

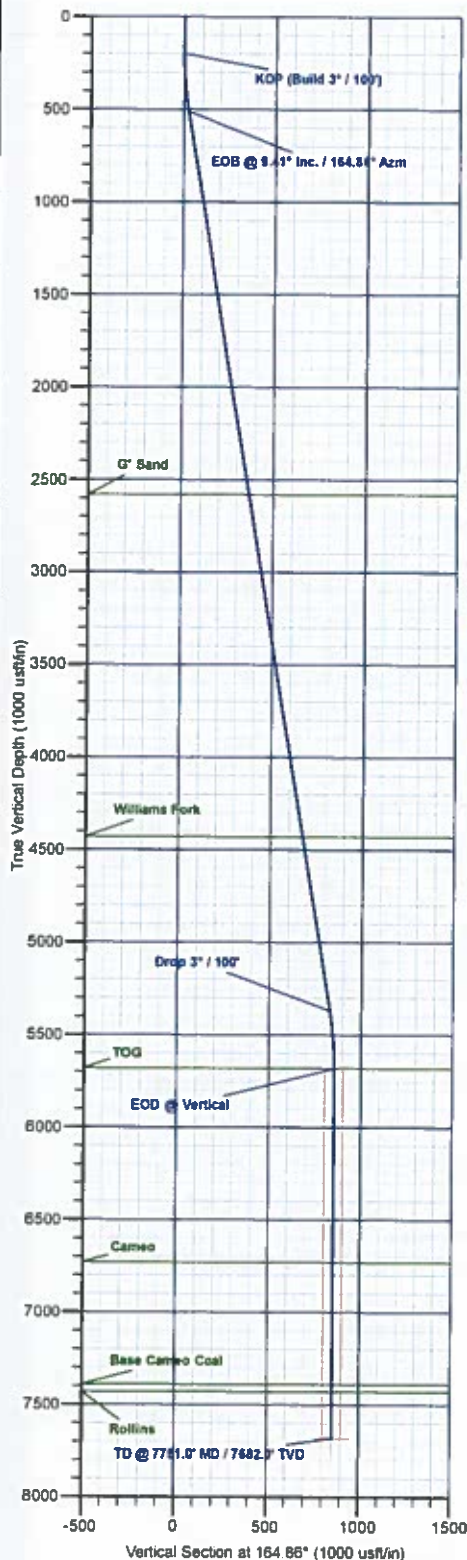
**PROJECT DETAILS: Mesa County, CO**

Geodetic System: US State Plane 1983  
Datum: North American Datum 1983  
Ellipsoid: GRS 1980  
Zone: Colorado Central Zone  
System Datum: Mean Sea Level

Project: Mesa County, CO  
Site: Gunderson 0993 21-05 Pad  
Well: BCU 0993-21-10W  
Wellbore: Wellbore #1  
Design: Design #1  
Latitude: 39.265320  
Longitude: -107.780162  
Ground Level: 7256.0  
well @ 7286.0usft (H&P #522)

**WELL DETAILS: BCU 0993-21-10W**

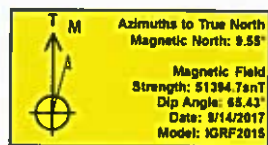
+N/-S +E/-W Northing Easting Latitude Longitude  
0.0 0.0 1529627.77 2354498.96 39.265320 -107.780162



