



Laramie Energy, LLC

Garfield County, CO

CC 603-23-32 Pad

CC 0697-03-22E

A-4

Plan: Permit #1

QES Well Planning Report

11 May, 2018





Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well CC 0697-03-22E
Company:	Laramie Energy, LLC	TVD Reference:	Well @ 8637.0usft (H&P 290)
Project:	Garfield County, CO	MD Reference:	Well @ 8637.0usft (H&P 290)
Site:	CC 603-23-32 Pad	North Reference:	True
Well:	CC 0697-03-22E	Survey Calculation Method:	Minimum Curvature
Wellbore:	A-4		
Design:	Permit #1		

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 603-23-32 Pad				
Site Position:		Northing:	1,636,139.15 usft	Latitude:	39.548692
From:	Lat/Long	Easting:	2,235,843.66 usft	Longitude:	-108.210280
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-1.71 °

Well	CC 0697-03-22E					
Well Position	+N/-S	39.0 usft	Northing:	1,636,176.34 usft	Latitude:	39.548799
	+E/-W	59.2 usft	Easting:	2,235,904.02 usft	Longitude:	-108.210070
Position Uncertainty		0.0 usft	Wellhead Elevation:		Ground Level:	8,613.0 usft

Wellbore	A-4				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	3/24/2018	9.72	65.58	51,423.79748648

Design	Permit #1			
Audit Notes:				
Version:	Phase:	PROTOTYPE	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	80.50

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
200.0	0.00	0.00	200.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,264.8	31.94	80.50	1,210.5	47.8	285.3	3.00	3.00	0.00	80.50	
6,085.9	31.94	80.50	5,301.5	468.9	2,801.1	0.00	0.00	0.00	0.00	
7,150.7	0.00	0.00	6,312.0	516.7	3,086.3	3.00	-3.00	0.00	180.00	
10,600.7	0.00	0.00	9,762.0	516.7	3,086.3	0.00	0.00	0.00	0.00	PBHL - CC 0697-03-2



Well Planning Report



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Company:	Laramie Energy, LLC	TVD Reference:	Well @ 8637.0usft (H&P 290)
Project:	Garfield County, CO	MD Reference:	Well @ 8637.0usft (H&P 290)
Site:	CC 603-23-32 Pad	North Reference:	True
Well:	CC 0697-03-22E	Survey Calculation Method:	Minimum Curvature
Wellbore:	A-4		
Design:	Permit #1		

