

# Abandoned Uranium Mine Assessment for the Corral No. 3 Site (NM0242)

**FINAL REPORT**

**Prepared For:**



New Mexico Energy, Minerals and  
Natural Resources Department  
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**Prepared By:**



**October 19, 2010**

NM0242

## 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.....	3
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.....	4
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 Corral No. 3 Site (AUM Site), MMD ID: NM0242 on September 30, 2010.

### 1.1 PREVIOUSLY KNOWN INFORMATION ABOUT THE SITE

The Corral No. 3 Site is identified in Anderson (1980) as the Sla-Tex open pit. The workings at the site consisted of an open pit, a dump running the length of the pit, an ore pile, and roads (Anderson, 1980). The total disturbed area of these features is shown to be approximately 200 ft by 300 ft (Anderson, 1980). The pit measured 260 ft long, 60 to 100 ft wide, and 40 ft deep (Anderson, 1980). The ore pile is located on the southern end of the pit and contained 125 tons, averaging 0.03%  $U_3O_8$  (Anderson, 1980). Anderson (1980) reported that twenty tons of ore was shipped in 1956. McLemore (1983) reported that twenty tons of ore yielding twelve pounds of 0.03%  $U_3O_8$  and twenty four pounds of  $V_2O_5$  were produced from the area prior to 1956.

### 1.2 SITE LOCATION AND DIRECTIONS

The AUM Site is located within the Santa Fe National Forest, in the northeast corner of Section 25, Township 23 North, Range 1 West. The AUM site is located in the northern part of Sandoval County and is approximately 4 miles southwest of the town of Gallina. The location of this Site was provided to INTERA by MMD.

To access the AUM Site from Albuquerque, take I-25 north to Bernalillo and exit US-550. Follow US-550 north 68 miles and turn right at NM-96, approximately 3.5 miles north of Cuba. Travel approximately 17 miles east on NM-96 and turn right at Rio Arriba County Road 414. Go approximately 3 miles south and turn right at Forest Road 76/Corral Canyon Road. Travel 1.5 miles west and the AUM Site will be on the right side of the road, on the northern slope of Corral Canyon.

### 1.3 SITE GEOLOGY

The AUM Site is located in the northern Sierra Nacimiento, a laramide uplift that forms the northwestern part of the Jemez Mountains (Pollock et al., 2004). Paleozoic sedimentary rocks are exposed in the vicinity of the AUM Site. Minor uraniferous sedimentary copper deposits occur locally within shale and arkosic conglomerate of the Permian Abo Formation and the Pennsylvanian Madera Group (McLemore and Chenoweth, 1989).

### 1.4 SITE HYDROGEOLOGY

The AUM Site is located near the southwestern boundary of the Rio Chama watershed which covers most of the Rio Chama Water Planning Region (La Calandria Associates, Inc., 2006). Surface runoff at the AUM Site flows south into Corral Creek, which joins the Rio Gallina

approximately 1.5 miles east. The Rio Gallina joins the Chama River approximately 16 miles northeast of the AUM Site.

The Permian Abo Formation constitutes a shallow aquifer that is partially exposed at the surface at the AUM Site. This aquifer is composed of reddish-brown arkosic mudstone and sandstone, with minor conglomerate and limestone (La Calandria Associates, Inc., 2006). Groundwater flow in this unit is generally to the north at the AUM Site.

## **1.5 REGIONAL TOPOGRAPHY AND TERRAIN**

The AUM Site is found on the Regina 7.5 minute United States Geological Survey topographic map at an elevation of approximately 8,100 ft above mean sea level (see Figure 2). The AUM Site is located along the northern slope of Corral Canyon which is on the northeastern flank of the San Pedro Mountains, a northwest-trending subrange of the Jemez Mountains.

## **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. Four piles, three cuts, two mine roads, and an erosional feature were identified onsite. 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**

Three open cuts (CutLn-1, CutPly-1, and CutPly-2) were found onsite. CutPly-2 represents the main open pit referred to by Anderson (1980) and exposes an approximately 400 ft long and 30 ft tall cliff of sandstone, mudstone, and conglomerate strata (See photos 5, 7, and 8 in Appendix A). CutLn-1 is a smaller surface excavation above the main pit (CutPly-2) measuring approximately 50 ft long and 10 ft tall (see Figures 4a and 4b). CutPly-1 is an excavation along the hillside below the main pit (CutPly-2) and is approximately 80 ft long and 20 ft deep (see Figures 4a and 4b). The maximum gamma radiation measurement for these features was 41  $\mu\text{R/hr}$  (microroentgens per hour) at 0 ft above ground at radiation survey point Rad-6 along CutPly-2 (see Table 2).

