



COG PRODUCTION LLC

LEA COUNTY, NM

BULLDOG

WINDWARD FEDERAL #10H

OWB

Plan: PWP1

Survey Report - Geographic

20 December, 2016

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COG PRODUCTION LLC

Survey Report - Geographic

Company:	COG PRODUCTION LLC	Local Co-ordinate Reference:	Well WINDWARD FEDERAL #10H
Project:	LEA COUNTY, NM	TVD Reference:	RKB=3550.8+26 @ 3576.8usft (McVay 8)
Site:	BULLDOG	MD Reference:	RKB=3550.8+26 @ 3576.8usft (McVay 8)
Well:	WINDWARD FEDERAL #10H	North Reference:	Grid
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	PWP1	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	WINDWARD FEDERAL #10H		
Well Position	+N/-S	0.0 usft	Northing:
	+E/-W	0.0 usft	Easting:
Position Uncertainty	3.0 usft	Wellhead Elevation:	0.0 usf
		Latitude:	32° 11' 41.713 N
		Longitude:	103° 42' 39.810 W
		Ground Level:	3,550.8 usf

Wellbore	OWB		
Magnetics	Model Name	Sample Date	Declination (°)
	WMM2015	8/29/2016	7.12
			Dip Angle (°)
			60.01
			Field Strength (nT)
			47,978.18537077

Design	PWP1		
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 (°)
			178.28

Survey Tool Program	Date 12/20/2016		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name
0.0	8,722.5 PWP1 (OWB)		Standard Keeper 104
8,722.5	19,180.2 PWP1 (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	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
100.0	0.00	0.00	100.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
200.0	0.00	0.00	200.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
300.0	0.00	0.00	300.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
400.0	0.00	0.00	400.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
500.0	0.00	0.00	500.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
600.0	0.00	0.00	600.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
700.0	0.00	0.00	700.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
800.0	0.00	0.00	800.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
900.0	0.00	0.00	900.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
1,000.0	0.00	0.00	1,000.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W



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Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	PWP1	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	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
1,200.0	0.00	0.00	1,200.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
1,300.0	0.00	0.00	1,300.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
1,400.0	0.00	0.00	1,400.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
1,500.0	0.00	0.00	1,500.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
1,600.0	0.00	0.00	1,600.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
1,700.0	0.00	0.00	1,700.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
1,800.0	0.00	0.00	1,800.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
1,900.0	0.00	0.00	1,900.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
2,000.0	0.00	0.00	2,000.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
2,100.0	0.00	0.00	2,100.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
2,200.0	0.00	0.00	2,200.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
2,300.0	0.00	0.00	2,300.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
2,400.0	0.00	0.00	2,400.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
2,500.0	0.00	0.00	2,500.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
2,600.0	0.00	0.00	2,600.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
2,700.0	0.00	0.00	2,700.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
2,800.0	0.00	0.00	2,800.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
2,900.0	0.00	0.00	2,900.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
3,000.0	0.00	0.00	3,000.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
3,100.0	0.00	0.00	3,100.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
3,200.0	0.00	0.00	3,200.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
3,300.0	0.00	0.00	3,300.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
3,400.0	0.00	0.00	3,400.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
3,500.0	0.00	0.00	3,500.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
3,600.0	0.00	0.00	3,600.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
3,700.0	0.00	0.00	3,700.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
3,800.0	0.00	0.00	3,800.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
3,900.0	0.00	0.00	3,900.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
4,000.0	0.00	0.00	4,000.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
4,100.0	0.00	0.00	4,100.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
4,200.0	0.00	0.00	4,200.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
4,300.0	0.00	0.00	4,300.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
4,400.0	0.00	0.00	4,400.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
4,500.0	0.00	0.00	4,500.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
4,600.0	0.00	0.00	4,600.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
4,700.0	0.00	0.00	4,700.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
4,800.0	0.00	0.00	4,800.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
4,900.0	0.00	0.00	4,900.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
5,000.0	0.00	0.00	5,000.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
5,100.0	0.00	0.00	5,100.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
5,200.0	0.00	0.00	5,200.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
5,300.0	0.00	0.00	5,300.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
5,400.0	0.00	0.00	5,400.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
5,500.0	0.00	0.00	5,500.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
5,600.0	0.00	0.00	5,600.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
5,700.0	0.00	0.00	5,700.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
5,800.0	0.00	0.00	5,800.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
5,900.0	0.00	0.00	5,900.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
6,000.0	0.00	0.00	6,000.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
6,100.0	0.00	0.00	6,100.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
6,200.0	0.00	0.00	6,200.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
6,300.0	0.00	0.00	6,300.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
6,400.0	0.00	0.00	6,400.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
6,500.0	0.00	0.00	6,500.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W



