

30-025-44023



Legacy Reserves Operating

Lea County, NM

Sec 11-T20S-R34E

Lea Unit #55H

Wellbore #1

Survey: IDS MWD Surveys

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Standard Survey Report

16 October, 2017





Integrity Directional Services, LLC

Survey Report



Company: Legacy Reserves Operating
Project: Lea County, NM
Site: Sec 11-T20S-R34E
Well: Lea Unit #55H
Wellbore: Wellbore #1
Design: Wellbore #1

Local Co-ordinate Reference: Well Lea Unit #55H
TVD Reference: KB=18 @ 3680.00ft (McVay 4)
MD Reference: KB=18 @ 3680.00ft (McVay 4)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Multi User Db

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 #55H				
Well Position	+N/-S	0.00 ft	Northing:	580,919.3000 usf	Latitude: 32.594418
	+E/-W	0.00 ft	Easting:	789,417.2000 usf	Longitude: -103.527817
Position Uncertainty		0.00 ft	Wellhead Elevation:	0.00 ft	Ground Level: 3,662.00 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	9/20/2017	6.72	60.57	48,288

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction	
	(ft)	(ft)	(ft)	(°)	
	0.00	0.00	0.00	181.79	

Survey Program		Date	10/16/2017		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
1,539.00	17,602.00	IDS MWD Surveys (Wellbore #1)	MWD	MWD - Standard	

Survey									
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn
Depth	(°)	(°)	Depth	(ft)	(ft)	Section	Rate	Rate	Rate
(ft)			(ft)			(ft)	(°/100usft)	(°/100usft)	(°/100usft)
1,445.00	0.92	241.04	1,444.92	-2.26	-9.29	2.55	0.00	0.00	0.00
FTP Lea Unit 55H									
1,539.00	0.84	229.26	1,538.91	-3.08	-10.47	3.40	0.21	-0.09	-12.53
First MWD Survey @ 1539									
1,659.00	0.75	222.58	1,658.90	-4.23	-11.67	4.59	0.11	-0.08	-5.57
1,759.00	1.05	177.05	1,758.89	-5.62	-12.07	6.00	0.75	0.30	-45.53
1,948.00	1.23	166.42	1,947.85	-9.33	-11.50	9.68	0.15	0.10	-5.62
2,136.00	1.14	150.68	2,135.81	-12.92	-10.11	13.23	0.18	-0.05	-8.37
2,324.00	0.62	218.10	2,323.79	-15.35	-9.82	15.65	0.57	-0.28	35.86
2,513.00	0.40	95.14	2,512.79	-16.21	-9.80	16.51	0.48	-0.12	-65.06



