

# NORTH DAKOTA GEOLOGICAL SURVEY CIRCULAR NO. 86

Summary of the Quintana Production Co., Chris Linnertz #1  
Ward County, North Dakota  
Well #126 Permit #142

By Carole Smith  
June, 1953

Quintana Production Company - Chris Linnertz No. 1, Ward County, North Dakota, Sec. 33, T. 156N., R. 83W. (660 feet from south line, 1980' from east line, Section 24.) Elevation: 1760' G.L.; 1772.3' K.B.

The Quintana Production Company Chris Linnertz No. 1 was spudded August 5, 1952 and 791.78 feet of 10 3/4" 40.50 lb. casing was set from the surface with 525 sacks. The well was plugged October 27, 1952 and abandoned as a dry hole, Total depth: 8938 feet.

## Tests:

DST: Johnson Tester 7 3/4" Rat Hole 5352-5382. 7" packer set 5358.24' Tail pipe tested 15 min. shut in 15 min. 740 feet, salty sulphur water 120 feet water cut mud 20 feet rat hole mud no gas, no oil, initial mud weight: 3000#; final mud and weight 2950#; initial flow: 125 lbs.; final flow: 375# shut in 2400 no pressure on top - good blow.

DST #2. 8062-8113 Strong blow at once, after 35 min. started decreasing, very weak at end. Open 1 hour shut in 20 min. Rec: 1800 feet muddy salt water, 5405 feet salt water. Initial flowing pressure: 2500#; final flowing pressure 3850#; shut in 3900#; Hydrostatic 4600#; pressure on tops: 17 min. - 13#, 28 min. - 17#, 34 min. - 19#, 37 min. - 15#, 40 min. - 18#, 44 min. - 11#, 47 min. - 11#, 53 min. - 5#, 1 hour - no blow.

## Cores:

2818-2823  
3344-3360  
4841-4844  
5352-5382

## FORMATION TOPS

Cretaceous System	
Pierre	1002
Niobrara	2255
Greenhorn	2722
Dakota	3345
Jurassic System	
Morrison	3720
Sundance	3910
Piper	4280
Triassic System	
Spearfish	4478
Mississippian System	

Charles	4755
Mission Canyon	5348
Lodgepole	5715
Englewood	6400
Devonian System	
Lyleton	6435
Nisku	6545
Duperow	6650
Souris River	7015
Dawson Bay	7312
Prairie Evaporites	7465
Winnipegosis	7675
Ashern	7800
Silurian System	
Interlake	7840
Ordovician Systems	
Upper Stony Mountain	8478
Lower Stony Mountain	8582
Red River	8658
Total depth	8938 feet

Formation tops were picked from electric log and samples; not all lithologic formation tops were picked. Colors were determined from the rock color chart.

0-42	Silt and gravel.
42-396	Poorly sorted sand and gravel.
396-548	Bentonitic shale; medium gray, lumpy, slightly silty, traces of sand and gravel.
548-729	Shale; medium gray, lumpy with much poorly sorted sand and gravel.
729-760	Shale; medium gray, lumpy, silty; some poorly sorted sand.
760-815	Shale; medium gray, lumpy, silty and sandy.
820-830	Sand; fine to medium, rounded; traces of limestone and pyrite.
830-1250	Missing samples.
1250-1330	Shale; medium light gray, lumpy, partly bentonitic.
1330-1410	Shale; medium gray, lumpy, partly firm beginning at 1360; slightly limy beginning at 1410.
1420-1530	Limy shale; medium gray, lumpy; some medium gray, firm shale increasing somewhat at 1520.
1530-1560	Shale; medium gray, lumpy; some limy shale as above; increasing in quantity.
1560-1700	Limy shale; medium gray; lumpy; some medium gray, rather firm shale.
1700-1850	Shale; medium gray; lumpy; some slightly, limy; gray shale.
1850-1890	Shale; medium light gray; lumpy, slightly limy.
1890-1950	Shale; medium gray, lumpy; slightly limy.
1950-1980	Shale; as above; some gray limy, firm, shale; some gray; lumpy, limy shale.
1980-2050	Shale; gray, lumpy, slightly limy, scattered traces of pyrite and dense, dark gray limestone.
2050-2060	Shale; gray; lumpy, slightly limy.
2060-2120	Shale; gray, lumpy, rather bentonitic.

2120-2190 Shale; medium gray, lumpy, rather bentonitic; small amounts of bentonite; traces of reddish brown siltstone beginning at 2140 and ending at 2160.

2190-2220 Shale; medium gray, lumpy, somewhat limy; small amounts of reddish orange, firm shale.

2220-2230 Limy shale; medium gray, lumpy, some shale as above.

2230-2250 Shale; dark gray, flaky; some limy shale as above; white specks appear at 2240.

2250-2260 Limy shale; gray, lumpy, some medium gray, flaky shale.

2260-2270 Shale; medium gray, lumpy, partly lumpy and lighter gray; traces of pyrite.

2270-2290 Shale; medium gray, flaky, partly brownish; some limy shale; as above; traces of pyrite.

2290-2320 Limy shale; medium gray, lumpy, some gray; rather firm to flaky shale; scattered traces of pyrite and Inoceramus prisms.

2320-2330 Shale; medium dark gray, flaky; some medium gray; lumpy limy shale; traces of pyrite and Inoceramus prisms.

2330-2370 Shale; gray; lumpy rather limy; scattered small amounts of shale as above; pyrite, and reddish brown, dense siltstone.

2370-2520 Shale; medium gray, lumpy, rather limy; scattered traces of Inoceramus prisms, pyrite, calcite, dense limestone, and very firm, reddish brown shale (siltstone?)

2520-2540 Shale; medium dark gray, lumpy, slightly limy; traces of pyrite and Inoceramus prisms.

2540-2560 Shale; medium dark gray, flaky; small amounts of shale as above; traces of pyrite and Inoceramus prisms.

2560-2590 Shale; medium dark gray, flaky, with white specks beginning at 2570; traces of pyrite and gray siltstone.

2590-2610 Shale; dark gray, flaky to lumpy, and somewhat limy; traces of reddish brown siltstone.

