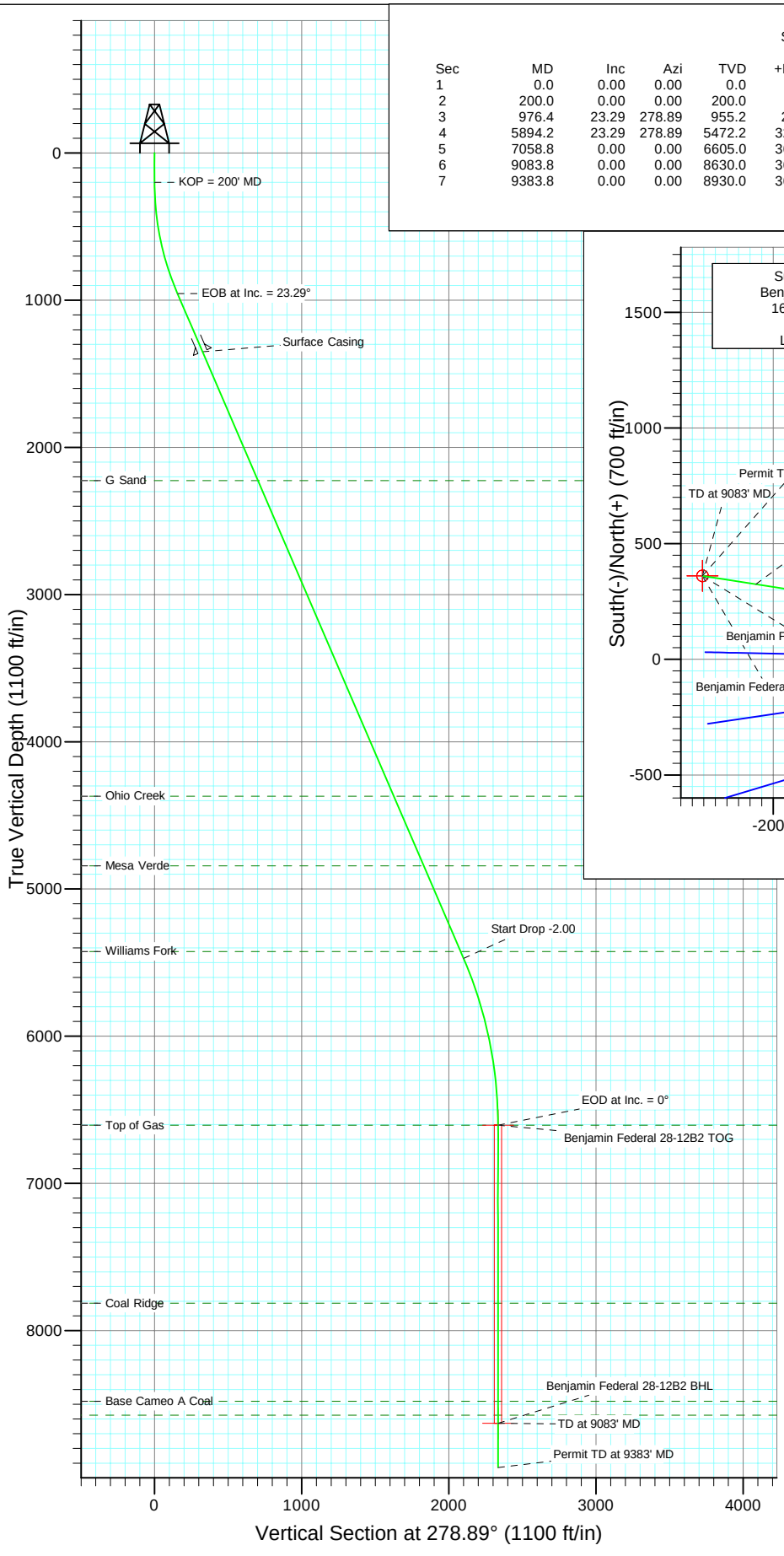
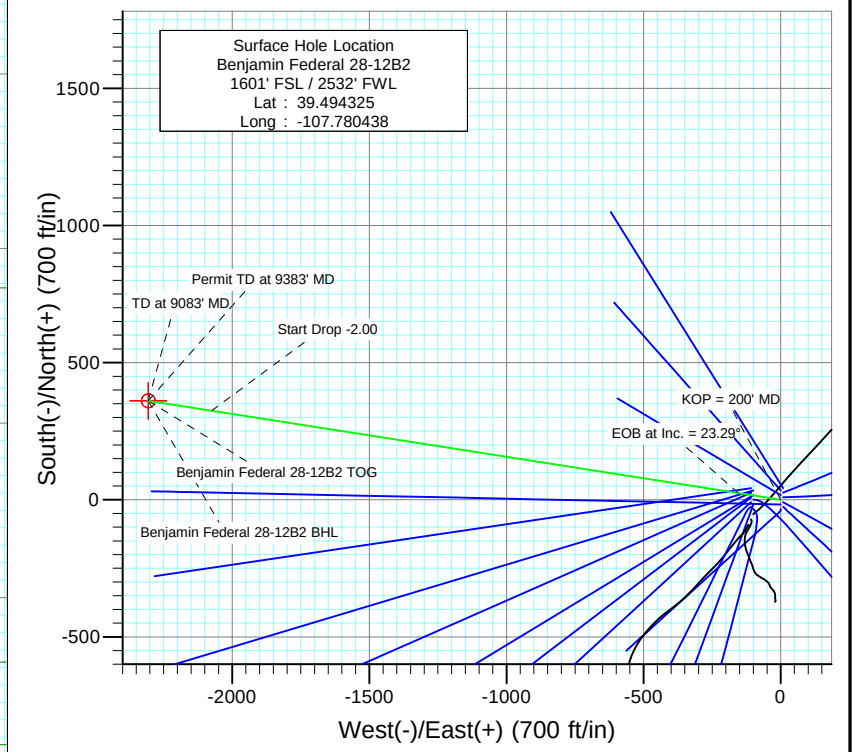
Project: Mamm Creek
Site: K28NW Pad
Well: Benjamin Federal 28-12B2
Wellbore: DD
Design: Plan #2

CATHEDRAL

SECTION DETAILS

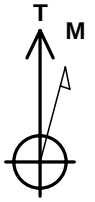
| Sec | MD | Inc | Azi | TVD | +N/-S | +E/-W | Dleg | TFace | VSect | Target |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0 | 0.00 | 0.00 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.0 | |
| 2 | 200.0 | 0.00 | 0.00 | 200.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.0 | |
| 3 | 976.4 | 23.29 | 278.89 | 955.2 | 24.1 | -153.8 | 3.00 | 278.89 | 155.7 | |
| 4 | 5894.2 | 23.29 | 278.89 | 5472.2 | 324.6 | -2075.0 | 0.00 | 0.00 | 2100.3 | |
| 5 | 7058.8 | 0.00 | 0.00 | 6605.0 | 360.7 | -2305.7 | 2.00 | 180.00 | 2333.7 | Benjamin Federal 28-12B2 TOG |
| 6 | 9083.8 | 0.00 | 0.00 | 8630.0 | 360.7 | -2305.7 | 0.00 | 0.00 | 2333.7 | Benjamin Federal 28-12B2 BHL |
| 7 | 9383.8 | 0.00 | 0.00 | 8930.0 | 360.7 | -2305.7 | 0.00 | 0.00 | 2333.7 | |




FORMATION TOP DETAILS

| TVDPath | MDPath | Formation |
|---|---|---|
| 2226.0 | 2360.0 | G Sand |
| 4370.0 | 4694.2 | Ohio Creek |
| 4842.0 | 5208.1 | Mesa Verde |
| 5424.0 | 5841.7 | Williams Fork |
| 6605.0 | 7058.8 | Top of Gas |
| 7814.0 | 8267.8 | Coal Ridge |
| 8480.0 | 8933.8 | Base Cameo A Coal |
| 8575.0 | 9028.8 | Rollins |




Azimuths to True North
Magnetic North: 10.30°

Magnetic Field
Strength: 52364.6snT
Dip Angle: 65.81°
Date: 11/24/2010
Model: IGRF200510

Plan #2
Benjamin Federal 28-12B2
(2000 FSL - 240 FWL) Job #10xxx: KR

WELL @ 5965.0ft (Original Well Elev)
North American Datum 1983
Well Benjamin Federal 28-12B2, True North

| Target | Azimuth | Origin Type | N/S | E/W |
|---|---|---|---|---|
| Benjamin Federal 28-12B2 BHL | 278.89 | Slot | 0.0 | 0.0 |

| Name | TVD | +N/-S | +E/-W | Latitude | Longitude |
|---|---|---|---|---|---|
| | | 360.7 | -2305.7 | 39.495315 | -107.788608 |
| Benjamin Federal 28-12B2 BHL | 8630.0 | 360.7 | -2305.7 | 39.495315 | -107.788608 |

# Cathedral Energy Services

Planning Report

| | | | |
|---|---|---|---|
| **Database:** | EDM 5000.1 US Multi Users DB | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Company:** | EnCana Oil & Gas (USA) Inc | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Project:** | Mamm Creek | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site:** | K28NW Pad | **North Reference:** | True |
| **Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | DD | | |
| **Design:** | Plan #2 | | |

**Project** Mamm Creek

| | | | |
|---|---|---|---|
| **Map System:** | US State Plane 1983 | **System Datum:** | Mean Sea Level |
| **Geo Datum:** | North American Datum 1983 | | |
| **Map Zone:** | Colorado Central Zone | | |

**Site** K28NW Pad

| | | | | | |
|---|---|---|---|---|---|
| **Site Position:** | | **Northing:** | 1,613,160.16 ft | **Latitude:** | 39.494711 |
| **From:** | Lat/Long | **Easting:** | 2,356,412.22 ft | **Longitude:** | -107.780819 |
| **Position Uncertainty:** | 0.0 ft | **Slot Radius:** | 13.200 in | **Grid Convergence:** | -1.44 ° |

**Well** Benjamin Federal 28-12B2

| | | | | | | |
|---|---|---|---|---|---|---|
| **Well Position** | **+N/-S** | 0.0 ft | **Northing:** | 1,613,016.85 ft | **Latitude:** | 39.494325 |
| | **+E/-W** | 0.0 ft | **Easting:** | 2,356,516.30 ft | **Longitude:** | -107.780438 |
| **Position Uncertainty** | | 0.0 ft | **Wellhead Elevation:** | ft | **Ground Level:** | 5,943.0 ft |

**Wellbore** DD

| Magnetics | Model Name | Sample Date | Declination (°) | Dip Angle (°) | Field Strength (nT) |
|---|---|---|---|---|---|
| | IGRF200510 | 11/24/2010 | 10.30 | 65.81 | 52,365 |

**Design** Plan #2

**Audit Notes:**

| | | | | | |
|---|---|---|---|---|---|
| **Version:** | | **Phase:** | PLAN | **Tie On Depth:** | 0.0 |

| Vertical Section: | Depth From (TVD) (ft) | +N/-S (ft) | +E/-W (ft) | Direction (°) |
|---|---|---|---|---|
| | 0.0 | 0.0 | 0.0 | 278.89 |

**Plan Sections**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) | TFO (°) | Target |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00 | 0.00 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 200.0 | 0.00 | 0.00 | 200.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 976.4 | 23.29 | 278.89 | 955.2 | 24.1 | -153.8 | 3.00 | 3.00 | 0.00 | 278.89 | |
| 5,894.2 | 23.29 | 278.89 | 5,472.2 | 324.6 | -2,075.0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 7,058.8 | 0.00 | 0.00 | 6,605.0 | 360.7 | -2,305.7 | 2.00 | -2.00 | 0.00 | 180.00 | Benjamin Federal 28- |
| 9,083.8 | 0.00 | 0.00 | 8,630.0 | 360.7 | -2,305.7 | 0.00 | 0.00 | 0.00 | 0.00 | Benjamin Federal 28- |
| 9,383.8 | 0.00 | 0.00 | 8,930.0 | 360.7 | -2,305.7 | 0.00 | 0.00 | 0.00 | 0.00 | |

| | | | |
|---|---|---|---|
| **Database:** | EDM 5000.1 US Multi Users DB | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Company:** | EnCana Oil & Gas (USA) Inc | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Project:** | Mamm Creek | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site:** | K28NW Pad | **North Reference:** | True |
| **Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | DD | | |
| **Design:** | Plan #2 | | |

**Planned Survey**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Comments / Formations |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00 | 0.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | |
| 100.0 | 0.00 | 0.00 | 100.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | |
| 200.0 | 0.00 | 0.00 | 200.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | KOP = 200' MD |
| 300.0 | 3.00 | 278.89 | 300.0 | 0.4 | -2.6 | 2.6 | 3.00 | 3.00 | |
| 400.0 | 6.00 | 278.89 | 399.6 | 1.6 | -10.3 | 10.5 | 3.00 | 3.00 | |
| 500.0 | 9.00 | 278.89 | 498.8 | 3.6 | -23.2 | 23.5 | 3.00 | 3.00 | |
| 600.0 | 12.00 | 278.89 | 597.1 | 6.5 | -41.2 | 41.7 | 3.00 | 3.00 | |
| 700.0 | 15.00 | 278.89 | 694.3 | 10.1 | -64.3 | 65.1 | 3.00 | 3.00 | |
| 800.0 | 18.00 | 278.89 | 790.2 | 14.4 | -92.4 | 93.5 | 3.00 | 3.00 | |
| 900.0 | 21.00 | 278.89 | 884.4 | 19.6 | -125.3 | 126.9 | 3.00 | 3.00 | |
| 976.4 | 23.29 | 278.89 | 955.2 | 24.1 | -153.8 | 155.7 | 3.00 | 3.00 | EOB at Inc. = 23.29° |
| 1,000.0 | 23.29 | 278.89 | 976.9 | 25.5 | -163.0 | 165.0 | 0.00 | 0.00 | |
| 1,100.0 | 23.29 | 278.89 | 1,068.7 | 31.6 | -202.1 | 204.5 | 0.00 | 0.00 | |
| 1,200.0 | 23.29 | 278.89 | 1,160.6 | 37.7 | -241.1 | 244.1 | 0.00 | 0.00 | |
| 1,300.0 | 23.29 | 278.89 | 1,252.4 | 43.8 | -280.2 | 283.6 | 0.00 | 0.00 | |
| 1,400.0 | 23.29 | 278.89 | 1,344.3 | 49.9 | -319.3 | 323.2 | 0.00 | 0.00 | |
| 1,406.0 | 23.29 | 278.89 | 1,349.8 | 50.3 | -321.6 | 325.5 | 0.00 | 0.00 | Surface Casing |
| 1,500.0 | 23.29 | 278.89 | 1,436.1 | 56.1 | -358.3 | 362.7 | 0.00 | 0.00 | |
| 1,600.0 | 23.29 | 278.89 | 1,528.0 | 62.2 | -397.4 | 402.2 | 0.00 | 0.00 | |
| 1,700.0 | 23.29 | 278.89 | 1,619.8 | 68.3 | -436.5 | 441.8 | 0.00 | 0.00 | |
| 1,800.0 | 23.29 | 278.89 | 1,711.7 | 74.4 | -475.5 | 481.3 | 0.00 | 0.00 | |
| 1,900.0 | 23.29 | 278.89 | 1,803.5 | 80.5 | -514.6 | 520.9 | 0.00 | 0.00 | |
| 2,000.0 | 23.29 | 278.89 | 1,895.4 | 86.6 | -553.7 | 560.4 | 0.00 | 0.00 | |
| 2,100.0 | 23.29 | 278.89 | 1,987.2 | 92.7 | -592.7 | 599.9 | 0.00 | 0.00 | |
| 2,200.0 | 23.29 | 278.89 | 2,079.1 | 98.8 | -631.8 | 639.5 | 0.00 | 0.00 | |
| 2,300.0 | 23.29 | 278.89 | 2,170.9 | 105.0 | -670.9 | 679.0 | 0.00 | 0.00 | |
| 2,360.0 | 23.29 | 278.89 | 2,226.0 | 108.6 | -694.3 | 702.7 | 0.00 | 0.00 | G Sand |
| 2,400.0 | 23.29 | 278.89 | 2,262.8 | 111.1 | -709.9 | 718.6 | 0.00 | 0.00 | |
| 2,500.0 | 23.29 | 278.89 | 2,354.6 | 117.2 | -749.0 | 758.1 | 0.00 | 0.00 | |
| 2,600.0 | 23.29 | 278.89 | 2,446.5 | 123.3 | -788.1 | 797.7 | 0.00 | 0.00 | |
| 2,700.0 | 23.29 | 278.89 | 2,538.3 | 129.4 | -827.1 | 837.2 | 0.00 | 0.00 | |
| 2,800.0 | 23.29 | 278.89 | 2,630.2 | 135.5 | -866.2 | 876.7 | 0.00 | 0.00 | |
| 2,900.0 | 23.29 | 278.89 | 2,722.0 | 141.6 | -905.3 | 916.3 | 0.00 | 0.00 | |
| 3,000.0 | 23.29 | 278.89 | 2,813.9 | 147.7 | -944.3 | 955.8 | 0.00 | 0.00 | |
| 3,100.0 | 23.29 | 278.89 | 2,905.7 | 153.8 | -983.4 | 995.4 | 0.00 | 0.00 | |
| 3,200.0 | 23.29 | 278.89 | 2,997.6 | 160.0 | -1,022.5 | 1,034.9 | 0.00 | 0.00 | |
| 3,300.0 | 23.29 | 278.89 | 3,089.4 | 166.1 | -1,061.5 | 1,074.5 | 0.00 | 0.00 | |
| 3,400.0 | 23.29 | 278.89 | 3,181.3 | 172.2 | -1,100.6 | 1,114.0 | 0.00 | 0.00 | |
| 3,500.0 | 23.29 | 278.89 | 3,273.1 | 178.3 | -1,139.7 | 1,153.5 | 0.00 | 0.00 | |
| 3,600.0 | 23.29 | 278.89 | 3,365.0 | 184.4 | -1,178.7 | 1,193.1 | 0.00 | 0.00 | |
| 3,700.0 | 23.29 | 278.89 | 3,456.8 | 190.5 | -1,217.8 | 1,232.6 | 0.00 | 0.00 | |
| 3,800.0 | 23.29 | 278.89 | 3,548.7 | 196.6 | -1,256.9 | 1,272.2 | 0.00 | 0.00 | |
| 3,900.0 | 23.29 | 278.89 | 3,640.5 | 202.7 | -1,295.9 | 1,311.7 | 0.00 | 0.00 | |
| 4,000.0 | 23.29 | 278.89 | 3,732.4 | 208.9 | -1,335.0 | 1,351.2 | 0.00 | 0.00 | |
| 4,100.0 | 23.29 | 278.89 | 3,824.2 | 215.0 | -1,374.1 | 1,390.8 | 0.00 | 0.00 | |
| 4,200.0 | 23.29 | 278.89 | 3,916.1 | 221.1 | -1,413.1 | 1,430.3 | 0.00 | 0.00 | |
| 4,300.0 | 23.29 | 278.89 | 4,007.9 | 227.2 | -1,452.2 | 1,469.9 | 0.00 | 0.00 | |
| 4,400.0 | 23.29 | 278.89 | 4,099.8 | 233.3 | -1,491.3 | 1,509.4 | 0.00 | 0.00 | |
| 4,500.0 | 23.29 | 278.89 | 4,191.6 | 239.4 | -1,530.3 | 1,549.0 | 0.00 | 0.00 | |
| 4,600.0 | 23.29 | 278.89 | 4,283.5 | 245.5 | -1,569.4 | 1,588.5 | 0.00 | 0.00 | |
| 4,694.2 | 23.29 | 278.89 | 4,370.0 | 251.3 | -1,606.2 | 1,625.8 | 0.00 | 0.00 | Ohio Creek |
| 4,700.0 | 23.29 | 278.89 | 4,375.3 | 251.6 | -1,608.5 | 1,628.0 | 0.00 | 0.00 | |

| | | | |
|---|---|---|---|
| **Database:** | EDM 5000.1 US Multi Users DB | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
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| **Project:** | Mamm Creek | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site:** | K28NW Pad | **North Reference:** | True |
| **Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | DD | | |
| **Design:** | Plan #2 | | |

**Planned Survey**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Comments / Formations |
|---|---|---|---|---|---|---|---|---|---|
| 4,800.0 | 23.29 | 278.89 | 4,467.2 | 257.7 | -1,647.5 | 1,667.6 | 0.00 | 0.00 | |
| 4,900.0 | 23.29 | 278.89 | 4,559.0 | 263.9 | -1,686.6 | 1,707.1 | 0.00 | 0.00 | |
| 5,000.0 | 23.29 | 278.89 | 4,650.9 | 270.0 | -1,725.7 | 1,746.7 | 0.00 | 0.00 | |
| 5,100.0 | 23.29 | 278.89 | 4,742.7 | 276.1 | -1,764.7 | 1,786.2 | 0.00 | 0.00 | |
| 5,200.0 | 23.29 | 278.89 | 4,834.6 | 282.2 | -1,803.8 | 1,825.8 | 0.00 | 0.00 | |
| 5,208.1 | 23.29 | 278.89 | 4,842.0 | 282.7 | -1,807.0 | 1,829.0 | 0.00 | 0.00 | Mesa Verde |
| 5,300.0 | 23.29 | 278.89 | 4,926.4 | 288.3 | -1,842.9 | 1,865.3 | 0.00 | 0.00 | |
| 5,400.0 | 23.29 | 278.89 | 5,018.3 | 294.4 | -1,881.9 | 1,904.8 | 0.00 | 0.00 | |
| 5,500.0 | 23.29 | 278.89 | 5,110.1 | 300.5 | -1,921.0 | 1,944.4 | 0.00 | 0.00 | |
| 5,600.0 | 23.29 | 278.89 | 5,202.0 | 306.6 | -1,960.1 | 1,983.9 | 0.00 | 0.00 | |
| 5,700.0 | 23.29 | 278.89 | 5,293.8 | 312.8 | -1,999.2 | 2,023.5 | 0.00 | 0.00 | |
| 5,800.0 | 23.29 | 278.89 | 5,385.7 | 318.9 | -2,038.2 | 2,063.0 | 0.00 | 0.00 | |
| 5,841.7 | 23.29 | 278.89 | 5,424.0 | 321.4 | -2,054.5 | 2,079.5 | 0.00 | 0.00 | Williams Fork |
| 5,894.2 | 23.29 | 278.89 | 5,472.2 | 324.6 | -2,075.0 | 2,100.3 | 0.00 | 0.00 | Start Drop -2.00 |
| 5,900.0 | 23.18 | 278.89 | 5,477.5 | 325.0 | -2,077.3 | 2,102.5 | 2.00 | -2.00 | |
| 6,000.0 | 21.18 | 278.89 | 5,570.1 | 330.8 | -2,114.6 | 2,140.3 | 2.00 | -2.00 | |
| 6,100.0 | 19.18 | 278.89 | 5,664.0 | 336.1 | -2,148.6 | 2,174.8 | 2.00 | -2.00 | |
| 6,200.0 | 17.18 | 278.89 | 5,759.0 | 341.0 | -2,179.5 | 2,206.0 | 2.00 | -2.00 | |
| 6,300.0 | 15.18 | 278.89 | 5,855.0 | 345.3 | -2,207.0 | 2,233.8 | 2.00 | -2.00 | |
| 6,400.0 | 13.18 | 278.89 | 5,952.0 | 349.1 | -2,231.2 | 2,258.3 | 2.00 | -2.00 | |
| 6,500.0 | 11.18 | 278.89 | 6,049.7 | 352.3 | -2,252.0 | 2,279.4 | 2.00 | -2.00 | |
| 6,600.0 | 9.18 | 278.89 | 6,148.1 | 355.0 | -2,269.5 | 2,297.1 | 2.00 | -2.00 | |
| 6,700.0 | 7.18 | 278.89 | 6,247.1 | 357.2 | -2,283.5 | 2,311.3 | 2.00 | -2.00 | |
| 6,800.0 | 5.18 | 278.89 | 6,346.5 | 358.9 | -2,294.2 | 2,322.1 | 2.00 | -2.00 | |
| 6,900.0 | 3.18 | 278.89 | 6,446.3 | 360.0 | -2,301.4 | 2,329.3 | 2.00 | -2.00 | |
| 7,000.0 | 1.18 | 278.89 | 6,546.2 | 360.6 | -2,305.1 | 2,333.1 | 2.00 | -2.00 | |
| 7,058.8 | 0.00 | 0.00 | 6,605.0 | 360.7 | -2,305.7 | 2,333.7 | 2.00 | -2.00 | EOD at Inc. = 0° - Top of Gas - Benjamin Feder |
| 7,100.0 | 0.00 | 0.00 | 6,646.2 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | |
| 7,200.0 | 0.00 | 0.00 | 6,746.2 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | |
| 7,300.0 | 0.00 | 0.00 | 6,846.2 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | |
| 7,400.0 | 0.00 | 0.00 | 6,946.2 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | |
| 7,500.0 | 0.00 | 0.00 | 7,046.2 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | |
| 7,600.0 | 0.00 | 0.00 | 7,146.2 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | |
| 7,700.0 | 0.00 | 0.00 | 7,246.2 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | |
| 7,800.0 | 0.00 | 0.00 | 7,346.2 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | |
| 7,900.0 | 0.00 | 0.00 | 7,446.2 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | |
| 8,000.0 | 0.00 | 0.00 | 7,546.2 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | |
| 8,100.0 | 0.00 | 0.00 | 7,646.2 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | |
| 8,200.0 | 0.00 | 0.00 | 7,746.2 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | |
| 8,267.8 | 0.00 | 0.00 | 7,814.0 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | Coal Ridge |
| 8,300.0 | 0.00 | 0.00 | 7,846.2 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | |
| 8,400.0 | 0.00 | 0.00 | 7,946.2 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | |
| 8,500.0 | 0.00 | 0.00 | 8,046.2 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | |
| 8,600.0 | 0.00 | 0.00 | 8,146.2 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | |
| 8,700.0 | 0.00 | 0.00 | 8,246.2 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | |
| 8,800.0 | 0.00 | 0.00 | 8,346.2 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | |
| 8,900.0 | 0.00 | 0.00 | 8,446.2 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | |
| 8,933.8 | 0.00 | 0.00 | 8,480.0 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | Base Cameo A Coal |
| 9,000.0 | 0.00 | 0.00 | 8,546.2 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | |
| 9,028.8 | 0.00 | 0.00 | 8,575.0 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | Rollins |
| 9,083.8 | 0.00 | 0.00 | 8,630.0 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | TD at 9083' MD - Benjamin Federal 28-12B2 BH |
| 9,100.0 | 0.00 | 0.00 | 8,646.2 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | |

| | | | |
|---|---|---|---|
| **Database:** | EDM 5000.1 US Multi Users DB | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Company:** | EnCana Oil & Gas (USA) Inc | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Project:** | Mamm Creek | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site:** | K28NW Pad | **North Reference:** | True |
| **Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | DD | | |
| **Design:** | Plan #2 | | |

## Planned Survey

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Comments / Formations |
|---|---|---|---|---|---|---|---|---|---|
| 9,200.0 | 0.00 | 0.00 | 8,746.2 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | |
| 9,300.0 | 0.00 | 0.00 | 8,846.2 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | |
| 9,383.8 | 0.00 | 0.00 | 8,930.0 | 360.7 | -2,305.7 | 2,333.7 | 0.00 | 0.00 | Permit TD at 9383' MD |

## Targets

| Target Name - hit/miss target - Shape | Dip Angle (°) | Dip Dir. (°) | TVD (ft) | +N/-S (ft) | +E/-W (ft) | Northing (ft) | Easting (ft) | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|
| Benjamin Federal 28-12 - plan hits target center - Point | 0.00 | 0.00 | 6,605.0 | 360.7 | -2,305.7 | 1,613,435.32 | 2,354,220.39 | 39.495315 | -107.788608 |
| Benjamin Federal 28-12 - plan hits target center - Circle (radius 25.0) | 0.00 | 0.00 | 8,630.0 | 360.7 | -2,305.7 | 1,613,435.32 | 2,354,220.39 | 39.495315 | -107.788608 |

## Casing Points

| Measured Depth (ft) | Vertical Depth (ft) | Name | Casing Diameter (in) | Hole Diameter (in) |
|---|---|---|---|---|
| 1,406.0 | 1,349.8 | Surface Casing | | |

