



COG Operating, LLC

Lea County, NM

Sec 32, T19S, R32E

Ringo 32 Federal COM

Wellbore #1H

Plan: Design #1

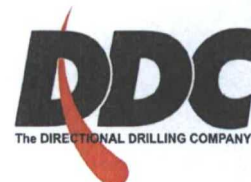
DDC Well Planning Report

14 September, 2015

HOBBS OCD

FEB 16 2016

RECEIVED



FEB 17 2016

Database:	Compass	Local Co-ordinate Reference:	Well Ringo 32 Federal COM
Company:	COG Operating, LLC	TVD Reference:	Well @ 3566.0usft (Ensign 772 RKB 31' + GL 3535')
Project:	Lea County, NM	MD Reference:	Well @ 3566.0usft (Ensign 772 RKB 31' + GL 3535')
Site:	Sec 32, T19S, R32E	North Reference:	Grid
Well:	Ringo 32 Federal COM	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1H		
Design:	Design #1		

Project	Lea County, NM		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	Sec 32, T19S, R32E				
Site Position:		Northing:	586,219.30 usft	Latitude:	32° 36' 37.462 N
From:	Map	Easting:	670,116.00 usft	Longitude:	103° 46' 51.150 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.30 °

Well	Ringo 32 Federal COM					
Well Position	+N/-S	0.0 usft	Northing:	586,219.30 usft	Latitude:	32° 36' 37.462 N
	+E/-W	0.0 usft	Easting:	670,116.00 usft	Longitude:	103° 46' 51.150 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	3,535.0 usft

Wellbore	Wellbore #1H				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	9/14/2015	7.27	60.41	48,326

Design	Design #1				
Audit Notes:					
Version:	Phase:	PLAN	Tie On Depth:	0.0	
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	180.91	

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
8,992.6	0.00	0.00	8,992.6	0.0	0.0	0.00	0.00	0.00	0.00	
9,737.4	89.38	180.91	9,470.0	-472.2	-7.5	12.00	12.00	-24.04	180.91	
18,528.9	89.38	180.91	9,565.0	-9,262.1	-147.3	0.00	0.00	0.00	0.00	EOL / PBHL - Ringo 3

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Design:	Design #1		

Planned 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)	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00	
SHL										
0.1	0.00	0.00	0.1	0.0	0.0	0.0	0.00	0.00	0.00	
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00	
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00	
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00	
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00	
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00	
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00	
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00	
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00	
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00	
Rustler										
946.0	0.00	0.00	946.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
TOS										
1,036.0	0.00	0.00	1,036.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,600.0	0.00	0.00	1,600.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,700.0	0.00	0.00	1,700.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,800.0	0.00	0.00	1,800.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,900.0	0.00	0.00	1,900.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,000.0	0.00	0.00	2,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,100.0	0.00	0.00	2,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,200.0	0.00	0.00	2,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,300.0	0.00	0.00	2,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
BOS										
2,395.0	0.00	0.00	2,395.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,400.0	0.00	0.00	2,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,500.0	0.00	0.00	2,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
Yates										
2,544.0	0.00	0.00	2,544.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,600.0	0.00	0.00	2,600.0	0.0	0.0	0.0	0.00	0.00	0.00	
Seven Rivers										
2,648.0	0.00	0.00	2,648.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,700.0	0.00	0.00	2,700.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,800.0	0.00	0.00	2,800.0	0.0	0.0	0.0	0.00	0.00	0.00	
Capitan Reef										
2,864.0	0.00	0.00	2,864.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,900.0	0.00	0.00	2,900.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,000.0	0.00	0.00	3,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,100.0	0.00	0.00	3,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,200.0	0.00	0.00	3,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,300.0	0.00	0.00	3,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,400.0	0.00	0.00	3,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,500.0	0.00	0.00	3,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,600.0	0.00	0.00	3,600.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,700.0	0.00	0.00	3,700.0	0.0	0.0	0.0	0.00	0.00	0.00	

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Wellbore:	Wellbore #1H		
Design:	Design #1		

