



WELL DETAILS: **WINDWARD FEDERAL #11H**
 Ground Level: 3547.8
 Northing 435203.10 Easting 693884.30 32° 11' 41.774 N 103° 42' 23.635 W Slot

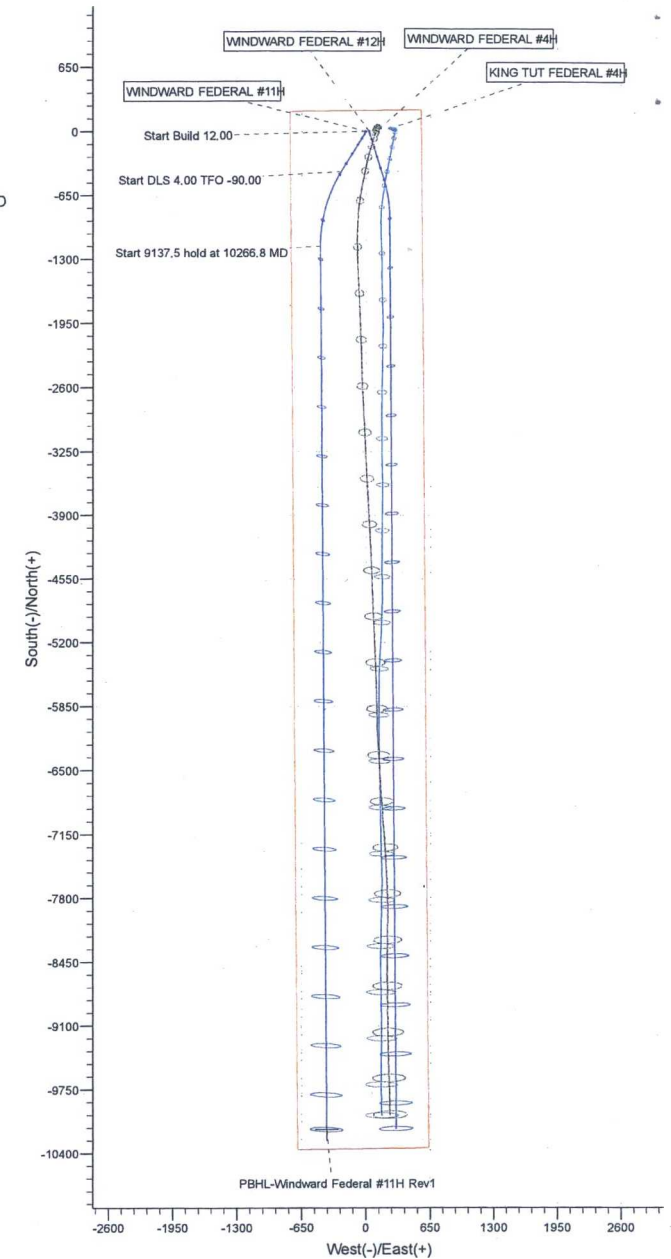
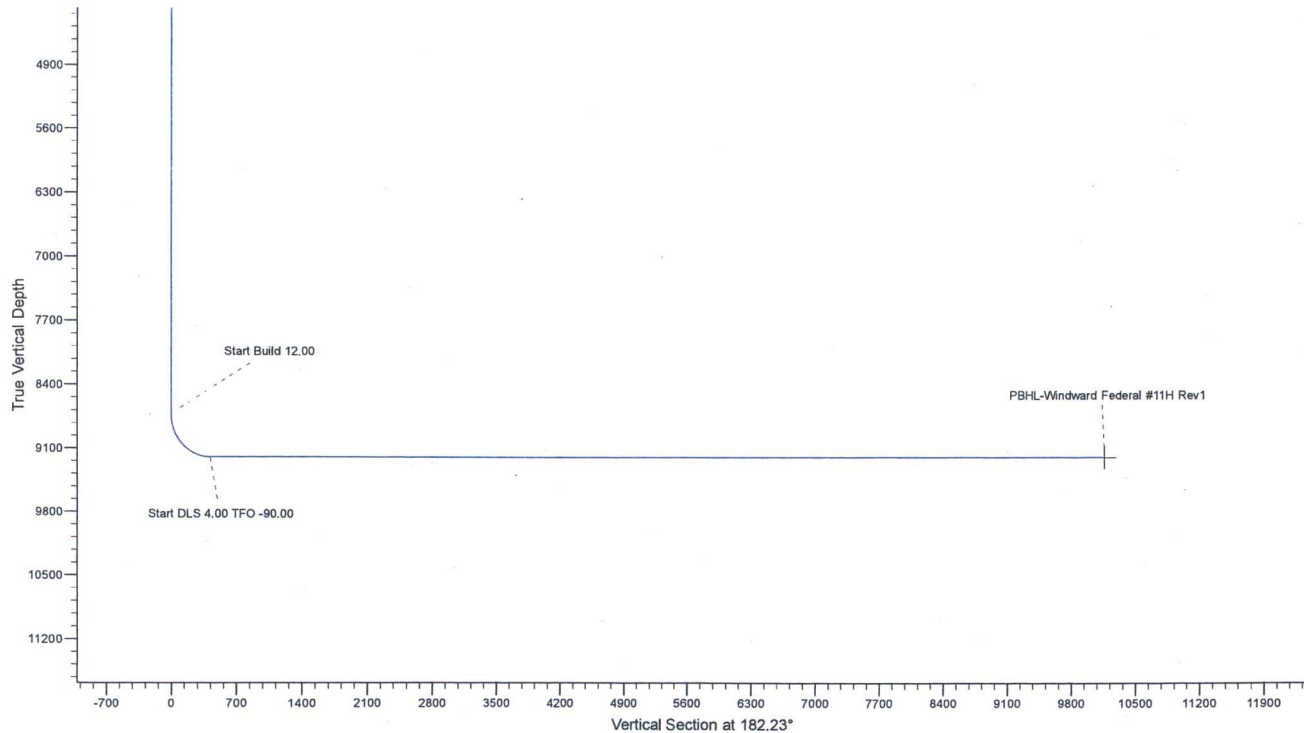
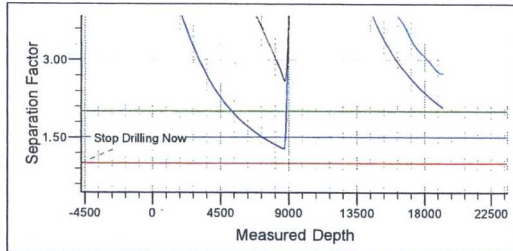
SECTION DETAILS									
	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0
2	8717.5	0.00	0.00	8717.5	0.0	0.0	0.00	0.00	0.0
3	9467.6	90.00	211.55	9195.0	-406.9	-249.8	12.00	211.55	416.3
4	10266.8	90.00	179.58	9195.0	-1166.9	-461.5	4.00	-90.00	1184.0
5	19254.3	90.00	179.58	9195.0	-10154.2	-395.7	0.00	0.00	10161.9

