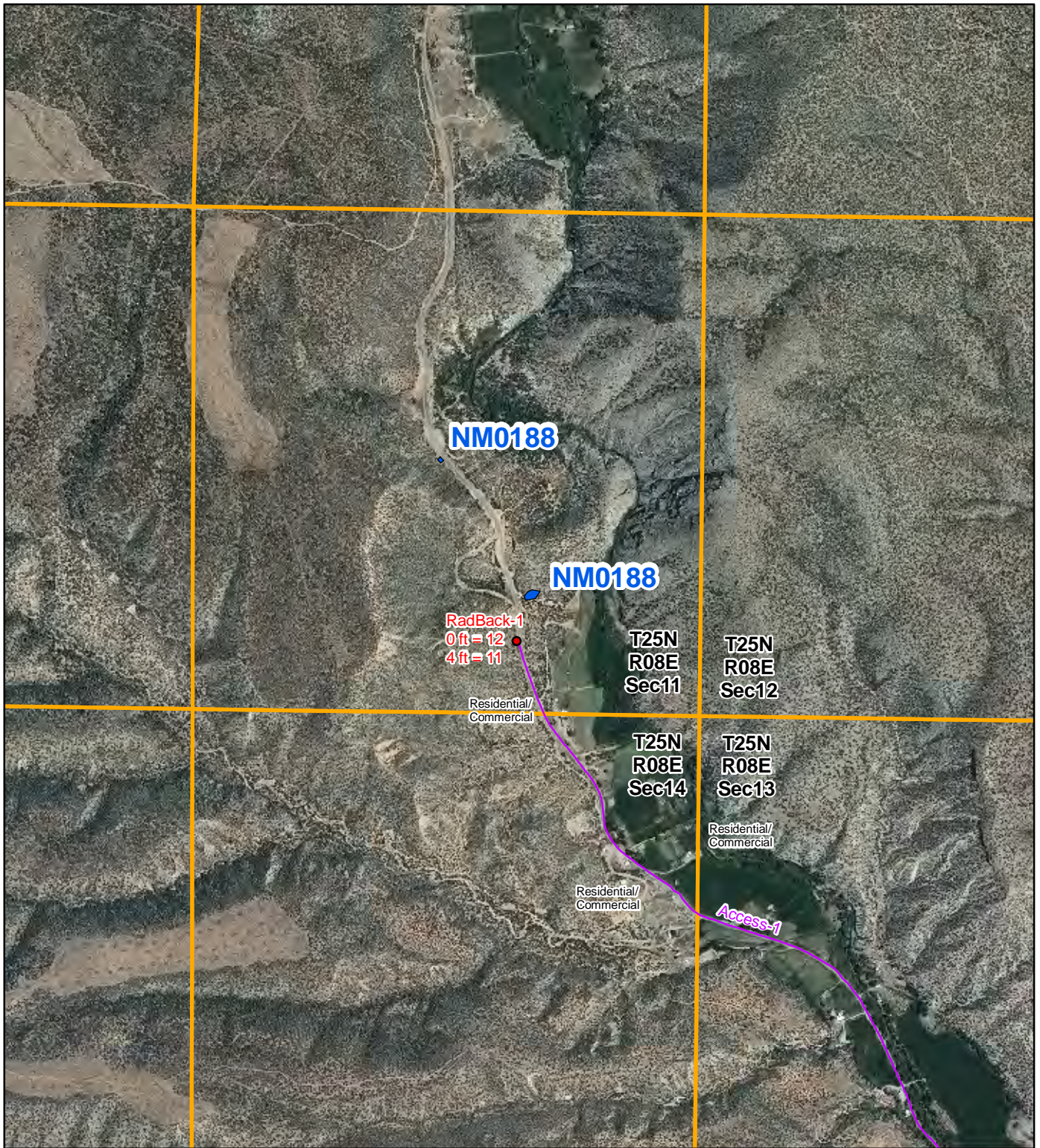
Note:
 There are no wells within 1 mile of the Site.



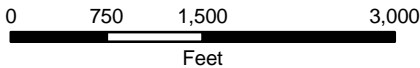
Legend

- Radiation Readings ($\mu\text{R/hr}$)
- Access Route
- AUM Location Boundary (MMD Provided)

Figure 2
Topographic Map
NM0188-Vargas-Jarmillo
 Abandoned Uranium
 Mine Assessment



Map Source(s):
 U.S. Geological Survey 7.5-Minute
 DOQQ County Mosaic
 -Rio Arriba County, 2009



