

Mack Energy

Lea County, NM

Sec 19-T17S-R32E

Partition 24 Fed HE #1H

HOBBS OCD
SEP 19 2019
RECEIVED

Wellbore #1

Survey: Survey #1

Standard Survey Report

29 July, 2019

Microsoft Survey Report

Company:	Mack Energy	Local Co-ordinate Reference:	Well Partition 24 Fed HE #1H
Project:	Lea County, NM	TVD Reference:	3929 +13 @ 3942.00usft
Site:	Sec 19-T17S-R32E	MD Reference:	3929 +13 @ 3942.00usft
Well:	Partition 24 Fed HE #1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.15 Single User Db

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 19-T17S-R32E			
Site Position:		Northing:	664,333.50 usft	Latitude:	32.8251977
From:	Map	Easting:	701,242.80 usft	Longitude:	-103.8127768
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.28 °

Well	Partition 24 Fed HE #1H					
Well Position	+N/-S	0.00 usft	Northing:	663,659.20 usft	Latitude:	32.8233483
	+E/-W	0.00 usft	Easting:	700,949.50 usft	Longitude:	-103.8137423
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,929.00 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	07/02/19	6.89	60.54	48,052.47151628

Design		Wellbore #1		
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	267.79

Survey Program	Date 07/29/19			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
112.00	10,660.00	Survey #1 (Wellbore #1)	MWD	MWD - Standard

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
112.00	0.10	355.00	112.00	0.10	-0.01	0.00	0.09	0.09	0.00	
1st MWD Survey										
293.00	0.30	270.00	293.00	0.25	-0.50	0.49	0.17	0.11	-46.96	
378.00	0.20	334.00	378.00	0.39	-0.78	0.77	0.33	-0.12	75.29	
525.00	0.30	286.00	525.00	0.72	-1.27	1.24	0.15	0.07	-32.65	
675.00	0.50	257.00	674.99	0.69	-2.28	2.25	0.19	0.13	-19.33	
755.00	0.60	268.60	754.99	0.60	-3.04	3.01	0.19	0.12	14.50	
850.00	1.00	270.30	849.98	0.59	-4.37	4.34	0.42	0.42	1.79	
945.00	1.10	259.40	944.96	0.43	-6.09	6.07	0.23	0.11	-11.47	
1,040.00	1.40	251.50	1,039.94	-0.11	-8.09	8.09	0.36	0.32	-8.32	

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Site: Sec 19-T17S-R32E	MD Reference: 3929 +13 @ 3942.00usft
Well: Partition 24 Fed HE #1H	North Reference: Grid
Wellbore: Wellbore #1	Survey Calculation Method: Minimum Curvature
Design: Wellbore #1	Database: EDM 5000.15 Single User Db

