

New Mexico Bureau of Mines & Mineral Resources

Open-File Report 82

DESCRIPTIONS OF CUTTINGS FROM  
NAVAJO WATER WELLS IN NEW MEXICO -- 1977

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## INTRODUCTION

In June 1976 an informal agreement was made with the Water Works Department of the Navajo Tribe (now Division of Water and Sanitation) whereby cuttings from Tribal water wells drilled in New Mexico would be turned over to the New Mexico Bureau of Mines and Mineral Resources for cataloging and permanent filing in their sample library. It was further agreed that copies of any descriptions made of the samples would be furnished to the Tribe. This agreement is mutually beneficial because, although cuttings are usually collected from Tribal wells and described in the field, samples are not always further studied in the laboratory or permanently filed. Under the present agreement not only may the Tribe and the Bureau routinely obtain more detailed stratigraphic records for numerous wells but the samples will be preserved for future use through storage in an established cuttings library.

## USING THIS REPORT

Only descriptions of cuttings received prior to January 1978 are included in this report; Table 1 (p. 9) is a catalog of wells for which sample descriptions are given. In this tabulation, wells are grouped by county and arranged by BIA (Bureau of Indian Affairs) field number. This number consists of 2 numerals and a letter: 14T-569. The first numeral identifies the BIA District (fig. 1a). The letter, since about 1950, denotes the source of funds used to construct the well. Common designations are: K = BIA funds and T =

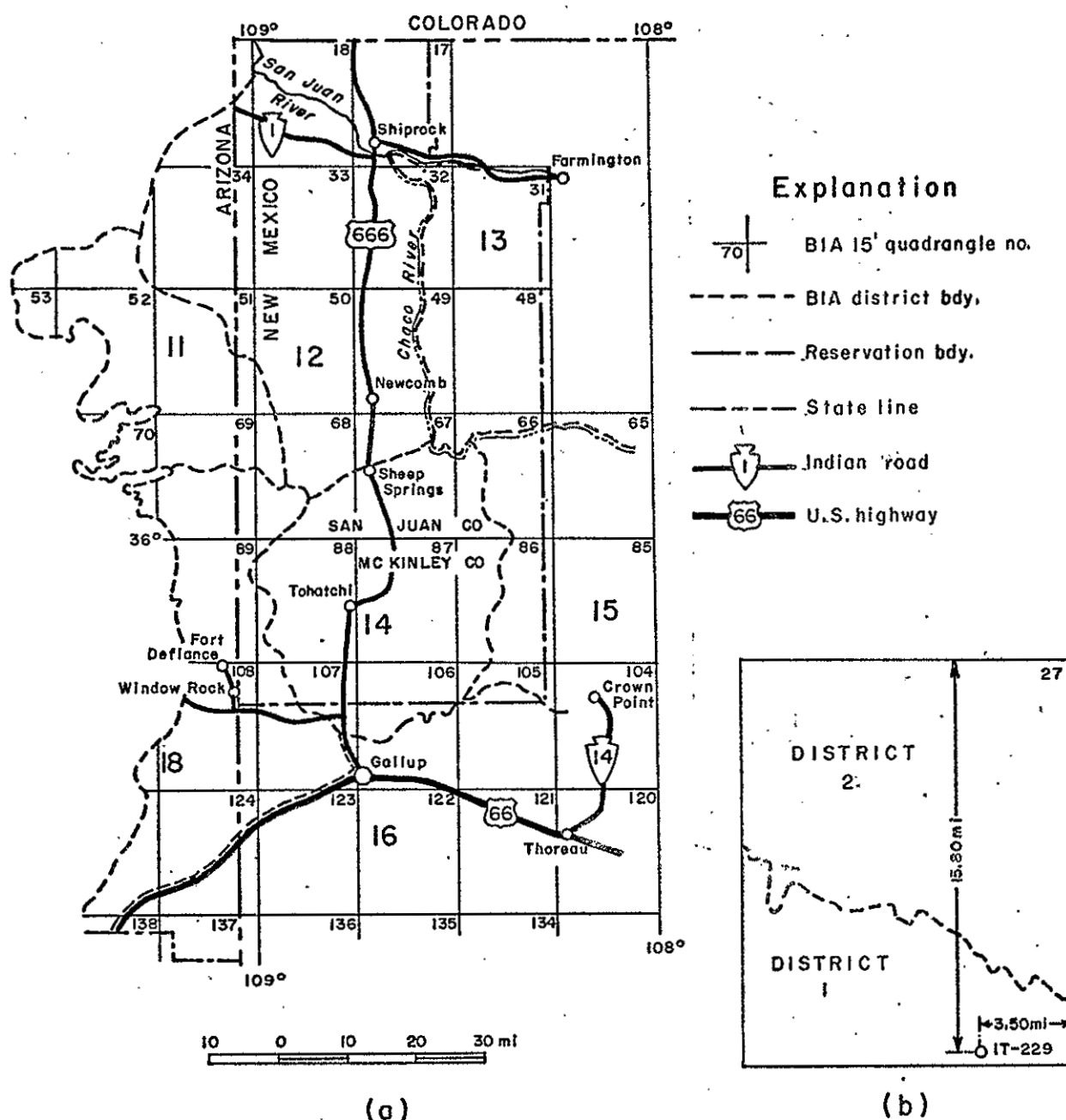


Figure 1. Reference map for northwestern New Mexico and key to numbering of Navajo water wells: a) location of BIA districts and 15' quadrangles associated with New Mexico portion of Navajo Indian Reservation; b) derivation of BIA quadrangle location numbers for wells (example shown has field number of 1 T-229 and quadrangle location number of 27-3.50-15.80).

Tribal funds. The significance of other letter designations used is less clear. The third part is an accession number for that district, representing the order in which the well was drilled. In addition to the well number, the township-range location, total well depth, sampled interval, probable aquifer, and pages covered by the description are also given.

Table 1 may be used in 2 ways: 1) to determine the availability of sample descriptions for a specific well of interest and 2) to determine the identity of wells for which there are samples or sample descriptions in a general area of interest. In the first case, look for the well in Table 1 using the BIA field number. If it is listed, a sample description is included in this report and cuttings are on file in the Bureau. In the second case, consult Table 1 for the area of interest using county and BIA district number (fig. 1). Samples and sample descriptions are available for all wells listed.

#### EXPLANATION OF DESCRIPTIONS

The descriptions which follow were made by conventional study of the cuttings with a binocular microscope. Abundances and textural characteristics are based on visual estimates following Terry and Chilingar (1958) and Powers (1953). All abbreviations used are defined in the "Key to Symbols and Terms" (p.11). Each description includes the following heading information: well number, location, sampled interval, sample spacing, total depth (TD), name of analyst, and date of

description. The well number given is generally the BIA field number.

Where possible, location is given according to:

1) standard legal description (section, township, range, county; for this the land grid was extended into the reservation from adjacent areas), 2) distance and direction from a local landmark, and 3) location within BIA quadrangle. The BIA quadrangle location number consists of 3 parts (for example 27-3.50-15.80). The first part is the number of the BIA quadrangle in which the well is located (fig. 1). The second is the distance in miles west of the northeast corner of the quadrangle, and the third part is the distance in miles south of the northeast corner of the quadrangle (fig. 1b).

Wells are arranged by county, then well number or name as in Table 1. Descriptions are presented in the order that the materials were encountered in drilling and depths of intervals described therefore increase down the page. The probable stratigraphic units (formations, groups, etc.) penetrated by the well are indicated by the abbreviations in the Depth column at the left. The term in caps at the beginning of each descriptive entry identifies the probable major rock or sediment type(s) in the interval indicated, based on examination of the cuttings. A single lithologic term is listed where it is deemed to constitute >50 percent of the total sample. Two lithologic terms joined by "and" are listed

where each constitutes 30-50 percent of the total sample. Other abundance terms are defined in the "Key to Symbols" (p.11).

The specific descriptive information given after the general lithologic term(s) varies slightly with rock types; for clarity, this information is always presented in the same order as follows:

SANDSTONES -- color; texture (grain size, grain sorting, grain shape); mineralogy; matrix, cement, induration; miscellaneous constituents or characteristics.

CLAYEY OR SILTY SANDSTONES -- color; texture (of sand); general comment on clay or silt; mineralogy; matrix, cement, induration; miscellaneous constituents or characteristics.

SHALE, SILTY SHALE, OR SILTSTONE -- color; general comment on silt or sand (if present); cement, induration; miscellaneous constituents or characteristics.

SANDY SILTSTONE OR SANDY SHALE -- color; texture of sand grains; mineralogy of sand grains; cement, induration; miscellaneous constituents or characteristics.

The rock color chart prepared by Goddard and others (1948) and distributed by the Geological Society of America (GSA) was used for rock color designations. In several cases, however, identical names are given on the chart for two slightly different colors, such that name alone cannot be used without creating doubt as to the color intended. Usage of such duplicate color designations in this report is clarified in the list below:

Grayish orange pink = 5 YR 7/2  
 Moderate orange pink = 10 R 7/4  
 Light brown = 5 YR 6/4  
 Grayish red = 10 R 4/2

Yellowish gray = 5 Y 7/2  
 Light greenish gray = 5 G 8/1  
 Greenish gray = 5 G 6/1  
 Light olive gray = 5 Y 6/1  
 Olive gray = 5 Y 3/2  
 Dark greenish gray = 5 G 4/1  
 Pale yellowish gray (GSA's yellowish gray) = 5 Y 8/1  
 Pale greenish gray (GSA's light greenish gray) = 5 GY 8/1  
 Olive greenish gray (GSA's greenish gray) = 5 GY 6/1  
 Pale olive gray (GSA's light olive gray) = 5 Y 5/2  
 Medium olive gray (GSA's dark greenish gray) = 5 GY 4/1  
 Moderate olive gray (GSA's olive gray) = 5 Y 4/1

All other color designations follow the GSA chart exactly.

The example below should aid in using the descriptions:

200-230 SANDSTONE and SILTSTONE--ss wh; grains f to  
 m, mod w sorted, subang, spher; milky qtz;  
 clay and slt mat, tr silica cem, fri. Sltst  
 lt gry; w ind; carb.

This description covers material from an interval lying between  
 200 and 230 feet below the surface. The interval is concluded  
 to consist of nearly equal amounts sandstone and siltstone  
 (each constituting 30-50 percent of the sample). The sandstone  
 is white, moderately well sorted, with subangular spherical  
 grains of milky quartz in the fine to medium size range  
 (0.125-0.5mm). It is also friable (crumbly) with only a  
 trace of silica cement between the grains but has an inter-  
 granular matrix consisting of clay and silt. The siltstone  
 is light gray, cemented by undetermined material, well indurated  
 (hardened), and contains carbonaceous material.

The designations of probable stratigraphic units penetrated  
 are based on Bureau maps of depth-to-top of selected units  
 in northwestern New Mexico prepared in conjunction with a  
 current study of the hydrogeology of that region. Where well  
 locations are incomplete or imprecise, the maps are of little  
 use and the probable stratigraphic units penetrated are omitted.



## REFERENCES CITED

- Goddard, E. N., Trask, P. D., De Ford, R. K., Rove, O. N., Singewald, J. T., Jr., and Overbeck, R. M., 1948, Rock Color Chart: Distributed by the Geological Society of America, Boulder, Co. (reprinted 1970).
- Powers, M. C., 1953, A new roundness scale for sedimentary particles: *Journal Sedimentary Petrology*, v. 23, p. 117-119.
- Terry, R. D., and Chilingar, G. V., 1958, Comparison charts for visual estimation of percentage composition: *American Geological Institute Data Sheet*, AGI 6, *Geotimes* (April).

## DESCRIPTIONS OF CUTTINGS

Table 1. Catalog of cuttings from Navajo water wells in New Mexico described in 1977.

Well No. (BIA Field No.)	Location ¼ Sec. Twp. Rge.	TD (ft)	Sampled Interval (ft)	Probable Aquifer	Description (Pages)
<u>BERNALILLO COUNTY</u>					12
C-20	24 11N 3W 6 mi N of Cañoncito Day School	?	0-150	Kmv(?)	13
C-20A	24 11N 3W 6 mi N of Cañoncito Day School	?	0-180	Kmv(?)	14
C-21	25 10 2	994	0-80	Kmv	15
<u>MCKINLEY COUNTY</u>					16
14T-569	28 20N 17W	1646	0-1400	Kmf	17-21
14T-588	NW 4 18N 19W	802	0-802	Kmf	22-24
15R-289	8 20N 7W	?	120-150	Kkf	25
15R-313	26 20N 8W	565	510-565	Km(?)	26
15R-321	31 17N 8W	?	0-620	Kmf	27-28
15R-321B	31 17N 8W	640	0-640	Kmf	29-30
15T-546	28 20N 14W	1640	0-1590	Kmf	31-34
15T-548	35 19N 9W	385	0-370	Kmf	35-36
16T-352	½ mi NE of Thoreau	573	470-570	Trc	37
16T-563	33 14N 17W	?	0-900	Kg	38-39
16T-572	19 15N 20W	?	0-387	Kg	40-41
16T-574	NE SE 21 12N 18W	749	0-530; 690-740	Kg?	42-43
16T-576	31 13N 19W	1306	1000-1100	Kd	44
16T-585	NE NE 23 16N 19W	1980	0-1960	Kmf	45-49
16T-587	9 15N 14W	1334	0-1334	Jm	50-53
16T-588	29 15N 11W	1030	0-1020	Je	54-57
16T-591	Near Smith Lake	?	0-1410	?	58-61

SANDOVAL COUNTY

62

19T-518	1	22N 7W	1250	0-801	Th	63-64
19T-518B	(1	22N 7W ?)	?	0-1300	?	65-66
19T-518C	"Recon. Marus Pass"		?	0-700	?	67-68

SAN JUAN COUNTY

69

13T-527			?	0-152	?	70
19T-517	NE 14	25N 10W	969	0-958	Tn(?)	71-74
19T-519	SE 23	27N 13W	?	0-125	Toa	75-76
19T-521	4	28N 11W	700	0-100; 200-270; 390-500	Toa	77-78

VALENCIA COUNTY

79

Ramah No. 21	22	9N 15W	480	0-310	Km	80
Ramah No. 21A	22	9N 15W	780	0-685	Kd.	81

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## KEY TO SYMBOLS AND TERMS USED

## Abundance Terms Used for Minor Constituents:

trace: 0-5% of total sample  
 little: 5-15% of total sample  
 some: 15-30% of total sample  
 much: 30% of total sample

## Stratigraphic Units (not intended as complete geologic column):

<u>Symbol</u>	<u>Unit of Lithology</u>	<u>Age</u>
Qa	Alluvium	(Quaternary)
Qb	Basalt	
Tn	Nacimiento Fm.	(Tertiary)
Toa	Ojo Alamo Ss.	
Kk	Kirtland Shale	
Kmv	Mesaverde Grp. (undiv.)	
Kmf	Menefee Fm.	
Kcc	Crevasse Canyon Fm. (Cretaceous)	
Kg	Gallup Fm.	
Km	Mancos Fm.	
Kd	Dakota Ss.	
Jm	Morrison Fm.	(Jurassic)
Jz	Zuni Ss	
Je	Entrada Ss	
Trc	Chinle Fm.	(Triassic)

## Abbreviations:

aa	as above	ol	olive
ang	angular	or	orange/orangish
blk	black	p	poorly
brn	brown/brownish	pk	pink
calc	calcareous/calcite	qtz	quartz
carb	carbonaceous/carbon	rd	rounded
cem	cement	ss	sandstone
crse	coarse (0.5-1mm)	sh	shale
dk	dark	slt	silt
f	fine (0.125-0.25mm)	sltst	siltstone
fis	fissile (platy)	spher	spherical
fri	friable (crumbly)	subang	subangular
ft	feet	srd	subrounded
grn	green/greenish	TD	total depth
gry	gray/grayish	tr	trace
ind	indurated (hardened)	v	very
lit	little	vcrse	very coarse (1.0-2.0mm)
lt	light	vf	very fine (0.0625-0.125mm)
mat	matrix	w	well
m	medium (0.25-0.5mm if textural term)	wh	white/whitish
mod	moderately	yel	yellow/yellowish

## Bernalillo County

Well no: C-20

Location: Sec. 24, T11N, R3W, Bernalillo Co., N.M. 6 miles  
north of Cañoncito Day School

Sampled interval: 0-150 ft

Sample spacing: 10 ft

TD: Unknown

Described by: Robert C. Brod (6/77)

Depth (ft)

Kmv(?)

