Abandoned Uranium Mine Site Assessment for the Gay Eagle Site (NM0121)

FINAL REPORT

Prepared For:

New Mexico Energy, Minerals and
Natural Resources Department
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NM0121

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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 Gay Eagle Site (AUM Site), MMD ID: NM0121 on April 7, 2010.

1.1 PREVIOUSLY KNOWN INFORMATION ABOUT THE SITE

The Gay Eagle claim was last registered at the State Mining Inspector's office in 1959. However, it was restaked and renamed the Tycoon 1 in 1976. Anderson (1980) visited the Gay Eagle site in 1980, finding waste piles, overburden piles, and open cuts. This visit was in conjunction with a survey of the Black Hawk, Bunney, UDC 1-4, and Red Bluff 7, 8, and 10 claims (Anderson, 1980).

1.2 SITE LOCATION AND DIRECTIONS

The AUM Site is on private land. The Site is located in the southern half of the southwest corner of Township 12 North, Range 9 West and is located in Cibola County (formerly part of Valencia County), approximately 10 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 1.6 miles to the AUM Site.

Note that permission from two 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, and the Site is owned by a different landowner.

1.3 SITE GEOLOGY

The AUM Site lies within the Grants uranium region. The topography of this region is characterized by mesas of Triassic, Jurassic, and Cretaceous sediments 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 7000 feet above mean sea level (see Figure 2). The AUM Site is located just west of La Jara Mesa, on a broad mesa capped by the Todilto Formation.

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 pit and five piles were found 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 mine shafts, adits, or declines were found at the AUM Site.

2.2 MINING AND EXPLORATION PITS AND OPEN CUTS

One pit was found onsite (Pit-1; see Photos 2-8 in Appendix A). This pit contains mineralized Todilto Formation limestone, some of which reads up to 3800 µR/hr at 0 ft above ground (radiation survey point Rad-4; see photos 7 and 8 in Appendix A).

2.3 WASTE AND ORE PILES AND DISTURBANCES

Five piles were found at the AUM Site. PilePly-1 consists of waste rock (see Photo 1 in Appendix A). PilePly-2 (see Photo 9 in Appendix A) and PilePly-3 (see Photo 10 in Appendix

A) contain both waste rock and overburden. PilePly-4 (see Photo 12 in Appendix A) and PilePly-5 (see Photo 14) are mostly waste rock. One gamma reading on PilePly-5 recorded 1000 µR/hr at 0 ft above ground (radiation survey point Rad-7). Material from PilePly-4 is spilling off the edge of the mesa, into a drainage below.

2.4 MINING RELATED BUILDINGS AND FOUNDATIONS

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

2.5 OTHER MINE FEATURES

No other mining related features were found at the AUM Site.

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, recording26 µR/hr at 0 ft above ground and 30 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 3600 µR/hr at 0 ft above ground at radiation survey point Rad-4 (see Photo 7 and 8 in Appendix A). This reading was taken on a localized area of mineralization on the walls of Pit-1. Other notable radiation readings were taken at radiation survey point Rad-3 (1600 µR/hr at 0 ft above ground) in Pit-1 and radiation survey point Rad-9 (1300 µR/hr at 0 ft above ground) on PilePly-5. An outcrop of Todilto Formation limestone in an arroyo yielded 1000 µR/hr (radiation survey point Rad-7, see Photo 11 in Appendix A).

5.0 CURRENT LAND USES

5.1 HUMAN ACTIVITY AND RECREATIONAL SITE USE

Nearby barbed wire fences and cow prints suggest the area is active ranchland. Evidence of present-day prospecting efforts (sample bags, water pipes, etc) was found onsite.

5.2 NEARBY RESIDENTIAL, COMMERCIAL AND INDUSTRIAL STRUCTURES

No structures were sighted within a mile of the AUM Site.

5.3 NEARBY DOMESTIC WELLS

One domestic well (B-01340) is located about 0.9 miles south of the AUM Site. This well is 300 ft deep, but depth to water and installment date are not known. A non-domestic well (B-01341) is located about 0.6 miles south of the Site (NMOSE, 2008).

5.4 EVIDENCE OF GRAZING OR AGRICULTURE

Direct evidence of grazing is not present at the AUM Site itself, but barbed wire fences and cow prints were seen nearby.

5.5 EVIDENCE OF WILDLIFE

Scrub jays, crows, and cottontails were observed onsite. Deer scat was also found.

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 many 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.

Edwards, Mark H. and Kiely, Jeffrey, 2004. Cibola-McKinley Regional Water Plan. Prepared for the New Mexico Interstate Stream Commission.

