



Project: Mesa County, CO  
 Site: Gunderson 13-11 Pad  
 Well: Gunderson 0994-13-05W  
 Wellbore: Wellbore #1  
 Design: Design #1  
 Latitude: 39.273929  
 Longitude: -107.834809  
 Ground Level: 7272.0  
 well @ 7302.0ustf (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

#### SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dieg	TFace	VSec	Annotation
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	KOP (Build 3" / 100')
225.0	0.00	0.00	225.0	0.0	0.0	0.00	0.00	0.0	EOB @ 10.00" Inc. / 20.00" Azm / Build 3" / 100'
558.3	10.00	20.00	558.3	27.3	9.9	3.00	20.00	29.6	EOB @ 28.20" Inc. / 356.70" Azm
1240.6	29.20	356.70	1197.1	251.2	17.8	3.00	-35.04	248.7	Drop 3" / 100'
5394.8	28.20	356.70	4825.4	2273.0	-134.1	0.00	0.00	2278.9	EOB @ Vertical
6376.0	0.00	0.00	8787.0	2514.9	-152.3	3.00	180.00	2518.5	TD @ 8220.0" MD / 7607.0" TVD
8220.0	0.00	0.00	7607.0	2514.9	-152.3	0.00	0.00	2518.5	

#### DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
PBHL - Gunderson 0994-13-05W	7607.0	2514.9	-152.3	1533673.33	2339022.16	39.280834	-107.835347

#### WELL DETAILS: Gunderson 0994-13-05W

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.0	0.0	1533155.31	2339109.77	39.273929	-107.834809

