



Project: Mesa County, CO  
 Site: Gunderson 20-03 Pad  
 Well: Gunderson 20-08W  
 Wellbore: Wellbore #1  
 Design: Design #2  
 Latitude: 39.266756  
 Longitude: -107.795317  
 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 20-08W, 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 20-08W

Ground Level: 7146.0  

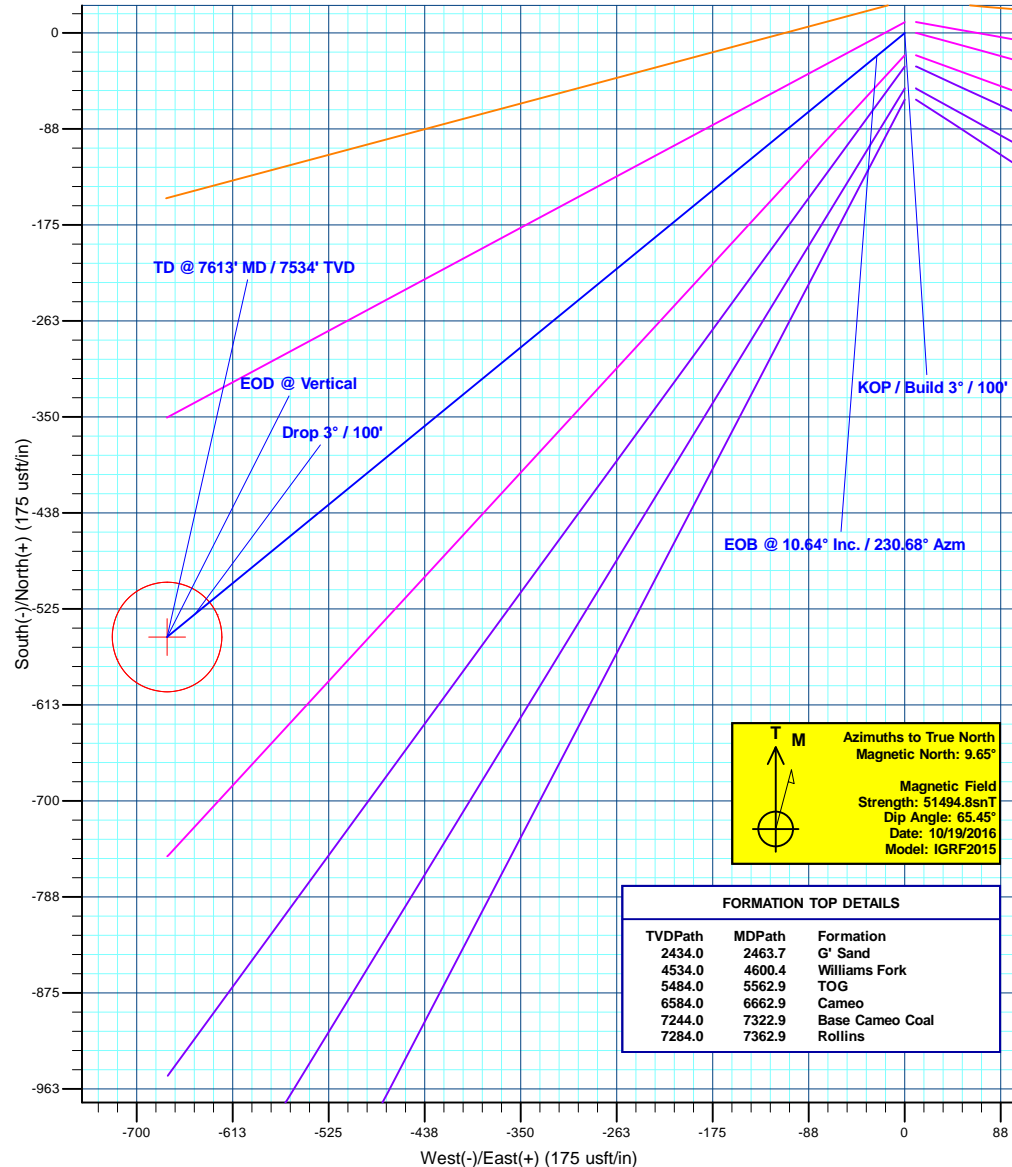
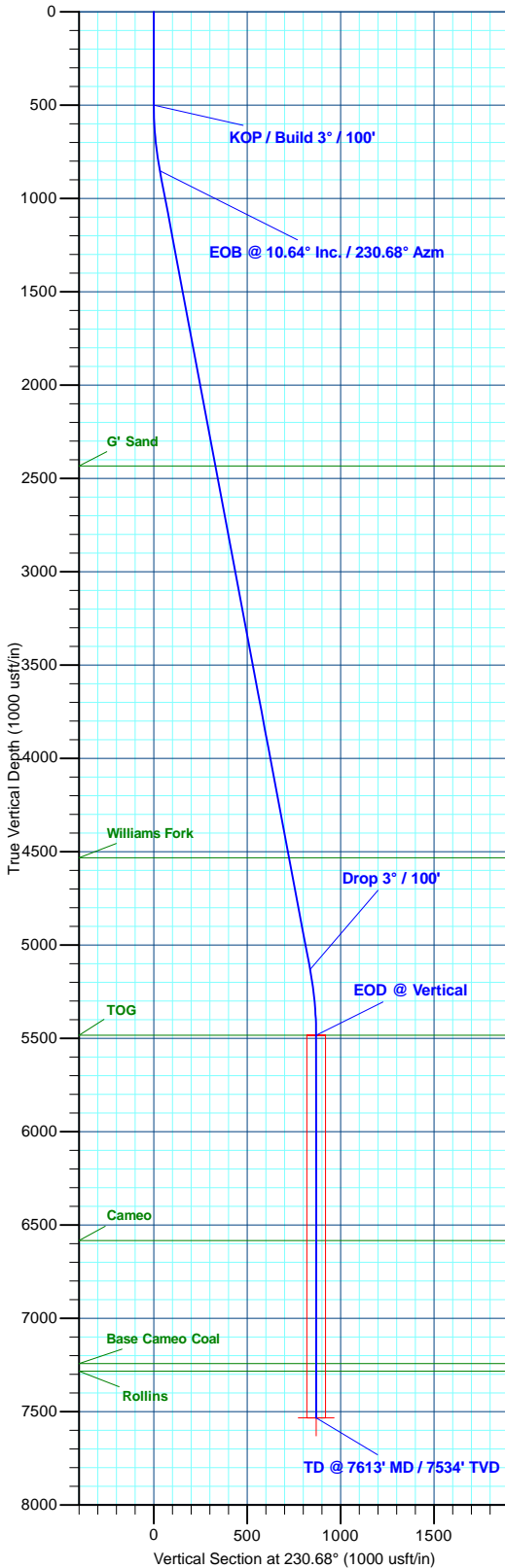
+N-S	+E-W	Northing	Easting	Latitude	Longitude
0.0	0.0	1530258.74	2350219.96	39.266756	-107.795317

