UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY

Lithologic Descriptions, of Cutting Samples, Mariano Lake-Lake Valley Drilling Project, McKinley County, New Mexico, Holes 9 and 10

by

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INTRODUCTION

In the fall of 1980, the U.S. Geological Survey contracted with Longman Drilling Company of Albuquerque, New Mexico to rotary drill and core twelve holes along a north-south line from Mariano Lake to the vicinity of Lake Valley, New Mexico. This report contains the lithologic descriptions of core and cutting samples from drill hole nos 9 and 10.

The drilling project was funded under a reimbursable interagency agreement between the U.S. Bureau of Indian Affairs (BIA) and the U.S. Geological Survey (USGS). The program was designed by representatives of the BIA, USGS, and the Minerals Department of the Navajo Tribe.

PURPOSE

The principal objective of this project was to provide core samples and geophysical logs for petrologic, sedimentologic, geophysical, and geochemical studies of the Upper Jurassic Morrison Formation. Other objectives included the following: stratigraphic and coal studies of Upper Cretaceous rocks; hydrologic and water monitoring of well no. 2; and control for a proposed seismic study of the same geographic area.

ACKNOWLEDGEMENTS

The USGS wishes to acknowledge the cooperation of Conoco for permission to drill hole nos. 9 and 10 on their mineral lease.

GENERAL DRILLING PLAN

The locations of all twelve drill holes are shown on figure 1, which is a portion of the Gallup $1^{\circ} \times 2^{\circ}$ Quadrangle. The general drilling plan called for most holes to be rotary drilled into the Upper Cretaceous Dakota Sandstone and then cored into or through the Recapture Member of the Morrison Formation. The interval to be cored in each hole was about 600 ft.

Exceptions to the general drilling plan were as follows: Hole no. 2,

rotary drilled, surface to Jurassic Entrada Sandstone; Hole no. 4A, cored 21-218 ft, to test an observed near surface I.P. anomaly; Hole no. 6, deepened after coring by rotary drilling into the Jurassic Entrada Sandstone; Hole no. 7A, cored only the Westwater Canyon Member of the Morrison Formation; Hole no. 8, abandoned in lower part of Westwater Canyon Member of the Morrison Formation; and Hole nos. 9 and 10, abandoned in Upper Cretaceous rocks.

Chip samples were collected at 10-ft or 20-ft intervals throughout each hole and sludge samples collected at 20-ft intervals throughout the cored interval.

The following suite of geophysical logs were included in the general drilling project: natural gamma, self potential, neutron-neutron porosity, resistance, resistivity, temperature, deviation, gamma-gamma density, caliper, magnetic susceptibility, gamma ray spectrometer (KUT), sonic, induced polarization, conductivity, and high-resolution 4-arm digital dipmeter.

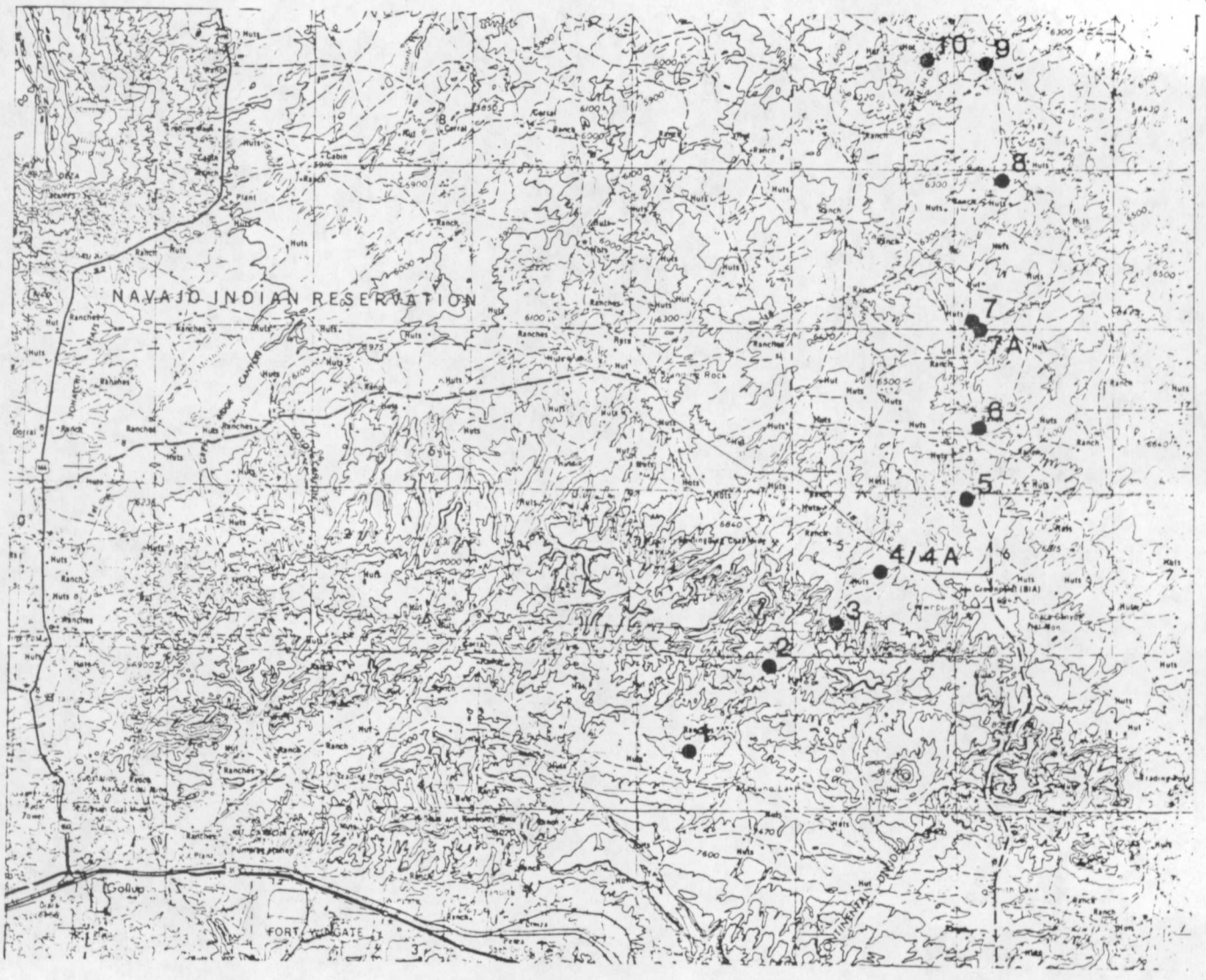

Figure 1. - Location of USGS Drill Holes, Gallup 1^{o} x 2^{o} Quadrangle.

HOLE NUMBERS 9 and 10

The location of these wells are shown on figures 2 and 3.

Cutting samples from rotary drilling were collected and described on 20-ft intervals (tables 1 and 2).

The following suite of geophysical logs were run on these holes and have been published by the U.S. Geological Survey (1981a, b): natural gamma, self potential, resistance, neutron-neutron porosity, resistivity, gamma-gamma density, deviation, and caliper.

Thin coal beds were encountered in hole no. 9 at 442, 715 and 972 ft; and in hole no. 10 at 560, 755 ft, and in the interval 1030-1060 ft.

Both holes were abandoned in Upper Cretaceous rocks after encountering artesian flows estimated from 90-125 gallons per minute of admixed oil and water. The oil producing formation in both holes was the Point Lookout Sandstone (Cretaceous) and was encountered at 1030-1177 ft in hole no. 9, and at 1068-1170 ft in hole no. 10. Equipment was not available to test the formation.

