

**NM OIL CONSERVATION**  
ARTESIA DISTRICT

AUG 14 2017



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COG OPERATING

## **COG Operating LLC**

Eddy County, NM (NAD-27 2015)

Burch Keely Unit #942H

API #: 30-015-44081

SHL: 2285' FSL, 230' FEL, Sec 13, T17S, R29E, Unit I

PP: 2245' FSL, 330' FWL, Sec 18, T17S, R30E, Unit L

BHL: 2298' FSL, 220' FEL, Sec 18, T17S, R30E, Unit I

Design: BHL: 2290' FSL, 220' FEL, Sec 18, T17S, R30E, Unit I

## **Standard Survey Report**

17 April, 2017

**Please provide signature  
page for directional survey**





**TDS**  
Survey Report



**Company:** COG Operating LLC  
**Project:** Eddy County, NM (NAD-27 2015)  
**Site:** Burch Keely Unit #942H  
**Well:** SHL: 2285' FSL, 230' FEL, Sec 13, T17S, R29E, Unit I  
**Wellbore:** BHL: 2290' FSL, 220' FEL, Sec 18, T17S, R30E, Unit I  
**Design:** BHL: 2290' FSL, 220' FEL, Sec 18, T17S, R30E, Unit I

**Local Co-ordinate Reference:** Well SHL: 2285' FSL, 230' FEL, Sec 13, T17S, R29E, Unit I  
KB @ 3653.00usft (Silver Oak 3)  
KB @ 3653.00usft (Silver Oak 3)  
Grid

**TVD Reference:**  
**MD Reference:**  
**North Reference:**

**Survey Calculation Method:** Minimum Curvature

**Database:** EDM 5000.1 Single User Db

|                    |                                      |                      |                |
|--------------------|--------------------------------------|----------------------|----------------|
| <b>Project</b>     | Eddy County, NM (NAD-27 2015)        |                      |                |
| <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                  |     | Burch Keely Unit #942H |                 |            |                   |        |
| Site Position:        |     | Northing:              | 667,060.90 usft | Latitude:  | 32° 50' 0.399 N   |        |
| From:                 | Map | Easting:               | 596,274.00 usft | Longitude: | 104° 1' 11.637 W  |        |
| Position Uncertainty: |     | 0.00 usft              | Slot Radius:    | 13.20 in   | Grid Convergence: | 0.17 ° |

|                      |                                                      |           |                     |                 |               |                  |
|----------------------|------------------------------------------------------|-----------|---------------------|-----------------|---------------|------------------|
| Well                 | SHL: 2285' FSL, 230' FEL, Sec 13, T17S, R29E, Unit I |           |                     |                 |               |                  |
| Well Position        | +N/-S                                                | 0.00 usft | Northing:           | 667,060.90 usft | Latitude:     | 32° 50' 0.399 N  |
|                      | +E/-W                                                | 0.00 usft | Easting:            | 596,274.00 usft | Longitude:    | 104° 1' 11.637 W |
| Position Uncertainty |                                                      | 0.00 usft | Wellhead Elevation: | 0.00 usft       | Ground Level: | 3,635.00 usft    |

|                  |                                                      |                    |                        |                      |                            |
|------------------|------------------------------------------------------|--------------------|------------------------|----------------------|----------------------------|
| <b>Wellbore</b>  | BHL: 2290' FSL, 220' FEL, Sec 18, T17S, R30E, Unit I |                    |                        |                      |                            |
| <b>Magnetics</b> | <b>Model Name</b>                                    | <b>Sample Date</b> | <b>Declination (°)</b> | <b>Dip Angle (°)</b> | <b>Field Strength (nT)</b> |
|                  | IGRF2015                                             | 3/24/2017          | 7.23                   | 60.55                | 48,274                     |

|                          |                                                      |                    |                    |                      |      |
|--------------------------|------------------------------------------------------|--------------------|--------------------|----------------------|------|
| <b>Design</b>            | BHL: 2290' FSL, 220' FEL, Sec 18, T17S, R30E, Unit I |                    |                    |                      |      |
| <b>Audit Notes:</b>      |                                                      |                    |                    |                      |      |
| <b>Version:</b>          | 1.0                                                  | <b>Phase:</b>      | ACTUAL             | <b>Tie On Depth:</b> | 0.00 |
| <b>Vertical Section:</b> | <b>Depth From (TVD) (usft)</b>                       | <b>+N-S (usft)</b> | <b>+E-W (usft)</b> | <b>Direction (°)</b> |      |
|                          | 0.00                                                 | 0.00               | 0.00               | 89.72                |      |

