



COG Operating LLC

Eddy County, NM

Burkett 16 State

#16H

Upper Lateral

Plan: UL Plan #1

Standard Planning Report

09 October, 2012

Surface: 990' FNL, 1650' FEL, Sec 16, T17S, R31E, Unit B

BHL: 990' FNL, 330' FWL, Sec 16, T17S, R31E, Unit D



Database:	Houston R5000 Database	Local Co-ordinate Reference	Well #16H
Company:	COG Operating LLC	TVD Reference:	Well @ 3863 0usft (UDI #40 - 14' KB)
Project:	Eddy County, NM	MD Reference:	Well @ 3863 0usft (UDI #40 - 14' KB)
Site:	Burkett 16 State	North Reference:	Grid
Well:	#16H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Upper Lateral		
Design:	UL Plan #1		

Project	Eddy 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	Burkett 16 State		
Site Position:	Northing:	669,419 27 usft	Latitude: 32° 50' 22 075 N
From: Map	Easting:	641,980 82 usft	Longitude: 103° 52' 15 830 W
Position Uncertainty:	0 0 usft	Slot Radius: 13-3/16"	Grid Convergence: 0 25 °

Well	#16H, Dual Lateral		
Well Position	+N/-S	-173 4 usft	Northing: 669,245 90 usft
	+E/-W	37 3 usft	Easting: 642,018 10 usft
Position Uncertainty	2 0 usft	Wellhead Elevation:	Ground Level: 3,849 0 usft

Wellbore	Upper Lateral		
Magnetics	Model Name	Sample Date	Declination
	IGRF2010	9/19/2012	7.62
			Dip Angle 60 67
			Field Strength 48,824

Design	UL Plan #1		
Audit Notes:			
Version:	Phase:	PLAN	Tie On Depth: 0 0
Vertical Section	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0 0	0 0	0 0
			Direction 269 63

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	
5,222 5	0 00	0 00	5,222 5	0 0	0 0	0 00	0 00	0 00	0 00	
5,981 0	91 00	269 63	5,700 0	-3 1	-485 9	12 00	12 00	0 00	269 63	
8,797 5	91 00	269 63	5,650 8	-21 3	-3,301 9	0 00	0 00	0 00	0 00	PBHL-UL (B#16H)



Planning Report



Database: Houston R5000 Database
Company: COG Operating LLC
Project: Eddy County, NM
Site: Burkett 16 State
Well: #16H
Wellbore: Upper Lateral
Design: UL Plan #1

Local Co-ordinate Reference
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:

Well #16H
Well @ 3863 0usft (UDI #40 - 14' KB)
Well @ 3863 0usft (UDI #40 - 14' KB)
Grid
Minimum Curvature

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
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
5,222.5	0 00	0 00	5,222.5	0 0	0 0	0 0	0 00	0 00	0 00

