



Laramie Energy, LLC

Garfield County, CO

CC 0697-03-07 Pad

CC 0697-03-15W

Wellbore #1

Design: Wellbore #1

QES Survey Report

08 July, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well CC 0697-03-15W
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 0697-03-15W	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 0697-03-15W					
Well Position	+N/-S	0.0 usft	Northing:	1,639,584.89 usft	Latitude:	39.558275
	+E/-W	0.0 usft	Easting:	2,237,392.73 usft	Longitude:	-108.205153
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	7/3/2018	9.62	65.58	51,396.10000000

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	229.69	

Survey Program	Date	7/8/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
313.0	9,761.0	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 @ 313.0' MD / 313.0' TVD									
313.0	0.80	203.70	313.0	-2.0	-0.9	2.0	0.26	0.26	0.00
405.0	2.20	227.10	405.0	-3.8	-2.4	4.3	1.63	1.52	25.43
497.0	4.80	229.00	496.8	-7.5	-6.6	9.9	2.83	2.83	2.07
588.0	6.80	233.60	587.3	-13.2	-13.8	19.1	2.25	2.20	5.05
679.0	9.10	233.90	677.4	-20.7	-24.0	31.7	2.53	2.53	0.33
769.0	10.10	228.80	766.2	-30.0	-35.7	46.6	1.46	1.11	-5.67
860.0	10.70	228.40	855.7	-40.9	-48.0	63.1	0.66	0.66	-0.44
951.0	12.50	233.00	944.8	-52.4	-62.2	81.3	2.22	1.98	5.05
1,042.0	13.40	232.80	1,033.5	-64.7	-78.4	101.7	0.99	0.99	-0.22



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Well:	CC 0697-03-15W	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)
1,136.0	15.20	232.20	1,124.6	-78.9	-96.9	124.9	1.92	1.91	-0.64
1,230.0	17.40	231.50	1,214.8	-95.2	-117.6	151.3	2.35	2.34	-0.74
1,325.0	19.00	229.60	1,305.0	-114.1	-140.5	180.9	1.80	1.68	-2.00
1,419.0	18.90	226.20	1,393.9	-134.5	-163.1	211.4	1.18	-0.11	-3.62
1,513.0	18.10	225.40	1,483.1	-155.3	-184.5	241.2	0.89	-0.85	-0.85
1,608.0	18.00	224.80	1,573.4	-176.1	-205.4	270.5	0.22	-0.11	-0.63
1,703.0	18.50	225.60	1,663.6	-197.0	-226.5	300.2	0.59	0.53	0.84
1,798.0	18.80	228.00	1,753.6	-217.8	-248.6	330.5	0.87	0.32	2.53
1,893.0	18.50	227.50	1,843.7	-238.3	-271.1	360.9	0.36	-0.32	-0.53
1,987.0	18.50	229.50	1,932.8	-258.0	-293.5	390.7	0.68	0.00	2.13
2,081.0	18.90	230.80	2,021.8	-277.3	-316.6	420.8	0.61	0.43	1.38
2,176.0	19.50	230.60	2,111.6	-297.1	-340.8	452.1	0.64	0.63	-0.21
2,270.0	20.00	232.90	2,200.0	-316.8	-365.7	483.8	0.98	0.53	2.45
2,365.0	18.60	231.70	2,289.7	-336.0	-390.6	515.2	1.53	-1.47	-1.26
2,459.0	18.70	230.10	2,378.8	-354.9	-413.9	545.2	0.55	0.11	-1.70
2,523.0	18.50	230.00	2,439.4	-368.0	-429.5	565.6	0.32	-0.31	-0.16
2,667.0	16.80	229.30	2,576.6	-396.3	-462.8	609.3	1.19	-1.18	-0.49
2,762.0	19.10	230.00	2,667.0	-415.2	-485.1	638.6	2.43	2.42	0.74
2,856.0	18.80	230.10	2,755.9	-434.8	-508.5	669.1	0.32	-0.32	0.11
2,951.0	18.40	230.80	2,845.9	-454.1	-531.9	699.4	0.48	-0.42	0.74
3,046.0	18.90	229.90	2,936.0	-473.5	-555.3	729.8	0.61	0.53	-0.95
3,140.0	16.80	230.00	3,025.4	-492.1	-577.3	758.6	2.23	-2.23	0.11
3,235.0	16.40	228.00	3,116.5	-509.8	-597.8	785.7	0.73	-0.42	-2.11
3,330.0	16.90	230.50	3,207.5	-527.6	-618.4	812.9	0.92	0.53	2.63
3,424.0	18.10	232.10	3,297.1	-545.3	-640.5	841.2	1.38	1.28	1.70
3,519.0	21.80	231.40	3,386.4	-565.3	-666.0	873.6	3.90	3.89	-0.74
3,613.0	21.50	230.20	3,473.8	-587.3	-692.8	908.2	0.57	-0.32	-1.28
3,708.0	20.40	230.50	3,562.5	-608.9	-719.0	942.2	1.16	-1.16	0.32
3,802.0	19.20	230.90	3,650.9	-629.1	-743.6	974.0	1.28	-1.28	0.43
3,896.0	17.50	230.80	3,740.2	-647.8	-766.6	1,003.6	1.81	-1.81	-0.11
3,991.0	19.70	228.10	3,830.2	-667.5	-789.6	1,033.9	2.49	2.32	-2.84
4,085.0	19.40	227.40	3,918.8	-688.7	-812.8	1,065.3	0.40	-0.32	-0.74
4,179.0	17.70	227.10	4,007.9	-709.0	-834.8	1,095.2	1.81	-1.81	-0.32
4,274.0	18.70	234.60	4,098.1	-727.6	-857.8	1,124.8	2.68	1.05	7.89
4,368.0	19.50	232.70	4,187.0	-745.8	-882.6	1,155.5	1.08	0.85	-2.02
4,463.0	18.70	233.20	4,276.7	-764.6	-907.4	1,186.5	0.86	-0.84	0.53
4,557.0	19.60	227.20	4,365.5	-784.3	-931.0	1,217.3	2.30	0.96	-6.38
4,651.0	18.60	226.90	4,454.4	-805.3	-953.5	1,248.1	1.07	-1.06	-0.32
4,746.0	17.90	228.40	4,544.6	-825.3	-975.5	1,277.8	0.89	-0.74	1.58
4,840.0	16.80	232.00	4,634.3	-843.3	-997.0	1,305.8	1.63	-1.17	3.83
4,935.0	18.30	232.20	4,724.9	-860.9	-1,019.6	1,334.4	1.58	1.58	0.21
5,029.0	20.40	231.60	4,813.6	-880.1	-1,044.1	1,365.6	2.24	2.23	-0.64
5,123.0	19.70	230.30	4,901.9	-900.4	-1,069.1	1,397.8	0.88	-0.74	-1.38



