

# 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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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](mailto: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.

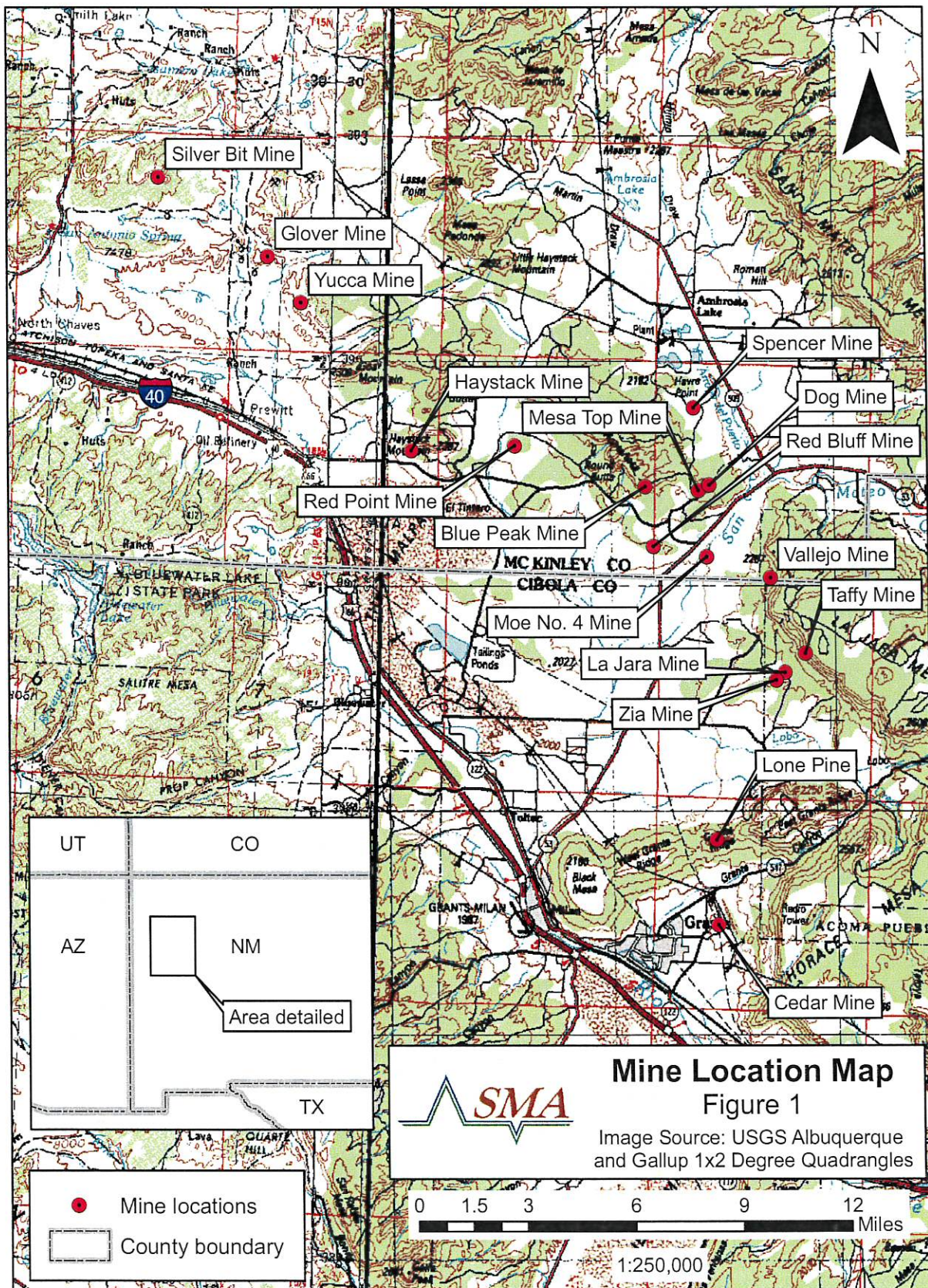
Areas of site disturbance ranged from less than one acre to tens of acres. Mine features observed included road cuts, shafts, adits, pits, ponds, and rock piles. Structures included headframes, loading structures, tanks, electrical components, steel structures, and others. Background radiation levels 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.



