

**GEOLOGICAL REPORT**

**Month 2017**

Prepared for:

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STRIP LOGS AND WELLPATH IN BACK POCKET

# GENERAL WELL DATA

**WELL NAME**:

**UNIQUE WELL ID**:

**PRIMARY OBJECTIVE**: Bakken (Middle Silty Dolomite/Reservoir)

**LICENSE NUMBER**:

**ELEVATIONS**: Ground:

Kelly Bushing:

**OPERATOR**: Crescent Point Energy Corp.

**CONTRACTOR**:

**SPUD DATE**: [Spud Date] at xxxx hrs

**ICP:** **ICP**: [ICP MD] m

**Date and Time**: [ICP Date] at xxxx hrs

**TOTAL DEPTH**: **Leg #1**: [TD MD] m

**Date and Time**: [TD Date] at xxxx hrs

**HOLE SIZE**: **Surface**: 349 mm

**Intermediate**: 222 mm

**Main**: 159 mm

**SURFACE CASING**: Ran 15 joints of 244.5 mm, 48.07 kg/m, H-40 casing.

Casing landed at xx.0 m. Plug down: [Plug Dn Date] at xxxx hrs.

Drilled out: [Drill Out Date] at xxxx hrs.

**KICK-OFF POINT**: [KOP MD] m MD **Date and Time**: [KOP Date] at xxxx hrs

**INTERMEDIATE CASING**:Ran 33 joints of 177.8 mm, 34.23 kg/m, J-55 and 93 joints of 177.8 mm, 29.76 kg/m, J-55 casing. Casing landed at xxxx.0 m. Plug down: [ICP Plug Dn Date] at xxxx hrs.

Drilled out: [Drill Out Date] at xxxx hrs.

**MUD SYSTEM:** Water for 349 mm surface hole; Floc-water for 222 mm vertical hole; Polymer for 222 mm build section; Polymer for 159 mm Hz section.

**DITCH SAMPLES**: One set of five meter samples from xxxx m to xxxx m and ten meter samples from xxxx m to xxxx m washed and vialed for Crescent Point Energy Corp.

Two sets of five meter samples from xxxx m to xxxx m and ten meter samples from xxxx m to xxxx m washed and vialed for Saskatchewan Industry and Resources.

# GEOLOGICAL MARKERS

**K.B. ELEVATION:**  **m**

|  |  |  |  |
| --- | --- | --- | --- |
| **FORMATION** | **MEASURED DEPTH (m)** | **TRUE VERTICAL DEPTH (m)** | **MEAN SEA LEVEL**  **(m)** |
| **Lower Watrous** | - | - | - |
| **KOP** | [KOP MD] | - | - |
| **Miss. U/C/ (Frobisher)** | - | - | - |
| **Kisbey** | - | - | - |
| **Alida** | - | - | - |
| **Tilston** | - | - | - |
| **Lodgepole** | - | - | - |
| **Basal Lodgepole Shale** | - | - | - |
| **Upper Bakken Shale** | - | - | - |
| **Bakken (Middle Silty Dolomite/Reservoir)** | - | - | - |
| **ICP** | [ICP MD] | [ICP TVD] | [ICP MSL] |
| **Total Depth Leg #1** | [TD MD] | [TD TVD] | [TD MSL] |

# SAMPLE DESCRIPTIONS - Build & Leg#1

**Interval** **Lithology & Comments**

[ICP MD] **Intermediate Casing Point**: ([ICP TVD] m TVD, [ICP MSL] m MSL)

[TD MD] **Total Depth Leg #1**: ([TD TVD] m TVD, [TD MSL] m MSL)

