



HOBBS OCD

SEP 08 2015

RECEIVED

COG Operating LLC

Lea County, NM

Pan Head Fee #23H

SHL: 245' FNL, 1910' FWL, Sec 11, T17S, R32E, Unit C

PP: 330' FNL, 1906.8' FWL, Sec 11, T17S, R32E, Unit C

EOC: 765.4' FNL, 1887.4' FWL, Sec 11, T17S, R32E, Unit C

BHL: 986' FNL, 1648' FWL, Sec 14, T17S, R32E, Unit C

Plan: Plan #1

Standard Planning Report

07 July, 2015



SEP 14 2015



TDS
Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well SHL: 245' FNL, 1910' FWL, Sec 11, T17S, R32E, Unit C
Company:	COG Operating LLC	TVD Reference:	KB @ 4171.0usft (Unit 43)
Project:	Lea County, NM	MD Reference:	KB @ 4171.0usft (Unit 43)
Site:	Pan Head Fee #23H	North Reference:	Grid
Well:	SHL: 245' FNL, 1910' FWL, Sec 11, T17S, R32E, Unit C	Survey Calculation Method:	Minimum Curvature
Wellbore:	BHL: 986' FNL, 1648' FWL, Sec 14, T17S, R32E, Unit C		
Design:	Plan #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						Pan Head Fee #23H					
Site Position:		Northing:		675,469.60 usft		Latitude:		32° 51' 19.937 N			
From:		Map		Easting:		682,519.70 usft		Longitude:		103° 44' 20.291 W	
Position Uncertainty:		0.0 usft		Slot Radius:		13-3/16 "		Grid Convergence:		0.32	

Well	SHL: 245' FNL, 1910' FWL, Sec 11, T17S, R32E, Unit C					
Well Position	+N/-S	0.0 usft	Northing:	675,469.60 usft	Latitude:	32° 51' 19.937 N
	+E/-W	0.0 usft	Easting:	682,519.70 usft	Longitude:	103° 44' 20.291 W
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	4,159.0 usft	

Wellbore:	BHL: 986' FNL, 1648' FWL, Sec 14, T17S, R32E, Unit C
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Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF2015	7/7/2015	7.29	60.64	48,491

Design:	Plan #1
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Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(usft)	(usft)	(usft)	(°)
	0.0	0.0	0.0	182.16

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	
5,929.1	0.00	0.00	5,929.1	0.0	0.0	0.00	0.00	0.00	0.00	
6,747.3	90.00	182.16	6,450.0	-520.5	-19.6	11.00	11.00	-21.74	182.16	
12,253.9	90.00	182.16	6,450.0	-6,023.2	-227.2	0.00	0.00	0.00	0.00	PBHL (PHF #23H/OH)



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Project:	Lea County, NM	MD Reference:	KB @ 4171.0usft (United 43)
Site:	Pan Head Fee #23H	North Reference:	Grid
Well:	SHL: 245' FNL, 1910' FWL, Sec 11, T17S, R32E, Unit C	Survey Calculation Method:	Minimum Curvature
Wellbore:	BHL: 986' FNL, 1648' FWL, Sec.14, T17S, R32E, Unit C		
Design:	Plan #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
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
1,000.0	0.00	0.00	1,000.0	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
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
2,600.0	0.00	0.00	2,600.0	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
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
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
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
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



