







Cathedral Energy Services

Survey Report

| | | | |
|------------------|-----------------------------|-------------------------------------|-------------------------------------|
| Company: | EnCana Oil & Gas (USA) Inc | Local Co-ordinate Reference: | Well Cook Gardner 20-4BB (PB-20) |
| Project: | S. Piceance (Parachute) | TVD Reference: | KBE @ 5665.0ft (Original Well Elev) |
| Site: | PB-20 Pad | MD Reference: | KBE @ 5665.0ft (Original Well Elev) |
| Well: | Cook Gardner 20-4BB (PB-20) | North Reference: | True |
| Wellbore: | DD | Survey Calculation Method: | Minimum Curvature |
| Design: | DD | Database: | USA EDM 5000 Multi Users DB |

| | | | |
|--------------------|--|----------------------|----------------|
| Project | S. Piceance (Parachute), Garfield County, CO | | |
| Map System: | US State Plane 1983 | System Datum: | Mean Sea Level |
| Geo Datum: | North American Datum 1983 | | |
| Map Zone: | Colorado Central Zone | | |

| Site | | PB-20 Pad | | | |
|-----------------------|----------|--------------|-----------------|-------------------|-------------|
| Site Position: | | Northing: | 1,590,537.58 ft | Latitude: | 39.427690 |
| From: | Lat/Long | Easting: | 2,288,393.21 ft | Longitude: | -108.019530 |
| Position Uncertainty: | 0.0 ft | Slot Radius: | 13.200 in | Grid Convergence: | -1.59 ° |

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|----------------------|-----------------------------|--------|---------------------|-----------------|---------------|-------------|
| Well | Cook Gardner 20-4BB (PB-20) | | | | | |
| Well Position | +N/-S | 0.0 ft | Northing: | 1,590,516.98 ft | Latitude: | 39.427631 |
| | +E/-W | 0.0 ft | Easting: | 2,288,360.71 ft | Longitude: | -108.019643 |
| Position Uncertainty | | 0.0 ft | Wellhead Elevation: | ft | Ground Level: | 5,643.0 ft |

| | | | | | |
|------------------|-------------------|--------------------|------------------------|----------------------|----------------------------|
| Wellbore | DD | | | | |
| Magnetics | Model Name | Sample Date | Declination (°) | Dip Angle (°) | Field Strength (nT) |
| | IGRF2010 | 4/3/2012 | 10.25 | 65.66 | 52,131 |

| | | | | | |
|--------------------------|-------------------------|---------------|--------------|----------------------|-----|
| Design | DD | | | | |
| Audit Notes: | | | | | |
| Version: | 1.0 | Phase: | ACTUAL | Tie On Depth: | 0.0 |
| Vertical Section: | Depth From (TVD) | +N/-S | +E/-W | Direction | |
| | (ft) | (ft) | (ft) | (°) | |
| | 0.0 | 0.0 | 0.0 | 286.58 | |

| | | | | | |
|-----------------------|----------------|--------------------------|------------------|--------------------|--|
| Survey Program | Date | 4/13/2012 | | | |
| From (ft) | To (ft) | Survey (Wellbore) | Tool Name | Description | |
| 82.0 | 1,072.0 | Survey #1 (DD) | MWD | Geolink MWD | |
| 1,167.0 | 7,217.0 | Survey #2 (DD) | MWD | Geolink MWD | |

