



Laramie Energy, LLC

Garfield County, CO

CC 0697-03-07 Pad

CC 0697-03-14E

Wellbore #1

Design: Wellbore #1

QES Survey Report

28 June, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well CC 0697-03-14E
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 0697-03-14E	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 0697-03-14E			
Well Position	+N/-S	0.0 usft	Northing:	1,639,592.53 usft
	+E/-W	0.0 usft	Easting:	2,237,404.66 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	137.00

Survey Program	Date	6/28/2018		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
318.0	9,796.0	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 / 316.9' TVD									
318.0	8.30	161.30	316.9	-21.8	7.4	21.0	2.61	2.61	0.00
411.0	10.50	155.40	408.6	-35.8	13.1	35.1	2.58	2.37	-6.34
502.0	12.10	145.90	497.9	-51.3	21.9	52.4	2.69	1.76	-10.44
593.0	14.90	137.10	586.4	-67.8	35.2	73.5	3.81	3.08	-9.67
683.0	16.60	128.60	673.0	-84.3	53.1	97.8	3.18	1.89	-9.44
774.0	17.20	120.10	760.1	-99.1	74.9	123.6	2.79	0.66	-9.34
865.0	16.90	117.80	847.1	-112.0	98.2	148.9	0.81	-0.33	-2.53
956.0	15.40	123.90	934.5	-124.9	120.0	173.2	2.49	-1.65	6.70
1,047.0	13.00	138.10	1,022.7	-139.3	136.8	195.2	4.63	-2.64	15.60



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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	13.00	144.10	1,115.3	-155.9	150.2	216.5	1.42	0.00	6.32
1,236.0	14.50	141.60	1,206.6	-173.7	163.8	238.7	1.72	1.60	-2.66
1,331.0	13.80	138.20	1,298.7	-191.5	178.7	261.9	1.14	-0.74	-3.58
1,426.0	11.90	137.90	1,391.3	-207.2	192.8	283.0	2.00	-2.00	-0.32
1,520.0	12.70	137.30	1,483.2	-222.0	206.3	303.0	0.86	0.85	-0.64
1,614.0	13.40	136.30	1,574.8	-237.4	220.9	324.3	0.78	0.74	-1.06
1,709.0	12.10	133.50	1,667.4	-252.3	235.7	345.2	1.51	-1.37	-2.95
1,804.0	11.40	133.40	1,760.4	-265.6	249.7	364.5	0.74	-0.74	-0.11
1,899.0	12.20	140.90	1,853.4	-279.8	262.9	383.9	1.82	0.84	7.89
1,994.0	12.50	139.40	1,946.2	-295.4	275.9	404.2	0.46	0.32	-1.58
2,088.0	12.80	137.80	2,037.9	-310.8	289.5	424.8	0.49	0.32	-1.70
2,182.0	12.60	138.70	2,129.6	-326.3	303.3	445.4	0.30	-0.21	0.96
2,277.0	12.70	135.80	2,222.3	-341.5	317.4	466.2	0.68	0.11	-3.05
2,371.0	12.50	137.20	2,314.1	-356.4	331.5	486.7	0.39	-0.21	1.49
2,466.0	12.60	135.30	2,406.8	-371.3	345.8	507.4	0.45	0.11	-2.00
2,505.0	12.80	136.40	2,444.8	-377.5	351.8	515.9	0.80	0.51	2.82
2,574.0	12.50	135.80	2,512.2	-388.3	362.2	531.1	0.47	-0.43	-0.87
2,669.0	12.20	133.80	2,605.0	-402.7	376.6	551.4	0.55	-0.32	-2.11
2,764.0	12.70	134.90	2,697.7	-417.0	391.3	571.8	0.58	0.53	1.16
2,858.0	12.00	134.90	2,789.6	-431.2	405.5	591.9	0.74	-0.74	0.00
2,953.0	11.50	133.80	2,882.6	-444.7	419.4	611.2	0.58	-0.53	-1.16
3,048.0	10.70	133.20	2,975.8	-457.3	432.6	629.5	0.85	-0.84	-0.63
3,142.0	10.20	133.50	3,068.2	-469.0	445.0	646.5	0.54	-0.53	0.32
3,237.0	10.40	140.60	3,161.7	-481.4	456.6	663.5	1.35	0.21	7.47
3,331.0	11.40	141.70	3,254.0	-495.3	467.7	681.2	1.09	1.06	1.17
3,426.0	13.00	134.40	3,346.9	-510.1	481.2	701.2	2.34	1.68	-7.68
3,520.0	12.00	134.00	3,438.6	-524.3	495.7	721.5	1.07	-1.06	-0.43
3,615.0	13.60	132.60	3,531.3	-538.7	511.1	742.5	1.72	1.68	-1.47
3,709.0	12.20	133.20	3,622.9	-553.0	526.5	763.5	1.50	-1.49	0.64
3,803.0	13.90	135.30	3,714.5	-567.8	541.6	784.7	1.88	1.81	2.23
3,898.0	12.90	136.30	3,806.9	-583.6	557.0	806.7	1.08	-1.05	1.05
3,992.0	11.80	136.70	3,898.7	-598.2	570.8	826.8	1.17	-1.17	0.43
4,086.0	13.00	140.40	3,990.5	-613.3	584.2	846.9	1.53	1.28	3.94
4,181.0	11.80	140.00	4,083.3	-629.0	597.2	867.3	1.27	-1.26	-0.42
4,275.0	13.20	140.10	4,175.1	-644.6	610.3	887.6	1.49	1.49	0.11
4,370.0	12.30	141.10	4,267.7	-660.8	623.6	908.6	0.98	-0.95	1.05
4,464.0	11.10	141.00	4,359.8	-675.6	635.6	927.6	1.28	-1.28	-0.11
4,558.0	12.30	137.00	4,451.8	-690.0	648.1	946.6	1.54	1.28	-4.26
4,653.0	11.70	139.80	4,544.7	-704.7	661.2	966.3	0.88	-0.63	2.95
4,747.0	10.60	139.10	4,637.0	-718.5	673.0	984.5	1.18	-1.17	-0.74
4,842.0	11.50	139.30	4,730.2	-732.3	684.9	1,002.7	0.95	0.95	0.21
4,936.0	13.00	135.70	4,822.1	-747.0	698.4	1,022.6	1.79	1.60	-3.83
5,030.0	11.20	137.10	4,914.0	-761.2	712.0	1,042.3	1.94	-1.91	1.49



