



Project: Mesa County, CO  
 Site: Gunderson 20-03 Pad  
 Well: Gunderson 20-10E  
 Wellbore: Wellbore #1  
 Design: Design #2  
 Latitude: 39.266672  
 Longitude: -107.795281  
 Ground Level: 7146.0  
 well @ 7176.0usft (H&P #522)



**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

**REFERENCE INFORMATION**

Co-ordinate (N/E) Reference: Well Gunderson 20-10E, True North  
 Vertical (TVD) Reference: well @ 7176.0usft (H&P #522)  
 Section (VS) Reference: Slot - (0.0N, 0.0E)  
 Measured Depth Reference: well @ 7176.0usft (H&P #522)  
 Calculation Method: Minimum Curvature

**WELL DETAILS: Gunderson 20-10E**

Ground Level: 7146.0  

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.0	0.0	1530227.90	2350229.38	39.266672	-107.795281

**WELLBORE TARGET DETAILS (MAP CO-ORDINATES AND LAT/LONG)**

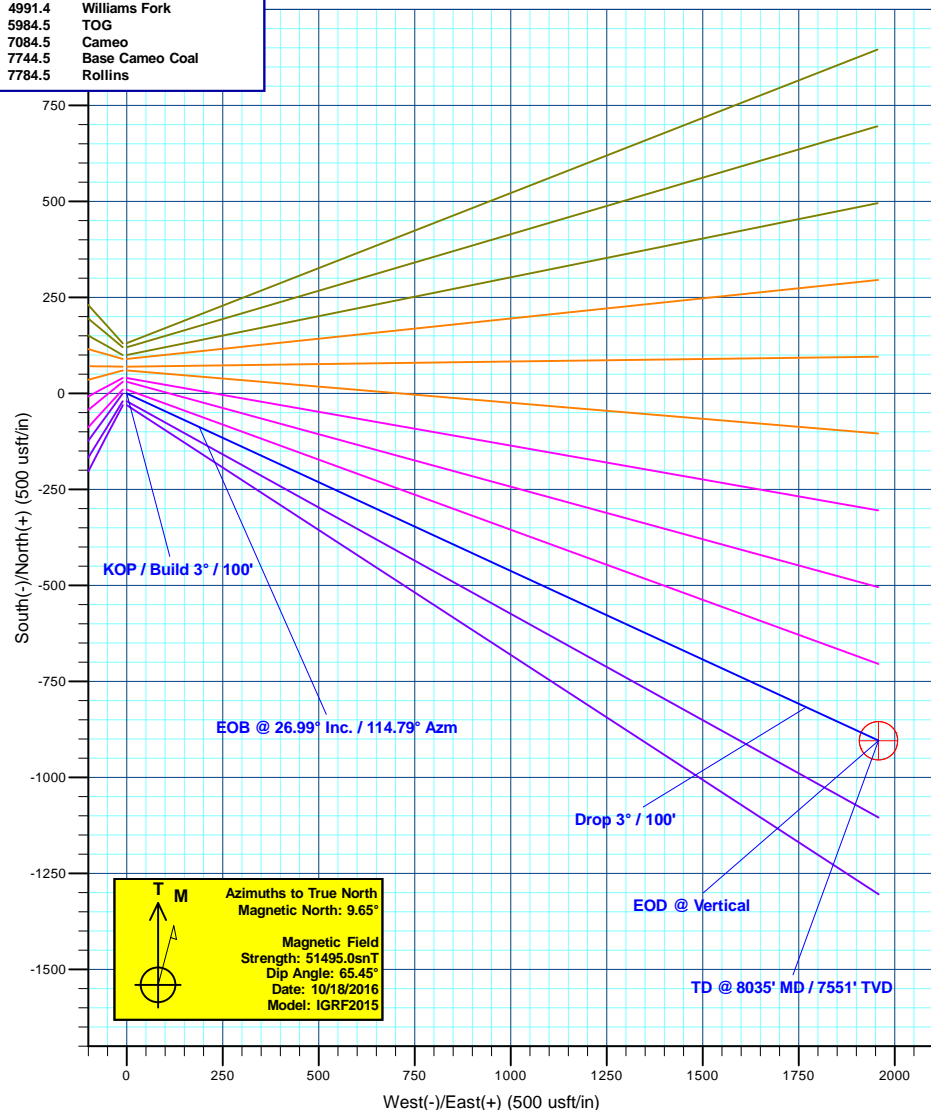
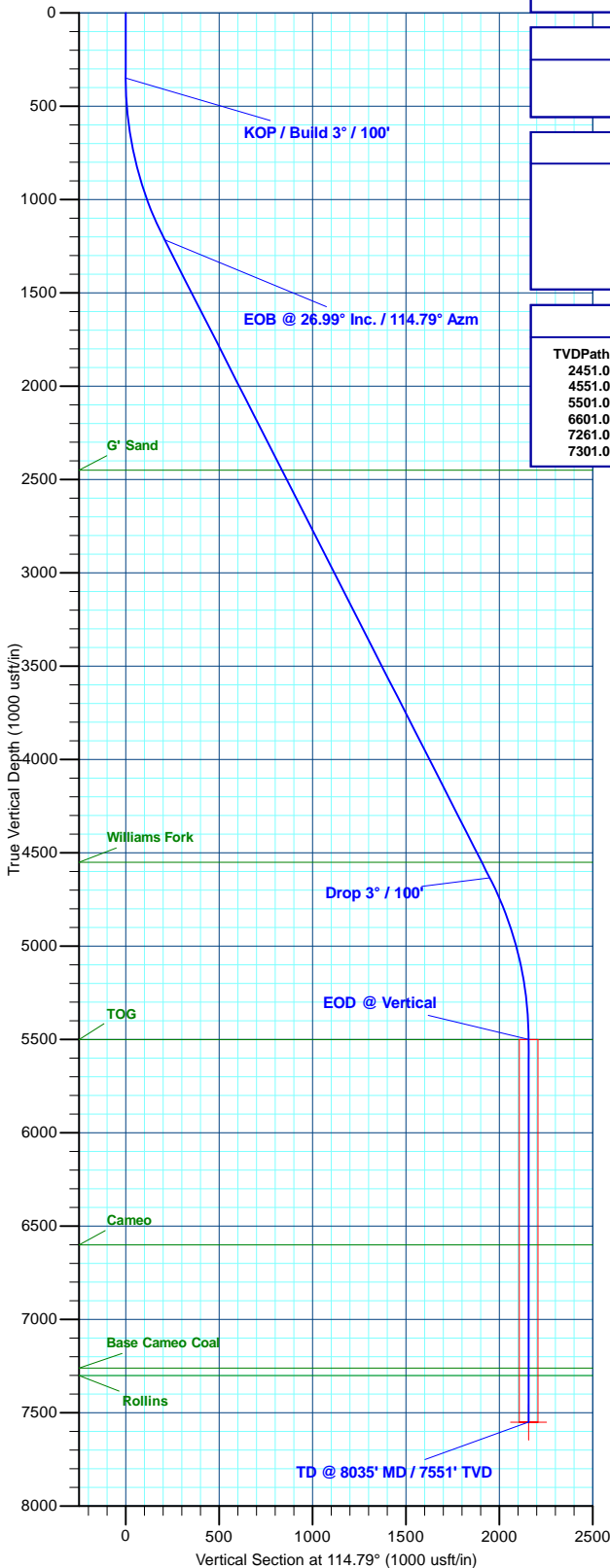
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
PBHL - Gunderson 20-10E	7551.0	-904.3	1957.8	1529274.45	2352163.75	39.264189	-107.788366

**SECTION DETAILS**

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Annotation
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
350.0	0.00	0.00	350.0	0.0	0.0	0.00	0.00	0.0	KOP / Build 3° / 100'
1249.7	26.99	114.79	1216.8	-87.2	188.8	3.00	114.79	208.0	EOB @ 26.99° Inc. / 114.79° Azm
5084.9	26.99	114.79	4634.2	-817.1	1769.0	0.00	0.00	1948.6	Drop 3° / 100'
5984.5	0.00	0.00	5501.0	-904.3	1957.8	3.00	180.00	2156.6	EOD @ Vertical
8034.5	0.00	0.00	7551.0	-904.3	1957.8	0.00	0.00	2156.6	TD @ 8035' MD / 7551' TVD