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Site:	Burkett 16 State	North Reference:	Grid
Well:	#16H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Upper Lateral		
Design:	UL 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)
KOP - 5222.5' MD, 5222.5' TVD, 0.00° INC, 0.00° AZI, 0.0' VS									
5,225.0	0.30	269.63	5,225.0	0.0	0.0	0.0	12.00	12.00	0.00
5,250.0	3.30	269.63	5,250.0	0.0	-0.8	0.8	12.00	12.00	0.00
5,275.0	6.30	269.63	5,274.9	0.0	-2.9	2.9	12.00	12.00	0.00
5,300.0	9.30	269.63	5,299.7	0.0	-6.3	6.3	12.00	12.00	0.00
5,325.0	12.30	269.63	5,324.2	-0.1	-11.0	11.0	12.00	12.00	0.00
5,350.0	15.30	269.63	5,348.5	-0.1	-16.9	16.9	12.00	12.00	0.00
5,375.0	18.30	269.63	5,372.4	-0.2	-24.1	24.1	12.00	12.00	0.00
5,400.0	21.30	269.63	5,395.9	-0.2	-32.6	32.6	12.00	12.00	0.00
5,425.0	24.29	269.63	5,419.0	-0.3	-42.3	42.3	12.00	12.00	0.00
5,450.0	27.29	269.63	5,441.5	-0.3	-53.2	53.2	12.00	12.00	0.00
5,475.0	30.29	269.63	5,463.4	-0.4	-65.2	65.2	12.00	12.00	0.00
5,500.0	33.29	269.63	5,484.6	-0.5	-78.4	78.4	12.00	12.00	0.00
5,525.0	36.29	269.63	5,505.2	-0.6	-92.6	92.6	12.00	12.00	0.00
5,550.0	39.29	269.63	5,524.9	-0.7	-108.0	108.0	12.00	12.00	0.00
5,575.0	42.29	269.63	5,543.9	-0.8	-124.3	124.3	12.00	12.00	0.00
5,600.0	45.29	269.63	5,561.9	-0.9	-141.6	141.6	12.00	12.00	0.00
5,625.0	48.29	269.63	5,579.0	-1.0	-159.8	159.8	12.00	12.00	0.00
5,650.0	51.29	269.63	5,595.2	-1.2	-178.9	178.9	12.00	12.00	0.00
5,675.0	54.29	269.63	5,610.3	-1.3	-198.8	198.8	12.00	12.00	0.00
5,700.0	57.29	269.63	5,624.3	-1.4	-219.5	219.5	12.00	12.00	0.00
5,725.0	60.29	269.63	5,637.3	-1.6	-240.9	240.9	12.00	12.00	0.00
5,750.0	63.29	269.63	5,649.1	-1.7	-262.9	262.9	12.00	12.00	0.00
5,775.0	66.29	269.63	5,659.7	-1.8	-285.5	285.5	12.00	12.00	0.00
5,800.0	69.28	269.63	5,669.2	-2.0	-308.6	308.6	12.00	12.00	0.00
5,825.0	72.28	269.63	5,677.4	-2.1	-332.2	332.2	12.00	12.00	0.00
5,850.0	75.28	269.63	5,684.4	-2.3	-356.2	356.2	12.00	12.00	0.00
5,875.0	78.28	269.63	5,690.1	-2.5	-380.6	380.6	12.00	12.00	0.00
5,900.0	81.28	269.63	5,694.6	-2.6	-405.2	405.2	12.00	12.00	0.00
5,925.0	84.28	269.63	5,697.7	-2.8	-430.0	430.0	12.00	12.00	0.00
5,950.0	87.28	269.63	5,699.5	-2.9	-454.9	454.9	12.00	12.00	0.00
5,975.0	90.28	269.63	5,700.1	-3.1	-479.9	479.9	12.00	12.00	0.00
5,981.0	91.00	269.63	5,700.0	-3.1	-485.9	485.9	12.00	12.00	0.00
EOC - 5981.0' MD, 5700.0' TVD, 91.00° INC, 269.63° AZI, 485.9' VS									
6,000.0	91.00	269.63	5,699.7	-3.3	-504.9	504.9	0.00	0.00	0.00
6,100.0	91.00	269.63	5,697.9	-3.9	-604.9	604.9	0.00	0.00	0.00
6,200.0	91.00	269.63	5,696.2	-4.6	-704.9	704.9	0.00	0.00	0.00
6,300.0	91.00	269.63	5,694.4	-5.2	-804.8	804.9	0.00	0.00	0.00
6,400.0	91.00	269.63	5,692.7	-5.8	-904.8	904.8	0.00	0.00	0.00
6,500.0	91.00	269.63	5,690.9	-6.5	-1,004.8	1,004.8	0.00	0.00	0.00
6,600.0	91.00	269.63	5,689.2	-7.1	-1,104.8	1,104.8	0.00	0.00	0.00
6,700.0	91.00	269.63	5,687.5	-7.8	-1,204.8	1,204.8	0.00	0.00	0.00
6,800.0	91.00	269.63	5,685.7	-8.4	-1,304.8	1,304.8	0.00	0.00	0.00
6,900.0	91.00	269.63	5,684.0	-9.1	-1,404.7	1,404.8	0.00	0.00	0.00
7,000.0	91.00	269.63	5,682.2	-9.7	-1,504.7	1,504.7	0.00	0.00	0.00
7,100.0	91.00	269.63	5,680.5	-10.4	-1,604.7	1,604.7	0.00	0.00	0.00
7,200.0	91.00	269.63	5,678.7	-11.0	-1,704.7	1,704.7	0.00	0.00	0.00
7,300.0	91.00	269.63	5,677.0	-11.7	-1,804.7	1,804.7	0.00	0.00	0.00
7,400.0	91.00	269.63	5,675.2	-12.3	-1,904.6	1,904.7	0.00	0.00	0.00
7,500.0	91.00	269.63	5,673.5	-12.9	-2,004.6	2,004.7	0.00	0.00	0.00
7,600.0	91.00	269.63	5,671.7	-13.6	-2,104.6	2,104.7	0.00	0.00	0.00
7,700.0	91.00	269.63	5,670.0	-14.2	-2,204.6	2,204.6	0.00	0.00	0.00
7,800.0	91.00	269.63	5,668.3	-14.9	-2,304.6	2,304.6	0.00	0.00	0.00