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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)
2,701.00	0.40	103.05	2,700.78	-16.42	-8.50	16.68	0.03	0.00	4.21
2,889.00	0.92	62.00	2,888.77	-15.86	-6.53	16.06	0.36	0.28	-21.84
3,077.00	0.84	57.61	3,076.75	-14.41	-4.04	14.53	0.06	-0.04	-2.34
3,266.00	0.84	89.78	3,265.73	-13.66	-1.48	13.70	0.25	0.00	17.02
3,454.00	0.53	171.87	3,453.72	-14.52	0.02	14.51	0.49	-0.16	43.66
3,642.00	1.27	138.56	3,641.69	-16.94	1.52	16.89	0.47	0.39	-17.72
3,831.00	0.75	155.08	3,830.67	-19.64	3.43	19.52	0.31	-0.28	8.74
4,019.00	0.79	146.29	4,018.65	-21.83	4.67	21.67	0.07	0.02	-4.68
4,207.00	1.85	149.98	4,206.60	-25.53	6.91	25.31	0.57	0.56	1.96
4,396.00	1.54	151.39	4,395.51	-30.41	9.65	30.09	0.17	-0.16	0.75
4,585.00	1.89	136.53	4,584.43	-34.90	13.01	34.47	0.30	0.19	-7.86
4,773.00	1.80	135.92	4,772.33	-39.27	17.20	38.71	0.05	-0.05	-0.32
4,961.00	2.37	131.61	4,960.21	-43.97	22.16	43.26	0.31	0.30	-2.29
5,150.00	2.37	125.13	5,149.05	-48.81	28.27	47.91	0.14	0.00	-3.43
5,442.00	2.59	127.31	5,440.77	-56.29	38.46	55.06	0.08	0.08	0.75
5,536.00	2.51	126.60	5,534.68	-58.80	41.80	57.47	0.09	-0.09	-0.76
5,631.00	0.84	16.56	5,629.65	-59.37	43.67	57.98	3.06	-1.76	-115.83
5,725.00	0.97	19.02	5,723.64	-57.96	44.12	56.56	0.14	0.14	2.62
5,819.00	2.07	321.46	5,817.61	-55.88	43.33	54.50	1.86	1.17	-61.23
5,913.00	2.11	303.00	5,911.54	-53.61	40.82	52.31	0.71	0.04	-19.64
6,008.00	2.46	303.00	6,006.47	-51.55	37.64	50.35	0.37	0.37	0.00
6,196.00	2.37	329.54	6,194.31	-46.00	32.29	44.97	0.59	-0.05	14.12
6,290.00	2.59	327.43	6,288.22	-42.54	30.16	41.57	0.25	0.23	-2.24
6,385.00	2.24	323.30	6,383.14	-39.24	27.89	38.35	0.41	-0.37	-4.35
6,479.00	2.37	324.27	6,477.06	-36.19	25.66	35.37	0.14	0.14	1.03
6,573.00	2.29	323.04	6,570.98	-33.11	23.40	32.36	0.10	-0.09	-1.31
6,667.00	2.02	325.85	6,664.92	-30.24	21.34	29.56	0.31	-0.29	2.99
6,761.00	2.15	324.53	6,758.85	-27.43	19.38	26.81	0.15	0.14	-1.40
6,855.00	2.07	322.07	6,852.79	-24.66	17.32	24.10	0.13	-0.09	-2.62
6,949.00	1.71	323.21	6,946.74	-22.19	15.43	21.70	0.39	-0.38	1.21
7,043.00	1.67	324.00	7,040.70	-19.96	13.79	19.52	0.05	-0.04	0.84
7,138.00	1.76	234.27	7,135.67	-19.69	11.79	19.32	2.55	0.09	-94.45
7,232.00	1.58	328.57	7,229.64	-19.43	9.94	19.11	2.61	-0.19	100.32
7,326.00	1.58	326.38	7,323.61	-17.25	8.55	16.97	0.06	0.00	-2.33
7,421.00	1.63	331.30	7,418.57	-14.97	7.17	14.74	0.15	0.05	5.18
7,515.00	1.45	326.73	7,512.54	-12.80	5.88	12.61	0.23	-0.19	-4.86
7,610.00	1.49	330.24	7,607.50	-10.73	4.61	10.58	0.10	0.04	3.69
7,704.00	1.58	325.44	7,701.47	-8.60	3.27	8.49	0.17	0.10	-5.11
7,893.00	1.32	318.20	7,890.41	-4.83	0.34	4.82	0.17	-0.14	-3.83
8,081.00	1.58	316.09	8,078.35	-1.35	-2.90	1.44	0.14	0.14	-1.12
8,176.00	1.63	312.49	8,173.31	0.51	-4.81	-0.36	0.12	0.05	-3.79
8,270.00	1.58	323.83	8,267.28	2.46	-6.56	-2.25	0.34	-0.05	12.06
8,365.00	1.41	318.56	8,362.24	4.39	-8.11	-4.14	0.23	-0.18	-5.55



