



30-015-38244

Cog Operating LLC- Eastern NM

Eddy County
Marauder Federal
#1
OH

Survey: MWD #1

Pathfinder X & Y Survey Report

04 January, 2011

PATHFINDER
A Schlumberger Company



Pathfinder
Pathfinder X & Y Survey Report

PATHFINDER
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Company: Cog Operating LLC- Eastern NM
Project: Eddy County
Site: Marauder Federal
Well: #1
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well #1
TVD Reference: WELL @ 3411.00usft (Original Well Elev)
MD Reference: WELL @ 3411.00usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Project: Eddy County

Map System: US State Plane 1927 (Exact solution)
Geo Datum: NAD 1927 (NADCON CONUS)
Map Zone: New Mexico East 3001

System Datum: Mean Sea Level

Site: Marauder Federal

Site Position:		Northing:	590,631.100 usft	Latitude:	32° 37' 22.978 N
From:	Map	Easting:	629,005.700 usft	Longitude:	103° 54' 51.560 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.23 °

Well: #1

Well Position	+N/-S	0.00 usft	Northing:	590,631.100 usft	Latitude:	32° 37' 22.978 N
	+E/-W	0.00 usft	Easting:	629,005.700 usft	Longitude:	103° 54' 51.560 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,392.00 usft

Wellbore: OH

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	11/12/10	7.83	60.53	48,912

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	179.83



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Survey Program		Date		01/04/11	
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	8,300.00	GYRo (OH)	CB-GYRO-MS	Camera based gyro multishot	
8,372.00	13,225.00	MWD #1 (OH)	MWD	MWD - Standard	

MD (usft)	Inc (°)	Azi (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
8,300.00	1.07	150.81	8,298.65	-4,887.65	60.09	67.39	-59.89	0.00	590,691.19	629,073.09
8,372.00	16.00	181.70	8,369.66	-4,958.66	49.52	67.42	-49.32	20.96	590,680.62	629,073.12
8,404.00	19.26	182.95	8,400.16	-4,989.16	39.84	67.02	-39.64	10.26	590,670.94	629,072.72
8,435.00	23.65	181.69	8,429.00	-5,018.00	28.52	66.57	-28.32	14.24	590,659.62	629,072.27
8,467.00	27.26	178.76	8,457.89	-5,046.89	14.77	66.54	-14.57	11.94	590,645.87	629,072.24
8,499.00	29.55	178.65	8,486.04	-5,075.04	-0.45	66.89	0.65	7.16	590,630.65	629,072.59
8,531.00	32.45	179.22	8,513.46	-5,102.46	-16.93	67.19	17.13	9.11	590,614.17	629,072.89
8,562.00	36.49	180.16	8,539.01	-5,128.01	-34.47	67.28	34.67	13.14	590,596.63	629,072.98
8,594.00	40.54	180.90	8,564.05	-5,153.05	-54.39	67.09	54.59	12.74	590,576.71	629,072.79
8,626.00	44.05	181.08	8,587.71	-5,176.71	-75.92	66.71	76.11	10.98	590,555.18	629,072.41
8,658.00	47.31	180.77	8,610.07	-5,199.07	-98.80	66.35	99.00	10.21	590,532.30	629,072.05
8,690.00	49.68	179.61	8,631.27	-5,220.27	-122.77	66.27	122.96	7.89	590,508.33	629,071.97
8,722.00	52.35	179.69	8,651.40	-5,240.40	-147.64	66.42	147.83	8.35	590,483.46	629,072.12
8,753.00	55.05	180.46	8,669.75	-5,258.75	-172.62	66.39	172.82	8.94	590,458.48	629,072.09
8,785.00	57.68	180.45	8,687.48	-5,276.48	-199.26	66.17	199.45	8.22	590,431.84	629,071.87
8,817.00	60.50	180.77	8,703.91	-5,292.91	-226.71	65.88	226.90	8.85	590,404.39	629,071.58
8,849.00	64.63	181.04	8,718.65	-5,307.65	-255.10	65.43	255.29	12.93	590,376.00	629,071.13
8,881.00	68.41	180.91	8,731.40	-5,320.40	-284.44	64.93	284.63	11.82	590,346.66	629,070.63
8,912.00	71.75	180.72	8,741.96	-5,330.96	-313.58	64.52	313.77	10.79	590,317.52	629,070.22
8,944.00	74.83	180.93	8,751.16	-5,340.16	-344.22	64.08	344.41	9.65	590,286.88	629,069.78
8,976.00	77.65	181.75	8,758.77	-5,347.77	-375.29	63.35	375.48	9.16	590,255.81	629,069.05



