



Laramie Energy, LLC

**Mesa County, CO
Gunderson 29-09 Pad
Piceance Federal 29-18E**

Wellbore #1

Plan: Design #1

QES Well Planning Report

08 November, 2016





Well Planning Report



Database:	EDM5002	Local Co-ordinate Reference:	Well Piceance Federal 29-18E
Company:	Laramie Energy, LLC	TVD Reference:	well @ 7561.0usft (H&P #522)
Project:	Mesa County, CO	MD Reference:	well @ 7561.0usft (H&P #522)
Site:	Gunderson 29-09 Pad	North Reference:	True
Well:	Piceance Federal 29-18E	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

Project	Mesa 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		Gunderson 29-09 Pad			
Site Position:		Northing:	1,523,671.42 usft	Latitude:	39.248803
From:	Lat/Long	Easting:	2,352,063.75 usft	Longitude:	-107.788221
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-1.44 °

Well		Piceance Federal 29-18E				
Well Position	+N/-S	-113.4 usft	Northing:	1,523,558.69 usft	Latitude:	39.248492
	+E/-W	-23.3 usft	Easting:	2,352,037.60 usft	Longitude:	-107.788303
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	7,531.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	11/8/2016	9.64	65.43	51,477

Design	Design #1			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	180.48

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	
500.0	0.00	0.00	500.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,196.5	20.89	180.48	1,181.1	-125.6	-1.1	3.00	3.00	0.00	180.48	
5,508.8	20.89	180.48	5,209.9	-1,663.4	-14.0	0.00	0.00	0.00	0.00	
6,205.2	0.00	0.00	5,891.0	-1,789.0	-15.0	3.00	-3.00	0.00	180.00	
8,005.2	0.00	0.00	7,691.0	-1,789.0	-15.0	0.00	0.00	0.00	0.00	PBHL - Piceance Fed



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Site:	Gunderson 29-09 Pad	North Reference:	True
Well:	Piceance Federal 29-18E	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #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
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
KOP (Build 3° / 100')									
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	3.00	180.48	600.0	-2.6	0.0	2.6	3.00	3.00	0.00
700.0	6.00	180.48	699.6	-10.5	-0.1	10.5	3.00	3.00	0.00
800.0	9.00	180.48	798.8	-23.5	-0.2	23.5	3.00	3.00	0.00
900.0	12.00	180.48	897.1	-41.7	-0.4	41.7	3.00	3.00	0.00
1,000.0	15.00	180.48	994.3	-65.1	-0.5	65.1	3.00	3.00	0.00
1,100.0	18.00	180.48	1,090.2	-93.5	-0.8	93.5	3.00	3.00	0.00
EOB @ 20.89° Inc. / 180.48° Azm									
1,196.5	20.89	180.48	1,181.1	-125.6	-1.1	125.6	3.00	3.00	0.00
1,200.0	20.89	180.48	1,184.4	-126.8	-1.1	126.8	0.00	0.00	0.00
1,300.0	20.89	180.48	1,277.9	-162.5	-1.4	162.5	0.00	0.00	0.00
1,400.0	20.89	180.48	1,371.3	-198.2	-1.7	198.2	0.00	0.00	0.00
1,500.0	20.89	180.48	1,464.7	-233.8	-2.0	233.8	0.00	0.00	0.00
8 5/8"									
1,530.0	20.89	180.48	1,492.7	-244.5	-2.1	244.5	0.00	0.00	0.00
1,600.0	20.89	180.48	1,558.1	-269.5	-2.3	269.5	0.00	0.00	0.00
1,700.0	20.89	180.48	1,651.6	-305.2	-2.6	305.2	0.00	0.00	0.00
1,800.0	20.89	180.48	1,745.0	-340.8	-2.9	340.8	0.00	0.00	0.00
1,900.0	20.89	180.48	1,838.4	-376.5	-3.2	376.5	0.00	0.00	0.00
2,000.0	20.89	180.48	1,931.8	-412.1	-3.5	412.2	0.00	0.00	0.00
2,100.0	20.89	180.48	2,025.3	-447.8	-3.8	447.8	0.00	0.00	0.00
2,200.0	20.89	180.48	2,118.7	-483.5	-4.1	483.5	0.00	0.00	0.00
2,300.0	20.89	180.48	2,212.1	-519.1	-4.4	519.1	0.00	0.00	0.00
2,400.0	20.89	180.48	2,305.5	-554.8	-4.7	554.8	0.00	0.00	0.00
2,500.0	20.89	180.48	2,399.0	-590.5	-5.0	590.5	0.00	0.00	0.00
2,600.0	20.89	180.48	2,492.4	-626.1	-5.3	626.1	0.00	0.00	0.00
2,700.0	20.89	180.48	2,585.8	-661.8	-5.6	661.8	0.00	0.00	0.00
G' Sand									
2,705.6	20.89	180.48	2,591.0	-663.8	-5.6	663.8	0.00	0.00	0.00
2,800.0	20.89	180.48	2,679.2	-697.4	-5.9	697.5	0.00	0.00	0.00
2,900.0	20.89	180.48	2,772.6	-733.1	-6.2	733.1	0.00	0.00	0.00
3,000.0	20.89	180.48	2,866.1	-768.8	-6.5	768.8	0.00	0.00	0.00
3,100.0	20.89	180.48	2,959.5	-804.4	-6.7	804.5	0.00	0.00	0.00
3,200.0	20.89	180.48	3,052.9	-840.1	-7.0	840.1	0.00	0.00	0.00
3,300.0	20.89	180.48	3,146.3	-875.7	-7.3	875.8	0.00	0.00	0.00
3,400.0	20.89	180.48	3,239.8	-911.4	-7.6	911.4	0.00	0.00	0.00
3,500.0	20.89	180.48	3,333.2	-947.1	-7.9	947.1	0.00	0.00	0.00
3,600.0	20.89	180.48	3,426.6	-982.7	-8.2	982.8	0.00	0.00	0.00
3,700.0	20.89	180.48	3,520.0	-1,018.4	-8.5	1,018.4	0.00	0.00	0.00
3,800.0	20.89	180.48	3,613.5	-1,054.1	-8.8	1,054.1	0.00	0.00	0.00
3,900.0	20.89	180.48	3,706.9	-1,089.7	-9.1	1,089.8	0.00	0.00	0.00
4,000.0	20.89	180.48	3,800.3	-1,125.4	-9.4	1,125.4	0.00	0.00	0.00
4,100.0	20.89	180.48	3,893.7	-1,161.0	-9.7	1,161.1	0.00	0.00	0.00
4,200.0	20.89	180.48	3,987.2	-1,196.7	-10.0	1,196.7	0.00	0.00	0.00
4,300.0	20.89	180.48	4,080.6	-1,232.4	-10.3	1,232.4	0.00	0.00	0.00
4,400.0	20.89	180.48	4,174.0	-1,268.0	-10.6	1,268.1	0.00	0.00	0.00
4,500.0	20.89	180.48	4,267.4	-1,303.7	-10.9	1,303.7	0.00	0.00	0.00
4,600.0	20.89	180.48	4,360.9	-1,339.4	-11.2	1,339.4	0.00	0.00	0.00



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Well:	Piceance Federal 29-18E	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #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)
Williams Fork									
4,685.8	20.89	180.48	4,441.0	-1,369.9	-11.5	1,370.0	0.00	0.00	0.00
4,700.0	20.89	180.48	4,454.3	-1,375.0	-11.5	1,375.1	0.00	0.00	0.00
4,800.0	20.89	180.48	4,547.7	-1,410.7	-11.8	1,410.7	0.00	0.00	0.00
4,900.0	20.89	180.48	4,641.1	-1,446.3	-12.1	1,446.4	0.00	0.00	0.00
5,000.0	20.89	180.48	4,734.6	-1,482.0	-12.4	1,482.1	0.00	0.00	0.00
5,100.0	20.89	180.48	4,828.0	-1,517.7	-12.7	1,517.7	0.00	0.00	0.00
5,200.0	20.89	180.48	4,921.4	-1,553.3	-13.0	1,553.4	0.00	0.00	0.00
5,300.0	20.89	180.48	5,014.8	-1,589.0	-13.3	1,589.0	0.00	0.00	0.00
5,400.0	20.89	180.48	5,108.3	-1,624.7	-13.6	1,624.7	0.00	0.00	0.00
5,500.0	20.89	180.48	5,201.7	-1,660.3	-13.9	1,660.4	0.00	0.00	0.00
Drop 3° / 100'									
5,508.8	20.89	180.48	5,209.9	-1,663.4	-14.0	1,663.5	0.00	0.00	0.00
5,600.0	18.16	180.48	5,295.9	-1,693.9	-14.2	1,694.0	3.00	-3.00	0.00
5,700.0	15.16	180.48	5,391.6	-1,722.6	-14.5	1,722.6	3.00	-3.00	0.00
5,800.0	12.16	180.48	5,488.8	-1,746.2	-14.7	1,746.3	3.00	-3.00	0.00
5,900.0	9.16	180.48	5,587.1	-1,764.7	-14.8	1,764.7	3.00	-3.00	0.00
6,000.0	6.16	180.48	5,686.2	-1,778.0	-14.9	1,778.1	3.00	-3.00	0.00
6,100.0	3.16	180.48	5,785.8	-1,786.1	-15.0	1,786.2	3.00	-3.00	0.00
6,200.0	0.16	180.48	5,885.8	-1,789.0	-15.0	1,789.1	3.00	-3.00	0.00
EOD @ Vertical - TOG									
6,205.2	0.00	0.00	5,891.0	-1,789.0	-15.0	1,789.1	3.00	-3.00	0.00
6,300.0	0.00	0.00	5,985.8	-1,789.0	-15.0	1,789.1	0.00	0.00	0.00
6,400.0	0.00	0.00	6,085.8	-1,789.0	-15.0	1,789.1	0.00	0.00	0.00
6,500.0	0.00	0.00	6,185.8	-1,789.0	-15.0	1,789.1	0.00	0.00	0.00
6,600.0	0.00	0.00	6,285.8	-1,789.0	-15.0	1,789.1	0.00	0.00	0.00
6,700.0	0.00	0.00	6,385.8	-1,789.0	-15.0	1,789.1	0.00	0.00	0.00
6,800.0	0.00	0.00	6,485.8	-1,789.0	-15.0	1,789.1	0.00	0.00	0.00
6,900.0	0.00	0.00	6,585.8	-1,789.0	-15.0	1,789.1	0.00	0.00	0.00
7,000.0	0.00	0.00	6,685.8	-1,789.0	-15.0	1,789.1	0.00	0.00	0.00
Cameo									
7,055.2	0.00	0.00	6,741.0	-1,789.0	-15.0	1,789.1	0.00	0.00	0.00
7,100.0	0.00	0.00	6,785.8	-1,789.0	-15.0	1,789.1	0.00	0.00	0.00
7,200.0	0.00	0.00	6,885.8	-1,789.0	-15.0	1,789.1	0.00	0.00	0.00
7,300.0	0.00	0.00	6,985.8	-1,789.0	-15.0	1,789.1	0.00	0.00	0.00
7,400.0	0.00	0.00	7,085.8	-1,789.0	-15.0	1,789.1	0.00	0.00	0.00
7,500.0	0.00	0.00	7,185.8	-1,789.0	-15.0	1,789.1	0.00	0.00	0.00
7,600.0	0.00	0.00	7,285.8	-1,789.0	-15.0	1,789.1	0.00	0.00	0.00
7,700.0	0.00	0.00	7,385.8	-1,789.0	-15.0	1,789.1	0.00	0.00	0.00
Base Cameo Coal									
7,715.2	0.00	0.00	7,401.0	-1,789.0	-15.0	1,789.1	0.00	0.00	0.00
Rollins									
7,755.2	0.00	0.00	7,441.0	-1,789.0	-15.0	1,789.1	0.00	0.00	0.00
7,800.0	0.00	0.00	7,485.8	-1,789.0	-15.0	1,789.1	0.00	0.00	0.00
7,900.0	0.00	0.00	7,585.8	-1,789.0	-15.0	1,789.1	0.00	0.00	0.00
8,000.0	0.00	0.00	7,685.8	-1,789.0	-15.0	1,789.1	0.00	0.00	0.00
TD @ 8005' MD / 7691' TVD									
8,005.2	0.00	0.00	7,691.0	-1,789.0	-15.0	1,789.1	0.00	0.00	0.00



Well Planning Report



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Company:	Laramie Energy, LLC	TVD Reference:	well @ 7561.0usft (H&P #522)
Project:	Mesa County, CO	MD Reference:	well @ 7561.0usft (H&P #522)
Site:	Gunderson 29-09 Pad	North Reference:	True
Well:	Piceance Federal 29-18E	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
PBHL - Piceance Federal 29-18E	0.00	0.00	7,691.0	-1,789.0	-15.0	1,521,770.61	2,351,977.53	39.243580	-107.788356
- plan hits target center									
- Circle (radius 50.0)									

Casing Points				
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,530.0	1,492.7	8 5/8"	8-5/8	11

Formations					
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
2,705.6	2,591.0	G' Sand		0.00	
4,685.8	4,441.0	Williams Fork		0.00	
6,205.2	5,891.0	TOG		0.00	
7,055.2	6,741.0	Cameo		0.00	
7,715.2	7,401.0	Base Cameo Coal		0.00	
7,755.2	7,441.0	Rollins		0.00	

Plan Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
500.0	500.0	0.0	0.0	KOP (Build 3° / 100')
1,196.5	1,181.1	-125.6	-1.1	EOB @ 20.89° Inc. / 180.48° Azm
5,508.8	5,209.9	-1,663.4	-14.0	Drop 3° / 100'
6,205.2	5,891.0	-1,789.0	-15.0	EOD @ Vertical
8,005.2	7,691.0	-1,789.0	-15.0	TD @ 8005' MD / 7691' TVD