

NORTH DAKOTA GEOLOGICAL SURVEY CIRCULAR NO. 37

Summary of Lion Oil Company - Nels Magnuson #1

Bottineau County, North Dakota

By Carole Smith

Lion Oil Company - Nels Magnuson #1, Bottineau County, North Dakota; Section 2, T. 163N., R. 77W. (1980' east of west line, 1895' south of north line). Elevation: 1659' G.L.; 1669' K.B.

The Lion Oil Company Magnuson # 1 was spudded September 24, 1952 and was abandoned as a dry hole on October 25, 1952 at a depth of 5102'. 8 5/8 inch casing was set at 351' and cemented to the surface with 250 sacks. Fifteen sack cement plugs (approximately 40 foot plugs) were set at 5055, 3895, 3065, 2955, 2375, 2030; a 25 sack plug was set in the base of the surface casing at 390'. A five sack plug was set at the top of the surface casing after the casing top had been lowered below plow depth.

The well was cored 3003' - 3135'. No tests.

FORMATION TOPS

	<u>Depth</u>
Cretaceous System	
Niobrara Formation	1265
Greenhorn Formation	1625
Dakota	2045
Jurassic System	
Morris on Formation	2235
Sundance Formation	2325
Piper Formation	2733
Triassic System	
Spearfish Formation	2940
Mississippian System	
Charles Formation	3066
Mission Canyon Formation	3083
Lodgepole Formation	3230
Englewood Formation	3898
Devonian System	
Lyleton Formation	3828
Nisku Formation	3875
Duperow Formation	3983
Souris River Formation	4392
Dawson Bay Formation	4672
Prarie Evaporites	4810
Winnipegosis Formation	4855
Ashern Formation	5007
Silurian System	
Interlake	5035
Total Depth	5102

Formation tops were picked by Anderson of the North Dakota Geological Survey on the basis of sample and radioactivity logs. Colors based on rock color chart.

Magnuson #1

<u>From</u>	<u>To</u>	<u>Formation</u>
0	40	Sand, fine to coarse; some dusky yellow to pale green silt.
40	50	Clayey silt, medium grey to pale yellow brown.
50	70	Silt to medium sand, green, grey, light olive gray, pale red.
70	110	Shaly siltstone, medium light gray.
110	150	Missing.
150	170	Shaly siltstone and sandstone, greenish grey to medium grey, very glauconitic.
170	180	Missing.
180	220	Shale, medium grey to dark, lumpy, somewhat silty starting at 200'.
220	240	Shale, medium light to medium dark grey, silty.
240	270	Shale, medium dark grey, somewhat silty.
270	290	Shale, medium to medium dark grey, pyritic.
290	300	Shale, medium grey, firm, pyritic.
300	320	Shale, greenish grey (5GY6/1) pyritic, firm.
320	350	Shale, medium light grey to medium grey, firm, pyritic; some greenish shale as above.
350	360	Missing.
360	390	Shale, greenish grey, brittle.
390	420	Shale, medium grey, brittle.
420	490	Shale, medium dark grey, brittle, half the shale is lumpy 470-480.
490	600	Shale, medium grey, mostly lumpy, pyritic.
600	610	Missing.
610	680	Shale, medium grey, firm.
680	740	Shale, medium grey, brittle, firm.
740	810	Shale, as above, some is lumpy.
810	900	Shale, medium grey, brittle, firm, very brittle and firm 880-890.
900	910	Missing.
910	960	Shale, medium light grey to medium grey, brittle, firm, some soft, slightly bentonitic shale (940-950).
960	1020	Shale, medium grey, lumpy; some shale as above, small amounts of hard, dense, moderate brown limestone starting at 980.
1020	1060	Shale, light grey to medium grey, lumpy, somewhat bentonitic, some brittle shale as above.
Niobrara	1092	
1060	1170	Shale, medium grey to medium dark grey, soft, pyritic partly bentonitic, traces of white to very light grey bentonite, increasing at 1120.
1170	1280	Shale, dark grey to black, very flaky, partly lumpy; traces of dense limestone as above; bentonite, light olive grey shale; lighter in color (medium dark to dark grey) starting at 1230.

