

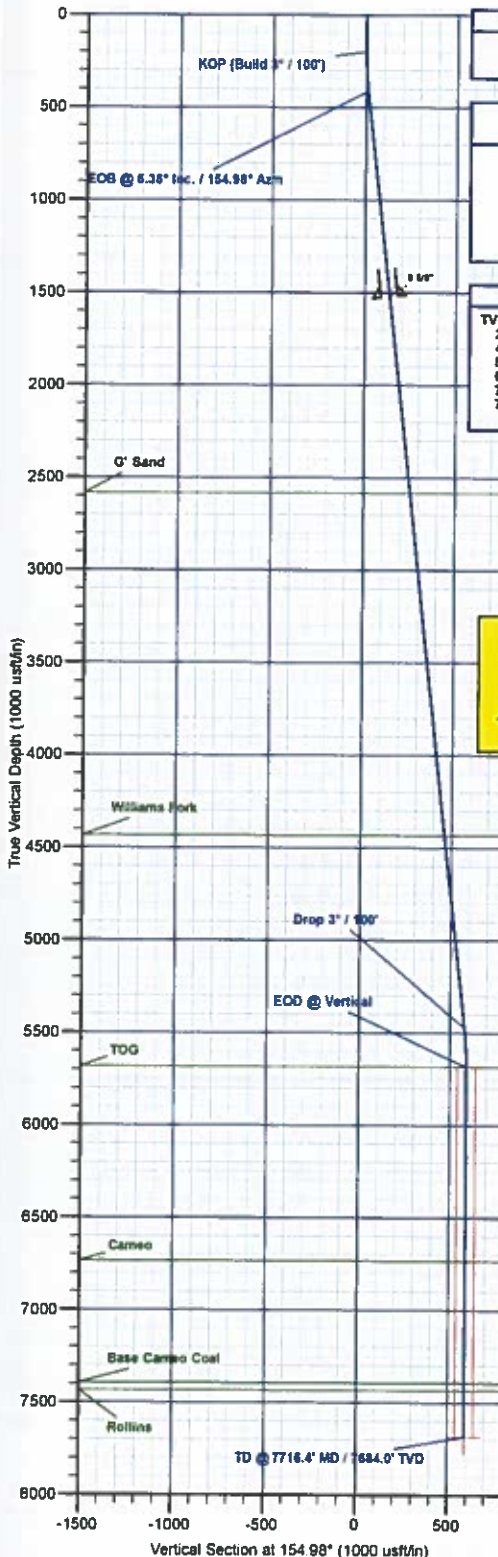
PROJECT DETAILS: Mesa County, CO

Geodetic System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone: Colorado Central Zone
System Datum: Mean Sea Level

WELL DETAILS: BCU 0993-21-09W

7256.0
+N-S 0.0 +E-W 0.0 Northing 1529635.42 Easting 2354498.89 Latitude 39.265341 Longitude -107.780153

Project: Mesa County, CO
Site: Gunderson 0993 21-05 Pad
Well: BCU 0993-21-09W
Wellbore: Wellbore #1
Design: Design #1
Latitude: 39.265341
Longitude: -107.780153
Ground Level: 7256.0
well @ 7288.0usft (H&P #522)



DESIGN TARGET DETAILS							
Name	TVD	+N-S	+E-W	Northing	Easting	Latitude	Longitude
PBHL - BCU 0993-21-09W	7684.0	-633.9	249.2	1529095.41	2354734.57	39.263875	-107.779273

