



HOE

MAY 09 2016

RE

COG Operating LLC

Lea County, NM

Flat Head Federal Com #17H

SHL: 1190' FNL, 1160' FEL, Sec 14, T17S, R32E, Unit A

PP: 681' FNL, 990' FEL, Sec 14, T17S, R32E, Unit A

BHL: 330' FNL, 990' FEL, Sec 11, T17S, R32E, Unit A

Plan: Plan #1

Standard Planning Report

28 May, 2015



MAY 12 2016



TDS
Planning Report



Database:	EDM 5000.1, Single User Db	Local Co-ordinate Reference:	Well SHL: 1190' FNL, 1160' FEL, Sec 14, T17S, R32E, Unit A
Company:	COG Operating LLC	TVD Reference:	KB @ 4110.0usft (United 43)
Project:	Lea County, NM	MD Reference:	KB @ 4110.0usft (United 43)
Site:	Flat Head Federal Com #17H	North Reference:	Grid
Well:	SHL: 1190' FNL, 1160' FEL, Sec 14, T17S, R32E, Unit A	Survey Calculation Method:	Minimum Curvature
Wellbore:	BHL: 330' FNL, 990' FEL, Sec 11, T17S, R32E, Unit A		
Design:	Plan #1		

HOBBS OCD

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RECEIVED

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	Flat Head Federal Com #17H				
Site Position:	Map	Northing:	669,253.50 usft	Latitude:	32° 50' 18.304 N
From:		Easting:	684,765.80 usft	Longitude:	103° 43' 54.375 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.33 °

Well	SHL: 1190' FNL, 1160' FEL, Sec 14, T17S, R32E, Unit A					
Well Position	+N/-S	0.0 usft	Northing:	669,253.50 usft	Latitude:	32° 50' 18.304 N
	+E/-W	0.0 usft	Easting:	684,765.80 usft	Longitude:	103° 43' 54.375 W
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	4,098.0 usft	

Wellbore	BHL: 330' FNL, 990' FEL, Sec 11, T17S, R32E, Unit A				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	5/21/2015	7.22	60.63	48,569

Design	Plan #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	1.22

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	
5,429.1	0.00	0.00	5,429.1	0.0	0.0	0.00	0.00	0.00	0.00	
6,247.3	90.00	18.48	5,950.0	494.0	165.1	11.00	11.00	0.00	18.48	
6,913.6	90.00	358.49	5,950.0	1,149.7	262.9	3.00	0.00	-3.00	-90.00	
11,906.9	90.00	358.49	5,950.0	6,141.3	131.3	0.00	0.00	0.00	0.00	PBHL (FHFC #17H/O)



TDS
Planning Report



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Company:	COG Operating LLC	TVD Reference:	KB @ 4110.0usft (United 43)
Project:	Lea County, NM	MD Reference:	KB @ 4110.0usft (United 43)
Site:	Flat Head Federal Com #17H	North Reference:	Grid
Well:	SHL: 1190' FNL, 1160' FEL, Sec 14, T17S, R32E, Unit A	Survey Calculation Method:	Minimum Curvature
Wellbore:	BHL: 330' FNL, 990' FEL, Sec 11, T17S, R32E, Unit A		
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