<u>From</u>	<u>To</u>	<u>Formation</u>
1280	1330	Shale, medium grey to light olive grey, calcareous, lumpy, small amounts of dense, shaly black limestone and moderate yellowish calcareous crystals (1280-1310).
1330	1340	Shale, dark grey, flaky and lumpy; some slightly calcareous, olive grey shale
1340	1390	Shale, olive grey to dark grey, lumpy, somewhat calcareous; small amounts of dense limestone and inoceramus fragments (70-90).
1390	1410	Shale, medium dark grey to dark grey, calcareous, lumpy, pyritic.
1410	1450	Shale, medium grey to medium dark grey, lumpy, pyritic, partly calcareous, traces of dense limestone, calcareous yellow crystals, inoceramus fragments.
1450	1490	Shale, medium dark grey to grey black, lumpy and flaky, partly calcareous; traces of limy yellow crystals, bentonite.
1490	1570	Shale, medium dark grey to grey black, lumpy, slightly calcareous.
1570	1610	Shale, medium dark grey to grey black, flaky to lumpy, slightly calcareous, some light grey calcareous shale with iron stains.
Greenhorn 1625		
1610	1640	Shale, medium dark grey to grey black, lumpy, calcareous, fossiliferous (inoceramus fragments) increasing amounts of inoceramus limestone.
1640	1820	Shale, grey black, firm, with white specks throughout, calcareous, much inoceramus shale and limy shale starting at 1660; small, scattered amounts of inoceramus fragments and inoceramus limestone.
Muddy 1873		
1820	1940	Silty shale, medium dark grey to black, calcareous; traces of dense limestone, inoceramus fragments; only slightly silty (1880-1900); only slightly calcareous after 1900.
1940	2050	Shale, medium dark grey, lumpy, calcareous, silty; traces of chalky limestone; some flaky, dark grey non-calcareous shale 1980-2000; traces of free, rounded, medium to coarse sand (2040-2050).
Dakota 2045		
2050	2170	Sand, subrounded, medium to coarse quartz; somewhat shaly and silty; especially shaly and silty (2050-2080, 2100-2120, 2140-2160).
2170	2200	Silty shale, medium grey to medium dark grey; pyritic, some grey black flaky shale.
2200	2330	Sand, as above, somewhat shaly and silty; especially shaly and silty (2200-2210, 2230-2240, 2250-2280, 2290-2330); traces of pyrite.
2330	2350	Same silty and shaly sand as above, plus much chalky white limestone.
2350	2360	Shale, grey black to black, flaky; some chalky white limestone.