Annotation
 Start Build 12.00
 Start DLS 4.00 TFO -90.00
 Start 9137.5 hold at 10266.8 MD

Project: LEA COUNTY, NM
 Site: BULLDOG
 Well: WINDWARD FEDERAL #11H
 Wellbore: OWB
 Design: **PWP1**

LEGEND

- KING TUT FEDERAL #4H, OWB, ACTUAL WELLPATH V0
- WINDWARD FEDERAL #12H, OWB, PWP1 V0
- ⊕ WINDWARD FEDERAL #4H, OWB, ACTUAL WELLPATH V0
- PWP1





CONCHO

COG PRODUCTION LLC

LEA COUNTY, NM

BULLDOG

WINDWARD FEDERAL #11H

OWB

Plan: PWP1

Survey Report - Geographic

20 December, 2016

HOBBS OCD
MAR 22 2017
RECEIVED



COG PRODUCTION LLC

Survey Report - Geographic

Company:	COG PRODUCTION LLC	Local Co-ordinate Reference:	Well WINDWARD FEDERAL #11H
Project:	LEA COUNTY, NM	TVD Reference:	RKB=3547.8+26 @ 3573.8usft (McVay 8)
Site:	BULLDOG	MD Reference:	RKB=3547.8+26 @ 3573.8usft (McVay 8)
Well:	WINDWARD FEDERAL #11H	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 #11H		
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' 41.774 N
		Longitude:	103° 42' 23.635 W
		Ground Level:	3,547.8 usf

