



January 12, 2018

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

Attn: Kanicia Castillo

RE: **MAS Federal Com 002H**

Please find enclosed a copy of the survey from 0' to 10,240' ran on the above referenced well.

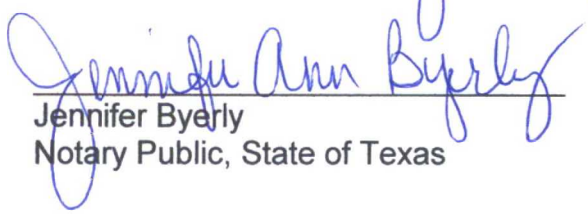
If I can be of any further service, please do not hesitate to call me at 800-606-4976.

Sincerely,

  
Keith Havelka  
Operations

STATE OF TEXAS     §  
                                  §  
COUNTY OF NUECES §

This instrument was acknowledged before me on the 12th day of January, A.D., 2017, by Keith Havelka.

  
Jennifer Byerly  
Notary Public, State of Texas





Company: COG Operating  
Lease/Well: MAS Federal Com/002H

Rig Name: Precision 595  
State/County: New Mexico/Lea  
VS-Azi: 179.64 Degrees  
Latitude: 32.53620, Longitude: -103.54115  
Grid North = True North -0.43 degs (NAD 27)  
Grid Correction Applied = -0.43 degs



Depth Reference : RKB= 25'

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: mas federal com #2h.ut  
Minimum Curvature Method  
Report Date/Time: 1/12/2018 / 11:46

VES Survey International  
Midland, Texas  
432-563-5444  
Surveyor: Eric Warner  
MAS Federal Com 002H / API: 30-025-44214

| 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                  | 0.11                 | 145.55                    | 100.00    | -0.08       | 0.05        | 0.08                      | 0.10                      | 145.55                      | 0.11                          |
| 200.00                  | 0.15                 | 263.25                    | 200.00    | -0.17       | -0.02       | 0.17                      | 0.18                      | 187.57                      | 0.22                          |
| 300.00                  | 0.24                 | 273.54                    | 300.00    | -0.18       | -0.36       | 0.17                      | 0.40                      | 244.10                      | 0.09                          |
| 400.00                  | 0.07                 | 359.55                    | 400.00    | -0.10       | -0.57       | 0.10                      | 0.58                      | 259.82                      | 0.24                          |
| 500.00                  | 0.27                 | 324.32                    | 500.00    | 0.15        | -0.71       | -0.15                     | 0.73                      | 281.90                      | 0.22                          |
| 600.00                  | 0.11                 | 315.97                    | 600.00    | 0.41        | -0.91       | -0.42                     | 1.00                      | 294.17                      | 0.16                          |
| 700.00                  | 0.31                 | 332.58                    | 700.00    | 0.72        | -1.10       | -0.72                     | 1.32                      | 302.99                      | 0.20                          |
| 800.00                  | 0.33                 | 324.93                    | 800.00    | 1.19        | -1.39       | -1.20                     | 1.83                      | 310.51                      | 0.05                          |
| 900.00                  | 0.32                 | 282.70                    | 899.99    | 1.49        | -1.84       | -1.50                     | 2.36                      | 309.05                      | 0.24                          |
| 1000.00                 | 0.06                 | 51.90                     | 999.99    | 1.58        | -2.07       | -1.60                     | 2.61                      | 307.46                      | 0.37                          |
| 1100.00                 | 0.32                 | 295.48                    | 1099.99   | 1.74        | -2.28       | -1.75                     | 2.87                      | 307.35                      | 0.35                          |
| 1200.00                 | 0.22                 | 281.75                    | 1199.99   | 1.90        | -2.72       | -1.91                     | 3.31                      | 304.95                      | 0.12                          |
| 1300.00                 | 0.14                 | 235.87                    | 1299.99   | 1.87        | -3.00       | -1.89                     | 3.54                      | 301.88                      | 0.16                          |
| 1400.00                 | 0.15                 | 238.90                    | 1399.99   | 1.73        | -3.22       | -1.75                     | 3.65                      | 298.27                      | 0.01                          |
| 1500.00                 | 0.31                 | 132.81                    | 1499.99   | 1.48        | -3.13       | -1.50                     | 3.46                      | 295.27                      | 0.38                          |
| 1600.00                 | 0.35                 | 113.90                    | 1599.99   | 1.17        | -2.66       | -1.19                     | 2.91                      | 293.82                      | 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 |
|-------------------------|----------------------|---------------------------|-----------|-------------|-------------|---------------------------|---------------------------|-----------------------------|-------------------------------|
| 1700.00                 | 0.32                 | 88.27                     | 1699.99   | 1.06        | -2.11       | -1.07                     | 2.36                      | 296.69                      | 0.15                          |
| 1800.00                 | 0.90                 | 85.56                     | 1799.98   | 1.13        | -1.05       | -1.14                     | 1.54                      | 317.10                      | 0.59                          |
| 1900.00                 | 1.14                 | 75.98                     | 1899.97   | 1.43        | 0.70        | -1.43                     | 1.59                      | 26.12                       | 0.30                          |
| 2000.00                 | 1.18                 | 76.95                     | 1999.95   | 1.91        | 2.67        | -1.89                     | 3.28                      | 54.50                       | 0.04                          |
| 2100.00                 | 1.21                 | 68.73                     | 2099.92   | 2.52        | 4.65        | -2.49                     | 5.29                      | 61.57                       | 0.17                          |
| 2200.00                 | 1.12                 | 77.37                     | 2199.90   | 3.11        | 6.59        | -3.07                     | 7.29                      | 64.69                       | 0.20                          |
| 2300.00                 | 1.09                 | 82.08                     | 2299.88   | 3.46        | 8.48        | -3.41                     | 9.16                      | 67.81                       | 0.09                          |
| 2400.00                 | 1.98                 | 67.93                     | 2399.85   | 4.24        | 11.03       | -4.17                     | 11.81                     | 68.97                       | 0.96                          |
| 2500.00                 | 2.26                 | 64.89                     | 2499.78   | 5.72        | 14.41       | -5.63                     | 15.50                     | 68.34                       | 0.30                          |
| 2600.00                 | 2.21                 | 65.49                     | 2599.70   | 7.36        | 17.95       | -7.25                     | 19.40                     | 67.70                       | 0.05                          |
| 2700.00                 | 1.81                 | 81.37                     | 2699.64   | 8.40        | 21.27       | -8.26                     | 22.87                     | 68.45                       | 0.68                          |
| 2800.00                 | 1.89                 | 80.75                     | 2799.59   | 8.90        | 24.46       | -8.75                     | 26.03                     | 70.00                       | 0.08                          |
| 2900.00                 | 1.67                 | 80.60                     | 2899.54   | 9.40        | 27.52       | -9.23                     | 29.08                     | 71.14                       | 0.22                          |
| 3000.00                 | 1.28                 | 76.96                     | 2999.51   | 9.89        | 30.05       | -9.70                     | 31.63                     | 71.78                       | 0.40                          |
| 3100.00                 | 0.57                 | 69.32                     | 3099.49   | 10.32       | 31.59       | -10.12                    | 33.24                     | 71.91                       | 0.72                          |
| 3200.00                 | 0.72                 | 305.05                    | 3199.49   | 10.86       | 31.54       | -10.66                    | 33.36                     | 71.01                       | 1.14                          |
| 3300.00                 | 0.98                 | 268.96                    | 3299.48   | 11.20       | 30.17       | -11.01                    | 32.18                     | 69.63                       | 0.58                          |
| 3400.00                 | 1.19                 | 249.20                    | 3399.46   | 10.82       | 28.34       | -10.64                    | 30.34                     | 69.11                       | 0.43                          |
| 3500.00                 | 1.19                 | 250.69                    | 3499.44   | 10.10       | 26.39       | -9.94                     | 28.25                     | 69.05                       | 0.03                          |
| 3600.00                 | 0.98                 | 245.95                    | 3599.42   | 9.41        | 24.62       | -9.26                     | 26.36                     | 69.08                       | 0.23                          |
| 3700.00                 | 1.03                 | 235.16                    | 3699.41   | 8.55        | 23.10       | -8.40                     | 24.63                     | 69.69                       | 0.19                          |
| 3800.00                 | 0.84                 | 235.14                    | 3799.40   | 7.61        | 21.76       | -7.48                     | 23.05                     | 70.71                       | 0.19                          |
| 3900.00                 | 0.68                 | 270.77                    | 3899.39   | 7.20        | 20.56       | -7.07                     | 21.78                     | 70.70                       | 0.49                          |
| 4000.00                 | 1.07                 | 278.55                    | 3999.38   | 7.35        | 19.04       | -7.23                     | 20.41                     | 68.89                       | 0.41                          |
| 4100.00                 | 0.95                 | 253.61                    | 4099.36   | 7.26        | 17.32       | -7.15                     | 18.78                     | 67.28                       | 0.45                          |
| 4200.00                 | 0.78                 | 240.73                    | 4199.35   | 6.69        | 15.94       | -6.59                     | 17.28                     | 67.23                       | 0.25                          |
| 4300.00                 | 0.79                 | 225.58                    | 4299.34   | 5.87        | 14.85       | -5.78                     | 15.96                     | 68.42                       | 0.21                          |
| 4400.00                 | 1.04                 | 205.45                    | 4399.33   | 4.57        | 13.96       | -4.48                     | 14.69                     | 71.88                       | 0.40                          |
| 4500.00                 | 0.77                 | 212.93                    | 4499.31   | 3.19        | 13.21       | -3.11                     | 13.59                     | 76.43                       | 0.29                          |
| 4600.00                 | 1.34                 | 200.10                    | 4599.30   | 1.53        | 12.44       | -1.45                     | 12.54                     | 82.99                       | 0.61                          |
| 4700.00                 | 1.40                 | 208.59                    | 4699.27   | -0.64       | 11.46       | 0.71                      | 11.48                     | 93.18                       | 0.21                          |
| 4800.00                 | 1.08                 | 214.59                    | 4799.25   | -2.49       | 10.34       | 2.55                      | 10.63                     | 103.53                      | 0.34                          |
| 4900.00                 | 1.13                 | 229.97                    | 4899.23   | -3.90       | 9.05        | 3.95                      | 9.85                      | 113.31                      | 0.30                          |
| 5000.00                 | 0.75                 | 210.23                    | 4999.21   | -5.10       | 7.97        | 5.15                      | 9.46                      | 122.61                      | 0.49                          |
| 5100.00                 | 0.89                 | 214.28                    | 5099.20   | -6.31       | 7.20        | 6.35                      | 9.57                      | 131.22                      | 0.15                          |
| 5200.00                 | 0.91                 | 221.10                    | 5199.19   | -7.55       | 6.24        | 7.58                      | 9.79                      | 140.42                      | 0.11                          |
| 5300.00                 | 0.88                 | 237.81                    | 5299.18   | -8.55       | 5.07        | 8.58                      | 9.94                      | 149.35                      | 0.26                          |
| 5400.00                 | 0.67                 | 315.34                    | 5399.17   | -8.54       | 4.00        | 8.57                      | 9.43                      | 154.88                      | 0.99                          |
| 5500.00                 | 0.93                 | 297.20                    | 5499.16   | -7.75       | 2.87        | 7.77                      | 8.27                      | 159.70                      | 0.36                          |

