

A GYRO TECHNOLOGIES INC. COMPANY

P.O. Box 261021  
Corpus Christi, Texas 78426  
(361) 767-0602 • (800) 606-GYRO • Fax (361) 767-0612

March 19, 2014

30-05-42016

Concho Resources, Inc.  
One Concho Center  
600 W. Illinois Avenue  
Midland, Texas 79701

Attn: Kanicia Castillo

RE: Blue Thunder 5 Federal Com No. 005H

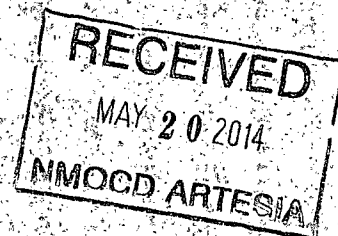
Please find enclosed a copy of the survey from 0.00' to 8230.00' ran on the above referenced well.

Sincerely,

  
Keith Havelka  
Operations

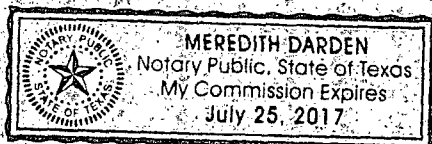
STATE OF TEXAS §

COUNTY OF NUECES §



This instrument was acknowledged before me on the 19<sup>th</sup> day of March, A.D., 2014, by Keith Havelka.

  
Meredith Darden  
Notary Public, State of Texas





Rig Name: PATRIOT #6  
State/County: NEW MEXICO/EDDY  
Latitude: 32.69, Longitude: -103.88  
GRID North is 0.24 Degrees East of True North  
VS-Azi: 0.00 Degrees



Depth Reference : RKB 17 FEET

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: gyro survey-de\_01.ut

Minimum Curvature Method

Report Date/Time: 3/19/2014 / 14:36

Vaughn Energy Services

Woodward, OK

580-254-5000

Surveyor: Vincent Marasco

Blue Thunder 5 Federal Com No. 005H / API 30-015-42016

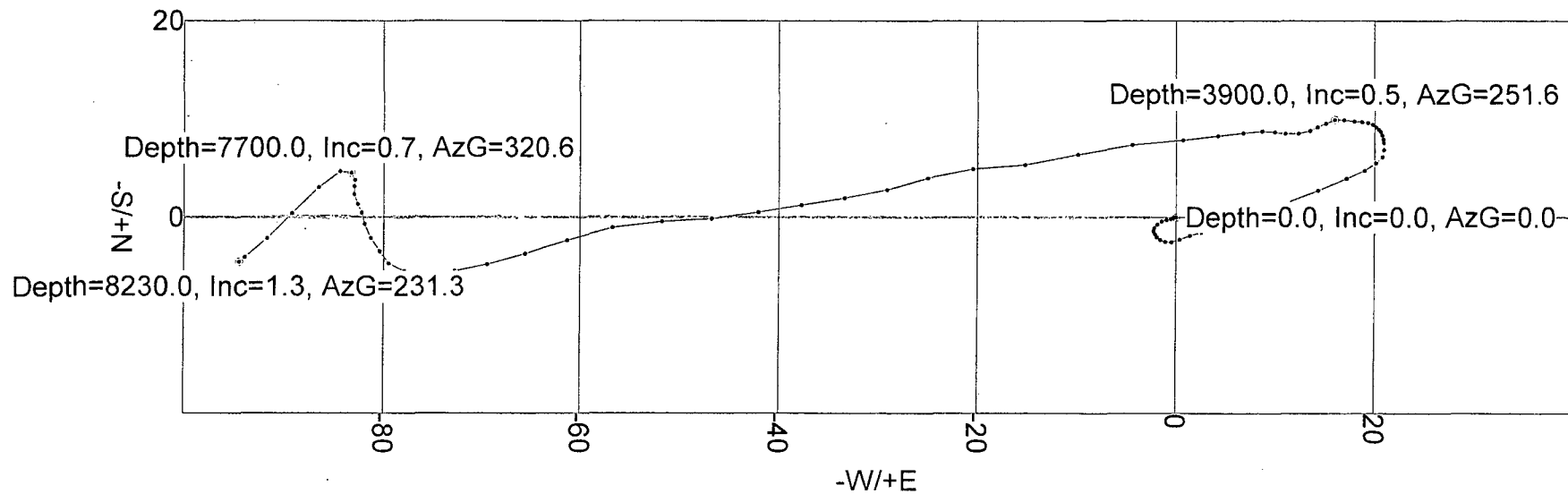
| Measured<br>Depth<br>FT | Incl<br>Angle<br>Deg | Drift<br>Direction<br>Deg | TVD<br>FT | +N/-S<br>FT | +E/-W<br>FT | Vertical<br>Section<br>FT | Closure<br>Distance<br>FT | Closure<br>Direction<br>Deg | Dogleg<br>Severity<br>Deg/100 |
|-------------------------|----------------------|---------------------------|-----------|-------------|-------------|---------------------------|---------------------------|-----------------------------|-------------------------------|
| 0.00                    | 0.00                 | 0.00                      | 0.00      | 0.00        | 0.00        | 0.00                      | 0.00                      | 0.00                        | ****                          |
| 100.00                  | 0.08                 | 293.67                    | 100.00    | 0.03        | -0.07       | 0.03                      | 0.07                      | 293.67                      | 0.08                          |
| 200.00                  | 0.14                 | 230.82                    | 200.00    | -0.02       | -0.23       | -0.02                     | 0.23                      | 265.41                      | 0.13                          |
| 300.00                  | 0.25                 | 253.72                    | 300.00    | -0.16       | -0.53       | -0.16                     | 0.55                      | 253.61                      | 0.13                          |
| 400.00                  | 0.27                 | 261.45                    | 400.00    | -0.25       | -0.97       | -0.25                     | 1.01                      | 255.49                      | 0.04                          |
| 500.00                  | 0.30                 | 246.11                    | 500.00    | -0.39       | -1.45       | -0.39                     | 1.50                      | 254.80                      | 0.08                          |
| 600.00                  | 0.31                 | 221.81                    | 600.00    | -0.70       | -1.87       | -0.70                     | 2.00                      | 249.47                      | 0.13                          |
| 700.00                  | 0.25                 | 217.42                    | 699.99    | -1.07       | -2.18       | -1.07                     | 2.43                      | 243.78                      | 0.06                          |
| 800.00                  | 0.16                 | 153.86                    | 799.99    | -1.37       | -2.25       | -1.37                     | 2.64                      | 238.64                      | 0.23                          |
| 900.00                  | 0.24                 | 157.63                    | 899.99    | -1.69       | -2.11       | -1.69                     | 2.71                      | 231.31                      | 0.08                          |
| 1000.00                 | 0.20                 | 142.37                    | 999.99    | -2.03       | -1.93       | -2.03                     | 2.80                      | 223.53                      | 0.07                          |
| 1100.00                 | 0.29                 | 116.69                    | 1099.99   | -2.28       | -1.59       | -2.28                     | 2.78                      | 214.89                      | 0.14                          |
| 1200.00                 | 0.34                 | 108.22                    | 1199.99   | -2.49       | -1.08       | -2.49                     | 2.71                      | 203.54                      | 0.07                          |
| 1300.00                 | 0.40                 | 79.85                     | 1299.99   | -2.52       | -0.46       | -2.52                     | 2.56                      | 190.28                      | 0.19                          |
| 1400.00                 | 0.60                 | 68.13                     | 1399.98   | -2.26       | 0.37        | -2.26                     | 2.29                      | 170.68                      | 0.22                          |
| 1500.00                 | 0.68                 | 69.14                     | 1499.98   | -1.86       | 1.41        | -1.86                     | 2.33                      | 142.83                      | 0.09                          |
| 1600.00                 | 0.73                 | 77.89                     | 1599.97   | -1.51       | 2.58        | -1.51                     | 3.00                      | 120.35                      | 0.12                          |
| 1700.00                 | 0.67                 | 57.05                     | 1699.96   | -1.06       | 3.69        | -1.06                     | 3.84                      | 106.05                      | 0.26                          |
| 1800.00                 | 0.95                 | 57.64                     | 1799.95   | -0.30       | 4.89        | -0.30                     | 4.90                      | 93.52                       | 0.29                          |