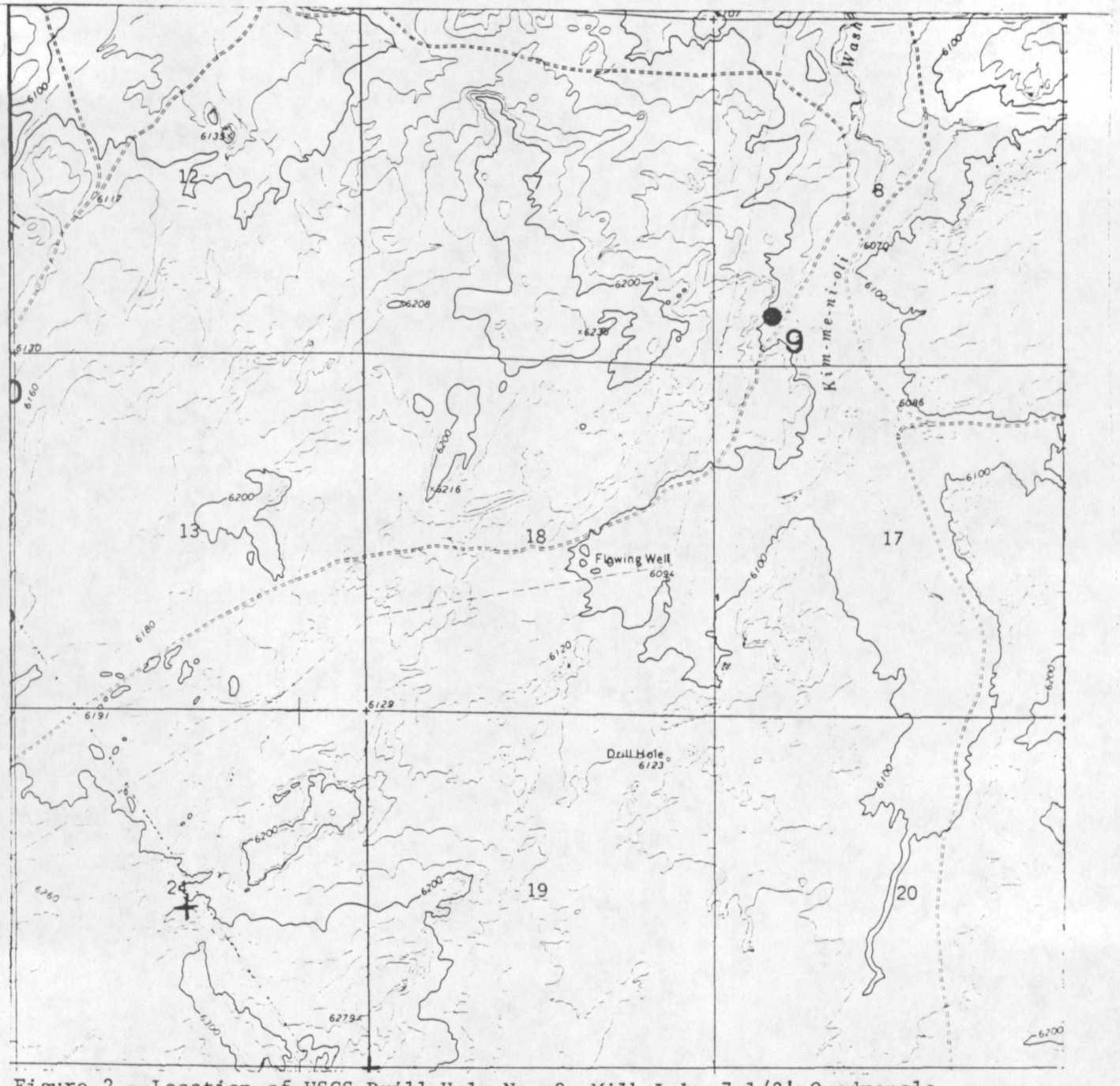

Figure 2.--Location of USGS Drill Hole No. 9, Milk Lake 7 1/2' Quadrangle, T20N, R12W.

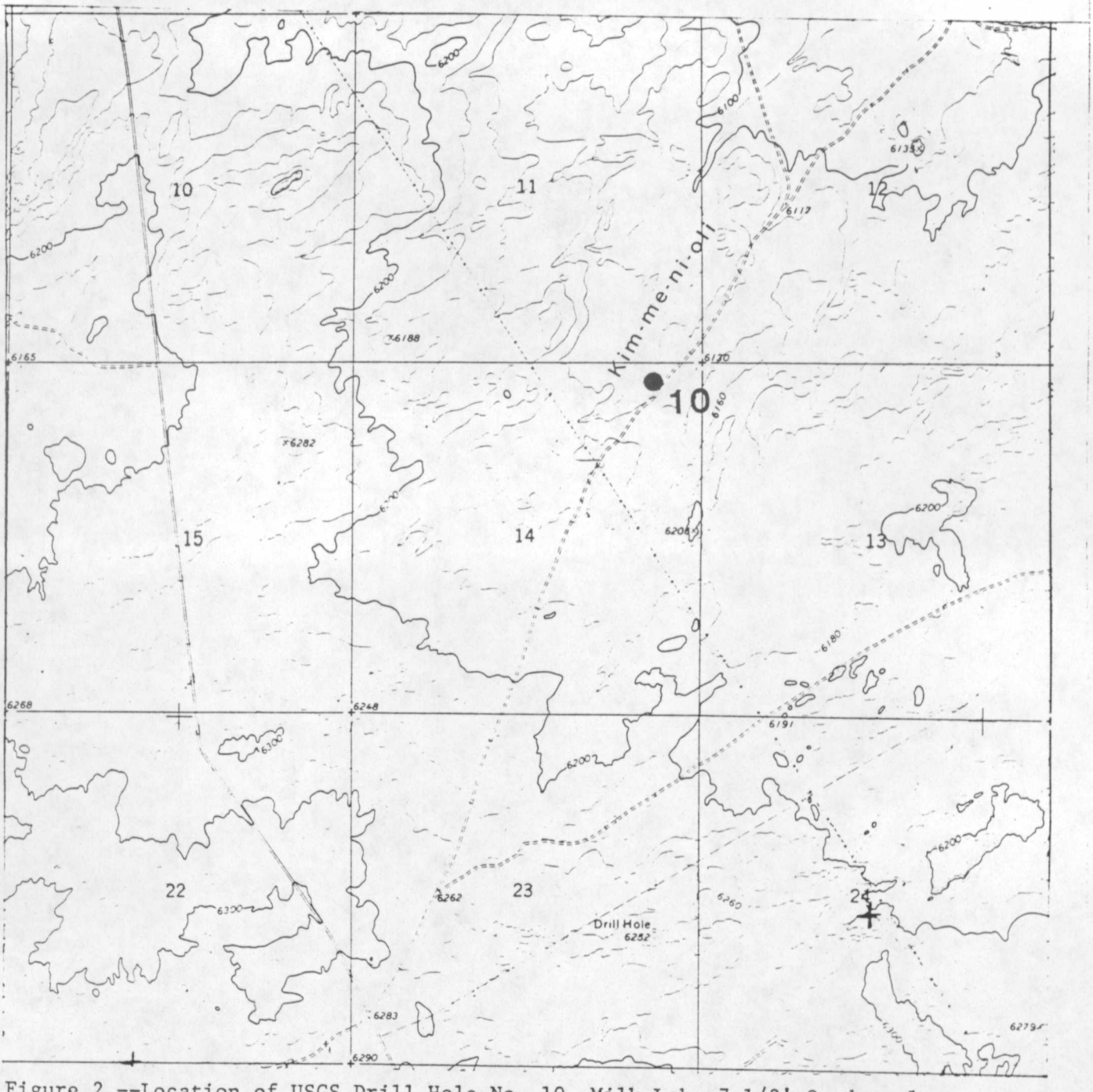

Figure 2.--Location of USGS Drill Hole No. 10, Milk Lake 7 1/2' Quadrangle, T20N, R12W.

