



Project: Mesa County, CO
 Site: Gunderson 20-03 Pad
 Well: Gunderson BCU 20-08E
 Wellbore: Wellbore #1
 Design: Design #3
 Latitude: 39.266756
 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 BCU 20-08E, 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 BCU 20-08E

Ground Level: 7146.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.0	0.0	1530258.48	2350230.15	39.266756	-107.795281

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

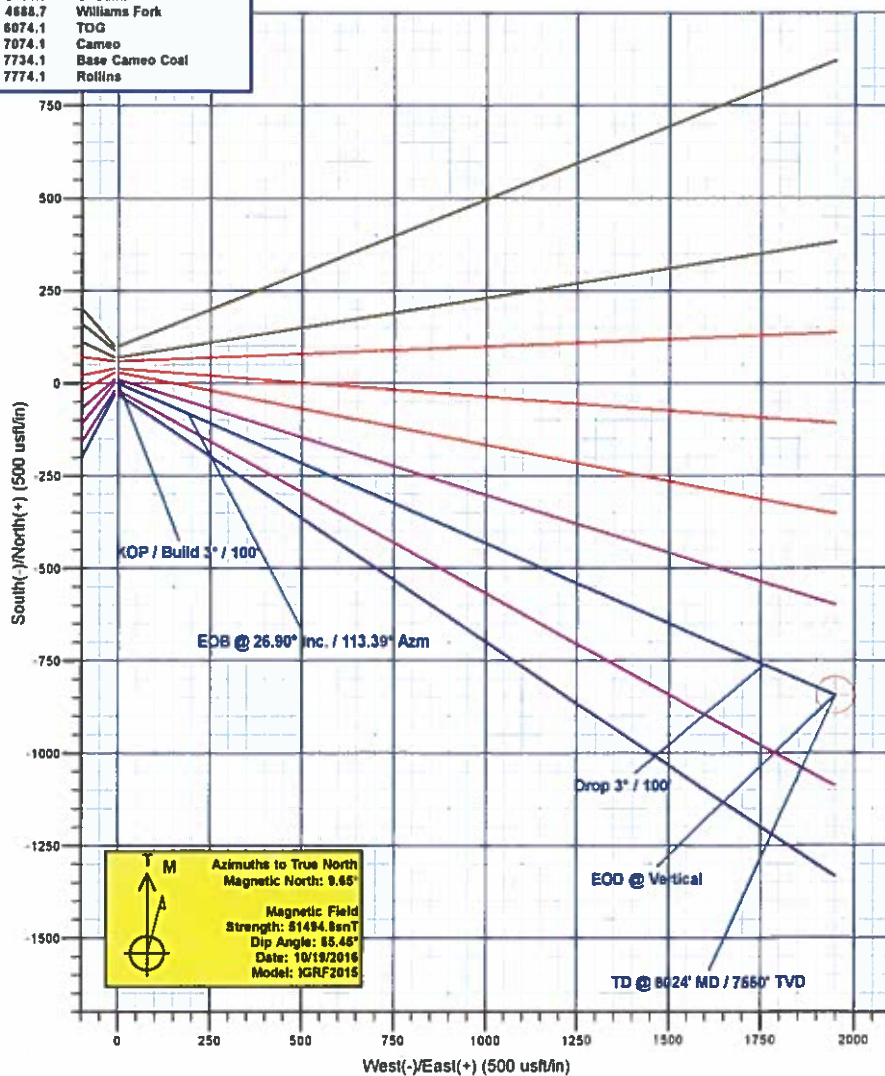
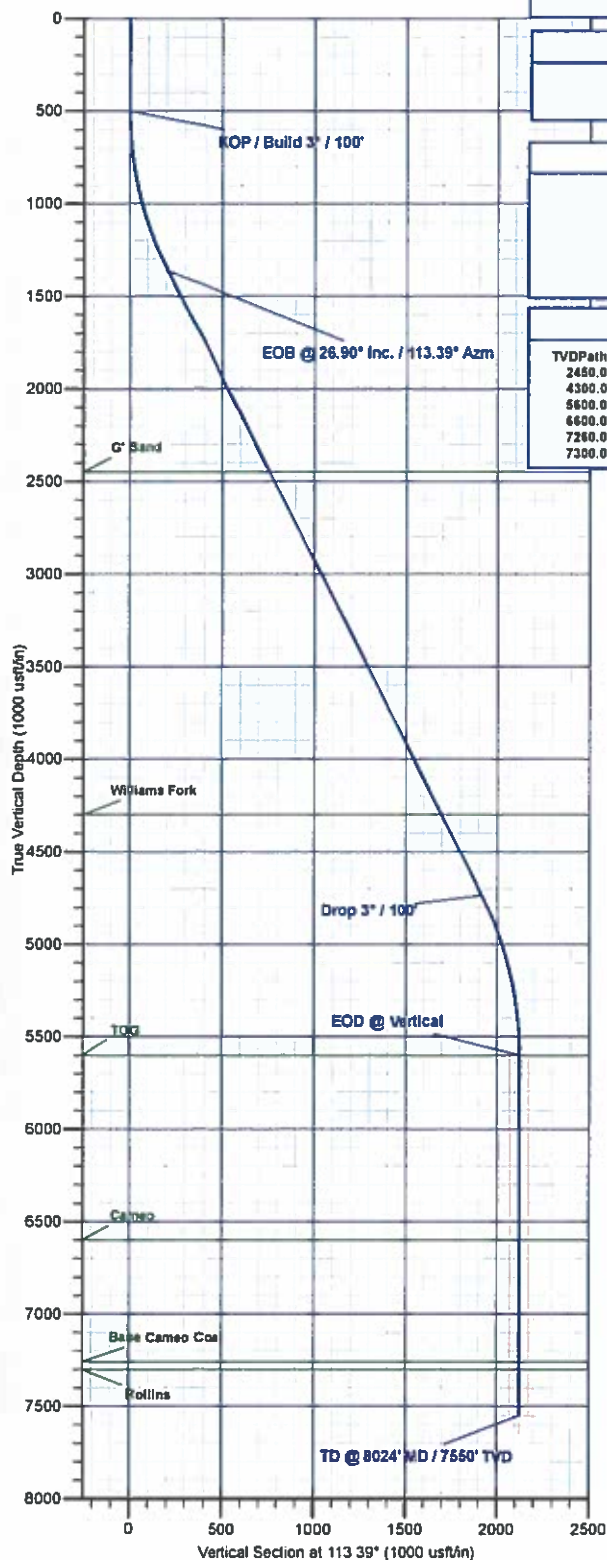
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
PBHL - Gunderson BCU 20-08E	7550.0	-843.1	1949.1	1529386.42	2352157.29	39.264441	-107.788397

SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Diag	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°
1398.5	26.90	113.39	1363.9	-82.0	189.6	3.00	113.39	206.6	EOB @ 26.90° Inc. / 113.39° Azm
5177.6	26.90	113.39	4736.1	-781.1	1759.5	0.00	0.00	1917.0	Drop 3° / 100°
6074.1	0.00	0.00	5600.0	-843.1	1949.1	3.00	180.00	2123.6	EOD @ Vertical
8024.1	0.00	0.00	7550.0	-843.1	1949.1	0.00	0.00	2123.6	TD @ 8024' MD / 7550' TVD

FORMATION TOP DETAILS

TVDPth	MDPath	Formation
2450.0	2614.3	G' Sand
4300.0	4688.7	Williams Fork
5600.0	6074.1	TOG
6600.0	7074.1	Cameo
7260.0	7734.1	Base Cameo Coal
7300.0	7774.1	Rollins



Plan: Design #3 (Gunderson BCU 20-08E/Wellbore #1)

Created By: Will Jircik Date: 11:45, February 14 2017



Laramie Energy, LLC

Mesa County, CO

Gunderson 20-03 Pad

Gunderson BCU 20-08E

Wellbore #1

Plan: Design #3

QES Well Planning Report

14 February, 2017





Well Planning Report



Database:	EDM5002	Local Co-ordinate Reference:	Well Gunderson BCU 20-08E
Company:	Laramie Energy, LLC	TVD Reference:	well @ 7176.0usft (H&P #522)
Project:	Mesa County, CO	MD Reference:	well @ 7176.0usft (H&P #522)
Site:	Gunderson 20-03 Pad	North Reference:	True
Well:	Gunderson BCU 20-08E	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #3		

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 BCU 20-08E					
Well Position	+N/-S	0.0 usft	Northing:	1,530,258.48 usft	Latitude:	39.266756
	+E/-W	10.2 usft	Easting:	2,350,230.16 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	10/19/2016	9.65	65.45	51,495