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McLaughlin, E. D., Jr., 1963. Uranium Deposits in the Todilto Limestone of the Grants District in Kelley, Vincent C., ed. Geology and Technology of the Grants Uranium Region. New Mexico Bureau of Mines and Mineral Resources, Memoir 15.

McLemore, Virginia T., 2002. Navajo Lake State Park: New Mexico Geology, v. 24, no. 3, p. 91-96,103.

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

Gay Eagle-NM0121
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	--	--	--	--	--	--	--	--
PilePly-1	Yes	Waste	--	Rock	15	75	100	--	--	--	NM0121_001	--
PilePly-2	Yes	Waste	--	Rock	25	75	100	--	--	--	NM0121_009	--
PilePly-3	Yes	Waste	--	Rock	20	50	120	--	--	--	NM0121_010	--
PilePly-4	Yes	Waste	--	Rock	20	100	200	--	--	--	NM0121_012	Spilling into drainage
PilePly-5	Yes	Waste	--	Rock	15	100	200	--	--	--	NM0121_014, NM0121_015	--
Pit-1	Yes	Mining	--	--	20	30	180	Yes	--	--	NM0121_003, NM0121_004, NM0121_005, NM0121_006	--

Notes:
-- designates no information

Table 2
Gamma Radiation Survey Results

Gay Eagle-NM0121
Abandoned Uranium Mine Assessments

Reading ID	0 ft (µR/hr)	4 ft (µR/hr)	Associated Photo	Asssociated Feature
Rad-1	190	110	--	PilePly-1
Rad-2	1000	280	--	Pit-1
Rad-3	1600	260	NM0121_007	Pit-1
Rad-4	3600	380	NM0121_008	Pit-1
Rad-5	160	110	--	PilePly-2
Rad-6	36	35	--	PilePly-3
Rad-7	1000	500	NM0121_011	--
Rad-8	220	150	--	PilePly-4
Rad-9	1300	700	--	PilePly-5
Rad-10	130	90	--	PilePly-5
RadBack-1	26	30	--	--

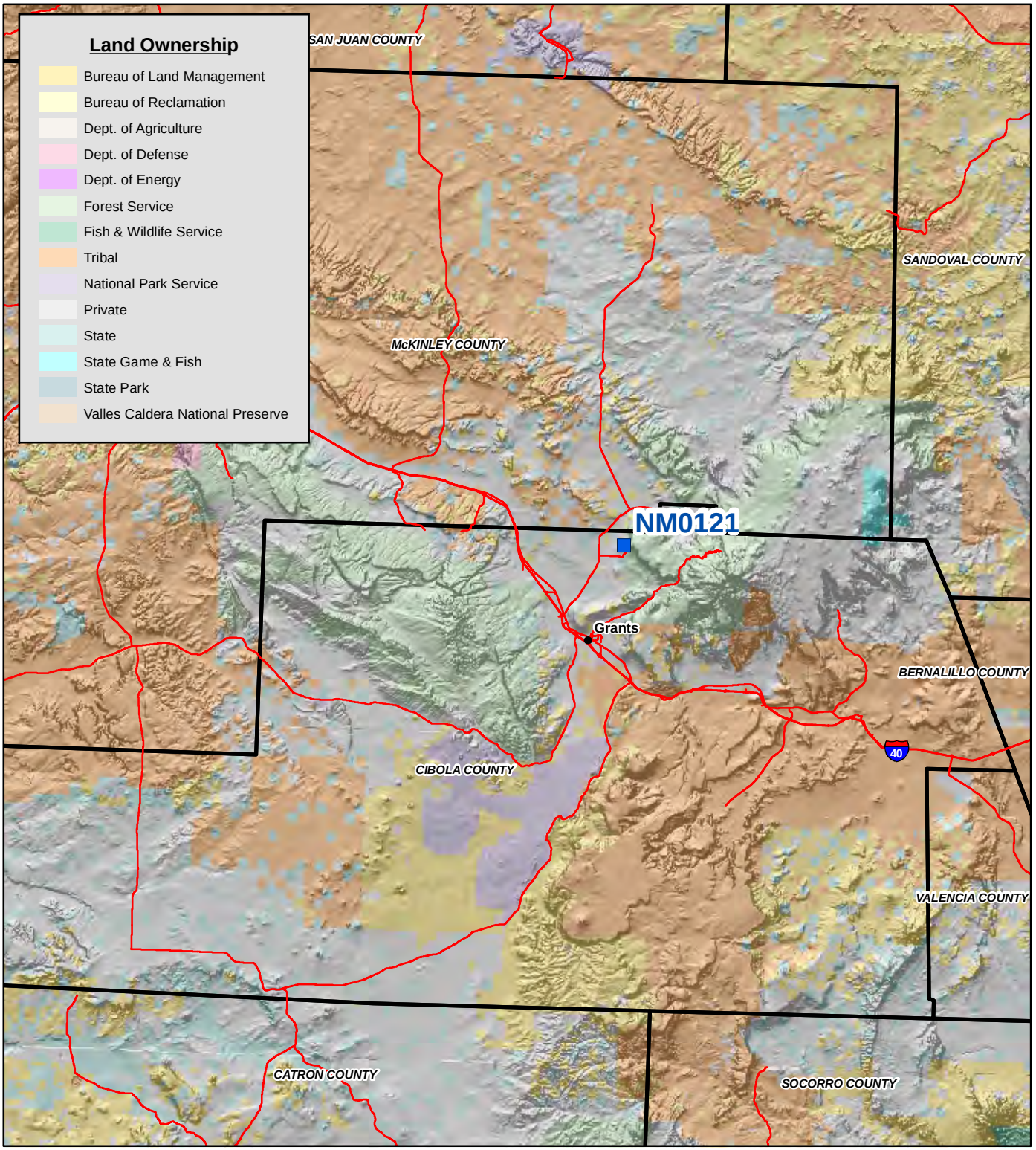
Notes:

