



Titan Directional Drilling, LLC

Survey Report

| | | | |
|------------------|-------------------------|-------------------------------------|---|
| Company: | Carrizo Oil & Gas, Inc. | Local Co-ordinate Reference: | Well 14-20-9-58 - Slot 14 |
| Project: | Niobrara CON'83 | TVD Reference: | WELL @ 4889.00usft (Original Well Elev) |
| Site: | Bringelson 20-9-58 Pad | MD Reference: | WELL @ 4889.00usft (Original Well Elev) |
| Well: | 14-20-9-58 | North Reference: | Grid |
| Wellbore: | 14-20-9-58 OH | Survey Calculation Method: | Minimum Curvature |
| Design: | 14-20-9-58 OH | Database: | EDM 5000.1 Single User Db |

| | | | |
|--------------------|----------------------------------|----------------------|-----------------------------|
| Project | Niobrara CON'83, Weld County, CO | | |
| Map System: | US State Plane 1983 | System Datum: | Mean Sea Level |
| Geo Datum: | North American Datum 1983 | | |
| Map Zone: | Colorado Northern Zone | | Using geodetic scale factor |

| | | | |
|------------------------------|--|--------------------------|-------------------|
| Site | Bringelson 20-9-58 Pad, Centered on 17-20-9-58 | | |
| Site Position: | | Northing: | 1,515,768.94 usft |
| From: | Map | Easting: | 3,444,594.58 usft |
| Position Uncertainty: | 0.00 usft | Slot Radius: | 13.20 in |
| | | Latitude: | 40° 44' 17.28 N |
| | | Longitude: | 103° 53' 44.09 W |
| | | Grid Convergence: | 1.04 ° |

| | | | |
|-----------------------------|----------------------|-----------|----------------------------|
| Well | 14-20-9-58 - Slot 14 | | |
| Well Position | +N/-S | 0.00 usft | Northing: |
| | +E/-W | 0.00 usft | Easting: |
| Position Uncertainty | 0.00 usft | | Wellhead Elevation: |
| | | | Latitude: |
| | | | Longitude: |
| | | | Ground Level: |

| | | | |
|------------------|-------------------|--------------------|-----------------------|
| Wellbore | 14-20-9-58 OH | | |
| Magnetics | Model Name | Sample Date | Declination |
| | | | (°) |
| | IGRF2015 | 03/04/15 | 8.01 |
| | | | Dip Angle |
| | | | (°) |
| | | | 67.32 |
| | | | Field Strength |
| | | | (nT) |
| | | | 52,918 |

| | | | |
|--------------------------|-------------------------|----------------------|------------------|
| Design | 14-20-9-58 OH | | |
| Audit Notes: | | | |
| Version: | 1.0 | Phase: | ACTUAL |
| | | Tie On Depth: | 0.00 |
| Vertical Section: | Depth From (TVD) | +N/-S | +E/-W |
| | (usft) | (usft) | (usft) |
| | 0.00 | 0.00 | 0.00 |
| | | | Direction |
| | | | (°) |
| | | | 91.72 |

| | | | | |
|-----------------------|-------------|---------------------------|------------------|--------------------|
| Survey Program | Date | 03/12/15 | | |
| From | To | Survey (Wellbore) | Tool Name | Description |
| (usft) | (usft) | | | |
| 141.00 | 10,533.00 | Survey #1 (14-20-9-58 OH) | MWD | MWD - Standard |
| 10,600.00 | 10,600.00 | Survey #2 (14-20-9-58 OH) | ZERO-ERROR | Zero Error |