|                       |                  |                                        |                   |                         |  |
|-----------------------|------------------|----------------------------------------|-------------------|-------------------------|--|
| <b>Survey Program</b> | <b>Date</b>      | 4/17/2017                              |                   |                         |  |
| <b>From (usft)</b>    | <b>To (usft)</b> | <b>Survey (Wellbore)</b>               | <b>Tool Name</b>  | <b>Description</b>      |  |
| 100.00                | 1,000.00         | VES Gyro #1 (BHL: 2290' FSL, 220' FEL, | VES-ISCWSA-GYRO-3 | Biaxial Semi-Cont. Gyro |  |
| 1,000.00              | 9,956.00         | TDS MWD #2 (BHL: 2290' FSL, 220' FEL,  | MWD               | MWD - Standard          |  |

|                              |                        |                    |                              |                    |                    |                                |                                |                               |                              |  |
|------------------------------|------------------------|--------------------|------------------------------|--------------------|--------------------|--------------------------------|--------------------------------|-------------------------------|------------------------------|--|
| <b>Survey</b>                |                        |                    |                              |                    |                    |                                |                                |                               |                              |  |
| <b>Measured Depth (usft)</b> | <b>Inclination (°)</b> | <b>Azimuth (°)</b> | <b>Vertical Depth (usft)</b> | <b>+N-S (usft)</b> | <b>+E-W (usft)</b> | <b>Vertical Section (usft)</b> | <b>Dogleg Rate (°/100usft)</b> | <b>Build Rate (°/100usft)</b> | <b>Turn Rate (°/100usft)</b> |  |
| 0.00                         | 0.00                   | 0.00               | 0.00                         | 0.00               | 0.00               | 0.00                           | 0.00                           | 0.00                          | 0.00                         |  |
| 100.00                       | 0.16                   | 128.00             | 100.00                       | -0.09              | 0.11               | 0.11                           | 0.16                           | 0.16                          | 0.00                         |  |
| 200.00                       | 0.19                   | 225.06             | 200.00                       | -0.29              | 0.10               | 0.10                           | 0.26                           | 0.03                          | 97.06                        |  |
| 300.00                       | 0.18                   | 285.85             | 300.00                       | -0.36              | -0.17              | -0.17                          | 0.19                           | -0.01                         | 60.79                        |  |
| 400.00                       | 0.65                   | 315.95             | 400.00                       | 0.09               | -0.71              | -0.71                          | 0.50                           | 0.47                          | 30.10                        |  |
| 500.00                       | 0.63                   | 311.60             | 499.99                       | 0.86               | -1.52              | -1.51                          | 0.05                           | -0.02                         | -4.35                        |  |
| 600.00                       | 0.72                   | 328.92             | 599.98                       | 1.76               | -2.25              | -2.24                          | 0.22                           | 0.09                          | 17.32                        |  |



TDS  
Survey Report



Company: COG Operating LLC

Local Co-ordinate Reference: Well SHL: 2285' FSL, 230' FEL, Sec 13, T17S, R29E, Unit I

Project: Eddy County, NM (NAD-27 2015)

TVD Reference: KB @ 3653.00usft (Silver Oak 3)

Site: Burch Keely Unit #942H

MD Reference: KB @ 3653.00usft (Silver Oak 3)