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

µR/hr=microroetgens per hour

-- designates no information

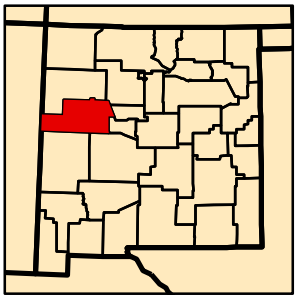
FIGURES



Map Source(s):
Ownership - BLM, 2008

0 7.5 15 30
Miles

NORTH



Legend

- AUM Location
- Road
- County Boundary

Figure 1
Site Location Map
NM0121-Gay Eagle
Abandoned Uranium Mine Assessment

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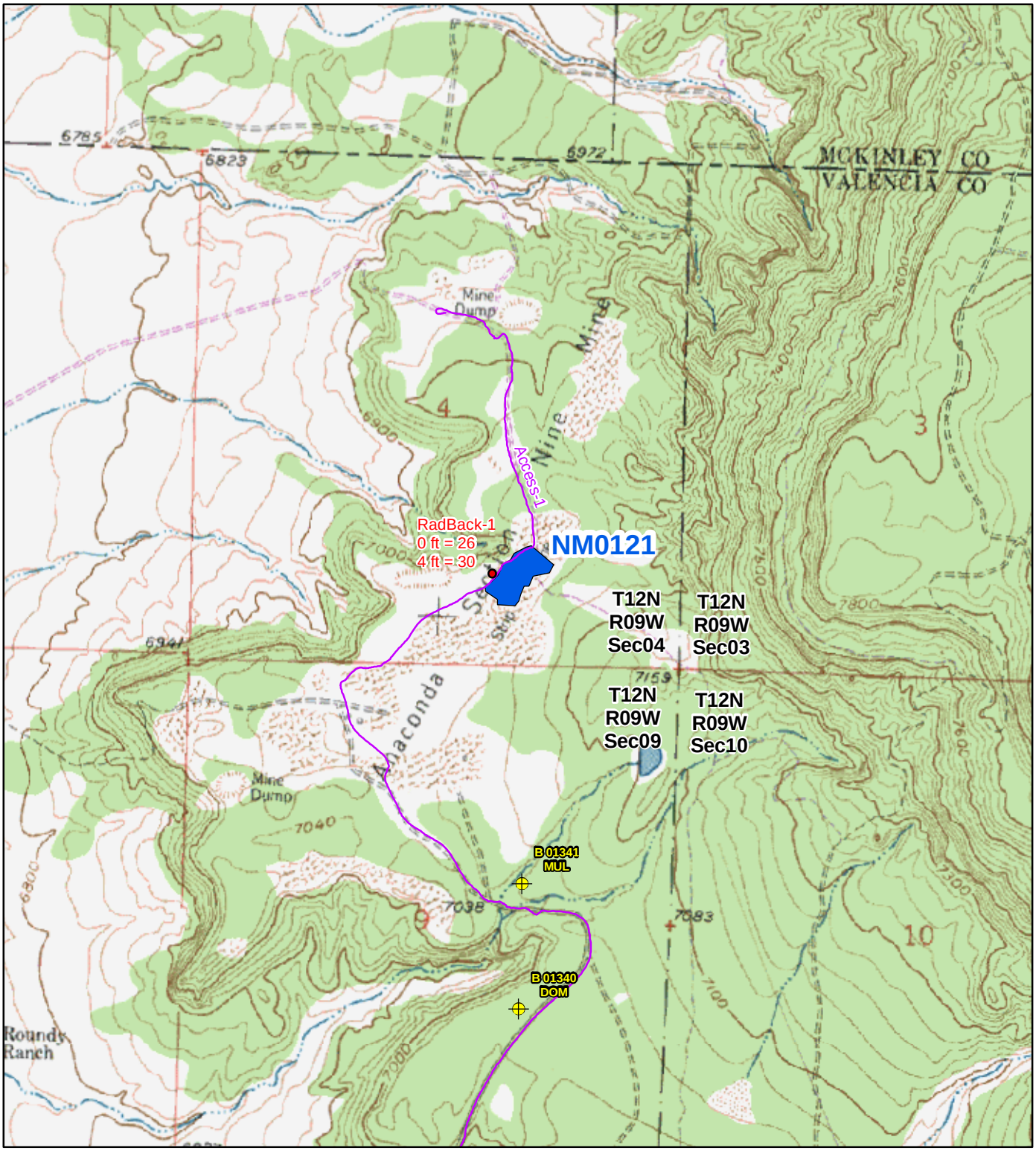