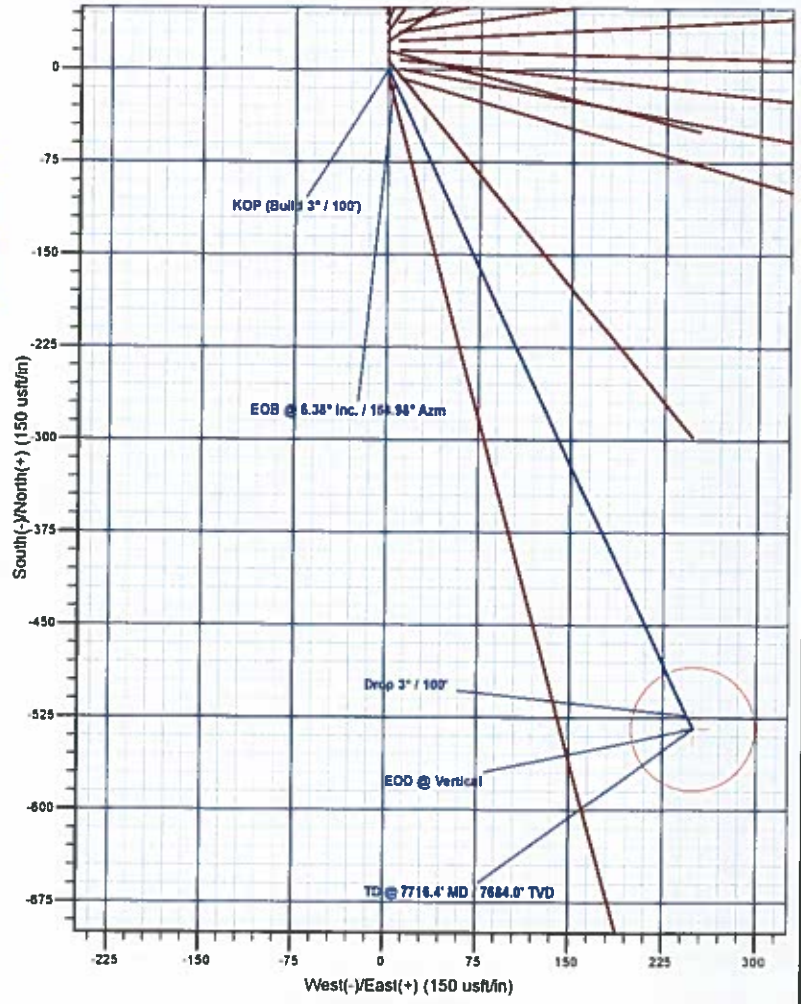
SECTION DETAILS									
MD	Inc	Azi	TVD	+N-S	+E-W	Dleg	TFace	VSecl	Annotation
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	KOP (Build 3° / 100')
200.0	0.00	0.00	200.0	0.0	0.0	0.00	0.00	0.0	EOB @ 6.38° Inc. / 154.98° Azm
412.6	6.38	154.98	412.2	-10.7	5.0	3.00	154.98	11.8	Drop 3° / 100'
5503.8	6.38	154.98	5471.8	-523.2	244.2	0.00	0.00	577.4	EOD @ Vertical
5716.4	0.00	0.00	5684.0	-633.9	249.2	3.00	180.00	589.2	TD @ 7716.4' MD / 7684.0' TVD
7716.4	0.00	0.00	7684.0	-633.9	249.2	0.00	0.00	589.2	

FORMATION TOP DETAILS		
TVDPath	MDPath	Formation
2584.0	2588.0	G' Sand
4434.0	4459.5	Williams Fork
5684.0	5716.4	TOG
6734.0	6786.4	Cameo
7394.0	7426.4	Base Cameo Coal
7434.0	7466.4	Rollins

REFERENCE INFORMATION	
Co-ordinate (N/E) Reference:	Well BCU 0993-21-09W, True North
Vertical (TVD) Reference:	well @ 7288.0usft (H&P #522)
Section (VS) Reference:	Slot - (0.0N, 0.0E)
Measured Depth Reference:	well @ 7288.0usft (H&P #522)
Calculation Method:	Minimum Curvature

Azimuths to True North
Magnetic North: 9.58°

Magnetic Field
Strength: 51394.7nT
Dip Angle: 65.43°
Date: 9/14/2017
Model: IGRF2015



Plan: Design #1 (BCU 0993-21-09W/Wellbore #1)
Created By: Will Jircik Date: 15:19, September 18 2017



Laramie Energy, LLC

Mesa County, CO

Gunderson 0993 21-05 Pad

BCU 0993-21-09W

Wellbore #1

Plan: Design #1

QES Well Planning Report

18 September, 2017





Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well BCU 0993-21-09W
Company:	Laramie Energy, LLC	TVD Reference:	well @ 7286.0usft (H&P #522)
Project:	Mesa County, CO	MD Reference:	well @ 7286.0usft (H&P #522)
Site:	Gunderson 0993 21-05 Pad	North Reference:	True
Well:	BCU 0993-21-09W	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 0993 21-05 Pad			
Site Position:		Northing:	1,529,627.90 usft	Latitude:	39.265321
From:	Lat/Long	Easting:	2,354,508.90 usft	Longitude:	-107.780117
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-1.44 "

