

Abandoned Uranium Mine Field Survey Project

prepared for
New Mexico Energy, Minerals and Natural Resources Department
Mining and Minerals Division

July 18, 2008



prepared by
Souder, Miller & Associates
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Albuquerque, NM 87107
505.299.0942



July 21, 2008

#5417514

Ms. Karen W. Garcia, Chief
Mine Reclamation Bureau
Mining and Minerals Division
New Mexico Energy, Minerals & Natural Resources Department
1220 South St. Francis Drive
Santa Fe, NM 87505

RE: Final Report - Abandoned Uranium Mine Field Survey Project

Dear Ms. Garcia:

Souder, Miller & Associates (SMA) is pleased to submit the attached report summarizing the Abandoned Uranium Mine Field Survey Project. The report has been modified in accordance with comments from your agency dated July 14 and July 16, 2008.

The complete report is being scanned, and CDs containing a pdf of the report will be forwarded to you, and put on SMA's FTP site for download. The geodatabase is enclosed on CDs. Additionally, it was placed on SMA's FTP site for download.

Souder, Miller & Associates appreciates the opportunity to complete this work. If you have questions or additional comments, please call me at the number above, on my cell at 505.220.6542, or email me at sam@soudermiller.com.

Sincerely,

SOUDER, MILLER & ASSOCIATES

A handwritten signature in blue ink, appearing to read 'Scott A. McKittrick'.

Scott A. McKittrick, P.G.
Senior Scientist

A handwritten signature in blue ink, appearing to read 'Reid S. Allan'.

Reid S. Allan, P.G.
Vice President/Principal Scientist

Encl.: Abandoned Uranium Mines Field Survey Project Report (three copies), GIS Database (one CD)

cc: Ms. Adela M. Duran, Associate Attorney, Comeau, Maldegen, Templeman & Indall, LLP, P.O. Box 669, Santa Fe, NM 87504-0699



Executive Summary

Souder, Miller & Associates (SMA) completed a field investigation of 21 abandoned uranium mine sites between January 9 and April 17, 2008 as per the contract between SMA and Comeau, Maldegen, Templeman & Indall, LLP (Comeau) dated January 16, 2008. The sites were located primarily in Cibola and McKinley Counties, with several outliers in Sandoval County and Socorro County. Site information was collected in order to allow prioritization of sites for potential reclamation activities.

Information collected included existing mine features (pits, piles, shafts, adits, structures, etc.), a radiological survey, land use (human, grazing), vegetation, soils, topography, wildlife, and hydrology information. Locations were determined using a global positioning system (GPS) survey, with field information collected on field sheets and entered into the GPS data dictionary. Digital photos of site features were collected.

Information collected during the field investigation is summarized in this report, and is also compiled in a geospatial database. These two items are the primary deliverables of the study.

Introduction

This evaluation of 21 abandoned uranium mining sites (shown in Figures 1 through 4) was conducted pursuant to the contract between SMA and Comeau, and under the oversight of the Mining and Minerals Division (MMD) of the New Mexico Energy, Minerals and Natural Resources Department. Field work was completed in January through April, 2008. The goal of the mine evaluation is to provide preliminary data for MMD to rank the sites based on relative risk to human health and the environment. There are two primary deliverables for this study: this written summary report and a geospatial database of all site field data and other research.