Map Source(s):
U.S. Geological Survey 7.5-Minute
Topographic Map
-Dos Lomas, 1980

0 750 1,500 3,000
Feet

NORTH

Legend

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

Figure 2
Topographic Map
NM0121-Gay Eagle
Abandoned Uranium
Mine Assessment

INTERA

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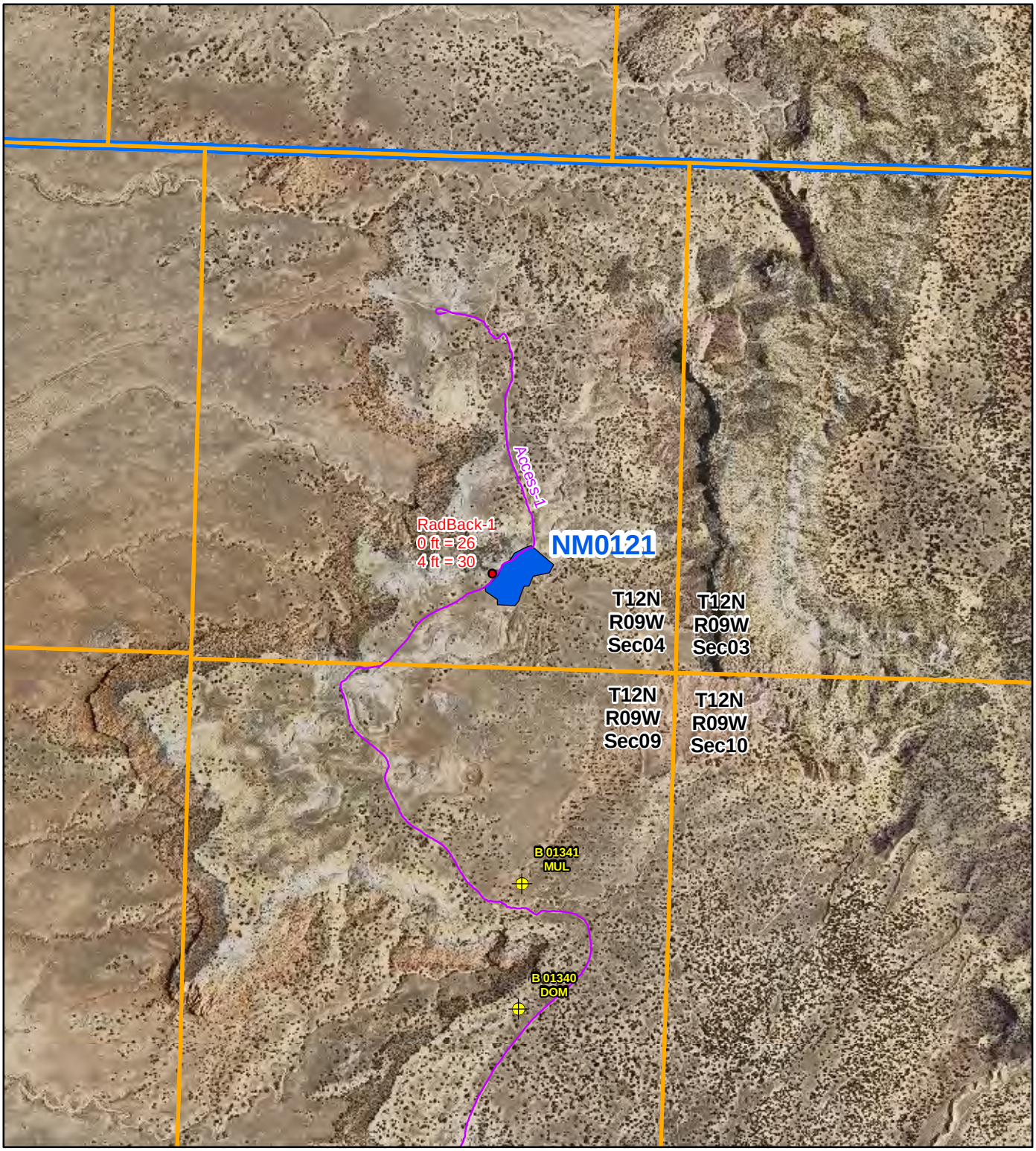