# WELLPATH

# DRILLING SUMMARY

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **DATE** | **DEPTH m**  **2400 hrs** | **24 hr Progress** | **RATE m/hr** | **ROTATING HOURS** | **24 Hr ACTIVITY** |
| 2017-mm-dd | 179.0 | 179.0 | 44.7 | 4.00 | Spud and drill 349.0 mm surface hole to 179.0 m MD, wiper trip, POOH, rig to & run casing, cement, WOC. |
| 2017-mm-dd | 1162.0 | 983.0 | 80.2 | 12.25 | Pressure test, RIH, drill out float & shoe and begin to drill 222.0 mm vertical hole from 179.0 m to 1162.0 m MD. |
| 2017-mm-dd | 1444.0 | 282.0 | 23.0 | 12.25 | Drill 222.0 mm vertical section from 282.0 m to 1313.0 m MD, POOH to dial up mud motor and change bit, RIH, kick-off 222.0 mm build section at 1322.0 m MD and drill & survey 222.0 mm build section from 1322.0 m MD to 1444 m MD. |
| 2017-mm-dd | 14.0 | 317.0 | 20.8 | 15.25 | drill & survey 222.0 mm build section from 1322.0 m MD to 1444 m MD. |
| 2017-mm-dd | 1668.0 | - | - | - | POOH, lay down directional tools, wiper trip, rig to & run casing, cement, pressure test. |
| 2017-mm-dd | 2252.0 | 584.0 | 55.6 | 10.5 | RIH, WOC, drill out float & shoe, drill & survey 159.0 mm lateral section from 1668.0 m to 2252.0 m MD. |
| 2017-mm-dd | 3071.0 | 819.0 | 52.0 | 15.75 | Drill & survey 159.0 mm lateral section from 2252.0 m to 3071.0 m MD (TD). |

**TOTAL ROTATING HOURS: xx**

# BIT RECORD

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **BIT #** | **MAKE** | **TYPE** | **SIZE mm** | **DEPTH IN** | **DEPTH OUT** | **DRILLED** | **HOURS** |
| 1 | - | - | 349.0 | 0.0 | - | - | - |
| 2 | - | - | 222.0 | - | - | - | - |
| 3 | - | - | 222.0 | - | - | - | - |
| 4 | - | - | 159.0 | - | - | - | - |

# DAILY MUD PROPERTIES

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **DATE** | **DEPTH(m MD)** | **DENSITY**  **(kg/m3)** | **VISCOSITY**  **(s/L)** | **WATER LOSS**  **(mL/30 sec)** | **FILTER CAKE**  **(mm)** | **pH** | **Calcium/**  **Chlorides**  **(mg/L)** |
| 2017-mm-dd | 179 | 1000 | 28 |  | - | 7.5 | 120/300 |
| 2017-mm-dd | 1055 | 1070 | 35 |  | 1.3 | 8.0 | 280/390 |
| 2017-mm-dd | 1426 | 1120 | 44 |  | 1.0 | 10.0 | 290/1100 |
| 2017-mm-dd | 1668 | 1160 | 65 |  | 1.0 | 10.0 | 150/1500 |
| 2017-mm-dd | 1668 | 1005 | 34 |  | 1.0 | 10.5 | 100/140 |
| 2017-mm-dd | 2560 | 1050 | 32 |  | 1.0 | 10.0 | 140/1100 |

# SURVEYS - Build & Leg #1

Job Number: 19677

Province/Country: Sask/Canada

Company: Crescent Point Energy Corp.

Well:

Location:

Rig Name:

KB:  m

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **MD** | **INC** | **AZM** | **TVD** | **MSL** | **N-S** | **E-W** | **VS** | **DogLeg** |
| **(m)** | **(°)** | **(°)** | **(m)** | **(m)** | **(m)** | **(m)** | **(m)** | **°/30m** |
| 179 | 0 | 0 | 179 | 440.2 | 0 | 0 | 0 | 0 |
| 191.62 | 0.8 | 161.6 | 191.62 | 427.58 | -0.08 | 0.03 | -0.08 | 1.9 |
| 293.43 | 0.8 | 43.4 | 293.42 | 325.78 | -0.24 | 0.74 | -0.22 | 0.4 |
| 395.2 | 1.2 | 16.8 | 395.18 | 224.02 | 1.29 | 1.54 | 1.34 | 0.18 |
| 496.9 | 0.5 | 306.4 | 496.87 | 122.33 | 2.58 | 1.49 | 2.62 | 0.33 |
| 600.43 | 1.3 | 181.4 | 600.39 | 18.81 | 1.67 | 1.1 | 1.7 | 0.47 |
| 703.64 | 1 | 107.1 | 703.59 | -84.39 | 0.24 | 1.93 | 0.29 | 0.41 |
| 806.86 | 0.5 | 65 | 806.8 | -187.6 | 0.16 | 3.2 | 0.25 | 0.21 |
| 910.18 | 0.4 | 89.3 | 910.11 | -290.91 | 0.36 | 3.97 | 0.47 | 0.06 |
| 1013.91 | 0.4 | 213.4 | 1013.84 | -394.64 | 0.06 | 4.13 | 0.18 | 0.2 |
| 1117.61 | 0.4 | 19.3 | 1117.54 | -498.34 | 0.1 | 4.05 | 0.21 | 0.23 |
| 1220.87 | 0.4 | 77 | 1220.8 | -601.6 | 0.52 | 4.52 | 0.65 | 0.11 |
| 1334 | 0.7 | 64.9 | 1333.92 | -714.72 | 0.9 | 5.53 | 1.06 | 0.08 |