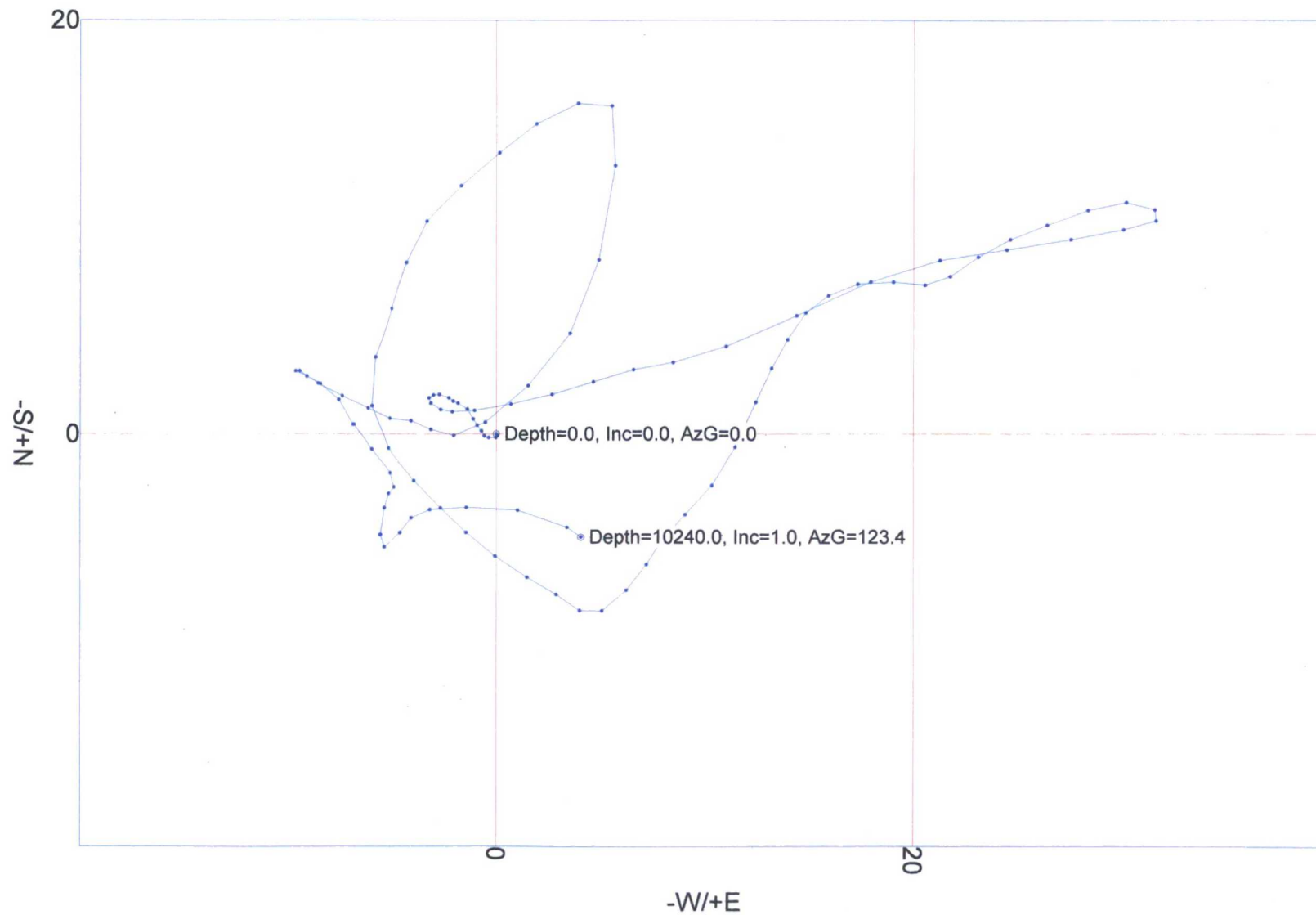


| Measured<br>Depth<br>FT | Incl<br>Angle<br>Deg | Drift<br>Direction<br>Deg | TVD<br>FT | +N/-S<br>FT | +E/-W<br>FT | Vertical<br>Section<br>FT | Closure<br>Distance<br>FT | Closure<br>Direction<br>Deg | Dogleg<br>Severity<br>Deg/100 |
|-------------------------|----------------------|---------------------------|-----------|-------------|-------------|---------------------------|---------------------------|-----------------------------|-------------------------------|
| 5600.00                 | 0.93                 | 304.07                    | 5599.15   | -6.93       | 1.47        | 6.94                      | 7.08                      | 168.00                      | 0.11                          |
| 5700.00                 | 1.18                 | 303.53                    | 5699.13   | -5.90       | -0.06       | 5.90                      | 5.90                      | 180.55                      | 0.25                          |
| 5800.00                 | 0.89                 | 316.91                    | 5799.12   | -4.77       | -1.44       | 4.76                      | 4.98                      | 196.86                      | 0.37                          |
| 5900.00                 | 1.07                 | 311.86                    | 5899.10   | -3.58       | -2.67       | 3.56                      | 4.47                      | 216.70                      | 0.20                          |
| 6000.00                 | 1.04                 | 319.66                    | 5999.08   | -2.27       | -3.95       | 2.24                      | 4.55                      | 240.12                      | 0.15                          |
| 6100.00                 | 1.27                 | 322.59                    | 6099.06   | -0.70       | -5.21       | 0.66                      | 5.26                      | 262.40                      | 0.24                          |
| 6200.00                 | 1.34                 | 354.84                    | 6199.04   | 1.35        | -5.99       | -1.39                     | 6.14                      | 282.74                      | 0.73                          |
| 6300.00                 | 1.41                 | 12.81                     | 6299.01   | 3.72        | -5.82       | -3.76                     | 6.91                      | 302.58                      | 0.43                          |
| 6400.00                 | 1.45                 | 24.51                     | 6398.98   | 6.07        | -5.03       | -6.10                     | 7.88                      | 320.36                      | 0.29                          |
| 6500.00                 | 1.25                 | 10.66                     | 6498.95   | 8.29        | -4.30       | -8.31                     | 9.34                      | 332.57                      | 0.38                          |
| 6600.00                 | 1.38                 | 39.96                     | 6598.93   | 10.28       | -3.32       | -10.30                    | 10.81                     | 342.08                      | 0.68                          |
| 6700.00                 | 1.34                 | 47.84                     | 6698.90   | 11.99       | -1.69       | -12.00                    | 12.11                     | 352.00                      | 0.19                          |
| 6800.00                 | 1.45                 | 49.95                     | 6798.87   | 13.59       | 0.15        | -13.59                    | 13.59                     | 0.64                        | 0.13                          |
| 6900.00                 | 1.14                 | 54.14                     | 6898.84   | 14.99       | 1.93        | -14.98                    | 15.11                     | 7.33                        | 0.33                          |
| 7000.00                 | 1.44                 | 71.26                     | 6998.82   | 15.98       | 3.92        | -15.95                    | 16.45                     | 13.79                       | 0.48                          |
| 7100.00                 | 0.78                 | 141.20                    | 7098.80   | 15.85       | 5.53        | -15.81                    | 16.79                     | 19.24                       | 1.38                          |
| 7200.00                 | 2.71                 | 186.34                    | 7198.76   | 12.96       | 5.70        | -12.93                    | 14.16                     | 23.72                       | 2.23                          |
| 7300.00                 | 2.59                 | 193.45                    | 7298.65   | 8.41        | 4.91        | -8.38                     | 9.74                      | 30.26                       | 0.35                          |
| 7400.00                 | 1.82                 | 211.95                    | 7398.58   | 4.87        | 3.55        | -4.85                     | 6.03                      | 36.05                       | 1.04                          |
| 7500.00                 | 1.92                 | 224.44                    | 7498.52   | 2.33        | 1.53        | -2.32                     | 2.79                      | 33.35                       | 0.42                          |
| 7600.00                 | 1.20                 | 236.81                    | 7598.48   | 0.56        | -0.52       | -0.56                     | 0.76                      | 316.87                      | 0.79                          |
| 7700.00                 | 0.73                 | 264.60                    | 7698.47   | -0.08       | -2.04       | 0.07                      | 2.04                      | 267.77                      | 0.65                          |
| 7800.00                 | 0.65                 | 306.85                    | 7798.46   | 0.20        | -3.13       | -0.22                     | 3.14                      | 273.67                      | 0.51                          |
| 7900.00                 | 0.58                 | 279.41                    | 7898.46   | 0.62        | -4.08       | -0.65                     | 4.13                      | 278.69                      | 0.30                          |
| 8000.00                 | 0.64                 | 274.24                    | 7998.45   | 0.75        | -5.14       | -0.78                     | 5.19                      | 278.28                      | 0.09                          |
| 8100.00                 | 0.75                 | 312.84                    | 8098.45   | 1.24        | -6.18       | -1.27                     | 6.31                      | 281.31                      | 0.47                          |
| 8200.00                 | 0.92                 | 281.55                    | 8198.44   | 1.84        | -7.45       | -1.89                     | 7.67                      | 283.90                      | 0.48                          |
| 8300.00                 | 0.68                 | 319.19                    | 8298.43   | 2.45        | -8.62       | -2.51                     | 8.96                      | 285.88                      | 0.56                          |
| 8400.00                 | 0.60                 | 286.09                    | 8398.42   | 3.05        | -9.51       | -3.11                     | 9.98                      | 287.76                      | 0.37                          |
| 8500.00                 | 0.38                 | 115.43                    | 8498.42   | 3.05        | -9.71       | -3.11                     | 10.18                     | 287.43                      | 0.97                          |
| 8600.00                 | 0.32                 | 113.95                    | 8598.42   | 2.79        | -9.16       | -2.85                     | 9.57                      | 286.97                      | 0.06                          |
| 8700.00                 | 0.55                 | 122.41                    | 8698.41   | 2.43        | -8.50       | -2.48                     | 8.84                      | 285.92                      | 0.24                          |
| 8800.00                 | 0.79                 | 137.21                    | 8798.41   | 1.66        | -7.62       | -1.71                     | 7.80                      | 282.28                      | 0.30                          |
| 8900.00                 | 0.84                 | 159.82                    | 8898.40   | 0.46        | -6.90       | -0.51                     | 6.92                      | 273.83                      | 0.32                          |
| 9000.00                 | 0.95                 | 128.23                    | 8998.39   | -0.74       | -6.00       | 0.70                      | 6.04                      | 262.97                      | 0.50                          |
| 9100.00                 | 0.76                 | 161.55                    | 9098.38   | -1.88       | -5.13       | 1.85                      | 5.47                      | 249.87                      | 0.52                          |
| 9200.00                 | 0.07                 | 171.45                    | 9198.37   | -2.57       | -4.92       | 2.54                      | 5.55                      | 242.39                      | 0.69                          |
| 9300.00                 | 0.45                 | 230.85                    | 9298.37   | -2.88       | -5.21       | 2.84                      | 5.95                      | 241.09                      | 0.42                          |
| 9400.00                 | 0.52                 | 168.83                    | 9398.37   | -3.57       | -5.42       | 3.53                      | 6.49                      | 236.66                      | 0.50                          |

| 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 |
|-------------------------|----------------------|---------------------------|-----------|-------------|-------------|---------------------------|---------------------------|-----------------------------|-------------------------------|
| 9500.00                 | 1.03                 | 197.40                    | 9498.36   | -4.87       | -5.60       | 4.83                      | 7.42                      | 229.02                      | 0.62                          |
| 9600.00                 | 0.60                 | 59.92                     | 9598.35   | -5.46       | -5.42       | 5.43                      | 7.69                      | 224.78                      | 1.52                          |
| 9700.00                 | 0.65                 | 40.86                     | 9698.35   | -4.77       | -4.60       | 4.74                      | 6.62                      | 223.94                      | 0.21                          |
| 9800.00                 | 0.36                 | 28.21                     | 9798.34   | -4.06       | -4.07       | 4.04                      | 5.75                      | 225.10                      | 0.31                          |
| 9900.00                 | 0.86                 | 80.73                     | 9898.34   | -3.66       | -3.19       | 3.64                      | 4.85                      | 221.03                      | 0.70                          |
| 10000.00                | 1.16                 | 90.54                     | 9998.32   | -3.55       | -1.44       | 3.54                      | 3.83                      | 202.05                      | 0.34                          |
| 10100.00                | 1.67                 | 94.77                     | 10098.29  | -3.68       | 1.02        | 3.69                      | 3.82                      | 164.44                      | 0.53                          |
| 10200.00                | 1.32                 | 127.65                    | 10198.26  | -4.50       | 3.39        | 4.53                      | 5.64                      | 143.05                      | 0.91                          |
| 10240.00                | 1.03                 | 123.44                    | 10238.25  | -4.98       | 4.05        | 5.01                      | 6.42                      | 140.88                      | 0.74                          |



VES Survey International  
Midland, Texas  
432-563-5444  
Surveyor: Eric Warner  
MAS Federal Com 002H / API: 30-025-44214



VES Survey Date: 1/6/2018



I Eric Warner certify that I am employed by VES Survey International. That I did on the day(s) of 01/06/18 through 01/06/18 conduct or supervise the taking of a Rate Gyro survey from a depth of 0.00 feet to a depth of 10,240.00 feet; that the data is true, correct, complete and within the limitations of the tool as set forth by Vaughn Energy Services, that I am authorized and qualified to make this report; that this survey was conducted at the request of COG Operating for the MAS Federal Com Well # 2H API # 30-025-44214 in Lea County / Parish New Mexico; and that I have reviewed this report and find that it conforms to the principles and procedures as set forth by VES Survey International.

A handwritten signature in blue ink, appearing to read "Eric Warner", is written over a horizontal line.

