

# NORTH DAKOTA GEOLOGICAL SURVEY CIRCULAR NO. 19

## Summary of the General Atlas Carbon Co. Albert Ketterling No. 1

McIntosh County, North Dakota

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General Atlas Carbon Company - Albert Ketterling No. 1, McIntosh County, North Dakota. NE/4 NE/4 Section 15, T. 131, R. 73W. (660' S. of N. line, 660' W. of E. line, Section 15), Elevation 2176KB. (2165 GL).

The General Atlas Carbon Company's Ketterling No. 1 was spudded June 27, 1952, & 10 3/4 inch surface casing was run at 408 feet. The well was drilled to 4777 feet, plugged and abandoned July 19, 1952.

Cement plugs were set at the following depths: 4540 to 4560 with 10 sacks, 3710 to 3740 with 15 sacks, 3590 to 3660 with 35 sacks, 3030 to 3065 with 25 sacks, 2750 to 2765 with 10 sacks, 2415 to 2465 with 85 sacks, 340 to 390 bottom of surface pipe with 26 sacks, and at surface.

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

	<u>TOPS</u>
Cretaceous System	
Niobrara Formation	1316
Greenhorn	1843
Muddy	2260
Dakota	2466
Jurassic System	
Sundance Formation	2747
Piper Formation (Sawtooth)	2820
Mississippian System	
Charles Formation	2930
Mission Canyon Formation	3065
Lodgepole Formation	3244
Englewood Formation	3593
Devonian System	3612
Ordovician System	
Stony Mountain Formation	3717
Stony Mountain Shale Member	3775
Red River Formation	3817
Winnipeg Formation	4376
Shale	4376
Sand (Upper)	4382
Shale	4413
Sand	4561
Pre-Cambrian	4772
Total Depth	4777

The "Upper" sand in the Winnipeg in this well is a new lithologic unit that has not been described previously in other wells.

General Atlas Ketterling No. 1

<u>From</u>	<u>To</u>	<u>Formation</u>
0	10	Sand, very fine to fine tan quartz.
10	70	Sand, fine to medium tan quartz, some colorless quartz.
70	340	Sand, light gray (salt and pepper) fine quartz with glauconite.
340	420	Sand, fine tan (salt and pepper) with glauconite.
420	430	Shale, gray (pebbles).
430	470	Gray to green gray shale.
470	480	Shale as above and little soft white limestone.
480	490	Gray to green gray shale.
490	610	Shale as above to medium gray.
610	1120	Gray to green gray shale.
1120	1160	Shale as above and some light brown shale.
1160	1180	Shale as above and some light brown, hard limey shale.
1180	1210	Shale as above and some light brown hard silty shale.
1210	1250	Shale as above and some light brown to red hard silty shale.
1250	1260	Shale as above and very mall amount of fine grained brown sandstone.
1260	1290	Shale as above.
Niobrara 1316		
1290	1320	Shale, light to medium gray with white specks.
1320	1340	Shale, light to medium gray with white specks and dark gray shale.
1340	1370	Shale as above and some iridescent shell fragments.
1370	1380	Shale as above, very small amount of fine grained brown sandstone and small snail.
1380	1390	Shale as above.
1390	1400	Shale as above and much dark gray shale.
1400	1460	Shale, light to medium light gray with white specks.
1460	1470	Shale as above and little fine limey sandstone.
1470	1490	Shale, light to medium light gray.
1490	1500	Shale as above with a few white specks.
1500	1770	Shale, light to medium light gray.
1770	1780	Shale as above and little sandy shale.
1780	1830	Shale as above.
1830	1840	Shale as above and little fine grained brown sandstone.
Greenhorn 1843		
1840	1920	Shale, light to medium light gray and medium gray shale.
1920	1970	Shale as above and little colorless calcite?
1970	2000	Shale as above and many inoceramus prisms.
2000	2090	Shale as above, mostly medium gray.
2090	2200	Shale, medium dark gray.

