

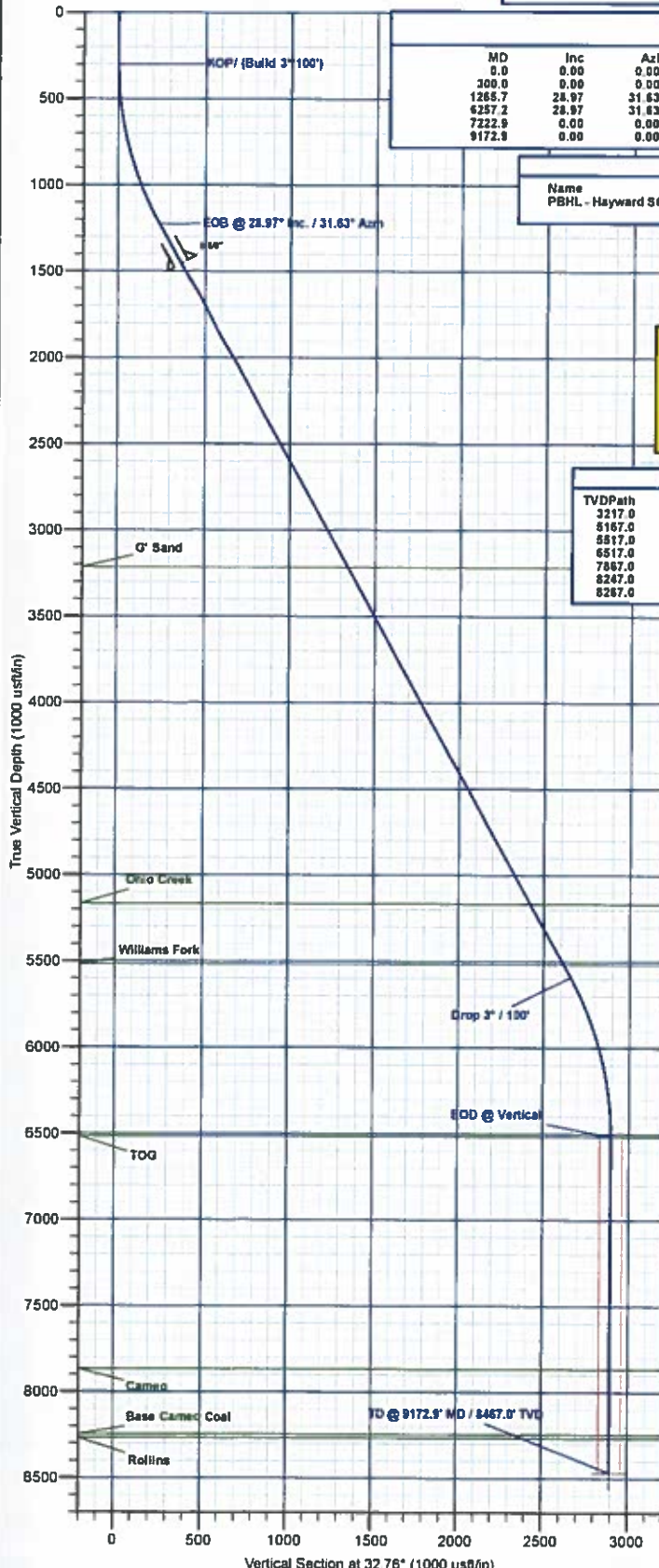


Project: Mesa County, CO  
 Site: Hayward 0993 25-09 Pad  
 Well: Hayward SCU Federal 0992-19-16W  
 Wellbore: B-1  
 Design: Design #1  
 Latitude: 39.244802  
 Longitude: -107.715730  
 Ground Level: 8007.0  
 RKB @ 8037.0usft (H&P #522)



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	KOP (Build 3°/100')
300.0	0.00	0.00	300.0	0.0	0.0	0.00	0.00	0.0	EOB @ 28.97° Inc. / 31.63° Azm
1265.7	28.97	31.63	1225.1	203.5	125.3	3.00	31.63	238.9	Drop 3° / 100'
6257.2	28.97	31.63	5591.9	2262.0	1393.4	0.00	0.00	2656.2	EOD @ Vertical
7222.9	0.00	0.00	6517.0	2465.4	1518.7	3.00	180.00	2895.1	TD @ 9172.9' MD / 8467.0' TVD
9172.9	0.00	0.00	8467.0	2465.4	1518.7	0.00	0.00	2895.1	

