



## **Mack Energy**

Lea County, NM

Sec 19-T17S-R32E

Partition 24 Fed IL #1H

Wellbore #1

Survey: Survey #1

## **Standard Survey Report**

21 January, 2020





Company:	Mack Energy	Local Co-ordinate Reference:	Well Partition 24 Fed IL #1H
Project:	Lea County, NM	TVD Reference:	3924.5+18 @ 3942.50usft
Site:	Sec 19-T17S-R32E	MD Reference:	3924.5+18 @ 3942.50usft
Well:	Partition 24 Fed IL #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
From:	Map	Easting:	701,242.80 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32.825198
		Longitude:	-103.812777
		Grid Convergence:	0.28 °

Well	Partition 24 Fed IL #1H		
Well Position	+N/-S	0.00 usft	Northing:
	+E/-W	0.00 usft	Easting:
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32.819265
		Longitude:	-103.814016
		Ground Level:	3,924.50 usft

Wellbore	Wellbore #1		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2015	01/03/20	6.84
			Dip Angle
			(°)
			Field Strength
			(nT)
			47,997.53396765

Design	Wellbore #1		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
			Direction
			(°)
			269.65

Survey Program	Date 01/21/20		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
151.00	10,463.00	Survey #1 (Wellbore #1)	MWD
			Description
			MWD - Standard

Survey									
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn
Depth	(°)	(°)	Depth	(usft)	(usft)	Section	Rate	Rate	Rate
(usft)			(usft)			(usft)	(°/100ft)	(°/100ft)	(°/100ft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
151.00	0.60	247.60	151.00	-0.30	-0.73	0.73	0.40	0.40	0.00
1st MWD Survey									
247.00	1.20	339.60	246.99	0.45	-1.55	1.54	1.42	0.62	95.83
423.00	0.50	43.60	422.97	2.73	-1.66	1.64	0.61	-0.40	36.36
652.00	0.30	268.60	651.97	3.44	-1.57	1.55	0.32	-0.09	-58.95
770.00	0.40	340.10	769.97	3.82	-2.02	1.99	0.35	0.08	60.59
899.00	0.50	336.10	898.96	4.76	-2.40	2.37	0.08	0.08	-3.10
1,026.00	0.80	345.60	1,025.95	6.12	-2.84	2.81	0.25	0.24	7.48
1,152.00	0.70	338.30	1,151.94	7.69	-3.35	3.30	0.11	-0.08	-5.79
1,278.00	0.80	352.10	1,277.93	9.28	-3.75	3.70	0.16	0.08	10.95



Company:	Mack Energy	Local Co-ordinate Reference:	Well Partition 24 Fed IL #1H
Project:	Lea County, NM	TVD Reference:	3924.5+18 @ 3942.50usft
Site:	Sec 19-T17S-R32E	MD Reference:	3924.5+18 @ 3942.50usft
Well:	Partition 24 Fed IL #1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.15 Single User Db