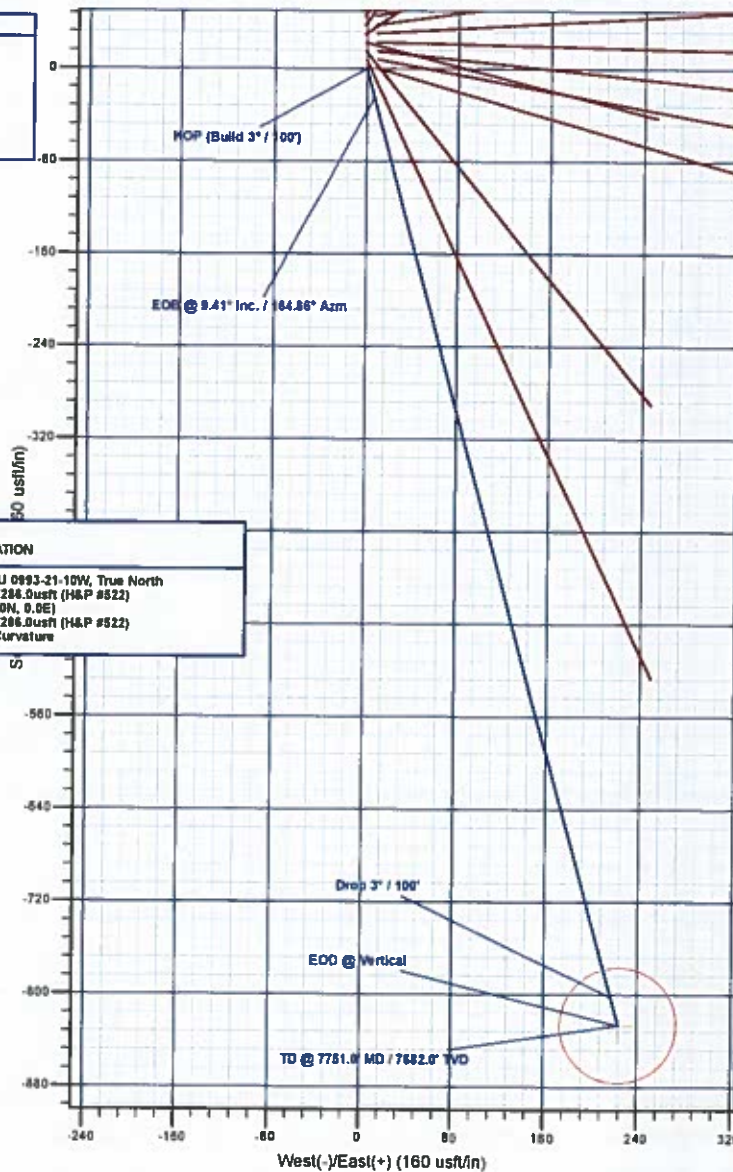
DESIGN TARGET DETAILS							
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
PBHL - BCU 0993-21-10W	7682.0	-826.4	223.7	1528796.02	2354701.85	39.263051	-107.779362

SECTION DETAILS										
MD	Inc	Azi	TVD	+N/-S	+E/-W	Diag	TFace	VFace	Annotation	
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	KOP (Build 3° / 100°)	
200.0	0.00	0.00	200.0	0.0	0.0	0.00	0.00	0.0	EOB @ 9.41° Inc. / 164.86° Azm	
513.6	9.41	164.86	512.2	-34.8	6.7	3.00	164.86	25.7	Drop 3° / 100°	
5437.5	9.41	164.86	5389.8	-801.6	217.0	0.00	0.00	830.5	EOD @ Vertical	
5751.0	0.00	0.00	5682.0	-826.4	223.7	3.00	100.00	856.1	TD @ 7761.0' MD / 7682.0' TVD	
7751.0	0.00	0.00	7682.0	-826.4	223.7	0.00	0.00	856.1		

FORMATION TOP DETAILS		
TVDPath	MDPath	Formation
2582.0	2611.6	G' Sand
4432.0	4486.8	Williams Fork
5682.0	5751.0	TOG
6732.0	6801.0	Cameo
7392.0	7461.0	Base Cameo Coal
7432.0	7501.0	Rollins



REFERENCE INFORMATION	
Co-ordinate (N/E) Reference:	Well BCU 0993-21-10W, True North
Vertical (TVD) Reference:	well @ 7286.0usft (H&P #522)
Section (VS) Reference:	Slot - (0.0N, 0.0E)
Measured Depth Reference:	well @ 7206.0usft (H&P #522)
Calculation Method:	Minimum Curvature



Plan: Design #1 (BCU 0993-21-10W/Wellbore #1)

Created By: Will Jircik Date: 15:29, September 18 2017



# **Laramie Energy, LLC**

**Mesa County, CO**

**Gunderson 0993 21-05 Pad**

**BCU 0993-21-10W**

**Wellbore #1**

**Plan: Design #1**

## **QES Well Planning Report**

**18 September, 2017**





## Well Planning Report



<b>Database:</b>	EDM 5000 1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well BCU 0993-21-10W
<b>Company:</b>	Laramie Energy, LLC	<b>TVD Reference:</b>	well @ 7286.0usft (H&P #522)
<b>Project:</b>	Mesa County, CO	<b>MD Reference:</b>	well @ 7286.0usft (H&P #522)
<b>Site:</b>	Gunderson 0993 21-05 Pad	<b>North Reference:</b>	True
<b>Well:</b>	BCU 0993-21-10W	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	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 0993-21-10W					
Well Position	+N/-S	-0.4 usft	Northing:	1,529,627.78 usft	Latitude:	39.265320
	+E/-W	-9.9 usft	Easting:	2,354,498.99 usft	Longitude:	-107.780152
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	85 43	51,394.66470574

