



Project: Mesa County, CO
 Site: Gunderson 13-11 Pad
 Well: Gunderson 0994-13-12W
 Wellbore: Wellbore #1
 Design: Design #1
 Latitude: 39.273903
 Longitude: -107.834890
 Ground Level: 7272.0
 well @ 7302.0usft (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

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')
481.4	8.44	353.17	480.4	29.5	-2.6	3.00	353.17	20.7	EOB @ 8.44" Inc. / 353.17" Azm
5817.2	8.44	353.17	5461.6	754.5	-90.4	0.00	0.00	759.9	Drop 3" / 100'
5798.5	0.00	0.00	5742.0	775.1	-82.9	3.00	180.00	780.6	EOD @ Vertical
7648.6	0.00	0.00	7592.0	775.1	-92.9	0.00	0.00	780.6	TD @ 7648.6" MD / 7592.0" TVD

DESIGN TARGET DETAILS

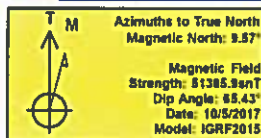
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
PBHL - Gunderson 0994-13-12W	7592.0	775.1	-92.9	1533923.63	2339013.70	39.274031	-107.835218

WELL DETAILS: Gunderson 0994-13-12W

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.0	0.0	1533145.43	2339086.61	39.273903	-107.834890

