



HOBBS OCD

30-025-40165

NOV 04 2011

PO Box 1370  
Artesia, NM 88211-1370  
(575) 748-1288

RECEIVED

August 31, 2011

COG, LLC  
Fasken Center, Tower II  
550 West Texas Ave, Suite 1300  
Midland, TX 79701

RE: GC Federal #47  
1505' FSL & 200' FEL  
Sec. 20, T17S, R32E  
Lea County, New Mexico

Dear Sir,

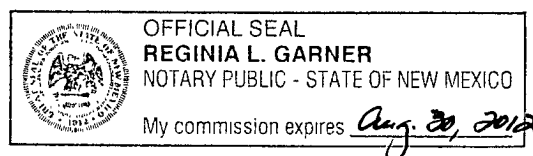
The attached is the Deviation Survey for the above captioned well.

Very truly yours,

Eddie C. LaRue  
Operations Manager

State of New Mexico }  
County of Eddy }

*The foregoing was acknowledged before me this 31<sup>st</sup> day of August, 2011.*

  
\_\_\_\_\_  
Notary Public

NOV 09 2011

# Pason DataHub Deviation Survey  
# Well Dossier 3201119 - GC FED #47  
#

| # Date    | Depth | Deviation | Direction |
|-----------|-------|-----------|-----------|
| 8/17/2011 | 148   | 0.20      | 0         |
| 8/17/2011 | 237   | 0.80      | 0         |
| 8/17/2011 | 323   | 0.20      | 0         |
| 8/17/2011 | 412   | 0.80      | 0         |
| 8/17/2011 | 501   | 0.40      | 0         |
| 8/18/2011 | 590   | 0.20      | 0         |
| 8/18/2011 | 679   | 0.30      | 0         |
| 8/18/2011 | 787   | 0.30      | 0         |
| 8/19/2011 | 1276  | 0.60      | 0         |
| 8/20/2011 | 1748  | 1.30      | 0         |
| 8/20/2011 | 2166  | 1.50      | 0         |
| 8/22/2011 | 2475  | 1.60      | 165.50    |
| 8/22/2011 | 2632  | 4.40      | 186.20    |
| 8/22/2011 | 2694  | 4.90      | 194.50    |
| 8/22/2011 | 2852  | 6.90      | 200.70    |
| 8/22/2011 | 3010  | 7.30      | 198.20    |
| 8/22/2011 | 3072  | 8.30      | 197.40    |
| 8/22/2011 | 3292  | 7.30      | 192.00    |
| 8/22/2011 | 3166  | 8.20      | 193.50    |
| 8/22/2011 | 3387  | 6.90      | 200.40    |
| 8/22/2011 | 3418  | 6.70      | 201.50    |
| 8/23/2011 | 3513  | 6.90      | 204.00    |
| 8/23/2011 | 3734  | 6.90      | 204.80    |
| 8/23/2011 | 3866  | 7.30      | 202.60    |
| 8/23/2011 | 3961  | 7.30      | 197.60    |
| 8/23/2011 | 4119  | 7.60      | 195.30    |
| 8/23/2011 | 4181  | 7.60      | 195.80    |
| 8/23/2011 | 4372  | 7.90      | 192.70    |
| 8/23/2011 | 4560  | 7.60      | 192.40    |
| 8/24/2011 | 4750  | 6.20      | 194.10    |
| 8/24/2011 | 4876  | 6.40      | 194.50    |
| 8/24/2011 | 4971  | 6.60      | 193.80    |
| 8/24/2011 | 5129  | 6.80      | 197.50    |
| 8/24/2011 | 5286  | 6.80      | 192.80    |
| 8/24/2011 | 5318  | 6.70      | 191.00    |
| 8/24/2011 | 5476  | 6.70      | 196.70    |
| 8/24/2011 | 5601  | 7.20      | 193.90    |
| 8/25/2011 | 5633  | 7.30      | 194.80    |
| 8/25/2011 | 5822  | 7.40      | 192.80    |
| 8/25/2011 | 5885  | 7.20      | 193.60    |
| 8/25/2011 | 5916  | 7.00      | 193.90    |
| 8/25/2011 | 6010  | 6.50      | 195.80    |
| 8/29/2011 | 6202  | 6.80      | 196.10    |
| 8/29/2011 | 6234  | 6.70      | 195.70    |
| 8/30/2011 | 6485  | 6.40      | 195.50    |
| 8/30/2011 | 6578  | 6.30      | 196.10    |
| 8/30/2011 | 6642  | 6.30      | 196.10    |
| 8/30/2011 | 6830  | 6.40      | 192.80    |
| 8/30/2011 | 6956  | 6.60      | 192.70    |
| 8/30/2011 | 7019  | 6.50      | 190.90    |
| 8/30/2011 | 7050  | 6.30      | 190.40    |
| 8/30/2011 | 7113  | 6.20      | 190.40    |

# EOF

**HOBBS OCD**

**NOV 04 2011**

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## **COG Operating, LLC**

**Lea County , NM**

**CG Federal #47**

**CG Federal #47**

**Top of Paddock = 334.08' S & 86.72' W of Surface @ 5375' TVD  
Wellbore #1**

**Survey: MWD Survey #1**

## **Standard Survey Report**

**31 August, 2011**

**NOV 09 2011**

# Survey Report

|                  |                    |                                     |                                       |
|------------------|--------------------|-------------------------------------|---------------------------------------|
| <b>Company:</b>  | COG Operating, LLC | <b>Local Co-ordinate Reference:</b> | Site CG Federal #47                   |
| <b>Project:</b>  | Lea County , NM    | <b>TVD Reference:</b>               | WELL @ 4003 00ft (Original Well Elev) |
| <b>Site:</b>     | CG Federal #47     | <b>MD Reference:</b>                | WELL @ 4003 00ft (Original Well Elev) |
| <b>Well:</b>     | CG Federal #47     | <b>North Reference:</b>             | Gnd                                   |
| <b>Wellbore:</b> | Wellbore #1        | <b>Survey Calculation Method:</b>   | Minimum Curvature                     |
| <b>Design:</b>   | Wellbore #1        | <b>Database:</b>                    | EDM 5000 1 Black Viper                |