## Formations

| Measured Depth (ft) | Vertical Depth (ft) | Name | Lithology | Dip (°) | Dip Direction (°) |
|---|---|---|---|---|---|
| 2,360.0 | 2,226.0 | G Sand | | | |
| 4,694.2 | 4,370.0 | Ohio Creek | | | |
| 5,208.1 | 4,842.0 | Mesa Verde | | | |
| 5,841.7 | 5,424.0 | Williams Fork | | | |
| 7,058.8 | 6,605.0 | Top of Gas | | | |
| 8,267.8 | 7,814.0 | Coal Ridge | | | |
| 8,933.8 | 8,480.0 | Base Cameo A Coal | | | |
| 9,028.8 | 8,575.0 | Rollins | | | |

## Plan Annotations

| Measured Depth (ft) | Vertical Depth (ft) | Local Coordinates +N/-S (ft) | Local Coordinates +E/-W (ft) | Comment |
|---|---|---|---|---|
| 200.0 | 200.0 | 0.0 | 0.0 | KOP = 200' MD |
| 976.4 | 955.2 | 24.1 | -153.8 | EOB at Inc. = 23.29° |
| 5,894.2 | 5,472.2 | 324.6 | -2,075.0 | Start Drop -2.00 |
| 7,058.8 | 6,605.0 | 360.7 | -2,305.7 | EOD at Inc. = 0° |
| 9,083.8 | 8,630.0 | 360.7 | -2,305.7 | TD at 9083' MD |
| 9,383.8 | 8,930.0 | 360.7 | -2,305.7 | Permit TD at 9383' MD |

# EnCana Oil & Gas (USA) Inc

**Mamm Creek**
**K28NW Pad**
**Benjamin Federal 28-12B2**
**DD**
**Plan #2**

# Anticollision Report

**23 November, 2010**

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

| | |
|---|---|
| **Reference** | Plan #2 |

| | | | |
|---|---|---|---|
| **Filter type:** | NO GLOBAL FILTER: Using user defined selection & filtering criteria | | |
| **Interpolation Method:** | Stations | **Error Model:** | Systematic Ellipse |
| **Depth Range:** | 0.0 to 99,999.0ft | **Scan Method:** | Closest Approach 3D |
| **Results Limited by:** | Maximum center-center distance of 828.6ft | **Error Surface:** | Elliptical Conic |
| **Warning Levels Evaluated at:** | 2.00 **Sigma** | | |

**Survey Tool Program** **Date** 11/23/2010

| From (ft) | To (ft) | Survey (Wellbore) | Tool Name | Description |
|---|---|---|---|---|
| 0.0 | 9,383.8 | Plan #2 (DD) | MWD | Geolink MWD |

# Cathedral Energy Services

## Anticollision Report

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

**Summary**

| Site Name<br>Offset Well - Wellbore - Design | Reference Measured Depth (ft) | Offset Measured Depth (ft) | Distance Between Centres (ft) | Distance Between Ellipses (ft) | Separation Factor | Warning |
|---|---|---|---|---|---|---|
| K28NW Pad | | | | | | |
| Benjamin 28-11 Existing - Existing - Existing | 749.1 | 737.5 | 101.9 | 98.6 | 30.610 | CC, ES |
| Benjamin 28-11 Existing - Existing - Existing | 900.0 | 880.1 | 112.0 | 107.6 | 25.243 | SF |
| Benjamin Federal 28-12C1 - DD - Plan #2 | 200.0 | 200.0 | 17.1 | 16.5 | 27.552 | CC, ES |
| Benjamin Federal 28-12C1 - DD - Plan #2 | 9,349.8 | 9,384.3 | 330.2 | 238.4 | 3.598 | SF |
| Benjamin Federal 28-12C2 - DD - Plan #2 | 1,115.1 | 1,073.9 | 98.5 | 94.3 | 23.689 | CC |
| Benjamin Federal 28-12C2 - DD - Plan #2 | 1,200.0 | 1,158.2 | 99.0 | 94.0 | 20.008 | ES |
| Benjamin Federal 28-12C2 - DD - Plan #2 | 3,000.0 | 2,945.7 | 242.7 | 207.5 | 6.889 | SF |
| Benjamin Federal 28-13B1 - DD - Plan #2 | 880.5 | 847.9 | 92.3 | 89.2 | 29.634 | CC |
| Benjamin Federal 28-13B1 - DD - Plan #2 | 900.0 | 866.4 | 92.4 | 89.2 | 28.652 | ES |
| Benjamin Federal 28-13B1 - DD - Plan #2 | 2,400.0 | 2,339.3 | 282.3 | 256.1 | 10.763 | SF |
| Benjamin Federal 28-13B2 - DD - Plan #2 | 788.5 | 758.9 | 99.7 | 96.9 | 35.643 | CC |
| Benjamin Federal 28-13B2 - DD - Plan #2 | 800.0 | 769.7 | 99.7 | 96.9 | 34.951 | ES |
| Benjamin Federal 28-13B2 - DD - Plan #2 | 2,400.0 | 2,318.4 | 377.0 | 351.0 | 14.535 | SF |
| Benjamin Federal 28-13C1 - DD - Plan #2 | 694.1 | 671.7 | 92.2 | 89.7 | 37.480 | CC |
| Benjamin Federal 28-13C1 - DD - Plan #2 | 700.0 | 677.3 | 92.2 | 89.7 | 37.080 | ES |
| Benjamin Federal 28-13C1 - DD - Plan #2 | 1,700.0 | 1,621.1 | 290.6 | 275.1 | 18.729 | SF |
| Benjamin Federal 28-13C2 - DD - Plan #2 | 655.5 | 633.6 | 100.3 | 97.9 | 42.958 | CC, ES |
| Benjamin Federal 28-13C2 - DD - Plan #2 | 1,300.0 | 1,221.7 | 213.8 | 204.3 | 22.535 | SF |
| Benjamin Federal 28-14B1 - DD - Plan #2 | 200.0 | 200.0 | 34.2 | 33.6 | 55.105 | CC, ES |
| Benjamin Federal 28-14B1 - DD - Plan #2 | 700.0 | 693.4 | 85.8 | 82.7 | 27.773 | SF |
| Benjamin Federal 28-14B2 - DD - Plan #2 | 523.9 | 509.4 | 106.7 | 104.8 | 57.230 | CC |
| Benjamin Federal 28-14B2 - DD - Plan #2 | 600.0 | 583.6 | 106.9 | 104.6 | 47.736 | ES |
| Benjamin Federal 28-14B2 - DD - Plan #2 | 1,000.0 | 964.5 | 141.2 | 135.7 | 25.456 | SF |
| Benjamin Federal 28-14C - DD - Plan #2 | 545.8 | 532.7 | 93.8 | 91.8 | 46.786 | CC, ES |
| Benjamin Federal 28-14C - DD - Plan #2 | 976.4 | 936.3 | 152.2 | 146.9 | 28.784 | SF |
| Benjamin Federal 28-16C - DD - Plan #2 | 200.0 | 200.0 | 26.8 | 26.2 | 43.097 | CC, ES |
| Benjamin Federal 28-16C - DD - Plan #2 | 300.0 | 298.6 | 30.4 | 29.4 | 31.196 | SF |
| Benjamin Federal 33-3B - DD - Plan #2 | 579.0 | 566.9 | 91.4 | 89.2 | 41.559 | CC, ES |
| Benjamin Federal 33-3B - DD - Plan #2 | 800.0 | 766.6 | 116.5 | 112.8 | 31.707 | SF |
| Benjamin Federal 33-4B - DD - Plan #2 | 562.1 | 544.5 | 104.4 | 102.4 | 53.250 | CC, ES |
| Benjamin Federal 33-4B - DD - Plan #2 | 1,200.0 | 1,117.5 | 209.5 | 201.4 | 25.749 | SF |
| Benjamin Fee 28-10D2 - DD - Plan #2 | 200.0 | 200.0 | 11.7 | 11.1 | 18.849 | CC, ES |
| Benjamin Fee 28-10D2 - DD - Plan #2 | 300.0 | 299.3 | 15.6 | 14.6 | 16.037 | SF |
| Benjamin Fee 28-11A - DD - Plan #2 | 200.0 | 200.0 | 16.8 | 16.1 | 26.966 | CC, ES |
| Benjamin Fee 28-11A - DD - Plan #2 | 600.0 | 598.4 | 30.0 | 27.4 | 11.787 | SF |
| Benjamin Fee 28-11B - DD - Plan #2 | 200.0 | 200.0 | 33.9 | 33.3 | 54.518 | CC, ES |
| Benjamin Fee 28-11B - DD - Plan #2 | 800.0 | 791.6 | 84.5 | 80.5 | 20.833 | SF |
| Benjamin Fee 28-15A - DD - Plan #2 | 200.0 | 200.0 | 12.0 | 11.4 | 19.273 | CC, ES |
| Benjamin Fee 28-15A - DD - Plan #2 | 300.0 | 299.1 | 16.7 | 15.7 | 17.183 | SF |
| Benjamin Fee 28-6C - DD - Plan #2 | 200.0 | 200.0 | 43.0 | 42.4 | 69.265 | CC, ES |
| Benjamin Fee 28-6C - DD - Plan #2 | 900.0 | 883.7 | 133.6 | 128.6 | 26.556 | SF |
| Benjamin Fee 28-9B - DD - Plan #2 | 200.0 | 200.0 | 26.8 | 26.2 | 43.097 | CC, ES |
| Benjamin Fee 28-9B - DD - Plan #2 | 400.0 | 396.2 | 39.4 | 38.1 | 29.067 | SF |
| Benjamin Fee 33-1B - DD - Plan #2 | 726.8 | 720.8 | 17.0 | 13.7 | 5.170 | CC, ES, SF |
| GMR 28-7D Existing - DD - Schlumberger Surveys | 690.2 | 690.7 | 23.5 | 20.3 | 7.239 | CC, ES |
| GMR 28-7D Existing - DD - Schlumberger Surveys | 700.0 | 699.8 | 23.8 | 20.5 | 7.220 | SF |
| GMU 28-14D Existing - Schlumberger Surveys - Schlumb | 740.8 | 725.2 | 122.3 | 119.1 | 37.853 | CC, ES |
| GMU 28-14D Existing - Schlumberger Surveys - Schlumb | 1,000.0 | 967.3 | 147.1 | 141.8 | 27.658 | SF |
| SWSE Sec 29-T6S-R93W | | | | | | |
| Federal 29-09D - DD - Plan #1 | | | | | | Out of range |

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

# Cathedral Energy Services

## Anticollision Report

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

**Offset Design** K28NW Pad - Benjamin 28-11 Existing - Existing - Existing

**Offset Site Error:** 0.0 ft

**Survey Program:** 100-MWD

**Offset Well Error:** 0.0 ft

| Reference Measured Depth (ft) | Reference Vertical Depth (ft) | Offset Measured Depth (ft) | Offset Vertical Depth (ft) | Semi Major Axis Reference (ft) | Semi Major Axis Offset (ft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (ft) | Offset Wellbore Centre +E/-W (ft) | Distance Between Centres (ft) | Distance Between Ellipses (ft) | Total Uncertainty Axis | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -123.72 | -71.8 | -107.6 | 129.4 | | | | |
| 100.0 | 100.0 | 99.4 | 99.4 | 0.1 | 0.1 | -123.74 | -72.0 | -107.8 | 129.7 | 129.4 | 0.27 | 477.383 | |
| 200.0 | 200.0 | 199.3 | 199.3 | 0.3 | 0.3 | -123.85 | -72.5 | -108.1 | 130.1 | 129.5 | 0.62 | 209.710 | |
| 300.0 | 300.0 | 299.5 | 299.5 | 0.5 | 0.5 | -43.91 | -73.4 | -108.0 | 128.7 | 127.7 | 0.97 | 132.099 | |
| 400.0 | 399.6 | 399.4 | 399.4 | 0.7 | 0.7 | -47.31 | -74.8 | -107.2 | 123.4 | 122.1 | 1.35 | 91.415 | |
| 500.0 | 498.8 | 497.0 | 497.0 | 1.0 | 0.8 | -53.25 | -77.0 | -106.4 | 115.9 | 114.1 | 1.78 | 65.263 | |
| 600.0 | 597.1 | 594.3 | 594.2 | 1.4 | 1.0 | -62.14 | -79.9 | -106.3 | 108.2 | 105.9 | 2.30 | 47.071 | |
| 700.0 | 694.3 | 690.4 | 690.2 | 1.8 | 1.2 | -74.27 | -83.3 | -106.9 | 102.7 | 99.7 | 2.95 | 34.790 | |
| 749.1 | 741.6 | 737.5 | 737.3 | 2.1 | 1.3 | -81.41 | -85.2 | -107.5 | 101.9 | 98.6 | 3.33 | 30.610 | CC, ES |
| 800.0 | 790.2 | 786.0 | 785.8 | 2.4 | 1.4 | -89.34 | -87.2 | -108.1 | 102.9 | 99.2 | 3.71 | 27.759 | |
| 900.0 | 884.4 | 880.1 | 879.7 | 3.0 | 1.5 | -105.13 | -91.2 | -109.5 | 112.0 | 107.6 | 4.44 | 25.243 | SF |
| 976.4 | 955.2 | 951.1 | 950.6 | 3.6 | 1.7 | -116.05 | -94.5 | -110.8 | 126.1 | 121.2 | 4.91 | 25.703 | |
| 1,000.0 | 976.9 | 972.9 | 972.4 | 3.8 | 1.7 | -119.19 | -95.5 | -111.3 | 131.6 | 126.6 | 5.03 | 26.185 | |
| 1,100.0 | 1,068.7 | 1,065.4 | 1,064.8 | 4.5 | 1.9 | -129.97 | -99.8 | -113.6 | 158.4 | 153.0 | 5.46 | 29.046 | |
| 1,200.0 | 1,160.6 | 1,158.3 | 1,157.5 | 5.2 | 2.1 | -137.62 | -104.1 | -116.1 | 189.1 | 183.3 | 5.82 | 32.516 | |
| 1,300.0 | 1,252.4 | 1,250.8 | 1,250.0 | 6.0 | 2.3 | -143.12 | -108.4 | -118.8 | 221.9 | 215.7 | 6.15 | 36.051 | |
| 1,400.0 | 1,344.3 | 1,343.4 | 1,342.4 | 6.7 | 2.4 | -147.19 | -112.7 | -121.4 | 256.2 | 249.7 | 6.49 | 39.476 | |
| 1,500.0 | 1,436.1 | 1,435.4 | 1,434.3 | 7.5 | 2.6 | -150.28 | -117.2 | -124.2 | 291.3 | 284.4 | 6.83 | 42.662 | |
| 1,600.0 | 1,528.0 | 1,525.6 | 1,524.3 | 8.3 | 2.8 | -152.68 | -121.7 | -126.4 | 327.5 | 320.3 | 7.17 | 45.705 | |
| 1,700.0 | 1,619.8 | 1,616.1 | 1,614.7 | 9.0 | 3.0 | -154.64 | -126.5 | -128.1 | 364.7 | 357.2 | 7.50 | 48.599 | |
| 1,800.0 | 1,711.7 | 1,707.2 | 1,705.6 | 9.8 | 3.2 | -156.29 | -131.2 | -129.5 | 402.6 | 394.7 | 7.84 | 51.333 | |
| 1,900.0 | 1,803.5 | 1,797.7 | 1,796.0 | 10.5 | 3.3 | -157.69 | -135.8 | -130.5 | 440.9 | 432.7 | 8.18 | 53.917 | |
| 2,000.0 | 1,895.4 | 1,888.8 | 1,887.0 | 11.3 | 3.5 | -158.90 | -140.5 | -131.3 | 479.6 | 471.1 | 8.51 | 56.337 | |
| 2,100.0 | 1,987.2 | 1,978.7 | 1,976.8 | 12.0 | 3.7 | -159.92 | -145.1 | -131.8 | 518.8 | 509.9 | 8.85 | 58.605 | |
| 2,200.0 | 2,079.1 | 2,068.9 | 2,066.9 | 12.8 | 3.9 | -160.82 | -149.7 | -132.0 | 558.3 | 549.1 | 9.19 | 60.752 | |
| 2,300.0 | 2,170.9 | 2,159.0 | 2,156.8 | 13.6 | 4.0 | -161.62 | -154.3 | -132.0 | 598.2 | 588.6 | 9.53 | 62.783 | |
| 2,400.0 | 2,262.8 | 2,248.5 | 2,246.2 | 14.3 | 4.2 | -162.33 | -158.8 | -131.7 | 638.3 | 628.5 | 9.86 | 64.715 | |
| 2,500.0 | 2,354.6 | 2,338.0 | 2,335.6 | 15.1 | 4.4 | -162.98 | -163.2 | -131.0 | 678.9 | 668.7 | 10.20 | 66.575 | |
| 2,600.0 | 2,446.5 | 2,428.2 | 2,425.7 | 15.8 | 4.6 | -163.58 | -167.6 | -130.2 | 719.6 | 709.1 | 10.53 | 68.338 | |
| 2,700.0 | 2,538.3 | 2,519.0 | 2,516.4 | 16.6 | 4.7 | -164.14 | -171.8 | -129.2 | 760.5 | 749.6 | 10.86 | 70.032 | |
| 2,800.0 | 2,630.2 | 2,609.3 | 2,606.6 | 17.4 | 4.9 | -164.65 | -175.8 | -128.0 | 801.5 | 790.3 | 11.19 | 71.644 | |

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

**Offset Design** K28NW Pad - Benjamin Federal 28-12C1 - DD - Plan #2

**Offset Site Error:** 0.0 ft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 ft

| Reference Measured Depth (ft) | Reference Vertical Depth (ft) | Offset Measured Depth (ft) | Offset Vertical Depth (ft) | Semi Major Axis Reference (ft) | Semi Major Axis Offset (ft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (ft) | Offset Wellbore Centre +E/-W (ft) | Distance Between Centres (ft) | Distance Between Ellipses (ft) | Total Uncertainty Axis | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 180.00 | -17.1 | 0.0 | 17.1 | | | | |
| 100.0 | 100.0 | 100.0 | 100.0 | 0.1 | 0.1 | 180.00 | -17.1 | 0.0 | 17.1 | 16.8 | 0.27 | 62.876 | |
| 200.0 | 200.0 | 200.0 | 200.0 | 0.3 | 0.3 | 180.00 | -17.1 | 0.0 | 17.1 | 16.5 | 0.62 | 27.552 | CC, ES |
| 300.0 | 300.0 | 300.0 | 300.0 | 0.5 | 0.5 | -107.26 | -17.1 | 0.0 | 17.7 | 16.7 | 0.98 | 18.111 | |
| 400.0 | 399.6 | 399.6 | 399.6 | 0.7 | 0.7 | -127.62 | -17.1 | 0.0 | 21.4 | 20.0 | 1.35 | 15.823 | |
| 500.0 | 498.8 | 498.8 | 498.8 | 1.0 | 0.8 | -146.79 | -17.1 | 0.0 | 31.2 | 29.4 | 1.71 | 18.192 | |
| 600.0 | 597.1 | 597.1 | 597.1 | 1.4 | 1.0 | -158.71 | -17.1 | 0.0 | 47.5 | 45.4 | 2.05 | 23.183 | |
| 700.0 | 694.3 | 694.3 | 694.3 | 1.8 | 1.2 | -165.50 | -17.1 | 0.0 | 69.8 | 67.4 | 2.37 | 29.421 | |
| 800.0 | 790.2 | 792.2 | 792.2 | 2.4 | 1.3 | -169.50 | -17.1 | -0.5 | 97.2 | 94.5 | 2.69 | 36.105 | |
| 900.0 | 884.4 | 893.7 | 893.5 | 3.0 | 1.5 | -171.58 | -17.0 | -5.4 | 125.7 | 122.7 | 3.02 | 41.675 | |
| 976.4 | 955.2 | 972.3 | 971.8 | 3.6 | 1.7 | -172.42 | -16.8 | -12.9 | 147.6 | 144.4 | 3.27 | 45.159 | |
| 1,000.0 | 976.9 | 996.8 | 996.1 | 3.8 | 1.7 | -172.62 | -16.8 | -15.9 | 154.2 | 150.9 | 3.36 | 45.973 | |
| 1,100.0 | 1,068.7 | 1,102.6 | 1,100.6 | 4.5 | 2.0 | -173.01 | -16.4 | -32.4 | 179.2 | 175.4 | 3.73 | 47.986 | |
| 1,200.0 | 1,160.6 | 1,211.0 | 1,206.6 | 5.2 | 2.4 | -172.87 | -16.0 | -55.4 | 198.8 | 194.6 | 4.14 | 48.064 | |
| 1,300.0 | 1,252.4 | 1,321.5 | 1,313.1 | 6.0 | 2.9 | -172.32 | -15.3 | -84.9 | 212.9 | 208.4 | 4.57 | 46.588 | |
| 1,400.0 | 1,344.3 | 1,433.4 | 1,418.9 | 6.7 | 3.5 | -171.39 | -14.6 | -120.9 | 221.5 | 216.5 | 5.05 | 43.829 | |
| 1,500.0 | 1,436.1 | 1,545.9 | 1,523.0 | 7.5 | 4.3 | -170.05 | -13.7 | -163.4 | 224.5 | 218.9 | 5.62 | 39.986 | |
| 1,600.0 | 1,528.0 | 1,652.8 | 1,619.8 | 8.3 | 5.1 | -168.36 | -12.8 | -209.0 | 222.6 | 216.3 | 6.27 | 35.530 | |
| 1,700.0 | 1,619.8 | 1,752.6 | 1,709.6 | 9.0 | 5.9 | -166.66 | -11.9 | -252.4 | 219.9 | 213.0 | 6.98 | 31.523 | |
| 1,800.0 | 1,711.7 | 1,852.3 | 1,799.4 | 9.8 | 6.7 | -164.93 | -11.0 | -295.8 | 217.5 | 209.7 | 7.78 | 27.959 | |
| 1,900.0 | 1,803.5 | 1,952.1 | 1,889.2 | 10.5 | 7.5 | -163.16 | -10.0 | -339.2 | 215.2 | 206.5 | 8.67 | 24.811 | |
| 2,000.0 | 1,895.4 | 2,051.8 | 1,979.0 | 11.3 | 8.3 | -161.35 | -9.1 | -382.6 | 213.2 | 203.5 | 9.67 | 22.049 | |
| 2,100.0 | 1,987.2 | 2,151.6 | 2,068.8 | 12.0 | 9.1 | -159.51 | -8.2 | -426.0 | 211.3 | 200.6 | 10.76 | 19.641 | |
| 2,200.0 | 2,079.1 | 2,251.3 | 2,158.6 | 12.8 | 10.0 | -157.64 | -7.3 | -469.4 | 209.7 | 197.8 | 11.95 | 17.548 | |
| 2,300.0 | 2,170.9 | 2,351.1 | 2,248.4 | 13.6 | 10.8 | -155.74 | -6.4 | -512.8 | 208.4 | 195.1 | 13.24 | 15.736 | |
| 2,400.0 | 2,262.8 | 2,450.8 | 2,338.3 | 14.3 | 11.6 | -153.82 | -5.5 | -556.2 | 207.2 | 192.6 | 14.62 | 14.169 | |
| 2,500.0 | 2,354.6 | 2,550.6 | 2,428.1 | 15.1 | 12.5 | -151.88 | -4.6 | -599.6 | 206.3 | 190.2 | 16.10 | 12.815 | |
| 2,600.0 | 2,446.5 | 2,650.3 | 2,517.9 | 15.8 | 13.3 | -149.92 | -3.7 | -643.0 | 205.6 | 188.0 | 17.66 | 11.644 | |
| 2,700.0 | 2,538.3 | 2,750.1 | 2,607.7 | 16.6 | 14.1 | -147.96 | -2.8 | -686.4 | 205.2 | 185.9 | 19.30 | 10.630 | |
| 2,800.0 | 2,630.2 | 2,849.8 | 2,697.5 | 17.4 | 15.0 | -145.99 | -1.9 | -729.8 | 205.0 | 184.0 | 21.02 | 9.753 | |
| 2,826.2 | 2,654.2 | 2,875.9 | 2,721.0 | 17.6 | 15.2 | -145.47 | -1.7 | -741.1 | 205.0 | 183.5 | 21.48 | 9.543 | |
| 2,900.0 | 2,722.0 | 2,949.6 | 2,787.3 | 18.1 | 15.8 | -144.02 | -1.0 | -773.2 | 205.1 | 182.3 | 22.81 | 8.991 | |
| 3,000.0 | 2,813.9 | 3,049.3 | 2,877.1 | 18.9 | 16.6 | -142.05 | -0.1 | -816.6 | 205.4 | 180.7 | 24.66 | 8.329 | |
| 3,100.0 | 2,905.7 | 3,149.1 | 2,966.9 | 19.6 | 17.5 | -140.09 | 0.8 | -860.0 | 205.9 | 179.4 | 26.56 | 7.752 | |
| 3,200.0 | 2,997.6 | 3,248.8 | 3,056.7 | 20.4 | 18.3 | -138.14 | 1.7 | -903.4 | 206.7 | 178.2 | 28.52 | 7.248 | |
| 3,300.0 | 3,089.4 | 3,348.6 | 3,146.5 | 21.2 | 19.2 | -136.21 | 2.6 | -946.8 | 207.7 | 177.2 | 30.51 | 6.808 | |
| 3,400.0 | 3,181.3 | 3,448.3 | 3,236.3 | 21.9 | 20.0 | -134.30 | 3.5 | -990.2 | 209.0 | 176.4 | 32.54 | 6.423 | |
| 3,500.0 | 3,273.1 | 3,548.1 | 3,326.1 | 22.7 | 20.8 | -132.41 | 4.4 | -1,033.6 | 210.5 | 175.9 | 34.59 | 6.084 | |
| 3,600.0 | 3,365.0 | 3,647.8 | 3,416.0 | 23.4 | 21.7 | -130.56 | 5.3 | -1,077.0 | 212.2 | 175.5 | 36.67 | 5.787 | |
| 3,700.0 | 3,456.8 | 3,747.6 | 3,505.8 | 24.2 | 22.5 | -128.73 | 6.2 | -1,120.4 | 214.1 | 175.4 | 38.76 | 5.525 | |
| 3,800.0 | 3,548.7 | 3,847.3 | 3,595.6 | 25.0 | 23.4 | -126.94 | 7.1 | -1,163.8 | 216.3 | 175.4 | 40.85 | 5.294 | |
| 3,900.0 | 3,640.5 | 3,947.1 | 3,685.4 | 25.7 | 24.2 | -125.19 | 8.1 | -1,207.2 | 218.6 | 175.7 | 42.95 | 5.090 | |
| 4,000.0 | 3,732.4 | 4,046.8 | 3,775.2 | 26.5 | 25.0 | -123.47 | 9.0 | -1,250.6 | 221.2 | 176.1 | 45.05 | 4.910 | |
| 4,100.0 | 3,824.2 | 4,146.6 | 3,865.0 | 27.2 | 25.9 | -121.80 | 9.9 | -1,294.0 | 223.9 | 176.8 | 47.14 | 4.751 | |
| 4,200.0 | 3,916.1 | 4,246.3 | 3,954.8 | 28.0 | 26.7 | -120.16 | 10.8 | -1,337.4 | 226.9 | 177.7 | 49.22 | 4.610 | |
| 4,300.0 | 4,007.9 | 4,346.1 | 4,044.6 | 28.8 | 27.6 | -118.57 | 11.7 | -1,380.8 | 230.0 | 178.7 | 51.28 | 4.485 | |
| 4,400.0 | 4,099.8 | 4,445.8 | 4,134.4 | 29.5 | 28.4 | -117.03 | 12.6 | -1,424.2 | 233.3 | 180.0 | 53.34 | 4.374 | |
| 4,500.0 | 4,191.6 | 4,545.6 | 4,224.2 | 30.3 | 29.3 | -115.52 | 13.5 | -1,467.6 | 236.8 | 181.4 | 55.37 | 4.276 | |
| 4,600.0 | 4,283.5 | 4,645.3 | 4,314.0 | 31.0 | 30.1 | -114.06 | 14.4 | -1,511.0 | 240.4 | 183.0 | 57.38 | 4.189 | |
| 4,700.0 | 4,375.3 | 4,745.1 | 4,403.9 | 31.8 | 30.9 | -112.65 | 15.3 | -1,554.4 | 244.1 | 184.8 | 59.37 | 4.112 | |
| 4,800.0 | 4,467.2 | 4,844.8 | 4,493.7 | 32.6 | 31.8 | -111.28 | 16.2 | -1,597.8 | 248.0 | 186.7 | 61.34 | 4.044 | |
| 4,900.0 | 4,559.0 | 4,944.6 | 4,583.5 | 33.3 | 32.6 | -109.95 | 17.1 | -1,641.2 | 252.1 | 188.8 | 63.29 | 3.984 | |