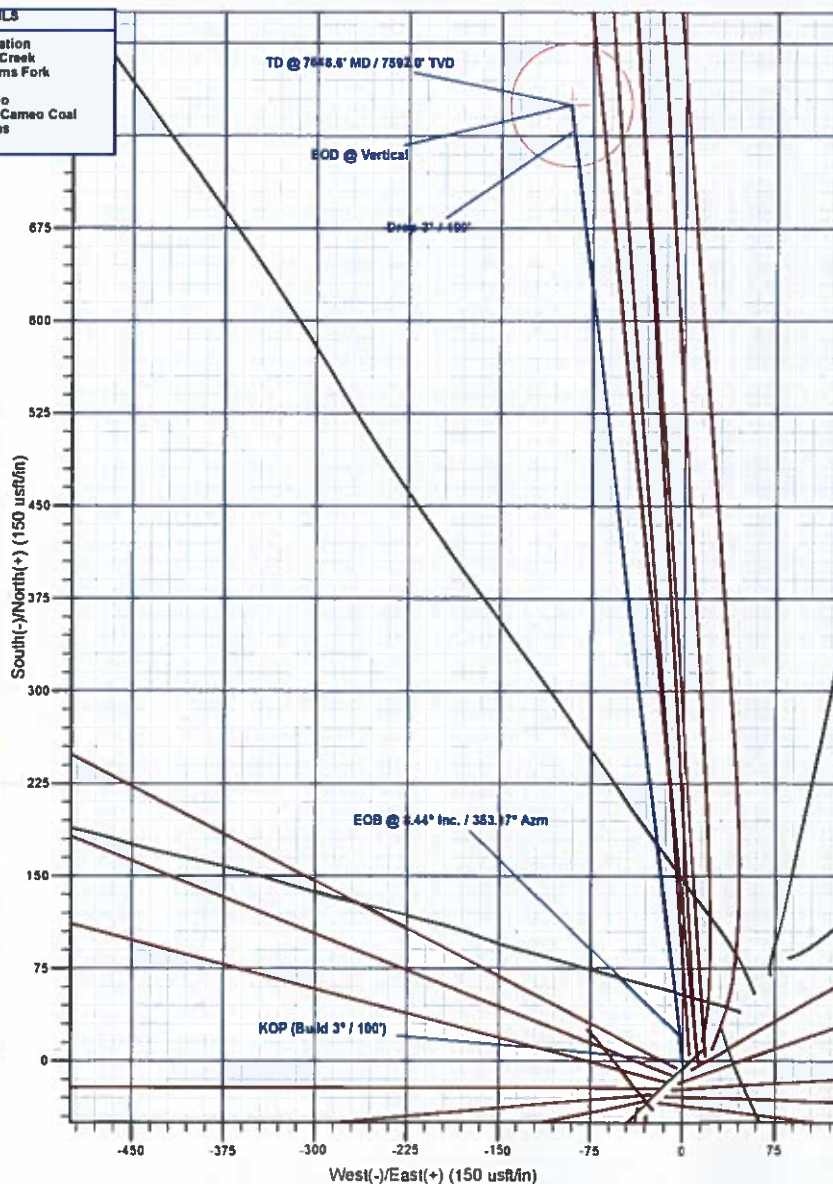
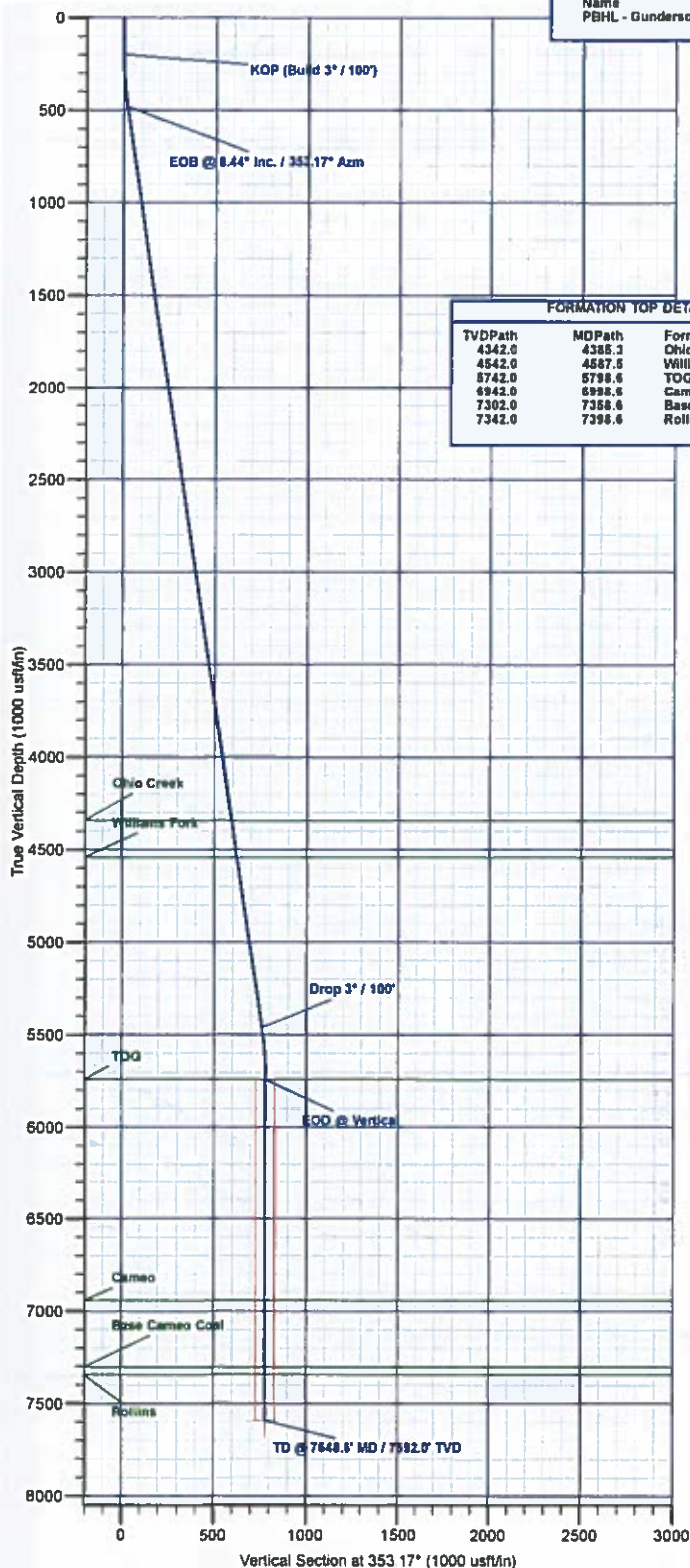
REFERENCE INFORMATION

Co-ordinate (NE) Reference: Well Gunderson 0994-13-12W, True North
 Vertical (TVD) Reference: well @ 7302.0usft (H&P #522)
 Section (VS) Reference: Slot - (0.0N, 0.0E)
 Measured Depth Reference: well @ 7302.0usft (H&P #522)
 Calculation Method: Minimum Curvature



FORMATION TOP DETAILS

TVDPath	MDPath	Formation
4342.0	4385.3	Ohio Creek
4542.0	4587.5	Williams Fork
5742.0	5798.5	TOO
6942.0	6998.6	Cameo
7302.0	7358.6	Base Cameo Coal
7342.0	7398.6	Rollins



Plan: Design #1 (Gunderson 0994-13-12W/Wellbore #1)

