

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 697-10-01W

+N/-S 0.0 +E/-W 0.0 Northing 1634801.77 Easting 2236709.35 8595.0 Latitude 39.544544 Longitude -108.207049

Project: Garfield County, CO
Site: CC 610-21-41 Pad
Well: CC 697-10-01W
Wellbore: Wellbore #1
Design: Design #2
Latitude: 39.544544
Longitude: -108.207049
Ground Level: 8595.0
RKB @ 8625.0ustf (H&P #522)



DIRECTIONAL DRILLING



REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well CC 697-10-01W, True North
Vertical (TVD) Reference: RKB @ 8625.0ustf (H&P #522)
Section (VS) Reference: Slot - (0.0N, 0.0E)
Measured Depth Reference: RKB @ 8625.0ustf (H&P #522)
Calculation Method: Minimum Curvature

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
910.0	910.0	Mahogany
2878.0	2886.9	Wasatch
4868.0	4886.0	Wasatch 'G' Sand
4878.0	4887.0	Fort Union
6412.0	6438.0	Ohio Creek
6600.0	6627.8	Williams Fork
7326.0	7358.8	TOG
8850.0	8880.8	Cameo
9217.0	9247.8	Base Cameo Coal
9263.0	9293.0	Rollins



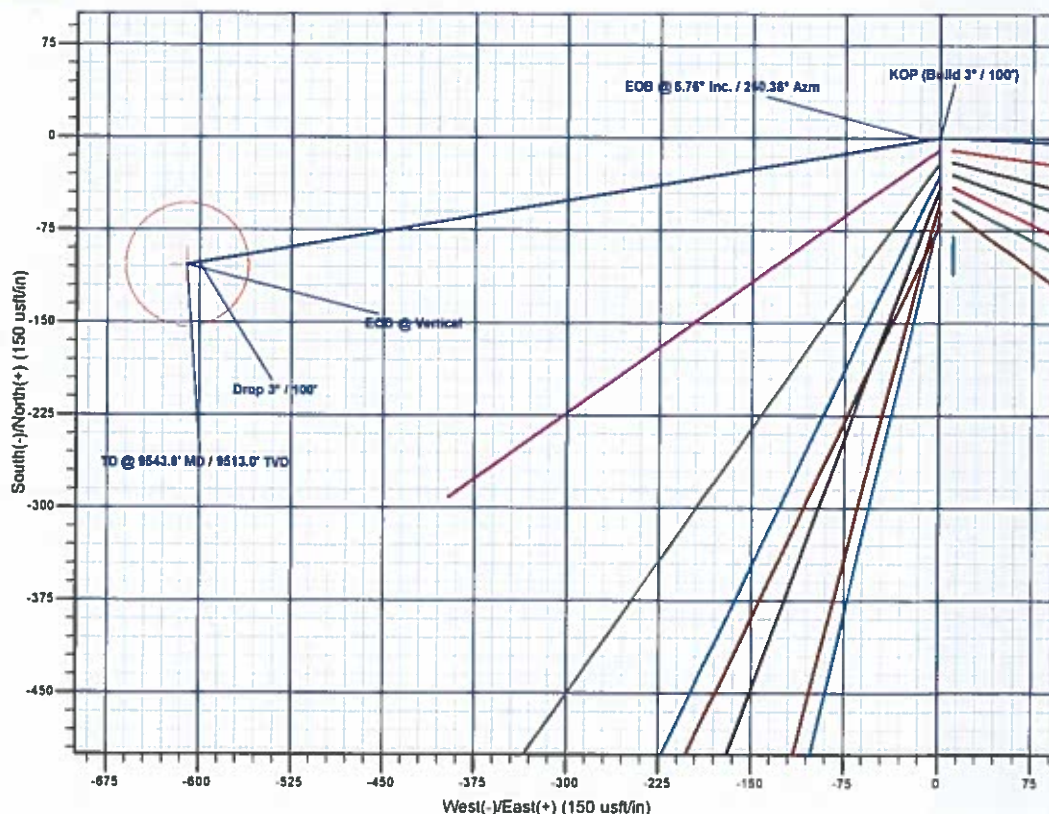
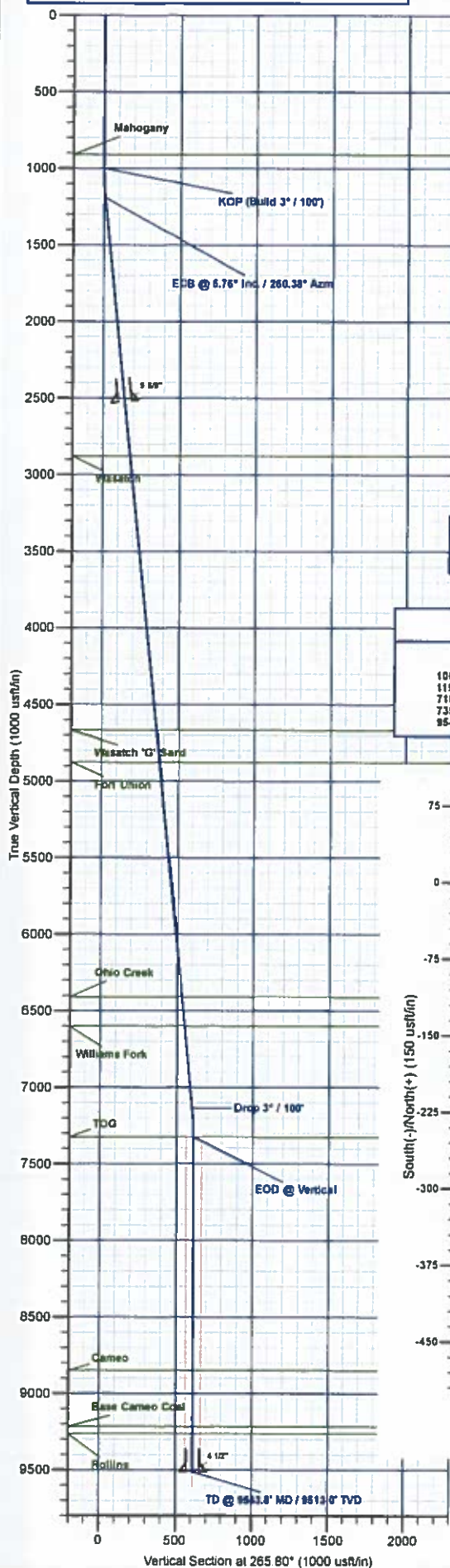
Azimuths to True North
Magnetic North: 9.78°
Magnetic Field
Strength: 51480.9nT
Dip Angle: 65.59°
Date: 8/10/2017
Model: KOPF2015

