

NORTH DAKOTA GEOLOGICAL SURVEY CIRCULAR NO. 177

Summary of the Caroline Hunt Trust Estate - Paul Ryberg #1
Well No. 772 - Permit No. 785
Burleigh County, North Dakota

by R. S. George
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Caroline Hunt Trust Estate, Paul Ryberg #1, Burleigh County, North Dakota. Location: C NW NW Sec. 23-140N-79NW. Elevation: 2007' KB.

The Caroline Hunt Trust Estate, Paul Ryberg #1 was spudded December 11, 1954, drilled to a total depth of 7230', found dry and plugged January 13, 1955.

Logging Record:

Gamma ray-neutron, E. S. and microlog by Schlumberger, January 12, 1955.

Casing Record:

10 3/4" H-40 surface casing set at 330' with 300 sacks cement.

Plugging Record:

Plug #6 Ground level 5 sacks cement
Plug #5 280- 330 25 sacks cement
Plug #4 2952-2995 15 sacks cement
Plug #3 3647-3690 15 sacks cement
Plug #2 5428-5485 20 sacks cement
Plug #1 6303-6360 20 sacks cement

Formation tops were determined from samples and logs. Doubtful or obscure formations were not picked. Color names and identifying numbers were taken from the 1948 Rock-Color chart distributed by the National Research Council, Washington, D.C.

FORMATION TOPS

Cretaceous System	
Pierre formation	787
Niobrara formation	1690
Greenhorn formation	2370
Basal Cretaceous sandstones	2995
Jurassic System	3240
Piper formation	3620
Triassic System	
Spearfish formation	3968
Mississippian System	
Amsden formation	4182
Charles formation	4270
Mission Canyon formation	4590
Lodgepole formation	4830
Englewood formation	5355
Devonian System	
Lyleton formation	5399

Nisku formation	5455
Duperow formation	5506
Souris River formation	5692
Ashern formation	5881
Silurian System	
Interlake group	5926
Ordovician System	
Stony Mountain formation	
	Upper 6175
	Lower 6265
Red River formation	6362
Winnipeg shale	7010
Winnipeg sand	7181

330-360	Siltstone, medium gray, micaceous, lignite.
360-390	Siltstone, medium gray to light gray, silty, micaceous.
390-420	Siltstone lignite, medium gray, some sand grains.
420-450	Siltstone lignite, medium gray, silty, quartz grains slightly micaceous and calcitic.
450-480	Siltstone, medium gray, medium light gray, some lignite, micaceous quartz grains.
480-510	Samples missing.
510-540	Lignite, shale, medium gray, medium light gray, slightly variegated, iron stains, glauconitic quartz grains, some pyrite, slightly calcitic.
540-570	Shale, silty, medium gray, medium light gray, iron stains, quartz grains, pyrite, lignite.
570-600	Shale, medium light gray to red brown, micaceous, iron stains, quartz grains, some lignite.
600-630	Shale, silty, light gray and pale red, fine micaceous, slightly calcitic.
630-660	Shale, medium light gray to pale red, micaceous, slightly calcitic.
660-690	Shale, silty, medium light gray to pale red, micaceous, quartz grains.
690-720	Shale, medium light gray to pale red, micaceous, slightly calcitic, glauconite?.
720-750	Shale, silty clay, silty, medium light gray to pale red, micaceous, poorly cemented.
750-780	Same as above.
780-810	Same as above, more quartz and glauconite, conspicuous amount; larger silt particles.
810-840	Silty shale, medium gray, micaceous, some iron stains.
840-870	Shale, medium gray to medium dark gray.
870-900	Shale, medium gray to medium dark gray, some fossil fragments, micaceous.
900-930	Shale, medium light gray, slightly silty.
930-960	Shale, medium light gray, slightly calcareous, micaceous, soft.
960-1020	Same as above.
1020-1050	Same as above, few white specks?
1050-1080	Shale, light gray, finely disseminated mica, more fissile.
1080-1110	Shale, medium light gray with a trace of buff dense dolomitic limestone, some carbonaceous material.

1110-1140 Shale, light gray with trace of buff dolomite.
 1140-1170 Shale, limestone, medium light gray shale and buff limestone.
 1170-1200 Medium light gray shale, finely micaceous, some calcareous spots of lighter color.
 1200-1230 Shale, medium light gray, micaceous, some light brown calcareous streaks.
 1230-1260 Same as above.
 1260-1290 Shale, medium light gray, micaceous, lignite specks and pale brown limestone streaks.
 1290-1320 Same as above, some silty portions.
 1320-1350 Shale medium light gray, micaceous with calcareous mottled streaks.
 1350-1380 Same as above, more consolidated with better fissility.
 1380-1410 Same as above, specks of hematite, very slightly calcareous.
 1410-1440 Medium gray, shale, calcareous specks.
 1440-1470 Medium gray shale, with calcite or limestone fillings, mica and fine pyrite.
 1470-1500 Shale, medium light gray, fine mica specks some tan pale yellow brown, trace of lignite.
 1500-1530 Shale, medium light gray mottled, clayey gummy calcareous bentonitic and micaceous.
 1530-1560 Shale, medium light gray, mottled, gummy calcareous bentonite, micaceous.
 1560-1590 Shale, medium light gray, mottled, concorded fractures, calcareous white bentonitic micaceous, trace pyrite.
 1590-1620 Clay shale, medium gray, mottled, calcareous, bentonitic, pyrite specks some carbonaceous portions.
 1620-1650 Shale, mottled, varicolored shades of gray and brown, bentonite mica pyrite and hematite.
 1650-1680 Shale, medium dark gray, white specks mica and bentonite, probably carbonaceous, some portions calcareous.
 1680-1710 Same as above, much less carbonate.
 1710-1740 Same as above, no calcareous portions.
 1740-1770 Same as above, with trace pyrite.
 1770-1800 Shale, medium gray, conspicuous absence of white material, micaceous, calcareous, trace glauconite and pyrite.
 1800-1830 Shale, medium gray, medium light gray, platy, pyrite balls, calcareous probably bentonitic.
 1830-1860 Shale, medium dark gray, bentonitic, carbonaceous with pyrite and mica.
 1860-1890 Shale, as above with fibrous calcite.
 1890-1920 Shale, dark gray-medium gray with fine specks of calcite, pyrite, chunky carbonaceous.
 1920-1950 Shale, medium dark gray-medium light gray, silty slightly calcareous, micaceous mottled, some carbonaceous shale and light gray micaceous bentonite.
 1950-1980 Shale, medium dark gray-medium light gray, chunky mottled calcareous with pyrite, bentonite and mica.
 1980-2010 Shale, medium light gray, mottled calcareous with pyrite, white micaceous, bentonite (some dark gray shale).
 2010-2040 Shale as above.
 2040-2070 Shale, as above, with some fibrous calcite, marcasite, medium dark gray shale are fissile and non-calcareous.

