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ENVIRONMENT DEPARTMENT

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Memorandum

Date: **March 20, 2012**

To: **LaDonna Turner, Site Assessment Manager**
Technical and Enforcement Branch
U.S. Environmental Protection Agency, Region 6

From: **Phyllis Bustamante**
Acting Manager, Superfund Oversight Section
New Mexico Environment Department, Ground Water Quality Bureau

Subject: **Pre-CERCLIS Screening Assessment of the Rio Puerco Mine (Grants Mining District), Sandoval County, New Mexico: Further Investigation under CERCLA Recommended**

Site name	Rio Puerco Mine	**Alternate name**	Kerr McGee, Uranium King	**Address**	P.O. Box 222
City	Peralta	**State**	New Mexico	**Zip code**	87042
County	Sandoval				
Latitude	35.271444	**Longitude**	-107.198028	**TRS**	T12N, R3W, Sec 18, SW & NW

Site physical description:
The Rio Puerco Mine ("Site") is located approximately 25 miles north of Interstate 40 Exit No. 131 for Cibola, NM (Ref. 1). The Rio Puerco Mine is located in Sandoval County near the Sandoval-Valencia County line in the La Gotera 7.5 minute USGS 1:24000 scale topographic map quadrangle at latitude 35.271444, longitude -107.198028, and approximate elevation of 6,420 ft. above sea level (Ref. 2). The Rio Puerco Mine is located in the western center part of Section 18 in the SW and NW quadrants (Ref. 2). The Site is approximately seven miles east, southeast of the community of Marquez, NM, and it is estimated to comprise an area of approximately 12 acres (Ref. 3).

Figure 1 is a regional location map of the Rio Puerco Mine. Figure 2 is a topographic site map of Section 18 that includes the Rio Puerco Mine. Figure 3 is a Google Earth aerial view map of the Rio Puerco Mine features looking southeastward across the Site. Figure 4 is a copy of the 2008 Abandoned Mine Land (AML) survey map of the Site. Figures 1, 2, 3, and 4 are contained in Attachment A.

The Site is located east of the Mount Taylor volcanic complex in the eastern part of the Marquez Sub-District in the far eastern section of the Grants Mining District (Ref. 4). The Rio Puerco Mine is located on an un-named, low-lying mesa in the upper portion of the very arid drainage area for the Cañon del Piojo arroyo (Ref. 2). The Site is located within the Rio Puerco Watershed of the Middle Rio Grande Water Planning Region (Ref. 5) on lands under the jurisdiction of the Bureau of Land Management (Ref. 6).

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Site identification:
The Site is one of numerous legacy uranium sites within the Grants Mining District, Marquez Sub-District, Rio Puerco Watershed, Middle Rio Grande Basin (Ref. 4 and Ref. 5)

Site summary:
The Site is part of the uranium mineralization trend which occurs in the Morrison Formation, Westwater Canyon Member of the Grants Mineral Belt (Ref. 7, and Ref. 8). The Rio Puerco Mine was originally named, the "Uranium King Mine" according to information contained in the NMED file for Discharge Permit (DP) 16 (Ref. 9 and Ref. 10). In 1968, Karl F. Meyers, doing business as Summit Partners, encountered uranium in a drill hole at a depth of 830 ft. in the Rio Puerco area about 50 miles northwest of Albuquerque, NM. The discovery was sold to the Kerr McGee Corporation of Oklahoma City, OK in 1970. Kerr McGee spent $15 million in proving and developing the Uranium King mining claim. Kerr McGee drilled three monitor wells in August 1976 to collect information about the occurrence of ground water and hydraulic head in the Westwater Canyon formation. Kerr McGee began construction of the mine shaft in February 1977 and supposedly finished the excavation of the shaft and underground stations at the end of 1978 (Ref. 9). In 1979 approximately 10,000 tons of ore were mined and milled by Kerr McGee.

Information reviewed in the DP-16 file indicated the NM Environmental Improvement Agency (NMEID), the predecessor to NMED, conducted a site inspection of the Rio Puerco mining facility on September 8, 1977, and observed the discharge of mine water into an excavated pond for which no plans and specifications had been submitted to the Agency. From this date to 1988, the DP-16 file contains correspondence between NMEID and Kerr McGee describing the monitoring and reporting requirements for the state discharge permit. The discharge water was contained in ponds that were constructed with earth liners although no specific design plans and specifications are found in the file. There is discussion in the file that the ponds were proposed for a polyethylene liner, but it appears they were never installed. The depth to ground water is reported to be 200 to 350 ft. (Ref. 9).

Fifteen quarterly monitoring reports from 1978 to 1982 are contained in the DP-16 file. Eight quarterly monitoring reports contain information about the discharge flow rate and laboratory results of a sample of mine discharge effluent. The discharge flow ranged from approximately 0.4 million gallons per day (MGD) in 1978 to 2.1 MGD in late 1979. The total dissolved solids (TDS) concentration of the discharge was above 1,200 milligrams/liter (mg/l), the sulfate concentration was generally around 550 mg/l, and the pH was around 8.8 – 8.9. The TDS, sulfate, and pH concentrations reflect the natural geochemical conditions of a sodium-bicarbonate+sulfate type water which is typical for the Westwater Canyon Member of the Morrison Formation (Ref. 8 and Ref. 11). Since the ground water naturally contains a TDS concentration greater than 1,000 mg/l it is generally classified as "brackish" (Ref. 11). Information presented in the quarterly monitoring reports indicated the mine discharge water never exceeded the state surface water quality standards for metals including uranium and radium 226+228 (Ref. 9).

The mine was idle from 1980 to 1987. In 1987 Kerr McGee deeded back to Uranium King the proven, unpatented lode mining claims (Ref. 9). These claims contain over 5 million pounds of uranium oxide (U3O8) as well as the mine shaft, pumps, generators, power stations, surface plant, fuel tanks, powder magazines, et cetera. The fee land contiguous to the mining claims is owned by the rancher (25%), Summit Partners (37.5%), and Kerr McGee (37.5%). Rio Algom (BHP Billiton) has since purchased all the remaining Kerr McGee uranium rights in NM.

According to the information from the New Mexico Energy, Mineral, and Natural Resource Department, Mining and Minerals Division (MMD), the Rio Puerco Mine operated from 1979 to 1980; produced less than 20,000 lbs of uranium oxide; and the mine is exempt from state regulation under the Mining and Reclamation Program or MARP (Ref. 6).

An Abandoned Mine Land (AML) survey was performed in 2008 on the Rio Puerco Mine by a contractor to MMD (Ref. 2). Figure 4 is taken from the 2008 AML survey report. In the area around the Rio Puerco Mine radioactivity counts were reported up to 600 microRoentgens per hour (uR/hr) in the area of the waste rock dumps (Ref. 2). Background radioactivity levels are in the range of 14 to 20 uR/hr. Many original mine

operation buildings are present at the Site under non-secure conditions such that physical, chemical, and radiological hazards are evident. It is suspected that oil spilled on and around the electric transformer concrete mounting pads and adjacent soil may contain polychlorinated biphenols (PCBs). The fence surrounding part or all of the Site is not secure. Trespassers and animals can easily enter and leave this remote site. Attachment B contains photographs from the 2008 AML survey.