Design	Design #3			
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	113.39

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	
1,396.5	26.90	113.39	1,363.9	-82.0	189.6	3.00	3.00	0.00	113.39	
5,177.6	26.90	113.39	4,736.1	-761.1	1,759.5	0.00	0.00	0.00	0.00	
6,074.1	0.00	0.00	5,600.0	-843.1	1,949.1	3.00	-3.00	0.00	180.00	
8,024.1	0.00	0.00	7,550.0	-843.1	1,949.1	0.00	0.00	0.00	0.00	PBHL - Gunderson B



Well Planning Report



Database:	EDM5002	Local Co-ordinate Reference:	Well Gunderson BCU 20-08E
Company:	Laramie Energy, LLC	TVD Reference:	well @ 7176 0usft (H&P #522)
Project:	Mesa County, CO	MD Reference:	well @ 7176 0usft (H&P #522)
Site:	Gunderson 20-03 Pad	North Reference:	True
Well:	Gunderson BCU 20-08E	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #3		

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
KOP / Build 3° / 100'									
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	3.00	113.39	600.0	-1.0	2.4	2.6	3.00	3.00	0.00
700.0	6.00	113.39	699.6	-4.2	9.6	10.5	3.00	3.00	0.00
800.0	9.00	113.39	798.8	-9.3	21.6	23.5	3.00	3.00	0.00
900.0	12.00	113.39	897.1	-16.6	38.3	41.7	3.00	3.00	0.00
1,000.0	15.00	113.39	994.3	-25.8	59.7	65.1	3.00	3.00	0.00
1,100.0	18.00	113.39	1,090.2	-37.1	85.8	93.5	3.00	3.00	0.00
1,200.0	21.00	113.39	1,184.4	-50.4	116.4	126.9	3.00	3.00	0.00
1,300.0	24.00	113.39	1,276.8	-65.6	151.5	165.1	3.00	3.00	0.00
EOB @ 26.90° Inc. / 113.39° Azm									
1,396.5	26.90	113.39	1,363.9	-82.0	189.6	206.6	3.00	3.00	0.00
1,400.0	26.90	113.39	1,367.1	-82.6	191.1	208.2	0.01	0.01	0.00
1,500.0	26.90	113.39	1,456.2	-100.6	232.6	253.4	0.00	0.00	0.00
8 5/8"									
1,530.0	26.90	113.39	1,483.0	-106.0	245.0	267.0	0.00	0.00	0.00
1,600.0	26.90	113.39	1,545.4	-118.6	274.1	298.6	0.00	0.00	0.00
1,700.0	26.90	113.39	1,634.6	-136.5	315.6	343.9	0.00	0.00	0.00
1,800.0	26.90	113.39	1,723.8	-154.5	357.1	389.1	0.00	0.00	0.00
1,900.0	26.90	113.39	1,813.0	-172.4	398.6	434.3	0.00	0.00	0.00
2,000.0	26.90	113.39	1,902.2	-190.4	440.2	479.8	0.00	0.00	0.00
2,100.0	26.90	113.39	1,991.3	-208.4	481.7	524.8	0.00	0.00	0.00
2,200.0	26.90	113.39	2,080.5	-226.3	523.2	570.0	0.00	0.00	0.00
2,300.0	26.90	113.39	2,169.7	-244.3	564.7	615.3	0.00	0.00	0.00
2,400.0	26.90	113.39	2,258.9	-262.2	606.2	660.5	0.00	0.00	0.00
2,500.0	26.90	113.39	2,348.1	-280.2	647.8	705.8	0.00	0.00	0.00
2,600.0	26.90	113.39	2,437.3	-298.2	689.3	751.0	0.00	0.00	0.00
G' Sand									
2,614.3	26.90	113.39	2,450.0	-300.7	695.2	757.5	0.00	0.00	0.00
2,700.0	26.90	113.39	2,526.4	-316.1	730.8	796.2	0.00	0.00	0.00
2,800.0	26.90	113.39	2,615.6	-334.1	772.3	841.5	0.00	0.00	0.00
2,900.0	26.90	113.39	2,704.8	-352.0	813.8	886.7	0.00	0.00	0.00
3,000.0	26.90	113.39	2,794.0	-370.0	855.3	931.9	0.00	0.00	0.00
3,100.0	26.90	113.39	2,883.2	-387.9	896.9	977.2	0.00	0.00	0.00
3,200.0	26.90	113.39	2,972.4	-405.9	938.4	1,022.4	0.00	0.00	0.00
3,300.0	26.90	113.39	3,061.5	-423.9	979.9	1,067.6	0.00	0.00	0.00
3,400.0	26.90	113.39	3,150.7	-441.8	1,021.4	1,112.9	0.00	0.00	0.00
3,500.0	26.90	113.39	3,239.9	-459.8	1,062.9	1,158.1	0.00	0.00	0.00
3,600.0	26.90	113.39	3,329.1	-477.7	1,104.5	1,203.4	0.00	0.00	0.00
3,700.0	26.90	113.39	3,418.3	-495.7	1,146.0	1,248.6	0.00	0.00	0.00
3,800.0	26.90	113.39	3,507.5	-513.7	1,187.5	1,293.8	0.00	0.00	0.00
3,900.0	26.90	113.39	3,596.6	-531.6	1,229.0	1,339.1	0.00	0.00	0.00
4,000.0	26.90	113.39	3,685.8	-549.6	1,270.5	1,384.3	0.00	0.00	0.00
4,100.0	26.90	113.39	3,775.0	-567.5	1,312.1	1,429.5	0.00	0.00	0.00
4,200.0	26.90	113.39	3,864.2	-585.5	1,353.6	1,474.8	0.00	0.00	0.00
4,300.0	26.90	113.39	3,953.4	-603.5	1,395.1	1,520.0	0.00	0.00	0.00
4,400.0	26.90	113.39	4,042.6	-621.4	1,436.6	1,565.2	0.00	0.00	0.00
4,500.0	26.90	113.39	4,131.7	-639.4	1,478.1	1,610.5	0.00	0.00	0.00
4,600.0	26.90	113.39	4,220.9	-657.3	1,519.6	1,655.7	0.00	0.00	0.00



