



Company: PDC Energy

Well: Zarlengo 14-4

API: 05-001-09384

Rig Name: Production / V.E.S.

State/County: Colorado / Adams

Latitude: 39.988, Longitude: -104.902

Directions are relative to True North

VS-Azi: 0.000 Degrees



FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : RKB = Ground Level

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: hagyro-de\_01.ut

Minimum Curvature Method

Report Date/Time: 8/2/2014 / 12:16

VES Survey International

Henderson Colorado

303-853-4976

Norman Cowan

| Measured Depth<br>FT | Incl Angle<br>Deg | Drift Direction<br>Deg | TVD<br>FT | +N/-S<br>FT | +E/-W<br>FT | Vertical Section<br>FT | Closure Distance<br>FT | Closure Direction<br>Deg | Dogleg Severity<br>Deg/100 |
|----------------------|-------------------|------------------------|-----------|-------------|-------------|------------------------|------------------------|--------------------------|----------------------------|
| 0.000                | 0.000             | 0.000                  | 0.000     | 0.000       | 0.000       | 0.000                  | 0.000                  | 0.000                    | ****                       |
| 100.000              | 0.770             | 185.465                | 99.997    | -0.669      | -0.064      | -0.669                 | 0.672                  | 185.465                  | 0.770                      |
| 200.000              | 0.862             | 197.414                | 199.987   | -2.055      | -0.353      | -2.055                 | 2.085                  | 189.748                  | 0.193                      |
| 300.000              | 0.912             | 221.156                | 299.975   | -3.372      | -1.102      | -3.372                 | 3.548                  | 198.097                  | 0.368                      |
| 400.000              | 1.076             | 246.770                | 399.961   | -4.342      | -2.489      | -4.342                 | 5.005                  | 209.821                  | 0.469                      |
| 500.000              | 1.146             | 231.268                | 499.942   | -5.338      | -4.132      | -5.338                 | 6.750                  | 217.740                  | 0.307                      |
| 600.000              | 1.289             | 240.916                | 599.920   | -6.510      | -5.895      | -6.510                 | 8.782                  | 222.159                  | 0.250                      |
| 700.000              | 1.669             | 249.323                | 699.886   | -7.571      | -8.240      | -7.571                 | 11.191                 | 227.422                  | 0.436                      |
| 800.000              | 1.786             | 257.220                | 799.841   | -8.430      | -11.123     | -8.430                 | 13.957                 | 232.840                  | 0.265                      |
| 900.000              | 1.552             | 279.576                | 899.799   | -8.550      | -13.978     | -8.550                 | 16.386                 | 238.548                  | 0.687                      |
| 1000.000             | 1.576             | 290.960                | 999.762   | -7.833      | -16.598     | -7.833                 | 18.353                 | 244.737                  | 0.311                      |
| 1100.000             | 1.239             | 309.686                | 1099.733  | -6.650      | -18.714     | -6.650                 | 19.861                 | 250.437                  | 0.566                      |
| 1200.000             | 1.375             | 312.362                | 1199.707  | -5.151      | -20.433     | -5.151                 | 21.072                 | 255.850                  | 0.149                      |
| 1300.000             | 1.402             | 318.581                | 1299.677  | -3.425      | -22.129     | -3.425                 | 22.393                 | 261.202                  | 0.153                      |
| 1400.000             | 1.530             | 310.861                | 1399.645  | -1.634      | -23.948     | -1.634                 | 24.004                 | 266.097                  | 0.235                      |