| 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 |
|-------------------------|----------------------|---------------------------|-----------|-------------|-------------|---------------------------|---------------------------|-----------------------------|-------------------------------|
| 1900.00                 | 0.89                 | 87.94                     | 1899.94   | 0.17        | 6.37        | 0.17                      | 6.37                      | 88.45                       | 0.49                          |
| 2000.00                 | 1.41                 | 73.46                     | 1999.92   | 0.55        | 8.33        | 0.55                      | 8.34                      | 86.21                       | 0.59                          |
| 2100.00                 | 1.88                 | 71.49                     | 2099.88   | 1.42        | 11.06       | 1.42                      | 11.15                     | 82.67                       | 0.48                          |
| 2200.00                 | 2.13                 | 65.03                     | 2199.82   | 2.73        | 14.31       | 2.73                      | 14.56                     | 79.20                       | 0.34                          |
| 2300.00                 | 1.44                 | 69.10                     | 2299.77   | 3.96        | 17.17       | 3.96                      | 17.62                     | 77.00                       | 0.70                          |
| 2400.00                 | 0.84                 | 58.01                     | 2399.75   | 4.80        | 18.96       | 4.80                      | 19.56                     | 75.79                       | 0.63                          |
| 2500.00                 | 0.75                 | 53.21                     | 2499.74   | 5.58        | 20.11       | 5.58                      | 20.88                     | 74.48                       | 0.11                          |
| 2600.00                 | 0.34                 | 31.59                     | 2599.73   | 6.23        | 20.80       | 6.23                      | 21.71                     | 73.32                       | 0.46                          |
| 2700.00                 | 0.55                 | 356.43                    | 2699.73   | 6.96        | 20.92       | 6.96                      | 22.05                     | 71.59                       | 0.34                          |
| 2800.00                 | 0.27                 | 1.38                      | 2799.73   | 7.67        | 20.90       | 7.67                      | 22.26                     | 69.84                       | 0.29                          |
| 2900.00                 | 0.13                 | 334.85                    | 2899.73   | 8.01        | 20.86       | 8.01                      | 22.34                     | 69.00                       | 0.16                          |
| 3000.00                 | 0.38                 | 347.36                    | 2999.73   | 8.43        | 20.74       | 8.43                      | 22.38                     | 67.88                       | 0.25                          |
| 3100.00                 | 0.08                 | 294.86                    | 3099.73   | 8.78        | 20.60       | 8.78                      | 22.39                     | 66.92                       | 0.33                          |
| 3200.00                 | 0.27                 | 321.19                    | 3199.73   | 8.99        | 20.39       | 8.99                      | 22.28                     | 66.20                       | 0.20                          |
| 3300.00                 | 0.16                 | 305.00                    | 3299.72   | 9.25        | 20.13       | 9.25                      | 22.15                     | 65.31                       | 0.13                          |
| 3400.00                 | 0.32                 | 308.29                    | 3399.72   | 9.51        | 19.79       | 9.51                      | 21.96                     | 64.34                       | 0.17                          |
| 3500.00                 | 0.33                 | 269.68                    | 3499.72   | 9.68        | 19.29       | 9.68                      | 21.58                     | 63.35                       | 0.21                          |
| 3600.00                 | 0.36                 | 287.73                    | 3599.72   | 9.78        | 18.71       | 9.78                      | 21.11                     | 62.41                       | 0.11                          |
| 3700.00                 | 0.56                 | 265.81                    | 3699.72   | 9.84        | 17.92       | 9.84                      | 20.44                     | 61.24                       | 0.26                          |
| 3800.00                 | 0.67                 | 285.97                    | 3799.71   | 9.96        | 16.88       | 9.96                      | 19.60                     | 59.46                       | 0.24                          |
| 3900.00                 | 0.47                 | 251.62                    | 3899.71   | 9.99        | 15.94       | 9.99                      | 18.81                     | 57.91                       | 0.39                          |
| 4000.00                 | 0.64                 | 241.76                    | 3999.70   | 9.60        | 15.06       | 9.60                      | 17.86                     | 57.48                       | 0.20                          |
| 4100.00                 | 0.42                 | 251.48                    | 4099.70   | 9.22        | 14.22       | 9.22                      | 16.95                     | 57.05                       | 0.24                          |
| 4200.00                 | 0.52                 | 238.90                    | 4199.69   | 8.87        | 13.49       | 8.87                      | 16.15                     | 56.67                       | 0.14                          |
| 4300.00                 | 0.88                 | 266.35                    | 4299.69   | 8.59        | 12.34       | 8.59                      | 15.04                     | 55.16                       | 0.48                          |
| 4400.00                 | 0.62                 | 273.96                    | 4399.68   | 8.58        | 11.04       | 8.58                      | 13.98                     | 52.15                       | 0.28                          |
| 4500.00                 | 0.65                 | 281.66                    | 4499.67   | 8.73        | 9.95        | 8.73                      | 13.23                     | 48.72                       | 0.09                          |
| 4600.00                 | 0.81                 | 266.82                    | 4599.66   | 8.81        | 8.69        | 8.81                      | 12.37                     | 44.61                       | 0.25                          |
| 4700.00                 | 1.37                 | 263.86                    | 4699.65   | 8.64        | 6.79        | 8.64                      | 10.99                     | 38.19                       | 0.56                          |
| 4800.00                 | 1.57                 | 262.99                    | 4799.61   | 8.34        | 4.25        | 8.34                      | 9.36                      | 26.98                       | 0.21                          |
| 4900.00                 | 2.55                 | 263.63                    | 4899.55   | 7.93        | 0.68        | 7.93                      | 7.96                      | 4.87                        | 0.98                          |
| 5000.00                 | 3.31                 | 265.15                    | 4999.42   | 7.44        | -4.41       | 7.44                      | 8.65                      | 329.34                      | 0.76                          |
| 5100.00                 | 3.16                 | 254.39                    | 5099.26   | 6.45        | -9.94       | 6.45                      | 11.85                     | 302.98                      | 0.62                          |
| 5200.00                 | 3.07                 | 263.49                    | 5199.11   | 5.41        | -15.26      | 5.41                      | 16.19                     | 289.50                      | 0.50                          |
| 5300.00                 | 2.89                 | 266.88                    | 5298.97   | 4.97        | -20.45      | 4.97                      | 21.04                     | 283.65                      | 0.25                          |
| 5400.00                 | 2.50                 | 249.09                    | 5398.87   | 4.05        | -25.00      | 4.05                      | 25.33                     | 279.20                      | 0.92                          |
| 5500.00                 | 2.42                 | 257.74                    | 5498.77   | 2.82        | -29.10      | 2.82                      | 29.24                     | 275.54                      | 0.38                          |
| 5600.00                 | 2.57                 | 259.74                    | 5598.68   | 1.98        | -33.37      | 1.98                      | 33.43                     | 273.39                      | 0.17                          |
| 5700.00                 | 2.47                 | 261.02                    | 5698.58   | 1.24        | -37.71      | 1.24                      | 37.73                     | 271.89                      | 0.11                          |

