NEW MEXICO
ENVIRONMENT DEPARTMENT

Ground Water Quality Bureau

Harold Runnels Building
1190 St. Francis Drive, P.O. Box 5469
Santa Fe, NM 87502-5469
Phone (505) 827-2900 Fax (505) 827-2965
www.nmenv.state.nm.us

BILL RICHARDSON
Governor
DIANE DENISH
Lieutenant Governor

RON CURRY
Secretary
SARAH COTTRELL
Deputy Secretary

Memorandum

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

From: **Dana Bahar, Manager, Superfund Oversight Section**
Ground Water Quality Bureau, New Mexico Environment Department

Date: **October 8, 2010**

Subject: **Pre-CERCLIS Screening Assessment of the Marquez Mine (Grants Mining District), McKinley County, New Mexico: Further action under CERCLA recommended**

Site name	Marquez Mine	**Alternative names**	Marcus, Calumet		
Street address	not applicable	**City**	not applicable	**State**	New Mexico
Zip code	not applicable		**County**	McKinley	
Latitude	35.34226	**Longitude**	107.75867	**TRS**	T13N, R9W, Sec 23 NE/SW

Site physical description:
The Marquez Mine ("Site") is located approximately 2.5 miles east of the junction of State highways 509 and 605 (Ref. 1). The Site is approximately 13.5 miles directly north of Grants, NM. The Site is located in the Dos Lomas 7.5 minute USGS 1:24000 scale topographic map quadrangle at latitude 35.34226, longitude 107.75867, and elevation approximately 6,912 ft above sea level. The total area of the Site is unknown (Ref. 2).

Figure 1 is a general location map and Figure 2 is a site map of Section 23. Figure 3 is a Google Earth figure-photograph. Figures 1, 2, and 3 are contained in Attachment A.

The Site is located along the southern side of the San Mateo Creek alluvial drainage channel north of La Jara Mesa (Ref. 2).

Site identification:
The Site is one of numerous legacy uranium sites within the Grants Mining District, Ambrosia Lake Subdistrict, San Mateo Creek watershed, Bluewater Underground Basin.

Site summary: The Site is part of the Poison Canyon uranium mineralization trend which occurs in the Westwater Canyon Member of the Morrison Formation. The Marquez is the largest uranium deposit within the

Poison Canyon trend (Ref. 3). Based on a visit by Anderson (1980), the number of disturbed acres is unknown (Ref. 2).

Field radioactivity readings were measured by Anderson in 1980 (Ref. 3). The main dump measured 800-2,500 cps (48,000 – 150,000 cpm or 274 - 857 µR/hr). A stockpile of ore measured 10,000 cps (600,000 cpm or 3,428 µR/hr). High readings were measured on a streambed road near or leading to the site but no concentrations were provided with reference to a background reading to help gage the road readings as "high" (Ref. 3). A 10 degree incline shaft was noted at the site (Ref. 3). The field notes by Anderson (1980) also indicated buildings were removed but the concrete building foundations were still present; the main portal was secured with mesh metal gate; additional waste rock-ore dumps were present; there was mining-related debris near the San Mateo Creek channel; and a waste rock and/or /stockpile of ore was present near south creek bank.

In 1987 Santa Fe Pacific Gold Company backfilled the declined adit shaft and removed other structures. The Site was regraded with approximately 12 inches of top soil but apparently the soil was mostly sand (Ref. 3).

Targets:
The Site is located adjacent to the south bank of the alluvial channel for the San Mateo Creek surface water drainage system. The San Mateo Creek alluvial drainage system is in hydraulic connection with bedrock aquifer units in the area. There is a potential for contaminant releases at the Site to become mobilized by wind and surface water to where off site exposure is a possibility. The Site is located less than 0.5 mile from Highway 609 and could be accessed by trespassers traveling along the road. It is assumed the Site is accessible by cattle and local animals like deer, coyotes, and prairie dogs.

Potential impacts to the alluvial ground water system during Site operation may have occurred from ground water discharges from mine workings to settling ponds and ultimately to the San Mateo Creek drainage. Some portion of discharged contaminants may adhere to sediments, and propagate episodically downgradient in response to stream flows within the San Mateo Creek drainage. Current details of alluvial ground water flow are unknown, but are thought to follow general topographic slope (i.e., locally northwest from the site, and generally south 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. Additional contaminant mobilization in ore-bearing Westwater Canyon Formation could result from oxygenated ground water influx resulting from progressive basin recharge following cessation of mining activities.