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

Name	TVD	+N-S	+E-W	Northing	Easting	Latitude	Longitude
PBHL - Gunderson 20-08W	7534.0	-550.7	-672.4	1529725.22	2349533.84	39.265244	-107.797692

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	
500.0	0.00	0.00	500.0	0.0	0.0	0.00	0.00	0.0	KOP / Build 3° / 100'
854.5	10.64	230.68	852.5	-20.8	-25.4	3.00	230.68	32.8	EOB @ 10.64° Inc. / 230.68° Azm
5208.3	10.64	230.68	5131.5	-529.9	-647.0	0.00	0.00	836.3	Drop 3° / 100'
5562.9	0.00	0.00	5484.0	-550.7	-672.4	3.00	180.00	869.1	EOD @ Vertical
7612.9	0.00	0.00	7534.0	-550.7	-672.4	0.00	0.00	869.1	TD @ 7613' MD / 7534' TVD



FORMATION TOP DETAILS

TVDPath	MDPath	Formation
2434.0	2463.7	G' Sand
4534.0	4600.4	Williams Fork
5484.0	5562.9	TOG
6584.0	6662.9	Cameo
7244.0	7322.9	Base Cameo Coal
7284.0	7362.9	Rollins

Plan: Design #2 (Gunderson 20-08W/Wellbore #1)

Created By: Will Jircik Date: 14:24, November 15 2016



# **Laramie Energy, LLC**

**Mesa County, CO**

**Gunderson 20-03 Pad**

**Gunderson 20-08W**

**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 20-08W
<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 20-08W	<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 20-08W					
Well Position	+N/-S	0.0 usft	Northing:	1,530,258.74 usft	Latitude:	39.266756
	+E/-W	0.0 usft	Easting:	2,350,219.97 usft	Longitude:	-107.795317
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	10/19/2016	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	230.68

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	
854.5	10.64	230.68	852.5	-20.8	-25.4	3.00	3.00	0.00	230.68	
5,208.3	10.64	230.68	5,131.5	-529.9	-647.0	0.00	0.00	0.00	0.00	
5,562.9	0.00	0.00	5,484.0	-550.7	-672.4	3.00	-3.00	0.00	180.00	
7,612.9	0.00	0.00	7,534.0	-550.7	-672.4	0.00	0.00	0.00	0.00	PBHL - Gunderson 20



# Well Planning Report



<b>Database:</b>	EDM5002	<b>Local Co-ordinate Reference:</b>	Well Gunderson 20-08W
<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 20-08W	<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
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>KOP / Build 3° / 100'</b>									
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	3.00	230.68	600.0	-1.7	-2.0	2.6	3.00	3.00	0.00
700.0	6.00	230.68	699.6	-6.6	-8.1	10.5	3.00	3.00	0.00
800.0	9.00	230.68	798.8	-14.9	-18.2	23.5	3.00	3.00	0.00
<b>EOB @ 10.64° Inc. / 230.68° Azm</b>									
854.5	10.64	230.68	852.5	-20.8	-25.4	32.8	3.00	3.00	0.00
900.0	10.64	230.68	897.2	-26.1	-31.9	41.2	0.00	0.00	0.00