### **2.3 WASTE AND ORE PILES AND DISTURBANCES**

Four waste piles (PileRidge-1, PileRidge-2, PilePly-1, and PilePly-2) were found onsite. PileRidge-1 is located above the main pit (CutPly-2) and is associated with CutLn-1 (see Figures 4a and 4b). This pile is approximately 5 ft high, 5 ft wide, and 90 ft long. PileRidge-2 extends down the slope below the main pit (CutPly-2) (see Figures 4a and 4b). It is approximately 20 ft

wide, 200 ft long, and 30 ft high. PilePly-1 and PilePly-2 consist of waste rock and are located next to CutPly-2 (see Photos 5, 8, 9 and 10 in Appendix A and Figures 4a and 4b). The maximum gamma radiation measurement for these features was 38  $\mu\text{R/hr}$  at 0 ft above ground at radiation survey point Rad-8 on PilePly-1 (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**

Two mine roads (Rd-1 and Rd-2) were identified onsite. Rd-1 is adjacent to CutPly-1 and runs east-west along the bottom of PileRidge-2 (see Figures 4a and 4b). Rd-2 leads east down from CutPly-2 and then curves to the south and joins Rd-1 below (see Figures 4a and 4b).

## **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**

One background gamma radiation reading was taken near the AUM Site, recording 11  $\mu\text{R/hr}$  at 0 ft above ground and 11  $\mu\text{R/hr}$  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 onsite was 41  $\mu\text{R/hr}$  at 0 ft above ground at radiation survey point Rad-6 on CutPly-2. A gamma radiation measurement taken at PilePly-1 (radiation survey point Rad-8) recorded 38  $\mu\text{R/hr}$  at 0 ft above ground.

## **5.0 CURRENT LAND USES**

### **5.1 HUMAN ACTIVITY AND RECREATIONAL SITE USE**

Tire tracks and trash observed along Corral Canyon Road indicate that the area is used for recreation and sees ATV activity. Cattle seen nearby indicate the land is also used for grazing.

## **5.2 NEARBY RESIDENTIAL, COMMERCIAL AND INDUSTRIAL STRUCTURES**

No residential, commercial, or industrial 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**

Cows, cow prints and droppings, fences, and corrals were observed near the AUM Site indicating that the area surrounding the AUM Site is used for cattle grazing.

## **5.5 EVIDENCE OF WILDLIFE**

A magpie, hawk, and lizard were observed near the AUM Site, as well as rabbit and deer droppings.

# **6.0 VEGETATION**

The Corral No. 3 site is located in the Coniferous and Mixed Woodland vegetation type (Dick-Peddie, 1999). Woody vegetation at the site included ponderosa pine, gambel oak, chamisa, spineless horsebrush, fir, and juniper species. Grass species included blue grama grass and a needlegrass. Forbs included Rocky Mountain goldenrod. No noxious weeds were noted from photographs of the site.

# **7.0 POTENTIAL OFFSITE IMPACTS**

## **7.1 EROSION**

One erosional feature (ErosPt-1) was observed onsite. This erosional feature has formed from runoff cutting through the top of PileRidge-2 and draining down the steep slope of the pile (See photo 12 in Appendix A).

## **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.

# **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.

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

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

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

McLemore, Virginia T., and William L. Chenoweth, 1989. Uranium Resources in New Mexico. Socorro: New Mexico Bureau of Mines & Mineral Resources.

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

Pollock, Caleb J., Kevin G. Stewart, James P. Hibbard, Laura Wallace, and Ruben A. Giral, 2004. Thrust wedge tectonics and strike-slip faulting in the Sierra Nacimiento, New Mexico. New Mexico Bureau of Geology & Mineral Resources Bulletin 160.

## TABLES

**Table 1  
Site Features**

**Corral No. 3-NM0242  
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	--	Dirt Nonmaintained	--	--	--	--	--	--	--	Hiking - Corral Canyon Rd
Access-2	No	Access	--	Dirt Nonmaintained	--	--	--	--	--	--	--	Corral Canyon Rd
Access-3	No	Access	--	Dirt Maintained	--	--	--	--	--	--	--	Co Rd 414
ErosPt-1	Yes	Water eroded	--	--	5	10	50				NM0242_012	--
CutLn-1	Yes	--	--	--	10	5	50	--	--	--	NM0242_006	--
CutPly-1	Yes	--	--	--	20	70	80	--	--	--	NM0242_003	--
CutPly-2	Yes	--	--	--	30	50	400	--	--	--	NM0242_005 NM0242_007 NM0242_008	--
PilePly-1	Yes	Waste	--	Rock	8	15	25	--	--	--	NM0242_009	--
PilePly-2	Yes	Waste	--	Rock	15	30	80	--	--	--	NM0242_010	--
PileRidge-1	Yes	--	--	--	5	5	90	--	--	--	NM0242_004	--
PileRidge-2	Yes	--	--	--	30	20	200	--	--	--	NM0242_011	--
Rd-1	Yes	Dirt	--	Dirt Nonmaintained	--	--	--	--	--	--	NM0242_013	--
Rd-2	Yes	Dirt	--	Dirt Nonmaintained	--	--	--	--	--	--	NM0242_002	--

**Notes:**

-- designates no information



**Table 2**  
**Gamma Radiation Survey Results**

**Corral No. 3-NM0242**  
**Abandoned Uranium Mine Assessments**

Reading ID	Associated Features	0 ft ( $\mu$ R/hr)	4 ft ( $\mu$ R/hr)	Associated Photos
Rad-1	rd-1	30	20	NM0242_001
Rad-2	cutply-1	33	21	--
Rad-3	cutply-1	29	20	--
Rad-4	pileridge-1	23	15	--
Rad-5	cutln-1	26	21	--
Rad-6	cutply-2	41	28	--
Rad-7	cutply-2	25	22	--
Rad-8	pileply-1	38	26	--
Rad-9	pileply-2	37	25	--
Rad-10	pileridge-2	32	18	--
Rad-11	rd-2	14	13	--
RadBack-1	--	11	11	--

