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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 31, 2011

Subject: Pre-CERCLIS Screening Assessment of Section 36 Mine, New Mexico: No
Further Action under CERLCA Recommended

Site name	Section 36 Mine	Alias	Cliffside		
City	NA	State	New Mexico	Zip code	NA
County	McKinley County				
Latitude	35°23'43.29" N	Longitude	107°45'01.18" W		

Site physical description:

The Section 36 mine is located approximately 3.5 miles northeast of the junction of State highways 509 and 605 in the Ambrosia Mining Sub-District (Figure 1). The surface of the Section 36 mine was reclaimed by the Quivira Mining Company (QMC) starting in November 1989 and was completed in 1990. Three cased vent holes remain open at the Section 36 mine to serve as monitoring wells (Ref. 1).

Site identification:

The Section 36 mine is one of approximately 97 legacy uranium mines identified in the Ambrosia Lake Mining Sub-District of the Grants Mining District. On-going remedial activities at the Section 36 mine are being conducted by Rio Algom Mining, LLC (RAML) under state oversight in accordance with New Mexico Water Quality Control Commission (NMWQCC) Regulations [20.6.2.3000 NMAC] under discharge permit (DP)-67, DP 264 and DP-362 and a separate Abatement Plan.

Site summary:

A vertical shaft was sunk in 1958 in order to access the uranium deposit below the water table within the Westwater Canyon member of the Morrison Formation. Phillips Petroleum began

mining operations at the Section 36 mine in 1960. Kerr McGee operated the mine from 1969 until 1984. The Section 36 mine prior to 1970 produced 893,140 tons of uranium ore and 7,745,917 pounds of uranium oxide (Ref. 3). QMC placed the Section 36 mine on standby status in 1985. In October 1989 a decision was made to close the Section 36 mine and reclaim the area (Ref. 1).

Reclamation of the surface at the site was conducted primarily in 1989 and 1990 by QMC. The site being an "existing mining operation" under the New Mexico Mining Act (NMMA), QMC requested release from further requirements from the NMMA. Reclamation of the site included the removal of all buildings and other improvements. The mine shaft and all but three vent holes were permanently sealed with a 4 foot thick reinforced concrete cap and two foot of soil cover. Radiation surveys (gamma) were routinely performed during reclamation activities to ensure all material to be removed was identified and taken to a disposal area. All disturbed areas have been recontoured, covered with at least one foot of soil and revegetated (Ref. 1). After a site inspection by New Mexico Energy, Minerals and Natural Resources Department (NMEMNRD), QMC was released in 1995 from further requirements of the New Mexico Mining Act (Ref. 2).

The Section 36 mine was dewatered from 1960 through 1984. The average discharge rate from the Section 36 mine was 1,400 gallons per minute between 1960 and 1977. Until 1979 mine water from the Section 36 mine was largely untreated and was discharged directly into the natural surface drainage. Starting in 1979 mine water was treated with barium chloride within a settlement pond to treat for radium prior to discharge. Some of the mine water from the Section 36 mine was used locally as irrigation water (Ref. 4). NMED originally approved a ground water DP-67 in 1980 to Kerr McGee which authorized discharge of mine water from the Section 35 and Section 36 mines. DP-67 covered the operation of an Ion Exchange (IX) facility located at the Section 35 mine for the recovery of uranium from mine water, the associated settlement ponds and the final outfalls (Ref. 5). In 2005, RAML notified NMED that a preliminary assessment identified that discharge of mine water from the Section 35 and 36 mines has resulted in contamination of soil and alluvial ground water. Pursuant to the NMWQCC Regulations 20.6.2.1203 NMAC, NMED considered contamination from the Section 35 and 36 mines to be the result of an unpermitted discharge, prior to the implementation of DP-67 and subject to corrective action (Ref. 4). Based on the Corrective Action Report findings received by NMED, NMED notified RAML in 2008 to submit a Stage 1 Abatement Plan. Also NMED has determined that DP-67 restoration and closure requirements cannot be met or the permit terminated until the above contamination is appropriately addressed (Ref. 6).

