

Abandoned Uranium Mine Assessment for the High Peak Site (NM0237)

FINAL REPORT

Prepared For:



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NM0237

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.....	4
5.4	Evidence of Grazing or Agriculture.....	4
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 High Peak Site (AUM Site), MMD ID: NM0237 on August 3, 2010.

1.1 PREVIOUSLY KNOWN INFORMATION ABOUT THE SITE

According to Anderson (1980), total production from the High Peak Claim through 1954 was reported as a few hundred pounds of monazite ore taken from float rock, and 1.25 tons of hand-sorted ore from two shallow trenches. Anderson further states that the workings at the mine consist of a 100 ft long trench, with a dump extending some 50 ft to 75 ft to the east (Anderson, 1980).

1.2 SITE LOCATION AND DIRECTIONS

The AUM Site is located within the Santa Fe National Forest, about 1.5 miles northwest of the Emerson Ranch, and approximately 9 miles north of the town of Pecos (please see Figure 1).

To access the AUM Site from Albuquerque, drive north on Interstate 25 approximately 75 miles. Take Exit 299 towards Pecos and continue east on NM-50 for 7 miles. After passing through the town of Pecos, bear to the left as the pavement ends and continue onto Forest Road 86. Follow Forest Rd. 86 5.6 miles until it reaches Cow Creek, then turn left onto Forest Rd. 92. Follow Forest Rd. 92 up Cow Creek 4.3 miles to Cow Creek Ranch. At this point, Forest Rd. 92 turns into a side canyon called Rito de la Osha. Drive 1.3 miles further and park. The site can be accessed on foot from here, by hiking 0.8 miles south.

1.3 SITE GEOLOGY

The AUM Site lies within an exposure of Precambrian basement granite in the southern end of the Sangre de Cristo range. Uranium is found in monazites sporadically distributed in a pegmatite dike contained in this granite exposure (Romslo, 1954). Additionally, epithermal veins throughout the granite in the region contain localized deposits of uranium, thorium and other rare earth elements (McLemore and Chenoweth, 1989).

1.4 SITE HYDROGEOLOGY

The AUM Site is located about 300 ft west of the Rito Atascoso, which drains southward into Cow Creek. Cow Creek eventually drains into the Pecos River further south.

The AUM Site is located in the Sangre de Cristo groundwater region of the Mora-San Miguel-Guadalupe water planning region. Groundwater in this region is found in the alluvial deposits along drainages. Groundwater flow in the vicinity of the AUM Site follows surface flow, generally to the southeast and south (DBSA, 2005).



1.5 REGIONAL TOPOGRAPHY AND TERRAIN

The AUM Site is found on the Honey Boy Ranch 7.5 minute United States Geological Survey topographic map at an elevation of approximately 9100 ft above mean sea level (see Figure 2). The AUM Site is located in a region of steep hills and canyons in the southern Sangre de Cristo Mountains. Mine features are found on a northeast-facing hillslope.

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. Two open cuts, two trenches, five waste piles, and one pit were found on site. Please see the Photo Log in Appendix A for photos of the AUM Site features, Table 1 for a list of the AUM Site features, and Figures 4a and 4b for the locations of the AUM Site features.

2.1 MINE SHAFTS, ADITS, AND DECLINES

No shafts, adits or declines were found at the AUM Site.

2.2 MINING AND EXPLORATION PITS AND OPEN CUTS

Two open cuts (CutPly-1 and -2), two trenches (Trench-1 and -2), and one pit (Pit-1) were found at the AUM Site. CutPly-1 is a 20 ft deep, semi-circular cut about 50 ft across, and may represent a caved-in adit referred to in the Anderson Report. No mineralization was apparent in this cut and the walls of the cut showed evidence of erosion. CutPly-2 is a 5 ft deep excavation into the igneous bedrock. This feature contained the maximum gamma radiation measurements at Rad-8 (650 $\mu\text{R/hr}$ at 0 ft above ground; see Photos 9-11 in Appendix A). Trench-1 and trench-2 are both 10 ft deep excavations into the igneous bedrock. Pit-1 is a shallow excavation into the bedrock.

2.3 WASTE AND ORE PILES AND DISTURBANCES

Five waste piles were found onsite. All of the piles consisted of waste rock. The largest pile, PilePly-5 is 15 ft high, 30 ft wide and 50 ft long and was found down slope from the excavation features. PilePly-1, near Trench-1, contained the highest radiation reading found on the waste piles; the gamma radiation measurement was 260 $\mu\text{R/hr}$ at 0 ft above ground at radiation survey point Rad-4 (see Table 2).

2.4 MINING RELATED BUILDINGS AND FOUNDATIONS

No mining related buildings or foundations were found at the AUM Site.

