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UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY

Lithologic Descriptions, Core and Cutting Samples,
Mariano Lake-Lake Valley Drilling Project,
McKinley County, New Mexico, Holes 4 and 4A

by

A. C. Huffman, Jr., E. S. Santos, D. J. Hammond,
A. R. Kirk, W. M. Aubrey, D. S. Mruk, P. G. L. Sikkink,
S. M. Condon, R. F. Dubiel, M. Moore,
C. Yost, D. Armstrong, P. Hildebrandt,
and L. A. Indelicato

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This report is preliminary and has not been reviewed
for conformity with U.S. Geological Survey editorial
standards and stratigraphic nomenclature.

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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. 4 and 4A.

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 thank the Navajo Tribe for permission to drill this hole and publish the data.

GENERAL DRILLING PLAN

The locations of all twelve drill holes are shown on figure 1, which is a portion of the Gallup 1° x 2° 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.

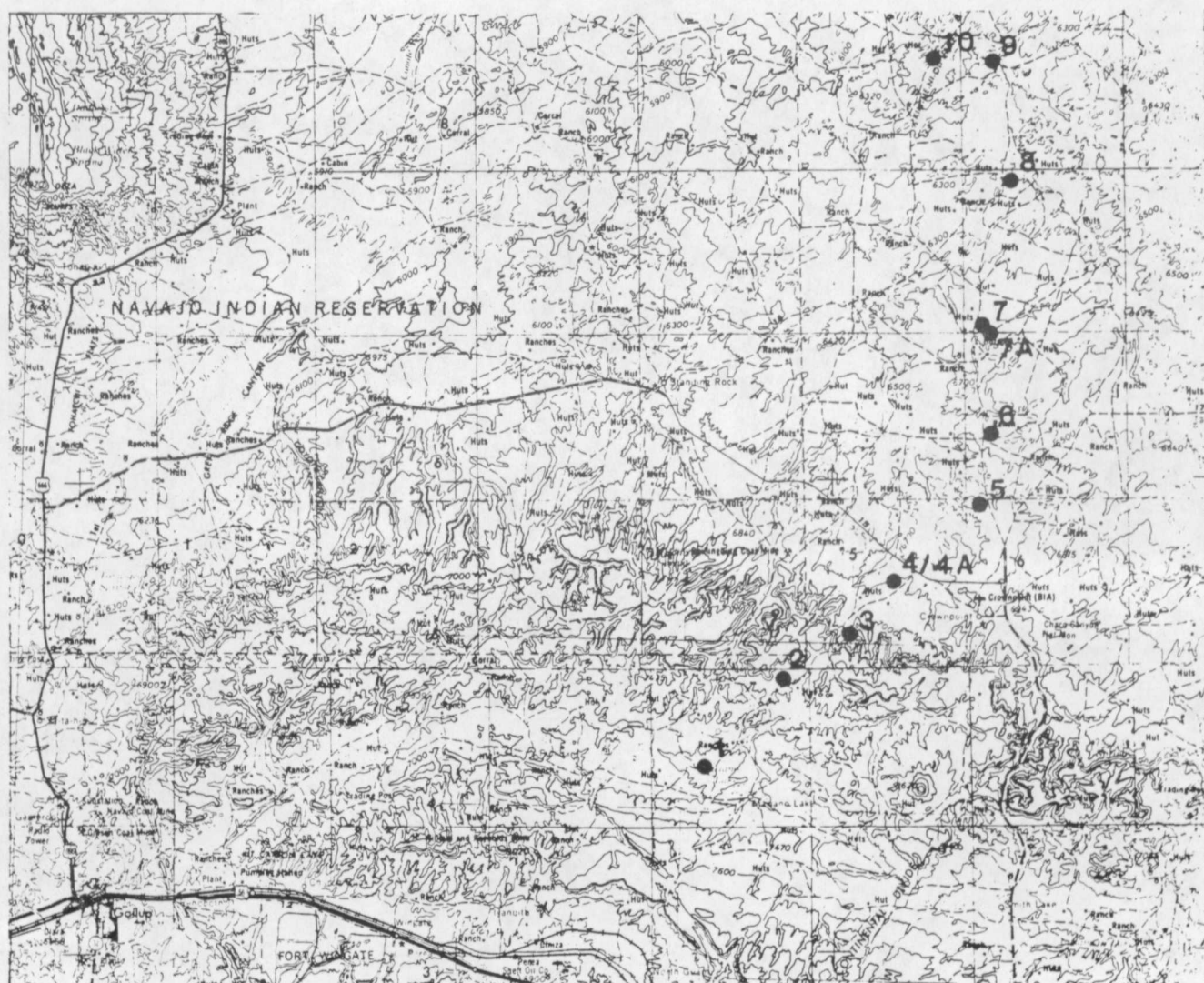


Figure 1. - Location of USGS Drill Holes, Gallup 1° x 2° Quadrangle.

DRILL HOLE NO. 4.

The location of this well is shown on figure 2.

The vital statistics on this well include:

Spud date: November 18, 1980

Location: T. 17 N., R. 13 W., SE/4 sec. 15, Lat. $35^{\circ}41'55''$; Long. $108^{\circ}12'00''$

Collar Elevation: 6810 ft (topo) Gibson Coal Mbr., Crevasse

.....Canyon Fm. (Cretaceous)

Core Point Top: 1722 ft (depth) Dakota Sandstone (Cretaceous)

Bottom Cored Interval: 2310 ft (depth) Recapture Shale Mbr., Morrison Fm.

.....(Jurassic)

Total Depth: 2310 ft (depth) Recapture Shale Mbr., Morrison Fm. (Jurassic)

Core Recovery: 97 percent

Status of well: Abandoned, December 11, 1980.

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, resistivity, deviation, gamma-gamma density, caliper, KUT, sonic, prompt fission neutron and magnetic susceptibility.

Cutting samples were collected and described on ten (10) foot intervals to the core point at 1722 ft (table 1). Cutting samples were collected but not described through the cored interval 1722-2310 ft.

Core samples were collected in 20 ft core runs and are 3 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

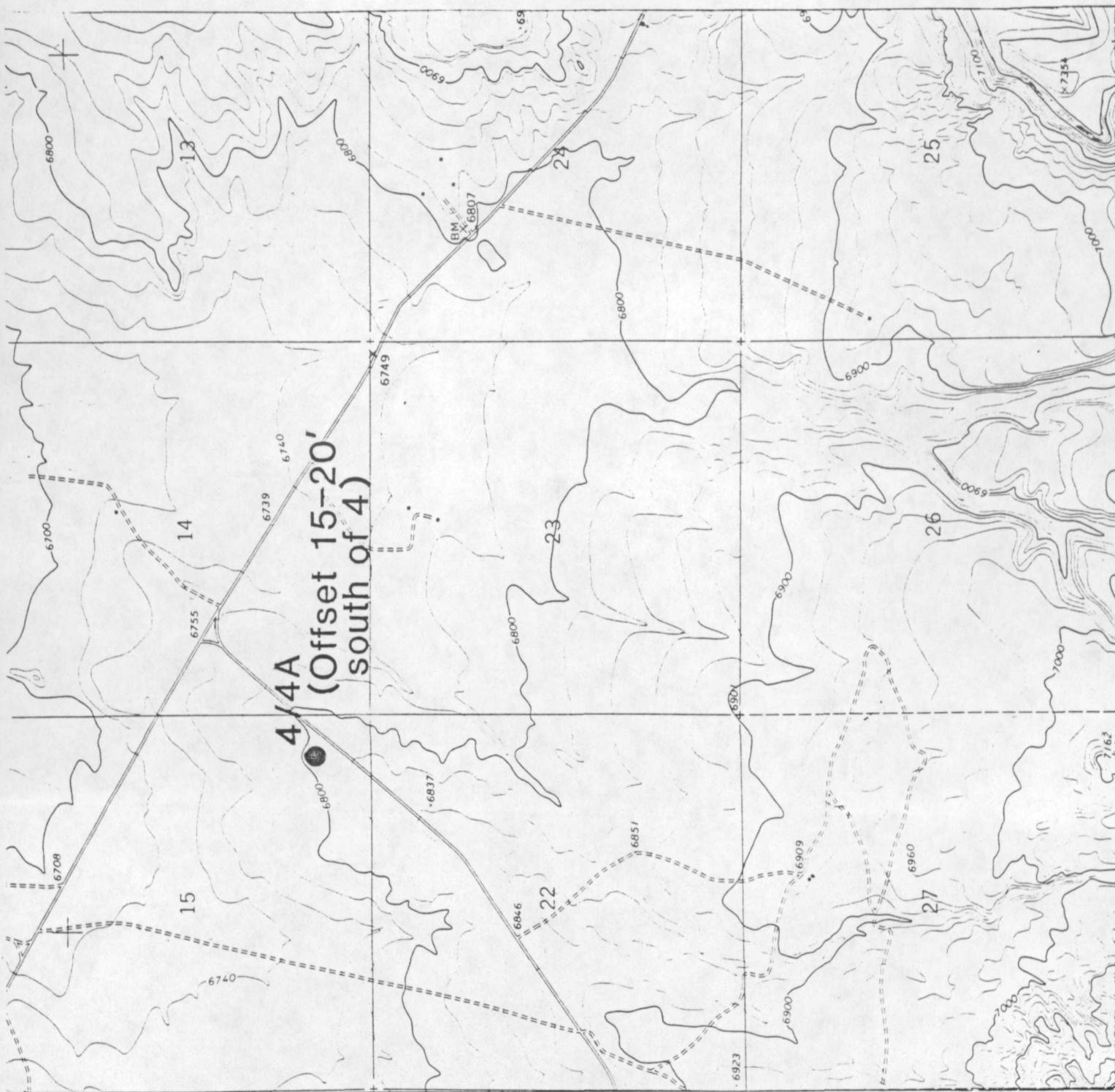


Figure 2.--Locations of USGS Drill Hole 4, Crownpoint 7½' Quadrangle, T17N R13W.

core has been archived for reference and future study.

