Terry McLeod
Consulting Geologist
P.O. Box 503
Wichita, Kansas 67201
316-265-6431

# GEOLOGIST'S REPORT
## DRILLING TIME AND SAMPLE LOG

OPERATOR: I.A. OPERATING INC.
LEASE: Archer WELL NO. 21-1
FIELD:
LOCATION: 2456' FSL & 545' FEL
SEC. 21 TWP. 8S RGE. 26W
COUNTY: Sheridan STATE: Kansas
CONTRACTOR: Discovery drlg Co. Rig No. 1
COMM.: 4-25-2013 COMP.: 5-02-2013
RTD: 3925' LOG TD: 3925
SAMPLES SAVED FROM: 3400' TO RTD
DRILLING TIME KEPT FROM: 3200' TO RTD
SAMPLES EXAMINED FROM: 3400' TO RTD
GEOLOGICAL SUPERVISION FROM: 3430' TO RTD
MUD UP: 3100 TYPE MUD: Chemical

ELEVATION
KB: 2491'
DF:
GL: 2483'
Measurements Are All From K.B.

CASING RECORD
SURFACE: 221' 8 5/8 w/ 220 SX.
PRODUCTION: 5 1/2"

ELECTRICAL SURVEYS
NABORS
DUAL Induction
DSE / NEUTRON - SONIC

R26W; 21; Loc; A; B; T8S

| FORMATION | LOG TOP | LOG DATUM | SAMPLE TOP | SAMPLE DATUM | STRUCT. COMP. |
|---|---|---|---|---|---|
| Anhydrite | 2114 | +377 | 2114 | +377 | +6 |
| Base Anhydrite | 2148 | +343 | 2149 | +342 | +5 |
| TOPEKA | 3420 | -929 | 3421 | -1030 | +16 |
| Heebner | 3623 | -1132 | 3624 | -1133 | +19 |
| Toronto | 3645 | -1154 | 3645 | -1154 | +19 |
| Lansing | 3660 | -1169 | 3662 | -1171 | +22 |
| Base Kans. City | 3879 | -1388 | 3884 | -1393 | +19 |

REFERENCE WELL FOR STRUCTURAL COMPARISON: Maurice L. Brown, No. 1 Mizer, Ne Se Se, Sec 21-8S-26W, 2481 KB

| DATE | DEPTH | BIT NO. | SIZE | | | DEPTH OUT | | |
|---|---|---|---|---|---|---|---|---|
| 4-25-2013 | miRT - surf Csging | A | 12 1/4 | | | 222 | 222 | N/A |
| 4-26-2013 | 600' drlg | | | | | | | |
| 4-27-2013 | 2545' drlg | 1 | 7 7/8 | | | 3925 | 3703 | N/A |
| 4-28-2013 | 3192' drlg on Loc. 1) | | | | | | | |
| 4-29-2013 | 3710' dst-1-/2- 2) | | | | | | | |
| 4-30-2013 | 3720' dst-3 3) | | | | | | | |
| 5-01-2013 | 3865' dst-4- 4) | | | | | | | |
| 5-02-2013 | 3925 E-LOG - run pipe 5) | | | | | | | |

Surveys 3720' 1 1/4° BOARD 3728.96; STRAP 3731.47; diff 2.51L

| FORMATION | INTERVAL | DESCRIPTION | |
|---|---|---|---|
| Lansing B/c | 3700-3705 | Limestone, cream, fine-xln + v. foss-oolitic, w/ gd 8-10 pcs w/ brown sat oil stain + 6d SFO - 6d ø, faint odor | dst 1+2 |
| Lansing G | 3749-3754 | Limestone, cream-oolitic, w/ 4 to 5 pc's w/ brown stain in fair ool ø. tr f.o. faint odor | E-LOG |
| Lansing H | 3796-3800 | Limestone, cream, fine xln, foss, w/ 4 to 5 pc's w/ medium brown stain + SFO in poor foss ø, v. faint odor | dst 3 |
| Lansing J | 3831-3836 | Limestone, cream, fine xln, sli foss w/ 5-6 pcs w/ drk brn sptd + sat stn. in poor pinpoint ø, v.SFO + faint odor | dst 3 |
| Lansing K | 3852-3857 | Limestone, tan, fn-xln - sli foss, w/ 3-4 pcs w/ med + drk sptd stain in poor foss ø, SSFO + v. faint odor | dst 4 |

