

PETROLEUM DEVELOPMENT CORP Weld County CO

Well Name: **Thornton 17T-421**

Surface Location: Thornton 17T-421 Pad Sec.17-T7N-R66W
 North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone
 Ground Elevation: 4951.0

| +N/-S | +E/-W | Northing | Easting | Latitude | Longitude | Slot |
|-------|-------|------------|------------|-----------|-------------|------|
| 0.0 | 0.0 | 1450806.61 | 3195225.60 | 40.568740 | -104.797280 | |

RKB-15' WELL @ 4966.0ft (RKB-15')

WELLBORE TARGET DETAILS

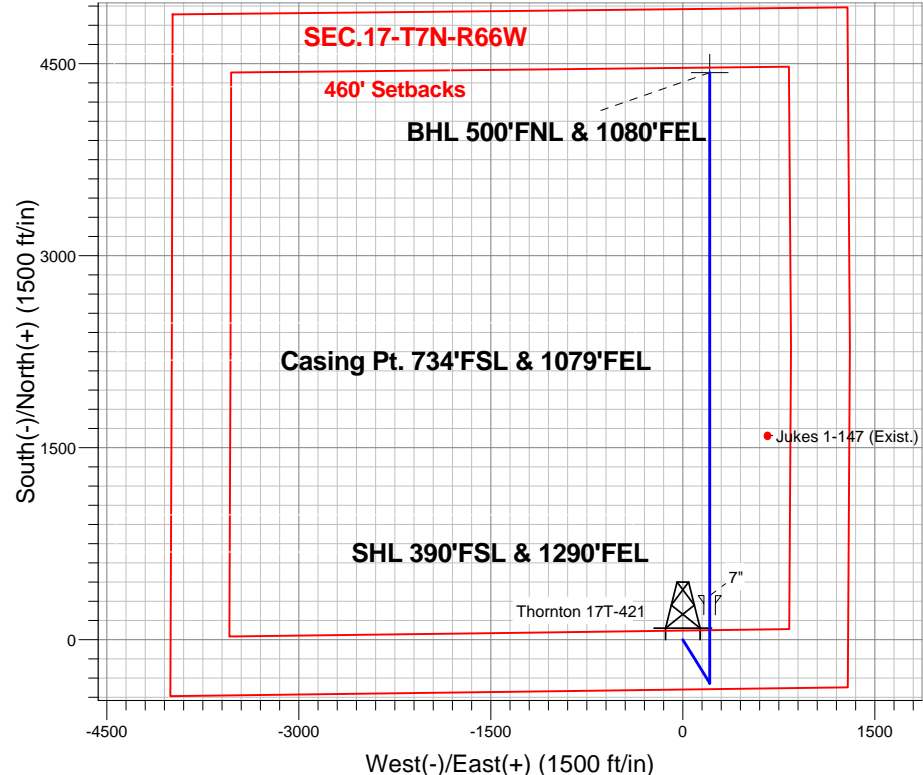
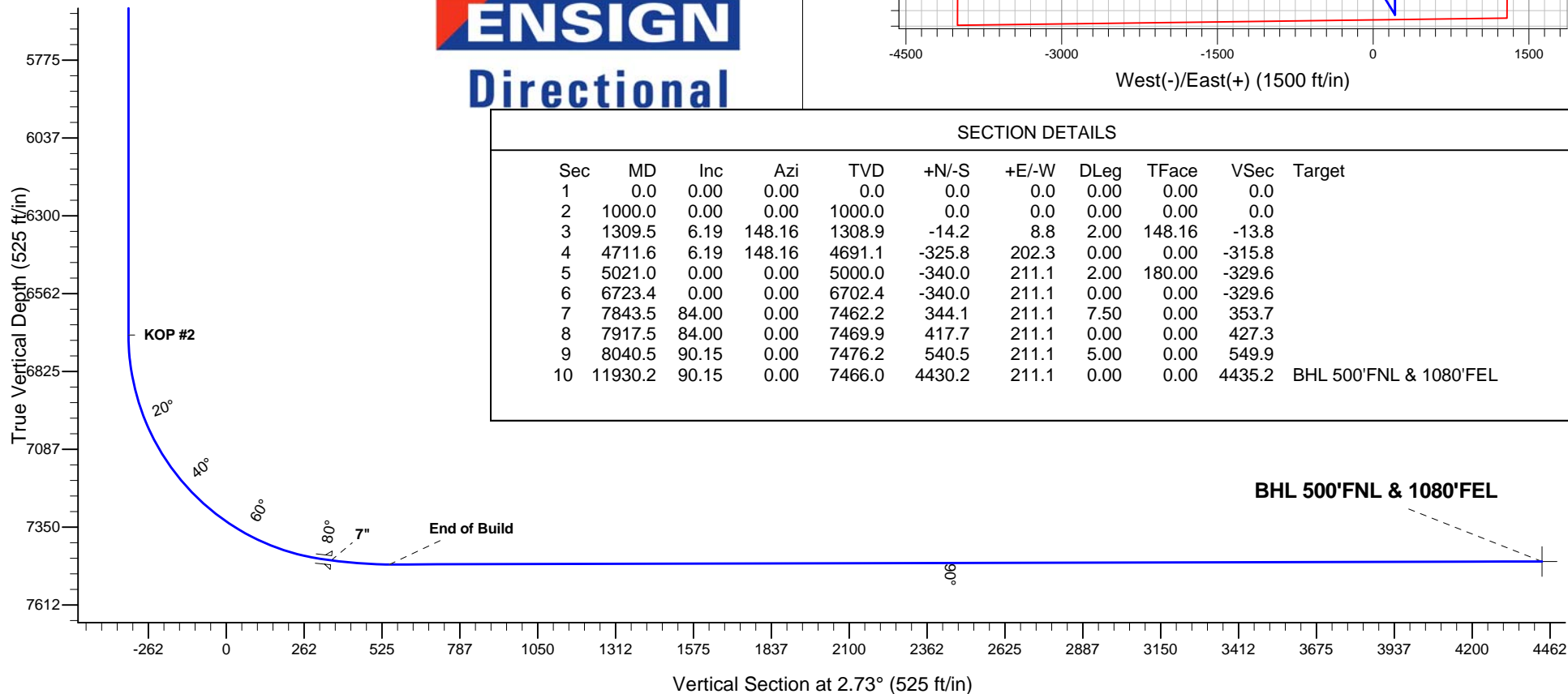
| Name | TVD | +N/-S | +E/-W | Shape |
|------------------------|--------|--------|-------|-------|
| BHL 500'FNL & 1080'FEL | 7466.0 | 4430.2 | 211.1 | Point |