2.5 OTHER MINE FEATURES

A mine road (Rd-1) runs southeast-northwest through the AUM Site. This road runs past several of the cuts, trenches, and waste piles, but cannot be traced off the site boundary, as it has become eroded and overgrown.

2.6 BOREHOLES

No boreholes were found at the AUM Site.

2.7 RECLAMATION ACTIVITIES

No reclamation activities were identified onsite.

3.0 ARCHEOLOGICAL SITES

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

4.0 SITE GAMMA RADIATION READINGS

The background gamma radiation readings were measured approximately 0.8 miles north of the AUM Site boundary. The background gamma level was 17 $\mu\text{R/hr}$ (microrentgens per hour) at 0 ft above ground and 18 $\mu\text{R/hr}$ at 4 ft above ground. Please see Table 2 for all of the gamma radiation readings taken at the AUM Site and Figures 4a and 4b for the locations of the radiation readings.

The maximum gamma radiation measured on site was 650 $\mu\text{R/hr}$ at 0 ft above ground and 200 $\mu\text{R/hr}$ at 4 ft above ground at radiation survey point Rad-8 in CutPly-2 (see Photos 9-11 in Appendix A). A gamma radiation measurement taken on top of PilePly-1 (radiation survey point Rad-4, see Photo 6 in Appendix A) recorded 260 $\mu\text{R/hr}$ at 0 ft above ground.

5.0 CURRENT LAND USES

5.1 HUMAN ACTIVITY AND RECREATIONAL SITE USE

Several campsites are situated along Forest Rd 92, approximately 0.8 miles north of the AUM Site. Signs, cut trees, and the sound of chainsaws while at the AUM Site were all evidence of firewood collection.

5.2 NEARBY RESIDENTIAL, COMMERCIAL AND INDUSTRIAL STRUCTURES

No structures were sighted within a mile of the AUM Site.

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

The presence of cow pies indicate the area around the AUM Site is or has been used for grazing.

5.5 EVIDENCE OF WILDLIFE

Several species of birds were seen near the AUM Site, as well as squirrels, chipmunks, and a deer. Elk and coyote droppings were also seen.

6.0 VEGETATION

The High Peak Site is located in the Subalpine Coniferous Forest vegetation type of northern New Mexico. Woody vegetation at the AUM Site included ponderosa pine, aspen, and raspberry. Grass species included june grass and alpine fescue. Forb species included goldenrod and scarlet gilia. No evidence of noxious weeds was observed onsite.

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.

8.0 REFERENCES

Anderson, Orin J., 1980. Abandoned or Inactive Uranium Mines in New Mexico. New Mexico Bureau of Mines and Mineral Resources Open File Report 148.

Daniel B. Stephens & Associates, Inc. (DBSA), 2005. Mora-San Miguel-Guadalupe Regional Water Plan. Prepared for: Tierra y Montes Soil and Water Conservation District and the Mora-San Miguel-Gaudalupe Regional Water Planning Steering Committee.

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. and William L. Chenoweth, 1989. Uranium Resources in New Mexico. New Mexico Bureau of Mines & Mineral Resources, Resource Map 18.

Romslo, T., 1954, Mora Monazite Company High Peak Monazite claim, Willow Creek Mining District, San Miguel Co., N. Mex.; AEC DEIEA-3207.

TABLES



**Table 1
Site Features**

**High Peak-NM0237
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	Yes	Access	--	--	--	--	--	--	--	--	--	--
Access-2	No	Access	--	Dirt Maintained	--	--	--	--	--	--	--	fr 86 to fr 92
CutPly-1	Yes	--	--	--	20	50	50	--	--	--	NM0237_002 NM0237_003	caved-in pit; photo 2 looking west, photo 3 looking southwest
CutPly-2	Yes	--	--	--	5	15	30	--	--	--	NM0237_009 NM0237_010 NM0237_011	photo 9 looking north, photos 10/11 closeups
PilePly-1	Yes	Waste	--	Rock	5	25	30	--	--	--	NM0237_006	photo 6 looking west
PilePly-2	Yes	Waste	--	Rock	10	25	20	--	--	--	NM0237_007	photo 7 looking south
PilePly-3	Yes	Waste	--	Rock	10	15	30	--	--	--	NM0237_008	photo 8 looking west
PilePly-4	Yes	Waste	--	Rock	5	25	40	--	--	--	NM0237_013	photo 13 looking west
PilePly-5	Yes	Waste	--	Rock	15	30	50	--	--	--	NM0237_015	photo 15 looking southeast
Pit-1	Yes	--	--	--	5	15	20	yes	--	--	NM0237_014	photo 14 looking north
Rd-1	Yes	Dirt	--	Dirt Nonmaintained	--	--	--	--	--	--	NM0237_001	--
Trench-1	Yes	--	--	--	10	15	30	--	--	--	NM0237_004 NM0237_005	photo 4 looking south down length of trench, photo 5 looking west
Trench-2	Yes	--	--	--	10	10	40	--	--	--	NM0237_012	photo 12 looking southwest

