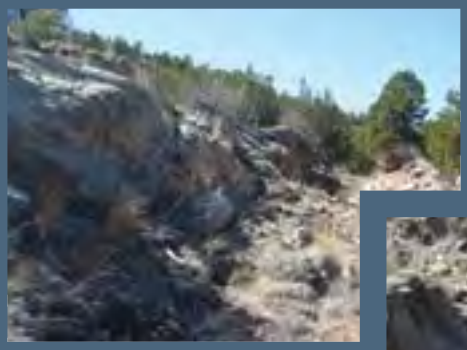
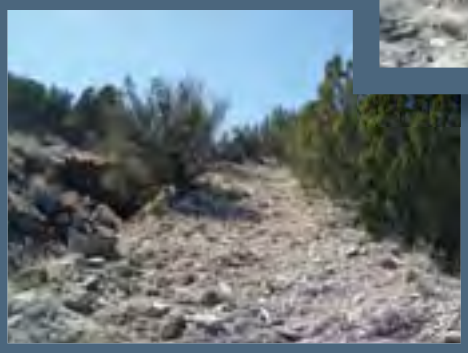
Abandoned Uranium Mine Site Assessment for the Good Luck Site (NM0175)





FINAL REPORT

Prepared For:

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April 20, 2010

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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 Good Luck Site (AUM Site), MMD ID: NM0175, on March 12, 2010.

1.1 PREVIOUSLY KNOWN INFORMATION ABOUT THE SITE

Anderson (1980) visited the Good Luck prospect in September 1979. A trench trending east-west in mottled gray sandstone of the Chinle Formation was described. In addition, two mine roads were recorded, one to the south and one to the east (Anderson, 1980).

Finch (1972) reports that 8.43 tons of uranium ore was produced from the Good Luck group. This ore was extracted from the middle (sandstone) member of the Chinle Formation (Finch, 1972).

1.2 SITE LOCATION AND DIRECTIONS

The AUM Site is on land owned by the State of New Mexico in the northwestern quarter of Section 6, Township 7 North, Range 32 East. Mine features are just east of the boundary with Township 7 North, Range 31 East, Section 1. The Site is located in Quay County and is approximately 23 miles south-southeast of the town of Tucumcari. The location of this site was provided to INTERA by MMD.

The AUM Site is on the edge of a mesa and it can be accessed from below or above. INTERA recommends accessing the Site from below, but this requires permission from several private landowners. Access from above also requires permission from a private landowner. Permission to access the AUM Site itself must be obtained from the State of New Mexico and the holder of the grazing lease.

To access the AUM Site from below, drive east from Albuquerque on Interstate 40 for 170 miles. After passing through the town of Tucumcari, take Exit 339 towards New Mexico 278. Continue east on the frontage road for about a third of a mile, then turn left onto New Mexico 278. Remain on New Mexico 278 for approximately 21 miles. The road will take a sharp left, but continue straight onto a dirt road. Travel on this dirt road for 1 mile, then turn right onto another dirt road. Continue on this road for 1.3 miles and then turn left onto another dirt road. Continue for 2 miles, then turn right again and continue for 2.8 miles. After 2.8 miles, turn left towards the mesa and continue for approximately 2.7 miles. Once you reach the stock tank at the base of the mesa, continue on foot to the AUM site.

To access the AUM Site from above, drive east from Albuquerque on Interstate 40 for 164 miles. At the town of Tucumcari, take Exit 332 and drive south along New Mexico 209 for about 32 miles. Turn left at Quay Road AH, and drive north for two miles. The last mile along this county road is gated, and permission from the landowner is required to proceed further. When you reach Quay Road 41, turn left and watch for a road to your left. This road will descend the

slope of the mesa. At the foot of the slope, there is a stock tank. Park at this stock tank and proceed on foot to the AUM Site.

1.3 SITE GEOLOGY

The AUM Site is located on the southeastern edge of the Tucumcari Basin, a Pennsylvanian structure formed by strike-slip motion. The topography of this basin consists of isolated mesas and buttes. The subsurface geology is a complex series of buried basins and uplifts (Broadhead, 2004).