Azimuths to True North
 Magnetic North: 8.62°

Magnetic Field
 Strength: 52999.0snT
 Dip Angle: 67.11°
 Date: 7/3/2013
 Model: IGRF2010

Thornton 17T-421 Pad Sec.17-T7N-R66W
 Thornton 17T-421
 Plan #1 (7-02-13)
 10:47, July 03 2013



SECTION DETAILS

| Sec | MD | Inc | Azi | TVD | +N/-S | +E/-W | DLeg | TFace | VSec | Target |
|-----|---------|-------|--------|--------|--------|-------|------|--------|--------|------------------------|
| 1 | 0.0 | 0.00 | 0.00 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.0 | |
| 2 | 1000.0 | 0.00 | 0.00 | 1000.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.0 | |
| 3 | 1309.5 | 6.19 | 148.16 | 1308.9 | -14.2 | 8.8 | 2.00 | 148.16 | -13.8 | |
| 4 | 4711.6 | 6.19 | 148.16 | 4691.1 | -325.8 | 202.3 | 0.00 | 0.00 | -315.8 | |
| 5 | 5021.0 | 0.00 | 0.00 | 5000.0 | -340.0 | 211.1 | 2.00 | 180.00 | -329.6 | |
| 6 | 6723.4 | 0.00 | 0.00 | 6702.4 | -340.0 | 211.1 | 0.00 | 0.00 | -329.6 | |
| 7 | 7843.5 | 84.00 | 0.00 | 7462.2 | 344.1 | 211.1 | 7.50 | 0.00 | 353.7 | |
| 8 | 7917.5 | 84.00 | 0.00 | 7469.9 | 417.7 | 211.1 | 0.00 | 0.00 | 427.3 | |
| 9 | 8040.5 | 90.15 | 0.00 | 7476.2 | 540.5 | 211.1 | 5.00 | 0.00 | 549.9 | |
| 10 | 11930.2 | 90.15 | 0.00 | 7466.0 | 4430.2 | 211.1 | 0.00 | 0.00 | 4435.2 | BHL 500'FNL & 1080'FEL |



PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.17-T7N-R66W

Thornton 17T-421 Pad Sec.17-T7N-R66W

Thornton 17T-421

Wellbore #1

Plan: Plan #1 (7-02-13)

Standard Planning Report

03 July, 2013

| | | | |
|------------------|---|-------------------------------------|---------------------------|
| Database: | Landmark | Local Co-ordinate Reference: | Well Thornton 17T-421 |
| Company: | PETROLEUM DEVELOPMENT CORP Weld County CO | TVD Reference: | WELL @ 4966.0ft (RKB-15') |
| Project: | SEC.17-T7N-R66W | MD Reference: | WELL @ 4966.0ft (RKB-15') |
| Site: | Thornton 17T-421 Pad Sec.17-T7N-R66W | North Reference: | True |
| Well: | Thornton 17T-421 | Survey Calculation Method: | Minimum Curvature |
| Wellbore: | Wellbore #1 | | |
| Design: | Plan #1 (7-02-13) | | |

| | | | |
|--------------------|--|----------------------|-----------------------------|
| Project | SEC.17-T7N-R66W, Weld County, Colorado | | |
| Map System: | US State Plane 1983 | System Datum: | Mean Sea Level |
| Geo Datum: | North American Datum 1983 | | Using Well Reference Point |
| Map Zone: | Colorado Northern Zone | | Using geodetic scale factor |

| | | | | | |
|-----------------------|----------|--------------------------------------|----------------|-------------------|-------------|
| Site | | Thornton 17T-421 Pad Sec.17-T7N-R66W | | | |
| Site Position: | | Northing: | 1,450,806.63ft | Latitude: | 40.568740 |
| From: | Lat/Long | Easting: | 3,195,225.60ft | Longitude: | -104.797280 |
| Position Uncertainty: | 0.0 ft | Slot Radius: | " | Grid Convergence: | 0.45 ° |

| | | | | | | |
|----------------------|------------------|--------|---------------------|-----------------|---------------|-------------|
| Well | Thornton 17T-421 | | | | | |
| Well Position | +N/-S | 0.0 ft | Northing: | 1,450,806.61 ft | Latitude: | 40.568740 |
| | +E/-W | 0.0 ft | Easting: | 3,195,225.60 ft | Longitude: | -104.797280 |
| Position Uncertainty | | 0.0 ft | Wellhead Elevation: | ft | Ground Level: | 4,951.0 ft |

| | | | | | |
|------------------|-------------------|--------------------|------------------------|----------------------|----------------------------|
| Wellbore | Wellbore #1 | | | | |
| Magnetics | Model Name | Sample Date | Declination (°) | Dip Angle (°) | Field Strength (nT) |
| | IGRF2010 | 7/3/2013 | 8.62 | 67.11 | 52,999 |

| | | | | |
|--------------------------|------------------------------|-------------------|----------------------|----------------------|
| Design | Plan #1 (7-02-13) | | | |
| Audit Notes: | | | | |
| Version: | Phase: | PROTOTYPE | Tie On Depth: | 0.0 |
| Vertical Section: | Depth From (TVD) (ft) | +N/-S (ft) | +E/-W (ft) | Direction (°) |
| | 0.0 | 0.0 | 0.0 | 2.73 |

| 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 | |
| 1,000.0 | 0.00 | 0.00 | 1,000.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 1,309.5 | 6.19 | 148.16 | 1,308.9 | -14.2 | 8.8 | 2.00 | 2.00 | 0.00 | 148.16 | |
| 4,711.6 | 6.19 | 148.16 | 4,691.1 | -325.8 | 202.3 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5,021.0 | 0.00 | 0.00 | 5,000.0 | -340.0 | 211.1 | 2.00 | -2.00 | 0.00 | 180.00 | |
| 6,723.4 | 0.00 | 0.00 | 6,702.4 | -340.0 | 211.1 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 7,843.5 | 84.00 | 0.00 | 7,462.2 | 344.1 | 211.1 | 7.50 | 7.50 | 0.00 | 0.00 | |
| 7,917.5 | 84.00 | 0.00 | 7,469.9 | 417.7 | 211.1 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 8,040.5 | 90.15 | 0.00 | 7,476.2 | 540.5 | 211.1 | 5.00 | 5.00 | 0.00 | 0.00 | |
| 11,930.2 | 90.15 | 0.00 | 7,466.0 | 4,430.2 | 211.1 | 0.00 | 0.00 | 0.00 | 0.00 | BHL 500'FNL & 100' |