Well	BCU 0993-21-09W					
Well Position	+N/-S	7.3 usft	Northing:	1,529,635.43 usft	Latitude:	39.265341
	+E/-W	-10.2 usft	Easting:	2,354,498.90 usft	Longitude:	-107.780153
Position Uncertainty	0.0 usft		Wellhead Elevation:		Ground Level:	7,256.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	9/14/2017	9.55	65.43	51,394.67591270

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	154.98

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	
412.6	8.38	154.98	412.2	-10.7	5.0	3.00	3.00	0.00	154.98	
5,503.8	8.38	154.98	5,471.8	-523.2	244.2	0.00	0.00	0.00	0.00	
5,716.4	0.00	0.00	5,684.0	-533.9	249.2	3.00	-3.00	0.00	180.00	
7,716.4	0.00	0.00	7,684.0	-533.9	249.2	0.00	0.00	0.00	0.00	PBHL - BCU 0993-21



Well Planning Report



Database: EDM 5000.1 Single User Db
 Company: Laramie Energy, LLC
 Project: Mesa County, CO
 Site: Gunderson 0993 21-05 Pad
 Well: BCU 0993-21-09W
 Wellbore: Wellbore #1
 Design: Design #1

Local Co-ordinate Reference: Well BCU 0993-21-09W
 TVD Reference: well @ 7286.0usft (H&P #522)
 MD Reference: well @ 7286.0usft (H&P #522)
 North Reference: True
 Survey Calculation Method: Minimum Curvature

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
KOP (Build 3° / 100')									
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	3.00	154.98	300.0	-2.4	1.1	2.6	3.00	3.00	0.00
400.0	6.00	154.98	399.6	-9.5	4.4	10.5	3.00	3.00	0.00
EOB @ 6.38° Inc. / 154.98° Azm									
412.6	6.38	154.98	412.2	-10.7	5.0	11.8	3.00	3.00	0.00
500.0	6.38	154.98	499.0	-19.5	9.1	21.5	0.00	0.00	0.00
600.0	6.38	154.98	598.4	-29.6	13.8	32.6	0.00	0.00	0.00
700.0	6.38	154.98	697.8	-39.6	18.5	43.7	0.00	0.00	0.00
800.0	6.38	154.98	797.2	-49.7	23.2	54.9	0.00	0.00	0.00
900.0	6.38	154.98	896.5	-59.8	27.9	66.0	0.00	0.00	0.00
1,000.0	6.38	154.98	995.9	-69.8	32.6	77.1	0.00	0.00	0.00
1,100.0	6.38	154.98	1,095.3	-79.9	37.3	88.2	0.00	0.00	0.00
1,200.0	6.38	154.98	1,194.7	-90.0	42.0	99.3	0.00	0.00	0.00
1,300.0	6.38	154.98	1,294.1	-100.0	46.7	110.4	0.00	0.00	0.00
1,400.0	6.38	154.98	1,393.4	-110.1	51.4	121.5	0.00	0.00	0.00