Well: SHL: 2285' FSL, 230' FEL, Sec 13, T17S, R29E, Unit I

North Reference: Grid

Wellbore: BHL: 2290' FSL, 220' FEL, Sec 18, T17S, R30E, Unit I

Survey Calculation Method: Minimum Curvature

Design: BHL: 2290' FSL, 220' FEL, Sec 18, T17S, R30E, Unit I

Database: EDM 5000.1 Single User Db

Survey

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| 700.00                | 0.78            | 8.31        | 699.98                | 2.97         | -2.48        | -2.46                   | 0.51                    | 0.06                   | 39.39                 |
| 800.00                | 0.84            | 24.19       | 799.97                | 4.32         | -2.08        | -2.06                   | 0.23                    | 0.06                   | 15.88                 |
| 900.00                | 0.87            | 46.17       | 899.95                | 5.51         | -1.23        | -1.20                   | 0.33                    | 0.03                   | 21.98                 |
| 1,000.00              | 0.99            | 45.89       | 999.94                | 6.64         | -0.06        | -0.03                   | 0.12                    | 0.12                   | -0.28                 |
| 1,114.00              | 0.80            | 58.84       | 1,113.93              | 7.74         | 1.32         | 1.36                    | 0.24                    | -0.17                  | 11.36                 |
| Tie-In to VES Gyro    |                 |             |                       |              |              |                         |                         |                        |                       |
| 1,198.00              | 0.50            | 63.50       | 1,197.92              | 8.20         | 2.15         | 2.19                    | 0.36                    | -0.36                  | 5.55                  |
| First TDS MWD Survey  |                 |             |                       |              |              |                         |                         |                        |                       |
| 1,230.00              | 0.60            | 45.60       | 1,229.92              | 8.38         | 2.40         | 2.44                    | 0.62                    | 0.31                   | -55.94                |
| 1,323.00              | 1.80            | 252.70      | 1,322.91              | 8.29         | 1.35         | 1.39                    | 2.53                    | 1.29                   | -164.41               |
| 1,417.00              | 3.60            | 253.90      | 1,416.80              | 7.03         | -2.89        | -2.86                   | 1.92                    | 1.91                   | 1.28                  |
| 1,512.00              | 3.50            | 256.70      | 1,511.62              | 5.54         | -8.58        | -8.55                   | 0.21                    | -0.11                  | 2.95                  |
| 1,606.00              | 3.50            | 259.20      | 1,605.44              | 4.34         | -14.19       | -14.17                  | 0.16                    | 0.00                   | 2.66                  |
| 1,701.00              | 3.30            | 259.40      | 1,700.28              | 3.29         | -19.73       | -19.71                  | 0.21                    | -0.21                  | 0.21                  |
| 1,796.00              | 3.20            | 259.80      | 1,795.12              | 2.32         | -25.02       | -25.01                  | 0.11                    | -0.11                  | 0.42                  |
| 1,890.00              | 3.10            | 260.70      | 1,888.98              | 1.44         | -30.12       | -30.11                  | 0.12                    | -0.11                  | 0.96                  |
| 1,985.00              | 2.90            | 265.90      | 1,983.85              | 0.86         | -35.05       | -35.04                  | 0.36                    | -0.21                  | 5.47                  |
| 2,080.00              | 3.30            | 237.00      | 2,078.72              | -0.80        | -39.74       | -39.74                  | 1.68                    | 0.42                   | -30.42                |
| 2,175.00              | 3.60            | 233.90      | 2,173.54              | -4.05        | -44.44       | -44.46                  | 0.37                    | 0.32                   | -3.26                 |
| 2,269.00              | 3.30            | 235.90      | 2,267.37              | -7.31        | -49.07       | -49.10                  | 0.34                    | -0.32                  | 2.13                  |
| 2,364.00              | 3.20            | 234.30      | 2,362.22              | -10.39       | -53.48       | -53.53                  | 0.14                    | -0.11                  | -1.68                 |
| 2,459.00              | 2.90            | 234.20      | 2,457.09              | -13.34       | -57.59       | -57.65                  | 0.32                    | -0.32                  | -0.11                 |
| 2,553.00              | 2.90            | 231.50      | 2,550.97              | -16.21       | -61.37       | -61.45                  | 0.15                    | 0.00                   | -2.87                 |
| 2,648.00              | 3.00            | 231.00      | 2,645.84              | -19.27       | -65.19       | -65.28                  | 0.11                    | 0.11                   | -0.53                 |
| 2,742.00              | 1.70            | 239.10      | 2,739.76              | -21.53       | -68.30       | -68.40                  | 1.42                    | -1.38                  | 8.62                  |
| 2,837.00              | 1.50            | 249.70      | 2,834.72              | -22.69       | -70.67       | -70.78                  | 0.38                    | -0.21                  | 11.16                 |
| 2,931.00              | 1.50            | 249.10      | 2,928.69              | -23.56       | -72.97       | -73.09                  | 0.02                    | 0.00                   | -0.64                 |
| 3,026.00              | 1.60            | 252.10      | 3,023.66              | -24.41       | -75.40       | -75.52                  | 0.14                    | 0.11                   | 3.16                  |
| 3,120.00              | 1.50            | 238.60      | 3,117.62              | -25.45       | -77.70       | -77.82                  | 0.40                    | -0.11                  | -14.36                |
| 3,215.00              | 1.70            | 242.70      | 3,212.58              | -26.74       | -80.01       | -80.14                  | 0.24                    | 0.21                   | 4.32                  |
| 3,309.00              | 1.50            | 249.30      | 3,306.55              | -27.82       | -82.40       | -82.54                  | 0.29                    | -0.21                  | 7.02                  |
| 3,404.00              | 1.70            | 248.20      | 3,401.51              | -28.78       | -84.87       | -85.01                  | 0.21                    | 0.21                   | -1.16                 |
| 3,499.00              | 1.70            | 246.60      | 3,496.47              | -29.87       | -87.47       | -87.62                  | 0.05                    | 0.00                   | -1.68                 |
| 3,593.00              | 1.60            | 255.10      | 3,590.43              | -30.76       | -90.02       | -90.17                  | 0.28                    | -0.11                  | 9.04                  |
| 3,687.00              | 1.80            | 247.70      | 3,684.39              | -31.65       | -92.66       | -92.81                  | 0.32                    | 0.21                   | -7.87                 |
| 3,782.00              | 1.80            | 248.80      | 3,779.34              | -32.76       | -95.43       | -95.59                  | 0.04                    | 0.00                   | 1.16                  |
| 3,876.00              | 1.80            | 256.10      | 3,873.30              | -33.65       | -98.24       | -98.40                  | 0.24                    | 0.00                   | 7.77                  |
| 3,971.00              | 1.80            | 246.60      | 3,968.25              | -34.60       | -101.05      | -101.22                 | 0.31                    | 0.00                   | -10.00                |
| 4,066.00              | 1.90            | 252.40      | 4,063.20              | -35.67       | -103.92      | -104.10                 | 0.22                    | 0.11                   | 6.11                  |
| 4,160.00              | 0.60            | 248.20      | 4,157.18              | -36.32       | -105.87      | -106.04                 | 1.39                    | -1.38                  | -4.47                 |
| 4,255.00              | 0.40            | 226.00      | 4,252.17              | -36.74       | -106.57      | -106.75                 | 0.29                    | -0.21                  | -23.37                |