Planned 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)
3,800.0	0.00	0.00	3,800.0	0.0	0.0	0.0	0.00	0.00	0.00
3,900.0	0.00	0.00	3,900.0	0.0	0.0	0.0	0.00	0.00	0.00
4,000.0	0.00	0.00	4,000.0	0.0	0.0	0.0	0.00	0.00	0.00
4,100.0	0.00	0.00	4,100.0	0.0	0.0	0.0	0.00	0.00	0.00
Base of reef									
4,168.0	0.00	0.00	4,168.0	0.0	0.0	0.0	0.00	0.00	0.00
4,200.0	0.00	0.00	4,200.0	0.0	0.0	0.0	0.00	0.00	0.00
4,300.0	0.00	0.00	4,300.0	0.0	0.0	0.0	0.00	0.00	0.00
4,400.0	0.00	0.00	4,400.0	0.0	0.0	0.0	0.00	0.00	0.00
4,500.0	0.00	0.00	4,500.0	0.0	0.0	0.0	0.00	0.00	0.00
4,600.0	0.00	0.00	4,600.0	0.0	0.0	0.0	0.00	0.00	0.00
Delaware									
4,648.0	0.00	0.00	4,648.0	0.0	0.0	0.0	0.00	0.00	0.00
4,700.0	0.00	0.00	4,700.0	0.0	0.0	0.0	0.00	0.00	0.00
4,800.0	0.00	0.00	4,800.0	0.0	0.0	0.0	0.00	0.00	0.00
4,900.0	0.00	0.00	4,900.0	0.0	0.0	0.0	0.00	0.00	0.00
5,000.0	0.00	0.00	5,000.0	0.0	0.0	0.0	0.00	0.00	0.00
5,100.0	0.00	0.00	5,100.0	0.0	0.0	0.0	0.00	0.00	0.00
5,200.0	0.00	0.00	5,200.0	0.0	0.0	0.0	0.00	0.00	0.00
5,300.0	0.00	0.00	5,300.0	0.0	0.0	0.0	0.00	0.00	0.00
5,400.0	0.00	0.00	5,400.0	0.0	0.0	0.0	0.00	0.00	0.00
5,500.0	0.00	0.00	5,500.0	0.0	0.0	0.0	0.00	0.00	0.00
5,600.0	0.00	0.00	5,600.0	0.0	0.0	0.0	0.00	0.00	0.00
5,700.0	0.00	0.00	5,700.0	0.0	0.0	0.0	0.00	0.00	0.00
5,800.0	0.00	0.00	5,800.0	0.0	0.0	0.0	0.00	0.00	0.00
5,900.0	0.00	0.00	5,900.0	0.0	0.0	0.0	0.00	0.00	0.00
6,000.0	0.00	0.00	6,000.0	0.0	0.0	0.0	0.00	0.00	0.00
6,100.0	0.00	0.00	6,100.0	0.0	0.0	0.0	0.00	0.00	0.00
6,200.0	0.00	0.00	6,200.0	0.0	0.0	0.0	0.00	0.00	0.00
6,300.0	0.00	0.00	6,300.0	0.0	0.0	0.0	0.00	0.00	0.00
6,400.0	0.00	0.00	6,400.0	0.0	0.0	0.0	0.00	0.00	0.00
6,500.0	0.00	0.00	6,500.0	0.0	0.0	0.0	0.00	0.00	0.00
6,600.0	0.00	0.00	6,600.0	0.0	0.0	0.0	0.00	0.00	0.00
6,700.0	0.00	0.00	6,700.0	0.0	0.0	0.0	0.00	0.00	0.00
6,800.0	0.00	0.00	6,800.0	0.0	0.0	0.0	0.00	0.00	0.00
6,900.0	0.00	0.00	6,900.0	0.0	0.0	0.0	0.00	0.00	0.00
7,000.0	0.00	0.00	7,000.0	0.0	0.0	0.0	0.00	0.00	0.00
7,100.0	0.00	0.00	7,100.0	0.0	0.0	0.0	0.00	0.00	0.00
7,200.0	0.00	0.00	7,200.0	0.0	0.0	0.0	0.00	0.00	0.00
7,300.0	0.00	0.00	7,300.0	0.0	0.0	0.0	0.00	0.00	0.00
Bone Spring (BSGL)									
7,376.0	0.00	0.00	7,376.0	0.0	0.0	0.0	0.00	0.00	0.00
7,400.0	0.00	0.00	7,400.0	0.0	0.0	0.0	0.00	0.00	0.00
7,500.0	0.00	0.00	7,500.0	0.0	0.0	0.0	0.00	0.00	0.00
7,600.0	0.00	0.00	7,600.0	0.0	0.0	0.0	0.00	0.00	0.00
7,700.0	0.00	0.00	7,700.0	0.0	0.0	0.0	0.00	0.00	0.00
7,800.0	0.00	0.00	7,800.0	0.0	0.0	0.0	0.00	0.00	0.00
7,900.0	0.00	0.00	7,900.0	0.0	0.0	0.0	0.00	0.00	0.00
8,000.0	0.00	0.00	8,000.0	0.0	0.0	0.0	0.00	0.00	0.00
8,100.0	0.00	0.00	8,100.0	0.0	0.0	0.0	0.00	0.00	0.00
8,200.0	0.00	0.00	8,200.0	0.0	0.0	0.0	0.00	0.00	0.00