Well records from the New Mexico Office of the State Engineer that are located within a four-mile radius of the Site are shown in Table 1 (Ref. 4). The Site is located less than a few hundred feet from the south bank of the channel for San Mateo Creek (SMC). Five domestic wells are located between 0.75 – 1.0 miles of the Site.

Site ownership and Potential Responsible Parties:
The history of site ownership and potential responsible parties information includes the following. From late 1957 to August 1958 Farris Mines, of Grants, drove the main decline leading from the surface down to the ore zone, estimated at approximately 1,400 feet or more from the surface (Ref. 2). Farris Mines was a contractor to the site owner, Calumet and Hecla Inc., of Chicago, Illinois. From 1958 to 1964 Calumet & Hecla owned and operated the Site, and from 1965 to-1966 United Nuclear Corporation worked the Site. From 1970 to 1972 the Kerr-McGee Corporation controlled the Site. The Site was idle and was not mined by the Kerr –McGee Corporation, although leaching operations were planned (Ref. 2).

Ted and Dianne Schmitt own the surface rights and Newmont Mining Corp. owns the mineral rights at the Site. The Site is located on private land (Ref. 2 and Ref. 7).

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

Site reconnaissance:
NMED made an attempt on July 26, 2010 to access the Site, but the property owner of the Marquez Mine was not home.

In October 2009, the USEPA, Office of Emergency Management, National Decontamination Team from Cincinnati, OH conducted an Aerial Radiological Survey of the Grants and Cebolleta Land Grant Areas in New Mexico (Ref. 6). The Airborne Spectrophotometric Environmental Collections Technology (ASPECT) program was employed to survey about 200 square miles and identify areas where surface uranium concentrations were in excess of background concentrations. The survey produced contour plots of: 1) total count rate in counts per second (cps); 2) exposure rate in micorRoentgen per hour (μR/hr); 3) uranium concentration in picocuries per gram (pCi/g); and 4) a plot of individual data points color coded for statistical significance representing deviation from normal background conditions. The survey area that includes the Marquez Mine is presented in Figures 3, 4, and 5. Figures 3 and 5 clearly indicate the level of gamma radioactivity and soil uranium concentration are elevated at the Marquez Mine. The exposure rate appears to be in the 40-60 μR/hr for the Marquez Mine. When the gamma count rate maximum value of 13,500 cps is converted to counts per minute (cps X 60 sec/min = 816,000 cpm) then converted to μR/hr (816,000 / 175 cpm/μR), the 4,628 μR/hr value does not agree with the ASPECT survey results (4,628 μR/hr vs. 40-60 μR/hr).

A field visit-site assessment was performed at the Site on September 19, 2010 (Ref. 7) by a contractor to the New Mexico Energy Minerals and Natural Resources Department. The assessment included field notation, radioactivity measures at 0 and 4 feet above the ground surface, and photographs. Radiation readings were taken using a Ludlum Model 192 uR ratemeter (Ref. 7). The background gamma radiation reading was measured at 14 and 13 uR/hr at 0 and 4 feet, respectfully. Radiation readings from 12 locations at 0 feet ranged from 21 to 2,200 uR/hr and averaged 406.9 uR/hr (Ref. 7). When the 0 feet high radiation readings are compared to the background radiation level of 14 uR/hr, the radiation at the Site ranged from 1.5 to 157.1 above the background radiation level. Figure 6 which illustrated the measurements is taken from the AUM report (Ref. 7). Radiation readings at 4 feet high ranged from 22 to 380 uR/hr and averaged 121 uR/hr (Ref. 7). When the 4 feet high radiation readings are compared to the background radiation level of 14 uR/hr, the radiation at the Site ranged from 1.6 to 27.1 above the background radiation level.

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 decline should be assessed and mitigated as soon as possible.

Currently, the existence of regional impacts from legacy uranium sites to the ground water system has not been determined. Ground water had to be pumped from the Marquez mine in order to access the ore deposits, but the location of the effluent discharge is not evident. The bank of San Mateo Creek near the Site should be surveyed to attempt to determine where the effluent discharge may have been routed. Radiological surveying and limited sampling of the 0-6 inch interval of soil at the Site is recommended to determine the extent potential release 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. A generalized investigation of potential alluvial ground water impacts from “wet” former uranium mines within the Grants Mining District is recommended as part of regional ground water quality characterization. If this generalized investigation were to indicate a potential for alluvial ground water impacts, on-Site installation of one or more monitor wells then should be considered.