#### DESIGN TARGET DETAILS

Name	TVD	+N-S	+E-W	Northing	Easting	Latitude	Longitude
PBHL - Hayward SCU Federal 0992-19-16W	8007.0	2465.4	1518.7	1524133.37	2374129.02	39.251571	-107.710367

#### WELL DETAILS: Hayward SCU Federal 0992-19-16W

+N-S	+E-W	Northing	Easting	Latitude	Longitude
0.0	0.0	1521705.70	2372550.85	39.244802	-107.715730

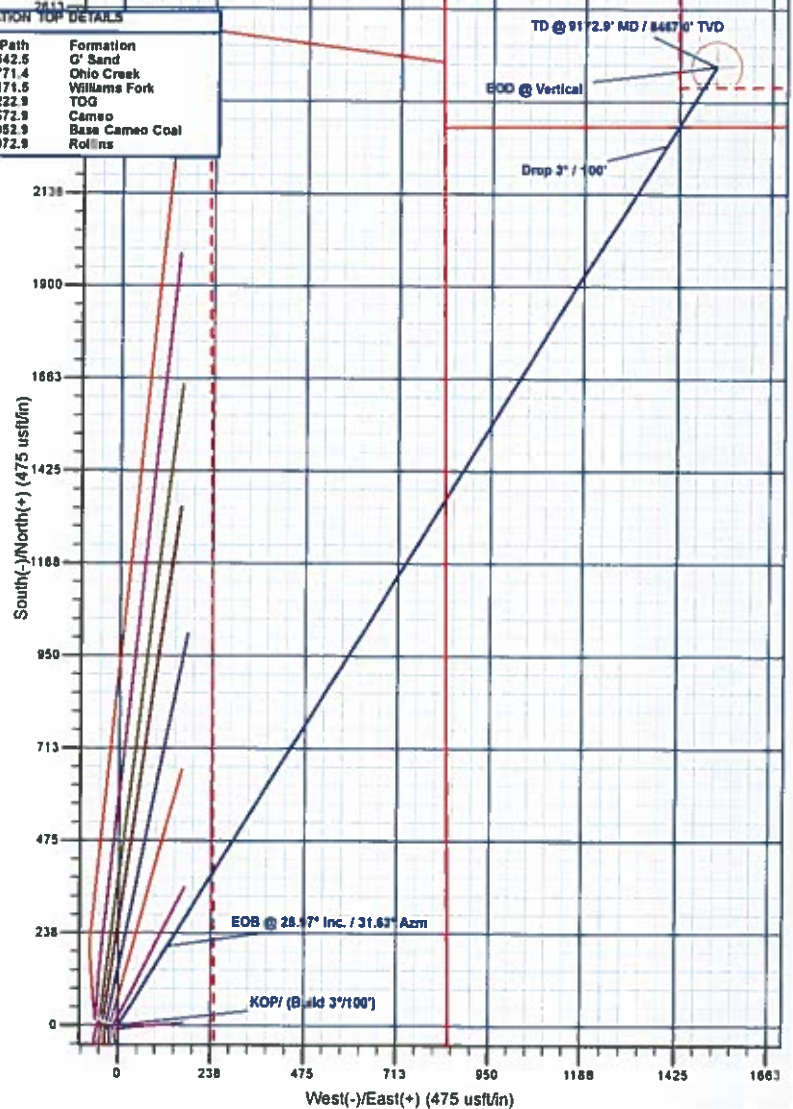
#### REFERENCE INFORMATION

Co-ordinate (NE) Reference: Well Hayward SCU Federal 0992-19-16W, True North  
 Vertical (TVD) Reference: RKB @ 8037.0usft (H&P #522)  
 Section (VS) Reference: S101 - (0.0N, 0.0E)  
 Measured Depth Reference: RKB @ 8037.0usft (H&P #522)  
 Calculation Method: Minimum Curvature



#### FORMATION TOP DETAILS

TVDPath	MDPath	Formation
3217.0	3542.5	G' Sand
5167.0	5771.4	Ohio Creek
5517.0	6171.5	Williams Fork
6517.0	7222.9	TOG
7067.0	8572.9	Cameo
8247.0	8952.9	Base Cameo Coal
8267.0	8972.9	Rollins



