



Laramie Energy, LLC

Garfield County, CO

CC 0697-03-07 Pad

CC 0697-03-13W

Wellbore #1

Design: Wellbore #1

QES Survey Report

16 June, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well CC 0697-03-13W
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 0697-03-13W	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 0697-03-13W					
Well Position	+N/-S	0.0 usft	Northing:	1,639,604.58 usft	Latitude:	39.558329
	+E/-W	0.0 usft	Easting:	2,237,396.50 usft	Longitude:	-108.205142
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	241.38	

Survey Program	Date	6/16/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
226.0	9,739.0	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 @ 226.0' MD / 226.0' TVD									
226.0	1.30	282.60	226.0	0.6	-2.5	1.9	0.58	0.58	0.00
318.0	2.80	260.70	317.9	0.4	-5.7	4.8	1.81	1.63	-23.80
411.0	3.80	251.80	410.8	-0.9	-10.9	10.0	1.21	1.08	-9.57
502.0	5.40	253.30	501.5	-3.1	-17.9	17.2	1.76	1.76	1.65
593.0	7.30	248.30	591.9	-6.4	-27.3	27.1	2.17	2.09	-5.49
683.0	8.80	237.40	681.0	-12.3	-38.5	39.6	2.37	1.67	-12.11
774.0	10.70	233.00	770.7	-21.1	-51.1	54.9	2.24	2.09	-4.84
865.0	11.80	236.20	860.0	-31.4	-65.6	72.6	1.39	1.21	3.52
956.0	13.40	239.90	948.8	-41.8	-82.4	92.4	1.97	1.76	4.07



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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)
1,047.0	14.30	242.40	1,037.1	-52.3	-101.5	114.2	1.19	0.99	2.75
1,142.0	16.10	243.40	1,128.8	-63.7	-123.7	139.1	1.91	1.89	1.05
1,236.0	18.30	244.00	1,218.6	-76.0	-148.6	166.8	2.35	2.34	0.64
1,331.0	17.80	243.00	1,308.9	-89.1	-174.9	196.2	0.62	-0.53	-1.05
1,426.0	16.00	237.60	1,399.8	-102.7	-198.9	223.8	2.51	-1.89	-5.68
1,520.0	15.60	235.10	1,490.3	-116.9	-220.2	249.3	0.84	-0.43	-2.66
1,614.0	15.00	234.10	1,580.9	-131.2	-240.5	273.9	0.70	-0.64	-1.06
1,709.0	13.90	234.70	1,672.9	-145.0	-259.7	297.5	1.17	-1.16	0.63
1,804.0	13.70	237.60	1,765.2	-157.7	-278.5	320.0	0.76	-0.21	3.05
1,899.0	12.90	239.60	1,857.6	-169.1	-297.2	341.9	0.97	-0.84	2.11
1,994.0	12.40	239.00	1,950.3	-179.7	-315.1	362.6	0.54	-0.53	-0.63
2,088.0	10.90	243.20	2,042.4	-188.9	-331.7	381.6	1.83	-1.60	4.47
2,182.0	11.00	247.50	2,134.7	-196.3	-347.9	399.4	0.88	0.11	4.57
2,277.0	11.00	246.30	2,227.9	-203.4	-364.5	417.5	0.24	0.00	-1.26
2,371.0	11.80	241.70	2,320.1	-211.6	-381.2	436.0	1.29	0.85	-4.89
2,466.0	13.00	242.90	2,412.9	-221.1	-399.3	456.4	1.29	1.26	1.26
2,494.0	13.40	245.20	2,440.1	-223.9	-405.0	462.8	2.36	1.43	8.21
2,667.0	14.90	247.10	2,607.9	-240.9	-443.7	504.9	0.91	0.87	1.10
2,762.0	16.40	243.50	2,699.3	-251.7	-467.0	530.5	1.88	1.58	-3.79
2,856.0	16.50	241.90	2,789.5	-263.9	-490.6	557.1	0.49	0.11	-1.70
2,951.0	16.00	242.30	2,880.7	-276.3	-514.1	583.7	0.54	-0.53	0.42
3,046.0	16.10	239.60	2,972.0	-289.1	-537.1	609.9	0.79	0.11	-2.84
3,140.0	15.80	236.10	3,062.4	-302.8	-558.9	635.7	1.07	-0.32	-3.72
3,235.0	16.10	236.40	3,153.7	-317.3	-580.7	661.7	0.33	0.32	0.32
3,329.0	16.40	236.10	3,244.0	-331.9	-602.5	687.9	0.33	0.32	-0.32
3,424.0	18.00	240.20	3,334.7	-346.7	-626.4	715.9	2.11	1.68	4.32
3,518.0	18.40	241.60	3,424.0	-361.0	-652.0	745.3	0.63	0.43	1.49
3,613.0	17.90	240.80	3,514.3	-375.2	-678.0	774.9	0.59	-0.53	-0.84
3,708.0	17.20	240.30	3,604.9	-389.3	-702.9	803.5	0.75	-0.74	-0.53
3,802.0	16.30	240.60	3,694.9	-402.7	-726.5	830.6	0.96	-0.96	0.32
3,896.0	17.30	242.30	3,784.9	-415.6	-750.4	857.8	1.19	1.06	1.81
3,991.0	17.40	241.90	3,875.5	-428.9	-775.4	886.1	0.16	0.11	-0.42
4,085.0	16.90	241.20	3,965.4	-442.1	-799.8	913.8	0.58	-0.53	-0.74
4,179.0	16.00	240.30	4,055.5	-455.1	-823.0	940.4	1.00	-0.96	-0.96
4,273.0	17.10	241.40	4,145.6	-468.1	-846.4	967.2	1.22	1.17	1.17
4,368.0	17.90	242.50	4,236.2	-481.6	-871.6	995.8	0.91	0.84	1.16
4,462.0	17.50	241.60	4,325.8	-495.0	-896.8	1,024.3	0.52	-0.43	-0.96
4,557.0	17.10	241.10	4,416.5	-508.5	-921.6	1,052.6	0.45	-0.42	-0.53
4,651.0	16.90	240.50	4,506.4	-521.9	-945.6	1,080.1	0.28	-0.21	-0.64
4,746.0	17.90	240.80	4,597.0	-535.8	-970.4	1,108.5	1.06	1.05	0.32
4,840.0	18.20	241.70	4,686.4	-549.8	-995.9	1,137.6	0.44	0.32	0.96
4,934.0	17.10	239.60	4,776.0	-563.8	-1,020.8	1,166.1	1.35	-1.17	-2.23
5,029.0	18.70	239.60	4,866.4	-578.6	-1,046.0	1,195.3	1.68	1.68	0.00