Wellbore	OWB		
Magnetics	Model Name	Sample Date	Declination (°)
	WMM2015	8/29/2016	7.12
			Dip Angle (°)
			60.01
			Field Strength (nT)
			47,978.70163514

Design	PWP1		
Audit Notes:			
Version:	Phase:	PROTOTYPE	Tie On Depth:
			0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)
	9,195.0	0.0	0.0
			Direction (°)
			182.23

Survey Tool Program	Date	12/20/2016		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.0	8,717.5	PWP1 (OWB)	Standard Keeper 104	Standard Wireline Keeper ver 1.0.4
8,717.5	19,254.3	PWP1 (OWB)	MWD	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	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
100.0	0.00	0.00	100.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
200.0	0.00	0.00	200.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
300.0	0.00	0.00	300.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
400.0	0.00	0.00	400.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
500.0	0.00	0.00	500.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
600.0	0.00	0.00	600.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
700.0	0.00	0.00	700.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
800.0	0.00	0.00	800.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
900.0	0.00	0.00	900.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
1,000.0	0.00	0.00	1,000.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	



COG PRODUCTION LLC

Survey Report - Geographic

Company:	COG PRODUCTION LLC	Local Co-ordinate Reference:	Well WINDWARD FEDERAL #11H
Project:	LEA COUNTY, NM	TVD Reference:	RKB=3547.8+26 @ 3573.8usft (McVay 8)
Site:	BULLDOG	MD Reference:	RKB=3547.8+26 @ 3573.8usft (McVay 8)
Well:	WINDWARD FEDERAL #11H	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
1,100.0	0.00	0.00	1,100.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
1,200.0	0.00	0.00	1,200.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
1,300.0	0.00	0.00	1,300.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
1,400.0	0.00	0.00	1,400.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
1,500.0	0.00	0.00	1,500.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
1,600.0	0.00	0.00	1,600.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
1,700.0	0.00	0.00	1,700.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
1,800.0	0.00	0.00	1,800.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
1,900.0	0.00	0.00	1,900.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
2,000.0	0.00	0.00	2,000.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
2,100.0	0.00	0.00	2,100.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
2,200.0	0.00	0.00	2,200.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
2,300.0	0.00	0.00	2,300.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
2,400.0	0.00	0.00	2,400.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
2,500.0	0.00	0.00	2,500.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
2,600.0	0.00	0.00	2,600.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
2,700.0	0.00	0.00	2,700.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
2,800.0	0.00	0.00	2,800.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
2,900.0	0.00	0.00	2,900.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
3,000.0	0.00	0.00	3,000.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
3,100.0	0.00	0.00	3,100.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
3,200.0	0.00	0.00	3,200.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
3,300.0	0.00	0.00	3,300.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
3,400.0	0.00	0.00	3,400.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
3,500.0	0.00	0.00	3,500.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
3,600.0	0.00	0.00	3,600.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
3,700.0	0.00	0.00	3,700.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
3,800.0	0.00	0.00	3,800.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
3,900.0	0.00	0.00	3,900.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
4,000.0	0.00	0.00	4,000.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
4,100.0	0.00	0.00	4,100.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
4,200.0	0.00	0.00	4,200.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
4,300.0	0.00	0.00	4,300.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
4,400.0	0.00	0.00	4,400.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
4,500.0	0.00	0.00	4,500.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
4,600.0	0.00	0.00	4,600.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
4,700.0	0.00	0.00	4,700.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
4,800.0	0.00	0.00	4,800.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
4,900.0	0.00	0.00	4,900.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
5,000.0	0.00	0.00	5,000.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
5,100.0	0.00	0.00	5,100.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
5,200.0	0.00	0.00	5,200.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
5,300.0	0.00	0.00	5,300.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
5,400.0	0.00	0.00	5,400.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
5,500.0	0.00	0.00	5,500.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
5,600.0	0.00	0.00	5,600.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
5,700.0	0.00	0.00	5,700.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
5,800.0	0.00	0.00	5,800.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
5,900.0	0.00	0.00	5,900.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
6,000.0	0.00	0.00	6,000.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
6,100.0	0.00	0.00	6,100.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
6,200.0	0.00	0.00	6,200.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
6,300.0	0.00	0.00	6,300.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
6,400.0	0.00	0.00	6,400.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W
6,500.0	0.00	0.00	6,500.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W



