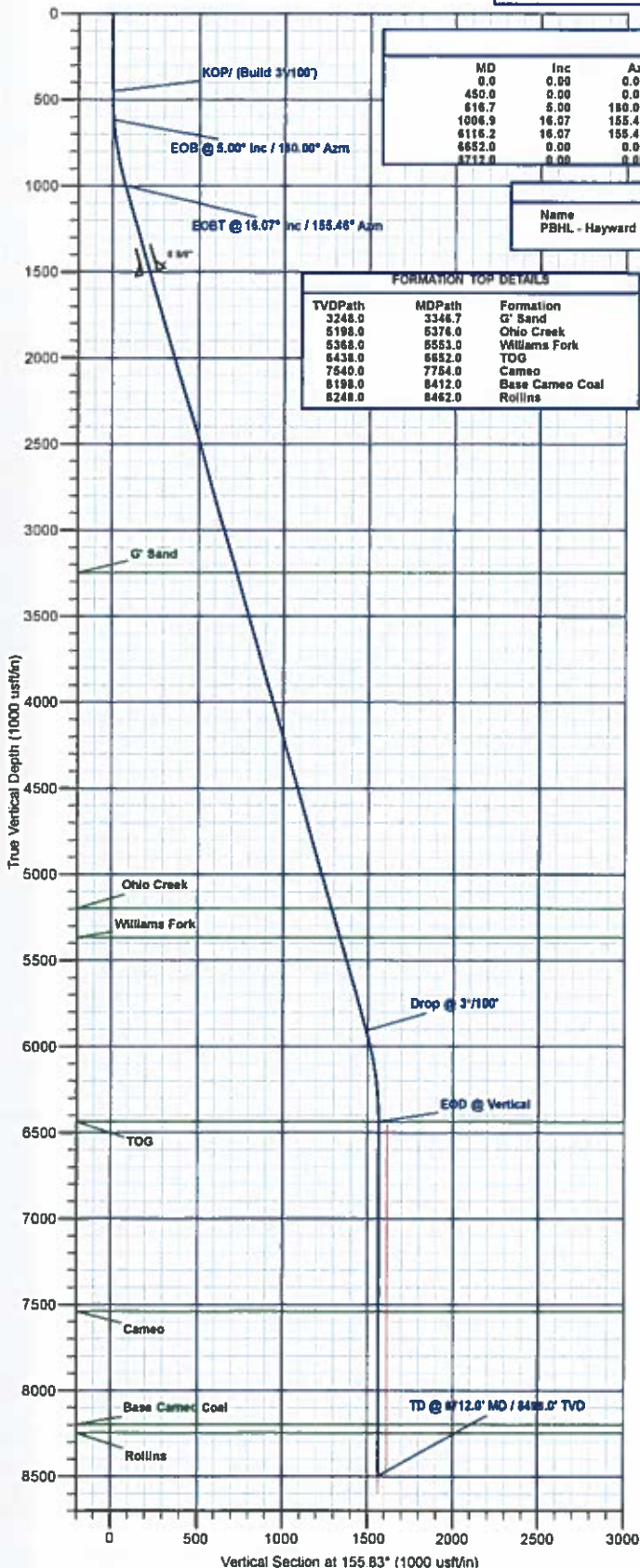




Project: Mesa County, CO
 Site: Hayward 0993 25-09 Pad
 Well: Hayward 0993-25-16E
 Wellbore: A-6
 Design: Design #1
 Latitude: 39.244833
 Longitude: -107.715906
 Ground Level: 8008.0
 well @ 8038.0usft (H&P 522)

PROJECT DETAILS: Mesa County, CO

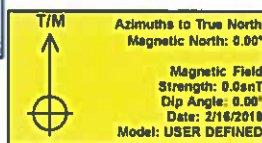
Geodetic System: US State Plane 1983
 Datum: North American Datum 1983
 Ellipsoid: GRS 1980
 Zone: Colorado Central Zone
 System Datum: Mean Sea Level