The local Site geology is dominated by the Caprock Escarpment, a large mesa comprising the edge of the Llano Estacado. Flat-lying members of the Tertiary Ogallala Formation and Triassic Chinle Formation outcrop on the slopes of this mesa. The highest stratum is a calcrete layer in the Ogallala Formation. Below the calcrete layer lie fluvial sands, clays and silts as well as some aeolian sands (Gustavson and Holliday, 1999). Sandstone and shale of the Chinle Group underlie the Ogallala Formation. The Upper Chinle Group in this location consists of three layers: an upper shale, a middle sandstone, and a lower shale. The upper and lower shales are slope forming, whereas the middle sandstone forms a prominent resistant shelf about three quarters down the slope of the Caprock Escarpment. The AUM Site is located in this middle layer. Anomalous radioactivity is present in discontinuous conglomerates and accumulations of carbonized organic matter in a gray-green fluvial sandstone (Finch, 1972).

1.4 SITE HYDROGEOLOGY

The surface runoff at the AUM Site discharges north off the slope of the Caprock Escarpment, eventually entering Barranca Creek, which drains into the Canadian River just east of the town of Logan. Permanent surface water in the area is restricted to stock tanks, several of which lie on the drainage below the AUM Site.

The AUM Site is located in the Curry County Underground Water Basin near its northern border with the Tucumcari Underground Water Basin. This basin falls between the Tucumcari Basin to the north, the Portales Basin to the south, the Fort Sumner basin to the west, and the Texas border to the east. The underlying Chinle Formation is generally a poor aquifer in this region. The Ogallala Formation is also present, but it is thinner in New Mexico compared to states further east. Groundwater in the Ogallala Formation tends to flow west to east (DBSA, 2007).

1.5 REGIONAL TOPOGRAPHY AND TERRAIN

The AUM Site is found on the Forrest Quadrangle 7.5 minute United States Geological Survey topographic map at an elevation of approximately 4600 feet above mean sea level (see Figure 2). The AUM Site is located on the northern slopes of the Caprock Escarpment, approximately 23 miles south-southeast of Tucumcari. The Caprock Escarpment marks the boundary between the Llano Estacado to the south and the Canadian River Valley to the north, rising about 500 feet above the surrounding terrain. Figure 3 shows an aerial photograph of the area 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. Two open cuts and two piles were found onsite. In addition, two mining roads, a possible claim marker, and a large erosional feature were found at the AUM Site. A stock tank (water catchment) was also discovered about a quarter mile northeast of the mine features. Please see the Photo Log in Appendix A, Table 1 for a list of AUM Site features, and Figure 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

Two open cuts were discovered at the AUM Site. CutLn-1 is the trench cut mentioned by Anderson, 1980. Photo 7 (see Appendix A) is a view of CutLn-1 that replicates photo "a" in the Anderson Report. The highest gamma ray reading in CutLn-1 was 9 µR/h at contact. CutPly-1 is the other open cut found onsite. This open cut was next to a mining road (Rd-2). The highest gamma ray reading recorded in CutPly-1 was 17 µR/h at contact.

2.3 WASTE AND ORE PILES AND DISTURBANCES

Two piles were found at the AUM Site. PilePly-1 is a small boulder pile at the northwest end of CutPly-1. Photo 9 (see Appendix A) shows PilePly-1 with CutPly-1 in the background, replicating photo b in the Anderson Report. The maximum gamma ray reading at PilePly-1 was 30 µR/hr at contact. PilePly-2 is a larger, flat topped pile to the east of CutPly-1. Rocks in this pile contained fragments of petrified wood and zones of conglomerate. The highest gamma ray reading at PilePly-2 was 39 µR/hr at contact.

2.4 MINING RELATED BUILDINGS AND FOUNDATIONS

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

2.5 OTHER MINE FEATURES

Two mine roads (Rd-1 and Rd-2) exist at the AUM Site. Both of these roads are no longer passable. A possible claim marker was discovered (Claim-1, see Photo 4 in Appendix A).

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 at the AUM Site, recording 6 µR/hr at contact and 6 µR/hr at 4 ft above ground. Please see Table 2 for all of the gamma radiation readings taken at the AUM Site and Figure 4 for the locations of the radiation readings.

The maximum gamma radiation reading for the AUM Site was 39 µR/hr at contact at radiation survey point Rad-8. This reading was taken on a pile (PilePly-2).

5.0 CURRENT LAND USES

5.1 HUMAN ACTIVITY AND RECREATIONAL SITE USE

A well maintained dirt road descends the Caprock Escarpment about a third of a mile to the east of the AUM Site. Stock tanks, cow droppings, and the presence of a grazing lease on the land indicate that it is being ranched.