Plan: Design #1 (Hayward SCU Federal 0992-19-16WB-1)

Created By: Will Jircik Date: 10:01, May 14 2019



# **Laramie Energy, LLC**

**Mesa County, CO**

**Hayward 0993 25-09 Pad**

**Hayward SCU Federal 0992-19-16W**

**B-1**

**Plan: Design #1**

## **QES Well Planning Report**

**14 May, 2019**





# Well Planning Report



<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well Hayward SCU Federal 0992-19-16W
<b>Company:</b>	Laramie Energy, LLC	<b>TVD Reference:</b>	RKB @ 8037.0usft (H&P #522)
<b>Project:</b>	Mesa County, CO	<b>MD Reference:</b>	RKB @ 8037.0usft (H&P #522)
<b>Site:</b>	Hayward 0993 25-09 Pad	<b>North Reference:</b>	True
<b>Well:</b>	Hayward SCU Federal 0992-19-16W	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	B-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		Hayward 0993 25-09 Pad			
Site Position:		Northing:	1,519,030.59 usft	Latitude:	39.237495
From:	Lat/Long	Easting:	2,373,084.06 usft	Longitude:	-107.713617
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-1.40 °

Well	Hayward SCU Federal 0992-19-16W					
Well Position	+N/-S	2,661.3 usft	Northing:	1,521,705.70 usft	Latitude:	39.244802
	+E/-W	-598.4 usft	Easting:	2,372,550.66 usft	Longitude:	-107.715730
Position Uncertainty	0.0 usft		Wellhead Elevation:		Ground Level:	8,007.0 usft

Wellbore	B-1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	5/9/2019	9.08	65.20	51,203.10000000

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	32.76

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	
300.0	0.00	0.00	300.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,265.7	28.97	31.63	1,225.1	203.5	125.3	3.00	3.00	0.00	31.63	
6,257.2	28.97	31.63	5,591.9	2,262.0	1,393.4	0.00	0.00	0.00	0.00	
7,222.9	0.00	0.00	6,517.0	2,465.4	1,518.7	3.00	-3.00	0.00	180.00	
9,172.9	0.00	0.00	8,467.0	2,465.4	1,518.7	0.00	0.00	0.00	0.00	PBHL - Hayward S