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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)	
5,125.0	12.60	136.10	5,006.9	-775.5	725.5	1,061.9	1.49	1.47	-1.05	
5,219.0	11.60	134.60	5,098.8	-789.5	739.3	1,081.6	1.12	-1.06	-1.60	
5,314.0	11.70	134.90	5,191.9	-803.0	752.9	1,100.8	0.12	0.11	0.32	
5,408.0	12.80	133.50	5,283.7	-816.9	767.3	1,120.7	1.21	1.17	-1.49	
5,503.0	11.40	132.10	5,376.6	-830.4	781.9	1,140.6	1.51	-1.47	-1.47	
5,598.0	13.20	134.30	5,469.4	-844.3	796.6	1,160.8	1.96	1.89	2.32	
5,692.0	12.70	136.30	5,561.0	-859.3	811.4	1,181.8	0.71	-0.53	2.13	
5,786.0	11.90	135.40	5,652.9	-873.6	825.3	1,201.8	0.88	-0.85	-0.96	
5,880.0	13.60	134.60	5,744.6	-888.3	840.0	1,222.6	1.82	1.81	-0.85	
5,975.0	13.60	135.70	5,836.9	-904.1	855.8	1,244.9	0.27	0.00	1.16	
6,069.0	13.00	134.30	5,928.4	-919.4	871.1	1,266.5	0.72	-0.64	-1.49	
6,163.0	12.90	134.40	6,020.0	-934.2	886.1	1,287.5	0.11	-0.11	0.11	
6,258.0	12.30	133.40	6,112.7	-948.5	901.1	1,308.2	0.67	-0.63	-1.05	
6,353.0	11.50	136.30	6,205.7	-962.3	914.9	1,327.8	1.05	-0.84	3.05	
6,447.0	10.20	136.50	6,298.0	-975.1	927.2	1,345.5	1.38	-1.38	0.21	
6,541.0	9.80	137.00	6,390.5	-987.0	938.3	1,361.8	0.44	-0.43	0.53	
6,636.0	9.00	139.80	6,484.3	-998.6	948.6	1,377.3	0.97	-0.84	2.95	
6,730.0	8.80	143.90	6,577.1	-1,010.1	957.6	1,391.8	0.71	-0.21	4.36	
6,825.0	8.40	139.90	6,671.1	-1,021.2	966.4	1,406.0	0.76	-0.42	-4.21	
6,920.0	7.60	137.20	6,765.1	-1,031.1	975.1	1,419.2	0.93	-0.84	-2.84	
7,014.0	6.80	136.90	6,858.4	-1,039.8	983.1	1,430.9	0.85	-0.85	-0.32	
7,109.0	6.20	138.70	6,952.8	-1,047.7	990.4	1,441.7	0.67	-0.63	1.89	
7,204.0	5.80	143.10	7,047.3	-1,055.4	996.6	1,451.6	0.64	-0.42	4.63	
7,298.0	5.10	144.40	7,140.9	-1,062.6	1,001.9	1,460.5	0.76	-0.74	1.38	
7,393.0	4.70	150.30	7,235.5	-1,069.4	1,006.3	1,468.4	0.68	-0.42	6.21	
7,487.0	3.38	153.33	7,329.3	-1,075.3	1,009.5	1,474.8	1.42	-1.40	3.22	
7,582.0	3.42	149.38	7,424.1	-1,080.2	1,012.2	1,480.3	0.25	0.04	-4.16	
7,677.0	3.56	146.83	7,518.9	-1,085.1	1,015.2	1,486.0	0.22	0.15	-2.68	
7,771.0	3.60	161.20	7,612.7	-1,090.3	1,017.8	1,491.5	0.95	0.04	15.29	
7,865.0	3.42	170.21	7,706.6	-1,095.9	1,019.2	1,496.6	0.62	-0.19	9.59	
7,960.0	3.64	169.94	7,801.4	-1,101.7	1,020.2	1,501.5	0.23	0.23	-0.28	
8,055.0	3.80	150.00	7,896.2	-1,107.4	1,022.3	1,507.1	1.37	0.17	-20.99	
8,149.0	2.80	148.60	7,990.0	-1,112.0	1,025.1	1,512.4	1.07	-1.06	-1.49	
8,244.0	0.40	99.60	8,085.0	-1,114.0	1,026.6	1,514.9	2.69	-2.53	-51.58	
8,338.0	2.80	5.90	8,179.0	-1,111.8	1,027.2	1,513.7	3.04	2.55	-99.68	
8,433.0	4.50	34.20	8,273.8	-1,106.4	1,029.5	1,511.3	2.56	1.79	29.79	
8,527.0	3.90	34.20	8,367.5	-1,100.7	1,033.4	1,509.8	0.64	-0.64	0.00	
8,621.0	2.60	28.30	8,461.4	-1,096.2	1,036.2	1,508.4	1.43	-1.38	-6.28	
8,716.0	1.70	54.10	8,556.3	-1,093.5	1,038.3	1,507.9	1.37	-0.95	27.16	
8,810.0	1.10	66.10	8,650.3	-1,092.3	1,040.3	1,508.3	0.71	-0.64	12.77	
8,904.0	0.70	99.60	8,744.3	-1,092.0	1,041.7	1,509.1	0.69	-0.43	35.64	
8,998.0	1.10	137.80	8,838.2	-1,092.8	1,042.8	1,510.4	0.74	0.43	40.64	
9,093.0	1.40	187.20	8,933.2	-1,094.6	1,043.3	1,512.1	1.14	0.32	52.00	



