NORTH DAKOTA GEOLOGICAL SURVEY CIRCULAR NO. 238

Summary of the Cardinal Petroleum Co., Great Plains Royalty, Kaufman, Jr. Ole and Victor Johnson No. 1
Bottineau County, North Dakota
Well No. 2272 - Permit No. 2284

by Clarence G. Carlson
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The Cardinal Petroleum Company, Great Plains Royalty, Kaufman, Jr. - O. and V. Johnson No. 1, is located in Center NE SW Section 20, T. 161N., R. 79W., Bottineau County, North Dakota. The elevation is 1,458 feet ground level and 1,467 K.B.

The Cardinal Petroleum Company, Great Plains Royalty, Kaufman, Jr. - Ole and Victor Johnson No. 1 was spudded April 5, 1959. 8 5/8" surface casing was set at 228 feet with 140 sacks of cement and 5 1/2" casing was set at 3294 feet with 150 sacks of cement. The well was tested and completed as a producing well April 26, 1959; producing from the Spearfish formation (3266-3270) and the Charles formation (3294-3332). Discovery well Starbuck field.

Logs:
Electric
Microlaterolog

Cores: 3306-3335

Tests:
DST 1 - 3266 to 3277 (Spearfish); tool open 2 hours; shut in 30 minutes. Recovered 75 feet of slightly mud cut oil, 170 feet of gassy oil no water. Pressures: HP 1765-1750; FP 25-105; SIP 1430.

DST 2 - 3299-3335 (Madison); tool open 2 hours; shut in 30 minutes. Recovered 20 feet of slightly gas cut mud, 120 feet of highly gas cut, slightly oil cut mud, 180 feet of highly gas and oil cut mud, 140 feet of highly gas cut, slightly mud cut oil, 30 feet of salt water. Total recovery 490 feet. Pressures: HP 1830-1775; FP 70-160; SIP 1610.

Completion Data:
Perforations: Three vibro-frac charges 3312-3317, 3301-3306, 3266-3270. Shot interval of 3266-3270 with 8 shots per foot, acidized with 2,000 gallons. Completed interval of 3294 to 3332 as open hole completion. Initial production; pumping 94 barrels of oil per day, 36.4 gravity, 12% water.

Formation tops were determined from samples and mechanical logs, corrected to the electric logs. Not all formation tops are called in the following list. Colors are from the Rock Color Chart distributed by the Geological Society of America.

FORMATION TOPS

Cretaceous System	
Niobrara formation	1372
Greenhorn formation	1674
Mowry formation	1942
Fall River formation	2121
Jurassic System	2370 ?
Piper limestone	2820
Triassic System	
Spearfish formation	3112
Mississippian System	
Madison Group	3274

Ratcliffe interval

300-390	Shale, medium gray, micaceous, lumpy.
390-420	Shale, as above and medium light gray, soft, slightly bentonitic.
420-600	Shale, medium light gray to medium gray, lumpy.
600-660	Shale, very light olive gray, soft, bentonitic; a little white bentonite.
660-720	Shale, medium light gray to medium gray, micaceous, lumpy; a little white bentonite, some pyrite.
720-780	Shale, medium light gray and pale yellowish brown (10YR6/2), micaceous, lumpy.
780-840	Shale, medium light gray, micaceous, lumpy.
840-870	Shale, medium light gray and pale yellowish brown (10YR6/2), micaceous, lumpy.
870-1080	Shale, medium light gray, micaceous, lumpy.
1080-1230	Shale, medium gray, bentonitic.
1230-1260	Shale, medium dark gray, fissile; shale, as above.
1260-1410	Shale, medium gray, bentonitic.
1410-1440	Shale, medium gray, fissile, calcareous, “white specks”.
1440-1500	Shale, medium gray, bentonitic, micaceous.
1500-1680	Shale, dark gray to medium dark gray, fissile, micaceous.
1680-1710	Shale, dark gray, fissile, calcareous, “white specks”, numerous fragments of Inoceramus, some of them cemented into an argillaceous limestone.
1710-1770	Shale, dark gray, calcareous, “white specks”, fissile in part to lumpy.
1770-1800	Shale, as above; numerous Inoceramus fragments.
1800-1860	Shale, dark gray, fissile; shale as above.
1860-1980	Shale, dark gray, fissile.
1980-2010	Shale, medium light gray, lumpy and dark gray, fissile.
2010-2080	Shale, medium light gray to medium gray, fissile in part, lumpy in part.
2080-2110	Shale, dark gray, fissile.
2110-2140	Sandstone, very fine to coarse grained, rounded to subrounded, a little pyrite cement, otherwise weakly cemented; shale as above.
2140-2170	Shale, medium light gray to medium dark gray; lignite; some sandstone as above.
2170-2200	Sandstone, composed of fine to very coarse grained, rounded to subangular, quartz grains; a little scattered pyrite.
2200-2210	Sandstone, as above; some shale, very light gray, to orangish gray, soft, waxy.

