

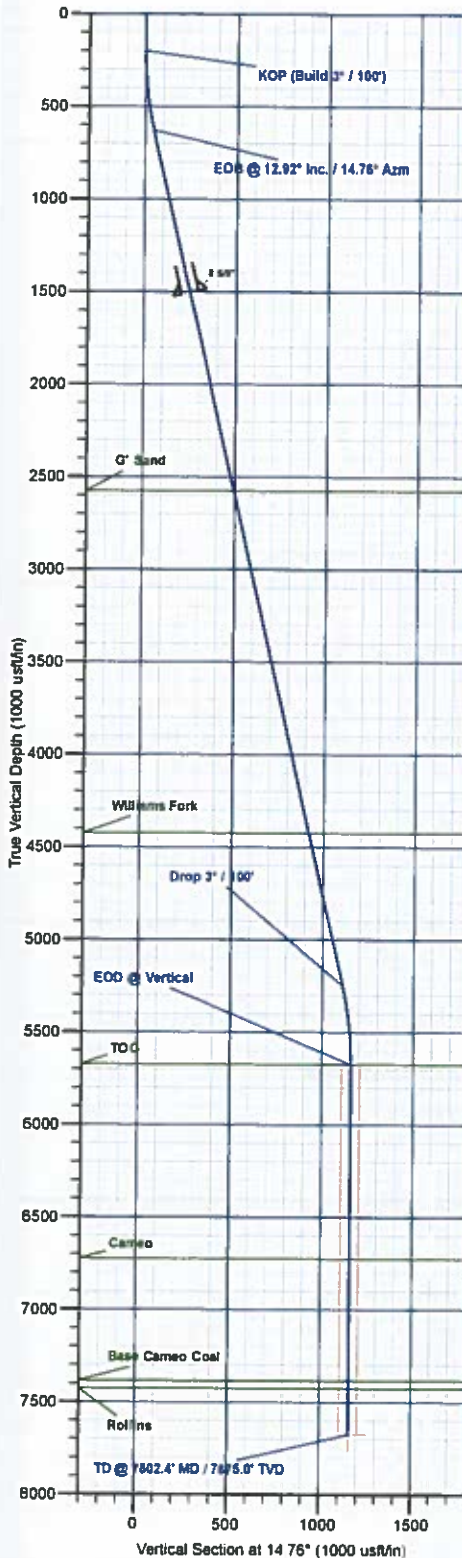
**PROJECT DETAILS: Mesa County, CO**

Geodetic System: US State Plane 1983  
Datum: North American Datum 1983  
Ellipsoid: GRS 1980  
Zone: Colorado Central Zone  
System Datum: Mean Sea Level

Project: Mesa County, CO  
Site: Gunderson 0993 21-05 Pad  
Well: BCU 0993-21-02W  
Wellbore: Wellbore #1  
Design: Design #1  
Latitude: 39.265485  
Longitude: -107.780162  
Ground Level: 7256.0  
well @ 7286.0usft (H&P #522)

**WELL DETAILS: BCU 0993-21-02W**

7256.0  
+N/-S 0.0 +E/-W 0.0 Northing 1529687.32 Easting 2354497.66 Latitude 39.265485 Longitude -107.780162



DESIGN TARGET DETAILS							
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
PBHL - BCU 0993-21-02W	7475.0	1116.9	294.7	1530799.06	2354520.37	39.265567	-107.779121