0-100 SAND--mod or pk; grains, f, p sorted, rd to srd,  
spher; clear and pk qtz.

100-30 SAND--aa but grains f to m, mod w sorted.

130-50 SANDSTONE--mod or pk; grains aa; much calc cem, fri.

Well no: C-20A

Location: Sec. 24, T11N, R3W, Bernalillo Co., N.M. 6 miles  
north of Cañoncito Day School

Sampled interval: 0-180 ft

Sample spacing: 10 ft

TD: Unknown

Described by: Robert C. Brod (6/77)

Depth (ft)

Kmv(?)

- 0-20 SAND--lt gry or; grains f to vcrse, p sorted, ang to  
rd, spher to oblate; clear qtz.
- 20-30 SAND and SILTSTONE--Sand aa. Sltst lt gry or; w sorted;  
much calc cem, fri.
- 30-40 SILTSTONE--aa; little sand aa.
- 40-50 SILTY SANDSTONE--lt gry or; grains f to m, p sorted,  
ang, spher; clear qtz; much calc cem.
- 50-60 SILTY SANDSTONE--dk gry and lt gry or; aa.
- 60-70 SILTY SANDSTONE--lt gry or; aa.
- 70-80 SILTY SANDSTONE and SAND--Ss dk gry; aa. Sand grains f to  
crse, p sorted, ang, spher; clear.
- 80-100 Missing
- 100-40 SHALE--m gry; fri.
- 140-50 SHALE--aa; some silty sandstone lt gry; grains vf to  
crse, p sorted, srd, spher; clear qtz; slt mat lt gry;  
much calc cem.
- 150-60 SANDSTONE--wh; aa but not silty. Lit sh aa.
- 160-70 SANDSTONE--aa.
- 170-80 SILTY SANDSTONE--aa; Lit sh aa.



Well no: C-21

Location: Sec. 25, T10N, R2W, Bernalillo Co., N.M.

Sampled interval: 0-80 ft

Sample spacing: 5 ft

TD: 994 ft

Described by: Robert C. Brod (6/77)

Depth (ft)

Kmv

0-5 SILTSTONE--gry or pk; p sorted; much calc cem w ind.

5-20 SANDY SILTSTONE--aa; sand grains f to m, p sorted, srd, spher; clear qtz.

20-30 SANDY SILTSTONE--aa. Some gravel, f, srd; milky qtz. Lit chert.

30-80 FINE GRAVEL--aa.

## McKinley County

Well no: 14T-569

Location: Sec. 28, T20N, R17W, McKinley Co., N.M.; .3 mile WSW of Buffalo Springs Trading Post; 87-9.0-4.5.

Sampled interval: 0-1400 ft

Sample spacing: 10 ft

TD: 1646 ft (cemented back to 1580 ft)

Described by: Robert C. Brod (6/77)

# Depth (ft)

Kmf

0-10	SILTY SANDSTONE--gry or pk; grains vf to crse, v p sorted, srd to rd, spher; clear qtz; slt gry or pk; no apparent cem, v fri.
10-20	SILTY SANDSTONE--aa but some silica cem.
30-40	SILTY SANDSTONE and SILTSTONE--Ss aa. Sltst v pale or; w ind.
40-50	SILTSTONE and SHALE--Sltst v pale or; mod fri. Sh m gry; w ind, carb.
50-80	SILTSTONE--gry or and pale red; mod ind.
80-100	SILTSTONE--aa; some shale m gry.
100-40	SILTSTONE--lt gry; silica cem, w ind; carb.
140-50	SILTSTONE--aa but not carb.
150-60	SILTSTONE--aa, carb.
160-70	SANDY SILTSTONE--lt gry; sand grains vf to f, p sorted, subang, spher; clear qtz; silica cem, w ind.
170-80	SANDY SILTSTONE--aa. Some sh lt gry.
180-90	SILTSTONE--lt gry; w ind; carb. Some sh m gry; carb.
190-220	SILTSTONE--m gry and brn blk; fri to w ind.
220-50	SHALE and SILTSTONE--Sh m gry. Sltst m gry; w ind.
250-60	SILTY SANDSTONE and MUDSTONE--Ss wh; grains f to m, mod w sorted, subang, spher; milky qtz; slt mat; tr silica cem, mod ind. Mudstone v lt gry; w sorted; highly ind.

- 260-70 SILTSTONE--m gry; w ind, carb. some sh m gry.
- 270-90 SILTSTONE--aa but not carb.
- 290-300 SILTSTONE--m gry and lt gry; Lit f sand; v w ind. Some sh m gry. Some ss lt gry and wh; grains vf to m, ang to subang, spher, clear qtz; slt mat; tr silica cem.
- 300-10 SILTSTONE--lt gry; fri slightly carb.
- 310-20 SILTSTONE--aa but not carb.
- 320-40 SILTSTONE--m gry and lt gry; w to p sorted; fri; some sh m gry; some silty ss lt gry, vf to m p sorted; grains ang to subang, spher, milky qtz; slt mat; tr silica cem.
- 340-50 SILTSTONE--m gry; fri.
- 350-60 SILTSTONE--aa. Some sh m gry.
- 360-70 SILTSTONE--aa. Lit sh aa.
- 370-80 SILTSTONE--aa; Some sh aa.
- 380-90 SILTSTONE--dk gry; grains mod-w sorted; fri. Lit slst lt gry; p sorted, w ind.
- 390-400 SILTSTONE and SHALE--Sltst aa. Sh dk gry.
- 400-20 SANDY SILTSTONE--v lt gry; sand grains vf to m, mod sorted, ang, spher and platey; clear qtz; tr silica cem, fri. Lit sh dk grn gry.
- 420-40 SANDY SILTSTONE--aa but no sh.
- 440-500 SANDY SILTSTONE--aa. Some sh m gry.
- 500-10 Missing
- 510-20 SANDY SILTSTONE--aa but no sh.
- 520-30 Missing
- 530-40 SILTSTONE--dk gry; fri; tr coal.
- Kpl
- 540-70 SILTY SANDSTONE--wh; grains f to m, mod to p sorted, subang to srd, spher; clear and milky qtz, tr muscovite; much slt mat; tr silica cement.

- 580-600 SANDSTONE--aa, includes granular coal. Lit sh v lt gry.  
Kcc
- 600-30 SILTSTONE--m gry; mod ind. Some sh m gry; tr carb.
- 630-50 SILTSTONE and SHALE--aa.
- 650-60 SILTSTONE and SHALE--Siltst v lt gry; fri. Sh v lt gry.
- 660-70 SANDY SILTSTONE--v lt gry; sand grains f to m, p sorted, srd, spher; milky qtz, no apparent cem, fri. Lit sh aa.
- 670-80 SANDY SILTSTONE--aa. Some sh aa.
- 680-90 SANDY SILTSTONE--aa. Some shale aa. Lit granular coal and muscovite.
- 690-700 SILTSTONE--v lt gry; grains p sorted, ang, spher and platey; clear qtz; fri. Some sh m gry.
- 700-20 Missing
- 720-30 SILTY SANDSTONE--v lt gry and wh, sand grains vf to m, v p sorted, ang, spher and platey, clear qtz; much wh silt mat, much calc cem.
- 730-40 SANDY SILTSTONE--m gry; sand grains f to m, p sorted, srd, subang, spher; clear qtz; mod ind.
- 740-50 SANDY SILTSTONE--aa. Some sh dk to lt gry.
- 750-60 SILTSTONE--lt gry; grains w sorted, mod ind.
- 760-70 SILTSTONE--aa. Some silty ss wh; grains vf to f, p sorted srd, spher and platey; clear qtz; silt mat; calc cem.
- 770-80 SILTY SANDSTONE--aa.
- 780-90 SANDY SILTSTONE--lt and dk gry; sand grains f, p sorted, srd, spher; milky qtz, tr biotite, tr muscovite; mod ind. Some silty ss of same composition. Tr coal.
- 790-810 SANDY SILTSTONE--aa but no coal.
- 810-20 SANDY SILTSTONE and SHALE--Siltst lt gry and wh; sand grains vf to m, p sorted, srd and subang, spher; clear qtz. Sh m gry.
- 820-30 SILTSTONE--dk gry; fri. Some sh dk gry.
- 830-40 SILTSTONE--dk gry, some lt gry; w sorted; fri.
- 840-50 SILTSTONE--aa. Some sh m gry.

850-70	SHALE--aa. Some sltst aa.
870-80	SHALE--aa. Lit sltst aa.
880-900	SHALE--aa. Slst aa. Lit carb sh.
900-10	SHALE and SILTSTONE--both m gry; tr muscovite; fri.
910-60	SANDY SILTSTONE--wh; sand grains vf to m, p sorted srd and subang, spher; clear and milky qtz; tr silica cem. w ind.
960-80	SHALE--lt gr and dk gr; carb. Some sltst dk gry; w sorted; fri.
980-90	SANDY SILTSTONE--wh and lt gry; sand grains vf to m, p sorted; fri. Lit. sh m gry.
990-1000	SILTSTONE--grains dk gry; mod w sorted, fri carb. Lit. sh lt to m gry.
1000-10	SILTSTONE--v lt gry; mod w sorted; fri. Tr granular coal.
1010-20	SILTSTONE and SHALE--Slst aa. Sh m gry. Tr coal aa.
1020-50	SILTSTONE--v lt gry; poorly sorted; much calc cem, fri.
1050-70	SHALE--v lt to m gry; fri to brittle. Tr coal and carb sh.
1070-1100	SILTSTONE--lt gry; p sorted; mod w ind. Tr granular coal.
1100-10	SILTSTONE--m gry; w sorted; fri. Tr coal.
1110-20	SHALE--m and dk gry. Lit. sltst aa.
1120-50	SILTSTONE--m gry; p sorted; lit calc cem, fri. Lit. Sh m gry.
1150-60	SILTSTONE and SHALE--aa but no calc cem.
1160-70	SHALE--m gry.
1170-80	SILTSTONE--v lt gry; p sorted; mod ind.
1180-90	SILTSTONE and SHALE--Slst aa. Sh m gry.
1190-1200	SILTSTONE and SHALE--Slst m gry; w sorted; fri. Sh aa.
1200-10	SILTSTONE--v lt gry; p sorted; lit calc cem, mod fri.
1220-30	SILTSTONE--aa. Lit sh dk gry.
1230-40	SILTSTONE--m gry; poorly sorted; fri. Lit sh m gry.
1240-50	Missing

- 1250-60 SHALE--m gry.
- 1260-70 SILTSTONE and SHALE--Sltst lt gry and wh; much calc cem, extremely fri. Sh lt gry and wh; much calc cem, fri.
- 1270-90 SHALE--m gry.
- 1290-1300 SHALE--dk gry; carb.
- 1300-10 SILTSTONE--v lt gry; p sorted; lit calc cem, mod w ind. Lit coal.
- 1310-30 SHALE and SILTSTONE--Sh dk gry. Sltst dk gry; well sorted; w ind; not calc.
- 1330-60 Missing
- 1360-70 SILTSTONE--wh; p sorted, much calc cem; fri; and lt gry; mod p sorted; mod w ind. Lit sh m to dk gry; slightly carb.
- 1370-90 SILTSTONE and SHALE--Sltst wh; p sorted; lit calc cem, fri. Sh m and dk gry. Tr granular coal.

Well no: 14T-588

Location: NW¼, Sec 4, T18N, R19W, McKinley Co., N.M.; 3.4 miles NW of Mexican Springs Trading Post; 88-6.67-11.84.

Sampled interval: 0-800 ft

Sample spacing: variable

TD: 802 ft

Described by: Scott Anderholm (1/78)

# Depth(ft)

Kmf

- 0-10 SILTY SANDSTONE--lt ol gry; grains vf to f, p sorted, subang to rd; qtz, tr mica; calc, fri.
- 10-20 SILTY SANDSTONE--gry or; grains vf to f, p sorted, subang to srd; qtz, tr mica; calc, mod ind.
- 20-30 SANDSTONE--yel gry; grains vf to f, mod sorted, subang to rd; qtz; calc, w ind.
- 30-40 SILTY SANDSTONE--yel gry; grains vf to f, p sorted, srd; qtz; calc, mod ind.
- 40-60 SILTSTONE--mod ol gry; calc, w ind.
- 60-70 SILTSTONE and SANDSTONE--sltst ol grn gry; calc, w ind. Ss grn gry; grains vf, mod sorted; qtz; calc, w ind.
- 70-80 SILTSTONE and SHALE--sltst ol grn gry; grains p sorted; slightly calc, w ind. Sh ol grn gry; calc, w ind.
- 80-90 SILTSTONE--aa.
- 90-100 SILTY SANDSTONE--lt ol gry; grains vf to f, p sorted srd; qtz; calc, fri.
- 100-20 SILTSTONE and SILTY SANDSTONE--sltst yel gry; mod sorted; calc, mod ind. Ss yel gry; grains vf to f, mod sorted, subang to srd; qtz, tr mica; calc, fri.
- 120-30 SILTY SANDSTONE--aa.
- 130-40 SILTY SANDSTONE and SHALE--ss aa. Sh m gry; calc, w ind.
- 140-50 SILTSTONE and SILTY SANDSTONE--sltst lt ol gry; grains w sorted; fri. Ss lt ol gry; grains vf to f, p sorted, srd; qtz; calc, w ind.
- 150-70 SILTSTONE--aa. Some silty ss aa.