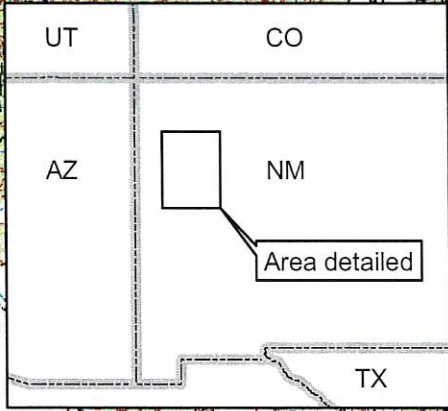
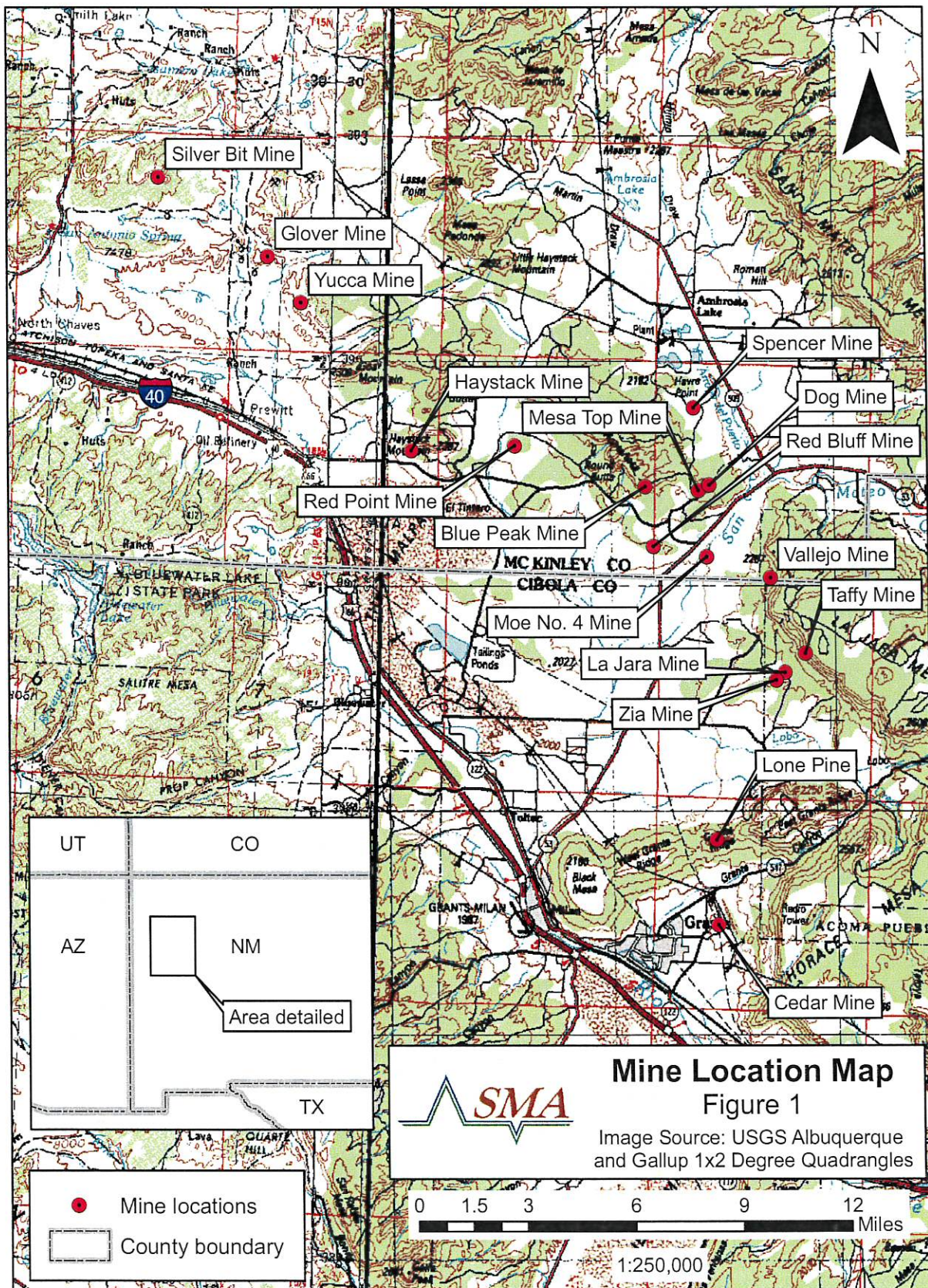
Areas of site disturbance ranged from less than one acre to tens of acres. Mine features observed included road cuts, shafts, adits, pits, ponds, and rock piles. Structures included headframes, loading structures, tanks, electrical components, steel structures, and others. Background radiation levels were generally between 10 and 20 $\mu\text{R}/\text{hour}$, with impacted readings as high as 1,800 $\mu\text{R}/\text{hour}$.

Scope of Services

SMA's scope of services included the following:

Health and Safety Plan

Prior to the commencement of field work, a field task-specific health and safety plan (HASp) was developed in accordance with applicable requirements (OSHA), the SMA Health and Safety program, and any applicable Agency safety requirements. A copy of the HASp is included in Appendix 1 to this report.



