PHOENIX
TECHNOLOGY SERVICES



30-015-40126

# Chesapeake Operating Inc.

**Eddy County, New Mexico (NAD 1983)**
**PLU Pierce canyon 16-24-30 State 1H**
**Job # 1210411**
**Rig Patterson 62**

**Survey: Phoenix MWD Surveys**

# Chesapeake Energy, Survey Report

**04 June, 2012**

Chesapeake

| | | | |
|---|---|---|---|
| **Company:** | Chesapeake Operating Inc. | **Local Co-ordinate Reference:** | Well Job # 1210411 |
| **Project:** | Eddy County, New Mexico (NAD 1983) | **TVD Reference:** | WELL @ 3378.00usft (Original Well Elev) |
| **Site:** | PLU Pierce canyon 16-24-30 State 1H | **MD Reference:** | WELL @ 3378.00usft (Original Well Elev) |
| **Well:** | Job # 1210411 | **North Reference:** | Grid |
| **Wellbore:** | Rig: Patterson 62 | **Survey Calculation Method:** | Minimum Curvature |
| **Design:** | Rig: Patterson 62 | **Database:** | Compass5000 |

**Project** Eddy County, New Mexico (NAD 1983)

| | | | |
|---|---|---|---|
| **Map System:** | US State Plane 1983 | **System Datum:** | Mean Sea Level |
| **Geo Datum:** | North American Datum 1983 | | |
| **Map Zone:** | New Mexico Eastern Zone | | |

**Site** PLU Pierce canyon 16-24-30 State 1H

| | | | | | |
|---|---|---|---|---|---|
| **Site Position:** | | **Northing:** | 440,647.00 usft | **Latitude:** | 32° 12' 38.2210 N |
| **From:** | Map | **Easting:** | 680,310.00 usft | **Longitude:** | 103° 53' 2.3622 W |
| **Position Uncertainty:** | 0.00 usft | **Slot Radius:** | 13-3/16 " | **Grid Convergence:** | 0.24 ° |

**Well** Job # 1210411

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Well Position** | **+N/-S** | 0.00 usft | **Northing:** | 440,647.00 usft | **Latitude:** | 32° 12' 38.2210 N |
| | **+E/-W** | 0.00 usft | **Easting:** | 680,310.00 usft | **Longitude:** | 103° 53' 2.3622 W |
| **Position Uncertainty** | | 0.00 usft | **Wellhead Elevation:** | 23.00 usft | **Ground Level:** | 3,355.00 usft |

**Wellbore** Rig: Patterson 62

| Magnetics | Model Name | Sample Date | Declination (°) | Dip Angle (°) | Field Strength (nT) |
|---|---|---|---|---|---|
| | IGRF2010_14 | 05/09/12 | 7.62 | 60.10 | 48,484 |

**Design** Rig: Patterson 62

**Audit Notes:**

| | | | | | |
|---|---|---|---|---|---|
| **Version:** | 1.0 | **Phase:** | ACTUAL | **Tie On Depth:** | 0.00 |

| Vertical Section: | Depth From (TVD) (usft) | +N/-S (usft) | +E/-W (usft) | Direction (°) |
|---|---|---|---|---|
| | 0.00 | 0.00 | 0.00 | 359.94 |

**Survey Program** Date 06/04/12

| From (usft) | To (usft) | Survey (Wellbore) | Tool Name | Description |
|---|---|---|---|---|
| 204.00 | 12,880.00 | Phoenix MWD Surveys (Rig: Patterson 62 | MWD | MWD - Standard |

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| **Design:** | Rig: Patterson 62 | **Database:** | Compass5000 |

**Survey**

| MD (usft) | Inc (°) | Azi (azimuth) (°) | TVDSS (usft) | TVD (usft) | N/S (usft) | E/W (usft) | V. Sec (usft) | DLeg (°/100usft) | Northing (usft) | Easting (usft) |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | 0.00 | 0.00 | 3,378.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 440,647.00 | 680,310.00 |
| 204.00 | 0.70 | 308.30 | 3,174.01 | 203.99 | 0.77 | -0.98 | 0.77 | 0.34 | 440,647.77 | 680,309.02 |
| **First Phoenix MWD Surveys @ 204' MD** | | | | | | | | | | |
| 386.00 | 0.70 | 306.70 | 2,992.02 | 385.98 | 2.13 | -2.74 | 2.13 | 0.01 | 440,649.13 | 680,307.26 |
| 576.00 | 1.20 | 292.50 | 2,802.05 | 575.95 | 3.58 | -5.51 | 3.59 | 0.29 | 440,650.58 | 680,304.49 |
| 686.00 | 0.70 | 305.30 | 2,692.06 | 685.94 | 4.41 | -7.12 | 4.42 | 0.49 | 440,651.41 | 680,302.88 |
| 854.00 | 0.10 | 119.40 | 2,524.06 | 853.94 | 4.93 | -7.83 | 4.94 | 0.48 | 440,651.93 | 680,302.17 |
| 1,044.00 | 0.10 | 15.30 | 2,334.06 | 1,043.94 | 5.01 | -7.64 | 5.02 | 0.08 | 440,652.01 | 680,302.36 |
| 1,234.00 | 0.50 | 54.20 | 2,144.07 | 1,233.93 | 5.65 | -6.93 | 5.66 | 0.22 | 440,652.65 | 680,303.07 |
| 1,425.00 | 1.30 | 73.40 | 1,953.09 | 1,424.91 | 6.76 | -4.18 | 6.77 | 0.44 | 440,653.76 | 680,305.82 |
| 1,615.00 | 1.80 | 75.50 | 1,763.16 | 1,614.84 | 8.12 | 0.78 | 8.12 | 0.26 | 440,655.12 | 680,310.78 |
| 1,805.00 | 2.50 | 77.20 | 1,573.30 | 1,804.70 | 9.79 | 7.71 | 9.78 | 0.37 | 440,656.79 | 680,317.71 |
| 1,996.00 | 2.70 | 70.00 | 1,382.49 | 1,995.51 | 12.25 | 16.00 | 12.23 | 0.20 | 440,659.25 | 680,326.00 |
| 2,186.00 | 1.90 | 69.90 | 1,192.65 | 2,185.35 | 14.86 | 23.16 | 14.84 | 0.42 | 440,661.86 | 680,333.16 |
| 2,376.00 | 0.80 | 45.10 | 1,002.70 | 2,375.30 | 16.88 | 27.06 | 16.85 | 0.64 | 440,663.88 | 680,337.06 |
| 2,566.00 | 1.20 | 39.80 | 812.73 | 2,565.27 | 19.35 | 29.27 | 19.32 | 0.22 | 440,666.35 | 680,339.27 |
| 2,756.00 | 2.10 | 26.80 | 622.81 | 2,755.19 | 23.98 | 32.11 | 23.95 | 0.51 | 440,670.98 | 680,342.11 |
| 2,947.00 | 2.70 | 18.50 | 431.98 | 2,946.02 | 31.37 | 35.12 | 31.34 | 0.36 | 440,678.37 | 680,345.12 |
| 3,137.00 | 3.60 | 4.60 | 242.27 | 3,135.73 | 41.56 | 37.02 | 41.52 | 0.62 | 440,688.56 | 680,347.02 |
| 3,327.00 | 3.20 | 2.70 | 52.60 | 3,325.40 | 52.81 | 37.75 | 52.77 | 0.22 | 440,699.81 | 680,347.75 |
| 3,518.00 | 2.60 | 356.80 | -138.15 | 3,516.15 | 62.46 | 37.76 | 62.42 | 0.35 | 440,709.46 | 680,347.76 |
| 3,640.00 | 1.80 | 6.20 | -260.06 | 3,638.06 | 67.12 | 37.81 | 67.08 | 0.72 | 440,714.12 | 680,347.81 |
| 3,822.00 | 1.60 | 356.00 | -441.98 | 3,819.98 | 72.50 | 37.94 | 72.46 | 0.20 | 440,719.50 | 680,347.94 |
| 4,013.00 | 1.30 | 344.90 | -632.92 | 4,010.92 | 77.25 | 37.19 | 77.21 | 0.21 | 440,724.25 | 680,347.19 |
| 4,203.00 | 1.10 | 340.10 | -822.88 | 4,200.88 | 81.05 | 36.01 | 81.01 | 0.12 | 440,728.05 | 680,346.01 |
| 4,393.00 | 0.80 | 315.80 | -1,012.86 | 4,390.86 | 83.71 | 34.46 | 83.68 | 0.26 | 440,730.71 | 680,344.46 |
| 4,584.00 | 1.10 | 327.70 | -1,203.83 | 4,581.83 | 86.22 | 32.55 | 86.19 | 0.19 | 440,733.22 | 680,342.55 |

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| **Design:** | Rig: Patterson 62 | **Database:** | Compass5000 |

**Survey**

| MD (usft) | Inc (°) | Azi (azimuth) (°) | TVDSS (usft) | TVD (usft) | N/S (usft) | E/W (usft) | V. Sec (usft) | DLeg (°/100usft) | Northing (usft) | Easting (usft) |
|---|---|---|---|---|---|---|---|---|---|---|
| 4,774.00 | 0.90 | 316.80 | -1,393.80 | 4,771.80 | 88.85 | 30.56 | 88.82 | 0.14 | 440,735.85 | 680,340.56 |
| 4,964.00 | 0.90 | 319.00 | -1,583.78 | 4,961.78 | 91.06 | 28.56 | 91.03 | 0.02 | 440,738.06 | 680,338.56 |
| 5,155.00 | 1.00 | 317.80 | -1,774.75 | 5,152.75 | 93.43 | 26.45 | 93.40 | 0.05 | 440,740.43 | 680,336.45 |
| 5,345.00 | 1.20 | 310.20 | -1,964.72 | 5,342.72 | 95.94 | 23.82 | 95.92 | 0.13 | 440,742.94 | 680,333.82 |
| 5,535.00 | 1.10 | 311.00 | -2,154.68 | 5,532.68 | 98.42 | 20.92 | 98.40 | 0.05 | 440,745.42 | 680,330.92 |
| 5,726.00 | 1.10 | 308.60 | -2,345.64 | 5,723.64 | 100.77 | 18.11 | 100.75 | 0.02 | 440,747.77 | 680,328.11 |
| 5,916.00 | 0.90 | 323.40 | -2,535.61 | 5,913.61 | 103.11 | 15.79 | 103.09 | 0.17 | 440,750.11 | 680,325.79 |
| 6,106.00 | 1.00 | 321.00 | -2,725.59 | 6,103.59 | 105.59 | 13.86 | 105.58 | 0.06 | 440,752.59 | 680,323.86 |
| 6,297.00 | 1.10 | 316.10 | -2,916.56 | 6,294.56 | 108.21 | 11.54 | 108.20 | 0.07 | 440,755.21 | 680,321.54 |
| 6,487.00 | 1.00 | 311.70 | -3,106.52 | 6,484.52 | 110.62 | 9.04 | 110.62 | 0.07 | 440,757.62 | 680,319.04 |
| 6,678.00 | 0.70 | 290.40 | -3,297.50 | 6,675.50 | 112.14 | 6.70 | 112.13 | 0.23 | 440,759.14 | 680,316.70 |
| 6,869.00 | 0.60 | 327.50 | -3,488.49 | 6,866.49 | 113.39 | 5.07 | 113.39 | 0.22 | 440,760.39 | 680,315.07 |
| 7,059.00 | 0.40 | 344.80 | -3,678.48 | 7,056.48 | 114.87 | 4.36 | 114.86 | 0.13 | 440,761.87 | 680,314.36 |
| 7,250.00 | 0.40 | 266.00 | -3,869.48 | 7,247.48 | 115.47 | 3.52 | 115.46 | 0.27 | 440,762.47 | 680,313.52 |
| 7,441.00 | 0.40 | 222.00 | -4,060.48 | 7,438.48 | 114.92 | 2.41 | 114.92 | 0.16 | 440,761.92 | 680,312.41 |
| 7,492.00 | 0.60 | 182.50 | -4,111.47 | 7,489.47 | 114.53 | 2.28 | 114.52 | 0.76 | 440,761.53 | 680,312.28 |
| 7,561.00 | 1.50 | 354.50 | -4,180.47 | 7,558.47 | 115.06 | 2.17 | 115.06 | 3.04 | 440,762.06 | 680,312.17 |
| 7,593.00 | 5.90 | 10.10 | -4,212.39 | 7,590.39 | 117.10 | 2.42 | 117.10 | 13.98 | 440,764.10 | 680,312.42 |
| 7,624.00 | 10.00 | 7.20 | -4,243.09 | 7,621.09 | 121.34 | 3.04 | 121.34 | 13.28 | 440,768.34 | 680,313.04 |
| 7,656.00 | 13.10 | 3.60 | -4,274.44 | 7,652.44 | 127.72 | 3.62 | 127.71 | 9.94 | 440,774.72 | 680,313.62 |
| 7,688.00 | 16.40 | 3.60 | -4,305.38 | 7,683.38 | 135.85 | 4.13 | 135.84 | 10.31 | 440,782.85 | 680,314.13 |
| 7,720.00 | 19.40 | 1.30 | -4,335.83 | 7,713.83 | 145.67 | 4.53 | 145.67 | 9.63 | 440,792.67 | 680,314.53 |
| 7,751.00 | 22.00 | 357.40 | -4,364.83 | 7,742.83 | 156.62 | 4.39 | 156.62 | 9.49 | 440,803.62 | 680,314.39 |
| 7,783.00 | 24.40 | 355.40 | -4,394.24 | 7,772.24 | 169.20 | 3.58 | 169.20 | 7.89 | 440,816.20 | 680,313.58 |
| 7,815.00 | 27.10 | 355.10 | -4,423.06 | 7,801.06 | 183.05 | 2.43 | 183.05 | 8.45 | 440,830.05 | 680,312.43 |
| 7,847.00 | 30.00 | 355.40 | -4,451.16 | 7,829.16 | 198.29 | 1.17 | 198.29 | 9.07 | 440,845.29 | 680,311.17 |
| 7,878.00 | 33.70 | 354.70 | -4,477.49 | 7,855.49 | 214.59 | -0.25 | 214.59 | 11.99 | 440,861.59 | 680,309.75 |

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| **Wellbore:** | Rig: Patterson 62 | **Survey Calculation Method:** | Minimum Curvature |
| **Design:** | Rig: Patterson 62 | **Database:** | Compass5000 |