| 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 |
|-------------------------|----------------------|---------------------------|-----------|-------------|-------------|---------------------------|---------------------------|-----------------------------|-------------------------------|
| 5800.00                 | 2.62                 | 260.30                    | 5798.48   | 0.52        | -42.10      | 0.52                      | 42.10                     | 270.71                      | 0.15                          |
| 5900.00                 | 2.79                 | 263.40                    | 5898.37   | -0.15       | -46.77      | -0.15                     | 46.77                     | 269.82                      | 0.22                          |
| 6000.00                 | 2.96                 | 269.93                    | 5998.25   | -0.43       | -51.76      | -0.43                     | 51.76                     | 269.53                      | 0.37                          |
| 6100.00                 | 2.82                 | 256.15                    | 6098.12   | -1.02       | -56.73      | -1.02                     | 56.74                     | 268.97                      | 0.71                          |
| 6200.00                 | 2.65                 | 251.29                    | 6198.01   | -2.35       | -61.31      | -2.35                     | 61.35                     | 267.80                      | 0.29                          |
| 6300.00                 | 2.49                 | 253.32                    | 6297.91   | -3.71       | -65.57      | -3.71                     | 65.68                     | 266.76                      | 0.18                          |
| 6400.00                 | 2.15                 | 256.00                    | 6397.82   | -4.79       | -69.48      | -4.79                     | 69.64                     | 266.06                      | 0.35                          |
| 6500.00                 | 1.74                 | 261.09                    | 6497.77   | -5.48       | -72.80      | -5.48                     | 73.01                     | 265.69                      | 0.45                          |
| 6600.00                 | 1.41                 | 270.14                    | 6597.73   | -5.71       | -75.53      | -5.71                     | 75.74                     | 265.67                      | 0.41                          |
| 6700.00                 | 1.32                 | 281.04                    | 6697.70   | -5.49       | -77.88      | -5.49                     | 78.08                     | 265.97                      | 0.27                          |
| 6800.00                 | 0.86                 | 319.07                    | 6797.68   | -4.70       | -79.50      | -4.70                     | 79.64                     | 266.61                      | 0.83                          |
| 6900.00                 | 0.89                 | 327.86                    | 6897.67   | -3.47       | -80.41      | -3.47                     | 80.49                     | 267.53                      | 0.14                          |
| 7000.00                 | 0.95                 | 324.58                    | 6997.66   | -2.14       | -81.30      | -2.14                     | 81.33                     | 268.49                      | 0.07                          |
| 7100.00                 | 0.91                 | 348.26                    | 7097.65   | -0.70       | -81.94      | -0.70                     | 81.95                     | 269.51                      | 0.38                          |
| 7200.00                 | 0.45                 | 341.25                    | 7197.64   | 0.45        | -82.23      | 0.45                      | 82.23                     | 270.31                      | 0.46                          |
| 7300.00                 | 0.70                 | 331.06                    | 7297.63   | 1.36        | -82.65      | 1.36                      | 82.66                     | 270.94                      | 0.27                          |
| 7400.00                 | 0.55                 | 352.29                    | 7397.63   | 2.37        | -83.01      | 2.37                      | 83.04                     | 271.63                      | 0.27                          |
| 7500.00                 | 0.43                 | 13.33                     | 7497.62   | 3.20        | -82.99      | 3.20                      | 83.05                     | 272.21                      | 0.22                          |
| 7600.00                 | 0.33                 | 355.49                    | 7597.62   | 3.85        | -82.93      | 3.85                      | 83.02                     | 272.66                      | 0.15                          |
| 7700.00                 | 0.67                 | 320.57                    | 7697.62   | 4.59        | -83.32      | 4.59                      | 83.45                     | 273.15                      | 0.45                          |
| 7800.00                 | 0.94                 | 246.97                    | 7797.61   | 4.72        | -84.45      | 4.72                      | 84.58                     | 273.20                      | 0.99                          |
| 7900.00                 | 2.19                 | 226.66                    | 7897.57   | 3.09        | -86.59      | 3.09                      | 86.65                     | 272.04                      | 1.35                          |
| 8000.00                 | 2.16                 | 222.26                    | 7997.50   | 0.38        | -89.25      | 0.38                      | 89.26                     | 270.24                      | 0.17                          |
| 8100.00                 | 1.88                 | 225.70                    | 8097.44   | -2.16       | -91.70      | -2.16                     | 91.72                     | 268.65                      | 0.31                          |
| 8200.00                 | 1.48                 | 233.17                    | 8197.39   | -4.08       | -93.90      | -4.08                     | 93.99                     | 267.51                      | 0.46                          |
| 8230.00                 | 1.31                 | 231.32                    | 8227.39   | -4.53       | -94.48      | -4.53                     | 94.59                     | 267.26                      | 0.59                          |



Vaughn Energy Services  
Woodward, OK  
580-254-5000  
Surveyor: Vincent Marasco  
Blue Thunder 5 Federal Com No. 005H / API 30-015-42016





## Standard\_report



**Company:** COG Operating LLC  
**Project:** Eddy County, New Mexico  
**Site:** Blue Thunder Federal Com  
**Well:** Blue Thunder Federal Com Well No. 5H  
**Wellbore:** Original Hole  
**Design:** Surveys Original Hole

**Local Co-ordinate Reference:** Well Blue Thunder Federal Com Well No. 5H  
**TVD Reference:** RKB=3565+18 @ 3583.00usft (Patriot 6)  
**MD Reference:** RKB=3565+18 @ 3583.00usft (Patriot 6)  
**North Reference:** Grid  
**Survey Calculation Method:** Minimum Curvature  
**Database:** EDM 5000.1 Ddatabase

|                    |                                      |                      |                |
|--------------------|--------------------------------------|----------------------|----------------|
| <b>Project</b>     | Eddy County, New Mexico              |                      |                |
| <b>Map System:</b> | US State Plane 1927 (Exact solution) | <b>System Datum:</b> | Mean Sea Level |
| <b>Geo Datum:</b>  | NAD 1927 (NADCON CONUS)              |                      |                |
| <b>Map Zone:</b>   | New Mexico East 3001                 |                      |                |

|                              |                          |                          |                 |
|------------------------------|--------------------------|--------------------------|-----------------|
| <b>Site</b>                  | Blue Thunder Federal Com |                          |                 |
| <b>Site Position:</b>        |                          | <b>Northing:</b>         | 613,776.30 usft |
| <b>From:</b>                 | Map                      | <b>Easting:</b>          | 638,966.80 usft |
| <b>Position Uncertainty:</b> | 0.00 usft                | <b>Slot Radius:</b>      | 13-3/16 "       |
|                              |                          | <b>Latitude:</b>         | 32.68655697     |
|                              |                          | <b>Longitude:</b>        | -103.88164968   |
|                              |                          | <b>Grid Convergence:</b> | 0.24 °          |

|                             |                                      |           |                            |
|-----------------------------|--------------------------------------|-----------|----------------------------|
| <b>Well</b>                 | Blue Thunder Federal Com Well No. 5H |           |                            |
| <b>Well Position</b>        | <b>+N/-S</b>                         | 0.00 usft | <b>Northing:</b>           |
|                             | <b>+E/-W</b>                         | 0.00 usft | <b>Easting:</b>            |
| <b>Position Uncertainty</b> |                                      | 0.00 usft | <b>Wellhead Elevation:</b> |
|                             |                                      |           | usft                       |
|                             |                                      |           | <b>Latitude:</b>           |
|                             |                                      |           | 32.68655697                |
|                             |                                      |           | <b>Longitude:</b>          |
|                             |                                      |           | -103.88164968              |
|                             |                                      |           | <b>Ground Level:</b>       |
|                             |                                      |           | 3,565.00 usft              |

|                  |                   |                    |                       |
|------------------|-------------------|--------------------|-----------------------|
| <b>Wellbore</b>  | Original Hole     |                    |                       |
| <b>Magnetics</b> | <b>Model Name</b> | <b>Sample Date</b> | <b>Declination</b>    |
|                  |                   |                    | (°)                   |
|                  | IGRF2010          | 2/21/2014          | 7.43                  |
|                  |                   |                    | <b>Dip Angle</b>      |
|                  |                   |                    | (°)                   |
|                  |                   |                    | 60.49                 |
|                  |                   |                    | <b>Field Strength</b> |
|                  |                   |                    | (nT)                  |
|                  |                   |                    | 48,591                |

|                          |                         |                      |                  |
|--------------------------|-------------------------|----------------------|------------------|
| <b>Design:</b>           | Surveys Original Hole   |                      |                  |
| <b>Audit Notes:</b>      |                         |                      |                  |
| <b>Version:</b>          | 1.0                     | <b>Phase:</b>        | ACTUAL           |
|                          |                         | <b>Tie On Depth:</b> | 0.00             |
| <b>Vertical Section:</b> | <b>Depth From (TVD)</b> | <b>+N/-S</b>         | <b>+E/-W</b>     |
|                          | (usft)                  | (usft)               | (usft)           |
|                          | 0.00                    | 0.00                 | 0.00             |
|                          |                         |                      | <b>Direction</b> |
|                          |                         |                      | (°)              |
|                          |                         |                      | 273.52           |



## Standard\_report



Company: COG Operating LLC  
Project: Eddy County, New Mexico  
Site: Blue Thunder Federal Com  
Well: Blue Thunder Federal Com Well No. 5H  
Wellbore: Original Hole  
Design: Surveys Original Hole

