# Piceance Energy, LLC

**Mesa County, CO**
**Piceance 28-05**
**Piceance 28-07W**

**Slot B-4**

**Plan: Design #1**

# Standard Planning Report

**29 April, 2015**

Archer

Project: Mesa County, CO
Site: Piceance 28-05
Well: Piceance 28-07W
Wellbore: Slot B-4
Design: Design #1
Latitude: 39° 15' 3.910 N
Longitude: 107° 46' 46.490 W
Ground Level: 7556.0
Well @ 7578.0usft

Archer

## PROJECT DETAILS: Mesa County, CO

Geodetic System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone: Colorado Central Zone

System Datum: Mean Sea Level

## REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well Piceance 28-07W, True North
Vertical (TVD) Reference: Well @ 7578.0usft
Section (VS) Reference: Slot - (0.0N, 0.0E)
Measured Depth Reference: Well @ 7578.0usft
Calculation Method: Minimum Curvature

## WELL DETAILS: Piceance 28-07W

Ground Level: 7556.0

| +N/-S | +E/-W | Northing | Easting | Latitude | Longitude | Slot |
|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 1524441.11 | 2354530.65 | 39° 15' 3.910 N | 107° 46' 46.490 W | |

## WELLBORE TARGET DETAILS (MAP CO-ORDINATES AND LAT/LONG)

| Name | TVD | +N/-S | +E/-W | Northing | Easting | Latitude | Longitude | Shape |
|---|---|---|---|---|---|---|---|---|
| Piceance Federal 28-07W tgt | 7850.0 | -70.8 | -317.8 | 1524378.30 | 2354211.18 | 39° 15' 3.210 N | 107° 46' 50.530 W | Circle (Radius: 50.0) |

## SECTION DETAILS

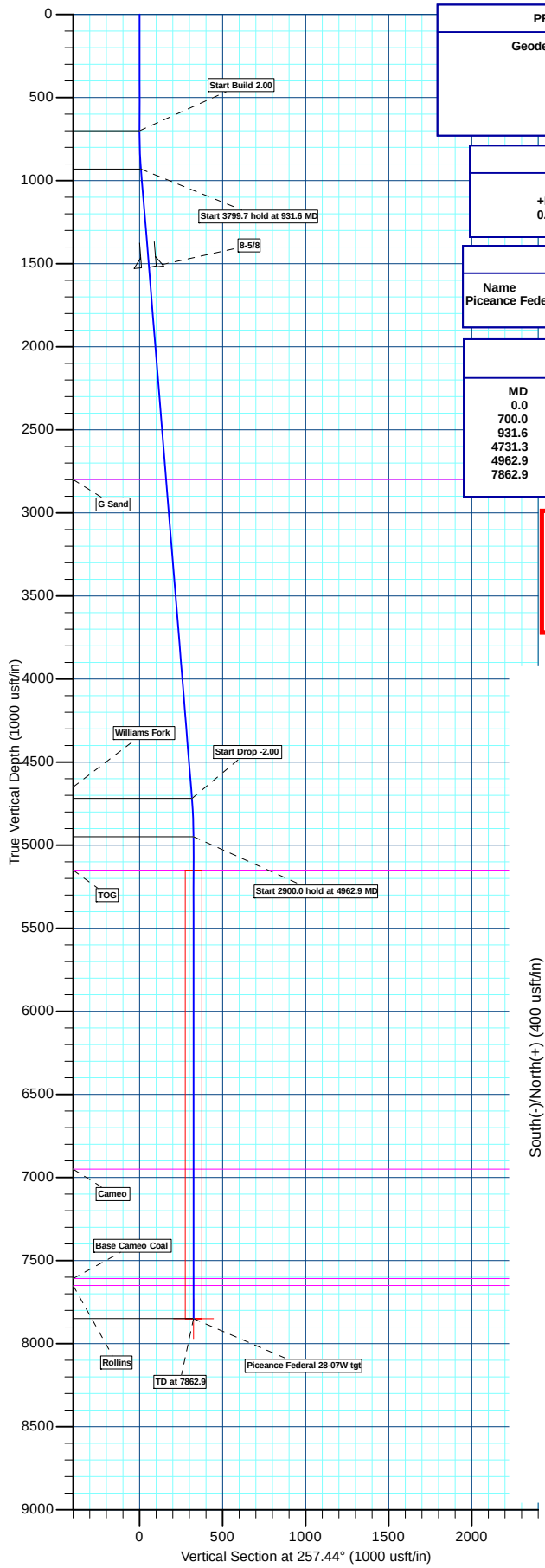
| MD | Inc | Azi | TVD | +N/-S | +E/-W | Dleg | TFace | VSect | Annotation |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00 | 0.00 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.0 | |
| 700.0 | 0.00 | 0.00 | 700.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.0 | Start Build 2.00 |
| 931.6 | 4.63 | 257.44 | 931.4 | -2.0 | -9.1 | 2.00 | 257.44 | 9.4 | Start 3799.7 hold at 931.6 MD |
| 4731.3 | 4.63 | 257.44 | 4718.6 | -68.8 | -308.7 | 0.00 | 0.00 | 316.2 | Start Drop -2.00 |
| 4962.9 | 0.00 | 0.00 | 4950.0 | -70.8 | -317.8 | 2.00 | 180.00 | 325.6 | Start 2900.0 hold at 4962.9 MD |
| 7862.9 | 0.00 | 0.00 | 7850.0 | -70.8 | -317.8 | 0.00 | 0.00 | 325.6 | TD at 7862.9 |

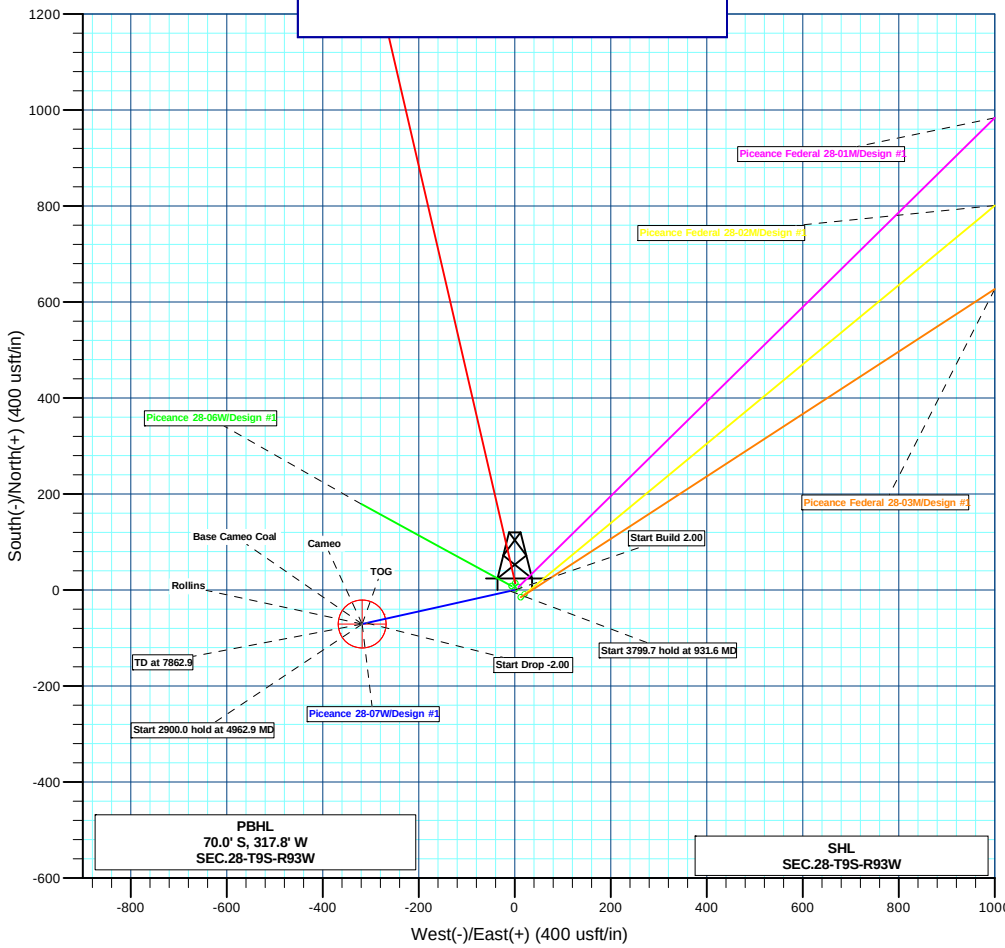

Azimuths to True North
Magnetic North: 9.72°

Magnetic Field
Strength: 51741.9snT
Dip Angle: 65.47°
Date: 2015/04/27
Model: IGRF2010

## FORMATION TOP DETAILS

| TVDPath | MDPath | Formation |
|---|---|---|
| 2800.0 | 2806.4 | G Sand |
| 4650.0 | 4662.4 | Williams Fork |
| 5150.0 | 5162.9 | TOG |
| 6950.0 | 6962.9 | Cameo |
| 7608.0 | 7620.9 | Base Cameo Coal |
| 7650.0 | 7662.9 | Rollins |




**Plan: Design #1 (Piceance 28-07W/Slot B-4)**

**Created By:** Ricky Osburn **Date:** 8:34, April 29 2015

| | | | |
|---|---|---|---|
| **Database:** | EDMDBBW | **Local Co-ordinate Reference:** | Well Piceance 28-07W |
| **Company:** | Piceance Energy, LLC | **TVD Reference:** | Well @ 7578.0usft |
| **Project:** | Mesa County, CO | **MD Reference:** | Well @ 7578.0usft |
| **Site:** | Piceance 28-05 | **North Reference:** | True |
| **Well:** | Piceance 28-07W | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | Slot B-4 | | |
| **Design:** | Design #1 | | |

**Project** Mesa County, CO

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

**Site** Piceance 28-05

| | | | | | |
|---|---|---|---|---|---|
| **Site Position:** | | **Northing:** | 1,524,375.79 usft | **Latitude:** | 39° 15' 3.280 N |
| **From:** | Lat/Long | **Easting:** | 2,354,593.53 usft | **Longitude:** | 107° 46' 45.670 W |
| **Position Uncertainty:** | 0.0 usft | **Slot Radius:** | 13-3/16 " | **Grid Convergence:** | -1.44 ° |

**Well** Piceance 28-07W

| | | | | | | |
|---|---|---|---|---|---|---|
| **Well Position** | **+N/-S** | 63.7 usft | **Northing:** | 1,524,441.11 usft | **Latitude:** | 39° 15' 3.910 N |
| | **+E/-W** | -64.5 usft | **Easting:** | 2,354,530.65 usft | **Longitude:** | 107° 46' 46.490 W |
| **Position Uncertainty** | | 0.0 usft | **Wellhead Elevation:** | 0.0 usft | **Ground Level:** | 7,556.0 usft |

