

NORTH DAKOTA GEOLOGICAL SURVEY CIRCULAR NO. 39

Summary of the Nels Dronen No. 1 Well
Burleigh County, North Dakota

by John W. Caldwell
Well #155, Permit #171
March 1954

Continental Oil Company - Nels Dronen No. 1, Burleigh County, North Dakota, Section 9, T. 145W., R. 62W., (660 feet S. of W. line and 660 feet W. of E. line, Section 9). Elevation R.B. 1912.

The Continental No. 1 Dronen was spudded September 13, 1952, 13 3/8 inch casing was set at 367 feet. The well was plugged November 1, 1952. Cement plugs were used as follows: 20 sacks 5815-5865 feet, 13 sacks 4663-4700 feet, 15 sacks 4403-4440 feet, 15 sacks 3686-3723 feet, 32 sacks 2553-2630 feet, 25 sacks at top of surface casing.

The well was extensively cored, with 18 cores being taken. Descriptions of the cores are found in the text of this report.

TESTS:

DST #1 - The packer was set at 3722'-3744'. Tool open 1 hour and 15 minutes. Shut in 25 minutes. FP-0, SIP-1250#, recovered 270' mud.

DST #2 - The packer was set at 4594'-4647'. Tool open 1 1/2 hours. Shut in 30 minutes. FP 900#, SIP 1750#, recovered 1980' salt water.

Formation tops determined from sample and electric logs, not all lithologic formation tops called in following list. Colors determined from rock color chart.

FORMATION TOPS

<u>Formation</u>	<u>Tops</u>
Cretaceous system	
Pierre Formation	665
Niobrara Formation	1347
Greenhorn Formation	1970
Dakota	2592
Jurassic System	
Morrison Formation	2703
Sundance Formation	2755
Piper Formation	3063
Triassic System	
Spearfish Formation	3220?
Mississippian System	
Amsden Formation	3266
Big Snowy group	3290
Charles Formation	3420
Mission Canyon Formation	3680
Lodgepole Formation	3912
Englewood Formation	4320

<u>Formation</u>	<u>Tops</u>
Devonian System	
Nisku Formation	4370
Duperow Formation	4458
Souris River Formation	4620
Dawson Bay Formation	4690
Ashern Formation	4735
Silurian System	
Interlake Group	4782
Ordovician System	
Upper Stony Mountain	4920
Lower Stony Mountain	4994
Red River	5090
Winnipeg Formation	5680
Winnipeg Sand	5868
Pre-Cambrian	6140

<u>From</u>	<u>To</u>	<u>Formation</u>
1500	1520	Shale, medium dark gray bentonitic, white specks, pyrite, lumpy, calcareous.
1520	1540	Missing samples.
1540	1560	Shale, medium light gray, bentonitic pyrite, lumpy calcareous.
1600	1740	Shale, medium dark gray, bentonitic, lumpy.
1740	1760	Shale, dark gray, crumbly.
1760	1860	Shale, medium gray, bentonitic, lumpy, calcareous.
1860	1920	Shale, medium dark gray, bentonitic, crumbly.
1920	2040	Shale, medium gray, bentonitic calcareous, numerous inoceramus prisms, pyrite.
2040	2050	Shale, medium dark gray, bentonitic calcareous, white specks, little limestone composed of shell fragments.
2050	2070	Missing samples.
2070	2110	Shale, medium dark gray bentonitic calcareous, white specks, little limestone composed of shell fragments; abundant Globigerina 2090-2100.
2110	2220	Shale, medium gray bentonitic calcareous, abundant inoceramus and shell fragments, abundant Globigerina 2120-2130, pyrite.
2220	2260	Shale, medium dark gray and as above; interbedded with abundant pyrite and shell fragments.
2260	2390	Shale, dark gray, crumbly with occasional shale as above, cave?
2390	2420	Shale, dark gray crumbly with medium gray interbedded bentonitic shale, little siltstone.
2420	2440	Shale, dark gray, crumbly.
2440	2590	Shale as above interbedded with medium gray bentonitic lumpy shale.
2590	2600	Shale, dark gray crumbly with medium gray bentonitic lumpy shale, trace quartz grains, some pyrite.
2600	2610	Shale, as above with some gray, very fine grained calcareous sandstone and few quartz grains.
2610	2640	Shale, as before with large amount of fine grained sandstone and subangular to subrounded coarse quartz grains, some pyrite cement.