| 1500.000             | 1.509             | 310.586                | 1499.609  | 0.096       | -25.958     | 0.096                  | 25.958                 | 270.212                  | 0.022                      |
| 1600.000             | 1.418             | 314.297                | 1599.577  | 1.817       | -27.843     | 1.817                  | 27.903                 | 273.733                  | 0.132                      |
| 1700.000             | 1.670             | 298.852                | 1699.541  | 3.384       | -30.006     | 3.384                  | 30.196                 | 276.435                  | 0.485                      |
| 1800.000             | 1.528             | 296.709                | 1799.502  | 4.687       | -32.473     | 4.687                  | 32.810                 | 278.213                  | 0.154                      |
| 1900.000             | 1.801             | 287.301                | 1899.460  | 5.753       | -35.165     | 5.753                  | 35.632                 | 279.292                  | 0.385                      |
| 2000.000             | 1.613             | 291.768                | 1999.415  | 6.743       | -37.972     | 6.743                  | 38.566                 | 280.069                  | 0.230                      |
| 2100.000             | 1.768             | 292.917                | 2099.372  | 7.865       | -40.700     | 7.865                  | 41.453                 | 280.937                  | 0.159                      |
| 2200.000             | 1.759             | 290.961                | 2199.325  | 9.015       | -43.554     | 9.015                  | 44.477                 | 281.694                  | 0.061                      |
| 2300.000             | 1.555             | 293.932                | 2299.283  | 10.114      | -46.227     | 10.114                 | 47.320                 | 282.341                  | 0.221                      |
| 2400.000             | 1.498             | 311.658                | 2399.248  | 11.533      | -48.444     | 11.533                 | 49.798                 | 283.391                  | 0.474                      |
| 2500.000             | 1.523             | 316.648                | 2499.213  | 13.368      | -50.332     | 13.368                 | 52.077                 | 284.874                  | 0.134                      |
| 2600.000             | 1.532             | 310.301                | 2599.178  | 15.199      | -52.264     | 15.199                 | 54.429                 | 286.215                  | 0.169                      |
| 2700.000             | 1.269             | 302.522                | 2699.148  | 16.659      | -54.217     | 16.659                 | 56.719                 | 287.080                  | 0.324                      |
| 2800.000             | 1.259             | 297.688                | 2799.123  | 17.765      | -56.124     | 17.765                 | 58.868                 | 287.564                  | 0.107                      |
| 2900.000             | 1.281             | 334.259                | 2899.100  | 19.282      | -57.582     | 19.282                 | 60.725                 | 288.514                  | 0.797                      |
| 3000.000             | 1.126             | 342.818                | 2999.078  | 21.227      | -58.358     | 21.227                 | 62.098                 | 289.989                  | 0.237                      |
| 3100.000             | 1.130             | 5.566                  | 3099.060  | 23.147      | -58.552     | 23.147                 | 62.961                 | 291.570                  | 0.445                      |
| 3200.000             | 1.132             | 15.814                 | 3199.040  | 25.079      | -58.187     | 25.079                 | 63.362                 | 293.316                  | 0.202                      |
| 3300.000             | 0.957             | 6.688                  | 3299.024  | 26.859      | -57.821     | 26.859                 | 63.755                 | 294.916                  | 0.241                      |
| 3400.000             | 0.674             | 348.443                | 3399.014  | 28.265      | -57.841     | 28.265                 | 64.378                 | 296.043                  | 0.380                      |