Uranium mineral concentrations were encountered from 1914 to 1937 ft with ore-grade (0.05 percent U_3O_8) intercepts at 1914 and 1934 ft. A coal and carbonaceous shale interval was penetrated at 615 and 15 ft of coal with an interbedded 3 ft sandstone was encountered at 1730 ft.

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).

DRILL HOLE NO. 4A

The location of this well is shown on figure 2.

The vital statistics on this well include:

Spud Date: December 12, 1980

Location: T. 17 N., R. 13 W., SE/4 sec. 15

Lat. $35^{\circ}41'55''$ Long. $108^{\circ}12'00''$

Collar Elevation: 6810 ft (topo) Gibson Coal Member, Crevasse
Canyon Fm. (Cretaceous)

Core Point Top: 21 ft (depth) Gibson Coal Member, Crevasse
Canyon Fm. (Cretaceous)

Bottom Cored Interval: 218 ft (depth) Gibson Coal Member, Crevasse
Canyon Fm. (Cretaceous)

Core Recovery: 91 percent

Status of well: Abandoned, December 13, 1980.

This hole was drilled as an offset (15 to 20 ft south) of drill hole no. 4, to provide samples with which to study an observed near surface (140-240 ft depth) induced polarization anomaly, detected by ground and geophysics studies.

No geophysical logs were run on this hole.

The following core description (table 3) was described in the field.

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. 4, Mariano Lake-Lake
Valley drilling project, McKinley County, New Mexico, USGS Open-File
Report 81-969, 4 p.

CHIP SAMPLE LOG
FORM

Location: Sec. 15 T. 17N R. 13W Quadrangle (7.5') Crown Point
 Hole No: S-4 State: N.M. Date: 11/18/80
 Company: U.S.G.S. County: McKinley Geologist: Huffman, Condon
 Lat/Long: _____ Sheet 1 of 18

Table 1. Descriptions of cuttings samples from Mariano Lake -
Lake Valley Drilling Project, Hole No. 4, New Mexico

Depth to base of sample interval	Sample Number	Grain Size	Estimated % of Lithologies							Sandstones							Fossils / markers	Comments	
			Congl.	Sandst.	Siltst	Shale	Shale Color	Coal	Limestone	Grain Size	Sorting	Rounded	Feldspar	Carbonates	Rhyol.	Flintst.			Sandstone Color
10	80-54-10	80/70		70						UF-LM	MW	SR	TR	TR		1-2% BIK Chert	10YR5/4	Kcg Gibson Coal Hemlock Canyon Fossiliferous	30% caliche Iron-staining on grains
20		85/70		100						Med.	W	SR-R	TR	TR		1-2% BIK Chert	"	Kcg	
30		75/70		100						Med.	W	SR-R	TR	TR		3-4% BIK Chert	"	Kcg	Shell Fragments Green grains
40		80/70		100						Med.	W	SR-R	TR	1-2%		3-4% BIK Chert	"	Kcg	Limonite staining on grains Ironstone clast - 3mm
50		75/70		100						Med.	W	SR-SA	TR	1-2%		Gyp BIK Chert	"	Kcg	Ironstone clasts Limonite staining Green grains
60		75/70		100						Med.	W	SR-SA	TR	1-2%		Gyp BIK Chert	"	Kcg	Green grains Shell fragments
70		70/70		70		30	N-3			UF-LM	W	SR	TR			BIK Chert	"	Kcg	Iron-cemented clasts Limonite staining
80		70/70		80		20	N-3			UF-LM	W	SR	TR			Gyp BIK Chert	"	Kcg	Limonite staining
90		70/70		40		60	N-3			UF-LM	W	SR	TR			BIK Chert	"	Kcg	Iron-cemented clast Limonite staining
100	80-54-100	80/70		75		25	N-4			UF	W	SR-R	TR			BIK Chert Gyp	N-4	Kcg	

CHIP SAMPLE 106
FORM

Location: Sec. 15 T. 17N R. 13W Quadrangle (7.5') Crown Point
 Hole No: S-4 State: N.M. Date: 11/18/80
 Company: U.S.G.S. County: McKinley Geologist: Huffman, Condon
 Lat/Long: _____ Sheet 2 of 18.

Table 1. Descriptions of cuttings samples from Mariano Lake -
 Lake Valley Drilling Project, Hole No. 4, New Mexico

Lake Valley Drilling Project, Hole No. 4, New Mexico																			
Depth to Sample Interval	Sample Number	Grain Size	Estimated % of Lithologies						Sandstones										
			Congl.	Sandst.	Siltst.	Shale	Shale Color	Bed	Lithology	Drain Spec	Sorting	Rounded	Feldspar	Carbonate	Pyrite	Fluores.	Subs. Color		
110	80-SV-110	75/70		95		5	N-3			UF -LM	W	SR	TR			Black chert 1-2% long grains	10YR5/4	Kcg	Limonite stain Limonite clast (<1cm)
120		70/70		80		20	N-4			UF -LM	MW	SR	1%			Black chert 1-2% long grains	N-6	Kcg	Limonite cemented sandstone clast
130		70/70		80		20	N-4			UF -LM	W	SR	TR	TR		Black chert 1-2% long grains	N-6 5YR5/6	Kcg	Limonite staining & limonite cemented clasts
140		75/70		90		10	N-4			LM	W	SR	TR		TR	Black chert 1-2% long grains	N-6 5YR5/6	Kcg	Limonite staining
150		75/70		95		5	N-4			Med MW	MW	SA -SR	TR	1-2%		Black chert 1-2% long grains	N-6 5YR5/6	Kcg	Large carbonaceous fragments & carbonaceous shale clasts Limonite staining
160		80/70		90		10	N-4			UF -LM	W	SR	1%	TR		Black chert 1-2% long grains	N-6 5YR5/6	Kcg	Limonite staining
170		70/70		100						UF -LM	W	SR	2%	1-2%		Black chert 1-2% long grains	N-7	Kcda	Gray clay cemented clasts Limonite cemented clasts Pink grains may be Fe ₂ O ₃ coating
180		75/70		100						F	W	SR	1%	TR		Black chert 1-2% long grains	N-7	Kcda	Limonite staining
190		75/70		100						Med.	W	SR	1%			Black chert 1-2% long grains	N-7	Kcda	Limonite & hematite staining Pink grains probably hematite coated
200	80-SV-200	70/70		100						Med.	MW	SR	1-2%	TR	TR	Black chert 1-2% long grains	N-7	Kcda	Limonite & hematite staining

CHIP SAMPLE LOG
FORM

Location: _____ Sec. 15 T. 17N R. 13W Quadrangle (7.5') Crown Point
Hole No: S-4 State: N.M. Date: 11/18/80
Company: U.S.G.S. County: McKinley Geologist: Condon, Huffman
Lat/Long: _____ Sheet 3 of 18

Table 1. Descriptions of cuttings samples from Mariano Lake -
Lake Valley Drilling Project, Hole No. 4, New Mexico