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8,300.0	0.00	0.00	8,300.0	0.0	0.0	0.0	0.00	0.00	0.00
8,400.0	0.00	0.00	8,400.0	0.0	0.0	0.0	0.00	0.00	0.00
FBSG_sand									
8,500.0	0.00	0.00	8,500.0	0.0	0.0	0.0	0.00	0.00	0.00
8,600.0	0.00	0.00	8,600.0	0.0	0.0	0.0	0.00	0.00	0.00
8,700.0	0.00	0.00	8,700.0	0.0	0.0	0.0	0.00	0.00	0.00
8,800.0	0.00	0.00	8,800.0	0.0	0.0	0.0	0.00	0.00	0.00
8,900.0	0.00	0.00	8,900.0	0.0	0.0	0.0	0.00	0.00	0.00
Build 12°/100'									
8,992.6	0.00	0.00	8,992.6	0.0	0.0	0.0	0.00	0.00	0.00
9,000.0	0.89	180.91	9,000.0	-0.1	0.0	0.1	12.00	12.00	0.00
9,100.0	12.89	180.91	9,099.1	-12.0	-0.2	12.0	12.00	12.00	0.00
9,200.0	24.89	180.91	9,193.5	-44.3	-0.7	44.3	12.00	12.00	0.00
9,300.0	36.89	180.91	9,279.2	-95.6	-1.5	95.6	12.00	12.00	0.00
SBSG_sand									
9,397.6	48.60	180.91	9,350.7	-161.7	-2.6	161.7	12.00	12.00	0.00
9,400.0	48.89	180.91	9,352.3	-163.5	-2.6	163.5	12.00	12.00	0.00
9,500.0	60.89	180.91	9,409.7	-245.1	-3.9	245.2	12.00	12.00	0.00
9,600.0	72.89	180.91	9,448.9	-336.9	-5.4	337.0	12.00	12.00	0.00
9,700.0	84.89	180.91	9,468.2	-434.9	-6.9	434.9	12.00	12.00	0.00
EOB 89.38° inc, 180.91° azm									
9,737.4	89.38	180.91	9,470.0	-472.2	-7.5	472.3	12.00	12.00	0.00
9,800.0	89.38	180.91	9,470.7	-534.8	-8.5	534.9	0.01	0.01	0.00
9,900.0	89.38	180.91	9,471.8	-634.8	-10.1	634.9	0.00	0.00	0.00
10,000.0	89.38	180.91	9,472.9	-734.8	-11.7	734.8	0.00	0.00	0.00
10,100.0	89.38	180.91	9,474.0	-834.7	-13.3	834.8	0.00	0.00	0.00
10,200.0	89.38	180.91	9,475.0	-934.7	-14.9	934.8	0.00	0.00	0.00
10,300.0	89.38	180.91	9,476.1	-1,034.7	-16.5	1,034.8	0.00	0.00	0.00
10,400.0	89.38	180.91	9,477.2	-1,134.7	-18.0	1,134.8	0.00	0.00	0.00
10,500.0	89.38	180.91	9,478.3	-1,234.7	-19.6	1,234.8	0.00	0.00	0.00
10,600.0	89.38	180.91	9,479.4	-1,334.6	-21.2	1,334.8	0.00	0.00	0.00
10,700.0	89.38	180.91	9,480.4	-1,434.6	-22.8	1,434.8	0.00	0.00	0.00
10,800.0	89.38	180.91	9,481.5	-1,534.6	-24.4	1,534.8	0.00	0.00	0.00
10,900.0	89.38	180.91	9,482.6	-1,634.6	-26.0	1,634.8	0.00	0.00	0.00
11,000.0	89.38	180.91	9,483.7	-1,734.6	-27.6	1,734.8	0.00	0.00	0.00
11,100.0	89.38	180.91	9,484.8	-1,834.6	-29.2	1,834.8	0.00	0.00	0.00
11,200.0	89.38	180.91	9,485.8	-1,934.5	-30.8	1,934.8	0.00	0.00	0.00
11,300.0	89.38	180.91	9,486.9	-2,034.5	-32.4	2,034.8	0.00	0.00	0.00
11,400.0	89.38	180.91	9,488.0	-2,134.5	-33.9	2,134.8	0.00	0.00	0.00
11,500.0	89.38	180.91	9,489.1	-2,234.5	-35.5	2,234.8	0.00	0.00	0.00
11,600.0	89.38	180.91	9,490.2	-2,334.5	-37.1	2,334.8	0.00	0.00	0.00
11,700.0	89.38	180.91	9,491.2	-2,434.4	-38.7	2,434.8	0.00	0.00	0.00
11,800.0	89.38	180.91	9,492.3	-2,534.4	-40.3	2,534.7	0.00	0.00	0.00
11,900.0	89.38	180.91	9,493.4	-2,634.4	-41.9	2,634.7	0.00	0.00	0.00
12,000.0	89.38	180.91	9,494.5	-2,734.4	-43.5	2,734.7	0.00	0.00	0.00
12,100.0	89.38	180.91	9,495.6	-2,834.4	-45.1	2,834.7	0.00	0.00	0.00
12,200.0	89.38	180.91	9,496.6	-2,934.4	-46.7	2,934.7	0.00	0.00	0.00
12,300.0	89.38	180.91	9,497.7	-3,034.3	-48.3	3,034.7	0.00	0.00	0.00
12,400.0	89.38	180.91	9,498.8	-3,134.3	-49.8	3,134.7	0.00	0.00	0.00
12,500.0	89.38	180.91	9,499.9	-3,234.3	-51.4	3,234.7	0.00	0.00	0.00
12,600.0	89.38	180.91	9,501.0	-3,334.3	-53.0	3,334.7	0.00	0.00	0.00