DRILL HOLE NO. 9

The vital statistics on this well include:

Spud date: Dec. 10, 1980

Location: T. 20 N., R. 12 W., SW/4 sec. 8

Lat. 35°58′30", Long. 108°08′30"

Collar Elevation: 6095 ft (topo) Menefee Fm. (Cretaceous)

Total Depth: 1465 ft (depth) Satan Tongue of Mancos Shale (Cretaceous)

Casing: 78 ft of 7 in. surface casing

Status of well: Cemented and abandoned, December 12, 1980.

DRILL HOLE NO. 10

The vital statistics on this well include:

Spud date: December 12, 1980

Location: T. 20 N., R. 13 W., NE/4 sec. 14

Lat. 35°58′17", Long. 108°11′04"

Collar Elevation: 6130 ft (topo) Menefee Fm. (Cretaceous)

Total Depth: 2326 ft (depth) Gallup Sandstone (Cretaceous)

Casing: 117 ft of 7 in. surface casing

Status of well: Cemented and abandoned, December 18, 1980.

REFERENCES CITED

Reynolds, M. W., Ahlbrandt, T. S., Fox, J. E., and Lambert, P. W., 1975, Description of selected drill cores from Paleozoic rocks, Lost Soldier Oil Field, South Central Wyoming, Part 1: U.S. Geological Survey Open-File Report 75-662, 34 p.

USGS, 1981a, Geophysical log suite from drill hole no 9, Mariano Lake-Lake Valley drilling project, McKinley County, New Mexico, USGS Open-File Report 81-975, 4 p.

USGS, 1981b, Geophysical log suite from drill hole no. 10, Mariano Lake-Lake Valley Drilling Project, McKinley County, New Mexico, USGS Open-File Report 81-976, 4 p.

Table 1. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 9, New Mexico

CHIP SAMPLE LOG FORM

Location: Lake Valley Sec. 8 T. 20N R. 12W Quadrangle (7.5') Milk Lake

Hole No: 5-9 State: NM Date: 12/14/80

Company: USGS County: McKinley Geologist: Hammond, Dubiel

Lat/Long: ______ Sheet 1 of 8.

Depth to btm of Sampled Interval (feet)	Sample Number	Geob/sec BKG=75	Congl.	Sandst.	Siltst.	Shale	Shale color	Coal	Limestone	Grain size	Sorting	Roundness	Feldspar	Carbonac.	Pyrite	Access.	Sandstone Color	Formation/Member	COMMENTS
			Estimated % of Lithologies							Sandstones									
20																			No Sample
40																			No Sample
60																			No Sample
80	80-59-80	75		95	5			TR		UF-LM	M	SA	TR			Red cht	5Y6/1	Allison Mbr. Menefee Fm Kmfa	Limonite-stained quartz
100		75		30		70	N-2			LF	M	SA		TR			N-6	Kmfa	
120		75		80		20	N-3 (5G6/1)			F	MW	SA-SR				Red cht	N-6	Kmfa	
140		75		60		40	N-7 (5G6/1)			F	W	SA-SR	TR			Red cht	N-6	Kmfa	Limonite-stained quartz
160		75		80		20	N-5			F	W	SA-SR					N-6	Kmfa	Muddy
180		75		80		20	N-3 (5G4/1)			F	W	SA-SR				Red cht	5GY6/1	Kmfa	Hematite-stained qtz, calcareous
200	80-59-200	75		90		10	N-2 (5G4/1)			F	W	SA-SR				Red cht	5GY6/1	Kmfa	Limonite-stained qtz, calcareous

Table 1. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 9, New Mexico

CHIP SAMPLE 106 FORM

Location: Lake Valley Sec. 8 T. 20N R. 12W Quadrangle (7.5') Milk Lake

Hole No: 5-9 State: NM Date: 12/14/80

Company: USGS County: McKinley Geologist: Hammond, Dobiel

Lat/Long: ______ Sheet 2 of 8.

			Estimated % of Lithologies							Sandstones									
Depth to btm. of sampled Interval (feet)	Sample Number	Condb/ice DXE-75	Congl.	Sandst.	Siltst.	Shale	Shale color	Coal	Limestone	Grain Size	Sorting	Roundness	Feldspar	Carbonac.	Pyrite	Access.	Sandstone Color	Formation/Member	COMMENTS (VERY MUDDY)
220	80-59-220	75		60	10	30	N-5			F-M	M	SR		✓			5G6/1	Kmfa	
240		75		50		50	N-3			F	P	SA	TR				5G6/1	Kmfa	Calcareous
260		75		80		20	N-6			F	M	SA-SR		✓		Blue qtz, Red cht	5G6/1	Kmfa	Very calcareous Limonite-staining
280		75		70		30	N-5			F	M	SR		✓			5G46/1	Kmfa	Limonite-staining
300		75		80		20	N-5			F	M-W	SR		✓		Red cht	10YR6/6	Kmfa	Slightly calcareous Limonite-staining
320		75		95		5	N-6			VF	M-W	SA		✓		Apple-green grains	5Y6/1	Kmfa	Limonite-staining
340		75		95		5	N-6			F-VF	M	SR		✓		Red cht	5G46/1	Kmfa	Calcareous Limonite-staining
360		75		95		5	N-6			F	W	SR		✓		Red cht	5G48/1	Kmfa	Calcareous
380		75		90		10	N-6			F-M	P	SR		✓		Red cht	5G46/1	Kmfa	Slightly calcareous Hematite-staining
400	80-59-400	75		90		10	N-6			F-M	M	SA		✓		Green grain	5G46/1	Kmfa	Limonite-staining

CHIP SAMPLE 106 FORM

Location: Lake Valley Sec. 8 T. 20N R. 12W Quadrangle (7.5') Milk Lake

Hole No: 5-9 State: NM Date: 12/14/80

Company: USGS County: McKinley Geologist: Hammond, Dubiel

Lat/Long: ______ Sheet 3 of 8.

Table 1. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 9, New Mexico

Depth to btm of Sampled Interval (feet)	Sample Number	Count/sec BKG = 75	Estimated % of Lithologies: Congl.	Sandst.	Siltst.	Shale	Shale color	Coal	Limestone	Sandstones: Grain Size	Sorting	Roundness	Feldspar	Carbonac.	Pyrite	Access.	Sandstone Color	Formation/Member	COMMENTS
420	80-59-420	75		90		10	5YR4/1	TR		F-VF	W			✓			5GY6/1	Kmfa	Limonite-stained quartz
440		75		95		5	N-3 (5G6/1)	TR		UF-LM	M			✓		Red cht	N-7	Kmfa	Calcareous
460		75		80		20	N-3			F	MW			✓		Red cht	Too muddy	Kmfa	Very muddy
480		75		80		20	N-4			F	W			✓			N-7	Kmfa	
500		75		100					TR	F	W			✓		Red cht, apple gn gr	N-7	Kmfa	Limonite-stained quartz
520		75		100						F	W		?	✓		Blue qtz, red cht, apple-gn gr	N-5	Kmfa	
540		75		100						F	W		?	✓		Red cht, bl qtz, apple-gn gr	N-5	Kmfa	Limonite-stained grains
560		75		90		10	N-2			F	W			✓			N-5	Kmfa	
580		75																Kmfa	Too muddy (100% driller's mud)
600	80-59-600	75		100						F	MW		TR	✓		Bl qtz, red cht, apple-green grains	N-5	Kmfa	Hematite- & Limonite-stained quartz

CHIP SAMPLE LOG FORM

Location: Lake Valley Sec. 8 T. 20N R. 12W Quadrangle (7.5') Milk Lake

Hole No: S-9 State: NM Date: 12/14/80

Company: USGS County: McKinley Geologist: Hammond, Dubiel

Lat/Long: ______ Sheet 4 of 8.