| | | | |
|------------------|---|-------------------------------------|---------------------------|
| Database: | Landmark | Local Co-ordinate Reference: | Well Thornton 17T-421 |
| Company: | PETROLEUM DEVELOPMENT CORP Weld County CO | TVD Reference: | WELL @ 4966.0ft (RKB-15') |
| Project: | SEC.17-T7N-R66W | MD Reference: | WELL @ 4966.0ft (RKB-15') |
| Site: | Thornton 17T-421 Pad Sec.17-T7N-R66W | North Reference: | True |
| Well: | Thornton 17T-421 | Survey Calculation Method: | Minimum Curvature |
| Wellbore: | Wellbore #1 | | |
| Design: | Plan #1 (7-02-13) | | |

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) | Turn Rate (°/100ft) |
|---------------------|-----------------|-------------|---------------------|------------|------------|-----------------------|-----------------------|----------------------|---------------------|
| 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 |
| 700.0 | 0.00 | 0.00 | 700.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 800.0 | 0.00 | 0.00 | 800.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 900.0 | 0.00 | 0.00 | 900.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 1,000.0 | 0.00 | 0.00 | 1,000.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| KOP #1 | | | | | | | | | |
| 1,100.0 | 2.00 | 148.16 | 1,100.0 | -1.5 | 0.9 | -1.4 | 2.00 | 2.00 | 0.00 |
| 1,200.0 | 4.00 | 148.16 | 1,199.8 | -5.9 | 3.7 | -5.7 | 2.00 | 2.00 | 0.00 |
| 1,300.0 | 6.00 | 148.16 | 1,299.5 | -13.3 | 8.3 | -12.9 | 2.00 | 2.00 | 0.00 |
| 1,309.5 | 6.19 | 148.16 | 1,308.9 | -14.2 | 8.8 | -13.8 | 2.00 | 2.00 | 0.00 |
| 1,400.0 | 6.19 | 148.16 | 1,398.9 | -22.5 | 14.0 | -21.8 | 0.00 | 0.00 | 0.00 |
| 1,500.0 | 6.19 | 148.16 | 1,498.3 | -31.6 | 19.6 | -30.7 | 0.00 | 0.00 | 0.00 |
| 1,600.0 | 6.19 | 148.16 | 1,597.7 | -40.8 | 25.3 | -39.5 | 0.00 | 0.00 | 0.00 |
| 1,700.0 | 6.19 | 148.16 | 1,697.1 | -50.0 | 31.0 | -48.4 | 0.00 | 0.00 | 0.00 |
| 1,800.0 | 6.19 | 148.16 | 1,796.5 | -59.1 | 36.7 | -57.3 | 0.00 | 0.00 | 0.00 |
| 1,900.0 | 6.19 | 148.16 | 1,896.0 | -68.3 | 42.4 | -66.2 | 0.00 | 0.00 | 0.00 |
| 2,000.0 | 6.19 | 148.16 | 1,995.4 | -77.4 | 48.1 | -75.1 | 0.00 | 0.00 | 0.00 |
| 2,100.0 | 6.19 | 148.16 | 2,094.8 | -86.6 | 53.8 | -83.9 | 0.00 | 0.00 | 0.00 |
| 2,200.0 | 6.19 | 148.16 | 2,194.2 | -95.8 | 59.5 | -92.8 | 0.00 | 0.00 | 0.00 |
| 2,300.0 | 6.19 | 148.16 | 2,293.6 | -104.9 | 65.1 | -101.7 | 0.00 | 0.00 | 0.00 |
| 2,400.0 | 6.19 | 148.16 | 2,393.0 | -114.1 | 70.8 | -110.6 | 0.00 | 0.00 | 0.00 |
| 2,500.0 | 6.19 | 148.16 | 2,492.5 | -123.2 | 76.5 | -119.5 | 0.00 | 0.00 | 0.00 |
| 2,600.0 | 6.19 | 148.16 | 2,591.9 | -132.4 | 82.2 | -128.3 | 0.00 | 0.00 | 0.00 |
| 2,700.0 | 6.19 | 148.16 | 2,691.3 | -141.6 | 87.9 | -137.2 | 0.00 | 0.00 | 0.00 |
| 2,800.0 | 6.19 | 148.16 | 2,790.7 | -150.7 | 93.6 | -146.1 | 0.00 | 0.00 | 0.00 |
| 2,900.0 | 6.19 | 148.16 | 2,890.1 | -159.9 | 99.3 | -155.0 | 0.00 | 0.00 | 0.00 |
| 3,000.0 | 6.19 | 148.16 | 2,989.5 | -169.0 | 105.0 | -163.8 | 0.00 | 0.00 | 0.00 |
| 3,100.0 | 6.19 | 148.16 | 3,089.0 | -178.2 | 110.6 | -172.7 | 0.00 | 0.00 | 0.00 |
| 3,200.0 | 6.19 | 148.16 | 3,188.4 | -187.4 | 116.3 | -181.6 | 0.00 | 0.00 | 0.00 |
| 3,300.0 | 6.19 | 148.16 | 3,287.8 | -196.5 | 122.0 | -190.5 | 0.00 | 0.00 | 0.00 |
| 3,400.0 | 6.19 | 148.16 | 3,387.2 | -205.7 | 127.7 | -199.4 | 0.00 | 0.00 | 0.00 |
| 3,500.0 | 6.19 | 148.16 | 3,486.6 | -214.8 | 133.4 | -208.2 | 0.00 | 0.00 | 0.00 |
| 3,600.0 | 6.19 | 148.16 | 3,586.0 | -224.0 | 139.1 | -217.1 | 0.00 | 0.00 | 0.00 |
| 3,700.0 | 6.19 | 148.16 | 3,685.5 | -233.2 | 144.8 | -226.0 | 0.00 | 0.00 | 0.00 |
| 3,800.0 | 6.19 | 148.16 | 3,784.9 | -242.3 | 150.5 | -234.9 | 0.00 | 0.00 | 0.00 |
| 3,900.0 | 6.19 | 148.16 | 3,884.3 | -251.5 | 156.1 | -243.8 | 0.00 | 0.00 | 0.00 |
| 4,000.0 | 6.19 | 148.16 | 3,983.7 | -260.6 | 161.8 | -252.6 | 0.00 | 0.00 | 0.00 |
| 4,100.0 | 6.19 | 148.16 | 4,083.1 | -269.8 | 167.5 | -261.5 | 0.00 | 0.00 | 0.00 |
| 4,200.0 | 6.19 | 148.16 | 4,182.5 | -279.0 | 173.2 | -270.4 | 0.00 | 0.00 | 0.00 |
| 4,300.0 | 6.19 | 148.16 | 4,282.0 | -288.1 | 178.9 | -279.3 | 0.00 | 0.00 | 0.00 |
| 4,400.0 | 6.19 | 148.16 | 4,381.4 | -297.3 | 184.6 | -288.2 | 0.00 | 0.00 | 0.00 |
| 4,500.0 | 6.19 | 148.16 | 4,480.8 | -306.4 | 190.3 | -297.0 | 0.00 | 0.00 | 0.00 |
| 4,600.0 | 6.19 | 148.16 | 4,580.2 | -315.6 | 196.0 | -305.9 | 0.00 | 0.00 | 0.00 |
| 4,700.0 | 6.19 | 148.16 | 4,679.6 | -324.8 | 201.6 | -314.8 | 0.00 | 0.00 | 0.00 |
| 4,711.6 | 6.19 | 148.16 | 4,691.1 | -325.8 | 202.3 | -315.8 | 0.00 | 0.00 | 0.00 |
| 4,800.0 | 4.42 | 148.16 | 4,779.2 | -332.8 | 206.6 | -322.5 | 2.00 | -2.00 | 0.00 |
| 4,900.0 | 2.42 | 148.16 | 4,879.0 | -337.8 | 209.8 | -327.5 | 2.00 | -2.00 | 0.00 |