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Survey Report - Geographic

Company:	COG PRODUCTION LLC	Local Co-ordinate Reference:	Well WINDWARD FEDERAL #11H
Project:	LEA COUNTY, NM	TVD Reference:	RKB=3547.8+26 @ 3573.8usft (McVay 8)
Site:	BULLDOG	MD Reference:	RKB=3547.8+26 @ 3573.8usft (McVay 8)
Well:	WINDWARD FEDERAL #11H	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	
6,600.0	0.00	0.00	6,600.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
6,700.0	0.00	0.00	6,700.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
6,800.0	0.00	0.00	6,800.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
6,900.0	0.00	0.00	6,900.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
7,000.0	0.00	0.00	7,000.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
7,100.0	0.00	0.00	7,100.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
7,200.0	0.00	0.00	7,200.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
7,300.0	0.00	0.00	7,300.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
7,400.0	0.00	0.00	7,400.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
7,500.0	0.00	0.00	7,500.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
7,600.0	0.00	0.00	7,600.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
7,700.0	0.00	0.00	7,700.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
7,800.0	0.00	0.00	7,800.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
7,900.0	0.00	0.00	7,900.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
8,000.0	0.00	0.00	8,000.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
8,100.0	0.00	0.00	8,100.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
8,200.0	0.00	0.00	8,200.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
8,300.0	0.00	0.00	8,300.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
8,400.0	0.00	0.00	8,400.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
8,500.0	0.00	0.00	8,500.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
8,600.0	0.00	0.00	8,600.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
8,700.0	0.00	0.00	8,700.0	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
8,717.5	0.00	0.01	8,717.5	0.0	0.0	435,203.10	693,884.30	32° 11' 41.774 N	103° 42' 23.635 W	
8,800.0	9.90	211.55	8,799.6	-6.1	-3.7	435,197.04	693,880.58	32° 11' 41.714 N	103° 42' 23.678 W	
8,900.0	21.90	211.55	8,895.6	-29.4	-18.0	435,173.74	693,866.27	32° 11' 41.484 N	103° 42' 23.846 W	
9,000.0	33.90	211.55	8,983.8	-69.2	-42.5	435,133.94	693,841.83	32° 11' 41.092 N	103° 42' 24.133 W	
9,100.0	45.90	211.55	9,060.4	-123.7	-76.0	435,079.38	693,808.33	32° 11' 40.554 N	103° 42' 24.527 W	
9,200.0	57.90	211.55	9,122.0	-190.7	-117.1	435,012.44	693,767.23	32° 11' 39.894 N	103° 42' 25.010 W	