<u>From</u>	<u>To</u>	<u>Formation</u>
2640	2720	Shale, medium gray crumbly with medium light gray bentonitic shale, little fine grain silty calcareous light gray sandstone, pyrite, few sand grains as before.
2720	2790	Shale as above with little red shale, few medium to coarse quartz grains.
2790	2800	Shale, medium dark gray crumbly, few quartz grains.
2800	2810	Shale as above, little gray, fine grained calcareous cemented sandstone.
2810	2820	Shale, medium gray with little pale reddish brown shale and sandstone as above.
2820	2860	Shale, pale reddish brown and gray, little calcareous and pyrite cemented, fine grained sand.
2860	2890	Shale, pale reddish brown and gray, little reddish brown siltstone.
2890	2940	Shale, medium gray bentonitic, little siltstone and sandstone, trace red shale.
2940	2960	Shale as above with little light gray pisolitic limestone.
2960	2980	Limestone, light gray pisolitic with quartz and clay ball inclusions, large amount of shale as before, occasional shell fragments,
2980	3010	Limestone as above, some shale as before, numerous shell fragments.
3010	3035	Shale, pale reddish brown and gray, little red and gray siltstone, some anhydrite from 3025-3035.
3035	3040	Shale, pale reddish brown, little gray shale and anhydrite.
3040	3050	Missing samples.
3050	3065	Limestone, yellowish gray to light olive gray, fine grain.
3065	3075	Shale, pale greenish gray, splintery, some limestone as before.
3075	3080	Limestone, yellowish gray to light olive gray, fine grained.
3080	3105	Limestone, yellowish gray, chalky to fine grained.
3105	3115	Limestone, yellowish gray, chalky to fine grained, little gray limestone, mottled pink.
3115	3125	Limestone, yellowish gray to light gray, fine grained.
3125	3135	Shale, light to dark gray bentonitic with some limestone as above.
3135	3145	Limestone, light gray to yellowish gray, fine grained, large amount of shale as above, occasional shell fragments.
3145	3170	Limestone, light gray to yellowish gray, argillaceous in part, fine grained, occasional shell fragments.
3170	3190	Limestone, light gray to yellowish gray, fine grained, occasional shell fragments, some shale red and gray with trace of chert.
3190	3210	Limestone as above with large amount of shale, mostly gray, little anhydrite, trace chert.
3210	3220	Limestone, yellowish gray to light gray, large amount of gray shale, little tan green and reddish brown shale.
3220	3230	Shale, largely gray, some reddish brown and tan, little anhydrite.
3230	3235	Shale, as above, some anhydrite.
3235	3250	Shale, light to dark gray, little anhydrite.
3250	3280	Shale, gray, reddish brown, tan, some anhydrite.

<u>From</u>	<u>To</u>	<u>Formation</u>
3280	3300	Shale, greenish gray, silty little shale as above, and anhydrite, little red shale.
3300	3315	Shale, greenish gray, large amount of red shale and some anhydrite, occasional well rounded medium red stained sand grains.
3315	3330	Shale, greenish gray, some red shale, little anhydrite and yellowish brown shale, occasional sand.
3330	3350	Shale, greenish gray and dark gray, large amount of red shale, occasional sand.
3350	3360	Shale, greenish gray and reddish brown, some yellowish brown shale, occasional sand.
3360	3380	Shale, dark gray with large amount of varicolored shales as above, occasional sand.
3380	3415	Shale, various shades of gray and reddish brown, smaller amounts of yellowish brown and purple shale, occasional sand.
3415	3430	Shale, as above with minor amount of very fine grain dolomitic sandstone, light gray.
3430	3470	Shale, gray reddish brown with some yellowish gray, fine to medium grained limestone, slight cut of oil with acid.
3470	3500	Shale, medium gray, some reddish brown and yellowish brown shale.
3500	3525	Shale as above with little yellowish gray, fine grain limestone.
3525	3570	Shale, medium gray, some reddish brown and yellowish brown shale, occasional light olive gray, fine to medium grain limestone, little staining, slight fluorescence.
3570	3585	Shale as above with very light gray, very argillaceous limestone.
3585	3620	Limestone, yellowish gray to light gray, fine grained, little chalky limestone and few shell fragments.
3620	3640	Shale, medium gray, some reddish brown shale and limestone as above, little anhydrite.
3640	3650	Limestone, yellowish gray to light olive gray, fine to medium grained, some shale as above.
3653	3660	Core #1. Claystone, gray dense dolomite and anhydritic.
3660	3670	Claystone, gray dense and anhydrite.
3670	3673	Limestone, grayish brown dolomitic, streaks of anhydrite.
3673	3680	Limestone, yellowish gray and anhydrite.
3680	3686	Limestone, light olive gray, medium grained, and anhydrite.
3686	3692	Core #2. Anhydrite, dark bluish gray.
3692	3697	Limestone and anhydrite, limestone light olive gray with inclusions of anhydrite crystals.
3697	3700	Dolomite, light gray, very argillaceous.
3700	3705	Anhydrite, bluish gray to white.
3705	3710	Limestone, yellowish gray to olive gray, fine grain with inclusions of crystalline anhydrite.
3710	3715	Anhydrite, medium light gray dense.
3715	3721	Anhydrite, light gray to bluish gray with thin stringers of dolomite.
3721	3725	Limestone, yellowish gray, very argillaceous with considerable anhydrite stringers.

