



30-015-37146

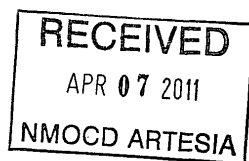
Cog Operating, LLC

Eddy County(NAD27)
Nervous Horz Com #4H
Lateral
OH

Survey: MWD #1

Pathfinder X & Y Survey Report

22 December, 2010



PATHFINDER
A Schlumberger Company



Pathfinder
Pathfinder X & Y Survey Report



Company: Cog Operating, LLC
Project: Eddy County(NAD27)
Site: Nervous Horz Com #4H
Well: Lateral
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well Lateral
TVD Reference: Patrioy #6 @ 3674.50usft (17.5' KB)
MD Reference: Patrioy #6 @ 3674.50usft (17.5' KB)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Project	Eddy 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	Nervous Horz Com #4H		
Site Position:		Northing:	622,471.500 usft
From:	Map	Easting:	654,879.800 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 42' 36.937 N
		Longitude:	103° 49' 47.262 W
		Grid Convergence:	0.27 °

Well	Lateral					
Well Position	+N/-S	0.00 usft	Northing:	622,471.500 usft	Latitude:	32° 42' 36.937 N
	+E/-W	0.00 usft	Easting:	654,879.800 usft	Longitude:	103° 49' 47.262 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,657.00 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF200510	12/07/10	7.79	60.63	48,965

Design	OH			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth:
Vertical Section:	Depth From (TVD)	+N-S	+E-W	Direction
	(usft)	(usft)	(usft)	(°)
	0.00	0.00	0.00	179.67

Survey Program		Date	12/22/10		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
7,635.00	12,640.00	MWD #1 (OH)	MWD	MWD - Standard	



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	7,570.00	1.67	283.92	7,568.86	-3,894.36	36.61	-23.02	-36.75	0.00	622,508.11	654,856.78
	7,635.00	1.49	281.37	7,633.84	-3,959.34	37.01	-24.77	-37.15	0.30	622,508.51	654,855.03
	7,667.00	1.14	264.76	7,665.83	-3,991.33	37.06	-25.49	-37.21	1.61	622,508.56	654,854.31
	7,698.00	2.37	199.93	7,696.82	-4,022.32	36.43	-26.02	-36.58	6.93	622,507.93	654,853.78
	7,730.00	5.72	181.51	7,728.73	-4,054.23	34.21	-26.28	-34.36	11.10	622,505.71	654,853.52
	7,762.00	9.50	179.05	7,760.45	-4,085.95	29.98	-26.28	-30.13	11.85	622,501.48	654,853.52
	7,793.00	13.28	180.77	7,790.83	-4,116.33	23.86	-26.29	-24.01	12.24	622,495.36	654,853.51
	7,825.00	16.97	182.64	7,821.72	-4,147.22	15.51	-26.55	-15.67	11.63	622,487.01	654,853.25
	7,857.00	19.43	182.00	7,852.11	-4,177.61	5.53	-26.95	-5.68	7.71	622,477.03	654,852.85
	7,888.00	22.51	179.50	7,881.06	-4,206.56	-5.56	-27.08	5.41	10.34	622,465.94	654,852.72
	7,920.00	25.32	175.26	7,910.31	-4,235.81	-18.51	-26.46	18.36	10.29	622,452.99	654,853.34
	7,952.00	28.58	174.74	7,938.83	-4,264.33	-32.95	-25.19	32.81	10.21	622,438.55	654,854.61
	7,983.00	31.30	177.12	7,965.69	-4,291.19	-48.38	-24.11	48.24	9.57	622,423.12	654,855.69
	8,015.00	34.47	180.05	7,992.56	-4,318.06	-65.75	-23.70	65.61	11.08	622,405.75	654,856.10
	8,047.00	38.60	181.18	8,018.27	-4,343.77	-84.79	-23.91	84.65	13.08	622,386.71	654,855.89
	8,078.00	43.09	181.21	8,041.72	-4,367.22	-105.06	-24.34	104.91	14.48	622,366.44	654,855.46
	8,110.00	46.60	181.07	8,064.40	-4,389.90	-127.61	-24.78	127.47	10.97	622,343.89	654,855.02
	8,142.00	50.12	180.01	8,085.66	-4,411.16	-151.52	-25.00	151.38	11.27	622,319.98	654,854.80
	8,173.00	53.82	178.70	8,104.76	-4,430.26	-175.94	-24.72	175.79	12.39	622,295.56	654,855.08
	8,205.00	57.24	179.54	8,122.86	-4,448.36	-202.31	-24.32	202.17	10.90	622,269.19	654,855.48
	8,237.00	59.97	180.04	8,139.53	-4,465.03	-229.62	-24.22	229.48	8.63	622,241.88	654,855.58
	8,269.00	63.84	180.44	8,154.60	-4,480.10	-257.85	-24.34	257.70	12.14	622,213.65	654,855.46
	8,300.00	67.80	180.49	8,167.29	-4,492.79	-286.12	-24.57	285.97	12.78	622,185.38	654,855.23
	8,332.00	71.23	179.64	8,178.49	-4,503.99	-316.09	-24.60	315.94	11.00	622,155.41	654,855.20
	8,364.00	75.10	178.87	8,187.76	-4,513.26	-346.71	-24.20	346.57	12.31	622,124.79	654,855.60
	8,396.00	78.61	178.70	8,195.03	-4,520.53	-377.86	-23.54	377.72	10.98	622,093.64	654,856.26
	8,428.00	83.36	178.89	8,200.05	-4,525.55	-409.45	-22.88	409.31	14.86	622,062.05	654,856.92



