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Directional Survey**

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DISTRICT II-ARTESIA O.C.D.

Mack Energy

Chaves County

Sec 17-T15S-R29E 17.5 KB

Chilliwack Federal Com #1H

Wellbore #1

30-005-64311

Survey: Survey #1

Standard Survey Report

18 June, 2018

Survey Report

Company: Mack Energy
Project: Chaves County
Site: Sec 17-T15S-R29E 17.5 KB
Well: Chiliwack Federal Com #1H
Wellbore: Wellbore #1
Design: Wellbore #1

Local Co-ordinate Reference: Site Sec 17-T15S-R29E 17.5 KB
TVD Reference: KB=17.5 @ 3799.40ft
MD Reference: KB=17.5 @ 3799.40ft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1

Project	Chaves County		
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 17-T15S-R29E 17.5 KB				
Site Position:		Northing:	731,614.56 usft	Latitude:	33.010901
From:	Map	Easting:	626,335.23 usft	Longitude:	-104.056052
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.15 °

Well	Chiliwack Federal Com #1H				
Well Position	+N/-S 0.00 ft	Northing:	731,614.56 usft	Latitude:	33.010901
	+E/-W 0.00 ft	Easting:	626,335.23 usft	Longitude:	-104.056052
Position Uncertainty	0.00 ft	Wellhead Elevation:	0.00 ft	Ground Level:	3,781.90 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	6/1/2018	7.38	60.70	48,265

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	179.91	

Survey Program	Date	6/18/2018			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
64.00	8,968.00	Survey #1 (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
64.00	0.70	164.00	64.00	-0.38	0.11	0.38	1.09	1.09	0.00
1st MWD Survey									
249.00	1.50	161.00	248.96	-3.75	1.21	3.75	0.43	0.43	-1.62
336.00	2.20	163.00	335.92	-6.43	2.07	6.43	0.81	0.80	2.30
428.00	1.60	152.00	427.87	-9.25	3.19	9.25	0.76	-0.65	-11.96
517.00	1.10	168.00	516.84	-11.18	3.95	11.19	0.70	-0.56	17.98
643.00	0.60	148.00	642.83	-12.92	4.55	12.93	0.46	-0.40	-15.87
737.00	0.70	132.00	736.82	-13.72	5.24	13.73	0.22	0.11	-17.02
791.00	0.90	137.00	790.82	-14.26	5.77	14.26	0.39	0.37	9.26
1,149.00	0.40	130.60	1,148.79	-17.13	8.64	17.14	0.14	-0.14	-1.79