Well Planning Report



Database: EDM5002
Company: Laramie Energy, LLC
Project: Mesa County, CO
Site: Gunderson 20-03 Pad
Well: Gunderson BCU 20-08E
Wellbore: Wellbore #1
Design: Design #3

Local Co-ordinate Reference: Well Gunderson BCU 20-08E
TVD Reference: well @ 7176 0usft (H&P #522)
MD Reference: well @ 7176 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)
Williams Fork									
4,688.7	26.90	113.39	4,300.0	-673.3	1,556.5	1,695.8	0.00	0.00	0.00
4,700.0	26.90	113.39	4,310.1	-675.3	1,561.2	1,701.0	0.00	0.00	0.00
4,800.0	26.90	113.39	4,399.3	-693.3	1,602.7	1,746.2	0.00	0.00	0.00
4,900.0	26.90	113.39	4,488.5	-711.2	1,644.2	1,791.4	0.00	0.00	0.00
5,000.0	26.90	113.39	4,577.7	-729.2	1,685.7	1,836.7	0.00	0.00	0.00
5,100.0	26.90	113.39	4,666.8	-747.1	1,727.2	1,881.9	0.00	0.00	0.00
Drop 3° / 100'									
5,177.6	26.90	113.39	4,736.1	-761.1	1,759.5	1,917.0	0.00	0.00	0.00
5,200.0	26.22	113.39	4,756.1	-765.0	1,768.6	1,927.0	3.00	-3.00	0.00
5,300.0	23.22	113.39	4,846.9	-781.6	1,807.0	1,968.8	3.00	-3.00	0.00
5,400.0	20.22	113.39	4,939.8	-796.3	1,841.0	2,005.8	3.00	-3.00	0.00
5,500.0	17.22	113.39	5,034.5	-809.1	1,870.5	2,037.9	3.00	-3.00	0.00
5,600.0	14.22	113.39	5,130.7	-819.8	1,895.3	2,065.0	3.00	-3.00	0.00
5,700.0	11.22	113.39	5,228.3	-828.6	1,915.5	2,087.1	3.00	-3.00	0.00
5,800.0	8.22	113.39	5,326.8	-835.3	1,931.0	2,103.9	3.00	-3.00	0.00
5,900.0	5.22	113.39	5,426.1	-839.9	1,941.8	2,115.7	3.00	-3.00	0.00
6,000.0	2.22	113.39	5,525.9	-842.5	1,947.7	2,122.1	3.00	-3.00	0.00
EOD @ Vertical - TOG									
6,074.1	0.00	0.00	5,600.0	-843.1	1,949.1	2,123.6	3.00	-3.00	-153.00
6,100.0	0.00	0.00	5,625.9	-843.1	1,949.1	2,123.6	0.00	0.00	0.00
6,200.0	0.00	0.00	5,725.9	-843.1	1,949.1	2,123.6	0.00	0.00	0.00
6,300.0	0.00	0.00	5,825.9	-843.1	1,949.1	2,123.6	0.00	0.00	0.00
6,400.0	0.00	0.00	5,925.9	-843.1	1,949.1	2,123.6	0.00	0.00	0.00
6,500.0	0.00	0.00	6,025.9	-843.1	1,949.1	2,123.6	0.00	0.00	0.00
6,600.0	0.00	0.00	6,125.9	-843.1	1,949.1	2,123.6	0.00	0.00	0.00
6,700.0	0.00	0.00	6,225.9	-843.1	1,949.1	2,123.6	0.00	0.00	0.00
6,800.0	0.00	0.00	6,325.9	-843.1	1,949.1	2,123.6	0.00	0.00	0.00
6,900.0	0.00	0.00	6,425.9	-843.1	1,949.1	2,123.6	0.00	0.00	0.00
7,000.0	0.00	0.00	6,525.9	-843.1	1,949.1	2,123.6	0.00	0.00	0.00
Cameo									
