EPA-R9-2015-010125 Production VOL002

Uranium Mines and Deposits in the Grants district, Cibola and McKinley Counties, New Mexico

Virginia T. McLemore
and
William L. Chenoweth

New Mexico Bureau of Mines and Mineral Resources
Open-file Report 353

Revised December 1991

ED_000571_00011052-00001

List of Maps

Map 1 – Location of uranium deposit maps of the Grants uranium district, New Mexico.

Map 2 – Uranium ore deposits and mines in the Jackpile-Paguate mine area, Laguna subdistrict, Grants uranium district, Cibola County, New Mexico.

Map 3 – Uranium deposits and mines in the Ambrosia Lake subdistrict Grants uranium district, McKinley and Cibola Counties, New Mexico.

Map 4 – Uranium deposits in the Borrego Pass area, Ambrosia Lake subdistrict, Grants uranium district, McKinley County, New Mexico.

Map 5 – Uranium deposits and mines in the Smith Lake subdistrict, Grants uranium district, McKinley County, New Mexico.

Map 6 – Uranium mines and deposits in the Churchrock subdistrict, Grants uranium district, McKinley County, New Mexico.

Map 7 – Uranium deposits in the Crownpoint area, Grants uranium district, McKinley County, New Mexico.

Map 8 – Uranium deposits in the Nose Rock area, Grants uranium district, McKinley County, New Mexico.

The purpose of this report is to present a series of maps showing the approximate outlines of uranium deposits and areas of significant mineralization. Mines and prospects are also shown on the maps. The data presented here are intended to supplement McLemore and Chenoweth (1989) and to aid exploration and mining companies in locating and developing these deposits. The data may also be useful for administrators in local, state, and federal government agencies who require this information for environmental studies, land-use decisions, and other planning actions. The data will be updated periodically and ultimately published by NMBMMR in the future and any updates and/or corrections will be greatly appreciated.

The approximate outlines of the uranium deposits were obtained from a variety of sources including published and unpublished reports. Most sources are referenced on each of the maps. In addition to published reports, mine and uranium deposit maps and other data were obtained from a number of mining companies and the files of the U.S. Atomic Energy Commission, Grand Junction (Colorado) Office. Several geologists from various companies review portions of the maps, including M. H. Alief (Chevron Resources Co.), J. Greenslade (retired, Phillips Petroleum Co.), D. C. Fitch and J. E. Motica (Hecla Mining Co.), J. H. Jackson (Santa Fe Mining, Inc.), and H. E. Whitacre (Quivira Mining Co., now Rio Algom Mining Corp.). George W. Hazlett (retired, United Nuclear Corp.) and Harlen K. Holen (retired, U.S. Department of Energy) reviewed all of the maps and assisted in plotting the oxidation-reduction interface in the Morrison Formation. Warren I. Finch (U.S. Geological Survey) and William Hatchell (New Mexico Department of Natural Resources) also reviewed all of the maps. However, the authors assume full responsibility for the data presented.

Production data for each mine are presented in Table 1 up through 1970. These data were obtained from the U.S. Atomic Energy Commission files. Production data for each mine from 1971 to 1988 are confidential and summarized in Table 2. Additional production data are presented in McLemore (1983a) and McLemore and Chenoweth (1989). Statistics on reserves are from various cited references, however reserve data are not available for most deposits.

The geologic setting, host rocks, size, geometry, and mineralogy of uranium deposits in the Grants district are summarized elsewhere and not repeated here. The reader is referred to McLemore and Chenoweth (1989), Turner-Peterson and others (1986), Rautman (1980), Hilpert (1969), and Kelley (1963) for more information.

References

Adams, S. S., and Saucier, A. E., 1981, Geology and recognition criteria for uraniferous humate deposits, Grants uranium region, New Mexico—final report: U.S. Department of Energy, Report GJBX-2-81, 226 pp. (Open-file Report)

Anderson, O. J., 1980, Abandoned or inactive uranium mines in New Mexico: New Mexico Bureau of Mines and Mineral Resources, Open-file Report 148, 778 p., photos, maps.

Baird, C. W., Martin, K. W., and Lowry, R. M., 1980, Comparison of braided-stream depositional environment and uranium deposits at Saint Anthony underground mine; in Rautman, C. A. (compiler), Geology and mineral technology of the Grants uranium region 1979: New Mexico Bureau of Mines and Mineral Resources, Memoir 38, p. 292–298.

Beck, R. G., Cherrywell, C. H., Earnest, D. F., and Feirn, W. C., 1980, Jackpile-Paguate deposit—a review; in Rautman, C. A. (compiler), Geology and mineral technology of the Grants uranium region 1979: New Mexico Bureau of Mines and Mineral Resources, Memoir 38, pp. 269–275.

Chapman, Wood, and Griswold, Inc., 1979, Geologic map of Grants uranium region: New Mexico Bureau of Mines and Mineral Resources, Geologic Map 31, scale 1:126,720.

Chenoweth, W. L., 1985, Historical review of uranium production from the Todilto Limestone, Cibola and McKinley Counties, New Mexico: New Mexico Geology, v. 7, no. 4, pp. 80–83.

Chenoweth, W. L., 1989, Geology and production history of uranium deposits in the Dakota Sandstone, McKinley County, New Mexico: New Mexico Geology, v. 11, p 21–29.

Clark, D. S., 1980, Uranium ore rolls in Westwater Canyon Sandstone, San Juan Basin, New Mexico; in Rautman, C. A. (compiler), Geology and mineral technology of the Grants uranium region 1979: New Mexico Bureau of Mines and Mineral Resources, Memoir 38, p. 195–201.

Clary, T. A., Mobley, C. M., and Moulton, G. F., Jr., 1963, Geological setting of an anomalous ore deposit in the Section 30 mine, Ambrosia Lake area; in Kelley, V. C. (compiler), Geology and mineral technology of the Grants uranium region: New Mexico Bureau of Mines and Mineral Resources, Memoir 15, p. 72–79, 6 figs.

Day, H. C., Spirakis, C. S., Zech, R. S., Kirk, A. R., 1983, Distribution of trace elements in drilling chip samples around a roll-type uranium deposit, San Juan Basin, New Mexico: U.S. Geological Survey, Open-file Report 83–56, 26 p., 1 table, 11 figs.

Fishman, N. S., and Reynolds, R. L., 1982, Origin of the Mariano Lake uranium deposit, McKinley County, New Mexico: U.S. Geological Survey, Open-file Report 82–888, 52 pp.

Fishman, N. S., and Reynolds, R. L., 1986, Origin of the Mariano Lake uranium deposit, McKinley County, New Mexico; in Turner-Peterson, C. E., Santos, E. S., and Fishman, N. S. (eds.), A basin analysis case study: The Morrison Formation, Grants uranium region, New Mexico: American Association of Petroleum Geologists, Studies in Geology 22, pp. 211–226.

Hazlett, G. W., and Kreek, J., 1963, Geology and ore deposits of the southeastern part of the Ambrosia Lake area; in Kelley, V. C. (compiler), Geology and mineral technology of the Grants uranium region: New Mexico Bureau of Mines and Mineral

Resources, Memoir 15, pp. 82–89.

Hilpert, L. S., 1969, Uranium resources of northwestern New Mexico: U.S. Geological Survey, Professional Paper 603, 166 pp.

Holen, H. K., and Hatchell, W. O., 1986, Geological characterization of New Mexico uranium deposits for extraction by in situ leach recovery: New Mexico Bureau of Mines and Mineral Resources, Open-file Report 251, 93 pp.

Holmquist, R. J., 1970, The discovery and development of uranium in the Grants mineral belt, New Mexico: U.S. Atomic Energy Commission, Report RME-172, 122 p. (Open-file Report)

Hoppe, R., 1978, The jackpot at Jackpile is still paying off: Engineering and Mining Journal, November, p. 86–90.

Hoskins, W. G., 1963, Geology of the Black Jack No. 2 mine, Smith Lake area; in Kelley, V. C. (compiler), Geology and technology of the Grants uranium region: New Mexico Bureau of Mines and Mineral Resources, Memoir 15, pp. 49–52.

Jacobsen, L. C., 1980, Sedimentary controls on uranium ore at L-Bar deposits, Laguna district, New Mexico; in Rautman, C. A. (compiler), Geology and mineral technology of the Grants uranium region 1979: New Mexico Bureau of Mines and Mineral Resources, Memoir 38, pp. 284–291.

Kelley, V. C. (compiler), 1963, Geology and technology of the Grants uranium region: New Mexico Bureau of Mines and Mineral Resources, Memoir 15, 277 pp.

Kittle, D. F., 1963, Geology of the Jackpile mine area; *in* Kelley, V. C. (compiler), Geology and technology of the Grants uranium region: New Mexico Bureau of Mines

and Mineral Resources, Memoir 15, p. 167-176, 6 figs.

MacRae, M. E., 1963, Geology of the Black Jack No. 1 mine, Smith Lake area; *in* Kelley, V. C. (compiler), Geology and mineral technology of the Grants uranium region: New Mexico Bureau of Mines and Mineral Resources, Memoir 15, pp. 45-48.

McCammon, R. B., Finch, W. I., Kork, J. O., and Bridges, N. J., 1986, Estimation of uranium endowment in the Westwater Canyon Member, Morrison Formation, San Juan Basin, using a data-directed numerical method; *in* Turner-Peterson, C. E., Santos, E. S., and Rishman, N. S. (eds.), A basin analysis case study: The Morrison Formation, Grants uranium region, New Mexico: American Association of Petroleum Geologists, Studies in Geology 22, pp. 331-355.

McLaughlin, E. D., Jr., 1963, Uranium deposits in the Todilto Limestone in the Grants district; *in* Kelley, V. C. (compiler), Geology and technology of the Grants uranium region: New Mexico Bureau of Mines and Mineral Resources, Memoir 15, p. 136-149, 6 figs.

McLemore, V. T., 1983a, Uranium and thorium occurrences in New Mexico—distribution, geology, production, and resources, with selected bibliography: New Mexico Bureau of Mines and Mineral Resources, Open-file Report 183, 1,541 pp.

McLemore, V. T., and Chenoweth, W. L., 1989, Uranium resources in New Mexico: New Mexico Bureau of Mines and Mineral Resources, Resource Map 18.

Moench, R. H., and Schlee, J. S., 1967, Geology and uranium deposits of the Laguna district, New Mexico: U.S. Geological Survey, Professional Paper 519, 117 pp.

Perkins, B. L., 1979, An overview of the New Mexico uranium industry: New Mexico

Energy and Minerals Department, Report, 147 pp.

Peterson, R. J., 1980, Geology of pre-Dakota uranium geochemical cell, sec. 13, T16N, R17W, Church Rock area, McKinley County; *in* Rautman, C. A. (compiler), Geology and mineral technology of the Grants uranium region 1979: New Mexico Bureau of Mines and Mineral Resources, Memoir 38, p. 131-138, 13 figs.

Rautman, C. A. (compiler), 1980, Geology and mineral technology of the Grants uranium region 1979: New Mexico Bureau of Mines and Mineral Resources, Memoir 38, 400 pp.

Sayala, D., and Ward, D. L., 1983, Multidisciplinary studies of a uranium deposit in the San Juan Basin, New Mexico: U.S. Department of Energy, Report GJBX-2(83), 236 p., 10 tables, 71 figs., 7 pls. (Open-file Report)

Schlee, J. S., and Moench, R. H., 1963a, Geologic map of the Moquino quadrangle, New Mexico: U.S. Geological Survey, Geologic Quadrangle Map GQ-209.

Schlee, J. S., and Moench, R. H., 1963b, Geologic map of the Mesita quadrangle, New Mexico: U.S. Geological Survey, Geological Quadrangle Map GQ-210 [abs.]: Am. Geol. Inst. Geosci. Abs., v. 5, no. 5-4209, p. 5.

Squyres, J. B., 1963, Geology and ore deposits of the Ann Lee mine, Ambrosia Lake area; *in* Kelley, V. C. (compiler), Geology and mineral technology of the Grants uranium region: New Mexico Bureau of Mines and Mineral Resources, Memoir 15, p. 90-101, 3 figs., 1 pl.

Thaden, R. E., and Santos, E. S., 1963, Map showing the general structural features of the Grants district and the aerial distribution of the known uranium orebodies in the

Morrison Formation; *in* Kelley, V. C. (compiler), Geology and technology of the Grants uranium region: New Mexico Bureau of Mines and Mineral Resources, Memoir 15, map between p. 20-21, or in pocket in later printings, scale 1:187,500.

Thompson, D. T., 1980, Geophysical experiments at Mariano Lake uranium orebody; *in* Rautman, C. A. (compiler), Geology and mineral technology of the Grants uranium region 1979: New Mexico Bureau of Mines and Mineral Resources, Memoir 38, p. 185-194, 15 figs.

Turner-Peterson, C. E., Santos, E. S., and Fishman, N. S. (eds.), 1986, A basin analysis case study: the Morrison Formation, Grants uranium region, New Mexico: American Association of Petroleum Geologists, Studies in Geology 22, 391 pp.

Vogt, T. C., Dixon, S. A., Strom, E. T., Johnson, W. F., and Venuto, P. B., 1982, In-situ leaching of Crownpoint, New Mexico, ore, pt. VI—the section 9 pilot test: Society of Petroleum Engineers Paper 11047, 19 pp.

Wentworth, D. W., Porter, D. A., and Jensen, H. N., 1980, Geology of Crownpoint Sec. 29 uranium deposit, McKinley County; *in* Rautman, C. A. (compiler), Geology and mineral technology of the Grants uranium region 1979: New Mexico Bureau of Mines and Mineral Resources, Memoir 38, p. 139-144, 7 figs.

Wylie, E. T., 1963, Geology of the Woodrow breccia pipe; *in* Kelley, V. C. (compiler), Geology and technology of the Grants uranium region: New Mexico Bureau of Mines and Mineral Resources, Memoir 15, p. 177-181, 3 figs.

Table 1 - Uranium production 1943–1970 from ore deposits in New Mexico from the U.S. Atomic Energy Commission ore production reports (mill receipts), government contracts only. This includes total ore that was received at the buying stations and mills. Ore grades represent an average of the total shipments V_2O_5 analyses are incomplete; not all of the ore shipments were assayed for V_2O_5. [1]Produced unknown amount of uranium ore after 1970 (see table 2). [2]Some of the ore credited to Barbara J #1 may actually have been produced from Barbara J #3.