|                    |                                      |                      |                |
|--------------------|--------------------------------------|----------------------|----------------|
| <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                  | CG Federal #47, Section 20, T-17-S, R-32-E |              |               |                   |                   |
| Site Position:        |                                            | Northing:    | 661,349 00 ft | Latitude:         | 32° 49' 0.878 N   |
| From:                 | Map                                        | Easting:     | 669,940 70 ft | Longitude:        | 103° 46' 48.632 W |
| Position Uncertainty: | 0 00 ft                                    | Slot Radius: | 13 200 in     | Grid Convergence: | 0 30 °            |

|                      |                 |         |                     |               |               |                   |
|----------------------|-----------------|---------|---------------------|---------------|---------------|-------------------|
| Well                 | CG Federal #47, |         |                     |               |               |                   |
| Well Position        | +N/-S           | 0 00 ft | Northing:           | 661,349 00 ft | Latitude:     | 32° 49' 0 878 N   |
|                      | +E/-W           | 0 00 ft | Easting:            | 669,940 70 ft | Longitude:    | 103° 46' 48 632 W |
| Position Uncertainty |                 | 0 00 ft | Wellhead Elevation: | ft            | Ground Level: | 0 00 ft           |

|                  |                   |                    |                    |                  |                       |
|------------------|-------------------|--------------------|--------------------|------------------|-----------------------|
| <b>Wellbore</b>  | Wellbore #1       |                    |                    |                  |                       |
| <b>Magnetics</b> | <b>Model Name</b> | <b>Sample Date</b> | <b>Declination</b> | <b>Dip Angle</b> | <b>Field Strength</b> |
|                  |                   |                    | (°)                | (°)              | (nT)                  |
|                  | IGRF200510        | 8/4/2011           | 7 70               | 60 72            | 48,969                |

|                          |                         |               |              |                      |          |
|--------------------------|-------------------------|---------------|--------------|----------------------|----------|
| <b>Design</b>            | Wellbore #1             |               |              |                      |          |
| <b>Audit Notes:</b>      |                         |               |              |                      |          |
| <b>Version:</b>          | 1 0                     | <b>Phase:</b> | ACTUAL       | <b>Tie On Depth:</b> | 2,154.00 |
| <b>Vertical Section:</b> | <b>Depth From (TVD)</b> | <b>+N/-S</b>  | <b>+E/-W</b> | <b>Direction</b>     |          |
|                          | (ft)                    | (ft)          | (ft)         | (°)                  |          |
|                          | 0 00                    | 0 00          | 0 00         | 55 19                |          |

|                       |             |                             |                  |                    |  |
|-----------------------|-------------|-----------------------------|------------------|--------------------|--|
| <b>Survey Program</b> | <b>Date</b> | 8/31/2011                   |                  |                    |  |
| <b>From</b>           | <b>To</b>   | <b>Survey (Wellbore)</b>    | <b>Tool Name</b> | <b>Description</b> |  |
| (ft)                  | (ft)        |                             |                  |                    |  |
| 100 00                | 2,154 00    | Gyro Survey #1 (OH)         | Gyro             |                    |  |
| 2,288 00              | 7,160 00    | MWD Survey #1 (Wellbore #1) | MWD              |                    |  |

|                         |                    |                |                 |              |              |                 |                  |                  |                  |  |
|-------------------------|--------------------|----------------|-----------------|--------------|--------------|-----------------|------------------|------------------|------------------|--|
| <b>Survey</b>           |                    |                |                 |              |              |                 |                  |                  |                  |  |
| <b>Measured</b>         | <b>Inclination</b> | <b>Azimuth</b> | <b>Vertical</b> | <b>+N/-S</b> | <b>+E/-W</b> | <b>Vertical</b> | <b>Dogleg</b>    | <b>Build</b>     | <b>Turn</b>      |  |
| <b>Depth</b>            | <b>(°)</b>         | <b>(°)</b>     | <b>Depth</b>    | <b>(ft)</b>  | <b>(ft)</b>  | <b>Section</b>  | <b>Rate</b>      | <b>Rate</b>      | <b>Rate</b>      |  |
| <b>(ft)</b>             |                    |                | <b>(ft)</b>     |              |              | <b>(ft)</b>     | <b>(°/100ft)</b> | <b>(°/100ft)</b> | <b>(°/100ft)</b> |  |
| 2,154.00                | 1 44               | 59 17          | 2,153 80        | 7 50         | 8 03         | 10 87           | 0 00             | 0 00             | 0 00             |  |
| 2,288 00                | 1 60               | 57 50          | 2,287 75        | 9 36         | 11 05        | 14 42           | 0 12             | 0 12             | -1 25            |  |
| <b>First MWD Survey</b> |                    |                |                 |              |              |                 |                  |                  |                  |  |
| 2,319 00                | 1 50               | 61 20          | 2,318 74        | 9 79         | 11 77        | 15 26           | 0 46             | -0 32            | 11 94            |  |
| 2,351 00                | 1 20               | 85 50          | 2,350 73        | 10 02        | 12 47        | 15 96           | 2 00             | -0 94            | 75 94            |  |
| 2,382 00                | 1 20               | 115 40         | 2,381 72        | 9 91         | 13 09        | 16 40           | 2 00             | 0 00             | 96 45            |  |
| 2,413.00                | 1 40               | 141 00         | 2,412 72        | 9 47         | 13 62        | 16 59           | 1 96             | 0 65             | 82 58            |  |
| 2,444 00                | 1 50               | 165 00         | 2,443 71        | 8 79         | 13 97        | 16 48           | 1 97             | 0 32             | 77 42            |  |
| 2,475 00                | 2 00               | 173 50         | 2,474 69        | 7 86         | 14 13        | 16 09           | 1 81             | 1 61             | 27 42            |  |
| 2,507 00                | 2 30               | 175 90         | 2,506 67        | 6 66         | 14 24        | 15 50           | 0 98             | 0 94             | 7 50             |  |
| 2,538 00                | 2 30               | 178 30         | 2,537 64        | 5 42         | 14 30        | 14 84           | 0 31             | 0 00             | 7 74             |  |

