



Laramie Energy, LLC

Garfield County, CO

CC 0697-03-07 Pad

CC 0697-03-12E

Wellbore #1

Design: Wellbore #1

QES Survey Report

01 June, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well CC 0697-03-12E
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 0697-03-12E	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 0697-03-12E					
Well Position	+N/-S	0.0 usft	Northing:	1,639,612.22 usft	Latitude:	39.558351
	+E/-W	0.0 usft	Easting:	2,237,408.43 usft	Longitude:	-108.205100
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	5/16/2018	9.63	65.59	51,411.00000000

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	121.51	

Survey Program	Date	6/1/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
202.0	9,772.0	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 @ 202.0' MD / 202.0' TVD										
202.0	1.60	136.90	202.0	-2.1	1.9	2.7	0.79	0.79	0.00	
295.0	2.50	125.10	294.9	-4.2	4.5	6.0	1.06	0.97	-12.69	
387.0	3.30	129.40	386.8	-7.0	8.2	10.6	0.90	0.87	4.67	
478.0	4.10	124.50	477.6	-10.5	12.9	16.5	0.94	0.88	-5.38	
568.0	5.20	116.90	567.3	-14.2	19.2	23.7	1.40	1.22	-8.44	
659.0	6.70	110.10	657.8	-17.9	27.8	33.1	1.82	1.65	-7.47	
749.0	8.30	111.50	747.0	-22.1	38.8	44.6	1.79	1.78	1.56	
840.0	9.80	117.20	836.9	-28.0	51.8	58.8	1.92	1.65	6.26	
931.0	10.50	118.30	926.5	-35.5	66.0	74.8	0.80	0.77	1.21	



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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)
1,022.0	11.00	116.90	1,015.9	-43.3	81.0	91.7	0.62	0.55	-1.54
1,115.0	11.10	116.40	1,107.2	-51.3	97.0	109.5	0.15	0.11	-0.54
1,211.0	10.70	119.70	1,201.4	-59.9	113.0	127.6	0.77	-0.42	3.44
1,306.0	11.30	118.00	1,294.7	-68.6	128.9	145.7	0.72	0.63	-1.79
1,400.0	11.00	120.30	1,386.9	-77.4	144.7	163.9	0.57	-0.32	2.45
1,494.0	11.50	115.60	1,479.1	-86.0	160.9	182.2	1.11	0.53	-5.00
1,589.0	11.00	119.90	1,572.3	-94.6	177.3	200.6	1.03	-0.53	4.53
1,684.0	11.50	118.60	1,665.5	-103.7	193.5	219.1	0.59	0.53	-1.37
1,779.0	10.80	122.10	1,758.7	-112.9	209.3	237.5	1.02	-0.74	3.68
1,874.0	10.40	120.60	1,852.0	-122.0	224.3	255.0	0.51	-0.42	-1.58
1,968.0	9.40	128.50	1,944.6	-131.1	237.6	271.1	1.79	-1.06	8.40
2,063.0	8.80	127.10	2,038.5	-140.3	249.4	286.0	0.67	-0.63	-1.47
2,157.0	8.80	121.30	2,131.3	-148.4	261.3	300.4	0.94	0.00	-6.17
2,252.0	8.20	128.50	2,225.3	-156.4	272.8	314.4	1.28	-0.63	7.58
2,346.0	8.00	129.20	2,318.4	-164.7	283.2	327.5	0.24	-0.21	0.74
2,442.0	9.60	130.70	2,413.2	-174.2	294.4	342.0	1.68	1.67	1.56
2,496.0	9.90	133.00	2,466.5	-180.3	301.2	351.0	0.91	0.56	4.26
2,640.0	9.90	135.00	2,608.3	-197.5	319.0	375.2	0.24	0.00	1.39
2,735.0	9.90	125.60	2,701.9	-208.0	331.4	391.3	1.70	0.00	-9.89
2,829.0	9.80	123.30	2,794.5	-217.1	344.7	407.3	0.43	-0.11	-2.45
2,924.0	9.60	119.80	2,888.2	-225.5	358.3	423.3	0.66	-0.21	-3.68
3,019.0	10.20	123.80	2,981.7	-234.1	372.2	439.6	0.96	0.63	4.21
3,113.0	9.20	122.20	3,074.4	-242.7	385.5	455.5	1.10	-1.06	-1.70
3,208.0	8.30	124.00	3,168.3	-250.6	397.6	469.9	0.99	-0.95	1.89
3,302.0	8.00	126.50	3,261.3	-258.3	408.5	483.2	0.49	-0.32	2.66
3,397.0	9.40	127.10	3,355.3	-266.9	420.0	497.5	1.48	1.47	0.63
3,491.0	10.20	122.60	3,447.9	-276.0	433.1	513.5	1.18	0.85	-4.79
3,586.0	9.80	121.50	3,541.4	-284.8	447.1	530.0	0.47	-0.42	-1.16
3,680.0	10.70	124.20	3,633.9	-293.8	461.1	546.7	1.09	0.96	2.87
3,775.0	10.20	126.50	3,727.4	-303.8	475.2	563.9	0.69	-0.53	2.42
3,869.0	9.40	125.50	3,820.0	-313.2	488.1	579.8	0.87	-0.85	-1.06
3,964.0	10.60	128.50	3,913.5	-323.2	501.3	596.2	1.38	1.26	3.16
4,058.0	9.70	127.80	4,006.1	-333.4	514.3	612.7	0.97	-0.96	-0.74
4,152.0	10.90	125.60	4,098.6	-343.4	527.8	629.4	1.34	1.28	-2.34
4,246.0	10.20	125.30	4,191.0	-353.4	541.8	646.6	0.75	-0.74	-0.32
4,341.0	10.40	125.40	4,284.4	-363.2	555.6	663.6	0.21	0.21	0.11
4,435.0	9.60	125.60	4,377.0	-372.7	568.9	679.8	0.85	-0.85	0.21
4,530.0	11.00	122.20	4,470.5	-382.2	583.0	696.8	1.61	1.47	-3.58
4,624.0	10.50	122.60	4,562.8	-391.5	597.8	714.3	0.54	-0.53	0.43
4,718.0	11.70	116.10	4,655.1	-400.4	613.6	732.4	1.84	1.28	-6.91
4,813.0	10.80	115.00	4,748.2	-408.4	630.3	750.8	0.97	-0.95	-1.16
4,907.0	10.10	116.80	4,840.7	-415.8	645.7	767.8	0.82	-0.74	1.91
5,002.0	9.50	113.80	4,934.3	-422.7	660.3	783.9	0.83	-0.63	-3.16



