

# **COG OPERATING LLC**

**LEA COUNTY, NM**

**BULLDOG**

**COLUMBUS FEDERAL COM #22H**

**OWB**

**Plan: PWP0**

## **Survey Report - Geographic**

**24 October, 2016**

# COG Operating LLC

## Survey Report - Geographic

|                  |                           |                                     |                                              |
|------------------|---------------------------|-------------------------------------|----------------------------------------------|
| <b>Company:</b>  | COG OPERATING LLC         | <b>Local Co-ordinate Reference:</b> | Well COLUMBUS FEDERAL COM #22H               |
| <b>Project:</b>  | LEA COUNTY, NM            | <b>TVD Reference:</b>               | RKB=3325+27 @ 3352.0usft (SCANDRILL FREEDOM) |
| <b>Site:</b>     | BULLDOG                   | <b>MD Reference:</b>                | RKB=3325+27 @ 3352.0usft (SCANDRILL FREEDOM) |
| <b>Well:</b>     | COLUMBUS FEDERAL COM #22H | <b>North Reference:</b>             | Grid                                         |
| <b>Wellbore:</b> | OWB                       | <b>Survey Calculation Method:</b>   | Minimum Curvature                            |
| <b>Design:</b>   | PWP0                      | <b>Database:</b>                    | EDM_Users                                    |

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

|                              |          |                          |                  |
|------------------------------|----------|--------------------------|------------------|
| <b>Site</b>                  | BULLDOG  |                          |                  |
| <b>Site Position:</b>        |          | <b>Northing:</b>         | 398,637.10 usft  |
| <b>From:</b>                 | Map      | <b>Easting:</b>          | 741,887.40 usft  |
| <b>Position Uncertainty:</b> | 0.0 usft | <b>Slot Radius:</b>      | 13-3/16 "        |
|                              |          | <b>Latitude:</b>         | 32° 5' 36.820 N  |
|                              |          | <b>Longitude:</b>        | 103° 33' 8.116 W |
|                              |          | <b>Grid Convergence:</b> | 0.42 °           |

|                             |                           |                            |                                 |
|-----------------------------|---------------------------|----------------------------|---------------------------------|
| <b>Well</b>                 | COLUMBUS FEDERAL COM #22H |                            |                                 |
| <b>Well Position</b>        | <b>+N/-S</b>              | 0.0 usft                   | <b>Northing:</b> 398,630.60 usf |
|                             | <b>+E/-W</b>              | 0.0 usft                   | <b>Easting:</b> 740,917.60 usf  |
| <b>Position Uncertainty</b> | 3.0 usft                  | <b>Wellhead Elevation:</b> | 0.0 usf                         |
|                             |                           | <b>Latitude:</b>           | 32° 5' 36.825 N                 |
|                             |                           | <b>Longitude:</b>          | 103° 33' 19.389 W               |
|                             |                           | <b>Ground Level:</b>       | 3,325.0 usf                     |

|                  |                   |                    |                            |
|------------------|-------------------|--------------------|----------------------------|
| <b>Wellbore</b>  | OWB               |                    |                            |
| <b>Magnetics</b> | <b>Model Name</b> | <b>Sample Date</b> | <b>Declination (°)</b>     |
|                  | WMM2015           | 10/24/2016         | 7.02                       |
|                  |                   |                    | <b>Dip Angle (°)</b>       |
|                  |                   |                    | 59.94                      |
|                  |                   |                    | <b>Field Strength (nT)</b> |
|                  |                   |                    | 47,920                     |

|                          |                                |                     |                          |
|--------------------------|--------------------------------|---------------------|--------------------------|
| <b>Design</b>            | PWP0                           |                     |                          |
| <b>Audit Notes:</b>      |                                |                     |                          |
| <b>Version:</b>          | <b>Phase:</b>                  | PROTOTYPE           | <b>Tie On Depth:</b> 0.0 |
| <b>Vertical Section:</b> | <b>Depth From (TVD) (usft)</b> | <b>+N/-S (usft)</b> | <b>+E/-W (usft)</b>      |
|                          | 0.0                            | 0.0                 | 0.0                      |
|                          |                                |                     | <b>Direction (°)</b>     |
|                          |                                |                     | 177.83                   |

|                            |                  |                          |                     |                                    |
|----------------------------|------------------|--------------------------|---------------------|------------------------------------|
| <b>Survey Tool Program</b> | <b>Date</b>      | 10/24/2016               |                     |                                    |
| <b>From (usft)</b>         | <b>To (usft)</b> | <b>Survey (Wellbore)</b> | <b>Tool Name</b>    | <b>Description</b>                 |
| 0.0                        | 11,900.0         | PWP0 (OWB)               | Standard Keeper 104 | Standard Wireline Keeper ver 1.0.4 |
| 11,900.0                   | 22,454.6         | PWP0 (OWB)               | MWD                 | OWSG MWD - Standard                |

