



Job Number: SVGJ-130376
 Company: PDC
 Lease/Well: Butter Ball B4-19
 Location: Weld County, CO
 Rig Name: MS Energy Wireline
 RKB: 0'
 G.L. or M.S.L.: GL

State/Country: Colorado/USA
 Declination: 8.51°
 Grid: East To True North
 File name: F:\SURVEY\2013SU~1\PDC\GJ\BUTTER~1\B419.SVY
 Date/Time: 23-Apr-13 / 14:19
 Curve Name: Surface - 7047' M.D. (Rate Gyro)

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 | .27 | 242.55 | 100.00 | -.11 | -.21 | -.11 | .24 | 242.55 | .27 |
| 200.00 | .31 | 239.42 | 200.00 | -.35 | -.65 | -.35 | .74 | 241.41 | .04 |
| 300.00 | .20 | 222.22 | 300.00 | -.62 | -1.00 | -.62 | 1.18 | 238.16 | .13 |
| 400.00 | .07 | 213.21 | 400.00 | -.80 | -1.15 | -.80 | 1.40 | 235.15 | .13 |
| 500.00 | .14 | 254.90 | 500.00 | -.89 | -1.30 | -.89 | 1.58 | 235.82 | .10 |
| 600.00 | .05 | 84.60 | 600.00 | -.91 | -1.38 | -.91 | 1.65 | 236.48 | .19 |
| 700.00 | .23 | 83.72 | 700.00 | -.89 | -1.13 | -.89 | 1.44 | 232.00 | .18 |
| 800.00 | .32 | 86.78 | 800.00 | -.85 | -.66 | -.85 | 1.07 | 217.72 | .09 |
| 900.00 | .27 | 70.69 | 899.99 | -.76 | -.16 | -.76 | .77 | 191.63 | .10 |

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|-------------------------|----------------------|---------------------------|---------------------------|-----------|-----------|---------------------------|----------------|------------------|-------------------------------|
| | | | | | | | Distance FT | Direction Deg | |
| 1000.00 | .28 | 85.26 | 999.99 | -.66 | .31 | -.66 | .73 | 154.72 | .07 |
| 1100.00 | .17 | 33.92 | 1099.99 | -.51 | .64 | -.51 | .82 | 128.92 | .22 |
| 1200.00 | .06 | 37.25 | 1199.99 | -.35 | .75 | -.35 | .83 | 114.94 | .11 |
| 1300.00 | .07 | 14.32 | 1299.99 | -.25 | .80 | -.25 | .84 | 107.29 | .03 |
| 1400.00 | .13 | 17.38 | 1399.99 | -.08 | .85 | -.08 | .85 | 95.46 | .06 |
| 1500.00 | .21 | 353.09 | 1499.99 | .21 | .86 | .21 | .88 | 76.31 | .11 |
| 1600.00 | .11 | 21.00 | 1599.99 | .48 | .87 | .48 | 1.00 | 61.10 | .12 |
| 1700.00 | .18 | 335.89 | 1699.99 | .71 | .84 | .71 | 1.10 | 49.69 | .13 |
| 1800.00 | .23 | 22.78 | 1799.99 | 1.04 | .85 | 1.04 | 1.35 | 39.36 | .17 |
| 1900.00 | .35 | 9.29 | 1899.99 | 1.53 | .98 | 1.53 | 1.82 | 32.71 | .14 |
| 2000.00 | .57 | 359.72 | 1999.99 | 2.33 | 1.03 | 2.33 | 2.54 | 23.85 | .23 |
| 2100.00 | .65 | 15.14 | 2099.98 | 3.37 | 1.17 | 3.37 | 3.57 | 19.20 | .18 |
| 2200.00 | .72 | 19.79 | 2199.97 | 4.51 | 1.54 | 4.51 | 4.77 | 18.80 | .09 |
| 2300.00 | .78 | 30.88 | 2299.96 | 5.69 | 2.10 | 5.69 | 6.06 | 20.25 | .16 |
| 2400.00 | .96 | 37.21 | 2399.95 | 6.94 | 2.95 | 6.94 | 7.54 | 23.06 | .20 |
| 2500.00 | .93 | 45.77 | 2499.94 | 8.17 | 4.04 | 8.17 | 9.12 | 26.32 | .14 |
| 2600.00 | .78 | 56.33 | 2599.93 | 9.11 | 5.19 | 9.11 | 10.49 | 29.66 | .22 |
| 2700.00 | .75 | 67.57 | 2699.92 | 9.74 | 6.36 | 9.74 | 11.63 | 33.14 | .15 |
| 2800.00 | .74 | 73.65 | 2799.91 | 10.17 | 7.59 | 10.17 | 12.69 | 36.71 | .08 |
| 2900.00 | .98 | 65.66 | 2899.90 | 10.71 | 8.98 | 10.71 | 13.98 | 40.00 | .27 |
| 3000.00 | .78 | 56.49 | 2999.89 | 11.44 | 10.33 | 11.44 | 15.41 | 42.09 | .24 |
| 3100.00 | .93 | 39.70 | 3099.88 | 12.44 | 11.42 | 12.44 | 16.88 | 42.55 | .29 |
| 3200.00 | 1.02 | 18.75 | 3199.86 | 13.90 | 12.22 | 13.90 | 18.51 | 41.32 | .37 |
| 3300.00 | .86 | 24.14 | 3299.85 | 15.43 | 12.81 | 15.43 | 20.06 | 39.71 | .18 |
| 3400.00 | 1.02 | 19.03 | 3399.84 | 16.96 | 13.41 | 16.96 | 21.62 | 38.34 | .18 |
| 3500.00 | .99 | 21.20 | 3499.82 | 18.60 | 14.01 | 18.60 | 23.29 | 36.99 | .05 |
| 3600.00 | 1.03 | 13.57 | 3599.80 | 20.28 | 14.54 | 20.28 | 24.95 | 35.63 | .14 |
| 3700.00 | 1.23 | 5.88 | 3699.79 | 22.22 | 14.86 | 22.22 | 26.73 | 33.77 | .25 |
| 3800.00 | 1.25 | 10.25 | 3799.76 | 24.37 | 15.16 | 24.37 | 28.70 | 31.89 | .10 |