Notes:

-- designates no information



Table 2
Gamma Radiation Survey Results

High Peak-NM0237
Abandoned Uranium Mine Assessments

Reading ID	Associated Features	0 ft (μ R/hr)	4 ft (μ R/hr)	Associated Photos
Rad-1	Rd-1	8	8	--
Rad-2	CutPly-1	6	7	--
Rad-3	Trench-1	25	20	--
Rad-4	PilePly-1	260	47	--
Rad-5	PilePly-2	15	13	NM0237_007
Rad-6	PilePly-3	28	17	NM0237_008
Rad-7	Rd-1	32	20	--
Rad-8	CutPly-2	650	200	--
Rad-9	Trench-2	34	28	--
Rad-10	PilePly-4	14	12	--
Rad-11	Pit-1	12	14	--
Rad-12	PilePly-5	23	22	--
RadBack-1	parking area/starting point	17	18	--

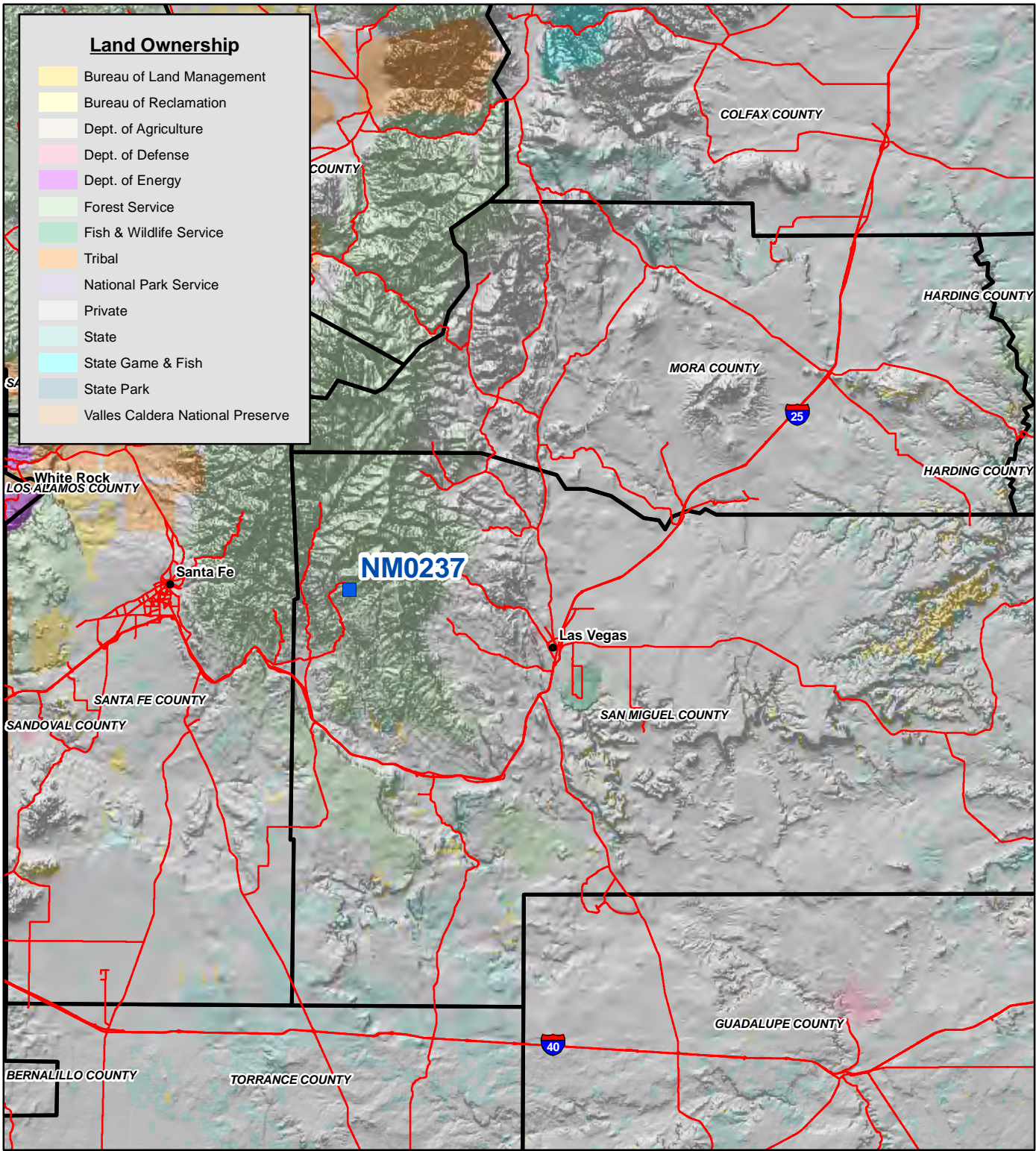
Notes:

All gamma readings at this site taken by Ludlum 192 μ R/Ratemeter



FIGURES

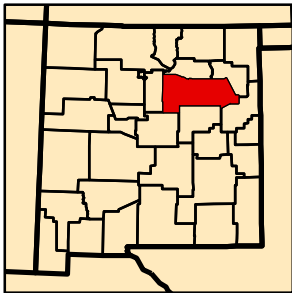
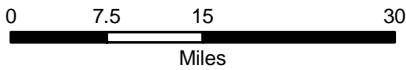




Land Ownership

Yellow	Bureau of Land Management
Light Yellow	Bureau of Reclamation
Light Orange	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

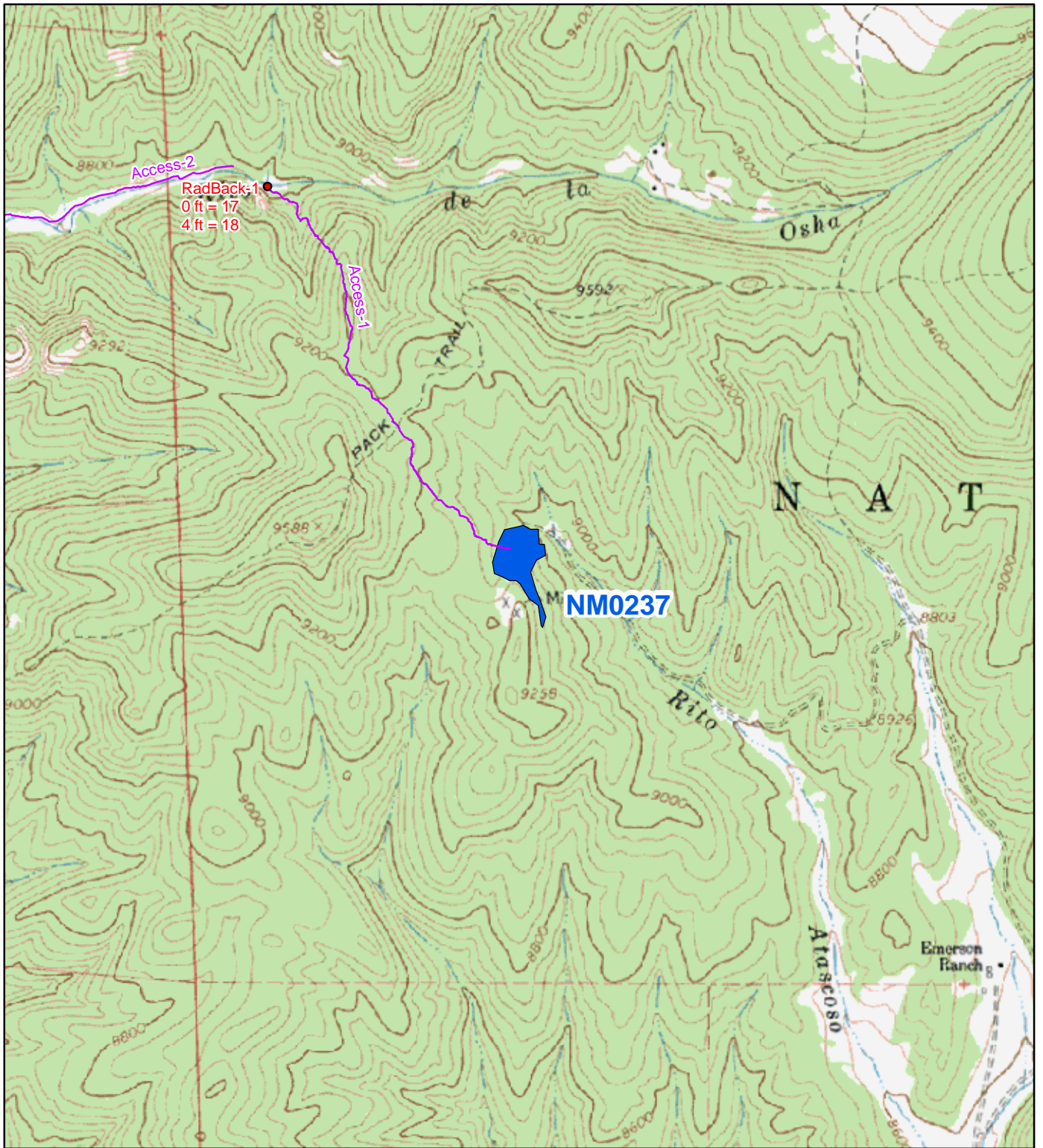


Legend

Blue square	AUM Location
Red line	Road
Black outline	County Boundary

Figure 1
Site Location Map
NM0237-High Peak
Abandoned Uranium
Mine Assessment





Map Source(s):
 U.S. Geological Survey 7.5-Minute
 Topographic Map
 -Honey Boy Ranch, 1961

