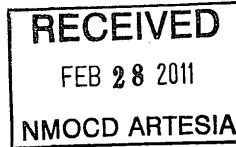




COG Operating LLC

Eddy County(NAD83)
High Lonesome 26 Fed
#3H
OH

30-015-38197



Survey: MWD #1

Pathfinder X & Y Survey Report

23 February, 2011

PATHFINDER
A Schlumberger Company



Pathfinder
Pathfinder X & Y Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #3H
Project:	Eddy County(NAD83)	TVD Reference:	WELL @ 3708.00usft (Original Well Elev)
Site:	High Lonesome 26 Fed	MD Reference:	WELL @ 3708.00usft (Original Well Elev)
Well:	#3H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Single User Db

Project	Eddy County(NAD83)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site	High Lonesome 26 Fed				
Site Position:		Northing:	690,573.540 usft	Latitude:	32° 53' 53.021 N
From:	Map	Easting:	631,197.810 usft	Longitude:	104° 2' 26.020 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.16 °

Well	#3H					
Well Position	+N/-S	0.00 usft	Northing:	688,359.012 usft	Latitude:	32° 53' 31.088 N
	+E/-W	0.00 usft	Easting:	631,924.804 usft	Longitude:	104° 2' 17.566 W
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,693.00 usft	

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	12/11/10	7.90	60.76	49,050

Design	OH				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	264.58	



Pathfinder
Pathfinder X & Y Survey Report

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Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #3H
Project:	Eddy County(NAD83)	TVD Reference:	WELL @ 3708.00usft (Original Well Elev)
Site:	High Lonesome 26 Fed	MD Reference:	WELL @ 3708.00usft (Original Well Elev)
Well:	#3H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Single User Db

Survey Program		Date	02/23/11		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	6,800.00	GYRO (OH)	MWD	MWD - Standard	
6,832.00	11,604.00	MWD #1 (OH)	MWD	MWD - Standard	

Survey	MD (usft)	Inc (°)	Azi (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
	6,800.00	0.25	72.86	6,799.66	-3,091.66	-1.50	-27.81	27.83	0.00	688,357.51	631,897.00
	6,832.00	2.37	255.69	6,831.65	-3,123.65	-1.65	-28.38	28.41	8.19	688,357.36	631,896.42
	6,864.00	7.12	256.04	6,863.53	-3,155.53	-2.29	-30.95	31.03	14.84	688,356.72	631,893.85
	6,896.00	11.70	256.83	6,895.09	-3,187.09	-3.51	-36.04	36.21	14.32	688,355.50	631,888.77
	6,928.00	15.39	259.29	6,926.20	-3,218.20	-5.04	-43.37	43.65	11.67	688,353.97	631,881.43
	6,960.00	18.29	263.95	6,956.82	-3,248.82	-6.36	-52.54	52.90	9.99	688,352.66	631,872.27
	6,992.00	20.75	267.99	6,986.98	-3,278.98	-7.08	-63.20	63.59	8.76	688,351.93	631,861.61
	7,024.00	23.30	268.08	7,016.64	-3,308.64	-7.50	-75.19	75.56	7.97	688,351.52	631,849.61
	7,056.00	26.38	267.82	7,045.68	-3,337.68	-7.98	-88.62	88.98	9.63	688,351.03	631,836.18
	7,088.00	29.37	266.85	7,073.96	-3,365.96	-8.68	-103.57	103.92	9.45	688,350.33	631,821.24
	7,120.00	31.92	265.89	7,101.49	-3,393.49	-9.72	-119.84	120.22	8.11	688,349.29	631,804.96
	7,152.00	34.29	265.45	7,128.30	-3,420.30	-11.04	-137.27	137.70	7.44	688,347.97	631,787.54
	7,183.00	38.69	265.18	7,153.21	-3,445.21	-12.55	-155.64	156.13	14.20	688,346.47	631,769.17
	7,216.00	41.68	263.51	7,178.42	-3,470.42	-14.65	-176.82	177.42	9.63	688,344.36	631,747.98
	7,247.00	45.29	260.17	7,200.91	-3,492.91	-17.70	-197.93	198.71	13.80	688,341.31	631,726.88
	7,279.00	47.66	258.68	7,222.95	-3,514.95	-21.96	-220.73	221.82	8.14	688,337.05	631,704.07
	7,311.00	51.27	257.01	7,243.74	-3,535.74	-27.09	-244.50	245.96	11.96	688,331.92	631,680.31
	7,343.00	54.87	255.16	7,262.97	-3,554.97	-33.25	-269.32	271.26	12.16	688,325.76	631,655.48
	7,375.00	58.74	252.96	7,280.49	-3,572.49	-40.62	-295.06	297.57	13.39	688,318.40	631,629.75
	7,408.00	62.52	252.09	7,296.67	-3,588.67	-49.25	-322.48	325.69	11.68	688,309.76	631,602.32
	7,440.00	65.95	251.47	7,310.58	-3,602.58	-58.27	-349.85	353.79	10.86	688,300.75	631,574.95