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Site:	Pan Head Fee #23H	North Reference:	Grid
Well:	SHL: 245' FNL, 1910' FWL, Sec 11, T17S, R32E, Unit C	Survey Calculation Method:	Minimum Curvature
Wellbore:	BHL: 986' FNL, 1648' FWL, Sec 14, T17S, R32E, Unit C		
Design:	Plan #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)
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
5,929.1	0.00	0.00	5,929.1	0.0	0.0	0.0	0.00	0.00	0.00
KOP - Start DLS 11.00 TFO 182.16									
5,950.0	2.30	182.16	5,950.0	-0.4	0.0	0.4	11.00	11.00	0.00
6,000.0	7.80	182.16	5,999.8	-4.8	-0.2	4.8	11.00	11.00	0.00
6,050.0	13.30	182.16	6,048.9	-14.0	-0.5	14.0	11.00	11.00	0.00
6,100.0	18.80	182.16	6,097.0	-27.8	-1.0	27.8	11.00	11.00	0.00
6,150.0	24.30	182.16	6,143.4	-46.1	-1.7	46.1	11.00	11.00	0.00
6,200.0	29.80	182.16	6,188.0	-68.8	-2.6	68.9	11.00	11.00	0.00
6,250.0	35.30	182.16	6,230.1	-95.7	-3.6	95.8	11.00	11.00	0.00
6,300.0	40.80	182.16	6,269.4	-126.5	-4.8	126.6	11.00	11.00	0.00
6,350.0	46.30	182.16	6,305.7	-160.9	-6.1	161.0	11.00	11.00	0.00
6,400.0	51.80	182.16	6,338.4	-198.6	-7.5	198.8	11.00	11.00	0.00
6,450.0	57.30	182.16	6,367.4	-239.3	-9.0	239.5	11.00	11.00	0.00
6,500.0	62.80	182.16	6,392.4	-282.6	-10.7	282.8	11.00	11.00	0.00
6,550.0	68.30	182.16	6,413.1	-328.0	-12.4	328.3	11.00	11.00	0.00
6,600.0	73.80	182.16	6,429.3	-375.3	-14.2	375.5	11.00	11.00	0.00
6,650.0	79.30	182.16	6,440.9	-423.9	-16.0	424.2	11.00	11.00	0.00
6,700.0	84.80	182.16	6,447.8	-473.3	-17.9	473.7	11.00	11.00	0.00
6,747.3	90.00	182.16	6,450.0	-520.5	-19.6	520.9	11.00	11.00	0.00
EOC - Start 5506.6 hold at 6747.3 MD									
6,800.0	90.00	182.16	6,450.0	-573.2	-21.6	573.6	0.00	0.00	0.00
6,900.0	90.00	182.16	6,450.0	-673.1	-25.4	673.6	0.00	0.00	0.00
7,000.0	90.00	182.16	6,450.0	-773.0	-29.2	773.6	0.00	0.00	0.00
7,100.0	90.00	182.16	6,450.0	-873.0	-32.9	873.6	0.00	0.00	0.00
7,200.0	90.00	182.16	6,450.0	-972.9	-36.7	973.6	0.00	0.00	0.00
7,300.0	90.00	182.16	6,450.0	-1,072.8	-40.5	1,073.6	0.00	0.00	0.00
7,400.0	90.00	182.16	6,450.0	-1,172.8	-44.2	1,173.6	0.00	0.00	0.00
7,500.0	90.00	182.16	6,450.0	-1,272.7	-48.0	1,273.6	0.00	0.00	0.00
7,600.0	90.00	182.16	6,450.0	-1,372.6	-51.8	1,373.6	0.00	0.00	0.00
7,700.0	90.00	182.16	6,450.0	-1,472.5	-55.5	1,473.6	0.00	0.00	0.00
7,800.0	90.00	182.16	6,450.0	-1,572.5	-59.3	1,573.6	0.00	0.00	0.00
7,900.0	90.00	182.16	6,450.0	-1,672.4	-63.1	1,673.6	0.00	0.00	0.00
8,000.0	90.00	182.16	6,450.0	-1,772.3	-66.9	1,773.6	0.00	0.00	0.00
8,100.0	90.00	182.16	6,450.0	-1,872.3	-70.6	1,873.6	0.00	0.00	0.00
8,200.0	90.00	182.16	6,450.0	-1,972.2	-74.4	1,973.6	0.00	0.00	0.00
8,300.0	90.00	182.16	6,450.0	-2,072.1	-78.2	2,073.6	0.00	0.00	0.00
8,400.0	90.00	182.16	6,450.0	-2,172.0	-81.9	2,173.6	0.00	0.00	0.00
8,500.0	90.00	182.16	6,450.0	-2,272.0	-85.7	2,273.6	0.00	0.00	0.00
8,600.0	90.00	182.16	6,450.0	-2,371.9	-89.5	2,373.6	0.00	0.00	0.00
8,700.0	90.00	182.16	6,450.0	-2,471.8	-93.2	2,473.6	0.00	0.00	0.00
8,800.0	90.00	182.16	6,450.0	-2,571.8	-97.0	2,573.6	0.00	0.00	0.00
8,900.0	90.00	182.16	6,450.0	-2,671.7	-100.8	2,673.6	0.00	0.00	0.00