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
1,135.00	1.10	235.50	1,134.92	-0.99	-9.94	9.97	0.48	-0.32	-16.84
1,230.00	1.20	222.70	1,229.90	-2.24	-11.37	11.44	0.29	0.11	-13.47
1,326.00	0.80	195.80	1,325.89	-3.63	-12.23	12.36	0.63	-0.42	-28.02
1,421.00	0.70	158.10	1,420.88	-4.80	-12.20	12.37	0.52	-0.11	-39.68
1,516.00	1.10	133.00	1,515.87	-5.96	-11.31	11.53	0.58	0.42	-26.42
1,611.00	1.50	112.80	1,610.84	-7.07	-9.50	9.76	0.63	0.42	-21.26
1,706.00	1.50	92.10	1,705.81	-7.59	-7.11	7.40	0.57	0.00	-21.79
1,801.00	1.30	77.30	1,800.78	-7.40	-4.82	5.10	0.43	-0.21	-15.58
1,896.00	1.40	74.80	1,895.76	-8.86	-2.64	2.91	0.12	0.11	-2.63
1,938.00	1.60	79.60	1,937.74	-6.62	-1.57	1.83	0.56	0.48	11.43
2,053.00	1.50	78.20	2,052.70	-6.02	1.48	-1.25	0.09	-0.09	-1.22
2,148.00	1.20	80.40	2,147.67	-5.60	3.68	-3.46	0.32	-0.32	2.32
2,243.00	1.30	73.90	2,242.65	-5.14	5.69	-5.49	0.18	0.11	-6.84
2,338.00	1.10	75.10	2,337.63	-4.61	7.61	-7.43	0.21	-0.21	1.26
2,434.00	1.10	73.70	2,433.61	-4.11	9.39	-9.22	0.03	0.00	-1.46
2,529.00	1.00	85.40	2,528.60	-3.79	11.09	-10.93	0.25	-0.11	12.32
2,624.00	0.90	90.00	2,623.58	-3.72	12.66	-12.51	0.13	-0.11	4.84
2,719.00	1.00	95.40	2,718.57	-3.80	14.23	-14.07	0.14	0.11	5.68
2,814.00	1.20	99.10	2,813.55	-4.03	16.04	-15.87	0.22	0.21	3.89
2,909.00	1.20	103.00	2,908.53	-4.42	17.99	-17.81	0.09	0.00	4.11
3,004.00	1.20	105.40	3,003.51	-4.90	19.92	-19.71	0.05	0.00	2.53
3,099.00	1.30	110.10	3,098.49	-5.54	21.89	-21.66	0.15	0.11	4.95
3,195.00	1.20	113.40	3,194.47	-6.31	23.83	-23.57	0.13	-0.10	3.44
3,290.00	1.40	115.90	3,289.44	-7.21	25.79	-25.49	0.22	0.21	2.63
3,385.00	1.40	115.20	3,384.41	-8.21	27.89	-27.55	0.02	0.00	-0.74
3,480.00	1.50	115.70	3,479.38	-9.25	30.06	-29.68	0.11	0.11	0.53
3,575.00	0.60	285.70	3,574.37	-9.65	30.70	-30.30	2.20	-0.95	178.95
3,670.00	0.60	284.60	3,669.37	-9.39	29.74	-29.35	0.01	0.00	-1.16
3,766.00	0.50	259.20	3,765.36	-9.34	28.84	-28.46	0.27	-0.10	-26.46
3,861.00	0.60	241.70	3,860.36	-9.66	27.99	-27.60	0.20	0.11	-18.42
3,956.00	0.40	242.20	3,955.36	-10.05	27.26	-26.86	0.21	-0.21	0.53
4,052.00	0.30	258.40	4,051.36	-10.25	26.72	-26.31	0.15	-0.10	16.87
4,147.00	0.10	250.80	4,146.35	-10.33	26.40	-25.98	0.21	-0.21	-8.00
4,242.00	0.10	220.70	4,241.35	-10.42	26.27	-25.84	0.05	0.00	-31.68
4,337.00	0.00	358.60	4,336.35	-10.49	26.21	-25.79	0.11	-0.11	0.00
4,432.00	0.00	295.80	4,431.35	-10.49	26.21	-25.79	0.00	0.00	0.00
4,528.00	0.20	175.30	4,527.35	-10.65	26.23	-25.80	0.21	0.21	0.00
4,623.00	0.40	170.50	4,622.35	-11.14	26.29	-25.84	0.21	0.21	-5.05
4,718.00	0.80	229.90	4,717.35	-11.90	25.84	-25.36	0.72	0.42	62.53
4,750.00	3.60	261.20	4,749.32	-12.20	24.68	-24.19	9.21	8.75	97.81
4,782.00	7.40	266.90	4,781.17	-12.46	21.63	-21.13	11.98	11.87	17.81
4,814.00	11.10	288.20	4,812.75	-12.67	16.49	-15.99	11.58	11.56	4.06
4,845.00	14.50	274.00	4,842.97	-12.49	9.63	-9.14	11.71	10.97	18.71

