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Directional Survey**

**NM OIL CONSERVATION
ARTESIA DISTRICT**

JAN 16 2019

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Mack Energy

Chaves County

Sec.17, T15 S, R 29 E

Prince Rupert Federal #4H

Lateral

30.005.64320

Survey: Survey #1

Standard Survey Report

24 October, 2018

Survey Report

Company: Mack Energy
Project: Chaves County
Site: Sec.17, T15 S, R 29 E
Well: Prince Rupert Federal #4H
Wellbore: Lateral
Design: Lateral

Local Co-ordinate Reference: Well Prince Rupert Federal #4H
TVD Reference: KB=17.5 @ 3806.20usft
MD Reference: KB=17.5 @ 3806.20usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1

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

Site	Sec.17, T15 S, R 29 E				
Site Position:		Northing:	731,138.58 usft	Latitude:	33.00958
From:	Map	Easting:	628,480.32 usft	Longitude:	-104.04906
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.15 °

Well	Prince Rupert Federal #4H				
Well Position	+N/-S	0.00 usft	Northing:	731,374.73 usft	Latitude: 33.01022
	+E/-W	0.00 usft	Easting:	628,964.85 usft	Longitude: -104.04748
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level: 3,788.70 usft

Wellbore	Lateral				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	10/5/2018	7.35	60.70	48,227

Design	Lateral				
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	180.61	

Survey Program	Date	10/24/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
217.00	8,775.00	Survey #1 (Lateral)	MWD	MWD - Standard	

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	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
217.00	1.10	320.00	216.99	1.60	-1.34	-1.58	0.51	0.51	0.00
1st MWD Survey									
362.00	1.67	316.77	361.94	4.20	-3.68	-4.16	0.40	0.39	-2.23
544.00	1.32	328.34	543.88	7.92	-6.60	-7.85	0.25	-0.19	6.36
726.00	0.84	188.07	725.87	8.38	-7.89	-8.30	1.12	-0.26	-77.07
912.00	1.71	174.80	911.82	4.27	-7.83	-4.18	0.49	0.47	-7.13
1,102.00	1.01	127.69	1,101.77	0.42	-6.24	-0.35	0.66	-0.37	-24.79
1,165.00	0.84	110.02	1,164.76	-0.08	-5.37	0.13	0.52	-0.27	-28.05
1,292.00	0.92	118.90	1,291.75	-0.89	-3.60	0.93	0.12	0.06	6.99
1,480.00	0.66	116.61	1,479.73	-2.10	-1.31	2.12	0.14	-0.14	-1.22

