



Project: Mesa County, CO
 Site: Hayward 0993 25-09 Pad
 Well: Hayward 0993-25-14E
 Wellbore: A-4
 Design: Design #1
 Latitude: 39.244810
 Longitude: -107.715841
 Ground Level: 8008.0
 well @ 8038.0usft (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')
570.0	0.00	0.00	570.0	0.0	0.0	0.00	0.00	0.0	EOB @ 5.00" Inc / 180.00" Azm
736.7	5.00	180.00	736.5	-7.3	0.0	3.00	180.00	5.9	EOBT @ 11.46" Inc / 143.97" Azm
1002.5	11.46	143.97	999.5	-40.3	16.6	3.00	-57.42	41.8	Drop @ 3"/100'
8179.5	11.46	143.97	8073.4	-672.4	620.8	0.00	0.00	1070.7	EOD @ Vertical
8561.8	0.00	0.00	8483.0	-903.2	643.2	0.00	180.00	1108.8	TD @ 8521.8" MD / 8513.9" TVD

DESIGN TARGET DETAILS

Name	TVD	+N-S	+E-W	Northing	Easting	Latitude	Longitude
PBHL - Hayward 0993-25-14E	8513.0	-903.2	643.2	1520790.73	2373140.26	39.242330	-107.713570

WELL DETAILS: Hayward 0993-25-14E

+N-S	+E-W	Northing	Easting	Latitude	Longitude
0.0	0.0	1521709.38	2372519.30	39.244810	-107.715841

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
3263.0	3312.0	G' Sand
5213.0	5301.7	Ohio Creek
5383.0	5475.2	Williams Fork
6453.0	6561.8	TOO
7556.0	7664.8	Cameo
8213.0	8321.8	Base Cameo Coal
8263.0	8371.8	Rollins