Map Source(s):
U.S. Geological Survey 7.5-Minute
DOQQ County Mosaic
-Cibola County, 2009

0 750 1,500 3,000
Feet

NORTH

Legend

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

Figure 3
Aerial Photo
NM0121-Gay Eagle
Abandoned Uranium
Mine Assessment

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

0 40 80 160
Feet

NORTH

Legend

- Radiation Readings (µR/hr)
- Photo Location
- Access Route
- Pile Boundary
- Pit Boundary

Figure 4a
Site Map on
Aerial Photo
NM0121-Gay Eagle
Abandoned Uranium
Mine Assessment

INTERA

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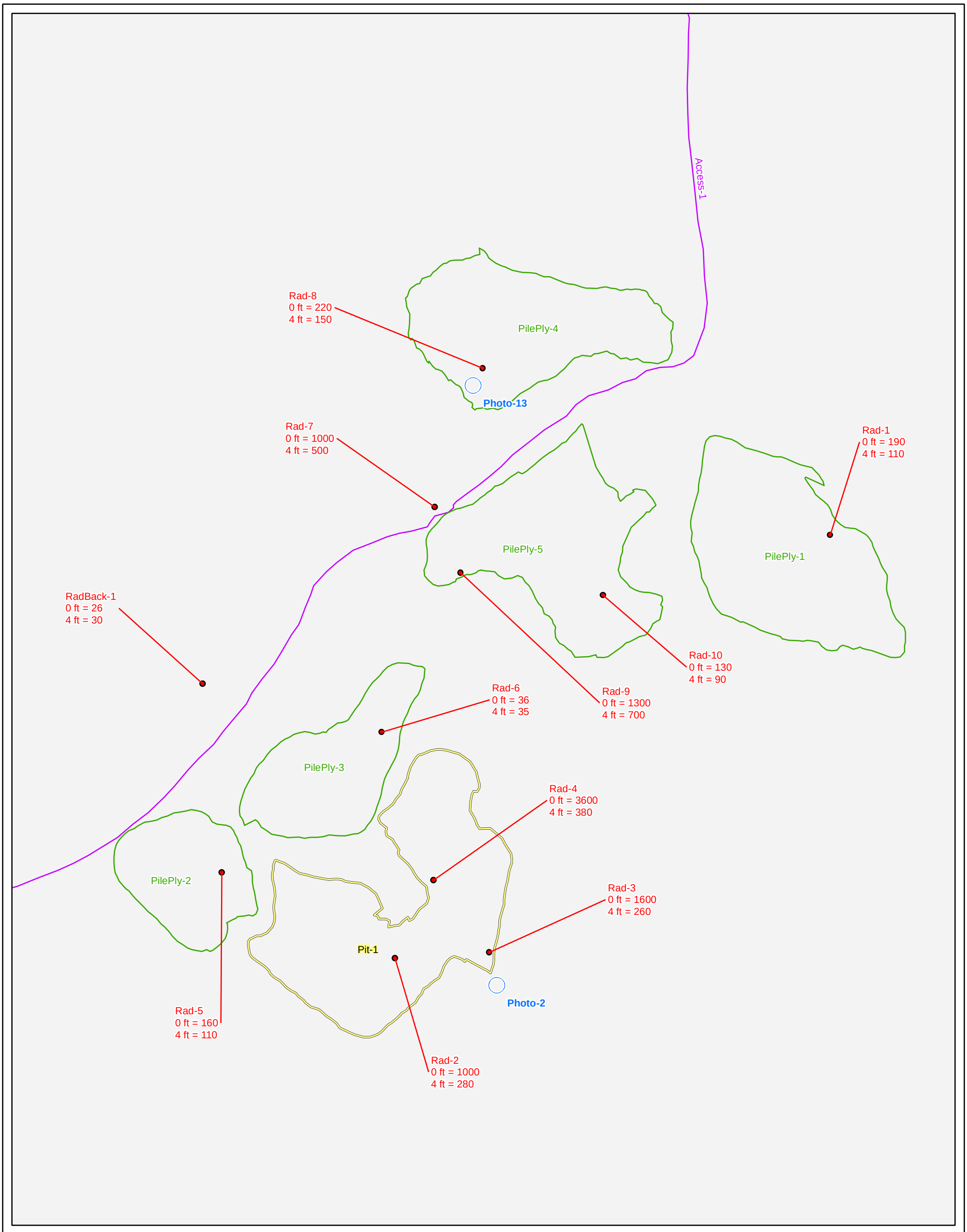