TDS
Planning Report



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Project:	Lea County, NM	MD Reference:	KB @ 4110.0usft (United 43)
Site:	Flat Head Federal Com #17H	North Reference:	Grid
Well:	SHL: 1190' FNL, 1160' FEL, Sec 14, T17S, R32E, Unit A	Survey Calculation Method:	Minimum Curvature
Wellbore:	BHL: 330' FNL, 990' FEL, Sec 11, T17S, R32E, Unit A		
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
5,429.1	0.00	0.00	5,429.1	0.0	0.0	0.0	0.00	0.00	0.00
KOP - Start Build 11.00									
5,450.0	2.30	18.48	5,450.0	0.4	0.1	0.4	11.00	11.00	0.00
5,500.0	7.80	18.48	5,499.8	4.6	1.5	4.6	11.00	11.00	0.00
5,550.0	13.30	18.48	5,548.9	13.2	4.4	13.3	11.00	11.00	0.00
5,600.0	18.80	18.48	5,597.0	26.4	8.8	26.5	11.00	11.00	0.00
5,650.0	24.30	18.48	5,643.4	43.8	14.6	44.1	11.00	11.00	0.00
5,700.0	29.80	18.48	5,688.0	65.3	21.8	65.8	11.00	11.00	0.00
5,750.0	35.30	18.48	5,730.1	90.8	30.4	91.5	11.00	11.00	0.00
5,800.0	40.80	18.48	5,769.4	120.0	40.1	120.9	11.00	11.00	0.00
5,850.0	46.30	18.48	5,805.7	152.7	51.0	153.8	11.00	11.00	0.00
5,900.0	51.80	18.48	5,838.4	188.5	63.0	189.8	11.00	11.00	0.00
5,950.0	57.30	18.48	5,867.4	227.1	75.9	228.7	11.00	11.00	0.00
6,000.0	62.80	18.48	5,892.4	268.2	89.6	270.0	11.00	11.00	0.00
6,050.0	68.30	18.48	5,913.1	311.3	104.1	313.5	11.00	11.00	0.00
6,100.0	73.80	18.48	5,929.3	356.2	119.0	358.6	11.00	11.00	0.00
6,150.0	79.30	18.48	5,940.9	402.3	134.4	405.1	11.00	11.00	0.00
6,200.0	84.80	18.48	5,947.8	449.2	150.1	452.3	11.00	11.00	0.00
6,247.3	90.00	18.48	5,950.0	494.0	165.1	497.4	11.00	11.00	0.00
EOC/TURN - Start DLS 3.00 TFO -90.00									
6,300.0	90.00	16.90	5,950.0	544.2	181.1	548.0	3.00	0.00	-3.00
6,400.0	90.00	13.90	5,950.0	640.6	207.7	644.9	3.00	0.00	-3.00
6,500.0	90.00	10.90	5,950.0	738.3	229.1	743.0	3.00	0.00	-3.00
6,600.0	90.00	7.90	5,950.0	836.9	245.5	842.0	3.00	0.00	-3.00
6,700.0	90.00	4.90	5,950.0	936.3	256.6	941.6	3.00	0.00	-3.00
6,800.0	90.00	1.90	5,950.0	1,036.1	262.5	1,041.5	3.00	0.00	-3.00
6,900.0	90.00	358.90	5,950.0	1,136.1	263.2	1,141.5	3.00	0.00	-3.00
6,913.6	90.00	358.49	5,950.0	1,149.7	262.9	1,155.1	3.00	0.00	-3.00
END TURN - Start 4993.3 hold at 6913.6 MD									
7,000.0	90.00	358.49	5,950.0	1,236.1	260.6	1,241.4	0.00	0.00	0.00
7,100.0	90.00	358.49	5,950.0	1,336.0	258.0	1,341.2	0.00	0.00	0.00
7,200.0	90.00	358.49	5,950.0	1,436.0	255.4	1,441.1	0.00	0.00	0.00
7,300.0	90.00	358.49	5,950.0	1,536.0	252.7	1,541.0	0.00	0.00	0.00
7,400.0	90.00	358.49	5,950.0	1,635.9	250.1	1,640.9	0.00	0.00	0.00
7,500.0	90.00	358.49	5,950.0	1,735.9	247.5	1,740.8	0.00	0.00	0.00
7,600.0	90.00	358.49	5,950.0	1,835.9	244.8	1,840.7	0.00	0.00	0.00
7,700.0	90.00	358.49	5,950.0	1,935.8	242.2	1,940.6	0.00	0.00	0.00
7,800.0	90.00	358.49	5,950.0	2,035.8	239.6	2,040.4	0.00	0.00	0.00
7,900.0	90.00	358.49	5,950.0	2,135.8	236.9	2,140.3	0.00	0.00	0.00
8,000.0	90.00	358.49	5,950.0	2,235.7	234.3	2,240.2	0.00	0.00	0.00
8,100.0	90.00	358.49	5,950.0	2,335.7	231.6	2,340.1	0.00	0.00	0.00
8,200.0	90.00	358.49	5,950.0	2,435.7	229.0	2,440.0	0.00	0.00	0.00
8,300.0	90.00	358.49	5,950.0	2,535.6	226.4	2,539.9	0.00	0.00	0.00
8,400.0	90.00	358.49	5,950.0	2,635.6	223.7	2,639.8	0.00	0.00	0.00
8,500.0	90.00	358.49	5,950.0	2,735.5	221.1	2,739.6	0.00	0.00	0.00
8,600.0	90.00	358.49	5,950.0	2,835.5	218.5	2,839.5	0.00	0.00	0.00
8,700.0	90.00	358.49	5,950.0	2,935.5	215.8	2,939.4	0.00	0.00	0.00