**Survey**

| MD (usft) | Inc (°) | Azi (azimuth) (°) | TVDSS (usft) | TVD (usft) | N/S (usft) | E/W (usft) | V. Sec (usft) | DLeg (°/100usft) | Northing (usft) | Easting (usft) |
|---|---|---|---|---|---|---|---|---|---|---|
| 7,910.00 | 36.90 | 354.90 | -4,503.60 | 7,881.60 | 233.00 | -1.93 | 233.00 | 10.01 | 440,880.00 | 680,308.07 |
| 7,942.00 | 39.60 | 355.30 | -4,528.73 | 7,906.73 | 252.74 | -3.62 | 252.74 | 8.47 | 440,899.74 | 680,306.38 |
| 7,974.00 | 42.90 | 356.00 | -4,552.79 | 7,930.79 | 273.77 | -5.21 | 273.78 | 10.41 | 440,920.77 | 680,304.79 |
| 8,005.00 | 45.50 | 357.60 | -4,575.01 | 7,953.01 | 295.35 | -6.41 | 295.35 | 9.13 | 440,942.35 | 680,303.59 |
| 8,037.00 | 48.10 | 358.40 | -4,596.91 | 7,974.91 | 318.66 | -7.22 | 318.67 | 8.33 | 440,965.66 | 680,302.78 |
| 8,069.00 | 51.20 | 359.60 | -4,617.63 | 7,995.63 | 343.04 | -7.64 | 343.05 | 10.10 | 440,990.04 | 680,302.36 |
| 8,100.00 | 54.60 | 0.00 | -4,636.33 | 8,014.33 | 367.76 | -7.72 | 367.77 | 11.02 | 441,014.76 | 680,302.28 |
| 8,132.00 | 57.20 | 0.20 | -4,654.27 | 8,032.27 | 394.26 | -7.68 | 394.26 | 8.14 | 441,041.26 | 680,302.32 |
| 8,164.00 | 62.00 | 0.30 | -4,670.45 | 8,048.45 | 421.85 | -7.56 | 421.86 | 15.00 | 441,068.85 | 680,302.44 |
| 8,196.00 | 66.40 | 0.20 | -4,684.38 | 8,062.38 | 450.65 | -7.43 | 450.66 | 13.75 | 441,097.65 | 680,302.57 |
| 8,228.00 | 70.20 | 359.90 | -4,696.21 | 8,074.21 | 480.38 | -7.41 | 480.38 | 11.91 | 441,127.38 | 680,302.59 |
| 8,259.00 | 76.10 | 359.10 | -4,705.19 | 8,083.19 | 510.03 | -7.67 | 510.04 | 19.19 | 441,157.03 | 680,302.33 |
| 8,284.00 | 80.80 | 358.90 | -4,710.19 | 8,088.19 | 534.52 | -8.10 | 534.52 | 18.82 | 441,181.52 | 680,301.90 |
| 8,322.00 | 86.80 | 358.90 | -4,714.30 | 8,092.30 | 572.27 | -8.82 | 572.28 | 15.79 | 441,219.27 | 680,301.18 |
| 8,418.00 | 90.60 | 358.60 | -4,716.47 | 8,094.47 | 668.20 | -10.91 | 668.21 | 3.97 | 441,315.20 | 680,299.09 |
| 8,513.00 | 90.50 | 359.10 | -4,715.56 | 8,093.56 | 763.18 | -12.82 | 763.19 | 0.54 | 441,410.18 | 680,297.18 |
| 8,608.00 | 90.90 | 358.90 | -4,714.40 | 8,092.40 | 858.16 | -14.48 | 858.17 | 0.47 | 441,505.16 | 680,295.52 |
| 8,703.00 | 91.00 | 358.40 | -4,712.83 | 8,090.83 | 953.12 | -16.72 | 953.13 | 0.54 | 441,600.12 | 680,293.28 |
| 8,799.00 | 91.60 | 356.90 | -4,710.65 | 8,088.65 | 1,049.01 | -20.65 | 1,049.03 | 1.68 | 441,696.01 | 680,289.35 |
| 8,894.00 | 90.30 | 357.90 | -4,709.07 | 8,087.07 | 1,143.90 | -24.96 | 1,143.92 | 1.73 | 441,790.90 | 680,285.04 |
| 8,989.00 | 90.20 | 359.00 | -4,708.66 | 8,086.66 | 1,238.86 | -27.53 | 1,238.89 | 1.16 | 441,885.86 | 680,282.47 |
| 9,084.00 | 89.20 | 359.30 | -4,709.16 | 8,087.16 | 1,333.85 | -28.94 | 1,333.87 | 1.10 | 441,980.85 | 680,281.06 |
| 9,179.00 | 89.70 | 2.00 | -4,710.07 | 8,088.07 | 1,428.83 | -27.86 | 1,428.85 | 2.89 | 442,075.83 | 680,282.14 |
| 9,275.00 | 89.60 | 2.20 | -4,710.65 | 8,088.65 | 1,524.76 | -24.34 | 1,524.78 | 0.23 | 442,171.76 | 680,285.66 |
| 9,370.00 | 89.90 | 1.80 | -4,711.07 | 8,089.07 | 1,619.70 | -21.03 | 1,619.72 | 0.53 | 442,266.70 | 680,288.97 |
| 9,465.00 | 89.60 | 2.00 | -4,711.48 | 8,089.48 | 1,714.65 | -17.88 | 1,714.66 | 0.38 | 442,361.65 | 680,292.12 |
| 9,560.00 | 89.90 | 2.30 | -4,711.90 | 8,089.90 | 1,809.58 | -14.32 | 1,809.59 | 0.45 | 442,456.58 | 680,295.68 |

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Survey

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|---|---|---|---|---|---|---|---|---|---|---|
| 9,656.00 | 89.80 | 1.20 | -4,712.15 | 8,090.15 | 1,905.53 | -11.38 | 1,905.54 | 1.15 | 442,552.53 | 680,298.62 |
| 9,750.00 | 90.50 | 359.80 | -4,711.90 | 8,089.90 | 1,999.53 | -10.56 | 1,999.54 | 1.67 | 442,646.53 | 680,299.44 |
| 9,846.00 | 91.00 | 358.90 | -4,710.65 | 8,088.65 | 2,095.51 | -11.65 | 2,095.52 | 1.07 | 442,742.51 | 680,298.35 |
| 9,941.00 | 90.00 | 0.30 | -4,709.82 | 8,087.82 | 2,190.50 | -12.32 | 2,190.51 | 1.81 | 442,837.50 | 680,297.68 |
| 10,036.00 | 90.60 | 359.60 | -4,709.32 | 8,087.32 | 2,285.50 | -12.40 | 2,285.51 | 0.97 | 442,932.50 | 680,297.60 |
| 10,132.00 | 89.80 | 359.40 | -4,708.98 | 8,086.98 | 2,381.49 | -13.24 | 2,381.51 | 0.86 | 443,028.49 | 680,296.76 |
| 10,227.00 | 89.80 | 358.90 | -4,709.32 | 8,087.32 | 2,476.48 | -14.65 | 2,476.50 | 0.53 | 443,123.48 | 680,295.35 |
| 10,322.00 | 90.60 | 359.10 | -4,708.98 | 8,086.98 | 2,571.47 | -16.30 | 2,571.48 | 0.87 | 443,218.47 | 680,293.70 |
| 10,417.00 | 91.00 | 0.90 | -4,707.66 | 8,085.66 | 2,666.45 | -16.30 | 2,666.47 | 1.94 | 443,313.45 | 680,293.70 |
| 10,512.00 | 89.70 | 1.80 | -4,707.08 | 8,085.08 | 2,761.42 | -14.07 | 2,761.43 | 1.66 | 443,408.42 | 680,295.93 |
| 10,608.00 | 89.80 | 0.80 | -4,707.50 | 8,085.50 | 2,857.39 | -11.89 | 2,857.41 | 1.05 | 443,504.39 | 680,298.11 |
| 10,703.00 | 89.80 | 1.20 | -4,707.83 | 8,085.83 | 2,952.38 | -10.23 | 2,952.39 | 0.42 | 443,599.38 | 680,299.77 |
| 10,798.00 | 89.70 | 1.60 | -4,708.24 | 8,086.24 | 3,047.35 | -7.91 | 3,047.36 | 0.43 | 443,694.35 | 680,302.09 |
| 10,894.00 | 90.20 | 1.40 | -4,708.33 | 8,086.33 | 3,143.32 | -5.40 | 3,143.32 | 0.56 | 443,790.32 | 680,304.60 |
| 10,989.00 | 87.80 | 359.60 | -4,709.98 | 8,087.98 | 3,238.29 | -4.57 | 3,238.29 | 3.16 | 443,885.29 | 680,305.43 |
| 11,084.00 | 87.70 | 359.60 | -4,713.71 | 8,091.71 | 3,333.21 | -5.23 | 3,333.22 | 0.11 | 443,980.21 | 680,304.77 |
| 11,179.00 | 87.80 | 359.70 | -4,717.44 | 8,095.44 | 3,428.14 | -5.81 | 3,428.14 | 0.15 | 444,075.14 | 680,304.19 |
| 11,274.00 | 86.70 | 358.90 | -4,722.00 | 8,100.00 | 3,523.02 | -6.97 | 3,523.02 | 1.43 | 444,170.02 | 680,303.03 |
| 11,369.00 | 88.30 | 359.00 | -4,726.15 | 8,104.15 | 3,617.91 | -8.71 | 3,617.92 | 1.69 | 444,264.91 | 680,301.29 |
| 11,464.00 | 89.10 | 359.30 | -4,728.30 | 8,106.30 | 3,712.87 | -10.12 | 3,712.88 | 0.90 | 444,359.87 | 680,299.88 |
| 11,560.00 | 90.20 | 0.20 | -4,728.89 | 8,106.89 | 3,808.87 | -10.53 | 3,808.88 | 1.48 | 444,455.87 | 680,299.47 |
| 11,655.00 | 90.50 | 0.00 | -4,728.31 | 8,106.31 | 3,903.87 | -10.37 | 3,903.87 | 0.38 | 444,550.87 | 680,299.63 |
| 11,750.00 | 91.20 | 358.50 | -4,726.90 | 8,104.90 | 3,998.84 | -11.61 | 3,998.85 | 1.74 | 444,645.84 | 680,298.39 |
| 11,845.00 | 89.40 | 358.90 | -4,726.40 | 8,104.40 | 4,093.81 | -13.77 | 4,093.83 | 1.94 | 444,740.81 | 680,296.23 |
| 11,940.00 | 88.60 | 358.30 | -4,728.06 | 8,106.06 | 4,188.77 | -16.09 | 4,188.78 | 1.05 | 444,835.77 | 680,293.91 |
| 12,036.00 | 88.40 | 358.20 | -4,730.57 | 8,108.57 | 4,284.69 | -19.02 | 4,284.71 | 0.23 | 444,931.69 | 680,290.98 |
| 12,131.00 | 88.70 | 358.40 | -4,732.98 | 8,110.98 | 4,379.62 | -21.84 | 4,379.64 | 0.38 | 445,026.62 | 680,288.16 |

| | | | |
|---|---|---|---|
| **Company:** | Chesapeake Operating Inc. | **Local Co-ordinate Reference:** | Well Job # 1210411 |
| **Project:** | Eddy County, New Mexico (NAD 1983) | **TVD Reference:** | WELL @ 3378.00usft (Original Well Elev) |
| **Site:** | PLU Pierce canyon 16-24-30 State 1H | **MD Reference:** | WELL @ 3378.00usft (Original Well Elev) |
| **Well:** | Job # 1210411 | **North Reference:** | Grid |
| **Wellbore:** | Rig: Patterson 62 | **Survey Calculation Method:** | Minimum Curvature |
| **Design:** | Rig: Patterson 62 | **Database:** | Compass5000 |

**Survey**

| MD (usft) | Inc (°) | Azi (azimuth) (°) | TVDSS (usft) | TVD (usft) | N/S (usft) | E/W (usft) | V. Sec (usft) | DLeg (°/100usft) | Northing (usft) | Easting (usft) |
|---|---|---|---|---|---|---|---|---|---|---|
| 12,226.00 | 89.20 | 357.80 | -4,734.72 | 8,112.72 | 4,474.55 | -24.98 | 4,474.57 | 0.82 | 445,121.55 | 680,285.02 |
| 12,321.00 | 90.90 | 357.20 | -4,734.63 | 8,112.63 | 4,569.46 | -29.13 | 4,569.48 | 1.90 | 445,216.46 | 680,280.87 |
| 12,417.00 | 92.50 | 357.60 | -4,731.79 | 8,109.79 | 4,665.31 | -33.48 | 4,665.34 | 1.72 | 445,312.31 | 680,276.52 |
| 12,512.00 | 91.60 | 359.60 | -4,728.39 | 8,106.39 | 4,760.22 | -35.80 | 4,760.25 | 2.31 | 445,407.22 | 680,274.20 |
| 12,607.00 | 90.60 | 0.90 | -4,726.56 | 8,104.56 | 4,855.20 | -35.39 | 4,855.23 | 1.73 | 445,502.20 | 680,274.61 |
| 12,702.00 | 92.10 | 359.90 | -4,724.32 | 8,102.32 | 4,950.16 | -34.72 | 4,950.20 | 1.90 | 445,597.16 | 680,275.28 |
| 12,797.00 | 90.20 | 357.60 | -4,722.42 | 8,100.42 | 5,045.11 | -36.79 | 5,045.15 | 3.14 | 445,692.11 | 680,273.21 |
| 12,830.00 | 89.90 | 357.10 | -4,722.39 | 8,100.39 | 5,078.07 | -38.32 | 5,078.11 | 1.77 | 445,725.07 | 680,271.68 |
| Last Phoenix MWD Survey @ 12830' MD | | | | | | | | | | |
| 12,880.00 | 89.90 | 357.10 | -4,722.48 | 8,100.48 | 5,128.01 | -40.85 | 5,128.05 | 0.00 | 445,775.01 | 680,269.15 |
| Projection to TD @ 12880' MD | | | | | | | | | | |

**Survey Annotations**

| Measured Depth (usft) | Vertical Depth (usft) | Local Coordinates +N/-S (usft) | Local Coordinates +E/-W (usft) | Comment |
|---|---|---|---|---|
| 204.00 | 203.99 | 0.77 | -0.98 | First Phoenix MWD Surveys @ 204' MD |
| 12,830.00 | 8,100.39 | 5,078.07 | -38.32 | Last Phoenix MWD Survey @ 12830' MD |
| 12,880.00 | 8,100.48 | 5,128.01 | -40.85 | Projection to TD @ 12880' MD |