1,500.0	6.38	154.98	1,492.8	-120.2	56.1	132.6	0.00	0.00	0.00
8 5/8"									
1,530.0	6.38	154.98	1,522.6	-123.2	57.5	135.9	0.00	0.00	0.00
1,600.0	6.38	154.98	1,592.2	-130.2	60.8	143.7	0.00	0.00	0.00
1,700.0	6.38	154.98	1,691.6	-140.3	65.5	154.8	0.00	0.00	0.00
1,800.0	6.38	154.98	1,791.0	-150.4	70.2	165.9	0.00	0.00	0.00
1,900.0	6.38	154.98	1,890.4	-160.4	74.9	177.1	0.00	0.00	0.00
2,000.0	6.38	154.98	1,989.7	-170.5	79.6	188.2	0.00	0.00	0.00
2,100.0	6.38	154.98	2,089.1	-180.6	84.3	199.3	0.00	0.00	0.00
2,200.0	6.38	154.98	2,188.5	-190.6	89.0	210.4	0.00	0.00	0.00
2,300.0	6.38	154.98	2,287.9	-200.7	93.7	221.5	0.00	0.00	0.00
2,400.0	6.38	154.98	2,387.3	-210.8	98.4	232.6	0.00	0.00	0.00
2,500.0	6.38	154.98	2,486.6	-220.8	103.1	243.7	0.00	0.00	0.00
G' Sand									
2,598.0	6.38	154.98	2,584.0	-230.7	107.7	254.6	0.00	0.00	0.00
2,600.0	6.38	154.98	2,586.0	-230.9	107.8	254.8	0.00	0.00	0.00
2,700.0	6.38	154.98	2,685.4	-241.0	112.4	265.9	0.00	0.00	0.00
2,800.0	6.38	154.98	2,784.8	-251.0	117.1	277.0	0.00	0.00	0.00
2,900.0	6.38	154.98	2,884.2	-261.1	121.8	288.1	0.00	0.00	0.00
3,000.0	6.38	154.98	2,983.5	-271.2	126.5	299.2	0.00	0.00	0.00
3,100.0	6.38	154.98	3,082.9	-281.2	131.2	310.4	0.00	0.00	0.00
3,200.0	6.38	154.98	3,182.3	-291.3	135.9	321.5	0.00	0.00	0.00
3,300.0	6.38	154.98	3,281.7	-301.4	140.6	332.6	0.00	0.00	0.00
3,400.0	6.38	154.98	3,381.1	-311.4	145.3	343.7	0.00	0.00	0.00
3,500.0	6.38	154.98	3,480.5	-321.5	150.0	354.8	0.00	0.00	0.00
3,600.0	6.38	154.98	3,579.8	-331.6	154.7	365.9	0.00	0.00	0.00
3,700.0	6.38	154.98	3,679.2	-341.6	159.4	377.0	0.00	0.00	0.00
3,800.0	6.38	154.98	3,778.6	-351.7	164.1	388.1	0.00	0.00	0.00
3,900.0	6.38	154.98	3,878.0	-361.8	168.8	399.2	0.00	0.00	0.00
4,000.0	6.38	154.98	3,977.4	-371.8	173.5	410.3	0.00	0.00	0.00
4,100.0	6.38	154.98	4,076.7	-381.9	178.2	421.4	0.00	0.00	0.00
4,200.0	6.38	154.98	4,176.1	-392.0	182.9	432.6	0.00	0.00	0.00
4,300.0	6.38	154.98	4,275.5	-402.0	187.6	443.7	0.00	0.00	0.00
4,400.0	6.38	154.98	4,374.9	-412.1	192.3	454.8	0.00	0.00	0.00
Williams Fork									
4,459.5	6.38	154.98	4,434.0	-418.1	195.1	461.4	0.00	0.00	0.00



