UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY

Lithologic Descriptions, Core and Cutting Samples, Mariano Lake-Lake Valley Drilling Project, McKinley County, New Mexico, Hole Number 5

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 no. 5.

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; control for a proposed seismic study of the same geographic area; and development of water wells by the Navajo Tribal Water and Sanitation Department.

ACKNOWLEDGEMENTS

The USGS wishes to acknowledge the cooperation of Conoco for permission to drill hole no. 5 on their claim block.

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.

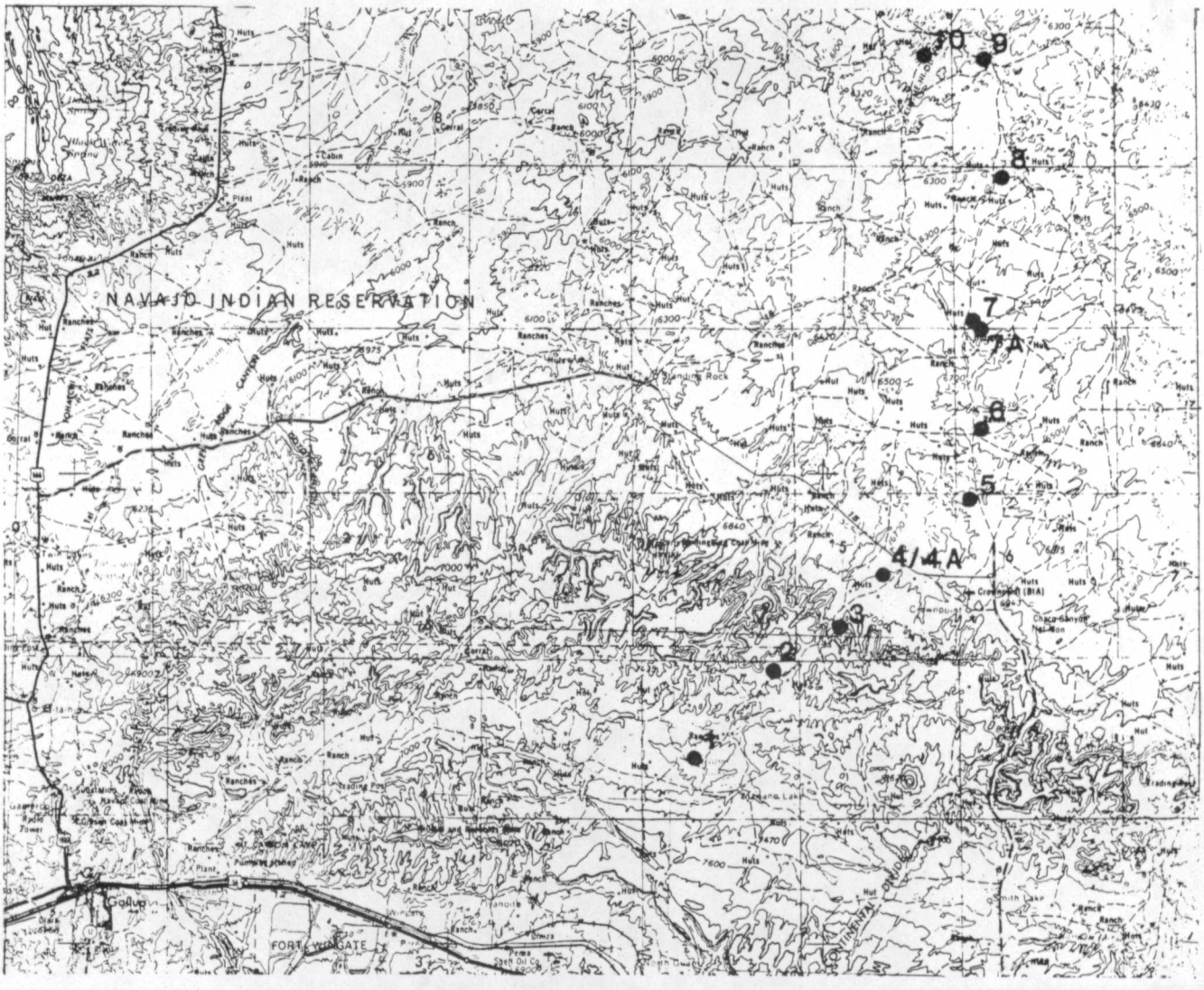

Figure 1. - Location of USGS Drill Holes, Gallup 1^{o} x 2^{o} Quadrangle.

DRILL HOLE NO. 5.

The location of this well is shown on figure 2.

The vital statistics on this well include:

Spud date: December 14, 1980

Location: T. 17 N., R. 12 W., NE/4 sec. 6; Lat. 35°44′15", Long. 108°08′48"

Collar Elevation: 6795 ft (topo) Point Lookout Sandstone (Cretaceous)

Core Point: 2250 ft (depth) Dakota Sandstone (Cretaceous)

Bottom Cored Interval: 2850 ft (depth) Recapture Shale Mbr., Morrison Fm. (Jurassic)

Total Depth: 2850 ft (depth) Recapture Shale Mbr., Morrison Fm. (Jurassic)

Core Recovery: 99 percent

Status of well: Abandoned, January 18, 1981.

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

Cutting samples from rotary drilling were collected and described at 20 ft intervals to the core point at 2250 ft (table 1). Cutting samples were collected through the cored interval but were not described.

Core samples were collected in 20 and 40 ft core runs and are three in. in diameter. The core samples were described in the field (table 2), taped, boxed, and shipped to the USGS Core Library in Denver where they were frozen, split, photographed, and sampled (for petrography, geochemistry, heavy-mineral-suite, clay-mineralogy, and paleomagnetic studies). A split of the core has been archived for reference and future study.

Coal and carbonaceous shale intervals were encountered at 430 ft, 1120 ft, and 2260 ft.

