



Project: Mesa County, CO
 Site: H Thomas 0993 26-06 Pad
 Well: H. Thomas 0993-23-21E
 Wellbore: A-1
 Design: Design #1
 Latitude: 39.249213
 Longitude: -107.742474
 Ground Level: 7631.0
 well @ 7655.0usft (H&P #290)



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	Diag	TFace	Vsect	Annotation
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
200.0	0.00	0.00	200.0	0.0	0.0	0.00	0.00	0.0	KOP (Build 3" / 100')
1092.3	26.77	36.00	1060.2	165.6	120.3	3.00	36.00	203.0	EOB @ 26.77° Inc. / 36.00° Azm
3092.3	26.77	36.00	2945.9	894.4	649.8	0.00	0.00	1096.6	Turn 3" / 100'
3286.1	26.77	48.93	3019.0	958.4	708.4	3.00	95.81	1183.4	EOT @ 48.93° Azm
6098.7	26.77	48.93	5449.9	1763.9	1632.8	0.00	0.00	2403.6	Drop 3" / 100'
6900.9	0.00	0.00	6316.0	1898.4	1787.1	3.00	180.00	2607.2	EOD @ Vertical
8200.9	0.00	0.00	8210.0	1898.4	1787.1	0.00	0.00	2607.2	TD @ 8200.9' MD / 8210.0' TVD

DESIGN TARGET DETAILS

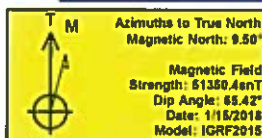
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
PSHL - H. Thomas 0993-23-21E	8210.0	1898.4	1787.1	1525351.29	2366851.87	39.254425	-107.736163

WELL DETAILS: H. Thomas 0993-23-21E

	7631.0						
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude		
0.0	0.0	1523497.60	2366816.48	39.249213	-107.742474		

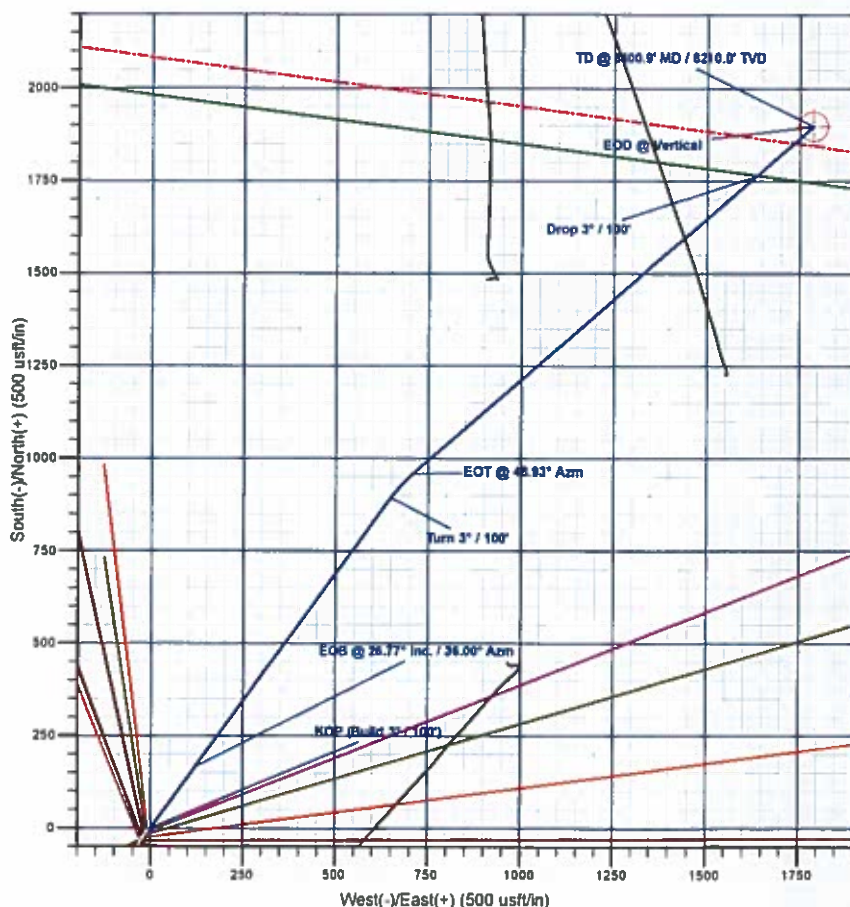
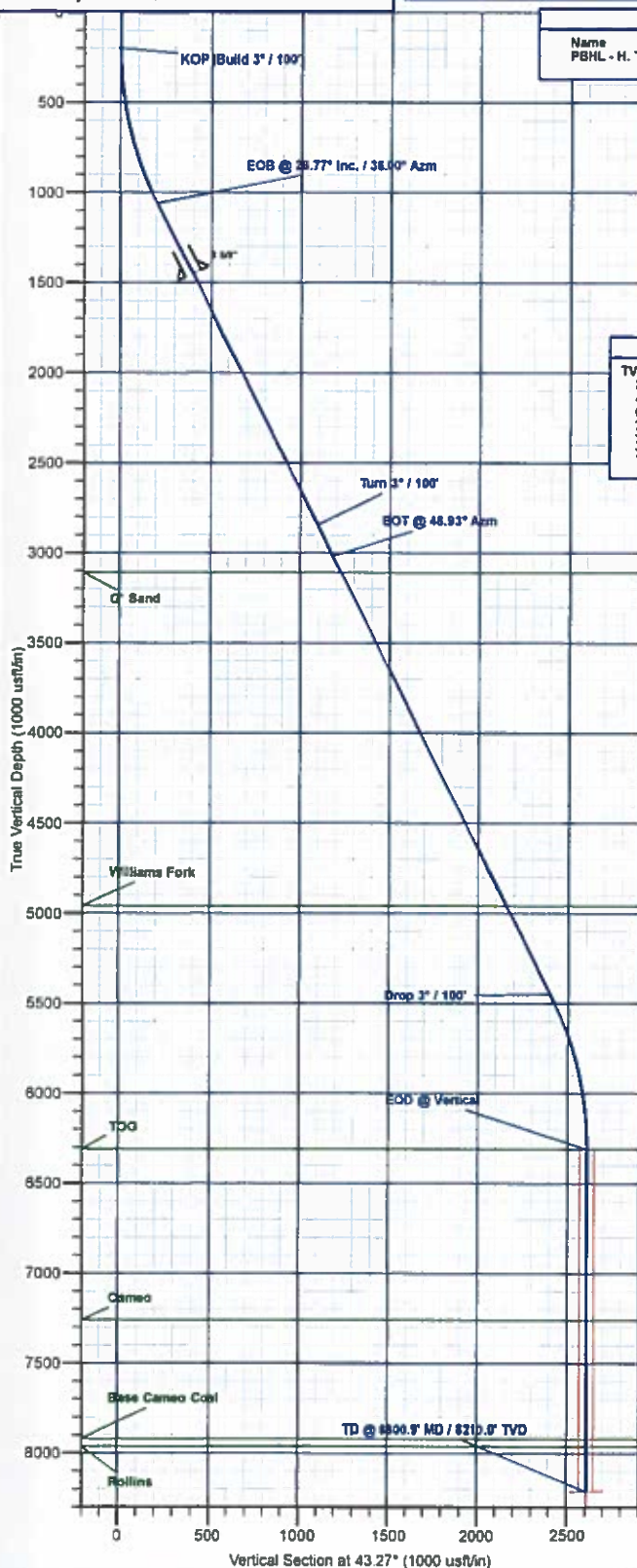
REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well H. Thomas 0993-23-21E, True North
 Vertical (TVD) Reference: well @ 7655.0usft (H&P #290)
 Section (VS) Reference: Slot - (6.0H, 6.0E)
 Measured Depth Reference: well @ 7655.0usft (H&P #290)
 Calculation Method: Minimum Curvature



