

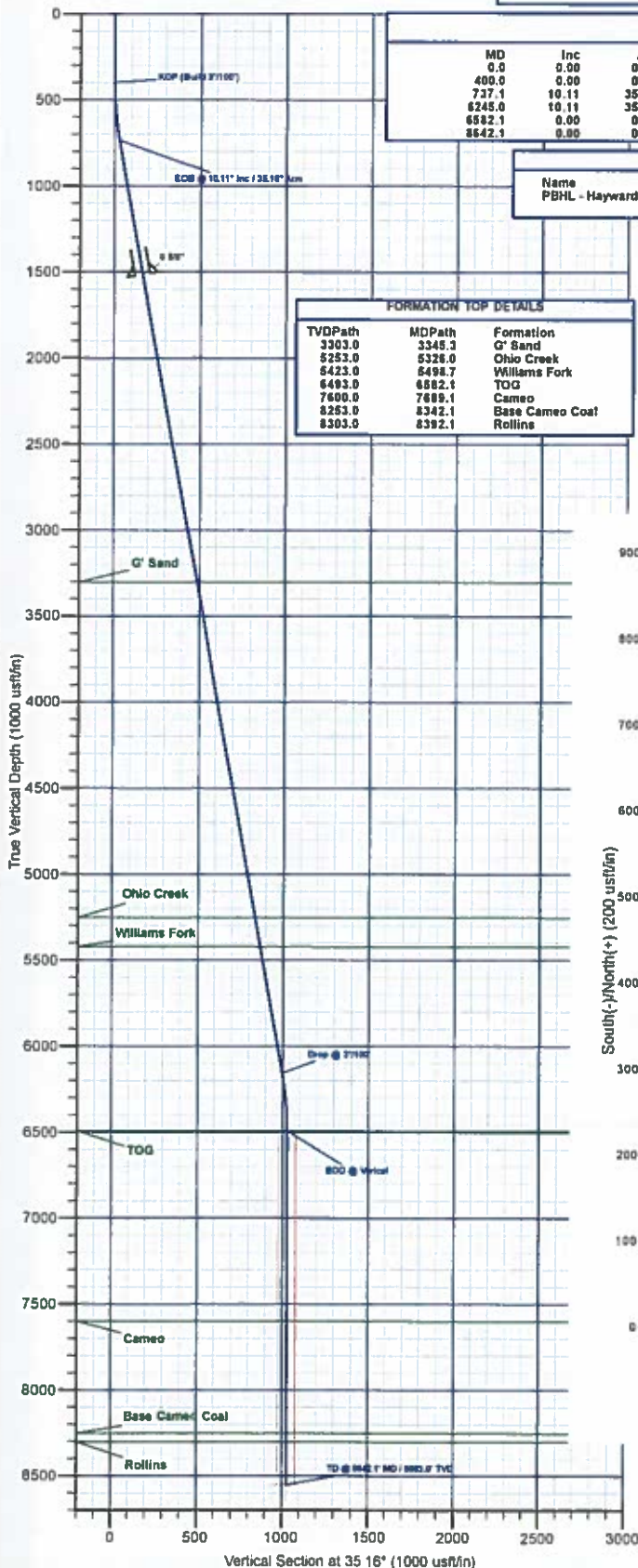


Project: Mesa County, CO
 Site: Hayward 0993 25-09 Pad
 Well: Hayward 0993-25-07E
 Wellbore: B-4
 Design: Design #1
 Latitude: 39.244836
 Longitude: -107.715827
 Ground Level: 8008.0
 well @ 8038.0ust (H&P 522)



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')
400.0	0.00	0.00	400.0	0.0	0.0	0.00	0.00	0.0	EOB @ 10.11° Inc / 35.16° Azm
737.1	10.11	35.16	735.3	24.3	17.1	3.00	35.16	29.7	Drop @ 3°/100'
8245.0	10.11	35.16	8167.7	814.9	574.0	0.00	0.00	996.7	EOO @ Vertical
8582.1	0.00	0.00	8493.0	839.2	691.0	3.00	180.00	1026.4	TD @ 8542.1' MD / 8553.0' TVD
8642.1	0.00	0.00	8553.0	839.2	691.0	0.00	0.00	1026.4	