* move dst's up 5-6' on log *

DRILL STEM TESTS

| No. | Interval | FP/time | SIP/time | FP/time | | | |
|---|---|---|---|---|---|---|---|
| 1 | 3682-3710 | | | | | | |
| 2 | 3682-3710 B/c | 34#-229# 30" | 1065# 45" | 236#-449# 45" | 1028# 45" | | 1816 1768 |
| 3 | 3775-3845 H + J | 77#-294# 30" | 1062# 45" | 310#-548# 45" | 1035# 45" | | 1889 1820 |
| 4 | 3840-3865 K | — | — | — | | | |

E-log calculations, with the success of dst-3 + production 5 1/2" production casing was set to further evaluate. *(move dst's up 5-6' on log)

Respectively,
[signature]
Petroleum Geologist
5-02-2013

LEGEND
Anhydrite, Salt, Sandstone, Shale, Gold ool, Limestone, Cnt/Lime, Chert, Dolomite

SCALE 1" = 100'

| DEPTH | DRILLING TIME IN MINUTES PER FOOT (Rate of Penetration Increases) | LITHOLOGY | SAMPLE DESCRIPTIONS | REMARKS |
|---|---|---|---|---|
| 2110 | Anhydrite 2114 (+377) | | | |
| 2150 | Base Anhydrite 2149 (+342) | | | |
| 3200–3400 | | | | |
| 3400 | samples start | | Shale - gry, brn, mar | |
| 3410 | | | Sh - gry's + Ls. tan, fn-xln foss - mott pr ø N.S. | |
| 3420 | TOPEKA 3421 (-1030) | | Ls. tan, fn-xln, foss some mott. pr ø. N.S. | |
| 3430 | | | Ls. tan-Gry, fn-xln-foss. tight pr ø. N.S. | |
| | | | SHLY, gry | |
| 3440 | | | Ls. brn-tan, dse, Hrd, tight NVø N.S | |
| 3450 | | | Ls. tan-crm, fn-xln - suc-foss-ool w/ gd ø. N.S. | |
| | | | Ls. tan-crm foss-ool w/ fr ø. N.S. SLI CHKY SHLY | |
| 3460 | | | tr Gry-Blk sh. | |
| | | | Ls. tan-Gry, dse, Hrd NVø N.S. | |
| 3470 | | | Ls 9/a inc in drk Gry sh. | |
| | | | SH. GRY | |
| 3480 | Gd ø N.S. | | Ls. lt tan, ool-foss w/ fair → Gd ool-foss ø, CHKY, N.S. NO odor | |
| 3490 | | | Ls. lt tan, fn-xln + foss w/ fr-Gd foss ø. N.S. NO odor SLI-CHKY. | |
| 3500 | | | | |
| 3510 | | | Ls. tan fn-xln - SLI - foss. CHKY - N.S | |
| | | | Ls. tan-gry, fn-xln-dse V.SLI-FOSS, pr → NVø | |
| 3520 | | | Ls. tan-Gry, fn-xln-SLI foss - N.S. inc shale BLK Carb | |
| | | | SH - BLK - GRY | |
| 3530 | | | Sh - gry - mar + gry siltstone, tight Hrd - NVø N.S. | |
| 3550 | | | Ls. tan-gry, fn-xln-foss w/ fair foss ø. N.S. | |
| | | | Ls. tan-Gry foss fr ø N.S | |
| 3560 | | | Sh - gry - mar | |
| 3570 | | | Ls., tan, brn, gry, fn-xln V.SLI foss, tight Rx, N.S. SH - BLK - Carb - V.SHLY | |
| 3580 | | | sh - blk - Carb - GRY | |
| 3590 | | | Ls. tan - brn. fn-xln. foss w/ scatt foss ø. N.S, SLI CHKY | Vis - 63 wt 9.0 wL 6.4 Lcm 2# |
| 3600 | | | Sh. GRY | DST No 1 3682-3710' misrun. Hit bridge (did 27 stand S.T.) came out to retest * prior |
| 3610 | | | Ls. lt tan, fn-xln - SLI suc foss, pr-fr foss ø N.S SLI CHKY | DST NO 2 3682-3710' "B/C". BOB 5", 1st op + BOB 6" 2nd op. No blow backs. 30" 45" 45" 45" |
| 3620 | Heebner Sh 3624 (-1133) | | Ls. lt tan, fn-xln. foss w/ sc → H foss ø. N.S. SLI CHKY. → SH - BLK Carb | Rec: 8' F.O. 18°; 116' VSOCMW 5% oil; 310' VSOCMW 2% oil; 499' MW 95% wtr; 933' fluid. HP: 1816 / 1768 |
