

## Results of Directional Survey

|             |                     |           |                                  |
|-------------|---------------------|-----------|----------------------------------|
| API number: | <b>30-005-29050</b> |           |                                  |
| OGRID:      |                     | Operator: | <b>COG OPERATING LLC</b>         |
|             |                     | Property: | <b>HERCULES FEDERAL COM</b> # 3H |

|         |        |          |           |                 |                |
|---------|--------|----------|-----------|-----------------|----------------|
| surface | ULSTR: | <b>L</b> | <b>15</b> | <b>T 15S</b>    | <b>R 31E</b>   |
|         |        |          |           | <b>1980 FSL</b> | <b>430 FWL</b> |

|                 |        |               |            |                 |                 |
|-----------------|--------|---------------|------------|-----------------|-----------------|
| BH Loc          | ULSTR: | <b>I</b>      | <b>15</b>  | <b>T 15S</b>    | <b>R 31E</b>    |
| <b>13083 MD</b> |        | <b>8781.7</b> | <b>TVD</b> | <b>2028 FSL</b> | <b>334 FEL</b>  |
|                 |        |               |            |                 | <b>4946 FWL</b> |

|                |        |               |            |                 |                 |
|----------------|--------|---------------|------------|-----------------|-----------------|
| Top Perf/OH    | ULSTR: | <b>L</b>      | <b>15</b>  | <b>T 15S</b>    | <b>R 31E</b>    |
| <b>9154 MD</b> |        | <b>8762.6</b> | <b>TVD</b> | <b>1997 FSL</b> | <b>1019 FWL</b> |

|                 |        |               |            |                 |                 |
|-----------------|--------|---------------|------------|-----------------|-----------------|
| Bot Perf/OH     | ULSTR: | <b>I</b>      | <b>15</b>  | <b>T 15S</b>    | <b>R 31E</b>    |
| <b>12914 MD</b> |        | <b>8788.4</b> | <b>TVD</b> | <b>2025 FSL</b> | <b>503 FEL</b>  |
|                 |        |               |            |                 | <b>4777 FWL</b> |

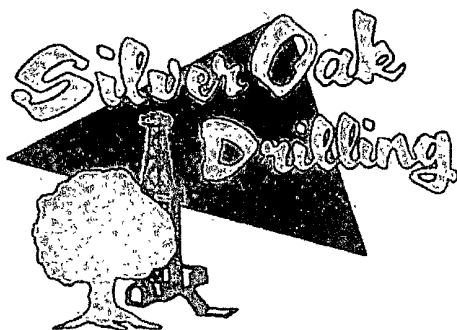
|              |              |       |         |         |
|--------------|--------------|-------|---------|---------|
|              | MD           | N/S   | E/W     | VD      |
|              | 9079         | 15.54 | 514.22  | 8762.68 |
| TOP PERFS/OH | <b>9154</b>  | 16.72 | 589.20  | 8762.62 |
|              | 9174         | 17.03 | 609.20  | 8762.60 |
|              | 12895        | 44.42 | 4328.44 | 8789.05 |
| BOT PERFS/OH | <b>12914</b> | 44.82 | 4347.42 | 8788.39 |
|              | 12991        | 46.43 | 4424.36 | 8785.70 |

|              |              |       |         |         |
|--------------|--------------|-------|---------|---------|
| NEXT TO LAST | 13022        | 46.97 | 4455.33 | 8784.40 |
| LAST READING | 13083        | 48.04 | 4516.26 | 8781.74 |
| TD           | <b>13083</b> | 48.04 | 4516.26 | 8781.74 |

|                  |         |         |
|------------------|---------|---------|
| Surface Location | 1980 FS | 430 FW  |
| Projected BHL    | 2028 FS | 4946 FW |
| Location of      |         |         |
| Top Perfs/OH     | 1997 FS | 1019 FW |
| Bottom Perfs/OH  | 2025 FS | 4777 FW |

### SUMMARY of Subsurface Locations

|                         |                     |                |                |                    |
|-------------------------|---------------------|----------------|----------------|--------------------|
| <b>Surface Location</b> | <b>L-15-15S-31E</b> | <b>1980 FS</b> | <b>430 FW</b>  | <b>Vert. Depth</b> |
| <b>Top Perfs/OH</b>     | <b>L-15-15S-31E</b> | <b>1997 FS</b> | <b>1019 FW</b> | <b>8762.62</b>     |
| <b>Bottom Perfs/OH</b>  | <b>I-15-15S-31E</b> | <b>2025 FS</b> | <b>4777 FW</b> | <b>8788.39</b>     |
| <b>Projected TD</b>     | <b>I-15-15S-31E</b> | <b>2028 FS</b> | <b>4946 FW</b> | <b>8781.74</b>     |



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

HOBBS OCD

MAR 06 2012

RECEIVED

December 21, 2011

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

RE: Hercules Federal Com #3H  
1980' FSL & 430' FWL  
Sec. 15, T15S, R31E  
Chaves Eddy County, New Mexico

