



HOBBS OCD
FEB 22 2012
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COG Operating LLC

Lea County(NAD27)

Macho Nacho State

#2H

OH

Plan: Plan #1

Pathfinder X & Y Report

20 February, 2012

PATHFINDER[®]
A Schlumberger Company

FEB 23 2012



Pathfinder
Pathfinder X & Y Report

PATHFINDER
A Schlumberger Company

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #2H
Project:	Lea County(NAD27)	TVD Reference:	KB = 17' @ 3631.0usft (Original Well Elev)
Site:	Macho Nacho State	MD Reference:	KB = 17' @ 3631.0usft (Original Well Elev)
Well:	#2H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	EDM 5000 1 Single User Db

Project	Lea County(NAD27)		
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	Macho Nacho State				
Site Position:		Northing:	451,172.700' usft	Latitude:	32° 14' 17.819 N
From:	Map	Easting:	725,665.800' usft	Longitude:	103° 36' 12.533 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.39 °

Well	#2H					
Well Position	+N/-S	0.0 usft	Northing:	449,683.100 usft	Latitude:	32° 14' 3.078 N
	+E/-W	0.0 usft	Easting:	725,676.600 usft	Longitude:	103° 36' 12.525 W
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft	Ground Level:	3,614.0 usft	

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	2/17/2012	7.51	60.20	48,589

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	269.66

Survey Tool Program	Date	2/17/2012		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.0	15,271.5	Plan #1 (OH)		



Pathfinder
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Well:	#2H	North Reference:					Grid			
Wellbore:	OH	Survey Calculation Method:					Minimum Curvature			
Design:	Plan #1	Database:					EDM 5000.1 Single User Db			
Planned Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
0.0	0.00	0.00	0.0	-3,631.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60
100.0	0.00	0.00	100.0	-3,531.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60
200.0	0.00	0.00	200.0	-3,431.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60
300.0	0.00	0.00	300.0	-3,331.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60
400.0	0.00	0.00	400.0	-3,231.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60
500.0	0.00	0.00	500.0	-3,131.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60
600.0	0.00	0.00	600.0	-3,031.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60
700.0	0.00	0.00	700.0	-2,931.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60
800.0	0.00	0.00	800.0	-2,831.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60
900.0	0.00	0.00	900.0	-2,731.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60
1,000.0	0.00	0.00	1,000.0	-2,631.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60
1,100.0	0.00	0.00	1,100.0	-2,531.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60
1,200.0	0.00	0.00	1,200.0	-2,431.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60
1,300.0	0.00	0.00	1,300.0	-2,331.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60
1,400.0	0.00	0.00	1,400.0	-2,231.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60
1,500.0	0.00	0.00	1,500.0	-2,131.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60
1,600.0	0.00	0.00	1,600.0	-2,031.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60
1,700.0	0.00	0.00	1,700.0	-1,931.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60
1,800.0	0.00	0.00	1,800.0	-1,831.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60
1,900.0	0.00	0.00	1,900.0	-1,731.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60
2,000.0	0.00	0.00	2,000.0	-1,631.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60
2,100.0	0.00	0.00	2,100.0	-1,531.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60
2,200.0	0.00	0.00	2,200.0	-1,431.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60
2,300.0	0.00	0.00	2,300.0	-1,331.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60
2,400.0	0.00	0.00	2,400.0	-1,231.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60
2,500.0	0.00	0.00	2,500.0	-1,131.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60
2,600.0	0.00	0.00	2,600.0	-1,031.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60



Pathfinder
Pathfinder X & Y Report



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Well:	#2H	North Reference:	Gnd
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	EDM 5000.1 Single User Db

