

Job Number: J-WT-0510-0171-WT-WT

State/Country: NEW MEXICO

Company: ENERGEN RESOURCES CORPORATION

Elevation: 10.42

Lease/Well: CARRACAS CANYON UNIT 24A-1B

Brid:

Location: RIO ARRIBA COUNTY

File name: C:\WINSERVE\CC\_24\_12.SVY

Rig Name: AZTEC 289

Date/Time: 27-Oct-05 / 15:10

RKB: 15

Curve Name: Ron &amp; Jim Original

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

**FINDER**

30-039-27548

Surface: 2630/S 980/W  
 B/L1 curve 2109/S 974/W  
 B/L2 Turn 1075/S 834/W

PathFinder Energy Services

## WINSERVE SURVEY CALCULATIONS

Minimum Curvature Method

Vertical Section Plane 186.71

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 | Vertical<br>Section<br>FT | N-S<br>FT | E-W<br>FT | CLOSURE<br>Distance<br>FT | Direction<br>Deg | Dogleg<br>Severity<br>Deg/100 | WALK<br>RATE<br>Deg/100 | BUILD<br>RATE<br>Deg/100 |
|--------------------------------------------------------------|----------------------|---------------------------|---------------------------|---------------------------|-----------|-----------|---------------------------|------------------|-------------------------------|-------------------------|--------------------------|
| .00                                                          | .00                  | .00                       | .00                       | .00                       | .00       | .00       | .00                       | .00              | .00                           | .00                     | .00                      |
| 952.00                                                       | 1.23                 | 71.06                     | 951.93                    | -4.42                     | 3.32      | 9.66      | 10.22                     | 71.06            | .13                           | 7.46                    | .13                      |
| 1564.00                                                      | 2.02                 | 85.65                     | 1563.68                   | -9.34                     | 6.27      | 26.63     | 27.36                     | 76.76            | .14                           | 2.38                    | .13                      |
| 2182.00                                                      | 1.93                 | 131.01                    | 2181.35                   | -5.56                     | .26       | 45.35     | 45.35                     | 89.67            | .25                           | 7.34                    | -.01                     |
| 2802.00                                                      | 3.17                 | 100.24                    | 2800.75                   | 1.38                      | -9.64     | 70.10     | 70.76                     | 97.83            | .29                           | -4.96                   | .20                      |
| 3303.00                                                      | 1.23                 | 63.59                     | 3301.37                   | -.71                      | -9.71     | 68.55     | 89.08                     | 96.26            | .46                           | -7.32                   | -.39                     |
| 3335.00                                                      | 1.06                 | 71.42                     | 3333.37                   | -1.02                     | -9.46     | 89.14     | 89.64                     | 96.06            | .72                           | 24.47                   | -.53                     |
| --Top of Ojo Alamo Sandstone @ 3351 (TVD) & KOP @ 3358 TMD-- |                      |                           |                           |                           |           |           |                           |                  |                               |                         |                          |
| 3365.00                                                      | 1.14                 | 147.35                    | 3363.36                   | -.91                      | -9.62     | 89.56     | 90.08                     | 96.13            | 4.52                          | 253.10                  | .27                      |
| 3396.00                                                      | 3.96                 | 179.43                    | 3394.33                   | .39                       | -10.95    | 89.74     | 90.40                     | 96.96            | 9.85                          | 103.48                  | 9.10                     |
| 3427.00                                                      | 7.30                 | 182.60                    | 3425.18                   | 3.42                      | -13.99    | 89.66     | 90.74                     | 98.87            | 10.82                         | 10.23                   | 10.77                    |
| 3459.00                                                      | 11.17                | 182.77                    | 3456.76                   | 8.54                      | -19.12    | 89.42     | 91.44                     | 102.07           | 12.09                         | .53                     | 12.09                    |
| --Top of Kirkland Shale @ 3471 (TVD)--                       |                      |                           |                           |                           |           |           |                           |                  |                               |                         |                          |
| 3488.00                                                      | 14.95                | 182.86                    | 3485.00                   | 15.08                     | -25.66    | 89.09     | 92.72                     | 106.07           | 13.03                         | .31                     | 13.03                    |
| 3519.00                                                      | 18.20                | 185.76                    | 3514.71                   | 23.91                     | -34.48    | 88.41     | 94.89                     | 111.30           | 10.82                         | 9.35                    | 10.48                    |
| 3550.00                                                      | 21.72                | 189.28                    | 3543.84                   | 34.49                     | -44.96    | 87.00     | 97.93                     | 117.33           | 11.99                         | 11.36                   | 11.35                    |
| 3580.00                                                      | 25.15                | 192.00                    | 3571.37                   | 46.38                     | -56.68    | 84.78     | 101.98                    | 123.76           | 11.99                         | 9.07                    | 11.43                    |
| 3611.00                                                      | 28.75                | 193.67                    | 3599.00                   | 60.35                     | -70.37    | 81.64     | 107.78                    | 130.76           | 11.87                         | 5.39                    | 11.61                    |
| 3642.00                                                      | 32.10                | 194.38                    | 3625.72                   | 75.91                     | -85.60    | 77.83     | 115.69                    | 137.72           | 10.87                         | 2.29                    | 10.81                    |
| 3673.00                                                      | 35.09                | 194.09                    | 3651.54                   | 92.92                     | -102.22   | 73.62     | 125.97                    | 144.24           | 9.66                          | -.94                    | 9.65                     |
| 3704.00                                                      | 37.46                | 195.17                    | 3676.53                   | 111.08                    | -119.96   | 68.98     | 138.38                    | 150.10           | 7.92                          | 3.48                    | 7.65                     |
| 3736.00                                                      | 38.78                | 195.08                    | 3701.71                   | 130.62                    | -139.03   | 63.83     | 152.98                    | 155.34           | 4.13                          | -.28                    | 4.13                     |
| 3767.00                                                      | 39.92                | 194.82                    | 3725.68                   | 150.08                    | -158.02   | 58.76     | 168.59                    | 159.60           | 3.72                          | -.84                    | 3.68                     |