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Well #1
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WELL @ 3411.00usft (Original Well Elev)
Grid
Minimum Curvature
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)
9,008.00	81.69	181.60	8,764.51	-5,353.51	-406.75	62.43	406.94	12.63	590,224.35	629,068.13
9,173.00	90.13	180.17	8,776.27	-5,365.27	-571.16	59.90	571.34	5.19	590,059.94	629,065.60
9,269.00	89.96	180.01	8,776.19	-5,365.19	-667.16	59.75	667.33	0.24	589,963.94	629,065.45
9,364.00	89.34	180.06	8,776.77	-5,365.77	-762.16	59.69	762.33	0.65	589,866.94	629,065.39
9,459.00	89.16	180.11	8,778.02	-5,367.02	-857.15	59.55	857.32	0.20	589,773.95	629,065.25
9,554.00	88.99	179.92	8,779.55	-5,368.55	-952.14	59.53	952.31	0.27	589,678.96	629,065.23
9,650.00	89.25	180.86	8,781.02	-5,370.02	-1,048.12	58.87	1,048.29	1.02	589,582.98	629,064.57
9,745.00	89.60	181.39	8,781.98	-5,370.98	-1,143.10	57.01	1,143.26	0.67	589,488.00	629,062.71
9,841.00	89.96	181.87	8,782.35	-5,371.35	-1,239.06	54.28	1,239.21	0.62	589,392.04	629,059.98
9,936.00	89.87	182.45	8,782.49	-5,371.49	-1,333.99	50.70	1,334.14	0.62	589,297.11	629,056.40
10,031.00	89.25	182.15	8,783.22	-5,372.22	-1,428.91	46.88	1,429.04	0.73	589,202.19	629,052.58
10,127.00	88.99	182.24	8,784.69	-5,373.69	-1,524.83	43.21	1,524.95	0.29	589,106.27	629,048.91
10,222.00	89.43	181.38	8,786.00	-5,375.00	-1,619.77	40.21	1,619.88	1.02	589,011.33	629,045.91
10,317.00	89.52	181.93	8,786.87	-5,375.87	-1,714.73	37.46	1,714.83	0.59	588,916.37	629,043.16
10,412.00	89.78	182.25	8,787.45	-5,376.45	-1,809.66	34.00	1,809.75	0.43	588,821.44	629,039.70
10,508.00	89.96	182.25	8,787.67	-5,376.67	-1,905.59	30.23	1,905.67	0.19	588,725.51	629,035.93
10,603.00	89.69	180.89	8,787.96	-5,376.96	-2,000.55	27.63	2,000.62	1.46	588,630.55	629,033.33
10,699.00	89.60	180.18	8,788.56	-5,377.56	-2,096.54	26.73	2,096.61	0.75	588,534.56	629,032.43
10,794.00	89.52	180.78	8,789.28	-5,378.28	-2,191.54	25.93	2,191.60	0.64	588,439.56	629,031.63
10,889.00	89.60	181.00	8,790.01	-5,379.01	-2,286.52	24.46	2,286.58	0.25	588,344.58	629,030.16
10,985.00	89.43	180.83	8,790.83	-5,379.83	-2,382.51	22.93	2,382.56	0.25	588,248.59	629,028.63
11,080.00	89.25	179.16	8,791.92	-5,380.92	-2,477.50	22.93	2,477.55	1.77	588,153.60	629,028.63
11,176.00	89.43	179.48	8,793.03	-5,382.03	-2,573.48	24.07	2,573.54	0.38	588,057.62	629,029.77
11,271.00	89.52	179.15	8,793.90	-5,382.90	-2,668.47	25.21	2,668.54	0.36	587,962.63	629,030.91
11,367.00	90.13	179.52	8,794.19	-5,383.19	-2,764.46	26.32	2,764.53	0.74	587,866.64	629,032.02
11,462.00	90.13	179.23	8,793.98	-5,382.98	-2,859.46	27.36	2,859.53	0.31	587,771.64	629,033.06
11,558.00	90.04	179.53	8,793.83	-5,382.83	-2,955.45	28.40	2,955.52	0.33	587,675.65	629,034.10



