



HOBBS OCD
JUL 16 2018
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Legacy Reserves Operating

Lea County, NM
Sec 11-T20S-R34E
Lea Unit #58H

Wellbore #1

Survey: MWD Surveys

Standard Survey Report

09 February, 2018



Survey Report

Company: Legacy Reserves Operating
Project: Lea County, NM
Site: Sec 11-T20S-R34E
Well: Lea Unit #58H
Wellbore: Wellbore #1
Design: Wellbore #1

Local Co-ordinate Reference: Well Lea Unit #58H
TVD Reference: KB=18 @ 3681.00ft (McVay 4)
MD Reference: KB=18 @ 3681.00ft (McVay 4)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1

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

Site	Sec 11-T20S-R34E				
Site Position:		Northing:	581,113.4047 usft	Latitude:	32.594916
From:	Lat/Long	Easting:	791,122.5525 usft	Longitude:	-103.522275
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.44 °

Well	Lea Unit #58H					
Well Position	+N-S	0.00 ft	Northing:	580,921.3000 usf	Latitude:	32.594411
	+E-W	0.00 ft	Easting:	789,992.2000 usf	Longitude:	-103.525950
Position Uncertainty	0.00 ft	Wellhead Elevation:	0.00 ft	Ground Level:	3,663.00 ft	

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	12/21/2017	6.68	60.57	48,257

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	174.28	

Survey Program		Date	2/9/2018		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
227.00	16,685.00	MWD Surveys (Wellbore #1)	MWD	MWD - Standard	

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
227.00	0.40	90.40	227.00	-0.01	0.79	0.08	0.18	0.18	0.00
First MWD Survey @ 227'MD									
409.00	0.00	154.00	409.00	-0.01	1.43	0.15	0.22	-0.22	0.00
592.00	0.00	272.80	592.00	-0.01	1.43	0.15	0.00	0.00	0.00
773.00	0.00	322.40	773.00	-0.01	1.43	0.15	0.00	0.00	0.00
863.00	0.70	143.80	862.99	-0.45	1.75	0.63	0.78	0.78	0.00
1,045.00	1.10	157.10	1,044.97	-2.96	3.09	3.25	0.25	0.22	7.31
1,226.00	1.40	160.00	1,225.93	-6.64	4.52	7.06	0.17	0.17	1.60
1,408.00	1.10	172.80	1,407.89	-10.46	5.50	10.96	0.22	-0.16	7.03
1,597.00	1.10	215.50	1,596.85	-13.74	4.67	14.14	0.42	0.00	22.59



