

COG OPERATING LLC

**LEA COUNTY, NM
BULLDOG
MONTERA FEDERAL #23H**

OWB

HOBBS OCD

AUG 15 2017

Plan: PWP0

RECEIVED

Survey Report - Geographic

27 October, 2016

COG Operating LLC

Survey Report - Geographic

Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Well MONTERA FEDERAL #23H
Project:	LEA COUNTY, NM	TVD Reference:	RKB=3221+26 @ 3247.0usft (BIG RIG 1)
Site:	BULLDOG	MD Reference:	RKB=3221+26 @ 3247.0usft (BIG RIG 1)
Well:	MONTERA FEDERAL #23H	North Reference:	Grid
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	PWP0	Database:	EDM_Users

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

Well	MONTERA FEDERAL #23H		
Well Position	+N/-S	0.0 usft	Northing: 415,305.10 usf
	+E/-W	0.0 usft	Easting: 801,857.40 usf
Position Uncertainty	3.0 usft	Wellhead Elevation:	0.0 usf
		Latitude:	32° 8' 16.921 N
		Longitude:	103° 21' 29.304 W
		Ground Level:	3,221.0 usf

Wellbore	OWB		
Magnetics	Model Name	Sample Date	Declination (°)
	WMM2015	10/27/2016	6.93
			Dip Angle (°)
			60.02
			Field Strength (nT)
			47,967

Design	PWP0		
Audit Notes:			
Version:	Phase:	PROTOTYPE	Tie On Depth: 0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)
	0.0	0.0	0.0
			Direction (°)
			2.05

Survey Tool Program	Date 10/27/2016		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name
0.0	11,900.0	PWP0 (OWB)	Standard Keeper 104
11,900.0	19,768.0	PWP0 (OWB)	MWD
			Description
			Standard Wireline Keeper ver 1.0.4
			OWSG MWD - Standard

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
0.0	0.00	0.00	0.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W	
100.0	0.00	0.00	100.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W	
200.0	0.00	0.00	200.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W	
300.0	0.00	0.00	300.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W	
400.0	0.00	0.00	400.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W	
500.0	0.00	0.00	500.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W	
600.0	0.00	0.00	600.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W	
700.0	0.00	0.00	700.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W	
800.0	0.00	0.00	800.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W	
900.0	0.00	0.00	900.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W	
1,000.0	0.00	0.00	1,000.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W	

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Well:	MONTERA FEDERAL #23H	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
1,100.0	0.00	0.00	1,100.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
1,200.0	0.00	0.00	1,200.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
1,300.0	0.00	0.00	1,300.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
1,400.0	0.00	0.00	1,400.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
1,500.0	0.00	0.00	1,500.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
1,600.0	0.00	0.00	1,600.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
1,700.0	0.00	0.00	1,700.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
1,800.0	0.00	0.00	1,800.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
1,900.0	0.00	0.00	1,900.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
2,000.0	0.00	0.00	2,000.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
2,100.0	0.00	0.00	2,100.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
2,200.0	0.00	0.00	2,200.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
2,300.0	0.00	0.00	2,300.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
2,400.0	0.00	0.00	2,400.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
2,500.0	0.00	0.00	2,500.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
2,600.0	0.00	0.00	2,600.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
2,700.0	0.00	0.00	2,700.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
2,800.0	0.00	0.00	2,800.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
2,900.0	0.00	0.00	2,900.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
3,000.0	0.00	0.00	3,000.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
3,100.0	0.00	0.00	3,100.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
3,200.0	0.00	0.00	3,200.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
3,300.0	0.00	0.00	3,300.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
3,400.0	0.00	0.00	3,400.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
3,500.0	0.00	0.00	3,500.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
3,600.0	0.00	0.00	3,600.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
3,700.0	0.00	0.00	3,700.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
3,800.0	0.00	0.00	3,800.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
3,900.0	0.00	0.00	3,900.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
4,000.0	0.00	0.00	4,000.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
4,100.0	0.00	0.00	4,100.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
4,200.0	0.00	0.00	4,200.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
4,300.0	0.00	0.00	4,300.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
4,400.0	0.00	0.00	4,400.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
4,500.0	0.00	0.00	4,500.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
4,600.0	0.00	0.00	4,600.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
4,700.0	0.00	0.00	4,700.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
4,800.0	0.00	0.00	4,800.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
4,900.0	0.00	0.00	4,900.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
5,000.0	0.00	0.00	5,000.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
5,100.0	0.00	0.00	5,100.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
5,200.0	0.00	0.00	5,200.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
5,300.0	0.00	0.00	5,300.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
5,400.0	0.00	0.00	5,400.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
5,500.0	0.00	0.00	5,500.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
5,600.0	0.00	0.00	5,600.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
5,700.0	0.00	0.00	5,700.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
5,800.0	0.00	0.00	5,800.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
5,900.0	0.00	0.00	5,900.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
6,000.0	0.00	0.00	6,000.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
6,100.0	0.00	0.00	6,100.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
6,200.0	0.00	0.00	6,200.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
6,300.0	0.00	0.00	6,300.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
6,400.0	0.00	0.00	6,400.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
6,500.0	0.00	0.00	6,500.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W