| | | | | | | | | | |
|----------------------------|------------------------|--------------------|----------------------------|-------------------|-------------------|------------------------------|------------------------------|-----------------------------|------------------------------|
| Survey | | | | | | | | | |
| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Formations / Comments |
| 0.0 | 0.00 | 0.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | |
| 82.0 | 0.40 | 48.70 | 82.0 | 0.2 | 0.2 | -0.2 | 0.49 | 0.49 | |
| 113.0 | 0.50 | 49.20 | 113.0 | 0.3 | 0.4 | -0.3 | 0.32 | 0.32 | |
| 143.0 | 0.80 | 23.40 | 143.0 | 0.6 | 0.6 | -0.4 | 1.37 | 1.00 | |
| 173.0 | 0.90 | 57.50 | 173.0 | 0.9 | 0.9 | -0.6 | 1.69 | 0.33 | |
| 204.0 | 0.90 | 21.60 | 204.0 | 1.3 | 1.2 | -0.7 | 1.79 | 0.00 | |
| 235.0 | 1.00 | 4.10 | 235.0 | 1.8 | 1.3 | -0.7 | 0.99 | 0.32 | |
| 266.0 | 1.10 | 320.30 | 266.0 | 2.3 | 1.1 | -0.4 | 2.54 | 0.32 | |
| 297.0 | 2.00 | 312.10 | 297.0 | 2.9 | 0.5 | 0.3 | 2.98 | 2.90 | |
| 328.0 | 2.30 | 313.10 | 327.9 | 3.7 | -0.4 | 1.4 | 0.98 | 0.97 | |
| 359.0 | 3.00 | 312.80 | 358.9 | 4.7 | -1.4 | 2.7 | 2.26 | 2.26 | |
| 389.0 | 3.60 | 304.40 | 388.9 | 5.7 | -2.8 | 4.3 | 2.56 | 2.00 | |

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| Project: | S. Piceance (Parachute) | TVD Reference: | KBE @ 5665.0ft (Original Well Elev) |
| Site: | PB-20 Pad | MD Reference: | KBE @ 5665.0ft (Original Well Elev) |
| Well: | Cook Gardner 20-4BB (PB-20) | North Reference: | True |
| Wellbore: | DD | Survey Calculation Method: | Minimum Curvature |
| Design: | DD | Database: | USA EDM 5000 Multi Users DB |