<u>From</u>	<u>To</u>	<u>Formation</u>
2200	2220	Shale, medium to medium dark gray.
2220	2250	Shale, medium dark gray to dark gray.
Muddy 2260		
2250	2260	Shale as above.
Circulation		
	2264	Shale as above and little very fine grained light gray sandstone.
2260	2280	Shale as above and very little fine grained tan to light gray sandstone.
Core 1st. ft.		
2306	2316	Light very fine sandstone.
2nd ft.		Medium gray shale.
3rd ft.		Light gray fine sandstone.
4th ft.		Light gray fine sandstone and medium gray shale.
5th ft.		Medium gray shale.
6th ft.		Light gray sandstone and medium gray shale.
	2370	Shale as above.
2370	2410	Shale, medium light gray to dark gray.
2410	2460	Shale, medium light gray to medium dark gray.
Dakota 2466		
2460	2470	Shale as above and little medium light gray siltstone.
2470	2480	Shale as above.
2480	2490	Shale as above and very little fine grained light gray sandstone.
2490	2520	Sandstone, fine grained white to light gray.
2520	2560	Shale as above and some sandstone as above and pyrite; little medium to coarse round free quartz.
2560	2570	Shale and sandstone as above; mostly shale.
2570	2580	Dark gray shale, some medium light to medium gray shale and some sandstone as above.
2580	2600	Sandstone, much fine to medium grained colorless to light gray; little medium to coarse round quartz. (some pyrite)
2600	2620	Sandstone, white to light gray, fine, calcareous.
2620	2660	Some sandstone as above and much medium to coarse sub-angular to round free quartz.
2660	2670	Some sandstone as above and medium to coarse free quartz as above; medium dark gray, shale.
2670	2690	Sandstone, medium grained, sub-angular, to round free quartz.
2690	2700	Sandstone, medium to coarse grained, sub-angular to round free quartz and some fine grained calcareous white sandstone and pyrite.
2700	2710	Sandstone, medium to coarse free quartz as above and pyrite.
2710	2720	Sandstone, white to light gray, fine grained, calcareous.
2720	2730	Sandstone as above and free quartz.

<u>From</u>	<u>To</u>	<u>Formation</u>
Sundance Formation 2747		
2730	2750	Sandstone, very little white to light gray, much medium to coarse free quartz and some brown fine to medium non-calcareous sandstone.
2750	2760	Sandstone, coarse free quartz, sub-angular to round.
2760	2800	Sandstone, medium to coarse free quartz, sub-angular to round and pyrite.
2800	2810	Dolomite, yellow gray fine grained; medium grain sandstone and medium light to dark gray shale.
Piper Formation 2820		
2810	2840	Dolomite, as above, fine grained white to light gray to tan sandstone and shale as above.
2840	2850	Yellow gray dolomite as above; little white to buff chert, sandstone and free quartz as above (cave).
2850	2860	Dolomite as above, very little white chert.
2860	2870	Dolomite as above and much medium to dark gray shale.
Spearfish 2881		
2870	2890	Limestone, pale red 5R6/2 fine grained dense; little light gray fine grained dense limestone.
2890	2900	Limestone as above and much yellow gray fine grained dense dolomite.
2900	2920	Pale red limestone as above and moderate red brown shale.
Charles Formation 2930		
2920	2930	Limestone, pale red to white, fine grained; much free quartz medium grained (Cave) little gypsum.
2930	2940	Limestone, yellow gray to pale red, moderate red brown shale and white gypsum.
2940	2950	Mostly red and gray shale, gypsum and some limestone as above.
2950	2960	Much medium grained free quartz, red and gray shale, little gypsum and white to light gray, fine grained sandstone.
	2966	Circulation 10 minutes. As above.
	2966	Circulation 20 minutes. As above.
	2966	Circulation 30 minutes. White to pink limestone; shale as above and some free quartz.
2960	2970	Sandstone, much free quartz, medium grained rounded (reddish shale staining?) some red shale.
2970	2980	Much sand as above, some limestone as above, gypsum and shale.
2980	2990	Limestone, white fine grained, dense.
2990	3000	Limestone, white to light gray and light tan dense.
	3000	Circulation 10 minutes. Limestone, white (pale red limestone free quartz as above, cave)
	3000	Circulation 20 minutes. Limestone as above and little white to light gray fine grained sandstone.
	3000	Circulation 30 minutes. Limestone as above and little brown sandstone.