# Survey Report

|                  |                    |                                     |                                       |
|------------------|--------------------|-------------------------------------|---------------------------------------|
| <b>Company:</b>  | COG Operating, LLC | <b>Local Co-ordinate Reference:</b> | Site CG Federal #47                   |
| <b>Project:</b>  | Lea County , NM    | <b>TVD Reference:</b>               | WELL @ 4003 00ft (Original Well Elev) |
| <b>Site:</b>     | CG Federal #47     | <b>MD Reference:</b>                | WELL @ 4003 00ft (Original Well Elev) |
| <b>Well:</b>     | CG Federal #47     | <b>North Reference:</b>             | Gnd                                   |
| <b>Wellbore:</b> | Wellbore #1        | <b>Survey Calculation Method:</b>   | Minimum Curvature                     |
| <b>Design:</b>   | Wellbore #1        | <b>Database:</b>                    | EDM 5000 1 Black Viper                |

## Survey

| Measured<br>Depth<br>(ft) | Inclination<br>(°) | Azimuth<br>(°) | Vertical<br>Depth<br>(ft) | +N/-S<br>(ft) | +E/-W<br>(ft) | Vertical<br>Section<br>(ft) | Dogleg<br>Rate<br>(°/100ft) | Build<br>Rate<br>(°/100ft) | Turn<br>Rate<br>(°/100ft) |
|---------------------------|--------------------|----------------|---------------------------|---------------|---------------|-----------------------------|-----------------------------|----------------------------|---------------------------|
| 2,569 00                  | 2 90               | 181 40         | 2,568 61                  | 4 01          | 14 30         | 14 04                       | 1 99                        | 1 94                       | 10 00                     |
| 2,600 00                  | 3 30               | 182 50         | 2,599 57                  | 2 34          | 14 25         | 13 03                       | 1 30                        | 1 29                       | 3 55                      |
| 2,632 00                  | 3 90               | 186 20         | 2,631 50                  | 0 34          | 14 09         | 11 76                       | 2 01                        | 1 88                       | 11 56                     |
| 2,663 00                  | 4 40               | 191 30         | 2,662 42                  | -1 88         | 13 74         | 10 21                       | 2 00                        | 1 61                       | 16 45                     |
| 2,694 00                  | 4 90               | 194 50         | 2,693 32                  | -4 33         | 13 18         | 8 35                        | 1 82                        | 1 61                       | 10 32                     |
| 2,726 00                  | 5 30               | 200 10         | 2,725 19                  | -7 04         | 12 33         | 6 10                        | 1 99                        | 1 25                       | 17 50                     |
| 2,758 00                  | 5 80               | 201 50         | 2,757 04                  | -9 93         | 11 23         | 3 55                        | 1 62                        | 1 56                       | 4 38                      |
| 2,789 00                  | 6 10               | 201 60         | 2,787 88                  | -12 92        | 10 05         | 0 87                        | 0 97                        | 0 97                       | 0 32                      |
| 2,820 00                  | 6 60               | 201 80         | 2,818 69                  | -16 10        | 8 78          | -1 99                       | 1 61                        | 1 61                       | 0 65                      |
| 2,852 00                  | 6 90               | 200 70         | 2,850 46                  | -19 61        | 7 42          | -5 11                       | 1 02                        | 0 94                       | -3 44                     |
| 2,884 00                  | 7 10               | 198 50         | 2,882 23                  | -23 28        | 6 11          | -8 28                       | 1 05                        | 0 63                       | -6 88                     |
| 2,915 00                  | 6 80               | 197 50         | 2,913 00                  | -26 85        | 4 95          | -11 27                      | 1 04                        | -0 97                      | -3 23                     |
| 2,947 00                  | 6 50               | 198 20         | 2,944 78                  | -30 38        | 3 81          | -14 21                      | 0 97                        | -0 94                      | 2 19                      |
| 2,978 00                  | 6 90               | 198 00         | 2,975 57                  | -33 82        | 2 69          | -17 10                      | 1 29                        | 1 29                       | -0 65                     |
| 3,010 00                  | 7 30               | 198 20         | 3,007 33                  | -37 57        | 1 46          | -20 25                      | 1 25                        | 1 25                       | 0 63                      |
| 3,041 00                  | 7 70               | 198 20         | 3,038 06                  | -41 42        | 0 20          | -23 48                      | 1 29                        | 1 29                       | 0 00                      |
| 3,072 00                  | 8 30               | 197 40         | 3,068 76                  | -45 53        | -1 12         | -26 91                      | 1 97                        | 1 94                       | -2 58                     |
| 3,103 00                  | 8 50               | 195 80         | 3,099 43                  | -49 87        | -2 41         | -30 45                      | 0 99                        | 0 65                       | -5 16                     |
| 3,135 00                  | 8 30               | 193 60         | 3,131 08                  | -54 39        | -3 60         | -34 00                      | 1 18                        | -0 63                      | -6 88                     |
| 3,166 00                  | 8 20               | 193 50         | 3,161 76                  | -58 71        | -4 64         | -37 33                      | 0 33                        | -0 32                      | -0 32                     |
| 3,198 00                  | 8 00               | 194 20         | 3,193 44                  | -63 09        | -5 72         | -40 71                      | 0 70                        | -0 63                      | 2 19                      |