- Mine locations
- County boundary

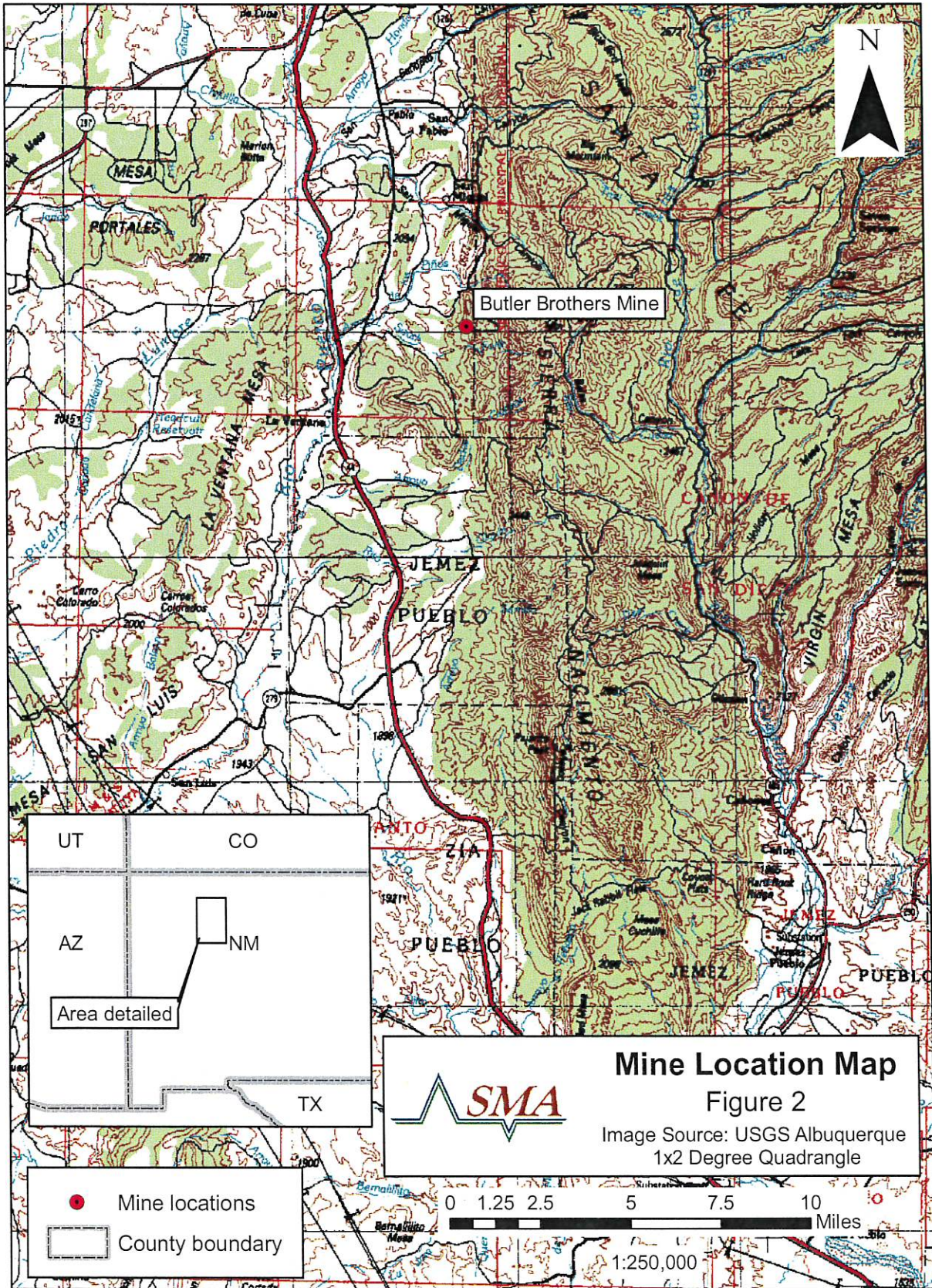


Mine Location Map Figure 1

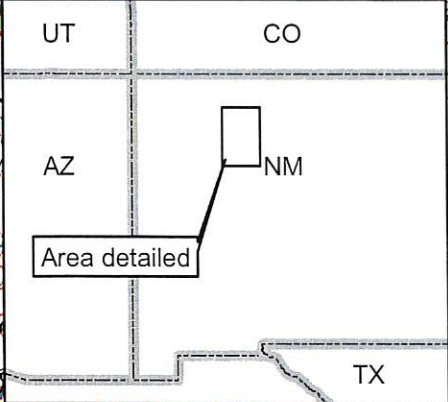
Image Source: USGS Albuquerque and Gallup 1x2 Degree Quadrangles



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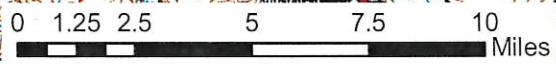
Butler Brothers Mine



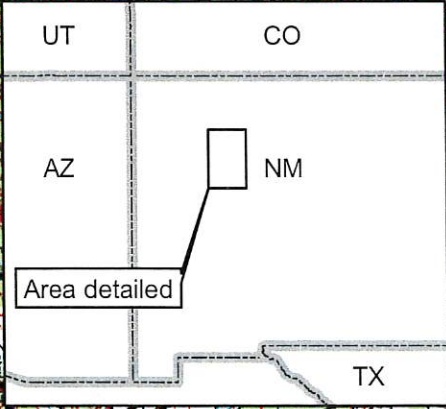
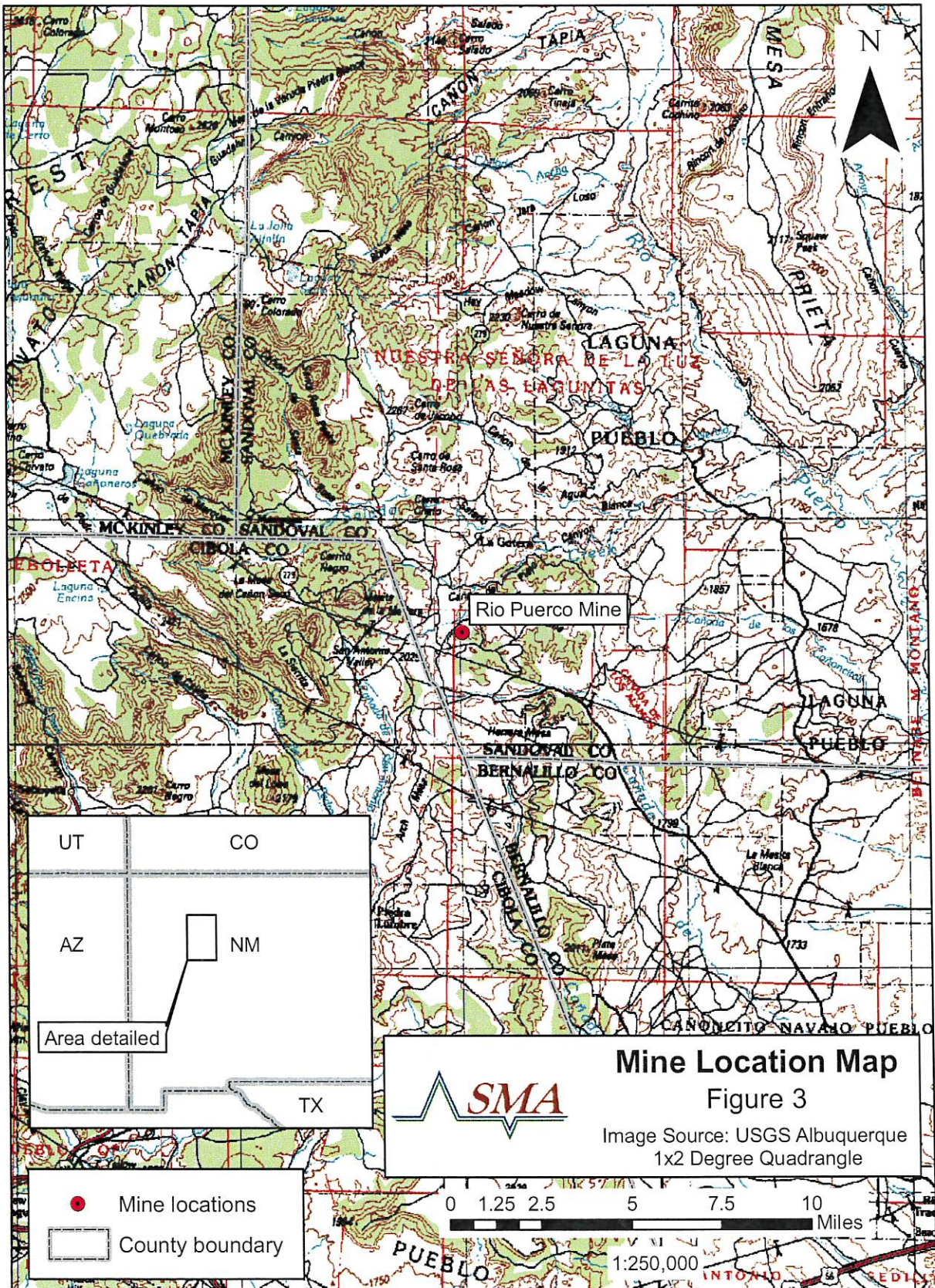
Mine Location Map
Figure 2