Created By: Will Jircik

Date: 14:35, October 10 2017



Laramie Energy, LLC

Mesa County, CO

Gunderson 13-11 Pad

Gunderson 0994-13-12W

Wellbore #1

Plan: Design #1

QES Well Planning Report

10 October, 2017





Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Gunderson 0994-13-12W
Company:	Laramie Energy, LLC	TVD Reference:	well @ 7302.0usft (H&P #522)
Project:	Mesa County, CO	MD Reference:	well @ 7302.0usft (H&P #522)
Site:	Gunderson 13-11 Pad	North Reference:	True
Well:	Gunderson 0994-13-12W	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 13-11 Pad			
Site Position:		Northing:	1,533,162.26 usft	Latitude: 39.273948
From:	Lat/Long	Easting:	2,339,102.68 usft	Longitude: -107.834835
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence: -1.47 °

Well	Gunderson 0994-13-12W			
Well Position	+N/-S	-16.2 usft	Northing:	1,533,146.43 usft
	+E/-W	-15.7 usft	Easting:	2,339,086.61 usft
Position Uncertainty	0.0 usft	Wellhead Elevation:		Ground Level: 7,272.0 usft

Wellbore	Wellbore #1			
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	10/5/2017	9.57	65.43	51,385.85443011

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)
		0.0	0.0	0.0
				Direction (°) 353.17

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	
481.4	8.44	353.17	480.4	20.5	-2.5	3.00	3.00	0.00	353.17	
5,517.2	8.44	353.17	5,461.6	754.5	-90.4	0.00	0.00	0.00	0.00	
5,798.6	0.00	0.00	5,742.0	775.1	-92.9	3.00	-3.00	0.00	180.00	
7,648.6	0.00	0.00	7,592.0	775.1	-92.9	0.00	0.00	0.00	0.00	PBHL - Gunderson 05



Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Gunderson 0994-13-12W
Company:	Laramie Energy, LLC	TVD Reference:	well @ 7302 0usft (H&P #522)
Project:	Mesa County, CO	MD Reference:	well @ 7302 0usft (H&P #522)
Site:	Gunderson 13-11 Pad	North Reference:	True
Well:	Gunderson 0994-13-12W	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	353.17	300.0	2.6	-0.3	2.6	3.00	3.00	0.00
400.0	6.00	353.17	399.6	10.4	-1.2	10.5	3.00	3.00	0.00
EOB @ 8.44° Inc. / 353.17° Azm									
481.4	8.44	353.17	480.4	20.5	-2.5	20.7	3.00	3.00	0.00
500.0	8.44	353.17	498.8	23.3	-2.8	23.4	0.00	0.00	0.00
600.0	8.44	353.17	597.7	37.8	-4.5	38.1	0.00	0.00	0.00
700.0	8.44	353.17	696.6	52.4	-6.3	52.8	0.00	0.00	0.00
800.0	8.44	353.17	795.5	67.0	-8.0	67.5	0.00	0.00	0.00
900.0	8.44	353.17	894.4	81.6	-9.8	82.1	0.00	0.00	0.00
1,000.0	8.44	353.17	993.4	96.1	-11.5	96.8	0.00	0.00	0.00
1,100.0	8.44	353.17	1,092.3	110.7	-13.3	111.5	0.00	0.00	0.00
1,200.0	8.44	353.17	1,191.2	125.3	-15.0	126.2	0.00	0.00	0.00
1,300.0	8.44	353.17	1,290.1	139.9	-16.8	140.9	0.00	0.00	0.00
1,400.0	8.44	353.17	1,389.0	154.4	-18.5	155.5	0.00	0.00	0.00
1,500.0	8.44	353.17	1,487.9	169.0	-20.2	170.2	0.00	0.00	0.00
8 5/8"									
1,530.0	8.44	353.17	1,517.6	173.4	-20.8	174.6	0.00	0.00	0.00
1,600.0	8.44	353.17	1,586.9	183.6	-22.0	184.9	0.00	0.00	0.00
1,700.0	8.44	353.17	1,685.8	198.2	-23.7	199.6	0.00	0.00	0.00
1,800.0	8.44	353.17	1,784.7	212.7	-25.5	214.3	0.00	0.00	0.00
1,900.0	8.44	353.17	1,883.6	227.3	-27.2	228.9	0.00	0.00	0.00
2,000.0	8.44	353.17	1,982.5	241.9	-29.0	243.6	0.00	0.00	0.00
2,100.0	8.44	353.17	2,081.4	256.5	-30.7	258.3	0.00	0.00	0.00
2,200.0	8.44	353.17	2,180.4	271.0	-32.5	273.0	0.00	0.00	0.00
2,300.0	8.44	353.17	2,279.3	285.6	-34.2	287.7	0.00	0.00	0.00
2,400.0	8.44	353.17	2,378.2	300.2	-36.0	302.3	0.00	0.00	0.00
2,500.0	8.44	353.17	2,477.1	314.8	-37.7	317.0	0.00	0.00	0.00
2,600.0	8.44	353.17	2,576.0	329.3	-39.5	331.7	0.00	0.00	0.00
2,700.0	8.44	353.17	2,674.9	343.9	-41.2	346.4	0.00	0.00	0.00
2,800.0	8.44	353.17	2,773.9	358.5	-42.9	361.0	0.00	0.00	0.00
2,900.0	8.44	353.17	2,872.8	373.1	-44.7	375.7	0.00	0.00	0.00
3,000.0	8.44	353.17	2,971.7	387.6	-46.4	390.4	0.00	0.00	0.00
3,100.0	8.44	353.17	3,070.6	402.2	-48.2	405.1	0.00	0.00	0.00
3,200.0	8.44	353.17	3,169.5	416.8	-49.9	419.8	0.00	0.00	0.00
3,300.0	8.44	353.17	3,268.4	431.4	-51.7	434.4	0.00	0.00	0.00
3,400.0	8.44	353.17	3,367.4	445.9	-53.4	449.1	0.00	0.00	0.00
3,500.0	8.44	353.17	3,466.3	460.5	-55.2	463.8	0.00	0.00	0.00
3,600.0	8.44	353.17	3,565.2	475.1	-56.9	478.5	0.00	0.00	0.00
3,700.0	8.44	353.17	3,664.1	489.7	-58.7	493.2	0.00	0.00	0.00
3,800.0	8.44	353.17	3,763.0	504.2	-60.4	507.8	0.00	0.00	0.00
3,900.0	8.44	353.17	3,861.9	518.8	-62.2	522.5	0.00	0.00	0.00
4,000.0	8.44	353.17	3,960.9	533.4	-63.9	537.2	0.00	0.00	0.00
4,100.0	8.44	353.17	4,059.8	548.0	-65.6	551.9	0.00	0.00	0.00
4,200.0	8.44	353.17	4,158.7	562.5	-67.4	566.6	0.00	0.00	0.00
4,300.0	8.44	353.17	4,257.6	577.1	-69.1	581.2	0.00	0.00	0.00
Ohio Creek									
4,385.3	8.44	353.17	4,342.0	589.5	-70.6	593.8	0.00	0.00	0.00
4,400.0	8.44	353.17	4,356.5	591.7	-70.9	595.9	0.00	0.00	0.00
4,500.0	8.44	353.17	4,455.4	606.3	-72.6	610.6	0.00	0.00	0.00
Williams Fork									



Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Gunderson 0994-13-12W
Company:	Laramie Energy, LLC	TVD Reference:	well @ 7302.0usft (H&P #522)
Project:	Mesa County, CO	MD Reference:	well @ 7302.0usft (H&P #522)
Site:	Gunderson 13-11 Pad	North Reference:	True
Well:	Gunderson 0994-13-12W	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)
4,587.5	8.44	353.17	4,542.0	619.0	-74.2	623.4	0.00	0.00	0.00
4,600.0	8.44	353.17	4,554.4	620.8	-74.4	625.3	0.00	0.00	0.00
4,700.0	8.44	353.17	4,653.3	635.4	-76.1	640.0	0.00	0.00	0.00
4,800.0	8.44	353.17	4,752.2	650.0	-77.9	654.6	0.00	0.00	0.00
4,900.0	8.44	353.17	4,851.1	664.6	-79.6	669.3	0.00	0.00	0.00
5,000.0	8.44	353.17	4,950.0	679.1	-81.4	684.0	0.00	0.00	0.00
5,100.0	8.44	353.17	5,049.0	693.7	-83.1	698.7	0.00	0.00	0.00
5,200.0	8.44	353.17	5,147.9	708.3	-84.9	713.4	0.00	0.00	0.00
5,300.0	8.44	353.17	5,246.8	722.9	-86.6	728.0	0.00	0.00	0.00
5,400.0	8.44	353.17	5,345.7	737.4	-88.3	742.7	0.00	0.00	0.00
5,500.0	8.44	353.17	5,444.6	752.0	-90.1	757.4	0.00	0.00	0.00
Drop 3° / 100'									
5,517.2	8.44	353.17	5,461.6	754.5	-90.4	759.9	0.00	0.00	0.00
5,600.0	5.96	353.17	5,543.8	764.8	-91.6	770.3	3.00	-3.00	0.00
5,700.0	2.96	353.17	5,643.5	772.5	-92.5	778.1	3.00	-3.00	0.00
EOD @ Vertical - TOG									
5,798.6	0.00	0.00	5,742.0	775.1	-92.9	780.6	3.00	-3.00	6.93
5,800.0	0.00	0.00	5,743.4	775.1	-92.9	780.6	0.00	0.00	0.00
5,900.0	0.00	0.00	5,843.4	775.1	-92.9	780.6	0.00	0.00	0.00
6,000.0	0.00	0.00	5,943.4	775.1	-92.9	780.6	0.00	0.00	0.00
6,100.0	0.00	0.00	6,043.4	775.1	-92.9	780.6	0.00	0.00	0.00
6,200.0	0.00	0.00	6,143.4	775.1	-92.9	780.6	0.00	0.00	0.00
6,300.0	0.00	0.00	6,243.4	775.1	-92.9	780.6	0.00	0.00	0.00
6,400.0	0.00	0.00	6,343.4	775.1	-92.9	780.6	0.00	0.00	0.00
6,500.0	0.00	0.00	6,443.4	775.1	-92.9	780.6	0.00	0.00	0.00
6,600.0	0.00	0.00	6,543.4	775.1	-92.9	780.6	0.00	0.00	0.00
6,700.0	0.00	0.00	6,643.4	775.1	-92.9	780.6	0.00	0.00	0.00
6,800.0	0.00	0.00	6,743.4	775.1	-92.9	780.6	0.00	0.00	0.00
6,900.0	0.00	0.00	6,843.4	775.1	-92.9	780.6	0.00	0.00	0.00
Cameo									
6,998.6	0.00	0.00	6,942.0	775.1	-92.9	780.6	0.00	0.00	0.00
7,000.0	0.00	0.00	6,943.4	775.1	-92.9	780.6	0.00	0.00	0.00
7,100.0	0.00	0.00	7,043.4	775.1	-92.9	780.6	0.00	0.00	0.00
7,200.0	0.00	0.00	7,143.4	775.1	-92.9	780.6	0.00	0.00	0.00
7,300.0	0.00	0.00	7,243.4	775.1	-92.9	780.6	0.00	0.00	0.00
Base Cameo Coal									
7,358.6	0.00	0.00	7,302.0	775.1	-92.9	780.6	0.00	0.00	0.00
Rollins									
7,398.6	0.00	0.00	7,342.0	775.1	-92.9	780.6	0.00	0.00	0.00
7,400.0	0.00	0.00	7,343.4	775.1	-92.9	780.6	0.00	0.00	0.00
7,500.0	0.00	0.00	7,443.4	775.1	-92.9	780.6	0.00	0.00	0.00
7,600.0	0.00	0.00	7,543.4	775.1	-92.9	780.6	0.00	0.00	0.00
TD @ 7648.6' MD / 7692.0' TVD									
7,648.6	0.00	0.00	7,592.0	775.1	-92.9	780.6	0.00	0.00	0.00