| | | | | | | | | | |
|-----------------|--------------------|----------------|-----------------|---------------|---------------|-----------------|--------------------|--------------------|--------------------|
| Survey | | | | | | | | | |
| Measured | Inclination | Azimuth | Vertical | +N/-S | +E/-W | Vertical | Dogleg | Build | Turn |
| Depth | (°) | (°) | Depth | (usft) | (usft) | Section | Rate | Rate | Rate |
| (usft) | | | (usft) | | | (usft) | (°/100usft) | (°/100usft) | (°/100usft) |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 141.00 | 0.40 | 22.40 | 141.00 | 0.46 | 0.19 | 0.17 | 0.28 | 0.28 | 0.00 |
| 231.00 | 0.30 | 34.30 | 231.00 | 0.94 | 0.44 | 0.41 | 0.14 | -0.11 | 13.22 |
| 322.00 | 2.10 | 335.30 | 321.97 | 2.65 | -0.12 | -0.20 | 2.16 | 1.98 | -64.84 |
| 413.00 | 4.70 | 322.20 | 412.81 | 7.11 | -3.10 | -3.32 | 2.96 | 2.86 | -14.40 |
| 503.00 | 6.70 | 306.70 | 502.36 | 13.17 | -9.58 | -9.97 | 2.79 | 2.22 | -17.22 |
| 594.00 | 7.00 | 306.40 | 592.71 | 19.63 | -18.29 | -18.88 | 0.33 | 0.33 | -0.33 |
| 685.00 | 7.60 | 308.30 | 682.98 | 26.65 | -27.48 | -28.27 | 0.71 | 0.66 | 2.09 |
| 776.00 | 6.70 | 308.30 | 773.27 | 33.67 | -36.37 | -37.36 | 0.99 | -0.99 | 0.00 |
| 868.00 | 8.30 | 309.30 | 864.48 | 41.20 | -45.72 | -46.94 | 1.74 | 1.74 | 1.09 |

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| Site: | Bringelson 20-9-58 Pad | MD Reference: | WELL @ 4889.00usft (Original Well Elev) |
| Well: | 14-20-9-58 | North Reference: | Grid |
| Wellbore: | 14-20-9-58 OH | Survey Calculation Method: | Minimum Curvature |
| Design: | 14-20-9-58 OH | Database: | EDM 5000.1 Single User Db |