Figure 3 and Figure 4 clearly show the mine dewatering effluent ponds at the south end of the Site, and the mine waste rock material that is present in the eastern and western parts of the Site. The waste rock material is elevated in radioactivity above background according the measurements from the 2008 AML survey report. Figure 5 is the 2009 Google Earth aerial photograph of the Rio Puerco Mine showing the upper part of the ephemeral drainage for the Cañon del Piojo arroyo (Ref. 2 and Ref. 12). The 7.5 minute topographic map for this part of the La Gotera quadrangle indicates two possible spring locations approximately one mile from the Rio Puerco Mine. Hand-written notes on the NMED copy of the La Gotera quadrangle map indicate a private well is located about 0.5 miles west of the Site at the junction of the main access roads. The 2008 AML survey report indicates two wells are located within a one mile search radius of the Site (Ref. 2).

The Marquez Sub-District and Rio Puerco Mine areas were visited by investigators working for the National Uranium Resource Evaluation (NURE) Project in 1979 (Ref. 13). Dry sediment samples were collected, sieved, and submitted for laboratory analysis of metals and select radionuclides. Figure 6 presents the general location of two NURE sediment sample locations near the Rio Puerco Mine Site (See Attachment A). The laboratory data for NURE sediment sample locations in the La Gotera 7.5 minute quadrangle has not been formally evaluated and presented in any report to date. Ground water samples from wells in the area were also collected and analyzed under the NURE program but the suite of parameters is limited and the source of the water would have to be assessed with respect to well information. The existence of two springs is noted at locations north of the Site in the Cañon del Piojo drainage at a distance of approximately 1.5 miles (Ref. 2). It is unknown if these springs discharge water from alluvium, bedrock, or a combination of both aquifer units.

Targets:
The Site is located within an unnamed ephemeral drainage that is part of the Cañon del Piojo watershed. Surface and ground water in Section 18 appear to flow northeastward and eastward toward the Rio Puerco Basin, the largest tributary to the Middle Rio Grande Basin (Ref. 5). The Cañon del Piojo Creek ephemeral drainage system is probably in hydraulic connection with bedrock aquifer units in the area (Ref. 9). There is a potential for contaminants at the Site to become mobilized by wind and surface water to where off site exposure is a possibility. The Site is located in a remote area, and could be accessed by trespassers traveling along the many dirt roads in the area. It is assumed the Site is accessible by cattle and local animals like deer, coyotes, and prairie dogs.

Mining operations at the Rio Puerco Mine included dewatering and discharge of ground water. Waste rock exposed at the Rio Puerco Mine surface may contribute contaminant releases that propagate episodically down gradient in response to ephemeral stream flows within the Cañon del Piojo drainage system. Current details of alluvial ground water flow are unknown, but are thought to follow the general topographic slope (i.e., locally northeast-east from the Site in the direction of surface water flow). Such alluvial ground water impacts may also propagate into underlying bedrock aquifers through stratigraphic, structural, and/or anthropogenic (e.g., leaky wells, mine shafts) interconnections.

Well records from the New Mexico Office of the State Engineer (OSE) that are for wells located within increments of a four-mile radius of the Site are shown in Table 1 (Ref. 14). Figure 7 presents a map of the well locations within a four-mile distance ring radius of the Rio Puerco Mine. The 2008 AML survey report indicated well no. RG27310 is located in the southwest corner of the Site.

Site ownership and Potential Responsible Parties:
The history of site ownership and potential responsible parties information includes the following. The Rio Puerco Mine is located on BLM land (Ref. 6). Originally, Mr. Karl Meyers and Summit Partners-Uranium King Corporation discovered the ore deposit in 1968 (Ref. 9). Meyers sold the discovery (mineral rights?) to Kerr McGee in 1970. In the late 1970s (beginning in mid-1977?), Kerr McGee began dewatering and limited ore extraction operations at the Site. The mine was idle from 1980 to 1987 and in 1987 Kerr McGee sold the discovery back to the Uranium King Corporation (Ref. 9). In 2005 Mr. Meyers doing business as Mineral Energy and Technology Corporation applied for a renewal of National Pollution Discharge Elimination System (NPDES) permit no. NM0028169 which was certified to comply with the Clean Water Act by NMED (Ref. 9). The NPDES permit for the Rio Puerco Mine was recently renewed for another five years by EPA Region 6 (6WQ-PP) according to a telephone conversation with Mr. Isaac Chen (Ref. 15 and Ref. 16). This permit application documentation indicates Mr. Meyers is doing business as Resurrection Mining, LLC – Rio Puerco Mine from a post office box in Peralta, NM (Ref. 15).

File review:
Files and information sources that were reviewed for this assessment are listed below.

Site reconnaissance:
NMED has not made an attempt to visit and screen the Rio Puerco Mine for hazards.

Recommendation:
Additional investigation of the Site under CERCLA authority is recommended to assess the areal extent of elevated radioactivity readings noted in the Site reconnaissance to determine if threats to human health and the environment exist. NMED also recommends assessment of sediments in the Site vicinity in order to evaluate the potential occurrence of impacts from dispersal of waste materials that have been left on-Site.

The Site should be formally characterized for the radionuclide concentration in the soil profile following a methodology that incorporates a specific grid design and sample node spacing interval to enable the correlation of field readings with laboratory soil sample analysis. The field and laboratory data from the next phase of Site characterization and assessment would indicate the extent of potential hazardous material release and the threat it would present to on site and off site receptors via the soil exposure pathways. Potential physical hazards at the Site, especially the long term performance of soil cover and backfilling of the Shaft should be assessed and mitigated as soon as possible.

Radiological surveying and limited sampling of the 0-6 inch interval of soil at the Site is recommended to determine the extent of potential releases to the surface. Some samples of the soil profile at intervals of 12, 24, 36, and 48 inches may be appropriate at some locations if field and/or laboratory results indicate more characterization is necessary.

Currently, the existence of regional impacts from legacy uranium sites to the ground water system has not been determined. It appears unlikely that the release of mine dewatering effluent during the period of mine development was a detriment to ground water quality because the discharge was not subject to much, if any, anthropogenic treatment. Natural exposure of ground water to atmospheric conditions may have caused the water to become more oxidizing and thus could have caused contaminants like uranium to assume a more mobile form. The discharged ground water from dewatering could have acquired dissolved forms of ions like nitrate, sulfate, and maybe some metals as it moved down through the soil column in the nearby arroyo.

