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ENVIRONMENT DEPARTMENT

Ground Water Quality Bureau

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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: **August 16, 2010**

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

Site name Chill Willis mine **Alternative names** Chill Wills; Rialto; Section 13; Section 24
Street address not applicable **City** not applicable **State** New Mexico
Zip code not applicable **County** McKinley
Latitude 35.347278 **Longitude** -107.746722 **TRS** T13N, R9W, s. 24NW

Site physical description:
Information on the current physical description of the Chill Willis minesite ("Site") is summarized from the March 23, 2010 Site visit report by Intera, Inc., contractor to the New Mexico Energy, Minerals, and Natural Resources Department ("NMEMNED;" Ref. 1). The Site is located approximately 1000 feet ("ft") northeast of San Mateo Creek ("SMC") within a flat valley that drains toward SMC (Ref. 1, p. 1). State highway 605 is approximately ¼ mile to the north; the Schmitt Ranch is located approximately ½ mile to the east. During the 2010 site inspection, two shafts, one pit, seven piles, three structures, one foundation, one fenceline, and miscellaneous debris were noted on-Site (Ref. 1, p. 2, 4).

One collapsed shaft was originally reported to be 375 to 450 ft deep. Currently this shaft, which is surrounded by a 3-ft tall fence, is 15 ft in diameter, and filled to a depth of approximately 50 ft. Three vertical timbers surround the shaft, and timbering is visible within the shaft in the collapse-crater (Ref. 1, p. 3, 9). The second shaft, located approximately 150 ft south of the first shaft, is denoted by a collapse feature 40 ft in diameter and 70 ft deep; the

depth has reportedly increased in recent years (Ref. 1, p. 3).

The pit is approximately 20 ft wide, 50 ft long, and 5 ft deep (Ref. 1, p. 3).

One waste pile comprises a ridge of waste material nearly 400 ft long; two other nearby piles also are comprised of waste rock. Another two piles, one of which is approximately 35 ft wide by 85 ft long by 11 ft tall, are comprised of ore rock (Ref. 1, p. 3). The highest on-Site gamma radiation reading was recorded from gray rock on one of these ore piles (1200 microroentgens/hr ["µR/hr"] at 0 ft, 400 µR/hr at 4 ft, background is 26 µR/hr at 0 ft and 24 µR/hr at 4 ft [Ref. 1, Table 2]). Gamma radiation levels from the other of these two piles of ore rock, which is approximately 35 ft wide, 85 ft long, and 11 ft tall, were recorded to be 34 µR/hr at 0 ft and 37 µR/hr at 4 ft (Ref. 1, p. 3, 4, Table 2). Gamma radiation readings on other waste and ore piles range from 34 to 500 µR/hr at ground surface, and 37 to 220 µR/hr at 4 ft elevation (Ref. 1, p. 4).

One of the structures, which is identified in Ref. 2 (p. 227) as a powder magazine, now is partially buried by sand; a 'No Smoking" sign is still visible on this structure (Ref. 1, p. 3).

Site identification:
The Site is one of numerous legacy uranium sites within the Grants Mining District.

Site summary:
Mining occurred from the basal arkosic Poison Canyon sandstone within the Brushy Basin Member of the Morrison Formation (Ref. 1, p. 2). The mine was operated between 1960 and 1963 first by Bailey and Fife, and later by Farris Mines; Febco Mines, Inc. may have operated or controlled the Site during some of the period of operation (Ref. 3, p. 3). In 1963, the main shaft caved-in due to a leak in a dewatering hose, which caused major washout from the shaft and eventual failure of shaft timbers. The headframe and most of the mining equipment were lost in the cave-in (Ref. 2, p. 224).

The mine produced 9,261 tons of ore, which yielded 31,381 pounds of uranium oxide at an average grade of 0.17% (Ref. 3, p. 3). Febco Mines, Inc. also accessed ore underlying section 13 through the Chill Willis shaft (Ref. 3, p. 2). In 2010, no reclamation, other than the fence surrounding one shaft, was noted (Ref. 1, p. 4).

Targets:
Surface runoff from the Site either directly enters SMC, or else becomes alluvial ground water, which also flows towards SMC (Ref. 1, p. 2); however no erosion was observed at the Site (Ref. 1, p. 5). Due to its proximity to State highway 605 (Ref. 1, p. 4), the Site may be accessible to trespassers. In addition to the proximity to the Schmitt Ranch, two other residences are located within a one-mile radius. The Site is located within a pasture that is used for grazing of cattle and horses (Ref. 1, p. 4).

Wells that are registered with the New Mexico Office of the State Engineer and located within a 4-mile radius of the Site are shown in the table following (Ref. 4).