Planned Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
2,700.0	0.00	0.00	2,700.0	-931.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	
2,800.0	0.00	0.00	2,800.0	-831.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	
2,900.0	0.00	0.00	2,900.0	-731.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	
3,000.0	0.00	0.00	3,000.0	-631.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	
3,100.0	0.00	0.00	3,100.0	-531.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	
3,200.0	0.00	0.00	3,200.0	-431.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	
3,300.0	0.00	0.00	3,300.0	-331.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	
3,400.0	0.00	0.00	3,400.0	-231.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	
3,500.0	0.00	0.00	3,500.0	-131.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	
3,600.0	0.00	0.00	3,600.0	-31.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	
3,700.0	0.00	0.00	3,700.0	69.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	
3,800.0	0.00	0.00	3,800.0	169.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	
3,900.0	0.00	0.00	3,900.0	269.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	
4,000.0	0.00	0.00	4,000.0	369.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	
4,100.0	0.00	0.00	4,100.0	469.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	
4,200.0	0.00	0.00	4,200.0	569.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	
4,300.0	0.00	0.00	4,300.0	669.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	
4,400.0	0.00	0.00	4,400.0	769.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	
4,500.0	0.00	0.00	4,500.0	869.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	
4,600.0	0.00	0.00	4,600.0	969.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	
4,700.0	0.00	0.00	4,700.0	1,069.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	
4,800.0	0.00	0.00	4,800.0	1,169.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	
4,900.0	0.00	0.00	4,900.0	1,269.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	
5,000.0	0.00	0.00	5,000.0	1,369.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	
5,100.0	0.00	0.00	5,100.0	1,469.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	
5,200.0	0.00	0.00	5,200.0	1,569.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	
5,300.0	0.00	0.00	5,300.0	1,669.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60	



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Planned Survey												
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)		
5,400.0	0.00	0.00	5,400.0	1,769.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
5,500.0	0.00	0.00	5,500.0	1,869.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
5,600.0	0.00	0.00	5,600.0	1,969.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
5,700.0	0.00	0.00	5,700.0	2,069.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
5,800.0	0.00	0.00	5,800.0	2,169.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
5,900.0	0.00	0.00	5,900.0	2,269.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
6,000.0	0.00	0.00	6,000.0	2,369.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
6,100.0	0.00	0.00	6,100.0	2,469.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
6,200.0	0.00	0.00	6,200.0	2,569.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
6,300.0	0.00	0.00	6,300.0	2,669.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
6,400.0	0.00	0.00	6,400.0	2,769.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
6,500.0	0.00	0.00	6,500.0	2,869.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
6,600.0	0.00	0.00	6,600.0	2,969.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
6,700.0	0.00	0.00	6,700.0	3,069.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
6,800.0	0.00	0.00	6,800.0	3,169.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
6,900.0	0.00	0.00	6,900.0	3,269.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
7,000.0	0.00	0.00	7,000.0	3,369.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
7,100.0	0.00	0.00	7,100.0	3,469.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
7,200.0	0.00	0.00	7,200.0	3,569.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
7,300.0	0.00	0.00	7,300.0	3,669.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
7,400.0	0.00	0.00	7,400.0	3,769.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
7,500.0	0.00	0.00	7,500.0	3,869.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
7,600.0	0.00	0.00	7,600.0	3,969.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
7,700.0	0.00	0.00	7,700.0	4,069.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
7,800.0	0.00	0.00	7,800.0	4,169.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
7,900.0	0.00	0.00	7,900.0	4,269.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
8,000.0	0.00	0.00	8,000.0	4,369.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		