| Survey | | | | | | | | | |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |
| 960.00 | 8.40 | 310.20 | 955.50 | 49.74 | -55.99 | -57.46 | 0.18 | 0.11 | 0.98 |
| 1,051.00 | 7.90 | 308.60 | 1,045.58 | 57.94 | -65.96 | -67.66 | 0.60 | -0.55 | -1.76 |
| 1,143.00 | 7.60 | 308.00 | 1,136.74 | 65.63 | -75.69 | -77.63 | 0.34 | -0.33 | -0.65 |
| 1,235.00 | 7.60 | 307.50 | 1,227.93 | 73.08 | -85.31 | -87.47 | 0.07 | 0.00 | -0.54 |
| 1,326.00 | 7.80 | 307.40 | 1,318.11 | 80.49 | -94.99 | -97.36 | 0.22 | 0.22 | -0.11 |
| 1,400.00 | 7.80 | 308.50 | 1,391.43 | 86.67 | -102.91 | -105.47 | 0.20 | 0.00 | 1.49 |
| 1,435.00 | 7.65 | 309.21 | 1,426.11 | 89.62 | -106.57 | -109.22 | 0.50 | -0.42 | 2.01 |
| 9 5/8" | | | | | | | | | |
| 1,496.00 | 7.40 | 310.50 | 1,486.59 | 94.74 | -112.71 | -115.50 | 0.50 | -0.41 | 2.12 |
| 1,582.00 | 7.50 | 308.80 | 1,571.86 | 101.85 | -121.29 | -124.30 | 0.28 | 0.12 | -1.98 |
| 1,667.00 | 7.40 | 306.10 | 1,656.14 | 108.55 | -130.04 | -133.24 | 0.43 | -0.12 | -3.18 |
| 1,752.00 | 6.60 | 298.60 | 1,740.51 | 114.11 | -138.75 | -142.12 | 1.43 | -0.94 | -8.82 |
| 1,837.00 | 5.90 | 293.90 | 1,825.01 | 118.22 | -147.04 | -150.52 | 1.02 | -0.82 | -5.53 |
| 1,922.00 | 6.00 | 314.10 | 1,909.56 | 123.08 | -154.22 | -157.85 | 2.45 | 0.12 | 23.76 |
| 2,007.00 | 6.00 | 309.10 | 1,994.09 | 128.98 | -160.86 | -164.66 | 0.61 | 0.00 | -5.88 |
| 2,092.00 | 7.30 | 324.30 | 2,078.52 | 136.17 | -167.46 | -171.47 | 2.56 | 1.53 | 17.88 |
| 2,177.00 | 7.40 | 325.00 | 2,162.83 | 145.04 | -173.75 | -178.02 | 0.16 | 0.12 | 0.82 |
| 2,263.00 | 7.40 | 322.20 | 2,248.11 | 153.95 | -180.32 | -184.86 | 0.42 | 0.00 | -3.26 |
| 2,348.00 | 6.80 | 321.20 | 2,332.46 | 162.19 | -186.83 | -191.61 | 0.72 | -0.71 | -1.18 |
| 2,432.00 | 8.10 | 313.20 | 2,415.75 | 170.12 | -194.26 | -199.28 | 1.98 | 1.55 | -9.52 |
| 2,517.00 | 8.10 | 313.00 | 2,499.90 | 178.31 | -203.00 | -208.26 | 0.03 | 0.00 | -0.24 |
| 2,601.00 | 8.50 | 312.10 | 2,583.02 | 186.50 | -211.94 | -217.44 | 0.50 | 0.48 | -1.07 |
| 2,685.00 | 8.40 | 301.20 | 2,666.11 | 193.84 | -221.79 | -227.51 | 1.91 | -0.12 | -12.98 |
| 2,770.00 | 8.60 | 297.40 | 2,750.18 | 199.99 | -232.75 | -238.64 | 0.70 | 0.24 | -4.47 |
| 2,855.00 | 8.90 | 296.70 | 2,834.19 | 205.86 | -244.26 | -250.33 | 0.37 | 0.35 | -0.82 |
| 2,940.00 | 7.20 | 306.80 | 2,918.36 | 212.01 | -254.40 | -260.65 | 2.59 | -2.00 | 11.88 |
| 3,024.00 | 6.20 | 300.30 | 3,001.78 | 217.45 | -262.53 | -268.94 | 1.49 | -1.19 | -7.74 |
| 3,107.00 | 5.50 | 290.10 | 3,084.35 | 221.08 | -270.14 | -276.65 | 1.51 | -0.84 | -12.29 |
| 3,191.00 | 6.50 | 296.60 | 3,167.89 | 224.59 | -278.17 | -284.79 | 1.44 | 1.19 | 7.74 |
| 3,276.00 | 7.10 | 310.60 | 3,252.30 | 230.17 | -286.46 | -293.24 | 2.07 | 0.71 | 16.47 |
| 3,361.00 | 7.60 | 312.70 | 3,336.60 | 237.40 | -294.58 | -301.58 | 0.67 | 0.59 | 2.47 |
| 3,446.00 | 8.50 | 313.70 | 3,420.76 | 245.55 | -303.26 | -310.49 | 1.07 | 1.06 | 1.18 |
| 3,530.00 | 7.80 | 315.60 | 3,503.91 | 253.91 | -311.73 | -319.21 | 0.89 | -0.83 | 2.26 |
| 3,615.00 | 8.60 | 316.20 | 3,588.04 | 262.62 | -320.17 | -327.90 | 0.95 | 0.94 | 0.71 |
| 3,698.00 | 8.00 | 309.10 | 3,670.18 | 270.74 | -328.94 | -336.92 | 1.43 | -0.72 | -8.55 |
| 3,783.00 | 6.90 | 301.20 | 3,754.46 | 277.12 | -337.90 | -346.07 | 1.77 | -1.29 | -9.29 |
| 3,868.00 | 6.60 | 298.20 | 3,838.87 | 282.07 | -346.57 | -354.88 | 0.54 | -0.35 | -3.53 |
| 3,953.00 | 6.00 | 298.90 | 3,923.36 | 286.52 | -354.77 | -363.21 | 0.71 | -0.71 | 0.82 |
| 4,038.00 | 7.30 | 305.10 | 4,007.78 | 291.78 | -363.08 | -371.67 | 1.75 | 1.53 | 7.29 |
| 4,123.00 | 6.90 | 307.30 | 4,092.13 | 297.98 | -371.56 | -380.33 | 0.57 | -0.47 | 2.59 |
| 4,208.00 | 6.60 | 303.00 | 4,176.54 | 303.73 | -379.71 | -388.66 | 0.69 | -0.35 | -5.06 |
| 4,293.00 | 6.10 | 303.30 | 4,261.02 | 308.87 | -387.59 | -396.68 | 0.59 | -0.59 | 0.35 |
| 4,377.00 | 5.70 | 299.50 | 4,344.58 | 313.38 | -394.95 | -404.18 | 0.67 | -0.48 | -4.52 |