| Measured<br>Depth<br>FT                           | Incl<br>Angle<br>Deg | Drift<br>Direction<br>Deg | True<br>Vertical<br>Depth | Vertical<br>Section<br>FT | N-S<br>FT | E-W<br>FT | C L O S U R E  |                  | Dogleg<br>Severity<br>Deg/100 | WALK<br>RATE<br>Deg/100 | BUILD<br>RATE<br>Deg/100 |
|---------------------------------------------------|----------------------|---------------------------|---------------------------|---------------------------|-----------|-----------|----------------|------------------|-------------------------------|-------------------------|--------------------------|
|                                                   |                      |                           |                           |                           |           |           | Distance<br>FT | Direction<br>Deg |                               |                         |                          |
| 3798.00                                           | 41.24                | 194.90                    | 3749.22                   | 170.04                    | -177.51   | 53.59     | 185.43         | 163.20           | 4.26                          | .26                     | 4.26                     |
| 3829.00                                           | 42.82                | 193.94                    | 3772.25                   | 190.60                    | -197.61   | 48.42     | 203.46         | 166.23           | 5.50                          | -3.10                   | 5.10                     |
| 3860.00                                           | 44.93                | 192.44                    | 3794.59                   | 211.95                    | -218.53   | 43.52     | 222.82         | 168.74           | 7.59                          | -4.84                   | 6.81                     |
| 3892.00                                           | 47.57                | 190.51                    | 3816.72                   | 234.98                    | -241.18   | 38.93     | 244.31         | 170.83           | 9.33                          | -6.03                   | 8.25                     |
| 3922.00                                           | 50.30                | 190.42                    | 3836.43                   | 257.55                    | -263.42   | 34.83     | 265.72         | 172.47           | 9.10                          | -.30                    | 9.10                     |
|                                                   |                      |                           |                           |                           |           |           |                |                  |                               |                         |                          |
| 3952.00                                           | 53.11                | 190.60                    | 3855.02                   | 281.04                    | -286.57   | 30.53     | 288.19         | 173.92           | 9.38                          | .60                     | 9.37                     |
| 3984.00                                           | 56.10                | 191.04                    | 3873.55                   | 307.06                    | -312.19   | 25.63     | 313.24         | 175.31           | 9.41                          | 1.37                    | 9.34                     |
| 4016.00                                           | 59.27                | 191.48                    | 3890.65                   | 334.01                    | -338.71   | 20.35     | 339.32         | 176.56           | 9.97                          | 1.38                    | 9.91                     |
| 4046.00                                           | 62.17                | 190.86                    | 3905.33                   | 360.10                    | -364.38   | 15.28     | 364.70         | 177.60           | 9.83                          | -2.07                   | 9.67                     |
| 4077.00                                           | 64.63                | 189.72                    | 3919.20                   | 387.76                    | -391.65   | 10.34     | 391.79         | 178.49           | 8.59                          | -3.68                   | 7.94                     |
|                                                   |                      |                           |                           |                           |           |           |                |                  |                               |                         |                          |
| 4109.00                                           | 66.30                | 188.40                    | 3932.49                   | 416.84                    | -420.40   | 5.75      | 420.44         | 179.22           | 6.43                          | -4.13                   | 5.22                     |
| 4139.00                                           | 67.36                | 187.70                    | 3944.30                   | 444.42                    | -447.70   | 1.89      | 447.71         | 179.76           | 4.13                          | -2.33                   | 3.53                     |
| 4170.00                                           | 69.29                | 187.52                    | 3955.75                   | 473.22                    | -476.26   | -1.92     | 476.26         | 180.23           | 6.25                          | -.58                    | 6.23                     |
| 4201.00                                           | 72.11                | 187.87                    | 3965.99                   | 502.47                    | -505.25   | -5.84     | 505.28         | 180.66           | 9.16                          | 1.13                    | 9.10                     |
| Interpolated Point - Top of Coal (Drilling Break) |                      |                           |                           |                           |           |           |                |                  |                               |                         |                          |
| 4218.00                                           | 73.72                | 187.87                    | 3970.99                   | 518.72                    | -521.34   | -8.06     | 521.41         | 180.89           | 9.46                          | .00                     | 9.46                     |
| 4240.00                                           | 75.80                | 187.87                    | 3976.77                   | 539.94                    | -542.37   | -10.97    | 542.48         | 181.16           | 9.46                          | .00                     | 9.46                     |
| 4271.00                                           | 78.52                | 188.05                    | 3983.66                   | 570.15                    | -572.30   | -15.16    | 572.50         | 181.52           | 8.79                          | .58                     | 8.77                     |
| --Base of Coal found between 4290' - 4300'        |                      |                           |                           |                           |           |           |                |                  |                               |                         |                          |
| 4303.00                                           | 82.31                | 188.93                    | 3988.98                   | 601.68                    | -603.50   | -19.81    | 603.83         | 181.88           | 12.15                         | 2.75                    | 11.84                    |
| 4335.00                                           | 86.53                | 189.28                    | 3992.09                   | 633.50                    | -634.94   | -24.85    | 635.43         | 182.24           | 13.23                         | 1.09                    | 13.19                    |
| 4366.00                                           | 90.84                | 189.80                    | 3992.81                   | 664.44                    | -665.50   | -29.99    | 666.17         | 182.58           | 14.00                         | 1.68                    | 13.90                    |