Checked By: _____ Approved By: _____ Date: _____

Chesapeake Operating Inc.
Job # 1210411 - Phoenix MWD Surveys

Eddy County, New Mexico (NAD 1983)
PLU Pierce canyon 16-24-30 State 1H
Your Ref:

| Measured Depth (ft) | Incl. (ft) | Azim. (ft) | Sub-Sea Vertical Depth (ft) | Vertical Dogleg Depth Section (ft) | Dogleg Rate (°/100ft) | Local Coordinates Northings (ft) | Local Coordinates Eastings (ft) |
|---|---|---|---|---|---|---|---|
| UTM Coordinates Northings (ft) | | Eastings (ft) | | | | | |
| 0.00 | 0.000 | 0.000 | -3378.00 | 0.00 | 0.00 | 0.00 N | 0.00 E |
| 440647.000 N | | 680310.000 E | 0.00 | 0.00 | | | |
| 204.00 | 0.700 | 308.300 | -3174.01 | 203.99 | 0.34 | 0.77 N | 0.98 W |
| 440647.772 N | | 680309.022 E | 0.77 | 0.34 | | | |
| 386.00 | 0.700 | 306.700 | -2992.02 | 385.98 | 0.01 | 2.13 N | 2.74 W |
| 440649.126 N | | 680307.258 E | 2.13 | 0.01 | | | |
| 576.00 | 1.200 | 292.500 | -2802.05 | 575.95 | 0.29 | 3.58 N | 5.51 W |
| 440650.581 N | | 680304.490 E | 3.59 | 0.29 | | | |
| 686.00 | 0.700 | 305.300 | -2692.06 | 685.94 | 0.49 | 4.41 N | 7.12 W |
| 440651.410 N | | 680302.877 E | 4.42 | 0.49 | | | |
| 854.00 | 0.100 | 119.400 | -2524.06 | 853.94 | 0.48 | 4.93 N | 7.83 W |
| 440651.931 N | | 680302.167 E | 4.94 | 0.48 | | | |
| 1044.00 | 0.100 | 15.300 | -2334.06 | 1043.94 | 0.08 | 5.01 N | 7.64 W |
| 440652.009 N | | 680302.355 E | 5.02 | 0.08 | | | |
| 1234.00 | 0.500 | 54.200 | -2144.07 | 1233.93 | 0.22 | 5.65 N | 6.93 W |
| 440652.654 N | | 680303.072 E | 5.66 | 0.22 | | | |
| 1425.00 | 1.300 | 73.400 | -1953.09 | 1424.91 | 0.44 | 6.76 N | 4.18 W |
| 440653.761 N | | 680305.824 E | 6.77 | 0.44 | | | |
| 1615.00 | 1.800 | 75.500 | -1763.16 | 1614.84 | 0.26 | 8.12 N | 0.78 E |
| 440655.124 N | | 680310.778 E | 8.12 | 0.26 | | | |
| 1805.00 | 2.500 | 77.200 | -1573.30 | 1804.70 | 0.37 | 9.79 N | 7.71 E |
| 440656.789 N | | 680317.708 E | 9.78 | 0.37 | | | |
| 1996.00 | 2.700 | 70.000 | -1382.49 | 1995.51 | 0.20 | 12.25 N | 16.00 E |
| 440659.250 N | | 680325.998 E | 12.23 | 0.20 | | | |
| 2186.00 | 1.900 | 69.900 | -1192.65 | 2185.35 | 0.42 | 14.86 N | 23.16 E |
| 440661.864 N | | 680333.161 E | 14.84 | 0.42 | | | |
| 2376.00 | 0.800 | 45.100 | -1002.70 | 2375.30 | 0.64 | 16.88 N | 27.06 E |
| 440663.882 N | | 680337.059 E | 16.85 | 0.64 | | | |
| 2566.00 | 1.200 | 39.800 | -812.73 | 2565.27 | 0.22 | 19.35 N | 29.27 E |
| 440666.347 N | | 680339.272 E | 19.32 | 0.22 | | | |
| 2756.00 | 2.100 | 26.800 | -622.81 | 2755.19 | 0.51 | 23.98 N | 32.11 E |
| 440670.983 N | | 680342.115 E | 23.95 | 0.51 | | | |
| 2947.00 | 2.700 | 18.500 | -431.98 | 2946.02 | 0.36 | 31.37 N | 35.12 E |
| 440678.373 N | | 680345.120 E | 31.34 | 0.36 | | | |
| 3137.00 | 3.600 | 4.600 | -242.27 | 3135.73 | 0.62 | 41.56 N | 37.02 E |
| 440688.563 N | | 680347.019 E | 41.52 | 0.62 | | | |
| 3327.00 | 3.200 | 2.700 | -52.60 | 3325.40 | 0.22 | 52.81 N | 37.75 E |
| 440699.806 N | | 680347.747 E | 52.77 | 0.22 | | | |
| 3518.00 | 2.600 | 356.800 | 138.15 | 3516.15 | 0.35 | 62.46 N | 37.76 E |
| 440709.457 N | | 680347.756 E | 62.42 | 0.35 | | | |
| 3640.00 | 1.800 | 6.200 | 260.06 | 3638.06 | 0.72 | 67.12 N | 37.81 E |
| 440714.124 N | | 680347.809 E | 67.08 | 0.72 | | | |
| 3822.00 | 1.600 | 356.000 | 441.98 | 3819.98 | 0.20 | 72.50 N | 37.94 E |
| 440719.501 N | | 680347.940 E | 72.46 | 0.20 | | | |
| 4013.00 | 1.300 | 344.900 | 632.92 | 4010.92 | 0.21 | 77.25 N | 37.19 E |
| 440724.253 N | | 680347.190 E | 77.21 | 0.21 | | | |
| 4203.00 | 1.100 | 340.100 | 822.88 | 4200.88 | | 81.05 N | 36.01 E |

| | | | | | | |
|---|---|---|---|---|---|---|
| 440728.048 N | 680346.007 E | 81.01 | 0.12 | | | |
| 4393.00 | 0.800 315.800 | 1012.86 | 4390.86 | 83.71 N | 34.46 E | |
| 440730.714 N | 680344.462 E | 83.68 | 0.26 | | | |
| 4584.00 | 1.100 327.700 | 1203.83 | 4581.83 | 86.22 N | 32.55 E | |
| 440733.220 N | 680342.553 E | 86.19 | 0.19 | | | |
| 4774.00 | 0.900 316.800 | 1393.80 | 4771.80 | 88.85 N | 30.56 E | |
| 440735.849 N | 680340.557 E | 88.82 | 0.14 | | | |
| 4964.00 | 0.900 319.000 | 1583.78 | 4961.78 | 91.06 N | 28.56 E | |
| 440738.063 N | 680338.556 E | 91.03 | 0.02 | | | |
| 5155.00 | 1.000 317.800 | 1774.75 | 5152.75 | 93.43 N | 26.45 E | |
| 440740.430 N | 680336.452 E | 93.40 | 0.05 | | | |
| 5345.00 | 1.200 310.200 | 1964.72 | 5342.72 | 95.94 N | 23.82 E | |
| 440742.942 N | 680333.819 E | 95.92 | 0.13 | | | |
| 5535.00 | 1.100 311.000 | 2154.68 | 5532.68 | 98.42 N | 20.92 E | |
| 440745.423 N | 680330.923 E | 98.40 | 0.05 | | | |
| 5726.00 | 1.100 308.600 | 2345.64 | 5723.64 | 100.77 N | 18.11 E | |
| 440747.769 N | 680328.107 E | 100.75 | 0.02 | | | |
| 5916.00 | 0.900 323.400 | 2535.61 | 5913.61 | 103.11 N | 15.79 E | |
| 440750.105 N | 680325.792 E | 103.09 | 0.17 | | | |
| 6106.00 | 1.000 321.000 | 2725.59 | 6103.59 | 105.59 N | 13.86 E | |
| 440752.592 N | 680323.859 E | 105.58 | 0.06 | | | |
| 6297.00 | 1.100 316.100 | 2916.56 | 6294.56 | 108.21 N | 11.54 E | |
| 440755.208 N | 680321.538 E | 108.20 | 0.07 | | | |
| 6487.00 | 1.000 311.700 | 3106.52 | 6484.52 | 110.62 N | 9.04 E | |
| 440757.625 N | 680319.036 E | 110.62 | 0.07 | | | |
| 6678.00 | 0.700 290.400 | 3297.50 | 6675.50 | 112.14 N | 6.70 E | |
| 440759.140 N | 680316.698 E | 112.13 | 0.23 | | | |
| 6869.00 | 0.600 327.500 | 3488.49 | 6866.49 | 113.39 N | 5.07 E | |
| 440760.391 N | 680315.067 E | 113.39 | 0.22 | | | |
| 7059.00 | 0.400 344.800 | 3678.48 | 7056.48 | 114.87 N | 4.36 E | |
| 440761.870 N | 680314.359 E | 114.86 | 0.13 | | | |
| 7250.00 | 0.400 266.000 | 3869.48 | 7247.48 | 115.47 N | 3.52 E | |
| 440762.466 N | 680313.519 E | 115.46 | 0.27 | | | |
| 7441.00 | 0.400 222.000 | 4060.48 | 7438.48 | 114.92 N | 2.41 E | |
| 440761.924 N | 680312.408 E | 114.92 | 0.16 | | | |
| 7492.00 | 0.600 182.500 | 4111.47 | 7489.47 | 114.53 N | 2.28 E | |
| 440761.525 N | 680312.277 E | 114.52 | 0.76 | | | |
| 7561.00 | 1.500 354.500 | 4180.47 | 7558.47 | 115.06 N | 2.17 E | |
| 440762.063 N | 680312.174 E | 115.06 | 3.04 | | | |
| 7593.00 | 5.900 10.100 | 4212.39 | 7590.39 | 117.10 N | 2.42 E | |
| 440764.101 N | 680312.423 E | 117.10 | 13.98 | | | |
| 7624.00 | 10.000 7.200 | 4243.09 | 7621.09 | 121.34 N | 3.04 E | |
| 440768.341 N | 680313.040 E | 121.34 | 13.28 | | | |
| 7656.00 | 13.100 3.600 | 4274.44 | 7652.44 | 127.72 N | 3.62 E | |
| 440774.719 N | 680313.616 E | 127.71 | 9.94 | | | |
| 7688.00 | 16.400 3.600 | 4305.38 | 7683.38 | 135.85 N | 4.13 E | |
| 440782.849 N | 680314.127 E | 135.84 | 10.31 | | | |
| 7720.00 | 19.400 1.300 | 4335.83 | 7713.83 | 145.67 N | 4.53 E | |
| 440792.673 N | 680314.532 E | 145.67 | 9.63 | | | |
| 7751.00 | 22.000 357.400 | 4364.83 | 7742.83 | 156.62 N | 4.39 E | |
| 440803.623 N | 680314.385 E | 156.62 | 9.49 | | | |
| 7783.00 | 24.400 355.400 | 4394.24 | 7772.24 | 169.20 N | 3.58 E | |
| 440816.201 N | 680313.583 E | 169.20 | 7.89 | | | |
| 7815.00 | 27.100 355.100 | 4423.06 | 7801.06 | 183.05 N | 2.43 E | |
| 440830.054 N | 680312.430 E | 183.05 | 8.45 | | | |
| 7847.00 | 30.000 355.400 | 4451.16 | 7829.16 | 198.29 N | 1.17 E | |
| 440845.293 N | 680311.166 E | 198.29 | 9.07 | | | |
| 7878.00 | 33.700 354.700 | 4477.49 | 7855.49 | 214.59 N | 0.25 W | |
| 440861.588 N | 680309.749 E | 214.59 | 11.99 | | | |
| 7910.00 | 36.900 354.900 | 4503.60 | 7881.60 | 233.00 N | 1.93 W | |
| 440880.001 N | 680308.075 E | 233.00 | 10.01 | | | |
| 7942.00 | 39.600 355.300 | 4528.73 | 7906.73 | 252.74 N | 3.62 W | |
| 440899.737 N | 680306.385 E | 252.74 | 8.47 | | | |

