Abandoned Uranium Mine Site Assessment for the Charlotte Site (NM0143)

FINAL REPORT

Prepared For:

New Mexico Energy, Minerals and
Natural Resources Department
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NM0143

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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 Charlotte Site (AUM Site), MMD ID: NM0143 on April 6, 2010.

1.1 PREVIOUSLY KNOWN INFORMATION ABOUT THE SITE

Anderson (1980) visited the Charlotte site in 1980 and found an open cut 40 feet long and 8 feet wide in the Todilto Limestone, located in the southern half of the southern half of Section 33, Township 13 North, Range 9 West. No mineralization was apparent. Another cut was found 1000 feet to the northwest, but was not described in detail. Anderson believed that no ore had been produced from this particular cut. Radiation readings were twice background (Anderson, 1980).

McLemore (1983) reports that the Charlotte Prospect consisted of 5 pits throughout the southern half of Section 33, Township 13 North, Range 9 West. These pits mined small patches of ore, extracting a total of 208 tons of material (McLemore, 1983). However, these pits are not immediately apparent from either air photos or field investigations.

1.2 SITE LOCATION AND DIRECTIONS

The AUM Site is on private land just north of the boundary between Section 4, Township 12 North, Range 5 West and Section 33, Township 13 North, Range 9 West. The Site is located in McKinley County and is approximately 11 miles northeast of the town of Milan. The location of this site was provided to INTERA by MMD.

To access the AUM Site from Albuquerque, drive west on Interstate 40 for 83 miles. Take Exit 79 towards San Mateo and turn right. Continue straight until you reach U. S. 66, less than a quarter mile. Turn left on U.S. 66 and drive 0.2 miles, then turn right onto New Mexico 605. Continue northeast on New Mexico 605 for 7.4 miles, then turn right onto a dirt road, passing through a locked gate. Drive east along this road for approximately 2 miles, after which the road makes a slight bend to the south and then curves north and ascends a mesa. After reaching the top of the mesa, continue north for another 2.2 miles, passing numerous mine features and piles on both sides of the road. After 2.2 miles, the road will fork. Take the right hand fork north another 0.3 miles, crossing a small arroyo. A faint road will continue northwest and allows closer access to the Site itself; alternatively stop along the main road and continue on foot another 0.2 miles.

Note that permission from three private landowners is required in order to access and view the AUM Site. The access route from New Mexico 605 to the mesa is owned by one landowner, the mesa is owned by another, and the AUM Site itself is owned by a third.

1.3 SITE GEOLOGY

The AUM Site lies within the Grants uranium region. The topography of this region is characterized by mesas of Triassic to Cretaceous strata separated by broad valleys. The Site area is part of the Chaco Slope, the southern part of the San Juan Basin. Strata in the Chaco Slope dip gently to the north (McLemore, 2002).

The AUM Site is located within the Jurassic-age Todilto Formation, a sequence of carbonates and evaporites. This formation likely represents a salina environment intermittently connected to the ocean. The Todilto Formation is underlain by the Entrada Formation and overlain by the Summerville Formation (Hilpert, 1963). The Todilto consists of two members, the upper Tonque Arroyo Member and the lower Luciano Mesa Member. The Tonque Arroyo Member consists of gypsum and is absent from the Site area. The Luciano Mesa Member consists of a thinly laminated, locally deformed lower layer and a massive, vuggy upper layer (Lucas and Anderson, 2000). Primary-type uranium minerals such as pitchblende are reported to occur in the Todilto Limestone as well as secondary minerals such as carnotite and tyuyamunite (McLaughlin, 1963).

1.4 SITE HYDROGEOLOGY

The surface runoff at the AUM Site discharges to San Mateo Creek, which drains into the Rio San Jose approximately 8 miles to the southwest. There is no nearby permanent surface water.