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
PBHL - CC 697-10-01W	9513.0	-103.4	-610.0	1634816.56	2236096.56	39.544280	-108.209212

SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Annotation
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
1000.0	0.00	0.00	1000.0	0.0	0.0	0.00	0.00	0.0	KOP (Build 3° / 100°)
1192.0	5.76	260.38	1191.7	-1.6	-9.5	3.00	260.38	9.8	EOB @ 5.76° Inc. / 260.38° Azm
7184.8	5.76	260.38	7134.3	-101.8	-600.5	0.00	0.00	806.3	Drop 3° / 100°
7356.8	0.00	0.00	7326.0	-103.4	-610.0	3.00	160.00	615.9	EOD @ Vertical
9543.8	0.00	0.00	9513.0	-103.4	-610.0	0.00	0.00	615.9	TD @ 9543.8° MD / 9513.0° TVD



Plan: Design #2 (CC 697-10-01W/Wellbore #1)

Created By: Will Jircik Date: 14:44, September 17 2018



Laramie Energy, LLC

Garfield County, CO

CC 610-21-41 Pad

CC 697-10-01W

Wellbore #1

Plan: Design #2

QES Well Planning Report

17 September, 2018





Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well CC 697-10-01W
Company:	Laramie Energy, LLC	TVD Reference:	RKB @ 8625.0usft (H&P #522)
Project:	Garfield County, CO	MD Reference:	RKB @ 8625.0usft (H&P #522)
Site:	CC 610-21-41 Pad	North Reference:	True
Well:	CC 697-10-01W	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 610-21-41 Pad			
Site Position:		Northing:	1,634,574.32 usft	Latitude:	39.544469
From:	Lat/Long	Easting:	2,236,708.86 usft	Longitude:	-108.207048
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-1.71 "

Well	CC 697-10-01W					
Well Position	+N/-S	27.4 usft	Northing:	1,634,601.77 usft	Latitude:	39.544544
	+E/-W	-0.3 usft	Easting:	2,236,709.35 usft	Longitude:	-108.207049
Position Uncertainty		0.0 usft	Wellhead Elevation:		Ground Level:	8,595.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	8/10/2017	9.78	65.59	51,490.85588952

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	265.80

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	
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,192.0	5.76	260.38	1,191.7	-1.6	-9.5	3.00	3.00	0.00	260.38	
7,164.8	5.76	260.38	7,134.3	-101.8	-600.5	0.00	0.00	0.00	0.00	
7,356.8	0.00	0.00	7,326.0	-103.4	-610.0	3.00	-3.00	0.00	180.00	
9,543.8	0.00	0.00	9,513.0	-103.4	-610.0	0.00	0.00	0.00	0.00	PBHL - CC 697-10-



Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well CC 697-10-01W
Company:	Laramie Energy, LLC	TVD Reference:	RKB @ 8625.0usft (H&P #522)
Project:	Garfield County, CO	MD Reference:	RKB @ 8625.0usft (H&P #522)
Site:	CC 610-21-41 Pad	North Reference:	True
Well:	CC 697-10-01W	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