Eric Warner  
Service Technician  
VES Survey International

# **COG Operating LLC**

Lea County, NM  
Mas Federal Com  
2H

OH

Design: OH

## **Standard Survey Report**

01 February, 2018



# LEAM Drilling Services

## Survey Report

|                  |                   |                                     |                                             |
|------------------|-------------------|-------------------------------------|---------------------------------------------|
| <b>Company:</b>  | COG Operating LLC | <b>Local Co-ordinate Reference:</b> | Well 2H                                     |
| <b>Project:</b>  | Lea County, NM    | <b>TVD Reference:</b>               | 3717.7' + KB 20' @ 3737.70usft (Patriot #2) |
| <b>Site:</b>     | Mas Federal Com   | <b>MD Reference:</b>                | 3717.7' + KB 20' @ 3737.70usft (Patriot #2) |
| <b>Well:</b>     | 2H                | <b>North Reference:</b>             | Grid                                        |
| <b>Wellbore:</b> | OH                | <b>Survey Calculation Method:</b>   | Minimum Curvature                           |
| <b>Design:</b>   | OH                | <b>Database:</b>                    | EDM 5000.1 Multi User Db                    |

|                    |                                      |                      |                |
|--------------------|--------------------------------------|----------------------|----------------|
| <b>Project</b>     | Lea County, NM                       |                      |                |
| <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>                  | Mas Federal Com |                          |                    |
| <b>Site Position:</b>        |                 | <b>Northing:</b>         | 559,689.80 usft    |
| <b>From:</b>                 | Map             | <b>Easting:</b>          | 744,135.50 usft    |
| <b>Position Uncertainty:</b> | 0.00 usft       | <b>Slot Radius:</b>      | 13-3/16 "          |
|                              |                 | <b>Latitude:</b>         | 32° 32' 10.3222 N  |
|                              |                 | <b>Longitude:</b>        | 103° 32' 28.1472 W |
|                              |                 | <b>Grid Convergence:</b> | 0.43 °             |

|                             |              |                            |                                  |
|-----------------------------|--------------|----------------------------|----------------------------------|
| <b>Well</b>                 | 2H           |                            |                                  |
| <b>Well Position</b>        | <b>+N/-S</b> | 0.00 usft                  | <b>Northing:</b> 559,689.80 usft |
|                             | <b>+E/-W</b> | 0.00 usft                  | <b>Easting:</b> 744,135.50 usft  |
| <b>Position Uncertainty</b> | 0.00 usft    | <b>Wellhead Elevation:</b> | 0.00 usft                        |
|                             |              | <b>Latitude:</b>           | 32° 32' 10.3222 N                |
|                             |              | <b>Longitude:</b>          | 103° 32' 28.1472 W               |
|                             |              | <b>Ground Level:</b>       | 3,717.70 usft                    |

|                  |                   |                    |                            |
|------------------|-------------------|--------------------|----------------------------|
| <b>Wellbore</b>  | OH                |                    |                            |
| <b>Magnetics</b> | <b>Model Name</b> | <b>Sample Date</b> | <b>Declination (°)</b>     |
|                  | HDGM              | 12/12/2017         | 6.73                       |
|                  |                   |                    | <b>Dip Angle (°)</b>       |
|                  |                   |                    | 60.48                      |
|                  |                   |                    | <b>Field Strength (nT)</b> |
|                  |                   |                    | 48,260                     |

|                          |                                |                      |                      |
|--------------------------|--------------------------------|----------------------|----------------------|
| <b>Design</b>            | OH                             |                      |                      |
| <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) (usft)</b> | <b>+N/-S (usft)</b>  | <b>+E/-W (usft)</b>  |
|                          | 0.00                           | 0.00                 | 0.00                 |
|                          |                                |                      | <b>Direction (°)</b> |
|                          |                                |                      | 179.64               |

|                       |                  |                          |                    |
|-----------------------|------------------|--------------------------|--------------------|
| <b>Survey Program</b> | Date 2/1/2018    |                          |                    |
| <b>From (usft)</b>    | <b>To (usft)</b> | <b>Survey (Wellbore)</b> | <b>Tool Name</b>   |
| 100.00                | 10,240.00        | Survey #2 (OH)           | VES GyroFlex V2    |
| 10,453.00             | 11,673.00        | Survey #3 (OH)           | LEAM MWD+HDGM      |
| 11,750.00             | 11,750.00        | Survey #4 (OH)           | Project            |
|                       |                  |                          | <b>Description</b> |
|                       |                  |                          | MWD+HDGM           |
|                       |                  |                          | Projection         |

|                              |                        |                    |                              |                     |                     |                                |                                |                               |                              |
|------------------------------|------------------------|--------------------|------------------------------|---------------------|---------------------|--------------------------------|--------------------------------|-------------------------------|------------------------------|
| <b>Survey</b>                |                        |                    |                              |                     |                     |                                |                                |                               |                              |
| <b>Measured Depth (usft)</b> | <b>Inclination (°)</b> | <b>Azimuth (°)</b> | <b>Vertical Depth (usft)</b> | <b>+N/-S (usft)</b> | <b>+E/-W (usft)</b> | <b>Vertical Section (usft)</b> | <b>Dogleg Rate (°/100usft)</b> | <b>Build Rate (°/100usft)</b> | <b>Turn Rate (°/100usft)</b> |
| 0.00                         | 0.00                   | 0.00               | 0.00                         | 0.00                | 0.00                | 0.00                           | 0.00                           | 0.00                          | 0.00                         |
| 100.00                       | 0.11                   | 145.55             | 100.00                       | -0.08               | 0.05                | 0.08                           | 0.11                           | 0.11                          | 0.00                         |
| 200.00                       | 0.15                   | 263.25             | 200.00                       | -0.17               | -0.02               | 0.17                           | 0.22                           | 0.04                          | 117.70                       |
| 300.00                       | 0.24                   | 273.54             | 300.00                       | -0.18               | -0.36               | 0.17                           | 0.10                           | 0.09                          | 10.29                        |
| 400.00                       | 0.07                   | 359.55             | 400.00                       | -0.10               | -0.57               | 0.10                           | 0.25                           | -0.17                         | 86.01                        |
| 500.00                       | 0.27                   | 324.32             | 500.00                       | 0.15                | -0.71               | -0.15                          | 0.22                           | 0.20                          | -35.23                       |
| 600.00                       | 0.11                   | 315.97             | 600.00                       | 0.41                | -0.91               | -0.42                          | 0.16                           | -0.16                         | -8.35                        |
| 700.00                       | 0.31                   | 332.58             | 700.00                       | 0.72                | -1.10               | -0.73                          | 0.21                           | 0.20                          | 16.61                        |
| 800.00                       | 0.33                   | 324.93             | 800.00                       | 1.20                | -1.39               | -1.20                          | 0.05                           | 0.02                          | -7.65                        |

# LEAM Drilling Services

## Survey Report

|                  |                   |                                     |                                             |
|------------------|-------------------|-------------------------------------|---------------------------------------------|
| <b>Company:</b>  | COG Operating LLC | <b>Local Co-ordinate Reference:</b> | Well 2H                                     |
| <b>Project:</b>  | Lea County, NM    | <b>TVD Reference:</b>               | 3717.7' + KB 20' @ 3737.70usft (Patriot #2) |
| <b>Site:</b>     | Mas Federal Com   | <b>MD Reference:</b>                | 3717.7' + KB 20' @ 3737.70usft (Patriot #2) |
| <b>Well:</b>     | 2H                | <b>North Reference:</b>             | Grid                                        |
| <b>Wellbore:</b> | OH                | <b>Survey Calculation Method:</b>   | Minimum Curvature                           |
| <b>Design:</b>   | OH                | <b>Database:</b>                    | EDM 5000.1 Multi User Db                    |

| Survey                |                 |             |                       |              |              |                         |                         |                        |                       |  |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|--|
| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |  |
| 900.00                | 0.32            | 282.70      | 899.99                | 1.49         | -1.83        | -1.50                   | 0.23                    | -0.01                  | -42.23                |  |
| 1,000.00              | 0.06            | 51.90       | 999.99                | 1.59         | -2.06        | -1.60                   | 0.36                    | -0.26                  | 129.20                |  |
| 1,100.00              | 0.32            | 295.48      | 1,099.99              | 1.74         | -2.27        | -1.75                   | 0.35                    | 0.26                   | -116.42               |  |
| 1,200.00              | 0.22            | 281.75      | 1,199.99              | 1.90         | -2.71        | -1.92                   | 0.12                    | -0.10                  | -13.73                |  |
| 1,300.00              | 0.14            | 235.87      | 1,299.99              | 1.87         | -3.00        | -1.89                   | 0.16                    | -0.08                  | -45.88                |  |
| 1,400.00              | 0.15            | 238.90      | 1,399.99              | 1.73         | -3.22        | -1.75                   | 0.01                    | 0.01                   | 3.03                  |  |
| 1,500.00              | 0.31            | 132.81      | 1,499.99              | 1.48         | -3.13        | -1.50                   | 0.38                    | 0.16                   | -106.09               |  |
| 1,600.00              | 0.35            | 113.90      | 1,599.99              | 1.17         | -2.65        | -1.19                   | 0.12                    | 0.04                   | -18.91                |  |
| 1,700.00              | 0.32            | 88.27       | 1,699.99              | 1.06         | -2.09        | -1.07                   | 0.15                    | -0.03                  | -25.63                |  |
| 1,800.00              | 0.90            | 85.56       | 1,799.98              | 1.13         | -1.03        | -1.13                   | 0.58                    | 0.58                   | -2.71                 |  |
| 1,900.00              | 1.14            | 75.98       | 1,899.97              | 1.43         | 0.72         | -1.42                   | 0.29                    | 0.24                   | -9.58                 |  |
| 2,000.00              | 1.18            | 76.95       | 1,999.95              | 1.90         | 2.69         | -1.89                   | 0.04                    | 0.04                   | 0.97                  |  |
| 2,100.00              | 1.21            | 68.73       | 2,099.92              | 2.52         | 4.67         | -2.49                   | 0.17                    | 0.03                   | -8.22                 |  |
| 2,200.00              | 1.12            | 77.37       | 2,199.90              | 3.11         | 6.61         | -3.07                   | 0.20                    | -0.09                  | 8.64                  |  |
| 2,300.00              | 1.09            | 82.08       | 2,299.88              | 3.46         | 8.51         | -3.41                   | 0.10                    | -0.03                  | 4.71                  |  |
| 2,400.00              | 1.98            | 67.93       | 2,399.85              | 4.24         | 11.05        | -4.17                   | 0.96                    | 0.89                   | -14.15                |  |
| 2,500.00              | 2.26            | 64.89       | 2,499.78              | 5.73         | 14.44        | -5.63                   | 0.30                    | 0.28                   | -3.04                 |  |
| 2,600.00              | 2.21            | 65.49       | 2,599.70              | 7.36         | 17.97        | -7.25                   | 0.06                    | -0.05                  | 0.60                  |  |
| 2,700.00              | 1.81            | 81.37       | 2,699.64              | 8.40         | 21.29        | -8.27                   | 0.68                    | -0.40                  | 15.88                 |  |
| 2,800.00              | 1.89            | 80.75       | 2,799.59              | 8.90         | 24.48        | -8.75                   | 0.08                    | 0.08                   | -0.62                 |  |
| 2,900.00              | 1.67            | 80.60       | 2,899.54              | 9.40         | 27.54        | -9.23                   | 0.22                    | -0.22                  | -0.15                 |  |
| 3,000.00              | 1.28            | 76.96       | 2,999.51              | 9.89         | 30.07        | -9.71                   | 0.40                    | -0.39                  | -3.64                 |  |
| 3,100.00              | 0.57            | 69.32       | 3,099.49              | 10.32        | 31.62        | -10.12                  | 0.72                    | -0.71                  | -7.64                 |  |
| 3,200.00              | 0.72            | 305.05      | 3,199.49              | 10.86        | 31.57        | -10.66                  | 1.14                    | 0.15                   | -124.27               |  |
| 3,300.00              | 0.98            | 268.96      | 3,299.48              | 11.20        | 30.21        | -11.01                  | 0.58                    | 0.26                   | -36.09                |  |
| 3,400.00              | 1.19            | 249.20      | 3,399.46              | 10.82        | 28.38        | -10.64                  | 0.43                    | 0.21                   | -19.76                |  |
| 3,500.00              | 1.19            | 250.69      | 3,499.44              | 10.11        | 26.43        | -9.94                   | 0.03                    | 0.00                   | 1.49                  |  |
| 3,600.00              | 0.98            | 245.95      | 3,599.42              | 9.42         | 24.67        | -9.26                   | 0.23                    | -0.21                  | -4.74                 |  |
| 3,700.00              | 1.03            | 235.16      | 3,699.41              | 8.55         | 23.15        | -8.41                   | 0.20                    | 0.05                   | -10.79                |  |
| 3,800.00              | 0.84            | 235.14      | 3,799.40              | 7.62         | 21.81        | -7.48                   | 0.19                    | -0.19                  | -0.02                 |  |
| 3,900.00              | 0.68            | 270.77      | 3,899.39              | 7.21         | 20.62        | -7.08                   | 0.49                    | -0.16                  | 35.63                 |  |
| 4,000.00              | 1.07            | 278.55      | 3,999.38              | 7.36         | 19.10        | -7.24                   | 0.41                    | 0.39                   | 7.78                  |  |
| 4,100.00              | 0.95            | 253.61      | 4,099.36              | 7.26         | 17.38        | -7.15                   | 0.45                    | -0.12                  | -24.94                |  |
| 4,200.00              | 0.78            | 240.73      | 4,199.35              | 6.70         | 15.99        | -6.59                   | 0.26                    | -0.17                  | -12.88                |  |
| 4,300.00              | 0.79            | 225.58      | 4,299.34              | 5.88         | 14.91        | -5.79                   | 0.21                    | 0.01                   | -15.15                |  |
| 4,400.00              | 1.04            | 205.45      | 4,399.33              | 4.58         | 14.02        | -4.49                   | 0.40                    | 0.25                   | -20.13                |  |
| 4,500.00              | 0.77            | 212.93      | 4,499.31              | 3.19         | 13.27        | -3.11                   | 0.29                    | -0.27                  | 7.48                  |  |
| 4,600.00              | 1.34            | 200.10      | 4,599.30              | 1.53         | 12.50        | -1.45                   | 0.61                    | 0.57                   | -12.83                |  |
| 4,700.00              | 1.40            | 208.59      | 4,699.27              | -0.64        | 11.51        | 0.71                    | 0.21                    | 0.06                   | 8.49                  |  |
| 4,800.00              | 1.08            | 214.59      | 4,799.25              | -2.49        | 10.39        | 2.55                    | 0.34                    | -0.32                  | 6.00                  |  |
| 4,900.00              | 1.13            | 229.97      | 4,899.23              | -3.90        | 9.10         | 3.95                    | 0.30                    | 0.05                   | 15.38                 |  |
| 5,000.00              | 0.75            | 210.23      | 4,999.21              | -5.10        | 8.02         | 5.15                    | 0.49                    | -0.38                  | -19.74                |  |
| 5,100.00              | 0.89            | 214.28      | 5,099.20              | -6.30        | 7.25         | 6.35                    | 0.15                    | 0.14                   | 4.05                  |  |