Lake Valley Drilling Project, Hole No. 4, New Mexico										Sandstones										Formation / member	COMMENTS
Depth to base of Sample Interval	Sample Number	Core/b/sec	Estimated % of Lithologies					Limestone	Grain size	Sorting	Roundedness	Feldspar	Carbonates	Pyrite	Fluores.	Sandstone Color					
			Congl.	Sandst.	Siltst	Shale	Shale Color										Coal				
210	80-S-4-210	70/70		100					UF	W	SR	1%	TR		blkcht gray	N-6	Kcda	Dalton Ss Mbr. Crevasse Canyon Formation	Limonite staining		
220		75/70		100					UF-LM	W	SR	TR	TR		blkcht gray red gr.	N-6 5YR5/6	Kcda		Much limonite staining		
230		70/70		100					UF	W	SR	-R	-		blkcht gray	N-6	Kcda		Limonite cemented clasts		
240		75/70		85	15	N-6			UF	W	SR	-R	-		Gyp. blkcht red gr.	N-6	Kcda		Limonite staining		
250		70/70		90	10	N-6			F	MW	SR	SA	TR	-	blkcht gray	N-6 5YR5/6	Kcda		Limonite staining		
260		75/70		75	25	N-6			UF-LM	W	SR	SA	TR	-1%	blkcht gray	N-6 5YR5/6	Kcda		Limonite staining		
270		75/70		40	60	N-6			UF	W	SR	-	TR		blkcht	N-6	Kmm	Mulletto Tongue of Minors Shale	Limonite cemented clasts		
280		75/70		100					F	W	R	SA	1%		Abnt. blkcht	N-6	Kmm		"		
290		70/70		50	50	N-4			UF	W	SR	SA	TR		blkcht gray	N-4	Kmm		"		
300	80-S-4-300	76/70		20	80	N-4			LF	W	SR	-	TR		blkcht gray	N-4	Kmm				

Table 1. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 4, New Mexico

Lake Valley Drilling Project, Hole No. 4, New Mexico																		
Depth to base of Sample Interval	Sample Number	Coar./fine	Estimated % of Lithologies					Sandstones					Fossils / mm box	Comments				
			Congl.	Sandst.	Siltst.	Shale	Shale color	Coal	Limestone	Grain size	Sorting	Rounded			Feldspar	Carbonates	Pyrite	Flint	Sandstone color
310	80-54-310	75/70		80		20	N-4			UF -LM	MW	SR -SA	-	-			N-4	Some coarse grains of quartz Limonite staining
320		80/70		25		75	N-4			UF -LM	W	R -SR	-	-			N-4	Pink Thread Limonite staining
330		75/70		15		85	N-4			UF -LM	W	SR TR	-	-			N-4	
340		75/70		15		85	N-4			UF -LM	W	SR TR	-	-			N-4	Limonite staining
350		75/70		50		50	N-4			UF -LM	Med.	SR -SA	-	-			N-6	Medium coarse grains
360		80/70		40		60	N-4			LF	W	SR -SA	-	-			N-6	
370		75/70		20		80	N-4			LF	W	SR -SA	-	-			N-6	
380		70/70		10		90	N-4			F	W	SR -SA	-	-			N-6	Limonite staining
390		70/70		25		75	N-4			UF -LM	MW	SR	-	-			N-4	Some coarse grains of quartz Limonite staining
400	80-54-400	75/70		60		40	N-3			UF -LM	W	SR -SA	-	-			N-3	Limonite staining

CHIP SAMPLE 106
FORM

Location: _____ Sec. 15 T. 17N R. 13W Quadrangle (7.5') Crown Point
Hole No: S-4 State: N.M. Date: 11/18/80
Company: U.S.G.S. County: McKinley Geologist: Corden, Huffman
Lat/Long: _____ Sheet 4 of 18

CHIP SAMPLE 106
FORM

Location: _____ Sec. 15 T. 17N R. 13W Quadrangle (9.5') Crown Point
Hole No: 5-4 State: N.M. Date: 11/19/80
Company: U.S.G.S. County: McKinley Geologist: Huffman, Gordon
Lat/Long: _____ Sheet 5 of 18

Table 1. Descriptions of cuttings samples from Mariano Lake -
Lake Valley Drilling Project, Hole No. 4, New Mexico

Lake Valley Drilling Project, Hole No. 4, New Mexico																			
Depth to base of Sample Interval	Sample Number	Grain Size	Estimated % of Lithologies						Sandstones										
			Congl.	Sandst.	Siltst.	Shale	Shale color	Coal	Limestone	Grain Size	Sorting	Roundness	Feldspar	Carbonates	Pelite	Floccul.	Sandstone Color		
410	80SY-V10	70/70		5		95	N-3			UVF -LM	P	SA	-	-	TR	Gyp white		Kmm Mollusca Tongue of Mammals Shale	Shell Fragments?
420		70/70		5		95	N-3			UF -LM			-	-		white gr. gr.		Kmm	"
430		75/70		2.5		97.5	N-3			UVF			-	TR				Kmm	
440		75/70		5		95	N-3			UVF	W	SR	-	-				Kmm	Fissile
450		70/70		5		95	N-3			UF -LM	P	SR -SA	-	-				Kmm	Shell Fragments?
460		70/70		5		95	N-3			UVF	W	SR -SA	-	-				Kmm	White amorphous material
470		76/70		10		90	N-3			UF	MW	SR	-	-				Kmm	Limonite stain on grains Shell Fragments?
480		75/70		10		90	N-3			F	W	SR	-	-		white		Kmm	Limonite staining
490		70/70		5		95	N-3			UF -LM	M	SR	-	-		white red dot		Kmm	
500	80SY-V10	75/70		5		95	N-3			UVF -LF	W	SA	-	-	TR			Kmm	Shell Fragments

CHIP SAMPLE 106
FORM

Location: _____ Sec. 15 T. 17N R. 13W Quadrangle (7.5') Crown Point
 Hole No: S-4 State: N.M. Date: 11/19/80
 Company: U.S.G.S. County: McKinley Geologist: ?
 Lat/Long: _____ Sheet 6 of 18.

Table 1. Descriptions of cuttings samples from Mariano Lake -
Lake Valley Drilling Project, Hole No. 4, New Mexico

Lake Valley Drilling Project, Hole No. 4, New Mexico										Sandstones										Formations/Markers										COMMENTS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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Depth to bottom of Sample Interval	Sample Number	Coar./fine	Congl.	Sandst.	Siltst.	Shale	shale color	Cal	Limestone	Grain size	Sorting	Rounded	Fiducial	Carbonac.	Pyrite	Reacts.	Sandstone Color																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
510	8054-510	70/70	98			2	N-3			Med.	W	SR-R				TR. Rd. chert	N-6																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			

CHIP SAMPLE 106
FORM

Location: _____ Sec. 15 T. 17N R. 13W Quadrangle (7.5') Crown Point
 Hole No: S-4 State: N.M. Date: 11/19/80
 Company: U.S.G.S. County: McKinley Geologist: ?
 Lat/Long: _____ Sheet 7 of 18

Table 1. Descriptions of cuttings samples from Mariano Lake -
Lake Valley Drilling Project, Hole No. 4, New Mexico

Exp. to base of (sample interval)	Sample Number	Grain/size	Estimated % of Lithologies								Sandstones							Remarks / notes	COMMENTS
			Congl.	Sandst.	Siltst.	Shale	shale color	Coal	Limestone	Grain size	Sorting	Roundness	Fidelpar	Carbonates	Pyrite	Notes	Sandstone Color		
610	80-S4-610	70/70		70		30	N-3			UF-LM	P	SA-R		TR		Reddish bl. qtz	N-7	Kmm Mudst. Tongue Mudst. Shale Kmm	Hematite staining on quartz. White chert
620		68/70		10	TR	80	5YR2/1			UF	P	SA-R		TR		brn. chert.			
630		74/70		10		50	5YR2/1	40		UF-LM	P	SR-R		TR				Kmm	
640		68/70		95				5		UF-UC	P	SA-R	TR	TR		bl. qtz Reddish	N-4	Kmm/Kcdl	
650		72/70		33		33	N-4	33		UF-LC	F	SA-R		TR		Reddish	N-4	Kcdl Dilco Coal Mbr. Dilco Canyon Fossiliferous	Hematite staining
660		70/70		20		5	N-4	75		UF-UC	P	SA-R	TR	TR	TR	Reddish bl. qtz	5G6/1	Kcdl	"
670		74/70		70				30		UF-LC	F-P	SA-R	TR	TR	TR	bl. qtz Reddish	N-4	Kcdl	"
680		68/70		60				40		UF-LC	F	SA-R	TR	TR	TR	bl. qtz Reddish	N-5	Kcdl	Pyrite on coal Hematite staining
690		70/70		80				20		UF-LC	F	SA-R	TR	TR	TR	brn. chert.	N-5	Kcdl	
700	80-S4-700	75/70		95				5		UF-LC	P	SA-R	TR	TR	TR	bl. qtz	N-6	Kcdl	Hematite staining

CHIP SAMPLE 106
FORM

Location: Sec. 15 T. 17N R. 13W Quadrangle (9.5') Crown Point
 Hole No: S-4 State: N.M. Date: 11/19/80
 Company: U.S.G.S. County: McKinley Geologist: ?
 Lat/Long: _____ Sheet 8 of 18.

