



30-015-37689

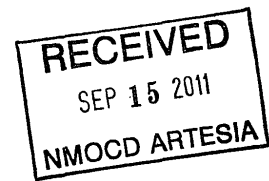
Marbob

Eddy County
Lovelady State
#4H
OH

Survey: MWD #1

Pathfinder X & Y Survey Report

14 September, 2010



PATHFINDER[®]

A Schlumberger Company



Pathfinder

Pathfinder X & Y Survey Report



Company: Marbob
Project: Eddy County
Site: Lovelady State
Well: #4H
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well #4H
TVD Reference: WELL @ 3556 00ft (Original Well Elev)
MD Reference: WELL @ 3556 00ft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Midland Database

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: Lovelady State

Site Position: Northing: 412,717.600 ft Latitude: 32° 8' 4.788 N
From: Map Easting: 481,546.600 ft Longitude: 104° 23' 34.615 W
Position Uncertainty: 0 00 ft Slot Radius: Grid Convergence: -0.03 °

Well: #4H

Well Position: +N/-S 0.00 ft Northing: 408,606.000 ft Latitude: 32° 7' 24.096 N
+E/-W 0.00 ft Easting: 481,299.800 ft Longitude: 104° 23' 37.459 W
Position Uncertainty: 0 00 ft Wellhead Elevation: ft Ground Level: 3,538.00 ft

Wellbore: OH

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	03/10/2010	8.09	59.99	48,618

Design: OH

Audit Notes:

Version: 1.0 Phase: ACTUAL Tie On Depth: 0.00

Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.00	0.00	0.00	2.21



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North Reference: Gnd
Survey Calculation Method: Minimum Curvature
Database: Midland Database

Survey Program		Date	09/14/2010	
From (ft)	To (ft)	Survey (Wellbore)		Tool Name
100.00	5,000.00	GYRO (OH)		MWD
5,056.00	10,088.15	MWD #1 (OH)		MWD
				Description
				MWD - Standard
				MWD - Standard

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (°/100ft)	Northing (ft)	Easting (ft)
5,000.00	0.36	178.24	4,999.85	1,443.85	-7.63	3.92	-7.47	0.00	408,598.37	481,303.72
5,056.00	2.64	357.66	5,055.83	1,499.83	-6.52	3.87	-6.36	5.36	408,599.48	481,303.67
5,088.00	8.35	359.04	5,087.67	1,531.67	-3.45	3.80	-3.30	17.85	408,602.55	481,303.60
5,119.00	12.57	358.33	5,118.15	1,562.15	2.17	3.67	2.31	13.62	408,608.17	481,303.47
5,151.00	16.44	356.68	5,149.12	1,593.12	10.18	3.30	10.30	12.16	408,616.18	481,303.10
5,183.00	20.22	357.89	5,179.49	1,623.49	20.23	2.84	20.32	11.87	408,626.23	481,302.64
5,215.00	24.27	358.27	5,209.10	1,653.10	32.33	2.44	32.40	12.66	408,638.33	481,302.24
5,247.00	28.40	358.66	5,237.78	1,681.78	46.52	2.06	46.56	12.92	408,652.52	481,301.86
5,278.00	32.62	359.62	5,264.48	1,708.48	62.25	1.83	62.28	13.70	408,668.25	481,301.63
5,310.00	36.14	0.44	5,290.88	1,734.88	80.32	1.85	80.33	11.09	408,686.32	481,301.65
5,342.00	38.16	0.73	5,316.39	1,760.39	99.64	2.04	99.65	6.34	408,705.64	481,301.84
5,374.00	40.36	1.51	5,341.16	1,785.16	119.89	2.44	119.89	7.05	408,725.89	481,302.24
5,406.00	42.65	1.47	5,365.13	1,809.13	141.08	2.99	141.09	7.16	408,747.08	481,302.79
5,438.00	46.17	1.10	5,387.98	1,831.98	163.47	3.49	163.48	11.03	408,769.47	481,303.29
5,470.00	50.21	0.16	5,409.31	1,853.31	187.31	3.75	187.32	12.81	408,793.31	481,303.55
5,502.00	54.34	0.04	5,428.89	1,872.89	212.62	3.79	212.61	12.91	408,818.62	481,303.59
5,533.00	58.39	359.77	5,446.06	1,890.06	238.42	3.75	238.39	13.08	408,844.42	481,303.55
5,565.00	61.55	0.48	5,462.07	1,906.07	266.12	3.81	266.07	10.06	408,872.12	481,303.61
5,597.00	64.63	1.14	5,476.55	1,920.55	294.65	4.22	294.59	9.80	408,900.65	481,304.02
5,629.00	66.21	1.83	5,489.86	1,933.86	323.74	4.97	323.69	5.31	408,929.74	481,304.77
5,660.00	67.88	2.35	5,501.95	1,945.95	352.26	6.02	352.23	5.60	408,958.26	481,305.82