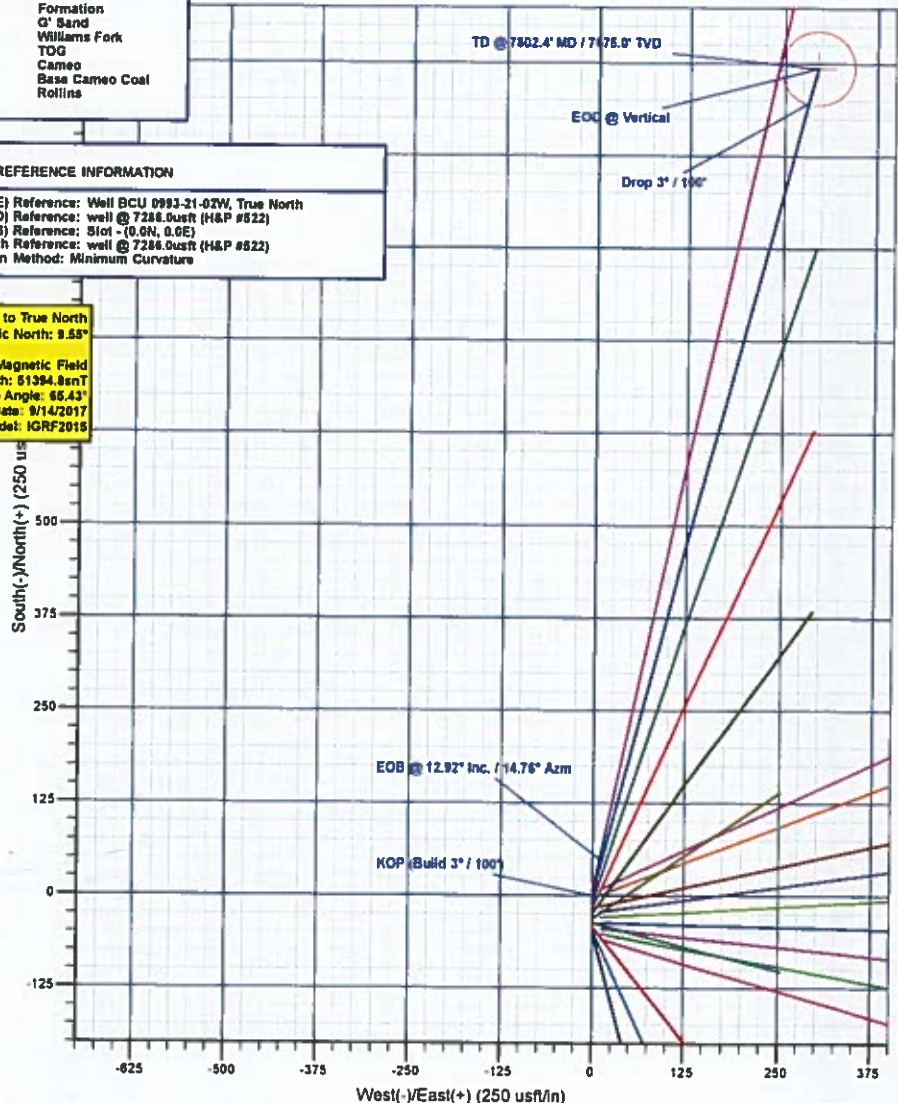
SECTION DETAILS									
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	V5ect	Annotation
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	KOP (Build 3° / 100')
200.0	0.00	0.00	200.0	0.0	0.0	0.00	0.00	0.0	EOB @ 12.92° Inc. / 14.76° Azm
630.8	12.92	14.76	627.1	46.8	12.3	3.00	14.76	44.4	Drop 3° / 100'
5371.6	12.92	14.76	5247.9	1072.1	282.4	0.00	0.00	1108.7	EOO @ Vertical
5802.4	0.00	0.00	5675.0	1116.9	294.7	3.00	180.00	1157.1	TD @ 7802.4' MD / 7475.9' TVD
7802.4	0.00	0.00	7675.0	1116.9	294.7	0.00	0.00	1157.1	

FORMATION TOP DETAILS		
TVDPath	MDPath	Formation
2575.0	2629.3	G' Sand
4425.0	4527.3	Williams Fork
5475.0	5402.4	TOG
6725.0	6452.4	Cameo
7385.0	7512.4	Base Cameo Coal
7425.0	7552.4	Rollins

