

NORTH DAKOTA GEOLOGICAL SURVEY CIRCULAR NO. 168

Summary of the Northern Pump - Lucy Fritz No. 1
Billings County, North Dakota
Well No. 1304 - Permit No. 1316

By Richard Maywald
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Northern Pump Company - Lucy Fritz No. 1, Billings County, North Dakota.
Location: SE SE Section 15, T. 137N., R. 100W., Elevation: 2854 K.B., G.L.
2841.

The Northern Pump Company - Lucy Fritz No. 1 was spudded November 7, 1956, drilled to a total depth of 9384' and was completed as a producer, January 7, 1957. Laterolog-gamma ray from 606-9382 feet and microlateral log-caliper from 6600-9380 were run January 1, 1957.

Coring Record:

9106-9134
9134-9184

Testing Record:

DST No. 1, 8043-8081 - Open 33 minutes; shut in 30 minutes. Immediate very strong blow. Gas to surface in 10 minutes; gas burned with 10-15' flare. Oil to surface in 28 minutes; flowed oil for 5 minutes at estimated rate of 22 barrels of oil per hour. Reversed out 8081' of gassy dark brown oil. IHP: 4865 psi., IFP: 2779 psi., FFP: 3133 psi; 30 minutes shut in: 3703 psi., FHP: 5047 psi.

DST No. 2, 9107-9134 - Shut in 30 minutes; open 3 hours, shut in 45 minutes. Immediate weak blow decreasing to very weak blow in 90 minutes; very weak blow continuing for remainder of test. Recovered 15' drilling mud, 180' muddy water, 180' muddy water with scum of green oil, (Note: analysis of drill stem test water showed salinity of 74,250 to 115,500 ppm), IHP: 5200 Psi, 30 minutes, ISIP: 3340 psi., IF: 0, 45 minutes SIP: 3170 psi., FHP: 5200 psi.

Casing Record:

606 feet of 10 3/4" with 400 sacks at 606'
8148 feet of 5 1/2" with 480 sacks at 8148'

Formation tops were determined from samples and electric logs. Doubtful or obscure formation tops were not picked. Color names and identifying numbers are taken from the 1948 Rock-Color Chart which is distributed by the National Research Council, Washington, D.C.

FORMATION TOPS

Cretaceous System

Pierre formation	1920
Niobrara formation	4000
Greenhorn formation	4600
Muddy formation	5225
Basal Cretaceous sands	5510

Jurassic System	5865
Piper "lime"	6570
Triassic System	
Spearfish formation	6740
Permian System	
Minnekahta formation	7255
Opeche	7300
Pennsylvanian System	
Minnelusa formation	7400
Mississippian System	
Amsden formation	7700
Heath formation	7980
Heath "oil sand"	8054-8074
Kibbey formation	8250
Kibbey "lime"	8375
Charles formation	8515
Base Last Salt	8810
Total Depth	9382

630-1140	Shale, light gray, compact and lumpy scattered lignite fragments.
1140-1170	Sandstone, fine to medium grained friable; shale, as above, and shell fragments.
1170-1200	Peculiar sample composed of small subrounded calcareous fragments, light gray color, limestone?
1200-1230	Sandstone fine to medium grained, angular to subangular, friable.
1230-1290	Lignite, black and splintery; scattered shale fragments.
1290-1320	Shale, light brownish gray, compact and lumpy; lignite fragments.
1320-1470	Shale, as above; siltstone, light brown (5YR6/4), well indurated, slightly calcareous, in scattered fragments.
1470-1650	Sandstone, fine to medium sized-grains, well cemented with calcareous cement, composed of both quartz and dark mineral grains; scattered shale fragments, as above.
1650-1710	Shale, light brownish gray, spongy and disaggregated, bentonitic; sandstone, scattered grains, as above.
1710-1800	Sandstone, fine-grained, rounded to subrounded, disaggregated quartz grains; scattered shale fragments.
1800-1920	Sandstone, as above, some of which is cemented with a calcareous cement, shale, as above.
1920-2070	Shale, light brownish gray, spongy, with scattered shell fragments, and some scattered sand grains.
2070-2100	Shale a light brownish gray, spongy, bentonitic, scattered shell fragments.
2100-2400	Shale, medium light gray, lumpy and compact, platy cleavage, scattered shell fragments.
2400-2520	Poor samples, mixture of fine-grained sandstone, gray shale, and black carbonaceous material, probably still largely shale, as above.
2520-2640	Shale, medium light gray, compact, some pyrite streamers on bedding surfaces, scattered shell fragments.
2640-2700	Shale as above, and Inoceramus fragments; some scattered calcareous shale or limestone fragments, medium gray, fine-grained.
2700-2820	Calcareous shale, as above, and abundant shell and Inoceramus fragments.