Pathfinder

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Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well #4H
TVD Reference: WELL @ 3556.00ft (Original Well Elev)
MD Reference: WELL @ 3556.00ft (Original Well Elev)
North Reference: Grd
Survey Calculation Method: Minimum Curvature
Database: Midland Database

Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (°/100ft)	Northing (ft)	Easting (ft)
5,692.00	70.08	2.44	5,513.43	1,957.43	382.11	7.26	382.10	6.88	408,988.11	481,307.06
5,723.00	73.42	2.77	5,523.13	1,967.13	411.51	8.60	411.54	10.82	409,017.51	481,308.40
5,754.00	76.33	2.18	5,531.22	1,975.22	441.41	9.89	441.46	9.57	409,047.41	481,309.69
5,785.00	78.96	2.12	5,537.85	1,981.85	471.67	11.03	471.74	8.49	409,077.67	481,310.83
5,817.00	80.90	2.43	5,543.45	1,987.45	503.15	12.28	503.25	6.14	409,109.15	481,312.08
5,848.00	82.75	2.53	5,547.86	1,991.86	533.80	13.61	533.93	5.98	409,139.80	481,313.41
5,880.00	84.68	2.54	5,551.36	1,995.36	565.58	15.02	565.74	6.03	409,171.58	481,314.82
5,918.00	87.32	3.20	5,554.01	1,998.01	603.43	16.91	603.64	7.16	409,209.43	481,316.71
5,950.00	88.55	2.95	5,555.16	1,999.16	635.37	18.63	635.61	3.92	409,241.37	481,318.43
5,982.00	90.22	3.64	5,555.51	1,999.51	667.31	20.47	667.60	5.65	409,273.31	481,320.27
6,045.00	91.10	3.07	5,554.78	1,998.78	730.20	24.15	730.59	1.66	409,336.20	481,323.95
6,077.00	91.10	3.75	5,554.17	1,998.17	762.13	26.06	762.57	2.12	409,368.13	481,325.86
6,141.00	91.19	3.03	5,552.89	1,996.89	826.01	29.84	826.55	1.13	409,432.01	481,329.64
6,204.00	90.40	2.67	5,552.01	1,996.01	888.92	32.97	889.53	1.38	409,494.92	481,332.77
6,267.00	89.16	2.48	5,552.26	1,996.26	951.86	35.80	952.53	1.99	409,557.86	481,335.60
6,331.00	88.46	3.00	5,553.58	1,997.58	1,015.77	38.86	1,016.51	1.36	409,621.77	481,338.66
6,394.00	88.99	2.47	5,554.99	1,998.99	1,078.68	41.87	1,079.50	1.19	409,684.68	481,341.67
6,457.00	89.25	2.33	5,555.95	1,999.95	1,141.62	44.51	1,142.49	0.47	409,747.62	481,344.31
6,521.00	89.43	2.50	5,556.69	2,000.69	1,205.56	47.20	1,206.48	0.39	409,811.56	481,347.00
6,584.00	88.90	2.58	5,557.61	2,001.61	1,268.49	49.99	1,269.48	0.85	409,874.49	481,349.79
6,647.00	88.90	3.24	5,558.82	2,002.82	1,331.40	53.19	1,332.46	1.05	409,937.40	481,352.99
6,709.00	89.25	2.05	5,559.82	2,003.82	1,393.32	56.05	1,394.45	2.00	409,999.32	481,355.85
6,772.00	89.87	1.79	5,560.30	2,004.30	1,456.28	58.16	1,457.44	1.07	410,062.28	481,357.96
6,835.00	89.60	2.25	5,560.60	2,004.60	1,519.24	60.38	1,520.44	0.85	410,125.24	481,360.18
6,898.00	89.34	1.66	5,561.18	2,005.18	1,582.21	62.53	1,583.44	1.02	410,188.21	481,362.33
6,961.00	89.96	2.49	5,561.56	2,005.56	1,645.16	64.81	1,646.44	1.64	410,251.16	481,364.61
7,024.00	89.78	1.73	5,561.71	2,005.71	1,708.12	67.13	1,709.44	1.24	410,314.12	481,366.93



