



Project: Mesa County, CO
 Site: Gunderson 20-03 Pad
 Well: Gunderson 20-08W
 Wellbore: Wellbore #1
 Design: Design #3
 Latitude: 39.266756
 Longitude: -107.795317
 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 (NE) Reference: Well Gunderson 20-08W, 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 20-08W

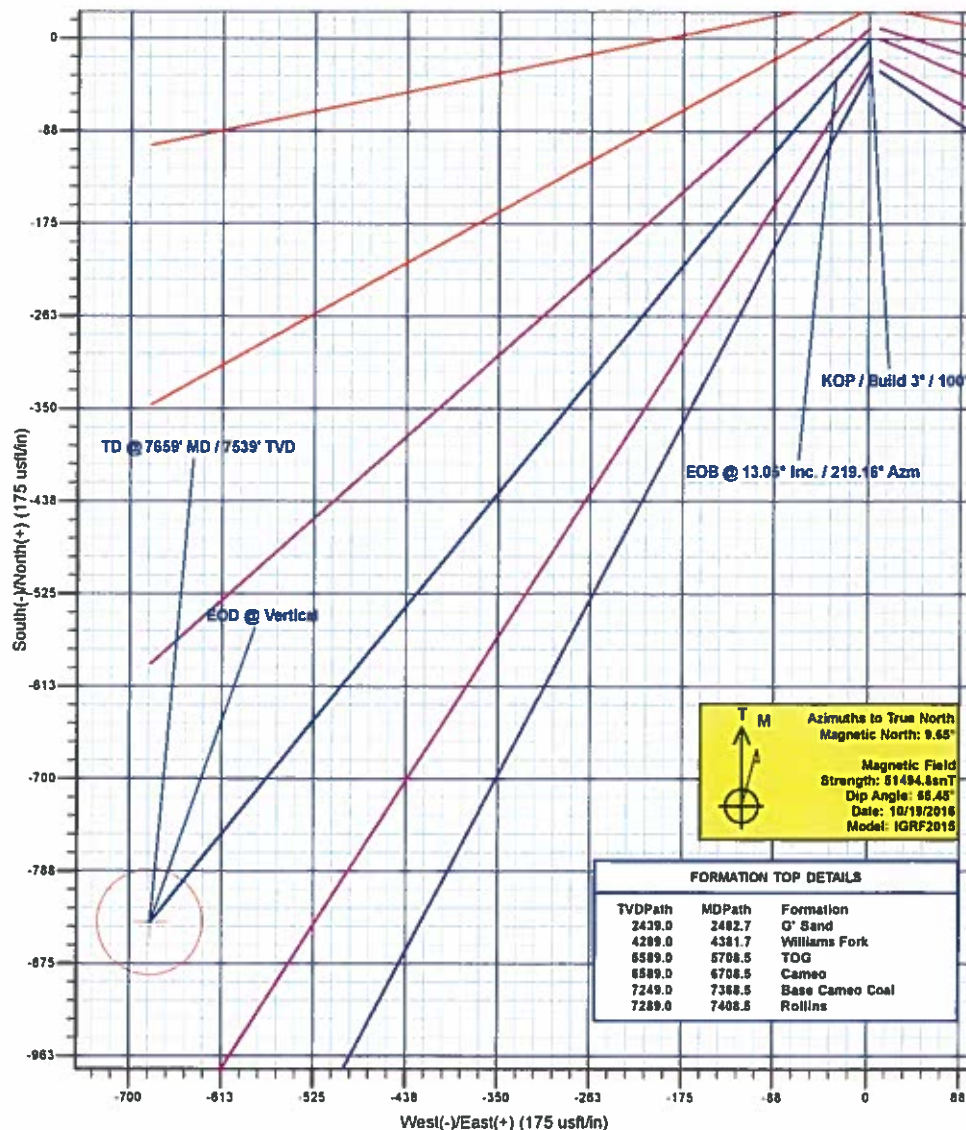
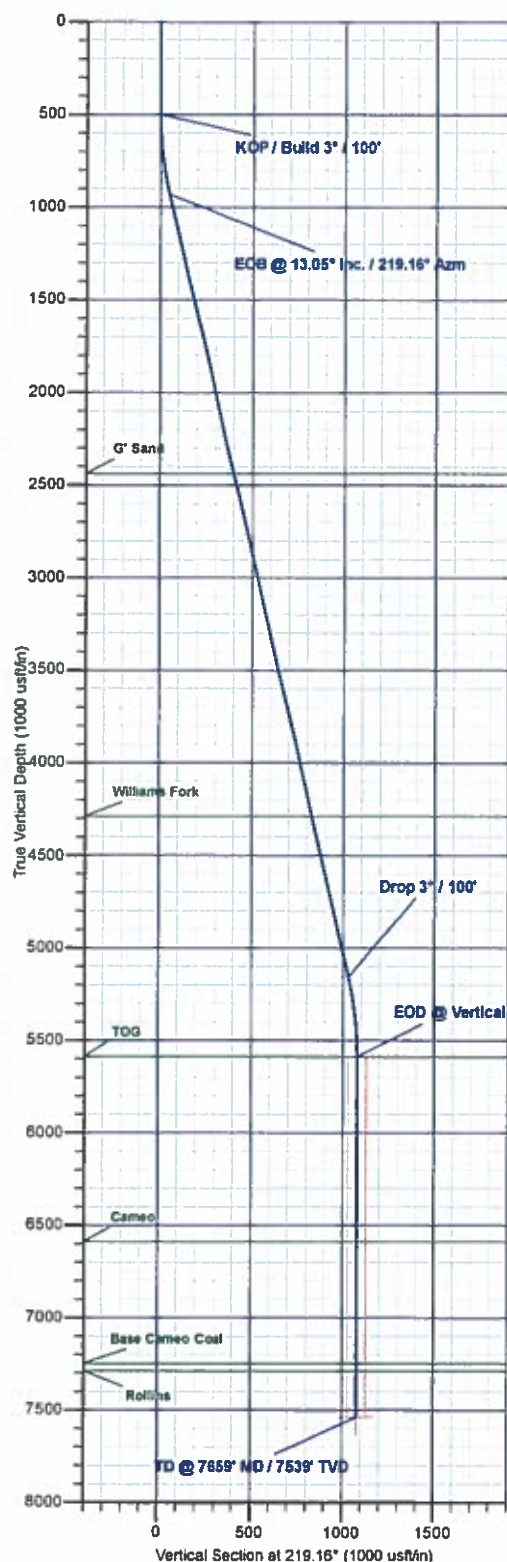
+N-S	+E-W	Northing	Ground Level: 7146.0 Easting	Latitude	Longitude
0.0	0.0	1530259.74	2350219.96	39.266756	-107.795317