Table 1. Descriptions of cuttings samples from Mariano Lake -
Lake Valley Drilling Project, Hole No. 4, New Mexico

Depth to base of sample interval	Sample Number	Core/s	Estimated % of Lithologies								Sandstones							Formation / member	Comments
			Congl.	Sandst.	Siltst.	Shale	Shale color	Coal	Limestone	Grain size	Sorting	Rounded	Flake	Carbon.	Pyrite	Heaviness	Sample Color		
710	80-54-710	66/70	30	30				40		LF-LC	P	SA-R	TR	TR	TR	brn. chc	N-5	Kidd Dilco Coal Mbr. Grease Canyon Formation	Limonite staining
720		70/70	95	2			3		UF-UC	P	SA-R	TR	TR			Red chc. brn. chc.	N-6	Kg Gallup Ss Main body	Bright green grains
730		65/70	98	TR			2		LF-LM	F	SA-R	TR	TR	TR		bl. qtz. Red chc.		Kg	Hematite staining
740		65/70	97				3		LF-LC	P	SA-R	TR	TR	TR		bl. qtz. Red chc.	5Y6/1	Kg	
750		68/10	98				2		LF-LC	P	SA-SR	TR	TR			Red chc.	5Y6/1	Kg	Limonite staining Green grains
760		68/70	98				2		LF-LM	F	SA-SR	TR	TR				N-6	Kg	
770		70/70	99				1		UVF-UM	P	SA-R	TR	TR	TR		Red chc. bl. qtz.	N-6	Kg	Green grains Hematite staining
780		68/70	95	2			3		UVF-UM	W	A-SR	TR	TR	TR		Red chc. brn. chc.	N-5	Kg	Green grains Hematite staining
790		65/70	98				2		UVF-UM	W	A-SR	TR	TR			brn. chc. Red chc.	N-6	Kg	Green grains (abundant) Hematite staining
800	80-54-800	74/70	80		19		TR		LF-LM	P	A-SR	TR	TR	TR		Red chc.		Kg	Green grains

Location: _____ Sec. 15 T. 17N R. 13W Quadrangle (9.s.) Crown Point
 Hole No: S-4 State: N.M Date: 11/19/80
 Company: U.S.G.S. County: McKinley Geologist: Huffman, S. Kink
 Lat/Long: _____ Sheet 9 of 18

Table 1. Descriptions of cuttings samples from Mariano Lake -
Lake Valley Drilling Project, Hole No. 4, New Mexico

Depth to base of Sample Interval	Sample Number	Core/Loss	Estimated % of Lithologies									Sandstones							Formation/Marker	Comments	
			Congl.	Sandst.	Siltst.	Shale	Shale	Shale	Shale	Shale	Shale	Grain Size	Sorting	Rounded	Feldspar	Carbonates	Pyrite	Fluores.			Sandstone Color
810	80-S-4-810	65/70		85		15	N-3				LF	W	SR	TR		TR		bl/cht red/cht	N-3	Kg Gallup Ss Main body	
820		72/70		75		25	N-3				LF	W	R-SR					bl/cht eng. etc	N-6	Kg	Trace Organics (contaminants?)
830		70/70		85		15	N-3				LF	W	SR					bl/cht red/cht	N-6(?)	Kg	"
840		70/70		50		50	N-3				LF	W	SR-R	TR		TR		Gyp bl/cht	N-6	Km Tongue Manos Shale	"
850		68/70		50		50	N-3				LF	W	SR-R	TR		TR		Gyp x-gr. eng. etc bl/cht	N-6	Km	"
860		65/70		30		70	N-3				LF	W	SR-R	TR		TR		Gyp x-gr. eng. etc bl/cht	N-6	Km	
870		72/70		60		40	N-3				UF	W	SR						N-6	Kg Lower Gallup Ss	
880		72/70		75		25	N-3				LF-UF	W	R-SR					bl/cht red/cht	N-6	Kg	
890		70/70		75		25	N-3				LF-UF	W	R-SR					bl/cht red/cht	N-6	Kg	
900	80-S-4-900	72/70		50		50	N-3				LF	W	SR						N-6	Km Manos Shale	

CHIP SAMPLE 106
FAM

Location: _____ Sec. 15 T. 17N R. 13W Quadrangle (7.5') Crown Point
Hole No: S-4 State: N.M Date: 11/19/80
Company: U.S.G.S County: McKinley Geologist: Hammond S. Kink
Lat/Long: _____ Sheet 10 of 18.

Table 1. Descriptions of cuttings samples from Mariano Lake -
Lake Valley Drilling Project, Hole No. 4, New Mexico

Lake Valley Drilling Project, Hole No. 4, New Mexico										Sandstones										Formation / member	COMMENTS
Depth to base of Sample Interval	Sample Number	Core / sec	Estimated % of Lithologies								Limestone	Grain Size	Sorting	Rounded	Feldspar	Carbonate	Pelite	Foliation	Surface Color		
			Congl.	Sandst.	Siltst.	Shale	shale color	Coal													
910	80-54-910	73/70		50		50	N-2			UVF -LF	W	SA -SR							N-3	Km	Manos Shale Few miscellaneous chips of light colored sandstone (N-8)
920		77/70		60		40	N-2			UVF -LF	W	SA -SR							N-3	Km	"
930		76/70		50		50	N-2			UVF -LF	W	SA -SR			TR				N-3	Km	covered with drillers mud. Very hard to see
940		75/70		40		60	N-2			UVF -LF	W	SA -SR							N-3	Km	"
950		72/70		40		60	N-2			UVF -LF	W	SA -SR							N-3	Km	Large 1cm chip of calcite (vein?)
960		74/70		40		60	N-2			-	-	-							-	Km	
970		72/70		60		40	N-2			UVF	W	SA -SR							N-3	Km	
980		75/70		40		60	N-2			UVF	W	SA -SR								Km	
990		80/70		30		70	N-2			UVF	W	SA -SR								Km	
1000	80-54-1000	75/70		40		60	N-2			UVF	W	SA -SR								Km	Angular quartz grains (uM)

CHIP SAMPLE 106
FORM

Location: Sec. 15 T. 17N R. 13W Quadrangle (7.5') Crown Point
 Hole No: S-4 State: N.M. Date: 11/19/80
 Company: U.S.G.S County: McKinley Geologist: Hoffman, Gordon, S. Klink
 Lat/Long: _____ Sheet 11 of 18

Table 1. Descriptions of cuttings samples from Mariano Lake -
Lake Valley Drilling Project, Hole No. 4, New Mexico

Depth to base of sample (Interval)	Sample Number	Core/Less	Estimated % of Lithologies								Sandstones							Formation / member	Comments	
			Congl.	Sandst.	Siltst.	Shale	shale color	Coal	Limestone	Grain Size	Sorting	Roundness	Fiduciar	Carbonates	Pyrite	Floccs.	Sandstone Color			
1010	80-54-1010	70/70		10	TR	90	N-3			UF-LM	W	R						Km	Manicos Shale	Shell fragments? White calcite veins? Limonite staining
1020		68/70		5	TR	95	N-3											Km		Shell fragments? White calcite?
1030		70/70		5		95	N-3			UF-LM								Km		
1040		70/70		5		95	N-3		TR									Km		Fissile shale chips Calcareous Tan chips (L.S.) Calcite (white)
1050		69/70		5		95	N-3		TR					5%?		Reddish		Km	Tan Limestone chips Fissile shale chips	
1060		68/70		10		90	N-3		TR	UF	MW							Km		Fissile white calcite shale fragments?
1070		73/70		10		90	N-3		TR	UF	MW							Km		Shell fragments
1080		66/70		5		95	N-3		TR	UF-LM	MW	SR-SA						Km		Limonite staining White calcite-shale fragments?
1090		73/70		10		90	N-3		TR	UF-LM	MW	SR				Reddish		Km		Fissile shale fragments
1100	80-54-1100	72/70		10		87	N-3		1-3%	UF-LM	MW	SR-SA						Km		Tan Limestone fragments

CHIP SAMPLE 106
TEAM

Location: _____ Sec. 15 T. 17N R. 13W Quadrangle (9.5') Crown Point
 Hole No: S-4 State: N. M. Date: 11/19/80
 Company: U.S.G.S. County: McKinley Geologist: Huffman, Gordon, Sikkink
 Lat/Long: _____ Sheet 12 of 18.

Table 1. Descriptions of cuttings samples from Mariano Lake -
Lake Valley Drilling Project, Hole No. 4, New Mexico

Depth to base of sample interval	Sample Number	Core/Loss	Estimated % of Lithologies								Sandstones							Formation / member	Comments
			Congl.	Sandst.	Siltst.	Shale	Shale Color	Col	Limestone	Grain Size	Sorting	Roundness	Feldspar	Carbonates	Pyrite	Fluorite	Sandstone Color		
1110	80-54-1110	68/70		TR	10	85	N-3		5									Km	Limonite staining on siltstone Shell fragments
1120		74/70		1-3	7-9	85	N-3		5	F								Km	CalciTe Veins? Limonite staining on siltstone & sandstone
1130		70/70		1-3	7-9	85	N-3		5	F								Km	"
1140		70/70		10		80	N-3			UF-LM	W	SR-SA			TR		N-7	Km	Fissile shale 10% white calcite veins Trace limonite staining
1150		74/70		13-14		85	N-3		1-2	UF	W	R			TR		N-7	Km	Calcareous vein material
1160		72/70		10	TR	90	N-3			UF							N-7	Km	Shell fragments?
1170		74/70		5		95	N-3			UF					TR	Gyp	N-7	Km	Limonite staining
1180		70/70		15		85	N-3			UF-F					TR	Gyp	N-7	Km	"
1190		70/70		15		85	N-3			UF-F						Gyp	N-7	Km	"
1200	80-54-1200	75/70		10		90	N-3			UF-F							N-7	Km	"

CHIP SAMPLE 106
FORM

Location: _____ Sec. 15 T. 17N R. 13W Quadrangle (7.5') Crown Point
Hole No: S-4 State: N. M. Date: 11/19/80
Company: U.S.G.S County: McKinley Geologist: _____
Lat/Long: _____ Sheet 13 of 18.