2210-2240	Sandstone, orangish gray, very fine to fine grained, rounded to subangular, firmly cemented; shale, very light gray and light brownish gray, soft, waxy.
2240-2250	Sandstone, pale red (10R6/2), very fine to medium grained, rounded to subangular, silty, firmly cemented with ferruginous and a little pyrite cement.
2250-2270	Shale, medium light gray, lumpy to platy.
2270-2300	Sandstone, very light gray, very fine grained, silty, micaceous, slightly friable; some shale as above, some pyrite.
2300-2310	Sandstone, very light gray, very fine grained, silty, argillaceous, micaceous, some shale, medium light gray and light brownish gray, soft, lumpy.
2310-2350	Sandstone as above, shale, medium light gray and light greenish gray, platy, soft and medium dark gray, fissile.
2360-2370	Shale, medium light gray, lumpy, some sandstone, pale red, very fine to medium grained, firmly cemented with ferruginous cement.
2370-2450	Shale, greenish gray, (5G6/1), platy, slightly calcareous; sandstone, light greenish gray, very fine grained, silty, argillaceous, slightly calcareous; much shale, medium dark gray, fissile cave ?
2550-2590	Shale, greenish gray (5G6/1) to light olive gray, (5Y6/1), platy, to fissile, slightly calcareous, micaceous; sandstone, light greenish gray, very fine grained, silty, argillaceous, very calcareous.
2590-2670	Shale, greenish gray, (5G6/1), to light olive gray (5Y6/1), fissile, calcareous; limestone, very light gray, fine to medium crystalline, granular, fragmental, slightly argillaceous; a little sandstone, as above.
2670-2700	Shale, greenish gray (5G6/1) to light olive gray, (5Y6/1), fissile, calcareous; a little sandstone, light greenish gray, very fine grained, calcareous.
2700-2710	Shale, as above and pale red (10R6/2), calcareous, lumpy; some sandstone as above.
2720-2760	Shale, greenish gray (5G6/1) to light olive gray (5Y6/1) and pale red (10R6/2), calcareous, platy to fissile; a little sandstone, light greenish gray, very fine grained, calcareous.
2760-2820	Shale, variegated, calcareous, platy to fissile; sandstone, colorless to white, fine grained, clean, quartzose.
2820-2830	Limestone, very light gray, finely crystalline, slightly dolomitic; a little light gray chert; much shale and sandstone, as above.
2830-2850	Limestone, yellowish gray to very light gray, finely crystalline, a little light gray to white chert.
2850-2870	Sandstone, light yellowish gray, fine grained, very calcareous, slightly argillaceous grading into a sandy limestone.
2870-2890	Sandstone, colorless to light gray, fine grained, subrounded to subangular, clean quartzose; a little limestone, as above.
2890-2900	Shale, variegated, mostly medium dark gray, platy to fissile, may be mostly cave ?; a little sandstone and limestone as above.
2950-2960	Limestone, light yellowish gray, very finely crystalline.
2960-2970	Limestone, very light gray to white, very finely crystalline.
2970-2980	Limestone, very light gray, very finely crystalline and anhydrite, very light gray, dense.
2980-3020	Limestone, light yellowish gray to very light gray, finely crystalline, some light gray to white chert.