Image Source: USGS Albuquerque
1x2 Degree Quadrangle

- Mine locations
- ▭ County boundary



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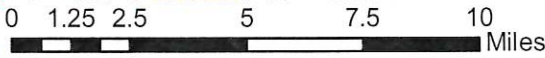


- Mine locations
- ▭ County boundary

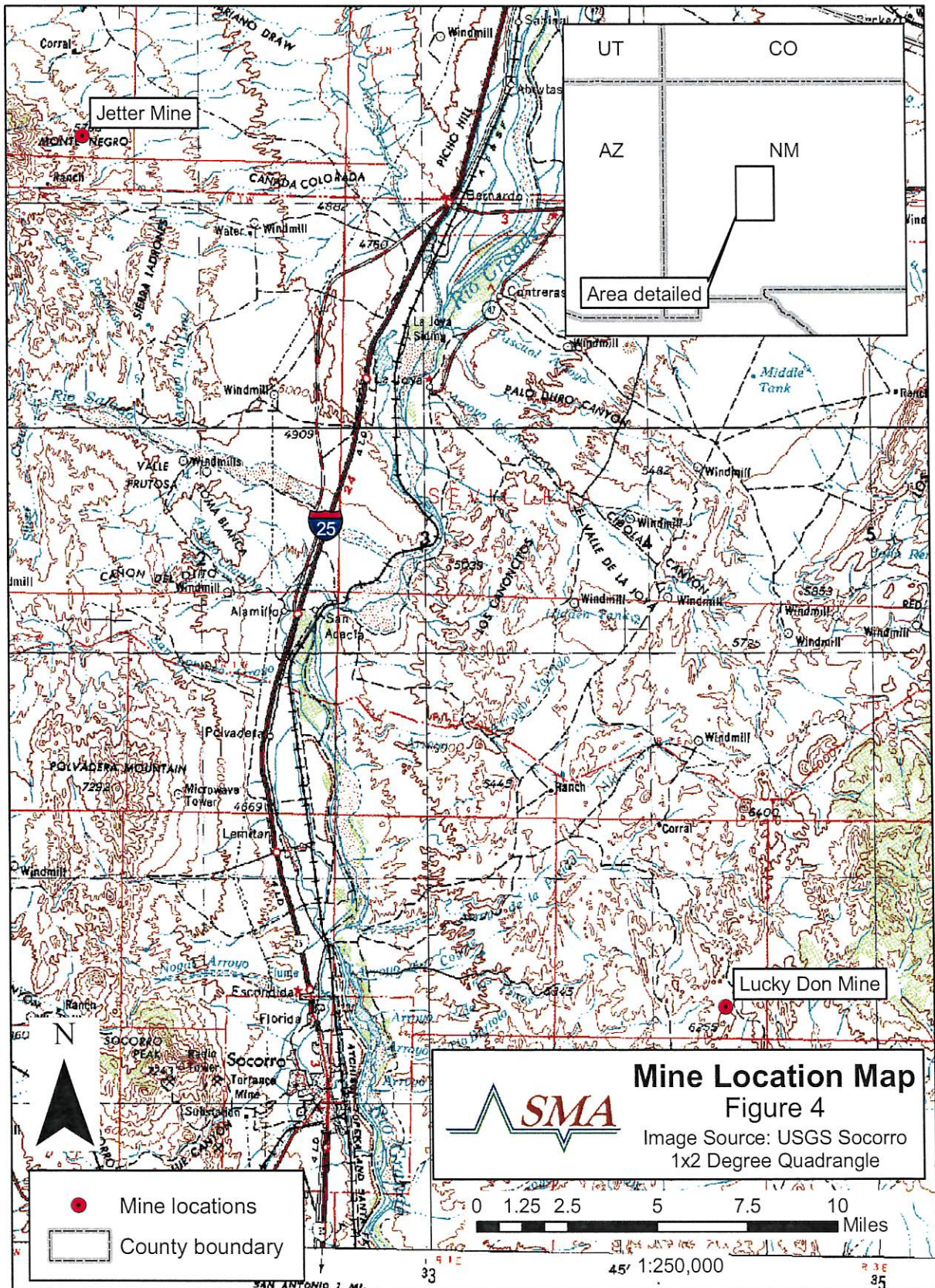


Mine Location Map
Figure 3

Image Source: USGS Albuquerque
1x2 Degree Quadrangle



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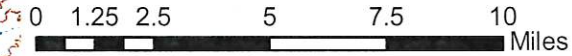
Jetter Mine