**Notes:**

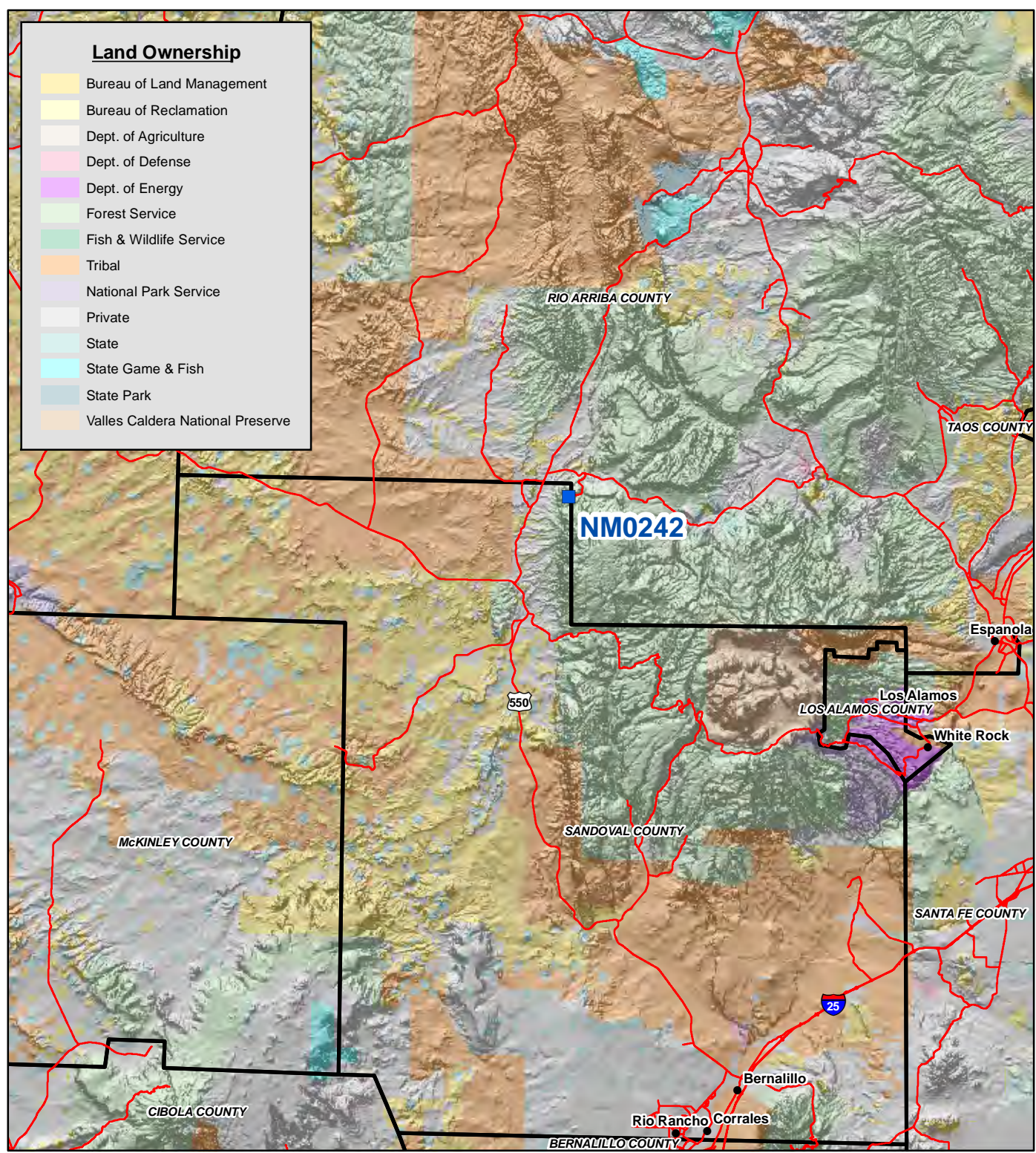
All gamma readings at this site taken by Ludlum 192  $\mu$ R/Ratemeter  
 $\mu$ R/hr=microroetgens per hour  
 -- designates no information



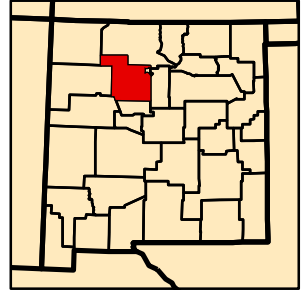
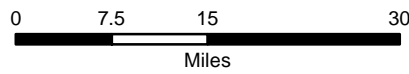
## FIGURES

**Land Ownership**

- Bureau of Land Management
- Bureau of Reclamation
- Dept. of Agriculture
- Dept. of Defense
- Dept. of Energy
- Forest Service
- Fish & Wildlife Service
- Tribal
- National Park Service
- Private
- State
- State Game & Fish
- State Park
- Valles Caldera National Preserve