Dear Sir,

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

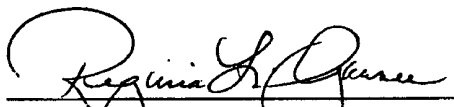
Very truly yours,

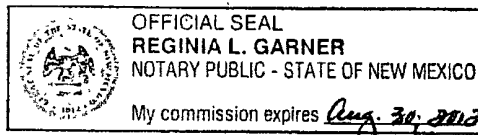
  
Eddie C. LaRue  
Operations Manager

State of New Mexico }  
County of Eddy }

SUR: L-15-15s-31e, 1980/S & 430/W  
BHL: I-15-15s-31e, 2028/S & 4946/W  
API # 30-005-29050

The foregoing was acknowledged before me this 21<sup>st</sup> day of December, 2011.

  
Regina L. Garner  
Notary Public



Hercules Federal Com # 3H

| Date       | Depth | Deviation | Inclination | TVD     |
|------------|-------|-----------|-------------|---------|
| 11/17/2011 | 116   | 0.6       |             |         |
| 11/17/2011 | 418   | 0.8       |             |         |
| 11/19/2011 | 584   | 0.9       |             |         |
| 11/19/2011 | 800   | 0.6       |             |         |
| 11/19/2011 | 1053  | 0.5       |             |         |
| 11/19/2011 | 1527  | 0.7       |             |         |
| 11/19/2011 | 1970  | 0.5       |             |         |
| 11/20/2011 | 2446  | 0.9       |             |         |
| 11/20/2011 | 2826  | 1.4       |             |         |
| 11/21/2011 | 3143  | 0.4       |             |         |
| 11/21/2011 | 3521  | 1.1       |             |         |
| 11/22/2011 | 3948  | 1.5       |             |         |
| 11/24/2011 | 4045  | 0.8       |             |         |
| 11/24/2011 | 4486  | 0.7       |             |         |
| 11/24/2011 | 4962  | 0.4       |             |         |
| 11/25/2011 | 5406  | 0.9       |             |         |
| 11/25/2011 | 5879  | 1.4       |             |         |
| 11/25/2011 | 6132  | 0.0       |             |         |
| 11/25/2011 | 6291  | 0.8       |             |         |
| 11/26/2011 | 6766  | 0.7       |             |         |
| 11/26/2011 | 7208  | 0.9       |             |         |
| 11/26/2011 | 7683  | 1.6       |             |         |
| 11/27/2011 | 7968  | 0.7       |             |         |
| 12/1/2011  | 8421  | 0.8       |             |         |
| 12/1/2011  | 8900  | 1.7       |             |         |
| 12/4/2011  | 8282  | 1.2       | 84.5        |         |
| 12/5/2011  | 8314  | 3.4       | 81.7        |         |
| 12/5/2011  | 8346  | 6.8       | 81.0        |         |
| 12/5/2011  | 8378  | 11.0      | 83.3        |         |
| 12/5/2011  | 8410  | 14.7      | 86.3        | 8408.15 |
| 12/5/2011  | 8442  | 17.8      | 89.6        | 8438.87 |
| 12/5/2011  | 8474  | 21.6      | 91.4        | 8468.99 |
| 12/5/2011  | 8505  | 25.1      | 90.7        |         |
| 12/5/2011  | 8537  | 29.1      | 88.7        | 8525.96 |
| 12/5/2011  | 8569  | 33.3      | 88.2        | 8553.30 |
| 12/5/2011  | 8600  | 37.5      | 88.7        | 8579.40 |
| 12/6/2011  | 8632  | 41.7      | 89.3        | 8642.00 |
| 12/6/2011  | 8664  | 45.8      | 90.3        | 8663.00 |
| 12/6/2011  | 8697  | 49.7      | 91.4        | 8681.00 |
| 12/6/2011  | 8728  | 53.9      | 91.2        | 8668.39 |
| 12/6/2011  | 8760  | 57.6      | 91.9        | 8685.00 |
| 12/7/2011  | 8792  | 61.0      | 92.1        | 8702.00 |
| 12/7/2011  | 8824  | 64.3      | 91.7        | 8716.00 |

