

Abandoned Uranium Mine Assessment for the Pineapple Site (NM0186)

FINAL REPORT

Prepared For:



New Mexico Energy, Minerals and
Natural Resources Department
Wendell Chino Building
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

Prepared By:



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NM0186

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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 Pineapple Site (AUM Site), MMD ID: NM0186 on August 31, 2010.

1.1 PREVIOUSLY KNOWN INFORMATION ABOUT THE SITE

According to McLemore (1983), 4 tons of ore yielding 2 pounds U_3O_8 were mined from the AUM Site by S.H. Wells in 1954. This ore may have contained samarskite, monazite, and trace amounts of uraninite (McLemore, 1983). Workings at the site consisted of bulldozer scrapings, cuts, and pits (McLemore, 1983).

Anderson (1980) visited the site, and found several shallow bulldozer cuts and an associated dump pile. No uranium minerals were seen at the AUM Site (Anderson, 1980).

1.2 SITE LOCATION AND DIRECTIONS

The Pineapple Mine Site is located within the Carson National Forest, in the northern half of Section 30, Township 29 North, Range 9 East. This AUM Site is located in Rio Arriba County and is approximately 7 miles north of the town of La Madera, along New Mexico Highway 519 (please see Figure 1).

To reach the AUM Site from Albuquerque, drive approximately 57 miles north on Interstate 25 and take exit 282 for US-84 W/US-285 N. Continue through Santa Fe and follow US-84 W/US-285 N approximately 26 miles north to Española. In Española, turn left on Paseo de Onate to continue following US-84 W/US-285 N. Continue 8.5 miles further to the junction of US-84 W and US-285 N, and turn right to continue following US-285 N. Drive approximately 18 miles further on US-285 N and turn left at State Route 111, just past Ojo Caliente. Drive approximately 5 miles on State Route 111 and then turn right on NM-519 in the town of La Madera. Drive approximately 7.5 miles on NM-519 and then turn left onto an unnamed dirt road. Follow this dirt road approximately 0.5 miles to a "T", turn left at the "T" and continue approximately 0.25 miles to a fork in the road. At the fork bear right and continue approximately 0.60 miles to another "T" in the road. Turn left and drive approximately 150 ft and then turn left again. Continue approximately 0.60 miles to the AUM Site.

1.3 SITE GEOLOGY

The AUM Site is located in the southern Tusas Mountains, the southernmost subrange of the Rocky Mountains. The area surrounding the AUM Site is comprised of Precambrian metamorphic and intrusive igneous rocks overlain by Tertiary volcanic and sedimentary deposits (Bingler, 1968). In eastern Rio Arriba County, these sediments consist of poorly consolidated pinkish-brown to yellowish-tan fine-grained arkosic silt and sand (Bingler, 1968). The uranium

deposits found in the area are associated with Precambrian pegmatites intruding quartzite and schist (Anderson, 1980 and McLemore, 1983).

1.4 SITE HYDROGEOLOGY

The AUM Site is located along a south-facing hill and all surface drainage flows south to the drainage along Cañon de la Paloma approximately 1,000 ft to the southwest. This drainage flows south to the Rio Tusas which joins the Rio Vallecitos and then joins the Rio Ojo Caliente. The Rio Ojo Caliente in turns joins the Rio Chama approximately 27 miles southwest of the AUM Site.

The AUM Site is located near the eastern boundary of the Rio Chama Watershed, which covers most of the Rio Chama Water Planning Region (La Calandria Associates, Inc., 2006). The area surrounding the AUM Site is comprised of Precambrian crystalline rocks overlain by Tertiary volcanic and sedimentary deposits. The Precambrian rocks contain small amounts of groundwater in faults and weathered zones (La Calandria Associates, Inc., 2006). The Santa Fe Group strata exposed in the area surrounding the AUM Site constitute a shallow aquifer which covers most of the southern portion of the Rio Chama Watershed. This aquifer is composed predominantly of fluvial, deformed, slightly consolidated sedimentary rocks, and groundwater flow in this unit is to the southwest at the AUM Site (La Calandria Associates, Inc., 2006).

1.5 REGIONAL TOPOGRAPHY AND TERRAIN

The AUM Site can be found on the La Madera Quadrangle 7.5 minute United States Geological Survey topographic map at an elevation of approximately 7,500 ft above mean sea level (please see Figure 2). The AUM Site is located east of Canon de la Paloma, on top of gently sloping hills. 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. Five open cuts, six waste piles, one pit, one trench, and one disturbed area 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 mining related declines were evident at the AUM site.

2.2 MINING AND EXPLORATION PITS AND OPEN CUTS

Five open cuts, one pit, and one trench were found at the AUM Site. CutLn-1, CutLn-2, and CutLn-3 are 3-5 ft high and 2-3 ft wide, and are 40-100 ft in length. These cuts are shallow excavations into igneous bedrock exposed at the ground surface. CutPly-1 and CutPly-2 are

bulldozer scrapings, with CutPly-1 measuring approximately 4 ft deep, 10 ft wide and 20 ft long, and CutPly-2 approximately 6 ft deep, 30 ft wide and 30 ft long. Pit-1 and Trench-1 are also shallow exploration workings within exposed igneous bedrock. Pit-1 is approximately 6 ft deep, 15 ft wide and 40 ft long, and Trench-1 is approximately 5 ft deep, 8 ft wide, and 20 ft long. The maximum gamma radiation measurement on these features was 32 $\mu\text{R/hr}$ at 0 ft above ground at radiation survey point Rad-14 in CutPly-2 (see Table 2).