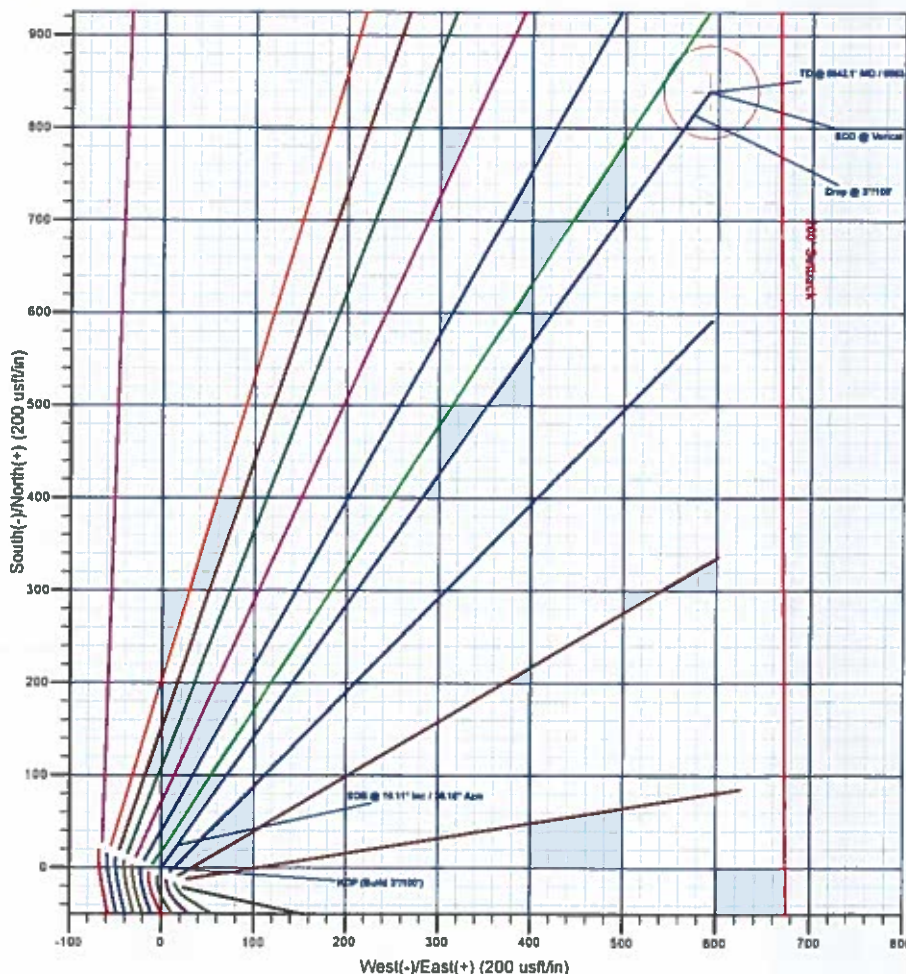
DESIGN TARGET DETAILS						
Name	TVD	+N-S	+E-W	Northing	Easting	Latitude
PBHL - Hayward 0993-25-07E	8553.0	839.2	591.0	1522543.26	2373134.82	39.247140

WELL DETAILS: Hayward 0993-25-07E					
+N-S	+E-W	Northing	Easting	Latitude	Longitude
0.0	0.0	1521719.75	2372523.49	39.244836	-107.715827

FORMATION TOP DETAILS		
TVDPath	MDPath	Formation
3303.0	3345.3	G' Sand
5253.0	5326.0	Ohio Creek
5423.0	5498.7	Williams Fork
6493.0	6582.1	TOG
7600.0	7689.1	Cameo
8253.0	8342.1	Base Cameo Coal
8303.0	8392.1	Rollins



REFERENCE INFORMATION	
Co-ordinate (N/E) Reference:	Well Hayward 0993-25-07E, True North
Vertical (TVD) Reference:	well @ 8038.0ust (H&P 522)
Section (VS) Reference:	Slot - (0.0N, 0.0E)
Measured Depth Reference:	well @ 8038.0ust (H&P 522)
Calculation Method:	Minimum Curvature



Plan: Design #1 (Hayward 0993-25-07E/B-4)

Created By:

