Abandoned Uranium Mine Site Assessment for the Bobcat Site (NM0141)

FINAL REPORT

Prepared For:

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Natural Resources Department
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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 Bobcat Mine Site (AUM Site), MMD ID: NM0141, on March 23, 2010.

1.1 PREVIOUSLY KNOWN INFORMATION ABOUT THE SITE

The AUM Site was registered as the Bobcat claim and is located in the Ambrosia Lake Mining District. This AUM Site produced a total of 117 tons of ore yielding 186 pounds of U_3O_8 ore at an average production grade of 0.06 percent according to McLemore (1983). The workings are described as rim stripping and include a 50 foot long trench (McLemore, 1983). The target rock was the Poison Canyon sandstone bed which is part of the Brushy Basin Member in the Jurassic Morrison Formation (McLemore, 1983). This AUM Site was not included in the Anderson Report.

1.2 SITE LOCATION AND DIRECTIONS

The AUM Site is located on Bureau of Land Management (BLM) land in the N ½ of Section 24, Township 13 North, Range 10 West, on the west face of Mesa Montanosa. This AUM Site is located in McKinley County and is approximately 14 miles north of the town of Grants (Figure 1).

To reach the AUM Site from Albuquerque, drive approximately 83 miles west on Interstate 40. Take Exit 79 toward NM-122/NM-605, Milan/San Mateo. Turn right on Horizon Boulevard, continue approximately 400 feet and turn left at Willow Drive. Continue on Willow Drive for 0.2 miles and turn right onto NM-605. Continue on NM-605 for 13.8 miles. Turn left onto Ambrosia Lake Road/NM-509 N.

Approximately ½ mile after turning onto Ambrosia Lake Road/NM-509 N turn left at the first mailbox on the left side of the road. This is the Schmitt Ranch, private property, and permission to proceed must be obtained from the landowner. With permission, continue through the gate, less than ½ mile after turning the Schmitt Ranch house is on the right, follow the dirt road to the right just beyond the house. Note: this is a different ranch and landowner than the Schmitt referenced in the AUM assessment for NM0101, Chill Willis. Follow this road through another gate, after crossing through the gate you will continue north for approximately 0.3 miles. The road turns to the west (left) continue following the road for another 0.4 miles and pass through another gate. Just after this gate is a cattle corral on the north side of the road. After passing through this gate continue west on the road for approximately 0.9 miles. At this point the road turns to the north and the south. Follow the road up the hill to the south. The road becomes very rough and has been washed out in a number of places. Continue following the road south and southwest for another 0.6 miles. At 0.4 miles there are piles of green shale waste rock on either side of the road. At 0.6 miles turn right and follow the road west for approximately 1.7 miles, or until you cannot drive any further. Park the vehicle at 1.7 miles and look for a road on the left

(west) that drops down off the mesa top onto the west face of Mesa Montanosa. This road is one of the mine roads of the Bobcat Mine Site.

1.3 SITE GEOLOGY

The AUM Site is located on Mesa Montanosa, the eastern side of the Colorado Plateau and the southeastern edge of the San Juan Basin. The AUM Site is characterized as being in the Brushy Basin Member of the Morrison Formation (McLemore, 1983). The Jurassic Brushy Basin Member consists of light greenish-gray shales with interbedded sandstone lenses (McLemore, 1983). The uranium at this AUM Site is found in the basal Poison Canyon sandstone of the Brushy Basin Member (McLemore, 1983). The Poison Canyon sandstone is an arkosic sandstone that was deposited in a braided stream environment and is similar to the upper Westwater Canyon sandstones (McLemore, 1983). Uranium mineralization in the Poison Canyon sandstone occurs as primary-tabular and redistributed ore bodies (McLemore, 1983).

1.4 SITE HYDROGEOLOGY

The AUM Site is located on the west face of Mesa Montanosa, along a steep face above a broad valley with ephemeral drainages. The surface runoff flows southwest, either seeping into the ground or flowing to San Mateo Creek. San Mateo Creek flows south-southwest to the Rio San Jose. Rio San Jose is an intermittent stream that flows east-southeast past the town of Grants and into the Rio Puerco. The Rio Puerco is also an intermittent stream that flows southeast into the Rio Grande south of Belen.

The AUM Site is located in the Bluewater groundwater basin, which covers the south central portion of McKinley County and the north central portion of Cibola County (Edwards and Kiely, 2004). The Bluewater Basin contains a patchwork of groundwater aquifers, though the most productive is the San Andres-Glorieta Aquifer (Edwards and Kiely, 2004). Many domestic and stock wells utilize groundwater in the alluvium of surface drainages but the majority of potable groundwater comes from the San Andres-Glorieta Aquifer, including the town of Grants' municipal supply (Edwards and Kiely, 2004).