2610-2640 Shale; dark gray with white specks, flaky; some light gray, slightly brown siltstone; traces of pyrite; a trace of reddish brown siltstone beginning at 2620.

2640-2680 Shale; as above; traces of reddish brown siltstone beginning at 2670.

2680-2720 Shale; dark gray, flaky; scattered traces of bentonite and yellowish brown siltstone.

2720-2730 Missing samples.

2730-2760 Limy shale; dark gray, rather firm; traces of Inoceramus prisms.

2760-2800 Limy shale; light gray to dark gray, flaky, partly lumpy; traces of pyrite, and Inoceramus prisms.

2800-2840 Shale; dark gray with white specks, flaky, partly limy, some white specks, small amounts of Inoceramus prisms and chalky very light gray limestone.

2840-2920 Shale; dark gray; flaky, small amounts of light gray lumpy shale and Inoceramus prisms.

2920-2940 Shale; medium dark gray, soft; lumpy; partly flaky; traces of fish scales and microscopic teeth.

2940-2960 Shale; dark gray, flaky, partly lumpy, fossiliferous.

2960-2980 Shale; dark gray, lumpy, partly flaky, fossiliferous.

2980-3040 Shale; medium light gray to dark gray with white specks, flaky, slightly fossiliferous.

3040-3060 Shale; dark gray, flaky, partly lumpy.

3060-3110 Shale; light gray to dark gray, flaky, partly lumpy, scattered traces of pyrite and shell fragments.

3110-3200 Shale; medium gray to dark gray, mostly lumpy, becoming flakier at 3140.

3200-3270 Shale; medium light gray to medium dark gray, flaky to lumpy, a trace of fine limy sandstone at 3240.

3270-3280 Shale; medium gray to dark gray, flaky.

3280-3330 Shale; medium gray, lumpy, slightly limy, becoming rather silty at 3300; a small amount of light gray, medium sandstone at 3300.

3330-3344 Shale; medium dark gray shale, mostly flaky; much lumpy shale, ending at 3340.

Cored interval: 3344-3360.

3344-3350 Shale; medium gray, soft, flaky; small amounts of sand.

3350-3355 Limy shale; medium gray to light gray.

3355-3360 Siltstone; medium gray, shale.

3360-3370 Shale; gray; flaky to lumpy; some coarse sand; small amounts of light brown, shaly silt.

3370-3390 Shale; as above some very coarse, orangish, quartz concretions; traces of pyrite and medium sandstone; much light brown, limy, shaly siltstone beginning at 3380.

3390-3400 Shale; gray; flaky somewhat limy, small amounts of concretionary quartz; pale yellow brown siltstone, and reddish brown siltstone and shale.

3400-3420 Siltstone; medium gray, small amounts of sand, fine sandstone, and dark gray shale; some medium sandstone beginning at 3410.

3420-3440 Shale; gray flaky, partly lumpy and silty and limy; traces of pyrite reddish shale, and sand.

3440-3470 Silty shale; light brownish gray, lumpy, slightly limy, missing samples; 3450-3460.

3488 Silty shale; light brownish gray, lumpy, much rounded; medium sand; traces of pyrite. Circulation: 40 minutes.

3500-3560 Shale; gray, flaky to lumpy; some medium to coarse sand (decreasing in quantity: 3510-3520); small amounts of pyrite.

3560-3600 Shale; dark gray, flaky to lumpy, some medium sand; small amounts of pyrite much medium to coarse sandstone (3580-3590).

3600-3630 Shale; dark gray, lumpy, silty, slightly limy; partly flaky; small amounts of sand and sandstone.

3630-3640 Shale; dark gray, flaky; much pale yellow brown siltstone; small amounts of sand, sandstone, and reddish siltstone and shale.

3640-3660 Shale; dark gray flaky; much pyrite; much medium to coarse, rounded quartz sand.

3660-3710 Sand; medium to coarse, well rounded, slightly frosted, partly yellow and pink stained; traces of shale and pyrite.

3710-3750 Shale; dark gray, flaky; small amounts of moderate orange pink siltstone; increasing in quantity; traces of sand and pyrite.

3750-3790 Siltstone; light gray, becoming reddish orange, slightly limy; much dark gray, flaky shale; small amounts of sand.

3790-3850 Siltstone; pale reddish orange brown to light brownish gray, partly limy; some dark gray, flaky shale; traces of sand; traces of yellow green and grayish purple shale at 3840.

3850-3870	Shale; medium gray, flaky; small amounts of pyrite and sand.
3870-3890	Shale; dark gray, flaky, partly light gray and limy; some fine, limy sandstone, traces of pale green shale.
3890-3900	Shale; dark gray; flaky; small amounts of sand and chalky white limestone.
3900-3930	Shale; moderate reddish brown, partly lumpy and silty; some dark gray and pale green shale; traces of chalky; white limestone and sand.
3930-3970	Limy shale; light gray, lumpy; some dark gray and moderate reddish brown shale, decreasing greatly in quantity.
3970-4060	Limy shale; medium light gray, lumpy; traces of reddish brown and dark gray shale; small amounts of medium gray shale; small amounts of pale green, waxey shale (4010-4040); small amounts of medium sand beginning at 4010; traces of gray, dense limestone at 4050.
4060-4080	Limy shale as above; much gray shale, increasing in quantity; much medium to coarse sand; decreasing in quantity.
4080-4100	Shale; gray, partly reddish brown; some limy, gray shale; much sand as above; traces of pyrite.
4100-4110	Shale; pale green, waxey; some gray and reddish brown shale and sand; traces of pyrite.
4110-4120	Missing samples.
4120-4170	Shale; dark gray; pale green, reddish brown, and olive brown; some sand (4120-4130); some fine, very light gray to white sandstone, beginning at 4130 and increasing somewhat in quantity.
4170-4200	Sandstone; white, fine to medium, decreasing somewhat in quantity; much gray shale; increasing in quantity; small amounts of red and greenish shale.
4200-4220	Shale; medium gray, flaky soft some white sandstone as above; traces of sands and pyrite.
4220-4260	Shale; as above; becoming partly limy at 4230; small amounts of bluish gray, dense limestone beginning at 4240.
4260-4280	Shale; medium gray, flaky; much light gray, lumpy; limy shale; much medium, limy sandstone beginning at 4270; traces of pyrite.
4280-4290	Shale; medium gray, flaky, partly limy; much limy, medium sandstone.
4290-4320	Shale; moderate reddish brown, some gray and green; some white, chalky to lithographic limestone, increasing in quantity.
4320-4380	Shale; medium gray, flaky, partly reddish brown, small amounts of pale green; some white, chalky to lithographic limestone increasing in quantity until 4360; then decreasing in quantity.
4380-4420	Shale; medium gray, flaky, partly moderate reddish brown, small amounts of pale green, pink, and dusky yellow; some light gray, limy shale; small amounts of gypsum and anhydrite beginning at 4400.
4420-4440	Shale; medium gray, flaky; much white to very light gray anhydrite; traces of dense, light gray dolomite.
4440-4450	Shale; moderate reddish brown; some shale as above; some very light gray, limy shale; some anhydrite and medium sand.
4450-4470	Shale; dark gray, flaky, small amounts of reddish brown; much white anhydrite, decreasing in quantity; some fine sand.
4470-4480	Shale; moderate reddish brown to dark gray; some fine sand; small amounts of pale green shale.