Local Co-ordinate Reference: Well Blue Thunder Federal Com Well No. 5H  
TVD Reference: RKB=3565+18 @ 3583.00usft (Patriot 6)  
MD Reference: RKB=3565+18 @ 3583.00usft (Patriot 6)  
North Reference: Grid  
Survey Calculation Method: Minimum Curvature  
Database: EDM 5000.1 Ddatabase

| Survey Program | Date      | 3/20/2014            |            |                                  |  |
|----------------|-----------|----------------------|------------|----------------------------------|--|
| From (usft)    | To (usft) | Survey (Wellbore)    | Tool Name  | Description                      |  |
| 100.00         | 8,230.00  | Gyro (Original Hole) | NS-GYRO-MS | North sensing gyrocompassing m/s |  |
| 8,275.00       | 13,705.00 | MWD (Original Hole)  | MWD        | MWD - Standard                   |  |

| Survey | MD (usft) | Inc (°) | Azi (azimuth) (°) | TVD (usft) | N/S (usft) | E/W (usft) | DLeg (°/100ft) | V. Sec (usft) | Northing (usft) | Easting (usft) |
|--------|-----------|---------|-------------------|------------|------------|------------|----------------|---------------|-----------------|----------------|
|        | 0.00      | 0.00    | 0.00              | 0.00       | 0.00       | 0.00       | 0.00           | 0.00          | 613,776.30      | 638,966.80     |
|        | 100.00    | 0.08    | 293.67            | 100.00     | 0.03       | -0.06      | 0.08           | 0.07          | 613,776.33      | 638,966.74     |
| Gyro   | 200.00    | 0.14    | 230.82            | 200.00     | -0.02      | -0.22      | 0.13           | 0.22          | 613,776.28      | 638,966.58     |
|        | 300.00    | 0.25    | 253.72            | 300.00     | -0.16      | -0.53      | 0.13           | 0.52          | 613,776.14      | 638,966.27     |
|        | 400.00    | 0.27    | 261.45            | 400.00     | -0.26      | -0.97      | 0.04           | 0.95          | 613,776.04      | 638,965.83     |
|        | 500.00    | 0.30    | 246.11            | 500.00     | -0.40      | -1.44      | 0.08           | 1.41          | 613,775.90      | 638,965.36     |
|        | 600.00    | 0.31    | 221.81            | 600.00     | -0.70      | -1.86      | 0.13           | 1.81          | 613,775.60      | 638,964.94     |
|        | 700.00    | 0.25    | 217.42            | 699.99     | -1.08      | -2.17      | 0.06           | 2.10          | 613,775.22      | 638,964.63     |
|        | 800.00    | 0.16    | 153.86            | 799.99     | -1.38      | -2.25      | 0.23           | 2.16          | 613,774.92      | 638,964.55     |
|        | 900.00    | 0.24    | 157.63            | 899.99     | -1.70      | -2.10      | 0.08           | 2.00          | 613,774.60      | 638,964.70     |
|        | 1,000.00  | 0.20    | 142.37            | 999.99     | -2.03      | -1.92      | 0.07           | 1.79          | 613,774.27      | 638,964.88     |
|        | 1,100.00  | 0.29    | 116.69            | 1,099.99   | -2.28      | -1.59      | 0.14           | 1.44          | 613,774.02      | 638,965.21     |
|        | 1,200.00  | 0.34    | 108.22            | 1,199.99   | -2.49      | -1.08      | 0.07           | 0.92          | 613,773.81      | 638,965.72     |
|        | 1,300.00  | 0.40    | 79.85             | 1,299.99   | -2.52      | -0.45      | 0.19           | 0.30          | 613,773.78      | 638,966.35     |
|        | 1,400.00  | 0.60    | 68.13             | 1,399.98   | -2.26      | 0.38       | 0.22           | -0.52         | 613,774.04      | 638,967.18     |
|        | 1,500.00  | 0.68    | 69.14             | 1,499.98   | -1.86      | 1.42       | 0.08           | -1.53         | 613,774.44      | 638,968.22     |
|        | 1,600.00  | 0.73    | 77.89             | 1,599.97   | -1.51      | 2.60       | 0.12           | -2.68         | 613,774.79      | 638,969.40     |
|        | 1,700.00  | 0.67    | 57.05             | 1,699.96   | -1.06      | 3.71       | 0.26           | -3.77         | 613,775.24      | 638,970.51     |
|        | 1,800.00  | 0.95    | 57.64             | 1,799.95   | -0.30      | 4.90       | 0.28           | -4.91         | 613,776.00      | 638,971.70     |
|        | 1,900.00  | 0.89    | 87.94             | 1,899.94   | 0.17       | 6.38       | 0.48           | -6.35         | 613,776.47      | 638,973.18     |



## Standard\_report



Company: COG Operating LLC  
Project: Eddy County, New Mexico  
Site: Blue Thunder Federal Com  
Well: Blue Thunder Federal Com Well No. 5H  
Wellbore: Original Hole  
Design: Surveys Original Hole

Local Co-ordinate Reference: Well Blue Thunder Federal Com Well No. 5H  
TVD Reference: RKB=3565+18 @ 3583.00usft (Patriot 6)  
MD Reference: RKB=3565+18 @ 3583.00usft (Patriot 6)  
North Reference: Grid  
Survey Calculation Method: Minimum Curvature  
Database: EDM 5000.1 Ddatabase

## Survey

| MD<br>(usft) | Inc<br>(°) | Azi (azimuth)<br>(°) | TVD<br>(usft) | N/S<br>(usft) | E/W<br>(usft) | DLeg<br>(°/100ft) | V. Sec<br>(usft) | Northing<br>(usft) | Easting<br>(usft) |
|--------------|------------|----------------------|---------------|---------------|---------------|-------------------|------------------|--------------------|-------------------|
| 2,000.00     | 1.41       | 73.46                | 1,999.92      | 0.55          | 8.33          | 0.59              | -8.28            | 613,776.85         | 638,975.13        |
| 2,100.00     | 1.88       | 71.49                | 2,099.88      | 1.42          | 11.07         | 0.47              | -10.96           | 613,777.72         | 638,977.87        |
| 2,200.00     | 2.13       | 65.03                | 2,199.82      | 2.73          | 14.31         | 0.34              | -14.11           | 613,779.03         | 638,981.11        |
| 2,300.00     | 1.44       | 69.10                | 2,299.77      | 3.96          | 17.17         | 0.70              | -16.89           | 613,780.26         | 638,983.97        |
| 2,400.00     | 0.84       | 58.01                | 2,399.75      | 4.80          | 18.96         | 0.64              | -18.63           | 613,781.10         | 638,985.76        |
| 2,500.00     | 0.75       | 53.21                | 2,499.74      | 5.58          | 20.11         | 0.11              | -19.73           | 613,781.88         | 638,986.91        |
| 2,600.00     | 0.34       | 31.59                | 2,599.73      | 6.22          | 20.79         | 0.45              | -20.37           | 613,782.52         | 638,987.59        |
| 2,700.00     | 0.55       | 356.43               | 2,699.73      | 6.95          | 20.91         | 0.34              | -20.45           | 613,783.25         | 638,987.71        |
| 2,800.00     | 0.27       | 1.38                 | 2,799.73      | 7.67          | 20.89         | 0.28              | -20.38           | 613,783.97         | 638,987.69        |
| 2,900.00     | 0.13       | 334.85               | 2,899.73      | 8.01          | 20.85         | 0.16              | -20.31           | 613,784.31         | 638,987.65        |
| 3,000.00     | 0.38       | 347.36               | 2,999.73      | 8.43          | 20.72         | 0.25              | -20.17           | 613,784.73         | 638,987.52        |
| 3,100.00     | 0.08       | 294.86               | 3,099.73      | 8.79          | 20.59         | 0.34              | -20.01           | 613,785.09         | 638,987.39        |
| 3,200.00     | 0.27       | 321.19               | 3,199.73      | 9.00          | 20.38         | 0.20              | -19.79           | 613,785.30         | 638,987.18        |
| 3,300.00     | 0.16       | 305.00               | 3,299.73      | 9.26          | 20.12         | 0.12              | -19.51           | 613,785.56         | 638,986.92        |
| 3,400.00     | 0.32       | 308.29               | 3,399.72      | 9.52          | 19.78         | 0.16              | -19.16           | 613,785.82         | 638,986.58        |
| 3,500.00     | 0.33       | 269.68               | 3,499.72      | 9.69          | 19.27         | 0.22              | -18.64           | 613,785.99         | 638,986.07        |
| 3,600.00     | 0.36       | 287.73               | 3,599.72      | 9.78          | 18.69         | 0.11              | -18.05           | 613,786.08         | 638,985.49        |
| 3,700.00     | 0.56       | 265.81               | 3,699.72      | 9.84          | 17.90         | 0.26              | -17.26           | 613,786.14         | 638,984.70        |
| 3,800.00     | 0.67       | 285.97               | 3,799.71      | 9.97          | 16.85         | 0.24              | -16.21           | 613,786.27         | 638,983.65        |
| 3,900.00     | 0.47       | 251.62               | 3,899.71      | 10.00         | 15.90         | 0.39              | -15.26           | 613,786.30         | 638,982.70        |
| 4,000.00     | 0.64       | 241.76               | 3,999.70      | 9.61          | 15.02         | 0.19              | -14.40           | 613,785.91         | 638,981.82        |
| 4,100.00     | 0.42       | 251.48               | 4,099.70      | 9.22          | 14.18         | 0.24              | -13.59           | 613,785.52         | 638,980.98        |
| 4,200.00     | 0.52       | 238.90               | 4,199.69      | 8.87          | 13.44         | 0.14              | -12.87           | 613,785.17         | 638,980.24        |
| 4,300.00     | 0.88       | 266.35               | 4,299.69      | 8.59          | 12.29         | 0.48              | -11.74           | 613,784.89         | 638,979.09        |
| 4,400.00     | 0.62       | 273.96               | 4,399.68      | 8.58          | 10.98         | 0.28              | -10.43           | 613,784.88         | 638,977.78        |
| 4,500.00     | 0.65       | 281.66               | 4,499.67      | 8.73          | 9.89          | 0.09              | -9.33            | 613,785.03         | 638,976.69        |
| 4,600.00     | 0.81       | 266.82               | 4,599.66      | 8.81          | 8.63          | 0.25              | -8.07            | 613,785.11         | 638,975.43        |



