

Abandoned Uranium Mine Site Assessment for the Dysart No. 1 Site (NM0041)

FINAL REPORT

Prepared For:



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NM0041

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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 Dysart No. 1 Site (AUM Site), MMD ID: NM0041 on April 9, 2010.

1.1 PREVIOUSLY KNOWN INFORMATION ABOUT THE SITE

Anderson (1980) visited the AUM Site in 1980 and found a 395 ft deep shaft, a headframe, mine buildings, and waste piles. An ore bin and load out structure was also located nearby. At the time of Anderson's visit, the property was considered active and no remediation was planned (Anderson, 1980). Mining occurred at the AUM Site from 1956-1962 in the Westwater Canyon Member of the Jurassic-age Morrison Formation. The mine yielded 891,922 tons of ore (McLemore, 1983).

1.2 SITE LOCATION AND DIRECTIONS

The AUM Site is on private land in the southern half of Section 11, Township 14 North, Range 10 West. The Site is located in McKinley County, approximately 19 miles north 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 approximately 13.8 miles, then turn left on New Mexico 509 (Ambrosia Lake Road). Continue on New Mexico 509 for 7.3 miles, then turn left, passing through a locked gate. At this point, the road will change from paved to dirt. Travel along the main dirt road northwest for another 2 miles, crossing railroad tracks. After 2 miles, the road turns to the southwest, but a faint two-track continues west-northwest. This two-track is drivable and passes through the center of the AUM Site.

Note that permission from one private landowner is required to travel along the access road, and permission from another private landowner is required to view the Site itself.

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).

Mine workings at the AUM Site were located within the Westwater Canyon Member of the Jurassic Morrison Formation. This member is believed to have been deposited by northward flowing streams draining a highland to the south. It is underlain by the Recapture Member of the Morrison Formation, a series of alternating beds of sandstone and mudstone. The Westwater Canyon Member is overlain by the Brushy Basin Formation, a layer of mudstone with some

sandstones and limestones. The Westwater Canyon Member is a fine to coarse grained, poorly sorted, crossbedded sandstone with occasional gravel lags and petrified logs (Hilpert, 1963). The Westwater Canyon Member occurs at depth beneath the Site.

Ore deposits at the Dysart No. 1 mine consisted of black primary uranium minerals with some yellow secondary mineralization. Other occurrences included molybdenum minerals and native selenium. Most uranium ore bodies in the mine trended roughly north-south along fractures (Cronk, 1963). Uranium ore bodies in the nearby Mary No. 1 mine were also associated with fractures (Anderson, 1980).

1.4 SITE HYDROGEOLOGY

The surface runoff at the AUM Site discharges to Martin Draw. Martin Draw joins Arroyo del Puerto, which drains into San Mateo Creek approximately 9 miles southeast of the AUM Site. 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 Ambrosia Lake Quadrangle 7.5 minute United States Geological Survey topographic map at an elevation of approximately 7100 feet above mean sea level (see Figure 2). The AUM Site is located in a broad, alluvium-filled valley surrounded by small, isolated mesas capped by Mesozoic strata. No bedrock outcrops are located nearby.

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, one foundation, four piles, a subsidence feature, and power lines 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. Anderson (1980) reported a shaft onsite, but no evidence of this shaft was observed during the present survey.

2.2 MINING AND EXPLORATION PITS AND OPEN CUTS

One open cut (CutPly-1) was found at the AUM Site (see Photo 7 in Appendix A). This feature is a small, linear cut with gamma radiation levels equivalent to background.

2.3 WASTE AND ORE PILES AND DISTURBANCES

Four piles were found at the AUM Site. These piles consist of (or were later capped by) soil, but some rock with associated uranium minerals can still be found in the piles. One pile (PilePly-3) contained cement blocks (see Photo 11 in Appendix A). The highest gamma radiation reading on these piles was taken at radiation survey point Rad-10 (PilePly-3, 350 μ R/hr at 0 ft above ground).

2.4 MINING RELATED BUILDINGS AND FOUNDATIONS

One foundation (FndPt-1) was found at the AUM Site. This foundation consisted of broken cement blocks (see Photo 5) and may correspond to the caretaker's house in Photo (a) in Anderson (1980).

2.5 OTHER MINE FEATURES

A possible subsidence feature (SubsidPly-1) was observed on the northeast corner of the AUM Site (see Photos 2 and 3 in Appendix A). This feature is 180 ft long, 90 ft wide and 10 ft deep. A power line (Pline-1) crosses the southern portion of the Site (see Photo 6 in Appendix A). This power line trends northwest-southeast and may be the same as the power line in Photo (a) in Anderson (1980).