4480-4500 Shale; dark gray; flaky; much moderate reddish orange shale and siltstone; small amounts of sand.

4500-4520 Shale; as above; much moderate reddish orange siltstone; small amounts of fine sand.

4520-4540 Shale; dark gray; flaky; partly moderate reddish brown; much reddish orange siltstone; much reddish brown; fine grained sandstone; small amounts of fine sand.

4540-4580 sandstone; moderate reddish orange, very fine grained; much light gray to dark gray, flaky shale; small amounts of fine to medium sand; some coarse, rounded sand (4580-4630).

4640-4660 Shale; medium dark gray, flaky; some siltstone and sandstone as above.

4660-4670 Sandstone; moderate reddish orange, fine grained; much medium dark gray flaky shale.

4670-4680 Shale; gray, flaky; small amounts of reddish siltstone.

4680-4750 Siltstone; and fine sandstone; moderate reddish orange; much gray, flaky shale; small amounts of fine, rounded sand; scattered traces of pyrite.

4750-4760 Shale; medium gray; some reddish brown siltstone; increasing in quantity, much white, chalky to lithographic limestone beginning at 4755.

4760-4765 Shale; medium gray, flaky, partly reddish brown, some reddish siltstone and white anhydrite.

4765-4780 Shale; medium gray, flaky; some reddish shale; some white limestone; gypsum and anhydrite, increasing slightly in quantity; small amounts of pale red and pale green shale beginning at 4775.

4780-4785 Shale; gray; flaky; some light grayish pink, limy shale; small amounts of white gypsum and anhydrite and greenish shale.

4785-4790 Shale; gray; flaky; small amounts of pale green, pink, and yellow brown shale; some white gypsum, anhydrite, and limestone.

4790-4815 Shale; light gray to dark gray; some moderate reddish brown, small amounts of pale green; some white anhydrite, decreasing in quantity; a small amount of limy, pale, green siltstone beginning at 4805.

4815-4820 Shale as above; small amounts of limy, pink shale; some white anhydrite and limestone.

4820-4830 Shale; as above; some pale orange and pinkish gray anhydrite; some very pale orange, micro-sugary dolomite; some gray, shaley limestone beginning at 4825.

4830-4835 Shale; medium dark gray, traces of variegated; small amounts of white anhydrite and pinkish dolomite.

4835-4840 Limestone; white, sublithographic; some gray shale; small amounts of variegated limestone.

Cored interval: 4841-4844.

4841-4844 Limestone; light pinkish gray, sublithographic, slightly shaly.

4845-4875 Limestone; almost white, becoming partly pink at 4865; sublithographic; some gray shale.

4875-4890 Dolomite; pale red, dense; much variegated shale (mostly gray); small amounts of limestone as above; some white anhydrite beginning at 4880.

4890-4905 Shale; gray pale reddish brown, small amounts of green, pink, yellow; some white anhydrite, pink dolomite, white limestone, and shaly limestone; traces of fine, limy sandstone and siltstone beginning at 4895 and increasing somewhat in quantity.

4905-4910 Shale; light gray to medium dark gray, partly limy, some reddish brown, some white anhydrite and gray, limy sandstone; small amounts of dense, pink dolomite.

4910-4915 Shale as above; much light blue gray, dense dolomite; some pale yellow gray to white, dense limestone; small amounts of white anhydrite.

4915-4920 Shale; as above; much limestone as above; small amounts of anhydrite and dolomite.

4920-4930 Shale as above; much white anhydrite; small amounts of white limestone and dolomite.

4930-4935 Shale; gray, flaky, some moderate reddish brown; some chalky, white limestone; small amounts of anhydrite.

4935-4940 Limestone; very pale orange, sublithographic to dense, some shale; small amounts of grayish blue, dense dolomite.

4940-4950 Limestone; very light yellow gray, sublithographic to dense; some gray shale; small amounts of reddish brown shale.

4950-4970 Limestone; white, soft, chalky; small amounts of gray shale.

4970-4985 Limestone; almost white, sublithographic, slightly shaly small amounts of limy sandstone and gray shale; some pale blue, dense dolomite beginning at 4980.

4985-4995 Shale; gray, partly reddish brown; much white anhydrite (4985-4990); small amounts of dense dolomite and white limestone; a small amount of limy, fine moderate reddish orange sandstone at 4990.

4995-5005 Shale; variegated; much almost white, silty, sublithographic limestone; small amounts of limy sandstone.

5005-5020 Shale; variegated; some white anhydrite; small amounts of silty limestone; and light gray sandstone; (sandstone ending at 5010).

5020-5040 Shale; mostly gray; some gray blue, dense dolomite; some silty and sandy; light gray to pale yellow brown limestone, decreasing in quantity.

5040-5060 Shale; light gray to medium dark gray; partly reddish brown; some dense, blue gray dolomite.