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

# Cathedral Energy Services

## Anticollision Report

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

**Offset Design** K28NW Pad - Benjamin Federal 28-12C1 - DD - Plan #2

**Offset Site Error:** 0.0 ft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 ft

| Reference Measured Depth (ft) | Reference Vertical Depth (ft) | Offset Measured Depth (ft) | Offset Vertical Depth (ft) | Semi Major Axis Reference (ft) | Semi Major Axis Offset (ft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (ft) | Offset Wellbore Centre +E/-W (ft) | Distance Between Centres (ft) | Distance Between Ellipses (ft) | Total Uncertainty Axis | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5,000.0 | 4,650.9 | 5,044.3 | 4,673.3 | 34.1 | 33.5 | -108.67 | 18.0 | -1,684.6 | 256.3 | 191.1 | 65.21 | 3.930 | |
| 5,100.0 | 4,742.7 | 5,144.1 | 4,763.1 | 34.9 | 34.3 | -107.42 | 18.9 | -1,728.0 | 260.6 | 193.5 | 67.10 | 3.883 | |
| 5,200.0 | 4,834.6 | 5,243.8 | 4,852.9 | 35.6 | 35.2 | -106.22 | 19.8 | -1,771.4 | 265.0 | 196.0 | 68.98 | 3.842 | |
| 5,300.0 | 4,926.4 | 5,343.5 | 4,942.7 | 36.4 | 36.0 | -105.06 | 20.7 | -1,814.8 | 269.6 | 198.7 | 70.83 | 3.806 | |
| 5,400.0 | 5,018.3 | 5,443.3 | 5,032.5 | 37.1 | 36.8 | -103.93 | 21.6 | -1,858.2 | 274.2 | 201.5 | 72.66 | 3.774 | |
| 5,500.0 | 5,110.1 | 5,543.0 | 5,122.3 | 37.9 | 37.7 | -102.85 | 22.5 | -1,901.6 | 278.9 | 204.5 | 74.46 | 3.746 | |
| 5,600.0 | 5,202.0 | 5,642.8 | 5,212.1 | 38.7 | 38.5 | -101.80 | 23.4 | -1,945.0 | 283.8 | 207.5 | 76.24 | 3.722 | |
| 5,700.0 | 5,293.8 | 5,742.5 | 5,301.9 | 39.4 | 39.4 | -100.78 | 24.3 | -1,988.4 | 288.7 | 210.7 | 78.00 | 3.701 | |
| 5,800.0 | 5,385.7 | 5,842.0 | 5,391.7 | 40.2 | 40.2 | -99.90 | 25.2 | -2,031.2 | 293.8 | 214.1 | 79.69 | 3.686 | |
| 5,894.2 | 5,472.2 | 5,935.7 | 5,477.4 | 40.9 | 40.9 | -99.64 | 26.0 | -2,068.9 | 298.7 | 217.6 | 81.14 | 3.682 | |
| 5,900.0 | 5,477.5 | 5,941.4 | 5,482.7 | 40.9 | 40.9 | -99.65 | 26.1 | -2,071.2 | 299.0 | 217.8 | 81.22 | 3.682 | |
| 6,000.0 | 5,570.1 | 6,040.8 | 5,575.0 | 41.6 | 41.6 | -99.79 | 26.8 | -2,108.0 | 304.1 | 221.5 | 82.57 | 3.683 | |
| 6,100.0 | 5,664.0 | 6,140.2 | 5,668.6 | 42.3 | 42.2 | -99.92 | 27.5 | -2,141.6 | 308.7 | 224.9 | 83.78 | 3.685 | |
| 6,200.0 | 5,759.0 | 6,239.6 | 5,763.2 | 42.8 | 42.7 | -100.05 | 28.2 | -2,171.9 | 312.9 | 228.0 | 84.87 | 3.687 | |
| 6,300.0 | 5,855.0 | 6,339.0 | 5,858.9 | 43.3 | 43.2 | -100.17 | 28.7 | -2,198.9 | 316.7 | 230.8 | 85.83 | 3.689 | |
| 6,400.0 | 5,952.0 | 6,438.4 | 5,955.4 | 43.8 | 43.6 | -100.29 | 29.2 | -2,222.6 | 320.0 | 233.3 | 86.67 | 3.692 | |
| 6,500.0 | 6,049.7 | 6,537.9 | 6,052.7 | 44.1 | 44.0 | -100.41 | 29.6 | -2,243.0 | 322.8 | 235.4 | 87.38 | 3.694 | |
| 6,600.0 | 6,148.1 | 6,637.3 | 6,150.7 | 44.4 | 44.3 | -100.52 | 30.0 | -2,259.9 | 325.2 | 237.2 | 87.98 | 3.696 | |
| 6,700.0 | 6,247.1 | 6,736.7 | 6,249.1 | 44.7 | 44.5 | -100.62 | 30.3 | -2,273.4 | 327.1 | 238.7 | 88.45 | 3.698 | |
| 6,800.0 | 6,346.5 | 6,836.0 | 6,348.0 | 44.9 | 44.7 | -100.72 | 30.5 | -2,283.5 | 328.6 | 239.8 | 88.81 | 3.700 | |
| 6,900.0 | 6,446.3 | 6,935.4 | 6,447.2 | 45.0 | 44.8 | -100.82 | 30.6 | -2,290.2 | 329.6 | 240.5 | 89.05 | 3.701 | |
| 7,000.0 | 6,546.2 | 7,034.8 | 6,546.5 | 45.1 | 44.9 | -100.91 | 30.7 | -2,293.5 | 330.1 | 240.9 | 89.19 | 3.701 | |
| 7,058.8 | 6,605.0 | 7,093.3 | 6,605.0 | 45.1 | 44.9 | 177.93 | 30.7 | -2,293.8 | 330.2 | 241.0 | 89.24 | 3.700 | |
| 7,100.0 | 6,646.2 | 7,134.5 | 6,646.2 | 45.1 | 45.0 | 177.93 | 30.7 | -2,293.8 | 330.2 | 240.9 | 89.28 | 3.699 | |
| 7,200.0 | 6,746.2 | 7,234.5 | 6,746.2 | 45.2 | 45.0 | 177.93 | 30.7 | -2,293.8 | 330.2 | 240.8 | 89.38 | 3.695 | |
| 7,300.0 | 6,846.2 | 7,334.5 | 6,846.2 | 45.2 | 45.1 | 177.93 | 30.7 | -2,293.8 | 330.2 | 240.7 | 89.47 | 3.691 | |
| 7,400.0 | 6,946.2 | 7,434.5 | 6,946.2 | 45.3 | 45.1 | 177.93 | 30.7 | -2,293.8 | 330.2 | 240.6 | 89.57 | 3.687 | |
| 7,500.0 | 7,046.2 | 7,534.5 | 7,046.2 | 45.3 | 45.2 | 177.93 | 30.7 | -2,293.8 | 330.2 | 240.5 | 89.68 | 3.682 | |
| 7,600.0 | 7,146.2 | 7,634.5 | 7,146.2 | 45.4 | 45.2 | 177.93 | 30.7 | -2,293.8 | 330.2 | 240.4 | 89.78 | 3.678 | |
| 7,700.0 | 7,246.2 | 7,734.5 | 7,246.2 | 45.4 | 45.3 | 177.93 | 30.7 | -2,293.8 | 330.2 | 240.3 | 89.88 | 3.674 | |
| 7,800.0 | 7,346.2 | 7,834.5 | 7,346.2 | 45.5 | 45.3 | 177.93 | 30.7 | -2,293.8 | 330.2 | 240.2 | 89.99 | 3.670 | |
| 7,900.0 | 7,446.2 | 7,934.5 | 7,446.2 | 45.5 | 45.4 | 177.93 | 30.7 | -2,293.8 | 330.2 | 240.1 | 90.09 | 3.665 | |
| 8,000.0 | 7,546.2 | 8,034.5 | 7,546.2 | 45.6 | 45.4 | 177.93 | 30.7 | -2,293.8 | 330.2 | 240.0 | 90.20 | 3.661 | |
| 8,100.0 | 7,646.2 | 8,134.5 | 7,646.2 | 45.7 | 45.5 | 177.93 | 30.7 | -2,293.8 | 330.2 | 239.9 | 90.31 | 3.657 | |
| 8,200.0 | 7,746.2 | 8,234.5 | 7,746.2 | 45.7 | 45.5 | 177.93 | 30.7 | -2,293.8 | 330.2 | 239.8 | 90.42 | 3.652 | |
| 8,300.0 | 7,846.2 | 8,334.5 | 7,846.2 | 45.8 | 45.6 | 177.93 | 30.7 | -2,293.8 | 330.2 | 239.7 | 90.53 | 3.648 | |
| 8,400.0 | 7,946.2 | 8,434.5 | 7,946.2 | 45.8 | 45.6 | 177.93 | 30.7 | -2,293.8 | 330.2 | 239.6 | 90.64 | 3.643 | |
| 8,500.0 | 8,046.2 | 8,534.5 | 8,046.2 | 45.9 | 45.7 | 177.93 | 30.7 | -2,293.8 | 330.2 | 239.5 | 90.76 | 3.639 | |
| 8,600.0 | 8,146.2 | 8,634.5 | 8,146.2 | 45.9 | 45.8 | 177.93 | 30.7 | -2,293.8 | 330.2 | 239.3 | 90.87 | 3.634 | |
| 8,700.0 | 8,246.2 | 8,734.5 | 8,246.2 | 46.0 | 45.8 | 177.93 | 30.7 | -2,293.8 | 330.2 | 239.2 | 90.99 | 3.629 | |
| 8,800.0 | 8,346.2 | 8,834.5 | 8,346.2 | 46.0 | 45.9 | 177.93 | 30.7 | -2,293.8 | 330.2 | 239.1 | 91.10 | 3.625 | |
| 8,900.0 | 8,446.2 | 8,934.5 | 8,446.2 | 46.1 | 45.9 | 177.93 | 30.7 | -2,293.8 | 330.2 | 239.0 | 91.22 | 3.620 | |
| 9,000.0 | 8,546.2 | 9,034.5 | 8,546.2 | 46.2 | 46.0 | 177.93 | 30.7 | -2,293.8 | 330.2 | 238.9 | 91.34 | 3.615 | |
| 9,083.8 | 8,630.0 | 9,118.3 | 8,630.0 | 46.2 | 46.0 | 177.93 | 30.7 | -2,293.8 | 330.2 | 238.8 | 91.44 | 3.611 | |
| 9,100.0 | 8,646.2 | 9,134.5 | 8,646.2 | 46.2 | 46.1 | 177.93 | 30.7 | -2,293.8 | 330.2 | 238.8 | 91.46 | 3.610 | |
| 9,200.0 | 8,746.2 | 9,234.5 | 8,746.2 | 46.3 | 46.1 | 177.93 | 30.7 | -2,293.8 | 330.2 | 238.6 | 91.58 | 3.606 | |
| 9,300.0 | 8,846.2 | 9,334.5 | 8,846.2 | 46.3 | 46.2 | 177.93 | 30.7 | -2,293.8 | 330.2 | 238.5 | 91.71 | 3.601 | |
| 9,349.8 | 8,896.0 | 9,384.3 | 8,896.0 | 46.4 | 46.2 | 177.93 | 30.7 | -2,293.8 | 330.2 | 238.4 | 91.77 | 3.598 | SF |
| 9,383.8 | 8,930.0 | 9,403.3 | 8,915.0 | 46.4 | 46.2 | 177.93 | 30.7 | -2,293.8 | 330.6 | 238.8 | 91.80 | 3.601 | |

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

**Offset Design** K28NW Pad - Benjamin Federal 28-12C2 - DD - Plan #2

**Offset Site Error:** 0.0 ft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 ft

| Reference Measured Depth (ft) | Reference Vertical Depth (ft) | Offset Measured Depth (ft) | Offset Vertical Depth (ft) | Semi Major Axis Reference (ft) | Semi Major Axis Offset (ft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (ft) | Offset Wellbore Centre +E/-W (ft) | Distance Between Centres (ft) | Distance Between Ellipses (ft) | Total Uncertainty Axis | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -68.60 | 42.3 | -107.8 | 115.8 | | | | |
| 100.0 | 100.0 | 100.0 | 100.0 | 0.1 | 0.1 | -68.60 | 42.3 | -107.8 | 115.8 | 115.5 | 0.27 | 425.265 | |
| 200.0 | 200.0 | 200.0 | 200.0 | 0.3 | 0.3 | -68.60 | 42.3 | -107.8 | 115.8 | 115.2 | 0.62 | 186.352 | |
| 300.0 | 300.0 | 295.0 | 295.0 | 0.5 | 0.5 | 12.20 | 41.9 | -110.1 | 115.4 | 114.4 | 0.96 | 119.781 | |
| 400.0 | 399.6 | 390.0 | 389.7 | 0.7 | 0.7 | 11.25 | 40.9 | -117.1 | 114.2 | 112.9 | 1.31 | 86.996 | |
| 500.0 | 498.8 | 484.9 | 483.9 | 1.0 | 1.0 | 9.62 | 39.2 | -128.8 | 112.4 | 110.7 | 1.67 | 67.179 | |
| 600.0 | 597.1 | 579.8 | 577.3 | 1.4 | 1.3 | 7.26 | 36.8 | -145.0 | 109.9 | 107.9 | 2.04 | 53.980 | |
| 700.0 | 694.3 | 674.6 | 669.7 | 1.8 | 1.7 | 4.10 | 33.7 | -165.8 | 107.1 | 104.7 | 2.39 | 44.788 | |
| 800.0 | 790.2 | 769.3 | 760.9 | 2.4 | 2.2 | 0.03 | 30.0 | -191.1 | 104.2 | 101.5 | 2.72 | 38.234 | |
| 900.0 | 884.4 | 863.8 | 850.5 | 3.0 | 2.8 | -5.01 | 25.6 | -220.8 | 101.5 | 98.4 | 3.04 | 33.328 | |
| 976.4 | 955.2 | 936.1 | 918.0 | 3.6 | 3.3 | -9.55 | 21.8 | -246.4 | 99.8 | 96.5 | 3.32 | 30.068 | |
| 1,000.0 | 976.9 | 959.6 | 939.8 | 3.8 | 3.4 | -11.12 | 20.5 | -255.1 | 99.4 | 96.0 | 3.43 | 28.975 | |
| 1,100.0 | 1,068.7 | 1,058.9 | 1,031.8 | 4.5 | 4.1 | -17.87 | 15.1 | -291.9 | 98.5 | 94.5 | 4.04 | 24.376 | |
| 1,115.1 | 1,082.6 | 1,073.9 | 1,045.8 | 4.6 | 4.2 | -18.90 | 14.2 | -297.5 | 98.5 | 94.3 | 4.16 | 23.689 | CC |
| 1,200.0 | 1,160.6 | 1,158.2 | 1,123.9 | 5.2 | 4.8 | -24.65 | 9.6 | -328.7 | 99.0 | 94.0 | 4.95 | 20.008 | ES |
| 1,300.0 | 1,252.4 | 1,257.5 | 1,216.0 | 6.0 | 5.5 | -31.27 | 4.2 | -365.5 | 100.9 | 94.7 | 6.18 | 16.327 | |
| 1,400.0 | 1,344.3 | 1,356.8 | 1,308.1 | 6.7 | 6.2 | -37.58 | -1.2 | -402.3 | 104.0 | 96.4 | 7.68 | 13.545 | |
| 1,500.0 | 1,436.1 | 1,456.1 | 1,400.1 | 7.5 | 6.9 | -43.44 | -6.7 | -439.1 | 108.4 | 99.0 | 9.37 | 11.565 | |
| 1,600.0 | 1,528.0 | 1,555.4 | 1,492.2 | 8.3 | 7.7 | -48.81 | -12.1 | -475.9 | 113.8 | 102.6 | 11.18 | 10.185 | |
| 1,700.0 | 1,619.8 | 1,654.7 | 1,584.3 | 9.0 | 8.4 | -53.66 | -17.5 | -512.7 | 120.2 | 107.1 | 13.03 | 9.222 | |
| 1,800.0 | 1,711.7 | 1,754.0 | 1,676.4 | 9.8 | 9.1 | -58.00 | -23.0 | -549.5 | 127.3 | 112.4 | 14.89 | 8.546 | |
| 1,900.0 | 1,803.5 | 1,853.3 | 1,768.4 | 10.5 | 9.8 | -61.86 | -28.4 | -586.3 | 135.0 | 118.3 | 16.74 | 8.065 | |
| 2,000.0 | 1,895.4 | 1,952.6 | 1,860.5 | 11.3 | 10.5 | -65.30 | -33.8 | -623.1 | 143.3 | 124.8 | 18.57 | 7.720 | |
| 2,100.0 | 1,987.2 | 2,051.9 | 1,952.6 | 12.0 | 11.2 | -68.35 | -39.3 | -659.9 | 152.1 | 131.7 | 20.36 | 7.471 | |
| 2,200.0 | 2,079.1 | 2,151.2 | 2,044.7 | 12.8 | 11.9 | -71.06 | -44.7 | -696.7 | 161.2 | 139.1 | 22.12 | 7.291 | |
| 2,300.0 | 2,170.9 | 2,250.5 | 2,136.7 | 13.6 | 12.6 | -73.48 | -50.1 | -733.5 | 170.7 | 146.9 | 23.84 | 7.160 | |
| 2,400.0 | 2,262.8 | 2,349.8 | 2,228.8 | 14.3 | 13.3 | -75.64 | -55.6 | -770.3 | 180.5 | 154.9 | 25.54 | 7.066 | |
| 2,500.0 | 2,354.6 | 2,449.1 | 2,320.9 | 15.1 | 14.0 | -77.58 | -61.0 | -807.1 | 190.4 | 163.2 | 27.21 | 7.000 | |
| 2,600.0 | 2,446.5 | 2,548.4 | 2,413.0 | 15.8 | 14.8 | -79.32 | -66.4 | -843.9 | 200.6 | 171.7 | 28.85 | 6.953 | |
| 2,700.0 | 2,538.3 | 2,647.7 | 2,505.0 | 16.6 | 15.5 | -80.90 | -71.9 | -880.7 | 210.9 | 180.4 | 30.47 | 6.922 | |
| 2,800.0 | 2,630.2 | 2,747.1 | 2,597.1 | 17.4 | 16.2 | -82.33 | -77.3 | -917.5 | 221.4 | 189.3 | 32.07 | 6.902 | |
| 2,900.0 | 2,722.0 | 2,846.4 | 2,689.2 | 18.1 | 16.9 | -83.62 | -82.7 | -954.3 | 232.0 | 198.3 | 33.66 | 6.892 | |
| 3,000.0 | 2,813.9 | 2,945.7 | 2,781.3 | 18.9 | 17.6 | -84.81 | -88.2 | -991.1 | 242.7 | 207.5 | 35.23 | 6.889 | SF |
| 3,100.0 | 2,905.7 | 3,045.0 | 2,873.3 | 19.6 | 18.3 | -85.89 | -93.6 | -1,027.9 | 253.5 | 216.7 | 36.79 | 6.890 | |
| 3,200.0 | 2,997.6 | 3,144.3 | 2,965.4 | 20.4 | 19.0 | -86.89 | -99.0 | -1,064.7 | 264.4 | 226.0 | 38.34 | 6.896 | |
| 3,300.0 | 3,089.4 | 3,243.6 | 3,057.5 | 21.2 | 19.8 | -87.81 | -104.5 | -1,101.5 | 275.3 | 235.5 | 39.87 | 6.905 | |
| 3,400.0 | 3,181.3 | 3,342.9 | 3,149.6 | 21.9 | 20.5 | -88.65 | -109.9 | -1,138.3 | 286.4 | 245.0 | 41.40 | 6.917 | |
| 3,500.0 | 3,273.1 | 3,442.2 | 3,241.6 | 22.7 | 21.2 | -89.44 | -115.3 | -1,175.1 | 297.4 | 254.5 | 42.92 | 6.930 | |
| 3,600.0 | 3,365.0 | 3,541.5 | 3,333.7 | 23.4 | 21.9 | -90.16 | -120.8 | -1,211.9 | 308.6 | 264.1 | 44.43 | 6.944 | |
| 3,700.0 | 3,456.8 | 3,640.8 | 3,425.8 | 24.2 | 22.6 | -90.84 | -126.2 | -1,248.7 | 319.7 | 273.8 | 45.94 | 6.960 | |
| 3,800.0 | 3,548.7 | 3,740.1 | 3,517.9 | 25.0 | 23.3 | -91.47 | -131.6 | -1,285.5 | 331.0 | 283.5 | 47.44 | 6.976 | |
| 3,900.0 | 3,640.5 | 3,839.4 | 3,609.9 | 25.7 | 24.0 | -92.06 | -137.1 | -1,322.3 | 342.2 | 293.3 | 48.94 | 6.993 | |
| 4,000.0 | 3,732.4 | 3,938.7 | 3,702.0 | 26.5 | 24.7 | -92.61 | -142.5 | -1,359.1 | 353.5 | 303.1 | 50.43 | 7.010 | |
| 4,100.0 | 3,824.2 | 4,038.0 | 3,794.1 | 27.2 | 25.5 | -93.13 | -147.9 | -1,395.9 | 364.8 | 312.9 | 51.91 | 7.027 | |
| 4,200.0 | 3,916.1 | 4,137.3 | 3,886.2 | 28.0 | 26.2 | -93.62 | -153.4 | -1,432.7 | 376.2 | 322.8 | 53.40 | 7.045 | |
| 4,300.0 | 4,007.9 | 4,236.6 | 3,978.2 | 28.8 | 26.9 | -94.08 | -158.8 | -1,469.5 | 387.5 | 332.7 | 54.88 | 7.062 | |
| 4,400.0 | 4,099.8 | 4,335.9 | 4,070.3 | 29.5 | 27.6 | -94.51 | -164.2 | -1,506.3 | 398.9 | 342.6 | 56.35 | 7.079 | |
| 4,500.0 | 4,191.6 | 4,435.2 | 4,162.4 | 30.3 | 28.3 | -94.92 | -169.7 | -1,543.1 | 410.3 | 352.5 | 57.83 | 7.096 | |
| 4,600.0 | 4,283.5 | 4,534.5 | 4,254.5 | 31.0 | 29.0 | -95.30 | -175.1 | -1,579.9 | 421.8 | 362.5 | 59.30 | 7.113 | |
| 4,700.0 | 4,375.3 | 4,633.9 | 4,346.5 | 31.8 | 29.7 | -95.67 | -180.5 | -1,616.7 | 433.2 | 372.5 | 60.76 | 7.130 | |
| 4,800.0 | 4,467.2 | 4,733.2 | 4,438.6 | 32.6 | 30.5 | -96.02 | -186.0 | -1,653.5 | 444.7 | 382.5 | 62.23 | 7.146 | |
| 4,900.0 | 4,559.0 | 4,832.5 | 4,530.7 | 33.3 | 31.2 | -96.35 | -191.4 | -1,690.3 | 456.2 | 392.5 | 63.69 | 7.162 | |