The AUM Site is located in the Bluewater Underground Water Basin. This basin falls between the San Juan Underground Water Basin to the north, the Middle Rio Grande Underground Water Basin to the south and east, and the Gallup Underground Water Basin to the west (Edwards and Kiely, 2004). Aquifers are found in alluvium near major drainages such as San Mateo Creek and throughout the Cretaceous, Jurassic, and Triassic strata in the region. Groundwater flows southward in alluvium and northeast in Mesozoic strata (Brod, 1979).

1.5 REGIONAL TOPOGRAPHY AND TERRAIN

The AUM Site is found on the Dos Lomas Quadrangle 7.5 minute United States Geological Survey topographic map at an elevation of approximately 6900 feet above mean sea level (see Figure 2). The AUM Site is located just west of La Jara Mesa, on an alluvial fan with small, isolated hills and bedrock outcrops. 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 pile were found onsite. In addition, a mine road and a barbed wire fence were also identified. 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. Note that the scale differs between Figure 4a (aerial photo) and 4b (ownership map).

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

One open cut was found at the AUM Site (CutPly-1). This open cut is located at the top of an isolated hill capped by rocks of the Todilto Formation. The cut exposes both the Todilto Formation and the underlying Entrada Formation. The maximum gamma ray reading in this cut was 31 µR/hr at 0 ft. This open cut appears in photo (a) in Anderson (1980).

2.3 WASTE AND ORE PILES AND DISTURBANCES

One pile (PileRidge-1) is located on the AUM Site. This pile parallels the mine road (Rd-1) to the south of CutPly-1. The maximum gamma ray reading on this pile was 80 µR/hr at 0 ft above ground level.

2.4 MINING RELATED BUILDINGS AND FOUNDATIONS

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

2.5 OTHER MINE FEATURES

One mine road (Rd-1) lies immediately to the south of the AUM Site features. This road is aligned east-west and has a barbed wire fence (Fenc-1) along its southern edge.

2.6 BOREHOLES

No boreholes were evident at the AUM Site.

2.7 RECLAMATION ACTIVITIES

No apparent reclamation activities have taken place at the AUM Site.

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 8 µR/hr at 0 ft above ground and 7 µR/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 reading for the AUM Site was 100 µR/hr at 0 ft above ground at radiation survey point Rad-9 (see Photo 5 in Appendix A). This reading was taken on a tabular slab of Todilto Formation limestone.

5.0 CURRENT LAND USES

5.1 HUMAN ACTIVITY AND RECREATIONAL SITE USE

Fences, cow droppings, and horse droppings indicate that the Site area is active ranchland.

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 are located within a mile of the AUM Site.

5.4 EVIDENCE OF GRAZING OR AGRICULTURE

Cow droppings, horse droppings, and cow footprints were noted in the area.

5.5 EVIDENCE OF WILDLIFE

Wildlife burrows were noted onsite (see Photo 6 in Appendix A). The type of animal that produced these burrows is unknown. Deer scat was found onsite, and scrub jays were observed nearby.

6.0 VEGETATION

The AUM Site is located in the Coniferous and Mixed Woodland vegetation type and borders the Desert Grassland (Ecotone). Woody species at the site include Utah juniper, pinyon pine, fourwing saltbush and rubber rabbitbush. Snakeweed, narrowleaf yucca, and common sagewort were also present. Scapose bitterweed was present at the AUM Site along with grama grass, dropseed, and Indian ricegrass. Cryptogamic crust was present in areas. No noxious weeds were observed.

7.0 POTENTIAL OFFSITE IMPACTS

7.1 EROSION

No evidence of 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

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

Brod, Robert C., 1979. Hydrogeology and Water Resources of the Ambrosia Lake-San Mateo Area, McKinley and Valencia Counties, New Mexico. Master's thesis. New Mexico Institute of Mining and Technology, Socorro, New Mexico.

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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.

