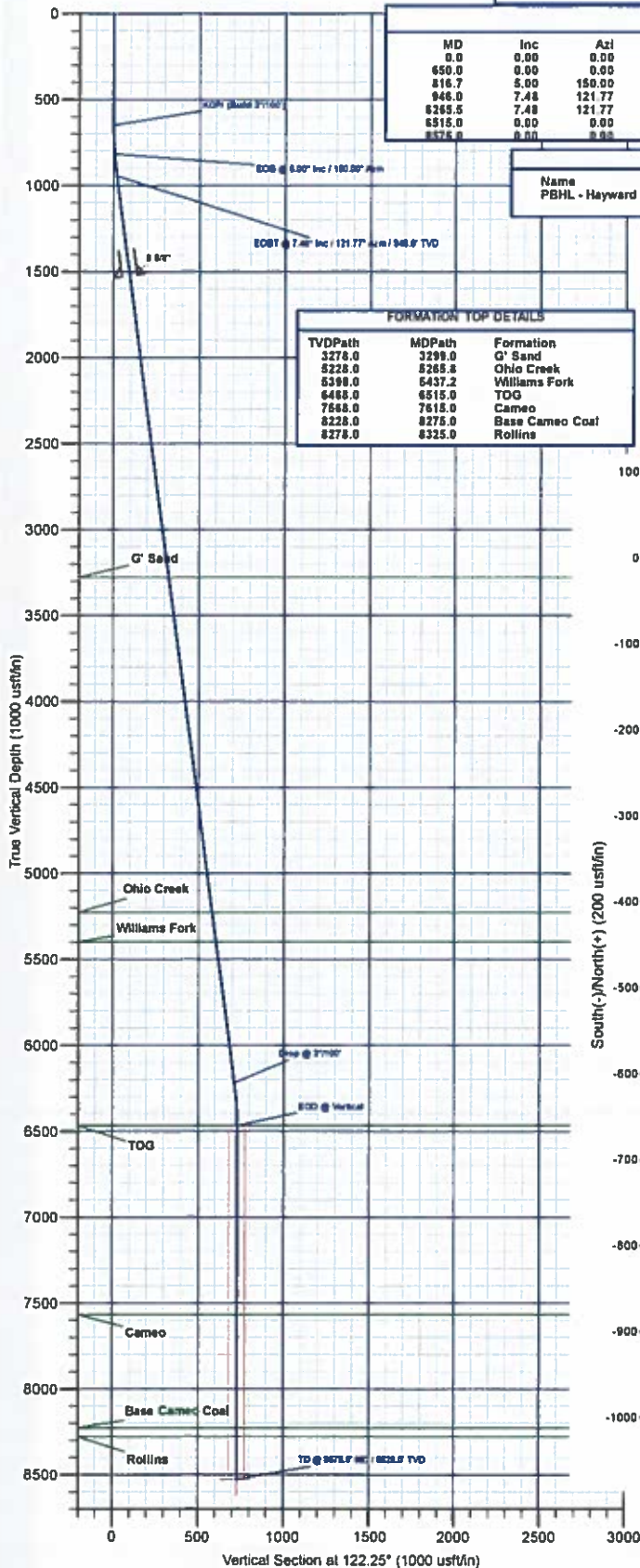




Project: Mesa County, CO
Site: Hayward 0993 25-09 Pad
Well: Hayward 0993-25-12E
Wellbore: A-2
Design: Design #1
Latitude: 39.244788
Longitude: -107.715777
Ground Level: 8008.0
well @ 8038.0usft (H&P 522)

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°)
650.0	0.00	0.00	650.0	0.0	0.0	0.00	0.00	0.0	EOB @ 5.00° Inc / 150.00° Azm
816.7	5.00	150.00	816.5	-4.3	3.6	3.00	150.00	5.4	EOB @ 7.48° Inc / 121.77° Azm / 945.0° TVD
946.0	7.48	121.77	945.0	-15.6	13.6	3.00	-65.63	18.6	Drop @ 3°/100°
8265.5	7.48	121.77	8219.2	-380.4	602.7	0.00	0.00	712.7	EOD @ Vertical
8316.0	0.00	0.00	8468.0	-389.0	616.6	3.00	180.00	729.0	TD @ 8575.0' MD / 8528.0' TVD
8575.0	0.00	0.00	8528.0	-389.0	616.6	0.00	0.00	729.0	

DESIGN TARGET DETAILS

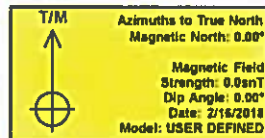
Name	TVD	+N-S	+E-W	Northing	Easting	Latitude	Longitude
PBHL - Hayward 0993-25-12E	8528.0	-389.0	616.6	1821297.04	2373144.11	39.243720	-107.713600