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Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
6,600.0	0.00	0.00	6,600.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
6,700.0	0.00	0.00	6,700.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
6,800.0	0.00	0.00	6,800.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
6,900.0	0.00	0.00	6,900.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
7,000.0	0.00	0.00	7,000.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
7,100.0	0.00	0.00	7,100.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
7,200.0	0.00	0.00	7,200.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
7,300.0	0.00	0.00	7,300.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
7,400.0	0.00	0.00	7,400.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
7,500.0	0.00	0.00	7,500.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
7,600.0	0.00	0.00	7,600.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
7,700.0	0.00	0.00	7,700.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
7,800.0	0.00	0.00	7,800.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
7,900.0	0.00	0.00	7,900.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
8,000.0	0.00	0.00	8,000.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
8,100.0	0.00	0.00	8,100.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
8,200.0	0.00	0.00	8,200.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
8,300.0	0.00	0.00	8,300.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
8,400.0	0.00	0.00	8,400.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
8,500.0	0.00	0.00	8,500.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
8,600.0	0.00	0.00	8,600.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
8,700.0	0.00	0.00	8,700.0	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
8,722.5	0.00	0.00	8,722.5	0.0	0.0	435,188.90	692,494.40	32° 11' 41.713 N	103° 42' 39.810 W
8,800.0	9.30	160.70	8,799.7	-5.9	2.1	435,182.98	692,496.47	32° 11' 41.654 N	103° 42' 39.786 W
8,900.0	21.30	160.70	8,895.9	-30.8	10.8	435,158.12	692,505.17	32° 11' 41.408 N	103° 42' 39.687 W
9,000.0	33.30	160.70	8,984.6	-74.0	25.9	435,114.91	692,520.30	32° 11' 40.979 N	103° 42' 39.513 W
9,100.0	45.30	160.70	9,061.9	-133.7	46.8	435,055.25	692,541.20	32° 11' 40.388 N	103° 42' 39.274 W
9,200.0	57.30	160.70	9,124.3	-207.2	72.5	434,981.73	692,566.95	32° 11' 39.659 N	103° 42' 38.980 W
9,300.0	69.29	160.70	9,169.2	-291.3	102.0	434,897.57	692,596.42	32° 11' 38.824 N	103° 42' 38.642 W
9,400.0	81.29	160.70	9,194.5	-382.5	133.9	434,806.45	692,628.33	32° 11' 37.921 N	103° 42' 38.277 W