Number	Mine Name	Tons Ore	Pounds U_3O_8	%U308	Pounds V_2O_5	%V_2O_5	Type of deposit	Host Rock[4]	Periods of Production/Shipper
				GRANTS URANIUM DISTRICT					
Cibola County (formerly Valencia County)									
12N.9W.4.414	Blackhawk and Bunney (Sec. 4)	13,934	72,996	0.26	4,571	0.09	limestone	Jt	1952 - John Dorsett; 1954-M.W. Larsen; 1956-Cheyenne Contracting; 1958-1960, 1962-Sutton and Sutton; 1960-1962-Astro Enterprises; 1963-Sutton and Moe; 1965-1966-Mesa Mining Co.; 1967-Bailey and Fife
11N.9W.20.414	Cedar (Yucca, Falcon)	3,199	13,631	0.21	6,461	0.10	limestone	Jt	1952 - Maddox and Teague; 1953-Maddox and Teague; 1954-1955-La Jara Mining Co.; 1955-Falcon Uranium and Oil Co.;1955-1956-Yucca Uranium Co; 1956-1957-Florida Minerals; 1957-Utco Uranium Corp.
10N.3W.22.400	Chaves Lease	192	821	0.21	2,165	0.56	sandstone	Jmr	1955 - Calumet and Hecla
12N.9W.4.243	Christmas Day	2,624	9,373	0.18	5,621	0.10	limestone	Jt	1954-1956 - Colamer Corp.
8N.5W.8.113	Crackpot	3,214	8,396	0.13	21,348	0.33	limestone	Jt	1955 - Anaconda
12N.9W.33.444	[1]F-33 (Sec. 33)	48,686	304,871	0.31	31,306	0.12	limestone	Jt	1954-1959 - Anaconda
11N.5W.26,35	[1]Jackpile-Paguate	9,498,698	46,194,350	0.24	5,315,237	–	sandstone	Jmbj	1952-1970 - Anaconda
12N.9W.15.411	La Jara (Zia)	3,574	31,277	0.44	613	0.52	limestone	Jt,Je	1952 - J.M. Keeney; 1954-La Jara Mining Co.; 1956-Florida Minerals; 1957-1958-Zia Mining Co.; 1960-Chena Mining Co.
12N.9W.8.224	Last Chance	2,753	9,334	0.17	12,804	0.26	limestone	Jt	1951 - William Barlow; 1952-F.A. Sutton; 1953-T.H. Skidmore; 1956-F.J. Broaddus
11N.9W.8.214	Lone Pine	392	983	0.13	3,309	0.42	limestone	Jt	1954-1955 - Lone Pine Mining Co.; 1955-Permian Basin Uranium Co.
8N.6W.16.124	Paisano	9	34	0.18	–	–	limestone	Jt	1957 - Good News Mining Ltd.
12N.9W.4	[1]Red Bluff-Gay Eagle						limestone	Jt	1952-1959 - Uranium Development Co.; 1953,1955, 1957,1964-Moise Mirabel; 1953,1955-1957 - W.A. Martin; 1954, 1956 - Amuranium Corp; 1954 - M.L. Larson; 1954 - E and M Mining Co.; 1954 - William and Russell; 1954, 1956 - McElvain Brothers; 1958-1958 - Sutton and Sutton; 1958 - Chena Uranium Co.; 1959-1960 - L.O. Sutton; 1960 - Astro Enterprises; 1962-1953 - Homer Scriven; 1963, 1965-Mesa Mining Co.
12N.9W.4.221	Red Bluff #2,4	2,756	10,157	0.18					
12N.9W.4.214	Red Bluff #3,5,9	457	1,350	0.15					
12N.9W.4.434	Red Bluff #7,8,10;								
	Gay Eagle	41,914	168,560	0.20					
	TOTAL	45,127	180,067	0.20	49,831				
11N.4W.30.243	[1]St. Anthony (M-6, Hanosh)	78,722	320,942	0.20	100		sandstone	Jmbj	1951 - Hanosh Mines; 1957-1960-St. Anthony Uranium Co.; 1960-American Metal-Climax Corp. (now controlled by United Nuclear Corp.)
13N.8W.30.243	[1]San Mateo Mine	837,110	2,847,799	0.17	–		sandstone	Jmp	1959-1962 - Rare Metals Corp. of America; 1962-1967 - El Paso Natural Gas Co.; 1967-1970-United Nuclear Corp.
9N.5W.27.211	Sandy Mine	939	2,221	0.12	2,579	0.14	limestone	Jt,Je	1955 - Anaconda
12N.9W.9.120	Section 9	64,424	189,778	0.15	112,584	–	limestone	Jt	1950 - Fred Glover; 1953-1959-Anaconda; 1960-1962-Farris Mines

Number	Mine Name	Tons Ore	Pounds U_3O_8	%U308	Pounds V_2O_5	%V_2O_5	Type of deposit	Host Rock[4]	Periods of Production/Shipper
12N.9W.11.334	Taffy (Bonanza)	110	362	0.16	–	–	sandstone	Jmp	1961 - Lummus and Muriel
11N.9W.4.411	Tom 13	32	169	0.26	315	0.49	limestone	Jt	1954-1955 - Anaconda
12N.9W.4.442	UDC #5	927	3,091	0.17	1,375	0.07	limestone	Jt	1953-1954 - Uranium Development Co.
11N.5W.35.341	Watter	319	2,643	0.41	2,184	0.34	sandstone	Jmbj	1952-1953 - Anaconda
11N.5W.35.100	Windwhip	2,788	17,325	0.31	9,298	0.17	sandstone	Jmbj	1954 - Anaconda
11N.5W.36.443	Woodrow	5,326	134,014	1.26	4,895	0.05	breccia pipe	Jmj;Jmb	1953-1956 - Anaconda
	McKinley County								
14N.11W.5.313	Alta (Section 6)	3,330	27,212	0.40	13,719	0.35	sandstone	Jmw	1951-1957 - Anaconda; 1960-Farris Mines, Inc.; 1961-L.O. Sutton, Jr.; 1966-Henry Andrews
14N.9W.28.144	[1]Ann Lee (Section 28)	1,116,729	5,032,647	0.20	–	–	sandstone	Jmw	1958-1963 - Phillips; 1963-1970-United Nuclear
13N.9W.30.213	[2]Barbara J #1	8,691	52,631	0.26	14,830	0.11	limestone	Jt	1956-1957, 1960-1962 - Midcontinent Uranium; 1959-1960 - Dalco Uranium, Inc.
13N.9W.30.141	Barbara J #2	46,495	191,199	0.21			limestone	Jt	1957,1960-1964 - Midcontinent Uranium; 1959 - Dalco Uranium, Inc.
	[1]Whitecap	11,953	41,631	0.17					1959-1960 - Dalco Uranium Co.; 1966-1967 - Farris Mines, Inc.; 1967-1968 - Midcontinent Uranium Co.; 1966-1967-Farris Mines
	TOTAL	58,448	232,830	0.20					
13N.9W.30.221	Barbara J #3	102,128	485,719	0.23			limestone	Jt	1959-1963 - Midcontinent Uranium Co.
13N.9W.18.441	Beacon Hill-Gossett (Section 18)	39,354	166,065	0.21	22,671		sandstone	Jmp	1956 - Holly Mining Co.; 1957-Lea Exploration Co; 1958-1959-E.P. Moe; 1960-1961-KSN Co., Inc.; 1962-1963,1966-1967-Farris Mines
15N.17W.28.132	Becenti (NW1/4 Section 28, Eunice Becenti allotment)	846	3,350	0.20	2,266	0.14	sandstone	Kd	1952-1954 - Tucker, Hyde, Davenport 1953 - Hagens, Fitzhugh, Davenport 1956,1958-1959 - A.W. Tucker
15N.17W.28.344	Becenti (SW1/4 Section 28, Naomi Becenti allotment) mined through Diamond #2	8,536	42,499	0.25	20,847	0.13	sandstone	Kd	1958-1959 - Largo Uranium Co. 1964-1966 - A and 8 Mining Co. 1968-1969 - Shiprock Ltd.
14N.11W.19.220	[1]Billy the Kid (Section 19)	872	2,693	0.15	4,276		limestone	Jt	1952 - Warren McCormick; 1952-W.A. Greer; 1953-Maddox-Teague; 1954-Continental Divide; 1958-H.E. Andrews; 1960-Don W. Wright
15N.13W.12.322	[1]Black Jack #1	1,439,432	6,440,419	0.22			sandstone	Jmw	1959-1961 - Lance Corp.; 1960-1961-Homestake Mining Co; 1961-Sabre-Pinon Corp.; 1962-1968-Homestake-Sapin Partners; 1969-1970-United Nuclear-Homestake Partners
15N.13W.18.223	[1]Black Jack #2	247,613	1,129,004	0.23	–	–	sandstone	Jmb	1959-1961 - Lance Corp.; 1961-Sabre Pinon Corp.; 1962-1967-Homestake-Sapin Partners; 1968-1970-United Nuclear-Homestake Partners
13N.10W.24.234	Blue Peak	12,051	44,020	0.19	18,707	–	sandstone	Jmp	1951-1952-Blue Peak Mining; 1953-Shattuck Denn; 1955-Saint Michaels Foundation; 1956-Colohoma Uranium, Inc.; 1957-1958-Three Jacks Mining; 1954-1960-Farris Mining Co.; 1960-1961-Lloyd O. Sutton; 1964-Lee Garcia
13N.10W.24.144	Bob Cat	117	186	0.06	71	0.12	sandstone	Jmp	1956-Brown and Wallace

Number	Mine Name	Tons Ore	Pounds U_3O_8	%U308	Pounds V_2O_5	$\%V_2O_5$	Type of deposit	Host Rock[4]	Periods of Production/Shipper
14N.10W.14.414	[1]Buckey (Jeep)	161,635	770,893	0.24	241	–	sandstone	Jmw	1957-1958-Holly Minerals; 1958-1965-See Tee Mining Co.
16N.17W.35.411	C D and S	16	48	0.15	–	–	sandstone	Jmw	1957-C D and S Mining Co.
13N.9W.33.433	Charlotte (Section 33)	208	704	0.17	–	–	limestone	Jt	1958-Westvaco Minerals
16N.16W.17.212	[1]Church Rock (Section 17)	77,965	302,608	0.19	–	–	sandstone	Jmw,Jmb, Kd	1960-1961-Phillips Petroleum Co.; 1961-1962-Quinta Corporation (now owned by United Nuclear Corp.)
14N.9W.35.332	[1]Cliffside - Section 36	7,074	6,046,780	0.41	–	–	sandstone	Jmw	1960-1963-Phillips Petroleum Co.; 1963-1968-United Nuclear; 1970-Kerr McGee
13N.9W.20.312	Davenport Incline	7,517	28,539	0.19	–	–	sandstone	Jmp	1957-1958-E.P. Moe; 1959-Black Rock Mining; 1961-See Tee Mining Co.; 1966-Bailey and Fife
15N.17W.33.214	Diamond #2 (Largo #2, Mike Smith Lease)	47,181	202,440	0.21	65,450	–	sandstone	Kd	1952-Albert Smith; 1953-Adee Dodge Enterprises; 1953-1954-General Uranium Co.; 1954-1959-Largo Uranium Co.; 1964-1957- A and B Mining Co.; 1970-Shiprock Ltd.
13N.9W.20.411	[1]Dog, Flea, and BG Group	244,177	906,235	0.19	–	–	sandstone	Jmp	1957-1970-Four Corners Exploration
13N.9W.21.324	[1]Doris-Section 21	31,950	118,052	0.18	–	–	sandstone	Jmp	1958-1959-Westvaco Minerals; 1959-1961-Phillips Petroleum Co.; 1961-KSN Co.
14N.10W.11.312	Dysart #1 (Section 11)	891,922	3,795,495	0.21	47,438	–	sandstone	Jmw	1956-1960-Rio de Oro; 1959-1960-Midcontinent Exploration Co.; 1961-1962-Homestake-Sapin
14N.10W.11.424	Dysart #2	237,602	894,642	0.18	–	–	sandstone	Jmw	1959-1961-Rio de Oro; 1959-Midcontinent Exploration Co.; 1961-1962-Homestake-Sapin
13N.9W.20.233	East Malpais Lease	30,333	139,818	0.23	–	–	sandstone	Jmp	1959-1960-Four Corners Exploration Co.
14N.12W.24.243	Elkins Group	59	151	0.13	231	0.20	limestone	Jt	1953-1954-Josephine Elkins
14N.11W.9.214	[1]Evelyn	10,743	49,584	0.23	23,539	0.48	sandstone	Jmb	1953-1956 - Anaconda Co.; 1966-1968-Farris Mines, Inc.; 1969-1970-Smith Development; 1970-Minerals Energy
13N.9W.29.141	Faith-Section 29	66,327	258,615	0.19	–	–	limestone	Jt	1958-1959 - Westvaco Minerals; 1960-Phillips Petroleum Co.; 1960–1964-KSN Co.; 1963-United Nuclear
13N.9W.30.442	Flat Top	49,663	216,486	0.22	66,126	0.11	limestone	Jt	1955-1957 - Holly Uranium Co.; 1957-1959-Flat Top Mining Co.; 1963-1966-Bailey and Fife
15N.16W.4.111	Foutz #1	324	1,844	0.28	2,676	0.41	sandstone	Jmw	1953-1954-Foutz Mining Co.; 1953-Hanosh Mines, Inc.
15N.16W.31.444	Foutz #2	242	1,045	0.22	2,877	0.59	sandstone	Jmw	1953-1954 - Foutz Mining Co.
16N.16W.31.444	Foutz #3 (Yellow Jacket)	2,412	8,556	0.18	12,466	0.26	sandstone	Jmb	1953-1955 - Foutz Mining Co.
14N.11W.8.213	Francis	755	6,164	0.41	12,578	0.93	sandstone	Jmb	1953-1954 - Farris Mines, Inc.
	[1]Haystack								Haystack Mountain Development Corp.
13N.11W.13.312	SW1/4 sec. 13	1,162	2,830	0.12	–	–	limestone	Jt	1958,1961-Haystack Development Corp.
13N.11W.13.444	Sec. 13	3,736	16,701	0.22	–		limestone	Jt	1956,1958-1961-Art Bibo (mined in trespass)
13N.10W.19.110	Sec. 19 (Haystack No. 1)	137,310	562,267	0.20	165,454		limestone	Jt	1951-A.T.S.F.RR; 1952-1957,1959-1961, 1963-1965-Haystack Mountain Development Corp.
	TOTAL	142,208	581,798	0.20	165,494				
13N.9W.14.414	Hogan Mine (Section 14)	129,551	678,510	0.26	–	–	sandstone	Jmp	1959-1961 - Four Corners Exploration Co.; 1962-Homestake-Sapin