FORMATION TOP DETAILS

TVDPATH	MDPATH	FORMATION
3110.0	3388.0	G* Sand
4960.0	5460.0	Williams Fork
6310.0	6900.9	TOG
7280.0	7850.9	Cameo
7920.0	8510.9	Base Cameo Coal
7960.0	8550.9	Rollins



Plan: Design #1 (H. Thomas 0993-23-21E/A-1)

Created By: Will Jircik Date: 17:25, January 18 2018



Laramie Energy, LLC

Mesa County, CO

H Thomas 0993 26-06 Pad

H. Thomas 0993-23-21E

A-1

Plan: Design #1

QES Well Planning Report

18 January, 2018





Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well H. Thomas 0993-23-21E
Company:	Laramie Energy, LLC	TVD Reference:	well @ 7655 0usft (H&P #290)
Project:	Mesa County, CO	MD Reference:	well @ 7655 0usft (H&P #290)
Site:	H Thomas 0993 26-06 Pad	North Reference:	True
Well:	H. Thomas 0993-23-21E	Survey Calculation Method:	Minimum Curvature
Wellbore:	A-1		
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		H Thomas 0993 26-06 Pad			
Site Position:		Northing:	1,523,440.69 usft	Latitude:	39.249054
From:	Lat/Long	Easting:	2,364,977.70 usft	Longitude:	-107.742613
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-1.41 °

Well	H. Thomas 0993-23-21E					
Well Position	+N/-S	57.9 usft	Northing:	1,523,497.61 usft	Latitude:	39.249213
	+E/-W	39.4 usft	Easting:	2,365,018.49 usft	Longitude:	-107.742474
Position Uncertainty		0.0 usft	Wellhead Elevation:		Ground Level:	7,631.0 usft

Wellbore	A-1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	1/15/2018	9.50	65.42	51,350.39842383