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Survey

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4,877.00	16.90	273.90	4,873.78	-11.90	0.99	-0.53	7.50	7.50	-0.31
4,909.00	19.40	272.40	4,904.18	-11.36	-8.96	9.39	7.95	7.81	-4.69
4,940.00	21.60	272.50	4,933.22	-10.89	-19.80	20.21	7.10	7.10	0.32
4,971.00	24.10	273.40	4,961.78	-10.27	-31.83	32.20	8.14	8.06	2.90
5,003.00	26.80	274.70	4,990.68	-9.29	-45.54	45.86	8.62	8.44	4.06
5,035.00	30.40	275.60	5,018.77	-7.91	-60.79	61.05	11.33	11.25	2.81
5,067.00	34.60	275.60	5,045.75	-6.23	-77.90	78.08	13.12	13.12	0.00
5,099.00	38.70	274.70	5,071.42	-4.52	-96.92	97.02	12.92	12.81	-2.81
5,131.00	42.40	273.10	5,095.73	-3.12	-117.67	117.70	12.01	11.56	-5.00
5,162.00	45.30	271.90	5,118.08	-2.19	-139.12	139.11	9.73	9.35	-3.87
5,194.00	47.80	270.20	5,140.09	-1.77	-162.35	162.30	8.71	7.81	-5.31
5,225.00	49.80	267.30	5,160.51	-2.29	-185.66	185.81	9.55	6.45	-9.35
5,257.00	50.80	264.10	5,180.95	-4.14	-210.21	210.21	8.30	3.12	-10.00
5,281.00	51.77	262.37	5,195.96	-6.35	-228.80	228.88	6.94	4.05	-7.22
Cross Lease 5281 MD/5195.96 TVD -6.35 S -228.8 W N: 663652.8 E: 700720.7									
5,289.00	52.10	261.80	5,200.90	-7.22	-235.04	235.14	6.94	4.11	-7.09
5,321.00	52.50	261.10	5,220.47	-10.98	-260.08	260.31	2.13	1.25	-2.19
5,338.00	52.90	260.90	5,230.77	-13.10	-273.43	273.73	2.53	2.35	-1.18
5,348.00	53.00	261.00	5,236.79	-14.35	-281.31	281.66	1.28	1.00	1.00
5,358.00	53.10	260.80	5,242.80	-15.61	-289.21	289.59	1.89	1.00	-2.00
5,368.00	53.20	260.70	5,248.80	-16.90	-297.10	297.53	1.28	1.00	-1.00
5,378.00	53.40	260.40	5,254.78	-18.22	-305.01	305.49	3.13	2.00	-3.00
5,388.00	53.40	260.20	5,260.74	-19.57	-312.93	313.45	1.61	0.00	-2.00
5,398.00	53.30	260.20	5,266.71	-20.94	-320.83	321.40	1.00	-1.00	0.00
5,408.00	53.40	260.10	5,272.68	-22.31	-328.74	329.35	1.28	1.00	-1.00
5,418.00	53.50	260.10	5,278.63	-23.69	-336.65	337.31	1.00	1.00	0.00
5,428.00	53.60	260.40	5,284.57	-25.05	-344.58	345.29	2.61	1.00	3.00
5,438.00	53.70	260.10	5,290.50	-26.42	-352.52	353.27	2.61	1.00	-3.00
5,448.00	53.80	260.30	5,296.41	-27.79	-360.46	361.27	1.90	1.00	2.00
5,458.00	53.90	259.60	5,302.31	-29.20	-368.41	369.27	5.74	1.00	-7.00
5,468.00	54.00	260.10	5,308.20	-30.62	-376.37	377.27	4.16	1.00	5.00
5,478.00	54.20	260.10	5,314.06	-32.01	-384.35	385.30	2.00	2.00	0.00
5,488.00	54.40	259.60	5,319.90	-33.45	-392.35	393.34	4.53	2.00	-5.00
5,498.00	54.50	259.60	5,325.71	-34.91	-400.35	401.40	1.00	1.00	0.00
5,508.00	54.60	259.70	5,331.51	-36.38	-408.36	409.46	1.29	1.00	1.00
5,518.00	54.80	259.70	5,337.29	-37.84	-416.39	417.54	2.00	2.00	0.00
5,528.00	55.10	260.20	5,343.03	-39.27	-424.45	425.85	5.07	3.00	5.00
5,538.00	55.60	258.70	5,348.72	-40.77	-432.54	433.79	13.31	5.00	-15.00
5,575.00	57.90	255.30	5,369.01	-47.74	-462.68	464.17	9.88	6.22	-9.19
5,607.00	61.30	252.80	5,385.20	-55.34	-489.20	490.97	12.58	10.62	-7.81
5,671.00	71.70	250.30	5,410.69	-73.93	-544.78	547.23	16.64	16.25	-3.91
5,685.75	75.43	250.43	5,414.86	-78.68	-558.10	560.72	25.31	25.29	0.90
FTP 5685.75 MD/5414.86 TVD -78.68 S -558.10 W N: 663580.5 E: 700391.4									
5,705.00	80.30	250.60	5,418.91	-84.96	-575.84	578.69	25.31	25.29	0.87