Database:	Houston R5000 Database	Local Co-ordinate Reference:	Well #16H
Company:	COG Operating LLC	TVD Reference:	Well @ 3863 0usft (UDI #40 - 14' KB)
Project:	Eddy County, NM	MD Reference:	Well @ 3863 0usft (UDI #40 - 14' KB)
Site:	Burkett 16 State	North Reference:	Grid
Well:	#16H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Upper Lateral		
Design:	UL 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)
7,900 0	91 00	269.63	5,666 5	-15.5	-2,404 6	2,404 6	0 00	0 00	0 00
8,000 0	91 00	269 63	5,664 8	-16 2	-2,504 5	2,504 6	0 00	0 00	0 00
8,100 0	91 00	269.63	5,663 0	-16 8	-2,604 5	2,604 6	0 00	0 00	0 00
8,200 0	91 00	269 63	5,661 3	-17 5	-2,704 5	2,704 6	0 00	0 00	0 00
8,300 0	91 00	269.63	5,659 5	-18 1	-2,804 5	2,804 5	0 00	0 00	0 00
8,400 0	91 00	269 63	5,657 8	-18 8	-2,904 5	2,904 5	0 00	0 00	0 00
8,500 0	91 00	269 63	5,656 0	-19 4	-3,004 5	3,004 5	0 00	0 00	0 00
8,600 0	91 00	269 63	5,654 3	-20 0	-3,104 4	3,104 5	0 00	0 00	0 00
8,700 0	91 00	269 63	5,652 5	-20 7	-3,204 4	3,204 5	0 00	0 00	0 00
8,797 5	91 00	269.63	5,650 8	-21 3	-3,301 9	3,302 0	0 00	0 00	0 00
TD @ 8797.5' MD, 5650.8' TVD									

Design Targets									
Target Name	hit/miss target	Dip Angle (°)	Dip Dir (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude Longitude
PBHL-UL (B#16H)	- Shape	0 00	0 00	5,650 8	-21 1	-3,301 9	669,224 80	638,716 20	32° 50' 20 291 N 103° 52' 54 103 W
- plan misses target center by 0 2usft at 8797 5usft MD (5650 8 TVD, -21 3 N, -3301 9 E)									
- Point									

Plan Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
5,222 5	5,222 5	0 0	0 0	KOP - 5222.5' MD, 5222 5' TVD, 0 00° INC, 0 00° AZI, 0 0' VS
5,981 0	5,700 0	-3 1	-485 9	EOC - 5981 0' MD, 5700 0' TVD, 91 00° INC, 269 63° AZI, 485 9' VS
8,797 5	5,650 8	-21 3	-3,301 9	TD @ 8797 5' MD, 5650 8' TVD



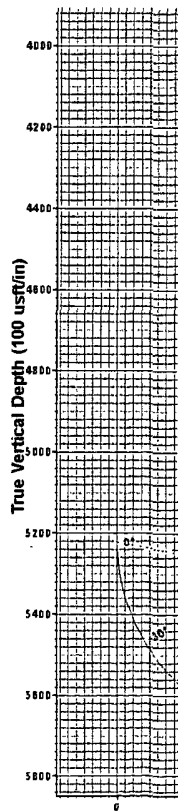
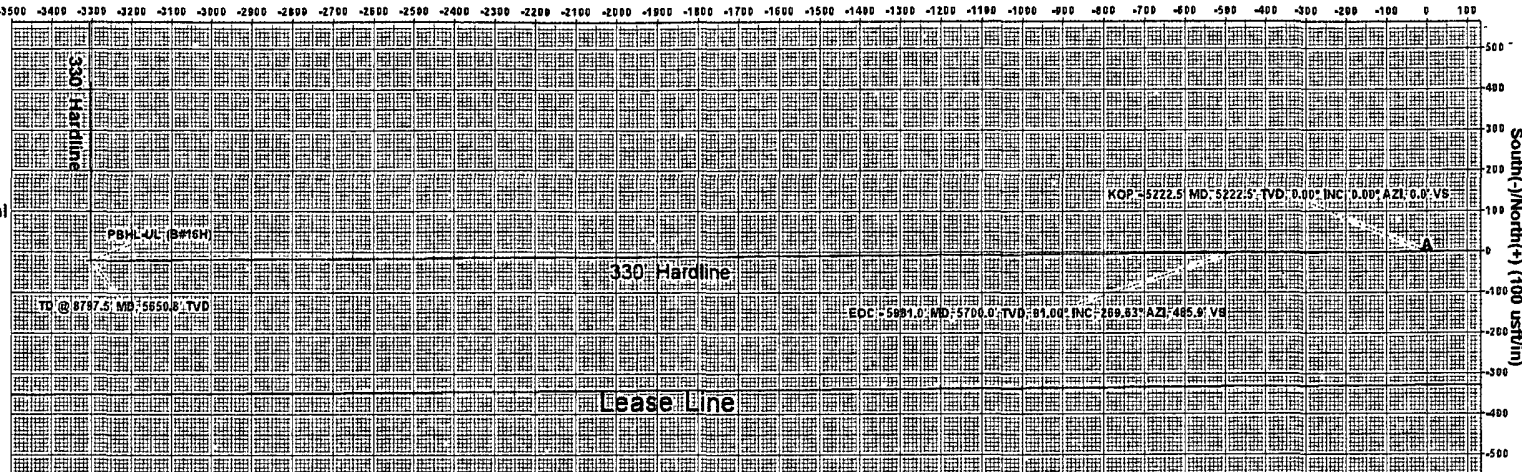
COG Operating LLC
Project: Eddy County, NM
Site: Burkett 16 State
Well: #16H
Wellbore: Upper Lateral
Plan: UL Plan #1 (#16H/Upper Lateral)