| Survey | | | | | | | | | |
|---------------------|-----------------|-------------|---------------------|------------|------------|-----------------------|-----------------------|----------------------|-----------------------------------|
| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Formations / Comments |
| 420.0 | 4.10 | 304.30 | 419.8 | 6.9 | -4.5 | 6.3 | 1.61 | 1.61 | |
| 451.0 | 4.70 | 295.60 | 450.7 | 8.1 | -6.5 | 8.6 | 2.89 | 1.94 | |
| 482.0 | 5.30 | 292.30 | 481.6 | 9.2 | -9.0 | 11.2 | 2.15 | 1.94 | |
| 513.0 | 6.40 | 288.60 | 512.4 | 10.3 | -12.0 | 14.4 | 3.75 | 3.55 | |
| 542.0 | 7.30 | 286.10 | 541.2 | 11.3 | -15.3 | 17.9 | 3.27 | 3.10 | |
| 635.0 | 9.80 | 281.50 | 633.2 | 14.5 | -28.7 | 31.6 | 2.78 | 2.69 | |
| 727.0 | 12.70 | 281.40 | 723.4 | 18.1 | -46.3 | 49.5 | 3.15 | 3.15 | |
| 820.0 | 15.80 | 281.50 | 813.5 | 22.6 | -68.7 | 72.3 | 3.33 | 3.33 | |
| 911.0 | 19.00 | 284.20 | 900.4 | 28.7 | -95.2 | 99.5 | 3.63 | 3.52 | |
| 1,004.0 | 21.00 | 284.60 | 987.7 | 36.6 | -126.0 | 131.2 | 2.16 | 2.15 | |
| 1,072.0 | 21.90 | 285.50 | 1,051.0 | 43.1 | -150.1 | 156.1 | 1.41 | 1.32 | Last Cathedral Survey @ 1,072' MD |
| 1,167.0 | 22.80 | 284.20 | 1,138.9 | 52.3 | -185.0 | 192.2 | 1.08 | 0.95 | |
| 1,262.0 | 24.20 | 287.10 | 1,226.0 | 62.6 | -221.4 | 230.1 | 1.91 | 1.47 | |
| 1,357.0 | 26.50 | 289.40 | 1,311.9 | 75.3 | -260.0 | 270.7 | 2.63 | 2.42 | |
| 1,453.0 | 28.30 | 291.30 | 1,397.1 | 90.7 | -301.4 | 314.8 | 2.08 | 1.87 | |
| 1,548.0 | 31.20 | 292.70 | 1,479.6 | 108.4 | -345.1 | 361.7 | 3.14 | 3.05 | |
| 1,644.0 | 32.00 | 291.20 | 1,561.3 | 127.2 | -391.8 | 411.8 | 1.17 | 0.83 | |
| 1,739.0 | 31.50 | 291.40 | 1,642.1 | 145.4 | -438.4 | 461.6 | 0.54 | -0.53 | |
| 1,834.0 | 33.50 | 288.20 | 1,722.2 | 162.6 | -486.4 | 512.6 | 2.78 | 2.11 | |
| 1,930.0 | 33.30 | 286.20 | 1,802.4 | 178.2 | -536.9 | 565.4 | 1.17 | -0.21 | |
| 2,026.0 | 35.20 | 285.40 | 1,881.7 | 192.9 | -588.8 | 619.4 | 2.03 | 1.98 | |
| 2,121.0 | 34.90 | 284.60 | 1,959.5 | 207.1 | -641.5 | 674.0 | 0.58 | -0.32 | |
| 2,217.0 | 34.40 | 283.30 | 2,038.5 | 220.2 | -694.5 | 728.5 | 0.93 | -0.52 | |
| 2,312.0 | 33.60 | 282.00 | 2,117.2 | 231.9 | -746.3 | 781.5 | 1.14 | -0.84 | |
| 2,407.0 | 32.90 | 282.70 | 2,196.7 | 243.0 | -797.2 | 833.4 | 0.84 | -0.74 | |
| 2,502.0 | 34.60 | 284.90 | 2,275.7 | 255.6 | -848.5 | 886.1 | 2.20 | 1.79 | |
| 2,598.0 | 33.70 | 284.40 | 2,355.1 | 269.2 | -900.6 | 940.0 | 0.98 | -0.94 | |
| 2,693.0 | 35.80 | 286.20 | 2,433.2 | 283.5 | -952.8 | 994.1 | 2.46 | 2.21 | |
| 2,788.0 | 35.60 | 286.00 | 2,510.3 | 298.9 | -1,006.1 | 1,049.5 | 0.24 | -0.21 | |
| 2,883.0 | 34.90 | 285.20 | 2,587.9 | 313.7 | -1,058.9 | 1,104.4 | 0.88 | -0.74 | |
| 2,979.0 | 34.70 | 287.10 | 2,666.7 | 328.9 | -1,111.5 | 1,159.1 | 1.15 | -0.21 | |
| 3,074.0 | 34.30 | 286.00 | 2,745.0 | 344.2 | -1,163.1 | 1,213.0 | 0.78 | -0.42 | |
| 3,170.0 | 35.80 | 288.90 | 2,823.6 | 360.8 | -1,215.7 | 1,268.1 | 2.33 | 1.56 | |
| 3,265.0 | 35.30 | 288.50 | 2,900.9 | 378.5 | -1,268.0 | 1,323.3 | 0.58 | -0.53 | |
| 3,360.0 | 35.00 | 288.20 | 2,978.6 | 395.7 | -1,319.9 | 1,377.9 | 0.36 | -0.32 | |
| 3,456.0 | 34.10 | 287.20 | 3,057.7 | 412.3 | -1,371.8 | 1,432.4 | 1.11 | -0.94 | |
| 3,551.0 | 34.80 | 289.60 | 3,136.0 | 429.2 | -1,422.7 | 1,486.1 | 1.61 | 0.74 | |
| 3,646.0 | 33.90 | 288.90 | 3,214.4 | 446.9 | -1,473.3 | 1,539.6 | 1.03 | -0.95 | |
| 3,741.0 | 34.80 | 288.20 | 3,292.9 | 464.0 | -1,524.2 | 1,593.2 | 1.03 | 0.95 | |
| 3,836.0 | 34.00 | 286.90 | 3,371.3 | 480.2 | -1,575.3 | 1,646.8 | 1.14 | -0.84 | |
| 3,932.0 | 33.90 | 286.20 | 3,450.9 | 495.4 | -1,626.7 | 1,700.5 | 0.42 | -0.10 | |
| 4,028.0 | 35.00 | 286.80 | 3,530.1 | 510.8 | -1,678.8 | 1,754.8 | 1.20 | 1.15 | |
| 4,123.0 | 34.50 | 287.40 | 3,608.1 | 526.8 | -1,730.5 | 1,808.9 | 0.64 | -0.53 | |
| 4,218.0 | 33.90 | 288.10 | 3,686.7 | 543.0 | -1,781.4 | 1,862.3 | 0.76 | -0.63 | |
| 4,314.0 | 32.10 | 285.10 | 3,767.2 | 558.0 | -1,831.5 | 1,914.6 | 2.53 | -1.87 | |
| 4,409.0 | 28.70 | 285.10 | 3,849.1 | 570.5 | -1,877.9 | 1,962.6 | 3.58 | -3.58 | |
| 4,504.0 | 26.70 | 283.90 | 3,933.2 | 581.6 | -1,920.6 | 2,006.7 | 2.19 | -2.11 | |
| 4,600.0 | 25.50 | 283.30 | 4,019.4 | 591.5 | -1,961.7 | 2,048.9 | 1.28 | -1.25 | |
| 4,695.0 | 23.50 | 284.40 | 4,105.9 | 601.0 | -1,999.9 | 2,088.3 | 2.16 | -2.11 | |
| 4,791.0 | 20.60 | 285.60 | 4,194.9 | 610.3 | -2,034.7 | 2,124.3 | 3.06 | -3.02 | |
| 4,886.0 | 18.60 | 284.30 | 4,284.3 | 618.5 | -2,065.5 | 2,156.1 | 2.15 | -2.11 | |
| 4,981.0 | 18.10 | 286.80 | 4,374.5 | 626.5 | -2,094.3 | 2,186.0 | 0.98 | -0.53 | |
| 5,076.0 | 16.30 | 288.10 | 4,465.3 | 634.9 | -2,121.1 | 2,214.1 | 1.94 | -1.89 | |