Survey

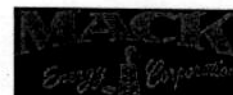
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
1,404.00	0.70	0.90	1,403.92	10.92	-3.86	3.80	0.12	-0.08	6.98
1,530.00	0.60	22.10	1,529.91	12.30	-3.60	3.53	0.21	-0.08	16.83
1,657.00	0.80	63.90	1,656.91	13.31	-2.56	2.47	0.42	0.16	32.91
1,783.00	1.40	57.60	1,782.88	14.52	-0.47	0.38	0.49	0.48	-5.00
1,910.00	1.10	50.40	1,909.85	16.13	1.78	-1.88	0.27	-0.24	-5.67
2,037.00	0.80	55.40	2,036.83	17.41	3.45	-3.56	0.24	-0.24	3.94
2,163.00	0.60	82.60	2,162.82	17.99	4.83	-4.94	0.30	-0.16	21.59
2,281.00	0.60	45.10	2,280.82	18.51	5.88	-5.99	0.33	0.00	-31.78
2,363.00	0.40	56.70	2,362.82	18.97	6.42	-6.54	0.27	-0.24	14.15
2,458.00	0.40	150.50	2,457.81	18.86	6.86	-6.98	0.61	0.00	98.74
2,585.00	0.70	184.90	2,584.81	17.70	7.02	-7.13	0.34	0.24	27.09
2,775.00	0.70	172.40	2,774.79	15.40	7.07	-7.17	0.08	0.00	-6.58
2,965.00	0.60	164.40	2,964.78	13.29	7.49	-7.57	0.07	-0.05	-4.21
3,154.00	0.70	157.90	3,153.77	11.26	8.19	-8.26	0.07	0.05	-3.44
3,344.00	1.00	164.70	3,343.75	8.59	9.07	-9.12	0.17	0.16	3.58
3,533.00	0.90	150.00	3,532.72	5.71	10.24	-10.28	0.14	-0.05	-7.78
3,724.00	0.90	140.80	3,723.70	3.25	11.94	-11.96	0.08	0.00	-4.82
3,913.00	1.00	115.00	3,912.67	1.40	14.38	-14.38	0.23	0.05	-13.65
4,103.00	0.40	163.30	4,102.66	0.07	16.07	-16.07	0.42	-0.32	25.42
4,293.00	0.70	157.50	4,292.65	-1.64	16.70	-16.69	0.16	0.16	-3.05
4,452.00	1.00	162.30	4,451.63	-3.86	17.50	-17.47	0.19	0.19	3.02
4,584.00	0.70	196.50	4,583.62	-5.73	17.62	-17.58	0.44	-0.23	25.91
4,647.00	5.70	259.80	4,646.51	-6.65	14.43	-14.39	8.61	7.94	100.48
4,710.00	10.70	259.10	4,708.85	-8.31	5.60	-5.55	7.94	7.94	-1.11
4,774.00	15.60	260.60	4,771.15	-10.84	-8.73	8.80	7.67	7.66	2.34
4,837.00	19.90	264.20	4,831.14	-13.31	-27.77	27.85	7.04	6.83	5.71
4,900.00	23.60	267.00	4,889.64	-15.06	-51.04	51.13	6.10	5.87	4.44
4,963.00	28.50	268.60	4,946.23	-16.08	-78.67	78.77	7.86	7.78	2.54
5,027.00	33.50	268.90	5,001.07	-16.80	-111.62	111.72	7.82	7.81	0.47
5,090.00	38.70	270.00	5,051.95	-17.13	-148.72	148.82	8.32	8.25	1.75
5,153.00	44.10	271.60	5,099.20	-16.52	-190.36	190.46	8.73	8.57	2.54
5,216.00	50.30	274.00	5,141.98	-14.21	-236.50	236.58	10.23	9.84	3.81
5,218.61	50.52	274.13	5,143.64	-14.07	-238.50	238.59	9.41	8.60	4.98
FTP Partition 24 Fed IL #1H									
5,225.27	51.10	274.46	5,147.85	-13.68	-243.65	243.73	9.41	8.61	4.93
FTP 5225.27 MD/5147.85 TVD -13.68 S -243.65 W N: 662159.3 E: 700629.0									
5,283.00	56.10	277.10	5,182.11	-8.97	-289.86	289.91	9.41	8.67	4.58
5,293.00	56.40	277.10	5,187.66	-7.95	-298.11	298.15	3.00	3.00	0.00
5,303.00	56.60	277.20	5,193.18	-6.91	-306.38	306.42	2.17	2.00	1.00
5,313.00	56.70	277.10	5,198.68	-5.87	-314.67	314.70	1.30	1.00	-1.00
5,323.00	56.80	277.10	5,204.16	-4.83	-322.97	322.99	1.00	1.00	0.00
5,333.00	56.80	277.10	5,209.64	-3.80	-331.27	331.29	0.00	0.00	0.00
5,343.00	56.70	276.90	5,215.12	-2.78	-339.57	339.58	1.95	-1.00	-2.00