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Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
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Planned Survey												
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)		
8,100.0	0.00	0.00	8,100.0	4,469.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
8,200.0	0.00	0.00	8,200.0	4,569.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
8,300.0	0.00	0.00	8,300.0	4,669.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
8,400.0	0.00	0.00	8,400.0	4,769.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
8,500.0	0.00	0.00	8,500.0	4,869.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
8,600.0	0.00	0.00	8,600.0	4,969.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
8,700.0	0.00	0.00	8,700.0	5,069.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
8,800.0	0.00	0.00	8,800.0	5,169.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
8,900.0	0.00	0.00	8,900.0	5,269.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
9,000.0	0.00	0.00	9,000.0	5,369.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
9,100.0	0.00	0.00	9,100.0	5,469.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
9,200.0	0.00	0.00	9,200.0	5,569.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
9,300.0	0.00	0.00	9,300.0	5,669.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
9,400.0	0.00	0.00	9,400.0	5,769.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
9,500.0	0.00	0.00	9,500.0	5,869.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
9,600.0	0.00	0.00	9,600.0	5,969.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
9,700.0	0.00	0.00	9,700.0	6,069.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
9,800.0	0.00	0.00	9,800.0	6,169.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
9,900.0	0.00	0.00	9,900.0	6,269.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
10,000.0	0.00	0.00	10,000.0	6,369.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
10,100.0	0.00	0.00	10,100.0	6,469.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
10,200.0	0.00	0.00	10,200.0	6,569.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
10,300.0	0.00	0.00	10,300.0	6,669.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
10,400.0	0.00	0.00	10,400.0	6,769.0	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
10,432.6	0.00	0.00	10,432.6	6,801.6	0.0	0.0	0.0	0.00	449,683.10	725,676.60		
10,450.0	2.09	269.66	10,450.0	6,819.0	0.0	-0.3	0.3	12.00	449,683.10	725,676.28		
10,475.0	5.09	269.66	10,474.9	6,843.9	0.0	-1.9	1.9	12.00	449,683.09	725,674.72		



Pathfinder
Pathfinder X & Y Report



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Planned Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
10,500.0	8.09	269.66	10,499.8	6,868.8	0.0	-4.7	4.7	12.00	449,683.07	725,671.85	
10,525.0	11.09	269.66	10,524.4	6,893.4	-0.1	-8.9	8.9	12.00	449,683.05	725,667.69	
10,550.0	14.09	269.66	10,548.8	6,917.8	-0.1	-14.4	14.4	12.00	449,683.02	725,662.24	
10,575.0	17.09	269.66	10,572.9	6,941.9	-0.1	-21.1	21.1	12.00	449,682.98	725,655.52	
10,600.0	20.09	269.66	10,596.6	6,965.6	-0.2	-29.0	29.0	12.00	449,682.93	725,647.55	
10,625.0	23.09	269.66	10,619.8	6,988.8	-0.2	-38.2	38.2	12.00	449,682.88	725,638.36	
10,650.0	26.09	269.66	10,642.6	7,011.6	-0.3	-48.6	48.6	12.00	449,682.81	725,627.96	
10,675.0	29.09	269.66	10,664.7	7,033.7	-0.4	-60.2	60.2	12.00	449,682.75	725,616.38	
10,700.0	32.09	269.66	10,686.2	7,055.2	-0.4	-72.9	72.9	12.00	449,682.67	725,603.66	
10,725.0	35.09	269.66	10,707.1	7,076.1	-0.5	-86.8	86.8	12.00	449,682.59	725,589.83	
10,750.0	38.09	269.66	10,727.1	7,096.1	-0.6	-101.7	101.7	12.00	449,682.50	725,574.93	
10,775.0	41.09	269.66	10,746.4	7,115.4	-0.7	-117.6	117.6	12.00	449,682.41	725,559.00	
10,800.0	44.09	269.66	10,764.8	7,133.8	-0.8	-134.5	134.5	12.00	449,682.31	725,542.09	
10,825.0	47.09	269.66	10,782.3	7,151.3	-0.9	-152.4	152.4	12.00	449,682.21	725,524.23	
10,850.0	50.09	269.66	10,798.8	7,167.8	-1.0	-171.1	171.1	12.00	449,682.10	725,505.48	
10,875.0	53.09	269.66	10,814.4	7,183.4	-1.1	-190.7	190.7	12.00	449,681.98	725,485.90	
10,900.0	56.09	269.66	10,828.8	7,197.8	-1.2	-211.1	211.1	12.00	449,681.86	725,465.53	
10,925.0	59.09	269.66	10,842.2	7,211.2	-1.4	-232.2	232.2	12.00	449,681.74	725,444.42	
10,950.0	62.09	269.66	10,854.5	7,223.5	-1.5	-254.0	254.0	12.00	449,681.61	725,422.65	
10,975.0	65.09	269.66	10,865.6	7,234.6	-1.6	-276.3	276.3	12.00	449,681.48	725,400.26	
11,000.0	68.09	269.66	10,875.6	7,244.6	-1.8	-299.3	299.3	12.00	449,681.34	725,377.32	
11,025.0	71.09	269.66	10,884.3	7,253.3	-1.9	-322.7	322.7	12.00	449,681.21	725,353.89	
11,050.0	74.09	269.66	10,891.8	7,260.8	-2.0	-346.6	346.6	12.00	449,681.07	725,330.04	
11,075.0	77.09	269.66	10,898.0	7,267.0	-2.2	-370.8	370.8	12.00	449,680.92	725,305.83	
11,100.0	80.09	269.66	10,902.9	7,271.9	-2.3	-395.3	395.3	12.00	449,680.78	725,281.33	
11,125.0	83.09	269.66	10,906.6	7,275.6	-2.5	-420.0	420.0	12.00	449,680.63	725,256.60	
11,150.0	86.09	269.66	10,909.0	7,278.0	-2.6	-444.9	444.9	12.00	449,680.49	725,231.72	



