

30-025-44410



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AUG 15 2018
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Legacy Reserves Operating

**Lea County, NM
Sec 01-T20S-R34E
Lea Unit 49H**

Wellbore #1

Survey: MWD Surveys

Standard Survey Report

27 February, 2018



Survey Report

Company:	Legacy Reserves Operating	Local Co-ordinate Reference:	Well Lea Unit 49H
Project:	Lea County, NM	TVD Reference:	KB= @ 3696.00ft
Site:	Sec 01-T20S-R34E	MD Reference:	KB= @ 3696.00ft
Well:	Lea Unit 49H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1

Project	Lea County, NM		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site		Sec 01-T20S-R34E			
Site Position:		Northing:	581,763.70 usft	Latitude:	32.596605
From:	Map	Easting:	795,728.60 usft	Longitude:	-103.507304
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.45 °

Well	Lea Unit 49H					
Well Position	+N/-S	0.00 ft	Northing:	581,747.20 usft	Latitude:	32.596602
	+E/-W	0.00 ft	Easting:	793,778.60 usft	Longitude:	-103.513636
Position Uncertainty		0.00 ft	Wellhead Elevation:	0.00 ft	Ground Level:	3,678.00 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	2/12/2018	6.67	60.57	48,232

Design	Wellbore #1				
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	173.09	

Survey Program	Date 2/27/2018			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
199.00	15,810.00	MWD Surveys (Wellbore #1)	MWD	MWD - Standard

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
199.00	0.10	26.70	199.00	0.16	0.08	-0.14	0.05	0.05	0.00	
First Mwd Survey @199 MD										
381.00	0.60	221.30	381.00	-0.42	-0.48	0.36	0.38	0.27	-90.88	
563.00	0.80	234.00	562.98	-1.88	-2.14	1.61	0.14	0.11	6.98	
747.00	0.50	260.10	746.97	-2.77	-3.97	2.28	0.23	-0.16	14.18	
927.00	0.40	282.00	926.97	-2.78	-5.35	2.11	0.11	-0.06	12.17	
1,110.00	0.30	269.00	1,109.96	-2.65	-6.46	1.86	0.07	-0.05	-7.10	
1,289.00	0.40	313.50	1,288.96	-2.23	-7.38	1.33	0.16	0.06	24.86	
1,475.00	0.70	288.60	1,474.95	-1.42	-8.93	0.34	0.20	0.16	-13.39	
1,664.00	1.00	270.20	1,663.93	-1.05	-11.67	-0.36	0.21	0.16	-9.74	



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Wellbore: Wellbore #1
Design: Wellbore #1