<u>From</u>	<u>To</u>	<u>Formation</u>
3725	3730	Limestone, yellowish gray to light olive gray, fine grained.
3730	3735	Anhydrite, with limestone stringers.
3735	3740	Limestone, yellowish gray with inclusion of crystalline anhydrite.
3740	3744	Limestone, light olive gray, thin banded.
3744	3750	Core #3. Anhydrite, brown crystalline banded, with limestone.
3750	3754	Dolomite, light gray, limy, very argillaceous, fine grained.
3754	3737	Dolomite, yellowish gray, fine grained with inclusion of anhydrite.
3757	3765	Anhydrite, white, dense.
3765	3775	Anhydrite, medium light gray to bluish gray with thin stringers of dolomite.
3775	3785	Anhydrite, white, dense.
3785	3790	Anhydrite, medium light gray.
3790	3795	Anhydrite, white to light gray dense.
3795	3800	Dolomite, light and light olive gray argillaceous and inclusions of anhydrite.
3800	3804	Limestone, yellowish gray dolomitic, good porosity.
3804	3815	Core #4. Dolomite, yellowish gray, fine grain porous.
3915	3820	Anhydrite, yellowish brown, banded with limestone.
3820	3824	Limestone, yellowish gray, medium grained with anhydrite as above.
3824	3827	Limestone, yellowish gray to light olive gray, fine grained, sucrosic.
3827	3832	Limestone, yellowish gray with anhydrite streaks.
3832	3835	Core #5. Limestone, yellowish gray, medium to coarse grained, oolitic.
3835	3840	Limestone, yellowish gray, fine grain porous.
3840	3865	Limestone, yellowish gray, medium to coarse grained oolitic. Bryozoa, occasional anhydrite inclusions.
3865	3880	Limestone, yellowish gray, fine grained, sucrosic porous.
3880	3885	Limestone, yellowish gray, fine grained, fossiliferous.
3885	3888	Limestone, yellowish gray to light olive gray, medium grained.
3888	3891	Limestone, medium light gray limestone.
3891	3950	Missing samples.
3950	3975	Limestone, yellowish gray to light gray, hard fine to medium grain, considerable shale, probably cave.
3975	3990	Limestone, yellowish gray to light gray argillaceous, considerable shale cave.
3990	4040	Limestone, yellowish gray to light gray, fine to medium grain, fossiliferous, considerable shale cave.
4040	4065	Limestone, yellowish gray to light gray, fine to medium grained, chalky and oolitic in part.
4065	4115	Limestone, light gray, mottled with medium gray, fossiliferous chalky in part.
4115	4150	Limestone as above, with little dark gray shale.
4150	4200	Limestone, light gray, mottled with medium gray, fossiliferous, chalky in part.
4200	4205	Core #6. Limestone light gray mottled with dark gray, fine and medium grained.