WELL DETAILS: Hayward 0993-25-12E

+N-S	+E-W	Northing	Easting	Latitude	Longitude
0.0	0.0	1821700.93	2372537.22	39.244788	-107.715777

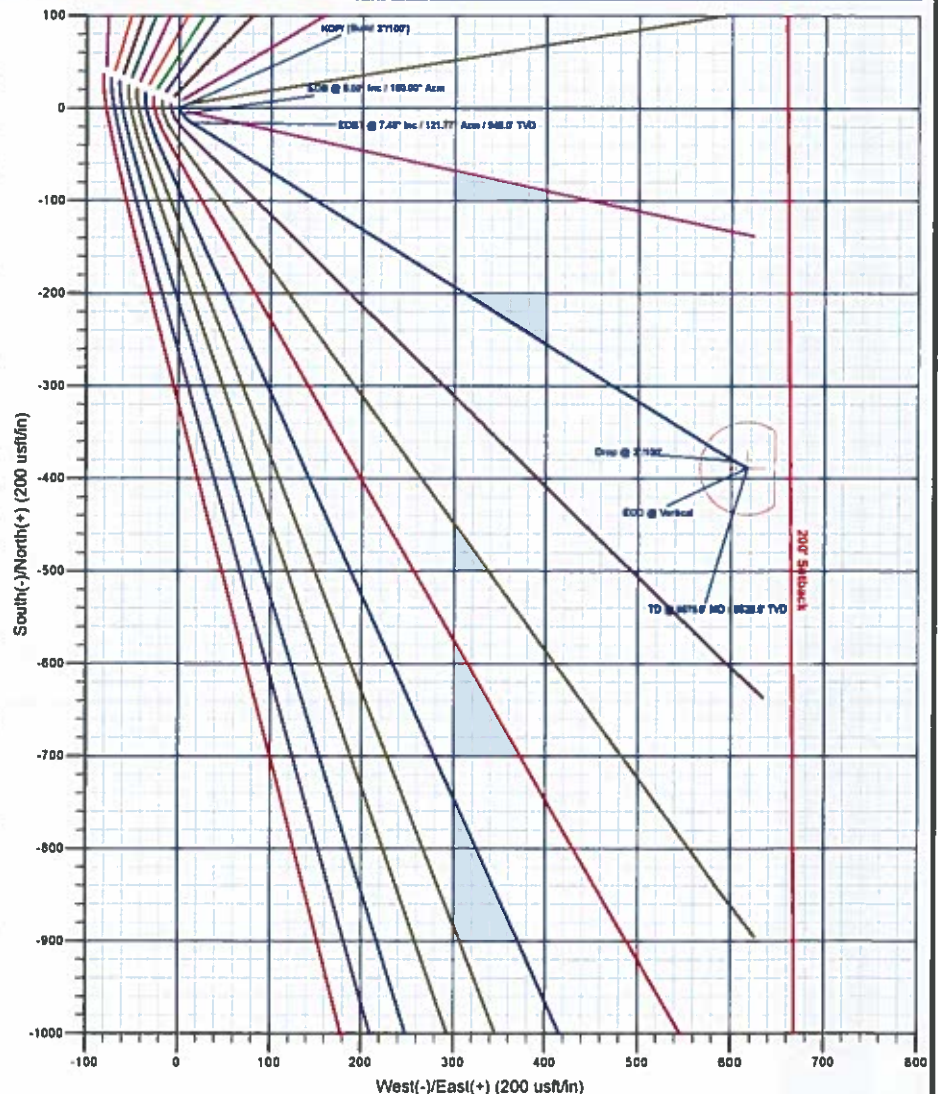
FORMATION TOP DETAILS

TVDPth	MDPth	Formation
3278.0	3299.0	G' Sand
5228.0	5268.0	Ohio Creek
5398.0	5437.2	Williams Fork
6468.0	6515.0	TOG
7668.0	7615.0	Cameo
8228.0	8275.0	Base Cameo Coal
8278.0	8325.0	Rollins



REFERENCE INFORMATION

Co-ordinate (NE) Reference: Well Hayward 0993-25-12E, 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 0993-25-12E/A-2)

Created By:

Date: 10:18, February 22 2018



Laramie Energy, LLC

Mesa County, CO

Hayward 0993 25-09 Pad

Hayward 0993-25-12E

A-2

Plan: Design #1

QES Well Planning Report

22 February, 2018





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 0993-25-12E
Wellbore: A-2
Design: Design #1