Silver Bit Mine

Glover Mine

Yucca Mine

Haystack Mine

Mesa Top Mine

Spencer Mine

Dog Mine

Red Bluff Mine

Red Point Mine

Blue Peak Mine

Vallejo Mine

Taffy Mine

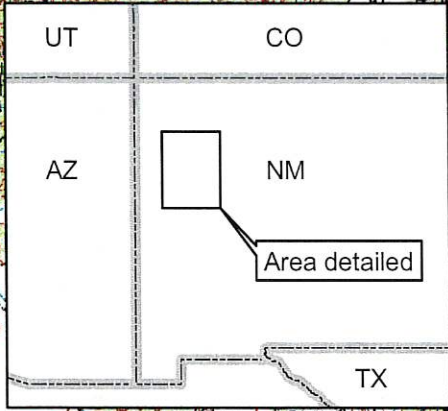
Moe No. 4 Mine

La Jara Mine

Zia Mine

Lone Pine

Cedar Mine



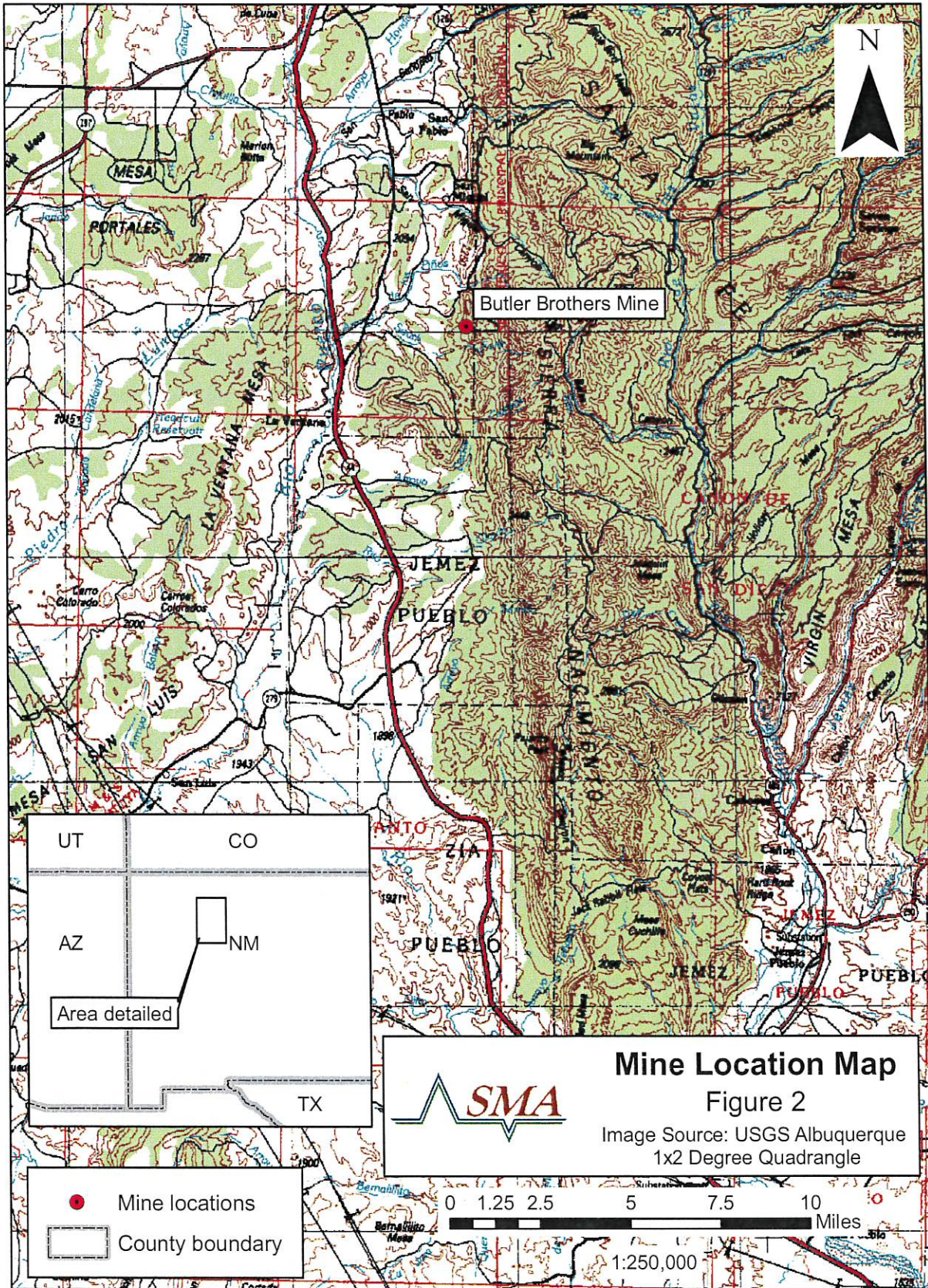
**Mine Location Map**  
Figure 1

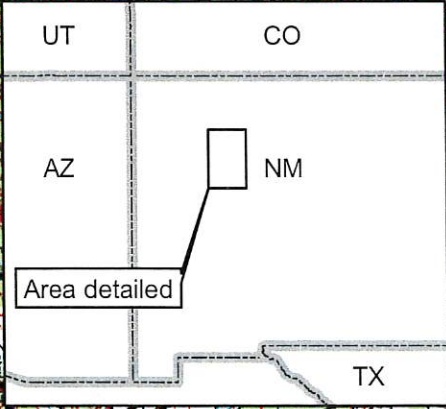
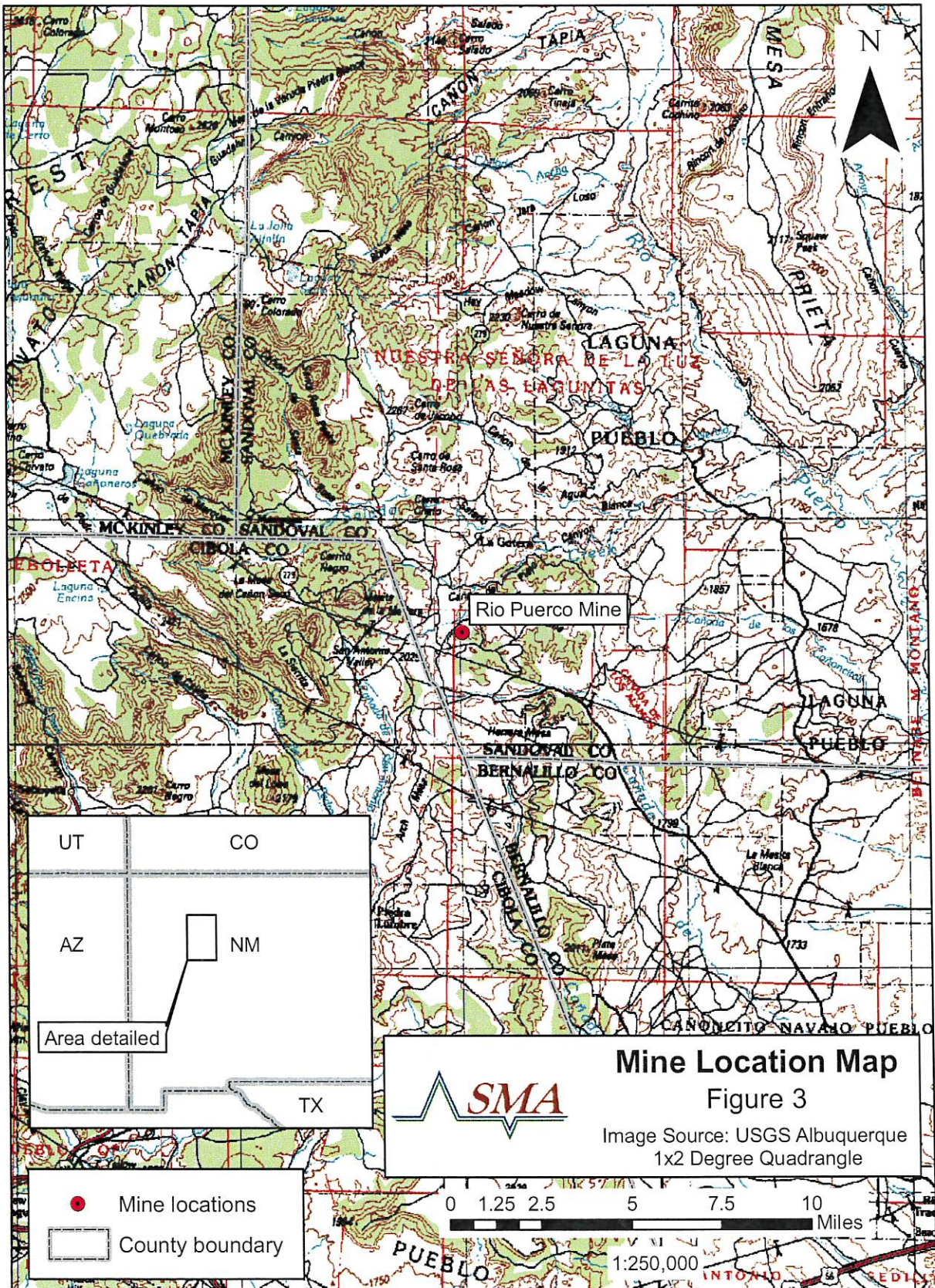
Image Source: USGS Albuquerque and Gallup 1x2 Degree Quadrangles