<u>From</u>	<u>To</u>	<u>Formation</u>
Morrison	2367	
2360	2380	Shale, dark grey, silty, sandy, calcareous, small amounts of chalky limestone and black, flaky shale.
2380	2400	Shale, grey black to black, flaky; some sand as above and some sugary, white, quartzose, limy sandstone; trace of waxey, pale green shale.
Sundance	2400	
2400	2450	Shale, light olive grey, silty, lumpy, partly calcareous; small amounts of dark grey flaky shale; trace of chalky to sugary limestone, waxey greenish grey and brown shale.
2450	2470	Shale, medium light grey, partly lumpy and calcareous; some dark grey shale, some waxey pale green shale.
2470	2480	Missing.
2480	2510	Shale, light olive grey, lumpy, calcareous; some sand (2480-2500); traces of inoceramus fragments, pyrite; more inoceramus fragments 2500-2510.
2510	2570	Shale, light olive grey to light grey, lumpy, calcareous; much moderate reddish orange, soft, calcareous shale; small amounts of pale green to light green grey, calcareous shale; some flaky black shale, much sand at (2520-2530, 2540-2550, 2560-2570).
2570	2580	Shale, as above, partly calcareous; much fine sugary, white limestone.
2580	2610	Shale, moderate reddish brown, lumpy, calcareous, somewhat silty; some grey to black to green shale; increasing small amounts of chalky to fine sugary limestone.
2610	2620	Limestone, sugary, light olive brown to white; lumpy, medium grey, very calcareous shale.
2620	2640	Shale, medium grey, greenish grey, calcareous, slightly silty; some flaky black shale, reddish orange shale, limestone.
2640	2660	Shale, lumpy, grey, black, reddish, greenish, light olive brown, calcareous; traces of inoceramus fragments, pyrite.
2660	2670	Missing samples.
2670	2680	Shale same as above, plus much moderate yellow green shale.
Piper	2685	
2680	2710	Shale, medium grey, light brown, lumpy, partly calcareous; some yellow orange to olive shale; traces of sugary to chalky limestone, pyrite.
2710	2720	Shale, greenish, greyish, reddish; a little sand.
2720	2730	Sand, as above; small amounts of varicolored shale.
2730	2810	Shale, mostly flaky black; some reddish orange shale as above; rapidly increasing amounts of dense, chalky, off-white limestone (up to more than half at 2800).
2810	2820	Limestone, white to pale yellow grey, brittle, sub-lithographic; some varicolored shale as above.
2820	2830	Shale, greenish, dark grey, partly calcareous; a small amount of reddish brown shale; some limestone as above.

<u>From</u>	<u>To</u>	<u>Formation</u>
2830	2920	Shale, dark grey to flaky black, some greenish in part (2840-2850, 2870-2880); fine crystalline to very fine grained white anhydrite; varying from a small amount, to very much (2830-2840, 2850-2870, 2880-2890, 2900-2920); traces of fine sand, pyrite, chalky limestone, reddish to pinkish shale (2910-2920).
Spearfish 2940		
2920	3003	Shale, medium grey firm to flaky black, some moderate reddish brown shale (especially at 2980-2990); small amounts of white anhydrite (ending at 2980), fine sand as above; traces of pyrite and limestone.
Core 1		
3003	3009	Siltstone, pale reddish brown to light brown (5YR6/4), slightly dolomitic, somewhat shaly, micaceous, becoming less shaly and more sandy.
3009	3015	Siltstone, light brown to dark reddish brown, micaceous.
3015	3023	Siltstone, light brown (YR6/4) to moderate brown (5YR4/4); partly sandy (3015-3017).
Core 2		
3023	3025	Siltstone, light brown to moderate brown, micaceous.
3025	3029	Siltstone, light brown, micaceous.
3029	3035	Siltstone, light brown to dark reddish brown, micaceous, becoming mostly reddish brown and slightly sandy (3033-3035).
3035	3043	Siltstone, light brown to moderate brown, micaceous, slightly sandy beginning at 3037.
3043	3018	Siltstone, light brown to moderate brown, micaceous, slightly dolomitic or limy.
Core 3		
3048	3052	Siltstone, moderate brown, slightly dolomitic or limy; a small amount of white anhydrite (3048-3050).
3052	3058	Siltstone, light brown to moderate brown, micaceous; traces of white, crystalline anhydrite (3052-3054); a few very thin, dark reddish brown shale beds (3054-3056); much round medium to coarse imbedded quartz (3056-3058).
3058	3060	Siltstone, moderate brown, micaceous.
3060	3062	Sandy siltstone to silty sandstone, greyish orange pink.
3062	3064	Sandy siltstone, greyish orange pink.
3064	3066	Sandy siltstone to silty sandstone, greyish orange pink.
Charles 3066		
3066	3069	Anhydrite, light brownish grey (5YR6/1), slightly pink, hard, brittle, micro-crystalline.
Core 4		
3069	3071	Anhydrite, pale red, micro-crystalline, hard.