**Wellbore** Slot B-4

| Magnetics | Model Name | Sample Date | Declination (°) | Dip Angle (°) | Field Strength (nT) |
|---|---|---|---|---|---|
| | IGRF2010 | 2015/04/27 | 9.73 | 65.47 | 51,742 |

**Design** Design #1

**Audit Notes:**

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

| Vertical Section: | Depth From (TVD) (usft) | +N/-S (usft) | +E/-W (usft) | Direction (°) |
|---|---|---|---|---|
| | 0.0 | 0.0 | 0.0 | 257.44 |

**Plan Sections**

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) | TFO (°) | Target |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00 | 0.00 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 700.0 | 0.00 | 0.00 | 700.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 931.6 | 4.63 | 257.44 | 931.4 | -2.0 | -9.1 | 2.00 | 2.00 | 0.00 | 257.44 | |
| 4,731.3 | 4.63 | 257.44 | 4,718.6 | -68.8 | -308.7 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 4,962.9 | 0.00 | 0.00 | 4,950.0 | -70.8 | -317.8 | 2.00 | -2.00 | 0.00 | 180.00 | |
| 7,862.9 | 0.00 | 0.00 | 7,850.0 | -70.8 | -317.8 | 0.00 | 0.00 | 0.00 | 0.00 | Piceance Federal 28- |

| | | | |
|---|---|---|---|
| **Database:** | EDMDBBW | **Local Co-ordinate Reference:** | Well Piceance 28-07W |
| **Company:** | Piceance Energy, LLC | **TVD Reference:** | Well @ 7578.0usft |
| **Project:** | Mesa County, CO | **MD Reference:** | Well @ 7578.0usft |
| **Site:** | Piceance 28-05 | **North Reference:** | True |
| **Well:** | Piceance 28-07W | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | Slot B-4 | | |
| **Design:** | Design #1 | | |

**Planned Survey**

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00 | 0.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 100.0 | 0.00 | 0.00 | 100.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 200.0 | 0.00 | 0.00 | 200.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 300.0 | 0.00 | 0.00 | 300.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 400.0 | 0.00 | 0.00 | 400.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 500.0 | 0.00 | 0.00 | 500.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 600.0 | 0.00 | 0.00 | 600.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| **Start Build 2.00** | | | | | | | | | |
| 700.0 | 0.00 | 0.00 | 700.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 800.0 | 2.00 | 257.44 | 800.0 | -0.4 | -1.7 | 1.7 | 2.00 | 2.00 | 0.00 |
| 900.0 | 4.00 | 257.44 | 899.8 | -1.5 | -6.8 | 7.0 | 2.00 | 2.00 | 0.00 |
| **Start 3799.7 hold at 931.6 MD** | | | | | | | | | |
| 931.6 | 4.63 | 257.44 | 931.4 | -2.0 | -9.1 | 9.4 | 2.00 | 2.00 | 0.00 |
| 1,000.0 | 4.63 | 257.44 | 999.5 | -3.2 | -14.5 | 14.9 | 0.00 | 0.00 | 0.00 |
| 1,100.0 | 4.63 | 257.44 | 1,099.2 | -5.0 | -22.4 | 23.0 | 0.00 | 0.00 | 0.00 |
| 1,200.0 | 4.63 | 257.44 | 1,198.9 | -6.7 | -30.3 | 31.0 | 0.00 | 0.00 | 0.00 |
| 1,300.0 | 4.63 | 257.44 | 1,298.5 | -8.5 | -38.2 | 39.1 | 0.00 | 0.00 | 0.00 |
| 1,400.0 | 4.63 | 257.44 | 1,398.2 | -10.3 | -46.1 | 47.2 | 0.00 | 0.00 | 0.00 |
| 1,500.0 | 4.63 | 257.44 | 1,497.9 | -12.0 | -53.9 | 55.3 | 0.00 | 0.00 | 0.00 |
| **8-5/8** | | | | | | | | | |
| 1,524.2 | 4.63 | 257.44 | 1,522.0 | -12.4 | -55.8 | 57.2 | 0.00 | 0.00 | 0.00 |
| 1,600.0 | 4.63 | 257.44 | 1,597.6 | -13.8 | -61.8 | 63.3 | 0.00 | 0.00 | 0.00 |
| 1,700.0 | 4.63 | 257.44 | 1,697.2 | -15.5 | -69.7 | 71.4 | 0.00 | 0.00 | 0.00 |
| 1,800.0 | 4.63 | 257.44 | 1,796.9 | -17.3 | -77.6 | 79.5 | 0.00 | 0.00 | 0.00 |
| 1,900.0 | 4.63 | 257.44 | 1,896.6 | -19.0 | -85.5 | 87.6 | 0.00 | 0.00 | 0.00 |
| 2,000.0 | 4.63 | 257.44 | 1,996.3 | -20.8 | -93.4 | 95.6 | 0.00 | 0.00 | 0.00 |
| 2,100.0 | 4.63 | 257.44 | 2,095.9 | -22.6 | -101.2 | 103.7 | 0.00 | 0.00 | 0.00 |
| 2,200.0 | 4.63 | 257.44 | 2,195.6 | -24.3 | -109.1 | 111.8 | 0.00 | 0.00 | 0.00 |
| 2,300.0 | 4.63 | 257.44 | 2,295.3 | -26.1 | -117.0 | 119.9 | 0.00 | 0.00 | 0.00 |
| 2,400.0 | 4.63 | 257.44 | 2,395.0 | -27.8 | -124.9 | 127.9 | 0.00 | 0.00 | 0.00 |
| 2,500.0 | 4.63 | 257.44 | 2,494.6 | -29.6 | -132.8 | 136.0 | 0.00 | 0.00 | 0.00 |
| 2,600.0 | 4.63 | 257.44 | 2,594.3 | -31.3 | -140.7 | 144.1 | 0.00 | 0.00 | 0.00 |
| 2,700.0 | 4.63 | 257.44 | 2,694.0 | -33.1 | -148.5 | 152.2 | 0.00 | 0.00 | 0.00 |
| 2,800.0 | 4.63 | 257.44 | 2,793.6 | -34.9 | -156.4 | 160.3 | 0.00 | 0.00 | 0.00 |
| **G Sand** | | | | | | | | | |
| 2,806.4 | 4.63 | 257.44 | 2,800.0 | -35.0 | -156.9 | 160.8 | 0.00 | 0.00 | 0.00 |
| 2,900.0 | 4.63 | 257.44 | 2,893.3 | -36.6 | -164.3 | 168.3 | 0.00 | 0.00 | 0.00 |
| 3,000.0 | 4.63 | 257.44 | 2,993.0 | -38.4 | -172.2 | 176.4 | 0.00 | 0.00 | 0.00 |
| 3,100.0 | 4.63 | 257.44 | 3,092.7 | -40.1 | -180.1 | 184.5 | 0.00 | 0.00 | 0.00 |
| 3,200.0 | 4.63 | 257.44 | 3,192.3 | -41.9 | -187.9 | 192.6 | 0.00 | 0.00 | 0.00 |
| 3,300.0 | 4.63 | 257.44 | 3,292.0 | -43.6 | -195.8 | 200.6 | 0.00 | 0.00 | 0.00 |
| 3,400.0 | 4.63 | 257.44 | 3,391.7 | -45.4 | -203.7 | 208.7 | 0.00 | 0.00 | 0.00 |
| 3,500.0 | 4.63 | 257.44 | 3,491.4 | -47.1 | -211.6 | 216.8 | 0.00 | 0.00 | 0.00 |
| 3,600.0 | 4.63 | 257.44 | 3,591.0 | -48.9 | -219.5 | 224.9 | 0.00 | 0.00 | 0.00 |
| 3,700.0 | 4.63 | 257.44 | 3,690.7 | -50.7 | -227.4 | 232.9 | 0.00 | 0.00 | 0.00 |
| 3,800.0 | 4.63 | 257.44 | 3,790.4 | -52.4 | -235.2 | 241.0 | 0.00 | 0.00 | 0.00 |
| 3,900.0 | 4.63 | 257.44 | 3,890.1 | -54.2 | -243.1 | 249.1 | 0.00 | 0.00 | 0.00 |
| 4,000.0 | 4.63 | 257.44 | 3,989.7 | -55.9 | -251.0 | 257.2 | 0.00 | 0.00 | 0.00 |
| 4,100.0 | 4.63 | 257.44 | 4,089.4 | -57.7 | -258.9 | 265.2 | 0.00 | 0.00 | 0.00 |
| 4,200.0 | 4.63 | 257.44 | 4,189.1 | -59.4 | -266.8 | 273.3 | 0.00 | 0.00 | 0.00 |
| 4,300.0 | 4.63 | 257.44 | 4,288.7 | -61.2 | -274.7 | 281.4 | 0.00 | 0.00 | 0.00 |
| 4,400.0 | 4.63 | 257.44 | 4,388.4 | -63.0 | -282.5 | 289.5 | 0.00 | 0.00 | 0.00 |
| 4,500.0 | 4.63 | 257.44 | 4,488.1 | -64.7 | -290.4 | 297.5 | 0.00 | 0.00 | 0.00 |
| 4,600.0 | 4.63 | 257.44 | 4,587.8 | -66.5 | -298.3 | 305.6 | 0.00 | 0.00 | 0.00 |

| | | | |
|---|---|---|---|
| **Database:** | EDMDBBW | **Local Co-ordinate Reference:** | Well Piceance 28-07W |
| **Company:** | Piceance Energy, LLC | **TVD Reference:** | Well @ 7578.0usft |
| **Project:** | Mesa County, CO | **MD Reference:** | Well @ 7578.0usft |
| **Site:** | Piceance 28-05 | **North Reference:** | True |
| **Well:** | Piceance 28-07W | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | Slot B-4 | | |
| **Design:** | Design #1 | | |

