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

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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

Scott A. McKitrick, P.G.
Senior Scientist

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.

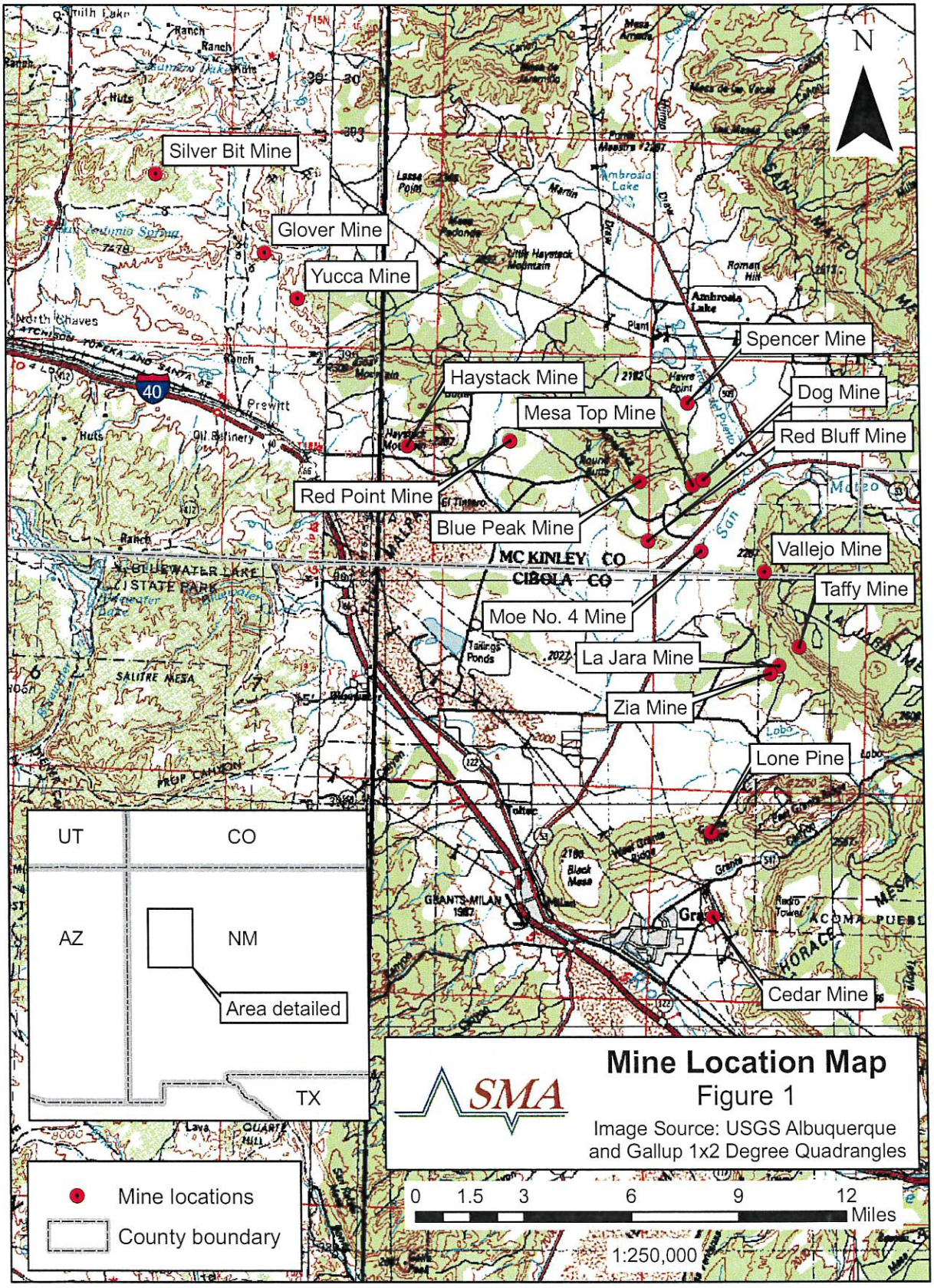
Areas of site disturbance ranged from less than one acre to tens of acres. Mine features observed included road cuts, shafts, adits, pits, ponds, and rock piles. Structures included headframes, loading structures, tanks, electrical components, steel structures, and others. Background radiation levels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