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Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
6,600.0	0.00	0.00	6,600.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
6,700.0	0.00	0.00	6,700.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
6,800.0	0.00	0.00	6,800.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
6,900.0	0.00	0.00	6,900.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
7,000.0	0.00	0.00	7,000.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
7,100.0	0.00	0.00	7,100.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
7,200.0	0.00	0.00	7,200.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
7,300.0	0.00	0.00	7,300.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
7,400.0	0.00	0.00	7,400.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
7,500.0	0.00	0.00	7,500.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
7,600.0	0.00	0.00	7,600.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
7,700.0	0.00	0.00	7,700.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
7,800.0	0.00	0.00	7,800.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
7,900.0	0.00	0.00	7,900.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
8,000.0	0.00	0.00	8,000.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
8,100.0	0.00	0.00	8,100.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
8,200.0	0.00	0.00	8,200.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
8,300.0	0.00	0.00	8,300.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
8,400.0	0.00	0.00	8,400.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
8,500.0	0.00	0.00	8,500.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
8,600.0	0.00	0.00	8,600.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
8,700.0	0.00	0.00	8,700.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
8,800.0	0.00	0.00	8,800.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
8,900.0	0.00	0.00	8,900.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
9,000.0	0.00	0.00	9,000.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
9,100.0	0.00	0.00	9,100.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
9,200.0	0.00	0.00	9,200.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
9,300.0	0.00	0.00	9,300.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
9,400.0	0.00	0.00	9,400.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
9,500.0	0.00	0.00	9,500.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
9,600.0	0.00	0.00	9,600.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
9,700.0	0.00	0.00	9,700.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
9,800.0	0.00	0.00	9,800.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
9,900.0	0.00	0.00	9,900.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
10,000.0	0.00	0.00	10,000.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
10,100.0	0.00	0.00	10,100.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
10,200.0	0.00	0.00	10,200.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
10,300.0	0.00	0.00	10,300.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
10,400.0	0.00	0.00	10,400.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
10,500.0	0.00	0.00	10,500.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
10,600.0	0.00	0.00	10,600.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
10,700.0	0.00	0.00	10,700.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
10,800.0	0.00	0.00	10,800.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
10,900.0	0.00	0.00	10,900.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
11,000.0	0.00	0.00	11,000.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
11,100.0	0.00	0.00	11,100.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
11,200.0	0.00	0.00	11,200.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
11,300.0	0.00	0.00	11,300.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
11,400.0	0.00	0.00	11,400.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
11,500.0	0.00	0.00	11,500.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
11,600.0	0.00	0.00	11,600.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
11,700.0	0.00	0.00	11,700.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
11,800.0	0.00	0.00	11,800.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
11,900.0	0.00	0.00	11,900.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W
11,955.0	0.00	0.00	11,955.0	0.0	0.0	415,305.10	801,857.40	32° 8' 16.921 N	103° 21' 29.304 W