1.5 REGIONAL TOPOGRAPHY AND TERRAIN

The AUM Site can be found on the Dos Lomas Quadrangle 7.5 minute United States Geological Survey topographic map at an elevation of approximately 7400 feet above mean sea level (Figure 2). The AUM Site is located on the west face of Mesa Montanosa in McKinley County. The broader region around the AUM Site consists of mesas and broad flat valleys. An aerial photograph of the terrain surrounding the AUM Site is shown in Figure 3.

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 consists of two claim markers and mine roads along the mesa face. Please see the Photo Log provided in Appendix A for photos, Table 1

for the locations of the AUM Site features, and Figures 4 for the locations of the AUM Site features.

2.1 MINE SHAFTS, ADITS, AND DECLINES

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

2.2 MINING AND EXPLORATION PITS AND OPEN CUTS

No mining and exploration pits or open cuts were identified at the AUM Site.

2.3 WASTE AND ORE PILES AND DISTURBANCES

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

2.4 MINING RELATED BUILDINGS AND FOUNDATIONS

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

2.5 OTHER MINE FEATURES

Two claim markers were identified along the mine roads. Claim-1, along Rd-1 and Rd-2, was identified with "Rick 28/29 Claims." The second claim marker (Claim-2), along Rd-5 was identified with "Rick 27/28 Claims." Both claim markers were metal stakes approximately 4 feet tall with no rust or damage.

Two mine roads were also identified at the AUM Site. One road (Rd-1, Rd-2, Rd-4, Rd-5, and Rd-6) extends from the mesa top down along the mesa face, continuing south along the west face to Poison Canyon; approximately 1 mile. Another mine road (Rd-3) extends north along the mesa face for approximately ½ mile. These mine roads are unmaintained dirt roads and are washed out in some locations.

2.6 BOREHOLES

No boreholes were identified at the AUM Site.

2.7 RECLAMATION ACTIVITIES

No reclamation activities were identified at the AUM Site.

3.0 ARCHEOLOGICAL SITES

No apparent archeological sites were identified at the AUM Site.

4.0 SITE GAMMA RADIATION READINGS

The background gamma radiation reading at the AUM Site was measured approximately 100 yards east of the AUM Site. The background gamma readings were measured at 7 microroentgens per hour (µR/hr) at the ground surface and 7 µR/hr at 4 feet above the ground surface. The gamma radiation readings taken at the AUM Site were not significantly above background levels (Table 2). The maximum readings at the AUM Site were recorded along the mine road (Rd-1) and were measured at 38 µR/hr at the ground surface and 18 µR/hr at 4 feet above the ground surface.

5.0 CURRENT LAND USES

5.1 HUMAN ACTIVITY AND RECREATIONAL SITE USE

The AUM Site is difficult to access. Evidence of ranching exists in the surrounding area. This evidence includes ranch houses, fences, corrals, and cattle prints. Evidence of past mining activity was significant in the surrounding area; old mine roads, waste piles, and various mining equipment were identified along the access road.

5.2 NEARBY RESIDENTIAL, COMMERCIAL AND INDUSTRIAL STRUCTURES

There are three residential structures within a 1-mile radius of the AUM Site. These residences are located in the valley below the mesa, just under 1 mile to the southwest and south of the site.

5.3 NEARBY DOMESTIC WELLS

There are no domestic wells within a 1-mile radius of the AUM Site.

5.4 EVIDENCE OF GRAZING OR AGRICULTURE

Fences, corrals, and cattle in the area attest to active ranching activity. Two stock wells are within a 1-mile radius of the AUM Site, located near the residential structure south of the AUM Site.

5.5 EVIDENCE OF WILDLIFE

Four elk, western bluebirds, and crows were observed in the area surrounding the AUM Site.

6.0 VEGETATION

The AUM Site is located in the Juniper Savannah (Ecotone) vegetation type. Woody species include juniper, Pinyon Pine, Fourwing Saltbush and rabbitbrush species. Spiny Aster was an identified forb species. Grasses included muhly species, Hairy Grama, and a bluestem species. There was no evidence of noxious weeds at the AUM Site.

7.0 POTENTIAL OFFSITE IMPACTS

7.1 EROSION

Some gullying and downward movement of rock was observed along the mesa face in the AUM Site.

7.2 ENVIRONMENTAL IMPACTS

There is no evidence of soil staining from chemicals or from constituents present in the ore or waste rock at 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.

Edwards, Mark H. and Jeffrey Kiely, 2004. New Mexico Water Planning Region 6, Cibola/McKinley Regional Water Plan. Prepared for: The New Mexico Interstate Stream Commission; Prepared by: Northwest New Mexico Council of Governments, Gallup, New Mexico.