TDS
Planning Report



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Design:	Plan #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)
9,000.0	90.00	182.16	6,450.0	-2,771.6	-104.5	2,773.6	0.00	0.00	0.00
9,100.0	90.00	182.16	6,450.0	-2,871.5	-108.3	2,873.6	0.00	0.00	0.00
9,200.0	90.00	182.16	6,450.0	-2,971.5	-112.1	2,973.6	0.00	0.00	0.00
9,300.0	90.00	182.16	6,450.0	-3,071.4	-115.9	3,073.6	0.00	0.00	0.00
9,400.0	90.00	182.16	6,450.0	-3,171.3	-119.6	3,173.6	0.00	0.00	0.00
9,500.0	90.00	182.16	6,450.0	-3,271.3	-123.4	3,273.6	0.00	0.00	0.00
9,600.0	90.00	182.16	6,450.0	-3,371.2	-127.2	3,373.6	0.00	0.00	0.00
9,700.0	90.00	182.16	6,450.0	-3,471.1	-130.9	3,473.6	0.00	0.00	0.00
9,800.0	90.00	182.16	6,450.0	-3,571.0	-134.7	3,573.6	0.00	0.00	0.00
9,900.0	90.00	182.16	6,450.0	-3,671.0	-138.5	3,673.6	0.00	0.00	0.00
10,000.0	90.00	182.16	6,450.0	-3,770.9	-142.2	3,773.6	0.00	0.00	0.00
10,100.0	90.00	182.16	6,450.0	-3,870.8	-146.0	3,873.6	0.00	0.00	0.00
10,200.0	90.00	182.16	6,450.0	-3,970.8	-149.8	3,973.6	0.00	0.00	0.00
10,300.0	90.00	182.16	6,450.0	-4,070.7	-153.5	4,073.6	0.00	0.00	0.00
10,400.0	90.00	182.16	6,450.0	-4,170.6	-157.3	4,173.6	0.00	0.00	0.00
10,500.0	90.00	182.16	6,450.0	-4,270.6	-161.1	4,273.6	0.00	0.00	0.00
10,600.0	90.00	182.16	6,450.0	-4,370.5	-164.9	4,373.6	0.00	0.00	0.00
10,700.0	90.00	182.16	6,450.0	-4,470.4	-168.6	4,473.6	0.00	0.00	0.00
10,800.0	90.00	182.16	6,450.0	-4,570.3	-172.4	4,573.6	0.00	0.00	0.00
10,900.0	90.00	182.16	6,450.0	-4,670.3	-176.2	4,673.6	0.00	0.00	0.00
11,000.0	90.00	182.16	6,450.0	-4,770.2	-179.9	4,773.6	0.00	0.00	0.00
11,100.0	90.00	182.16	6,450.0	-4,870.1	-183.7	4,873.6	0.00	0.00	0.00
11,200.0	90.00	182.16	6,450.0	-4,970.1	-187.5	4,973.6	0.00	0.00	0.00
11,300.0	90.00	182.16	6,450.0	-5,070.0	-191.2	5,073.6	0.00	0.00	0.00
11,400.0	90.00	182.16	6,450.0	-5,169.9	-195.0	5,173.6	0.00	0.00	0.00
11,500.0	90.00	182.16	6,450.0	-5,269.8	-198.8	5,273.6	0.00	0.00	0.00
11,600.0	90.00	182.16	6,450.0	-5,369.8	-202.6	5,373.6	0.00	0.00	0.00
11,700.0	90.00	182.16	6,450.0	-5,469.7	-206.3	5,473.6	0.00	0.00	0.00
11,800.0	90.00	182.16	6,450.0	-5,569.6	-210.1	5,573.6	0.00	0.00	0.00
11,900.0	90.00	182.16	6,450.0	-5,669.6	-213.9	5,673.6	0.00	0.00	0.00
12,000.0	90.00	182.16	6,450.0	-5,769.5	-217.6	5,773.6	0.00	0.00	0.00
12,100.0	90.00	182.16	6,450.0	-5,869.4	-221.4	5,873.6	0.00	0.00	0.00
12,200.0	90.00	182.16	6,450.0	-5,969.3	-225.2	5,973.6	0.00	0.00	0.00
12,253.9	90.00	182.16	6,450.0	-6,023.2	-227.2	6,027.5	0.00	0.00	0.00
TD at 12253.9									