Number	Mine Name	Tons Ore	Pounds U_3O_8	%U308	Pounds V_2O_5	%V_2O_5	Type of deposit	Host Rock[4]	Periods of Production/Shipper
15N.18W.12.244	Hogback #3-5	6,354	24,234	0.19	2,954	0.03	carbonaceous shale	Kd	1952-1954 - Tucker, Hyde, Davenport; 1955-1956-Hyde Uranium Co.; 1957-1958-Calumet and Hecla; 1958-Mathis and Mathis; 1959-See Tee Mining Co.; 1960-Windsor Mining Co.
13N.9W.7.221	[1]Isbella (Section 7)	76,748	237,060	0.15		–	sandstone	Jmp	1959-1961-Phillips Petroleum Co.; 1961-1962-KSN Mining Co.
14N.11W.35.120	Lost Mine	10	4	0.02	4	0.02	sandstone	Jmb	1954-Berryhill and Elkins
15N.14W.12.423	[1]Mac #1	60,109	289,125	0.24		–	sandstone	Jmb	1968-Homestake-Sapin; 1968-1970-United Nuclear-Homestake
15N.13W.18.442	Mac #2	31,194	109,009	0.14			sandstone	Jmb	1968-Homestake-Sapin; 1968-1970-United Nuclear-Homestake
13N.9W.20.144	Malpais Raise	42,070	198,492	0.24			sandstone	Jmp	1958-Holly Minerals; 1958-1961-See Tee Mining Group
13N.9W.23.233	Marquez Mine	712,911	3,724,047	0.26			sandstone	Jmp	1958-1964-Calumet and Hecla; 1965-1966-United Nuclear Corp.
14N.10W.11.112	Mary #1 (Dysart #3)	357,262	794,063	0.11			sandstone	Jmw	1959-1962-Boyles Brothers; 1962-Entrada Corp.; 1964-Stella Dysart; 1964-1965-Homestake-Sapin
13N.9W.20.321	Mesa Top Mine	108,261	512,965	0.24	144,610		sandstone	Jmp	1954-1957-Lea Exploration Co.; 1957-1958-Holly Minerals
13N.10W.4.244	Pat - Junior - Section 4 (Dakota Mine)	5,069	12,645	0.12	2,478		sandstone	Jmw,Kd	1952-1959-Dakota Mining Co.; 1962-1963-Farris Mines, Inc.
13N.9W.19.420	[1]Poison Canyon	217,066	1,004,574	0.23	338,094		sandstone	Jmp	1952-1959-Haystack Mountain Development Corp.; 1960-1962-Farris Mines Inc.
14N.11W.28.113	Red Cap Group (T Group)	195	497	0.13	951	0.24	limestone	Jt	1952-1953-Navajo Development Co.; 1953-Fitzhugh & Doerrie
13N.10W.16.134	Red Point Lode	482	1,223	0.13	746	0.07	limestone	Jt	1952-1955-R.M. Shaw
14N.11W.20.144	Red Top Mines	165	390	0.12	1,287	0.39	limestone	Jt	1955-Red Top Uranium Mining Co.
14N.9W.34.424	[1]Sandstone	1,034,255	3,540,829	0.17	–	–	sandstone	Jmw	1959-1963-Phillips Petroleum Co.; 1963-1970-United Nuclear Corp.
13N.9W.1.200	[1]Section 1 (13N-9W) mined through Cliffside	148,066	1,699,137	0.57	–		sandstone	Jmw	1967,1969-1970-Kerr McGee; 1969-1970-National Lead Co.
15N.16W.3.332	Section 3 (15N-16W) Santa Fe-Christensen (Rats Nest Mine)	324	1,836	0.28	404		carbonaceous sandstone (coal)	Kd	1957-George Christensen; 1957-1958-Rem Uranium Co.
13N.10W.5.144	Section 5 (13N-10W)	23	54	0.12	–		sandstone	Kd	1958-Westvaco
13N.9W.8.114	Section 8 (13N-9W) (Spencer Shaft)	47,808	165,319	0.17			sandstone	Jmp	1958-1960-United Western; 1961-Hyde and Casper; 1964-1966-W.D. Tripp; 1966-1967-James J. Goode
14N.10W.10.244	[1]Section 10 (14N-10W)	130,767	510,935	0.20			sandstone	Jmw	1957-1962-Kermac Nuclear; 1964-Homestake-Sapin
14N.10W.12.411	[1]Section 12 (14N-10)	74,975	211,873	0.14			sandstone	Jmw	1961-Anderson Development Corp.; 1962-1963-Stella Dysart
13N.9W.13.334	Section 13 (13N-9W) SW1/4 (mined through Rialto shaft)	1,689	6,312	0.19			sandstone	Jmp	1962-1963-Febco Mines, Inc.
14N.10W.15.441	[1]Section 15 (14N-10W)	1,213,814	3,625,924	0.15			sandstone	Jmw	1958-1968-Homestake-Sapin; 1961-1965-Rio de Oro; 1968-1970-United Nuclear-Homestake
14N.9W.17.323	[1]Section 17 (14N-9W)	544,164	2,315,182	0.21			sandstone	Jmw	1960-1964-Kermac Nuclear; 1965-1970-Kerr McGee

Number	Mine Name	Tons Ore	Pounds U_3O_8	%U308	Pounds V_2O_5	$\%V_2O_5$	Type of deposit	Host Rock[4]	Periods of Production/Shipper
13N.10W.18.341	Section 18 (13N-10W) (Indian Allotment)	25,796	98,175	0.19	75,342	0.30	limestone	Jt	1952-F.A. Sitton; 1952-Thompson and Williams; 1952-1953-Glen Williams; 1955-1956-Santa Fe Uranium Co.; 1956-1959-Federal Uranium Corp.; 1963-1964-Mesa Mining Co.; 1966-Cibola Mining Co.
14N.9W.18.400	[1]Section 18 (14N-9W) mined through Sec. 17	501,946	1,586,447	0.16			sandstone	Jmw	1962-1964-Kermac Nuclear; 1965-1970-Kerr McGee
14N.9W.20.114	[1]Section 20 (14N.9W) mined through Sec. 17	486,375	2,223,977	0.23			sandstone	Jmw	1962-Kermac Nuclear
14N.10W.22.223	[1]Section 22 (14N-10W) heap leach	2,189,051 —	11,605,672 38,105	0.18 –			sandstone	Jmw	1958-1964-Kermac Nuclear; 1965-1970-Kerr McGee
14N.10W.23.134	[1]Section 23 (14N-10W)	2,528,797	9,679,773	0.19	–	–	sandstone	Jmw	1959-1968-Homestake-Sapin; 1969-1970-Homestake-United Nuclear
13N.10W.23.444	Section 23 (13N-1OW)	21,826	138,541	0.32	10,256	0.06	limestone	Jt	1957-1965-Haystack Mountain Development Corp.; 1965-1966-Santa Fe Pacific
13N.9W.24.121	Section 24 (13N-9W) Chill Wills, Rialto	9,261	31,381	0.17	–	–	sandstone	Jmp	1960-1963-Febco Mines, Inc.
13N.9W.24.300	Section 24 (13N-9W) (Sl/2, East Marquez) mined through Marquez decline	10,120	33,800	0.17			sandstone	Jmp	1960-1962-Calumet and Hecla
13N.11W.24.222	Section 24 (13N-11W) (Nana-A-Bah Vandever Allotment)	24,638	115,075	0.22	85,545	0.18	limestone	Jt	1952-1954-Glen Williams; 1955-1956-Santa Fe Uranium Co.; 1956-1957-Federal Uranium Corp.
14N.10W.24.332	[1]Section 24 (14N-10W)	1,904,582	7,071,564	0.19			sandstone	Jmw	1959-1964-Kerr-McGee Nuclear; 1965-1970-Kerr McGee
	Heap leach	—	579	–					
13N.10W.25.411	[1]Section 25 (13N-10W)	235,156	958,058	0.20	153,657	0.12	limestone	Jt	1951-AT and SFRR; 1955-1961-Haystack Mountain Development Corp.; 1962-1965-Santa Fe Pacific; 1963, 1965-1966-Farris Mines, Inc.; 1968-Homestake Mining Co.; 1969-1970-United Nuclear Corp.
14N.10W.25.144	[1]Section 25 (14N-10W)	1,791,048	6,444,889	0.18	–	–	sandstone	Jmw	1959-1969-Homestake-Sapin; 1969-1970-Homestake-United Nuclear
13N.10W.26.221	[1]Section 26 (13N-IOW) (Desidero Allotment)	11,110	83,752	0.38	17,518	0.08	limestone	Jt	1952-1957-Hanosh Hines
14N.10W.26.220	[1]Section 26 (14N-10W) mined through Section 24	362,110	1,198,696	0.17	–	–	sandstone	Jmw	1965-1970-Kerr-McGee
14N.9W.27.324	[1]Section 27 (14N-9W) mined through	553,732	2,442,855	0.22			sandstone	Jmw	1967-1970-United Nuclear
14N.9W.27.310	Ann Lee	285,057	1,275,695	0.22				Jmw	
	section total	838,789	3,718,550	0.22					
14N.9W.28.333	Section 28 mined through Sec. 30	23,648	94,333	0.20			sandstone	Jmw	1958-United Western
14N.9W.29.300	Section 29 (14N-9W) mined through Sec. 32 shaft	390,511	1,999,236	0.26			sandstone	Jmw	1961-1964-Kermac Nuclear; 1965-1970-Kerr McGee

Number	Mine Name	Tons Ore	Pounds U_3O_8	%U308	Pounds V_2O_5	%V_2O_5	Type of deposit	Host Rock[4]	Periods of Production/Shipper
14N.9W.29.100	Section 29 mined through Sec. 30 shaft	318,361	1,401,003	0.22			sandstone	Jmw	1960-1970-Kerr-McGee
14N.9W.29.400	Section 29 mined through Sec. 33	641,918	1,936,819	0.15			sandstone	Jmw	1963-Kerr-McGee
13N.9W.30.333	Section 30 (13N-9W) Roundy Lease, Rimrock #3	91,513	464,810	0.25	76,565		limestone	Jt	1952-1956-F.O. Manot; 1956-1966-Rimrock Mining Co.; 1970-Bailey and Fife
14N.9W.30.232	[1]Section 30 (14N-9W)	2,855,164	15,064,056	0.26	–		sandstone	Jmw	1959-1964-Kermac Nuclear; 1965-1970-Kerr McGee
14N.9W.30.141	[1,3]Section 3OW (14N-9W)	68,895	282,714	0.21			sandstone	Jmw	1970-Kerr-McGee
14N.9W.31.200	Section 31 (14N-9W) mined through Sec. 32	3,469	17,999	0.26	–		sandstone	Jmw	1970-Kerr-McGee
13N.9W.31.120	Section 31 (13N-9W)	15,736	77,121	0.25	21,628	0.27	limestone	Jt	1953-1954, 1958, 1961-Haystack Mountain Development Corp.; 1962-Santa Fe Pacific
13N.9W.32.144	Section 32 (13N-9W) Moe #4	2,407	9,746	0.25	21,628	0.27	limestone	Jt	1963-Sutton and Moe
14N.9W.32.122	Section 32 (14N-9W)	488,031	1,927,388	0.20	–	–	sandstone	Jmw	1958-1961-Homestake-New Mexico; 1961-1968-Homestake-Sapin; 1968-1970-United Nuclear-Homestake
13N.9W.32.144	Section 32 (15N-11W) (NEl/4, D. Begay allotment) mined through Moe #5 decline	20,117	89,091	0.22			sandstone	Jmb	1960-1963-Kermac Nuclear; 1964-1968-E.P. Moe; 1968-1969-DeVilliers Nuclear
15N.11W.33.242	Section 33 (15N-11W) Moe #5, West Ranch Mine	4,243	21,149	0.25			sandstone	Jmb	1960,1962-1963-Kermac Nuclear 1964-E.P. Moe
14N.9W.33.213	[1]Section 33 (14N-9W) Branson heap leach	960,007	3,222,939 26,149	0.16	–		sandstone	Jmw	1959-1961-Ambrosia Lake Uranium Co.; 1959-1963-Phillips Petroleum Co.; 1962-1964-Kermac Nuclear; 1964-1965-United Nuclear Corp.; 1965-1970; Kerr McGee
	NOTE: Ambrosia Lake Uranium Co. consisted of Kerr-McGee, Anderson Development Co., Pacific Uranium Co., Phillips Petroleum Co., and Branson Estate								
13N.10W.36.224	Section 36 (13N-10W) Rimrock	1,435	3,770	0.13	2,698	0.19	limestone	Jt	1952-1953-Moses Mirabel; 1954-1955-Skult-Munson; 1958-Chena Mining Co.; 1962-Homer Scriven
14N.10W.36.222	Section 36 (14N-10W) Lease 60-167	5,249	53,349	0.51	45,950	0.43	sandstone	Jmb	1957-1958-V.C.A.; 1959-United Western
14N.12W.10.243	Silver Bit 1-18	293	3181	0.54	3,340	0.57	sandstone	Jmw,Jmb	1955-1956-G.W. Fields; 1957-Monitor Exploration; 1957-United Western Mining
14N.10W.31.334	Silver Spur Group	5,938	29,454	0.25	19,202	0.25	sandstone	Kd	1952-Chas Davis; 1952-1953-Silver Spur Mining Co.; 1955-Holly Uranium Co.; 1956-Holly Minerals; 1957-1959-Febco Mines; 1958-Holly Corp.; 1966-Farris Mines
15N.16W.4.414	U Mine Christensen 1-20	2,560	8,460	0.17	4,075	0.09	carbonaceous sandstone	Kd	1953-1954-Williams and Reynolds; 1955-Frontier Uranium; 1957-George Christensen; 1957-Rem Uranium Co.;1958-W.C.T. Engineering Co

Number	Mine Name	Tons Ore	Pounds U_3O_8	%U308	Pounds V_2O_5	$\%V_2O_5$	Type of deposit	Host Rock[4]	Periods of Production/Shipper
13N.9W.34.343	Vallejo Mine	6,458	21,733	0.17	394	--	limestone	Jt	1957-1959-Vallejo Uranium Mines; 1959-1960-Samson Oil and Minerals; 1962-1963-Penta Mining Co.
15N.16W.2.442	Westwater #1	4,713	26,571	0.28	27,134	0.40	sandstone	Jmw	1957-1960-Westwater Uranium Corp.
	[1]Mine Water Recovery	--	893,787	--	--	--		Jmw	1963-1970-Kerr McGee, HomestakeSapin Partners, United Nuclear

NOTE: In November 1961, Homestake-Sapin Partners acquired Homestake-New Mexico Partners. In April 1962, United Nuclear Corp. merged with the Sabre-Pinon Corp. and United Nuclear became the surviving corporation and became United Nuclear Corp. In February 1963, United Nuclear Corp. acquired the uranium mines and mill of the Phillips Petroleum Co. In 1965, Kermac Nuclear Fuels Corp. was dissolved. The operating company became Kerr-McGee Oil Industries, Inc. Later it was the Kerr-McGee Corp. and the Kerr-McGee Nuclear Corp. In April 1968, Homestake-Sapin Partners became United Nuclear-Homestake Partners. See Chenoweth (1989) for a listing of Ambrosia Lake operations.

Table 2—Uranium mines in New Mexico that have produced from 1971 to 1991.