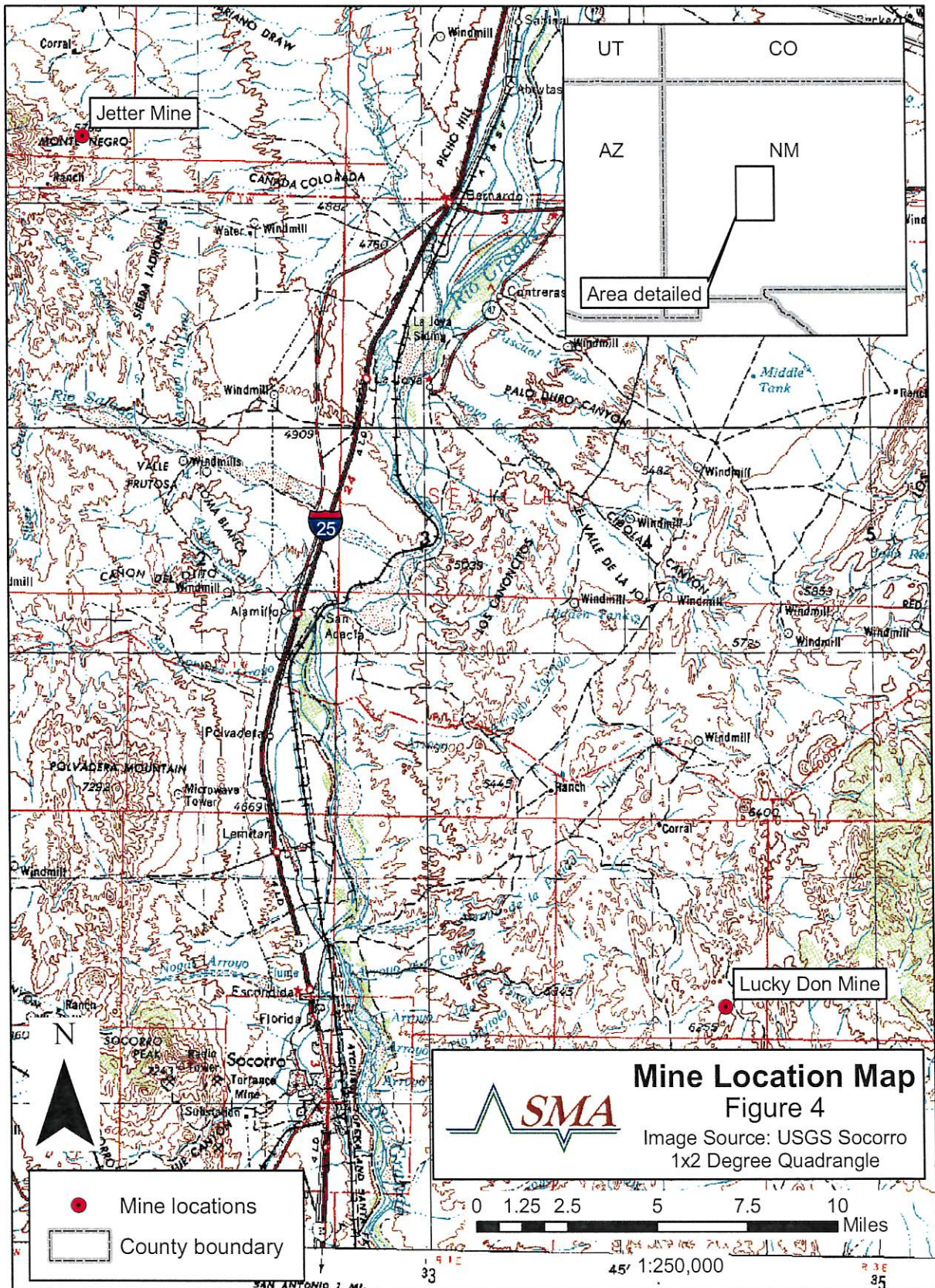
- Mine locations
- County boundary



1:250,000







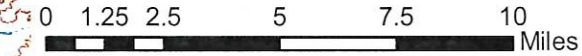
Jetter Mine

Lucky Don Mine

- Mine locations
- ▭ County boundary



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



0 1.25 2.5 5 7.5 10 Miles  
 45° 1:250,000

SAN ANTONIO 3 MI.



