

Abandoned Uranium Mine Assessment for the Midcontinent Site (NM0182)

FINAL REPORT

Prepared For:



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NM0182

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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 Midcontinent Site (AUM Site), MMD ID: NM0182 on October 13, 2010.

1.1 PREVIOUSLY KNOWN INFORMATION ABOUT THE SITE

According to McLemore (1983), workings at the site consist of rim cuts within the Agua Zarca Sandstone member of the Triassic Chinle Formation. One ton of ore yielding one pound of 0.06% U_3O_8 was mined from the site in 1955 by the Midcontinent Exploration Company (McLemore, 1983). Anderson (1980) did not visit this AUM Site.

1.2 SITE LOCATION AND DIRECTIONS

The AUM Site is located on private land in the northwest quarter of Section 10, Township 22 North, Range 3 East. The AUM Site is in Rio Arriba County and is approximately 0.5 miles southeast of the town of Coyote. The location of this Site was provided to INTERA by MMD.

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 30 miles further to the junction of US-84 and NM-96, and turn left onto NM-96 W. Go approximately 15 miles and turn left at Forest Road 309. Follow this road 1.1 miles and turn right onto a 4x4 trail. Go approximately 0.4 miles down this trail to where it ends. The AUM Site features can be found approximately 0.3 miles southwest of this point, and may be accessed on foot. Note that permission from the private landowner is required to access the site.

1.3 SITE GEOLOGY

The AUM Site is located in the southern part of the Chama Basin, a shallow structural basin bounded by the Nacimiento uplift to the west and the Brazos uplift and the Tusas Mountains to the east, and the Jemez Mountains to the south (Smith et al., 1961). Early Mesozoic sedimentary rocks are exposed in the vicinity of the AUM Site. Minor uraniferous sedimentary copper deposits occur locally within the Agua Zarca sandstone member of the Triassic Chinle Formation (McLemore and Chenoweth, 1989).

1.4 SITE HYDROGEOLOGY

The AUM Site is located near the southern 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 site flows northwest into Coyote Creek which joins the Rio Puerco 1.4 miles north. The Rio Puerco drains into the Abiquiu Reservoir approximately 8.2 miles northeast of the AUM Site.

The Agua Zarca sandstone member of the Triassic Chinle Formation constitutes a shallow aquifer partially exposed at the surface at the AUM Site. Locally this aquifer contains as much as 200 feet of coarse-grained, permeable sandstone (La Calandria Associates, Inc., 2006). Groundwater flow in this unit is generally to the northwest at the AUM Site.

1.5 REGIONAL TOPOGRAPHY AND TERRAIN

The AUM Site is found on the Youngsville 7.5 minute United States Geological Survey topographic map at an elevation of approximately 7,000 ft above mean sea level (please see Figure 2). The AUM Site is located in the northern foothills of the Jemez Mountains along the cliffs that form the eastern slope of the Coyote Creek drainage. 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. One open cut and one adit 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

An adit (Adit-1) was found at the AUM Site. The adit extended southeast into an exposure of Agua Zarca sandstone. The opening of the adit is collapsed (see Photo 1 in Appendix A). Gamma radiation near the entrance to the adit measured 31 $\mu\text{R/hr}$ (microrentgens per hour) at 0 ft above ground at radiation survey point Rad-1 (see Table 2). On the east wall of Adit-1 is an horizontal blast hole, approximately 3 inches in diameter and 1 ft deep (see Photo 3 in Appendix A).

2.2 MINING AND EXPLORATION PITS AND OPEN CUTS

One open cut (CutLn-1) was identified at the AUM Site. This feature is a 15 ft-high and 40 ft-long rim cut that exposes the Triassic sediments forming the cliff (see Photo 4 in Appendix A). Several gamma radiation measurements were taken along the surface of the cut but none of the readings varied significantly above background level. The maximum gamma radiation measurement along CutLn-1 was 21 $\mu\text{R/hr}$ (microrentgens per hour) at 0 ft above ground at radiation survey point Rad-5 (see Table 2).

2.3 WASTE AND ORE PILES AND DISTURBANCES

No waste piles or disturbances were identified at the AUM Site.