References:

1. USGS, 1957. Dos Lomas, N, Mex. 7.5 minute quadrangle topographic map, 1:24,000 scale.
2. New Mexico Energy, Mineral and Natural Resources Department, undated. "2007-07-20 to NMED-GWQ-Sfund.xls." Spreadsheet excerpt.
3. Rapaport, I., 1963. Uranium deposits of the Poison Canyon Ore Trend, Grants District, in Geology and Technology of the Grants Uranium Region, New Mexico Bureau of Mines and Mineral Resources, Memoir 15, pp. 122-135.
4. New Mexico Office of the State Engineer. "May_08_wells." Shapefile.
5. McLemore, Virginia T. and William L. Chenoweth, revised December 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
6. U.S. Environmental Protection Agency, Aerial Radiological Survey of the Grants and Cebolleta Land Grant Areas in New Mexico, Office of Emergency Management, National Decommissioning Team, Cincinnati, OH, January 2010, 85 p.
7. INTERA Draft Report September 24, 2010. Abandoned Uranium Mine Assessment for the Marquez Site (NM0039) prepared for the New Mexico Energy, Minerals and Natural Resources Department, 34 p.

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

distance from site (miles)	POD REC NBR	POD BASIN	POD NBR	COUNTY	well completion date	DEPTH WELL (ft)	DEPTH WATER (ft)	CASING SIZE (in)	owner name	USE	Diversion (acre ft/yr)
0 - 0.25											
0.25 - 0.50											
0.50 - 0.75											
0.75 - 1.0	706	B	415	McKinley	3/23/1978	32.00	15.00	5.00	NEW MEXICO E.I.A.	Domestic	3
0.75 - 1.0	936	B	415	McKinley	8/10/1977	95.00	72.00	5.00	NEW MEXICO E.I.A.	Domestic	3
0.75 - 1.0	538	B	415	McKinley	8/11/1977	90.00	73.00	5.00	NEW MEXICO E.I.A.	Domestic	3
0.75 - 1.0	898	B	415	McKinley	8/12/1977	80.00	74.00	5.00	NEW MEXICO E.I.A.	Domestic	3
0.75 - 1.0	259	B	1104	McKinley	4/2/1986	303.00	247.00	4.00	SANDOVAL	Domestic	3
1.0 -2.0	565	B	456	Valencia		0.00	0.00	0.00	SANDOVAL	Stock	3
1.0 -2.0	180546	B	558	McKinley		0.00	0.00	0.00	N.M. STATE HWY DEPT.	Public	3
1.0 -2.0	1391	B	659	McKinley	1/18/1979	220.00	190.00	0.00	GARCIA	Domestic	3
1.0 -2.0	1004	B	861	McKinley		0.00	0.00	0.00	SANDOVAL	Domestic	3
1.0 -2.0	804	B	1115	McKinley	7/21/1986	478.00	204.00	4.00	MARQUEZ	Domestic	3
1.0 -2.0	397	B	1190	McKinley	8/31/1989	390.00	37.00	0.00	MARQUEZ	Stock	3
1.0 -2.0	209713	B	1636	McKinley	5/10/2005	260.00	80.00	4.00	GARCIA	Domestic	3
2.0 - 3.0	183017	B	390	Valencia	12/31/1974	1800.00	900.00	6.63	FERNANDEZ CO. LTD	Irrigation	1386
2.0 - 3.0	375	B	997	Cibola		0.00	0.00	0.00	MARQUEZ	Municipal	3
2.0 - 3.0	190618	B	1544	McKinley	6/14/2003	715.00	624.00	5.00	JACKSON	Domestic	3
3.0 -4.0	1386	B	414	McKinley		0.00	0.00	0.00	RESERVE OIL & MINERALS CORP	Sanitary	3
3.0 -4.0	18	B	415	McKinley	8/30/1977	59.00	30.00	5.00	NEW MEXICO E.I.A.	Domestic	3
3.0 -4.0	992	B	415	McKinley	8/30/1977	72.00	30.00	5.00	NEW MEXICO E.I.A.	Domestic	3
3.0 -4.0	165	B	415	McKinley	8/30/1977	54.00	30.00	5.00	NEW MEXICO E.I.A.	Domestic	3
3.0 -4.0	328	B	415	McKinley	8/30/1977	57.00	32.00	5.00	NEW MEXICO E.I.A.	Domestic	3
3.0 -4.0	155005	B	848	McKinley		0.00	0.00	0.00	KERR-MCGEE NUCLEAR CORP.	Mining	0
3.0 -4.0	155007	B	848	McKinley	5/14/1981	1611.00	1315.00	4.50	KERR-MCGEE NUCLEAR CORP.	Mining	0
3.0 -4.0	186776	B	848	McKinley		0.00	0.00	0.00	KERR-MCGEE NUCLEAR CORP.	Mining	0
3.0 -4.0	197513	B	851	McKinley		0.00	0.00	0.00	KERR-MCGEE NUCLEAR CORP	Dewatering	0
3.0 -4.0	1412	B	993	McKinley	7/21/1969	1398.00	0.00	0.00	RIO ALGOM MINING LLC	Mining	4735
3.0 -4.0	1127	B	993	McKinley	1/1/1960	1533.00	0.00	0.00	RIO ALGOM MINING LLC	Mining	4735
3.0 -4.0	1466	B	1084	McKinley	1/1/1963	320.00	60.00	0.00	FERNANDEZ COMPANY	Stock	0
3.0 -4.0	175541	B	1485	McKinley	1/28/2002	580.00	280.00	4.00	MARQUEZ	Domestic	3
3.0 -4.0	227069	SP	3384	McKinley		0.00	0.00	0.00	ROUNDY	Irrigation	0
POD REC NBR: point of diversion record number.						B: Bluewater Basin					
POD BASIN: point of diversion basin						SP: Surface Permit					
POD NBR: point of diversion number											