2.3 WASTE AND ORE PILES AND DISTURBANCES

Six waste piles and one disturbed area were found onsite. All of the piles consisted of waste rock. The largest pile, PilePly-5, is 15 ft high, 35 ft wide and 175 ft long and was found down slope to the southwest of the excavation features. DistPly-1 is a bulldozed area, measuring approximately 15 ft x 60 ft. PilePly-2, to the north of the excavation features, contained the highest radiation reading found on these features; the gamma radiation measurement was 22 $\mu\text{R/hr}$ at 0 ft above ground at radiation survey point Rad-9 (see Table 2).

2.4 MINING RELATED BUILDINGS AND FOUNDATIONS

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

2.5 OTHER MINE FEATURES

A mine road (Rd-1) runs southeast-northwest through the AUM Site. PilePly-1 and PilePly-2 are along the northeast side of this road, CutLn-1 and CutLn-3 are adjacent to the road to the southwest, and PilePly-3 is located at the southern end of the road. This road joins with the access route to the AUM Site (Access-1) at its northern end.

2.6 BOREHOLES

No boreholes were found at the AUM Site.

2.7 RECLAMATION ACTIVITIES

No reclamation activities were identified onsite.

3.0 ARCHEOLOGICAL SITES

No apparent archeological sites were identified at or near this AUM Site.

4.0 SITE GAMMA RADIATION READINGS

The background gamma radiation readings were measured approximately 600 feet north of the AUM Site boundary. The background gamma level was 12 $\mu\text{R/hr}$ (microrentgens per hour) at 0 ft above ground and 11 $\mu\text{R/hr}$ 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 gamma radiation readings at the AUM Site were not significantly higher than background levels. The maximum gamma radiation measured on site was 70 $\mu\text{R/hr}$ at 0 ft above ground and 24 $\mu\text{R/hr}$ at 4 ft above ground at radiation survey point Rad-14 in CutPly-2.

5.0 CURRENT LAND USES

5.1 HUMAN ACTIVITY AND RECREATIONAL SITE USE

Cow prints, cow droppings, and a stock pond along Access-2 were seen in the area, indicating the AUM Site and surrounding area are used as grazing land.

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, domestic or otherwise, lie within a mile of the AUM Site.

5.4 EVIDENCE OF GRAZING OR AGRICULTURE

The stock pond seen along Access-2 and cow droppings observed near the site indicate the area may be used for grazing.

5.5 EVIDENCE OF WILDLIFE

Deer, elk, and rabbit droppings were observed near the AUM Site.

6.0 VEGETATION

The Pineapple Site is located in the Juniper Savanna (Ecotone) vegetation type (Dick-Peddie, 1999). Woody vegetation at the site included ponderosa pine and Utah juniper. Grass species included a bentgrass species and green needlegrass. No forb species were collected from the site. No noxious weeds were noted from photographs of the site.

7.0 POTENTIAL OFFSITE IMPACTS

7.1 EROSION

No evidence of mine related erosion was observed on site.

7.2 ENVIRONMENTAL IMPACTS

There is no evidence of soil staining from chemicals potentially brought to the AUM Site, or from constituents present in the ore or waste rock.

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.

Bingler, Edward C., 1968. Geology and Mineral Resources of Rio Arriba County, New Mexico. New Mexico Bureau of Mines and Mineral Resources Bulletin 91.

Dick-Peddie, William A, 1999. New Mexico Vegetation: Past, Present, and Future. University of New Mexico Press.

La Calandria Associates, Inc., 2006. Rio Chama Regional Water Plan. Prepared for Rio de Chama Acequias Association and Rio Arriba County.

McLemore, Virginia T., 1983. Uranium and Thorium Occurrences in New Mexico: Distribution, Geology, Production, and Resources, with Selected Bibliography. New Mexico Bureau of Mines and Mineral Resources Open File Report OF-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**

**Pineapple-NM0186
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	--	Dirt Nonmaintained	--	--	--	--	--	--	--	--
CutLn-1	Yes	--	--	--	5	3	100	--	--	--	NM0186_004	looking north
CutLn-2	Yes	--	--	--	3	2	40	--	--	--	NM0186_005	looking west
CutLn-3	Yes	--	--	--	3	2	60	--	--	--	NM0186_006	looking west
CutPly-1	Yes	--	--	--	4	10	20	--	--	--	NM0186_013	looking east
CutPly-2	Yes	--	--	--	6	30	30	--	--	--	NM0186_016	looking northeast
DistPly-1	Yes	--	--	--	1	15	60	--	--	--	NM0186_015	looking southwest; bulldozed area
PilePly-1	Yes	Waste	--	Rock	15	25	50	--	--	--	NM0186_002	looking north
PilePly-2	Yes	Waste	--	Rock	2	25	75	--	--	--	NM0186_003	looking northwest
PilePly-3	Yes	Waste	--	Rock	15	30	75	--	--	--	NM0186_007	looking north
PilePly-4	Yes	Waste	--	Rock	20	65	110	--	--	--	NM0186_009 NM0186_010 NM0186_011	looking northeast, north, east
PilePly-5	Yes	Waste	--	Rock	15	35	175	--	--	--	NM0186_012	looking north
PilePly-6	Yes	Waste	--	Rock	5	30	60	--	--	--	NM0186_017	looking northeast
Pit-1	Yes	Exploration	--	--	6	15	40	Yes	--	--	NM0186_014	looking northwest
Rd-1	Yes	Dirt	--	Dirt Nonmaintained	--	--	--	--	--	--	NM0186_002	looking north
Trench-1	Yes	--	--	--	5	8	20	--	--	--	NM0186_008	looking north