2070-2100 Shale, medium light gray, trace of mica and pyrite with some dark brown carbonaceous shale and brownish gray siltstone.

2100-2130 Shale, as above and light brownish gray siltstone (buff)?

2130-2160 Shale, medium light and medium dark gray with white bentonite, calcite pyrite and fine mica.

2160-2190 No samples.

2190-2220 Shale, as above.

2220-2250 Shale, medium light gray, biotite, some white bentonitic flakes of mica some limey mottled portions.

2250-2280 Shale, as above and grayish brown siltstone, some carbonaceous remains.

2280-2310 Shale, as above.

2310-2340 Shale, as above, with less impurities, some minute mica flakes.

2340-2370 Shale, as above, with fibrous calcite, bentonite, under strong light these shales have the luster of nicolite, chunky-fissile.

2370-2400 Shale as above.

2400-2420 Shale, medium light gray, silty, calcareous with pyrite, fibrous calcite, many white specks in shale, fragments of white-buff sugary limestone.

2420-2440 Shale, medium light gray-medium gray, abundant white specks, calcite and pyrite, small round grayish brown chert, trace pale sugary limestone.

2440-2460 Shale as above.

2460-2480 Shale, medium dark gray-medium gray, calcareous, abundant fibrous calcite white specks in shale matrix, trace pyrite.

2480-2500 Shale as above.

2500-2520 Shale as above.

2520-2540 Shale as above.

2540-2560 Shale as above, white specks gone, plenty of calcite.

2560-2580 Shale, medium dark gray, fissile with mica in matrix, some white bentonite and fibrous calcite.

2580-2600 Shale as above.

2600-2620 Shale as above.

2620-2640 Shale as above, iridescent fossil fragments.

2640-2660 Shale, medium dark gray, fissile with mica in matrix with calcite, bentonite iridescence? Trace glauconite.

2660-2680 Shale, medium dark gray, fissile beds, micaceous, some calcite and trace pyrite.

2680-2700 Shale, medium dark gray, fissile beds, micaceous, some calcite and trace pyrite.

2700-2720 Shale, medium dark gray, fissile beds, micaceous, some calcite and trace of pyrite, trace glauconite.

2720-2740 Shale, medium dark gray fissile beds, micaceous, some calcite and trace of pyrite, no glauconite.

2740-2760 Shale, as above, medium dark gray-medium gray with fine mica, sugary calcite, glauconite.

2760-2780 Shale, varicolor from medium dark to medium gray, calcite.

2780-2800 Shale, as above, much soft micaceous bentonite.

2800-2820 Shale, as above.

2820-2840 Shale, medium gray fine micaceous, fibrous calcite, trace bentonite and pyrite.

2840-2860 Shale, as above.

2860-2880 Shale, as above.

2880-2900 Shale, medium gray to medium dark gray, micaceous, some calcite, slightly calcareous.

2900-2920 Shale, as above with pyrite, abundant bentonite (white micaceous) some glauconite and calcite.

2920-2940 Shale, as above, less bentonite and pyrite.

2940-2960 Shale, as above, some silty streaks pyrite and white bentonite.

2960-2980 Shale, as above, trace pale pink dolomite.

2980-2990 Shale, as above.

2990-3000 Limestone, impure, pinkish gray sugary and shale as above a few milky quartz grains unweathered, fragmental.

3000-3010 Shale and impure limestone, medium dark gray shale (micaceous), limestone impure light greenish gray to light brown with pyrite marcasite and some quartz grains (fragmental).

3010-3020 Shale, medium dark gray, some sugary limestone, pyrite and silty shale fine grained getting harder and fissile, some calcareous portions.

3020-3030 Shale, as above.

3030-3040 Shale, as above, less calcite and sugary, limestone.

3040-3050 Shale, medium gray, trace sugary calcite, shale is fine grained, fissile, chippy with pyrite, some well rounded weathered sand grains.

3050-3060 Shale, as above, plus some silty soft pale red shale.

3060-3070 Shales as above, some fibrous calcite, still some sand grains.

3070-3080 Shale as above (no red shale).

3080-3090 Shale as above.

3090-3100 Shale as above, orange pink sand grains (feldspathic) and white silty limestone.