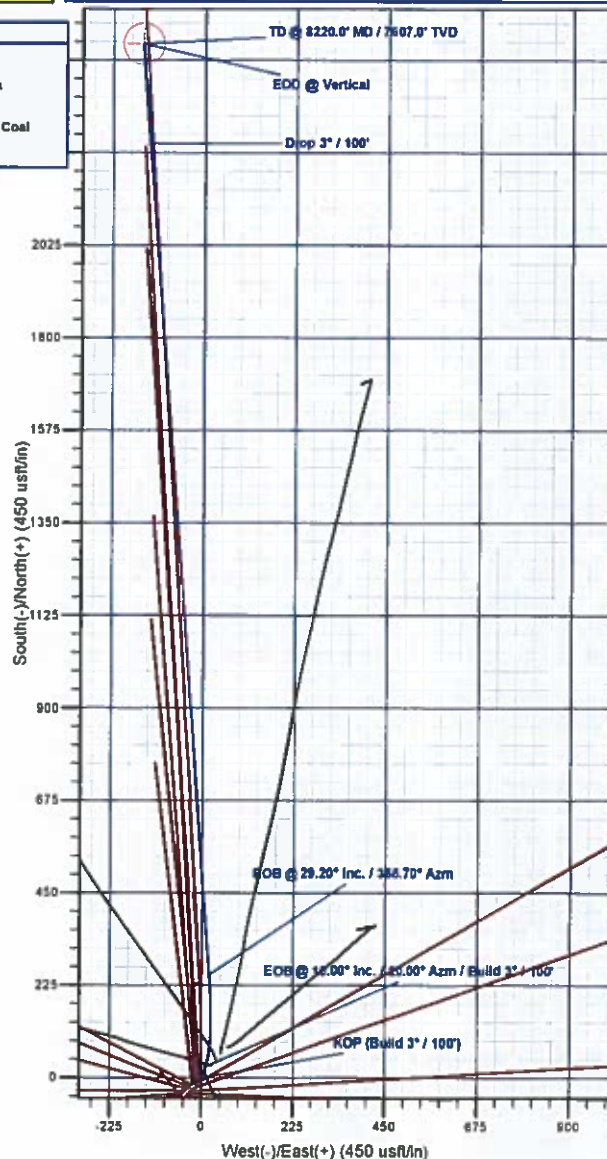
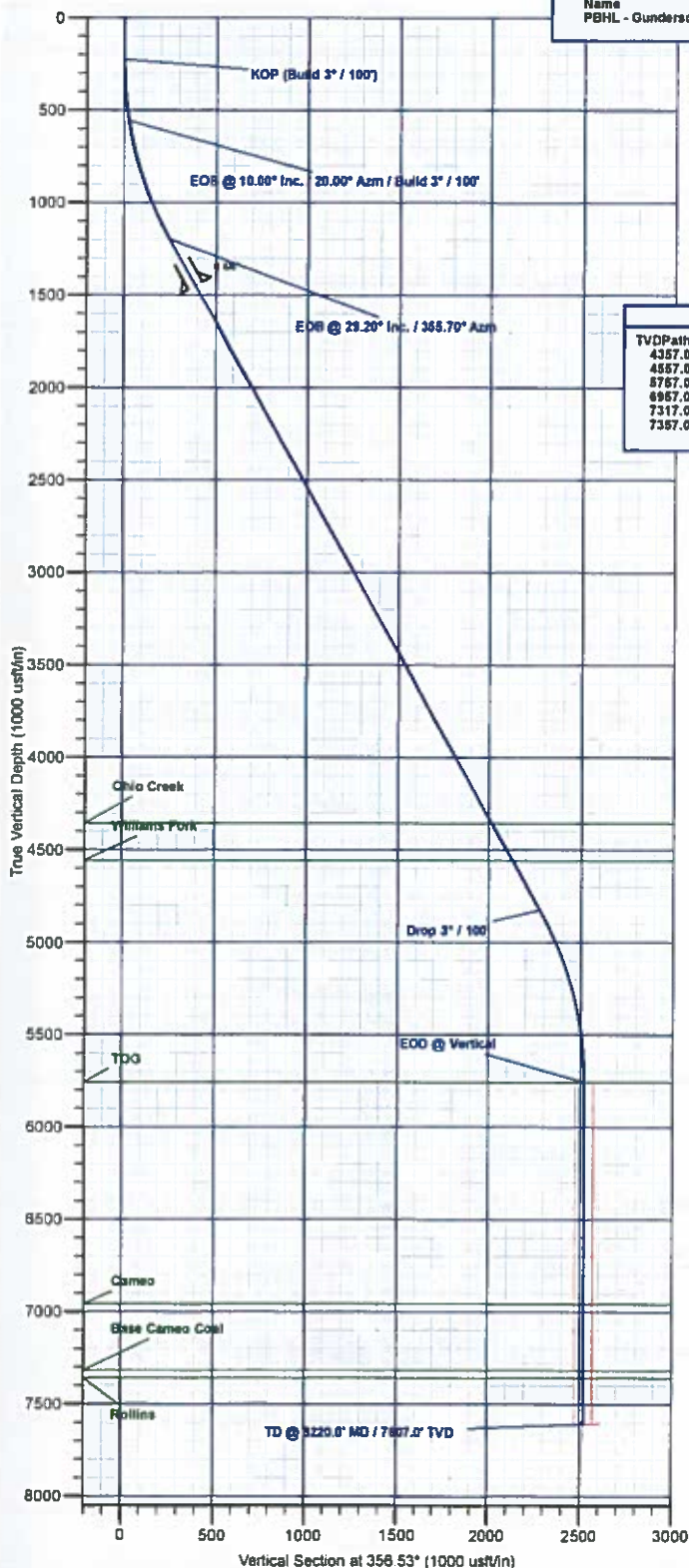
#### REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well Gunderson 0994-13-05W, True North  
 Vertical (TVD) Reference: well @ 7302.0ustf (H&P #522)  
 Section (VS) Reference: Slot - (0.0N, 0.0E)  
 Measured Depth Reference: well @ 7302.0ustf (H&P #522)  
 Calculation Method: Minimum Curvature



#### FORMATION TOP DETAILS

TVDPath	MDPath	Formation
4357.0	4860.3	Ohio Creek
4557.0	5089.4	Williams Fork
5767.0	6370.0	TOG
6967.0	7670.0	Cameo
7317.0	7930.0	Base Cameo Coal
7357.0	7970.0	Rollins



Plan: Design #1 (Gunderson 0994-13-05W/Wellbore #1)