Scope of Services

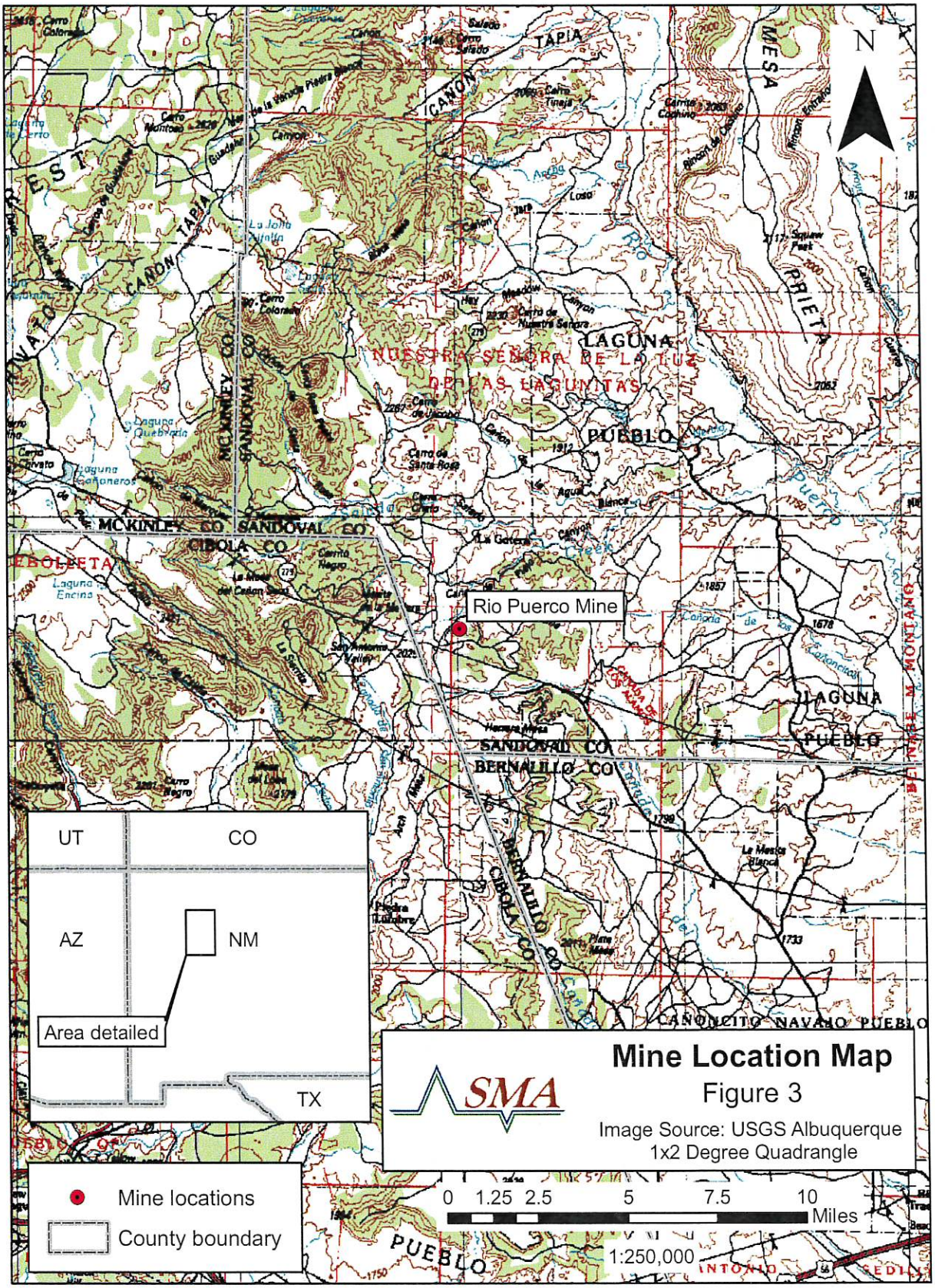
SMA's scope of services included the following:

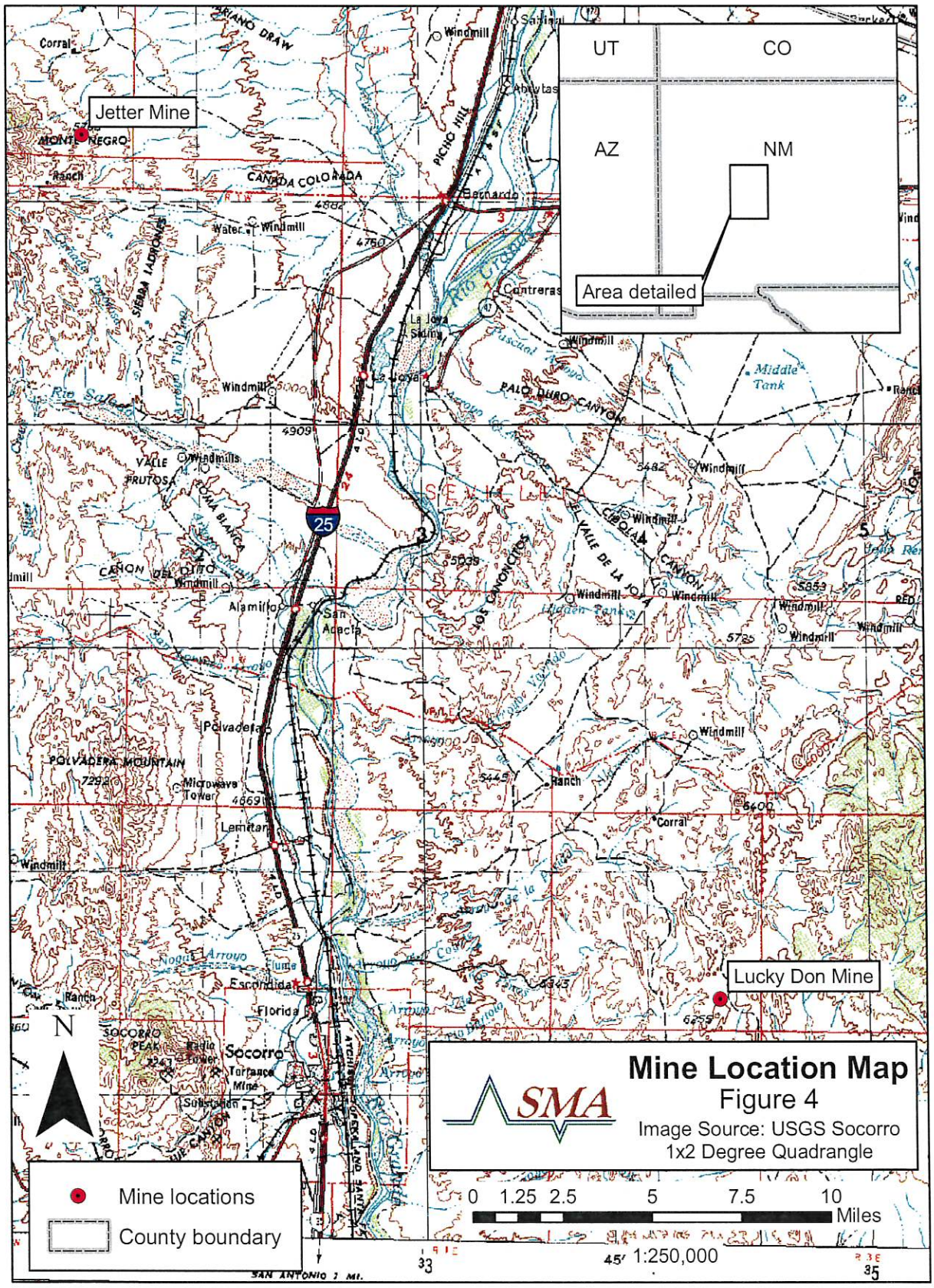
Health and Safety Plan

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
Spencer Mine
Haystack Mine
Dog Mine
Mesa Top 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
MC KINLEY CO
CIBOLA CO
N
UT
CO
AZ
NM
TX
Area detailed
Mine locations
County boundary
SMA
Mine Location Map
Figure 1
Image Source: USGS Albuquerque and Gallup 1x2 Degree Quadrangles
0 1.5 3 6 9 12
Miles
1:250,000


N
Butler Brothers Mine
UT
CO
AZ
NM
Area detailed
TX
Mine locations
County boundary
SMA
Mine Location Map
Figure 2
Image Source: USGS Albuquerque
1x2 Degree Quadrangle
0 1.25 2.5 5 7.5 10
Miles
1:250,000