Map Source(s):
Ownership - BLM, 2008

0 40 80 160
Feet

NORTH

Legend

- Radiation Readings (µR/hr)
- Photo Location
- Access Route
- Pile Boundary
- Pit Boundary

Surface Ownership

- Private

Figure 4b
Site Map with
Surface Ownership
NM0121-Gay Eagle
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 south at PilePly-1.

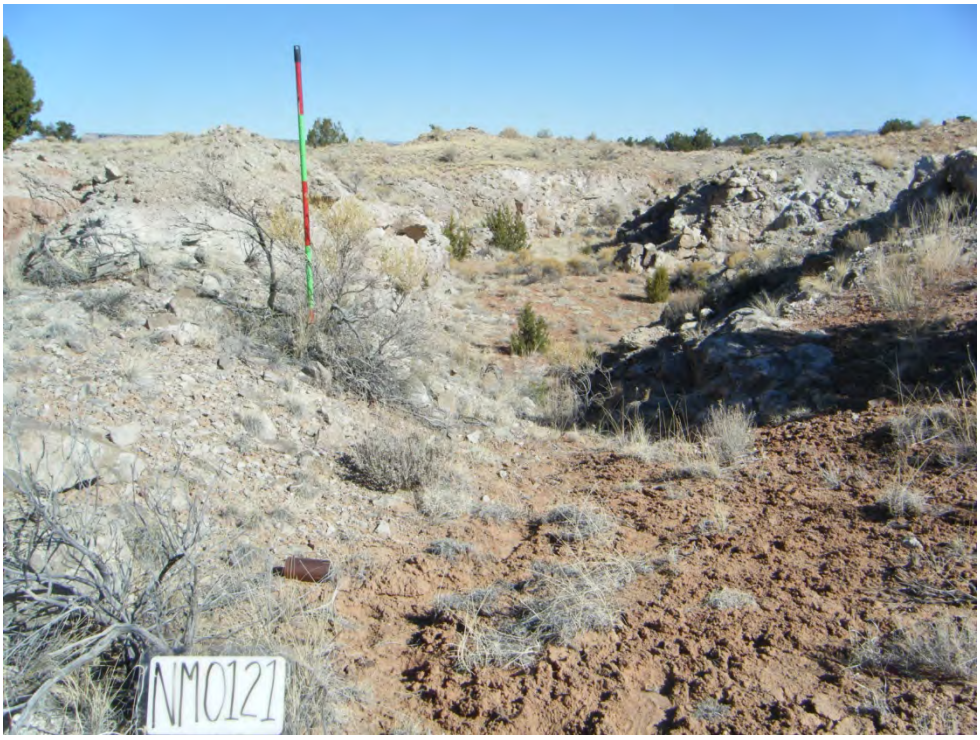


Photo 2-Site photo with Pit-1 in the background, looking north.

Photo 3-Looking north at the northern arm of Pit-1.

Photo 4-Looking west at Pit-1, western arm.

Photo 5-Looking west up the west arm of Pit-1.

Photo 6-Looking north up the north arm of Pit-1.

Photo 7-Radiation survey point 3 (1600 µR/hr at contact).

Photo 8-Secondary uranium minerals at radiation survey point Rad-4 (3600 µR/hr at contact).

Photo 9-Looking southwest at PilePly-2.

Photo 10-Looking southwest at PilePly-3.

Photo 11-Looking west at radiation survey point Rad-7 (1000 µR/hr at contact).

Photo 12-Looking north at PilePly-4.