Pathfinder
Pathfinder X & Y Survey Report

PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
Project: Eddy County(NAD83)
Site: High Lonesome 26 Fed
Well: #3H
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well #3H
TVD Reference: WELL @ 3708.00usft (Original Well Elev)
MD Reference: WELL @ 3708.00usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Survey

MD (usft)	Inc (°)	Azi (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
7,472.00	69.38	249.98	7,322.74	-3,614.74	-68.04	-377.78	382.52	11.55	688,290.97	631,547.02
7,503.00	72.63	249.19	7,332.83	-3,624.83	-78.26	-405.25	410.83	10.76	688,280.75	631,519.55
7,535.00	75.80	248.92	7,341.53	-3,633.53	-89.27	-434.01	440.50	9.94	688,269.74	631,490.80
7,567.00	79.84	248.75	7,348.28	-3,640.28	-100.56	-463.17	470.60	12.64	688,258.45	631,461.64
7,599.00	82.31	249.01	7,353.24	-3,645.24	-111.95	-492.66	501.03	7.76	688,247.06	631,432.15
7,631.00	83.27	249.01	7,357.26	-3,649.26	-123.32	-522.30	531.61	3.00	688,235.69	631,402.51
7,663.00	85.03	249.19	7,360.52	-3,652.52	-134.68	-552.03	562.29	5.53	688,224.33	631,372.77
7,694.00	89.87	249.01	7,361.90	-3,653.90	-145.72	-580.96	592.12	15.62	688,213.29	631,343.85
7,726.00	93.74	249.10	7,360.89	-3,652.89	-157.15	-610.82	622.93	12.10	688,201.86	631,313.98
7,790.00	93.56	248.66	7,356.82	-3,648.82	-180.17	-670.40	684.42	0.74	688,178.84	631,254.40
7,833.00	92.59	249.80	7,354.51	-3,646.51	-195.39	-710.55	725.83	3.48	688,163.62	631,214.26
7,929.00	90.92	250.33	7,351.57	-3,643.57	-228.11	-800.75	818.72	1.83	688,130.90	631,124.05
8,024.00	91.19	251.47	7,349.82	-3,641.82	-259.19	-890.50	911.00	1.23	688,099.82	631,034.30
8,120.00	91.28	253.84	7,347.75	-3,639.75	-287.80	-982.11	1,004.90	2.47	688,071.21	630,942.69
8,215.00	90.31	256.48	7,346.43	-3,638.43	-312.13	-1,073.92	1,098.60	2.96	688,046.88	630,850.88
8,311.00	90.57	257.10	7,345.70	-3,637.70	-334.06	-1,167.38	1,193.71	0.70	688,024.95	630,757.42
8,407.00	90.31	260.96	7,344.96	-3,636.96	-352.33	-1,261.60	1,289.24	4.03	688,006.68	630,663.20
8,502.00	90.57	266.15	7,344.23	-3,636.23	-362.99	-1,355.97	1,384.19	5.47	687,996.02	630,568.83
8,598.00	90.75	269.66	7,343.12	-3,635.12	-366.50	-1,451.88	1,480.01	3.66	687,992.51	630,472.92
8,694.00	90.48	268.61	7,342.09	-3,634.09	-367.95	-1,547.87	1,575.70	1.13	687,991.07	630,376.94
8,789.00	90.66	265.89	7,341.15	-3,633.15	-372.50	-1,642.74	1,670.58	2.87	687,986.51	630,282.06
8,884.00	89.34	267.73	7,341.15	-3,633.15	-377.79	-1,737.59	1,765.50	2.38	687,981.22	630,187.21
8,980.00	90.13	268.96	7,341.59	-3,633.59	-380.56	-1,833.55	1,861.29	1.52	687,978.45	630,091.26
9,076.00	89.60	269.66	7,341.82	-3,633.82	-381.72	-1,929.54	1,956.97	0.91	687,977.29	629,995.27
9,171.00	89.43	270.81	7,342.62	-3,634.62	-381.33	-2,024.53	2,051.50	1.22	687,977.68	629,900.27
9,267.00	90.66	269.31	7,342.55	-3,634.55	-381.23	-2,120.53	2,147.06	2.02	687,977.78	629,804.28
9,363.00	89.52	268.08	7,342.40	-3,634.40	-383.41	-2,216.50	2,242.80	1.75	687,975.60	629,708.31



