

PROJECT DETAILS: Garfield 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: CC 0697-03-13E

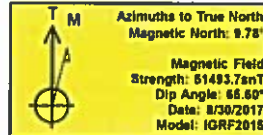
+N-S 0.0 +E-W 0.0 Northing 1638592.74 Easting 2237404.78 Elevation 8428.0
Latitude 39.558297 Longitude -108.205111

Project: Garfield County, CO
Site: CC 0697-03-07 Pad
Well: CC 0697-03-13E
Wellbore: Wellbore #1
Design: Design #2
Latitude: 39.558297
Longitude: -108.205111
Ground Level: 8428.0
well @ 8458.0ust (30' RKB)



REFERENCE INFORMATION

Co-ordinate (NE) Reference: Well CC 0697-03-13E, True North
Vertical (TVD) Reference: well @ 8458.0ust (30' RKB)
Section (VS) Reference: Slot - (0.0N, 0.0E)
Measured Depth Reference: well @ 8458.0ust (30' RKB)
Calculation Method: Minimum Curvature



FORMATION TOP DETAILS

TVDPath	MDPath	Formation
4613.0	4692.1	G' Sand
6713.0	6835.2	Williams Fork
7513.0	7648.4	TOG
8713.0	8848.4	Cameo
9373.0	9506.4	Base Cameo Coal
9413.0	9548.4	Rollins

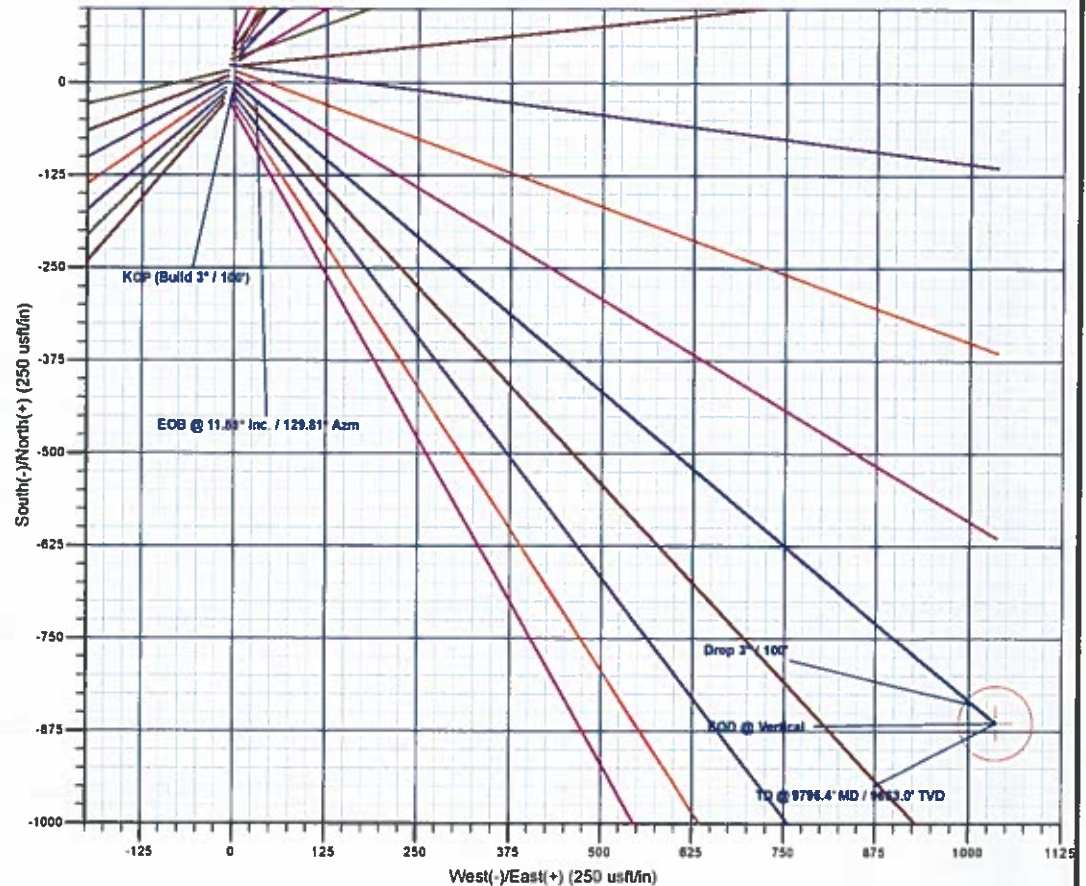
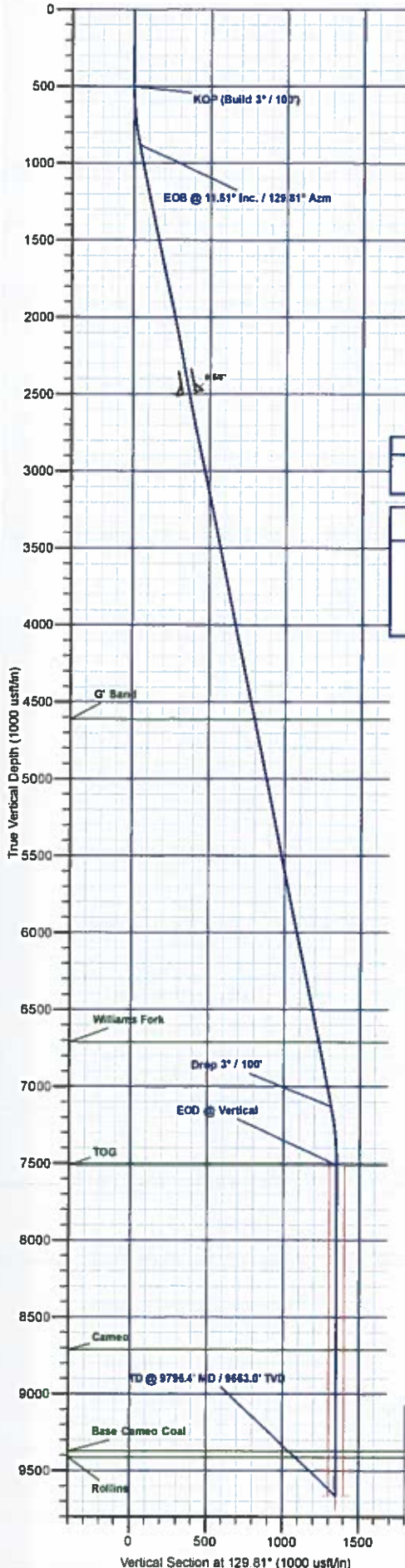