**FORMATION TOP DETAILS**

TVDPath	MDPath	Formation
2451.0	2634.8	G' Sand
4551.0	4991.4	Williams Fork
5501.0	5984.5	TOG
6601.0	7084.5	Cameo
7261.0	7744.5	Base Cameo Coal
7301.0	7784.5	Rollins



**Plan: Design #2 (Gunderson 20-10E/Wellbore #1)**

**Created By: Will Jircik Date: 15:00, November 15 2016**



# **Laramie Energy, LLC**

**Mesa County, CO  
Gunderson 20-03 Pad  
Gunderson 20-10E**

**Wellbore #1**

**Plan: Design #2**

## **QES Well Planning Report**

**15 November, 2016**





# Well Planning Report



<b>Database:</b>	EDM5002	<b>Local Co-ordinate Reference:</b>	Well Gunderson 20-10E
<b>Company:</b>	Laramie Energy, LLC	<b>TVD Reference:</b>	well @ 7176.0usft (H&P #522)
<b>Project:</b>	Mesa County, CO	<b>MD Reference:</b>	well @ 7176.0usft (H&P #522)
<b>Site:</b>	Gunderson 20-03 Pad	<b>North Reference:</b>	True
<b>Well:</b>	Gunderson 20-10E	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Design #2		

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 20-03 Pad			
Site Position:		Northing:	1,530,258.75 usft	Latitude:	39.266756
From:	Lat/Long	Easting:	2,350,219.97 usft	Longitude:	-107.795317
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-1.45 °

Well	Gunderson 20-10E					
Well Position	+N/-S	-30.6 usft	Northing:	1,530,227.90 usft	Latitude:	39.266672
	+E/-W	10.2 usft	Easting:	2,350,229.38 usft	Longitude:	-107.795281
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	7,146.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	10/18/2016	9.65	65.45	51,495

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	114.79

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	
350.0	0.00	0.00	350.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,249.7	26.99	114.79	1,216.8	-87.2	188.8	3.00	3.00	0.00	114.79	
5,084.9	26.99	114.79	4,634.2	-817.1	1,769.0	0.00	0.00	0.00	0.00	
5,984.5	0.00	0.00	5,501.0	-904.3	1,957.8	3.00	-3.00	0.00	180.00	
8,034.5	0.00	0.00	7,551.0	-904.3	1,957.8	0.00	0.00	0.00	0.00	PBHL - Gunderson 20