# LEAM Drilling Services

## Survey Report

|                  |                   |                                     |                                             |
|------------------|-------------------|-------------------------------------|---------------------------------------------|
| <b>Company:</b>  | COG Operating LLC | <b>Local Co-ordinate Reference:</b> | Well 2H                                     |
| <b>Project:</b>  | Lea County, NM    | <b>TVD Reference:</b>               | 3717.7' + KB 20' @ 3737.70usft (Patriot #2) |
| <b>Site:</b>     | Mas Federal Com   | <b>MD Reference:</b>                | 3717.7' + KB 20' @ 3737.70usft (Patriot #2) |
| <b>Well:</b>     | 2H                | <b>North Reference:</b>             | Grid                                        |
| <b>Wellbore:</b> | OH                | <b>Survey Calculation Method:</b>   | Minimum Curvature                           |
| <b>Design:</b>   | OH                | <b>Database:</b>                    | EDM 5000.1 Multi User Db                    |

| Survey                |                 |             |                       |              |              |                         |                         |                        |                       |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |
| 5,200.00              | 0.91            | 221.10      | 5,199.19              | -7.54        | 6.29         | 7.58                    | 0.11                    | 0.02                   | 6.82                  |
| 5,300.00              | 0.88            | 237.81      | 5,299.18              | -8.55        | 5.12         | 8.58                    | 0.26                    | -0.03                  | 16.71                 |
| 5,400.00              | 0.67            | 315.34      | 5,399.17              | -8.54        | 4.06         | 8.57                    | 0.98                    | -0.21                  | 77.53                 |
| 5,500.00              | 0.93            | 297.20      | 5,499.16              | -7.76        | 2.93         | 7.78                    | 0.36                    | 0.26                   | -18.14                |
| 5,600.00              | 0.93            | 304.07      | 5,599.15              | -6.93        | 1.53         | 6.94                    | 0.11                    | 0.00                   | 6.87                  |
| 5,700.00              | 1.18            | 303.53      | 5,699.13              | -5.91        | 0.00         | 5.91                    | 0.25                    | 0.25                   | -0.54                 |
| 5,765.00              | 0.98            | 311.34      | 5,764.12              | -5.17        | -0.97        | 5.16                    | 0.38                    | -0.30                  | 12.02                 |
| <b>CASING</b>         |                 |             |                       |              |              |                         |                         |                        |                       |
| 5,800.00              | 0.89            | 316.91      | 5,799.12              | -4.77        | -1.39        | 4.76                    | 0.38                    | -0.27                  | 15.91                 |
| 5,900.00              | 1.07            | 311.86      | 5,899.10              | -3.58        | -2.61        | 3.57                    | 0.20                    | 0.18                   | -5.05                 |
| 6,000.00              | 1.04            | 319.66      | 5,999.08              | -2.27        | -3.89        | 2.24                    | 0.15                    | -0.03                  | 7.80                  |
| 6,100.00              | 1.27            | 322.59      | 6,099.06              | -0.70        | -5.16        | 0.66                    | 0.24                    | 0.23                   | 2.93                  |
| 6,200.00              | 1.34            | 354.84      | 6,199.04              | 1.35         | -5.93        | -1.39                   | 0.73                    | 0.07                   | 32.25                 |
| 6,300.00              | 1.41            | 12.81       | 6,299.01              | 3.71         | -5.77        | -3.75                   | 0.43                    | 0.07                   | 17.97                 |
| 6,400.00              | 1.45            | 24.51       | 6,398.98              | 6.06         | -4.97        | -6.10                   | 0.29                    | 0.04                   | 11.70                 |
| 6,500.00              | 1.25            | 10.66       | 6,498.95              | 8.29         | -4.24        | -8.31                   | 0.38                    | -0.20                  | -13.85                |
| 6,600.00              | 1.38            | 39.96       | 6,598.93              | 10.28        | -3.27        | -10.30                  | 0.68                    | 0.13                   | 29.30                 |
| 6,700.00              | 1.34            | 47.84       | 6,698.90              | 11.99        | -1.63        | -12.00                  | 0.19                    | -0.04                  | 7.88                  |
| 6,800.00              | 1.45            | 49.95       | 6,798.87              | 13.59        | 0.21         | -13.59                  | 0.12                    | 0.11                   | 2.11                  |
| 6,900.00              | 1.14            | 54.14       | 6,898.84              | 14.99        | 1.98         | -14.97                  | 0.32                    | -0.31                  | 4.19                  |
| 7,000.00              | 1.44            | 71.26       | 6,998.82              | 15.97        | 3.98         | -15.95                  | 0.49                    | 0.30                   | 17.12                 |
| 7,100.00              | 0.78            | 141.20      | 7,098.80              | 15.85        | 5.60         | -15.81                  | 1.38                    | -0.66                  | 69.94                 |
| 7,200.00              | 2.71            | 186.34      | 7,198.76              | 12.96        | 5.76         | -12.93                  | 2.23                    | 1.93                   | 45.14                 |
| 7,300.00              | 2.59            | 193.45      | 7,298.65              | 8.42         | 4.97         | -8.39                   | 0.35                    | -0.12                  | 7.11                  |
| 7,400.00              | 1.82            | 211.95      | 7,398.58              | 4.87         | 3.61         | -4.85                   | 1.04                    | -0.77                  | 18.50                 |
| 7,500.00              | 1.92            | 224.44      | 7,498.52              | 2.33         | 1.60         | -2.32                   | 0.42                    | 0.10                   | 12.49                 |
| 7,600.00              | 1.20            | 236.81      | 7,598.48              | 0.56         | -0.45        | -0.56                   | 0.79                    | -0.72                  | 12.37                 |
| 7,700.00              | 0.73            | 264.60      | 7,698.47              | -0.07        | -1.96        | 0.06                    | 0.65                    | -0.47                  | 27.79                 |
| 7,800.00              | 0.65            | 306.85      | 7,798.46              | 0.21         | -3.05        | -0.23                   | 0.50                    | -0.08                  | 42.25                 |
| 7,900.00              | 0.58            | 279.41      | 7,898.46              | 0.63         | -4.01        | -0.66                   | 0.30                    | -0.07                  | -27.44                |
| 8,000.00              | 0.64            | 274.24      | 7,998.45              | 0.75         | -5.06        | -0.79                   | 0.08                    | 0.06                   | -5.17                 |
| 8,100.00              | 0.75            | 312.84      | 8,098.45              | 1.24         | -6.10        | -1.28                   | 0.47                    | 0.11                   | 38.60                 |
| 8,200.00              | 0.92            | 281.55      | 8,198.44              | 1.85         | -7.36        | -1.89                   | 0.48                    | 0.17                   | -31.29                |
| 8,300.00              | 0.68            | 319.19      | 8,298.43              | 2.46         | -8.54        | -2.51                   | 0.56                    | -0.24                  | 37.64                 |
| 8,400.00              | 0.60            | 286.09      | 8,398.42              | 3.05         | -9.43        | -3.11                   | 0.37                    | -0.08                  | -33.10                |
| 8,500.00              | 0.38            | 115.43      | 8,498.42              | 3.05         | -9.63        | -3.11                   | 0.98                    | -0.22                  | -170.66               |
| 8,600.00              | 0.32            | 113.95      | 8,598.42              | 2.80         | -9.08        | -2.85                   | 0.06                    | -0.06                  | -1.48                 |
| 8,700.00              | 0.55            | 122.41      | 8,698.41              | 2.43         | -8.42        | -2.48                   | 0.24                    | 0.23                   | 8.46                  |
| 8,800.00              | 0.79            | 137.21      | 8,798.41              | 1.66         | -7.55        | -1.71                   | 0.29                    | 0.24                   | 14.80                 |
| 8,900.00              | 0.84            | 159.82      | 8,898.40              | 0.47         | -6.82        | -0.51                   | 0.32                    | 0.05                   | 22.61                 |
| 9,000.00              | 0.95            | 128.23      | 8,998.39              | -0.73        | -5.92        | 0.69                    | 0.50                    | 0.11                   | -31.59                |
| 9,100.00              | 0.76            | 161.55      | 9,098.38              | -1.87        | -5.06        | 1.84                    | 0.52                    | -0.19                  | 33.32                 |
| 9,200.00              | 0.07            | 171.45      | 9,198.37              | -2.56        | -4.84        | 2.53                    | 0.69                    | -0.69                  | 9.90                  |
| 9,300.00              | 0.45            | 230.85      | 9,298.37              | -2.87        | -5.14        | 2.84                    | 0.42                    | 0.38                   | 59.40                 |



# LEAM Drilling Services

## Survey Report

|                  |                   |                                     |                                             |
|------------------|-------------------|-------------------------------------|---------------------------------------------|
| <b>Company:</b>  | COG Operating LLC | <b>Local Co-ordinate Reference:</b> | Well 2H                                     |
| <b>Project:</b>  | Lea County, NM    | <b>TVD Reference:</b>               | 3717.7' + KB 20' @ 3737.70usft (Patriot #2) |
| <b>Site:</b>     | Mas Federal Com   | <b>MD Reference:</b>                | 3717.7' + KB 20' @ 3737.70usft (Patriot #2) |
| <b>Well:</b>     | 2H                | <b>North Reference:</b>             | Grid                                        |
| <b>Wellbore:</b> | OH                | <b>Survey Calculation Method:</b>   | Minimum Curvature                           |
| <b>Design:</b>   | OH                | <b>Database:</b>                    | EDM 5000.1 Multi User Db                    |

### Survey

| Measured Depth (usft)    | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |
|--------------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| 9,400.00                 | 0.52            | 168.83      | 9,398.37              | -3.56        | -5.35        | 3.53                    | 0.50                    | 0.07                   | -62.02                |
| 9,500.00                 | 1.03            | 197.40      | 9,498.36              | -4.87        | -5.53        | 4.83                    | 0.62                    | 0.51                   | 28.57                 |
| 9,600.00                 | 0.60            | 59.92       | 9,598.35              | -5.46        | -5.35        | 5.43                    | 1.53                    | -0.43                  | -137.48               |
| 9,700.00                 | 0.65            | 40.86       | 9,698.35              | -4.77        | -4.52        | 4.74                    | 0.21                    | 0.05                   | -19.06                |
| 9,800.00                 | 0.36            | 28.21       | 9,798.34              | -4.07        | -4.00        | 4.04                    | 0.31                    | -0.29                  | -12.65                |
| 9,900.00                 | 0.86            | 80.73       | 9,898.34              | -3.67        | -3.12        | 3.65                    | 0.70                    | 0.50                   | 52.52                 |
| 10,000.00                | 1.16            | 90.54       | 9,998.32              | -3.56        | -1.36        | 3.55                    | 0.35                    | 0.30                   | 9.81                  |
| 10,100.00                | 1.67            | 94.77       | 10,098.29             | -3.69        | 1.10         | 3.69                    | 0.52                    | 0.51                   | 4.23                  |
| 10,200.00                | 1.32            | 127.65      | 10,198.26             | -4.51        | 3.47         | 4.53                    | 0.91                    | -0.35                  | 32.88                 |
| 10,240.00                | 1.03            | 123.44      | 10,238.25             | -4.99        | 4.13         | 5.02                    | 0.76                    | -0.73                  | -10.53                |
| 10,407.00                | 0.53            | 131.44      | 10,405.24             | -6.33        | 5.96         | 6.37                    | 0.30                    | -0.30                  | 4.79                  |
| <b>CASING</b>            |                 |             |                       |              |              |                         |                         |                        |                       |
| 10,453.00                | 0.40            | 137.10      | 10,451.23             | -6.59        | 6.23         | 6.63                    | 0.30                    | -0.29                  | 12.31                 |
| <b>LEAM's 1st Survey</b> |                 |             |                       |              |              |                         |                         |                        |                       |
| 10,547.00                | 0.50            | 187.90      | 10,545.23             | -7.24        | 6.40         | 7.28                    | 0.42                    | 0.11                   | 54.04                 |
| 10,641.00                | 1.30            | 200.00      | 10,639.22             | -8.65        | 5.98         | 8.68                    | 0.87                    | 0.85                   | 12.87                 |
| 10,734.00                | 0.20            | 250.80      | 10,732.21             | -9.69        | 5.47         | 9.72                    | 1.27                    | -1.18                  | 54.62                 |
| 10,828.00                | 0.30            | 210.00      | 10,826.21             | -9.96        | 5.19         | 9.99                    | 0.21                    | 0.11                   | -43.40                |
| 10,922.00                | 0.90            | 282.30      | 10,920.21             | -10.01       | 4.34         | 10.04                   | 0.91                    | 0.64                   | 76.91                 |
| 11,016.00                | 0.80            | 283.30      | 11,014.20             | -9.71        | 2.98         | 9.72                    | 0.11                    | -0.11                  | 1.06                  |
| 11,110.00                | 0.80            | 245.20      | 11,108.19             | -9.83        | 1.75         | 9.84                    | 0.56                    | 0.00                   | -40.53                |
| 11,204.00                | 0.70            | 226.40      | 11,202.18             | -10.50       | 0.74         | 10.51                   | 0.28                    | -0.11                  | -20.00                |
| 11,298.00                | 0.80            | 224.30      | 11,296.17             | -11.37       | -0.14        | 11.37                   | 0.11                    | 0.11                   | -2.23                 |
| 11,391.00                | 0.20            | 171.00      | 11,389.17             | -11.99       | -0.56        | 11.99                   | 0.75                    | -0.65                  | -57.31                |
| 11,485.00                | 0.40            | 106.20      | 11,483.17             | -12.25       | -0.22        | 12.24                   | 0.39                    | 0.21                   | -68.94                |
| 11,579.00                | 0.30            | 95.30       | 11,577.16             | -12.36       | 0.34         | 12.36                   | 0.13                    | -0.11                  | -11.60                |
| 11,673.00                | 0.30            | 140.30      | 11,671.16             | -12.57       | 0.74         | 12.58                   | 0.24                    | 0.00                   | 47.87                 |
| 11,750.00                | 0.30            | 140.30      | 11,748.16             | -12.88       | 1.00         | 12.89                   | 0.00                    | 0.00                   | 0.00                  |