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

# Cathedral Energy Services

## Anticollision Report

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

**Offset Design** K28NW Pad - Benjamin Federal 28-12C2 - DD - Plan #2

**Offset Site Error:** 0.0 ft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 ft

| Reference Measured Depth (ft) | Reference Vertical Depth (ft) | Offset Measured Depth (ft) | Offset Vertical Depth (ft) | Semi Major Axis Reference (ft) | Semi Major Axis Offset (ft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (ft) | Offset Wellbore Centre +E/-W (ft) | Distance Between Centres (ft) | Distance Between Ellipses (ft) | Total Uncertainty Axis | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5,000.0 | 4,650.9 | 4,931.8 | 4,622.8 | 34.1 | 31.9 | -96.66 | -196.9 | -1,727.1 | 467.7 | 402.5 | 65.16 | 7.178 | |
| 5,100.0 | 4,742.7 | 5,031.1 | 4,714.8 | 34.9 | 32.6 | -96.96 | -202.3 | -1,763.9 | 479.2 | 412.6 | 66.62 | 7.193 | |
| 5,200.0 | 4,834.6 | 5,130.4 | 4,806.9 | 35.6 | 33.3 | -97.24 | -207.7 | -1,800.7 | 490.7 | 422.6 | 68.08 | 7.208 | |
| 5,300.0 | 4,926.4 | 5,229.7 | 4,899.0 | 36.4 | 34.0 | -97.51 | -213.2 | -1,837.5 | 502.2 | 432.7 | 69.53 | 7.223 | |
| 5,400.0 | 5,018.3 | 5,329.0 | 4,991.1 | 37.1 | 34.7 | -97.77 | -218.6 | -1,874.3 | 513.8 | 442.8 | 70.99 | 7.237 | |
| 5,500.0 | 5,110.1 | 5,428.3 | 5,083.1 | 37.9 | 35.4 | -98.02 | -224.0 | -1,911.1 | 525.3 | 452.9 | 72.45 | 7.252 | |
| 5,600.0 | 5,202.0 | 5,527.6 | 5,175.2 | 38.7 | 36.2 | -98.26 | -229.5 | -1,947.9 | 536.9 | 463.0 | 73.90 | 7.265 | |
| 5,700.0 | 5,293.8 | 5,626.9 | 5,267.3 | 39.4 | 36.9 | -98.48 | -234.9 | -1,984.7 | 548.5 | 473.1 | 75.35 | 7.279 | |
| 5,800.0 | 5,385.7 | 5,726.2 | 5,359.4 | 40.2 | 37.6 | -98.70 | -240.3 | -2,021.5 | 560.1 | 483.3 | 76.80 | 7.292 | |
| 5,894.2 | 5,472.2 | 5,819.8 | 5,446.1 | 40.9 | 38.3 | -98.90 | -245.4 | -2,056.2 | 571.0 | 492.8 | 78.17 | 7.304 | |
| 5,900.0 | 5,477.5 | 5,825.5 | 5,451.4 | 40.9 | 38.3 | -98.92 | -245.8 | -2,058.3 | 571.6 | 493.4 | 78.25 | 7.305 | |
| 6,000.0 | 5,570.1 | 5,926.1 | 5,544.9 | 41.6 | 39.0 | -99.20 | -251.2 | -2,095.2 | 582.9 | 503.2 | 79.64 | 7.319 | |
| 6,100.0 | 5,664.0 | 6,028.1 | 5,640.8 | 42.3 | 39.6 | -99.42 | -256.3 | -2,129.6 | 593.2 | 512.3 | 80.90 | 7.332 | |
| 6,200.0 | 5,759.0 | 6,130.3 | 5,737.9 | 42.8 | 40.2 | -99.63 | -260.9 | -2,160.6 | 602.5 | 520.5 | 82.03 | 7.345 | |
| 6,300.0 | 5,855.0 | 6,232.5 | 5,836.3 | 43.3 | 40.7 | -99.83 | -264.9 | -2,188.3 | 610.8 | 527.8 | 83.03 | 7.357 | |
| 6,400.0 | 5,952.0 | 6,334.9 | 5,935.7 | 43.8 | 41.1 | -100.02 | -268.5 | -2,212.5 | 618.1 | 534.2 | 83.90 | 7.367 | |
| 6,500.0 | 6,049.7 | 6,437.3 | 6,036.0 | 44.1 | 41.5 | -100.19 | -271.6 | -2,233.1 | 624.3 | 539.7 | 84.64 | 7.376 | |
| 6,600.0 | 6,148.1 | 6,539.8 | 6,137.0 | 44.4 | 41.8 | -100.35 | -274.1 | -2,250.2 | 629.5 | 544.3 | 85.26 | 7.384 | |
| 6,700.0 | 6,247.1 | 6,642.4 | 6,238.6 | 44.7 | 42.1 | -100.50 | -276.1 | -2,263.8 | 633.7 | 547.9 | 85.75 | 7.390 | |
| 6,800.0 | 6,346.5 | 6,744.9 | 6,340.7 | 44.9 | 42.2 | -100.64 | -277.6 | -2,273.7 | 636.8 | 550.7 | 86.13 | 7.394 | |
| 6,900.0 | 6,446.3 | 6,847.5 | 6,443.1 | 45.0 | 42.4 | -100.77 | -278.5 | -2,280.0 | 638.9 | 552.5 | 86.38 | 7.396 | |
| 7,000.0 | 6,546.2 | 6,950.1 | 6,545.6 | 45.1 | 42.4 | -100.89 | -278.9 | -2,282.7 | 639.9 | 553.4 | 86.53 | 7.395 | |
| 7,058.8 | 6,605.0 | 7,009.5 | 6,605.0 | 45.1 | 42.5 | 177.95 | -278.9 | -2,282.8 | 640.0 | 553.4 | 86.59 | 7.392 | |
| 7,100.0 | 6,646.2 | 7,050.7 | 6,646.2 | 45.1 | 42.5 | 177.95 | -278.9 | -2,282.8 | 640.0 | 553.4 | 86.63 | 7.388 | |
| 7,200.0 | 6,746.2 | 7,150.7 | 6,746.2 | 45.2 | 42.5 | 177.95 | -278.9 | -2,282.8 | 640.0 | 553.3 | 86.73 | 7.380 | |
| 7,300.0 | 6,846.2 | 7,250.7 | 6,846.2 | 45.2 | 42.6 | 177.95 | -278.9 | -2,282.8 | 640.0 | 553.2 | 86.83 | 7.371 | |
| 7,400.0 | 6,946.2 | 7,350.7 | 6,946.2 | 45.3 | 42.6 | 177.95 | -278.9 | -2,282.8 | 640.0 | 553.1 | 86.93 | 7.362 | |
| 7,500.0 | 7,046.2 | 7,450.7 | 7,046.2 | 45.3 | 42.7 | 177.95 | -278.9 | -2,282.8 | 640.0 | 553.0 | 87.04 | 7.354 | |
| 7,600.0 | 7,146.2 | 7,550.7 | 7,146.2 | 45.4 | 42.7 | 177.95 | -278.9 | -2,282.8 | 640.0 | 552.9 | 87.14 | 7.345 | |
| 7,700.0 | 7,246.2 | 7,650.7 | 7,246.2 | 45.4 | 42.8 | 177.95 | -278.9 | -2,282.8 | 640.0 | 552.8 | 87.25 | 7.336 | |
| 7,800.0 | 7,346.2 | 7,750.7 | 7,346.2 | 45.5 | 42.9 | 177.95 | -278.9 | -2,282.8 | 640.0 | 552.7 | 87.35 | 7.327 | |
| 7,900.0 | 7,446.2 | 7,850.7 | 7,446.2 | 45.5 | 42.9 | 177.95 | -278.9 | -2,282.8 | 640.0 | 552.6 | 87.46 | 7.318 | |
| 8,000.0 | 7,546.2 | 7,950.7 | 7,546.2 | 45.6 | 43.0 | 177.95 | -278.9 | -2,282.8 | 640.0 | 552.5 | 87.57 | 7.308 | |
| 8,100.0 | 7,646.2 | 8,050.7 | 7,646.2 | 45.7 | 43.0 | 177.95 | -278.9 | -2,282.8 | 640.0 | 552.3 | 87.68 | 7.299 | |
| 8,200.0 | 7,746.2 | 8,150.7 | 7,746.2 | 45.7 | 43.1 | 177.95 | -278.9 | -2,282.8 | 640.0 | 552.2 | 87.80 | 7.290 | |
| 8,300.0 | 7,846.2 | 8,250.7 | 7,846.2 | 45.8 | 43.1 | 177.95 | -278.9 | -2,282.8 | 640.0 | 552.1 | 87.91 | 7.280 | |
| 8,400.0 | 7,946.2 | 8,350.7 | 7,946.2 | 45.8 | 43.2 | 177.95 | -278.9 | -2,282.8 | 640.0 | 552.0 | 88.03 | 7.271 | |
| 8,500.0 | 8,046.2 | 8,450.7 | 8,046.2 | 45.9 | 43.3 | 177.95 | -278.9 | -2,282.8 | 640.0 | 551.9 | 88.14 | 7.261 | |
| 8,600.0 | 8,146.2 | 8,550.7 | 8,146.2 | 45.9 | 43.3 | 177.95 | -278.9 | -2,282.8 | 640.0 | 551.8 | 88.26 | 7.252 | |
| 8,700.0 | 8,246.2 | 8,650.7 | 8,246.2 | 46.0 | 43.4 | 177.95 | -278.9 | -2,282.8 | 640.0 | 551.6 | 88.38 | 7.242 | |
| 8,800.0 | 8,346.2 | 8,750.7 | 8,346.2 | 46.0 | 43.4 | 177.95 | -278.9 | -2,282.8 | 640.0 | 551.5 | 88.50 | 7.232 | |
| 8,900.0 | 8,446.2 | 8,850.7 | 8,446.2 | 46.1 | 43.5 | 177.95 | -278.9 | -2,282.8 | 640.0 | 551.4 | 88.62 | 7.222 | |
| 9,000.0 | 8,546.2 | 8,950.7 | 8,546.2 | 46.2 | 43.6 | 177.95 | -278.9 | -2,282.8 | 640.0 | 551.3 | 88.74 | 7.212 | |
| 9,083.8 | 8,630.0 | 9,034.5 | 8,630.0 | 46.2 | 43.6 | 177.95 | -278.9 | -2,282.8 | 640.0 | 551.2 | 88.85 | 7.204 | |
| 9,100.0 | 8,646.2 | 9,050.7 | 8,646.2 | 46.2 | 43.6 | 177.95 | -278.9 | -2,282.8 | 640.0 | 551.2 | 88.87 | 7.202 | |
| 9,200.0 | 8,746.2 | 9,150.7 | 8,746.2 | 46.3 | 43.7 | 177.95 | -278.9 | -2,282.8 | 640.0 | 551.0 | 88.99 | 7.192 | |
| 9,300.0 | 8,846.2 | 9,250.7 | 8,846.2 | 46.3 | 43.7 | 177.95 | -278.9 | -2,282.8 | 640.0 | 550.9 | 89.12 | 7.182 | |
| 9,335.8 | 8,882.0 | 9,286.5 | 8,882.0 | 46.4 | 43.8 | 177.95 | -278.9 | -2,282.8 | 640.0 | 550.9 | 89.16 | 7.178 | |
| 9,383.8 | 8,930.0 | 9,299.5 | 8,895.0 | 46.4 | 43.8 | 177.95 | -278.9 | -2,282.8 | 641.0 | 551.8 | 89.20 | 7.186 | |

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

**Offset Design** K28NW Pad - Benjamin Federal 28-13B1 - DD - Plan #2

**Offset Site Error:** 0.0 ft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 ft

| Reference Measured Depth (ft) | Reference Vertical Depth (ft) | Offset Measured Depth (ft) | Offset Vertical Depth (ft) | Semi Major Axis Reference (ft) | Semi Major Axis Offset (ft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (ft) | Offset Wellbore Centre +E/-W (ft) | Distance Between Centres (ft) | Distance Between Ellipses (ft) | Total Uncertainty Axis | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -71.27 | 33.9 | -99.9 | 105.5 | | | | |
| 100.0 | 100.0 | 100.0 | 100.0 | 0.1 | 0.1 | -71.27 | 33.9 | -99.9 | 105.5 | 105.2 | 0.27 | 387.438 | |
| 200.0 | 200.0 | 200.0 | 200.0 | 0.3 | 0.3 | -71.27 | 33.9 | -99.9 | 105.5 | 104.9 | 0.62 | 169.776 | |
| 300.0 | 300.0 | 295.7 | 295.6 | 0.5 | 0.5 | 9.32 | 33.2 | -102.2 | 105.0 | 104.0 | 0.97 | 108.752 | |
| 400.0 | 399.6 | 391.3 | 391.0 | 0.7 | 0.7 | 7.72 | 31.1 | -109.1 | 103.4 | 102.1 | 1.32 | 78.459 | |
| 500.0 | 498.8 | 486.8 | 485.7 | 1.0 | 1.0 | 4.96 | 27.7 | -120.5 | 101.0 | 99.3 | 1.68 | 60.116 | |
| 600.0 | 597.1 | 582.1 | 579.6 | 1.4 | 1.3 | 0.91 | 22.9 | -136.4 | 98.1 | 96.1 | 2.04 | 48.038 | |
| 700.0 | 694.3 | 677.2 | 672.2 | 1.8 | 1.7 | -4.59 | 16.8 | -156.7 | 95.2 | 92.8 | 2.39 | 39.786 | |
| 800.0 | 790.2 | 771.9 | 763.4 | 2.4 | 2.2 | -11.62 | 9.4 | -181.3 | 93.0 | 90.3 | 2.75 | 33.794 | |
| 880.5 | 866.2 | 847.9 | 835.6 | 2.9 | 2.7 | -18.34 | 2.5 | -204.2 | 92.3 | 89.2 | 3.12 | 29.634 | CC |
| 900.0 | 884.4 | 866.4 | 852.9 | 3.0 | 2.8 | -20.09 | 0.7 | -210.1 | 92.4 | 89.2 | 3.22 | 28.652 | ES |
| 976.4 | 955.2 | 938.2 | 920.0 | 3.6 | 3.3 | -27.31 | -6.7 | -234.8 | 93.6 | 89.8 | 3.79 | 24.716 | |
| 1,000.0 | 976.9 | 960.4 | 940.5 | 3.8 | 3.4 | -29.59 | -9.1 | -243.0 | 94.4 | 90.4 | 4.01 | 23.542 | |
| 1,100.0 | 1,068.7 | 1,058.9 | 1,031.3 | 4.5 | 4.2 | -39.06 | -20.1 | -279.5 | 100.4 | 95.2 | 5.23 | 19.192 | |
| 1,200.0 | 1,160.6 | 1,157.4 | 1,122.1 | 5.2 | 4.9 | -47.30 | -31.1 | -316.1 | 108.8 | 102.1 | 6.74 | 16.142 | |
| 1,300.0 | 1,252.4 | 1,255.9 | 1,212.9 | 6.0 | 5.6 | -54.26 | -42.1 | -352.6 | 119.1 | 110.7 | 8.40 | 14.186 | |
| 1,400.0 | 1,344.3 | 1,354.4 | 1,303.7 | 6.7 | 6.3 | -60.06 | -53.1 | -389.2 | 131.0 | 120.9 | 10.11 | 12.956 | |
| 1,500.0 | 1,436.1 | 1,452.9 | 1,394.4 | 7.5 | 7.0 | -64.87 | -64.1 | -425.7 | 143.9 | 132.1 | 11.82 | 12.175 | |
| 1,600.0 | 1,528.0 | 1,551.4 | 1,485.2 | 8.3 | 7.8 | -68.87 | -75.1 | -462.3 | 157.7 | 144.2 | 13.51 | 11.671 | |
| 1,700.0 | 1,619.8 | 1,649.8 | 1,576.0 | 9.0 | 8.5 | -72.22 | -86.1 | -498.8 | 172.1 | 156.9 | 15.18 | 11.341 | |
| 1,800.0 | 1,711.7 | 1,748.3 | 1,666.8 | 9.8 | 9.2 | -75.05 | -97.0 | -535.4 | 187.0 | 170.2 | 16.81 | 11.123 | |
| 1,900.0 | 1,803.5 | 1,846.8 | 1,757.6 | 10.5 | 9.9 | -77.46 | -108.0 | -571.9 | 202.3 | 183.9 | 18.43 | 10.979 | |
| 2,000.0 | 1,895.4 | 1,945.3 | 1,848.4 | 11.3 | 10.7 | -79.53 | -119.0 | -608.5 | 217.9 | 197.9 | 20.02 | 10.885 | |
| 2,100.0 | 1,987.2 | 2,043.8 | 1,939.2 | 12.0 | 11.4 | -81.32 | -130.0 | -645.0 | 233.8 | 212.2 | 21.60 | 10.825 | |
| 2,200.0 | 2,079.1 | 2,142.3 | 2,030.0 | 12.8 | 12.1 | -82.89 | -141.0 | -681.6 | 249.8 | 226.7 | 23.15 | 10.789 | |
| 2,300.0 | 2,170.9 | 2,240.8 | 2,120.8 | 13.6 | 12.9 | -84.26 | -152.0 | -718.1 | 266.0 | 241.3 | 24.70 | 10.770 | |
| 2,400.0 | 2,262.8 | 2,339.3 | 2,211.6 | 14.3 | 13.6 | -85.48 | -163.0 | -754.7 | 282.3 | 256.1 | 26.23 | 10.763 | SF |
| 2,500.0 | 2,354.6 | 2,437.8 | 2,302.4 | 15.1 | 14.3 | -86.57 | -174.0 | -791.2 | 298.8 | 271.0 | 27.76 | 10.764 | |
| 2,600.0 | 2,446.5 | 2,536.2 | 2,393.2 | 15.8 | 15.0 | -87.54 | -185.0 | -827.8 | 315.3 | 286.1 | 29.28 | 10.771 | |
| 2,700.0 | 2,538.3 | 2,634.7 | 2,484.0 | 16.6 | 15.8 | -88.41 | -195.9 | -864.3 | 331.9 | 301.2 | 30.79 | 10.782 | |
| 2,800.0 | 2,630.2 | 2,733.2 | 2,574.8 | 17.4 | 16.5 | -89.20 | -206.9 | -900.9 | 348.6 | 316.3 | 32.29 | 10.797 | |
| 2,900.0 | 2,722.0 | 2,831.7 | 2,665.6 | 18.1 | 17.2 | -89.92 | -217.9 | -937.4 | 365.4 | 331.6 | 33.79 | 10.813 | |
| 3,000.0 | 2,813.9 | 2,930.2 | 2,756.3 | 18.9 | 18.0 | -90.58 | -228.9 | -974.0 | 382.2 | 346.9 | 35.28 | 10.831 | |
| 3,100.0 | 2,905.7 | 3,028.7 | 2,847.1 | 19.6 | 18.7 | -91.18 | -239.9 | -1,010.5 | 399.0 | 362.2 | 36.77 | 10.850 | |
| 3,200.0 | 2,997.6 | 3,127.2 | 2,937.9 | 20.4 | 19.4 | -91.73 | -250.9 | -1,047.1 | 415.9 | 377.6 | 38.26 | 10.870 | |
| 3,300.0 | 3,089.4 | 3,225.7 | 3,028.7 | 21.2 | 20.2 | -92.24 | -261.9 | -1,083.6 | 432.8 | 393.0 | 39.74 | 10.889 | |
| 3,400.0 | 3,181.3 | 3,324.2 | 3,119.5 | 21.9 | 20.9 | -92.71 | -272.9 | -1,120.2 | 449.7 | 408.5 | 41.23 | 10.909 | |
| 3,500.0 | 3,273.1 | 3,422.6 | 3,210.3 | 22.7 | 21.6 | -93.15 | -283.9 | -1,156.8 | 466.7 | 424.0 | 42.71 | 10.929 | |
| 3,600.0 | 3,365.0 | 3,521.1 | 3,301.1 | 23.4 | 22.3 | -93.56 | -294.8 | -1,193.3 | 483.7 | 439.5 | 44.18 | 10.948 | |
| 3,700.0 | 3,456.8 | 3,619.6 | 3,391.9 | 24.2 | 23.1 | -93.94 | -305.8 | -1,229.9 | 500.7 | 455.1 | 45.66 | 10.967 | |
| 3,800.0 | 3,548.7 | 3,718.1 | 3,482.7 | 25.0 | 23.8 | -94.29 | -316.8 | -1,266.4 | 517.8 | 470.6 | 47.13 | 10.986 | |
| 3,900.0 | 3,640.5 | 3,816.6 | 3,573.5 | 25.7 | 24.5 | -94.62 | -327.8 | -1,303.0 | 534.8 | 486.2 | 48.60 | 11.004 | |
| 4,000.0 | 3,732.4 | 3,915.1 | 3,664.3 | 26.5 | 25.3 | -94.93 | -338.8 | -1,339.5 | 551.9 | 501.8 | 50.07 | 11.022 | |
| 4,100.0 | 3,824.2 | 4,013.6 | 3,755.1 | 27.2 | 26.0 | -95.22 | -349.8 | -1,376.1 | 569.0 | 517.4 | 51.54 | 11.039 | |
| 4,200.0 | 3,916.1 | 4,112.1 | 3,845.9 | 28.0 | 26.7 | -95.50 | -360.8 | -1,412.6 | 586.1 | 533.1 | 53.01 | 11.056 | |
| 4,300.0 | 4,007.9 | 4,210.6 | 3,936.7 | 28.8 | 27.5 | -95.76 | -371.8 | -1,449.2 | 603.2 | 548.7 | 54.47 | 11.073 | |
| 4,400.0 | 4,099.8 | 4,309.0 | 4,027.4 | 29.5 | 28.2 | -96.00 | -382.7 | -1,485.7 | 620.3 | 564.4 | 55.94 | 11.089 | |
| 4,500.0 | 4,191.6 | 4,407.5 | 4,118.2 | 30.3 | 28.9 | -96.23 | -393.7 | -1,522.3 | 637.4 | 580.0 | 57.40 | 11.104 | |
| 4,600.0 | 4,283.5 | 4,506.0 | 4,209.0 | 31.0 | 29.7 | -96.45 | -404.7 | -1,558.8 | 654.6 | 595.7 | 58.87 | 11.119 | |
| 4,700.0 | 4,375.3 | 4,604.5 | 4,299.8 | 31.8 | 30.4 | -96.66 | -415.7 | -1,595.4 | 671.7 | 611.4 | 60.33 | 11.134 | |
| 4,800.0 | 4,467.2 | 4,703.0 | 4,390.6 | 32.6 | 31.1 | -96.86 | -426.7 | -1,631.9 | 688.9 | 627.1 | 61.79 | 11.148 | |
| 4,900.0 | 4,559.0 | 4,801.5 | 4,481.4 | 33.3 | 31.8 | -97.05 | -437.7 | -1,668.5 | 706.1 | 642.8 | 63.26 | 11.162 | |

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

**Offset Design** K28NW Pad - Benjamin Federal 28-13B1 - DD - Plan #2

**Offset Site Error:** 0.0 ft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 ft

| Reference Measured Depth (ft) | Reference Vertical Depth (ft) | Offset Measured Depth (ft) | Offset Vertical Depth (ft) | Semi Major Axis Reference (ft) | Semi Major Axis Offset (ft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (ft) | Offset Wellbore Centre +E/-W (ft) | Distance Between Centres (ft) | Distance Between Ellipses (ft) | Total Uncertainty Axis | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5,000.0 | 4,650.9 | 4,900.0 | 4,572.2 | 34.1 | 32.6 | -97.23 | -448.7 | -1,705.0 | 723.2 | 658.5 | 64.72 | 11.175 | |
| 5,100.0 | 4,742.7 | 4,998.5 | 4,663.0 | 34.9 | 33.3 | -97.40 | -459.7 | -1,741.6 | 740.4 | 674.2 | 66.18 | 11.188 | |
| 5,200.0 | 4,834.6 | 5,097.0 | 4,753.8 | 35.6 | 34.0 | -97.56 | -470.7 | -1,778.1 | 757.6 | 690.0 | 67.64 | 11.201 | |
| 5,300.0 | 4,926.4 | 5,195.5 | 4,844.6 | 36.4 | 34.8 | -97.72 | -481.6 | -1,814.7 | 774.8 | 705.7 | 69.10 | 11.213 | |
| 5,400.0 | 5,018.3 | 5,293.9 | 4,935.4 | 37.1 | 35.5 | -97.87 | -492.6 | -1,851.2 | 792.0 | 721.4 | 70.56 | 11.225 | |
| 5,500.0 | 5,110.1 | 5,392.4 | 5,026.2 | 37.9 | 36.2 | -98.01 | -503.6 | -1,887.8 | 809.2 | 737.2 | 72.02 | 11.237 | |
| 5,600.0 | 5,202.0 | 5,490.9 | 5,117.0 | 38.7 | 37.0 | -98.15 | -514.6 | -1,924.3 | 826.4 | 752.9 | 73.47 | 11.248 | |

# Cathedral Energy Services

## Anticollision Report

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

**Offset Design** K28NW Pad - Benjamin Federal 28-13B2 - DD - Plan #2

**Offset Site Error:** 0.0 ft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 ft

| Reference Measured Depth (ft) | Reference Vertical Depth (ft) | Offset Measured Depth (ft) | Offset Vertical Depth (ft) | Semi Major Axis Reference (ft) | Semi Major Axis Offset (ft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (ft) | Offset Wellbore Centre +E/-W (ft) | Distance Between Centres (ft) | Distance Between Ellipses (ft) | Total Uncertainty Axis | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -76.69 | 25.5 | -107.8 | 110.8 | | | | |
| 100.0 | 100.0 | 100.0 | 100.0 | 0.1 | 0.1 | -76.69 | 25.5 | -107.8 | 110.8 | 110.5 | 0.27 | 406.864 | |
| 200.0 | 200.0 | 200.0 | 200.0 | 0.3 | 0.3 | -76.69 | 25.5 | -107.8 | 110.8 | 110.2 | 0.62 | 178.289 | |
| 300.0 | 300.0 | 295.6 | 295.5 | 0.5 | 0.5 | 3.77 | 24.5 | -110.0 | 110.2 | 109.2 | 0.96 | 114.184 | |
| 400.0 | 399.6 | 391.0 | 390.7 | 0.7 | 0.7 | 1.78 | 21.6 | -116.5 | 108.4 | 107.1 | 1.32 | 82.321 | |
| 500.0 | 498.8 | 486.3 | 485.2 | 1.0 | 1.0 | -1.64 | 16.9 | -127.4 | 105.9 | 104.2 | 1.68 | 63.056 | |
| 600.0 | 597.1 | 581.2 | 578.6 | 1.4 | 1.3 | -6.66 | 10.2 | -142.5 | 103.0 | 100.9 | 2.04 | 50.395 | |
| 700.0 | 694.3 | 675.7 | 670.8 | 1.8 | 1.7 | -13.39 | 1.7 | -161.7 | 100.6 | 98.2 | 2.42 | 41.632 | |
| 788.5 | 779.3 | 758.9 | 751.0 | 2.3 | 2.1 | -20.75 | -7.3 | -182.1 | 99.7 | 96.9 | 2.80 | 35.643 | CC |
| 800.0 | 790.2 | 769.7 | 761.3 | 2.4 | 2.2 | -21.79 | -8.5 | -185.0 | 99.7 | 96.9 | 2.85 | 34.951 | ES |
| 900.0 | 884.4 | 863.1 | 849.9 | 3.0 | 2.8 | -31.46 | -20.5 | -212.1 | 101.6 | 98.1 | 3.50 | 29.074 | |
| 976.4 | 955.2 | 934.0 | 916.1 | 3.6 | 3.3 | -39.25 | -30.7 | -235.3 | 105.7 | 101.5 | 4.24 | 24.952 | |
| 1,000.0 | 976.9 | 955.9 | 936.3 | 3.8 | 3.4 | -41.63 | -34.1 | -242.9 | 107.6 | 103.1 | 4.51 | 23.836 | |
| 1,100.0 | 1,068.7 | 1,051.3 | 1,023.7 | 4.5 | 4.1 | -50.74 | -49.4 | -277.8 | 119.7 | 113.8 | 5.87 | 20.391 | |
| 1,200.0 | 1,160.6 | 1,148.8 | 1,112.9 | 5.2 | 4.9 | -58.17 | -65.3 | -313.8 | 134.8 | 127.4 | 7.41 | 18.197 | |
| 1,300.0 | 1,252.4 | 1,246.2 | 1,202.1 | 6.0 | 5.6 | -64.07 | -81.2 | -349.8 | 151.7 | 142.7 | 9.00 | 16.846 | |
| 1,400.0 | 1,344.3 | 1,343.7 | 1,291.3 | 6.7 | 6.3 | -68.76 | -97.0 | -385.8 | 169.8 | 159.2 | 10.61 | 16.008 | |
| 1,500.0 | 1,436.1 | 1,441.2 | 1,380.5 | 7.5 | 7.1 | -72.55 | -112.9 | -421.8 | 188.9 | 176.6 | 12.20 | 15.477 | |
| 1,600.0 | 1,528.0 | 1,538.6 | 1,469.7 | 8.3 | 7.8 | -75.64 | -128.8 | -457.7 | 208.6 | 194.8 | 13.78 | 15.136 | |
| 1,700.0 | 1,619.8 | 1,636.1 | 1,558.8 | 9.0 | 8.6 | -78.19 | -144.6 | -493.7 | 228.7 | 213.4 | 15.34 | 14.912 | |
| 1,800.0 | 1,711.7 | 1,733.6 | 1,648.0 | 9.8 | 9.3 | -80.33 | -160.5 | -529.7 | 249.3 | 232.4 | 16.88 | 14.766 | |
| 1,900.0 | 1,803.5 | 1,831.0 | 1,737.2 | 10.5 | 10.1 | -82.14 | -176.4 | -565.7 | 270.2 | 251.7 | 18.42 | 14.670 | |
| 2,000.0 | 1,895.4 | 1,928.5 | 1,826.4 | 11.3 | 10.8 | -83.70 | -192.2 | -601.7 | 291.2 | 271.3 | 19.94 | 14.608 | |
| 2,100.0 | 1,987.2 | 2,026.0 | 1,915.6 | 12.0 | 11.6 | -85.04 | -208.1 | -637.7 | 312.5 | 291.0 | 21.45 | 14.570 | |
| 2,200.0 | 2,079.1 | 2,123.5 | 2,004.8 | 12.8 | 12.3 | -86.22 | -223.9 | -673.6 | 333.9 | 310.9 | 22.95 | 14.548 | |
| 2,300.0 | 2,170.9 | 2,220.9 | 2,094.0 | 13.6 | 13.1 | -87.25 | -239.8 | -709.6 | 355.4 | 330.9 | 24.44 | 14.537 | |
| 2,400.0 | 2,262.8 | 2,318.4 | 2,183.1 | 14.3 | 13.8 | -88.16 | -255.7 | -745.6 | 377.0 | 351.0 | 25.93 | 14.535 | SF |
| 2,500.0 | 2,354.6 | 2,415.9 | 2,272.3 | 15.1 | 14.6 | -88.98 | -271.5 | -781.6 | 398.7 | 371.2 | 27.42 | 14.539 | |
| 2,600.0 | 2,446.5 | 2,513.3 | 2,361.5 | 15.8 | 15.3 | -89.71 | -287.4 | -817.6 | 420.4 | 391.5 | 28.90 | 14.547 | |
| 2,700.0 | 2,538.3 | 2,610.8 | 2,450.7 | 16.6 | 16.1 | -90.37 | -303.3 | -853.6 | 442.2 | 411.9 | 30.38 | 14.557 | |
| 2,800.0 | 2,630.2 | 2,708.3 | 2,539.9 | 17.4 | 16.8 | -90.97 | -319.1 | -889.6 | 464.1 | 432.2 | 31.85 | 14.570 | |
| 2,900.0 | 2,722.0 | 2,805.8 | 2,629.1 | 18.1 | 17.6 | -91.51 | -335.0 | -925.5 | 486.0 | 452.7 | 33.32 | 14.584 | |
| 3,000.0 | 2,813.9 | 2,903.2 | 2,718.3 | 18.9 | 18.3 | -92.01 | -350.8 | -961.5 | 508.0 | 473.2 | 34.79 | 14.599 | |
| 3,100.0 | 2,905.7 | 3,000.7 | 2,807.4 | 19.6 | 19.1 | -92.47 | -366.7 | -997.5 | 529.9 | 493.7 | 36.26 | 14.614 | |
| 3,200.0 | 2,997.6 | 3,098.2 | 2,896.6 | 20.4 | 19.8 | -92.89 | -382.6 | -1,033.5 | 552.0 | 514.2 | 37.73 | 14.630 | |
| 3,300.0 | 3,089.4 | 3,195.6 | 2,985.8 | 21.2 | 20.6 | -93.27 | -398.4 | -1,069.5 | 574.0 | 534.8 | 39.19 | 14.646 | |
| 3,400.0 | 3,181.3 | 3,293.1 | 3,075.0 | 21.9 | 21.3 | -93.63 | -414.3 | -1,105.5 | 596.1 | 555.4 | 40.65 | 14.662 | |
| 3,500.0 | 3,273.1 | 3,390.6 | 3,164.2 | 22.7 | 22.1 | -93.97 | -430.2 | -1,141.4 | 618.1 | 576.0 | 42.11 | 14.677 | |
| 3,600.0 | 3,365.0 | 3,488.0 | 3,253.4 | 23.4 | 22.8 | -94.28 | -446.0 | -1,177.4 | 640.2 | 596.7 | 43.57 | 14.693 | |
| 3,700.0 | 3,456.8 | 3,585.5 | 3,342.5 | 24.2 | 23.6 | -94.57 | -461.9 | -1,213.4 | 662.3 | 617.3 | 45.03 | 14.708 | |
| 3,800.0 | 3,548.7 | 3,683.0 | 3,431.7 | 25.0 | 24.3 | -94.84 | -477.7 | -1,249.4 | 684.5 | 638.0 | 46.49 | 14.723 | |
| 3,900.0 | 3,640.5 | 3,780.5 | 3,520.9 | 25.7 | 25.1 | -95.09 | -493.6 | -1,285.4 | 706.6 | 658.7 | 47.95 | 14.737 | |
| 4,000.0 | 3,732.4 | 3,877.9 | 3,610.1 | 26.5 | 25.8 | -95.33 | -509.5 | -1,321.4 | 728.8 | 679.4 | 49.40 | 14.751 | |
| 4,100.0 | 3,824.2 | 3,975.4 | 3,699.3 | 27.2 | 26.6 | -95.55 | -525.3 | -1,357.4 | 751.0 | 700.1 | 50.86 | 14.765 | |
| 4,200.0 | 3,916.1 | 4,072.9 | 3,788.5 | 28.0 | 27.3 | -95.77 | -541.2 | -1,393.3 | 773.1 | 720.8 | 52.32 | 14.778 | |
| 4,300.0 | 4,007.9 | 4,170.3 | 3,877.7 | 28.8 | 28.1 | -95.97 | -557.1 | -1,429.3 | 795.3 | 741.6 | 53.77 | 14.791 | |
| 4,400.0 | 4,099.8 | 4,267.8 | 3,966.8 | 29.5 | 28.8 | -96.16 | -572.9 | -1,465.3 | 817.5 | 762.3 | 55.22 | 14.804 | |