|                              |                        |                    |                              |                     |                     |                            |                           |                 |                   |
|------------------------------|------------------------|--------------------|------------------------------|---------------------|---------------------|----------------------------|---------------------------|-----------------|-------------------|
| <b>Planned 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>Map Northing (usft)</b> | <b>Map Easting (usft)</b> | <b>Latitude</b> | <b>Longitude</b>  |
| 0.0                          | 0.00                   | 0.00               | 0.0                          | 0.0                 | 0.0                 | 398,630.60                 | 740,917.60                | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 100.0                        | 0.00                   | 0.00               | 100.0                        | 0.0                 | 0.0                 | 398,630.60                 | 740,917.60                | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 200.0                        | 0.00                   | 0.00               | 200.0                        | 0.0                 | 0.0                 | 398,630.60                 | 740,917.60                | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 300.0                        | 0.00                   | 0.00               | 300.0                        | 0.0                 | 0.0                 | 398,630.60                 | 740,917.60                | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 400.0                        | 0.00                   | 0.00               | 400.0                        | 0.0                 | 0.0                 | 398,630.60                 | 740,917.60                | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 500.0                        | 0.00                   | 0.00               | 500.0                        | 0.0                 | 0.0                 | 398,630.60                 | 740,917.60                | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 600.0                        | 0.00                   | 0.00               | 600.0                        | 0.0                 | 0.0                 | 398,630.60                 | 740,917.60                | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 700.0                        | 0.00                   | 0.00               | 700.0                        | 0.0                 | 0.0                 | 398,630.60                 | 740,917.60                | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 800.0                        | 0.00                   | 0.00               | 800.0                        | 0.0                 | 0.0                 | 398,630.60                 | 740,917.60                | 32° 5' 36.825 N | 103° 33' 19.389 W |

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| <b>Well:</b>     | COLUMBUS FEDERAL COM #22H | <b>North Reference:</b>             | Grid                                         |
| <b>Wellbore:</b> | OWB                       | <b>Survey Calculation Method:</b>   | Minimum Curvature                            |
| <b>Design:</b>   | PWP0                      | <b>Database:</b>                    | EDM_Users                                    |

### Planned Survey

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Map Northing (usft) | Map Easting (usft) | Latitude        | Longitude         |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|---------------------|--------------------|-----------------|-------------------|
| 900.0                 | 0.00            | 0.00        | 900.0                 | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 1,000.0               | 0.00            | 0.00        | 1,000.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 1,100.0               | 0.00            | 0.00        | 1,100.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 1,200.0               | 0.00            | 0.00        | 1,200.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 1,300.0               | 0.00            | 0.00        | 1,300.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 1,400.0               | 0.00            | 0.00        | 1,400.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 1,500.0               | 0.00            | 0.00        | 1,500.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 1,600.0               | 0.00            | 0.00        | 1,600.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 1,700.0               | 0.00            | 0.00        | 1,700.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 1,800.0               | 0.00            | 0.00        | 1,800.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 1,900.0               | 0.00            | 0.00        | 1,900.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 2,000.0               | 0.00            | 0.00        | 2,000.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 2,100.0               | 0.00            | 0.00        | 2,100.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 2,200.0               | 0.00            | 0.00        | 2,200.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 2,300.0               | 0.00            | 0.00        | 2,300.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 2,400.0               | 0.00            | 0.00        | 2,400.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 2,500.0               | 0.00            | 0.00        | 2,500.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 2,600.0               | 0.00            | 0.00        | 2,600.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 2,700.0               | 0.00            | 0.00        | 2,700.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 2,800.0               | 0.00            | 0.00        | 2,800.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 2,900.0               | 0.00            | 0.00        | 2,900.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 3,000.0               | 0.00            | 0.00        | 3,000.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 3,100.0               | 0.00            | 0.00        | 3,100.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 3,200.0               | 0.00            | 0.00        | 3,200.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 3,300.0               | 0.00            | 0.00        | 3,300.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 3,400.0               | 0.00            | 0.00        | 3,400.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 3,500.0               | 0.00            | 0.00        | 3,500.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 3,600.0               | 0.00            | 0.00        | 3,600.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 3,700.0               | 0.00            | 0.00        | 3,700.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 3,800.0               | 0.00            | 0.00        | 3,800.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 3,900.0               | 0.00            | 0.00        | 3,900.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 4,000.0               | 0.00            | 0.00        | 4,000.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 4,100.0               | 0.00            | 0.00        | 4,100.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 4,200.0               | 0.00            | 0.00        | 4,200.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 4,300.0               | 0.00            | 0.00        | 4,300.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 4,400.0               | 0.00            | 0.00        | 4,400.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 4,500.0               | 0.00            | 0.00        | 4,500.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 4,600.0               | 0.00            | 0.00        | 4,600.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 4,700.0               | 0.00            | 0.00        | 4,700.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 4,800.0               | 0.00            | 0.00        | 4,800.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 4,900.0               | 0.00            | 0.00        | 4,900.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 5,000.0               | 0.00            | 0.00        | 5,000.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
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| 5,500.0               | 0.00            | 0.00        | 5,500.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 5,600.0               | 0.00            | 0.00        | 5,600.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 5,700.0               | 0.00            | 0.00        | 5,700.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 5,800.0               | 0.00            | 0.00        | 5,800.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
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| Project:  | LEA COUNTY, NM            | TVD Reference:               | RKB=3325+27 @ 3352.0usft (SCANDRILL FREEDOM) |
| Site:     | BULLDOG                   | MD Reference:                | RKB=3325+27 @ 3352.0usft (SCANDRILL FREEDOM) |
| Well:     | COLUMBUS FEDERAL COM #22H | North Reference:             | Grid                                         |
| Wellbore: | OWB                       | Survey Calculation Method:   | Minimum Curvature                            |
| Design:   | PWP0                      | Database:                    | EDM_Users                                    |

