

GEOLOGICAL REPORT

Ferguson Oil Company
#1 Blucher - Old Well Drilled Deeper

SW NE Sec. 13-35S-31W
Seward County, Kansas

Original Well

| | | |
|--------------------------|-------------------------------------|--|
| Operator: | J. M. Huber Corp. | Casing: |
| Completion Date: | 9/16/53 | Surface: 13 3/8" @ 638' |
| Elevation: | 2672 G.L. 2682.5 K.B. | Intermediate: 9 5/8" @ 2406' |
| Total Depth: | 6348 Schlumberger 6350 Driller | cmt'd w/300 sx on bottom and 175 sx through D.V. tool @ 886' |
| Completed as a dry hole. | | Production: None |
| Hole Size: | 8 3/4" from 2407 to T.D. (6350') | Electrical Surveys: |
| | | Schlumberger S.P., 16' |
| | | Lateral, 16" & 6 1/4" Normals from T.D. to 2405' |
| | | Microlog from T.D. to 4400' |

OWDD

| | | |
|--------------------|--|--|
| Commencement Date: | 4/22/67 | Casing: |
| Reached OTD: | 4/24/67 | Surface and Intermediate as above |
| Completion Date: | 5/1/67 | Production: 4 1/2" @ 4706' |
| Elevation: | 2683 K.B. 2672 G.L. | w/150 sx. |
| Total Depth: | 6770' Driller 6768' Schlumberger | Electrical Surveys: |
| Contractor: | Zenith Drilling Corp., Inc. Rig #1 | Schlumberger Dual Induction and FDC w/Gamma Ray-Caliper from T.D. to 5882', 5510' to 5296', 5070' to 4894' and 4728' to 4444'. |
| Special Equipment: | None | |
| Hole Size: | 7 7/8" from 6350' to T.D. | |

Drilling of new hole from O.T.D. of 6350' to 6770' was witnessed by the writer. Samples caught at five foot intervals were examined. One foot drilling time was recorded and plotted from 6350' to T.D.

Sample quality was poor due to excessive washing out and caving of the Morrow and Chester shale sections while drilling and circulating. No trouble was experienced due to heaving of the Morrow or Chester shale sections during trips, but these intervals washed out badly while drilling was in process. Lag time required to circulate samples out of the hole was excessively long due primarily to large washouts and the large diameter hole above 6350'. Approximately 90 to 120 minutes was required to circulate samples out of the new hole cut below 6350'.

Formation Tops (From new log)

| | Ferguson #1 Blucher Sec. 13-35S-31W | Stanolind #1 Adams Sec. 8-35S-30W | Relative Position |
|-----------------------------|---|---|----------------------|
| Toronto | 4492 (-1809) | 4283 (-1813) | 4' high |
| Lansing | 4600 (-1917) | 4403 (-1933) | 16' high |
| Kansas City | 4916 (-2233) | 4691 (-2221) | 12' low |
| Marmaton | 5322 (-2639) | 5140 (-2670) | 31' high |
| Morrow | 5893 (-3210) | 5710 (-3240) | 30' high |
| Chester | 6048 (-3365) | 5856 (-3386) | 21' high |
| Eroded Ste. Genevieve | 6350 (-3669) | 6198 (-3728) | 59' high |
| Electric log Ste. Genevieve | 6380 (-3697) | 6225 (-3755) | 58' high |
| St. Louis | 6443 (-3760) | 6290 (-3820) | 60' high |
| Sporgan | 6716 (-4033) | 6580 (-4110) | 77' high |
| Total Depth | 6770 (-4087) | 7888 (-5418) | |

DEPTH CORRECTIONS

There appear to be some minor variations between the depth measurements of the logs run on the original hole by J. M. Huber Corp. and those run recently by Ferguson Oil Company on the #1 Blucher.

Near the bottom of the original hole, the recent logs are indicating formation interfaces approximately two feet shallower than the original logs, while at 4600 feet the tops appear to be approximately two feet deeper on the new logs.

Correlation of the open hole drilling time depths to the log depths indicate a five foot up-hole correction is necessary to make driller's measurements agree with the logs.