Date: 8:59, February 22 2018



Laramie Energy, LLC

Mesa County, CO

Hayward 0993 25-09 Pad

Hayward 0993-25-07E

B-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 0993-25-07E
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 0993-25-07E	Survey Calculation Method:	Minimum Curvature
Wellbore:	B-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	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 0993-25-07E					
Well Position	+N/-S	2,673.7 usft	Northing:	1,521,718.76 usft	Latitude:	39.244836
	+E/-W	-625.9 usft	Easting:	2,372,523.50 usft	Longitude:	-107.715827
Position Uncertainty		0.0 usft	Wellhead Elevation:		Ground Level:	8,008.0 usft

Wellbore	B-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) (usft)	+N-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	35.16

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	
400.0	0.00	0.00	400.0	0.0	0.0	0.00	0.00	0.00	0.00	
737.1	10.11	35.16	735.3	24.3	17.1	3.00	3.00	0.00	35.16	
6,245.0	10.11	35.16	6,157.7	814.9	574.0	0.00	0.00	0.00	0.00	
6,582.1	0.00	0.00	6,493.0	839.2	591.0	3.00	-3.00	0.00	180.00	
8,642.1	0.00	0.00	8,553.0	839.2	591.0	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 0993-25-07E
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 0993-25-07E	Survey Calculation Method:	Minimum Curvature
Wellbore:	B-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
KOP (Build 3°/100')									
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	3.00	35.16	500.0	2.1	1.5	2.6	3.00	3.00	0.00
600.0	6.00	35.16	599.6	8.6	6.0	10.5	3.00	3.00	0.00
700.0	9.00	35.16	698.8	19.2	13.5	23.5	3.00	3.00	0.00
EOB @ 10.11° Inc / 35.16° Azm									
737.1	10.11	35.16	735.3	24.3	17.1	29.7	3.00	3.00	0.00
800.0	10.11	35.16	797.3	33.3	23.4	40.7	0.00	0.00	0.00
900.0	10.11	35.16	895.7	47.6	33.6	58.3	0.00	0.00	0.00
1,000.0	10.11	35.16	994.2	62.0	43.7	75.8	0.00	0.00	0.00
1,100.0	10.11	35.16	1,092.6	76.4	53.8	93.4	0.00	0.00	0.00
1,200.0	10.11	35.16	1,191.1	90.7	63.9	110.9	0.00	0.00	0.00
1,300.0	10.11	35.16	1,289.5	105.1	74.0	128.5	0.00	0.00	0.00
1,400.0	10.11	35.16	1,388.0	119.4	84.1	146.1	0.00	0.00	0.00
1,500.0	10.11	35.16	1,486.4	133.8	94.2	163.6	0.00	0.00	0.00
8 5/8"									
1,530.0	10.11	35.16	1,515.9	138.1	97.3	168.9	0.00	0.00	0.00
1,600.0	10.11	35.16	1,584.8	148.1	104.3	181.2	0.00	0.00	0.00
1,700.0	10.11	35.16	1,683.3	162.5	114.4	198.7	0.00	0.00	0.00
1,800.0	10.11	35.16	1,781.7	176.8	124.5	216.3	0.00	0.00	0.00
1,900.0	10.11	35.16	1,880.2	191.2	134.7	233.9	0.00	0.00	0.00
2,000.0	10.11	35.16	1,978.6	205.5	144.8	251.4	0.00	0.00	0.00
2,100.0	10.11	35.16	2,077.1	219.9	154.9	269.0	0.00	0.00	0.00
2,200.0	10.11	35.16	2,175.5	234.3	165.0	286.5	0.00	0.00	0.00
2,300.0	10.11	35.16	2,274.0	248.6	175.1	304.1	0.00	0.00	0.00
2,400.0	10.11	35.16	2,372.4	263.0	185.2	321.6	0.00	0.00	0.00
2,500.0	10.11	35.16	2,470.9	277.3	195.3	339.2	0.00	0.00	0.00
2,600.0	10.11	35.16	2,569.3	291.7	205.4	356.8	0.00	0.00	0.00
2,700.0	10.11	35.16	2,667.8	306.0	215.5	374.3	0.00	0.00	0.00
2,800.0	10.11	35.16	2,766.2	320.4	225.7	391.9	0.00	0.00	0.00
2,900.0	10.11	35.16	2,864.7	334.7	235.8	409.4	0.00	0.00	0.00
3,000.0	10.11	35.16	2,963.1	349.1	245.9	427.0	0.00	0.00	0.00
3,100.0	10.11	35.16	3,061.5	363.5	256.0	444.6	0.00	0.00	0.00
3,200.0	10.11	35.16	3,160.0	377.8	266.1	462.1	0.00	0.00	0.00
3,300.0	10.11	35.16	3,258.4	392.2	276.2	479.7	0.00	0.00	0.00
G' Sand									
3,345.3	10.11	35.16	3,303.0	398.7	280.8	487.6	0.00	0.00	0.00
3,400.0	10.11	35.16	3,356.9	406.5	286.3	497.2	0.00	0.00	0.00
3,500.0	10.11	35.16	3,455.3	420.9	296.4	514.8	0.00	0.00	0.00
3,600.0	10.11	35.16	3,553.8	435.2	306.5	532.3	0.00	0.00	0.00
3,700.0	10.11	35.16	3,652.2	449.6	316.6	549.9	0.00	0.00	0.00
3,800.0	10.11	35.16	3,750.7	463.9	326.8	567.5	0.00	0.00	0.00
3,900.0	10.11	35.16	3,849.1	478.3	336.9	585.0	0.00	0.00	0.00
4,000.0	10.11	35.16	3,947.6	492.6	347.0	602.6	0.00	0.00	0.00
4,100.0	10.11	35.16	4,046.0	507.0	357.1	620.1	0.00	0.00	0.00
4,200.0	10.11	35.16	4,144.5	521.4	367.2	637.7	0.00	0.00	0.00
4,300.0	10.11	35.16	4,242.9	535.7	377.3	655.2	0.00	0.00	0.00
4,400.0	10.11	35.16	4,341.3	550.1	387.4	672.8	0.00	0.00	0.00
4,500.0	10.11	35.16	4,439.8	564.4	397.5	690.4	0.00	0.00	0.00
4,600.0	10.11	35.16	4,538.2	578.8	407.6	707.9	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 0993-25-07E
 Wellbore: B-4
 Design: Design #1