### Planned Survey

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Map Northing (usft) | Map Easting (usft) | Latitude        | Longitude         |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|---------------------|--------------------|-----------------|-------------------|
| 6,200.0               | 0.00            | 0.00        | 6,200.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 6,300.0               | 0.00            | 0.00        | 6,300.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 6,400.0               | 0.00            | 0.00        | 6,400.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 6,500.0               | 0.00            | 0.00        | 6,500.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 6,600.0               | 0.00            | 0.00        | 6,600.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 6,700.0               | 0.00            | 0.00        | 6,700.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 6,800.0               | 0.00            | 0.00        | 6,800.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 6,900.0               | 0.00            | 0.00        | 6,900.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 7,000.0               | 0.00            | 0.00        | 7,000.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
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| 7,500.0               | 0.00            | 0.00        | 7,500.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 7,600.0               | 0.00            | 0.00        | 7,600.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 7,700.0               | 0.00            | 0.00        | 7,700.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 7,800.0               | 0.00            | 0.00        | 7,800.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 7,900.0               | 0.00            | 0.00        | 7,900.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 8,000.0               | 0.00            | 0.00        | 8,000.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 8,100.0               | 0.00            | 0.00        | 8,100.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 8,200.0               | 0.00            | 0.00        | 8,200.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 8,300.0               | 0.00            | 0.00        | 8,300.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 8,400.0               | 0.00            | 0.00        | 8,400.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 8,500.0               | 0.00            | 0.00        | 8,500.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 8,600.0               | 0.00            | 0.00        | 8,600.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 8,700.0               | 0.00            | 0.00        | 8,700.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 8,800.0               | 0.00            | 0.00        | 8,800.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 8,900.0               | 0.00            | 0.00        | 8,900.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 9,000.0               | 0.00            | 0.00        | 9,000.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 9,100.0               | 0.00            | 0.00        | 9,100.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 9,200.0               | 0.00            | 0.00        | 9,200.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 9,300.0               | 0.00            | 0.00        | 9,300.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 9,400.0               | 0.00            | 0.00        | 9,400.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 9,500.0               | 0.00            | 0.00        | 9,500.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 9,600.0               | 0.00            | 0.00        | 9,600.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 9,700.0               | 0.00            | 0.00        | 9,700.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 9,800.0               | 0.00            | 0.00        | 9,800.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 9,900.0               | 0.00            | 0.00        | 9,900.0               | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 10,000.0              | 0.00            | 0.00        | 10,000.0              | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 10,100.0              | 0.00            | 0.00        | 10,100.0              | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 10,200.0              | 0.00            | 0.00        | 10,200.0              | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 10,300.0              | 0.00            | 0.00        | 10,300.0              | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 10,400.0              | 0.00            | 0.00        | 10,400.0              | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 10,500.0              | 0.00            | 0.00        | 10,500.0              | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 10,600.0              | 0.00            | 0.00        | 10,600.0              | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 10,700.0              | 0.00            | 0.00        | 10,700.0              | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 10,800.0              | 0.00            | 0.00        | 10,800.0              | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 10,900.0              | 0.00            | 0.00        | 10,900.0              | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 11,000.0              | 0.00            | 0.00        | 11,000.0              | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 11,100.0              | 0.00            | 0.00        | 11,100.0              | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 11,200.0              | 0.00            | 0.00        | 11,200.0              | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 11,300.0              | 0.00            | 0.00        | 11,300.0              | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 11,400.0              | 0.00            | 0.00        | 11,400.0              | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |

# COG Operating LLC

## Survey Report - Geographic

|                  |                           |                                     |                                              |
|------------------|---------------------------|-------------------------------------|----------------------------------------------|
| <b>Company:</b>  | COG OPERATING LLC         | <b>Local Co-ordinate Reference:</b> | Well COLUMBUS FEDERAL COM #22H               |
| <b>Project:</b>  | LEA COUNTY, NM            | <b>TVD Reference:</b>               | RKB=3325+27 @ 3352.0usft (SCANDRILL FREEDOM) |
| <b>Site:</b>     | BULLDOG                   | <b>MD Reference:</b>                | RKB=3325+27 @ 3352.0usft (SCANDRILL FREEDOM) |
| <b>Well:</b>     | COLUMBUS FEDERAL COM #22H | <b>North Reference:</b>             | Grid                                         |
| <b>Wellbore:</b> | OWB                       | <b>Survey Calculation Method:</b>   | Minimum Curvature                            |
| <b>Design:</b>   | PWP0                      | <b>Database:</b>                    | EDM_Users                                    |