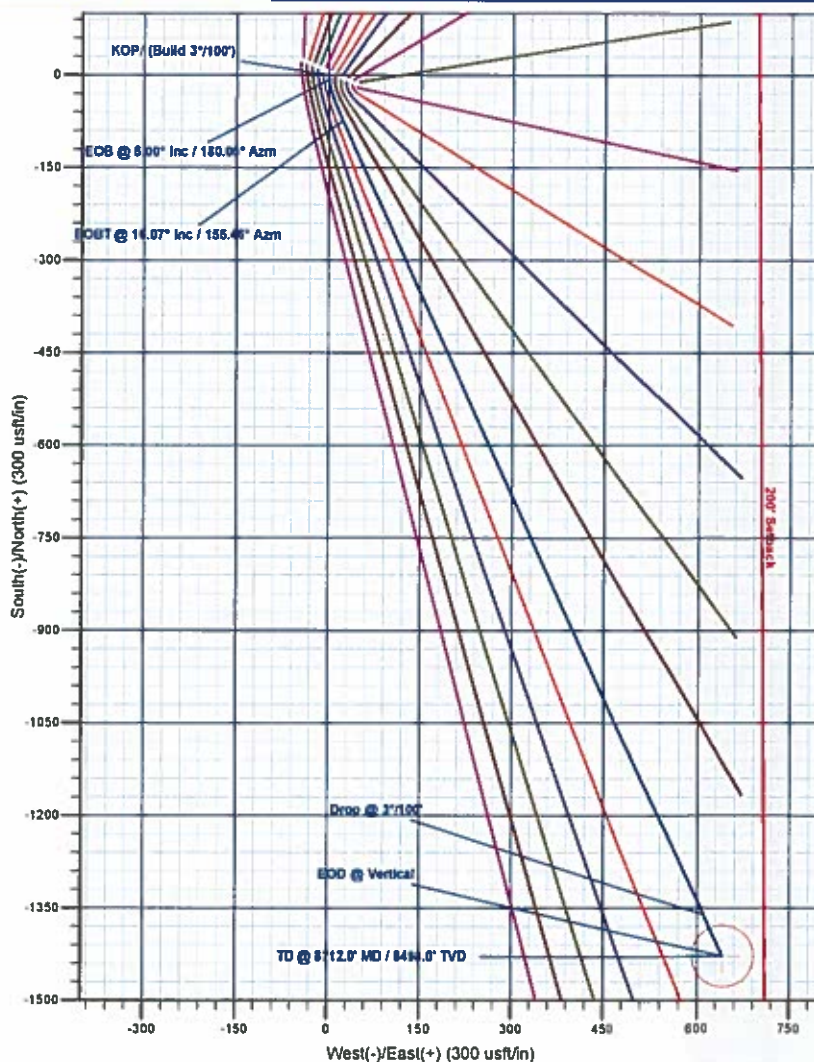
SECTION DETAILS										
MD	Inc	Azi	TVD	+N-S	+E-W	Dleg	TFace	VSec	Annotation	
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	KOP (Build 3°/100')	
450.0	0.00	0.00	450.0	0.0	0.0	0.00	0.00	0.0	EOB @ 5.00° Inc / 180.00° Azm	
616.7	5.00	180.00	616.5	-7.3	0.0	3.00	180.00	6.6	EOBT @ 16.07° Inc / 155.46° Azm	
1006.9	16.07	155.46	999.6	-73.6	22.5	3.00	-34.52	76.4	Drop @ 3°/100'	
6116.2	16.07	155.46	5909.2	-1360.5	609.9	0.00	0.00	1491.0	EOD @ Vertical	
6652.0	0.00	0.00	6438.0	-1428.4	640.9	3.00	180.00	1566.6	TD @ 8712.0' MD / 8438.0' TVD	
8712.0	0.00	0.00	8438.0	-1428.4	640.9	0.00	0.00	1566.6		