## Standard\_report



Company: COG Operating LLC  
Project: Eddy County, New Mexico  
Site: Blue Thunder Federal Com  
Well: Blue Thunder Federal Com Well No. 5H  
Wellbore: Original Hole  
Design: Surveys Original Hole

Local Co-ordinate Reference: Well Blue Thunder Federal Com Well No. 5H  
TVD Reference: RKB=3565+18 @ 3583.00usft (Patriot 6)  
MD Reference: RKB=3565+18 @ 3583.00usft (Patriot 6)  
North Reference: Grid  
Survey Calculation Method: Minimum Curvature  
Database: EDM 5000.1 Ddatabase

## Survey

| MD<br>(usft) | Inc<br>(°) | Azi (azimuth)<br>(°) | TVD<br>(usft) | N/S<br>(usft) | E/W<br>(usft) | DLeg<br>(°/100ft) | V. Sec<br>(usft) | Northing<br>(usft) | Easting<br>(usft) |
|--------------|------------|----------------------|---------------|---------------|---------------|-------------------|------------------|--------------------|-------------------|
| 4,700.00     | 1.37       | 263.86               | 4,699.65      | 8.64          | 6.73          | 0.56              | -6.19            | 613,784.94         | 638,973.53        |
| 4,800.00     | 1.57       | 262.99               | 4,799.61      | 8.34          | 4.18          | 0.20              | -3.66            | 613,784.64         | 638,970.98        |
| 4,900.00     | 2.55       | 263.63               | 4,899.55      | 7.93          | 0.61          | 0.98              | -0.12            | 613,784.23         | 638,967.41        |
| 5,000.00     | 3.31       | 265.15               | 4,999.42      | 7.44          | -4.48         | 0.76              | 4.92             | 613,783.74         | 638,962.32        |
| 5,100.00     | 3.16       | 254.39               | 5,099.26      | 6.45          | -10.01        | 0.62              | 10.38            | 613,782.75         | 638,956.79        |
| 5,200.00     | 3.07       | 263.49               | 5,199.11      | 5.41          | -15.32        | 0.50              | 15.62            | 613,781.71         | 638,951.48        |
| 5,300.00     | 2.89       | 266.88               | 5,298.98      | 4.97          | -20.50        | 0.25              | 20.77            | 613,781.27         | 638,946.30        |
| 5,400.00     | 2.50       | 249.09               | 5,398.87      | 4.05          | -25.05        | 0.92              | 25.26            | 613,780.35         | 638,941.75        |
| 5,500.00     | 2.42       | 257.74               | 5,498.77      | 2.83          | -29.15        | 0.38              | 29.27            | 613,779.13         | 638,937.65        |
| 5,600.00     | 2.57       | 259.74               | 5,598.68      | 1.98          | -33.42        | 0.17              | 33.48            | 613,778.28         | 638,933.38        |
| 5,700.00     | 2.47       | 261.02               | 5,698.58      | 1.24          | -37.76        | 0.11              | 37.76            | 613,777.54         | 638,929.04        |
| 5,800.00     | 2.62       | 260.30               | 5,798.48      | 0.52          | -42.14        | 0.15              | 42.09            | 613,776.82         | 638,924.66        |
| 5,900.00     | 2.79       | 263.40               | 5,898.37      | -0.14         | -46.81        | 0.22              | 46.71            | 613,776.16         | 638,919.99        |
| 6,000.00     | 2.96       | 269.93               | 5,998.25      | -0.43         | -51.81        | 0.37              | 51.69            | 613,775.87         | 638,914.99        |
| 6,100.00     | 2.82       | 256.15               | 6,098.12      | -1.02         | -56.78        | 0.71              | 56.61            | 613,775.28         | 638,910.02        |
| 6,200.00     | 2.65       | 251.29               | 6,198.01      | -2.35         | -61.36        | 0.29              | 61.10            | 613,773.95         | 638,905.44        |
| 6,300.00     | 2.49       | 253.32               | 6,297.91      | -3.71         | -65.63        | 0.18              | 65.28            | 613,772.59         | 638,901.17        |
| 6,400.00     | 2.15       | 256.00               | 6,397.82      | -4.79         | -69.53        | 0.36              | 69.10            | 613,771.51         | 638,897.27        |
| 6,500.00     | 1.74       | 261.09               | 6,497.77      | -5.48         | -72.85        | 0.44              | 72.38            | 613,770.82         | 638,893.95        |
| 6,600.00     | 1.41       | 270.14               | 6,597.73      | -5.71         | -75.58        | 0.41              | 75.09            | 613,770.59         | 638,891.22        |
| 6,700.00     | 1.32       | 281.04               | 6,697.70      | -5.49         | -77.94        | 0.27              | 77.46            | 613,770.81         | 638,888.86        |
| 6,800.00     | 0.86       | 319.07               | 6,797.68      | -4.70         | -79.56        | 0.83              | 79.12            | 613,771.60         | 638,887.24        |
| 6,900.00     | 0.89       | 327.86               | 6,897.67      | -3.48         | -80.47        | 0.14              | 80.10            | 613,772.82         | 638,886.33        |
| 7,000.00     | 0.95       | 324.58               | 6,997.66      | -2.14         | -81.36        | 0.08              | 81.08            | 613,774.16         | 638,885.44        |
| 7,100.00     | 0.91       | 348.26               | 7,097.65      | -0.69         | -82.00        | 0.38              | 81.81            | 613,775.61         | 638,884.80        |
| 7,200.00     | 0.45       | 341.25               | 7,197.64      | 0.46          | -82.29        | 0.47              | 82.16            | 613,776.76         | 638,884.51        |
| 7,300.00     | 0.70       | 331.06               | 7,297.63      | 1.36          | -82.71        | 0.27              | 82.64            | 613,777.66         | 638,884.09        |



## Standard\_report



**Company:** COG Operating LLC  
**Project:** Eddy County, New Mexico  
**Site:** Blue Thunder Federal Com  
**Well:** Blue Thunder Federal Com Well No. 5H  
**Wellbore:** Original Hole  
**Design:** Surveys Original Hole

