



Laramie Energy, LLC

Garfield County, CO

CC 0697-03-07 Pad

CC 0697-03-16W

Wellbore #1

Design: Wellbore #1

QES Survey Report

27 July, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well CC 0697-03-16W
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 0697-03-16W	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 0697-03-16W			
Well Position	+N/-S	0.0 usft	Northing:	1,639,574.95 usft
	+E/-W	0.0 usft	Easting:	2,237,390.79 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	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	225.00

Survey Program	Date	7/27/2018		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
499.0	9,808.0	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 @ 499.0' MD / 496.2' TVD									
499.0	10.50	219.30	496.2	-35.3	-28.9	45.4	2.10	2.10	0.00
590.0	13.20	223.80	585.3	-49.2	-41.3	64.0	3.13	2.97	4.95
681.0	15.00	230.60	673.5	-64.2	-57.6	86.1	2.69	1.98	7.47
771.0	16.30	229.60	760.2	-79.8	-76.2	110.3	1.48	1.44	-1.11
862.0	18.10	227.20	847.1	-97.6	-96.3	137.2	2.13	1.98	-2.64
953.0	20.00	225.10	933.1	-118.2	-117.7	166.9	2.22	2.09	-2.31
1,047.0	20.00	223.20	1,021.5	-141.3	-140.1	199.0	0.69	0.00	-2.02
1,138.0	18.80	224.20	1,107.3	-163.2	-161.0	229.2	1.37	-1.32	1.10
1,233.0	19.60	224.00	1,197.0	-185.6	-182.7	260.4	0.84	0.84	-0.21



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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)
1,327.0	19.00	223.70	1,285.7	-208.0	-204.3	291.5	0.65	-0.64	-0.32
1,422.0	19.90	224.10	1,375.3	-230.8	-226.2	323.1	0.96	0.95	0.42
1,516.0	19.50	224.20	1,463.8	-253.5	-248.3	354.8	0.43	-0.43	0.11
1,610.0	20.10	223.20	1,552.2	-276.5	-270.3	386.7	0.73	0.64	-1.06
1,706.0	18.00	227.10	1,643.0	-298.7	-292.4	418.0	2.56	-2.19	4.06
1,800.0	17.20	226.70	1,732.6	-318.1	-313.2	446.4	0.86	-0.85	-0.43
1,895.0	19.10	225.70	1,822.9	-338.6	-334.5	476.0	2.03	2.00	-1.05
1,989.0	19.70	225.10	1,911.5	-360.5	-356.8	507.2	0.67	0.64	-0.64
2,084.0	18.30	221.30	2,001.3	-383.0	-377.9	538.1	1.97	-1.47	-4.00
2,178.0	18.80	221.40	2,090.5	-405.5	-397.7	567.9	0.53	0.53	0.11
2,273.0	19.30	225.70	2,180.3	-427.9	-419.1	598.9	1.57	0.53	4.53