0 750 1,500 3,000
 Feet



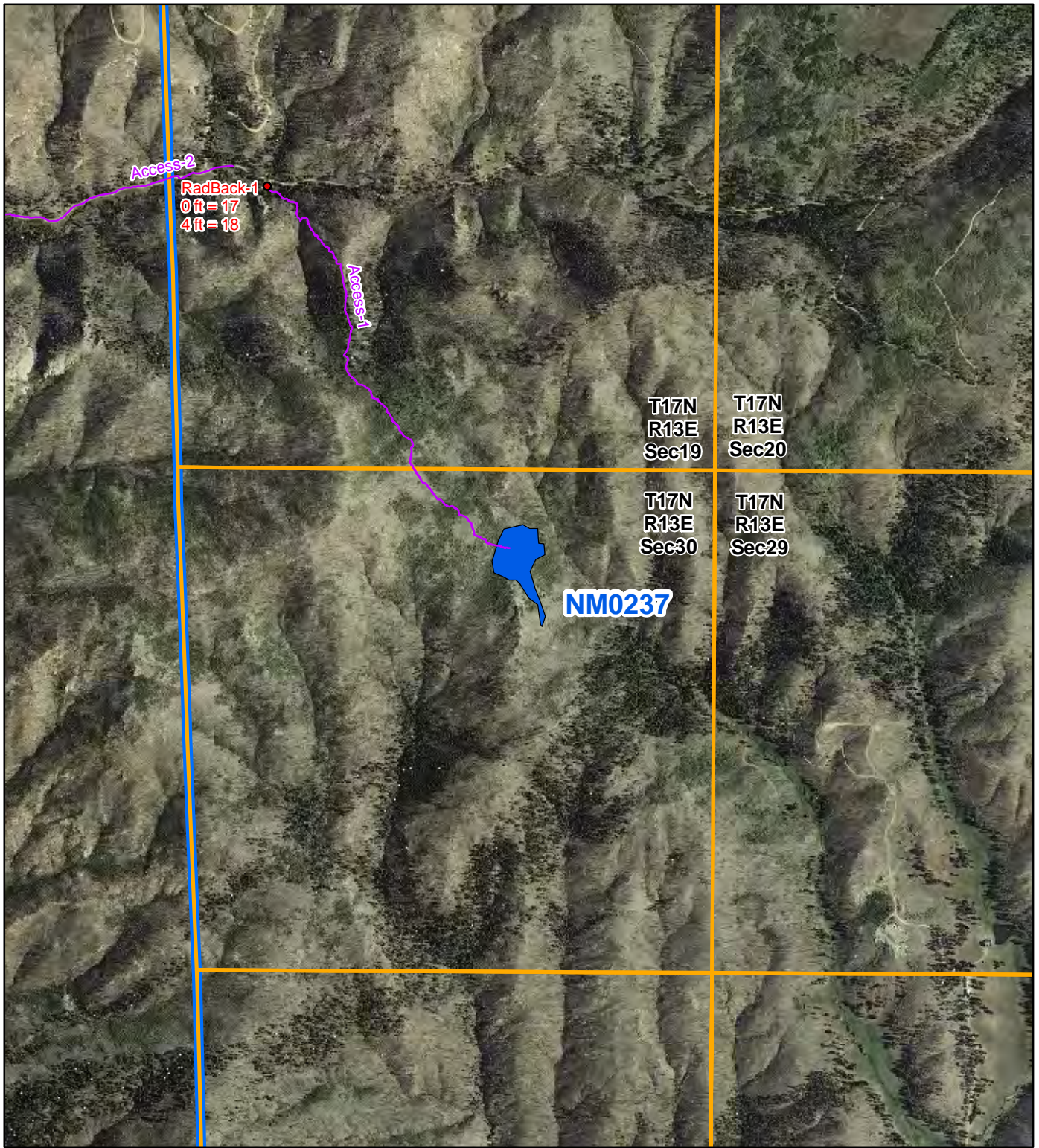
Note:
 There are no wells within 1 mile of the Site.

