



Job Number: SVGJ-110867

Company: Petroleum Development Corporation

Lease/Well: CBO 21-32

Location: Weld County, CO

Rig Name: MS Wireline

RKB: 0'

G.L. or M.S.L.: GL

State/Country: Colorado/USA

Declination: 8.70°

Grid: East To True

File name: F:\SURVEY\2011SU~1\PDC\CBO2132.SVY

Date/Time: 27-Sep-11 / 16:38

Curve Name: Surface - 6900' 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<br>Depth<br>FT | Incl<br>Angle<br>Deg | Drift<br>Direction<br>Deg | True<br>Vertical<br>Depth | N-S<br>FT | E-W<br>FT | Vertical<br>Section<br>FT | C L O S U R E  |                  | Dogleg<br>Severity<br>Deg/100 |
|-------------------------|----------------------|---------------------------|---------------------------|-----------|-----------|---------------------------|----------------|------------------|-------------------------------|
|                         |                      |                           |                           |           |           |                           | Distance<br>FT | Direction<br>Deg |                               |
| .00                     | .00                  | .00                       | .00                       | .00       | .00       | .00                       | .00            | .00              | .00                           |
| 100.00                  | .32                  | 226.08                    | 100.00                    | -.19      | -.20      | -.19                      | .28            | 226.08           | .32                           |
| 200.00                  | .58                  | 202.67                    | 200.00                    | -.85      | -.60      | -.85                      | 1.04           | 214.96           | .31                           |
| 300.00                  | .47                  | 193.00                    | 299.99                    | -1.72     | -.88      | -1.72                     | 1.94           | 207.20           | .14                           |
| 400.00                  | .40                  | 175.61                    | 399.99                    | -2.47     | -.95      | -2.47                     | 2.65           | 201.05           | .15                           |
| 500.00                  | .33                  | 155.49                    | 499.99                    | -3.08     | -.80      | -3.08                     | 3.18           | 194.64           | .14                           |
| 600.00                  | .54                  | 216.14                    | 599.98                    | -3.72     | -.96      | -3.72                     | 3.84           | 194.50           | .48                           |
| 700.00                  | .66                  | 230.83                    | 699.98                    | -4.47     | -1.69     | -4.47                     | 4.77           | 200.69           | .19                           |
| 800.00                  | .46                  | 262.19                    | 799.97                    | -4.88     | -2.53     | -4.88                     | 5.50           | 207.40           | .36                           |
| 900.00                  | .48                  | 201.49                    | 899.97                    | -5.33     | -3.08     | -5.33                     | 6.16           | 210.05           | .48                           |