Table 1. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 9, New Mexico

Depth to btm of Sampled Interval (feet)	Sample Number	Cond/lcc (8K6=75)	Estimated % of Lithologies: Congl.	Sandst.	Siltst.	Shale	Shale color	Coal	Limestone	Sandstones: Grain Size	Sorting	Roundness	Feldspar	Carbonac.	Pyrite	Access.	Sandstone Color	Formation/Member	COMMENTS
620	80-59-620	75		95		5	N-4	TR	TR	VF-F	M	SA-SR		✓			N-7	Km fa	Limonite-stained quartz
640		75		50		50	N-3			VF-F	W	SR					N-7	Km fa	Very slightly calcareous
660		75		100				TR		VF-F	MW	SR		✓			N-7	Km fa	Slightly calcareous Hematite-staining
680		75		95		5	N-3	TR		F	W	R-SR		✓		Red cht	N-7	Km fa	Slightly calcareous Limonite-staining
700		75		80		20				VF	MW	R-SR						Km fa	Very muddy
720		75		10		90	N-3 to N-2			VF	MW	SR-R		✓			N-7	Km fa	Slightly calcareous H_2S odor
740		75		10		90	N-2 to N-3			VF	MW	SR-R		✓			N-7	Km fa	H_2S odor
760		75		20		80				VF	MW	SR		✓		Pink qtz grains		Km fa	Very muddy
780		75		5		95	N-3			VF	MW	SR		✓				Km fa	Very slightly calc H_2S odor Very muddy.
800	80-59-800	75		5		95	N-3			VF	MW	R		TR				Km fa	Slightly calcareous white chips (ls?)

CHIP SAMPLE 106 FORM

Location: Lake Valley Sec. 8 T. 20N R. 12W Quadrangle (7.5') Milk Lake

Hole No: 5-9 State: NM Date: 12/15/80

Company: USGS County: McKinley Geologist: Hoffman, Mruk

Lat/Long: ________ Sheet 5 of 8.

Table 1. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 9, New Mexico

Depth to base of Sampled Interval (feet)	Sample Number	Cond/Loss (BKG=75)	Estimated % of Lithologies: Congl.	Sandst.	Siltst.	Shale	Shale color	Coal	Limestone	Sandstones: Grain Size	Sorting	Roundness	Feldspar	Carbonac.	Pyrite	Access.	Sandstone Color	Formation/Member	COMMENTS
820	80-59-820	75		90		8	N-4	2		LF	W	SR	TR	Coal flecks		Blk & red cht, Apple-green grains		Kmfa Allison Barren Mbr, Menefee Fm	Very Calcareous
840		75		40		60	N-4			LF	W	SR	TR			Blk & red cht, apple-green grains		Kmfa	Slightly calcareous
860		75		10		90	N-4			LF	W	SR	TR			Blk & red cht Apple-green grains		Kmfa	Moderately calcareous
880		75		5		95	N-4			LF	W	SR	TR			Blk & red cht apple-green grains		Kmfa	Slightly Calcareous (sand probably contamination)
900		75		100						UF	W	SR	1-2%	Carb frags		Blk & red cht dk gn grains		?	Very friable sltst Very slightly calc
920		75		100						UF	W	SR	1-2%	Carb frags		Blk & red cht dk gn grains	N-6	?	Very slightly calc Very friable
940		75		100						UF	W	SR	1-2%	Carb frags		Blk & red cht dk gn grains	N-6	?	Very slightly calc Very friable
960		75		90		10	N-4			LM	W	SR	<1%	Carb frags		Blk & red cht dk gn grains	N-6	Kmfc(?) Cleary Coal Mbr, Menefee Fm	Slightly calcareous
980		75		100						LF	W	SR	3-4%	Carb frags		Blk & red cht	N-7	Kmfc(?)	Non-calcareous Very friable sand (> drilling mud)
1000	80-59-1000	75		100						LF	W	SR	3-4%			Blk & red cht	N-7	Kmfc(?)	Non-calcareous Very friable sand (>drilling mud)

CHIP SAMPLE LOG FORM

Location: Lake Valley. Sec. 8 T. 20N R. 12W. Quadrangle (7.5') Milk Lake

Hole No: S-9 State: NM Date: 12/15/80

Company: USGS County: McKinley Geologist: Huffman, Mruk

Lat/Long: ______ . Sheet 6 of 8 .

Table 1. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 9, New Mexico

Depth to bottom of Sampled Interval (feet)	Sample Number	Comb/Ecc (Bkg=75)	Estimated % of Lithologies: Congl.	Sandst.	Siltst.	Shale	Shale color	Coal	Limestone	Sandstones: Grain size	Sorting	Roundness	Feldspar	Carbonac.	Pyrite	Access.	Sandstone Color	Formation/Member	COMMENTS
1020	80-59-1020	75		100				TR		LF	W	SR	3%	Carb frags		Blk & red cht DK gn grains	N-6	?	Very slightly calc
1040		75		40		60	N-4			LVF	W	SR		Carb frags		Blk (carb?) acc Red cht	N-6	?	Very slightly calc Trace silt >drilling mud
1060		75		30		70	N-4			UVF	?	?				Blk (carb?) acc Red cht	N-6	Kmfc/Kpl Point Lookout Sandstone	Very slightly calcareous
1080		75		100						LM	W	SR-SA	2-3%	Abun Carb mat	TR	Blk (carb?) acc Red cht Roseyte	N-5	Kpl	Slightly calc
1100		75		100						LM	W	SA-SR	2-3%	Abun carb mat	TR	Shell frags Blk & red cht	N-5	Kpl	Very calcareous Limonite-stained grains
1120		75		100				Coaly frags		LF	W	SR	1-2%	Abun carb mat		Blk cht Blk acc	N-5	Kpl	Muddy Very friable, fine-grained ss, limonite-stained Very slightly calc
1140		75		100				Coaly frags		UF	W	SR	1-2%	Abun carb mat		Blk & red cht	N-5	Kpl	Good ss
1160		75		100						UF	W	SR	TR	Abun carb mat	TR	Blk & red cht	N-5	Kpl	Limonite-stained grains
1180		75		75	25		N-4	Coaly frags		UF	W	SR	TR	Abun carb mat	TR	Blk & red cht	N-5	Kpl	Very muddy Limonite-stained
1200	80-59-1200	75		90	10		N-4			UF	MW	SR	TR	Abun carb mat	TR	Blk & red cht	N-5	Kpl	Limonite-stained