| Date       | Depth | Deviation | Inclination | TVD     |
|------------|-------|-----------|-------------|---------|
| 12/7/2011  | 8855  | 67.7      | 91.2        | 8729.00 |
| 12/7/2011  | 8888  | 71.5      | 91.6        | 8790.00 |
| 12/7/2011  | 8919  | 75.5      | 91.0        | 8749.00 |
| 12/7/2011  | 8951  | 80.2      | 90.3        | 8756.50 |
| 12/7/2011  | 8983  | 85.8      | 88.9        | 8760.59 |
| 12/7/2011  | 9015  | 88.8      | 88.2        | 8762.29 |
| 12/7/2011  | 9047  | 89.4      | 88.2        | 8762.29 |
| 12/7/2011  | 9079  | 90.5      | 88.9        | 8762.29 |
| 12/7/2011  | 9110  | 90.7      | 89.1        |         |
| 12/8/2011  | 9174  | 89.6      | 89.3        | 8764.51 |
| 12/8/2011  | 9270  | 89.9      | 89.1        | 8763.00 |
| 12/9/2011  | 9366  | 92.1      | 88.2        | 8761.00 |
| 12/9/2011  | 9462  | 89.2      | 88.2        | 8760.00 |
| 12/9/2011  | 9557  | 86.6      | 88.7        | 8763.73 |
| 12/9/2011  | 9653  | 92.3      | 88.6        |         |
| 12/10/2011 | 9757  | 89.3      | 88.9        | 8763.34 |
| 12/10/2011 | 9841  | 89.9      | 87.9        | 8746.00 |
| 12/10/2011 | 9938  | 87.2      | 88.6        | 8766.00 |
| 12/10/2011 | 10034 | 86.8      | 89.3        | 8771.96 |
| 12/11/2011 | 10130 | 88.3      | 91.0        | 8775.56 |
| 12/11/2011 | 10225 | 88.9      | 91.2        | 8777.91 |
| 12/11/2011 | 10321 | 91.9      | 91.4        | 8777.24 |
| 12/11/2011 | 10416 | 89.7      | 91.2        | 8775.92 |
| 12/11/2011 | 10512 | 91.9      | 91.6        | 8774.58 |
| 12/11/2011 | 10606 | 91.4      | 91.2        | 8771.87 |
| 12/11/2011 | 10702 | 90.4      | 91.2        | 8770.36 |
| 12/11/2011 | 10798 | 90.4      | 91.6        | 8769.22 |
| 12/13/2011 | 10894 | 88.2      | 90.8        | 8769.27 |
| 12/14/2011 | 10988 | 88.6      | 90.8        | 8772.65 |
| 12/14/2011 | 11083 | 87.9      | 90.8        | 8775.35 |
| 12/14/2011 | 11180 | 90.1      | 90.0        | 8777.25 |
| 12/14/2011 | 11274 | 89.6      | 90.0        | 8777.49 |
| 12/14/2011 | 11369 | 88.6      | 90.8        | 8778.98 |
| 12/14/2011 | 11465 | 88.3      | 91.1        | 8781.08 |
| 12/14/2011 | 11560 | 89.3      | 88.6        | 8782.57 |
| 12/15/2011 | 11655 | 90.0      | 88.3        | 8783.50 |
| 12/15/2011 | 11750 | 90.0      | 88.6        | 8783.15 |
| 12/15/2011 | 11940 | 90.0      | 89.3        | 8783.65 |
| 12/15/2011 | 12036 | 89.0      | 89.7        | 8784.49 |
| 12/15/2011 | 12131 | 90.0      | 89.3        | 8785.32 |
| 12/15/2011 | 12322 | 88.7      | 88.3        | 8790.06 |
| 12/16/2011 | 12417 | 90.0      | 87.9        | 8791.14 |
| 12/16/2011 | 12609 | 90.5      | 88.6        | 8792.40 |
| 12/16/2011 | 12704 | 89.3      | 89.0        | 8792.36 |
| 12/16/2011 | 12799 | 91.6      | 88.6        | 8791.81 |

| Date       | Depth | Deviation | Inclination | TVD      |
|------------|-------|-----------|-------------|----------|
| 12/16/2011 | 12895 | 91.7      | 88.6        | 8789.05  |
| 12/16/2011 | 12991 | 92.3      | 89.0        |          |
| 12/17/2011 | 13072 | 93.5      | 89.0        | 87884.40 |

SUR: L-15-15s-31e, 1980/S & 430/W  
BHL: I-15-15s-31e, 2028/S & 4946/W  
API # 30-005-29050

## **COG Operating LLC**

**Chaves County, NM**

**Hercules Federal Com #3H**

**Hercules Federal Com #3H**

**Wellbore #1**

**Survey: MWD Surveys**

## **Standard Survey Report**

**19 December, 2011**



**COG Operating LLC**  
**Hercules Federal Com #3H**  
**Chaves County, NM**  
**Plan #2**



| Surface Location |       | Ground Elev: 4400.00 WELL @ 4418.00ft (Silver Oak #12) |           |                |                 |
|------------------|-------|--------------------------------------------------------|-----------|----------------|-----------------|
| +N/-S            | +E/-W | Northing                                               | Easting   | Latitude       | Longitude       |
| 0.00             | 0.00  | 733044.32                                              | 699674.05 | 33° 0' 50.64 N | 103° 49' 0.45 W |