# Well Planning Report



<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well Hayward SCU Federal 0992-19-16W
<b>Company:</b>	Laramie Energy, LLC	<b>TVD Reference:</b>	RKB @ 8037.0usft (H&P #522)
<b>Project:</b>	Mesa County, CO	<b>MD Reference:</b>	RKB @ 8037.0usft (H&P #522)
<b>Site:</b>	Hayward 0993 25-09 Pad	<b>North Reference:</b>	True
<b>Well:</b>	Hayward SCU Federal 0992-19-16W	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	B-1		
<b>Design:</b>	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
<b>KOP/ (Build 3°/100')</b>									
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	3.00	31.63	400.0	2.2	1.4	2.6	3.00	3.00	0.00
500.0	6.00	31.63	499.6	8.9	5.5	10.5	3.00	3.00	0.00
600.0	9.00	31.63	598.8	20.0	12.3	23.5	3.00	3.00	0.00
700.0	12.00	31.63	697.1	35.5	21.9	41.7	3.00	3.00	0.00
800.0	15.00	31.63	794.3	55.4	34.1	65.1	3.00	3.00	0.00
900.0	18.00	31.63	890.2	79.6	49.0	93.5	3.00	3.00	0.00
1,000.0	21.00	31.63	984.4	108.0	66.5	126.8	3.00	3.00	0.00
1,100.0	24.00	31.63	1,076.8	140.6	86.6	165.1	3.00	3.00	0.00
1,200.0	27.00	31.63	1,167.1	177.2	109.2	208.1	3.00	3.00	0.00
<b>EOB @ 28.97° Inc. / 31.63° Azm</b>									
1,265.7	28.97	31.63	1,225.1	203.5	125.3	238.9	3.00	3.00	0.00
1,300.0	28.97	31.63	1,255.1	217.6	134.1	255.6	0.00	0.00	0.00
1,400.0	28.97	31.63	1,342.6	258.9	159.5	304.0	0.00	0.00	0.00
1,500.0	28.97	31.63	1,430.1	300.1	184.9	352.4	0.00	0.00	0.00
<b>8 5/8"</b>									
1,530.0	28.97	31.63	1,456.3	312.5	192.5	366.9	0.00	0.00	0.00
1,600.0	28.97	31.63	1,517.5	341.3	210.3	400.8	0.00	0.00	0.00
1,700.0	28.97	31.63	1,605.0	382.6	235.7	449.3	0.00	0.00	0.00
1,800.0	28.97	31.63	1,692.5	423.8	261.1	497.7	0.00	0.00	0.00
1,900.0	28.97	31.63	1,780.0	465.1	286.5	546.1	0.00	0.00	0.00
2,000.0	28.97	31.63	1,867.5	506.3	311.9	594.5	0.00	0.00	0.00
2,100.0	28.97	31.63	1,955.0	547.5	337.3	643.0	0.00	0.00	0.00
2,200.0	28.97	31.63	2,042.5	588.8	362.7	691.4	0.00	0.00	0.00
2,300.0	28.97	31.63	2,129.9	630.0	388.1	739.8	0.00	0.00	0.00
2,400.0	28.97	31.63	2,217.4	671.3	413.5	788.3	0.00	0.00	0.00
2,500.0	28.97	31.63	2,304.9	712.5	438.9	836.7	0.00	0.00	0.00
2,600.0	28.97	31.63	2,392.4	753.7	464.3	885.1	0.00	0.00	0.00
2,700.0	28.97	31.63	2,479.9	795.0	489.7	933.5	0.00	0.00	0.00
2,800.0	28.97	31.63	2,567.4	836.2	515.1	982.0	0.00	0.00	0.00
2,900.0	28.97	31.63	2,654.9	877.5	540.5	1,030.4	0.00	0.00	0.00
3,000.0	28.97	31.63	2,742.4	918.7	565.9	1,078.8	0.00	0.00	0.00
3,100.0	28.97	31.63	2,829.8	959.9	591.3	1,127.2	0.00	0.00	0.00
3,200.0	28.97	31.63	2,917.3	1,001.2	616.7	1,175.7	0.00	0.00	0.00
3,300.0	28.97	31.63	3,004.8	1,042.4	642.1	1,224.1	0.00	0.00	0.00
3,400.0	28.97	31.63	3,092.3	1,083.7	667.5	1,272.5	0.00	0.00	0.00
3,500.0	28.97	31.63	3,179.8	1,124.9	692.9	1,321.0	0.00	0.00	0.00
<b>G' Sand</b>									
3,542.5	28.97	31.63	3,217.0	1,142.5	703.7	1,341.5	0.00	0.00	0.00
3,600.0	28.97	31.63	3,267.3	1,166.1	718.3	1,369.4	0.00	0.00	0.00
3,700.0	28.97	31.63	3,354.8	1,207.4	743.7	1,417.8	0.00	0.00	0.00
3,800.0	28.97	31.63	3,442.2	1,248.6	769.1	1,466.2	0.00	0.00	0.00
3,900.0	28.97	31.63	3,529.7	1,289.9	794.6	1,514.7	0.00	0.00	0.00
4,000.0	28.97	31.63	3,617.2	1,331.1	820.0	1,563.1	0.00	0.00	0.00
4,100.0	28.97	31.63	3,704.7	1,372.3	845.4	1,611.5	0.00	0.00	0.00
4,200.0	28.97	31.63	3,792.2	1,413.6	870.8	1,659.9	0.00	0.00	0.00
4,300.0	28.97	31.63	3,879.7	1,454.8	896.2	1,708.4	0.00	0.00	0.00
4,400.0	28.97	31.63	3,967.2	1,496.1	921.6	1,756.8	0.00	0.00	0.00
4,500.0	28.97	31.63	4,054.7	1,537.3	947.0	1,805.2	0.00	0.00	0.00
4,600.0	28.97	31.63	4,142.1	1,578.5	972.4	1,853.6	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 Hayward SCU Federal 0992-19-16W
<b>Company:</b>	Laramie Energy, LLC	<b>TVD Reference:</b>	RKB @ 8037.0usft (H&P #522)