| | | | |
|------------------|---|-------------------------------------|---------------------------|
| Database: | Landmark | Local Co-ordinate Reference: | Well Thornton 17T-421 |
| Company: | PETROLEUM DEVELOPMENT CORP Weld County CO | TVD Reference: | WELL @ 4966.0ft (RKB-15') |
| Project: | SEC.17-T7N-R66W | MD Reference: | WELL @ 4966.0ft (RKB-15') |
| Site: | Thornton 17T-421 Pad Sec.17-T7N-R66W | North Reference: | True |
| Well: | Thornton 17T-421 | Survey Calculation Method: | Minimum Curvature |
| Wellbore: | Wellbore #1 | | |
| Design: | Plan #1 (7-02-13) | | |

| 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) | Turn Rate (°/100ft) |
| 5,000.0 | 0.42 | 148.16 | 4,979.0 | -339.9 | 211.1 | -329.5 | 2.00 | -2.00 | 0.00 |
| 5,021.0 | 0.00 | 0.00 | 5,000.0 | -340.0 | 211.1 | -329.6 | 2.00 | -2.00 | 0.00 |
| 5,100.0 | 0.00 | 0.00 | 5,079.0 | -340.0 | 211.1 | -329.6 | 0.00 | 0.00 | 0.00 |
| 5,200.0 | 0.00 | 0.00 | 5,179.0 | -340.0 | 211.1 | -329.6 | 0.00 | 0.00 | 0.00 |
| 5,300.0 | 0.00 | 0.00 | 5,279.0 | -340.0 | 211.1 | -329.6 | 0.00 | 0.00 | 0.00 |
| 5,400.0 | 0.00 | 0.00 | 5,379.0 | -340.0 | 211.1 | -329.6 | 0.00 | 0.00 | 0.00 |
| 5,500.0 | 0.00 | 0.00 | 5,479.0 | -340.0 | 211.1 | -329.6 | 0.00 | 0.00 | 0.00 |
| 5,600.0 | 0.00 | 0.00 | 5,579.0 | -340.0 | 211.1 | -329.6 | 0.00 | 0.00 | 0.00 |
| 5,700.0 | 0.00 | 0.00 | 5,679.0 | -340.0 | 211.1 | -329.6 | 0.00 | 0.00 | 0.00 |
| 5,800.0 | 0.00 | 0.00 | 5,779.0 | -340.0 | 211.1 | -329.6 | 0.00 | 0.00 | 0.00 |
| 5,900.0 | 0.00 | 0.00 | 5,879.0 | -340.0 | 211.1 | -329.6 | 0.00 | 0.00 | 0.00 |
| 6,000.0 | 0.00 | 0.00 | 5,979.0 | -340.0 | 211.1 | -329.6 | 0.00 | 0.00 | 0.00 |
| 6,100.0 | 0.00 | 0.00 | 6,079.0 | -340.0 | 211.1 | -329.6 | 0.00 | 0.00 | 0.00 |
| 6,200.0 | 0.00 | 0.00 | 6,179.0 | -340.0 | 211.1 | -329.6 | 0.00 | 0.00 | 0.00 |
| 6,300.0 | 0.00 | 0.00 | 6,279.0 | -340.0 | 211.1 | -329.6 | 0.00 | 0.00 | 0.00 |
| 6,400.0 | 0.00 | 0.00 | 6,379.0 | -340.0 | 211.1 | -329.6 | 0.00 | 0.00 | 0.00 |
| 6,500.0 | 0.00 | 0.00 | 6,479.0 | -340.0 | 211.1 | -329.6 | 0.00 | 0.00 | 0.00 |
| 6,600.0 | 0.00 | 0.00 | 6,579.0 | -340.0 | 211.1 | -329.6 | 0.00 | 0.00 | 0.00 |
| 6,700.0 | 0.00 | 0.00 | 6,679.0 | -340.0 | 211.1 | -329.6 | 0.00 | 0.00 | 0.00 |
| 6,723.4 | 0.00 | 0.00 | 6,702.4 | -340.0 | 211.1 | -329.6 | 0.00 | 0.00 | 0.00 |
| KOP #2 | | | | | | | | | |
| 6,800.0 | 5.74 | 0.00 | 6,778.8 | -336.2 | 211.1 | -325.7 | 7.50 | 7.50 | 0.00 |
| 6,900.0 | 13.24 | 0.00 | 6,877.4 | -319.7 | 211.1 | -309.3 | 7.50 | 7.50 | 0.00 |
| 7,000.0 | 20.74 | 0.00 | 6,973.0 | -290.5 | 211.1 | -280.1 | 7.50 | 7.50 | 0.00 |
| 7,100.0 | 28.24 | 0.00 | 7,063.9 | -249.1 | 211.1 | -238.7 | 7.50 | 7.50 | 0.00 |
| 7,200.0 | 35.74 | 0.00 | 7,148.7 | -196.1 | 211.1 | -185.9 | 7.50 | 7.50 | 0.00 |