Map Source(s):  
Ownership - BLM, 2008

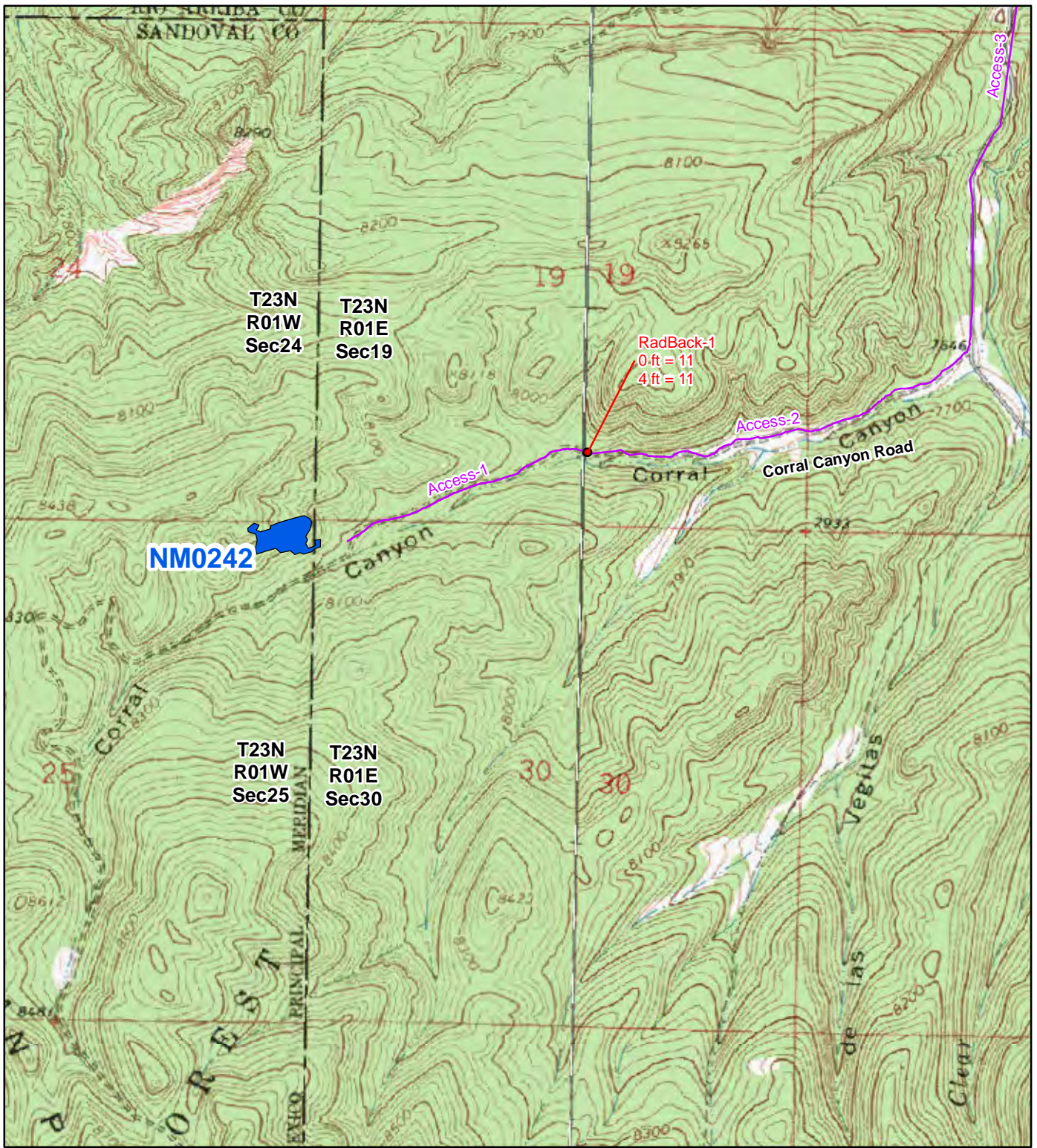


**Legend**

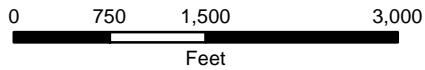
- AUM Location
- Road
- County Boundary

**Figure 1**  
**Site Location Map**  
**NM0242-Corral No. 3**  
Abandoned Uranium  
Mine Assessment





Map Source(s):  
 U.S. Geological Survey 7.5-Minute  
 Topographic Map  
 -Gallina, 1963  
 -Regina, 1963