References:

1. Exit Explorer, Highway I-40, Exit 131, Cibola, New Mexico, http://exitexplorer.com/exit.php?e=I-40-NM-131&d=12&f=custom.
2. USGS, 1961 and 1980. La Gotera, N, Mex. 7.5 minute quadrangle topographic map, 1:24,000 scale.
3. Souder Miller Associates, 2008. Abandoned Uranium Mine Field Survey Project, prepared for NM EMNRD, MMD, 7/18/2008, 220 p.
4. U.S. Environmental Protection Agency Region 6 Superfund Program, Assessment of Human and Environmental Impacts from Uranium Mining and Milling, Five Year Plan Grants Mining District New Mexico, August 2010, Figure 1, http://www.epa.gov/region6/6sf/newmexico/grants/nm_grants_alldistricts_mines_mills.pdf
5. New Mexico Office of the State Engineer, Middle Rio Grande Regional Water Plan 2000-2050, August 2004, Vol. 1, http://www.ose.state.nm.us/water-info/NMWaterPlanning/regions/MiddleRioGrande/AppC-1-ReferencesExecutiveSummaries.pdf.
6. New Mexico Energy, Mineral and Natural Resources Department, undated. "2007-07-20 to NMED-GWQ-Sfund.xls." Spreadsheet excerpt.
7. Kelley, V. C., compiler, 1963, Geology and technology of the Grants uranium region: New Mexico Bureau of Mines and Mineral Resources, Memoir 15, 277 p.
8. U.S. Department of the Interior, 1980, Uranium Development in the San Juan Basin Region – A Report on Environmental Issues, Parts 1 – 4.
9. New Mexico Environment Department, Discharge Permit 016 file, Mining and Environmental Compliance Section, Ground Water Quality Bureau, Santa Fe, NM.
10. Meyers, Karl F., September 24, 2003 letter with attachments to Eric Monroe, NMED, regarding Rio Puerco Plans. Attachment entitled, "History of the Rio Puerco Uranium Mine."
11. Freeze, R.A., and Cherry, J.A., 1979. *Groundwater*, Prentice Hall, Englewood Cliffs, N.J., 604 p.
12. Google Earth, kh.google.com, Build Date 11/13/2010, Section 1 8 area, Latitude: 35.269649; Longitude -107.188457.
13. NURE, 1981. "National Uranium Resource Evaluation (NURE) Hydrogeochemical and Stream Sediment Reconnaissance (HSSR) Program", Brief History and Description of Data, Gallup Quadrangle (NURE HSSR study GJBX -186-80) and Grants Special Study GJBX-351-81 report, Smith, S. M., 2006. http://pubs.usgs.gov/of/1997/ofr-97-0492/quad/q_gallup.htm.
14. New Mexico Office of the State Engineer (OSE). "Jan_2011_wells." Shapefile.
15. National Pollution Discharge Elimination System Permit No. NM0028169 Fact Sheet, January 12, 2011. http://www.epa.gov/Region06/water/npdes/publicnotices/nm/nm0028169factsheet.pdf.
16. Telephone conversation between Isaac Chen and Earle Dixon, March 23, 2011 regarding NPDES permit no. NM0028169 for the Rio Puerco Mine.

Table 1. Well records from the New Mexico Office of the State Engineer located within a 0 – 4 mile distance ring from the Rio Puerco Mine Site, Grants Mining District, New Mexico.