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|---|---|---|---|---|---|---|
| 7974.00 | 42.900 | 356.000 | 4552.79 | 7930.79 | 273.77 N | 5.21 W |
| 440920.773 N | 680304.789 E | | 273.78 | 10.41 | | |
| 8005.00 | 45.500 | 357.600 | 4575.01 | 7953.01 | 295.35 N | 6.41 W |
| 440942.348 N | 680303.590 E | | 295.35 | 9.13 | | |
| 8037.00 | 48.100 | 358.400 | 4596.91 | 7974.91 | 318.66 N | 7.22 W |
| 440965.659 N | 680302.779 E | | 318.67 | 8.33 | | |
| 8069.00 | 51.200 | 359.600 | 4617.63 | 7995.63 | 343.04 N | 7.64 W |
| 440990.039 N | 680302.360 E | | 343.05 | 10.10 | | |
| 8100.00 | 54.600 | 0.000 | 4636.33 | 8014.33 | 367.76 N | 7.72 W |
| 441014.760 N | 680302.275 E | | 367.77 | 11.02 | | |
| 8132.00 | 57.200 | 0.200 | 4654.27 | 8032.27 | 394.26 N | 7.68 W |
| 441041.256 N | 680302.322 E | | 394.26 | 8.14 | | |
| 8164.00 | 62.000 | 0.300 | 4670.45 | 8048.45 | 421.85 N | 7.56 W |
| 441068.848 N | 680302.443 E | | 421.86 | 15.00 | | |
| 8196.00 | 66.400 | 0.200 | 4684.38 | 8062.38 | 450.65 N | 7.43 W |
| 441097.651 N | 680302.568 E | | 450.66 | 13.75 | | |
| 8228.00 | 70.200 | 359.900 | 4696.21 | 8074.21 | 480.38 N | 7.41 W |
| 441127.377 N | 680302.593 E | | 480.38 | 11.91 | | |
| 8259.00 | 76.100 | 359.100 | 4705.19 | 8083.19 | 510.03 N | 7.67 W |
| 441157.032 N | 680302.331 E | | 510.04 | 19.19 | | |
| 8284.00 | 80.800 | 358.900 | 4710.19 | 8088.19 | 534.52 N | 8.10 W |
| 441181.515 N | 680301.904 E | | 534.52 | 18.82 | | |
| 8322.00 | 86.800 | 358.900 | 4714.30 | 8092.30 | 572.27 N | 8.82 W |
| 441219.269 N | 680301.179 E | | 572.28 | 15.79 | | |
| 8418.00 | 90.600 | 358.600 | 4716.47 | 8094.47 | 668.20 N | 10.91 W |
| 441315.203 N | 680299.085 E | | 668.21 | 3.97 | | |
| 8513.00 | 90.500 | 359.100 | 4715.56 | 8093.56 | 763.18 N | 12.82 W |
| 441410.180 N | 680297.179 E | | 763.19 | 0.54 | | |
| 8608.00 | 90.900 | 358.900 | 4714.40 | 8092.40 | 858.16 N | 14.48 W |
| 441505.158 N | 680295.521 E | | 858.17 | 0.47 | | |
| 8703.00 | 91.000 | 358.400 | 4712.83 | 8090.83 | 953.12 N | 16.72 W |
| 441600.118 N | 680293.283 E | | 953.13 | 0.54 | | |
| 8799.00 | 91.600 | 356.900 | 4710.65 | 8088.65 | 1049.01 N | 20.65 W |
| 441696.009 N | 680289.348 E | | 1049.03 | 1.68 | | |
| 8894.00 | 90.300 | 357.900 | 4709.07 | 8087.07 | 1143.90 N | 24.96 W |
| 441790.895 N | 680285.039 E | | 1143.92 | 1.73 | | |
| 8989.00 | 90.200 | 359.000 | 4708.66 | 8086.66 | 1238.86 N | 27.53 W |
| 441885.858 N | 680282.470 E | | 1238.89 | 1.16 | | |
| 9084.00 | 89.200 | 359.300 | 4709.16 | 8087.16 | 1333.85 N | 28.94 W |
| 441980.845 N | 680281.060 E | | 1333.87 | 1.10 | | |
| 9179.00 | 89.700 | 2.000 | 4710.07 | 8088.07 | 1428.83 N | 27.86 W |
| 442075.826 N | 680282.138 E | | 1428.85 | 2.89 | | |
| 9275.00 | 89.600 | 2.200 | 4710.65 | 8088.65 | 1524.76 N | 24.34 W |
| 442171.759 N | 680285.656 E | | 1524.78 | 0.23 | | |
| 9370.00 | 89.900 | 1.800 | 4711.07 | 8089.07 | 1619.70 N | 21.03 W |
| 442266.700 N | 680288.971 E | | 1619.72 | 0.53 | | |
| 9465.00 | 89.600 | 2.000 | 4711.48 | 8089.48 | 1714.65 N | 17.88 W |
| 442361.647 N | 680292.121 E | | 1714.66 | 0.38 | | |
| 9560.00 | 89.900 | 2.300 | 4711.90 | 8089.90 | 1809.58 N | 14.32 W |
| 442456.579 N | 680295.685 E | | 1809.59 | 0.45 | | |
| 9656.00 | 89.800 | 1.200 | 4712.15 | 8090.15 | 1905.53 N | 11.38 W |
| 442552.532 N | 680298.616 E | | 1905.54 | 1.15 | | |
| 9750.00 | 90.500 | 359.800 | 4711.90 | 8089.90 | 1999.53 N | 10.56 W |
| 442646.525 N | 680299.437 E | | 1999.54 | 1.67 | | |
| 9846.00 | 91.000 | 358.900 | 4710.65 | 8088.65 | 2095.51 N | 11.65 W |
| 442742.510 N | 680298.348 E | | 2095.52 | 1.07 | | |
| 9941.00 | 90.000 | 0.300 | 4709.82 | 8087.82 | 2190.50 N | 12.32 W |
| 442837.500 N | 680297.685 E | | 2190.51 | 1.81 | | |
| 10036.00 | 90.600 | 359.600 | 4709.32 | 8087.32 | 2285.50 N | 12.40 W |
| 442932.498 N | 680297.602 E | | 2285.51 | 0.97 | | |
| 10132.00 | 89.800 | 359.400 | 4708.98 | 8086.98 | 2381.49 N | 13.24 W |
| 443028.493 N | 680296.764 E | | 2381.51 | 0.86 | | |
| 10227.00 | 89.800 | 358.900 | 4709.32 | 8087.32 | 2476.48 N | 14.65 W |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 443123.481 | N | 680295.355 | E | 2476.50 | 0.53 | | | |
| 10322.00 | 90.600 | 359.100 | | 4708.98 | 8086.98 | 2571.47 | N | 16.30 W |
| 443218.466 | N | 680293.697 | E | 2571.48 | 0.87 | | | |
| 10417.00 | 91.000 | 0.900 | | 4707.66 | 8085.66 | 2666.45 | N | 16.30 W |
| 443313.452 | N | 680293.697 | E | 2666.47 | 1.94 | | | |
| 10512.00 | 89.700 | 1.800 | | 4707.08 | 8085.08 | 2761.42 | N | 14.07 W |
| 443408.421 | N | 680295.935 | E | 2761.43 | 1.66 | | | |
| 10608.00 | 89.800 | 0.800 | | 4707.50 | 8085.50 | 2857.39 | N | 11.89 W |
| 443504.394 | N | 680298.113 | E | 2857.41 | 1.05 | | | |
| 10703.00 | 89.800 | 1.200 | | 4707.83 | 8085.83 | 2952.38 | N | 10.23 W |
| 443599.379 | N | 680299.771 | E | 2952.39 | 0.42 | | | |
| 10798.00 | 89.700 | 1.600 | | 4708.24 | 8086.24 | 3047.35 | N | 7.91 W |
| 443694.350 | N | 680302.092 | E | 3047.36 | 0.43 | | | |
| 10894.00 | 90.200 | 1.400 | | 4708.33 | 8086.33 | 3143.32 | N | 5.40 W |
| 443790.316 | N | 680304.605 | E | 3143.32 | 0.56 | | | |
| 10989.00 | 87.800 | 359.600 | | 4709.98 | 8087.98 | 3238.29 | N | 4.57 W |
| 443885.287 | N | 680305.434 | E | 3238.29 | 3.16 | | | |
| 11084.00 | 87.700 | 359.600 | | 4713.71 | 8091.71 | 3333.21 | N | 5.23 W |
| 443980.212 | N | 680304.771 | E | 3333.22 | 0.11 | | | |
| 11179.00 | 87.800 | 359.700 | | 4717.44 | 8095.44 | 3428.14 | N | 5.81 W |
| 444075.137 | N | 680304.192 | E | 3428.14 | 0.15 | | | |
| 11274.00 | 86.700 | 358.900 | | 4722.00 | 8100.00 | 3523.02 | N | 6.97 W |
| 444170.018 | N | 680303.033 | E | 3523.02 | 1.43 | | | |
| 11369.00 | 88.300 | 359.000 | | 4726.15 | 8104.15 | 3617.91 | N | 8.71 W |
| 444264.909 | N | 680301.294 | E | 3617.92 | 1.69 | | | |
| 11464.00 | 89.100 | 359.300 | | 4728.30 | 8106.30 | 3712.87 | N | 10.12 W |
| 444359.873 | N | 680299.885 | E | 3712.88 | 0.90 | | | |
| 11560.00 | 90.200 | 0.200 | | 4728.89 | 8106.89 | 3808.87 | N | 10.53 W |
| 444455.868 | N | 680299.466 | E | 3808.88 | 1.48 | | | |
| 11655.00 | 90.500 | 0.000 | | 4728.31 | 8106.31 | 3903.87 | N | 10.37 W |
| 444550.865 | N | 680299.632 | E | 3903.87 | 0.38 | | | |
| 11750.00 | 91.200 | 358.500 | | 4726.90 | 8104.90 | 3998.84 | N | 11.61 W |
| 444645.844 | N | 680298.388 | E | 3998.85 | 1.74 | | | |
| 11845.00 | 89.400 | 358.900 | | 4726.40 | 8104.40 | 4093.81 | N | 13.77 W |
| 444740.814 | N | 680296.233 | E | 4093.83 | 1.94 | | | |
| 11940.00 | 88.600 | 358.300 | | 4728.06 | 8106.06 | 4188.77 | N | 16.09 W |
| 444835.770 | N | 680293.913 | E | 4188.78 | 1.05 | | | |
| 12036.00 | 88.400 | 358.200 | | 4730.57 | 8108.57 | 4284.69 | N | 19.02 W |
| 444931.692 | N | 680290.982 | E | 4284.71 | 0.23 | | | |
| 12131.00 | 88.700 | 358.400 | | 4732.98 | 8110.98 | 4379.62 | N | 21.84 W |
| 445026.620 | N | 680288.165 | E | 4379.64 | 0.38 | | | |
| 12226.00 | 89.200 | 357.800 | | 4734.72 | 8112.72 | 4474.55 | N | 24.98 W |
| 445121.551 | N | 680285.015 | E | 4474.57 | 0.82 | | | |
| 12321.00 | 90.900 | 357.200 | | 4734.63 | 8112.63 | 4569.46 | N | 29.13 W |
| 445216.456 | N | 680280.872 | E | 4569.48 | 1.90 | | | |
| 12417.00 | 92.500 | 357.600 | | 4731.79 | 8109.79 | 4665.31 | N | 33.48 W |
| 445312.312 | N | 680276.519 | E | 4665.34 | 1.72 | | | |
| 12512.00 | 91.600 | 359.600 | | 4728.39 | 8106.39 | 4760.22 | N | 35.80 W |
| 445407.217 | N | 680274.200 | E | 4760.25 | 2.31 | | | |
| 12607.00 | 90.600 | 0.900 | | 4726.56 | 8104.56 | 4855.20 | N | 35.39 W |
| 445502.195 | N | 680274.614 | E | 4855.23 | 1.73 | | | |
| 12702.00 | 92.100 | 359.900 | | 4724.32 | 8102.32 | 4950.16 | N | 34.72 W |
| 445597.163 | N | 680275.278 | E | 4950.20 | 1.90 | | | |
| 12797.00 | 90.200 | 357.600 | | 4722.42 | 8100.42 | 5045.11 | N | 36.79 W |
| 445692.110 | N | 680273.205 | E | 5045.15 | 3.14 | | | |
| 12830.00 | 89.900 | 357.100 | | 4722.39 | 8100.39 | 5078.07 | N | 38.32 W |
| 445725.075 | N | 680271.680 | E | 5078.11 | 1.77 | | | |
| 12880.00 | 89.900 | 357.100 | | 4722.48 | 8100.48 | 5128.01 | N | 40.85 W |
| 445775.011 | N | 680269.150 | E | 5128.05 | 0.00 | | | |

All data are in feet unless otherwise stated. Directions and coordinates are relative to Grid North.

Vertical depths are relative to WELL. Northings and Eastings are relative to Well.

The Dogleg Severity is in Degrees per 100 feet.
Vertical Section is from Slot and calculated along an Azimuth of 359.940° (Grid).

Coordinate System is North American Datum 1983 US State Plane 1983, New Mexico Eastern Zone.
Grid Convergence at Surface is 0.240°.

Based upon Minimum Curvature type calculations, at a Measured Depth of 12880.00ft., the Bottom Hole Displacement is 5128.17ft., in the Direction of 359.940° (Grid).

PHOENIX
TECHNOLOGY SERVICES

# Chesapeake Operating Inc.

**Eddy County, New Mexico (NAD 1983)**
**PLU Pierce canyon 16-24-30 State 1H**
**Job # 1210411**

**Rig Patterson 62**
**Survey: Phoenix MWD Surveys**

# Anticollision Report

**04 June, 2012**

Chesapeake

PHOENIX TECHNOLOGY SERVICES

# Anticollision Report

| | | | |
|---|---|---|---|
| **Company:** | Chesapeake Operating Inc. | **Local Co-ordinate Reference:** | Well Job # 1210411 |
| **Project:** | Eddy County, New Mexico (NAD 1983) | **TVD Reference:** | WELL @ 3378.00usft (Original Well Elev) |
| **Reference Site:** | PLU Pierce canyon 16-24-30 State 1H | **MD Reference:** | WELL @ 3378.00usft (Original Well Elev) |
| **Site Error:** | 0.00 usft | **North Reference:** | Grid |
| **Reference Well:** | Job # 1210411 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.00 usft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | Rig Patterson 62 | **Database:** | Compass5000 |
| **Reference Design:** | Survey Phoenix MWD Surveys | **Offset TVD Reference:** | Offset Datum |

**Reference** Survey: Phoenix MWD Surveys

| | | | |
|---|---|---|---|
| **Filter type:** | NO GLOBAL FILTER: Using user defined selection & filtering criteria | | |
| **Interpolation Method:** | Stations | **Error Model:** | ISCWSA |
| **Depth Range:** | Unlimited | **Scan Method:** | Closest Approach 3D |
| **Results Limited by:** | Maximum center-center distance of 9,999.98 usft | **Error Surface:** | Elliptical Conic |
| **Warning Levels Evaluated at:** | 2.00 **Sigma** | **Casing Method:** | Not applied |

**Survey Program** **Date** 06/04/12

| From (usft) | To (usft) | Survey (Wellbore) | Tool Name | Description |
|---|---|---|---|---|
| 204.00 | 12,880.00 | Phoenix MWD Surveys (Rig Patterson 62 | 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 |
|---|---|---|---|---|---|---|
| PLU Pierce Canyon 21 24 30 USA 1H | | | | | | |
| Job # 1210204 - Rig Latshaw 14 - Rig. Latshaw 14 | 1,207.68 | 1,205.40 | 173.33 | 169.00 | 39 963 | CC |
| Job # 1210204 - Rig. Latshaw 14 - Rig: Latshaw 14 | 1,234.00 | 1,231.15 | 173.38 | 168.94 | 39.043 | ES |
| Job # 1210204 - Rig Latshaw 14 - Rig: Latshaw 14 | 7,561.00 | 7,556.30 | 244.79 | 213.92 | 7.929 | SF |

**Offset Design** PLU Pierce Canyon 21 24 30 USA 1H - Job # 1210204 - Rig. Latshaw 14 - Rig: Latshaw 14 — Offset Site Error: 0.00 usft

Survey Program: 496-MWD, 7557-MWD — Offset Well Error: 0.00 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 00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 00 | 167 31 | -179.50 | 40 41 | 184.01 | | | | |
| 204.00 | 203.99 | 201.85 | 201.85 | 0.21 | 0.22 | -141.26 | -179.02 | 40.41 | 184.49 | 184.07 | 0.42 | 438.282 | |
| 386.00 | 385.98 | 384 62 | 384 61 | 0.60 | 0.41 | -140.19 | -177.75 | 40.41 | 184.99 | 183.98 | 1.01 | 183.340 | |
| 576 00 | 575.95 | 575.80 | 575.78 | 1.02 | 0.71 | -126 84 | -175 54 | 40 25 | 184.90 | 183.18 | 1 72 | 107 234 | |
| 686.00 | 685.94 | 686 80 | 686 76 | 1.24 | 0.96 | -139.97 | -173 68 | 39 48 | 184 13 | 181 93 | 2 19 | 83 915 | |
| 854 00 | 853 94 | 856.29 | 856 19 | 1.57 | 1.34 | 46.20 | -169 94 | 37.07 | 180.62 | 177.72 | 2.90 | 62 338 | |
| 1,044.00 | 1,043.94 | 1,045.01 | 1,044 81 | 1 96 | 1 74 | 151 26 | -165.25 | 33.03 | 175 09 | 171 40 | 3 68 | 47.521 | |
| 1,207.68 | 1,207.61 | 1,205.40 | 1,205.16 | 2 30 | 2.05 | 114 56 | -163 78 | 30.03 | 173.33 | 169.00 | 4.34 | 39 963 | CC |
| 1,234.00 | 1,233.93 | 1,231.15 | 1,230 91 | 2.35 | 2 10 | 113.62 | -163.83 | 29.64 | 173.38 | 168.94 | 4.44 | 39.043 | ES |
| 1,425.00 | 1,424.91 | 1,418 49 | 1,418.22 | 2.75 | 2 46 | 95 92 | -166.26 | 28.37 | 176.09 | 170.89 | 5 20 | 33.837 | |
| 1,615.00 | 1,614.84 | 1,606 73 | 1,606.37 | 3.16 | 2 84 | 94 48 | -170.83 | 32.23 | 181.78 | 175 79 | 5.99 | 30.342 | |
| 1,805 00 | 1,804 70 | 1,796.67 | 1,796.15 | 3.57 | 3.24 | 93.45 | -175 68 | 37.98 | 188 01 | 181.21 | 6 80 | 27.635 | |
| 1,996.00 | 1,995.51 | 1,990 51 | 1,989.87 | 3.99 | 3.65 | 101.71 | -179.64 | 43 79 | 193 91 | 186.28 | 7 64 | 25 394 | |
| 2,186 00 | 2,185.35 | 2,183 68 | 2,183.02 | 4 39 | 4.06 | 103.85 | -180.03 | 44 50 | 196 06 | 187.61 | 8 44 | 23 219 | |
| 2,376.00 | 2,375 30 | 2,374 04 | 2,373.37 | 4.78 | 4.45 | 130.38 | -179.14 | 42.57 | 196.64 | 187.41 | 9 23 | 21.309 | |
| 2,566.00 | 2,565 27 | 2,564.56 | 2,563 87 | 5.18 | 4.85 | 137.11 | -178.24 | 39.92 | 197.88 | 187.85 | 10 03 | 19 736 | |
| 2,756.00 | 2,755.19 | 2,755.71 | 2,755.00 | 5.60 | 5.26 | 151 44 | -176.15 | 38.27 | 200.25 | 189.41 | 10.84 | 18.469 | |
| 2,947.00 | 2,946 02 | 2,949 30 | 2,948.56 | 6.02 | 5.67 | 160 82 | -172 64 | 37.56 | 204.10 | 192.43 | 11.67 | 17.488 | |
| 3,137.00 | 3,135 73 | 3,142.04 | 3,141.17 | 6.45 | 6 09 | 175.78 | -166 00 | 35.63 | 207.74 | 195.25 | 12.49 | 16.633 | |
| 3,327.00 | 3,325 40 | 3,332.71 | 3,331.64 | 6.86 | 6.50 | 178.70 | -157.82 | 32.62 | 210 89 | 197 60 | 13 30 | 15.859 | |
| 3,518.00 | 3,516.15 | 3,520.55 | 3,519.30 | 7 26 | 6 90 | -174 21 | -150.73 | 28.10 | 213 49 | 199.42 | 14 07 | 15.170 | |
| 3,640 00 | 3,638.06 | 3,640 38 | 3,639.06 | 7.51 | 7 14 | 177 08 | -147.76 | 25.51 | 215 27 | 200 70 | 14 57 | 14.777 | |
| 3,822 00 | 3,819.98 | 3,820.74 | 3,819.37 | 7.90 | 7.51 | -171 90 | -145.11 | 22 33 | 218 18 | 202 87 | 15 31 | 14.253 | |
| 4,013.00 | 4,010.92 | 4,011.85 | 4,010.43 | 8.30 | 7.91 | -160.09 | -142 77 | 18.67 | 220 82 | 204 72 | 16.10 | 13 715 | |