TDS  
Survey Report



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TVD Reference: KB @ 3653.00usft (Silver Oak 3)

Site: Burch Keely Unit #942H

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North Reference: Grid

Wellbore: BHL: 2290' FSL, 220' FEL, Sec 18, T17S, R30E, Unit I

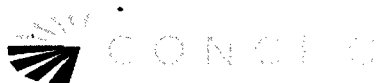
Survey Calculation Method: Minimum Curvature

Design: BHL: 2290' FSL, 220' FEL, Sec 18, T17S, R30E, Unit I

Database: EDM 5000.1 Single User Db

Survey

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| 4,286.00              | 0.90            | 106.80      | 4,283.17              | -36.88       | -106.41      | -106.59                 | 3.71                    | 1.61                   | -384.52               |
| 4,318.00              | 3.30            | 112.60      | 4,315.15              | -37.31       | -105.32      | -105.50                 | 7.52                    | 7.50                   | 18.13                 |
| 4,349.00              | 6.30            | 120.70      | 4,346.03              | -38.52       | -103.03      | -103.22                 | 9.90                    | 9.68                   | 26.13                 |
| 4,381.00              | 9.80            | 122.00      | 4,377.71              | -40.86       | -99.21       | -99.41                  | 10.95                   | 10.94                  | 4.06                  |
| 4,412.00              | 13.10           | 123.40      | 4,408.09              | -44.19       | -94.04       | -94.26                  | 10.68                   | 10.65                  | 4.52                  |
| 4,444.00              | 16.50           | 118.90      | 4,439.03              | -48.39       | -87.03       | -87.27                  | 11.21                   | 10.63                  | -14.06                |
| 4,475.00              | 20.00           | 112.30      | 4,468.47              | -52.53       | -78.27       | -78.53                  | 13.10                   | 11.29                  | -21.29                |
| 4,507.00              | 23.90           | 107.70      | 4,498.14              | -56.58       | -67.03       | -67.30                  | 13.31                   | 12.19                  | -14.38                |
| 4,538.00              | 28.00           | 105.80      | 4,526.01              | -60.47       | -54.04       | -54.33                  | 13.49                   | 13.23                  | -6.13                 |
| 4,570.00              | 32.00           | 103.60      | 4,553.72              | -64.51       | -38.56       | -38.88                  | 12.96                   | 12.50                  | -6.88                 |
| 4,601.00              | 35.80           | 101.00      | 4,579.45              | -68.17       | -21.67       | -22.00                  | 13.12                   | 12.26                  | -8.39                 |
| 4,633.00              | 39.10           | 97.20       | 4,604.85              | -71.23       | -2.46        | -2.81                   | 12.59                   | 10.31                  | -11.88                |
| 4,664.00              | 41.50           | 92.60       | 4,628.50              | -72.92       | 17.50        | 17.14                   | 12.33                   | 7.74                   | -14.84                |
| 4,696.00              | 44.40           | 88.20       | 4,651.92              | -73.05       | 39.29        | 38.93                   | 13.03                   | 9.06                   | -13.75                |
| 4,728.00              | 46.50           | 86.10       | 4,674.37              | -71.91       | 62.06        | 61.71                   | 8.06                    | 6.56                   | -6.56                 |
| 4,759.00              | 47.10           | 85.50       | 4,695.59              | -70.25       | 84.60        | 84.26                   | 2.40                    | 1.94                   | -1.94                 |
| 4,791.00              | 47.60           | 85.40       | 4,717.27              | -68.38       | 108.06       | 107.73                  | 1.58                    | 1.56                   | -0.31                 |
| 4,821.00              | 47.90           | 85.30       | 4,737.45              | -66.58       | 130.20       | 129.87                  | 1.03                    | 1.00                   | -0.33                 |
| 4,853.00              | 48.50           | 85.30       | 4,758.77              | -64.63       | 153.97       | 153.65                  | 1.88                    | 1.88                   | 0.00                  |