- 170-80 SILTSTONE--lt ol grn; grains p sorted; mod ind.
- 180-90 SILTSTONE and SILTY SANDSTONE--aa.
- 190-200 SANDY SILTSTONE--lt gry; sand grains vf to f, p sorted, srd; qtz; mod ind.
- 200-10 SILTSTONE and SANDY SILTSTONE--sltst m gry; p sorted; calc, mod ind. Sandy sltst aa.
- 210-20 SILTY SANDSTONE and SILTSTONE--ss yel gry; grains vf to f, p sorted, subang to srd; qtz; fri. Sltst aa.
- 220-30 SILTY SANDSTONE--aa.
- 230-40 SILTSTONE and SHALE--sltst yel gry; mod sorted; fri. Sh mod ol gry; w ind.
- 240-50 SANDY SILTSTONE and SHALE--sltst lt ol gry; sand grains vf to f, srd; qtz; fri. Sh m lt gry.
- 250-60 SILTSTONE and SANDY SILTSTONE--sltst m gry; w sorted; w ind. Sandy sltst aa.
- 260-70 SILTSTONE and SHALE--sltst aa. Sh ol gry; w ind.
- 270-80 SILTSTONE--ol gry; mod w sorted; calc.
- 280-90 SILTY SANDSTONE and SHALE--ss pale ol gry; grains vf to f, p sorted, srd; qtz; fri. Sh ol gry; calc, w ind.
- 290-300 SANDY SILTSTONE--lt ol gry; sand grains vf to f, mod w sorted, srd; qtz; fri.
- 300-10 SANDY SILTSTONE and SILTSTONE--sandy sltst aa. Sltst grn gry; w sorted; calc.
- 310-40 SHALE and SILTSTONE--sh ol gry; w ind. Sltst aa.
- 340-50 SHALE--sh aa. Some ltst aa. Some ss lt ol gry; grains vf to f, p sorted, subang; qtz; calc, w ind.
- 350-60 SHALE--aa.
- 360-90 SILTY SANDSTONE and SHALE--ss pale ol gry; grains vf to f, p sorted, subang to srd; qtz; fri. Sh aa.
- 390-400 SANDY SILTSTONE and SHALE--sltst lt ol gry; sand grains vf to f, p sorted, subang to srd; qtz; calc, mod ind. Sh aa.
- 400-30 SANDY SILTSTONE--aa.
- 430-40 SANDY SILTSTONE--yel gry; sand grains vf to f, p sorted, srd; qtz; fri.

- 440-50 SANDY SILTSTONE--lt gry; aa.
- 450-70 SANDY SILTSTONE--aa, w ind.
- 470-520 SILTSTONE and SHALE--sltst lt ol gry; mod w sorted; w ind. Sh m dk gry; w ind; carb.
- 520-50 SILTSTONE--aa. Some silty ss lt gry; grains vf to f, w sorted, subang to srd; qtz; fri. Some sh aa.
- 550-60 SILTY SANDSTONE--ss lt ol gry; grains vf to f; mod w sorted, srd; qtz; q ind. Some sh m ol gry; w ind. Some sltst aa.
- 560-70 SILTY SANDSTONE and SILTSTONE--ss gry or; grains vf to f, p sorted, subang to srd; qtz; fri. Slstst aa.
- 570-80 SILTY SANDSTONE--pale ol gry; grains vf to f, mod w sorted, srd; qtz; calc, w ind. Some sltst aa. Some sh aa.
- 580-90 SILTY SANDSTONE--yel gry; aa.
- 590-610 SILTY SANDSTONE--aa; fri.
- 610-20 SILTY SANDSTONE and SHALE--ss aa. Sh m gry; calc, w ind.
- 620-40 SHALE--sh ol gry; w ind. Some silty ss aa. Some sltst pale yel gry; grains mod w sorted; fri.
- 640-60 SANDSTONE--lt ol gry; grains vf to f, mod w sorted, subang to srd; qtz; calc, fri.
- 660-80 SILTY SANDSTONE and SILTSTONE--ss lt ol gry; grains vf to f, p sorted, srd to rd; qtz; calc, fri. Slstst lt ol gryp grains w sorted; w ind.
- 680-700 SILTY SANDSTONE and SHALE--ss aa. Sh ol gry; w ind.
- 700-10 SILTY SANDSTONE--aa.
- 710-60 SILTSTONE--grn gry; grains w sorted; mod w ind. Some silty ss aa. Some sh m lt gry; w ind.
- 760-70 SILTSTONE--lt gry; w sorted; fri.
- 770-80 SILTY SANDSTONE--lt ol gry; grains vf to f, p sorted, srd; qtz; fri.
- 780-90 SILTY SANDSTONE--aa. Lit sh ol gry; w ind.
- 790-800 SILTSTONE--lt ol gry; mod w ind. Some silty ss aa. Some sh aa.

Well no: 15R-289

Location: Sec. 8, T20N, R7W, McKinley Co., N.M.

Sampled interval: 120-150 ft

Sample spacing: 5 ft

TD: Unknown

Described by: Robert C. Brod (6/77)

Depth (ft)

Kkf

- 120-30 SANDY SILTSTONE--v pale or; p sorted; sand grains f to crse, srd, spher; clear; no apparent cem. Lit sh v carb. Lit coal.
- 130-35 SANDY SILTSTONE--aa but no sh or coal.
- 135-50 SILTY SANDSTONE--m gry; grains f to crse, srd, spher; clear qtz; fri.

Well no: 15R-313

Location: Sec. 26, T20N, R8W, McKinley Co., N.M.; 2.6 miles SSE of  
Pueblo Pintado.

Sampled interval: 510-565 ft

Sample spacing: 5 ft

TD: 565 ft

Described by: Robert C. Brod (6/77)

Depth(ft)

Kmf

- 510-21 SILTY SANDSTONE--wh; grains vf to m, p sorted, srd, spher; clear qtz; much slt mat. Some sltst lt brn; grains p sorted; highly fri, iron stained. Some coal.
- 525-35 SHALE and SILTY SANDSTONE--Sh pale brn and v lt gry; highly siliceous, extremely w ind. Ss aa; includes granular coal.
- 535-40 SHALE and SILTY SANDSTONE--aa; some loose sand; grains, m, ang, spher; clear qtz, tr pyrite.
- 540-45 SHALE--aa and med gry; mod w ind.
- 545-50 SILTY SANDSTONE and SHALE--aa but sh siliceous.
- 550-55 SHALE--aa.
- 555-60 SHALE and SILTY SANDSTONE--aa.
- 560-65 SHALE--aa.

Well no: 15R-321

Location: Sec. 31, T17N, R8W, McKinley Co., N.M.

Sampled interval: 0-620 ft

Sample spacing: 10 ft

TD: 640 ft

Described by: Robert C. Brod (6/77)

Depth (ft)

Kmf

0-20	SANDSTONE--gry or; grains m, mod sorted, subang, spher; clear qtz; lit slt mat; no apparent cem.
20-30	SANDSTONE--aa but extremely fri.
30-40	SANDSTONE--ss aa. Lit coal.
40-70	SILTSTONE--m gry; grains mod p sorted; w ind.
70-90	SANDY SILTSTONE--wh; sand grains f to m, p sorted srd, spher; clear and milky qtz, tr muscovite; no apparent cem, mod ind. Tr coal.
90-100	SHALE and COAL--sh dk gry; carb.
100-110	SHALE--m gry.
110-140	SANDY SILTSTONE--aa.
140-150	SILTSTONE--m gry, gry or., dk gry; grains p sorted; mod fri.
150-160	SILTSTONE--wh; grains p sorted; fri.
160-190	SHALE--m gry.
190-200	SILTSTONE--v lt gry; grains mod sorted; qtz; silica cem, v w ind. Tr coal.
200-270	SILTSTONE--m gry; grains mod w sorted; w ind.
270-290	SILTSTONE--m gry; grains p sorted; calc cem, w ind.
290-300	SILTSTONE and SHALE--Sltst aa. Sh lt gry.
300-330	SILTSTONE--aa. Some sh aa.
330-370	SILTSTONE--aa. Lit sh aa.
370-380	SILTSTONE--aa. Some sh aa. Both are carb.
380-390	SILTSTONE--aa. Lit sh. Not carb.

390-400 SILTSTONE--aa, slightly carb.  
 400-410 SHALE--m gry, brittle. Some sltst aa.  
 410-420 SHALE and SILTSTONE--aa.  
 420-430 SILTSTONE--m gry and gry brn; mod p sorted; w ind; carb.  
 430-440 SILTSTONE--m gry; mod w sorted; w ind.  
 440-450 Missing  
 450-460 SILTSTONE and SHALE--aa.  
 460-470 SILTSTONE--m gry; p sorted; w ind. Tr granular coal.  
 470-480 SHALE--m gry. Lit sltst aa.  
 480-490 SILTSTONE--aa. Lit sh aa.  
 490-500 SHALE--aa but slightly carb.  
 500-510 SHALE and SILTSTONE--Sh aa. Sltst v lt gry; grains v p sorted; no apparent cem, fri.  
 510-520 SILTSTONE--aa; not carb.  
 520-530 SHALE--dk gry; mod; v carb. Lit coal.  
 530-540 SILTSTONE--v lt gry; p sorted; calc cem, w ind; and m gry, mod w sorted; carb.  
 540-550 SHALE--dk gry and blk; fri; v carb.  
 550-560 SILTSTONE--m gry; mod w sorted; fri, contains granular coal. Some sh aa.  
 560-570 SILTSTONE--m gry; mod w sorted; w ind. Some sh m gry.  
 580-600 SHALE--aa. Some sltst aa.  
 600-610 SHALE--aa. Lit sltst aa.  
 610-620 SILTSTONE and SHALE--aa. Tr coal.

Well no: 15R-321B

Location: Sec. 31, T17N, R8W, McKinley Co., N.M.; 9 miles SSE  
White Horse Trading Post

Sampled interval: 0-640 ft

Sample spacing: 10 ft

TD: 640 ft

Described by: Robert C. Brod (6/77)

# Depth (ft)

Kmf

0-20	SANDSTONE--gry or; grains vf to m, v p sorted, ang, spher and platey; vit qtz; lit slt mat; silica cem.
20-30	SANDSTONE--v pale or.; grains f to m, mod p sorted ang to subang, spher; vit qtz; tr slt mat; tr calc cem, fri.
30-40	SANDSTONE, some SHALE, some COAL--Ss pale yellowish or. and m gry; grains vf to m, p sorted, subang to srd, spher; vit qtz; sm slt mat; tr silica cem, tr iron cem. Sh m gry.
40-70	SILTSTONE--m gry.
70-90	SANDY SILTSTONE--wh, sand grains f to m, w sorted, srd to subang, spher; vit qtz; fri.
90-100	SHALE --dk gry; highly carb. Lit coal.
100-110	SHALE--m gry.
110-140	SANDSTONE--wh; grains vf to f, p sorted, subang to srd, spher; clear to wh qtz; lit slt mat; extremely fri.
140-160	SILTSTONE--wh and lt gry; p sorted; fri.
160-190	SILTSTONE and SHALE--both dk gry; fri, tr carb.
190-200	SHALE and SILTSTONE--Sh m gry. Sltst lt gry. Tr carb in both.
200-210	SILTSTONE--m gry; fri; tr carb.
210-260	SHALE and SILTSTONE--Sh m gry; mod fri. Sltst m gry; fri. Tr carb in both.
260-310	SILTSTONE--lt gry; fri; tr carb.

- 310-30 SILTSTONE--lt gry; fri. Some sh dk gry; carb.
- 330-340 LIMESTONE--wh. Lit sltst dk gry; carb.
- 340-50 SHALE--m gry; slightly carb.
- 350-80 SILTSTONE--lt gry; slightly carb.
- 380-400 SANDY SILTSTONE--lt gry; sand grains f, subang, spher; clear qtz; slightly carb.
- 400-40 SHALE--m gry; mod carb.
- 440-70 SILTSTONE--lt gry; tr carb.
- 470-80 SILTSTONE--aa; tr muscovite.
- 480-520 SILTSTONE--aa but no muscovite.
- 520-30 SHALE--dk gry; highly carb.
- 530-60 SILTSTONE--dk gry; highly carb.
- 560-70 SHALE--m gry; slightly carb.
- 570-80 Missing
- 580-610 SILTSTONE--m gry; slightly carb.
- 610-20 SILTSTONE--m gry; slightly carb. Some sh m gry, slightly carb
- 630-40 SILTSTONE--lt gry; slightly carb.



Well no: 15T-546

Location: Sec. 28, T20N, R14W, McKinley County, N.M.; 9.5 miles NNW of Standing Rock Trading Post; 86-4.60-4.50.

Sampled interval: 0-1590 ft

Sample spacing: mostly 10 ft (7 ft initially)

TD: 1640 ft

Described by: Robert C. Brod (6/77)

# Depth(ft)

Kmf

- 0-10 SANDSTONE--v pale or; grains f to m, mod well sorted, srd to subang, spher, clearqtz; lit slt mat; some calc cem, w ind.
- 10-18 SILTSTONE--v pale or; w to sp sorted; mod w ind. Some ss aa.
- 18-25 COAL--fis. Some sltst aa. Lit ss aa.
- 25-40 SHALE--v lt gry; mod w ind.
- 40-50 SHALE and SANDY SILTSTONE--Sh aa. Sltst v lt gry; sand grains subang, spher; clearqtz; sm calc cem, w ind.
- 50-60 SANDY SILTSTONE--aa. Tr detrital coal and muscovite.
- 60-70 SANDY SILTSTONE--aa, no coal or muscovite.
- 70-90 SANDY SILTSTONE--Some sh dk gry; p sorted; highly fri.
- 90-100 SANDY SILTSTONE--v lt gry; sand grains subang, spher; milky qtz, sm biotite; sm silica cem, w ind.
- 100-30 SHALE and SILTY SANDSTONE--Sh m gry; highly fri. Ss v lt gry; grains m, mod w sorted, subang, spher; milky qtz; some slt mat; tr silica cem.
- 130-50 SHALE and SILTY SANDSTONE--aa. Tr subbituminous coal.
- 150-60 SILTSTONE--yel gry; mod w sorted; mod ind.
- 160-70 SHALE and SILTY SANDSTONE--Sh m gry; highly fri. Ss lt gry; grains m, p sorted, subang, spher; milky qtz; some slt mat; tr silica cem.