Attachment A

Figures 1 through 6

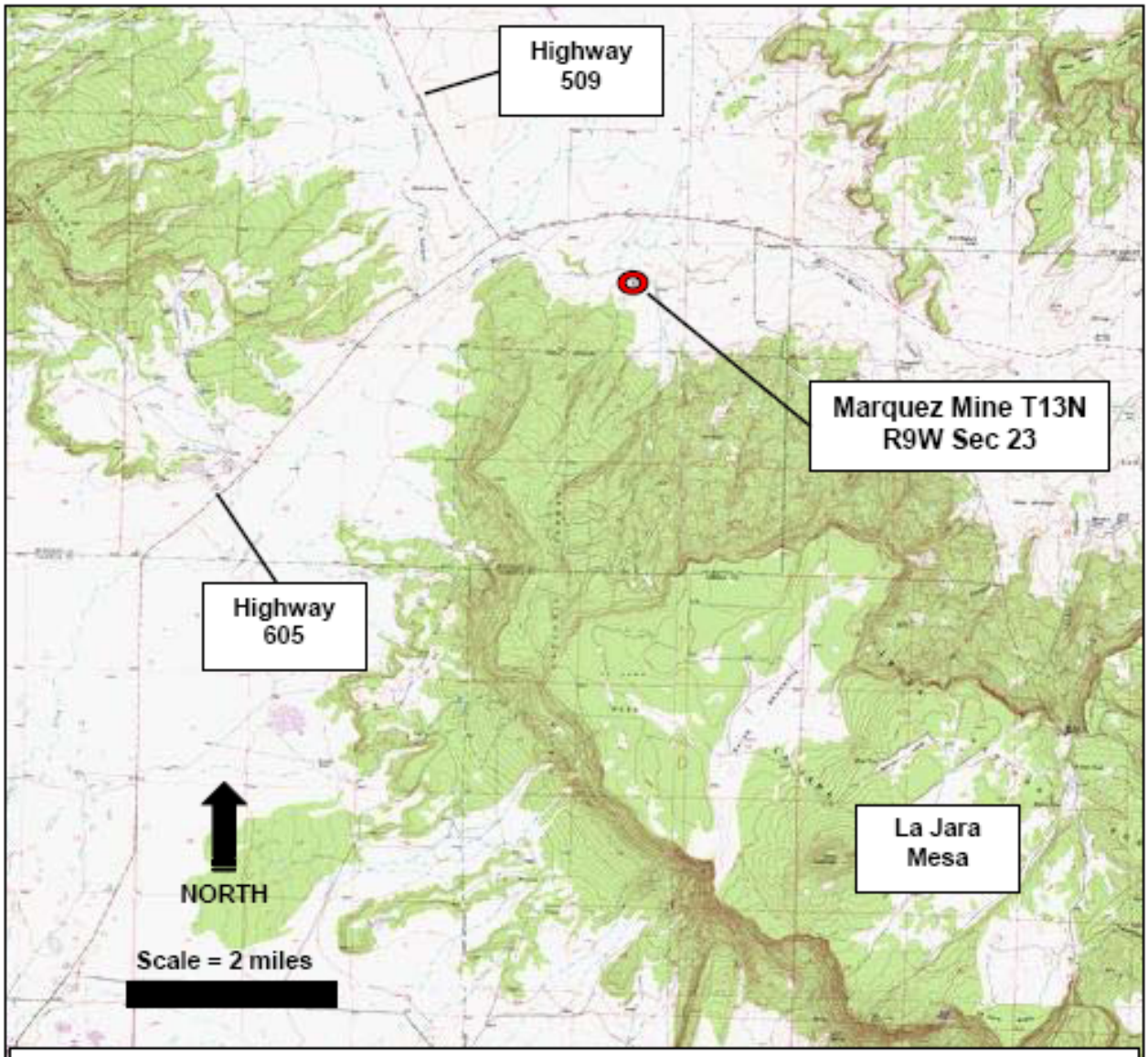

Figure 1. TopoQuest.com location map of the Marquez Mine in USGS Dos Lomas 7.5 Minute Quadrangle, Ambrosia Lake Subdistrict, San Mateo Creek area, Grants, NM.