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	164.86

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Bulld 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	
513.6	9.41	164.86	512.2	-24.8	6.7	3.00	3.00	0.00	164.86	
5,437.5	9.41	164.86	5,369.8	-801.6	217.0	0.00	0.00	0.00	0.00	
5,751.0	0.00	0.00	5,682.0	-826.4	223.7	3.00	-3.00	0.00	180.00	
7,751.0	0.00	0.00	7,682.0	-826.4	223.7	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 0993-21-10W
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 0993-21-10W	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
<b>KOP (Build 3° / 100')</b>									
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	3.00	164.86	300.0	-2.5	0.7	2.6	3.00	3.00	0.00
400.0	6.00	164.86	399.6	-10.1	2.7	10.5	3.00	3.00	0.00
500.0	9.00	164.86	498.8	-22.7	6.1	23.5	3.00	3.00	0.00
<b>EOB @ 9.41° Inc. / 164.86° Azm</b>									
513.6	9.41	164.86	512.2	-24.8	6.7	25.7	3.00	3.00	0.00
600.0	9.41	164.86	597.4	-38.4	10.4	39.8	0.00	0.00	0.00
700.0	9.41	164.86	696.1	-54.2	14.7	56.2	0.00	0.00	0.00
800.0	9.41	164.86	794.7	-70.0	18.9	72.5	0.00	0.00	0.00
900.0	9.41	164.86	893.4	-85.8	23.2	88.8	0.00	0.00	0.00
1,000.0	9.41	164.86	992.1	-101.5	27.5	105.2	0.00	0.00	0.00
1,100.0	9.41	164.86	1,090.7	-117.3	31.8	121.5	0.00	0.00	0.00
1,200.0	9.41	164.86	1,189.4	-133.1	36.0	137.9	0.00	0.00	0.00
1,300.0	9.41	164.86	1,288.0	-148.9	40.3	154.2	0.00	0.00	0.00
1,400.0	9.41	164.86	1,386.7	-164.6	44.6	170.6	0.00	0.00	0.00
1,500.0	9.41	164.86	1,485.3	-180.4	48.8	186.9	0.00	0.00	0.00
<b>8 5/8"</b>									
1,530.0	9.41	164.86	1,514.9	-185.1	50.1	191.8	0.00	0.00	0.00
1,600.0	9.41	164.86	1,584.0	-196.2	53.1	203.3	0.00	0.00	0.00
1,700.0	9.41	164.86	1,682.6	-212.0	57.4	219.6	0.00	0.00	0.00
1,800.0	9.41	164.86	1,781.3	-227.7	61.6	235.9	0.00	0.00	0.00
1,900.0	9.41	164.86	1,879.9	-243.5	65.9	252.3	0.00	0.00	0.00
2,000.0	9.41	164.86	1,978.6	-259.3	70.2	268.6	0.00	0.00	0.00
2,100.0	9.41	164.86	2,077.3	-275.1	74.5	285.0	0.00	0.00	0.00
2,200.0	9.41	164.86	2,175.9	-290.9	78.7	301.3	0.00	0.00	0.00
2,300.0	9.41	164.86	2,274.6	-306.6	83.0	317.7	0.00	0.00	0.00
2,400.0	9.41	164.86	2,373.2	-322.4	87.3	334.0	0.00	0.00	0.00
2,500.0	9.41	164.86	2,471.9	-338.2	91.5	350.3	0.00	0.00	0.00
2,600.0	9.41	164.86	2,570.5	-354.0	95.8	366.7	0.00	0.00	0.00
<b>G' Sand</b>									
2,811.6	9.41	164.86	2,582.0	-355.8	96.3	368.6	0.00	0.00	0.00
2,700.0	9.41	164.86	2,669.2	-369.7	100.1	383.0	0.00	0.00	0.00
2,800.0	9.41	164.86	2,767.8	-385.5	104.3	399.4	0.00	0.00	0.00
2,900.0	9.41	164.86	2,866.5	-401.3	108.6	415.7	0.00	0.00	0.00
3,000.0	9.41	164.86	2,965.2	-417.1	112.9	432.1	0.00	0.00	0.00
3,100.0	9.41	164.86	3,063.8	-432.8	117.2	448.4	0.00	0.00	0.00
3,200.0	9.41	164.86	3,162.5	-448.6	121.4	464.8	0.00	0.00	0.00
3,300.0	9.41	164.86	3,261.1	-464.4	125.7	481.1	0.00	0.00	0.00
3,400.0	9.41	164.86	3,359.8	-480.2	130.0	497.4	0.00	0.00	0.00
3,500.0	9.41	164.86	3,458.4	-495.9	134.2	513.8	0.00	0.00	0.00
3,600.0	9.41	164.86	3,557.1	-511.7	138.5	530.1	0.00	0.00	0.00
3,700.0	9.41	164.86	3,655.7	-527.5	142.8	546.5	0.00	0.00	0.00
3,800.0	9.41	164.86	3,754.4	-543.3	147.0	562.8	0.00	0.00	0.00
3,900.0	9.41	164.86	3,853.1	-559.1	151.3	579.2	0.00	0.00	0.00
4,000.0	9.41	164.86	3,951.7	-574.8	155.6	595.5	0.00	0.00	0.00
4,100.0	9.41	164.86	4,050.4	-590.6	159.9	611.9	0.00	0.00	0.00
4,200.0	9.41	164.86	4,149.0	-606.4	164.1	628.2	0.00	0.00	0.00
4,300.0	9.41	164.86	4,247.7	-622.2	168.4	644.5	0.00	0.00	0.00
4,400.0	9.41	164.86	4,346.3	-637.9	172.7	660.9	0.00	0.00	0.00
<b>Williams Fork</b>									
4,486.8	9.41	164.86	4,432.0	-651.6	176.4	675.1	0.00	0.00	0.00