| Measured<br>Depth<br>FT | Incl<br>Angle<br>Deg | Drift<br>Direction<br>Deg | TVD<br>FT | +N-S<br>FT | +E-W<br>FT | Vertical<br>Section<br>FT | Closure<br>Distance<br>FT | Closure<br>Direction<br>Deg | Dogleg<br>Severity<br>Deg/100 |
|-------------------------|----------------------|---------------------------|-----------|------------|------------|---------------------------|---------------------------|-----------------------------|-------------------------------|
| 3500.000                | 0.780                | 298.153                   | 3499.006  | 29.163     | -58.559    | 29.163                    | 65.419                    | 296.474                     | 0.625                         |
| 3600.000                | 1.496                | 270.458                   | 3598.987  | 29.495     | -60.465    | 29.495                    | 67.275                    | 296.003                     | 0.883                         |
| 3700.000                | 1.475                | 268.284                   | 3698.953  | 29.466     | -63.056    | 29.466                    | 69.601                    | 295.047                     | 0.060                         |
| 3800.000                | 1.269                | 263.134                   | 3798.924  | 29.296     | -65.441    | 29.296                    | 71.699                    | 294.116                     | 0.240                         |
| 3900.000                | 1.132                | 260.559                   | 3898.903  | 29.001     | -67.515    | 29.001                    | 73.480                    | 293.246                     | 0.147                         |
| 4000.000                | 1.035                | 269.208                   | 3998.885  | 28.827     | -69.392    | 28.827                    | 75.142                    | 292.559                     | 0.190                         |
| 4100.000                | 0.700                | 279.234                   | 4098.873  | 28.912     | -70.899    | 28.912                    | 76.567                    | 292.185                     | 0.366                         |
| 4200.000                | 0.403                | 292.860                   | 4198.868  | 29.147     | -71.826    | 29.147                    | 77.515                    | 292.087                     | 0.323                         |
| 4300.000                | 0.350                | 284.746                   | 4298.866  | 29.361     | -72.445    | 29.361                    | 78.169                    | 292.062                     | 0.075                         |
| 4400.000                | 0.344                | 245.909                   | 4398.865  | 29.316     | -73.014    | 29.316                    | 78.680                    | 291.876                     | 0.231                         |
| 4500.000                | 1.263                | 250.667                   | 4498.854  | 28.829     | -74.328    | 28.829                    | 79.723                    | 291.199                     | 0.920                         |
| 4600.000                | 1.950                | 241.909                   | 4598.814  | 27.663     | -76.868    | 27.663                    | 81.694                    | 289.793                     | 0.728                         |
| 4700.000                | 2.078                | 245.593                   | 4698.752  | 26.113     | -80.020    | 26.113                    | 84.173                    | 288.073                     | 0.182                         |
| 4800.000                | 2.342                | 224.068                   | 4798.679  | 23.896     | -83.092    | 23.896                    | 86.459                    | 286.044                     | 0.865                         |
| 4900.000                | 1.368                | 224.280                   | 4898.626  | 21.573     | -85.346    | 21.573                    | 88.031                    | 284.186                     | 0.973                         |
| 5000.000                | 1.274                | 225.526                   | 4998.599  | 19.939     | -86.973    | 19.939                    | 89.229                    | 282.913                     | 0.099                         |
| 5100.000                | 1.386                | 236.741                   | 5098.573  | 18.498     | -88.777    | 18.498                    | 90.684                    | 281.770                     | 0.283                         |
| 5200.000                | 1.672                | 239.511                   | 5198.537  | 17.094     | -91.045    | 17.094                    | 92.636                    | 280.634                     | 0.295                         |
| 5300.000                | 1.872                | 248.948                   | 5298.489  | 15.768     | -93.826    | 15.768                    | 95.142                    | 279.540                     | 0.353                         |
| 5400.000                | 1.185                | 221.681                   | 5398.454  | 14.409     | -96.038    | 14.409                    | 97.113                    | 278.533                     | 0.983                         |
| 5500.000                | 0.934                | 167.955                   | 5498.439  | 12.840     | -96.556    | 12.840                    | 97.406                    | 277.575                     | 0.983                         |
| 5600.000                | 1.766                | 154.696                   | 5598.411  | 10.650     | -95.727    | 10.650                    | 96.318                    | 276.348                     | 0.884                         |
| 5700.000                | 1.584                | 157.513                   | 5698.368  | 7.980      | -94.540    | 7.980                     | 94.876                    | 274.825                     | 0.200                         |
| 5800.000                | 0.727                | 157.088                   | 5798.347  | 6.118      | -93.764    | 6.118                     | 93.963                    | 273.733                     | 0.856                         |