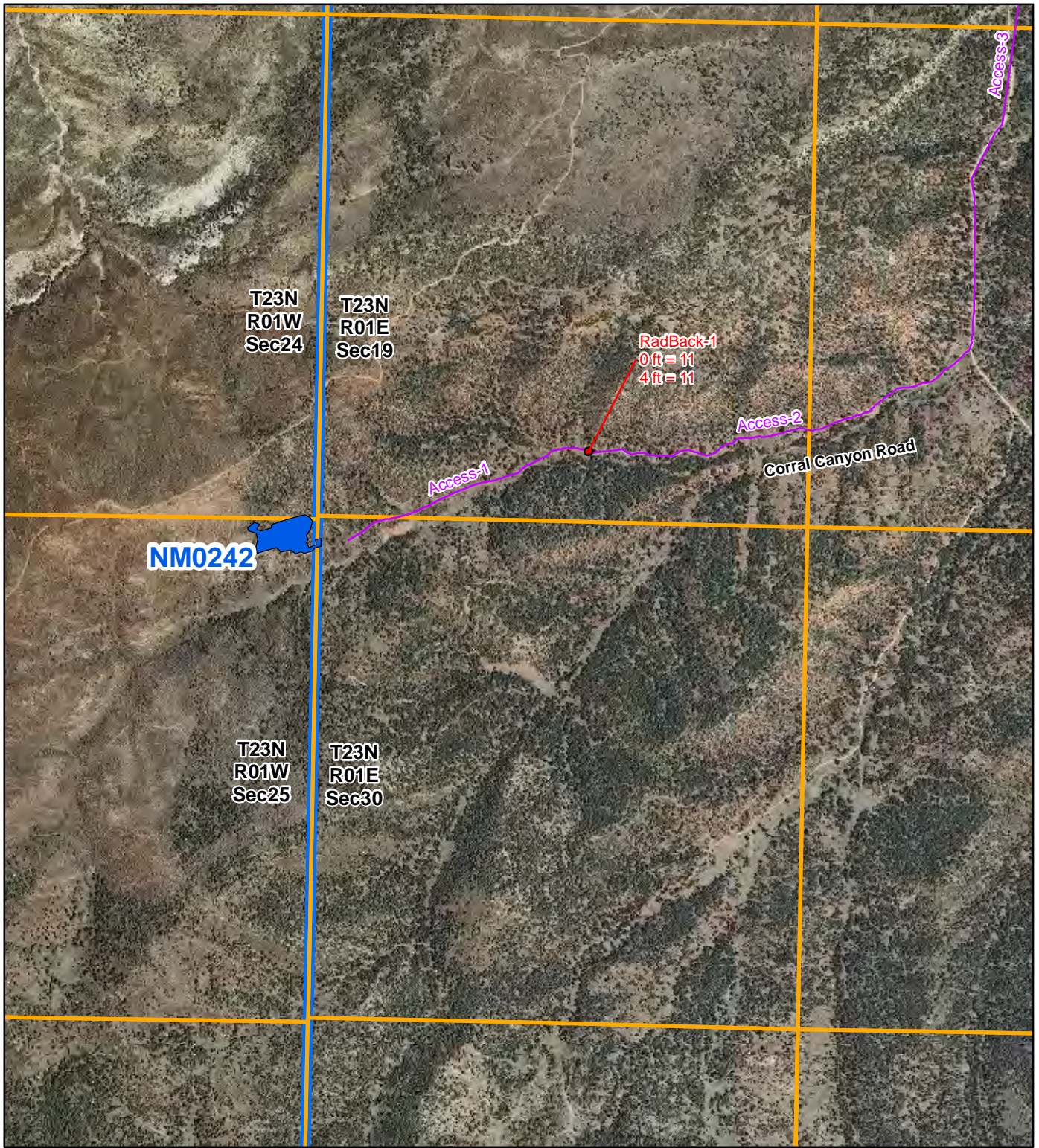
Note:  
 There are no wells within 1 mile of the Site.



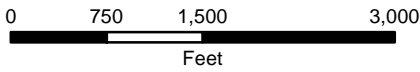
**Legend**

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

**Figure 2**  
**Topographic Map**  
**NM0242-Corral No. 3**  
 Abandoned Uranium  
 Mine Assessment



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



**Legend**

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

**Figure 3**  
**Aerial Photo**  
**NM0242-Corral No. 3**  
 Abandoned Uranium  
 Mine Assessment

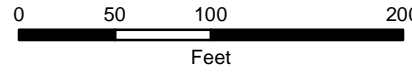
Note:  
 There are no wells within 1 mile of the Site.