### Planned Survey

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Map Northing (usft) | Map Easting (usft) | Latitude        | Longitude         |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|---------------------|--------------------|-----------------|-------------------|
| 11,500.0              | 0.00            | 0.00        | 11,500.0              | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 11,600.0              | 0.00            | 0.00        | 11,600.0              | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 11,700.0              | 0.00            | 0.00        | 11,700.0              | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 11,800.0              | 0.00            | 0.00        | 11,800.0              | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 11,900.0              | 0.00            | 0.00        | 11,900.0              | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 11,978.0              | 0.00            | 0.01        | 11,978.0              | 0.0          | 0.0          | 398,630.60          | 740,917.60         | 32° 5' 36.825 N | 103° 33' 19.389 W |
| 12,000.0              | 2.64            | 156.00      | 12,000.0              | -0.5         | 0.2          | 398,630.14          | 740,917.80         | 32° 5' 36.821 N | 103° 33' 19.387 W |
| 12,100.0              | 14.62           | 156.00      | 12,098.7              | -14.1        | 6.3          | 398,616.45          | 740,923.89         | 32° 5' 36.685 N | 103° 33' 19.317 W |
| 12,200.0              | 26.61           | 156.00      | 12,192.1              | -46.3        | 20.6         | 398,584.34          | 740,938.19         | 32° 5' 36.366 N | 103° 33' 19.154 W |
| 12,300.0              | 38.60           | 156.00      | 12,276.2              | -95.4        | 42.5         | 398,535.21          | 740,960.07         | 32° 5' 35.878 N | 103° 33' 18.904 W |
| 12,400.0              | 50.58           | 156.00      | 12,347.3              | -159.4       | 71.0         | 398,471.19          | 740,988.57         | 32° 5' 35.243 N | 103° 33' 18.578 W |
| 12,500.0              | 62.57           | 156.00      | 12,402.3              | -235.5       | 104.9        | 398,395.09          | 741,022.45         | 32° 5' 34.487 N | 103° 33' 18.190 W |
| 12,600.0              | 74.56           | 156.00      | 12,438.7              | -320.4       | 142.6        | 398,310.21          | 741,060.24         | 32° 5' 33.645 N | 103° 33' 17.758 W |
| 12,700.0              | 86.54           | 156.00      | 12,455.1              | -410.3       | 182.7        | 398,220.26          | 741,100.29         | 32° 5' 32.752 N | 103° 33' 17.300 W |
| 12,728.8              | 90.00           | 156.00      | 12,456.0              | -436.7       | 194.4        | 398,193.92          | 741,112.02         | 32° 5' 32.490 N | 103° 33' 17.166 W |
| 12,800.0              | 90.03           | 158.85      | 12,456.0              | -502.4       | 221.7        | 398,128.22          | 741,139.33         | 32° 5' 31.838 N | 103° 33' 16.854 W |
| 12,900.0              | 90.08           | 162.85      | 12,455.9              | -596.8       | 254.5        | 398,033.78          | 741,172.14         | 32° 5' 30.901 N | 103° 33' 16.481 W |
| 13,000.0              | 90.13           | 166.85      | 12,455.7              | -693.3       | 280.7        | 397,937.28          | 741,198.27         | 32° 5' 29.944 N | 103° 33' 16.185 W |
| 13,100.0              | 90.17           | 170.85      | 12,455.4              | -791.4       | 300.0        | 397,839.19          | 741,217.62         | 32° 5' 28.972 N | 103° 33' 15.968 W |
| 13,200.0              | 90.22           | 174.85      | 12,455.1              | -890.6       | 312.5        | 397,739.99          | 741,230.07         | 32° 5' 27.990 N | 103° 33' 15.832 W |
| 13,300.0              | 90.27           | 178.84      | 12,454.7              | -990.4       | 318.0        | 397,640.16          | 741,235.57         | 32° 5' 27.001 N | 103° 33' 15.776 W |
| 13,318.6              | 90.27           | 179.59      | 12,454.6              | -1,009.0     | 318.2        | 397,621.58          | 741,235.82         | 32° 5' 26.818 N | 103° 33' 15.775 W |
| 13,400.0              | 90.27           | 179.59      | 12,454.2              | -1,090.4     | 318.8        | 397,540.16          | 741,236.41         | 32° 5' 26.012 N | 103° 33' 15.775 W |
| 13,500.0              | 90.27           | 179.59      | 12,453.7              | -1,190.4     | 319.5        | 397,440.17          | 741,237.13         | 32° 5' 25.022 N | 103° 33' 15.775 W |
| 13,600.0              | 90.27           | 179.59      | 12,453.2              | -1,290.4     | 320.3        | 397,340.17          | 741,237.85         | 32° 5' 24.033 N | 103° 33' 15.775 W |
| 13,700.0              | 90.27           | 179.59      | 12,452.8              | -1,390.4     | 321.0        | 397,240.18          | 741,238.57         | 32° 5' 23.043 N | 103° 33' 15.775 W |
| 13,800.0              | 90.27           | 179.59      | 12,452.3              | -1,490.4     | 321.7        | 397,140.18          | 741,239.29         | 32° 5' 22.054 N | 103° 33' 15.775 W |