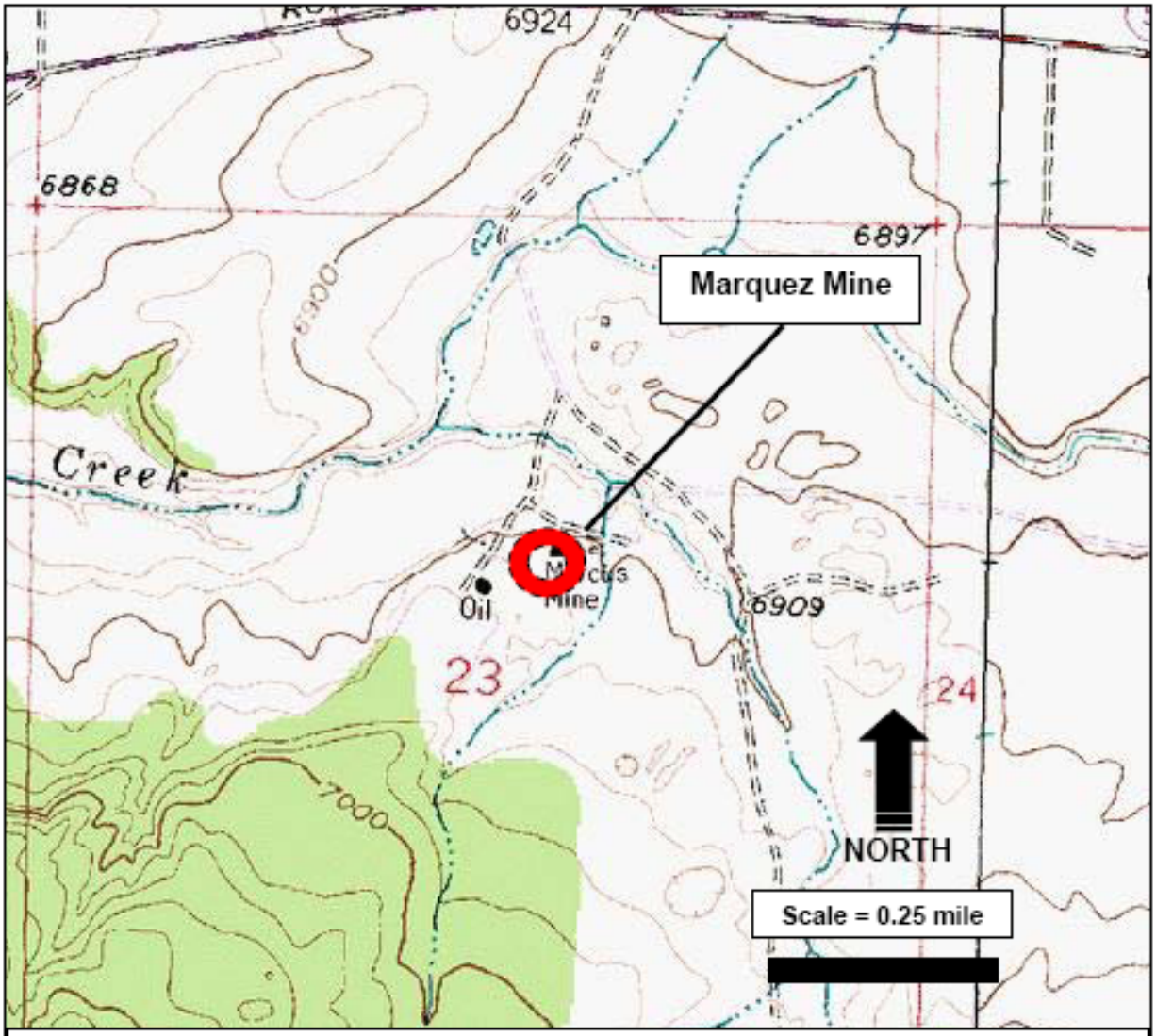

Figure 2. TopoQuest.com location map of the Marquez Mine in the Dos Lomas Quadrangle USGS 7.5 topographic map, T13N, R9W, Sec 23, Ambrosia Lake Subdistrict, Grants, NM.