2.6 BOREHOLES

No boreholes were found at the AUM Site.

2.7 RECLAMATION ACTIVITIES

Reclamation activity, including the infilling of a shaft, removal of mine buildings, and removal/capping of waste piles has taken place since Anderson (1980) visited the Site, according to George Lotspeich, mine owner.

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 24 μ R/hr at 0 ft above ground and 24 μ 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 maximum gamma radiation reading for the AUM Site was 450 $\mu\text{R/hr}$ at 0 ft above ground at radiation survey point Rad-7. Radiation survey points Rad-1, Rad-3, Rad-6, and Rad-7 detected gamma radiation above 100 $\mu\text{R/hr}$ at 0 ft above ground, but these readings were not associated with obvious mine features (see Photo 8 in Appendix A). Gamma radiation survey points on each of the four waste piles also read above 100 $\mu\text{R/hr}$.

5.0 CURRENT LAND USES

5.1 HUMAN ACTIVITY AND RECREATIONAL SITE USE

Barbed wire fences in the surrounding area and cow prints indicate that the 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

There are no wells, domestic or otherwise, within a mile of the Site.

5.4 EVIDENCE OF GRAZING OR AGRICULTURE

Barbed wire fences in the surrounding area and cow prints indicate that the area is being grazed.

5.5 EVIDENCE OF WILDLIFE

Evidence of rabbits was found onsite.

6.0 VEGETATION

The AUM Site is located in the Coniferous and Mixed Woodland vegetation type, bordering the Juniper Savanna (Ecotone). The Site has more grassland than woodland vegetation. Due to the time of year and the excessive grazing onsite, no grass or forb species could be identified except for Kochia seedlings. Positively identified woody species included prickly pear cactus and snakeweed. Salt cedar (a Class C noxious weed) was also present at the site.

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.
- Cronk, R. J., 1963. Geology of the Dysart No. 1 Mine, Ambrosia Lake Area in Kelley, Vincent C., ed. Geology and Technology of the Grants Uranium Region. New Mexico Bureau of Mines and Mineral Resources, Memoir 15.
- Edwards, Mark H. and Kiely, Jeffrey, 2004. Cibola-McKinley Regional Water Plan. Prepared for the New Mexico Interstate Stream Commission.
- Hilpert, Lowell S., 1963. Regional and Local Stratigraphy of Uranium-Bearing Rocks in Kelley, Vincent C., ed. Geology and Technology of the Grants Uranium Region. New Mexico Bureau of Mines and Mineral Resources, Memoir 15.
- Lotspeich, George. Personal communication. April 9, 2010.
- McLemore, Virginia T., 2002. Navajo Lake State Park: New Mexico Geology, v. 24, no. 3, p. 91-96,103.
- 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.

TABLES

**Table 1
Site Features**

**Dysart No. 1-NM0041
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	Yes	Access	--	Dirt	--	--	--	--	--	--	--	--
Access-2	No	Access	--	Dirt	--	--	--	--	--	--	--	--
CutPly-1	Yes	--	--	--	3	20	60	--	--	--	NM0041_007	--
FndPt-1	Yes	--	--	--	--	3	3	--	--	--	NM0041_005	Broken pieces of cement
PilePly-1	Yes	Waste	--	Soil	10	120	120	--	--	--	NM0041_009	--
PilePly-2	Yes	Waste	--	Soil	4	120	270	--	--	--	NM0041_010	--
PilePly-3	Yes	Waste	--	Soil	5	50	75	--	--	--	NM0041_011	--
PilePly-4	Yes	Waste	--	Soil	2	20	30	--	--	--	NM0041_012	--
PlineLn-1	Yes	--	--	--	40	--	--	--	--	--	NM0041_006	Power line
Subsidply-1	Yes	--	--	--	10	90	180	--	--	--	NM0041_002 NM0041_003	--

Notes:

-- designates no information



Table 2
Gamma Radiation Survey Results

Dysart No. 1-NM0041
Abandoned Uranium Mine Assessments

Reading ID	0 ft (μ R/hr)	4 ft (μ R/hr)	Associated Photo	Associated Feature
Rad-1	120	110	--	--
Rad-2	29	29	--	SubsidPly-1
Rad-3	150	120	NM0041_004	--
Rad-4	70	50	--	FndPt-1
Rad-5	26	26	--	CutPly-1
Rad-6	350	170	NM0041_008	--
Rad-7	450	200	--	--
Rad-8	150	100	--	PilePly-1
Rad-9	110	60	--	PilePly-2
Rad-10	350	60	--	PilePly-3
Rad-11	210	100	--	PilePly-4
RadBack-1	24	24	--	--