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

# Cathedral Energy Services

## Anticollision Report

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

**Offset Design** K28NW Pad - Benjamin Federal 28-13C1 - DD - Plan #2

**Offset Site Error:** 0.0 ft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 ft

| Reference Measured Depth (ft) | Reference Vertical Depth (ft) | Offset Measured Depth (ft) | Offset Vertical Depth (ft) | Semi Major Axis Reference (ft) | Semi Major Axis Offset (ft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (ft) | Offset Wellbore Centre +E/-W (ft) | Distance Between Centres (ft) | Distance Between Ellipses (ft) | Total Uncertainty Axis | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -80.47 | 16.8 | -99.8 | 101.2 | | | | |
| 100.0 | 100.0 | 100.0 | 100.0 | 0.1 | 0.1 | -80.47 | 16.8 | -99.8 | 101.2 | 100.9 | 0.27 | 371.702 | |
| 200.0 | 200.0 | 200.0 | 200.0 | 0.3 | 0.3 | -80.47 | 16.8 | -99.8 | 101.2 | 100.6 | 0.62 | 162.881 | |
| 300.0 | 300.0 | 296.1 | 296.1 | 0.5 | 0.5 | -0.25 | 15.5 | -101.9 | 100.5 | 99.5 | 0.97 | 104.010 | |
| 400.0 | 399.6 | 392.1 | 391.7 | 0.7 | 0.7 | -2.97 | 11.7 | -108.1 | 98.6 | 97.2 | 1.32 | 74.567 | |
| 500.0 | 498.8 | 487.7 | 486.6 | 1.0 | 1.0 | -7.69 | 5.5 | -118.3 | 95.9 | 94.2 | 1.69 | 56.762 | |
| 600.0 | 597.1 | 582.8 | 580.2 | 1.4 | 1.3 | -14.62 | -3.1 | -132.5 | 93.3 | 91.2 | 2.07 | 45.142 | |
| 694.1 | 688.6 | 671.7 | 666.9 | 1.8 | 1.7 | -23.17 | -13.3 | -149.3 | 92.2 | 89.7 | 2.46 | 37.480 | CC |
| 700.0 | 694.3 | 677.3 | 672.3 | 1.8 | 1.7 | -23.77 | -14.1 | -150.5 | 92.2 | 89.7 | 2.49 | 37.080 | ES |
| 800.0 | 790.2 | 770.9 | 762.5 | 2.4 | 2.2 | -34.65 | -27.2 | -172.2 | 94.2 | 91.2 | 3.05 | 30.879 | |
| 900.0 | 884.4 | 863.7 | 850.4 | 3.0 | 2.8 | -46.16 | -42.5 | -197.4 | 101.0 | 97.1 | 3.92 | 25.773 | |
| 976.4 | 955.2 | 933.9 | 916.0 | 3.6 | 3.3 | -54.53 | -55.6 | -218.8 | 110.1 | 105.2 | 4.85 | 22.706 | |
| 1,000.0 | 976.9 | 955.5 | 935.9 | 3.8 | 3.4 | -56.99 | -59.8 | -225.8 | 113.6 | 108.4 | 5.17 | 21.973 | |
| 1,100.0 | 1,068.7 | 1,046.4 | 1,019.0 | 4.5 | 4.1 | -65.30 | -79.1 | -257.5 | 133.4 | 126.8 | 6.60 | 20.220 | |
| 1,200.0 | 1,160.6 | 1,141.8 | 1,104.9 | 5.2 | 4.9 | -71.20 | -100.5 | -292.7 | 157.7 | 149.6 | 8.09 | 19.492 | |
| 1,300.0 | 1,252.4 | 1,237.6 | 1,191.4 | 6.0 | 5.7 | -75.55 | -122.0 | -328.2 | 183.2 | 173.6 | 9.59 | 19.101 | |
| 1,400.0 | 1,344.3 | 1,333.5 | 1,277.8 | 6.7 | 6.4 | -78.84 | -143.6 | -363.7 | 209.4 | 198.3 | 11.08 | 18.894 | |
| 1,500.0 | 1,436.1 | 1,429.4 | 1,364.2 | 7.5 | 7.2 | -81.39 | -165.2 | -399.1 | 236.1 | 223.6 | 12.57 | 18.789 | |
| 1,600.0 | 1,528.0 | 1,525.3 | 1,450.6 | 8.3 | 8.0 | -83.43 | -186.7 | -434.6 | 263.2 | 249.2 | 14.05 | 18.743 | |
| 1,700.0 | 1,619.8 | 1,621.1 | 1,537.1 | 9.0 | 8.8 | -85.09 | -208.3 | -470.0 | 290.6 | 275.1 | 15.52 | 18.729 | SF |
| 1,800.0 | 1,711.7 | 1,717.0 | 1,623.5 | 9.8 | 9.6 | -86.46 | -229.8 | -505.5 | 318.1 | 301.2 | 16.98 | 18.736 | |
| 1,900.0 | 1,803.5 | 1,812.9 | 1,709.9 | 10.5 | 10.4 | -87.62 | -251.4 | -541.0 | 345.8 | 327.4 | 18.44 | 18.753 | |
| 2,000.0 | 1,895.4 | 1,908.8 | 1,796.4 | 11.3 | 11.1 | -88.60 | -272.9 | -576.4 | 373.6 | 353.7 | 19.90 | 18.777 | |
| 2,100.0 | 1,987.2 | 2,004.6 | 1,882.8 | 12.0 | 11.9 | -89.45 | -294.5 | -611.9 | 401.5 | 380.1 | 21.35 | 18.805 | |
| 2,200.0 | 2,079.1 | 2,100.5 | 1,969.2 | 12.8 | 12.7 | -90.19 | -316.0 | -647.4 | 429.4 | 406.6 | 22.80 | 18.834 | |
| 2,300.0 | 2,170.9 | 2,196.4 | 2,055.7 | 13.6 | 13.5 | -90.83 | -337.6 | -682.8 | 457.4 | 433.2 | 24.25 | 18.864 | |
| 2,400.0 | 2,262.8 | 2,292.3 | 2,142.1 | 14.3 | 14.3 | -91.41 | -359.1 | -718.3 | 485.5 | 459.8 | 25.70 | 18.893 | |
| 2,500.0 | 2,354.6 | 2,388.1 | 2,228.5 | 15.1 | 15.1 | -91.92 | -380.7 | -753.8 | 513.6 | 486.5 | 27.14 | 18.922 | |
| 2,600.0 | 2,446.5 | 2,484.0 | 2,314.9 | 15.8 | 15.9 | -92.38 | -402.2 | -789.2 | 541.7 | 513.1 | 28.59 | 18.950 | |
| 2,700.0 | 2,538.3 | 2,579.9 | 2,401.4 | 16.6 | 16.7 | -92.79 | -423.8 | -824.7 | 569.9 | 539.9 | 30.03 | 18.977 | |
| 2,800.0 | 2,630.2 | 2,675.8 | 2,487.8 | 17.4 | 17.4 | -93.16 | -445.3 | -860.1 | 598.1 | 566.6 | 31.47 | 19.003 | |
| 2,900.0 | 2,722.0 | 2,771.7 | 2,574.2 | 18.1 | 18.2 | -93.50 | -466.9 | -895.6 | 626.3 | 593.4 | 32.91 | 19.028 | |
| 3,000.0 | 2,813.9 | 2,867.5 | 2,660.7 | 18.9 | 19.0 | -93.81 | -488.4 | -931.1 | 654.5 | 620.1 | 34.35 | 19.051 | |
| 3,100.0 | 2,905.7 | 2,963.4 | 2,747.1 | 19.6 | 19.8 | -94.10 | -510.0 | -966.5 | 682.7 | 646.9 | 35.79 | 19.074 | |
| 3,200.0 | 2,997.6 | 3,059.3 | 2,833.5 | 20.4 | 20.6 | -94.36 | -531.5 | -1,002.0 | 711.0 | 673.8 | 37.23 | 19.095 | |
| 3,300.0 | 3,089.4 | 3,155.2 | 2,920.0 | 21.2 | 21.4 | -94.61 | -553.1 | -1,037.5 | 739.3 | 700.6 | 38.67 | 19.115 | |
| 3,400.0 | 3,181.3 | 3,251.0 | 3,006.4 | 21.9 | 22.2 | -94.83 | -574.7 | -1,072.9 | 767.5 | 727.4 | 40.11 | 19.135 | |
| 3,500.0 | 3,273.1 | 3,346.9 | 3,092.8 | 22.7 | 23.0 | -95.04 | -596.2 | -1,108.4 | 795.8 | 754.3 | 41.55 | 19.153 | |
| 3,600.0 | 3,365.0 | 3,442.8 | 3,179.2 | 23.4 | 23.8 | -95.23 | -617.8 | -1,143.9 | 824.1 | 781.1 | 42.99 | 19.171 | |

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

**Offset Design** K28NW Pad - Benjamin Federal 28-13C2 - DD - Plan #2

**Offset Site Error:** 0.0 ft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 ft

| Reference Measured Depth (ft) | Reference Vertical Depth (ft) | Offset Measured Depth (ft) | Offset Vertical Depth (ft) | Semi Major Axis Reference (ft) | Semi Major Axis Offset (ft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (ft) | Offset Wellbore Centre +E/-W (ft) | Distance Between Centres (ft) | Distance Between Ellipses (ft) | Total Uncertainty Axis | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -85.56 | 8.4 | -107.8 | 108.1 | | | | |
| 100.0 | 100.0 | 100.0 | 100.0 | 0.1 | 0.1 | -85.56 | 8.4 | -107.8 | 108.1 | 107.9 | 0.27 | 397.134 | |
| 200.0 | 200.0 | 200.0 | 200.0 | 0.3 | 0.3 | -85.56 | 8.4 | -107.8 | 108.1 | 107.5 | 0.62 | 174.025 | |
| 300.0 | 300.0 | 295.9 | 295.9 | 0.5 | 0.5 | -5.41 | 6.9 | -109.7 | 107.4 | 106.4 | 0.97 | 111.173 | |
| 400.0 | 399.6 | 391.6 | 391.3 | 0.7 | 0.7 | -8.35 | 2.6 | -115.4 | 105.4 | 104.1 | 1.32 | 79.728 | |
| 500.0 | 498.8 | 486.8 | 485.8 | 1.0 | 1.0 | -13.44 | -4.7 | -124.9 | 102.8 | 101.1 | 1.69 | 60.693 | |
| 600.0 | 597.1 | 581.4 | 578.9 | 1.4 | 1.3 | -20.82 | -14.6 | -138.0 | 100.7 | 98.6 | 2.09 | 48.203 | |
| 655.5 | 651.2 | 633.6 | 629.9 | 1.6 | 1.5 | -25.87 | -21.3 | -146.8 | 100.3 | 97.9 | 2.33 | 42.958 | CC, ES |
| 700.0 | 694.3 | 675.2 | 670.3 | 1.8 | 1.7 | -30.35 | -27.3 | -154.6 | 100.6 | 98.1 | 2.55 | 39.492 | |
| 800.0 | 790.2 | 767.9 | 759.6 | 2.4 | 2.2 | -41.35 | -42.4 | -174.5 | 104.5 | 101.3 | 3.17 | 32.979 | |
| 900.0 | 884.4 | 859.5 | 846.4 | 3.0 | 2.7 | -52.57 | -59.9 | -197.5 | 113.9 | 109.8 | 4.07 | 27.984 | |
| 976.4 | 955.2 | 928.5 | 911.0 | 3.6 | 3.2 | -60.50 | -74.8 | -217.0 | 125.4 | 120.4 | 4.98 | 25.163 | |
| 1,000.0 | 976.9 | 949.7 | 930.6 | 3.8 | 3.4 | -62.82 | -79.7 | -223.4 | 129.8 | 124.5 | 5.30 | 24.503 | |
| 1,100.0 | 1,068.7 | 1,038.9 | 1,012.2 | 4.5 | 4.1 | -70.69 | -101.5 | -252.0 | 153.0 | 146.3 | 6.67 | 22.937 | |
| 1,200.0 | 1,160.6 | 1,127.6 | 1,091.5 | 5.2 | 4.8 | -75.77 | -125.4 | -283.5 | 182.2 | 174.1 | 8.06 | 22.603 | |
| 1,300.0 | 1,252.4 | 1,221.7 | 1,175.0 | 6.0 | 5.6 | -79.43 | -151.8 | -318.0 | 213.8 | 204.3 | 9.49 | 22.535 | SF |
| 1,400.0 | 1,344.3 | 1,315.8 | 1,258.5 | 6.7 | 6.4 | -82.14 | -178.1 | -352.6 | 246.0 | 235.0 | 10.91 | 22.536 | |
| 1,500.0 | 1,436.1 | 1,409.9 | 1,341.9 | 7.5 | 7.2 | -84.24 | -204.5 | -387.2 | 278.5 | 266.2 | 12.34 | 22.569 | |
| 1,600.0 | 1,528.0 | 1,504.0 | 1,425.4 | 8.3 | 8.0 | -85.89 | -230.8 | -421.8 | 311.4 | 297.6 | 13.77 | 22.617 | |
| 1,700.0 | 1,619.8 | 1,598.1 | 1,508.9 | 9.0 | 8.9 | -87.23 | -257.2 | -456.3 | 344.4 | 329.2 | 15.19 | 22.671 | |
| 1,800.0 | 1,711.7 | 1,692.2 | 1,592.3 | 9.8 | 9.7 | -88.34 | -283.5 | -490.9 | 377.6 | 361.0 | 16.61 | 22.726 | |
| 1,900.0 | 1,803.5 | 1,786.3 | 1,675.8 | 10.5 | 10.5 | -89.27 | -309.9 | -525.5 | 410.9 | 392.8 | 18.04 | 22.780 | |
| 2,000.0 | 1,895.4 | 1,880.4 | 1,759.3 | 11.3 | 11.3 | -90.06 | -336.2 | -560.1 | 444.2 | 424.8 | 19.46 | 22.832 | |
| 2,100.0 | 1,987.2 | 1,974.5 | 1,842.7 | 12.0 | 12.1 | -90.73 | -362.5 | -594.6 | 477.6 | 456.8 | 20.88 | 22.881 | |
| 2,200.0 | 2,079.1 | 2,068.6 | 1,926.2 | 12.8 | 13.0 | -91.33 | -388.9 | -629.2 | 511.1 | 488.8 | 22.29 | 22.927 | |
| 2,300.0 | 2,170.9 | 2,162.7 | 2,009.7 | 13.6 | 13.8 | -91.84 | -415.2 | -663.8 | 544.6 | 520.9 | 23.71 | 22.970 | |
| 2,400.0 | 2,262.8 | 2,256.8 | 2,093.1 | 14.3 | 14.6 | -92.30 | -441.6 | -698.4 | 578.2 | 553.1 | 25.13 | 23.010 | |
| 2,500.0 | 2,354.6 | 2,351.0 | 2,176.6 | 15.1 | 15.4 | -92.71 | -467.9 | -733.0 | 611.8 | 585.2 | 26.54 | 23.047 | |
| 2,600.0 | 2,446.5 | 2,445.1 | 2,260.1 | 15.8 | 16.3 | -93.08 | -494.3 | -767.5 | 645.4 | 617.4 | 27.96 | 23.082 | |
| 2,700.0 | 2,538.3 | 2,539.2 | 2,343.5 | 16.6 | 17.1 | -93.40 | -520.6 | -802.1 | 679.0 | 649.6 | 29.38 | 23.114 | |
| 2,800.0 | 2,630.2 | 2,633.3 | 2,427.0 | 17.4 | 17.9 | -93.70 | -546.9 | -836.7 | 712.7 | 681.9 | 30.79 | 23.145 | |
| 2,900.0 | 2,722.0 | 2,727.4 | 2,510.5 | 18.1 | 18.7 | -93.97 | -573.3 | -871.3 | 746.3 | 714.1 | 32.21 | 23.173 | |
| 3,000.0 | 2,813.9 | 2,821.5 | 2,593.9 | 18.9 | 19.5 | -94.22 | -599.6 | -905.8 | 780.0 | 746.4 | 33.62 | 23.199 | |
| 3,100.0 | 2,905.7 | 2,915.6 | 2,677.4 | 19.6 | 20.4 | -94.45 | -626.0 | -940.4 | 813.7 | 778.7 | 35.04 | 23.224 | |

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

**Offset Design** K28NW Pad - Benjamin Federal 28-14B1 - DD - Plan #2

**Offset Site Error:** 0.0 ft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 ft

| Reference Measured Depth (ft) | Reference Vertical Depth (ft) | Offset Measured Depth (ft) | Offset Vertical Depth (ft) | Semi Major Axis Reference (ft) | Semi Major Axis Offset (ft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (ft) | Offset Wellbore Centre +E/-W (ft) | Distance Between Centres (ft) | Distance Between Ellipses (ft) | Total Uncertainty Axis | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 180.00 | -34.2 | 0.0 | 34.2 | | | | |
| 100.0 | 100.0 | 100.0 | 100.0 | 0.1 | 0.1 | 180.00 | -34.2 | 0.0 | 34.2 | 34.0 | 0.27 | 125.752 | |
| 200.0 | 200.0 | 200.0 | 200.0 | 0.3 | 0.3 | 180.00 | -34.2 | 0.0 | 34.2 | 33.6 | 0.62 | 55.105 | CC, ES |
| 300.0 | 300.0 | 297.8 | 297.7 | 0.5 | 0.5 | -102.04 | -37.9 | -0.4 | 38.4 | 37.5 | 0.98 | 39.425 | |
| 400.0 | 399.6 | 396.9 | 396.5 | 0.7 | 0.7 | -105.45 | -44.5 | -4.6 | 46.6 | 45.2 | 1.38 | 33.700 | |
| 500.0 | 498.8 | 496.1 | 495.0 | 1.0 | 1.0 | -108.25 | -52.6 | -13.2 | 57.3 | 55.4 | 1.88 | 30.469 | |
| 600.0 | 597.1 | 595.1 | 593.2 | 1.4 | 1.2 | -113.54 | -60.8 | -22.3 | 70.0 | 67.6 | 2.46 | 28.503 | |
| 700.0 | 694.3 | 693.4 | 690.7 | 1.8 | 1.5 | -120.11 | -69.0 | -31.3 | 85.8 | 82.7 | 3.09 | 27.773 | SF |
| 800.0 | 790.2 | 790.7 | 787.3 | 2.4 | 1.7 | -126.73 | -77.1 | -40.3 | 105.4 | 101.7 | 3.74 | 28.213 | |
| 900.0 | 884.4 | 886.8 | 882.7 | 3.0 | 2.0 | -132.76 | -85.1 | -49.1 | 129.6 | 125.2 | 4.37 | 29.641 | |
| 976.4 | 955.2 | 959.3 | 954.6 | 3.6 | 2.2 | -136.79 | -91.2 | -55.8 | 151.3 | 146.5 | 4.83 | 31.295 | |
| 1,000.0 | 976.9 | 981.5 | 976.7 | 3.8 | 2.3 | -138.05 | -93.0 | -57.8 | 158.5 | 153.5 | 4.97 | 31.887 | |
| 1,100.0 | 1,068.7 | 1,075.8 | 1,070.2 | 4.5 | 2.5 | -142.34 | -100.9 | -66.5 | 189.6 | 184.1 | 5.53 | 34.285 | |
| 1,200.0 | 1,160.6 | 1,170.0 | 1,163.7 | 5.2 | 2.8 | -145.42 | -108.7 | -75.1 | 221.4 | 215.3 | 6.07 | 36.456 | |
| 1,300.0 | 1,252.4 | 1,264.2 | 1,257.2 | 6.0 | 3.0 | -147.73 | -116.6 | -83.8 | 253.6 | 247.0 | 6.61 | 38.391 | |
| 1,400.0 | 1,344.3 | 1,358.4 | 1,350.6 | 6.7 | 3.3 | -149.52 | -124.4 | -92.5 | 286.2 | 279.0 | 7.13 | 40.109 | |
| 1,500.0 | 1,436.1 | 1,452.6 | 1,444.1 | 7.5 | 3.6 | -150.94 | -132.3 | -101.1 | 318.9 | 311.2 | 7.66 | 41.635 | |
| 1,600.0 | 1,528.0 | 1,546.9 | 1,537.6 | 8.3 | 3.8 | -152.10 | -140.1 | -109.8 | 351.8 | 343.6 | 8.18 | 42.996 | |
| 1,700.0 | 1,619.8 | 1,641.1 | 1,631.1 | 9.0 | 4.1 | -153.07 | -148.0 | -118.4 | 384.7 | 376.0 | 8.70 | 44.215 | |
| 1,800.0 | 1,711.7 | 1,735.3 | 1,724.6 | 9.8 | 4.3 | -153.88 | -155.8 | -127.1 | 417.8 | 408.6 | 9.22 | 45.310 | |
| 1,900.0 | 1,803.5 | 1,829.5 | 1,818.1 | 10.5 | 4.6 | -154.57 | -163.7 | -135.8 | 450.9 | 441.2 | 9.74 | 46.299 | |
| 2,000.0 | 1,895.4 | 1,923.8 | 1,911.6 | 11.3 | 4.9 | -155.17 | -171.5 | -144.4 | 484.1 | 473.9 | 10.26 | 47.195 | |
| 2,100.0 | 1,987.2 | 2,018.0 | 2,005.1 | 12.0 | 5.1 | -155.69 | -179.4 | -153.1 | 517.3 | 506.6 | 10.78 | 48.012 | |
| 2,200.0 | 2,079.1 | 2,112.2 | 2,098.6 | 12.8 | 5.4 | -156.15 | -187.2 | -161.8 | 550.6 | 539.3 | 11.29 | 48.758 | |
| 2,300.0 | 2,170.9 | 2,206.4 | 2,192.1 | 13.6 | 5.7 | -156.56 | -195.0 | -170.4 | 583.9 | 572.1 | 11.81 | 49.442 | |
| 2,400.0 | 2,262.8 | 2,300.7 | 2,285.6 | 14.3 | 5.9 | -156.92 | -202.9 | -179.1 | 617.2 | 604.8 | 12.33 | 50.072 | |
| 2,500.0 | 2,354.6 | 2,394.9 | 2,379.1 | 15.1 | 6.2 | -157.24 | -210.7 | -187.8 | 650.5 | 637.6 | 12.84 | 50.654 | |
| 2,600.0 | 2,446.5 | 2,489.1 | 2,472.6 | 15.8 | 6.4 | -157.54 | -218.6 | -196.4 | 683.8 | 670.5 | 13.36 | 51.192 | |
| 2,700.0 | 2,538.3 | 2,583.3 | 2,566.1 | 16.6 | 6.7 | -157.80 | -226.4 | -205.1 | 717.2 | 703.3 | 13.87 | 51.692 | |
| 2,800.0 | 2,630.2 | 2,677.6 | 2,659.6 | 17.4 | 7.0 | -158.05 | -234.3 | -213.7 | 750.5 | 736.2 | 14.39 | 52.157 | |
| 2,900.0 | 2,722.0 | 2,771.8 | 2,753.1 | 18.1 | 7.2 | -158.27 | -242.1 | -222.4 | 783.9 | 769.0 | 14.91 | 52.591 | |
| 3,000.0 | 2,813.9 | 2,866.0 | 2,846.6 | 18.9 | 7.5 | -158.47 | -250.0 | -231.1 | 817.3 | 801.9 | 15.42 | 52.997 | |