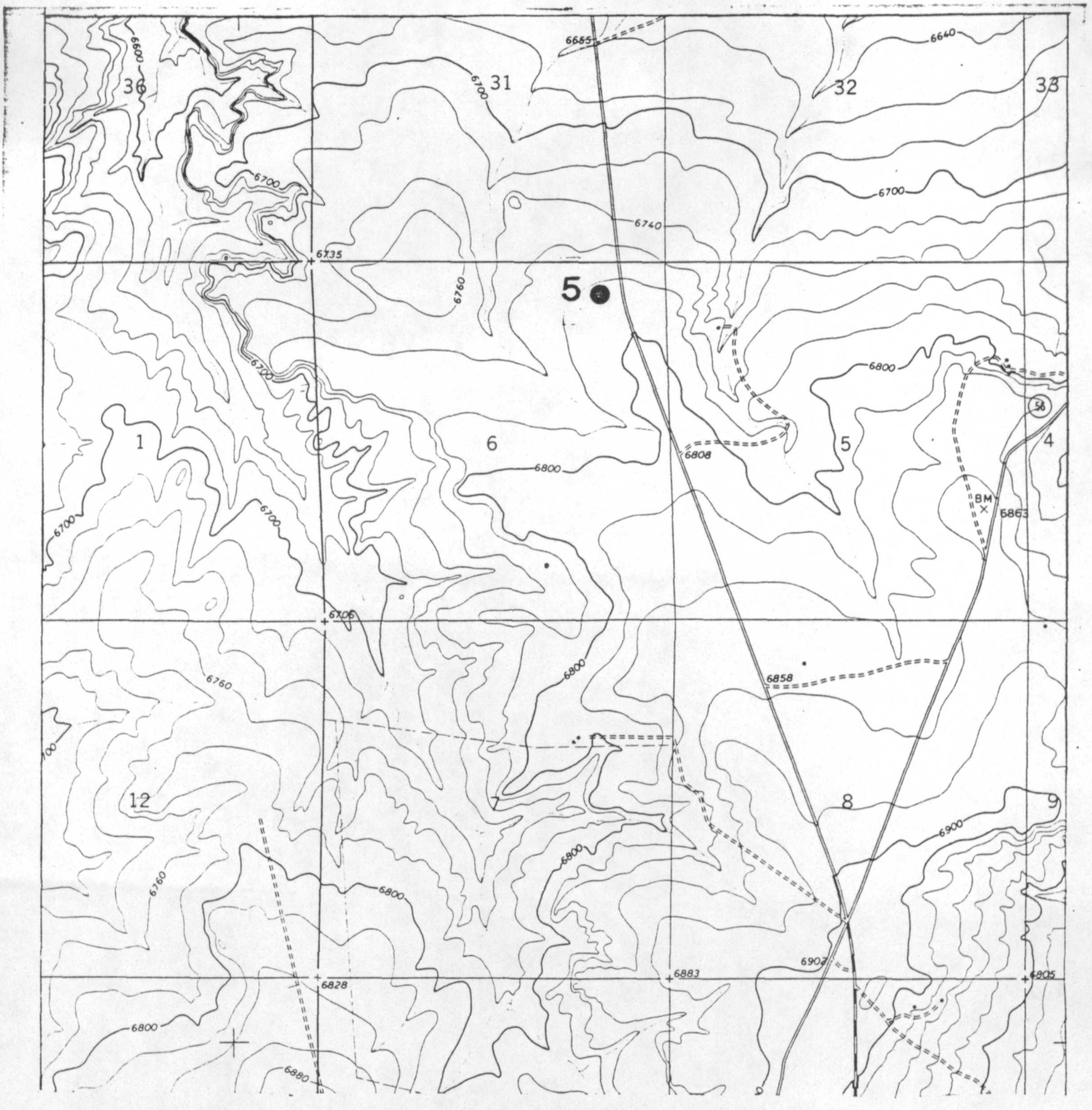

Figure 2.--Location of USGS Drill Hole No. 5, Crownpoint 7 1/2' Quadrangle, T17N, R12W.

The following core and cutting sample descriptions were described in the field. The abbreviations and graphic symbols used in the core description are defined in Reynolds and others (1975).

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, 1981, Geophysical log suite from drill hole no. 5, Mariano Lake-Lake Valley drilling project, McKinley County, New Mexico, USGS Open-File Report 81-970, 4 p.

CHIP SAMPLE 106 FORM

Location: ______ Sec. 6 T. 17N R. 12W Quadrangle (7.5') Crown Point

Hole No: S-5 State: N.M. Date: 12/20/80

Company: U.S.G.S. County: McKinley Geologist: Huffman, Aubrey

Lat/Long: ______ Sheet 1 of 12.

Table 1. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 5, New Mexico

Depth to btm. of Sampled Interval	Sample Number	Cont./Ccc	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	80-55-20			100						LF	MW	SR					10YR7/4	Kpl Point Lookout Sandstone	Limonite staining Slightly calc.
40				100						LF	MW	SR					10YR7/4	Kpl	"
60				100						LF	MW	SR					10YR7/4	Kpl	"
80				100						LF	MW	SR					10YR7/4	Kpl	"
100				100						LF	MW	SR					10YR7/4	Kpl	"
120				100						LF -uVF	MW	SR					10YR7/4	Kpl	"
140				95		5	N-3			LVF -uVF	W	SR		TR			N-3	Kpt/Kms Satan Tongue Mancos Shale	dark staining - organic? Slightly calc. Transition Zone
160				85		15	N-3			VF	W	SR					N-7	Kpl/Kms	Limonite staining Slightly calc. Transition Zone
180				50		50	N-3			VF	W	SR					N-7	Kms	Slightly-moderately calc.
200	80-55-200			20		80	N-3			VF	W	SR					N-7	Kms	Moderately calc.

CHIP SAMPLE LOG FORM

Location: ________ Sec. 6 T. 11N R. 12W Quadrangle (7.5') Crown Point

Hole No: S-5 State: N.M. Date: 12/20/80

Company: U.S.G.S. County: McKinley Geologist: Huffman, Aubrey

Lat/Long: ________ Sheet 2 of 12.

Table 1. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 5, New Mexico

Depth to btm. of Sampled Interval	Sample Number	Crush/Size	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
220	80-S5-220			10		90	N-3			VF	W	SR		TR?			N-7	Kms Satan Tongue Mancos Shale	Moderately calc.
240				25		75								=				Kms	slightly calc.
260				50		50												Kms	
280				50		50												Kms	
300				80		20												Kplh (?) Hosta Tongue Point Lookout Sandstone	Moderately calc.
320				80		20								TR				Kplh (?)	"
340				93		7								TR		Tr. Rd. Cht.?		Kplh (?)	"
360				95		5								TR				Kplh (?)	"
380				95		5								TR		lt.gn.gr.		Kplh (?)	"
400	80-S5-400			95		5												Kplh (?)	"

Table 1. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 5, New Mexico

Depth to bttm. of sampled interval	Sample number	Cmnts/Loss	Estimated % of Lithologies							Sandstones								Formation/Member	COMMENTS
			Congl.	Sandst.	Siltst.	Shale	shale color	Coal	Limestone	Grain Size	Sorting	Roundness	Feldspar	Carbonate	Pyrite	Access.	Sandstone Color		
420	80-55-420			75		25	N-3			uvF	W	SR		TR?		gn. gr. Rd. cht?	N-7	Kplh(?) Hosta Tongue Point Lookout Sandstone	Moderately calc.
440				85		15				uvF	W	SR		TR		wh. cly matrix Rd. cht. gn. gr.	N-7	Kplh (?)	Slightly calc.
460				85		15				uvF	W	SR		TR		wh. cly matrix Rd. cht. gn. gr.	N-7	Kplh(?)	Slightly calc.
480				60		40				uvF	W	SR		TR?		Blk. cht. Rd. cht. wh. cly matrix	N-7	Kcg Gibson Coal Mbr. Crevasse Canyon Formation	Slightly calc.
500				60		40				uvF	W	SR		TR		wh. cly matrix Rd. cht. gn. gr.	N-7	Kcg	Limonite staining slightly calc.
520				25		75				uvF	W	SR		TR	TR	wh. matrix (gyp?) Rd. cht. gn. gr.	N-7	Kcg	
540				10		90				uvF	W	SR		TR		gyp.	N-7	Kcg	
560				20		80				LvF	W	SR			TR	gyp. blk. cht.	N-7	Kcg	Slightly calc.
580					10	90								TR?				Kcg	Gypsum slightly calc.
600	80-55-600			TR	10	90								TR?	TR			Kcg	Gypsum

CHIP SAMPLE LOG FORM

Location: _____ Sec. 6 T. 12N R. 12W Quadrangle (U.S.) Crown Point

Hole No: S-5 State: N.M. Date: 12/20/80

Company: U.S.G.S. County: McKinley Geologist: Huffman, Aubrey

Lat/Long: _____ Sheet 3 of 12.