Lucky Don Mine

- Mine locations
- ▭ County boundary



Mine Location Map
Figure 4
 Image Source: USGS Socorro
 1x2 Degree Quadrangle

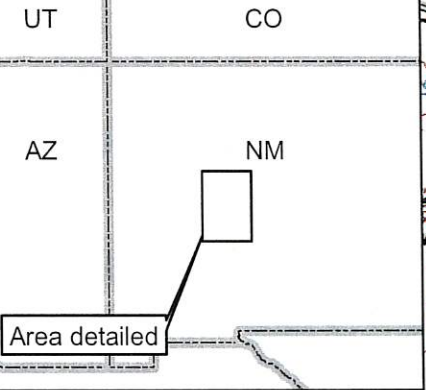


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SAN ANTONIO 3 MI.

33

35



Area detailed



Agency Notification

SMA notified, where appropriate, State and Federal land management agencies prior to field visits to allow Agency staff to accompany SMA staff. SMA was able to give at least a two business days (48 hour) notice.

Field Inspections and Data Collection

SMA developed and submitted a standardized data collection form prior to the start of the field work activities. Copies of the completed data collection forms are included in with each site summary. Field data locations were collected using a Trimble GPS Pathfinder Pro XRS receiver with sub-meter accuracy and data logging capability. Radiological survey information was collected using a state-of-the-art Ludlum Model 19 Micro-R meter.

Data Collection Reporting

A total of 21 sites were evaluated. Two sites that were originally requested by MMD were not evaluated. The United Western site was determined to be on private land, and is therefore not included in the written summaries. The Westwater site was not evaluated due to lack of access to the site.

Written site summaries have been compiled and are included in this report. The site summaries include all data collected, as well as representative photos and site maps, and copies of field notes.

Data collected has been entered into a geospatial database compatible with ESRI ArcGIS, including attribute tables for all collected data and georeferenced digital photos. An electronic copy of the database has been submitted under separate cover.

Field Data Collection Methodology

SMA field staff collected the following information during field survey activities:

- 1) GPS survey of the entire site including:
 - a. rock piles (type of rock, i.e. waste rock, ore stockpile, etc. not delineated)
 - b. mine features
 - c. adits
 - d. shafts
 - e. buildings
 - f. perimeter of disturbed area
 - g. perimeter of rock piles
 - h. buildings

SMA used a Trimble GPS Pathfinder Pro XRS receiver to locate and record data points.

The extent of disturbance was not delineated at each mine. Numerous mines were made up of cuts into the side of mesas, thus disturbance was limited and topography

did not allow field staff to walk the disturbance perimeter. The determination of the extent of the disturbance area at some mines was extremely subjective, and therefore not recorded.

- 2) Human activity: SMA documented any noted human activity, including vehicle tracks, paths, trash, etc. Additionally, SMA documented the nearest residence within a one mile search radius either in the field or through aerial photo review.
- 3) Photo documentation: Site photographs were collected using a digital camera. Characteristic photos are included in the site summaries. All photos obtained are included in the geospatial database.
- 4) Radiological survey: SMA used a Ludlum Model 19 Micro-R meter for radiological data collection. This meter is appropriate for the reconnaissance-level survey conducted, with a total range of 0-5,000 $\mu\text{R/hr}$.

Where possible, SMA conducted the radiological survey on a regular grid. Several sites had topography which did not allow survey on a grid (specifically, sites which were cut into hillsides, that were too steep to access, or included steep-sided pits). These sites included Blue Peak, Haystack, Lone Pine, Lucky Don, Silver Bit, and Taffy.

The initial step of the radiological survey at each site was to run two perpendicular lines of preliminary collection points across the widest portion of each site. Based on radiological readings collected, SMA then determined if the grid covered all areas of elevated radiological readings, and the appropriate grid spacing. The remainder of the grid was then surveyed. Radiological measurements were collected at each point at ground level and 4 feet from ground level. Where steep slopes did not allow access, field personnel collected readings where possible.

“Background” radiation is generally considered by MMD to be the naturally occurring conditions, which have not been impacted by mining activities. At the sites, background radiation levels were collected in locations outside of obvious disturbance, or on the margin of disturbed areas in an up-wind direction. SMA did not conduct a statistical review of radiation data to confirm background values.

- 5) Vegetation at the site was described and included the following information:
 - a. General life form description of vegetation, for example, if woody species, grasses, forbs, if native, exotic or weedy species. Percent coverage was estimated based on visual observation.
 - b. Evidence of vegetation die off
 - c. Evidence of grazing
- 6) Soils: Soil descriptions were collected using the applicable USDA Soil Survey and field evaluation where necessary.