<u>From</u>	<u>To</u>	<u>Formation</u>
4205	4220	Limestone, medium light gray, fine to medium grained, fossiliferous.
4220	4245	Limestone, yellowish gray to light olive gray, fine to medium grained, fossiliferous.
4245	4255	Limestone, yellowish gray to light gray, fine grained.
4255	4259	Limestone as above with white chert.
4260	4300	Limestone, yellowish gray to light gray, fine grained with very light gray chert.
4300	4335	Limestone as above with light olive dray dolomitic limestone, fine grained.
4335	4355	Limestone as above, little light and dark gray shale.
4355	4375	Limestone, yellowish gray to light gray, fine to medium grained, little light gray chert.
4375	4400	Dolomite, yellowish gray to light olive gray, very limy in part, sucrosic, fine grained with some limestone and chert as before.
4400	4415	Dolomite, yellowish gray to light olive gray, limy in part, sucrosic, fine gained.
4415	4430	Dolomite as above, large amount of light gray chert.
4430	4450	Dolomite as above, little yellowish gray, fine grained limestone.
4450	4489	Dolomite, light olive gray to yellowish gray, fine grained, little intergranular porosity.
4489	4500	Core #7. Dolomite, yellowish gray and light olive gray, fine grained, some intergranular porosity.
4500	4505	Dolomite, medium gray, fine grain, dense.
4505	4510	Dolomite, as above with yellowish gray, porous sucrosic dolomite.
4510	4514	Dolomite, olive gray porous fine to fine grain, asphaltic residue on bedding planes.
4514	4520	Shale, greenish gray, calcareous, silty glauconitic.
4520	4522	Dolomite, dark gray, argillaceous.
4522	4548	Dolomite, medium light gray, fine to medium gray, porous.
4548	4555	Dolomite as above. Core #8.
4555	4565	Limestone, yellowish gray, fine grained.
4565	4570	Limestone, medium light gray, ostracods, fine grained.
4570	4571	Shale, dark greenish gray, calcareous.
4571	4588	Limestone, light gray, fine to medium grained.
4588	4590	Core #9. Limestone, yellowish gray, fine grained.
4590	4596	Limestone, light olive gray, fine grained.
4596	4607	Dolomite, brownish gray, porous, fine to medium grained.
4607	4615	Dolomite and anhydrite, dolomite is yellowish gray, fine grained, anhydrite white granular.
4615	4635	Dolomite, very light gray, fine grained, pyrite and anhydrite inclusions.
4635	4640	Claystone, olive gray to dark greenish gray.
4640	4647	Dolomite, light olive okay, fine grained.
4647	4653	Core #10. Dolomite, light, olive gray to light gray, fine grain.
4653	4660	Limestone, yellowish gray, fine grained, shale partings and anhydrite.
4660	4665	Limestone, greenish gray, fine grained, sandy.

<u>From</u>	<u>To</u>	<u>Formation</u>
4665	4675	Dolomite, yellowish gray to light olive brown, fine grain, dense.
4675	4680	Dolomite, light olive gray, to greenish gray, fine grained.
4680	4685	Dolomite, yellowish gray to olive gray, fine grain, sandy.
4685	4707	Dolomite, light gray for yellowish gray, fine grain.
4707	4710	Core #11. Dolomite as above.
4710	4720	Limestone, light olive gray, dense, fine grain, dolomitic.
4720	4730	Limestone, light olive gray, fine to medium grain.
4730	4740	Dolomite, yellowish gray to light olive gray, fine to medium grain, porous.
4740	4745	Dolomite, light gray, fine grained with red mottlings, sandy.
4745	4755	Dolomite, very light gray, sandy.
4755	4760	Shale, grayish red, dolomitic.
4760	4764	Shale, olive gray to light gray, dolomitic.
4764	4775	Core #12. Dolomite, olive gray to light gray, fine grained, very argillaceous, sandy.
4775	4780	Sandstone, fine to medium grained, well rounded, frosted light brownish gray to reddish gray dolomitic.
4780	4785	Dolomite, white, fine grained.
4785	4790	Dolomite, pinkish gray, fine grain.
4790	4794	Shale, dolomitic, light greenish gray and reddish brown.
4794	4805	Dolomite, white fine grained, pale reddish brown streaks. Core #13.
4805	4810	Dolomite, pinkish gray, sucrosic vugs.
4810	4827	Dolomite, white fine grained.
4830	4850	Dolomite, white to yellowish gray, fine grained.
4850	4880	Dolomite, white, chalky, limy, fine grained.
4880	4920	Dolomite, white to yellowish gray, fine grained, dense.
4920	4965	Dolomite as above with some gray shale.
4965	4975	Dolomite, white to yellowish gray, large amount of dark gray shale.
4975	4990	Dolomite, white to yellowish gray, chalky in part, fine grain, limy.
4990	5010	Dolomite, light gray to yellowish gray, fine grained, sucrosic, part limy.
5010	5030	Limestone, yellowish gray to light gray, fine grained, chalky in part.
5030	5060	Shale, light gray and light greenish gray, calcareous, some limestone as above.
5060	5065	Shale, gray and light greenish gray limestone as above.
5065	5080	Dolomite, yellowish gray, fine grain shale as before, bryozoa.
5080	5110	Dolomite, yellowish gray, limy, fine grain, some gray shale.
5110	5135	Limestone, yellowish gray to light gray, fine grain, little gray shale.
5135	5145	Limestone, yellowish gray, chalky to fine grain.
5145	5160	Shale, gray and light greenish gray, limestone as above.
5160	5180	Limestone, yellowish gray, chalky to fine grain, some shale as before.
5180	5200	Limestone, yellowish gray, fine grained, dolomitic.