| 4398.00                                           | 92.68                | 189.63                    | 3991.82                   | 696.38                    | -697.02   | -35.39    | 697.92         | 182.91           | 5.77                          | -.53                    | 5.75                     |
| 4430.00                                           | 94.97                | 189.45                    | 3989.69                   | 728.27                    | -728.51   | -40.68    | 729.64         | 183.20           | 7.18                          | -.56                    | 7.16                     |
|                                                   |                      |                           |                           |                           |           |           |                |                  |                               |                         |                          |
| 4462.00                                           | 93.47                | 188.93                    | 3987.33                   | 760.15                    | -760.01   | -45.77    | 761.39         | 183.45           | 4.96                          | -1.62                   | -4.69                    |
| 4493.00                                           | 93.21                | 189.01                    | 3985.53                   | 791.08                    | -790.58   | -50.60    | 792.20         | 183.66           | .88                           | .26                     | -.84                     |
| Interpolated Point - Estimated Bottom of Coal     |                      |                           |                           |                           |           |           |                |                  |                               |                         |                          |
| 4524.00                                           | 93.30                | 188.67                    | 3983.77                   | 822.00                    | -821.16   | -55.36    | 823.02         | 183.86           | 1.13                          | -1.09                   | .28                      |
| 4525.00                                           | 93.30                | 188.66                    | 3983.71                   | 823.00                    | -822.15   | -55.51    | 824.02         | 183.86           | 1.13                          | -1.09                   | .28                      |
| 4557.00                                           | 94.26                | 188.40                    | 3981.60                   | 854.92                    | -853.72   | -60.24    | 855.85         | 184.04           | 3.11                          | -.81                    | 3.00                     |
| 4588.00                                           | 93.30                | 188.05                    | 3979.56                   | 885.84                    | -884.34   | -64.67    | 886.70         | 184.18           | 3.30                          | -1.13                   | -3.10                    |
| 4620.00                                           | 91.28                | 188.57                    | 3978.28                   | 917.80                    | -915.98   | -69.29    | 918.59         | 184.33           | 6.52                          | 1.62                    | -6.31                    |
|                                                   |                      |                           |                           |                           |           |           |                |                  |                               |                         |                          |
| 4652.00                                           | 90.40                | 188.49                    | 3977.81                   | 949.78                    | -947.62   | -74.03    | 950.51         | 184.47           | 2.76                          | -.25                    | -2.75                    |
| 4683.00                                           | 90.84                | 188.13                    | 3977.47                   | 980.76                    | -978.29   | -78.51    | 981.44         | 184.59           | 1.83                          | -1.16                   | 1.42                     |
| 4715.00                                           | 91.01                | 187.52                    | 3976.96                   | 1012.75                   | -1009.99  | -82.87    | 1013.38        | 184.69           | 1.98                          | -1.91                   | .53                      |
| 4746.00                                           | 90.75                | 187.26                    | 3976.48                   | 1043.75                   | -1040.73  | -86.86    | 1044.35        | 184.77           | 1.19                          | -.84                    | -.84                     |
| 4778.00                                           | 90.40                | 187.26                    | 3976.16                   | 1075.74                   | -1072.47  | -90.90    | 1076.31        | 184.84           | 1.09                          | .00                     | -1.09                    |
|                                                   |                      |                           |                           |                           |           |           |                |                  |                               |                         |                          |
| 4810.00                                           | 88.99                | 187.43                    | 3976.33                   | 1107.74                   | -1104.20  | -94.99    | 1108.28        | 184.92           | 4.44                          | .53                     | -4.41                    |
| 4841.00                                           | 88.46                | 187.08                    | 3977.02                   | 1138.73                   | -1134.95  | -98.91    | 1139.25        | 184.98           | 2.05                          | -1.13                   | -1.71                    |
| 4873.00                                           | 89.34                | 186.73                    | 3977.64                   | 1170.72                   | -1166.71  | -102.75   | 1171.23        | 185.03           | 2.96                          | -1.09                   | 2.75                     |
| 4905.00                                           | 90.66                | 186.29                    | 3977.64                   | 1202.72                   | -1198.50  | -106.38   | 1203.22        | 185.07           | 4.35                          | -1.38                   | 4.12                     |
| 4937.00                                           | 90.84                | 186.64                    | 3977.22                   | 1234.72                   | -1230.30  | -109.98   | 1235.20        | 185.11           | 1.23                          | 1.09                    | .56                      |
|                                                   |                      |                           |                           |                           |           |           |                |                  |                               |                         |                          |
| 4967.00                                           | 90.84                | 186.20                    | 3976.78                   | 1264.72                   | -1260.11  | -113.34   | 1265.19        | 185.14           | 1.47                          | -1.47                   | .00                      |
| 4997.00                                           | 90.22                | 186.55                    | 3976.50                   | 1294.72                   | -1289.92  | -116.67   | 1295.18        | 185.17           | 2.37                          | 1.17                    | -2.07                    |