**Local Co-ordinate Reference:** Well Blue Thunder Federal Com Well No. 5H  
**TVD Reference:** RKB=3565+18 @ 3583.00usft (Patriot 6)  
**MD Reference:** RKB=3565+18 @ 3583.00usft (Patriot 6)  
**North Reference:** Grid  
**Survey Calculation Method:** Minimum Curvature  
**Database:** EDM 5000.1 Ddatabase

## Survey

| MD<br>(usft) | Inc.<br>(°) | Azi (azimuth)<br>(°) | TVD<br>(usft) | N/S<br>(usft) | E/W<br>(usft) | DLeg<br>(°/100ft) | V. Sec<br>(usft) | Northing<br>(usft) | Easting<br>(usft) |
|--------------|-------------|----------------------|---------------|---------------|---------------|-------------------|------------------|--------------------|-------------------|
| 7,400.00     | 0.55        | 352.29               | 7,397.63      | 2.37          | -83.07        | 0.27              | 83.06            | 613,778.67         | 638,883.73        |
| 7,500.00     | 0.43        | 13.33                | 7,497.62      | 3.22          | -83.05        | 0.21              | 83.09            | 613,779.52         | 638,883.75        |
| 7,600.00     | 0.33        | 355.49               | 7,597.62      | 3.87          | -82.99        | 0.15              | 83.07            | 613,780.17         | 638,883.81        |
| 7,700.00     | 0.67        | 320.57               | 7,697.62      | 4.61          | -83.38        | 0.44              | 83.51            | 613,780.91         | 638,883.42        |
| 7,800.00     | 0.94        | 246.97               | 7,797.61      | 4.74          | -84.51        | 0.99              | 84.64            | 613,781.04         | 638,882.29        |
| 7,900.00     | 2.19        | 226.66               | 7,897.57      | 3.10          | -86.65        | 1.35              | 86.68            | 613,779.40         | 638,880.15        |
| 8,000.00     | 2.16        | 222.26               | 7,997.50      | 0.40          | -89.31        | 0.17              | 89.16            | 613,776.70         | 638,877.49        |
| 8,100.00     | 1.88        | 225.70               | 8,097.44      | -2.14         | -91.75        | 0.31              | 91.44            | 613,774.16         | 638,875.05        |
| 8,200.00     | 1.48        | 233.17               | 8,197.40      | -4.06         | -93.96        | 0.46              | 93.53            | 613,772.24         | 638,872.84        |
| 8,230.00     | 1.31        | 231.32               | 8,227.39      | -4.51         | -94.53        | 0.59              | 94.08            | 613,771.79         | 638,872.27        |
| 8,275.00     | 1.00        | 244.90               | 8,272.38      | -5.00         | -95.29        | 0.91              | 94.81            | 613,771.30         | 638,871.51        |

## MWD surveys

|          |       |        |          |       |         |       |        |            |            |
|----------|-------|--------|----------|-------|---------|-------|--------|------------|------------|
| 8,306.00 | 2.70  | 293.10 | 8,303.36 | -4.82 | -96.21  | 6.99  | 95.73  | 613,771.48 | 638,870.59 |
| 8,338.00 | 6.40  | 285.50 | 8,335.26 | -4.05 | -98.62  | 11.69 | 98.19  | 613,772.25 | 638,868.18 |
| 8,370.00 | 10.80 | 280.90 | 8,366.89 | -3.01 | -103.29 | 13.91 | 102.91 | 613,773.29 | 638,863.51 |
| 8,401.00 | 15.40 | 280.60 | 8,397.07 | -1.70 | -110.19 | 14.84 | 109.88 | 613,774.60 | 638,856.61 |
| 8,433.00 | 19.50 | 279.70 | 8,427.59 | -0.02 | -119.63 | 12.84 | 119.41 | 613,776.28 | 638,847.17 |
| 8,465.00 | 22.70 | 278.30 | 8,457.44 | 1.77  | -131.01 | 10.12 | 130.87 | 613,778.07 | 638,835.79 |
| 8,496.00 | 25.60 | 276.90 | 8,485.73 | 3.44  | -143.58 | 9.53  | 143.52 | 613,779.74 | 638,823.22 |
| 8,528.00 | 28.20 | 276.00 | 8,514.26 | 5.06  | -157.97 | 8.22  | 157.98 | 613,781.36 | 638,808.83 |
| 8,560.00 | 30.40 | 275.30 | 8,542.17 | 6.60  | -173.55 | 6.96  | 173.63 | 613,782.90 | 638,793.25 |
| 8,591.00 | 31.70 | 276.40 | 8,568.73 | 8.23  | -189.45 | 4.58  | 189.60 | 613,784.53 | 638,777.35 |
| 8,624.00 | 31.60 | 278.00 | 8,596.82 | 10.40 | -206.63 | 2.56  | 206.88 | 613,786.70 | 638,760.17 |
| 8,655.00 | 33.80 | 276.00 | 8,622.90 | 12.44 | -223.25 | 7.91  | 223.60 | 613,788.74 | 638,743.55 |
| 8,687.00 | 38.60 | 273.70 | 8,648.72 | 14.01 | -242.08 | 15.59 | 242.48 | 613,790.31 | 638,724.72 |
| 8,719.00 | 43.90 | 272.70 | 8,672.77 | 15.18 | -263.14 | 16.69 | 263.57 | 613,791.48 | 638,703.66 |
| 8,750.00 | 48.50 | 272.30 | 8,694.22 | 16.15 | -285.48 | 14.87 | 285.94 | 613,792.45 | 638,681.32 |



## Standard\_report



Company: COG Operating LLC  
Project: Eddy County, New Mexico  
Site: Blue Thunder Federal Com  
Well: Blue Thunder Federal Com Well No. 5H  
Wellbore: Original Hole  
Design: Surveys Original Hole

Local Co-ordinate Reference: Well Blue Thunder Federal Com Well No. 5H  
TVD Reference: RKB=3565+18 @ 3583.00usft (Patriot 6)  
MD Reference: RKB=3565+18 @ 3583.00usft (Patriot 6)  
North Reference: Grid  
Survey Calculation Method: Minimum Curvature  
Database: EDM 5000.1 Ddatabase