| 4,885.00              | 49.00           | 85.10       | 4,779.87              | -62.61       | 177.94       | 177.64                  | 1.63                    | 1.56                   | -0.63                 |
| 4,916.00              | 49.50           | 85.00       | 4,800.11              | -60.59       | 201.34       | 201.04                  | 1.63                    | 1.61                   | -0.32                 |
| 4,948.00              | 51.00           | 85.50       | 4,820.57              | -58.55       | 225.86       | 225.57                  | 4.84                    | 4.69                   | 1.56                  |
| 4,979.00              | 54.60           | 86.20       | 4,839.31              | -56.77       | 250.48       | 250.20                  | 11.75                   | 11.61                  | 2.26                  |
| 5,011.00              | 58.90           | 86.50       | 4,856.85              | -55.07       | 277.18       | 276.91                  | 13.46                   | 13.44                  | 0.94                  |
| 5,042.00              | 62.80           | 85.50       | 4,871.95              | -53.17       | 304.19       | 303.92                  | 12.89                   | 12.58                  | -3.23                 |
| 5,074.00              | 65.80           | 84.80       | 4,885.82              | -50.73       | 332.91       | 332.66                  | 9.58                    | 9.38                   | -2.19                 |
| 5,105.00              | 67.60           | 84.20       | 4,898.09              | -48.00       | 361.25       | 361.01                  | 6.07                    | 5.81                   | -1.94                 |
| 5,137.00              | 69.80           | 84.50       | 4,909.71              | -45.07       | 390.92       | 390.69                  | 6.93                    | 6.88                   | 0.94                  |
| 5,168.00              | 71.90           | 85.30       | 4,919.88              | -42.47       | 420.09       | 419.87                  | 7.20                    | 6.77                   | 2.58                  |
| 5,200.00              | 75.40           | 86.60       | 4,928.89              | -40.30       | 450.71       | 450.51                  | 11.61                   | 10.94                  | 4.06                  |
| 5,231.00              | 79.00           | 88.10       | 4,935.75              | -38.91       | 480.90       | 480.71                  | 12.53                   | 11.61                  | 4.84                  |
| 5,294.00              | 86.20           | 91.00       | 4,943.86              | -38.43       | 543.33       | 543.13                  | 12.31                   | 11.43                  | 4.60                  |
| 5,310.64              | 86.98           | 90.86       | 4,944.85              | -38.70       | 559.94       | 559.74                  | 4.79                    | 4.71                   | -0.86                 |
| As-Drilled PP         |                 |             |                       |              |              |                         |                         |                        |                       |
| 5,364.00              | 89.50           | 90.40       | 4,946.49              | -39.29       | 613.26       | 613.06                  | 4.79                    | 4.71                   | -0.86                 |
| 5,395.00              | 91.10           | 89.10       | 4,946.33              | -39.15       | 644.26       | 644.06                  | 6.65                    | 5.16                   | -4.19                 |
| 5,490.00              | 91.30           | 88.60       | 4,944.34              | -37.24       | 739.22       | 739.03                  | 0.57                    | 0.21                   | -0.53                 |
| 5,585.00              | 91.40           | 88.50       | 4,942.10              | -34.84       | 834.16       | 833.98                  | 0.15                    | 0.11                   | -0.11                 |
| 5,680.00              | 91.60           | 88.70       | 4,939.61              | -32.52       | 929.10       | 928.93                  | 0.30                    | 0.21                   | 0.21                  |
| 5,774.00              | 91.70           | 88.50       | 4,936.91              | -30.23       | 1,023.04     | 1,022.88                | 0.24                    | 0.11                   | -0.21                 |
| 5,869.00              | 92.00           | 88.60       | 4,933.84              | -27.82       | 1,117.95     | 1,117.81                | 0.33                    | 0.32                   | 0.11                  |