9,300.0	69.89	211.55	9,165.9	-267.0	-164.0	434,936.06	693,720.33	32° 11' 39.140 N	103° 42' 25.561 W	
9,400.0	81.89	211.55	9,190.2	-349.5	-214.6	434,853.56	693,669.68	32° 11' 38.327 N	103° 42' 26.156 W	
9,467.6	90.00	211.55	9,195.0	-406.9	-249.8	434,796.18	693,634.45	32° 11' 37.761 N	103° 42' 26.570 W	
9,500.0	90.00	210.25	9,195.0	-434.8	-266.5	434,768.34	693,617.79	32° 11' 37.487 N	103° 42' 26.765 W	
9,600.0	90.00	206.25	9,195.0	-522.8	-313.8	434,680.27	693,570.46	32° 11' 36.618 N	103° 42' 27.322 W	
9,700.0	90.00	202.25	9,195.0	-614.0	-354.9	434,589.12	693,529.39	32° 11' 35.718 N	103° 42' 27.806 W	
9,800.0	90.00	198.25	9,195.0	-707.8	-389.5	434,495.32	693,494.78	32° 11' 34.792 N	103° 42' 28.215 W	
9,900.0	90.00	194.25	9,195.0	-803.8	-417.5	434,399.33	693,466.80	32° 11' 33.844 N	103° 42' 28.547 W	
10,000.0	90.00	190.25	9,195.0	-901.5	-438.7	434,301.63	693,445.59	32° 11' 32.878 N	103° 42' 28.801 W	
10,100.0	90.00	186.25	9,195.0	-1,000.4	-453.1	434,202.69	693,431.24	32° 11' 31.900 N	103° 42' 28.975 W	
10,200.0	90.00	182.25	9,195.0	-1,100.1	-460.5	434,102.98	693,423.82	32° 11' 30.914 N	103° 42' 29.068 W	
10,266.8	90.00	179.58	9,195.0	-1,166.9	-461.5	434,036.20	693,422.75	32° 11' 30.253 N	103° 42' 29.085 W	
10,300.0	90.00	179.58	9,195.0	-1,200.1	-461.3	434,003.00	693,423.00	32° 11' 29.924 N	103° 42' 29.084 W	
10,400.0	90.00	179.58	9,195.0	-1,300.1	-460.6	433,903.00	693,423.73	32° 11' 28.935 N	103° 42' 29.082 W	
10,500.0	90.00	179.58	9,195.0	-1,400.1	-459.8	433,803.00	693,424.46	32° 11' 27.945 N	103° 42' 29.080 W	
10,600.0	90.00	179.58	9,195.0	-1,500.1	-459.1	433,703.01	693,425.20	32° 11' 26.955 N	103° 42' 29.079 W	
10,700.0	90.00	179.58	9,195.0	-1,600.1	-458.4	433,603.01	693,425.93	32° 11' 25.966 N	103° 42' 29.077 W	
10,800.0	90.00	179.58	9,195.0	-1,700.1	-457.6	433,503.01	693,426.66	32° 11' 24.976 N	103° 42' 29.075 W	
10,900.0	90.00	179.58	9,195.0	-1,800.1	-456.9	433,403.01	693,427.39	32° 11' 23.987 N	103° 42' 29.073 W	
11,000.0	90.00	179.58	9,195.0	-1,900.1	-456.2	433,303.02	693,428.13	32° 11' 22.997 N	103° 42' 29.072 W	
11,100.0	90.00	179.58	9,195.0	-2,000.1	-455.4	433,203.02	693,428.86	32° 11' 22.007 N	103° 42' 29.070 W	
11,200.0	90.00	179.58	9,195.0	-2,100.1	-454.7	433,103.02	693,429.59	32° 11' 21.018 N	103° 42' 29.068 W	
11,300.0	90.00	179.58	9,195.0	-2,200.1	-454.0	433,003.03	693,430.32	32° 11' 20.028 N	103° 42' 29.066 W	
11,400.0	90.00	179.58	9,195.0	-2,300.1	-453.2	432,903.03	693,431.06	32° 11' 19.039 N	103° 42' 29.065 W	
11,500.0	90.00	179.58	9,195.0	-2,400.1	-452.5	432,803.03	693,431.79	32° 11' 18.049 N	103° 42' 29.063 W	
11,600.0	90.00	179.58	9,195.0	-2,500.1	-451.8	432,703.03	693,432.52	32° 11' 17.059 N	103° 42' 29.061 W	
11,700.0	90.00	179.58	9,195.0	-2,600.1	-451.0	432,603.04	693,433.25	32° 11' 16.070 N	103° 42' 29.059 W	