Pathfinder
Pathfinder X & Y Report



Company: COG Operating LLC
Project: Lea County(NAD27)
Site: Macho Nacho State
Well: #2H
Wellbore: OH
Design: Plan #1

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

Well #2H
KB = 17' @ 3631.0usft (Original Well Elev)
KB = 17' @ 3631.0usft (Original Well Elev)
Grid
Minimum Curvature
EDM 5000.1 Single User Db

Planned Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
11,175.0	89.09	269.66	10,910.0	7,279.0	-2.8	-469.9	469.9	12.00	449,680.34	725,206.74
11,190.8	90.98	269.66	10,910.0	7,279.0	-2.9	-485.6	485.7	12.00	449,680.25	725,190.95
11,200.0	90.98	269.66	10,909.8	7,278.8	-2.9	-494.9	494.9	0.00	449,680.20	725,181.75
11,300.0	90.98	269.66	10,908.1	7,277.1	-3.5	-594.8	594.8	0.00	449,679.61	725,081.76
11,400.0	90.98	269.66	10,906.4	7,275.4	-4.1	-694.8	694.8	0.00	449,679.02	724,981.78
11,500.0	90.98	269.66	10,904.7	7,273.7	-4.7	-794.8	794.8	0.00	449,678.43	724,881.79
11,600.0	90.98	269.66	10,903.0	7,272.0	-5.3	-894.8	894.8	0.00	449,677.85	724,781.81
11,700.0	90.98	269.66	10,901.3	7,270.3	-5.8	-994.8	994.8	0.00	449,677.26	724,681.83
11,800.0	90.98	269.66	10,899.5	7,268.5	-6.4	-1,094.8	1,094.8	0.00	449,676.67	724,581.84
11,900.0	90.98	269.66	10,897.8	7,266.8	-7.0	-1,194.7	1,194.8	0.00	449,676.09	724,481.86
12,000.0	90.98	269.66	10,896.1	7,265.1	-7.6	-1,294.7	1,294.7	0.00	449,675.50	724,381.88
12,100.0	90.98	269.66	10,894.4	7,263.4	-8.2	-1,394.7	1,394.7	0.00	449,674.91	724,281.89
12,200.0	90.98	269.66	10,892.7	7,261.7	-8.8	-1,494.7	1,494.7	0.00	449,674.33	724,181.91
12,300.0	90.98	269.66	10,891.0	7,260.0	-9.4	-1,594.7	1,594.7	0.00	449,673.74	724,081.93
12,400.0	90.98	269.66	10,889.3	7,258.3	-9.9	-1,694.7	1,694.7	0.00	449,673.15	723,981.94
12,500.0	90.98	269.66	10,887.5	7,256.5	-10.5	-1,794.6	1,794.7	0.00	449,672.57	723,881.96
12,600.0	90.98	269.66	10,885.8	7,254.8	-11.1	-1,894.6	1,894.7	0.00	449,671.98	723,781.98
12,700.0	90.98	269.66	10,884.1	7,253.1	-11.7	-1,994.6	1,994.6	0.00	449,671.39	723,681.99
12,800.0	90.98	269.66	10,882.4	7,251.4	-12.3	-2,094.6	2,094.6	0.00	449,670.81	723,582.01
12,900.0	90.98	269.66	10,880.7	7,249.7	-12.9	-2,194.6	2,194.6	0.00	449,670.22	723,482.02
13,000.0	90.98	269.66	10,879.0	7,248.0	-13.5	-2,294.6	2,294.6	0.00	449,669.63	723,382.04
13,100.0	90.98	269.66	10,877.2	7,246.2	-14.1	-2,394.5	2,394.6	0.00	449,669.04	723,282.06
13,200.0	90.98	269.66	10,875.5	7,244.5	-14.6	-2,494.5	2,494.6	0.00	449,668.46	723,182.07
13,300.0	90.98	269.66	10,873.8	7,242.8	-15.2	-2,594.5	2,594.6	0.00	449,667.87	723,082.09
13,400.0	90.98	269.66	10,872.1	7,241.1	-15.8	-2,694.5	2,694.5	0.00	449,667.28	722,982.11
13,500.0	90.98	269.66	10,870.4	7,239.4	-16.4	-2,794.5	2,794.5	0.00	449,666.70	722,882.12
13,600.0	90.98	269.66	10,868.7	7,237.7	-17.0	-2,894.5	2,894.5	0.00	449,666.11	722,782.14