Table 1. Descriptions of cuttings samples from Mariano Lake -
Lake Valley Drilling Project, Hole No. 4, New Mexico

Depth to base of Sample Interval	Sample Number	Core length	Estimated % of lithologies								Sandstones							Formation / marker	COMMENTS	
			Congl.	Sandst.	Siltst.	Shale	shale color	Cal	Limestone	Grain size	Sorting	Roundness	Feldspar	Carbonates	Pyrite	Fluores.	Sandstone Color			
1210	80-54-1210	74/70		5		85				LS calc. 10								Km	Mancoes Shale	Limonite stains on sandstone grains.
1220		70/70		10		80				10								Km		
1230		68/70		15		85	N-3											Km		Iron staining on quartz grains
1240		68/70		10		85	N-3			5								Km		
1250		74/70		5		95	N-3											Km		
1260		72/70		TR		99+	N-2											Km		
1270		74/70				100	N-2											Km		
1280		73/70		5		95	N-2			TR	UM	M	SR -R					Km		Abundant calcite
1290		74/70		5		95				TR	UM	M	SR -R					Km		
1300	80-54-1300	72/70		5		95				TR	LF	W	SR					Km		

CHIP SAMPLE 106
FOAM

Location: _____ Sec. 15 T. 17N R. 13W Quadrangle (9.s.) Crown Point
Hole No: 5-4 State: N.M. Date: 11/19/80
Company: U.S.G.S County: McKinley Geologist: Hammond, Sikkink
Lat/Long: _____ Sheet 14 of 18

Table 1. Descriptions of cuttings samples from Mariano Lake -
Lake Valley Drilling Project, Hole No. 4, New Mexico

Exp. to top of sample interval	Sample Number	Core/loss	Estimated % of Lithologies								Sandstones							Formation / member	COMMENTS	
			Congl.	Sandst.	Siltst.	Shale	shale color	Coal	Limestone	Grain size	Sorting	Roundness	Feldspar	Carbonates	Pyrite	Roots	Searcher Color			
1310	80-SV-1310	70/70		10		90	N-3			UF	W	SR-R	TR				White	Km	Manos Shale	Black grains
1320		75/70		4+		95	N-3		TR	F	W	R					calc.	Kmj	Juana Lopez Member Manos Shale	
1330		72/70		TR		99+	N-3		TR	UF	W	R					calc.	Kmj (?)		Trace of black minerals Iron staining on sand grains
1340		75/70		2		98	N-3			LM	W	SA-SR						Kmj (?)		Iron staining on quartz grains
1350		75/70		9+		90	N-3		TR	LM-UF	MW	R	TR				calc. white	Kmj		Iron staining on quartz grains
1360		70/70		5		95	N-3			UF	W	SR					calc	Kmj		
1370		70/70		8-10		90	N-3		TR-2	UF	W	SR					White calc.	Kmj		
1380		70/70		10		85	N-3		5	UF-LM	M	SR-SA			TR		calc.	Kmj		
1390		71/70		5		95	N-3			UF	W	SR					calc. brown, etc.	Kmj		
1400	80-SV-1400	73/70				99+	N-3		TR								calc.	Kmj		

CHIP SAMPLE 106
FORM

Location: Sec. 15 T. 17N R. 13W Quadrangle (9.5') Crown Point
 Hole No: S-4 State: N.M. Date: 11/20/80
 Company: U.S.G.S. County: McKinley Geologist: _____
 Lat/Long: _____ Sheet 15 of 18

Table 1. Descriptions of cuttings samples from Mariano Lake -
Lake Valley Drilling Project, Hole No. 4, New Mexico

Lake Valley Drilling Project, Hole No. 4, New Mexico																	
Dip to direction of sample interval	Sample Number	Grain Size	Estimated % of Lithologies						Sandstones						Fossiliferous / number	Comments	
			Congl.	Sandst.	Siltst.	Shale	Shale Color	Coal	Limestone	Grain Size	Sorting	Roundness	Feldspar	Carbonate			Pyrite	Alc. etc.	Subsac Color
1410	80-54-1410	70/65	5	5	90	N-3		5	LM-LC	MW	SR				Red		Lim. staining on sand grains
1420		70/65	TR		98+	N-3								TR			Calcite 1% shell fragments (?)
1430		64/65	10		90	N-3			UF-LM	W	SR	TR(?)		TR			Trace calcite Pink quartz grains Limonite stained grains
1440		70/65	TR		99+	N-3											Shell fragments Pink grains
1450		68/65	TR		99+	N-3								TR			Shell fragments
1460		68/65	5		95	N-3			UF-LM	W	SA-SR						Trace calcite Shell fragments Green grains
1470		64/65	7-8		90	N-3			UVF-LM	MW	SR			TR	Gyp.		2-3% shell fragments or calcite Limonite staining
1480		70/65	7-8		90	N-3			Med (low grain count 5-10)	MW	SR			TR	Gyp.		2-3% shell fragments or calcite
1490		68/65	3		95	N-3			UF-LM	W	SR			TR	Gyp		2% calcite or shell fragments Limonite staining
1500	80-54-1500	64/65	3		95	N-3			UF-LF	W	SR			abnt.			2% calcite or shell fragments Limonite staining

Location: _____ Sec. 15 T. 17N R. 13W Quadrangle (7.5') Crown Point
 Hole No: S-4 State: N. M. Date: 11/20/80
 Company: U.S.G.S. County: McKinley Geologist: _____
 Lat/long: _____ Sheet 16 of 18.

Table 1. Descriptions of cuttings samples from Mariano Lake -
Lake Valley Drilling Project, Hole No. 4, New Mexico

Exp. to base of Sampled Interval	Sample Number	Core/Sec	Estimated % of Lithologies								Sandstones							Formation / member	COMMENTS
			Congl.	Sandst.	Siltst	Shale	shale color	Coal	Limestone	Grain Size	Sorting	Rounded	Feldspar	Carbon.	Pyrite	Alteest.	Sandstone Color		
1510	80-54-1510	65/65		3		95	N-3		TR									Km Manos Shale	2% calcite Limonite staining
1520		65/65		13		85	N-3			LF	W	SR-R	TR	TR	gn-gr			Km	Limonite staining 2% calcite Some sand grains in clear slump - Rock fragments
1530		68/65		50		50	N-5			UVF -UF	MW	SA-SR	TR	TR	gn-gr			Km	Trace brown siltstone (?) Fragments Shell fragments Limonite staining on sand Clear quartz sand grains Shell fragments
1540		65/65		50	TR	50	N-3			LF	W	SR			gn-gr			Km	Limonite staining Shell fragments siltstone (?) fragments; Sand in discrete clumps
1550		67/65		25	TR(?)	75	N-3			LF	W	SR			gn-gr Gpt (?)			Km	Limonite staining Shell fragments Some LM sand grains
1560		74/65		20		80	N-3			UVF -F	W	SR						Km	2% shell fragments Limonite staining
1570		70/65		10	TR(?)	90	N-3			UF -LM	MW	SR			gn-gr			Km	Limonite staining Quartz grains in discrete clumps Shell fragments
1580		68/65		25		75	N-3			UVF	W	SR			Abn. gn-gr			Km	Shell fragments
1590		70/65		15		85	N-3			UVF -LF	W	SR			TR			Km	Shell fragments
1600	80-54-1600	73/65		35		65	N-3			UVF -LF	W	SR			TR	gn-gr		Km	Shell fragments