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Survey											
MD (usft)	Inc (°)	Azi (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
8,489.00	90.92	178.90	8,203.09	-4,528.59	-470.32	-21.70	470.18	12.39	622,001.18	654,858.10	
8,584.00	91.45	178.41	8,201.12	-4,526.62	-565.27	-19.47	565.15	0.76	621,906.23	654,860.33	
8,679.00	90.84	178.69	8,199.23	-4,524.73	-660.22	-17.07	660.11	0.71	621,811.28	654,862.73	
8,774.00	90.48	178.84	8,198.13	-4,523.63	-755.19	-15.02	755.09	0.41	621,716.31	654,864.78	
8,869.00	90.48	178.26	8,197.34	-4,522.84	-850.16	-12.62	850.07	0.61	621,621.34	654,867.18	
8,964.00	90.31	178.44	8,196.68	-4,522.18	-945.12	-9.88	945.04	0.26	621,526.38	654,869.92	
9,060.00	90.48	178.18	8,196.02	-4,521.52	-1,041.07	-7.05	1,041.01	0.32	621,430.43	654,872.75	
9,155.00	90.13	177.53	8,195.51	-4,521.01	-1,136.00	-3.50	1,135.96	0.78	621,335.50	654,876.30	
9,251.00	90.04	174.54	8,195.37	-4,520.87	-1,231.76	3.14	1,231.76	3.12	621,239.74	654,882.94	
9,346.00	88.81	173.61	8,196.32	-4,521.82	-1,326.25	12.94	1,326.30	1.62	621,145.25	654,892.74	
9,410.00	89.52	174.66	8,197.26	-4,522.76	-1,389.90	19.48	1,389.99	1.98	621,081.60	654,899.28	
9,473.00	88.72	173.71	8,198.22	-4,523.72	-1,452.57	25.87	1,452.70	1.97	621,018.93	654,905.67	
9,537.00	89.08	174.31	8,199.45	-4,524.95	-1,516.21	32.54	1,516.37	1.09	620,955.29	654,912.34	
9,601.00	89.16	174.35	8,200.44	-4,525.94	-1,579.89	38.87	1,580.09	0.14	620,891.61	654,918.67	
9,696.00	89.78	176.18	8,201.31	-4,526.81	-1,674.56	46.71	1,674.80	2.03	620,796.94	654,926.51	
9,791.00	91.36	178.18	8,200.37	-4,525.87	-1,769.43	51.38	1,769.70	2.68	620,702.07	654,931.18	
9,887.00	91.54	180.01	8,197.94	-4,523.44	-1,865.38	52.90	1,865.66	1.91	620,606.12	654,932.70	
9,982.00	91.63	180.27	8,195.31	-4,520.81	-1,960.35	52.66	1,960.62	0.29	620,511.15	654,932.46	
10,077.00	91.36	180.25	8,192.83	-4,518.33	-2,055.31	52.23	2,055.58	0.28	620,416.19	654,932.03	
10,173.00	89.96	180.52	8,191.73	-4,517.23	-2,151.30	51.59	2,151.56	1.49	620,320.20	654,931.39	
10,268.00	88.37	180.41	8,193.11	-4,518.61	-2,246.28	50.82	2,246.54	1.68	620,225.22	654,930.62	
10,363.00	88.72	180.89	8,195.52	-4,521.02	-2,341.25	49.74	2,341.49	0.63	620,130.25	654,929.54	
10,458.00	91.01	180.24	8,195.75	-4,521.25	-2,436.24	48.80	2,436.48	2.51	620,035.26	654,928.60	
10,522.00	90.40	179.27	8,194.96	-4,520.46	-2,500.23	49.08	2,500.47	1.79	619,971.27	654,928.88	
10,617.00	91.45	180.41	8,193.43	-4,518.93	-2,595.21	49.34	2,595.45	1.63	619,876.29	654,929.14	
10,712.00	92.68	180.06	8,190.00	-4,515.50	-2,690.15	48.95	2,690.39	1.35	619,781.35	654,928.75	
10,808.00	90.92	180.76	8,186.99	-4,512.49	-2,786.09	48.27	2,786.33	1.97	619,685.41	654,928.07	