N
Rio Puerco Mine
MCKINLEY CO
SANDOVAL CO
CIBOLA CO
BERNALILLO CO
LAGUNA PUEBLO
UT
CO
AZ
NM
TX
Area detailed
Mine locations
County boundary
0 1.25 2.5 5 7.5 10
Miles
1:250,000
SMA
Mine Location Map
Figure 3
Image Source: USGS Albuquerque
1x2 Degree Quadrangle


Jetter Mine
Lucky Don Mine
UT
CO
AZ
NM
Area detailed
Mine locations
County boundary
N
0 1.25 2.5 5 7.5 10
Miles
1:250,000
SMA
Mine Location Map
Figure 4
Image Source: USGS Socorro
1x2 Degree Quadrangle

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 µR/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.

Rio Puerco Mine

1. Location/Land Status: The Rio Puerco Mine is located on BLM land within Section 18, T12N, R3W on USGS La Gotera quadrangle (35.271444N, 107.198028W). Physical access to the mine is gained by taking Canoncito School Road north from US I-40 approximately eight miles, bear right at the school, continue north on Canoncito School Road seventeen miles bearing westward throughout, turn right (north) onto Laguna Indian Service Road, travel two miles NE past a stock tank and on to the mesa to reach the site.

2. Human Activity: Fresh tire tracks indicate recent human access to the site.

3. Radiological Survey: Radiological survey results were as follows: ground surface maximum of 600 µR/hour and minimum of 14 µR/hour. Four-foot elevation maximum was 420 µR/hour and minimum was 12 µR/hour. Background radiation level is approximately 14 µR/hour.

4. Mine Disturbance: The Rio Puerco Mine is without question the most extensive site surveyed during the course of this investigation, covering an area of approximately 12 acres. The mine consists of a vertical shaft of unknown depth, adjoined by a 15,000 square foot steel structure containing lifts for the head frame (the head frame is no longer present), offices, showers, service bays, and equipment storage areas. Immediately east of the large building there is a second building, approximately 2,400 square feet, containing a 100+kW generator. North of the generator building there is an area which formerly contained electrical infrastructure; this impound contains three electric transformers. Oil from the transformers has leaked or been dumped onto the concrete pad and surrounding soils (possible PCB contamination). To the west of the main building there is a 1,200 square-foot Quonset hut equipment service building, a 25,000-gallon water tank, and three small utility sheds. Fire hydrants are present onsite, indicating the presence of a water distribution system likely fed by a nearby well (see Hydrogeology section below). Approximately 100 ft. east of the main building there are three petroleum storage tanks of various volumes: one 9,000 gallon and two 6,000 gallon. To the south southeast of the main building is a very large, enclosed, propane tank of unknown volume. 1,000 feet SSW of the main building there are three ponds (total dimensions 280 x 380 feet, approximately 750,000 gallon capacity) and a small (600 square-foot) chemical mixing shed. The site is open to foot and vehicle traffic as there is no longer a complete fence around the property.

5. Plant Community: The surrounding area is moderately grazed grassland with sparse clusters of pinon-juniper forest and ponderosa pine. Site vegetation is composed of 40% grass, 10% forbs, 5% shrubs, 5% trees, and 40% bare ground.

6. Soils: Soils at the site are Zia-Skyvillage Rock outcrop complex, with 5 to 40 percent slopes, 0 to 60 inches sandy loam.

7. Wildlife: When approaching the mine, a small herd of elk numbering approximately one dozen animals was observed. The ridge upon which the mine is located is covered with

various other animal sign including fox scat and tracks, coyote scat and tracks, rabbit tracks and remains, and several bird remains (raptor kills).

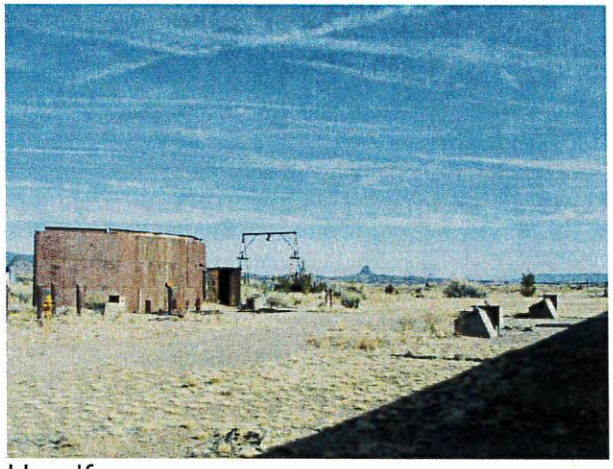
8. Land Use: Land use is light to moderate grazing.