Pathfinder

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Well: #4H
Wellbore: OH
Design: OH

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

Well #4H
WELL @ 3556.00ft (Original Well Elev)
WELL @ 3556.00ft (Original Well Elev)
Gnd
Minimum Curvature
Midland Database

Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (°/100ft)	Northing (ft)	Easting (ft)
7,088.00	90.48	2.14	5,561.56	2,005.56	1,772.08	69.29	1,773.44	1.27	410,378.08	481,369.09
7,151.00	90.40	2.17	5,561.08	2,005.08	1,835.03	71.66	1,836.43	0.14	410,441.03	481,371.46
7,213.00	89.25	1.55	5,561.27	2,005.27	1,897.00	73.68	1,898.43	2.11	410,503.00	481,373.48
7,277.00	89.25	1.64	5,562.10	2,006.10	1,960.97	75.46	1,962.42	0.14	410,566.97	481,375.26
7,340.00	90.48	2.25	5,562.25	2,006.25	2,023.93	77.59	2,025.42	2.18	410,629.93	481,377.39
7,403.00	90.48	2.61	5,561.72	2,005.72	2,086.87	80.27	2,088.42	0.57	410,692.87	481,380.07
7,466.00	90.57	2.85	5,561.15	2,005.15	2,149.80	83.27	2,151.41	0.41	410,755.80	481,383.07
7,529.00	89.52	2.88	5,561.10	2,005.10	2,212.72	86.42	2,214.41	1.67	410,818.72	481,386.22
7,593.00	90.40	3.39	5,561.14	2,005.14	2,276.62	89.92	2,278.40	1.59	410,882.62	481,389.72
7,657.00	91.28	2.36	5,560.20	2,004.20	2,340.53	93.13	2,342.38	2.12	410,946.53	481,392.93
7,721.00	90.92	2.99	5,558.98	2,002.98	2,404.45	96.11	2,406.37	1.13	411,010.45	481,395.91
7,784.00	90.75	3.17	5,558.06	2,002.06	2,467.35	99.50	2,469.36	0.39	411,073.35	481,399.30
7,847.00	90.66	1.98	5,557.28	2,001.28	2,530.28	102.33	2,532.35	1.89	411,136.28	481,402.13
7,910.00	90.84	2.32	5,556.46	2,000.46	2,593.23	104.69	2,595.34	0.61	411,199.23	481,404.49
7,974.00	90.75	2.41	5,555.57	1,999.57	2,657.17	107.33	2,659.34	0.20	411,263.17	481,407.13
8,036.00	90.66	3.47	5,554.81	1,998.81	2,719.09	110.51	2,721.33	1.72	411,325.09	481,410.31
8,099.00	88.55	1.80	5,555.24	1,999.24	2,782.01	113.41	2,784.32	4.27	411,388.01	481,413.21
8,162.00	88.72	1.69	5,556.74	2,000.74	2,844.97	115.32	2,847.30	0.32	411,450.97	481,415.12
8,225.00	89.08	2.65	5,557.95	2,001.95	2,907.91	117.71	2,910.28	1.63	411,513.91	481,417.51
8,289.00	87.58	1.91	5,559.82	2,003.82	2,971.83	120.25	2,974.25	2.61	411,577.83	481,420.05
8,352.00	89.34	2.58	5,561.51	2,005.51	3,034.75	122.72	3,037.23	2.99	411,640.75	481,422.52
8,415.00	90.31	2.61	5,561.70	2,005.70	3,097.69	125.57	3,100.23	1.54	411,703.69	481,425.37
8,478.00	91.54	3.05	5,560.68	2,004.68	3,160.60	128.68	3,163.21	2.07	411,766.60	481,428.48
8,541.00	91.28	3.36	5,559.13	2,003.13	3,223.48	132.20	3,226.18	0.64	411,829.48	481,432.00
8,604.00	90.75	3.50	5,558.02	2,002.02	3,286.36	135.97	3,289.16	0.87	411,892.36	481,435.77
8,667.00	90.04	2.79	5,557.58	2,001.58	3,349.26	139.43	3,352.15	1.59	411,955.26	481,439.23
8,730.00	90.31	1.58	5,557.39	2,001.39	3,412.22	141.83	3,415.15	1.97	412,018.22	481,441.63