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Survey										
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5,096.0	9.10	114.80	5,027.1	-429.0	674.1	798.9	0.46	-0.43	1.06	
5,190.0	10.00	110.70	5,119.8	-435.0	688.5	814.3	1.20	0.96	-4.36	
5,285.0	9.60	100.60	5,213.4	-439.3	704.0	829.8	1.86	-0.42	-10.63	
5,379.0	10.30	103.20	5,306.0	-442.7	719.9	845.1	0.88	0.74	2.77	
5,474.0	10.00	117.90	5,399.5	-448.5	735.5	861.4	2.74	-0.32	15.47	
5,569.0	9.40	121.80	5,493.1	-456.4	749.3	877.4	0.94	-0.63	4.11	
5,663.0	9.50	121.60	5,585.9	-464.6	762.5	892.9	0.11	0.11	-0.21	
5,757.0	9.20	121.20	5,678.6	-472.5	775.5	908.1	0.33	-0.32	-0.43	
5,852.0	9.40	123.20	5,772.4	-480.7	788.5	923.5	0.40	0.21	2.11	
5,946.0	8.90	122.40	5,865.2	-488.8	801.1	938.4	0.55	-0.53	-0.85	
6,040.0	8.90	121.40	5,958.0	-496.5	813.4	953.0	0.16	0.00	-1.06	
6,134.0	10.00	123.90	6,050.8	-504.8	826.4	968.4	1.25	1.17	2.66	
6,229.0	9.90	125.20	6,144.3	-514.1	839.9	984.8	0.26	-0.11	1.37	
6,324.0	9.00	125.90	6,238.0	-523.2	852.6	1,000.3	0.96	-0.95	0.74	
6,418.0	9.70	126.20	6,330.8	-532.2	865.0	1,015.6	0.75	0.74	0.32	
6,513.0	9.70	124.40	6,424.4	-541.4	878.0	1,031.5	0.32	0.00	-1.89	
6,607.0	10.40	125.90	6,517.0	-550.9	891.4	1,047.9	0.79	0.74	1.60	
6,702.0	10.90	126.90	6,610.4	-561.3	905.5	1,065.4	0.56	0.53	1.05	
6,796.0	10.90	129.40	6,702.7	-572.3	919.5	1,083.0	0.50	0.00	2.66	
6,891.0	10.40	130.40	6,796.0	-583.5	933.0	1,100.4	0.56	-0.53	1.05	
6,986.0	10.90	130.60	6,889.4	-594.9	946.3	1,117.7	0.53	0.53	0.21	
7,080.0	10.80	117.90	6,981.7	-604.8	960.9	1,135.3	2.54	-0.11	-13.51	
7,175.0	8.80	104.30	7,075.3	-610.8	975.8	1,151.1	3.21	-2.11	-14.32	
7,269.0	7.90	102.60	7,168.3	-614.0	989.1	1,164.1	0.99	-0.96	-1.81	
7,364.0	7.10	108.00	7,262.5	-617.2	1,001.0	1,176.0	1.12	-0.84	5.68	
7,458.0	7.00	108.20	7,355.8	-620.8	1,012.0	1,187.2	0.11	-0.11	0.21	
7,553.0	5.30	100.10	7,450.3	-623.4	1,021.8	1,197.0	2.00	-1.79	-8.53	
7,648.0	3.30	101.60	7,545.0	-624.7	1,028.8	1,203.6	2.11	-2.11	1.58	
7,742.0	2.60	114.20	7,638.9	-626.1	1,033.4	1,208.3	1.01	-0.74	13.40	
7,837.0	2.00	99.60	7,733.8	-627.3	1,037.0	1,211.9	0.88	-0.63	-15.37	
7,931.0	1.20	116.60	7,827.8	-628.0	1,039.5	1,214.4	0.98	-0.85	18.09	
8,026.0	1.00	147.20	7,922.7	-629.1	1,040.8	1,216.2	0.64	-0.21	32.21	
8,121.0	1.40	187.00	8,017.7	-631.0	1,041.1	1,217.4	0.95	0.42	41.89	
8,215.0	1.80	204.40	8,111.7	-633.5	1,040.4	1,218.1	0.66	0.43	18.51	
8,325.0	1.30	218.60	8,221.6	-636.0	1,038.9	1,218.1	0.57	-0.45	12.91	
8,404.0	0.70	220.50	8,300.6	-637.1	1,038.0	1,217.9	0.76	-0.76	2.41	
8,498.0	0.30	204.30	8,394.6	-637.8	1,037.6	1,217.9	0.45	-0.43	-17.23	
8,592.0	1.50	220.50	8,488.6	-638.9	1,036.7	1,217.7	1.29	1.28	17.23	
8,687.0	1.70	217.70	8,583.6	-641.0	1,035.0	1,217.4	0.23	0.21	-2.95	
8,781.0	0.30	254.10	8,677.6	-642.1	1,033.9	1,217.1	1.56	-1.49	38.72	
8,875.0	0.10	47.20	8,771.6	-642.2	1,033.7	1,216.9	0.42	-0.21	162.87	
8,970.0	0.70	282.70	8,866.6	-642.0	1,033.2	1,216.4	0.80	0.63	-131.05	
9,064.0	1.40	257.30	8,960.5	-642.1	1,031.5	1,215.0	0.88	0.74	-27.02	