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Survey										
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5,123.0	19.00	237.70	4,955.3	-594.4	-1,071.9	1,225.6	0.73	0.32	-2.02	
5,217.0	16.30	235.30	5,044.9	-610.1	-1,095.7	1,254.0	2.97	-2.87	-2.55	
5,312.0	15.30	235.90	5,136.3	-624.7	-1,117.0	1,279.7	1.07	-1.05	0.63	
5,406.0	17.00	238.30	5,226.6	-638.9	-1,139.0	1,305.8	1.94	1.81	2.55	
5,501.0	15.80	239.50	5,317.7	-652.7	-1,161.9	1,332.6	1.31	-1.26	1.26	
5,596.0	16.70	242.70	5,408.9	-665.5	-1,185.2	1,359.2	1.34	0.95	3.37	
5,690.0	16.70	243.90	5,499.0	-677.7	-1,209.3	1,386.2	0.37	0.00	1.28	
5,784.0	16.20	242.00	5,589.1	-689.8	-1,233.0	1,412.8	0.78	-0.53	-2.02	
5,879.0	17.60	246.20	5,680.0	-701.8	-1,257.9	1,440.3	1.95	1.47	4.42	
5,973.0	17.90	245.50	5,769.5	-713.5	-1,284.0	1,468.9	0.39	0.32	-0.74	
6,067.0	17.80	245.70	5,859.0	-725.4	-1,310.3	1,497.7	0.12	-0.11	0.21	
6,161.0	17.30	243.90	5,948.6	-737.5	-1,335.9	1,525.9	0.79	-0.53	-1.91	
6,256.0	17.20	243.00	6,039.4	-750.1	-1,361.1	1,554.1	0.30	-0.11	-0.95	
6,351.0	16.40	241.70	6,130.3	-762.8	-1,385.4	1,581.5	0.93	-0.84	-1.37	
6,445.0	16.30	245.90	6,220.5	-774.5	-1,409.2	1,608.0	1.26	-0.11	4.47	
6,540.0	16.00	245.00	6,311.8	-785.5	-1,433.2	1,634.3	0.41	-0.32	-0.95	
6,634.0	14.30	246.00	6,402.5	-795.7	-1,455.6	1,658.8	1.83	-1.81	1.06	
6,729.0	12.30	247.50	6,494.9	-804.3	-1,475.6	1,680.6	2.14	-2.11	1.58	
6,823.0	11.20	246.80	6,587.0	-811.7	-1,493.3	1,699.6	1.18	-1.17	-0.74	
6,918.0	9.40	246.30	6,680.4	-818.5	-1,508.8	1,716.5	1.90	-1.89	-0.53	
7,013.0	8.30	246.30	6,774.3	-824.4	-1,522.2	1,731.1	1.16	-1.16	0.00	
7,107.0	7.50	245.40	6,867.4	-829.6	-1,534.0	1,744.0	0.86	-0.85	-0.96	
7,202.0	6.00	244.20	6,961.8	-834.4	-1,544.1	1,755.1	1.59	-1.58	-1.26	
7,296.0	4.40	242.20	7,055.4	-838.2	-1,551.7	1,763.6	1.71	-1.70	-2.13	
7,391.0	3.20	254.40	7,150.2	-840.6	-1,557.5	1,769.9	1.52	-1.26	12.84	
7,486.0	2.30	266.10	7,245.0	-841.5	-1,562.0	1,774.2	1.11	-0.95	12.32	
7,580.0	1.10	217.20	7,339.0	-842.3	-1,564.4	1,776.7	1.90	-1.28	-52.02	
7,675.0	1.80	178.40	7,434.0	-844.5	-1,564.9	1,778.2	1.23	0.74	-40.84	
7,769.0	2.50	197.80	7,527.9	-848.0	-1,565.5	1,780.4	1.06	0.74	20.64	
7,864.0	2.10	183.50	7,622.8	-851.7	-1,566.2	1,782.8	0.73	-0.42	-15.05	
7,958.0	1.50	167.60	7,716.8	-854.6	-1,566.1	1,784.1	0.82	-0.64	-16.91	
8,053.0	1.50	191.40	7,811.8	-857.0	-1,566.1	1,785.2	0.65	0.00	25.05	
8,148.0	1.60	201.20	7,906.7	-859.5	-1,566.8	1,787.0	0.30	0.11	10.32	
8,242.0	1.80	215.90	8,000.7	-861.9	-1,568.1	1,789.4	0.51	0.21	15.64	
8,337.0	0.60	240.30	8,095.7	-863.3	-1,569.4	1,791.2	1.35	-1.26	25.68	
8,431.0	0.50	253.90	8,189.7	-863.7	-1,570.3	1,792.1	0.17	-0.11	14.47	
8,525.0	1.70	246.40	8,283.6	-864.4	-1,571.9	1,793.9	1.28	1.28	-7.98	
8,619.0	1.10	231.10	8,377.6	-865.5	-1,573.9	1,796.2	0.75	-0.64	-16.28	
8,714.0	1.10	116.70	8,472.6	-866.5	-1,573.8	1,796.6	1.95	0.00	-120.42	
8,808.0	1.00	148.30	8,566.6	-867.6	-1,572.6	1,796.0	0.62	-0.11	33.62	
8,902.0	1.40	200.60	8,660.6	-869.4	-1,572.5	1,796.8	1.19	0.43	55.64	
8,997.0	1.20	211.50	8,755.5	-871.3	-1,573.5	1,798.6	0.33	-0.21	11.47	
9,091.0	0.60	222.40	8,849.5	-872.5	-1,574.3	1,799.9	0.66	-0.64	11.60	