| 7,300.0 | 43.24 | 0.00 | 7,225.8 | -132.6 | 211.1 | -122.4 | 7.50 | 7.50 | 0.00 |
| 7,400.0 | 50.74 | 0.00 | 7,293.9 | -59.5 | 211.1 | -49.4 | 7.50 | 7.50 | 0.00 |
| 7,500.0 | 58.24 | 0.00 | 7,352.0 | 21.8 | 211.1 | 31.9 | 7.50 | 7.50 | 0.00 |
| 7,600.0 | 65.74 | 0.00 | 7,398.9 | 110.1 | 211.1 | 120.0 | 7.50 | 7.50 | 0.00 |
| 7,700.0 | 73.24 | 0.00 | 7,433.9 | 203.7 | 211.1 | 213.5 | 7.50 | 7.50 | 0.00 |
| 7,800.0 | 80.74 | 0.00 | 7,456.4 | 301.0 | 211.1 | 310.7 | 7.50 | 7.50 | 0.00 |
| 7,843.5 | 84.00 | 0.00 | 7,462.2 | 344.1 | 211.1 | 353.8 | 7.49 | 7.49 | 0.00 |
| 7" | | | | | | | | | |
| 7,900.0 | 84.00 | 0.00 | 7,468.1 | 400.3 | 211.1 | 409.9 | 0.00 | 0.00 | 0.00 |
| 7,917.5 | 84.00 | 0.00 | 7,469.9 | 417.7 | 211.1 | 427.3 | 0.00 | 0.00 | 0.00 |
| 8,000.0 | 88.13 | 0.00 | 7,475.6 | 500.0 | 211.1 | 509.5 | 5.00 | 5.00 | 0.00 |
| 8,040.5 | 90.15 | 0.00 | 7,476.2 | 540.5 | 211.1 | 550.0 | 4.99 | 4.99 | 0.00 |
| End of Build | | | | | | | | | |
| 8,100.0 | 90.15 | 0.00 | 7,476.0 | 600.0 | 211.1 | 609.4 | 0.00 | 0.00 | 0.00 |
| 8,200.0 | 90.15 | 0.00 | 7,475.8 | 700.0 | 211.1 | 709.3 | 0.00 | 0.00 | 0.00 |
| 8,300.0 | 90.15 | 0.00 | 7,475.5 | 800.0 | 211.1 | 809.2 | 0.00 | 0.00 | 0.00 |
| 8,400.0 | 90.15 | 0.00 | 7,475.2 | 900.0 | 211.1 | 909.0 | 0.00 | 0.00 | 0.00 |
| 8,500.0 | 90.15 | 0.00 | 7,475.0 | 1,000.0 | 211.1 | 1,008.9 | 0.00 | 0.00 | 0.00 |
| 8,600.0 | 90.15 | 0.00 | 7,474.7 | 1,100.0 | 211.1 | 1,108.8 | 0.00 | 0.00 | 0.00 |
| 8,700.0 | 90.15 | 0.00 | 7,474.5 | 1,200.0 | 211.1 | 1,208.7 | 0.00 | 0.00 | 0.00 |
| 8,800.0 | 90.15 | 0.00 | 7,474.2 | 1,300.0 | 211.1 | 1,308.6 | 0.00 | 0.00 | 0.00 |
| 8,900.0 | 90.15 | 0.00 | 7,473.9 | 1,400.0 | 211.1 | 1,408.5 | 0.00 | 0.00 | 0.00 |
| 9,000.0 | 90.15 | 0.00 | 7,473.7 | 1,500.0 | 211.1 | 1,508.4 | 0.00 | 0.00 | 0.00 |
| 9,100.0 | 90.15 | 0.00 | 7,473.4 | 1,600.0 | 211.1 | 1,608.2 | 0.00 | 0.00 | 0.00 |
| 9,200.0 | 90.15 | 0.00 | 7,473.1 | 1,700.0 | 211.1 | 1,708.1 | 0.00 | 0.00 | 0.00 |
| 9,300.0 | 90.15 | 0.00 | 7,472.9 | 1,800.0 | 211.1 | 1,808.0 | 0.00 | 0.00 | 0.00 |
| 9,400.0 | 90.15 | 0.00 | 7,472.6 | 1,900.0 | 211.1 | 1,907.9 | 0.00 | 0.00 | 0.00 |

| | | | |
|------------------|---|-------------------------------------|---------------------------|
| Database: | Landmark | Local Co-ordinate Reference: | Well Thornton 17T-421 |
| Company: | PETROLEUM DEVELOPMENT CORP Weld County CO | TVD Reference: | WELL @ 4966.0ft (RKB-15') |
| Project: | SEC.17-T7N-R66W | MD Reference: | WELL @ 4966.0ft (RKB-15') |
| Site: | Thornton 17T-421 Pad Sec.17-T7N-R66W | North Reference: | True |
| Well: | Thornton 17T-421 | Survey Calculation Method: | Minimum Curvature |
| Wellbore: | Wellbore #1 | | |
| Design: | Plan #1 (7-02-13) | | |