170-80 SHALE and SILTY SANDSTONE--aa. Tr coal.  
 180-90 SHALE and SILTY SANDSTONE--aa. No coal.  
 190-200 SILTSTONE--m gry and yel gry; p sorted; fri.  
 200-10 SILTSTONE--lt gry; p sorted; lit calc cem, mod ind.  
 210-20 aa, tr detrital coal.  
 220-230 SILTSTONE--aa. Some sh lt gry; fri.  
 230-40 SILTSTONE--aa. Some sh dk gry.  
 240-60 SILTSTONE--aa. Some sh lt gry.  
 260-70 SILTSTONE--aa. Some sh m gry, brittle.  
 270-80 SANDY SILTSTONE--lt gry; sand grains m, p sorted, srd, spher; vit and milky qtz; lit calc cem, fri.  
 280-300 SILTY SANDSTONE--wh; grains m, mod w sorted, subang, spher; vit qtz; sm slt mat; lit calc cem, mod ind.  
 300-40 SILTY SANDSTONE--aa. Some sh m gry; fri.  
 340-50 SILTY SANDSTONE and SHALE--aa.  
 350-60 SHALE and SILTSTONE--Sh aa. Sltst m gry; p sorted, fri.  
 360-70 SHALE--m gry; mod ind.  
 370-80 SHALE, some COAL--sh aa.  
 380-90 COAL and SHALE--aa.  
 390-410 SILTSTONE--v lt gry; p sorted; fri. Some sh aa.  
 410-20 SHALE--aa. Lit sltst aa.  
 420-40 SHALE--aa.  
 440-50 SHALE--aa. Lit sltst aa.  
 450-60 SHALE--aa. Some sltst aa.  
 460-70 SHALE and SILTSTONE--aa.  
 470-80 SHALE--aa. Lit sltst aa.  
 480-90 SHALE--aa.  
 490-500 SHALE--aa. Lit coal.

530-40 SHALE--aa.  
 540-50 SHALE--aa. Some sltst wh; p sorted; fri.  
 550-70 SHALE--aa.  
 570-80 SHALE and SILTSTONE--aa.  
 580-660 SHALE--aa. Some sltst aa. Tr coal.  
 660-70 COAL--blk. Some sltst m gry; mod w sorted; fri.  
 670-90 SHALE and SILTSTONE--Sh m gry. Sltst aa.  
 690-700 SHALE and SILTSTONE--aa; both carb.  
 700-10 SHALE--m gry.  
 710-20 SHALE and SILTSTONE--Sh aa. Sltst wh; p sorted; much cal cem, fri.  
 720-40 SHALE and SILTSTONE--aa. Lit coal.  
 740-70 SHALE--m gry and dk gry; carb.  
 770-80 SHALE--m gry. Some sltst wh; p sorted; lit calc cem, fri. Lit coal.  
 780-90 SHALE--aa; no coal.  
 790-800 SILTSTONE--aa. Some sh aa. Tr coal.  
 800-20 SILTSTONE--aa. Lit coal.  
 820-40 SHALE--aa. Some sltst aa. Lit coal aa.  
 840-60 SILTSTONE--aa. Lit sh aa. Tr coal aa.  
 860-70 SILTSTONE--aa. Lit sh and coal aa.  
 870-80 SHALE--aa. Some sltst aa. Lit coal aa.  
 880-930 SILTSTONE--aa. Lit sh and coal aa.  
 930-40 SHALE--aa. Lit sltst and coal aa.  
 940-50 SILTSTONE--aa. Lit sh aa. Tr coal aa.  
 950-60 SHALE and SILTSTONE--aa. Tr coal aa.  
 960-90 SILTSTONE--aa. Lit sh aa.  
 990-1000 SILTSTONE--aa.

1000-1110 Missing

1110-30 SILTSTONE--wh; w sorted; some calc cem, fri. Some sh aa. Tr coal.

1130-50 SHALE--aa. Some sltst aa. Tr coal aa.

1150-70 Missing

1170-1270 SHALE--aa. Lit sltst aa. Tr coal aa.

1270-80 SHALE--m gry; tr pyrite.

1280-90 Missing

1290-1320 SHALE--aa.

1320-30 SILTSTONE--lt gry; p sorted; sm calc cem, brittle. Some sh aa. Lit coal.

1330-50 SHALE--aa. Lit sltst and coal aa.

1350-60 SHALE--aa.

1360-1420 SILTSTONE--aa. Lit sh and coal aa.

1420-50 SHALE--aa. Lit sltst and coal aa.

1450-70 SAND--wh; grains f, w sorted, loose, subang, spher, clear qtz.

1470-90 Missing

1490-5000 SAND--lt gry; grains mod w sorted, loose, subang, spher; clear qtz; lit silt mat. Some sh aa.

1500-20 SANDSTONE--lt gry; grains f, mod w sorted, subang, spher; clear qtz; lit silt mat; lit calc cem, extremely fri.

1520-30 SHALE--m gry. Some ss aa.

1530-40 SANDSTONE--aa. Lit sh aa. Lit limestone wh; extremely fri. Tr coal.

1540-60 SANDSTONE--aa. Lit sh and limestone aa.

1560-70 SHALE--lt gry.

1570-90 SAND--wh; grains f, w sorted, srd, spher; clear qtz.

Well no: 15T-548

Location: Sec. 35, T19N, R9W, McKinley Co., N.M.; White Horse Lake Chapter well.

Sampled interval: 0-370 ft

Sample spacing: 10 ft

TD: 385 ft

Described by: Robert C. Brod (6/77)

Depth(ft)

Kmf

- 0-20 SHALE--m gry; w ind; and dusky yellow.
- 20-80 SHALE--v lt gry to dk gry; w ind.
- 80-1000 SHALE and SANDY SILTSTONE--Sh m gry. Sltst lt gry; sand grains f to m, mod w sorted, subang, spher; milky qtz; silica cem, fri.
- 100-20 SHALE--aa. Lit sandy sltst aa.
- 120-50 SHALE--m gry; tr muscovite.
- 150-70 SHALE--m gry. Some sltst lt gry; silica cem, fri.
- 170-80 SHALE and SILTSTONE--aa.
- 180-200 SANDY SILTSTONE--lt gry; sand grains f to m, mod w sorted, subang, spher; milky qtz; silica cem, fri. Some sh m gry.
- 200-10 SILTY SANDSTONE and SHALE--aa.
- 210-50 SILTY SANDSTONE--aa. Lit sh aa.
- 250-60 SANDY SILTSTONE--lt gry; sand grains f to me, p sorted, srd, spher; vit and milky qtz, lt biotite and muscovite; mod ind. Some sh m gry; slightly carb.
- 260-70 SILTY SANDSTONE--lt gry; grains m, mod w sorted, subang, spher; clear to milky qtz; calc cem, w ind.
- 270-80 SANDSTONE--lt gry; grains m, mod w sorted, subang, spher; vit and milky qtz; lit calc cem, w ind; carb.
- 280-90 SANDY SILTSTONE--lt gry; sand grains f to m, p sorted, subang; vit and milky qtz; well ind. Some sh m gry.

290-300 Missing

300-10 SANDY SILTSTONE--aa. Some sh aa. Lit coal aa.

310-20 SANDY SILTSTONE--aa. Some sh aa.

320-30 SANDY SILTSTONE and SHALE--aa; slightly carb.

330-40 SILTSTONE--lt gry; mod w sorted; fri. Lit ss lt gry; grains f to m, w sorted, subang, spher; clear-milky qtz; calc and silica cem, w ind. Tr coal.

340-50 Missing

350-70 SILTSTONE--aa. Some slity ss aa. Lit sh aa.

Well no: 16T-352

Location: 1½ miles NE of Thoreau, McKinley Co., N.M.; 120-10.9-5.8.

Sampled interval: 470-570 ft

Sample spacing: 10 ft

TD: 573 ft

Described by: Robert C. Brod (6/77)

Depth(ft)

Trc

470-570 SANDSTONE--wh; grains m, mod w sorted, subang and srd,  
spher; clear qtz; tr slt mat; no apparent cem,  
extremely fri.

Well no: 16T-563

Location: Sec. 33, T14N, R17W, McKinley Co., N.M.; 1.5 miles E of Bread Springs School; 122-7.80-6.80.

Sampled interval: 0-900 ft

Sample spacing: 10 ft

TD: Unknown

Described by: Robert C. Brod (6/77)

# Depth (ft)

Kcc and Kmf

0-10	SANDSTONE--mod or pk, grains vf to crse, mod sorted, ang to wrd, oblate to highly spher; vit qtz; much calc cem.
10-20	SANDSTONE--m gry; grains crse to vcrse, mod sorted, wrd, highly spher; many loose; milky qtz; much slt mat; no calc cem.
20-30	SHALE--dk gry; highly carb.
30-40	SHALE--m gry; slightly carb.
40-50	SANDSTONE--wh; grains vf, mod sorted, subang, spher; clear; lit calc cem.
50-60	SHALE--m gry; aa.
60-70	SILTY SANDSTONE--wh; grains f, p sorted, srd and subang, spher; clear qtz; much slt mat; lit calc cem.
70-90	SANDSTONE--aa. Some sh dk gry; carb; fri.
90-100	SHALE--aa.
100-130	SANDSTONE--wh; grains f, mod w sorted, subang, spher; clear qtz; tr slt mat.
130-40	SANDSTONE and SHALE--Ss aa. Sh m gry.
140-50	SANDSTONE--aa. Some shale.
150-90	SANDY SILTSTONE--wh; p sorted, extremely fri; sand grains aa.
190-200	SANDY SILTSTONE--lt brn; p sorted, w ind; sand aa; much iron cem.



200-30	SANDY SILTSTONE--wh; aa but no iron cem.
230-250	SANDY SILTSTONE--aa. Some sh lt brn.
250-60	SANDY SILTSTONE--lt brn; aa; iron cem.
260-70	Missing
270-390	SANDY SILTSTONE--wh; aa; calc cem but no iron cem.
390-440	SILTY SANDSTONE--wh; grains f to m, p sorted, subang, spher, slt mat; clear qtz; much calc cem.
440-50	SILTY SANDSTONE--gry or.; aa; lit iron cem.
450-60	SILTY SANDSTONE--wh; aa; no iron cem.
460-80	SILTY SANDSTONE--gry or.; aa.
490-500	SILTY SANDSTONE--wh; aa.
500-10	SILTY SANDSTONE--gry or pk; grains f, p sorted, subang, spher; slt mat; clear qtz; lit calc cem.
510-70	SILTY SANDSTONE--wh; aa.
570-600	SANDY SILTSTONE--wh; sand grains f, p sorted subang, spher; clear qtz; much calc cem, mod w ind.
Kg	
600-40	SANDSTONE--wh; grains vf to f, mod w sorted, subang, spher; clear qtz; some calc cem.
640-50	SANDSTONE--lt brn and wh; aa; lit iron cem.
650-60	Missing
660-880	SANDSTONE--wh; aa.
890-900	SANDSTONE and SHALE--Ss aa. Sh m gry; fri.

Well no: 16T-572

Location: Sec. 19, T15N, R20W, McKinley Co., N.M.

Sampled interval: 0-387 ft

Sample spacing: 10 ft.

TD: Unknown

Described by: Robert C. Brod (6/77)

Depth (ft)

Kcc

0-20	SANDSTONE--gry or; grains vf to m, p sorted, ang to subang, spher and platey; slt mat; clear qtz, tr muscovite; mod ind.
20-60	SHALE--gry; carb, tr roots.
60-70	SANDSTONE--gry or; grains f to crse p sorted, srd to subang, spher, slt mat; clear qtz; mod ind.
70-80	SANDSTONE--pale red; aa.
80-100	SANDSTONE--pale red; grains m to vcrse, ang to subang, spher, oblate, and platey, loose, w sorted, lit slt mat; clear qtz.
100-20	SANDSTONE--wh; grains vf to f, p sorted, ang to subang; clear qtz; lit slt; mod ind.
120-30	SANDSTONE--lt gry; grains vf to vcrse, p sorted, subang to srd, spher; clear qtz; some slt mat.
130-40	SHALE--dk gry.
140-70	SHALE--dk gry; carb. Tr coal.
170-80	SILTSTONE and SHALE--Sltst, lt gry. Sh dk gry; carb, lit roots.
180-90	SANDSTONE--wh; grains f to m, mod p sorted, srd, spher; clear and wh qtz; lit slt mat, calc cem.
190-200	SANDY SILTSTONE--dk gry; sandgrains vf to m, subang, spher; clear qtz. Lit coal; fri.
200-40	SHALE--dk gry. Tr coal and roots.
240-50	SANDSTONE--wh; grains m, w sorted, ang to srd, spher to platey; clear qtz, tr muscovite; tr slt mat, silica cem, fri.

- 257-60 SANDSTONE--aa. Lit coal.
- 267-77 SANDSTONE--aa. Some coal.
- 280-87 COAL--blk. Lit ss m gry; grains f to m, w sorted, subang, spher; clear qtz. Lit sh dk gry.
- 287-307 SANDSTONE--wh; grains f, p sorted, subang to srd, spher; clear qtz; lit slt mat; silica cem. Some coal.
- 307-27 SHALE--m gry. Some coal.
- 328-38 SHALE and SANDSTONE--Sh m gry. Ss lt gry; grains vf to f, p sorted, subang, spher; clear qtz, tr muscovite; lit slt mat. Tr coal.
- Kg
- 338-87 SANDSTONE--wh; grains vf to f, p sorted, srd to subang, spher; clear qtz, tr muscovite; lit slt mat. Tr coal.

Well no: 16T-574

Location: NE $\frac{1}{4}$ , SE $\frac{1}{4}$ , 21, T12N, R18W, McKinley Co., N.M.; 1 $\frac{1}{2}$  miles E of Pine Tree Mission; 22-13.35-16.95.