In 1983, NMED approved DP-264 for the backfilling of mined out stopes using tailing sands in the Section 35 and the Section 36 mines which occurred from 1983 through 1985. The backfilling to the mined out stopes was done using a slurry mixture of mine water and tailing sands. Bulkheads were erected at the stope accesses to retain the sand tailings and allow water to drain. The water was then collected and treated along with the mine water as part of dewatering activities. RAML did not submit a timely renewal application for the DP in 1995 to address the closure of the Site under a DP Closure Plan. NMED is currently reviewing RAML documents to determine if all materials have been sufficiently removed or if additional abatement will be required (Ref. 7).

RAML under DP-362 authorized the recirculation of mine water and ground water fortified with sodium bicarbonate or sulfuric acid to be injected into 12 underground uranium mines for the

secondary recovery of uranium. All underground injections ceased by 2000. NMED has required RAML under DP-362 to submit a Stage 1 Abatement Plan which will assess ground water conditions at the 10 mines RAML owned or operated. The Section 36 mine while not one of the 10 mines identified in DP-362 will be included in this investigation (Ref. 8).

Targets:

Wells that are registered with the New Mexico Office of the State Engineer (OSE) and located within a 4-mile radius are shown in Table 1. The site is within the 4-mile radius of the junction of State highway 509 and 605 which includes a small community, and residences, that rely on private and domestic wells (Ref. 9). Table 2 identifies domestic wells that were sampled by NMED in 2009. Results show ground water concentrations exceeding the Environmental Protection Agency (EPA) Maximum Contaminant Levels (MCL) and the NMWQCC ground water standards (Ref. 10).

Airborne Spectral Photometric Environmental Collection Technology (ASPECT) operated by EPA has developed exposure rate contour map of the Ambrosia Lake Mining Sub-District that includes the Section 36 (NM0017) mine (Figure 2). The EPA ASPECT exposure rate measurements were performed in part to evaluate if surface reclamation has been effective in the long-term elimination of such threats to human health and the environment. The map estimates radiation exposure rates on the ground and can be used to identify hazardous levels of radiation. Typical exposure rates in New Mexico range from 5 – 20 micro Roentgens per hour ($\mu\text{R/hr.}$). The ground surface exposure rates in and around the Section 30 mine are over one thousand times higher than the typical range, that is, ground surface radiological hazards were identified at most Ambrosia Lake uranium mine sites including the Section 30 mine (Ref. 11).

Site ownership and Potential Responsible Parties:

The New Mexico State Land Trust owns both the surface and mineral estates for the Section 36 mine (Ref. 3). Phillips Petroleum operated the Section 36 mine from 1960 to 1963. United Nuclear Corporation operated the mine from 1963 until 1968. Kerr McGee Corporation operated the mine from 1969 until 1984. QMC, a subsidiary of Kerr McGee Corporation, took over mining operations in 1984. Rio Algom Mining Company (RAMC) acquired QMC in 1989 (Ref. 12). Billiton plc purchased RAMC in 2000. Broken Hill Proprietary Company Limited (BHP) merged with Billiton plc to form BHP Billiton Limited, of which RAML is a wholly-owned subsidiary (Ref. 13).

File review:

Files that were reviewed for this assessment are listed below.

Site reconnaissance:

The last documented site reconnaissance occurred in 1995 by NMEMNRD personnel (Ref. 2). A site reconnaissance was not performed as part of this Pre-CERCLIS screening assessment.

Recommendation:

Data collected from the Ambrosia Lake Mining Sub-District has shown a release of CERCLA hazardous substances to both the ground surface, and ground water. In addition, an Aerial Radiological Survey conducted by EPA of the Ambrosia Lake Mining Sub-District measured radiological exposure rates above background in and around the eleven RAML mine sites.

On-going remedial activities at the Section 36 mine are being conducted by RAML under state oversight in accordance with NMWQCC regulations under DP-67, DP 264 and DP-362 and a separate Abatement Plan. RAML is required to investigate and abate radiological and metal contamination from the discharge of mine water, regional impacts from legacy uranium sites to the ground water system and surface and radiological hazards to ensure long-term elimination of such threats to human health and the environment.