Database:	Compass	Local Co-ordinate Reference:	Well Ringo 32 Federal COM
Company:	COG Operating, LLC	TVD Reference:	Well @ 3566.0usft (Ensign 772 RKB 31' + GL 3535')
Project:	Lea County, NM	MD Reference:	Well @ 3566.0usft (Ensign 772 RKB 31' + GL 3535')
Site:	Sec 32, T19S, R32E	North Reference:	Grid
Well:	Ringo 32 Federal COM	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1H		
Design:	Design #1		

Planned 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)	
12,700.0	89.38	180.91	9,502.0	-3,434.3	-54.6	3,434.7	0.00	0.00	0.00	
12,800.0	89.38	180.91	9,503.1	-3,534.2	-56.2	3,534.7	0.00	0.00	0.00	
12,900.0	89.38	180.91	9,504.2	-3,634.2	-57.8	3,634.7	0.00	0.00	0.00	
13,000.0	89.38	180.91	9,505.3	-3,734.2	-59.4	3,734.7	0.00	0.00	0.00	
13,100.0	89.38	180.91	9,506.4	-3,834.2	-61.0	3,834.7	0.00	0.00	0.00	
13,200.0	89.38	180.91	9,507.4	-3,934.2	-62.6	3,934.7	0.00	0.00	0.00	
13,300.0	89.38	180.91	9,508.5	-4,034.1	-64.2	4,034.7	0.00	0.00	0.00	
13,400.0	89.38	180.91	9,509.6	-4,134.1	-65.7	4,134.7	0.00	0.00	0.00	
13,500.0	89.38	180.91	9,510.7	-4,234.1	-67.3	4,234.6	0.00	0.00	0.00	
13,600.0	89.38	180.91	9,511.8	-4,334.1	-68.9	4,334.6	0.00	0.00	0.00	
13,700.0	89.38	180.91	9,512.8	-4,434.1	-70.5	4,434.6	0.00	0.00	0.00	
13,800.0	89.38	180.91	9,513.9	-4,534.1	-72.1	4,534.6	0.00	0.00	0.00	
13,900.0	89.38	180.91	9,515.0	-4,634.0	-73.7	4,634.6	0.00	0.00	0.00	
14,000.0	89.38	180.91	9,516.1	-4,734.0	-75.3	4,734.6	0.00	0.00	0.00	
14,100.0	89.38	180.91	9,517.2	-4,834.0	-76.9	4,834.6	0.00	0.00	0.00	
14,200.0	89.38	180.91	9,518.2	-4,934.0	-78.5	4,934.6	0.00	0.00	0.00	
14,300.0	89.38	180.91	9,519.3	-5,034.0	-80.1	5,034.6	0.00	0.00	0.00	
14,400.0	89.38	180.91	9,520.4	-5,133.9	-81.6	5,134.6	0.00	0.00	0.00	
14,500.0	89.38	180.91	9,521.5	-5,233.9	-83.2	5,234.6	0.00	0.00	0.00	
14,600.0	89.38	180.91	9,522.6	-5,333.9	-84.8	5,334.6	0.00	0.00	0.00	
14,700.0	89.38	180.91	9,523.6	-5,433.9	-86.4	5,434.6	0.00	0.00	0.00	
14,800.0	89.38	180.91	9,524.7	-5,533.9	-88.0	5,534.6	0.00	0.00	0.00	
14,900.0	89.38	180.91	9,525.8	-5,633.9	-89.6	5,634.6	0.00	0.00	0.00	