# Well Planning Report



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<b>Company:</b>	Laramie Energy, LLC	<b>TVD Reference:</b>	well @ 7176.0usft (H&P #522)
<b>Project:</b>	Mesa County, CO	<b>MD Reference:</b>	well @ 7176.0usft (H&P #522)
<b>Site:</b>	Gunderson 20-03 Pad	<b>North Reference:</b>	True
<b>Well:</b>	Gunderson 20-10E	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	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
<b>KOP / Build 3° / 100'</b>									
350.0	0.00	0.00	350.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	1.50	114.79	400.0	-0.3	0.6	0.7	3.00	3.00	0.00
500.0	4.50	114.79	499.8	-2.5	5.3	5.9	3.00	3.00	0.00
600.0	7.50	114.79	599.3	-6.9	14.8	16.3	3.00	3.00	0.00
700.0	10.50	114.79	698.0	-13.4	29.0	32.0	3.00	3.00	0.00
800.0	13.50	114.79	795.8	-22.1	47.9	52.8	3.00	3.00	0.00
900.0	16.50	114.79	892.4	-33.0	71.4	78.6	3.00	3.00	0.00
1,000.0	19.50	114.79	987.5	-45.9	99.5	109.5	3.00	3.00	0.00
1,100.0	22.50	114.79	1,080.9	-61.0	132.0	145.4	3.00	3.00	0.00
1,200.0	25.50	114.79	1,172.2	-78.0	168.9	186.0	3.00	3.00	0.00
<b>EOB @ 26.99° Inc. / 114.79° Azm</b>									
1,249.7	26.99	114.79	1,216.8	-87.2	188.9	208.0	3.00	3.00	0.00
1,300.0	26.99	114.79	1,261.6	-96.8	209.6	230.9	0.00	0.00	0.00
1,400.0	26.99	114.79	1,350.7	-115.8	250.8	276.2	0.00	0.00	0.00
1,500.0	26.99	114.79	1,439.8	-134.9	292.0	321.6	0.00	0.00	0.00
<b>8 5/8"</b>									
1,530.0	26.99	114.79	1,466.6	-140.6	304.3	335.2	0.00	0.00	0.00
1,600.0	26.99	114.79	1,528.9	-153.9	333.2	367.0	0.00	0.00	0.00
1,700.0	26.99	114.79	1,618.0	-172.9	374.4	412.4	0.00	0.00	0.00
1,800.0	26.99	114.79	1,707.2	-191.9	415.6	457.8	0.00	0.00	0.00
1,900.0	26.99	114.79	1,796.3	-211.0	456.8	503.2	0.00	0.00	0.00
2,000.0	26.99	114.79	1,885.4	-230.0	498.0	548.5	0.00	0.00	0.00
2,100.0	26.99	114.79	1,974.5	-249.0	539.2	593.9	0.00	0.00	0.00
2,200.0	26.99	114.79	2,063.6	-268.1	580.4	639.3	0.00	0.00	0.00
2,300.0	26.99	114.79	2,152.7	-287.1	621.6	684.7	0.00	0.00	0.00
2,400.0	26.99	114.79	2,241.8	-306.1	662.8	730.1	0.00	0.00	0.00
2,500.0	26.99	114.79	2,330.9	-325.2	704.0	775.5	0.00	0.00	0.00
2,600.0	26.99	114.79	2,420.0	-344.2	745.2	820.8	0.00	0.00	0.00
<b>G' Sand</b>									
2,634.8	26.99	114.79	2,451.0	-350.8	759.5	836.6	0.00	0.00	0.00
2,700.0	26.99	114.79	2,509.1	-363.2	786.4	866.2	0.00	0.00	0.00
2,800.0	26.99	114.79	2,598.2	-382.2	827.6	911.6	0.00	0.00	0.00
2,900.0	26.99	114.79	2,687.3	-401.3	868.8	957.0	0.00	0.00	0.00
3,000.0	26.99	114.79	2,776.5	-420.3	910.0	1,002.4	0.00	0.00	0.00
3,100.0	26.99	114.79	2,865.6	-439.3	951.2	1,047.8	0.00	0.00	0.00
3,200.0	26.99	114.79	2,954.7	-458.4	992.4	1,093.1	0.00	0.00	0.00
3,300.0	26.99	114.79	3,043.8	-477.4	1,033.6	1,138.5	0.00	0.00	0.00
3,400.0	26.99	114.79	3,132.9	-496.4	1,074.8	1,183.9	0.00	0.00	0.00
3,500.0	26.99	114.79	3,222.0	-515.5	1,116.0	1,229.3	0.00	0.00	0.00
3,600.0	26.99	114.79	3,311.1	-534.5	1,157.2	1,274.7	0.00	0.00	0.00
3,700.0	26.99	114.79	3,400.2	-553.5	1,198.4	1,320.1	0.00	0.00	0.00
3,800.0	26.99	114.79	3,489.3	-572.5	1,239.6	1,365.5	0.00	0.00	0.00
3,900.0	26.99	114.79	3,578.4	-591.6	1,280.8	1,410.8	0.00	0.00	0.00
4,000.0	26.99	114.79	3,667.5	-610.6	1,322.0	1,456.2	0.00	0.00	0.00
4,100.0	26.99	114.79	3,756.6	-629.6	1,363.2	1,501.6	0.00	0.00	0.00
4,200.0	26.99	114.79	3,845.8	-648.7	1,404.4	1,547.0	0.00	0.00	0.00
4,300.0	26.99	114.79	3,934.9	-667.7	1,445.6	1,592.4	0.00	0.00	0.00
4,400.0	26.99	114.79	4,024.0	-686.7	1,486.8	1,637.8	0.00	0.00	0.00
4,500.0	26.99	114.79	4,113.1	-705.8	1,528.0	1,683.1	0.00	0.00	0.00