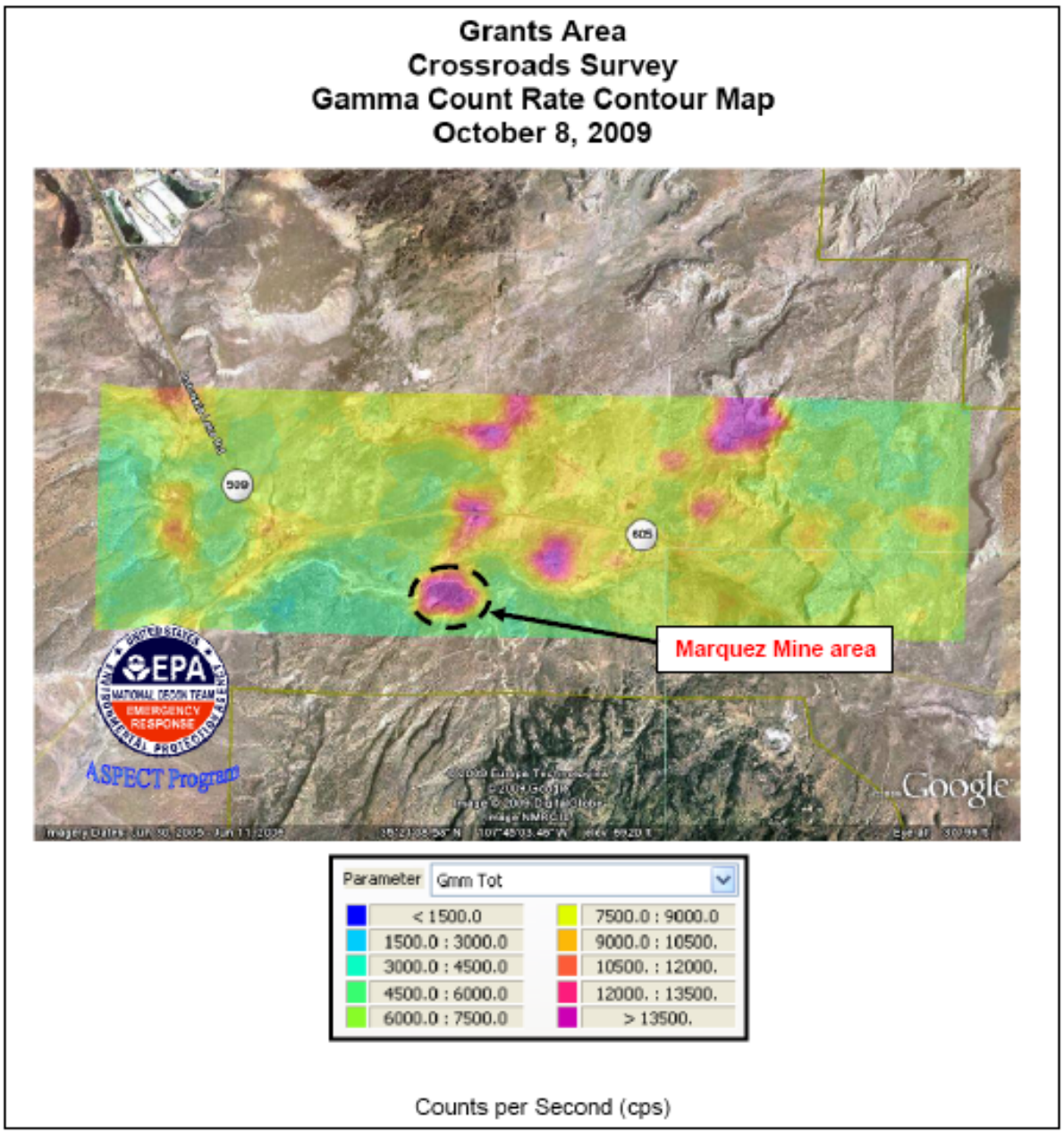

Figure 3. Aerial radiological survey Image 9 of the Grants, NM area conducted by USEPA in October 2009 presenting gamma count rate contour map data in counts per second (cps).