Well Planning Report



Database:	EDM 5000 1 Single User Db	Local Co-ordinate Reference:	Well BCU 0993-21-09W
Company:	Laramie Energy, LLC	TVD Reference:	well @ 7286.0usft (H&P #522)
Project:	Mesa County, CO	MD Reference:	well @ 7286.0usft (H&P #522)
Site:	Gunderson 0993 21-05 Pad	North Reference:	True
Well:	BCU 0993-21-09W	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)
4,500.0	6.38	154.98	4,474.3	-422.2	197.0	465.9	0.00	0.00	0.00
4,600.0	6.38	154.98	4,573.6	-432.2	201.7	477.0	0.00	0.00	0.00
4,700.0	6.38	154.98	4,673.0	-442.3	206.4	488.1	0.00	0.00	0.00
4,800.0	6.38	154.98	4,772.4	-452.4	211.1	499.2	0.00	0.00	0.00
4,900.0	6.38	154.98	4,871.8	-462.4	215.8	510.3	0.00	0.00	0.00
5,000.0	6.38	154.98	4,971.2	-472.5	220.5	521.4	0.00	0.00	0.00
5,100.0	6.38	154.98	5,070.5	-482.6	225.2	532.5	0.00	0.00	0.00
5,200.0	6.38	154.98	5,169.9	-492.6	229.9	543.6	0.00	0.00	0.00
5,300.0	6.38	154.98	5,269.3	-502.7	234.6	554.7	0.00	0.00	0.00
5,400.0	6.38	154.98	5,368.7	-512.8	239.3	565.9	0.00	0.00	0.00
5,500.0	6.38	154.98	5,468.1	-522.8	244.0	577.0	0.00	0.00	0.00
Drop 3° / 100'									
5,503.8	6.38	154.98	5,471.8	-523.2	244.2	577.4	0.00	0.00	0.00
5,600.0	3.49	154.98	5,567.7	-530.7	247.7	585.7	3.00	-3.00	0.00
5,700.0	0.49	154.98	5,667.6	-533.9	249.1	589.1	3.00	-3.00	0.00
EOD @ Vertical - TOG									
5,716.4	0.00	0.00	5,684.0	-533.9	249.2	589.2	3.00	-3.00	0.00
5,800.0	0.00	0.00	5,767.6	-533.9	249.2	589.2	0.00	0.00	0.00
5,900.0	0.00	0.00	5,867.6	-533.9	249.2	589.2	0.00	0.00	0.00
6,000.0	0.00	0.00	5,967.6	-533.9	249.2	589.2	0.00	0.00	0.00
6,100.0	0.00	0.00	6,067.6	-533.9	249.2	589.2	0.00	0.00	0.00
6,200.0	0.00	0.00	6,167.6	-533.9	249.2	589.2	0.00	0.00	0.00
6,300.0	0.00	0.00	6,267.6	-533.9	249.2	589.2	0.00	0.00	0.00
6,400.0	0.00	0.00	6,367.6	-533.9	249.2	589.2	0.00	0.00	0.00
6,500.0	0.00	0.00	6,467.6	-533.9	249.2	589.2	0.00	0.00	0.00
6,600.0	0.00	0.00	6,567.6	-533.9	249.2	589.2	0.00	0.00	0.00
6,700.0	0.00	0.00	6,667.6	-533.9	249.2	589.2	0.00	0.00	0.00
Cameo									
6,766.4	0.00	0.00	6,734.0	-533.9	249.2	589.2	0.00	0.00	0.00
6,800.0	0.00	0.00	6,767.6	-533.9	249.2	589.2	0.00	0.00	0.00
6,900.0	0.00	0.00	6,867.6	-533.9	249.2	589.2	0.00	0.00	0.00
7,000.0	0.00	0.00	6,967.6	-533.9	249.2	589.2	0.00	0.00	0.00
7,100.0	0.00	0.00	7,067.6	-533.9	249.2	589.2	0.00	0.00	0.00
7,200.0	0.00	0.00	7,167.6	-533.9	249.2	589.2	0.00	0.00	0.00
7,300.0	0.00	0.00	7,267.6	-533.9	249.2	589.2	0.00	0.00	0.00
7,400.0	0.00	0.00	7,367.6	-533.9	249.2	589.2	0.00	0.00	0.00
Base Cameo Coal									
7,426.4	0.00	0.00	7,394.0	-533.9	249.2	589.2	0.00	0.00	0.00
Rollins									
7,466.4	0.00	0.00	7,434.0	-533.9	249.2	589.2	0.00	0.00	0.00
7,500.0	0.00	0.00	7,467.6	-533.9	249.2	589.2	0.00	0.00	0.00
7,600.0	0.00	0.00	7,567.6	-533.9	249.2	589.2	0.00	0.00	0.00
7,700.0	0.00	0.00	7,667.6	-533.9	249.2	589.2	0.00	0.00	0.00
TD @ 7716.4' MD / 7684.0' TVD									
7,716.4	0.00	0.00	7,684.0	-533.9	249.2	589.2	0.00	0.00	0.00



Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well BCU 0993-21-09W
Company:	Laramie Energy, LLC	TVD Reference:	well @ 7286.0usft (H&P #522)
Project:	Mesa County, CO	MD Reference:	well @ 7286.0usft (H&P #522)
Site:	Gunderson 0993 21-05 Pad	North Reference:	True
Well:	BCU 0993-21-09W	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

Design Targets

Target Name

- hit/miss target	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- Shape									
PBHL - BCU 0993-21-09W	0.00	0.00	7,684.0	-533.9	249.2	1,529,095.41	2,354,734.57	39.263875	-107.779273
- plan hits target center									
- Circle (radius 50.0)									

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,530.0	1,522.6	8 5/8"	8-5/8	11

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
2,598.0	2,584.0	G' Sand			
4,459.5	4,434.0	Williams Fork			
5,716.4	5,684.0	TOG			
6,766.4	6,734.0	Cameo			
7,426.4	7,394.0	Base Cameo Coal			
7,466.4	7,434.0	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' / 100')
412.6	412.2	-10.7	5.0	EOB @ 6.38° Inc. / 154.98° Azm
5,503.8	5,471.8	-523.2	244.2	Drop 3' / 100'
5,716.4	5,684.0	-533.9	249.2	EOD @ Vertical
7,716.4	7,684.0	-533.9	249.2	TD @ 7716.4' MD / 7684.0' TVD