Created By: Will Jircik

Date: 9:50, October 10 2017



# **Laramie Energy, LLC**

**Mesa County, CO**

**Gunderson 13-11 Pad**

**Gunderson 0994-13-05W**

**Wellbore #1**

**Plan: Design #1**

## **QES Well Planning Report**

**10 October, 2017**





## Well Planning Report



<b>Database:</b>	EDM 5000 1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well Gunderson 0994-13-05W
<b>Company:</b>	Laramie Energy, LLC	<b>TVD Reference:</b>	well @ 7302 0usft (H&P #522)
<b>Project:</b>	Mesa County, CO	<b>MD Reference:</b>	well @ 7302 0usft (H&P #522)
<b>Site:</b>	Gunderson 13-11 Pad	<b>North Reference:</b>	True
<b>Well:</b>	Gunderson 0994-13-05W	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Design #1		

<b>Project</b>	Mesa County, CO		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		
<b>Map Zone:</b>	Colorado Central Zone		

<b>Site</b>	Gunderson 13-11 Pad			
<b>Site Position:</b>		<b>Northing:</b>	1,533,162.26 usft	<b>Latitude:</b> 39.273948
<b>From:</b>	Lat/Long	<b>Easting:</b>	2,339,102.68 usft	<b>Longitude:</b> -107.834835
<b>Position Uncertainty:</b>	0.0 usft	<b>Slot Radius:</b>	13-3/16 "	<b>Grid Convergence:</b> -1.47 "

<b>Well</b>	Gunderson 0994-13-05W			
<b>Well Position</b>	<b>+N/-S</b>	-6.8 usft	<b>Northing:</b>	1,533,155.31 usft
	<b>+E/-W</b>	7.3 usft	<b>Easting:</b>	2,339,109.77 usft
<b>Position Uncertainty</b>	0.0 usft	<b>Wellhead Elevation:</b>		<b>Ground Level:</b> 7,272.0 usft

<b>Wellbore</b>	Wellbore #1				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2015	10/5/2017	9.57	65.43	51,385.87871708

<b>Design</b>	Design #1			
<b>Audit Notes:</b>				
<b>Version:</b>	<b>Phase:</b>	PLAN	<b>Tie On Depth:</b>	0.0
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>
	0.0	0.0	0.0	356.53

<b>Plan Sections</b>										
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	
225.0	0.00	0.00	225.0	0.0	0.0	0.00	0.00	0.00	0.00	
558.3	10.00	20.00	556.6	27.3	9.9	3.00	3.00	0.00	20.00	
1,240.5	29.20	355.70	1,197.1	251.2	17.8	3.00	2.81	-3.56	-35.04	
5,396.8	29.20	355.70	4,825.4	2,273.0	-134.1	0.00	0.00	0.00	0.00	
6,370.0	0.00	0.00	5,757.0	2,514.9	-152.3	3.00	-3.00	0.00	180.00	
8,220.0	0.00	0.00	7,607.0	2,514.9	-152.3	0.00	0.00	0.00	0.00	PBHL - Gunderson 05