1,000.0	10.64	230.68	995.5	-37.8	-46.2	59.7	0.00	0.00	0.00
1,100.0	10.64	230.68	1,093.8	-49.5	-60.4	78.1	0.00	0.00	0.00
1,200.0	10.64	230.68	1,192.0	-61.2	-74.7	96.6	0.00	0.00	0.00
1,300.0	10.64	230.68	1,290.3	-72.9	-89.0	115.0	0.00	0.00	0.00
1,400.0	10.64	230.68	1,388.6	-84.6	-103.3	133.5	0.00	0.00	0.00
1,500.0	10.64	230.68	1,486.9	-96.3	-117.5	151.9	0.00	0.00	0.00
<b>8 5/8"</b>									
1,530.0	10.64	230.68	1,516.4	-99.8	-121.8	157.5	0.00	0.00	0.00
1,600.0	10.64	230.68	1,585.2	-108.0	-131.8	170.4	0.00	0.00	0.00
1,700.0	10.64	230.68	1,683.4	-119.7	-146.1	188.8	0.00	0.00	0.00
1,800.0	10.64	230.68	1,781.7	-131.3	-160.4	207.3	0.00	0.00	0.00
1,900.0	10.64	230.68	1,880.0	-143.0	-174.7	225.8	0.00	0.00	0.00
2,000.0	10.64	230.68	1,978.3	-154.7	-188.9	244.2	0.00	0.00	0.00
2,100.0	10.64	230.68	2,076.6	-166.4	-203.2	262.7	0.00	0.00	0.00
2,200.0	10.64	230.68	2,174.9	-178.1	-217.5	281.1	0.00	0.00	0.00
2,300.0	10.64	230.68	2,273.1	-189.8	-231.8	299.6	0.00	0.00	0.00
2,400.0	10.64	230.68	2,371.4	-201.5	-246.1	318.0	0.00	0.00	0.00
<b>G' Sand</b>									
2,463.7	10.64	230.68	2,434.0	-209.0	-255.1	329.8	0.00	0.00	0.00
2,500.0	10.64	230.68	2,469.7	-213.2	-260.3	336.5	0.00	0.00	0.00
2,600.0	10.64	230.68	2,568.0	-224.9	-274.6	354.9	0.00	0.00	0.00
2,700.0	10.64	230.68	2,666.3	-236.6	-288.9	373.4	0.00	0.00	0.00
2,800.0	10.64	230.68	2,764.5	-248.3	-303.2	391.9	0.00	0.00	0.00
2,900.0	10.64	230.68	2,862.8	-260.0	-317.4	410.3	0.00	0.00	0.00
3,000.0	10.64	230.68	2,961.1	-271.7	-331.7	428.8	0.00	0.00	0.00
3,100.0	10.64	230.68	3,059.4	-283.4	-346.0	447.2	0.00	0.00	0.00
3,200.0	10.64	230.68	3,157.7	-295.1	-360.3	465.7	0.00	0.00	0.00
3,300.0	10.64	230.68	3,256.0	-306.7	-374.6	484.1	0.00	0.00	0.00
3,400.0	10.64	230.68	3,354.2	-318.4	-388.8	502.6	0.00	0.00	0.00
3,500.0	10.64	230.68	3,452.5	-330.1	-403.1	521.0	0.00	0.00	0.00
3,600.0	10.64	230.68	3,550.8	-341.8	-417.4	539.5	0.00	0.00	0.00
3,700.0	10.64	230.68	3,649.1	-353.5	-431.7	558.0	0.00	0.00	0.00
3,800.0	10.64	230.68	3,747.4	-365.2	-446.0	576.4	0.00	0.00	0.00
3,900.0	10.64	230.68	3,845.7	-376.9	-460.2	594.9	0.00	0.00	0.00
4,000.0	10.64	230.68	3,943.9	-388.6	-474.5	613.3	0.00	0.00	0.00
4,100.0	10.64	230.68	4,042.2	-400.3	-488.8	631.8	0.00	0.00	0.00
4,200.0	10.64	230.68	4,140.5	-412.0	-503.1	650.2	0.00	0.00	0.00
4,300.0	10.64	230.68	4,238.8	-423.7	-517.3	668.7	0.00	0.00	0.00
4,400.0	10.64	230.68	4,337.1	-435.4	-531.6	687.1	0.00	0.00	0.00
4,500.0	10.64	230.68	4,435.3	-447.1	-545.9	705.6	0.00	0.00	0.00
4,600.0	10.64	230.68	4,533.6	-458.8	-560.2	724.1	0.00	0.00	0.00