9,472.6	90.00	160.70	9,200.0	-450.7	157.8	434,738.23	692,652.22	32° 11' 37.244 N	103° 42' 38.004 W
9,500.0	90.00	161.80	9,200.0	-476.7	166.6	434,712.25	692,661.04	32° 11' 36.987 N	103° 42' 37.903 W
9,600.0	90.00	165.80	9,200.0	-572.7	194.5	434,616.24	692,688.94	32° 11' 36.035 N	103° 42' 37.585 W
9,700.0	90.00	169.80	9,200.0	-670.4	215.7	434,518.52	692,710.07	32° 11' 35.067 N	103° 42' 37.345 W
9,800.0	90.00	173.80	9,200.0	-769.3	229.9	434,419.56	692,724.33	32° 11' 34.087 N	103° 42' 37.186 W
9,900.0	90.00	177.80	9,200.0	-869.1	237.3	434,319.85	692,731.66	32° 11' 33.099 N	103° 42' 37.108 W
9,944.7	90.00	179.58	9,200.0	-913.7	238.3	434,275.19	692,732.68	32° 11' 32.657 N	103° 42' 37.099 W
10,000.0	90.00	179.58	9,200.0	-969.0	238.7	434,219.86	692,733.08	32° 11' 32.110 N	103° 42' 37.098 W
10,100.0	90.00	179.58	9,200.0	-1,069.0	239.4	434,119.87	692,733.80	32° 11' 31.120 N	103° 42' 37.096 W
10,200.0	90.00	179.58	9,200.0	-1,169.0	240.1	434,019.87	692,734.53	32° 11' 30.131 N	103° 42' 37.094 W
10,300.0	90.00	179.58	9,200.0	-1,269.0	240.9	433,919.87	692,735.25	32° 11' 29.141 N	103° 42' 37.093 W
10,400.0	90.00	179.58	9,200.0	-1,369.0	241.6	433,819.87	692,735.98	32° 11' 28.151 N	103° 42' 37.091 W
10,500.0	90.00	179.58	9,200.0	-1,469.0	242.3	433,719.88	692,736.70	32° 11' 27.162 N	103° 42' 37.089 W
10,600.0	90.00	179.58	9,200.0	-1,569.0	243.0	433,619.88	692,737.43	32° 11' 26.172 N	103° 42' 37.088 W
10,700.0	90.00	179.58	9,200.0	-1,669.0	243.8	433,519.88	692,738.15	32° 11' 25.183 N	103° 42' 37.086 W
10,800.0	90.00	179.58	9,200.0	-1,769.0	244.5	433,419.89	692,738.88	32° 11' 24.193 N	103° 42' 37.084 W
10,900.0	90.00	179.58	9,200.0	-1,869.0	245.2	433,319.89	692,739.60	32° 11' 23.203 N	103° 42' 37.083 W
11,000.0	90.00	179.58	9,200.0	-1,969.0	245.9	433,219.89	692,740.32	32° 11' 22.214 N	103° 42' 37.081 W
11,100.0	90.00	179.58	9,200.0	-2,069.0	246.7	433,119.89	692,741.05	32° 11' 21.224 N	103° 42' 37.079 W
11,200.0	90.00	179.58	9,200.0	-2,169.0	247.4	433,019.90	692,741.77	32° 11' 20.235 N	103° 42' 37.077 W
11,300.0	90.00	179.58	9,200.0	-2,269.0	248.1	432,919.90	692,742.50	32° 11' 19.245 N	103° 42' 37.076 W
11,400.0	90.00	179.58	9,200.0	-2,369.0	248.8	432,819.90	692,743.22	32° 11' 18.255 N	103° 42' 37.074 W
11,500.0	90.00	179.58	9,200.0	-2,469.0	249.6	432,719.90	692,743.95	32° 11' 17.266 N	103° 42' 37.072 W
11,600.0	90.00	179.58	9,200.0	-2,569.0	250.3	432,619.91	692,744.67	32° 11' 16.276 N	103° 42' 37.071 W
11,700.0	90.00	179.58	9,200.0	-2,669.0	251.0	432,519.91	692,745.40	32° 11' 15.287 N	103° 42' 37.069 W