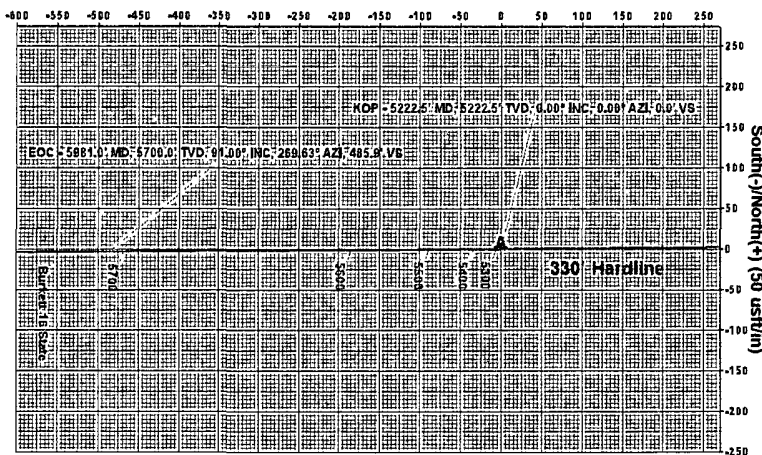
Azimuths to Grid North
True North: -0.25°
Magnetic North: 7.38°

Magnetic Field
Strength: 48823.8nT
Dip Angle: 60.67°
Date: 9/19/2012
Model: IGRF2010

West(-)/East(+) (100 usft/in)



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



Section Details

iec	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	5222.5	0.00	0.00	5222.5	0.0	0.0	0.00	0.00	0.0	
3	5981.0	91.00	269.63	5700.0	-3.1	-485.9	12.00	269.63	485.9	
4	8797.5	91.00	269.63	5650.8	-21.3	-3301.9	0.00	0.00	3302.0	PBHL-UL (#16H)

WELL DETAILS: #16H

Ground Elevation:: 3849.0
RKB Elevation: Well @ 3863.0usft (UDI #40 - 14' KB)
Rig Name: UDI #40 - 14' KB

Surface Hole Location

Northing Easting Latitude Longitude
669245.90 642018.10 32° 50' 20.358 N 103° 52' 15.402 W

DESIGN TARGET DETAILS

Name TVD +N/-S +E/-W Northing Easting
PBHL-UL (#16H) 5650.8 -21.1 -3301.9 669224.80 638716.20

PROJECT DETAILS: Eddy 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



Vertical Section at 269.63° (100 usft/in)

Crescent Directional Drilling
7715 West Industrial Ave. Midland, Tx 79706
Phone: 432-618-1135

Plan: UL Plan #1 (#16H/Upper Lateral)
Created By: Matt Higgins Date: 15:49, October 08 2012



COG Operating LLC

Eddy County, NM

Burkett 16 State

#16H

Lower Lateral

Plan: LL Plan #1

Standard Planning Report

09 October, 2012

Surface: 990' FNL, 1650' FEL, Sec 16, T17S, R31E, Unit B

BHL: 990' FNL, 330' FWL, Sec 16, T17S, R31E, Unit D



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Project:	Eddy County, NM	MD Reference:	Well @ 3863 0usft (UDI #40 - 14' KB)
Site:	Burkett 16 State	North Reference:	Grid
Well:	#16H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Lower Lateral		
Design:	LL Plan #1		