- 7) Wildlife: Description of sighted or evidence of wildlife within the mine sites was collected and is included in the written summary and geospatial database.
- 8) Land use information collected included the following items:
 - a. Grazing, cattle, sheep, etc
 - b. Agricultural areas in proximity
 - c. Identification of roads, corrals, or fences and evidence of use
- 9) Topographic features: Items noted were roads, water courses, terrain, and significant topographic features in the immediate area.
- 10) Hydrogeologic information: SMA conducted a search of the New Mexico Office of the State Engineer iWaters database for well records within a one-mile search radius of each site. Descriptions of well locations and depths to water are compiled in the written report. The geospatial database includes the iWaters database information.

Site Summaries

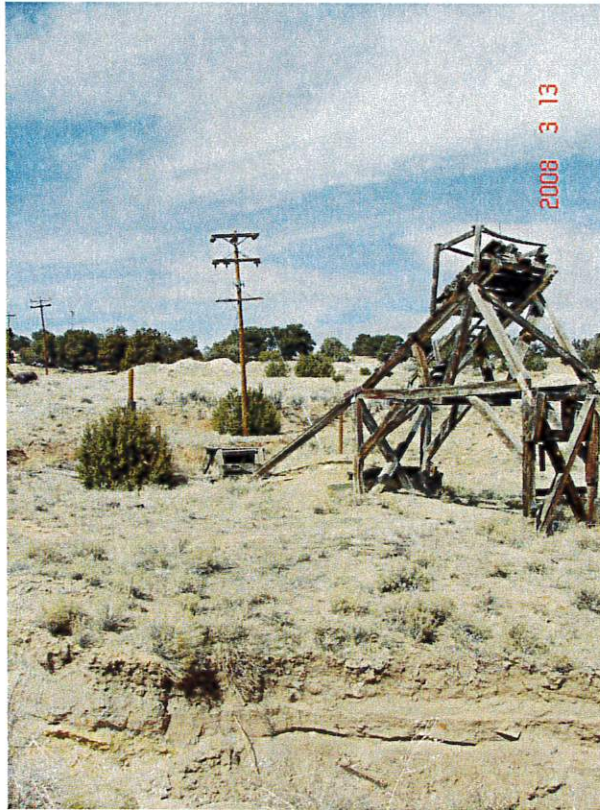
Site summaries, including site maps depicting features, and field notes, are included here.



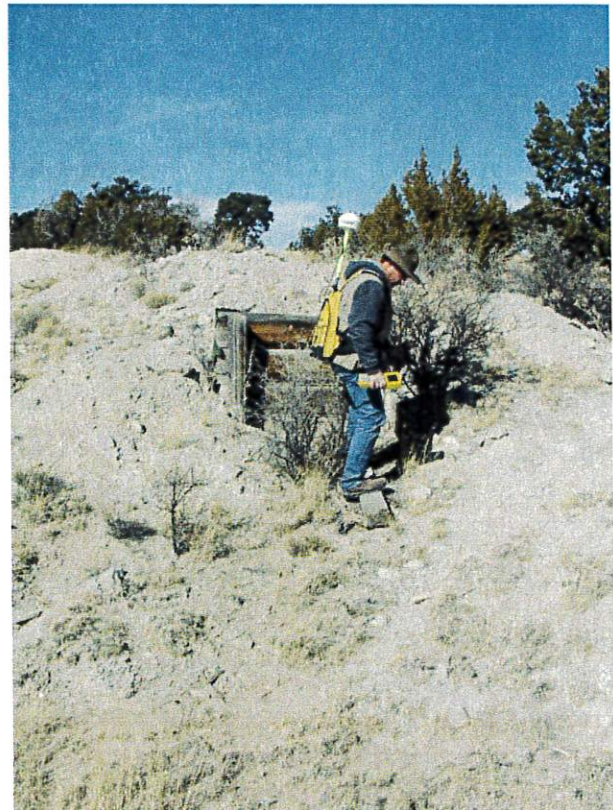
Dog Mine

- 1. Location/Land Status:** The Dog Mine is located on BLM land within Section 20, T13N, R9W on the USGS Dos Lomas quadrangle, some 12 miles north of Milan, NM. Physical access to the mine can be gained by traveling north from Milan, NM on NM 605 eleven miles to Haystack Road, continuing north 0.8 miles on NM 605. West of the highway there is a stock tank and gate. Park at the gate and proceed on foot to the mine. Legal access to this property was graciously provided by Mr. Robert Schmitt of 57 NM 509, Grants, NM, 87020; phone: (505) 287-2260.
- 2. Human Activity:** No obvious human activity besides historical mining was noted. No residences were noted within a one-mile radius of the site.
- 3. Radiological Survey:** Radiological survey results were as follows: ground surface maximum of 1,800 $\mu\text{R}/\text{hour}$ and minimum of 22 $\mu\text{R}/\text{hour}$. Four-foot elevation maximum was 1,000 $\mu\text{R}/\text{hour}$ and minimum was 20 $\mu\text{R}/\text{hour}$. Background radiation levels are approximately 17 $\mu\text{R}/\text{hour}$.
- 4. Mine Disturbance:** The mine consists of a 30 degree closed decline and wooden head frame striking SSW into underground workings. The site is strewn with numerous small rock piles (approximately 20) with an estimated total volume of 150 cubic-yards. On the northern extent of the site there are two large piles with an estimated total volume of 8,000 cubic-yards. The site is covered with various wastes: tools, derelict automobiles, and timbers.
- 5. Plant Community:** The surrounding area is typical pinon/juniper forest with grasses. Vegetation on site includes: 20% trees, 20% forbs, 20% grass, and 40% bare earth.
- 6. Soils:** Site soils are Celavar-Atarque complex, with 1 to 8 percent slopes, with 0-2 inches loam, 2-24 inches sandy clay loam, lithic bedrock at 20-40 inches.
- 7. Wildlife:** The site contains scattered rodent dens, canid tracks, and deer scat.
- 8. Land Use:** Land use is currently limited grazing.
- 9. Off-Site Impacts:** No off-site impacts were noted.
- 10. Topographic Features:** The site is low rolling hills, with no notable erosional features.
- 11. Hydrogeology:** Based on a review of the NMOSE iWaters database, there are two well records within a radius of one mile of the site. Neither of these wells have depth to water data on file. The nearest well with depth to water data on file is approximately 1.5 miles to the southwest of the site, with depth to water recorded as 280 ft.