<u>From</u>	<u>To</u>	<u>Formation</u>
3000	3040	Limestone, whitish fine grained, dense.
3040	3041	Circulation 30 minutes. Limestone as above and medium light to medium dark gray shale.
3041	3048	Limestone as above, much medium gray shale (some red shale cave?).
Mission Canyon	3065	
3050	3070	Missing.
3070	3072	Limestone, white to light tan, dense, fine grained; shale as above (cave?).
3072	3080	Limestone, whitish to tan, dense, fine grained.
3080	3090	Limestone, white, fine grained and white to pink very fine granular.
3090	3100	Limestone as above to tan fine grained, dense.
3100	3110	Limestone, whitish to buff fragmental to oolitic few pinpoint vugs.
	3110	Circulation 1 minute. Limestone as above and buff very fine granular dolomite.
	3110	Circulation 30 minutes. As above and pinkish very fine granular, dense dolomite.
	3110	Circulation 45 minutes. As above.
	3123	Circulation 15 minutes. Pinkish to tan dolomite as above, much medium gray shale. Some limestone as above, cave?
	3123	Circulation 30 minutes. Much whitish to buff (micro pisolitic dolomitic limestone. Many small vugs mostly rounded, some pinkish). Also medium gray to dark gray shale and dolomite as above.
	3123	Circulation 45 minutes. Dolomite, tan, very vuggy (frag?).
	3123	Circulation 2 hours. Dolomite, buff fine granular slightly limey dolomite, fair pinpoint porosity.
3130	3140	Dolomite, pale brown, fine granular; fair pinpoint porosity and buff oolitic limestone with fair to good oolitic porosity.
	3134	Circulation. Limestone, buff oolitic limestone as above and buff fine grained dense limestone.
3140	3150	Limestone same as above and some pale brown fine granular dolomite with fair pinpoint porosity.
3150	3155	Circulation 20 minutes. Limestones buff oolitic, fair pinpoint porosity to fine granular buff.
	3155	Circulation 40 minutes. Limestone, mostly buff as above.
3155	3170	Limestone, buff oolitic, fair pinpoint porosity.
3170	3190	Limestone, buff oolitic as above and fine granular buff to pink limestone.
3190	3200	Limestone, fragmental to oolitic, slightly pinkish.
3200	3210	Limestone as above and some pale brown to pale red brown, fine granular dolomite.
3210	3220	Limestone as above and some pale brown fine granular dolomite.

<u>From</u>	<u>To</u>	<u>Formation</u>
3220	3230	Limestone, buff oolitic, fair oolitic porosity and little red or pinkish fine granular.
3230	3240	Limestone as above (Buff with slight pink tinge, oolitic limestone).
Lodgepole Formation 3244		
3240	3270	Limestone, buff oolitic, slight pink tinge, orange streaks.
3270	3280	Limestone, color as above, oolitic to fragmental.
3280	3290	Limestone as above and few pieces of light gray, fine granular.
3290	3300	Limestone, light gray, fine grained to fragmental.
3300	3340	Limestone, light gray, fragmental.
3340	3350	Limestone as above and much medium dark to dark gray shale.
	3354	Circulation 40 minutes. Much medium dark to dark gray shale and some limestone as above.
	3354	Circulation 60 minutes. Shale and limestone as above.
3350	3370	Shale and limestone as above.
3370	3380	Limestones yellow gray or buff oolitic to fragmental as above.
3380	3390	Limestone as above to slightly pinkish.
3390	3397	Limestone as above and pale red brown vugular limey dolomite.
3397	3400	Limestone, yellow gray or buff to slight pinkish oolitic to fragmental; shale as above.
3400	3420	Limestone, same as above, fragmental to oolitic.
3420	3426	Circulation. Limestone as above. 20 minutes
	3426	Circulation 40 minutes. Limestone as above.
3426	3430	Limestone as above.
3430	3427	Circulation 10 minutes. Limestone as above, fair porosity in oolitic limestone.
3427	3460	Limestone, yellow gray or buff, fragmental fine granular.
3460	3467	Circulation 50 minutes. Limestone, yellow gray or buff, fragmental to oolitic, fair pinpoint porosity in oolitic limestone.
3467	3480	Limestone, yellow gray or buff as above and much medium to medium dark gray shale.
3480	3490	Much yellow gray oolitic limestone and shale as above.
3490	3510	Limestone, yellow gray oolitic, fair pinpoint porosity.
3510	3520	Limestone, yellow gray oolitic, fair pinpoint porosity and shale as above.
3520	3540	Limestone as above and some shale as above.
3540	3550	Limestone as above.
3550	3560	Limestone, yellow gray fragmental, fine saccharoidal.
3560	3565	Limestone as above and little pale brown fine saccharoidal dolomite.
3565	3565	Circulation 10 minutes. Limestone, yellow gray as above and much pale brown slightly saccharoidal dolomitic limestone.