# SUMMARY

was drilled as a one leg horizontal well to further develop the**Bakken (Middle Silty Dolomite/Reservoir)** in the Viewfield region. Samples were described from xxx m to total depth. The top of the Bakken (Middle Silty Dolomite/Reservoir) was intersected at xxxx m MD (xxxx m TVD, -xxxx m MSL). Intermediate casing was set approximately xx meters into the Bakken (Middle Silty Dolomite/Reservoir) at [ICP MD] m MD ([ICP TVD] m TVD, [ICP MSL] m MSL). The lithology of the reservoir was comprised predominantly of very fine grained sandstone with occasional calcareous fossil and micritic grains. Cement was comprised of lower microcrystalline dolomite and occasionally lower microcrystalline and micritic limestone. Chip samples were observed as being moderately well cemented to loose. Leg #1 was drilled along an average azimuth of ~xxº to a total depth of [TD MD] m MD ([TD TVD] m TVD, [TD MSL] m MSL). Chip sample analysis, gas detection and free oil analysis were used to evaluate the reservoir potential of the well.

**Geology Leg #1**

[ICP MD] m MD: **Intermediate Casing Point**: ([ICP TVD] m TVD, [ICP MSL] m MSL)

xxx.0 m - xxx.0 m MD (xxx.0 m): Upon drilling out of intermediate casing we see fair quality Bakken (Middle Silty Dolomite/Reservoir). This interval began at xxxx m TVD (-xxxx m MSL) and ended the interval at xxxx m TVD (-xxxx m MSL) where the wellbore came into contact with the Middle Bakken Cap. Samples displayed a predominantly light tan to buff tan with trace gray tan in part quartzose siltstone grading into very fine to occasional lower fine grained sandstone with dolomitic cement. Samples were slightly argillaceous and contained rare to occasional argillaceous grains and rare to common disseminated and nodular pyrite. Initial gas averaged 1769 units per 10000 with peaks as high as 7166 units per 10000. Gamma counts averaged 77 API. Oil staining was typically light tan in color and associated with a moderately bright to bright yellow white fluorescence (70-80%). Rates of penetration were typically 0.6 minutes per meter within this interval.

**Fair Reservoir**

xxxx.0 m - xxxx.0 m MD (xxx.0 m): At this point the wellbore enters the Middle Bakken Cap at xxxx m TVD (-xxxx m MSL) and is directed down, re-entering the Bakken (Middle Silty Dolomite/Reservoir) at xxxx m TVD (-xxxx m MSL). Samples here were light to medium gray with occasional gray tan and decreasing light tan to buff tan quartzose siltstone grading in part into very fine grained sandstone with dolomitic cement. Samples were argillaceous and contained abundant illite stringers with trace to occasional nodular pyrite. Gas units were an average of 261 units per 10000 with peaks as high as 3186 units. Gamma counts increased to an average of 123 API in this interval. Oil staining was patchy and light tan color and associated with a moderately bright to bright yellow white fluorescence (5-40%). Rates of penetration averaged 0.6 minutes per meter.

**Non-Reservoir**

xxx.0 m - xxx.0 m MD (xxx.0 m): After coming back into the Bakken (Middle Silty Dolomite/Reservoir) at xxxx m TVD (-xxxx m MSL), the wellbore is directed upwards, finishing the interval at xxxx m TVD (-xxxx m MSL). Samples here were light tan to buff tan with gray tan in part quartzose siltstone grading into very fine to lower fine grained sandstone with dolomitic cement. Samples were slightly argillaceous and contained trace to common illite grains with minor clay plugging and rare to occasional nodular and disseminated pyrite. Gas units were an average of 940 units per 10000 with peaks as high as 3455 units. Gamma counts decreased to average 80 API. Oil staining was typically light tan in color and associated with a dull to bright yellow white fluorescence (60-75%). Rates of penetration in this interval averaged 0.7 minutes per meter.