DESIGN TARGET DETAILS

Name	TVD	+N-S	+E-W	Northing	Easting	Latitude	Longitude
PBHL - CC 0697-03-13E	9663.0	-864.0	1036.5	1638699.30	2238416.08	39.558295	-108.201435

SECTION DETAILS

MD	Inc	Azi	TVD	+N-S	+E-W	Dieg	TFace	Vsect	Annotation
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	KOP (Build 3' / 100')
500.0	0.00	0.00	500.0	0.0	0.0	0.00	0.00	0.0	EOB @ 11.51' Inc. / 129.81' Azm
865.6	11.51	129.81	861.0	-24.6	29.5	3.00	129.81	38.4	Drop 3' / 100'
7262.9	11.51	129.81	7132.0	-839.4	1007.0	0.00	0.00	1311.0	EOB @ Vertical
7646.4	0.00	0.00	7513.0	-864.0	1036.5	3.00	180.00	1349.3	TD @ 9796.4' MD / 9663.0' TVD
9796.4	0.00	0.00	9663.0	-864.0	1036.5	0.00	0.00	1349.3	



Plan: Design #2 (CC 0697-03-13E/Wellbore #1)

Created By: Will Jircik

Date: 10:58, October 24 2017



Laramie Energy, LLC

Garfield County, CO

CC 0697-03-07 Pad

CC 0697-03-13E

Wellbore #1

Plan: Design #2

QES Well Planning Report

24 October, 2017





Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well CC 0697-03-13E
Company:	Laramie Energy, LLC	TVD Reference:	well @ 8458.0usft (30' RKB)
Project:	Garfield County, CO	MD Reference:	well @ 8458.0usft (30' RKB)
Site:	CC 0697-03-07 Pad	North Reference:	True
Well:	CC 0697-03-13E	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #2		

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: -108.208835
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence: -1.71 "

Well	CC 0697-03-13E			
Well Position	+N/-S	1,475.2 usft	Northing:	1,639,592.74 usft
	+E/-W	486.1 usft	Easting:	2,237,404.78 usft
Position Uncertainty	0.0 usft	Wellhead Elevation:		Ground Level: 8,428.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	8/30/2017	9.78	65.60	51,493.71501987

Design	Design #2			
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	129.81

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	
883.6	11.51	129.81	881.0	-24.6	29.5	3.00	3.00	0.00	129.81	
7,262.8	11.51	129.81	7,132.0	-839.4	1,007.0	0.00	0.00	0.00	0.00	
7,646.4	0.00	0.00	7,513.0	-864.0	1,036.5	3.00	-3.00	0.00	180.00	
9,796.4	0.00	0.00	9,663.0	-864.0	1,036.5	0.00	0.00	0.00	0.00	PBHL - CC 0697-03-1



Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well CC 0697-03-13E
Company:	Laramie Energy, LLC	TVD Reference:	well @ 8458.0usft (30' RKB)
Project:	Garfield County, CO	MD Reference:	well @ 8458.0usft (30' RKB)
Site:	CC 0697-03-07 Pad	North Reference:	True
Well:	CC 0697-03-13E	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #2		