<b>Project:</b>	Mesa County, CO	<b>MD Reference:</b>	RKB @ 8037.0usft (H&P #522)
<b>Site:</b>	Hayward 0993 25-09 Pad	<b>North Reference:</b>	True
<b>Well:</b>	Hayward SCU Federal 0992-19-16W	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	B-1		
<b>Design:</b>	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	28.97	31.63	4,229.6	1,619.8	997.8	1,902.1	0.00	0.00	0.00
4,800.0	28.97	31.63	4,317.1	1,661.0	1,023.2	1,950.5	0.00	0.00	0.00
4,900.0	28.97	31.63	4,404.6	1,702.3	1,048.6	1,998.9	0.00	0.00	0.00
5,000.0	28.97	31.63	4,492.1	1,743.5	1,074.0	2,047.4	0.00	0.00	0.00
5,100.0	28.97	31.63	4,579.6	1,784.7	1,099.4	2,095.8	0.00	0.00	0.00
5,200.0	28.97	31.63	4,667.1	1,826.0	1,124.8	2,144.2	0.00	0.00	0.00
5,300.0	28.97	31.63	4,754.5	1,867.2	1,150.2	2,192.6	0.00	0.00	0.00
5,400.0	28.97	31.63	4,842.0	1,908.5	1,175.6	2,241.1	0.00	0.00	0.00
5,500.0	28.97	31.63	4,929.5	1,949.7	1,201.0	2,289.5	0.00	0.00	0.00
5,600.0	28.97	31.63	5,017.0	1,990.9	1,226.4	2,337.9	0.00	0.00	0.00
5,700.0	28.97	31.63	5,104.5	2,032.2	1,251.8	2,386.3	0.00	0.00	0.00
<b>Ohio Creek</b>									
5,771.4	28.97	31.63	5,167.0	2,061.7	1,270.0	2,420.9	0.00	0.00	0.00
5,800.0	28.97	31.63	5,192.0	2,073.4	1,277.2	2,434.8	0.00	0.00	0.00
5,900.0	28.97	31.63	5,279.5	2,114.7	1,302.6	2,483.2	0.00	0.00	0.00
6,000.0	28.97	31.63	5,367.0	2,155.9	1,328.0	2,531.6	0.00	0.00	0.00
6,100.0	28.97	31.63	5,454.4	2,197.1	1,353.4	2,580.1	0.00	0.00	0.00
<b>Williams Fork</b>									
6,171.5	28.97	31.63	5,517.0	2,226.6	1,371.6	2,614.7	0.00	0.00	0.00
6,200.0	28.97	31.63	5,541.9	2,238.4	1,378.8	2,628.5	0.00	0.00	0.00
<b>Drop 3° / 100'</b>									
6,257.2	28.97	31.63	5,591.9	2,262.0	1,393.4	2,656.2	0.00	0.00	0.00
6,300.0	27.69	31.63	5,629.6	2,279.3	1,404.0	2,676.5	3.00	-3.00	0.00
6,400.0	24.69	31.63	5,719.4	2,316.8	1,427.2	2,720.6	3.00	-3.00	0.00
6,500.0	21.69	31.63	5,811.3	2,350.4	1,447.8	2,760.0	3.00	-3.00	0.00
6,600.0	18.69	31.63	5,905.1	2,379.7	1,465.9	2,794.5	3.00	-3.00	0.00
6,700.0	15.69	31.63	6,000.7	2,404.9	1,481.4	2,824.0	3.00	-3.00	0.00
6,800.0	12.69	31.63	6,097.6	2,425.7	1,494.2	2,848.5	3.00	-3.00	0.00
6,900.0	9.69	31.63	6,195.7	2,442.3	1,504.4	2,867.9	3.00	-3.00	0.00
7,000.0	6.69	31.63	6,294.7	2,454.4	1,511.9	2,882.1	3.00	-3.00	0.00
7,100.0	3.69	31.63	6,394.2	2,462.1	1,516.6	2,891.2	3.00	-3.00	0.00
7,200.0	0.69	31.63	6,494.1	2,465.3	1,518.6	2,895.0	3.00	-3.00	0.00
<b>EOD @ Vertical - TOG</b>									
7,222.9	0.00	0.00	6,517.0	2,465.4	1,518.7	2,895.1	3.00	-3.00	0.00
7,300.0	0.00	0.00	6,594.1	2,465.4	1,518.7	2,895.1	0.00	0.00	0.00
7,400.0	0.00	0.00	6,694.1	2,465.4	1,518.7	2,895.1	0.00	0.00	0.00
7,500.0	0.00	0.00	6,794.1	2,465.4	1,518.7	2,895.1	0.00	0.00	0.00
7,600.0	0.00	0.00	6,894.1	2,465.4	1,518.7	2,895.1	0.00	0.00	0.00
7,700.0	0.00	0.00	6,994.1	2,465.4	1,518.7	2,895.1	0.00	0.00	0.00
7,800.0	0.00	0.00	7,094.1	2,465.4	1,518.7	2,895.1	0.00	0.00	0.00
7,900.0	0.00	0.00	7,194.1	2,465.4	1,518.7	2,895.1	0.00	0.00	0.00
8,000.0	0.00	0.00	7,294.1	2,465.4	1,518.7	2,895.1	0.00	0.00	0.00
8,100.0	0.00	0.00	7,394.1	2,465.4	1,518.7	2,895.1	0.00	0.00	0.00
8,200.0	0.00	0.00	7,494.1	2,465.4	1,518.7	2,895.1	0.00	0.00	0.00
8,300.0	0.00	0.00	7,594.1	2,465.4	1,518.7	2,895.1	0.00	0.00	0.00
8,400.0	0.00	0.00	7,694.1	2,465.4	1,518.7	2,895.1	0.00	0.00	0.00
8,500.0	0.00	0.00	7,794.1	2,465.4	1,518.7	2,895.1	0.00	0.00	0.00
<b>Cameo</b>									
8,572.9	0.00	0.00	7,867.0	2,465.4	1,518.7	2,895.1	0.00	0.00	0.00
8,600.0	0.00	0.00	7,894.1	2,465.4	1,518.7	2,895.1	0.00	0.00	0.00
8,700.0	0.00	0.00	7,994.1	2,465.4	1,518.7	2,895.1	0.00	0.00	0.00
8,800.0	0.00	0.00	8,094.1	2,465.4	1,518.7	2,895.1	0.00	0.00	0.00
8,900.0	0.00	0.00	8,194.1	2,465.4	1,518.7	2,895.1	0.00	0.00	0.00



## Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Hayward SCU Federal 0992-19-16W
Company:	Laramie Energy, LLC	TVD Reference:	RKB @ 8037.0usft (H&P #522)
Project:	Mesa County, CO	MD Reference:	RKB @ 8037.0usft (H&P #522)
Site:	Hayward 0993 25-09 Pad	North Reference:	True
Well:	Hayward SCU Federal 0992-19-16W	Survey Calculation Method:	Minimum Curvature
Wellbore:	B-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)
<b>Base Cameo Coal</b>									
8,952.9	0.00	0.00	8,247.0	2,465.4	1,518.7	2,895.1	0.00	0.00	0.00
<b>Rollins</b>									
8,972.9	0.00	0.00	8,267.0	2,465.4	1,518.7	2,895.1	0.00	0.00	0.00
9,000.0	0.00	0.00	8,294.1	2,465.4	1,518.7	2,895.1	0.00	0.00	0.00
9,100.0	0.00	0.00	8,394.1	2,465.4	1,518.7	2,895.1	0.00	0.00	0.00
<b>TD @ 9172.9' MD / 8467.0' TVD</b>									
9,172.9	0.00	0.00	8,467.0	2,465.4	1,518.7	2,895.1	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 - Hayward SCU	0.00	0.00	8,467.0	2,465.4	1,518.7	1,524,133.37	2,374,129.03	39.251571	-107.710367
- plan hits target center									
- Circle (radius 65.0)									

## Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,530.0	1,456.3	8 5/8"	8-5/8	11

## Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
3,542.5	3,217.0	G' Sand			
5,771.4	5,167.0	Ohio Creek			
6,171.5	5,517.0	Williams Fork			
7,222.9	6,517.0	TOG			
8,572.9	7,867.0	Cameo			
8,952.9	8,247.0	Base Cameo Coal			
8,972.9	8,267.0	Rollins			

## Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	+E/-W (usft)	Comment
300.0	300.0	0.0	0.0	KOP/ (Build 3"/100')
1,265.7	1,225.1	203.5	125.3	EOB @ 28.97° Inc. / 31.63° Azm
6,257.2	5,591.9	2,262.0	1,393.4	Drop 3" / 100'
7,222.9	6,517.0	2,465.4	1,518.7	EOD @ Vertical
9,172.9	8,467.0	2,465.4	1,518.7	TD @ 9172.9' MD / 8467.0' TVD