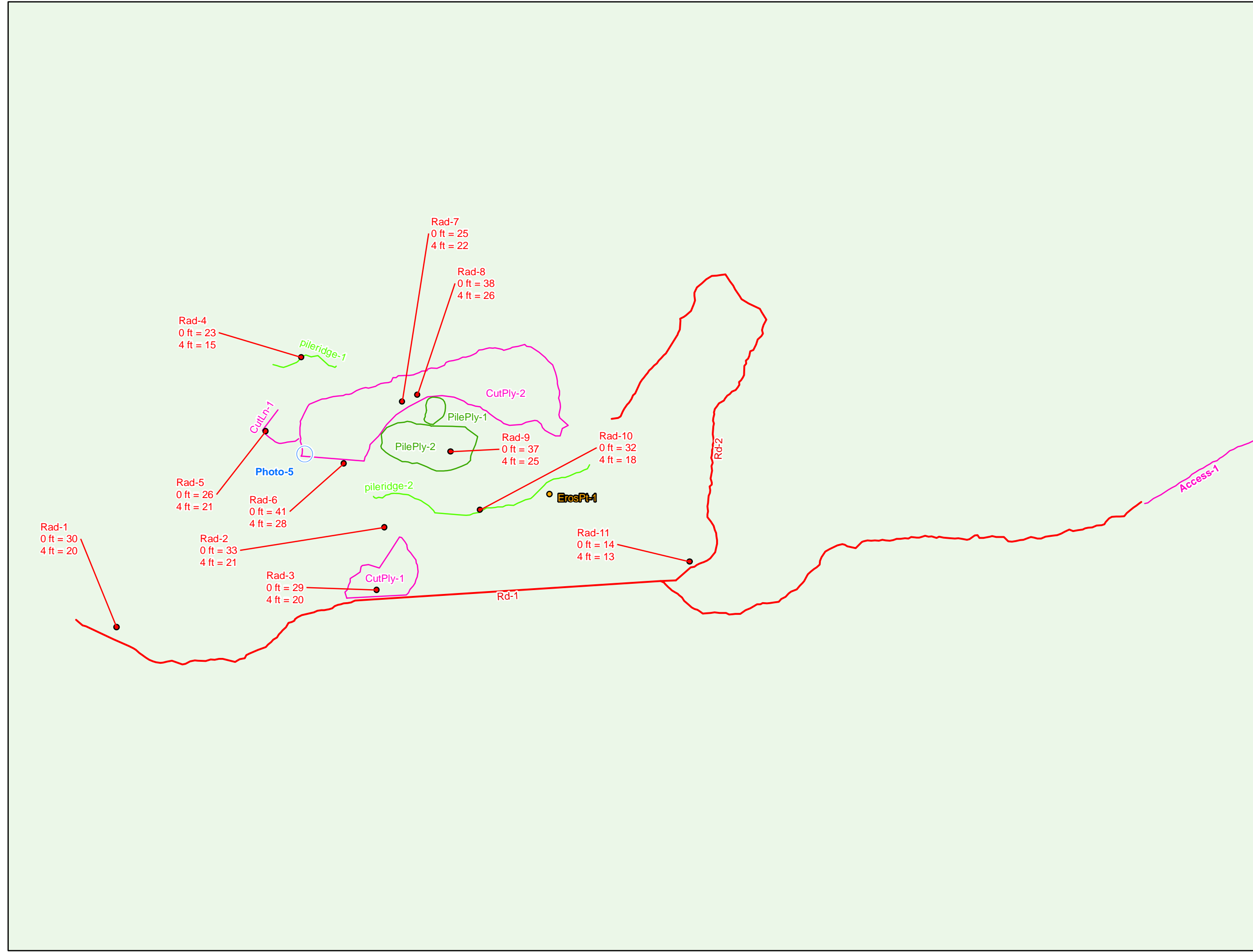
**Legend**

- Radiation Readings (μR/hr)
- Erosion Location
- Photo Location
- Access Route
- Mine Road
- Open Cut
- Pile Ridge
- Open Cut Boundary
- Pile Boundary



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

**Figure 4a**  
**Site Map on**  
**Aerial Photo**  
**NM0242-Corral No. 3**  
 Abandoned Uranium  
 Mine Assessment

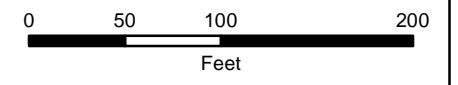


**Legend**

- Radiation Readings (µR/hr)
- Erosion Location
- Photo Location
- Access Route
- Mine Road
- Open Cut
- Pile Ridge
- Open Cut Boundary
- Pile Boundary

**Surface Ownership**

- Forest Service



Map Source(s):  
Ownership - BLM, 2008

**Figure 4b**  
**Site Map with**  
**Surface Ownership**  
**NM0242-Corral No. 3**  
 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.

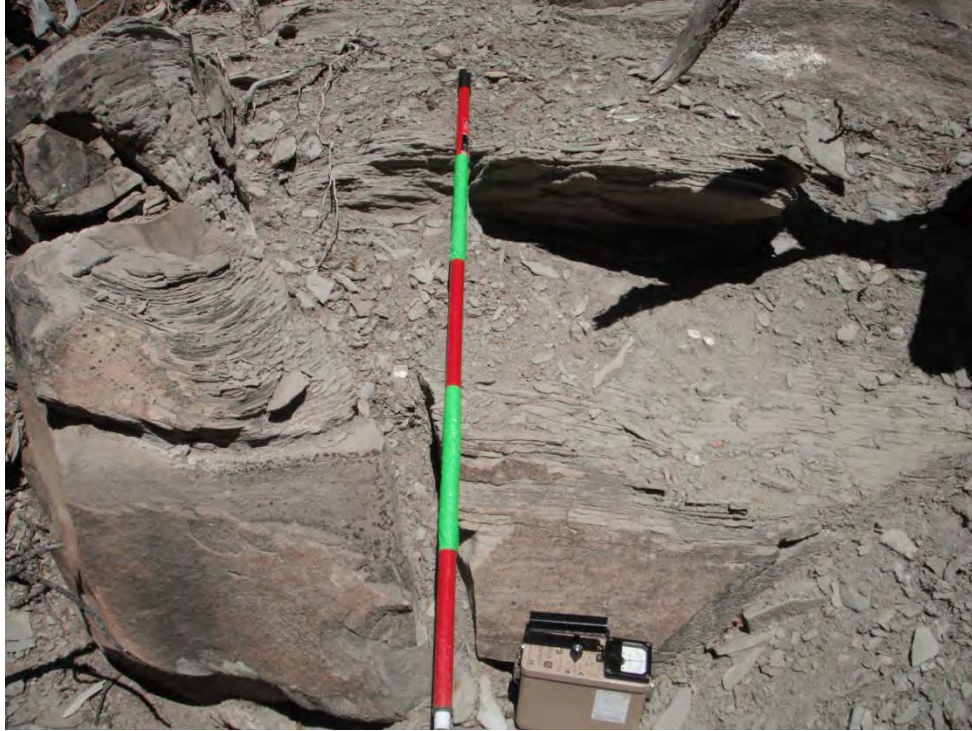


Photo 1-Looking northeast at Rad-1.