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

**Offset Design** K28NW Pad - Benjamin Federal 28-14B2 - DD - Plan #2

**Offset Site Error:** 0.0 ft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 ft

| Reference Measured Depth (ft) | Reference Vertical Depth (ft) | Offset Measured Depth (ft) | Offset Vertical Depth (ft) | Semi Major Axis Reference (ft) | Semi Major Axis Offset (ft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (ft) | Offset Wellbore Centre +E/-W (ft) | Distance Between Centres (ft) | Distance Between Ellipses (ft) | Total Uncertainty Axis | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -103.31 | -25.5 | -107.8 | 110.8 | | | | |
| 100.0 | 100.0 | 100.0 | 100.0 | 0.1 | 0.1 | -103.31 | -25.5 | -107.8 | 110.8 | 110.5 | 0.27 | 406.864 | |
| 200.0 | 200.0 | 200.0 | 200.0 | 0.3 | 0.3 | -103.31 | -25.5 | -107.8 | 110.8 | 110.2 | 0.62 | 178.289 | |
| 300.0 | 300.0 | 296.3 | 296.3 | 0.5 | 0.5 | -23.67 | -27.7 | -108.9 | 110.0 | 109.0 | 0.97 | 113.492 | |
| 400.0 | 399.6 | 392.1 | 391.8 | 0.7 | 0.7 | -28.15 | -34.1 | -112.2 | 108.2 | 106.9 | 1.34 | 80.686 | |
| 500.0 | 498.8 | 486.9 | 485.8 | 1.0 | 1.0 | -35.72 | -44.7 | -117.5 | 106.7 | 105.0 | 1.76 | 60.795 | |
| 523.9 | 522.4 | 509.4 | 508.0 | 1.1 | 1.0 | -37.97 | -47.8 | -119.1 | 106.7 | 104.8 | 1.86 | 57.230 | CC |
| 600.0 | 597.1 | 583.6 | 581.3 | 1.4 | 1.3 | -46.20 | -58.6 | -124.6 | 106.9 | 104.6 | 2.24 | 47.736 | ES |
| 700.0 | 694.3 | 680.7 | 677.1 | 1.8 | 1.6 | -58.53 | -72.7 | -131.7 | 108.1 | 105.3 | 2.84 | 38.028 | |
| 800.0 | 790.2 | 776.8 | 771.8 | 2.4 | 1.9 | -72.18 | -86.7 | -138.7 | 112.7 | 109.1 | 3.62 | 31.178 | |
| 900.0 | 884.4 | 871.4 | 865.2 | 3.0 | 2.2 | -86.07 | -100.4 | -145.7 | 123.2 | 118.7 | 4.55 | 27.069 | |
| 976.4 | 955.2 | 942.7 | 935.6 | 3.6 | 2.4 | -96.00 | -110.8 | -150.9 | 136.3 | 131.0 | 5.32 | 25.621 | |
| 1,000.0 | 976.9 | 964.5 | 957.1 | 3.8 | 2.5 | -98.96 | -113.9 | -152.6 | 141.2 | 135.7 | 5.55 | 25.456 | SF |
| 1,100.0 | 1,068.7 | 1,057.1 | 1,048.5 | 4.5 | 2.8 | -109.51 | -127.4 | -159.4 | 165.9 | 159.4 | 6.45 | 25.707 | |
| 1,200.0 | 1,160.6 | 1,149.8 | 1,139.9 | 5.2 | 3.1 | -117.33 | -140.8 | -166.2 | 194.8 | 187.5 | 7.26 | 26.812 | |
| 1,300.0 | 1,252.4 | 1,242.4 | 1,231.2 | 6.0 | 3.4 | -123.15 | -154.3 | -173.0 | 226.3 | 218.3 | 8.01 | 28.245 | |
| 1,400.0 | 1,344.3 | 1,335.0 | 1,322.6 | 6.7 | 3.7 | -127.58 | -167.8 | -179.8 | 259.5 | 250.7 | 8.72 | 29.760 | |
| 1,500.0 | 1,436.1 | 1,427.6 | 1,414.0 | 7.5 | 4.0 | -131.01 | -181.2 | -186.6 | 293.7 | 284.3 | 9.40 | 31.247 | |
| 1,600.0 | 1,528.0 | 1,520.2 | 1,505.3 | 8.3 | 4.3 | -133.74 | -194.7 | -193.4 | 328.8 | 318.7 | 10.07 | 32.656 | |
| 1,700.0 | 1,619.8 | 1,612.8 | 1,596.7 | 9.0 | 4.6 | -135.94 | -208.1 | -200.2 | 364.4 | 353.6 | 10.73 | 33.971 | |
| 1,800.0 | 1,711.7 | 1,705.4 | 1,688.1 | 9.8 | 4.9 | -137.76 | -221.6 | -207.0 | 400.3 | 388.9 | 11.38 | 35.188 | |
| 1,900.0 | 1,803.5 | 1,798.0 | 1,779.5 | 10.5 | 5.3 | -139.28 | -235.0 | -213.8 | 436.6 | 424.6 | 12.02 | 36.310 | |
| 2,000.0 | 1,895.4 | 1,890.6 | 1,870.8 | 11.3 | 5.6 | -140.57 | -248.5 | -220.6 | 473.1 | 460.4 | 12.67 | 37.343 | |
| 2,100.0 | 1,987.2 | 1,983.2 | 1,962.2 | 12.0 | 5.9 | -141.68 | -261.9 | -227.4 | 509.8 | 496.4 | 13.31 | 38.295 | |
| 2,200.0 | 2,079.1 | 2,075.8 | 2,053.6 | 12.8 | 6.2 | -142.64 | -275.4 | -234.3 | 546.6 | 532.6 | 13.95 | 39.173 | |
| 2,300.0 | 2,170.9 | 2,168.4 | 2,145.0 | 13.6 | 6.5 | -143.48 | -288.9 | -241.1 | 583.5 | 568.9 | 14.59 | 39.985 | |
| 2,400.0 | 2,262.8 | 2,261.1 | 2,236.3 | 14.3 | 6.8 | -144.22 | -302.3 | -247.9 | 620.6 | 605.3 | 15.23 | 40.735 | |
| 2,500.0 | 2,354.6 | 2,353.7 | 2,327.7 | 15.1 | 7.1 | -144.87 | -315.8 | -254.7 | 657.7 | 641.8 | 15.87 | 41.432 | |
| 2,600.0 | 2,446.5 | 2,446.3 | 2,419.1 | 15.8 | 7.4 | -145.46 | -329.2 | -261.5 | 694.8 | 678.3 | 16.51 | 42.079 | |
| 2,700.0 | 2,538.3 | 2,538.9 | 2,510.4 | 16.6 | 7.7 | -145.99 | -342.7 | -268.3 | 732.1 | 714.9 | 17.15 | 42.682 | |
| 2,800.0 | 2,630.2 | 2,631.5 | 2,601.8 | 17.4 | 8.0 | -146.46 | -356.1 | -275.1 | 769.4 | 751.6 | 17.79 | 43.244 | |
| 2,900.0 | 2,722.0 | 2,724.1 | 2,693.2 | 18.1 | 8.3 | -146.89 | -369.6 | -281.9 | 806.7 | 788.3 | 18.43 | 43.770 | |

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

**Offset Design** K28NW Pad - Benjamin Federal 28-14C - DD - Plan #2

**Offset Site Error:** 0.0 ft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 ft

| Reference Measured Depth (ft) | Reference Vertical Depth (ft) | Offset Measured Depth (ft) | Offset Vertical Depth (ft) | Semi Major Axis Reference (ft) | Semi Major Axis Offset (ft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (ft) | Offset Wellbore Centre +E/-W (ft) | Distance Between Centres (ft) | Distance Between Ellipses (ft) | Total Uncertainty Axis | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -99.73 | -17.1 | -99.8 | 101.3 | | | | |
| 100.0 | 100.0 | 100.0 | 100.0 | 0.1 | 0.1 | -99.73 | -17.1 | -99.8 | 101.3 | 101.0 | 0.27 | 371.926 | |
| 200.0 | 200.0 | 200.0 | 200.0 | 0.3 | 0.3 | -99.73 | -17.1 | -99.8 | 101.3 | 100.6 | 0.62 | 162.979 | |
| 300.0 | 300.0 | 297.3 | 297.3 | 0.5 | 0.5 | -20.33 | -19.4 | -100.7 | 100.1 | 99.1 | 0.97 | 102.960 | |
| 400.0 | 399.6 | 394.0 | 393.7 | 0.7 | 0.7 | -25.63 | -26.4 | -103.2 | 97.2 | 95.8 | 1.35 | 71.933 | |
| 500.0 | 498.8 | 489.5 | 488.4 | 1.0 | 1.0 | -34.83 | -37.7 | -107.3 | 94.3 | 92.5 | 1.78 | 53.013 | |
| 545.8 | 543.9 | 532.7 | 531.0 | 1.2 | 1.1 | -40.32 | -44.3 | -109.7 | 93.8 | 91.8 | 2.00 | 46.786 | CC, ES |
| 600.0 | 597.1 | 583.3 | 580.7 | 1.4 | 1.3 | -47.67 | -53.1 | -113.0 | 94.7 | 92.4 | 2.28 | 41.465 | |
| 700.0 | 694.3 | 677.8 | 673.1 | 1.8 | 1.7 | -62.71 | -72.0 | -119.9 | 101.4 | 98.5 | 2.89 | 35.021 | |
| 800.0 | 790.2 | 772.6 | 765.6 | 2.4 | 2.0 | -77.42 | -91.2 | -126.9 | 113.9 | 110.2 | 3.65 | 31.221 | |
| 900.0 | 884.4 | 866.0 | 856.8 | 3.0 | 2.4 | -90.46 | -110.2 | -133.8 | 133.0 | 128.4 | 4.54 | 29.267 | |
| 976.4 | 955.2 | 936.3 | 925.5 | 3.6 | 2.7 | -98.95 | -124.4 | -139.0 | 152.2 | 146.9 | 5.29 | 28.784 | SF |
| 1,000.0 | 976.9 | 957.9 | 946.5 | 3.8 | 2.8 | -101.47 | -128.8 | -140.6 | 158.8 | 153.3 | 5.51 | 28.811 | |
| 1,100.0 | 1,068.7 | 1,049.2 | 1,035.7 | 4.5 | 3.2 | -110.22 | -147.3 | -147.4 | 190.0 | 183.6 | 6.44 | 29.480 | |
| 1,200.0 | 1,160.6 | 1,140.5 | 1,124.9 | 5.2 | 3.5 | -116.55 | -165.8 | -154.1 | 224.2 | 216.9 | 7.33 | 30.602 | |
| 1,300.0 | 1,252.4 | 1,231.9 | 1,214.1 | 6.0 | 3.9 | -121.23 | -184.3 | -160.9 | 260.3 | 252.2 | 8.17 | 31.854 | |
| 1,400.0 | 1,344.3 | 1,323.2 | 1,303.3 | 6.7 | 4.3 | -124.80 | -202.9 | -167.6 | 297.6 | 288.6 | 8.99 | 33.096 | |
| 1,500.0 | 1,436.1 | 1,414.6 | 1,392.5 | 7.5 | 4.7 | -127.58 | -221.4 | -174.4 | 335.7 | 325.9 | 9.80 | 34.269 | |
| 1,600.0 | 1,528.0 | 1,505.9 | 1,481.7 | 8.3 | 5.0 | -129.80 | -239.9 | -181.2 | 374.4 | 363.8 | 10.59 | 35.354 | |
| 1,700.0 | 1,619.8 | 1,597.2 | 1,570.8 | 9.0 | 5.4 | -131.61 | -258.4 | -187.9 | 413.4 | 402.0 | 11.37 | 36.349 | |
| 1,800.0 | 1,711.7 | 1,688.6 | 1,660.0 | 9.8 | 5.8 | -133.11 | -276.9 | -194.7 | 452.7 | 440.6 | 12.15 | 37.256 | |
| 1,900.0 | 1,803.5 | 1,779.9 | 1,749.2 | 10.5 | 6.2 | -134.38 | -295.4 | -201.4 | 492.3 | 479.4 | 12.93 | 38.083 | |
| 2,000.0 | 1,895.4 | 1,871.3 | 1,838.4 | 11.3 | 6.6 | -135.45 | -313.9 | -208.2 | 532.0 | 518.3 | 13.70 | 38.837 | |
| 2,100.0 | 1,987.2 | 1,962.6 | 1,927.6 | 12.0 | 6.9 | -136.38 | -332.5 | -215.0 | 571.9 | 557.4 | 14.47 | 39.527 | |
| 2,200.0 | 2,079.1 | 2,053.9 | 2,016.8 | 12.8 | 7.3 | -137.19 | -351.0 | -221.7 | 611.9 | 596.6 | 15.24 | 40.159 | |
| 2,300.0 | 2,170.9 | 2,145.3 | 2,106.0 | 13.6 | 7.7 | -137.90 | -369.5 | -228.5 | 651.9 | 635.9 | 16.00 | 40.739 | |
| 2,400.0 | 2,262.8 | 2,236.6 | 2,195.2 | 14.3 | 8.1 | -138.53 | -388.0 | -235.3 | 692.1 | 675.3 | 16.77 | 41.273 | |
| 2,500.0 | 2,354.6 | 2,328.0 | 2,284.3 | 15.1 | 8.5 | -139.09 | -406.5 | -242.0 | 732.3 | 714.7 | 17.53 | 41.766 | |
| 2,600.0 | 2,446.5 | 2,419.3 | 2,373.5 | 15.8 | 8.8 | -139.59 | -425.0 | -248.8 | 772.5 | 754.2 | 18.30 | 42.222 | |
| 2,700.0 | 2,538.3 | 2,510.6 | 2,462.7 | 16.6 | 9.2 | -140.04 | -443.5 | -255.5 | 812.8 | 793.8 | 19.06 | 42.646 | |

# Cathedral Energy Services

## Anticollision Report

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

**Offset Design** K28NW Pad - Benjamin Federal 28-16C - DD - Plan #2

**Offset Site Error:** 0.0 ft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 ft

| Reference Measured Depth (ft) | Reference Vertical Depth (ft) | Offset Measured Depth (ft) | Offset Vertical Depth (ft) | Semi Major Axis Reference (ft) | Semi Major Axis Offset (ft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (ft) | Offset Wellbore Centre +E/-W (ft) | Distance Between Centres (ft) | Distance Between Ellipses (ft) | Total Uncertainty Axis | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 162.20 | -25.5 | 8.2 | 26.8 | | | | |
| 100.0 | 100.0 | 100.0 | 100.0 | 0.1 | 0.1 | 162.20 | -25.5 | 8.2 | 26.8 | 26.5 | 0.27 | 98.351 | |
| 200.0 | 200.0 | 200.0 | 200.0 | 0.3 | 0.3 | 162.20 | -25.5 | 8.2 | 26.8 | 26.2 | 0.62 | 43.097 | CC, ES |
| 300.0 | 300.0 | 298.6 | 298.5 | 0.5 | 0.5 | -123.32 | -27.2 | 10.1 | 30.4 | 29.4 | 0.97 | 31.196 | SF |
| 400.0 | 399.6 | 395.7 | 395.3 | 0.7 | 0.7 | -135.66 | -32.3 | 15.5 | 42.9 | 41.5 | 1.34 | 32.020 | |
| 500.0 | 498.8 | 490.0 | 488.9 | 1.0 | 1.0 | -144.98 | -40.4 | 24.3 | 65.6 | 63.9 | 1.70 | 38.557 | |
| 600.0 | 597.1 | 580.3 | 577.8 | 1.4 | 1.3 | -150.45 | -51.1 | 35.9 | 98.2 | 96.1 | 2.06 | 47.614 | |
| 700.0 | 694.3 | 665.6 | 661.0 | 1.8 | 1.7 | -153.53 | -63.8 | 49.7 | 139.8 | 137.4 | 2.43 | 57.618 | |
| 800.0 | 790.2 | 745.2 | 737.9 | 2.4 | 2.1 | -155.26 | -77.9 | 65.0 | 189.8 | 187.0 | 2.80 | 67.805 | |
| 900.0 | 884.4 | 818.6 | 807.9 | 3.0 | 2.5 | -156.17 | -92.9 | 81.2 | 247.3 | 244.1 | 3.18 | 77.759 | |
| 976.4 | 955.2 | 870.4 | 856.7 | 3.6 | 2.8 | -156.49 | -104.5 | 93.8 | 295.8 | 292.3 | 3.48 | 85.012 | |
| 1,000.0 | 976.9 | 890.1 | 875.1 | 3.8 | 2.9 | -156.85 | -109.1 | 98.8 | 311.5 | 307.9 | 3.58 | 87.036 | |
| 1,100.0 | 1,068.7 | 959.2 | 939.8 | 4.5 | 3.4 | -157.85 | -125.7 | 116.8 | 378.2 | 374.2 | 3.99 | 94.782 | |
| 1,200.0 | 1,160.6 | 1,033.5 | 1,009.4 | 5.2 | 3.8 | -158.61 | -143.5 | 136.1 | 445.0 | 440.6 | 4.41 | 100.893 | |
| 1,300.0 | 1,252.4 | 1,107.8 | 1,078.9 | 6.0 | 4.3 | -159.17 | -161.3 | 155.4 | 511.8 | 507.0 | 4.83 | 105.875 | |
| 1,400.0 | 1,344.3 | 1,182.1 | 1,148.4 | 6.7 | 4.8 | -159.60 | -179.1 | 174.7 | 578.7 | 573.4 | 5.26 | 109.986 | |
| 1,500.0 | 1,436.1 | 1,256.5 | 1,217.9 | 7.5 | 5.3 | -159.94 | -197.0 | 194.0 | 645.5 | 639.8 | 5.69 | 113.444 | |
| 1,600.0 | 1,528.0 | 1,330.8 | 1,287.4 | 8.3 | 5.8 | -160.22 | -214.8 | 213.3 | 712.4 | 706.3 | 6.12 | 116.392 | |
| 1,700.0 | 1,619.8 | 1,405.1 | 1,356.9 | 9.0 | 6.3 | -160.45 | -232.6 | 232.6 | 779.3 | 772.7 | 6.55 | 118.933 | |

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

# Cathedral Energy Services

## Anticollision Report

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

**Offset Design** K28NW Pad - Benjamin Federal 33-3B - DD - Plan #2

**Offset Site Error:** 0.0 ft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 ft

| Reference Measured Depth (ft) | Reference Vertical Depth (ft) | Offset Measured Depth (ft) | Offset Vertical Depth (ft) | Semi Major Axis Reference (ft) | Semi Major Axis Offset (ft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (ft) | Offset Wellbore Centre +E/-W (ft) | Distance Between Centres (ft) | Distance Between Ellipses (ft) | Total Uncertainty Axis | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -108.93 | -34.2 | -99.8 | 105.5 | | | | |
| 100.0 | 100.0 | 100.0 | 100.0 | 0.1 | 0.1 | -108.93 | -34.2 | -99.8 | 105.5 | 105.2 | 0.27 | 387.543 | |
| 200.0 | 200.0 | 200.0 | 200.0 | 0.3 | 0.3 | -108.93 | -34.2 | -99.8 | 105.5 | 104.9 | 0.62 | 169.822 | |
| 300.0 | 300.0 | 298.7 | 298.7 | 0.5 | 0.5 | -29.40 | -35.9 | -99.8 | 103.8 | 102.8 | 0.97 | 106.684 | |
| 400.0 | 399.6 | 396.9 | 396.7 | 0.7 | 0.7 | -34.41 | -41.0 | -99.8 | 99.1 | 97.8 | 1.35 | 73.480 | |
| 500.0 | 498.8 | 493.0 | 492.4 | 1.0 | 0.9 | -43.45 | -49.3 | -100.0 | 93.5 | 91.7 | 1.78 | 52.519 | |
| 579.0 | 576.5 | 566.9 | 565.8 | 1.3 | 1.1 | -53.61 | -58.7 | -100.9 | 91.4 | 89.2 | 2.20 | 41.559 | CC, ES |
| 600.0 | 597.1 | 586.4 | 585.1 | 1.4 | 1.2 | -56.69 | -61.6 | -101.4 | 91.6 | 89.3 | 2.32 | 39.556 | |
| 700.0 | 694.3 | 677.8 | 674.9 | 1.8 | 1.5 | -72.16 | -77.8 | -104.1 | 98.4 | 95.4 | 2.96 | 33.246 | |
| 800.0 | 790.2 | 766.6 | 761.4 | 2.4 | 1.9 | -86.32 | -97.3 | -108.1 | 116.5 | 112.8 | 3.67 | 31.707 | SF |
| 900.0 | 884.4 | 852.4 | 844.1 | 3.0 | 2.3 | -97.06 | -119.8 | -113.2 | 145.7 | 141.2 | 4.47 | 32.617 | |
| 976.4 | 955.2 | 915.7 | 904.4 | 3.6 | 2.6 | -102.96 | -138.7 | -117.7 | 174.3 | 169.2 | 5.13 | 34.005 | |
| 1,000.0 | 976.9 | 935.7 | 923.2 | 3.8 | 2.7 | -104.77 | -145.0 | -119.3 | 184.0 | 178.7 | 5.33 | 34.516 | |
| 1,100.0 | 1,068.7 | 1,022.6 | 1,005.3 | 4.5 | 3.2 | -110.91 | -173.0 | -126.2 | 227.3 | 221.1 | 6.23 | 36.499 | |
| 1,200.0 | 1,160.6 | 1,110.4 | 1,088.1 | 5.2 | 3.8 | -115.18 | -201.3 | -133.2 | 272.1 | 264.9 | 7.14 | 38.114 | |
| 1,300.0 | 1,252.4 | 1,198.2 | 1,170.9 | 6.0 | 4.3 | -118.26 | -229.6 | -140.3 | 317.8 | 309.7 | 8.06 | 39.432 | |
| 1,400.0 | 1,344.3 | 1,286.0 | 1,253.8 | 6.7 | 4.8 | -120.58 | -257.9 | -147.3 | 364.0 | 355.1 | 8.98 | 40.518 | |
| 1,500.0 | 1,436.1 | 1,373.8 | 1,336.6 | 7.5 | 5.3 | -122.38 | -286.1 | -154.3 | 410.7 | 400.7 | 9.91 | 41.428 | |
| 1,600.0 | 1,528.0 | 1,461.6 | 1,419.4 | 8.3 | 5.8 | -123.82 | -314.4 | -161.3 | 457.5 | 446.7 | 10.84 | 42.198 | |
| 1,700.0 | 1,619.8 | 1,549.4 | 1,502.2 | 9.0 | 6.4 | -124.99 | -342.7 | -168.3 | 504.6 | 492.8 | 11.77 | 42.857 | |
| 1,800.0 | 1,711.7 | 1,637.2 | 1,585.1 | 9.8 | 6.9 | -125.97 | -370.9 | -175.3 | 551.8 | 539.1 | 12.71 | 43.428 | |
| 1,900.0 | 1,803.5 | 1,725.0 | 1,667.9 | 10.5 | 7.4 | -126.79 | -399.2 | -182.3 | 599.1 | 585.5 | 13.64 | 43.927 | |
| 2,000.0 | 1,895.4 | 1,812.8 | 1,750.7 | 11.3 | 8.0 | -127.49 | -427.5 | -189.3 | 646.5 | 631.9 | 14.57 | 44.366 | |
| 2,100.0 | 1,987.2 | 1,900.6 | 1,833.5 | 12.0 | 8.5 | -128.10 | -455.8 | -196.3 | 694.0 | 678.5 | 15.51 | 44.755 | |
| 2,200.0 | 2,079.1 | 1,988.4 | 1,916.4 | 12.8 | 9.0 | -128.63 | -484.0 | -203.3 | 741.5 | 725.0 | 16.44 | 45.103 | |
| 2,300.0 | 2,170.9 | 2,076.2 | 1,999.2 | 13.6 | 9.5 | -129.09 | -512.3 | -210.3 | 789.0 | 771.7 | 17.37 | 45.415 | |

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

# Cathedral Energy Services

## Anticollision Report

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

**Offset Design** K28NW Pad - Benjamin Federal 33-4B - DD - Plan #2

**Offset Site Error:** 0.0 ft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 ft

| Reference Measured Depth (ft) | Reference Vertical Depth (ft) | Offset Measured Depth (ft) | Offset Vertical Depth (ft) | Semi Major Axis Reference (ft) | Semi Major Axis Offset (ft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (ft) | Offset Wellbore Centre +E/-W (ft) | Distance Between Centres (ft) | Distance Between Ellipses (ft) | Total Uncertainty Axis | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -94.64 | -8.7 | -107.8 | 108.2 | | | | |
| 100.0 | 100.0 | 100.0 | 100.0 | 0.1 | 0.1 | -94.64 | -8.7 | -107.8 | 108.2 | 107.9 | 0.27 | 397.240 | |
| 200.0 | 200.0 | 200.0 | 200.0 | 0.3 | 0.3 | -94.64 | -8.7 | -107.8 | 108.2 | 107.5 | 0.62 | 174.072 | |
| 300.0 | 300.0 | 295.7 | 295.6 | 0.5 | 0.5 | -14.63 | -10.4 | -109.6 | 107.6 | 106.6 | 0.97 | 111.427 | |
| 400.0 | 399.6 | 391.1 | 390.8 | 0.7 | 0.7 | -17.97 | -15.2 | -114.8 | 106.2 | 104.9 | 1.32 | 80.311 | |
| 500.0 | 498.8 | 486.0 | 484.9 | 1.0 | 1.0 | -23.65 | -23.2 | -123.5 | 104.8 | 103.1 | 1.70 | 61.570 | |
| 562.1 | 559.9 | 544.5 | 542.6 | 1.2 | 1.2 | -28.34 | -29.7 | -130.6 | 104.4 | 102.4 | 1.96 | 53.250 | CC, ES |
| 600.0 | 597.1 | 580.0 | 577.5 | 1.4 | 1.3 | -31.60 | -34.2 | -135.5 | 104.6 | 102.4 | 2.12 | 49.237 | |
| 700.0 | 694.3 | 673.1 | 668.2 | 1.8 | 1.7 | -41.37 | -48.2 | -150.7 | 107.4 | 104.8 | 2.64 | 40.640 | |
| 800.0 | 790.2 | 764.9 | 756.7 | 2.4 | 2.2 | -51.95 | -64.9 | -168.8 | 115.2 | 111.8 | 3.34 | 34.445 | |
| 900.0 | 884.4 | 855.2 | 842.4 | 3.0 | 2.7 | -62.10 | -84.1 | -189.7 | 129.1 | 124.8 | 4.30 | 30.018 | |
| 976.4 | 955.2 | 923.2 | 906.0 | 3.6 | 3.2 | -68.96 | -100.3 | -207.4 | 144.1 | 138.9 | 5.20 | 27.685 | |
| 1,000.0 | 976.9 | 944.0 | 925.3 | 3.8 | 3.3 | -70.99 | -105.6 | -213.1 | 149.5 | 144.0 | 5.51 | 27.152 | |
| 1,100.0 | 1,068.7 | 1,031.4 | 1,005.4 | 4.5 | 4.0 | -77.79 | -129.3 | -238.9 | 176.8 | 170.0 | 6.81 | 25.945 | |
| 1,200.0 | 1,160.6 | 1,117.5 | 1,082.7 | 5.2 | 4.7 | -82.13 | -155.1 | -267.0 | 209.5 | 201.4 | 8.14 | 25.749 | SF |
| 1,300.0 | 1,252.4 | 1,202.1 | 1,156.7 | 6.0 | 5.5 | -84.73 | -182.6 | -296.9 | 246.4 | 237.0 | 9.46 | 26.058 | |
| 1,400.0 | 1,344.3 | 1,293.9 | 1,236.3 | 6.7 | 6.3 | -86.57 | -213.7 | -330.8 | 285.2 | 274.3 | 10.82 | 26.362 | |
| 1,500.0 | 1,436.1 | 1,385.8 | 1,315.8 | 7.5 | 7.2 | -87.98 | -244.8 | -364.6 | 324.1 | 311.9 | 12.19 | 26.599 | |
| 1,600.0 | 1,528.0 | 1,477.6 | 1,395.3 | 8.3 | 8.1 | -89.08 | -275.9 | -398.4 | 363.2 | 349.6 | 13.56 | 26.789 | |
| 1,700.0 | 1,619.8 | 1,569.5 | 1,474.9 | 9.0 | 8.9 | -89.97 | -307.0 | -432.2 | 402.4 | 387.4 | 14.93 | 26.944 | |
| 1,800.0 | 1,711.7 | 1,661.3 | 1,554.4 | 9.8 | 9.8 | -90.70 | -338.1 | -466.1 | 441.6 | 425.3 | 16.31 | 27.074 | |
| 1,900.0 | 1,803.5 | 1,753.2 | 1,633.9 | 10.5 | 10.6 | -91.31 | -369.2 | -499.9 | 480.9 | 463.2 | 17.69 | 27.184 | |
| 2,000.0 | 1,895.4 | 1,845.0 | 1,713.4 | 11.3 | 11.5 | -91.83 | -400.3 | -533.7 | 520.2 | 501.1 | 19.07 | 27.278 | |
| 2,100.0 | 1,987.2 | 1,936.9 | 1,793.0 | 12.0 | 12.4 | -92.28 | -431.4 | -567.5 | 559.6 | 539.1 | 20.45 | 27.360 | |
| 2,200.0 | 2,079.1 | 2,028.7 | 1,872.5 | 12.8 | 13.2 | -92.67 | -462.5 | -601.4 | 598.9 | 577.1 | 21.83 | 27.432 | |
| 2,300.0 | 2,170.9 | 2,120.6 | 1,952.0 | 13.6 | 14.1 | -93.01 | -493.6 | -635.2 | 638.3 | 615.1 | 23.22 | 27.495 | |
| 2,400.0 | 2,262.8 | 2,212.4 | 2,031.6 | 14.3 | 15.0 | -93.31 | -524.7 | -669.0 | 677.8 | 653.2 | 24.60 | 27.551 | |
| 2,500.0 | 2,354.6 | 2,304.3 | 2,111.1 | 15.1 | 15.8 | -93.58 | -555.8 | -702.8 | 717.2 | 691.2 | 25.98 | 27.602 | |
| 2,600.0 | 2,446.5 | 2,396.1 | 2,190.6 | 15.8 | 16.7 | -93.82 | -586.9 | -736.7 | 756.6 | 729.3 | 27.37 | 27.647 | |
| 2,700.0 | 2,538.3 | 2,488.0 | 2,270.1 | 16.6 | 17.6 | -94.03 | -618.0 | -770.5 | 796.1 | 767.3 | 28.75 | 27.688 | |