The nearest surface water drainage feature is approximately 0.3 miles to the southwest of the site.



View west, headframe and decline



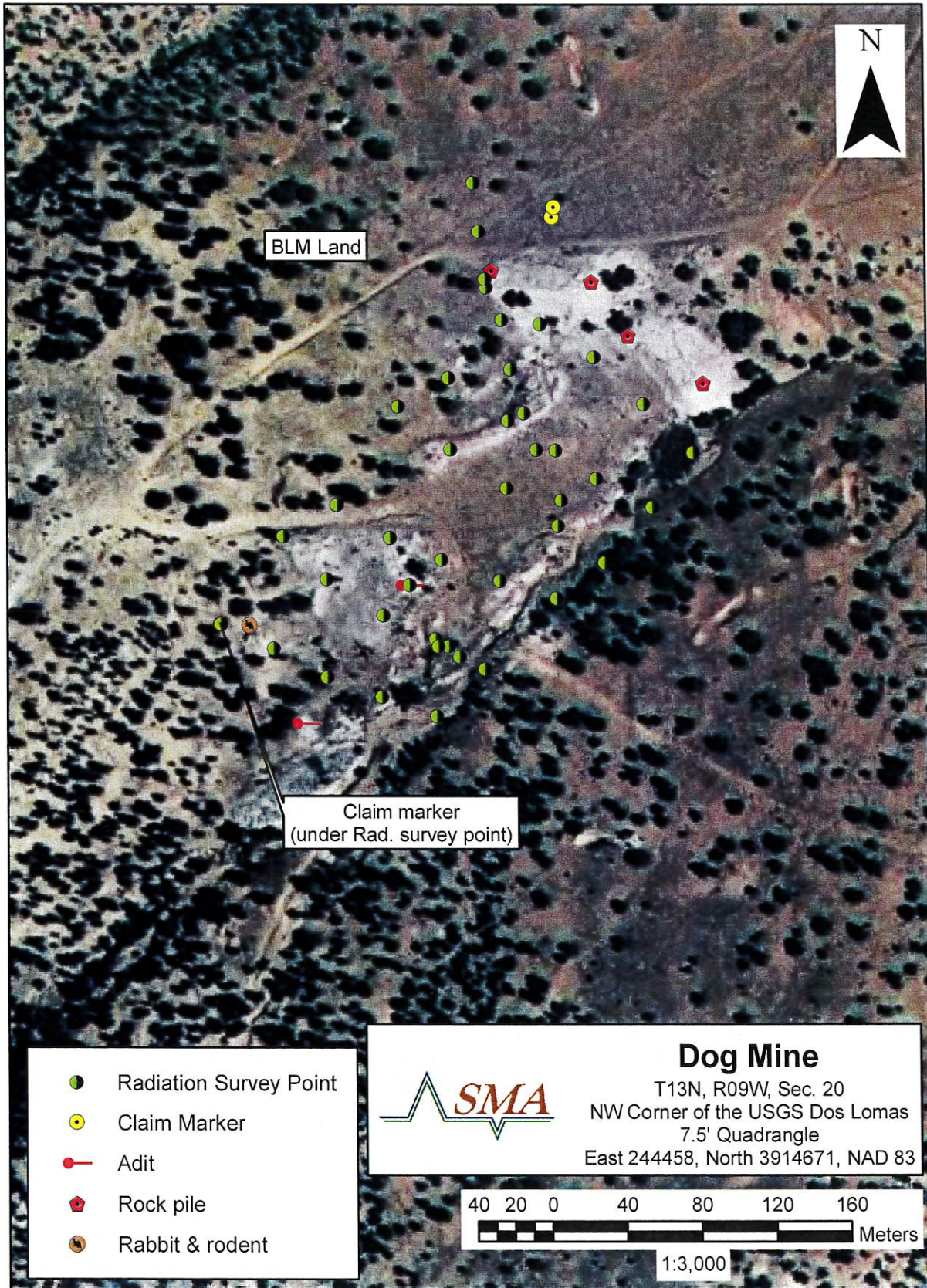
View west at adit



View south at adit








Headframe and decline



BLM Land

Claim marker
(under Rad. survey point)

-  Radiation Survey Point
-  Claim Marker
-  Adit
-  Rock pile
-  Rabbit & rodent



Dog Mine

T13N, R09W, Sec. 20
 NW Corner of the USGS Dos Lomas
 7.5' Quadrangle
 East 244458, North 3914671, NAD 83