2.4 MINING RELATED BUILDINGS AND FOUNDATIONS

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

2.5 OTHER MINE FEATURES

No other mine related features were identified at the AUM Site.

2.6 BOREHOLES

No boreholes were found at the AUM Site, however an horizontal blast hole was identified near the entrance to Adit-1 (see Section 2.1 and Photo 3 in Appendix A).

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 12 $\mu\text{R/hr}$ at 0 ft above ground and 12 $\mu\text{R/hr}$ 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 gamma radiation readings at the AUM Site did not vary significantly above background levels. The highest radiation reading was at Rad-1 where 31 $\mu\text{R/hr}$ was recorded near the collapsed entrance to Adit-1. Please see Table 2 for details.

5.0 CURRENT LAND USES

5.1 HUMAN ACTIVITY AND RECREATIONAL SITE USE

Human activity at the AUM Site and in the surrounding area included grazing and domestic dwellings within a 1 mile radius of the site (please see Figure 3).

5.2 NEARBY RESIDENTIAL, COMMERCIAL AND INDUSTRIAL STRUCTURES

Private residences within one mile of the AUM Site are located to the north along NM-96 and to the west along Coyote Creek.

5.3 NEARBY DOMESTIC WELLS

One domestic well lies within one mile of the AUM Site. This domestic well was drilled in 1991 to a depth of 140 feet below ground surface with a depth to water of 65 feet below ground surface (NMOSE, 2008). Please see Figures 2 and 3 for the location of this well.

5.4 EVIDENCE OF GRAZING OR AGRICULTURE

Horse droppings observed at the AUM Site indicate that the land is used for horse grazing. Much of the land along NM-96 within one mile of the site is used for grazing and agriculture.

5.5 EVIDENCE OF WILDLIFE

Deer and elk tracks and droppings were seen at the AUM Site.

6.0 VEGETATION

The Midcontinent, Coyote Hill, and Red Head sites are located in the Coniferous and Mixed Woodland vegetation type (Dick-Peddie, 1999). The vegetation photographs and samples collected are representative of these three sites (please see Photos 6 – 11 in Appendix A). Woody vegetation is dominated by pinyon pine, Utah juniper, rabbitbrush, and ephedra species. The grass species included blue grama and slender wheatgrass. Forb species are limited to barbwire Russian thistle and little hogweed. No noxious weeds were observed at the AUM Site.

7.0 POTENTIAL OFFSITE IMPACTS

7.1 EROSION

No evidence of mine related erosion was observed onsite.

7.2 ENVIRONMENTAL IMPACTS

There is no evidence of soil staining from chemicals potentially brought to the AUM Site.

8.0 REFERENCES

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.

New Mexico Office of the State Engineer (NMOSE), 2010. Wells and Surface Diversions in New Mexico. POD_WATERS_june2010.shp. OSE Waters Database.

Smith, Clay T., Antonius J. Budding and Charles W. Pitrat, 1961. Geology of the Southeastern Part of the Chama Basin. Socorro: New Mexico Bureau of Mines & Mineral Resources Bulletin 75.

TABLES

**Table 1
Site Features**

**Midcontinent-NM0182
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
Access-2	No	Dirt	--	Dirt Nonmaintained	--	--	--	--	--	--	--	--
Adit-1	Yes	--	--	--	5	5	--	No	Yes	Collapsed	NM0182_001 NM0182_003	--
CutLn-1	Yes	--	--	--	15	5	40	--	--	--	NM0182_004	--

Notes:

-- designates no information



Table 2
Gamma Radiation Survey Results

Midcontinent-NM0182
Abandoned Uranium Mine Assessments

Reading ID	Associated Features	0 ft (μ R/hr)	4 ft (μ R/hr)	Associated Photos
Rad-1	adit-1	31	16	--
Rad-2	adit-1	11	10	--
Rad-3	adit-1	18	13	NM0182_002.jpg
Rad-4	cutln-1	20	14	--
Rad-5	cutln-1	21	17	--
Rad-6	cutln-1	15	13	--
Rad-7	--	20	14	--
Rad-8	--	15	13	--
Rad-9	--	12	12	--
Rad-10	--	13	14	--
RadBack-1	--	12	12	--

Notes:

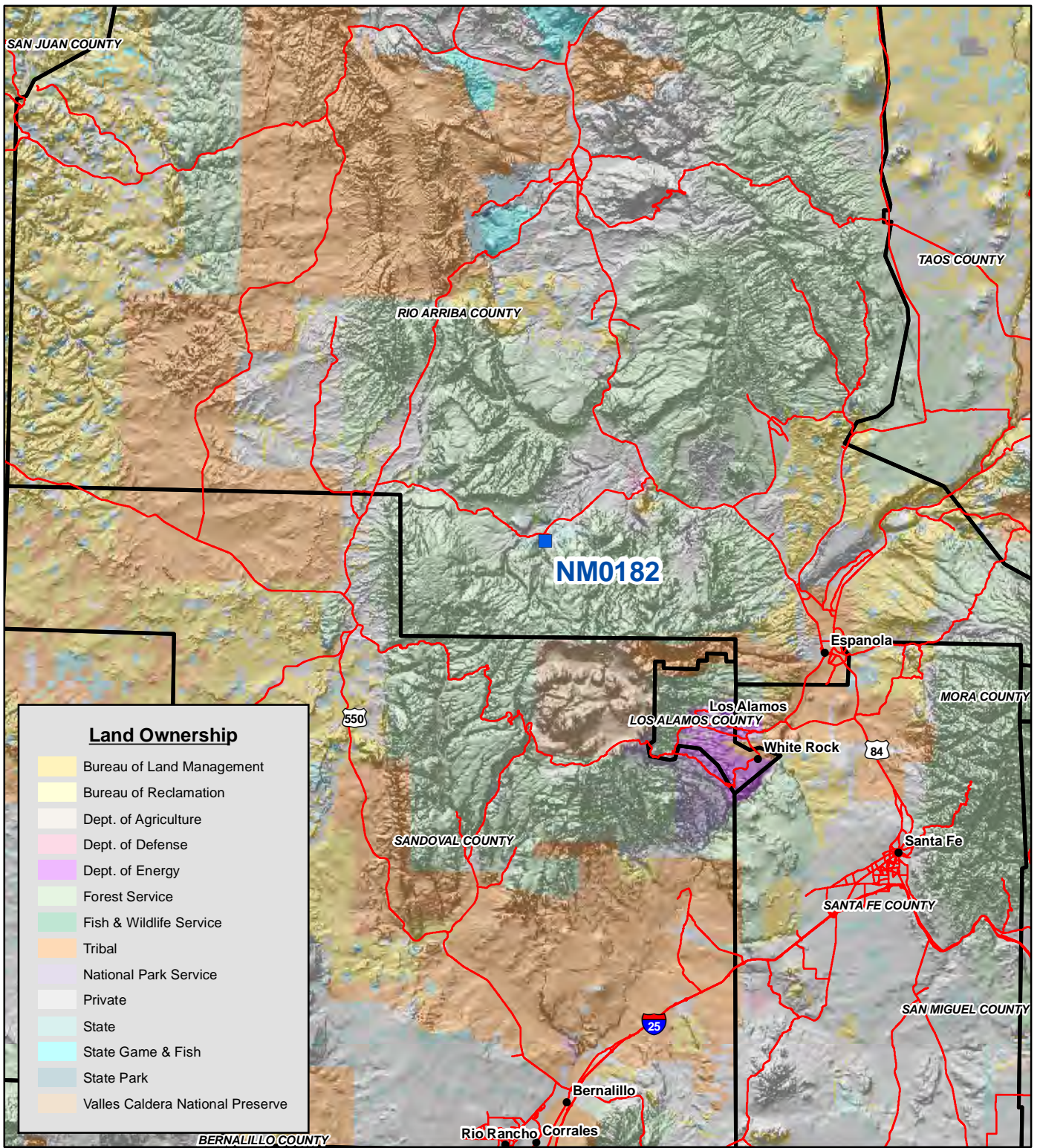
All gamma readings at this site taken by Ludlum 192 μ R/Ratemeter