<u>From</u>	<u>To</u>	<u>Formation</u>
5200	5250	Dolomite, yellowish gray, very fine grained, hard, dense, limy in part.
5250	5270	Dolomite, yellowish gray, very fine grain, limy in part, little light gray shale.
5270	5310	Limestone, yellowish gray, fine grain, chalky in part, little dolomite as above, fossiliferous.
5310	5320	Limestone as above, with yellowish gray limy dolomite, fine grained, occasional fossils.
5320	5340	Dolomite, yellowish gray to light olive gray, fine grained, sucrosic with large amount of limestone as above.
5340	5360	Limestone, yellowish gray, chalky to fine grain, fossiliferous, some dolomite as before.
5360	5370	Limestone, white to yellowish gray, mostly chalky, fine grain.
5370	5380	Limestone, white to yellowish gray, fine grain, some chalky, some sucrosic, light olive gray, limy dolomite.
5380	5405	Dolomite, yellowish gray to light olive gray, sucrosic, fine grain, limy, large amount of limestone as above.
5405	5415	Dolomite, yellowish gray, to light olive gray, sucrosic, fine grain, some interbedded chalky limestone.
5415	5430	Limestone, white to yellowish gray, chalky to fine grain, little dolomite as above.
5430	5450	Limestone, white to yellowish gray, chalky to fine grain, fossiliferous.
5450	5480	Limestone as above, with some gray shales and dolomite. Chert 5455-65.
5580	5495	Shale, medium gray, little greenish gray shale, some limestone as above and little dolomite and chert.
5495	5510	Dolomite, light olive gray, sucrosic, fine grained, large amount of shale and some limestone and light gray chert.
5510	5560	Dolomite as above, little limestone and some light gray chert.
5560	5600	Limestone, white to yellowish gray, chalky to fine grain, little chert and dolomite as above, fossiliferous.
5600	5705	Limestone, white to yellowish gray, chalky to fine grain, fossiliferous, coral and bryozoa, occasional gray shale (cave?)
5705	5740	Limestone as above, large amount of dark gray shale.
5740	5750	Shale, gray, dark greenish gray and olive gray, splintery shale, limestone as above.
5750	5860	Shale, dark greenish gray and olive gray splintery.
5862	5865	Core #14. Shale, greenish gray, splintery.
5865	5876	Shale, dark greenish gray, waxey splintery.
5876	5885	Sandstone, very light gray, fine grained, well sorted sub-rounded, porous.
5885	5893	Sandstone as above with numerous medium grained grains, poor to fair sorting.
5893	5896	Shale, dark greenish gray syplintery.
5896	5900	Dolomite, light olive gray, very glauconitic.
5900	5905	Core #15. Dolomite, light gray, sandy glauconitic.
5905	5910	Core #15. Dolomite, very light gray sandy glauconitic with interbedded greenish gray shale.

<u>From</u>	<u>To</u>	<u>Formation</u>
5910	5915	Dolomite, medium to coarse grained, light olive gray.
5915	5942	Sandstone, very light gray, fine grained, well sorted, rounded to sub-rounded, porous.
5942	5977	Missing samples.
5977	5985	Core #16. Sandstone, very light gray, fine grained, sub-round to rounded, porous, well sorted.
5985	5990	Sandstone as above, fine to medium grain, fair sorting.
5990	6011	Sandstone, as above, very fine to fine grain with few medium sized grains.
6011	6015	Core #17. Shale, greenish gray with sand partings as above.
6015	6020	Sandstone, very fine grained, silty, light gray, fossiliferous, shale partings.
6020	6031	Shale, greenish gray, splintery fossiliferous, brachiopods.
6031	6035	Shale as above with highly glauconitic sandstones.
6035	6040	Sandstone, brownish gray, highly glauconitic.
6040	6055	Shale, dark greenish gray streaked with glauconitic sandstone.
6055	6060	Dolomite, very sandy, light gray, glauconitic.
6060	6065	Sandstone, light gray, very fine grained, silty, glauconitic.
6065	6071	Dolomite, light gray, crystalline, medium grained, glauconitic and sandy.
6070	6085	Shale, greenish gray, splintery.
6086	6100	Core #18. Sandstone, very light gray, very fine to fine grained, well sorted, glauconitic, mottled with limonite 6090-95, dolomitic.
6100	6115	Sandstone as above with red grains.
6115	6120	Sandstone, white to fine grained, well sorted, slightly glauconitic.
6120	6125	Core #18. Sandstone, white very fine to fine grain, glauconitic.
6125	6130	Dolomite, olive gray with inclusions of red glauconitic sandstone. Core #18.
6130	6135	Sandstone, white, very fine to medium grained, poorly sorted.
6135	6142	Sandstone, coarse grained, white sub-round to rounded grains frosted.
6142	6146	Granite, pink, weathered.