COG Operating LLC

Survey Report - Geographic

Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Well MONTERA FEDERAL #23H
Project:	LEA COUNTY, NM	TVD Reference:	RKB=3221+26 @ 3247.0usft (BIG RIG 1)
Site:	BULLDOG	MD Reference:	RKB=3221+26 @ 3247.0usft (BIG RIG 1)
Well:	MONTERA FEDERAL #23H	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
12,000.0	5.41	2.05	11,999.9	2.1	0.1	415,307.22	801,857.47	32° 8' 16.942 N	103° 21' 29.303 W
12,100.0	17.42	2.05	12,097.8	21.9	0.8	415,326.95	801,858.18	32° 8' 17.137 N	103° 21' 29.292 W
12,200.0	29.43	2.05	12,189.4	61.5	2.2	415,366.61	801,859.60	32° 8' 17.529 N	103° 21' 29.272 W
12,300.0	41.44	2.05	12,270.7	119.3	4.3	415,424.44	801,861.67	32° 8' 18.101 N	103° 21' 29.241 W
12,400.0	53.45	2.05	12,338.2	192.8	6.9	415,497.92	801,864.30	32° 8' 18.828 N	103° 21' 29.203 W
12,500.0	65.46	2.05	12,388.9	278.7	10.0	415,583.84	801,867.38	32° 8' 19.678 N	103° 21' 29.158 W
12,600.0	77.48	2.05	12,420.6	373.3	13.4	415,678.42	801,870.76	32° 8' 20.614 N	103° 21' 29.109 W
12,700.0	89.49	2.05	12,432.0	472.4	16.9	415,777.53	801,874.31	32° 8' 21.594 N	103° 21' 29.057 W
12,704.3	90.00	2.05	12,432.0	476.7	17.1	415,781.79	801,874.46	32° 8' 21.636 N	103° 21' 29.055 W
12,800.0	91.91	2.05	12,430.4	572.3	20.5	415,877.45	801,877.88	32° 8' 22.582 N	103° 21' 29.005 W
12,820.8	92.33	2.05	12,429.6	593.2	21.2	415,898.27	801,878.63	32° 8' 22.788 N	103° 21' 28.994 W
12,900.0	92.33	2.05	12,426.4	672.2	24.1	415,977.30	801,881.45	32° 8' 23.570 N	103° 21' 28.953 W
13,000.0	92.33	2.05	12,422.3	772.1	27.6	416,077.15	801,885.02	32° 8' 24.558 N	103° 21' 28.901 W
13,100.0	92.33	2.05	12,418.3	871.9	31.2	416,177.01	801,888.59	32° 8' 25.546 N	103° 21' 28.849 W
13,200.0	92.33	2.05	12,414.2	971.8	34.8	416,276.86	801,892.16	32° 8' 26.533 N	103° 21' 28.797 W
13,300.0	92.33	2.05	12,410.1	1,071.6	38.3	416,376.72	801,895.73	32° 8' 27.521 N	103° 21' 28.745 W
13,400.0	92.33	2.05	12,406.1	1,171.5	41.9	416,476.57	801,899.30	32° 8' 28.509 N	103° 21' 28.693 W
13,500.0	92.33	2.05	12,402.0	1,271.3	45.5	416,576.42	801,902.87	32° 8' 29.497 N	103° 21' 28.641 W
13,600.0	92.33	2.05	12,397.9	1,371.2	49.0	416,676.28	801,906.44	32° 8' 30.484 N	103° 21' 28.589 W
13,700.0	92.33	2.05	12,393.9	1,471.0	52.6	416,776.13	801,910.01	32° 8' 31.472 N	103° 21' 28.537 W
13,800.0	92.33	2.05	12,389.8	1,570.9	56.2	416,875.98	801,913.58	32° 8' 32.460 N	103° 21' 28.485 W
13,900.0	92.33	2.05	12,385.7	1,670.7	59.7	416,975.84	801,917.15	32° 8' 33.447 N	103° 21' 28.433 W
14,000.0	92.33	2.05	12,381.7	1,770.6	63.3	417,075.69	801,920.72	32° 8' 34.435 N	103° 21' 28.381 W
14,100.0	92.33	2.05	12,377.6	1,870.4	66.9	417,175.54	801,924.29	32° 8' 35.423 N	103° 21' 28.329 W
14,200.0	92.33	2.05	12,373.5	1,970.3	70.5	417,275.40	801,927.85	32° 8' 36.411 N	103° 21' 28.277 W
14,300.0	92.33	2.05	12,369.5	2,070.2	74.0	417,375.25	801,931.42	32° 8' 37.398 N	103° 21' 28.225 W
