



Job Number: SVGJ-141092
 Company: PDC
 Lease/Well: Frick 32-18
 Location: Weld County, CO
 Rig Name: MS Slickline #6000
 RKB: 0'
 G.L. or M.S.L.: GL

State/Country: Colorado/USA
 Declination: 8.33°
 Grid: East To True North
 File name: S:\2014SU~1\PDC\GJ\FRICK\3218.SVY
 Date/Time: 08-Sep-14 / 14:56
 Curve Name: Surface - 7000' M.D. (Rate Gyro)

MS SURVEY

WINSERVE SURVEY CALCULATIONS

Minimum Curvature Method

Vertical Section Plane .00

Vertical Section Referenced to Wellhead

Rectangular Coordinates Referenced to Wellhead

| Measured Depth FT | Incl Angle Deg | Drift Direction Deg | True Vertical Depth | N-S FT | E-W FT | Vertical Section FT | C L O S U R E | | Dogleg Severity Deg/100 |
|-------------------------|----------------------|---------------------------|---------------------------|-----------|-----------|---------------------------|----------------|------------------|-------------------------------|
| | | | | | | | Distance FT | Direction Deg | |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 100.00 | 1.16 | 185.63 | 99.99 | -1.01 | -.10 | -1.01 | 1.01 | 185.63 | 1.16 |
| 200.00 | .79 | 173.30 | 199.98 | -2.70 | -.12 | -2.70 | 2.70 | 182.51 | .42 |
| 300.00 | .67 | 165.88 | 299.97 | -3.95 | .10 | -3.95 | 3.95 | 178.48 | .15 |
| 400.00 | .22 | 169.09 | 399.97 | -4.71 | .28 | -4.71 | 4.72 | 176.55 | .45 |
| 500.00 | .36 | 152.01 | 499.97 | -5.17 | .47 | -5.17 | 5.19 | 174.83 | .16 |
| 600.00 | .17 | 135.82 | 599.96 | -5.56 | .72 | -5.56 | 5.60 | 172.63 | .20 |
| 700.00 | .11 | 358.18 | 699.96 | -5.57 | .82 | -5.57 | 5.63 | 171.63 | .26 |
| 800.00 | .26 | 332.90 | 799.96 | -5.27 | .71 | -5.27 | 5.32 | 172.30 | .17 |
| 900.00 | .31 | 329.26 | 899.96 | -4.83 | .47 | -4.83 | 4.86 | 174.44 | .05 |