# Well Planning Report



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<b>Company:</b>	Laramie Energy, LLC	<b>TVD Reference:</b>	well @ 7176.0usft (H&P #522)
<b>Project:</b>	Mesa County, CO	<b>MD Reference:</b>	well @ 7176.0usft (H&P #522)
<b>Site:</b>	Gunderson 20-03 Pad	<b>North Reference:</b>	True
<b>Well:</b>	Gunderson 20-10E	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	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)
4,600.0	26.99	114.79	4,202.2	-724.8	1,569.2	1,728.5	0.00	0.00	0.00
4,700.0	26.99	114.79	4,291.3	-743.8	1,610.4	1,773.9	0.00	0.00	0.00
4,800.0	26.99	114.79	4,380.4	-762.8	1,651.6	1,819.3	0.00	0.00	0.00
4,900.0	26.99	114.79	4,469.5	-781.9	1,692.8	1,864.7	0.00	0.00	0.00
<b>Williams Fork</b>									
4,991.4	26.99	114.79	4,551.0	-799.3	1,730.5	1,906.2	0.00	0.00	0.00
5,000.0	26.99	114.79	4,558.6	-800.9	1,734.0	1,910.1	0.00	0.00	0.00
<b>Drop 3° / 100'</b>									
5,084.9	26.99	114.79	4,634.3	-817.1	1,769.0	1,948.6	0.00	0.00	0.00
5,100.0	26.54	114.79	4,647.8	-819.9	1,775.2	1,955.4	3.01	-3.01	0.00
5,200.0	23.54	114.79	4,738.3	-837.7	1,813.6	1,997.7	3.00	-3.00	0.00
5,300.0	20.54	114.79	4,831.0	-853.4	1,847.7	2,035.2	3.00	-3.00	0.00
5,400.0	17.54	114.79	4,925.6	-867.1	1,877.3	2,067.8	3.00	-3.00	0.00
5,500.0	14.54	114.79	5,021.7	-878.6	1,902.3	2,095.5	3.00	-3.00	0.00
5,600.0	11.54	114.79	5,119.1	-888.1	1,922.8	2,118.0	3.00	-3.00	0.00
5,700.0	8.54	114.79	5,217.5	-895.4	1,938.6	2,135.4	3.00	-3.00	0.00
5,800.0	5.54	114.79	5,316.8	-900.5	1,949.8	2,147.7	3.00	-3.00	0.00
5,900.0	2.54	114.79	5,416.5	-903.5	1,956.1	2,154.7	3.00	-3.00	0.00
<b>EOD @ Vertical - TOG</b>									
5,984.5	0.00	0.00	5,501.0	-904.3	1,957.8	2,156.6	3.00	-3.00	-135.80
6,000.0	0.00	0.00	5,516.5	-904.3	1,957.8	2,156.6	0.00	0.00	0.00
6,100.0	0.00	0.00	5,616.5	-904.3	1,957.8	2,156.6	0.00	0.00	0.00
6,200.0	0.00	0.00	5,716.5	-904.3	1,957.8	2,156.6	0.00	0.00	0.00
6,300.0	0.00	0.00	5,816.5	-904.3	1,957.8	2,156.6	0.00	0.00	0.00
6,400.0	0.00	0.00	5,916.5	-904.3	1,957.8	2,156.6	0.00	0.00	0.00
6,500.0	0.00	0.00	6,016.5	-904.3	1,957.8	2,156.6	0.00	0.00	0.00
6,600.0	0.00	0.00	6,116.5	-904.3	1,957.8	2,156.6	0.00	0.00	0.00
6,700.0	0.00	0.00	6,216.5	-904.3	1,957.8	2,156.6	0.00	0.00	0.00
6,800.0	0.00	0.00	6,316.5	-904.3	1,957.8	2,156.6	0.00	0.00	0.00
6,900.0	0.00	0.00	6,416.5	-904.3	1,957.8	2,156.6	0.00	0.00	0.00
7,000.0	0.00	0.00	6,516.5	-904.3	1,957.8	2,156.6	0.00	0.00	0.00
<b>Cameo</b>									
7,084.5	0.00	0.00	6,601.0	-904.3	1,957.8	2,156.6	0.00	0.00	0.00
7,100.0	0.00	0.00	6,616.5	-904.3	1,957.8	2,156.6	0.00	0.00	0.00
7,200.0	0.00	0.00	6,716.5	-904.3	1,957.8	2,156.6	0.00	0.00	0.00
7,300.0	0.00	0.00	6,816.5	-904.3	1,957.8	2,156.6	0.00	0.00	0.00
7,400.0	0.00	0.00	6,916.5	-904.3	1,957.8	2,156.6	0.00	0.00	0.00
7,500.0	0.00	0.00	7,016.5	-904.3	1,957.8	2,156.6	0.00	0.00	0.00
7,600.0	0.00	0.00	7,116.5	-904.3	1,957.8	2,156.6	0.00	0.00	0.00
7,700.0	0.00	0.00	7,216.5	-904.3	1,957.8	2,156.6	0.00	0.00	0.00
<b>Base Cameo Coal</b>									
7,744.5	0.00	0.00	7,261.0	-904.3	1,957.8	2,156.6	0.00	0.00	0.00
<b>Rollins</b>									
7,784.5	0.00	0.00	7,301.0	-904.3	1,957.8	2,156.6	0.00	0.00	0.00
7,800.0	0.00	0.00	7,316.5	-904.3	1,957.8	2,156.6	0.00	0.00	0.00
7,900.0	0.00	0.00	7,416.5	-904.3	1,957.8	2,156.6	0.00	0.00	0.00
8,000.0	0.00	0.00	7,516.5	-904.3	1,957.8	2,156.6	0.00	0.00	0.00
<b>TD @ 8035' MD / 7551' TVD</b>									
8,034.5	0.00	0.00	7,551.0	-904.3	1,957.8	2,156.6	0.00	0.00	0.00