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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)	
8,800.0	90.00	358.49	5,950.0	3,035.4	213.2	3,039.3	0.00	0.00	0.00	
8,900.0	90.00	358.49	5,950.0	3,135.4	210.6	3,139.2	0.00	0.00	0.00	
9,000.0	90.00	358.49	5,950.0	3,235.4	207.9	3,239.1	0.00	0.00	0.00	
9,100.0	90.00	358.49	5,950.0	3,335.3	205.3	3,339.0	0.00	0.00	0.00	
9,200.0	90.00	358.49	5,950.0	3,435.3	202.7	3,438.9	0.00	0.00	0.00	
9,300.0	90.00	358.49	5,950.0	3,535.3	200.0	3,538.7	0.00	0.00	0.00	
9,400.0	90.00	358.49	5,950.0	3,635.2	197.4	3,638.6	0.00	0.00	0.00	
9,500.0	90.00	358.49	5,950.0	3,735.2	194.7	3,738.5	0.00	0.00	0.00	
9,600.0	90.00	358.49	5,950.0	3,835.2	192.1	3,838.4	0.00	0.00	0.00	
9,700.0	90.00	358.49	5,950.0	3,935.1	189.5	3,938.3	0.00	0.00	0.00	
9,800.0	90.00	358.49	5,950.0	4,035.1	186.8	4,038.2	0.00	0.00	0.00	
9,900.0	90.00	358.49	5,950.0	4,135.1	184.2	4,138.1	0.00	0.00	0.00	
10,000.0	90.00	358.49	5,950.0	4,235.0	181.6	4,237.9	0.00	0.00	0.00	
10,100.0	90.00	358.49	5,950.0	4,335.0	178.9	4,337.8	0.00	0.00	0.00	
10,200.0	90.00	358.49	5,950.0	4,435.0	176.3	4,437.7	0.00	0.00	0.00	
10,300.0	90.00	358.49	5,950.0	4,534.9	173.7	4,537.6	0.00	0.00	0.00	
10,400.0	90.00	358.49	5,950.0	4,634.9	171.0	4,637.5	0.00	0.00	0.00	
10,500.0	90.00	358.49	5,950.0	4,734.9	168.4	4,737.4	0.00	0.00	0.00	
10,600.0	90.00	358.49	5,950.0	4,834.8	165.8	4,837.3	0.00	0.00	0.00	
10,700.0	90.00	358.49	5,950.0	4,934.8	163.1	4,937.1	0.00	0.00	0.00	
10,800.0	90.00	358.49	5,950.0	5,034.7	160.5	5,037.0	0.00	0.00	0.00	
10,900.0	90.00	358.49	5,950.0	5,134.7	157.8	5,136.9	0.00	0.00	0.00	
11,000.0	90.00	358.49	5,950.0	5,234.7	155.2	5,236.8	0.00	0.00	0.00	
11,100.0	90.00	358.49	5,950.0	5,334.6	152.6	5,336.7	0.00	0.00	0.00	
11,200.0	90.00	358.49	5,950.0	5,434.6	149.9	5,436.6	0.00	0.00	0.00	
11,300.0	90.00	358.49	5,950.0	5,534.6	147.3	5,536.5	0.00	0.00	0.00	
11,400.0	90.00	358.49	5,950.0	5,634.5	144.7	5,636.3	0.00	0.00	0.00	
11,500.0	90.00	358.49	5,950.0	5,734.5	142.0	5,736.2	0.00	0.00	0.00	
11,600.0	90.00	358.49	5,950.0	5,834.5	139.4	5,836.1	0.00	0.00	0.00	
11,700.0	90.00	358.49	5,950.0	5,934.4	136.8	5,936.0	0.00	0.00	0.00	
11,800.0	90.00	358.49	5,950.0	6,034.4	134.1	6,035.9	0.00	0.00	0.00	
11,906.9	90.00	358.49	5,950.0	6,141.3	131.3	6,142.7	0.00	0.00	0.00	
TD at 11906.9										