REFERENCE INFORMATION	
Co-ordinate (N/E) Reference: Well BCU 0993-21-02W, True North	
Vertical (TVD) Reference: well @ 7286.0usft (H&P #522)	
Section (VS) Reference: Slot = (0.0N, 0.0E)	
Measured Depth Reference: well @ 7286.0usft (H&P #522)	
Calculation Method: Minimum Curvature	

**Azimuths to True North**  
Magnetic North: 9.55°

**Magnetic Field**  
Strength: 51394.8nT  
Dip Angle: 65.43°  
Date: 9/14/2017  
Model: IGRF2015



Plan: Design #1 (BCU 0993-21-02W/Wellbore #1)

Created By: Will Jircik

Date: 14:19, September 18 2017



# **Laramie Energy, LLC**

**Mesa County, CO**

**Gunderson 0993 21-05 Pad**

**BCU 0993-21-02W**

**Wellbore #1**

**Plan: Design #1**

## **QES Well Planning Report**

**18 September, 2017**





## Well Planning Report



<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well BCU 0993-21-02W
<b>Company:</b>	Laramie Energy, LLC	<b>TVD Reference:</b>	well @ 7286 0usft (H&P #522)
<b>Project:</b>	Mesa County, CO	<b>MD Reference:</b>	well @ 7286 0usft (H&P #522)
<b>Site:</b>	Gunderson 0993 21-05 Pad	<b>North Reference:</b>	True
<b>Well:</b>	BCU 0993-21-02W	<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 0993 21-05 Pad			
<b>Site Position:</b>		<b>Northing:</b>	1,529,627.90 usft	<b>Latitude:</b> 39.265321
<b>From:</b>	Lat/Long	<b>Easting:</b>	2,354,508.90 usft	<b>Longitude:</b> -107.780117
<b>Position Uncertainty:</b>	0.0 usft	<b>Slot Radius:</b>	13-3/16 "	<b>Grid Convergence:</b> -1.44 *

<b>Well</b>	BCU 0993-21-02W			
<b>Well Position</b>	+N/-S	59.7 usft	<b>Northing:</b>	1,529,687.92 usft
	+E/-W	-12.7 usft	<b>Easting:</b>	2,354,497.67 usft
<b>Position Uncertainty</b>		0.0 usft	<b>Wellhead Elevation:</b>	<b>Ground Level:</b> 7,256.0 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	9/14/2017	9.55	65.43	51,394.75248952

<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	14.76

<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	
200.0	0.00	0.00	200.0	0.0	0.0	0.00	0.00	0.00	0.00	
630.8	12.92	14.76	627.1	46.8	12.3	3.00	3.00	0.00	14.76	
5,371.6	12.92	14.76	5,247.9	1,072.1	282.4	0.00	0.00	0.00	0.00	
5,802.4	0.00	0.00	5,675.0	1,118.9	294.7	3.00	-3.00	0.00	180.00	
7,802.4	0.00	0.00	7,675.0	1,118.9	294.7	0.00	0.00	0.00	0.00	PBHL - BCU 0993-21





## Well Planning Report



Database: EDM 5000.1 Single User Db  
 Company: Laramie Energy, LLC  
 Project: Mesa County, CO  
 Site: Gunderson 0993 21-05 Pad  
 Well: BCU 0993-21-02W  
 Wellbore: Wellbore #1  
 Design: Design #1

Local Co-ordinate Reference: Well BCU 0993-21-02W  
 TVD Reference: well @ 7286.0usft (H&P #522)  
 MD Reference: well @ 7286.0usft (H&P #522)  
 North Reference: True  
 Survey Calculation Method: Minimum Curvature