Table 1. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 5, New Mexico

CHIP SAMPLE LOG FORM

Location: _____ Sec. 6 T. 17N R. 12W Quadrangle (7.5') Crown Point

Hole No: 5-5 State: N.M. Date: 12/20/80

Company: U.S.G.S. County: McKinley Geologist: Huffman, Aubrey

Lat/long: _____ Sheet 4 of 12

Depth to bottom of sampled interval	Sample Number	Cuttings/Core	Estimated % of Lithologies							Sandstones								Formation/Member	COMMENTS
			Congl.	Sandst.	Siltst.	Shale	shale color	Coal	Limestone	Grain Size	Sorting	Roundness	Feldspar	Carbonac.	Pyrite	Accesr.	Sandstone Color		
620	80-55-620			15		85	N-3			LF	W	SR		TR		blk.cht. Rd cht gm gr.	N-7	Kcg Gibson Coal Mbr. Crevasse Canyon Formation	
640				95		5				LF	W	SR		1-2%	TR	Blk.cht. Rd.cht.		Kcda Dalton Ss Mbr. Crevasse Canyon Formation	Slightly calc.
660				95		5				LF	MW	SR -SA		3-5%		Rd.cht. Blk.cht.		Kcda	Amber Very slightly calc.
680				100						UF (LF in blobs)	MW	SR -SA	TR?	TR		Blk.cht.		Kcda	Slightly calc. Limonite staining Blobs up to 5mm of white matrix in sandstone
700				95		5				LF	MW	SR -SA	TR			Blk.cht dk.gn gr.		Kcda	non-calc.
720				100						LF	MW	SR -SA	TR	TR		Blk.cht dk.gn gr.		Kcda	Slightly calc. Few white-cemented blobs
740				100						LF	MW	SR -SA	TR	TR		Blk.cht. dk.gn. gr.		Kcda	
760				100						LF	MW	SR -SA	TR	TR		Blk.cht dk.gn. gr.		Kcda	
780				25		75				LF	MW	SR -SA	TR		TR	Blk.cht dk.gn. gr.		Kmm Mulatto Tongue Mancos Shale	
800	80-55-800			50		50				LF	W	SR				Blk.cht. Rd.cht.		Kmm	

Table 1. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 5, New Mexico

CHIP SAMPLE LOG FORM

Location: _____ Sec. 6 T. 17N R. 12W Quadrangle (U.S.) Crown Point

Hole No: S-5 State: N.M. Date: 12/20/80

Company: U.S.G.S. County: McKinley Geologist: Huffman, Aubrey

Lat/long: _____ Sheet 5 of 12.

Depth to bottom of sampled interval	Sample number	Cuttings/core	Estimated % of Lithologies							Sandstones								Formation / Member	COMMENTS
			Congl.	Sandst.	Siltst.	Shale	shale color	Coal	Limestone	Grain Size	Sorting	Roundness	Feldspar	Carbonac.	Pyrite	Accessr.	Sandstone Color		
820	80-55-820			60		40	N-3			uvF	W	SR				Rd.clst. blk.clst. Gyp.	N-7	Kmm Mulatto Tongue Manco Shale	Very Calc.
840				90		10								TR		blk.clst.		Kmm	"
860				80		20										blk.clst		Kmm	"
880				70		30										blk.clst		Kmm	"
900				85		15								TR		blk.clst		Kmm	"
920				75		25		TR						TR		blk.clst		Kcdi Dilco Coal Mbr. Crevasse Canyon Formation	Moderately calc.
940				80		20										blk.clst gn.gr.		Kcdi	Moderately calc.
960				80		20		TR						TR		blk.clst.		Kcdi	Very calc. } Both taken at 985'
980				80		20		TR						TR		blk.clst		Kcdi	Very calc.
1000	80-55-1000			90		10								TR		blk.clst		Kcdi	Very calc.

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CHIP SAMPLE LOG FORM

Location: ________ Sec. 6 T. 17N R. 12W Quadrangle (7.5') Crown Point

Hole No: S-5 State: N.M. Date: 12/20/80

Company: U.S.G.S. County: McKinley Geologist: Huffman, Aubrey

Lat/Long: ________ Sheet 6 of 12.

Table 1. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 5, New Mexico

Depth to btm. of Sampled Interval	Sample Number	Core/cuttings	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	80-55-1020			100						Lvf.	W	SR				Gyp.	N-7	Kcdi Dilco Coal Mbr. Crevasse Canyon Formation	Moderately calc.
1040				80		20	N-3			Lvf.								Kcdi	Very calc.
1060				90		10	N-3			Lvf.				TR	TR			Kcdi	Very calc. Hematite staining around pyrite
1080				50		50	N-3			Lvf.				TR Stain.		blk.cht. Gyp.		Kcdi	Moderately calc.
1100				95		5	N-3			uv.F				TR. Stain ?		Gyp.		Kcdi	"
1120				30		70	N-3			uvF.				TR stain.		gn.gr. Gyp.		Kcdi	"
1140				15		85	N-3			uvF				TR. Stain. ?				Kcdi	Moderately calc. White clay matrix
1160				75		25	N-3			uvF				TR		gn.gr.		Kg Gallup Sandstone	Moderately calc. Blobs of white matrix contain green grains
1180				80		20	N-3			uvF				TR		gn.gr.		Kg	"
1200	80-55-1200			80		20	N-3			uvF.				TR		gn.gr.		Kg	"

Table 1. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 5, New Mexico

CHIP SAMPLE LOG FORM

Location: _____ Sec. 6 T. 17N R. 12W Quadrangle (U.S.) Crown Point

Hole No: S-5 State: N.M. Date: 12/20/80

Company: U.S.G.S. County: McKinley Geologist: Hoffman, Aubrey

Lat/Long: _____ Sheet 1 of 12.

Depth to btm. of sample Interval	Sample Number	Core/Cuttings	Estimated % of Lithologies: Congl.	Sandst.	Siltst.	Shale	shale color	Coal	Limestone	Sandstones: Grain Size	Sorting	Rounding	Feldspar	Carbonac.	Pyrite	Access.	Sandstone Color	Formation / Member	COMMENTS
1220	80-55-1220			100						LF (TR C)	M	SR				Blk.cht. Rd.cht.	N-7	Kg Gallup Sandstone	Blobs of white matrix (clay or gypsum)
1240				90		10	N-3			LF (TR M)	M			TR debris		Blk.cht. Rd.cht.		Kg	Blobs of white cemented sandstone Moderately calc.
1260				50		50	N-3			uvF (TR M)	M			TR debris		Blk.cht. Rd.cht.		Kg / Km Mancos Shale	Blobs of white cemented sandstone Slightly calc.
1280				40		60	N-3			uvF (TR M)	M			TR debris		Blk.cht. Rd.cht.		Km	"
1300				60		40	N-3			uvF	W			TR org.		Blk.cht Rd.cht.		Km	Moderately calc.
1320				50		50	N-3			uvF	W			TR		Blk.cht Rd.cht.		Km	Trace of white cemented blobs Slightly calc.
1340				25	TR	75	N-3			Lvf	W			TR				Km	
1360				50		50	N-3			Lvf	W			TR		Blk.cht		Km	Slightly calc.
1380				50		50	N-3			LvF	W			TR org.		Blk.cht.		Km	"
1400	80-55-1400			10	15	75	N-3			LvF	W			TR		Blk.cht		Km	"

CHIP SAMPLE LOG FORM

Location: ______ Sec. 6 T. 17N R. 12W Quadrangle (7.5') Crown Point

Hole No: S-5 State: N.M. Date: 12/20/80

Company: U.S.G.S. County: McKinley Geologist: Huffman, Aubrey

Lat/Long: ______ Sheet 8 of 12.