15,000.0	89.38	180.91	9,526.9	-5,733.8	-91.2	5,734.6	0.00	0.00	0.00	
15,100.0	89.38	180.91	9,528.0	-5,833.8	-92.8	5,834.6	0.00	0.00	0.00	
15,200.0	89.38	180.91	9,529.0	-5,933.8	-94.4	5,934.5	0.00	0.00	0.00	
15,300.0	89.38	180.91	9,530.1	-6,033.8	-96.0	6,034.5	0.00	0.00	0.00	
15,400.0	89.38	180.91	9,531.2	-6,133.8	-97.5	6,134.5	0.00	0.00	0.00	
15,500.0	89.38	180.91	9,532.3	-6,233.7	-99.1	6,234.5	0.00	0.00	0.00	
15,600.0	89.38	180.91	9,533.4	-6,333.7	-100.7	6,334.5	0.00	0.00	0.00	
15,700.0	89.38	180.91	9,534.4	-6,433.7	-102.3	6,434.5	0.00	0.00	0.00	
15,800.0	89.38	180.91	9,535.5	-6,533.7	-103.9	6,534.5	0.00	0.00	0.00	
15,900.0	89.38	180.91	9,536.6	-6,633.7	-105.5	6,634.5	0.00	0.00	0.00	
16,000.0	89.38	180.91	9,537.7	-6,733.6	-107.1	6,734.5	0.00	0.00	0.00	
16,100.0	89.38	180.91	9,538.8	-6,833.6	-108.7	6,834.5	0.00	0.00	0.00	
16,200.0	89.38	180.91	9,539.8	-6,933.6	-110.3	6,934.5	0.00	0.00	0.00	
16,300.0	89.38	180.91	9,540.9	-7,033.6	-111.9	7,034.5	0.00	0.00	0.00	
16,400.0	89.38	180.91	9,542.0	-7,133.6	-113.4	7,134.5	0.00	0.00	0.00	
16,500.0	89.38	180.91	9,543.1	-7,233.6	-115.0	7,234.5	0.00	0.00	0.00	
16,600.0	89.38	180.91	9,544.2	-7,333.5	-116.6	7,334.5	0.00	0.00	0.00	
16,700.0	89.38	180.91	9,545.2	-7,433.5	-118.2	7,434.5	0.00	0.00	0.00	
16,800.0	89.38	180.91	9,546.3	-7,533.5	-119.8	7,534.5	0.00	0.00	0.00	
16,900.0	89.38	180.91	9,547.4	-7,633.5	-121.4	7,634.4	0.00	0.00	0.00	
17,000.0	89.38	180.91	9,548.5	-7,733.5	-123.0	7,734.4	0.00	0.00	0.00	
17,100.0	89.38	180.91	9,549.6	-7,833.4	-124.6	7,834.4	0.00	0.00	0.00	
17,200.0	89.38	180.91	9,550.6	-7,933.4	-126.2	7,934.4	0.00	0.00	0.00	
17,300.0	89.38	180.91	9,551.7	-8,033.4	-127.8	8,034.4	0.00	0.00	0.00	
17,400.0	89.38	180.91	9,552.8	-8,133.4	-129.3	8,134.4	0.00	0.00	0.00	
17,500.0	89.38	180.91	9,553.9	-8,233.4	-130.9	8,234.4	0.00	0.00	0.00	
17,600.0	89.38	180.91	9,555.0	-8,333.4	-132.5	8,334.4	0.00	0.00	0.00	
17,700.0	89.38	180.91	9,556.0	-8,433.3	-134.1	8,434.4	0.00	0.00	0.00	
17,800.0	89.38	180.91	9,557.1	-8,533.3	-135.7	8,534.4	0.00	0.00	0.00	