| 13,900.0              | 90.27           | 179.59      | 12,451.8              | -1,590.4     | 322.4        | 397,040.18          | 741,240.00         | 32° 5' 21.064 N | 103° 33' 15.775 W |
| 14,000.0              | 90.27           | 179.59      | 12,451.3              | -1,690.4     | 323.1        | 396,940.19          | 741,240.72         | 32° 5' 20.074 N | 103° 33' 15.775 W |
| 14,100.0              | 90.27           | 179.59      | 12,450.8              | -1,790.4     | 323.8        | 396,840.19          | 741,241.44         | 32° 5' 19.085 N | 103° 33' 15.775 W |
| 14,200.0              | 90.27           | 179.59      | 12,450.4              | -1,890.4     | 324.6        | 396,740.19          | 741,242.16         | 32° 5' 18.095 N | 103° 33' 15.775 W |
| 14,300.0              | 90.27           | 179.59      | 12,449.9              | -1,990.4     | 325.3        | 396,640.20          | 741,242.88         | 32° 5' 17.106 N | 103° 33' 15.775 W |
| 14,400.0              | 90.27           | 179.59      | 12,449.4              | -2,090.4     | 326.0        | 396,540.20          | 741,243.60         | 32° 5' 16.116 N | 103° 33' 15.776 W |
| 14,500.0              | 90.27           | 179.59      | 12,448.9              | -2,190.4     | 326.7        | 396,440.20          | 741,244.32         | 32° 5' 15.126 N | 103° 33' 15.776 W |
| 14,600.0              | 90.27           | 179.59      | 12,448.5              | -2,290.4     | 327.4        | 396,340.21          | 741,245.04         | 32° 5' 14.137 N | 103° 33' 15.776 W |
| 14,700.0              | 90.27           | 179.59      | 12,448.0              | -2,390.4     | 328.2        | 396,240.21          | 741,245.75         | 32° 5' 13.147 N | 103° 33' 15.776 W |
| 14,800.0              | 90.27           | 179.59      | 12,447.5              | -2,490.4     | 328.9        | 396,140.22          | 741,246.47         | 32° 5' 12.158 N | 103° 33' 15.776 W |
| 14,900.0              | 90.27           | 179.59      | 12,447.0              | -2,590.4     | 329.6        | 396,040.22          | 741,247.19         | 32° 5' 11.168 N | 103° 33' 15.776 W |
| 15,000.0              | 90.27           | 179.59      | 12,446.6              | -2,690.4     | 330.3        | 395,940.22          | 741,247.91         | 32° 5' 10.179 N | 103° 33' 15.776 W |
| 15,100.0              | 90.27           | 179.59      | 12,446.1              | -2,790.4     | 331.0        | 395,840.23          | 741,248.63         | 32° 5' 9.189 N  | 103° 33' 15.776 W |
| 15,200.0              | 90.27           | 179.59      | 12,445.6              | -2,890.4     | 331.8        | 395,740.23          | 741,249.35         | 32° 5' 8.199 N  | 103° 33' 15.776 W |
| 15,300.0              | 90.27           | 179.59      | 12,445.1              | -2,990.4     | 332.5        | 395,640.23          | 741,250.07         | 32° 5' 7.210 N  | 103° 33' 15.776 W |
| 15,400.0              | 90.27           | 179.59      | 12,444.6              | -3,090.4     | 333.2        | 395,540.24          | 741,250.79         | 32° 5' 6.220 N  | 103° 33' 15.776 W |
| 15,500.0              | 90.27           | 179.59      | 12,444.2              | -3,190.4     | 333.9        | 395,440.24          | 741,251.51         | 32° 5' 5.231 N  | 103° 33' 15.776 W |
| 15,600.0              | 90.27           | 179.59      | 12,443.7              | -3,290.4     | 334.6        | 395,340.25          | 741,252.22         | 32° 5' 4.241 N  | 103° 33' 15.776 W |
| 15,700.0              | 90.27           | 179.59      | 12,443.2              | -3,390.3     | 335.3        | 395,240.25          | 741,252.94         | 32° 5' 3.251 N  | 103° 33' 15.776 W |
| 15,800.0              | 90.27           | 179.59      | 12,442.7              | -3,490.3     | 336.1        | 395,140.25          | 741,253.66         | 32° 5' 2.262 N  | 103° 33' 15.776 W |
| 15,900.0              | 90.27           | 179.59      | 12,442.3              | -3,590.3     | 336.8        | 395,040.26          | 741,254.38         | 32° 5' 1.272 N  | 103° 33' 15.776 W |
| 16,000.0              | 90.27           | 179.59      | 12,441.8              | -3,690.3     | 337.5        | 394,940.26          | 741,255.10         | 32° 5' 0.283 N  | 103° 33' 15.776 W |
| 16,100.0              | 90.27           | 179.59      | 12,441.3              | -3,790.3     | 338.2        | 394,840.26          | 741,255.82         | 32° 4' 59.293 N | 103° 33' 15.776 W |
| 16,200.0              | 90.27           | 179.59      | 12,440.8              | -3,890.3     | 338.9        | 394,740.27          | 741,256.54         | 32° 4' 58.304 N | 103° 33' 15.776 W |
| 16,300.0              | 90.27           | 179.59      | 12,440.4              | -3,990.3     | 339.7        | 394,640.27          | 741,257.26         | 32° 4' 57.314 N | 103° 33' 15.776 W |
| 16,400.0              | 90.27           | 179.59      | 12,439.9              | -4,090.3     | 340.4        | 394,540.28          | 741,257.97         | 32° 4' 56.324 N | 103° 33' 15.776 W |