## 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
<b>KOP (Build 3° / 100')</b>									
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	3.00	14.76	300.0	2.5	0.7	2.6	3.00	3.00	0.00
400.0	6.00	14.76	399.6	10.1	2.7	10.5	3.00	3.00	0.00
500.0	9.00	14.76	498.8	22.7	6.0	23.5	3.00	3.00	0.00
600.0	12.00	14.76	597.1	40.4	10.6	41.7	3.00	3.00	0.00
<b>EOB @ 12.92° Inc. / 14.76° Azm</b>									
630.8	12.92	14.76	627.1	46.8	12.3	48.4	3.00	3.00	0.00
700.0	12.92	14.76	694.6	61.8	16.3	63.9	0.00	0.00	0.00
800.0	12.92	14.76	792.1	83.4	22.0	86.2	0.00	0.00	0.00
900.0	12.92	14.76	889.5	105.0	27.7	108.6	0.00	0.00	0.00
1,000.0	12.92	14.76	987.0	128.6	33.4	131.0	0.00	0.00	0.00
1,100.0	12.92	14.76	1,084.5	148.3	39.1	153.3	0.00	0.00	0.00
1,200.0	12.92	14.76	1,181.9	169.9	44.7	175.7	0.00	0.00	0.00
1,300.0	12.92	14.76	1,279.4	191.5	50.4	198.1	0.00	0.00	0.00
1,400.0	12.92	14.76	1,376.9	213.1	56.1	220.4	0.00	0.00	0.00
1,500.0	12.92	14.76	1,474.3	234.8	61.8	242.8	0.00	0.00	0.00
<b>8 5/8"</b>									
1,530.0	12.92	14.76	1,503.6	241.3	63.5	249.5	0.00	0.00	0.00
1,600.0	12.92	14.76	1,571.8	256.4	67.5	265.1	0.00	0.00	0.00
1,700.0	12.92	14.76	1,669.3	278.0	73.2	287.5	0.00	0.00	0.00
1,800.0	12.92	14.76	1,766.7	299.7	78.9	309.9	0.00	0.00	0.00
1,900.0	12.92	14.76	1,864.2	321.3	84.6	332.2	0.00	0.00	0.00
2,000.0	12.92	14.76	1,961.7	342.9	90.3	354.6	0.00	0.00	0.00
2,100.0	12.92	14.76	2,059.1	364.5	96.0	377.0	0.00	0.00	0.00
2,200.0	12.92	14.76	2,156.6	386.2	101.7	399.3	0.00	0.00	0.00
2,300.0	12.92	14.76	2,254.1	407.8	107.4	421.7	0.00	0.00	0.00
2,400.0	12.92	14.76	2,351.5	429.4	113.1	444.1	0.00	0.00	0.00
2,500.0	12.92	14.76	2,449.0	451.0	118.8	466.4	0.00	0.00	0.00
2,600.0	12.92	14.76	2,546.5	472.7	124.5	488.8	0.00	0.00	0.00
<b>G<sup>1</sup> Sand</b>									
2,629.3	12.92	14.76	2,575.0	479.0	126.2	495.3	0.00	0.00	0.00
2,700.0	12.92	14.76	2,643.9	494.3	130.2	511.2	0.00	0.00	0.00
2,800.0	12.92	14.76	2,741.4	515.9	135.9	533.5	0.00	0.00	0.00
2,900.0	12.92	14.76	2,838.9	537.6	141.6	555.9	0.00	0.00	0.00
3,000.0	12.92	14.76	2,936.3	559.2	147.3	578.3	0.00	0.00	0.00
3,100.0	12.92	14.76	3,033.8	580.8	153.0	600.6	0.00	0.00	0.00
3,200.0	12.92	14.76	3,131.3	602.4	158.7	623.0	0.00	0.00	0.00
3,300.0	12.92	14.76	3,228.7	624.1	164.4	645.4	0.00	0.00	0.00
3,400.0	12.92	14.76	3,326.2	645.7	170.1	667.7	0.00	0.00	0.00
3,500.0	12.92	14.76	3,423.7	667.3	175.8	690.1	0.00	0.00	0.00
3,600.0	12.92	14.76	3,521.1	689.0	181.5	712.5	0.00	0.00	0.00
3,700.0	12.92	14.76	3,618.6	710.6	187.2	734.8	0.00	0.00	0.00
3,800.0	12.92	14.76	3,716.1	732.2	192.9	757.2	0.00	0.00	0.00
3,900.0	12.92	14.76	3,813.5	753.8	198.6	779.5	0.00	0.00	0.00
4,000.0	12.92	14.76	3,911.0	775.5	204.3	801.9	0.00	0.00	0.00
4,100.0	12.92	14.76	4,008.5	797.1	210.0	824.3	0.00	0.00	0.00
4,200.0	12.92	14.76	4,105.9	818.7	215.7	846.6	0.00	0.00	0.00
4,300.0	12.92	14.76	4,203.4	840.3	221.4	869.0	0.00	0.00	0.00
4,400.0	12.92	14.76	4,300.9	862.0	227.0	891.4	0.00	0.00	0.00
4,500.0	12.92	14.76	4,398.3	883.6	232.7	913.7	0.00	0.00	0.00