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| Survey | | | | | | | | | |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |
| 4,462.00 | 7.70 | 306.70 | 4,428.99 | 318.86 | -403.19 | -412.58 | 2.55 | 2.35 | 8.47 |
| 4,548.00 | 7.20 | 304.10 | 4,514.27 | 325.32 | -412.27 | -421.85 | 0.70 | -0.58 | -3.02 |
| 4,632.00 | 6.50 | 300.50 | 4,597.67 | 330.69 | -420.73 | -430.46 | 0.98 | -0.83 | -4.29 |
| 4,717.00 | 6.90 | 308.00 | 4,682.09 | 336.27 | -428.89 | -438.79 | 1.13 | 0.47 | 8.82 |
| 4,802.00 | 5.80 | 308.10 | 4,766.57 | 342.07 | -436.30 | -446.37 | 1.29 | -1.29 | 0.12 |
| 4,887.00 | 7.90 | 317.90 | 4,850.96 | 349.05 | -443.60 | -453.87 | 2.82 | 2.47 | 11.53 |
| 4,971.00 | 7.20 | 319.70 | 4,934.23 | 357.35 | -450.87 | -461.39 | 0.88 | -0.83 | 2.14 |
| 5,056.00 | 6.70 | 321.10 | 5,018.60 | 365.27 | -457.43 | -468.19 | 0.62 | -0.59 | 1.65 |
| 5,140.00 | 5.70 | 317.90 | 5,102.11 | 372.18 | -463.30 | -474.27 | 1.26 | -1.19 | -3.81 |
| 5,183.00 | 5.20 | 317.80 | 5,144.92 | 375.21 | -466.04 | -477.10 | 1.16 | -1.16 | -0.23 |
| 5,220.00 | 4.80 | 315.80 | 5,181.78 | 377.56 | -468.25 | -479.37 | 1.18 | -1.08 | -5.41 |
| 5,263.00 | 4.30 | 328.10 | 5,224.64 | 380.22 | -470.36 | -481.56 | 2.54 | -1.16 | 28.60 |
| 5,305.00 | 6.50 | 5.20 | 5,266.47 | 383.92 | -470.97 | -482.28 | 9.56 | 5.24 | 88.33 |
| 5,347.00 | 10.60 | 16.30 | 5,307.99 | 390.00 | -469.67 | -481.17 | 10.48 | 9.76 | 26.43 |
| 5,389.00 | 13.60 | 24.00 | 5,349.06 | 398.22 | -466.58 | -478.32 | 8.10 | 7.14 | 18.33 |
| 5,432.00 | 16.10 | 37.20 | 5,390.63 | 407.59 | -460.91 | -472.94 | 9.75 | 5.81 | 30.70 |
| 5,474.00 | 18.70 | 47.20 | 5,430.71 | 416.81 | -452.45 | -464.76 | 9.41 | 6.19 | 23.81 |
| 5,517.00 | 20.20 | 55.80 | 5,471.27 | 425.67 | -441.25 | -453.83 | 7.51 | 3.49 | 20.00 |
| 5,559.00 | 20.00 | 63.90 | 5,510.72 | 432.91 | -428.80 | -441.60 | 6.64 | -0.48 | 19.29 |
| 5,602.00 | 22.30 | 69.50 | 5,550.82 | 439.00 | -414.55 | -427.54 | 7.11 | 5.35 | 13.02 |