<u>From</u>	<u>To</u>	<u>Formation</u>
3071	3073	Anhydrite, pale yellow grey to light olive grey, micro-sugary; some porous, light brown to moderate brown anhydrite.
3073	3075	Anhydrite, pale yellow brown, micro-sugary, hard.
3075	3077	Anhydrite, pale red to greyish red, micro-sugary, hard.
3077	3079	Anhydrite, pale red, micro-sugary, hard.
3079	3083	Anhydrite, very light grey to medium light grey micro-crystalline to sub-crystalline; some greyish orange, sub-lithographic limestone (3081-3083).
Mission Canyon 3083		
3083	3085	Limestone, white to very light grey, very fine sugary, slightly anhydrititic.
3085	3087	Limestone, very pale yellow grey, very fine sugary, slightly chalky.
3087	3091	Limestone, very pale orange, sub-oolitic, becoming somewhat crystalline and/or fragmental at 3089.
3091	3103	Limestone, very pale orange, very fine sugary, slightly oolitic in part, somewhat chalky in part beginning at 3099.
Core 5		
3103	3105	Limestone, pale orange, oolitic.
3105	3107	Limestone, pale greyish orange pink, very fine sugary.
3107	3109	Limestone, very pale orange, sub-oolitic to very fine sugary.
3109	3113	Limestone, very light grey to very pale orange, very fine sugary to chalky, vuggy, porous.
3113	3115	Limestone, very pale orange, very oolitic, very porous.
3115	3117	Limestone, pale yellow grey, very fine sugary.
3117	3119	Limestone, pale orange, oolitic to fragmental to fine sugary to chalky.
3119	3127	Limestone, very pale orange, oolitic.
3127	3129	Limestone, very pale orange, fine fragmental; some fine sugary light brown limestone.
3129	3131	Limestone, very pale orange, chalky to fine fragmental.
3131	3133	Limestone, very pale orange, fine sugary.
3133	3135	Limestone, pale orange, coarse oolitic.
3140	3210	Limestone, very pale orange, mostly oolitic, partly medium sugary (3140-3160) to fragmental to chalky (3170-3210), porous.
3210	3230	Limestone, very pale orange, fine sugary to chalky, partly oolitic and fragmental.
Lodgepole 3230		
3230	3280	Limestone, pinkish very pale yellow brown, fine sugary to fragmental and coarse crystalline; increasing amounts of grey and greenish shale; traces of anhydrite, chert, pyrite, shell fragments and impressions.
3280	3290	Limestone, very pale orange oolitic, to very pale yellow grey, sub-lithographic, to sugary; some dark grey and greenish shale; traces of anhydrite and chert.

<u>From</u>	<u>To</u>	<u>Formation</u>
3290	3300	Limestone, pale, sugary to chalky, much black grey, reddish, greenish shale; traces of sand and anhydrite.
3300	3330	Limestone, very pale orange to pale yellow grey, oolitic to fragmental to sugary to chalky, porous (3310-3330); some dark grey to reddish shale; traces of sand and pyrite.
3330	3350	Limestone, light olive grey fragmental, chalky white, fine sugary grey and pale yellow brown.
3350	3370	Limestone, olive grey, grey, pale orange, coarse crystalline to fragmental; traces of pyrite, shale, chalky limestone.
3370	3390	Limestone, chalky white, very fine sugary grey to very pale orange shaly; some reddish, greyish, greenish shale, traces of pyrite, anhydrite.
3390	3410	Limestone, medium light grey, coarse and fragmental, shaly; traces of anhydrite, shell fragments, shell impressions.
3410	3490	Limestone, medium grey, light olive grey, fine sugary and chalky, partly shaly; some sub-crystalline greyish limestone (3420-3440); some reddish and greyish shale; traces of pyrite, shell fragments, chalky white limestone.
3490	3560	Limestone, chalky white; some fine sugary to chalky and fragmental very pale orange (3500-3520); some coarse crystalline to sugary grey to light olive grey (3510-3530); some sugary medium light grey (3530-3540); some pale yellow grey chalky and fine sugary (3540-3550); some dense, fragmental, greyish (3550-3560); some greenish, greyish, reddish, light olive brownish shale; traces of shell impressions, anhydrite.
3560	3590	Limestone, greyish, fragmental; some sugary, light olive grey limestone; much shale, especially black; traces of pyrite and anhydrite.
3590	3640	Limestone, medium grey, fine sugary and chalky, partly fragmental; much greyish and reddish shale; some fine sugary, light olive grey shale (3630-3640); traces of pyrite, anhydrite, shell fragments and impressions.
3640	3660	Limestone, sugary, fragmental, dense, chalky, grey to white; much variegated shale; traces of pyrite, anhydrite, shell fragments and impressions, blue grey chert.
3660	3670	Limestone, medium grey, micro-crystalline to sub-crystalline; much shale; traces of pyrite, anhydrite.
3670	3730	Limestone, light grey to medium grey, fine sugary to chalky; much medium grey, sub-crystalline anhydrite (3670-3680); small amounts of flaky black shale; much dense, micro- to sub-crystalline, medium grey anhydrite; some greyish, reddish, and greenish shale (3710-3720).
3730	3810	Limestone, light grey to medium light grey, fine sugary to chalky; small amounts of reddish, greyish and greenish shale; traces of weathered chert, anhydrite, pyrite.
Englewood	3808	
3810	3830	Shale, carbonaceous, flaky, brown black, traces of colored shale, limestone, anhydrite; chert, pyrite.