Well Distance from Site in miles	Point of Diversion No.	Well No. (RG = Rio Grande Basin)	Town-ship	Range	Section	County	Well Start Date	Well Finish Date	Well Elevation in ft.	Well Depth in ft.	Depth to Water in ft.	Point of Diversion Status	Well Casing Size in Inches	UTM Zone	Easting	Northing	Well Owner Name	Well Owner Address	City	State	Zip Code	Well Use
0 to 0.25 miles	no wells																					
0.25 to 0.5 miles																						
0.3	27310	RG 27310 POD1	12N	03W	18	Sandoval	6/15/1976	8/14/1976	5800	800	200	Active	4	13	299955	3905134	KERR-MCGEE NUCLEAR CORP.	PO BOX 218	GRANTS	NM	87020	Sanitary
0.5	27310	RG 27310 POD2	12N	03W	18	Sandoval	5/28/1976	5/28/1976	0	800	0	Active	5	13	299746	3904721	KERR-MCGEE NUCLEAR CORP.	PO BOX 218	GRANTS	NM	87020	Sanitary
0.5 to 1.0 miles																						
1.0	71033	RG 71033	12N	04W	13	Sandoval			0	500	0		5	13	299057	3905043	GONZALES	P.O. BOX 22	SEBOYETA	NM	87014	Stock
1.0	71033	RG 71033 X	12N	04W	13	Sandoval			0	500	0	Pending	5	13	299057	3905043	GONZALES	P.O. BOX 22	SEBOYETA	NM	87014	Stock
1.0	71033	RG 71033 X-3	12N	04W	13	Sandoval			0	500	0	Pending	5	13	299057	3905043	GONZALES	P.O. BOX 22	SEBOYETA	NM	87014	Stock
1.0	71033	RG 71033 X 4	12N	04W	13	Sandoval			0	500	0	Pending	5	13	299057	3905043	GONZALES	P.O. BOX 22	SEBOYETA	NM	87014	Stock
1.0	71033	RG 71033 X 5	12N	04W	13	Sandoval			0	500	0	Pending	5	13	299057	3905043	GONZALES	P.O. BOX 22	SEBOYETA	NM	87014	Stock
1.0	71033	RG 71033 X-2	12N	04W	13	Sandoval			0	500	0		5	13	299057	3905043	GONZALES	P.O. BOX 22	SEBOYETA	NM	87014	Stock
1.0 to 2.0 miles																						
2.0	27723	RG 27723 D-1	12N	04W	13	Valencia	1/23/1977	1/25/1977	6385	620	365		0	13	298425	3904514	EXXON CORP C/O EXXON CO USA	PO BOX 2180	HOUSTON	TX	77001	Observation
2.0	27723	RG 27723 D-2	12N	04W	13	Valencia	1/25/1977	2/4/1977	6390	630	370		0	13	298421	3904440	EXXON CORP C/O EXXON CO USA	PO BOX 2180	HOUSTON	TX	77001	Observation
2.0 to 3.0 miles																						
3.0	29782	RG 29782				Valencia		11/5/1970	0	950	477		0	13	295537	3904598	EXXON CORP C/O EXXON COMPANY	USA C/O MINERALS DIVISION, PO Box 2180	HOUSTON	TX	77001	Oil
3.0	31891	RG 31891 X							0	0	0		0	13	295537	3904598	NM ST. HWY DEPT.	PO BOX 1149	SANTA FE	NM	87502	Domestic
3.0	89656	RG 89656 POD5	12N	03W	21	Sandoval			0	500	0	Pending	0	13	304054	3903132	URANIUM COMPANY OF NEW MEXICO	2470 ST ROSE PARKWAY #302	HENDERSON	NV	89704	Exploratory
3.0	89656	RG 89656 POD6	12N	03W	21	Sandoval			0	500	0	Pending	0	13	303770	3903394	URANIUM COMPANY OF NEW MEXICO	2470 ST ROSE PARKWAY #302	HENDERSON	NV	89704	Exploratory
3.0	89656	RG 89656 POD7	12N	03W	21	Sandoval			0	500	0	Pending	0	13	303710	3903484	URANIUM COMPANY OF NEW MEXICO	2470 ST ROSE PARKWAY #302	HENDERSON	NV	89704	Exploratory
3.0	89656	RG 89656 POD8	12N	03W	21	Sandoval			0	500	0	Pending	0	13	303876	3903635	URANIUM COMPANY OF NEW MEXICO	2470 ST ROSE PARKWAY #302	HENDERSON	NV	89704	Exploratory
3.0	89656	RG 89656 POD9	12N	03W	21	Sandoval			0	500	0	Pending	0	13	304100	3903498	URANIUM COMPANY OF NEW MEXICO	2470 ST ROSE PARKWAY #302	HENDERSON	NV	89704	Exploratory
3.0	89656	RG 89656 POD10	12N	03W	21	Sandoval			0	500	0	Pending	0	13	304185	3903635	URANIUM COMPANY OF NEW MEXICO	2470 ST ROSE PARKWAY #302	HENDERSON	NV	89704	Exploratory
3.0 to 4.0 miles																						
4.0	27980	RG 27980 D-2	12N	04W	22	Valencia	12/4/1976	12/7/1976	6615	940	598		0	13	294843	3903507	EXXON CORP C/O EXXON COMPANY	P.O. BOX 2180	HOUSTON	TX	77001	Observation
4.0	27980	RG 27980 D-1	12N	04W	22	Valencia	12/1/1976	12/4/1976	6612	940	530		0	13	294844	3903503	EXXON CORP C/O EXXON COMPANY	P.O. BOX 2180	HOUSTON	TX	77001	Observation
4.0	29783	RG 29783 B-23-EXPL					5/19/1978	5/23/1978	6679	915	675		0	13	294476	3903462	EXXON CORP C/O EXXON MINERALS	P.O. BOX 2180	HOUSTON	TX	77001	No water right
4.0	29783	RG 29783 B-36-EXPL				Valencia	5/11/1978	5/13/1978	6685	918	680		0	13	294499	3903327	EXXON CORP C/O EXXON MINERALS	P.O. BOX 2180	HOUSTON	TX	77001	No water right
4.0	29783	RG 29783 B-25-EXPL				Valencia	5/17/1978	5/19/1978	6673	898	670		0	13	294534	3903443	EXXON CORP C/O EXXON MINERALS	P.O. BOX 2180	HOUSTON	TX	77001	No water right
4.0	33310	RG 33310 0-5					4/20/1982	4/20/1982	0	54	32		0	13	295824	3908836	TENNESSE VALLEY AUTHORITY	NUCLEAR FUEL SUPPLY BRANCH, 175 Haney Building	CHATTANOOGA	TN	37402	Monitoring
4.0	29783	RG 29783 B-35-EXPL				Valencia	5/15/1978	5/17/1978	6682	899	675		0	13	294516	3903386	EXXON CORP C/O EXXON MINERALS	P.O. BOX 2180	HOUSTON	TX	77001	No water right
4.0	89656	RG 89656 POD1	12N	03W	21	Sandoval			0	500	0	Pending	0	13	304996	3903053	URANIUM COMPANY OF NEW MEXICO	2470 ST ROSE PARKWAY #302	HENDERSON	NV	89704	Exploratory
4.0	89656	RG 89656 POD2	12N	03W	21	Sandoval			0	500	0	Pending	0	13	304614	3902957	URANIUM COMPANY OF NEW MEXICO	2470 ST ROSE PARKWAY #302	HENDERSON	NV	89704	Exploratory
4.0	89656	RG 89656 POD3	12N	03W	21	Sandoval			0	500	0	Pending	0	13	304532	3903103	URANIUM COMPANY OF NEW MEXICO	2470 ST ROSE PARKWAY #302	HENDERSON	NV	89704	Exploratory
4.0	89656	RG 89656 POD4	12N	03W	21	Sandoval			0	500	0	Pending	0	13	304550	3903255	URANIUM COMPANY OF NEW MEXICO	2470 ST ROSE PARKWAY #302	HENDERSON	NV	89704	Exploratory
4.0	27627	RG 27627 A-6-15				Sandoval			0	0	0	Pending	0	13	296462	3910357	DILTS	BOX 193	LAGUNA	NM	88250	Mining
4.0	27627	RG 27627 A-6-19				Sandoval			0	0	0	Pending	0	13	301082	3910355	DILTS	BOX 193	LAGUNA	NM	88250	Mining

Attachment A

Figures 1 through 7

Figure 1. Google aerial location map of the Rio Puerco Mine in the Marquez Mining Sub-district, Grants Mining District, New Mexico.