| | | | Ls. tan-brn, dse NVø N.S. | SIP: 1065#-1028# |
| | | | SH - GRY - MAR | FP: 34#-229# + 236#-449# |
| 3640 | TORONTO 3645 (-1154) | | Ls. Crm, fn-xln-dse, SLI FOSS, TIGHT Rx, pr ø. N.S. CHKY | DST-2-chart |
| | | | Sh. Gry-mar | |
| 3660 | 3662 (-1171) Lansing | | Ls. tan, ool w/ Gd small ool ø. N.S. CHKY | |
| | | | Sh. gry + ool Ls w/ fr-gd ool ø N.S. | |
| 3670 | | | Ls. Crm, fn-xln - SLI ool tr ø. mostly tight Rx. N.S SLI CHKY. | |
| 3680 | | | Ls. tan-gry - dse, NVø N.S. - SHLY | |
| 3690 | | | Sh, gry - mar | |
| 3700 | | | Ls. Crm, fn-xln - foss w/ 8-10 pc's w/ gd sat stn + Gd SFO in gd pp → foss ø. faint odor, Also some ool pc's w/ fr. S.O. faint odor | |
| | | | SH GRY'S → MAR | |
| 3710 | | | Ls. Crm. fn-xln-dse, PR → NVø. N.S. No odor CHKY | |
| 3720 | | | Ls. Crm. fn-xln-dse, Hrd → tight Rx. N.S. No odor | |
| | | | Sh. gry - mar | |
| 3740 | | | Ls. lt tan - crm, fn-xln SLI foss 2-3 pc's w/ poor brn stn in fr-pr foss ø NFO - No odor | |
| 3750 | | | Ls. Crm, ool, w/ 4-5 pc's w/ brn stn + fr ool ø. TR FO faint odor | DST. NO.3 3775-3845' |
| 3760 | | | Ls. Crm - Lt-tan, fn-xln - dse, NVø. N.S. SLI CHKY | BOB 1" - 1st open, BBOB 19" shut in. BOB 1 1/2" 2nd open, GTS TSTM shut in. 30" 45" 45" 45" |
| | | | Ls. Crm fn-xln - dse SLI CHKY - N.S. | Rec: 1965' GIP; 1600' GOIL 60% GAS 40% oil; 83' DCGM 20% G 15% oil 65% m; 1683' fl. |
| | | | SH - BLK Carb | |
| 3780 | | | Ls. brn - tan, dse, NVø N.S. | SIP: 1062#-1035# |
| | | | SH. GRY'S | FP: 77#-294# + 310#-548# |
| 3790 | | | Ls. Crm, fn-xln - SLI foss w/ 4-5 pc's w/ med brn stn + SFO v. faint odor | HP: 1889#-1820#. Chart dst-3 |
| 3800 | | | Ls. tan-brn, fn-xln-arg - foss, scatt foss ø. 2-3 pc's w/ pr brn stn in poor ø, NFO No odor | |
| | | | SH GRY - MAR | |
| 3810 | | | tr - Ls. Crm fn-xln - N.S. SH - Gry - mar | |
| 3820 | | | Ls. Crm, fn-xln, SLI Foss 5-6 pc's w/ drk brn sptd + sat stn in poor pp ø. V-SFO - + faint odor | |
| 3830 | | | Ls. Crm fn-xln - tight N.S. + SH GRY - MAR | |
| | | | Sh gry - mar | |
| 3840 | | | Ls. tan, fn-xln, SLI foss 3-4 pc's w/ med-drk brn. spt'd stn. tr f.o. + v faint odor poor foss ø | DST NO. 4 3840'-3865' |
| 3850 | | | sh. gry - mar | Packer failed → will evaluate on Logs |
| 3860 | | | Ls. fn-xln, GRY-BRN - SLI foss, PR foss ø. N.S. NO odor | |
| | | | ls 9/a brn - Gry. SLI foss N.S. | |
| 3880 | Base KC 3884 (-1393) | | Sh. gry - Maroon - grn. | |
| 3900 | | | Sh. gry - mar - grn. | "move dst's up 5-6' on Log" |
| 3910 | | | Ls. Gry - lt tan. fn-xln tight Rx, NVø N.S | |
| 3920 | RTD = 3925'; ELTD = | | Sh. mar - gry | |

| DEPTH | DRILLING TIME Minutes/Foot (5" 10" 15" 20" 25"; Rate of Penetration Increases) | LITHOLOGY | SAMPLE DESCRIPTIONS | REMARKS |
|---|---|---|---|---|

COMPANY: I.A. Operating
LEASE: Archer 21-1
LOCATION: 2456' FSL & 545' FEL SEC. 21 TWP. 8S RNG. 26W
COUNTY: Sheridan STATE: Kansas
ELEVATION: 2491 K.B.