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## 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.



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## **Butler Brothers Mine**

**1. Location/Land Status:** The Butler Brothers Mine is located on BLM land within Section 23, T19N, R1W on the USGS La Ventana quadrangle (35.863833N, 106.902806W). The mine can be physically accessed by traveling south on Old NM 44 from Cuba 6.5 miles to San Miguel Road, east on San Miguel Road to the end of the pavement, then by foot approximately 3.5 miles SSE to the mine site. Legal access was graciously provided by verbal agreement of Mr. and Mrs. Miguel Montoya of 63 San Miguel Rd. Cuba, NM 87013, (575) 289-9160. The Butler Brothers Mine is located in a remote portion of Section 23 which has little access via roads. The most obvious and practical approach is from the south on Old 44 then east along ranch and jeep path directly to the mine; however, access via this route would require considerably more legal agreement than the path which was actually taken.

**2. Human Activity:** No residences or wells are located within a one-mile radius of the site. There is evidence of woodcutting in the area. Based on the limited scale, woodcutting is likely individuals collecting for home use.

**3. Radiological Survey:** Radiological survey results were as follows: ground surface maximum of 420  $\mu\text{R}/\text{hour}$  and minimum of 8  $\mu\text{R}/\text{hour}$ . Four-foot elevation maximum was 360  $\mu\text{R}/\text{hour}$  and minimum was 8  $\mu\text{R}/\text{hour}$ . Background readings were approximately 8  $\mu\text{R}/\text{hour}$ .

**4. Mine Disturbance:** The mine consists of two open excavations into the ridge. The jeep path winds to the top of the excavation and ends. Erosion through the center of the lower workings has removed enough material to disguise the excavation as being no more than a road cut.

**5. Plant Community:** The area surrounding the mine is a diverse forest of pinon, juniper, ponderosa, and oak. Much of the area within the mine site and along the road is notably dense with pinon seedlings. On-site vegetation is made up of 5% grasses, 20% forbs, 20% shrubs, 20% trees, and 35% bare ground, with no noted non-native species.

**6. Soils:** Site soils are made up of weathered volcanic tuff with slopes of 10-30 percent. Soils are generally thin loam overlying silty clay, with bedrock at 12 to 24 inches.

**7. Wildlife:** Animal sign, most particularly deer, was abundant: fox, rabbit, coyote, horned lizard, and rodent were all directly observed.

**8. Land Use:** The land use of the area is moderate cattle grazing and wood cutting.

**9. Off-Site Impacts:** No off-site impacts were noted.

**10. Topographic Features:** The site is cut into the steep side of a mesa. Active erosion of the cut is present.

**11. Hydrogeology:** Based on a review of the NMOSE iWaters database, there are no wells within a radius of one mile to the site. The nearest well records on file for wells near the site are approximately 1.5 miles away (total of two), to the northwest (depth to water 300 ft), and the south (depth to water 35 ft).

The nearest surface water drainage feature is approximately 0.2 miles to the south.