## Well Planning Report



<b>Database:</b>	EDM 5000 1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well Gunderson 0994-13-05W
<b>Company:</b>	Laramie Energy, LLC	<b>TVD Reference:</b>	well @ 7302.0usft (H&P #522)
<b>Project:</b>	Mesa County, CO	<b>MD Reference:</b>	well @ 7302.0usft (H&P #522)
<b>Site:</b>	Gunderson 13-11 Pad	<b>North Reference:</b>	True
<b>Well:</b>	Gunderson 0994-13-05W	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	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
<b>KOP (Build 3° / 100')</b>									
225.0	0.00	0.00	225.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	2.25	20.00	300.0	1.4	0.5	1.4	3.00	3.00	0.00
400.0	5.25	20.00	399.8	7.5	2.7	7.3	3.00	3.00	0.00
500.0	8.25	20.00	499.1	18.6	6.8	18.1	3.00	3.00	0.00
<b>EOB @ 10.00° Inc. / 20.00° Azm / Build 3° / 100'</b>									
558.3	10.00	20.00	556.6	27.3	9.9	26.6	3.00	3.00	0.00
600.0	11.05	16.25	597.6	34.5	12.3	33.7	3.00	2.51	-8.99
700.0	13.70	9.65	695.3	55.4	16.9	54.2	3.00	2.65	-6.60
800.0	16.47	5.19	791.8	81.2	20.2	79.8	3.00	2.77	-4.46
900.0	19.30	2.00	887.0	111.8	22.1	110.3	3.00	2.84	-3.19
1,000.0	22.18	359.60	980.5	147.2	22.5	145.6	3.00	2.88	-2.40
1,100.0	25.09	357.73	1,072.1	187.3	21.5	185.6	3.00	2.91	-1.87
1,200.0	28.01	356.23	1,161.6	231.9	19.2	230.3	3.00	2.92	-1.50
<b>EOB @ 29.20° Inc. / 355.70° Azm</b>									
1,240.5	29.20	355.70	1,197.1	251.2	17.8	249.7	3.00	2.93	-1.31
1,300.0	29.20	355.70	1,249.1	280.2	15.6	278.7	0.00	0.00	0.00
1,400.0	29.20	355.70	1,336.4	328.8	12.0	327.5	0.00	0.00	0.00
1,500.0	29.20	355.70	1,423.6	377.5	8.3	376.3	0.00	0.00	0.00
<b>8 5/8"</b>									
1,530.0	29.20	355.70	1,449.8	392.1	7.2	390.9	0.00	0.00	0.00
1,600.0	29.20	355.70	1,510.9	426.1	4.7	425.0	0.00	0.00	0.00
1,700.0	29.20	355.70	1,598.2	474.7	1.0	473.8	0.00	0.00	0.00
1,800.0	29.20	355.70	1,685.5	523.4	-2.7	522.6	0.00	0.00	0.00
1,900.0	29.20	355.70	1,772.8	572.0	-6.3	571.4	0.00	0.00	0.00
2,000.0	29.20	355.70	1,860.1	620.7	-10.0	620.1	0.00	0.00	0.00
2,100.0	29.20	355.70	1,947.4	669.3	-13.6	668.9	0.00	0.00	0.00
2,200.0	29.20	355.70	2,034.7	718.0	-17.3	717.7	0.00	0.00	0.00
2,300.0	29.20	355.70	2,122.0	766.6	-20.9	766.5	0.00	0.00	0.00
2,400.0	29.20	355.70	2,209.3	815.2	-24.6	815.2	0.00	0.00	0.00
2,500.0	29.20	355.70	2,296.6	863.9	-28.2	864.0	0.00	0.00	0.00
2,600.0	29.20	355.70	2,383.9	912.5	-31.9	912.8	0.00	0.00	0.00
2,700.0	29.20	355.70	2,471.2	961.2	-35.5	961.6	0.00	0.00	0.00
2,800.0	29.20	355.70	2,558.5	1,009.8	-39.2	1,010.3	0.00	0.00	0.00
2,900.0	29.20	355.70	2,645.8	1,058.5	-42.9	1,059.1	0.00	0.00	0.00
3,000.0	29.20	355.70	2,733.1	1,107.1	-46.5	1,107.9	0.00	0.00	0.00
3,100.0	29.20	355.70	2,820.4	1,155.7	-50.2	1,156.7	0.00	0.00	0.00
3,200.0	29.20	355.70	2,907.7	1,204.4	-53.8	1,205.4	0.00	0.00	0.00
3,300.0	29.20	355.70	2,995.0	1,253.0	-57.5	1,254.2	0.00	0.00	0.00
3,400.0	29.20	355.70	3,082.3	1,301.7	-61.1	1,303.0	0.00	0.00	0.00
3,500.0	29.20	355.70	3,169.6	1,350.3	-64.8	1,351.8	0.00	0.00	0.00
3,600.0	29.20	355.70	3,256.8	1,399.0	-68.4	1,400.5	0.00	0.00	0.00
3,700.0	29.20	355.70	3,344.1	1,447.6	-72.1	1,449.3	0.00	0.00	0.00
3,800.0	29.20	355.70	3,431.4	1,496.3	-75.7	1,498.1	0.00	0.00	0.00
3,900.0	29.20	355.70	3,518.7	1,544.9	-79.4	1,546.9	0.00	0.00	0.00
4,000.0	29.20	355.70	3,606.0	1,593.5	-83.1	1,595.6	0.00	0.00	0.00
4,100.0	29.20	355.70	3,693.3	1,642.2	-86.7	1,644.4	0.00	0.00	0.00
4,200.0	29.20	355.70	3,780.6	1,690.8	-90.4	1,693.2	0.00	0.00	0.00
4,300.0	29.20	355.70	3,867.9	1,739.5	-94.0	1,742.0	0.00	0.00	0.00
4,400.0	29.20	355.70	3,955.2	1,788.1	-97.7	1,790.7	0.00	0.00	0.00
4,500.0	29.20	355.70	4,042.5	1,836.8	-101.3	1,839.5	0.00	0.00	0.00