3100-3110 Shales as above.

3110-3120 Shales as above, more red shale, sand grains and pyrite.

3120-3130 Shale, medium gray, fine grained, thin, mica, some calcite and glauconite also brick red silty shale with white impurities and few small sand grains of various colors, white, clear, milky, pink.

3130-3140 Shale, medium gray to light gray, few milky white sand grains, some sugary calcite and red silty shale and bentonite.

3140-3150 Shale, medium gray, clear sand grains, pyrite and white sugary calcite.

3150-3160 As above.

3160-3170 As above, more sand grains.

3170-3180 Shale, as above, with grayish orange pink impure sandstone with calcareous cement, fine grained, slightly micaceous.

3180-3190 Shale as above, larger sand grains.

3190-3200 Shale, as above, more sandstone grains, pink-clear quartz, some pyrite chunks, shale and sand, medium dark-light gray, calcite and pyrite.

3210-3220 Shale, as above, chunks of pyrite, trace bentonite and fossil fragments.

3220-3230 Shale, as above, still some fine sandstone.

3230-3240 Shale, as above.

3240-3250 No samples.

3250-3260 Shale as above, pyritic sandstone chunks.

3260-3270 Shale and sandstone, as above, pink crystals of calcite, pyrite and micaceous bentonite.

3270-3280 Shale and sandstone, angular-subround some pink orange sandstone with calcareous cement, trace pale red shale or moderate red brown, white micaceous bentonite.

3280-3290 Shale, medium gray to light gray and sandstone.

3290-3300 As above, medium to coarse grained, angular to subround sandstone grains bentonite and pink limestone, fine grained.

3300-3310 Shale, as above, some light brown siltstone, with calcareous cement.

3320-3330 Shale, as above, some yellowish gray fine grained limestone.

3330-3340 Shale, as above, abundant grayish orange pink siltstone with very calcareous matrix, porous, fine to medium grained sand grains bentonite.

3340-3350 As above.

3350-3360 Shales medium light gray, micaceous, pyrite, few coarse sand grains of various colors, (pink, white, clear) some siltstone as above. Shale is dark gray when wet.

3360-3370 As above, lumpy.

3370-3380 As above and pale red silty shale, some grayish orange pink dolomite, white gypsum and few sand grains (sluff).

3380-3390 As above, and pyrite.

3390-3400 As above, medium light gray to dark gray, more medium grained sand and glauconite, pale red silty shale.

3400-3410 Shale, medium gray-light gray, gypsum, clear quartz grains, round to subangular, trace glauconite, trace pale red silty micaceous shale.

3410-3420 Shale, light gray-medium gray, (silty light gray) and pale red traces, few round quartz grains, some pyrite which forms matrix around quartz grains.

3420-3430 As above.

3430-3440 As above.

3440-3450 As above, more light gray shale (soft), trace of very light gray fine grained limestone.

3450-3460 Shale, medium dark gray, pale red, light gray, fossil fragments in dark shale, very silty, few sand grains, some fine grained sandstone.

3460-3470 Shale, as above, plus light olive gray dolomite, fine grained, shale, partly calcareous with plenty of calcite in matrix, pyrite and mica.

3470-3480 Shale, as above, micaceous.

3480-3490 Shale, varicolor micaceous as above, few small sand grains.

3490-3500 As above, less pale red shale, more light gray shale, some fine grained pale red sandstone.

3500-3510 Shale, as above, also pale red crystals, limestone and pale red fine grained sandstone with calcareous cement, pyrite, marcasite and varicolor sand grains, shale silty to clay size.

3510-3520 Shale, as above, silty calcareous thin, few iron stains, organic remains show brown spots on these shales, corals.

3520-3530 Shale and sandstone, as above, pyrite, calcite and sand grains, calcareous in spots.

3530-3540 Shale, medium gray-light gray, white calcite, abundant plant remains and fossil fragments, silty, sand grains, angular to subround.

3540-3550 Shale, as above, pyrite, calcite and gray crystalline limestone, soft.

3550-3560 Shale, as above, soft, some pale red silty shale (sluff).

3560-3570 Shale, medium light gray-light gray and greenish gray, some pale reddish brown silty pyritic shale, calcite, (shale, splintery).

3570-3580 Shale, as above, mostly greenish gray, calcareous.

3580-3590 Shale as above, mostly greenish gray, calcareous, with gypsum.

3590-3600 Shale, as above, mostly greenish gray, calcareous.

3600-3610 Shale, greenish gray and gray orange, silty, gypsum.

3610-3620 Limestone, very light gray-white and pinkish gray, dense to crystalline, some tiny fractures filled with calcite.

3620-3630 Limestone, white, trace of light olive gray shale, chalky limestone.

3630-3640 No samples.

3640-3650 Limestone, white to very light gray, chalky, some impurities.

3650-3660 As above, chalky.

3660-3670 Limestone, white to very pale orange, light olive gray shale, calcareous.

3670-3680 Limestone, pinkish gray dolomite.

3680-3690 Limestone as above, no dolomite.

3690-3700 Limestone, white, chalky, calcite fillings, dense-crystalline.

3700-3710 Limestone, white very light gray, as above.

3710-3720 Limestone, white, very light gray and grayish pink, dense, chalky.

3720-3730 Limestone, light gray to white.

3730-3740 Limestone, as above and moderate brown shale (small amount).

3740-3750 Limestone, as above, chalky, shale as above and chert fragments.

3750-3760 Limestone, as above, more light brown silty calcareous shale, trace greenish gray shale.