Planned 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	0.00
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
KOP/ (Build 3.00°/100')										
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
300.0	3.00	80.50	300.0	0.4	2.6	2.6	3.00	3.00	0.00	0.00
400.0	6.00	80.50	399.6	1.7	10.3	10.5	3.00	3.00	0.00	0.00
500.0	9.00	80.50	498.8	3.9	23.2	23.5	3.00	3.00	0.00	0.00
600.0	12.00	80.50	597.1	6.9	41.2	41.7	3.00	3.00	0.00	0.00
Mahogany										
603.0	12.09	80.50	600.0	7.0	41.8	42.4	3.00	3.00	0.00	0.00
700.0	15.00	80.50	694.3	10.7	64.2	65.1	3.00	3.00	0.00	0.00
800.0	18.00	80.50	790.2	15.4	92.2	93.5	3.00	3.00	0.00	0.00
900.0	21.00	80.50	884.4	20.9	125.1	126.9	3.00	3.00	0.00	0.00
1,000.0	24.00	80.50	976.8	27.3	162.8	165.1	3.00	3.00	0.00	0.00
1,100.0	27.00	80.50	1,067.1	34.4	205.3	208.2	3.00	3.00	0.00	0.00
1,200.0	30.00	80.50	1,154.9	42.2	252.4	255.9	3.00	3.00	0.00	0.00
EOB @ 31.94° Inc / 80.50° Azm										
1,264.8	31.94	80.50	1,210.5	47.8	285.3	289.2	3.00	3.00	0.00	0.00
1,300.0	31.94	80.50	1,240.4	50.8	303.6	307.8	0.00	0.00	0.00	0.00
1,400.0	31.94	80.50	1,325.2	59.6	355.8	360.8	0.00	0.00	0.00	0.00
1,500.0	31.94	80.50	1,410.1	68.3	408.0	413.7	0.00	0.00	0.00	0.00
1,600.0	31.94	80.50	1,494.9	77.0	460.2	466.6	0.00	0.00	0.00	0.00
1,700.0	31.94	80.50	1,579.8	85.8	512.3	519.5	0.00	0.00	0.00	0.00
1,800.0	31.94	80.50	1,664.6	94.5	564.5	572.4	0.00	0.00	0.00	0.00
1,900.0	31.94	80.50	1,749.5	103.2	616.7	625.3	0.00	0.00	0.00	0.00
2,000.0	31.94	80.50	1,834.4	112.0	668.9	678.2	0.00	0.00	0.00	0.00
2,100.0	31.94	80.50	1,919.2	120.7	721.1	731.1	0.00	0.00	0.00	0.00
2,200.0	31.94	80.50	2,004.1	129.5	773.3	784.0	0.00	0.00	0.00	0.00
2,300.0	31.94	80.50	2,088.9	138.2	825.4	836.9	0.00	0.00	0.00	0.00
2,400.0	31.94	80.50	2,173.8	146.9	877.6	889.8	0.00	0.00	0.00	0.00
2,500.0	31.94	80.50	2,258.6	155.7	929.8	942.8	0.00	0.00	0.00	0.00
8 5/8"										
2,524.0	31.94	80.50	2,279.0	157.8	942.3	955.5	0.00	0.00	0.00	0.00
2,600.0	31.94	80.50	2,343.5	164.4	982.0	995.7	0.00	0.00	0.00	0.00
2,700.0	31.94	80.50	2,428.3	173.1	1,034.2	1,048.6	0.00	0.00	0.00	0.00
2,800.0	31.94	80.50	2,513.2	181.9	1,086.4	1,101.5	0.00	0.00	0.00	0.00
2,900.0	31.94	80.50	2,598.1	190.6	1,138.5	1,154.4	0.00	0.00	0.00	0.00
3,000.0	31.94	80.50	2,682.9	199.3	1,190.7	1,207.3	0.00	0.00	0.00	0.00
3,100.0	31.94	80.50	2,767.8	208.1	1,242.9	1,260.2	0.00	0.00	0.00	0.00
3,200.0	31.94	80.50	2,852.6	216.8	1,295.1	1,313.1	0.00	0.00	0.00	0.00
3,300.0	31.94	80.50	2,937.5	225.6	1,347.3	1,366.0	0.00	0.00	0.00	0.00
3,400.0	31.94	80.50	3,022.3	234.3	1,399.5	1,418.9	0.00	0.00	0.00	0.00
3,500.0	31.94	80.50	3,107.2	243.0	1,451.6	1,471.8	0.00	0.00	0.00	0.00
3,600.0	31.94	80.50	3,192.1	251.8	1,503.8	1,524.8	0.00	0.00	0.00	0.00
3,700.0	31.94	80.50	3,276.9	260.5	1,556.0	1,577.7	0.00	0.00	0.00	0.00
3,800.0	31.94	80.50	3,361.8	269.2	1,608.2	1,630.6	0.00	0.00	0.00	0.00
3,900.0	31.94	80.50	3,446.6	278.0	1,660.4	1,683.5	0.00	0.00	0.00	0.00
4,000.0	31.94	80.50	3,531.5	286.7	1,712.6	1,736.4	0.00	0.00	0.00	0.00
4,100.0	31.94	80.50	3,616.3	295.4	1,764.7	1,789.3	0.00	0.00	0.00	0.00
4,200.0	31.94	80.50	3,701.2	304.2	1,816.9	1,842.2	0.00	0.00	0.00	0.00
4,300.0	31.94	80.50	3,786.0	312.9	1,869.1	1,895.1	0.00	0.00	0.00	0.00
4,400.0	31.94	80.50	3,870.9	321.7	1,921.3	1,948.0	0.00	0.00	0.00	0.00
4,500.0	31.94	80.50	3,955.8	330.4	1,973.5	2,000.9	0.00	0.00	0.00	0.00
4,600.0	31.94	80.50	4,040.6	339.1	2,025.7	2,053.8	0.00	0.00	0.00	0.00



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Wellbore:	A-4		
Design:	Permit #1		

Planned 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)
4,700.0	31.94	80.50	4,125.5	347.9	2,077.8	2,106.8	0.00	0.00	0.00
4,800.0	31.94	80.50	4,210.3	356.6	2,130.0	2,159.7	0.00	0.00	0.00
4,900.0	31.94	80.50	4,295.2	365.3	2,182.2	2,212.6	0.00	0.00	0.00
5,000.0	31.94	80.50	4,380.0	374.1	2,234.4	2,265.5	0.00	0.00	0.00
5,100.0	31.94	80.50	4,464.9	382.8	2,286.6	2,318.4	0.00	0.00	0.00
5,200.0	31.94	80.50	4,549.8	391.5	2,338.8	2,371.3	0.00	0.00	0.00
5,300.0	31.94	80.50	4,634.6	400.3	2,390.9	2,424.2	0.00	0.00	0.00
5,400.0	31.94	80.50	4,719.5	409.0	2,443.1	2,477.1	0.00	0.00	0.00
5,500.0	31.94	80.50	4,804.3	417.7	2,495.3	2,530.0	0.00	0.00	0.00
5,600.0	31.94	80.50	4,889.2	426.5	2,547.5	2,582.9	0.00	0.00	0.00
5,700.0	31.94	80.50	4,974.0	435.2	2,599.7	2,635.9	0.00	0.00	0.00
Wasatch 'G' Sand									
5,744.7	31.94	80.50	5,012.0	439.1	2,623.0	2,659.5	0.00	0.00	0.00
5,800.0	31.94	80.50	5,058.9	444.0	2,651.9	2,688.8	0.00	0.00	0.00
5,900.0	31.94	80.50	5,143.8	452.7	2,704.0	2,741.7	0.00	0.00	0.00
6,000.0	31.94	80.50	5,228.6	461.4	2,756.2	2,794.6	0.00	0.00	0.00
Drop @ 3.00°/100'									
6,085.9	31.94	80.50	5,301.5	468.9	2,801.1	2,840.0	0.00	0.00	0.00
6,100.0	31.52	80.50	5,313.5	470.2	2,808.4	2,847.4	3.00	-3.00	0.00
6,200.0	28.52	80.50	5,400.1	478.4	2,857.7	2,897.5	3.00	-3.00	0.00
6,300.0	25.52	80.50	5,489.1	485.9	2,902.5	2,942.9	3.00	-3.00	0.00
6,400.0	22.52	80.50	5,580.5	492.6	2,942.7	2,983.6	3.00	-3.00	0.00
6,500.0	19.52	80.50	5,673.8	498.6	2,978.0	3,019.5	3.00	-3.00	0.00
6,600.0	16.52	80.50	5,768.9	503.7	3,008.5	3,050.4	3.00	-3.00	0.00
6,700.0	13.52	80.50	5,865.5	507.9	3,034.1	3,076.3	3.00	-3.00	0.00
6,800.0	10.52	80.50	5,963.3	511.4	3,054.6	3,097.1	3.00	-3.00	0.00
6,900.0	7.52	80.50	6,062.0	514.0	3,070.1	3,112.8	3.00	-3.00	0.00
7,000.0	4.52	80.50	6,161.4	515.7	3,080.4	3,123.3	3.00	-3.00	0.00
7,100.0	1.52	80.50	6,261.3	516.6	3,085.6	3,128.6	3.00	-3.00	0.00
EOD @ Vertical									
7,150.7	0.00	0.00	6,312.0	516.7	3,086.3	3,129.3	3.00	-3.00	0.00
7,200.0	0.00	0.00	6,361.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00
7,300.0	0.00	0.00	6,461.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00
7,400.0	0.00	0.00	6,561.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00
7,500.0	0.00	0.00	6,661.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00
Ohio Creek									
7,550.7	0.00	0.00	6,712.0	516.7	3,086.3	3,129.3	0.00	0.00	0.00
7,600.0	0.00	0.00	6,761.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00
7,700.0	0.00	0.00	6,861.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00
Williams Fork									
7,750.7	0.00	0.00	6,912.0	516.7	3,086.3	3,129.3	0.00	0.00	0.00
7,800.0	0.00	0.00	6,961.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00
7,900.0	0.00	0.00	7,061.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00
8,000.0	0.00	0.00	7,161.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00
8,100.0	0.00	0.00	7,261.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00
8,200.0	0.00	0.00	7,361.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00
8,300.0	0.00	0.00	7,461.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00
TOG									
8,350.7	0.00	0.00	7,512.0	516.7	3,086.3	3,129.3	0.00	0.00	0.00
8,400.0	0.00	0.00	7,561.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00
8,500.0	0.00	0.00	7,661.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00
8,600.0	0.00	0.00	7,761.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00
8,700.0	0.00	0.00	7,861.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00