The only drill stem test which is affected by this depth correction is D.S.T. #1 which was run before logging. The reported depth of this test, 6460 to 6475, must be adjusted 5 feet up-hole, to 6455 to 6470, to agree with the electric log measurements.

SAMPLE DESCRIPTIONS AND DRILL STEM TESTS
(Depths adjusted to E-log measurements)

Ste. Genevieve
 6350-6443

This interval consisted primarily of white to light gray, very finely crystalline, micro-collitic, tight, chalky limestone which contained much very fine grained quartz sand in the upper 2/3rds of the interval. The bottom

30-40 feet of the Ste. Genevieve was slightly less sandy, very chalky and contained much white transparent and gray subopaque chert. No show of oil or visible porosity was observed in any of the Ste. Genevieve samples.

St. Louis
6443-6460

Light gray to white, slightly chalky limestone which contained medium sized oolites was observed from this interval. No shows or porosity were noted.

6460-6474

White to light gray to light buff, very fine crystalline, very chalky limestone with white shelled, light gray to buff centered small to medium sized oolites. Some poorly developed oolite casts and some questionable crystalline porosity was noted. One or two pieces with questionable light oil stain but no free oil in wet samples were noted. Some pieces displayed a slight fluorescence and a trace of cut in carbontetrachloride. The top 10 feet of this interval was covered by D.S.T. #1.

A significant drilling time change, from 7 min. per foot in the overlying zone to as fast as 1 min. per foot was noted in this interval.

D.S.T. #1 6460-6475 = 6455-6470 log depths.
Tool open 30 min, shut in 30 min, open 10 min, shut in 10 min.
Tool opened with a weak, intermittent blow for 20 min and died. No blow was apparent during the second flow period.
Recovered 30 feet of drilling mud with specks of black oil.
Flow Pressure 31# to 42# field reading, 31# to 46# office reading.
ISIP 1880/30 min field reading, 1890/30 min office reading.
FSIP 1564/10 min field reading, 1521/10 min office reading.
HH 3109-3009 field reading, 3101-3000 office reading.
Note: FSIP was still building at the end of the 10 min. shut in period, but the shape of the pressure curve did not appear to indicate that a pressure as high as the ISIP would be reached in a comparable time.

6474-6524

White to light gray, chalky, oolitic limestone much as described above. No visible porosity or oil shows were observed.

The majority of this interval drilled at a rate of penetration somewhat faster than the lower Ste. Genevieve and uppermost St. Louis.

(Note) The top and bottom depths of these St. Louis intervals are approximate and are picked partly from Gamma-Ray changes, drilling time changes and from observed lithology changes. Due to the relatively small amount of new formation being drilled at any one time appearing in the samples and the extremely long lag time, the reported depths of formation changes are probably subject to considerable error.

6524-6664

This overall interval contained a significant increase of light gray and brown coarse crystalline, tight fossiliferous limestone which contained some smokey, gray, opaque chert. Some gray to brown very dense to lithographic limestone and some white to light gray, chalky, oolitic limestone is believed to be interbedded throughout the designated interval. Considering the amount of hole cut by the various bits used, this overall interval drilled harder and slower than the overlying St. Louis.

6664-6685

This interval contained some coarse crystalline, gray to brown fossiliferous-crinoidal limestone which was very chalky as well as much very dense, lithographic, gray to brown limestone which was glauconitic in part and contained very much mottled-spotted, gray-brown, subopaque, sharp chert.

This interval drilled relatively slow.

6685-6716

This interval appeared much the same as that described above except that from 6685 to 6692 a significant drilling break was observed and white, very chalky, limestone which was partly replaced by silica was noted. No visible porosity, shows, or reason for the drilling break, other than the observed chalk was noted in this interval.

Some very fine, crystalline porosity and some very small vug porosity was noted at 6699 to 6704. No stain, fluorescence or out was observed in this visible porosity. The samples from 6685 to 6692 appeared very similar to the Spergan limestone to be described below and may well be the top of the Spergan, but because of the similarity of the gray and brown, coarse crystalline, fossiliferous, chalky limestone contained in the intervals between 6692-6699 and 6704 to 6716 to the overlying St. Louis, the top of the Spergan is called at 6716.

Spergan
6716 to T.D.