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	129.81	600.0	-1.7	2.0	2.6	3.00	3.00	0.00
700.0	6.00	129.81	699.6	-6.7	8.0	10.5	3.00	3.00	0.00
800.0	9.00	129.81	798.8	-15.1	18.1	23.5	3.00	3.00	0.00
EOB @ 11.51° Inc. / 129.81° Azm									
883.6	11.51	129.81	881.0	-24.6	29.5	38.4	3.00	3.00	0.00
900.0	11.51	129.81	897.1	-26.7	32.0	41.7	0.00	0.00	0.00
1,000.0	11.51	129.81	995.1	-39.5	47.3	61.6	0.00	0.00	0.00
1,100.0	11.51	129.81	1,093.1	-52.2	62.7	81.6	0.00	0.00	0.00
1,200.0	11.51	129.81	1,191.1	-65.0	78.0	101.5	0.00	0.00	0.00
1,300.0	11.51	129.81	1,289.1	-77.8	93.3	121.5	0.00	0.00	0.00
1,400.0	11.51	129.81	1,387.0	-90.5	108.6	141.4	0.00	0.00	0.00
1,500.0	11.51	129.81	1,485.0	-103.3	123.9	161.4	0.00	0.00	0.00
1,600.0	11.51	129.81	1,583.0	-116.1	139.3	181.3	0.00	0.00	0.00
1,700.0	11.51	129.81	1,681.0	-128.9	154.6	201.3	0.00	0.00	0.00
1,800.0	11.51	129.81	1,779.0	-141.6	169.9	221.2	0.00	0.00	0.00
1,900.0	11.51	129.81	1,877.0	-154.4	185.2	241.2	0.00	0.00	0.00
2,000.0	11.51	129.81	1,975.0	-167.2	200.6	261.1	0.00	0.00	0.00
2,100.0	11.51	129.81	2,073.0	-180.0	215.9	281.0	0.00	0.00	0.00
2,200.0	11.51	129.81	2,171.0	-192.7	231.2	301.0	0.00	0.00	0.00
2,300.0	11.51	129.81	2,269.0	-205.5	246.5	320.9	0.00	0.00	0.00
2,400.0	11.51	129.81	2,366.9	-218.3	261.9	340.9	0.00	0.00	0.00
2,500.0	11.51	129.81	2,464.9	-231.0	277.2	360.8	0.00	0.00	0.00
9 5/8"									
2,530.0	11.51	129.81	2,494.3	-234.9	281.8	366.8	0.00	0.00	0.00
2,600.0	11.51	129.81	2,562.9	-243.8	292.5	380.8	0.00	0.00	0.00
2,700.0	11.51	129.81	2,660.9	-256.6	307.8	400.7	0.00	0.00	0.00
2,800.0	11.51	129.81	2,758.9	-269.4	323.1	420.7	0.00	0.00	0.00
2,900.0	11.51	129.81	2,856.9	-282.1	338.5	440.6	0.00	0.00	0.00
3,000.0	11.51	129.81	2,954.9	-294.9	353.8	460.6	0.00	0.00	0.00
3,100.0	11.51	129.81	3,052.9	-307.7	369.1	480.5	0.00	0.00	0.00
3,200.0	11.51	129.81	3,150.9	-320.5	384.4	500.5	0.00	0.00	0.00
3,300.0	11.51	129.81	3,248.9	-333.2	399.8	520.4	0.00	0.00	0.00
3,400.0	11.51	129.81	3,346.8	-346.0	415.1	540.4	0.00	0.00	0.00
3,500.0	11.51	129.81	3,444.8	-358.8	430.4	560.3	0.00	0.00	0.00
3,600.0	11.51	129.81	3,542.8	-371.5	445.7	580.3	0.00	0.00	0.00
3,700.0	11.51	129.81	3,640.8	-384.3	461.1	600.2	0.00	0.00	0.00
3,800.0	11.51	129.81	3,738.8	-397.1	476.4	620.2	0.00	0.00	0.00
3,900.0	11.51	129.81	3,836.8	-409.9	491.7	640.1	0.00	0.00	0.00
4,000.0	11.51	129.81	3,934.8	-422.6	507.0	660.1	0.00	0.00	0.00
4,100.0	11.51	129.81	4,032.8	-435.4	522.4	680.0	0.00	0.00	0.00
4,200.0	11.51	129.81	4,130.8	-448.2	537.7	700.0	0.00	0.00	0.00
4,300.0	11.51	129.81	4,228.8	-461.0	553.0	719.9	0.00	0.00	0.00
4,400.0	11.51	129.81	4,326.7	-473.7	568.3	739.9	0.00	0.00	0.00
4,500.0	11.51	129.81	4,424.7	-486.5	583.6	759.8	0.00	0.00	0.00
4,600.0	11.51	129.81	4,522.7	-499.3	599.0	779.8	0.00	0.00	0.00
G' Sand									
4,692.1	11.51	129.81	4,613.0	-511.0	613.1	798.1	0.00	0.00	0.00



Well Planning Report



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Company:	Laramie Energy, LLC	TVD Reference:	well @ 8458.0usft (30' RKB)
Project:	Garfield County, CO	MD Reference:	well @ 8458.0usft (30' RKB)
Site:	CC 0697-03-07 Pad	North Reference:	True
Well:	CC 0697-03-13E	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #2		