14,400.0	92.33	2.05	12,365.4	2,170.0	77.6	417,475.10	801,934.99	32° 8' 38.386 N	103° 21' 28.173 W
14,500.0	92.33	2.05	12,361.3	2,269.9	81.2	417,574.96	801,938.56	32° 8' 39.374 N	103° 21' 28.121 W
14,600.0	92.33	2.05	12,357.2	2,369.7	84.7	417,674.81	801,942.13	32° 8' 40.362 N	103° 21' 28.069 W
14,700.0	92.33	2.05	12,353.2	2,469.6	88.3	417,774.66	801,945.70	32° 8' 41.349 N	103° 21' 28.017 W
14,800.0	92.33	2.05	12,349.1	2,569.4	91.9	417,874.52	801,949.27	32° 8' 42.337 N	103° 21' 27.965 W
14,900.0	92.33	2.05	12,345.0	2,669.3	95.4	417,974.37	801,952.84	32° 8' 43.325 N	103° 21' 27.913 W
15,000.0	92.33	2.05	12,341.0	2,769.1	99.0	418,074.22	801,956.41	32° 8' 44.313 N	103° 21' 27.861 W
15,100.0	92.33	2.05	12,336.9	2,869.0	102.6	418,174.08	801,959.98	32° 8' 45.300 N	103° 21' 27.809 W
15,200.0	92.33	2.05	12,332.8	2,968.8	106.2	418,273.93	801,963.55	32° 8' 46.288 N	103° 21' 27.756 W
15,300.0	92.33	2.05	12,328.8	3,068.7	109.7	418,373.78	801,967.12	32° 8' 47.276 N	103° 21' 27.704 W
15,400.0	92.33	2.05	12,324.7	3,168.5	113.3	418,473.64	801,970.69	32° 8' 48.264 N	103° 21' 27.652 W
15,500.0	92.33	2.05	12,320.6	3,268.4	116.9	418,573.49	801,974.26	32° 8' 49.251 N	103° 21' 27.600 W
15,600.0	92.33	2.05	12,316.6	3,368.2	120.4	418,673.34	801,977.83	32° 8' 50.239 N	103° 21' 27.548 W
15,700.0	92.33	2.05	12,312.5	3,468.1	124.0	418,773.20	801,981.40	32° 8' 51.227 N	103° 21' 27.496 W
15,800.0	92.33	2.05	12,308.4	3,568.0	127.6	418,873.05	801,984.97	32° 8' 52.214 N	103° 21' 27.444 W
15,900.0	92.33	2.05	12,304.4	3,667.8	131.1	418,972.90	801,988.53	32° 8' 53.202 N	103° 21' 27.392 W
16,000.0	92.33	2.05	12,300.3	3,767.7	134.7	419,072.76	801,992.10	32° 8' 54.190 N	103° 21' 27.340 W
16,100.0	92.33	2.05	12,296.2	3,867.5	138.3	419,172.61	801,995.67	32° 8' 55.178 N	103° 21' 27.288 W
16,200.0	92.33	2.05	12,292.2	3,967.4	141.8	419,272.46	801,999.24	32° 8' 56.165 N	103° 21' 27.236 W
16,300.0	92.33	2.05	12,288.1	4,067.2	145.4	419,372.32	802,002.81	32° 8' 57.153 N	103° 21' 27.184 W
16,400.0	92.33	2.05	12,284.0	4,167.1	149.0	419,472.17	802,006.38	32° 8' 58.141 N	103° 21' 27.132 W
16,500.0	92.33	2.05	12,279.9	4,266.9	152.6	419,572.03	802,009.95	32° 8' 59.129 N	103° 21' 27.080 W
16,600.0	92.33	2.05	12,275.9	4,366.8	156.1	419,671.88	802,013.52	32° 9' 0.116 N	103° 21' 27.028 W
16,700.0	92.33	2.05	12,271.8	4,466.6	159.7	419,771.73	802,017.09	32° 9' 1.104 N	103° 21' 26.976 W
16,800.0	92.33	2.05	12,267.7	4,566.5	163.3	419,871.59	802,020.66	32° 9' 2.092 N	103° 21' 26.924 W
16,900.0	92.33	2.05	12,263.7	4,666.3	166.8	419,971.44	802,024.23	32° 9' 3.080 N	103° 21' 26.872 W
17,000.0	92.33	2.05	12,259.6	4,766.2	170.4	420,071.29	802,027.80	32° 9' 4.067 N	103° 21' 26.820 W
17,100.0	92.33	2.05	12,255.5	4,866.0	174.0	420,171.15	802,031.37	32° 9' 5.055 N	103° 21' 26.768 W
17,200.0	92.33	2.05	12,251.5	4,965.9	177.5	420,271.00	802,034.94	32° 9' 6.043 N	103° 21' 26.716 W