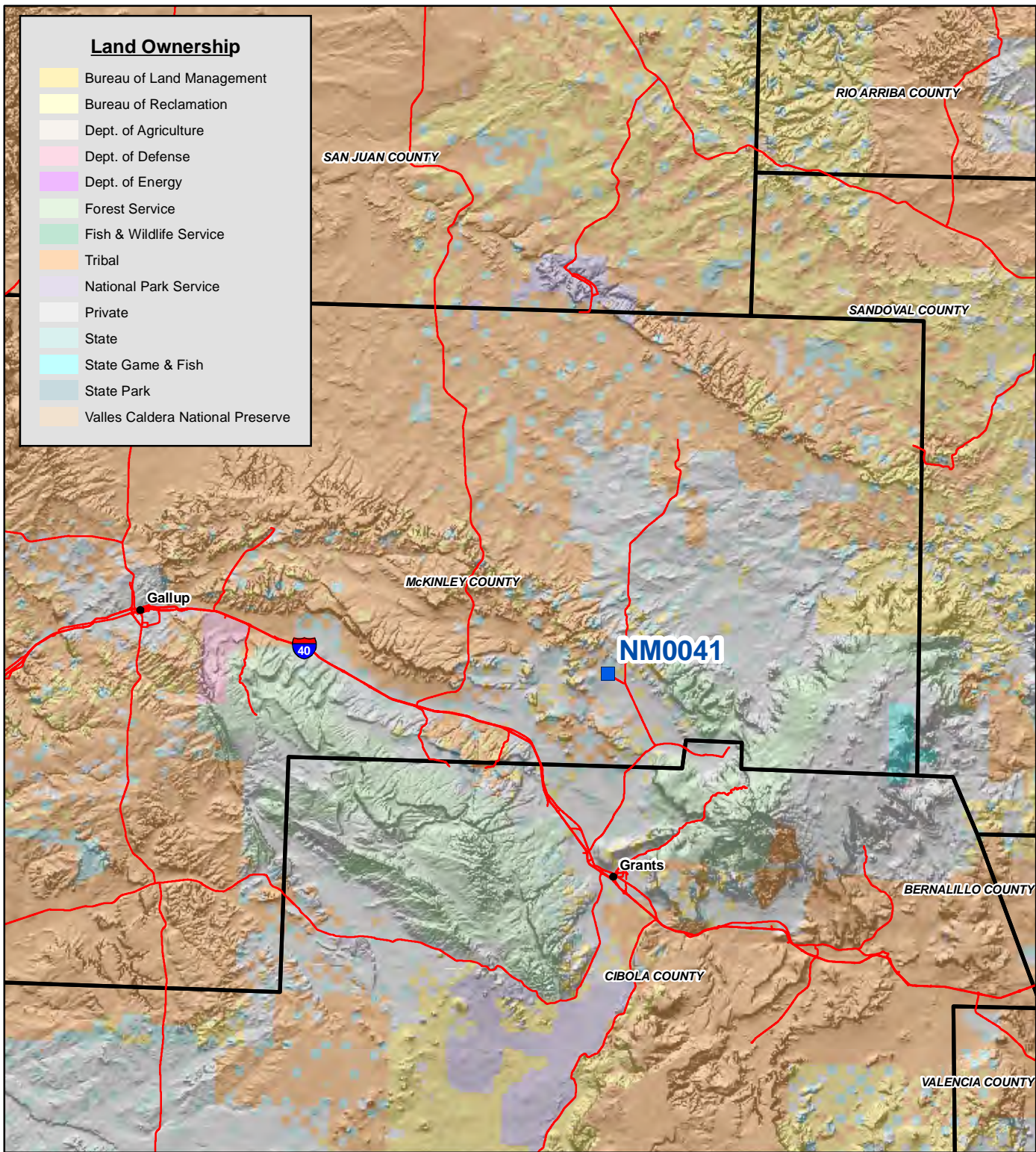
Notes:

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

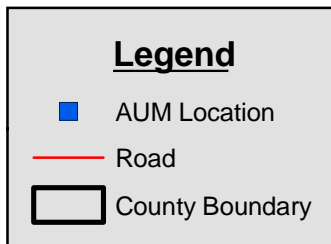
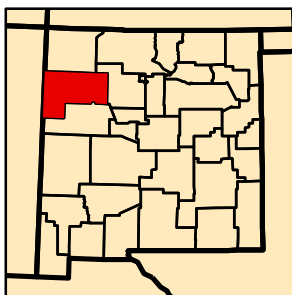
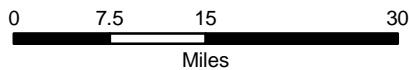
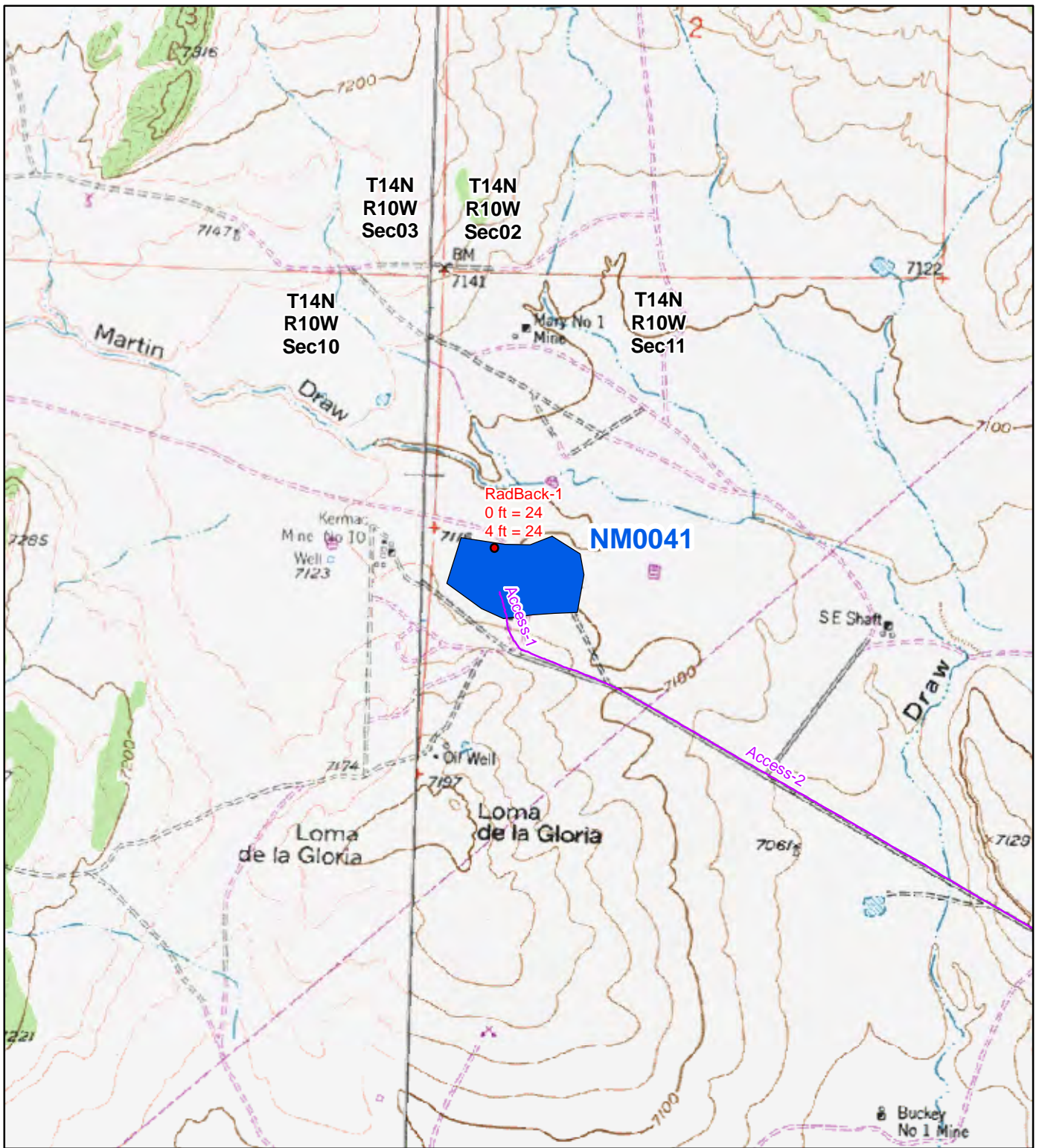
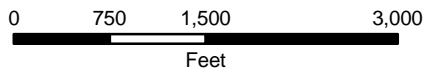