### Design Targets

| Target Name                          | Dip Angle (°) | Dip Dir. (°) | TVD (usft) | +N/-S (usft) | +E/-W (usft) | Northing (usft) | Easting (usft) | Latitude          | Longitude          |
|--------------------------------------|---------------|--------------|------------|--------------|--------------|-----------------|----------------|-------------------|--------------------|
| - hit/miss target                    |               |              |            |              |              |                 |                |                   |                    |
| - Shape                              |               |              |            |              |              |                 |                |                   |                    |
| BHL Pilot(Federal 2H)                | 0.00          | 0.00         | 11,748.16  | -12.88       | 1.00         | 559,676.92      | 744,136.49     | 32° 32' 10.1946 N | 103° 32' 28.1367 W |
| - actual wellpath hits target center |               |              |            |              |              |                 |                |                   |                    |
| - Point                              |               |              |            |              |              |                 |                |                   |                    |



# **COG Operating LLC**

**Lea County, NM  
Mas Federal Com  
2H**

**ST01**

**Design: ST01**

## **Standard Survey Report**

**01 February, 2018**

# LEAM Drilling Services

## Survey Report

|                  |                   |                                     |                                             |
|------------------|-------------------|-------------------------------------|---------------------------------------------|
| <b>Company:</b>  | COG Operating LLC | <b>Local Co-ordinate Reference:</b> | Well 2H                                     |
| <b>Project:</b>  | Lea County, NM    | <b>TVD Reference:</b>               | 3717.7' + KB 20' @ 3737.70usft (Patriot #2) |
| <b>Site:</b>     | Mas Federal Com   | <b>MD Reference:</b>                | 3717.7' + KB 20' @ 3737.70usft (Patriot #2) |
| <b>Well:</b>     | 2H                | <b>North Reference:</b>             | Grid                                        |
| <b>Wellbore:</b> | ST01              | <b>Survey Calculation Method:</b>   | Minimum Curvature                           |
| <b>Design:</b>   | ST01              | <b>Database:</b>                    | EDM 5000.1 Multi User Db                    |

|                    |                                      |                      |                |
|--------------------|--------------------------------------|----------------------|----------------|
| <b>Project</b>     | Lea County, NM                       |                      |                |
| <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                 |                      |                |

| Site                  |           | Mas Federal Com |                 |                   |                    |
|-----------------------|-----------|-----------------|-----------------|-------------------|--------------------|
| Site Position:        |           | Northing:       | 559,689.80 usft | Latitude:         | 32° 32' 10.3222 N  |
| From:                 | Map       | Easting:        | 744,135.50 usft | Longitude:        | 103° 32' 28.1472 W |
| Position Uncertainty: | 0.00 usft | Slot Radius:    | 13-3/16 "       | Grid Convergence: | 0.43 °             |

|                      |       |           |                     |                 |               |                    |
|----------------------|-------|-----------|---------------------|-----------------|---------------|--------------------|
| Well                 | 2H    |           |                     |                 |               |                    |
| Well Position        | +N/-S | 0.00 usft | Northing:           | 559,689.80 usft | Latitude:     | 32° 32' 10.3222 N  |
|                      | +E/-W | 0.00 usft | Easting:            | 744,135.50 usft | Longitude:    | 103° 32' 28.1472 W |
| Position Uncertainty |       | 0.00 usft | Wellhead Elevation: | 0.00 usft       | Ground Level: | 3,717.70 usft      |

|                  |                   |                    |                        |                      |                            |
|------------------|-------------------|--------------------|------------------------|----------------------|----------------------------|
| <b>Wellbore</b>  | ST01              |                    |                        |                      |                            |
| <b>Magnetics</b> | <b>Model Name</b> | <b>Sample Date</b> | <b>Declination (°)</b> | <b>Dip Angle (°)</b> | <b>Field Strength (nT)</b> |
|                  | HDGM              | 1/3/2018           | 6.73                   | 60.47                | 48,253                     |

|                          |                                |                     |                     |                      |           |
|--------------------------|--------------------------------|---------------------|---------------------|----------------------|-----------|
| <b>Design</b>            | ST01                           |                     |                     |                      |           |
| <b>Audit Notes:</b>      |                                |                     |                     |                      |           |
| <b>Version:</b>          | 1.0                            | <b>Phase:</b>       | ACTUAL              | <b>Tie On Depth:</b> | 10,547.00 |
| <b>Vertical Section:</b> | <b>Depth From (TVD) (usft)</b> | <b>+N/-S (usft)</b> | <b>+E/-W (usft)</b> | <b>Direction (°)</b> |           |
|                          | 0.00                           | 0.00                | 0.00                | 179.64               |           |

|                       |                  |                          |                  |                    |  |
|-----------------------|------------------|--------------------------|------------------|--------------------|--|
| <b>Survey Program</b> | <b>Date</b>      | 2/1/2018                 |                  |                    |  |
| <b>From (usft)</b>    | <b>To (usft)</b> | <b>Survey (Wellbore)</b> | <b>Tool Name</b> | <b>Description</b> |  |
| 100.00                | 10,240.00        | Survey #2 (OH)           | VES GyroFlex V2  |                    |  |
| 10,453.00             | 10,547.00        | Survey #3 (OH)           | LEAM MWD+HDGM    | MWD+HDGM           |  |
| 10,578.00             | 15,865.00        | Survey #1 (ST01)         | LEAM MWD+HDGM    | MWD+HDGM           |  |
| 15,915.00             | 15,915.00        | Survey #2 (ST01)         | Project          | Projection         |  |

|                              |                        |                    |                              |                     |                     |                                |                                |                               |                              |  |
|------------------------------|------------------------|--------------------|------------------------------|---------------------|---------------------|--------------------------------|--------------------------------|-------------------------------|------------------------------|--|
| <b>Survey</b>                |                        |                    |                              |                     |                     |                                |                                |                               |                              |  |
| <b>Measured Depth (usft)</b> | <b>Inclination (°)</b> | <b>Azimuth (°)</b> | <b>Vertical Depth (usft)</b> | <b>+N/-S (usft)</b> | <b>+E/-W (usft)</b> | <b>Vertical Section (usft)</b> | <b>Dogleg Rate (°/100usft)</b> | <b>Build Rate (°/100usft)</b> | <b>Turn Rate (°/100usft)</b> |  |
| 0.00                         | 0.00                   | 0.00               | 0.00                         | 0.00                | 0.00                | 0.00                           | 0.00                           | 0.00                          | 0.00                         |  |
| 100.00                       | 0.11                   | 145.55             | 100.00                       | -0.08               | 0.05                | 0.08                           | 0.11                           | 0.11                          | 0.00                         |  |
| 200.00                       | 0.15                   | 263.25             | 200.00                       | -0.17               | -0.02               | 0.17                           | 0.22                           | 0.04                          | 117.70                       |  |
| 300.00                       | 0.24                   | 273.54             | 300.00                       | -0.18               | -0.36               | 0.17                           | 0.10                           | 0.09                          | 10.29                        |  |
| 400.00                       | 0.07                   | 359.55             | 400.00                       | -0.10               | -0.57               | 0.10                           | 0.25                           | -0.17                         | 86.01                        |  |
| 500.00                       | 0.27                   | 324.32             | 500.00                       | 0.15                | -0.71               | -0.15                          | 0.22                           | 0.20                          | -35.23                       |  |
| 600.00                       | 0.11                   | 315.97             | 600.00                       | 0.41                | -0.91               | -0.42                          | 0.16                           | -0.16                         | -8.35                        |  |
| 700.00                       | 0.31                   | 332.58             | 700.00                       | 0.72                | -1.10               | -0.73                          | 0.21                           | 0.20                          | 16.61                        |  |



# LEAM Drilling Services

## Survey Report

|                  |                   |                                     |                                             |
|------------------|-------------------|-------------------------------------|---------------------------------------------|
| <b>Company:</b>  | COG Operating LLC | <b>Local Co-ordinate Reference:</b> | Well 2H                                     |
| <b>Project:</b>  | Lea County, NM    | <b>TVD Reference:</b>               | 3717.7' + KB 20' @ 3737.70usft (Patriot #2) |
| <b>Site:</b>     | Mas Federal Com   | <b>MD Reference:</b>                | 3717.7' + KB 20' @ 3737.70usft (Patriot #2) |
| <b>Well:</b>     | 2H                | <b>North Reference:</b>             | Grid                                        |
| <b>Wellbore:</b> | ST01              | <b>Survey Calculation Method:</b>   | Minimum Curvature                           |
| <b>Design:</b>   | ST01              | <b>Database:</b>                    | EDM 5000.1 Multi User Db                    |