Table 1. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 5, New Mexico

Depth to btm of Sampled Interval	Sample Number	Conventional core	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	80-55-1420			10	15	75	N-3			LvF	W	SR				Blk.cht	N-7	Km Mancos Shale	Some white matrix Moderately calc.
1440				20		80										Blk.cht Rd.cht.		Km	White matrix Slightly calc.
1460				20		80										Gyp.		Km	Slightly calc.
1480				20		80										Gyp.		Km	"
1500				10		90										Gyp.		Km	"
1520				10		90										Gyp.		Km	Some of the gypsum blades are coated with limonite(?) stain. Slightly calc.
1540				5		95										Gyp.		Km	Limonite staining on sandstone Slightly calc.
1560				5		95										Gyp.		Km	Slightly calc.
1580				5		95										Gyp.		Km	"
1600	80-55-1600			5	10	85	↓			↓	↓	↓					↓	Km	"

CHIP SAMPLE 106 FORM

Location: ______ Sec. 6 T. 17N R. 12W Quadrangle (7.5') Crown Point

Hole No: S-5 State: N.M. Date: 12/20/80

Company: U.S.G.S. County: McKinley Geologist: Huffman, Aubrey

Lat/Long: ______ Sheet 9 of 12.

Table 1. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 5, New Mexico

Depth to base of sampled interval	Sample number	Cond./Ice	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		
1620	80-55-1620			5		95	N-3			LvF	W	SR		TR			N-7	Km Mancos Shale	Very calc.
1640						100	↓									Gyp.		Km	Moderately calc.
1660				5		95	↓			LvF	W	SR		TR			N-7	Km	Very calc.
1680				5		95	↓			LvF	W	SR		TR			N-7	Km	"
1700				2		98	↓			LvF	W	SR		TR			N-7	Km	"
1720				5		95	↓			LvF	W	SR					N-7	Km	Limonite stained quartz grains (L.f. grains)
1740				5		95	↓			LvF	W	SR					N-7	Km	"
1760				15		85	↓			LvF	MW	SR			TR		N-7	Km	
1780				5		95	↓			LvF	W	SR		TR		Gyp	N-7	Km	
1800	80-55-1800					100	↓											Km	

Table 1. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 5, New Mexico

CHIP SAMPLE LOG FORM

Location: _____ Sec. 6 T. 12N R. 16W Quadrangle (15') Crown Point

Hole No.: S-5 State: N.M. Date: 12/21/80

Company: U.S.G.S. County: McKinley Geologist: Huffman, Hammond

Lat/Long: _____ Sheet 10 of 12.

Depth to bottom of sampled interval	Sample number	Cuttings/core	Estimated % of lithologies							Sandstones								Formation/member	COMMENTS
			Congl.	Sandst.	Siltst.	Shale	shale color	Coal	Limestone	Grain size	Sorting	Roundness	Feldspar	Carbonac.	Pyrite	Accesc.	Sandstone Color		
1820	80-55-1820					100	N-2											Km Mancos Shale	Slightly calc.
1840				TR		99+	N-2			LvF	W	SR					N-6	Km	"
1860				TR		99+	N-2			LvF	W	SR					N-6	Km	"
1880				3		97	N-2			LvF	W	SR					N-6	Km	"
1900				TR		99+	N-2			LvF	W	SR					N-6	Km	Hematite staining on shale chips. Slightly calc.
1920				TR		99+	N-3			lvF	W	SR					N-6	Km	Slightly calc.
1940				TR		99+	N-3			lvF	W	SR					N-6	Km	"
1960				TR		99+	N-3			lvF	W	SR					N-6	Km	"
1980				TR		99+	N-3			LvF	W	SR					N-6	Km	"
2000	80-55-2000			5		95	N-3			LF -uvF	W	SR -SA			TR		N-6	Km	"

CHIP SAMPLE 106 FORM

Location: ______ Sec. 6 T. 17N R. 12W Quadrangle (7.5') Crown Point

Hole No: S-5 State: N.M. Date: 12/21/80

Company: U.S.G.S. County: McKinley Geologist: Huffman, Hammond

Lat/Long: ______ Sheet 11 of 12.

Table 1. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 5, New Mexico

Depth to base of sampled interval	Sample number	Cond./Loc.	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	80-55-2020			5		95	N-3			uvF	W	SR					N-6	Km Mancos Shale	Calc.
2040				30		70				LF	W	SR -SA	TR		TR			Km/Kdt Twowells Tongue, Dakota Ss	Calc.
2060				75		25				uF	MW	SR -SA						Kdt	Very Calc. Trace Limonite staining uM-LC white grains (salt?) (shell Frags?)
2080				50		50				uF	MW	SR -SA						Kdt	Calc. White grains, same as above
2100				75		25				uvF	W	SR			TR			Kdt	Calc, Limonite stained sand
2120				50		50				uvF	W	SR						Kmw Whitewater Arroyo Tongue Mancos Shale	Slightly calc. Limonite stained sand Shell Fragments?
2140				60		40				uvF	W	SR			TR			Kmw	"
2160				95		5				uF	MW	SR				Blk cht		Kd Dakota Sandstone	Slightly calc. Limonite stained sand
2180				95		5				uF	MW	SR		TR		Blk cht		Kd	Slightly calc. Organic debris Limonite stained sand
2200	80-55-2200			97		3				LF	W	SR			TR			Kd	Calc. Shell Fragments

Table 1. Descriptions of cuttings samples from Harfano Lake -
Lake Valley Drilling Project, Hole No. 5, New Mexico

CHIP SAMPLE LOG FORM

Location: _____ Sec. 6 T. 17N R. 12W Quadrangle (U.S.): Crown Point

Hole No: S-5 State: N.M. Date: 12/21/80

Company: U.S.G.S. County: McKinley Geologist: Huffman, Hammond

Lat/Long: _____ Sheet 12 of 12.

Depth to btm of Sampled Interval	Sample Number	Cuttings/Core	Estimated % of Lithologies							Sandstones								Formation/Member	Comments
			Congl.	Sandst.	Siltst.	Shale	Shale color	Coal	Limestone	Grain Size	Sorting	Roundness	Feldspar	Carbonac.	Pyrite	Accesc.	Sandstone Color		
2210	80-55-2210			85		15	N-3			LF	W	SR		TR			N-6	Kd Dakota Sandstone	Very calc. Limonite staining
2220				85		15	N-3			LF	MW	SR -SA					N-6	Kd	Shell Fragments Limonite stained grains Calc.
2230				99		1	N-3			uF	W	SR			TR	blk.cht	N-6	Kd	Shell fragments
2240				80		20	N-3			uF	MW	SR		TR		blk.cht	N-6	Kd	Slightly calc. Limonite staining Shell Fragments
2250				75		25	N-3			uF	MW	SR		TR		Gyp.	N-6	Kd	Slightly calc. Shell Fragments
2250 -2850TD				Samples collected, but not described through the cored interval.															