T/M

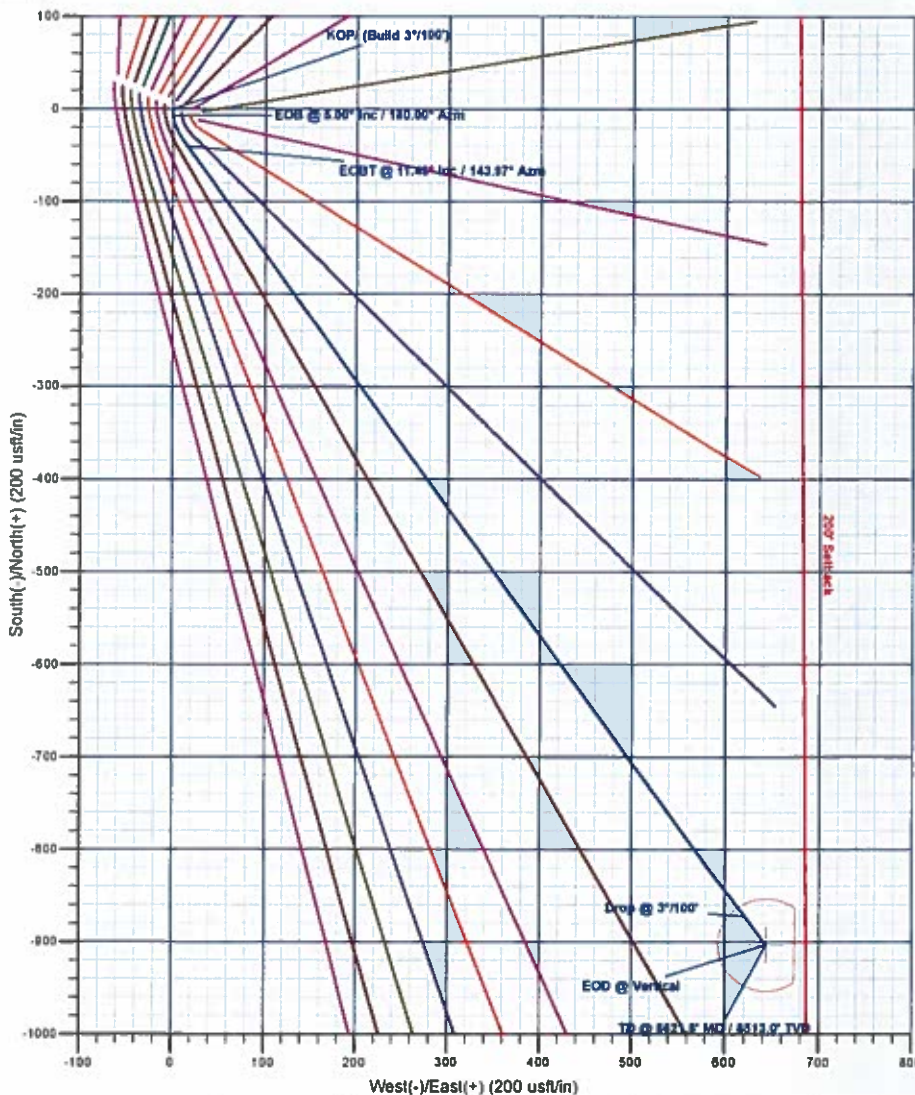
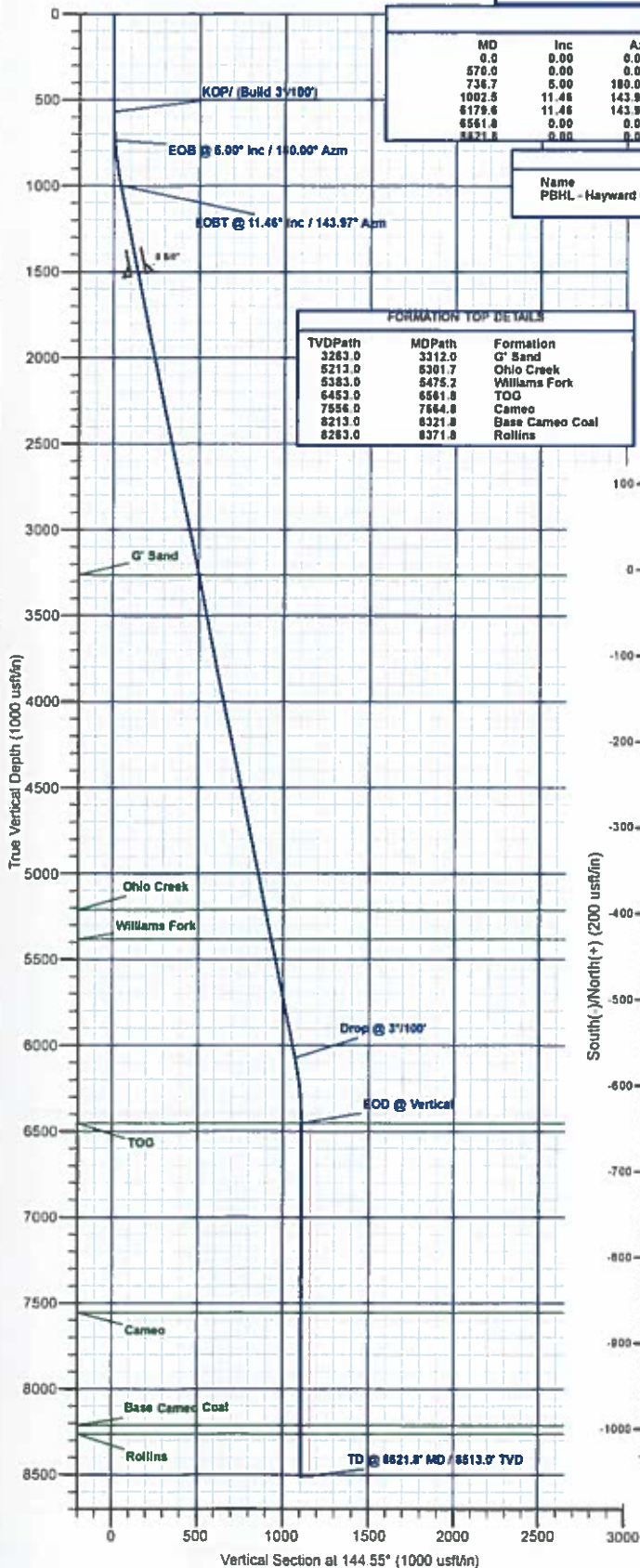


Azimuths to True North
 Magnetic North: 0.00°

Magnetic Field
 Strength: 0.00nT
 Dip Angle: 0.00°
 Date: 2/16/2016
 Model: USER DEFINED

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well Hayward 0993-25-14E, True North
 Vertical (TVD) Reference: well @ 8038.0usft (H&P 522)
 Section (VS) Reference: Slot - (0.0N, 0.0E)
 Measured Depth Reference: well @ 8038.0usft (H&P 522)
 Calculation Method: Minimum Curvature



Plan: Design #1 (Hayward 0993-25-14E/A-4)

Created By:

Date: 10:28, February 22 2018



Laramie Energy, LLC

Mesa County, CO

Hayward 0993 25-09 Pad

Hayward 0993-25-14E

A-4

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 0993-25-14E
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 0993-25-14E	Survey Calculation Method:	Minimum Curvature
Wellbore:	A-4		
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
From:	Lat/Long	Easting:	2,373,084.06 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	39.237495
		Longitude:	-107.713617
		Grid Convergence:	-1.40 "

Well	Hayward 0993-25-14E		
Well Position	+N/-S	2,664.2 usft	Northing:
	+E/-W	-629.9 usft	Easting:
Position Uncertainty	0.0 usft	Wellhead Elevation:	
		Latitude:	39.244810
		Longitude:	-107.715841
		Ground Level:	8,008.0 usft

Wellbore	A-4		
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)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			144.55

Plan Sections										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Dogleg	Build	Turn	TFO	Target
Depth	(°)	(°)	Depth	(usft)	(usft)	Rate	Rate	Rate	(°)	
(usft)			(usft)			(°/100usft)	(°/100usft)	(°/100usft)		
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
570.0	0.00	0.00	570.0	0.0	0.0	0.00	0.00	0.00	0.00	
736.7	5.00	180.00	736.5	-7.3	0.0	3.00	3.00	0.00	180.00	
1,002.5	11.46	143.97	999.5	-40.3	15.6	3.00	2.43	-13.55	-57.42	
6,179.6	11.46	143.97	6,073.4	-872.4	620.8	0.00	0.00	0.00	0.00	
6,581.8	0.00	0.00	6,453.0	-903.2	643.2	3.00	-3.00	0.00	180.00	
8,621.8	0.00	0.00	8,513.0	-903.2	643.2	0.00	0.00	0.00	0.00	PBHL - Hayward 099:



Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Hayward 0993-25-14E
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 0993-25-14E	Survey Calculation Method:	Minimum Curvature
Wellbore:	A-4		
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
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
KOP/ (Build 3°/100')									
570.0	0.00	0.00	570.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.90	180.00	600.0	-0.2	0.0	0.2	3.00	3.00	0.00
700.0	3.90	180.00	699.9	-4.4	0.0	3.6	3.00	3.00	0.00
EOB @ 5.00° Inc / 180.00° Azm									
736.7	5.00	180.00	736.5	-7.3	0.0	5.9	3.00	3.00	0.00
800.0	6.23	165.09	799.5	-13.3	0.9	11.4	3.00	1.94	-23.55
900.0	8.68	151.52	898.6	-25.2	5.9	24.0	3.00	2.45	-13.57
EOBT @ 11.46° Inc / 143.97° Azm / 999.6' TVD									
1,002.5	11.46	143.97	999.5	-40.3	15.6	41.8	3.00	2.72	-7.36
1,100.0	11.46	143.97	1,095.1	-55.9	27.0	61.2	0.00	0.00	0.00
1,200.0	11.46	143.97	1,193.1	-72.0	38.7	81.1	0.00	0.00	0.00
1,300.0	11.46	143.97	1,291.1	-88.1	50.3	101.0	0.00	0.00	0.00
1,400.0	11.46	143.97	1,389.1	-104.2	62.0	120.8	0.00	0.00	0.00
1,500.0	11.46	143.97	1,487.1	-120.2	73.7	140.7	0.00	0.00	0.00
8 5/8"									
1,530.0	11.46	143.97	1,516.5	-125.1	77.2	146.7	0.00	0.00	0.00
1,600.0	11.46	143.97	1,585.1	-136.3	85.4	160.6	0.00	0.00	0.00
1,700.0	11.46	143.97	1,683.1	-152.4	97.1	180.5	0.00	0.00	0.00
1,800.0	11.46	143.97	1,781.1	-168.5	108.8	200.3	0.00	0.00	0.00
1,900.0	11.46	143.97	1,879.2	-184.5	120.5	220.2	0.00	0.00	0.00
2,000.0	11.46	143.97	1,977.2	-200.6	132.2	240.1	0.00	0.00	0.00
2,100.0	11.46	143.97	2,075.2	-216.7	143.9	259.9	0.00	0.00	0.00
2,200.0	11.46	143.97	2,173.2	-232.8	155.6	279.8	0.00	0.00	0.00
2,300.0	11.46	143.97	2,271.2	-248.8	167.2	299.7	0.00	0.00	0.00
2,400.0	11.46	143.97	2,369.2	-264.9	178.9	319.6	0.00	0.00	0.00
2,500.0	11.46	143.97	2,467.2	-281.0	190.6	339.4	0.00	0.00	0.00
2,600.0	11.46	143.97	2,565.2	-297.0	202.3	359.3	0.00	0.00	0.00
2,700.0	11.46	143.97	2,663.2	-313.1	214.0	379.2	0.00	0.00	0.00
2,800.0	11.46	143.97	2,761.2	-329.2	225.7	399.1	0.00	0.00	0.00
2,900.0	11.46	143.97	2,859.2	-345.3	237.4	418.9	0.00	0.00	0.00
3,000.0	11.46	143.97	2,957.2	-361.3	249.1	438.8	0.00	0.00	0.00
3,100.0	11.46	143.97	3,055.2	-377.4	260.8	458.7	0.00	0.00	0.00
3,200.0	11.46	143.97	3,153.2	-393.5	272.5	478.6	0.00	0.00	0.00
3,300.0	11.46	143.97	3,251.2	-409.6	284.1	498.4	0.00	0.00	0.00
G' Sand									
3,312.0	11.46	143.97	3,263.0	-411.5	285.5	500.8	0.00	0.00	0.00
3,400.0	11.46	143.97	3,349.2	-425.6	295.8	518.3	0.00	0.00	0.00
3,500.0	11.46	143.97	3,447.2	-441.7	307.5	538.2	0.00	0.00	0.00
3,600.0	11.46	143.97	3,545.2	-457.8	319.2	558.1	0.00	0.00	0.00
3,700.0	11.46	143.97	3,643.2	-473.9	330.9	577.9	0.00	0.00	0.00
3,800.0	11.46	143.97	3,741.2	-489.9	342.6	597.8	0.00	0.00	0.00
3,900.0	11.46	143.97	3,839.3	-506.0	354.3	617.7	0.00	0.00	0.00
4,000.0	11.46	143.97	3,937.3	-522.1	366.0	637.6	0.00	0.00	0.00
4,100.0	11.46	143.97	4,035.3	-538.2	377.7	657.4	0.00	0.00	0.00
4,200.0	11.46	143.97	4,133.3	-554.2	389.4	677.3	0.00	0.00	0.00
4,300.0	11.46	143.97	4,231.3	-570.3	401.0	697.2	0.00	0.00	0.00
4,400.0	11.46	143.97	4,329.3	-586.4	412.7	717.1	0.00	0.00	0.00



Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Hayward 0993-25-14E
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 0993-25-14E	Survey Calculation Method:	Minimum Curvature
Wellbore:	A-4		
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)
4,500.0	11.46	143.97	4,427.3	-602.4	424.4	736.9	0.00	0.00	0.00
4,600.0	11.46	143.97	4,525.3	-618.5	436.1	756.8	0.00	0.00	0.00
4,700.0	11.46	143.97	4,623.3	-634.6	447.8	776.7	0.00	0.00	0.00
4,800.0	11.46	143.97	4,721.3	-650.7	459.5	796.6	0.00	0.00	0.00
4,900.0	11.46	143.97	4,819.3	-666.7	471.2	816.4	0.00	0.00	0.00
5,000.0	11.46	143.97	4,917.3	-682.8	482.9	836.3	0.00	0.00	0.00
5,100.0	11.46	143.97	5,015.3	-698.9	494.6	856.2	0.00	0.00	0.00
5,200.0	11.46	143.97	5,113.3	-715.0	506.3	876.0	0.00	0.00	0.00
5,300.0	11.46	143.97	5,211.3	-731.0	517.9	895.9	0.00	0.00	0.00
Ohio Creek									
5,301.7	11.46	143.97	5,213.0	-731.3	518.1	896.3	0.00	0.00	0.00
5,400.0	11.46	143.97	5,309.3	-747.1	529.6	915.8	0.00	0.00	0.00
Williams Fork									
5,475.2	11.46	143.97	5,383.0	-759.2	538.4	930.7	0.00	0.00	0.00
5,500.0	11.46	143.97	5,407.3	-763.2	541.3	935.7	0.00	0.00	0.00
5,600.0	11.46	143.97	5,505.3	-779.3	553.0	955.5	0.00	0.00	0.00
5,700.0	11.46	143.97	5,603.3	-795.3	564.7	975.4	0.00	0.00	0.00
5,800.0	11.46	143.97	5,701.3	-811.4	576.4	995.3	0.00	0.00	0.00
5,900.0	11.46	143.97	5,799.4	-827.5	588.1	1,015.2	0.00	0.00	0.00
6,000.0	11.46	143.97	5,897.4	-843.6	599.8	1,035.0	0.00	0.00	0.00
6,100.0	11.46	143.97	5,995.4	-859.6	611.5	1,054.9	0.00	0.00	0.00
Drop @ 3°/100'									
6,179.6	11.46	143.97	6,073.4	-872.4	620.8	1,070.7	0.00	0.00	0.00
6,200.0	10.85	143.97	6,093.4	-875.6	623.1	1,074.7	3.00	-3.00	0.00
6,300.0	7.85	143.97	6,192.0	-888.8	632.7	1,090.9	3.00	-3.00	0.00
6,400.0	4.85	143.97	6,291.4	-897.7	639.2	1,102.0	3.00	-3.00	0.00
6,500.0	1.85	143.97	6,391.2	-902.4	642.6	1,107.8	3.00	-3.00	0.00
EOD @ Vertical - TOG									
6,561.8	0.00	0.00	6,453.0	-903.2	643.2	1,108.8	3.00	-3.00	0.00
6,600.0	0.00	0.00	6,491.2	-903.2	643.2	1,108.8	0.00	0.00	0.00
6,700.0	0.00	0.00	6,591.2	-903.2	643.2	1,108.8	0.00	0.00	0.00
6,800.0	0.00	0.00	6,691.2	-903.2	643.2	1,108.8	0.00	0.00	0.00
6,900.0	0.00	0.00	6,791.2	-903.2	643.2	1,108.8	0.00	0.00	0.00
7,000.0	0.00	0.00	6,891.2	-903.2	643.2	1,108.8	0.00	0.00	0.00
7,100.0	0.00	0.00	6,991.2	-903.2	643.2	1,108.8	0.00	0.00	0.00
7,200.0	0.00	0.00	7,091.2	-903.2	643.2	1,108.8	0.00	0.00	0.00
7,300.0	0.00	0.00	7,191.2	-903.2	643.2	1,108.8	0.00	0.00	0.00
7,400.0	0.00	0.00	7,291.2	-903.2	643.2	1,108.8	0.00	0.00	0.00
7,500.0	0.00	0.00	7,391.2	-903.2	643.2	1,108.8	0.00	0.00	0.00
7,600.0	0.00	0.00	7,491.2	-903.2	643.2	1,108.8	0.00	0.00	0.00
Cameo									
7,664.8	0.00	0.00	7,556.0	-903.2	643.2	1,108.8	0.00	0.00	0.00
7,700.0	0.00	0.00	7,591.2	-903.2	643.2	1,108.8	0.00	0.00	0.00
7,800.0	0.00	0.00	7,691.2	-903.2	643.2	1,108.8	0.00	0.00	0.00
7,900.0	0.00	0.00	7,791.2	-903.2	643.2	1,108.8	0.00	0.00	0.00
8,000.0	0.00	0.00	7,891.2	-903.2	643.2	1,108.8	0.00	0.00	0.00
8,100.0	0.00	0.00	7,991.2	-903.2	643.2	1,108.8	0.00	0.00	0.00
8,200.0	0.00	0.00	8,091.2	-903.2	643.2	1,108.8	0.00	0.00	0.00
8,300.0	0.00	0.00	8,191.2	-903.2	643.2	1,108.8	0.00	0.00	0.00
Base Cameo Coal									
8,321.8	0.00	0.00	8,213.0	-903.2	643.2	1,108.8	0.00	0.00	0.00
Rollins									
8,371.8	0.00	0.00	8,263.0	-903.2	643.2	1,108.8	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 0993-25-14E
 Wellbore: A-4
 Design: Design #1

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

Well Hayward 0993-25-14E
 well @ 8038 0usft (H&P 522)
 well @ 8038 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)
8,400.0	0.00	0.00	8,291.2	-903.2	643.2	1,108.8	0.00	0.00	0.00
8,500.0	0.00	0.00	8,391.2	-903.2	643.2	1,108.8	0.00	0.00	0.00
8,600.0	0.00	0.00	8,491.2	-903.2	643.2	1,108.8	0.00	0.00	0.00
TD @ 8621.8' MD / 8513.0' TVD									
8,621.8	0.00	0.00	8,513.0	-903.2	643.2	1,108.8	0.00	0.00	0.00

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 - Hayward 0993-2	0.00	0.00	8,513.0	-903.2	643.2	1,520,790.73	2,373,140.27	39.242330	-107.713570
- plan hits target center									
- Circle (radius 50.0)									

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,530.0	1,516.5	8 5/8"	8-5/8	11

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
3,312.0	3,263.0	G' Sand			
5,301.7	5,213.0	Ohio Creek			
5,475.2	5,383.0	Williams Fork			
6,561.8	6,453.0	TOG			
7,664.8	7,556.0	Cameo			
8,321.8	8,213.0	Base Cameo Coal			
8,371.8	8,263.0	Rollins			

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
570.0	570.0	0.0	0.0	KOP/ (Build 3°/100')
736.7	736.5	-7.3	0.0	EOB @ 5.00° Inc / 180.00° Azm
1,002.5	999.5	-40.3	15.6	EOBT @ 11.46° Inc / 143.97° Azm / 999.6' TVD
6,179.6	6,073.4	-872.4	620.8	Drop @ 3°/100'
6,561.8	6,453.0	-903.2	643.2	EOD @ Vertical
8,621.8	8,513.0	-903.2	643.2	TD @ 8621.8' MD / 8513.0' TVD