Notes:

-- designates no information



**Table 2
Gamma Radiation Survey Results**

**Pineapple-NM0186
Abandoned Uranium Mine Assessments**

Reading ID	Associated Features	0 ft (μ R/hr)	4 ft (μ R/hr)	Associated Photos
Rad-1	rd-1	18	16	--
Rad-2	pileply-1	15	14	--
Rad-3	pileply-2	14	13	--
Rad-4	cutln-1	20	15	--
Rad-5	cutln-2	27	16	--
Rad-6	cutln-3	25	15	--
Rad-7	pileply-3	21	16	--
Rad-8	trench-1	70	20	--
Rad-9	pileply-4	22	14	--
Rad-10	pileply-5	16	14	--
Rad-11	cutply-1	19	16	--
Rad-12	pit-1	25	17	--
Rad-13	distply-1	12	12	--
Rad-14	cutply-2	32	24	--
Rad-15	pileply-6	20	18	--
RadBack-1	--	12	11	--

Notes:

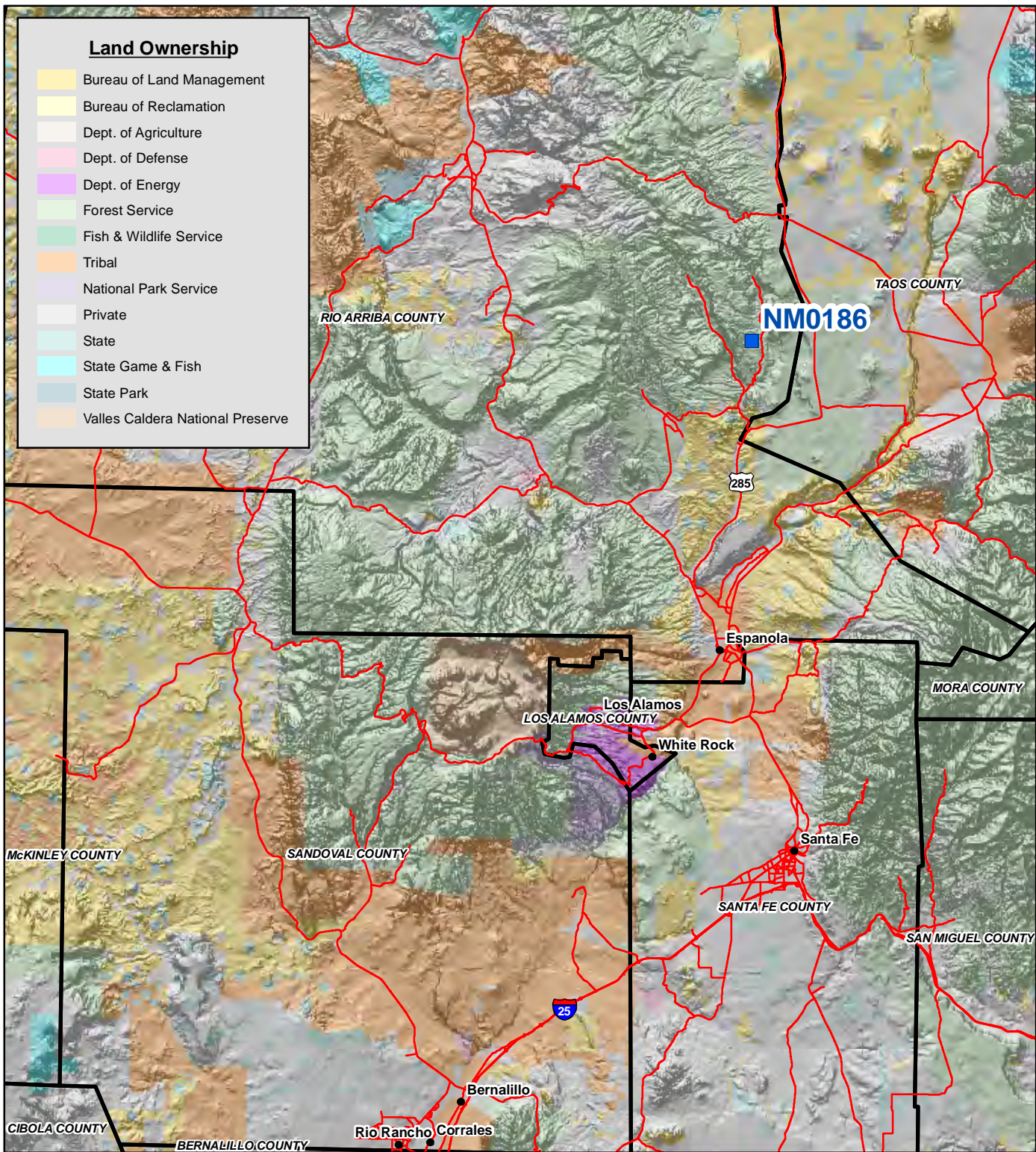
All gamma readings at this site taken by Ludlum 192 μ R/Ratemeter