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Wellbore:	A-4		
Design:	Permit #1		

Planned 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)	
8,800.0	0.00	0.00	7,961.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00	
8,900.0	0.00	0.00	8,061.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00	
9,000.0	0.00	0.00	8,161.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00	
9,100.0	0.00	0.00	8,261.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00	
9,200.0	0.00	0.00	8,361.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00	
9,300.0	0.00	0.00	8,461.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00	
9,400.0	0.00	0.00	8,561.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00	
9,500.0	0.00	0.00	8,661.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00	
9,600.0	0.00	0.00	8,761.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00	
9,700.0	0.00	0.00	8,861.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00	
9,800.0	0.00	0.00	8,961.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00	
9,900.0	0.00	0.00	9,061.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00	
Cameo										
9,950.7	0.00	0.00	9,112.0	516.7	3,086.3	3,129.3	0.00	0.00	0.00	
10,000.0	0.00	0.00	9,161.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00	
10,100.0	0.00	0.00	9,261.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00	
10,200.0	0.00	0.00	9,361.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00	
10,300.0	0.00	0.00	9,461.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00	
Base Cameo Coal										
10,340.7	0.00	0.00	9,502.0	516.7	3,086.3	3,129.3	0.00	0.00	0.00	
Rollins										
10,350.7	0.00	0.00	9,512.0	516.7	3,086.3	3,129.3	0.00	0.00	0.00	
10,400.0	0.00	0.00	9,561.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00	
10,500.0	0.00	0.00	9,661.3	516.7	3,086.3	3,129.3	0.00	0.00	0.00	
TD @ 10600.7' MD / 9762.0' TVD										
10,600.7	0.00	0.00	9,762.0	516.7	3,086.3	3,129.3	0.00	0.00	0.00	

Design Targets										
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude	
PBHL - CC 0697-03-22E	0.00	0.00	9,762.0	516.7	3,086.3	1,636,600.75	2,239,004.36	39.550217	-108.199125	
- hit/miss target										
- Shape										
- plan hits target center										
- Circle (radius 50.0)										

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")	
2,524.0	2,279.0	8 5/8"	8-5/8	11	



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well CC 0697-03-22E
Company:	Laramie Energy, LLC	TVD Reference:	Well @ 8637.0usft (H&P 290)
Project:	Garfield County, CO	MD Reference:	Well @ 8637.0usft (H&P 290)
Site:	CC 603-23-32 Pad	North Reference:	True
Well:	CC 0697-03-22E	Survey Calculation Method:	Minimum Curvature
Wellbore:	A-4		
Design:	Permit #1		

Formations					
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
603.0	600.0	Mahogany			
5,744.7	5,012.0	Wasatch 'G' Sand			
7,550.7	6,712.0	Ohio Creek			
7,750.7	6,912.0	Williams Fork			
8,350.7	7,512.0	TOG			
9,950.7	9,112.0	Cameo			
10,340.7	9,502.0	Base Cameo Coal			
10,350.7	9,512.0	Rollins			

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
200.0	200.0	0.0	0.0	KOP/ (Build 3.00°/100')	
1,264.8	1,210.5	47.8	285.3	EOB @ 31.94° Inc / 80.50° Azm	
6,085.9	5,301.5	468.9	2,801.1	Drop @ 3.00°/100'	
7,150.7	6,312.0	516.7	3,086.3	EOD @ Vertical	
10,600.7	9,762.0	516.7	3,086.3	TD @ 10600.7' MD / 9762.0' TVD	