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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)	
5,217.0	17.40	227.90	4,991.0	-919.9	-1,091.8	1,427.7	2.58	-2.45	-2.55	
5,312.0	17.20	232.20	5,081.7	-938.1	-1,113.4	1,455.9	1.36	-0.21	4.53	
5,407.0	18.10	229.60	5,172.2	-956.2	-1,135.7	1,484.7	1.26	0.95	-2.74	
5,502.0	19.80	227.80	5,262.1	-976.6	-1,158.9	1,515.5	1.89	1.79	-1.89	
5,596.0	18.70	229.10	5,350.8	-997.2	-1,182.1	1,546.5	1.26	-1.17	1.38	
5,691.0	19.40	230.00	5,440.6	-1,017.3	-1,205.7	1,577.5	0.80	0.74	0.95	
5,785.0	18.60	229.70	5,529.5	-1,037.0	-1,229.1	1,608.1	0.86	-0.85	-0.32	
5,879.0	19.60	232.00	5,618.3	-1,056.4	-1,252.9	1,638.9	1.33	1.06	2.45	
5,973.0	19.20	230.70	5,707.0	-1,075.9	-1,277.3	1,670.1	0.63	-0.43	-1.38	
6,067.0	18.50	230.40	5,795.9	-1,095.2	-1,300.8	1,700.4	0.75	-0.74	-0.32	
6,162.0	18.20	229.70	5,886.1	-1,114.4	-1,323.7	1,730.3	0.39	-0.32	-0.74	
6,257.0	17.40	230.40	5,976.6	-1,133.1	-1,346.0	1,759.4	0.87	-0.84	0.74	
6,351.0	16.50	230.30	6,066.5	-1,150.6	-1,367.1	1,786.8	0.96	-0.96	-0.11	
6,445.0	15.30	229.50	6,156.9	-1,167.1	-1,386.8	1,812.5	1.30	-1.28	-0.85	
6,540.0	14.40	228.70	6,248.7	-1,183.1	-1,405.2	1,836.9	0.97	-0.95	-0.84	
6,635.0	13.30	229.20	6,340.9	-1,198.0	-1,422.3	1,859.6	1.16	-1.16	0.53	
6,729.0	14.30	227.60	6,432.2	-1,212.9	-1,439.1	1,882.0	1.14	1.06	-1.70	
6,824.0	14.80	228.40	6,524.2	-1,228.9	-1,456.8	1,905.9	0.57	0.53	0.84	
6,919.0	12.60	228.60	6,616.5	-1,243.8	-1,473.7	1,928.4	2.32	-2.32	0.21	
7,013.0	11.90	229.50	6,708.3	-1,256.9	-1,488.7	1,948.3	0.77	-0.74	0.96	
7,108.0	11.30	229.30	6,801.4	-1,269.3	-1,503.2	1,967.4	0.63	-0.63	-0.21	
7,202.0	10.20	231.50	6,893.7	-1,280.5	-1,516.7	1,985.0	1.25	-1.17	2.34	
7,297.0	8.30	233.70	6,987.5	-1,289.8	-1,528.8	2,000.2	2.03	-2.00	2.32	
7,391.0	7.30	233.20	7,080.6	-1,297.4	-1,539.1	2,012.9	1.07	-1.06	-0.53	
7,486.0	5.70	237.00	7,175.0	-1,303.6	-1,547.9	2,023.6	1.74	-1.68	4.00	
7,581.0	4.00	235.80	7,269.7	-1,308.0	-1,554.6	2,031.6	1.79	-1.79	-1.26	
7,675.0	5.40	235.10	7,363.4	-1,312.4	-1,560.9	2,039.3	1.49	1.49	-0.74	
7,769.0	3.30	250.40	7,457.1	-1,315.8	-1,567.1	2,046.2	2.53	-2.23	16.28	
7,864.0	1.80	218.90	7,552.0	-1,317.9	-1,570.6	2,050.2	2.11	-1.58	-33.16	
7,958.0	2.50	216.00	7,645.9	-1,320.7	-1,572.7	2,053.7	0.75	0.74	-3.09	
8,053.0	1.60	217.20	7,740.9	-1,323.4	-1,574.8	2,057.0	0.95	-0.95	1.26	
8,148.0	2.80	222.10	7,835.8	-1,326.2	-1,577.1	2,060.6	1.28	1.26	5.16	
8,243.0	1.30	174.80	7,930.7	-1,329.0	-1,578.6	2,063.5	2.26	-1.58	-49.79	
8,337.0	2.50	104.90	8,024.7	-1,330.6	-1,576.5	2,062.9	2.54	1.28	-74.36	
8,431.0	2.10	100.70	8,118.6	-1,331.4	-1,572.8	2,060.7	0.46	-0.43	-4.47	
8,526.0	1.50	111.70	8,213.6	-1,332.2	-1,570.0	2,059.0	0.73	-0.63	11.58	
8,620.0	1.00	155.70	8,307.5	-1,333.4	-1,568.5	2,058.7	1.11	-0.53	46.81	
8,714.0	0.70	169.10	8,401.5	-1,334.7	-1,568.0	2,059.2	0.38	-0.32	14.26	
8,808.0	0.90	221.30	8,495.5	-1,335.8	-1,568.4	2,060.2	0.77	0.21	55.53	
8,903.0	0.40	119.20	8,590.5	-1,336.6	-1,568.6	2,060.8	1.11	-0.53	-107.47	
8,997.0	0.70	153.50	8,684.5	-1,337.2	-1,568.1	2,060.8	0.46	0.32	36.49	
9,092.0	1.10	203.60	8,779.5	-1,338.6	-1,568.2	2,061.8	0.89	0.42	52.74	
9,186.0	1.30	225.10	8,873.5	-1,340.2	-1,569.3	2,063.7	0.52	0.21	22.87	