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

| | | | |
|---|---|---|---|
| **Company:** | Chesapeake Operating Inc | **Local Co-ordinate Reference:** | Well Job # 1210411 |
| **Project:** | Eddy County, New Mexico (NAD 1983) | **TVD Reference:** | WELL @ 3378.00usft (Original Well Elev) |
| **Reference Site:** | PLU Pierce canyon 16-24-30 State 1H | **MD Reference:** | WELL @ 3378.00usft (Original Well Elev) |
| **Site Error:** | 0.00 usft | **North Reference:** | Grid |
| **Reference Well:** | Job # 1210411 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.00 usft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | Rig: Patterson 62 | **Database:** | Compass5000 |
| **Reference Design:** | Survey: Phoenix MWD Surveys | **Offset TVD Reference:** | Offset Datum |

**Offset Design** PLU Pierce Canyon 21 24 30 USA 1H - Job # 1210204 - Rig: Latshaw 14 - Rig: Latshaw 14 — **Offset Site Error:** 0.00 usft

Survey Program: 496-MWD, 7557-MWD — **Offset Well Error:** 0.00 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4,203 00 | 4,200 88 | 4,200 59 | 4,199 11 | 8 69 | 8 31 | -154 53 | -140.66 | 14 39 | 222 77 | 205 88 | 16.89 | 13 189 | |
| 4,393 00 | 4,390 86 | 4,390 72 | 4,389.19 | 9.09 | 8 71 | -129 65 | -139.30 | 10.42 | 224 31 | 206 63 | 17 68 | 12.686 | |
| 4,584 00 | 4,581 83 | 4,581 39 | 4,579.83 | 9 49 | 9.11 | -141 29 | -137.90 | 7.39 | 225 53 | 207.05 | 18 48 | 12 205 | |
| 4,774.00 | 4,771 80 | 4,771.67 | 4,770 08 | 9.89 | 9.51 | -130.13 | -136 64 | 4.20 | 227.02 | 207.75 | 19 28 | 11.777 | |
| 4,964 00 | 4,961.78 | 4,962 43 | 4,960 80 | 10 28 | 9.92 | -131 99 | -134 85 | 0 77 | 227 62 | 207.54 | 20 08 | 11.335 | |
| 5,155 00 | 5,152 75 | 5,154 22 | 5,152.54 | 10.68 | 10.33 | -130 40 | -132 34 | -2 90 | 227 69 | 206 79 | 20 89 | 10.897 | |
| 5,231 32 | 5,229 06 | 5,230 33 | 5,228.63 | 10.84 | 10 49 | -126 88 | -131.20 | -4.37 | 227.61 | 206.39 | 21.22 | 10.727 | |
| 5,345.00 | 5,342 72 | 5,343 07 | 5,341.34 | 11.08 | 10.73 | -122 47 | -129 83 | -6 83 | 227.85 | 206.15 | 21 70 | 10.500 | |
| 5,535.00 | 5,532 68 | 5,533 19 | 5,531.39 | 11.48 | 11 14 | -122 93 | -127.95 | -11.17 | 228 64 | 206.15 | 22.50 | 10.164 | |
| 5,726 00 | 5,723 64 | 5,723 51 | 5,721.67 | 11.88 | 11 53 | -120 31 | -126.17 | -14.98 | 229 34 | 206 04 | 23 29 | 9 846 | |
| 5,916.00 | 5,913 61 | 5,912 32 | 5,910.44 | 12 28 | 11.93 | -134 87 | -125 28 | -18.46 | 230 94 | 206.86 | 24 08 | 9 590 | |
| 6,106 00 | 6,103 59 | 6,101 27 | 6,099.37 | 12 68 | 12 32 | -132.28 | -125 40 | -21.52 | 233.69 | 208.82 | 24.87 | 9.395 | |
| 6,297.00 | 6,294.56 | 6,293.55 | 6,291 62 | 13 08 | 12 72 | -127.21 | -125 52 | -25 02 | 236.57 | 210 89 | 25.68 | 9.211 | |
| 6,487.00 | 6,484 52 | 6,483 87 | 6,481 90 | 13.48 | 13 13 | -122 62 | -124 68 | -28 55 | 238.28 | 211.80 | 26.49 | 8.996 | |
| 6,678.00 | 6,675 50 | 6,674.68 | 6,672 70 | 13 88 | 13 53 | -101 40 | -124.09 | -30 71 | 239.17 | 211.88 | 27 29 | 8.765 | |
| 6,869.00 | 6,866.49 | 6,865 76 | 6,863.78 | 14 28 | 13 93 | -138.77 | -123.81 | -31 36 | 239 98 | 211 90 | 28.08 | 8 545 | |
| 7,059.00 | 7,056 48 | 7,055 41 | 7,053.42 | 14.67 | 14 32 | -156 27 | -123.68 | -31.41 | 241.21 | 212 34 | 28.88 | 8.354 | |
| 7,250.00 | 7,247 48 | 7,244.78 | 7,242.79 | 15.07 | 14 71 | -77.87 | -124.39 | -30.72 | 242.29 | 212 63 | 29 67 | 8 167 | |
| 7,441 00 | 7,438 48 | 7,434.50 | 7,432.50 | 15 47 | 15 10 | -34.26 | -126 32 | -30 37 | 243 48 | 213 02 | 30 46 | 7 994 | |
| 7,492 00 | 7,489.48 | 7,485.65 | 7,483.65 | 15 58 | 15.19 | 5.16 | -126 99 | -30.22 | 243.71 | 213 06 | 30.65 | 7.951 | |
| 7,561 00 | 7,558.47 | 7,556.30 | 7,554 30 | 15 72 | 15.27 | -166.98 | -127 62 | -29 85 | 244.79 | 213 92 | 30.87 | 7.929 SF | |
| 7,593.00 | 7,590 40 | 7,585 90 | 7,583.89 | 15 79 | 15.27 | 177.41 | -127 89 | -29 96 | 247 14 | 216 28 | 30 86 | 8 008 | |
| 7,624 00 | 7,621.09 | 7,608 74 | 7,606.70 | 15.86 | 15 27 | -179 46 | -128.42 | -30 83 | 252 30 | 221 55 | 30 75 | 8.206 | |
| 7,656 00 | 7,652 44 | 7,629 55 | 7,627.39 | 15.94 | 15 27 | -175.34 | -129.46 | -32.76 | 260 67 | 230 06 | 30 61 | 8 515 | |
| 7,688 00 | 7,683 38 | 7,652 00 | 7,649 56 | 16.03 | 15.28 | -174.77 | -131.56 | -35.62 | 272 10 | 241 69 | 30.41 | 8 948 | |
| 7,720 00 | 7,713.83 | 7,667 66 | 7,664.91 | 16 11 | 15.28 | -171.73 | -133.55 | -38.01 | 286 15 | 255 96 | 30 19 | 9 479 | |
| 7,751 00 | 7,742.83 | 7,684 00 | 7,680 83 | 16 21 | 15.29 | -166.69 | -135 93 | -40.82 | 301 84 | 271 84 | 30.01 | 10 059 | |
| 7,783 00 | 7,772.24 | 7,703 85 | 7,700 03 | 16 30 | 15.29 | -163 65 | -139 31 | -44 55 | 319 82 | 289.98 | 29 83 | 10 720 | |
| 7,815 00 | 7,801 06 | 7,716 00 | 7,711 70 | 16 41 | 15 30 | -162.56 | -141 68 | -46 95 | 339.63 | 310.06 | 29 57 | 11.484 | |
| 7,847.00 | 7,829 16 | 7,733 84 | 7,728.69 | 16 52 | 15.30 | -162.05 | -145 61 | -50.66 | 361.19 | 331 94 | 29 25 | 12.347 | |
| 7,878 00 | 7,855 49 | 7,747.00 | 7,741.12 | 16.64 | 15 31 | -159 78 | -148.88 | -53 53 | 383 86 | 355 02 | 28 84 | 13.310 | |
| 7,910 00 | 7,881 60 | 7,758 10 | 7,751.50 | 16.77 | 15 31 | -158 72 | -151.84 | -56 10 | 408 89 | 380 44 | 28 45 | 14.372 | |
| 7,942 00 | 7,906 73 | 7,768 84 | 7,761.46 | 16 90 | 15.32 | -158.01 | -154.85 | -58.79 | 435 22 | 407 10 | 28.12 | 15 477 | |
| 7,974 00 | 7,930 79 | 7,779.00 | 7,770.78 | 17.05 | 15.32 | -157 24 | -157.83 | -61.50 | 462.71 | 435 02 | 27.68 | 16 714 | |
| 8,005 00 | 7,953 01 | 7,779 00 | 7,770.78 | 17.21 | 15 32 | -158.50 | -157.83 | -61.50 | 490 43 | 463 24 | 27.20 | 18 032 | |
| 8,037 00 | 7,974.91 | 7,791 51 | 7,782.15 | 17.38 | 15 33 | -158.25 | -161 72 | -64 99 | 519 72 | 492.89 | 26.83 | 19 368 | |
| 8,069 00 | 7,995.63 | 7,796.61 | 7,786.74 | 17.57 | 15.34 | -158 30 | -163 39 | -66 43 | 549 83 | 523 49 | 26 34 | 20 874 | |
| 8,100 00 | 8,014 33 | 7,800 50 | 7,790 23 | 17 77 | 15 34 | -154 99 | -164 70 | -67 55 | 579.63 | 553.44 | 26 19 | 22.135 | |
| 8,132.00 | 8,032 27 | 7,811.00 | 7,799 59 | 17.98 | 15.35 | -151.41 | -168.37 | -70 59 | 610.94 | 584.59 | 26 36 | 23.181 | |
| 8,164 00 | 8,048 45 | 7,811 00 | 7,799 59 | 18 21 | 15.35 | -135 10 | -168.37 | -70 59 | 642 48 | 613 81 | 28 66 | 22.415 | |
| 8,196 00 | 8,062 38 | 7,811 00 | 7,799.59 | 18 45 | 15.35 | -99 17 | -168.37 | -70.59 | 674.29 | 640.83 | 33 46 | 20.153 | |
| 8,228 00 | 8,074 21 | 7,811 00 | 7,799 59 | 18 72 | 15.35 | -60 87 | -168.37 | -70 59 | 706.14 | 674.71 | 31.43 | 22.467 | |
| 8,259.00 | 8,083 19 | 7,811.00 | 7,799.59 | 18.98 | 15.35 | -33 86 | -168.37 | -70.59 | 736 83 | 711.35 | 25.48 | 28 920 | |
| 8,284 00 | 8,088 19 | 7,811.00 | 7,799 59 | 19.21 | 15 35 | -24 11 | -168 37 | -70.59 | 761 26 | 738 40 | 22 86 | 33 299 | |
| 8,322.00 | 8,092 30 | 7,800 76 | 7,790 47 | 19 56 | 15 34 | -15 83 | -164 79 | -67 62 | 797.50 | 776.70 | 20 80 | 38.336 | |
| 8,418 00 | 8,094 47 | 7,790 17 | 7,780 94 | 20 54 | 15 33 | -13.04 | -161 29 | -64.61 | 887.34 | 866.91 | 20 43 | 43.429 | |
| 8,513 00 | 8,093 56 | 7,779 00 | 7,770.78 | 21 53 | 15.32 | -10.90 | -157.83 | -61 50 | 976 16 | 955.79 | 20.37 | 47.925 | |
| 8,608.00 | 8,092 40 | 7,768.97 | 7,761.58 | 22.61 | 15.32 | -10.51 | -154.89 | -58.82 | 1,065.69 | 1,045.07 | 20.61 | 51.698 | |
| 8,703.00 | 8,090 83 | 7,758.59 | 7,751 96 | 23 77 | 15 31 | -11.21 | -151 97 | -56.22 | 1,155.68 | 1,134.59 | 21.09 | 54 809 | |
| 8,799 00 | 8,088 65 | 7,747.00 | 7,741.12 | 25 00 | 15.31 | -14 49 | -148 88 | -53 53 | 1,246 88 | 1,224 72 | 22 16 | 56.273 | |
| 8,894 00 | 8,087.07 | 7,747.00 | 7,741.12 | 26.22 | 15 31 | -12.25 | -148 88 | -53 53 | 1,337 80 | 1,315 64 | 22 15 | 60.384 | |
| 8,989.00 | 8,086 66 | 7,734 98 | 7,729.78 | 27.45 | 15 30 | -7.55 | -145 88 | -50.90 | 1,429 44 | 1,407.70 | 21.74 | 65 750 | |

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

PHOENIX TECHNOLOGY SERVICES

# Anticollision Report

| | | | |
|---|---|---|---|
| **Company:** | Chesapeake Operating Inc. | **Local Co-ordinate Reference:** | Well Job # 1210411 |
| **Project:** | Eddy County, New Mexico (NAD 1983) | **TVD Reference:** | WELL @ 3378.00usft (Original Well Elev) |
| **Reference Site:** | PLU Pierce canyon 16-24-30 State 1H | **MD Reference:** | WELL @ 3378.00usft (Original Well Elev) |
| **Site Error:** | 0.00 usft | **North Reference:** | Grid |
| **Reference Well:** | Job # 1210411 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.00 usft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | Rig: Patterson 62 | **Database:** | Compass5000 |
| **Reference Design:** | Survey: Phoenix MWD Surveys | **Offset TVD Reference:** | Offset Datum |

