



Laramie Energy, LLC

Garfield County, CO

CC 0697-03-07 Pad

CC 0697-03-14W

Wellbore #1

Design: Wellbore #1

QES Survey Report

22 June, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well CC 0697-03-14W
Project:	Garfield County, CO	TVD Reference:	well @ 8458.0usft (30' RKB)
Site:	CC 0697-03-07 Pad	MD Reference:	well @ 8458.0usft (30' RKB)
Well:	CC 0697-03-14W	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Project	Garfield County, CO		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Central Zone		

Site	CC 0697-03-07 Pad			
Site Position:		Northing:	1,638,132.66 usft	Latitude: 39.554247
From:	Lat/Long	Easting:	2,236,874.96 usft	Longitude: -108.206835
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence: -1.71 °

Well	CC 0697-03-14W			
Well Position	+N/-S	0.0 usft	Northing:	1,639,594.60 usft
	+E/-W	0.0 usft	Easting:	2,237,394.51 usft
Position Uncertainty	0.0 usft		Wellhead Elevation:	usft
			Ground Level:	8,428.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	User Defined	6/15/2018	9.62	65.59	51,401.60000000

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	235.13	

Survey Program	Date	6/22/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
318.0	9,792.0	QES MWD Surveys (Wellbore #1)	MWD default	MWD - Standard	

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)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
First MWD Survey @ 318.0' MD / 317.0' TVD									
318.0	7.90	223.20	317.0	-16.0	-15.0	21.4	2.48	2.48	0.00
411.0	9.80	234.50	408.9	-25.2	-25.8	35.6	2.76	2.04	12.15
502.0	11.50	240.10	498.3	-34.2	-40.0	52.4	2.18	1.87	6.15
593.0	13.60	240.70	587.1	-44.0	-57.2	72.1	2.31	2.31	0.66
683.0	16.10	240.60	674.1	-55.3	-77.3	95.0	2.78	2.78	-0.11
774.0	18.10	232.30	761.1	-70.1	-99.5	121.7	3.46	2.20	-9.12
865.0	18.70	226.90	847.5	-88.8	-121.3	150.3	1.98	0.66	-5.93
956.0	16.80	226.50	934.1	-107.8	-141.5	177.7	2.09	-2.09	-0.44
1,047.0	17.60	238.20	1,021.1	-124.1	-162.7	204.4	3.90	0.88	12.86



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Well:	CC 0697-03-14W	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

