

NORTH DAKOTA GEOLOGICAL SURVEY CIRCULAR NO. 270

Summary of the Cardinal Drilling Company-James M. Anderson #1
Foster County, North Dakota
Well No. 1126 - Permit No. 1138

By John P. Bluemle
April, 1963

The Cardinal Drilling Company-James M. Anderson #1, Foster County, North Dakota. Location: Center NW NW Section 10, T. 146N. R. 67W., Elevation: 1582 Ground, 1589 K.B., Total Depth: 4185.

The Cardinal Drilling Company-James M. Anderson #1, was spudded April 30, 1956; drilled to a total depth of 4185 feet, found dry and plugged May 14, 1956. No drill stem tests were taken and no cores were cut. Electric and microlaterolog were run by Schlumberger.

Logging Record:

Schlumberger electric log - Run one, 5/13/56, 200-4026
Schlumberger microlaterolog - Run one, 5/13/56, 1750-4000

Casing Record:

Set 8 5/8" surface casing at 203.49 feet with 140 sacks of cement.

Plugging Record:

<u>Plug Set</u>	<u>Sacks Cement</u>
4070 feet	15
3284 feet	15
2711 feet	15
2157 feet	15
1766 feet	15
203 feet	30
Top Surface	5

Formation tops were determined from samples and electric logs. Doubtful or obscure formation tops were not picked. Color names are from the 1951 Rock Color Chart distributed by the Geological Society of America.

FORMATION TOPS

Cretaceous System

Niobrara Formation	762
Greenhorn Formation	1284
Belle Fourche Formation	1343
New Castle Formation	1622
Skull Creek Formation	1633
Fall River Formation	1768

Jurassic System

Unnamed Sands and Shales	1972
Piper Formation	2032
Redbeds	2120

Mississippian System	
Tilston Interval	2160
Lodgepole Formation	2219
Basal Miss. Shale	2643
Devonian System	
Duperow	2722
Souris River	2894
Silurian System	
Interlake	3040
Ordovician System	
Stonewall Formation	3075
Stony Mountain Formation	
Gunton Member	3140
Stoughton Member	3180
Red River Formation	3287
Winnipeg Formation	
Roughlock Member	3852
Icebox Member	3912
Black Island Member	Not Picked
Cambrian System	
Deadwood Formation	4100
Pre-Cambrian	4182
Total Depth	4185

215-240	Samples consist of drilling mud.
240-360	Shale, medium gray, resinous, fissile, compact; a few calcareous pieces and rounded inclusions of sand; slightly calcareous; fossil castes of polycypods; some iron stains.
360-540	Shale, as above; also shale, olive gray, dolomitic; some contorted lamination. Inoceramus fragments calcareousness increases with depth.
540-640	Shale, medium light gray, slightly calcareous, platy to fissile, micromicaceous; conchoidal fracturing common. Calcite prisms at 580; white bentonite at 600.
640-720	Shale, as above, plus shale, olive gray, calcareous, bentonitic.
720-760	Shale, medium dark gray, white calcareous specks, earthy, lumpy, disaggregated with inclusions of bluish white bentonite; pyritic; at 740, shale becomes more fissile with increased white specks.
760-780	Shale, light brownish gray, calcareous, large white specks, massive to fissile and compact.
780-820	Shale, as above, plus shale, dark gray, massive, compact, non-calcareous.
820-860	Shale, light brownish gray, highly calcareous, white specks and small limestone inclusions; fissile to flaky; limestone inclusions are flattened to parallel the bedding; some leaf fossils.
860-940	Shale, as above, pyritic, fossiliferous (Inoceramus).
940-1060	Shale, as above, highly pyritic; plus limestone, olive gray, microsucrosic; high content of iron; shale texture becomes lumpy and disaggregated at 1000 feet.
1060-1180	Shale, medium dark gray, fissile, slightly calcareous, some siderite and pyrite; some free sulphur; a few petroliferous chips at 1140.
1130-1240	Shale, dark gray, fissile, pitted, non-calcareous, brittle; becomes more fissile and flaky downward.

1240-1280 Shale, dark gray, very slightly calcareous, flaky; slightly more calcareous at 1260.

1280-1300 Shale, grayish black, tiny white specks, calcareous, resinous, flaky and slaty.