DESIGN TARGET DETAILS							
Name	TVD	+N-S	+E-W	Northing	Easting	Latitude	Longitude
PBHL - Hayward 0993-25-16E	8498.0	-1428.4	640.9	1520274.56	2373107.00	39.240911	-107.713643

WELL DETAILS: Hayward 0993-25-16E					
+N-S	+E-W	Northing	Easting	Latitude	Longitude
0.0	0.0	1521716.21	2372501.10	39.244833	-107.715906



REFERENCE INFORMATION	
Co-ordinate (N/E) Reference:	Well Hayward 0993-25-16E, True North
Vertical (TVD) Reference:	well @ 8038.0usft (H&P 522)
Section (V/S) Reference:	Slit - (0.0N, 0.0E)
Measured Depth Reference:	well @ 8038.0usft (H&P 522)
Calculation Method:	Minimum Curvature



Plan: Design #1 (Hayward 0993-25-16E/A-6)

Created By:

Date: 10:37, February 22 2018



Laramie Energy, LLC

Mesa County, CO

Hayward 0993 25-09 Pad

Hayward 0993-25-16E

A-6

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 0993-25-16E
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 0993-25-16E	Survey Calculation Method:	Minimum Curvature
Wellbore:	A-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 0993-25-16E					
Well Position	+N/-S	2 672.6 usft	Northing:	1,521,718.21 usft	Latitude:	39.244833
	+E/-W	-648.3 usft	Easting:	2,372,501.10 usft	Longitude:	-107.715906
Position Uncertainty	0.0 usft	Wellhead Elevation:		Ground Level:	8 008.0 usft	