Local Co-ordinate Reference: Well Lea Unit 49H
TVD Reference: KB= @ 3696.00ft
MD Reference: KB= @ 3696.00ft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,735.00	1.10	275.00	1,734.92	-0.99	-12.97	-0.58	0.19	0.14	6.76
1,889.00	0.40	333.40	1,888.91	-0.38	-14.68	-1.39	0.62	-0.45	37.92
2,077.00	0.50	339.60	2,076.90	0.98	-15.26	-2.81	0.06	0.05	3.30
2,266.00	0.40	344.80	2,265.89	2.39	-15.72	-4.26	0.06	-0.05	2.75
2,454.00	0.90	329.70	2,453.88	4.29	-16.64	-6.27	0.28	0.27	-8.03
2,642.00	0.80	350.60	2,641.86	6.86	-17.60	-8.93	0.17	-0.05	11.12
2,831.00	1.10	32.70	2,830.84	9.69	-16.84	-11.65	0.39	0.16	22.28
3,019.00	2.10	41.30	3,018.76	13.80	-13.59	-15.33	0.55	0.53	4.57
3,207.00	0.90	52.20	3,206.69	17.29	-10.15	-18.39	0.65	-0.64	5.80
3,396.00	1.00	115.70	3,395.67	17.49	-7.49	-18.26	0.53	0.05	33.60
3,490.00	1.00	149.30	3,489.66	16.43	-6.33	-17.07	0.61	0.00	35.74
3,584.00	1.10	181.90	3,583.65	14.82	-5.94	-15.43	0.64	0.11	34.68
3,678.00	2.00	180.00	3,677.61	12.28	-5.97	-12.91	0.96	0.96	-2.02
3,866.00	3.50	174.50	3,865.39	3.28	-5.42	-3.91	0.81	0.80	-2.93
3,960.00	4.00	177.10	3,959.19	-2.85	-4.98	2.23	0.56	0.53	2.77
4,054.00	3.30	178.20	4,053.00	-8.83	-4.73	8.19	0.75	-0.74	1.17
4,148.00	1.80	197.80	4,146.90	-12.94	-5.10	12.23	1.82	-1.60	20.85
4,242.00	0.90	248.50	4,240.88	-14.61	-6.23	13.76	1.50	-0.96	53.94
4,431.00	0.70	223.60	4,429.86	-15.99	-8.41	14.86	0.21	-0.11	-13.17
4,611.00	0.90	247.50	4,609.84	-17.33	-10.48	15.94	0.21	0.11	13.28
4,800.00	1.40	242.10	4,798.80	-18.98	-13.89	17.17	0.27	0.26	-2.86
4,988.00	1.30	244.90	4,986.75	-20.96	-17.85	18.66	0.06	-0.05	1.49
5,176.00	1.00	229.90	5,174.71	-22.92	-21.03	20.22	0.22	-0.16	-7.98
5,364.00	1.40	243.50	5,362.67	-25.00	-24.34	21.89	0.26	0.21	7.23
5,536.00	1.70	243.00	5,534.61	-27.10	-28.50	23.47	0.17	0.17	-0.29
5,648.00	1.50	244.20	5,646.57	-28.49	-31.30	24.52	0.18	-0.18	1.07
5,837.00	1.80	235.30	5,835.49	-31.25	-35.97	26.70	0.21	0.16	-4.71
6,025.00	1.70	240.30	6,023.40	-34.32	-40.82	29.16	0.10	-0.05	2.66
6,218.00	2.00	236.70	6,216.30	-37.58	-46.12	31.76	0.17	0.16	-1.87
6,407.00	1.90	235.30	6,405.19	-41.18	-51.45	34.69	0.06	-0.05	-0.74
6,595.00	1.60	227.80	6,593.10	-44.72	-55.96	37.66	0.20	-0.16	-3.99
6,784.00	1.50	225.60	6,782.03	-48.22	-59.68	40.69	0.06	-0.05	-1.16
6,973.00	1.40	220.30	6,970.97	-51.71	-62.94	43.76	0.09	-0.05	-2.80
7,162.00	1.50	221.80	7,159.91	-55.32	-66.08	46.96	0.06	0.05	0.79
7,351.00	1.60	234.20	7,348.84	-58.70	-69.87	49.87	0.18	0.05	6.56
7,540.00	1.80	234.90	7,537.76	-61.95	-74.44	52.55	0.11	0.11	0.37
7,728.00	2.10	236.70	7,725.65	-65.54	-79.73	55.47	0.16	0.16	0.96
7,917.00	2.10	219.70	7,914.53	-70.11	-84.84	59.39	0.33	0.00	-8.99
8,105.00	0.80	267.40	8,102.47	-72.82	-88.35	61.66	0.89	-0.69	25.37
8,294.00	0.40	296.90	8,291.46	-72.58	-90.26	61.19	0.26	-0.21	15.61
8,483.00	0.70	255.10	8,480.45	-72.58	-91.96	60.99	0.26	0.16	-22.12
8,672.00	0.60	20.20	8,669.44	-71.95	-92.74	60.27	0.61	-0.05	66.19
8,860.00	0.00	319.20	8,857.44	-71.02	-92.40	59.39	0.32	-0.32	0.00