Photo 2-Looking west at Rd-1.



Photo 3-Site location photo, looking northeast at CutPly-1.



Photo 4-Looking west at PileRidge-1.



Photo 5-Looking east at CutPly-2, replicating Anderson photo C.



Photo 6-Looking west at CutLn-1.



Photo 7-Looking northwest at CutPly-2.



Photo 8-Looking west at CutPly-2, replicating Anderson photo A.

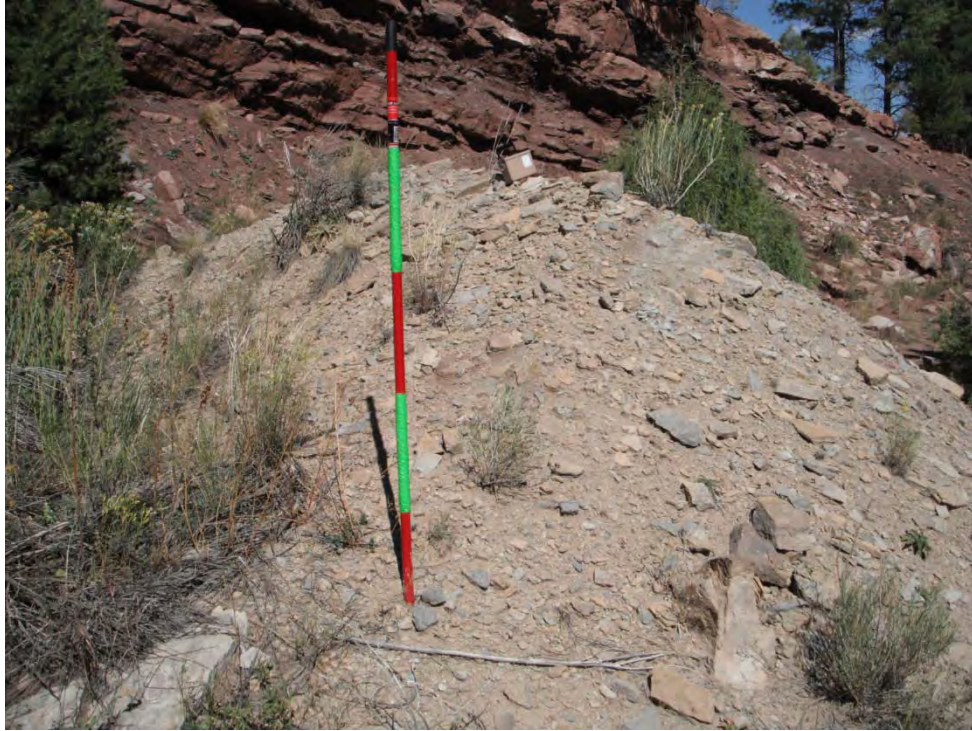


Photo 9-Looking north at PilePly-1.



Photo 10-Looking south at PilePly-2.



Photo 11-Looking east at PileRidge-2.



Photo 12-Looking south at ErosPt-1.



Photo 13-Looking northeast at Rd-2.

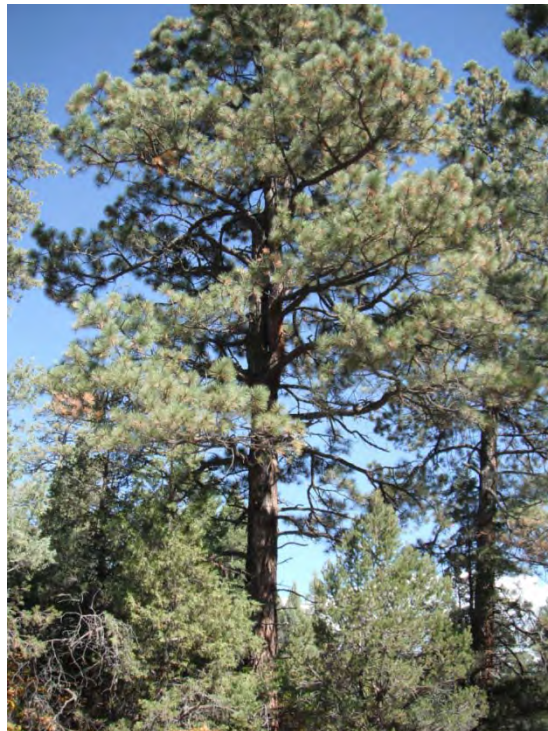


Photo 14-Vegetation at AUM Site.



Photo 15-Vegetation at AUM Site.



Photo 16-Vegetation at AUM Site.



Photo 17-Vegetation at AUM Site.



Photo 18-Vegetation at AUM Site.



Photo 19-Vegetation at AUM Site.