| 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 | .97 | 4.87 | 3899.74 | 26.28 | 15.43 | 26.28 | 30.48 | 30.41 | .30 |
| 4000.00 | .97 | 357.44 | 3999.73 | 27.97 | 15.46 | 27.97 | 31.96 | 28.93 | .13 |
| 4100.00 | .94 | 2.68 | 4099.71 | 29.64 | 15.46 | 29.64 | 33.43 | 27.55 | .09 |
| 4200.00 | .93 | 356.71 | 4199.70 | 31.27 | 15.45 | 31.27 | 34.88 | 26.30 | .10 |
| 4300.00 | .89 | 342.94 | 4299.69 | 32.82 | 15.18 | 32.82 | 36.16 | 24.82 | .22 |
| 4400.00 | .83 | 330.56 | 4399.68 | 34.19 | 14.60 | 34.19 | 37.18 | 23.12 | .19 |
| 4500.00 | 1.00 | 325.86 | 4499.67 | 35.54 | 13.75 | 35.54 | 38.11 | 21.15 | .19 |
| 4600.00 | .72 | 315.67 | 4599.65 | 36.72 | 12.82 | 36.72 | 38.89 | 19.25 | .32 |
| 4700.00 | .59 | 290.05 | 4699.65 | 37.34 | 11.90 | 37.34 | 39.19 | 17.67 | .32 |
| 4800.00 | .47 | 297.92 | 4799.64 | 37.71 | 11.05 | 37.71 | 39.30 | 16.34 | .14 |
| 4900.00 | .66 | 344.83 | 4899.64 | 38.46 | 10.54 | 38.46 | 39.88 | 15.33 | .48 |
| 5000.00 | .85 | 2.33 | 4999.63 | 39.76 | 10.42 | 39.76 | 41.10 | 14.69 | .30 |
| 5100.00 | .88 | 11.24 | 5099.62 | 41.25 | 10.60 | 41.25 | 42.59 | 14.41 | .14 |
| 5200.00 | .57 | 29.41 | 5199.61 | 42.44 | 10.99 | 42.44 | 43.84 | 14.52 | .38 |
| 5300.00 | .67 | 54.54 | 5299.61 | 43.21 | 11.71 | 43.21 | 44.77 | 15.17 | .29 |
| 5400.00 | .62 | 89.87 | 5399.60 | 43.55 | 12.73 | 43.55 | 45.37 | 16.30 | .39 |
| 5500.00 | .98 | 106.55 | 5499.59 | 43.31 | 14.09 | 43.31 | 45.54 | 18.02 | .43 |
| 5600.00 | 1.23 | 105.13 | 5599.57 | 42.78 | 15.95 | 42.78 | 45.66 | 20.44 | .25 |
| 5700.00 | 1.35 | 104.16 | 5699.55 | 42.22 | 18.13 | 42.22 | 45.94 | 23.24 | .12 |
| 5800.00 | 1.53 | 100.85 | 5799.51 | 41.68 | 20.58 | 41.68 | 46.48 | 26.28 | .20 |
| 5900.00 | 1.32 | 108.43 | 5899.48 | 41.06 | 22.98 | 41.06 | 47.05 | 29.24 | .28 |
| 6000.00 | 1.65 | 109.84 | 5999.45 | 40.21 | 25.43 | 40.21 | 47.57 | 32.31 | .33 |
| 6100.00 | 1.78 | 89.64 | 6099.41 | 39.73 | 28.34 | 39.73 | 48.80 | 35.50 | .61 |
| 6200.00 | 1.86 | 87.17 | 6199.35 | 39.82 | 31.51 | 39.82 | 50.78 | 38.36 | .11 |
| 6300.00 | 2.21 | 81.40 | 6299.29 | 40.19 | 35.04 | 40.19 | 53.32 | 41.09 | .41 |
| 6400.00 | 2.05 | 81.88 | 6399.22 | 40.73 | 38.72 | 40.73 | 56.19 | 43.55 | .16 |
| 6500.00 | 1.82 | 93.83 | 6499.17 | 40.87 | 42.07 | 40.87 | 58.66 | 45.83 | .46 |
| 6600.00 | 1.92 | 102.81 | 6599.11 | 40.40 | 45.29 | 40.40 | 60.69 | 48.27 | .31 |
| 6700.00 | 1.40 | 136.84 | 6699.07 | 39.13 | 47.76 | 39.13 | 61.74 | 50.67 | 1.09 |

| 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 | .86 | 145.74 | 6799.05 | 37.62 | 49.02 | 37.62 | 61.79 | 52.49 | .57 |
| 6900.00 | .43 | 129.83 | 6899.05 | 36.76 | 49.73 | 36.76 | 61.84 | 53.53 | .46 |
| 7000.00 | .75 | 97.96 | 6999.04 | 36.43 | 50.66 | 36.43 | 62.40 | 54.28 | .45 |
| Last Survey Depth Recorded | | | | | | | | | |
| 7047.00 | .60 | 87.55 | 7046.04 | 36.40 | 51.21 | 36.40 | 62.83 | 54.60 | .41 |