

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: BCU 0993-21-05E

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.0	0.0	1529665.43	2354508.14	39.265424	-107.780123

Project: Mesa County, CO
 Site: Gunderson 0993 21-05 Pad
 Well: BCU 0993-21-05E
 Wellbore: Wellbore #1
 Design: Design #1
 Latitude: 39.265424
 Longitude: -107.780123
 Ground Level: 7256.0
 well @ 7286.0ush (H&P #522)

REFERENCE INFORMATION

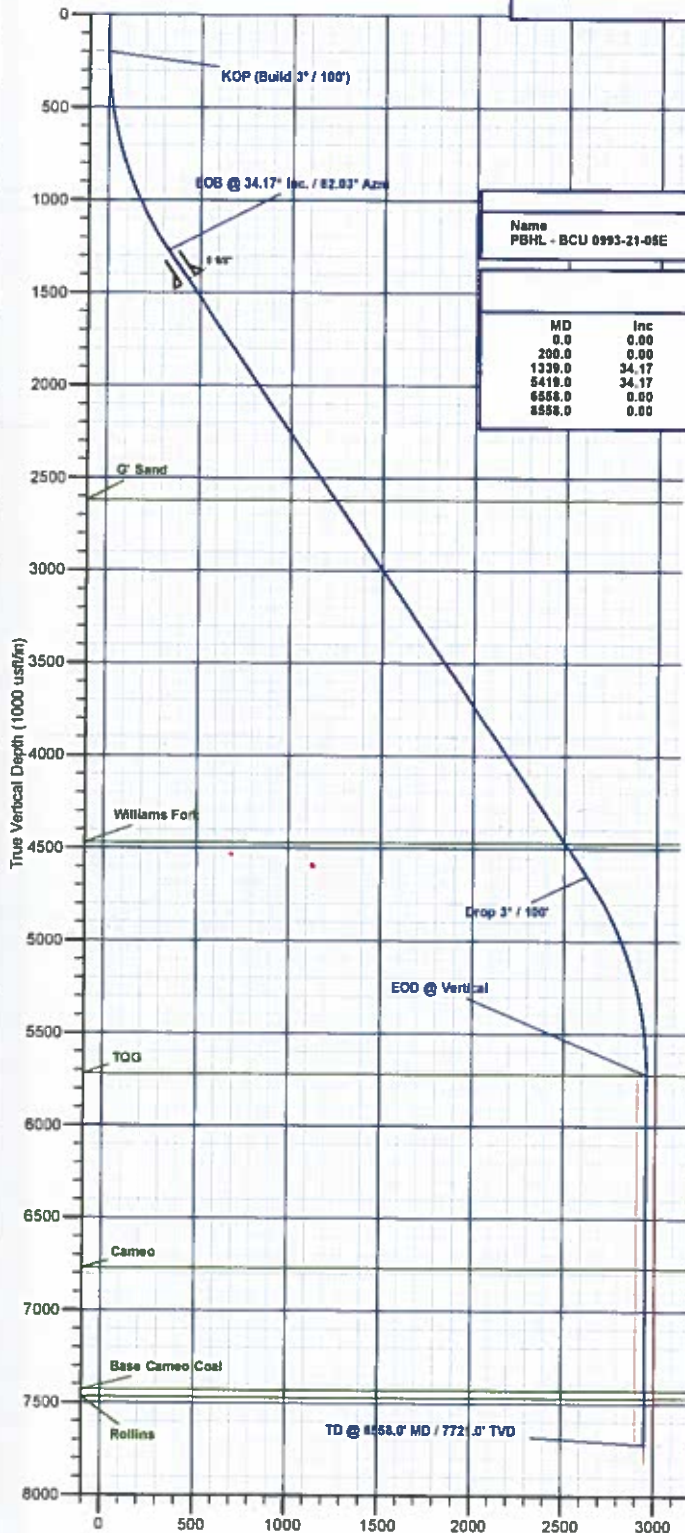
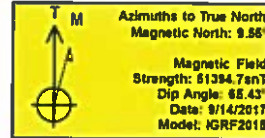
Co-ordinate (N/E) Reference: Well BCU 0993-21-05E, True North
 Vertical (TVD) Reference: well @ 7286.0ush (H&P #522)
 Section (VS) Reference: Slot - (0.0N, 0.0E)
 Measured Depth Reference: well @ 7286.0ush (H&P #522)
 Calculation Method: Minimum Curvature