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| Site: | PB-20 Pad | MD Reference: | KBE @ 5665.0ft (Original Well Elev) |
| Well: | Cook Gardner 20-4BB (PB-20) | North Reference: | True |
| Wellbore: | DD | Survey Calculation Method: | Minimum Curvature |
| Design: | DD | Database: | USA EDM 5000 Multi Users DB |

| Survey | | | | | | | | | |
|---------------------|-----------------|-------------|---------------------|------------|------------|-----------------------|-----------------------|----------------------|---|
| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Formations / Comments |
| 5,171.0 | 14.20 | 286.10 | 4,556.9 | 642.3 | -2,145.0 | 2,239.1 | 2.28 | -2.21 | |
| 5,267.0 | 11.20 | 281.30 | 4,650.6 | 647.4 | -2,165.5 | 2,260.2 | 3.31 | -3.12 | |
| 5,362.0 | 9.80 | 282.80 | 4,744.0 | 651.0 | -2,182.4 | 2,277.4 | 1.50 | -1.47 | |
| 5,457.0 | 7.30 | 282.10 | 4,837.9 | 654.0 | -2,196.2 | 2,291.5 | 2.63 | -2.63 | |
| 5,551.0 | 5.70 | 285.40 | 4,931.3 | 656.5 | -2,206.5 | 2,302.1 | 1.75 | -1.70 | |
| 5,646.0 | 3.90 | 282.30 | 5,026.0 | 658.5 | -2,214.2 | 2,310.1 | 1.91 | -1.89 | |
| 5,741.0 | 2.30 | 292.50 | 5,120.8 | 659.9 | -2,219.1 | 2,315.2 | 1.77 | -1.68 | |
| 5,836.0 | 2.00 | 276.50 | 5,215.7 | 660.8 | -2,222.6 | 2,318.7 | 0.70 | -0.32 | |
| 5,932.0 | 0.70 | 280.30 | 5,311.7 | 661.1 | -2,224.8 | 2,320.9 | 1.36 | -1.35 | |
| 6,027.0 | 0.20 | 41.90 | 5,406.7 | 661.3 | -2,225.3 | 2,321.4 | 0.87 | -0.53 | |
| 6,123.0 | 0.60 | 49.20 | 5,502.7 | 661.8 | -2,224.8 | 2,321.1 | 0.42 | 0.42 | |
| 6,217.0 | 0.30 | 191.80 | 5,596.7 | 661.9 | -2,224.4 | 2,320.8 | 0.91 | -0.32 | |
| 6,312.0 | 1.30 | 46.10 | 5,691.7 | 662.4 | -2,223.7 | 2,320.3 | 1.64 | 1.05 | |
| 6,407.0 | 1.00 | 69.10 | 5,786.7 | 663.4 | -2,222.2 | 2,319.1 | 0.57 | -0.32 | |
| 6,503.0 | 0.40 | 143.60 | 5,882.7 | 663.4 | -2,221.2 | 2,318.1 | 1.01 | -0.62 | |
| 6,598.0 | 0.40 | 266.30 | 5,977.7 | 663.1 | -2,221.3 | 2,318.2 | 0.74 | 0.00 | |
| 6,693.0 | 1.10 | 258.20 | 6,072.7 | 662.9 | -2,222.5 | 2,319.3 | 0.74 | 0.74 | |
| 6,789.0 | 1.10 | 244.80 | 6,168.7 | 662.4 | -2,224.3 | 2,320.8 | 0.27 | 0.00 | |
| 6,884.0 | 1.10 | 235.90 | 6,263.6 | 661.5 | -2,225.9 | 2,322.1 | 0.18 | 0.00 | |
| 6,979.0 | 1.30 | 262.80 | 6,358.6 | 660.8 | -2,227.7 | 2,323.6 | 0.62 | 0.21 | |
| 7,074.0 | 1.10 | 243.30 | 6,453.6 | 660.3 | -2,229.6 | 2,325.3 | 0.48 | -0.21 | |
| 7,167.0 | 1.20 | 241.40 | 6,546.6 | 659.4 | -2,231.2 | 2,326.6 | 0.12 | 0.11 | Last Cathedral Survey @ 7,167' MD Projection to Bit @ 7,217' |
| 7,217.0 | 1.20 | 241.40 | 6,596.6 | 658.9 | -2,232.1 | 2,327.3 | 0.00 | 0.00 | |