3020-3110	Anhydrite, pinkish gray to white; a little shale, pale red, lumpy.
3110-3120	Siltstone, pale reddish brown (10R5/4); shale and anhydrite, as above.
3120-3140	Siltstone, moderate reddish orange to grayish red (10R4/2), very argillaceous, slightly calcareous grading into a silty shale.
3140-3150	Siltstone, moderate reddish orange, slightly calcareous.
3150-3180	Siltstone, moderate reddish orange, very slightly calcareous, a little white anhydrite, scattered rounded, frosted, medium to fine quartz grains.
3180-3220	Siltstone, as above grading into a very fine to medium grained, silty, sandstone.
3220-3270	Sandstone, moderate reddish orange, very fine to medium grained, silty; siltstone, as above.
3270	Circulation - Sandstone, as above, some oil stain; some pinkish gray anhydrite.
3277	Circulation - Siltstone, as above and sandstone, moderate reddish orange, very fine to medium grained, silty, some oil staining; some anhydrite white to pinkish gray.
3277-3290	Anhydrite, very light gray, very finely crystalline, dense, calcareous; some interbedded limestone, very light yellowish gray, finely crystalline.
3290-3300	Dolomite, light gray and pinkish gray, very finely crystalline, dense, some anhydrite, very light gray.
3306	Circulation - Dolomite, yellowish gray, finely crystalline in part, fine grained, granular in part with good oil staining, pinpoint porosity.

Cores

3306-3307	Limestone, yellowish gray, fine grained, granular slight oil staining interbedded with medium to coarsely crystalline, anhydritic limestone.
3307-3308	Limestone, yellowish gray, oolitic in part, fine grained, granular in part with pinpoint porosity and good oil stain with some medium to coarse crystals and thin lenses of colorless anhydrite.
3308-3309	Limestone, yellowish gray, fine to medium crystalline, with a few vugs filled with colorless anhydrite.
3309-3310	Limestone, yellowish gray, fine to medium grained, pseudo-oolitic with medium to coarse crystals of pale brown anhydrite; good oil stain.
3310-3312	Limestone, light yellowish gray, finely crystalline, fair pinpoint porosity; with lenses and stringers of pale brown and colorless anhydrite; scattered light oil stain.
3312-3313	Limestone, light yellowish gray, fine to medium crystalline, fragmental in part with a few ostracods and granular in part; scattered crystals and lenses of pale brown anhydrite.
3313-3315	Limestone, light yellowish gray, fine to medium grained, fragmental, good intergranular porosity.
3315-3317	Limestone, light yellowish gray, fine grained, granular, pinpoint porosity, oil stained.
3317-3318	Limestone, light gray, fine grained, granular, dolomitic, spotty staining.
3318-3320	Limestone, light brownish gray, fine grained, granular, dolomitic, with scattered coarse crystals of pale brown to colorless anhydrite, good oil stain.

3320-3322	Limestone, light brownish gray, fine to medium crystalline, partially recrystallized, some traces of oolitic texture; good oil stain; scattered coarse crystals of pale brown to colorless anhydrite.
3322-3325	Limestone, as above, with spotty staining.
3325-3327	Limestone, light yellowish gray, finely crystalline, good pinpoint porosity, with scattered coarse crystals and stringers of pale brown to colorless anhydrite.
3327-3330	Limestone, light yellowish gray, finely crystalline, inter-fingering with colorless to white anhydrite.
3330-3332	Anhydrite, white to light blue with thin stringers of light yellowish gray, finely crystalline limestone; some reddish staining.
3332-3333	Limestone, light yellowish gray, finely crystalline with lenses and scattered crystals of pale brown anhydrite.
3333-3334	Limestone, light yellowish gray, oolitic with a finely crystalline matrix, scattered coarse crystals and lenses of pale brown to colorless anhydrite.
3334-3335	Limestone, light yellowish gray, fine grained, granular.