| 3,230 00                  | 7 60               | 193 30         | 3,225 15                  | -67 31        | -6 76         | -43 97                      | 1 31                        | -1 25                      | -2 81                     |
| 3,261 00                  | 7 50               | 192 70         | 3,255 88                  | -71 28        | -7 67         | -46 99                      | 0 41                        | -0 32                      | -1 94                     |
| 3,292 00                  | 7 30               | 192 00         | 3,286 62                  | -75 18        | -8 53         | -49 92                      | 0 71                        | -0 65                      | -2 26                     |
| 3,324 00                  | 7 10               | 193 10         | 3,318 37                  | -79 09        | -9 40         | -52 87                      | 0 76                        | -0 63                      | 3 44                      |
| 3,355 00                  | 7 00               | 195 30         | 3,349 13                  | -82 78        | -10 33        | -55 74                      | 0 93                        | -0 32                      | 7 10                      |
| 3,387 00                  | 6 90               | 200 40         | 3,380 90                  | -86 46        | -11 51        | -58 81                      | 1 95                        | -0 31                      | 15 94                     |
| 3,418 00                  | 6 70               | 201 50         | 3,411 68                  | -89 89        | -12 83        | -61 85                      | 0 77                        | -0 65                      | 3 55                      |
| 3,450 00                  | 6 50               | 201 20         | 3,443 47                  | -93 31        | -14 16        | -64 90                      | 0 63                        | -0 63                      | -0 94                     |
| 3,481 00                  | 6 60               | 202 70         | 3,474 27                  | -96 59        | -15 49        | -67 86                      | 0 64                        | 0 32                       | 4 84                      |
| 3,513 00                  | 6 90               | 204 00         | 3,506 04                  | -100 05       | -16 98        | -71 05                      | 1 05                        | 0 94                       | 4 06                      |
| 3,545 00                  | 6 90               | 203 80         | 3,537 81                  | -103 56       | -18 54        | -74 34                      | 0 08                        | 0 00                       | -0 63                     |
| 3,576 00                  | 7 00               | 204 40         | 3,568 58                  | -106 99       | -20 07        | -77 55                      | 0 40                        | 0 32                       | 1 94                      |
| 3,608 00                  | 7 00               | 204 30         | 3,600 35                  | -110 54       | -21 68        | -80 90                      | 0 04                        | 0 00                       | -0 31                     |
| 3,639 00                  | 6 90               | 205 10         | 3,631 12                  | -113 95       | -23 24        | -84 13                      | 0 45                        | -0 32                      | 2 58                      |
| 3,670 00                  | 7 00               | 204 70         | 3,661 89                  | -117 35       | -24 82        | -87 37                      | 0 36                        | 0 32                       | -1 29                     |
| 3,702 00                  | 6 90               | 204 40         | 3,693 66                  | -120 87       | -26 43        | -90 70                      | 0 33                        | -0 31                      | -0 94                     |
| 3,734 00                  | 6 90               | 204 80         | 3,725 42                  | -124 37       | -28 03        | -94 01                      | 0 15                        | 0 00                       | 1 25                      |
| 3,766 00                  | 7 00               | 203 90         | 3,757 19                  | -127 89       | -29 63        | -97 34                      | 0 46                        | 0 31                       | -2 81                     |
| 3,797 00                  | 7 40               | 202 90         | 3,787 94                  | -131 46       | -31 17        | -100 64                     | 1 35                        | 1 29                       | -3 23                     |
| 3,834 00                  | 7 30               | 202 30         | 3,824 64                  | -135 83       | -32 99        | -104 63                     | 0 34                        | -0 27                      | -1 62                     |
| 3,866 00                  | 7 30               | 202 60         | 3,856 38                  | -139 59       | -34 54        | -108 05                     | 0 12                        | 0 00                       | 0 94                      |
| 3,898 00                  | 7 30               | 201 90         | 3,888 12                  | -143 35       | -36 08        | -111 46                     | 0 28                        | 0 00                       | -2 19                     |
| 3,930 00                  | 7 30               | 198 30         | 3,919 86                  | -147 17       | -37 48        | -114 79                     | 1 43                        | 0 00                       | -11 25                    |

# Survey Report

|                  |                    |                                     |                                       |
|------------------|--------------------|-------------------------------------|---------------------------------------|
| <b>Company:</b>  | COG Operating, LLC | <b>Local Co-ordinate Reference:</b> | Site CG Federal #47                   |
| <b>Project:</b>  | Lea County, NM     | <b>TVD Reference:</b>               | WELL @ 4003 00ft (Original Well Elev) |
| <b>Site:</b>     | CG Federal #47     | <b>MD Reference:</b>                | WELL @ 4003 00ft (Original Well Elev) |
| <b>Well:</b>     | CG Federal #47     | <b>North Reference:</b>             | Gnd                                   |
| <b>Wellbore:</b> | Wellbore #1        | <b>Survey Calculation Method:</b>   | Minimum Curvature                     |
| <b>Design:</b>   | Wellbore #1        | <b>Database:</b>                    | EDM 5000 1 Black Viper                |