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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)
11,653.00	90.13	180.00	8,793.69	-5,382.69	-3,050.45	28.79	3,050.52	0.50	587,580.65	629,034.49
11,747.00	89.60	180.36	8,793.91	-5,382.91	-3,144.45	28.49	3,144.52	0.68	587,486.65	629,034.19
11,842.00	89.78	180.69	8,794.43	-5,383.43	-3,239.44	27.62	3,239.51	0.40	587,391.66	629,033.32
11,937.00	89.16	179.57	8,795.31	-5,384.31	-3,334.44	27.41	3,334.51	1.35	587,296.66	629,033.11
12,033.00	89.34	179.41	8,796.56	-5,385.56	-3,430.43	28.26	3,430.50	0.25	587,200.67	629,033.96
12,128.00	89.16	179.47	8,797.81	-5,386.81	-3,525.41	29.19	3,525.48	0.20	587,105.69	629,034.89
12,224.00	89.34	179.79	8,799.06	-5,388.06	-3,621.40	29.81	3,621.48	0.38	587,009.70	629,035.51
12,319.00	89.78	180.21	8,799.79	-5,388.79	-3,716.40	29.81	3,716.47	0.64	586,914.70	629,035.51
12,415.00	90.22	180.34	8,799.79	-5,388.79	-3,812.40	29.35	3,812.47	0.48	586,818.70	629,035.05
12,510.00	89.16	181.61	8,800.31	-5,389.31	-3,907.38	27.73	3,907.45	1.74	586,723.72	629,033.43
12,605.00	89.43	181.66	8,801.48	-5,390.48	-4,002.33	25.02	4,002.39	0.29	586,628.77	629,030.72
12,700.00	89.52	181.57	8,802.35	-5,391.35	-4,097.29	22.34	4,097.34	0.13	586,533.81	629,028.04
12,796.00	89.60	182.13	8,803.08	-5,392.08	-4,193.24	19.25	4,193.28	0.59	586,437.86	629,024.95
12,891.00	89.60	182.86	8,803.75	-5,392.75	-4,288.15	15.11	4,288.17	0.77	586,342.95	629,020.81
12,986.00	89.69	183.00	8,804.33	-5,393.33	-4,383.02	10.25	4,383.03	0.18	586,248.08	629,015.95
13,082.00	90.22	182.98	8,804.41	-5,393.41	-4,478.89	5.25	4,478.88	0.55	586,152.21	629,010.95
13,178.00	90.04	183.25	8,804.19	-5,393.19	-4,574.75	0.03	4,574.73	0.34	586,056.35	629,005.73
13,224.49	90.04	183.25	8,804.16	-5,393.16	-4,621.16	-2.61	4,621.13	0.00	586,009.94	629,003.09
PBHL(Mar#1) 13,225.00	90.04	183.25	8,804.16	-5,393.16	-4,621.67	-2.63	4,621.64	0.00	586,009.43	629,003.07

BHL-13225.00°MD,90.04°INC,183.25°AZI, 8804.16°TVD, 4621.64°VS, -4621.67°N, -2.63°E

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
13,225.00	8,804.16	-4,621.67	-2.63	BHL-13225.00°MD,90.04°INC,183.25°AZI, 8804.16°TVD, 4621.64°VS, -4621.67°



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Design: OH

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North Reference: Grid
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Database: EDM 5000.1 Single User Db

Checked By: _____ Approved By: _____ Date: _____



Project: Eddy County
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Well: #1
Wellbore: OH
Plan: Plan #2 (#1/OH)



Azimuths to Grid North
True North: -0.23°
Magnetic North: 7.61°
Magnetic Field
Strength: 48912.1snT
Dip Angle: 60.53°
Date: 11/12/2010
Model: IGRF200510