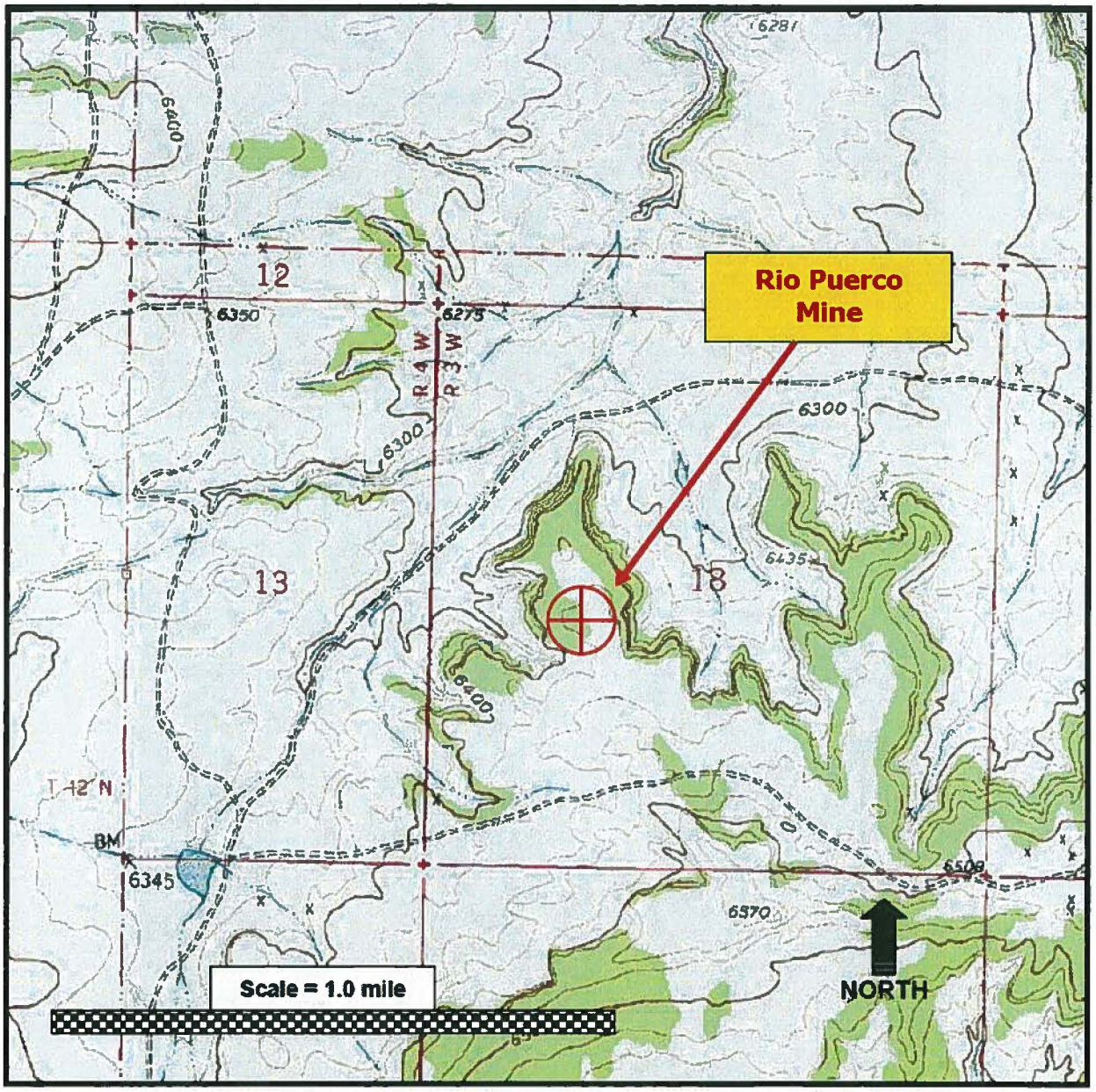


Figure 2. TopoQuest.com location map of the Rio Puerco Mine in the La Gotera Quadrangle USGS 7.5 minute topographic map, T12N, R3W, Section 18, Marquez Sub-district, Laguna, New Mexico.

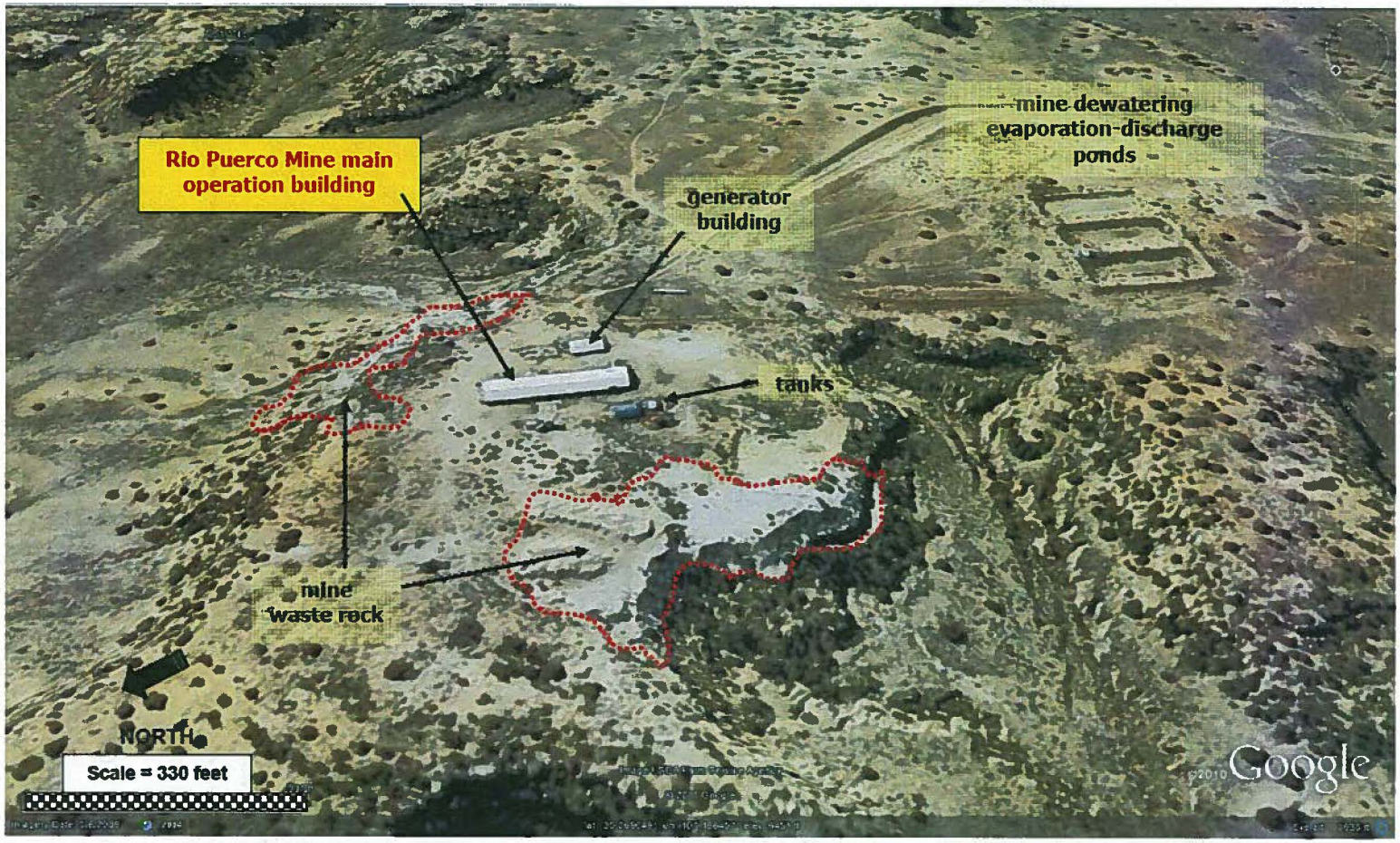


Figure 3. Google Earth aerial view map of the Rio Puerco Mine features looking southeastward across the Site, north of Laguna, New Mexico.