| 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) | Turn Rate (°/100ft) |
| 9,500.0 | 90.15 | 0.00 | 7,472.4 | 2,000.0 | 211.1 | 2,007.8 | 0.00 | 0.00 | 0.00 |
| 9,600.0 | 90.15 | 0.00 | 7,472.1 | 2,100.0 | 211.1 | 2,107.7 | 0.00 | 0.00 | 0.00 |
| 9,700.0 | 90.15 | 0.00 | 7,471.8 | 2,200.0 | 211.1 | 2,207.6 | 0.00 | 0.00 | 0.00 |
| 9,800.0 | 90.15 | 0.00 | 7,471.6 | 2,300.0 | 211.1 | 2,307.5 | 0.00 | 0.00 | 0.00 |
| 9,900.0 | 90.15 | 0.00 | 7,471.3 | 2,400.0 | 211.1 | 2,407.3 | 0.00 | 0.00 | 0.00 |
| 10,000.0 | 90.15 | 0.00 | 7,471.1 | 2,500.0 | 211.1 | 2,507.2 | 0.00 | 0.00 | 0.00 |
| 10,100.0 | 90.15 | 0.00 | 7,470.8 | 2,600.0 | 211.1 | 2,607.1 | 0.00 | 0.00 | 0.00 |
| 10,200.0 | 90.15 | 0.00 | 7,470.5 | 2,700.0 | 211.1 | 2,707.0 | 0.00 | 0.00 | 0.00 |
| 10,300.0 | 90.15 | 0.00 | 7,470.3 | 2,800.0 | 211.1 | 2,806.9 | 0.00 | 0.00 | 0.00 |
| 10,400.0 | 90.15 | 0.00 | 7,470.0 | 2,900.0 | 211.1 | 2,906.8 | 0.00 | 0.00 | 0.00 |
| 10,500.0 | 90.15 | 0.00 | 7,469.7 | 3,000.0 | 211.1 | 3,006.7 | 0.00 | 0.00 | 0.00 |
| 10,600.0 | 90.15 | 0.00 | 7,469.5 | 3,100.0 | 211.1 | 3,106.5 | 0.00 | 0.00 | 0.00 |
| 10,700.0 | 90.15 | 0.00 | 7,469.2 | 3,200.0 | 211.1 | 3,206.4 | 0.00 | 0.00 | 0.00 |
| 10,800.0 | 90.15 | 0.00 | 7,469.0 | 3,300.0 | 211.1 | 3,306.3 | 0.00 | 0.00 | 0.00 |
| 10,900.0 | 90.15 | 0.00 | 7,468.7 | 3,400.0 | 211.1 | 3,406.2 | 0.00 | 0.00 | 0.00 |
| 11,000.0 | 90.15 | 0.00 | 7,468.4 | 3,500.0 | 211.1 | 3,506.1 | 0.00 | 0.00 | 0.00 |
| 11,100.0 | 90.15 | 0.00 | 7,468.2 | 3,600.0 | 211.1 | 3,606.0 | 0.00 | 0.00 | 0.00 |
| 11,200.0 | 90.15 | 0.00 | 7,467.9 | 3,700.0 | 211.1 | 3,705.9 | 0.00 | 0.00 | 0.00 |
| 11,300.0 | 90.15 | 0.00 | 7,467.6 | 3,800.0 | 211.1 | 3,805.7 | 0.00 | 0.00 | 0.00 |
| 11,400.0 | 90.15 | 0.00 | 7,467.4 | 3,900.0 | 211.1 | 3,905.6 | 0.00 | 0.00 | 0.00 |
| 11,500.0 | 90.15 | 0.00 | 7,467.1 | 4,000.0 | 211.1 | 4,005.5 | 0.00 | 0.00 | 0.00 |
| 11,600.0 | 90.15 | 0.00 | 7,466.9 | 4,100.0 | 211.1 | 4,105.4 | 0.00 | 0.00 | 0.00 |
| 11,700.0 | 90.15 | 0.00 | 7,466.6 | 4,200.0 | 211.1 | 4,205.3 | 0.00 | 0.00 | 0.00 |
| 11,800.0 | 90.15 | 0.00 | 7,466.3 | 4,300.0 | 211.1 | 4,305.2 | 0.00 | 0.00 | 0.00 |
| 11,900.0 | 90.15 | 0.00 | 7,466.1 | 4,400.0 | 211.1 | 4,405.1 | 0.00 | 0.00 | 0.00 |
| 11,930.2 | 90.15 | 0.00 | 7,466.0 | 4,430.2 | 211.1 | 4,435.2 | 0.00 | 0.00 | 0.00 |

| Targets | | | | | | | | | |
|---------------------------|---------------|--------------|----------|------------|------------|---------------|--------------|-----------|-------------|
| Target Name | Dip Angle (°) | Dip Dir. (°) | TVD (ft) | +N/-S (ft) | +E/-W (ft) | Northing (ft) | Easting (ft) | Latitude | Longitude |
| - hit/miss target | | | | | | | | | |
| - Shape | | | | | | | | | |
| BHL 500'FNL & 1080' | 0.00 | 0.00 | 7,466.0 | 4,430.2 | 211.1 | 1,455,238.20 | 3,195,401.59 | 40.580900 | -104.796520 |
| - plan hits target center | | | | | | | | | |
| - Point | | | | | | | | | |

| Casing Points | | | | | |
|---------------------|---------------------|------|--|---------------------|-------------------|
| Measured Depth (ft) | Vertical Depth (ft) | Name | | Casing Diameter (") | Hole Diameter (") |
| 7,843.5 | 7,462.2 | 7" | | 7 | 7-1/2 |

| Plan Annotations | | | | |
|---------------------|---------------------|------------|------------|--------------|
| Measured Depth (ft) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Comment |
| 1,000.0 | 1,000.0 | 0.0 | 0.0 | KOP #1 |
| 6,723.4 | 6,702.4 | -340.0 | 211.1 | KOP #2 |
| 8,040.5 | 7,476.2 | 540.5 | 211.1 | End of Build |



PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.17-T7N-R66W

Thornton 17T-421 Pad Sec.17-T7N-R66W

Thornton 17T-421

Wellbore #1

Plan #1 (7-02-13)

Anticollision Report

03 July, 2013



| | | | |
|---------------------------|---|-------------------------------------|---------------------------|
| Company: | PETROLEUM DEVELOPMENT CORP Weld County CO | Local Co-ordinate Reference: | Well Thornton 17T-421 |
| Project: | SEC.17-T7N-R66W | TVD Reference: | WELL @ 4966.0ft (RKB-15') |
| Reference Site: | Thornton 17T-421 Pad Sec.17-T7N-R66W | MD Reference: | WELL @ 4966.0ft (RKB-15') |
| Site Error: | 0.0ft | North Reference: | True |
| Reference Well: | Thornton 17T-421 | Survey Calculation Method: | Minimum Curvature |
| Well Error: | 0.0ft | Output errors are at | 2.00 sigma |
| Reference Wellbore | Wellbore #1 | Database: | Landmark |
| Reference Design: | Plan #1 (7-02-13) | Offset TVD Reference: | Offset Datum |

| | | | |
|-------------------------------------|---|-----------------------|---------------------|
| Reference | Plan #1 (7-02-13) | | |
| Filter type: | NO GLOBAL FILTER: Using user defined selection & filtering criteria | | |
| Interpolation Method: | MD Interval 100.0ft | Error Model: | ISCWSA |
| Depth Range: | Unlimited | Scan Method: | Closest Approach 3D |
| Results Limited by: | Maximum center-center distance of 1,000.0ft | Error Surface: | Elliptical Conic |
| Warning Levels Evaluated at: | 2.00 Sigma | | |

| | | | | |
|----------------------------|----------------|---------------------------------|------------------|--------------------|
| Survey Tool Program | Date | 7/3/2013 | | |
| From (ft) | To (ft) | Survey (Wellbore) | Tool Name | Description |
| 0.0 | 11,930.2 | Plan #1 (7-02-13) (Wellbore #1) | MWD | MWD - Standard |