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9,049.00	1.30	57.90	9,046.42	-69.88	-90.58	58.48	0.69	0.69	0.00
9,238.00	1.50	74.20	9,235.37	-68.07	-86.38	57.18	0.23	0.11	8.62
9,427.00	0.60	85.20	9,424.33	-67.31	-83.02	56.84	0.49	-0.48	5.82
9,610.00	1.20	107.40	9,607.31	-67.81	-80.23	57.66	0.37	0.33	12.13
9,799.00	1.20	153.90	9,796.27	-70.18	-77.47	60.35	0.50	0.00	24.60
9,915.00	1.50	170.00	9,912.24	-72.76	-76.68	63.01	0.41	0.26	13.88
9,988.00	4.10	185.40	9,985.15	-76.30	-76.76	66.51	3.68	3.56	21.10
10,035.00	10.60	179.60	10,031.74	-82.30	-76.88	72.46	13.90	13.83	-12.34
10,082.00	15.80	174.10	10,077.48	-93.00	-76.19	83.16	11.37	11.06	-11.70
10,129.00	21.70	175.20	10,121.97	-108.03	-74.81	98.25	12.58	12.55	2.34
10,176.00	27.30	175.40	10,164.72	-127.45	-73.22	117.72	11.92	11.91	0.43
10,223.00	31.70	174.40	10,205.62	-150.50	-71.15	140.84	9.42	9.36	-2.13
10,271.00	35.10	169.90	10,245.69	-176.65	-67.49	167.24	8.76	7.08	-9.38
10,318.00	35.60	169.90	10,284.02	-203.42	-62.72	194.39	1.06	1.06	0.00
10,365.00	39.00	172.50	10,321.41	-231.56	-58.39	222.85	7.97	7.23	5.53
10,412.00	44.80	170.70	10,356.38	-262.59	-53.78	254.21	12.60	12.34	-3.83
10,459.00	50.30	169.10	10,388.09	-296.71	-47.68	288.82	11.97	11.70	-3.40
10,506.00	55.70	168.20	10,416.36	-333.50	-40.29	326.23	11.59	11.49	-1.91
10,554.00	61.80	168.00	10,441.25	-373.63	-31.83	367.09	12.71	12.71	-0.42
10,601.00	67.60	168.40	10,461.33	-415.21	-23.15	409.41	12.36	12.34	0.85
10,648.00	73.50	168.90	10,476.97	-458.64	-14.43	453.57	12.59	12.55	1.06
10,695.00	79.60	170.50	10,487.90	-503.59	-6.27	499.18	13.39	12.98	3.40
10,743.00	86.10	171.70	10,493.87	-550.62	1.09	546.75	13.77	13.54	2.50
10,767.00	88.10	169.40	10,495.09	-574.26	5.03	570.70	12.69	8.33	-9.58
10,824.10	88.28	167.18	10,496.89	-630.14	16.61	627.56	3.91	0.31	-3.89
Enter Lease @ 10824.1									
10,862.00	88.40	165.70	10,497.99	-666.97	25.49	665.19	3.91	0.32	-3.89
10,956.00	88.40	166.20	10,500.61	-758.12	48.30	758.43	0.53	0.00	0.53
11,050.00	88.70	167.00	10,502.99	-849.53	70.08	851.79	0.91	0.32	0.85
11,145.00	89.50	167.50	10,504.49	-942.18	91.04	946.29	0.99	0.84	0.53
11,162.52	89.76	167.69	10,504.60	-959.29	94.81	963.73	1.83	1.49	1.06
FTP @ 11162.52									
11,239.00	90.90	168.50	10,504.16	-1,034.12	110.59	1,039.91	1.83	1.49	1.06
11,334.00	91.50	170.10	10,502.17	-1,127.44	128.22	1,134.68	1.80	0.63	1.68
11,428.00	91.10	170.20	10,500.03	-1,220.03	144.30	1,228.53	0.44	-0.43	0.11
11,523.00	92.90	171.90	10,496.72	-1,313.81	159.07	1,323.41	2.61	1.89	1.79
11,617.00	92.00	171.50	10,492.70	-1,406.74	172.62	1,417.29	1.05	-0.96	-0.43
11,711.00	90.20	171.10	10,490.90	-1,499.64	186.84	1,511.23	1.96	-1.91	-0.43
11,806.00	91.60	171.30	10,489.40	-1,593.51	201.37	1,606.16	1.49	1.47	0.21
11,900.00	91.50	173.30	10,486.86	-1,686.62	213.96	1,700.11	2.13	-0.11	2.13
11,995.00	91.30	173.50	10,484.54	-1,780.96	224.88	1,795.08	0.30	-0.21	0.21
12,089.00	91.50	173.70	10,482.24	-1,874.35	235.35	1,889.05	0.30	0.21	0.21
12,183.00	91.30	174.60	10,479.95	-1,967.83	244.93	1,983.00	0.98	-0.21	0.96
12,278.00	90.30	175.00	10,478.62	-2,062.43	253.54	2,077.95	1.13	-1.05	0.42