## Well Planning Report



Database:	EDM 5000 1 Single User Db	Local Co-ordinate Reference:	Well Gunderson 0994-13-05W
Company:	Laramie Energy, LLC	TVD Reference:	well @ 7302.0usft (H&P #522)
Project:	Mesa County, CO	MD Reference:	well @ 7302.0usft (H&P #522)
Site:	Gunderson 13-11 Pad	North Reference:	True
Well:	Gunderson 0994-13-05W	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)
4,600.0	29.20	355.70	4,129.8	1,885.4	-105.0	1,888.3	0.00	0.00	0.00
4,700.0	29.20	355.70	4,217.1	1,934.0	-108.6	1,937.1	0.00	0.00	0.00
4,800.0	29.20	355.70	4,304.4	1,982.7	-112.3	1,985.8	0.00	0.00	0.00
<b>Ohio Creek</b>									
4,860.3	29.20	355.70	4,357.0	2,012.0	-114.5	2,015.2	0.00	0.00	0.00
4,900.0	29.20	355.70	4,391.7	2,031.3	-116.0	2,034.6	0.00	0.00	0.00
5,000.0	29.20	355.70	4,479.0	2,080.0	-119.6	2,083.4	0.00	0.00	0.00
<b>Williams Fork</b>									
5,089.4	29.20	355.70	4,557.0	2,123.4	-122.9	2,127.0	0.00	0.00	0.00
5,100.0	29.20	355.70	4,566.3	2,128.6	-123.3	2,132.2	0.00	0.00	0.00
5,200.0	29.20	355.70	4,653.6	2,177.3	-126.9	2,180.9	0.00	0.00	0.00
5,300.0	29.20	355.70	4,740.9	2,225.9	-130.6	2,229.7	0.00	0.00	0.00
<b>Drop 3° / 100'</b>									
5,396.8	29.20	355.70	4,825.4	2,273.0	-134.1	2,276.9	0.00	0.00	0.00
5,400.0	29.10	355.70	4,828.2	2,274.5	-134.2	2,278.5	3.00	-3.00	0.00
5,500.0	26.10	355.70	4,916.8	2,320.7	-137.7	2,324.8	3.00	-3.00	0.00
5,600.0	23.10	355.70	5,007.7	2,362.2	-140.8	2,366.4	3.00	-3.00	0.00
5,700.0	20.10	355.70	5,100.7	2,398.9	-143.6	2,403.2	3.00	-3.00	0.00
5,800.0	17.10	355.70	5,195.4	2,430.7	-146.0	2,435.1	3.00	-3.00	0.00
5,900.0	14.10	355.70	5,291.7	2,457.6	-148.0	2,462.0	3.00	-3.00	0.00
6,000.0	11.10	355.70	5,389.3	2,479.3	-149.6	2,483.8	3.00	-3.00	0.00
6,100.0	8.10	355.70	5,487.9	2,495.9	-150.9	2,500.5	3.00	-3.00	0.00
6,200.0	5.10	355.70	5,587.2	2,507.4	-151.7	2,512.0	3.00	-3.00	0.00
6,300.0	2.10	355.70	5,687.0	2,513.7	-152.2	2,518.3	3.00	-3.00	0.00
<b>EOD @ Vertical - TOG</b>									
6,370.0	0.00	0.00	5,757.0	2,514.9	-152.3	2,519.5	3.00	-3.00	0.00
6,400.0	0.00	0.00	5,787.0	2,514.9	-152.3	2,519.5	0.00	0.00	0.00
6,500.0	0.00	0.00	5,887.0	2,514.9	-152.3	2,519.5	0.00	0.00	0.00
6,600.0	0.00	0.00	5,987.0	2,514.9	-152.3	2,519.5	0.00	0.00	0.00
6,700.0	0.00	0.00	6,087.0	2,514.9	-152.3	2,519.5	0.00	0.00	0.00
6,800.0	0.00	0.00	6,187.0	2,514.9	-152.3	2,519.5	0.00	0.00	0.00
6,900.0	0.00	0.00	6,287.0	2,514.9	-152.3	2,519.5	0.00	0.00	0.00
7,000.0	0.00	0.00	6,387.0	2,514.9	-152.3	2,519.5	0.00	0.00	0.00
7,100.0	0.00	0.00	6,487.0	2,514.9	-152.3	2,519.5	0.00	0.00	0.00
7,200.0	0.00	0.00	6,587.0	2,514.9	-152.3	2,519.5	0.00	0.00	0.00
7,300.0	0.00	0.00	6,687.0	2,514.9	-152.3	2,519.5	0.00	0.00	0.00
7,400.0	0.00	0.00	6,787.0	2,514.9	-152.3	2,519.5	0.00	0.00	0.00
7,500.0	0.00	0.00	6,887.0	2,514.9	-152.3	2,519.5	0.00	0.00	0.00
<b>Cameo</b>									
7,570.0	0.00	0.00	6,957.0	2,514.9	-152.3	2,519.5	0.00	0.00	0.00
7,600.0	0.00	0.00	6,987.0	2,514.9	-152.3	2,519.5	0.00	0.00	0.00
7,700.0	0.00	0.00	7,087.0	2,514.9	-152.3	2,519.5	0.00	0.00	0.00
7,800.0	0.00	0.00	7,187.0	2,514.9	-152.3	2,519.5	0.00	0.00	0.00
7,900.0	0.00	0.00	7,287.0	2,514.9	-152.3	2,519.5	0.00	0.00	0.00
<b>Base Cameo Coal</b>									
7,930.0	0.00	0.00	7,317.0	2,514.9	-152.3	2,519.5	0.00	0.00	0.00
<b>Rollins</b>									
7,970.0	0.00	0.00	7,357.0	2,514.9	-152.3	2,519.5	0.00	0.00	0.00
8,000.0	0.00	0.00	7,387.0	2,514.9	-152.3	2,519.5	0.00	0.00	0.00
8,100.0	0.00	0.00	7,487.0	2,514.9	-152.3	2,519.5	0.00	0.00	0.00
8,200.0	0.00	0.00	7,587.0	2,514.9	-152.3	2,519.5	0.00	0.00	0.00
<b>TD @ 8220.0' MD / 7607.0' TVD</b>									
8,220.0	0.00	0.00	7,607.0	2,514.9	-152.3	2,519.5	0.00	0.00	0.00