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Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,670.00	0.66	127.86	1,669.72	-3.26	0.53	3.26	0.07	0.00	5.92
1,860.00	0.79	155.81	1,859.70	-5.13	1.93	5.11	0.20	0.07	14.71
2,049.00	0.53	130.59	2,048.69	-6.89	3.13	6.85	0.20	-0.14	-13.34
2,144.00	0.92	16.33	2,143.69	-6.44	3.68	6.40	1.30	0.41	-120.27
2,333.00	1.01	37.60	2,332.66	-3.67	5.12	3.61	0.19	0.05	11.25
2,459.00	1.14	24.15	2,458.64	-1.64	6.31	1.58	0.22	0.10	-10.67
2,522.00	0.31	144.74	2,521.63	-1.21	6.66	1.14	2.10	-1.32	191.41
2,616.00	5.41	193.08	2,615.49	-5.74	5.81	5.68	5.54	5.43	51.43
2,710.00	12.70	198.00	2,708.25	-19.90	1.61	19.88	7.79	7.76	5.23
2,804.00	21.05	197.65	2,798.13	-45.86	-6.72	45.93	8.88	8.88	-0.37
2,899.00	29.67	190.27	2,883.91	-85.34	-16.11	85.50	9.65	9.07	-7.77
2,993.00	38.81	186.22	2,961.55	-137.63	-23.46	137.87	10.02	9.72	-4.31
3,056.00	45.05	184.64	3,008.40	-179.52	-27.41	179.80	10.04	9.90	-2.51
3,190.00	54.51	183.41	3,094.83	-281.47	-34.50	281.82	7.09	7.06	-0.92
3,205.00	54.95	183.59	3,103.49	-293.70	-35.25	294.05	3.09	2.93	1.20
3,220.00	55.30	184.20	3,112.07	-305.97	-36.09	306.34	4.07	2.33	4.07
3,235.00	55.69	184.20	3,120.56	-318.30	-36.99	318.68	2.60	2.60	0.00
3,250.00	55.87	183.76	3,129.00	-330.67	-37.85	331.06	2.71	1.20	-2.93
3,262.00	56.22	184.38	3,135.70	-340.60	-38.56	340.99	5.18	2.92	5.17
3,276.00	56.40	184.38	3,143.47	-352.22	-39.45	352.62	1.29	1.29	0.00
3,293.00	57.10	184.11	3,152.79	-366.40	-40.50	366.80	4.33	4.12	-1.59
3,307.00	57.98	183.67	3,160.30	-378.18	-41.30	378.60	6.82	6.29	-3.14
3,338.00	60.57	182.53	3,176.14	-404.79	-42.74	405.22	8.93	8.35	-3.68
3,370.00	63.16	181.57	3,191.23	-432.99	-43.75	433.42	8.52	8.09	-3.00
3,465.00	72.00	180.77	3,227.43	-520.70	-45.52	521.15	9.34	9.31	-0.84
3,511.00	76.17	180.16	3,240.04	-564.93	-45.88	565.38	9.16	9.07	-1.33
Cross Section Line 3511 MD/3240.04 TVD -564.93 S -45.88 W N: 730809.8 E: 628918.9									
3,559.00	80.53	179.54	3,249.72	-611.92	-45.75	612.37	9.16	9.08	-1.29
3,590.00	84.04	179.46	3,253.89	-642.64	-45.48	643.08	11.33	11.32	-0.26
3,654.00	89.10	179.63	3,257.71	-706.50	-44.97	706.94	7.91	7.91	0.27
3,748.00	92.00	178.93	3,256.81	-800.48	-43.79	800.90	3.17	3.09	-0.74
3,843.00	91.82	178.49	3,253.64	-895.40	-41.66	895.79	0.50	-0.19	-0.46
3,938.00	90.15	178.31	3,252.01	-990.35	-39.00	990.70	1.77	-1.76	-0.19
4,031.00	88.62	179.37	3,253.01	-1,083.32	-37.12	1,083.65	2.00	-1.65	1.14
4,126.00	89.27	179.10	3,254.76	-1,178.29	-35.85	1,178.61	0.74	0.68	-0.28
4,220.00	89.67	179.90	3,255.63	-1,272.28	-35.03	1,272.58	0.95	0.43	0.85
4,315.00	90.02	181.48	3,255.89	-1,367.27	-36.18	1,367.58	1.70	0.37	1.66
4,410.00	89.98	181.65	3,255.89	-1,462.24	-38.77	1,462.57	0.18	-0.04	0.18
4,504.00	90.02	181.21	3,255.89	-1,556.21	-41.12	1,556.56	0.47	0.04	-0.47
4,599.00	89.32	180.16	3,256.43	-1,651.20	-42.25	1,651.55	1.33	-0.74	-1.11
4,693.00	88.97	179.63	3,257.84	-1,745.19	-42.08	1,745.54	0.68	-0.37	-0.56
4,788.00	90.77	179.37	3,258.05	-1,840.18	-41.25	1,840.51	1.91	1.89	-0.27
4,882.00	90.51	179.02	3,257.00	-1,934.16	-39.93	1,934.48	0.46	-0.28	-0.37