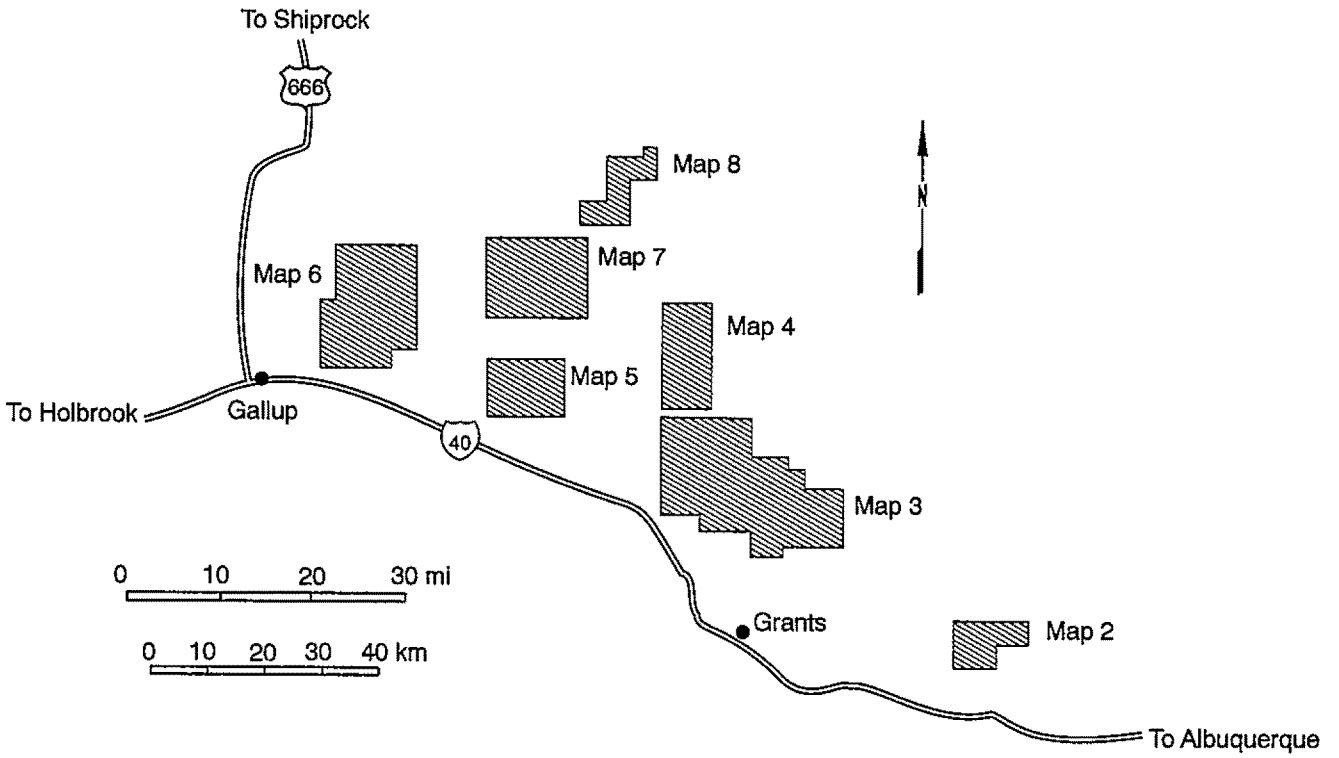
Occurrence number	Mine name	Production[1] class	Host[2] rock	Periods of production/Shipper
		GRANTS URANIUM DISTRICT		
Cibola County (formerly Valencia County)				
12N.9W.33.444	[3]F-33 (Section 33)	c	Jt	1971–1977 - Homestake
11N.5W.26,33	[3]Jackpile-Paguate	e	Jmj	1971–1982 - Anaconda
11N.5W.13.300	JJ #1	d	Jmj	1976–1981 - Sohio-Reserve
13N.8W.24.433	Mt. Taylor	d	Jmw	1980–1983 - Gulf, 1985–1990 - Chevron
12N.9W.4	[3]Red Bluff-Gay Eagle	b	Jt	1976 - Moises-Mirabel
11N.4W.19.300, 11N.4W.30.240, 11N.5W.24.411	[3]St. Anthony	b	Jmj	1976–1980 - United Nuclear
13N.8W.30.243	[3]San Mateo Mine	d	Jmp	1971 - United Nuclear
McKinley County				
14N.9W.28.144	[3]Ann Lee (Spider Rock)	d	Jmw	1971–1972, 1982 - United Nuclear; 1977–1982 - Spider Rock
13N.9W.30.221	[3]Barbara J #3 (White Cap)	c	Jt	1979–1980 - Todilto Exp. Dev. Co.
14N.11W.19.220	[3]Billy the Kid	a	Jt	1976 - Henry Andrews
15N.13W.12.322	[3]Black Jack #1	d	Jmw	1971 - United Nuclear-Homestake
14N.10W.14.414	[3]Buckey	c	Jmw	1972 - Hydro-Nuclear; 1978–1980, 1982 - Cobb
16N.16W.17.212	[3]Church Rock (Sec. 8, 17)	c	Jmw, Jmb, Kd	1976–1977, 1979–1982 - United Nuclear
14N.9W.36.332	[3]Cliffside-Section 36	d	Jmw	1971–1985 - Kerr McGee
13N.9W.20.411	[3]Dog, Flea, and BG Group	c	Jmp	1971–1975 - Four Corners Exp.; 1978–1980 - M&M Mining
13N.9W.21.324	[3]Doris-Section 21	b	Jmp	1978–1979 - Ranchers
14N.11W.9.214	[3]Evelyn	b	Jmb	1971 - Smith Dev.; 1971–1972 - Stevenson; 1972 - Oral Creek
13N.11W.13.314	[3]Haystack-Section 13	c	Jt	1975–1981 - Todilto Exp. and Dev.
13N.10W.19.110	Section 18 and 19	c		
13N.9W.19.323	Hope (Section 19)	b	Jt	1977–1981 - Ranchers
13N.9W.7.221	[3]Isabella	c	Jmp	1978–1980 - Koppin; 1980–United Nuclear
13N.8W.7,18	Johnny M (Sections 7, 18)	d	Jmw	1976–1982 - Ranchers

Occurrence number	Mine name	Production[1] class	Host[2] rock	Periods of production/Shipper
15N.14W.12.423	[3]Mac #1	c	Jmb	1976–1978, 1980 - United Nuclear-Homestake
15N.14W.12.134	Mariano Lake (Section 12)	d	Jmb	1977–1982 - Gulf
17N.16W.35.200	N.E. Church Rock (2 shafts)	d	Jmw	1972–1982 - United Nuclear
17N.16W.35.200	N.E. Church Rock #1	d	Jmw	1976–1985 - Kerr McGee
17N.16W.36.100	N.E. Church Rock #1-E	d	Jmw	1979–1985 - Kerr McGee
17N.16W.27.200	N.E. Church Rock #2	d	Jmw	1978–1982 - Kerr McGee
13N.9W.30.143	Piedra Trieste (Section 30)	a	Jt	1979–1981 - Todilto Exp. & Dev.
13N.9W.19.420	[3]Poiston Canyon	c	Jmp	1976–1978 - Reserve
15N.13W.21.142	Ruby #1 } mined through	d	Jmb	1976–1979 - Western Nuclear
15N.13W.25.224	Ruby #3 and #4 } same decline			1980–1982 - Western Nuclear
15N.13W.25.224	Ruby #3 and #4	d	Jmb	1980–1982, 1984–1985 - Western Nuclear
14N.9W.34.424	[3]Sandstone	d	Jmw	1974–1980 - United Nuclear
13N.9W.1.200	[3,4]Section 1 (13N–9W) mined through Cliffside	d	Jmw	1971–1982 - Kerr McGee
14N.10W.10.244	[3]Section 10 (14N–10W)	c	Jmw	1980 - Cobb
14N.10W.12.411	[3]Section 12 (14N–10W)	c	Jmw	1978–1982 - Cobb; 1980 - United Nuclear
14N.10W.13.413	Section 13 (14N–10W)	c	Jmw	1977–1981 - United Nuclear-Homestake; 1981 - Homestake
14N.10W.15.441	[3]Section 15 (14N–10W)	d	Jmw	1971–1981 - United Nuclear-Homestake; 1981 - Homestake
13N.9W.16.441	Section 16 (13N–9W) mined through Dog-Flea mines	b	Jmp	1973 - United Nuclear-Homestake
14N.9W.17.323	[3]Section 17 (14N–9W)	d	Jmw	1971–1985 - Kerr McGee
14N.9W.18.420	[3,4]Section 18 (14N–9W) mined through Section 17	d	Jmw	1971–1982 - Kerr McGee
14N.9W.19.411	Section 19 (14N-9W)	d	Jmw	1978–1985 - Kerr McGee
14N.9W.20.114	[3,4]Section 20 (14N–9W) mined through Section 17	d	Jmw	1971–1979 - Kerr McGee
14N.10W.22.223	[3]Section 22 (14N–10W)	d	Jmw	1971–1985 - Kerr McGee
14N.10W.23.134	[3]Section 23 (14N–10W)	d	Jmw	1971–1982 - United Nuclear-Homestake; 1981–1989 - Homestake
16N.17W.23.221	Section 23 (16N–17W)	a	Jmw	1975 - Grace Nuclear (in situ production)
14N.10W.24.332	[3]Section 24 (14N–10W)	d	Jmw	1971–1985 - Kerr McGee

Occurrence number	Mine name	Production[1] class	Host[2] rock	Periods of production/Shipper
13N.10W.25.411	[3]Section 25 (13N–10W)	c	Jt	1971, 1979 - United Nuclear; 1972–1973 - United Nuclear-Homestake; 1972–1973 - Bailey and Fife; 1980–1981 - Reserve
13N.9W.8.114	Section 8 (Spencer Shaft)	c	Jmp	1978–1979 - Koppin
14N.10W.25.144	[3]Section 25 (14N–10W)	d	Jmw	1971–1981 - United Nuclear-Homestake; 1981–1985 - Homestake
14N.9W.26	Section 26 (14N–9W) mined through Section 35 and sandstone	c	Jmw	1971–1972, 1977–1982 - Kerr McGee
14N.9W.26.430	[4]Section 26 (14N–10W)	c	Jmw	1971–1982 - Kerr McGee
14N.9W.27.310,324	[4]Section 27 E and W	d	Jmw	1971–1979 - United Nuclear
14N.9W.29	[3,4]Section 29 (14N–9W) mined through Sections 32 and 30	d	Jmw	1971–1982 - Kerr McGee
14N.9W.30.232	[3]Section 30 (14N–9W)	d,e	Jmw	1971–1985 - Kerr McGee
14N.9W.30.141	[3]Section 30W (14N–9W)	d,e	Jmw	1971–1985 - Kerr McGee
13N.9W.30.333	[3]Section 30 (13N–9W)	c	Jt	1971 - Bailey and Fife
14N.9W.31.200	[1,3]Section 31 (14N–9W)	c	Jmw	1971–1972, 1980–1981 - Kerr McGee
14N.9W.32.122	[3]Section 32 (14N–9W)	d	Jmw	1971–1981 - United Nuclear-Homestake; 1981–1982 - Homestake
14N.11W.32.224	[3]Section 32–33 (West Ranch)	c	Jmw	1972 - Hydro Nuclear; 1978 - Cobb
14N.9W.33.213	[3]Section 33 (14N–9W)	d	Jmw	1971–1985 - Kerr McGee
14N.9W.35.233	Section 35 (14N–9W) (Elizabeth Shaft)	d	Jmw	1971–1985 - Kerr McGee
<u>Sandoval County</u>				
12N.3W.18.141	Rio Puerco	a	Jmw	1979–1980 - Kerr McGee
<u>Insitu Leaching Pilot Plant</u>				
17N.13W.9.322, 17N.13W.16	Crownpoint	a	Jmw	1981–1987 - Mobil (Nufuels)

[1]Production Class: a - 0–20,000 lbs U_3O_8; b - 20,000–100,000 lbs U_3O_8; c - 200,000–2 million lbs U_3O_8; d - 2 million-20 million lbs U_3O_8; e - greater than 20 million lbs U_3O_8 (total production to date).
[2]Host rock: Jt - Todilto Limestone; Jmr - Recapture Member; Jmw - Westwater Canyon Member; Jmb - Brushy Basin Member; Jmp - Poison Canyon Sandstone; Jmj - Jackpile Sandstone; Jmj - Jackpile Sandstone; Kd - Dakota Formation.
[3]Produced prior to 1970, included Table 1. Production classification based on total production.
[4]Properties mined through adjacent shafts.

NOTE: In 1981, the United Nuclear-Homestake Partnership was dissolved. Homestake Mining Co. became the sole operator of the mill and the Sections 13, 15, 23, 25, and 32 mines. (All but Section 23 closed in 1981–1982, but Homestake continued to recover uranium from ine water until June 1990.) In 1983, Kerr McGee reorganized the uranium operations in New Mexico into the Quivira Mining Co. Quivira closed its mines in March 1985 but continued to recover uranium from mine water. In 1988, Kerr McGee sold the Quivira Mining Co. to Rio Algom Ltd. Rio Algom Mining Corp. (U.S. subsidiary) continues to recover uranium from mine water.



MAP 1 - LOCATION OF URANIUM ORE DEPOSIT MAPS OF THE GRANTS URANIUM DISTRICT, NEW MEXICO.

Brushy Basin-Poison Canyon Ore. NOTE: McCammon et al. (1986) consider the Poison Canyon sandstone (of economic usage) to be part of the Westwater Canyon Member, not the Brushy Basin Member.

Property	Location	Estimated depth (ft)	Host	Dominant type of deposit	Estimated size	References
*Bobcat-Blue Peak	24 T13N R10W	surface	Jmb	primary	44,206 lbs U_3O_8 produced	---
*Poison Canyon-Beacon Hill-Davenport-Dog-Flea	19,20,21 T13N R10W	surface-300	Jmb	primary	over 1.3 mill lbs U_3O_8 produced	Hilpert (1969), Rapaport (1963), Tessendorf (1980)
*Marquez	23 T13N R9W	1800-1875	Jmb	primary	3,757,847 lbs U_3O_8 produced	Weege (1963), Rapaport (1963)
*Hogan	14 T13N R9W	300-340	Jmb	primary	678,510 lbs U_3O_8 produced	Rapaport (1963)
Sec. 13	13 T13N R9W	---	Jmb	primary	---	---
*Sec. 24	24 T13N R9W	400-500	Jmb	primary	37,693 lbs U_3O_8 produced	---
*San Mateo	30 T13N R9W	---	Jmb	primary	over 2.8 mill lbs U_3O_8 produced	Rapaport (1963)
Sec. 29,32	29,32 T13N R9W	---	Jmb	primary	---	---
Sec. 19	19 T13N R9W	500	Jmb	primary	---	---
Pat (Dakota)	4 T13N R10W	surface	Kd,Jm	---	12,645 lbs produced	---
+La Jara Mesa	1,12 T12N R9W	---	Jmb	primary	2.5 mill lbs U_3O_8 reserves at 0.2-0.3%	NMBMMR files, Homestake Mining Co. files
Sec. 1	1 T14N R11W	600-700	Jmb	---	---	Pathfinder files, 1981
Sec. 5,7,8	5,7,8, T14N R10W	1160-1200	Jmb	primary	over 1 mill lbs reserves delineated	Pathfinder files, 1981
Sec. 17,18	17,18 T14N R10W	800-1000, 1400	Jmb	primary	over 100,000 lbs reserves delineated	Pathfinder files, 1981

* Produced, mineralization may still be present.
\+ Mine plan under consideration.

Ambrosia subdistrict-Dakota orebodies (redistributed ore). Production data from McLemore (1983a).