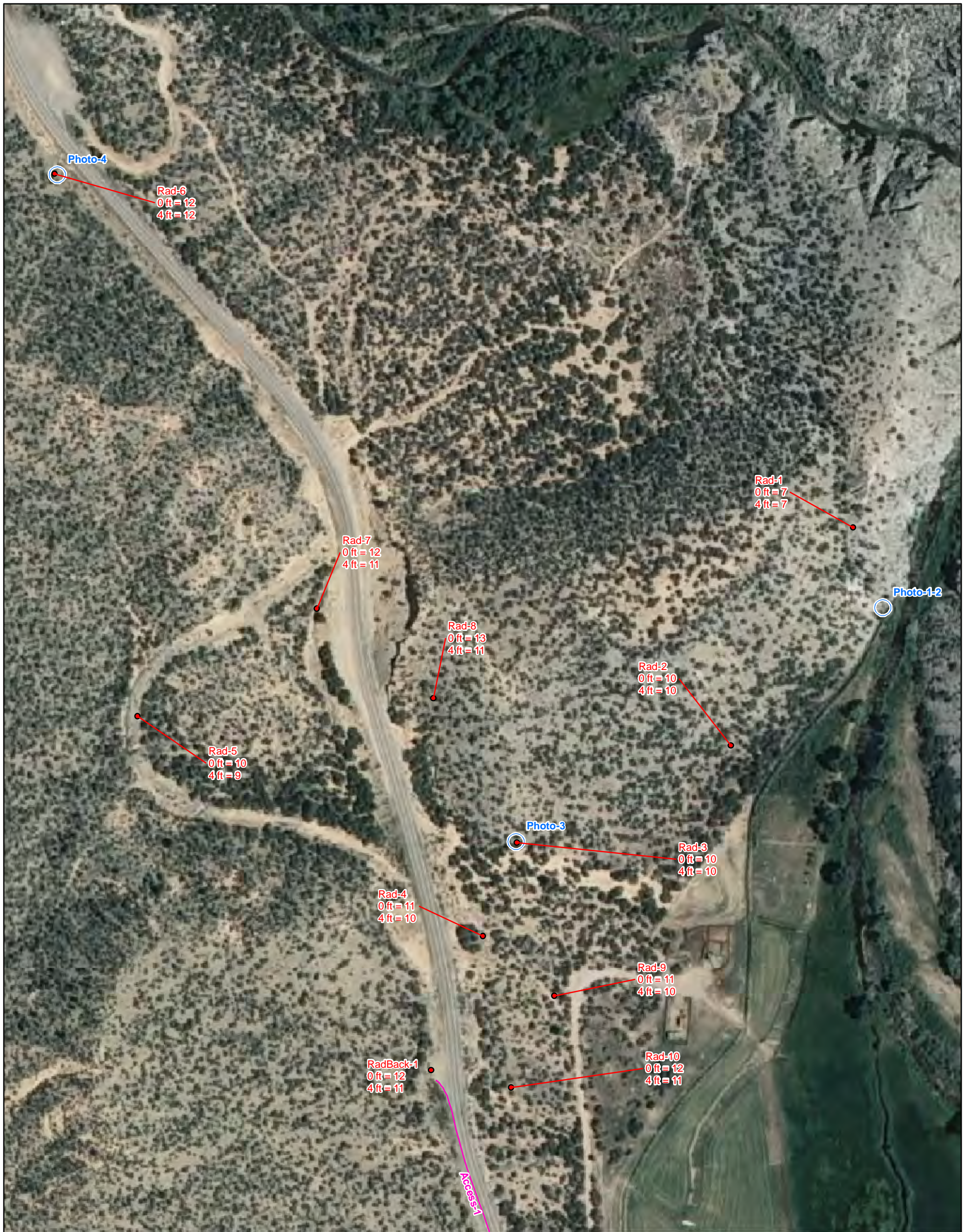
Legend

- Radiation Readings ($\mu\text{R/hr}$)
- Access Route
- AUM Location Boundary (MMD Provided)
- Section Boundary

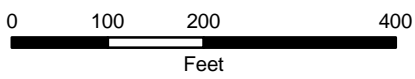
Figure 3
Aerial Photo
NM0188-Vargas-Jarmillo
 Abandoned Uranium
 Mine Assessment

Note:
 There are no wells within 1 mile of the Site.