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

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

Charlotte-NM0143
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 Photo	Notes
Access-1	No	Access	--	Dirt	--	--	--	--	--	--	--	--
Access-2	No	Access	--	Dirt	--	--	--	--	--	--	--	--
CutPly-1	Yes	--	--	--	5	20	35	--	--	--	NM0143_001 NM0143_002	--
Fenc-1	Yes	Barbwire	--	Wood	4	--	--	--	--	--	--	--
PileRidge-1	Yes	--	--	--	2	3	50	--	--	--	NM0143_003 NM0143_004	--
Rd-1	Yes	Dirt	--	--	--	--	--	--	--	--	--	--

Notes:
-- designates no information

Table 2
Gamma Radiation Survey Results

Charlotte-NM0143
Abandoned Uranium Mine Assessments

Reading ID	0 ft (µR/hr)	4 ft (µR/hr)	Associated Photo	Asssociated Feature
Rad-1	30	13	--	CutPly-1
Rad-2	7	8	--	CutPly-1
Rad-3	14	10	--	CutPly-1
Rad-4	31	12	--	CutPly-1
Rad-5	14	10	--	--
Rad-6	80	8	--	PileRidge-1
Rad-7	10	8	--	PileRidge-1
Rad-8	10	10	--	PileRidge-1
Rad-9	100	20	NM0143_005	--
Rad-10	6	9	--	--
RadBack-1	8	7	--	--

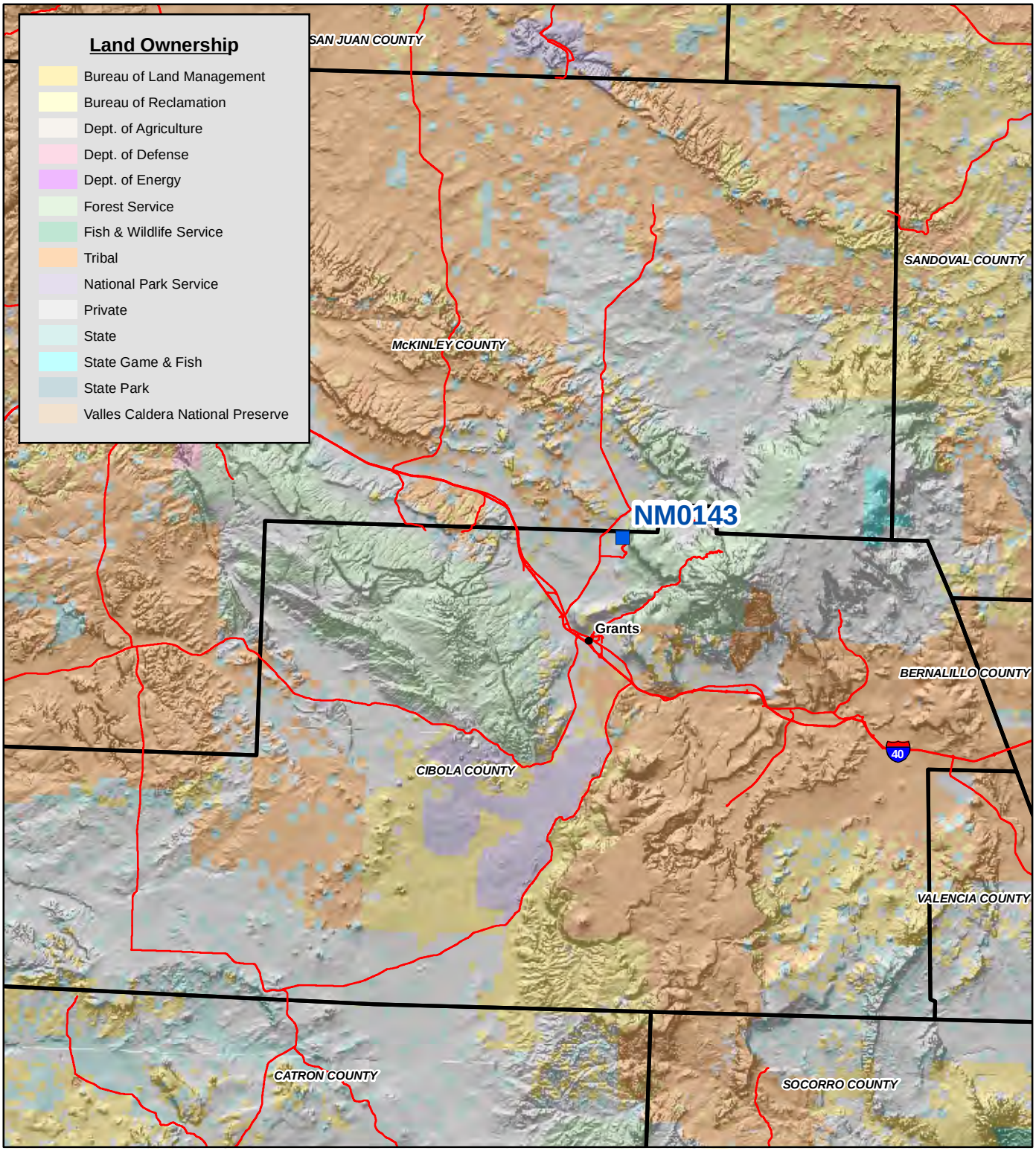
Notes:

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

µR/hr=microroetgens per hour

-- designates no information

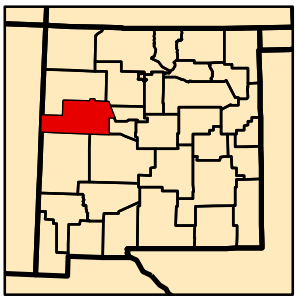
FIGURES



Map Source(s):
Ownership - BLM, 2008

0 7.5 15 30
Miles

NORTH



Legend

- AUM Location
- Road
- County Boundary

Figure 1
Site Location Map
NM0143-Charlotte
Abandoned Uranium Mine Assessment

INTERA

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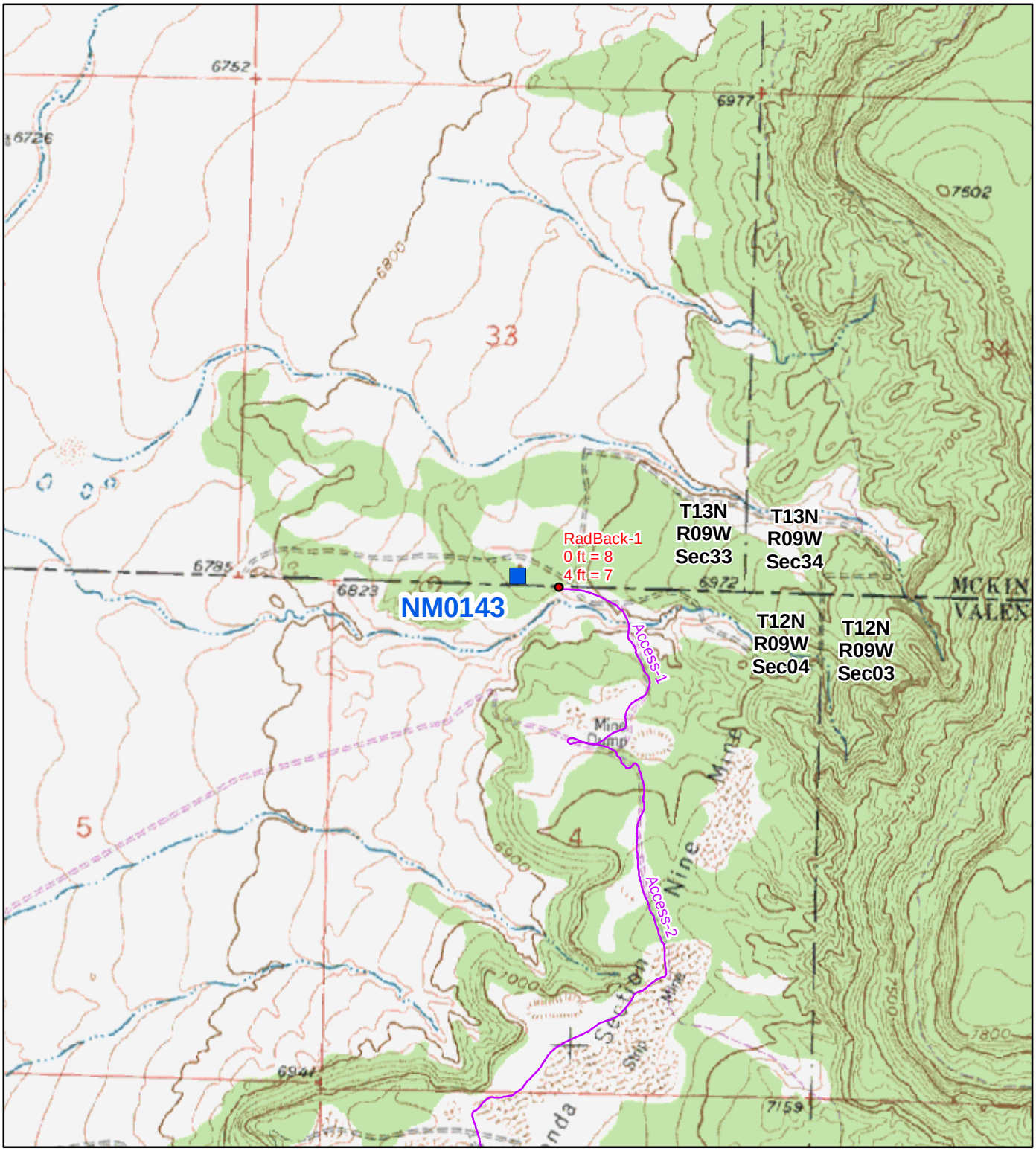

Map Source(s):
U.S. Geological Survey 7.5-Minute
Topographic Map
-Dos Lomas, 1980