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well SHL: 245' FNL, 1910' FWL, Sec 11, T17S, R32E, Unit C
Company:	COG Operating LLC	TVD Reference:	KB @ 4171.0usft (United 43)
Project:	Lea County, NM	MD Reference:	KB @ 4171.0usft (United 43)
Site:	Pan Head Fee #23H	North Reference:	Grid
Well:	SHL: 245' FNL, 1910' FWL, Sec 11, T17S, R32E, Unit C	Survey Calculation Method:	Minimum Curvature
Wellbore:	BHL: 986' FNL, 1648' FWL, Sec 14, T17S, R32E, Unit C		
Design:	Plan #1		

Design Targets									
Target Name	hit/miss target	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	
Shape		(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)	
PP (PHF #23H/OH Plan	- plan hits target center	0.00	0.00	6,214.4	-85.0	-3.2	675,384.60	682,516.49	32° 51' 19.096 N
- Point									103° 44' 20.334 W
EOC (PHF #23H/OH Pla	- plan hits target center	0.00	0.00	6,450.0	-520.5	-19.6	674,949.08	682,500.06	32° 51' 14.787 N
- Point									103° 44' 20.555 W
PBHL (PHF #23H/OH)	- plan hits target center	0.00	0.00	6,450.0	-6,023.2	-227.2	669,446.40	682,292.50	32° 50' 20.351 N
- Point									103° 44' 23.351 W

Plan Annotations				
Measured Depth	Vertical Depth	Local Coordinates		Comment
(usft)	(usft)	+N/-S (usft)	+E/-W (usft)	
5,929.1	5,929.1	0.0	0.0	KOP - Start DLS 11.00 TFO 182.16
6,747.3	6,450.0	-520.5	-19.6	EOC - Start 5506.6 hold at 6747.3 MD
12,253.9	6,450.0	-6,023.2	-227.2	TD at 12253.9



Section Details										
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Target
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2	5929.1	0.00	0.00	5929.1	0.0	0.0	0.00	0.00	0.0	
3	6747.3	90.00	182.16	6450.0	-520.5	-19.6	11.00	182.16	520.9	
4	12253.9	90.00	182.16	6450.0	-6023.2	-227.2	0.00	0.00	6027.5	PBHL (PHF #23H/OH)