**APPENDIX B**  
**FIELD NOTES**

69 9/30/10 ACT Abandoned Uranium Mines

Site Name: NMO242, Corral No. 3

Objective: Site Assessment

Personnel: Annelia Tinklenberg  
Alex Resovsky

Equipment: Rental truck, Trimbel GeoXM (SN494844727, 2008 series), Ludlum 192 (SN:234149), Fujifilm digital camera (No OTB31259), backup Garmin GPS, cell phone amplifier, field laptop

1245 - Looking for AUM Polygon and features

Rad-1 - mine Rd-1; 0m - 30 uR/h; 1m - 20 uR/h

Photo 1 - looking northeast at Rad-1

Mine Rd-1 - 5' wide; dirt non-maintained

Photo 2 - mine Rd-1 looking west

CutPly-1 - 20' high, 80' long, 20' wide

Photo 3 - cutPly-1 looking northeast, site ID photo.

Rad-2 - CutPly-1; 0m - 33 uR/h; 1m - 21 uR/h

Rad-3 - CutPly-1; 0m - 29 uR/h; 1m - 20 uR/h

PileRidge-1 - 5' tall, 5' wide, 90' long

Photo 4 - PileRidge-1 looking west

Rad-4 - PileRidge-1; 0m - 23 uR/h; 1m - 15 uR/h

Photo Pt-1; Photo 5 looking east at CutPly

CutIn-1 - 10' tall, 5' wide, 50' long

Photo 6 - CutIn-1 looking west

Rad 5 - CutIn-1; 0m - 26 uR/h; 1m - 21 uR/h

CutPly-2 - 30' high, 50' wide, 400' long

Photo 7 - CutPly 2 looking northwest

Photo 8 - CutPly 2 looking west

Rad 6 - CutPly-2; 0m - 41 uR/h; 1m - 28 uR/h

9/30/10 ACT Abandoned Uranium Mines

Rad 7 - CutPly-2; 0m - 25 uR/h; 1m - 22 uR/h

PilePly-1 - 8' tall, 15' wide, 25' long, 35% slope

Photo 9 - PilePly-1 looking north

Rad 8 - PilePly-1 - 0m - 38 uR/h; 1m - 26 uR/h

PilePly-2 - 15' tall, 30' wide, 80' long, 45% slope

Photo 10 - PilePly 2 looking south;

Rad 9 - PilePly 2; 0m - 37 uR/h; 1m - 25 uR/h

PileRidge 2 - 30' tall, 20' wide, 200' long; 50% slope; <sup>ALT</sup> end

Photo 11 - PileRidge-2 looking east; edge of slope runs down hill

Rad-10 - PileRidge-2; 0m - 32 uR/h; 1m - 18 uR/h

ErosPt-1 - 5' deep, 10' wide, 50' long; in PileRidge-2

Photo 12 - ErosPt-1 looking south

Mine Rd-2 - leading east from CutPly 2 and then south to mine Rd-1

Photo 13 - Mine Rd-2 looking northeast

Rad 11 - Mine Rd-2 & mine Rd-1 junction; 0m - 14 uR/h; 1m - 13 uR/h

1420 - Recorded all features

Access-1 - road to NMO242 and NMO184

Background Rad - 0m - 11 uR/h; 1m - 11 uR/h

Vegetation - Photos 14-19

1450 Leaving site continuing Access-1

Soils: Red silty sand. Locally gray clay

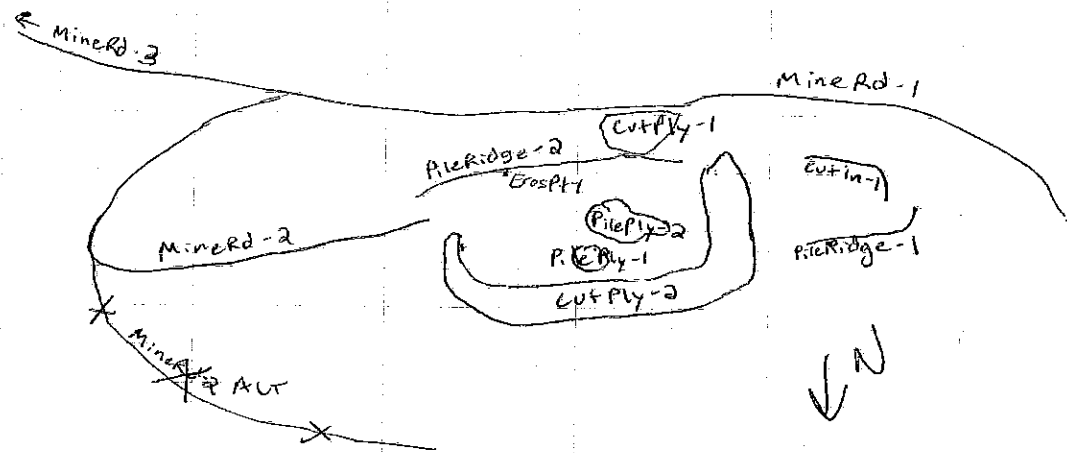
Rocks: Red arkosic siltstone and sandstone of the Abo Formation

Wildlife: Hawk. Rabbit and deer droppings

Human Activities; Cattle guards, fences, corral, catchment pond, and cow prints and droppings indicate grazing. ATV tracks and beer cans indicate recreational use.

Sketch on page 71 →

71 9/30/10 ALT Abandoned Uranium Mines



Access-2 - Road to NMO242 and NMO184 - driveable section

Access-3 - Forest Road 76

ALT