1300-1500 Shale, as above; calcite crystals, pyritic.

1500-1560 Shale, dark gray, tiny white specks, slightly calcareous, fissile; iron stains; a few tiny fossil impressions; more flaky downward and becoming a little more calcareous.

1560-1600 Shale, dark gray, extremely abundant white specks, calcareous, fissile to flaky, iron stains; tendency to lighter shades downward.

1600-1640 Shale, grayish black, calcareous, a few white specks; very flaky to splintery; a few massive pieces of medium gray siltstone; also brownish gray, resinous, dolomitic shale.

1640-1680 Shale, medium dark gray, fissile to lumpy and spongy; slightly calcareous; becoming more disaggregated downward.

1680-1760 Shale, dark gray, slightly calcareous; fissile and brittle; occasional chips of yellowish gray calcareous siltstone; very light gray bentonite.

1760-1780 Shale, as above; plus a few rounded grains of quartz.

1780-1900 Shale, medium dark gray, calcareous, fissile; abundant iron-carbonate pellets; pyritiferous; a few quartz grains; pellets are especially abundant at 1860-1880.

1900-1940 Shale, as above; abundant grains of rounded, frosted quartz; iron-carbonate pellets.

1940-1980 Sand, primarily quartz, grains subrounded to rounded, clear to semifrosted; non-calcareous and very clean.

1930-2000 Sand, as above but with shale, medium gray, massive, compact, silty.

2000-2010 Sand, as above; siltstone, light gray, calcareous; low degree of induration.

2010-2030 Shale, medium light gray, slightly calcareous, dense; contains layers of light bluish gray bentonite; sand, as above; iron carbonate pellets and iron staining on shale.

2030-2050 Limestone, light brownish gray, coarse grained with irregular oolitic texture; tends to be speckled black with black cored oolites; shale, dark gray; a few moderate reddish brown grains of rounded quartz.

2050-2090 Limestone, yellowish gray, coarsely crystalline to microsugrosic, tends to be slabby; some pieces are sublithographic; also shale, as above; pyrite inclusions in lithographic pieces of limestone, fossiliferous.

2090-2140 Limestone, as above; a few pieces of moderate brownish red siltstone; clear crystals of selenite at 2120.

2140-2160 Siltstone, moderate reddish brown, calcareous, porous; also limestone and shale as above; the shale has reddish brown stains.

2160-2170 Limestone, pinkish gray; a few chalky white pieces; powdery to microsugrosic.

2170-2180 Limestone, pinkish gray, spheroidal oolitic, moderate intergranular porosity.

2180-2210 Limestone, pinkish gray, microsugrosic with some pinpoint porosity; tends to be grainy.

2210-2220 Dolomite, calcic, pale red (10R6/2), subcrystalline to sugrosic; pinpoint porosity, fossiliferous.

2220-2260 Limestone, pale red, (5R6/2), color is streaked purple; slabby, non-porous; large calcite crystals, fossiliferous (brachiopods).

2260-2320 Limestone, pinkish gray, microsucrosic, a few soapy greenish pieces; brachiopod fossils and some coral; increased purple caste at 2280.

2320-2400 Limestone, pinkish gray, grainy, red silty inclusions, becomes slabbier downward; sandy; selenite at 2390.

2400-2420 Limestone, pinkish gray, microsucrosic to powdery; a few soapy pieces; fossiliferous; iron staining; becomes pale red and more porous at 2410.

2420-2460 Limestone, pale red, mottled; microsucrosic and silty; some pinpoint porosity; sandy with rounded grains of quartz, mostly sand at 2470.

2460-2500 Limestone, moderate red, silty, sandy, microsucrosic, mottled, fossiliferous.

2500-2510 Interval missing.

2510-2580 Limestone, pale red to white, mottled; microsucrosic, silty, some pinpoint porosity, sandy.

2580-2630 Limestone, chalky white, dense, non-porous; becomes grainy at 2590.

2630-2640 Interval missing.

2640-2650 Limestone, pinkish gray to chalky white, microsucrosic, reddish mottling.

2650-2670 Limestone, as above; plus dolomite, calcic, dendritic, silty, light brownish gray to brownish gray.

2670-2680 Limestone, grayish orange pink to grayish red, grainy; also sucrosic; porous; zones of reddish silt in limestone.