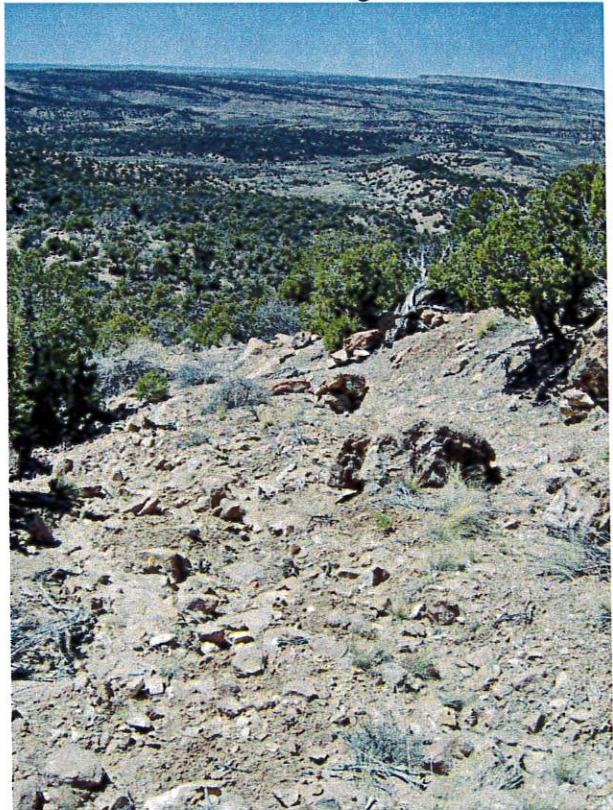
View northwest



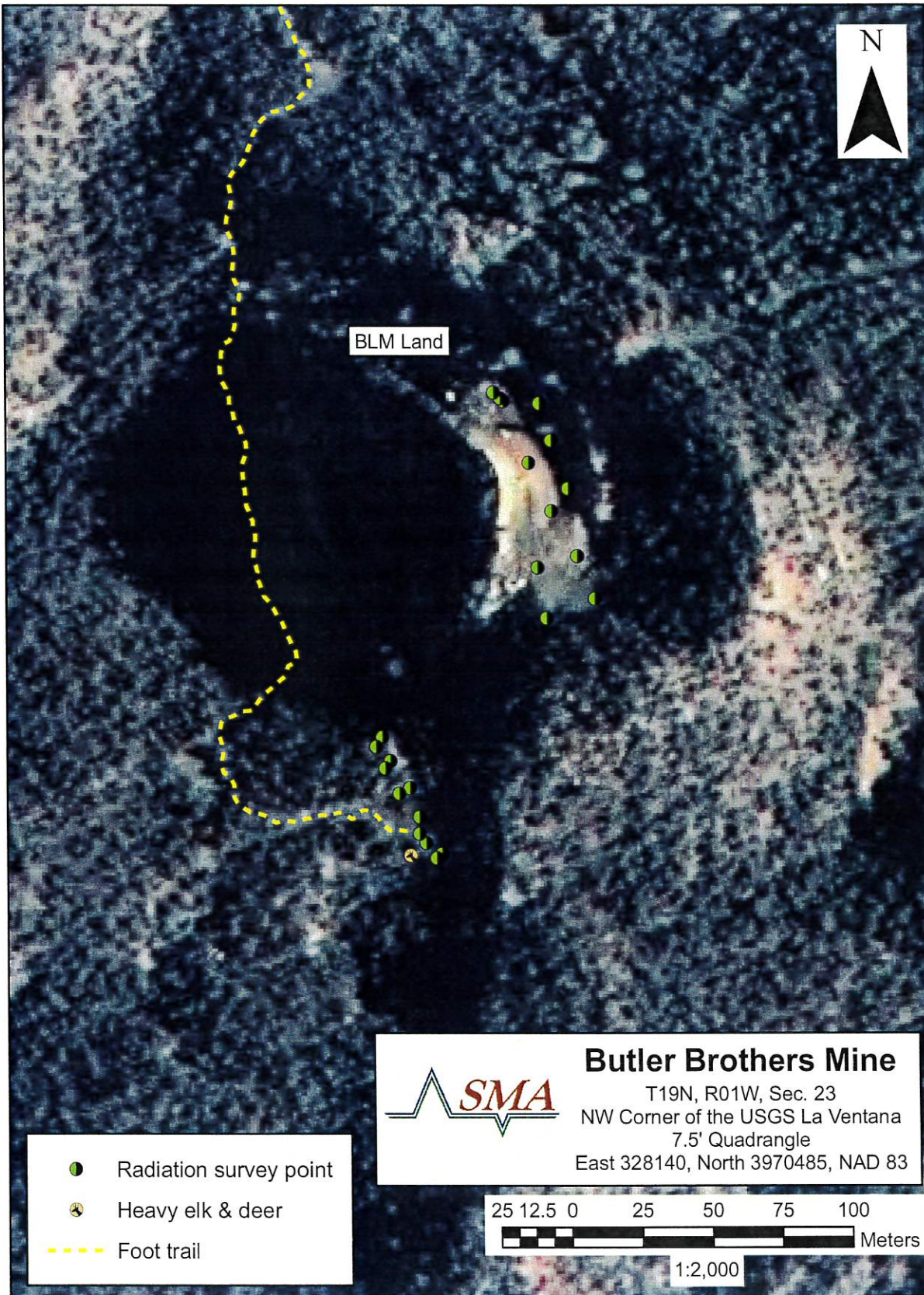
View northwest to workings



View west of cut



View to West



BLM Land

- Radiation survey point
- 🦌 Heavy elk & deer
- Foot trail



### Butler Brothers Mine

T19N, R01W, Sec. 23  
NW Corner of the USGS La Ventana  
7.5' Quadrangle  
East 328140, North 3970485, NAD 83



1:2,000

## AUM Field Survey Data Sheet

Site Butler Brothers

Date 4/14/08	Time On-Site	Time Off-Site	By Baldwin Mertz
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Weather Conditions:

Disturbances	GPS#	Description	Dim/Area/Volume	Photo #'s
Shafts				
Adits				
Pits		2 cuts -		
Waste Rock Dumps				
Tailings				
Trenches				
Roads				
Erosional Features		- lower cut eroded.		

Structures / Equipment	GPS#	Description	Dimensions	Photo #
Buildings				
Headframes				

## AUM Field Survey Data Sheet

Site Butler Brothers

Equipment				
<b>Soils</b>	GPS#	Description	Extent	Photo #
<b>Vegetation</b>	GPS#	Description	Extent	Photo #
	Veg-0	35% - bare 5% - grass 20% - tree 20% - shrub 20% - Forbs		
<b>Wildlife</b>	GPS#	Description		Photo #
	wildlife 0	heavy elk, deer, coyote, fox, bear, Aberts Squirrel, etc		
<b>Human Activity</b> (non-mining, w/in 0.5 mi of site)	GPS#	Description	Extent	Photo #
	Land- 0	No evidence of current use		
<b>Land Use</b> (grazing, agricultural, roads, etc., w/in 0.5 mi of site)	GPS#	Description	Extent	Photo #