Project:	Eddy 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: Burkett 16 State						
Site Position:		Northing:	669,419.27 usft	Latitude:	32° 50' 22.075 N	
From:	Map	Easting:	641,980.82 usft	Longitude:	103° 52' 15.830 W	
Position Uncertainty:		0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.25

Well	#16H, Dual Lateral					
Well Position	+N-S	-173.4 usft	Northing:	669,245.90 usft	Latitude:	32° 50' 20.358 N
	+E-W	37.3 usft	Easting:	642,018.10 usft	Longitude:	103° 52' 15.402 W
Position Uncertainty		2.0 usft	Wellhead Elevation:		Ground Level:	3,849.0 usft

Wellbore	Lower Lateral				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	9/19/2012	7 62	60 67	48,824

Design: LL Plan #1				
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	269 63

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	
5,622.5	0.00	0.00	5,622.5	0.0	0.0	0.00	0.00	0.00	0.00	
6,381.0	91.00	269.63	6,100.0	-3.1	-485.9	12.00	12.00	0.00	269.63	
9,197.5	91.00	269.63	6,050.8	-21.3	-3,301.9	0.00	0.00	0.00	0.00	PBHL-LL (B#16H)

Database:	Houston R5000 Database	Local Co-ordinate Reference:	Well #16H
Company:	COG Operating LLC	TVD Reference:	Well @ 3863 0usft (UDI #40 - 14' KB)
Project:	Eddy County, NM	MD Reference:	Well @ 3863 0usft (UDI #40 - 14' KB)
Site:	Burkett 16 State	North Reference:	Grid
Well:	#16H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Lower Lateral		
Design:	LL 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	
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	