**Fair Reservoir**

xxx.0 m - xxx.0 m MD (xxx.0 m): A decrease in reservoir quality is observed in this interval. The wellbore began the interval at xxxx m TVD (-xxxx m MSL) and rose to xxxx m TVD (-xxxx m MSL). Samples show a light tan to buff tan to gray tan quartzose siltstone grading into very fine grained sandstone with dolomitic cement. Samples were slightly argillaceous and contained trace to occasional argillaceous stringers with minor clay plugging and rare disseminated pyrite. Gas units decreased to an average of 480 units per 10000 with spikes as high as 1195 units per 10000. Gamma counts were an average of 81 API in this interval. Oil staining was light tan in color and associated with a moderately bright yellow white fluorescence (65-75%). Rates of penetration were an average of 0.6 minutes per meter in this interval.

**Poor to Fair Reservoir**

xxx.0 m - xxx.0 m MD (xxx.0 m): A slight increase in reservoir quality is noted here. The interval began at xxxx m TVD (-xxxx m MSL) and continued to rise until total depth, finishing at xxxx m TVD (-xxxx m MSL). Samples displayed a light tan to buff tan to gray tan quartzose siltstone grading to very fine grained sandstone with dolomitic cement. Samples were slightly argillaceous and contained trace to occasional argillaceous stringers with trace to occasional nodular and disseminated pyrite. Gas units increased to an average of 829 units per 10000 with spikes as high as 1701 units. Gamma counts averaged 80 API. Oil staining was light tan in color and associated with a moderately bright yellow white fluorescence (70-75%). Rates of penetration remained at an average of 0.6 minutes per meter here.

**Trace Poor to Fair Reservoir**

2775.0 m - 2923.0 m (148.0 m): The wellbore continues to climbs and eventually terminates at -482.7 m MSL.

Samples for this interval are comprised of mudstone grading increasingly to very fine to trace fine grained, biofragmental wackestone. Rare to abundant cryptocrystalline and indistinct fossil fragments are present, as well as crinoids, oolites and pellets. Samples have tan to dark brown oil staining, present on between 45 and 60% of drill cuttings. Porosity is observed as poor to increasingly fair across the interval, and is primarily interfragmental in nature with trace moldic and pin point vugs. Gas values average 2170 counts per 10 000 while gamma values average 9.8 API. Minor to moderate free oil is present on sample wash.

**Fair Reservoir**

[TD MD] m MD: **Total Depth Leg #1**: ([TD TVD] m TVD, [TD MSL] m MSL)

# OPERATIONS

1) [Spud Date]-xxxx hrs: Spud 349.0 mm surface hole.

2) 2017-mm-dd-xxxx hrs: Reach surface casing point at xxxx.0 m MD.

3) [SC Plug Dn Date]-xxxx hrs: Plug down on surface casing.

4) [Drill Out Date]-xxxx hrs: Drill out of surface casing & begin 222.0 mm vertical section.

5) 2017-mm-dd-xxxx hrs: Reach sample point at xxxx.0 m MD.

6) [KOP Date]-xxxx hrs: Kick-off 222.0 mm build section at [KOP MD] m MD.

7) [ICP Date]-xxxx hrs: Reach Intermediate Casing Point at [ICP MD] m MD.

8) [ICP Plug Dn Date]-xxxx hrs: Plug down on intermediate casing.

9) [Drill Out Date]-xxxx hrs: Drill out shoe & begin 159.0 mm lateral section.

10) [TD Date]-xxxx hrs: Reach Total Depth of Hz Leg #1 at [TD MD] m MD.

In terms of production values, using gas readings, free oil analysis, and oil staining, Leg #1’s xxx m horizontal section consisted of xxx m (100%) gross pay (wellbore within Bakken (Middle Silty Dolomite/Reservoir)). This gross pay consisted of xxx m (xxx%) very poor reservoir, xxx m (xxx%) poor reservoir, and, xxx m (xxx%) fair reservoir. With this in mind,  should be a successful oil producer following a formation fracture procedure.