CHIP SAMPLE LOG FORM

Location: ______ Sec. 8 T. 20N R. 12W Quadrangle (7.5') Milk Lake

Hole No: S-9 State: NM Date: 12/15/80

Company: USGS County: McKinley Geologist: Huffman, Mruk

Lat/Long: ______ Sheet 7 of 8

Table 1. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 9, New Mexico

Depth to btm of Sampled Interval (Feet)	Sample Number	Comb/Loss (Ext=75)	Estimated % of Lithologies: Congl.	Sandst.	Siltst.	Shale	Shale color	Coal	Limestone	Sandstones: Grain Size	Sorting	Roundness	Feldspar	Carbonac.	Pyrite	Access.	Sandstone Color	Formation/Member	COMMENTS
1220	20-59-1220	75		100				✓		UF	MW	SR-SA	TR	Abun		Red & blk cht shell frags	5Y4/11	Kpl Point Lookout Sandstone	Very calcareous Abun. limonite stain
1240		75		40	60			✓		LM	MW	SR-SA	3-4%	Abun		Red & blk cht	5Y4/11	Satan Tongue Mancos Shale	Very slightly calc Limonite-stained quartz
1260		75		70	25	5	N-3	✓		LM-UF	M	SR-SA	1-2%	Abun	✓	Red & blk cht	N-6	Kms	Slightly calcareous Limonite- & hematite(?)-stained qtz Large white qtz
1280		75		90	5	5	N-3	TR		LM	MW	SR-SA	1-2%	Abun		Rose qtz Red & blk cht	N-7	Kms	Moderately calc Shell (?) frags Hematite-stained qtz Large white qtz
1300		75		95	5			✓		UF	MW	SR-SA	1-2%	Abun		Rose qtz Red & blk cht	N-7	Kms	Moderately calc Large(cr) qtz
1320		75		100						LF	W	SR	1%	Abun	✓	Red & blk cht	N-7	Kms	Muddy Slightly calcareous Limonite-stained qtz
1340		75		20	TR	80	N-3			UF	MW	SR	1%	Abun	✓	Rose qtz Red & blk cht Grn qtz	N-6	Kms	Very calcareous Limonite-stained qtz
1360		75		95		5	N-3	TR		UF	W	SR	2-3%	Abun		Abun red cht Rose qtz	N-6	Kms	Slightly calcareous Limonite-stained quartz
1380		75		95		5	N-3	TR		UF	W	SR	2-3%	Abun		Abun red cht	N-6	Kms	Slightly calcareous Limonite-stained quartz
1400	20-59-1400	75		90		10	N-3			UF	W	SR	3%	Abun	✓	Red & blk cht Rose qtz	N-6	Kms	Shell fragments Large granules of feldspar

CHIP SAMPLE LOG FORM

Location: Lake Valley Sec. 8 T. 20N R. 12W Quadrangle (7.5') Milk Lake

Hole No: 5-9 State: NM Date: 12/15/80

Company: USGS County: McKinley Geologist: Huffman, Mruk

Lat/Long: ______ , Sheet 8 of 8.

Table 1. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 9, New Mexico

Depth to btm of sampled interval (feet)	Sample number	Comb/Geo (BKG=75)	Estimated % of lithologies: Congl.	Sandst.	Siltst.	Shale	Shale color	Coal	Limestone	Sandstones: Grain size	Sorting	Roundness	Feldspar	Carbonac.	Pyrite	Access.	Sandstone color	Formation/Member	COMMENTS
1420	80-59-1420	75		90		10	N-4			VF	MW	SR	TR	TR		Lt gn clay frag	N-7	Kms Mancos Shale	Green stringer Moderately calc
1440		75		95		5	N-4			VF	MW	SR	2% plag?	TR		Red & blk cht Lt gn cly frag	N-7	Kms	Slightly calcareous
1460		75		97		3	N-4	TR		LF	MW	SR	TR	Abun		Blk & red cht Rose qtz Lt gn cly	N-7	Kms	Slightly calcareous Limonite-stained grains
1465 T.D.																			No Sample

CHIP SAMPLE LOG FORM

Location: ______ Sec. 14 T. 20N R. 13W Quadrangle (7.5') Milk Lake

Hole No: S-10 State: NM Date: 12/16/80

Company: USGS County: McKinley Geologist: Huffman, Dubiel

Lat/Long: ______ . Sheet 1 of 12 .

Table 2. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 10, New Mexico

Depth to btm of sampled interval (Feet)	Sample number	Geoph/sco BKG=65	Estimated % of lithologies: Congl.	Sandst.	Siltst.	Shale	Shale color	Coal	Limestone	Sandstones: Grain size	Sorting	Roundness	Feldspar	Carbonac.	Pyrite	Access.	Sandstone Color	Formation/Member	COMMENTS
20	80-510-20	68																QUATERNARY ALLUVIUM	Surficial
40		66																↓	Surficial
60		67				100	N-4											↓	90% surficial
80		69		80		20	N-4			UVF	W	SR	—	?		Blk chert (ORG?) dk gn gr	N-6	Kmfa Allison Mbr., Menefee Formation	Limonite-stained grains (quartz)
100		67		90		10	N-4			UVF	W	SR		TR		Blk chert	N-6	Kmfa	Limonite-stained quartz grains; very slightly calc.
120		73		10	30	60	N-4			UVF	W	SR					N-6	Kmfa	Some gn-gy (5GY6/1) siltstone & shale chips
140		72		5	5	90	N-4			LF	W	SR	TR			Red chert	5GY6/1	Kmfa	Gypsum(?) Very slightly calc.
160		67		90		10	N-4	TR		LF-UF	W	SR	TR	✓		Blk chert Tr red chert	N-6	Kmfa	
180		74		80		20	N-4			LF	W	SR	TR	TR		Tr blk & red chert	N-6	Kmfa	
200	80-510-200	70		90		10	N-4			LF-UF	W	SR	TR	✓		Blk & red chert	N-5	Kmfa	Limonite-stained siltstone (surficial?) slightly calc.

Table 2. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 10, New Mexico

CHIP SAMPLE LOG FORM

Location: _____ Sec. 14 T. 20N R. 13W Quadrangle (7.5') Mill Lake

Hole No: S-10 State: NM Date: 12/16/80

Company: USGS County: McKinley Geologist: Huffman, Dubiel

Lat/Long: _____ Sheet 2 of 12.

Depth to btm of Sampled Interval	Sample Number	Cuttings/Core BKS=CS	Estimated % of Lithologies							Sandstones								Formation/Member	COMMENTS
			Congl.	Sandst.	Siltst.	Shale	shale color	Coal	Limestone	Grain Size	Sorting	Roundness	Feldspar	Carbonac.	Pyrite	Access.	Sandstone Color		
220	80-S10-220	65		75	10	15	N-2 → N-1	✓		UVF	W	SR	TR	✓		BLK & red chert	N-6	Kmfa Allison Mbr, Menefee Formation	Moderately calcareous
240		67		90		10	N-4	TR		UVF	W	SR	TR	✓✓		BLK chert, dk gn sand gr	N-6	Kmfa	Slightly calcareous
260		65		60		40	N-4	✓		LVF	W	SR		✓		Y-gn gl gr, s BLK cht gr	N-6	Kmfa	
280		68		90		10	N-4			LF	W	SR	TR	✓		BLK chert	N-6	Kmfa	Carb shale fragments
300		68		50	30	1-20	N-4			LVF	VW	WR		TR		v small slt-sz BLK chert	N-6	Kmfa	
320		70		90	5	5	N-4			UVF	VW	WR	TR			BLK cht WA appln gn gr	N-6	Kmfa	Limonite-stained quartz
340		66		100						LF	W	SR	1-2%	✓		Red chert, gn grains	N-6	Kmfa	
360		65		100						LF	W	SR	1-2%	TR		BLK & red cht	N-6	Kmfa	
380		70		95		5	N-4			LF-UVF	W	SR	1-2%	✓		BLK & red cht	N-6	Kmfa	
400	80-S10-400	70		95		5	N-4			LF-UVF	W	SR	1-2%	✓✓		BLK & red chert	N-6	Kmfa	

CHIP SAMPLE LOG FORM

Location: ______ Sec. 14 T. 20N R. 13W Quadrangle (7.5') Milk Lake

Hole No: 5-10 State: NM Date: 12/17/80

Company: USGS County: McKinley Geologist: Huffman

Lat/Long: ______ Sheet 3 of 12.