| 5,644.00 | 26.90 | 70.80 | 5,589.00 | 444.92 | -398.11 | -411.28 | 11.03 | 10.95 | 3.10 |
| 5,687.00 | 32.10 | 72.50 | 5,626.41 | 451.56 | -378.01 | -391.39 | 12.25 | 12.09 | 3.95 |
| 5,729.00 | 37.20 | 73.80 | 5,660.95 | 458.46 | -355.16 | -368.76 | 12.27 | 12.14 | 3.10 |
| 5,772.00 | 40.30 | 76.20 | 5,694.49 | 465.41 | -329.16 | -342.98 | 8.01 | 7.21 | 5.58 |
| 5,814.00 | 43.40 | 80.40 | 5,725.77 | 471.06 | -301.73 | -315.74 | 9.95 | 7.38 | 10.00 |
| 5,857.00 | 48.50 | 82.90 | 5,755.66 | 475.51 | -271.17 | -285.32 | 12.57 | 11.86 | 5.81 |
| 5,899.00 | 54.75 | 83.39 | 5,781.72 | 479.44 | -238.49 | -252.77 | 14.91 | 14.88 | 1.17 |
| 300' entry | | | | | | | | | |
| 5,900.00 | 54.90 | 83.40 | 5,782.30 | 479.53 | -237.68 | -251.96 | 14.91 | 14.89 | 1.07 |
| 5,942.00 | 58.90 | 84.80 | 5,805.23 | 483.14 | -202.69 | -217.10 | 9.92 | 9.52 | 3.33 |
| 5,984.00 | 61.50 | 85.20 | 5,826.10 | 486.31 | -166.38 | -180.91 | 6.25 | 6.19 | 0.95 |
| 6,027.00 | 64.90 | 85.00 | 5,845.49 | 489.59 | -128.15 | -142.79 | 7.92 | 7.91 | -0.47 |
| 6,068.00 | 69.90 | 84.50 | 5,861.24 | 493.05 | -90.47 | -105.23 | 12.25 | 12.20 | -1.22 |
| 6,108.00 | 73.26 | 85.04 | 5,873.88 | 496.51 | -52.68 | -67.56 | 8.50 | 8.40 | 1.35 |
| 7" | | | | | | | | | |
| 6,143.00 | 76.20 | 85.50 | 5,883.09 | 499.29 | -19.04 | -34.01 | 8.50 | 8.40 | 1.31 |
| 6,189.00 | 79.50 | 88.50 | 5,892.78 | 501.64 | 25.86 | 10.79 | 9.60 | 7.17 | 6.52 |
| 6,235.00 | 83.40 | 90.60 | 5,899.62 | 501.99 | 71.34 | 56.24 | 9.60 | 8.48 | 4.57 |
| 6,281.00 | 90.60 | 92.80 | 5,902.02 | 500.63 | 117.22 | 102.14 | 16.36 | 15.65 | 4.78 |
| 6,372.00 | 90.70 | 91.20 | 5,900.99 | 497.45 | 208.16 | 193.13 | 1.76 | 0.11 | -1.76 |
| 6,464.00 | 91.50 | 91.20 | 5,899.22 | 495.53 | 300.12 | 285.11 | 0.87 | 0.87 | 0.00 |
| 6,556.00 | 90.50 | 90.30 | 5,897.62 | 494.32 | 392.09 | 377.08 | 1.46 | -1.09 | -0.98 |
| 6,648.00 | 88.30 | 90.50 | 5,898.58 | 493.68 | 484.08 | 469.05 | 2.40 | -2.39 | 0.22 |
| 6,739.00 | 87.80 | 89.90 | 5,901.68 | 493.36 | 575.03 | 559.96 | 0.86 | -0.55 | -0.66 |