# COG Operating LLC

## Survey Report - Geographic

|                  |                           |                                     |                                              |
|------------------|---------------------------|-------------------------------------|----------------------------------------------|
| <b>Company:</b>  | COG OPERATING LLC         | <b>Local Co-ordinate Reference:</b> | Well COLUMBUS FEDERAL COM #22H               |
| <b>Project:</b>  | LEA COUNTY, NM            | <b>TVD Reference:</b>               | RKB=3325+27 @ 3352.0usft (SCANDRILL FREEDOM) |
| <b>Site:</b>     | BULLDOG                   | <b>MD Reference:</b>                | RKB=3325+27 @ 3352.0usft (SCANDRILL FREEDOM) |
| <b>Well:</b>     | COLUMBUS FEDERAL COM #22H | <b>North Reference:</b>             | Grid                                         |
| <b>Wellbore:</b> | OWB                       | <b>Survey Calculation Method:</b>   | Minimum Curvature                            |
| <b>Design:</b>   | PWP0                      | <b>Database:</b>                    | EDM_Users                                    |

### Planned Survey

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Map Northing (usft) | Map Easting (usft) | Latitude        | Longitude         |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|---------------------|--------------------|-----------------|-------------------|
| 16,500.0              | 90.27           | 179.59      | 12,439.4              | -4,190.3     | 341.1        | 394,440.28          | 741,258.69         | 32° 4' 55.335 N | 103° 33' 15.776 W |
| 16,600.0              | 90.27           | 179.59      | 12,438.9              | -4,290.3     | 341.8        | 394,340.28          | 741,259.41         | 32° 4' 54.345 N | 103° 33' 15.776 W |
| 16,700.0              | 90.27           | 179.59      | 12,438.4              | -4,390.3     | 342.5        | 394,240.29          | 741,260.13         | 32° 4' 53.356 N | 103° 33' 15.776 W |
| 16,800.0              | 90.27           | 179.59      | 12,438.0              | -4,490.3     | 343.3        | 394,140.29          | 741,260.85         | 32° 4' 52.366 N | 103° 33' 15.776 W |
| 16,900.0              | 90.27           | 179.59      | 12,437.5              | -4,590.3     | 344.0        | 394,040.29          | 741,261.57         | 32° 4' 51.376 N | 103° 33' 15.776 W |
| 17,000.0              | 90.27           | 179.59      | 12,437.0              | -4,690.3     | 344.7        | 393,940.30          | 741,262.29         | 32° 4' 50.387 N | 103° 33' 15.777 W |
| 17,100.0              | 90.27           | 179.59      | 12,436.5              | -4,790.3     | 345.4        | 393,840.30          | 741,263.01         | 32° 4' 49.397 N | 103° 33' 15.777 W |
| 17,200.0              | 90.27           | 179.59      | 12,436.1              | -4,890.3     | 346.1        | 393,740.31          | 741,263.73         | 32° 4' 48.408 N | 103° 33' 15.777 W |
| 17,300.0              | 90.27           | 179.59      | 12,435.6              | -4,990.3     | 346.8        | 393,640.31          | 741,264.44         | 32° 4' 47.418 N | 103° 33' 15.777 W |
| 17,400.0              | 90.27           | 179.59      | 12,435.1              | -5,090.3     | 347.6        | 393,540.31          | 741,265.16         | 32° 4' 46.429 N | 103° 33' 15.777 W |
| 17,500.0              | 90.27           | 179.59      | 12,434.6              | -5,190.3     | 348.3        | 393,440.32          | 741,265.88         | 32° 4' 45.439 N | 103° 33' 15.777 W |
| 17,600.0              | 90.27           | 179.59      | 12,434.2              | -5,290.3     | 349.0        | 393,340.32          | 741,266.60         | 32° 4' 44.449 N | 103° 33' 15.777 W |
| 17,700.0              | 90.27           | 179.59      | 12,433.7              | -5,390.3     | 349.7        | 393,240.32          | 741,267.32         | 32° 4' 43.460 N | 103° 33' 15.777 W |
| 17,800.0              | 90.27           | 179.59      | 12,433.2              | -5,490.3     | 350.4        | 393,140.33          | 741,268.04         | 32° 4' 42.470 N | 103° 33' 15.777 W |
| 17,900.0              | 90.27           | 179.59      | 12,432.7              | -5,590.3     | 351.2        | 393,040.33          | 741,268.76         | 32° 4' 41.481 N | 103° 33' 15.777 W |
| 18,000.0              | 90.27           | 179.59      | 12,432.2              | -5,690.3     | 351.9        | 392,940.33          | 741,269.48         | 32° 4' 40.491 N | 103° 33' 15.777 W |
| 18,100.0              | 90.27           | 179.59      | 12,431.8              | -5,790.3     | 352.6        | 392,840.34          | 741,270.19         | 32° 4' 39.501 N | 103° 33' 15.777 W |
| 18,200.0              | 90.27           | 179.59      | 12,431.3              | -5,890.3     | 353.3        | 392,740.34          | 741,270.91         | 32° 4' 38.512 N | 103° 33' 15.777 W |
| 18,300.0              | 90.27           | 179.59      | 12,430.8              | -5,990.3     | 354.0        | 392,640.35          | 741,271.63         | 32° 4' 37.522 N | 103° 33' 15.777 W |
| 18,400.0              | 90.27           | 179.59      | 12,430.3              | -6,090.2     | 354.8        | 392,540.35          | 741,272.35         | 32° 4' 36.533 N | 103° 33' 15.777 W |
| 18,500.0              | 90.27           | 179.59      | 12,429.9              | -6,190.2     | 355.5        | 392,440.35          | 741,273.07         | 32° 4' 35.543 N | 103° 33' 15.777 W |
| 18,600.0              | 90.27           | 179.59      | 12,429.4              | -6,290.2     | 356.2        | 392,340.36          | 741,273.79         | 32° 4' 34.553 N | 103° 33' 15.777 W |
| 18,700.0              | 90.27           | 179.59      | 12,428.9              | -6,390.2     | 356.9        | 392,240.36          | 741,274.51         | 32° 4' 33.564 N | 103° 33' 15.777 W |