Sampled interval: 0-530, 690-740 ft

Sample spacing: 10 ft

TD: 749 ft

Described by: Robert C. Brod (6/77)

# Depth(ft)

Kcc

- 0-10 SANDSTONE--lt brn; grains f to med, p sorted; subang, spher, clear qtz; some calc cem, fri.
- 10-30 CONGLOMERATE--mod or pk; grains f gravel, subang, spher, loose; clear, milky and red qtz; slt mat.
- 30-60 CONGLOMERATIC SILTSTONE--pale reddish bron; gravel aa; much calc cem.
- 60-80 SILTY SANDSTONE--pale reddish brn; grains m, p sorted, srd, spher; slt aa; clear qtz; fri.
- 80-110 SANDY SILTSTONE--pale reddish bron; sand grains m, p sorted, srd, spher.
- 110-30 CONGLOMERATIC SANDY SILTSTONE--gravel f, w sorted, srd, spher; slst aa; clear and milky qtz; calc cem.
- 130-90 SILTY, SANDY CONGLOMERATE--aa.
- 190-200 CONGLOMERATIC SANDY SILTSTONE--aa. Lit coal.
- 200-10 SILTY SANDSTONE--gry or; grains f to med, p sorted; srd, spher; clear qtz; much slt mat, tr calc cem, fri.
- 210-20 SILTY SANDSTONE--lt gry or; aa; much calc cem.
- 220-60 SANDY SILTSTONE--v lt gry and wh; aa; tr calc cem. Tr coal.
- 260-70 SANDY SILTSTONE and COAL--aa.
- 270-80 SANDY SILTSTONE and LIMESTONE--Sltst aa. Limestone wh, fri. Lit coal, aa.
- 280-330 SANDY SILTSTONE--aa. Lit coal. Lit limestone aa.
- 330-40 SANDY SILTSTONE--aa; sand mod w sorted; fri. Lit coal aa.

- 340-50 COAL--aa. Lit sandy sltst aa.
- 350-400 SANDY SILTSTONE--aa. Some coal.
- 400-10 COAL--aa. Lit limestone and sandy sltst aa.
- 410-30 COAL--aa.
- 430-70 COAL--aa. Some sltst aa. Lit limestone aa.
- 470-80 COAL--aa. Some sltst aa.
- 480-500 SILTSTONE--aa. Some coal aa.
- 500-530 SILTSTONE--wh; p sorted, lit calc cem, mod to w ind.  
Some coal.
- 530-690 Missing
- 690-700 SHALE--m gry.
- 700-30 SHALE and SILTSTONE--Sh aa. Sltst wh; p sorted; fri.
- 730-40 SHALE and SANDSTONE--Sh aa. Ss wh; grains f to m, mod w sorted,  
srd, spher; clear qtz; lit slt mat; w ind.

Well no: 16T-576

Locations: Sec. 31, T13N, R19W, McKinley Co., N.M.; 4.75 miles SE of Jones Ranch; 123-9.50-13.65.

Sampled interval: 1000-1100 ft

Sample spacing: 10 ft

TD: 1306 ft

Described by: Robert C. Brod (6/77)

Depth (ft)

Kd

1000-20	SANDSTONE--mod or pk; grains f, mod w sorted, ang to subang, spher to platey; clear and or qtz; lit slt mat; calc cem. Tr coal.
1020-30	SANDSTONE--aa. Lit sh dk gry; carb.
1030-70	SANDSTONE--aa. Lit sh pale reddish brn.
1070-80	SANDSTONE--mod or pk; grains m, w sorted, v wrd to srd, highly spher; clear and pale or pk qtz; calc cem, v fri.
1080-90	SANDSTONE--mod or pk; grains f to crse, p sorted, wrd to srd, spher; clear and pale or pk qtz; lit slt mat; calc cem, v fri.
1090-1100	SANDSTONE--aa; aggregates contain rounded sh and coal fragments as well as ss.

Wellno: 16T-585

Location: NE $\frac{1}{4}$ , NE $\frac{1}{4}$ , Sec. 23, T16N, R19W, McKinley Co., N.M.;  
3 miles WSW of Yah-Ta-Hey; 107-3.78-9.77.

Sampled interval: 0-1960 ft

Sample spacing: 10 ft

TD: 1980 ft (completed at 1775 ft)

Described by: Robert C. Brod (6/77)

# Depth(ft)

Kmf

0-20	SILTSTONE--gry or; grains mod w sorted; lit calc cem, fri.
20-30	SHALE--m gry. Lit ss m gry; grains f, mod w sorted; subang, spher and oblate; clear qtz, tr feldspar; tr slt mat, somewhat fri.
30-60	SHALE--m gry.
60-70	SILTSTONE--lt gry; grains mod w sorted; tr calc cem, fri.
70-100	SILTY SANDSTONE--lt gry and wh; grains f, mod w sorted, subr, spher; milky qtz; lit slt mat; calc cem, mod w ind. Tr coal.
100-10	SILTY SANDSTONE--aa but m gry.
110-20	SILTSTONE--m gry; grains mod w sorted; w ind; some also gry brn; fri. Some sh aa.
120-30	SHALE and SILTSTONE--aa.
130-60	SHALE--aa.
160-80	SILTSTONE--lt gry; grains v p sorted; qtz, tr coal, tr feldspar; tr calc cem, fri, m calcite crystals. Sh aa.
180-90	SHALE--m gry and gry blk; w ind. Tr coal.
190-210	SHALE- m gry.
210-220	SANDY SILTSTONE and SHALE--sltst v lt gry; sand grains subang, spher and elongate; clear qtz; fri. Sh m gry. Tr coal.
220-50	SHALE--aa.
250-300	SHALE--v lt gry, m gry, and gry brn.
300-310	Missing

- 310-320 SHALE--aa. Lit sltst v lt gry; p sorted; qtz; mod fri. Lit sand-sized granular coal.
- 320-340 SILTY SANDSTONE--v lt gry; grains vf to m, p sorted, srd to ang, spher and oblate; clear qtz, tr granular coal and muscovite; slt wh; no visible cem.
- 340-380 SHALE--m gry.
- 380-90 SILTSTONE--lt gry; grains v p sorted; qtz; fri. Lit sh lt gry.
- 390-410 SHALE--aa. Lit sltst aa.
- 410-20 SHALE and CARBONACEOUS SANDY SILTSTONE--sh m gry. Sltst lt gry; sand grains f to m, ang, spher; milky qtz; lit calc cem, mod fri; bark texture visible in carb segments.
- 420-50 SHALE--m gry.
- 450-60 SILTSTONE--v lt gry; to lt gry brn p sorted; fri to v fri.
- 460-70 SHALE and SILTSTONE--sh m gry. Sltst aa.
- 470-80 SHALE--aa. Some silty ss lt gry; grains f and me, mod w sorted; srd, spher; clear qtz; tr silica cem, extremely fri. Tr coal.
- 480-500 SILTY SANDSTONE--aa but some silica cem, w ind.
- 500-10 SANDY SILTSTONE--lt gry; sand grains f, srd, spher; clear qtz, tr granular coal; no apparent cem, fri. Lit sh aa.
- 510-30 SANDSTONE--lt gry; m, w sorted, ang, spher; clear qtz, tr muscovite; tr silica cem, fri. Lit sh aa.
- 530-610 SHALE--aa.
- 610-80 SHALE--m gry, carb. Some coal.
- 680-700 SHALE--lt gry. Some sandy sltst wh; sand grains f, srd to subang, spherl clear qtz, tr muscovite; calc cem fri.
- 700-10 SHALE--v lt gry and dk gry; slightly carb.
- 710-30 SHALE--lt gry.
- 730-40 SHALE--m gry.
- 740-50 SHALE and COAL--sh aa. Coal blk.
- 750-60 SILTSTONE--v lt gry; p sorted; fri.



- 760-90 SANDY SILTSTONE--wh; sand grains f, srd and subang, spehr, clear qtz; no apparent cem, fri. Some sh aa.
- 790-800 SHALE--lt to dk gry.
- 800-20 SHALE--m gry.
- 820-30 SANDY SILTSTONE--wh; sand grains f, p sorted, subang, spher and platey; clear qtz; mod amount calc cem, mod w ind.
- 830-40 SHALE--m gry.
- 840-50 SHALE and COAL--Sh aa. Coal blk.
- 850-70 SHALE--m gry; slightly carb.
- 870-90 SHALE--aa. Some sandy sltst v lt gry; sand grains f, p sorted, subang, spher; clear qtz; no apparent cem, fri.
- 890-940 SHALE--m dk gry; carb.
- 940-70 SHALE--aa but not carb.
- 970-80 SHALE--aa. Some coal
- 980-90 SHALE--aa.
- 990-1000 SHALE and SILTSTONE--Sh aa. Sltst wh; grains mod w sorted; tr silica cem, w ind.
- 1000-20 SHALE--aa. Some sltst v lt gry; grains p sorted; fri. Lit ss v lt gry; grains f, mod w sorted, srd, spher; milky qtz; silty mat, tr silica cem.
- 1020-30 SANDSTONE--aa. Some sltst aa. Some sh aa.
- 1030-40 SHALE--aa. Some sltst aa. Lit ss aa.
- 1040-50 SILTSTONE--aa. Some ss aa. Some sh aa.
- 1050-70 SHALE--aa. Some sltst aa.
- 1070-80 SHALE--dk gry. Lit coal.
- 1090-1130 SHALE and SILTSTONE--sh m gry. Sltst wh; grains p sorted; tr silica cem, fri.
- 1130-40 SANDSTONE and SHALE--ss wh; grains f to me, p sorted, spher; milky qtz; tr silica cem, mod fri. Sh aa.
- 1140-60 SHALE and SANDSTONE--aa.
- 1160-70 SANDY SILTSTONE--wh; sand grains f to m, subang, spher; clear qtz; no apparent cem, extremely fri.
- 1170-80 SHALE--m. Some sandy sltst aa. Lit coal.

1180-90 SHALE--aa. Some sandy sltst aa.  
 1190-1230 SHALE and SANDY SILTSTONE--aa.  
 1230-70 SHALE--m dk gry; slightly carb.  
 1270-80 SILTSTONE--wh; p sorted; much calc cem, variably ind.  
 1280-90 SHALE--m gry.  
 1290-1300 SHALE--aa, slightly carb.  
 1300-1310 COAL and CARBONACEOUS SHALE--coal blk. Sh  
 gry blk; v carb.  
 1310-20 SHALE--aa.  
 1320-30 SHALE--m gry.  
 1330-60 SHALE--sh m gry; -arb. Some silty ss wh; grains  
 f, srd, spher; clear qtz; lit calc cem brittle.  
 1360-80 SHALE--aa. Lit silty ss aa.  
 1380-90 SHALE--m gry.  
 1390-1410 SHALE--aa.  
 1410-20 COAL--blk; some granular.  
 1420-30 SHALE--m gry.  
 1430-50 SHALE--aa; slightly carb.  
 1450-70 SHALE and COAL--aa.  
 1470-1500 SHALE--m gry; mod fri; some dk gry, carb.  
 1500-30 SHALE--m gry.  
 1530-40 SHALE--aa. Lit coal.  
 1540-60 SHALE--aa. Lit sand, grains loose, vcrse, srd, spher;  
 clear qtz. Lit coal.  
 1560-70 SHALE--m gry.  
 1570-80 COAL--aa. Lit sh. aa.  
 1580-90 SHALE--m gry.  
 1600-20 SANDSTONE--wh; grains f, mod w sorted, srd, spher;  
 clear qtz; tr silica cem. Some sh. aa.  
 1620-30 SHALE--aa. Some ss aa.  
 1630-50 SHALE and SANDSTONE--aa.

- 1650-60 SHALE and SILTSTONE--sh aa. Sltst v lt gry; grains p sorted; qtz; silica cem, w ind.
- 1660-70 SHALE and SILTSTONE--sh m gry to dk gry; fri. Sltst aa.
- 1670-80 SILTSTONE and SHALE--sltst aa. Sh m gry.
- 1680-1700 SILTSTONE and SHALE--sltst aa. Sh m gry to dk gry; carb, fri.
- 1700-50 SHALE--m gry. Some ss lt gry; grains f to c (c fraction is loose), p sorted, srd, spher; clear qtz, tr muscovite; no apparent cem.
- 1750-70 SANDSTONE--aa. Lit limestone wh; extremely fri.
- 1770-1820 SANDSTONE--aa. Some sh dk gry; p sorted, carb. Lit limestone aa.
- 1820-30 SHALE--aa. Lit ss aa.
- 1830-90 SHALE--m dk gry.
- 1890-1900 SHALE--aa. Lit sltst wh, grains mod w sorted; qtz; some silica cem, brittle.
- 1900-10 SHALE--aa. Tr sltst aa.
- 1910-20 SHALE--aa.
- 1920-60 SHALE--m gry.

Well no: 16T-587

Location: Sec. 19, T15N, R14W, McKinley Co., N.M.; 2 miles SSW of Mariano Lake Chapter House; 105-4.34-14.05.

Sampled interval: 0-1334 ft

Sample spacing: 10 ft

TD: 1334 ft

Described by: Robert C. Brod (6/77)

Depth(ft)

Km

- 0-30 SANDSTONE--wh; grains, mod w sorted, rd, spher; clear qtz; silica cem.
- 30-50 SILTSTONE--dk gry; mod fri. Lit ss dk yel or, grains f, mod sorted, subang to ang, spher; clear qtz; silica cem, tr calc cem.
- 50-80 SILTSTONE--aa.
- 80-90 SANDSTONE--wh; grains f to m, mod sorted, agn to subang, spher; clear and milky qtz; gypsiferous.
- 90-100 SILTSTONE--lt gry; gypsiferous.
- 100-110 Missing
- 110-120 SILTSTONE--dk gry and wh; sand grains f to m, w sorted, subang, spher; clear qtz; gypsiferous w ind.
- 120-130 SANDSTONE and SILTSTONE--ss lt gry; grains vf to f, mod w sorted; subang, spher; clear qtz; silica cem. Siltst m gry; sandy.
- 130-140 SILTY SANDSTONE--wh; grains f, w sorted, ang, spher; clear qtz; silt mat, fri.
- 140-150 SILTSTONE--dk gry; sand grains mod p sorted; w ind.

Kd

- 150-160 SILTY SANDSTONE--wh; grains f, w sorted, ang, spher; clear qtz; silt mat, fri.
- 160-170 SANDSTONE--wh; grains vf to f, mod w sorted, subang to ang, spher; clear qtz; silica cem, fri.
- 170-180 SANDSTONE--aa; v fri.
- 180-190 SILTY SANDSTONE--dk yel or; grains f, mod w sorted, srd to subang, spher; clear qtz; fri.

