

NORTH DAKOTA GEOLOGICAL SURVEY CIRCULAR NO. 271

Summary of the Cardinal Drilling Company, et al. - J. S. Smith #1
Foster County, North Dakota
Well No. 1105 - Permit No. 1117

by John P. Bluemle
April 1963

The Cardinal Drilling Company, et al. - J. S. Smith #1, Foster County, North Dakota. Location: Center SE SW Section 8, T. 146N., R. 65W. Elevation: 1526 Ground, 1533 K.B. Total Depth: 3553.

The Cardinal Drilling Company, et al. - J. S. Smith #1 was spudded March 21, 1956; drilled to a total depth of 3553 feet, found dry and plugged April 5, 1956. Electric and microlaterolog were run by Schlumberger.

Logging Record:

Schlumberger electric log - Run one 4-4-56, 180-3553
Schlumberger microlaterolog - Run one 4-4-56, 1400-3551

Coring Record:

#1 3500-3553

Casing Record:

Set 8 5/8" surface casing at 178 feet with 125 sacks of cement.

Plugging Record:

Top Surface	5 sacks of cement
Bottom Surface	10 sacks of cement
2800 feet	15 sacks of cement
2060 feet	15 sacks of cement
1670 feet	15 sacks of cement

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

Pierre Formation	200 (base of drift)
Niobrara Formation	663
Greenhorn Formation	1162
"Muddy"	1502
Skull Creek Formation	1544
Fall River Formation	1643

Jurassic System

Piper limestone (?)	1892
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Triassic System

Spearfish Formation	1982
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Mississippian System

Lodgepole Formation	2033
Shale facies	2290

Devonian System	
Duperow Formation	2354
Souris River Formation	2497
Ordovician System	
Stonewall Formation	2563
Stony Mountain Formation	
Gunton Member	2577
Stoughton Member	2671
Red River Formation	2774
Winnipeg Formation	
Roughlock Member	3324
Icebox Member	3392
Black Island Member	3518
Pre-Cambrian	3523
Total Depth	3554

0-40	Sandstone, fine to very fine grained, frosted to clear, sub-angular; primarily quartz with particles of calcite, biotite, hornblende and pyrite; slightly calcareous.
40-60	Sandstone, fine to coarse grained, frosted to clear, subrounded; argillaceous; primarily quartz with some shale; slightly calcareous.
60-80	Sandstone, medium to coarse grained, angular to subangular, argillaceous; unoxidized and calcareous.
80-100	Clay; coarse sand and shale, non-calcareous; shale is medium light gray.
100-140	Sandstone, about 80% shale, increasing downward; coarse to medium grained, subrounded except the shale tends to be subangular, arenaceous slightly calcareous.
140-160	Sandstone, fine to medium-grained, angular to well-rounded, about 50% crystalline rock, 40% shale, 10% argillaceous chunks; slightly calcareous.
160-180	Sandstone, medium to coarse-grained, frosted to clear, angular to well-rounded; primarily quartz and other crystalline rocks; calcareous.
180-200	Missing sample.
200-240	Shale, medium light gray, rounded pieces; some crystalline pieces are angular; non-calcareous.
240-400	Shale, medium light gray, non-calcareous.
400-460	Shale, medium light gray, slightly calcareous.
460-480	Shale, light gray, non-calcareous.
480-500	Shale, medium light gray, some calcareous particles.
500-580	Shale, medium light gray, non-calcareous.
580-600	Shale, medium light gray, non-calcareous; some chips of gray limestone.
600-620	Shale, medium light gray, non-calcareous; poorly consolidated.
620-640	Shale, medium light gray, calcareous; bentonite, creamy to white.
640-660	Shale, light brownish gray; pieces of white bentonite, brown stained; white calcareous specks in shale.
660-680	Shale, medium light gray, some bluish pieces; some tan pieces; very calcareous. White calcareous specks in shale.
680-700	Shale, light brownish gray, calcareous; pieces of limestone with white specks.
700-720	Shale, medium light gray to light brownish gray; white specks abundant.

720-800 Shale, medium light gray, white specks, calcareous.

800-840 Shale, light gray to medium light gray, white specks, calcareous.

840-920 Shale, medium light gray, few white specks, poorly consolidated, calcareous.

920-960 Shale, medium light gray with brown stains, tiny white specks, poorly consolidated, calcareous.