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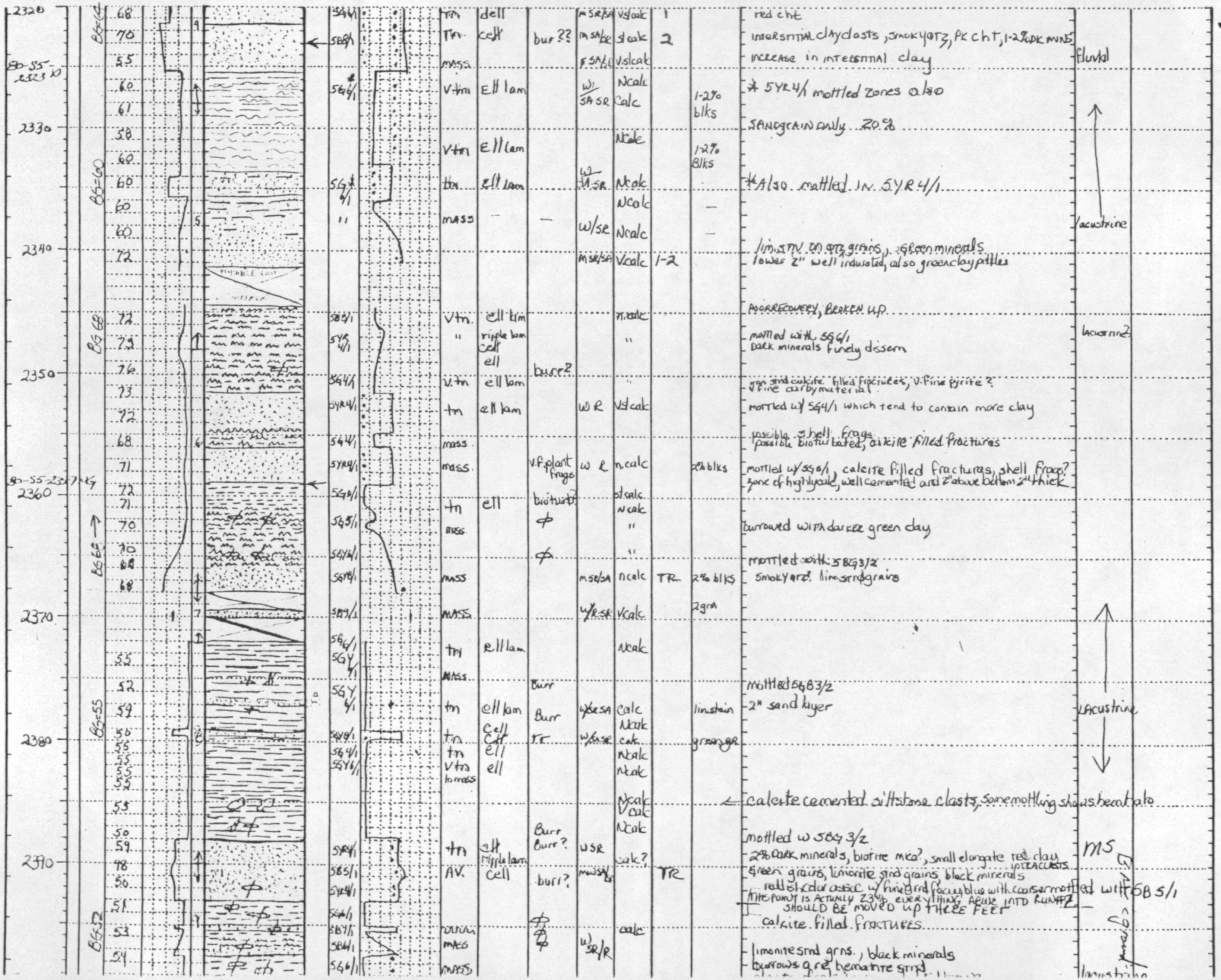
STATE New Mexico COUNTY McKinley DATE 1/6/81

LAT.-LONG. GEOL. Zech, Hammond

Table 2 Descriptions of core from Mariano Lake - Lake Valley Drilling Project Hole No. 5, New Mexico

Thickness / Sample No. (ft)	Unit No.	Fm/Mbr.	Radioact. CPS	Color	Bedding	Sedimentary Structures	Biology/Organics	Sorting/Roundness	Cement	Percent Feldspar	Accessory Minerals or Fragments	Notes: (Alteration, Attitude, Clasts, Mineralization, & Misc. Info.)	Inferred Environment of Deposition	Transport Direction (No. of Measurements)
2250			65	5Y8/1		ell	⌀ &	MW SR	ncalc	<1%	pyrite	dark minerals, limonite staining on qtz grains,		
			68		thin	bioturbated	bioturb						low energy fluvial	
		Bg 60	69	N4										
			68	N8	Thin	cll	carb mat ... coaling	MW SR	Vcalc	Tr	pyrite	dk. minerals burrowed?	v low energy fluvial	
			68	N3		ell	⌀ plant frags		ncalc	0	pyrite	conchoidal fracture & slickensides		
2260			63	N3 N8		ell								
			68	N8	MASS				ncalc		pyrite	calcite along fractures in the coal; coal breaks in very small cleats to conchoidal frac.	poorly drained swamp	
			62	N8 N3 N8		ell wlf ell	⌀? plant frags		Vcalc		pyrite	possible ... ash unit; dark minerals, v.f.gr.		
			60 62	N3	mass				ncalc		"	" "		
			76	N3 5Y7/2	MASS				"			A 2" sect of N8 claystone MANY mineral calcite filled fractures.		
2270			79		MASS		plant frags		"		"	coalified		
				N2	MASS				"		"	pyrite is finely dissem, A 2" thick coal zone.		
			71	N4	MASS		plant frags				dissem fine pyrite	coalified plant frags; internal shears.	under clay?	
			65	N3										
			65	N8	Thin	cell		M SR/SA	Sl.calc		pyrite?	scoured base, finely dissem carb. mat. 1-2% dk minerals		
					Vthin	wlf	burrowed plant frags	mw SR/SA	Sl.calc	Tr		limonite strd grns	low energy fluvial	
			70		av.	cell								
2280			60	N2 N3 N2	MASS Th	wlf wlf	plant frags	m/SA SR	V.calc V.calc	0 0	py... pyrite	1-2cm v.f. grained elongate inclusion; lams defined by concentration of carb material, limonite stained qtz		
			60	N3	mass								v low energy fluvial or bay fill	
			60 60		mass									
		Bg= 55	69	N3										
2290			59	N8 N-?	Vthin	wlf	plt frags	m/SA-SR	ncalc	0		lim stained areas - destroyed py, bed structures in base	m org fluvial?	
			60				fine carb							
				N5	V.tn	wlf	burr	w/SR	Ncalc	0			lagoon or bay fill	
			63 60	N2*	V.tn	clf	burr plt. frags	w/SR	Ncalc	0	Limestone sand gravel	*SAND, N-7 SAND shows loading structures & burrowing		
		Kd	62	N2 N8	tn		"		Ncalc Ncalc					
2300			60			"	"	w/SA	Vcalc	0		4-5cm rip up clast of v.carb shale, contorted bedd		
		Bg= 60	55	N8 N8	vtn	dwlf contrt	—	m/SR-SA	Slcalc	0	Bl qtz tr green clay			
			50											
			44	N-3	tk	cell	coal plt frag	m/SA SR	Ncalc	0	pyrite	small graded beds 2-4"		
			45		AV	Cell					pyrite			
			48 44	N8	AV-tk	cdlf	plt frag	w/SR/SA	Ncalc Sl calc	Tr	/	thin coaly streaks along lam; scour base, intraclasts of green clay, chert; 1-2% dk minerals, tr. biotite		
2310		Jmb	70 65	5Y8/2	Tn	dell	⌀	w SR	Slcalc	Tr?		1 mm sized clay intraclasts; dk clay filling in horiz. & vert cracks		
			69											
			70	5Y4/1	Tn	ell			Slcalc			sand is rounded		
			80											
			79	5Y4/1	MASS	bioturb		w/SR SR/SA	Slcalc			calcite filled fracture; 1% black minerals; redcht.		
2320				5Y4/1										