Legend

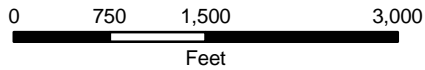
- Radiation Readings ($\mu\text{R/hr}$)
- Access Route
- AUM Location Boundary (MMD Provided)

Figure 2
Topographic Map
NM0237-High Peak
 Abandoned Uranium
 Mine Assessment





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



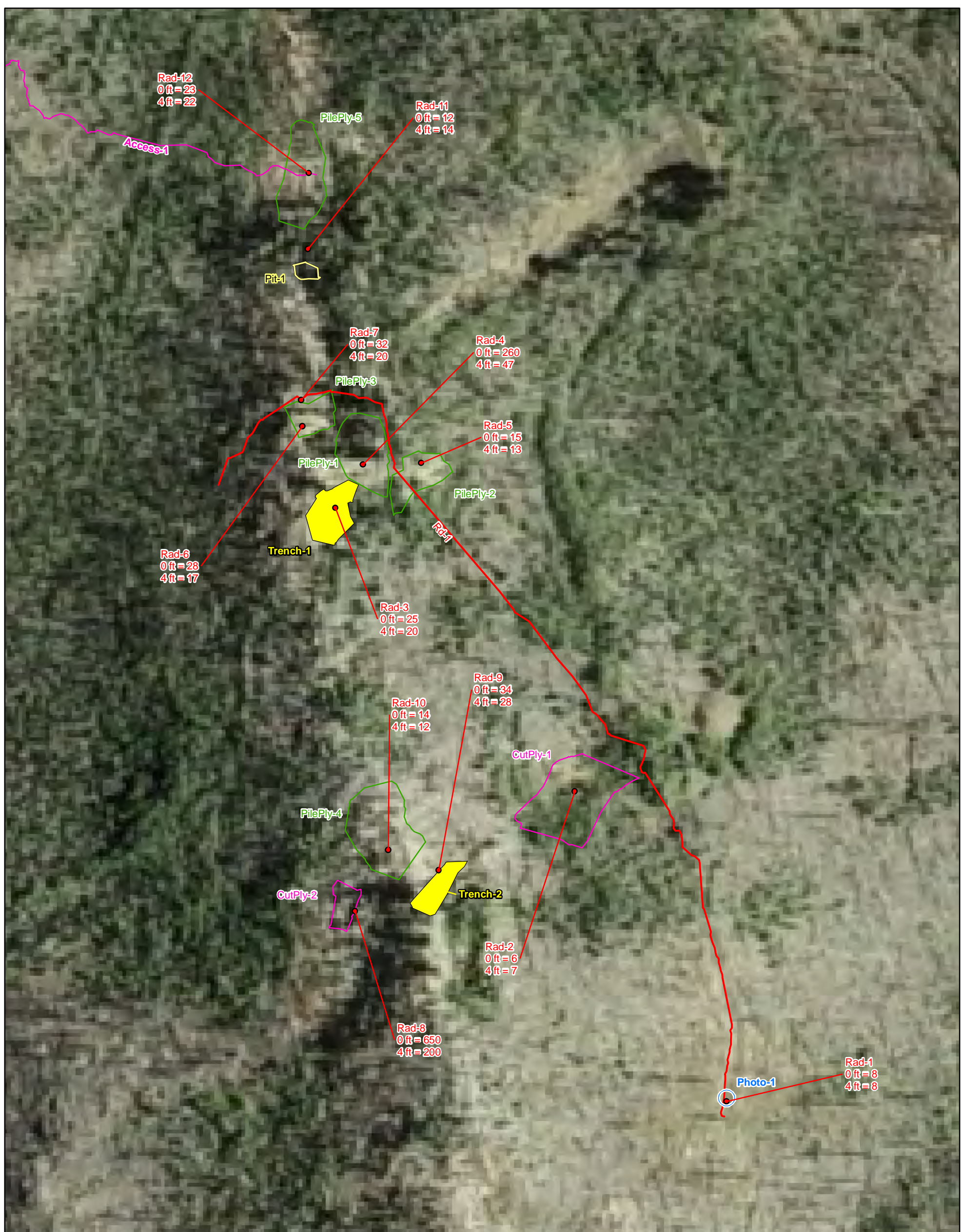
Note:
 There are no wells within 1 mile of the Site.

Legend

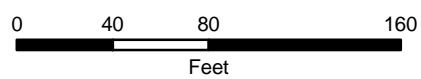
- Radiation Readings ($\mu\text{R/hr}$)
- Access Route
- AUM Location Boundary (MMD Provided)
- Section Boundary
- Township/Range Boundary