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Design: Wellbore #1

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Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
12,372.00	90.20	174.50	10,478.21	-2,156.03	262.14	2,171.91	0.54	-0.11	-0.53
12,466.00	90.20	172.70	10,477.88	-2,249.44	272.62	2,265.90	1.91	0.00	-1.91
12,561.00	91.00	172.30	10,476.89	-2,343.62	285.02	2,360.89	0.94	0.84	-0.42
12,655.00	91.80	173.10	10,474.59	-2,436.83	296.96	2,454.86	1.20	0.85	0.85
12,748.00	91.60	173.50	10,471.83	-2,529.16	307.80	2,547.82	0.48	-0.22	0.43
12,841.00	90.00	173.50	10,470.53	-2,621.55	318.33	2,640.80	1.72	-1.72	0.00
12,935.00	88.90	174.00	10,471.44	-2,714.98	328.56	2,734.79	1.29	-1.17	0.53
13,028.00	90.60	173.20	10,471.84	-2,807.40	338.93	2,827.78	2.02	1.83	-0.86
13,121.00	89.60	172.60	10,471.68	-2,899.68	350.42	2,920.78	1.25	-1.08	-0.65
13,214.00	90.60	173.60	10,471.52	-2,992.01	361.60	3,013.78	1.52	1.08	1.08
13,308.00	91.50	173.80	10,469.79	-3,085.42	371.91	3,107.76	0.98	0.96	0.21
13,401.00	91.40	173.70	10,467.44	-3,177.84	382.03	3,200.72	0.15	-0.11	-0.11
13,494.00	90.80	173.70	10,465.66	-3,270.26	392.23	3,293.70	0.65	-0.65	0.00
13,587.00	90.70	173.00	10,464.44	-3,362.63	403.00	3,386.69	0.76	-0.11	-0.75
13,680.00	90.20	172.60	10,463.71	-3,454.89	414.66	3,479.68	0.69	-0.54	-0.43
13,774.00	89.10	172.30	10,464.28	-3,548.07	427.01	3,573.67	1.21	-1.17	-0.32
13,867.00	90.00	173.30	10,465.01	-3,640.33	438.66	3,666.67	1.45	0.97	1.08
13,961.00	91.70	172.30	10,463.62	-3,733.58	450.44	3,760.65	2.10	1.81	-1.06
14,054.00	91.40	171.30	10,461.10	-3,825.59	463.70	3,853.59	1.12	-0.32	-1.08
14,141.00	90.70	170.80	10,459.51	-3,911.52	477.23	3,940.52	0.99	-0.80	-0.57
14,235.00	89.30	170.60	10,459.51	-4,004.28	492.42	4,034.44	1.50	-1.49	-0.21
14,328.00	90.50	172.10	10,459.67	-4,096.22	506.41	4,127.39	2.07	1.29	1.61
14,421.00	90.20	171.60	10,459.10	-4,188.28	519.60	4,220.37	0.63	-0.32	-0.54
14,514.00	89.80	170.80	10,459.10	-4,280.18	533.82	4,313.32	0.96	-0.43	-0.86
14,608.00	88.80	172.30	10,460.25	-4,373.15	547.63	4,407.27	1.92	-1.06	1.60
14,702.00	89.90	173.60	10,461.32	-4,466.43	559.17	4,501.26	1.81	1.17	1.38
14,796.00	89.50	173.10	10,461.81	-4,559.80	570.06	4,595.26	0.68	-0.43	-0.53
14,890.00	88.00	172.30	10,463.86	-4,653.01	582.00	4,689.23	1.81	-1.60	-0.85
14,984.00	88.90	172.90	10,466.40	-4,746.19	594.10	4,783.19	1.15	0.96	0.64
15,077.00	90.70	174.00	10,466.73	-4,838.58	604.71	4,876.18	2.27	1.94	1.18
15,172.00	90.80	174.20	10,465.48	-4,933.06	614.47	4,971.16	0.24	0.11	0.21
15,265.00	90.80	174.60	10,464.19	-5,025.61	623.54	5,064.13	0.43	0.00	0.43
15,360.00	90.30	174.70	10,463.27	-5,120.19	632.40	5,159.09	0.54	-0.53	0.11
15,453.00	90.40	174.50	10,462.71	-5,212.78	641.15	5,252.05	0.24	0.11	-0.22
15,546.00	90.40	174.50	10,462.06	-5,305.35	650.07	5,345.02	0.00	0.00	0.00
15,641.00	90.10	174.60	10,461.64	-5,399.92	659.09	5,439.99	0.33	-0.32	0.11
15,758.00	89.40	174.70	10,462.15	-5,516.41	670.00	5,556.94	0.60	-0.60	0.09
Final MWD Survey @15758									
15,810.00	89.40	174.70	10,462.70	-5,568.18	674.80	5,608.92	0.00	0.00	0.00
PTD @ 15810									



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North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1

Survey Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
199.00	199.00	0.16	0.08	First Mwd Survey @199 MD
10,824.10	10,496.89	-630.14	16.61	Enter Lease @ 10824.1
11,162.52	10,504.60	-959.29	94.81	FTP @ 11162.52
15,758.00	10,462.15	-5,516.41	670.00	Final MWD Survey @15758
15,810.00	10,462.70	-5,568.18	674.80	PTD @ 15810

Checked By: _____ Approved By: _____ Date: _____