960-1000 Shale, medium gray, tiny white specks, calcareous.

1000-1080 Shale, medium dark gray, few tiny white specks, calcareous.

1080-1100 Shale, medium dark gray to medium light gray, a few tiny white specks, calcareous.

1100-1120 Shale, medium gray, tiny white specks, calcareous.

1120-1140 Shale, light brownish gray, tiny white specks, calcareous.

1140-1160 Shale, medium gray, white specks; some chips of grayish yellow arenaceous limestone.

1160-1180 Shale, medium light gray, calcite prisms, white specks, calcareous.

1180-1200 Shale, medium gray, calcite prisms, white specks, highly calcareous.

1200-1220 Missing sample.

1220-1260 Shale, medium gray; calcite prisms, pyritic, white specks; highly calcareous.

1260-1320 Shale, medium dark gray, a few calcite prisms; white specks, calcareous.

1320-1380 Shale, medium dark gray, calcite prisms, white specks; pieces of white bentonite.

1380-1460 Shale, dark gray to medium dark gray; calcite prisms, pyritic, white specks; some pieces of bentonite; calcareous.

1460-1480 Shale, medium gray, calcite prisms, tiny white specks, calcareous.

1480-1500 Shale, brownish gray, calcite prisms, white specks, calcareous.

1500-1520 Shale, medium dark gray, pyritic, white specks, calcite prisms; particles of brownish siltstone included; calcareous.

1520-1560 Shale to siltstone, medium gray, contorted texture, white specks in shale; pyritic, calcareous.

1560-1600 Shale to siltstone, dark gray, contorted texture, tiny white specks in shale; calcite prisms; pieces of bentonite, calcareous pyritic.

1600-1620 Shale to siltstone, medium gray with green granules, white specks calcite prisms; calcareous.

1620-1640 Shale to siltstone, medium gray; few sandstone pieces; rounded calcite granules, very pyritic; white pieces of bentonite, calcareous.

1640-1680 Shale, medium dark gray; a few rounded free quartz grains; calcite prisms; calcareous; very pyritic with some green altered pyrite; bentonitic; siltstone, medium light gray, non-calcareous.

1680-1700 Shale, medium gray; about 10% rounded, frosted quartz sand; iron-stained sand particles; pink clay; siltstone; calcareous.

1700-1740 Shale, medium dark gray, calcareous; iron carbonate pellets, brownish gray, less than 1 mm across, pyritic, free quartz.

1740-1760 Shale, dark gray; siltstone, light gray; iron carbonate pellets; calcite prisms, pinkish clay, calcareous.

1760-1780 Siltstone, medium light gray; quartz grains; iron concretions and a few iron carbonate pellets, calcareous.

1780-1800 Siltstone, medium light gray; shale, medium gray; iron carbonate pellets; pyritic, calcareous.

1800-1840 Siltstone, medium gray; FeCO₃ pellets, some rounded quartz grains, calcite prisms, calcareous.

1840-1880 Siltstone, medium gray; sandy with well rounded frosted to clear quartz grains; FeCO₃ pellets; pyritic, calcareous.

1880-1900 Siltstone, medium dark gray, rounded, frosted quartz, some FeCO₃ pellets, pyritic, calcareous.

1900-1920 Sandstone, subangular to subrounded granules; pyritic, calcareous.

1920-1930 Sandstone, subrounded; frosted quartz grains, FeCO₃ pellets, pyritic, chips of light gray limestone.

1930-1950 Limestone, light gray, fragmental, silty, fossiliferous.

1950-1960 Limestone, light gray, angular and rounded inclusions as a breccia.

1960-1970 Limestone, yellowish gray, silty, almost oolitic.

1970-1980 Limestone, light gray, fossiliferous; some coal.

1980-2000 Siltstone, medium light gray, with sand and limestone particles; red blocks of clay and silt; coal; pyritic.

2000-2010 Siltstone, medium light gray; sandstone, cemented with reddish iron rich calcareous clay; free quartz; limestone chips.

2010-2020 Sandstone, cemented with red clay; shale, medium gray, calcareous; limestone, light gray.

2020-2030 Sandstone, all degrees of rounding, red cement gives reddish hue to whole sample; calcareous.

2030-2050 Limestone, yellowish gray, argillaceous.

2050-2060 Limestone, yellowish to pinkish gray, fragmental, argillaceous, microsucrosic; spotted pink and red.