WELL DETAILS: SHL: 245' FNL, 1910' FWL, Sec 11, T17S, R32E, Unit C

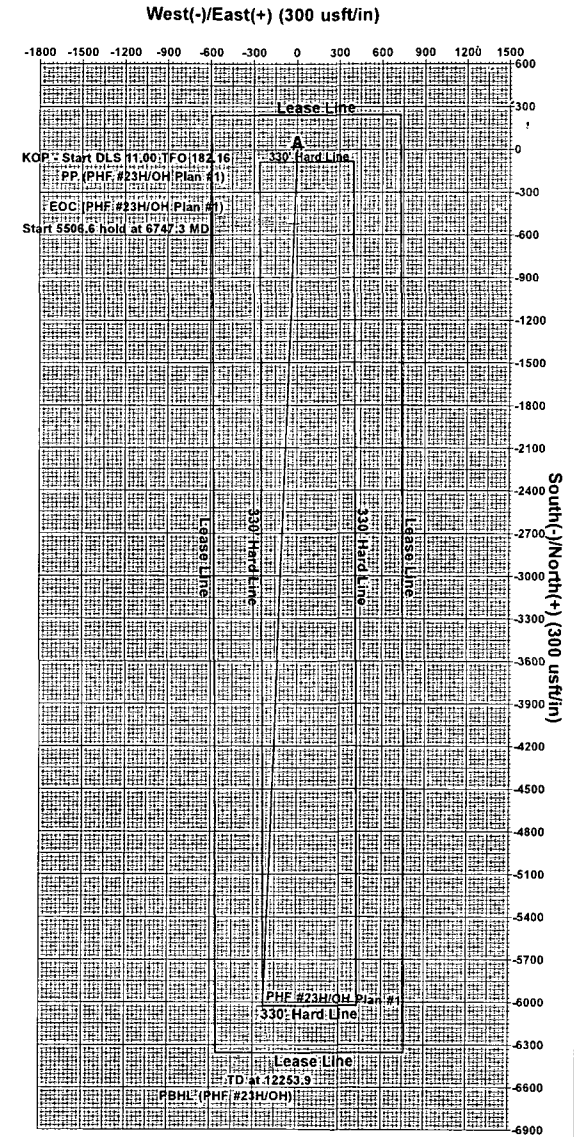
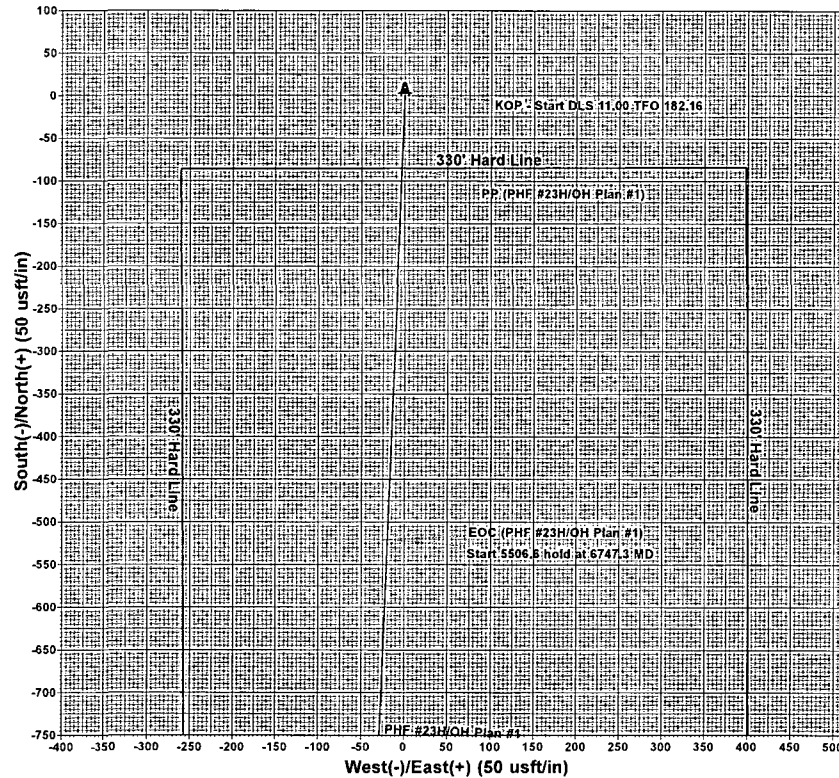
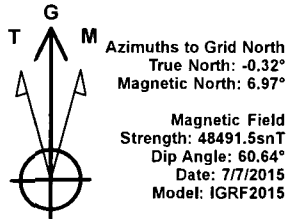
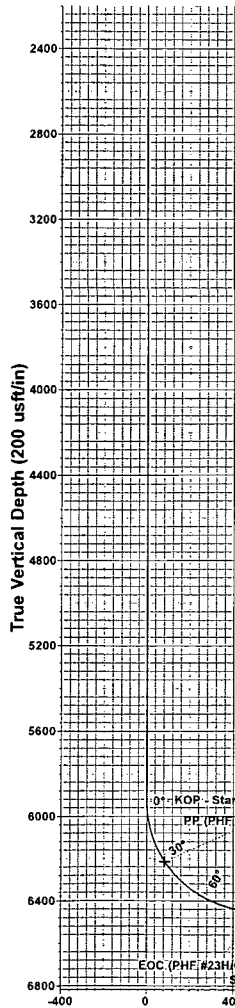
Ground Elevation: 4159.0
RKB Elevation: KB @ 4171.0usft (United 43)
Rig Name: United 43

Northing 675469.60 Easting 682519.70 Latitude 32° 51' 19.937 N Longitude 103° 44' 20.291 W

COG Operating LLC
Project: Lea County, NM
Site: Pan Head Fee #23H

Well: SHL: 245' FNL, 1910' FWL, Sec 11, T17S, R32E, Unit C
Wellbore: BHL: 986' FNL, 1648' FWL, Sec 14, T17S, R32E, Unit C

Plan: Plan #1 (SHL: 245' FNL, 1910' FWL, Sec 11, T17S, R32E, Unit C/BHL: 986' FNL, 1648' FWL, Sec 14, T17S, R32E, Unit C)



Terra Directional Services LLC
322 Spring Hill Drive, Suite A300, Spring, Tx 77386
Phone: 432-425-7532

PROJECT DETAILS: Lea County, NM
Geodetic System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone: New Mexico East 3001
System Datum: Mean Sea Level
Local North: Grid