Table 1. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 4, New Mexico

Depth to base of Sample Interval	Sample Number	Grain Size	Estimated % of Lithologies						Sandstones							Facies / Remarks	COMMENTS		
			Coagl.	Sandst.	Siltst.	Shale	shale color	Bed	Lamination	Grain Size	Sorting	Rounded	Feldspar	Carbonates	Pyrite			Access.	Subs. Color
1610	8054-1610	65/65	10			90	N-3			UF-LM	W	SA-SR				calc.		km Mancos Shale	
1620		68/65	60			40	N-3			UF-LM	W	SA-SR					N-5	km	Limonite staining
1630		68/65	60			40	N-3	TR	TR	UF-LF	W	SA-SR		TR	TR	calc.	N-5	km Greenhorn LS Mancos Shale	
1640		66/65	60			40	N-3	TR		UF-LF	W	SA-SR		TR	TR	calc.	N-5	km/kdt	Limonite staining
1650		68/65	80			20	N-2			UF-LC	F	SA-R			TR	calc. Hgt.	N-5	Kdt Towells Tongue Dakota SS	
1660		62/65	80			20	N-2			UF-UM	M	SA-R			TR	calc.	N-5	Kdt	Limonite staining
1670		62/65	70			30	N-2			UF-UM	M	SA-R			TR	calc.	N-5	Kdt	
1680		68/65	70			30	N-2			UF-UM	M	SA-R				calc.	N-5	Kdt/Kmw wastewater Tongue Mancos Shale	
1690		62/65	80			20	N-2			UF-LC	M	SA-R					N-5	Kdt/Kmw	Limonite staining
1700	8054-1700	67/65	70			30	N-2			UF-LC	M	SA-R			TR		N-5	Kdt/Kmw/Kd Dakota SS	

CHIP SAMPLE 106 FORM

Location: Sec. 15 T. 17N R. 13W Quadrangle (9.5) Crown Point
Hole No: 5-4 State: N.M. Date: 11/20/80
Company: U.S.G.S. County: McKinley Geologist: _____
Lat/Long: _____ Sheet 17 of 18

Location: _____ Sec. 15 T. 17N R. 13W Quadrangle (7.5') Crown Point
Hole No: S-4 State: N.M. Date: 11/20/80
Company: U.S.G.S. County: McKinley Geologist: Condon, Huffman
Lat/Long: _____ Sheet 18 of 18.

Table 1. Descriptions of cuttings samples from Mariano Lake - Lake Valley Drilling Project, Hole No. 4, New Mexico

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Table 2 Descriptions of core from Mariano Lake - Lake valley
Drilling Project Hole No. 4, New Mexico

2 LOCATION 11-6 Sec. 15 T. 17 N R. 13 W
STATE New Mexico COUNTY McKinley
U.S.G.S. CORE LIBRARY NUMBER _____ API WELL NUMBER _____

Depth (ft)	Core Description	Grain Size	Color	Texture	Notes	Mineralogy	Other
1710	CLAYEY SANDSTONE	ell				CLAYEY SANDSTONE	
1800	MOTTLED MUDSTONE w/ VERY THIN SAND STRINGERS	ell				MOTTLED MUDSTONE w/ VERY THIN SAND STRINGERS	
1805	MOTTLED, CLINOTILOLITE?	ell				MOTTLED, CLINOTILOLITE?	
1807	MOTTLED OR BASE	ell				MOTTLED OR BASE	
1810	MOTTLED HORIZONTAL BARROWS, CLINOTILOLITE?	ell				MOTTLED HORIZONTAL BARROWS, CLINOTILOLITE?	
1815	CALCITE VENEING	ell				CALCITE VENEING	
1820	CALCITE VENEING, RED & GN GRAINS	ell				CALCITE VENEING, RED & GN GRAINS	
1825	CALCITE FILLED VENS	ell				CALCITE FILLED VENS	
1830	BLEBS, OF 5G 4/1, SMALL REDUCED ZONES AROUND BLEBS	ell				BLEBS, OF 5G 4/1, SMALL REDUCED ZONES AROUND BLEBS	
1835	MOTTLED 5YR 4/1 - 5G 4/1	ell				MOTTLED 5YR 4/1 - 5G 4/1	
1840	CALCITE VENS, BROWN BLEBS (STAIN?) 5G 4/1 - 5YR 4/1	ell				CALCITE VENS, BROWN BLEBS (STAIN?) 5G 4/1 - 5YR 4/1	
1845	5G 4/1 - 5YR 4/1	ell				5G 4/1 - 5YR 4/1	
1850	3" CALC CONCENTRATION 5YR 4/1, SCORIE SURF. w/ GRN CLAY CLASTS; 2 cm calc BLEBS - IRREG. PATCHES OF LT. GRN, 2 cm DILKS - YELLOW SHAED; MOTTLED 5YR 4/1	ell				3" CALC CONCENTRATION 5YR 4/1, SCORIE SURF. w/ GRN CLAY CLASTS; 2 cm calc BLEBS - IRREG. PATCHES OF LT. GRN, 2 cm DILKS - YELLOW SHAED; MOTTLED 5YR 4/1	
1855	MOTTLED 5G 4/1, RED, BLK GR, DR GRN ZONE 1/2" BAND 5G 4/1, SNIDE PIL GR	ell				MOTTLED 5G 4/1, RED, BLK GR, DR GRN ZONE 1/2" BAND 5G 4/1, SNIDE PIL GR	
1860	MOTTLED, 2G 4/1, 5YR 4/1, BLK, SEAMS IN GRN ZONES	ell				MOTTLED, 2G 4/1, 5YR 4/1, BLK, SEAMS IN GRN ZONES	
1865	MOTTLED SCORIE FILLER w/ CALCITE COBBLE BANDS w/ 5YR 4/1, RED CLAY AT TOP	ell				MOTTLED SCORIE FILLER w/ CALCITE COBBLE BANDS w/ 5YR 4/1, RED CLAY AT TOP	
1870	STREAKED w PRG 2 THROUGHOUT	ell				STREAKED w PRG 2 THROUGHOUT	
1875	MOTTLED, 2G 5YR 4/1, 3" DILKS, CALC CONCENTRATION	ell				MOTTLED, 2G 5YR 4/1, 3" DILKS, CALC CONCENTRATION	
1880	CALC. CONCA. 5YR 4/1	ell				CALC. CONCA. 5YR 4/1	
1885	STREAKED w/ 5YR 4/1	ell				STREAKED w/ 5YR 4/1	

11-10-18

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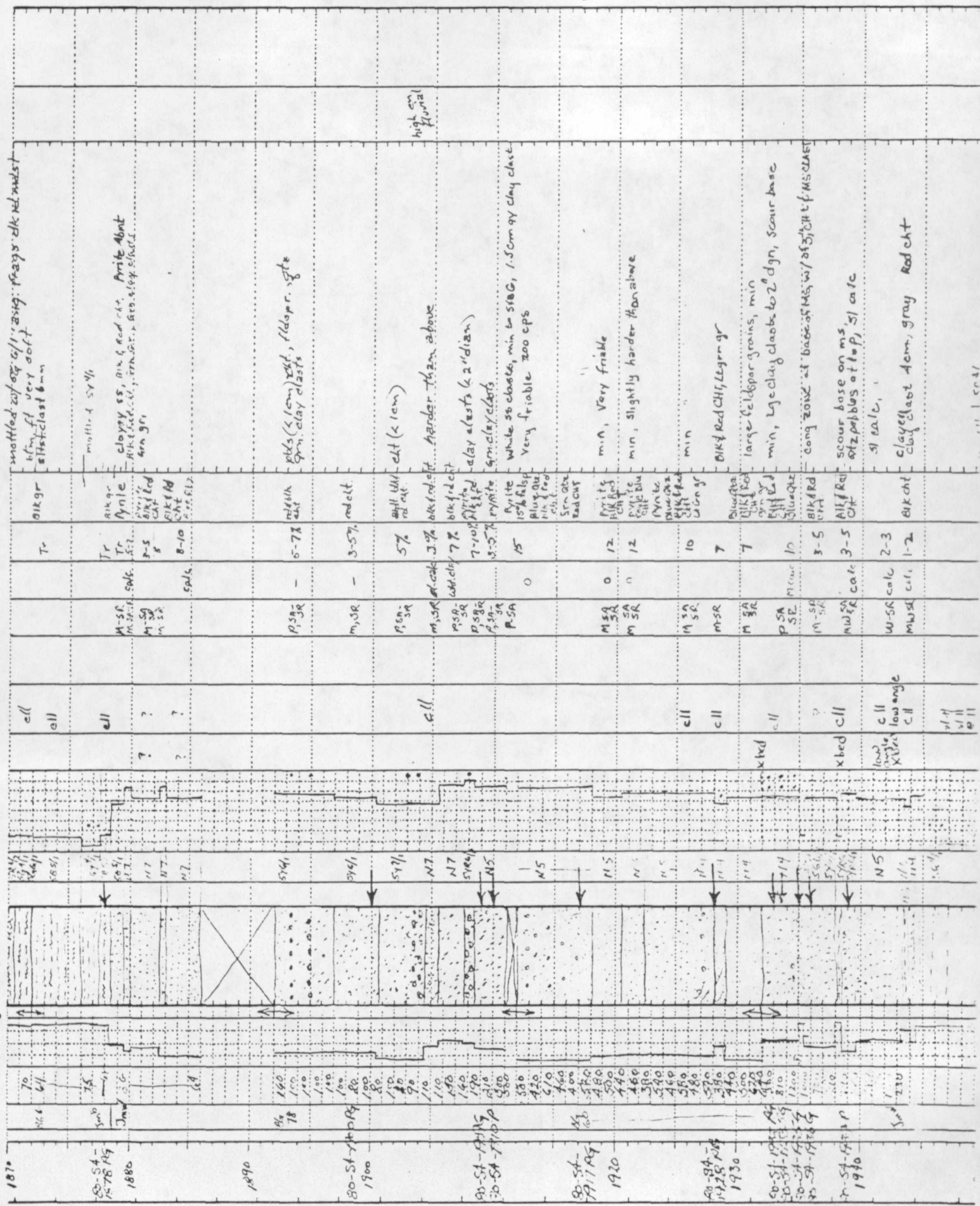