2680-2710 Shale, grayish red, non-calcareous; dense, resinous; also limestone as above.

2710-2720 Shale, pale yellowish brown with reddish specks, moderately calcareous; sucrosic to silty, fragmental, black inclusions; also limestone, grayish orange pink, very platy.

2720-2740 Shale, grayish red, calcareous, silty.

2740-2760 Limestone, dolomitic, grayish orange pink, cherty, microsucrosic; some purple-stained vuggy chips.

2760-2770 Limestone, very pale orange, powdery to microsucrosic; some areas of pure calcite crystals.

2770-2790 Limestone, pale yellowish brown, sucrosic; interstitial porosity; grades to rhombic and very porous.

2790-2830 Dolomite, calcic, very pale orange, rhombic, very porous; some chalky limestone.

2830-2860 Dolomite, calcic, pale reddish brown to very pale orange, sucrosic, variable porosity.

2860-2910 Dolomite, calcic, grayish orange pink, microsucrosic to grainy, dense to porous; a few chalky pieces of limestone.

2910-2920 Limestone, dolomitic, very pale orange, microsucrosic, not much porosity.

2920-2950 Limestone, pinkish gray, sucrosic, calcite rhombs as inclusions.

2950-3030 Limestone, as above, with limonite staining; slight increase in porosity downward; increased red and purple staining downward and becoming more grainy.

3030-3040 Limestone, pale red (10R6/2), microsucrosic, vuggy porosity, silty.

3040-3050 Limestone, very pale orange, microsucrosic, essentially non-porous.

3050-3090 Limestone, moderate orange pink, quite porous, tends to be spheroided oolitic.

3090-3220 Dolomite, calcic, pinkish gray, subcrystalline, dense, fossiliferous; some porosity and rounded quartz inclusions at 3150.

3220-3250 Shale, very calcareous, olive gray with much quartz, rounded sand grains; also dolomite, as above; includes reddish, angular inclusions at 3240.

3250-3290 Limestone, light brown (5YR6/4) dolomitic, sucrosic with inclusions of reddish silt; fossiliferous.

3290-3300 Limestone, moderate orange pink, grainy, reddish silt grains included; thin purple veins.

3300-3330 Limestone, very pale orange, dendritic, grainy, some pinpoint porosity.

3330-3350 Sand, coarse, rounded grains of quartz and pyrite as cement in finer sand, also limestone as above.

3350-3360 Dolomite, calcic, grayish orange pink, silty with angular inclusions of limestone; fossiliferous, cherty.

3360-3410 Limestone, pinkish gray with purple specks and streaks; grainy; a few red specks on outer surfaces; becomes microsucrosic at 3400.

3410-3420 Sand, rounded quartz, frosted to clear, uniformly fine.

3420-3430 Limestone, as from 3360-3410.

3430-3600 Limestone, very pale orange, sucrosic, intergranular porosity; interval also has abundant sand similar to that above; a few pieces of chalky limestone at 3570; lost circulation 3572.

3600-3860 Limestone, very pale orange, sucrosic, as above with some iron staining; white oolitic limestone at 3630; anhydrite at 3710.

3860-3930 Shale, greenish gray, calcareous, waxy to soapy; compact and massive to platy; speckled black; becomes softer downward.

3930-3970 Shale, light olive gray, resinous, slightly calcareous, platy but soft and soapy; tends to be splintery; disaggregates quickly when wet (interval 3950-3960 missing).

3970-3990 Shale, olive gray, slightly calcareous, resinous and soapy; soft, splintery.

3990-4040 Shale, greenish gray (5Y6/1), calcareous, soapy, splintery to platy.

4040-4080 Shale, as above; plus brownish gray shale, slightly calcareous and more brittle than the greener shale, resinous and soapy; tends to have a reddish tinge; essentially the same as green shale except for color; few fossils.

4080-4100 Shale, grayish red (5R4/2 to 10R4/2), resinous, very slightly calcareous, splintery.

4100-4140 Shale, as above; weathered chips of porous; calcareous arenite containing abundant grains of glauconite and negligible quartz.

4140-4180 Arenite, silty with calcareous cement; glauconitic; predominantly grayish-red color, fine to medium-grained.

4180-4185 Calcareenite, as above, highly glauconitic, weathered, well rounded grains.

4185 Total depth.