1:3,000

AUM Field Survey Data Sheet

Site Mine TopDoc

Date	Time On-Site	Time Off-Site	By	
01/24/08	1000 hrs	1340 hrs.	Brian MERTZ / Bill ENDREIN	
Weather Conditions: <i>Clear, Sunny, appx 30°F, slight breeze</i>				
Disturbances	GPS#	Description	Dim/Area/Volume	Photo #'s
Shafts	01	vertical shaft ~60' fenced w/wood collar	12' x 12'	
Adits	16 37 39			
Pits				
N/A				
Waste Rock Dumps/ STOCK PILE	12 42-45			
Tailings				
N/A				
Trenches				
N/A				
Roads				
overgrown non-existent				
Erosional Features				
NONE extraordinary				
Structures / Equipment	GPS#	Description	Dimensions	Photo #
Buildings				
N/A				
Headframes	35	WOODEN		
1				
Claim Marker	22	Possible claim marker		

AUM Field Survey Data Sheet

Site Mesatop/Dig

Equipment				
Soils	GPS#	Description	Extent	Photo #
290 - Rockout crop - Westmin Sky Village 305 - CELAVAR - ATARQUE Complex		SEE USDA-NRCS ATTACHMENT		
Vegetation	GPS#	Description	Extent	Photo #
— SEE ATTACHMENT				
Wildlife	GPS#	Description		Photo #
Scattered rodent dens Canid tracks (?) old Scattered deer pellets				
Human Activity (non-mining, w/in 0.5 mi of site)	GPS#	Description	Extent	Photo #
None known				
Land Use (grazing, agricultural, roads, etc., w/in 0.5 mi of site)	GPS#	Description	Extent	Photo #
Limited grazing		on E of site		
Nearby Residences / Wells (w/in 0.5 mi of site)	GPS#	Description	Distance to Site	Photo #
None known				
Topographic Features (roads, water courses, etc.)	GPS#	Description		Photo #

Typical low, rolling hills.

AUM Field Survey Data Sheet

Site Mess Top

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AUM Field Survey Data Sheet

Site _____

Radiological Survey

GPS#	Description	Reading Surface	Reading 4 feet
02	Rad. survey E to W	80	70
03	"	120	90
04	"	80	70
05	"	90	80
06	"	150	120
07	"	120	100
08	"	80	70
09	"	20	19
10	Vertical iron cylinder 1.5' dia. x 9' h	500	—
11	Stock pile , Rad S to N	110	90
12	Stock pile & framework	—	—
13	Rad. survey S to N	80	70

AUM Field Survey Data Sheet

Site Mesa Top / Dog

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AUM Field Survey Data Sheet

Site _____

Radiological Survey

GPS#	Description	Reading Surface	Reading 4 feet
14	Rad survey S to N	80	70
15	"	120	110
16	"	140	120
17	"	120	110
18	"	100	90
19	"	30	27
20	Old car pieces	24	20
21	Claim stake hole	24	20
22	Claim stake	11	10
23	Claim stake	—	—
24	"	—	—
25	pent shaft (pt gene.)	—	—

AUM Field Survey Data Sheet

Site Mesa TOP/DOG

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AUM Field Survey Data Sheet

Site _____

Radiological Survey

GPS#	Description	Reading Surface	Reading 4 feet
26	Pad survey W to E	19	17
27	"	17	15
28	"	26	24
29	"	30	28
30	"	130	110
31	"	70	50
32	"	26	22
33	"	20	20
34	"	24	20
35	headframe	—	—
36	decline	800	800
37	decline	600	300
38	concrete pad	260	260
39	abt	46	42

Mine I.D.: Mesquite/DOG

Plant Community Data

Date/Time: 01/24/08

Weather: Sunny, slight breeze

Observer: B. MERTZ

Current Plant Community:

Photo# *Pinon - Juniper, open forest*

30% Tree, 30% grasses, 20% Forb, 10% shrub, 10% bare ground

Other Species Present:

Photo # *Four wing Saltbrush (Atriplex canescens)*

Blue gramma (B. gracilis)

Unknown grass (no inflorescence, culm) NOT B. gracilis

Brown Snakehead (G. sarothrae)

*Rabbit brush
Chrysothamnus spp.*

T&E Present: Y/N?

If yes, species? *NO*

Photo #

Noxious Weeds: Y/N?

If yes, species? *NO*

Photo #

Bare Spots? Y/N?

Number of spots/size *yes, normal bare spots - between vegetation*

Photo #

Standing Dead? Y/N?

If yes, species? *NO*

Photo #

Photo Point GPS Coord.

Photo #/Direction

Additional Notes:

Use back if necessary

AUM Field Survey Data Sheet

Site AUM-Dog 2008-3-13

Radiological Survey				
GPS#	Description		Reading Surface	Reading 4 feet
G0	Rad. survey	✓	22	20
G1	"		60	50
G2	"		70	80
G3	"		70	80
G4	"	✓	80	80
G5	"	✓	44	40
G6	"		1800	1000
G7	"		90	90
G8	"		130	110
G9	"	✓	38	32
G10	"	✓	28	22
G11	"		80	70
G12	"		140	120
G13	"		260	220
G14	"	✓	28	24

AUM Field Survey Data Sheet

Site Aum Dog 2008-3-13

Radiological Survey			
GPS#	Description	Reading Surface	Reading 4 feet
G15	Rod survey ✓	42	42
G16	"	280	260
G17	"	50	48
G18	"	200	180
G19	" ✓	180	170
G20	" ✓	180	170
G21	"	100	80
G22	"	240	220
G23	"	500	320
G24	" ✓	36	30
G25	" ✓	24	22
G26	"	90	90
G27	"	40	38
G28	"	44	42
G29	" ✓	22	20

H₂O: 30% base 20% forb.
 20% P&J 10% base
 20% grass