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

Name	TVD	+N-S	+E-W	Northing	Easting	Latitude	Longitude
PBHL - Gunderson 20-08W	7539.0	-835.9	-680.6	1529440.33	2349518.42	39.264461	-107.797721

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	
500.0	0.00	0.00	500.0	0.0	0.0	0.00	0.00	0.0	KOP / Build 3° / 100°
934.8	13.05	219.16	931.1	-38.2	-31.1	3.00	219.16	49.3	EOB @ 13.05° Inc. / 219.16° Azm
5273.6	13.05	219.16	5157.9	-797.6	-449.5	0.00	0.00	1028.6	Drop 3° / 100°
5708.5	0.00	0.00	5589.0	-835.9	-680.6	3.00	180.00	1077.9	EOD @ Vertical
7659.5	0.00	0.00	7539.0	-835.9	-680.6	0.00	0.00	1077.9	TD @ 7659' MD / 7539' TVD



FORMATION TOP DETAILS

TVDPath	MDPath	Formation
2439.0	2482.7	G' Sand
4289.0	4381.7	Williams Fork
5589.0	5708.5	TOG
6589.0	6708.5	Cameo
7249.0	7388.5	Base Cameo Coal
7289.0	7408.5	Rollins

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

Created By: Will Jircik Date: 9:37, February 14 2017



Laramie Energy, LLC

Mesa County, CO

Gunderson 20-03 Pad

Gunderson 20-08W

Wellbore #1

Plan: Design #3

QES Well Planning Report

14 February, 2017





Well Planning Report



Database:	EDM5002	Local Co-ordinate Reference:	Well Gunderson 20-08W
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 20-08W	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 20-08W			
Well Position	+N-S	0.0 usft	Northing:	1,530,258.74 usft
	+E-W	0.0 usft	Easting:	2,350,219.97 usft
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	219.16

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	
934.8	13.05	219.16	931.1	-38.2	-31.1	3.00	3.00	0.00	219.16	
5,273.6	13.05	219.16	5,157.9	-797.6	-649.5	0.00	0.00	0.00	0.00	
5,708.5	0.00	0.00	5,589.0	-835.9	-680.6	3.00	-3.00	0.00	180.00	
7,658.5	0.00	0.00	7,539.0	-835.9	-680.6	0.00	0.00	0.00	0.00	PBHL - Gunderson 20



Well Planning Report



Database:	EDM5002	Local Co-ordinate Reference:	Well Gunderson 20-08W
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 20-08W	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	219.16	600.0	-2.0	-1.7	2.6	3.00	3.00	0.00
700.0	6.00	219.16	699.6	-8.1	-6.6	10.5	3.00	3.00	0.00
800.0	9.00	219.16	798.8	-18.2	-14.8	23.5	3.00	3.00	0.00
900.0	12.00	219.16	897.1	-32.4	-26.4	41.7	3.00	3.00	0.00
EOB @ 13.05° Inc. / 219.16° Azm									
934.8	13.04	219.16	931.1	-38.2	-31.1	49.3	3.00	3.00	0.00
1,000.0	13.05	219.16	994.6	-49.6	-40.4	64.0	0.00	0.00	0.00