White, very chalky, fine crystalline limestone with some small vug and crystalline porosity. No stain or shows.

Much of the limestone appears to have been replaced by silica. In HCL acid the limestone and chalk dissolved rapidly leaving a spongy appearing skeleton of siliceous material. Some white sharp chert was also observed. The bottom portion of the interval, from 6752 to T.D. appeared to be nearly 100% chalk.

This formation drilled considerably faster than did the St. Louis.

After reaching total depth and logging, several drill stem tests were attempted:

D.S.T. #2 6560-6615. Straddle test run with tail pipe set on bottom.
Misrun. Top packer seat washed out on initial opening.

D.S.T. #3 6564-6615. Straddle test run with tail pipe set on bottom.
Misrun. Tool did not open.

(D.S.T. #2)

D.S.T. #4 (Reported by Western Testers as D.S.T. #2)
4604-4618. Hook Wall Straddle Test with hook set at 4638.
Tool open 30 min., shutin 30 min., open 30 min., shutin 30 min.
Tool opened with a strong blow.
GTS/35 min. (5 min. after opening tool for second flow period) Gas TSTM.
Recovered 950 feet fluid which was 386 feet of gassy, slightly muddy oil (37° gravity) and 564 feet of slightly oil cut water.
FP 73-271 and 303-418 field reading, 79-282 and 309-422 office reading.
ISIP 1170/30 min. field reading, 1203/30 min office reading.
FSIP 1240/30 min. field reading, 1261/30 min office reading.
HH 2326-2316 field reading, 2311-2320 office reading.
BHT 118°
Resistivity of recovered water = .066 @ BHT
Resistivity of mud filtrate = .32 @ BHT
Anticipated resistivity of formation water = .03 to .035 @ BHT

(D.S.T. #3)

D.S.T. #5 (Reported by Western Testers as D.S.T. #3)
6564-6615. Straddle Test run with tail pipe set on bottom. (Misrun) Tool opened with a very weak blow for 30 min. When attempting to close tool for initial closed

in period, the packer seat washed out. No closed in pressure was reported because the pressure recorded during the 30 min. closed in period was influenced by hydrostatic mud pressure leaking by the packer. It was not readily apparent that the packer seat had failed until opening the tool for the second flow period at which time a strong blow was noted at the surface and the drilling fluid dropped rapidly in the hole. Examination of the pressure recorder charts reveals that the packer seat was holding and that a valid flow test of 30 minutes duration was attained before the hydrostatic pressure washed out the packer seat. During the 30 min flow period, flow pressure remained constant at 20 p.s.i. indicating that no fluid was entering the drill pipe through the test tool. 450 feet of drilling mud was recovered in the drill pipe. No shows of oil were apparent in the recovered fluid.

Due to lack of favorable indications of commercial productive capacity, the decision was made at this point by Ferguson Oil Company to abandon the #1 Blucher as a dry hole.

Operations were taken over by Cimarron Exploration, Inc. at this time and 4 1/2" casing was run to 4706 feet to make a completion attempt in the Lansing Zone at 4600'.

W. R. Atkinson
Geologist

Ferguson Oil Company
 Blucher #1
 SW NE Sec. 13-35S-31W
 Seward County, Kansas

DRILLING TIME

Drilling time by 1 ft. intervals from 6350 ft. to total depth.