## Survey

| Measured<br>Depth<br>(ft) | Inclination<br>(°) | Azimuth<br>(°) | Vertical<br>Depth<br>(ft) | +N/-S<br>(ft) | +E/-W<br>(ft) | Vertical<br>Section<br>(ft) | Dogleg<br>Rate<br>(°/100ft) | Build<br>Rate<br>(°/100ft) | Turn<br>Rate<br>(°/100ft) |
|---------------------------|--------------------|----------------|---------------------------|---------------|---------------|-----------------------------|-----------------------------|----------------------------|---------------------------|
| 3,961 00                  | 7 30               | 197 60         | 3,950 61                  | -150 91       | -38 69        | -117 92                     | 0 29                        | 0 00                       | -2 26                     |
| 3,993 00                  | 7 30               | 194 80         | 3,982 35                  | -154 82       | -39 83        | -121 08                     | 1 11                        | 0 00                       | -8 75                     |
| 4,024 00                  | 7 30               | 195 50         | 4,013 10                  | -158 62       | -40 86        | -124 10                     | 0 29                        | 0 00                       | 2 26                      |
| 4,056 00                  | 7 30               | 194 00         | 4,044 84                  | -162 55       | -41 89        | -127 19                     | 0 60                        | 0 00                       | -4 69                     |
| 4,087 00                  | 7 30               | 194 30         | 4,075 59                  | -166 37       | -42 85        | -130 16                     | 0 12                        | 0 00                       | 0 97                      |
| 4,119 00                  | 7 60               | 195 30         | 4,107 32                  | -170 38       | -43 91        | -133 32                     | 1 02                        | 0 94                       | 3 13                      |
| 4,150 00                  | 7 60               | 195 30         | 4,138 05                  | -174 34       | -45 00        | -136 47                     | 0 00                        | 0 00                       | 0 00                      |
| 4,181 00                  | 7 60               | 195 80         | 4,168 77                  | -178 29       | -46 09        | -139 63                     | 0 21                        | 0 00                       | 1 61                      |
| 4,213 00                  | 7 70               | 196 10         | 4,200 49                  | -182 38       | -47 27        | -142 93                     | 0 34                        | 0 31                       | 0 94                      |
| 4,245 00                  | 8 00               | 195 40         | 4,232 19                  | -186 59       | -48 45        | -146 30                     | 0 98                        | 0 94                       | -2 19                     |
| 4,277 00                  | 7 70               | 192 40         | 4,263 89                  | -190 83       | -49 50        | -149 59                     | 1 59                        | -0 94                      | -9 38                     |
| 4,309 00                  | 7 80               | 191 70         | 4,295 60                  | -195 05       | -50 40        | -152 73                     | 0 43                        | 0 31                       | -2 19                     |
| 4,340 00                  | 8 00               | 192 20         | 4,326 30                  | -199 22       | -51 29        | -155 84                     | 0 68                        | 0 65                       | 1 61                      |
| 4,372 00                  | 7 90               | 192 70         | 4,358 00                  | -203 54       | -52 24        | -159 09                     | 0 38                        | -0 31                      | 1 56                      |
| 4,404 00                  | 7 60               | 193 20         | 4,389 70                  | -207 75       | -53 21        | -162 28                     | 0 96                        | -0 94                      | 1 56                      |
| 4,435 00                  | 7 50               | 194 20         | 4,420 43                  | -211 70       | -54 17        | -165 33                     | 0 53                        | -0 32                      | 3 23                      |
| 4,466 00                  | 7 50               | 193 60         | 4,451 17                  | -215 63       | -55 14        | -168 37                     | 0 25                        | 0 00                       | -1 94                     |
| 4,498 00                  | 7 40               | 192 80         | 4,482 90                  | -219 67       | -56 09        | -171 46                     | 0 45                        | -0 31                      | -2 50                     |
| 4,530 00                  | 7 50               | 193 10         | 4,514 63                  | -223 71       | -57 02        | -174 53                     | 0 34                        | 0 31                       | 0 94                      |
| 4,560 00                  | 7 60               | 192 40         | 4,544 37                  | -227 56       | -57 89        | -177 44                     | 0 45                        | 0 33                       | -2 33                     |
| 4,592 00                  | 7 70               | 192 00         | 4,576 08                  | -231 72       | -58 79        | -180 56                     | 0 35                        | 0 31                       | -1 25                     |
| 4,623 00                  | 7 20               | 192 60         | 4,606 82                  | -235 65       | -59 65        | -183 50                     | 1 63                        | -1 61                      | 1 94                      |
| 4,655 00                  | 6 70               | 194 00         | 4,638 59                  | -239 42       | -60 54        | -186 38                     | 1 65                        | -1 56                      | 4 38                      |
| 4,687 00                  | 6 70               | 193 10         | 4,670 37                  | -243 05       | -61 41        | -189 17                     | 0 33                        | 0 00                       | -2 81                     |
| 4,718 00                  | 6 80               | 192 90         | 4,701 15                  | -246 60       | -62 23        | -191 87                     | 0 33                        | 0 32                       | -0 65                     |
| 4,750 00                  | 6 20               | 194 10         | 4,732 95                  | -250 12       | -63 07        | -194 57                     | 1 92                        | -1 88                      | 3 75                      |
| 4,782 00                  | 6 20               | 195 20         | 4,764 76                  | -253 46       | -63 95        | -197 20                     | 0 37                        | 0 00                       | 3 44                      |
| 4,813 00                  | 6 30               | 193 90         | 4,795 58                  | -256 73       | -64 80        | -199 76                     | 0 56                        | 0 32                       | -4 19                     |
| 4,845 00                  | 6 50               | 194 30         | 4,827 38                  | -260 19       | -65 66        | -202 45                     | 0 64                        | 0 63                       | 1 25                      |
| 4,876 00                  | 6 40               | 194 50         | 4,858 18                  | -263 56       | -66 53        | -205 09                     | 0 33                        | -0 32                      | 0 65                      |
| 4,908 00                  | 6 50               | 193 70         | 4,889 98                  | -267 05       | -67 41        | -207 80                     | 0 42                        | 0 31                       | -2 50                     |
| 4,939 00                  | 6 50               | 193 60         | 4,920 78                  | -270 46       | -68 23        | -210 42                     | 0 04                        | 0 00                       | -0 32                     |
| 4,971 00                  | 6 60               | 193 80         | 4,952 57                  | -274 01       | -69 10        | -213 16                     | 0 32                        | 0 31                       | 0 63                      |
| 5,003 00                  | 6 60               | 194 30         | 4,984 36                  | -277 57       | -69 99        | -215 93                     | 0 18                        | 0 00                       | 1 56                      |
| 5,035 00                  | 6 60               | 192 70         | 5,016 15                  | -281 15       | -70 85        | -218 67                     | 0 57                        | 0 00                       | -5 00                     |
| 5,067 00                  | 6 80               | 193 30         | 5,047 93                  | -284 79       | -71 69        | -221 44                     | 0 66                        | 0 63                       | 1 88                      |
| 5,098 00                  | 6 70               | 196 30         | 5,078 71                  | -288 31       | -72 62        | -224 21                     | 1 18                        | -0 32                      | 9 68                      |
| 5,129 00                  | 6 80               | 197 50         | 5,109 50                  | -291 79       | -73 68        | -227 07                     | 0 56                        | 0 32                       | 3 87                      |
| 5,161 00                  | 6 90               | 197 50         | 5,141 27                  | -295 43       | -74 83        | -230 09                     | 0 31                        | 0 31                       | 0 00                      |
| 5,192 00                  | 6 90               | 196 40         | 5,172 05                  | -299 00       | -75 91        | -233 02                     | 0 43                        | 0 00                       | -3 55                     |
| 5,224 00                  | 7 00               | 197 50         | 5,203 81                  | -302 70       | -77 04        | -236 06                     | 0 52                        | 0 31                       | 3 44                      |
| 5,255 00                  | 7 10               | 195 70         | 5,234 58                  | -306 35       | -78 13        | -239 03                     | 0 78                        | 0 32                       | -5 81                     |
| 5,286 00                  | 6 80               | 192 80         | 5,265 35                  | -309 98       | -79 05        | -241 87                     | 1 49                        | -0 97                      | -9 35                     |
| 5,318 00                  | 6 70               | 191 00         | 5,297 13                  | -313 66       | -79 83        | -244 61                     | 0 73                        | -0 31                      | -5 63                     |