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

Well Hayward 0993-25-07E
 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)
4,700.0	10.11	35.16	4,636.7	593.1	417.7	725.5	0.00	0.00	0.00
4,800.0	10.11	35.16	4,735.1	607.5	427.9	743.0	0.00	0.00	0.00
4,900.0	10.11	35.16	4,833.6	621.8	438.0	760.6	0.00	0.00	0.00
5,000.0	10.11	35.16	4,932.0	636.2	448.1	778.2	0.00	0.00	0.00
5,100.0	10.11	35.16	5,030.5	650.6	458.2	795.7	0.00	0.00	0.00
5,200.0	10.11	35.16	5,128.9	664.9	468.3	813.3	0.00	0.00	0.00
5,300.0	10.11	35.16	5,227.4	679.3	478.4	830.8	0.00	0.00	0.00
Ohio Creek									
5,326.0	10.11	35.16	5,253.0	683.0	481.0	835.4	0.00	0.00	0.00
5,400.0	10.11	35.16	5,325.8	693.6	488.5	848.4	0.00	0.00	0.00
Williams Fork									
5,498.7	10.11	35.16	5,423.0	707.8	498.5	865.7	0.00	0.00	0.00
5,500.0	10.11	35.16	5,424.3	708.0	498.6	865.9	0.00	0.00	0.00
5,600.0	10.11	35.16	5,522.7	722.3	508.7	883.5	0.00	0.00	0.00
5,700.0	10.11	35.16	5,621.2	736.7	518.9	901.1	0.00	0.00	0.00
5,800.0	10.11	35.16	5,719.6	751.0	529.0	918.6	0.00	0.00	0.00
5,900.0	10.11	35.16	5,818.0	765.4	539.1	936.2	0.00	0.00	0.00
6,000.0	10.11	35.16	5,916.5	779.7	549.2	953.7	0.00	0.00	0.00
6,100.0	10.11	35.16	6,014.9	794.1	559.3	971.3	0.00	0.00	0.00
6,200.0	10.11	35.16	6,113.4	808.5	569.4	988.8	0.00	0.00	0.00
Drop @ 3°/100'									
6,245.0	10.11	35.16	6,157.7	814.9	574.0	996.7	0.00	0.00	0.00
6,300.0	8.46	35.16	6,212.0	822.2	579.1	1,005.6	3.00	-3.00	0.00
6,400.0	5.46	35.16	6,311.2	832.1	586.0	1,017.7	3.00	-3.00	0.00
6,500.0	2.46	35.16	6,411.0	837.7	590.0	1,024.7	3.00	-3.00	0.00
EOD @ Vertical - TOG									
6,582.1	0.00	0.00	6,493.0	839.2	591.0	1,026.4	3.00	-3.00	0.00
6,600.0	0.00	0.00	6,510.9	839.2	591.0	1,026.4	0.00	0.00	0.00
6,700.0	0.00	0.00	6,610.9	839.2	591.0	1,026.4	0.00	0.00	0.00
6,800.0	0.00	0.00	6,710.9	839.2	591.0	1,026.4	0.00	0.00	0.00
6,900.0	0.00	0.00	6,810.9	839.2	591.0	1,026.4	0.00	0.00	0.00
7,000.0	0.00	0.00	6,910.9	839.2	591.0	1,026.4	0.00	0.00	0.00
7,100.0	0.00	0.00	7,010.9	839.2	591.0	1,026.4	0.00	0.00	0.00
7,200.0	0.00	0.00	7,110.9	839.2	591.0	1,026.4	0.00	0.00	0.00
7,300.0	0.00	0.00	7,210.9	839.2	591.0	1,026.4	0.00	0.00	0.00