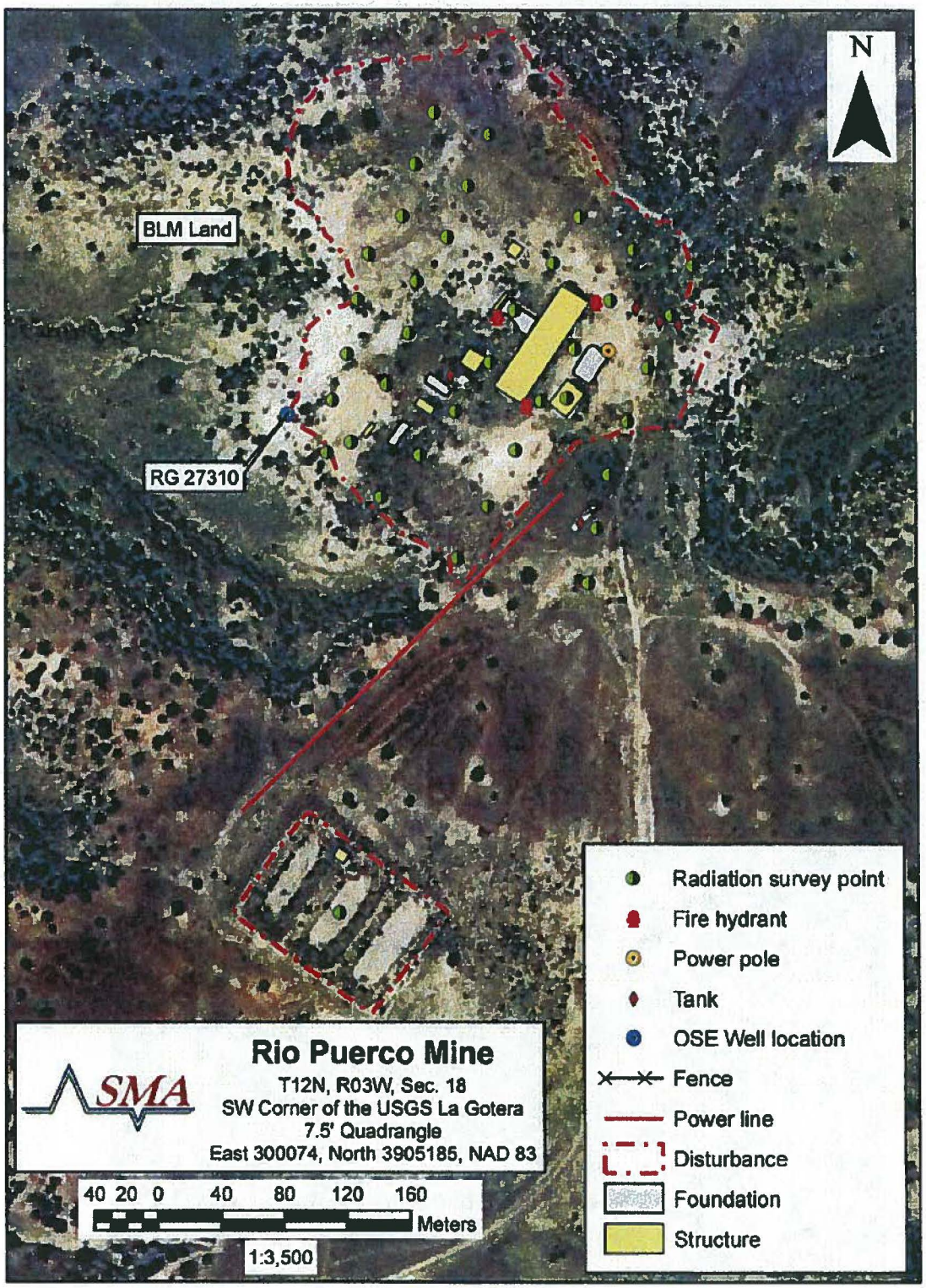


Figure 4. Location map of the Rio Puerco Mine property boundaries north of Laguna, New Mexico as presented in the 2008 Abandoned Uranium Mine Field Survey Project Report authored by Soder Miller Associates.

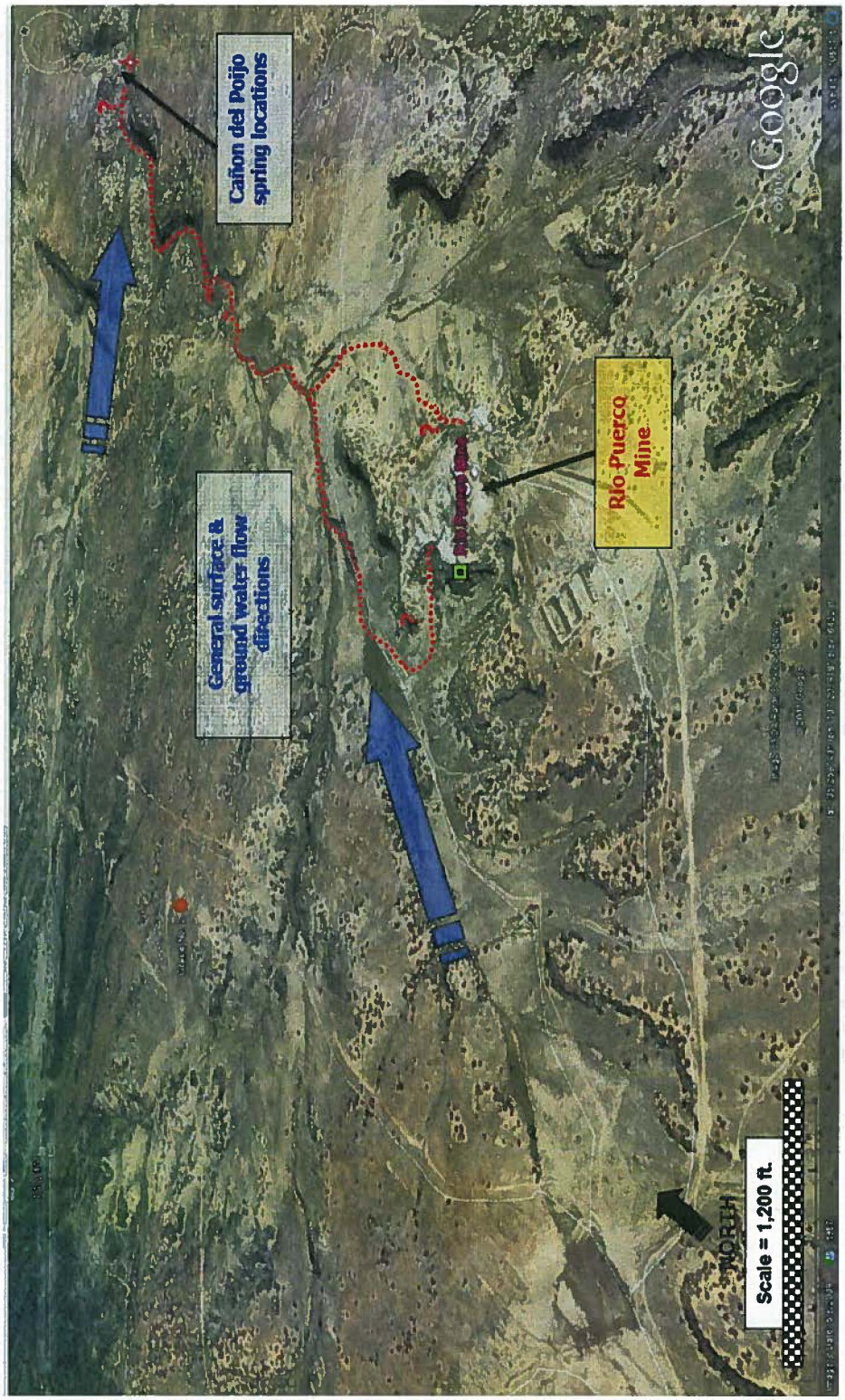


Figure 5. Google Earth aerial photograph of the Rio Puerco Mine showing the upper part of the ephemeral drainage for the Cañon del Piojo arroyo, north of Laguna, New Mexico.