Table 2. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 10, New Mexico

Depth to btm of Sampled Interval	Sample number	Gamb/Lcc BKG±65	Estimated % of Lithologies: Congl.	Sandst.	Siltst.	Shale	Shale color	Coal	Limestone	Sandstones: Grain size	Sorting	Roundness	Feldspar	Carbonac.	Pyrite	Access.	Sandstone Color	Formation/Member	COMMENTS
420	80-510-420	65		95		5	N-4			VF	W	SR	1-2%	NONE		Blk chert	N-6	Kmfa Allison Mbr, Menefee Formation	Non-calcareous
440		68		10	30	60	N-4 (also some gn-gy clay)			VF	W	SR	TR				N-6	Kmfa	Non-calcareous
460		65		20	50	30	N-4 (also some gn-gy slty clay)			VF	W	SR	TR			Blk & red chert	N-6	Kmfa	
480		69		85	TR	15	N-4 (also some gn-gy slty clay chips)			UVF-LF	W	SR	TR			Blk & red chert	N-6	Kmfa	
500		70		85		Carb shale 15	N-2			UVF	W	SR	TR			Blk cht, Tr red chert	N-6	Kmfa	
520		70		90		10	N-4			UVF-LF	W	SR	TR	?		Red & blk cht	N-6	Kmfa	
540		68		90		10	N-4 (gn-gy slty clyst)	TR		UVF	W	SR	1-2%			Red & blk cht	N-6	Kmfa	
560		70		85		15	N-4 (also gn-gy slty clyst)			UVF-LF	W	SR	1%	TR		Blk & red cht	N-6	Kmfa	
580		69		90		10	N-4 (also gn-gy slty shale)			LF	W	SR	1%	TR		Blk & red cht	N-6	Kmfa	
600	80-510-600	70		40		60	N-4			UVF	W	SR				Blk cht	N-6	Kmfa	

CHIP SAMPLE LOG FORM

Location: ______ Sec. 14 T. 20N R. 13W Quadrangle (7.5') Milk Lake

Hole No: S-10 State: NM Date: 12/17/80

Company: USGS County: McKinley Geologist: Huffman

Lat/Long: ______ Sheet 4 of 12

Table 2. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 10, New Mexico

Depth to btm of Sampled Interval	Sample Number	Geoph/ssc Bkg ocs	Estimated % of Lithologies: Congl.	Sandst.	Siltst.	Shale	Shale color	Coal	Limestone	Sandstones: Grain Size	Sorting	Roundness	Feldspar	Carbonac.	Pyrite	Access.	Sandstone Color	Formation/Member	COMMENTS
620	80-510-620			5		95	N-4			UVF							N-6	Kmfa Allison Mbr, Menefee Formation	
640				25		75	N-4			UVF	W	SR				Blk cht	N-6	Kmfa	
660				80		20	N-4			UVF	W	SR	TR	TR		Blk cht	N-6	Kmfa	
680				95		5	N-4			LF	W	SR	TR	TR		Blk cht, Tr red cht	N-6	Kmfa	
700				95		5	N-4			LF	W	SR	TR	TR		Blk cht, tr red cht	N-6	Kmfa	
720				97				3		LF	M	SR-SA	1%	TR		Red & blk cht	N-6	Kmfc(?) Cleary Coal Mbr Menefee Fm	
740				95		4	N-4	1		LF	W	SR-SA	1%			Gn-gy sltst clast; R & blk cht	N-6	Kmfc(?)	
760				95		5	N-4			LF	M	SR-SA	1-2%			Gy-gn slty clyst, R & blk cht	N-6	Kmfc(?)	
780				95		4	N-4	1		LF	M	SR-SA	1%			Gn-gy sltst, R & blk cht, lt gn gr	N-6	Kmfc(?)	Quite a bit of carb shale and coal
800	80-510-800			97		3	N-4			LF	W	SR-SA	TR	TR		Red & blk cht	N-6	Kmfc(?)	Small limonite-stained quartz grain

Table 2. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 10, New Mexico

CHIP SAMPLE LOG FORM

Location: ______ Sec. 14 T. 20N R. 13W Quadrangle (7.5') Milk Lake

Hole No: 5-10 State: NM Date: 12/17/80

Company: USGS County: McKinley Geologist: Huffman, Dubiel

Lat/Long: ______ Sheet 5 of 12.

Depth to btm of Sampled Interval	Sample Number	Count/sec Bkg 65	Estimated % of Lithologies: Congl.	Sandst.	Siltst.	Shale	Shale color	Coal	Limestone	Sandstones: Grain size	Sorting	Roundness	Feldspar	Carbonac.	Pyrite	Access.	Sandstone Color	Formation/Member	COMMENTS
820	80-510-820	65		30			N-4	TR	TR	VF	MW	SR			✓		N-6	Kmfc(?) Cleary Coal Mbr Menefee Fm.	Non-calcareous
840		71		70			N-4		TR	F	W	SR-SA				Blk cht	N-7	Kmfc(?)	Very slightly calc, limonite-stained quartz
860		73		80			N-4	TR	2	VF-M	W	SR-SA		✓	✓	Blk cht	N-7	Kmfc	Slightly calc, limonite-stained quartz
880		74		10	30	60	5Y8/1 (silt) N-4 (shale)			VF	W	SR	TR			Red & blk cht	N-6	Kmfc	Calcareous, hematite-stained quartz
900		74		60	5	35	N-4			F-VF	W	R-SR	TR			Blk cht	N-6	Kmfc	Slightly calc, limonite-stained quartz
920		74		80		20	N-4		TR	F-M	MW	SA	✓	✓		Red & blk cht	N-6	Kmfc	Calcareous, limonite-stained quartz
940		76		70		30	N-4			VF-M	MW	SR	1-2%	✓		Blk cht, Bi otz, Apple-gn grains	N-6	Kmfc	Slightly calcareous
960		68		70		30	N-4			F	MW	SR				Red cht	N-6	Kmfc	Very calcareous limonite-stained quartz
980		70		85		15	N-4		TR	F-M	MW	SA-SR	2%	TR		Blk cht	N-7	Kmfc	Very calcareous limonite-stained quartz
1000	80-510-1000	70		80	5	15	N-4			VF-F	W	R-SA		✓		Blk cht	N-7	Kmfc	Very calcareous

CHIP SAMPLE LOG FORM

Location: ________ Sec. 14 T. 20N R. 13W Quadrangle (7.5') Milk Lake

Hole No: 5-10 State: NM Date: 12/19/80

Company: USGS County: McKinley Geologist: Hammond, Dubiel

Lat/Long: ________ Sheet 6 of 12.

Table 2. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 10, New Mexico

Depth to btm of Sampled Interval	Sample Number	Counts/sec BKG=CS	Estimated % of Lithologies: Congl.	Sandst.	Siltst.	Shale	Shale Color	Coal	Limestone	Sandstones: Grain Size	Sorting	Roundness	Feldspar	Carbonat.	Pyrite	Access.	Sandstone Color	Formation/Member	Comments
1020	80-S10-1020	65		90		10	N-4			VF-F	MW	SA-SR				Apple gn gr	N-7	Kmfc Cleary Coal Mbr, Menefee Fm	VERY CALCAREOUS LIMONITE-STAINED QUARTZ
1040		67		85		15	N-4			VF-F	W	R-SA	TR	✓			N-7	Kmfc	CALCAREOUS LIMONITE-STAINED QUARTZ
1060		70		10		30	N-4	60		VF	W	SR-SA		✓			N-7	Kmfc	SLIGHTLY CALC HEMATITE-STAINED QUARTZ
1080		74		40		50	N-4	10		VF-F	W	SR-SA		✓			N-7	Kmfc	SLIGHTLY CALC HEMATITE-STAINED QUARTZ
1100		70		28		70	N-3	2	TR	F-VF	W	SR-SA		✓	✓	PYR, H_2S, rose qtz	N6	Kmfc	SLIGHTLY CALC HEMATITE-STAINED QUARTZ
1120		75		40		60	N-3	TR		F	W	SA-SR		✓	✓	PYR, rose qtz	N6	Kpl(?) POINT LOOKOUT SS	CALCAREOUS LIMONITE-AND HEMATITE-STAINED QUARTZ
1140		69		20		80	N-2	TR		F	W	SA-SA		✓		Apple-gngr	N6	Kpl(?)	SLIGHTLY CALCAREOUS
1160		70		50		50	N-3			F	W	SR-SA		✓	✓	Pyr, Apple-gngr	5Y4/1	Kpl	CALCAREOUS HEMATITE-STAINED QUARTZ
1180		70		95		5	N-3			UVF-UF	W	SA-SR		✓	✓	Apple-gngr, red cht	5Y6/1	Kpl	SLIGHTLY CALC LIMONITE-STAINED GRAINS
1200	80-S10-1200	67		95		5	N-2			UVF-UF	W	SA-SR		✓	✓	Apple-gngr, red cht	5Y6/1	Kpl	SLIGHTLY CALC LIMONITE-STAINED GRAINS

CHIP SAMPLE LOG FORM

Location: ______ Sec. 14 T. 20N R. 13W Quadrangle (7.5') Milk Lake

Hole No: S-10 State: NM Date: 12/19/80

Company: USGS County: McKinley Geologist: Dubiel, Hammond

Lat/Long: ______ Sheet 7 of 12.