Database:	Houston R5000 Database	Local Co-ordinate Reference:	Well #16H
Company:	COG Operating LLC	TVD Reference:	Well @ 3863 0usft (UDI #40 - 14' KB)
Project:	Eddy County, NM	MD Reference:	Well @ 3863 0usft (UDI #40 - 14' KB)
Site:	Burkett 16 State	North Reference:	Grid
Well:	#16H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Lower Lateral		
Design:	LL 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)
5,400.0	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
5,622.5	0.00	0.00	5,622.5	0.0	0.0	0.0	0.00	0.00	0.00
KOP - 5622.5' MD, 5622.5' TVD, 0.00° INC, 0.00° AZI, 0.0' VS									
5,625.0	0.30	269.63	5,625.0	0.0	0.0	0.0	12.00	12.00	0.00
5,650.0	3.30	269.63	5,650.0	0.0	-0.8	0.8	12.00	12.00	0.00
5,675.0	6.30	269.63	5,674.9	0.0	-2.9	2.9	12.00	12.00	0.00
5,700.0	9.30	269.63	5,699.7	0.0	-6.3	6.3	12.00	12.00	0.00
5,725.0	12.30	269.63	5,724.2	-0.1	-11.0	11.0	12.00	12.00	0.00
5,750.0	15.30	269.63	5,748.5	-0.1	-16.9	16.9	12.00	12.00	0.00
5,775.0	18.30	269.63	5,772.4	-0.2	-24.1	24.1	12.00	12.00	0.00
5,800.0	21.30	269.63	5,795.9	-0.2	-32.6	32.6	12.00	12.00	0.00
5,825.0	24.29	269.63	5,819.0	-0.3	-42.3	42.3	12.00	12.00	0.00
5,850.0	27.29	269.63	5,841.5	-0.3	-53.2	53.2	12.00	12.00	0.00
5,875.0	30.29	269.63	5,863.4	-0.4	-65.2	65.2	12.00	12.00	0.00
5,900.0	33.29	269.63	5,884.6	-0.5	-78.4	78.4	12.00	12.00	0.00
5,925.0	36.29	269.63	5,905.2	-0.6	-92.6	92.6	12.00	12.00	0.00
5,950.0	39.29	269.63	5,924.9	-0.7	-108.0	108.0	12.00	12.00	0.00
5,975.0	42.29	269.63	5,943.9	-0.8	-124.3	124.3	12.00	12.00	0.00
6,000.0	45.29	269.63	5,961.9	-0.9	-141.6	141.6	12.00	12.00	0.00
6,025.0	48.29	269.63	5,979.0	-1.0	-159.8	159.8	12.00	12.00	0.00
6,050.0	51.29	269.63	5,995.2	-1.2	-178.9	178.9	12.00	12.00	0.00
6,075.0	54.29	269.63	6,010.3	-1.3	-198.8	198.8	12.00	12.00	0.00
6,100.0	57.29	269.63	6,024.3	-1.4	-219.5	219.5	12.00	12.00	0.00
6,125.0	60.29	269.63	6,037.3	-1.6	-240.9	240.9	12.00	12.00	0.00
6,150.0	63.29	269.63	6,049.1	-1.7	-262.9	262.9	12.00	12.00	0.00
6,175.0	66.29	269.63	6,059.7	-1.8	-285.5	285.5	12.00	12.00	0.00
6,200.0	69.28	269.63	6,069.2	-2.0	-308.6	308.6	12.00	12.00	0.00
6,225.0	72.28	269.63	6,077.4	-2.1	-332.2	332.2	12.00	12.00	0.00
6,250.0	75.28	269.63	6,084.4	-2.3	-356.2	356.2	12.00	12.00	0.00
6,275.0	78.28	269.63	6,090.1	-2.5	-380.6	380.6	12.00	12.00	0.00
6,300.0	81.28	269.63	6,094.6	-2.6	-405.2	405.2	12.00	12.00	0.00
6,325.0	84.28	269.63	6,097.7	-2.8	-430.0	430.0	12.00	12.00	0.00
6,350.0	87.28	269.63	6,099.5	-2.9	-454.9	454.9	12.00	12.00	0.00
6,375.0	90.28	269.63	6,100.1	-3.1	-479.9	479.9	12.00	12.00	0.00
6,381.0	91.00	269.63	6,100.0	-3.1	-485.9	485.9	12.00	12.00	0.00
EOC - 6381.0' MD, 6100.0' TVD, 91.00° INC, 269.63° AZI, 485.9' VS									
6,400.0	91.00	269.63	6,099.7	-3.3	-504.9	504.9	0.00	0.00	0.00
6,500.0	91.00	269.63	6,097.9	-3.9	-604.9	604.9	0.00	0.00	0.00
6,600.0	91.00	269.63	6,096.2	-4.6	-704.9	704.9	0.00	0.00	0.00
6,700.0	91.00	269.63	6,094.4	-5.2	-804.8	804.9	0.00	0.00	0.00
6,800.0	91.00	269.63	6,092.7	-5.8	-904.8	904.8	0.00	0.00	0.00
6,900.0	91.00	269.63	6,090.9	-6.5	-1,004.8	1,004.8	0.00	0.00	0.00
7,000.0	91.00	269.63	6,089.2	-7.1	-1,104.8	1,104.8	0.00	0.00	0.00
7,100.0	91.00	269.63	6,087.5	-7.8	-1,204.8	1,204.8	0.00	0.00	0.00
7,200.0	91.00	269.63	6,085.7	-8.4	-1,304.8	1,304.8	0.00	0.00	0.00
7,300.0	91.00	269.63	6,084.0	-9.1	-1,404.7	1,404.8	0.00	0.00	0.00
7,400.0	91.00	269.63	6,082.2	-9.7	-1,504.7	1,504.7	0.00	0.00	0.00
7,500.0	91.00	269.63	6,080.5	-10.4	-1,604.7	1,604.7	0.00	0.00	0.00
7,600.0	91.00	269.63	6,078.7	-11.0	-1,704.7	1,704.7	0.00	0.00	0.00
7,700.0	91.00	269.63	6,077.0	-11.7	-1,804.7	1,804.7	0.00	0.00	0.00
7,800.0	91.00	269.63	6,075.2	-12.3	-1,904.6	1,904.7	0.00	0.00	0.00