Table 2 Descriptions of core from Mariano Lake - Lake Valley Drilling Project Hole No. 5, New Mexico



LOCATION S-5 Sec. 6 T. 12N R. 12W
STATE New Mexico COUNTY McKinley
U.S.G.S. CORE LIBRARY NUMBER API WELL NUMBER

2
R2, D4H

sheet 3 of Ro[illegible]

3

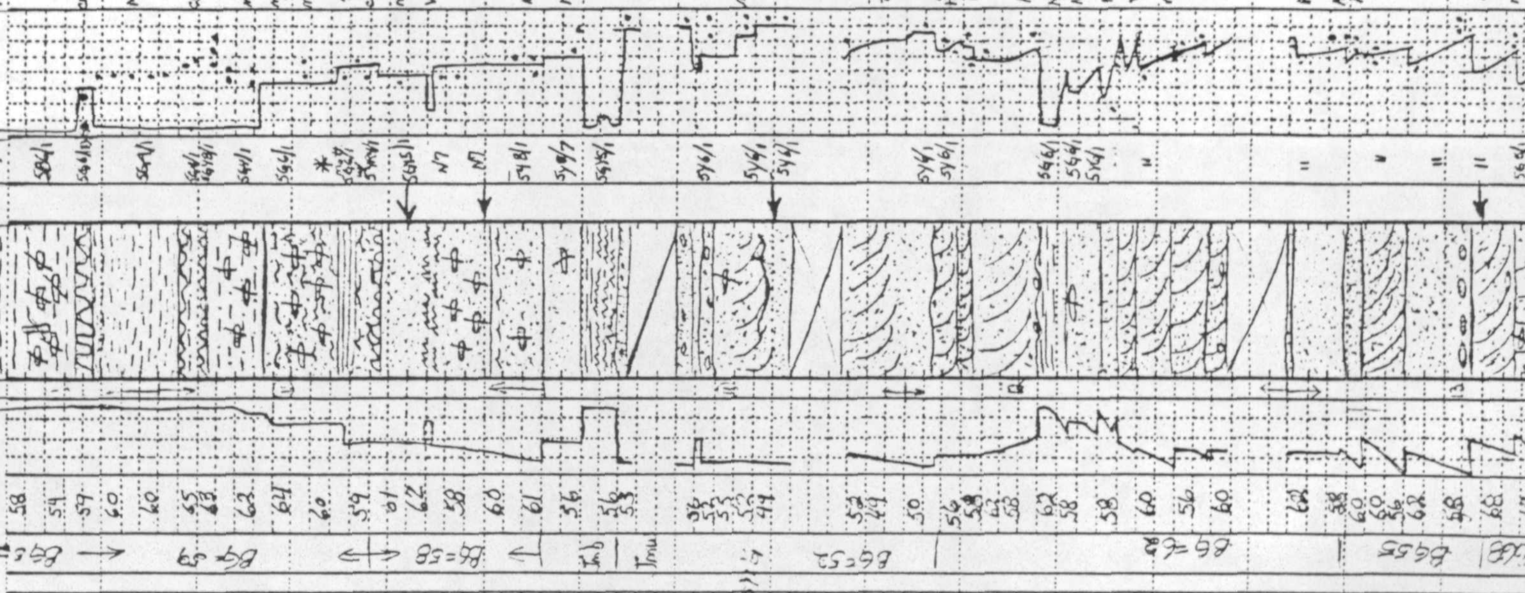
LOCATION 5-5 Sec. 6 T. 17N R. 12W

STATE New Mexico COUNTY McKinley

U.S.G.S. CORE LIBRARY NUMBER .... API WELL NUMBER ....

MS Background

CORRECTION FOR 3' ERROR from last page



- 2400: Burrows are 5BG 3/2; calcite cemented interclasts of UVF sand 1-2.5 cm; mottled w/ N7 calc filled fractures, limon. stains sand grains. (entrt; burr, tr. burr; W.R; V.calc; 4% blk min.) — lacustrine
- 1% dk minerals thru out (mass; burr.; m SR/A; few green grains, PY)
- 2410: nodules of v. cal. ss. UVF gnd..., mottled calc. (entrt; tr. burr; nealc/sltcalc; TR; PY, pink) — lacustrine
- fines upward, mottled at base w/ 5YR4/1; limonite stnd cht, burrows lined w/ darker mat'l (n.calc; TR; 1-2% BLK) — lacustrine
- Very fine dissem pyrite (mass; n.calc; 1-2% BK)
- 1' above base mottled w/ 5YR4/1; dark mat'l along ripple fams prob organic (mass; ripple fam, dwll, dwlk; 1% BLK)
- upper 2' fine dissem pyrite, limonite stnd qtz gns; coarsest mat'l very angular; TR/lt gn, biotite org. 2" above base (tn, entrt; ell, lwlk; m/w SR/SA; n.calc; TR)
- 2420: lim stained qtz, wht min. filled fractures (mass; 2-3% dk)
- ms partings 2" @ 2' from unit top, irregular dark banding in ms, possibly organic (vtn.)
- burrows pyrite filled (bioturb.; py filled; m/SA; n.calc; TR; orange cht, lim stnd qtz)
- smky qtz (dwll; 2-3% blk)
- Lt grn claycht — very few burrows (mass; cell; py filled; m/SA/SR; n.calc; TR; orange cht, 2-3% blk)
- 2430: scour base, clay matrix; internal slicks in mudstone, mottled N7, blk along contact (meD; py filled; m/SRSA; vslcalc/Ncalc; TR; Rd cht, gry)
- tan blk gry cht, blue qtz, pebbles of feldspars & Dk chts, py; gray green mudstone clasts 6 1/2 cm; granitic pbls; tan cht (dwll, cell; burr; P/SASR; 5; Py, Biotite, Kbcht, Ltg) — h ngy fluvial
- Pebbles up to 1.2 cm, burr py filled; scour base (cell; py filled; m/SR; Ncalc/vslcalc; TR; dkcht, py)
- grn mud chips, pbbles blue qtz & granitic blk qtzite; scour base (vslcalc; 1, 3)
- 2440: & internal scours (m. tk; cell; detrital; m SR/SA, SA-SR; 7; Blk rd cht, Bl qtz, tan cht, lt gn)
- cht tan cht, Lt green blue qtz (tk; cell; m/SRSA, P/SASR; vslcalc; 2; Dk Red, Py tr)
- 2450: Scour base gry & green clay chips, Pbbles are granitic, dk cht, bl; smoky qtz; green clay intestinal clasts (mass, tk, Ngrd; cell; P/SASR; calc, vslcalc; 5, 8; Ltgrn & dk cht, lt qtz, Ltcht)
- (Riplam; cell; slcalc; 4; grn blu qtz)
- scour base (Ngrd; cell; burr mottled; calc; 5; black flecks)
- Dark lithic frags at base, green grains (Ngrd; w/SR; Ncalc, vslcalc; Black flecks, Bluqtz, Flds)
- 2460: red & tan cht, lt gn grns, gn clay grns, blk cht...; blue qtz, blk & misc minerals (fm-av; cell; ncalc; 3) — hi energy fluvial braided
- [illegible] (med; cell; 2-3; Pyrite?)
- tan, rd & blk cht, blue qtz, lt gn grnd (cell; 6; Pyrite?)
- green clay chips, [illegible] 2" thick unit, broken, same acc as above; tn cht, blue qtz, black flecks (mass; ncalc; 2)
- 2470: red cht, lt gn grns (AV.; 5)
- small gn clay intraclasts (AV.; cell; vslcalc; ncalc)
- [illegible] (cell; 5)
- (M SRSA; 2)
- grn cht (6)
- Gn clay clasts [illegible] (AV; cell; ncalc; 1; Blue qtz)
- smokey qtz, green grains (mass; cell; P/BASE; Ncalc; 3; Rd tan cht, Blue qtz)