NMED recommends that no further action is required at the Section 36 mine at this time. SOS may revisit this recommendation should additional information become available that indicates that an imminent threat to human health or the environment exists such that further action under CERCLA is warranted. NMED SOS also proposes to periodically review new data as it becomes available and incorporate it into the ground water conceptual model for the Grants Mining District. A generalized investigation of potential ground water impacts from former uranium mines within the Grants Mineral District is recommended as part of regional ground water quality characterization.

References:

1. Quivira Mining Company, 1993, Reclamation Activity-Section 36, Report to New Mexico State Land Office.
2. NMEMNRD, 1995, Determination of Release of Prior Reclamation Sites, Section 36 Mine, NMEMNRD to Quivira Mining Company.
3. New Mexico Energy, Minerals and Natural Resources Department, 2007, Abandoned and inactive uranium mines in New Mexico database, Mining and Minerals Division.
4. Inera Incorporated, 2007, Evaluation of Impacts from Section 35 and 36 Mine Dewatering, Ambrosia Lake Valley, New Mexico, Rio Algom Mining, LLC
5. New Mexico Environment Department, Discharge Plan-67 files.
6. Inera Incorporated, 2008, Rio Algom Mining Stage 1 Abatement Plan.
7. New Mexico Environment Department, Discharge Plan-264
8. New Mexico Environment Department, Discharge Plan-362.
9. New Mexico Office of the State Engineer, 2011, New Mexico water rights reporting system database, point of diversion by location, four mile radius of the Sandstone Mine.
10. New Mexico Environment Department, 2010, Phase 1 Site Investigation Report San Mateo Creek Legacy Uranium Sites, CERCLIS ID# NMN00060684, McKinley and Cibola Counties, New Mexico.
11. EPA, 2011, Airborne Spectral Photometric Environmental Collection Technology Exposure Rate Contour Map of Ambrosia Lake Mining District.
12. Quivira Mining Company, 1994, Letter to the Mining and Minerals Division.
13. Rio Algom Mining, LLC, 2001, Letter to the Mining and Minerals Division.

Table 1. Domestic Wells within a Four Mile Radius of the Section 36 Mine, Office of the State Engineer¹

OSE Well Number	Well Use	Well Owner	Section	Township	Range	Depth of Well	Depth to Water	Water Column
Wells (>2 and <3 miles)								
B 01190	Livestock ^a	MELOIN MARQUEZ	11	13N	09W	390	37	353
B 00456	Livestock ^a	CARLOS SANDOVAL	14	13N	09W	700	*	*
Wells (>3 and <4 miles)								
B 01104	Domestic	ALVIN D. SANDOVAL	14	13N	09W	303	247	56
B 01115	Domestic	MELVIN MARQUEZ	15	13N	09W	478	204	274
B 01636	Domestic	MICHAEL GARCIA	22	13N	09W	260	80	180
B 01544	Domestic	THOMAS JACKSON	18	13N	08W	715	624	91
B 00659	Domestic	MICHAEL G. GARCIA	22	13N	09W	220	190	30
B 00390	Irrigation ^a	FERNANDEZ CO. LTD	18	13N	08W	1800	900	900
* = Value Unknown								
^a = Wells are permitted for household use								
¹ = Taken from Sandstone Mine Wells								

Table 2. Domestic Wells Sampled within a Four Mile Radius of the Section 36 Mine

OSE Well Number	Well Use	Well Owner	Gross Alpha	Radium 226/228	Uranium	Selenium
			pCi/L		µg/L	
B 01104	Domestic	ALVIN D. SANDOVAL	16.0	0.51	20.6	13.2
B 01115	Domestic	MELVIN MARQUEZ	46.6	0.96	63.9	73.6
B 01636	Domestic	MICHAEL GARCIA	20.7	0.33	13.8	66.2
B 00659	Domestic	MICHAEL GARCIA	6.2	1.39	10.1	27.1
*	Domestic	SCHMITT-1	56.0	6.81	2.0	2.0
*	Domestic	SCHMITT-6	0.9	0.72	2.5	2
* = Well not permitted with the OSE						
Bold = Exceeds the EPA MCL and or NMWQCC Ground Water Standard.						
pCi/L = picoCuries/Liter						
µg/L = micrograms/Liter						