5060-5075 Shale as above; much pale bluish gray; dense dolomite; some pale yellow brown, limy siltstone and fine sandstone; some yellow brown, micro-sugary limestone at 5070.

5075-5080 Shale; mostly gray, some reddish brown; some very light blue; dense dolomite; some pale yellow brown; limy siltstone.

5080-5090 Shale; as above; small amounts of pale green; some light bluish gray, dense; dolomite; some dense white anhydrite; some pale yellow brown micro-sugary to sublithographic.

5090-5100 Limestone; very pale yellow brown, stblithographic; some shale as above.

5100-5110 Shale; mostly gray; much light bluish gray, dense anhydrite.

5110-5120 Limestone; very pale yellow brown, micro-sugary to sublithographic; some gray shale; traces of anhydrite and dolomite.

5120-5125 Dolomite; pale blue, dense; some limestone and anhydrite as above; small amounts of subangular quartz sand.

5125-5130 Sand; subangular to rounded, quartz; some gray and reddish shale, dense dolomite, and yellow brown limestone.

5130-5145 Dolomite; pale blue, dense; much sand as above; decreasing greatly in quantity; some gray shale.

5145-5185 Shaly; limestone; gray, soft; lumpy, some gray shale.

5185-5195 Limestone; almost white, sublithographic to dense, partly chalky; some gray shale.

5195-5200 Limestone; very light gray, sublithographic to lithographic; much dense pale blue and gray dolomite; small amounts of gray shale.

5200-5210 Dolomite; light gray to blue gray, dense; some gray shale; small amounts of limestone and anhydrite.

5210-5215 Shale; medium gray and moderate reddish brown, some dolomite as above.

5215-5220 Limestone; pale yellow brown, lithographic; some brownish shale; some dolomite and anhydrite as above.

5220-5235 Limestone; pale yellow gray, sublithographic, decreasing in quantity; small amounts of dolomite and anhydrite; much gray shale beginning at 5225.

5235-5255 Dolomite; pale blue, dense; some white to light gray anhydrite, increasing in quantity; small amounts of gray shale and dense, gray limestone; becoming lighter and chalkier.

5255-5265 Anhydrite and dolomite; pale blue, dense; small amounts of flaky, gray shale and very light gray, chalky, shaly limestone.

5265-5300 Anhydrite; pale blue to white to light gray, dense; some gray shale, increasing somewhat in quantity.

5300-5315 Dolomite; pale blue, dense; much gray, reddish brown, and olive gray shale.

5315-5325 Anhydrite; white, dense; much shale as above.

5325-5330 Limestone; pale orange, slightly gray, fine sugary; small amounts of gray shale.

5330-5345 Anhydrite; white to light gray, dense; some gray shale, increasing in quantity.

5345-5352 Shaly limestone; very pale yellow brown, very fine sugary; small amounts of shale.

Cored interval: 5352-5382

5352-5355 Limestone; very pale orange, micro-sugary, partly vuggy.

5355-5358 Limestone; very light gray, micro-sugary; few small vugs, included veinlets and crystalline anhydrite.

5358-5361 Limestone; very pale orange, sublithographic, partly fragmental and fossiliferous.

5361-5364 Dolomitic limestone; very pale orange, fine grained, somewhat vuggy, with few anhydrite crystals.

5364-5367 Limestone; very pale orange, micro-sugary; partly oolitic.

5367-5370 Limestone; very pale orange, slightly gray, tight oolitic.

5370-5376 Limestone; very pale orange, micro-sugary.

5376-5382 Limestone; very light gray, micro-sugary, partly fossiliferous.

5382-5400 Limestone; very light gray, micro-sugary; small amounts of dark gray shale.

5400-5455 Limestone; very light gray, fragmental, partly chalky, partly dolomitic, small amounts of medium dark gray shale, some amounts of yellow brown, micro-sugary limestone, beginning at 5450; missing samples: 5425-5430.



5455-5490	Limestone; pale yellow brown, micro-sugary; becoming partly sublithographic at 5475; small amounts of gray shale.
5490-5525	Limestone; very light gray, chalky; some limestone as above; much yellow brown, micro-sugary to dense limestone beginning at 5510.
5525-5535	Limestone; very pale yellow brown to very light gray, lithographic; a trace of chert at 5525.
5535-5580	Limestone; pale; yellow gray, sublithographic, becoming partly oolitic 5540.
5580-5640	Limestone; pale yellow brown, very fine sugary, partly chalky, partly dolomitic beginning at 5610.
5640-5650	Limestone; light gray to very light brown, lithographic to chalky, becoming partly very pale yellow brown and fine sugary at 5645; small amounts of medium gray shale.
5650-5670	Limestone; pale yellow brown micro-sugary to chalky; small amounts of chalky, light gray limestone; small amounts of dark gray shale.
5670-5690	Dolomitic limestone; pale yellow brown, sugary to chalky; some sublithographic to chalky, white limestone; small amounts of dark gray shale.
5690-5715	Limestone; very pale yellow brown to light gray, chalky to lithographic; some medium dark gray shale.
5715-5720	Dolomitic limestone; pale, sugary; much limestone as above; some medium dark gray and dark olive gray shale.
5720-5725	Shale; medium dark gray to dark olive gray; some limestone as above; some yellow brown, sugary limy dolomite.
5725-5730	Dolomitic limestone; pale yellow brown to light gray, sugary, partly chalky; some dark gray shale.
5730-5750	Limestone; very light gray to medium gray, chalky and fragmental; some very pale yellow brown, fine sugary limestone; small amounts of dark gray shale.
5750-5765	Limestone; pale yellow brown, fine sugary; much light gray, chalky to fragmental; small amounts of dark gray and olive gray shale increasing greatly in quantity at 5755; brachiopod fragments.
5765-5780	Limestone light gray to yellow gray, fragmental to chalky, partly dense and olive gray; some dark gray to light olive gray shale; brachiopod fragments.
5780-5785	Limestone; medium light gray, micro-sugary; some olive gray, medium dark gray, and greenish gray shale; brachiopod fragments.
5785-5795	Limy shale; gray, olive, greenish, flaky; some gray, fine sugary limestone, small amounts of medium dark gray, dense dolomite at 5790.
5795-5820	Limestone; light gray to medium gray, dense to fine sugary, partly chalky; some shale as above.
5820-5885	Limestone; medium light gray, fine sugary to chalky; small amounts of gray shale.
5885-5920	Limestone; light gray, chalky; some very light gray, micro-sugary to sublithographic limestone; small amounts of gray shale.
5920-5945	Dolomitic limestone; pale yellow gray, fine sugary to chalky; small amounts of gray shale.