# Survey Report

|                  |                    |                                     |                                       |
|------------------|--------------------|-------------------------------------|---------------------------------------|
| <b>Company:</b>  | COG Operating, LLC | <b>Local Co-ordinate Reference:</b> | Site CG Federal #47                   |
| <b>Project:</b>  | Lea County , NM    | <b>TVD Reference:</b>               | WELL @ 4003 00ft (Original Well Elev) |
| <b>Site:</b>     | CG Federal #47     | <b>MD Reference:</b>                | WELL @ 4003 00ft (Original Well Elev) |
| <b>Well:</b>     | CG Federal #47     | <b>North Reference:</b>             | Gnd                                   |
| <b>Wellbore:</b> | Wellbore #1        | <b>Survey Calculation Method:</b>   | Minimum Curvature                     |
| <b>Design:</b>   | Wellbore #1        | <b>Database:</b>                    | EDM 5000 1 Black Viper                |

## Survey

| Measured<br>Depth<br>(ft)                                  | Inclination<br>(°) | Azimuth<br>(°) | Vertical<br>Depth<br>(ft) | +N/-S<br>(ft) | +E/-W<br>(ft) | Vertical<br>Section<br>(ft) | Dogleg<br>Rate<br>(°/100ft) | Build<br>Rate<br>(°/100ft) | Turn<br>Rate<br>(°/100ft) |
|------------------------------------------------------------|--------------------|----------------|---------------------------|---------------|---------------|-----------------------------|-----------------------------|----------------------------|---------------------------|
| 5,350 00                                                   | 6 80               | 190 80         | 5,328 90                  | -317 35       | -80 54        | -247 30                     | 0 32                        | 0 31                       | -0 63                     |
| 5,382 00                                                   | 6 90               | 190 30         | 5,360 68                  | -321 11       | -81 24        | -250 01                     | 0 36                        | 0 31                       | -1 56                     |
| 5,397 86                                                   | 6 85               | 190 55         | 5,376 43                  | -322 97       | -81 58        | -251 36                     | 0 38                        | -0 32                      | 1 60                      |
| <b>Top of Paddock (CG Federal #47 Wellbore #1 Plan #1)</b> |                    |                |                           |               |               |                             |                             |                            |                           |
| 5,413 00                                                   | 6 80               | 190 80         | 5,391 45                  | -324 74       | -81 92        | -252 64                     | 0 38                        | -0 32                      | 1 62                      |
| 5,444 00                                                   | 6 60               | 195 30         | 5,422 24                  | -328 26       | -82 73        | -255 32                     | 1 81                        | -0 65                      | 14 52                     |
| 5,476 00                                                   | 6 70               | 196 70         | 5,454 03                  | -331 82       | -83 75        | -258 20                     | 0 60                        | 0 31                       | 4 38                      |
| 5,507 00                                                   | 6 70               | 195 60         | 5,484 82                  | -335 30       | -84 76        | -261 00                     | 0 41                        | 0 00                       | -3 55                     |
| 5,539 00                                                   | 7 00               | 194 60         | 5,516 59                  | -338 98       | -85 75        | -263 92                     | 1 01                        | 0 94                       | -3 13                     |
| 5,570 00                                                   | 7 00               | 194 90         | 5,547 36                  | -342 64       | -86 71        | -266 80                     | 0 12                        | 0 00                       | 0 97                      |
| 5,601 00                                                   | 7 20               | 193 90         | 5,578 12                  | -346 35       | -87 67        | -269 70                     | 0 76                        | 0 65                       | -3 23                     |
| 5,633 00                                                   | 7 30               | 194 80         | 5,609 86                  | -350 26       | -88 67        | -272 76                     | 0 47                        | 0 31                       | 2 81                      |
| 5,664 00                                                   | 7 30               | 194 30         | 5,640 61                  | -354 07       | -89 66        | -275 74                     | 0 20                        | 0 00                       | -1 61                     |
| 5,696 00                                                   | 7 40               | 194 20         | 5,672 35                  | -358 04       | -90 66        | -278 84                     | 0 32                        | 0 31                       | -0 31                     |
| 5,727 00                                                   | 7 50               | 194 00         | 5,703 09                  | -361 94       | -91 64        | -281 87                     | 0 33                        | 0 32                       | -0 65                     |
| 5,759 00                                                   | 7 40               | 193 90         | 5,734 82                  | -365 96       | -92 64        | -284 99                     | 0 32                        | -0 31                      | -0 31                     |
| 5,791 00                                                   | 7 30               | 193 90         | 5,766 55                  | -369 94       | -93 63        | -288 06                     | 0 31                        | -0 31                      | 0 00                      |
| 5,822 00                                                   | 7 40               | 192 80         | 5,797 30                  | -373 80       | -94 54        | -291 02                     | 0 56                        | 0 32                       | -3 55                     |
| 5,854 00                                                   | 7 50               | 194 20         | 5,829 03                  | -377 83       | -95 51        | -294 12                     | 0 65                        | 0 31                       | 4 38                      |