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	11.51	129.81	4,620.7	-512.0	614.3	799.7	0.00	0.00	0.00
4,800.0	11.51	129.81	4,718.7	-524.8	629.6	819.7	0.00	0.00	0.00
4,900.0	11.51	129.81	4,816.7	-537.6	644.9	839.6	0.00	0.00	0.00
5,000.0	11.51	129.81	4,914.7	-550.4	660.3	859.6	0.00	0.00	0.00
5,100.0	11.51	129.81	5,012.7	-563.1	675.6	879.5	0.00	0.00	0.00
5,200.0	11.51	129.81	5,110.7	-575.9	690.9	899.5	0.00	0.00	0.00
5,300.0	11.51	129.81	5,208.7	-588.7	706.2	919.4	0.00	0.00	0.00
5,400.0	11.51	129.81	5,306.6	-601.5	721.6	939.4	0.00	0.00	0.00
5,500.0	11.51	129.81	5,404.6	-614.2	736.9	959.3	0.00	0.00	0.00
5,600.0	11.51	129.81	5,502.6	-627.0	752.2	979.3	0.00	0.00	0.00
5,700.0	11.51	129.81	5,600.6	-639.8	767.5	999.2	0.00	0.00	0.00
5,800.0	11.51	129.81	5,698.6	-652.5	782.8	1,019.1	0.00	0.00	0.00
5,900.0	11.51	129.81	5,796.6	-665.3	798.2	1,039.1	0.00	0.00	0.00
6,000.0	11.51	129.81	5,894.6	-678.1	813.5	1,059.0	0.00	0.00	0.00
6,100.0	11.51	129.81	5,992.6	-690.9	828.8	1,079.0	0.00	0.00	0.00
6,200.0	11.51	129.81	6,090.6	-703.6	844.1	1,098.9	0.00	0.00	0.00
6,300.0	11.51	129.81	6,188.6	-716.4	859.5	1,118.9	0.00	0.00	0.00
6,400.0	11.51	129.81	6,286.6	-729.2	874.8	1,138.8	0.00	0.00	0.00
6,500.0	11.51	129.81	6,384.5	-742.0	890.1	1,158.8	0.00	0.00	0.00
6,600.0	11.51	129.81	6,482.5	-754.7	905.4	1,178.7	0.00	0.00	0.00
6,700.0	11.51	129.81	6,580.5	-767.5	920.8	1,198.7	0.00	0.00	0.00
6,800.0	11.51	129.81	6,678.5	-780.3	936.1	1,218.6	0.00	0.00	0.00
Williams Fork									
6,835.2	11.51	129.81	6,713.0	-784.8	941.5	1,225.7	0.00	0.00	0.00
6,900.0	11.51	129.81	6,776.5	-793.0	951.4	1,238.6	0.00	0.00	0.00
7,000.0	11.51	129.81	6,874.5	-805.8	966.7	1,258.5	0.00	0.00	0.00
7,100.0	11.51	129.81	6,972.5	-818.6	982.1	1,278.5	0.00	0.00	0.00
7,200.0	11.51	129.81	7,070.5	-831.4	997.4	1,298.4	0.00	0.00	0.00
Drop 3" / 100'									
7,262.8	11.51	129.81	7,132.0	-839.4	1,007.0	1,311.0	0.00	0.00	0.00
7,300.0	10.39	129.81	7,168.5	-843.9	1,012.4	1,318.0	3.00	-3.00	0.00
7,400.0	7.39	129.81	7,267.3	-853.8	1,024.3	1,333.5	3.00	-3.00	0.00
7,500.0	4.39	129.81	7,366.8	-860.4	1,032.2	1,343.7	3.00	-3.00	0.00
7,600.0	1.39	129.81	7,466.6	-863.6	1,036.1	1,348.8	3.00	-3.00	0.00
EOD @ Vertical - TOG									
7,646.4	0.00	0.00	7,513.0	-864.0	1,036.5	1,349.3	3.00	-3.00	0.00
7,700.0	0.00	0.00	7,566.6	-864.0	1,036.5	1,349.3	0.00	0.00	0.00
7,800.0	0.00	0.00	7,666.6	-864.0	1,036.5	1,349.3	0.00	0.00	0.00
7,900.0	0.00	0.00	7,766.6	-864.0	1,036.5	1,349.3	0.00	0.00	0.00
8,000.0	0.00	0.00	7,866.6	-864.0	1,036.5	1,349.3	0.00	0.00	0.00
8,100.0	0.00	0.00	7,966.6	-864.0	1,036.5	1,349.3	0.00	0.00	0.00
8,200.0	0.00	0.00	8,066.6	-864.0	1,036.5	1,349.3	0.00	0.00	0.00
8,300.0	0.00	0.00	8,166.6	-864.0	1,036.5	1,349.3	0.00	0.00	0.00
8,400.0	0.00	0.00	8,266.6	-864.0	1,036.5	1,349.3	0.00	0.00	0.00
8,500.0	0.00	0.00	8,366.6	-864.0	1,036.5	1,349.3	0.00	0.00	0.00
8,600.0	0.00	0.00	8,466.6	-864.0	1,036.5	1,349.3	0.00	0.00	0.00
8,700.0	0.00	0.00	8,566.6	-864.0	1,036.5	1,349.3	0.00	0.00	0.00
8,800.0	0.00	0.00	8,666.6	-864.0	1,036.5	1,349.3	0.00	0.00	0.00
Cameo									
8,846.4	0.00	0.00	8,713.0	-864.0	1,036.5	1,349.3	0.00	0.00	0.00
8,900.0	0.00	0.00	8,766.6	-864.0	1,036.5	1,349.3	0.00	0.00	0.00
9,000.0	0.00	0.00	8,866.6	-864.0	1,036.5	1,349.3	0.00	0.00	0.00
9,100.0	0.00	0.00	8,966.6	-864.0	1,036.5	1,349.3	0.00	0.00	0.00