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)
1,142.0	19.60	243.90	1,111.1	-138.7	-189.2	234.5	2.84	2.11	6.00
1,236.0	18.70	243.90	1,199.9	-152.2	-216.9	265.0	0.96	-0.96	0.00
1,331.0	16.30	238.70	1,290.5	-165.9	-242.0	293.4	3.01	-2.53	-5.47
1,426.0	16.50	234.30	1,381.7	-180.7	-264.4	320.2	1.32	0.21	-4.63
1,520.0	18.00	239.00	1,471.4	-195.9	-287.7	348.0	2.18	1.60	5.00
1,614.0	16.90	236.70	1,561.1	-210.9	-311.5	376.2	1.38	-1.17	-2.45
1,709.0	17.00	234.30	1,652.0	-226.6	-334.3	403.9	0.74	0.11	-2.53
1,804.0	16.70	233.90	1,742.9	-242.7	-356.6	431.4	0.34	-0.32	-0.42
1,899.0	15.90	232.20	1,834.1	-258.8	-378.0	458.0	0.98	-0.84	-1.79
1,994.0	16.00	232.00	1,925.4	-274.8	-398.6	484.1	0.12	0.11	-0.21
2,088.0	16.30	232.90	2,015.7	-290.7	-419.3	510.2	0.42	0.32	0.96
2,182.0	15.90	238.30	2,106.0	-305.5	-440.8	536.3	1.65	-0.43	5.74
2,277.0	15.80	240.30	2,197.4	-318.7	-463.1	562.1	0.58	-0.11	2.11
2,371.0	16.30	236.30	2,287.8	-332.4	-485.2	588.1	1.29	0.53	-4.26
2,466.0	16.40	235.70	2,378.9	-347.3	-507.3	614.8	0.21	0.11	-0.63
2,538.0	16.60	236.20	2,448.0	-358.8	-524.3	635.3	0.34	0.28	0.69
2,669.0	15.60	238.60	2,573.8	-378.4	-554.9	671.5	0.92	-0.76	1.83
2,764.0	16.70	236.70	2,665.1	-392.5	-577.2	697.9	1.28	1.16	-2.00
2,858.0	16.20	236.60	2,755.2	-407.1	-599.4	724.6	0.53	-0.53	-0.11
2,953.0	15.90	235.90	2,846.5	-421.7	-621.2	750.8	0.38	-0.32	-0.74
3,048.0	14.60	234.50	2,938.2	-436.0	-641.8	775.8	1.42	-1.37	-1.47
3,142.0	14.60	236.40	3,029.1	-449.4	-661.3	799.5	0.51	0.00	2.02
3,237.0	14.20	235.80	3,121.2	-462.6	-680.9	823.1	0.45	-0.42	-0.63
3,331.0	14.70	235.90	3,212.2	-475.8	-700.3	846.6	0.53	0.53	0.11
3,426.0	15.90	237.40	3,303.8	-489.5	-721.3	871.6	1.33	1.26	1.58
3,520.0	15.80	238.10	3,394.2	-503.2	-743.0	897.3	0.23	-0.11	0.74
3,615.0	14.80	237.40	3,485.9	-516.6	-764.2	922.3	1.07	-1.05	-0.74
3,709.0	17.10	238.10	3,576.2	-530.4	-786.0	948.1	2.46	2.45	0.74
3,804.0	16.60	236.70	3,667.2	-545.2	-809.2	975.6	0.68	-0.53	-1.47
3,898.0	15.50	235.90	3,757.5	-559.6	-830.8	1,001.6	1.19	-1.17	-0.85
3,993.0	17.10	233.80	3,848.7	-575.0	-852.6	1,028.3	1.79	1.68	-2.21
4,087.0	16.60	233.40	3,938.6	-591.1	-874.6	1,055.5	0.55	-0.53	-0.43
4,181.0	15.60	232.30	4,029.0	-606.9	-895.3	1,081.5	1.11	-1.06	-1.17
4,275.0	16.60	232.30	4,119.3	-622.8	-916.0	1,107.6	1.06	1.06	0.00
4,370.0	16.30	231.60	4,210.4	-639.4	-937.1	1,134.4	0.38	-0.32	-0.74
4,464.0	17.90	235.90	4,300.2	-655.7	-959.4	1,162.1	2.17	1.70	4.57
4,559.0	17.80	235.80	4,390.7	-672.0	-983.5	1,191.2	0.11	-0.11	-0.11
4,653.0	17.60	235.70	4,480.2	-688.1	-1,007.2	1,219.8	0.22	-0.21	-0.11
4,747.0	17.20	235.40	4,569.9	-704.0	-1,030.4	1,247.9	0.44	-0.43	-0.32
4,842.0	17.30	235.00	4,660.6	-720.1	-1,053.5	1,276.0	0.16	0.11	-0.42
4,936.0	16.50	234.10	4,750.6	-736.0	-1,075.7	1,303.4	0.90	-0.85	-0.96
5,030.0	17.50	237.40	4,840.5	-751.4	-1,098.5	1,330.8	1.48	1.06	3.51
5,125.0	17.40	236.80	4,931.1	-766.9	-1,122.4	1,359.3	0.22	-0.11	-0.63