Photo 13-Looking west down a drainage on the edge of the mesa. Note waste rock spilling down the slope to the left.

Photo 14-Looking southeast at PilePly-5.

Photo 15-Looking northwest at part of PilePly-5.

APPENDIX B

FIELD NOTES

4/7/10 act Abandoned Uranium Mines

Site Name: NM0121, Gay Eagle

Objective: Site Assessment

Personnel: Annelia Tinklenberg
Danay Bowman

Equipment: Rental truck, Trimble GeoXM (SN: 4848447271, 2008 series), Ludlum 192 (SN: 234149), Fujifilm digital camera (No. 80839493), backup Garmin GPS, cell phone amplifier, field laptop

925 At AUM Site
Background Rad - 0m - 26 uR/h; 1m - 30 uR/h
PilePly-1 - 15' high, 75' wide, 100' long; waste
Photo 1 - PilePly-1 looking south

Rad 1 - PilePly-1 - 0m - 190 uR/h; 1m - 110 uR/h

Photo 2 - SiteName looking north at Pit 1

Photo 3 - looking west at Pit1, west arm
Photo 4 - looking north at Pit1, north arm

Pit-1 - 20' deep, 30' wide, 180' long; "L" shaped

Photo 5 - looking west up west arm of Pit-1
Photo 6 - looking north up north arm of Pit1

Rad 2 - west arm Pit-1; 0m - 1000 uR/h; 1m - 280 uR/h

Rad 3 - entrance to Pit 1, south end; 0m - 1600 uR/h; 1m - 260 uR/h

Photo 7 - looking at Rad 3 and yellow mineralization on Todilto

Rad 4 - Pit 1; 0m - 3600 uR/h; 1m - ~~380~~ 380 ALT uR/h

Photo 8 - yellow mineralization at Rad 4

Pile Ply 2 - 25' high; 75' wide; 100' long
Photo 9 - looking southwest at Pile Ply 2
Rad 5 - Pile Ply 2; 0m - 160 uR/h; 1m - 110 uR/h

Pile Ply 3 - 20' high; 50' wide; 120' long
Photo 10 - looking southwest at Pile Ply 3
Rad 6 - Pile Ply 3; 0m - 36 uR/h; 1m - 35 uR/h

Rad 7 - drainage, through site, yellow mineralization on Todilto; 0m - 1000 uR/h; 1m - 500 uR/h
Photo 11 - looking west down drainage

Pile Ply 4 - 20' high, 100' wide, 200' long
Photo 12 - look ~~south~~ North ALT west at Pile Ply 4
Rad 8 - Pile Ply 4; 0m - 220 uR/h; 1m - 150 uR/h

Photo 13 - looking west down drainage, on west face of mesa; note waste rock spilling into drainage

Pile Ply 5 - 15' high, 100' wide, 200' long
piles of small and large waste rock

Photo 14 - Pile Ply 5 looking southeast
Photo 15 - part of Pile Ply 5 looking northwest

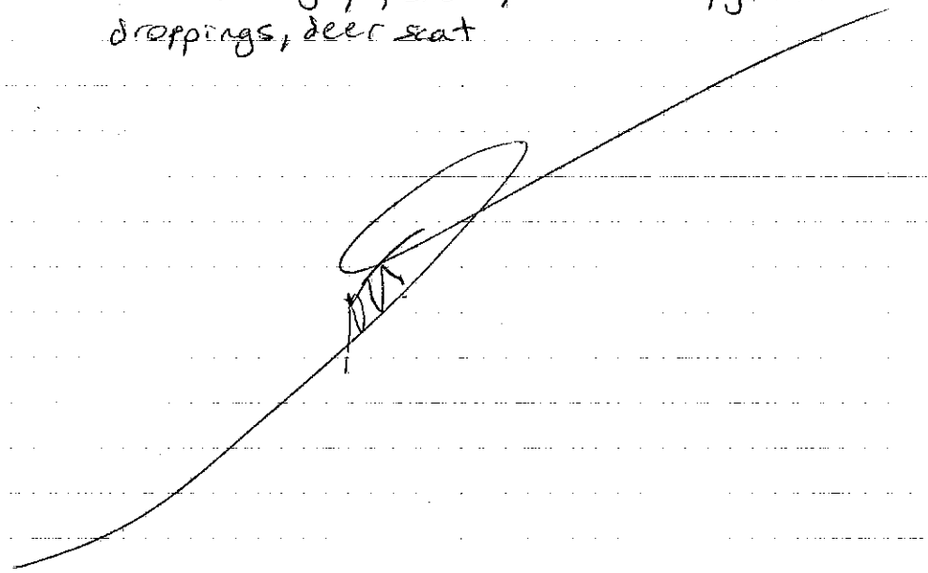
Rad 9 - Pile Ply ~~6~~ 5 ALT - 0m - 1300 uR/h; 1m - 700 uR/h