| 18,800.0              | 90.27           | 179.59      | 12,428.4              | -6,490.2     | 357.6        | 392,140.36          | 741,275.23         | 32° 4' 32.574 N | 103° 33' 15.777 W |
| 18,900.0              | 90.27           | 179.59      | 12,428.0              | -6,590.2     | 358.3        | 392,040.37          | 741,275.95         | 32° 4' 31.585 N | 103° 33' 15.777 W |
| 19,000.0              | 90.27           | 179.59      | 12,427.5              | -6,690.2     | 359.1        | 391,940.37          | 741,276.66         | 32° 4' 30.595 N | 103° 33' 15.777 W |
| 19,100.0              | 90.27           | 179.59      | 12,427.0              | -6,790.2     | 359.8        | 391,840.38          | 741,277.38         | 32° 4' 29.606 N | 103° 33' 15.777 W |
| 19,200.0              | 90.27           | 179.59      | 12,426.5              | -6,890.2     | 360.5        | 391,740.38          | 741,278.10         | 32° 4' 28.616 N | 103° 33' 15.777 W |
| 19,300.0              | 90.27           | 179.59      | 12,426.0              | -6,990.2     | 361.2        | 391,640.38          | 741,278.82         | 32° 4' 27.626 N | 103° 33' 15.777 W |
| 19,400.0              | 90.27           | 179.59      | 12,425.6              | -7,090.2     | 361.9        | 391,540.39          | 741,279.54         | 32° 4' 26.637 N | 103° 33' 15.777 W |
| 19,500.0              | 90.27           | 179.59      | 12,425.1              | -7,190.2     | 362.7        | 391,440.39          | 741,280.26         | 32° 4' 25.647 N | 103° 33' 15.777 W |
| 19,600.0              | 90.27           | 179.59      | 12,424.6              | -7,290.2     | 363.4        | 391,340.39          | 741,280.98         | 32° 4' 24.658 N | 103° 33' 15.777 W |
| 19,700.0              | 90.27           | 179.59      | 12,424.1              | -7,390.2     | 364.1        | 391,240.40          | 741,281.70         | 32° 4' 23.668 N | 103° 33' 15.778 W |
| 19,800.0              | 90.27           | 179.59      | 12,423.7              | -7,490.2     | 364.8        | 391,140.40          | 741,282.41         | 32° 4' 22.678 N | 103° 33' 15.778 W |
| 19,900.0              | 90.27           | 179.59      | 12,423.2              | -7,590.2     | 365.5        | 391,040.41          | 741,283.13         | 32° 4' 21.689 N | 103° 33' 15.778 W |
| 20,000.0              | 90.27           | 179.59      | 12,422.7              | -7,690.2     | 366.3        | 390,940.41          | 741,283.85         | 32° 4' 20.699 N | 103° 33' 15.778 W |
| 20,100.0              | 90.27           | 179.59      | 12,422.2              | -7,790.2     | 367.0        | 390,840.41          | 741,284.57         | 32° 4' 19.710 N | 103° 33' 15.778 W |
| 20,200.0              | 90.27           | 179.59      | 12,421.8              | -7,890.2     | 367.7        | 390,740.42          | 741,285.29         | 32° 4' 18.720 N | 103° 33' 15.778 W |
| 20,300.0              | 90.27           | 179.59      | 12,421.3              | -7,990.2     | 368.4        | 390,640.42          | 741,286.01         | 32° 4' 17.731 N | 103° 33' 15.778 W |
| 20,400.0              | 90.27           | 179.59      | 12,420.8              | -8,090.2     | 369.1        | 390,540.42          | 741,286.73         | 32° 4' 16.741 N | 103° 33' 15.778 W |
| 20,500.0              | 90.27           | 179.59      | 12,420.3              | -8,190.2     | 369.8        | 390,440.43          | 741,287.45         | 32° 4' 15.751 N | 103° 33' 15.778 W |
| 20,600.0              | 90.27           | 179.59      | 12,419.8              | -8,290.2     | 370.6        | 390,340.43          | 741,288.17         | 32° 4' 14.762 N | 103° 33' 15.778 W |
| 20,700.0              | 90.27           | 179.59      | 12,419.4              | -8,390.2     | 371.3        | 390,240.44          | 741,288.88         | 32° 4' 13.772 N | 103° 33' 15.778 W |
| 20,800.0              | 90.27           | 179.59      | 12,418.9              | -8,490.2     | 372.0        | 390,140.44          | 741,289.60         | 32° 4' 12.783 N | 103° 33' 15.778 W |
| 20,900.0              | 90.27           | 179.59      | 12,418.4              | -8,590.2     | 372.7        | 390,040.44          | 741,290.32         | 32° 4' 11.793 N | 103° 33' 15.778 W |
| 21,000.0              | 90.27           | 179.59      | 12,417.9              | -8,690.2     | 373.4        | 389,940.45          | 741,291.04         | 32° 4' 10.803 N | 103° 33' 15.778 W |
| 21,100.0              | 90.27           | 179.59      | 12,417.5              | -8,790.1     | 374.2        | 389,840.45          | 741,291.76         | 32° 4' 9.814 N  | 103° 33' 15.778 W |
| 21,200.0              | 90.27           | 179.59      | 12,417.0              | -8,890.1     | 374.9        | 389,740.45          | 741,292.48         | 32° 4' 8.824 N  | 103° 33' 15.778 W |
| 21,300.0              | 90.27           | 179.59      | 12,416.5              | -8,990.1     | 375.6        | 389,640.46          | 741,293.20         | 32° 4' 7.835 N  | 103° 33' 15.778 W |
| 21,400.0              | 90.27           | 179.59      | 12,416.0              | -9,090.1     | 376.3        | 389,540.46          | 741,293.92         | 32° 4' 6.845 N  | 103° 33' 15.778 W |
| 21,500.0              | 90.27           | 179.59      | 12,415.6              | -9,190.1     | 377.0        | 389,440.47          | 741,294.63         | 32° 4' 5.856 N  | 103° 33' 15.778 W |
| 21,600.0              | 90.27           | 179.59      | 12,415.1              | -9,290.1     | 377.8        | 389,340.47          | 741,295.35         | 32° 4' 4.866 N  | 103° 33' 15.778 W |
| 21,700.0              | 90.27           | 179.59      | 12,414.6              | -9,390.1     | 378.5        | 389,240.47          | 741,296.07         | 32° 4' 3.876 N  | 103° 33' 15.778 W |