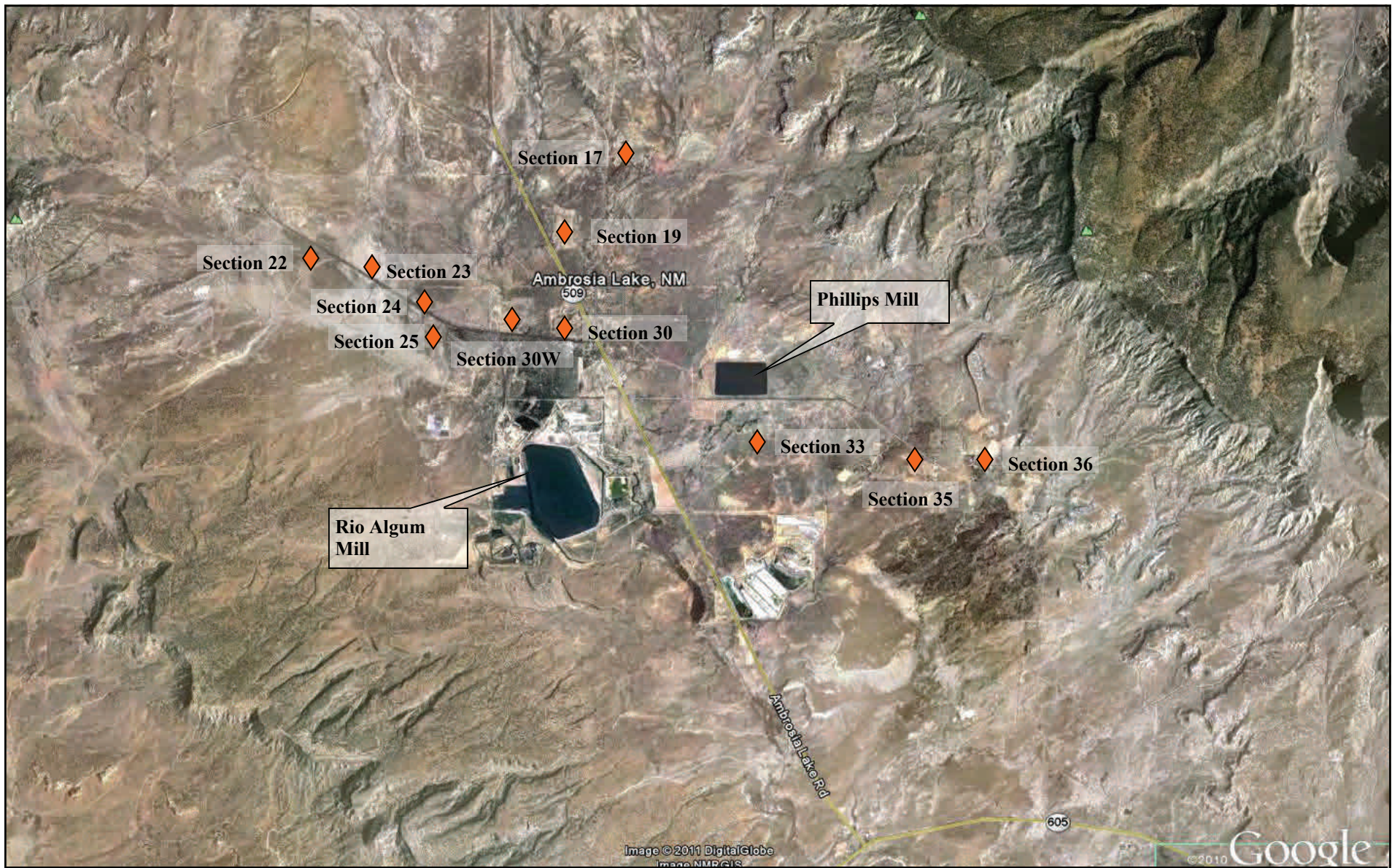


Figure 1. Ambrosia Lake Mining District, Rio Algom Mine Sites