7,400.0	0.00	0.00	7,310.9	839.2	591.0	1,026.4	0.00	0.00	0.00
7,500.0	0.00	0.00	7,410.9	839.2	591.0	1,026.4	0.00	0.00	0.00
7,600.0	0.00	0.00	7,510.9	839.2	591.0	1,026.4	0.00	0.00	0.00
Cameo									
7,689.1	0.00	0.00	7,600.0	839.2	591.0	1,026.4	0.00	0.00	0.00
7,700.0	0.00	0.00	7,610.9	839.2	591.0	1,026.4	0.00	0.00	0.00
7,800.0	0.00	0.00	7,710.9	839.2	591.0	1,026.4	0.00	0.00	0.00
7,900.0	0.00	0.00	7,810.9	839.2	591.0	1,026.4	0.00	0.00	0.00
8,000.0	0.00	0.00	7,910.9	839.2	591.0	1,026.4	0.00	0.00	0.00
8,100.0	0.00	0.00	8,010.9	839.2	591.0	1,026.4	0.00	0.00	0.00
8,200.0	0.00	0.00	8,110.9	839.2	591.0	1,026.4	0.00	0.00	0.00
8,300.0	0.00	0.00	8,210.9	839.2	591.0	1,026.4	0.00	0.00	0.00
Base Cameo Coal									
8,342.1	0.00	0.00	8,253.0	839.2	591.0	1,026.4	0.00	0.00	0.00
Rollins									
8,392.1	0.00	0.00	8,303.0	839.2	591.0	1,026.4	0.00	0.00	0.00
8,400.0	0.00	0.00	8,310.9	839.2	591.0	1,026.4	0.00	0.00	0.00
8,500.0	0.00	0.00	8,410.9	839.2	591.0	1,026.4	0.00	0.00	0.00



Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Hayward 0993-25-07E
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 0993-25-07E	Survey Calculation Method:	Minimum Curvature
Wellbore:	B-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)
8,600.0	0.00	0.00	8,510.9	839.2	591.0	1,026.4	0.00	0.00	0.00
TD @ 8642.1' MD / 8553.0' TVD									
8,642.1	0.00	0.00	8,553.0	839.2	591.0	1,026.4	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	8,553.0	839.2	591.0	1,522,543.26	2,373,134.82	39 247140	-107.713740
- plan hits target center									
- Circle (radius 50.0)									

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,530.0	1,515.9	8 5/8"	8-5/8	11

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
3,345.3	3,303.0	G' Sand			
5,326.0	5,253.0	Ohio Creek			
5,498.7	5,423.0	Williams Fork			
6,582.1	6,493.0	TOG			
7,689.1	7,600.0	Cameo			
8,342.1	8,253.0	Base Cameo Coal			
8,392.1	8,303.0	Rollins			

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
400.0	400.0	0.0	0.0	KOP (Build 3°/100')
737.1	735.3	24.3	17.1	EOB @ 10.11° Inc / 35.16° Azm
6,245.0	6,157.7	814.9	574.0	Drop @ 3°/100'
6,582.1	6,493.0	839.2	591.0	EOD @ Verical
8,642.1	8,553.0	839.2	591.0	TD @ 8642.1' MD / 8553.0' TVD