Figure 3
Aerial Photo
NM0237-High Peak
 Abandoned Uranium
 Mine Assessment





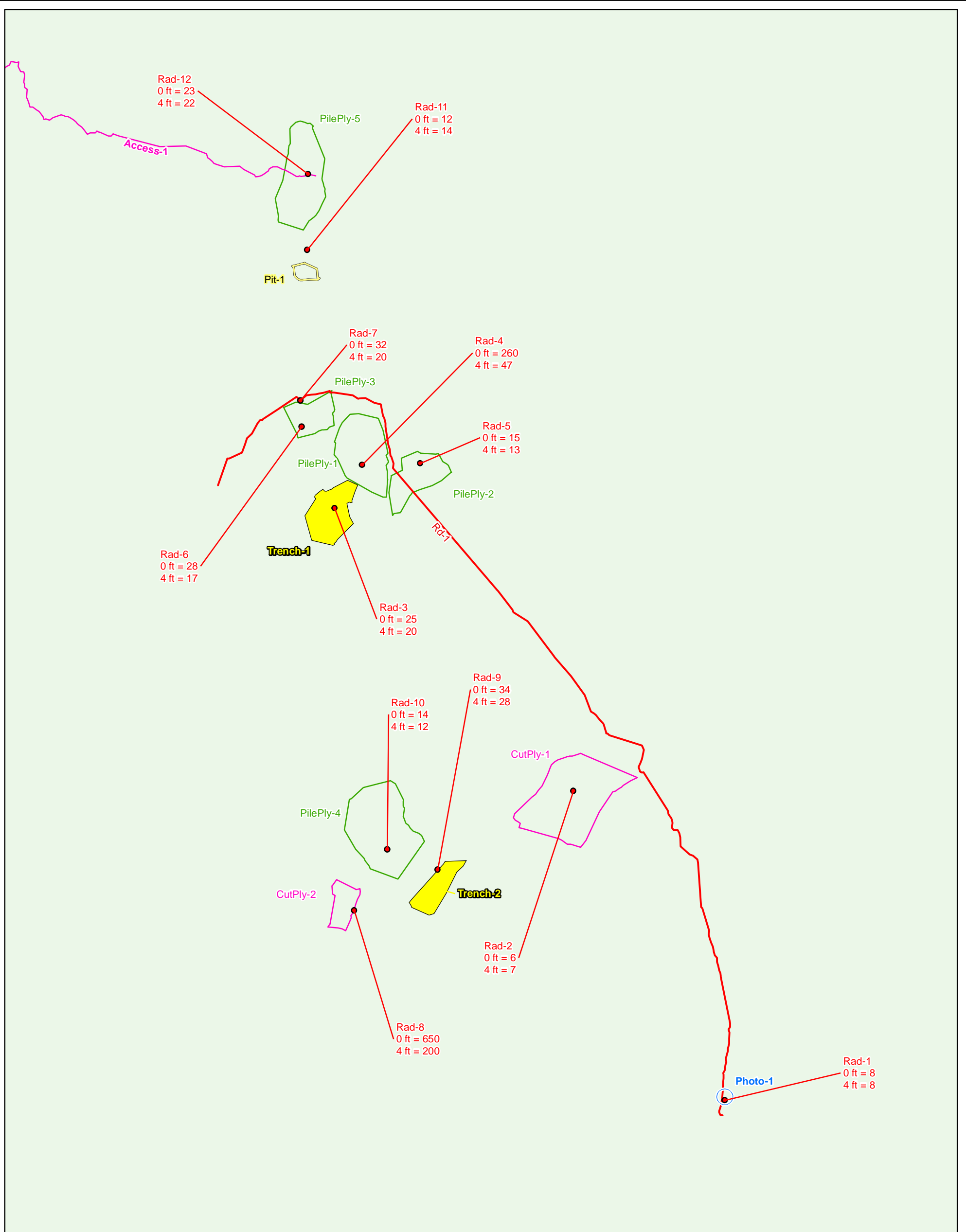
Map Source(s):
 U.S. Geological Survey 7.5-Minute
 DOQQ County Mosaic
 -San Miguel County, 2009



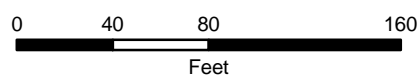
Legend	
●	Radiation Readings ($\mu\text{R/hr}$)
○	Photo Location
—	Mine Road
—	Fence
—	Access Route
□	Open Cut Boundary
□	Pile Boundary
□	Pit Boundary
□	Trench

Figure 4a
Site Map on
Aerial Photo
NM0237-High Peak
 Abandoned Uranium
 Mine Assessment





Map Source(s):
Ownership - BLM, 2008



Legend

● Radiation Readings (µR/hr)	□ Open Cut Boundary
○ Photo Location	□ Pile Boundary
— Mine Road	□ Pit Boundary
— Fence	■ Trench
— Access Route	Surface Ownership
	□ Forest Service

Figure 4b
Site Map with
Surface Ownership
NM0237-High Peak
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-Site location photo, looking north along Rd-1.



Photo 2-Looking west at CutPly-1.



Photo 3-Looking southwest at CutPly-1.



Photo 4-Looking south at Trench-1.



Photo 5-Looking west down at Trench-1.



Photo 6-Looking west at PilePly-1.



Photo 7- Looking south at PilePly-2.



Photo 8- Looking west at PilePly-3.



Photo 9- Looking north at CutPly-2.



Photo 10-Close-up of rock face in CutPly-2, looking east.



Photo 11- Close-up of rock face in CutPly-2, looking east



Photo 12-Looking southwest at Trench-2.