Well Planning Report



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Company:	Laramie Energy, LLC	TVD Reference:	well @ 8458.0usft (30' RKB)
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Well:	CC 0697-03-13E	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #2		

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)
9,200.0	0.00	0.00	9,066.6	-864.0	1,036.5	1,349.3	0.00	0.00	0.00
9,300.0	0.00	0.00	9,166.6	-864.0	1,036.5	1,349.3	0.00	0.00	0.00
9,400.0	0.00	0.00	9,266.6	-864.0	1,036.5	1,349.3	0.00	0.00	0.00
9,500.0	0.00	0.00	9,366.6	-864.0	1,036.5	1,349.3	0.00	0.00	0.00
Base Cameo Coal									
9,506.4	0.00	0.00	9,373.0	-864.0	1,036.5	1,349.3	0.00	0.00	0.00
Rollins									
9,546.4	0.00	0.00	9,413.0	-864.0	1,036.5	1,349.3	0.00	0.00	0.00
9,600.0	0.00	0.00	9,466.6	-864.0	1,036.5	1,349.3	0.00	0.00	0.00
9,700.0	0.00	0.00	9,566.6	-864.0	1,036.5	1,349.3	0.00	0.00	0.00
TD @ 9796.4' MD / 9663.0' TVD									
9,796.4	0.00	0.00	9,663.0	-864.0	1,036.5	1,349.3	0.00	0.00	0.00

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
PBHL - CC 0697-03-13E - plan hits target center - Circle (radius 50.0)	0.00	0.00	9,663.0	-864.0	1,036.5	1,638,698.30	2,238,415.08	39.555925	-108.201435

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
2,530.0	2,494.3	9 5/8"	9-5/8	12-1/4

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
4,692.1	4,613.0	G' Sand			
6,835.2	6,713.0	Williams Fork			
7,646.4	7,513.0	TOG			
8,846.4	8,713.0	Cameo			
9,506.4	9,373.0	Base Cameo Coal			
9,546.4	9,413.0	Rollins			



Well Planning Report



Database: EDM 5000.1 Single User Db
Company: Laramie Energy, LLC
Project: Garfield County, CO
Site: CC 0697-03-07 Pad
Well: CC 0697-03-13E
Wellbore: Wellbore #1
Design: Design #2

Local Co-ordinate Reference: Well CC 0697-03-13E
TVD Reference: well @ 8458.0usft (30' RKB)
MD Reference: well @ 8458.0usft (30' RKB)
North Reference: True
Survey Calculation Method: Minimum Curvature

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')
883.6	881.0	-24.6	29.5	EOB @ 11.51° Inc. / 129.81° Azm
7,262.8	7,132.0	-839.4	1,007.0	Drop 3" / 100'
7,648.4	7,513.0	-864.0	1,036.5	EOD @ Vertical
9,796.4	9,663.0	-864.0	1,036.5	TD @ 9796.4' MD / 9663.0' TVD