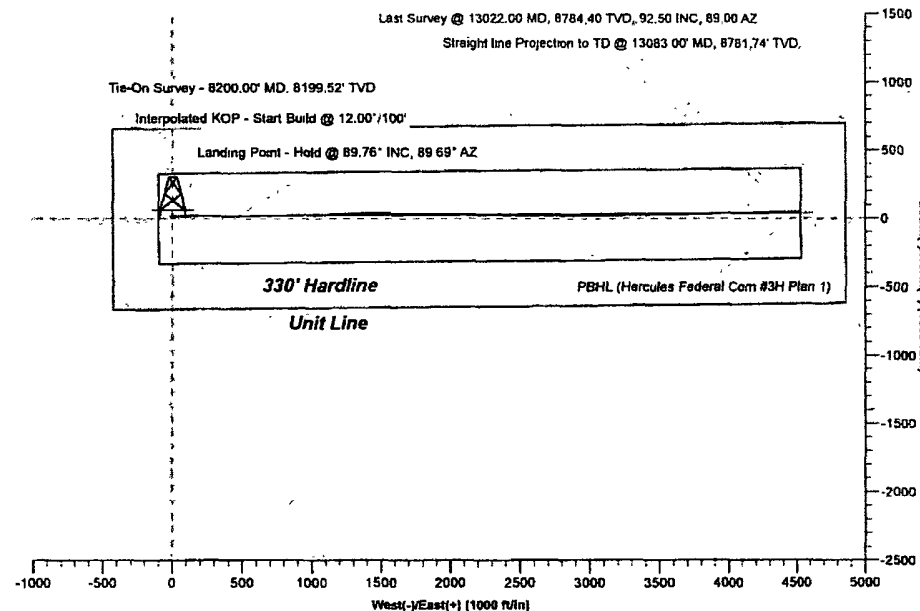
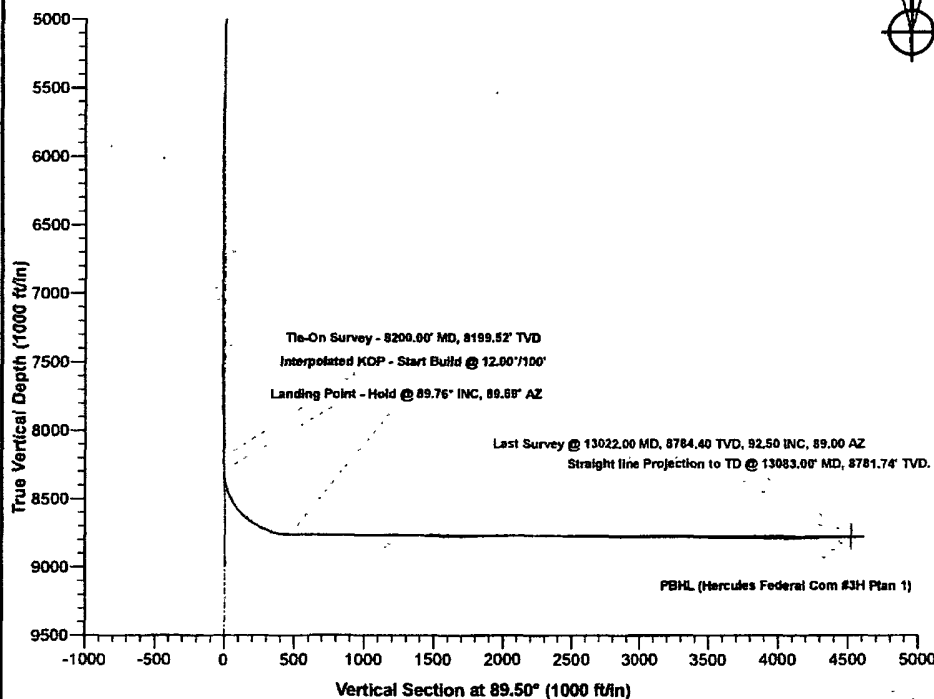
| TARGET DETAILS                         |         |       |         |           |           |                                |
|----------------------------------------|---------|-------|---------|-----------|-----------|--------------------------------|
| Name                                   | TVD     | +N/-S | +E/-W   | Northing  | Easting   | Latitude Longitude             |
| PBHL (Hercules Federal Com #3H Plan 1) | 8780.00 | 39.86 | 4526.33 | 733084.18 | 704200.38 | 33° 0' 50.81 N 103° 48' 7.29 W |

| SECTION DETAILS |          |       |       |         |       |         |       |        |         |                                              |
|-----------------|----------|-------|-------|---------|-------|---------|-------|--------|---------|----------------------------------------------|
| Sec             | MD       | Inc   | Azi   | TVD     | +N/-S | +E/-W   | Dleg  | TFace  | Vsect   | Annotation                                   |
| 1               | 8200.00  | 0.74  | 95.80 | 8199.52 | 15.87 | -5.61   | 0.00  | 0.00   | -5.47   | Tie-On Survey - 8200.00' MD, 8199.52' TVD    |
| 2               | 8293.27  | 0.87  | 91.35 | 8292.78 | 15.80 | -4.30   | 0.15  | -27.92 | -4.16   | Interpolated KOP - Start Build @ 12.00°/100' |
| 3               | 9034.02  | 89.76 | 89.89 | 8783.00 | 18.14 | 471.10  | 12.00 | -1.66  | 471.24  | Landing Point - Hold @ 89.76° INC, 89.69° AZ |
| 4               | 13089.35 | 89.76 | 89.69 | 8780.00 | 39.86 | 4526.33 | 0.00  | 0.00   | 4526.31 | TD @ 13089.35' MD, 8780.00' TVD              |



Azimuths to Grd North  
 True North: -0.28°  
 Magnetic North: 7.43°

Magnetic Field  
 Strength: 49016.7snT  
 Dip Angle: 60.86°  
 Date: 11/11/2011  
 Model: IGRF2010



# Crescent Directional Drilling

## Survey Report

|           |                          |                              |                                   |
|-----------|--------------------------|------------------------------|-----------------------------------|
| Company:  | COG Operating LLC        | Local Co-ordinate Reference: | Site Hercules Federal Com #3H     |
| Project:  | Chaves County, NM        | TVD Reference:               | WELL @ 4418.00ft (Silver Oak #12) |
| Site:     | Hercules Federal Com #3H | MD Reference:                | WELL @ 4418.00ft (Silver Oak #12) |
| Well:     | Hercules Federal Com #3H | North Reference:             | Grid                              |
| Wellbore: | Wellbore #1              | Survey Calculation Method:   | Minimum Curvature                 |
| Design:   | Wellbore #1              | Database:                    | Compass R5000 DB Server           |

|             |                           |               |                |
|-------------|---------------------------|---------------|----------------|
| Project:    | Chaves County, NM         |               |                |
| Map System: | US State Plane 1983       | System Datum: | Mean Sea Level |
| Geo Datum:  | North American Datum 1983 |               |                |
| Map Zone:   | New Mexico Eastern Zone   |               |                |

|                                |         |              |               |                   |                 |
|--------------------------------|---------|--------------|---------------|-------------------|-----------------|
| Site: Hercules Federal Com #3H |         |              |               |                   |                 |
| Site Position:                 |         | Northing:    | 733,044.31 ft | Latitude:         | 33° 0' 50.64 N  |
| From:                          | Map     | Easting:     | 699,674.04 ft | Longitude:        | 103° 49' 0.45 W |
| Position Uncertainty:          | 0.00 ft | Slot Radius: | 13.200 in     | Grid Convergence: | 0.28 °          |

|                      |                          |         |                     |               |               |                 |
|----------------------|--------------------------|---------|---------------------|---------------|---------------|-----------------|
| Well:                | Hercules Federal Com #3H |         |                     |               |               |                 |
| Well Position        | +N/-S                    | 0.00 ft | Northing:           | 733,044.31 ft | Latitude:     | 33° 0' 50.64 N  |
|                      | +E/-W                    | 0.00 ft | Easting:            | 699,674.04 ft | Longitude:    | 103° 49' 0.45 W |
| Position Uncertainty |                          | 0.00 ft | Wellhead Elevation: | ft            | Ground Level: | 4,400.00 ft     |

|           |             |             |                    |                  |                        |
|-----------|-------------|-------------|--------------------|------------------|------------------------|
| Wellbore  | Wellbore #1 |             |                    |                  |                        |
| Magnetics | Model Name  | Sample Date | Declination<br>(°) | Dip Angle<br>(°) | Field Strength<br>(nT) |
|           | IGRF2010    | 11/11/2011  | 7.71               | 60.86            | 49,017                 |

|                   |                  |        |        |               |      |
|-------------------|------------------|--------|--------|---------------|------|
| Design            | Wellbore #1      |        |        |               |      |
| Audit Notes:      |                  |        |        |               |      |
| Version:          | 1.0              | Phase: | ACTUAL | Tie On Depth: | 0.00 |
| Vertical Section: | Depth From (TVD) | +N/-S  | +E/-W  | Direction     |      |
|                   | (ft)             | (ft)   | (ft)   | (°)           |      |
|                   | 0.00             | 0.00   | 0.00   | 89.50         |      |

| Survey Program |            | Date                       | 12/19/2011 |               |
|----------------|------------|----------------------------|------------|---------------|
| From<br>(ft)   | To<br>(ft) | Survey (Wellbore)          | Tool Name  | Description   |
| 100.00         | 8,200.00   | Gyro Surveys (Wellbore #1) | Good_mag   | Good Magnetic |
| 8,200.00       | 13,083.00  | MWD Surveys (Wellbore #1)  | Good_mag   | Good Magnetic |

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
|---------------------|-----------------|-------------|---------------------|------------|------------|-----------------------|-----------------------|----------------------|---------------------|
| 8,200.00            | 0.74            | 95.80       | 8,199.52            | 15.87      | -5.61      | -5.47                 | 0.00                  | 0.00                 | 0.00                |
| 8,282.00            | 1.20            | 84.50       | 8,281.51            | 15.90      | -4.23      | -4.09                 | 0.60                  | 0.56                 | -13.78              |
| 8,314.00            | 3.40            | 81.70       | 8,313.48            | 16.07      | -2.95      | -2.81                 | 6.88                  | 6.88                 | -8.75               |
| 8,346.00            | 6.80            | 81.00       | 8,345.35            | 16.50      | -0.14      | 0.00                  | 10.63                 | 10.63                | -2.19               |
| 8,378.00            | 11.00           | 83.30       | 8,376.98            | 17.16      | 4.76       | 4.91                  | 13.17                 | 13.13                | 7.19                |
| 8,410.00            | 14.70           | 86.30       | 8,408.15            | 17.78      | 11.85      | 12.00                 | 11.75                 | 11.56                | 9.38                |
| 8,442.00            | 17.80           | 89.60       | 8,438.87            | 18.07      | 20.80      | 20.95                 | 10.10                 | 9.69                 | 10.31               |
| 8,474.00            | 21.60           | 91.40       | 8,468.99            | 17.96      | 31.58      | 31.73                 | 12.02                 | 11.88                | 5.63                |
| 8,506.00            | 25.10           | 90.70       | 8,498.37            | 17.74      | 44.26      | 44.41                 | 10.97                 | 10.94                | -2.19               |
| 8,537.00            | 29.10           | 88.70       | 8,525.96            | 17.83      | 58.37      | 58.53                 | 13.23                 | 12.90                | -6.45               |

# Crescent Directional Drilling

## Survey Report

|           |                          |                              |                                   |
|-----------|--------------------------|------------------------------|-----------------------------------|
| Company:  | COG Operating, LLC       | Local Co-ordinate Reference: | Site Hercules Federal Com #3H     |
| Project:  | Chaves County, NM        | TVD Reference:               | WELL @ 4418.00ft (Silver Oak #12) |
| Site:     | Hercules Federal Com #3H | MD Reference:                | WELL @ 4418.00ft (Silver Oak #12) |
| Well:     | Hercules Federal Com #3H | North Reference:             | Grid                              |
| Wellbore: | Wellbore #1              | Survey/Calculation Method:   | Minimum Curvature                 |
| Design:   | Wellbore #1              | Database:                    | Compass R5000 DB Server           |

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
|---------------------|-----------------|-------------|---------------------|------------|------------|-----------------------|-----------------------|----------------------|---------------------|
| 8,569.00            | 33.30           | 88.20       | 8,553.32            | 18.28      | 74.94      | 75.10                 | 13.15                 | 13.13                | -1.56               |
| 8,601.00            | 37.50           | 88.70       | 8,579.40            | 18.78      | 93.47      | 93.63                 | 13.16                 | 13.13                | 1.56                |
| 8,633.00            | 41.90           | 89.30       | 8,604.02            | 19.13      | 113.90     | 114.06                | 13.80                 | 13.75                | 1.88                |
| 8,665.00            | 45.80           | 90.30       | 8,627.09            | 19.20      | 136.06     | 136.23                | 12.38                 | 12.19                | 3.13                |
| 8,697.00            | 49.70           | 91.40       | 8,648.60            | 18.84      | 159.74     | 159.90                | 12.45                 | 12.19                | 3.44                |
| 8,729.00            | 53.90           | 92.10       | 8,668.39            | 18.07      | 184.87     | 185.02                | 13.24                 | 13.13                | 2.19                |
| 8,760.00            | 57.60           | 91.90       | 8,685.83            | 17.17      | 210.48     | 210.62                | 11.95                 | 11.94                | -0.65               |
| 8,792.00            | 61.00           | 92.10       | 8,702.17            | 16.21      | 237.97     | 238.10                | 10.84                 | 10.63                | 0.63                |
| 8,824.00            | 64.30           | 91.70       | 8,716.87            | 15.27      | 266.37     | 266.50                | 10.37                 | 10.31                | -1.25               |
| 8,855.00            | 67.60           | 91.20       | 8,729.50            | 14.56      | 294.67     | 294.79                | 10.75                 | 10.65                | -1.61               |
| 8,887.00            | 71.50           | 91.60       | 8,740.68            | 13.82      | 324.64     | 324.75                | 12.24                 | 12.19                | 1.25                |
| 8,919.00            | 75.50           | 91.00       | 8,749.76            | 13.13      | 355.31     | 355.41                | 12.63                 | 12.50                | -1.88               |
| 8,951.00            | 80.20           | 90.30       | 8,756.50            | 12.78      | 386.58     | 386.68                | 14.84                 | 14.69                | -2.19               |
| 8,983.00            | 85.10           | 88.70       | 8,760.59            | 13.06      | 418.30     | 418.40                | 16.08                 | 15.31                | -5.00               |
| 9,015.00            | 88.80           | 88.20       | 8,762.29            | 13.92      | 450.24     | 450.35                | 11.67                 | 11.56                | -1.56               |
| 9,079.00            | 90.50           | 88.90       | 8,762.68            | 15.54      | 514.22     | 514.33                | 2.87                  | 2.66                 | 1.09                |
| 9,174.00            | 89.60           | 89.30       | 8,762.60            | 17.03      | 609.20     | 609.33                | 1.04                  | -0.95                | 0.42                |
| 9,270.00            | 89.90           | 89.10       | 8,763.02            | 18.37      | 705.19     | 705.33                | 0.38                  | 0.31                 | -0.21               |
| 9,366.00            | 92.10           | 88.20       | 8,761.34            | 20.63      | 801.14     | 801.28                | 2.48                  | 2.29                 | -0.94               |
| 9,462.00            | 89.20           | 88.20       | 8,760.25            | 23.65      | 897.08     | 897.25                | 3.02                  | -3.02                | 0.00                |
| 9,557.00            | 86.60           | 88.70       | 8,763.73            | 26.22      | 991.97     | 992.17                | 2.79                  | -2.74                | 0.53                |
| 9,653.00            | 92.30           | 88.60       | 8,764.66            | 28.48      | 1,087.90   | 1,088.11              | 5.94                  | 5.94                 | -0.10               |
| 9,747.00            | 89.30           | 88.90       | 8,763.34            | 30.53      | 1,181.86   | 1,182.08              | 3.21                  | -3.19                | 0.32                |
| 9,842.00            | 89.90           | 87.90       | 8,764.01            | 33.18      | 1,276.82   | 1,277.06              | 1.23                  | 0.63                 | -1.05               |
| 9,938.00            | 87.20           | 88.60       | 8,766.44            | 36.11      | 1,372.74   | 1,373.00              | 2.91                  | -2.81                | 0.73                |
| 10,034.00           | 86.80           | 89.30       | 8,771.46            | 37.87      | 1,468.59   | 1,468.86              | 0.84                  | -0.42                | 0.73                |
| 10,130.00           | 88.30           | 91.00       | 8,775.56            | 37.62      | 1,564.49   | 1,564.76              | 2.36                  | 1.56                 | 1.77                |
| 10,226.00           | 88.90           | 91.20       | 8,777.91            | 35.77      | 1,660.45   | 1,660.69              | 0.66                  | 0.63                 | 0.21                |
| 10,321.00           | 91.90           | 91.40       | 8,777.25            | 33.62      | 1,755.41   | 1,755.63              | 3.16                  | 3.16                 | 0.21                |
| 10,416.00           | 89.70           | 91.20       | 8,775.92            | 31.46      | 1,850.37   | 1,850.57              | 2.33                  | -2.32                | -0.21               |
| 10,512.00           | 91.90           | 91.60       | 8,774.58            | 29.12      | 1,946.32   | 1,946.50              | 2.33                  | 2.29                 | 0.42                |
| 10,606.00           | 91.40           | 91.20       | 8,771.87            | 26.82      | 2,040.26   | 2,040.41              | 0.68                  | -0.53                | -0.43               |
| 10,702.00           | 90.40           | 91.20       | 8,770.37            | 24.81      | 2,136.22   | 2,136.36              | 1.04                  | -1.04                | 0.00                |
| 10,798.00           | 90.90           | 91.60       | 8,769.28            | 22.47      | 2,232.19   | 2,232.30              | 0.67                  | 0.52                 | 0.42                |
| 10,894.00           | 88.20           | 90.80       | 8,770.03            | 20.46      | 2,328.15   | 2,328.24              | 2.93                  | -2.81                | -0.83               |
| 10,988.00           | 88.60           | 90.80       | 8,772.65            | 19.14      | 2,422.11   | 2,422.18              | 0.43                  | 0.43                 | 0.00                |
| 11,083.00           | 87.90           | 90.80       | 8,775.56            | 17.82      | 2,517.05   | 2,517.11              | 0.74                  | -0.74                | 0.00                |
| 11,180.00           | 90.10           | 90.00       | 8,777.25            | 17.14      | 2,614.03   | 2,614.08              | 2.41                  | 2.27                 | -0.82               |
| 11,274.00           | 89.60           | 90.00       | 8,777.49            | 17.14      | 2,708.03   | 2,708.08              | 0.53                  | -0.53                | 0.00                |
| 11,369.00           | 88.60           | 90.80       | 8,778.99            | 16.48      | 2,803.01   | 2,803.05              | 1.35                  | -1.05                | 0.84                |
| 11,465.00           | 88.90           | 91.10       | 8,781.08            | 14.89      | 2,898.98   | 2,899.00              | 0.44                  | 0.31                 | 0.31                |
| 11,560.00           | 89.30           | 88.80       | 8,782.57            | 15.14      | 2,993.96   | 2,993.97              | 2.66                  | 0.42                 | -2.63               |
| 11,655.00           | 90.00           | 88.30       | 8,783.15            | 17.71      | 3,088.92   | 3,088.96              | 0.80                  | 0.74                 | -0.32               |

# Crescent Directional Drilling

## Survey Report

|                  |                          |                                     |                                   |
|------------------|--------------------------|-------------------------------------|-----------------------------------|
| <b>Company:</b>  | COG Operating, LLC       | <b>Local Co-ordinate Reference:</b> | Site Hercules Federal Com #3H     |
| <b>Project:</b>  | Chaves County, NM        | <b>TVD Reference:</b>               | WELL @ 4418.00ft (Silver Oak #12) |
| <b>Site:</b>     | Hercules Federal Com #3H | <b>MD Reference:</b>                | WELL @ 4418.00ft (Silver Oak #12) |
| <b>Well:</b>     | Hercules Federal Com #3H | <b>North Reference:</b>             | Grid                              |
| <b>Wellbore:</b> | Wellbore #1              | <b>Survey Calculation Method:</b>   | Minimum Curvature                 |
| <b>Design:</b>   | Wellbore #1              | <b>Database:</b>                    | Compass R5000 DB Server           |

| Survey                                                      |                 |             |                     |           |           |                       |                       |                      |                     |
|-------------------------------------------------------------|-----------------|-------------|---------------------|-----------|-----------|-----------------------|-----------------------|----------------------|---------------------|
| Measured Depth (ft)                                         | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N-S (ft) | +E-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
| 11,750.00                                                   | 90.00           | 88.60       | 8,783.15            | 20.28     | 3,183.88  | 3,183.94              | 0.32                  | 0.00                 | 0.32                |
| 11,845.00                                                   | 89.70           | 89.30       | 8,783.40            | 22.02     | 3,278.87  | 3,278.94              | 0.80                  | -0.32                | 0.74                |
| 11,940.00                                                   | 90.00           | 89.30       | 8,783.65            | 23.18     | 3,373.86  | 3,373.93              | 0.32                  | 0.32                 | 0.00                |
| 12,036.00                                                   | 89.00           | 89.70       | 8,784.49            | 24.01     | 3,469.85  | 3,469.93              | 1.12                  | -1.04                | 0.42                |
| 12,131.00                                                   | 90.00           | 89.30       | 8,785.32            | 24.84     | 3,564.84  | 3,564.92              | 1.13                  | 1.05                 | -0.42               |
| 12,227.00                                                   | 87.80           | 88.60       | 8,787.18            | 26.60     | 3,660.80  | 3,660.90              | 2.40                  | -2.29                | -0.73               |
| 12,322.00                                                   | 88.70           | 88.30       | 8,790.08            | 29.17     | 3,755.72  | 3,755.83              | 1.00                  | 0.85                 | -0.32               |
| 12,417.00                                                   | 90.00           | 87.90       | 8,791.14            | 32.32     | 3,850.66  | 3,850.80              | 1.43                  | 1.37                 | -0.42               |
| 12,513.00                                                   | 89.00           | 88.30       | 8,791.98            | 35.50     | 3,946.60  | 3,946.76              | 1.12                  | -1.04                | 0.42                |
| 12,609.00                                                   | 90.50           | 88.80       | 8,792.40            | 38.10     | 4,042.57  | 4,042.74              | 1.59                  | 1.56                 | 0.31                |
| 12,704.00                                                   | 89.30           | 89.00       | 8,792.56            | 40.08     | 4,137.54  | 4,137.73              | 1.33                  | -1.26                | 0.42                |
| 12,799.00                                                   | 91.60           | 88.60       | 8,791.82            | 42.08     | 4,232.51  | 4,232.72              | 2.46                  | 2.42                 | -0.42               |
| 12,895.00                                                   | 91.70           | 88.60       | 8,789.05            | 44.42     | 4,328.44  | 4,328.67              | 0.10                  | 0.10                 | 0.00                |
| 12,991.00                                                   | 92.30           | 89.00       | 8,785.70            | 46.43     | 4,424.36  | 4,424.80              | 0.75                  | 0.63                 | 0.42                |
| 13,022.00                                                   | 92.50           | 89.00       | 8,784.40            | 46.97     | 4,455.33  | 4,455.57              | 0.65                  | 0.65                 | 0.00                |
| Last Survey @ 13022.00 MD, 8784.40 TVD, 92.50 INC, 89.00 AZ |                 |             |                     |           |           |                       |                       |                      |                     |
| 13,083.00                                                   | 92.50           | 89.00       | 8,781.74            | 48.04     | 4,516.26  | 4,516.51              | 0.00                  | 0.00                 | 0.00                |
| Straight line Projection to TD @ 13083.00 MD, 8781.74 TVD.  |                 |             |                     |           |           |                       |                       |                      |                     |

| Survey Annotations  |                     |                   |           |                                                             |
|---------------------|---------------------|-------------------|-----------|-------------------------------------------------------------|
| Measured Depth (ft) | Vertical Depth (ft) | Local Coordinates |           | Comment                                                     |
|                     |                     | +N-S (ft)         | +E-W (ft) |                                                             |
| 13,022.00           | 8,784.40            | 46.97             | 4,455.33  | Last Survey @ 13022.00 MD, 8784.40 TVD, 92.50 INC, 89.00 AZ |
| 13,083.00           | 8,781.74            | 48.04             | 4,516.26  | Straight line Projection to TD @ 13083.00 MD, 8781.74 TVD.  |

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