Survey Report



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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)	
5,219.0	15.70	238.10	5,021.2	-781.3	-1,144.9	1,386.0	1.85	-1.81	1.38	
5,314.0	15.60	237.40	5,112.7	-795.0	-1,166.6	1,411.6	0.22	-0.11	-0.74	
5,408.0	16.50	237.40	5,203.0	-809.0	-1,188.5	1,437.6	0.96	0.96	0.00	
5,503.0	15.80	236.30	5,294.3	-823.4	-1,210.6	1,464.0	0.80	-0.74	-1.16	
5,598.0	15.20	235.40	5,385.8	-837.7	-1,231.7	1,489.4	0.68	-0.63	-0.95	
5,692.0	16.50	235.70	5,476.2	-852.2	-1,252.8	1,515.1	1.39	1.38	0.32	
5,786.0	15.90	235.20	5,566.5	-867.0	-1,274.4	1,541.3	0.66	-0.64	-0.53	
5,881.0	15.50	234.70	5,658.0	-881.8	-1,295.5	1,567.0	0.44	-0.42	-0.53	
5,975.0	14.90	232.90	5,748.7	-896.4	-1,315.4	1,591.7	0.81	-0.64	-1.91	
6,069.0	16.50	233.30	5,839.2	-911.6	-1,335.7	1,617.1	1.71	1.70	0.43	
6,163.0	17.00	232.60	5,929.2	-927.9	-1,357.3	1,644.1	0.57	0.53	-0.74	
6,258.0	15.60	232.80	6,020.3	-944.1	-1,378.5	1,670.8	1.47	-1.47	0.21	
6,353.0	15.50	233.20	6,111.9	-959.4	-1,398.9	1,696.2	0.15	-0.11	0.42	
6,447.0	13.80	234.50	6,202.8	-973.5	-1,418.1	1,720.0	1.84	-1.81	1.38	
6,542.0	13.00	235.20	6,295.2	-986.1	-1,436.1	1,742.0	0.86	-0.84	0.74	
6,636.0	12.80	234.30	6,386.8	-998.3	-1,453.2	1,763.0	0.30	-0.21	-0.96	
6,731.0	11.70	233.60	6,479.7	-1,010.1	-1,469.5	1,783.1	1.17	-1.16	-0.74	
6,825.0	10.60	234.50	6,571.9	-1,020.8	-1,484.2	1,801.3	1.18	-1.17	0.96	
6,920.0	9.20	231.90	6,665.5	-1,030.6	-1,497.3	1,817.6	1.55	-1.47	-2.74	
7,015.0	9.00	232.80	6,759.3	-1,039.7	-1,509.2	1,832.6	0.26	-0.21	0.95	
7,109.0	8.10	235.90	6,852.3	-1,047.9	-1,520.5	1,846.6	1.08	-0.96	3.30	
7,204.0	6.30	240.30	6,946.5	-1,054.2	-1,530.6	1,858.5	1.98	-1.89	4.63	
7,298.0	5.90	238.60	7,040.0	-1,059.3	-1,539.2	1,868.5	0.47	-0.43	-1.81	
7,393.0	6.10	240.30	7,134.4	-1,064.3	-1,547.8	1,878.4	0.28	0.21	1.79	
7,487.0	4.90	240.70	7,228.0	-1,068.8	-1,555.6	1,887.3	1.28	-1.28	0.43	
7,582.0	3.90	223.80	7,322.7	-1,073.1	-1,561.4	1,894.5	1.71	-1.05	-17.79	
7,677.0	2.70	221.60	7,417.6	-1,077.1	-1,565.1	1,899.9	1.27	-1.26	-2.32	
7,771.0	1.90	227.90	7,511.5	-1,079.8	-1,567.7	1,903.6	0.89	-0.85	6.70	
7,866.0	2.10	229.80	7,606.4	-1,082.0	-1,570.2	1,906.9	0.22	0.21	2.00	
7,960.0	2.40	225.50	7,700.4	-1,084.5	-1,572.9	1,910.5	0.37	0.32	-4.57	
8,055.0	2.50	218.10	7,795.3	-1,087.5	-1,575.6	1,914.5	0.35	0.11	-7.79	
8,149.0	2.60	214.70	7,889.2	-1,090.9	-1,578.1	1,918.4	0.19	0.11	-3.62	
8,244.0	1.60	188.30	7,984.1	-1,094.0	-1,579.5	1,921.4	1.44	-1.05	-27.79	
8,338.0	0.70	53.90	8,078.1	-1,094.9	-1,579.3	1,921.7	2.29	-0.96	-142.98	
8,433.0	0.40	321.40	8,173.1	-1,094.3	-1,579.0	1,921.1	0.86	-0.32	-97.37	
8,527.0	1.10	240.10	8,267.1	-1,094.5	-1,580.0	1,922.0	1.18	0.74	-86.49	
8,621.0	1.20	241.00	8,361.1	-1,095.4	-1,581.6	1,923.9	0.11	0.11	0.96	
8,716.0	0.40	309.50	8,456.1	-1,095.7	-1,582.7	1,925.0	1.18	-0.84	72.11	
8,810.0	0.10	126.20	8,550.1	-1,095.5	-1,582.9	1,925.1	0.53	-0.32	187.98	
8,904.0	0.80	224.40	8,644.1	-1,096.1	-1,583.3	1,925.7	0.87	0.74	104.47	
8,998.0	2.10	233.40	8,738.0	-1,097.6	-1,585.2	1,928.0	1.40	1.38	9.57	
9,093.0	2.90	234.50	8,833.0	-1,100.0	-1,588.5	1,932.2	0.84	0.84	1.16	
9,188.0	2.00	303.50	8,927.9	-1,100.5	-1,591.9	1,935.2	3.02	-0.95	72.63	



Survey Report



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Well:	CC 0697-03-14W	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
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9,282.0	2.40	345.10	9,021.8	-1,097.7	-1,593.7	1,935.1	1.71	0.43	44.26	
9,377.0	2.00	2.50	9,116.7	-1,094.1	-1,594.2	1,933.4	0.81	-0.42	18.32	
9,471.0	1.30	297.10	9,210.7	-1,092.0	-1,595.1	1,933.0	2.00	-0.74	-69.57	
9,565.0	1.70	281.56	9,304.7	-1,091.2	-1,597.4	1,934.4	0.60	0.43	-16.53	
9,660.0	1.90	265.90	9,399.6	-1,091.0	-1,600.3	1,936.7	0.56	0.21	-16.48	
9,736.0	2.29	250.89	9,475.6	-1,091.6	-1,603.0	1,939.3	0.88	0.51	-19.75	
Projection to TD @ 9792.0' MD / 9531.5' TVD										
9,792.0	2.29	250.89	9,531.5	-1,092.3	-1,605.1	1,941.4	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
318.0	317.0	-16.0	-15.0	First MWD Survey @ 318.0' MD / 317.0' TVD	
9,792.0	9,531.5	-1,092.3	-1,605.1	Projection to TD @ 9792.0' MD / 9531.5' TVD	

Checked By: _____	Approved By: _____	Date: _____
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