COG PRODUCTION LLC

Survey Report - Geographic

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Site: BULLDOG
Well: WINDWARD FEDERAL #11H
Wellbore: OWB
Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #11H
TVD Reference: RKB=3547.8+26 @ 3573.8usft (McVay 8)
MD Reference: RKB=3547.8+26 @ 3573.8usft (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
11,800.0	90.00	179.58	9,195.0	-2,700.1	-450.3	432,503.04	693,433.99	32° 11' 15.080 N	103° 42' 29.058 W
11,900.0	90.00	179.58	9,195.0	-2,800.1	-449.6	432,403.04	693,434.72	32° 11' 14.091 N	103° 42' 29.056 W
12,000.0	90.00	179.58	9,195.0	-2,900.1	-448.8	432,303.04	693,435.45	32° 11' 13.101 N	103° 42' 29.054 W
12,100.0	90.00	179.58	9,195.0	-3,000.1	-448.1	432,203.05	693,436.18	32° 11' 12.111 N	103° 42' 29.052 W
12,200.0	90.00	179.58	9,195.0	-3,100.1	-447.4	432,103.05	693,436.92	32° 11' 11.122 N	103° 42' 29.051 W
12,300.0	90.00	179.58	9,195.0	-3,200.0	-446.6	432,003.05	693,437.65	32° 11' 10.132 N	103° 42' 29.049 W
12,400.0	90.00	179.58	9,195.0	-3,300.0	-445.9	431,903.05	693,438.38	32° 11' 9.143 N	103° 42' 29.047 W
12,500.0	90.00	179.58	9,195.0	-3,400.0	-445.2	431,803.06	693,439.11	32° 11' 8.153 N	103° 42' 29.045 W
12,600.0	90.00	179.58	9,195.0	-3,500.0	-444.4	431,703.06	693,439.85	32° 11' 7.163 N	103° 42' 29.044 W
12,700.0	90.00	179.58	9,195.0	-3,600.0	-443.7	431,603.06	693,440.58	32° 11' 6.174 N	103° 42' 29.042 W
12,800.0	90.00	179.58	9,195.0	-3,700.0	-443.0	431,503.07	693,441.31	32° 11' 5.184 N	103° 42' 29.040 W
12,900.0	90.00	179.58	9,195.0	-3,800.0	-442.3	431,403.07	693,442.04	32° 11' 4.195 N	103° 42' 29.038 W
13,000.0	90.00	179.58	9,195.0	-3,900.0	-441.5	431,303.07	693,442.78	32° 11' 3.205 N	103° 42' 29.036 W
13,100.0	90.00	179.58	9,195.0	-4,000.0	-440.8	431,203.07	693,443.51	32° 11' 2.215 N	103° 42' 29.035 W
13,200.0	90.00	179.58	9,195.0	-4,100.0	-440.1	431,103.08	693,444.24	32° 11' 1.226 N	103° 42' 29.033 W
13,300.0	90.00	179.58	9,195.0	-4,200.0	-439.3	431,003.08	693,444.98	32° 11' 0.236 N	103° 42' 29.031 W
13,400.0	90.00	179.58	9,195.0	-4,300.0	-438.6	430,903.08	693,445.71	32° 10' 59.247 N	103° 42' 29.029 W
13,500.0	90.00	179.58	9,195.0	-4,400.0	-437.9	430,803.08	693,446.44	32° 10' 58.257 N	103° 42' 29.028 W
13,600.0	90.00	179.58	9,195.0	-4,500.0	-437.1	430,703.09	693,447.17	32° 10' 57.267 N	103° 42' 29.026 W
13,700.0	90.00	179.58	9,195.0	-4,600.0	-436.4	430,603.09	693,447.91	32° 10' 56.278 N	103° 42' 29.024 W
13,800.0	90.00	179.58	9,195.0	-4,700.0	-435.7	430,503.09	693,448.64	32° 10' 55.288 N	103° 42' 29.022 W
13,900.0	90.00	179.58	9,195.0	-4,800.0	-434.9	430,403.10	693,449.37	32° 10' 54.299 N	103° 42' 29.021 W
14,000.0	90.00	179.58	9,195.0	-4,900.0	-434.2	430,303.10	693,450.10	32° 10' 53.309 N	103° 42' 29.019 W
14,100.0	90.00	179.58	9,195.0	-5,000.0	-433.5	430,203.10	693,450.84	32° 10' 52.319 N	103° 42' 29.017 W
14,200.0	90.00	179.58	9,195.0	-5,100.0	-432.7	430,103.10	693,451.57	32° 10' 51.330 N	103° 42' 29.015 W
14,300.0	90.00	179.58	9,195.0	-5,200.0	-432.0	430,003.11	693,452.30	32° 10' 50.340 N	103° 42' 29.014 W