| 5900.000                | 0.530                | 129.753                   | 5898.341  | 5.238      | -93.162    | 5.238                     | 93.309                    | 273.218                     | 0.354                         |
| 6000.000                | 0.510                | 148.535                   | 5998.337  | 4.563      | -92.574    | 4.563                     | 92.686                    | 272.822                     | 0.171                         |
| 6100.000                | 0.461                | 136.026                   | 6098.333  | 3.894      | -92.062    | 3.894                     | 92.145                    | 272.422                     | 0.117                         |
| 6200.000                | 0.347                | 123.525                   | 6198.331  | 3.437      | -91.530    | 3.437                     | 91.595                    | 272.150                     | 0.143                         |
| 6300.000                | 0.315                | 153.964                   | 6298.329  | 3.022      | -91.157    | 3.022                     | 91.207                    | 271.899                     | 0.177                         |
| 6400.000                | 0.431                | 128.125                   | 6398.327  | 2.543      | -90.740    | 2.543                     | 90.776                    | 271.605                     | 0.201                         |
| 6500.000                | 0.479                | 102.674                   | 6498.324  | 2.219      | -90.036    | 2.219                     | 90.064                    | 271.412                     | 0.206                         |
| 6600.000                | 0.189                | 148.922                   | 6598.323  | 1.986      | -89.544    | 1.986                     | 89.566                    | 271.271                     | 0.374                         |
| 6700.000                | 0.430                | 131.894                   | 6698.321  | 1.594      | -89.179    | 1.594                     | 89.193                    | 271.024                     | 0.256                         |
| 6800.000                | 1.898                | 119.921                   | 6798.298  | 0.517      | -87.464    | 0.517                     | 87.466                    | 270.339                     | 1.480                         |
| 6900.000                | 4.746                | 113.170                   | 6898.120  | -1.937     | -82.224    | -1.937                    | 82.247                    | 268.650                     | 2.869                         |
| 7000.000                | 3.168                | 101.270                   | 6997.880  | -4.105     | -75.711    | -4.105                    | 75.822                    | 266.897                     | 1.770                         |
| 7100.000                | 1.981                | 138.234                   | 7097.784  | -5.934     | -71.849    | -5.934                    | 72.093                    | 265.278                     | 1.983                         |
| 7200.000                | 1.058                | 153.118                   | 7197.748  | -8.047     | -70.280    | -8.047                    | 70.739                    | 263.468                     | 0.997                         |
| 7300.000                | 1.590                | 221.964                   | 7297.726  | -9.902     | -70.790    | -9.902                    | 71.479                    | 262.038                     | 1.559                         |
| 7400.000                | 1.628                | 223.015                   | 7397.687  | -11.972    | -72.687    | -11.972                   | 73.666                    | 260.647                     | 0.049                         |
| 7500.000                | 1.590                | 213.636                   | 7497.647  | -14.165    | -74.424    | -14.165                   | 75.760                    | 259.224                     | 0.266                         |
| 7600.000                | 1.587                | 241.507                   | 7597.610  | -15.981    | -76.410    | -15.981                   | 78.063                    | 258.187                     | 0.765                         |
| 7700.000                | 1.759                | 272.980                   | 7697.570  | -16.562    | -79.159    | -16.562                   | 80.873                    | 258.183                     | 0.922                         |
| 7800.000                | 2.621                | 308.205                   | 7797.500  | -15.068    | -82.489    | -15.068                   | 83.854                    | 259.648                     | 1.559                         |
| 7900.000                | 3.572                | 310.826                   | 7897.353  | -11.617    | -86.643    | -11.617                   | 87.418                    | 262.363                     | 0.961                         |
| 8000.000                | 3.917                | 316.386                   | 7997.140  | -7.108     | -91.356    | -7.108                    | 91.632                    | 265.551                     | 0.501                         |
| 8100.000                | 1.596                | 324.673                   | 8097.018  | -3.498     | -94.517    | -3.498                    | 94.582                    | 267.880                     | 2.349                         |
| 8200.000                | 0.796                | 296.936                   | 8196.996  | -2.047     | -95.942    | -2.047                    | 95.964                    | 268.778                     | 0.965                         |
| 8300.000                | 0.476                | 316.748                   | 8296.990  | -1.430     | -96.846    | -1.430                    | 96.857                    | 269.154                     | 0.384                         |
| 8350.000                | 0.421                | 274.533                   | 8346.988  | -1.264     | -97.172    | -1.264                    | 97.180                    | 269.255                     | 0.654                         |

HORIZONTAL DISPLACEMENT IS  
97.180 FEET AT 269.255 DEGREES