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| Design: | 14-20-9-58 OH | Database: | EDM 5000.1 Single User Db |

| Survey | | | | | | | | | | |
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| 6,829.00 | 89.70 | 91.70 | 5,903.64 | 492.10 | 664.99 | 649.92 | 2.91 | 2.11 | 2.00 | |
| 6,920.00 | 90.10 | 91.90 | 5,903.80 | 489.25 | 755.94 | 740.92 | 0.49 | 0.44 | 0.22 | |
| 7,005.00 | 90.10 | 91.50 | 5,903.65 | 486.72 | 840.91 | 825.92 | 0.47 | 0.00 | -0.47 | |
| 7,090.00 | 89.90 | 91.20 | 5,903.65 | 484.72 | 925.88 | 910.92 | 0.42 | -0.24 | -0.35 | |
| 7,173.00 | 89.90 | 90.50 | 5,903.80 | 483.49 | 1,008.87 | 993.91 | 0.84 | 0.00 | -0.84 | |
| 7,258.00 | 89.80 | 90.50 | 5,904.02 | 482.75 | 1,093.87 | 1,078.89 | 0.12 | -0.12 | 0.00 | |
| 7,343.00 | 89.60 | 89.80 | 5,904.46 | 482.53 | 1,178.87 | 1,163.85 | 0.86 | -0.24 | -0.82 | |
| 7,428.00 | 88.60 | 91.50 | 5,905.80 | 481.56 | 1,263.85 | 1,248.82 | 2.32 | -1.18 | 2.00 | |
| 7,513.00 | 89.50 | 92.40 | 5,907.21 | 478.67 | 1,348.79 | 1,333.81 | 1.50 | 1.06 | 1.06 | |
| 7,598.00 | 89.70 | 92.60 | 5,907.80 | 474.96 | 1,433.70 | 1,418.80 | 0.33 | 0.24 | 0.24 | |
| 7,682.00 | 89.70 | 92.00 | 5,908.24 | 471.59 | 1,517.63 | 1,502.79 | 0.71 | 0.00 | -0.71 | |
| 7,767.00 | 90.00 | 91.70 | 5,908.46 | 468.85 | 1,602.59 | 1,587.79 | 0.50 | 0.35 | -0.35 | |
| 7,851.00 | 90.50 | 91.70 | 5,908.10 | 466.36 | 1,686.55 | 1,671.79 | 0.60 | 0.60 | 0.00 | |
| 7,935.00 | 90.50 | 91.50 | 5,907.36 | 464.01 | 1,770.51 | 1,755.79 | 0.24 | 0.00 | -0.24 | |
| 8,020.00 | 89.00 | 91.50 | 5,907.74 | 461.79 | 1,855.48 | 1,840.79 | 1.76 | -1.76 | 0.00 | |
| 8,105.00 | 89.30 | 91.30 | 5,909.00 | 459.71 | 1,940.45 | 1,925.77 | 0.42 | 0.35 | -0.24 | |
| 8,189.00 | 89.60 | 91.30 | 5,909.80 | 457.80 | 2,024.42 | 2,009.77 | 0.36 | 0.36 | 0.00 | |
| 8,274.00 | 89.70 | 91.00 | 5,910.32 | 456.10 | 2,109.40 | 2,094.76 | 0.37 | 0.12 | -0.35 | |
| 8,359.00 | 90.10 | 90.50 | 5,910.47 | 454.99 | 2,194.39 | 2,179.75 | 0.75 | 0.47 | -0.59 | |
| 8,443.00 | 90.40 | 90.80 | 5,910.10 | 454.03 | 2,278.39 | 2,263.73 | 0.51 | 0.36 | 0.36 | |
| 8,528.00 | 91.30 | 92.20 | 5,908.84 | 451.81 | 2,363.35 | 2,348.72 | 1.96 | 1.06 | 1.65 | |