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

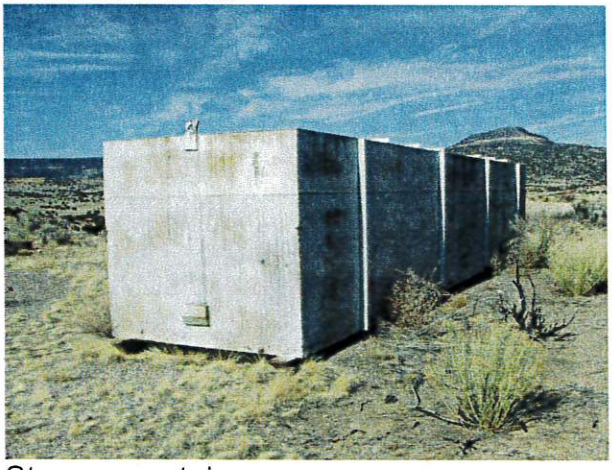
10. Topographic Features: The site is flat-lying, with no notable erosional features.

11. Hydrogeology: Based on a review of the NMOSE iWaters database, there are two well records within a one mile search radius. One of these wells, located approximately one-half of a mile to the west of the site, does not have a recorded depth to water. The other well, located on the western margin of the site, has a recorded depth to water of 200 ft.

The nearest surface water drainage feature is approximately one-tenth of a mile to the northwest of the site.