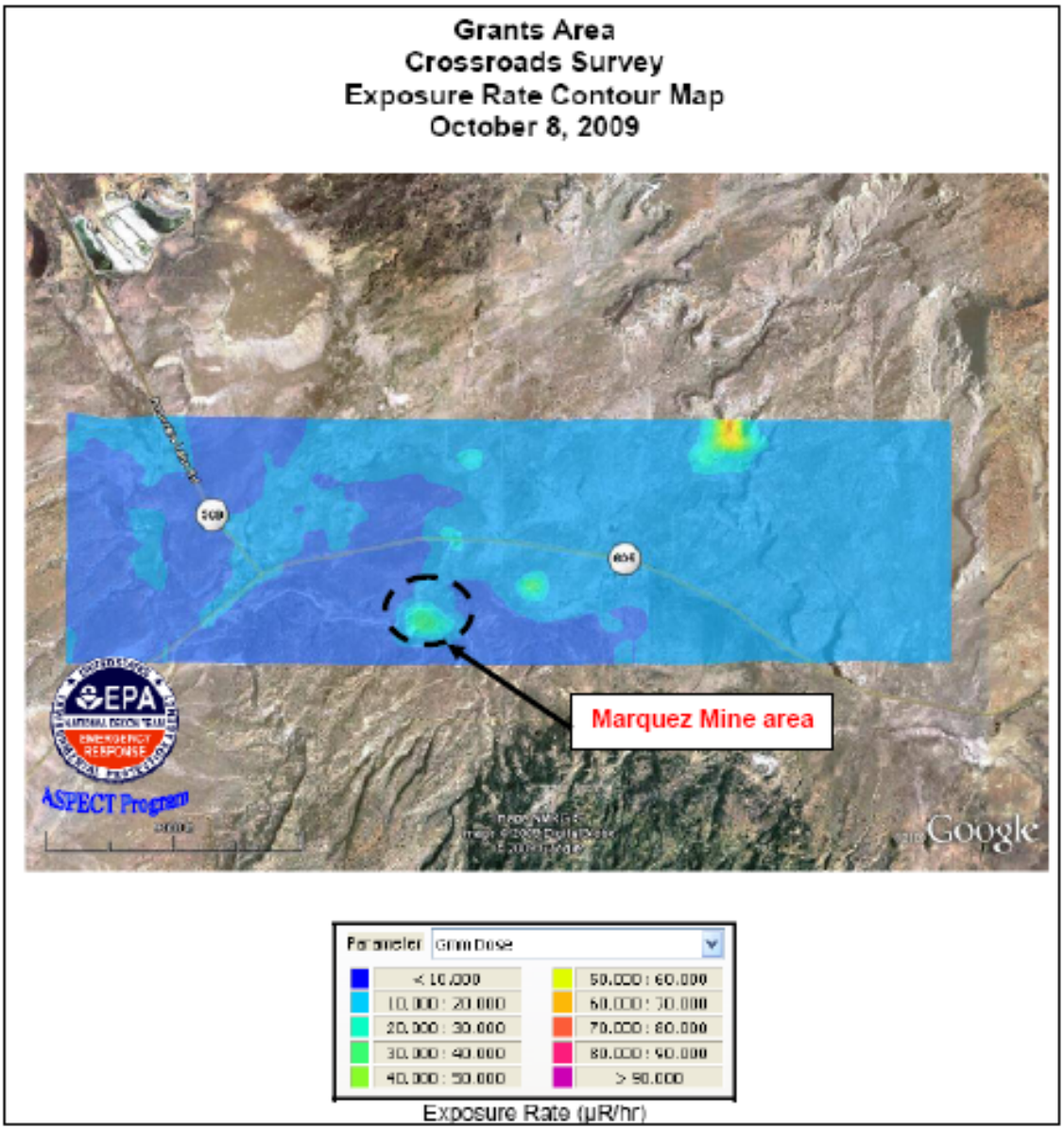

Figure 4. Aerial radiological survey Image 21 of the Grants, NM area conducted by USEPA in October 2009 presenting exposure rate contour map data in microRoetengens /hr (µR/hr).