3760-3770 Limestone and shale as above, gypsum crystals and chert fragments, calcite crystals.

3770-3780 Limestone and shale, as above, more light brown shale, gypsum and calcite crystals.

3780-3790 Limestone and shale, as above, some anhydritic limestone.

3790-3800 Shale, greenish gray, silty.

3800-3810 Shale, greenish gray, silty, more light brown shale and gypsum or anhydrite, trace milky chert and limestone sluff.

3810-3820 Shale, as above.

3820-3830 Shale, varicolor, much as above, with pale red brown shale, crystalline limestone and gypsum.

3830-3840 Shale, varicolor, greenish gray - pale red brown, gypsum and plenty chert.

3840-3850 Shale, as above, much pale red brown, much gypsum, some pale yellowish brown limestone (dense) and pale red brown calcareous siltstone.

3850-3860 Shale, pale red brown, white gypsum, fossil castings.

3860-3870 Shale, as above, 90 percent.

3870-3880 Shale, as above, 40 percent, some pinkish gray arenaceous limestone or dolomite, medium gray shale, gypsum.

3880-3890 Shale, medium dark gray, carbonaceous, lots of gypsum and chert, still stringers of very light gray-white limestone (may be sluff) conodonts.

3890-3900 Shale, varicolor, pale reddish brown gypsiferous, 25 percent, silk some medium dark gray shale and impure sugary, very pale red dolomite, gypsum.

3900-3910 Shale, moderate reddish brown, silty, gypsum and anhydritic limestone.

3910-3920 Shale, as above.

3920-3930 Shale, varicolor, dark gray-moderate reddish brown, clay and carbonaceous.

3930-3940 Shale, varicolor as above, less dark gray shale, gypsum and pinkish gray sugary dolomite.

3940-3950 Shale, moderate reddish brown with pale red streaks and very dense light gray limestone and 5-10 percent gypsum.

3950-3960 Shale, as above, 25 percent white gypsum or anhydrite, also some pale red dolomite.

3960-3970 Shale, as above, less gypsum.

3970-3980 Shale, as above, some medium light gray shale (calcareous), some gypsum.

3980-3990 Shale, varicolor, much dark gray carbonaceous shale, some medium light gray impure dolomite.

3990-4000 Shale, moderate reddish brown, light brown or orange pink, calcareous, silty, some very light gray anhydrite, some dark gray calcareous shale.

4000-4010 Shale, as above, with anhydrite and gypsum crystals, slightly calcareous, gypsum.

4010-4020 Shale, as above, also pale yellowish brown dolomite with few oolites.

4020-4030 As above, with limestone, dense, light gray.

4030-4040 Shale, moderate reddish brown, 5 percent, the remainder light gray and hard dark gray shale with pyrite trace sandstone, fine grain with pyrite and glauconite, light gray hue. Conspicuous absence of gypsum and anhydrite with much less limestone and dolomite.

4040-4050 Shale, as above, with white and gray spotted shaly limestone.

4050-4060 As above, some medium dark gray thin chippy shale, trace glauconite.

4060-4070 Limestone, white to very light gray, shale as above, (crystalline-dense limestone).

4070-4080 Shale and limestone as above, varicolor, moderate reddish brown and medium gray shale, some white (stained red) anhydrite.

4080-4090 Shale, varicolored, with limestone and calcite, buff-white, crystalline-dense.

4090-4100 Shale and limestone, as above, much increased amount of dark gray to olive black carbonaceous and calcareous shale, trace pyrite.

4100-4110 Shale, moderate reddish brown, slightly calcareous, silty, some chunky medium dark gray shale, few sand grains.

4110-4120 Shale, moderate reddish brown, dusky yellow, greenish gray, some angular quartz grains (poor samples).

4120-4130 Shale, as above.

4130-4140 Shale, as above, lots of carbonaceous olive black shale, some white crystalline limestone, well rounded clear-pink quartz grains and pyrite (poor samples).

4140-4150 Shale, as above, (poor samples).

4150-4160 Shale, as above, plant fiber replaced by marcasite.

4160-4170 As above, still plenty sand (poor samples).

4170-4180 Shale, varicolor, black-pale red predominantly, some poorly consolidated sandstone with calcareous cement, quartz grains, medium large, pink to clear, round-subangular, pyrite, trace pale brown chert, (some grayish orange pink dense dolomite).

4180-4190 Shale and sandstone as above, pale red sandy soft shale dominant - wet samples. Shale, medium dark gray, moderate reddish brown, dark reddish brown, calcareous, plenty of cloudy-clear sand grains, pyrite, trace anhydrite, many chert fragments (pale brown).

4190-4200 As above.

4200-4210 Limestone, soft white-very light grayish brown, chalky, shale, medium dark gray, resinous with marcasite, sandstone, light brown, fine grained calcareous, moderate reddish brown shale and few well rounded sand grains.

4210-4220 As above, some anhydrite.

4220-4230 Shale, moderate reddish brown, calcareous also pale red, silty, some light gray-medium dark gray shale, white crystalline anhydritic limestone and sand grains.

4230-4240 As above.

4240-4250 Shale, as above, mostly medium gray, some light gray "oolitic" limestone.

4250-4260 As above.

4260-4270 Limestone, very light pinkish gray, tight, dense.

4270-4280 Limestone, very light pinkish gray, dense, crystalline or fragmental, some of above shale.

4280-4290 Limestone, pinkish gray, pyrite.

4290-4300 Limestone, as above, plenty of anhydrite.