<u>From</u>	<u>To</u>	<u>Formation</u>
	3565	Circulation 20 minutes. Limestone, pale brown, slightly saccharoidal dolomitic.
	3565	Circulation 30 minutes. Limestone as above.
	3565	Circulation 56 minutes. Limestone as above.
3565	3570	Limestone as above and some shale as above.
3570	3590	Limestone, yellow gray fragmental to slightly saccharoidal.
Englewood Formation 3593		
3590	3600	Limestone, tan, saccharoidal and some yellow gray fragmental to saccharoidal limestone.
3600	3610	Dolomite, pale red, fine granular.
Ashern 3643		
3610	3620	Dolomite, pale red, fine granular, some pinpoint porosity. 5R6/2
3620	3630	Dolomite, pale red 10R6/2 fine granular, some pinpoint porosity.
3630	3645	Dolomite, pale yellow brown 10YR6/2, fine granular.
3645	3650	Dolomite, pale red 5R6/2 fine granular, little pinpoint porosity.
Stonewall 3654		
3650	3655	Dolomite as above and some medium gray shale.
3655	3660	Medium gray shale, little red shale and pale red dolomite as above.
3660	3665	Dolomite, buff to pinkish very fine granular, dense.
3665	3670	Dolomite, color as above, very fine granular to saccharoidal, some porosity.
3670	3680	Dolomite, mostly pinkish, fine granular.
3680	3685	Dolomite, buff to pinkish, fine granular, some pinpoint porosity.
3685	3690	Dolomite, buff, fine granular to saccharoidal.
3690	3705	Dolomite, buff to pale yellow brown, fine granular to little porosity.
3705	3715	Dolomite as above and little medium gray shale.
Stony Mountain 3717		
3715	3718	Circulation 20 minutes. Dolomite, pale yellow brown, fine granular to saccharoidal, fair porosity.
	3718	Circulation 60 minutes. Dolomite, pale yellow brown, fine granular to slightly saccharoidal, fair porosity.
	3718	Circulation 1 hour 40 minutes. Dolomite as above and medium light gray, saccharoidal.
3718	3720	Dolomite, pale yellow brown as above and little medium light gray as above.
3720	3730	Dolomite, pale yellow brown, fine granular, fair pinpoint porosity.
3730	3735	Limestone, light gray, fragmental, argillaceous.
3735	3745	Shale, much light to medium gray, little limestone as above.
3745	3750	Limestone, very pale yellow brown, fragmental and some shale as above.