McLemore, Virginia T., 1983. Uranium and Thorium Occurrences in New Mexico: Distribution, Geology, Production, and Resources with Selected Bibliography, New Mexico Bureau of Mines & Mineral Resources, Open-file Report 183, pp. 1-21.

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

Bobcat-NM0141
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	Dirt nonmaintained	--	--	--	--	--	--	--	--	--	--
Claim-1	Yes	Other	Rd-1	Metal	4.00	--	--	--	--	--	NM0141_004	Along Rd-1.
Claim-2	Yes	Other	Rd-5	Metal	4.00	--	--	--	--	--	NM0141_019	Along Rd-5.
Rd-1	Yes	Dirt nonmaintained	--	--	--	--	--	--	--	--	NM0141_001 NM0141_002	Rd-1, Rd-2, Rd-4, Rd-5, and Rd-6 all one mine road along the mesa face.
Rd-2	Yes	Dirt nonmaintained	--	--	--	--	--	--	--	--	NM0141_003	Rd-1, Rd-2, Rd-4, Rd-5, and Rd-6 all one mine road along the mesa face.
Rd-3	Yes	Dirt nonmaintained	--	--	--	--	--	--	--	--	NM0141_005 NM0141_006 NM0141_007 NM0141_008 NM0141_018	--
Rd-4	Yes	Dirt nonmaintained	--	--	--	--	--	--	--	--	NM0141_018	Rd-1, Rd-2, Rd-4, Rd-5, and Rd-6 all one mine road along the mesa face.
Rd-5	Yes	Dirt nonmaintained	--	--	--	--	--	--	--	--	NM0141_018 NM0141_019	Rd-1, Rd-2, Rd-4, Rd-5, and Rd-6 all one mine road along the mesa face.
Rd-6	Yes	Dirt nonmaintained	--	--	--	--	--	--	--	--	NM0141_018	Rd-1, Rd-2, Rd-4, Rd-5, and Rd-6 all one mine road along the mesa face.