## Well Planning Report



Database: EDM 5000.1 Single User Db  
 Company: Laramie Energy, LLC  
 Project: Mesa County, CO  
 Site: Gunderson 0993 21-05 Pad  
 Well: BCU 0993-21-10W  
 Wellbore: Wellbore #1  
 Design: Design #1

Local Co-ordinate Reference:  
 TVD Reference:  
 MD Reference:  
 North Reference:  
 Survey Calculation Method:

Well BCU 0993-21-10W  
 well @ 7286.0usft (H&P #522)  
 well @ 7286.0usft (H&P #522)  
 True  
 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)
4,500.0	9.41	164.86	4,445.0	-653.7	176.9	677.2	0.00	0.00	0.00
4,600.0	9.41	164.86	4,543.6	-669.5	181.2	693.6	0.00	0.00	0.00
4,700.0	9.41	164.86	4,642.3	-685.3	185.5	709.9	0.00	0.00	0.00
4,800.0	9.41	164.86	4,741.0	-701.0	189.7	726.3	0.00	0.00	0.00
4,900.0	9.41	164.86	4,839.6	-716.8	194.0	742.6	0.00	0.00	0.00
5,000.0	9.41	164.86	4,938.3	-732.6	198.3	759.0	0.00	0.00	0.00
5,100.0	9.41	164.86	5,036.9	-748.4	202.6	775.3	0.00	0.00	0.00
5,200.0	9.41	164.86	5,135.6	-764.1	206.8	791.6	0.00	0.00	0.00
5,300.0	9.41	164.86	5,234.2	-779.9	211.1	808.0	0.00	0.00	0.00
5,400.0	9.41	164.86	5,332.9	-795.7	215.4	824.3	0.00	0.00	0.00
<b>Drop 3° / 100'</b>									
5,437.5	9.41	164.86	5,369.8	-801.6	217.0	830.5	0.00	0.00	0.00
5,500.0	7.53	164.86	5,431.7	-810.5	219.4	839.7	3.00	-3.00	0.00
5,600.0	4.53	164.86	5,531.1	-820.6	222.1	850.2	3.00	-3.00	0.00
5,700.0	1.53	164.86	5,631.0	-825.7	223.5	855.5	3.00	-3.00	0.00
<b>EOD @ Vertical - TOG</b>									
5,751.0	0.00	0.00	5,682.0	-826.4	223.7	856.1	3.00	-3.00	0.00
5,800.0	0.00	0.00	5,731.0	-826.4	223.7	856.1	0.00	0.00	0.00
5,900.0	0.00	0.00	5,831.0	-826.4	223.7	856.1	0.00	0.00	0.00
6,000.0	0.00	0.00	5,931.0	-826.4	223.7	856.1	0.00	0.00	0.00
6,100.0	0.00	0.00	6,031.0	-826.4	223.7	856.1	0.00	0.00	0.00
6,200.0	0.00	0.00	6,131.0	-826.4	223.7	856.1	0.00	0.00	0.00
6,300.0	0.00	0.00	6,231.0	-826.4	223.7	856.1	0.00	0.00	0.00
6,400.0	0.00	0.00	6,331.0	-826.4	223.7	856.1	0.00	0.00	0.00
6,500.0	0.00	0.00	6,431.0	-826.4	223.7	856.1	0.00	0.00	0.00
6,600.0	0.00	0.00	6,531.0	-826.4	223.7	856.1	0.00	0.00	0.00
6,700.0	0.00	0.00	6,631.0	-826.4	223.7	856.1	0.00	0.00	0.00
6,800.0	0.00	0.00	6,731.0	-826.4	223.7	856.1	0.00	0.00	0.00