Pathfinder
Pathfinder X & Y Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #2H
Project:	Lea County(NAD27)	TVD Reference:	KB = 17' @ 3631.0usft (Original Well Elev)
Site:	Macho Nacho Stale	MD Reference:	KB = 17' @ 3631.0usft (Original Well Elev)
Well:	#2H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	EDM 5000 1 Single User Db

Planned Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
13,700.0	90.98	269.66	10,867.0	7,236.0	-17.6	-2,994.4	2,994.5	0.00	449,665.52	722,682.16	
13,800.0	90.98	269.66	10,865.2	7,234.2	-18.2	-3,094.4	3,094.5	0.00	449,664.94	722,582.17	
13,900.0	90.98	269.66	10,863.5	7,232.5	-18.8	-3,194.4	3,194.5	0.00	449,664.35	722,482.19	
14,000.0	90.98	269.66	10,861.8	7,230.8	-19.3	-3,294.4	3,294.5	0.00	449,663.76	722,382.21	
14,100.0	90.98	269.66	10,860.1	7,229.1	-19.9	-3,394.4	3,394.4	0.00	449,663.18	722,282.22	
14,200.0	90.98	269.66	10,858.4	7,227.4	-20.5	-3,494.4	3,494.4	0.00	449,662.59	722,182.24	
14,300.0	90.98	269.66	10,856.7	7,225.7	-21.1	-3,594.3	3,594.4	0.00	449,662.00	722,082.25	
14,400.0	90.98	269.66	10,854.9	7,223.9	-21.7	-3,694.3	3,694.4	0.00	449,661.41	721,982.27	
14,500.0	90.98	269.66	10,853.2	7,222.2	-22.3	-3,794.3	3,794.4	0.00	449,660.83	721,882.29	
14,600.0	90.98	269.66	10,851.5	7,220.5	-22.9	-3,894.3	3,894.4	0.00	449,660.24	721,782.30	
14,700.0	90.98	269.66	10,849.8	7,218.8	-23.4	-3,994.3	3,994.3	0.00	449,659.65	721,682.32	
14,800.0	90.98	269.66	10,848.1	7,217.1	-24.0	-4,094.3	4,094.3	0.00	449,659.07	721,582.34	
14,900.0	90.98	269.66	10,846.4	7,215.4	-24.6	-4,194.2	4,194.3	0.00	449,658.48	721,482.35	
15,000.0	90.98	269.66	10,844.7	7,213.7	-25.2	-4,294.2	4,294.3	0.00	449,657.89	721,382.37	
15,100.0	90.98	269.66	10,842.9	7,211.9	-25.8	-4,394.2	4,394.3	0.00	449,657.31	721,282.39	
15,200.0	90.98	269.66	10,841.2	7,210.2	-26.4	-4,494.2	4,494.3	0.00	449,656.72	721,182.40	
15,271.5	90.98	269.66	10,840.0	7,209.0	-26.8	-4,565.7	4,565.8	0.00	449,656.30	721,110.90	