2,367.0	18.40	224.50	2,269.2	-449.3	-440.6	629.3	1.04	-0.96	-1.28
2,462.0	19.90	224.60	2,359.0	-471.5	-462.4	660.4	1.58	1.58	0.11
2,529.0	20.00	223.60	2,421.9	-488.0	-478.4	683.3	0.53	0.15	-1.49
2,663.0	18.10	223.90	2,548.6	-519.6	-508.6	727.0	1.42	-1.42	0.22
2,758.0	19.00	227.90	2,638.7	-540.6	-530.3	757.2	1.64	0.95	4.21
2,852.0	18.80	228.50	2,727.6	-560.9	-553.0	787.6	0.30	-0.21	0.64
2,947.0	18.50	228.60	2,817.6	-581.0	-575.8	817.9	0.32	-0.32	0.11
3,041.0	18.80	227.70	2,906.7	-601.0	-598.2	847.9	0.44	0.32	-0.96
3,136.0	15.20	225.20	2,997.5	-620.1	-618.3	875.7	3.87	-3.79	-2.63
3,230.0	14.40	226.10	3,088.4	-636.9	-635.5	899.7	0.89	-0.85	0.96
3,325.0	14.20	228.00	3,180.4	-652.9	-652.7	923.2	0.54	-0.21	2.00
3,420.0	13.40	228.30	3,272.7	-668.0	-669.5	945.8	0.85	-0.84	0.32
3,514.0	15.60	230.40	3,363.7	-683.3	-687.4	969.2	2.41	2.34	2.23
3,609.0	17.40	228.60	3,454.8	-700.8	-707.9	996.1	1.97	1.89	-1.89
3,703.0	18.80	226.70	3,544.1	-720.5	-729.5	1,025.3	1.62	1.49	-2.02
3,797.0	20.40	226.40	3,632.7	-742.2	-752.4	1,056.8	1.71	1.70	-0.32
3,892.0	20.00	227.80	3,721.8	-764.5	-776.4	1,089.6	0.66	-0.42	1.47
3,986.0	21.00	225.70	3,809.9	-787.1	-800.4	1,122.5	1.32	1.06	-2.23
4,080.0	21.30	225.60	3,897.6	-810.8	-824.6	1,156.4	0.32	0.32	-0.11
4,175.0	20.30	226.40	3,986.4	-834.3	-848.9	1,190.2	1.09	-1.05	0.84
4,269.0	20.90	224.50	4,074.4	-857.5	-872.4	1,223.2	0.96	0.64	-2.02
4,364.0	20.80	225.50	4,163.1	-881.4	-896.3	1,257.0	0.39	-0.11	1.05
4,458.0	20.20	226.20	4,251.2	-904.3	-920.0	1,289.9	0.69	-0.64	0.74
4,552.0	21.20	225.60	4,339.1	-927.4	-943.8	1,323.2	1.09	1.06	-0.64
4,647.0	20.10	224.40	4,428.0	-951.1	-967.5	1,356.7	1.24	-1.16	-1.26
4,741.0	19.40	224.70	4,516.5	-973.7	-989.8	1,388.4	0.75	-0.74	0.32
4,836.0	20.00	224.40	4,605.9	-996.6	-1,012.3	1,420.5	0.64	0.63	-0.32
4,930.0	19.70	223.20	4,694.3	-1,019.6	-1,034.4	1,452.4	0.54	-0.32	-1.28
5,024.0	18.60	223.30	4,783.1	-1,042.1	-1,055.5	1,483.2	1.17	-1.17	0.11
5,119.0	19.90	224.60	4,872.8	-1,064.6	-1,077.2	1,514.5	1.44	1.37	1.37
5,213.0	18.70	223.80	4,961.5	-1,086.9	-1,098.9	1,545.6	1.31	-1.28	-0.85
5,308.0	18.50	221.30	5,051.6	-1,109.2	-1,119.4	1,575.8	0.87	-0.21	-2.63