Figure 1
Site Location Map
NM0041-Dysart No. 1
Abandoned Uranium
Mine Assessment





Map Source(s):
 U.S. Geological Survey 7.5-Minute
 Topographic Map
 -Ambrosia Lake, 1980
 -Goat Mountain, 1980



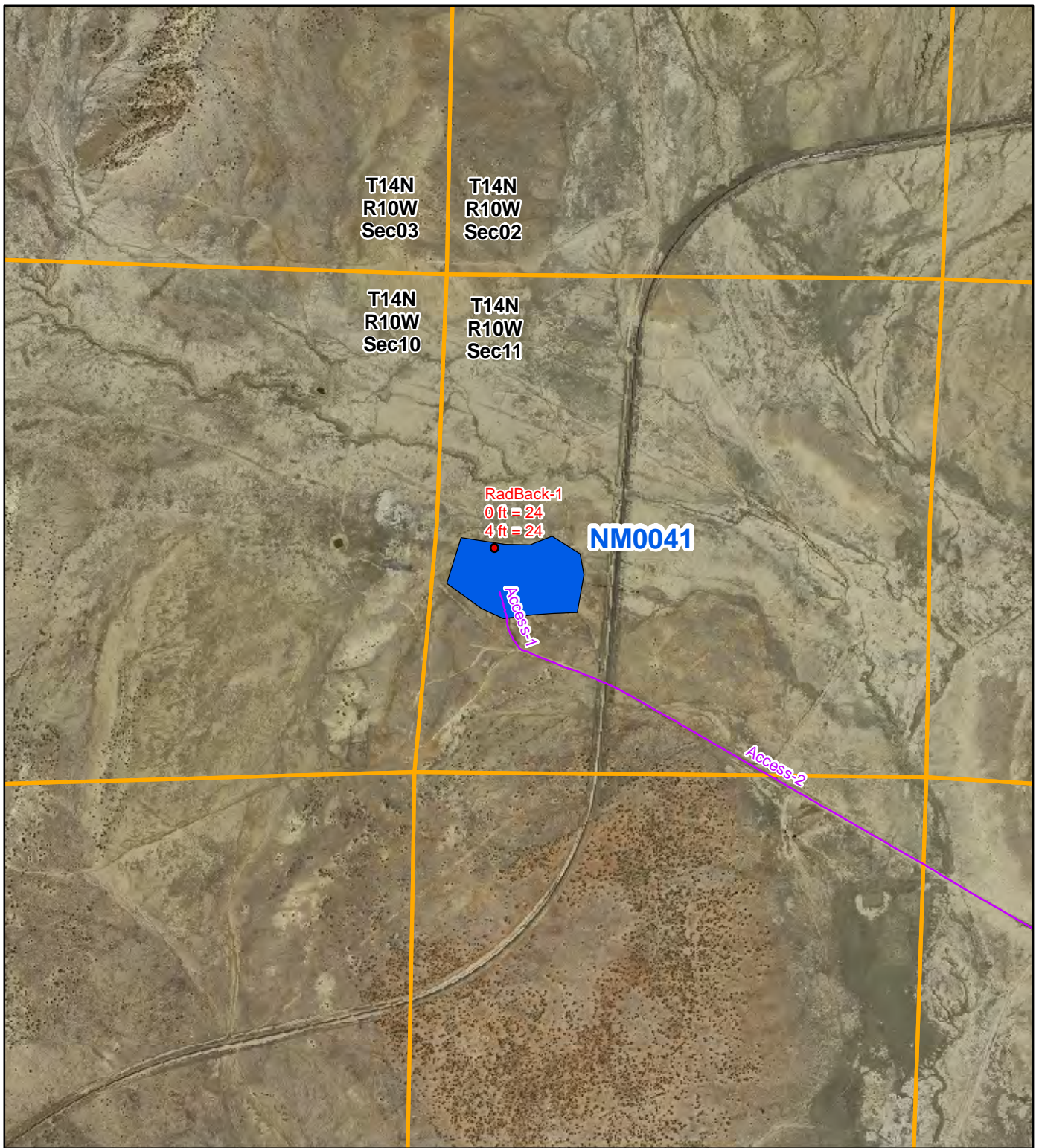
Note:
 There are no wells within 1 mile of the Site.