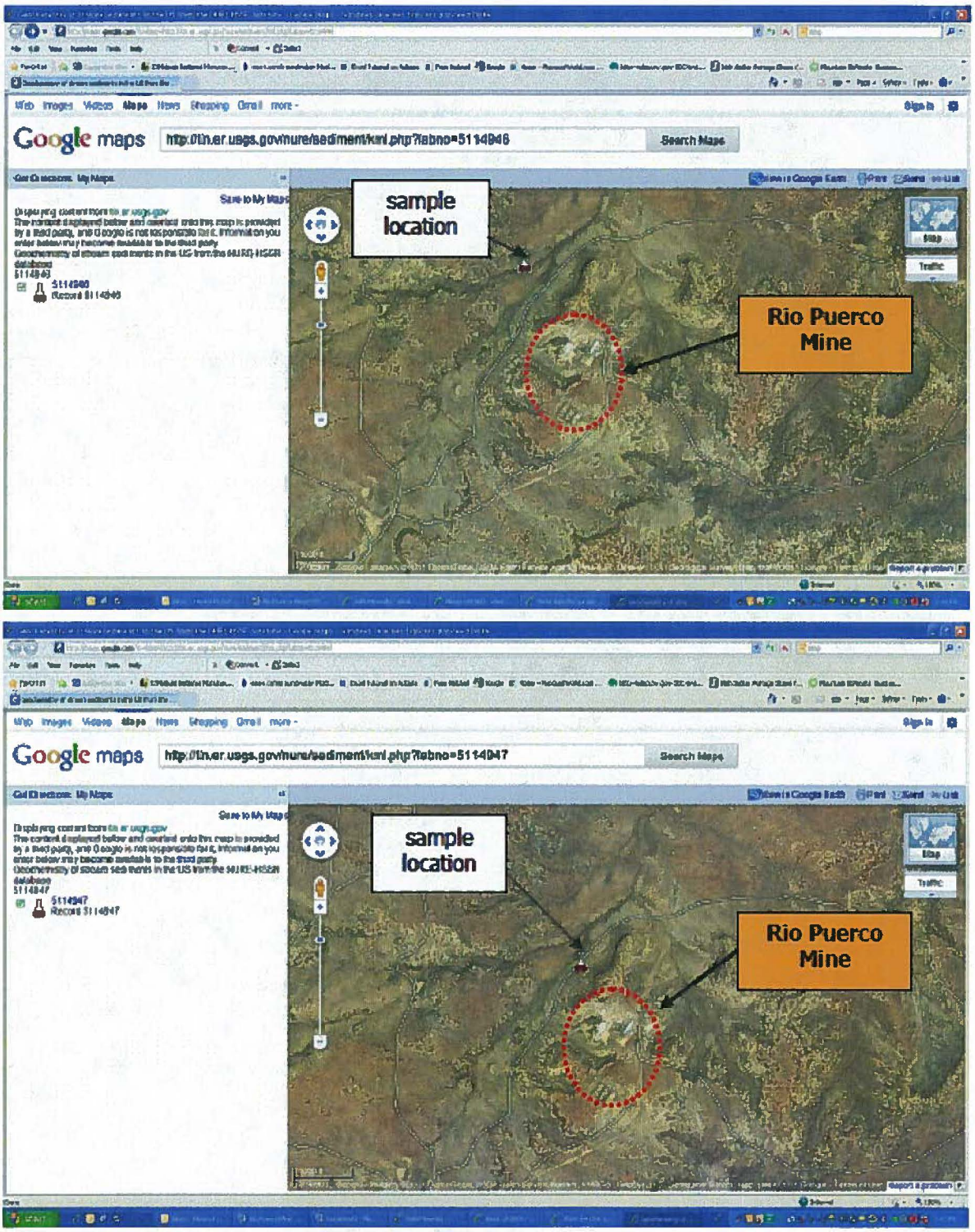


Figure 6. Google Maps showing location of the Rio Puerco Mine and the sediment sample locations from the National Uranium Resource Evaluation (NURE) project, Grants Mineral Belt Special Project, Grants, New Mexico.