COG PRODUCTION LLC

Survey Report - Geographic

Company:	COG PRODUCTION LLC	Local Co-ordinate Reference:	Well WINDWARD FEDERAL #10H
Project:	LEA COUNTY, NM	TVD Reference:	RKB=3550.8+26 @ 3576.8usft (McVay 8)
Site:	BULLDOG	MD Reference:	RKB=3550.8+26 @ 3576.8usft (McVay 8)
Well:	WINDWARD FEDERAL #10H	North Reference:	Grid
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	PWP1	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	
11,800.0	90.00	179.58	9,200.0	-2,769.0	251.7	432,419.91	692,746.12	32° 11' 14.297 N	103° 42' 37.067 W	
11,900.0	90.00	179.58	9,200.0	-2,869.0	252.4	432,319.91	692,746.85	32° 11' 13.307 N	103° 42' 37.066 W	
12,000.0	90.00	179.58	9,200.0	-2,969.0	253.2	432,219.92	692,747.57	32° 11' 12.318 N	103° 42' 37.064 W	
12,100.0	90.00	179.58	9,200.0	-3,069.0	253.9	432,119.92	692,748.29	32° 11' 11.328 N	103° 42' 37.062 W	
12,200.0	90.00	179.58	9,200.0	-3,169.0	254.6	432,019.92	692,749.02	32° 11' 10.339 N	103° 42' 37.061 W	
12,300.0	90.00	179.58	9,200.0	-3,269.0	255.3	431,919.92	692,749.74	32° 11' 9.349 N	103° 42' 37.059 W	
12,400.0	90.00	179.58	9,200.0	-3,369.0	256.1	431,819.93	692,750.47	32° 11' 8.359 N	103° 42' 37.057 W	
12,500.0	90.00	179.58	9,200.0	-3,469.0	256.8	431,719.93	692,751.19	32° 11' 7.370 N	103° 42' 37.055 W	
12,600.0	90.00	179.58	9,200.0	-3,569.0	257.5	431,619.93	692,751.92	32° 11' 6.380 N	103° 42' 37.054 W	
12,700.0	90.00	179.58	9,200.0	-3,669.0	258.2	431,519.94	692,752.64	32° 11' 5.391 N	103° 42' 37.052 W	
12,800.0	90.00	179.58	9,200.0	-3,769.0	259.0	431,419.94	692,753.37	32° 11' 4.401 N	103° 42' 37.050 W	
12,900.0	90.00	179.58	9,200.0	-3,869.0	259.7	431,319.94	692,754.09	32° 11' 3.411 N	103° 42' 37.049 W	
13,000.0	90.00	179.58	9,200.0	-3,969.0	260.4	431,219.94	692,754.82	32° 11' 2.422 N	103° 42' 37.047 W	
13,100.0	90.00	179.58	9,200.0	-4,069.0	261.1	431,119.95	692,755.54	32° 11' 1.432 N	103° 42' 37.045 W	
13,200.0	90.00	179.58	9,200.0	-4,169.0	261.9	431,019.95	692,756.26	32° 11' 0.443 N	103° 42' 37.044 W	
13,300.0	90.00	179.58	9,200.0	-4,268.9	262.6	430,919.95	692,756.99	32° 10' 59.453 N	103° 42' 37.042 W	
13,400.0	90.00	179.58	9,200.0	-4,368.9	263.3	430,819.95	692,757.71	32° 10' 58.463 N	103° 42' 37.040 W	
13,500.0	90.00	179.58	9,200.0	-4,468.9	264.0	430,719.96	692,758.44	32° 10' 57.474 N	103° 42' 37.039 W	
13,600.0	90.00	179.58	9,200.0	-4,568.9	264.8	430,619.96	692,759.16	32° 10' 56.484 N	103° 42' 37.037 W	
13,700.0	90.00	179.58	9,200.0	-4,668.9	265.5	430,519.96	692,759.89	32° 10' 55.495 N	103° 42' 37.035 W	
13,800.0	90.00	179.58	9,200.0	-4,768.9	266.2	430,419.96	692,760.61	32° 10' 54.505 N	103° 42' 37.033 W	
13,900.0	90.00	179.58	9,200.0	-4,868.9	266.9	430,319.97	692,761.34	32° 10' 53.515 N	103° 42' 37.032 W	
14,000.0	90.00	179.58	9,200.0	-4,968.9	267.7	430,219.97	692,762.06	32° 10' 52.526 N	103° 42' 37.030 W	
14,100.0	90.00	179.58	9,200.0	-5,068.9	268.4	430,119.97	692,762.79	32° 10' 51.536 N	103° 42' 37.028 W	
14,200.0	90.00	179.58	9,200.0	-5,168.9	269.1	430,019.97	692,763.51	32° 10' 50.547 N	103° 42' 37.027 W	