| Measured<br>Depth<br>FT | Incl<br>Angle<br>Deg | Drift<br>Direction<br>Deg | True<br>Vertical<br>Depth | N-S<br>FT | E-W<br>FT | Vertical<br>Section<br>FT | C L O S U R E  |                  | Dogleg<br>Severity<br>Deg/100 |
|-------------------------|----------------------|---------------------------|---------------------------|-----------|-----------|---------------------------|----------------|------------------|-------------------------------|
|                         |                      |                           |                           |           |           |                           | Distance<br>FT | Direction<br>Deg |                               |
| 1000.00                 | .50                  | 251.55                    | 999.97                    | -5.86     | -3.65     | -5.86                     | 6.90           | 211.93           | .42                           |
| 1100.00                 | .53                  | 181.36                    | 1099.97                   | -6.46     | -4.07     | -6.46                     | 7.63           | 212.25           | .59                           |
| 1200.00                 | .41                  | 231.93                    | 1199.96                   | -7.14     | -4.37     | -7.14                     | 8.37           | 211.45           | .42                           |
| 1300.00                 | .41                  | 188.18                    | 1299.96                   | -7.71     | -4.70     | -7.71                     | 9.03           | 211.35           | .31                           |
| 1400.00                 | .44                  | 155.47                    | 1399.96                   | -8.42     | -4.59     | -8.42                     | 9.59           | 208.61           | .24                           |
| 1500.00                 | .45                  | 161.52                    | 1499.95                   | -9.14     | -4.31     | -9.14                     | 10.10          | 205.23           | .05                           |
| 1600.00                 | .34                  | 173.74                    | 1599.95                   | -9.81     | -4.15     | -9.81                     | 10.65          | 202.94           | .14                           |
| 1700.00                 | .25                  | 24.93                     | 1699.95                   | -9.90     | -4.03     | -9.90                     | 10.69          | 202.12           | .57                           |
| 1800.00                 | .37                  | 152.96                    | 1799.95                   | -9.99     | -3.79     | -9.99                     | 10.69          | 200.76           | .56                           |
| 1900.00                 | .35                  | 156.07                    | 1899.95                   | -10.56    | -3.52     | -10.56                    | 11.13          | 198.42           | .03                           |
| 2000.00                 | .12                  | 199.78                    | 1999.95                   | -10.94    | -3.43     | -10.94                    | 11.46          | 197.40           | .28                           |
| 2100.00                 | .34                  | 63.81                     | 2099.95                   | -10.91    | -3.20     | -10.91                    | 11.37          | 196.34           | .43                           |
| 2200.00                 | .19                  | 153.98                    | 2199.95                   | -10.92    | -2.86     | -10.92                    | 11.29          | 194.66           | .39                           |
| 2300.00                 | .90                  | 69.45                     | 2299.94                   | -10.80    | -2.05     | -10.80                    | 10.99          | 190.75           | .90                           |
| 2400.00                 | 1.06                 | 54.57                     | 2399.93                   | -9.99     | -.56      | -9.99                     | 10.00          | 183.22           | .30                           |
| 2500.00                 | 1.14                 | 61.43                     | 2499.91                   | -8.97     | 1.07      | -8.97                     | 9.04           | 173.23           | .15                           |
| 2600.00                 | 1.00                 | 68.41                     | 2599.89                   | -8.18     | 2.75      | -8.18                     | 8.63           | 161.40           | .19                           |
| 2700.00                 | 1.01                 | 69.87                     | 2699.88                   | -7.55     | 4.39      | -7.55                     | 8.74           | 149.83           | .03                           |
| 2800.00                 | 1.03                 | 64.82                     | 2799.86                   | -6.87     | 6.03      | -6.87                     | 9.14           | 138.71           | .09                           |
| 2900.00                 | 1.14                 | 52.70                     | 2899.84                   | -5.88     | 7.64      | -5.88                     | 9.64           | 127.61           | .25                           |
| 3000.00                 | 1.26                 | 39.08                     | 2999.82                   | -4.43     | 9.12      | -4.43                     | 10.14          | 115.88           | .31                           |
| 3100.00                 | 1.13                 | 40.55                     | 3099.80                   | -2.82     | 10.45     | -2.82                     | 10.83          | 105.11           | .13                           |
| 3200.00                 | 1.20                 | 44.25                     | 3199.78                   | -1.32     | 11.83     | -1.32                     | 11.90          | 96.38            | .10                           |
| 3300.00                 | 1.25                 | 46.97                     | 3299.76                   | .17       | 13.35     | .17                       | 13.35          | 89.26            | .08                           |
| 3400.00                 | 1.14                 | 45.39                     | 3399.73                   | 1.61      | 14.86     | 1.61                      | 14.95          | 83.80            | .11                           |
| 3500.00                 | .44                  | 22.17                     | 3499.72                   | 2.67      | 15.71     | 2.67                      | 15.94          | 80.36            | .76                           |
| 3600.00                 | .37                  | 359.25                    | 3599.72                   | 3.35      | 15.85     | 3.35                      | 16.20          | 78.08            | .17                           |
| 3700.00                 | .19                  | 144.82                    | 3699.72                   | 3.53      | 15.94     | 3.53                      | 16.33          | 77.50            | .54                           |
| 3800.00                 | .37                  | 92.05                     | 3799.72                   | 3.39      | 16.36     | 3.39                      | 16.71          | 78.30            | .30                           |