| Measured Depth FT | Incl Angle Deg | Drift Direction Deg | True Vertical Depth | N-S FT | E-W FT | Vertical Section FT | C L O S U R E | | Dogleg Severity Deg/100 |
|-------------------------|----------------------|---------------------------|---------------------------|-----------|-----------|---------------------------|----------------|------------------|-------------------------------|
| | | | | | | | Distance FT | Direction Deg | |
| 1000.00 | .46 | 292.20 | 999.96 | -4.45 | -.04 | -4.45 | 4.45 | 180.50 | .28 |
| 1100.00 | .62 | 230.65 | 1099.96 | -4.64 | -.83 | -4.64 | 4.72 | 190.13 | .57 |
| 1200.00 | .47 | 178.93 | 1199.95 | -5.39 | -1.24 | -5.39 | 5.54 | 192.94 | .49 |
| 1300.00 | .10 | 78.97 | 1299.95 | -5.79 | -1.15 | -5.79 | 5.90 | 191.21 | .50 |
| 1400.00 | .61 | 241.44 | 1399.95 | -6.03 | -1.53 | -6.03 | 6.22 | 194.23 | .71 |
| 1500.00 | .61 | 202.36 | 1499.95 | -6.77 | -2.20 | -6.77 | 7.12 | 197.98 | .41 |
| 1600.00 | .15 | 71.37 | 1599.94 | -7.22 | -2.28 | -7.22 | 7.57 | 197.50 | .72 |
| 1700.00 | .50 | 211.58 | 1699.94 | -7.55 | -2.38 | -7.55 | 7.92 | 197.50 | .62 |
| 1800.00 | .70 | 135.03 | 1799.94 | -8.36 | -2.18 | -8.36 | 8.64 | 194.61 | .76 |
| 1900.00 | .39 | 96.49 | 1899.93 | -8.83 | -1.41 | -8.83 | 8.94 | 189.07 | .46 |
| 2000.00 | .55 | 149.46 | 1999.93 | -9.28 | -.83 | -9.28 | 9.32 | 185.09 | .44 |
| 2100.00 | 1.01 | 158.34 | 2099.92 | -10.51 | -.26 | -10.51 | 10.52 | 181.40 | .47 |
| 2200.00 | 1.45 | 145.58 | 2199.90 | -12.37 | .78 | -12.37 | 12.40 | 176.38 | .52 |
| 2300.00 | 1.76 | 142.75 | 2299.86 | -14.64 | 2.43 | -14.64 | 14.84 | 170.58 | .32 |
| 2400.00 | 1.76 | 143.54 | 2399.81 | -17.10 | 4.27 | -17.10 | 17.62 | 165.98 | .02 |
| 2500.00 | 1.92 | 135.73 | 2499.76 | -19.53 | 6.35 | -19.53 | 20.54 | 161.99 | .30 |
| 2600.00 | 2.04 | 134.99 | 2599.70 | -21.99 | 8.78 | -21.99 | 23.68 | 158.23 | .12 |
| 2700.00 | 2.09 | 130.47 | 2699.64 | -24.43 | 11.43 | -24.43 | 26.97 | 154.94 | .17 |
| 2800.00 | 2.03 | 128.22 | 2799.57 | -26.71 | 14.20 | -26.71 | 30.25 | 152.00 | .10 |
| 2900.00 | 1.88 | 130.23 | 2899.51 | -28.87 | 16.85 | -28.87 | 33.42 | 149.73 | .16 |
| 3000.00 | 1.65 | 133.64 | 2999.47 | -30.92 | 19.14 | -30.92 | 36.37 | 148.24 | .25 |
| 3100.00 | 1.10 | 149.39 | 3099.44 | -32.74 | 20.67 | -32.74 | 38.72 | 147.73 | .66 |
| 3200.00 | 1.45 | 170.95 | 3199.41 | -34.82 | 21.36 | -34.82 | 40.85 | 148.47 | .59 |
| 3300.00 | 1.80 | 168.37 | 3299.37 | -37.60 | 21.88 | -37.60 | 43.50 | 149.81 | .36 |
| 3400.00 | 1.47 | 167.88 | 3399.33 | -40.40 | 22.46 | -40.40 | 46.22 | 150.92 | .33 |
| 3500.00 | 1.30 | 194.59 | 3499.30 | -42.75 | 22.45 | -42.75 | 48.28 | 152.30 | .66 |
| 3600.00 | 1.75 | 204.09 | 3599.27 | -45.24 | 21.54 | -45.24 | 50.10 | 154.54 | .51 |
| 3700.00 | 2.00 | 196.37 | 3699.21 | -48.31 | 20.42 | -48.31 | 52.45 | 157.08 | .35 |
| 3800.00 | 2.21 | 187.97 | 3799.15 | -51.89 | 19.66 | -51.89 | 55.49 | 159.25 | .37 |