1,100.0	13.05	219.16	1,092.0	-67.1	-54.7	86.6	0.00	0.00	0.00
1,200.0	13.05	219.16	1,189.4	-84.6	-68.9	109.1	0.00	0.00	0.00
1,300.0	13.05	219.16	1,286.8	-102.1	-83.2	131.7	0.00	0.00	0.00
1,400.0	13.05	219.16	1,384.2	-119.6	-97.4	154.3	0.00	0.00	0.00
1,500.0	13.05	219.16	1,481.7	-137.1	-111.7	176.9	0.00	0.00	0.00
8 5/8"									
1,530.0	13.05	219.16	1,510.9	-142.4	-115.9	183.6	0.00	0.00	0.00
1,600.0	13.05	219.16	1,579.1	-154.6	-125.9	199.4	0.00	0.00	0.00
1,700.0	13.05	219.16	1,676.5	-172.1	-140.2	222.0	0.00	0.00	0.00
1,800.0	13.05	219.16	1,773.9	-189.7	-154.4	244.6	0.00	0.00	0.00
1,900.0	13.05	219.16	1,871.3	-207.2	-168.7	267.1	0.00	0.00	0.00
2,000.0	13.05	219.16	1,968.8	-224.7	-182.9	289.7	0.00	0.00	0.00
2,100.0	13.05	219.16	2,066.2	-242.2	-197.2	312.3	0.00	0.00	0.00
2,200.0	13.05	219.16	2,163.6	-259.7	-211.4	334.9	0.00	0.00	0.00
2,300.0	13.05	219.16	2,261.0	-277.2	-225.7	357.4	0.00	0.00	0.00
2,400.0	13.05	219.16	2,358.4	-294.7	-239.9	380.0	0.00	0.00	0.00
G⁺ Sand									
2,482.7	13.05	219.16	2,439.0	-309.1	-251.7	398.7	0.00	0.00	0.00
2,500.0	13.05	219.16	2,455.9	-312.2	-254.2	402.6	0.00	0.00	0.00
2,600.0	13.05	219.16	2,553.3	-329.7	-268.5	425.2	0.00	0.00	0.00
2,700.0	13.05	219.16	2,650.7	-347.2	-282.7	447.7	0.00	0.00	0.00
2,800.0	13.05	219.16	2,748.1	-364.7	-297.0	470.3	0.00	0.00	0.00
2,900.0	13.05	219.16	2,845.5	-382.2	-311.2	492.9	0.00	0.00	0.00
3,000.0	13.05	219.16	2,943.0	-399.7	-325.5	515.4	0.00	0.00	0.00
3,100.0	13.05	219.16	3,040.4	-417.2	-339.7	538.0	0.00	0.00	0.00
3,200.0	13.05	219.16	3,137.8	-434.7	-354.0	560.6	0.00	0.00	0.00
3,300.0	13.05	219.16	3,235.2	-452.2	-368.2	583.2	0.00	0.00	0.00
3,400.0	13.05	219.16	3,332.6	-469.7	-382.5	605.7	0.00	0.00	0.00
3,500.0	13.05	219.16	3,430.1	-487.2	-396.7	628.3	0.00	0.00	0.00
3,600.0	13.05	219.16	3,527.5	-504.7	-411.0	650.9	0.00	0.00	0.00
3,700.0	13.05	219.16	3,624.9	-522.2	-425.2	673.4	0.00	0.00	0.00
3,800.0	13.05	219.16	3,722.3	-539.7	-439.5	696.0	0.00	0.00	0.00
3,900.0	13.05	219.16	3,819.7	-557.2	-453.7	718.6	0.00	0.00	0.00
4,000.0	13.05	219.16	3,917.1	-574.7	-468.0	741.2	0.00	0.00	0.00
4,100.0	13.05	219.16	4,014.6	-592.2	-482.2	763.7	0.00	0.00	0.00
4,200.0	13.05	219.16	4,112.0	-609.7	-496.5	786.3	0.00	0.00	0.00
4,300.0	13.05	219.16	4,209.4	-627.2	-510.7	808.9	0.00	0.00	0.00
Williams Fork									
4,381.7	13.05	219.16	4,289.0	-641.5	-522.4	827.3	0.00	0.00	0.00
4,400.0	13.05	219.16	4,306.8	-644.7	-525.0	831.5	0.00	0.00	0.00



