

NORTH DAKOTA GEOLOGICAL SURVEY CIRCULAR NO. 73

Summary of the Zach Brooks Drilling Company Herman Haugen #1
Bottineau County, North Dakota
Permit #442, Well #426

By LaVerne B. Nelson
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Zach-Brooks - Herman Haugen #1, Bottineau County, North Dakota. C NW NE Section 11, T. 163N., R. 80W. (660 feet from north line & 1980 feet from east line of Section 11). Elevation ground 1492, K.B. 1501.

The Zach Brooks Drilling Company - Herman Haugen #1 was spudded September 9, 1953. 10 3/4" casing was set at 286 feet and cemented with 200 sacks of cement. The well was drilled to a total depth of 3755 feet, plugged and abandoned October 10, 1953.

Cement plugs were set at the following depths: 3750-3700; 3550-3500; 3250-3200; 3100-2950; 2000-1950; 320-270; surface.

DST #1 3280-94

Tool open 3 hours, recovered 130' very slightly oil and gas cut mud. Flow pressure 0#, shut in 15 minutes, SIP 150#, hydrostatic pressure 2200#.

CORES

Core #1 3175-3204	Core #5 3272-3294
Core #2 3204-3254	Core #6 3294-3324
Core #3 3254-3256	Core #7 3395-3418
Core #4 3256-3271	Core #8 3559-3590

Formation tops were determined from sample and electric logs, corrected to electric log depth; not all lithologic tops were called in following list. Colors were determined from rock color chart.

FORMATION TOPS

	<u>Depth</u>
Cretaceous System	
Greenhorn Formation	1675
Dakota	2113
Jurassic System	
Morrison Formation	2463
Sundance Formation	2538
Piper Formation	2852
Triassic System	
Spearfish Formation	3117
Mississippian System	
Charles Formation	3255
Mission Canyon Formation	3390
Lodgepole Formation	3686

<u>From</u>	<u>To</u>	<u>Formation</u>
1500	1520	Shale, medium dark gray, flaky, slightly calcareous, bentonitic. Some white bentonite and moderate reddish brown siltstone.
1520	1560	Shale, medium dark gray, lumpy, bentonitic, highly calcareous. Much bluish white bentonite. Traces of dense lithographic and crystalline calcite.
1560	1580	Shale, medium dark and dark gray, flaky, calcareous, bentonitic. Traces of pyrite and limestone. Some moderate reddish brown siltstone.
1580	1680	Shale, dark gray, flaky. Traces of bluish white bentonite.
1680	1760	Shale, medium dark gray, calcareous, speckled. Few inoceramus prisms.
1760	1820	Shale, dark gray, flaky, slightly calcareous.
1820	1880	Shale, medium dark gray, flaky. Some bluish white bentonite.
1880	1980	Shale, dark gray, flaky.
1980	2110	Shale, medium gray, flaky and lumpy, slightly silty.
2110	2190	Sandstone, medium to fine, angular, clear quartz, cemented with calcite. Scattered clear and frosted, angular quartz granules. Shale as above.
2190	2210	Sandstone, fine to very coarse, poorly sorted, subangular and angular, frosted, pitted quartz.
2210	2230	Sandstone, medium and fine, subangular quartz, cemented with pyrite and calcite. Some quartz as above. Shale as above.
2230	2260	Sandstone, medium to very coarse, angular, frosted and pitted quartz. Numerous moderate red siderite pellets, some pyrite & shale.
2260	2300	Shale, medium gray, lumpy and flaky. Traces of quartz grains and siderite pellets.
2300	2330	Shale, medium gray, lumpy and medium dark gray, flaky and platy. Some pyrite, red siltstone, and yellow siltstone. Some medium sized quartz grains.
2330	2380	Shale, medium gray, flaky and lumpy. Much pyrite crystal inclusions. Some quartz grains and siltstone.
2380	2400	Shale, medium dark gray, flaky. Some coarse grained, subangular, frosted quartz and light brown siltstone.
2400	2440	Shale, medium gray, flaky, some light brown siderite pellets, limestone and quartz grains.
2440	2550	Shale, medium gray, flaky. Light brown siltstone. Some medium sized, well rounded quartz grains and pyrite crystals. Traces of dense, sublithographic limestone.
2550	2670	Shale, greenish gray and light olive gray, splintery and flaky. Some light brown siltstone. Traces of dense crystalline limestone.
2670	2730	Shale, pale reddish brown, and grayish green variegated, brittle. Some gypsum and quartz pebbles.
2730	2740	Limestone, white, crystalline, vuggy porosity. Shale as above.
2740	2820	Shale, pale reddish brown and grayish green variegated, brittle. Medium and fine, angular and subangular, frosted quartz grains. Some white gypsum.
2820	2850	Shale, medium dark gray and medium gray, platy, brittle. Moderate red brown siltstone and glauconite.