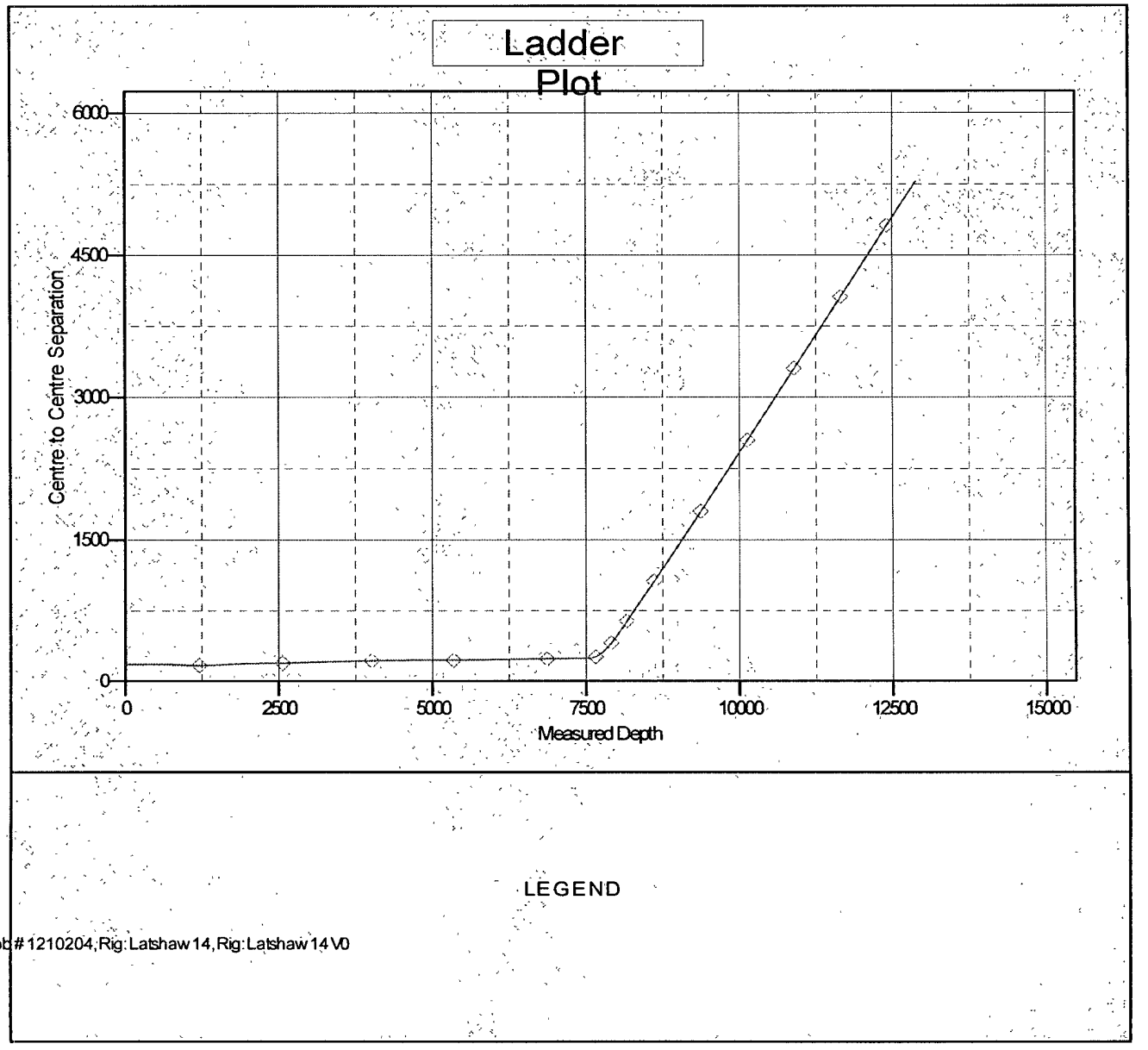
**Offset Design** PLU Pierce Canyon 21 24 30 USA 1H - Job # 1210204 - Rig: Latshaw 14 - Rig: Latshaw 14 — Offset Site Error: 0.00 usft

Survey Program: 496-MWD, 7557-MWD — Offset Well Error: 0.00 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9,084.00 | 8,087.16 | 7,729.30 | 7,724.39 | 28.72 | 15.30 | -6.53 | -144.56 | -49.69 | 1,521.69 | 1,499.61 | 22.08 | 68.907 | |
| 9,179.00 | 8,088.07 | 7,716.00 | 7,711.70 | 30.03 | 15.30 | 5.59 | -141.68 | -46.95 | 1,614.39 | 1,592.01 | 22.38 | 72.148 | |
| 9,275.00 | 8,088.65 | 7,716.00 | 7,711.70 | 31.40 | 15.30 | 6.52 | -141.68 | -46.95 | 1,708.03 | 1,685.03 | 23.00 | 74.247 | |
| 9,370.00 | 8,089.07 | 7,716.00 | 7,711.70 | 32.80 | 15.30 | 4.53 | -141.68 | -46.95 | 1,800.91 | 1,777.65 | 23.26 | 77.419 | |
| 9,465.00 | 8,089.48 | 7,716.00 | 7,711.70 | 34.22 | 15.30 | 5.64 | -141.68 | -46.95 | 1,894.01 | 1,870.07 | 23.94 | 79.130 | |
| 9,560.00 | 8,089.90 | 7,716.00 | 7,711.70 | 35.64 | 15.30 | 7.01 | -141.68 | -46.95 | 1,987.27 | 1,962.59 | 24.68 | 80.513 | |
| 9,656.00 | 8,090.15 | 7,700.75 | 7,697.04 | 37.09 | 15.29 | 1.53 | -138.74 | -43.95 | 2,081.42 | 2,056.78 | 24.63 | 84.504 | |
| 9,750.00 | 8,089.90 | 7,696.89 | 7,693.31 | 38.54 | 15.29 | -5.56 | -138.05 | -43.21 | 2,173.76 | 2,148.19 | 25.57 | 85.017 | |
| 9,846.00 | 8,088.65 | 7,684.00 | 7,680.83 | 40.08 | 15.29 | -9.22 | -135.93 | -40.82 | 2,268.05 | 2,241.17 | 26.88 | 84.375 | |
| 9,941.00 | 8,087.82 | 7,684.00 | 7,680.83 | 41.59 | 15.29 | -2.31 | -135.93 | -40.82 | 2,361.41 | 2,335.06 | 26.35 | 89.611 | |
| 10,036.00 | 8,087.32 | 7,684.00 | 7,680.83 | 43.11 | 15.29 | -6.03 | -135.93 | -40.82 | 2,454.98 | 2,427.57 | 27.41 | 89.576 | |
| 10,132.00 | 8,086.98 | 7,684.00 | 7,680.83 | 44.64 | 15.29 | -7.79 | -135.93 | -40.82 | 2,549.65 | 2,521.22 | 28.43 | 89.687 | |
| 10,227.00 | 8,087.32 | 7,684.00 | 7,680.83 | 46.14 | 15.29 | -10.95 | -135.93 | -40.82 | 2,643.51 | 2,613.54 | 29.98 | 88.185 | |
| 10,322.00 | 8,086.98 | 7,684.00 | 7,680.83 | 47.68 | 15.29 | -8.83 | -135.93 | -40.82 | 2,737.35 | 2,707.41 | 29.95 | 91.409 | |
| 10,417.00 | 8,085.66 | 7,684.00 | 7,680.83 | 49.22 | 15.29 | 2.48 | -135.93 | -40.82 | 2,831.15 | 2,801.82 | 29.33 | 96.528 | |
| 10,512.00 | 8,085.08 | 7,669.87 | 7,667.07 | 50.75 | 15.28 | 9.46 | -133.85 | -38.37 | 2,924.97 | 2,893.57 | 31.40 | 93.158 | |
| 10,608.00 | 8,085.50 | 7,667.02 | 7,664.28 | 52.30 | 15.28 | 2.21 | -133.46 | -37.91 | 3,020.07 | 2,989.50 | 30.57 | 98.796 | |
| 10,703.00 | 8,085.83 | 7,652.00 | 7,649.56 | 53.85 | 15.28 | 5.30 | -131.56 | -35.62 | 3,114.33 | 3,082.73 | 31.60 | 98.560 | |
| 10,798.00 | 8,086.24 | 7,652.00 | 7,649.56 | 55.40 | 15.28 | 8.33 | -131.56 | -35.62 | 3,208.48 | 3,175.46 | 33.01 | 97.192 | |
| 10,894.00 | 8,086.33 | 7,652.00 | 7,649.56 | 57.00 | 15.28 | 6.38 | -131.56 | -35.62 | 3,303.62 | 3,270.49 | 33.12 | 99.732 | |
| 10,989.00 | 8,087.98 | 7,652.00 | 7,649.56 | 58.56 | 15.28 | -10.12 | -131.56 | -35.62 | 3,398.00 | 3,362.89 | 35.11 | 96.771 | |
| 11,084.00 | 8,091.71 | 7,652.00 | 7,649.56 | 60.09 | 15.28 | -10.32 | -131.56 | -35.62 | 3,492.62 | 3,456.74 | 35.88 | 97.336 | |
| 11,179.00 | 8,095.44 | 7,652.00 | 7,649.56 | 61.65 | 15.28 | -9.00 | -131.56 | -35.62 | 3,587.27 | 3,551.21 | 36.06 | 99.478 | |
| 11,274.00 | 8,100.00 | 7,652.00 | 7,649.56 | 63.21 | 15.28 | -22.68 | -131.56 | -35.62 | 3,681.98 | 3,637.50 | 44.48 | 82.786 | |
| 11,369.00 | 8,104.15 | 7,652.00 | 7,649.56 | 64.79 | 15.28 | -15.19 | -131.56 | -35.62 | 3,776.66 | 3,736.26 | 40.40 | 93.475 | |
| 11,464.00 | 8,106.30 | 7,652.00 | 7,649.56 | 66.40 | 15.28 | -10.44 | -131.56 | -35.62 | 3,871.20 | 3,832.52 | 38.68 | 100.085 | |
| 11,560.00 | 8,106.89 | 7,652.00 | 7,649.56 | 68.02 | 15.28 | -1.39 | -131.56 | -35.62 | 3,966.61 | 3,929.69 | 36.93 | 107.416 | |
| 11,655.00 | 8,106.31 | 7,652.00 | 7,649.56 | 69.64 | 15.28 | -2.96 | -131.56 | -35.62 | 4,060.93 | 4,023.19 | 37.74 | 107.600 | |
| 11,750.00 | 8,104.90 | 7,652.00 | 7,649.56 | 71.27 | 15.28 | -13.78 | -131.56 | -35.62 | 4,155.17 | 4,112.68 | 42.48 | 97.806 | |
| 11,845.00 | 8,104.40 | 7,652.00 | 7,649.56 | 72.86 | 15.28 | -14.18 | -131.56 | -35.62 | 4,249.52 | 4,205.98 | 43.54 | 97.595 | |
| 11,940.00 | 8,106.06 | 7,652.00 | 7,649.56 | 74.43 | 15.28 | -23.00 | -131.56 | -35.62 | 4,344.11 | 4,293.39 | 50.72 | 85.646 | |
| 12,036.00 | 8,108.57 | 7,652.00 | 7,649.56 | 76.02 | 15.28 | -25.03 | -131.56 | -35.62 | 4,439.76 | 4,386.46 | 53.30 | 83.298 | |
| 12,131.00 | 8,110.98 | 7,652.00 | 7,649.56 | 77.62 | 15.28 | -21.43 | -131.56 | -35.62 | 4,534.43 | 4,483.27 | 51.16 | 88.624 | |
| 12,226.00 | 8,112.72 | 7,652.00 | 7,649.56 | 79.25 | 15.28 | -25.34 | -131.56 | -35.62 | 4,629.05 | 4,573.70 | 55.35 | 83.626 | |
| 12,321.00 | 8,112.63 | 7,652.00 | 7,649.56 | 80.90 | 15.28 | -23.86 | -131.56 | -35.62 | 4,723.48 | 4,668.62 | 54.86 | 86.104 | |
| 12,417.00 | 8,109.79 | 7,652.00 | 7,649.56 | 82.57 | 15.28 | -16.96 | -131.56 | -35.62 | 4,818.61 | 4,768.70 | 49.91 | 96.543 | |
| 12,512.00 | 8,106.39 | 7,652.00 | 7,649.56 | 84.19 | 15.28 | -3.29 | -131.56 | -35.62 | 4,912.78 | 4,869.00 | 43.78 | 112.210 | |
| 12,607.00 | 8,104.56 | 7,652.00 | 7,649.56 | 85.78 | 15.28 | 8.80 | -131.56 | -35.62 | 5,007.20 | 4,960.88 | 46.31 | 108.112 | |
| 12,702.00 | 8,102.32 | 7,652.00 | 7,649.56 | 87.40 | 15.28 | -0.88 | -131.56 | -35.62 | 5,101.59 | 5,056.78 | 44.81 | 113.847 | |
| 12,797.00 | 8,100.42 | 7,652.00 | 7,649.56 | 89.02 | 15.28 | -24.83 | -131.56 | -35.62 | 5,196.01 | 5,135.67 | 60.34 | 86.116 | |
| 12,830.00 | 8,100.39 | 7,652.00 | 7,649.56 | 89.57 | 15.28 | -30.74 | -131.56 | -35.62 | 5,228.85 | 5,162.26 | 66.59 | 78.519 | |
| 12,880.00 | 8,100.48 | 7,652.00 | 7,649.56 | 90.43 | 15.28 | -30.74 | -131.56 | -35.62 | 5,278.61 | 5,211.49 | 67.13 | 78.636 | |

| | | | |
|---|---|---|---|
| **Company:** | Chesapeake Operating Inc. | **Local Co-ordinate Reference:** | Well Job # 1210411 |
| **Project:** | Eddy County, New Mexico (NAD 1983) | **TVD Reference:** | WELL @ 3378.00usft (Original Well Elev) |
| **Reference Site:** | PLU Pierce canyon 16-24-30 State 1H | **MD Reference:** | WELL @ 3378.00usft (Original Well Elev) |
| **Site Error:** | 0.00 usft | **North Reference:** | Grid |
| **Reference Well:** | Job # 1210411 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.00 usft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | Rig Patterson 62 | **Database:** | Compass5000 |
| **Reference Design:** | Survey Phoenix MWD Surveys | **Offset TVD Reference:** | Offset Datum |

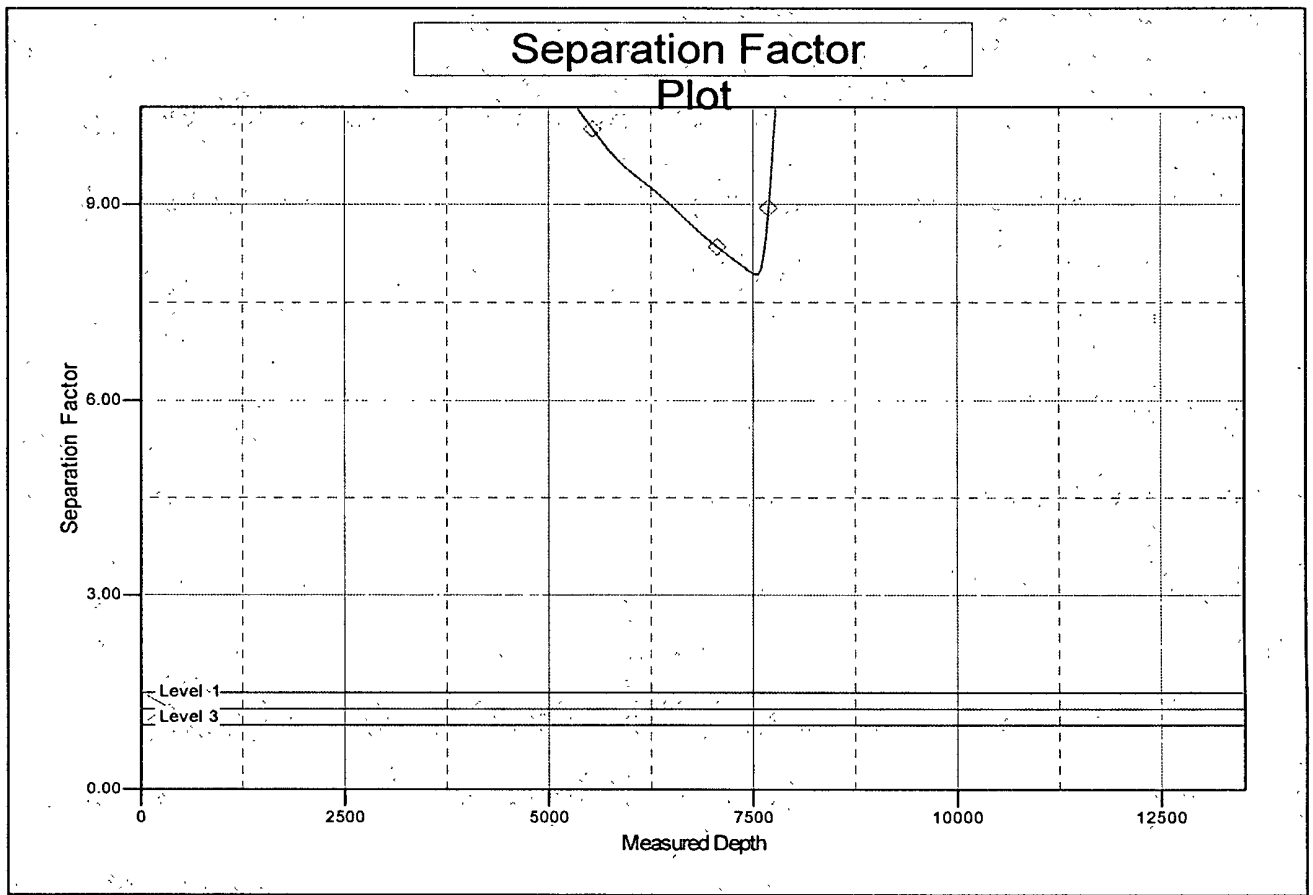
| | |
|---|---|
| Reference Depths are relative to WELL @ 3378.00usft (Original Well E | Coordinates are relative to Job # 1210411 |
| Offset Depths are relative to Offset Datum | Coordinate System is US State Plane 1983, New Mexico Eastern Zone |
| Central Meridian is 104° 19' 60.0000 W | Grid Convergence at Surface is. 0.24° |



| | | | |
|---|---|---|---|
| **Company:** | Chesapeake Operating Inc. | **Local Co-ordinate Reference:** | Well Job # 1210411 |
| **Project:** | Eddy County, New Mexico (NAD 1983) | **TVD Reference:** | WELL @ 3378.00usft (Original Well Elev) |
| **Reference Site:** | PLU Pierce canyon 16-24-30 State 1H | **MD Reference:** | WELL @ 3378.00usft (Original Well Elev) |
| **Site Error:** | 0.00 usft | **North Reference:** | Grid |
| **Reference Well:** | Job # 1210411 | **Survey Calculation Method:** | Minimum Curvature |
| **Well Error:** | 0.00 usft | **Output errors are at** | 2.00 sigma |
| **Reference Wellbore** | Rig: Patterson 62 | **Database:** | Compass5000 |
| **Reference Design:** | Survey: Phoenix MWD Surveys | **Offset TVD Reference:** | Offset Datum |