| Measured Depth FT | Incl Angle Deg | Drift Direction Deg | True Vertical Depth | N-S FT | E-W FT | Vertical Section FT | C L O S U R E | | Dogleg Severity Deg/100 |
|-------------------------|----------------------|---------------------------|---------------------------|-----------|-----------|---------------------------|----------------|------------------|-------------------------------|
| | | | | | | | Distance FT | Direction Deg | |
| 3900.00 | 1.98 | 181.16 | 3899.08 | -55.53 | 19.36 | -55.53 | 58.81 | 160.78 | .34 |
| 4000.00 | 1.64 | 185.84 | 3999.03 | -58.68 | 19.18 | -58.68 | 61.73 | 161.90 | .37 |
| 4100.00 | 2.03 | 200.36 | 4098.98 | -61.76 | 18.42 | -61.76 | 64.45 | 163.39 | .60 |
| 4200.00 | 1.90 | 193.11 | 4198.92 | -65.04 | 17.43 | -65.04 | 67.33 | 165.00 | .28 |
| 4300.00 | 2.18 | 181.16 | 4298.86 | -68.55 | 17.01 | -68.55 | 70.63 | 166.06 | .51 |
| 4400.00 | 2.27 | 177.05 | 4398.78 | -72.43 | 17.08 | -72.43 | 74.42 | 166.74 | .18 |
| 4500.00 | 2.35 | 180.32 | 4498.70 | -76.46 | 17.17 | -76.46 | 78.36 | 167.35 | .15 |
| 4600.00 | 2.48 | 183.86 | 4598.61 | -80.67 | 17.01 | -80.67 | 82.44 | 168.09 | .20 |
| 4700.00 | 2.00 | 184.69 | 4698.54 | -84.57 | 16.72 | -84.57 | 86.20 | 168.82 | .48 |
| 4800.00 | 1.45 | 163.49 | 4798.49 | -87.52 | 16.94 | -87.52 | 89.14 | 169.05 | .83 |
| 4900.00 | 1.64 | 124.00 | 4898.46 | -89.53 | 18.48 | -89.53 | 91.42 | 168.34 | 1.06 |
| 5000.00 | 1.66 | 117.02 | 4998.42 | -90.99 | 20.96 | -90.99 | 93.37 | 167.03 | .20 |
| 5100.00 | 1.39 | 121.00 | 5098.38 | -92.27 | 23.29 | -92.27 | 95.17 | 165.83 | .29 |
| 5200.00 | 1.12 | 130.33 | 5198.36 | -93.53 | 25.07 | -93.53 | 96.83 | 164.99 | .34 |
| 5300.00 | 1.07 | 144.55 | 5298.34 | -94.92 | 26.36 | -94.92 | 98.52 | 164.48 | .28 |
| 5400.00 | 1.25 | 163.18 | 5398.32 | -96.73 | 27.22 | -96.73 | 100.49 | 164.28 | .42 |
| 5500.00 | 1.37 | 174.70 | 5498.29 | -98.96 | 27.64 | -98.96 | 102.75 | 164.39 | .29 |
| 5600.00 | 1.68 | 161.44 | 5598.26 | -101.54 | 28.22 | -101.54 | 105.39 | 164.47 | .47 |
| 5700.00 | 1.61 | 171.23 | 5698.22 | -104.32 | 28.90 | -104.32 | 108.25 | 164.51 | .29 |
| 5800.00 | 1.24 | 178.26 | 5798.18 | -106.79 | 29.15 | -106.79 | 110.70 | 164.73 | .41 |
| 5900.00 | .91 | 182.25 | 5898.17 | -108.67 | 29.15 | -108.67 | 112.51 | 164.98 | .34 |
| 6000.00 | .93 | 182.80 | 5998.15 | -110.27 | 29.08 | -110.27 | 114.04 | 165.23 | .02 |
| 6100.00 | 1.08 | 179.14 | 6098.14 | -112.02 | 29.05 | -112.02 | 115.73 | 165.46 | .16 |
| 6200.00 | 1.25 | 165.76 | 6198.12 | -114.02 | 29.34 | -114.02 | 117.74 | 165.57 | .32 |
| 6300.00 | 1.17 | 170.88 | 6298.10 | -116.09 | 29.77 | -116.09 | 119.84 | 165.62 | .13 |
| 6400.00 | .94 | 172.92 | 6398.08 | -117.91 | 30.03 | -117.91 | 121.67 | 165.71 | .23 |
| 6500.00 | .90 | 149.32 | 6498.07 | -119.40 | 30.53 | -119.40 | 123.24 | 165.66 | .38 |
| 6600.00 | .77 | 151.68 | 6598.06 | -120.67 | 31.25 | -120.67 | 124.65 | 165.48 | .13 |
| 6700.00 | .84 | 160.55 | 6698.05 | -121.95 | 31.81 | -121.95 | 126.03 | 165.38 | .14 |

| Measured Depth FT | Incl Angle Deg | Drift Direction Deg | True Vertical Depth | N-S FT | E-W FT | Vertical Section FT | C L O S U R E | | Dogleg Severity Deg/100 |
|----------------------------|----------------------|---------------------------|---------------------------|-----------|-----------|---------------------------|----------------|------------------|-------------------------------|
| | | | | | | | Distance FT | Direction Deg | |
| 6800.00 | .79 | 146.12 | 6798.04 | -123.21 | 32.44 | -123.21 | 127.41 | 165.25 | .21 |
| 6900.00 | .92 | 130.07 | 6898.02 | -124.30 | 33.44 | -124.30 | 128.72 | 164.94 | .27 |
| Last Survey Depth Recorded | | | | | | | | | |
| 7000.00 | .57 | 91.32 | 6998.02 | -124.83 | 34.55 | -124.83 | 129.52 | 164.53 | .59 |