14,400.0	90.00	179.58	9,195.0	-5,300.0	-431.3	429,903.11	693,453.03	32° 10' 49.351 N	103° 42' 29.012 W
14,500.0	90.00	179.58	9,195.0	-5,400.0	-430.5	429,803.11	693,453.77	32° 10' 48.361 N	103° 42' 29.010 W
14,600.0	90.00	179.58	9,195.0	-5,500.0	-429.8	429,703.11	693,454.50	32° 10' 47.371 N	103° 42' 29.008 W
14,700.0	90.00	179.58	9,195.0	-5,600.0	-429.1	429,603.12	693,455.23	32° 10' 46.382 N	103° 42' 29.007 W
14,800.0	90.00	179.58	9,195.0	-5,700.0	-428.3	429,503.12	693,455.96	32° 10' 45.392 N	103° 42' 29.005 W
14,900.0	90.00	179.58	9,195.0	-5,800.0	-427.6	429,403.12	693,456.70	32° 10' 44.403 N	103° 42' 29.003 W
15,000.0	90.00	179.58	9,195.0	-5,900.0	-426.9	429,303.12	693,457.43	32° 10' 43.413 N	103° 42' 29.001 W
15,100.0	90.00	179.58	9,195.0	-6,000.0	-426.1	429,203.13	693,458.16	32° 10' 42.423 N	103° 42' 28.999 W
15,200.0	90.00	179.58	9,195.0	-6,100.0	-425.4	429,103.13	693,458.89	32° 10' 41.434 N	103° 42' 28.998 W
15,300.0	90.00	179.58	9,195.0	-6,200.0	-424.7	429,003.13	693,459.63	32° 10' 40.444 N	103° 42' 28.996 W
15,400.0	90.00	179.58	9,195.0	-6,300.0	-423.9	428,903.14	693,460.36	32° 10' 39.455 N	103° 42' 28.994 W
15,500.0	90.00	179.58	9,195.0	-6,400.0	-423.2	428,803.14	693,461.09	32° 10' 38.465 N	103° 42' 28.992 W
15,600.0	90.00	179.58	9,195.0	-6,500.0	-422.5	428,703.14	693,461.82	32° 10' 37.475 N	103° 42' 28.991 W
15,700.0	90.00	179.58	9,195.0	-6,600.0	-421.7	428,603.14	693,462.56	32° 10' 36.486 N	103° 42' 28.989 W
15,800.0	90.00	179.58	9,195.0	-6,700.0	-421.0	428,503.15	693,463.29	32° 10' 35.496 N	103° 42' 28.987 W
15,900.0	90.00	179.58	9,195.0	-6,800.0	-420.3	428,403.15	693,464.02	32° 10' 34.507 N	103° 42' 28.985 W
16,000.0	90.00	179.58	9,195.0	-6,899.9	-419.5	428,303.15	693,464.75	32° 10' 33.517 N	103° 42' 28.984 W
16,100.0	90.00	179.58	9,195.0	-6,999.9	-418.8	428,203.15	693,465.49	32° 10' 32.527 N	103° 42' 28.982 W
16,200.0	90.00	179.58	9,195.0	-7,099.9	-418.1	428,103.16	693,466.22	32° 10' 31.538 N	103° 42' 28.980 W
16,300.0	90.00	179.58	9,195.0	-7,199.9	-417.3	428,003.16	693,466.95	32° 10' 30.548 N	103° 42' 28.978 W
16,400.0	90.00	179.58	9,195.0	-7,299.9	-416.6	427,903.16	693,467.69	32° 10' 29.559 N	103° 42' 28.977 W
16,500.0	90.00	179.58	9,195.0	-7,399.9	-415.9	427,803.16	693,468.42	32° 10' 28.569 N	103° 42' 28.975 W
16,600.0	90.00	179.58	9,195.0	-7,499.9	-415.1	427,703.17	693,469.15	32° 10' 27.579 N	103° 42' 28.973 W
16,700.0	90.00	179.58	9,195.0	-7,599.9	-414.4	427,603.17	693,469.88	32° 10' 26.590 N	103° 42' 28.971 W
16,800.0	90.00	179.58	9,195.0	-7,699.9	-413.7	427,503.17	693,470.62	32° 10' 25.600 N	103° 42' 28.970 W
16,900.0	90.00	179.58	9,195.0	-7,799.9	-412.9	427,403.18	693,471.35	32° 10' 24.611 N	103° 42' 28.968 W
17,000.0	90.00	179.58	9,195.0	-7,899.9	-412.2	427,303.18	693,472.08	32° 10' 23.621 N	103° 42' 28.966 W
17,100.0	90.00	179.58	9,195.0	-7,999.9	-411.5	427,203.18	693,472.81	32° 10' 22.631 N	103° 42' 28.964 W
17,200.0	90.00	179.58	9,195.0	-8,099.9	-410.7	427,103.18	693,473.55	32° 10' 21.642 N	103° 42' 28.962 W