## Survey

| MD<br>(usft)                                       | Inc<br>(°) | Azi (azimuth)<br>(°) | TVD<br>(usft) | N/S<br>(usft) | E/W<br>(usft) | DLeg<br>(°/100ft) | V. Sec<br>(usft) | Northing<br>(usft) | Easting<br>(usft) |
|----------------------------------------------------|------------|----------------------|---------------|---------------|---------------|-------------------|------------------|--------------------|-------------------|
| 8,782.00                                           | 52.00      | 272.70               | 8,714.68      | 17.23         | -310.06       | 10.98             | 310.53           | 613,793.53         | 638,656.74        |
| 8,813.00                                           | 54.60      | 272.90               | 8,733.21      | 18.44         | -334.88       | 8.40              | 335.38           | 613,794.74         | 638,631.92        |
| 8,845.00                                           | 58.20      | 273.00               | 8,750.91      | 19.81         | -361.50       | 11.25             | 362.03           | 613,796.11         | 638,605.30        |
| 8,877.00                                           | 62.30      | 273.20               | 8,766.79      | 21.32         | -389.23       | 12.82             | 389.81           | 613,797.62         | 638,577.57        |
| 8,908.00                                           | 66.00      | 274.10               | 8,780.30      | 23.10         | -417.07       | 12.22             | 417.70           | 613,799.40         | 638,549.73        |
| 8,940.00                                           | 69.50      | 275.10               | 8,792.42      | 25.47         | -446.59       | 11.31             | 447.31           | 613,801.77         | 638,520.21        |
| 8,972.00                                           | 72.70      | 275.70               | 8,802.78      | 28.32         | -476.72       | 10.16             | 477.56           | 613,804.62         | 638,490.08        |
| 9,003.00                                           | 74.50      | 275.70               | 8,811.53      | 31.28         | -506.31       | 5.81              | 507.28           | 613,807.58         | 638,460.49        |
| 9,035.00                                           | 76.60      | 274.60               | 8,819.52      | 34.06         | -537.17       | 7.36              | 538.25           | 613,810.36         | 638,429.63        |
| 9,070.00                                           | 79.10      | 273.60               | 8,826.88      | 36.50         | -571.30       | 7.67              | 572.46           | 613,812.80         | 638,395.50        |
| 9,085.00                                           | 79.66      | 273.32               | 8,829.65      | 37.39         | -586.01       | 4.18              | 587.20           | 613,813.69         | 638,380.79        |
| 330 Hard line intercept @ 9085 MD 1671 FSL 330 FWL |            |                      |               |               |               |                   |                  |                    |                   |
| 9,102.00                                           | 80.30      | 273.00               | 8,832.61      | 38.31         | -602.73       | 4.18              | 603.94           | 613,814.61         | 638,364.07        |
| 9,133.00                                           | 81.20      | 272.00               | 8,837.59      | 39.65         | -633.30       | 4.31              | 634.54           | 613,815.95         | 638,333.50        |
| 9,165.00                                           | 84.10      | 271.50               | 8,841.68      | 40.62         | -665.01       | 9.19              | 666.25           | 613,816.92         | 638,301.79        |
| 9,197.00                                           | 85.90      | 271.50               | 8,844.47      | 41.45         | -696.88       | 5.62              | 698.11           | 613,817.75         | 638,269.92        |
| 9,260.00                                           | 88.90      | 272.30               | 8,847.33      | 43.54         | -759.77       | 4.93              | 761.01           | 613,819.84         | 638,207.03        |
| 9,355.00                                           | 91.90      | 271.80               | 8,846.67      | 46.94         | -854.70       | 3.20              | 855.97           | 613,823.24         | 638,112.10        |
| 9,450.00                                           | 91.70      | 272.00               | 8,843.68      | 50.08         | -949.60       | 0.30              | 950.88           | 613,826.38         | 638,017.20        |
| 9,576.00                                           | 89.30      | 273.70               | 8,842.58      | 56.35         | -1,075.43     | 2.33              | 1,076.86         | 613,832.65         | 637,891.37        |
| 9,671.00                                           | 90.00      | 273.60               | 8,843.16      | 62.40         | -1,170.23     | 0.74              | 1,171.85         | 613,838.70         | 637,796.57        |
| 9,766.00                                           | 88.50      | 274.30               | 8,844.41      | 68.94         | -1,264.99     | 1.74              | 1,266.84         | 613,845.24         | 637,701.81        |
| 9,861.00                                           | 89.20      | 274.30               | 8,846.31      | 76.06         | -1,359.71     | 0.74              | 1,361.81         | 613,852.36         | 637,607.09        |
| 9,956.00                                           | 88.70      | 274.40               | 8,848.05      | 83.27         | -1,454.42     | 0.54              | 1,456.78         | 613,859.57         | 637,512.38        |
| 10,051.00                                          | 88.90      | 274.80               | 8,850.04      | 90.88         | -1,549.09     | 0.47              | 1,551.75         | 613,867.18         | 637,417.71        |
| 10,146.00                                          | 86.50      | 273.60               | 8,853.86      | 97.84         | -1,643.75     | 2.82              | 1,646.66         | 613,874.14         | 637,323.05        |
| 10,241.00                                          | 85.90      | 272.00               | 8,860.15      | 102.47        | -1,738.42     | 1.80              | 1,741.44         | 613,878.77         | 637,228.38        |



## Standard\_report



**Company:** COG Operating LLC  
**Project:** Eddy County, New Mexico  
**Site:** Blue Thunder Federal Com  
**Well:** Blue Thunder Federal Com Well No. 5H  
**Wellbore:** Original Hole  
**Design:** Surveys Original Hole

**Local Co-ordinate Reference:** Well Blue Thunder Federal Com Well No. 5H  
**TVD Reference:** RKB=3565+18 @ 3583.00usft (Patriot 6)  
**MD Reference:** RKB=3565+18 @ 3583.00usft (Patriot 6)  
**North Reference:** Grid  
**Survey Calculation Method:** Minimum Curvature  
**Database:** EDM 5000.1 Ddatabase

## Survey

| MD<br>(usft) | Inc<br>(°) | Azi (azimuth)<br>(°) | TVD<br>(usft) | N/S<br>(usft) | E/W<br>(usft) | DLeg<br>(°/100ft) | V. Sec<br>(usft) | Northing<br>(usft) | Easting<br>(usft) |
|--------------|------------|----------------------|---------------|---------------|---------------|-------------------|------------------|--------------------|-------------------|
| 10,304.00    | 85.60      | 271.30               | 8,864.82      | 104.28        | -1,801.22     | 1.21              | 1,804.23         | 613,880.58         | 637,165.58        |
| 10,431.00    | 86.30      | 272.30               | 8,873.79      | 108.25        | -1,927.84     | 0.96              | 1,930.85         | 613,884.55         | 637,038.96        |
| 10,558.00    | 87.80      | 272.20               | 8,880.33      | 113.23        | -2,054.57     | 1.18              | 2,057.65         | 613,889.53         | 636,912.23        |
| 10,653.00    | 90.00      | 271.60               | 8,882.15      | 116.38        | -2,149.50     | 2.40              | 2,152.59         | 613,892.68         | 636,817.30        |
| 10,716.00    | 90.00      | 273.20               | 8,882.15      | 119.02        | -2,212.44     | 2.54              | 2,215.57         | 613,895.32         | 636,754.36        |
| 10,779.00    | 90.40      | 272.20               | 8,881.93      | 121.99        | -2,275.37     | 1.71              | 2,278.56         | 613,898.29         | 636,691.43        |
| 10,843.00    | 90.70      | 271.60               | 8,881.32      | 124.11        | -2,339.33     | 1.05              | 2,342.54         | 613,900.41         | 636,627.47        |
| 10,937.00    | 91.40      | 271.60               | 8,879.59      | 126.73        | -2,433.28     | 0.74              | 2,436.47         | 613,903.03         | 636,533.52        |
| 11,027.00    | 91.90      | 271.60               | 8,877.00      | 129.25        | -2,523.20     | 0.56              | 2,526.38         | 613,905.55         | 636,443.60        |
| 11,154.00    | 90.90      | 273.20               | 8,873.90      | 134.56        | -2,650.05     | 1.49              | 2,653.31         | 613,910.86         | 636,316.75        |
| 11,249.00    | 90.70      | 272.90               | 8,872.57      | 139.62        | -2,744.90     | 0.38              | 2,748.30         | 613,915.92         | 636,221.90        |
| 11,344.00    | 89.00      | 272.20               | 8,872.82      | 143.84        | -2,839.81     | 1.94              | 2,843.28         | 613,920.14         | 636,126.99        |
| 11,439.00    | 88.50      | 270.90               | 8,874.89      | 146.41        | -2,934.75     | 1.47              | 2,938.20         | 613,922.71         | 636,032.05        |
| 11,533.00    | 89.30      | 270.80               | 8,876.70      | 147.81        | -3,028.72     | 0.86              | 3,032.08         | 613,924.11         | 635,938.08        |
| 11,628.00    | 90.00      | 271.80               | 8,877.28      | 149.96        | -3,123.69     | 1.28              | 3,127.00         | 613,926.26         | 635,843.11        |
| 11,723.00    | 88.60      | 271.60               | 8,878.44      | 152.78        | -3,218.64     | 1.49              | 3,221.95         | 613,929.08         | 635,748.16        |
| 11,818.00    | 89.10      | 273.70               | 8,880.35      | 157.17        | -3,313.51     | 2.27              | 3,316.91         | 613,933.47         | 635,653.29        |
| 11,913.00    | 88.50      | 272.50               | 8,882.34      | 162.31        | -3,408.35     | 1.41              | 3,411.89         | 613,938.61         | 635,558.45        |
| 12,008.00    | 90.90      | 273.00               | 8,882.83      | 166.87        | -3,503.23     | 2.58              | 3,506.87         | 613,943.17         | 635,463.57        |
| 12,103.00    | 90.00      | 274.80               | 8,882.09      | 173.33        | -3,598.00     | 2.12              | 3,601.86         | 613,949.63         | 635,368.80        |
| 12,198.00    | 89.30      | 274.30               | 8,882.67      | 180.86        | -3,692.70     | 0.91              | 3,696.84         | 613,957.16         | 635,274.10        |
| 12,293.00    | 90.60      | 274.60               | 8,882.75      | 188.23        | -3,787.41     | 1.40              | 3,791.83         | 613,964.53         | 635,179.39        |
| 12,388.00    | 89.90      | 275.00               | 8,882.34      | 196.18        | -3,882.08     | 0.85              | 3,886.80         | 613,972.48         | 635,084.72        |
| 12,483.00    | 89.70      | 275.30               | 8,882.67      | 204.71        | -3,976.69     | 0.38              | 3,981.76         | 613,981.01         | 634,990.11        |
| 12,578.00    | 89.30      | 275.30               | 8,883.50      | 213.48        | -4,071.28     | 0.42              | 4,076.71         | 613,989.78         | 634,895.52        |
| 12,673.00    | 88.50      | 274.80               | 8,885.32      | 221.85        | -4,165.90     | 0.99              | 4,171.66         | 613,998.15         | 634,800.90        |
| 12,768.00    | 89.60      | 274.10               | 8,886.89      | 229.22        | -4,260.60     | 1.37              | 4,266.63         | 614,005.52         | 634,706.20        |