Survey Report



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Well:	CC 0697-03-15W	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Survey										
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9,281.0	1.70	237.30	8,968.5	-1,341.7	-1,571.2	2,066.1	0.54	0.42	12.84	
9,375.0	2.50	240.80	9,062.4	-1,343.5	-1,574.2	2,069.5	0.86	0.85	3.72	
9,470.0	2.50	238.70	9,157.3	-1,345.5	-1,577.8	2,073.6	0.10	0.00	-2.21	
9,564.0	3.10	234.90	9,251.2	-1,348.1	-1,581.6	2,078.2	0.67	0.64	-4.04	
9,659.0	3.40	236.30	9,346.0	-1,351.1	-1,586.1	2,083.5	0.33	0.32	1.47	
9,704.0	3.70	236.60	9,390.9	-1,352.6	-1,588.4	2,086.3	0.67	0.67	0.67	
TD @ 9761.0' MD / 9447.8' TVD										
9,761.0	3.70	236.60	9,447.8	-1,354.7	-1,591.4	2,089.9	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
313.0	313.0	-2.0	-0.9	First MWD Survey @ 313.0' MD / 313.0' TVD	
9,761.0	9,447.8	-1,354.7	-1,591.4	TD @ 9761.0' MD / 9447.8' TVD	

Checked By: _____	Approved By: _____	Date: _____
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