TDS  
Survey Report



Company: COG Operating LLC

Local Co-ordinate Reference:

Well SHL: 2285' FSL, 230' FEL, Sec 13, T17S, R29E, Unit I

Project: Eddy County, NM (NAD-27 2015)

TVD Reference:

KB @ 3653.00usft (Silver Oak 3)

Site: Burch Keely Unit #942H

MD Reference:

KB @ 3653.00usft (Silver Oak 3)

Well: SHL: 2285' FSL, 230' FEL, Sec 13, T17S, R29E, Unit I

North Reference:

Grid

Wellbore: BHL: 2290' FSL, 220' FEL, Sec 18, T17S, R30E, Unit I

Survey Calculation Method:

Minimum Curvature

Design: BHL: 2290' FSL, 220' FEL, Sec 18, T17S, R30E, Unit I

Database:

EDM 5000.1 Single User Db

| Survey                |                 |             |                       |              |              |                         |                         |                        |                       |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |
| 5,964.00              | 90.00           | 89.90       | 4,932.18              | -26.58       | 1,212.93     | 1,212.78                | 2.51                    | -2.11                  | 1.37                  |
| 6,058.00              | 90.30           | 90.10       | 4,931.93              | -26.58       | 1,306.93     | 1,306.78                | 0.38                    | 0.32                   | 0.21                  |
| 6,153.00              | 90.60           | 90.10       | 4,931.19              | -26.75       | 1,401.92     | 1,401.77                | 0.32                    | 0.32                   | 0.00                  |
| 6,248.00              | 91.10           | 90.80       | 4,929.78              | -27.49       | 1,496.91     | 1,496.76                | 0.91                    | 0.53                   | 0.74                  |
| 6,342.00              | 90.50           | 89.90       | 4,928.47              | -28.07       | 1,590.90     | 1,590.74                | 1.15                    | -0.64                  | -0.96                 |
| 6,437.00              | 90.80           | 88.60       | 4,927.39              | -26.82       | 1,685.88     | 1,685.73                | 1.40                    | 0.32                   | -1.37                 |
| 6,531.00              | 90.80           | 88.90       | 4,926.08              | -24.77       | 1,779.85     | 1,779.70                | 0.32                    | 0.00                   | 0.32                  |
| 6,626.00              | 91.00           | 89.20       | 4,924.58              | -23.20       | 1,874.82     | 1,874.69                | 0.38                    | 0.21                   | 0.32                  |
| 6,721.00              | 90.80           | 89.30       | 4,923.09              | -21.95       | 1,969.80     | 1,969.67                | 0.24                    | -0.21                  | 0.11                  |
| 6,815.00              | 90.80           | 89.50       | 4,921.78              | -20.97       | 2,063.79     | 2,063.66                | 0.21                    | 0.00                   | 0.21                  |
| 6,910.00              | 91.20           | 88.40       | 4,920.12              | -19.23       | 2,158.76     | 2,158.64                | 1.23                    | 0.42                   | -1.16                 |
| 7,005.00              | 91.30           | 88.00       | 4,918.05              | -16.25       | 2,253.69     | 2,253.58                | 0.43                    | 0.11                   | -0.42                 |
| 7,099.00              | 91.10           | 87.30       | 4,916.08              | -12.39       | 2,347.59     | 2,347.50                | 0.77                    | -0.21                  | -0.74                 |
| 7,194.00              | 91.60           | 87.70       | 4,913.64              | -8.25        | 2,442.47     | 2,442.40                | 0.67                    | 0.53                   | 0.42                  |
| 7,289.00              | 92.10           | 87.90       | 4,910.78              | -4.60        | 2,537.35     | 2,537.30                | 0.57                    | 0.53                   | 0.21                  |
| 7,383.00              | 90.40           | 88.00       | 4,908.73              | -1.24        | 2,631.26     | 2,631.23                | 1.81                    | -1.81                  | 0.11                  |
| 7,478.00              | 90.30           | 87.60       | 4,908.14              | 2.40         | 2,726.19     | 2,726.17                | 0.43                    | -0.11                  | -0.42                 |
| 7,572.00              | 90.10           | 89.10       | 4,907.82              | 5.11         | 2,820.15     | 2,820.14                | 1.61                    | -0.21                  | 1.60                  |