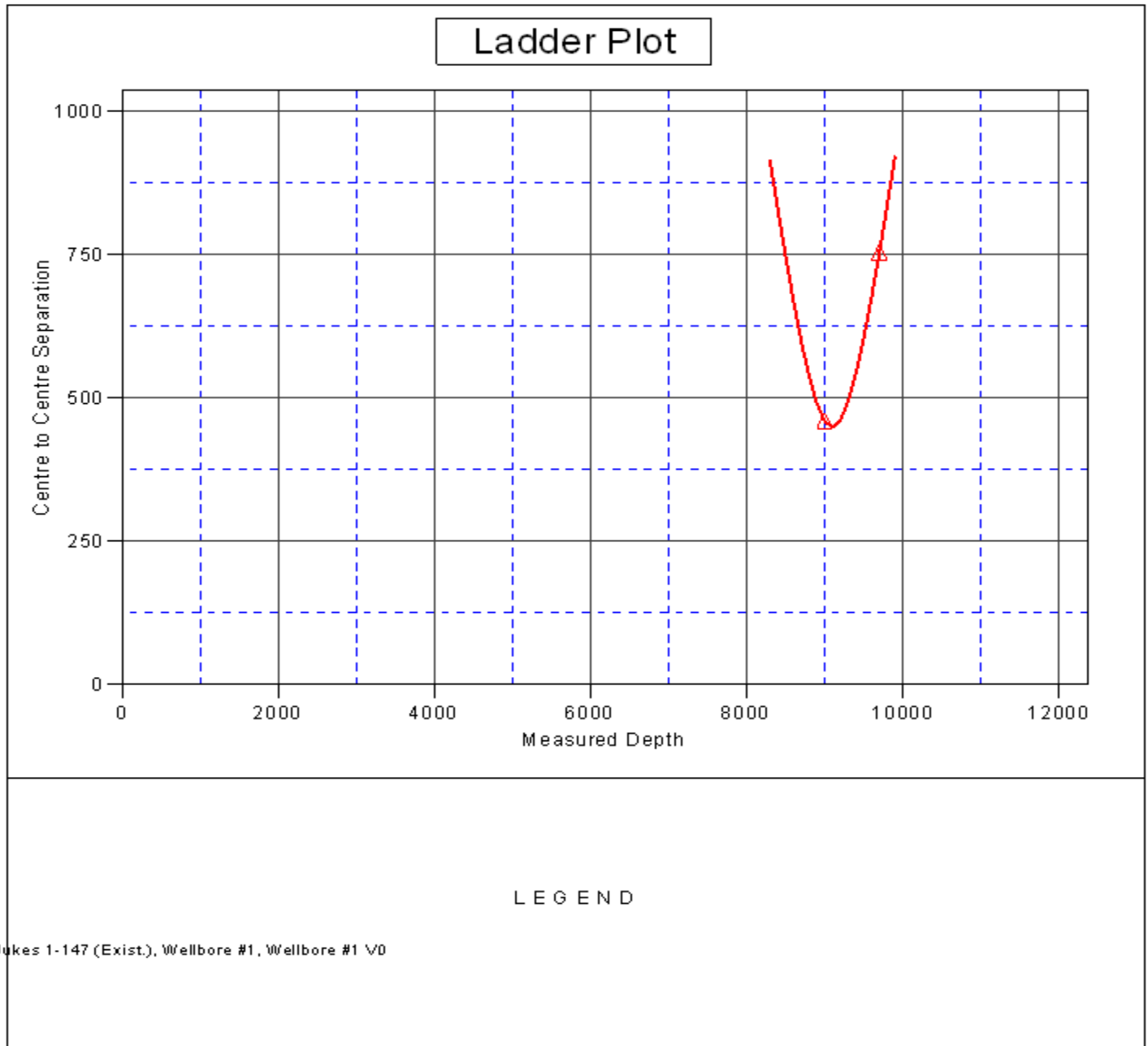
| | | | | | | |
|--|--------------------------------------|-----------------------------------|--------------------------------------|--------------------------|----------------|--------|
| Summary | | | | | | |
| Site Name | Reference Measured Depth (ft) | Offset Measured Depth (ft) | Distance Between Centres (ft) | Separation Factor | Warning | |
| Offset Well - Wellbore - Design | | | | | | |
| Existing Wells | | | | | | |
| Jukes 1-147 (Exist.) - Wellbore #1 - Wellbore #1 | 9,095.7 | 7,184.4 | 450.1 | 270.1 | 2.501 | CC |
| Jukes 1-147 (Exist.) - Wellbore #1 - Wellbore #1 | 9,100.0 | 7,184.4 | 450.1 | 270.1 | 2.501 | ES, SF |