Reference Depths are relative to WELL @ 3378.00usft (Original Well E
Offset Depths are relative to Offset Datum
Central Meridian is 104° 19' 60.0000 W

Coordinates are relative to: Job # 1210411
Coordinate System is US State Plane 1983, New Mexico Eastern Zone
Grid Convergence at Surface is 0.24°



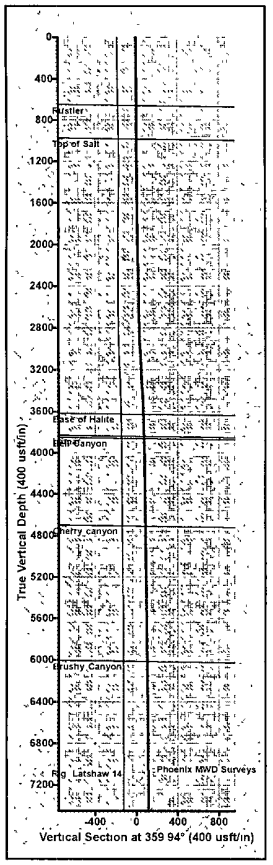

LEGEND

ob # 1210204, Rig: Latshaw 14, Rig: Latshaw 14 V0

# Chesapeake Operating Inc.

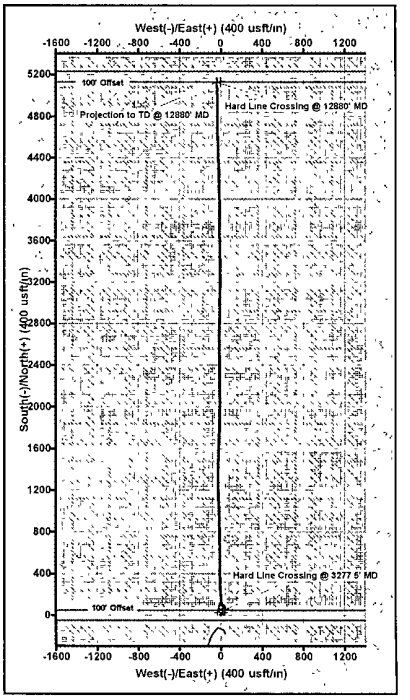
**Project: Eddy County, New Mexico (NAD 1983)**
**Site: PLU Pierce canyon 16-24-30 State 1H**
**Well: Job # 1210411**
**Wellbore: Rig Patterson 62**
**Plan: Plan 1 5-9-2012**

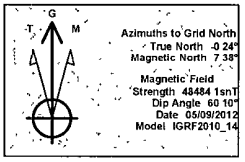
| WELL DETAILS: Job # 1210411 | | | |
|---|---|---|---|
| Ground Level: 3355.00 | | | |
| Northing | Easting | Latitude | Longitude |
| 440647.00 | 680310.00 | 32° 12' 38.2210 N | 103° 53' 2.3622 W |

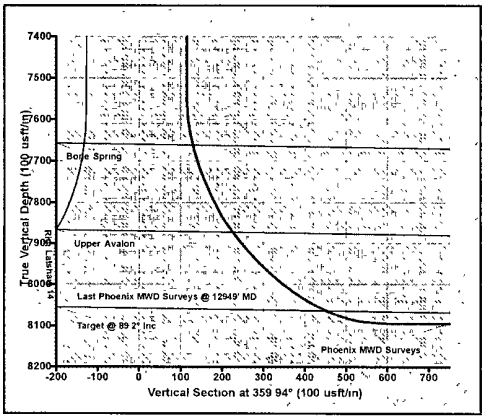



| SECTION DETAILS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MD | Inc | Azi | TVD | +N/-S | +E/-W | Dleg | TFace | VSect | |
| 0 00 | 0 00 | 0 00 | 0 00 | 0 00 | 0 00 | 0 00 | 0 00 | 0 00 | |
| 7586 50 | 0 00 | 0 00 | 7586 50 | 0 00 | 0 00 | 0 00 | 0 00 | 0 00 | |
| 8329 96 | 89 20 | 359 94 | 8064 00 | 470 88 | -0 49 | 12 00 | 359 94 | 470 88 | |
| 12989 54 | 89 20 | 359 95 | 8129 00 | 5130 00 | -5 00 | 0 00 | 81 16 | 5130 00 | PLU Pierce Canyon 16 24 30 ST 1H PBHL |

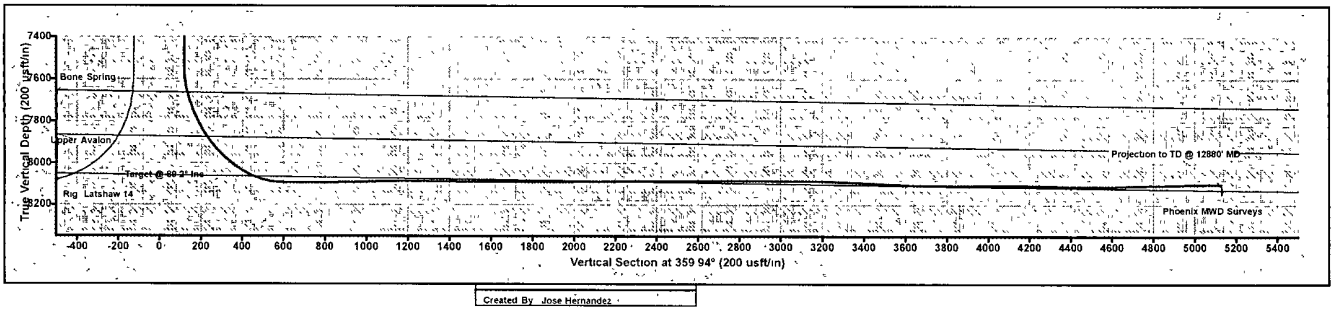
| FORMATION TOP DETAILS | | | | |
|---|---|---|---|---|
| TVDPath | MDPath | Formation | DipAngle | DipDir |
| 657 00 | 657 00 | Rustler | 0 80 | 359 94 |
| 883 00 | 883 00 | Top of Salt | 0 80 | 359 94 |
| 3625 00 | 3625 00 | Base of Halite | 0 80 | 359 94 |
| 3839 00 | 3839 00 | Lamar | 0 80 | 359 94 |
| 3860 00 | 3860 00 | Bell Canyon | 0 80 | 359 94 |
| 4706 00 | 4706 00 | Cherry canyon | 0 80 | 359 94 |
| 6014 00 | 6014 00 | Brushy Canyon | 0 80 | 359 94 |
| 7660 08 | 7660 37 | Bone Spring | 0 80 | 359 94 |
| 7871 32 | 7891 67 | Upper Avalon | 0 80 | 359 94 |
| 8063 29 | 8309 82 | Target @ 89 2° Inc | 0 80 | 359 94 |




| ANNOTATIONS | | |
|---|---|---|
| TVD | MD | Annotation |
| 7586 50 | 7586 50 | KOP Build 12 00°/100' |
| 8064 00 | 8329 96 | LP @ 8064' TVD |
| 8128 99 | 12989.00 | TD @ 12989 54' MD |




Created By Jose Hernandez

| MD | Inc | Az | TVDSS | TVD | N/S | E/W |
|---|---|---|---|---|---|---|
| 0 | 0 | 0 | -3378 | 0 | 0 N | 0 E |
| 204 | 0.7 | 308.3 | -3174.01 | 203.99 | 0.77 N | 0.98 W |
| 386 | 0.7 | 306.7 | -2992.02 | 385.98 | 2.13 N | 2.74 W |
| 576 | 1.2 | 292.5 | -2802.05 | 575.95 | 3.58 N | 5.51 W |
| 686 | 0.7 | 305.3 | -2692.06 | 685.94 | 4.41 N | 7.12 W |
| 854 | 0.1 | 119.4 | -2524.06 | 853.94 | 4.93 N | 7.83 W |
| 1044 | 0.1 | 15.3 | -2334.06 | 1043.94 | 5.01 N | 7.64 W |
| 1234 | 0.5 | 54.2 | -2144.07 | 1233.93 | 5.65 N | 6.93 W |
| 1425 | 1.3 | 73.4 | -1953.09 | 1424.91 | 6.76 N | 4.18 W |
| 1615 | 1.8 | 75.5 | -1763.16 | 1614.84 | 8.12 N | 0.78 E |
| 1805 | 2.5 | 77.2 | -1573.3 | 1804.7 | 9.79 N | 7.71 E |
| 1996 | 2.7 | 70 | -1382.49 | 1995.51 | 12.25 N | 16 E |
| 2186 | 1.9 | 69.9 | -1192.65 | 2185.35 | 14.86 N | 23.16 E |
| 2376 | 0.8 | 45.1 | -1002.7 | 2375.3 | 16.88 N | 27.06 E |
| 2566 | 1.2 | 39.8 | -812.73 | 2565.27 | 19.35 N | 29.27 E |
| 2756 | 2.1 | 26.8 | -622.81 | 2755.19 | 23.98 N | 32.11 E |
| 2947 | 2.7 | 18.5 | -431.98 | 2946.02 | 31.37 N | 35.12 E |
| 3137 | 3.6 | 4.6 | -242.27 | 3135.73 | 41.56 N | 37.02 E |
| 3327 | 3.2 | 2.7 | -52.6 | 3325.4 | 52.81 N | 37.75 E |
| 3518 | 2.6 | 356.8 | 138.15 | 3516.15 | 62.46 N | 37.76 E |
| 3640 | 1.8 | 6.2 | 260.06 | 3638.06 | 67.12 N | 37.81 E |
| 3822 | 1.6 | 356 | 441.98 | 3819.98 | 72.5 N | 37.94 E |
| 4013 | 1.3 | 344.9 | 632.92 | 4010.92 | 77.25 N | 37.19 E |
| 4203 | 1.1 | 340.1 | 822.88 | 4200.88 | 81.05 N | 36.01 E |
| 4393 | 0.8 | 315.8 | 1012.86 | 4390.86 | 83.71 N | 34.46 E |
| 4584 | 1.1 | 327.7 | 1203.83 | 4581.83 | 86.22 N | 32.55 E |
| 4774 | 0.9 | 316.8 | 1393.8 | 4771.8 | 88.85 N | 30.56 E |
| 4964 | 0.9 | 319 | 1583.78 | 4961.78 | 91.06 N | 28.56 E |
| 5155 | 1 | 317.8 | 1774.75 | 5152.75 | 93.43 N | 26.45 E |
| 5345 | 1.2 | 310.2 | 1964.72 | 5342.72 | 95.94 N | 23.82 E |
| 5535 | 1.1 | 311 | 2154.68 | 5532.68 | 98.42 N | 20.92 E |
| 5726 | 1.1 | 308.6 | 2345.64 | 5723.64 | 100.77 N | 18.11 E |
| 5916 | 0.9 | 323.4 | 2535.61 | 5913.61 | 103.11 N | 15.79 E |
| 6106 | 1 | 321 | 2725.59 | 6103.59 | 105.59 N | 13.86 E |
| 6297 | 1.1 | 316.1 | 2916.56 | 6294.56 | 108.21 N | 11.54 E |
| 6487 | 1 | 311.7 | 3106.52 | 6484.52 | 110.62 N | 9.04 E |
| 6678 | 0.7 | 290.4 | 3297.5 | 6675.5 | 112.14 N | 6.7 E |
| 6869 | 0.6 | 327.5 | 3488.49 | 6866.49 | 113.39 N | 5.07 E |
| 7059 | 0.4 | 344.8 | 3678.48 | 7056.48 | 114.87 N | 4.36 E |
| 7250 | 0.4 | 266 | 3869.48 | 7247.48 | 115.47 N | 3.52 E |
| 7441 | 0.4 | 222 | 4060.48 | 7438.48 | 114.92 N | 2.41 E |
| 7492 | 0.6 | 182.5 | 4111.47 | 7489.47 | 114.53 N | 2.28 E |
| 7561 | 1.5 | 354.5 | 4180.47 | 7558.47 | 115.06 N | 2.17 E |
| 7593 | 5.9 | 10.1 | 4212.39 | 7590.39 | 117.1 N | 2.42 E |
| 7624 | 10 | 7.2 | 4243.09 | 7621.09 | 121.34 N | 3.04 E |
| 7656 | 13.1 | 3.6 | 4274.44 | 7652.44 | 127.72 N | 3.62 E |