Pathfinder
Pathfinder X & Y Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #3H
Project:	Eddy County(NAD83)	TVD Reference:	WELL @ 3708.00usft (Original Well Elev)
Site:	High Lonesome 26 Fed	MD Reference:	WELL @ 3708.00usft (Original Well Elev)
Well:	#3H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Single User Db

Survey											
MD (usft)	Inc (°)	Azi (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
9,458.00	89.87	265.97	7,342.90	-3,634.90	-388.34	-2,311.36	2,337.71	2.25	687,970.67	629,613.44	
9,553.00	90.75	264.30	7,342.39	-3,634.39	-396.40	-2,406.02	2,432.70	1.99	687,962.61	629,518.79	
9,649.00	92.24	267.49	7,339.88	-3,631.88	-403.27	-2,501.72	2,528.63	3.67	687,955.74	629,423.08	
9,744.00	90.13	269.05	7,337.92	-3,629.92	-406.14	-2,596.65	2,623.40	2.76	687,952.87	629,328.15	
9,840.00	91.45	270.28	7,336.59	-3,628.59	-406.70	-2,692.63	2,719.01	1.88	687,952.31	629,232.17	
9,936.00	91.54	270.19	7,334.09	-3,626.09	-406.30	-2,788.60	2,814.51	0.13	687,952.71	629,136.20	
10,032.00	91.80	269.93	7,331.29	-3,623.29	-406.20	-2,884.56	2,910.03	0.38	687,952.81	629,040.24	
10,128.00	91.63	268.61	7,328.42	-3,620.42	-407.43	-2,980.51	3,005.67	1.39	687,951.59	628,944.30	
10,223.00	91.98	268.61	7,325.43	-3,617.43	-409.73	-3,075.43	3,100.38	0.37	687,949.28	628,849.37	
10,318.00	91.01	269.93	7,322.95	-3,614.95	-410.94	-3,170.39	3,195.03	1.72	687,948.07	628,754.42	
10,414.00	90.57	270.19	7,321.62	-3,613.62	-410.84	-3,266.38	3,290.58	0.53	687,948.17	628,658.42	
10,510.00	91.10	270.02	7,320.23	-3,612.23	-410.66	-3,362.37	3,386.13	0.58	687,948.35	628,562.44	
10,606.00	91.80	270.81	7,317.80	-3,609.80	-409.97	-3,458.33	3,481.60	1.10	687,949.04	628,466.47	
10,700.00	92.07	270.90	7,314.62	-3,606.62	-408.57	-3,552.27	3,574.98	0.30	687,950.45	628,372.53	
10,796.00	92.07	270.63	7,311.15	-3,603.15	-407.29	-3,648.20	3,670.36	0.28	687,951.73	628,276.61	
10,891.00	92.24	269.84	7,307.58	-3,599.58	-406.90	-3,743.13	3,764.83	0.85	687,952.12	628,181.67	
10,987.00	91.45	269.75	7,304.49	-3,596.49	-407.24	-3,839.08	3,860.38	0.83	687,951.77	628,085.73	
11,082.00	90.84	269.49	7,302.59	-3,594.59	-407.87	-3,934.06	3,954.99	0.70	687,951.14	627,990.75	
11,177.00	91.98	269.25	7,300.26	-3,592.26	-408.91	-4,029.02	4,049.63	1.23	687,950.10	627,895.78	
11,274.00	92.15	269.16	7,296.76	-3,588.76	-410.26	-4,125.95	4,146.25	0.20	687,948.75	627,798.86	
11,370.00	92.24	268.93	7,293.08	-3,585.08	-411.86	-4,221.86	4,241.89	0.26	687,947.15	627,702.94	
11,465.00	93.03	269.23	7,288.72	-3,580.72	-413.38	-4,316.75	4,336.50	0.89	687,945.63	627,608.05	
11,560.00	92.42	268.51	7,284.20	-3,576.20	-415.25	-4,411.62	4,431.12	0.99	687,943.76	627,513.18	
11,604.00	92.42	268.51	7,282.34	-3,574.34	-416.40	-4,455.57	4,474.98	0.00	687,942.62	627,469.23	