5945-5950	Limestone; very pale yellow brown to light gray; sub-lithographic to micro-sugary; much medium dark gray and moderate reddish brown shale.
5950-5960	Limestone; pale yellow brown to very light gray, fragmental to chalky small amounts of medium dark gray shale.
5960-5985	Limestone; very light gray, chalky, soft; small amounts of shale and denser limestone as above.
5985-6000	Limestone; medium light gray to very pale yellow gray, fragmental to chalky, partly, micro-sugary; traces of brachiopod fragments and shale; much very light gray, chalky limestone at 5995.
6000-6020	Limestone; light gray, sublithographic to dense; small amounts of pale yellow brown to white, dense to chalky limestone; traces of gray shale and brachiopod fragments.
6020-6045	Limestone; pale yellow gray, fragmental, partly chalky.
6045-6065	Limestone; light gray, micro-sugary; some very pale yellow gray, sublithographic to chalky limestone; traces of gray and olive gray shale.
6065-6080	Limestone; pale yellow gray, micro-sugary; some limestone as above; traces of gray olive gray and greenish gray shale.
6080-6110	Limestone; light gray, chalky, soft, shaly, some gray shale, some limestone as above.
6110-6125	Shale; gray black; some limestone as above; increasing in quantity.
6125-6145	Limestone; light gray, chalky, soft, shaly, much medium dark gray and greenish gray shale, decreasing in quantity.
6145-6215	Limestone; light gray, chalky, lumpy, shaly, soft; traces of dark gray shale.
6215-6220	Shale; dark gray, partly light gray; some limestone as above.
6220-6240	Limestone; light gray, chalky, lumpy, shaly, soft; some dark gray shale.
6240-6300	Limestone; light gray, lumpy, chalky, shaly, soft; small amounts of medium gray shale, increasing at 6295.
6300-6305	Shale; medium dark gray, small amounts of limy greenish gray; some pale yellow gray, fragmental limestone.
6305-6340	Limestone; light gray, lumpy, chalky, shaly, soft; much shale as above; decreasing in quantity; small amounts of medium gray, dense, shaly limestone beginning at 6325.
6340-6345	Limestone as above; much greenish gray, dense, slightly shaly limestone.
6345-6365	Limestone; very pale yellow gray to light gray; sublithographic to dense; traces of medium dark gray shale, increasing at 6360.
6365-6370	Limestone; white to medium gray, chalky to dense, partly shaly; some medium dark gray shale.
6370-6395	Shale; dark brownish gray, slightly limy; small amounts of limestone as above; increasing greatly in quantity at 6390.
6395-6400	Limestone; medium gray, lumpy, shaly, chalky; some chalky to dense, white to gray limestone; much dark gray and dark brownish gray shale.
6400-6405	Shaly limestone; to limy shale; medium gray lumpy; small amounts of fine sugary limestone; traces of sand.
6405-6425	Shaly limestone; very light gray, chalky, lumpy; small amounts of light brown limy siltstone and dark gray shale, increasing in quantity.

6425-6435 Siltstone; light brown to moderate reddish brown, limy; some light brown, chalky, lumpy, limy shale beginning at 6430.

6435-6450 Shaly, limestone; moderate reddish brown lumpy chalky; much siltstone as above decreasing in quantity; small amounts of dark gray shale.

6450-6485 Limestone; as above; some white to light gray; fine sugary to chalky limestone, some dark gray shale.

6485-6500 Limy shale; moderate reddish brown lumpy; small amounts of chalky, white limestone, ending at 6495; small amounts of dark gray and pale green shale.

6500-6555 Limy shale as above; traces of dark gray shale; increasing in quantity small amounts of medium sand (6530-6535); scattered small amounts of chalky, white limestone.

6555-6560 Shale; dark gray; much very pale yellow brown; chalky to micro-sugary limestone.

6560-6575 Limestone; pale yellow gray, micro-sugary to dense, becoming partly chalky and fragmental.

6575-6605 Limestone; pale yellow gray, micro-sugary, somewhat dolomitic; much pale yellow gray to white, chalky to dense limestone; small amounts of dark gray shale; missing samples: 6590-6605.

6605-6615 Shaly limestone; almost white, chalky; some limestone as above; some blue gray, dense dolomite at 6610; small amounts of dark gray shale.

6615-6640 Limestone; pale yellow brown, sugary, partly dolomitic; some chalky to fragmental, pale yellow brown limestone; small amounts of dark gray shale.

6640-6655 Limestone; pale yellow gray, fine sugary; partly fragmental and chalky; small amounts of dark gray shale, increasing in quantity.

6655-6665 Shale; medium dark gray to dark gray, light brown to moderate reddish brown much fine sugary to chalky, pale yellow brown limestone.

6665-6670 Shale; medium dark gray, much gray to very pale orange, dense dolomite; much limestone as above.

6670-6680 Dolomite; very pale orange, dense.

6680-6690 Limestone; light gray to very pale yellow brown; fine sugary to chalky; partly dolomitic; traces of medium gray shale.

6690-6705 Shaly limestone; very light gray, chalky, lumpy; much medium light gray dense limestone; much dense, medium light gray, limy dolomite at 6700.

6705-6715 Limestone; pale yellow gray to light gray dense to fine sugary, partly chalky; traces of gray shale.

6715-6720 Dolomite; pale yellow gray to light gray, dense to fine sugary; small amounts of limestone and shale as above.

6720-6725 Dolomite; yellow brown micro-sugary to dense, slightly limy; some pale gray blue, dense dolomite; small amounts of medium dark gray shale and pale dense limestone.