4300-4310 Limestone, as above, plus anhydritic limestone, pinkish gray-very light gray.

4310-4320 Limestone, as above, some medium light gray shale.

4320-4330 Shale, medium gray with fossil fragments in shale, also lime and anhydritic lime as above.

4330-4340 Shale, and limestone, as above, calcareous shale.

4350-4360 Shale, 85 percent medium dark gray-light gray, varicolor, silty, some white gypsum crystals also light gray-light brown crystalline limestone.

4360-4370 As above, varicolor, some moderate brown shale.

4370-4380 As above, shale and limestone, more gypsum crystals, trace anhydrite (sluff).

4380-4390 Limestone, very light gray, impure crystalline fragments (trace shale).

4390-4400 Limestone, as above, becoming shaly and pyritic (some of above).

4400-4410 Limestone and dolomite, very light gray-brownish, gray orange pink dolomite limestone is fragmental, medium-crystalline, few ostracods in shale.

4410-4420 Shale and limestone, much as above, light olive gray limestone, shale, varicolor with some anhydritic limestone.

4420-4430 Shale and limestone, gray red shale and medium dark gray-medium light gray shale, crystalline limestone, very light brownish gray, light gray anhydritic lime.

4430-4440 As above, some anhydrite.

4440-4450 Dolomite, shale, and limestone, more grayish red shale (resinous soft)(less limestone) much fine grained, sugary, very light gray dolomite (shale as above).

4450-4460 Limestone, white-light gray with light gray anhydritic limestone, trace pale red chunky shale (5%) some anhydrite, abundant medium dark gray fissile shale.

4460-4470 Limestone, 80-90 percent, white-light gray impure, fine crystalline to fragmental fossil molds, some of above.

4470-4480 Limestone, as above, white (pyrite).
 4480-4490 Shale, varicolor and light gray anhydrite, trace of lime.
 4490-4510 As above.
 4510-4520 Limestone and anhydritic lime, pinkish gray, shale as above.
 4520-4530 Shale, and anhydrite, dark gray-pale red and yellowish brown (as above), crinoid stem fossil.
 4530-4540 Shale, medium gray-medium light gray, and pale red plus anhydrite, dense crystalline.
 4540-4550 Shale, as above, some pyrite and yellowish gray dense limestone.
 4550-4560 Shale, as above.
 4560-4570 Dolomitic limestone, yellowish gray, fine crystalline to fine granular, shale, as above.
 4570-4580 Anhydrite, 50 percent, white-light gray translucent few shale as above plus limestone, small stain ?? in yellowish gray limestone.
 4580-4590 Limestone, 45-50 percent, poor oolitic limestone, coarse, light-gray fragmental, some shale and anhydrite, as above.
 4590-4600 Limestone, pinkish gray, good intergranular porosity, coarse, crystalline-oolitic.
 4600-4610 As above.
 4610-4620 As above, coarse crystalline-granular, few oolites.
 4620-4630 As above, oolitic small vugs, filled with anhydrite, fair porosity (intergranular).
 4630-4640 Limestone, as above, no visible porosity, all filled with anhydrite.
 4640-4650 Limestone, yellowish gray, fine granular, tight, trace fossil fragments.
 4650-4670 As above.
 4670-4680 Limestone, as in 4630-4340, some yellowish gray chert.
 4680-4700 Limestone, as above, some medium light gray anhydrite.
 4700-4710 Limestone, light gray anhydritic (some of above) fine grained, tight, some anhydrite.
 4710-4720 Light gray anhydrite and lime as above.
 4720-4730 Anhydrite and limestone as above.
 4730-4740 Limestone, pinkish gray, fine granular, porous to dense, some anhydrite.
 4740-4750 Limestone, as above, few poor oolites?
 4750-4760 Limestone, as above, good intergranular porosity, fine granular-coarse oolitic.
 4760-4770 Limestone, as above, many oolites.
 4770-4780 Limestone, pinkish gray-white oolitic limestone, good intergranular porosity small stain, good cut and fluorescence.
 4780-4790 Limestone, as above, fewer oolites in white limestone, small stain, good cut and fluorescence.
 4790-4800 Limestone, as above, less porosity - none visible.
 4800-4810 Limestone, as above, trace of shale and gummy resinous residue? small stain?
 4810-4820 Limestone, as above, partly oolitic - trace of anhydrite?
 4820-4830 Limestone, some of above, the remainder, medium gray shale and limestone, very argillaceous, fine grained, light gray to white, soft chalky.
 4830-4840 Limestone, light gray, slightly argillaceous, fine crystalline-fragmental, tight, some clear quartz grains.

4340-4850 Shale, light gray shale, limestone, coarse crystalline argillaceous, or fine sandy, white-light gray, few corals and a fish tooth.

4850-4860 Limestone, as above, fine arenaceous, some shale as above.

4860-4870 Shale and limestone, as above, pyrite, some medium dark gray shale, glauconite, fossil molds and fragments? Few specks light reddish brown shale?

4870-4880 Shale and limestone, as above.

4880-4890 As above, including fossil fragments.

4890-4900 Limestone, light gray, hard, crystalline, few oolites and pisolites, some light gray slightly calcareous shale? Pyrite.

4900-4910 Limestone, as above, coarse crystalline-fragments, hard resinous, gummy residue?

4910-4920 Limestone, as above, plus abundant light gray fine argillaceous limestone, residue as above, organic? (no cut).

4920-4930 Limestone, and shale as above, tight.

4930-4940 Limestone, slightly argillaceous (as above), trace white dense dolomite.

4940-4950 As above.