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

Well Hayward 0993-25-12E
 well @ 8038 0usft (H&P 522)
 well @ 8038 0usft (H&P 522)
 True
 Minimum Curvature

Project Mesa County, CO

Map System: US State Plane 1983
Geo Datum: North American Datum 1983
Map Zone: Colorado Central Zone
System Datum: Mean Sea Level

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 0993-25-12E

Well Position +N/-S 2,656.2 usft Northing: 1,521,700.94 usft Latitude: 39 244788
 +E/-W -611.7 usft Easting: 2,372,537.23 usft Longitude: -107.715777
Position Uncertainty 0.0 usft Wellhead Elevation: Ground Level: 8,008.0 usft

Wellbore A-2

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	122.25

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	
650.0	0.00	0.00	650.0	0.0	0.0	0.00	0.00	0.00	0.00	
816.7	5.00	150.00	816.5	-6.3	3.6	3.00	3.00	0.00	150.00	
946.0	7.48	121.77	945.0	-15.6	13.6	3.00	1.92	-21.84	-65.63	
6,265.5	7.48	121.77	6,219.2	-380.4	602.7	0.00	0.00	0.00	0.00	
6,515.0	0.00	0.00	6,468.0	-389.0	616.6	3.00	-3.00	0.00	180.00	
8,575.0	0.00	0.00	8,528.0	-389.0	616.6	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 0993-25-12E
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 0993-25-12E	Survey Calculation Method:	Minimum Curvature
Wellbore:	A-2		
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
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
KOP/ (Build 3°/100')									
650.0	0.00	0.00	650.0	0.0	0.0	0.0	0.00	0.00	0.00
700.0	1.50	150.00	700.0	-0.6	0.3	0.6	3.00	3.00	0.00
800.0	4.50	150.00	799.8	-5.1	2.9	5.2	3.00	3.00	0.00
EOB @ 5.00° Inc / 150.00° Azm									
816.7	5.00	150.00	816.5	-6.3	3.6	6.4	3.00	3.00	0.00
900.0	6.45	129.27	899.4	-12.4	9.1	14.3	3.00	1.74	-24.87
EOBT @ 7.48° Inc / 121.77° Azm / 945.0' TVD									
946.0	7.48	121.77	945.0	-15.6	13.6	19.8	3.00	2.26	-16.33
1,000.0	7.48	121.77	998.6	-19.3	19.6	26.9	0.00	0.00	0.00
1,100.0	7.48	121.77	1,097.7	-26.2	30.7	39.9	0.00	0.00	0.00
1,200.0	7.48	121.77	1,196.9	-33.0	41.7	52.9	0.00	0.00	0.00
1,300.0	7.48	121.77	1,296.0	-39.9	52.8	66.0	0.00	0.00	0.00
1,400.0	7.48	121.77	1,395.2	-46.7	63.9	79.0	0.00	0.00	0.00
1,500.0	7.48	121.77	1,494.3	-53.6	75.0	92.0	0.00	0.00	0.00
8 5/8"									
1,530.0	7.48	121.77	1,524.1	-55.7	78.3	95.9	0.00	0.00	0.00
1,600.0	7.48	121.77	1,593.5	-60.5	86.0	105.0	0.00	0.00	0.00
1,700.0	7.48	121.77	1,692.6	-67.3	97.1	118.1	0.00	0.00	0.00
1,800.0	7.48	121.77	1,791.8	-74.2	108.2	131.1	0.00	0.00	0.00
1,900.0	7.48	121.77	1,890.9	-81.0	119.3	144.1	0.00	0.00	0.00
2,000.0	7.48	121.77	1,990.1	-87.9	130.3	157.1	0.00	0.00	0.00
2,100.0	7.48	121.77	2,089.2	-94.7	141.4	170.2	0.00	0.00	0.00
2,200.0	7.48	121.77	2,188.4	-101.6	152.5	183.2	0.00	0.00	0.00
2,300.0	7.48	121.77	2,287.5	-108.5	163.6	196.2	0.00	0.00	0.00
2,400.0	7.48	121.77	2,386.7	-115.3	174.6	209.2	0.00	0.00	0.00
2,500.0	7.48	121.77	2,485.8	-122.2	185.7	222.3	0.00	0.00	0.00
2,600.0	7.48	121.77	2,584.9	-129.0	196.8	235.3	0.00	0.00	0.00
2,700.0	7.48	121.77	2,684.1	-135.9	207.9	248.3	0.00	0.00	0.00
2,800.0	7.48	121.77	2,783.2	-142.8	218.9	261.3	0.00	0.00	0.00
2,900.0	7.48	121.77	2,882.4	-149.6	230.0	274.4	0.00	0.00	0.00
3,000.0	7.48	121.77	2,981.5	-156.5	241.1	287.4	0.00	0.00	0.00
3,100.0	7.48	121.77	3,080.7	-163.3	252.2	300.4	0.00	0.00	0.00
3,200.0	7.48	121.77	3,179.8	-170.2	263.2	313.4	0.00	0.00	0.00
G' Sand									
3,299.0	7.48	121.77	3,278.0	-177.0	274.2	326.3	0.00	0.00	0.00
3,300.0	7.48	121.77	3,279.0	-177.0	274.3	326.5	0.00	0.00	0.00
3,400.0	7.48	121.77	3,378.1	-183.9	285.4	339.5	0.00	0.00	0.00
3,500.0	7.48	121.77	3,477.3	-190.8	296.5	352.5	0.00	0.00	0.00
3,600.0	7.48	121.77	3,576.4	-197.6	307.5	365.5	0.00	0.00	0.00
3,700.0	7.48	121.77	3,675.6	-204.5	318.6	378.6	0.00	0.00	0.00
3,800.0	7.48	121.77	3,774.7	-211.3	329.7	391.6	0.00	0.00	0.00
3,900.0	7.48	121.77	3,873.9	-218.2	340.8	404.6	0.00	0.00	0.00
4,000.0	7.48	121.77	3,973.0	-225.0	351.8	417.6	0.00	0.00	0.00
4,100.0	7.48	121.77	4,072.2	-231.9	362.9	430.7	0.00	0.00	0.00
4,200.0	7.48	121.77	4,171.3	-238.8	374.0	443.7	0.00	0.00	0.00
4,300.0	7.48	121.77	4,270.5	-245.6	385.1	456.7	0.00	0.00	0.00



Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Hayward 0993-25-12E
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 0993-25-12E	Survey Calculation Method:	Minimum Curvature
Wellbore:	A-2		
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)
4,400.0	7.48	121.77	4,369.6	-252.5	396.1	469.7	0.00	0.00	0.00
4,500.0	7.48	121.77	4,468.8	-259.3	407.2	482.8	0.00	0.00	0.00
4,600.0	7.48	121.77	4,567.9	-266.2	418.3	495.8	0.00	0.00	0.00
4,700.0	7.48	121.77	4,667.1	-273.0	429.3	508.8	0.00	0.00	0.00
4,800.0	7.48	121.77	4,766.2	-279.9	440.4	521.8	0.00	0.00	0.00
4,900.0	7.48	121.77	4,865.4	-286.8	451.5	534.9	0.00	0.00	0.00
5,000.0	7.48	121.77	4,964.5	-293.6	462.6	547.9	0.00	0.00	0.00
5,100.0	7.48	121.77	5,063.6	-300.5	473.6	560.9	0.00	0.00	0.00
5,200.0	7.48	121.77	5,162.8	-307.3	484.7	573.9	0.00	0.00	0.00
Ohio Creek									
5,265.8	7.48	121.77	5,228.0	-311.8	492.0	582.5	0.00	0.00	0.00
5,300.0	7.48	121.77	5,261.9	-314.2	495.8	587.0	0.00	0.00	0.00
5,400.0	7.48	121.77	5,361.1	-321.0	506.9	600.0	0.00	0.00	0.00
Williams Fork									
5,437.2	7.48	121.77	5,398.0	-323.6	511.0	604.8	0.00	0.00	0.00
5,500.0	7.48	121.77	5,460.2	-327.9	517.9	613.0	0.00	0.00	0.00
5,600.0	7.48	121.77	5,559.4	-334.8	529.0	626.0	0.00	0.00	0.00
5,700.0	7.48	121.77	5,658.5	-341.6	540.1	639.1	0.00	0.00	0.00
5,800.0	7.48	121.77	5,757.7	-348.5	551.2	652.1	0.00	0.00	0.00
5,900.0	7.48	121.77	5,856.8	-355.3	562.2	665.1	0.00	0.00	0.00
6,000.0	7.48	121.77	5,956.0	-362.2	573.3	678.1	0.00	0.00	0.00
6,100.0	7.48	121.77	6,055.1	-369.1	584.4	691.2	0.00	0.00	0.00
6,200.0	7.48	121.77	6,154.3	-375.9	595.5	704.2	0.00	0.00	0.00
Drop @ 3°/100'									
6,265.5	7.48	121.77	6,219.2	-380.4	602.7	712.7	0.00	0.00	0.00
6,300.0	6.45	121.77	6,253.5	-382.6	606.3	716.9	3.00	-3.00	0.00
6,400.0	3.45	121.77	6,353.1	-387.1	613.6	725.5	3.00	-3.00	0.00
6,500.0	0.45	121.77	6,453.0	-388.9	616.5	728.9	3.00	-3.00	0.00
EOD @ Vertical - TOG									
6,515.0	0.00	0.00	6,468.0	-389.0	616.6	729.0	3.00	-3.00	-812.40
6,600.0	0.00	0.00	6,553.0	-389.0	616.6	729.0	0.00	0.00	0.00
6,700.0	0.00	0.00	6,653.0	-389.0	616.6	729.0	0.00	0.00	0.00
6,800.0	0.00	0.00	6,753.0	-389.0	616.6	729.0	0.00	0.00	0.00
6,900.0	0.00	0.00	6,853.0	-389.0	616.6	729.0	0.00	0.00	0.00
7,000.0	0.00	0.00	6,953.0	-389.0	616.6	729.0	0.00	0.00	0.00
7,100.0	0.00	0.00	7,053.0	-389.0	616.6	729.0	0.00	0.00	0.00
7,200.0	0.00	0.00	7,153.0	-389.0	616.6	729.0	0.00	0.00	0.00
7,300.0	0.00	0.00	7,253.0	-389.0	616.6	729.0	0.00	0.00	0.00
7,400.0	0.00	0.00	7,353.0	-389.0	616.6	729.0	0.00	0.00	0.00
7,500.0	0.00	0.00	7,453.0	-389.0	616.6	729.0	0.00	0.00	0.00
7,600.0	0.00	0.00	7,553.0	-389.0	616.6	729.0	0.00	0.00	0.00
Cameo									
7,615.0	0.00	0.00	7,568.0	-389.0	616.6	729.0	0.00	0.00	0.00
7,700.0	0.00	0.00	7,653.0	-389.0	616.6	729.0	0.00	0.00	0.00
7,800.0	0.00	0.00	7,753.0	-389.0	616.6	729.0	0.00	0.00	0.00
7,900.0	0.00	0.00	7,853.0	-389.0	616.6	729.0	0.00	0.00	0.00
8,000.0	0.00	0.00	7,953.0	-389.0	616.6	729.0	0.00	0.00	0.00
8,100.0	0.00	0.00	8,053.0	-389.0	616.6	729.0	0.00	0.00	0.00
8,200.0	0.00	0.00	8,153.0	-389.0	616.6	729.0	0.00	0.00	0.00
Base Cameo Coal									
8,275.0	0.00	0.00	8,228.0	-389.0	616.6	729.0	0.00	0.00	0.00
8,300.0	0.00	0.00	8,253.0	-389.0	616.6	729.0	0.00	0.00	0.00
Rollins									



Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Hayward 0993-25-12E
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 0993-25-12E	Survey Calculation Method:	Minimum Curvature
Wellbore:	A-2		
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)
8,325.0	0.00	0.00	8,278.0	-389.0	616.6	729.0	0.00	0.00	0.00
8,400.0	0.00	0.00	8,353.0	-389.0	616.6	729.0	0.00	0.00	0.00
8,500.0	0.00	0.00	8,453.0	-389.0	616.6	729.0	0.00	0.00	0.00
TD @ 8575.0' MD / 8528.0' TVD									
8,575.0	0.00	0.00	8,528.0	-389.0	616.6	729.0	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	8,528.0	-389.0	616.6	1,521,297.05	2,373,144.11	39.243720	-107.713600
- plan hits target center									
- Circle (radius 50.0)									

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,530.0	1,524.1	8 5/8"	8-5/8	11

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
3,299.0	3,278.0	G ⁺ Sand			
5,285.8	5,228.0	Ohio Creek			
5,437.2	5,398.0	Williams Fork			
6,515.0	6,468.0	TOG			
7,615.0	7,568.0	Cameo			
8,275.0	8,228.0	Base Cameo Coal			
8,325.0	8,278.0	Rollins			

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
650.0	650.0	0.0	0.0	KOP/ (Build 3"/100')
816.7	816.5	-6.3	3.6	EOB @ 5.00° Inc / 150.00° Azm
946.0	945.0	-15.6	13.6	EOBT @ 7.48° Inc / 121.77° Azm / 945.0' TVD
6,265.5	6,219.2	-380.4	602.7	Drop @ 3"/100'
6,515.0	6,468.0	-389.0	616.6	EOD @ Vertical
8,575.0	8,528.0	-389.0	616.6	TD @ 8575.0' MD / 8528.0' TVD