| Survey                |                 |             |                       |              |              |                         |                         |                        |                       |  |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|--|
| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |  |
| 800.00                | 0.33            | 324.93      | 800.00                | 1.20         | -1.39        | -1.20                   | 0.05                    | 0.02                   | -7.65                 |  |
| 900.00                | 0.32            | 282.70      | 899.99                | 1.49         | -1.83        | -1.50                   | 0.23                    | -0.01                  | -42.23                |  |
| 1,000.00              | 0.06            | 51.90       | 999.99                | 1.59         | -2.06        | -1.60                   | 0.36                    | -0.26                  | 129.20                |  |
| 1,100.00              | 0.32            | 295.48      | 1,099.99              | 1.74         | -2.27        | -1.75                   | 0.35                    | 0.26                   | -116.42               |  |
| 1,200.00              | 0.22            | 281.75      | 1,199.99              | 1.90         | -2.71        | -1.92                   | 0.12                    | -0.10                  | -13.73                |  |
| 1,300.00              | 0.14            | 235.87      | 1,299.99              | 1.87         | -3.00        | -1.89                   | 0.16                    | -0.08                  | -45.88                |  |
| 1,400.00              | 0.15            | 238.90      | 1,399.99              | 1.73         | -3.22        | -1.75                   | 0.01                    | 0.01                   | 3.03                  |  |
| 1,500.00              | 0.31            | 132.81      | 1,499.99              | 1.48         | -3.13        | -1.50                   | 0.38                    | 0.16                   | -106.09               |  |
| 1,600.00              | 0.35            | 113.90      | 1,599.99              | 1.17         | -2.65        | -1.19                   | 0.12                    | 0.04                   | -18.91                |  |
| 1,700.00              | 0.32            | 88.27       | 1,699.99              | 1.06         | -2.09        | -1.07                   | 0.15                    | -0.03                  | -25.63                |  |
| 1,800.00              | 0.90            | 85.56       | 1,799.98              | 1.13         | -1.03        | -1.13                   | 0.58                    | 0.58                   | -2.71                 |  |
| 1,900.00              | 1.14            | 75.98       | 1,899.97              | 1.43         | 0.72         | -1.42                   | 0.29                    | 0.24                   | -9.58                 |  |
| 2,000.00              | 1.18            | 76.95       | 1,999.95              | 1.90         | 2.69         | -1.89                   | 0.04                    | 0.04                   | 0.97                  |  |
| 2,100.00              | 1.21            | 68.73       | 2,099.92              | 2.52         | 4.67         | -2.49                   | 0.17                    | 0.03                   | -8.22                 |  |
| 2,200.00              | 1.12            | 77.37       | 2,199.90              | 3.11         | 6.61         | -3.07                   | 0.20                    | -0.09                  | 8.64                  |  |
| 2,300.00              | 1.09            | 82.08       | 2,299.88              | 3.46         | 8.51         | -3.41                   | 0.10                    | -0.03                  | 4.71                  |  |
| 2,400.00              | 1.98            | 67.93       | 2,399.85              | 4.24         | 11.05        | -4.17                   | 0.96                    | 0.89                   | -14.15                |  |
| 2,500.00              | 2.26            | 64.89       | 2,499.78              | 5.73         | 14.44        | -5.63                   | 0.30                    | 0.28                   | -3.04                 |  |
| 2,600.00              | 2.21            | 65.49       | 2,599.70              | 7.36         | 17.97        | -7.25                   | 0.06                    | -0.05                  | 0.60                  |  |
| 2,700.00              | 1.81            | 81.37       | 2,699.64              | 8.40         | 21.29        | -8.27                   | 0.68                    | -0.40                  | 15.88                 |  |
| 2,800.00              | 1.89            | 80.75       | 2,799.59              | 8.90         | 24.48        | -8.75                   | 0.08                    | 0.08                   | -0.62                 |  |
| 2,900.00              | 1.67            | 80.60       | 2,899.54              | 9.40         | 27.54        | -9.23                   | 0.22                    | -0.22                  | -0.15                 |  |
| 3,000.00              | 1.28            | 76.96       | 2,999.51              | 9.89         | 30.07        | -9.71                   | 0.40                    | -0.39                  | -3.64                 |  |
| 3,100.00              | 0.57            | 69.32       | 3,099.49              | 10.32        | 31.62        | -10.12                  | 0.72                    | -0.71                  | -7.64                 |  |
| 3,200.00              | 0.72            | 305.05      | 3,199.49              | 10.86        | 31.57        | -10.66                  | 1.14                    | 0.15                   | -124.27               |  |
| 3,300.00              | 0.98            | 268.96      | 3,299.48              | 11.20        | 30.21        | -11.01                  | 0.58                    | 0.26                   | -36.09                |  |
| 3,400.00              | 1.19            | 249.20      | 3,399.46              | 10.82        | 28.38        | -10.64                  | 0.43                    | 0.21                   | -19.76                |  |
| 3,500.00              | 1.19            | 250.69      | 3,499.44              | 10.11        | 26.43        | -9.94                   | 0.03                    | 0.00                   | 1.49                  |  |
| 3,600.00              | 0.98            | 245.95      | 3,599.42              | 9.42         | 24.67        | -9.26                   | 0.23                    | -0.21                  | -4.74                 |  |
| 3,700.00              | 1.03            | 235.16      | 3,699.41              | 8.55         | 23.15        | -8.41                   | 0.20                    | 0.05                   | -10.79                |  |
| 3,800.00              | 0.84            | 235.14      | 3,799.40              | 7.62         | 21.81        | -7.48                   | 0.19                    | -0.19                  | -0.02                 |  |
| 3,900.00              | 0.68            | 270.77      | 3,899.39              | 7.21         | 20.62        | -7.08                   | 0.49                    | -0.16                  | 35.63                 |  |
| 4,000.00              | 1.07            | 278.55      | 3,999.38              | 7.36         | 19.10        | -7.24                   | 0.41                    | 0.39                   | 7.78                  |  |
| 4,100.00              | 0.95            | 253.61      | 4,099.36              | 7.26         | 17.38        | -7.15                   | 0.45                    | -0.12                  | -24.94                |  |
| 4,200.00              | 0.78            | 240.73      | 4,199.35              | 6.70         | 15.99        | -6.59                   | 0.26                    | -0.17                  | -12.88                |  |
| 4,300.00              | 0.79            | 225.58      | 4,299.34              | 5.88         | 14.91        | -5.79                   | 0.21                    | 0.01                   | -15.15                |  |
| 4,400.00              | 1.04            | 205.45      | 4,399.33              | 4.58         | 14.02        | -4.49                   | 0.40                    | 0.25                   | -20.13                |  |
| 4,500.00              | 0.77            | 212.93      | 4,499.31              | 3.19         | 13.27        | -3.11                   | 0.29                    | -0.27                  | 7.48                  |  |
| 4,600.00              | 1.34            | 200.10      | 4,599.30              | 1.53         | 12.50        | -1.45                   | 0.61                    | 0.57                   | -12.83                |  |
| 4,700.00              | 1.40            | 208.59      | 4,699.27              | -0.64        | 11.51        | 0.71                    | 0.21                    | 0.06                   | 8.49                  |  |
| 4,800.00              | 1.08            | 214.59      | 4,799.25              | -2.49        | 10.39        | 2.55                    | 0.34                    | -0.32                  | 6.00                  |  |
| 4,900.00              | 1.13            | 229.97      | 4,899.23              | -3.90        | 9.10         | 3.95                    | 0.30                    | 0.05                   | 15.38                 |  |
| 5,000.00              | 0.75            | 210.23      | 4,999.21              | -5.10        | 8.02         | 5.15                    | 0.49                    | -0.38                  | -19.74                |  |



# LEAM Drilling Services

## Survey Report

|                  |                   |                                     |                                             |
|------------------|-------------------|-------------------------------------|---------------------------------------------|
| <b>Company:</b>  | COG Operating LLC | <b>Local Co-ordinate Reference:</b> | Well 2H                                     |
| <b>Project:</b>  | Lea County, NM    | <b>TVD Reference:</b>               | 3717.7' + KB 20' @ 3737.70usft (Patriot #2) |
| <b>Site:</b>     | Mas Federal Com   | <b>MD Reference:</b>                | 3717.7' + KB 20' @ 3737.70usft (Patriot #2) |
| <b>Well:</b>     | 2H                | <b>North Reference:</b>             | Grid                                        |
| <b>Wellbore:</b> | ST01              | <b>Survey Calculation Method:</b>   | Minimum Curvature                           |
| <b>Design:</b>   | ST01              | <b>Database:</b>                    | EDM 5000.1 Multi User Db                    |

### Survey

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| 5,100.00              | 0.89            | 214.28      | 5,099.20              | -6.30        | 7.25         | 6.35                    | 0.15                    | 0.14                   | 4.05                  |
| 5,200.00              | 0.91            | 221.10      | 5,199.19              | -7.54        | 6.29         | 7.58                    | 0.11                    | 0.02                   | 6.82                  |
| 5,300.00              | 0.88            | 237.81      | 5,299.18              | -8.55        | 5.12         | 8.58                    | 0.26                    | -0.03                  | 16.71                 |
| 5,400.00              | 0.67            | 315.34      | 5,399.17              | -8.54        | 4.06         | 8.57                    | 0.98                    | -0.21                  | 77.53                 |
| 5,500.00              | 0.93            | 297.20      | 5,499.16              | -7.76        | 2.93         | 7.78                    | 0.36                    | 0.26                   | -18.14                |
| 5,600.00              | 0.93            | 304.07      | 5,599.15              | -6.93        | 1.53         | 6.94                    | 0.11                    | 0.00                   | 6.87                  |
| 5,700.00              | 1.18            | 303.53      | 5,699.13              | -5.91        | 0.00         | 5.91                    | 0.25                    | 0.25                   | -0.54                 |
| 5,765.00              | 0.98            | 311.34      | 5,764.12              | -5.17        | -0.97        | 5.16                    | 0.38                    | -0.30                  | 12.02                 |
| <b>CASING</b>         |                 |             |                       |              |              |                         |                         |                        |                       |
| 5,800.00              | 0.89            | 316.91      | 5,799.12              | -4.77        | -1.39        | 4.76                    | 0.38                    | -0.27                  | 15.91                 |
| 5,900.00              | 1.07            | 311.86      | 5,899.10              | -3.58        | -2.61        | 3.57                    | 0.20                    | 0.18                   | -5.05                 |
| 6,000.00              | 1.04            | 319.66      | 5,999.08              | -2.27        | -3.89        | 2.24                    | 0.15                    | -0.03                  | 7.80                  |
| 6,100.00              | 1.27            | 322.59      | 6,099.06              | -0.70        | -5.16        | 0.66                    | 0.24                    | 0.23                   | 2.93                  |
| 6,200.00              | 1.34            | 354.84      | 6,199.04              | 1.35         | -5.93        | -1.39                   | 0.73                    | 0.07                   | 32.25                 |
| 6,300.00              | 1.41            | 12.81       | 6,299.01              | 3.71         | -5.77        | -3.75                   | 0.43                    | 0.07                   | 17.97                 |
| 6,400.00              | 1.45            | 24.51       | 6,398.98              | 6.06         | -4.97        | -6.10                   | 0.29                    | 0.04                   | 11.70                 |
| 6,500.00              | 1.25            | 10.66       | 6,498.95              | 8.29         | -4.24        | -8.31                   | 0.38                    | -0.20                  | -13.85                |
| 6,600.00              | 1.38            | 39.96       | 6,598.93              | 10.28        | -3.27        | -10.30                  | 0.68                    | 0.13                   | 29.30                 |
| 6,700.00              | 1.34            | 47.84       | 6,698.90              | 11.99        | -1.63        | -12.00                  | 0.19                    | -0.04                  | 7.88                  |
| 6,800.00              | 1.45            | 49.95       | 6,798.87              | 13.59        | 0.21         | -13.59                  | 0.12                    | 0.11                   | 2.11                  |
| 6,900.00              | 1.14            | 54.14       | 6,898.84              | 14.99        | 1.98         | -14.97                  | 0.32                    | -0.31                  | 4.19                  |
| 7,000.00              | 1.44            | 71.26       | 6,998.82              | 15.97        | 3.98         | -15.95                  | 0.49                    | 0.30                   | 17.12                 |
| 7,100.00              | 0.78            | 141.20      | 7,098.80              | 15.85        | 5.60         | -15.81                  | 1.38                    | -0.66                  | 69.94                 |
| 7,200.00              | 2.71            | 186.34      | 7,198.76              | 12.96        | 5.76         | -12.93                  | 2.23                    | 1.93                   | 45.14                 |
| 7,300.00              | 2.59            | 193.45      | 7,298.65              | 8.42         | 4.97         | -8.39                   | 0.35                    | -0.12                  | 7.11                  |
| 7,400.00              | 1.82            | 211.95      | 7,398.58              | 4.87         | 3.61         | -4.85                   | 1.04                    | -0.77                  | 18.50                 |
| 7,500.00              | 1.92            | 224.44      | 7,498.52              | 2.33         | 1.60         | -2.32                   | 0.42                    | 0.10                   | 12.49                 |
| 7,600.00              | 1.20            | 236.81      | 7,598.48              | 0.56         | -0.45        | -0.56                   | 0.79                    | -0.72                  | 12.37                 |
| 7,700.00              | 0.73            | 264.60      | 7,698.47              | -0.07        | -1.96        | 0.06                    | 0.65                    | -0.47                  | 27.79                 |
| 7,800.00              | 0.65            | 306.85      | 7,798.46              | 0.21         | -3.05        | -0.23                   | 0.50                    | -0.08                  | 42.25                 |
| 7,900.00              | 0.58            | 279.41      | 7,898.46              | 0.63         | -4.01        | -0.66                   | 0.30                    | -0.07                  | -27.44                |
| 8,000.00              | 0.64            | 274.24      | 7,998.45              | 0.75         | -5.06        | -0.79                   | 0.08                    | 0.06                   | -5.17                 |
| 8,100.00              | 0.75            | 312.84      | 8,098.45              | 1.24         | -6.10        | -1.28                   | 0.47                    | 0.11                   | 38.60                 |
| 8,200.00              | 0.92            | 281.55      | 8,198.44              | 1.85         | -7.36        | -1.89                   | 0.48                    | 0.17                   | -31.29                |
| 8,300.00              | 0.68            | 319.19      | 8,298.43              | 2.46         | -8.54        | -2.51                   | 0.56                    | -0.24                  | 37.64                 |
| 8,400.00              | 0.60            | 286.09      | 8,398.42              | 3.05         | -9.43        | -3.11                   | 0.37                    | -0.08                  | -33.10                |
| 8,500.00              | 0.38            | 115.43      | 8,498.42              | 3.05         | -9.63        | -3.11                   | 0.98                    | -0.22                  | -170.66               |
| 8,600.00              | 0.32            | 113.95      | 8,598.42              | 2.80         | -9.08        | -2.85                   | 0.06                    | -0.06                  | -1.48                 |
| 8,700.00              | 0.55            | 122.41      | 8,698.41              | 2.43         | -8.42        | -2.48                   | 0.24                    | 0.23                   | 8.46                  |
| 8,800.00              | 0.79            | 137.21      | 8,798.41              | 1.66         | -7.55        | -1.71                   | 0.29                    | 0.24                   | 14.80                 |
| 8,900.00              | 0.84            | 159.82      | 8,898.40              | 0.47         | -6.82        | -0.51                   | 0.32                    | 0.05                   | 22.61                 |
| 9,000.00              | 0.95            | 128.23      | 8,998.39              | -0.73        | -5.92        | 0.69                    | 0.50                    | 0.11                   | -31.59                |
| 9,100.00              | 0.76            | 161.55      | 9,098.38              | -1.87        | -5.06        | 1.84                    | 0.52                    | -0.19                  | 33.32                 |
| 9,200.00              | 0.07            | 171.45      | 9,198.37              | -2.56        | -4.84        | 2.53                    | 0.69                    | -0.69                  | 9.90                  |