Database:	Compass	Local Co-ordinate Reference:	Well Ringo 32 Federal COM
Company:	COG Operating, LLC	TVD Reference:	Well @ 3566.0usft (Ensign 772 RKB 31' + GL 3535')
Project:	Lea County, NM	MD Reference:	Well @ 3566.0usft (Ensign 772 RKB 31' + GL 3535')
Site:	Sec 32, T19S, R32E	North Reference:	Grid
Well:	Ringo 32 Federal COM	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1H		
Design:	Design #1		

Planned 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)
17,900.0	89.38	180.91	9,558.2	-8,633.3	-137.3	8,634.4	0.00	0.00	0.00
18,000.0	89.38	180.91	9,559.3	-8,733.3	-138.9	8,734.4	0.00	0.00	0.00
18,100.0	89.38	180.91	9,560.4	-8,833.3	-140.5	8,834.4	0.00	0.00	0.00
18,200.0	89.38	180.91	9,561.4	-8,933.2	-142.1	8,934.4	0.00	0.00	0.00
18,300.0	89.38	180.91	9,562.5	-9,033.2	-143.7	9,034.4	0.00	0.00	0.00
18,400.0	89.38	180.91	9,563.6	-9,133.2	-145.3	9,134.4	0.00	0.00	0.00
18,500.0	89.38	180.91	9,564.7	-9,233.2	-146.8	9,234.4	0.00	0.00	0.00
TD at 18528.9									
18,528.9	89.38	180.91	9,565.0	-9,262.1	-147.3	9,263.3	0.00	0.00	0.00

Design Targets									
Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
SHL - Ringo 32 FedCOM - plan hits target center - Point	0.00	0.00	0.0	0.0	0.0	586,219.30	670,116.00	32° 36' 37.462 N	103° 46' 51.150 W
EOC / LP - Ringo 32 Fer - plan hits target center - Point	0.00	0.01	9,470.0	-472.2	-7.5	585,747.06	670,108.49	32° 36' 32.790 N	103° 46' 51.267 W
EOL / PBHL - Ringo 32 I - plan hits target center - Point	0.00	0.00	9,565.0	-9,262.1	-147.3	576,957.20	669,968.70	32° 35' 5.819 N	103° 46' 53.434 W

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
946.0	946.0	Rustler		0.62	180.91	
1,036.0	1,036.0	TOS		0.62	180.91	
2,395.0	2,395.0	BOS		0.62	180.91	
2,544.0	2,544.0	Yates		0.62	180.91	
2,648.0	2,648.0	Seven Rivers		0.62	180.91	
2,864.0	2,864.0	Capitan Reef		0.62	180.91	
4,168.0	4,168.0	Base of reef		0.62	180.91	
4,648.0	4,648.0	Delaware		0.62	180.91	
7,376.0	7,376.0	Bone Spring (BSGL)		0.62	180.91	
8,500.0	8,500.0	FBSG_sand		0.62	180.91	
9,397.6	9,350.7	SBSG_sand		0.62	180.91	

Database:	Compass	Local Co-ordinate Reference:	Well Ringo 32 Federal COM
Company:	COG Operating, LLC	TVD Reference:	Well @ 3566.0usft (Ensign 772 RKB 31' + GL 3535')
Project:	Lea County, NM	MD Reference:	Well @ 3566.0usft (Ensign 772 RKB 31' + GL 3535')
Site:	Sec 32, T19S, R32E	North Reference:	Grid
Well:	Ringo 32 Federal COM	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1H		
Design:	Design #1		

Plan Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
0.1	0.1	0.0	0.0	SHL
8,992.6	8,992.6	0.0	0.0	Build 12°/100'
9,737.4	9,470.0	-472.2	-7.5	EOB 89.38° inc, 180.91° azm
18,528.9	9,565.0	-9,262.1	-147.3	TD at 18528.9