- 190-200 SILTY SANDSTONE--pale gry ro pk; grains m, w sorted, rd to srd, spher; clear qtz; lit iron cem. Limestone wh and m gry; fis.
- 200-10 SILTY SANDSTONE--m gry and gry or pk; grains f, p sorted, subang, spher; clear qtz; v fri.
- Jm
- 210-20 SILTSTONE--dk gry; v fri.
- 220-40 SILTY SANDSTONE--m gry; grains vf to f, p sorted, subang to srd, spher; clear qtz; tr pyrtie, slt mat fri.
- 240-50 SILTSTONE--lt gry; w to p ind.
- 250-60 SILTSTONE--aa. Lit sh dk gry. Lit coal.
- 260-70 SANDY SILTSTONE--lt gry; sand grains m to crse, w sorted, w rd, spher; clear qtz; w ind.
- 270-300 SANDY SILTSTONE--lt gry; sand grains crse to vcrse, p sorted, srd, spher; milky and red qtz. Tr coal.
- 300-10 SANDY SILTSTONE--lt gry; sand grains m, w sorted; rd, highly spher; clear qtz; fri.
- 310-20 SILTSTONE--lt gry to wh; calc cem, fri. Tr limestone wh.
- 320-30 MUDSTONE--lt gry; v w ind.
- 330-40 SANDY SILTSTONE--m gry; sand grains f to m, w sorted, srd, spher; milky qtz; fri.
- 340-50 LIMESTONE--dk gry; fis.
- 350-60 SANDY SILTSTONE--mod red or; sand grains m to crse, w sorted, srd, spher; clear qtz; v fis.
- 360-400 SILTY SANDSTONE--mod reddish or; grains m to vcrse, coarsest grains loose, p sorted, rd, spher; clear qtz.
- 400-410 Missing
- 410-40 SILTY SANDSTONE--mod reddish or; grains m to vcrse, mod w sorted, rd to w rd, spher; clear and red qtz; slt mat. Lit mudstone lt gry; w ind.
- 440-50 SILTY SANDSTONE--m gry; grains m to vcrse, p sorted, srd, spher to elongate; clear qtz; slt mat. Lit mudstone lt gry; w ind.
- 450-500 SILTY SANDSTONE--mod reddish or; grains m to vcrse, mod w sorted, rd to subr, spher; red qtz; slt mat. Lit mudstone lt gry; w ind.

- 500-50 SANDY SILTSTONE and SHALE--sltst mod or pk; sand grains f to crse, p sorted, srd, spher; clear and or qtz; v fri. Sh lt gry.
- 550-60 Missing
- 560-70 SHALE and SANDSTONE--sh v lt gry. Ss wh; grains f to m, p sorted, ang, platy to spher; clear qtz; tr vcrse loose sand, grains rd, spher; milky qtz.
- 570-80 SILTSTONE and SHALE--sltst lt gry; tr sand grains f, mod sorted; fri. Sh pale red and lt gry.
- 580-600 SILTSTONE and SHALE--sltst lt gry and mod or pk. Sh lt gry and dk gry.
- 600-10 SILTY SANDSTONE--wh; grains f to vcrse, p sorted, srd, subang; clear qtz; slt mat, calc cem.
- 610-30 SANDY SILTSTONE--wh; sand grains m, rd, spher; mod reddish brn qtz; fri.
- 630-40 SANDY SILTSTONE--wh; sand grains f to crse, srd, spher; clear qtz; calc cem, fri. Lit sh dk gry. Lit chert m gry and lt red.
- 640-60 SANDY SILTSTONE--pale red; sand grains m to crse, mod w sorted, rd, spher; clear and mod reddish or qtz.
- 660-70 SILTSTONE--wh; fri.
- 670-80 SILTSTONE--mod reddish brn; fri.
- 680-700 SANDY SILTSTONE--wh; sand grains f to m, p sorted, srd to rd, spher; clear qtz; calc cem, fri.
- 700-20 SILTSTONE--aa. Lit sh dk gry. Tr coal.
- 720-90 SILTSTONE--aa. Tr coal.
- 790-800 Missing
- 800-30 SILTY SANDSTONE--wh; grains vf to m, v p sorted, subang, spher; qtz; slt mat, lit calc cem, fri. Tr coal.
- 830-40 SILTSTONE and SILTY SANDSTONE--sltst wh; w ind. Ss aa.
- 840-50 SILTSTONE--aa.
- 850-70 Missing
- 870-80 SILTY SANDSTONE--wh; grains vf to f, p sorted, subang, spher; clear qtz; slt mat, calc cem, mod ind.

- 890-910 SILTY SANDSTONE--aa; w ind.
- 910-20 SILTY SANDSTONE-- wh and mod or pk; grains vf to m, p sorted, srd to subang, spher; clear qtz; slt mat calc cem, mod ind. Some sh lt gry and dk reddish brn. Tr coal.
- 920-70 SANDY SILTSTONE--mod or pk; sand grains f to m, mod w sorted, rd to w rd, spher; clear qtz; much calc cem, w ind.
- 970-90 SANDY SILTSTONE--aa. Lit sh lt gry (bentonitic) and dk reddish brn.
- 990-1220 SANDY SILTSTONE--aa but mottled with wh.
- 1220-30 SANDY SILTSTONE and BENTONITIC SHALE--sltst wh and mod or pk; sand grains f to m, p sorted, srd, spher; clear qtz; calc and iron cem mod ind. Sh lt gry; w ind.
- 1230-50 SILTSTONE--v lt gry and mod or pk; mod ind.
- 1250-90 SANDY SILTSTONE--mod reddish or; sand grains f to m, mod to p sorted, red, sph; clear and milky qtz; calc and iron cem, fri. Lit bentonitic sh vlt gry.
- 1290-1300 SANDY SILTSTONE--aa. Lit sh pale red.
- 1300-10 SILTSTONE--lt gry; sand grains p sorted; calc cem, w ind.
- 1310-30 SILTSTONE--lt gry and mod reddish or; sand grains p sorted; calc and iron cem, fri. Tr pale red sh. Lit v lt gry, bentonitic sh.
- 1330-34 SILTY SANDSTONE--variable color, wh, mod reddish or mod pk, mod yel grains f to crse, p sorted, subang to highly rd, sph to highly spher; clear, wh, milky and iron-stained qtz; slt mat, calc and iron cem, v fri. Lit sh v lt gry, bentonitic.

Well no: 16T-588

Location: Sec. 29, T15N, R11W, McKinley Co., N.M., 2 miles south of well 16B-37; 104-1.90-16.75.

Sampled interval: 0-1020 ft

Sample spacing: 10 ft

TD: 1030 ft (plugged back to 700 ft)

Described by: Scott Anderholm (1/78)

# Depth(ft)

Kd

- 0-10 SILTSTONE and SANDSTONE--sltst yel gry and ol grn gry; grains p sorted; calc cem, w ind. Ss lt brn; grains vf to f, p sorted, srd to rd; milky qtz; calc cem.
- 10-20 SILTSTONE--aa.
- 20-70 SANDY SILTSTONE--m gry; sand grains vf to f, srd; milky qtz; calc cem, w ind.
- 70-100 SILTY SANDSTONE--lt m gry; grains vf to f, p sorted, subang to srd; milky qtz; calc cem, mod ind.
- 100-110 SANDSTONE and SILTSTONE--ss lt gry; grains vf to f, mod w sorted, srd; milky qtz; calc cem, mod w ind. Sltst m gry; calc cem, fri.
- 110-130 SILTSTONE--aa.
- 130-140 SILTSTONE--lt gry; p sorted; calc cem, fri.
- 140-150 Missing
- 150-180 SILTSTONE--aa.
- 180-210 SILTY SANDSTONE and SILTSTONE--ss lt gry; grains vf to f p sorted, srd; milky qtz; slt mat; calc cem, fri. Sltst aa.

Jm

- 210-220 SHALE--lt gry; calc cem, fri.
- 220-240 SHALE and SANDSTONE--sh aa. Ss lt gry; grains vf to f, p sorted, ang to srd; milky qtz; calc cem, fri.
- 250-260 SILTSTONE and SHALE--sltst lt gry; p sorted; calc cem. Sh m lt gry; calc.



- 260-270 SANDSTONE--lt gry; grains vf, mod w sorted, srd to rd; milky qtz; calc cem, fri. Some sh m lt gry; calc. Tr coal.
- 270-280 SHALE--dk gry; fis; carb.
- 280-290 SANDSTONE and SHALE--ss aa. Sh m dk gry; wind; carb.
- 290-300 SHALE--dk gry; w ind.
- 300-10 SHALE--aa. Some ss aa.
- 310-20 Missing
- 320-30 SHALE--aa. Some ss aa.
- 330-40 LOOSE SAND--grains m to crse, subang to rd; milky qtz. Some sh dk gry to blk; carb.
- 340-50 SHALE--lt gry; w ind; calc. Some sltst yel gry; calc. Some ss lt gry; vf to crse, srd to rd; milky qtz and blk chert; calc, fri.
- 350-60 LOOSE SAND--grains m to crse, subang to rd; milky qtz. Some sh m lt gry to blk; w ond. Tr coal.
- 360-70 SILTSTONE--m gry; grains mod sorted; w ind. Some sh lt gry to gry blk; m ind. Some ss lt gry; grains vf to f, p sorted, srd; milky qtz.
- 370-80 SANDY SILTSTONE--lt gry; sand grains vf to f, p sorted, srd; milky qtz; w ind. Some sh lt gry.
- 380-400 SILTSTONE--lt gry; p sorted; milky qtz; calc cem.
- 400-10 SILTSTONE--lt gry; p sorted; milky qtz.
- 410-20 SILTSTONE--aa, calc.
- 420-40 SILTSTONE--aa. Some sh pale red; mod ind.
- 440-50 SILTSTONE--aa. Some sh aa.
- 450-60 SILTSTONE--aa.
- 460-80 SANDY SILTSTONE--pk gry; sand grains vf to f, p sorted, srd; qtz; calc, fri.
- Jz
- 480-500 LOOSE SAND--grains m vcrse, srd to rd; milky qtz.
- 510-20 LOOSE SAND--aa. Some sltst lt ol gry; grains p sorted; qtz; calc.

- 520-30 LOOSE SAND--grains f to crse, p sorted, srd to rd; qtz. Some sh lt gry; calc.
- 530-40 LOOSE SAND--grains f to m, p sorted, subang to rd; qtz. Some sh lt gry; calc; plant fragments.
- 540-60 LOOSE SAND--grains f to crse, p sorted, subang to rd; qtz. Some sh aa.
- 560-70 SHALE--m gry; calc. Some ss lt gry; vf-crse, p sorted, srd; qtz; fri.
- 520-80 SILTY SANDSTONE--pk gry; grains vf to m, p sorted, srd; qtz; calc, fri. Lit sh aa.
- 580-600 SANDY SILTSTONE--pk gry; sand grains vf to m; qtz; calc, fri. Tr coal.
- 600-10 SILTY SANDSTONE--pk gry; grains vf to m, rd; qtz; calc, fri.
- 610-20 SILTY SANDSTONE--aa but w ind to fri.
- 620-30 SANDY SILTSTONE--pk gry; sand grains vf to m, p sorted, rd; qtz; calc, fri.
- 630-50 Missing
- 650-60 SILTY SANDSTONE--pk gry; grains vf to m, srd; qtz; calc, fri.
- 660-90 Missing
- 690-700 SILTY SANDSTONE--aa.
- Je
- 700-10 SILTSTONE--lt brn gry; p sorted; calc
- 710-20 SANDSTONE--v lt gry; grains vf to m, srd; qtz; calc; fri.
- 720-30 Missing
- 730-40 SILTY SANDSTONE--pale yel brn; grains vf to f, p sorted, srd; qtz; calc.
- 740-50 Missing
- 750-70 SILTY SANDSTONE--pk gry; grains vf to f, srd; qtz; calc, fri.
- 770-80 SILTSTONE--pale brn; calc, fri. Some silty ss aa.
- 780-800 SANDY SILTSTONE--pk gry; sand grains vf to f, srd; calc. Tr sh gry red. Tr coal.
- 800-50 SANDY SILTSTONE--aa.

- 850-60 SANDY SILTSTONE--pale red; sand grains vf to m, p sorted, srd to rd; qtz; calc. Tr coal.
- 860-70 Missing.
- 870-80 SANDY SILTSTONE--mod brn; sand grains vf to m, p sorted, srd; qtz. Sh m dk gry. Tr sh.
- 880-90 SILTSTONE--pale yel brn, p sorted; calc. Some sh grn gry; mod w ind.
- 890-910 SANDY SILTSTONE--pale yel brn; sand grains vf to f, p sorted, srd to rd; qtz; calc.
- 910-30 SANDY SILTSTONE--aa; p ind.
- 930-40 Missing
- 940-60 SANDY SILTSTONE--lt brn; sand grains, vf to f, p sorted, srd to rd; qtz; calc.
- 960-970 SANDY SILTSTONE--lt brn and lt ol gry; sand grains vf to f, p sorted; qtz; mod ind.
- 970-80 Missing
- 980-1020 SANDY SILTSTONE--aa.

Well no: 16T-591

Location: Near Smith Lake

Sample interval: 350-1410 ft

Sample spacing: 10 ft

TD: Unknown

Described by: Scott Anderholm (1/78)

Depth(ft)

- 350-60 SILTY SANDSTONE--lt gry; grains vf to f, mod w sorted, subang to srd; qtz; abundant plant fragments.
- 360-70 SILTY SANDSTONE--v pale or; grains vf to m, p sorted, subang to srd; qtz; fri. Some sltst pale yel gry; w sorted; w ind.
- 370-400 SILTY SANDSTONE--pale yel gry; grains vf to crse, p sorted, subang to srd; qtz; fri; plant fragments.
- 400-10 SANDSTONE--pale red; grains vf to vcrse, p sorted, srd; qtz; calc, mod ind; plant fragments.
- 410-20 SANDSTONE--pk gry; grain f, w sorted, srd; qtz; calc, w ind.
- 420-40 SANDSTONE--gry or pk; grains f to vcrse, p sorted, srd to rd; qtz; calc, fri.
- 440-60 SANDSTONE--gry or pk; grains f to crse, mod w sorted, srd to rd; qtz; fri.
- 460-80 SANDSTONE and CLAYEY SANDSTONE--ss aa. Clayey ss pale yel gry; grains f, mod w sorted, srd; qtz; mod w ind.
- 480-90 SANDSTONE--aa.
- 490-510 SANDSTONE--gry or pk; grains m to vcrse, p sorted, srd; qtz; fri; plant fragments.
- 510-50 SANDSTONE--gry or pk; grains vf to vcrse, vp sorted, srd; qtz; fri; shale chips and plant fragments.
- 550-60 SANDSTONE--pale yel brn; grains f to crse, mod w sorted, subang to rd; qtz; fri, plant fragments.
- 560-80 SANDSTONE and SHALE--ss aa. Sh ol gry; w ind; carb.