Table 2 Descriptions of core from Mariano Lake - Lake Valley
Drilling Project Hole No. 4, New Mexico

LOCATION 3-4 Sec. 15 T. 17N R. 15W
STATE New Mexico COUNTY Mckinley
U.S.G.S. CORE LIBRARY NUMBER _____ API WELL NUMBER _____

Core No.	Depth (ft)	Core Description	Grain Size	Grain Shape	Grain Color	Grain Texture	Grain Orientation	Grain Abundance	Grain Distribution	Grain Comments
30-54-2009	30	red chert, small black grains, red chert, laminae stained with blue, affected by slight difference in grain size, blue, black, metallic looking grains	5-10	scale	5-10	scale	5-10	scale	5-10	scale
30-54-2009	35	blue, red chert, black metallic grains	5-10	scale	5-10	scale	5-10	scale	5-10	scale
30-54-2009	40	hematite staining, small chert, light green, blue, red chert	5-10	scale	5-10	scale	5-10	scale	5-10	scale
30-54-2009	45	feldspar granules, small, green, grains	5-10	scale	5-10	scale	5-10	scale	5-10	scale
30-54-2009	50	large feldspar granules (approx 1cm)	5-10	scale	5-10	scale	5-10	scale	5-10	scale
30-54-2009	55	medium to large calcareous, hematite staining	5-10	scale	5-10	scale	5-10	scale	5-10	scale
30-54-2009	60	red chert, apple green, slightly streaked mottled w/ 50% chert	5-10	scale	5-10	scale	5-10	scale	5-10	scale
30-54-2009	65	orange clay elast	5-10	scale	5-10	scale	5-10	scale	5-10	scale
30-54-2009	70	red clay elast	5-10	scale	5-10	scale	5-10	scale	5-10	scale
30-54-2009	75	3" calc. rem. bed (N7)	5-10	scale	5-10	scale	5-10	scale	5-10	scale
30-54-2009	80	granules & pebbles, slightly calc	5-10	scale	5-10	scale	5-10	scale	5-10	scale
30-54-2009	85	light blue shale, pebbles, (most in clay of core)	5-10	scale	5-10	scale	5-10	scale	5-10	scale
30-54-2009	90	clay elast, blue, calc	5-10	scale	5-10	scale	5-10	scale	5-10	scale
30-54-2009	95	light calc, cemented sand, below tip and	5-10	scale	5-10	scale	5-10	scale	5-10	scale
30-54-2009	100	slightly calc	5-10	scale	5-10	scale	5-10	scale	5-10	scale
30-54-2009	105	white clay, green, red chert	5-10	scale	5-10	scale	5-10	scale	5-10	scale
30-54-2009	110	blue, calc, small dk black grains, red chert	5-10	scale	5-10	scale	5-10	scale	5-10	scale
30-54-2009	115	apple green grains	5-10	scale	5-10	scale	5-10	scale	5-10	scale
30-54-2009	120	blue, calc, pebbles, in middle, foot, red chert	5-10	scale	5-10	scale	5-10	scale	5-10	scale
30-54-2009	125	green clay elast (5mm), red chert, blue, calc, green grains	5-10	scale	5-10	scale	5-10	scale	5-10	scale
30-54-2009	130	green clay elast, sandstone, non-size feldspar, small black grains	5-10	scale	5-10	scale	5-10	scale	5-10	scale
30-54-2009	135	blue, calc, apple green grains, hematite	5-10	scale	5-10	scale	5-10	scale	5-10	scale

Table 2 Descriptions of core from Mariano Lake - Lake Valley
Drilling Project Hole No. 4, New Mexico

LOCATION <u>5-4</u>		Sec. <u>(1)</u>	T. <u>17N</u>	R. <u>10E</u>
STATE <u>New Mexico</u>		COUNTY <u>McKinley</u>		
U.S.G.S. CORE LIBRARY NUMBER _____		API WELL NUMBER _____		
39 2030-2034	5044	5044	5044	5044
2040	5044	5044	5044	5044
2045-2050-2055-2060	5044	5044	5044	5044
2050	5044	5044	5044	5044
2055-2060-2065-2070	5044	5044	5044	5044
2060	5044	5044	5044	5044
2070	5044	5044	5044	5044
2080	5044	5044	5044	5044
2085-2090-2095-2100	5044	5044	5044	5044
2090	5044	5044	5044	5044
2100	5044	5044	5044	5044

2030-2034	2040	2045-2050-2055-2060	2050	2055-2060-2065-2070	2060	2070	2080	2085-2090-2095-2100	2090	2100
5044	5044	5044	5044	5044	5044	5044	5044	5044	5044	5044
5044	5044	5044	5044	5044	5044	5044	5044	5044	5044	5044
5044	5044	5044	5044	5044	5044	5044	5044	5044	5044	5044
5044	5044	5044	5044	5044	5044	5044	5044	5044	5044	5044
5044	5044	5044	5044	5044	5044	5044	5044	5044	5044	5044
5044	5044	5044	5044	5044	5044	5044	5044	5044	5044	5044
5044	5044	5044	5044	5044	5044	5044	5044	5044	5044	5044
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5044	5044	5044	5044	5044	5044	5044	5044	5044	5044	5044
5044	5044	5044	5044	5044	5044	5044	5044	5044	5044	5044
5044	5044	5044	5044	5044	5044	5044	5044	5044	5044	5044
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5044	5044	5044	5044	5044	5044	5044	5044	5044	5044	5044
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5044	5044	5044	5044	5044	5044	5044	5044	5044	5044	5044
5044	5044	5044	5044	5044	5044	5044	5044	5044	5044	5044
5044	5044	5044	5044	5044	5044	5044	5044	5044	5044	5044
5044	5044	5044	5044	5044	5044	5044	5044	5044	5044	5044
5044	5044	5044	5044	5044	5044	5044	5044	5044	5044	5044
5044	5044	5044	5044	5044	5044	5044	5044	5044	5044	5044
5044	5044	5044	5044	5044	5044	5044	5044	5044	5044	5044
5044	5044	5044	5044	5044	5044	5044	5044	5044	5044	5044
5044	5044	5044	5044	5044	5044	5044	5044	5044	5044	5044
5044	5044	5044	5044	5044	5044	5044	5044	5044	5044	5044
5044	5044	5044	5044	5044	5044	5044	5044	5044	5044	5044
5044	5044	5044	5044	5044	5044	5044	5044	5044	5044	5044
5044	5044	5044	5044	5044	5044	5044	5044	5044	5044	5044
5044	5044	5044	5044	5044	5044	5044				

(6) 12/19
 RTH
 JLM
 JLM
 WNA

Table 2 Descriptions of core from Mariano Lake - Lake Valley
 Drilling Project Hole No. 4, New Mexico

LOCATION 5-4 Sec. 15 T. 17N R. 8W
 STATE NM COUNTY MCKINLEY
 U.S.G.S. CORE LIBRARY NUMBER _____ API WELL NUMBER _____

Depth (ft)	Core Description	Grain Size	Color	Texture	Notes
2110	Blue-gray, limonite-stained arg. feldspar brown chert, finely disseminated	5			
2120	Dark gray, limonite-stained arg. feldspar brown chert, finely disseminated	3			
2123-2123.5	Dark gray, limonite-stained arg. feldspar brown chert, finely disseminated	3			
2130	Dark gray, limonite-stained arg. feldspar brown chert, finely disseminated	3			
2135	Dark gray, limonite-stained arg. feldspar brown chert, finely disseminated	3			
2140	Dark gray, limonite-stained arg. feldspar brown chert, finely disseminated	3			
2150	Dark gray, limonite-stained arg. feldspar brown chert, finely disseminated	3			
2160	Dark gray, limonite-stained arg. feldspar brown chert, finely disseminated	3			
2170	Dark gray, limonite-stained arg. feldspar brown chert, finely disseminated	3			
2180	Dark gray, limonite-stained arg. feldspar brown chert, finely disseminated	3			
2190	Dark gray, limonite-stained arg. feldspar brown chert, finely disseminated	3			
2200	Dark gray, limonite-stained arg. feldspar brown chert, finely disseminated	3			

Table 2 Descriptions of core from Mariano Lake - Lake Valley

Drilling Project Hole No. 4, New Mexico

Depth (ft)	Core Description	Grain Size	Color	Texture	Notes
2190	...	N7	...	...	...
2200	...	N7	...	...	...
2210	...	N7	...	...	...
2220	...	N7	...	...	...
2230	...	N7	...	...	...
2240	...	N7	...	...	...
2250	...	N7	...	...	...
2260	...	N7	...	...	...
2270	...	N7	...	...	...
2280	...	N7	...	...	...
2290	...	N7	...	...	...
2300	...	N7	...	...	...
2310	...	N7	...	...	...
2320	...	N7	...	...	...
2330	...	N7	...	...	...
2340	...	N7	...	...	...
2350	...	N7	...	...	...
2360	...	N7	...	...	...
2370	...	N7	...	...	...
2380	...	N7	...	...	...
2390	...	N7	...	...	...
2400	...	N7	...	...	...