Legend

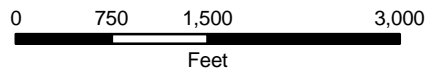
- Radiation Readings ($\mu\text{R/hr}$)
- Access Route
- AUM Location Boundary (MMD Provided)

Figure 2
Topographic Map
NM0041-Dysart No. 1
 Abandoned Uranium
 Mine Assessment





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



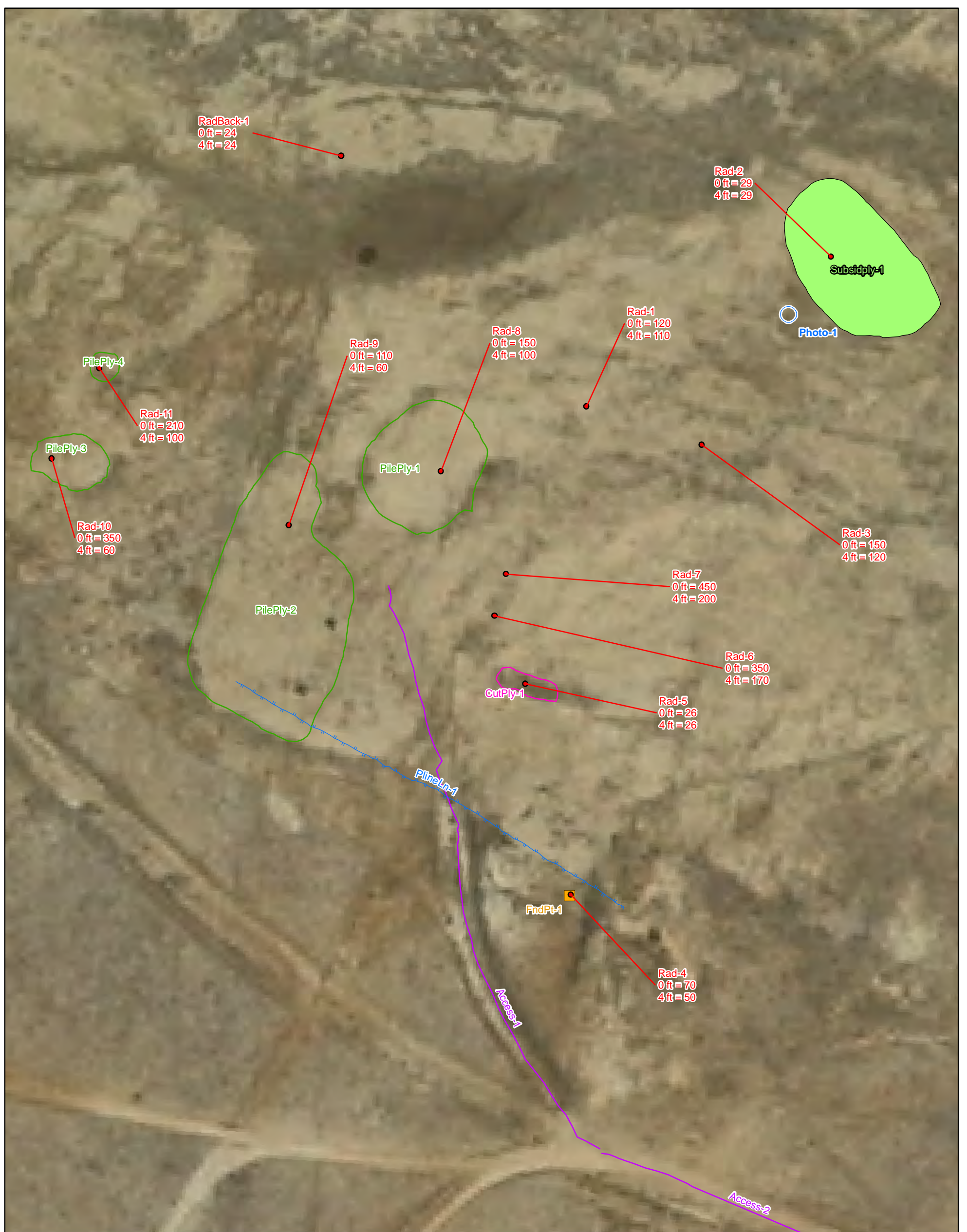
Note:
 There are no wells within 1 mile of the Site.