Notes:
-- designates no information

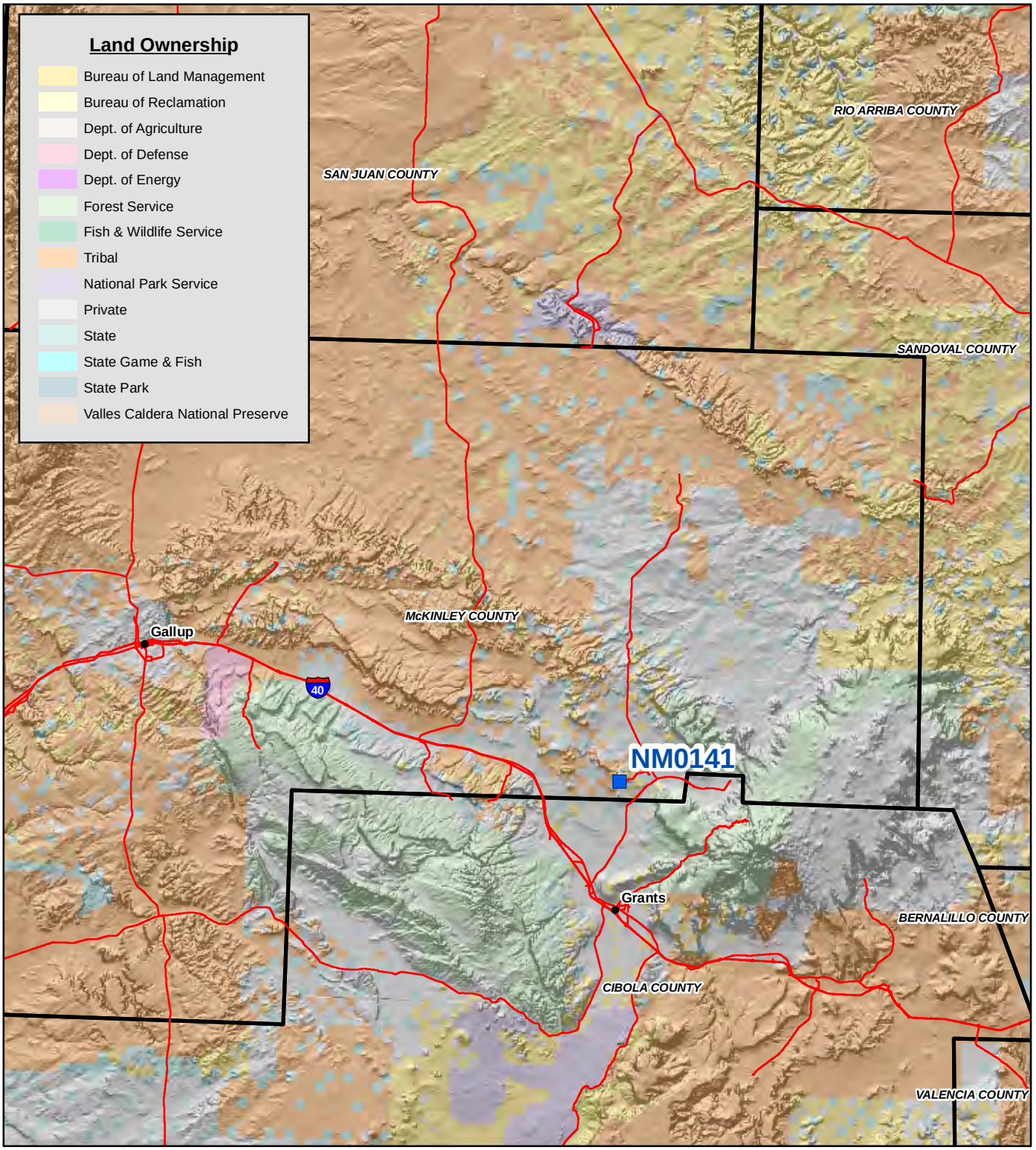
Table 2
Gamma Radiation Survey Results

Bobcat-NM0141
Abandoned Uranium Mine Assessments

Reading ID	Contact (µR/hr)	4 ft (µR/hr)	Associated Photo	Asssociated Feature
Rad-1	12	12	NM0141_001	Rd-1
Rad-2	38	18	NM0141_002	Rd-1
Rad-3	15	13	NM0141_004	Claim-1
Rad-4	24	14	NM0141_006	Rd-3
Rad-5	20	16	NM0141_007	Rd-3
Rad-6	16	12	--	Rd-3
Rad-7	35	18	NM0141_008	Rd-3
Rad-8	12	10	--	Rd-3
Rad-9	14	12	--	Rd-2, Rd-3, Rd-4
Rad-10	26	16	--	Rd-4
Rad-11	9	9	NM0141_019	Claim-2
RadBack-1	7	7	--	--

Notes:
All gamma readings at this site taken by Ludlum 192 µR/Ratemeter
µR/hr=microroetgens per hour
-- designates no information