| | | | | | | |
|---|---|---|---|---|---|---|
| 7688 | 16.4 | 3.6 | 4305.38 | 7683.38 | 135.85 N | 4.13 E |
| 7720 | 19.4 | 1.3 | 4335.83 | 7713.83 | 145.67 N | 4.53 E |
| 7751 | 22 | 357.4 | 4364.83 | 7742.83 | 156.62 N | 4.39 E |
| 7783 | 24.4 | 355.4 | 4394.24 | 7772.24 | 169.2 N | 3.58 E |
| 7815 | 27.1 | 355.1 | 4423.06 | 7801.06 | 183.05 N | 2.43 E |
| 7847 | 30 | 355.4 | 4451.16 | 7829.16 | 198.29 N | 1.17 E |
| 7878 | 33.7 | 354.7 | 4477.49 | 7855.49 | 214.59 N | 0.25 W |
| 7910 | 36.9 | 354.9 | 4503.6 | 7881.6 | 233 N | 1.93 W |
| 7942 | 39.6 | 355.3 | 4528.73 | 7906.73 | 252.74 N | 3.62 W |
| 7974 | 42.9 | 356 | 4552.79 | 7930.79 | 273.77 N | 5.21 W |
| 8005 | 45.5 | 357.6 | 4575.01 | 7953.01 | 295.35 N | 6.41 W |
| 8037 | 48.1 | 358.4 | 4596.91 | 7974.91 | 318.66 N | 7.22 W |
| 8069 | 51.2 | 359.6 | 4617.63 | 7995.63 | 343.04 N | 7.64 W |
| 8100 | 54.6 | 0 | 4636.33 | 8014.33 | 367.76 N | 7.72 W |
| 8132 | 57.2 | 0.2 | 4654.27 | 8032.27 | 394.26 N | 7.68 W |
| 8164 | 62 | 0.3 | 4670.45 | 8048.45 | 421.85 N | 7.56 W |
| 8196 | 66.4 | 0.2 | 4684.38 | 8062.38 | 450.65 N | 7.43 W |
| 8228 | 70.2 | 359.9 | 4696.21 | 8074.21 | 480.38 N | 7.41 W |
| 8259 | 76.1 | 359.1 | 4705.19 | 8083.19 | 510.03 N | 7.67 W |
| 8284 | 80.8 | 358.9 | 4710.19 | 8088.19 | 534.52 N | 8.1 W |
| 8322 | 86.8 | 358.9 | 4714.3 | 8092.3 | 572.27 N | 8.82 W |
| 8418 | 90.6 | 358.6 | 4716.47 | 8094.47 | 668.2 N | 10.91 W |
| 8513 | 90.5 | 359.1 | 4715.56 | 8093.56 | 763.18 N | 12.82 W |
| 8608 | 90.9 | 358.9 | 4714.4 | 8092.4 | 858.16 N | 14.48 W |
| 8703 | 91 | 358.4 | 4712.83 | 8090.83 | 953.12 N | 16.72 W |
| 8799 | 91.6 | 356.9 | 4710.65 | 8088.65 | 1049.01 N | 20.65 W |
| 8894 | 90.3 | 357.9 | 4709.07 | 8087.07 | 1143.9 N | 24.96 W |
| 8989 | 90.2 | 359 | 4708.66 | 8086.66 | 1238.86 N | 27.53 W |
| 9084 | 89.2 | 359.3 | 4709.16 | 8087.16 | 1333.85 N | 28.94 W |
| 9179 | 89.7 | 2 | 4710.07 | 8088.07 | 1428.83 N | 27.86 W |
| 9275 | 89.6 | 2.2 | 4710.65 | 8088.65 | 1524.76 N | 24.34 W |
| 9370 | 89.9 | 1.8 | 4711.07 | 8089.07 | 1619.7 N | 21.03 W |
| 9465 | 89.6 | 2 | 4711.48 | 8089.48 | 1714.65 N | 17.88 W |
| 9560 | 89.9 | 2.3 | 4711.9 | 8089.9 | 1809.58 N | 14.32 W |
| 9656 | 89.8 | 1.2 | 4712.15 | 8090.15 | 1905.53 N | 11.38 W |
| 9750 | 90.5 | 359.8 | 4711.9 | 8089.9 | 1999.53 N | 10.56 W |
| 9846 | 91 | 358.9 | 4710.65 | 8088.65 | 2095.51 N | 11.65 W |
| 9941 | 90 | 0.3 | 4709.82 | 8087.82 | 2190.5 N | 12.32 W |
| 10036 | 90.6 | 359.6 | 4709.32 | 8087.32 | 2285.5 N | 12.4 W |
| 10132 | 89.8 | 359.4 | 4708.98 | 8086.98 | 2381.49 N | 13.24 W |
| 10227 | 89.8 | 358.9 | 4709.32 | 8087.32 | 2476.48 N | 14.65 W |
| 10322 | 90.6 | 359.1 | 4708.98 | 8086.98 | 2571.47 N | 16.3 W |
| 10417 | 91 | 0.9 | 4707.66 | 8085.66 | 2666.45 N | 16.3 W |
| 10512 | 89.7 | 1.8 | 4707.08 | 8085.08 | 2761.42 N | 14.07 W |
| 10608 | 89.8 | 0.8 | 4707.5 | 8085.5 | 2857.39 N | 11.89 W |
| 10703 | 89.8 | 1.2 | 4707.83 | 8085.83 | 2952.38 N | 10.23 W |
| 10798 | 89.7 | 1.6 | 4708.24 | 8086.24 | 3047.35 N | 7.91 W |

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|---|---|---|---|---|---|---|
| 10894 | 90.2 | 1.4 | 4708.33 | 8086.33 | 3143.32 N | 5.4 W |
| 10989 | 87.8 | 359.6 | 4709.98 | 8087.98 | 3238.29 N | 4.57 W |
| 11084 | 87.7 | 359.6 | 4713.71 | 8091.71 | 3333.21 N | 5.23 W |
| 11179 | 87.8 | 359.7 | 4717.44 | 8095.44 | 3428.14 N | 5.81 W |
| 11274 | 86.7 | 358.9 | 4722 | 8100 | 3523.02 N | 6.97 W |
| 11369 | 88.3 | 359 | 4726.15 | 8104.15 | 3617.91 N | 8.71 W |
| 11464 | 89.1 | 359.3 | 4728.3 | 8106.3 | 3712.87 N | 10.12 W |
| 11560 | 90.2 | 0.2 | 4728.89 | 8106.89 | 3808.87 N | 10.53 W |
| 11655 | 90.5 | 0 | 4728.31 | 8106.31 | 3903.87 N | 10.37 W |
| 11750 | 91.2 | 358.5 | 4726.9 | 8104.9 | 3998.84 N | 11.61 W |
| 11845 | 89.4 | 358.9 | 4726.4 | 8104.4 | 4093.81 N | 13.77 W |
| 11940 | 88.6 | 358.3 | 4728.06 | 8106.06 | 4188.77 N | 16.09 W |
| 12036 | 88.4 | 358.2 | 4730.57 | 8108.57 | 4284.69 N | 19.02 W |
| 12131 | 88.7 | 358.4 | 4732.98 | 8110.98 | 4379.62 N | 21.84 W |
| 12226 | 89.2 | 357.8 | 4734.72 | 8112.72 | 4474.55 N | 24.98 W |
| 12321 | 90.9 | 357.2 | 4734.63 | 8112.63 | 4569.46 N | 29.13 W |
| 12417 | 92.5 | 357.6 | 4731.79 | 8109.79 | 4665.31 N | 33.48 W |
| 12512 | 91.6 | 359.6 | 4728.39 | 8106.39 | 4760.22 N | 35.8 W |
| 12607 | 90.6 | 0.9 | 4726.56 | 8104.56 | 4855.2 N | 35.39 W |
| 12702 | 92.1 | 359.9 | 4724.32 | 8102.32 | 4950.16 N | 34.72 W |
| 12797 | 90.2 | 357.6 | 4722.42 | 8100.42 | 5045.11 N | 36.79 W |
| 12830 | 89.9 | 357.1 | 4722.39 | 8100.39 | 5078.07 N | 38.32 W |
| 12880 | 89.9 | 357.1 | 4722.48 | 8100.48 | 5128.01 N | 40.85 W |

| Northing | Easting | V Sec | D Leg |
|---|---|---|---|
| 440647 N | 680310 E | 0 | 0 |
| 440647.8 N | 680309 E | 0.77 | 0.34 |
| 440649.1 N | 680307.3 E | 2.13 | 0.01 |
| 440650.6 N | 680304.5 E | 3.59 | 0.29 |
| 440651.4 N | 680302.9 E | 4.42 | 0.49 |
| 440651.9 N | 680302.2 E | 4.94 | 0.48 |
| 440652 N | 680302.4 E | 5.02 | 0.08 |
| 440652.7 N | 680303.1 E | 5.66 | 0.22 |
| 440653.8 N | 680305.8 E | 6.77 | 0.44 |
| 440655.1 N | 680310.8 E | 8.12 | 0.26 |
| 440656.8 N | 680317.7 E | 9.78 | 0.37 |
| 440659.3 N | 680326 E | 12.23 | 0.2 |
| 440661.9 N | 680333.2 E | 14.84 | 0.42 |
| 440663.9 N | 680337.1 E | 16.85 | 0.64 |
| 440666.3 N | 680339.3 E | 19.32 | 0.22 |
| 440671 N | 680342.1 E | 23.95 | 0.51 |
| 440678.4 N | 680345.1 E | 31.34 | 0.36 |
| 440688.6 N | 680347 E | 41.52 | 0.62 |
| 440699.8 N | 680347.7 E | 52.77 | 0.22 |
| 440709.5 N | 680347.8 E | 62.42 | 0.35 |
| 440714.1 N | 680347.8 E | 67.08 | 0.72 |
| 440719.5 N | 680347.9 E | 72.46 | 0.2 |
| 440724.3 N | 680347.2 E | 77.21 | 0.21 |
| 440728 N | 680346 E | 81.01 | 0.12 |
| 440730.7 N | 680344.5 E | 83.68 | 0.26 |
| 440733.2 N | 680342.6 E | 86.19 | 0.19 |
| 440735.8 N | 680340.6 E | 88.82 | 0.14 |
| 440738.1 N | 680338.6 E | 91.03 | 0.02 |
| 440740.4 N | 680336.5 E | 93.4 | 0.05 |
| 440742.9 N | 680333.8 E | 95.92 | 0.13 |
| 440745.4 N | 680330.9 E | 98.4 | 0.05 |
| 440747.8 N | 680328.1 E | 100.75 | 0.02 |
| 440750.1 N | 680325.8 E | 103.09 | 0.17 |
| 440752.6 N | 680323.9 E | 105.58 | 0.06 |
| 440755.2 N | 680321.5 E | 108.2 | 0.07 |
| 440757.6 N | 680319 E | 110.62 | 0.07 |
| 440759.1 N | 680316.7 E | 112.13 | 0.23 |
| 440760.4 N | 680315.1 E | 113.39 | 0.22 |
| 440761.9 N | 680314.4 E | 114.86 | 0.13 |
| 440762.5 N | 680313.5 E | 115.46 | 0.27 |
| 440761.9 N | 680312.4 E | 114.92 | 0.16 |
| 440761.5 N | 680312.3 E | 114.52 | 0.76 |
| 440762.1 N | 680312.2 E | 115.06 | 3.04 |
| 440764.1 N | 680312.4 E | 117.1 | 13.98 |
| 440768.3 N | 680313 E | 121.34 | 13.28 |
| 440774.7 N | 680313.6 E | 127.71 | 9.94 |

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|---|---|---|---|
| 440782.8 N | 680314.1 E | 135.84 | 10.31 |
| 440792.7 N | 680314.5 E | 145.67 | 9.63 |
| 440803.6 N | 680314.4 E | 156.62 | 9.49 |
| 440816.2 N | 680313.6 E | 169.2 | 7.89 |
| 440830.1 N | 680312.4 E | 183.05 | 8.45 |
| 440845.3 N | 680311.2 E | 198.29 | 9.07 |
| 440861.6 N | 680309.7 E | 214.59 | 11.99 |
| 440880 N | 680308.1 E | 233 | 10.01 |
| 440899.7 N | 680306.4 E | 252.74 | 8.47 |
| 440920.8 N | 680304.8 E | 273.78 | 10.41 |
| 440942.3 N | 680303.6 E | 295.35 | 9.13 |
| 440965.7 N | 680302.8 E | 318.67 | 8.33 |
| 440990 N | 680302.4 E | 343.05 | 10.1 |
| 441014.8 N | 680302.3 E | 367.77 | 11.02 |
| 441041.3 N | 680302.3 E | 394.26 | 8.14 |
| 441068.8 N | 680302.4 E | 421.86 | 15 |
| 441097.7 N | 680302.6 E | 450.66 | 13.75 |
| 441127.4 N | 680302.6 E | 480.38 | 11.91 |
| 441157 N | 680302.3 E | 510.04 | 19.19 |
| 441181.5 N | 680301.9 E | 534.52 | 18.82 |
| 441219.3 N | 680301.2 E | 572.28 | 15.79 |
| 441315.2 N | 680299.1 E | 668.21 | 3.97 |
| 441410.2 N | 680297.2 E | 763.19 | 0.54 |
| 441505.2 N | 680295.5 E | 858.17 | 0.47 |
| 441600.1 N | 680293.3 E | 953.13 | 0.54 |
| 441696 N | 680289.3 E | 1049.03 | 1.68 |
| 441790.9 N | 680285 E | 1143.92 | 1.73 |
| 441885.9 N | 680282.5 E | 1238.89 | 1.16 |
| 441980.8 N | 680281.1 E | 1333.87 | 1.1 |
| 442075.8 N | 680282.1 E | 1428.85 | 2.89 |
| 442171.8 N | 680285.7 E | 1524.78 | 0.23 |
| 442266.7 N | 680289 E | 1619.72 | 0.53 |
| 442361.6 N | 680292.1 E | 1714.66 | 0.38 |
| 442456.6 N | 680295.7 E | 1809.59 | 0.45 |
| 442552.5 N | 680298.6 E | 1905.54 | 1.15 |
| 442646.5 N | 680299.4 E | 1999.54 | 1.67 |
| 442742.5 N | 680298.3 E | 2095.52 | 1.07 |
| 442837.5 N | 680297.7 E | 2190.51 | 1.81 |
| 442932.5 N | 680297.6 E | 2285.51 | 0.97 |
| 443028.5 N | 680296.8 E | 2381.51 | 0.86 |
| 443123.5 N | 680295.4 E | 2476.5 | 0.53 |
| 443218.5 N | 680293.7 E | 2571.48 | 0.87 |
| 443313.5 N | 680293.7 E | 2666.47 | 1.94 |
| 443408.4 N | 680295.9 E | 2761.43 | 1.66 |
| 443504.4 N | 680298.1 E | 2857.41 | 1.05 |
| 443599.4 N | 680299.8 E | 2952.39 | 0.42 |
| 443694.4 N | 680302.1 E | 3047.36 | 0.43 |

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|---|---|---|---|
| 443790.3 N | 680304.6 E | 3143.32 | 0.56 |
| 443885.3 N | 680305.4 E | 3238.29 | 3.16 |
| 443980.2 N | 680304.8 E | 3333.22 | 0.11 |
| 444075.1 N | 680304.2 E | 3428.14 | 0.15 |
| 444170 N | 680303 E | 3523.02 | 1.43 |
| 444264.9 N | 680301.3 E | 3617.92 | 1.69 |
| 444359.9 N | 680299.9 E | 3712.88 | 0.9 |
| 444455.9 N | 680299.5 E | 3808.88 | 1.48 |
| 444550.9 N | 680299.6 E | 3903.87 | 0.38 |
| 444645.8 N | 680298.4 E | 3998.85 | 1.74 |
| 444740.8 N | 680296.2 E | 4093.83 | 1.94 |
| 444835.8 N | 680293.9 E | 4188.78 | 1.05 |
| 444931.7 N | 680291 E | 4284.71 | 0.23 |
| 445026.6 N | 680288.2 E | 4379.64 | 0.38 |
| 445121.6 N | 680285 E | 4474.57 | 0.82 |
| 445216.5 N | 680280.9 E | 4569.48 | 1.9 |
| 445312.3 N | 680276.5 E | 4665.34 | 1.72 |
| 445407.2 N | 680274.2 E | 4760.25 | 2.31 |
| 445502.2 N | 680274.6 E | 4855.23 | 1.73 |
| 445597.2 N | 680275.3 E | 4950.2 | 1.9 |
| 445692.1 N | 680273.2 E | 5045.15 | 3.14 |
| 445725.1 N | 680271.7 E | 5078.11 | 1.77 |
| 445775 N | 680269.2 E | 5128.05 | 0 |