μ R/hr=microroetgens per hour

-- designates no information



FIGURES



Map Source(s):
Ownership - BLM, 2008

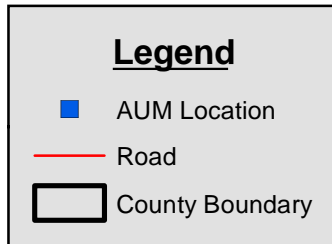
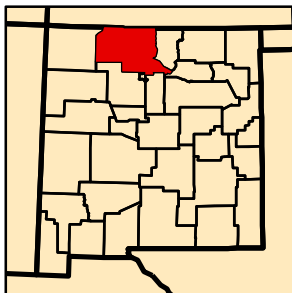
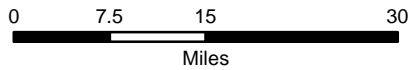
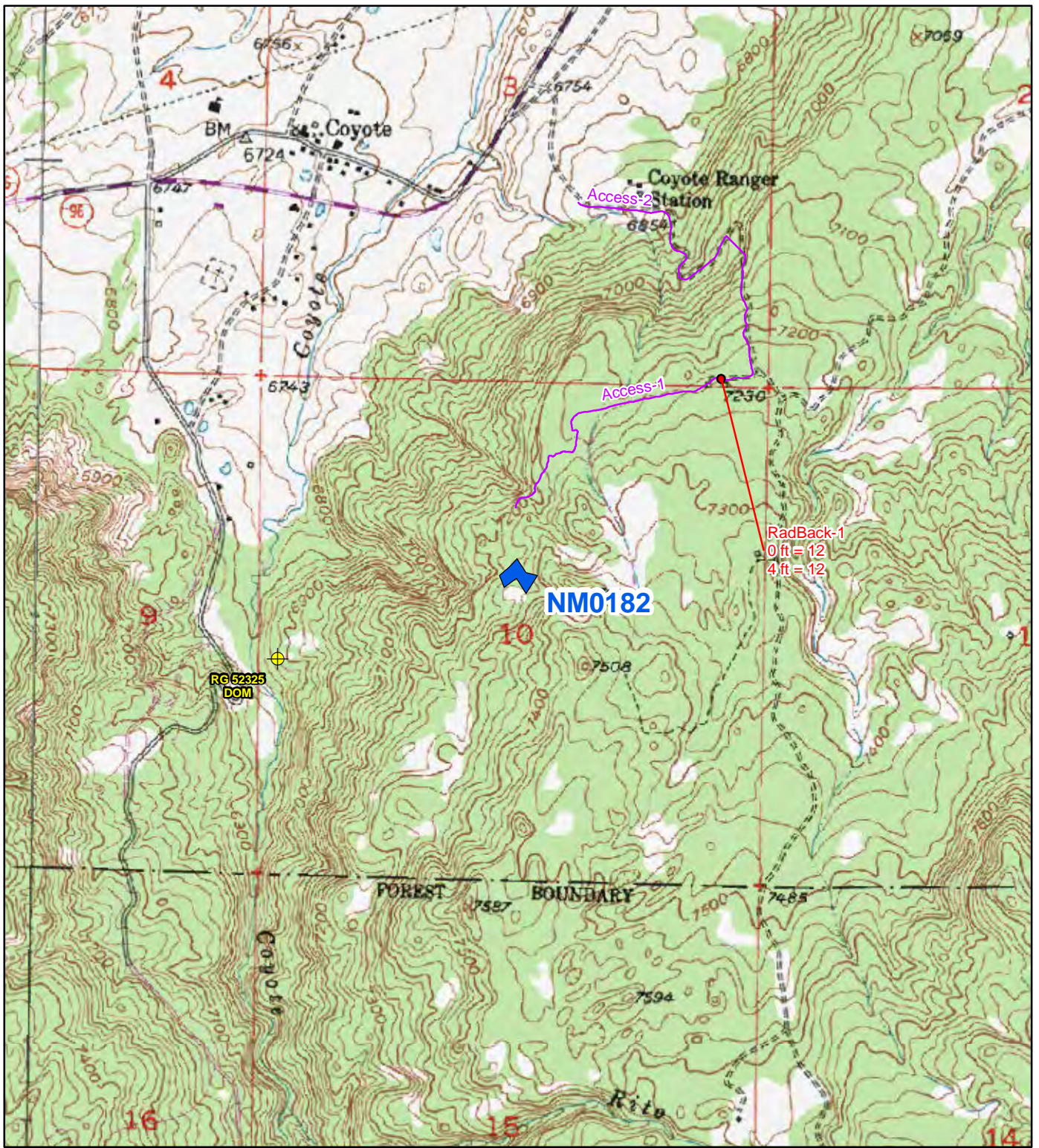
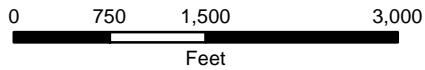