<u>From</u>	<u>To</u>	<u>Formation</u>
Three Forks 3828		
3830	3840	Shale, greenish greys to grey; some sugary to chalky limestone.
3840	3880	Shale, flaky black; mostly light to moderate brown, lumpy, calcareous shale; small amounts of soft white gypsum, anhydrite, and dolomite (3870-3880).
Nisku 3875		
3880	3890	Limestone; greyish orange pink very fine sugary, to very pale orange chalky.
3890	3960	Limestone, pale yellow brown, very pale orange, very fine sugary to chalky; some sugary, slightly dolomitic limestone (3920-3930); traces of anhydrite, pyrite, shale.
3960	3980	Limestone, very pale orange fine sugary, chalky white, light olive grey crystalline (3970-3980).
Duperow 3983		
3980	3990	Limestone, as above; much dark grey shale; much light brown, crystalline dolomite.
3990	4010	Limestone, yellow brown, sugary; much grey to black shale; much chalky white gypsum (3990-4000); much dense white anhydrite (4000-4010).
4010	4040	Dolomitic limestone, very pale orange, pale brown, pale yellow brown, sugary, sub-crystalline.
4040	4050	Dolomitic limestone, light olive grey fine sugary, to pale orange micro-sugary; some greyed brown crystalline and fragmental limestone.
4050	4070	Limestone, yellow brown, fragmental and crystalline; some very pale orange to pale yellow brown sugary and chalky limestone; traces of shale, anhydrite.
4070	4170	Limestone, very pale orange, very fine sugary and chalky; some is crystalline and fragmental in part (4090-4110), some is partly oolitic (4160-4170); traces of chert, anhydrite, shale.
4170	4180	Missing samples.
4180	4220	Limestone, very pale orange, very fine sugary to firm chalky; much grey anhydrite (4190-4200); traces of shale.
4220	4250	Limestone, pale brown to pale yellow brown, sugary and chalky, slightly dolomitic; much is lithographic to chalky (4240-4250).
4250	4300	Limestone, very light grey, partly very pale orange chalky (soft to firm); some is fine sugary in part (4270-4300).
4300	4400	Limestone, greyish orange pink, chalky to crystalline to fine sugary; traces of anhydrite; some medium grey, micro-sugary limestone (4390-4400).
Souris River 4392		
4400	4430	Limestone, chalky white, fine sugary yellow grey, lithographic very pale orange, greyish orange pink as above; mostly chalky to very fine sugar(4420-4430); traces of anhydrite and pyrite.