Williams Fork



## Well Planning Report



**Database:** EDM 5000.1 Single User Db  
**Company:** Laramie Energy, LLC  
**Project:** Mesa County, CO  
**Site:** Gunderson 0993 21-05 Pad  
**Well:** BCU 0993-21-02W  
**Wellbore:** Wellbore #1  
**Design:** Design #1

**Local Co-ordinate Reference:** Well BCU 0993-21-02W  
**TVD Reference:** well @ 7286 0usft (H&P #522)  
**MD Reference:** well @ 7286 0usft (H&P #522)  
**North Reference:** True  
**Survey Calculation Method:** Minimum Curvature

## 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)
4,527.3	12.92	14.76	4,425.0	889.5	234.3	919.9	0.00	0.00	0.00
4,600.0	12.92	14.76	4,495.8	905.2	238.4	936.1	0.00	0.00	0.00
4,700.0	12.92	14.76	4,593.3	926.9	244.1	958.5	0.00	0.00	0.00
4,800.0	12.92	14.76	4,690.7	948.5	249.8	980.8	0.00	0.00	0.00
4,900.0	12.92	14.76	4,788.2	970.1	255.5	1,003.2	0.00	0.00	0.00
5,000.0	12.92	14.76	4,885.7	991.7	261.2	1,025.6	0.00	0.00	0.00
5,100.0	12.92	14.76	4,983.1	1,013.4	266.9	1,047.9	0.00	0.00	0.00
5,200.0	12.92	14.76	5,080.6	1,035.0	272.6	1,070.3	0.00	0.00	0.00
5,300.0	12.92	14.76	5,178.1	1,056.6	278.3	1,092.7	0.00	0.00	0.00
<b>Drop 3" / 100'</b>									
5,371.6	12.92	14.76	5,247.9	1,072.1	282.4	1,108.7	0.00	0.00	0.00
5,400.0	12.07	14.76	5,275.6	1,078.1	284.0	1,114.8	3.00	-3.00	0.00
5,500.0	9.07	14.76	5,373.9	1,095.8	288.6	1,133.2	3.00	-3.00	0.00
5,600.0	6.07	14.76	5,473.0	1,108.5	292.0	1,146.3	3.00	-3.00	0.00
5,700.0	3.07	14.76	5,572.7	1,116.2	294.0	1,154.3	3.00	-3.00	0.00
5,800.0	0.07	14.76	5,672.6	1,118.9	294.7	1,157.1	3.00	-3.00	0.00
<b>EOD @ Vertical - TOG</b>									
5,802.4	0.00	0.00	5,675.0	1,118.9	294.7	1,157.1	3.00	-3.00	-620.66
5,900.0	0.00	0.00	5,772.6	1,118.9	294.7	1,157.1	0.00	0.00	0.00
6,000.0	0.00	0.00	5,872.6	1,118.9	294.7	1,157.1	0.00	0.00	0.00
6,100.0	0.00	0.00	5,972.6	1,118.9	294.7	1,157.1	0.00	0.00	0.00
6,200.0	0.00	0.00	6,072.6	1,118.9	294.7	1,157.1	0.00	0.00	0.00
6,300.0	0.00	0.00	6,172.6	1,118.9	294.7	1,157.1	0.00	0.00	0.00
6,400.0	0.00	0.00	6,272.6	1,118.9	294.7	1,157.1	0.00	0.00	0.00
6,500.0	0.00	0.00	6,372.6	1,118.9	294.7	1,157.1	0.00	0.00	0.00
6,600.0	0.00	0.00	6,472.6	1,118.9	294.7	1,157.1	0.00	0.00	0.00
6,700.0	0.00	0.00	6,572.6	1,118.9	294.7	1,157.1	0.00	0.00	0.00