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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)
1,205.00	0.40	151.80	1,204.79	-17.42	8.88	17.44	0.26	0.00	37.86
1,395.00	0.60	323.20	1,394.79	-17.21	8.59	17.23	0.52	0.11	90.21
1,584.00	0.80	334.80	1,583.77	-15.23	7.44	15.24	0.13	0.11	6.14
1,773.00	0.60	325.50	1,772.76	-13.22	6.32	13.23	0.12	-0.11	-4.92
1,961.00	0.50	310.30	1,960.75	-11.88	5.13	11.88	0.09	-0.05	-8.09
2,150.00	0.70	322.60	2,149.74	-10.42	3.80	10.43	0.13	0.11	6.51
2,339.00	0.70	277.10	2,338.73	-9.36	1.96	9.37	0.29	0.00	-24.07
2,465.00	1.10	250.70	2,464.71	-9.67	0.05	9.67	0.45	0.32	-20.95
2,496.00	2.50	224.60	2,495.70	-10.25	-0.70	10.25	5.12	4.52	-84.19
2,560.00	7.30	208.60	2,559.45	-14.82	-3.63	14.81	7.73	7.50	-25.00
2,623.00	12.50	201.30	2,621.49	-24.69	-8.03	24.68	8.47	8.25	-11.59
2,717.00	20.70	189.80	2,711.52	-50.59	-14.56	50.57	9.36	8.72	-12.23
2,812.00	27.40	188.50	2,798.22	-88.80	-20.66	88.77	7.07	7.05	-1.37
2,906.00	33.40	179.50	2,879.30	-136.13	-23.63	136.09	8.00	6.38	-9.57
3,001.00	40.70	180.60	2,955.07	-193.33	-23.73	193.29	7.72	7.68	1.16
3,096.00	47.60	176.80	3,023.21	-259.41	-22.10	259.38	7.78	7.26	-4.00
3,173.00	54.10	177.40	3,071.80	-319.02	-19.09	318.99	8.46	8.44	0.78
3,190.00	54.30	177.40	3,081.74	-332.79	-18.46	332.76	1.18	1.18	0.00
3,206.00	54.50	177.60	3,091.06	-345.79	-17.90	345.76	1.61	1.25	1.25
3,221.00	54.80	177.60	3,099.73	-358.01	-17.38	357.99	2.00	2.00	0.00
3,246.00	55.00	177.30	3,114.11	-378.45	-16.47	378.42	1.27	0.80	-1.20
3,262.00	55.50	177.50	3,123.23	-391.58	-15.88	391.55	3.29	3.13	1.25
3,272.00	56.40	177.80	3,128.83	-399.86	-15.54	399.83	9.34	9.00	3.00
3,309.00	61.50	178.30	3,147.91	-431.53	-14.46	431.50	13.83	13.78	1.35
3,373.00	70.50	180.30	3,173.91	-489.93	-13.79	489.90	14.35	14.06	3.13
3,468.00	77.70	179.80	3,199.92	-581.23	-13.86	581.21	7.60	7.58	-0.53
3,562.00	88.40	179.40	3,211.28	-674.40	-13.20	674.38	11.39	11.38	-0.43
3,656.00	88.90	178.80	3,213.50	-768.36	-11.73	768.34	0.83	0.53	-0.64
3,697.50	89.21	178.71	3,214.18	-809.85	-10.83	809.83	0.77	0.74	-0.21
Cross Section Line 3697.5 MD/3214.18 TVD -809.85 S -10.83 W N: 730804.7 E: 626324.4									
3,750.00	89.60	178.60	3,214.73	-862.33	-9.60	862.32	0.77	0.74	-0.21
3,845.00	89.90	178.40	3,215.14	-957.30	-7.11	957.29	0.38	0.32	-0.21
3,940.00	90.60	178.30	3,214.73	-1,052.26	-4.37	1,052.25	0.74	0.74	-0.11
4,034.00	91.00	177.50	3,213.41	-1,146.18	-0.93	1,146.18	0.95	0.43	-0.85
4,129.00	89.60	178.20	3,212.92	-1,241.11	2.63	1,241.11	1.65	-1.47	0.74
4,223.00	89.10	179.60	3,213.98	-1,335.09	4.44	1,335.09	1.58	-0.53	1.49
4,317.00	90.30	181.60	3,214.47	-1,429.07	3.45	1,429.08	2.48	1.28	2.13
4,412.00	92.30	181.10	3,212.32	-1,524.02	1.22	1,524.02	2.17	2.11	-0.53
4,506.00	91.00	180.70	3,209.61	-1,617.96	-0.26	1,617.96	1.45	-1.38	-0.43
4,600.00	91.70	179.70	3,207.40	-1,711.94	-0.59	1,711.93	1.30	0.74	-1.06
4,695.00	89.60	179.60	3,206.32	-1,806.92	-0.01	1,806.92	2.21	-2.21	-0.11
4,789.00	90.20	179.40	3,206.48	-1,900.92	0.81	1,900.92	0.67	0.64	-0.21
4,909.00	90.70	178.90	3,205.54	-2,020.90	2.59	2,020.90	0.59	0.42	-0.42