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										
EOC (FHFC #17H/OH P - plan hits target center - Point	0.00	0.00	5,950.0	494.0	165.1	669,747.53	684,930.90	32° 50' 23.183 N	103° 43' 52.407 W	
PBHL (FHFC #17H/OH) - plan hits target center - Point	0.00	0.00	5,950.0	6,141.3	131.3	675,394.80	684,897.10	32° 51' 19.063 N	103° 43' 52.426 W	



TDS
Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well SHL: 1190' FNL, 1160' FEL, Sec 14, T17S, R32E, Unit A
Company:	COG Operating LLC	TVD Reference:	KB @ 4110.0usft (United 43)
Project:	Lea County, NM	MD Reference:	KB @ 4110.0usft (United 43)
Site:	Flat Head Federal Com #17H	North Reference:	Grid
Well:	SHL: 1190' FNL, 1160' FEL, Sec 14, T17S, R32E, Unit A	Survey Calculation Method:	Minimum Curvature
Wellbore:	BHL: 330' FNL, 990' FEL, Sec 11, T17S, R32E, Unit A		
Design:	Plan #1		

Plan Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N-S (usft)	+E-W (usft)	
5,429.1	5,429.1	0.0	0.0	KOP - Start Build 11.00
6,247.3	5,950.0	494.0	165.1	EOC/TURN - Start DLS 3.00 TFO -90.00
6,913.6	5,950.0	1,149.7	262.9	END TURN - Start 4993.3 hold at 6913.6 MD
11,906.9	5,950.0	6,141.3	131.3	TD at 11906.9



COG Operating LLC

Project: Lea County, NM

Site: Flat Head Federal Com #17H

Well: SHL: 1190' FNL, 1160' FEL, Sec 14, T17S, R32E, Unit A

Wellbore: BHL: 330' FNL, 990' FEL, Sec 11, T17S, R32E, Unit A

Plan: Plan #1 (SHL: 1190' FNL, 1160' FEL, Sec 14, T17S, R32E, Unit A/BHL: 330' FNL, 990' FEL, Sec 11, T17S, R32E, Unit A)

Section Details

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSecl	Target
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	0.0
2	5429.1	0.00	0.00	5429.1	0.0	0.0	0.00	0.00	0.0	0.0
3	6247.3	90.00	18.48	5950.0	494.0	165.1	11.00	18.48	497.4	0.0
4	6913.6	90.00	358.49	5950.0	1149.7	262.9	3.00	-90.00	1155.1	0.0
5	11906.9	90.00	358.49	5950.0	6141.3	131.3	0.00	0.00	6142.7	PBHL (FHFC #17H/OH)

WELL DETAILS: SHL: 1190' FNL, 1160' FEL, Sec 14, T17S, R32E, Unit A

Ground Elevation: 4098.0

RKB Elevation: KB @ 4110.0usft (United 43)