Property	Location	Estimated depth (ft)	Production lbs U_3O_8	Average grade % U_3O_8	Comments
Febco (Small Stake)	31 T14N R10W	surface	(included in Silver Spur mine)	---	---
Silver Spur	31 T14N R10W	surface	29,454	0.25	---
Junior	4 T13N R10W	surface	(included in Pat mine)	---	---
Sec. 5	5 T13N R10W	surface	54	0.12	---

Also minor anomalies or occurrences in 2 T13N R11W; 5 T13N R10W; 34 T14N R11W

Ambrosia Lake subdistrict

Property	Location	Estimated depth (ft)	Host	Dominant type of deposit	Estimated size	References
*Mary 1, Sec. 10,12, Dysart 1,2	10,11,12 T14N R10W	400-600	Jmw	primary, redistributed	over 5 mill lbs U_3O_8 produced	Cronk (1963)
*Buckey, Sec. 13, 17	13,14 T14N R10W, 17,18 T14N R9W	350-400	Jmw	primary	over 3 mill lbs U_3O_8 produced	---
*Sec. 14,15,22, 23,24,25	14,15,22,23,24,25 T14N R10W	600-800	Jmw	primary, redistributed, remnant	over 38 mill lbs U_3O_8 produced	Gould and others (1963)
Sec. 21,28,27, 26, W1/2 36	21,27,26,28,W1/2 36 T14N R10W	400-600	Jmw	remnant	over 3.5 mill lbs U_3O_8 reserves delineated	Smith and Peterson (1980), McCammon and others (1986), Pathfinder files, 1981
*Sec. 30,30W,32, 29, 36 (VCA)	30,32,31,29 T14N R9W, 36 T14N R8W	800	Jmw	primary, redistributed	---	Clary and others (1963)
*Ann Lee, Sec. 27	26,27 T14N R9W	700-750	Jmw	primary, redistributed	over 8 mill lbs U_3O_8 produced	Hazlett and Kreek (1963), Squyres (1963, 1980)
*Sec. 33,26, John Billy, Sandstone, Sec. 35,1, Cliffside	33,34,35,36 T14N R9W	1500	Jmw	primary, redistributed, remnant	over 10 mill lbs U_3O_8 produced	Hazlett and Kreek (1963), Harmon and Taylor (1963), Foster and Quintanar
Enerdyne	31 T14N R8W	1560	Jmw	primary	---	---
Helrich	32 T14N R8W	1880	Jmw	primary	---	---
Johnny M	7,18,17 T13N R8W	1300-1400	Jmw	primary, redistributed	about 2 mill lbs U_3O_8 produced, 1.5 mill lbs U_3O_8 remaining reserves	McLemore (1983a), Falkowski (1980a, b)
Roca Honda	9 T13N R8W	1800-2000	Jmw	primary	---	---
Lee	17,16 T13N R8W	1800	Jmw	primary, minor redistributed	---	---
Sec. 10	10 T13N R8W	---	Jmw	primary	---	NMBMMR files
Fernandez-Main Ranch	15,23 T13N R8W	2500-3000	Jmw	primary	8-9 mill lbs U_3O_8 reserves	Holmquist (1970)
Sec. 14,13	14,13 T13N R8W	---	Jmw	primary	---	---
*Mt. Taylor	23,24,25,30,31,32 T13N R8W	3100-3400	Jmw	primary, redistributed(?)	120 mill lbs U_3O_8 at 0.5% U_3O_8 reserves (including the Fernandez-Main Ranch property)	NMBMMR files, Chevron Resources Corp. files

* Produced, mineralization may still be present.

Brushy Basin-Poison Canyon Ore. NOTE: McCammon et al. (1986) consider the Poison Canyon sandstone (of economic usage) to be part of the Westwater Canyon Member, not the Brushy Basin Member.

Property	Location	Estimated depth (ft)	Host	Dominant type of deposit	Estimated size	References
*Bobcat-Blue Peak	24 T13N R10W	surface	Jmb	primary	44,206 lbs U_3O_8 produced	---
*Poison Canyon-Beacon Hill-Davenport-Dog-Flea	19,20,21 T13N R10W	surface-300	Jmb	primary	over 1.3 mill lbs U_3O_8 produced	Hilpert (1969), Rapaport (1963), Tessendorf (1980)
*Marquez	23 T13N R9W	1800-1875	Jmb	primary	3,757,847 lbs U_3O_8 produced	Weege (1963), Rapaport (1963)
*Hogan	14 T13N R9W	300-340	Jmb	primary	678,510 lbs U_3O_8 produced	Rapaport (1963)
Sec. 13	13 T13N R9W	---	Jmb	primary	---	---
*Sec. 24	24 T13N R9W	400-500	Jmb	primary	37,693 lbs U_3O_8 produced	---
*San Mateo	30 T13N R9W	---	Jmb	primary	over 2.8 mill lbs U_3O_8 produced	Rapaport (1963)
Sec. 29,32	29,32 T13N R9W	---	Jmb	primary	---	---
Sec. 19	19 T13N R9W	500	Jmb	primary	---	---
Pat (Dakota)	4 T13N R10W	surface	Kd,Jm	---	12,645 lbs produced	---
+La Jara Mesa	1,12 T12N R9W	---	Jmb	primary	2.5 mill lbs U_3O_8 reserves at 0.2-0.3%	NMBMMR files, Homestake Mining Co. files
Sec. 1	1 T14N R11W	600-700	Jmb	---	---	Pathfinder files, 1981
Sec. 5,7,8	5,7,8, T14N R10W	1160-1200	Jmb	primary	over 1 mill lbs reserves delineated	Pathfinder files, 1981
Sec. 17,18	17,18 T14N R10W	800-1000, 1400	Jmb	primary	over 100,000 lbs reserves delineated	Pathfinder files, 1981

* Produced, mineralization may still be present.
\+ Mine plan under consideration.

Ambrosia subdistrict-Dakota orebodies (redistributed ore). Production data from McLemore (1983a).

Property	Location	Estimated depth (ft)	Production lbs U_3O_8	Average grade % U_3O_8	Comments
Febco (Small Stake)	31 T14N R10W	surface	(included in Silver Spur mine)	---	---
Silver Spur	31 T14N R10W	surface	29,454	0.25	---
Junior	4 T13N R10W	surface	(included in Pat mine)	---	---
Sec. 5	5 T13N R10W	surface	54	0.12	---

Also minor anomalies or occurrences in 2 T13N R11W; 5 T13N R10W; 34 T14N R11W

Brushy Basin-Poison Canyon Ore. NOTE: McCammon et al. (1986) consider the Poison Canyon sandstone (of economic usage) to be part of the Westwater Canyon Member, not the Brushy Basin Member.

Property	Location	Estimated depth (ft)	Host	Dominant type of deposit	Estimated size	References
*Bobcat-Blue Peak	24 T13N R10W	surface	Jmb	primary	44,206 lbs U_3O_8 produced	---
*Poison Canyon-Beacon Hill-Davenport-Dog-Flea	19,20,21 T13N R10W	surface-300	Jmb	primary	over 1.3 mill lbs U_3O_8 produced	Hilpert (1969), Rapaport (1963), Tessendorf (1980)
*Marquez	23 T13N R9W	1800-1875	Jmb	primary	3,757,847 lbs U_3O_8 produced	Weege (1963), Rapaport (1963)
*Hogan	14 T13N R9W	300-340	Jmb	primary	678,510 lbs U_3O_8 produced	Rapaport (1963)
Sec. 13	13 T13N R9W	---	Jmb	primary	---	---
*Sec. 24	24 T13N R9W	400-500	Jmb	primary	37,693 lbs U_3O_8 produced	---
*San Mateo	30 T13N R9W	---	Jmb	primary	over 2.8 mill lbs U_3O_8 produced	Rapaport (1963)
Sec. 29,32	29,32 T13N R9W	---	Jmb	primary	---	---
Sec. 19	19 T13N R9W	500	Jmb	primary	---	---
Pat (Dakota)	4 T13N R10W	surface	Kd,Jm	---	12,645 lbs produced	---
+La Jara Mesa	1,12 T12N R9W	---	Jmb	primary	2.5 mill lbs U_3O_8 reserves at 0.2-0.3%	NMBMMR files, Homestake Mining Co. files
Sec. 1	1 T14N R11W	600-700	Jmb	---	---	Pathfinder files, 1981
Sec. 5,7,8	5,7,8, T14N R10W	1160-1200	Jmb	primary	over 1 mill lbs reserves delineated	Pathfinder files, 1981
Sec. 17,18	17,18 T14N R10W	800-1000, 1400	Jmb	primary	over 100,000 lbs reserves delineated	Pathfinder files, 1981

* Produced, mineralization may still be present.
\+ Mine plan under consideration.

Ambrosia subdistrict-Dakota orebodies (redistributed ore). Production data from McLemore (1983a).

Property	Location	Estimated depth (ft)	Production lbs U_3O_8	Average grade % U_3O_8	Comments
Febco (Small Stake)	31 T14N R10W	surface	(included in Silver Spur mine)	---	---
Silver Spur	31 T14N R10W	surface	29,454	0.25	---
Junior	4 T13N R10W	surface	(included in Pat mine)	---	---
Sec. 5	5 T13N R10W	surface	54	0.12	---

[illegible] occurrences in 2 T13N R11W, 5 T13N R10W, 36 T14N R11W

OPEN FILE 353
MAP 2
REVISED 1991

Laguna subdistrict

Property[1]	Location	Estimated depth (ft)	Host	Dominant type of deposit	Estimated size	References
JJ-1 (L Bar)	23, 24 T11N R5W	650-700	Jmbj	primary	2.1 mill lbs U_3O_8 produced, 13.9 mill lbs U_3O_8 reserves at 0.16% U_3O_8	Sohio files (1981)[2], Jacobsen (1980)
St. Anthony open pit & shaft	24 T11N R5W 19,30 T10N R9W	surface	Jmbj	primary, possibly some remnant	Over 2,500,000 lbs U_3O_8 produced	Baird and others (1980), Sohio files (1981)[2]
Bibo rim cuts	29 T10N R4W	surface	Jmbj	primary	---	---
Windwhip rim cuts, in-situ	34,35 T11N R5W	surface-250	Jmbj	primary	included with Jackpile-Paguate	Holen and Hatchell (1986)
Walter rim cut	35 T11N R5W	surface	Jmbj	primary	included with Jackpile-Paguate	---
Jackpile-Paguate open pits & declines	T10,11N R5W	surface-300	Jmbj	primary	26.6 mill tons of ore yielding 100 mill lbs of U_3O_8	Kittel (1963), Hoppe Hoppe (1978), Beck and others (1980)
Oak Creek rim cut	11 T10N R5W	surface	Jmbj	primary	included in Jackpile-Paguate	---
Woodrow	36 T11N R5W 1 T10N R5W	360	Jm	breccia pipe	134,014 lbs U_3O_8 produced, average grade of 1.26% U_3O_8	Wylie (1963)

[1] All mines have produced, mineralized zones may still be present.
[2] Sohio files (1981) available for inspection at NMBMMR Geotechnical Information Center.

SHAFT

ADIT OR DECLINE

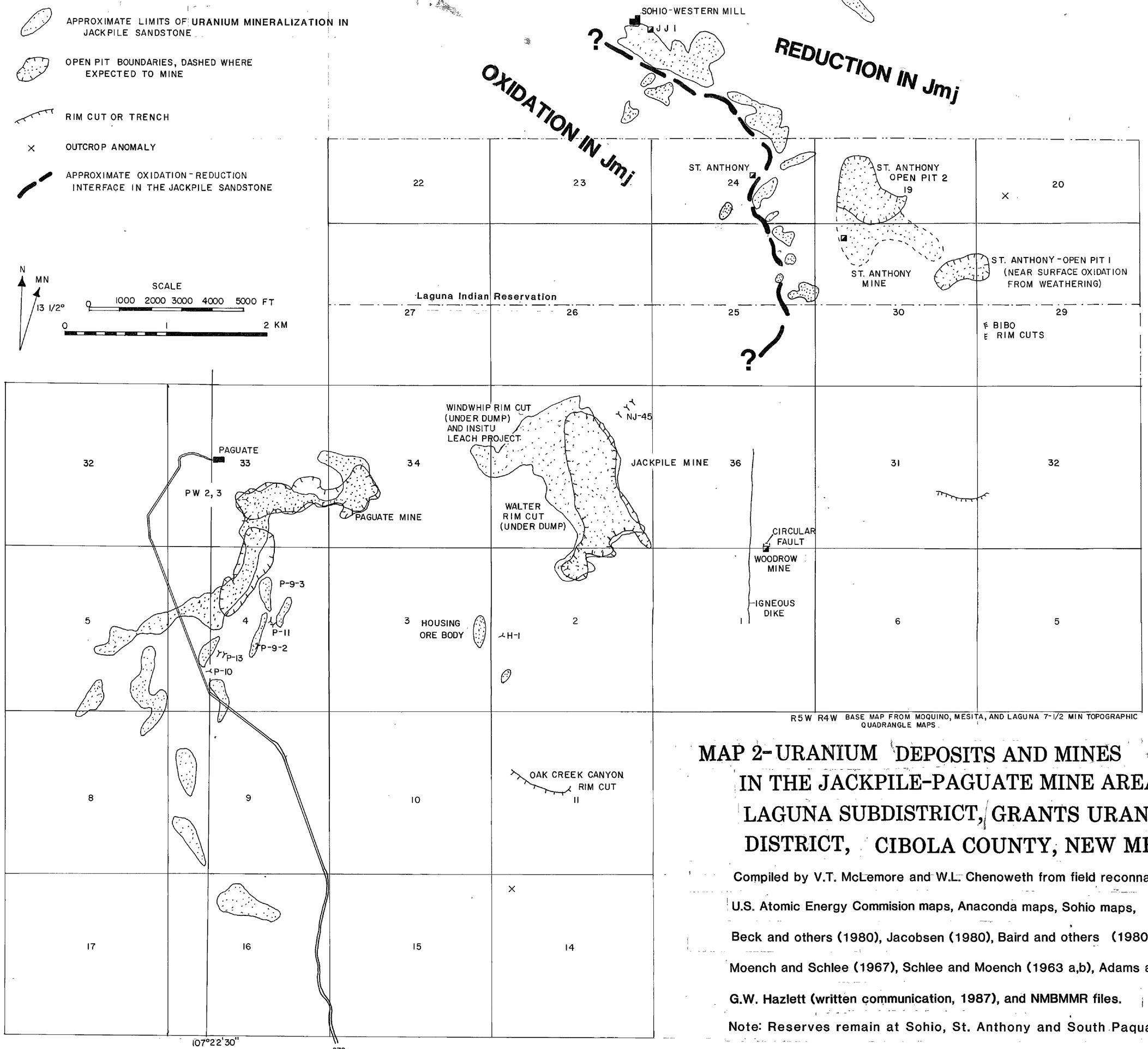
APPROXIMATE LIMITS OF URANIUM MINERALIZATION IN JACKPILE SANDSTONE

OPEN PIT BOUNDARIES, DASHED WHERE EXPECTED TO MINE

RIM CUT OR TRENCH

OUTCROP ANOMALY

APPROXIMATE OXIDATION-REDUCTION INTERFACE IN THE JACKPILE SANDSTONE



BASE MAP FROM MOQUINO, MESITA, AND LAGUNA 7-1/2 MIN TOPOGRAPHIC QUADRANGLE MAPS.

MAP 2- URANIUM DEPOSITS AND MINES IN THE JACKPILE-PAGUATE MINE AREA, LAGUNA SUBDISTRICT, GRANTS URANIUM DISTRICT, CIBOLA COUNTY, NEW MEXICO.