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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
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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)
5,353.00	56.70	276.80	5,220.61	-1.78	-347.87	347.88	0.84	0.00	-1.00
5,363.00	56.70	276.80	5,226.10	-0.79	-356.17	356.17	0.00	0.00	0.00
5,373.00	56.70	276.80	5,231.59	0.20	-364.47	364.46	0.00	0.00	0.00
5,383.00	56.60	276.70	5,237.09	1.18	-372.77	372.75	1.30	-1.00	-1.00
5,393.00	56.60	276.60	5,242.59	2.14	-381.06	381.04	0.83	0.00	-1.00
5,403.00	56.60	276.50	5,248.10	3.10	-389.35	389.33	0.83	0.00	-1.00
5,413.00	56.50	276.60	5,253.61	4.05	-397.64	397.61	1.30	-1.00	1.00
5,423.00	56.70	276.80	5,259.12	5.02	-405.93	405.89	2.61	2.00	2.00
5,433.00	56.70	276.90	5,264.61	6.02	-414.23	414.19	0.84	0.00	1.00
5,443.00	56.70	276.90	5,270.10	7.02	-422.53	422.48	0.00	0.00	0.00
5,453.00	56.80	276.90	5,275.58	8.03	-430.83	430.77	1.00	1.00	0.00
5,463.00	56.80	276.90	5,281.05	9.03	-439.14	439.07	0.00	0.00	0.00
5,473.00	56.90	276.80	5,286.52	10.03	-447.45	447.38	1.30	1.00	-1.00
5,483.00	57.20	275.80	5,291.96	10.95	-455.79	455.72	8.91	3.00	-10.00
5,533.00	61.10	267.70	5,317.63	12.20	-498.64	498.55	15.94	7.80	-16.20
5,597.00	70.80	264.70	5,343.68	8.27	-556.87	556.81	15.75	15.16	-4.69
5,660.00	79.50	265.20	5,359.81	2.92	-617.47	617.44	13.83	13.81	0.79
5,723.00	80.80	265.30	5,370.59	-2.22	-679.33	679.33	2.07	2.06	0.16
5,787.00	81.90	266.30	5,380.22	-6.85	-742.43	742.46	2.31	1.72	1.56
5,850.00	84.20	268.60	5,387.84	-9.63	-804.90	804.94	5.14	3.65	3.65
5,913.00	88.00	269.00	5,392.13	-10.94	-867.72	867.77	6.06	6.03	0.63
5,977.00	88.40	269.30	5,394.14	-11.89	-931.69	931.74	0.78	0.62	0.47
6,040.00	89.00	269.40	5,395.56	-12.61	-994.66	994.72	0.97	0.95	0.16
6,103.00	89.80	269.50	5,396.22	-13.21	-1,057.66	1,057.72	1.28	1.27	0.16
6,167.00	90.40	269.50	5,396.11	-13.77	-1,121.65	1,121.72	0.94	0.94	0.00
6,293.00	89.90	269.30	5,395.78	-15.09	-1,247.65	1,247.72	0.43	-0.40	-0.16
6,420.00	91.60	269.50	5,394.12	-16.42	-1,374.62	1,374.70	1.35	1.34	0.16
6,547.00	90.40	270.70	5,391.90	-16.20	-1,501.60	1,501.67	1.34	-0.94	0.94
6,674.00	89.10	271.40	5,392.46	-13.87	-1,628.57	1,628.63	1.16	-1.02	0.55
6,800.00	89.90	271.50	5,393.56	-10.68	-1,754.53	1,754.56	0.64	0.63	0.08
6,926.00	91.30	271.50	5,392.24	-7.38	-1,880.48	1,880.48	1.11	1.11	0.00
7,054.00	89.80	271.30	5,391.01	-4.26	-2,008.43	2,008.42	1.18	-1.17	-0.16
7,180.00	89.60	270.30	5,391.67	-2.50	-2,134.41	2,134.39	0.81	-0.16	-0.79
7,308.00	91.30	270.20	5,390.66	-1.94	-2,262.40	2,262.37	1.33	1.33	-0.08
7,435.00	92.00	269.20	5,387.01	-2.60	-2,389.34	2,389.32	0.96	0.55	-0.79
7,561.00	90.80	267.80	5,383.93	-5.90	-2,515.26	2,515.25	1.46	-0.95	-1.11
7,688.00	89.90	268.90	5,383.15	-9.56	-2,642.20	2,642.21	1.12	-0.71	0.87
7,815.00	88.50	268.60	5,384.93	-12.33	-2,769.15	2,769.18	1.13	-1.10	-0.24
7,942.00	89.80	268.60	5,386.81	-15.43	-2,896.10	2,896.14	1.02	1.02	0.00
8,068.00	90.90	268.50	5,386.04	-18.62	-3,022.06	3,022.11	0.88	0.87	-0.08
8,194.00	90.90	269.60	5,384.06	-20.71	-3,148.02	3,148.09	0.87	0.00	0.87
8,321.00	92.40	269.60	5,380.40	-21.59	-3,274.96	3,275.03	1.18	1.18	0.00
8,448.00	91.30	271.40	5,376.30	-20.49	-3,401.88	3,401.94	1.66	-0.87	1.42
8,574.00	88.70	271.20	5,376.30	-17.63	-3,527.84	3,527.88	2.07	-2.06	-0.16



