# NORTH DAKOTA GEOLOGICAL SURVEY CIRCULAR NO. 211

Summary of the Herman Hanson Oil Syndicate
Barbara, Ann and Theresa Welder No. 1
Logan County, North Dakota
Well No. 1835 - Permit No. 1847

by Clarence Carlson
December, 1958

The Herman Hanson - Welder No. 1 is located in the NE/4, NW/4 of Sec. 20, T. 133N., R. 72W., Logan County, North Dakota. The elevation is 1993 feet G.L., 2004 feet K.B.

The Herman Hanson - Welder No. 1 was spudded May 26, 1958, and 10 3/4" surface casing was set at 216 feet with 111 sacks of cement. The well was drilled to a total depth of 3188 feet, plugged and abandoned June 10, 1958.

Logs: Electric and Microlaterolog

Cores:
2677-2738
2794-3019

This well was cored through the Mesozoic-Paleozoic unconformity providing some interesting information about the nature of the unconformity in this area of North Dakota. Apparently the Paleozoic surface was exposed for a much longer period of time in this part of the state than in the northern part of the state because a karst topography had developed on the Madison limestone in this area. Solution cavities to a depth of 136 feet were noted in this well. The solution cavities were filled with a breccia conglomerate which becomes more calcareous in the lower part of the weathered zone (2904-2952). The breccia conglomerate contains fragments and chunks of Madison limestone throughout as well as some unidentified plant remains (2909-2912).

Tests:
DST 1 2720-2738; Tool open 2 hours, shut in 30 minutes. Tool opened with a weak blow. Recovered 180 feet of muddy fresh water and 30 feet of drilling mud. FP 0-125; SIP 1025.

DST 2 2982-3019; Tool open 4 hours, shut in 30 minutes. Tool opened with strong blow, died in 25 minutes. Recovered 180 feet of muddy fresh water and 2654 feet of fresh water. FP 1005-1240; HP 1730; SIP 1240.

Plugging record:
2809' - 2869' 25 sacks of cement
2659' - 2719' 25 sacks of cement
2269' - 2329' 25 sacks of cement
195' - 240' 25 sacks of cement
ground level 5 sacks of cement

Formation tops were picked from samples and electric logs; corrected to the electric log. Not all formation tops were called. Colors are from the rock color chart, distributed by the Geological Society of America (1951).

## FORMATION TOPS

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| Cretaceous System | |
| Greenhorn formation | 1724 |
| Newcastle formation | 2133 |
| Fall River formation | 2333 |
| Jurassic System | 2462? |
| Piper limestone | 2654 |
| Mississippian System | |
| Madison group | |
| (Charles formation?) | 2816 |
| Lodgepole formation | 3122 |

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| 500-560 | Shale, medium gray, fissile, bentonitic; some white bentonite. |
| 560-800 | Shale, medium light gray, fissile in part, blocky in part. |
| 800-1070 | Shale, medium light gray to medium gray, fissile and bentonitic in part, blocky in part. |
| 1070-1100 | Shale, dark gray, fissile. |
| 1100-1160 | Shale, dark gray as above and medium light gray, fissile. |
| 1160-1190 | Shale, as above and shale, medium light gray, calcareous “white specks”. |
| 1190-1280 | Shale, medium light gray to medium gray, white specks, calcareous, fissile. |
| 1280-1370 | Shale, medium light gray to medium gray, fissile in part, blocky in part. |
| 1370-1460 | Shale, medium light gray, fissile. |
| 1460-1560 | Shale, dark gray, fissile. |
| 1560-1590 | Shale, medium light gray and dark gray, fissile; some white bentonite. |
| 1600-1700 | Shale, medium light gray to medium gray, fissile. |
| 1700-1720 | Shale, dark gray, fissile; bentonite, white, micaceous. |
| 1720-1750 | Shale, dark gray, fissile. |
| 1750-1840 | Shale, medium dark gray, “white specks”, calcareous, numerous Inoceramus fragments. |
| 1840-2150 | Shale, medium dark gray, fissile. |
| 2150-2160 | Siltstone, very light gray. Shale, as above. |
| 2160-2170 | Sandstone, light gray, very fine grained, silty, argillaceous, very soft and crumbly. |
| 2170-2180 | Sandstone as above and shale, medium light gray. |
| 2180-2190 | Shale, medium light gray and medium gray, fissile. |
| 2190-2200 | Sandstone, grayish orange pink, 5YR7/2, very fine to medium grained, calcareous, shaly; siltstone, moderate brown 5YR4/4, sandy, slightly calcareous; some shale as above. |
| 2200-2350 | Shale, medium gray to medium dark gray. |
| 2350-2360 | Pyrite and fine to coarse, subrounded quartz grains; some sandstone, fine to medium grained, pyrite cemented. |
| 2360-2370 | Sandstone, very fine to fine grained, pyrite cemented; shale, medium to medium dark gray. |
| 2370-2380 | Sandstone white to grayish orange 10YR7/4, very fine to fine grained, calcareous; some siderite nodules. |
| 2380-2410 | Sandstone as above, siderite nodules and pyrite, much more abundant. |
| 2410-2430 | Sandstone, grayish orange, 10YR7/4, very fine to fine grained calcareous and siltstone, grayish orange 10YR7/4, sandy, calcareous, some shale, pale yellowish brown 10YR6/2. |

2430-2440 Sandstone, colorless to very light gray, fine subangular to subrounded, weakly cemented with pyrite.
2440-2460 Sandstone, grayish orange pink, 5YR7/2, fine to medium and coarse grained subrounded to subangular, firmly cemented.
2460-2490 Shale, medium light gray and sandstone very light gray, very fine grained argillaceous.
2490-2510 Shale, medium light gray and sandstone, very light gray, very fine grained, argillaceous with traces of glauconite.
2510-2530 Siltstone, moderate reddish orange, 10R6/6, calcareous and sandstone, moderate reddish orange, 10R6/6, calcareous, fine to medium, rounded grains; shale, medium light gray and medium gray; pyrite nodules.
2530-2540 Sandstone, white, very fine grained, silty, calcareous, traces of glauconite some pyrite cement.
2540-2550 Sandstone, white, very fine to fine grained, calcareous.
2550-2560 Sandstone, as above; many pyrite nodules, some pyrite cemented sandstone.
2560-2580 Sandstone, as above and siltstone, moderate reddish orange 10R6/6, calcareous; pyrite nodules.
2580-2620 Siltstone, moderate reddish orange 10R6/6, calcareous.
2620-2630 Shale, light gray to light greenish gray, 5GY8/1, platy; some siltstone as above.
2630-2640 Shale, as above; some sandstone, light greenish gray, very fine to fine grained, calcareous.
2640-2650 Sandstone, white, very fine grained, shaly, calcareous, shale, as above.
2650-2660 Sand, loose, medium to coarse, rounded grains composed of quartz, anhydrite and limestone; shale, light greenish gray, as above.

Cores (30 feet - recovered 11 1/2 feet; depths may be in error)
2677-2678 Sandstone, light greenish gray, very fine to fine grained, shaly, calcareous with sandy shale layers.
2678-2679 Limestone, white, fine grained, granular, vuggy dolomitic.
2679-2681 Limestone, white, partially recrystallized oolitic to fine grained, granular.
2681-2682 Limestone, white, sublithographic.
2682-2683 Limestone, white, fine grained, good intergranular porosity.
2683-2685 Limestone, very light gray, finely crystalline, slightly argillaceous.
2685-2686 Dolomite, grayish orange pink, granular, very cherty, chert, light gray.
2686-2687 Shale, pale red 10R6/2, thinly laminated with pile red siltstone bands.
2687? (one chip) Siltstone, moderate reddish orange, calcareous.
2709-2717 Limestone, pinkish gray, and light gray, finely crystalline, dense.
2717-2721 Limestone, pinkish gray, very finely crystalline, dense.
2721-2725 Limestone, very light gray, very finely crystalline, fair inter-granular, porosity.
2725-2727 Limestone, pale brown, very finely crystalline, argillaceous.
2727-2728 Shale, light gray and grayish pink, calcareous.
2728-2730 Limestone, very light gray, very finely crystalline, argillaceous and slightly arenaceous.
2730-2737 Limestone, very light gray, very finely crystalline, some coarsely crystalline, with colorless calcite filling vugs and fractures.

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| 2737-2738 | Shale, pale reddish brown 10R5/4, and siltstone, moderate reddish orange 10R6/6 with fine to medium rounded sand grains. |
| Samples | |
| 2738-2740 | Shale, as above; some white gypsum; some siltstone, as above. |
| 2740-2750 | Dolomite, yellowish gray, finely crystalline with some white gypsum. |
| 2750-2760 | Gypsum, white, shale and siltstone, moderate reddish orange. |
| 2760-2792 | Shale, pale reddish brown; gypsum, white. |
| Cores | |
| 2794-2806 | Shale, grayish red, 10R4/2, blocky, calcareous with minor amounts of colorless anhydrite. |
| 2806-2807 | Sandstone, very light gray, very fine to medium grained, rounded to subangular with calcareous cement. |
| 2807-2809 | Shale, grayish red 10R4/2, slightly calcareous with a few floating sand grains, scattered lenses of sandstone as above and a little anhydrite. |
| 2809-2811 | Shale, grayish red, 10R4/2, very arenaceous, slightly calcareous. |
| 2811-2816 | Shale, mottled, grayish red 10R4/2, dusky yellow 5Y6/4 and light greenish gray, 5GY8/1, arenaceous, slightly calcareous. |
| 2816- | Limestone, pale red 10R6/1, very finely crystalline, dense and limestone mottled pale red and yellowish gray 5Y6/1, composed of angular fragments of very finely crystalline texture with medium to coarsely crystalline calcite matrix; some grayish red and light greenish gray shale lining vugs. |
| 2816- | Siltstone, grayish red 10R4/2, grayish pink 5R6/2 and light greenish gray 5G8/1, sandy and sandstone, light greenish gray 5G8/1, very fine to fine grained with some shale pebbles. |
| 2816-2823 | Argillaceous, calcareous; some shale, grayish red 10R4/2 and light greenish gray 5G8/1. |
| 2824 | Siltstone, mottled, light greenish gray, 5G8/l to pale red, 10R6/1, calcareous, arenaceous. |
| 2825- | Limestone, very light gray, very finely crystalline. |
| 2826-2830 | Limestone, yellowish gray, finely crystalline, recrystallized from oolitic or fragmental limestone. |
| 2830-2832 | Limestone yellowish gray, finely crystalline, fragmental. |
| 2832- | Breccia zone, composed of angular chunks of light gray limestone imbedded in grayish red, 10R6/1, sandy siltstone and light greenish gray, 5G8/1, waxy shale and 2 pieces of limestone, yellowish gray, finely crystalline, fragmental, apparently in place. |
| 2837½-2838½ | Limestone, pinkish gray 5YR6/1, very fine to medium crystalline. |
| 2838½-2839 | Breccia zone, same as 2832-2837½. |
| 2839-3" | Limestone, yellowish gray, very fine to finely crystalline, dense. |
| 2839-15" | Siltstone, mottled grayish red and light greenish gray; mostly grayish red argillaceous and sandy, very calcareous. |
| 2840-2841 | Limestone, yellowish gray, finely crystalline. |
| 2841-2842 | Mostly solution filling consisting of grayish red, arenaceous, calcareous siltstone, with a shell of limestone, yellowish gray, finely crystalline, along one side of the core. |
| 2842-2843 | Limestone, pinkish gray 5YR6/1, very finely crystalline, dense. |

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| 2843-2845 | Breccia zone composed of angular fragments of yellowish gray, very finely crystalline, limestone and shale, light greenish gray, calcareous silty and sandy and some siltstone, pale red, sandy, calcareous. |
| 2845-2846 | Limestone, light yellowish gray, fine to medium crystalline. |
| 2846-2848 | Limestone, grayish orange pink, fine to medium crystalline along 1/3 of core; Breccia zone, as from 2843-2845 in about 1/2 to 2/3 of the core. |
| 2848-2851 | Breccia zone composed of angular fragments of limestone, pinkish gray, finely crystalline; siltstone, grayish red, arenaceous, slightly calcareous and shale, light greenish gray and pale red, 10R6/2, waxy. |
| 2851-2854 | Dolomite, moderate red, 5R4/2, finely crystalline, argillaceous, dense. |
| 2854-2856 | Breccia zone, as in 48-51. |
| 2856-2857 | Limestone yellowish gray, fine to medium crystalline, dense. |
| 2857-2864 | Breccia zone as from 2848-51 with limestone yellowish gray, as above, along one side (1/3) of the core at 2859-60 and 2862-63. |
| 2864-2864½ | Limestone, yellowish gray, oolitic to fragmental with a very finely crystalline matrix, partially recrystallized to a very finely crystalline, dense limestone. |
| 2864½-2867 | Breccia zone, composed mostly of grayish red, 5R4/2 to pale red, 5R6/2 and light greenish gray, 5G8/1, silty to sandy shale and dolomite, pale red, finely crystalline; a few chunks of limestone at 2868. |
| 2869-2872 | Breccia composed mostly of angular chunks of limestone, yellowish gray, 5Y8/1 oolitic to fragmental in part and very finely crystalline, dense in part with a matrix of grayish red and light greenish gray, silty, sandy shale. |
| 2872-2874 | Limestone, yellowish gray 5Y8/1, saccharoidal, partially re-crystallized to microcrystalline, dense limestone. |
| 2874-2875 | Limestone, yellowish gray, sublithographic. |
| 2875-2877 | Limestone, yellowish gray, 5Y8/1, very finely crystalline to sub-lithographic with a few small vugs. |
| 2877-2879 | Limestone, yellowish gray, saccharoidal, some small vugs, good porosity. |
| 2879-2881 | Limestone, yellowish gray to grayish orange pink 10R8/5, fine to medium and coarsely crystalline, fragmental (Brachiopod fragments) in part, very finely crystalline, dense in part. |
| 2881-2882 | Limestone pinkish gray, 5YR8/1, finely crystalline, with thin shale laminations, grayish red. |
| 2882-2883 | Limestone, yellowish gray, fine to coarsely crystalline, fragmental in part, microcrystalline in part. |
| 2883-2884 | Limestone, grayish pink, 5R6/2, finely crystalline, solution cavities lined with grayish red and green shale coatings, cavities filled with limestone breccia with a grayish red shale matrix. |
| 2884-2885 | Limestone, yellowish gray, 5Y8/1, finely crystalline to sub-lithographic with a few small vugs. |
| 2885-2888 | Limestone, yellowish gray, 5Y8/1, fine to coarsely crystalline fragmental in part, very finely crystalline, dense in part. |
| 2888-2889 | Limestone, pinkish gray, finely crystalline, thinly laminated with grayish red and greenish gray shale along laminations. |
| 2889-2890 | Limestone, yellowish gray, fine to medium crystalline, fragmental solution cavities filled with very finely crystalline, yellowish gray limestone. |

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| 2890-2892 | Limestone, very light gray and pale red 5R6/2, finely crystalline fragmental in part, argillaceous, dolomitic. |
| 2892-2893 | Limestone, grayish orange pink, 10R8/2, very fine to finely crystalline. |
| 2893-2895 | Limestone, grayish pink, 5R6/2, microsucrosic, slightly dolomitic. |
| 2895-2897 | Limestone, pinkish gray and pale red 5R6/2, finely crystalline, argillaceous. |
| 2897-2903 | Breccia zone composed of angular chunks of limestone, yellowish gray, fine to medium crystalline, fragmental and very finely crystalline, dense in a matrix of limestone, mottled light gray to grayish red 10R4/2, silty, arenaceous; and a little shale, light greenish gray and grayish red. |
| 2903-2904 | Limestone, grayish orange pink to pale brown, fine to coarsely crystalline, fragmental. |
| 2904 | Shale, greenish gray and very light gray, soft sandy; some chunks of limestone, yellowish gray imbedded in the shale. |
| 2904-2907 | Limestone, mottled pinkish gray, light gray and very light gray, finely crystalline, argillaceous. |
| 2907-2909 | Limestone, light gray, very finely crystalline, argillaceous with scattered very fine quartz grains. |
| 2909-2912 | Breccia zone composed of small fragments of limestone, yellowish gray in a matrix of limestone, medium light gray, fine to medium crystalline, silty; some fossil plant remains at 2909; matrix becomes pale red, 5R6/2 and quite sandy at 2910, limestone fragments become larger (up to 3 inches in length) at 2911. |
| 2912-2913 | Limestone, pinkish gray to medium light gray, fine to medium, granular, very arenaceous, scattered carbonaceous material and fossil plant remains. |
| 2913-2914 | Limestone, grayish orange pink to yellowish gray, micro-crystalline, dense; partially dissolved along one side of the core. |
| 2914-2915 | Limestone, medium light gray, microcrystalline, dense. |
| 2915-2916 | Breccia zone composed of fragments of limestone, yellowish gray in a matrix of limestone mottled greenish gray to grayish red, finely crystalline, shaly and very arenaceous. |
| 2916-2917 | Breccia zone, fragments as above in a matrix of sandstone, medium gray to grayish pink, very fine to medium, rounded quartz grains, shaly, very calcareous, scattered carbonaceous material. |
| 2917-2918 | Breccia zone, same as from 2915-16. |
| 2918-2919 | Limestone, grayish orange pink, recrystallized oolitic with colorless calcite filling of pores; core is about 1/3 dissolved along one side. |
| 2919-2920½ | Breccia zone composed of limestone fragments in a matrix of limestone, light gray, finely crystalline, argillaceous. |
| 2920½-2921 | Limestone, pale red 10R6/2, very finely crystalline, dense, partially dissolved on one side of core. |
| 2921-2930 | Breccia zone composed of limestone fragments in a matrix of limestone, pinkish gray to light gray, finely crystalline, very arenaceous, scattered carbonaceous material, some shale fragments. |
| 2930-4" | Limestone, yellowish gray, fine to medium crystalline fragmental. |
| 2930½-2932 | Breccia zone as from 2921-30. |
| 2932-2933 | Limestone, grayish orange pink. |
| 2933-2937 | Limestone, light gray, finely crystalline, argillaceous with a few small solution cavities filled with breccia. |

2937-2939 Breccia zone as from 2921-30.
2939-4" Limestone, yellowish gray, fragmental to oolitic, partially re-crystallized, with colorless calcite filling the primary porosity.
2939½-2952 Breccia zone composed of fragments of yellowish gray limestone and greenish gray shale in a matrix of limestone, pinkish gray, fine grained, very arenaceous; remnants of limestone, yellowish gray, very finely crystalline along the side of the core at 2944 and 2945; at 2948½ of the core is limestone, yellowish gray, fine to medium crystalline.
2952-2954 Limestone, yellowish gray, oolitic to fragmental with colorless calcite filling the primary porosity.
2954-2956 Dolomite, pale red 10R6/2, very finely crystalline, dense, limey, slightly argillaceous; with some thin shale partings along solution channels filled with grayish red and greenish gray soft shale.
2960-2960½ Limestone, yellowish gray, fine to medium crystalline, fragmental slightly vuggy, good intergranular porosity.
2960½-2961½ Dolomite, pale red, 10R6/2, very finely crystalline, dense.
2961½-2962 Limestone, yellowish gray, finely crystalline, in part, fragmental in part.
2965-2967 Limestone, light gray, finely crystalline with grayish red staining along fractures and solution cavities.
2967-2967½ Dolomite, pale red, 10R6/2, very finely crystalline, dense.
2967½-2970½ Limestone, yellowish gray, very finely crystalline in part, finely crystalline in part.
2970½-2972 Dolomite, grayish orange pink, 10R8/2, fine to medium crystalline granular, limey, fair intergranular porosity.
2972-2973 Dolomite, pale red 5R6/2, finely crystalline, dense.
2973-2974 Limestone, yellowish gray, oolitic, partially recrystallized to finely crystalline.
2981-2983½ Dolomite, pale red, 10R6/2, very finely crystalline, dense.
2983½-2984½ Limestone, yellowish gray, very finely crystalline, dense.
2984½-2987 Limestone, pale red 10R6/2, very finely crystalline, dense, dolomitic.
2987-2988 Limestone, yellowish gray, finely crystalline, dense, some stylolites.
2988-2990 Limestone, yellowish gray, fine to medium crystalline, granular, fair to good intergranular porosity, some stylolites.
2990-2993 Limestone, yellowish gray, very finely crystalline, dense; some small vugs.
2993-2994 Limestone, yellowish gray, saccharoidal, good porosity.
2994-2994½ Limestone, yellowish gray, microcrystalline, dense.
2994½-2997½ Limestone, yellowish gray, saccharoidal, good porosity, some small vugs; some finely crystalline, vuggy.
2997½-2998 Limestone, yellowish gray, fine to medium crystalline, excellent vuggy porosity from numerous small vugs giving a “worm eaten” appearance.
2998-2999 Limestone, yellowish gray, very finely crystalline, dense in part, finely crystalline, fragmental in part.
2999-3009 Limestone, yellowish gray, oolitic to pisolitic in part, good porosity.
3009-3012 Limestone, yellowish gray, fine to medium crystalline, granular fair intergranular porosity.
3012-3014 Limestone, yellowish gray, oolitic. A plug from this core measured 12.6% porosity, 93.6 md. permeability.

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| 3014-3017 | Limestone, yellowish gray, very finely crystalline, dense, scattered stylolites. |
| 3017-3018 | Limestone, yellowish gray, finely crystalline fragmental in part. |
| 3018-3019 | Limestone, yellowish gray, oolitic to pisolitic. |

Samples

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| 3020-3030 | Limestone, yellowish gray, oolitic to pisolitic. |
| 3030-3040 | Limestone, yellowish gray, oolitic to pisolitic, partially re-crystallized to finely crystalline. |
| 3040-3080 | Limestone yellowish gray and grayish orange pink, fine grained, fragmental and fossiliferous. |
| 3080-3090 | Limestone, yellowish gray, oolitic partially recrystallized to finely crystalline. |
| 3090-3100 | Limestone, as above and limestone, grayish orange pink 5YR7/2 fine to medium grained, granular. |
| 3100-3110 | Limestone, pinkish gray, 5YR8/1, oolitic partially recrystallized to finely crystalline. |
| 3110-3130 | Limestone, pale red, 10R6/2, fine to medium grained, granular, slightly argillaceous. |
| 3130-3160 | Limestone, pale red, 10R6/2, to pinkish gray 5YR8/1, fine to medium grained, fragmental, fossiliferous. |
| 3160 | Total depth. |