| 7,667.00              | 90.90           | 89.70       | 4,906.99              | 6.11         | 2,915.14     | 2,915.13                | 1.05                    | 0.84                   | 0.63                  |
| 7,762.00              | 91.30           | 90.00       | 4,905.16              | 6.35         | 3,010.12     | 3,010.12                | 0.53                    | 0.42                   | 0.32                  |
| 7,857.00              | 91.10           | 90.30       | 4,903.17              | 6.11         | 3,105.10     | 3,105.09                | 0.38                    | -0.21                  | 0.32                  |
| 7,951.00              | 91.40           | 90.60       | 4,901.12              | 5.37         | 3,199.07     | 3,199.06                | 0.45                    | 0.32                   | 0.32                  |
| 8,046.00              | 91.70           | 89.40       | 4,898.55              | 5.37         | 3,294.04     | 3,294.02                | 1.30                    | 0.32                   | -1.26                 |
| 8,141.00              | 92.00           | 89.50       | 4,895.49              | 6.28         | 3,388.98     | 3,388.97                | 0.33                    | 0.32                   | 0.11                  |
| 8,235.00              | 90.00           | 89.10       | 4,893.85              | 7.43         | 3,482.96     | 3,482.95                | 2.17                    | -2.13                  | -0.43                 |
| 8,330.00              | 90.50           | 89.30       | 4,893.43              | 8.75         | 3,577.95     | 3,577.95                | 0.57                    | 0.53                   | 0.21                  |
| 8,425.00              | 90.80           | 89.90       | 4,892.35              | 9.42         | 3,672.94     | 3,672.94                | 0.71                    | 0.32                   | 0.63                  |
| 8,519.00              | 91.40           | 90.20       | 4,890.55              | 9.33         | 3,766.92     | 3,766.92                | 0.71                    | 0.64                   | 0.32                  |
| 8,614.00              | 91.10           | 89.50       | 4,888.48              | 9.58         | 3,861.90     | 3,861.90                | 0.80                    | -0.32                  | -0.74                 |
| 8,709.00              | 90.70           | 88.80       | 4,886.99              | 10.99        | 3,956.87     | 3,956.88                | 0.85                    | -0.42                  | -0.74                 |
| 8,803.00              | 90.90           | 89.00       | 4,885.67              | 12.80        | 4,050.85     | 4,050.86                | 0.30                    | 0.21                   | 0.21                  |
| 8,898.00              | 91.30           | 89.00       | 4,883.85              | 14.45        | 4,145.81     | 4,145.84                | 0.42                    | 0.42                   | 0.00                  |
| 8,992.00              | 91.60           | 89.50       | 4,881.47              | 15.68        | 4,239.78     | 4,239.80                | 0.62                    | 0.32                   | 0.53                  |
| 9,087.00              | 91.90           | 89.50       | 4,878.57              | 16.51        | 4,334.73     | 4,334.76                | 0.32                    | 0.32                   | 0.00                  |
| 9,182.00              | 92.40           | 89.70       | 4,875.01              | 17.18        | 4,429.66     | 4,429.69                | 0.57                    | 0.53                   | 0.21                  |
| 9,277.00              | 90.60           | 88.60       | 4,872.52              | 18.59        | 4,524.61     | 4,524.65                | 2.22                    | -1.89                  | -1.16                 |
| 9,372.00              | 90.90           | 89.10       | 4,871.27              | 20.49        | 4,619.58     | 4,619.63                | 0.61                    | 0.32                   | 0.53                  |
| 9,466.00              | 91.20           | 89.30       | 4,869.55              | 21.80        | 4,713.56     | 4,713.61                | 0.38                    | 0.32                   | 0.21                  |
| 9,561.00              | 91.50           | 89.20       | 4,867.31              | 23.05        | 4,808.52     | 4,808.58                | 0.33                    | 0.32                   | -0.11                 |
| 9,655.00              | 89.60           | 88.90       | 4,866.41              | 24.61        | 4,902.50     | 4,902.56                | 2.05                    | -2.02                  | -0.32                 |
| 9,750.00              | 89.60           | 88.40       | 4,867.08              | 26.84        | 4,997.47     | 4,997.54                | 0.53                    | 0.00                   | -0.53                 |