7,074.1	0.00	0.00	6,600.0	-843.1	1,949.1	2,123.6	0.00	0.00	0.00
7,100.0	0.00	0.00	6,625.9	-843.1	1,949.1	2,123.6	0.00	0.00	0.00
7,200.0	0.00	0.00	6,725.9	-843.1	1,949.1	2,123.6	0.00	0.00	0.00
7,300.0	0.00	0.00	6,825.9	-843.1	1,949.1	2,123.6	0.00	0.00	0.00
7,400.0	0.00	0.00	6,925.9	-843.1	1,949.1	2,123.6	0.00	0.00	0.00
7,500.0	0.00	0.00	7,025.9	-843.1	1,949.1	2,123.6	0.00	0.00	0.00
7,600.0	0.00	0.00	7,125.9	-843.1	1,949.1	2,123.6	0.00	0.00	0.00
7,700.0	0.00	0.00	7,225.9	-843.1	1,949.1	2,123.6	0.00	0.00	0.00
Base Cameo Coal									
7,734.1	0.00	0.00	7,260.0	-843.1	1,949.1	2,123.6	0.00	0.00	0.00
Rollins									
7,774.1	0.00	0.00	7,300.0	-843.1	1,949.1	2,123.6	0.00	0.00	0.00
7,800.0	0.00	0.00	7,325.9	-843.1	1,949.1	2,123.6	0.00	0.00	0.00
7,900.0	0.00	0.00	7,425.9	-843.1	1,949.1	2,123.6	0.00	0.00	0.00
8,000.0	0.00	0.00	7,525.9	-843.1	1,949.1	2,123.6	0.00	0.00	0.00
TD @ 8024' MD / 7550' TVD									
8,024.1	0.00	0.00	7,550.0	-843.1	1,949.1	2,123.6	0.00	0.00	0.00



Well Planning Report



Database:	EDM5002	Local Co-ordinate Reference:	Well Gunderson BCU 20-08E
Company:	Laramie Energy, LLC	TVD Reference:	well @ 7176.0usft (H&P #522)
Project:	Mesa County, CO	MD Reference:	well @ 7176.0usft (H&P #522)
Site:	Gunderson 20-03 Pad	North Reference:	True
Well:	Gunderson BCU 20-08E	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #3		

Design Targets

Target Name

- hit/miss target	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- Shape									
PBHL - Gunderson BCU - plan hits target center - Circle (radius 50.0)	0.00	0.00	7,550.0	-843.1	1,949.1	1,529,366.43	2,352,157.29	39.264441	-107.788397

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,530.0	1,483.0	8 5/8"	8-5/8	11

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
2,614.3	2,450.0	G' Sand		0.00	
4,688.7	4,300.0	Williams Fork		0.00	
6,074.1	5,600.0	TOG		0.00	
7,074.1	6,600.0	Cameo		0.00	
7,734.1	7,260.0	Base Cameo Coal		0.00	
7,774.1	7,300.0	Rollins		0.00	

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
500.0	500.0	0.0	0.0	KOP / Build 3° / 100'
1,396.5	1,363.9	-82.0	189.6	EOB @ 26.90° Inc. / 113.39° Azm
5,177.6	4,736.1	-761.1	1,759.5	Drop 3° / 100'
6,074.1	5,600.0	-843.1	1,949.1	EOD @ Vertical
8,024.1	7,550.0	-843.1	1,949.1	TD @ 8024' MD / 7550' TVD