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9,159.0	1.70	254.70	9,055.5	-642.7	1,029.0	1,213.2	0.32	0.32	-2.74
9,253.0	2.50	246.10	9,149.4	-643.9	1,025.8	1,211.1	0.91	0.85	-9.15
9,348.0	3.20	236.60	9,244.3	-646.2	1,021.7	1,208.8	0.89	0.74	-10.00
9,442.0	3.00	228.20	9,338.2	-649.3	1,017.7	1,207.0	0.53	-0.21	-8.94
9,536.0	3.50	224.40	9,432.0	-653.0	1,013.8	1,205.6	0.58	0.53	-4.04
9,631.0	3.90	224.70	9,526.8	-657.4	1,009.5	1,204.3	0.42	0.42	0.32
9,717.0	3.60	228.20	9,612.7	-661.2	1,005.5	1,202.8	0.44	-0.35	4.07
Projection to TD @ 9772.0' MD / 9667.6' TVD									
9,772.0	3.60	228.20	9,667.6	-663.5	1,002.9	1,201.8	0.00	0.00	0.00

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
202.0	202.0	-2.1	1.9	First MWD Survey @ 202.0' MD / 202.0' TVD
9,772.0	9,667.6	-663.5	1,002.9	Projection to TD @ 9772.0' MD / 9667.6' TVD

Checked By: _____ Approved By: _____ Date: _____