COG Operating LLC

Survey Report - Geographic

Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Well MONTERA FEDERAL #23H
Project:	LEA COUNTY, NM	TVD Reference:	RKB=3221+26 @ 3247.0usft (BIG RIG 1)
Site:	BULLDOG	MD Reference:	RKB=3221+26 @ 3247.0usft (BIG RIG 1)
Well:	MONTERA FEDERAL #23H	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
17,300.0	92.33	2.05	12,247.4	5,065.8	181.1	420,370.85	802,038.51	32° 9' 7.030 N	103° 21' 26.664 W
17,400.0	92.33	2.05	12,243.3	5,165.6	184.7	420,470.71	802,042.08	32° 9' 8.018 N	103° 21' 26.612 W
17,500.0	92.33	2.05	12,239.3	5,265.5	188.2	420,570.56	802,045.65	32° 9' 9.006 N	103° 21' 26.560 W
17,600.0	92.33	2.05	12,235.2	5,365.3	191.8	420,670.41	802,049.21	32° 9' 9.994 N	103° 21' 26.508 W
17,700.0	92.33	2.05	12,231.1	5,465.2	195.4	420,770.27	802,052.78	32° 9' 10.981 N	103° 21' 26.456 W
17,800.0	92.33	2.05	12,227.1	5,565.0	199.0	420,870.12	802,056.35	32° 9' 11.969 N	103° 21' 26.403 W
17,900.0	92.33	2.05	12,223.0	5,664.9	202.5	420,969.97	802,059.92	32° 9' 12.957 N	103° 21' 26.351 W
18,000.0	92.33	2.05	12,218.9	5,764.7	206.1	421,069.83	802,063.49	32° 9' 13.945 N	103° 21' 26.299 W
18,100.0	92.33	2.05	12,214.9	5,864.6	209.7	421,169.68	802,067.06	32° 9' 14.932 N	103° 21' 26.247 W
18,200.0	92.33	2.05	12,210.8	5,964.4	213.2	421,269.53	802,070.63	32° 9' 15.920 N	103° 21' 26.195 W
18,300.0	92.33	2.05	12,206.7	6,064.3	216.8	421,369.39	802,074.20	32° 9' 16.908 N	103° 21' 26.143 W
18,400.0	92.33	2.05	12,202.7	6,164.1	220.4	421,469.24	802,077.77	32° 9' 17.896 N	103° 21' 26.091 W
18,500.0	92.33	2.05	12,198.6	6,264.0	223.9	421,569.09	802,081.34	32° 9' 18.883 N	103° 21' 26.039 W
18,600.0	92.33	2.05	12,194.5	6,363.8	227.5	421,668.95	802,084.91	32° 9' 19.871 N	103° 21' 25.987 W
18,700.0	92.33	2.05	12,190.4	6,463.7	231.1	421,768.80	802,088.48	32° 9' 20.859 N	103° 21' 25.935 W
18,800.0	92.33	2.05	12,186.4	6,563.6	234.6	421,868.65	802,092.05	32° 9' 21.847 N	103° 21' 25.883 W
18,900.0	92.33	2.05	12,182.3	6,663.4	238.2	421,968.51	802,095.62	32° 9' 22.834 N	103° 21' 25.831 W
19,000.0	92.33	2.05	12,178.2	6,763.3	241.8	422,068.36	802,099.19	32° 9' 23.822 N	103° 21' 25.779 W
19,100.0	92.33	2.05	12,174.2	6,863.1	245.4	422,168.21	802,102.76	32° 9' 24.810 N	103° 21' 25.727 W
19,200.0	92.33	2.05	12,170.1	6,963.0	248.9	422,268.07	802,106.32	32° 9' 25.797 N	103° 21' 25.675 W
19,300.0	92.33	2.05	12,166.0	7,062.8	252.5	422,367.92	802,109.89	32° 9' 26.785 N	103° 21' 25.623 W
19,400.0	92.33	2.05	12,162.0	7,162.7	256.1	422,467.77	802,113.46	32° 9' 27.773 N	103° 21' 25.571 W
19,500.0	92.33	2.05	12,157.9	7,262.5	259.6	422,567.63	802,117.03	32° 9' 28.761 N	103° 21' 25.519 W
19,600.0	92.33	2.05	12,153.8	7,362.4	263.2	422,667.48	802,120.60	32° 9' 29.748 N	103° 21' 25.467 W
19,700.0	92.33	2.05	12,149.8	7,462.2	266.8	422,767.34	802,124.17	32° 9' 30.736 N	103° 21' 25.415 W
19,768.0	92.33	2.05	12,147.0	7,530.1	269.2	422,835.20	802,126.60	32° 9' 31.407 N	103° 21' 25.379 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-Montera Fed	0.00	0.00	12,147.0	7,530.1	269.2	422,835.20	802,126.60	32° 9' 31.407 N	103° 21' 25.379 W
- plan hits target center									
- Point									

Checked By: _____ Approved By: _____ Date: _____



WELL DETAILS: **MONTERA FEDERAL #23H**

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	415305.10	801857.40	32° 8' 16.921 N 103° 21' 29.304 W		

SECTION DETAILS									
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0
2	11955.0	0.00	0.00	11955.0	0.0	0.0	0.00	0.00	0.0
3	12704.3	90.00	2.05	12432.0	476.7	17.1	12.01	2.05	477.0
4	12820.8	92.33	2.05	12429.6	593.2	21.2	2.00	-0.07	593.5
5	19768.0	92.33	2.05	12147.0	7530.1	269.2	0.00	0.00	7534.9

LEGEND

— PWP0