<b>Cameo</b>									
6,801.0	0.00	0.00	6,732.0	-826.4	223.7	856.1	0.00	0.00	0.00
6,900.0	0.00	0.00	6,831.0	-826.4	223.7	856.1	0.00	0.00	0.00
7,000.0	0.00	0.00	6,931.0	-826.4	223.7	856.1	0.00	0.00	0.00
7,100.0	0.00	0.00	7,031.0	-826.4	223.7	856.1	0.00	0.00	0.00
7,200.0	0.00	0.00	7,131.0	-826.4	223.7	856.1	0.00	0.00	0.00
7,300.0	0.00	0.00	7,231.0	-826.4	223.7	856.1	0.00	0.00	0.00
7,400.0	0.00	0.00	7,331.0	-826.4	223.7	856.1	0.00	0.00	0.00
<b>Base Cameo Coal</b>									
7,461.0	0.00	0.00	7,392.0	-826.4	223.7	856.1	0.00	0.00	0.00
7,500.0	0.00	0.00	7,431.0	-826.4	223.7	856.1	0.00	0.00	0.00
<b>Rollins</b>									
7,501.0	0.00	0.00	7,432.0	-826.4	223.7	856.1	0.00	0.00	0.00
7,600.0	0.00	0.00	7,531.0	-826.4	223.7	856.1	0.00	0.00	0.00
7,700.0	0.00	0.00	7,631.0	-826.4	223.7	856.1	0.00	0.00	0.00
<b>TD @ 7761.0' MD / 7682.0' TVD</b>									
7,751.0	0.00	0.00	7,682.0	-826.4	223.7	856.1	0.00	0.00	0.00



## Well Planning Report



<b>Database:</b>	EDM 5000 1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well BCU 0993-21-10W
<b>Company:</b>	Laramie Energy, LLC	<b>TVD Reference:</b>	well @ 7286.0usft (H&P #522)
<b>Project:</b>	Mesa County, CO	<b>MD Reference:</b>	well @ 7286.0usft (H&P #522)
<b>Site:</b>	Gunderson 0993 21-05 Pad	<b>North Reference:</b>	True
<b>Well:</b>	BCU 0993-21-10W	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Design #1		

## 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 - BCU 0993-21-10	0.00	0.00	7,682.0	-826.4	223.7	1,528,796.02	2,354,701.85	39.263051	-107.779362
- plan hits target center									
- Circle (radius 50.0)									

## Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,530.0	1,514.9	8 5/8"	8-5/8	11

## Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
2,611.6	2,582.0	G' Sand			
4,486.8	4,432.0	Williams Fork			
5,751.0	5,682.0	TOG			
6,801.0	6,732.0	Cameo			
7,461.0	7,392.0	Base Cameo Coal			
7,501.0	7,432.0	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')
513.6	512.2	-24.8	6.7	EOB @ 9.41" Inc. / 164.86° Azm
5,437.5	5,369.8	-801.6	217.0	Drop 3' / 100'
5,751.0	5,682.0	-826.4	223.7	EOD @ Vertical
7,751.0	7,682.0	-826.4	223.7	TD @ 7751.0' MD / 7682.0' TVD