| 5,885 00                                                   | 7 20               | 193 60         | 5,859 77                  | -381 68       | -96 46        | -297 10                     | 1 00                        | -0 97                      | -1 94                     |
| 5,916 00                                                   | 7 00               | 193 90         | 5,890 54                  | -385 40       | -97 37        | -299 97                     | 0 66                        | -0 65                      | 0 97                      |
| 5,947 00                                                   | 6 80               | 193 20         | 5,921 31                  | -389 02       | -98 25        | -302 75                     | 0 70                        | -0 65                      | -2 26                     |
| 5,979 00                                                   | 6 90               | 193 00         | 5,953 08                  | -392 74       | -99 11        | -305 58                     | 0 32                        | 0 31                       | -0 63                     |
| 6,010 00                                                   | 6 50               | 195 80         | 5,983 87                  | -396 24       | -100 01       | -308 32                     | 1 67                        | -1 29                      | 9 03                      |
| 6,042 00                                                   | 6 50               | 195 50         | 6,015 67                  | -399 73       | -100 99       | -311 11                     | 0 11                        | 0 00                       | -0 94                     |
| 6,073 00                                                   | 6 60               | 195 80         | 6,046 46                  | -403 14       | -101 94       | -313 84                     | 0 34                        | 0 32                       | 0 97                      |
| 6,105 00                                                   | 6 50               | 196 30         | 6,078 26                  | -406 64       | -102 95       | -316 67                     | 0 36                        | -0 31                      | 1 56                      |
| 6,138 00                                                   | 6 70               | 196 40         | 6,111 04                  | -410 28       | -104 02       | -319 63                     | 0 61                        | 0 61                       | 0 30                      |
| 6,170 00                                                   | 6 80               | 196 20         | 6,142 82                  | -413 89       | -105 07       | -322 55                     | 0 32                        | 0 31                       | -0 63                     |
| 6,202 00                                                   | 6 80               | 196 10         | 6,174 59                  | -417 53       | -106 13       | -325 50                     | 0 04                        | 0 00                       | -0 31                     |
| 6,234 00                                                   | 6 70               | 195 70         | 6,206 37                  | -421 15       | -107 16       | -328 41                     | 0 35                        | -0 31                      | -1 25                     |
| 6,266 00                                                   | 6 60               | 195 10         | 6,238 15                  | -424 72       | -108 14       | -331 26                     | 0 38                        | -0 31                      | -1 88                     |
| 6,297 00                                                   | 6 60               | 194 80         | 6,268 95                  | -428 17       | -109 06       | -333 98                     | 0 11                        | 0 00                       | -0 97                     |
| 6,329 00                                                   | 6 60               | 195 10         | 6,300 74                  | -431 72       | -110 01       | -336 78                     | 0 11                        | 0 00                       | 0 94                      |
| 6,360 00                                                   | 6 40               | 195 50         | 6,331 54                  | -435 10       | -110 93       | -339 48                     | 0 66                        | -0 65                      | 1 29                      |
| 6,392 00                                                   | 6 50               | 194 70         | 6,363 33                  | -438 57       | -111 87       | -342 23                     | 0 42                        | 0 31                       | -2 50                     |
| 6,423 00                                                   | 6 40               | 195 00         | 6,394 14                  | -441 94       | -112 76       | -344 88                     | 0 34                        | -0 32                      | 0 97                      |
| 6,454 00                                                   | 6 40               | 196 10         | 6,424 94                  | -445 27       | -113 69       | -347 54                     | 0 40                        | 0 00                       | 3 55                      |
| 6,485 00                                                   | 6 40               | 195 50         | 6,455 75                  | -448 59       | -114 63       | -350 21                     | 0 22                        | 0 00                       | -1 94                     |
| 6,516 00                                                   | 6 40               | 196 10         | 6,486 56                  | -451 92       | -115 57       | -352 88                     | 0 22                        | 0 00                       | 1 94                      |
| 6,548 00                                                   | 6 40               | 196 70         | 6,518 36                  | -455 34       | -116 58       | -355 66                     | 0 21                        | 0 00                       | 1 88                      |
| 6,578 00                                                   | 6 30               | 196 10         | 6,548 17                  | -458 52       | -117 52       | -358 25                     | 0 40                        | -0 33                      | -2 00                     |
| 6,610 00                                                   | 6 30               | 196 30         | 6,579 98                  | -461 90       | -118 50       | -360 98                     | 0 07                        | 0 00                       | 0 63                      |
| 6,642 00                                                   | 6 30               | 196 10         | 6,611 79                  | -465 27       | -119 48       | -363 71                     | 0 07                        | 0 00                       | -0 63                     |