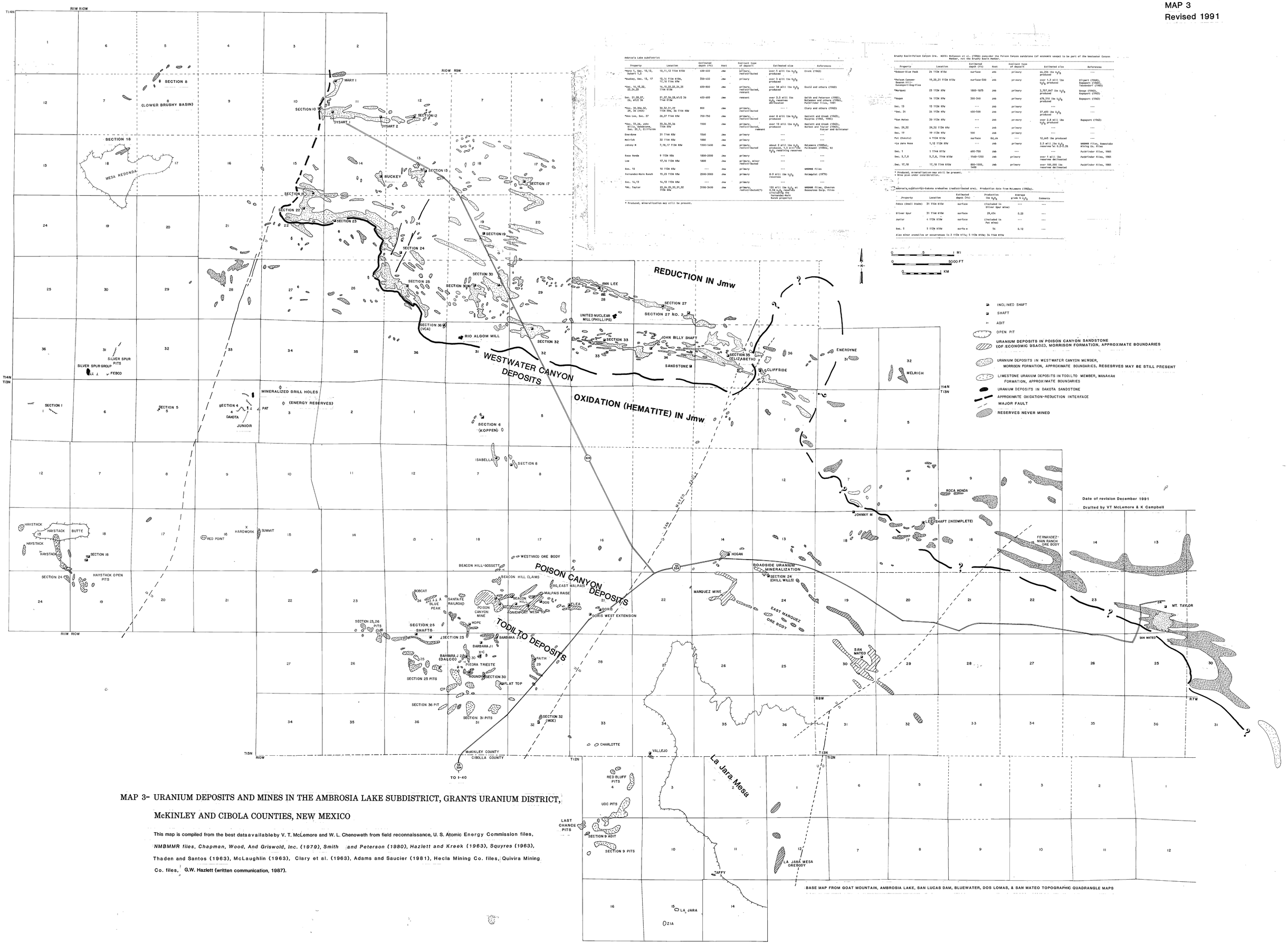
Compiled by V.T. McLemore and W.L. Chenoweth from field reconnaissance, U.S. Atomic Energy Commision maps, Anaconda maps, Sohio maps, Beck and others (1980), Jacobsen (1980), Baird and others (1980), Moench and Schlee (1967), Schlee and Moench (1963 a,b), Adams and Saucier (1981), G.W. Hazlett (written communication, 1987), and NMBMMR files.

Note: Reserves remain at Sohio, St. Anthony and South Paquate.

Drafted by V.T. McLemore & K. Campbell
Revised December 1991

EPA-R9-2015-010125 Production VOL002

OPEN FILE 353
MAP 3
Revised 1991



Ambrosia Lake subdistrict

Property	Location	Estimated depth (ft)	Host	Formation of deposit	Estimated size	References
*Brushy Basin Sec. 14, Dysart 1,2	14,11,12 T14N R10W	400-600	Jmw	primary, redistributed	over 4 mill lbs U_3O_8 produced	Grant (1963)
*Buckey, Sec. 13, 17	13,14 T14N R10W, 17,18 T14N R9W	350-400	Jmw	primary	over 3 mill lbs U_3O_8 produced	---
*Sec. 14,15,22, 23,24,25	14,15,22,23,24,25 T14N R10W	600-800	Jmw	primary, redistributed, remnant	over 30 mill lbs U_3O_8 produced	Gould and others (1963)
Sec. 21,28,27, 26, W1/2 36	21,27,26,28,W1/2 36 T14N R10W	400-600	Jmw	remnant	over 3.5 mill lbs U_3O_8 reserves (all reserves mined)	Smith and Peterson (1980); Hazlett and Kreek (1963); Pathfinder files, 1981
*Sec. 30,36W,32, 29, 30 (DOE)	30,32,31,29 T14N R9W, 36 T14N R8W	800	Jmw	primary, redistributed	---	Clary and others (1963)
*Ann Lee, Sec. 27	26,27 T14N R9W	700-750	Jmw	primary, redistributed	over 8 mill lbs U_3O_8 produced	Hazlett and Kreek (1963), Squyres (1963, 1980)
*Sec. 33,28, John Billy, Sandstone, Sec. 35,1, Cliffside	33,34,35,36 T14N R9W	1500	Jmw	primary, redistributed, remnant	over 10 mill lbs U_3O_8 produced	Hazlett and Kreek (1963), Hansen and Taylor (1963), Fiesser and Schlenker
Enerdyne	31 T14N R9W	1550	Jmw	primary	---	---
Melrich	32 T14N R9W	1800	Jmw	primary	---	---
Johnny M	7,18,17 T13N R9W	1300-1400	Jmw	primary, redistributed	about 2 mill lbs U_3O_8 produced, 1.2 mill lbs U_3O_8 remaining reserves	McLemore (1982a); Pickwoski (1980a, b)
Roca Honda	9 T13N R9W	1800-2000	Jmw	primary	---	---
Lee	17,16 T13N R8W	1800	Jmw	primary, minor redistributed	---	---
Sec. 10	10 T12N R9W	---	Jmw	primary	---	NMBMMR files
Fernandez-Main Ranch	15,23 T13N R8W	2500-3000	Jmw	primary	8-9 mill lbs U_3O_8 reserves	Holmquist (1979)
Sec. 14,13	14,13 T13N R8W	---	Jmw	primary	---	---
*Mt. Taylor	23,24,25,30,31,32 T13N R8W	3100-3400	Jmw	primary, redistributed(?)	120 mill lbs U_3O_8 at 0.15 U_3O_8 resource (including the Fernandez-Main Ranch property)	NMBMMR files, Chevron Resources Corp. files

* Produced, mineralization may still be present.

Brushy Basin-Poison Canyon Ore. NOTE: McCammon et al. (1986) consider the Poison Canyon sandstone (of economic usage) to be part of the Westwater Canyon Member, not the Brushy Basin Member.

Property	Location	depth (ft)	Host	of deposit	Estimated size	References
*Indian Blue Peak	24 T13N R10W	surface	Jmb	primary	44,206 lbs U_3O_8 produced	---
*Poison Canyon-Season Hill-Davenport-Dog-Flea	19,20,21 T13N R10W	surface-300	Jmb	primary	over 1.0 mill lbs U_3O_8 produced	Gilpert (1960), Rapaport (1963), Tanenbaum (1980)
*Marquez	23 T13N R9W	1800-1875	Jmb	primary	3,757,847 lbs U_3O_8 produced	Wenge (1963), Rapaport (1963)
*Hogan	14 T13N R9W	300-340	Jmb	primary	429,550 lbs U_3O_8 produced	Rapaport (1963)
Sec. 13	13 T13N R9W	---	Jmb	primary	---	---
*Sec. 24	24 T13N R9W	400-500	Jmb	primary	37,693 lbs U_3O_8 produced	---
*San Mateo	30 T13N R9W	---	Jmb	primary	over 2.8 mill lbs U_3O_8 produced	Rapaport (1963)
Sec. 29,32	29,32 T13N R9W	---	Jmb	primary	---	---
Sec. 19	19 T13N R9W	500	Jmb	primary	---	---
Pat (Dakota)	4 T13N R10W	surface	Kd,Jm	---	12,645 lbs produced	---
*La Jara Mesa	1,12 T12N R9W	---	Jmb	primary	2.5 mill lbs U_3O_8 reserves at 0.2-0.35	NMBMMR files, Homestake Mining Co. files
Sec. 1	1 T14N R11W	600-700	Jmb	---	---	Pathfinder files, 1981
Sec. 5,7,8	5,7,8, T14N R10W	1160-1200	Jmb	primary	over 1 mill lbs reserves delineated	Pathfinder files, 1981
Sec. 17,18	17,18 T14N R10W	800-1000, 1400	Jmb	primary	over 100,000 lbs reserves delineated	Pathfinder files, 1981

* Produced, mineralization may still be present.
* Mine plan under consideration.

Ambrosia subdistrict-Dakota orebodies (redistributed ore). Production data from McLemore (1982a).

Property	Location	Estimated depth (ft)	Production lbs U_3O_8	Average grade % U_3O_8	Comments
Felix (Small Stake)	31 T14N R10W	surface	(included in Silver Spur mine)	---	---
Silver Spur	31 T14N R10W	surface	29,454	0.25	---
Junior	4 T13N R10W	surface	(included in Pat mine)	---	---
Sec. 5	5 T13N R10W	surface	54	0.12	---

Also minor anomalies or occurrences in 2 T13N R11W; 5 T13N R10W; 34 T14N R11W

MAP 3- URANIUM DEPOSITS AND MINES IN THE AMBROSIA LAKE SUBDISTRICT, GRANTS URANIUM DISTRICT, McKINLEY AND CIBOLA COUNTIES, NEW MEXICO

This map is compiled from the best data available by V. T. McLemore and W. L. Chenoweth from field reconnaissance, U. S. Atomic Energy Commission files, NMBMMR files, Chapman, Wood, And Griswold, Inc. (1979), Smith and Peterson (1980), Hazlett and Kreek (1963), Squyres (1963), Thaden and Santos (1963), McLaughlin (1963), Clary et al. (1963), Adams and Saucier (1981), Hecla Mining Co. files, Quivira Mining Co. files, G.W. Hazlett (written communication, 1987).

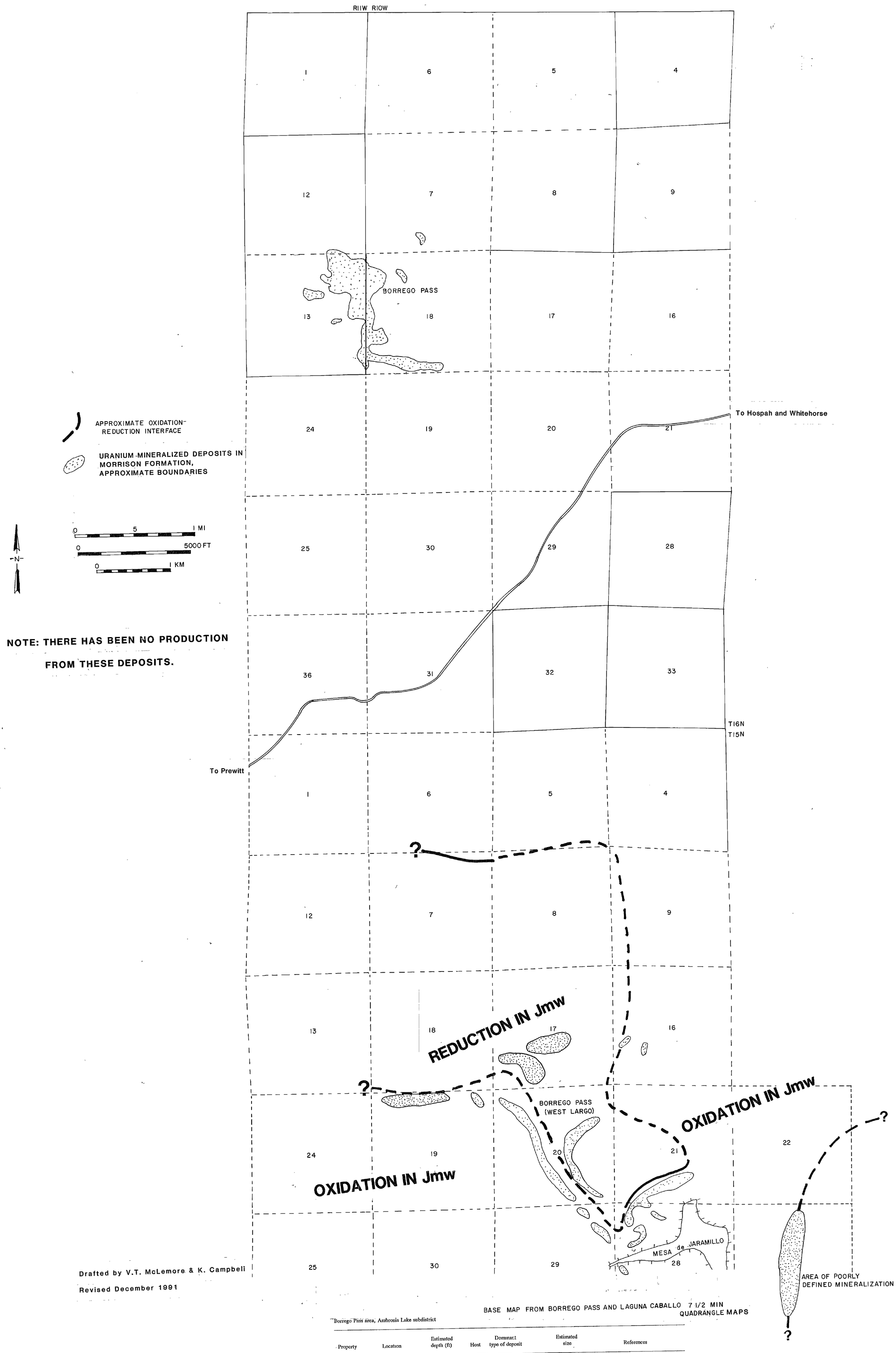
ED_000571_00011052-00028

EPA-R9-2015-010125 Production VOL002

OPEN FILE 353
MAP 4
REVISESD 1991

MAP 4- URANIUM DEPOSITS IN THE BORREGO PASS AREA, AMBROSIA LAKE SUBDISTRICT, GRANTS URANIUM DISTRICT, McKINLEY COUNTY, NEW MEXICO