4950-4960 Limestone, as above - interbedded with argillaceous material, gray shale and pale reddish brown shale.

4960-4970 Limestone and shale as above.

4970-4980 Limestone as above (argillaceous).

4980-4990 Limestone, as above, few oolites, less shale.

4990-5000 Limestone, as above.

5000-5090 Limestone, as above, light gray (gummy residue in 40-50' interval), gray crystalline, argillaceous, limestone.

5090-5100 Limestone, as above, and shales, some very argillaceous lime.

5100-5110 Shale, medium dark gray and light gray, some of above, also fine grained buff calcareous glauconitic sandstone?

5110-5120 Limestone and shale, as before, light gray-very light gray limestone, argillaceous and crystalline to fragmental texture. Few small stains on gray argillaceous limestone, it looks in some cases natural - good cut.

5120-5130 Limestone and shale, as above, silty - argillaceous.

5130-5150 Limestone and shale as above, few fossil fragments.

5150-5160 Limestone, much as above, becoming more dense, smaller crystals.

5160-5170 Limestone, as above (95 percent limestone) many fossil fragments.

5170-5180 Limestone, light gray-very light gray, argillaceous-crystalline, plenty fossils.

5180-5190 Limestone, light gray fine crystalline, abundant light gray chert and very light gray arenaceous, argillaceous limestone.

5190-5200 Limestone, as above and chert, fossil fragments light gray and yellowish gray, dense limestone.

5200-5220 As above, some crystals of calcite, lots of chert.

5220-5230 Shale and limestone (50-50) shale, greenish gray medium gray, pyrite calcite crystals and fossil fragments (chert).

5230-5240 Limestone, light gray, dense, fine crystalline, sublithographic, very hard, cherty - some shale and limestone as above.

5240-5250 As above.

5250-5260 As above, some gummy material.

5260-5270 As above, brown residue?

5270-5280 As above, some light gray chert.

5280-5290 Limestone, and chert, as above, (some light gray-dark gray shale, sluff).

5290-5330 Limestone and chert, as above.

5330-5340 Limestone and chert as above, plus shale, light gray-moderate reddish brown (ostracods) plus medium dark gray, some light brown argillaceous limestone.

5340-5350 As above, more dark gray shale, much less lime and chert.

5350-5360 Limestone, light gray, medium-fine grained, porous, few shale as above, trace soft, light gray argillaceous limestone (probably sluff).

5360-5370 Limestone, light gray, medium-fine grain, porous, fine sugary, trace brown organic residue, no cut? (impure).

5370-5390 As above.

5390-5400 As above, somewhat tighter, less sugary.

5400-5410 75 percent limestone, as above plus medium light gray, fine grained, sucrosic dolomitic limestone.

5410-5420 Limestone and dolomitic limestone, (medium gray shale), limestone is white very light gray, medium light gray, sugary, some medium crystalline limestone.

5420-5430 As above, more white limestone.

5430-5440 Limestone, white-very light gray, fine arenaceous sugary limestone, some very arenaceous limestone, slight stain, good cut? Good porosity, few well rounded clear quartz grains (medium) some pyrite inclusions.

5440-5450 As above.

5450-5460 Limestone and shale, lime as above, medium gray clay shale with many impurities (soft) plenty of pyrite and a few well rounded quartz grains, some moderate reddish brown shale.

5460-5470 Dolomite, very pale orange, sugary, medium gray, crystalline, some medium gray shales.

5470-5480 Dolomitic limestone, very pale orange, as above, (trace shale).

5480-5490 As above, good porosity.

5490-5500 Much of above, harder, fine crystalline - dense, more limestone, white very light gray.

5500-5510 Dolomite, pinkish gray-pale orange, crystalline, medium-fine grained, sugary.

5510-5520 Dolomite and dolomitic limestone, becoming tighter, pinkish gray, crystalline to microsucrosic, some dense, also light gray dolomite (sugary).

5520-5530 As above, 5500-5510.

5530-5540 As above, few small vugs.

5540-5550 Dolomite, very light gray-pinkish gray, fine crystalline, sugary.

5550-5560 Dolomite, very light gray, few streaks, light gray, clay, shale.

5560-5570 Dolomite, very light gray-pinkish gray, dense-crystalline, sucrosic some impurities, electro log shows shale streaks?

5570-5580 Dolomite, light gray-brownish, argillaceous - fine crystalline, sugary, some medium light gray shale.

5580-5590 Dolomite, as above, plus limestone, dense, pinkish gray.

5590-5600 Dolomite and shale, dolomite as above, shale, medium light gray, impure, soft-hard, calcareous, silty, few speaks pyrite.

5600-5610 Dolomite, medium light gray-very light gray, fine crystalline-dense, in essence varicolor, some shale as above - (good light brownish gray dolomite crystals in light gray matrix).

5610-5630 As above.

5630-5640 Limestone, light gray, mottled, dense, hard, (some of above).

5640-5650 Limestone, very light gray, dense, tight, few light gray chert fragments.

5650-5660 Limestone, as above, few shale fragments, no chert, some small fossil fragments.

5660-5670 Limestone, as above, dense, fragmental, fossiliferous, (small oolites?? Ostracods forams).

5670-5680 Limestone as above, fewer fossils, still argillaceous limestone.

5680-5690 Limestone, pinkish gray-very light gray, mostly pink, dense-fine, fragmental or crystalline, tiny dolomite crystals in matrix. The remainder very light gray, argillaceous limestone.