**Planned Survey**

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |
|---|---|---|---|---|---|---|---|---|---|
| **Williams Fork** | | | | | | | | | |
| 4,662.4 | 4.63 | 257.44 | 4,650.0 | -67.6 | -303.2 | 310.7 | 0.00 | 0.00 | 0.00 |
| 4,700.0 | 4.63 | 257.44 | 4,687.4 | -68.2 | -306.2 | 313.7 | 0.00 | 0.00 | 0.00 |
| **Start Drop -2.00** | | | | | | | | | |
| 4,731.3 | 4.63 | 257.44 | 4,718.6 | -68.8 | -308.7 | 316.2 | 0.00 | 0.00 | 0.00 |
| 4,800.0 | 3.26 | 257.44 | 4,787.2 | -69.8 | -313.3 | 321.0 | 2.00 | -2.00 | 0.00 |
| 4,900.0 | 1.26 | 257.44 | 4,887.1 | -70.7 | -317.1 | 324.9 | 2.00 | -2.00 | 0.00 |
| **Start 2900.0 hold at 4962.9 MD** | | | | | | | | | |
| 4,962.9 | 0.00 | 0.00 | 4,950.0 | -70.8 | -317.8 | 325.6 | 2.00 | -2.00 | 163.01 |
| 5,000.0 | 0.00 | 0.00 | 4,987.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 5,100.0 | 0.00 | 0.00 | 5,087.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| **TOG** | | | | | | | | | |
| 5,162.9 | 0.00 | 0.00 | 5,150.0 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 5,200.0 | 0.00 | 0.00 | 5,187.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 5,300.0 | 0.00 | 0.00 | 5,287.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 5,400.0 | 0.00 | 0.00 | 5,387.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 5,500.0 | 0.00 | 0.00 | 5,487.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 5,600.0 | 0.00 | 0.00 | 5,587.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 5,700.0 | 0.00 | 0.00 | 5,687.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 5,800.0 | 0.00 | 0.00 | 5,787.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 5,900.0 | 0.00 | 0.00 | 5,887.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 6,000.0 | 0.00 | 0.00 | 5,987.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 6,100.0 | 0.00 | 0.00 | 6,087.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 6,200.0 | 0.00 | 0.00 | 6,187.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 6,300.0 | 0.00 | 0.00 | 6,287.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 6,400.0 | 0.00 | 0.00 | 6,387.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 6,500.0 | 0.00 | 0.00 | 6,487.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 6,600.0 | 0.00 | 0.00 | 6,587.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 6,700.0 | 0.00 | 0.00 | 6,687.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 6,800.0 | 0.00 | 0.00 | 6,787.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 6,900.0 | 0.00 | 0.00 | 6,887.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| **Cameo** | | | | | | | | | |
| 6,962.9 | 0.00 | 0.00 | 6,950.0 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 7,000.0 | 0.00 | 0.00 | 6,987.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 7,100.0 | 0.00 | 0.00 | 7,087.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 7,200.0 | 0.00 | 0.00 | 7,187.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 7,300.0 | 0.00 | 0.00 | 7,287.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 7,400.0 | 0.00 | 0.00 | 7,387.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 7,500.0 | 0.00 | 0.00 | 7,487.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 7,600.0 | 0.00 | 0.00 | 7,587.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| **Base Cameo Coal** | | | | | | | | | |
| 7,620.9 | 0.00 | 0.00 | 7,608.0 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| **Rollins** | | | | | | | | | |
| 7,662.9 | 0.00 | 0.00 | 7,650.0 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 7,700.0 | 0.00 | 0.00 | 7,687.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| 7,800.0 | 0.00 | 0.00 | 7,787.1 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |
| **TD at 7862.9** | | | | | | | | | |
| 7,862.9 | 0.00 | 0.00 | 7,850.0 | -70.8 | -317.8 | 325.6 | 0.00 | 0.00 | 0.00 |

| | | | |
|---|---|---|---|
| **Database:** | EDMDBBW | **Local Co-ordinate Reference:** | Well Piceance 28-07W |
| **Company:** | Piceance Energy, LLC | **TVD Reference:** | Well @ 7578.0usft |
| **Project:** | Mesa County, CO | **MD Reference:** | Well @ 7578.0usft |
| **Site:** | Piceance 28-05 | **North Reference:** | True |
| **Well:** | Piceance 28-07W | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | Slot B-4 | | |
| **Design:** | Design #1 | | |

**Design Targets**

| Target Name - hit/miss target - Shape | Dip Angle (°) | Dip Dir. (°) | TVD (usft) | +N/-S (usft) | +E/-W (usft) | Northing (usft) | Easting (usft) | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|
| Piceance Federal 28-07 - plan hits target center - Circle (radius 50.0) | 0.00 | 0.00 | 7,850.0 | -70.8 | -317.8 | 1,524,378.30 | 2,354,211.18 | 39° 15' 3.210 N | 107° 46' 50.530 W |

**Casing Points**

| Measured Depth (usft) | Vertical Depth (usft) | Name | Casing Diameter (") | Hole Diameter (") |
|---|---|---|---|---|
| 1,524.2 | 1,522.0 | 8-5/8 | 8-5/8 | 12-1/4 |

**Formations**

| Measured Depth (usft) | Vertical Depth (usft) | Name | Lithology | Dip (°) | Dip Direction (°) |
|---|---|---|---|---|---|
| 2,806.4 | 2,800.0 | G Sand | | 0.00 | |
| 4,662.4 | 4,650.0 | Williams Fork | | 0.00 | |
| 5,162.9 | 5,150.0 | TOG | | 0.00 | |
| 6,962.9 | 6,950.0 | Cameo | | 0.00 | |
| 7,620.9 | 7,608.0 | Base Cameo Coal | | 0.00 | |
| 7,662.9 | 7,650.0 | Rollins | | 0.00 | |

**Plan Annotations**

| Measured Depth (usft) | Vertical Depth (usft) | Local Coordinates +N/-S (usft) | Local Coordinates +E/-W (usft) | Comment |
|---|---|---|---|---|
| 700.0 | 700.0 | 0.0 | 0.0 | Start Build 2.00 |
| 931.6 | 931.4 | -2.0 | -9.1 | Start 3799.7 hold at 931.6 MD |
| 4,731.3 | 4,718.6 | -68.8 | -308.7 | Start Drop -2.00 |
| 4,962.9 | 4,950.0 | -70.8 | -317.8 | Start 2900.0 hold at 4962.9 MD |
| 7,862.9 | 7,850.0 | -70.8 | -317.8 | TD at 7862.9 |

# Piceance Energy, LLC

**Mesa County, CO**
**Piceance 28-05**
**Piceance Federal 28-07W**

**Slot B-4**
**Design #1**

# Anticollision Report

**28 April, 2015**

Archer

| | | | |
|---|---|---|---|
| **Company:** | Piceance Energy, LLC | **Local Co-ordinate Reference:** | Well Piceance Federal 28-07W |
| **Project:** | Mesa County, CO | **TVD Reference:** | Well @ 7578.0usft |
| **Reference Site:** | Piceance 28-05 | **MD Reference:** | Well @ 7578.0usft |
| **Site Error:** | 0.0 usft | **North Reference:** | True |
| **Reference Well:** | Piceance Federal 28-07W | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0 usft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | Slot B-4 | **Database:** | EDMDBBW |
| **Reference Design:** | Design #1 | **Offset TVD Reference:** | Reference Datum |

**Reference** Design #1

| | | | |
|---|---|---|---|
| **Filter type:** | NO GLOBAL FILTER: Using user defined selection & filtering criteria | | |
| **Interpolation Method:** | MD Interval 100.0usft | **Error Model:** | ISCWSA |
| **Depth Range:** | Unlimited | **Scan Method:** | Closest Approach 3D |
| **Results Limited by:** | Maximum center-center distance of 1,000.0 usft | **Error Surface:** | Elliptical Conic |
| **Warning Levels Evaluated at:** | 2.00 **Sigma** | **Casing Method:** | Not applied |

**Survey Tool Program** **Date** 2015/04/28

| From (usft) | To (usft) | Survey (Wellbore) | Tool Name | Description |
|---|---|---|---|---|
| 0.0 | 7,862.9 | Design #1 (Slot B-4) | MWD | MWD - Standard |

**Summary**

| Site Name / Offset Well - Wellbore - Design | Reference Measured Depth (usft) | Offset Measured Depth (usft) | Distance Between Centres (usft) | Distance Between Ellipses (usft) | Separation Factor | Warning |
|---|---|---|---|---|---|---|
| Piceance 28-05 | | | | | | |
| Piceance Federal 28-01M - Slot A-4 - Design #1 | 100.0 | 100.0 | 9.9 | 9.8 | 56.675 | CC, ES |
| Piceance Federal 28-01M - Slot A-4 - Design #1 | 300.0 | 299.0 | 16.9 | 15.8 | 15.581 | SF |
| Piceance Federal 28-01W - Slot A-3 - Design #1 | 100.0 | 100.0 | 14.3 | 14.1 | 81.288 | CC, ES |
| Piceance Federal 28-01W - Slot A-3 - Design #1 | 400.0 | 397.5 | 29.4 | 27.9 | 18.853 | SF |
| Piceance Federal 28-02M - Slot A-5 - Design #1 | 100.0 | 100.0 | 22.4 | 22.2 | 127.697 | CC, ES |
| Piceance Federal 28-02M - Slot A-5 - Design #1 | 500.0 | 496.1 | 42.7 | 40.6 | 20.733 | SF |
| Piceance Federal 28-03M - Slot B-5 - Design #1 | 200.0 | 200.0 | 19.7 | 19.1 | 31.553 | CC |
| Piceance Federal 28-03M - Slot B-5 - Design #1 | 300.0 | 299.9 | 20.0 | 18.9 | 18.654 | ES |
| Piceance Federal 28-03M - Slot B-5 - Design #1 | 500.0 | 498.7 | 26.6 | 24.6 | 13.323 | SF |
| Piceance Federal 28-06W - Slot B-3 - Design #1 | 400.0 | 400.0 | 10.3 | 8.7 | 6.728 | CC, ES |
| Piceance Federal 28-06W - Slot B-3 - Design #1 | 500.0 | 499.6 | 11.9 | 9.9 | 6.034 | SF |