0 750 1,500 3,000
Feet

NORTH

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

Legend

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

Figure 2
Topographic Map
NM0143-Charlotte
Abandoned Uranium
Mine Assessment

INTERA

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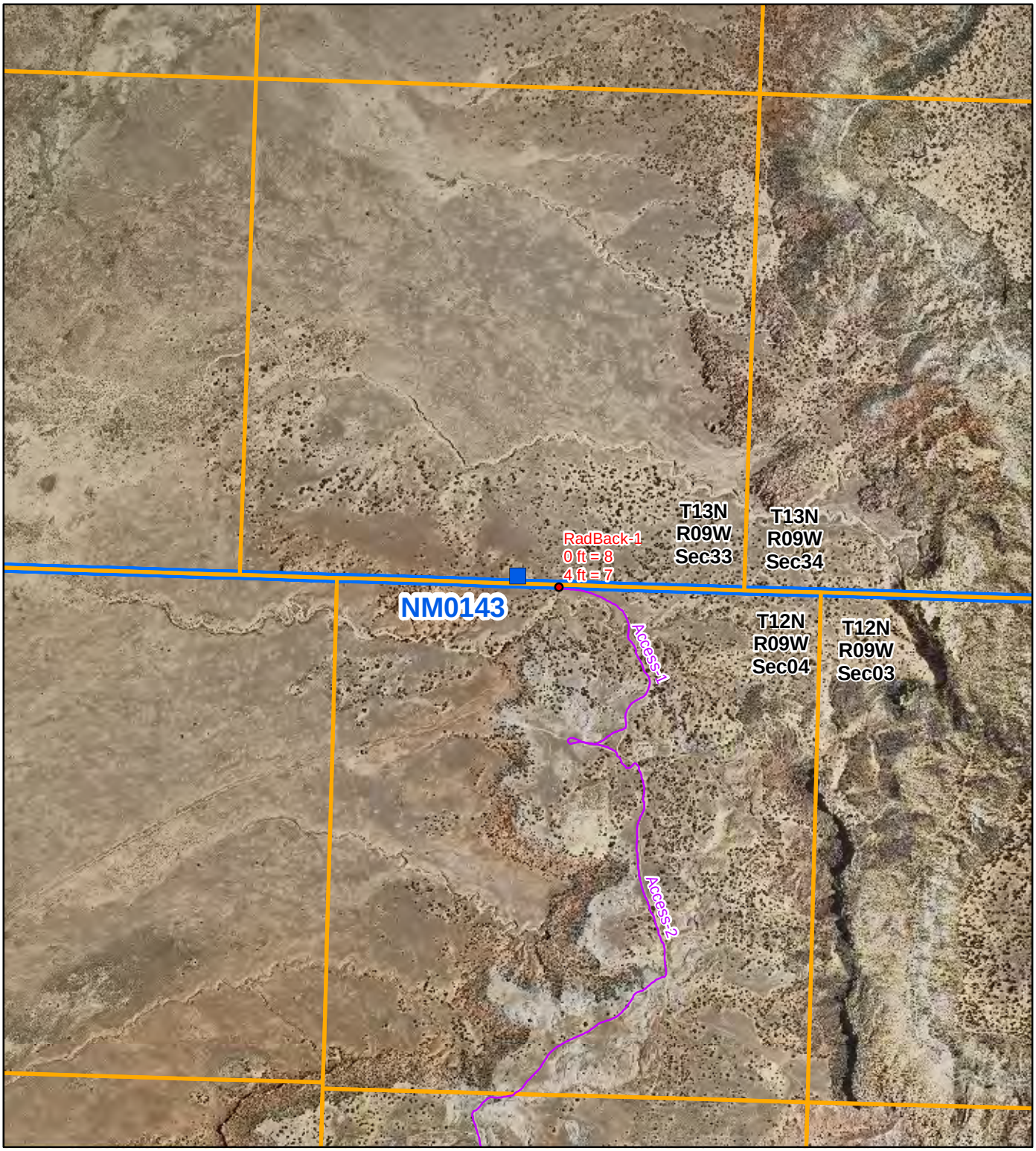

Map Source(s):
U.S. Geological Survey 7.5-Minute
DOQQ County Mosaic
-Cibola County, 2009
-McKinley County, 2009

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

0 750 1,500 3,000
Feet

NORTH

Legend

- Radiation Readings (µR/hr)
- Access Route
- AUM Location
- Section Boundary
- Township/Range Boundary

Figure 3
Aerial Photo
NM0143-Charlotte
Abandoned Uranium Mine Assessment

INTERA

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INTERA

Legend

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

0 40 80 160
Feet

NORTH

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

Figure 4a
Site Map on
Aerial Photo
NM0143-Charlotte
Abandoned Uranium
Mine Assessment