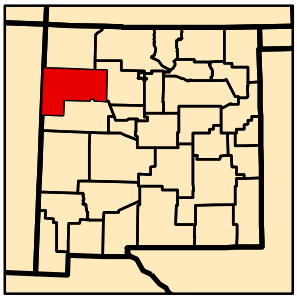
FIGURES



Map Source(s):
Ownership - BLM, 2007

0 7.5 15 30
Miles

NORTH

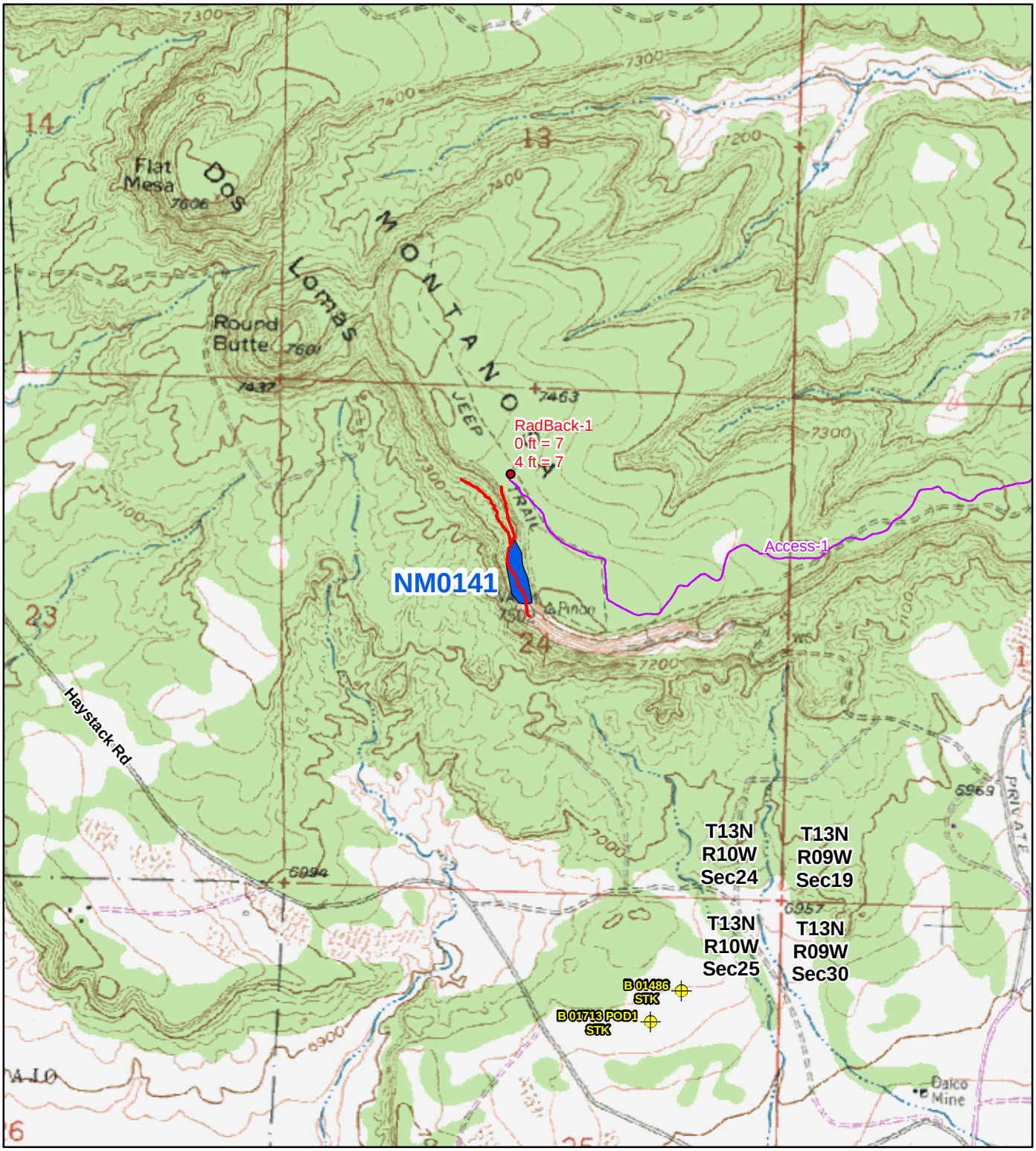


Legend

- AUM Location
- Road
- County Boundary

Figure 1
Site Location Map
NM0141-Bobcat
Abandoned Uranium Mine Assessment

File: S:\Projects\EMMD-001_Abandoned Uranium Mine Assessment\Sites\NM0141-Bobcat\GIS\Map\Site_Map_Bobcat_CP.mxd 03/25/2010



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

0 750 1,500 3,000
Feet

NORTH

Legend

- Radiation Readings (µR/hr)
- Well Within 1 Mile of Site
- Mine Road
- Access Route
- AUM Location Boundary (MMD Provided)

Figure 2
Topographic Map
NM0141-Bobcat
Abandoned Uranium
Mine Assessment

INTERA

File: S:\Projects\EMMD-001_Abandoned Uranium Mine Assessment\Sites\NM0141-Bobcat\GIS\Map\Topo_Map_Bobcat_CP.mxd 03/31/2010

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

0 750 1,500 3,000
Feet

NORTH

Legend

- Radiation Readings (µR/hr)
- Well Within 1 Mile of Site
- Mine Road
- Access Route
- AUM Location Boundary (MMD Provided)
- Section Boundary
- Township/Range Boundary

Figure 3
Aerial Photo
NM0141-Bobcat
Abandoned Uranium
Mine Assessment

File: S:\Projects\EMMD-001_Abandoned Uranium Mine Assessment\Sites\NM0141-Bobcat\GIS\Map\Aerial_Map_Bobcat_CP.mxd 04/19/2010

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

0 75 150 300
Feet

NORTH

Legend

- Radiation Readings (µR/hr)
- Claim Marker
- Photo Location
- Mine Road
- Access Route

Figure 4a
Site Map on
Aerial Photo
NM0141-Bobcat
Abandoned Uranium
Mine Assessment

INTERA

File: S:\Projects\EMMD-001_Abandoned Uranium Mine Assessment\Sites\NM0141-Bobcat\GIS\Map\CloseUp_Map_Aerial_Bobcat_CP.mxd 04/19/2010

Rad-4
0 ft = 24
4 ft = 14

Rad-5
0 ft = 20
4 ft = 16

Photo-7

Rd-3

Rad-7
0 ft = 35
4 ft = 18

Rad-6
0 ft = 16
4 ft = 12

Rad-8
0 ft = 12
4 ft = 10

RadBack-1
0 ft = 7
4 ft = 7

Rd-6

Claim-2

Rad-11
0 ft = 9
4 ft = 9

Access-1

Rd-5

Rd-4

Rad-10
0 ft = 26
4 ft = 16

Rad-9
0 ft = 14
4 ft = 12

Photo-18

Claim-1

Rad-3
0 ft = 15
4 ft = 13

Rd-2

Photo-2

Rad-2
0 ft = 38
4 ft = 18

Rd-1

Rad-1
0 ft = 12
4 ft = 12

Photo-1

Map Source(s):
Ownership - BLM, 2008

0 75 150 300
Feet

NORTH

Legend

- Radiation Readings (µR/hr)
- Claim Marker
- Photo Location
- Mine Road
- Access Route

Surface Ownership

- Bureau of Land Management

Figure 4b
Site Map with
Surface Ownership
NM0141-Bobcat
Abandoned Uranium
Mine Assessment

INTERA

File: S:\Projects\EMMD-001_Abandoned Uranium Mine Assessment\Sites\NM0141-Bobcat\GIS\Map\CloseUp_Map_Ownership_Bobcat_CP.mxd 04/19/2010

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 northwest at the Site.