5.2 NEARBY RESIDENTIAL, COMMERCIAL AND INDUSTRIAL STRUCTURES

No structures were noted on or near the AUM Site.

5.3 NEARBY DOMESTIC WELLS

No wells are located within a mile of the Site.

5.4 EVIDENCE OF GRAZING OR AGRICULTURE

Cow droppings were noted in the area and a local rancher holds a grazing lease on the Site. A stock tank is located about a quarter mile northeast of the mine features.

5.5 EVIDENCE OF WILDLIFE

No evidence of wildlife was seen onsite.

6.0 VEGETATION

The Good Luck site is located in the Plains-Mesa Grassland vegetation type. Woody species include juniper, scrub oak, prickly pear cactus, tree cholla, soapwood yucca, and featherplume. No forbs were collected from or seen at the site. Grasses include beargrass (*Nolina* Sp.), side-oats grama grass as well as a *Stipa* species. There was no evidence of noxious weeds onsite.

7.0 POTENTIAL OFFSITE IMPACTS

7.1 EROSION

A large gully (ErosPly-1) is developing from runoff channeled by CutLn-1. This gully is also cutting into Rd-1. See Photos 13 and 14 in Appendix A for a view of this feature.

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.

Broadhead, Ronald F, 2004. Petroleum Geology of the Tucumcari Basin-Overview and Recent Exploratory Activity. New Mexico Geology, Vol. 26, No. 3.

Daniel B. Stephens & Associates, Inc (DBSA), 2007. Northeast New Mexico Regional Water Plan. Prepared for the City of Tucumcari and the Northeast New Mexico Regional Water Planning Steering Committee.

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

New Mexico Office of the State Engineer (NMOSE), 2006. Rules and Regulations Governing the Appropriation and Use of Ground Water in New Mexico.

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TABLES

Table 1
Site Features

Good Luck-NM0175
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 Road	--	Dirt Maintained	--	--	--	--	--	--	--	access attempt
Access-2	No	Access Road	--	Dirt Nonmaintained	--	--	--	--	--	--	--	--
Claim-1	Yes	Claim Marker	--	--	3	0.5	0.5	--	--	--	NM0175_004	wooden post
CutLn-1	Yes	Open Cut	--	--	6	20	80	--	--	--	NM0175_006 NM0175_007	--
CutPly-1	Yes	Open Cut	--	--	5	10	70	--	--	--	NM0175_008 NM0175_012	--
ErosPly-1	Yes	Erosion	--	--	30	30	50	--	--	--	NM0175_013 NM0175_014	--
Imp-1	No	Stock Tank	--	--	--	--	--	--	--	--	NM0175_002	stock tank
PilePly-1	Yes	Pile	--	Rock	5	10	20	--	--	--	NM0175_009	--
PilePly-2	Yes	Pile	--	Rock	8	40	40	--	--	--	NM0175_010 NM0175_011	--
Rd-1	Yes	Mine Road	--	Dirt Nonmaintained	--	--	--	--	--	--	NM0175_005	--
Rd-2	Yes	Mine Road	--	Dirt Nonmaintained	--	--	--	--	--	--	NM0175_008	--

Notes:

-- designates no information

Table 2
Gamma Radiation Survey Results

Good Luck-NM0175
Abandoned Uranium Mine Assessments

Reading ID	Associated Features	Reading at 0ft Above Ground (µR/hr)	Reading at 4ft Above Ground (µR/hr)	Associated Photos
Rad-1	--	7	9	--
Rad-2	--	7	9	NM0175_003
Rad-3	Claim-1	7	7	--
Rad-4	CutLn-1	8	8	--
Rad-5	--	9	8	--
Rad-6	PilePly-1	10	9	--
Rad-7	--	30	14	--
Rad-8	PilePly-2	39	18	--
Rad-9	CutPly-1	9	11	--
Rad-10	CutPly-1	17	13	--
RadBack-1	--	6	6	--