**Offset Design** Piceance 28-05 - Piceance Federal 28-01M - Slot A-4 - Design #1

**Survey Program:** 0-MWD

**Offset Site Error:** 0.0 usft

**Offset Well Error:** 0.0 usft

| Reference Measured Depth (usft) | Reference Vertical Depth (usft) | Offset Measured Depth (usft) | Offset Vertical Depth (usft) | Semi Major Axis Reference (usft) | Semi Major Axis Offset (usft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (usft) | Offset Wellbore Centre +E/-W (usft) | Distance Between Centres (usft) | Distance Between Ellipses (usft) | Minimum Separation (usft) | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 52.34 | 6.1 | 7.9 | 9.9 | | | | |
| 100.0 | 100.0 | 100.0 | 100.0 | 0.1 | 0.1 | 52.34 | 6.1 | 7.9 | 9.9 | 9.8 | 0.18 | 56.675 | CC, ES |
| 200.0 | 200.0 | 199.6 | 199.6 | 0.3 | 0.3 | 51.32 | 7.3 | 9.1 | 11.7 | 11.0 | 0.62 | 18.720 | |
| 300.0 | 300.0 | 299.0 | 298.8 | 0.5 | 0.6 | 49.51 | 10.9 | 12.8 | 16.9 | 15.8 | 1.08 | 15.581 | SF |
| 400.0 | 400.0 | 397.9 | 397.4 | 0.8 | 0.8 | 48.13 | 16.9 | 18.9 | 25.5 | 23.9 | 1.56 | 16.326 | |
| 500.0 | 500.0 | 496.1 | 494.8 | 1.0 | 1.1 | 47.27 | 25.3 | 27.3 | 37.6 | 35.5 | 2.07 | 18.126 | |
| 600.0 | 600.0 | 593.3 | 590.9 | 1.2 | 1.4 | 46.74 | 35.8 | 38.1 | 53.0 | 50.4 | 2.62 | 20.230 | |
| 700.0 | 700.0 | 689.5 | 685.3 | 1.4 | 1.8 | 46.40 | 48.5 | 50.9 | 71.8 | 68.6 | 3.21 | 22.365 | |
| 800.0 | 800.0 | 783.9 | 777.4 | 1.6 | 2.2 | 149.04 | 63.1 | 65.7 | 95.3 | 91.9 | 3.45 | 27.654 | |
| 900.0 | 899.8 | 875.9 | 866.5 | 1.8 | 2.6 | 149.70 | 79.4 | 82.3 | 124.9 | 120.9 | 3.92 | 31.845 | |
| 1,000.0 | 999.5 | 965.2 | 952.1 | 2.1 | 3.1 | 150.62 | 97.1 | 100.2 | 159.6 | 155.2 | 4.38 | 36.421 | |
| 1,100.0 | 1,099.2 | 1,052.4 | 1,034.9 | 2.3 | 3.7 | 151.25 | 116.1 | 119.6 | 197.4 | 192.6 | 4.84 | 40.770 | |
| 1,200.0 | 1,198.9 | 1,137.3 | 1,114.8 | 2.5 | 4.2 | 151.63 | 136.4 | 140.2 | 238.0 | 232.7 | 5.31 | 44.859 | |
| 1,300.0 | 1,298.5 | 1,220.0 | 1,191.7 | 2.8 | 4.8 | 151.85 | 157.8 | 161.9 | 281.2 | 275.4 | 5.78 | 48.688 | |
| 1,400.0 | 1,398.2 | 1,300.0 | 1,265.2 | 3.0 | 5.4 | 151.98 | 179.9 | 184.3 | 327.0 | 320.7 | 6.24 | 52.381 | |
| 1,500.0 | 1,497.9 | 1,378.5 | 1,336.5 | 3.3 | 6.0 | 152.04 | 203.0 | 207.8 | 375.2 | 368.5 | 6.72 | 55.866 | |

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

| | | | |
|---|---|---|---|
| **Company:** | Piceance Energy, LLC | **Local Co-ordinate Reference:** | Well Piceance Federal 28-07W |
| **Project:** | Mesa County, CO | **TVD Reference:** | Well @ 7578.0usft |
| **Reference Site:** | Piceance 28-05 | **MD Reference:** | Well @ 7578.0usft |
| **Site Error:** | 0.0 usft | **North Reference:** | True |
| **Reference Well:** | Piceance Federal 28-07W | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0 usft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | Slot B-4 | **Database:** | EDMDBBW |
| **Reference Design:** | Design #1 | **Offset TVD Reference:** | Reference Datum |

**Offset Design** Piceance 28-05 - Piceance Federal 28-01M - Slot A-4 - Design #1

**Offset Site Error:** 0.0 usft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 usft

| Reference Measured Depth (usft) | Reference Vertical Depth (usft) | Offset Measured Depth (usft) | Offset Vertical Depth (usft) | Semi Major Axis Reference (usft) | Semi Major Axis Offset (usft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (usft) | Offset Wellbore Centre +E/-W (usft) | Distance Between Centres (usft) | Distance Between Ellipses (usft) | Minimum Separation (usft) | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,600.0 | 1,597.6 | 1,454.3 | 1,404.4 | 3.5 | 6.7 | 152.07 | 226.6 | 231.7 | 425.7 | 418.5 | 7.19 | 59.244 | |
| 1,700.0 | 1,697.2 | 1,527.7 | 1,469.3 | 3.8 | 7.3 | 152.06 | 250.6 | 256.1 | 478.5 | 470.8 | 7.65 | 62.518 | |
| 1,800.0 | 1,796.9 | 1,603.9 | 1,535.9 | 4.1 | 8.1 | 152.04 | 276.7 | 282.6 | 533.2 | 525.0 | 8.14 | 65.529 | |
| 1,900.0 | 1,896.6 | 1,687.4 | 1,608.6 | 4.3 | 8.9 | 152.02 | 305.5 | 311.8 | 588.3 | 579.6 | 8.63 | 68.165 | |
| 2,000.0 | 1,996.3 | 1,770.8 | 1,681.3 | 4.6 | 9.7 | 152.00 | 334.2 | 341.0 | 643.4 | 634.2 | 9.13 | 70.482 | |
| 2,100.0 | 2,095.9 | 1,854.3 | 1,754.0 | 4.9 | 10.5 | 151.98 | 363.0 | 370.2 | 698.4 | 688.8 | 9.63 | 72.534 | |
| 2,200.0 | 2,195.6 | 1,937.7 | 1,826.7 | 5.1 | 11.3 | 151.97 | 391.8 | 399.4 | 753.5 | 743.4 | 10.13 | 74.360 | |
| 2,300.0 | 2,295.3 | 2,021.2 | 1,899.3 | 5.4 | 12.1 | 151.96 | 420.5 | 428.6 | 808.6 | 798.0 | 10.64 | 75.994 | |
| 2,400.0 | 2,395.0 | 2,104.7 | 1,972.0 | 5.7 | 12.9 | 151.95 | 449.3 | 457.8 | 863.7 | 852.6 | 11.15 | 77.464 | |
| 2,500.0 | 2,494.6 | 2,188.1 | 2,044.7 | 5.9 | 13.7 | 151.94 | 478.1 | 487.0 | 918.8 | 907.2 | 11.66 | 78.787 | |
| 2,600.0 | 2,594.3 | 2,271.6 | 2,117.4 | 6.2 | 14.6 | 151.93 | 506.8 | 516.2 | 973.9 | 961.7 | 12.18 | 79.988 | |

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

| | | | |
|---|---|---|---|
| **Company:** | Piceance Energy, LLC | **Local Co-ordinate Reference:** | Well Piceance Federal 28-07W |
| **Project:** | Mesa County, CO | **TVD Reference:** | Well @ 7578.0usft |
| **Reference Site:** | Piceance 28-05 | **MD Reference:** | Well @ 7578.0usft |
| **Site Error:** | 0.0 usft | **North Reference:** | True |
| **Reference Well:** | Piceance Federal 28-07W | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0 usft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | Slot B-4 | **Database:** | EDMDBBW |
| **Reference Design:** | Design #1 | **Offset TVD Reference:** | Reference Datum |

**Offset Design** Piceance 28-05 - Piceance Federal 28-01W - Slot A-3 - Design #1

**Offset Site Error:** 0.0 usft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 usft

| Reference Measured Depth (usft) | Reference Vertical Depth (usft) | Offset Measured Depth (usft) | Offset Vertical Depth (usft) | Semi Major Axis Reference (usft) | Semi Major Axis Offset (usft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (usft) | Offset Wellbore Centre +E/-W (usft) | Distance Between Centres (usft) | Distance Between Ellipses (usft) | Minimum Separation (usft) | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 6.34 | 14.2 | 1.6 | 14.3 | | | | |
| 100.0 | 100.0 | 100.0 | 100.0 | 0.1 | 0.1 | 6.34 | 14.2 | 1.6 | 14.3 | 14.1 | 0.18 | 81.288 | CC, ES |
| 200.0 | 200.0 | 199.5 | 199.5 | 0.3 | 0.3 | 4.27 | 15.8 | 1.2 | 15.9 | 15.3 | 0.63 | 25.438 | |
| 300.0 | 300.0 | 298.7 | 298.6 | 0.5 | 0.6 | 0.05 | 20.9 | 0.0 | 20.9 | 19.8 | 1.08 | 19.309 | |
| 400.0 | 400.0 | 397.5 | 397.0 | 0.8 | 0.8 | -3.74 | 29.2 | -1.9 | 29.4 | 27.9 | 1.56 | 18.853 | SF |
| 500.0 | 500.0 | 495.6 | 494.3 | 1.0 | 1.1 | -6.42 | 40.7 | -4.6 | 41.4 | 39.3 | 2.07 | 20.025 | |
| 600.0 | 600.0 | 592.7 | 590.3 | 1.2 | 1.4 | -8.19 | 55.3 | -8.0 | 56.7 | 54.1 | 2.61 | 21.753 | |
| 700.0 | 700.0 | 688.8 | 684.6 | 1.4 | 1.8 | -9.38 | 72.9 | -12.0 | 75.5 | 72.3 | 3.19 | 23.643 | |
| 800.0 | 800.0 | 783.4 | 777.0 | 1.6 | 2.2 | 92.94 | 93.2 | -16.7 | 97.5 | 94.1 | 3.44 | 28.377 | |
| 900.0 | 899.8 | 876.5 | 867.1 | 1.8 | 2.6 | 94.07 | 116.1 | -22.0 | 123.0 | 119.1 | 3.90 | 31.530 | |
| 1,000.0 | 999.5 | 967.8 | 954.6 | 2.1 | 3.1 | 95.83 | 141.2 | -27.9 | 151.9 | 147.5 | 4.39 | 34.601 | |
| 1,100.0 | 1,099.2 | 1,057.3 | 1,039.6 | 2.3 | 3.7 | 97.07 | 168.5 | -34.2 | 183.9 | 179.0 | 4.89 | 37.568 | |
| 1,200.0 | 1,198.9 | 1,144.9 | 1,121.9 | 2.5 | 4.2 | 97.82 | 197.8 | -41.0 | 218.8 | 213.4 | 5.41 | 40.442 | |
| 1,300.0 | 1,298.5 | 1,230.5 | 1,201.4 | 2.8 | 4.8 | 98.25 | 228.7 | -48.1 | 256.5 | 250.6 | 5.93 | 43.226 | |
| 1,400.0 | 1,398.2 | 1,316.4 | 1,280.2 | 3.0 | 5.5 | 98.49 | 261.9 | -55.8 | 296.8 | 290.3 | 6.47 | 45.841 | |
| 1,500.0 | 1,497.9 | 1,407.6 | 1,363.7 | 3.3 | 6.2 | 98.66 | 297.8 | -64.1 | 337.8 | 330.7 | 7.02 | 48.121 | |
| 1,600.0 | 1,597.6 | 1,498.8 | 1,447.1 | 3.5 | 6.9 | 98.79 | 333.6 | -72.5 | 378.7 | 371.2 | 7.57 | 50.019 | |
| 1,700.0 | 1,697.2 | 1,590.0 | 1,530.6 | 3.8 | 7.6 | 98.90 | 369.5 | -80.8 | 419.7 | 411.6 | 8.13 | 51.616 | |
| 1,800.0 | 1,796.9 | 1,681.3 | 1,614.0 | 4.1 | 8.3 | 98.99 | 405.4 | -89.1 | 460.7 | 452.0 | 8.70 | 52.978 | |
| 1,900.0 | 1,896.6 | 1,772.5 | 1,697.5 | 4.3 | 9.0 | 99.06 | 441.3 | -97.4 | 501.7 | 492.4 | 9.26 | 54.151 | |
| 2,000.0 | 1,996.3 | 1,863.7 | 1,780.9 | 4.6 | 9.7 | 99.13 | 477.2 | -105.7 | 542.7 | 532.8 | 9.84 | 55.169 | |
| 2,100.0 | 2,095.9 | 1,954.9 | 1,864.4 | 4.9 | 10.4 | 99.18 | 513.0 | -114.0 | 583.7 | 573.3 | 10.41 | 56.060 | |
| 2,200.0 | 2,195.6 | 2,046.1 | 1,947.8 | 5.1 | 11.1 | 99.23 | 548.9 | -122.4 | 624.6 | 613.7 | 10.99 | 56.845 | |
| 2,300.0 | 2,295.3 | 2,137.3 | 2,031.3 | 5.4 | 11.8 | 99.27 | 584.8 | -130.7 | 665.6 | 654.1 | 11.57 | 57.543 | |
| 2,400.0 | 2,395.0 | 2,228.5 | 2,114.7 | 5.7 | 12.6 | 99.31 | 620.7 | -139.0 | 706.6 | 694.5 | 12.15 | 58.165 | |
| 2,500.0 | 2,494.6 | 2,319.8 | 2,198.1 | 5.9 | 13.3 | 99.34 | 656.6 | -147.3 | 747.6 | 734.9 | 12.73 | 58.724 | |
| 2,600.0 | 2,594.3 | 2,411.0 | 2,281.6 | 6.2 | 14.0 | 99.37 | 692.4 | -155.6 | 788.6 | 775.3 | 13.31 | 59.229 | |
| 2,700.0 | 2,694.0 | 2,502.2 | 2,365.0 | 6.5 | 14.7 | 99.39 | 728.3 | -163.9 | 829.6 | 815.7 | 13.90 | 59.686 | |
| 2,800.0 | 2,793.6 | 2,593.4 | 2,448.5 | 6.7 | 15.4 | 99.42 | 764.2 | -172.2 | 870.6 | 856.1 | 14.48 | 60.102 | |
| 2,900.0 | 2,893.3 | 2,684.6 | 2,531.9 | 7.0 | 16.1 | 99.44 | 800.1 | -180.6 | 911.6 | 896.5 | 15.07 | 60.483 | |
| 3,000.0 | 2,993.0 | 2,775.8 | 2,615.4 | 7.3 | 16.9 | 99.46 | 836.0 | -188.9 | 952.5 | 936.9 | 15.66 | 60.832 | |
| 3,100.0 | 3,092.7 | 2,867.0 | 2,698.8 | 7.5 | 17.6 | 99.48 | 871.9 | -197.2 | 993.5 | 977.3 | 16.25 | 61.153 | |