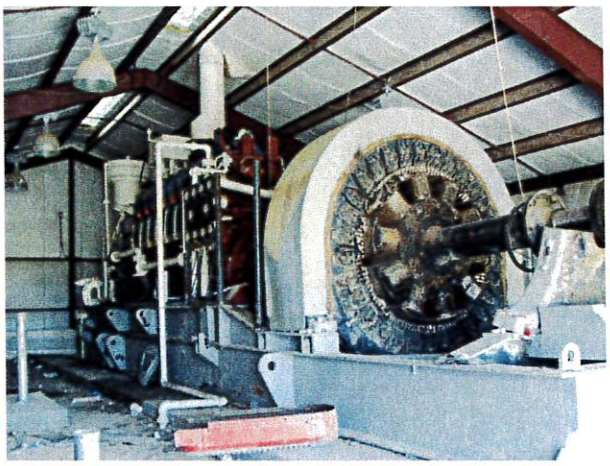

Headframe area


Site view

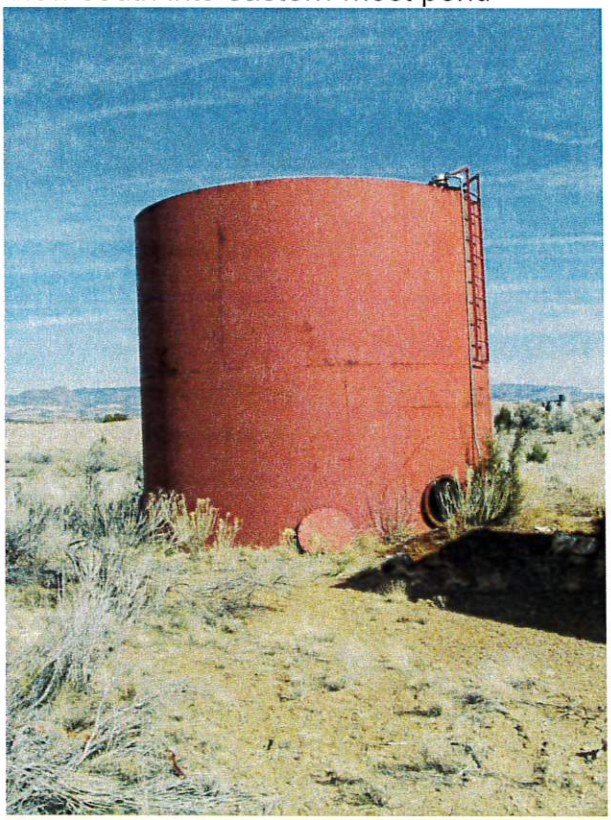

Storage containers


Pump station

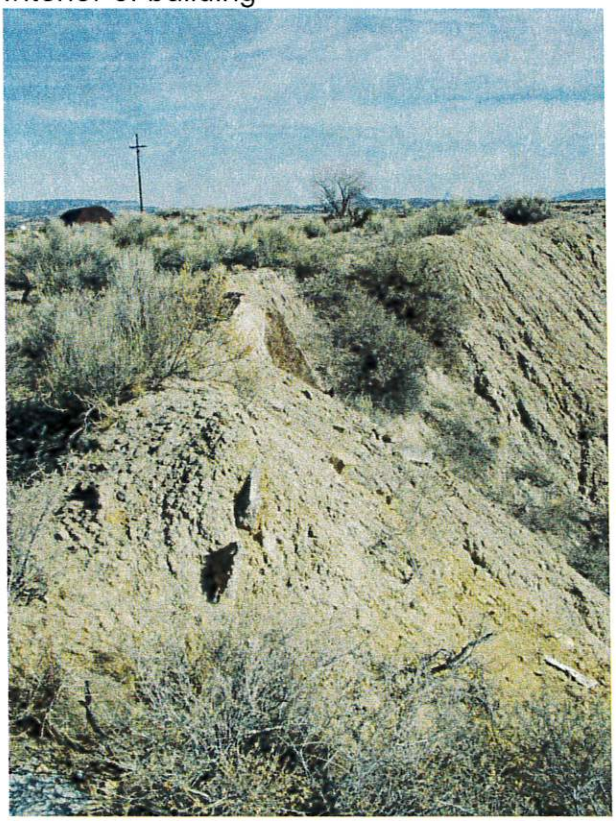
View south into eastern-most pond



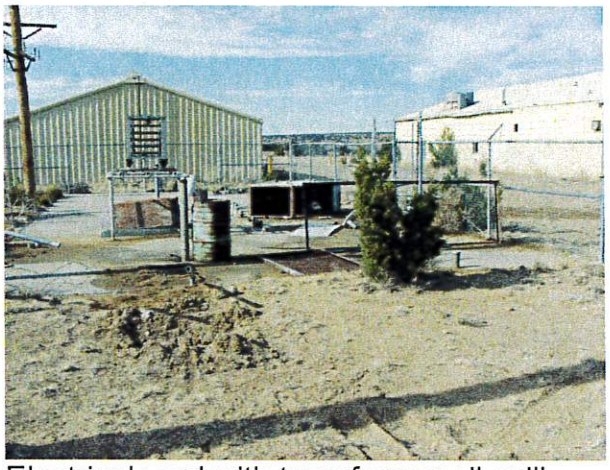
Interior of building



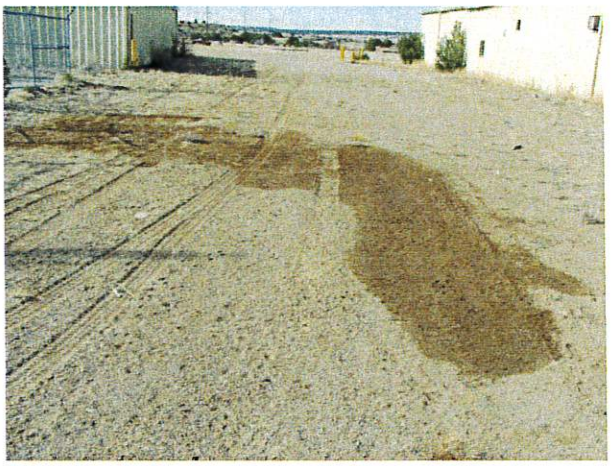
Water tank



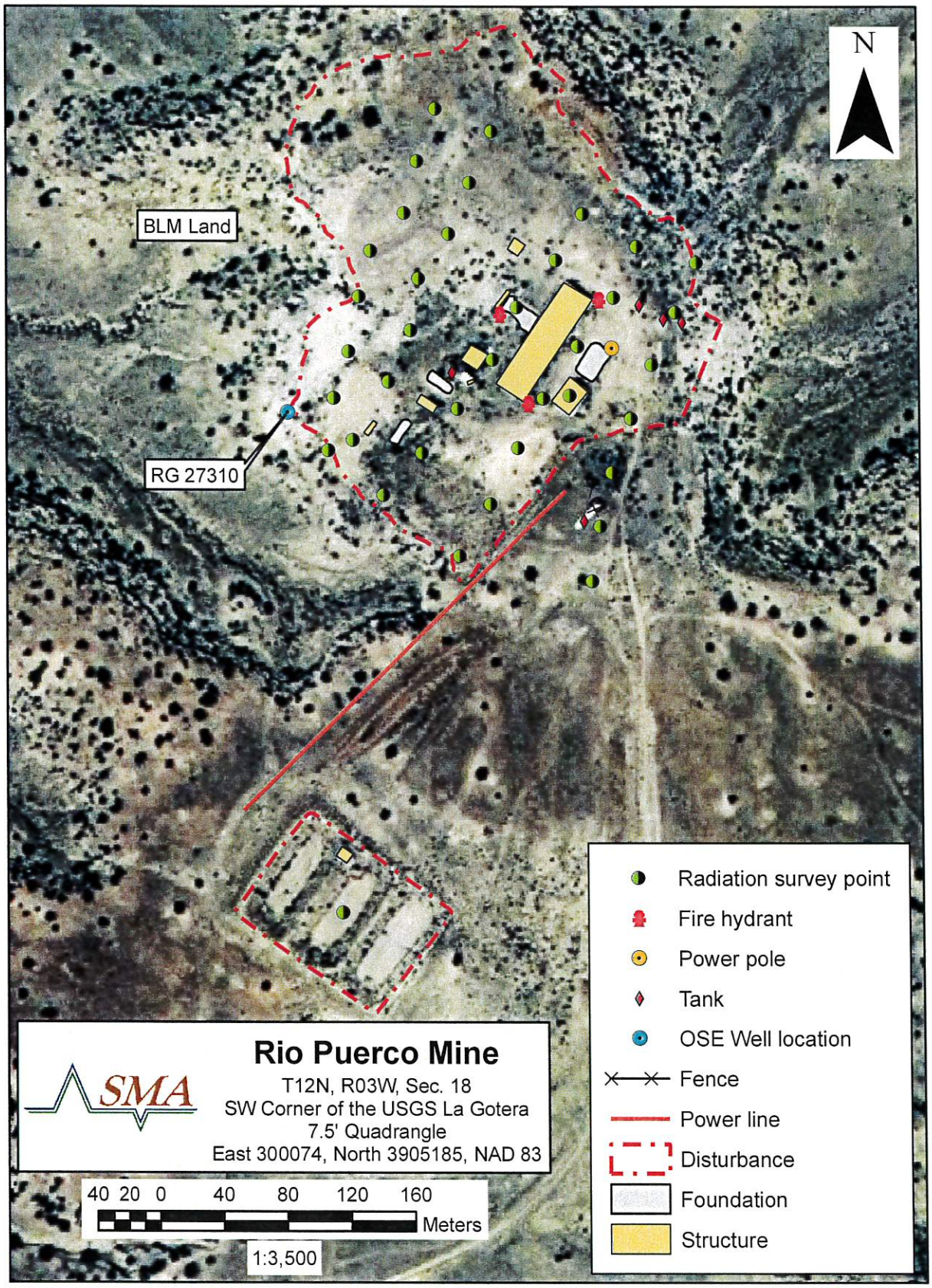
Rock piles



Electrical yard with transformer oil spill



Transformer oil spill, recent tire tracks


N
BLM Land
RG 27310
Rio Puerco Mine
T12N, R03W, Sec. 18
SW Corner of the USGS La Gotera
7.5' Quadrangle
East 300074, North 3905185, NAD 83
SMA
40 20 0 40 80 120 160
Meters
1:3,500
Radiation survey point
Fire hydrant
Power pole
Tank
OSE Well location
Fence
Power line
Disturbance
Foundation
Structure

Page ____ of ____

AUM Field Survey Data Sheet Site Rio Puerco

Date	Time On-Site	Time Off-Site	By
03/20/08	0815 hrs.	1100 hrs	B. Mertz B. Baldwin

Weather Conditions: Sunny, wind calm-Breezy, temp. Mod-cool.