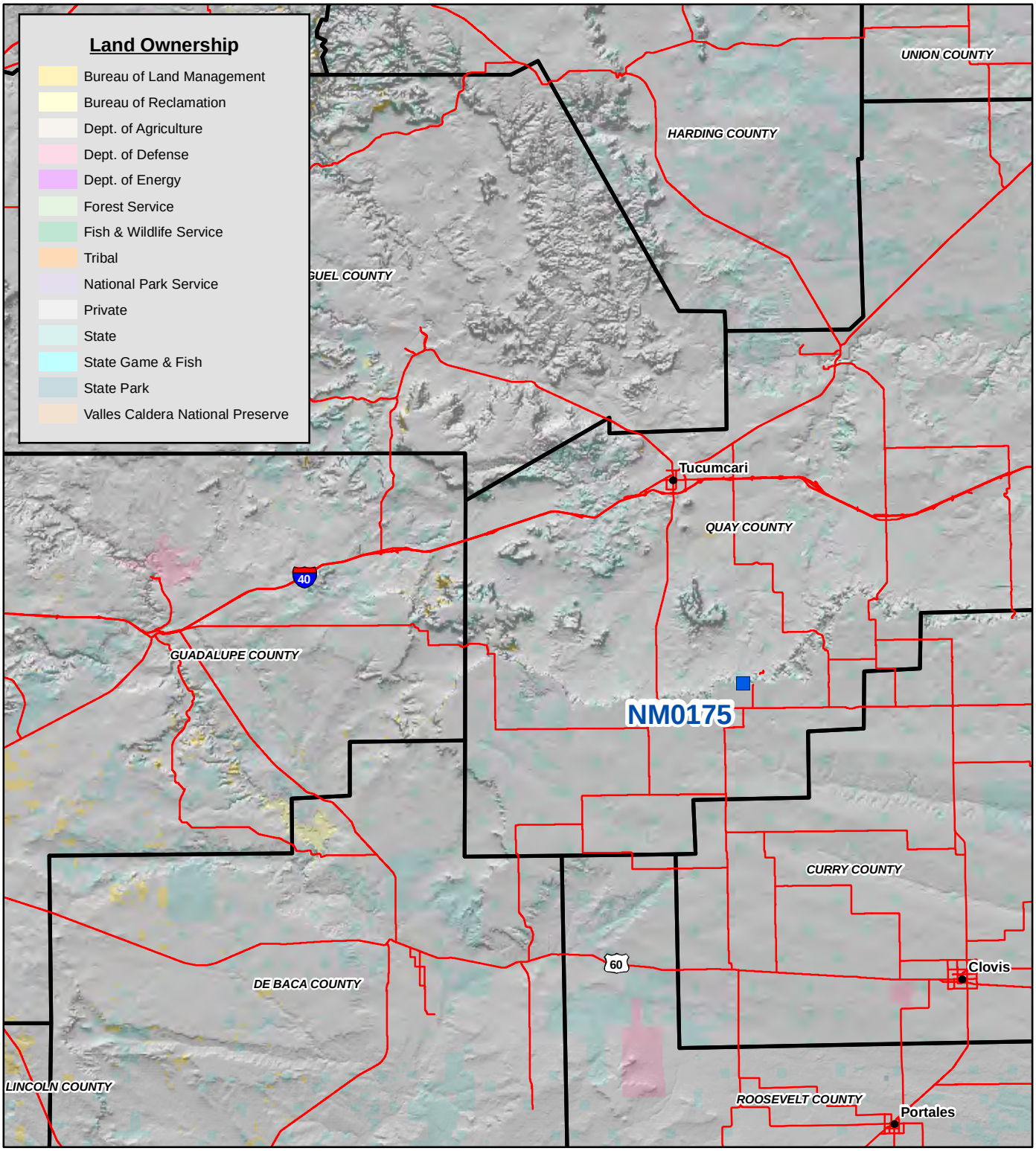
Notes:

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

µR/hr=microroetgens per hour

-- designates no information

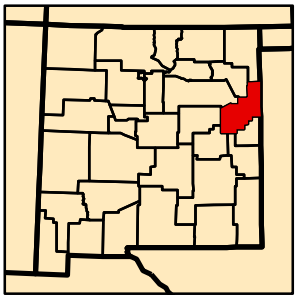
FIGURES



Map Source(s):
Ownership - BLM, 2007

0 7.5 15 30
Miles

NORTH



Legend

- AUM Location
- Road
- County Boundary

Figure 1
Site Location Map
NM0175-Good Luck
Abandoned Uranium Mine Assessment

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Map Source(s):
U.S. Geological Survey 7.5-Minute
Topographic Map
-Forrest, 1987
-Norton, 1971