DIRECTIONAL DRILLING

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
2621.0	2968.6	G' Sand
4471.0	5204.6	Williams Fork
5721.0	6558.0	TOG
6771.0	7608.0	Cameo
7431.0	8268.0	Base Cameo Coal
7471.0	8308.0	Rollins

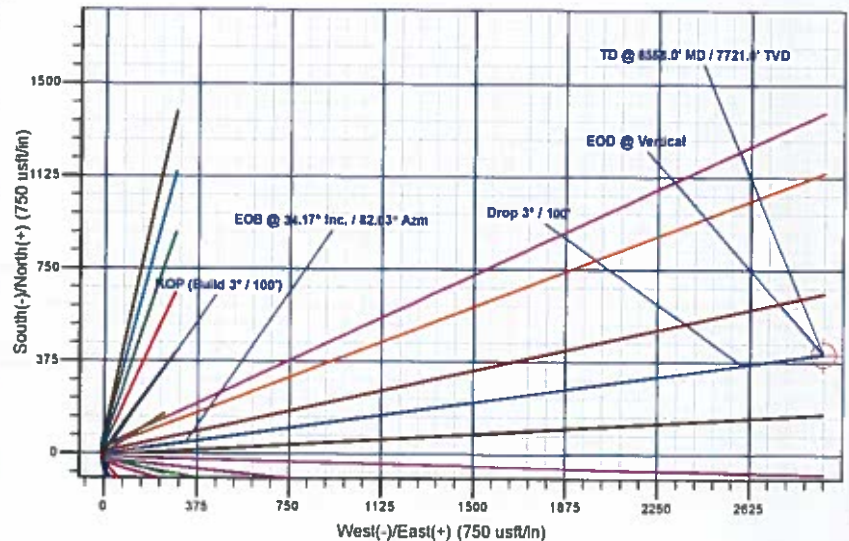


DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
PBHL - BCU 0993-21-05E	7721.0	409.2	2922.4	1530001.15	2357439.06	39.266547	-107.769801

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	
200.0	0.00	0.00	200.0	0.0	0.0	0.00	0.00	0.0	KOP (Build 3° / 100')
1339.0	34.17	82.03	1272.7	45.7	326.5	3.00	82.03	329.7	EOB @ 34.17° Inc. / 82.03° Azm
5419.0	34.17	82.03	4648.3	383.5	2585.9	0.00	0.00	2621.2	Drop 3° / 100'
6558.0	0.00	0.00	8721.0	409.2	2922.4	3.00	180.00	2950.9	EOD @ Vertical
8558.0	0.00	0.00	7721.0	409.2	2922.4	0.00	0.00	2950.9	TD @ 8558.0' MD / 7721.0' TVD



Plan: Design #1 (BCU 0993-21-05E/Wellbore #1)

Created By: Will Jircik

Date: 13:14, September 18 2017



Laramie Energy, LLC

Mesa County, CO

Gunderson 0993 21-05 Pad

BCU 0993-21-05E

Wellbore #1

Plan: Design #1

QES Well Planning Report

18 September, 2017





Well Planning Report



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

Well	BCU 0993-21-05E			
Well Position	+N/-S	37.5 usft	Northing:	1,529,665.44 usft
	+E/-W	-1.7 usft	Easting:	2,354,508.15 usft
Position Uncertainty	0.0 usft		Wellhead Elevation:	
			Ground Level:	7,256.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	9/14/2017	9.55	65.43	51,394.72449705

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	82.03

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	
200.0	0.00	0.00	200.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,339.0	34.17	82.03	1,272.7	45.7	326.5	3.00	3.00	0.00	82.03	
5,419.0	34.17	82.03	4,648.3	363.5	2,595.9	0.00	0.00	0.00	0.00	
6,558.0	0.00	0.00	5,721.0	409.2	2,922.4	3.00	-3.00	0.00	180.00	
8,558.0	0.00	0.00	7,721.0	409.2	2,922.4	0.00	0.00	0.00	0.00	PBHL - BCU 0993-21



Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well BCU 0993-21-05E
Company:	Laramie Energy, LLC	TVD Reference:	well @ 7286.0usft (H&P #522)
Project:	Mesa County, CO	MD Reference:	well @ 7286.0usft (H&P #522)
Site:	Gunderson 0993 21-05 Pad	North Reference:	True
Well:	BCU 0993-21-05E	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)
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
KOP (Build 3° / 100')									
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	3.00	82.03	300.0	0.4	2.6	2.6	3.00	3.00	0.00
400.0	6.00	82.03	399.6	1.5	10.4	10.5	3.00	3.00	0.00
500.0	9.00	82.03	498.8	3.3	23.3	23.5	3.00	3.00	0.00
600.0	12.00	82.03	597.1	5.8	41.3	41.7	3.00	3.00	0.00
700.0	15.00	82.03	694.3	9.0	64.4	65.1	3.00	3.00	0.00
800.0	18.00	82.03	790.2	13.0	92.6	93.5	3.00	3.00	0.00
900.0	21.00	82.03	884.4	17.6	125.6	126.9	3.00	3.00	0.00
1,000.0	24.00	82.03	976.8	22.9	163.5	165.1	3.00	3.00	0.00
1,100.0	27.00	82.03	1,067.1	28.9	206.2	208.2	3.00	3.00	0.00
1,200.0	30.00	82.03	1,154.9	35.5	253.4	255.9	3.00	3.00	0.00
1,300.0	33.00	82.03	1,240.2	42.7	305.1	308.1	3.00	3.00	0.00
EOB @ 34.17° Inc. / 82.03° Azm									
1,339.0	34.17	82.03	1,272.7	45.7	326.5	329.7	3.00	3.00	0.00
1,400.0	34.17	82.03	1,323.1	50.5	360.4	364.0	0.00	0.00	0.00
1,500.0	34.17	82.03	1,405.9	58.3	418.1	420.1	0.00	0.00	0.00
8 5/8"									
1,530.0	34.17	82.03	1,430.7	60.6	432.7	437.0	0.00	0.00	0.00
1,600.0	34.17	82.03	1,488.6	68.0	471.7	476.3	0.00	0.00	0.00
1,700.0	34.17	82.03	1,571.4	73.8	527.3	532.4	0.00	0.00	0.00
1,800.0	34.17	82.03	1,654.1	81.6	582.9	588.6	0.00	0.00	0.00
1,900.0	34.17	82.03	1,736.8	89.4	638.5	644.8	0.00	0.00	0.00
2,000.0	34.17	82.03	1,819.6	97.2	694.2	700.9	0.00	0.00	0.00
2,100.0	34.17	82.03	1,902.3	105.0	749.8	757.1	0.00	0.00	0.00
2,200.0	34.17	82.03	1,985.0	112.8	805.4	813.3	0.00	0.00	0.00
2,300.0	34.17	82.03	2,067.8	120.6	861.0	869.4	0.00	0.00	0.00
2,400.0	34.17	82.03	2,150.5	128.4	916.7	925.6	0.00	0.00	0.00
2,500.0	34.17	82.03	2,233.3	136.1	972.3	981.8	0.00	0.00	0.00
2,600.0	34.17	82.03	2,316.0	143.9	1,027.9	1,037.9	0.00	0.00	0.00
2,700.0	34.17	82.03	2,398.7	151.7	1,083.5	1,094.1	0.00	0.00	0.00
2,800.0	34.17	82.03	2,481.5	159.5	1,139.1	1,150.3	0.00	0.00	0.00
2,900.0	34.17	82.03	2,564.2	167.3	1,194.8	1,206.4	0.00	0.00	0.00
G' Sand									
2,968.6	34.17	82.03	2,621.0	172.6	1,232.9	1,245.0	0.00	0.00	0.00
3,000.0	34.17	82.03	2,646.9	175.1	1,250.4	1,262.6	0.00	0.00	0.00
3,100.0	34.17	82.03	2,729.7	182.9	1,306.0	1,318.8	0.00	0.00	0.00
3,200.0	34.17	82.03	2,812.4	190.7	1,361.6	1,374.9	0.00	0.00	0.00
3,300.0	34.17	82.03	2,895.2	198.4	1,417.3	1,431.1	0.00	0.00	0.00
3,400.0	34.17	82.03	2,977.9	206.2	1,472.9	1,487.2	0.00	0.00	0.00
3,500.0	34.17	82.03	3,060.6	214.0	1,528.5	1,543.4	0.00	0.00	0.00
3,600.0	34.17	82.03	3,143.4	221.8	1,584.1	1,599.6	0.00	0.00	0.00
3,700.0	34.17	82.03	3,226.1	229.6	1,639.7	1,655.7	0.00	0.00	0.00
3,800.0	34.17	82.03	3,308.8	237.4	1,695.4	1,711.9	0.00	0.00	0.00
3,900.0	34.17	82.03	3,391.6	245.2	1,751.0	1,768.1	0.00	0.00	0.00
4,000.0	34.17	82.03	3,474.3	253.0	1,806.6	1,824.2	0.00	0.00	0.00
4,100.0	34.17	82.03	3,557.1	260.8	1,862.2	1,880.4	0.00	0.00	0.00
4,200.0	34.17	82.03	3,639.8	268.5	1,917.9	1,936.6	0.00	0.00	0.00
4,300.0	34.17	82.03	3,722.5	276.3	1,973.5	1,992.7	0.00	0.00	0.00
4,400.0	34.17	82.03	3,805.3	284.1	2,029.1	2,048.9	0.00	0.00	0.00
4,500.0	34.17	82.03	3,888.0	291.9	2,084.7	2,105.1	0.00	0.00	0.00
4,600.0	34.17	82.03	3,970.7	299.7	2,140.3	2,161.2	0.00	0.00	0.00



Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well BCU 0993-21-05E
Company:	Laramie Energy, LLC	TVD Reference:	well @ 7286.0usft (H&P #522)
Project:	Mesa County, CO	MD Reference:	well @ 7286.0usft (H&P #522)
Site:	Gunderson 0993 21-05 Pad	North Reference:	True
Well:	BCU 0993-21-05E	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)
4,700.0	34.17	82.03	4,053.5	307.5	2,196.0	2,217.4	0.00	0.00	0.00
4,800.0	34.17	82.03	4,136.2	315.3	2,251.6	2,273.6	0.00	0.00	0.00
4,900.0	34.17	82.03	4,219.0	323.1	2,307.2	2,329.7	0.00	0.00	0.00
5,000.0	34.17	82.03	4,301.7	330.8	2,362.8	2,385.9	0.00	0.00	0.00
5,100.0	34.17	82.03	4,384.4	338.6	2,418.5	2,442.0	0.00	0.00	0.00
5,200.0	34.17	82.03	4,467.2	346.4	2,474.1	2,498.2	0.00	0.00	0.00
Williams Fork									
5,204.6	34.17	82.03	4,471.0	346.8	2,476.7	2,500.8	0.00	0.00	0.00
5,300.0	34.17	82.03	4,549.9	354.2	2,529.7	2,554.4	0.00	0.00	0.00
5,400.0	34.17	82.03	4,632.6	362.0	2,585.3	2,610.5	0.00	0.00	0.00
Drop 3° / 100'									
5,419.0	34.17	82.03	4,648.3	363.5	2,595.9	2,621.2	0.00	0.00	0.00
5,500.0	31.74	82.03	4,716.3	369.6	2,639.5	2,665.3	3.00	-3.00	0.00
5,600.0	28.74	82.03	4,802.7	376.6	2,689.4	2,715.6	3.00	-3.00	0.00
5,700.0	25.74	82.03	4,891.6	382.9	2,734.7	2,761.4	3.00	-3.00	0.00
5,800.0	22.74	82.03	4,982.8	388.6	2,775.4	2,802.4	3.00	-3.00	0.00
5,900.0	19.74	82.03	5,076.0	393.6	2,811.2	2,838.7	3.00	-3.00	0.00
6,000.0	16.74	82.03	5,171.0	398.0	2,842.2	2,870.0	3.00	-3.00	0.00
6,100.0	13.74	82.03	5,267.4	401.6	2,868.3	2,896.2	3.00	-3.00	0.00
6,200.0	10.74	82.03	5,365.1	404.6	2,889.2	2,917.4	3.00	-3.00	0.00
6,300.0	7.74	82.03	5,463.8	406.8	2,905.1	2,933.5	3.00	-3.00	0.00
6,400.0	4.74	82.03	5,563.2	408.3	2,915.9	2,944.3	3.00	-3.00	0.00
6,500.0	1.74	82.03	5,663.1	409.1	2,921.5	2,950.0	3.00	-3.00	0.00
EOD @ Vertical - TOG									
6,558.0	0.00	0.00	5,721.0	409.2	2,922.4	2,950.9	3.00	-3.00	0.00
6,600.0	0.00	0.00	5,763.0	409.2	2,922.4	2,950.9	0.00	0.00	0.00
6,700.0	0.00	0.00	5,863.0	409.2	2,922.4	2,950.9	0.00	0.00	0.00
6,800.0	0.00	0.00	5,963.0	409.2	2,922.4	2,950.9	0.00	0.00	0.00
6,900.0	0.00	0.00	6,063.0	409.2	2,922.4	2,950.9	0.00	0.00	0.00
7,000.0	0.00	0.00	6,163.0	409.2	2,922.4	2,950.9	0.00	0.00	0.00
7,100.0	0.00	0.00	6,263.0	409.2	2,922.4	2,950.9	0.00	0.00	0.00
7,200.0	0.00	0.00	6,363.0	409.2	2,922.4	2,950.9	0.00	0.00	0.00
7,300.0	0.00	0.00	6,463.0	409.2	2,922.4	2,950.9	0.00	0.00	0.00
7,400.0	0.00	0.00	6,563.0	409.2	2,922.4	2,950.9	0.00	0.00	0.00
7,500.0	0.00	0.00	6,663.0	409.2	2,922.4	2,950.9	0.00	0.00	0.00
7,600.0	0.00	0.00	6,763.0	409.2	2,922.4	2,950.9	0.00	0.00	0.00
Cameo									
7,608.0	0.00	0.00	6,771.0	409.2	2,922.4	2,950.9	0.00	0.00	0.00
7,700.0	0.00	0.00	6,863.0	409.2	2,922.4	2,950.9	0.00	0.00	0.00
7,800.0	0.00	0.00	6,963.0	409.2	2,922.4	2,950.9	0.00	0.00	0.00
7,900.0	0.00	0.00	7,063.0	409.2	2,922.4	2,950.9	0.00	0.00	0.00
8,000.0	0.00	0.00	7,163.0	409.2	2,922.4	2,950.9	0.00	0.00	0.00
8,100.0	0.00	0.00	7,263.0	409.2	2,922.4	2,950.9	0.00	0.00	0.00
8,200.0	0.00	0.00	7,363.0	409.2	2,922.4	2,950.9	0.00	0.00	0.00
Base Cameo Coal									
8,268.0	0.00	0.00	7,431.0	409.2	2,922.4	2,950.9	0.00	0.00	0.00
8,300.0	0.00	0.00	7,463.0	409.2	2,922.4	2,950.9	0.00	0.00	0.00
Rollins									
8,308.0	0.00	0.00	7,471.0	409.2	2,922.4	2,950.9	0.00	0.00	0.00
8,400.0	0.00	0.00	7,563.0	409.2	2,922.4	2,950.9	0.00	0.00	0.00
8,500.0	0.00	0.00	7,663.0	409.2	2,922.4	2,950.9	0.00	0.00	0.00
TD @ 8558.0' MD / 7721.0' TVD									
8,558.0	0.00	0.00	7,721.0	409.2	2,922.4	2,950.9	0.00	0.00	0.00



Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well BCU 0993-21-05E
Company:	Laramie Energy, LLC	TVD Reference:	well @ 7286.0usft (H&P #522)
Project:	Mesa County, CO	MD Reference:	well @ 7286.0usft (H&P #522)
Site:	Gunderson 0993 21-05 Pad	North Reference:	True
Well:	BCU 0993-21-05E	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)
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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 0993-21-05 - plan hits target center - Circle (radius 50.0)	0.00	0.00	7,721.0	409.2	2,922.4	1,530,001.16	2,357,439.86	39.266547	-107.769801

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,530.0	1,430.7	8 5/8"	8-5/8	11

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
2,968.6	2,621.0	G' Sand			
5,204.6	4,471.0	Williams Fork			
6,558.0	5,721.0	TOG			
7,608.0	6,771.0	Cameo			
8,268.0	7,431.0	Base Cameo Coal			
8,308.0	7,471.0	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')
1,339.0	1,272.7	45.7	326.5	EOB @ 34.17° Inc. / 82.03° Azm
5,419.0	4,648.3	363.5	2,595.9	Drop 3° / 100'
6,558.0	5,721.0	409.2	2,922.4	EOD @ Vertical
8,558.0	7,721.0	409.2	2,922.4	TD @ 8558.0' MD / 7721.0' TVD