6,800.0	0.00	0.00	6,672.6	1,118.9	294.7	1,157.1	0.00	0.00	0.00
<b>Cameo</b>									
6,852.4	0.00	0.00	6,725.0	1,118.9	294.7	1,157.1	0.00	0.00	0.00
6,900.0	0.00	0.00	6,772.6	1,118.9	294.7	1,157.1	0.00	0.00	0.00
7,000.0	0.00	0.00	6,872.6	1,118.9	294.7	1,157.1	0.00	0.00	0.00
7,100.0	0.00	0.00	6,972.6	1,118.9	294.7	1,157.1	0.00	0.00	0.00
7,200.0	0.00	0.00	7,072.6	1,118.9	294.7	1,157.1	0.00	0.00	0.00
7,300.0	0.00	0.00	7,172.6	1,118.9	294.7	1,157.1	0.00	0.00	0.00
7,400.0	0.00	0.00	7,272.6	1,118.9	294.7	1,157.1	0.00	0.00	0.00
7,500.0	0.00	0.00	7,372.6	1,118.9	294.7	1,157.1	0.00	0.00	0.00
<b>Base Cameo Coal</b>									
7,512.4	0.00	0.00	7,385.0	1,118.9	294.7	1,157.1	0.00	0.00	0.00
<b>Rollins</b>									
7,552.4	0.00	0.00	7,425.0	1,118.9	294.7	1,157.1	0.00	0.00	0.00
7,600.0	0.00	0.00	7,472.6	1,118.9	294.7	1,157.1	0.00	0.00	0.00
7,700.0	0.00	0.00	7,572.6	1,118.9	294.7	1,157.1	0.00	0.00	0.00
7,800.0	0.00	0.00	7,672.6	1,118.9	294.7	1,157.1	0.00	0.00	0.00
<b>TD @ 7802.4' MD / 7675.0' TVD</b>									
7,802.4	0.00	0.00	7,675.0	1,118.9	294.7	1,157.1	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 BCU 0993-21-02W
<b>Company:</b>	Laramie Energy, LLC	<b>TVD Reference:</b>	well @ 7286.0usft (H&P #522)
<b>Project:</b>	Mesa County, CO	<b>MD Reference:</b>	well @ 7286.0usft (H&P #522)
<b>Site:</b>	Gunderson 0993 21-05 Pad	<b>North Reference:</b>	True
<b>Well:</b>	BCU 0993-21-02W	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Design #1		

## 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 - BCU 0993-21-02 - plan hits target center - Circle (radius 50.0)	0.00	0.00	7,675.0	1,118.9	294.7	1,530,799.06	2,354,820.37	39.268557	-107.779121

## Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,530.0	1,503.6	8 5/8"	8-5/8	11

## Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
2,629.3	2,575.0	G' Sand			
4,527.3	4,425.0	Williams Fork			
5,802.4	5,675.0	TOG			
6,852.4	6,725.0	Cameo			
7,512.4	7,385.0	Base Cameo Coal			
7,552.4	7,425.0	Rollins			

## Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
200.0	200.0	0.0	0.0	KOP (Build 3" / 100')
630.8	627.1	46.8	12.3	EOB @ 12.82° Inc. / 14.76° Azm
5,371.6	5,247.9	1,072.1	282.4	Drop 3" / 100'
5,802.4	5,675.0	1,118.9	294.7	EOD @ Vertical
7,802.4	7,675.0	1,118.9	294.7	TD @ 7802.4' MD / 7675.0' TVD