| Targets | | | | | | | | | |
|--|---------------|--------------|----------|------------|------------|---------------|--------------|-----------|-------------|
| Target Name | Dip Angle (°) | Dip Dir. (°) | TVD (ft) | +N/-S (ft) | +E/-W (ft) | Northing (ft) | Easting (ft) | Latitude | Longitude |
| Interp @ 977.0 (Cook G; - hit/miss target - Shape | 0.00 | 0.00 | 977.0 | 31.7 | -123.6 | 1,590,552.06 | 2,288,238.07 | 39.427718 | -108.020080 |
| - actual wellpath misses target center by 4.2ft at 992.6ft MD (977.1 TVD, 35.6 N, -122.1 E) | | | | | | | | | |
| - Point | | | | | | | | | |
| Cook Gardner 20-4BB T | 0.00 | 0.00 | 5,020.0 | 662.7 | -2,225.0 | 1,591,241.08 | 2,286,154.94 | 39.429450 | -108.027520 |
| - actual wellpath misses target center by 11.9ft at 5641.0ft MD (5021.0 TVD, 658.4 N, -2213.9 E) | | | | | | | | | |
| - Circle (radius 25.0) | | | | | | | | | |
| Cook Gardner 20-4BB B | 0.00 | 0.00 | 6,556.0 | 662.7 | -2,225.0 | 1,591,241.08 | 2,286,154.94 | 39.429450 | -108.027520 |
| - actual wellpath misses target center by 11.7ft at 7167.0ft MD (6546.6 TVD, 659.4 N, -2231.2 E) | | | | | | | | | |
| - Circle (radius 25.0) | | | | | | | | | |

| Design Annotations | | | | | |
|---------------------|---------------------|-------------------|------------|-----------------------------------|--|
| Measured Depth (ft) | Vertical Depth (ft) | Local Coordinates | | | |
| | | +N/-S (ft) | +E/-W (ft) | Comment | |
| 1,072.0 | 1,051.0 | 43.1 | -150.1 | Last Cathedral Survey @ 1,072' MD | |
| 7,167.0 | 6,546.6 | 659.4 | -2,231.2 | Last Cathedral Survey @ 7,167' MD | |
| 7,217.0 | 6,596.6 | 658.9 | -2,232.1 | Projection to Bit @ 7,217' | |

| | | |
|-------------------|--------------------|-------------|
| Checked By: _____ | Approved By: _____ | Date: _____ |
|-------------------|--------------------|-------------|