Figure 1
Site Location Map
NM0182-Midcontinent
Abandoned Uranium
Mine Assessment





Map Source(s):
 U.S. Geological Survey 7.5-Minute
 Topographic Map
 -Arroyo Del Agua, 1979
 -Youngsville, 1979



Legend

- Radiation Readings ($\mu\text{R/hr}$)
- ⊕ Well Within 1 Mile of Site
- Access Route
- ▭ AUM Location Boundary (MMD Provided)

Figure 2
Topographic Map
NM0182-Midcontinent
 Abandoned Uranium
 Mine Assessment





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

0 750 1,500 3,000
 Feet


 NORTH

Legend





-  Radiation Readings ($\mu\text{R}/\text{hr}$)
-  Well Within 1 Mile of Site
-  Access Route
-  AUM Location Boundary (MMD Provided)

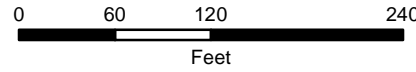
Figure 3
Aerial Photo
NM0182-Midcontinent
 Abandoned Uranium
 Mine Assessment





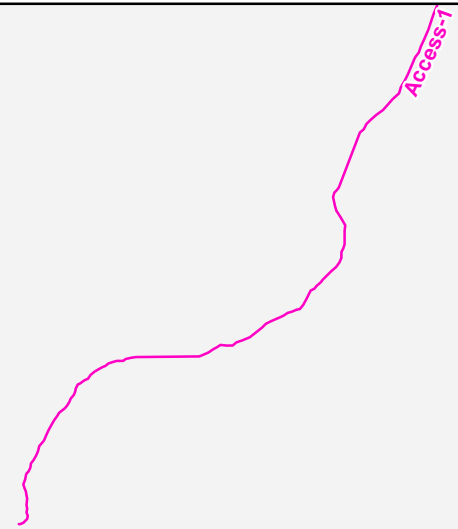
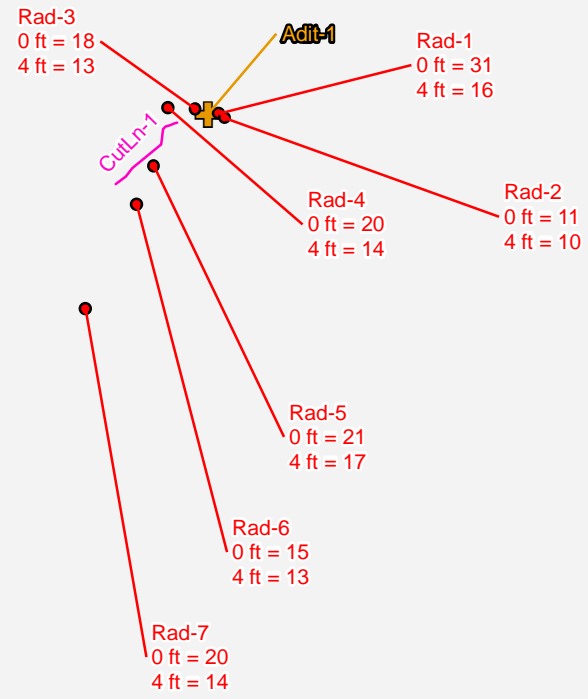
Legend

- Radiation Readings (μR/hr)
- ⊕ Adit
- Photo Location
- Open Cut
- Access Route



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

Figure 4a
Site Map on
Aerial Photo
NM0182-Midcontinent
 Abandoned Uranium
 Mine Assessment