<u>From</u>	<u>To</u>	<u>Formation</u>
2850	2880	Limestone, very pale orange, dense, sublithographic, dolomitic. Some anhydrite and shale.
2880	2910	Shale, medium dark gray and greenish gray, friable and brittle. Some pale reddish brown shale.
2910	2940	Shale, medium light gray, firm, highly calcareous. Numerous micro-ostrocods.
2940	2950	Limestone, white, dense, sublithographic. Some shale as above.
2950	2960	Limestone, as above. Much anhydrite, white, sublithographic.
2960	3030	Shale, greenish gray, medium gray and pale reddish brown, calcareous. Much crystalline anhydrite.
3030	3090	Shale, medium gray and greenish gray. Much white sucrosic anhydrite. Some white to yellowish gray dense sucrosic limestone.
3090	3100	Anhydrite, white, sucrosic. Some shale as above.
3100	3130	Shale, greenish gray and medium gray, brittle. Some white sucrosic anhydrite.
3130	3160	Shale, greenish gray and pale reddish brown, brittle. Some white sucrosic anhydrite.
3160	3175	Sandstone, very fine grained, well cemented, reddish orange. Shale as above.
3175	3272	Missing Samples.

Cores #1-6

3272	3273	Dolomite, pale pink and pale red bands, dense, lithographic. Streaks of colorless clear anhydrite.
3273	3276	Dolomite, pale red, dense, lithographic. Streaks of clear, colorless anhydrite.
3276	3280	Anhydrite, very light, gray, dense lithographic. Streaks of pale red, lithographic anhydrite.
3280	3282	Dolomite, pale red, dense, lithographic, anhydritic. Anhydrite inclusions.
3282	3283	Anhydrite, grayish orange pink, dense, lithographic.
3283	3286	Dolomite, yellowish gray, oolitic, fossiliferous. Brown dolomite rhomb inclusions.
3286	3287	Limestone, yellowish gray, dense, sublithographic. Some fracturing.
3287	3288	Limestone, interbedded thin beds (3/4") of anhydrite and limestone.
3288	3291	Limestone, light olive gray, fine grained, dense, silty, streaks of clear, colorless anhydrite.
3291	3294	Limestone, pale red, dense, sublithographic, silty. Oil stain and good cut. Poor porosity.
3294	3295	Dolomite, pale red, dense, lithographic. Streaks of clear, colorless anhydrite.
3295	3296	Anhydrite, pale red to lavender, dense, lithographic.
3296	3302	Anhydrite, moderate red, dense streak of greenish gray shale - 3298-3301.
3302	3303	Anhydrite, greenish gray and pale red purple variegated, dense, massive.
3303	3307	Anhydrite, pale red, dense, massive, dolomitic. Scattered clear anhydrite inclusions.

<u>From</u>	<u>To</u>	<u>Formation</u>
3307	3308	Anhydrite, pale red and bluish white variegated, massive.
3308	3309	Anhydrite, pale red, massive.
3309	3310	Anhydrite, bluish white, massive. Streaks of pale red massive anhydrite.
3310	3312	Anhydrite, pale red and light brownish gray variegated. Clear anhydrite inclusions and streaks.
3312	3313	Anhydrite, pale red and light bluish gray, variegated, massive.
3313	3314	Anhydrite, light brownish gray, massive. Clear, colorless anhydrite inclusions.
3314	3315	Anhydrite, bluish white and grayish red purple variegated, massive.
3315	3316	Anhydrite, pale red, massive.
3316	3318	Anhydrite, pale red, massive with very light gray anhydrite mottling.
3318	3319	Anhydrite, medium gray and bluish gray mottled, massive.
3319	3320	Anhydrite, bluish gray with streaks of pale red anhydrite, massive.
3320	3321	Anhydrite, pale red purple with moderate red streaks, massive.
3321	3324	Anhydrite, light gray with streaks of moderate reddish orange, massive. End of core.
3324	3340	Missing Samples.
3340	3370	Anhydrite, pinkish red, dense, massive.
3370	3380	Shale, greenish gray and pale reddish brown variegated. Traces of white sucrosic anhydrite.
3380	3390	Dolomite, pale yellowish brown, dense, lithographic. Some white and bluish white anhydrite.
3390	3395	Anhydrite, white, sucrosic.
3395		1 1/2 hour Circulation. Limestone, yellowish gray, medium grained, sucrosic. Some good interstitial porosity.