Rad 10 - Pile Ply 5 - 0m - 130 uR/h; 1m - 90 uR/h

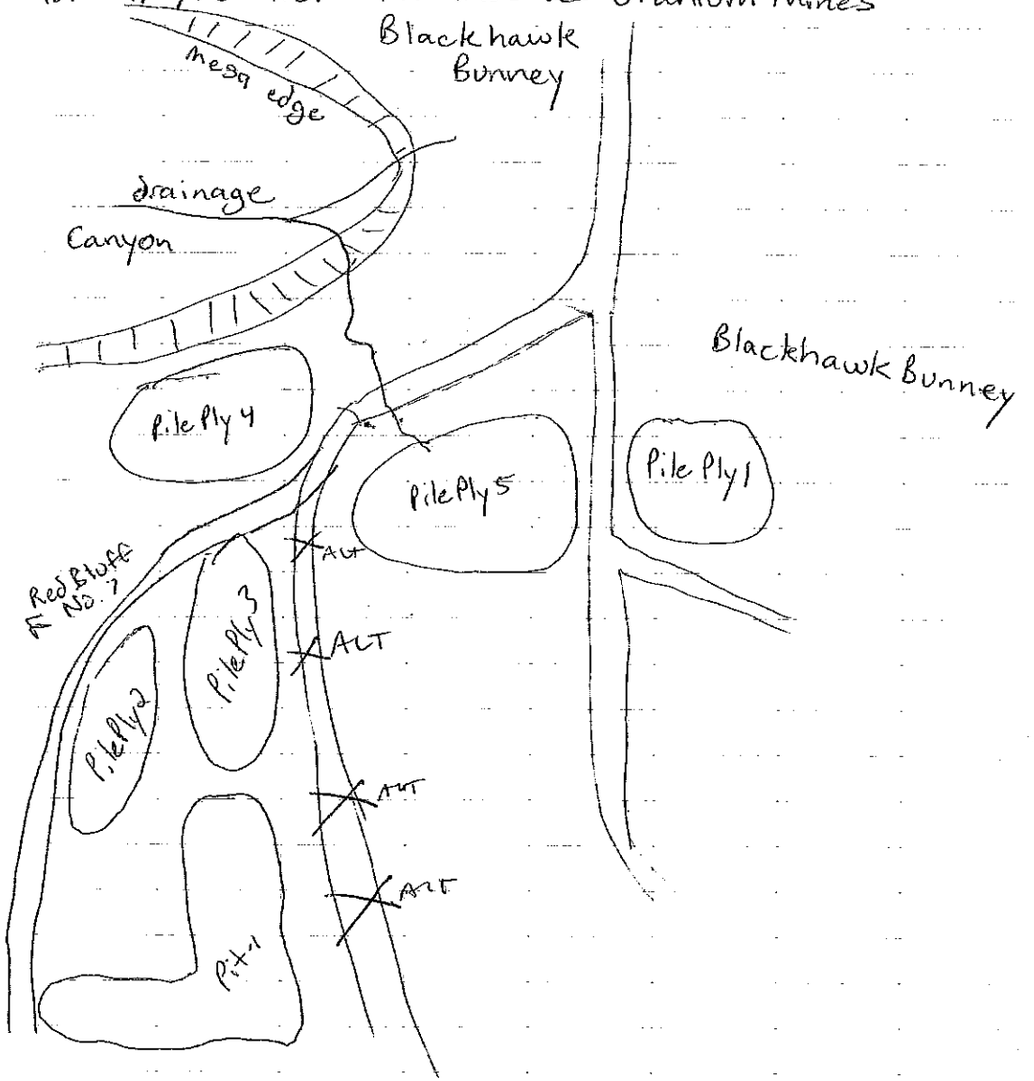
1100 - Back at truck
called Susan concerning Christmas Day location, not looking like Anderson Report.

Soils: Tan, red sandy, rock soils. Locally grey silt/clay.
Rocks: Tan, red sandstone (red = Entrada)
Grey Todilto limestone
Human Activities: Grazing. Past mining activities, present prospecting: bags of cement, pipes, etc.

Wildlife: Scrub jays, crows, cottontails, jackrabbit droppings, deer scat



137 4/7/10 ALT Abandoned Uranium Mines



Red Bluff No. 8 + 10