# LEAM Drilling Services

## Survey Report

|                  |                   |                                     |                                             |
|------------------|-------------------|-------------------------------------|---------------------------------------------|
| <b>Company:</b>  | COG Operating LLC | <b>Local Co-ordinate Reference:</b> | Well 2H                                     |
| <b>Project:</b>  | Lea County, NM    | <b>TVD Reference:</b>               | 3717.7' + KB 20' @ 3737.70usft (Patriot #2) |
| <b>Site:</b>     | Mas Federal Com   | <b>MD Reference:</b>                | 3717.7' + KB 20' @ 3737.70usft (Patriot #2) |
| <b>Well:</b>     | 2H                | <b>North Reference:</b>             | Grid                                        |
| <b>Wellbore:</b> | ST01              | <b>Survey Calculation Method:</b>   | Minimum Curvature                           |
| <b>Design:</b>   | ST01              | <b>Database:</b>                    | EDM 5000.1 Multi User Db                    |

### Survey

| Measured Depth (usft)                     | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |
|-------------------------------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| 9,300.00                                  | 0.45            | 230.85      | 9,298.37              | -2.87        | -5.14        | 2.84                    | 0.42                    | 0.38                   | 59.40                 |
| 9,400.00                                  | 0.52            | 168.83      | 9,398.37              | -3.56        | -5.35        | 3.53                    | 0.50                    | 0.07                   | -62.02                |
| 9,500.00                                  | 1.03            | 197.40      | 9,498.36              | -4.87        | -5.53        | 4.83                    | 0.62                    | 0.51                   | 28.57                 |
| 9,600.00                                  | 0.60            | 59.92       | 9,598.35              | -5.46        | -5.35        | 5.43                    | 1.53                    | -0.43                  | -137.48               |
| 9,700.00                                  | 0.65            | 40.86       | 9,698.35              | -4.77        | -4.52        | 4.74                    | 0.21                    | 0.05                   | -19.06                |
| 9,800.00                                  | 0.36            | 28.21       | 9,798.34              | -4.07        | -4.00        | 4.04                    | 0.31                    | -0.29                  | -12.65                |
| 9,900.00                                  | 0.86            | 80.73       | 9,898.34              | -3.67        | -3.12        | 3.65                    | 0.70                    | 0.50                   | 52.52                 |
| 10,000.00                                 | 1.16            | 90.54       | 9,998.32              | -3.56        | -1.36        | 3.55                    | 0.35                    | 0.30                   | 9.81                  |
| 10,100.00                                 | 1.67            | 94.77       | 10,098.29             | -3.69        | 1.10         | 3.69                    | 0.52                    | 0.51                   | 4.23                  |
| 10,200.00                                 | 1.32            | 127.65      | 10,198.26             | -4.51        | 3.47         | 4.53                    | 0.91                    | -0.35                  | 32.88                 |
| 10,240.00                                 | 1.03            | 123.44      | 10,238.25             | -4.99        | 4.13         | 5.02                    | 0.76                    | -0.73                  | -10.53                |
| 10,407.00                                 | 0.53            | 131.44      | 10,405.24             | -6.33        | 5.96         | 6.37                    | 0.30                    | -0.30                  | 4.79                  |
| <b>CASING</b>                             |                 |             |                       |              |              |                         |                         |                        |                       |
| 10,453.00                                 | 0.40            | 137.10      | 10,451.23             | -6.59        | 6.23         | 6.63                    | 0.30                    | -0.29                  | 12.31                 |
| 10,547.00                                 | 0.50            | 187.90      | 10,545.23             | -7.24        | 6.40         | 7.28                    | 0.42                    | 0.11                   | 54.04                 |
| 10,578.00                                 | 2.24            | 174.80      | 10,576.22             | -7.97        | 6.44         | 8.02                    | 5.67                    | 5.61                   | -42.26                |
| 10,610.00                                 | 9.50            | 169.96      | 10,608.03             | -11.20       | 6.96         | 11.25                   | 22.72                   | 22.69                  | -15.13                |
| 10,641.00                                 | 17.09           | 172.80      | 10,638.18             | -18.25       | 7.97         | 18.30                   | 24.57                   | 24.48                  | 9.16                  |
| 10,672.00                                 | 19.40           | 171.76      | 10,667.62             | -27.87       | 9.28         | 27.92                   | 7.52                    | 7.45                   | -3.35                 |
| 10,703.00                                 | 18.76           | 171.77      | 10,696.92             | -37.90       | 10.73        | 37.96                   | 2.06                    | -2.06                  | 0.03                  |
| 10,734.00                                 | 18.26           | 169.24      | 10,726.31             | -47.60       | 12.35        | 47.68                   | 3.05                    | -1.61                  | -8.16                 |
| 10,766.00                                 | 17.51           | 167.96      | 10,756.77             | -57.23       | 14.29        | 57.32                   | 2.65                    | -2.34                  | -4.00                 |
| 10,797.00                                 | 16.69           | 167.23      | 10,786.40             | -66.14       | 16.25        | 66.24                   | 2.73                    | -2.65                  | -2.35                 |
| 10,829.00                                 | 18.10           | 168.30      | 10,816.93             | -75.49       | 18.28        | 75.60                   | 4.52                    | 4.41                   | 3.34                  |
| 10,860.00                                 | 21.63           | 171.00      | 10,846.08             | -85.85       | 20.15        | 85.97                   | 11.76                   | 11.39                  | 8.71                  |
| 10,891.00                                 | 23.41           | 170.55      | 10,874.72             | -97.57       | 22.05        | 97.70                   | 5.77                    | 5.74                   | -1.45                 |
| 10,923.00                                 | 23.39           | 173.29      | 10,904.09             | -110.15      | 23.84        | 110.29                  | 3.40                    | -0.06                  | 8.56                  |
| 10,954.00                                 | 24.69           | 174.56      | 10,932.40             | -122.70      | 25.17        | 122.86                  | 4.51                    | 4.19                   | 4.10                  |
| 10,985.00                                 | 26.11           | 176.00      | 10,960.40             | -135.95      | 26.26        | 136.12                  | 4.99                    | 4.58                   | 4.65                  |
| 10,993.63                                 | 26.06           | 176.60      | 10,968.15             | -139.74      | 26.50        | 139.90                  | 3.13                    | -0.62                  | 6.97                  |
| <b>330' HL Crossing 330' FNL 634' FEL</b> |                 |             |                       |              |              |                         |                         |                        |                       |
| 11,016.00                                 | 25.93           | 178.17      | 10,988.26             | -149.53      | 26.95        | 149.70                  | 3.13                    | -0.57                  | 7.01                  |
| 11,047.00                                 | 25.99           | 177.72      | 11,016.13             | -163.10      | 27.44        | 163.26                  | 0.66                    | 0.19                   | -1.45                 |
| 11,079.00                                 | 26.52           | 177.54      | 11,044.83             | -177.24      | 28.02        | 177.41                  | 1.67                    | 1.66                   | -0.56                 |
| 11,110.00                                 | 27.00           | 177.76      | 11,072.51             | -191.18      | 28.60        | 191.36                  | 1.58                    | 1.55                   | 0.71                  |
| 11,140.00                                 | 28.35           | 177.78      | 11,099.08             | -205.11      | 29.14        | 205.29                  | 4.50                    | 4.50                   | 0.07                  |
| 11,171.00                                 | 33.98           | 180.17      | 11,125.59             | -221.14      | 29.40        | 221.32                  | 18.59                   | 18.16                  | 7.71                  |
| 11,203.00                                 | 41.40           | 183.10      | 11,150.90             | -240.68      | 28.80        | 240.85                  | 23.85                   | 23.19                  | 9.16                  |
| 11,234.00                                 | 47.08           | 185.68      | 11,173.10             | -262.23      | 27.12        | 262.39                  | 19.22                   | 18.32                  | 8.32                  |
| 11,265.00                                 | 51.41           | 186.91      | 11,193.34             | -285.56      | 24.54        | 285.71                  | 14.29                   | 13.97                  | 3.97                  |
| 11,297.00                                 | 54.95           | 187.20      | 11,212.51             | -310.98      | 21.39        | 311.11                  | 11.09                   | 11.06                  | 0.91                  |
| 11,328.00                                 | 58.78           | 186.98      | 11,229.45             | -336.73      | 18.19        | 336.84                  | 12.37                   | 12.35                  | -0.71                 |
| 11,359.00                                 | 61.09           | 186.13      | 11,244.98             | -363.39      | 15.13        | 363.47                  | 7.82                    | 7.45                   | -2.74                 |



# LEAM Drilling Services

## Survey Report

|                  |                   |                                     |                                             |
|------------------|-------------------|-------------------------------------|---------------------------------------------|
| <b>Company:</b>  | COG Operating LLC | <b>Local Co-ordinate Reference:</b> | Well 2H                                     |
| <b>Project:</b>  | Lea County, NM    | <b>TVD Reference:</b>               | 3717.7' + KB 20' @ 3737.70usft (Patriot #2) |
| <b>Site:</b>     | Mas Federal Corn  | <b>MD Reference:</b>                | 3717.7' + KB 20' @ 3737.70usft (Patriot #2) |
| <b>Well:</b>     | 2H                | <b>North Reference:</b>             | Grid                                        |
| <b>Wellbore:</b> | ST01              | <b>Survey Calculation Method:</b>   | Minimum Curvature                           |
| <b>Design:</b>   | ST01              | <b>Database:</b>                    | EDM 5000.1 Multi User Db                    |