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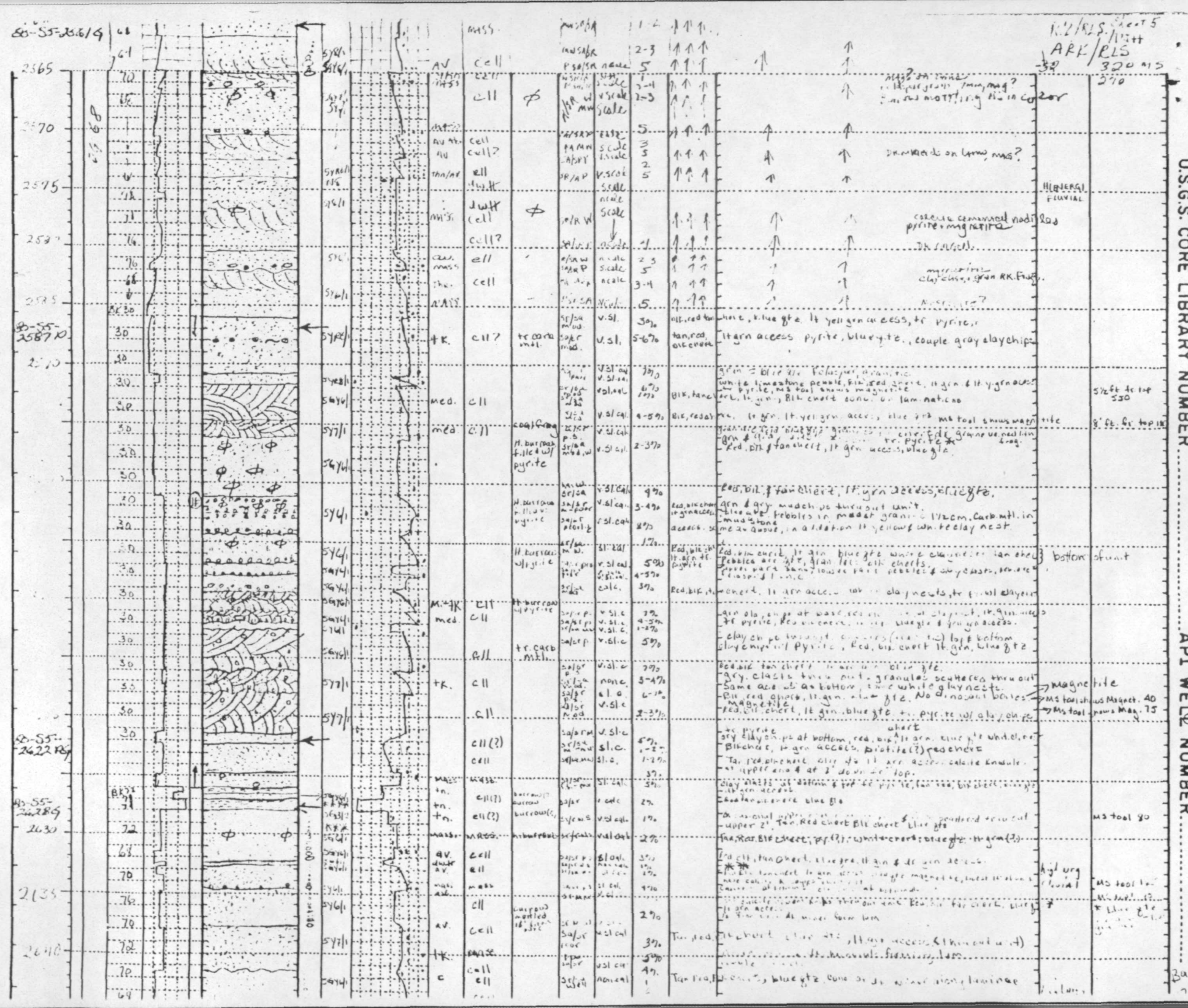
Table 2 Descriptions of core from Mariano Lake - Lake Valley Drilling Project Hole No. 5, New Mexico

LOCATION S-5 Sec. 6 T. 17N R. 12W
STATE New Mexico COUNTY McKinley
U.S.G.S. CORE LIBRARY NUMBER API WELL NUMBER



LOCATION 5-5 Sec. 6 T. 17N R. 12W
STATE New Mexico COUNTY Mckinley
U.S.G.S. CORE LIBRARY NUMBER API WELL NUMBER

Table 2 Descriptions of core from Mariano Lake - Lake Valley Drilling Project Hole No. 5, New Mexico