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5,714.94	81.71	250.89	5,420.48	-88.20	-585.11	588.08	14.50	14.21	2.94
FTP Partition 24 Fed HE #1H - LP Partition 24 Fed HE #1H									
5,781.00	91.10	252.80	5,424.60	-108.71	-647.69	651.40	14.50	14.21	2.89
5,875.00	91.40	255.90	5,422.55	-134.06	-738.17	742.79	3.31	0.32	3.30
5,971.00	90.90	258.50	5,420.82	-155.32	-831.76	837.13	2.76	-0.52	2.71
6,068.00	90.40	260.40	5,419.54	-172.71	-925.14	931.11	2.07	-0.53	2.00
6,161.00	89.30	264.70	5,419.79	-185.03	-1,019.31	1,025.69	4.67	-1.16	4.53
6,256.00	90.10	267.50	5,420.29	-191.49	-1,114.08	1,120.64	3.07	0.84	2.95
6,352.00	91.40	269.90	5,419.03	-193.68	-1,210.04	1,216.81	2.84	1.35	2.50
6,447.00	90.10	270.20	5,417.79	-193.58	-1,305.03	1,311.52	1.40	-1.37	0.32
6,542.00	90.20	270.20	5,417.54	-193.25	-1,400.03	1,406.44	0.11	0.11	0.00
6,637.00	90.60	270.10	5,416.88	-193.00	-1,495.03	1,501.36	0.43	0.42	-0.11
6,686.00	90.60	269.80	5,416.36	-193.04	-1,544.02	1,550.32	0.61	0.00	-0.61
6,782.00	90.90	270.00	5,415.11	-193.21	-1,640.01	1,646.24	0.38	0.31	0.21
6,877.00	89.80	270.00	5,414.53	-193.21	-1,735.01	1,741.17	1.16	-1.16	0.00
6,972.00	89.60	270.40	5,415.02	-192.88	-1,830.01	1,836.09	0.47	-0.21	0.42
7,067.00	89.70	269.90	5,415.60	-192.63	-1,925.01	1,931.00	0.54	0.11	-0.53
7,162.00	90.60	269.70	5,415.36	-192.96	-2,020.01	2,025.94	0.97	0.95	-0.21
7,183.00	90.60	269.10	5,415.14	-193.18	-2,041.00	2,046.93	2.86	0.00	-2.86
7,278.00	91.30	269.20	5,413.56	-194.59	-2,135.98	2,141.89	0.74	0.74	0.11
7,374.00	91.80	269.80	5,410.96	-195.43	-2,231.94	2,237.81	0.81	0.52	0.62
7,469.00	89.70	269.80	5,409.72	-195.76	-2,326.93	2,332.74	2.21	-2.21	0.00
7,564.00	89.80	269.20	5,410.13	-196.59	-2,421.92	2,427.70	0.64	0.11	-0.63
7,659.00	90.50	269.20	5,409.89	-197.92	-2,516.91	2,522.67	0.74	0.74	0.00
7,755.00	91.30	268.80	5,408.38	-199.59	-2,612.88	2,618.64	0.93	0.83	-0.42
7,850.00	90.00	269.10	5,407.30	-201.33	-2,707.86	2,713.61	1.40	-1.37	0.32
7,945.00	90.80	268.70	5,406.84	-203.15	-2,802.84	2,808.59	0.94	0.84	-0.42
8,040.00	90.60	269.80	5,405.48	-204.40	-2,897.82	2,903.55	1.18	-0.21	1.16
8,135.00	91.30	269.70	5,403.90	-204.81	-2,992.81	2,998.48	0.74	0.74	-0.11
8,231.00	90.80	271.20	5,402.14	-204.06	-3,088.78	3,094.36	1.85	-0.52	1.56
8,326.00	91.10	270.70	5,400.57	-202.48	-3,183.76	3,189.20	0.61	0.32	-0.53
8,420.00	90.50	270.40	5,399.25	-201.58	-3,277.74	3,283.08	0.71	-0.64	-0.32
8,515.00	90.90	270.40	5,398.09	-200.92	-3,372.73	3,377.97	0.42	0.42	0.00
8,611.00	89.90	269.60	5,397.42	-200.92	-3,468.73	3,473.90	1.33	-1.04	-0.83
8,706.00	90.30	269.20	5,397.26	-201.91	-3,563.72	3,568.86	0.60	0.42	-0.42
8,801.00	90.90	269.30	5,396.26	-203.16	-3,658.71	3,663.82	0.64	0.63	0.11
8,896.00	90.40	270.10	5,395.19	-203.65	-3,753.70	3,758.76	0.99	-0.53	0.84
8,992.00	89.90	269.90	5,394.93	-203.65	-3,849.70	3,854.69	0.56	-0.52	-0.21
9,087.00	90.30	269.60	5,394.77	-204.07	-3,944.70	3,949.63	0.53	0.42	-0.32
9,182.00	90.90	269.40	5,393.77	-204.90	-4,039.69	4,044.59	0.67	0.63	-0.21
9,277.00	89.90	270.50	5,393.11	-204.98	-4,134.69	4,139.51	1.56	-1.05	1.16
9,373.00	90.30	270.40	5,392.94	-204.23	-4,230.68	4,235.41	0.43	0.42	-0.10
9,468.00	90.80	270.30	5,392.03	-203.65	-4,325.68	4,330.31	0.54	0.53	-0.11