<u>From</u>	<u>To</u>	<u>Formation</u>
3750	3755	Limestone, light gray to light tan argillaceous with ostracods.
3755	3760	Limestone, light gray to light tan, fine grained, little fine granular light brown limestone.
3760	3765	Limestone, light gray to light tan, argillaceous with ostracods.
3765	3770	Dolomite, medium gray to light brown, fine granular.
Stony Mountain Shale Member 3775		
3770	3775	Dolomite, pale yellow brown and brown gray, fine grained to fine granular, some pinpoint porosity.
3775	3776	Circulation. Dolomite, whitish very fine grained, dense, calcitic.
3776	3780	Dolomite, light brown to brown gray and little light gray, saccharoidal; little very light olive gray, very fine grained dense limestone.
3780	3785	Dolomite as above and some buff oolitic limestone and gray shale.
3785	3800	Light brown saccharoidal dolomite, little red staining.
3800	3805	As above, little gray shale and red shale.
3805	3815	Dolomite, light brown to medium gray, fine granular, medium gray shale.
Red River Formation 3817		
3815	3820	Dolomite, pale brown, fine granular and light gray saccharoidal.
3820	3830	Dolomite, pale red 10R6/2, fine grained, dense.
3830	3840	Dolomite as above, whitish fine grained, dense.
3840	3849	Circulation 20 minutes. Dolomite, whitish, fine grained, dense.
	3849	Circulation 40 minutes. Dolomite, whitish to pinkish, fine grained to saccharoidal, fair pinpoint porosity.
3849	3850	Dolomite as above and little gray dolomite.
3850	3860	Dolomite, fine crystalline and saccharoidal with some porosity, color as above.
3860	3870	Dolomite, very pale brown, with slight pink tinge, vitreous, fine granular to saccharoidal.
3870	3875	Gray shale and some dolomite as above, cave.
3875	3880	Dolomite as above with slight pink tinge and pinkish sublithographic dolomite.
3880	3900	Dolomite, white, fine grained, dense.
3900	3940	Dolomite, white, fine grained to fine granular, dense.
3940	3950	Dolomite, buff to whitish, fine granular.
3950	3998	Dolomite as above to pale brown; fine grained, dense.
3998	4020	Little dolomite as above and much sandstone, medium grained, cave.
4020	4040	Dolomite, light tan to brown gray, fine granular to saccharoidal.
4040	4070	Dolomite, light tan and fine granular and saccharoidal to fine grained dolomite.



<u>From</u>	<u>To</u>	<u>Formation</u>
4070	4100	Dolomite, light tan to very pale yellow brown, fine granular to slightly saccharoidal, few pieces of white chert.
4100	4106	Circulation 30 minutes. Dolomite, light tan to light brown and little pinkish, fine grained to slightly saccharoidal, few pieces of white chert.
4106	4130	Dolomite, pale yellow brown to alight pinkish, fine grained to saccharoidal.
4130	4140	Dolomite, pale yellow brown, fine grained, dense; same as above.
4140	4170	Dolomite, light tan, fine grained, dense, few pieces of white chert.
4170	4190	Dolomite, light tan to pink, fine grained to fine granular, dense; little white chert.
4190	4192	Circulation 30 minutes. Dolomite, light tan, fine grained, dense, much white chert.
4192	4150	Dolomite, light tan to light gray, fine grained to fine granular; some white chert.
4150	4180	Dolomite, light gray, fine granular.
4180	4190	Dolomite, very pale brown, fragmental ?, fine grained, dense.
4190	4330	Dolomite, very light brown to buff, fine grained, dense.
4330	4340	Dolomite, very light brown, fine grained, dense, medium gray shale.
Winnipeg Formation 4376		
4340	4380	Dolomite as above, medium to medium dark gray shale.
Sand "Upper" 4382		
4380	4390	Dolomite as above and little gray shale.
4390		Circulation 45 minutes. Sandstone, light gray, very fine grained quartz.
4390	4410	Sandstone as above and little gray and green shale.
Shale 4413		
4410	4440	Shale as above and Dakota Sand ? cave. Dolomite cave.
4440	4450	Shale, much green, and shale as above.
4450	4460	Green waxey shale.
4460	4470	Green and brown waxey shale.
4470	4500	Green waxey shale.
4500	4510	Green and dark gray shale.
4510	4520	Shale as above and much dark gray carbonaceous shale.
4520	4530	Green and dark gray shale.
4530	4560	Green shale and little gray shale.
Sand 4561		
4560	4569	Circulation 60 minutes. Sandstone, buff to very pale orange, fine grained.
4569	4620	Sandstone as above.
4620	4650	Sandstone as above and light gray, medium grained, slightly glauconitic.

<u>From</u>	<u>To</u>	<u>Formation</u>
4650	4670	Sandstone, buff to very pale orange and light gray glauconitic, fine grained.
4670	4770	Sandstone, light gray, fine to medium grained, very glauconitic, little yellow iron ? staining.
Pre-Cambrian	4772	
4770	4777	Sandstone as above and pink granite with quartz and mica.
	4777	Total Depth.