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1,741.00	1.10	186.30	1,740.83	-16.24	3.72	16.53	0.39	0.00	-20.28
1,883.00	1.40	99.10	1,882.80	-17.87	5.28	18.30	1.22	0.21	-61.41
2,072.00	1.40	92.10	2,071.75	-18.32	9.87	19.21	0.09	0.00	-3.70
2,260.00	0.70	166.60	2,259.72	-19.52	12.43	20.66	0.74	-0.37	39.63
2,449.00	1.40	173.70	2,448.69	-22.94	12.95	24.11	0.38	0.37	3.76
2,638.00	1.40	189.50	2,637.63	-27.51	12.82	28.65	0.20	0.00	8.36
2,826.00	1.40	161.00	2,825.58	-31.94	13.19	33.10	0.37	0.00	-15.16
3,014.00	1.10	133.20	3,013.54	-35.35	15.26	36.70	0.36	-0.16	-14.79
3,203.00	1.80	158.60	3,202.48	-39.36	17.66	40.92	0.49	0.37	13.44
3,392.00	1.80	168.40	3,391.38	-45.03	19.34	46.73	0.16	0.00	5.19
3,580.00	2.10	175.80	3,579.28	-51.36	20.19	53.11	0.21	0.16	3.94
3,769.00	2.10	187.70	3,768.15	-58.24	19.98	59.94	0.23	0.00	6.30
3,957.00	2.50	184.20	3,956.00	-65.74	19.22	67.33	0.23	0.21	-1.86
4,146.00	3.20	193.70	4,144.76	-74.98	17.66	76.37	0.45	0.37	5.03
4,336.00	1.40	176.10	4,334.61	-82.45	16.57	83.69	1.01	-0.95	-9.26
4,525.00	1.10	122.70	4,523.57	-85.73	18.25	87.12	0.61	-0.16	-28.25
4,714.00	0.70	86.80	4,712.54	-86.65	20.93	88.30	0.36	-0.21	-18.99
4,902.00	1.10	48.50	4,900.52	-85.39	23.43	87.30	0.37	0.21	-20.37
5,090.00	1.10	46.40	5,088.49	-82.95	26.09	85.13	0.02	0.00	-1.12
5,279.00	1.40	46.80	5,277.44	-80.12	29.08	82.62	0.16	0.16	0.21
5,467.00	1.80	49.60	5,465.37	-76.63	33.01	79.54	0.22	0.21	1.49
5,561.00	1.80	50.60	5,559.32	-74.74	35.27	77.88	0.03	0.00	1.06
5,651.00	1.60	43.50	5,649.28	-72.93	37.23	76.27	0.32	-0.22	-7.89
5,745.00	1.50	54.70	5,743.25	-71.26	39.14	74.81	0.34	-0.11	11.91
5,839.00	2.00	54.50	5,837.20	-69.60	41.48	73.39	0.53	0.53	-0.21
5,933.00	1.80	50.40	5,931.15	-67.71	43.95	71.75	0.26	-0.21	-4.36
6,027.00	0.80	79.60	6,025.13	-66.65	45.73	70.87	1.24	-1.06	31.06
6,216.00	0.40	110.50	6,214.12	-66.64	47.65	71.06	0.26	-0.21	16.35
6,310.00	0.00	300.50	6,308.12	-66.76	47.95	71.20	0.43	-0.43	0.00
6,498.00	0.30	241.90	6,496.12	-66.99	47.52	71.39	0.16	0.16	0.00
6,592.00	0.70	240.40	6,590.11	-67.39	46.80	71.72	0.43	0.43	-1.60
6,687.00	0.80	252.30	6,685.10	-67.88	45.67	72.09	0.19	0.11	12.53
6,781.00	0.80	214.20	6,779.10	-68.62	44.67	72.73	0.56	0.00	-40.53
6,989.00	1.20	281.30	6,987.07	-69.39	41.72	73.20	0.56	0.19	32.26
7,064.00	0.90	233.30	7,062.06	-69.59	40.48	73.28	1.20	-0.40	-64.00
7,158.00	1.10	249.40	7,156.04	-70.35	39.04	73.89	0.36	0.21	17.13
7,347.00	1.30	249.30	7,345.00	-71.74	35.34	74.91	0.11	0.11	-0.05
7,535.00	1.30	240.80	7,532.95	-73.54	31.48	76.31	0.10	0.00	-4.52
7,724.00	1.30	236.40	7,721.91	-75.77	27.82	78.17	0.05	0.00	-2.33
7,913.00	1.40	235.60	7,910.85	-78.26	24.13	80.28	0.05	0.05	-0.42
8,102.00	1.30	248.70	8,099.80	-80.35	20.23	81.96	0.17	-0.05	6.93
8,291.00	0.50	292.90	8,288.78	-80.80	17.47	82.14	0.53	-0.42	23.39
8,480.00	0.70	326.90	8,477.77	-79.52	16.08	80.72	0.21	0.11	17.99