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4,977.00	89.71	178.84	3,256.82	-2,029.15	-38.16	2,029.44	0.86	-0.84	-0.19
5,065.00	89.42	179.72	3,257.49	-2,117.14	-37.05	2,117.41	1.05	-0.33	1.00
5,160.00	91.87	179.28	3,256.42	-2,212.12	-36.22	2,212.38	2.62	2.58	-0.46
5,255.00	91.91	179.72	3,253.28	-2,307.06	-35.39	2,307.31	0.46	0.04	0.46
5,349.00	89.45	180.60	3,252.17	-2,401.05	-35.66	2,401.29	2.78	-2.62	0.94
5,443.00	88.40	180.51	3,253.93	-2,495.03	-36.57	2,495.27	1.12	-1.12	-0.10
5,538.00	90.46	180.07	3,254.88	-2,590.02	-37.05	2,590.26	2.22	2.17	-0.46
5,632.00	89.71	179.46	3,254.74	-2,684.01	-36.66	2,684.25	1.03	-0.80	-0.65
5,727.00	89.54	179.98	3,255.36	-2,779.01	-36.20	2,779.24	0.58	-0.18	0.55
5,822.00	89.85	179.54	3,255.86	-2,874.01	-35.80	2,874.23	0.57	0.33	-0.46
5,917.00	89.19	179.72	3,256.66	-2,969.00	-35.19	2,969.21	0.72	-0.69	0.19
6,011.00	90.90	179.54	3,256.59	-3,063.00	-34.58	3,063.19	1.83	1.82	-0.19
6,106.00	90.11	179.19	3,255.75	-3,157.99	-33.53	3,158.16	0.91	-0.83	-0.37
6,200.00	89.45	179.72	3,256.11	-3,251.98	-32.63	3,252.14	0.90	-0.70	0.56
6,295.00	89.49	180.42	3,256.99	-3,346.97	-32.75	3,347.13	0.74	0.04	0.74
6,390.00	89.58	180.95	3,257.76	-3,441.96	-33.88	3,442.13	0.57	0.09	0.56
6,484.00	89.76	181.39	3,258.30	-3,535.94	-35.80	3,536.12	0.51	0.19	0.47
6,579.00	89.85	180.95	3,258.63	-3,630.92	-37.74	3,631.12	0.47	0.09	-0.46
6,674.00	89.63	180.95	3,259.06	-3,725.91	-39.32	3,726.12	0.23	-0.23	0.00
6,768.00	90.20	180.42	3,259.20	-3,819.90	-40.44	3,820.12	0.83	0.61	-0.56
6,800.00	90.51	180.69	3,259.00	-3,851.90	-40.75	3,852.11	1.28	0.97	0.84
6,894.00	91.03	178.75	3,257.73	-3,945.88	-40.29	3,946.09	2.14	0.55	-2.06
6,989.00	90.42	178.05	3,256.53	-4,040.84	-37.64	4,041.01	0.98	-0.64	-0.74
7,083.00	89.10	178.49	3,256.93	-4,134.79	-34.80	4,134.93	1.48	-1.40	0.47
7,175.00	88.88	178.40	3,258.55	-4,226.74	-32.31	4,226.85	0.26	-0.24	-0.10
7,270.00	88.57	179.63	3,260.66	-4,321.71	-30.67	4,321.79	1.33	-0.33	1.29
7,367.00	88.84	181.21	3,262.85	-4,418.67	-31.38	4,418.76	1.65	0.28	1.63
7,461.00	89.85	180.86	3,263.93	-4,512.65	-33.08	4,512.75	1.14	1.07	-0.37
7,556.00	90.77	180.60	3,263.41	-4,607.64	-34.29	4,607.75	1.01	0.97	-0.27
7,651.00	91.43	180.60	3,261.59	-4,702.62	-35.29	4,702.73	0.69	0.69	0.00
7,745.00	91.65	178.49	3,259.06	-4,796.58	-34.54	4,796.67	2.26	0.23	-2.24
7,839.00	90.55	177.17	3,257.26	-4,890.49	-30.98	4,890.54	1.83	-1.17	-1.40
7,933.00	88.97	177.70	3,257.65	-4,984.39	-26.78	4,984.39	1.77	-1.68	0.56
8,027.00	88.88	179.63	3,259.42	-5,078.34	-24.59	5,078.32	2.06	-0.10	2.05
8,122.00	90.59	180.95	3,259.86	-5,173.34	-25.07	5,173.31	2.27	1.80	1.39
8,216.00	92.18	180.86	3,257.58	-5,267.29	-26.55	5,267.28	1.69	1.69	-0.10
8,311.00	92.66	180.69	3,253.57	-5,362.20	-27.84	5,362.19	0.54	0.51	-0.18
8,406.00	90.64	178.31	3,250.84	-5,457.14	-27.01	5,457.12	3.29	-2.13	-2.51
8,500.00	88.84	177.87	3,251.26	-5,551.09	-23.87	5,551.03	1.97	-1.91	-0.47
8,594.00	88.18	178.58	3,253.71	-5,645.01	-20.96	5,644.91	1.03	-0.70	0.76
8,689.00	88.88	180.25	3,256.15	-5,739.97	-19.99	5,739.86	1.91	0.74	1.76
8,728.00	89.05	180.60	3,256.85	-5,778.96	-20.28	5,778.85	1.00	0.44	0.90
Last MWD Survey 8728 MD/3256.85 TVD -5778.96 S -20.28 W N: 725595.7 E: 628944.5									
8,775.00	89.05	180.60	3,257.63	-5,825.95	-20.77	5,825.85	0.00	0.00	0.00

Survey Report

Company: Mack Energy
Project: Chaves County
Site: Sec.17, T15 S, R 29 E
Well: Prince Rupert Federal #4H
Wellbore: Lateral
Design: Lateral

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PTB 8775 MD/3257.63 TVD -5825.95 S -20.77 W N: 725548.7 E: 628944.0									

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
217.00	216.99	1.60	-1.34	1st MWD Survey
3,511.00	3,240.04	-564.93	-45.88	Cross Section Line 3511 MD/3240.04 TVD -564.93 S -45.88 W N: 730809.8 E: 628944.0
8,728.00	3,256.85	-5,778.96	-20.28	Last MWD Survey 8728 MD/3256.85 TVD -5778.96 S -20.28 W N: 725595.7 E: 628944.0
8,775.00	3,257.63	-5,825.95	-20.77	PTB 8775 MD/3257.63 TVD -5825.95 S -20.77 W N: 725548.7 E: 628944.0

Checked By: _____ Approved By: _____ Date: _____

MACK
Energy Corporation

PROJECT DETAILS: Chaves County
Geodetic System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone: New Mexico Eastern Zone
System Datum: Mean Sea Level
Local North: Grid