COG PRODUCTION LLC

Survey Report - Geographic

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Site: BULLDOG
Well: WINDWARD FEDERAL #11H
Wellbore: OWB
Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #11H
TVD Reference: RKB=3547.8+26 @ 3573.8usft (McVay 8)
MD Reference: RKB=3547.8+26 @ 3573.8usft (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	9,195.0	-8,199.9	-410.0	427,003.19	693,474.28	32° 10' 20.652 N	103° 42' 28.961 W
17,400.0	90.00	179.58	9,195.0	-8,299.9	-409.3	426,903.19	693,475.01	32° 10' 19.662 N	103° 42' 28.959 W
17,500.0	90.00	179.58	9,195.0	-8,399.9	-408.6	426,803.19	693,475.74	32° 10' 18.673 N	103° 42' 28.957 W
17,600.0	90.00	179.58	9,195.0	-8,499.9	-407.8	426,703.19	693,476.48	32° 10' 17.683 N	103° 42' 28.955 W
17,700.0	90.00	179.58	9,195.0	-8,599.9	-407.1	426,603.20	693,477.21	32° 10' 16.694 N	103° 42' 28.954 W
17,800.0	90.00	179.58	9,195.0	-8,699.9	-406.4	426,503.20	693,477.94	32° 10' 15.704 N	103° 42' 28.952 W
17,900.0	90.00	179.58	9,195.0	-8,799.9	-405.6	426,403.20	693,478.67	32° 10' 14.714 N	103° 42' 28.950 W
18,000.0	90.00	179.58	9,195.0	-8,899.9	-404.9	426,303.21	693,479.41	32° 10' 13.725 N	103° 42' 28.948 W
18,100.0	90.00	179.58	9,195.0	-8,999.9	-404.2	426,203.21	693,480.14	32° 10' 12.735 N	103° 42' 28.947 W
18,200.0	90.00	179.58	9,195.0	-9,099.9	-403.4	426,103.21	693,480.87	32° 10' 11.746 N	103° 42' 28.945 W
18,300.0	90.00	179.58	9,195.0	-9,199.9	-402.7	426,003.21	693,481.60	32° 10' 10.756 N	103° 42' 28.943 W
18,400.0	90.00	179.58	9,195.0	-9,299.9	-402.0	425,903.22	693,482.34	32° 10' 9.766 N	103° 42' 28.941 W
18,500.0	90.00	179.58	9,195.0	-9,399.9	-401.2	425,803.22	693,483.07	32° 10' 8.777 N	103° 42' 28.940 W
18,600.0	90.00	179.58	9,195.0	-9,499.9	-400.5	425,703.22	693,483.80	32° 10' 7.787 N	103° 42' 28.938 W
18,700.0	90.00	179.58	9,195.0	-9,599.9	-399.8	425,603.22	693,484.53	32° 10' 6.798 N	103° 42' 28.936 W
18,800.0	90.00	179.58	9,195.0	-9,699.9	-399.0	425,503.23	693,485.27	32° 10' 5.808 N	103° 42' 28.934 W
18,900.0	90.00	179.58	9,195.0	-9,799.9	-398.3	425,403.23	693,486.00	32° 10' 4.818 N	103° 42' 28.933 W
19,000.0	90.00	179.58	9,195.0	-9,899.9	-397.6	425,303.23	693,486.73	32° 10' 3.829 N	103° 42' 28.931 W
19,100.0	90.00	179.58	9,195.0	-9,999.9	-396.8	425,203.23	693,487.46	32° 10' 2.839 N	103° 42' 28.929 W
19,200.0	90.00	179.58	9,195.0	-10,099.9	-396.1	425,103.24	693,488.20	32° 10' 1.850 N	103° 42' 28.927 W
19,254.3	90.00	179.58	9,195.0	-10,154.2	-395.7	425,048.90	693,488.60	32° 10' 1.312 N	103° 42' 28.926 W

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
PBHL-Windward - plan hits target center - Point	0.00	0.00	9,195.0	-10,154.2	-395.7	425,048.90	693,488.60	32° 10' 1.312 N	103° 42' 28.926 W

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
8718	8718	0	0	Start Build 12.00
9468	9195	-407	-250	Start DLS 4.00 TFO -90.00
10,267	9195	-1167	-462	Start 9137.5 hold at 10266.8 MD
19,404				TD at 19404.3

Checked By: _____ Approved By: _____ Date: _____