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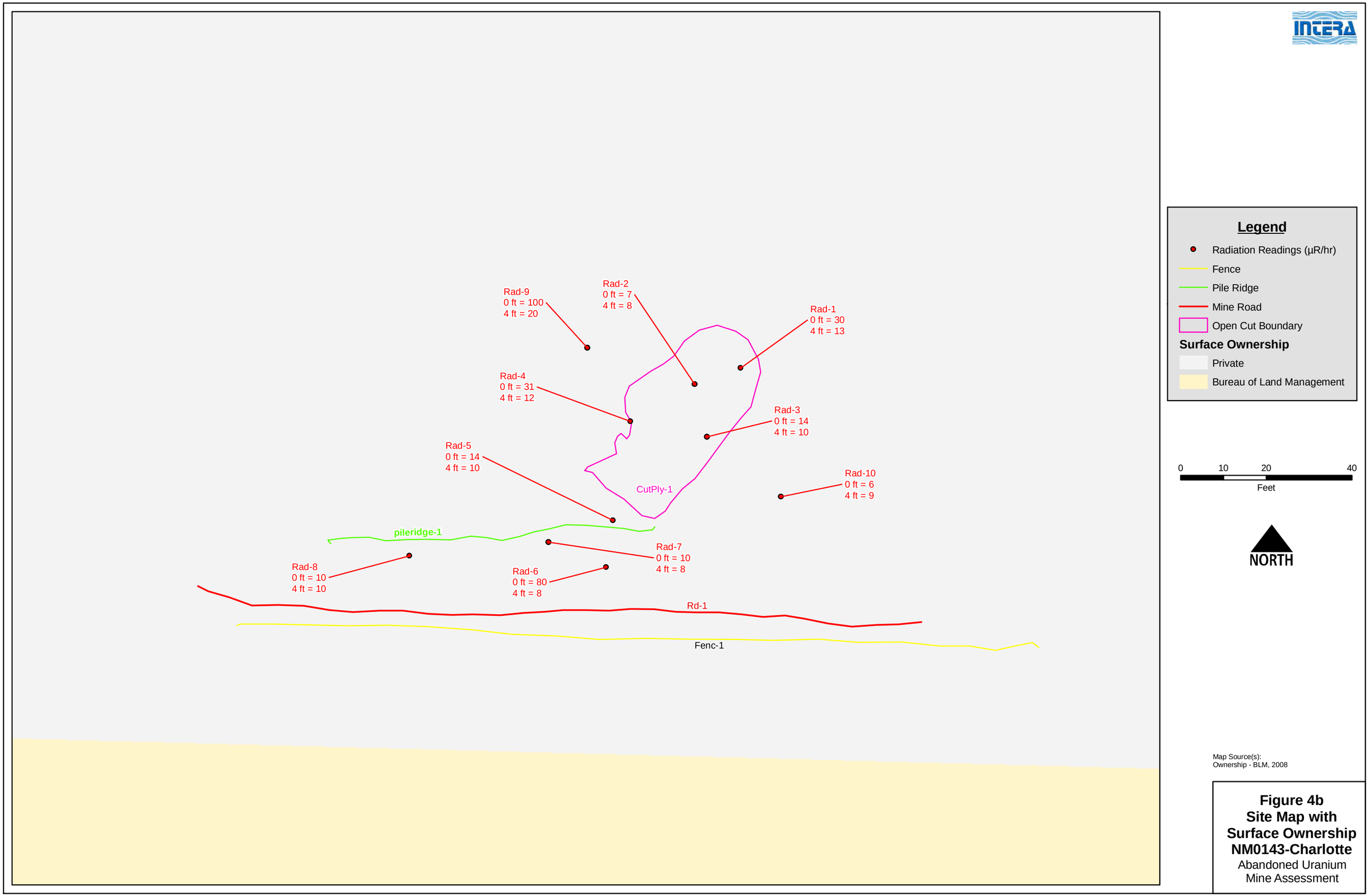

Map Source(s):
Ownership - BLM, 2008

Figure 4b
Site Map with Surface Ownership
NM0143-Charlotte
Abandoned Uranium Mine Assessment

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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 north at CutPly-1. This view is similar to photo (a) in Anderson (1980).

Photo 2-Looking south at CutPly-1.

Photo 3-Looking northeast at PileRidge-1.

Photo 4-Looking west along PileRidge-1.

Photo 5-Radiation survey point Rad-9, taken on Todilto Limestone, measuring 100 µR/hr at contact.

Photo 6-Wildlife burrows west of CutPly-1.