Table 2. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 10, New Mexico

Depth to btm of Sampled Interval	Sample Number	Grab/cc BKG = 65	Estimated % of Lithologies: Congl.	Sandst.	Siltst.	Shale	Shale color	Coal	Limestone	Sandstones: Grain Size	Sorting	Roundness	Feldspar	Carbonac.	Pyrite	Access.	Sandstone Color	Formation/Member	COMMENTS
1220	80-510-1220	69		95		5	N-3	TR		F	W	SR-SA	TR	✓		BlK cht	5GY6/1	Kpl POINT LOOKOUT SANDSTONE	SLIGHTLY CALC LIMONITE-STAINED QUARTZ
1240		68		95		5	N-5			F	W	SR	TR	✓		BlK cht	5GY6/1	Kpl	SLIGHTLY CALC LIMONITE-STAINED QUARTZ
1260		68		60		40	N-2			VF-F	W	SR	2	✓	✓	Pyr, H_2S, blK cht	5Y6/1	Kpl/Kms Satan Tongue, MANCOS SH	SLIGHTLY CALC
1280		70		60		40	N-4		TR	F	W	SR	TR		✓		5Y6/1	Kms	SLIGHTLY CALC LIMONITE-STAINED QUARTZ
1300		68		70		30	N-3			UF	W	SA	TR		✓	Rose qtz, blk cht, apple-gn gr	5GY6/1	Kms	SLIGHTLY CALC HEMATITE- & LIMONITE-STAINED QUARTZ
1320		75		35		65	N-4	TR		F	W	SA-SR	TR	✓		Apple-gn gr	5GY6/1	Kms	CALCAREOUS LIMONITE-STAINED QUARTZ
1340		70		60		40	N-5			F	W	SR			✓	BLK cht, Rose qtz	5GY6/1	Kms	CALCAREOUS LIMONITE-STAINED QUARTZ
1360		70		60		40	N-4			F-VF	W	SR-SA			✓		5GY6/1	?	SLIGHTLY CALC LIMONITE-STAINED QUARTZ
1380		70		70		25	N-4	5		F-M	MW	SA-SR	TR	✓		BLK cht	5GY6/1	?	CALCAREOUS LIMONITE-STAINED QUARTZ
1400	80-510-1400	68		50		50	N-5	TR		VF	W	SA-SR				Red cht	5GY6/1	?	SLIGHTLY CALC LIMONITE-STAINED QTZ, MUDDY

CHIP SAMPLE LOG FORM

Location: ______ Sec. 14 T. 20N R. 13W Quadrangle (7.5') Milk Lake

Hole No: 5-10 State: NM Date: 12/19/80

Company: USGS County: McKinley Geologist: Hammond, Dubiel

Lat/Long: ______ Sheet 8 of 12.

Table 2. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 10, New Mexico

Depth to btm of Sampled Interval	Sample Number	Coarb/fine SKE=65	Estimated % of Lithologies: Congl.	Sandst.	Siltst.	Shale	Shale color	Coal	Limestone	Sandstones: Grain Size	Sorting	Roundness	Feldspar	Carbonac.	Pyrite	Access.	Sandstone Color	Formation/Member	COMMENTS
1420	80-510-1420	70		40		60	N-2	TR		F	W	SR-SA	TR	✓	✓		5GY6/1	?	CALCAREOUS
1440		68		70		30	N-3			F-VF	MW	SR-SA		✓	✓	Red cht, apple-gn gr	N-6	?	VERY CALCAREOUS LIMONITE-STAINED QUARTZ
1460		70		60		40	N-3		TR	VF-F	MW	SA-SR	TR	-	✓		N-6	?	HEMATITE-STAINED GRAINS SLIGHTLY CALC
1480		70		30	30	40	N-3	TR		F-VF	MW	SA	TR	✓	✓		N-5	?	CALCAREOUS LIMONITE-STAINED QUARTZ
1500		69		50	30	20	N-4			VF	W	SA-SR		✓	✓	Red cht	N-6	?	VERY CALCAREOUS
1520		70		60		40	N-4		TR	VF-F	MW	SA				BLK cht	N-6	?	CALCAREOUS GREEN CLAY (5GY6/1)
1540		69		30	50	20	N-4	TR		F	W	SA-SA					N-6	?	SLIGHTY CALC LIMONITE-STAINED QUARTZ
1560		67		60	30	10	N-5		TR	VF-F	MW	R-SA		✓	✓	Red cht	N-5	?	VERY CALCAREOUS HEMATITE- & LIMONITE-STAINED GRAINS
1580		70		70		30	N-4	TR		VF-F	MW	SA-SR	TR	✓		Red cht, blue qtz	N-5	?	VERY CALCAREOUS GREEN CLAY CHIPS (5GY6/1)
1600	80-510-1600	65		70		25	N-3		5	VF	W	SR		✓	✓		5GY6/1	?	CALCAREOUS

CHIP SAMPLE LOG FORM

Location: ______ Sec. 14 T. 20N R. 13W Quadrangle (7.5') Milk Lake

Hole No: S-10 State: NM Date: 12/19/80

Company: USGS County: McKinley Geologist: Hammond, Dubiel

Lat/Long: ______ Sheet 9 of 12.

Table 2. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 10, New Mexico

Depth to btm of Sampled Interval	Sample Number	Gamma/cps SRS: GS	Estimated % of Lithologies: Congl.	Sandst.	Siltst.	Shale	Shale color	Coal	Limestone	Sandstones: Grain size	Sorting	Roundness	Feldspar	Carbonac.	Pyrite	Access.	Sandstone Color	Formation/Member	Comments
1620	80-S10-1620	70		60		40	N-3			VF	W	SR-SA	TR		✓	Blk cht, rose qtz	5GY6/1	?	CALCAREOUS APPLE-GN GRAINS
1640		69		60		40	N-3			VF	W	SR-SA	TR		✓	Blk cht, rose qtz	5GY6/1	?	CALCAREOUS APPLE-GN GRAINS
1660		74		60		40	N-5			VF	W	SR		✓		Red cht	5GY8/1	?	SLIGHTLY CALCAREOUS
1680		65		60		40	N-5			VF	W	SR		✓	✓	Rose qtz, red cht	5GY6/1	?	SLIGHTLY CALC LIMONITE-STAINED QUARTZ
1700		67		80		20	N-5			VF-F	W	SR-SA		✓		Blk cht, H_2S	5GY6/1	?	CALCAREOUS HEMATITE-STAINED QUARTZ
1720		65		50		50	N-4			VF-F	W	SA-R	TR	✓		Blk cht	5GY6/1	?	CALCAREOUS LIMONITE-STAINED QUARTZ
1740		70		80		20	N-3	TR		F-VF	W	SR-SA	TR	✓	✓	Red & blk cht apple-gn gr	5GY6/1	?	CALCAREOUS LIMONITE-STAINED QUARTZ
1760		70		90		10	N-4			VF-F	W	SR-SA	TR			Red & blk cht	5GY6/1	?	CALCAREOUS LIMONITE-STAINED QUARTZ
1780		74		90		10	N-4	TR		VF-F	W	SR-SA	2%	TR		Blue qtz, blk cht	5GY6/1	?	VERY CALCAREOUS LIMONITE-STAINED QUARTZ
1800	80-S10-1800	71		90		10	N-3			VF-F	W	R-SR	TR		✓	Blk cht	5GY6/1	?	CALCAREOUS LIMONITE-STAINED QUARTZ

CHIP SAMPLE LOG FORM

Location: ________ Sec. 14 T. 20 R. 13W Quadrangle (7.5') Milk Lake

Hole No: 5-10 State: NM Date: 12/19/80

Company: USGS County: McKinley Geologist: Hammond, Dubiel

Lat/Long: ________ Sheet 10 of 12.