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8,459.00	1.27	332.79	8,456.22	6.18	-9.35	-5.89	0.38	-0.15	15.14
8,553.00	1.05	333.58	8,550.20	7.88	-10.21	-7.56	0.23	-0.23	0.84
8,648.00	1.19	330.16	8,645.18	9.52	-11.09	-9.17	0.16	0.15	-3.60
8,742.00	1.05	331.39	8,739.16	11.12	-11.98	-10.74	0.15	-0.15	1.31
8,836.00	0.40	326.99	8,833.15	12.15	-12.57	-11.75	0.69	-0.69	-4.68
8,930.00	0.35	24.39	8,927.15	12.69	-12.63	-12.29	0.39	-0.05	61.06
9,025.00	0.44	105.95	9,022.15	12.85	-12.16	-12.47	0.55	0.09	85.85
9,119.00	0.26	77.56	9,116.15	12.80	-11.61	-12.43	0.26	-0.19	-30.20
9,213.00	0.13	95.23	9,210.15	12.84	-11.29	-12.48	0.15	-0.14	18.80
9,308.00	0.48	107.21	9,305.15	12.71	-10.81	-12.36	0.37	0.37	12.61
9,496.00	0.31	72.20	9,493.14	12.63	-9.57	-12.33	0.15	-0.09	-18.62
9,591.00	0.31	138.38	9,588.14	12.52	-9.16	-12.23	0.36	0.00	69.66
9,686.00	0.48	181.27	9,683.14	11.93	-8.99	-11.64	0.35	0.18	45.15
9,755.00	0.70	176.79	9,752.14	11.22	-8.98	-10.93	0.33	0.32	-6.49
9,822.00	1.89	164.14	9,819.12	9.75	-8.65	-9.47	1.82	1.78	-18.88
9,869.00	6.02	190.41	9,866.00	6.57	-8.88	-6.29	9.37	8.79	55.89
9,916.00	9.85	187.42	9,912.54	0.16	-9.85	0.15	8.19	8.15	-6.36
9,964.00	13.71	178.99	9,959.52	-9.60	-10.28	9.92	8.78	8.04	-17.56
10,011.00	18.42	177.05	10,004.68	-22.59	-9.80	22.89	10.08	10.02	-4.13
10,058.00	21.80	176.96	10,048.80	-38.73	-8.95	38.99	7.19	7.19	-0.19
10,105.00	26.42	176.88	10,091.69	-57.89	-7.92	58.11	9.83	9.83	-0.17
10,153.00	30.90	181.18	10,133.81	-80.89	-7.59	81.09	10.27	9.33	8.96
10,200.00	33.67	186.90	10,173.55	-105.90	-9.41	106.15	8.77	5.89	12.17
10,247.00	37.23	187.60	10,211.83	-132.94	-12.86	133.28	7.62	7.57	1.49
10,289.88	42.05	186.47	10,244.84	-160.08	-16.19	160.51	11.36	11.23	-2.64
FTP @ 10289.88' MD / 330' FNL									
10,294.00	42.51	186.37	10,247.89	-162.84	-16.50	163.27	11.36	11.25	-2.37
10,341.00	47.43	182.59	10,281.13	-195.93	-19.05	196.43	11.91	10.47	-8.04
10,388.00	53.58	177.93	10,311.02	-232.17	-19.15	232.65	15.15	13.09	-9.91
10,436.00	58.73	177.67	10,337.75	-271.99	-17.61	272.41	10.74	10.73	-0.54
10,483.00	62.59	176.79	10,360.77	-312.90	-15.63	313.24	8.37	8.21	-1.87
10,530.00	67.21	177.58	10,380.70	-355.40	-13.54	355.65	9.95	9.83	1.68
10,577.00	69.45	178.81	10,398.06	-399.06	-12.17	399.24	5.35	4.77	2.62
10,625.00	72.92	180.04	10,413.54	-444.48	-11.72	444.63	7.63	7.23	2.56
10,672.00	77.01	180.48	10,425.73	-489.86	-11.93	490.00	8.75	8.70	0.94
10,719.00	81.93	181.45	10,434.31	-536.05	-12.71	536.18	10.66	10.47	2.06
10,766.00	87.25	180.22	10,438.74	-582.82	-13.39	582.95	11.61	11.32	-2.62
10,833.00	90.64	179.59	10,439.98	-649.80	-13.28	649.89	5.15	5.06	-0.94
10,928.00	90.86	179.25	10,438.73	-744.78	-12.32	744.80	0.43	0.23	-0.36
11,022.00	91.12	179.16	10,437.11	-838.76	-11.01	838.69	0.29	0.28	-0.10
11,117.00	88.79	179.60	10,437.18	-933.75	-9.98	933.60	2.50	-2.45	0.46
11,211.00	88.53	179.69	10,439.38	-1,027.72	-9.40	1,027.51	0.29	-0.28	0.10
11,306.00	89.49	178.90	10,441.02	-1,122.70	-8.23	1,122.41	1.31	1.01	-0.83
11,400.00	88.40	181.18	10,442.76	-1,216.67	-8.30	1,216.34	2.69	-1.16	2.43