| 8,612.00 | 91.00 | 91.70 | 5,907.16 | 448.95 | 2,447.28 | 2,432.70 | 0.69 | -0.36 | -0.60 | |
| 8,697.00 | 91.60 | 92.40 | 5,905.23 | 445.91 | 2,532.20 | 2,517.68 | 1.08 | 0.71 | 0.82 | |
| 8,782.00 | 91.70 | 92.00 | 5,902.78 | 442.65 | 2,617.11 | 2,602.64 | 0.48 | 0.12 | -0.47 | |
| 8,867.00 | 91.20 | 92.40 | 5,900.63 | 439.39 | 2,702.02 | 2,687.61 | 0.75 | -0.59 | 0.47 | |
| 8,952.00 | 90.90 | 92.40 | 5,899.07 | 435.83 | 2,786.93 | 2,772.59 | 0.35 | -0.35 | 0.00 | |
| 9,037.00 | 90.40 | 92.40 | 5,898.11 | 432.27 | 2,871.85 | 2,857.58 | 0.59 | -0.59 | 0.00 | |
| 9,122.00 | 90.80 | 92.90 | 5,897.22 | 428.34 | 2,956.75 | 2,942.56 | 0.75 | 0.47 | 0.59 | |
| 9,206.00 | 91.30 | 93.30 | 5,895.68 | 423.80 | 3,040.61 | 3,026.52 | 0.76 | 0.60 | 0.48 | |
| 9,291.00 | 91.50 | 93.50 | 5,893.60 | 418.76 | 3,125.44 | 3,111.46 | 0.33 | 0.24 | 0.24 | |
| 9,376.00 | 90.60 | 91.90 | 5,892.04 | 414.75 | 3,210.33 | 3,196.43 | 2.16 | -1.06 | -1.88 | |
| 9,461.00 | 90.70 | 91.70 | 5,891.08 | 412.09 | 3,295.28 | 3,281.42 | 0.26 | 0.12 | -0.24 | |
| 9,546.00 | 90.90 | 91.70 | 5,889.89 | 409.56 | 3,380.23 | 3,366.42 | 0.24 | 0.24 | 0.00 | |
| 9,631.00 | 91.30 | 91.30 | 5,888.26 | 407.34 | 3,465.19 | 3,451.40 | 0.67 | 0.47 | -0.47 | |
| 9,716.00 | 90.00 | 90.80 | 5,887.30 | 405.78 | 3,550.17 | 3,536.39 | 1.64 | -1.53 | -0.59 | |
| 9,801.00 | 90.00 | 90.50 | 5,887.30 | 404.82 | 3,635.16 | 3,621.37 | 0.35 | 0.00 | -0.35 | |
| 9,885.00 | 90.20 | 90.60 | 5,887.15 | 404.01 | 3,719.16 | 3,705.35 | 0.27 | 0.24 | 0.12 | |
| 9,969.00 | 91.50 | 91.50 | 5,885.90 | 402.47 | 3,803.13 | 3,789.34 | 1.88 | 1.55 | 1.07 | |
| 10,054.00 | 91.70 | 91.00 | 5,883.53 | 400.62 | 3,888.08 | 3,874.30 | 0.63 | 0.24 | -0.59 | |
| 10,139.00 | 88.80 | 91.00 | 5,883.16 | 399.14 | 3,973.05 | 3,959.28 | 3.41 | -3.41 | 0.00 | |
| 10,224.00 | 89.50 | 90.60 | 5,884.42 | 397.95 | 4,058.03 | 4,044.26 | 0.95 | 0.82 | -0.47 | |
| 10,309.00 | 90.60 | 91.50 | 5,884.35 | 396.39 | 4,143.02 | 4,129.25 | 1.67 | 1.29 | 1.06 | |
| 10,394.00 | 90.40 | 91.00 | 5,883.60 | 394.54 | 4,227.99 | 4,214.25 | 0.63 | -0.24 | -0.59 | |