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8,668.00	0.70	340.80	8,665.75	-77.47	15.08	78.59	0.09	0.00	7.39
8,857.00	0.90	353.90	8,854.74	-74.90	14.54	75.98	0.14	0.11	6.93
8,951.00	0.70	353.00	8,948.73	-73.60	14.39	74.67	0.21	-0.21	-0.96
9,039.00	4.20	172.40	9,036.66	-76.26	14.75	77.35	5.57	3.98	203.86
9,086.00	10.00	177.40	9,083.28	-82.05	15.17	83.15	12.40	12.34	10.64
9,133.00	15.00	179.70	9,129.15	-92.21	15.38	93.29	10.69	10.64	4.89
9,180.00	19.60	179.80	9,174.01	-106.19	15.44	107.20	9.79	9.79	0.21
9,228.00	25.00	179.90	9,218.41	-124.39	15.49	125.32	11.25	11.25	0.21
9,275.00	28.90	180.00	9,260.29	-145.69	15.51	146.51	8.30	8.30	0.21
9,302.96	32.17	180.88	9,284.37	-159.89	15.39	160.63	11.81	11.70	3.16
Hardline Crossing @ 9302.96' MD									
9,322.00	34.40	181.40	9,300.29	-170.34	15.18	171.00	11.81	11.71	2.71
9,359.00	42.10	180.70	9,337.17	-199.41	14.66	199.88	16.41	16.38	-1.49
FTP: Lea Unit #58H									
9,416.00	48.10	180.80	9,370.33	-232.68	14.23	232.94	12.77	12.77	0.21
9,463.00	50.20	178.10	9,401.08	-268.23	14.58	268.34	6.23	4.47	-5.74
9,511.00	53.70	175.20	9,430.66	-305.95	16.81	306.10	8.71	7.29	-6.04
9,558.00	57.20	173.80	9,457.31	-344.47	20.53	344.80	7.84	7.45	-2.98
9,605.00	61.70	172.80	9,481.19	-384.66	25.26	385.26	9.75	9.57	-2.13
9,652.00	66.00	173.20	9,501.90	-426.52	30.40	427.43	9.18	9.15	0.85
9,699.00	68.70	173.80	9,520.00	-469.61	35.31	470.79	5.86	5.74	1.28
9,746.00	72.70	174.60	9,535.53	-513.74	39.78	515.14	8.66	8.51	1.70
9,793.00	77.10	175.10	9,547.77	-558.92	43.85	560.51	9.42	9.36	1.06
9,840.00	81.70	174.60	9,556.42	-604.92	48.00	606.69	9.84	9.79	-1.06
9,888.00	86.70	174.00	9,561.27	-652.42	52.74	654.43	10.49	10.42	-1.25
9,982.00	91.00	174.20	9,563.15	-745.88	62.40	748.39	4.58	4.57	0.21
10,102.00	92.60	174.00	9,559.38	-865.18	74.73	868.32	1.34	1.33	-0.17
10,197.00	89.70	174.10	9,557.48	-959.64	84.58	963.29	3.05	-3.05	0.11
10,291.00	88.70	174.20	9,558.79	-1,053.14	94.16	1,057.28	1.07	-1.06	0.11
10,386.00	89.10	173.90	9,560.61	-1,147.61	104.00	1,152.27	0.53	0.42	-0.32
10,480.00	89.20	174.60	9,562.01	-1,241.13	113.42	1,246.25	0.75	0.11	0.74
10,574.00	88.50	174.10	9,563.89	-1,334.65	122.67	1,340.23	0.92	-0.74	-0.53
10,669.00	88.40	173.40	9,566.46	-1,429.05	133.01	1,435.20	0.74	-0.11	-0.74
10,763.00	89.90	172.40	9,567.86	-1,522.32	144.63	1,529.15	1.92	1.60	-1.06
10,858.00	91.00	173.70	9,567.11	-1,616.61	156.12	1,624.13	1.79	1.16	1.37
10,952.00	92.10	174.60	9,564.57	-1,710.09	165.70	1,718.09	1.51	1.17	0.96
11,046.00	90.20	173.90	9,562.68	-1,803.59	175.11	1,812.06	2.15	-2.02	-0.74
11,141.00	90.30	173.90	9,562.27	-1,898.05	185.21	1,907.06	0.11	0.11	0.00
11,235.00	90.00	173.70	9,562.02	-1,991.50	195.36	2,001.06	0.38	-0.32	-0.21
11,330.00	90.20	173.60	9,561.86	-2,085.92	205.87	2,096.05	0.24	0.21	-0.11
11,424.00	90.70	174.50	9,561.12	-2,179.41	215.61	2,190.05	1.10	0.53	0.96
11,519.00	90.30	174.30	9,560.29	-2,273.95	224.88	2,285.04	0.47	-0.42	-0.21
11,613.00	90.80	173.90	9,559.39	-2,367.45	234.54	2,379.04	0.68	0.53	-0.43
11,707.00	90.90	173.80	9,557.99	-2,460.90	244.61	2,473.02	0.15	0.11	-0.11