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11,494.00	88.22	181.01	10,445.53	-1,310.61	-10.09	1,310.29	0.26	-0.19	-0.18
11,589.00	88.62	182.68	10,448.15	-1,405.53	-13.15	1,405.25	1.81	0.42	1.76
11,683.00	89.27	182.68	10,449.88	-1,499.41	-17.54	1,499.22	0.69	0.69	0.00
11,778.00	90.15	182.68	10,450.36	-1,594.30	-21.99	1,594.21	0.93	0.93	0.00
11,872.00	90.81	182.59	10,449.57	-1,688.20	-26.31	1,688.20	0.71	0.70	-0.10
11,967.00	91.03	182.50	10,448.05	-1,783.09	-30.53	1,783.17	0.25	0.23	-0.09
12,061.00	90.51	184.87	10,446.78	-1,876.88	-36.57	1,877.11	2.58	-0.55	2.52
12,156.00	88.13	180.48	10,447.91	-1,971.74	-41.00	1,972.06	5.26	-2.51	-4.62
12,250.00	90.11	182.24	10,449.35	-2,065.69	-43.23	2,066.04	2.82	2.11	1.87
12,344.00	90.55	181.89	10,448.81	-2,159.63	-46.62	2,160.03	0.60	-0.47	-0.37
12,439.00	91.60	181.62	10,447.03	-2,254.57	-49.53	2,255.02	1.14	1.11	-0.28
12,533.00	92.18	181.45	10,443.93	-2,348.48	-52.04	2,348.96	0.64	0.62	-0.18
12,627.00	92.35	181.53	10,440.22	-2,442.38	-54.49	2,442.89	0.20	0.18	0.09
12,722.00	90.55	182.76	10,437.81	-2,537.28	-58.04	2,537.85	2.29	-1.89	1.29
12,816.00	92.35	183.56	10,435.43	-2,631.10	-63.22	2,631.79	2.10	1.91	0.85
12,910.00	90.07	182.59	10,433.45	-2,724.93	-68.26	2,725.74	2.64	-2.43	-1.03
13,005.00	89.80	182.94	10,433.56	-2,819.82	-72.84	2,820.72	0.47	-0.28	0.37
13,099.00	90.86	182.32	10,433.01	-2,913.72	-77.16	2,914.71	1.31	1.13	-0.66
13,193.00	91.03	182.41	10,431.46	-3,007.63	-81.03	3,008.69	0.20	0.18	0.10
13,287.00	90.99	181.71	10,429.81	-3,101.55	-84.41	3,102.68	0.75	-0.04	-0.74
13,382.00	90.55	181.62	10,428.53	-3,196.50	-87.17	3,197.67	0.47	-0.46	-0.09
13,476.00	91.08	182.32	10,427.19	-3,290.44	-90.40	3,291.66	0.93	0.56	0.74
13,571.00	92.26	181.71	10,424.42	-3,385.34	-93.74	3,386.61	1.40	1.24	-0.64
13,665.00	92.66	181.89	10,420.39	-3,479.20	-96.69	3,480.53	0.47	0.43	0.19
13,760.00	91.43	181.80	10,417.00	-3,574.09	-99.75	3,575.46	1.30	-1.29	-0.09
13,854.00	90.95	181.89	10,415.05	-3,668.02	-102.78	3,669.44	0.52	-0.51	0.10
13,949.00	92.09	182.06	10,412.53	-3,762.93	-106.05	3,764.41	1.21	1.20	0.18
14,044.00	91.12	181.71	10,409.87	-3,857.84	-109.17	3,859.37	1.09	-1.02	-0.37
14,138.00	90.46	180.22	10,408.57	-3,951.82	-110.75	3,953.35	1.73	-0.70	-1.59
14,232.00	90.64	180.04	10,407.67	-4,045.81	-110.97	4,047.30	0.27	0.19	-0.19
14,327.00	90.51	179.07	10,406.72	-4,140.80	-110.23	4,142.23	1.03	-0.14	-1.02
14,421.00	90.42	180.48	10,405.95	-4,234.80	-109.86	4,236.16	1.50	-0.10	1.50
14,516.00	90.11	180.48	10,405.51	-4,329.79	-110.66	4,331.14	0.33	-0.33	0.00
14,610.00	90.73	180.22	10,404.82	-4,423.79	-111.23	4,425.10	0.72	0.66	-0.28
14,705.00	91.43	180.30	10,403.03	-4,518.77	-111.66	4,520.05	0.74	0.74	0.08
14,799.00	90.37	181.80	10,401.56	-4,612.74	-113.38	4,614.03	1.95	-1.13	1.60
14,894.00	89.71	182.68	10,401.49	-4,707.66	-117.10	4,709.02	1.16	-0.69	0.93
14,988.00	89.41	183.56	10,402.21	-4,801.52	-122.21	4,803.00	0.99	-0.32	0.94
15,083.00	89.93	183.20	10,402.76	-4,896.35	-127.81	4,897.96	0.67	0.55	-0.38
15,177.00	90.90	183.56	10,402.08	-4,990.19	-133.36	4,991.92	1.10	1.03	0.38
15,272.00	91.38	184.26	10,400.19	-5,084.94	-139.83	5,086.83	0.89	0.51	0.74
15,297.56	91.05	184.09	10,399.65	-5,110.43	-141.69	5,112.36	1.47	-1.31	-0.66