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Well:	Partition 24 Fed IL #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)
8,701.00	89.80	271.50	5,377.97	-14.64	-3,654.79	3,654.81	0.90	0.87	0.24
8,827.00	89.70	270.60	5,378.52	-12.33	-3,780.77	3,780.77	0.72	-0.08	-0.71
8,953.00	91.10	270.80	5,377.64	-10.79	-3,906.75	3,906.74	1.12	1.11	0.16
9,080.00	89.50	271.60	5,376.97	-8.13	-4,033.72	4,033.69	1.41	-1.26	0.63
9,206.00	91.10	272.10	5,376.31	-4.06	-4,159.65	4,159.59	1.33	1.27	0.40
9,332.00	91.90	270.20	5,373.01	-1.53	-4,285.57	4,285.50	1.64	0.63	-1.51
9,459.00	90.70	269.80	5,370.13	-1.53	-4,412.53	4,412.46	1.00	-0.94	-0.31
9,586.00	89.90	268.60	5,369.47	-3.31	-4,539.52	4,539.45	1.14	-0.63	-0.94
9,712.00	90.20	267.70	5,369.36	-7.37	-4,665.45	4,665.41	0.75	0.24	-0.71
9,839.00	90.60	267.30	5,368.47	-12.91	-4,792.33	4,792.31	0.45	0.31	-0.31
9,966.00	89.30	267.10	5,368.58	-19.12	-4,919.17	4,919.20	1.04	-1.02	-0.16
10,092.00	90.20	267.80	5,369.13	-24.72	-5,045.04	5,045.10	0.90	0.71	0.56
10,219.00	90.10	268.50	5,368.80	-28.82	-5,171.98	5,172.06	0.56	-0.08	0.55
10,282.00	90.80	268.20	5,368.30	-30.64	-5,234.95	5,235.04	1.21	1.11	-0.48
10,373.87	92.00	268.52	5,366.06	-33.26	-5,326.75	5,326.85	1.35	1.30	0.35
LTP Partition 24 Fed IL #1H									
10,373.91	92.00	268.52	5,366.06	-33.27	-5,326.79	5,326.89	1.35	1.30	0.35
LTP 10373.91 MD/5366.06 TVD -33.27 S -5326.79 W N: 662139.7 E: 695545.8									
10,397.00	92.30	268.60	5,365.19	-33.85	-5,349.86	5,349.96	1.35	1.30	0.35
Last MWD Survey 10397 MD/5365.19 TVD -33.85 S -5349.86 W N: 662139.2 E: 695522.8									
10,463.00	92.30	268.60	5,362.54	-35.46	-5,415.78	5,415.90	0.00	0.00	0.00
PTB 10463 MD/5362.54 TVD -35.46 S -5415.78 W N: 662137.6 E: 695456.9 - BHL Partition 24 Fed IL #1H									

#### Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
151.00	151.00	-0.30	-0.73	1st MWD Survey
5,225.27	5,147.85	-13.68	-243.65	FTP 5225.27 MD/5147.85 TVD -13.68 S -243.65 W N: 662159.3 E: 700629.0
10,373.91	5,366.06	-33.27	-5,326.79	LTP 10373.91 MD/5366.06 TVD -33.27 S -5326.79 W N: 662139.7 E: 695545.8
10,397.00	5,365.19	-33.85	-5,349.86	Last MWD Survey 10397 MD/5365.19 TVD -33.85 S -5349.86 W N: 662139.2 E
10,463.00	5,362.54	-35.46	-5,415.78	PTB 10463 MD/5362.54 TVD -35.46 S -5415.78 W N: 662137.6 E: 695456.9

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_