| Measured<br>Depth<br>FT | Incl<br>Angle<br>Deg | Drift<br>Direction<br>Deg | True<br>Vertical<br>Depth | N-S<br>FT | E-W<br>FT | Vertical<br>Section<br>FT | C L O S U R E  |                  | Dogleg<br>Severity<br>Deg/100 |
|-------------------------|----------------------|---------------------------|---------------------------|-----------|-----------|---------------------------|----------------|------------------|-------------------------------|
|                         |                      |                           |                           |           |           |                           | Distance<br>FT | Direction<br>Deg |                               |
| 3900.00                 | .56                  | 88.02                     | 3899.72                   | 3.39      | 17.17     | 3.39                      | 17.51          | 78.83            | .19                           |
| 4000.00                 | .81                  | 73.12                     | 3999.71                   | 3.61      | 18.34     | 3.61                      | 18.69          | 78.85            | .30                           |
| 4100.00                 | .73                  | 64.25                     | 4099.70                   | 4.10      | 19.59     | 4.10                      | 20.01          | 78.19            | .14                           |
| 4200.00                 | .47                  | 109.88                    | 4199.70                   | 4.23      | 20.55     | 4.23                      | 20.98          | 78.36            | .52                           |
| 4300.00                 | .60                  | 56.84                     | 4299.69                   | 4.38      | 21.37     | 4.38                      | 21.82          | 78.42            | .49                           |
| 4400.00                 | .72                  | 66.27                     | 4399.69                   | 4.92      | 22.39     | 4.92                      | 22.92          | 77.60            | .16                           |
| 4500.00                 | .80                  | 43.07                     | 4499.68                   | 5.68      | 23.44     | 5.68                      | 24.12          | 76.37            | .32                           |
| 4600.00                 | .60                  | 37.40                     | 4599.67                   | 6.61      | 24.23     | 6.61                      | 25.12          | 74.74            | .21                           |
| 4700.00                 | .38                  | 61.93                     | 4699.67                   | 7.18      | 24.84     | 7.18                      | 25.86          | 73.88            | .30                           |
| 4800.00                 | .48                  | 239.78                    | 4799.66                   | 7.13      | 24.77     | 7.13                      | 25.78          | 73.95            | .86                           |
| 4900.00                 | .74                  | 221.45                    | 4899.66                   | 6.43      | 23.98     | 6.43                      | 24.83          | 74.99            | .32                           |
| 5000.00                 | 1.41                 | 163.88                    | 4999.64                   | 4.77      | 23.90     | 4.77                      | 24.37          | 78.72            | 1.19                          |
| 5100.00                 | 1.36                 | 156.55                    | 5099.61                   | 2.49      | 24.71     | 2.49                      | 24.84          | 84.24            | .18                           |
| 5200.00                 | 1.02                 | 168.15                    | 5199.59                   | .53       | 25.37     | .53                       | 25.37          | 88.79            | .42                           |
| 5300.00                 | .87                  | 174.96                    | 5299.58                   | -1.09     | 25.62     | -1.09                     | 25.64          | 92.44            | .19                           |
| 5400.00                 | .85                  | 167.38                    | 5399.57                   | -2.57     | 25.85     | -2.57                     | 25.97          | 95.68            | .12                           |
| 5500.00                 | .35                  | 228.05                    | 5499.56                   | -3.50     | 25.78     | -3.50                     | 26.02          | 97.73            | .74                           |
| 5600.00                 | .27                  | 154.24                    | 5599.56                   | -3.92     | 25.66     | -3.92                     | 25.95          | 98.68            | .38                           |
| 5700.00                 | .48                  | 334.97                    | 5699.56                   | -3.75     | 25.58     | -3.75                     | 25.85          | 98.34            | .75                           |
| 5800.00                 | .52                  | 290.52                    | 5799.56                   | -3.21     | 24.98     | -3.21                     | 25.18          | 97.33            | .38                           |
| 5900.00                 | .71                  | 318.45                    | 5899.55                   | -2.59     | 24.14     | -2.59                     | 24.28          | 96.12            | .35                           |
| 6000.00                 | .46                  | 345.48                    | 5999.55                   | -1.74     | 23.63     | -1.74                     | 23.69          | 94.20            | .37                           |
| 6100.00                 | .83                  | 298.82                    | 6099.54                   | -1.00     | 22.90     | -1.00                     | 22.92          | 92.50            | .61                           |
| 6200.00                 | .41                  | 330.19                    | 6199.54                   | -.34      | 22.08     | -.34                      | 22.09          | 90.88            | .53                           |
| 6300.00                 | .42                  | 334.85                    | 6299.53                   | .30       | 21.75     | .30                       | 21.75          | 89.20            | .04                           |
| 6400.00                 | .30                  | 326.82                    | 6399.53                   | .85       | 21.45     | .85                       | 21.47          | 87.72            | .13                           |
| 6500.00                 | .43                  | 310.33                    | 6499.53                   | 1.32      | 21.02     | 1.32                      | 21.06          | 86.42            | .17                           |
| 6600.00                 | .69                  | 281.78                    | 6599.52                   | 1.68      | 20.15     | 1.68                      | 20.22          | 85.23            | .37                           |
| 6700.00                 | .87                  | 287.60                    | 6699.51                   | 2.03      | 18.83     | 2.03                      | 18.94          | 83.83            | .20                           |

| Measured<br>Depth<br>FT    | Incl<br>Angle<br>Deg | Drift<br>Direction<br>Deg | True<br>Vertical<br>Depth | N-S<br>FT | E-W<br>FT | Vertical<br>Section<br>FT | C L O S U R E  |                  | Dogleg<br>Severity<br>Deg/100 |
|----------------------------|----------------------|---------------------------|---------------------------|-----------|-----------|---------------------------|----------------|------------------|-------------------------------|
|                            |                      |                           |                           |           |           |                           | Distance<br>FT | Direction<br>Deg |                               |
| 6800.00                    | .56                  | 279.33                    | 6799.51                   | 2.34      | 17.63     | 2.34                      | 17.78          | 82.43            | .33                           |
| Last Survey Depth Recorded |                      |                           |                           |           |           |                           |                |                  |                               |
| 6900.00                    | .59                  | 280.01                    | 6899.50                   | 2.51      | 16.64     | 2.51                      | 16.83          | 81.41            | .03                           |