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

**Offset Design** K28NW Pad - Benjamin Fee 28-10D2 - DD - Plan #2

**Offset Site Error:** 0.0 ft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 ft

| Reference Measured Depth (ft) | Reference Vertical Depth (ft) | Offset Measured Depth (ft) | Offset Vertical Depth (ft) | Semi Major Axis Reference (ft) | Semi Major Axis Offset (ft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (ft) | Offset Wellbore Centre +E/-W (ft) | Distance Between Centres (ft) | Distance Between Ellipses (ft) | Total Uncertainty Axis | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 44.33 | 8.4 | 8.2 | 11.7 | | | | |
| 100.0 | 100.0 | 100.0 | 100.0 | 0.1 | 0.1 | 44.33 | 8.4 | 8.2 | 11.7 | 11.4 | 0.27 | 43.014 | |
| 200.0 | 200.0 | 200.0 | 200.0 | 0.3 | 0.3 | 44.33 | 8.4 | 8.2 | 11.7 | 11.1 | 0.62 | 18.849 | CC, ES |
| 300.0 | 300.0 | 299.3 | 299.2 | 0.5 | 0.5 | 139.76 | 8.5 | 10.8 | 15.6 | 14.6 | 0.97 | 16.037 | SF |
| 400.0 | 399.6 | 397.0 | 396.6 | 0.7 | 0.7 | 156.62 | 8.8 | 18.3 | 29.7 | 28.4 | 1.32 | 22.477 | |
| 500.0 | 498.8 | 491.6 | 490.5 | 1.0 | 1.0 | 164.44 | 9.4 | 30.4 | 54.6 | 52.9 | 1.66 | 32.955 | |
| 600.0 | 597.1 | 582.7 | 580.1 | 1.4 | 1.3 | 167.99 | 10.1 | 46.3 | 89.2 | 87.2 | 1.98 | 45.104 | |
| 700.0 | 694.3 | 673.8 | 669.6 | 1.8 | 1.6 | 169.90 | 10.9 | 63.6 | 130.2 | 127.9 | 2.30 | 56.734 | |
| 800.0 | 790.2 | 762.6 | 756.8 | 2.4 | 1.9 | 171.08 | 11.6 | 80.4 | 176.0 | 173.4 | 2.60 | 67.582 | |
| 900.0 | 884.4 | 848.9 | 841.6 | 3.0 | 2.3 | 171.88 | 12.4 | 96.8 | 226.3 | 223.4 | 2.90 | 77.974 | |
| 976.4 | 955.2 | 913.1 | 904.5 | 3.6 | 2.5 | 172.33 | 12.9 | 109.0 | 267.8 | 264.7 | 3.12 | 85.741 | |
| 1,000.0 | 976.9 | 932.6 | 923.7 | 3.8 | 2.6 | 172.51 | 13.1 | 112.7 | 281.0 | 277.8 | 3.20 | 87.846 | |
| 1,100.0 | 1,068.7 | 1,015.4 | 1,005.0 | 4.5 | 2.9 | 173.11 | 13.8 | 128.4 | 337.0 | 333.5 | 3.52 | 95.781 | |
| 1,200.0 | 1,160.6 | 1,098.2 | 1,086.3 | 5.2 | 3.2 | 173.54 | 14.5 | 144.1 | 393.0 | 389.2 | 3.84 | 102.407 | |
| 1,300.0 | 1,252.4 | 1,181.0 | 1,167.6 | 6.0 | 3.5 | 173.87 | 15.2 | 159.8 | 449.0 | 444.9 | 4.16 | 108.025 | |
| 1,400.0 | 1,344.3 | 1,263.9 | 1,248.9 | 6.7 | 3.8 | 174.12 | 15.9 | 175.5 | 505.1 | 500.6 | 4.48 | 112.848 | |
| 1,500.0 | 1,436.1 | 1,346.7 | 1,330.2 | 7.5 | 4.1 | 174.32 | 16.6 | 191.3 | 561.1 | 556.3 | 4.79 | 117.035 | |
| 1,600.0 | 1,528.0 | 1,429.5 | 1,411.5 | 8.3 | 4.4 | 174.48 | 17.4 | 207.0 | 617.1 | 612.0 | 5.11 | 120.704 | |
| 1,700.0 | 1,619.8 | 1,512.3 | 1,492.8 | 9.0 | 4.7 | 174.62 | 18.1 | 222.7 | 673.2 | 667.7 | 5.43 | 123.946 | |
| 1,800.0 | 1,711.7 | 1,595.1 | 1,574.2 | 9.8 | 5.1 | 174.74 | 18.8 | 238.4 | 729.2 | 723.4 | 5.75 | 126.831 | |
| 1,900.0 | 1,803.5 | 1,677.9 | 1,655.5 | 10.5 | 5.4 | 174.84 | 19.5 | 254.1 | 785.2 | 779.2 | 6.07 | 129.414 | |

# Cathedral Energy Services

## Anticollision Report

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

**Offset Design** K28NW Pad - Benjamin Fee 28-11A - DD - Plan #2

**Offset Site Error:** 0.0 ft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 ft

| Reference Measured Depth (ft) | Reference Vertical Depth (ft) | Offset Measured Depth (ft) | Offset Vertical Depth (ft) | Semi Major Axis Reference (ft) | Semi Major Axis Offset (ft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (ft) | Offset Wellbore Centre +E/-W (ft) | Distance Between Centres (ft) | Distance Between Ellipses (ft) | Total Uncertainty Axis | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00 | 16.8 | 0.0 | 16.8 | | | | |
| 100.0 | 100.0 | 100.0 | 100.0 | 0.1 | 0.1 | 0.00 | 16.8 | 0.0 | 16.8 | 16.5 | 0.27 | 61.538 | |
| 200.0 | 200.0 | 200.0 | 200.0 | 0.3 | 0.3 | 0.00 | 16.8 | 0.0 | 16.8 | 16.1 | 0.62 | 26.966 | CC, ES |
| 300.0 | 300.0 | 299.5 | 299.5 | 0.5 | 0.5 | 82.19 | 18.1 | -2.2 | 17.7 | 16.7 | 0.98 | 17.960 | |
| 400.0 | 399.6 | 399.0 | 398.7 | 0.7 | 0.7 | 84.83 | 22.0 | -8.9 | 20.5 | 19.1 | 1.42 | 14.469 | |
| 500.0 | 498.8 | 498.8 | 497.8 | 1.0 | 1.0 | 91.84 | 27.7 | -18.5 | 24.6 | 22.6 | 1.94 | 12.646 | |
| 600.0 | 597.1 | 598.4 | 596.8 | 1.4 | 1.2 | 106.55 | 33.4 | -28.1 | 30.0 | 27.4 | 2.54 | 11.787 | SF |
| 700.0 | 694.3 | 697.5 | 695.2 | 1.8 | 1.5 | 122.97 | 39.1 | -37.7 | 39.4 | 36.3 | 3.10 | 12.706 | |
| 800.0 | 790.2 | 795.7 | 792.8 | 2.4 | 1.7 | 136.45 | 44.7 | -47.2 | 54.4 | 50.9 | 3.54 | 15.383 | |
| 900.0 | 884.4 | 892.8 | 889.4 | 3.0 | 2.0 | 146.03 | 50.3 | -56.6 | 75.4 | 71.5 | 3.90 | 19.352 | |
| 976.4 | 955.2 | 966.2 | 962.2 | 3.6 | 2.2 | 151.28 | 54.5 | -63.7 | 95.3 | 91.2 | 4.14 | 22.999 | |
| 1,000.0 | 976.9 | 988.7 | 984.6 | 3.8 | 2.2 | 152.68 | 55.7 | -65.9 | 102.0 | 97.8 | 4.22 | 24.173 | |
| 1,100.0 | 1,068.7 | 1,084.1 | 1,079.4 | 4.5 | 2.5 | 157.02 | 61.2 | -75.1 | 130.8 | 126.2 | 4.55 | 28.721 | |
| 1,200.0 | 1,160.6 | 1,179.5 | 1,174.2 | 5.2 | 2.7 | 159.80 | 66.7 | -84.3 | 160.0 | 155.1 | 4.91 | 32.618 | |
| 1,300.0 | 1,252.4 | 1,274.9 | 1,269.0 | 6.0 | 3.0 | 161.72 | 72.1 | -93.6 | 189.5 | 184.2 | 5.27 | 35.965 | |
| 1,400.0 | 1,344.3 | 1,370.2 | 1,363.7 | 6.7 | 3.2 | 163.12 | 77.6 | -102.8 | 219.1 | 213.5 | 5.64 | 38.859 | |
| 1,500.0 | 1,436.1 | 1,465.6 | 1,458.5 | 7.5 | 3.5 | 164.19 | 83.0 | -112.0 | 248.8 | 242.8 | 6.01 | 41.381 | |
| 1,600.0 | 1,528.0 | 1,561.0 | 1,553.3 | 8.3 | 3.7 | 165.03 | 88.5 | -121.2 | 278.6 | 272.2 | 6.39 | 43.596 | |
| 1,700.0 | 1,619.8 | 1,656.4 | 1,648.1 | 9.0 | 4.0 | 165.71 | 94.0 | -130.5 | 308.4 | 301.6 | 6.77 | 45.555 | |
| 1,800.0 | 1,711.7 | 1,751.8 | 1,742.9 | 9.8 | 4.2 | 166.27 | 99.4 | -139.7 | 338.2 | 331.1 | 7.15 | 47.299 | |
| 1,900.0 | 1,803.5 | 1,847.2 | 1,837.7 | 10.5 | 4.5 | 166.74 | 104.9 | -148.9 | 368.1 | 360.6 | 7.53 | 48.862 | |
| 2,000.0 | 1,895.4 | 1,942.6 | 1,932.5 | 11.3 | 4.7 | 167.13 | 110.3 | -158.1 | 398.0 | 390.1 | 7.92 | 50.269 | |
| 2,100.0 | 1,987.2 | 2,038.0 | 2,027.3 | 12.0 | 5.0 | 167.48 | 115.8 | -167.4 | 427.9 | 419.6 | 8.30 | 51.544 | |
| 2,200.0 | 2,079.1 | 2,133.4 | 2,122.1 | 12.8 | 5.2 | 167.77 | 121.3 | -176.6 | 457.8 | 449.1 | 8.69 | 52.703 | |
| 2,300.0 | 2,170.9 | 2,228.8 | 2,216.9 | 13.6 | 5.5 | 168.04 | 126.7 | -185.8 | 487.7 | 478.6 | 9.07 | 53.762 | |
| 2,400.0 | 2,262.8 | 2,324.2 | 2,311.7 | 14.3 | 5.7 | 168.27 | 132.2 | -195.0 | 517.6 | 508.2 | 9.46 | 54.733 | |
| 2,500.0 | 2,354.6 | 2,419.6 | 2,406.5 | 15.1 | 6.0 | 168.47 | 137.6 | -204.3 | 547.6 | 537.7 | 9.84 | 55.626 | |
| 2,600.0 | 2,446.5 | 2,515.0 | 2,501.2 | 15.8 | 6.2 | 168.66 | 143.1 | -213.5 | 577.5 | 567.3 | 10.23 | 56.451 | |
| 2,700.0 | 2,538.3 | 2,610.4 | 2,596.0 | 16.6 | 6.5 | 168.82 | 148.6 | -222.7 | 607.5 | 596.9 | 10.62 | 57.215 | |
| 2,800.0 | 2,630.2 | 2,705.8 | 2,690.8 | 17.4 | 6.7 | 168.97 | 154.0 | -231.9 | 637.4 | 626.4 | 11.00 | 57.925 | |
| 2,900.0 | 2,722.0 | 2,801.2 | 2,785.6 | 18.1 | 7.0 | 169.11 | 159.5 | -241.2 | 667.4 | 656.0 | 11.39 | 58.585 | |
| 3,000.0 | 2,813.9 | 2,896.6 | 2,880.4 | 18.9 | 7.2 | 169.24 | 164.9 | -250.4 | 697.3 | 685.6 | 11.78 | 59.202 | |
| 3,100.0 | 2,905.7 | 2,992.0 | 2,975.2 | 19.6 | 7.5 | 169.35 | 170.4 | -259.6 | 727.3 | 715.1 | 12.17 | 59.779 | |
| 3,200.0 | 2,997.6 | 3,087.4 | 3,070.0 | 20.4 | 7.7 | 169.46 | 175.8 | -268.8 | 757.3 | 744.7 | 12.55 | 60.319 | |
| 3,300.0 | 3,089.4 | 3,182.8 | 3,164.8 | 21.2 | 8.0 | 169.56 | 181.3 | -278.1 | 787.2 | 774.3 | 12.94 | 60.828 | |
| 3,400.0 | 3,181.3 | 3,278.2 | 3,259.6 | 21.9 | 8.2 | 169.65 | 186.8 | -287.3 | 817.2 | 803.9 | 13.33 | 61.306 | |

# Cathedral Energy Services

## Anticollision Report

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

**Offset Design** K28NW Pad - Benjamin Fee 28-11B - DD - Plan #2

**Offset Site Error:** 0.0 ft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 ft

| Reference Measured Depth (ft) | Reference Vertical Depth (ft) | Offset Measured Depth (ft) | Offset Vertical Depth (ft) | Semi Major Axis Reference (ft) | Semi Major Axis Offset (ft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (ft) | Offset Wellbore Centre +E/-W (ft) | Distance Between Centres (ft) | Distance Between Ellipses (ft) | Total Uncertainty Axis | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00 | 33.9 | 0.0 | 33.9 | | | | |
| 100.0 | 100.0 | 100.0 | 100.0 | 0.1 | 0.1 | 0.00 | 33.9 | 0.0 | 33.9 | 33.6 | 0.27 | 124.414 | |
| 200.0 | 200.0 | 200.0 | 200.0 | 0.3 | 0.3 | 0.00 | 33.9 | 0.0 | 33.9 | 33.3 | 0.62 | 54.518 | CC, ES |
| 300.0 | 300.0 | 298.7 | 298.6 | 0.5 | 0.5 | 82.46 | 35.8 | -1.7 | 35.4 | 34.4 | 0.98 | 36.120 | |
| 400.0 | 399.6 | 397.1 | 396.8 | 0.7 | 0.7 | 85.85 | 41.5 | -6.7 | 40.1 | 38.7 | 1.40 | 28.708 | |
| 500.0 | 498.8 | 495.4 | 494.2 | 1.0 | 1.0 | 89.98 | 50.9 | -15.1 | 48.2 | 46.3 | 1.92 | 25.101 | |
| 600.0 | 597.1 | 594.7 | 592.4 | 1.4 | 1.3 | 96.27 | 62.0 | -25.0 | 58.1 | 55.6 | 2.56 | 22.726 | |
| 700.0 | 694.3 | 693.5 | 690.1 | 1.8 | 1.6 | 104.77 | 73.1 | -34.8 | 69.7 | 66.4 | 3.29 | 21.203 | |
| 800.0 | 790.2 | 791.6 | 787.1 | 2.4 | 1.9 | 113.85 | 84.1 | -44.6 | 84.5 | 80.5 | 4.06 | 20.833 | SF |
| 900.0 | 884.4 | 888.7 | 883.0 | 3.0 | 2.2 | 122.38 | 95.0 | -54.2 | 103.6 | 98.8 | 4.80 | 21.584 | |
| 976.4 | 955.2 | 961.9 | 955.5 | 3.6 | 2.4 | 128.14 | 103.2 | -61.5 | 121.6 | 116.2 | 5.33 | 22.821 | |
| 1,000.0 | 976.9 | 984.5 | 977.8 | 3.8 | 2.5 | 129.87 | 105.7 | -63.8 | 127.6 | 122.1 | 5.48 | 23.305 | |
| 1,100.0 | 1,068.7 | 1,079.8 | 1,072.1 | 4.5 | 2.8 | 135.68 | 116.4 | -73.2 | 154.3 | 148.2 | 6.08 | 25.372 | |
| 1,200.0 | 1,160.6 | 1,175.2 | 1,166.4 | 5.2 | 3.1 | 139.77 | 127.1 | -82.7 | 182.0 | 175.3 | 6.66 | 27.334 | |
| 1,300.0 | 1,252.4 | 1,270.6 | 1,260.7 | 6.0 | 3.4 | 142.79 | 137.8 | -92.2 | 210.3 | 203.1 | 7.22 | 29.123 | |
| 1,400.0 | 1,344.3 | 1,366.0 | 1,355.0 | 6.7 | 3.7 | 145.09 | 148.5 | -101.7 | 239.1 | 231.3 | 7.78 | 30.732 | |
| 1,500.0 | 1,436.1 | 1,461.4 | 1,449.3 | 7.5 | 4.0 | 146.89 | 159.2 | -111.2 | 268.1 | 259.8 | 8.33 | 32.173 | |
| 1,600.0 | 1,528.0 | 1,556.7 | 1,543.6 | 8.3 | 4.3 | 148.35 | 169.9 | -120.7 | 297.4 | 288.5 | 8.89 | 33.463 | |
| 1,700.0 | 1,619.8 | 1,652.1 | 1,637.9 | 9.0 | 4.6 | 149.54 | 180.6 | -130.2 | 326.7 | 317.3 | 9.44 | 34.622 | |
| 1,800.0 | 1,711.7 | 1,747.5 | 1,732.2 | 9.8 | 4.9 | 150.54 | 191.3 | -139.6 | 356.2 | 346.2 | 9.99 | 35.665 | |
| 1,900.0 | 1,803.5 | 1,842.9 | 1,826.5 | 10.5 | 5.2 | 151.39 | 202.0 | -149.1 | 385.8 | 375.3 | 10.54 | 36.609 | |
| 2,000.0 | 1,895.4 | 1,938.3 | 1,920.8 | 11.3 | 5.5 | 152.11 | 212.7 | -158.6 | 415.4 | 404.4 | 11.09 | 37.465 | |
| 2,100.0 | 1,987.2 | 2,033.7 | 2,015.1 | 12.0 | 5.8 | 152.74 | 223.3 | -168.1 | 445.1 | 433.5 | 11.64 | 38.244 | |
| 2,200.0 | 2,079.1 | 2,129.0 | 2,109.4 | 12.8 | 6.1 | 153.29 | 234.0 | -177.6 | 474.9 | 462.7 | 12.19 | 38.957 | |
| 2,300.0 | 2,170.9 | 2,224.4 | 2,203.7 | 13.6 | 6.4 | 153.78 | 244.7 | -187.1 | 504.6 | 491.9 | 12.74 | 39.611 | |
| 2,400.0 | 2,262.8 | 2,319.8 | 2,298.0 | 14.3 | 6.7 | 154.21 | 255.4 | -196.6 | 534.4 | 521.2 | 13.29 | 40.213 | |
| 2,500.0 | 2,354.6 | 2,415.2 | 2,392.3 | 15.1 | 7.0 | 154.59 | 266.1 | -206.0 | 564.3 | 550.4 | 13.84 | 40.768 | |
| 2,600.0 | 2,446.5 | 2,510.6 | 2,486.7 | 15.8 | 7.3 | 154.94 | 276.8 | -215.5 | 594.1 | 579.7 | 14.39 | 41.282 | |
| 2,700.0 | 2,538.3 | 2,606.0 | 2,581.0 | 16.6 | 7.6 | 155.26 | 287.5 | -225.0 | 624.0 | 609.0 | 14.94 | 41.760 | |
| 2,800.0 | 2,630.2 | 2,701.3 | 2,675.3 | 17.4 | 7.9 | 155.54 | 298.2 | -234.5 | 653.9 | 638.4 | 15.49 | 42.204 | |
| 2,900.0 | 2,722.0 | 2,796.7 | 2,769.6 | 18.1 | 8.2 | 155.80 | 308.9 | -244.0 | 683.8 | 667.7 | 16.04 | 42.618 | |
| 3,000.0 | 2,813.9 | 2,892.1 | 2,863.9 | 18.9 | 8.5 | 156.04 | 319.6 | -253.5 | 713.7 | 697.1 | 16.59 | 43.005 | |
| 3,100.0 | 2,905.7 | 2,987.5 | 2,958.2 | 19.6 | 8.8 | 156.26 | 330.3 | -263.0 | 743.6 | 726.4 | 17.15 | 43.368 | |
| 3,200.0 | 2,997.6 | 3,082.9 | 3,052.5 | 20.4 | 9.1 | 156.46 | 340.9 | -272.5 | 773.5 | 755.8 | 17.70 | 43.709 | |
| 3,300.0 | 3,089.4 | 3,178.3 | 3,146.8 | 21.2 | 9.4 | 156.65 | 351.6 | -281.9 | 803.4 | 785.2 | 18.25 | 44.029 | |

# Cathedral Energy Services

## Anticollision Report

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

**Offset Design** K28NW Pad - Benjamin Fee 28-15A - DD - Plan #2

**Offset Site Error:** 0.0 ft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 ft

| Reference Measured Depth (ft) | Reference Vertical Depth (ft) | Offset Measured Depth (ft) | Offset Vertical Depth (ft) | Semi Major Axis Reference (ft) | Semi Major Axis Offset (ft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (ft) | Offset Wellbore Centre +E/-W (ft) | Distance Between Centres (ft) | Distance Between Ellipses (ft) | Total Uncertainty Axis | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 136.89 | -8.7 | 8.2 | 12.0 | | | | |
| 100.0 | 100.0 | 100.0 | 100.0 | 0.1 | 0.1 | 136.89 | -8.7 | 8.2 | 12.0 | 11.7 | 0.27 | 43.981 | |
| 200.0 | 200.0 | 200.0 | 200.0 | 0.3 | 0.3 | 136.89 | -8.7 | 8.2 | 12.0 | 11.4 | 0.62 | 19.273 | CC, ES |
| 300.0 | 300.0 | 299.1 | 299.1 | 0.5 | 0.5 | -150.23 | -10.0 | 10.4 | 16.7 | 15.7 | 0.97 | 17.183 | SF |
| 400.0 | 399.6 | 396.7 | 396.4 | 0.7 | 0.7 | -159.52 | -13.6 | 17.1 | 31.5 | 30.2 | 1.32 | 23.931 | |
| 500.0 | 498.8 | 491.3 | 490.2 | 1.0 | 1.0 | -163.97 | -19.4 | 27.6 | 56.5 | 54.8 | 1.66 | 34.115 | |
| 600.0 | 597.1 | 581.7 | 579.1 | 1.4 | 1.3 | -166.01 | -27.0 | 41.5 | 91.0 | 89.1 | 1.99 | 45.816 | |
| 700.0 | 694.3 | 667.9 | 663.2 | 1.8 | 1.6 | -167.02 | -36.1 | 58.1 | 134.5 | 132.2 | 2.31 | 58.220 | |
| 800.0 | 790.2 | 754.9 | 747.8 | 2.4 | 2.0 | -167.70 | -45.8 | 75.9 | 183.7 | 181.1 | 2.63 | 69.763 | |
| 900.0 | 884.4 | 839.2 | 829.8 | 3.0 | 2.4 | -168.22 | -55.3 | 93.2 | 237.3 | 234.4 | 2.95 | 80.461 | |
| 976.4 | 955.2 | 901.7 | 890.6 | 3.6 | 2.7 | -168.52 | -62.3 | 106.0 | 281.2 | 278.1 | 3.19 | 88.251 | |
| 1,000.0 | 976.9 | 920.7 | 909.1 | 3.8 | 2.7 | -168.70 | -64.4 | 109.9 | 295.2 | 291.9 | 3.27 | 90.345 | |
| 1,100.0 | 1,068.7 | 1,001.4 | 987.5 | 4.5 | 3.1 | -169.31 | -73.4 | 126.4 | 354.2 | 350.6 | 3.61 | 98.214 | |
| 1,200.0 | 1,160.6 | 1,082.0 | 1,065.9 | 5.2 | 3.5 | -169.74 | -82.5 | 142.9 | 413.3 | 409.4 | 3.95 | 104.716 | |
| 1,300.0 | 1,252.4 | 1,162.6 | 1,144.4 | 6.0 | 3.8 | -170.06 | -91.5 | 159.3 | 472.4 | 468.2 | 4.29 | 110.186 | |
| 1,400.0 | 1,344.3 | 1,243.3 | 1,222.8 | 6.7 | 4.2 | -170.31 | -100.5 | 175.8 | 531.6 | 526.9 | 4.63 | 114.849 | |
| 1,500.0 | 1,436.1 | 1,323.9 | 1,301.2 | 7.5 | 4.5 | -170.51 | -109.6 | 192.3 | 590.7 | 585.7 | 4.97 | 118.872 | |
| 1,600.0 | 1,528.0 | 1,404.6 | 1,379.6 | 8.3 | 4.9 | -170.68 | -118.6 | 208.8 | 649.8 | 644.5 | 5.31 | 122.377 | |
| 1,700.0 | 1,619.8 | 1,485.2 | 1,458.0 | 9.0 | 5.3 | -170.81 | -127.6 | 225.3 | 708.9 | 703.3 | 5.65 | 125.456 | |
| 1,800.0 | 1,711.7 | 1,565.8 | 1,536.4 | 9.8 | 5.6 | -170.93 | -136.7 | 241.8 | 768.0 | 762.0 | 5.99 | 128.184 | |
| 1,900.0 | 1,803.5 | 1,646.5 | 1,614.8 | 10.5 | 6.0 | -171.03 | -145.7 | 258.3 | 827.2 | 820.8 | 6.33 | 130.617 | |