14,300.0	90.00	179.58	9,200.0	-5,268.9	269.8	429,919.98	692,764.24	32° 10' 49.557 N	103° 42' 37.025 W	
14,400.0	90.00	179.58	9,200.0	-5,368.9	270.6	429,819.98	692,764.96	32° 10' 48.567 N	103° 42' 37.023 W	
14,500.0	90.00	179.58	9,200.0	-5,468.9	271.3	429,719.98	692,765.68	32° 10' 47.578 N	103° 42' 37.022 W	
14,600.0	90.00	179.58	9,200.0	-5,568.9	272.0	429,619.99	692,766.41	32° 10' 46.588 N	103° 42' 37.020 W	
14,700.0	90.00	179.58	9,200.0	-5,668.9	272.7	429,519.99	692,767.13	32° 10' 45.599 N	103° 42' 37.018 W	
14,800.0	90.00	179.58	9,200.0	-5,768.9	273.5	429,419.99	692,767.86	32° 10' 44.609 N	103° 42' 37.017 W	
14,900.0	90.00	179.58	9,200.0	-5,868.9	274.2	429,319.99	692,768.58	32° 10' 43.619 N	103° 42' 37.015 W	
15,000.0	90.00	179.58	9,200.0	-5,968.9	274.9	429,220.00	692,769.31	32° 10' 42.630 N	103° 42' 37.013 W	
15,100.0	90.00	179.58	9,200.0	-6,068.9	275.6	429,120.00	692,770.03	32° 10' 41.640 N	103° 42' 37.011 W	
15,200.0	90.00	179.58	9,200.0	-6,168.9	276.4	429,020.00	692,770.76	32° 10' 40.651 N	103° 42' 37.010 W	
15,300.0	90.00	179.58	9,200.0	-6,268.9	277.1	428,920.00	692,771.48	32° 10' 39.661 N	103° 42' 37.008 W	
15,400.0	90.00	179.58	9,200.0	-6,368.9	277.8	428,820.01	692,772.21	32° 10' 38.671 N	103° 42' 37.006 W	
15,500.0	90.00	179.58	9,200.0	-6,468.9	278.5	428,720.01	692,772.93	32° 10' 37.682 N	103° 42' 37.005 W	
15,600.0	90.00	179.58	9,200.0	-6,568.9	279.3	428,620.01	692,773.65	32° 10' 36.692 N	103° 42' 37.003 W	
15,700.0	90.00	179.58	9,200.0	-6,668.9	280.0	428,520.01	692,774.38	32° 10' 35.703 N	103° 42' 37.001 W	
15,800.0	90.00	179.58	9,200.0	-6,768.9	280.7	428,420.02	692,775.10	32° 10' 34.713 N	103° 42' 37.000 W	
15,900.0	90.00	179.58	9,200.0	-6,868.9	281.4	428,320.02	692,775.83	32° 10' 33.723 N	103° 42' 36.998 W	
16,000.0	90.00	179.58	9,200.0	-6,968.9	282.2	428,220.02	692,776.55	32° 10' 32.734 N	103° 42' 36.996 W	
16,100.0	90.00	179.58	9,200.0	-7,068.9	282.9	428,120.02	692,777.28	32° 10' 31.744 N	103° 42' 36.995 W	
16,200.0	90.00	179.58	9,200.0	-7,168.9	283.6	428,020.03	692,778.00	32° 10' 30.755 N	103° 42' 36.993 W	
16,300.0	90.00	179.58	9,200.0	-7,268.9	284.3	427,920.03	692,778.73	32° 10' 29.765 N	103° 42' 36.991 W	
16,400.0	90.00	179.58	9,200.0	-7,368.9	285.1	427,820.03	692,779.45	32° 10' 28.775 N	103° 42' 36.989 W	
16,500.0	90.00	179.58	9,200.0	-7,468.9	285.8	427,720.03	692,780.18	32° 10' 27.786 N	103° 42' 36.988 W	
16,600.0	90.00	179.58	9,200.0	-7,568.9	286.5	427,620.04	692,780.90	32° 10' 26.796 N	103° 42' 36.986 W	
16,700.0	90.00	179.58	9,200.0	-7,668.9	287.2	427,520.04	692,781.62	32° 10' 25.807 N	103° 42' 36.984 W	
16,800.0	90.00	179.58	9,200.0	-7,768.9	288.0	427,420.04	692,782.35	32° 10' 24.817 N	103° 42' 36.983 W	
16,900.0	90.00	179.58	9,200.0	-7,868.9	288.7	427,320.05	692,783.07	32° 10' 23.827 N	103° 42' 36.981 W	
17,000.0	90.00	179.58	9,200.0	-7,968.9	289.4	427,220.05	692,783.80	32° 10' 22.838 N	103° 42' 36.979 W	
17,100.0	90.00	179.58	9,200.0	-8,068.8	290.1	427,120.05	692,784.52	32° 10' 21.848 N	103° 42' 36.978 W	
17,200.0	90.00	179.58	9,200.0	-8,168.8	290.9	427,020.05	692,785.25	32° 10' 20.859 N	103° 42' 36.976 W	