Legend

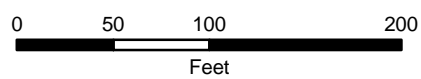
- Radiation Readings ($\mu\text{R/hr}$)
- Access Route
- AUM Location Boundary (MMD Provided)
- Section Boundary

Figure 3
Aerial Photo
NM0041-Dysart No. 1
 Abandoned Uranium
 Mine Assessment





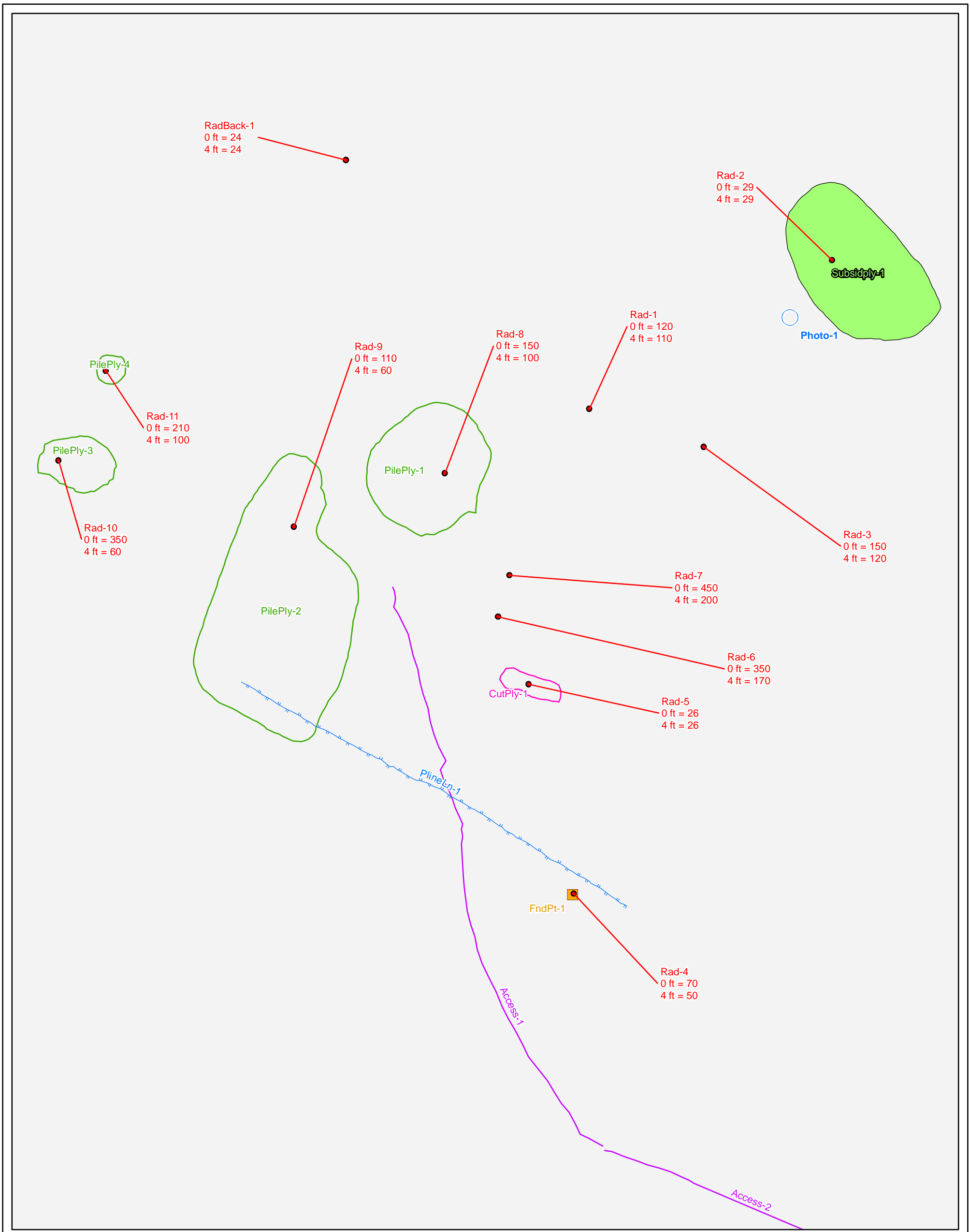
Map Source(s):
 U.S. Geological Survey 7.5-Minute
 DOQQ County Mosaic
 -McKinley County, 2009



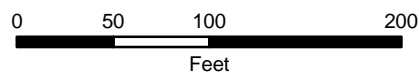
Legend	
●	Radiation Readings ($\mu\text{R/hr}$)
■	Foundation Location
○	Photo Location
—	Power Line
—	Access Route
□	Open Cut Boundary
□	Pile Boundary
□	Subsidence Boundary

Figure 4a
Site Map on
Aerial Photo
NM0041-Dysart No. 1
 Abandoned Uranium
 Mine Assessment





Map Source(s):
Ownership - BLM, 2008



Legend

● Radiation Readings ($\mu\text{R/hr}$)	□ Open Cut Boundary
■ Foundation Location	□ Pile Boundary
○ Photo Location	■ Subsidence Boundary
— Power Line	Surface Ownership
— Access Route	□ Private

Figure 4b
Site Map with
Surface Ownership
NM0041-Dysart No. 1
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 photo, looking southwest.