APPENDIX B

FIELD NOTES

Site Name: NM0143, Charlotte

Objective: Site Assessment

Personnel: Annelia Tinklenberg
Danny Bowman

Equipment: Rental truck, Trimbel Geo XM (SN: 4948447271, 2008 Series), Ludlum 192 (SN: 234149), Fuji Film digital camera (No: 80839493), backup Garmin GPS, cellphone amplifier, field laptop

1300 At fence line, southern end of Schmitt property.

Background Rad - 0m - 8uR/h ; 4m - 7uR/h

1320

CutPly-1 - 20' wide, 35' long, 5' deep; cut into Todilto limestone cap on top of hill.

Photo-1 - looking north at cutPly-1 with site name.

Photo 2 - looking south at cutPly-1

PileRidge-1 - 3' wide, ' long, 2' high; todilto from cutPly-1

Photo 3 - looking north ~~west~~ east AUT at PileRidge-1

Photo 4 - looking west at PileRidge-1

Rad-1 - north end of cutPly 1 - 0m - 30uR/h; 4m - 13uR/h

Rad-2 - floor of cutPly 1 - 0m - 7 uR/h; 4m - 8 uR/h

1330

Rad 3 - southeast end of CutPly1 - 0m-14uR/h; 1m-10uR/h

Rad 4 - southwest end of CutPly1 - 0m-31uR/h; 1m-12uR/h

Rad 5 - between CutPly-1 and PileRidge-1
0m-14uR/h; 1m-10uR/h

Rad 6 - east end of PileRidge-1; 0m-80uR/h, ~~1m~~ 1 ALT - 8uR/h

Rad 7 - middle of PileRidge1; 0m-10uR/h; ~~1m~~ 1 ALT - 8uR/h

Rad 8 - west end of PileRidge1; 0m-10uR/h; ~~10m~~ 1 ALT - 10uR/h

Rad 9 - west of CutPly-1, on hill; 0m-100uR/h; ~~1m~~ 1 ALT - 20uR/h
on gray Todilto

Photo 5 - Todilto Limestone, Rad 9 reading

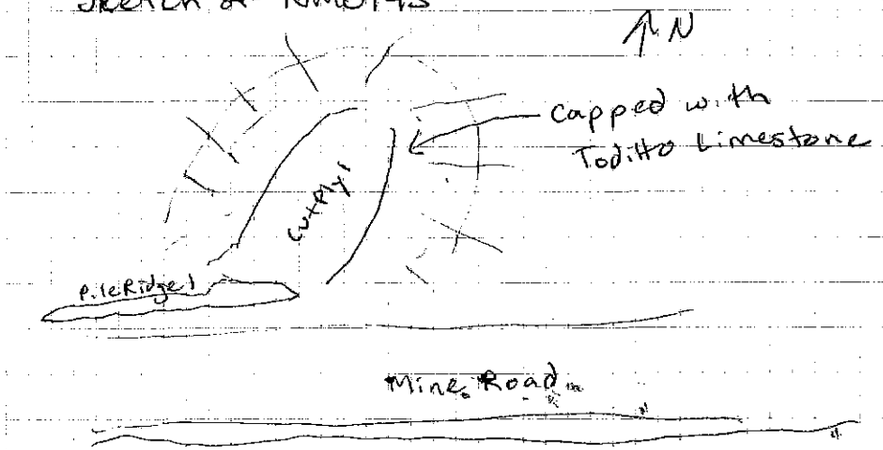
Rad 10 - east of CutPly-1; 0m-6uR/h; ~~1m~~ 1 ALT - 9uR/h

Photo 6 - Wildlife; borrow holes under pine tree.
1400 - leaving site for Red Bluff
Soils: Red, sandy

Rocks: Red entrada sandstone, locally grey Todilto Limestone

Human Activities: Grazing, cattle and horses, fence, prints, excrement

Wildlife: borrow holes, deer scat, scrub jays

~~Site Name: NM0077~~ ALT

Sketch of NM0143