<u>From</u>	<u>To</u>	<u>Formation</u>
4430	4450	Limestone, chalky to fine sugary, very pale yellow brown; small amounts of limestone as above, and shale.
4450	4460	Limestone, very pale orange, greyish, very fine sugary to chalky; traces of anhydrite and shale.
4460	4480	Limestone, greyish orange pink, fine sugary and chalky; traces of white anhydrite and black shale.
4480	4490	Dolomitic limestone, yellowish grey, pale yellow brown, micro- to fine sugary.
4490	4540	Limestone, greyish orange pink, very pale orange, fine sugary and/or chalky; traces of oolitic limestone (4490-4520), shale, anhydrite, pyrite.
4540	4560	Dolomitic limestone, very pale orange, chalky to dense fine sugary; much white anhydrite.
4560	4570	Dolomite, pale yellow brown, fine sugary, quite limy in part; much light grey, micro sugary dolomite; much white and pale yellow brown dense anhydrite.
4570	4590	Dolomite, light grey, micro-crystalline; some greyish orange pink fine sugary and chalky dolomite; becoming increasingly light grey and limy.
4590	4610	Dolomitic limestone, very pale yellow grey and brown, fine sugary to sugary; some is limy dolomite; small amounts of white anhydrite.
4610	4630	Limy dolomite, pale to dark yellowish brown, sugary (more limy at 4620); small amounts of white anhydrite.
4630	4640	Dolomite, yellow brown, glassy crystalline, partly some sub-crystalline and greasy, some anhydrite.
4640	4650	Dolomite, pale yellow brown, fine sugary; some very fine sugary to chalky, dolomitic limestone.
Dawson Bay 4672		
4650	4680	Dolomitic limestone, very pale orange, micro-sugary to sub-lithographic; much sub-crystalline, grey to white anhydrite (4670-4680).
4680	4740	Dolomite, pale yellow brown, some dark yellow brown, sub-crystalline to coarse sugary crystalline; quite sugary and porous (4690-4730).
4740	4770	Dolomite, greyish orange pink, fine grained, becoming increasingly yellow brown and fine crystalline.
4770	4810	Limestone, pale yellow brown to dark yellow brown, fine sugary, slightly dolomitic; much white to very pale orange, chalky and lithographic limestone (4780-4810).
Prairie Evaporites 4810		
4810	4830	Limestone, very pale orange to pale yellow brown, firm, very fine sugary, slightly dolomitic.
4830	4850	Limestone, very pale orange, very fine sugary to chalky; some is very fine sugary and dolomitic, light grey.
4850	4860	Dolomite, pale yellow brown, coarse sugary, porous; some chalky limestone; some white anhydrite.

<u>From</u>	<u>To</u>	<u>Formation</u>
Winnipegosis 4855		
4860	4890	Limy dolomite, yellow brown, coarse sugary; very limy (4870-4880). Porous.
4890	4900	Dolomite, greyed brown, fine to coarse sugary, porous, slightly limy.
4900	4930	Limy dolomite, very pale orange, pale to dark yellow brown, coarse sugary, porous; traces of white anhydrite.
4930	4950	Dolomite, dark yellow brown, dense, sub-crystalline; some coarse sugary, porous dolomite (4940-4950).
4950	4960	Dolomitic limestone, yellow brown, very fine to medium sugary; a little chalky limestone; traces of shell impressions.
4960	5000	Limestone, very pale orange, sub-lithographic to chalky; some is very fine sugary, especially (4990-5000).
5000	5010	Limestone, pale to dark yellow brown, sugary; traces of shell impressions, pyrite, chalky limestone.
Ashern 5007		
5010	5020	Dolomitic limestone, light grey to medium grey, very fine grained.
5030	5040	Dolomitic limestone, very pale orange to medium light grey, very fine grained to chalky; traces of pyrite and anhydrite.
5040	5060	Limestone, pale pink orange, soft, micro-crystalline, to chalky white; traces of pyrite.
5060	5070	Dolomitic limestone, very pale orange to white, very fine sugary, becoming limy dolomite.
5070	5100	Limestone, very pale orange to white, very fine sugary to chalky.
5100	5102	Dolomite, grey, pinkish orange, coarse crystalline.