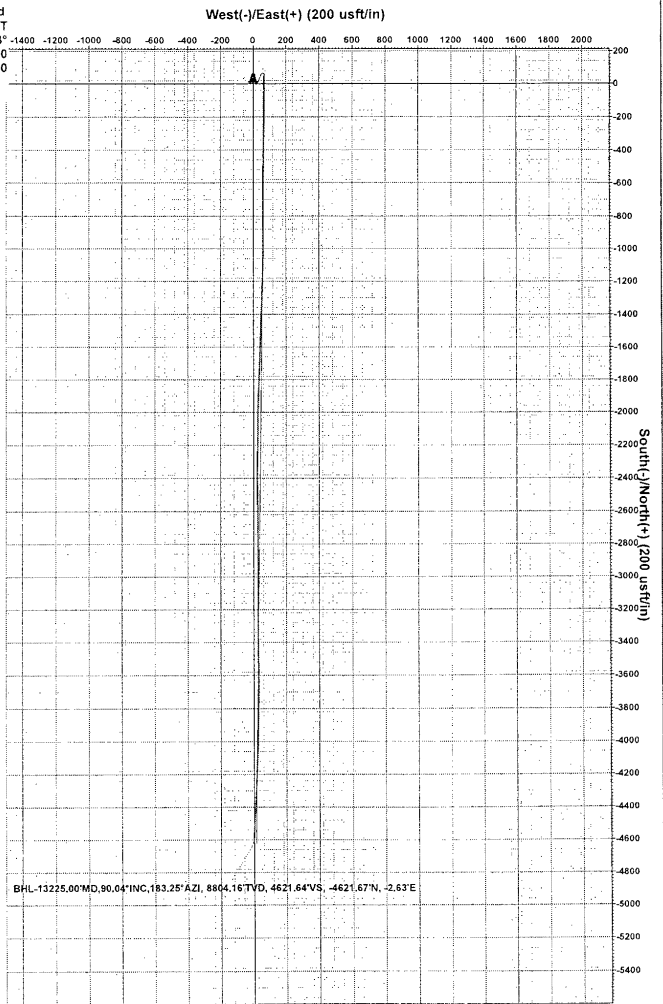
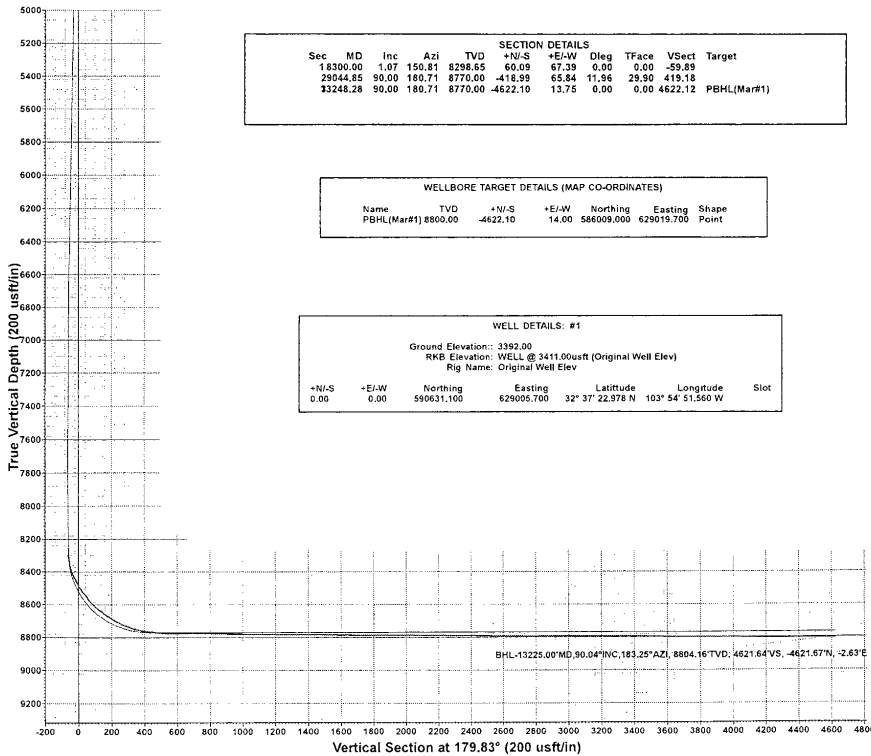
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PROJECT DETAILS: Eddy County
Geodetic System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1886
Zone: New Mexico East 3001
System Datum: Mean Sea Level
Local North: Grid

SECTION DETAILS									
Sec	MD	Inc	Azi	TVD	+N-S	+E-W	Dleg	TFace	VSect Target
18300.00	1.07	150.81	8298.65	60.09	67.35	0.00	0.00	-59.89	
29044.85	90.00	180.71	8770.00	-418.99	65.84	11.96	29.90	419.18	
33248.28	90.00	180.71	8770.00	-4622.10	13.75	0.00	0.00	4622.12	PBHL(Mar#1)

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)					
Name	TVD	+N-S	+E-W	Northing	Easting
PBHL(Mar#1)	8800.00	-4622.10	14.00	586009.000	629019.700

WELL DETAILS: #1							
Ground Elevation: 3392.00							
RWB Elevation: WELL @ 3411.00usft (Original Well Elev)							
Rig Name: Original Well Elev							
+N-S	+E-W	Northing	Easting	Latitude	Longitude	Slot	
0.00	0.00	590631.100	629005.700	32° 37' 22.978 N	103° 54' 51.560 W		



BHL-13225.00°MD,90.04°INC,183.25°AZI, 8804.16°TVD, 4621.64°VS, -4621.67°N, -2.63°E

BHL-13225.00°MD,90.04°INC,183.25°AZI, 8804.16°TVD, 4621.64°VS, -4621.67°N, -2.63°E

Plan: Plan #2 (#1/OH)

Created By: Nate Bingham Date: 10:35, January 04 2011