μ R/hr=microroetgens per hour

-- designates no information



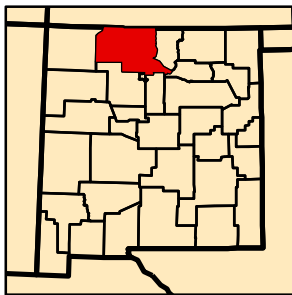
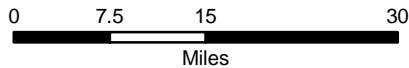
FIGURES



Land Ownership

Yellow	Bureau of Land Management
Light Yellow	Bureau of Reclamation
Light Green	Dept. of Agriculture
Pink	Dept. of Defense
Purple	Dept. of Energy
Light Green	Forest Service
Green	Fish & Wildlife Service
Orange	Tribal
Light Purple	National Park Service
White	Private
Light Blue	State
Cyan	State Game & Fish
Blue	State Park
Light Orange	Valles Caldera National Preserve

Map Source(s):
Ownership - BLM, 2008

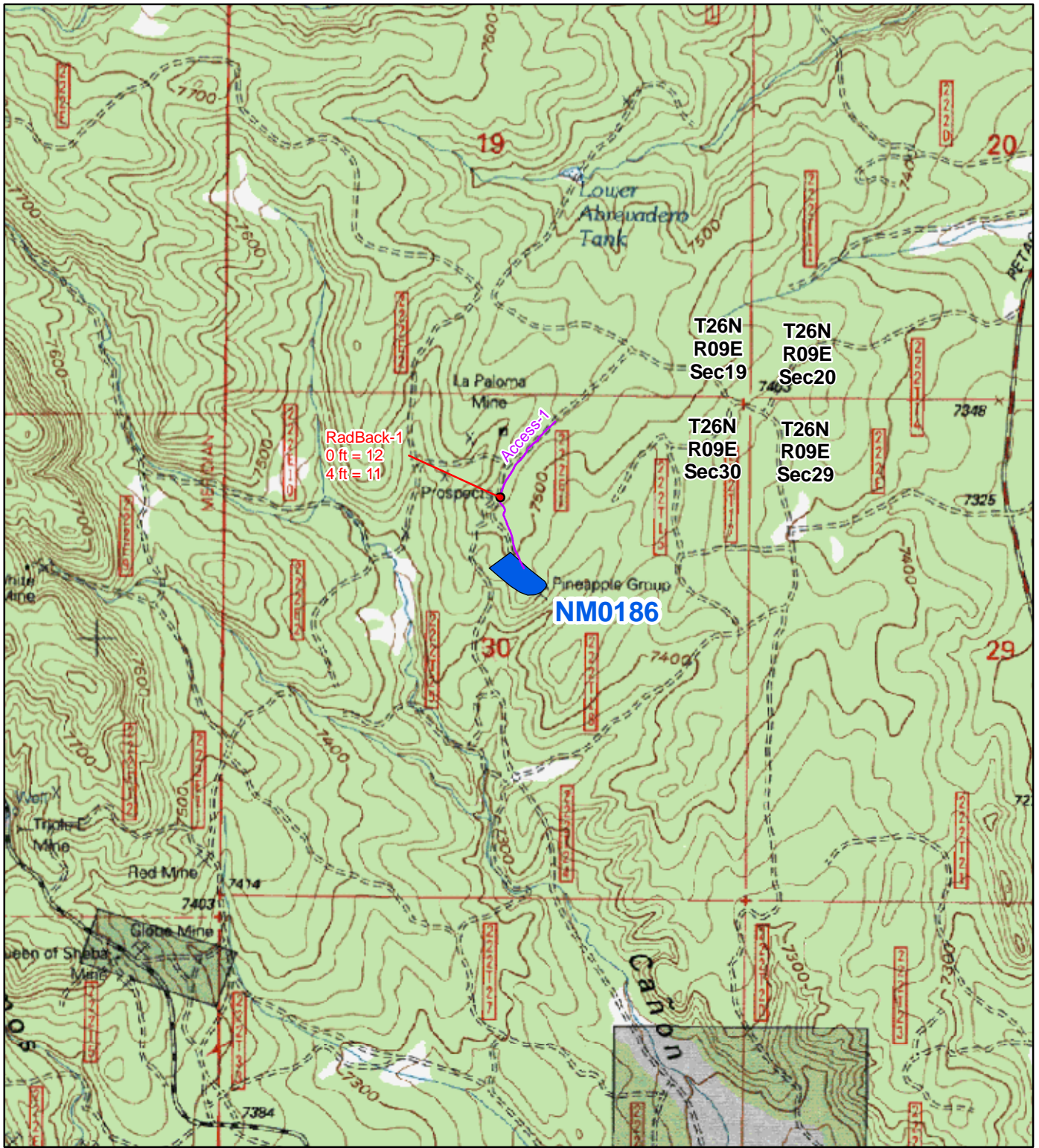


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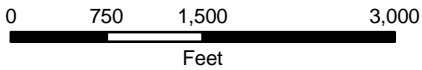
Blue square	AUM Location
Red line	Road
Black outline	County Boundary

Figure 1
Site Location Map
NM0186-Pineapple
Abandoned Uranium
Mine Assessment





Map Source(s):
 U.S. Geological Survey 7.5-Minute
 Topographic Map
 -La Madera, 1995



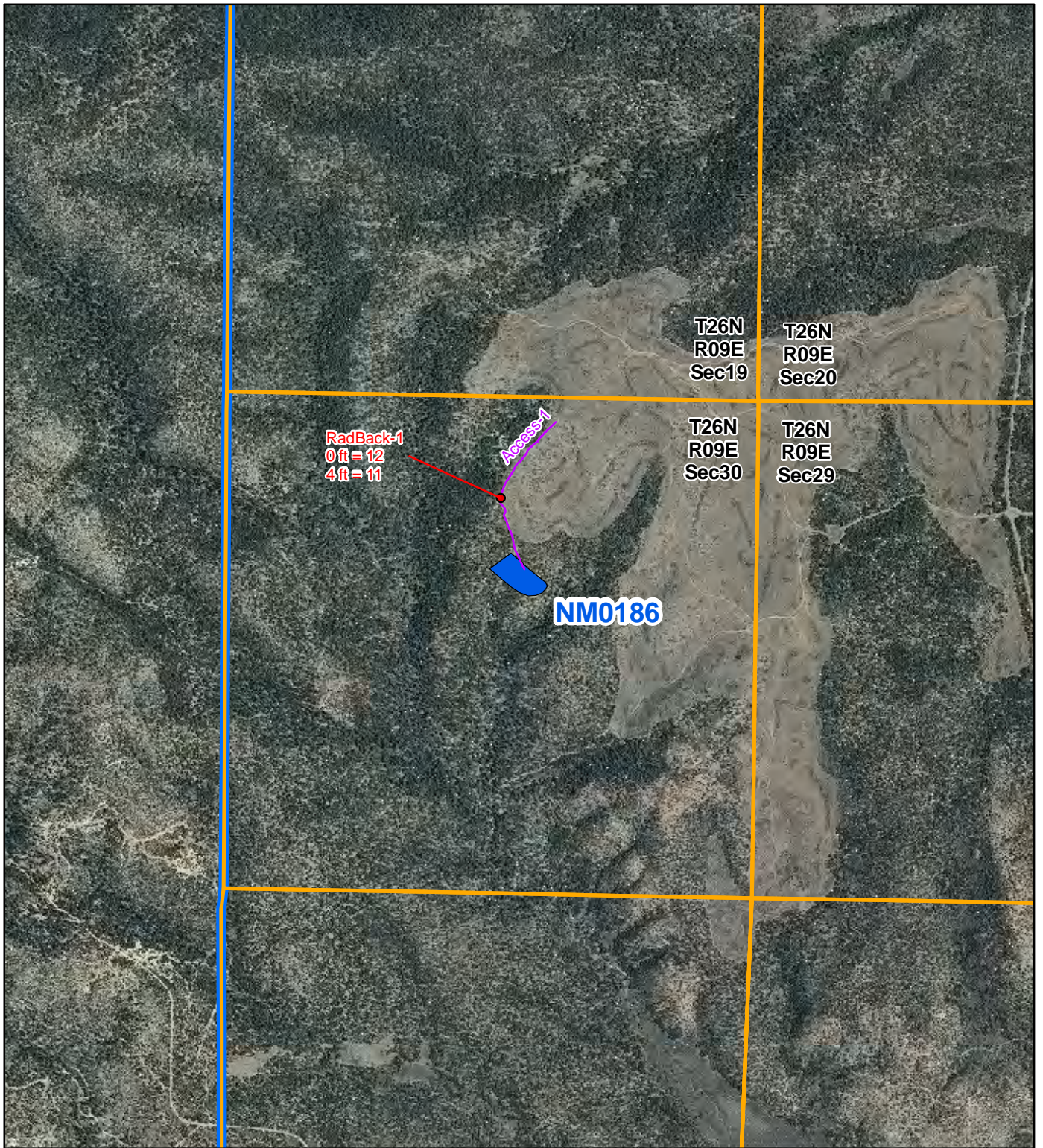
Legend

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

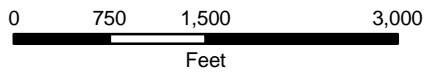
Figure 2
Topographic Map
NM0186-Pineapple
 Abandoned Uranium
 Mine Assessment

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





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



Legend

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

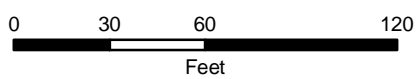
Figure 3
Aerial Photo
NM0186-Pineapple
 Abandoned Uranium
 Mine Assessment

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





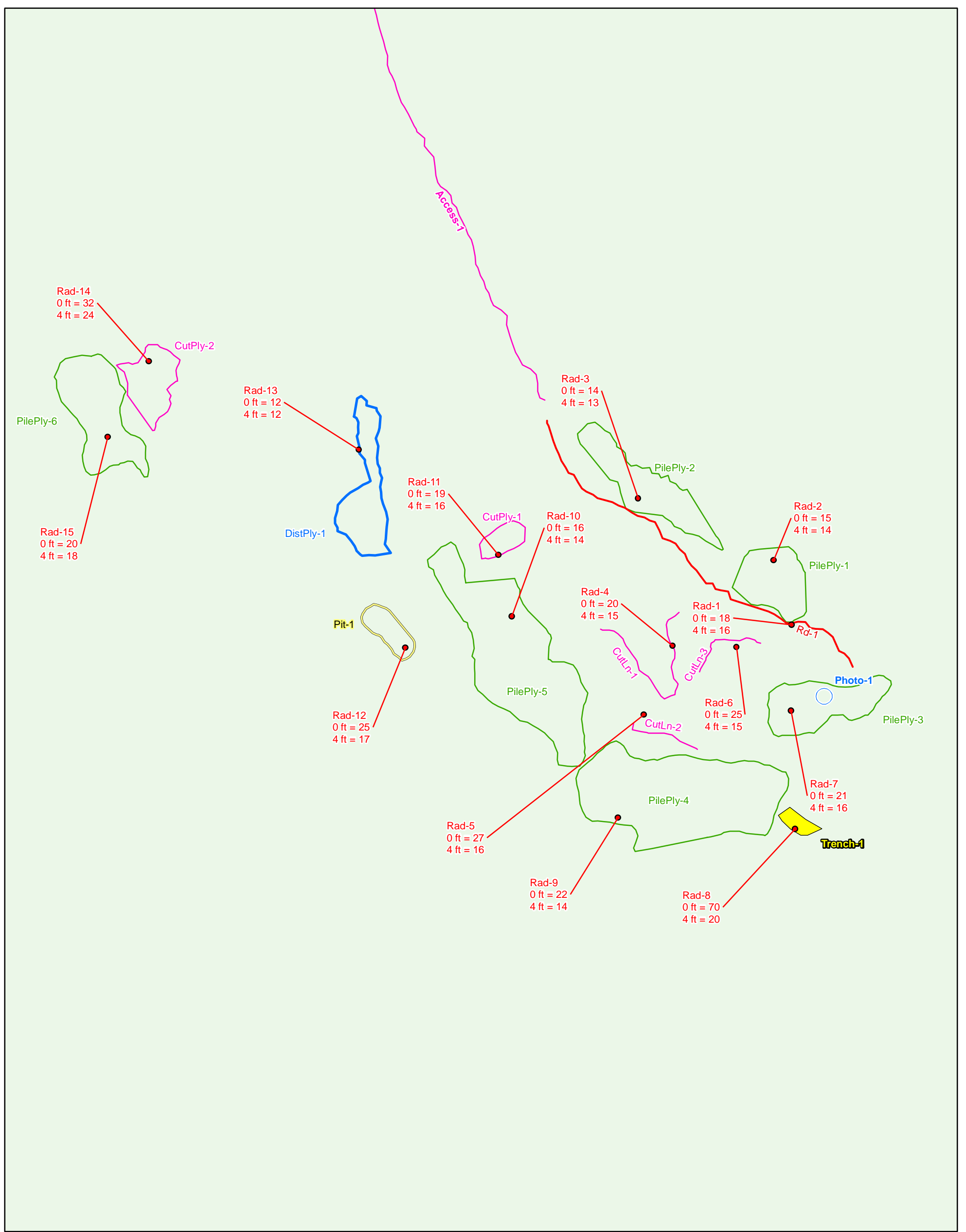
Map Source(s):
 U.S. Geological Survey 7.5-Minute
 DOQQ County Mosaic
 -Rio Arriba County, 2009



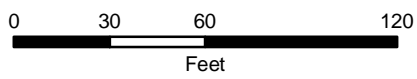
Legend	
●	Radiation Readings ($\mu\text{R/hr}$)
○	Photo Location
—	Access Route
—	Open Cut
—	Mine Road
□	Open Cut Boundary
□	Pile Boundary
□	Pit Boundary
□	Other Disturbance Area
□	Trench

Figure 4a
Site Map on
Aerial Photo
NM0186-Pineapple
 Abandoned Uranium
 Mine Assessment





Map Source(s):
Ownership - BLM, 2008



Legend		
● Radiation Readings (µR/hr)	□ Open Cut Boundary	■ Trench
○ Photo Location	□ Pile Boundary	Surface Ownership
— Access Route	□ Pit Boundary	■ Forest Service
— Open Cut	□ Other Disturbance Area	
— Mine Road		

Figure 4b
Site Map with
Surface Ownership
NM0186-Pineapple
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-At south end of site, site location photo looking west.



Photo 2-Looking north at Rd-1 and PilePly-1.



Photo 3-Looking northwest at PilePly-2.



Photo 4-Looking north at CutLn-1.



Photo 5-Looking west at CutLn-2.

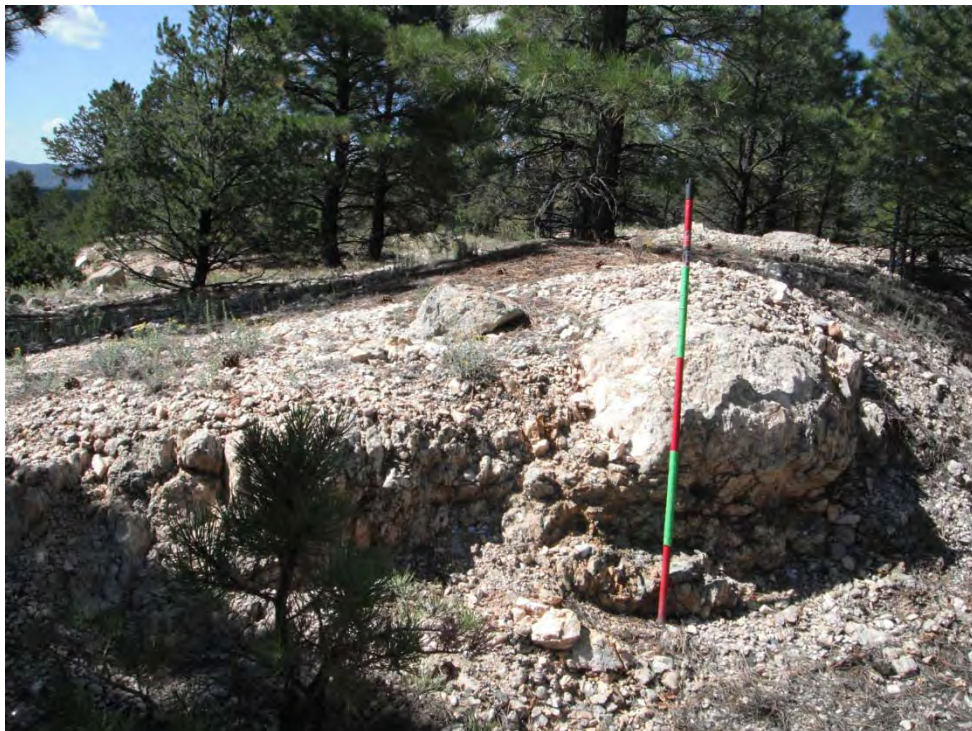


Photo 6-Looking west at CutLn-3.



Photo 7-Looking north at PilePly-3.



Photo 8-Looking north at Trench-1.



Photo 9-Looking northeast at PilePly-4.

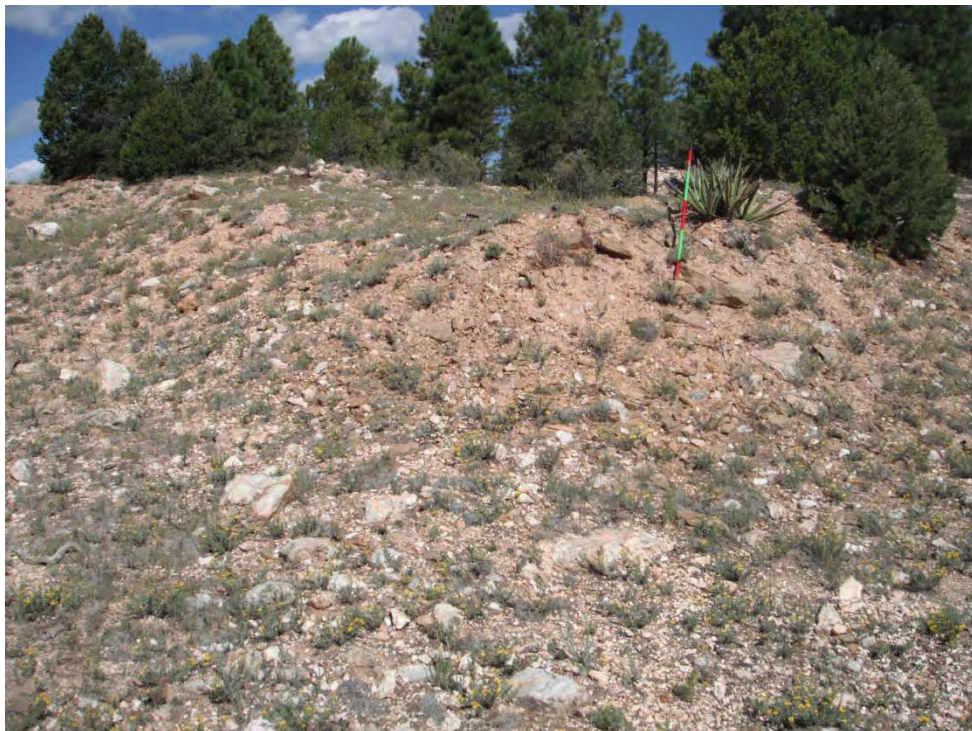


Photo 10-Looking north at PilePly-4, replicating Anderson photo B.



Photo 11-Looking east at PilePly-4.



Photo 12-Looking north at PilePly-5.



Photo 13-Looking east at CutPly-1.



Photo 14-Looking northwest at Pit-1.



Photo 15-Looking southwest at DistPly-1.



Photo 16-Looking northeast at CutPly-2.



Photo 17-Looking northeast at PilePly-6.



Photo 18-Vegetation at AUM Site.



Photo 19-Vegetation at AUM Site.



Photo 20-Vegetation at AUM Site.



Photo 21-Vegetation at AUM Site.