**TDS**  
Survey Report



**Company:** COG Operating LLC  
**Project:** Eddy County, NM (NAD-27 2015)  
**Site:** Burch Keely Unit #942H  
**Well:** SHL: 2285' FSL, 230' FEL, Sec 13, T17S, R29E, Unit I  
**Wellbore:** BHL: 2290' FSL, 220' FEL, Sec 18, T17S, R30E, Unit I  
**Design:** BHL: 2290' FSL, 220' FEL, Sec 18, T17S, R30E, Unit I

**Local Co-ordinate Reference:** Well SHL: 2285' FSL, 230' FEL, Sec 13, T17S, R29E, Unit I  
**TVD Reference:** KB @ 3653.00usft (Silver Oak 3)  
**MD Reference:** KB @ 3653.00usft (Silver Oak 3)  
**North Reference:** Grid  
**Survey Calculation Method:** Minimum Curvature  
**Database:** EDM 5000.1 Single User Db

**Survey**

| Measured Depth (usft)       | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |
|-----------------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| 9,844.00                    | 89.70           | 88.40       | 4,867.65              | 29.47        | 5,091.43     | 5,091.52                | 0.11                    | 0.11                   | 0.00                  |
| 9,876.00                    | 89.90           | 88.20       | 4,867.76              | 30.42        | 5,123.42     | 5,123.51                | 0.88                    | 0.63                   | -0.63                 |
| <b>Last TDS MWD Survey</b>  |                 |             |                       |              |              |                         |                         |                        |                       |
| 9,956.00                    | 89.90           | 88.20       | 4,867.90              | 32.93        | 5,203.38     | 5,203.48                | 0.00                    | 0.00                   | 0.00                  |
| <b>Projection to Bit/TD</b> |                 |             |                       |              |              |                         |                         |                        |                       |

**Design Annotations**

| Measured Depth (usft) | Vertical Depth (usft) | Local Coordinates |              | Comment              |
|-----------------------|-----------------------|-------------------|--------------|----------------------|
|                       |                       | +N/-S (usft)      | +E/-W (usft) |                      |
| 1,114.00              | 1,113.93              | 7.74              | 1.32         | Tie-In to VES Gyro   |
| 1,198.00              | 1,197.92              | 8.20              | 2.15         | First TDS MWD Survey |
| 5,310.64              | 4,944.85              | -38.70            | 559.94       | As-Drilled PP        |
| 9,876.00              | 4,867.76              | 30.42             | 5,123.42     | Last TDS MWD Survey  |
| 9,956.00              | 4,867.90              | 32.93             | 5,203.38     | Projection to Bit/TD |

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