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

0 750 1,500 3,000
Feet

NORTH

Legend

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

Figure 2
Topographic Map
NM0175-Good Luck
Abandoned Uranium
Mine Assessment

INTERA

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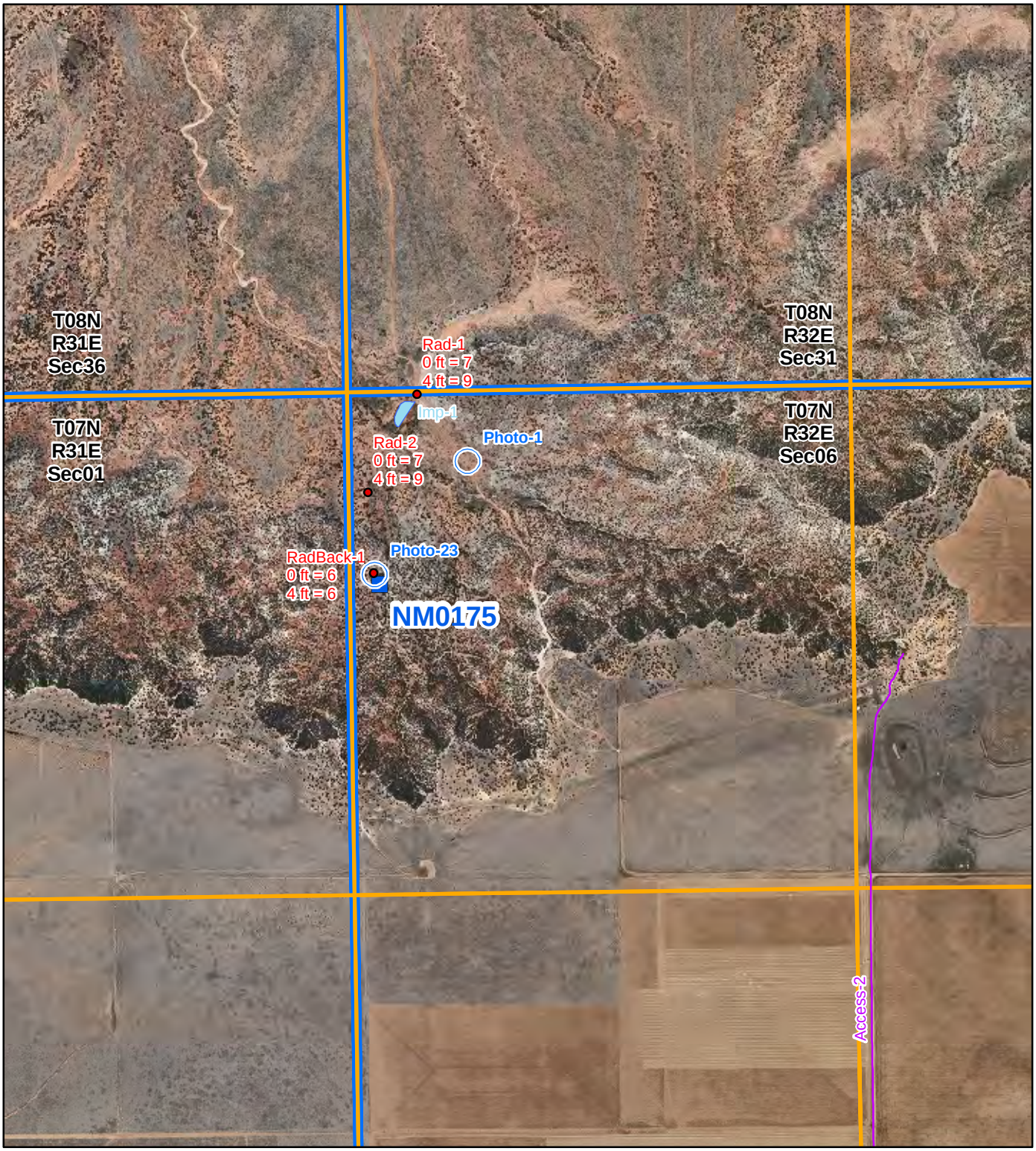

Map Source(s):
U.S. Geological Survey 7.5-Minute
DOQQ County Mosaic
-Quay County, 2009

0 750 1,500 3,000
Feet

NORTH

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

Legend

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

Figure 3
Aerial Photo
NM0175-Good Luck
Abandoned Uranium
Mine Assessment

INTERA

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

0 40 80 160
Feet

NORTH

Legend

- Radiation Readings (µR/hr)
- Claim Marker
- Photo Location
- Open Cut
- Mine Road
- Erosion Boundary
- Open Cut Boundary
- Pile Boundary