6725-6755 Limestone; very pale orange gray, fine sugary to chalky; some chalky white limestone; beginning et 6730; traces of dark gray shale; some dense; blue gray dolomite (6745-6755).

6755-6770 Limestone; white to very pale yellow brown fine sugary to chalky, small amounts of dense dolomite and dark gray shale.

6770-6800 Limestone; white to very pale yellow brown chalky, lumpy, some fine sugary limestone and dark gray shale; some pale yellow brown, fine sugary dolomite beginning at 6795.

6800-6820 Limestone; pale yellow gray to white, micro-sugary to chalky; some pale yellow brown, micro-sugary to dense dolomite, increasing in quantity.

6820-6830 Limestone; pale yellow brown, fine sugary; small amounts of medium dark gray shale and dolomite as above.

6830-6875 Dolomitic limestone; pale yellow brown; sugary; some very pale yellow brown, chalky limestone; some dark gray shale, beginning at 6850; and increasing in quantity; some light gray, shaly, lumpy, chalky limestone beginning at 6860.

6875-6885 Dolomitic limestone; pale yellow brown, sugary, partly chalky.

6885-6900 Limestone; very light gray, lumpy, chalky, shaly; some dolomitic limestone as above.

6900-6905 Limestone; pale yellow brown; sugary, slightly dolomitic.

6905-6920 Limy dolomite to dolomitic limestone; pale yellow brown, sugary; small amounts of gray shale.

6920-6925 Limestone; white to very pale orange, chalky to dense; much limy dolomite as above; traces of gray shale and sand.

6925-6945 Limestone; light olive gray to light gray, dense to chalky; traces of gray shale.

6945-6960 Limestone; light gray to light olive gray, chalky; some pale yellow brown, fine sugary limestone; traces of sand and shale.

6960-6965 Limestone; yellow brown, fragmental to sugary, partly chalky.

6965-6995 Limestone; very pale yellow brown, sublithographic to chalky; some very pale orange, fragmental dolomite; small amounts of gray shale; small amounts of pale yellow brown, sugary, limy dolomite beginning at 6975.

6995-7020 Limestone; very light gray, shaly, chalky, lumpy, soft; small amounts of very pale yellow brown, fragmental to dense limestone; small amounts of grayish, micro-sugary, limy dolomite beginning at 7010; traces of medium dark gray shale.

7020-7025 Limestone; as above; some dark gray shale.

7025-7055 Limestone; gray, chalky to dense; some pale yellow brown, micro-sugary dolomite; small amounts of dark gray shale.

7055-7070 Dolomite; pale yellow brown to yellow gray, micro-sugary to fragmental much very pale yellow brown chalky limestone, decreasing greatly in quantity.

7070-7090 Limy dolomite; pale yellow brown micro-sugary to fine sugary, becoming partly gray and dense; much sublithographic, very pale yellow gray limestone; much dark gray shale beginning at 7080.

7090-7100 Limestone; white to very pale yellow gray, chalky, soft; much very pale yellow brown, fine sugary, limy dolomite, decreasing, in quantity; some dark gray shale.

7100-7140 Limestone; almost white shaly, chalky, soft; some pale yellow brown fine sugary, limy dolomite (7110-7115); small amounts of pale yellow brown, micro-sugary limestone and dark gray shale beginning at 7115.

7140-7145 Shale; light gray to dark gray, partly limy; some pale yellow brown, fine sugary dolomite; some very pale yellow brown, fine sugary dolomite; some very pale yellow brown, sugary, dolomitic limestone.

7145-7150 Limestone; very light gray, chalky; some pale yellow brown, sugary dolomite, small amounts of dark gray shale.

7150-7165 Limy dolomite; very pale yellow brown, micro-sugary; traces of light gray, sublithographic limestone.

7165-7170	Shale; dark gray; some pale yellow brown to pale yellow gray, fine sugary to dense dolomite; small amounts of chalky limestone.
7170-7185	Dolomite; pale yellow brown, sugary; small amounts of dark gray shale, increasing at 7180; much chalky; lumpy, shaly, light gray limestone beginning at 7180.
7185-7190	Limestone; pale orange gray to white, sublithographic to chalky, partly very pale yellow brown and micro-sugary; small amounts of dark gray shale.
7190-7220	Limestone; very light gray to very light brown, shaly, lumpy, chalky; small amounts of shale, limestone and dolomite as above.
7220-7230	Limestone; light brown, dense, becoming partly olive gray; much medium light gray to pale yellow brown, micro-sugary to sublithographic dolomite, partly limy; small amounts of dark gray shale.
7230-7235	Limestone; very pale yellow brown to light olive gray, sublithographic to dense, partly chalky; some pale orange, dense, limy dolomite; traces of gray shale.
7235-7240	Limestone; pale greenish gray, dense; much limestone as above.
7240-7245	Dolomitic limestone, light olive gray to yellow gray, fine sugary to sublithographic.
7245-7250	Dolomitic limestone as above; much pale bluish gray, dense, limy dolomite.
7250-7260	Limestone; light gray to light olive gray, micro-sugary to dense, partly dolomitic; much very pale yellow brown to medium gray, dense to micro-sugary partly chalky, partly limy dolomite; some pale orange, sublithographic limestone beginning at 7255.
7260-7275	Limestone; almost white, lumpy to lithographic; some dense, gray limestone; small amounts of dense limestone and dolomite as above.
7275-7285	Limestone; almost white, chalky; some very pale yellow brown micro-sugary limestone.
7285-7320	Limestone; pale orange, sublithographic to dense; some chalky limestone as above; some sugary; pale yellow brown limestone beginning at 7290; missing samples: 7295-7320.
7320-7325	Limestone; pale yellow brown to light gray fine sugary; small amounts of medium dark gray shale.
7325-7330	Limy dolomite; light olive gray, sugary; much dark gray shale; traces of fossils and fragmental limestone.
7330-7360	Limy dolomite; very pale yellow brown to very pale orange sugary; traces of dark gray shale; some chalky limestone beginning at 7355.
7360-7380	Dolomitic limestone; greenish gray to light olive gray to pale yellow brown fine sugary; missing samples: 7370-7375.
7380-7395	Dolomitic limestone; pale yellow brown, fine sugary; much light olive gray to very pale yellow brown, fine sugary to chalky, partly dolomitic limestone beginning at 7390.
7395-7420	Limestone; light olive gray to pale yellow brown, sublithographic to chalky.
7420-7425	Limestone; very pale yellow brown to light olive gray, fine sugary to micro-sugary.