Photo 2-Looking at green-grey sediment along the mine road (Rd-1).

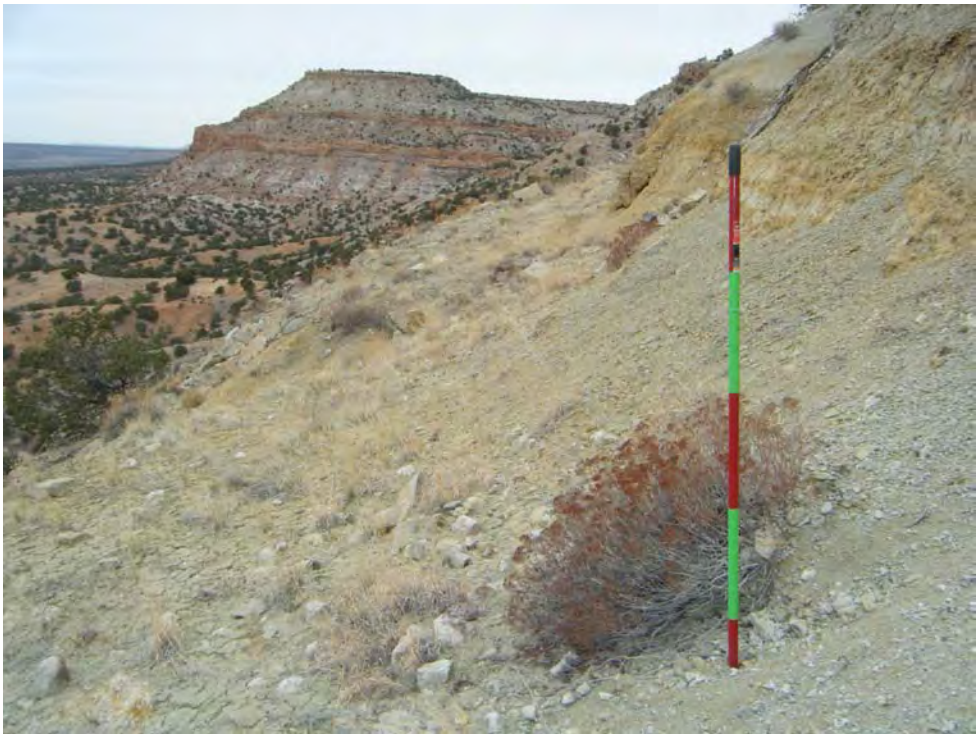


Photo 3-Looking northwest along the mine road (Rd-2).