| Offset Design | | Existing Wells - Jukes 1-147 (Exist.) - Wellbore #1 - Wellbore #1 | | | | | | | | | | | Offset Site Error: | 0.0 ft |
|------------------------------|---------------------|---|---------------------|-----------------|-------------|-----------------------|------------------------|------------|----------------------|-----------------------|-------------------------|-------------------|--------------------|---------|
| Survey Program: 7500-UNKNOWN | | | | | | | | | | | | | Offset Well Error: | 0.0 ft |
| Reference | | Offset | | Semi Major Axis | | Distance | | | | | | | | Warning |
| Measured Depth (ft) | Vertical Depth (ft) | Measured Depth (ft) | Vertical Depth (ft) | Reference (ft) | Offset (ft) | Highside Toolface (°) | Offset Wellbore Centre | | Between Centres (ft) | Between Ellipses (ft) | Minimum Separation (ft) | Separation Factor | | |
| | | | | | | | +N/-S (ft) | +E/-W (ft) | | | | | | |
| 8,300.0 | 7,475.5 | 7,186.5 | 7,186.5 | 23.7 | 143.7 | 90.27 | 1,595.8 | 661.2 | 914.2 | 746.9 | 167.33 | 5.464 | | |
| 8,400.0 | 7,475.2 | 7,186.2 | 7,186.2 | 25.1 | 143.7 | 90.23 | 1,595.8 | 661.2 | 828.6 | 659.9 | 168.75 | 4.910 | | |
| 8,500.0 | 7,475.0 | 7,186.0 | 7,186.0 | 26.6 | 143.7 | 90.20 | 1,595.8 | 661.2 | 746.6 | 576.4 | 170.23 | 4.386 | | |
| 8,600.0 | 7,474.7 | 7,185.7 | 7,185.7 | 28.1 | 143.7 | 90.17 | 1,595.8 | 661.2 | 669.6 | 497.8 | 171.77 | 3.898 | | |
| 8,700.0 | 7,474.5 | 7,185.5 | 7,185.5 | 29.7 | 143.7 | 90.13 | 1,595.8 | 661.2 | 599.3 | 426.0 | 173.35 | 3.457 | | |
| 8,800.0 | 7,474.2 | 7,185.2 | 7,185.2 | 31.3 | 143.7 | 90.10 | 1,595.8 | 661.2 | 538.5 | 363.6 | 174.97 | 3.078 | | |
| 8,900.0 | 7,473.9 | 7,184.9 | 7,184.9 | 33.0 | 143.7 | 90.07 | 1,595.8 | 661.2 | 490.8 | 314.2 | 176.62 | 2.779 | | |
| 9,000.0 | 7,473.7 | 7,184.7 | 7,184.7 | 34.7 | 143.7 | 90.03 | 1,595.8 | 661.2 | 460.1 | 281.8 | 178.30 | 2.581 | | |
| 9,095.7 | 7,473.4 | 7,184.4 | 7,184.4 | 36.3 | 143.7 | 90.00 | 1,595.8 | 661.2 | 450.1 | 270.1 | 179.93 | 2.501 | CC | |
| 9,100.0 | 7,473.4 | 7,184.4 | 7,184.4 | 36.4 | 143.7 | 90.00 | 1,595.8 | 661.2 | 450.1 | 270.1 | 180.00 | 2.501 | ES, SF | |
| 9,200.0 | 7,473.1 | 7,184.1 | 7,184.1 | 38.1 | 143.7 | 89.97 | 1,595.8 | 661.2 | 462.0 | 280.3 | 181.72 | 2.542 | | |
| 9,300.0 | 7,472.9 | 7,183.9 | 7,183.9 | 39.9 | 143.7 | 89.93 | 1,595.8 | 661.2 | 494.3 | 310.8 | 183.47 | 2.694 | | |
| 9,400.0 | 7,472.6 | 7,183.6 | 7,183.6 | 41.6 | 143.7 | 89.90 | 1,595.8 | 661.2 | 543.3 | 358.0 | 185.22 | 2.933 | | |
| 9,500.0 | 7,472.4 | 7,183.4 | 7,183.4 | 43.4 | 143.7 | 89.87 | 1,595.8 | 661.2 | 605.0 | 418.0 | 186.99 | 3.235 | | |
| 9,600.0 | 7,472.1 | 7,183.1 | 7,183.1 | 45.2 | 143.7 | 89.83 | 1,595.8 | 661.2 | 675.9 | 487.1 | 188.78 | 3.580 | | |
| 9,700.0 | 7,471.8 | 7,182.8 | 7,182.8 | 47.0 | 143.7 | 89.80 | 1,595.8 | 661.2 | 753.5 | 562.9 | 190.57 | 3.954 | | |
| 9,800.0 | 7,471.6 | 7,182.6 | 7,182.6 | 48.8 | 143.7 | 89.77 | 1,595.8 | 661.2 | 835.8 | 643.4 | 192.37 | 4.345 | | |
| 9,900.0 | 7,471.3 | 7,182.3 | 7,182.3 | 50.6 | 143.6 | 89.73 | 1,595.8 | 661.2 | 921.6 | 727.4 | 194.19 | 4.746 | | |

| | | | |
|---------------------------|---|-------------------------------------|---------------------------|
| Company: | PETROLEUM DEVELOPMENT CORP Weld County CO | Local Co-ordinate Reference: | Well Thornton 17T-421 |
| Project: | SEC.17-T7N-R66W | TVD Reference: | WELL @ 4966.0ft (RKB-15') |
| Reference Site: | Thornton 17T-421 Pad Sec.17-T7N-R66W | MD Reference: | WELL @ 4966.0ft (RKB-15') |
| Site Error: | 0.0ft | North Reference: | True |
| Reference Well: | Thornton 17T-421 | Survey Calculation Method: | Minimum Curvature |
| Well Error: | 0.0ft | Output errors are at | 2.00 sigma |
| Reference Wellbore | Wellbore #1 | Database: | Landmark |
| Reference Design: | Plan #1 (7-02-13) | Offset TVD Reference: | Offset Datum |

Reference Depths are relative to WELL @ 4966.0ft (RKB-15')
Offset Depths are relative to Offset Datum
Central Meridian is -105.500000 °

Coordinates are relative to: Thornton 17T-421
Coordinate System is US State Plane 1983, Colorado Northern Zone
Grid Convergence at Surface is: 0.45°



| | | | |
|---------------------------|---|-------------------------------------|---------------------------|
| Company: | PETROLEUM DEVELOPMENT CORP Weld County CO | Local Co-ordinate Reference: | Well Thornton 17T-421 |
| Project: | SEC.17-T7N-R66W | TVD Reference: | WELL @ 4966.0ft (RKB-15') |
| Reference Site: | Thornton 17T-421 Pad Sec.17-T7N-R66W | MD Reference: | WELL @ 4966.0ft (RKB-15') |
| Site Error: | 0.0ft | North Reference: | True |
| Reference Well: | Thornton 17T-421 | Survey Calculation Method: | Minimum Curvature |
| Well Error: | 0.0ft | Output errors are at | 2.00 sigma |
| Reference Wellbore | Wellbore #1 | Database: | Landmark |
| Reference Design: | Plan #1 (7-02-13) | Offset TVD Reference: | Offset Datum |

Reference Depths are relative to WELL @ 4966.0ft (RKB-15')
Offset Depths are relative to Offset Datum
Central Meridian is -105.500000 °

Coordinates are relative to: Thornton 17T-421
Coordinate System is US State Plane 1983, Colorado Northern Zone
Grid Convergence at Surface is: 0.45°