| | | | | | | | | | | |
|-----------|----|----|----|----|----|----|----|----|----|----|
| 6350-6360 | 4 | 4 | 2 | 4 | 4 | 3 | 4 | 4 | 5 | 5 |
| -6370 | 6 | 6 | 5 | 6 | 4 | 4 | 7 | 5 | 5 | 5 |
| -6380 | 4 | 5 | 4 | 4 | 5 | 5 | 5 | 4 | 4 | 4 |
| -6390 | 5 | 5 | 4 | 6 | 6 | 6 | 7 | 5 | 6 | 6 |
| -6400 | 6 | 6 | 6 | 4 | 5 | 5 | 8 | 9 | 8 | 6 |
| 6400-6410 | 8 | 9 | 9 | 8 | 9 | 9 | 9 | 9 | 9 | 7 |
| -6420 | 6 | 8 | 9 | 9 | 7 | 7 | 9 | 10 | 8 | 8 |
| -6430 | 7 | 7 | 8 | 6 | 5 | 12 | 5 | 6 | 8 | 11 |
| -6440 | 7 | 9 | 8 | 8 | 11 | 8 | 9 | 10 | 9 | 11 |
| -6450 | 13 | 15 | 4 | 3 | 4 | 6 | 6 | 6 | 6 | 6 |
| -6460 | 6 | 6 | 4 | 6 | 7 | 6 | 9 | 6 | 8 | 6 |
| -6470 | 8 | 6 | 7 | 5 | 5 | 2 | 2 | 1 | 1 | 2 |
| -6480 | 4 | 2 | 2 | 1 | 3 | 3 | 3 | 1 | 5 | 2 |
| -6490 | 4 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 |
| -6500 | 3 | 4 | 3 | 4 | 2 | 3 | 3 | 2 | 5 | 4 |
| 6500-6510 | 3 | 3 | 6 | 4 | 2 | 3 | 4 | 3 | 7 | 4 |
| -6520 | 4 | 4 | 4 | 5 | 5 | 3 | 5 | 3 | 5 | 5 |
| -6530 | 5 | 3 | 6 | 4 | 5 | 6 | 4 | 6 | 4 | 5 |
| -6540 | 5 | 8 | 9 | 6 | 8 | 8 | 4 | 7 | 7 | 6 |
| -6550 | 8 | 6 | 8 | 6 | 8 | 6 | 9 | 8 | 8 | 7 |
| -6560 | 7 | 8 | 8 | 8 | 9 | 8 | 8 | 7 | 6 | 8 |
| -6570 | 9 | 8 | 8 | 8 | 8 | 8 | 9 | 9 | 8 | 7 |
| -6580 | 7 | 9 | 9 | 8 | 9 | 8 | 8 | 8 | 9 | 8 |
| -6590 | 8 | 8 | 10 | 4 | 4 | 3 | 3 | 3 | 3 | 4 |
| -6600 | 4 | 5 | 4 | 5 | 5 | 4 | 5 | 5 | 7 | 6 |
| 6600-6610 | 8 | 7 | 6 | 4 | 5 | 5 | 5 | 5 | 5 | 10 |
| -6620 | 11 | 6 | 13 | 11 | 8 | 17 | 9 | 15 | 12 | 8 |
| -6630 | 15 | 10 | 11 | 10 | 9 | 14 | 10 | 11 | 12 | 11 |
| -6640 | 14 | 11 | 11 | 9 | 10 | 10 | 11 | 11 | 10 | 10 |
| -6650 | 11 | 12 | 14 | 5 | 4 | 4 | 4 | 5 | 5 | 4 |
| -6660 | 4 | 4 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 5 |
| -6670 | 5 | 7 | 5 | 4 | 5 | 6 | 6 | 6 | 6 | 7 |
| -6680 | 7 | 7 | 9 | 6 | 8 | 7 | 8 | 8 | 9 | 10 |
| -6690 | 9 | 8 | 9 | 10 | 10 | 9 | 9 | 9 | 8 | 4 |
| -6700 | 4 | 3 | 2 | 3 | 6 | 10 | 8 | 9 | 12 | 10 |
| 6700-6710 | 9 | 8 | 7 | 4 | 7 | 7 | 10 | 12 | 11 | 11 |
| -6720 | 10 | 12 | 5 | 6 | 5 | 4 | 7 | 7 | 5 | 2 |
| -6730 | 4 | 3 | 4 | 4 | 3 | 4 | 3 | 5 | 4 | 4 |
| -6740 | 4 | 4 | 4 | 6 | 4 | 5 | 4 | 6 | 4 | 5 |
| -6750 | 5 | 5 | 4 | 4 | 4 | 4 | 2 | 6 | 4 | 4 |
| -6760 | 4 | 4 | 4 | 4 | 3 | 4 | 2 | 2 | 2 | 4 |
| -6770 | 2 | 2 | 2 | 1 | 3 | 2 | 3 | 5 | 2 | 3 |

Trip @ 6442

Kelly 1' short

Trip @ 6583

Kelly 1' long
 Trip @ 6643

T.D. 6770