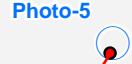
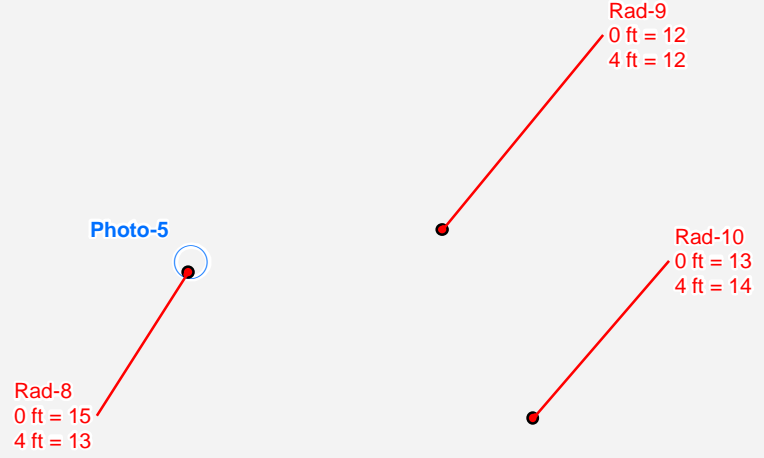
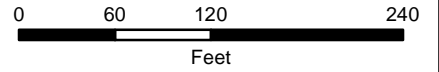


Legend

- Radiation Readings (μR/hr)
- ⊕ Adit
- Photo Location
- Open Cut
- Access Route

Surface Ownership

- Private



Map Source(s):
Ownership - BLM, 2008

Figure 4b
Site Map with
Surface Ownership
NM0182-Midcontinent
 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 south at collapsed Adit-1.



Photo 2-Closeup of rocks at Rad-3.



Photo 3-Looking east at hole in outcrop near Adit-1.



Photo 4-Looking south at CutLn-1.



Photo 5-Looking east at MMD polygon area.



Photo 6-Vegetation representative of the AUM Site.



Photo 7- Vegetation representative of the AUM Site.



Photo 8-Vegetation representative of the AUM Site.



Photo 9-Vegetation representative of the AUM Site.



Photo 10-Vegetation representative of the AUM Site.



Photo 11-Vegetation representative of the AUM Site.

APPENDIX B
FIELD NOTES

Site Name: NMO182, Midcontinent

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. 0TB31259), backup Garmin GPS, cell phone amplifier, field laptop

900 Leaving Espanola to meet landowner in Coyote.

1030 In Coyote waiting for landowner.

1100 landowner to led us to the site

1200 At site

Adit-1 - collapsed, landowner said it was a hole

Photo-1 - Adit-1 looking south

Rad-1 - north of adit; 0m - 31 uR/h; 1m - 16 uR/h

Rad-2 - Adit-1; 0m - 11 uR/h; 1m - 10 uR/h

Rad-3 - below Adit-1; 0m - 18 uR/h; 1m - 13 uR/h

Photo 2 - close up of Rad-3

Photo 3 - explosive hole in Adit-1 wall looking east

Rad 4 - ^{cut in} south of Adit-1 on cliff face; 0m - 20 uR/h; 1m - 14 uR/h

Cut In-1 - 15' tall, 5' wide, 40' long

Photo 4 - Cut In-1 looking south

Rad 5 - Cut In-1; 0m - 21 uR/h; 1m - 17 uR/h

Rad 6 - Cut In-1; 0m - 15 uR/h; 1m - 13 uR/h

Rad 7 - 0m - 20 uR/h; 1m - 14 uR/h

1240 At AUM polygon - no visible mine features

Rad 8 - 0m - 15 uR/h; 1m - 13 uR/h

Photos - looking east at AUM Polygon area

Rad 9 - 0m - 12 uR/h; 1m - 12 uR/h

Rad 10 - 0m - 13 uR/h; 1m - 14 uR/h

Access Rd - 1 - hiking

Background Rad - 0m - 12 uR/h; 1m - 12 uR/h

Access Rd - 2 - Dirt road to NMO96

1310 Leaving site

Vegetation same as NMO180 and NMO183

Soils: Red sandy soils and light tan silty sand. Rocky

Rocks: Purple red sandstone. Light tan

Wildlife: Deer and elk prints and droppings.

Human Activities: Horse grazing occasionally, saw horse droppings.