Database:	Houston R5000 Database	Local Co-ordinate Reference:	Well #16H
Company:	COG Operating LLC	TVD Reference:	Well @ 3863 0usft (UDI #40 - 14' KB)
Project:	Eddy County, NM	MD Reference:	Well @ 3863 0usft (UDI #40 - 14' KB)
Site:	Burkett 16 State	North Reference:	Grid
Well:	#16H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Lower Lateral		
Design:	LL 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)
7,900.0	91.00	269.63	6,073.5	-12.9	-2,004.6	2,004.7	0.00	0.00	0.00
8,000.0	91.00	269.63	6,071.7	-13.6	-2,104.6	2,104.7	0.00	0.00	0.00
8,100.0	91.00	269.63	6,070.0	-14.2	-2,204.6	2,204.6	0.00	0.00	0.00
8,200.0	91.00	269.63	6,068.3	-14.9	-2,304.6	2,304.6	0.00	0.00	0.00
8,300.0	91.00	269.63	6,066.5	-15.5	-2,404.6	2,404.6	0.00	0.00	0.00
8,400.0	91.00	269.63	6,064.8	-16.2	-2,504.5	2,504.6	0.00	0.00	0.00
8,500.0	91.00	269.63	6,063.0	-16.8	-2,604.5	2,604.6	0.00	0.00	0.00
8,600.0	91.00	269.63	6,061.3	-17.5	-2,704.5	2,704.6	0.00	0.00	0.00
8,700.0	91.00	269.63	6,059.5	-18.1	-2,804.5	2,804.5	0.00	0.00	0.00
8,800.0	91.00	269.63	6,057.8	-18.8	-2,904.5	2,904.5	0.00	0.00	0.00
8,900.0	91.00	269.63	6,056.0	-19.4	-3,004.5	3,004.5	0.00	0.00	0.00
9,000.0	91.00	269.63	6,054.3	-20.0	-3,104.4	3,104.5	0.00	0.00	0.00
9,100.0	91.00	269.63	6,052.5	-20.7	-3,204.4	3,204.5	0.00	0.00	0.00
9,197.5	91.00	269.63	6,050.8	-21.3	-3,301.9	3,302.0	0.00	0.00	0.00
TD @ 9197.5' MD, 6050.8' TVD									

Design Targets

Target Name	hit/miss target	Dip Angle (°)	Dip Dir (°)	TVD (usft)	+N-S (usft)	+E-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
PBHL-LL (B#16H)		0.00	0.00	6,050.8	-21.1	-3,301.9	669,224.80	638,716.20	32° 50' 20.291 N	103° 52' 54.103 W
- plan misses target center by 0.2usft at 9197.5usft MD (6050.8 TVD, -21.3 N, -3301.9 E)										
- Point										

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N-S (usft)	+E-W (usft)	
5,622.5	5,622.5	0.0	0.0	KOP - 5622.5' MD, 5622.5' TVD, 0.00° INC, 0.00° AZI, 0.0' VS
6,381.0	6,100.0	-3.1	-485.9	EOC - 6381.0' MD, 6100.0' TVD, 91.00° INC, 269.63° AZI, 485.9' VS
9,197.5	6,050.8	-21.3	-3,301.9	TD @ 9197.5' MD, 6050.8' TVD