Compiled by V. T. McLemore and W. L. Chenoweth from Chapman, Wood, and Griswald, Inc. (1979), Quviria Mining Co. files, NMBMMR files, Holen and Hatchell (1986), Adams and Saucier (1981), Sayala and Ward (1983) ,Pathfinder Mines Corp. files



Drafted by V.T. McLemore & K. Campbell
Revised December 1991

Borrego Pass area, Ambrosia Lake subdistrict

Property	Location	Estimated depth (ft)	Host	Dominant type of deposit	Estimated size	References
Borrego Pass	7,18, T16N, R10W 13, T16N, R11W	2000–2200	Jmw	redistributed (roll-type), primary	15 million pounds U_3O_8 at average grade of 0.15%	Sayala and Ward (1983); Holen and Hatchell (1986); McCammon and others (1986)
Borrego Pass (West Largo)	16,17,20,21,27,28, 29, T15N, R10W	1800–2200(?)	Jmw	redistributed (roll-type)	8 million pounds U_3O_8 at average grade of 0.35%	McCammon and others (1986), Pathfinder Mines Corp. files

ED_000571_00011052-00029

OPEN FILE 353
MAP 5
REVISED 1991

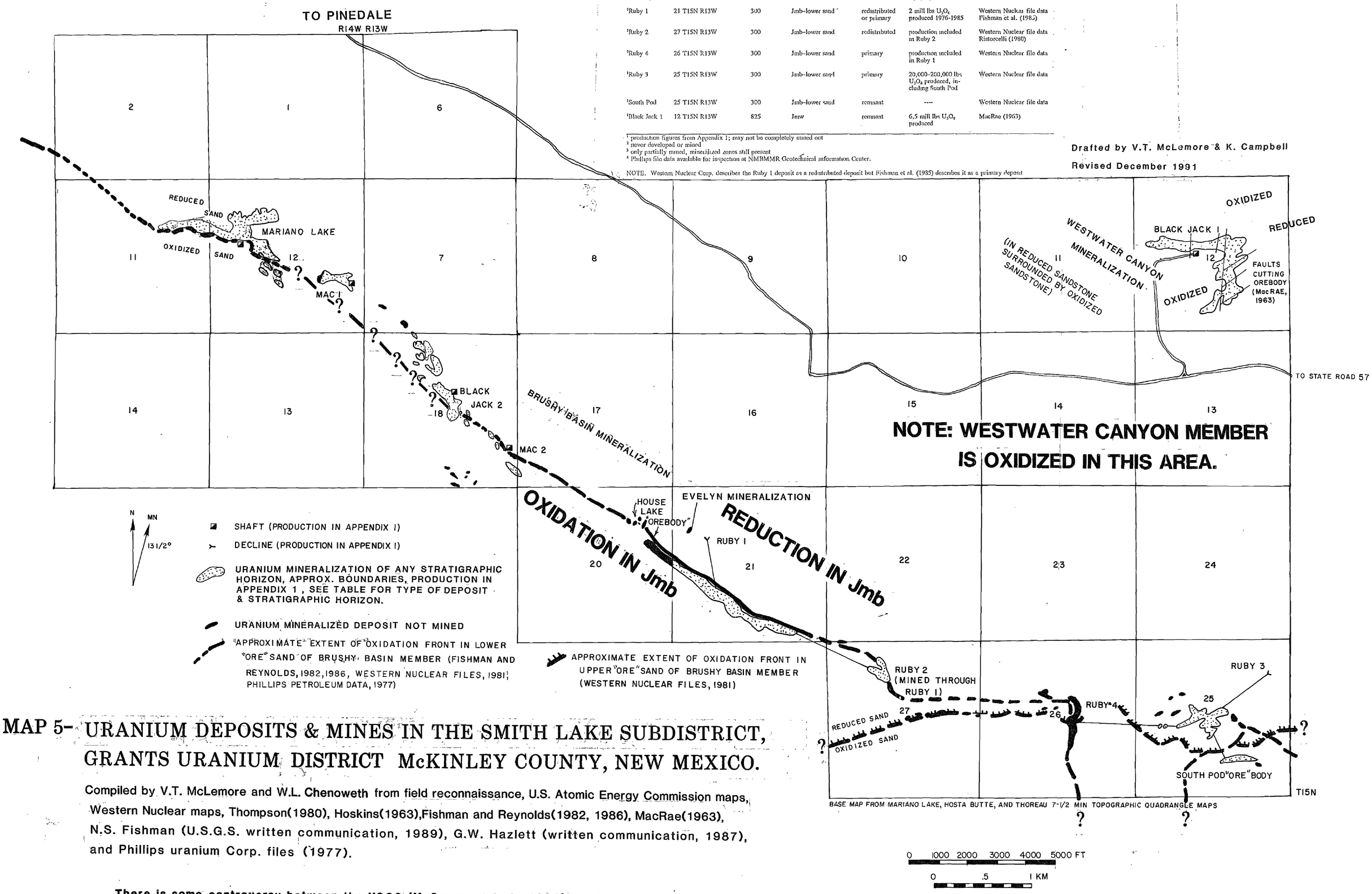
Smith Lake (Black Jack) subdistrict NOTE McCammon and others (1986) refers to the mineralized lower sandstone of the Brushy Basin Member as part of the Westwater Canyon Member. Other geologists sometimes refer to this sandstone as the Poison Canyon sandstone (of economic usage).

Property	Location	Estimated depth (ft)	Host	Dominant type of deposit	Estimated size[1]	References
[1]Mariano Lake	12 T15N R14W	500	Jmb–lower sand	primary	2.3 mill lbs U_3O_8 produced	Fishman and Reynolds (1982, 1986), Perkins (1979), Fishman et al (1985)
[1]Mac 1	12 T15N R14W	515	Jmb	primary(?)	About 0 4 mill lbs of U_3O_8 produced	McLemore (1983a)
[1]Black Jack 2	18 T14N R13W	303	Jmb–lower sand	redistributed	1,129,004 lbs of 0.23% U_3O_8 produced	Hoskins (1963), Anderson (1980)
[1]Mac 2	18 T15N R13W	288	Jmb–lower sand	redistributed	109,009 lbs U_3O_8 produced	Western Nuclear file data (1981), McLemore (1983a)
[2]House Lake orebody	20 T15N R13W	240–300	Jmb–lower sand	redistributed	285,000 lbs of 0.18% U_3O_8 reported	Phillips file data (1977)[4]
[1]Ruby 1	21 T15N R13W	300	Jmb–lower sand	redistributed or primary	2 mill lbs U_3O_8 produced 1976-1985	Western Nuclear file data Fishman et al. (1985)
[1]Ruby 2	27 T15N R13W	300	Jmb–lower sand	redistributed	production included in Ruby 2	Western Nuclear file data Ristorcelli (1980)
[1]Ruby 4	26 T15N R13W	300	Jmb–lower sand	primary	production included in Ruby 1	Western Nuclear file data
[1]Ruby 3	25 T15N R13W	300	Jmb–lower sand	primary	20,000–200,000 lbs U_3O_8 produced, including South Pod	Western Nuclear file data
[1]South Pod	25 T15N R13W	300	Jmb–lower sand	remnant	----	Western Nuclear file data
[1]Black Jack 1	12 T15N R13W	825	Jmw	remnant	6.5 mill lbs U_3O_8 produced	MacRae (1963)

[1] production figures from Appendix 1; may not be completely mined out
[2] never developed or mined
[3] only partially mined, mineralized zones still present
[4] Phillips file data available for inspection at NMBMMR Geotechnical Information Center.

NOTE. Western Nuclear Corp. describes the Ruby 1 deposit as a redistributed deposit but Fishman et al. (1985) describes it as a primary deposit

Drafted by V.T. McLemore & K. Campbell
Revised December 1991



MAP 5- URANIUM DEPOSITS & MINES IN THE SMITH LAKE SUBDISTRICT, GRANTS URANIUM DISTRICT McKINLEY COUNTY, NEW MEXICO.

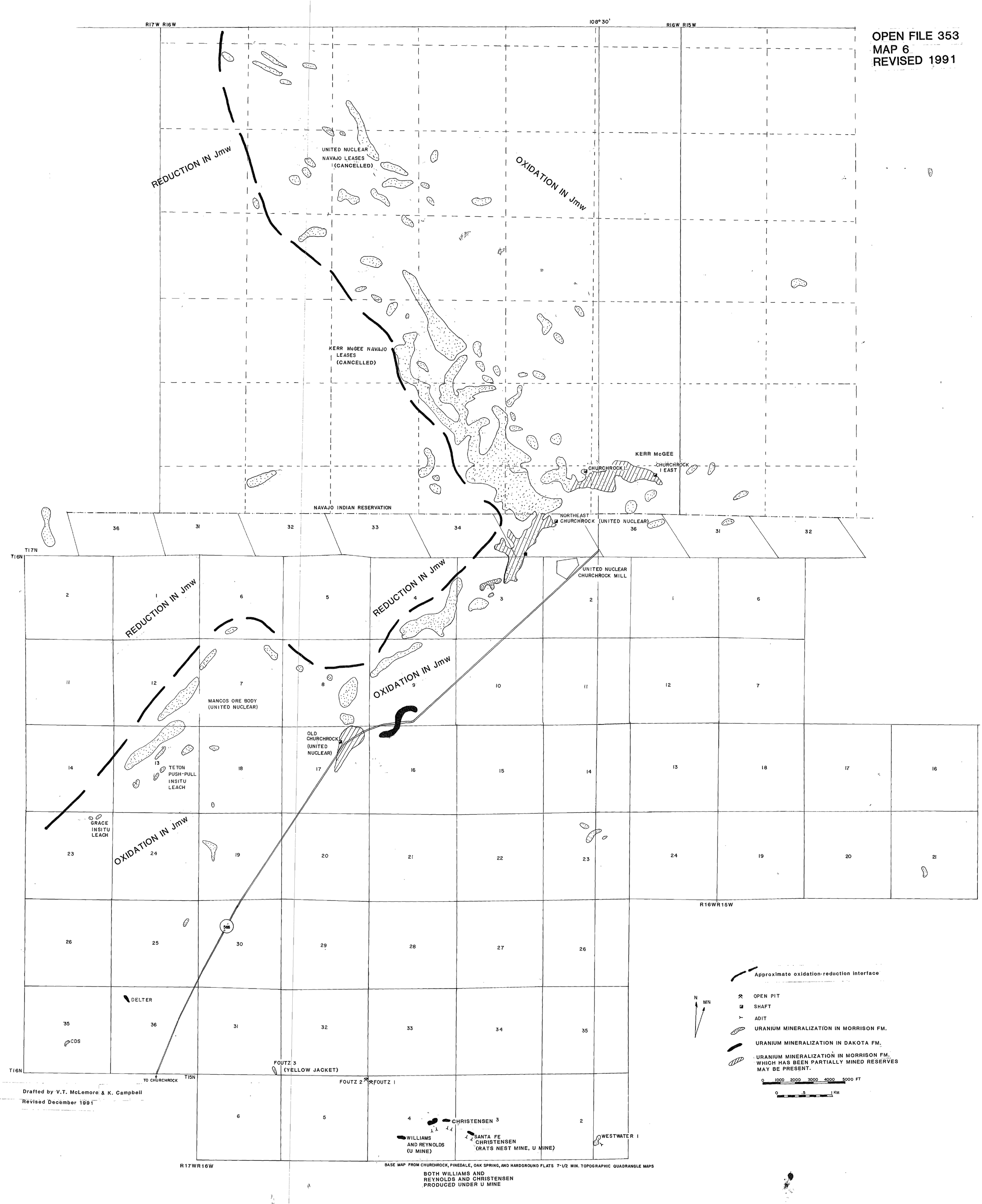
Compiled by V.T. McLemore and W.L. Chenoweth from field reconnaissance, U.S. Atomic Energy Commission maps, Western Nuclear maps, Thompson(1980), Hoskins(1963), Fishman and Reynolds(1982, 1986), MacRae(1963), N.S. Fishman (U.S.G.S. written communication, 1989), G.W. Hazlett (written communication, 1987), and Phillips uranium Corp. files (1977).

There is some controversy between the USGS (McCammon et al., 1986) and industry (Place et al., 1980) reguarding the stratigraphic position of the ore in the Mariano Lake trend. Some industry geologists call the ore bearing sandstone Poison Canyon . The USGS then places it in the Westwater Canyon Member. Other geologists (Fishman and Reynolds, 1986) and the authors reguard the ore bearing sandstone is an unnamed sandstone in the lower Brushy Basin Member. McLemore and Chenoweth (1989 , Table 3) placed the deposits in the Westwater Canyon Member to be consistent with McCammon et al., 1986).

rv. 5/11/89 vrm

EPA-R9-2015-010125 Production VOL002

OPEN FILE 353
MAP 6
REVISED 1991



MAP 6- URANIUM DEPOSITS AND MINES IN THE CHURCHROCK SUBDISTRICT, GRANTS URANIUM DISTRICT, McKINLEY COUNTY, NEW MEXICO.

Compiled by V.T. McLemore and W.L. Chenoweth from field reconnaissance, NMBMMR filers, U.S. Atomic Energy Commission files, Adams and Saucier (1981), Peterson (1980), Fishman and Reynolds (1983), United Nuclear Corp. files, and G.W. Hazlett (written communication, 1987).

Churchrock subdistrict (*Produced, reserves may be present)

Property	Location	Estimated depth (ft)	Host	Dominant type of deposit	Estimated size	References[2]
Kerr McGee Navajo Leases (Churchrock 2,3)	21,27,35 T17N R16W	2000-2500	Jmw	redistributed, primary	over 35 mill lbs of 0.19% U_3O_8 reserves	Perkinds (1979), Kirk and Condon (1986)
*Churchrock 1 and 1E (Kerr McGee)	35, 36 T17N R16W	1500-1800	Jmw	redistributed, primary	about 5 mill lbs U_3O_8 produced	Kerr McGee report (1980), Fishman and Reynolds (1986), NMBMMR files
*NE Churchrock (United Nuclear)	35 T17N R16E	1700-1800	Jmw	redistributed	about 10 mill lbs U_3O_8 produced	Hazlett (1969), Adams and Saucier (1980), NMBMMR files
*Section 3	3 T16N R16W	1550-1660	Jmw	redistributed	part of NE Churchrock	McLemore (1983a)
Section 4	4 T16N R16W	1550-1600(?)	Jmw	redistributed	—	McLemore (1983a)
*Old Churchrock	8,17 T16N T16W	800-900	Jmw,Jmb, Kd	redistributed, remnant	about 900,000 lbs U_3O_8 produced	NMBMMR files
Section 7	7, T16N R16W	260-1020	Jmw	redistributed	—	McLemore (1983a)
Section 7, 12 (Mancos)	7,12 T16N R16W	360-1020	Jmw	redistributed	—	McLemore (1983a)
*Teton-Sec. 13 (insitu leach)	13 T16N R17W	1300	Jmw	primary, redistributed	reserves of 41.9 million lbs of U_3O_8 at average grade of 0.12% including adjacent sections	Peterson (1980), Holen and Hatchell (1986)
*Grace-Site I (insitu leach)	23 T16N R17W	500	Jmw	?	about 200 lbs U_3O_8 produced	Holen and Hatchell (1986)
Section 19	19 T16N R16W	—	Jmw	redistributed(?)	—	McLemore (1983a)
Section 23	23 T16N R16W	400-500	Jmw	redistributed	—	McLemore (1983a)
Section 21	21 T16N R15W	—	Jmw(?)	remnant(?)	—	—
*Foutz 1, 2, 3	4,5 T15N R16W 31 T16N R16W	surface	Jmw	remnant	small (1000 lbs U_3O_8) orebodies	Hilpert (1969), McCammon et al. (1986)
*Westwater	2 T15N R16W	164	Jmw	remnant	26,571 lbs at 0.28% U_3O_8 produced	Hilpert (1969), McCammon et al. (1986)
*CD&S	35 T16N R17W	surface	Jmw	remnant	48 lbs U_3O_8 produced	Hilpert (1969), McCammon et al. (1986)

Churchrock subdistrict-Dakota orebodies (redistributed ore). Production data from Chenoweth (1989). [1]Ore shipped from both Williams and Reynolds and Christensen mines are identified in the AEC ore receipts as the U mine.