5690-5700 Limestone, arenaceous, very light gray, argillaceous, some anhydrite, white to very light gray, abundant microfossils (sluff?) few good fossil shell fragments, some medium gray, fissile shale.

5700-5710 Limestone, very light gray, microsucrosic, argillaceous-fine silty, shale as above.

5710-5730 As above.

5730-5740 As above, few fossil fragments.

5740-5750 Dolomite - dolomitic limestone, becoming more crystalline, fine-microsucrosic, (as above).

5750-5760 Limestone, much as above, some light gray, very argillaceous mottled limestone and shale of various shades of gray, some anhydrite crystals, some pyrite, fair-good porosity.

5760-5770 Limestone, light gray-very light gray, porous, silty, argillaceous, trace shale.

5770-5780 Limestone, as above, some medium dark gray fissile shale.

5790-5800 Limestone, as above, some soft brittle dolomite with pale brown hue, crystalline-very fine grain.

5800-5810 Limestone, very light gray-pinkish gray, dense with few crystals and fossils, much of above.

5810-5820 Limestone, as above, some varicolor shale, including light gray clay shale.

5820-5830 Limestone, very light gray-white with brownish hue, fine, silty, argillaceous.

5830-5840 Limestone, light gray-very light gray, dense chippy, micro-crystalline few moderate reddish orange quartz fragments (much of above).

5840-5850 Limestone, light gray, dense, hard, probably siliceous or silty plus much of above.

5850-5860 As above.

5860-5870 Limestone, as above, light gray-yellowish gray.

5870-5880 Limestone, some as above, mostly very light gray, earthy, sandy limestone, much varicolored shale, calcareous, light gray-moderate reddish brown.

5880-5890 Dolomite, very light gray-pinkish gray, silty, sandy, earthy.

5890-5900 Limestone and dolomite, as above.

5900-5910 Limestone and dolomite, as above, some varicolored shale, fine grain, few small well preserved brachiopods.

5910-5920 As above.

5920-5930 Dolomite, white-very light gray and pinkish gray, micro-crystalline and sucrosic, some small vugs, fair porosity, (much of above).

5930-5940 Dolomite as above, (95 percent).

5940-5950 Dolomite, as above, some pyrite.

5950-5960 Dolomite, as above.

5960-5970 Dolomite, as above, some white-very light pinkish gray dolomite, dense, tight.

5970-5980 Dolomite, as above, crystalline, sugary, dense, some well formed crystals, trace brownish gray shale.

5980-6000 Dolomite as above.

6010-6020 Dolomite, as above, tight.

6020-6030 Dolomite, color as above, dense-very fine microcrystalline, some excellent anhydrite crystals, translucent to transparent.

6030-6040 Dolomite, as before.

6040-6050 Dolomite, pinkish gray, dense, hard, conchoidal fracture, tight, microcrystalline - sublithographic.

6050-6060 Dolomite, light gray-white, dense as above, few fine vugs and crystals, some medium gray shale?

6060-6070 Dolomite, as above, plus shale, some anhydrite crystals and pyrite.

6070-6080 Dolomite, as above, 50-60 percent, dense.

6080-6090 No samples.

6090-6100 Dolomite as above and shale.

6100-6110 Dolomite, as above, trace sand grains.

6110-6120 Dolomite, light gray-white and pinkish gray, microsugary, slightly impure and argillaceous, shale, medium gray, impure, sandy, fissile, some well rounded, clear quartz grains in a matrix of pyrite.

6120-6130 Dolomite and limestone, white, chalky, fine sugary, fair porosity.

6130-6140 Dolomite, gray orange pink, dense, limestone, light gray, dense, slightly dolomitic.

6140-6150 As above, 6110-6120.

6150-6160 Dolomite, some gray orange pink, remainder as in 6320-6330, some varicolor shale, few dolomite crystals, brown stain, no cut.

6160-6170 Dolomite, white, chalky, few vugs, fine grain.

6170-6180 Dolomite, white, very light gray, fine crystalline - chalky, some fine grain argillaceous limestone, medium gray, few shales, medium gray, fine grain.

6180-6190 Limestone, light gray, dense to fine grain, argillaceous.

6190-6200 Limestone, as before, few well rounded sand grains, medium grain.

6200-6210 Limestone, medium gray, argillaceous, fine grain, dense, some medium gray shale.

6210-6220 Limestone, as above.

6220-6230 Dolomite, yellowish gray, argillaceous, fine sugary, crystalline.

6230-6250 Dolomite, as above.

6250-6260 Limestone, light gray-yellowish gray, argillaceous, fine sugary to dense.

6260-6270 Limestone, light gray, mottled, argillaceous, fine crystalline, dense.

6270-6280 Limestone, light gray, much carbonaceous material.

6280-6290 Limestone, as above, pyrite, few fossils (Bryozoans?).

6290-6310 Limestone, as above.

6310-6320 Limestone, light gray, mottled, crystalline to dense, argillaceous, some light gray shale.

6320-6330 Shale, medium light gray, fine grain, some of above.

6330-6340 Shale, medium gray, fine grained, (much sluff).

6340-6350 Shale and limestone as above.

6350-6360 Dolomitic limestone, very pale orange, microcrystalline-dense, tight.

6360-6370 Dolomitic limestone, as above.

6370-6380 Limestone, very light gray, fine grain, tight (much of above).

6380-6390 Limestone, light gray-very light gray, fine grain-dense, tight.

6390-6400 Limestone, as above, slightly yellowish, argillaceous, brachiopods.

6400-6410 Limestone, light gray to pinkish gray, fine grain, crystalline, sucrosic, slightly argillaceous, some white anhydrite.