7425-7430	Limy dolomite; very light gray, slightly greenish in parts fine sugary to micro-sugary; small amounts of dark gray shale.
7430-7440	Shale; dark gray, small amounts of reddish brown and olive gray, much pale sublithographic to dense dolomite; small amounts of sand and chalky limestone.
7440-7455	Shale; pale reddish brown, partly limy; some dark gray shale increasing in quantity; small amounts of dolomite sand and limestone.
7455-7465	Salt.
7465-7550	Anhydrite; yellowish, somewhat weathered; small amounts of red and gray shales, sand, limestone, and dolomite.
7550-7605	Anhydrite; white to yellowish somewhat weathered; much reddish brown and dark gray shale; small amounts of rounded sand; missing samples: 7600-7605.
7605-7675	Shale; reddish brown and dark gray; some sand chalky limestone; and anhydrite; small amounts of sugary and chalky, light gray to very pale yellow brown dolomite beginning at 7645.
7675-7680	Dolomite; very light gray to very light yellow gray, micro-sugary to chalky; some pale yellow brown, sugary limestone; small amounts of shale as above.
7680-7690	Shale; dark gray to moderate reddish brown, some white anhydrite, pale yellow brown dolomite, and chalky limestone.
7690-7710	Limestone; off white, sublithographic to dense, partly chalky; much shale as above.
7710-7735	Limestone; light gray to very pale yellow brown, sublithographic to dense, small amounts of dark gray shale.
7735-7775	Limestone; very light gray with thin shale breaks; some dark gray and moderate reddish brown shale; some moderate gray denser limestone beginning at 7750; some pale yellow brown, micro-sugary limestone beginning at 7760 and increasing somewhat in quantity.
7775-7795	Limestone; very light gray, chalky; some very pale yellow brown and light gray, micro-sugary limestone, increasing in quantity; small amounts of dark gray shale.
7795-7800	Limestone; very pale yellow brown, fine sugary, partly chalky; small amounts of dark gray and moderate reddish brown shale.
7800-7805	Shale; moderate reddish brown to light brown; some chalky limestone; some pale yellow brown, fine sugary, limy dolomite; small amounts of dark gray shale.
7805-7810	Shale; medium olive gray; small amounts of chalky limestone, reddish brown shale, dark gray shale, and dense, gray limestone.
7810-7815	Shale; dark gray to limy, moderate reddish brown to light brown; some limestone.
7815-7855	Shale; moderate reddish brown to light brown, partly lumpy and limy; small amounts of chalky limestone, increasing in quantity; some pale yellow brown micro-sugary limestone beginning at 7825; small amounts of dark gray shale, traces of pale yellow green shale.
7855-7860	Shale, moderate reddish brown, limy; much medium light gray to dark gray shale; some light gray, fine sugary to chalky limestone and dolomite.
7860-7870	Shale as above, partly greenish gray; small amounts of pale yellow brown, fine sugary to chalky limestone.

7870-7880	Shale as above; much pink and white mottled, sublithographic, dolomitic limestone; much off white, sublithographic to dense limestone beginning at 7875.
7880-7895	Limestone; white, sublithographic to dense, slightly dolomitic; small amounts of shale.
7895-7925	Limy dolomite to dolomitic limestone; white, sublithographic to dense; small amounts of shale; much dark gray shale (7915-7925).
7925-7945	Limy dolomitic to dolomitic limestone; white, sublithographic to lithographic; some dark gray shale; much dense, pale orange dolomite beginning at 7935.
7945-7955	Limy dolomite; white, sublithographic to dense; small amounts of dark gray and reddish brown shale.
7955-7985	Limestone; white, sublithographic to dense; some limy dolomite as above, increasing in quantity; small amounts of shale.
7985-8010	Dolomitic limestone; white, dense, partly chalky; much pale yellow brown micro-sugary limestone beginning at 7995.
8010-8025	Limestone; white, dense to chalky; much dark gray and moderate reddish orange brown shale, decreasing in quantity; some limy, white dolomite and pink dolomitic limestone beginning at 8020.
8025-8030	Limestone; white, chalky to lithographic; much dark gray and moderate reddish orange brown shale; traces of greenish gray shale.
8030-8040	Dolomite; very pale yellow brown to very light gray, micro-sugary to dense, partly limy; some dense, pale limestone beginning at 8035; small amounts of shale.
8040-8045	Limestone; pale to white, micro-sugary to dense, partly chalky, partly dolomitic; small amounts of shale.
8045-8055	Limy dolomite; white, dense to micro sugary; small amounts of shale, increasing greatly in quantity; some dense, white limestone at 8050.
8055-8060	Limy dolomite, white, dense to sublithographic; some similar dolomitic limestone; small amounts of shale.
8060-8075	Dolomite, very light gray to light yellow gray, micro-sugary to dense, partly limy; some dense, pale limestone at 8070; small amounts of shale.
8075-8085	Dolomite, white to pale yellow gray, micro-sugary to dense, slightly limy; some chalky, white limestone; small amounts of shale.
8085-8115	Limy dolomite, pale yellow brown, fine sugary; some dolomite as above; small amounts of shale.
8115-8215	Dolomite, pale orange gray to light gray, dense to micro-sugary; some shale. Poor samples, much cave. Missing samples: 8140-8160.
8215-8265	Dolomite, pale yellow brown to white, micro-sugary; much cave. Poor samples.
8265-8275	Dolomite, pale yellow gray, micro-sugary, partly limy at 8270.
8275-8295	Dolomite, pale yellow gray to white, micro-sugary to sublithographic, partly crypto-crystalline; some cave.
8295-8350	Dolomite, very pale orange to pale yellow gray, micro-sugary; some cave; much dense, pale limestone at 8340.
8350-8370	Limy dolomite, white, micro-sugary to dense; traces of greenish shale; some light olive gray, micro-sugary limestone (8355-8370); some cave of shale and sand.