2070-2080 Limestone, pinkish gray to grayish orange pink; sandy to micro-sucrosic.

2080-2120 Limestone, yellowish gray to grayish orange pink; microsucrosic; red specks in whiter chunks; fossiliferous, tends to be chalky.

Poor Circulation.

2120-2180 Limestone, yellowish gray to light brownish gray, microsucrosic; fragmental; some chalky pieces.

Lost Circulation.

2180-2200 Limestone, pinkish gray, dense to microsucrosic; few pieces of gray shale.

2200-2210 Shale, dark to medium gray, red stained, calcareous; limestone, as above.

2210-2220 Limestone, pinkish gray, lithographic; shale, red-stained.

2220-2230 Limestone, chalky white to yellowish gray, shale, same as above.

2230-2240 Missing sample.

2240-2260 Shale, medium gray to medium dark gray; red stained.

2260-2290 Shale, dark gray to medium light gray; red-stained shale.

Lost Circulation.

2290-2380 Missing samples. Lost circulation.

2380-2400 Limestone, pinkish gray to moderate red; microsucrosic to sandy texture; angular reddish particles in some pieces.

2400-2410 Limestone, light brownish gray, sucrosic to granular and porous.

2410-2430 Dolomite, pinkish gray to grayish pink; sucrosic; sublithographic.

2430-2440 Dolomite, pale red to pinkish gray, fossiliferous, slightly porous.

2440-2460 Dolomite, light brownish gray to pinkish gray, microsucrosic.

2460-2490 Dolomite, light brownish gray to pinkish gray; sandy; quite porous.

2490-2500 Dolomite to limestone, light brownish gray to pinkish gray; dense.

2500-2530 Dolomite to limestone, pinkish gray to yellowish gray, speckled; microsucrosic.

2530-2560 Dolomite, pinkish gray to grayish orange pink with some lighter colored chips of limestone; red stains; finer texture than above.

2560-2580 Dolomite to limestone, grayish orange pink to very pale orange respectively; microsucrosic to dense.

2580-2620 Dolomite to limestone, moderate red to pale orange respectively; dolomite is porous, limestone lithographic.

Lost Circulation.

2620-2630 Dolomite, grayish orange pink, coarse sucrosic; limestone, yellowish gray, dense to lithographic.

2630-2640 Dolomite, pale red and limestone, pale yellowish brown; essentially same as above.

2640-2650 Dolomite, grayish red to pale red, vuggy to very porous; limestone, pale yellowish brown, fine grained to dense.

2650-2680 Limestone, pale yellowish brown, dense, becoming more crystalline downward; dolomite, grayish orange pink, vuggy, red stains on lips of vugs; calcite crystals.

2680-2690 Limestone, pinkish gray with purple staining, sucrosic; dolomite, pale orange; shale, medium gray with black specks.

2690-2700 Limestone, white, dendritic to sucrosic to dense; dolomite, pale orange; shale, medium gray with reddish iron stains; slightly calcareous, white calcareous inclusions.

2700-2720 Limestone, pale red to yellowish gray, red stains; fine-grained to crystalline.

2720-2740 Limestone, white to moderate red; sucrosic, close texture to sub-crystalline porous texture; fragmental; shale reddish stained, coarse to medium grained; one brachiopod fragment noted.

2740-2750 Limestone, white to moderate red, fragmental with some porous chips; shale, pyrite, quartz sand.

2750-2780 Limestone, light gray to mottled pale red and gray; fine-grained to sublithographic, some pinpoint porosity; siltstone, pale reddish brown, calcareous; shale, rounded quartz grains.

2780-2790 Missing sample.

2790-2800 Limestone, yellowish gray to pale red, fine-grained to sucrosic; shale, dark gray, well-indurated with rounded quartz grains.

2800-2810 Missing sample.

Lost Circulation.

2820-2830 Limestone, yellowish gray to mottled pale red, red stains; gypsum fragments; shale, dark gray, flaky to slaty, calcareous.

2830-2840 Dolomite to limestone, yellowish gray to mottled pale red and gray; shale, red to brownish with rusty stains, dense.

2840-2850 Limestone, pale red; shale, light brown, calcareous.

2850-2860 Limestone, grayish orange pink, mottled browner and lighter; yellow stains; shell fragments.

2860-2870 Missing sample.