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11,802.00	91.70	174.60	9,555.84	-2,555.39	254.21	2,568.00	1.19	0.84	0.84
11,890.00	90.30	174.30	9,554.30	-2,642.96	262.72	2,655.98	1.63	-1.59	-0.34
11,984.00	86.60	173.50	9,556.84	-2,736.37	272.70	2,749.93	4.03	-3.94	-0.85
12,079.00	85.90	173.50	9,563.06	-2,830.56	283.43	2,844.72	0.74	-0.74	0.00
12,173.00	86.90	174.60	9,568.96	-2,923.87	293.16	2,938.53	1.58	1.06	1.17
12,268.00	87.60	174.90	9,573.52	-3,018.36	301.84	3,033.41	0.80	0.74	0.32
12,362.00	88.90	174.30	9,576.39	-3,111.90	310.68	3,127.37	1.52	1.38	-0.64
12,457.00	90.60	173.90	9,576.80	-3,206.39	320.45	3,222.36	1.84	1.79	-0.42
12,551.00	90.30	174.00	9,576.06	-3,299.86	330.35	3,316.36	0.34	-0.32	0.11
12,646.00	89.80	174.20	9,575.98	-3,394.36	340.12	3,411.36	0.57	-0.53	0.21
12,740.00	88.90	174.00	9,577.05	-3,487.85	349.78	3,505.35	0.98	-0.96	-0.21
12,835.00	91.00	174.60	9,577.13	-3,582.38	359.22	3,600.34	2.30	2.21	0.63
12,929.00	90.60	174.60	9,575.82	-3,675.95	368.06	3,694.33	0.43	-0.43	0.00
13,024.00	90.90	174.80	9,574.57	-3,770.54	376.84	3,789.32	0.38	0.32	0.21
13,118.00	90.30	174.00	9,573.59	-3,864.08	386.01	3,883.31	1.06	-0.64	-0.85
13,212.00	90.20	173.30	9,573.18	-3,957.50	396.40	3,977.31	0.75	-0.11	-0.74
13,307.00	89.70	172.80	9,573.26	-4,051.80	407.90	4,072.28	0.74	-0.53	-0.53
13,401.00	88.90	172.80	9,574.41	-4,145.06	419.68	4,166.25	0.85	-0.85	0.00
13,496.00	89.50	173.40	9,575.74	-4,239.36	431.09	4,261.21	0.89	0.63	0.63
13,590.00	89.10	172.60	9,576.89	-4,332.65	442.55	4,355.18	0.95	-0.43	-0.85
13,684.00	90.50	174.40	9,577.21	-4,426.04	453.19	4,449.17	2.43	1.49	1.91
13,779.00	89.00	173.10	9,577.63	-4,520.47	463.53	4,544.16	2.09	-1.58	-1.37
13,873.00	89.70	174.50	9,578.70	-4,613.91	473.68	4,638.15	1.67	0.74	1.49
13,968.00	90.50	174.80	9,578.53	-4,708.49	482.54	4,733.14	0.90	0.84	0.32
14,062.00	90.70	175.10	9,577.55	-4,802.12	490.81	4,827.13	0.38	0.21	0.32
14,156.00	87.60	172.90	9,578.94	-4,895.58	500.63	4,921.10	4.04	-3.30	-2.34
14,250.00	88.00	173.20	9,582.55	-4,988.82	512.00	5,015.01	0.53	0.43	0.32
14,344.00	89.00	173.50	9,585.01	-5,082.16	522.88	5,108.97	1.11	1.06	0.32
14,369.78	89.21	173.75	9,585.41	-5,107.77	525.74	5,134.74	1.26	0.80	0.97
Section Line Crossing @ 14369.78'MD									
14,457.00	89.90	174.60	9,586.09	-5,194.54	534.59	5,221.96	1.26	0.80	0.97
14,531.00	90.10	174.60	9,586.09	-5,268.21	541.56	5,295.96	0.27	0.27	0.00
14,626.00	91.10	175.40	9,585.10	-5,362.84	549.84	5,390.94	1.35	1.05	0.84
14,719.00	91.00	175.40	9,583.39	-5,455.53	557.29	5,483.91	0.11	-0.11	0.00
14,834.00	91.40	175.40	9,580.99	-5,570.13	566.51	5,598.86	0.35	0.35	0.00
14,908.00	91.30	175.40	9,579.24	-5,643.87	572.45	5,672.82	0.14	-0.14	0.00
15,017.00	90.90	175.30	9,577.15	-5,752.49	581.28	5,781.79	0.38	-0.37	-0.09
15,096.00	89.30	174.30	9,577.01	-5,831.16	588.44	5,860.78	2.39	-2.03	-1.27
15,190.00	89.60	174.40	9,577.91	-5,924.70	597.70	5,954.77	0.34	0.32	0.11
15,284.00	91.30	175.30	9,577.18	-6,018.32	606.13	6,048.76	2.05	1.81	0.96
15,388.00	89.30	173.10	9,576.63	-6,121.77	616.64	6,152.75	2.86	-1.92	-2.12
15,473.00	87.10	171.40	9,579.30	-6,205.95	628.10	6,237.65	3.27	-2.59	-2.00
15,567.00	88.10	171.70	9,583.24	-6,298.84	641.90	6,331.46	1.11	1.06	0.32