| | | | |
|---|---|---|---|
| **Company:** | Piceance Energy, LLC | **Local Co-ordinate Reference:** | Well Piceance Federal 28-07W |
| **Project:** | Mesa County, CO | **TVD Reference:** | Well @ 7578.0usft |
| **Reference Site:** | Piceance 28-05 | **MD Reference:** | Well @ 7578.0usft |
| **Site Error:** | 0.0 usft | **North Reference:** | True |
| **Reference Well:** | Piceance Federal 28-07W | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0 usft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | Slot B-4 | **Database:** | EDMDBBW |
| **Reference Design:** | Design #1 | **Offset TVD Reference:** | Reference Datum |

**Offset Design** Piceance 28-05 - Piceance Federal 28-02M - Slot A-5 - Design #1

**Offset Site Error:** 0.0 usft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 usft

| Reference Measured Depth (usft) | Reference Vertical Depth (usft) | Offset Measured Depth (usft) | Offset Vertical Depth (usft) | Semi Major Axis Reference (usft) | Semi Major Axis Offset (usft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (usft) | Offset Wellbore Centre +E/-W (usft) | Distance Between Centres (usft) | Distance Between Ellipses (usft) | Minimum Separation (usft) | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 114.00 | -9.1 | 20.5 | 22.4 | | | | |
| 100.0 | 100.0 | 100.0 | 100.0 | 0.1 | 0.1 | 114.00 | -9.1 | 20.5 | 22.4 | 22.2 | 0.18 | 127.697 | CC, ES |
| 200.0 | 200.0 | 199.6 | 199.6 | 0.3 | 0.3 | 110.17 | -8.0 | 21.8 | 23.2 | 22.6 | 0.63 | 37.098 | |
| 300.0 | 300.0 | 299.0 | 298.8 | 0.5 | 0.6 | 100.34 | -4.7 | 25.8 | 26.2 | 25.1 | 1.09 | 24.109 | |
| 400.0 | 400.0 | 397.9 | 397.3 | 0.8 | 0.8 | 88.67 | 0.8 | 32.4 | 32.5 | 30.9 | 1.56 | 20.833 | |
| 500.0 | 500.0 | 496.1 | 494.8 | 1.0 | 1.1 | 78.68 | 8.3 | 41.5 | 42.7 | 40.6 | 2.06 | 20.733 | SF |
| 600.0 | 600.0 | 593.3 | 590.9 | 1.2 | 1.4 | 71.38 | 17.9 | 53.1 | 56.8 | 54.2 | 2.59 | 21.881 | |
| 700.0 | 700.0 | 689.5 | 685.3 | 1.4 | 1.8 | 66.32 | 29.4 | 67.0 | 74.7 | 71.5 | 3.18 | 23.499 | |
| 800.0 | 800.0 | 783.9 | 777.4 | 1.6 | 2.2 | 165.52 | 42.7 | 83.1 | 97.7 | 94.3 | 3.46 | 28.218 | |
| 900.0 | 899.8 | 875.8 | 866.4 | 1.8 | 2.7 | 163.53 | 57.4 | 100.9 | 127.3 | 123.3 | 3.94 | 32.303 | |
| 1,000.0 | 999.5 | 965.0 | 951.9 | 2.1 | 3.1 | 162.45 | 73.5 | 120.3 | 162.3 | 157.9 | 4.40 | 36.877 | |
| 1,100.0 | 1,099.2 | 1,052.0 | 1,034.6 | 2.3 | 3.7 | 161.68 | 90.8 | 141.3 | 200.3 | 195.5 | 4.86 | 41.235 | |
| 1,200.0 | 1,198.9 | 1,136.9 | 1,114.4 | 2.5 | 4.2 | 161.06 | 109.2 | 163.5 | 241.1 | 235.8 | 5.32 | 45.337 | |
| 1,300.0 | 1,298.5 | 1,219.4 | 1,191.1 | 2.8 | 4.8 | 160.54 | 128.5 | 186.9 | 284.5 | 278.7 | 5.79 | 49.176 | |
| 1,400.0 | 1,398.2 | 1,300.0 | 1,265.2 | 3.0 | 5.4 | 160.11 | 148.7 | 211.3 | 330.5 | 324.2 | 6.25 | 52.864 | |
| 1,500.0 | 1,497.9 | 1,377.6 | 1,335.6 | 3.3 | 6.0 | 159.74 | 169.4 | 236.4 | 378.9 | 372.1 | 6.72 | 56.385 | |
| 1,600.0 | 1,597.6 | 1,455.4 | 1,405.4 | 3.5 | 6.7 | 159.41 | 191.4 | 263.0 | 429.5 | 422.3 | 7.20 | 59.695 | |
| 1,700.0 | 1,697.2 | 1,541.2 | 1,482.0 | 3.8 | 7.5 | 159.10 | 216.0 | 292.7 | 480.9 | 473.2 | 7.68 | 62.579 | |
| 1,800.0 | 1,796.9 | 1,626.9 | 1,558.6 | 4.1 | 8.2 | 158.86 | 240.6 | 322.5 | 532.3 | 524.1 | 8.18 | 65.114 | |
| 1,900.0 | 1,896.6 | 1,712.7 | 1,635.2 | 4.3 | 9.0 | 158.65 | 265.2 | 352.2 | 583.7 | 575.0 | 8.67 | 67.327 | |
| 2,000.0 | 1,996.3 | 1,798.5 | 1,711.7 | 4.6 | 9.8 | 158.49 | 289.8 | 382.0 | 635.1 | 626.0 | 9.17 | 69.273 | |
| 2,100.0 | 2,095.9 | 1,884.2 | 1,788.3 | 4.9 | 10.5 | 158.34 | 314.4 | 411.8 | 686.5 | 676.9 | 9.67 | 70.991 | |
| 2,200.0 | 2,195.6 | 1,970.0 | 1,864.9 | 5.1 | 11.3 | 158.22 | 339.0 | 441.5 | 738.0 | 727.8 | 10.18 | 72.522 | |
| 2,300.0 | 2,295.3 | 2,055.7 | 1,941.5 | 5.4 | 12.1 | 158.11 | 363.6 | 471.3 | 789.4 | 778.7 | 10.68 | 73.895 | |
| 2,400.0 | 2,395.0 | 2,141.5 | 2,018.0 | 5.7 | 12.9 | 158.02 | 388.2 | 501.0 | 840.8 | 829.6 | 11.19 | 75.130 | |
| 2,500.0 | 2,494.6 | 2,227.3 | 2,094.6 | 5.9 | 13.6 | 157.93 | 412.8 | 530.8 | 892.2 | 880.5 | 11.70 | 76.248 | |
| 2,600.0 | 2,594.3 | 2,313.0 | 2,171.2 | 6.2 | 14.4 | 157.86 | 437.4 | 560.6 | 943.6 | 931.4 | 12.21 | 77.263 | |
| 2,700.0 | 2,694.0 | 2,398.8 | 2,247.8 | 6.5 | 15.2 | 157.79 | 462.0 | 590.3 | 995.1 | 982.3 | 12.73 | 78.189 | |

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

| | | | |
|---|---|---|---|
| **Company:** | Piceance Energy, LLC | **Local Co-ordinate Reference:** | Well Piceance Federal 28-07W |
| **Project:** | Mesa County, CO | **TVD Reference:** | Well @ 7578.0usft |
| **Reference Site:** | Piceance 28-05 | **MD Reference:** | Well @ 7578.0usft |
| **Site Error:** | 0.0 usft | **North Reference:** | True |
| **Reference Well:** | Piceance Federal 28-07W | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0 usft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | Slot B-4 | **Database:** | EDMDBBW |
| **Reference Design:** | Design #1 | **Offset TVD Reference:** | Reference Datum |