## Well Planning Report



<b>Database:</b>	EDM 5000 1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well Gunderson 0994-13-05W
<b>Company:</b>	Laramie Energy, LLC	<b>TVD Reference:</b>	well @ 7302.0usft (H&P #522)
<b>Project:</b>	Mesa County, CO	<b>MD Reference:</b>	well @ 7302.0usft (H&P #522)
<b>Site:</b>	Gunderson 13-11 Pad	<b>North Reference:</b>	True
<b>Well:</b>	Gunderson 0994-13-05W	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	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)
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## 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 0994	0.00	0.00	7,607.0	2,514.9	-152.3	1,535,673.34	2,339,022.17	39.280834	-107.835347
- plan hits target center									
- Circle (radius 50.0)									

## Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,530.0	1,449.8	8 5/8"	8-5/8	11

## Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
4,860.3	4,357.0	Ohio Creek			
5,089.4	4,557.0	Williams Fork			
6,370.0	5,757.0	TOG			
7,570.0	6,957.0	Cameo			
7,930.0	7,317.0	Base Cameo Coal			
7,970.0	7,357.0	Rollins			

## Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
225.0	225.0	0.0	0.0	KOP (Build 3° / 100')
558.3	556.6	27.3	9.9	EOB @ 10.00° Inc. / 20.00° Azm / Build 3° / 100'
1,240.5	1,197.1	251.2	17.8	EOB @ 29.20° Inc. / 355.70° Azm
5,396.8	4,825.4	2,273.0	-134.1	Drop 3° / 100'
6,370.0	5,757.0	2,514.9	-152.3	EOD @ Vertical
8,220.0	7,607.0	2,514.9	-152.3	TD @ 8220.0' MD / 7607.0' TVD