Sec 11 / 14 Crossing Point @ 15297.56' MD



Integrity Directional Services, LLC

Survey Report



Company: Legacy Reserves Operating
Project: Lea County, NM
Site: Sec 11-T20S-R34E
Well: Lea Unit #55H
Wellbore: Wellbore #1
Design: Wellbore #1

Local Co-ordinate Reference: Well Lea Unit #55H
TVD Reference: KB=18 @ 3680.00ft (McVay 4)
MD Reference: KB=18 @ 3680.00ft (McVay 4)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Multi User Db

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)
15,366.00	90.15	183.64	10,398.93	-5,178.71	-146.31	5,180.75	1.47	-1.31	-0.66
15,460.00	90.55	184.17	10,398.36	-5,272.49	-152.71	5,274.69	0.71	0.43	0.56
15,555.00	89.63	183.64	10,398.21	-5,367.27	-159.18	5,369.62	1.12	-0.97	-0.56
15,650.00	89.76	182.76	10,398.72	-5,462.12	-164.48	5,464.59	0.94	0.14	-0.93
15,745.00	89.76	183.03	10,399.11	-5,557.00	-169.28	5,559.57	0.28	0.00	0.28
15,839.00	90.46	182.41	10,398.93	-5,650.89	-173.74	5,653.56	0.99	0.74	-0.66
15,933.00	91.34	182.32	10,397.46	-5,744.80	-177.62	5,747.54	0.94	0.94	-0.10
16,028.00	89.76	181.45	10,396.54	-5,839.74	-180.74	5,842.53	1.90	-1.66	-0.92
16,122.00	90.59	181.45	10,396.26	-5,933.70	-183.12	5,936.53	0.88	0.88	0.00
16,217.00	88.71	181.47	10,396.84	-6,028.67	-185.54	6,031.52	1.98	-1.98	0.02
16,311.00	89.05	181.70	10,398.68	-6,122.61	-188.14	6,125.50	0.44	0.36	0.24
16,406.00	89.30	182.05	10,400.04	-6,217.55	-191.25	6,220.49	0.45	0.26	0.37
16,500.00	89.66	182.12	10,400.90	-6,311.49	-194.67	6,314.49	0.39	0.38	0.07
16,594.00	89.24	180.83	10,401.80	-6,405.45	-197.09	6,408.48	1.44	-0.45	-1.37
16,689.00	89.41	180.52	10,402.92	-6,500.44	-198.21	6,503.45	0.37	0.18	-0.33
16,783.00	88.54	179.79	10,404.60	-6,594.42	-198.46	6,597.40	1.21	-0.93	-0.78
16,877.00	88.71	179.19	10,406.86	-6,688.39	-197.63	6,691.30	0.66	0.18	-0.64
16,971.00	88.80	178.97	10,408.90	-6,782.35	-196.12	6,785.17	0.25	0.10	-0.23
17,065.00	89.16	178.36	10,410.57	-6,876.31	-193.93	6,879.01	0.75	0.38	-0.65
17,158.00	89.55	178.20	10,411.62	-6,969.26	-191.14	6,971.83	0.45	0.42	-0.17
17,251.00	89.66	177.60	10,412.26	-7,062.20	-187.73	7,064.62	0.66	0.12	-0.65
17,344.00	90.17	176.29	10,412.40	-7,155.06	-182.77	7,157.28	1.51	0.55	-1.41
17,438.00	90.70	175.71	10,411.68	-7,248.83	-176.21	7,250.80	0.84	0.56	-0.62
17,548.00	91.09	174.96	10,409.96	-7,358.45	-167.27	7,360.09	0.77	0.35	-0.68

Final MWD Survey @ 17548'MD

17,602.00 91.09 174.96 10,408.94 -7,412.23 -162.53 7,413.70 0.00 0.00 0.00
Projection to TD @ 17602'MD - PBHL Lea Unit 55H

Survey Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
1,539.00	1,538.91	-3.08	-10.47	First MWD Survey @ 1539
10,289.88	10,244.84	-160.08	-16.19	FTP @ 10289.88'MD / 330' FNL
15,297.56	10,399.65	-5,110.43	-141.69	Sec 11 / 14 Crossing Point @ 15297.56'MD
17,548.00	10,409.96	-7,358.45	-167.27	Final MWD Survey @ 17548'MD
17,602.00	10,408.94	-7,412.23	-162.53	Projection to TD @ 17602'MD

Checked By: _____ Approved By: _____ Date: _____