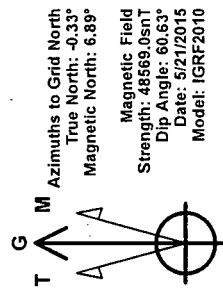
Rig Name: United 43

Northings 669253.50

Easting 684765.80

Latitude 32° 50' 18.304 N

Longitude 103° 43' 54.375 W

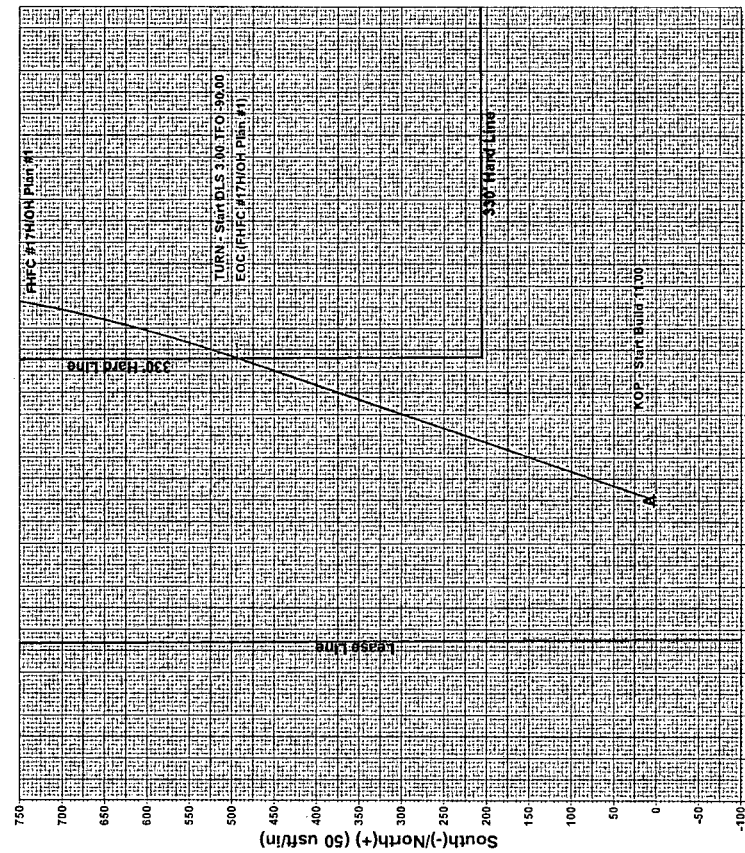


Magnetic Field Strength: 48569.0snT

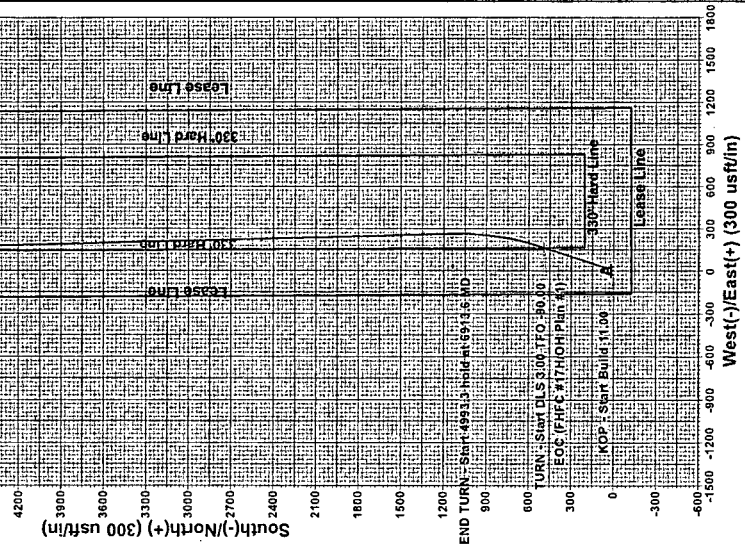