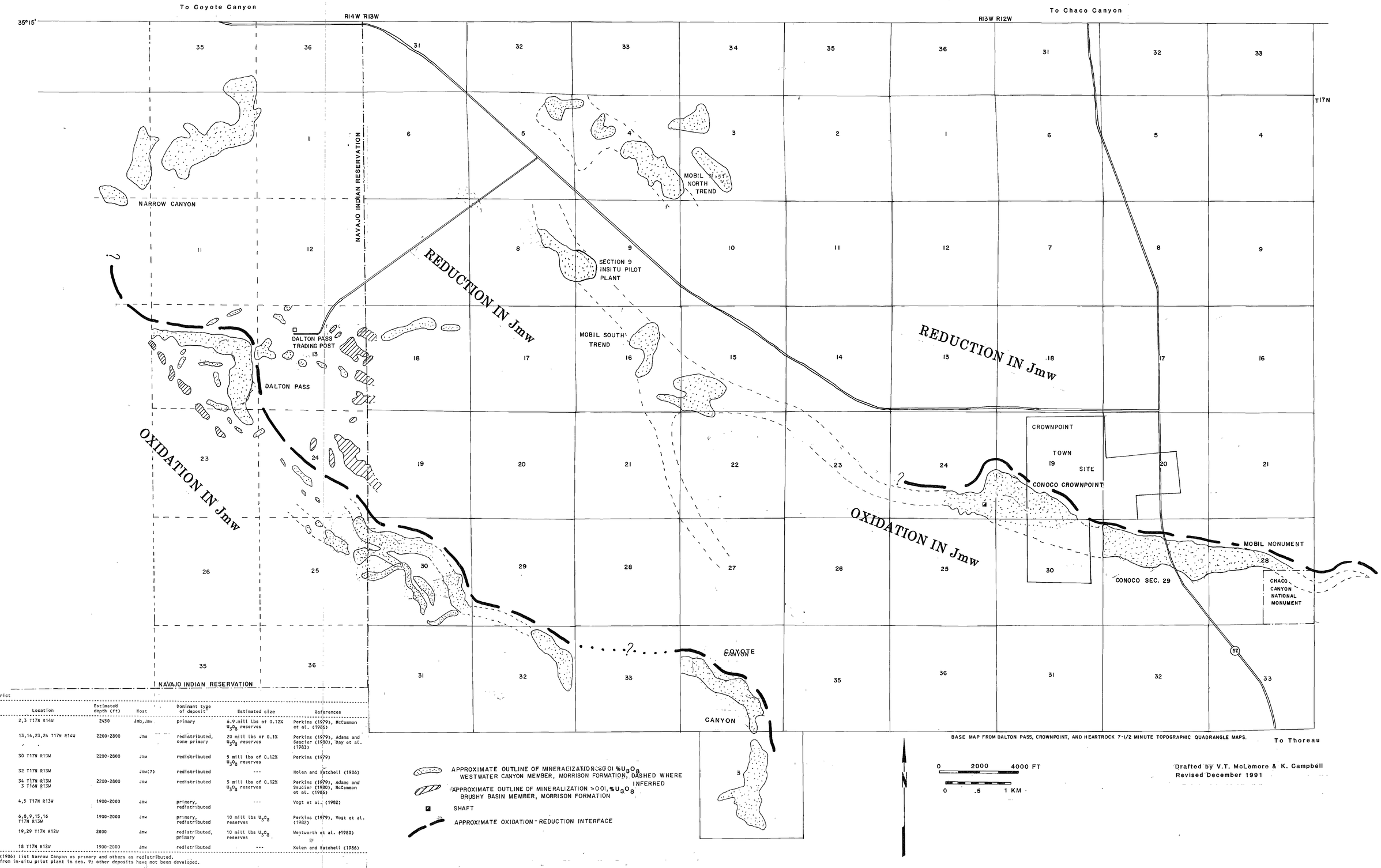
Property	Location	Estimated depth (ft)	Production lbs U_3O_8	Average grade % U_3O_8	Comments
Old Churchrock	8,9,16,17 T16N R16W	800-900	188,686 from Kd	0.21	mine produced ore from both Kd and Jm; plans under-way for in situ leach project
Section 9, 16	9,16 T16N R16W	320-480	Reserves-150,000	0.19	---
Delter	36 T16N R17W	surface	none	---	---
Williams and Reynolds[1] (U mine)	4 T15N R16W	surface-20	3,954	0.15	---
Christensen[1] (U mine)	4 T15N R16W	100	4,506	0.18	---
Santa Fe Christensen 3 (Rats Nest mine)	T15N R16W	100	1,836	0.28	---
Hogback 3-5	12 T15N R18W	surface	24,234	0.19	---
Diamond No. 2 (includes Mike Smith lease, Largo claims, and N. Becenti lease)	33 T15N R17W	surface-300	244,939	0.22	mineralized zones extends into sec. 34
Sec. 28-E. Becenti	28 T15N R17W	surface	3,350	0.20	---

Also minor anomalies or occurrences in 33, 34 T15N R17W; 36 T16N R18W (Black Rainbow); 15 T15N R16W

ED_000571_00011052-00031

EPA-R9-2015-010125 Production VOL002

OPEN FILE 353
MAP 7
Revised 1991



BASE MAP FROM DALTON PASS, CROWNPOINT, AND HEARTROCK 7-1/2 MINUTE TOPOGRAPHIC QUADRANGLE MAPS.

Drafted by V.T. McLemore & K. Campbell
Revised December 1991

Crownpoint subdistrict

Property	Location	Estimated depth (ft)	Host	Dominant type of deposit[1]	Estimated size	References
Narrow Canyon (Standing Rock)	2,3 T17N R14W	2450	Jmb,Jmw	primary	6.9 mill lbs of 0.12% U_3O_8 reserves	Perkins (1979), McCammon et al. (1986)
Dalton Pass	13,14,23,24 T17N R14W	2200-2800	Jmw	redistributed, some primary	20 mill lbs of 0.1% U_3O_8 reserves	Perkins (1979), Adams and Saucier (1980), Day et al. (1983)
Section 30	30 T17N R13W	2200-2800	Jmw	redistributed	5 mill lbs of 0.12% U_3O_8 reserves	Perkins (1979)
Section 32	32 T17N R13W		Jmw(?)	redistributed	---	Nolen and Watchell (1986)
Canyon	34 T17N R13W 3 T16N R13W	2200-2800	Jmw	redistributed	5 mill lbs of 0.12% U_3O_8 reserves	Perkins (1979), Adams and Saucier (1980), McCammon et al. (1986)
Mobil North Trend	4,5 T17N R13W	1900-2000	Jmw	primary, redistributed	---	Vogt et al. (1982)
[2]Mobil South Trend	6,8,9,15,16 T17N R13W	1900-2000	Jmw	primary, redistributed	10 mill lbs U_3O_8 reserves	Perkins (1979), Vogt et al. (1982)
Conoco Crownpoint	19,29 T17N R12W	2000	Jmw	redistributed, primary	10 mill lbs U_3O_8 reserves	Wentworth et al. (1980)
Monument	18 T17N R12W	1900-2000	Jmw	redistributed	---	Nolen and Watchell (1986)

1 McCammon et al. (1986) list Narrow Canyon as primary and others as redistributed.
2 Some production from in-situ pilot plant in sec. 9; other deposits have not been developed.

MAP 7- URANIUM DEPOSITS IN THE CROWNPOINT AREA, GRANTS URANIUM DISTRICT, McKINLEY COUNTY, NEW MEXICO.

Compiled by V. T. McLemore and W. L. Chenoweth from field reconnaissance, NMBMMR files, Adams and Saucier (1981), Wentworth et al. (1980), G.W. Hazlett (written communication, 1987), Pathfinder Mines Corp. files.

The only production from this area was from Mobil Oil Corp.'s insitu pilot plant (Appendix 1).

Data are incomplete to show the extent of the oxidation-reduction interface. McCammon et al. (1986) places the interface further to the northeast which inferrs that Mobil's North and South Trend are redistributed deposits. However, some geologists believe an interface exists along the Dalton Pass-Canyon trend which inferrs that some ot these deposits are primary. The Narrow Canyon deposit is primary (McCammon et al. (1986). The authors are investigation the extent of the interface at different stratigraphic intervals whithin the Morrison Formation.

ED_000571_00011052-00032

EPA-R9-2015-010125 Production VOL002

OPEN FILE 353
MAP 8
REVISED 1991

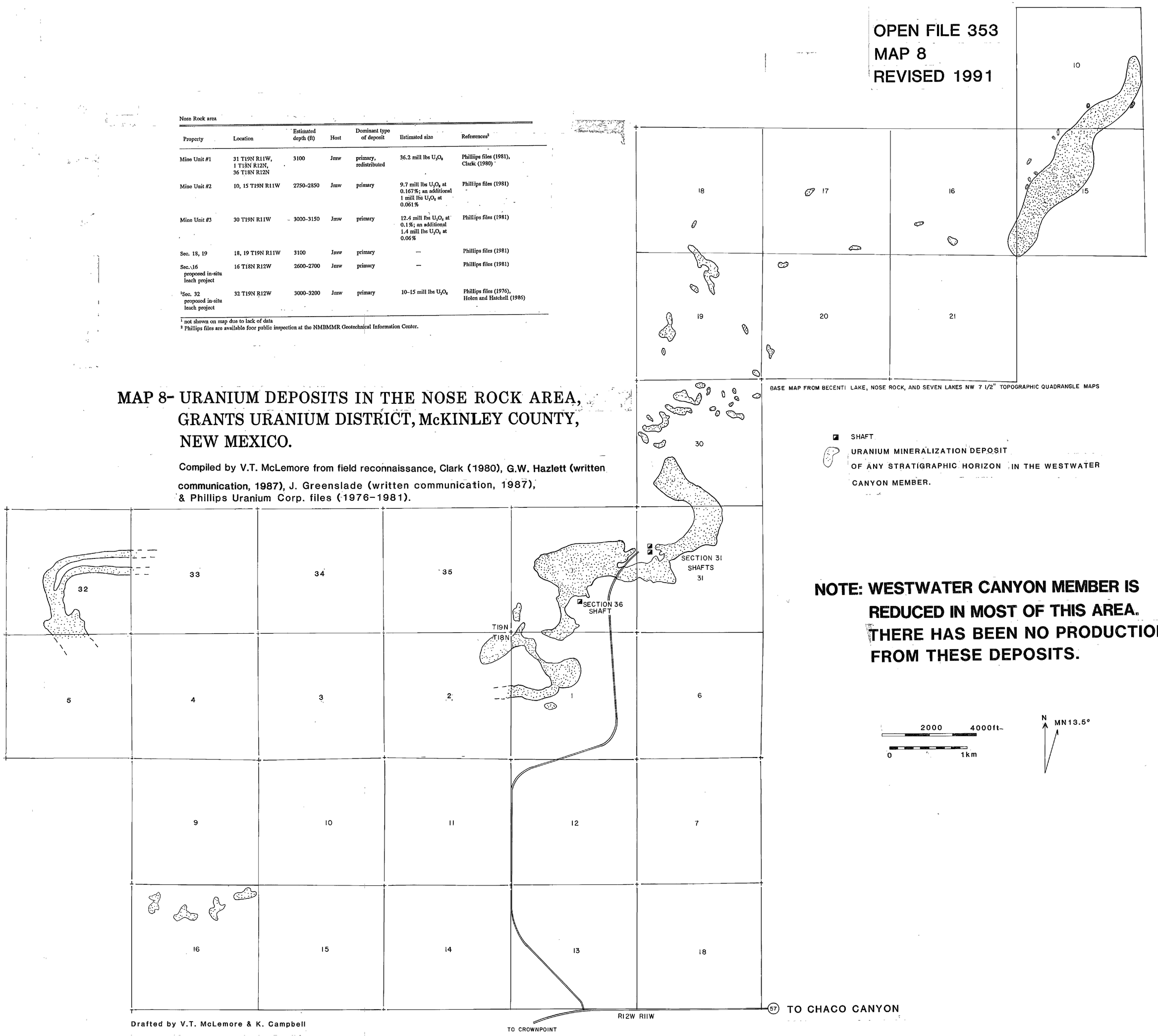
Nose Rock area

Property	Location	Estimated depth (ft)	Host	Dominant type of deposit	Estimated size	References[2]
Mine Unit #1	31 T19N R11W, 1 T18N R12N, 36 T18N R12N	3100	Jmw	primary, redistributed	36.2 mill lbs U_3O_8	Phillips files (1981), Clark (1980)
Mine Unit #2	10, 15 T19N R11W	2750–2850	Jmw	primary	9.7 mill lbs U_3O_8 at 0.167%; an additional 1 mill lbs U_3O_8 at 0.061%	Phillips files (1981)
Mine Unit #3	30 T19N R11W	3000–3150	Jmw	primary	12.4 mill lbs U_3O_8 at 0.1%; an additional 1.4 mill lbs U_3O_8 at 0.06%	Phillips files (1981)
Sec. 18, 19	18, 19 T19N R11W	3100	Jmw	primary	—	Phillips files (1981)
Sec. 16 proposed in-situ leach project	16 T18N R12W	2600–2700	Jmw	primary	—	Phillips files (1981)
[1]Sec. 32 proposed in-situ leach project	32 T19N R12W	3000–3200	Jmw	primary	10–15 mill lbs U_3O_8	Phillips files (1976), Holen and Hatchell (1986)

[1] not shown on map due to lack of data
[2] Phillips files are available foor public inspection at the NMBMMR Geotechnical Information Center.

MAP 8- URANIUM DEPOSITS IN THE NOSE ROCK AREA, GRANTS URANIUM DISTRICT, McKINLEY COUNTY, NEW MEXICO.

Compiled by V.T. McLemore from field reconnaissance, Clark (1980), G.W. Hazlett (written communication, 1987), J. Greenslade (written communication, 1987), & Phillips Uranium Corp. files (1976–1981).



NOTE: WESTWATER CANYON MEMBER IS REDUCED IN MOST OF THIS AREA. THERE HAS BEEN NO PRODUCTION FROM THESE DEPOSITS.

Drafted by V.T. McLemore & K. Campbell

Revised December 1991

ED_000571_00011052-00033