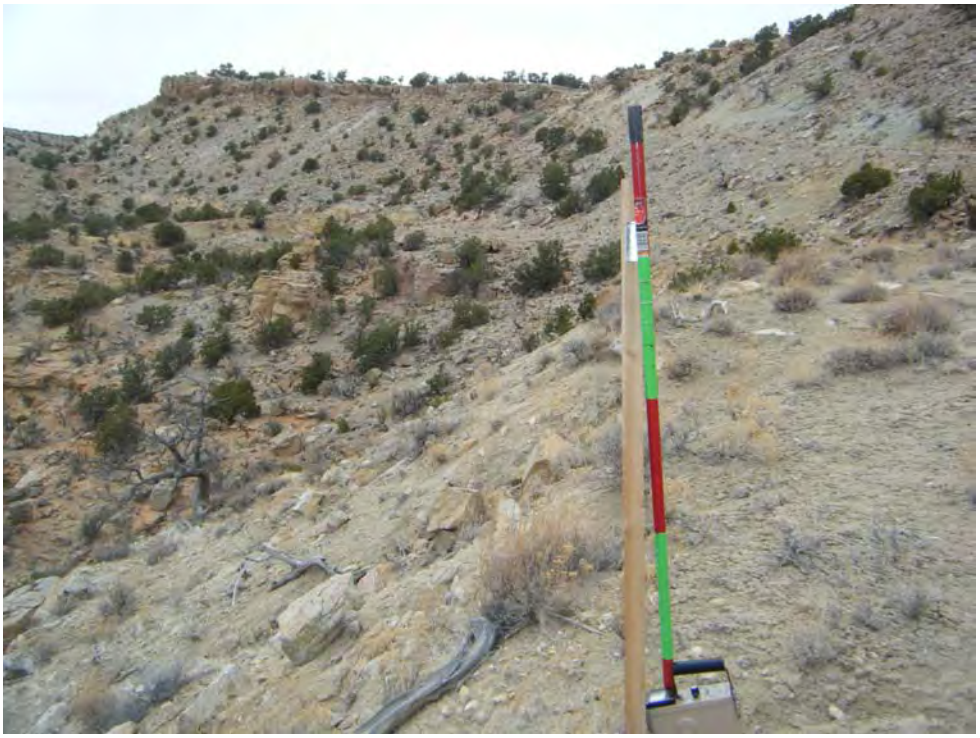


Photo 4-Looking north at Claim marker-1 along the mine road.

Photo 5-Looking north along the mine road (Rd-3).

Photo 6-Looking northwest at Rd-3.

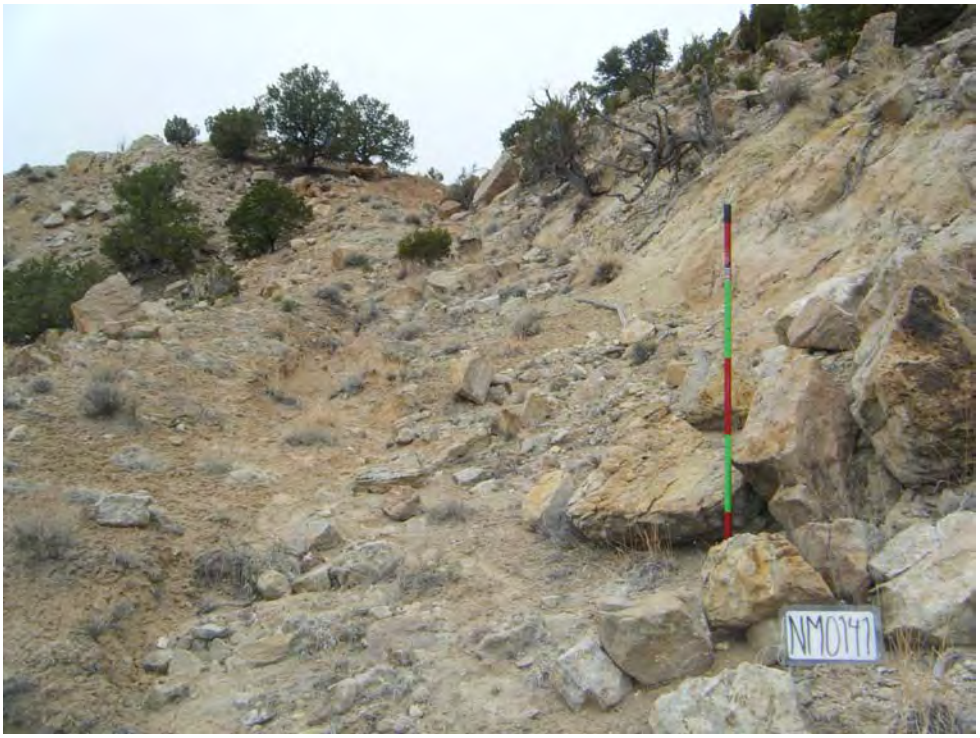


Photo 7-Looking northwest at the Site along the mine road (Rd-3).

Photo 8-Green sediment, west of the mine road (Rd-3).

Photo 9-Vegetation at the AUM Site.

Photo 10- Vegetation at the AUM Site.

Photo 11- Vegetation at the AUM Site.

Photo 12- Vegetation at the AUM Site.

Photo 13-Vegetation at the AUM Site.

Photo 14-Vegetation at the AUM Site.

Photo 15-Vegetation at the AUM Site.

Photo 16-Vegetation at the AUM Site.

Photo 17-Vegetation at the AUM Site.

Photo 18-Looking northwest at the junction of mine roads (Rd-3, lower left, and Rd-4 and Rd-5 upper left).

Photo 19-Looking northwest at Claimmarker-2 along the mine road (Rd-5).

APPENDIX B

FIELD NOTES

3/23/2010 ALT Abandoned Uranium Mines

Site Name: NM0141, Bobcat

Objective: Site Assessment

Personnel: Annelia Tinklenberg
Amy Andrews

Equipment: Rental Truck, Trimbel GeoXM (SN: 4948447271, 2008 Series), Ludlum 192 (SN: 234149), Fuji Film digital camera x ALT (No. 80539493), backup Garmin GPS, cell phone amplifier, field laptop

700 Left office for Bob Schmitt Ranch.

900 Met with Bob Schmitt, landowner for access and directions.

1000 Parked truck about 1-2 miles from site, cannot drive on the road anymore. Hiking in.

1100 At site. Beginning to log road.

Photo 1 - looking northwest at site name on southern end of site road (Photo Pt 1)