# COG Operating LLC

## Survey Report - Geographic

|                  |                           |                                     |                                              |
|------------------|---------------------------|-------------------------------------|----------------------------------------------|
| <b>Company:</b>  | COG OPERATING LLC         | <b>Local Co-ordinate Reference:</b> | Well COLUMBUS FEDERAL COM #22H               |
| <b>Project:</b>  | LEA COUNTY, NM            | <b>TVD Reference:</b>               | RKB=3325+27 @ 3352.0usft (SCANDRILL FREEDOM) |
| <b>Site:</b>     | BULLDOG                   | <b>MD Reference:</b>                | RKB=3325+27 @ 3352.0usft (SCANDRILL FREEDOM) |
| <b>Well:</b>     | COLUMBUS FEDERAL COM #22H | <b>North Reference:</b>             | Grid                                         |
| <b>Wellbore:</b> | OWB                       | <b>Survey Calculation Method:</b>   | Minimum Curvature                            |
| <b>Design:</b>   | PWP0                      | <b>Database:</b>                    | EDM_Users                                    |

| Planned Survey        |                 |             |                       |              |              |                     |                    |                 |                   |  |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|---------------------|--------------------|-----------------|-------------------|--|
| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Map Northing (usft) | Map Easting (usft) | Latitude        | Longitude         |  |
| 21,800.0              | 90.27           | 179.59      | 12,414.1              | -9,490.1     | 379.2        | 389,140.48          | 741,296.79         | 32° 4' 2.887 N  | 103° 33' 15.778 W |  |
| 21,900.0              | 90.27           | 179.59      | 12,413.6              | -9,590.1     | 379.9        | 389,040.48          | 741,297.51         | 32° 4' 1.897 N  | 103° 33' 15.778 W |  |
| 22,000.0              | 90.27           | 179.59      | 12,413.2              | -9,690.1     | 380.6        | 388,940.48          | 741,298.23         | 32° 4' 0.908 N  | 103° 33' 15.778 W |  |
| 22,100.0              | 90.27           | 179.59      | 12,412.7              | -9,790.1     | 381.4        | 388,840.49          | 741,298.95         | 32° 3' 59.918 N | 103° 33' 15.778 W |  |
| 22,200.0              | 90.27           | 179.59      | 12,412.2              | -9,890.1     | 382.1        | 388,740.49          | 741,299.67         | 32° 3' 58.928 N | 103° 33' 15.778 W |  |
| 22,300.0              | 90.27           | 179.59      | 12,411.7              | -9,990.1     | 382.8        | 388,640.49          | 741,300.39         | 32° 3' 57.939 N | 103° 33' 15.778 W |  |
| 22,400.0              | 90.27           | 179.59      | 12,411.3              | -10,090.1    | 383.5        | 388,540.50          | 741,301.10         | 32° 3' 56.949 N | 103° 33' 15.778 W |  |
| 22,454.6              | 90.27           | 179.59      | 12,411.0              | -10,144.7    | 383.9        | 388,485.90          | 741,301.50         | 32° 3' 56.409 N | 103° 33' 15.778 W |  |

| Design Targets            |               |              |            |              |              |                 |                |                 |                   |  |
|---------------------------|---------------|--------------|------------|--------------|--------------|-----------------|----------------|-----------------|-------------------|--|
| Target Name               | Dip Angle (°) | Dip Dir. (°) | TVD (usft) | +N/-S (usft) | +E/-W (usft) | Northing (usft) | Easting (usft) | Latitude        | Longitude         |  |
| - hit/miss target         |               |              |            |              |              |                 |                |                 |                   |  |
| - Shape                   |               |              |            |              |              |                 |                |                 |                   |  |
| PBHL-Columbus             | 0.00          | 0.00         | 12,411.0   | -10,144.7    | 383.9        | 388,485.90      | 741,301.50     | 32° 3' 56.409 N | 103° 33' 15.778 W |  |
| - plan hits target center |               |              |            |              |              |                 |                |                 |                   |  |
| - Point                   |               |              |            |              |              |                 |                |                 |                   |  |

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