Checked By: _____	Approved By: _____	Date: _____
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Project: Lea County(NAD27)
Site: Macho Nacho State
Well: #2H
Wellbore: OH
Plan: Plan #1 (#2H/OH)



Azimuths to Grid North
True North: -0.39°
Magnetic North: 7.12°

Magnetic Field
Strength: 48589.0snT
Dip Angle: 60.20°
Date: 2/17/2012
Model: IGRF200510

PATHFINDER
A Schlumberger Company

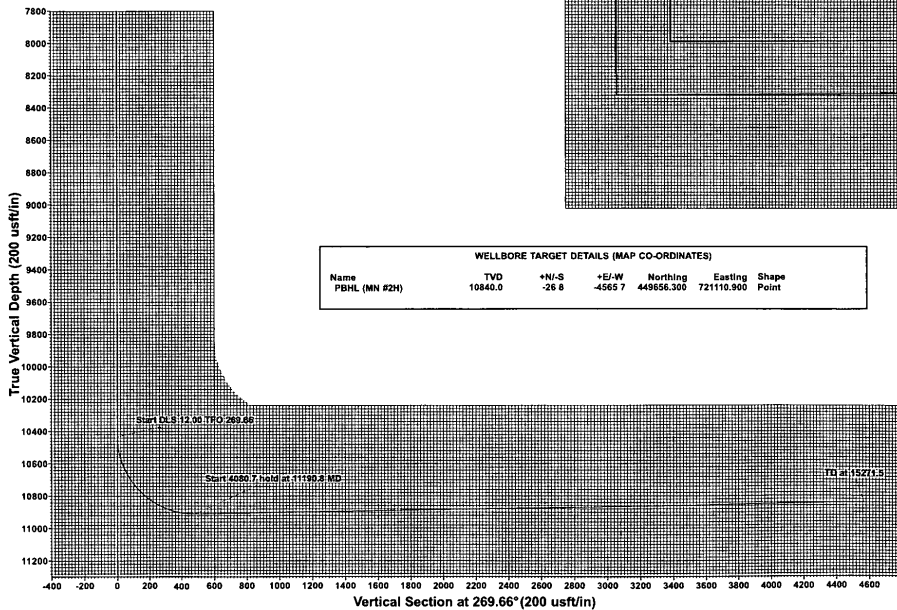
WELL DETAILS: #2H

Ground Elevation: 3514.0
RKB Elevation: KB = 17' @ 3531.0usft (Original Well Elev)
Rig Name: Original Well Elev

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	449683.100	725676.690	32°14' 3.078 N	103°36' 1.2525 W	

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Diag	TFace	VSeal	Target
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2	10432.6	0.00	0.00	10432.6	0.0	0.0	0.00	0.00	0.0	
3	11190.8	90.98	269.66	10910.0	-2.9	-485.6	12.00	269.66	485.7	
4	15271.5	90.98	269.66	10840.0	-26.8	-4565.7	0.00	0.00	4565.8	PBHL (MN #2H)



WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape
PBHL (MN #2H)	10840.0	-26.8	-4565.7	449556.300	721110.900	Point

PROJECT DETAILS: Lea County(NAD27)
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

Plan: Plan #1 (#2H/OH)

Created By: Michael Trout Date: 9/54, February 20 2012
Checked: _____ Date: _____

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Lea County(NAD27)
Mach Nacho State
RKB
Original Well Elev
OH
Plan #1