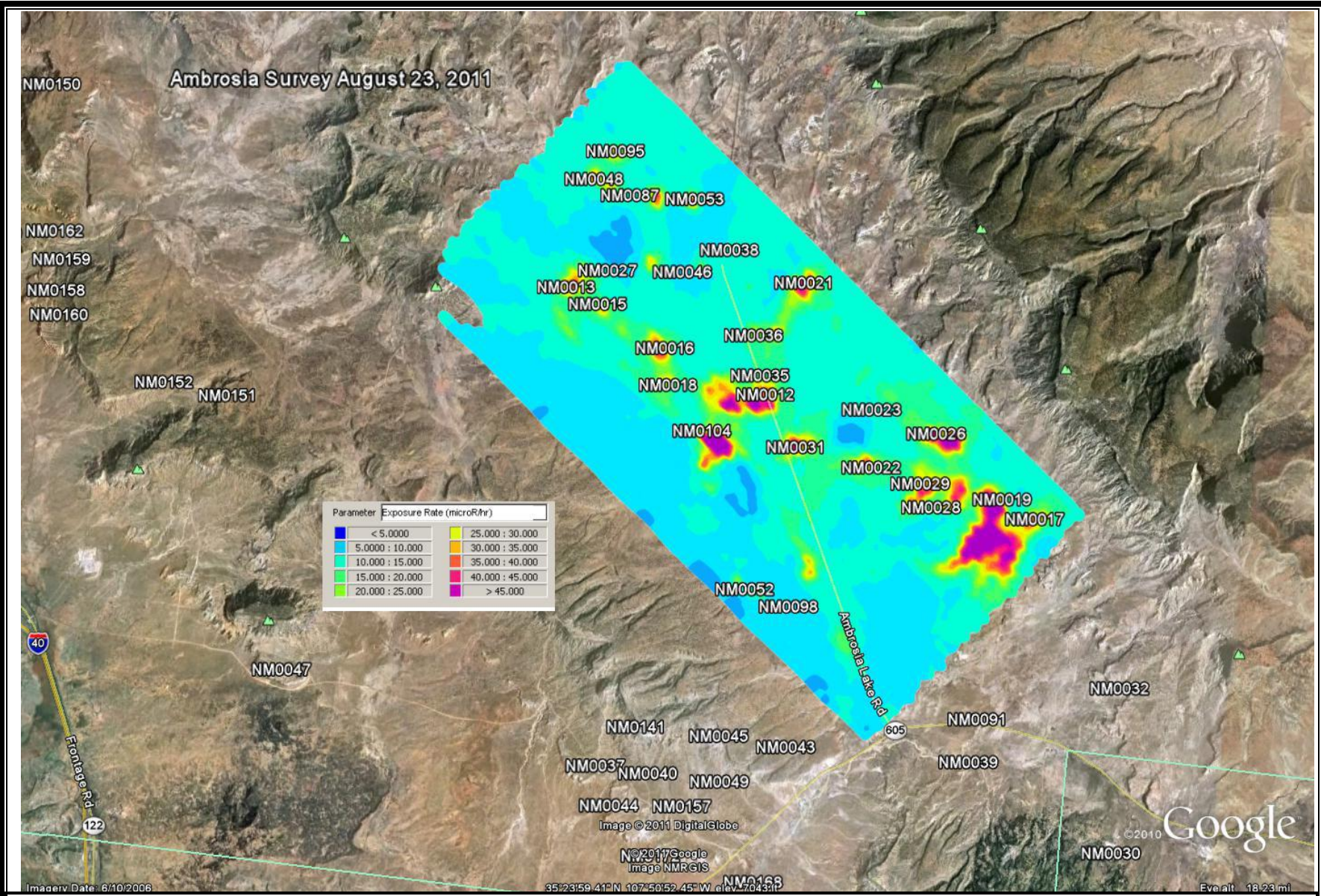


Figure 2. U.S. EPA ASPECT Exposure Rate Contour Map of Ambrosia Lake Mining District.