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Well:	CC 0697-03-14E	North Reference:	True
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Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

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9,188.0	2.00	212.90	9,028.2	-1,097.2	1,042.3	1,513.2	1.01	0.63	27.05	
9,282.0	2.70	227.90	9,122.1	-1,100.0	1,039.7	1,513.6	0.99	0.74	15.96	
9,377.0	3.20	234.20	9,217.0	-1,103.1	1,035.9	1,513.2	0.63	0.53	6.63	
9,471.0	3.70	233.20	9,310.8	-1,106.4	1,031.4	1,512.6	0.54	0.53	-1.06	
9,565.0	3.91	225.84	9,404.6	-1,110.5	1,026.6	1,512.3	0.57	0.22	-7.83	
9,660.0	4.35	224.90	9,499.4	-1,115.3	1,021.8	1,512.5	0.47	0.46	-0.99	
9,740.0	5.20	227.20	9,579.1	-1,119.9	1,017.0	1,512.6	1.09	1.06	2.88	
Projection to TD @ 9796.0' MD / 9634.8' TVD										
9,796.0	5.20	227.20	9,634.8	-1,123.4	1,013.2	1,512.6	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
318.0	316.9	-21.8	7.4	First MWD Survey @ 318.0' MD / 316.9' TVD	
9,796.0	9,634.8	-1,123.4	1,013.2	Projection to TD @ 9796.0' MD / 9634.8' TVD	

Checked By: _____	Approved By: _____	Date: _____
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