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

**Offset Design** K28NW Pad - Benjamin Fee 28-6C - DD - Plan #2

**Offset Site Error:** 0.0 ft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 ft

| Reference Measured Depth (ft) | Reference Vertical Depth (ft) | Offset Measured Depth (ft) | Offset Vertical Depth (ft) | Semi Major Axis Reference (ft) | Semi Major Axis Offset (ft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (ft) | Offset Wellbore Centre +E/-W (ft) | Distance Between Centres (ft) | Distance Between Ellipses (ft) | Total Uncertainty Axis | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.96 | 42.3 | 8.2 | 43.0 | | | | |
| 100.0 | 100.0 | 100.0 | 100.0 | 0.1 | 0.1 | 10.96 | 42.3 | 8.2 | 43.0 | 42.8 | 0.27 | 158.067 | |
| 200.0 | 200.0 | 200.0 | 200.0 | 0.3 | 0.3 | 10.96 | 42.3 | 8.2 | 43.0 | 42.4 | 0.62 | 69.265 | CC, ES |
| 300.0 | 300.0 | 298.3 | 298.3 | 0.5 | 0.5 | 93.09 | 44.4 | 6.8 | 45.0 | 44.0 | 0.98 | 45.941 | |
| 400.0 | 399.6 | 396.4 | 396.0 | 0.7 | 0.7 | 95.66 | 50.8 | 2.8 | 51.1 | 49.7 | 1.40 | 36.578 | |
| 500.0 | 498.8 | 493.9 | 492.8 | 1.0 | 1.0 | 98.74 | 61.4 | -3.8 | 61.3 | 59.3 | 1.91 | 32.018 | |
| 600.0 | 597.1 | 591.0 | 588.3 | 1.4 | 1.3 | 101.62 | 76.0 | -12.9 | 75.7 | 73.1 | 2.55 | 29.616 | |
| 700.0 | 694.3 | 689.3 | 684.7 | 1.8 | 1.7 | 105.65 | 92.4 | -23.1 | 92.6 | 89.2 | 3.31 | 27.978 | |
| 800.0 | 790.2 | 787.0 | 780.5 | 2.4 | 2.0 | 110.77 | 108.6 | -33.2 | 111.6 | 107.5 | 4.15 | 26.919 | |
| 900.0 | 884.4 | 883.7 | 875.3 | 3.0 | 2.4 | 116.20 | 124.7 | -43.2 | 133.6 | 128.6 | 5.03 | 26.556 | SF |
| 976.4 | 955.2 | 956.8 | 947.0 | 3.6 | 2.7 | 120.25 | 136.8 | -50.8 | 152.9 | 147.2 | 5.71 | 26.765 | |
| 1,000.0 | 976.9 | 979.2 | 969.0 | 3.8 | 2.8 | 121.58 | 140.5 | -53.1 | 159.3 | 153.4 | 5.92 | 26.917 | |
| 1,100.0 | 1,068.7 | 1,074.4 | 1,062.3 | 4.5 | 3.1 | 126.22 | 156.3 | -63.0 | 186.9 | 180.2 | 6.76 | 27.667 | |
| 1,200.0 | 1,160.6 | 1,169.5 | 1,155.6 | 5.2 | 3.5 | 129.67 | 172.1 | -72.8 | 215.4 | 207.9 | 7.57 | 28.473 | |
| 1,300.0 | 1,252.4 | 1,264.6 | 1,248.9 | 6.0 | 3.8 | 132.32 | 187.9 | -82.7 | 244.5 | 236.2 | 8.36 | 29.256 | |
| 1,400.0 | 1,344.3 | 1,359.8 | 1,342.2 | 6.7 | 4.2 | 134.40 | 203.7 | -92.5 | 274.0 | 264.8 | 9.14 | 29.987 | |
| 1,500.0 | 1,436.1 | 1,454.9 | 1,435.5 | 7.5 | 4.6 | 136.09 | 219.5 | -102.4 | 303.7 | 293.8 | 9.91 | 30.657 | |
| 1,600.0 | 1,528.0 | 1,550.0 | 1,528.8 | 8.3 | 4.9 | 137.47 | 235.3 | -112.2 | 333.6 | 323.0 | 10.67 | 31.268 | |
| 1,700.0 | 1,619.8 | 1,645.2 | 1,622.1 | 9.0 | 5.3 | 138.63 | 251.1 | -122.1 | 363.7 | 352.3 | 11.43 | 31.822 | |
| 1,800.0 | 1,711.7 | 1,740.3 | 1,715.4 | 9.8 | 5.7 | 139.61 | 266.9 | -131.9 | 393.9 | 381.7 | 12.18 | 32.326 | |
| 1,900.0 | 1,803.5 | 1,835.4 | 1,808.7 | 10.5 | 6.0 | 140.45 | 282.7 | -141.8 | 424.2 | 411.2 | 12.94 | 32.785 | |
| 2,000.0 | 1,895.4 | 1,930.6 | 1,901.9 | 11.3 | 6.4 | 141.18 | 298.5 | -151.6 | 454.5 | 440.8 | 13.69 | 33.204 | |
| 2,100.0 | 1,987.2 | 2,025.7 | 1,995.2 | 12.0 | 6.8 | 141.81 | 314.3 | -161.5 | 484.9 | 470.5 | 14.44 | 33.587 | |
| 2,200.0 | 2,079.1 | 2,120.8 | 2,088.5 | 12.8 | 7.1 | 142.38 | 330.1 | -171.3 | 515.4 | 500.2 | 15.19 | 33.938 | |
| 2,300.0 | 2,170.9 | 2,216.0 | 2,181.8 | 13.6 | 7.5 | 142.88 | 345.9 | -181.2 | 545.8 | 529.9 | 15.93 | 34.261 | |
| 2,400.0 | 2,262.8 | 2,311.1 | 2,275.1 | 14.3 | 7.9 | 143.32 | 361.7 | -191.1 | 576.4 | 559.7 | 16.68 | 34.559 | |
| 2,500.0 | 2,354.6 | 2,406.2 | 2,368.4 | 15.1 | 8.2 | 143.73 | 377.5 | -200.9 | 606.9 | 589.5 | 17.42 | 34.835 | |
| 2,600.0 | 2,446.5 | 2,501.4 | 2,461.7 | 15.8 | 8.6 | 144.09 | 393.3 | -210.8 | 637.5 | 619.3 | 18.17 | 35.090 | |
| 2,700.0 | 2,538.3 | 2,596.5 | 2,555.0 | 16.6 | 9.0 | 144.42 | 409.1 | -220.6 | 668.1 | 649.2 | 18.91 | 35.328 | |
| 2,800.0 | 2,630.2 | 2,691.6 | 2,648.3 | 17.4 | 9.3 | 144.72 | 424.9 | -230.5 | 698.7 | 679.1 | 19.66 | 35.549 | |
| 2,900.0 | 2,722.0 | 2,786.8 | 2,741.6 | 18.1 | 9.7 | 145.00 | 440.7 | -240.3 | 729.4 | 709.0 | 20.40 | 35.756 | |
| 3,000.0 | 2,813.9 | 2,881.9 | 2,834.9 | 18.9 | 10.1 | 145.25 | 456.5 | -250.2 | 760.0 | 738.9 | 21.14 | 35.949 | |
| 3,100.0 | 2,905.7 | 2,977.1 | 2,928.2 | 19.6 | 10.4 | 145.49 | 472.3 | -260.0 | 790.7 | 768.8 | 21.88 | 36.130 | |
| 3,200.0 | 2,997.6 | 3,072.2 | 3,021.5 | 20.4 | 10.8 | 145.70 | 488.1 | -269.9 | 821.4 | 798.7 | 22.63 | 36.300 | |

# Cathedral Energy Services

## Anticollision Report

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

**Offset Design** K28NW Pad - Benjamin Fee 28-9B - DD - Plan #2

**Offset Site Error:** 0.0 ft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 ft

| Reference Measured Depth (ft) | Reference Vertical Depth (ft) | Offset Measured Depth (ft) | Offset Vertical Depth (ft) | Semi Major Axis Reference (ft) | Semi Major Axis Offset (ft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (ft) | Offset Wellbore Centre +E/-W (ft) | Distance Between Centres (ft) | Distance Between Ellipses (ft) | Total Uncertainty Axis | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 17.80 | 25.5 | 8.2 | 26.8 | | | | |
| 100.0 | 100.0 | 100.0 | 100.0 | 0.1 | 0.1 | 17.80 | 25.5 | 8.2 | 26.8 | 26.5 | 0.27 | 98.351 | |
| 200.0 | 200.0 | 200.0 | 200.0 | 0.3 | 0.3 | 17.80 | 25.5 | 8.2 | 26.8 | 26.2 | 0.62 | 43.097 | CC, ES |
| 300.0 | 300.0 | 298.9 | 298.8 | 0.5 | 0.5 | 107.74 | 26.5 | 10.6 | 29.2 | 28.2 | 0.98 | 29.805 | |
| 400.0 | 399.6 | 396.2 | 395.9 | 0.7 | 0.7 | 125.69 | 29.3 | 17.5 | 39.4 | 38.1 | 1.36 | 29.067 | SF |
| 500.0 | 498.8 | 490.8 | 489.7 | 1.0 | 1.0 | 139.69 | 33.8 | 28.7 | 60.7 | 59.0 | 1.72 | 35.248 | |
| 600.0 | 597.1 | 581.2 | 578.7 | 1.4 | 1.3 | 147.74 | 39.8 | 43.3 | 92.7 | 90.6 | 2.08 | 44.615 | |
| 700.0 | 694.3 | 666.6 | 662.0 | 1.8 | 1.7 | 152.18 | 46.8 | 60.7 | 134.3 | 131.8 | 2.43 | 55.165 | |
| 800.0 | 790.2 | 752.5 | 745.1 | 2.4 | 2.0 | 154.95 | 54.9 | 80.5 | 183.1 | 180.3 | 2.80 | 65.357 | |
| 900.0 | 884.4 | 836.6 | 826.7 | 3.0 | 2.4 | 156.82 | 62.7 | 99.9 | 236.5 | 233.3 | 3.18 | 74.425 | |
| 976.4 | 955.2 | 899.0 | 887.1 | 3.6 | 2.7 | 157.87 | 68.6 | 114.3 | 280.1 | 276.7 | 3.47 | 80.810 | |
| 1,000.0 | 976.9 | 918.0 | 905.5 | 3.8 | 2.8 | 158.32 | 70.3 | 118.6 | 294.0 | 290.4 | 3.56 | 82.617 | |
| 1,100.0 | 1,068.7 | 998.6 | 983.5 | 4.5 | 3.2 | 159.86 | 77.9 | 137.2 | 352.9 | 348.9 | 3.95 | 89.360 | |
| 1,200.0 | 1,160.6 | 1,079.1 | 1,061.5 | 5.2 | 3.6 | 160.95 | 85.4 | 155.8 | 411.9 | 407.5 | 4.34 | 94.878 | |
| 1,300.0 | 1,252.4 | 1,159.6 | 1,139.5 | 6.0 | 3.9 | 161.78 | 93.0 | 174.3 | 470.9 | 466.2 | 4.73 | 99.477 | |
| 1,400.0 | 1,344.3 | 1,240.1 | 1,217.5 | 6.7 | 4.3 | 162.42 | 100.5 | 192.9 | 530.0 | 524.9 | 5.13 | 103.367 | |
| 1,500.0 | 1,436.1 | 1,320.7 | 1,295.5 | 7.5 | 4.7 | 162.93 | 108.0 | 211.5 | 589.2 | 583.7 | 5.52 | 106.697 | |
| 1,600.0 | 1,528.0 | 1,401.2 | 1,373.5 | 8.3 | 5.1 | 163.35 | 115.6 | 230.0 | 648.4 | 642.5 | 5.92 | 109.579 | |
| 1,700.0 | 1,619.8 | 1,481.7 | 1,451.5 | 9.0 | 5.5 | 163.70 | 123.1 | 248.6 | 707.6 | 701.3 | 6.31 | 112.095 | |
| 1,800.0 | 1,711.7 | 1,562.2 | 1,529.5 | 9.8 | 5.9 | 163.99 | 130.7 | 267.2 | 766.8 | 760.1 | 6.71 | 114.313 | |
| 1,900.0 | 1,803.5 | 1,642.8 | 1,607.5 | 10.5 | 6.2 | 164.25 | 138.2 | 285.7 | 826.0 | 818.9 | 7.10 | 116.281 | |

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

**Offset Design** K28NW Pad - Benjamin Fee 33-1B - DD - Plan #2

**Offset Site Error:** 0.0 ft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 ft

| Reference Measured Depth (ft) | Reference Vertical Depth (ft) | Offset Measured Depth (ft) | Offset Vertical Depth (ft) | Semi Major Axis Reference (ft) | Semi Major Axis Offset (ft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (ft) | Offset Wellbore Centre +E/-W (ft) | Distance Between Centres (ft) | Distance Between Ellipses (ft) | Total Uncertainty Axis | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -90.00 | 0.0 | -99.8 | 99.8 | | | | |
| 100.0 | 100.0 | 100.0 | 100.0 | 0.1 | 0.1 | -90.00 | 0.0 | -99.8 | 99.8 | 99.5 | 0.27 | 366.573 | |
| 200.0 | 200.0 | 200.0 | 200.0 | 0.3 | 0.3 | -90.00 | 0.0 | -99.8 | 99.8 | 99.2 | 0.62 | 160.633 | |
| 300.0 | 300.0 | 300.0 | 300.0 | 0.5 | 0.5 | -9.14 | 0.0 | -99.8 | 97.2 | 96.3 | 0.97 | 100.252 | |
| 400.0 | 399.6 | 399.6 | 399.6 | 0.7 | 0.7 | -9.98 | 0.0 | -99.8 | 89.5 | 88.2 | 1.32 | 67.953 | |
| 500.0 | 498.8 | 502.8 | 502.7 | 1.0 | 0.8 | -11.95 | 0.0 | -97.0 | 74.0 | 72.3 | 1.67 | 44.283 | |
| 600.0 | 597.1 | 602.0 | 601.7 | 1.4 | 1.0 | -17.56 | -0.3 | -89.3 | 48.7 | 46.7 | 2.04 | 23.899 | |
| 700.0 | 694.3 | 696.3 | 695.3 | 1.8 | 1.3 | -53.75 | -3.7 | -78.9 | 20.1 | 17.3 | 2.86 | 7.044 | |
| 726.8 | 720.1 | 720.8 | 719.6 | 2.0 | 1.3 | -83.26 | -5.3 | -75.8 | 17.0 | 13.7 | 3.30 | 5.170 | CC, ES, SF |
| 800.0 | 790.2 | 786.0 | 783.9 | 2.4 | 1.5 | -140.96 | -10.7 | -66.8 | 36.4 | 33.2 | 3.17 | 11.474 | |
| 900.0 | 884.4 | 870.2 | 866.5 | 3.0 | 1.8 | -156.56 | -20.4 | -53.5 | 84.2 | 80.9 | 3.25 | 25.881 | |
| 976.4 | 955.2 | 930.5 | 925.1 | 3.6 | 2.1 | -159.75 | -29.3 | -42.8 | 126.8 | 123.3 | 3.46 | 36.602 | |
| 1,000.0 | 976.9 | 948.5 | 942.5 | 3.8 | 2.2 | -160.43 | -32.3 | -39.4 | 140.7 | 137.1 | 3.54 | 39.748 | |
| 1,100.0 | 1,068.7 | 1,022.4 | 1,013.7 | 4.5 | 2.5 | -161.88 | -45.9 | -24.6 | 201.3 | 197.4 | 3.89 | 51.758 | |
| 1,200.0 | 1,160.6 | 1,092.9 | 1,080.7 | 5.2 | 2.9 | -162.24 | -61.1 | -9.2 | 264.4 | 260.1 | 4.27 | 61.901 | |
| 1,300.0 | 1,252.4 | 1,159.9 | 1,143.8 | 6.0 | 3.3 | -162.14 | -77.5 | 6.6 | 329.8 | 325.1 | 4.68 | 70.434 | |
| 1,400.0 | 1,344.3 | 1,223.7 | 1,202.9 | 6.7 | 3.7 | -161.83 | -94.9 | 22.6 | 397.3 | 392.2 | 5.11 | 77.807 | |
| 1,500.0 | 1,436.1 | 1,284.2 | 1,258.4 | 7.5 | 4.2 | -161.42 | -113.0 | 38.8 | 466.8 | 461.2 | 5.55 | 84.181 | |
| 1,600.0 | 1,528.0 | 1,349.6 | 1,317.6 | 8.3 | 4.7 | -160.93 | -133.9 | 57.1 | 537.8 | 531.8 | 6.01 | 89.498 | |
| 1,700.0 | 1,619.8 | 1,419.8 | 1,381.1 | 9.0 | 5.2 | -160.52 | -156.4 | 76.8 | 609.0 | 602.5 | 6.49 | 93.848 | |
| 1,800.0 | 1,711.7 | 1,490.0 | 1,444.6 | 9.8 | 5.7 | -160.20 | -178.9 | 96.4 | 680.2 | 673.2 | 6.97 | 97.557 | |
| 1,900.0 | 1,803.5 | 1,560.2 | 1,508.1 | 10.5 | 6.3 | -159.93 | -201.4 | 116.1 | 751.4 | 743.9 | 7.46 | 100.740 | |
| 2,000.0 | 1,895.4 | 1,630.3 | 1,571.6 | 11.3 | 6.8 | -159.71 | -223.9 | 135.8 | 822.6 | 814.6 | 7.95 | 103.522 | |

# Cathedral Energy Services

## Anticollision Report

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

**Offset Design** K28NW Pad - GMR 28-7D Existing - DD - Schlumberger Surveys

**Offset Site Error:** 0.0 ft

**Survey Program:** 140-MWD

**Offset Well Error:** 0.0 ft

| Reference Measured Depth (ft) | Reference Vertical Depth (ft) | Offset Measured Depth (ft) | Offset Vertical Depth (ft) | Semi Major Axis Reference (ft) | Semi Major Axis Offset (ft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (ft) | Offset Wellbore Centre +E/-W (ft) | Distance Between Centres (ft) | Distance Between Ellipses (ft) | Total Uncertainty Axis | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -118.25 | -53.6 | -99.8 | 113.3 | | | | |
| 100.0 | 100.0 | 102.0 | 101.9 | 0.1 | 0.2 | -117.94 | -52.7 | -99.3 | 112.4 | 112.1 | 0.29 | 386.190 | |
| 200.0 | 200.0 | 204.1 | 204.0 | 0.3 | 0.3 | -117.15 | -50.1 | -97.6 | 109.8 | 109.1 | 0.64 | 170.278 | |
| 300.0 | 300.0 | 308.2 | 307.9 | 0.5 | 0.6 | -36.24 | -46.1 | -93.2 | 102.2 | 101.2 | 0.99 | 102.921 | |
| 400.0 | 399.6 | 409.4 | 408.8 | 0.7 | 0.8 | -38.62 | -40.4 | -85.6 | 86.7 | 85.3 | 1.36 | 63.771 | |
| 500.0 | 498.8 | 508.2 | 506.9 | 1.0 | 1.1 | -44.30 | -33.0 | -77.0 | 65.5 | 63.8 | 1.76 | 37.166 | |
| 600.0 | 597.1 | 605.7 | 603.4 | 1.4 | 1.4 | -59.95 | -23.1 | -67.1 | 39.8 | 37.5 | 2.30 | 17.275 | |
| 690.2 | 684.9 | 690.7 | 687.1 | 1.8 | 1.7 | -112.31 | -13.2 | -56.7 | 23.5 | 20.3 | 3.25 | 7.239 | CC, ES |
| 700.0 | 694.3 | 699.8 | 696.0 | 1.8 | 1.7 | -120.73 | -12.0 | -55.5 | 23.8 | 20.5 | 3.30 | 7.220 | SF |
| 800.0 | 790.2 | 790.8 | 785.2 | 2.4 | 2.1 | -173.26 | 1.2 | -43.2 | 51.2 | 48.0 | 3.18 | 16.082 | |
| 900.0 | 884.4 | 877.3 | 869.5 | 3.0 | 2.4 | 172.40 | 15.9 | -30.2 | 96.4 | 92.9 | 3.46 | 27.861 | |
| 976.4 | 955.2 | 941.4 | 931.6 | 3.6 | 2.7 | 167.55 | 28.1 | -19.8 | 136.1 | 132.4 | 3.79 | 35.913 | |
| 1,000.0 | 976.9 | 960.8 | 950.3 | 3.8 | 2.8 | 166.57 | 32.0 | -16.6 | 149.0 | 145.1 | 3.91 | 38.082 | |
| 1,100.0 | 1,068.7 | 1,039.3 | 1,025.7 | 4.5 | 3.3 | 163.56 | 48.6 | -2.8 | 204.6 | 200.1 | 4.45 | 45.996 | |
| 1,200.0 | 1,160.6 | 1,116.0 | 1,098.8 | 5.2 | 3.7 | 161.53 | 66.2 | 12.4 | 262.4 | 257.4 | 5.01 | 52.362 | |
| 1,300.0 | 1,252.4 | 1,191.6 | 1,170.4 | 6.0 | 4.2 | 159.99 | 84.7 | 28.3 | 321.8 | 316.2 | 5.60 | 57.495 | |
| 1,400.0 | 1,344.3 | 1,265.1 | 1,239.5 | 6.7 | 4.6 | 158.86 | 103.1 | 44.9 | 382.6 | 376.4 | 6.19 | 61.843 | |
| 1,500.0 | 1,436.1 | 1,336.7 | 1,306.6 | 7.5 | 5.1 | 158.00 | 121.5 | 62.1 | 444.7 | 438.0 | 6.77 | 65.676 | |
| 1,600.0 | 1,528.0 | 1,422.1 | 1,386.5 | 8.3 | 5.6 | 157.21 | 143.6 | 82.7 | 507.1 | 499.7 | 7.41 | 68.420 | |
| 1,700.0 | 1,619.8 | 1,504.2 | 1,463.7 | 9.0 | 6.1 | 156.64 | 164.5 | 101.3 | 568.2 | 560.2 | 8.04 | 70.684 | |
| 1,800.0 | 1,711.7 | 1,575.3 | 1,530.4 | 9.8 | 6.6 | 156.25 | 182.6 | 117.9 | 629.9 | 621.3 | 8.63 | 73.026 | |
| 1,900.0 | 1,803.5 | 1,649.6 | 1,599.9 | 10.5 | 7.1 | 155.92 | 201.6 | 136.1 | 692.5 | 683.3 | 9.22 | 75.076 | |
| 2,000.0 | 1,895.4 | 1,736.8 | 1,681.6 | 11.3 | 7.6 | 155.61 | 223.7 | 157.0 | 754.7 | 744.8 | 9.87 | 76.487 | |
| 2,100.0 | 1,987.2 | 1,821.3 | 1,761.1 | 12.0 | 8.2 | 155.35 | 245.0 | 176.4 | 816.1 | 805.6 | 10.50 | 77.688 | |

# Cathedral Energy Services

## Anticollision Report

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

**Offset Design** K28NW Pad - GMU 28-14D Existing - Schlumberger Surveys - Schlumberger Surveys

**Offset Site Error:** 0.0 ft

**Survey Program:** 270-MWD

**Offset Well Error:** 0.0 ft

| Reference Measured Depth (ft) | Reference Vertical Depth (ft) | Offset Measured Depth (ft) | Offset Vertical Depth (ft) | Semi Major Axis Reference (ft) | Semi Major Axis Offset (ft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (ft) | Offset Wellbore Centre +E/-W (ft) | Distance Between Centres (ft) | Distance Between Ellipses (ft) | Total Uncertainty Axis | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -127.88 | -91.1 | -117.1 | 148.3 | | | | |
| 100.0 | 100.0 | 100.1 | 100.1 | 0.1 | 0.2 | -127.86 | -91.0 | -117.1 | 148.3 | 148.0 | 0.30 | 499.743 | |
| 200.0 | 200.0 | 200.2 | 200.2 | 0.3 | 0.3 | -127.81 | -90.8 | -117.0 | 148.1 | 147.5 | 0.63 | 234.497 | |
| 300.0 | 300.0 | 300.1 | 300.1 | 0.5 | 0.5 | -47.41 | -90.6 | -117.0 | 146.2 | 145.2 | 0.97 | 149.949 | |
| 400.0 | 399.6 | 398.3 | 398.3 | 0.7 | 0.7 | -49.93 | -90.9 | -117.1 | 141.3 | 139.9 | 1.35 | 104.806 | |
| 500.0 | 498.8 | 495.6 | 495.6 | 1.0 | 0.8 | -54.22 | -92.1 | -118.4 | 135.0 | 133.2 | 1.77 | 76.260 | |
| 600.0 | 597.1 | 592.6 | 592.5 | 1.4 | 1.0 | -60.98 | -94.2 | -120.1 | 127.9 | 125.7 | 2.28 | 56.047 | |
| 700.0 | 694.3 | 687.1 | 687.0 | 1.8 | 1.2 | -70.67 | -98.3 | -121.8 | 122.9 | 119.9 | 2.92 | 42.054 | |
| 740.8 | 733.6 | 725.2 | 724.9 | 2.0 | 1.3 | -75.28 | -100.5 | -122.9 | 122.3 | 119.1 | 3.23 | 37.853 | CC, ES |
| 800.0 | 790.2 | 781.0 | 780.6 | 2.4 | 1.4 | -82.53 | -104.3 | -124.8 | 123.5 | 119.8 | 3.69 | 33.485 | |
| 900.0 | 884.4 | 875.4 | 874.6 | 3.0 | 1.6 | -95.33 | -111.2 | -128.9 | 131.2 | 126.7 | 4.52 | 29.048 | |
| 976.4 | 955.2 | 945.9 | 944.9 | 3.6 | 1.7 | -104.40 | -116.5 | -132.9 | 142.5 | 137.4 | 5.14 | 27.727 | |
| 1,000.0 | 976.9 | 967.3 | 966.1 | 3.8 | 1.8 | -107.00 | -118.4 | -134.4 | 147.1 | 141.8 | 5.32 | 27.658 | SF |
| 1,100.0 | 1,068.7 | 1,058.4 | 1,056.4 | 4.5 | 2.0 | -115.91 | -127.7 | -142.3 | 170.6 | 164.5 | 6.04 | 28.240 | |
| 1,200.0 | 1,160.6 | 1,150.3 | 1,146.9 | 5.2 | 2.3 | -121.74 | -139.4 | -152.9 | 198.3 | 191.5 | 6.77 | 29.307 | |
| 1,300.0 | 1,252.4 | 1,241.5 | 1,236.1 | 6.0 | 2.6 | -125.30 | -153.4 | -165.7 | 228.6 | 221.0 | 7.54 | 30.313 | |
| 1,400.0 | 1,344.3 | 1,330.4 | 1,322.6 | 6.7 | 3.0 | -127.56 | -169.2 | -179.0 | 261.1 | 252.8 | 8.36 | 31.251 | |
| 1,500.0 | 1,436.1 | 1,420.8 | 1,409.9 | 7.5 | 3.4 | -128.94 | -188.0 | -193.1 | 295.9 | 286.6 | 9.24 | 32.016 | |
| 1,600.0 | 1,528.0 | 1,517.3 | 1,502.5 | 8.3 | 3.9 | -129.71 | -208.9 | -210.1 | 330.5 | 320.3 | 10.22 | 32.352 | |
| 1,700.0 | 1,619.8 | 1,614.8 | 1,595.7 | 9.0 | 4.4 | -130.08 | -230.2 | -229.0 | 364.3 | 353.0 | 11.22 | 32.459 | |
| 1,800.0 | 1,711.7 | 1,712.9 | 1,689.8 | 9.8 | 4.9 | -130.45 | -250.5 | -248.3 | 397.1 | 384.9 | 12.23 | 32.466 | |
| 1,900.0 | 1,803.5 | 1,806.0 | 1,779.0 | 10.5 | 5.4 | -130.74 | -269.6 | -266.8 | 429.6 | 416.4 | 13.25 | 32.425 | |
| 2,000.0 | 1,895.4 | 1,897.6 | 1,866.5 | 11.3 | 5.9 | -130.87 | -289.2 | -285.4 | 462.7 | 448.4 | 14.28 | 32.400 | |
| 2,100.0 | 1,987.2 | 1,990.9 | 1,955.4 | 12.0 | 6.4 | -130.88 | -310.0 | -304.7 | 496.1 | 480.8 | 15.34 | 32.341 | |
| 2,200.0 | 2,079.1 | 2,084.6 | 2,044.5 | 12.8 | 6.9 | -130.86 | -331.2 | -324.4 | 529.7 | 513.3 | 16.41 | 32.275 | |
| 2,300.0 | 2,170.9 | 2,190.9 | 2,145.7 | 13.6 | 7.5 | -130.83 | -354.4 | -347.2 | 562.5 | 545.0 | 17.54 | 32.063 | |
| 2,400.0 | 2,262.8 | 2,300.3 | 2,250.2 | 14.3 | 8.1 | -130.89 | -375.6 | -371.6 | 592.8 | 574.2 | 18.69 | 31.720 | |
| 2,500.0 | 2,354.6 | 2,396.8 | 2,342.2 | 15.1 | 8.7 | -130.87 | -393.7 | -394.4 | 622.0 | 602.2 | 19.84 | 31.351 | |
| 2,600.0 | 2,446.5 | 2,493.4 | 2,433.8 | 15.8 | 9.2 | -130.70 | -412.7 | -418.6 | 651.1 | 630.1 | 21.01 | 30.983 | |
| 2,700.0 | 2,538.3 | 2,578.7 | 2,514.2 | 16.6 | 9.8 | -130.45 | -430.2 | -440.8 | 680.5 | 658.3 | 22.13 | 30.751 | |
| 2,800.0 | 2,630.2 | 2,653.6 | 2,584.9 | 17.4 | 10.2 | -130.25 | -447.2 | -459.2 | 712.3 | 689.1 | 23.17 | 30.741 | |
| 2,900.0 | 2,722.0 | 2,734.8 | 2,661.4 | 18.1 | 10.7 | -130.08 | -467.2 | -477.5 | 746.5 | 722.3 | 24.23 | 30.810 | |
| 3,000.0 | 2,813.9 | 2,816.0 | 2,738.2 | 18.9 | 11.2 | -130.02 | -487.1 | -494.6 | 781.6 | 756.4 | 25.26 | 30.940 | |
| 3,100.0 | 2,905.7 | 2,908.0 | 2,825.4 | 19.6 | 11.7 | -130.00 | -510.4 | -512.8 | 818.0 | 791.7 | 26.34 | 31.053 | |

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

| | | | |
|---|---|---|---|
| **Company:** | EnCana Oil & Gas (USA) Inc | **Local Co-ordinate Reference:** | Well Benjamin Federal 28-12B2 |
| **Project:** | Mamm Creek | **TVD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Reference Site:** | K28NW Pad | **MD Reference:** | WELL @ 5965.0ft (Original Well Elev) |
| **Site Error:** | 0.0ft | **North Reference:** | True |
| **Reference Well:** | Benjamin Federal 28-12B2 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0ft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | DD | **Database:** | EDM 5000.1 US Multi Users DB |
| **Reference Design:** | Plan #2 | **Offset TVD Reference:** | Offset Datum |

Reference Depths are relative to WELL @ 5965.0ft (Original Well Elev)
Offset Depths are relative to Offset Datum
Central Meridian is -105.500000 °

Coordinates are relative to: Benjamin Federal 28-12B2
Coordinate System is US State Plane 1983, Colorado Central Zone
Grid Convergence at Surface is: -1.44°