# Well Planning Report



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<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 20-08W	<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)
<b>Williams Fork</b>									
4,600.4	10.64	230.68	4,534.0	-458.8	-560.2	724.1	0.00	0.00	0.00
4,700.0	10.64	230.68	4,631.9	-470.5	-574.5	742.5	0.00	0.00	0.00
4,800.0	10.64	230.68	4,730.2	-482.1	-588.7	761.0	0.00	0.00	0.00
4,900.0	10.64	230.68	4,828.5	-493.8	-603.0	779.4	0.00	0.00	0.00
5,000.0	10.64	230.68	4,926.8	-505.5	-617.3	797.9	0.00	0.00	0.00
5,100.0	10.64	230.68	5,025.0	-517.2	-631.6	816.3	0.00	0.00	0.00
5,200.0	10.64	230.68	5,123.3	-528.9	-645.8	834.8	0.00	0.00	0.00
<b>Drop 3° / 100'</b>									
5,208.3	10.64	230.68	5,131.5	-529.9	-647.0	836.3	0.00	0.00	0.00
5,300.0	7.89	230.68	5,222.0	-539.2	-658.5	851.1	3.00	-3.00	0.00
5,400.0	4.89	230.68	5,321.3	-546.3	-667.1	862.2	3.00	-3.00	0.00
5,500.0	1.89	230.68	5,421.2	-550.0	-671.6	868.1	3.00	-3.00	0.00
<b>EOD @ Vertical - TOG</b>									
5,562.9	0.00	0.00	5,484.0	-550.7	-672.4	869.1	3.00	-3.00	0.00
5,600.0	0.00	0.00	5,521.1	-550.7	-672.4	869.1	0.00	0.00	0.00
5,700.0	0.00	0.00	5,621.1	-550.7	-672.4	869.1	0.00	0.00	0.00
5,800.0	0.00	0.00	5,721.1	-550.7	-672.4	869.1	0.00	0.00	0.00
5,900.0	0.00	0.00	5,821.1	-550.7	-672.4	869.1	0.00	0.00	0.00
6,000.0	0.00	0.00	5,921.1	-550.7	-672.4	869.1	0.00	0.00	0.00
6,100.0	0.00	0.00	6,021.1	-550.7	-672.4	869.1	0.00	0.00	0.00
6,200.0	0.00	0.00	6,121.1	-550.7	-672.4	869.1	0.00	0.00	0.00
6,300.0	0.00	0.00	6,221.1	-550.7	-672.4	869.1	0.00	0.00	0.00
6,400.0	0.00	0.00	6,321.1	-550.7	-672.4	869.1	0.00	0.00	0.00
6,500.0	0.00	0.00	6,421.1	-550.7	-672.4	869.1	0.00	0.00	0.00
6,600.0	0.00	0.00	6,521.1	-550.7	-672.4	869.1	0.00	0.00	0.00
<b>Cameo</b>									
6,662.9	0.00	0.00	6,584.0	-550.7	-672.4	869.1	0.00	0.00	0.00
6,700.0	0.00	0.00	6,621.1	-550.7	-672.4	869.1	0.00	0.00	0.00
6,800.0	0.00	0.00	6,721.1	-550.7	-672.4	869.1	0.00	0.00	0.00
6,900.0	0.00	0.00	6,821.1	-550.7	-672.4	869.1	0.00	0.00	0.00
7,000.0	0.00	0.00	6,921.1	-550.7	-672.4	869.1	0.00	0.00	0.00
7,100.0	0.00	0.00	7,021.1	-550.7	-672.4	869.1	0.00	0.00	0.00
7,200.0	0.00	0.00	7,121.1	-550.7	-672.4	869.1	0.00	0.00	0.00
7,300.0	0.00	0.00	7,221.1	-550.7	-672.4	869.1	0.00	0.00	0.00
<b>Base Cameo Coal</b>									
7,322.9	0.00	0.00	7,244.0	-550.7	-672.4	869.1	0.00	0.00	0.00
<b>Rollins</b>									
7,362.9	0.00	0.00	7,284.0	-550.7	-672.4	869.1	0.00	0.00	0.00
7,400.0	0.00	0.00	7,321.1	-550.7	-672.4	869.1	0.00	0.00	0.00
7,500.0	0.00	0.00	7,421.1	-550.7	-672.4	869.1	0.00	0.00	0.00
7,600.0	0.00	0.00	7,521.1	-550.7	-672.4	869.1	0.00	0.00	0.00
<b>TD @ 7613' MD / 7534' TVD</b>									
7,612.9	0.00	0.00	7,534.0	-550.7	-672.4	869.1	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 20-08W	<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 20-0:	0.00	0.00	7,534.0	-550.7	-672.4	1,529,725.22	2,349,533.85	39.265244	-107.797692
- plan hits target center									
- Circle (radius 50.0)									

Casing Points				
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,530.0	1,516.4	8 5/8"	8-5/8	11

Formations					
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
2,463.7	2,434.0	G' Sand		0.00	
4,600.4	4,534.0	Williams Fork		0.00	
5,562.9	5,484.0	TOG		0.00	
6,662.9	6,584.0	Cameo		0.00	
7,322.9	7,244.0	Base Cameo Coal		0.00	
7,362.9	7,284.0	Rollins		0.00	

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
500.0	500.0	0.0	0.0	KOP / Build 3° / 100'	
854.5	852.5	-20.8	-25.4	EOB @ 10.64° Inc. / 230.68° Azm	
5,208.3	5,131.5	-529.9	-647.0	Drop 3° / 100'	
5,562.9	5,484.0	-550.7	-672.4	EOD @ Vertical	
7,612.9	7,534.0	-550.7	-672.4	TD @ 7613' MD / 7534' TVD	