Map Source(s):
 U.S. Geological Survey 7.5-Minute
 DOQQ County Mosaic
 -Rio Arriba County, 2009

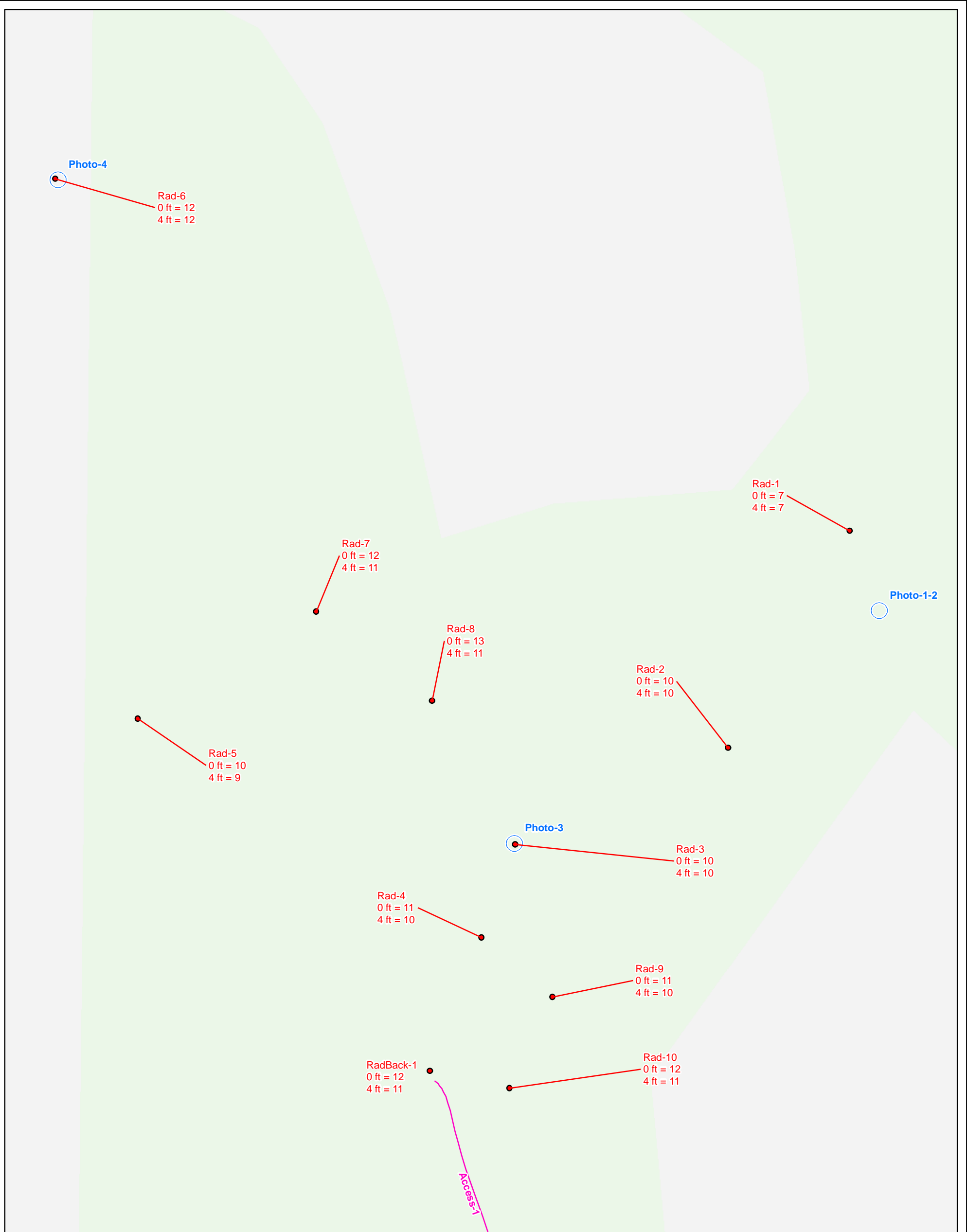


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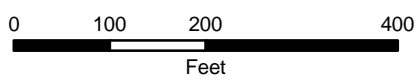
- Radiation Readings ($\mu\text{R/hr}$)
- Photo Location
- Access Route

Figure 4a
Site Map on
Aerial Photo
NM0188-Vargas-Jarmillo
 Abandoned Uranium
 Mine Assessment





Map Source(s):
Ownership - BLM, 2008



Legend

- Radiation Readings (μR/hr)
- Photo Location
- Access Route

Surface Ownership

- Forest Service
- Private

Figure 4b
Site Map with
Surface Ownership
NM0188-Vargas-Jarmillo
 Abandoned Uranium
 Mine Assessment



APPENDIX A

PHOTO LOG

Note: Gaps in the numbering sequence of the photos is the result of removing photos not suitable for the report. A full set of photos is provided in the electronic deliverable.



Photo 1-Looking east at eastern extent of accessible area.



Photo 2-Looking north toward Rad-1.



Photo 3-Site location photo looking west at MMD polygon location.