**Offset Design** Piceance 28-05 - Piceance Federal 28-03M - Slot B-5 - Design #1

**Offset Site Error:** 0.0 usft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 usft

| Reference Measured Depth (usft) | Reference Vertical Depth (usft) | Offset Measured Depth (usft) | Offset Vertical Depth (usft) | Semi Major Axis Reference (usft) | Semi Major Axis Offset (usft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (usft) | Offset Wellbore Centre +E/-W (usft) | Distance Between Centres (usft) | Distance Between Ellipses (usft) | Minimum Separation (usft) | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 140.33 | -15.2 | 12.6 | 19.7 | | | | |
| 100.0 | 100.0 | 100.0 | 100.0 | 0.1 | 0.1 | 140.33 | -15.2 | 12.6 | 19.7 | 19.5 | 0.18 | 112.458 | |
| 200.0 | 200.0 | 200.0 | 200.0 | 0.3 | 0.3 | 140.33 | -15.2 | 12.6 | 19.7 | 19.1 | 0.62 | 31.553 | CC |
| 300.0 | 300.0 | 299.9 | 299.9 | 0.5 | 0.5 | 135.37 | -14.2 | 14.0 | 20.0 | 18.9 | 1.07 | 18.654 | ES |
| 400.0 | 400.0 | 399.5 | 399.4 | 0.8 | 0.8 | 121.75 | -11.4 | 18.4 | 21.7 | 20.1 | 1.53 | 14.176 | |
| 500.0 | 500.0 | 498.7 | 498.1 | 1.0 | 1.0 | 104.65 | -6.7 | 25.6 | 26.6 | 24.6 | 1.99 | 13.323 | SF |
| 600.0 | 600.0 | 597.1 | 595.8 | 1.2 | 1.3 | 90.32 | -0.2 | 35.6 | 35.9 | 33.4 | 2.48 | 14.449 | |
| 700.0 | 700.0 | 694.6 | 692.2 | 1.4 | 1.6 | 80.56 | 8.0 | 48.3 | 49.6 | 46.6 | 3.01 | 16.468 | |
| 800.0 | 800.0 | 790.6 | 786.5 | 1.6 | 2.0 | 176.88 | 17.9 | 63.5 | 69.0 | 65.6 | 3.41 | 20.243 | |
| 900.0 | 899.8 | 884.4 | 877.9 | 1.8 | 2.4 | 173.14 | 29.2 | 80.8 | 95.4 | 91.5 | 3.88 | 24.568 | |
| 1,000.0 | 999.5 | 975.5 | 966.1 | 2.1 | 2.8 | 170.93 | 41.7 | 100.1 | 127.5 | 123.2 | 4.34 | 29.404 | |
| 1,100.0 | 1,099.2 | 1,064.6 | 1,051.5 | 2.3 | 3.3 | 169.46 | 55.4 | 121.1 | 162.9 | 158.1 | 4.79 | 34.019 | |
| 1,200.0 | 1,198.9 | 1,151.5 | 1,134.1 | 2.5 | 3.8 | 168.39 | 70.1 | 143.9 | 201.1 | 195.8 | 5.24 | 38.355 | |
| 1,300.0 | 1,298.5 | 1,236.1 | 1,213.7 | 2.8 | 4.4 | 167.56 | 85.8 | 168.0 | 242.1 | 236.4 | 5.70 | 42.464 | |
| 1,400.0 | 1,398.2 | 1,318.5 | 1,290.3 | 3.0 | 4.9 | 166.91 | 102.3 | 193.4 | 285.7 | 279.6 | 6.16 | 46.361 | |
| 1,500.0 | 1,497.9 | 1,400.0 | 1,365.2 | 3.3 | 5.6 | 166.37 | 119.8 | 220.3 | 331.9 | 325.3 | 6.63 | 50.082 | |
| 1,600.0 | 1,597.6 | 1,479.3 | 1,437.3 | 3.5 | 6.2 | 165.92 | 137.9 | 248.1 | 380.4 | 373.3 | 7.10 | 53.605 | |
| 1,700.0 | 1,697.2 | 1,566.4 | 1,516.1 | 3.8 | 6.9 | 165.53 | 158.0 | 279.0 | 429.5 | 422.0 | 7.58 | 56.685 | |
| 1,800.0 | 1,796.9 | 1,653.4 | 1,595.0 | 4.1 | 7.7 | 165.21 | 178.1 | 310.0 | 478.7 | 470.6 | 8.06 | 59.388 | |
| 1,900.0 | 1,896.6 | 1,740.5 | 1,673.8 | 4.3 | 8.4 | 164.96 | 198.2 | 340.9 | 527.8 | 519.3 | 8.55 | 61.754 | |
| 2,000.0 | 1,996.3 | 1,827.6 | 1,752.7 | 4.6 | 9.1 | 164.74 | 218.3 | 371.9 | 577.0 | 568.0 | 9.04 | 63.839 | |
| 2,100.0 | 2,095.9 | 1,914.6 | 1,831.5 | 4.9 | 9.9 | 164.57 | 238.4 | 402.8 | 626.2 | 616.6 | 9.53 | 65.686 | |
| 2,200.0 | 2,195.6 | 2,001.7 | 1,910.4 | 5.1 | 10.6 | 164.41 | 258.5 | 433.8 | 675.3 | 665.3 | 10.03 | 67.334 | |
| 2,300.0 | 2,295.3 | 2,088.8 | 1,989.2 | 5.4 | 11.4 | 164.28 | 278.7 | 464.7 | 724.5 | 714.0 | 10.53 | 68.807 | |
| 2,400.0 | 2,395.0 | 2,175.8 | 2,068.1 | 5.7 | 12.1 | 164.17 | 298.8 | 495.7 | 773.7 | 762.6 | 11.03 | 70.135 | |
| 2,500.0 | 2,494.6 | 2,262.9 | 2,146.9 | 5.9 | 12.9 | 164.06 | 318.9 | 526.6 | 822.9 | 811.3 | 11.53 | 71.337 | |
| 2,600.0 | 2,594.3 | 2,350.0 | 2,225.8 | 6.2 | 13.6 | 163.97 | 339.0 | 557.6 | 872.0 | 860.0 | 12.04 | 72.430 | |
| 2,700.0 | 2,694.0 | 2,437.0 | 2,304.6 | 6.5 | 14.4 | 163.89 | 359.1 | 588.5 | 921.2 | 908.7 | 12.55 | 73.428 | |
| 2,800.0 | 2,793.6 | 2,524.1 | 2,383.5 | 6.7 | 15.1 | 163.82 | 379.2 | 619.5 | 970.4 | 957.3 | 13.05 | 74.341 | |

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

| | | | |
|---|---|---|---|
| **Company:** | Piceance Energy, LLC | **Local Co-ordinate Reference:** | Well Piceance Federal 28-07W |
| **Project:** | Mesa County, CO | **TVD Reference:** | Well @ 7578.0usft |
| **Reference Site:** | Piceance 28-05 | **MD Reference:** | Well @ 7578.0usft |
| **Site Error:** | 0.0 usft | **North Reference:** | True |
| **Reference Well:** | Piceance Federal 28-07W | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0 usft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | Slot B-4 | **Database:** | EDMDBBW |
| **Reference Design:** | Design #1 | **Offset TVD Reference:** | Reference Datum |