- 580-610 SANDSTONE--gry or pk; grains f to m; w sorted, srd; qtz; fri.
- 610-30 SANDSTONE--pale yel brn; grains f to m, w sorted, srd; qtz; calc, fri; plant fragments.
- 630-40 SANDSTONE and SHALE--ss aa. Sh m lt gry; w ind.
- 640-50 SANDSTONE and SILTSTONE--ss yel gry; grains vf to f, mod w sorted, srd; qtz; calc, fri. Sltst brn gry; w sorted; wind.
- 650-70 SILTSTONE and SANDSTONE--sltst lt grn gry; w sorted; calc. Ss aa.
- 670-80 SILTY SANDSTONE--pale yel gry; grains vf to f, p sorted, subang to rd; qtz; calc, fri. Some sltst aa.
- 680-90 SILTY SANDSTONE--pk gry; grains vf to f, mod w sorted, subang to srd; qtz; calc, mod ind.
- 690-700 SILTY SANDSTONE and SHALE--ss aa. Sh gry red; w ind.
- 700-10 SILTY SANDSTONE and SHALE--ss aa. Sh gry red to lt grn gry; calc, w ind.
- 710-20 SHALE and SILTY SANDSTONE--sh gry red; calc, w ind. Ss pale yel brn; grains vf to f, mod w sorted, subang to srd; qtz; calc, mod w ind.
- 720-40 SHALE and SILTY SANDSTONE--sh lt grn gry; calc, w ind. Ss aa.
- 740-50 SANDSTONE and SHALE--ss yel gry; grains vf to f, w sorted, srd; qtz; calc, fri. Sh gry red; calc, w ind.
- 750-70 SILTY SANDSTONE and SHALE--ss yel gry; grains vf to f, p sorted, srd; qtz; fri. Sh aa.
- 770-80 SILTY SANDSTONE, some SHALE--ss pk gry; grains vf to f, mod w sorted, srd; qtz; calc. Sh pale grn gry; calc, w ind.
- 780-90 SHALE and SILTY SANDSTONE--sh brn gry to lt grn gry; calc. Ss aa.
- 790-800 SHALE--aa. Some silty ss aa.
- 800-10 SANDSTONE--pk gry; grains vf to m, p sorted, srd; qtz; calc, mod w ind.
- 810-20 SANDSTONE, some SHALE--ss aa. Sh brn gry calc.
- 820-70 SANDSTONE--pk gry; grains vf to f, mod w sorted, srd; qtz; calc, fri. Lit sh aa.

- 870-90 SANDSTONE--aa. Some sh aa.
- 890-900 SANDSTONE--pk gry; grains m, v w sorted, srd; qtz; fri. Lit sh aa.
- 900-40 SANDSTONE--ss pk gry; grains vf to m, p sorted, srd to rd; qtz; calc, fri. Lit sh aa.
- 940-50 SANDY SILTSTONE--lt brn gry; sand grains vf to f, p sorted, srd; qtz; calc.
- 950-60 SHALE and SANDY SILTSTONE--sh brn gry to lt grn gry; mod w ind. Sltst aa.
- 960-80 SANDSTONE and SHALE--ss pale yel brn; grains vf to f, mod w sorted, srd; qtz; calc, mod w ind. Sh brn gry; calc, mod w ind.
- 980-1000 SILTY SANDSTONE--pale yel brn; grains vf to f, p sorted, srd; qtz; calc, fri.
- 1000-20 SILTY SANDSTONE--aa. Some sltst brn gry; calc, mod w ind.
- 1020-30 SANDSTONE--lt brn; grains vf to f, w sorted, subang; qtz; calc.
- 1030-40 SANDSTONE--aa but not calc.
- 1040-90 SILTY SANDSTONE--lt brn; grains vf to f, p sorted, subang to srd; qtz; calc, mod w ind.
- 1090-1100 SANDSTONE--lt brn; grains vf to f; mod w sorted, srd; qtz; calc, fri. Lit sh dk gry; w ind.
- 1100-1200 SILTY SANDSTONE--lt brn; grains vf to f, p sorted, srd; qtz; calc, fri.
- 1200-10 SILTY SANDSTONE--aa. Lit sh gry red; calc, w ind-
- 1210-20 SILTY SANDSTONE--gry or. pk; grains vf to f, mod sorted, srd; qtz; calc, mod w ind. Lit sh aa.
- 1220-40 SHALE--mod ol gry; calc, v w ind.
- 1240-60 SILTY SANDSTONE--ss. gry or. pk to lit grn gry; grains vf to f, p sorted, srd; qtz; calc, fri. Some sh brn gry; calc, w ind.
- 1260-70 SILTY SANDSTONE--aa. Lit sh aa.
- 1270-90 SILTY SANDSTONE--lt brn to lt grn gry; grains vf to f, p sorted, srd; qtz; calc, fri. Lit sh brn gry; calc, w ind.

1290-1370 SILTY SANDSTONE--aa.

1370-80 SILTY SANDSTONE--aa. Lit sh m dk gry; w ind.

1380-1410 SILTY SANDSTONE--aa.

## Sandoval County



Well no: 19T-518

Location: Sec. 1, T22N, R7W, Sandoval Co., N.M.; 6 mi SE of  
Lybrook; 63-1.10-6.05.

Sampled interval: 0-801 ft

Sample spacing: 10 ft

TD: 1250 ft

Described by: Robert C. Brod (6/77)

Depth(ft)

Tn

0-20	SAND--wh; grains m to vcrse, mod w sorted, ang, spher; clear qtz.
20-30	SANDSTONE--sand aa in gry or slt mat, no apparent cem.
30-50	SILTSTONE--m gry; grains p sorted; mod fri.
50-60	SANDSTONE--wh; sand aa in wh slt mat, no apparent cem.
60-100	SANDSTONE--aa but lt gry.
100-106	Missing
106-16	SANDSTONE--wh; aa.
116-36	SANDSTONE--wh; grains f, p sorted, ang, spher; clear qtz; much slt mat, lit calc cem.
136-96	SILTSTONE--m gry; grains p sorted; mod w ind.
196-257	SANDY SILTSTONE--wh; sand grains f to m, p sorted, srd, spher; clear qtz; no apparent cem, fri.
257-367	SANDY SILTSTONE--aa. Lit sh m gry.
367-427	SHALE--m dk gry.
427-37	SHALE--aa. Some ss wh; grains vf to f, p sorted, ang, spher, clear qtz; much slt mat and calc cem.
437-47	SHALE--gry or pk. Some ss aa.
447-57	SHALE--aa. Lit ss aa.
457-507	SHALE--aa.
507-37	SHALE--aa. Some ss wh; grains vf to f, p sorted, ang, spher; clear qtz; much slt mat.

- 537-67 SANDSTONE--aa.
- 567-87 SHALE--m gry and gry or pk. Some ss aa.
- 587-647 SANDSTONE--aa. Some sh aa.
- 647-57 SANDY SILTSTONE--lt gry; sand grains f to m, rd, spher; qtz; fri. Some sh aa.
- 657-97 SANDY SILTSTONE--aa. Lit sh aa.
- 697-721 SHALE--aa. Lit ss aa.
- 721-41 SHALE--m gry.
- 741-801 SANDY SILTSTONE--wh; sand grains f to m, rd, sph; qtz; fri. Some sh aa.

Well number: 19T-518B

Location: (Sec. 1, T22N, R7W, Sandoval Co., N.M. ?)

Sampled interval: 0-1300 ft

Sample spacing: 10 ft

TD: Unknown

Described by: Robert C. Brod (6/77)

Depth(ft)

0-20	SAND--wh; grains crse, mod w sorted, ang, spher; clear qtz.
20-30	SAND--aa; lit wh slt coating grains.
30-40	SHALE--m gry.
40-50	SANDY SILTSTONE--wh; sand grains f to m, ang, spher; clear qtz, lit muscovite; mod ind.
50-90	SANDY--wh; grains crse, mod w sorted, subang, spher; clear qtz; lit slt coating grains.
90-100	SHALE--m gry.
100-10	SAND--wh; grains f to crse, p sorted, srd, sph; clear qtz; lit slt.
110-20	SANDSTONE--aa; lit calc cem.
120-50	SHALE--m gry.
150-60	SHALE and SILTSTONE--sh aa. Sltst wh; p sorted; mod w ind.
160-90	SILTSTONE--aa.
190-200	Missing
200-40	SANDY SILTSTONE--wh; sand grains f to m, sph, and platey; qtz, tr muscovite; tr calc cem, fri.
240-50	SANDY SILTSTONE--aa. Some sh m gry.
250-70	SANDY SILTSTONE--aa.
270-80	SANDY SILTSTONE and SHALE--aa.
280-90	SANDY SILTSTONE--aa; slightly carb.

290-310	SHALE--m gry.
310-30	SHALE--aa. Some sandy sltst aa.
330-60	SHALE--aa.
360-70	SHALE and SANDY SILTSTONE--aa.
370-80	SANDY SILTSTONE--aa.
380-430	SHALE--aa.
430-50	SILTY SANDSTONE--wh; grains vf to f, p sorted, ang, spher; clear qtz; lit calc cem.
450-500	SHALE--gry or pk.
500-50	SHALE--m gry.
550-90	SILTY SANDSTONE--wh; grains f to m, p sorted, subang, spher; clear qtz; lit calc cem.
590-600	SHALE--m gry.
600-10	SAND--grains, crse, w sorted, subang, spher; clear qtz. Some sh aa.
610-30	SILTSTONE--m gry, grains mod w sorted, sm calc cem. mod fri.
630-40	SANDY SILTSTONE--wh; sand grains f to m, srd, spher; clear qtz; lit calc cem, mod w ind.
640-50	SHALE--m gry.
650-700	SANDY SILTSTONE--aa.
700-10	SILTY SANDSTONE--wh; grains f to crse, p sorted, grains srd, spher; milky qtz; no apparent cem, mod ind.
710-60	SHALE--m gry.
760-90	SILTY SANDSTONE--aa.
790-1100	Missing
1100-1300	SHALE--m gry.

Well no: 19T-518C

Location: "Recon. Marus Pass"

Sampled interval: 0-700 ft.

Sample spacing: 10 ft.

TD: Unknown

Described by: Robert C. Brod (6/77)

Depth(ft)

5-20	SANDSTONE--gry or; grains f to m, p sorted, ang, spher; clear qtz; lit slt mat.
20-60	SHALE--m gry.
60-70	COAL and SANDSTONE--coal blk. Ss aa.
70-80	SHALE--aa
80-90	SHALE and SANDSTONE--aa
90-100	SHALE--aa. Lit ss aa.
100-110	SANDSTONE--aa.
110-130	SHALE--aa.
130-140	SANDSTONE--aa. Lit sh aa.
140-150	SHALE--aa. Lit ss aa.
150-170	SANDSTONE--aa. Lit sh aa.
170-180	SHALE--aa.
180-190	SANDSTONE--aa.
190-200	SHALE--aa.
200-260	SANDSTONE--aa.
260-290	SHALE--aa.
290-300	SANDSTONE--aa.
300-500	Missing
500-700	SILTY SANDSTONE--wh; grains f to m, p sorted, subang, spher; clear qtz; some slt mat, lit calc cem.

520-30 SILTY SANDSTONE--aa. Some sh m gry. Lit coal.  
530-40 SHALE--aa. Some coal.  
540-70 SANDSTONE--aa. Lit sh and coal aa.  
570-80 SANDSTONE--aa. Lit sh aa.  
580-620 SANDSTONE--aa.  
620-30 SHALE--m gry; v fri. Some ss aa.  
630-40 SANDSTONE and SHALE--aa.  
640-650 SANDSTONE--aa. Some sh aa.  
650-700 SHALE--aa. Lit ss aa.

## San Juan County

Well no: 13T-527

Location: San Juan Co., N.M.

Sampled interval: 0-152 ft

Sample spacing: 10 ft

TD: Unknown

Described by: Scott Anderholm (1/78)

Depth(ft)

- 0-12 SANDSTONE--yel gry; grains vf to pebbles, p sorted, subang to rd; qtz; calc, fri.
- 12-32 SILTY SANDSTONE--yel gry; grains vf to pebbles, p sorted, subang to rd; qtz and brn basalt; calc, fri.
- 32-42 SILTY SANDSTONE and SHALE--ss aa. Sh mod brn; w ind.
- 42-52 SHALE--pale ol gry; contains f to m, srd qtz grains; calc. Some silty ss yel gry; grains vf to f, p sorted, subang to srd; qtz; calc, v w ind. Tr coal.
- 52-62 SHALE and SILTY SANDSTONE--sh mod brn; w ind. Ss aa.
- 62-72 SANDSTONE and SHALE--ss ol gry; grains vf to f, mod w sorted, srd; qtz; calc, mod w ind. Sh ol gry; mod w ind; carb. Lit coal.
- 72-82 SILTY SANDSTONE--yel gry; grains vf to f, mod w sorted, srd; qtz; fri.
- 82-92 SILTY SANDSTONE-- v lt gry; grains vf to f, p sorted, srd; qtz; fri.
- 92-102 SHALE--blk; mod w ind; carb. Some silty ss and coal aa.
- 102-112 SILTY SANDSTONE--lt ol gry; grains vf to f, p sorted, subang to srd; qtz; p to v w ind. Tr coal.
- 112-122 SILTY SANDSTONE and SHALE--ss aa. Sh blk; carb.
- 122-152 SILTY SANDSTONE--yel gry; grains vf to f, mod w sorted, subang to srd; qtz; fri. Lit sh aa. Tr coal.



Well no: 19T-517

Location: NE $\frac{1}{4}$ , Sec. 14, T25N, R10W, San Juan Co., N.M.; .3 mile W  
of Huerfano Trading Post; 46-6.0-6.7.