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8,792.00	89.69	0.68	5,557.39	2,001.39	3,474.20	143.05	3,477.14	1.76	412,080.20	481,442.85
8,855.00	89.60	0.34	5,557.78	2,001.78	3,537.20	143.61	3,540.11	0.56	412,143.20	481,443.41
8,918.00	89.52	0.76	5,558.27	2,002.27	3,600.20	144.22	3,603.08	0.68	412,206.20	481,444.02
8,981.00	90.04	0.46	5,558.51	2,002.51	3,663.19	144.89	3,666.05	0.95	412,269.19	481,444.69
9,044.00	90.13	1.09	5,558.41	2,002.41	3,726.18	145.74	3,729.03	1.01	412,332.18	481,445.54
9,108.00	90.31	1.03	5,558.17	2,002.17	3,790.17	146.93	3,793.02	0.30	412,396.17	481,446.73
9,171.00	90.48	0.95	5,557.73	2,001.73	3,853.16	148.01	3,856.00	0.30	412,459.16	481,447.81
9,233.00	91.19	0.73	5,556.83	2,000.83	3,915.15	148.92	3,917.98	1.20	412,521.15	481,448.72
9,296.00	91.19	0.89	5,555.52	1,999.52	3,978.13	149.81	3,980.95	0.25	412,584.13	481,449.61
9,358.00	90.40	1.71	5,554.66	1,998.66	4,040.11	151.22	4,042.93	1.84	412,646.11	481,451.02
9,422.00	90.48	2.59	5,554.17	1,998.17	4,104.06	153.62	4,106.93	1.38	412,710.06	481,453.42
9,485.00	90.92	2.54	5,553.40	1,997.40	4,166.99	156.44	4,169.92	0.70	412,772.99	481,456.24
9,548.00	90.22	2.89	5,552.77	1,996.77	4,229.92	159.42	4,232.92	1.24	412,835.92	481,459.22
9,611.00	89.69	2.17	5,552.82	1,996.82	4,292.85	162.21	4,295.92	1.42	412,898.85	481,462.01
9,673.00	89.69	2.89	5,553.16	1,997.16	4,354.79	164.94	4,357.91	1.16	412,960.79	481,464.74
9,737.00	89.69	1.78	5,553.51	1,997.51	4,418.74	167.55	4,421.91	1.73	413,024.74	481,467.35
9,800.00	90.22	1.86	5,553.56	1,997.56	4,481.71	169.55	4,484.91	0.85	413,087.71	481,469.35
9,863.00	90.66	1.41	5,553.07	1,997.07	4,544.68	171.35	4,547.90	1.00	413,150.68	481,471.15
9,925.00	90.04	1.96	5,552.69	1,996.69	4,606.65	173.17	4,609.90	1.34	413,212.65	481,472.97
9,988.00	89.08	2.78	5,553.18	1,997.18	4,669.59	175.78	4,672.90	2.00	413,275.59	481,475.58
10,031.00	88.99	1.97	5,553.90	1,997.90	4,712.55	177.56	4,715.89	1.90	413,318.55	481,477.36
10,088.15	88.99	1.97	5,554.91	1,998.91	4,769.66	179.52	4,773.03	0.00	413,375.66	481,479.32