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00
Mahogany									
910.0	0.00	0.00	910.0	0.0	0.0	0.0	0.00	0.00	0.00
KOP (Build 3° / 100')									
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00
1,100.0	3.00	260.38	1,100.0	-0.4	-2.6	2.6	3.00	3.00	0.00
EOB @ 5.76° Inc. / 260.38° Azm									
1,192.0	5.76	260.38	1,191.7	-1.6	-9.5	9.6	3.00	3.00	0.00
1,200.0	5.76	260.38	1,199.6	-1.7	-10.3	10.4	0.00	0.00	0.00
1,300.0	5.76	260.38	1,299.1	-3.4	-20.2	20.4	0.00	0.00	0.00
1,400.0	5.76	260.38	1,398.6	-5.1	-30.1	30.4	0.00	0.00	0.00
1,500.0	5.76	260.38	1,498.1	-6.8	-40.0	40.4	0.00	0.00	0.00
1,600.0	5.76	260.38	1,597.6	-8.5	-49.9	50.4	0.00	0.00	0.00
1,700.0	5.76	260.38	1,697.1	-10.1	-59.8	60.4	0.00	0.00	0.00
1,800.0	5.76	260.38	1,796.6	-11.8	-69.7	70.3	0.00	0.00	0.00
1,900.0	5.76	260.38	1,896.1	-13.5	-79.6	80.3	0.00	0.00	0.00
2,000.0	5.76	260.38	1,995.6	-15.2	-89.5	90.3	0.00	0.00	0.00
2,100.0	5.76	260.38	2,095.1	-16.8	-99.3	100.3	0.00	0.00	0.00
2,200.0	5.76	260.38	2,194.6	-18.5	-109.2	110.3	0.00	0.00	0.00
2,300.0	5.76	260.38	2,294.1	-20.2	-119.1	120.3	0.00	0.00	0.00
2,400.0	5.76	260.38	2,393.6	-21.9	-129.0	130.3	0.00	0.00	0.00
2,500.0	5.76	260.38	2,493.1	-23.6	-138.9	140.3	0.00	0.00	0.00
9 5/8"									
2,530.0	5.76	260.38	2,522.9	-24.1	-141.9	143.3	0.00	0.00	0.00
2,600.0	5.76	260.38	2,592.6	-25.2	-148.8	150.3	0.00	0.00	0.00
2,700.0	5.76	260.38	2,692.1	-26.9	-158.7	160.3	0.00	0.00	0.00
2,800.0	5.76	260.38	2,791.6	-28.6	-168.6	170.2	0.00	0.00	0.00
Wasatch									
2,886.9	5.76	260.38	2,878.0	-30.0	-177.2	178.9	0.00	0.00	0.00
2,900.0	5.76	260.38	2,891.1	-30.3	-178.5	180.2	0.00	0.00	0.00
3,000.0	5.76	260.38	2,990.5	-31.9	-188.4	190.2	0.00	0.00	0.00
3,100.0	5.76	260.38	3,090.0	-33.6	-198.3	200.2	0.00	0.00	0.00
3,200.0	5.76	260.38	3,189.5	-35.3	-208.2	210.2	0.00	0.00	0.00
3,300.0	5.76	260.38	3,289.0	-37.0	-218.1	220.2	0.00	0.00	0.00
3,400.0	5.76	260.38	3,388.5	-38.7	-228.0	230.2	0.00	0.00	0.00
3,500.0	5.76	260.38	3,488.0	-40.3	-237.9	240.2	0.00	0.00	0.00
3,600.0	5.76	260.38	3,587.5	-42.0	-247.8	250.2	0.00	0.00	0.00
3,700.0	5.76	260.38	3,687.0	-43.7	-257.7	260.2	0.00	0.00	0.00
3,800.0	5.76	260.38	3,786.5	-45.4	-267.6	270.2	0.00	0.00	0.00
3,900.0	5.76	260.38	3,886.0	-47.0	-277.4	280.1	0.00	0.00	0.00
4,000.0	5.76	260.38	3,985.5	-48.7	-287.3	290.1	0.00	0.00	0.00
4,100.0	5.76	260.38	4,085.0	-50.4	-297.2	300.1	0.00	0.00	0.00
4,200.0	5.76	260.38	4,184.5	-52.1	-307.1	310.1	0.00	0.00	0.00
4,300.0	5.76	260.38	4,284.0	-53.8	-317.0	320.1	0.00	0.00	0.00
4,400.0	5.76	260.38	4,383.5	-55.4	-326.9	330.1	0.00	0.00	0.00