**Offset Design** Piceance 28-05 - Piceance Federal 28-06W - Slot B-3 - Design #1 — **Offset Site Error:** 0.0 usft

**Survey Program:** 0-MWD — **Offset Well Error:** 0.0 usft

| Reference Measured Depth (usft) | Reference Vertical Depth (usft) | Offset Measured Depth (usft) | Offset Vertical Depth (usft) | Semi Major Axis Reference (usft) | Semi Major Axis Offset (usft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (usft) | Offset Wellbore Centre +E/-W (usft) | Distance Between Centres (usft) | Distance Between Ellipses (usft) | Minimum Separation (usft) | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -37.87 | 8.1 | -6.3 | 10.3 | | | | |
| 100.0 | 100.0 | 100.0 | 100.0 | 0.1 | 0.1 | -37.87 | 8.1 | -6.3 | 10.3 | 10.1 | 0.18 | 58.478 | |
| 200.0 | 200.0 | 200.0 | 200.0 | 0.3 | 0.3 | -37.87 | 8.1 | -6.3 | 10.3 | 9.6 | 0.62 | 16.407 | |
| 300.0 | 300.0 | 300.0 | 300.0 | 0.5 | 0.5 | -37.87 | 8.1 | -6.3 | 10.3 | 9.2 | 1.07 | 9.542 | |
| 400.0 | 400.0 | 400.0 | 400.0 | 0.8 | 0.8 | -37.87 | 8.1 | -6.3 | 10.3 | 8.7 | 1.52 | 6.728 | CC, ES |
| 500.0 | 500.0 | 499.6 | 499.6 | 1.0 | 1.0 | -41.20 | 8.9 | -7.8 | 11.9 | 9.9 | 1.97 | 6.034 | SF |
| 600.0 | 600.0 | 599.0 | 598.9 | 1.2 | 1.2 | -47.29 | 11.4 | -12.4 | 16.9 | 14.4 | 2.41 | 6.990 | |
| 700.0 | 700.0 | 698.5 | 698.1 | 1.4 | 1.4 | -51.75 | 15.2 | -19.2 | 24.6 | 21.7 | 2.87 | 8.559 | |
| 800.0 | 800.0 | 798.3 | 797.5 | 1.6 | 1.7 | 50.73 | 19.0 | -26.3 | 31.4 | 28.1 | 3.29 | 9.529 | |
| 900.0 | 899.8 | 898.1 | 897.0 | 1.8 | 1.9 | 54.96 | 22.9 | -33.3 | 36.1 | 32.4 | 3.73 | 9.689 | |
| 1,000.0 | 999.5 | 998.0 | 996.5 | 2.1 | 2.2 | 61.53 | 26.7 | -40.4 | 39.7 | 35.5 | 4.18 | 9.488 | |
| 1,100.0 | 1,099.2 | 1,097.8 | 1,096.0 | 2.3 | 2.5 | 67.18 | 30.6 | -47.4 | 43.6 | 38.9 | 4.65 | 9.367 | |
| 1,200.0 | 1,198.9 | 1,197.7 | 1,195.6 | 2.5 | 2.7 | 71.87 | 34.4 | -54.5 | 47.9 | 42.7 | 5.14 | 9.308 | |
| 1,300.0 | 1,298.5 | 1,297.5 | 1,295.1 | 2.8 | 3.0 | 75.77 | 38.3 | -61.5 | 52.4 | 46.7 | 5.64 | 9.288 | |
| 1,400.0 | 1,398.2 | 1,397.3 | 1,394.6 | 3.0 | 3.2 | 79.04 | 42.1 | -68.6 | 57.1 | 51.0 | 6.15 | 9.293 | |
| 1,500.0 | 1,497.9 | 1,497.2 | 1,494.1 | 3.3 | 3.5 | 81.80 | 46.0 | -75.6 | 62.0 | 55.4 | 6.66 | 9.311 | |
| 1,600.0 | 1,597.6 | 1,597.0 | 1,593.6 | 3.5 | 3.8 | 84.15 | 49.8 | -82.7 | 67.0 | 59.9 | 7.18 | 9.339 | |
| 1,700.0 | 1,697.2 | 1,696.8 | 1,693.1 | 3.8 | 4.0 | 86.17 | 53.7 | -89.7 | 72.1 | 64.5 | 7.70 | 9.372 | |
| 1,800.0 | 1,796.9 | 1,796.7 | 1,792.7 | 4.1 | 4.3 | 87.92 | 57.5 | -96.8 | 77.3 | 69.1 | 8.22 | 9.408 | |
| 1,900.0 | 1,896.6 | 1,896.5 | 1,892.2 | 4.3 | 4.6 | 89.45 | 61.4 | -103.8 | 82.6 | 73.8 | 8.75 | 9.445 | |
| 2,000.0 | 1,996.3 | 1,996.4 | 1,991.7 | 4.6 | 4.8 | 90.80 | 65.2 | -110.9 | 87.9 | 78.6 | 9.27 | 9.482 | |
| 2,100.0 | 2,095.9 | 2,096.2 | 2,091.2 | 4.9 | 5.1 | 91.99 | 69.1 | -117.9 | 93.2 | 83.5 | 9.80 | 9.518 | |
| 2,200.0 | 2,195.6 | 2,196.0 | 2,190.7 | 5.1 | 5.4 | 93.06 | 72.9 | -125.0 | 98.6 | 88.3 | 10.32 | 9.553 | |
| 2,300.0 | 2,295.3 | 2,295.9 | 2,290.2 | 5.4 | 5.6 | 94.01 | 76.8 | -132.0 | 104.1 | 93.2 | 10.85 | 9.587 | |
| 2,400.0 | 2,395.0 | 2,395.7 | 2,389.7 | 5.7 | 5.9 | 94.87 | 80.6 | -139.1 | 109.5 | 98.1 | 11.38 | 9.620 | |
| 2,500.0 | 2,494.6 | 2,495.6 | 2,489.3 | 5.9 | 6.2 | 95.65 | 84.5 | -146.1 | 115.0 | 103.0 | 11.91 | 9.652 | |
| 2,600.0 | 2,594.3 | 2,595.4 | 2,588.8 | 6.2 | 6.4 | 96.35 | 88.3 | -153.2 | 120.4 | 108.0 | 12.44 | 9.682 | |
| 2,700.0 | 2,694.0 | 2,695.2 | 2,688.3 | 6.5 | 6.7 | 97.00 | 92.2 | -160.2 | 125.9 | 113.0 | 12.97 | 9.710 | |
| 2,800.0 | 2,793.6 | 2,795.1 | 2,787.8 | 6.7 | 7.0 | 97.59 | 96.0 | -167.3 | 131.5 | 118.0 | 13.50 | 9.737 | |
| 2,900.0 | 2,893.3 | 2,894.9 | 2,887.3 | 7.0 | 7.2 | 98.13 | 99.9 | -174.3 | 137.0 | 122.9 | 14.03 | 9.763 | |
| 3,000.0 | 2,993.0 | 2,994.8 | 2,986.8 | 7.3 | 7.5 | 98.63 | 103.7 | -181.4 | 142.5 | 128.0 | 14.56 | 9.788 | |
| 3,100.0 | 3,092.7 | 3,094.6 | 3,086.4 | 7.5 | 7.8 | 99.10 | 107.6 | -188.4 | 148.1 | 133.0 | 15.09 | 9.812 | |
| 3,200.0 | 3,192.3 | 3,194.4 | 3,185.9 | 7.8 | 8.0 | 99.53 | 111.4 | -195.5 | 153.6 | 138.0 | 15.62 | 9.834 | |
| 3,300.0 | 3,292.0 | 3,294.3 | 3,285.4 | 8.1 | 8.3 | 99.93 | 115.3 | -202.5 | 159.2 | 143.0 | 16.15 | 9.856 | |
| 3,400.0 | 3,391.7 | 3,394.1 | 3,384.9 | 8.3 | 8.6 | 100.30 | 119.1 | -209.6 | 164.8 | 148.1 | 16.68 | 9.876 | |
| 3,500.0 | 3,491.4 | 3,494.0 | 3,484.4 | 8.6 | 8.8 | 100.65 | 123.0 | -216.6 | 170.3 | 153.1 | 17.21 | 9.896 | |
| 3,600.0 | 3,591.0 | 3,593.8 | 3,583.9 | 8.9 | 9.1 | 100.97 | 126.8 | -223.7 | 175.9 | 158.2 | 17.74 | 9.914 | |
| 3,700.0 | 3,690.7 | 3,693.6 | 3,683.4 | 9.2 | 9.4 | 101.28 | 130.7 | -230.7 | 181.5 | 163.2 | 18.27 | 9.932 | |
| 3,800.0 | 3,790.4 | 3,793.5 | 3,783.0 | 9.4 | 9.7 | 101.57 | 134.5 | -237.8 | 187.1 | 168.3 | 18.81 | 9.949 | |
| 3,900.0 | 3,890.1 | 3,893.3 | 3,882.5 | 9.7 | 9.9 | 101.84 | 138.4 | -244.8 | 192.7 | 173.4 | 19.34 | 9.966 | |
| 4,000.0 | 3,989.7 | 3,993.1 | 3,982.0 | 10.0 | 10.2 | 102.09 | 142.2 | -251.9 | 198.3 | 178.4 | 19.87 | 9.981 | |
| 4,100.0 | 4,089.4 | 4,093.0 | 4,081.5 | 10.2 | 10.5 | 102.34 | 146.1 | -258.9 | 203.9 | 183.5 | 20.40 | 9.996 | |
| 4,200.0 | 4,189.1 | 4,192.8 | 4,181.0 | 10.5 | 10.7 | 102.57 | 149.9 | -266.0 | 209.5 | 188.6 | 20.93 | 10.010 | |
| 4,300.0 | 4,288.7 | 4,292.7 | 4,280.5 | 10.8 | 11.0 | 102.78 | 153.8 | -273.0 | 215.1 | 193.7 | 21.46 | 10.024 | |
| 4,400.0 | 4,388.4 | 4,392.5 | 4,380.1 | 11.1 | 11.3 | 102.99 | 157.6 | -280.1 | 220.8 | 198.8 | 21.99 | 10.037 | |
| 4,500.0 | 4,488.1 | 4,492.3 | 4,479.6 | 11.3 | 11.5 | 103.18 | 161.5 | -287.1 | 226.4 | 203.9 | 22.52 | 10.050 | |
| 4,600.0 | 4,587.8 | 4,592.2 | 4,579.1 | 11.6 | 11.8 | 103.37 | 165.3 | -294.2 | 232.0 | 208.9 | 23.06 | 10.062 | |
| 4,700.0 | 4,687.4 | 4,692.0 | 4,678.6 | 11.9 | 12.1 | 103.55 | 169.2 | -301.2 | 237.6 | 214.0 | 23.59 | 10.074 | |
| 4,800.0 | 4,787.2 | 4,791.9 | 4,778.1 | 12.1 | 12.3 | 103.60 | 173.0 | -308.3 | 243.1 | 219.0 | 24.09 | 10.088 | |
| 4,900.0 | 4,887.1 | 4,894.2 | 4,880.2 | 12.3 | 12.6 | 103.03 | 176.7 | -314.9 | 247.4 | 222.9 | 24.52 | 10.093 | |
| 5,000.0 | 4,987.1 | 4,998.4 | 4,984.3 | 12.5 | 12.8 | -0.21 | 178.7 | -318.7 | 249.5 | 224.7 | 24.86 | 10.036 | |
| 5,100.0 | 5,087.1 | 5,101.2 | 5,087.1 | 12.6 | 12.9 | -0.36 | 179.1 | -319.4 | 249.9 | 224.7 | 25.21 | 9.912 | |

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

| | | | |
|---|---|---|---|
| **Company:** | Piceance Energy, LLC | **Local Co-ordinate Reference:** | Well Piceance Federal 28-07W |
| **Project:** | Mesa County, CO | **TVD Reference:** | Well @ 7578.0usft |
| **Reference Site:** | Piceance 28-05 | **MD Reference:** | Well @ 7578.0usft |
| **Site Error:** | 0.0 usft | **North Reference:** | True |
| **Reference Well:** | Piceance Federal 28-07W | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0 usft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | Slot B-4 | **Database:** | EDMDBBW |
| **Reference Design:** | Design #1 | **Offset TVD Reference:** | Reference Datum |