2820-2970 Shale, light brownish gray, resinous luster, brittle; shell and Inoceramus fragments, as above; also gray shale fragments.

2970-3180 Shale medium light gray, spongy and bentonitic; Inoceramus and shell fragments, as above.

3180-3210 Shale, pale brown (5YR5/2), thinly laminated, spongy.

3210-3300 Shale, medium light gray, spongy.

3300-3360 Shale, medium gray, calcareous, compact.

3360-3420 Shale, medium gray, compact, with brown plant fragments on bedding surfaces.

3420-3600 Shale, medium gray, thinly laminated, compact, somewhat sooty luster.

3600-4020 Shale, as above, with scattered shell fragments.

4020-4110 Shale, medium gray, with calcareous "white specks".

4110-4140 Shale, pale brown (5YR5/2), platy fragments.

4140-4620 Shale, medium gray, foliated structure; scattered shell fragments and Inoceramus prisms.

4620-4710 Shale, medium dark gray, calcareous with "white specks".

4710-5240 Shale, medium dark gray, thinly laminated, brittle.

5240-5260 Sandstone, fine-grained, subangular quartz grains, friable.

5260-5540 Shale, medium dark gray, thinly laminated to fissile, brittle, splintery fragments.

5540-5740 Sandstone, fine-grained well cemented quartz grains; abundant shale fragments, as above.

5740-5760 Shale, medium dark gray, laminated splintery fragments, probably still sandstone.

5760-5810 Sandstone, fine-grained, fairly well cemented quartz grains, some greenish and some gray in color; abundant shale caving.

5810-5840 Dolomitic limestone, light brownish gray, finely crystalline; shale and some sandstone caving.

5840-5860 Sandstone, fine-grained loosely cemented quartz grains; shale caving.

5860-5920 Shale, medium dark gray, fissile; sandstone, as above, caving(?)

5990-5960 Sandstone, fine-grained, loosely cemented with calcareous cementing material, light gray color, some greenish grains but essentially quartz.

5960-5970 Limestone, very light gray, microsugrosic texture.

5970-6050 Sandstone greenish gray (5YR6/1), slightly calcareous, fine-grained, friable, quartz grains, glauconitic.

6050-6100 Limestone, very light gray, finely crystalline, grainy texture, somewhat dolomitic.

6100-6200 Sandstone, fine-grained, fairly well cemented quartz grains, very light gray color.

6200-6220 Sandstone, as above, but possibly shaly.

6220-6340 Sandstone, fine-grained, fairly well cemented quartz grains, calcareous cement.

6340-6400 Shale, medium dark gray, splintery; sandstone, as above.

6400-6460 Dolomitic limestone, medium gray, fine-grained, grained, micro-crystalline texture.

6460-6530 Shale, pale brown (5YR5/2), slightly calcareous, platy fragments; anhydrite; scattered fragments.

6530-6550 Limestone, very light gray, microsugrosic texture.

6550-6570 Shale, pale brown, compact; fragments of anhydrite; some limestone, as above.

6570-6590 Dolomite, pinkish gray, microsugrosic texture, dense.

6590-6600 Dolomite, as above, with medium gray shale.

6600-6640 Limestone, pale red (5R6/2), very fine-grained, argillaceous.

6640-6660 Shale, light red (5R6/6), very fine textured, calcareous, argillaceous limestone, as above.

6660-6680 Shale, medium gray, splintery fragments; shale, light red, as above.

6680-6700 Dolomitic limestone, pinkish gray, fine grained, dense.

6700-6760 Shale, moderate red, (5R5/4)) finely textured, dolomitic; scattered fragments of anhydrite.

6760-6810 Sandstone, fine-grained, pale reddish brown (10R5/4), friable.

6810-6840 Limestone, light brownish gray (5YR6/1), very fine textured, dense; sandstone, as above; shale, medium gray, splintery to platy.

6840-6950 Sandstone, fine grained, with scattered fragments of anhydrite, as above; according to the laterolog there is salt from 6870-7040.

6950-6970 Salt in sample; sandstone, as above.

6970-7050 Sandstone, as above, with some quartz crystals.

7050-7100 Shale, medium dark gray, platy to splintery fragments; sandstone and gypsum, as above, caving?; some argillaceous siltstone, pale red (10R6/2), with some anhydrite inclusions.

7100-7270 Shale, pale reddish brown (10R5/4), with some anhydrite inclusions; scattered fragments of anhydrite.

7270-7290 Anhydrite, white, microsucrosic; also fragments of argillaceous siltstone as above.