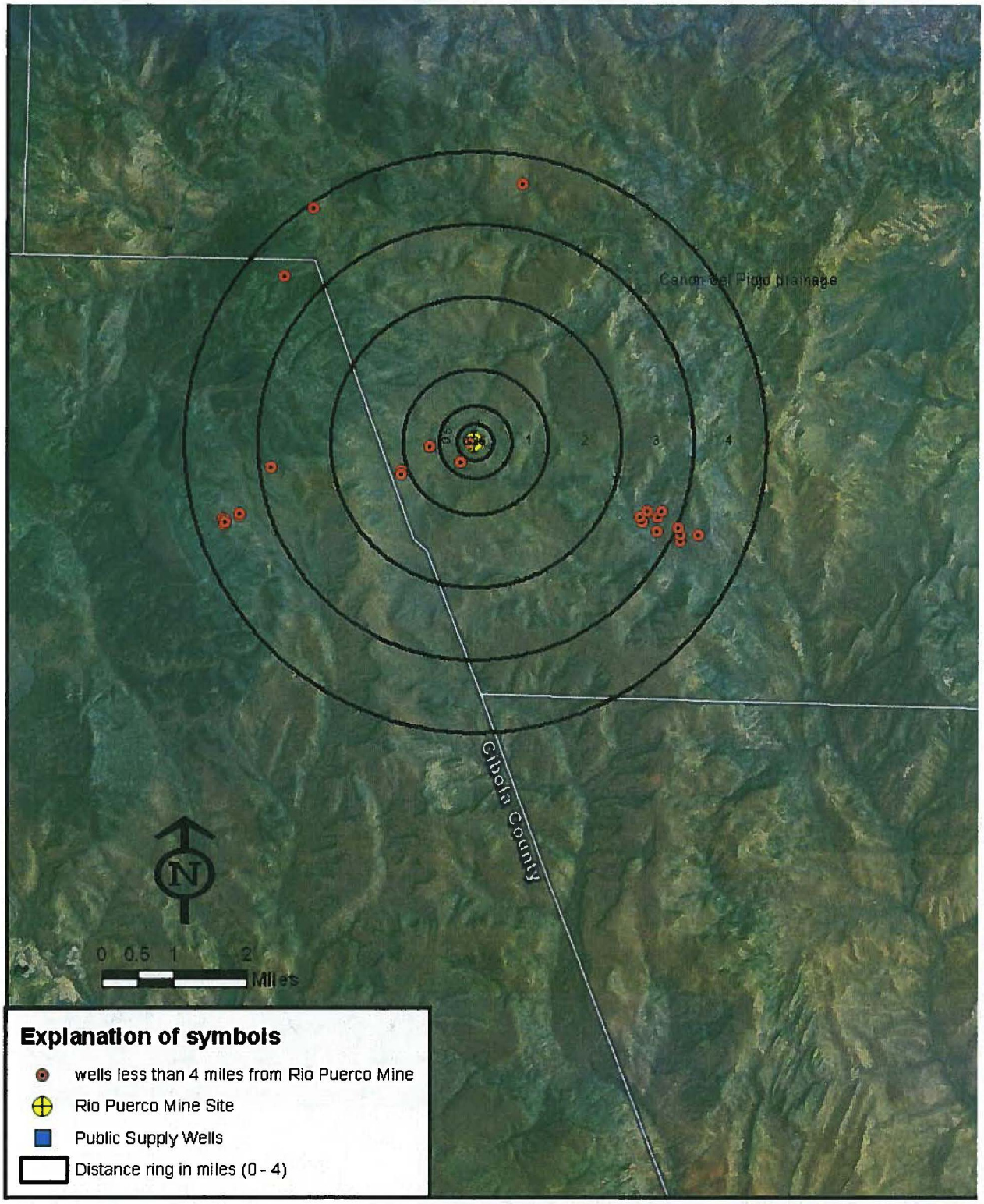
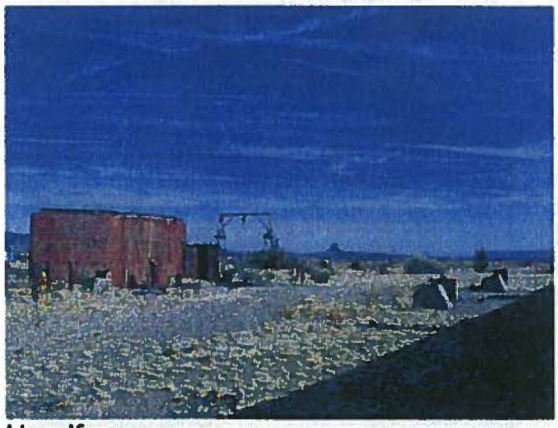


Figure 7: Wells within a 4-mile radius of the Rio Puerco Mine Site, Marquez Sub-district, Grants Mining District, north of Laguna, NM (OSE 2011).

Attachment B

Photographs (1-10) are from the Souder Miller 2008 report.

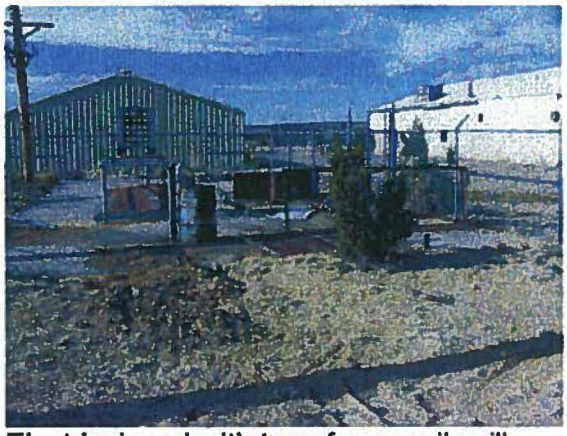


Headframe area

Site view

Storage containers

Pump station

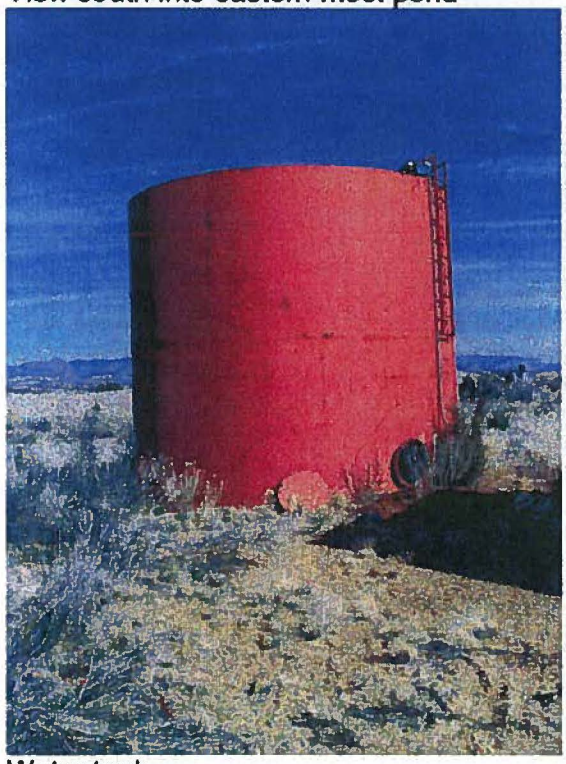


Electrical yard with transformer oil spill

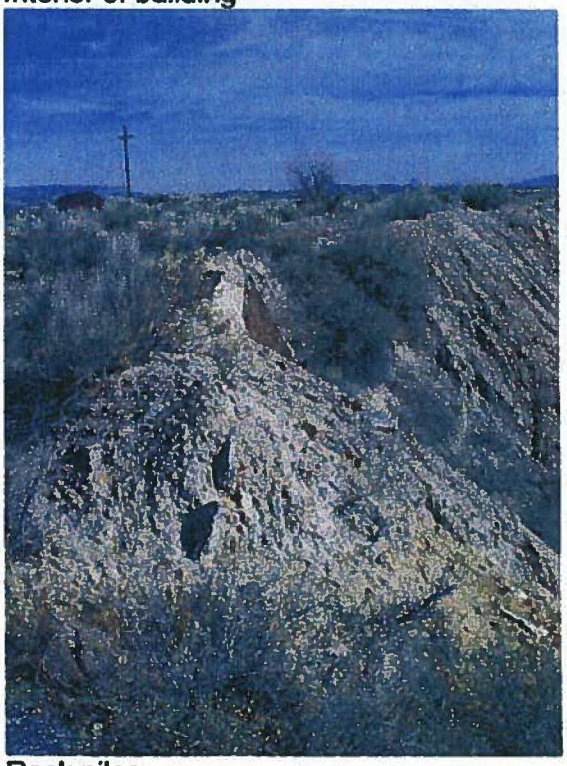
Transformer oil spill, recent tire tracks

View south into eastern-most pond

Interior of building



Water tank



Rock piles