# Survey Report

|                  |                    |                                     |                                       |
|------------------|--------------------|-------------------------------------|---------------------------------------|
| <b>Company:</b>  | COG Operating, LLC | <b>Local Co-ordinate Reference:</b> | Site CG Federal #47                   |
| <b>Project:</b>  | Lea County, NM     | <b>TVD Reference:</b>               | WELL @ 4003 00ft (Original Well Elev) |
| <b>Site:</b>     | CG Federal #47     | <b>MD Reference:</b>                | WELL @ 4003 00ft (Original Well Elev) |
| <b>Well:</b>     | CG Federal #47     | <b>North Reference:</b>             | Gnd                                   |
| <b>Wellbore:</b> | Wellbore #1        | <b>Survey Calculation Method:</b>   | Minimum Curvature                     |
| <b>Design:</b>   | Wellbore #1        | <b>Database:</b>                    | EDM 5000 1 Black Viper                |

## Survey

| Measured<br>Depth<br>(ft) | Inclination<br>(°) | Azimuth<br>(°) | Vertical<br>Depth<br>(ft) | +N/-S<br>(ft) | +E/-W<br>(ft) | Vertical<br>Section<br>(ft) | Dogleg<br>Rate<br>(°/100ft) | Build<br>Rate<br>(°/100ft) | Turn<br>Rate<br>(°/100ft) |
|---------------------------|--------------------|----------------|---------------------------|---------------|---------------|-----------------------------|-----------------------------|----------------------------|---------------------------|
| 6,674 00                  | 6 20               | 196 30         | 6,643 60                  | -468 61       | -120 45       | -366 42                     | 0 32                        | -0 31                      | 0 63                      |
| 6,705 00                  | 6 20               | 196 40         | 6,674 42                  | -471 83       | -121 39       | -369 02                     | 0 03                        | 0 00                       | 0 32                      |
| 6,736 00                  | 6 10               | 197 70         | 6,705 24                  | -475 00       | -122 36       | -371 63                     | 0 55                        | -0 32                      | 4 19                      |
| 6,767 00                  | 6 10               | 197 30         | 6,736 06                  | -478 14       | -123 35       | -374 24                     | 0 14                        | 0 00                       | -1 29                     |
| 6,799 00                  | 6 00               | 196 90         | 6,767 88                  | -481 37       | -124 35       | -376 90                     | 0 34                        | -0 31                      | -1 25                     |
| 6,830 00                  | 6 40               | 192 80         | 6,798 70                  | -484 60       | -125 20       | -379 44                     | 1 92                        | 1 29                       | -13 23                    |
| 6,862 00                  | 6 90               | 191 30         | 6,830 49                  | -488 23       | -125 97       | -382 15                     | 1 65                        | 1 56                       | -4 69                     |
| 6,894 00                  | 6 80               | 191 30         | 6,862 26                  | -491 97       | -126 72       | -384 90                     | 0 31                        | -0 31                      | 0 00                      |
| 6,925 00                  | 6 70               | 192 70         | 6,893 04                  | -495 53       | -127 48       | -387 55                     | 0 62                        | -0 32                      | 4 52                      |
| 6,956 00                  | 6 60               | 192 70         | 6,923 84                  | -499 03       | -128 27       | -390 20                     | 0 32                        | -0 32                      | 0 00                      |
| 6,988 00                  | 6 60               | 191 50         | 6,955 62                  | -502 63       | -129 04       | -392 89                     | 0 43                        | 0 00                       | -3 75                     |
| 7,029 00                  | 6 50               | 190 70         | 6,996 36                  | -507 22       | -129 94       | -396 25                     | 0 33                        | -0 24                      | -1 95                     |
| 7,050 00                  | 6 30               | 190 40         | 7,017 23                  | -509 52       | -130 37       | -397 91                     | 0 97                        | -0 95                      | -1 43                     |
| 7,082 00                  | 6 20               | 190 40         | 7,049 03                  | -512 95       | -130 99       | -400 38                     | 0 31                        | -0 31                      | 0 00                      |
| 7,113 00                  | 6 20               | 190 40         | 7,079 85                  | -516 24       | -131 60       | -402 76                     | 0 00                        | 0 00                       | 0 00                      |
| PBHL#1[CGF#47]            |                    |                |                           |               |               |                             |                             |                            |                           |
| 7,160 00                  | 6 20               | 190 40         | 7,126 58                  | -521 23       | -132 51       | -406 36                     | 0 00                        | 0 00                       | 0 00                      |
| Proj. to Bit              |                    |                |                           |               |               |                             |                             |                            |                           |

## Survey Annotations

| Measured<br>Depth<br>(ft) | Vertical<br>Depth<br>(ft) | Local Coordinates |               | Comment          |
|---------------------------|---------------------------|-------------------|---------------|------------------|
|                           |                           | +N/-S<br>(ft)     | +E/-W<br>(ft) |                  |
| 2,288 00                  | 2,287 75                  | 9 36              | 11 05         | First MWD Survey |
| 7,160 00                  | 7,126 58                  | -521 23           | -132 51       | Proj. to Bit     |

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_