Distance from Site (miles)	OSE record number	Owner's last name	use	finish date	depth of well (ft)	depth to water (ft)	casing diameter (in.)	yield (gpm)
0.5 – 1.0	B 01104	SANDOVAL	DOM	04/02/1986	303	247	4.0	12.0
1.0 – 2.0	B 00390	FERNANDEZ CO. LTD	IRR	12/31/1974	1800	900	6.63	850.0
	B 00415	NEW MEXICO E.I.A.	DOM	08/10/1977	95	72	5.0	2.0
	B 00415	NEW MEXICO E.I.A.	DOM	08/11/1977	90	73	5.0	10.0
	B 00415	NEW MEXICO E.I.A.	DOM	08/12/1977	80	74	5.0	1.0
	B 00456	SANDOVAL	STK		0	0		
	B 00997	MARQUEZ	MUL		0	0		
	B 01115	MARQUEZ	DOM	07/21/1986	478	204	4.0	30.0
	B 01190	MARQUEZ	STK	08/31/1989	390	37		15.0
	B 01544	JACKSON	DOM	06/14/2003	715	624	5.0	6.0
	B 01636	GARCIA	DOM	05/10/2005	260	80	4.0	5.0
2.0 – 3.0	B 00558	N.M. STATE HWY DEPT.	PUB		0	0		
	B 00659	GARCIA	DOM	01/18/1979	220	190		15.0
	B 00848	KERR-MCGEE NUCLEAR CORP.	MIN		0	0		
	B 00848	KERR-MCGEE NUCLEAR CORP.	MIN	05/14/1981	1611	1315	4.5	
	B 00848	KERR-MCGEE NUCLEAR CORP.	MIN		0	0		
	B 00851	KERR-MCGEE NUCLEAR CORP	DEW		0	0		
	B 00861	SANDOVAL	DOM		0	0		
	B 01084	FERNANDEZ COMPANY	STK	01/01/1963	320	60		
3.0 – 4.0	B 00415	NEW MEXICO E.I.A.	DOM	03/23/1978	32	15	5.0	20.0
	B 00415	NEW MEXICO E.I.A.	DOM	03/23/1978	32	15	5.0	10.0
	B 00557	NEW MEXICO STATE HWY DEPT	PUB		0	0		
	B 01086	FERNANDEZ COMPANY	STK	01/01/1947	210	20		

DOM -- 72-12-1 DOMESTIC ONE HOUSEHOLD
DEW -- DEWATERING WELL
IRR -- IRRIGATION
MIN -- MINING OR MILLING OR OIL
MON -- MONITORING WELL
MUL -- 72-12-1 MULTIPLE DOMESTIC HOUSEHOLDS
PUB -- 72-12-1 CONSTRUCTION OF PUBLIC WORKS
STK -- 72-12-1 LIVESTOCK WATERING

Site ownership and Potential Responsible Parties:
The original operator, Bailey and Fife, was succeeded by Farris Mines, which operated the mine at the time of the 1963 cave-in (Ref. 2, p. 224); Febco Mines, Inc. operated or controlled the Site throughout some of the period of operation (Ref. 3, p. 3). Ref. 2 (p. 224) reports that Conoco Minerals Division had control of the mining interests by 1980. Surface rights are owned by Margaret Marquez and Theodore and Doris Schmitt (Ref. 5).

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

Site reconnaissance:
The most recent site reconnaissance was conducted by Intera Inc. on March 23, 2010 (Ref. 1, p. 1).

Recommendation:
Potential surface hazards, such as the powder magazine and the shafts, should be assessed and mitigated as soon as possible.

Additional investigation of the Site under CERCLA authority is recommended to assess the areal extent of elevated radioactivity readings noted in the most recent 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.

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 Chill Willis mine in order to access the ore deposits, but the location of the effluent discharge is not known. A linear feature trending from the primary caved-in shaft toward SMC is visible in aerial photograph (Ref. 1, figure 4a), which may mark the former route of a ditch or pipeline, which carried this effluent. This linear feature, as well as the bank of SMC, should be surveyed to attempt to determine where the effluent discharge may have been routed; radiological surveying and sediment sampling to depth also is recommended to determine potential impacts to sediments. 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.

Data from other former “wet” mines suggest that repressurization of the ore-host Morrison Formation, following cessation of pumping for mine dewatering, may be causing mobilization of uranium and associated minerals, and consequent degradation of ground water quality, due to influx of oxygenated ground water. The potential for such impacts, on both regional and site-specific scales, should also be assessed and characterized.

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1. Intera Inc., April 20, 2010. "Abandoned uranium mine assessment for the Chill Willis site (NM0101)." Prepared for the New Mexico Energy, Minerals and Natural Resources Department.
2. Anderson, Orin J., 1980(?). "Abandoned or inactive uranium mines in New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 148.
3. 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.
4. New Mexico Office of the State Engineer. "May_06_wells." Shapefile.
5. New Mexico Energy, Minerals and Natural Resources Department, August 16, 2010. "RE: section 32 mine-MARP Prior Rec files." Emailed edits from Susan Lucas-Kamat (NMEMNRD) to David L. Mayerson (NMED).