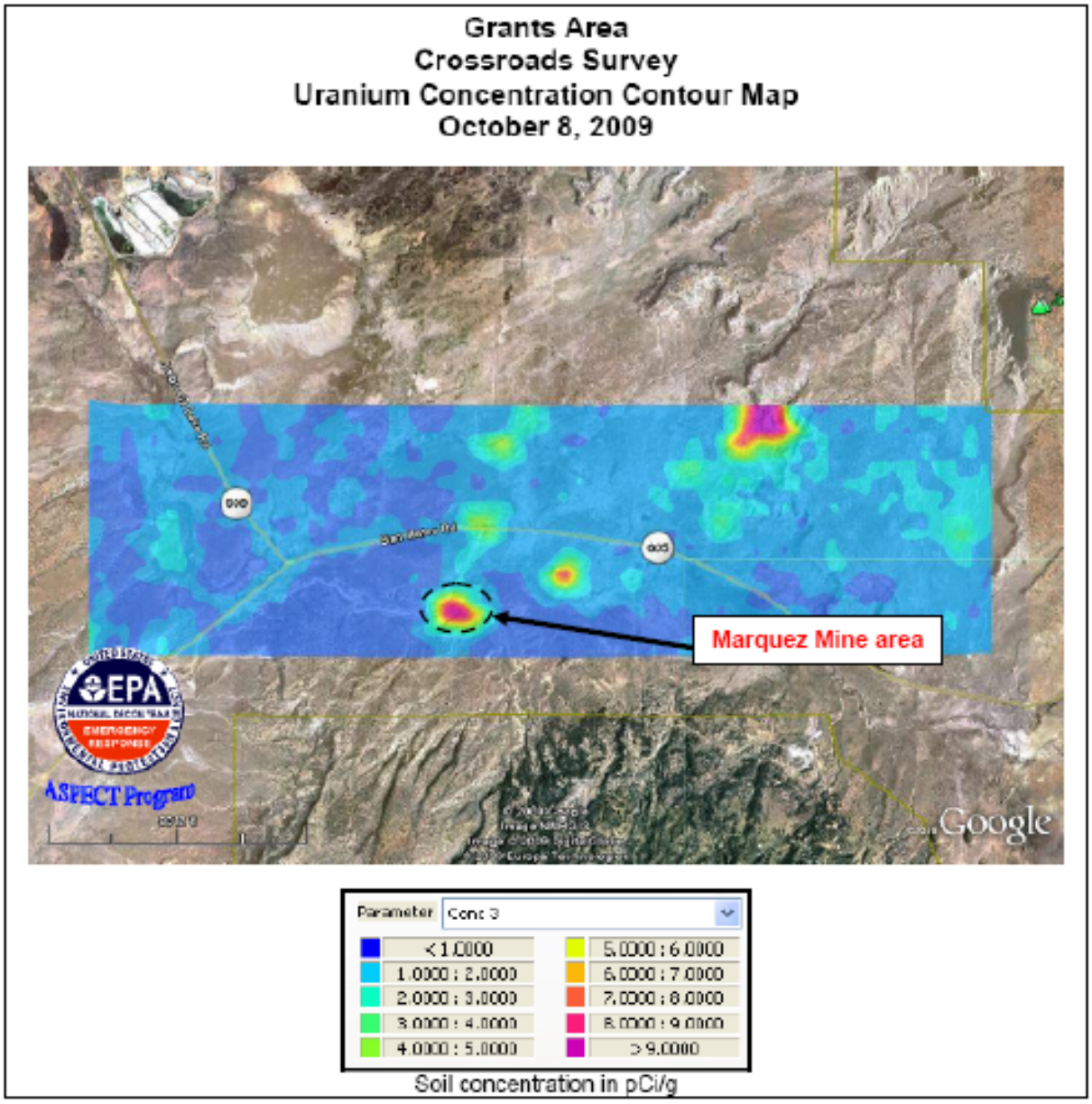

Figure 5. Aerial radiological survey Image 32 of the Grants, NM area conducted by USEPA in October 2009 presenting soil uranium concentration contour map data in picoCuries per gram (pCi/g).

Figure 6. Site map on aerial photo, NM0039-Marquez Mine, Abandoned Uranium Mine Assessment, Figure 4a, Draft Report, September 24, 2010 (Ref. 7).