LOCATION S-4 Sec. 15 T. 17N R. 13W
 STATE NM COUNTY McKinley
 U.S.G.S. CORE LIBRARY NUMBER API WELL NUMBER

(7) 1/4

Table 2 Descriptions of core from Mariano Lake - Lake Valley

Drilling Project Hole No. 4, New Mexico

LOCATION S-4 Sec. 15 T. 17N R. 2W
 STATE New Mexico COUNTY McKinley
 U.S.G.S. CORE LIBRARY NUMBER API WELL NUMBER

Depth (ft)	Core Description	Grain Size	Color	Texture	Notes
2270	Small black acc.	3-5	black	fine	
2275	blue grz red chrt. maroon chrt.	1-2	blue	fine	
2280	" " " " " " " "	"	blue	fine	
2285	" " " " " " " "	"	blue	fine	
2290	gray mottling	2	gray	fine	
2295	large bluish class of gray, v. ss	2	gray	fine	
2300	lenses of v. fine sand	2	gray	fine	
2305	min. size of small black sands. red chrt.	2	gray	fine	
2310	clay clasts red & gray mottling	2	gray	fine	
2315	scour trace	2	gray	fine	
2320	small oolitic grains, red chrt.	2	gray	fine	
2325	red chert magnetite	2	gray	fine	
2330	" " " " " " " "	2	gray	fine	
2335	orange. multi-granular pebble	2	gray	fine	
2340	grains of red chert and orange pebbles	2	gray	fine	
2345	mottled red & gray (SR/2)	2	gray	fine	
2350	bl. small grains, apple green grains	2	gray	fine	
2355	mottled green (SR/2) and red (SR/2)	2	gray	fine	
2360	" " " " " " " "	2	gray	fine	
2365	apple green grains bl. chrt	2	gray	fine	
2370	uniformity pebbles, brown chrt, red chrt, bl. grt	2	gray	fine	
2375	red chrt pebbles, bl. chrt, apple green grains, blue grt	2	gray	fine	
2380	fine bl. grains	2	gray	fine	

Table 3. Description of core from Mariano Lake - Lake Valley
Drilling Project Hole No. 4a, New Mexico

THICKNESS	SAMPLE NO.	UNIT NO.	FM/MBR.	RADIOACT.	CPS	VISUAL POROSITY	ESTIMATE	CORE	ROCK TYPE	FOOTNOTES	COLOR	CLAY MIN. DOMINANT	GRAIN SIZE	BEDDING	SEDIMENTARY STRUCTURES	BIOLOGY/ORGANICS	SOILING/ROUNDNESS	CEMENT	PERCENT FELDSPAR	ACCESSORY MINERALS OR FRAGMENTS	NOTES: (ALTERATION, ATTITUDE, CLASTS, MINERALIZATION, & MISC. INFO.)	INFERRED ENVIRONMENT OF DEPOSITION	TRANSPORT DIRECTION	(NO. OF MEASUREMENTS)
0																								
10																								
20																								
30																								
40																								
50																								
60																								
70																								

Sheet 1 of 3
ARX

LOCATION S-4A Sec. T. R. QUADRANGLE (7.5')
STATE N.M. COUNTY McKinley DATE 12/20/80
LAT.-LONG. GEOL.

Sheet 202-208
ARC-10000

LOCATION S-4A Sec. 5 T. 4 R. 2
STATE New Mexico COUNTY Mckinley
U.S.G.S. CORE LIBRARY NUMBER _____ API WELL NUMBER _____

Table 3. Description of core from Mariano Lake - Lake Valley
Drilling Project Hole No. 4a, New Mexico

Depth (ft)	Core Description	Grain Size	Color	Texture	Notes
10	Whole interval with partial red, browned to blackish carb. ss. and ms.	red blk chert	Tr	med. n. calc	
20		red blk chert	Tr	med. n. calc	
30		red blk chert	Tr	med. n. calc	
40		red blk chert	Tr	med. n. calc	
50		red blk chert	Tr	med. n. calc	
60		red blk chert	Tr	med. n. calc	
70		red blk chert	Tr	med. n. calc	
80		red blk chert	Tr	med. n. calc	
90		red blk chert	Tr	med. n. calc	
100		red blk chert	Tr	med. n. calc	
110		red blk chert	Tr	med. n. calc	
120		red blk chert	Tr	med. n. calc	
130		red blk chert	Tr	med. n. calc	
140		red blk chert	Tr	med. n. calc	
150		red blk chert	Tr	med. n. calc	

Table 3. Description of core from Mariano Lake - Lake Valley
Drilling Project Hole No. 4a, New Mexico

LOCATION	STATE	U.S.G.S. CORE LIBRARY NUMBER	Sec.	T.	R.	COUNTY	API WELL NUMBER
S-4A	New Mexico					Mckinley	
150	160	170	180	190	200	210	218 TO
157	158	159	160	161	162	163	164
165	166	167	168	169	170	171	172
175	176	177	178	179	180	181	182
185	186	187	188	189	190	191	192
195	196	197	198	199	200	201	202
205	206	207	208	209	210	211	212
213	214	215	216	217	218	219	220
225	226	227	228	229	230	231	232
235	236	237	238	239	240	241	242
245	246	247	248	249	250	251	252
255	256	257	258	259	260	261	262
265	266	267	268	269	270	271	272
275	276	277	278	279	280	281	282
285	286	287	288	289	290	291	292
295	296	297	298	299	300	301	302
305	306	307	308	309	310	311	312
315	316	317	318	319	320	321	322
325	326	327	328	329	330	331	332
335	336	337	338	339	340	341	342
345	346	347	348	349	350	351	352
355	356	357	358	359	360	361	362
365	366	367	368	369	370	371	372
375	376	377	378	379	380	381	382
385	386	387	388	389	390	391	392
395	396	397	398	399	400	401	402
405	406	407	408	409	410	411	412
415	416	417	418	419	420	421	422
425	426	427	428	429	430	431	432
435	436	437	438	439	440	441	442
445	446	447	448	449	450	451	452
455	456	457	458	459	460	461	462
465	466	467	468	469	470	471	472
475	476	477	478	479	480	481	482
485	486	487	488	489	490	491	492
495	496	497	498	499	500	501	502
505	506	507	508	509	510	511	512
515	516	517	518	519	520	521	522
525	526	527	528	529	530	531	532
535	536	537	538	539	540	541	542
545	546	547	548	549	550	551	552
555	556	557	558	559	560	561	562
565	566	567	568	569	570	571	572
575	576	577	578	579	580	581	582
585	586	587	588	589	590	591	592
595	596	597	598	599	600	601	602
605	606	607	608	609	610	611	612
615	616	617	618	619	620	621	622
625	626	627	628	629	630	631	632
635	636	637	638	639	640	641	642
645	646	647	648	649	650	651	652
655	656	657	658	659	660	661	662
665	666	667	668	669	670	671	672
675	676	677	678	679	680	681	682
685	686	687	688	689	690	691	692
695	696	697	698	699	700	701	702
705	706	707	708	709	710	711	712
715	716	717	718	719	720	721	722
725	726	727	728	729	730	731	732
735	736	737	738	739	740	741	742
745	746	747	748	749	750	751	752
755	756	757	758	759	760	761	762
765	766	767	768	769	770	771	772
775	776	777	778	779	780	781	782
785	786	787	788	789	790	791	792
795	796	797	798	799	800	801	802
805	806	807	808	809	810	811	812
815	816	817	818	819	820	821	822
825	826	827	828	829	830	831	832
835	836	837	838	839	840	841	842
845	846	847	848	849	850	851	852
855	856	857	858	859	860	861	862
865	866	867	868	869	870	871	872
875	876	877	878	879	880	881	882
885	886	887	888	889	890	891	892
895	896	897	898	899	900	901	902
905	906	907	908	909	910	911	912
915	916	917	918	919	920	921	922
925	926	927	928	929	930	931	932
935	936	937	938	939	940	941	942
945	946	947	948	949	950	951	952
955	956	957	958	959	960	961	962
965	966	967	968	969	970	971	972
975	976	977	978	979	980	981	982
985	986	987	988	989	990	991	992
995	996	997	998	999	1000	1001	1002

Sheet 3 of 3
ARC