Well Planning Report



Database:	EDM 5000 1 Single User Db	Local Co-ordinate Reference:	Well Gunderson 0994-13-12W
Company:	Laramie Energy, LLC	TVD Reference:	well @ 7302.0usft (H&P #522)
Project:	Mesa County, CO	MD Reference:	well @ 7302.0usft (H&P #522)
Site:	Gunderson 13-11 Pad	North Reference:	True
Well:	Gunderson 0994-13-12W	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	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 - Gunderson 0994 - plan hits target center - Circle (radius 50.0)	0.00	0.00	7,592.0	775.1	-92.9	1,533,923.63	2,339,013.71	39.276031	-107.835218

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,530.0	1,517.6	8 5/8"	8-5/8	11

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
4,385.3	4,342.0	Ohio Creek			
4,587.5	4,542.0	Williams Fork			
5,798.6	5,742.0	TOG			
6,998.6	6,942.0	Cameo			
7,358.6	7,302.0	Base Cameo Coal			
7,398.6	7,342.0	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')
481.4	480.4	20.5	-2.5	EOB @ 8.44° Inc. / 353.17° Azm
5,517.2	5,461.6	754.5	-90.4	Drop 3" / 100'
5,798.6	5,742.0	775.1	-92.9	EOD @ Vertical
7,648.6	7,592.0	775.1	-92.9	TD @ 7648.6' MD / 7592.0' TVD