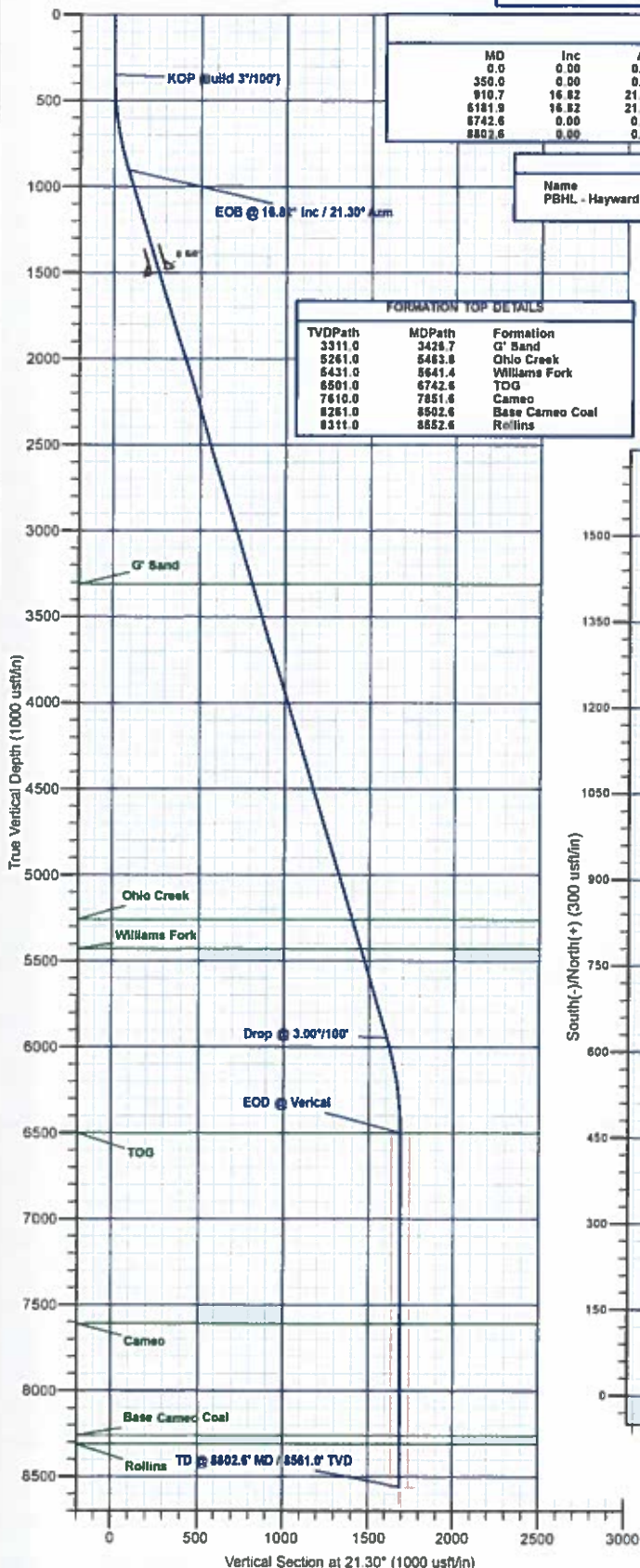




Project: Mesa County, CO
Site: Hayward 0993-25-09 Pad
Well: Hayward 0993-25-04E
Wellbore: B-8
Design: Design #1
Latitude: 39.244880
Longitude: -107.716956
Ground Level: 8008.0
well @ 8038.0ustf (H&P 522)

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

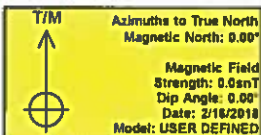


SECTION DETAILS									
MD	Inc	Azi	TVD	+N-S	+E-W	Dleg	TFace	VSect	Annotation
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	KOP (Build 3°/100')
350.0	0.00	0.00	350.0	0.0	0.0	0.00	0.00	0.0	EOB @ 16.82° Inc / 21.30° Azm
910.7	16.82	21.30	902.7	76.1	29.7	3.00	21.30	81.7	Drop @ 3.00°/100'
6181.9	16.82	21.30	5948.3	1497.3	523.7	0.00	0.00	1607.1	EOD @ Vertical
6742.6	0.00	0.00	6601.0	1573.4	613.4	3.00	180.00	1698.8	TD @ 8802.6' MD / 8561.0' TVD
8802.6	0.00	0.00	8561.0	1573.4	613.4	0.00	0.00	1698.8	

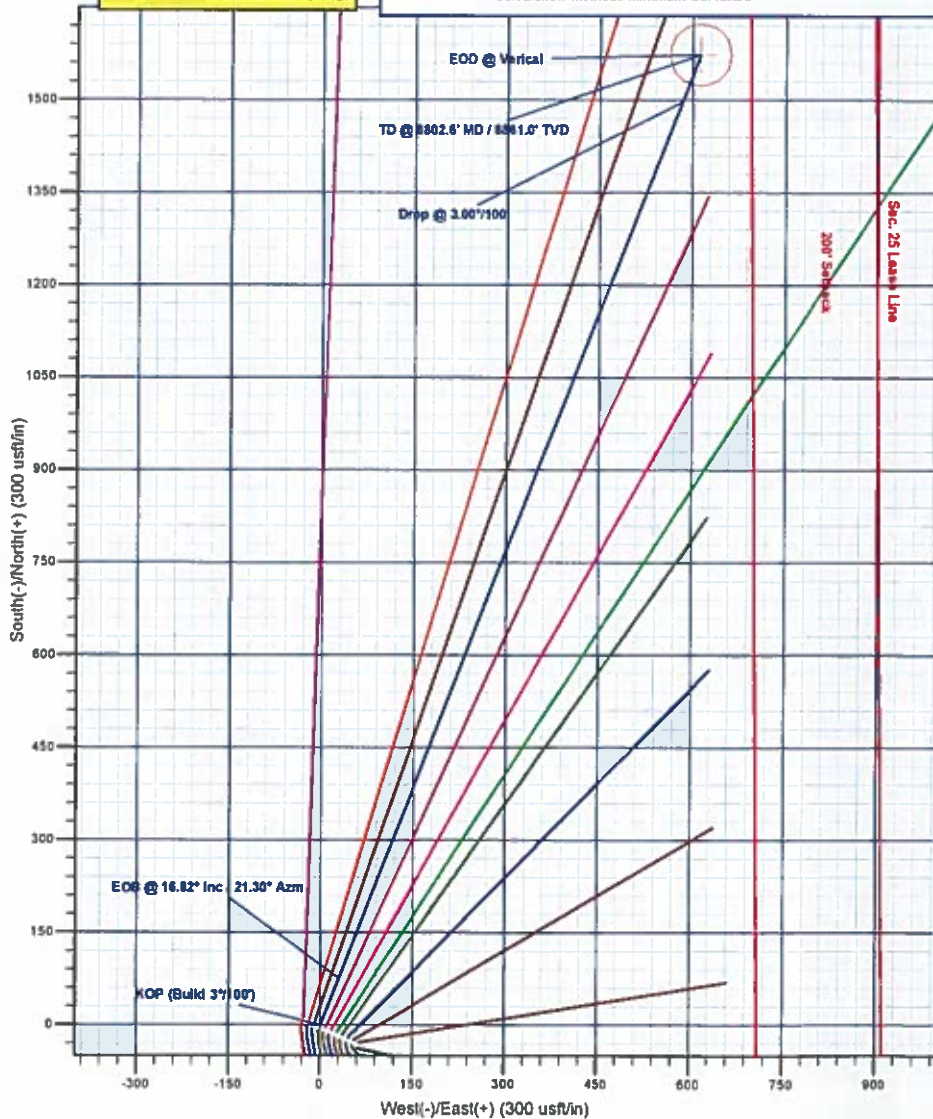
DESIGN TARGET DETAILS							
Name	TVD	+N-S	+E-W	Northing	Easting	Latitude	Longitude
PBHL - Hayward 0993-25-04E	8561.0	1573.4	613.4	1523293.67	2373138.94	39.244880	-107.713790

WELL DETAILS: Hayward 0993-25-04E					
+N-S	+E-W	Northing	Easting	Latitude	Longitude
0.0	0.0	1521735.67	2372487.36	39.244880	-107.716956

FORMATION TOP DETAILS		
TVDPath	MDPath	Formation
3311.0	3428.7	G' Sand
5261.0	5463.8	Ohio Creek
6431.0	6541.4	Williams Fork
6601.0	6742.6	TOG
7610.0	7851.6	Cameo
8261.0	8502.6	Base Cameo Coal
8311.0	8552.6	Rollins



REFERENCE INFORMATION	
Co-ordinate (N/E) Reference: Well Hayward 0993-25-04E, True North	
Vertical (TVD) Reference: well @ 8038.0ustf (H&P 522)	
Section (VS) Reference: Slot - (0.0N, 0.0E)	
Measured Depth Reference: well @ 8038.0ustf (H&P 522)	
Calculation Method: Minimum Curvature	



Plan: Design #1 (Hayward 0993-25-04E/B-8)

Created By:

Date: 8:43, February 22 2018



Laramie Energy, LLC

Mesa County, CO

Hayward 0993 25-09 Pad

Hayward 0993-25-04E

B-8

Plan: Design #1

QES Well Planning Report

22 February, 2018





Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Hayward 0993-25-04E
Company:	Laramie Energy, LLC	TVD Reference:	well @ 8038.0usft (H&P 522)
Project:	Mesa County, CO	MD Reference:	well @ 8038.0usft (H&P 522)
Site:	Hayward 0993 25-09 Pad	North Reference:	True
Well:	Hayward 0993-25-04E	Survey Calculation Method:	Minimum Curvature
Wellbore:	B-8		
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		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 0993-25-04E					
Well Position	+N/-S	2,689.7 usft	Northing:	1,521,735.67 usft	Latitude:	39.244880
	+E/-W	-662.4 usft	Easting:	2,372,487.36 usft	Longitude:	-107.715956
Position Uncertainty		0.0 usft	Wellhead Elevation:		Ground Level:	8,008.0 usft

Wellbore	B-8				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	User Defined	2/16/2018	0.00	0.00	0.00000000

Design	Design #1			
Audit Notes:				
Version:	Phase:	PROTOTYPE	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	21.30

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	
350.0	0.00	0.00	350.0	0.0	0.0	0.00	0.00	0.00	0.00	
910.7	16.82	21.30	902.7	76.1	29.7	3.00	3.00	0.00	21.30	
6,181.9	16.82	21.30	5,948.3	1,497.3	583.7	0.00	0.00	0.00	0.00	
6,742.6	0.00	0.00	6,501.0	1,573.4	613.4	3.00	-3.00	0.00	180.00	
8,802.6	0.00	0.00	8,561.0	1,573.4	613.4	0.00	0.00	0.00	0.00	PBHL - Hayward 0993



Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Hayward 0993-25-04E
Company:	Laramie Energy, LLC	TVD Reference:	well @ 8038.0usft (H&P 522)
Project:	Mesa County, CO	MD Reference:	well @ 8038.0usft (H&P 522)
Site:	Hayward 0993 25-09 Pad	North Reference:	True
Well:	Hayward 0993-25-04E	Survey Calculation Method:	Minimum Curvature
Wellbore:	B-8		
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
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
KOP (Build 3°/100')									
350.0	0.00	0.00	350.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	1.50	21.30	400.0	0.6	0.2	0.7	3.00	3.00	0.00
500.0	4.50	21.30	499.8	5.5	2.1	5.9	3.00	3.00	0.00
600.0	7.50	21.30	599.3	15.2	5.9	16.3	3.00	3.00	0.00
700.0	10.50	21.30	698.0	29.8	11.6	32.0	3.00	3.00	0.00
800.0	13.50	21.30	795.8	49.2	19.2	52.8	3.00	3.00	0.00
900.0	16.50	21.30	892.4	73.3	28.6	78.6	3.00	3.00	0.00
EOB @ 16.82° Inc / 21.30° Azm									
910.7	16.82	21.30	902.7	76.1	29.7	81.7	3.00	3.00	0.00
1,000.0	16.82	21.30	988.2	100.2	39.1	107.6	0.00	0.00	0.00
1,100.0	16.82	21.30	1,083.9	127.2	49.6	136.5	0.00	0.00	0.00
1,200.0	16.82	21.30	1,179.6	154.1	60.1	165.4	0.00	0.00	0.00
1,300.0	16.82	21.30	1,275.3	181.1	70.6	194.4	0.00	0.00	0.00
1,400.0	16.82	21.30	1,371.0	208.1	81.1	223.3	0.00	0.00	0.00
1,500.0	16.82	21.30	1,466.8	235.0	91.6	252.2	0.00	0.00	0.00
8 5/8"									
1,530.0	16.82	21.30	1,495.5	243.1	94.8	260.9	0.00	0.00	0.00
1,600.0	16.82	21.30	1,562.5	262.0	102.1	281.2	0.00	0.00	0.00
1,700.0	16.82	21.30	1,658.2	288.9	112.6	310.1	0.00	0.00	0.00
1,800.0	16.82	21.30	1,753.9	315.9	123.2	339.1	0.00	0.00	0.00
1,900.0	16.82	21.30	1,849.7	342.9	133.7	368.0	0.00	0.00	0.00
2,000.0	16.82	21.30	1,945.4	369.8	144.2	396.9	0.00	0.00	0.00
2,100.0	16.82	21.30	2,041.1	396.8	154.7	425.9	0.00	0.00	0.00
2,200.0	16.82	21.30	2,136.8	423.7	165.2	454.8	0.00	0.00	0.00
2,300.0	16.82	21.30	2,232.5	450.7	175.7	483.7	0.00	0.00	0.00
2,400.0	16.82	21.30	2,328.3	477.7	186.2	512.7	0.00	0.00	0.00
2,500.0	16.82	21.30	2,424.0	504.6	196.7	541.6	0.00	0.00	0.00
2,600.0	16.82	21.30	2,519.7	531.6	207.2	570.6	0.00	0.00	0.00
2,700.0	16.82	21.30	2,615.4	558.5	217.7	599.5	0.00	0.00	0.00
2,800.0	16.82	21.30	2,711.1	585.5	228.3	628.4	0.00	0.00	0.00
2,900.0	16.82	21.30	2,806.9	612.5	238.8	657.4	0.00	0.00	0.00
3,000.0	16.82	21.30	2,902.6	639.4	249.3	686.3	0.00	0.00	0.00
3,100.0	16.82	21.30	2,998.3	666.4	259.8	715.2	0.00	0.00	0.00
3,200.0	16.82	21.30	3,094.0	693.4	270.3	744.2	0.00	0.00	0.00
3,300.0	16.82	21.30	3,189.8	720.3	280.8	773.1	0.00	0.00	0.00
3,400.0	16.82	21.30	3,285.5	747.3	291.3	802.1	0.00	0.00	0.00
G' Sand									
3,426.7	16.82	21.30	3,311.0	754.5	294.1	809.8	0.00	0.00	0.00
3,500.0	16.82	21.30	3,381.2	774.2	301.8	831.0	0.00	0.00	0.00
3,600.0	16.82	21.30	3,476.9	801.2	312.3	859.9	0.00	0.00	0.00
3,700.0	16.82	21.30	3,572.6	828.2	322.9	888.9	0.00	0.00	0.00
3,800.0	16.82	21.30	3,668.4	855.1	333.4	917.8	0.00	0.00	0.00
3,900.0	16.82	21.30	3,764.1	882.1	343.9	946.7	0.00	0.00	0.00
4,000.0	16.82	21.30	3,859.8	909.0	354.4	975.7	0.00	0.00	0.00
4,100.0	16.82	21.30	3,955.5	936.0	364.9	1,004.6	0.00	0.00	0.00
4,200.0	16.82	21.30	4,051.3	963.0	375.4	1,033.6	0.00	0.00	0.00
4,300.0	16.82	21.30	4,147.0	989.9	385.9	1,062.5	0.00	0.00	0.00
4,400.0	16.82	21.30	4,242.7	1,016.9	396.4	1,091.4	0.00	0.00	0.00
4,500.0	16.82	21.30	4,338.4	1,043.8	406.9	1,120.4	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: Hayward 0993 25-09 Pad
Well: Hayward 0993-25-04E
Wellbore: B-8
Design: Design #1

Local Co-ordinate Reference: Well Hayward 0993-25-04E
TVD Reference: well @ 8038.0usft (H&P 522)
MD Reference: well @ 8038.0usft (H&P 522)
North Reference: True
Survey Calculation Method: 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)
4,600.0	16.82	21.30	4,434.1	1,070.8	417.4	1,149.3	0.00	0.00	0.00
4,700.0	16.82	21.30	4,529.9	1,097.8	428.0	1,178.2	0.00	0.00	0.00
4,800.0	16.82	21.30	4,625.6	1,124.7	438.5	1,207.2	0.00	0.00	0.00
4,900.0	16.82	21.30	4,721.3	1,151.7	449.0	1,236.1	0.00	0.00	0.00
5,000.0	16.82	21.30	4,817.0	1,178.7	459.5	1,265.1	0.00	0.00	0.00
5,100.0	16.82	21.30	4,912.7	1,205.6	470.0	1,294.0	0.00	0.00	0.00
5,200.0	16.82	21.30	5,008.5	1,232.6	480.5	1,322.9	0.00	0.00	0.00
5,300.0	16.82	21.30	5,104.2	1,259.5	491.0	1,351.9	0.00	0.00	0.00
5,400.0	16.82	21.30	5,199.9	1,286.5	501.5	1,380.8	0.00	0.00	0.00
Ohio Creek									
5,463.8	16.82	21.30	5,261.0	1,303.7	508.2	1,399.3	0.00	0.00	0.00
5,500.0	16.82	21.30	5,295.6	1,313.5	512.0	1,409.7	0.00	0.00	0.00
5,600.0	16.82	21.30	5,391.4	1,340.4	522.6	1,438.7	0.00	0.00	0.00
Williams Fork									
5,641.4	16.82	21.30	5,431.0	1,351.6	526.9	1,450.7	0.00	0.00	0.00
5,700.0	16.82	21.30	5,487.1	1,367.4	533.1	1,467.6	0.00	0.00	0.00
5,800.0	16.82	21.30	5,582.8	1,394.3	543.6	1,496.6	0.00	0.00	0.00
5,900.0	16.82	21.30	5,678.5	1,421.3	554.1	1,525.5	0.00	0.00	0.00
6,000.0	16.82	21.30	5,774.2	1,448.3	564.6	1,554.4	0.00	0.00	0.00
6,100.0	16.82	21.30	5,870.0	1,475.2	575.1	1,583.4	0.00	0.00	0.00
Drop @ 3.00°/100'									
6,181.9	16.82	21.30	5,948.3	1,497.3	583.7	1,607.1	0.00	0.00	0.00
6,200.0	16.28	21.30	5,965.7	1,502.1	585.6	1,612.2	3.00	-3.00	0.00
6,300.0	13.28	21.30	6,062.4	1,525.9	594.8	1,637.7	3.00	-3.00	0.00
6,400.0	10.28	21.30	6,160.3	1,544.9	602.3	1,658.1	3.00	-3.00	0.00
6,500.0	7.28	21.30	6,259.1	1,559.1	607.8	1,673.4	3.00	-3.00	0.00
6,600.0	4.28	21.30	6,358.6	1,568.5	611.5	1,683.4	3.00	-3.00	0.00
6,700.0	1.28	21.30	6,458.4	1,573.0	613.2	1,688.3	3.00	-3.00	0.00
EOD @ Vertical - TOG									
6,742.6	0.00	0.00	6,501.0	1,573.4	613.4	1,688.8	3.00	-3.00	0.00
6,800.0	0.00	0.00	6,558.4	1,573.4	613.4	1,688.8	0.00	0.00	0.00
6,900.0	0.00	0.00	6,658.4	1,573.4	613.4	1,688.8	0.00	0.00	0.00
7,000.0	0.00	0.00	6,758.4	1,573.4	613.4	1,688.8	0.00	0.00	0.00
7,100.0	0.00	0.00	6,858.4	1,573.4	613.4	1,688.8	0.00	0.00	0.00
7,200.0	0.00	0.00	6,958.4	1,573.4	613.4	1,688.8	0.00	0.00	0.00
7,300.0	0.00	0.00	7,058.4	1,573.4	613.4	1,688.8	0.00	0.00	0.00
7,400.0	0.00	0.00	7,158.4	1,573.4	613.4	1,688.8	0.00	0.00	0.00
7,500.0	0.00	0.00	7,258.4	1,573.4	613.4	1,688.8	0.00	0.00	0.00
7,600.0	0.00	0.00	7,358.4	1,573.4	613.4	1,688.8	0.00	0.00	0.00
7,700.0	0.00	0.00	7,458.4	1,573.4	613.4	1,688.8	0.00	0.00	0.00
7,800.0	0.00	0.00	7,558.4	1,573.4	613.4	1,688.8	0.00	0.00	0.00
Cameo									
7,851.6	0.00	0.00	7,610.0	1,573.4	613.4	1,688.8	0.00	0.00	0.00
7,900.0	0.00	0.00	7,658.4	1,573.4	613.4	1,688.8	0.00	0.00	0.00
8,000.0	0.00	0.00	7,758.4	1,573.4	613.4	1,688.8	0.00	0.00	0.00
8,100.0	0.00	0.00	7,858.4	1,573.4	613.4	1,688.8	0.00	0.00	0.00
8,200.0	0.00	0.00	7,958.4	1,573.4	613.4	1,688.8	0.00	0.00	0.00
8,300.0	0.00	0.00	8,058.4	1,573.4	613.4	1,688.8	0.00	0.00	0.00
8,400.0	0.00	0.00	8,158.4	1,573.4	613.4	1,688.8	0.00	0.00	0.00
8,500.0	0.00	0.00	8,258.4	1,573.4	613.4	1,688.8	0.00	0.00	0.00
Base Cameo Coal									
8,502.6	0.00	0.00	8,261.0	1,573.4	613.4	1,688.8	0.00	0.00	0.00
Rollins									



Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Hayward 0993-25-04E
Company:	Laramie Energy, LLC	TVD Reference:	well @ 8038.0usft (H&P 522)
Project:	Mesa County, CO	MD Reference:	well @ 8038.0usft (H&P 522)
Site:	Hayward 0993 25-09 Pad	North Reference:	True
Well:	Hayward 0993-25-04E	Survey Calculation Method:	Minimum Curvature
Wellbore:	B-8		
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)
8,552.6	0.00	0.00	8,311.0	1,573.4	613.4	1,688.8	0.00	0.00	0.00
8,600.0	0.00	0.00	8,358.4	1,573.4	613.4	1,688.8	0.00	0.00	0.00
8,700.0	0.00	0.00	8,458.4	1,573.4	613.4	1,688.8	0.00	0.00	0.00
TD @ 8802.6' MD / 8561.0' TVD									
8,802.6	0.00	0.00	8,561.0	1,573.4	613.4	1,688.8	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 0993-2	0.00	0.00	8,561.0	1,573.4	613.4	1,523,293.67	2,373,138.95	39 249200	-107.713790
- plan hits target center									
- Circle (radius 50.0)									

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,530.0	1,495.5	8 5/8"	8-5/8	11

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
3,426.7	3,311.0	G' Sand			
5,483.8	5,261.0	Ohio Creek			
5,641.4	5,431.0	Williams Fork			
6,742.6	6,501.0	TOG			
7,851.6	7,610.0	Cameo			
8,502.6	8,261.0	Base Cameo Coal			
8,552.6	8,311.0	Rollins			

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
350.0	350.0	0.0	0.0	KOP (Build 3°/100')
910.7	902.7	76.1	29.7	EOB @ 16.82° Inc / 21.30° Azm
6,181.9	5,948.3	1,497.3	583.7	Drop @ 3.00°/100'
6,742.6	6,501.0	1,573.4	613.4	EOD @ Vertical
8,802.6	8,561.0	1,573.4	613.4	TD @ 8802.6' MD / 8561.0' TVD