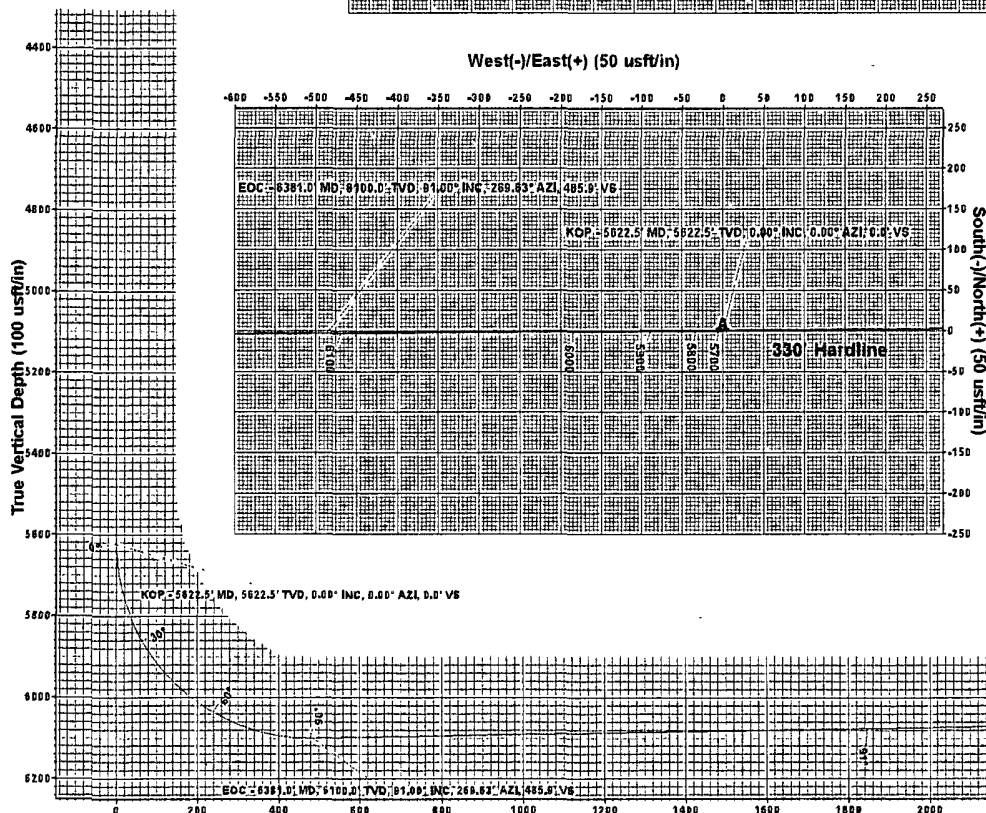
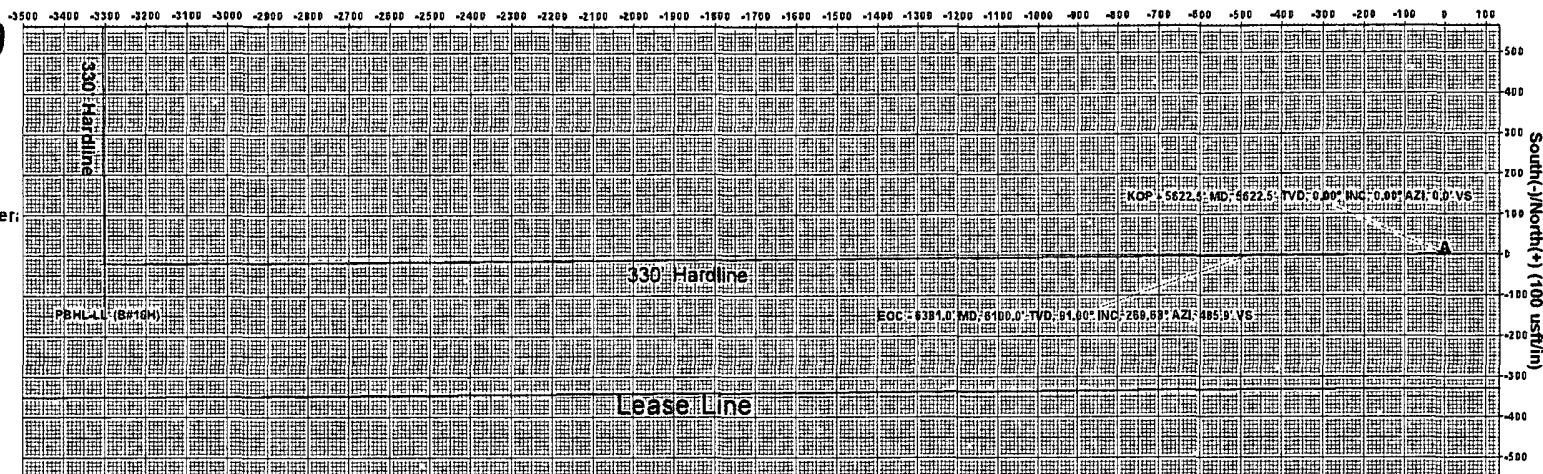
COG Operating LLC
Project: Eddy County, NM
Site: Burkett 16 State
Well: #16H
Wellbore: Lower Lateral
Plan: LL Plan #1 (#16H/Lower Later.



Azimuths to Grid North
True North: -0.25°
Magnetic North: 7.35°

Magnetic Field
Strength 48823.8nT
Dip Angle: 60.67°
Date: 9/19/2012
Model: IGRF2010

West(-)/East(+) (100 usft/in)



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	5622.5	0.00	0.00	5622.5	0.0	0.0	0.00	0.00	0.0	
3	6381.0	91.00	269.63	6100.0	-3.1	-485.9	12.00	269.63	485.9	
4	9197.5	91.00	269.63	6050.8	-21.3	-3301.9	0.00	0.00	3302.0	PBHL-LL (B#16H)

WELL DETAILS: #16H

Ground Elevation:: 3849.0
RKB Elevation: Well @ 3863.0usft (UDI #40 - 14' KB)
Rig Name: UDI #40 - 14' KB

Surface Hole Location
Northing: 669245.90
Easting: 642018.10
Latitude: 32° 50' 20.358 N
Longitude: 103° 52' 15.402 W

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting
PBHL-LL (B#16H)	6050.8	-21.1	-3301.9	669224.80	638716.20

PROJECT DETAILS: Eddy 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



Crescent Directional Drilling
7715 West Industrial Ave. Midland, Tx 79706
Phone: 432-618-1135

Plan: LL Plan #1 (#16H/Lower Lateral)
Created By: Matt Higgins Date: 15:27, October 08 2012