<b>Nearby Residences / Wells</b> (w/in 0.5 mi of site)	GPS#	Description	Distance to Site	Photo #
<b>Topographic Features</b> (roads, water courses, etc.)	GPS#	Description		Photo #

AUM Field Survey Data Sheet

Site AUM Butler Brook, 2008-4-14

Radiological Survey			
GPS#	Description	Reading Surface	Reading 4 feet
BUTLER 1	Eastern-most extent of site	11	12
G0	Rad. survey	11	12
G1	"	17	16
G2	"	12	14
G3	"	16	16
G4	"	14	13
G5	"	12	12
G6	"	10	12
G7	"	10	12
G8	"	15	12
G9	"	12	12
G10	"	20	14
WILDLIFE 0	HAY, ELK, DEER, COYOTE, FOX, BEAR ABERTS SWL., ETC...	—	—
VEG 0	35% BARE 20% SHRUB 5% GRASS 20% TREE 20% FORB	—	—
LAND 0	OTHER - NO EVIDENCE OF CURRENT USE	—	—

AUM Field Survey Data Sheet

Site Butter Base, 2008-4-14

Radiological Survey			
GPS#	Description	Reading Surface	Reading 4 feet
G11/B1	Rad. survey control	48	44
G12/B2	"	38	36
G13/B3	"	12	12
G14/B4	"	12	12
G15/B5	"	10	10
G16/B6	"	15	12
G17/B7	"	13	12
G18/B8	"	8	8
G19/B9	"	70	60
G20/B10	"	50	46
G21/B11	"	420	360
G22/B12	"	48	46
	P-Dep 6.75' @ 14:47		
	BH VALUES ARE LISTED IN GERMAN HANDHELD		

Butler Brothers Field data, from handheld Garmin GPS unit, 04-14-08.  
Points collected by Brian Mertz & Bill Baldwin

Data Point	Lat.	Long.	Elev.
B1	35.86390	106.90359	7639
B2	35.86389	106.90358	7636
B3	35.86369	106.90347	7653
B4	35.86354	106.90338	7664
B5	35.86336	106.90343	7664
B6	35.86320	106.90339	7665
B7	35.86326	106.90321	7677
B8	35.86340	106.90327	7669
B9	35.86361	106.90331	7668
B10	35.86377	106.90338	7664
B11	35.86388	106.90343	7656