**Offset Design** Piceance 28-05 - Piceance Federal 28-06W - Slot B-3 - Design #1

**Offset Site Error:** 0.0 usft

**Survey Program:** 0-MWD

**Offset Well Error:** 0.0 usft

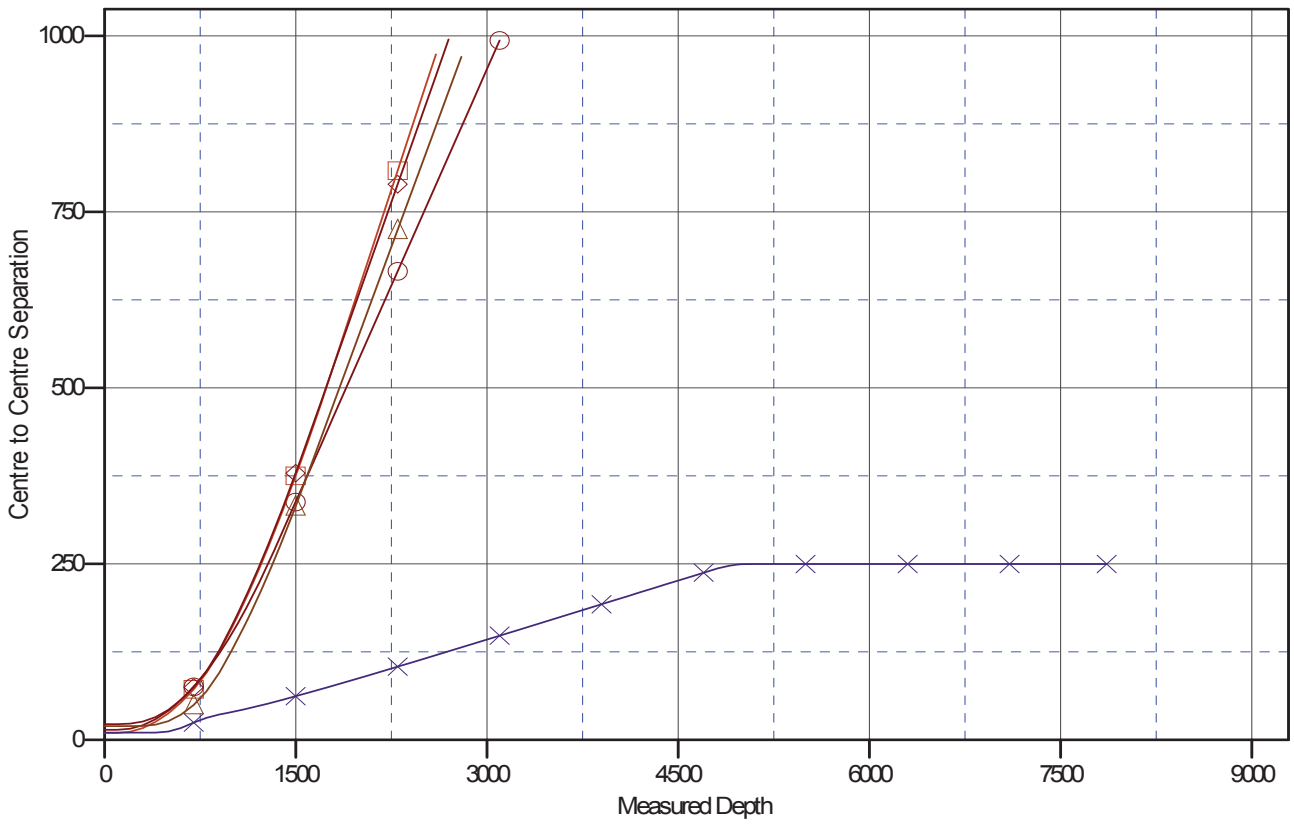
| Reference Measured Depth (usft) | Reference Vertical Depth (usft) | Offset Measured Depth (usft) | Offset Vertical Depth (usft) | Semi Major Axis Reference (usft) | Semi Major Axis Offset (usft) | Highside Toolface (°) | Offset Wellbore Centre +N/-S (usft) | Offset Wellbore Centre +E/-W (usft) | Distance Between Centres (usft) | Distance Between Ellipses (usft) | Minimum Separation (usft) | Separation Factor | Warning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5,200.0 | 5,187.1 | 5,201.2 | 5,187.1 | 12.8 | 13.1 | -0.36 | 179.1 | -319.4 | 249.9 | 224.3 | 25.58 | 9.769 | |
| 5,300.0 | 5,287.1 | 5,301.2 | 5,287.1 | 13.0 | 13.3 | -0.36 | 179.1 | -319.4 | 249.9 | 223.9 | 25.95 | 9.629 | |
| 5,400.0 | 5,387.1 | 5,401.2 | 5,387.1 | 13.2 | 13.5 | -0.36 | 179.1 | -319.4 | 249.9 | 223.6 | 26.33 | 9.492 | |
| 5,500.0 | 5,487.1 | 5,501.2 | 5,487.1 | 13.4 | 13.7 | -0.36 | 179.1 | -319.4 | 249.9 | 223.2 | 26.70 | 9.358 | |
| 5,600.0 | 5,587.1 | 5,601.2 | 5,587.1 | 13.5 | 13.9 | -0.36 | 179.1 | -319.4 | 249.9 | 222.8 | 27.08 | 9.227 | |
| 5,700.0 | 5,687.1 | 5,701.2 | 5,687.1 | 13.7 | 14.1 | -0.36 | 179.1 | -319.4 | 249.9 | 222.4 | 27.46 | 9.099 | |
| 5,800.0 | 5,787.1 | 5,801.2 | 5,787.1 | 13.9 | 14.3 | -0.36 | 179.1 | -319.4 | 249.9 | 222.1 | 27.85 | 8.974 | |
| 5,900.0 | 5,887.1 | 5,901.2 | 5,887.1 | 14.1 | 14.5 | -0.36 | 179.1 | -319.4 | 249.9 | 221.7 | 28.23 | 8.851 | |
| 6,000.0 | 5,987.1 | 6,001.2 | 5,987.1 | 14.3 | 14.7 | -0.36 | 179.1 | -319.4 | 249.9 | 221.3 | 28.62 | 8.732 | |
| 6,100.0 | 6,087.1 | 6,101.2 | 6,087.1 | 14.5 | 14.8 | -0.36 | 179.1 | -319.4 | 249.9 | 220.9 | 29.01 | 8.615 | |
| 6,200.0 | 6,187.1 | 6,201.2 | 6,187.1 | 14.7 | 15.0 | -0.36 | 179.1 | -319.4 | 249.9 | 220.5 | 29.40 | 8.500 | |
| 6,300.0 | 6,287.1 | 6,301.2 | 6,287.1 | 14.8 | 15.2 | -0.36 | 179.1 | -319.4 | 249.9 | 220.1 | 29.79 | 8.388 | |
| 6,400.0 | 6,387.1 | 6,401.2 | 6,387.1 | 15.0 | 15.4 | -0.36 | 179.1 | -319.4 | 249.9 | 219.7 | 30.19 | 8.279 | |
| 6,500.0 | 6,487.1 | 6,501.2 | 6,487.1 | 15.2 | 15.6 | -0.36 | 179.1 | -319.4 | 249.9 | 219.3 | 30.58 | 8.172 | |
| 6,600.0 | 6,587.1 | 6,601.2 | 6,587.1 | 15.4 | 15.8 | -0.36 | 179.1 | -319.4 | 249.9 | 218.9 | 30.98 | 8.067 | |
| 6,700.0 | 6,687.1 | 6,701.2 | 6,687.1 | 15.6 | 16.0 | -0.36 | 179.1 | -319.4 | 249.9 | 218.5 | 31.38 | 7.965 | |
| 6,800.0 | 6,787.1 | 6,801.2 | 6,787.1 | 15.8 | 16.2 | -0.36 | 179.1 | -319.4 | 249.9 | 218.1 | 31.78 | 7.864 | |
| 6,900.0 | 6,887.1 | 6,901.2 | 6,887.1 | 16.0 | 16.4 | -0.36 | 179.1 | -319.4 | 249.9 | 217.7 | 32.18 | 7.766 | |
| 7,000.0 | 6,987.1 | 7,001.2 | 6,987.1 | 16.2 | 16.6 | -0.36 | 179.1 | -319.4 | 249.9 | 217.3 | 32.58 | 7.671 | |
| 7,100.0 | 7,087.1 | 7,101.2 | 7,087.1 | 16.4 | 16.8 | -0.36 | 179.1 | -319.4 | 249.9 | 216.9 | 32.98 | 7.577 | |
| 7,200.0 | 7,187.1 | 7,201.2 | 7,187.1 | 16.6 | 17.0 | -0.36 | 179.1 | -319.4 | 249.9 | 216.5 | 33.39 | 7.485 | |
| 7,300.0 | 7,287.1 | 7,301.2 | 7,287.1 | 16.8 | 17.2 | -0.36 | 179.1 | -319.4 | 249.9 | 216.1 | 33.79 | 7.395 | |
| 7,400.0 | 7,387.1 | 7,401.2 | 7,387.1 | 17.0 | 17.5 | -0.36 | 179.1 | -319.4 | 249.9 | 215.7 | 34.20 | 7.307 | |
| 7,500.0 | 7,487.1 | 7,501.2 | 7,487.1 | 17.2 | 17.7 | -0.36 | 179.1 | -319.4 | 249.9 | 215.3 | 34.61 | 7.221 | |
| 7,600.0 | 7,587.1 | 7,601.2 | 7,587.1 | 17.4 | 17.9 | -0.36 | 179.1 | -319.4 | 249.9 | 214.9 | 35.02 | 7.137 | |
| 7,700.0 | 7,687.1 | 7,701.2 | 7,687.1 | 17.6 | 18.1 | -0.36 | 179.1 | -319.4 | 249.9 | 214.5 | 35.43 | 7.054 | |
| 7,800.0 | 7,787.1 | 7,801.2 | 7,787.1 | 17.8 | 18.3 | -0.36 | 179.1 | -319.4 | 249.9 | 214.1 | 35.84 | 6.973 | |
| 7,862.9 | 7,850.0 | 7,864.1 | 7,850.0 | 17.9 | 18.4 | -0.36 | 179.1 | -319.4 | 249.9 | 213.8 | 36.10 | 6.923 | |

| | | | |
|---|---|---|---|
| **Company:** | Piceance Energy, LLC | **Local Co-ordinate Reference:** | Well Piceance Federal 28-07W |
| **Project:** | Mesa County, CO | **TVD Reference:** | Well @ 7578.0usft |
| **Reference Site:** | Piceance 28-05 | **MD Reference:** | Well @ 7578.0usft |
| **Site Error:** | 0.0 usft | **North Reference:** | True |
| **Reference Well:** | Piceance Federal 28-07W | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0 usft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | Slot B-4 | **Database:** | EDMDBBW |
| **Reference Design:** | Design #1 | **Offset TVD Reference:** | Reference Datum |

Reference Depths are relative to Well @ 7578.0usft
Offset Depths are relative to Offset Datum
Central Meridian is 105° 30' 0.000 W

Coordinates are relative to: Piceance Federal 28-07W
Coordinate System is US State Plane 1983, Colorado Central Zone
Grid Convergence at Surface is: -1.44°

## Ladder Plot




LEGEND

Piceance Federal 28-01M, Slot A-4, Design #1 V0
Piceance Federal 28-02M, Slot A-5, Design #1 V0
Piceance Federal 28-03M, Slot B-5, Design #1
Piceance Federal 28-01W, Slot A-3, Design #1 V0
Piceance Federal 28-06W, Slot B-3, Design #1 V0

| | | | |
|---|---|---|---|
| **Company:** | Piceance Energy, LLC | **Local Co-ordinate Reference:** | Well Piceance Federal 28-07W |
| **Project:** | Mesa County, CO | **TVD Reference:** | Well @ 7578.0usft |
| **Reference Site:** | Piceance 28-05 | **MD Reference:** | Well @ 7578.0usft |
| **Site Error:** | 0.0 usft | **North Reference:** | True |
| **Reference Well:** | Piceance Federal 28-07W | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.0 usft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | Slot B-4 | **Database:** | EDMDBBW |
| **Reference Design:** | Design #1 | **Offset TVD Reference:** | Reference Datum |

Reference Depths are relative to Well @ 7578.0usft
Offset Depths are relative to Offset Datum
Central Meridian is 105° 30' 0.000 W

Coordinates are relative to: Piceance Federal 28-07W
Coordinate System is US State Plane 1983, Colorado Central Zone
Grid Convergence at Surface is: -1.44°