Dip Angle: 60.63°

Date: 5/21/2015

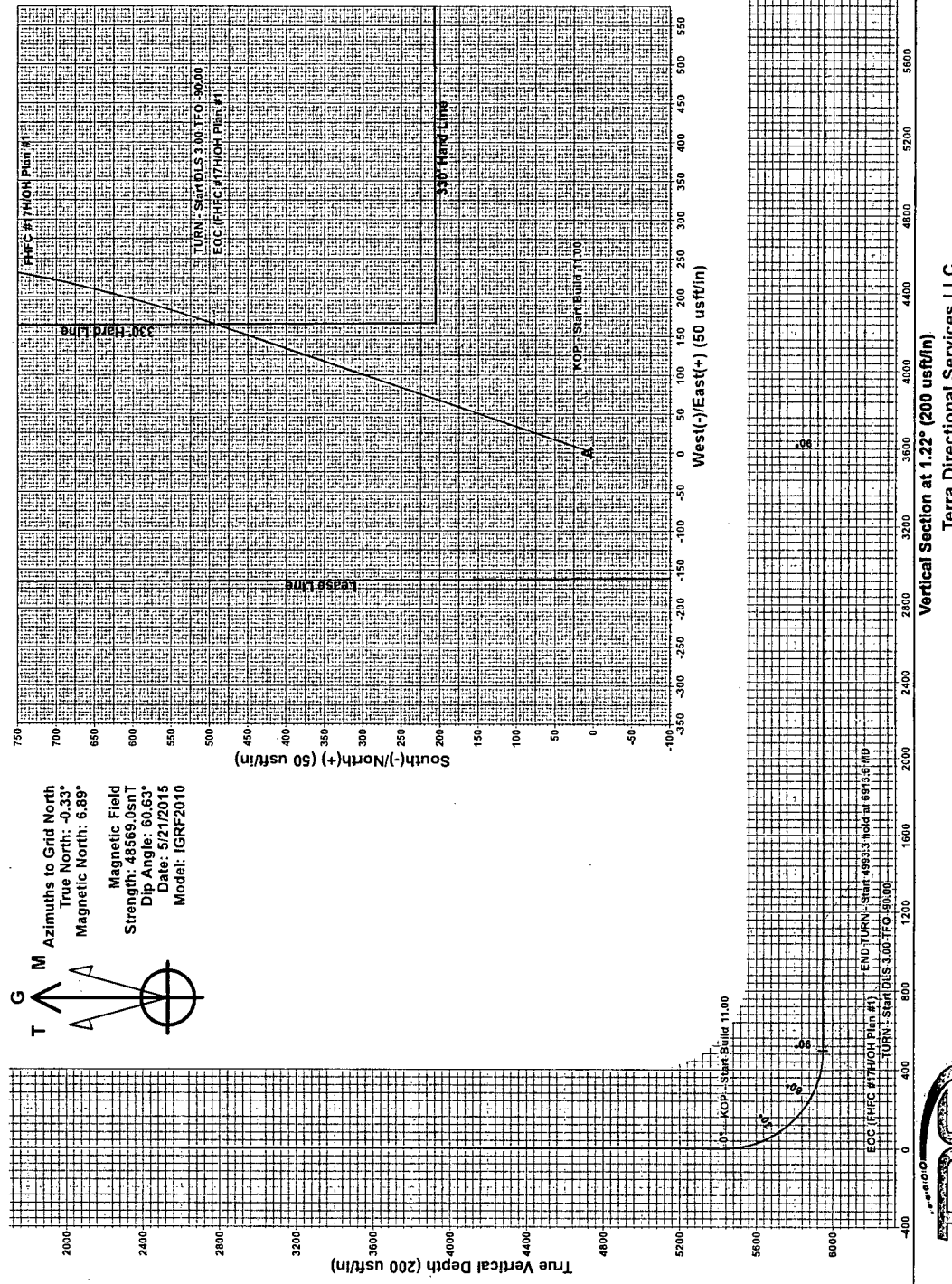
Model: IGRF2010



West(-)/East(+) (50 usft/in)



West(-)/East(+) (300 usft/in)



Vertical Section at 1.22° (200 usft/in)

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



Exhibit #10