Well Planning Report



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Company:	Laramie Energy, LLC	TVD Reference:	RKB @ 8625.0usft (H&P #522)
Project:	Garfield County, CO	MD Reference:	RKB @ 8625.0usft (H&P #522)
Site:	CC 610-21-41 Pad	North Reference:	True
Well:	CC 697-10-01W	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)
4,500.0	5.76	260.38	4,483.0	-57.1	-336.8	340.1	0.00	0.00	0.00
4,600.0	5.76	260.38	4,582.5	-58.8	-346.7	350.1	0.00	0.00	0.00
Wasatch 'G' Sand									
4,686.0	5.76	260.38	4,668.0	-60.2	-355.2	358.7	0.00	0.00	0.00
4,700.0	5.76	260.38	4,682.0	-60.5	-356.6	360.1	0.00	0.00	0.00
4,800.0	5.76	260.38	4,781.5	-62.1	-366.5	370.1	0.00	0.00	0.00
Fort Union									
4,897.0	5.76	260.38	4,878.0	-63.8	-376.1	379.8	0.00	0.00	0.00
4,900.0	5.76	260.38	4,881.0	-63.8	-376.4	380.0	0.00	0.00	0.00
5,000.0	5.76	260.38	4,980.5	-65.5	-386.3	390.0	0.00	0.00	0.00
5,100.0	5.76	260.38	5,079.9	-67.2	-396.2	400.0	0.00	0.00	0.00
5,200.0	5.76	260.38	5,179.4	-68.9	-406.1	410.0	0.00	0.00	0.00
5,300.0	5.76	260.38	5,278.9	-70.5	-416.0	420.0	0.00	0.00	0.00
5,400.0	5.76	260.38	5,378.4	-72.2	-425.9	430.0	0.00	0.00	0.00
5,500.0	5.76	260.38	5,477.9	-73.9	-435.8	440.0	0.00	0.00	0.00
5,600.0	5.76	260.38	5,577.4	-75.6	-445.6	450.0	0.00	0.00	0.00
5,700.0	5.76	260.38	5,676.9	-77.2	-455.5	460.0	0.00	0.00	0.00
5,800.0	5.76	260.38	5,776.4	-78.9	-465.4	470.0	0.00	0.00	0.00
5,900.0	5.76	260.38	5,875.9	-80.6	-475.3	480.0	0.00	0.00	0.00
6,000.0	5.76	260.38	5,975.4	-82.3	-485.2	489.9	0.00	0.00	0.00
6,100.0	5.76	260.38	6,074.9	-84.0	-495.1	499.9	0.00	0.00	0.00
6,200.0	5.76	260.38	6,174.4	-85.6	-505.0	509.9	0.00	0.00	0.00
6,300.0	5.76	260.38	6,273.9	-87.3	-514.9	519.9	0.00	0.00	0.00
6,400.0	5.76	260.38	6,373.4	-89.0	-524.8	529.9	0.00	0.00	0.00
Ohio Creek									
6,438.8	5.76	260.38	6,412.0	-89.6	-528.6	533.8	0.00	0.00	0.00
6,500.0	5.76	260.38	6,472.9	-90.7	-534.7	539.9	0.00	0.00	0.00
6,600.0	5.76	260.38	6,572.4	-92.3	-544.6	549.9	0.00	0.00	0.00
Williams Fork									
6,627.8	5.76	260.38	6,600.0	-92.8	-547.3	552.7	0.00	0.00	0.00
6,700.0	5.76	260.38	6,671.9	-94.0	-554.5	559.9	0.00	0.00	0.00
6,800.0	5.76	260.38	6,771.4	-95.7	-564.4	569.9	0.00	0.00	0.00
6,900.0	5.76	260.38	6,870.9	-97.4	-574.3	579.9	0.00	0.00	0.00
7,000.0	5.76	260.38	6,970.4	-99.1	-584.2	589.8	0.00	0.00	0.00
7,100.0	5.76	260.38	7,069.9	-100.7	-594.1	599.8	0.00	0.00	0.00
Drop 3° / 100'									
7,164.8	5.76	260.38	7,134.3	-101.8	-600.5	606.3	0.00	0.00	0.00
7,200.0	4.70	260.38	7,169.4	-102.4	-603.6	609.5	3.00	-3.00	0.00
7,300.0	1.70	260.38	7,269.2	-103.3	-609.1	615.1	3.00	-3.00	0.00
EOD @ Vertical - TOG									
7,356.8	0.00	0.00	7,326.0	-103.4	-610.0	615.9	3.00	-3.00	175.40
7,400.0	0.00	0.00	7,369.2	-103.4	-610.0	615.9	0.00	0.00	0.00
7,500.0	0.00	0.00	7,469.2	-103.4	-610.0	615.9	0.00	0.00	0.00
7,600.0	0.00	0.00	7,569.2	-103.4	-610.0	615.9	0.00	0.00	0.00
7,700.0	0.00	0.00	7,669.2	-103.4	-610.0	615.9	0.00	0.00	0.00
7,800.0	0.00	0.00	7,769.2	-103.4	-610.0	615.9	0.00	0.00	0.00
7,900.0	0.00	0.00	7,869.2	-103.4	-610.0	615.9	0.00	0.00	0.00
8,000.0	0.00	0.00	7,969.2	-103.4	-610.0	615.9	0.00	0.00	0.00
8,100.0	0.00	0.00	8,069.2	-103.4	-610.0	615.9	0.00	0.00	0.00
8,200.0	0.00	0.00	8,169.2	-103.4	-610.0	615.9	0.00	0.00	0.00
8,300.0	0.00	0.00	8,269.2	-103.4	-610.0	615.9	0.00	0.00	0.00
8,400.0	0.00	0.00	8,369.2	-103.4	-610.0	615.9	0.00	0.00	0.00
8,500.0	0.00	0.00	8,469.2	-103.4	-610.0	615.9	0.00	0.00	0.00



Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well CC 697-10-01W
Company:	Laramie Energy, LLC	TVD Reference:	RKB @ 8625.0usft (H&P #522)
Project:	Garfield County, CO	MD Reference:	RKB @ 8625.0usft (H&P #522)
Site:	CC 610-21-41 Pad	North Reference:	True
Well:	CC 697-10-01W	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)
8,600.0	0.00	0.00	8,569.2	-103.4	-610.0	615.9	0.00	0.00	0.00
8,700.0	0.00	0.00	8,669.2	-103.4	-610.0	615.9	0.00	0.00	0.00
8,800.0	0.00	0.00	8,769.2	-103.4	-610.0	615.9	0.00	0.00	0.00
Cameo									
8,880.8	0.00	0.00	8,850.0	-103.4	-610.0	615.9	0.00	0.00	0.00
8,900.0	0.00	0.00	8,869.2	-103.4	-610.0	615.9	0.00	0.00	0.00
9,000.0	0.00	0.00	8,969.2	-103.4	-610.0	615.9	0.00	0.00	0.00
9,100.0	0.00	0.00	9,069.2	-103.4	-610.0	615.9	0.00	0.00	0.00
9,200.0	0.00	0.00	9,169.2	-103.4	-610.0	615.9	0.00	0.00	0.00
Base Cameo Coal									
9,247.8	0.00	0.00	9,217.0	-103.4	-610.0	615.9	0.00	0.00	0.00
Rollins									
9,293.8	0.00	0.00	9,263.0	-103.4	-610.0	615.9	0.00	0.00	0.00
9,300.0	0.00	0.00	9,269.2	-103.4	-610.0	615.9	0.00	0.00	0.00
9,400.0	0.00	0.00	9,369.2	-103.4	-610.0	615.9	0.00	0.00	0.00
9,500.0	0.00	0.00	9,469.2	-103.4	-610.0	615.9	0.00	0.00	0.00
TD @ 9543.8' MD / 9513.0' TVD									
9,543.8	0.00	0.00	9,513.0	-103.4	-610.0	615.9	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
- hit/miss target									
- Shape									
PBHL - CC 697-10-01	0.00	0.00	9,513.0	-103.4	-610.0	1,634,516.56	2,236,096.56	39.544260	-108.209212
- plan hits target center									
- Circle (radius 50.0)									

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
2,530.0	2,522.9	9 5/8"	9-5/8	14-1/2
9,543.8	9,513.0	4 1/2"	4-1/2	8-3/4



Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well CC 697-10-01W
Company:	Laramie Energy, LLC	TVD Reference:	RKB @ 8625.0usft (H&P #522)
Project:	Garfield County, CO	MD Reference:	RKB @ 8625.0usft (H&P #522)
Site:	CC 610-21-41 Pad	North Reference:	True
Well:	CC 697-10-01W	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #2		

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
910.0	910.0	Mahogany			
2,886.9	2,878.0	Wasatch			
4,686.0	4,668.0	Wasatch 'G' Sand			
4,897.0	4,878.0	Fort Union			
6,438.8	6,412.0	Ohio Creek			
6,627.8	6,600.0	Williams Fork			
7,356.8	7,326.0	TOG			
8,880.8	8,850.0	Cameo			
9,247.8	9,217.0	Base Cameo Coal			
9,293.8	9,263.0	Rollins			

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,000.0	1,000.0	0.0	0.0	KOP (Build 3° / 100')
1,192.0	1,191.7	-1.6	-9.5	EOB @ 5.76° Inc. / 260.38° Azm
7,164.8	7,134.3	-101.8	-600.5	Drop 3° / 100'
7,356.8	7,326.0	-103.4	-610.0	EOD @ Vertical
9,543.8	9,513.0	-103.4	-610.0	TD @ 9543.8' MD / 9513.0' TVD