## Standard\_report



**Company:** COG Operating LLC  
**Project:** Eddy County, New Mexico  
**Site:** Blue Thunder Federal Com  
**Well:** Blue Thunder Federal Com Well No. 5H  
**Wellbore:** Original Hole  
**Design:** Surveys Original Hole

**Local Co-ordinate Reference:** Well Blue Thunder Federal Com Well No. 5H  
**TVD Reference:** RKB=3565+18 @ 3583.00usft (Patriot 6)  
**MD Reference:** RKB=3565+18 @ 3583.00usft (Patriot 6)  
**North Reference:** Grid  
**Survey Calculation Method:** Minimum Curvature  
**Database:** EDM 5000.1 Ddatabase

## Survey

| MD<br>(usft) | Inc<br>(°) | Azi (azimuth)<br>(°) | TVD<br>(usft) | N/S<br>(usft) | E/W<br>(usft) | DLeg<br>(°/100ft) | V. Sec<br>(usft) | Northing<br>(usft) | Easting<br>(usft) |
|--------------|------------|----------------------|---------------|---------------|---------------|-------------------|------------------|--------------------|-------------------|
| 12,863.00    | 91.30      | 273.00               | 8,886.15      | 235.10        | -4,355.41     | 2.13              | 4,361.62         | 614,011.40         | 634,611.39        |
| 12,958.00    | 90.80      | 272.70               | 8,884.41      | 239.82        | -4,450.27     | 0.61              | 4,456.60         | 614,016.12         | 634,516.53        |
| 13,053.00    | 90.50      | 272.30               | 8,883.33      | 243.96        | -4,545.18     | 0.53              | 4,551.58         | 614,020.26         | 634,421.62        |
| 13,148.00    | 89.90      | 271.30               | 8,883.00      | 246.95        | -4,640.13     | 1.23              | 4,646.53         | 614,023.25         | 634,326.67        |
| 13,243.00    | 89.00      | 271.30               | 8,883.91      | 249.10        | -4,735.10     | 0.95              | 4,741.46         | 614,025.40         | 634,231.70        |
| 13,338.00    | 88.20      | 270.90               | 8,886.23      | 250.93        | -4,830.05     | 0.94              | 4,836.34         | 614,027.23         | 634,136.75        |
| 13,433.00    | 89.90      | 270.90               | 8,887.81      | 252.42        | -4,925.02     | 1.79              | 4,931.23         | 614,028.72         | 634,041.78        |
| 13,529.00    | 90.00      | 270.60               | 8,887.89      | 253.67        | -5,021.01     | 0.33              | 5,027.12         | 614,029.97         | 633,945.79        |
| 13,705.00    | 90.00      | 270.60               | 8,887.89      | 255.52        | -5,197.00     | 0.00              | 5,202.89         | 614,031.82         | 633,769.80        |

Survey projected to 13705.00 MD

## Design Annotations

| Measured<br>Depth<br>(usft) | Vertical<br>Depth<br>(usft) | Local Coordinates |                 | Comment                                            |
|-----------------------------|-----------------------------|-------------------|-----------------|----------------------------------------------------|
|                             |                             | +N/-S<br>(usft)   | +E/-W<br>(usft) |                                                    |
| 100.00                      | 100.00                      | 0.03              | -0.06           | Gyro                                               |
| 8,275.00                    | 8,272.38                    | -5.00             | -95.29          | MWD surveys                                        |
| 9,085.00                    | 8,829.65                    | 37.39             | -586.01         | 330 Hard line intercept @ 9085 MD 1671 FSL 330 FWL |
| 13,705.00                   | 8,887.89                    | 255.52            | -5,197.00       | Survey projected to 13705.00 MD                    |

# COG Operating LLC



Well: Blue Thunder Federal Com Well No. 5H  
 Site: Blue Thunder Federal Com  
 Project: Eddy County, New Mexico  
 Design: rev1  
 Rig: Patriot 6

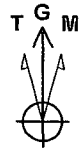
## SECTION DETAILS

| Sec | MD       | Inc   | Azi    | TVD     | +N/-S  | +E/-W    | Dleg  | TFace | Vsect   | Annotation                |
|-----|----------|-------|--------|---------|--------|----------|-------|-------|---------|---------------------------|
| 1   | 8230.00  | 1.31  | 231.32 | 8227.39 | -4.51  | -94.53   | 0.00  | 0.00  | 94.08   | Survey @ 8230.00 MD       |
| 2   | 8364.65  | 1.31  | 231.32 | 8362.00 | -6.43  | -96.94   | 0.00  | 0.00  | 96.36   | Begin 12"/100' build/turn |
| 3   | 8399.41  | 5.00  | 276.00 | 8396.70 | -6.52  | -98.76   | 12.00 | 57.41 | 98.17   | Begin 12"/100' build      |
| 4   | 8759.41  | 48.20 | 276.00 | 8711.03 | 9.93   | -255.30  | 12.00 | 0.00  | 255.42  | Begin 12"/100' build/turn |
| 5   | 9095.39  | 88.46 | 273.52 | 8832.58 | 34.36  | -560.14  | 12.00 | -3.83 | 561.19  | Begin 88.46° lateral      |
| 6   | 10632.60 | 88.46 | 273.52 | 8873.99 | 128.80 | -2093.89 | 0.00  | 0.00  | 2097.85 | Begin 2"/100' build       |
| 7   | 10709.81 | 90.00 | 273.52 | 8875.03 | 133.54 | -2170.94 | 2.00  | -0.14 | 2175.04 | Begin 90.00° lateral      |
| 8   | 13751.91 | 90.00 | 273.52 | 8875.00 | 320.30 | -5207.30 | 0.00  | 0.00  | 5217.14 | PBHL/TD                   |

## ANNOTATIONS

| TVD     | MD       | Inc   | Azi    | +N/-S  | +E/-W    | Vsect   | Departure | Annotation                                         |
|---------|----------|-------|--------|--------|----------|---------|-----------|----------------------------------------------------|
| 100.00  | 100.00   | 0.08  | 293.67 | 0.03   | -0.06    | 0.07    | 0.07      | Gyro                                               |
| 8272.38 | 8275.00  | 1.00  | 244.90 | -5.00  | -95.29   | 94.81   | 160.62    | MWD surveys                                        |
| 8829.65 | 9085.00  | 79.66 | 273.32 | 37.39  | -588.01  | 587.20  | 653.65    | 330 Hard line intercept @ 9085 MD 1671 FSL 330 FVL |
| 8887.89 | 13705.00 | 90.00 | 270.60 | 255.52 | -5197.00 | 5202.89 | 5271.05   | Survey projected to 13705.00 MD                    |

Surface Location: RKB-3565+18 @ 3583.00usft (Patriot 6)  
 US State Plane 1927 (Exact solution)  
 New Mexico East 3001  
 Northing: 613776.30 Easting: 638966.80  
 Latitude: 32.68655697 Longitude: -103.88164968  
 Total Correction (M => G) To convert a Magnetic Direction to a Grid Direction, Add 7.19°



Azimuths to Grid North  
 True North: -0.24°  
 Magnetic North: 7.19°  
 Magnetic Field  
 Strength: 48590.7nT  
 Dip Angle: 60.49°  
 Date: 2/21/2014  
 Model: IGRF2010

# N-ZONE