Checked By: _____	Approved By: _____	Date: _____
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Azimuths to Grid North
True North: -0.16°
Magnetic North: 7.74°
Magnetic Field
Strength: 49049.5nT
Dip Angle: 60.76°
Date: 12/11/2010
Model: IGRF200510

Project: Eddy County(NAD83)
Site: High Lonesome 26 Fed
Well: #3H
Wellbore: OH
Plan: Plan #4 (#3H/OH)

PATHFINDER
A Schlumberger Company

PROJECT DETAILS: Eddy County(NAD83)
Geodetic System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone: New Mexico Eastern Zone
System Datum: Mean Sea Level
Local North: Grid

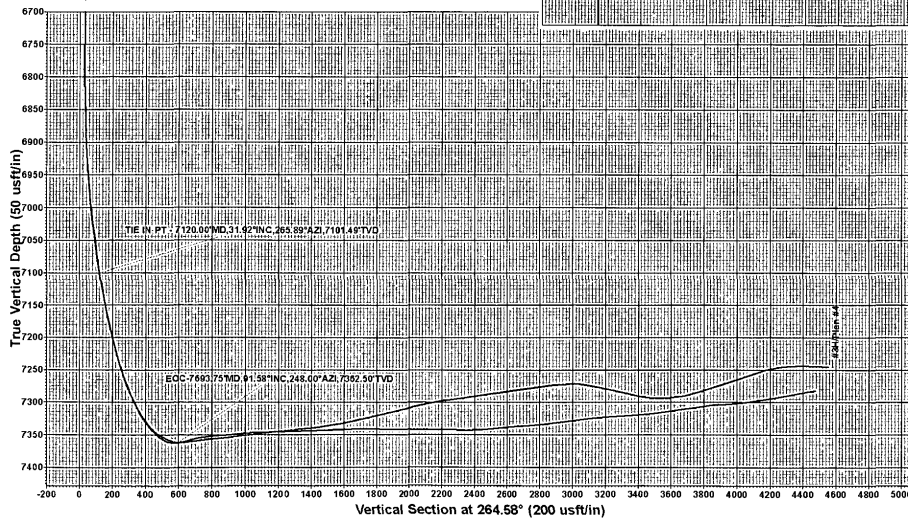
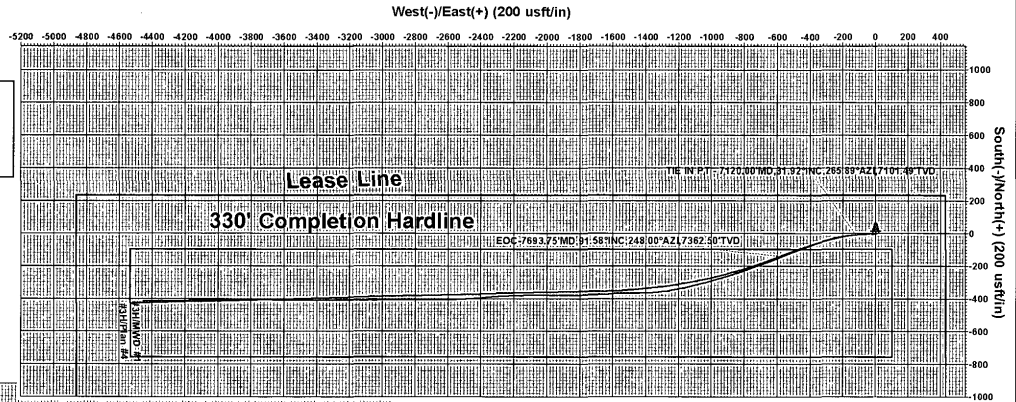
WELL DETAILS: #3H