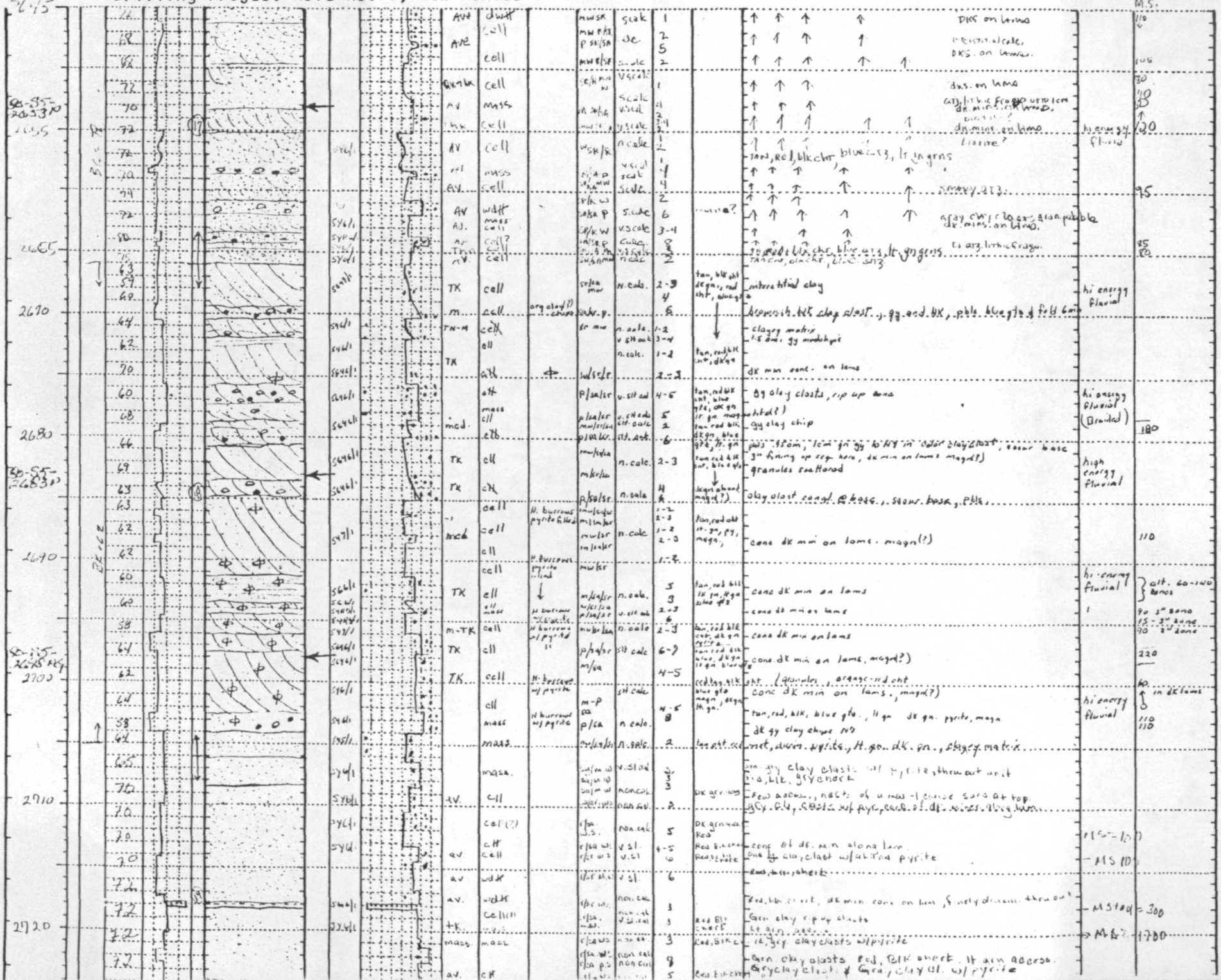


Table 2 Descriptions of core from Mariano Lake - Lake Valley Drilling Project Hole No. 5, New Mexico

DJH/RLS/RSZ

LOCATION 5-5 Sec. 6 T. 17N R. 12W

STATE New Mexico COUNTY McKinley

U.S.G.S. CORE LIBRARY NUMBER API WELL NUMBER

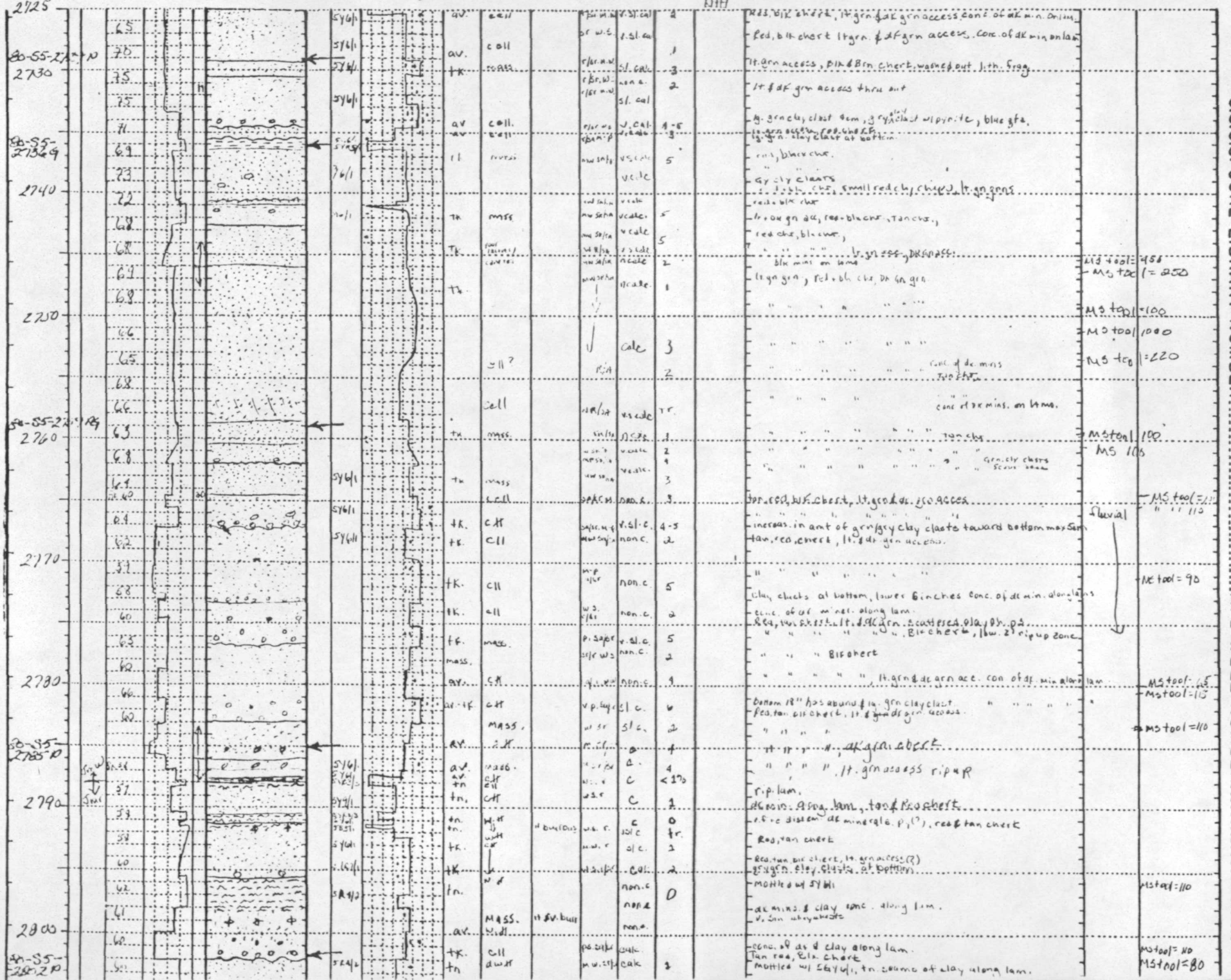


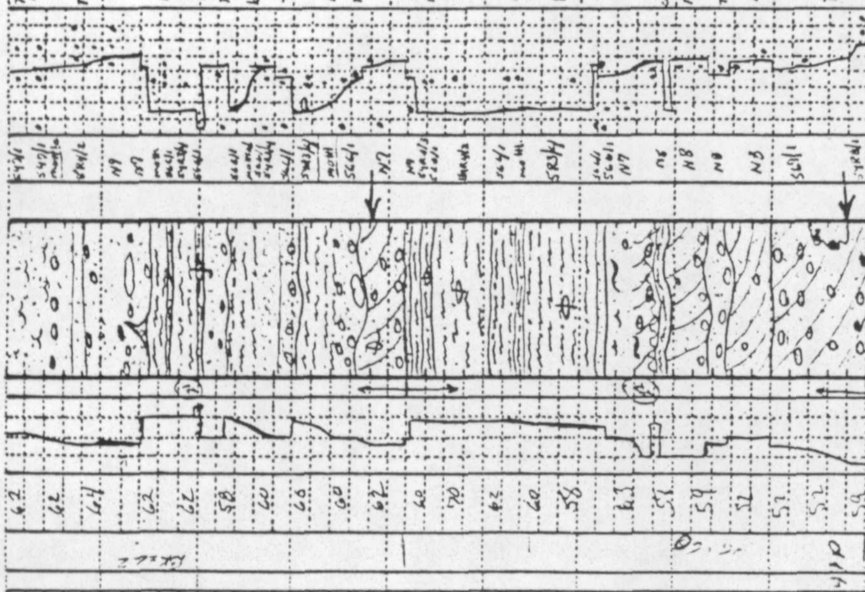
Table 2 Descriptions of core from Mariano Lake - Lake Valley Drilling Project Hole No. 5, New Mexico

Sheet 8 of 8
ARK

LOCATION 5-5 Sec. 6 T. 17N R. 12W

STATE New Mexico COUNTY McKinley

U.S.G.S. CORE LIBRARY NUMBER API WELL NUMBER



2810

2820

2830

2840

2850

T.D.