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5,004.00	91.60	179.30	3,203.64	-2,115.87	4.08	2,115.87	1.04	0.95	0.42
5,099.00	90.20	179.50	3,202.14	-2,210.85	5.08	2,210.85	1.49	-1.47	0.21
5,194.00	90.90	179.90	3,201.23	-2,305.84	5.58	2,305.85	0.85	0.74	0.42
5,288.00	91.80	180.40	3,199.02	-2,399.82	5.33	2,399.82	1.10	0.96	0.53
5,383.00	89.90	180.80	3,197.61	-2,494.80	4.34	2,494.80	2.04	-2.00	0.42
5,477.00	90.70	181.10	3,197.11	-2,588.78	2.78	2,588.78	0.91	0.85	0.32
5,572.00	89.50	180.30	3,196.95	-2,683.77	1.62	2,683.77	1.52	-1.26	-0.84
5,666.00	90.10	180.10	3,197.28	-2,777.77	1.29	2,777.77	0.67	0.64	-0.21
5,760.00	90.70	180.50	3,196.62	-2,871.76	0.80	2,871.76	0.77	0.64	0.43
5,855.00	91.60	180.90	3,194.71	-2,966.74	-0.36	2,966.73	1.04	0.95	0.42
5,949.00	90.20	180.10	3,193.24	-3,060.72	-1.18	3,060.71	1.72	-1.49	-0.85
6,044.00	89.10	178.10	3,193.82	-3,155.70	0.31	3,155.70	2.40	-1.16	-2.11
6,138.00	89.50	178.10	3,194.97	-3,249.64	3.42	3,249.64	0.43	0.43	0.00
6,232.00	90.10	178.20	3,195.29	-3,343.59	6.46	3,343.60	0.65	0.64	0.11
6,327.00	91.00	178.30	3,194.38	-3,438.54	9.36	3,438.55	0.95	0.95	0.11
6,422.00	91.70	178.30	3,192.14	-3,533.47	12.18	3,533.49	0.74	0.74	0.00
6,516.00	90.90	181.10	3,190.01	-3,627.44	12.67	3,627.45	3.10	-0.85	2.98
6,609.00	91.20	181.20	3,188.31	-3,720.40	10.80	3,720.41	0.34	0.32	0.11
6,704.00	90.40	181.50	3,186.98	-3,815.37	8.57	3,815.37	0.90	-0.84	0.32
6,798.00	91.20	181.80	3,185.67	-3,909.32	5.86	3,909.32	0.91	0.85	0.32
6,893.00	90.00	180.60	3,184.67	-4,004.29	3.87	4,004.29	1.79	-1.26	-1.26
6,987.00	90.80	180.70	3,184.02	-4,098.28	2.80	4,098.28	0.86	0.85	0.11
7,082.00	90.00	179.20	3,183.35	-4,193.27	2.89	4,193.27	1.79	-0.84	-1.58
7,176.00	90.80	179.00	3,182.70	-4,287.26	4.36	4,287.26	0.88	0.85	-0.21
7,271.00	91.60	179.00	3,180.71	-4,382.22	6.02	4,382.22	0.84	0.84	0.00
7,365.00	90.40	179.30	3,179.07	-4,476.19	7.41	4,476.20	1.32	-1.28	0.32
7,460.00	89.60	180.60	3,179.07	-4,571.19	7.50	4,571.20	1.61	-0.84	1.37
7,555.00	90.20	180.50	3,179.23	-4,666.19	6.59	4,666.19	0.64	0.63	-0.11
7,650.00	91.10	180.70	3,178.16	-4,761.17	5.59	4,761.18	0.97	0.95	0.21
7,745.00	90.10	181.10	3,177.16	-4,856.16	4.10	4,856.16	1.13	-1.05	0.42
7,840.00	89.10	179.40	3,177.82	-4,951.15	3.68	4,951.15	2.08	-1.05	-1.79
7,934.00	89.90	179.30	3,178.64	-5,045.14	4.75	5,045.14	0.86	0.85	-0.11
8,029.00	90.50	179.00	3,178.31	-5,140.13	6.16	5,140.13	0.71	0.63	-0.32
8,123.00	91.40	179.60	3,176.75	-5,234.10	7.31	5,234.11	1.15	0.96	0.64
8,217.00	90.00	179.70	3,175.61	-5,328.09	7.88	5,328.10	1.49	-1.49	0.11
8,312.00	90.70	180.20	3,175.03	-5,423.09	7.97	5,423.10	0.91	0.74	0.53
8,407.00	91.70	180.30	3,173.04	-5,518.07	7.55	5,518.07	1.06	1.05	0.11
8,501.00	90.20	179.90	3,171.48	-5,612.05	7.39	5,612.06	1.65	-1.60	-0.43
8,596.00	90.70	180.10	3,170.73	-5,707.05	7.39	5,707.05	0.57	0.53	0.21
8,691.00	91.50	180.30	3,168.91	-5,802.03	7.06	5,802.03	0.87	0.84	0.21
8,786.00	89.60	179.90	3,168.00	-5,897.02	6.89	5,897.02	2.04	-2.00	-0.42
8,880.00	90.20	180.20	3,168.16	-5,991.02	6.81	5,991.02	0.71	0.64	0.32
8,916.00	90.70	180.20	3,167.88	-6,027.02	6.68	6,027.02	1.39	1.39	0.00

Last MWD Survey 8916 MD/3167.88 TVD -6027.02 S 6.68 E N: 726587.5 E: 626341.9

Survey Report

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Project:	Chaves County	TVD Reference:	KB=17.5 @ 3799.40ft
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Design:	Wellbore #1	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)
8,968.00	90.70	180.20	3,167.24	-6,079.01	6.50	6,079.02	0.00	0.00	0.00
PTB 8968 MD/3167.24 TVD -6079.01 S 6.5 E N: 725535.5 E: 626341.7									

Survey Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
64.00	64.00	-0.38	0.11	1st MWD Survey
3,697.50	3,214.18	-809.85	-10.83	Cross Section Line 3697.5 MD/3214.18 TVD -809.85 S -10.83 W N: 730804.7 E
8,916.00	3,167.88	-6,027.02	6.68	Last MWD Survey 8916 MD/3167.88 TVD -6027.02 S 6.68 E N: 725587.5 E: 62
8,968.00	3,167.24	-6,079.01	6.50	PTB 8968 MD/3167.24 TVD -6079.01 S 6.5 E N: 725535.5 E: 626341.7

Checked By: _____	Approved By: _____	Date: _____
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