8370-8385 Dolomite, white to very light gray, micro-sugary; small amounts of grayish limestone; some cave.

8385-8425 Dolomite, pale, dense to micro-sugary, slightly limy; small amounts of dense, light olive gray limestone; some cave.

8425-8440 Dolomite, very pale yellow gray, dense; small amounts of white, fine sugary, limy dolomite, increasing in quantity.

8440-8445 Limy dolomite, pale to light olive gray, micro-sugary; poor samples, some cave.

8445-8485 Dolomite, very pale orange to light olive gray, micro-sugary to sublithographic; small amounts of sand.

8485-8525 Dolomite, very pale orange to white, dense; some very pale yellow brown limestone; some reddish brown and dark gray shale (cave ?); traces of sand and siltstone.

8525-8565 Dolomite, very pale orange to pale yellow brown, dense; some dense, medium gray limestone; much shale and sand (cave ?) Poor samples.

8565-8585 Dolomite, grayish orange pink to light brown, dense, partly limy, some dense, dolomitic limestone beginning at 8375. Rather poor samples.

8585-8615 Limy dolomite to dolomitic limestone; white to very pale yellow brown, micro-sugary limestone beginning at 8600; traces of sand (cave ?). Rather poor samples.

8615-8625 Limestone, very pale yellow brown to light olive gray, fine sugary to dense, partly chalky, partly dolomitic; small amounts of very pale orange, dense dolomite; some shale (cave ?). Rather poor samples.

8625-8650 Limestone, pale yellow brown to bluish gray, micro-sugary to dense; small amounts of limestone an above; some dark gray and reddish brown shale (cave ?); some pale orange, fine sugary to chalky, dolomitic limestone beginning at 8635; some dense to lithographic, pale yellow brown dolomite beginning at 8645.

8650-8660 Limestone, light gray, chalky to dense; some dense limestone and dolomite as above, decreasing in quantity; small amounts of shale.

8660-6670 Limestone, gray to yellow gray, micro-sugary to dense, partly chalky, fossiliferous, some shale.

8670-8690 Limestone, gray to white, slightly greenish in part, shaly, fossiliferous, micro-sugary to chalky; some shale.

8690-8700 Limestone, light brown to gray to light olive gray, micro-sugary, partly chalky; small amounts of pale orange to very pale yellow brown, micro-sugary to dense dolomite; much shale (cave ?)

8700-8705 Limestone, very pale yellow brown, micro-sugary, partly chalky; small amounts of dense dolomite; much shale (cave ?)

8705-8710 Limestone, gray, micro-sugary; some pale yellow gray to pale yellow brown, micro-sugary to fine sugary dolomite; some shale (cave ?)

8710-8720 Limestone, gray, partly greenish, micro-sugary to dense, partly chalky, some pale orange, dense dolomite; some dark gray shale (cave ?)

8720-8735 Limestone, gray and white mottled, micro-sugary; much pale yellow brown, sublithographic to chalky limestone; some pale yellow gray, fine sugary to chalky dolomite, decreasing in quantity; small amounts of shale.



8735-8760	Limestone; pale; chalky to sublithographic, becoming partly pale orange at 8745; small amounts of pale, micro-sugary to dense dolomite, ending at 8745; small amounts of shale.
8760-8780	Limestone, light olive gray to very pale yellow brown to white, micro-sugary to dense, partly chalky; some very pale orange to light gray, dense dolomite beginning at 8770; some shale.
8780-8800	Limestone, white to very pale orange to very pale yellow brown, micro-sugary to fine sugary, partly chalky; some pale orange to olive gray, micro-sugary dolomite, decreasing in quantity; some shale, decreasing in quantity.
8800-8815	Limestone; very pale yellow brown to very pale orange to white, chalky to lithographic, partly micro-sugary; small amounts of dense, pale yellow brown dolomite; small amounts of shale.
8815-8830	Limestone as above; becoming chalkier; some light olive gray to very pale orange, micro-sugary dolomite; traces of shale.
8830-8835	Limestone; very pale yellow gray, chalky to lithographic.
8835-8840	Limestone; very pale orange, dense, partly chalky and white; traces of chert.
8840-8855	Limestone; pale yellow brown, chalky to lithographic, becoming partly darker and micro-sugary; some micro-sugary, yellow brown dolomite (8840-8845).
8855-8860	Limestone; pale yellow brown, micro-sugary to lithographic, partly chalky some micro-sugary; pale yellow brown dolomite; small amounts of shale.
8860-8865	Limestone; pale yellow gray to very pale orange, fine sugary to dense partly chalky, partly dolomitic; some light olive gray, micro-sugary dolomite some dark gray and greenish gray shale.
8865-8870	Limestone; light olive gray to very pale orange, micro-sugary to dense, partly chalky; small amounts of dolomite.
8870-8875	Limestone; very pale yellow brown to light olive gray, lithographic to chalky, some very pale yellow brown to light gray, micro-sugary dolomite.
8875-8880	Limestone; light olive gray, dense.
8880-8890	Limestone; very light gray to very pale yellow brown, chalky to lithographic becoming partly micro-sugary; some pale yellow brown, fine sugary, limy dolomite (8880-8885).
8890-8895	Limestone; very pale orange to light olive gray, micro-sugary to sublithographic; small amounts of shale and dolomite.
8895-8905	Limestone; white, chalky, partly yellow brown and dense, fossiliferous; small amounts of pale orange, micro-sugary dolomite.
8905-8910	Limestone; light olive gray to almost white, dense to chalky; small amounts of pale yellow brown, micro-sugary dolomite.
8910-8915	Limestone; pale yellow brown to light olive gray, micro-sugary to dense, partly chalky.
8915-8920	Limestone; light olive gray to white, micro-sugary to chalky.
8920-8925	Limestone; white, chalky, some very pale yellow brown, micro-sugary, dolomitic limestone; some pale yellow gray, micro-sugary dolomite.
8925-8938	Limestone; white to very pale yellow brown, chalky to micro-sugary; some pale yellow gray; sublithographic, dolomitic limestone.
8938	Total depth.