Wellbore	A-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	155.83

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	
450.0	0.00	0.00	450.0	0.0	0.0	0.00	0.00	0.00	0.00	
616.7	5.00	180.00	616.5	-7.3	0.0	3.00	3.00	0.00	180.00	
1,008.9	16.07	155.46	999.6	-73.6	22.5	3.00	2.84	-6.29	-34.52	
6,116.2	16.07	155.46	5,909.2	-1,360.5	609.9	0.00	0.00	0.00	0.00	
6,652.0	0.00	0.00	6,438.0	-1,428.4	640.9	3.00	-3.00	0.00	180.00	
8,712.0	0.00	0.00	8,498.0	-1,428.4	640.9	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 0993-25-16E
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 0993-25-16E	Survey Calculation Method:	Minimum Curvature
Wellbore:	A-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
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
KOP/ (Build 3°/100')									
450.0	0.00	0.00	450.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	1.50	180.00	500.0	-0.7	0.0	0.6	3.00	3.00	0.00
600.0	4.50	180.00	599.8	-5.9	0.0	5.4	3.00	3.00	0.00
EOB @ 6.00° Inc / 180.00° Azm									
616.7	5.00	180.00	616.5	-7.3	0.0	6.6	3.00	3.00	0.00
700.0	7.20	168.63	699.3	-16.0	1.0	15.0	3.00	2.64	-13.65
800.0	10.03	161.82	798.2	-30.4	5.0	29.8	3.00	2.83	-6.80
900.0	12.93	158.02	898.2	-49.1	11.9	49.7	3.00	2.90	-3.80
EOBT @ 16.07° Inc / 155.46° Azm									
1,008.9	16.07	155.46	999.6	-73.6	22.5	76.4	3.00	2.94	-2.39
1,100.0	16.07	155.46	1,089.1	-87.1	33.2	102.2	0.00	0.00	0.00
1,200.0	16.07	155.46	1,185.2	-122.3	44.7	129.9	0.00	0.00	0.00
1,300.0	16.07	155.46	1,281.3	-147.5	56.2	157.6	0.00	0.00	0.00
1,400.0	16.07	155.46	1,377.4	-172.7	67.7	185.2	0.00	0.00	0.00
1,500.0	16.07	155.46	1,473.5	-197.8	79.2	212.9	0.00	0.00	0.00
8 5/8"									
1,530.0	16.07	155.46	1,502.3	-205.4	82.7	221.2	0.00	0.00	0.00
1,600.0	16.07	155.46	1,569.6	-223.0	90.7	240.6	0.00	0.00	0.00
1,700.0	16.07	155.46	1,665.7	-248.2	102.2	268.3	0.00	0.00	0.00
1,800.0	16.07	155.46	1,761.7	-273.4	113.7	296.0	0.00	0.00	0.00
1,900.0	16.07	155.46	1,857.8	-298.6	125.2	323.7	0.00	0.00	0.00
2,000.0	16.07	155.46	1,953.9	-323.8	136.7	351.4	0.00	0.00	0.00
2,100.0	16.07	155.46	2,050.0	-349.0	148.2	379.1	0.00	0.00	0.00
2,200.0	16.07	155.46	2,146.1	-374.2	159.7	406.7	0.00	0.00	0.00
2,300.0	16.07	155.46	2,242.2	-399.3	171.2	434.4	0.00	0.00	0.00
2,400.0	16.07	155.46	2,338.3	-424.5	182.7	462.1	0.00	0.00	0.00
2,500.0	16.07	155.46	2,434.4	-449.7	194.2	489.8	0.00	0.00	0.00
2,600.0	16.07	155.46	2,530.5	-474.9	205.7	517.5	0.00	0.00	0.00
2,700.0	16.07	155.46	2,626.6	-500.1	217.2	545.2	0.00	0.00	0.00
2,800.0	16.07	155.46	2,722.7	-525.3	228.7	572.9	0.00	0.00	0.00
2,900.0	16.07	155.46	2,818.7	-550.5	240.2	600.5	0.00	0.00	0.00
3,000.0	16.07	155.46	2,914.8	-575.6	251.7	628.2	0.00	0.00	0.00
3,100.0	16.07	155.46	3,010.9	-600.8	263.2	655.9	0.00	0.00	0.00
3,200.0	16.07	155.46	3,107.0	-626.0	274.7	683.6	0.00	0.00	0.00
3,300.0	16.07	155.46	3,203.1	-651.2	286.2	711.3	0.00	0.00	0.00
G' Sand									
3,346.7	16.07	155.46	3,248.0	-663.0	291.5	724.2	0.00	0.00	0.00
3,400.0	16.07	155.46	3,299.2	-676.4	297.6	739.0	0.00	0.00	0.00
3,500.0	16.07	155.46	3,395.3	-701.6	309.1	766.7	0.00	0.00	0.00
3,600.0	16.07	155.46	3,491.4	-726.8	320.6	794.3	0.00	0.00	0.00
3,700.0	16.07	155.46	3,587.5	-752.0	332.1	822.0	0.00	0.00	0.00
3,800.0	16.07	155.46	3,683.6	-777.1	343.6	849.7	0.00	0.00	0.00
3,900.0	16.07	155.46	3,779.7	-802.3	355.1	877.4	0.00	0.00	0.00
4,000.0	16.07	155.46	3,875.7	-827.5	366.6	905.1	0.00	0.00	0.00
4,100.0	16.07	155.46	3,971.8	-852.7	378.1	932.8	0.00	0.00	0.00
4,200.0	16.07	155.46	4,067.9	-877.9	389.6	960.5	0.00	0.00	0.00
4,300.0	16.07	155.46	4,164.0	-903.1	401.1	988.1	0.00	0.00	0.00
4,400.0	16.07	155.46	4,260.1	-928.3	412.6	1,015.8	0.00	0.00	0.00



Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Hayward 0993-25-16E
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 0993-25-16E	Survey Calculation Method:	Minimum Curvature
Wellbore:	A-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)
4,500.0	16.07	155.46	4,356.2	-953.5	424.1	1,043.5	0.00	0.00	0.00
4,600.0	16.07	155.46	4,452.3	-978.6	435.6	1,071.2	0.00	0.00	0.00
4,700.0	16.07	155.46	4,548.4	-1,003.8	447.1	1,098.9	0.00	0.00	0.00
4,800.0	16.07	155.46	4,644.5	-1,029.0	458.6	1,126.6	0.00	0.00	0.00
4,900.0	16.07	155.46	4,740.6	-1,054.2	470.1	1,154.3	0.00	0.00	0.00
5,000.0	16.07	155.46	4,836.7	-1,079.4	481.6	1,181.9	0.00	0.00	0.00
5,100.0	16.07	155.46	4,932.7	-1,104.6	493.1	1,209.6	0.00	0.00	0.00
5,200.0	16.07	155.46	5,028.8	-1,129.8	504.6	1,237.3	0.00	0.00	0.00
5,300.0	16.07	155.46	5,124.9	-1,154.9	516.1	1,265.0	0.00	0.00	0.00
Ohio Creek									
5,376.0	16.07	155.46	5,198.0	-1,174.1	524.8	1,286.1	0.00	0.00	0.00
5,400.0	16.07	155.46	5,221.0	-1,180.1	527.6	1,292.7	0.00	0.00	0.00
5,500.0	16.07	155.46	5,317.1	-1,205.3	539.1	1,320.4	0.00	0.00	0.00
Williams Fork									
5,553.0	16.07	155.46	5,368.0	-1,218.7	545.2	1,335.0	0.00	0.00	0.00
5,600.0	16.07	155.46	5,413.2	-1,230.5	550.6	1,348.1	0.00	0.00	0.00
5,700.0	16.07	155.46	5,509.3	-1,255.7	562.1	1,375.8	0.00	0.00	0.00
5,800.0	16.07	155.46	5,605.4	-1,280.9	573.6	1,403.4	0.00	0.00	0.00
5,900.0	16.07	155.46	5,701.5	-1,306.1	585.1	1,431.1	0.00	0.00	0.00
6,000.0	16.07	155.46	5,797.6	-1,331.3	596.6	1,458.8	0.00	0.00	0.00
6,100.0	16.07	155.46	5,893.7	-1,356.4	608.1	1,486.5	0.00	0.00	0.00
Drop @ 3°/100'									
6,116.2	16.07	155.46	5,909.2	-1,360.5	609.9	1,491.0	0.00	0.00	0.00
6,200.0	13.56	155.46	5,990.2	-1,380.0	618.8	1,512.4	3.00	-3.00	0.00
6,300.0	10.56	155.46	6,088.0	-1,399.0	627.5	1,533.3	3.00	-3.00	0.00
6,400.0	7.56	155.46	6,186.7	-1,413.3	634.0	1,549.0	3.00	-3.00	0.00
6,500.0	4.56	155.46	6,286.2	-1,422.9	638.4	1,559.6	3.00	-3.00	0.00
6,600.0	1.56	155.46	6,386.0	-1,427.8	640.6	1,564.9	3.00	-3.00	0.00
EOD @ Vertical - TOG									
6,652.0	0.00	0.00	6,438.0	-1,428.4	640.9	1,565.6	3.00	-3.00	0.00
6,700.0	0.00	0.00	6,486.0	-1,428.4	640.9	1,565.6	0.00	0.00	0.00
6,800.0	0.00	0.00	6,586.0	-1,428.4	640.9	1,565.6	0.00	0.00	0.00
6,900.0	0.00	0.00	6,686.0	-1,428.4	640.9	1,565.6	0.00	0.00	0.00
7,000.0	0.00	0.00	6,786.0	-1,428.4	640.9	1,565.6	0.00	0.00	0.00
7,100.0	0.00	0.00	6,886.0	-1,428.4	640.9	1,565.6	0.00	0.00	0.00
7,200.0	0.00	0.00	6,986.0	-1,428.4	640.9	1,565.6	0.00	0.00	0.00
7,300.0	0.00	0.00	7,086.0	-1,428.4	640.9	1,565.6	0.00	0.00	0.00
7,400.0	0.00	0.00	7,186.0	-1,428.4	640.9	1,565.6	0.00	0.00	0.00
7,500.0	0.00	0.00	7,286.0	-1,428.4	640.9	1,565.6	0.00	0.00	0.00
7,600.0	0.00	0.00	7,386.0	-1,428.4	640.9	1,565.6	0.00	0.00	0.00
7,700.0	0.00	0.00	7,486.0	-1,428.4	640.9	1,565.6	0.00	0.00	0.00
Cameo									
7,754.0	0.00	0.00	7,540.0	-1,428.4	640.9	1,565.6	0.00	0.00	0.00
7,800.0	0.00	0.00	7,586.0	-1,428.4	640.9	1,565.6	0.00	0.00	0.00
7,900.0	0.00	0.00	7,686.0	-1,428.4	640.9	1,565.6	0.00	0.00	0.00
8,000.0	0.00	0.00	7,786.0	-1,428.4	640.9	1,565.6	0.00	0.00	0.00
8,100.0	0.00	0.00	7,886.0	-1,428.4	640.9	1,565.6	0.00	0.00	0.00
8,200.0	0.00	0.00	7,986.0	-1,428.4	640.9	1,565.6	0.00	0.00	0.00
8,300.0	0.00	0.00	8,086.0	-1,428.4	640.9	1,565.6	0.00	0.00	0.00
8,400.0	0.00	0.00	8,186.0	-1,428.4	640.9	1,565.6	0.00	0.00	0.00
Base Cameo Coal									
8,412.0	0.00	0.00	8,198.0	-1,428.4	640.9	1,565.6	0.00	0.00	0.00
Rollins									



Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Hayward 0993-25-16E
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 0993-25-16E	Survey Calculation Method:	Minimum Curvature
Wellbore:	A-6		
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)
8 462.0	0.00	0.00	8 248.0	-1,428.4	640.9	1 565.6	0.00	0.00	0.00
8 500.0	0.00	0.00	8 286.0	-1,428.4	640.9	1 565.6	0.00	0.00	0.00
8 600.0	0.00	0.00	8 386.0	-1,428.4	640.9	1 565.6	0.00	0.00	0.00
8 700.0	0.00	0.00	8 486.0	-1,428.4	640.9	1 565.6	0.00	0.00	0.00
TD @ 8712.0' MD / 8498.0' TVD									
8 712.0	0.00	0.00	8 498.0	-1,428.4	640.9	1 565.6	0.00	0.00	0.00

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
PBHL - Hayward 0993-2 - plan hits target center - Circle (radius 50.0)	0.00	0.00	8 498.0	-1,428.4	640.9	1 520 274.56	2 373 107.01	39 240911	-107.713643

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,530.0	1,502.3	8 5/8"	8-5/8	11

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
3 346.7	3 248.0	G ⁺ Sand			
5 376.0	5 198.0	Ohio Creek			
5 553.0	5 368.0	Williams Fork			
6 652.0	6 438.0	TOG			
7 754.0	7 540.0	Cameo			
8 412.0	8 198.0	Base Cameo Coal			
8 462.0	8 248.0	Rollins			

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
450.0	450.0	0.0	0.0	KOP/ (Build 3"/100')
616.7	616.5	-7.3	0.0	EOB @ 5.00° Inc / 180.00° Azm
1 006.9	999.6	-73.6	22.5	EOBT @ 16.07° Inc / 155.46° Azm
6 116.2	5 909.2	-1 360.5	609.9	Drop @ 3"/100'
6 652.0	6 438.0	-1 428.4	640.9	EOD @ Vertical
8 712.0	8 498.0	-1 428.4	640.9	TD @ 8712.0' MD / 8498.0' TVD