2870-2890 Dolomite, pale red to grayish orange pink, microsucrosic to sublithographic.

2890-2940 Dolomite, pale red to grayish orange pink, microsucrosic to sub-lithographic, some intergranular porosity, shell fragments.

2940-2950 Dolomite, moderate red to moderate orange pink; fine grained to microsucrosic.

2950-2970 Dolomite, pale yellowish brown to light brown, fine-grained to microsucrosic, fossil fragments in lower 10 feet.

2970-2990 Dolomite, pale red to grayish orange pink, fine-grained to microsucrosic; brachiopod fragments in upper 10 feet.

2990-3000 Dolomite, moderate red to grayish orange pink, microsucrosic.

3000-3010 Dolomite, moderate red to very pale orange, microsucrosic.

3010-3020 Dolomite, white to moderate red, fine grained to microsucrosic.

3020-3030 Dolomite, same as above; limestone, grayish orange, cherty.

3030-3040 Limestone, grayish orange fine grained; dolomite, same as above, cherty.

3040-3050 Limestone, grayish orange, sublithographic; yellowish brown shale, grayish orange pink microsucrosic dolomite.

3050-3060 Limestone, light brown to very pale orange, microsucrosic to chalky.

3060-3070 Limestone, same color as above, fine grained to microsucrosic.

3070-3080 Missing sample.

3080-3090 Limestone, chalky white to light brown; cherty, fine grained.

3090-3150 Missing sample.

3150-3160 Limestone, light brown to grayish orange pink; dendritic dense, microsucrosic to fine grained.

3160-3170 Limestone, pale red to grayish orange pink, microsucrosic, some porosity.

3170-3180 Limestone, pale red to grayish orange, cherty, microsucrosic to coarse grained, some porosity.

3180-3190 Limestone, chalky white to very pale orange; very dense to coarse grained.

3190-3200 Limestone, pinkish gray to pale red; dense to microsucrosic to coarse; fossil shells; some sandy pieces are porous, some dolomite.

3200-3210 Limestone, very pale orange; chert; microsucrosic to coarse grained.

3210-3220 Limestone, pale yellowish brown to grayish orange pink; some chalky pieces dendritic.

3220-3230 Limestone, very pale orange, chalky pieces, very fine to medium grained.

3230-3240 Limestone, very pale orange, rusty colored dots in limestone, texture is chalky to fine grained.

3240-3250 Same as above, more reddish dots in limestone, fragmental limestone--very pale orange.

3250-3280 Limestone, grayish orange pink to very pale orange, calcite crystals encompass sand grains, reddish sand mixed in, increasing downward.

3280-3290 Limestone, considerable recrystallized calcite included, coarse to sucrosic texture, red sand grains, grayish orange pink.

3290-3300 Same as above; a few chips of sandy, shale--dark gray color.

3300-3310 Limestone, light brownish gray to grayish orange pink. Some silty; some porous pieces of limestone. Contorted, twisted limestone with sand zones in layers.

3310-3320 Limestone, same as above with considerable numbers of re-crystallized (?) calcite included to make a breccia-like texture.

Abundant red sand grains in limestone. Shale, gray.
3320-3330 Same as above, limestone has more sucrosic texture. Shale is a little more brownish gray.
3330-3340 Limestone, grayish orange pink, dense to very porous; white chert; limestone has inclusions of calcite, some iron stains, some gray shale.
3340-3370 Limestone, very pale orange to pale yellowish brown; white chert; shale, dark gray; some free quartz grains.
3370-3380 Limestone, same as above but more porous than above.
3380-3400 Limestone, pale yellowish brown, sucrosic; white chert; shale, greenish gray calcareous.
3400-3440 Shale, greenish gray, calcareous, splintery, rounded quartz grains. Limestone (from above) mixed in.

Lost Circulation.

3440-3480 Shale, greenish gray, splintery, rounded quartz grains, calcareous.
3480-3490 Shale, greenish gray, splintery, very slightly calcareous also shades of black, calcareous shale, free, rounded quartz. Limestone, small chips probably from above.
3490-3500 Shale, greenish gray, splintery slightly calcareous--one fossil caste noted in shale--some pieces of dark gray shale. Free quartz, also limestone chips.
3500-3520 Shale, greenish gray, non-calcareous with a few rounded grains of quartz in the matrix; a few pyrite lenses in shale in lower 10 feet.
3520-3540 Basic igneous rock.