Sampled interval: 0-958 ft

Sample spacing: 10 ft

TD: 969 ft

Described by: Robert C. Brod (6/77)

Depth (ft)

Tn

0-10	SAND--pale yellowish brn; grains f to crse, p sorted, subang to rd, spher; vit qtz; much caliche on grain surfaces and forming aggregates.
10-20	SAND--aa but gry or.
20-67	SAND--aa but gry yel.
67-77	SHALE--m gry; fri; lit caliche on surfaces.
77-87	SHALE--dk gry; slightly fri.
87-97	SHALE--gry red and m gry; v fri.
97-107	SHALE--gry red. Lit ss lt gry; grains f, w sorted, srd, spher; clear qtz; calc cem, fri.
107-27	SHALE--lt gry and dk reddish brn; fri.
127-47	SHALE--m gry.
147-57	SHALE--dk reddish brn and lt gry; fri.
157-67	SHALE and SANDSTONE--sh m gry. Ss wh; grains f fd, spher; clear qtz; much calc cem, fri.
167-77	SANDSTONE--wh; grains f, mod w sorted, srd, spher; clear qtz; much calc cem.
177-87	Missing
187-227	SANDSTONE--wh; grains f to vcrse, p sorted, srd to ang, spher and oblate; clear qtz; calc cem.
227-37	SANDSTONE--lt gry; grains m to vcrse, p sorted, srd, spher to rod-like; clear qtz. Some sh m gry.
237-47	Missing

- 247-67 SANDSTONE--lt gry; grains f to m, p sorted, srd, spher; vit qtz; calc cem aggregates common. Lit sh m gry.
- 267-77 SANDSTONE and SHALE--ss lt gry; grains f to crse, p sorted, srd, spher; vit qtz; calc cem. Sh gry red and m gry.
- 277-87 SANDSTONE--wh; grains vf, p sorted, srd, spher; clear qtz, tr biotite and muscovite; calc and silica cem.
- 287-97 SANDSTONE and SILTSTONE--ss wh; grains m to vcrse, vcrse grains loose, mod sorted, srd to ang, spher; clear qtz; calc and silica cem. Sltst lt gry; slightly fis.
- 297-307 SILTSTONE--lt gry; slightly fis.
- 317-37 SILTSTONE and SANDSTONE--sltst aa. Ss wh; grains f, w sorted, srd, spher; clear qtz; calc cem, fri.
- 337-57 SILTSTONE--lt gry and gry red; silica cem, pyrite cem in one chip, fri.
- 357-87 SILTSTONE--m gry; extremely fri.
- 387-97 SILTY SANDSTONE--lt gry; grains m to vcrse, mod sorted, srd, spher; clear qtz; slt mat, silica and pyrite cem.
- 397-437 SANDSTONE--lt gry; grains m and vcrse, bimodal, srd, spher; clear qtz, tr muscovite; silica cem.
- 437-47 SANDSTONE--aa. Lit sh lt gry.
- 447-57 SANDY SILTSTONE--lt gry; sand grains m, w sorted, rd, spher; clear qtz; calc cem, fri.
- 457-77 SANDY SILTSTONE-- lt gry; sand grains crse, srd, spher; clear qtz, tr muscovite.
- 477-507 SANDSTONE and SHALE--ss wh; grains m to vcrse, large grains loose, mod sorted, srd, spher; clear qtz; calc and pyrite cem. Sh pale red and m gry.
- 508-18 SANDSTONE and SHALE--aa but without pyrite.
- 518-28 SANDSTONE and SHALE--ss lt gry; grains f to m, mod sorted, srd, spher; clear qtz, tr muscovite; calc cem. Sh m gry; tr carb. material.
- 528-48 SANDSTONE and SHALE--ss lt gry, grains ft. m, w sorted, rd, spher; clear qtz; calc cem. Sh m gry and pale red.

- 548-68 SANDSTONE--aa. Lit sh aa.
- 578-88 SANDSTONE and SHALE--aa.
- 588-98 SANDSTONE and SHALE--ss m gry; grains m to vcrse, p sorted, srd, spher; clear qtz; slt mat. Sh m gry and pale red; tr carb. material.
- 598-608 Missing
- 608-28 SANDSTONE and SHALE--ss lt gry; grains f to vcrse, p sorted, srd to subang, spher to elongate; clear qtz, tr muscovite; silica cem; Sh m gry and gry red; fri. Tr coal.
- 628-48 SHALE--aa. Some ss aa.
- 648-88 SHALE--pale red, lit m gry; mod fri. Some Ss wh; grains m to crse, mod sorted, srd to subang, spher; clear qtz; silica cem.
- 688-718 SANDSTONE--wh; grains m, w sorted, srd to subang, spher; vit and milky qtz, lit muscovite, tr biotite and feldspar; calc and silica cem. Some sh pale red and m gry.
- 738-68 SHALE and SILTSTONE--sh m gry. Sltst pale red; qtz and muscovite; v fri.
- 768-78 SHALE--m gry and pale red.
- 778-88 SHALE and SILTSTONE--sh m gry. Sltst pale red; lit f to vc sand; qtz, lit muscovite; fri.
- 788-808 SHALE--aa. Lit sltst aa.
- 810-20 SANDSTONE and SHALE--ss wh; grains m, w sorted, srd to subang, spher; clear and milky qtz, tr muscovite; silica cem. Sh m gry. Tr coal.
- 828-48 SHALE and SANDSTONE--sh lt gry and pale red. Ss wh and lt gry; grains m to vcrse, p sorted, subang to srd, spher to platy; clear and milky qtz; some slt mat; silica and tr pyrite cem.
- 848-68 SANDSTONE and SHALE--ss lt gry; grains crse to vcrse, loose, w sorted, subang to srd; spher, clear qtz. Sh lt gry and dk reddish brn.
- 868-908 SILTSTONE--m gry and gry red; qtz and muscovite. Lit ss lt gry; grains crse to vcrse, loose, subang, spher to platy; clear qtz. Lit sh m gry and gry red.
- 908-18 SHALE--m gry.

- 918-28 SHALE--m gry. Lit Ss lt gry; grains vcrse, loose,  
w sorted, subang to srd, spher, clear qtz.
- 928-38 SILTSTONE--lt gry; grains of clear qtz and muscovite.
- 938-58 SANDSTONE--lt gry; grains f, mod sorted, subang to  
srd, spher; clear qtz, some muscovite; fri. Sh gry red  
and m gry; mod ind.

Well no: 19T-519

Location: SE $\frac{1}{4}$ , Sec. 23, T27N, R13W, San Juan Co., N.M.

Sampled interval: 0-125 ft

Sample spacing: 10 ft

TD: Unknown

Described by: Robert C. Brod (6/77)

Depth(ft)

Toa

- 0-10 SAND--Some pale yel or and wh; grains f to crse, p sorted, srd and subang, spher, clear qtz, tr feldspar; gravel, f, w rd and spher, some aggregated by caliche, others cem by qtz.
- 10-15 SAND--pale yel or; grains m to crse, mod to p sorted, srd, spher; clear and wh qtz tr gypsum, no caliche.
- 15-20 SAND--pale yel or; grains f to crse, p sorted, subang to rd, spher and elongate; clear qtz. Lit f gravel f, rd to ang, spher; qtz, sm dk reddish brn chert; caliche coating grains, tr iron oxide cem.
- 20-25 SAND--pale yel or; grains f to m, mod to p sorted, srd and subang, spher; clear qtz. Some gravel f, ang to subang, spher to oblate; qtz, sm dk reddish bron chert; tr iron oxide cem, tr caliche cem.
- 25-30 SAND--pale yel or and wh; grains m, w sorted, grains srd, spher, clear qtz, lit gypsum; lit caliche cementing grains.
- 30-60 SAND--pale yel or and wh; grains m to crse, mod w sorted, ang to srd, spher and oblate; clear and lt or qtz; lit calc and iron oxide cem.
- 60-65 SAND--wh; grains m to crse, w sorted, ang to srd, spher, oblate; clear qtz; tr iron oxide cem.
- 70-85 SAND--wh and pale yel grains f to crse, p sorted, ang to srd, spher and oblate; clear and m gry qtz; mod amount iron oxide cem; a few grains show conchoidal fracture.
- 85-90 SAND--wh; grains m, v w sorted, ang to srd, spher; clear qtz.
- 100-05 SAND--wh; grains m to crse, mod sorted, ang to w rd, spher to elongate; clear qtz, lit chert; tr iron oxide cem.

105-25 SAND--multicolored; grains m to vcrse, p sorted, ang to srd, spher, elongate and platey; clear qtz, vcrse grained chert, and unidentified rock fragments; tr iron oxide cem.

Well no: 19T-521

Location: Sec. 4, T28N, R10W, San Juan Co., N.M.; 3 miles S of Bloomfield; 30-1.12-6.34.

Sampled intervals: 0-100, 200-270, 390-500 ft

Sample spacing: 10 ft

TD: 700 ft (completed at 370 ft)

Described by: Robert C. Brod (6/77)

Depth (ft)

Tn

- 0-20 SANDY SILTSTONE --lt brn, sand grains f to vcrse, p sorted, srd to srbang, spher; clear qtz, muscovite; calc cem, fri.
- 20-30 SANDSTONE and GRAVEL--ss lt gry, f to m, p sorted; grains ang, platey qtz muscovite, and biotite; calc and iron oxide cem, v fri. Gravel m gry and gry red, w sorted, grains f, ang to srd, spher and platey; chert.
- 30-50 SILTSTONE--v lt gry; grains mod sorted; w ind.
- 50-70 SHALE--dk gry. Sltst lt gry; aa.
- 70-80 SHALE--dk gry.
- 80-92 Missing
- 92-100 SANDSTONE and SILTSTONE--ss lt gry; grains vf to crse, p sorted, subang to srd, spher; vit qtz; slt mat; calc cem. Sltst aa.
- 100-200 Missing
- 200-16 SANDSTONE and SILTSTONE--ss lt gry; grains f, p sorted, ang to subang, spher and platey; clear qtz and biotite; slt mat, calc cem. Sltst aa.
- 216-20 SANDSTONE and SILTSTONE--aa. Lit sh m gry.
- 220-30 SANDSTONE--lt gry; grains f to m, p sorted, ang to subang, platey to spher; clear qtz; slt mat; tr calc and iron oxide cem.
- 230-40 MUDSTONE and SILTSTONE--mudstone dk gry; fri. Sltst lt gry; aa. Lit sand f to m, w sorted, srd, spher; qtz; tr roots.
- 240-50 SILTSTONE--aa. Lit mudstone aa.

## Toa

- 250-60 SANDSTONE--wh; grains f to vcrse, p sorted, ang to srd, spher; clear qtz; silica cem, fri.
- 260-70 SANDSTONE--wh; grains m to crse, p sorted, ang to subang, spher to platey; clear qtz, tr muscovite; slt mat; calc cem, fri.
- 270-390 Missing
- 390-410 SANDSTONE and SHALE--ss wh; grains crse to vcrse, w sorted, subang to srd, spher; clear qtz, lit chert. Sh dk reddish brn and m gry.

## Kk

- 410-20 SHALE--m gry and pale red Lit sltst m gry; mod w sorted; v fri.
- 420-40 SANDSTONE--wh; grains f, p sorted, srd to subang, spher; clear qtz; slt mat; calc cem.
- 440-50 SHALE--dk gry. Lit sandy sltst m gry some sand grains f to m srd to subang, spher; clear qtz.
- 450-60 SANDSTONE--lt gry; grains f to m, p sorted, subang to srd, spher; clear qtz; slt mat; calc cem.
- 460-90 SILTSTONE--m gry; calc cem.
- 490-500 SANDY SILTSTONE--wh; sand grains f, p sorted, subang, spher; clear qtz; calc cem.



## Valencia County

Well name: Ramah 21

Location: Sec. 22, T9N, R15W, Valencia Co., N.M., 1000 ft E of  
Ramah Chapter House; 152-8.80-0.15.

Sampled interval: 0-310 ft

Sample spacing: 5 ft

TD: 480 ft

Described by: Robert C. Brod (6/77)

### Depth(ft)

#### Qb

- 0-5 SANDSTONE and BASALT--ss gry or; grains f to crse, p sorted, srd, spher; clear qtz; much calc cem. Basalt mod weathered, med gry, vesicles visible microscopically.
- 5-10 BASALT--aa.
- 10-25 BASALT--small vesicles visible macroscopically.
- 25-45 TUFF--lt gry, highly welded.
- 45-55 BASALT--aa. Some tuff aa.
- 55-120 TUFF--aa.
- 120-30 TUFF--aa. Lit sltst mod reddish or; p sorted; qtz, some calc cem, extremely fri.

#### Km

- 130-35 SILTSTONE--aa. Lit tuff aa.
- 135-55 SILTSTONE--aa.
- 155-85 SILTSTONE--gry or; p sorted; qtz; lit calc cem. fri.
- 185-220 SILTSTONE--lt gry; p sorted; qtz; tr calc cem fri.
- 220-25 SILTSTONE--wh; p sorted; qtz, no cem evident, fri.
- 225-30 SANDY SILTSTONE--lt gry; sand grains f to crse, p sorted, spher, rd; clear qtz; no cem evident, fri.
- 230-300 SILTSTONE--wh; p sorted; qtz; no cem evident, highly fri.
- 305-10 SAND--v lt gry; grains f to crse, p sorted, srd, spher; clear qtz.

Well name: Ramah 21A

Location: Sec. 22, T9N, R15W, Valencia Co., N.M.; 1000 ft E of  
Ramah Chapter House; 152-8.80-0.15.

Sampled interval: 0-685 ft.

Sample spacing: 5 ft.

TD: 780 ft.

Described by: Robert C. Brod (6/77)

# Depth(ft)

Km

0-10 SILTSTONE--gry or; p sorted; much calc cem, mod fri.  
10-25 SILTSTONE--dk yel-brn; p sorted; qtz, lit muscovite,  
lit clay; much calc cem, w ind.  
25-30 SHALE--dk gry. Some sltst aa.  
30-45 SHALE--aa. Lit sltst aa.  
45-400 SHALE--aa.  
400-455 SHALE--aa. Lit claystone wh; mod ind; calcite crystals.  
455-555 SHALE--aa. Some sltst v lt gry; p sorted; clear qtz;  
much calc cem, v w ind. Lit claystone aa.

Kd

555-65 SANDSTONE--wh; grains f, mod w sorted, subang, spher;  
clear qtz; lit silica cem. Some sh and lit claystone aa.  
565-70 SANDSTONE--aa. Lit sh and tr claystone aa.  
570-75 SANDSTONE and SHALE--aa. Lit claystone aa.  
575-80 SANDSTONE--wh; grains m, w sorted, loose, srd, spher;  
clear qtz. Some sh aa.  
580-95 SANDSTONE--aa; some iron cement. Some claystone and  
lit sh aa.  
595-600 SANDSTONE--aa. Lit claystone and sh aa.  
600-685 SANDSTONE--aa. Tr sh and claystone aa.