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	10,903.00	86.97	180.85	8,188.74	-4,514.24	-2,881.05	46.93	2,881.27	4.16	619,590.45	654,926.73
	10,967.00	81.25	182.03	8,195.30	-4,520.80	-2,944.66	45.34	2,944.88	9.12	619,526.84	654,925.14
	11,062.00	78.88	180.07	8,211.69	-4,537.19	-3,038.21	43.62	3,038.41	3.22	619,433.29	654,923.42
	11,156.00	88.02	179.77	8,222.40	-4,547.90	-3,131.50	43.75	3,131.70	9.73	619,340.00	654,923.55
	11,220.00	91.63	180.42	8,222.60	-4,548.10	-3,195.49	43.64	3,195.69	5.73	619,276.01	654,923.44
	11,315.00	91.54	180.03	8,219.97	-4,545.47	-3,290.45	43.27	3,290.65	0.42	619,181.05	654,923.07
	11,411.00	90.13	179.82	8,218.57	-4,544.07	-3,386.44	43.39	3,386.63	1.48	619,085.06	654,923.19
	11,506.00	90.04	179.93	8,218.43	-4,543.93	-3,481.44	43.60	3,481.63	0.15	618,990.06	654,923.40
	11,569.00	89.69	180.03	8,218.58	-4,544.08	-3,544.44	43.62	3,544.63	0.58	618,927.06	654,923.42
	11,633.00	90.04	179.62	8,218.73	-4,544.23	-3,608.44	43.82	3,608.63	0.84	618,863.06	654,923.62
	11,729.00	89.69	178.71	8,218.96	-4,544.46	-3,704.43	45.22	3,704.62	1.02	618,767.07	654,925.02
	11,824.00	91.45	177.45	8,218.01	-4,543.51	-3,799.36	48.40	3,799.58	2.28	618,672.14	654,928.20
	11,919.00	87.85	176.76	8,218.59	-4,544.09	-3,894.22	53.20	3,894.46	3.86	618,577.28	654,933.00
	12,014.00	89.96	177.10	8,220.41	-4,545.91	-3,989.06	58.28	3,989.33	2.25	618,482.44	654,938.08
	12,109.00	87.67	176.68	8,222.37	-4,547.87	-4,083.90	63.44	4,084.19	2.45	618,387.60	654,943.24
	12,205.00	88.55	176.78	8,225.54	-4,551.04	-4,179.69	68.91	4,180.02	0.92	618,291.81	654,948.71
	12,300.00	89.25	177.88	8,227.36	-4,552.86	-4,274.57	73.33	4,274.92	1.37	618,196.93	654,953.13
	12,396.00	90.04	177.94	8,227.96	-4,553.46	-4,370.50	76.84	4,370.87	0.83	618,101.00	654,956.64
	12,491.00	86.97	176.64	8,230.44	-4,555.94	-4,465.35	81.32	4,465.74	3.51	618,006.15	654,961.12
	12,587.00	90.48	177.80	8,232.57	-4,558.07	-4,561.19	85.98	4,561.61	3.85	617,910.31	654,965.78
	12,640.00	90.48	177.80	8,232.13	-4,557.63	-4,614.15	88.01	4,614.58	0.00	617,857.35	654,967.81

BHL-12640.00°MD,90.48°INC,177.80°AZI, 8232.13°TVD, 4614.58°VS, -4614.15°N, 88.01°E



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Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
12,640.00	8,232.13	-4,614.15	88.01	BHL-12640.00MD,90.48°INC,177.80°AZI, 8232.13°TVD, 4614.58°VS, -4614.15'

Checked By: _____ Approved By: _____ Date: _____