7290-7320 Limestone, pale red (5R6/2) very fine-grained, dense; also scattered anhydrite fragments.

7320-7370 Probably salt due to characteristic on laterolog; sample shows medium gray shale, fissile and splintery, and reddish brown shale, and anhydrite.

7370-7400 Shale, pale reddish brown (10R5/4), relatively structureless but dense and brittle.

7400-7700 Sandstone, fine-grained with some medium sized grains imbedded in sandstone, well cemented, pale red color.

7700-7770 Dolomite, pale red (5R6/2), very finely crystalline, dense; scattered fragments of sandstone, as above; also a little anhydrite and pale reddish brown shale, caving.

7770-7820 Dolomite and sandstone, as above; shale, medium dark gray, splintery.

7820-7840 Sandstone, grayish pink, fine grained well cemented; reddish brown shale.

7840-7890 Dolomite, grayish pink (5R8/2), finely crystalline, dense, some reddish brown shale.

7890-7950 Dolomite, very light gray, microsucrosic, dense.

7950-7960 Dolomites grayish pink (5R8/2) very finely crystalline, shale, moderate red (5R5/4), platy.

7960-8000 Dolomite, as above; limestone, medium gray, very finely crystalline, dense, argillaceous.

8000-8030 Limestone, medium dark gray, finely crystalline, dense, with some scattered microfossils (ostracodes?).

8030-8050 Shale, dark gray, fissile to finely laminated, brittle.

8050-8081 Sandstone, fine-grained, subangular, fairly well cemented quartz grains, good oil under ultra violet light; shale, as above.

8081- Circulation samples, sandstone, scattered quartz grains, fine to medium grained, subangular, some fairly well cemented together in small clusters, good oil cut with ccl_4 , some of the grains show sharp crystals faces apparently due to recrystallization; shale fragments, as above.

8081-8100 Shale, dark gray, fissile to thinly laminated; scattered sand grains as above; fragments of pale reddish brown shale, platy, probably caving.

8100-8150 Sandstone, fine to medium grained, well rounded to subangular quartz grains; shale, as above, caving.

8150-8250 Argillaceous silty dolomite, light brownish gray, dense and hard, medium dark gray shale, as above; sandstone, as above.

8250-8330 Sandstone, fine-grained, pale red (5R6/2), well cemented, some of the sandstone is grayish pink; shale fragments as above.

8330-8380 Sandstone, as above, but composed of large sand grains, grading into medium grained; pale reddish brown shale fragments, probably caving.

8380-8400 Limestone, light brownish gray, fine grained; sandstone and shale caving.

8400-8450 Sandstone, fine grained, friable; limestone, as above; shale fragments, moderate reddish brown.

8450-8570 Shale, pale reddish brown (10R5/4), platy fragments; some sandstone fragments.

8570-8490 Shale, as above, and anhydrite fragments.

8490-8610 Poor samples, however laterolog indicates salt, also salt in samples.

8610-8650 Shale and anhydrite, poor samples.

8650-8710 Anhydrite and shale, poor samples.

8710-8750 Limestone, medium dark gray, fine grained, argillaceous, dense.

8750-8800 Anhydrite, light gray.

8800-8830 Limestone light gray, fine grained, dense; some fragments of anhydrite.

8830-8880 Anhydrite, medium gray.

8880-8940 Limestone pale yellowish brown (10YR6/2), fine grained, dense.

8940-9020 Limestone, pale yellowish brown, microsucrosic texture to fine-grained texture.

9020-9105 Limestone fragments, as above; scattered anhydrite fragments.

Core Chip Description

9106-9108 Limestone, pale brown, fine grained, dense.

9108-9126 Dolomitic limestone, pale brown, fine grained, dense.

9126-9137 Limestone, light brownish gray, fine grained, dense.

9137-9141 Limestone, medium dark gray, medium grained, dense.

9141-9147 Limestone, light brownish gray, microsucrosic texture.

9147-9156 Limestone, light brownish gray, fine grained with larger grains which are recrystallized, some recrystallized microfossils.

9156-9158 Limestone, as above, but brownish gray.

9158-9165 Limestone, light brownish gray, microsucrosic texture, very finely porous.

9165-9174 Limestone, as above, more dense, with scattered recrystallized microfossils.

9174-9180 Limestone, medium gray, finely crystalline, dense.

Sample Description

9184-9325 Limestone, light brownish gray, microsucrosic to finely crystalline fragments; scattered anhydrite fragments.

9325-9360 Shale, medium dark gray, platy fragments; scattered fragments of limestone as above.

9360-9382 Slightly dolomitic limestone fragments, light brownish gray, fine grained, dense.

9382 Total Depth