**Microsoft
Survey Report**

Company:	Mack Energy	Local Co-ordinate Reference:	Well Partition 24 Fed HE #1H
Project:	Lea County, NM	TVD Reference:	3929 +13 @ 3942.00usft
Site:	Sec 19-T17S-R32E	MD Reference:	3929 +13 @ 3942.00usft
Well:	Partition 24 Fed HE #1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.15 Single User Db

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
9,563.00	89.70	270.90	5,391.62	-202.65	-4,420.67	4,425.19	1.32	-1.16	0.63
9,659.00	89.70	270.30	5,392.12	-201.65	-4,516.66	4,521.08	0.62	0.00	-0.62
9,754.00	90.30	270.50	5,392.12	-200.98	-4,611.66	4,615.98	0.67	0.63	0.21
9,850.00	91.00	270.90	5,391.03	-199.81	-4,707.64	4,711.85	0.84	0.73	0.42
9,945.00	90.90	270.80	5,389.45	-198.40	-4,802.62	4,806.70	0.15	-0.11	-0.11
10,040.00	90.10	271.00	5,388.63	-196.91	-4,897.60	4,901.55	0.87	-0.84	0.21
10,136.00	90.50	271.10	5,388.12	-195.15	-4,993.59	4,997.40	0.43	0.42	0.10
10,231.00	91.10	271.40	5,388.80	-193.08	-5,088.55	5,092.21	0.71	0.63	0.32
10,326.00	90.10	271.00	5,385.80	-191.09	-5,183.53	5,187.04	1.13	-1.05	-0.42
10,380.31	89.70	270.20	5,385.90	-190.52	-5,237.83	5,241.28	1.65	-0.74	-1.47
Plat BHL Partition 24 Fed HE #1H									
10,421.00	89.40	269.60	5,386.22	-190.59	-5,278.52	5,281.94	1.65	-0.74	-1.47
10,517.00	89.80	269.60	5,386.89	-191.26	-5,374.52	5,377.89	0.42	0.42	0.00
10,569.38	90.08	269.60	5,386.94	-191.63	-5,426.90	5,430.25	0.54	0.54	0.00
LTP 10569.38 MD/5386.94 TVD -191.63 S -5426.86 W N: 663467.5 E: 695522.6									
10,569.46	90.08	269.60	5,386.94	-191.63	-5,426.98	5,430.33	0.00	0.00	0.00
LTP Partition 24 Fed HE #1H									
10,591.00	90.20	269.60	5,386.89	-191.78	-5,448.51	5,451.88	0.54	0.54	0.00
Last MWD Survey 10591 MD/5386.89 TVD -191.78 S -5448.51 W N: 663467.4 E: 695500.9									
10,660.00	90.20	269.60	5,386.65	-192.26	-5,517.51	5,520.82	0.00	0.00	0.00
PTB 10660 MD/5386.65 TVD -192.26 S -5517.51 W N: 663466.9 E: 695431.9 - BHL Partition 24 Fed HE #1H									

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
112.00	112.00	0.10	-0.01	1st MWD Survey
5,281.00	5,195.98	-8.35	-228.80	Cross Lease 5281 MD/5195.98 TVD -6.35 S -228.8 W N: 663652.8 E: 700720.7
5,685.75	5,414.86	-78.68	-558.10	FTP 5685.75 MD/5414.86 TVD -78.68 S -558.10 W N: 663580.5 E: 700391.4
10,569.38	5,386.94	-191.63	-5,426.90	LTP 10569.38 MD/5386.94 TVD -191.63 S -5426.86 W N: 663467.5 E: 695522.6
10,591.00	5,386.89	-191.78	-5,448.51	Last MWD Survey 10591 MD/5386.89 TVD -191.78 S -5448.51 W N: 663467.4
10,660.00	5,386.65	-192.26	-5,517.51	PTB 10660 MD/5386.65 TVD -192.26 S -5517.51 W N: 663466.9 E: 695431.9

Checked By: _____ Approved By: _____ Date: _____