Well Planning Report



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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 20-08W	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)
4,500.0	13.05	219.16	4,404.2	-662.2	-539.3	854.0	0.00	0.00	0.00
4,600.0	13.05	219.16	4,501.7	-679.7	-553.5	876.6	0.00	0.00	0.00
4,700.0	13.05	219.16	4,599.1	-697.2	-567.8	899.2	0.00	0.00	0.00
4,800.0	13.05	219.16	4,696.5	-714.7	-582.0	921.7	0.00	0.00	0.00
4,900.0	13.05	219.16	4,793.9	-732.2	-596.3	944.3	0.00	0.00	0.00
5,000.0	13.05	219.16	4,891.3	-749.8	-610.5	966.9	0.00	0.00	0.00
5,100.0	13.05	219.16	4,988.8	-767.3	-624.8	989.5	0.00	0.00	0.00
5,200.0	13.05	219.16	5,086.2	-784.8	-639.0	1,012.0	0.00	0.00	0.00
Drop 3° / 100'									
5,273.6	13.05	219.16	5,157.9	-797.6	-649.5	1,028.6	0.00	0.00	0.00
5,300.0	12.25	219.16	5,183.6	-802.1	-653.2	1,034.4	3.00	-3.00	0.00
5,400.0	9.25	219.16	5,281.9	-816.6	-664.9	1,053.1	3.00	-3.00	0.00
5,500.0	6.25	219.16	5,380.9	-827.1	-673.5	1,066.6	3.00	-3.00	0.00
5,600.0	3.25	219.16	5,480.6	-833.5	-678.7	1,074.9	3.00	-3.00	0.00
5,700.0	0.25	219.16	5,580.5	-835.9	-680.6	1,077.9	3.00	-3.00	0.00
EOD @ Vertical - TOG									
5,708.5	0.00	0.00	5,589.0	-835.9	-680.6	1,077.9	3.00	-3.00	0.00
5,800.0	0.00	0.00	5,680.5	-835.9	-680.6	1,077.9	0.00	0.00	0.00
5,900.0	0.00	0.00	5,780.5	-835.9	-680.6	1,077.9	0.00	0.00	0.00
6,000.0	0.00	0.00	5,880.5	-835.9	-680.6	1,077.9	0.00	0.00	0.00
6,100.0	0.00	0.00	5,980.5	-835.9	-680.6	1,077.9	0.00	0.00	0.00
6,200.0	0.00	0.00	6,080.5	-835.9	-680.6	1,077.9	0.00	0.00	0.00
6,300.0	0.00	0.00	6,180.5	-835.9	-680.6	1,077.9	0.00	0.00	0.00
6,400.0	0.00	0.00	6,280.5	-835.9	-680.6	1,077.9	0.00	0.00	0.00
6,500.0	0.00	0.00	6,380.5	-835.9	-680.6	1,077.9	0.00	0.00	0.00
6,600.0	0.00	0.00	6,480.5	-835.9	-680.6	1,077.9	0.00	0.00	0.00
6,700.0	0.00	0.00	6,580.5	-835.9	-680.6	1,077.9	0.00	0.00	0.00
Cameo									
6,708.5	0.00	0.00	6,589.0	-835.9	-680.6	1,077.9	0.00	0.00	0.00
6,800.0	0.00	0.00	6,680.5	-835.9	-680.6	1,077.9	0.00	0.00	0.00
6,900.0	0.00	0.00	6,780.5	-835.9	-680.6	1,077.9	0.00	0.00	0.00
7,000.0	0.00	0.00	6,880.5	-835.9	-680.6	1,077.9	0.00	0.00	0.00
7,100.0	0.00	0.00	6,980.5	-835.9	-680.6	1,077.9	0.00	0.00	0.00
7,200.0	0.00	0.00	7,080.5	-835.9	-680.6	1,077.9	0.00	0.00	0.00
7,300.0	0.00	0.00	7,180.5	-835.9	-680.6	1,077.9	0.00	0.00	0.00
Base Cameo Coal									
7,368.5	0.00	0.00	7,249.0	-835.9	-680.6	1,077.9	0.00	0.00	0.00
7,400.0	0.00	0.00	7,280.5	-835.9	-680.6	1,077.9	0.00	0.00	0.00
Rollins									
7,408.5	0.00	0.00	7,289.0	-835.9	-680.6	1,077.9	0.00	0.00	0.00
7,500.0	0.00	0.00	7,380.5	-835.9	-680.6	1,077.9	0.00	0.00	0.00
7,600.0	0.00	0.00	7,480.5	-835.9	-680.6	1,077.9	0.00	0.00	0.00
TD @ 7659' MD / 7539' TVD									
7,658.5	0.00	0.00	7,539.0	-835.9	-680.6	1,077.9	0.00	0.00	0.00



Well Planning Report



Database:	EDM5002	Local Co-ordinate Reference:	Well Gunderson 20-08W
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 20-08W	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 20-0	0.00	0.00	7,539.0	-835.9	-680.6	1,529,440.34	2,349,518.43	39.264461	-107.797721
- plan hits target center									
- Circle (radius 50.0)									

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,530.0	1,510.9	8 5/8"	8-5/8	11

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
2,482.7	2,439.0	G' Sand		0.00	
4,381.7	4,289.0	Williams Fork		0.00	
5,708.5	5,589.0	TOG		0.00	
6,708.5	6,589.0	Cameo		0.00	
7,368.5	7,249.0	Base Cameo Coal		0.00	
7,408.5	7,289.0	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'
934.8	931.1	-38.2	-31.1	EOB @ 13.05° Inc. / 219.16° Azm
5,273.6	5,157.9	-797.6	-649.5	Drop 3" / 100'
5,708.5	5,589.0	-835.9	-680.6	EOD @ Vertical
7,658.5	7,539.0	-835.9	-680.6	TD @ 7659' MD / 7539' TVD