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Survey									
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5,402.0	19.30	221.70	5,140.5	-1,132.0	-1,139.6	1,606.2	0.86	0.85	0.43
5,497.0	18.90	227.40	5,230.3	-1,154.1	-1,161.3	1,637.3	2.01	-0.42	6.00
5,591.0	18.70	229.80	5,319.3	-1,174.2	-1,184.0	1,667.5	0.85	-0.21	2.55
5,686.0	20.40	228.30	5,408.8	-1,195.0	-1,208.0	1,699.2	1.87	1.79	-1.58
5,780.0	19.60	228.70	5,497.1	-1,216.3	-1,232.1	1,731.3	0.86	-0.85	0.43
5,874.0	20.90	226.60	5,585.3	-1,238.2	-1,256.1	1,763.8	1.58	1.38	-2.23
5,969.0	21.90	225.50	5,673.8	-1,262.3	-1,281.1	1,798.4	1.13	1.05	-1.16
6,062.0	21.60	225.10	5,760.1	-1,286.5	-1,305.6	1,832.9	0.36	-0.32	-0.43
6,157.0	21.60	224.90	5,848.5	-1,311.3	-1,330.3	1,867.9	0.08	0.00	-0.21
6,252.0	21.40	224.40	5,936.9	-1,336.0	-1,354.8	1,902.7	0.29	-0.21	-0.53
6,347.0	20.40	225.20	6,025.6	-1,360.1	-1,378.7	1,936.6	1.09	-1.05	0.84
6,441.0	19.40	225.00	6,114.0	-1,382.7	-1,401.3	1,968.6	1.07	-1.06	-0.21
6,535.0	18.70	226.20	6,202.8	-1,404.1	-1,423.2	1,999.3	0.85	-0.74	1.28
6,630.0	17.90	226.10	6,293.0	-1,424.8	-1,444.8	2,029.1	0.84	-0.84	-0.11
6,725.0	17.10	226.00	6,383.6	-1,444.6	-1,465.3	2,057.6	0.84	-0.84	-0.11
6,819.0	17.30	227.00	6,473.4	-1,463.8	-1,485.5	2,085.4	0.38	0.21	1.06
6,914.0	15.70	224.20	6,564.5	-1,482.6	-1,504.8	2,112.4	1.88	-1.68	-2.95
7,009.0	13.10	222.70	6,656.5	-1,499.7	-1,521.0	2,136.0	2.76	-2.74	-1.58
7,103.0	10.80	222.10	6,748.5	-1,514.1	-1,534.2	2,155.5	2.45	-2.45	-0.64
7,198.0	9.40	222.80	6,842.0	-1,526.4	-1,545.4	2,172.1	1.48	-1.47	0.74
7,292.0	7.50	226.30	6,935.0	-1,536.3	-1,555.1	2,185.9	2.09	-2.02	3.72
7,387.0	5.50	225.20	7,029.4	-1,543.8	-1,562.8	2,196.7	2.11	-2.11	-1.16
7,482.0	3.50	225.60	7,124.1	-1,549.0	-1,568.1	2,204.1	2.11	-2.11	0.42
7,576.0	1.00	225.00	7,218.0	-1,551.6	-1,570.7	2,207.8	2.66	-2.66	-0.64
7,671.0	0.90	186.50	7,313.0	-1,552.9	-1,571.4	2,209.2	0.67	-0.11	-40.53
7,765.0	0.80	160.70	7,407.0	-1,554.3	-1,571.2	2,210.1	0.42	-0.11	-27.45
7,859.0	0.70	166.00	7,501.0	-1,555.4	-1,570.9	2,210.7	0.13	-0.11	5.64
7,954.0	1.10	167.30	7,595.9	-1,556.9	-1,570.5	2,211.4	0.42	0.42	1.37
8,049.0	1.60	170.00	7,690.9	-1,559.1	-1,570.1	2,212.7	0.53	0.53	2.84
8,144.0	2.00	197.60	7,785.9	-1,562.0	-1,570.4	2,214.9	0.99	0.42	29.05
8,238.0	1.80	236.70	7,879.8	-1,564.4	-1,572.1	2,217.8	1.37	-0.21	41.60
8,333.0	1.30	318.40	7,974.8	-1,564.4	-1,574.1	2,219.2	2.17	-0.53	86.00
8,427.0	1.80	48.40	8,068.8	-1,562.6	-1,573.7	2,217.7	2.36	0.53	95.74
8,521.0	1.70	61.30	8,162.7	-1,560.9	-1,571.4	2,214.9	0.43	-0.11	13.72
8,615.0	2.50	55.90	8,256.7	-1,559.1	-1,568.4	2,211.5	0.88	0.85	-5.74
8,710.0	2.00	60.90	8,351.6	-1,557.2	-1,565.3	2,207.9	0.56	-0.53	5.26
8,804.0	0.40	94.60	8,445.6	-1,556.4	-1,563.5	2,206.1	1.79	-1.70	35.85
8,898.0	1.30	222.00	8,539.6	-1,557.2	-1,563.9	2,207.0	1.68	0.96	135.53
8,993.0	0.90	248.90	8,634.6	-1,558.3	-1,565.3	2,208.7	0.68	-0.42	28.32
9,087.0	1.50	250.50	8,728.5	-1,558.9	-1,567.2	2,210.5	0.64	0.64	1.70
9,182.0	2.40	266.00	8,823.5	-1,559.5	-1,570.3	2,213.1	1.09	0.95	16.32
9,276.0	2.90	262.70	8,917.4	-1,559.9	-1,574.6	2,216.5	0.56	0.53	-3.51
9,371.0	3.20	267.50	9,012.2	-1,560.4	-1,579.7	2,220.3	0.41	0.32	5.05



Survey Report



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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

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9,465.0	3.60	263.40	9,106.1	-1,560.8	-1,585.2	2,224.6	0.50	0.43	-4.36	
9,559.0	4.20	259.10	9,199.9	-1,561.8	-1,591.5	2,229.8	0.71	0.64	-4.57	
9,654.0	5.00	261.90	9,294.5	-1,563.0	-1,599.1	2,235.9	0.87	0.84	2.95	
9,748.0	5.70	256.90	9,388.1	-1,564.7	-1,607.7	2,243.2	0.89	0.74	-5.32	
Projection to TD @ 9808.0' MD / 9447.8' TVD										
9,808.0	5.70	256.90	9,447.8	-1,566.0	-1,613.5	2,248.2	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
499.0	496.2	-35.3	-28.9	First MWD Survey @ 499.0' MD / 496.2' TVD	
9,808.0	9,447.8	-1,566.0	-1,613.5	Projection to TD @ 9808.0' MD / 9447.8' TVD	

Checked By: _____	Approved By: _____	Date: _____
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