Table 2. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 10, New Mexico

Depth to btm of Sampled Interval	Sample Number	Count/sec BKG 365	Estimated % of Lithologies: Congl.	Sandst.	Siltst.	Shale	Shale color	Coal	Limestone	Sandstones: Grain size	Sorting	Roundness	Feldspar	Carbonac.	Pyrite	Access.	Sandstone Color	Formation/Member	COMMENTS
1820	80-510-1820	70		90		10	N-4			VF	W	SA-SR	TR	✓		Rose qtz	5GY6/1	?	CALCAREOUS LIMONITE-STAINED QUARTZ
1840		73		75		25	N-4			VF-F	W	SA-SR	2%	✓			5GY6/1	?	CALCAREOUS
1860		67		40		60	N-4			VF-F	W	SR				Rose qtz, apple-gn gr	5GY6/1	?	SLIGHTLY CALC LIMONITE- & HEMATITE-STAINED QUARTZ
1880		70		50		50	N-4			VF-F	W	SR-SA		✓		Magnetite	5GY6/1	?	SLIGHTLY CALC LIMONITE-STAINED GRAINS
1900		73		60		40	N-5			F	W	R-SA	1-2%	✓		Red cht	N-6	?	CALCAREOUS HEMATITE-STAINED GRAINS
1920		70		70		30	N-4	TR		F-VF	W	SR-SA	TR	✓		Red cht	5GY6/1	?	SLIGHTLY CALC GREEN CLAY CHIPS
1940		73		80		15	N-4	5		F	W	SA-SR	TR	✓		Rose qtz, apple-gn gr	5GY6/1	?	CALCAREOUS LIMONITE-STAINED QUARTZ
1960		70		80		20	N-4	TR		VF-F	W	SA		✓			N-6	?	VERY CALCAREOUS
1980		69		70		10	N-4	TR		VF-F	W	R-SA	2%	✓		Rose qtz	N-6	?	VERY CALCAREOUS
2000	80-510-2000	72		80		20	N-4			F-VF	W	A-SR	TR	✓		Rose qtz, apple-gn gr	5Y6/1	?	VERY CALCAREOUS LIMONITE-STAINED GRAINS

CHIP SAMPLE LOG FORM

Location: ______ Sec. 14 T. 20N R. 13W Quadrangle (7.5') Milk Lake

Hole No: 5-10 State: NM Date: 12/19/80

Company: USGS County: McKinley Geologist: Hammond, Dubiel

Lat/Long: ______ Sheet 11 of 12.

Table 2. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 10, New Mexico

Depth to btm of sampled interval	Sample number	Count/sec BTS:GS	Estimated % of lithologies: Congl.	Sandst.	Siltst.	Shale	Shale color	Coal	Limestone	Sandstones: Grain size	Sorting	Roundness	Feldspar	Carbonac.	Pyrite	Access.	Sandstone color	Formation/Member	COMMENTS
2020	80-510-2020	76		70		30	5YR4/1			F	W	SA-SR	TR	✓		Rose qtz	N-6	?	VERY CALCAREOUS
2040		73		40	30	30	5YR4/1	2%		VF-F	W	R-SA	TR	✓		Red cht, apple-gn gr	N-6	Kcdi(?) Dilco Coal Mbr Crevasse Canyon Fm	CALCAREOUS GREEN SHALE CHIP
2060		69		70	20	10	5YR4/1	TR		F-VF	W	R-SA		✓			N-6	Kcdi(?)	VERY CALCAREOUS HEMATITE STAIN
2080		76		70		30	N-3	TR		VF-F	W	SA-SR	2%	✓			N-6	Kcdi(?)	CALCAREOUS
2100		77		60	20	20	5YR4/1			VF-F	W	R-SA				Apple-green grains	5YR5/1	Kcdi(?)	VERY CALCAREOUS LIMONITE-STAINED QTZ
2120		70		80		20	N-3			F	W	A-SR	TR	✓		Red cht, rose qtz	5GY6/1	Kcdi(?)	CALCAREOUS GREEN SHALE CHIPS
2140		71		80		20	N-3			F	W	A-SR	TR	✓	✓		5Y6/1	Kcdi(?)	VERY CALCAREOUS HEMATITE STAIN GREEN SHALE CHIPS
2160		69		85		15	N-3	TR		F-VF	W	SA-SR	TR	✓		MAGNETITE	5Y6/1	Kcdi(?)	VERY CALCAREOUS LIMONITE-STAINED GRAINS
2180		75		90		10	N-4			F	W	A-SA	2-3%	✓	✓	Apple-green grains	5GY6/1	Kcdi(?)	VERY CALCAREOUS LIMONITE-STAINED GRAINS
2200	80-510-2200	72		90		10	N-4			F-M	W	A-SR	1-2%	✓		Blue qtz	5GY6/1	Kcdi(?)	VERY CALCAREOUS LIMONITE AND HEMATITE STAINING

Location: ________ Sec. ____ T. ____ R. ____ Quadrangle (7.5') Milk Lake

Hole No: 5-10 State: NM Date: 12/19/80

Company: USGS County: McKinley Geologist: Hammond, Dubiel

Lat/Long: ________ Sheet 12 of 12.

CHIP SAMPLE LOG FORM

Table 2. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 10, New Mexico

Depth to btm of Sampled Interval	Sample Number	Gamb/Sec BKG 65	Estimated % of Lithologies: Congl.	Sandst.	Siltst.	Shale	Shale color	Coal	Limestone	Sandstones: Grain size	Sorting	Roundness	Feldspar	Carbonac.	Pyrite	Access.	Sandstone Color	Formation/Member	Comments
2220	80-510-2220	68		85	5	10	N-4			F-M (VF)	MW	A-SA	2-3%				5GY4/1	Kcdi(?) Dilco Coal Mbr Crevasse Canyon Fm.	VERY CALCAREOUS HEMATITE-STAINED QUARTZ
2240		74		85		15	N-4	TR		F	W	A-SA	1-2%	✓	✓	Blk cht	5GY4/1	GALLUP SANDSTONE Kg(?)	CALCAREOUS GREEN CLAY CHIPS
2260		72		95		5	N-4			VF-F (M)	MW	A-SA	2-4%	✓	✓	Red cht	5GY4/1	Kg(?)	CALCAREOUS GREEN SHALE CHIPS
2280		70		95		5	N-4			VF-F	W	A-SA	2-4%	✓	✓		5GY4/1	Kg	CALCAREOUS LIMONITE-STAINED QUARTZ
2300		68		85		15	N-4			VF-F	W	SA-SR	TR	✓	✓	Blk cht	5Y4/1	Kg	VERY SLIGHTLY CALC LIMONITE-STAINED QUARTZ
2320	80-510-2320	72		80		20	N-4	TR		F (M)	W	SR-SA	2-5%	✓	✓		5GY4/1	Kg	SLIGHTLY CALC LIMONITE-STAINED QUARTZ
T.D.																			