Survey Report

Company: Legacy Reserves Operating
Project: Lea County, NM
Site: Sec 11-T20S-R34E
Well: Lea Unit #58H
Wellbore: Wellbore #1
Design: Wellbore #1

Local Co-ordinate Reference: Well Lea Unit #58H
TVD Reference: KB=18 @ 3681.00ft (McVay 4)
MD Reference: KB=18 @ 3681.00ft (McVay 4)
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)
15,661.00	86.50	172.40	9,587.67	-6,391.83	654.88	6,425.28	1.86	-1.70	0.74
15,755.00	87.00	173.20	9,593.00	-6,484.94	666.65	6,519.09	1.00	0.53	0.85
15,849.00	86.30	173.90	9,598.49	-6,578.18	677.19	6,612.92	1.05	-0.74	0.74
15,943.00	86.30	175.00	9,604.55	-6,671.55	686.26	6,706.73	1.17	0.00	1.17
16,036.00	88.50	177.10	9,608.77	-6,764.22	692.66	6,799.57	3.27	2.37	2.26
16,129.00	90.70	176.40	9,609.42	-6,857.06	697.93	6,892.48	2.48	2.37	-0.75
16,223.00	91.10	176.60	9,607.95	-6,950.87	703.67	6,986.40	0.48	0.43	0.21
16,317.00	91.40	176.80	9,605.90	-7,044.70	709.08	7,080.29	0.38	0.32	0.21
16,421.00	91.30	176.70	9,603.45	-7,148.50	714.97	7,184.17	0.14	-0.10	-0.10
16,505.00	91.60	176.90	9,601.32	-7,232.34	719.66	7,268.06	0.43	0.36	0.24
16,599.00	91.70	176.50	9,598.61	-7,326.15	725.07	7,361.93	0.44	0.11	-0.43
16,626.00	92.00	176.70	9,597.74	-7,353.09	726.67	7,388.90	1.34	1.11	0.74
Final MWD Survey @ 16626'MD									
16,685.00	92.00	176.70	9,595.68	-7,411.95	730.06	7,447.81	0.00	0.00	0.00

PTD @ 16685'MD - BHL Lea Unit #58H

Survey Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
227.00	227.00	-0.01	0.79	First MWD Survey @ 227'MD
9,302.96	9,284.37	-159.89	15.39	Hardline Crossing @ 9302.96'MD
14,369.78	9,585.41	-5,107.77	525.74	Section Line Crossing @ 14369.78'MD
16,626.00	9,597.74	-7,353.09	726.67	Final MWD Survey @ 16626'MD
16,685.00	9,595.68	-7,411.95	730.06	PTD @ 16685'MD

Checked By: _____ Approved By: _____ Date: _____