APPENDIX B
FIELD NOTES

8/31/10 ALT Abandoned Uranium Mines

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Site Name: NM0186, Pineapple

Objective: Site Assessment

Personnel: Annelia Tinklenberg
Alex Resovsky

Equipment: Rental truck, Trimbel GeoxM (SN: 494844727, 2008 Series), Ludlum 192 (SN: 234149), Fujifilm digital camera (No. OTB31256), backup Garmin GPS, cell phone amplifier, field laptop

800 am Leaving Espanola

920 At the end of the road - no longer passable must hike remaining mile. * Road is passable see Access 2

950 At the site

Photo 1 - Site ID location looking west at south end of site.

Mine Rd-1 - road onsite

Photo 2 - Rd-1 looking north

Rad-1 - Rd-1; 0m - 18 mR/h; 1m - 16 mR/h

Pileply-1 - 15' tall, 25' wide, 50' long, 45 slope east of Rd-1

Photo ~~2~~^{2 ALT} - looking north at ~~the~~^{ALT} Pileply-1

Rad-2 - Pile-1; 0m - 15 mR/h; 1m - 14 mR/h

Pileply-2 - series of low piles; 2' tall, 25' wide, 75' long; 20°

Photo ~~3~~^{3 ALT} - looking northwest at Pile 2

Rad 3 - Pileply-2 - 0m - 14 mR/h; 1m - 13 mR/h

Cutln-1; 3' wide, 100' long, 5' high; bull dozer cut

Photo ~~4~~^{4 ALT} - looking north at Cutln-1

Rad 4 - Cutln-1; 0m - 20 mR/h; 1m - 15 mR/h

39 8/31/10 Act Abandoned Uranium Mines

CutIn-2 - 2' wide; 40' long; 3' high; bull dozer cut

Photo ^{5 ACT} 1 - looking west at cut-2

Rad 5 - CutIn-2; Om - 27 uR/h; 1m - 16 uR/h

CutIn-3 - 2' wide; 60' long; 3' high; bull dozer cut

Photo ^{6 ACT} 2 - looking west at cut-3

Rad 6 - CutIn-3; Om - 25 uR/h; 1m - 15 uR/h

Pile Ply 3 - 15' tall, 30' wide, 75' long, 50°

Photo ^{7 ACT} 3 - looking north at Pile Ply 3

Rad 7 - Pile Ply 3; Om - 21 uR/h; 1m - 16 uR/h

Trench-1 - 5' deep, ~~20~~ ^{ACT} 20' long, 8' wide

Photo ^{8 ACT} 4 - looking north at Trench-1

Rad 8 - Trench-1 - Om - 70 uR/h; 1m - 20 uR/h

Pile Ply 4 - Anderson report dump; 20' high, 65' wide, 110' long, 30° ^{ACT} slope, waste rock

Photo ^{9 ACT} 5 - looking northeast at Pile Ply 4

Photo ^{10 ACT} 6 - looking north at Pile Ply 4 replicating Anderson

Photo ^{11 ACT} 7 - looking east at Pile Ply 4

Rad 9 - Pile Ply 4 - Om - 32 uR/h; 1m - 14 uR/h

Pile Ply 5 - 15' tall, 35' wide, 175' long, 35°

Photo ^{12 ACT} 8 - looking north at Pile Ply 5

Rad 10 - Pile Ply 5; Om - 16 uR/h; 1m - 14 uR/h

Cut Ply-1 - 4' deep, 10' wide, 20' long; bulldozer cut

Photo ^{13 ACT} 9 - looking east at cut Ply-1

Rad 11 - Cut Ply-1; Om - 19 uR/h; 1m - 16 uR/h

Pit-1; 6' deep, ~~30~~ ^{ACT} 15' wide, 40' long

Photo ^{14 ACT} 10 - looking ^{ACT} northwest at Pit-1

Rad 12 - Pit-1; Om - 25 uR/h; 1m - 17 uR/h

8/31/10 Act Abandoned Uranium Mines

Dist Ply-1 - bulldozer scrapping, may have been for road

1' high; 15' wide; 60' long
Photo ^{15 ACT} 11 - looking southwest at Dist Ply-1

Rad 13 - Dist Ply-1; Om - 12 uR/h; 1m - 12 uR/h

Cut Ply-2 - 6' tall, 30' wide, 30' long

Photo ^{16 ACT} 12 - looking northeast at cut Ply-2

Rad 14 - Cut Ply-2; Om - 32 uR/h; 1m - 24 uR/h

Pile Ply 6 - 5' high, 30' wide, 60' long; 40° slope

Photo ^{17 ACT} 13 - looking north east at Pile Ply 6

Rad 15 - Pile Ply 6; Om - 20 uR/h; 1m - 18 uR/h

Access-1 - Rd between La Paloma and Pineapple mine sites

Access-2 - Road to Route 519

1140 Leaving Pineapple for La Paloma

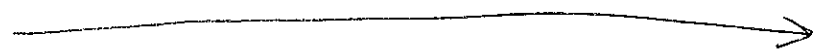
Background Rad - Om - 12 uR/h; 1m - 11 uR/h

Soils: Light tan, micaceous - thin, rocky shallow

Rocks: Muscovite mica, feldspar, quartz ~~pegmatite~~ ~~vein~~
schist ~~in~~ with a pegmatite vein

Wildlife: Deer, elk, and rabbit droppings

Human Activities: Grazing. Cow droppings and water berms.

Sketch 



41 8/31/10 Alt Abandoned Uranium Mines