### Survey

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| 11,390.00             | 63.45           | 185.71      | 11,259.41             | -390.68      | 12.30        | 390.75                  | 7.71                    | 7.61                   | -1.35                 |
| 11,422.00             | 65.28           | 185.24      | 11,273.25             | -419.39      | 9.55         | 419.45                  | 5.87                    | 5.72                   | -1.47                 |
| 11,453.00             | 66.65           | 184.43      | 11,285.88             | -447.60      | 7.16         | 447.64                  | 5.02                    | 4.42                   | -2.61                 |
| 11,484.00             | 68.58           | 182.83      | 11,297.68             | -476.21      | 5.35         | 476.23                  | 7.84                    | 6.23                   | -5.16                 |
| 11,515.00             | 70.70           | 181.28      | 11,308.47             | -505.25      | 4.31         | 505.27                  | 8.29                    | 6.84                   | -5.00                 |
| 11,547.00             | 71.04           | 180.92      | 11,318.95             | -535.48      | 3.73         | 535.49                  | 1.50                    | 1.06                   | -1.13                 |
| 11,578.00             | 71.01           | 180.59      | 11,329.03             | -564.79      | 3.34         | 564.80                  | 1.01                    | -0.10                  | -1.06                 |
| 11,610.00             | 70.89           | 180.48      | 11,339.48             | -595.04      | 3.06         | 595.04                  | 0.50                    | -0.38                  | -0.34                 |
| 11,641.00             | 72.58           | 180.26      | 11,349.19             | -624.47      | 2.87         | 624.48                  | 5.49                    | 5.45                   | -0.71                 |
| 11,672.00             | 74.47           | 179.88      | 11,357.98             | -654.20      | 2.84         | 654.20                  | 6.21                    | 6.10                   | -1.23                 |
| 11,703.00             | 76.17           | 179.22      | 11,365.84             | -684.18      | 3.07         | 684.19                  | 5.86                    | 5.48                   | -2.13                 |
| 11,734.00             | 78.60           | 178.22      | 11,372.61             | -714.43      | 3.75         | 714.44                  | 8.45                    | 7.84                   | -3.23                 |
| 11,765.00             | 80.89           | 177.68      | 11,378.13             | -744.91      | 4.84         | 744.93                  | 7.58                    | 7.39                   | -1.74                 |
| 11,796.00             | 83.37           | 178.09      | 11,382.37             | -775.59      | 5.97         | 775.62                  | 8.11                    | 8.00                   | 1.32                  |
| 11,827.00             | 85.62           | 179.76      | 11,385.35             | -806.44      | 6.55         | 806.47                  | 9.02                    | 7.26                   | 5.39                  |
| 11,859.00             | 87.98           | 181.18      | 11,387.13             | -838.39      | 6.29         | 838.41                  | 8.60                    | 7.38                   | 4.44                  |
| 11,953.00             | 91.30           | 182.98      | 11,387.72             | -932.31      | 2.88         | 932.31                  | 4.02                    | 3.53                   | 1.91                  |
| 12,046.00             | 90.57           | 181.60      | 11,386.21             | -1,025.22    | -0.84        | 1,025.19                | 1.68                    | -0.78                  | -1.48                 |
| 12,140.00             | 89.82           | 180.95      | 11,385.89             | -1,119.19    | -2.93        | 1,119.15                | 1.06                    | -0.80                  | -0.69                 |
| 12,234.00             | 88.32           | 178.30      | 11,387.41             | -1,213.17    | -2.32        | 1,213.13                | 3.24                    | -1.60                  | -2.82                 |
| 12,327.00             | 87.73           | 177.48      | 11,390.62             | -1,306.05    | 1.11         | 1,306.03                | 1.09                    | -0.63                  | -0.88                 |
| 12,421.00             | 87.48           | 176.93      | 11,394.55             | -1,399.85    | 5.69         | 1,399.86                | 0.64                    | -0.27                  | -0.59                 |
| 12,514.00             | 87.00           | 176.11      | 11,399.02             | -1,492.57    | 11.32        | 1,492.62                | 1.02                    | -0.52                  | -0.88                 |
| 12,608.00             | 89.52           | 178.12      | 11,401.88             | -1,586.40    | 16.05        | 1,586.47                | 3.43                    | 2.68                   | 2.14                  |
| 12,703.00             | 88.98           | 177.38      | 11,403.12             | -1,681.32    | 19.78        | 1,681.41                | 0.96                    | -0.57                  | -0.78                 |
| 12,797.00             | 90.44           | 177.25      | 11,403.60             | -1,775.21    | 24.18        | 1,775.33                | 1.56                    | 1.55                   | -0.14                 |
| 12,890.00             | 90.97           | 179.71      | 11,402.45             | -1,868.16    | 26.65        | 1,868.29                | 2.71                    | 0.57                   | 2.65                  |
| 12,984.00             | 91.43           | 179.46      | 11,400.48             | -1,962.14    | 27.33        | 1,962.27                | 0.56                    | 0.49                   | -0.27                 |
| 13,078.00             | 89.94           | 181.34      | 11,399.36             | -2,056.12    | 26.68        | 2,056.25                | 2.55                    | -1.59                  | 2.00                  |
| 13,172.00             | 88.32           | 179.94      | 11,400.79             | -2,150.10    | 25.63        | 2,150.22                | 2.28                    | -1.72                  | -1.49                 |
| 13,266.00             | 89.05           | 180.32      | 11,402.95             | -2,244.08    | 25.41        | 2,244.19                | 0.88                    | 0.78                   | 0.40                  |
| 13,360.00             | 88.76           | 180.39      | 11,404.74             | -2,338.06    | 24.83        | 2,338.17                | 0.32                    | -0.31                  | 0.07                  |
| 13,454.00             | 87.00           | 179.09      | 11,408.22             | -2,431.99    | 25.26        | 2,432.10                | 2.33                    | -1.87                  | -1.38                 |
| 13,548.00             | 88.50           | 179.07      | 11,411.91             | -2,525.90    | 26.76        | 2,526.02                | 1.60                    | 1.60                   | -0.02                 |
| 13,642.00             | 89.90           | 180.10      | 11,413.22             | -2,619.88    | 27.44        | 2,620.00                | 1.85                    | 1.49                   | 1.10                  |
| 13,733.00             | 89.28           | 179.35      | 11,413.87             | -2,710.88    | 27.88        | 2,711.00                | 1.07                    | -0.68                  | -0.82                 |
| 13,827.00             | 89.98           | 179.76      | 11,414.48             | -2,804.87    | 28.61        | 2,805.00                | 0.86                    | 0.74                   | 0.44                  |
| 13,922.00             | 91.12           | 179.91      | 11,413.57             | -2,899.87    | 28.88        | 2,899.99                | 1.21                    | 1.20                   | 0.16                  |
| 14,016.00             | 91.83           | 180.49      | 11,411.15             | -2,993.83    | 28.56        | 2,993.95                | 0.98                    | 0.76                   | 0.62                  |
| 14,110.00             | 89.19           | 179.61      | 11,410.31             | -3,087.82    | 28.47        | 3,087.94                | 2.96                    | -2.81                  | -0.94                 |
| 14,204.00             | 89.68           | 179.48      | 11,411.24             | -3,181.81    | 29.22        | 3,181.93                | 0.54                    | 0.52                   | -0.14                 |
| 14,299.00             | 88.68           | 178.27      | 11,412.60             | -3,276.78    | 31.09        | 3,276.91                | 1.65                    | -1.05                  | -1.27                 |
| 14,392.00             | 90.73           | 179.30      | 11,413.08             | -3,369.75    | 33.06        | 3,369.89                | 2.47                    | 2.20                   | 1.11                  |
| 14,485.00             | 90.87           | 178.59      | 11,411.78             | -3,462.73    | 34.77        | 3,462.88                | 0.78                    | 0.15                   | -0.76                 |



# LEAM Drilling Services

## Survey Report

|                  |                   |                                     |                                             |
|------------------|-------------------|-------------------------------------|---------------------------------------------|
| <b>Company:</b>  | COG Operating LLC | <b>Local Co-ordinate Reference:</b> | Well 2H                                     |
| <b>Project:</b>  | Lea County, NM    | <b>TVD Reference:</b>               | 3717.7' + KB 20' @ 3737.70usft (Patriot #2) |
| <b>Site:</b>     | Mas Federal Com   | <b>MD Reference:</b>                | 3717.7' + KB 20' @ 3737.70usft (Patriot #2) |
| <b>Well:</b>     | 2H                | <b>North Reference:</b>             | Grid                                        |
| <b>Wellbore:</b> | ST01              | <b>Survey Calculation Method:</b>   | Minimum Curvature                           |
| <b>Design:</b>   | ST01              | <b>Database:</b>                    | EDM 5000.1 Multi User Db                    |

| Survey                             |                 |             |                       |              |              |                         |                         |                        |                       |
|------------------------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| Measured Depth (usft)              | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |
| 14,578.00                          | 90.51           | 176.58      | 11,410.66             | -3,555.63    | 38.69        | 3,555.81                | 2.20                    | -0.39                  | -2.16                 |
| 14,672.00                          | 92.37           | 178.17      | 11,408.30             | -3,649.50    | 42.99        | 3,649.70                | 2.60                    | 1.98                   | 1.69                  |
| 14,765.00                          | 92.12           | 180.88      | 11,404.65             | -3,742.41    | 43.76        | 3,742.62                | 2.92                    | -0.27                  | 2.91                  |
| 14,860.00                          | 91.30           | 181.56      | 11,401.82             | -3,837.35    | 41.74        | 3,837.54                | 1.12                    | -0.86                  | 0.72                  |
| 14,954.00                          | 91.18           | 181.94      | 11,399.78             | -3,931.28    | 38.87        | 3,931.45                | 0.42                    | -0.13                  | 0.40                  |
| 15,048.00                          | 89.40           | 182.54      | 11,399.31             | -4,025.21    | 35.20        | 4,025.35                | 2.00                    | -1.89                  | 0.64                  |
| 15,142.00                          | 87.27           | 182.40      | 11,402.04             | -4,119.07    | 31.15        | 4,119.19                | 2.27                    | -2.27                  | -0.15                 |
| 15,236.00                          | 89.23           | 182.96      | 11,404.91             | -4,212.92    | 26.75        | 4,213.01                | 2.17                    | 2.09                   | 0.60                  |
| 15,330.00                          | 89.65           | 184.13      | 11,405.83             | -4,306.74    | 20.94        | 4,306.78                | 1.32                    | 0.45                   | 1.24                  |
| 15,424.00                          | 89.18           | 184.50      | 11,406.79             | -4,400.46    | 13.87        | 4,400.46                | 0.64                    | -0.50                  | 0.39                  |
| 15,517.00                          | 88.40           | 186.20      | 11,408.75             | -4,493.03    | 5.20         | 4,492.98                | 2.01                    | -0.84                  | 1.83                  |
| 15,612.00                          | 88.47           | 183.93      | 11,411.35             | -4,587.62    | -3.18        | 4,587.51                | 2.39                    | 0.07                   | -2.39                 |
| 15,706.00                          | 90.79           | 184.19      | 11,411.95             | -4,681.38    | -9.84        | 4,681.22                | 2.48                    | 2.47                   | 0.28                  |
| 15,785.37                          | 88.82           | 183.52      | 11,412.22             | -4,760.56    | -15.17       | 4,760.37                | 2.62                    | -2.48                  | -0.84                 |
| 330' HL Crossing 330' FSL 705' FEL |                 |             |                       |              |              |                         |                         |                        |                       |
| 15,800.00                          | 88.46           | 183.40      | 11,412.57             | -4,775.16    | -16.06       | 4,774.97                | 2.62                    | -2.48                  | -0.84                 |
| 15,865.00                          | 89.00           | 183.29      | 11,414.01             | -4,840.04    | -19.85       | 4,839.82                | 0.85                    | 0.83                   | -0.17                 |
| 15,915.00                          | 89.00           | 183.29      | 11,414.88             | -4,889.95    | -22.72       | 4,889.71                | 0.00                    | 0.00                   | 0.00                  |

# LEAM Drilling Services

## Survey Report

|                  |                   |                                     |                                             |
|------------------|-------------------|-------------------------------------|---------------------------------------------|
| <b>Company:</b>  | COG Operating LLC | <b>Local Co-ordinate Reference:</b> | Well 2H                                     |
| <b>Project:</b>  | Lea County, NM    | <b>TVD Reference:</b>               | 3717.7' + KB 20' @ 3737.70usft (Patriot #2) |
| <b>Site:</b>     | Mas Federal Com   | <b>MD Reference:</b>                | 3717.7' + KB 20' @ 3737.70usft (Patriot #2) |
| <b>Well:</b>     | 2H                | <b>North Reference:</b>             | Grid                                        |
| <b>Wellbore:</b> | ST01              | <b>Survey Calculation Method:</b>   | Minimum Curvature                           |
| <b>Design:</b>   | ST01              | <b>Database:</b>                    | EDM 5000.1 Multi User Db                    |

| Design Targets                                                                                              |           |          |           |           |        |            |            |                   |                    |  |
|-------------------------------------------------------------------------------------------------------------|-----------|----------|-----------|-----------|--------|------------|------------|-------------------|--------------------|--|
| Target Name                                                                                                 | Dip Angle | Dip Dir. | TVD       | +N/-S     | +E/-W  | Northing   | Easting    | Latitude          | Longitude          |  |
| - hit/miss target                                                                                           | (°)       | (°)      | (usft)    | (usft)    | (usft) | (usft)     | (usft)     |                   |                    |  |
| - Shape                                                                                                     |           |          |           |           |        |            |            |                   |                    |  |
| SHL (Federal 2H)                                                                                            | 0.00      | 0.00     | 0.00      | 0.00      | 0.00   | 559,689.80 | 744,135.50 | 32° 32' 10.3222 N | 103° 32' 28.1472 W |  |
| - actual wellpath hits target center                                                                        |           |          |           |           |        |            |            |                   |                    |  |
| - Point                                                                                                     |           |          |           |           |        |            |            |                   |                    |  |
| FTP (Federal 2H)                                                                                            | 0.00      | 0.00     | 11,387.00 | -139.93   | 0.91   | 559,549.87 | 744,136.41 | 32° 32' 8.9374 N  | 103° 32' 28.1487 W |  |
| - actual wellpath misses target center by 243.37usft at 11267.70usft MD (11195.01 TVD, -287.66 N, 24.28 E)  |           |          |           |           |        |            |            |                   |                    |  |
| - Point                                                                                                     |           |          |           |           |        |            |            |                   |                    |  |
| BHL (Federal 2H)                                                                                            | 0.00      | 0.00     | 11,414.88 | -4,889.95 | -22.72 | 554,799.86 | 744,112.78 | 32° 31' 21.9381 N | 103° 32' 28.8372 W |  |
| - actual wellpath hits target center                                                                        |           |          |           |           |        |            |            |                   |                    |  |
| - Point                                                                                                     |           |          |           |           |        |            |            |                   |                    |  |
| LTP (Federal 2H)                                                                                            | 0.00      | 0.00     | 11,433.50 | -4,760.21 | 30.23  | 554,929.59 | 744,165.72 | 32° 31' 23.2179 N | 103° 32' 28.2076 W |  |
| - actual wellpath misses target center by 50.07usft at 15782.03usft MD (11412.16 TVD, -4757.23 N, -14.97 E) |           |          |           |           |        |            |            |                   |                    |  |
| - Point                                                                                                     |           |          |           |           |        |            |            |                   |                    |  |
| PBHL (Federal 2H)                                                                                           | 0.00      | 0.00     | 11,435.00 | -4,890.20 | 31.10  | 554,799.60 | 744,166.60 | 32° 31' 21.9316 N | 103° 32' 28.2087 W |  |
| - actual wellpath misses target center by 57.40usft at 15912.52usft MD (11414.84 TVD, -4887.47 N, -22.58 E) |           |          |           |           |        |            |            |                   |                    |  |
| - Point                                                                                                     |           |          |           |           |        |            |            |                   |                    |  |
| BHL Pilot(Federal 2H)                                                                                       | 0.00      | 0.00     | 11,748.16 | -12.88    | 1.00   | 559,676.92 | 744,136.49 | 32° 32' 10.1946 N | 103° 32' 28.1367 W |  |
| - actual wellpath misses target center by 611.75usft at 11328.00usft MD (11229.45 TVD, -336.73 N, 18.19 E)  |           |          |           |           |        |            |            |                   |                    |  |
| - Point                                                                                                     |           |          |           |           |        |            |            |                   |                    |  |