Photo 13-Looking west at PilePly-4.



Photo 14-Looking north at Pit-1.



Photo 15-Looking southeast at PilePly-5.



Photo 16-Vegetation at AUM Site.



Photo 17-Vegetation at AUM Site.



Photo 18-Vegetation at AUM Site.



Photo 19-Vegetation at AUM Site.



Photo 20-Vegetation at AUM Site.

APPENDIX B
FIELD NOTES



8/3/10 ALT Abandoned Uranium Mines

26

Site Name: NM0237, High Peak

Objective: Site Assessment

Personnel: Annelia Tinklenberg
Alex Resovsky

Equipment: Rental truck, Trimble GeoXM (SN: 494844727, 2008 Series), Ludlum 192 (SN: 234149), Fuji Film digital camera (No 80839493), backup garmin GPS, Cell phone amplifier, field laptop.

6:30 Leaving Las Vegas for site

8:30 At parking area along FR 92 to begin hike to site.

Rad back - at truck - 0m - 17 uR/h; 1m - 18 uR/h

1000 At site - visible mine features

Photo - 1 - Photo ID - 1 site location photo looking north

Rad - 1 - south end of mine Rd - 1; 0m - 8 uR/h; 1m - 8 uR/h

Mine Rd - 1 - along east end of hill; 5' wide

Open Cut Ply - 1 - 50' wide, ^{50'}~~40'~~ long, 20' deep; along mine Rd - 1 maybe location of pit and ~~cut~~ filled in mentioned in the Anderson Report. The area experienced a large fire ~~recently~~ ^{ALT} and mass wasting may have occurred and aspen growth

Photo - 2 looking west at cut Ply - 1

Photo - 3 looking southwest at cut Ply - 1

Rad 2 - cut Ply - 1; 0m - 6 uR/h; 1m - 7 uR/h

Trench Ply - 1 - 15' wide, ^{30' ALT}~~25'~~ long; 10' deep

Photo 4 - looking south at Trench - 1

Rad 3 - ^{Trench} cut Ply - 1; 0m - 25 uR/h; 1m - 26 uR/h

Photo 5 - looking west down at Trench - 1

27 8/3/10 at Abandoned Uranium Mines

Pile Ply-1 - 25' wide, 30' long, 5' tall; north of Trench-1, 40% slope

Photo 6 - looking west at Pile Ply-1, waste rock

Rad 4 - Pile Ply-1; Om - 26 uR/h; 1m - 47 uR/h

Pile 2 - 25' wide, 20' long, 10' tall, 35% slope, east of Pile Ply-1

Photo 7 - looking south at Pile Ply 2

Rad 5 - Pile 2; Om - 15 uR/h; 1m - 13 uR/h

Pile Ply-3 - 15' wide, 30' long, 10' tall, 40% slope, west of Pile Ply-1

Photo 8 - looking west at Pile Ply-3

Rad 6 - Pile Ply 3; Om - 28 uR/h; 1m - 17 uR/h

Rad 7 - mine Rd-1 along the road at the northern part of hill; Om - 32 uR/h; 1m - 20 uR/h

Cut Ply 2 - 15' wide, 30' long, 5' deep; in Pegmatite

Photo 9 - north at cut Ply 2

Photo 10 & 11 - closeup of rock face, east

Rad 8 - cut Ply 2 - Om - 650 uR/h; 1m - 200 uR/h

Trench-2 - 10' wide, 40' long, 10' deep

Photo 12 - looking southwest at Trench-2

Rad 9 - Trench 2; Om - 34 uR/h; 1m - 28 uR/h

Pile Ply-4 - 25' wide, 40' long, 5' tall waste rock; 25% slope

Photo 13 - looking west at Pile Ply-4

Rad 10 - Pile Ply-4; Om - 14 uR/h; 1m - 12 uR/h

Pit-1 - 15' wide; 20' long, 5' deep; 45%

Photo 14 - looking north at Pit-1

Rad-11 - Pit-1; Om - 12 uR/h; 1m - 14 uR/h

Pile Ply 5 - 30' wide; 50' long, 15' tall waste rock

Photo 15 - looking south east at Pile 5

Rad-12 - Pile Ply 5; Om - 23 uR/h; 1m - 22 uR/h

Photos 16-20 - vegetation

1300 Leaving site

8/3/10 at Abandoned Uranium Mines

28

Access-1 - hike from site to truck
1400 Back at Truck

Access 2 - FR 92 to FR 86

Soils: Tan to pink sandy, shallow/thin - ash build up in areas

Rocks: Pink to white igneous granite with pink pegmatite veins, lots of mica and feldspar

Wildlife: small birds, small grey squirrel, chipmunk; deer, elk and coyote scat; hummingbird

Human Activities: camping and recreation along FR. Firewood collecting, we heard a chainsaw near the site. Cow scat, evidence of grazing.