Disturbances	GPS#	Description	Dim/Area/Volume	Photo #'s
Shafts				
Adits				
Pits				
Waste Rock Dumps				
Taillngs				
Trenches				
Roads				
Erosional Features				

Structures / Equipment	GPS#	Description	Dimensions	Photo #
Buildings		numerous		
Headframes		1		

3 ponds

AUM Field Survey Data Sheet

Site _____

Equipment				
Soils	GPS#	Description	Extent	Photo #
Vegetation	GPS#	Description	Extent	Photo #
SEE ATTACHED				
Wildlife	GPS#	Description		Photo #
Rabbits, rodents. Elk offsite		Observed Jack rabbits (2x) feces evident. Rodent feces inside buildings. Observed appx 10 head of elk on way to site - mostly cow, one with calf. About 3 miles to SW of site.		
Human Activity (non-mining, w/in 0.5 mi of site)	GPS#	Description	Extent	Photo #
No Housing nearby Propane tank.		very large tank on site		
Land Use (grazing, agricultural, roads, etc., w/in 0.5 mi of site)	GPS#	Description	Extent	Photo #
Grazing OHV		Grazing light on site - Heavier offsite esp. to North. Noticed Pickup/ATV tracks on site.		
Nearby Residences / Wells (w/in 0.5 mi of site)	GPS#	Description	Distance to Site	Photo #
Windmill / Tank		To north appx 1/2 mile Corrals / Tanks to SW appx 1 mile		
Topographic Features (roads, water courses, etc.)	GPS#	Description		Photo #

AUM Field Survey Data Sheet Site AUM-Rio Puerco 2008-3-20

Radiological Survey			
GPS#	Description	Reading Surface	Reading 4 feet
DISTRB Ø	Area around buildings and waste piles ✓	—	—
Found Ø	Power Distribution yard. Several transformers w/ spilled oil; ✓	—	—
11	possible PCB contaminated soils. ✓	—	—
STRUC Ø	House air and power generation 4 cyl CAT compressor & 16 cyl. ✓	—	—
11	generator (locomotive scale) ✓	17	17
Built Ø ARC	Fire hydrant	—	—
STRUC-1	Main building; consists of offices, shower, headframe lifts, etc. ✓✓✓		
STRUC-3	Quonset-hut ✓		
STRUC-4	headframe ✓		
ARC-1	Fire hydrant		
STRUC-5	Pump house ✓		
TANK-0	16 x 16' ✓		
STRUC-6	Unknown 1/4" plate steel structure ventilated w/ two locked doors. ✓		
FOUND-2	unknown		
STRUC-7	Multi-celled tank and pump structure. ✓		

AUM Field Survey Data Sheet Site AUM - Rio Rancho 2008-3-20

Radiological Survey			
GPS#	Description	Reading Surface	Reading 4 feet
GØ	Rad. survey start SW corner	16	19
G1	Rad. survey cont'd.	24	24
G2	"	100	100
G3	"	600	360
G4	"	600	360
G5	"	600	420
G6	"	150	140
G7	"	80	100
G8	" ✓	130	120
G9	"	120	120
G10	"	440	360
G11	"	200	180
G12	"	120	80
G13	"	22	18
G14	" ✓	20	20

AUM Field Survey Data Sheet Site AUM - Rio Puerco 2008-3-20

Radiological Survey			
GPS#	Description	Reading Surface	Reading 4 feet
G15	Rad. survey cont'd ✓	14	14
G16	"	17	15
G17	"	26	23
G18	"	32	30
G19	"	32	26
G20	"	42	40
G21	" ✓	90	80
G22	" ✓	46	42
G23	"	21	16
G24	"	25	20
G25	"	19	19
G26	"	16	15
G27	"	16	15
G28	" ✓	14	13

AUM Field Survey Data Sheet Site AUM - Rio Puerco 2008-3-20

Radiological Survey			
GPS#	Description	Reading Surface	Reading 4 feet
G29	Rad. survey cont'd ✓	32	30
G30	"	40	36
G31	"	25	21
G32	"	19	16
G33	"	17	15
G34	"	14	12
G36	" ✓	17	15
~~G37~~	~~"~~		
~~Arc.~~			
TANK Ø	propane tank ✓		
ARC Ø	power line between genst. & ponds		
DISTURB 1	ponds (3) ✓	130	130
STRUC 8	shed adjacent ponds ✓		
Pit Ø	trash ✓		