COG PRODUCTION LLC

Survey Report - Geographic

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Site: BULLDOG
Well: WINDWARD FEDERAL #10H
Wellbore: OWB
Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #10H
TVD Reference: RKB=3550.8+26 @ 3576.8usft (McVay 8)
MD Reference: RKB=3550.8+26 @ 3576.8usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
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	90.00	179.58	9,200.0	-8,268.8	291.6	426,920.06	692,785.97	32° 10' 19.869 N	103° 42' 36.974 W
17,400.0	90.00	179.58	9,200.0	-8,368.8	292.3	426,820.06	692,786.70	32° 10' 18.879 N	103° 42' 36.973 W
17,500.0	90.00	179.58	9,200.0	-8,468.8	293.0	426,720.06	692,787.42	32° 10' 17.890 N	103° 42' 36.971 W
17,600.0	90.00	179.58	9,200.0	-8,568.8	293.8	426,620.06	692,788.15	32° 10' 16.900 N	103° 42' 36.969 W
17,700.0	90.00	179.58	9,200.0	-8,668.8	294.5	426,520.07	692,788.87	32° 10' 15.911 N	103° 42' 36.967 W
17,800.0	90.00	179.58	9,200.0	-8,768.8	295.2	426,420.07	692,789.59	32° 10' 14.921 N	103° 42' 36.966 W
17,900.0	90.00	179.58	9,200.0	-8,868.8	295.9	426,320.07	692,790.32	32° 10' 13.931 N	103° 42' 36.964 W
18,000.0	90.00	179.58	9,200.0	-8,968.8	296.6	426,220.07	692,791.04	32° 10' 12.942 N	103° 42' 36.962 W
18,100.0	90.00	179.58	9,200.0	-9,068.8	297.4	426,120.08	692,791.77	32° 10' 11.952 N	103° 42' 36.961 W
18,200.0	90.00	179.58	9,200.0	-9,168.8	298.1	426,020.08	692,792.49	32° 10' 10.963 N	103° 42' 36.959 W
18,300.0	90.00	179.58	9,200.0	-9,268.8	298.8	425,920.08	692,793.22	32° 10' 9.973 N	103° 42' 36.957 W
18,400.0	90.00	179.58	9,200.0	-9,368.8	299.5	425,820.08	692,793.94	32° 10' 8.983 N	103° 42' 36.956 W
18,500.0	90.00	179.58	9,200.0	-9,468.8	300.3	425,720.09	692,794.67	32° 10' 7.994 N	103° 42' 36.954 W
18,600.0	90.00	179.58	9,200.0	-9,568.8	301.0	425,620.09	692,795.39	32° 10' 7.004 N	103° 42' 36.952 W
18,700.0	90.00	179.58	9,200.0	-9,668.8	301.7	425,520.09	692,796.12	32° 10' 6.015 N	103° 42' 36.951 W
18,800.0	90.00	179.58	9,200.0	-9,768.8	302.4	425,420.10	692,796.84	32° 10' 5.025 N	103° 42' 36.949 W
18,900.0	90.00	179.58	9,200.0	-9,868.8	303.2	425,320.10	692,797.57	32° 10' 4.035 N	103° 42' 36.947 W
19,000.0	90.00	179.58	9,200.0	-9,968.8	303.9	425,220.10	692,798.29	32° 10' 3.046 N	103° 42' 36.945 W
19,100.0	90.00	179.58	9,200.0	-10,068.8	304.6	425,120.10	692,799.01	32° 10' 2.056 N	103° 42' 36.944 W
19,180.2	90.00	179.58	9,200.0	-10,149.0	305.2	425,039.90	692,799.60	32° 10' 1.262 N	103° 42' 36.942 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-Windward - plan hits target center - Point	0.00	0.00	9,200.0	-10,149.0	305.2	425,039.90	692,799.60	32° 10' 1.262 N	103° 42' 36.942 W

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Comment
8723	8723	0	0	Start Build 12.00
9473	9200	-451	158	Start DLS 4.00 TFO 90.00
9945	9200	-914	238	Start 9385.6 hold at 9944.7 MD
19,330				TD at 19330.2

Checked By: _____ Approved By: _____ Date: _____



WELL DETAILS: **WINDWARD FEDERAL #10H**
 Ground Level: 3550.8
 Slot

	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
	0.0	0.0	435188.90	692494.40	32° 11' 41.713 N	103° 42' 39.810 W

SECTION DETAILS									
	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	8722.5	0.00	0.00	8722.5	0.0	0.0	0.00	0.00	0.0
3	9472.6	90.00	160.70	9200.0	-450.7	157.8	12.00	160.70	455.2
4	9944.7	90.00	179.58	9200.0	-913.7	238.3	4.00	90.00	920.5
5	19180.2	90.00	179.58	9200.0	-10149.0	305.2	0.00	90.00	10153.6

Project: LEA COUNTY, NM
 Site: BULLDOG
 Well: WINDWARD FEDERAL #10H
 Wellbore: OWB
 Design: **PWP1**

LEGEND

- PADUCA FEDERAL #1, OWB, INC ONLY - WELLPATH V0
- WINDWARD FEDERAL #3H, OWB, ACTUAL WELLPATH V0
- KING TUT FEDERAL #3H, OWB, ACTUAL WELLPATH V0
- WINDWARD FEDERAL #9H, OWB, PWP1 V0
- PWP1