-1555.2 446.92

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Ron & Jim Original File: C:\WINSERVE\CC\_24\_12.SVY

Td

| Measured<br>Depth<br>FT | Incl<br>Angle<br>Deg | Drift<br>Direction<br>Deg | True<br>Vertical<br>Depth | Vertical<br>Section<br>FT | N-S<br>FT | E-W<br>FT | CLOSURE<br>Distance<br>FT | Direction<br>Deg | Dogleg<br>Severity<br>Deg/100 | WALK<br>RATE<br>Deg/100 | BUILD<br>RATE<br>Deg/100 |
|-------------------------|----------------------|---------------------------|---------------------------|---------------------------|-----------|-----------|---------------------------|------------------|-------------------------------|-------------------------|--------------------------|
| 5029.00                 | 89.96                | 186.90                    | 3976.45                   | 1326.72                   | -1321.70  | -120.42   | 1327.17                   | 185.21           | 1.36                          | 1.09                    | -8.81                    |
| 5061.00                 | 87.41                | 186.20                    | 3977.18                   | 1358.70                   | -1353.48  | -124.06   | 1359.15                   | 185.24           | 8.26                          | -2.19                   | -7.97                    |
| 5092.00                 | 88.64                | 185.76                    | 3978.25                   | 1389.68                   | -1384.29  | -127.29   | 1390.13                   | 185.25           | 4.21                          | -1.42                   | -3.97                    |
| 5124.00                 | 90.22                | 185.94                    | 3978.57                   | 1421.68                   | -1416.12  | -130.55   | 1422.13                   | 185.27           | 4.97                          | 56                      | 4.94                     |
| 5156.00                 | 90.57                | 186.29                    | 3978.35                   | 1453.67                   | -1447.94  | -133.96   | 1454.12                   | 185.29           | 1.85                          | 1.09                    | 1.09                     |
| 5187.00                 | 89.52                | 186.02                    | 3978.32                   | 1484.67                   | -1478.76  | -137.29   | 1485.12                   | 185.30           | 18.50                         | 5.87                    | -3.39                    |
| 5218.00                 | 87.32                | 186.55                    | 3979.18                   | 1515.66                   | -1509.56  | -140.68   | 1516.10                   | 185.32           | 7.30                          | 1.71                    | -7.10                    |
| --Projection to Bit--   |                      |                           |                           |                           |           |           |                           |                  |                               |                         |                          |
| 5264.00                 | 87.00                | 186.55                    | 3981.46                   | 1561.60                   | -1555.20  | -145.92   | 1562.03                   | 185.36           | .70                           | .00                     | -7.70                    |

VOCEBLED FOR RECORD