Rad 1 - at Photo Pt 1 - southern end of road
0m - 12 uR/h; 1m - 12 uR/h

~~ALT~~ Rd-1 - logging road, dirt, non maintained 5 ft wide average - Photo 1

Rad 2 - along Rd-1 at Photo 2 location, slope with ALT greenish-grey sediment
0m - 38 uR/h; 1m - 18 uR/h

Photo 2 - Rad 2, greenish-grey sediment, looking north

Photo 3 - looking northwest along Rd-2
Rd-2 - continuation of Rd-2
Claimmark-1 - along Rd-2; "Rick 28/29 Claims"

Photo 4 - looking north at Claim marker-1

Rad 3 - claimmarker-1 - 0m - 15 uR/h; 1m - 13 uR/h

~~Rd-3 continuation of Rd-1 and Rd-2~~ ALT

Rd-3 - lower road along mesa side; 8 ft wide
Photo 5 - looking north at Rd-3
Rd-3 leads to what looks like it could be a trench, filling in.

Photo 6 - looking northwest at trench-1
Rad 4 - north end trench-1 - 0m - 24 uR/h; 1m - 14 uR/h
Trench-1 - 50 ft long; 7ft wide; 3ft deep

Rad 5 - south of Trench-1; 0m - 20 uR/h; 1m - 16 uR/h

Photo 7 - looking northwest at site name, Trench-1 in the background

Rad 6 - west of Rd-3; 0m - 16 uR/h; 1m - 12 uR/h

Rad 7 - west of Rd-3, greenish rock
0m - 35 μR/h ; 1m - 18 μR/h
Photo 8 - greenish rock west of Rd-3

Rad 8 - Rd-3 ; 0m - 12 μR/h ; 1m - 10 μR/h

Photos 9 - 17 - Vegetation

Rad 9 - Junction of Rd-2, Rd-3, Rd-4
0m - 14 μR/h ; 1m - 12 μR/h

Photo 18 - looking west at Junction of Rd-2, Rd-3 and Rd-4

Rad 10 - along Rd-4 ; 0m - 26 μR/h ; 1m - 16 μR/h

Rd-4 - leading up the mesa face to the top, ~5ft wide
Rd-5 - continuation of Rd-4
Claimmarker-2 - along Rd 5 "Rick, 27/28 Claims"
Photo 19 - looking northeast at claimmarker-2

Rad 11 - claimmarker-2 ; 0m - 9 μR/h ; 1m - 9 μR/h

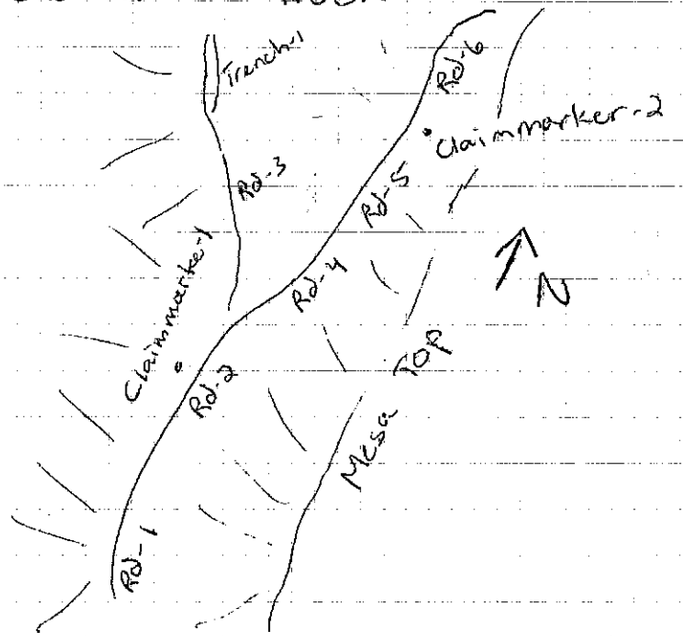
Rd-6 - continuation of Rd-5

1300 - At access road

Background Rad - 0m - 7 μR/h ; 1m - 7 μR/h

Access Rd-1 - Dirt, non maintained
Hiking back to truck

1340 Back at the truck



Soils: Tan, grey-green, purple silt. Fine-grained. Rocky.

Rocks: Tan, grey-green, purple sandstones, some black to dark grey shale and coal beds.

Human Activities: Cattle grazing: fences, corrals, cow tracks, etc. Some evidence of survey from aerial survey markers and metal survey stakes along the access road. Evidence of past mining from waste piles and old equipment along access road.

Wildlife: Pinon-Juniper. Dry. Eastern, Western or Mountain Bluebird. Jackrabbit droppings. Elk.