# Well Planning Report



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<b>Company:</b>	Laramie Energy, LLC	<b>TVD Reference:</b>	well @ 7176.0usft (H&P #522)
<b>Project:</b>	Mesa County, CO	<b>MD Reference:</b>	well @ 7176.0usft (H&P #522)
<b>Site:</b>	Gunderson 20-03 Pad	<b>North Reference:</b>	True
<b>Well:</b>	Gunderson 20-10E	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Design #2		

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 - Gunderson 20-10E	0.00	0.00	7,551.0	-904.3	1,957.8	1,529,274.45	2,352,163.76	39.264189	-107.788366
- plan hits target center									
- Circle (radius 50.0)									

Casing Points				
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,530.0	1,466.6	8 5/8"	8-5/8	11

Formations					
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
2,634.8	2,451.0	G' Sand		0.00	
4,991.4	4,551.0	Williams Fork		0.00	
5,984.5	5,501.0	TOG		0.00	
7,084.5	6,601.0	Cameo		0.00	
7,744.5	7,261.0	Base Cameo Coal		0.00	
7,784.5	7,301.0	Rollins		0.00	

Plan Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
350.0	350.0	0.0	0.0	KOP / Build 3° / 100'
1,249.7	1,216.8	-87.2	188.9	EOB @ 26.99° Inc. / 114.79° Azm
5,084.9	4,634.3	-817.1	1,769.0	Drop 3° / 100'
5,984.5	5,501.0	-904.3	1,957.8	EOD @ Vertical
8,034.5	7,551.0	-904.3	1,957.8	TD @ 8035' MD / 7551' TVD