Figure 4a
Site Map on
Aerial Photo
NM0175-Good Luck
Abandoned Uranium
Mine Assessment

INTERA

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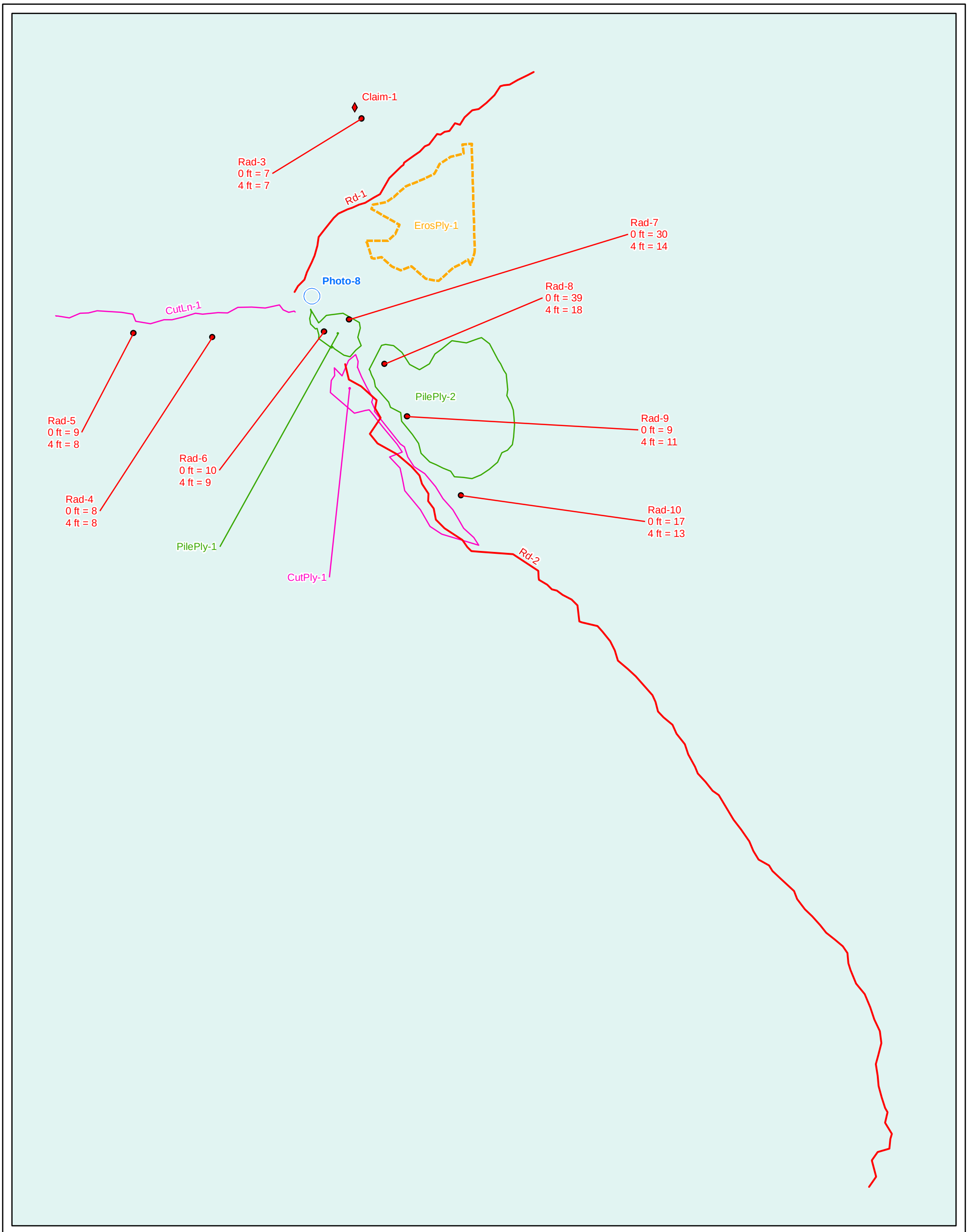

Map Source(s):
Ownership - BLM, 2008

0 15 30 60
Feet

NORTH

Legend

- Radiation Readings (µR/hr)
- Claim Marker
- Photo Location
- Open Cut
- Mine Road
- Erosion Boundary
- Open Cut Boundary
- Pile Boundary

Surface Ownership

- State

Figure 4b
Site Map with
Surface Ownership
NM0175-Good Luck
Abandoned Uranium
Mine Assessment

File: S:\Projects\EMMD-001_Abandoned Uranium Mine Assessment\Sites\NM0175-Good_Luck\GIS\Maps\CloseUp_Map_Ownership_GoodLuck_CP.mxd 04/08/2010

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-Site photo, looking south.