Ground Elevation: 3693.00
RKB Elevation: WELL @ 3708.00usft (Original Well Elev)
Rig Name: Original Well Elev

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.00	0.00	688359.012	631924.804	32° 53' 31.069 N	104° 2' 17.566 W	

SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Diag	TFace	VSeal	Target
7120.00	31.92	265.89	7101.49	-9.72	-119.84	0.00	0.00	120.22	
7693.75	91.58	248.00	7362.50	-140.78	-582.03	10.89	-20.48	592.72	
8444.43	91.58	293.02	7341.71	-328.00	-1306.43	2.00	89.81	1331.61	
8488.29	91.58	262.02	7340.50	-333.33	-1350.00	0.00	0.00	1375.44	TGT1(26#3)
8787.42	93.33	268.95	7327.25	-354.95	-1657.93	2.00	73.38	1684.04	
9246.31	93.33	268.95	7301.50	-363.63	-2100.00	0.00	0.00	2124.89	TGT2(26#3)
9309.02	92.07	268.40	7298.26	-364.61	-2168.61	2.00	-156.35	2193.35	
9993.12	92.07	268.40	7273.50	-363.69	-2852.00	0.00	0.00	2875.49	TGT3(26#3)
10268.36	88.77	268.43	7276.18	-361.01	-3117.03	2.00	178.94	3140.03	
10494.79	88.77	268.43	7289.50	-397.45	-3353.00	0.00	0.00	3375.55	TGT4(26#3)
10897.18	84.82	268.42	7283.93	-466.48	-3754.87	2.00	-0.08	3776.66	
11247.88	84.82	268.42	7254.50	-418.09	-4104.00	0.00	0.00	4125.14	TGT5(26#3)
11515.02	88.47	268.43	7244.50	-425.43	-4370.95	2.00	179.97	4391.60	
11676.91	89.47	268.43	7246.00	-429.87	-4532.77	0.00	0.00	4553.11	PBHL(26#3)



WELLBORE TARGET DETAILS (MAP CO-ORDINATES)						
Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape
PBHL(26#3)	7246.00	-429.87	-4532.77	687926.137	627392.030	Point
TGT5(26#3)	7254.50	-418.09	-4104.00	687940.922	627820.804	Point
TGT3(26#3)	7273.50	-363.69	-2852.00	687975.322	629072.804	Point
TGT4(26#3)	7289.50	-397.46	-3353.00	687961.552	628571.804	Point
TGT2(26#3)	7301.50	-363.63	-2100.00	687995.982	626824.804	Point
TGT1(26#3)	7346.50	-333.33	-1350.00	688025.982	630574.804	Point

Plan: Plan #4 (#3H/OH)
Created By: Nate Bingham Date: 15.09. February 23 2011
Checked: Date: