



Project: Mesa County, CO
 Site: Sup & Shep 25-11 Pad
 Well: Sup & Shep 0993-25-10W
 Wellbore: A-9
 Design: Design #1
 Latitude: 39.244787
 Longitude: -107.723444
 Ground Level: 8077.0
 well @ 8107.0ustf (30' RKB)



SECTION DETAILS									
MD	Inc	Azi	TVD	+N-S	+E-W	Diag	TFace	VSec1	Annotation
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	Build 3.00°/100'
4000.0	0.00	0.00	4000.0	0.0	0.0	0.00	0.00	0.0	EOB @ 12.42° Inc / 331.64° Azm
4414.1	12.42	331.64	4410.8	39.3	-21.2	3.00	331.64	44.7	Drop @ 3.00°/100'
6520.7	12.42	331.64	6468.2	438.1	-236.5	0.00	0.00	487.8	EOD @ Vertical
6934.5	0.00	0.00	6879.0	477.5	-257.7	3.00	180.00	542.6	TD @ 8484.8' MD / 6629.0' TVD
8684.8	0.00	0.00	8629.0	477.5	-257.7	0.00	0.00	542.6	

DESIGN TARGET DETAILS							
Name	TVD	+N-S	+E-W	Northing	Easting	Latitude	Longitude
PBHL - SUP & SHEP 0993-25-10W	8629.0	477.5	-257.7	1522237.28	2370120.56	39.246098	-107.724354

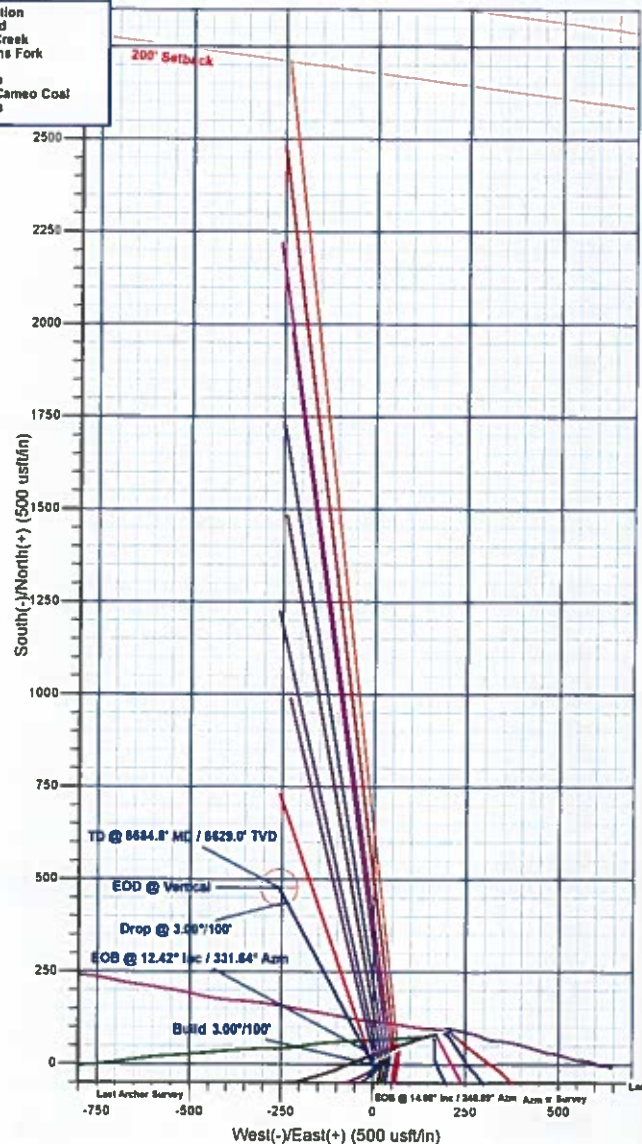
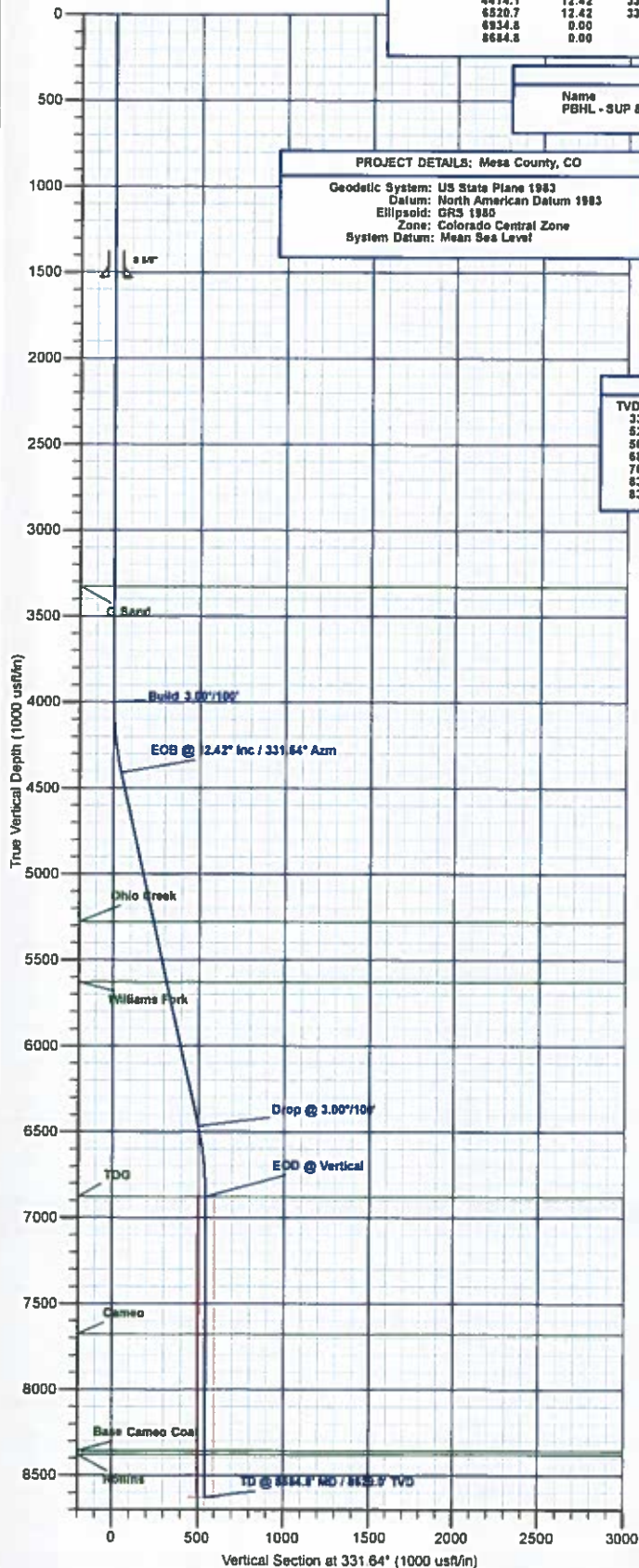
PROJECT DETAILS: Mesa County, CO
 Geodetic System: US State Plane 1983
 Datum: North American Datum 1983
 Ellipsoid: GRS 1980
 Zone: Colorado Central Zone
 System Datum: Mean Sea Level

WELL DETAILS: Sup & Shep 0993-25-10W					
+N-S	+E-W	Northing	Easting	Latitude	Longitude
0.0	0.0	1521753.61	2370366.51	39.244787	-107.723444

Azimuths to True North
 Magnetic North: 9.48°
 Magnetic Field
 Strength: 51350.8nT
 Dip Angle: 65.42°
 Date: 1/2/2018
 Model: IGRF2015

REFERENCE INFORMATION
 Co-ordinate (NE) Reference: Well Sup & Shep 0993-25-10W, True North
 Vertical (TVD) Reference: well @ 8107.0ustf (30' RKB)
 Section (VS) Reference: Slot - (0.0N, 0.0E)
 Measured Depth Reference: well @ 8107.0ustf (30' RKB)
 Calculation Method: Minimum Curvature

FORMATION TOP DETAILS		
TVDPath	MDPath	Formation
3329.0	3329.0	G Sand
5279.0	5303.0	Ohio Creek
5629.0	5661.4	Williams Fork
6879.0	6834.8	TOG
7679.0	7734.6	Cameo
8359.0	8414.6	Base Cameo Coal
8379.0	8434.6	Rollins





Laramie Energy, LLC

Mesa County, CO

Sup & Shep 25-11 Pad

Sup & Shep 0993-25-10W

A-9

Plan: Design #1

QES Well Planning Report

04 March, 2018





Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Sup & Shep 0993-25-10W
Company:	Laramie Energy, LLC	TVD Reference:	well @ 8107.0usft (30' RKB)
Project:	Mesa County, CO	MD Reference:	well @ 8107.0usft (30' RKB)
Site:	Sup & Shep 25-11 Pad	North Reference:	True
Well:	Sup & Shep 0993-25-10W	Survey Calculation Method:	Minimum Curvature
Wellbore:	A-9		
Design:	Design #1		

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		Sup & Shep 25-11 Pad			
Site Position:		Northing:	1,521,749.72 usft	Latitude:	39.244779
From:	Lat/Long	Easting:	2,370,406.93 usft	Longitude:	-107.723301
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-1.40 °

Well	Sup & Shep 0993-25-10W					
Well Position	+N/-S	2.9 usft	Northing:	1,521,753.62 usft	Latitude:	39.244787
	+E/-W	-40.5 usft	Easting:	2,370,366.51 usft	Longitude:	-107.723444
Position Uncertainty		0.0 usft	Wellhead Elevation:		Ground Level:	8,077.0 usft

Wellbore	A-9				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	1/2/2018	9.49	65.42	51,350.81562826

Design	Design #1			
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	331.64

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	
4,000.0	0.00	0.00	4,000.0	0.0	0.0	0.00	0.00	0.00	0.00	
4,414.1	12.42	331.64	4,410.8	39.3	-21.2	3.00	3.00	0.00	331.64	
6,520.7	12.42	331.64	6,468.2	438.1	-236.5	0.00	0.00	0.00	0.00	
6,934.8	0.00	0.00	6,879.0	477.5	-257.7	3.00	-3.00	0.00	180.00	
8,684.8	0.00	0.00	8,629.0	477.5	-257.7	0.00	0.00	0.00	0.00	PBHL - SUP & SHEP



Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Sup & Shep 0993-25-10W
Company:	Laramie Energy, LLC	TVD Reference:	well @ 8107.0usft (30' RKB)
Project:	Mesa County, CO	MD Reference:	well @ 8107.0usft (30' RKB)
Site:	Sup & Shep 25-11 Pad	North Reference:	True
Well:	Sup & Shep 0993-25-10W	Survey Calculation Method:	Minimum Curvature
Wellbore:	A-8		
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)
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
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	0.00
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	0.00
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	0.00	0.00
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	0.00
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	0.00
8 5/8"									
1,530.0	0.00	0.00	1,530.0	0.0	0.0	0.0	0.00	0.00	0.00
1,600.0	0.00	0.00	1,600.0	0.0	0.0	0.0	0.00	0.00	0.00
1,700.0	0.00	0.00	1,700.0	0.0	0.0	0.0	0.00	0.00	0.00
1,800.0	0.00	0.00	1,800.0	0.0	0.0	0.0	0.00	0.00	0.00
1,900.0	0.00	0.00	1,900.0	0.0	0.0	0.0	0.00	0.00	0.00
2,000.0	0.00	0.00	2,000.0	0.0	0.0	0.0	0.00	0.00	0.00
2,100.0	0.00	0.00	2,100.0	0.0	0.0	0.0	0.00	0.00	0.00
2,200.0	0.00	0.00	2,200.0	0.0	0.0	0.0	0.00	0.00	0.00
2,300.0	0.00	0.00	2,300.0	0.0	0.0	0.0	0.00	0.00	0.00
2,400.0	0.00	0.00	2,400.0	0.0	0.0	0.0	0.00	0.00	0.00
2,500.0	0.00	0.00	2,500.0	0.0	0.0	0.0	0.00	0.00	0.00
2,600.0	0.00	0.00	2,600.0	0.0	0.0	0.0	0.00	0.00	0.00
2,700.0	0.00	0.00	2,700.0	0.0	0.0	0.0	0.00	0.00	0.00
2,800.0	0.00	0.00	2,800.0	0.0	0.0	0.0	0.00	0.00	0.00
2,900.0	0.00	0.00	2,900.0	0.0	0.0	0.0	0.00	0.00	0.00
3,000.0	0.00	0.00	3,000.0	0.0	0.0	0.0	0.00	0.00	0.00
3,100.0	0.00	0.00	3,100.0	0.0	0.0	0.0	0.00	0.00	0.00
3,200.0	0.00	0.00	3,200.0	0.0	0.0	0.0	0.00	0.00	0.00
3,300.0	0.00	0.00	3,300.0	0.0	0.0	0.0	0.00	0.00	0.00
G Sand									
3,329.0	0.00	0.00	3,329.0	0.0	0.0	0.0	0.00	0.00	0.00
3,400.0	0.00	0.00	3,400.0	0.0	0.0	0.0	0.00	0.00	0.00
3,500.0	0.00	0.00	3,500.0	0.0	0.0	0.0	0.00	0.00	0.00
3,600.0	0.00	0.00	3,600.0	0.0	0.0	0.0	0.00	0.00	0.00
3,700.0	0.00	0.00	3,700.0	0.0	0.0	0.0	0.00	0.00	0.00
3,800.0	0.00	0.00	3,800.0	0.0	0.0	0.0	0.00	0.00	0.00
3,900.0	0.00	0.00	3,900.0	0.0	0.0	0.0	0.00	0.00	0.00
Build 3.00°/100'									
4,000.0	0.00	0.00	4,000.0	0.0	0.0	0.0	0.00	0.00	0.00
4,100.0	3.00	331.64	4,100.0	2.3	-1.2	2.6	3.00	3.00	0.00
4,200.0	6.00	331.64	4,199.6	9.2	-5.0	10.5	3.00	3.00	0.00
4,300.0	9.00	331.64	4,298.8	20.7	-11.2	23.5	3.00	3.00	0.00
4,400.0	12.00	331.64	4,397.1	36.7	-19.8	41.7	3.00	3.00	0.00
EOB @ 12.42° Inc / 331.64° Azm									
4,414.1	12.42	331.64	4,410.8	39.3	-21.2	44.7	3.00	3.00	0.00
4,500.0	12.42	331.64	4,494.8	55.6	-30.0	63.2	0.00	0.00	0.00
4,600.0	12.42	331.64	4,592.4	74.5	-40.2	84.7	0.00	0.00	0.00