Photo 2-Looking north at possible subsidence feature (SubsidPly-1).



Photo 3-Looking west at possible subsidence feature (SubsidPly-1).



Photo 4-Radiation survey point Rad-3 (150 μ R/hr at 0 meters).



Photo 5-Looking northeast at remnants of a foundation (FndPly-1).



Photo 6-Looking west at power lines running through Site (PlineLn-1).



Photo 7-Looking west at CutPly-1.



Photo 8-Radiation survey point Rad-6 (350 μ R/hr at 0 meters).



Photo 9-Looking northwest at PilePly-1.



Photo 10-Looking southwest at PilePly-2.



Photo 11-Looking east at PilePly-3.



Photo 12-Looking west at PilePly-4.



Photo 13-Site photo, looking northwest.

APPENDIX B
FIELD NOTES

Site Name: NM0091, Dysert No. 1

Objective: Site Assessment

Personnel: Annelia Tinklenberg
Danny Bowman

Equipment: Rental truck, Trimbel GeoXM
(SN: 7948447271, 2008 series), Ludlum 192
(SN: 234149), Fujifilm digital camera
(No. 80839493), backup Garmin GPS, cell phone
amplifier, field laptop

1200 ^{ALT} ~~ACT~~ At AUM Site

Background Rad - Om - 24 uR/h; 1m - 24 uR/h

Rad-1 - center of shapefile polygon; Om - 120 uR/h;
1m - 110 uR/h

^{RAD} Photo 1 - Site Name looking southwest

Subsid Ply-1 - 10' deep, 90' wide, 180' long; water collects

Photo 2 - Subsid Ply-1, looking north

Photo 3 - Subsid Ply-1, looking ^{ALT} west

Rad 2 - Subsid Ply-1; Om - 29 uR/h; 1m - 29 uR/h

Rad 3 - Om - 150 uR/h; 1m - 120 uR/h

Photo 4 - looking at sand at Rad 3

End Pt-1 - cement blocks from a foundation, 3' x 3'

Photo 5 - looking northeast at End Pt-1

Rad 4 - End Pt-1; Om - 70 uR/h; 1m - 50 uR/h

Pln-1 - Power lines

Photo 6 - looking west at Pln-1

Cut Ply-1 - 3' deep, 15' wide, 60' long; bulldozed cut

Photo 7 - looking west at Cut Ply-1

Rad 5 - Cut Ply-1; Om - 26 uR/h; 1m - 26 uR/h

Rad 6 - Om - 350 uR/h; 1m - 170 uR/h

Photo 8 - Rad 6 looking north

Rad 7 - Om - 450 uR/h; 1m - 200 uR/h

Pile Ply-1 - 10' tall; 120' wide, 120' long; soil

Photo 9 - Pile Ply-1 looking northwest

Rad 8 - Pile Ply-1; Om - 150 uR/h; 1m - 100 uR/h

Pile Ply-2 - 4' tall, 120' wide, 270' long; soil

Photo 10 - Pile Ply-2, looking southwest

Rad 9 - Pile Ply-2; Om - 110 uR/h; 1m - 60 uR/h

Pile Ply 3 - 5' tall, 50' wide, 75' long; soil with cement
blocks in it

Photo 11 - Pile Ply 3 looking east

Rad 10 - Pile Ply 3; Om - 350 uR/h; 1m - 60 uR/h

Pile Ply 4 - 2' tall, 20' wide, 30' long; soil with cement and
various metal in it

Photo 12 - Pile Ply 4 looking west

Rad 11 - Pile Ply 4; Om - 210 uR/h; 1m - 100 uR/h

Photo 13 - looking northwest at access to site

1400 - Access Road
Leaving site

157 4/9/10 alt Abandoned Uranium Mines

Phil Schiemer 505-350-5241
URAN employee on Grants Ridge.

Soils: Tan sandy

Rocks: No rock outcrop in the vicinity, the target ore was in the Westwater Canyon Member. Loose westwater canyon scattered across the site.

Human Activities: Grazing, fences, cattle guards, Past mining.

Wildlife: evidence of rabbits.