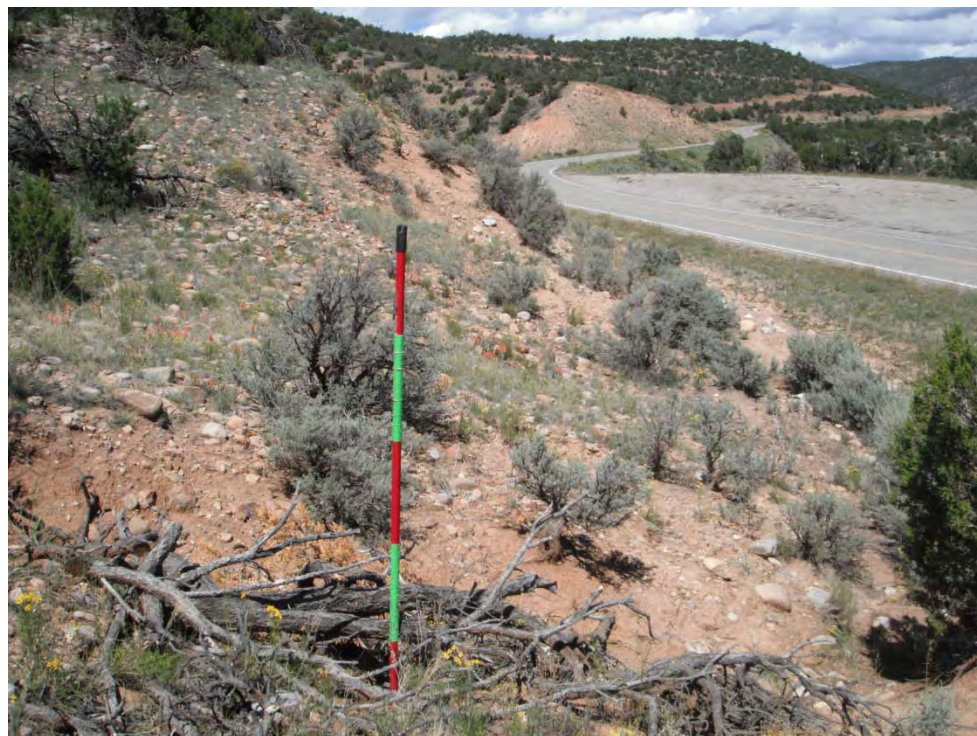


Photo 4-Looking north at second MMD polygon location.

APPENDIX B
FIELD NOTES

Site Name: NMU188, Vargas-Jaramillo

Objective: Site Assessment

Personnel: Annelia Tinklenberg
Alex Resovsky

Equipment: Rental truck, Trimbel GeoXM (SN:494844727, 2008 Series), Ludlum 192 (SN:234149), Fuji Film digital camera (No. OTB31259), backup Garmin GPS, cell phone amplifier, field laptop

8:00^{ACT} - Leaving Albuquerque

11:00^{ACT} - At AUM site just off of Route 111.

Background Rad - 0m - 12 μ R/h; 1m - 11 μ R/h

12:00 Hiking around, looking for mine features, no visible mine features at polygon location.

Rad-1 - 0m - 7 μ R/h; 1m - 7 μ R/h - no visible mine features, rad measurement taken to verify no radiation.

Photo 1 - looking east at eastern extent of accessible area. Fence for private land meets steep canyon.

Photo 2 - looking north looking up steep hill; rad-1 taken toward top of hill. No visible mine features.

Rad-2 - 0m - 16 μ R/h; 1m - 10 μ R/h - no visible mine features

Rad-3 - on polygon - 0m - 10 μ R/h; 1m - 10 μ R/h - no visible mine features

Photo 3 looking east at polygon location, site #0

Rad-4 - 0m - 11 μ R/h; 1m - 10 μ R/h - no visible mine features

Rad-5 - 0m - 10 μ R/h; 1m - 9 μ R/h - no visible mine features; on west side of Route 111 on Forest Service land.

12:30 Moving on to second polygon location

37 8/30/10 ~~at~~ Abandoned Uranium Mines

1245 At second ~~poly~~^{ALT} polygon location. No visible mine features:

Rad 6 - 0m - 12μR/h; 1m - 12μR/h

Photo 4 - looking north at polygon location

1300 Hiking to first polygon location to look for more features

Rad 7 - 0m - 12μR/h; 1m - 11μR/h

Rad 8 - 0m - 13μR/h; 1m - 11μR/h

Rad 9 - 0m - 11μR/h; 1m - 10μR/h - south of polygon, no visible mine features

Rad 10 - 0m - 12μR/h; 1m - 11μR/h

Access Road - Route 111

1350 - Leaving site

No vegetation collected due to lack of mine features.

Soils: Red brown - tan, thin rocky, sandy

Rocks: ~~Gray~~^{ALT} quartz; rich granite cobbles in alluvium fill. Gray limestone, locally. Could not find sandstone outcrop mentioned in McLenore.

Wildlife: Ravens, Rabbit droppings and deer tracks.

Human Activities: Farming south of site.

ALT