Survey Report



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9,186.0	1.10	329.20	8,944.5	-872.1	-1,575.1	1,800.4	1.47	0.53	112.42	
9,280.0	1.80	311.70	9,038.5	-870.3	-1,576.7	1,800.9	0.87	0.74	-18.62	
9,375.0	2.33	267.41	9,133.4	-869.4	-1,579.7	1,803.2	1.72	0.56	-46.62	
9,469.0	3.25	248.69	9,227.3	-870.5	-1,584.1	1,807.5	1.37	0.98	-19.91	
9,563.0	4.20	245.88	9,321.1	-872.9	-1,589.7	1,813.6	1.03	1.01	-2.99	
9,658.0	4.92	245.26	9,415.8	-876.0	-1,596.6	1,821.1	0.76	0.76	-0.65	
9,679.0	5.05	244.21	9,436.7	-876.8	-1,598.3	1,822.9	0.76	0.62	-5.00	
Projection to TD @ 9739.0' MD / 9496.5' TVD										
9,739.0	5.05	244.21	9,496.5	-879.1	-1,603.0	1,828.2	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
226.0	226.0	0.6	-2.5	First MWD Survey @ 226.0' MD / 226.0' TVD	
9,739.0	9,496.5	-879.1	-1,603.0	Projection to TD @ 9739.0' MD / 9496.5' TVD	