Titan Directional Drilling, LLC

Survey Report

| | | | |
|------------------|-------------------------|-------------------------------------|---|
| Company: | Carrizo Oil & Gas, Inc. | Local Co-ordinate Reference: | Well 14-20-9-58 - Slot 14 |
| Project: | Niobrara CON'83 | TVD Reference: | WELL @ 4889.00usft (Original Well Elev) |
| Site: | Bringelson 20-9-58 Pad | MD Reference: | WELL @ 4889.00usft (Original Well Elev) |
| Well: | 14-20-9-58 | North Reference: | Grid |
| Wellbore: | 14-20-9-58 OH | Survey Calculation Method: | Minimum Curvature |
| Design: | 14-20-9-58 OH | Database: | EDM 5000.1 Single User Db |

| Survey | | | | | | | | | | |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|--|
| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) | |
| 10,479.00 | 89.60 | 89.90 | 5,883.60 | 393.87 | 4,312.99 | 4,299.22 | 1.60 | -0.94 | -1.29 | |
| 10,533.00 | 89.50 | 90.30 | 5,884.03 | 393.78 | 4,366.99 | 4,353.20 | 0.76 | -0.19 | 0.74 | |
| 10,600.00 | 89.50 | 90.30 | 5,884.61 | 393.42 | 4,433.98 | 4,420.18 | 0.00 | 0.00 | 0.00 | |

| Design Targets | | | | | | | | | | |
|--|---------------|--------------|------------|--------------|--------------|-----------------|----------------|-----------------|------------------|--|
| Target Name | Dip Angle (°) | Dip Dir. (°) | TVD (usft) | +N/-S (usft) | +E/-W (usft) | Northing (usft) | Easting (usft) | Latitude | Longitude | |
| 14-20-9-58 BHL | 0.00 | 0.00 | 5,884.61 | 393.42 | 4,433.98 | 1,516,161.57 | 3,448,983.54 | 40° 44' 20.37 N | 103° 52' 46.99 W | |
| - hit/miss target | | | | | | | | | | |
| - Shape | | | | | | | | | | |
| - actual wellpath misses target center by 0.01usft at 10600.00usft MD (5884.61 TVD, 393.42 N, 4433.98 E) | | | | | | | | | | |
| - Point | | | | | | | | | | |

| Casing Points | | | | | | | | | |
|-----------------------|-----------------------|--------|--|----------------------|--------------------|--|--|--|--|
| Measured Depth (usft) | Vertical Depth (usft) | Name | | Casing Diameter (in) | Hole Diameter (in) | | | | |
| 1,435.00 | 1,426.11 | 9 5/8" | | 9.62 | 12.25 | | | | |
| 6,108.00 | 5,873.88 | 7" | | 7.00 | 8.75 | | | | |

| Design Annotations | | | | | |
|-----------------------|-----------------------|-------------------|--------------|------------|--|
| Measured Depth (usft) | Vertical Depth (usft) | Local Coordinates | | Comment | |
| | | +N/-S (usft) | +E/-W (usft) | | |
| 5,899.00 | 5,781.72 | 479.44 | -238.49 | 300' entry | |