Core # 7

3395	3396	Anhydrite, pale brown, translucent, massive.
3396	3399	Limestone, white, oolitic. Good vuggy porosity. Fluorescence with no oil cut in carbon tetrachloride.
3399	3405	Limestone, white, very fine grained to sublithographic, dense.
3405	3415	Limestone, white to yellowish gray, oolitic. Fair to good interstitial porosity. Very fine grained matrix.
3415	3416	Limestone as above. Thin band of micro- conglomerate, fine to medium, well rounded quartz in fine grained limestone matrix.
3416	3418	Limestone, white to yellowish gray, oolitic, fine grained matrix. Fair interstitial porosity. End Core.
3418	3430	Shale, greenish gray to medium gray. Some pale reddish brown shale.
3430	3445	Limestone, yellowish gray, fine grained, sucrosic. Some good tubular and vuggy porosity.
3445	3480	Shale, medium dark gray, platy and splintery, brittle, some limestone as above.

<u>From</u>	<u>To</u>	<u>Formation</u>
3480	3500	Limestone, yellowish gray, fine grained, dense. Shale as above. Brown dolomite rhomb inclusions.
3500	3530	Anhydrite, variegated white and lavender, dense, lithographic.
3530	3550	Limestone, grayish orange pink to yellowish gray, sub-lithographic, dolomite inclusions. Some white, sucrosic anhydrite.
3550		1 1/2 hour circulation. Limestone, as above.
Core 3550-3580		
3550	3551	Limestone, very light gray with scattered black specks, oolitic, fair interstitial porosity.
3551	3553	Limestone, yellowish gray, fine grained sucrosic, spotted fluorescence with no cut in carbon tetrochloride. Poor porosity.
3553	3556	Limestone, yellowish gray, fine grained, sucrosic spotted fluorescence, slight cut in CC14. Good pinpoint porosity.
3556	3558	Limestone, yellowish gray, oolitic, good fluorescence and cut in CC14. Good interstitial porosity.
3558	3560	Limestone, yellowish gray, oolitic, spotted fluorescence. No oil cut in CC14, fair to good interstitial porosity.
3560	3563	Yellowish gray with black specks, oolitic, good fluorescence and no oil cut in CC14; good tubular and interstitial porosity.
3563	3566	Limestone, very light gray, fine grained oolitic, fair to poor interstitial porosity spotted fluorescence, no cut in CC14.
3566	3570	Limestone, very light gray, oolitic, good porosity, slight fluorescence, no cut in CC14.
3570	3578	Limestone, very light gray with dark bands, fine grained, arenaceous spotted fluorescence, no cut, good interstitial porosity.
3578	3580	Limestone, very light gray, oolitic, fair to good pinpoint porosity, spotted fluorescence, no cut.
3580	3620	Limestone, white chalky.
3620	3650	Limestone, yellowish gray, medium grained, sucrosic, chalky in part.
3650	3660	Shale, medium dark gray, platy, some limestone as above.
3660	3670	Limestone, yellowish gray, dense, very fine grained shale as above
3670	3680	Shale, medium gray, platy some limestone as above.
3680	3700	Limestone, yellowish gray, coarse grained, oolitic.
3700	3725	Limestone, yellowish gray, fragmental, chalky in part.
3725	3745	Limestone, yellowish gray, very fine grained, dense, some fragmental limestone, shale as above.
3745	3755	Shale, medium dark gray, platy, brittle some limestone as above.
3755		Total Depth