6410-6420 Limestone, as above, (crinoids).

6420-6430 Limestone, light gray-white-pinkish gray, fine grain, crystalline-fragmental, argillaceous partings, calcite crystals, few fossil fragments.

6430-6440 Limestone, as above, fine grain-dense, fragmental, pyrite, crinoids and other fossils, white anhydrite.

6440-6450 Limestone and shale, color as above, fine grain, crystalline limestone, fine silty, or argillaceous, shale, medium gray fossiliferous (some organic stain).

6450-6460 Limestone, white-very light gray and light gray, argillaceous, dense-fine crystalline, few vugs, some fine grain shale and anhydrite.

6460-6470 Dolomite and limestone, very light gray, fine grain, crystalline, argillaceous and porous.

6470-6490 Dolomite and limestone, porous.

6490-6500 Dolomite and limestone, porous, trace light yellowish gray chert.

6500-6510 Dolomite and limestone, chalky, some tight portions, some light gray limestone.

6510-6520 Limestone and dolomite? Crystalline, chalky, tight, sucrosic-argillaceous.

6520-6530 Limestone and dolomite, chert.

6530-6540 Dolomite, very fine grain, much as above.

6540-6550 Dolomite, as above, fine grain-dense, siliceous-argillaceous.

6550-6560 As above (trip sample) gray limestone, crinoids and pyrite, much dark shale.

6560-6570 As above.

6570-6580 As above, lost circulation material.

6580-6590 Limestone, light gray to very light gray, part dolomitic, sucrosic, fine grain, argillaceous or siliceous, pyrite.

6590-6600 Limestone, white-very light gray, fine grain, argillaceous.

6600-6610 Limestone, as above, fine grain - sugary, argillaceous.

6610-6620 Limestone, white (yellowish gray when wet) chalky.

6620-6640 Limestone, as above.

6640-6650 Limestone, as above, few small brachiopods.

6650-6660 Limestone, as above, some chert.

6660-6670 Limestone, as above, crystalline, dense, argillaceous.

6670-6680 Limestone, as above? medium dark gray shale? trip sample?

6680-6690 All of above, trip sample? varicolor shales.

6690-6700 Limestone, as above.

6700-6710 Limestone, as above, some light gray dense siliceous limestone.

6710-6720 Limestone, as, above, many fossil fragments in shale (sluff). Poor circulation.

6720-6730 Limestone, as before, fine crystalline, sugary, dense, soft, argillaceous.

6730-6740 Limestone, as above, pyrite.

6740-6790 Limestone, as above, few tiny dolomite crystals in matrix.

6790-6800 Limestone, as above, tighter, less argillaceous.

6800-6810 Limestone, dense, light gray, hard, much chert, argillaceous material, some very soft pinkish gray fine grain, chalky porous limestone, few medium dark gray shales and fossil fragments.

6810-6820 Limestone, light gray, dense, hard, siliceous, much chert.

6820-6830 Limestone, very light gray-pinkish gray, fine grain, dense, argillaceous, chalky, some chert, parts siliceous, others very soft porous, pinkish color.

6830-6840 As above, some light gray chert (sublithographic), siliceous dense limestone, shale and fossil fragments.

6840-6850 As above, some soft chalky limestone (as above).

6850-6860 As above, dense.

6860-6870 Limestone, light gray-very light gray, fine grain, argillaceous, soft chert?

6870-6880 Limestone, as above, trace chert.

6880-6890 Limestone, much as above, some crystalline, yellowish gray limestone, much fine grain, medium light gray shale - chert.

6890-6900 Limestone, very light gray, white, dense, fine grain - crystalline, argillaceous.

6900-6910 As above.

6900-6910 Limestone, as above, dense to crystalline, chalky argillaceous, few sand grains.

6920-6930 Limestones as above, trace of siliceous limestone, yellowish gray, dense, very hard, much shale, splintery, medium light gray.

6930-6940 Limestone, as above, chert and shale.

6940-6950 Limestone, as above.

6950-6960 Limestone, white-very light gray, fine crystalline - soft chalky, argillaceous.

6960-6970 Limestone as above, (some disseminated pyrite) sluff? Limestone, light gray, (much of above), mottled, fossil fragments, pyritic, some hard, some soft chalky argillaceous.

6980-6990 Limestone, as above.

6990-7000 Limestone, white-very light gray, very chalky argillaceous.

7000-7010 Limestone, as above.

7010-7020 Limestone, few gray shales (as above).

7020-7030 Limestone, as above, varicolor, small trace greenish gray shale.

7030-7040 Shale, greenish gray, fine grain, splintery, slightly calcareous.

7040-7050 Shale, as above, also medium dark gray shale.

7050-7060 Shale, as above.

7060-7100 Shale, greenish gray, splintery, fine grain, silky, some medium light gray fissile shale.

7100-7110 Shale, as above. In Hydrochloric acid, this shale disseminates into fine splinters.

7110-7120 Shale, as above.

7120-7160 Shale, as above (7160) few small quartz grains, medium size, clear.

7160-7170 Shale, as above, becoming slightly sandy.

7170-7180 Shale, as above, trace pyrite.

7180-7190 Shale, as above.

7190-7200 Sandstone, clear-white, fine grain, round to subangular, siliceous cement, friable, some larger loose grains.

7200-7210 Sandstone, as before, porous, much sluff.

7210-7220 Sandstone, slightly pale greenish hue.

7220-7230 Sandstone, very light gray-clear, argillaceous fine grain, friable.

7231 Total Depth.