Photo 2-A stock tank (Imp-1) below the AUM Site, looking southwest.

Photo 3-Site photo, looking south.

Photo 4-A possible claim marker (Claim-1).

Photo 5-Looking southwest up the slope at Rd-1.

Photo 6-CutLn-1, looking west.

Photo 7-CutLn-1, looking southwest, replicating Anderson photo “a”.

Photo 8-Looking southeast at Rd-2, replicating Anderson photo “b”.

Photo 9-Looking southeast at PilePly-1.

Photo 10-Looking southeast at PilePly-2.

Photo 11-Looking east at PilePly-2.

Photo 12-Looking east at PilePly-1 (foreground), PilePly-2 (left background), Rd-2 (center background), and CutPly-1 (right background).

Photo 13-Looking east at ErosPly-1.

Photo 14-Looking northwest into ErosPly-1.

Photo 22-AUM Site vegetation.

Photo 23-Looking southeast at location of MMD shapefile.

APPENDIX B

FIELD NOTES

3/12/10 AEA Abandoned Uranium Mines

Site Name: NM0175 - Good Luck

Objective: Site Assessment

Personnel: Amy Andrews
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, cell phone amplifier, field laptop

630 left hotel for site

715 met up with Wade Whitson for access across his land to the state land, he gave us a key to one of his gates.

830 ran into another locked gate, looks like our route cuts through the corner of someone else's land. Turning around, will approach from the top of the caprock, through Ted Rush's land. Ted Rush's wife gave us permission to be on their land.

1030 parked truck, packed bags and set out on foot, walking around the caprock to a road that goes down through the W½ of Section 6.

3/12/10 AEA Abandoned Uranium Mines

Photo 1 - site photo, looking S

Rad 1 - 0m = 7uR/hr; 1m = 9uR/hr
Imp 1 - stock tank
Photo 2 - Imp 1, looking SW

Rad 2 - 0m = 7uR/hr; 1m = 9uR/hr
Photo 3 - site photo, looking S

Claim 1 - wooden plank supported by a rock
Photo 4 - claim 1, looking W
Rad 3 - 0m = 7uR/hr; 1m = 7uR/hr

Rd 1 - 8ft wide
Photo 5 - rd 1, looking SW

Cut/fill - rd 1 lead to open cut 20ft wide, 6ft deep
Photo 6 - cut/fill
Photo 7 - replicating Anderson photo of cut, looking SW
Photo 8 - replicating Anderson photo of access road, looking SE
Rad 4 - 0m = 8uR/hr; 1m = 8uR/hr
Rad 5 - 0m = 9uR/hr; 1m = 8uR/hr

Pilepoly 1 - 5ft high, 10ft x 20ft
Photo 9 - pilepoly 1, looking SE
Rad 6 - 0m = 6uR/hr; 1m = 9uR/hr

Rad 7 - 0m = 30uR/hr; 1m = 14uR/hr

3/12/10 AEM Abandoned Uranium Mines

Pileply2 - 8ft high
Photo 10 - pileply2, looking SE AEM
Photo 11 - pileply2, looking E
Rad 8 - 0m = 34 uR/hr; 1m = 18uR/hr

Cutply1 - 10ft wide, 5ft deep
Photo 12 - shows pileply1, pileply2, cutply1, and rd2
Rd2 - 10ft wide, runs SE - NW

Erosply1 - erosion from water running through cutln1 + down the hill
Photo 13 - erosply1, looking E
Photo 14 - erosply1, looking NW

Rad 9 - 0m = 9uR/hr; 1m = 11uR/hr
Rad 10 - 0m = 17uR/hr; 1m = 13 uR/hr

Photos 15-22 - vegetation

Photo 23 - canyon S of mine features, looking SE, where MMD shape file is located

RadBack1 - 0m = 6uR/hr; 1m = 6uR/hr

1400 finished recording features, walking back to truck

1430 back at truck, packing up to head to abq

3/12/10 AEM Abandoned Uranium Mines