Well Planning Report



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Company:	Laramie Energy, LLC	TVD Reference:	well @ 8107.0usft (30' RKB)
Project:	Mesa County, CO	MD Reference:	well @ 8107.0usft (30' RKB)
Site:	Sup & Shep 25-11 Pad	North Reference:	True
Well:	Sup & Shep 0993-25-10W	Survey Calculation Method:	Minimum Curvature
Wellbore:	A-9		
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)
4,700.0	12.42	331.64	4,690.1	93.5	-50.5	106.2	0.00	0.00	0.00
4,800.0	12.42	331.64	4,787.7	112.4	-50.7	127.7	0.00	0.00	0.00
4,900.0	12.42	331.64	4,885.4	131.3	-70.9	149.2	0.00	0.00	0.00
5,000.0	12.42	331.64	4,983.0	150.3	-81.1	170.8	0.00	0.00	0.00
5,100.0	12.42	331.64	5,080.7	169.2	-91.3	192.3	0.00	0.00	0.00
5,200.0	12.42	331.64	5,178.4	188.1	-101.5	213.8	0.00	0.00	0.00
5,300.0	12.42	331.64	5,276.0	207.1	-111.8	235.3	0.00	0.00	0.00
Ohio Creek									
5,303.0	12.42	331.64	5,279.0	207.6	-112.1	235.9	0.00	0.00	0.00
5,400.0	12.42	331.64	5,373.7	226.0	-122.0	256.8	0.00	0.00	0.00
5,500.0	12.42	331.64	5,471.3	244.9	-132.2	278.3	0.00	0.00	0.00
5,600.0	12.42	331.64	5,569.0	263.9	-142.4	299.8	0.00	0.00	0.00
Williams Fork									
5,661.4	12.42	331.64	5,629.0	275.5	-148.7	313.0	0.00	0.00	0.00
5,700.0	12.42	331.64	5,666.7	282.8	-152.6	321.3	0.00	0.00	0.00
5,800.0	12.42	331.64	5,764.3	301.7	-162.8	342.9	0.00	0.00	0.00
5,900.0	12.42	331.64	5,862.0	320.6	-173.1	364.4	0.00	0.00	0.00
6,000.0	12.42	331.64	5,959.6	339.6	-183.3	385.9	0.00	0.00	0.00
6,100.0	12.42	331.64	6,057.3	358.5	-193.5	407.4	0.00	0.00	0.00
6,200.0	12.42	331.64	6,155.0	377.4	-203.7	428.9	0.00	0.00	0.00
6,300.0	12.42	331.64	6,252.6	396.4	-213.9	450.4	0.00	0.00	0.00
6,400.0	12.42	331.64	6,350.3	415.3	-224.1	471.9	0.00	0.00	0.00
6,500.0	12.42	331.64	6,447.9	434.2	-234.4	493.4	0.00	0.00	0.00
Drop @ 3.00°/100'									
6,520.7	12.42	331.64	6,468.2	438.1	-236.5	497.9	0.00	0.00	0.00
6,600.0	10.04	331.64	6,545.9	451.7	-243.8	513.3	3.00	-3.00	0.00
6,700.0	7.04	331.64	6,644.8	464.8	-250.9	528.2	3.00	-3.00	0.00
6,800.0	4.04	331.64	6,744.3	473.3	-255.5	537.9	3.00	-3.00	0.00
6,900.0	1.04	331.64	6,844.2	477.2	-257.6	542.3	3.00	-3.00	0.00
EOD @ Vertical - TOG									
6,934.8	0.00	0.00	6,879.0	477.5	-257.7	542.6	3.00	-3.00	0.00
7,000.0	0.00	0.00	6,944.2	477.5	-257.7	542.6	0.00	0.00	0.00
7,100.0	0.00	0.00	7,044.2	477.5	-257.7	542.6	0.00	0.00	0.00
7,200.0	0.00	0.00	7,144.2	477.5	-257.7	542.6	0.00	0.00	0.00
7,300.0	0.00	0.00	7,244.2	477.5	-257.7	542.6	0.00	0.00	0.00
7,400.0	0.00	0.00	7,344.2	477.5	-257.7	542.6	0.00	0.00	0.00
7,500.0	0.00	0.00	7,444.2	477.5	-257.7	542.6	0.00	0.00	0.00
7,600.0	0.00	0.00	7,544.2	477.5	-257.7	542.6	0.00	0.00	0.00
7,700.0	0.00	0.00	7,644.2	477.5	-257.7	542.6	0.00	0.00	0.00
Cameo									
7,734.8	0.00	0.00	7,679.0	477.5	-257.7	542.6	0.00	0.00	0.00
7,800.0	0.00	0.00	7,744.2	477.5	-257.7	542.6	0.00	0.00	0.00
7,900.0	0.00	0.00	7,844.2	477.5	-257.7	542.6	0.00	0.00	0.00
8,000.0	0.00	0.00	7,944.2	477.5	-257.7	542.6	0.00	0.00	0.00
8,100.0	0.00	0.00	8,044.2	477.5	-257.7	542.6	0.00	0.00	0.00
8,200.0	0.00	0.00	8,144.2	477.5	-257.7	542.6	0.00	0.00	0.00
8,300.0	0.00	0.00	8,244.2	477.5	-257.7	542.6	0.00	0.00	0.00
8,400.0	0.00	0.00	8,344.2	477.5	-257.7	542.6	0.00	0.00	0.00
Base Cameo Coal									
8,414.8	0.00	0.00	8,359.0	477.5	-257.7	542.6	0.00	0.00	0.00
Rollins									
8,434.8	0.00	0.00	8,379.0	477.5	-257.7	542.6	0.00	0.00	0.00
8,500.0	0.00	0.00	8,444.2	477.5	-257.7	542.6	0.00	0.00	0.00



Well Planning Report



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Company:	Laramie Energy, LLC	TVD Reference:	well @ 8107.0usft (30' RKB)
Project:	Mesa County, CO	MD Reference:	well @ 8107.0usft (30' RKB)
Site:	Sup & Shep 25-11 Pad	North Reference:	True
Well:	Sup & Shep 0993-25-10W	Survey Calculation Method:	Minimum Curvature
Wellbore:	A-9		
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)
8,600.0	0.00	0.00	8,544.2	477.5	-257.7	542.6	0.00	0.00	0.00
TD @ 8684.8' MD / 8629.0' TVD									
8,684.8	0.00	0.00	8,629.0	477.5	-257.7	542.6	0.00	0.00	0.00

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 - SUP & SHEP 09	0.00	0.00	8,629.0	477.5	-257.7	1,522,237.28	2,370,120.56	39.246098	-107.724354
- plan hits target center									
- Circle (radius 50.0)									

Casing Points

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

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
3,329.0	3,329.0	G Sand			
5,303.0	5,279.0	Ohio Creek			
5,661.4	5,629.0	Williams Fork			
6,934.8	6,879.0	TOG			
7,734.8	7,679.0	Cameo			
8,414.8	8,359.0	Base Cameo Coal			
8,434.8	8,379.0	Rollins			

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
4,000.0	4,000.0	0.0	0.0	Build 3.00°/100'
4,414.1	4,410.8	39.3	-21.2	EOB @ 12.42° Inc / 331.64° Azm
6,520.7	6,468.2	438.1	-236.5	Drop @ 3.00°/100'
6,934.8	6,879.0	477.5	-257.7	EOD @ Vertical
8,684.8	8,629.0	477.5	-257.7	TD @ 8684.8' MD / 8629.0' TVD