Design	Design #1			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	43.27

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	
200.0	0.00	0.00	200.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,092.3	26.77	36.00	1,060.2	165.6	120.3	3.00	3.00	0.00	36.00	
3,092.3	26.77	36.00	2,845.9	894.4	649.8	0.00	0.00	0.00	0.00	
3,286.1	26.77	48.93	3,019.0	958.4	708.4	3.00	0.00	6.67	95.81	
6,008.7	26.77	48.93	5,449.9	1,763.9	1,632.8	0.00	0.00	0.00	0.00	
6,900.9	0.00	0.00	6,310.0	1,898.4	1,787.1	3.00	-3.00	0.00	180.00	
8,800.9	0.00	0.00	8,210.0	1,898.4	1,787.1	0.00	0.00	0.00	0.00	PBHL - H. Thomas 09



Well Planning Report



Database: EDM 5000.1 Single User Db
 Company: Laramie Energy, LLC
 Project: Mesa County, CO
 Site: H Thomas 0993 28-06 Pad
 Well: H. Thomas 0993-23-21E
 Wellbore: A-1
 Design: Design #1

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

Well H. Thomas 0993-23-21E
 well @ 7655.0usft (H&P #290)
 well @ 7655.0usft (H&P #290)
 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)
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
KOP (Build 3° / 100')									
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	3.00	36.00	300.0	2.1	1.5	2.6	3.00	3.00	0.00
400.0	6.00	36.00	399.6	8.5	6.1	10.4	3.00	3.00	0.00
500.0	9.00	36.00	498.8	19.0	13.8	23.3	3.00	3.00	0.00
600.0	12.00	36.00	597.1	33.8	24.5	41.4	3.00	3.00	0.00
700.0	15.00	36.00	694.3	52.6	38.3	64.6	3.00	3.00	0.00
800.0	18.00	36.00	790.2	75.6	54.9	92.7	3.00	3.00	0.00
900.0	21.00	36.00	884.4	102.6	74.6	125.8	3.00	3.00	0.00
1,000.0	24.00	36.00	976.8	133.6	97.1	163.8	3.00	3.00	0.00
EOB @ 26.77° Inc. / 36.00° Azm									
1,092.3	26.77	36.00	1,060.2	165.6	120.3	203.0	3.00	3.00	0.00
1,100.0	26.77	36.00	1,067.1	168.4	122.3	206.5	0.00	0.00	0.00
1,200.0	26.77	36.00	1,156.3	204.8	148.8	251.2	0.00	0.00	0.00
1,300.0	26.77	36.00	1,245.6	241.3	175.3	295.8	0.00	0.00	0.00
1,400.0	26.77	36.00	1,334.9	277.7	201.8	340.5	0.00	0.00	0.00
1,500.0	26.77	36.00	1,424.2	314.2	228.2	385.2	0.00	0.00	0.00
8 5/8"									
1,530.0	26.77	36.00	1,451.0	325.1	236.2	398.6	0.00	0.00	0.00
1,600.0	26.77	36.00	1,513.5	350.6	254.7	429.9	0.00	0.00	0.00
1,700.0	26.77	36.00	1,602.8	387.0	281.2	474.5	0.00	0.00	0.00
1,800.0	26.77	36.00	1,692.0	423.5	307.7	519.2	0.00	0.00	0.00
1,900.0	26.77	36.00	1,781.3	459.9	334.1	563.9	0.00	0.00	0.00
2,000.0	26.77	36.00	1,870.6	496.3	360.6	608.6	0.00	0.00	0.00
2,100.0	26.77	36.00	1,959.9	532.8	387.1	653.3	0.00	0.00	0.00
2,200.0	26.77	36.00	2,049.2	569.2	413.6	697.9	0.00	0.00	0.00
2,300.0	26.77	36.00	2,138.5	605.7	440.0	742.6	0.00	0.00	0.00
2,400.0	26.77	36.00	2,227.7	642.1	466.5	787.3	0.00	0.00	0.00
2,500.0	26.77	36.00	2,317.0	678.5	493.0	832.0	0.00	0.00	0.00
2,600.0	26.77	36.00	2,406.3	715.0	519.5	876.7	0.00	0.00	0.00
2,700.0	26.77	36.00	2,495.6	751.4	545.9	921.3	0.00	0.00	0.00
2,800.0	26.77	36.00	2,584.9	787.9	572.4	966.0	0.00	0.00	0.00
2,900.0	26.77	36.00	2,674.1	824.3	598.9	1,010.7	0.00	0.00	0.00
3,000.0	26.77	36.00	2,763.4	860.7	625.4	1,055.4	0.00	0.00	0.00
Turn 3° / 100'									
3,092.3	26.77	36.00	2,845.9	894.4	649.8	1,096.6	0.00	0.00	0.00
3,100.0	26.75	36.51	2,852.7	897.2	651.8	1,100.1	3.00	-0.29	6.63
3,200.0	26.62	43.19	2,942.1	931.6	680.6	1,144.8	3.00	-0.12	6.68
EOT @ 48.93° Azm									
3,286.1	26.77	48.93	3,019.0	958.4	708.4	1,183.4	3.00	0.17	6.67
3,300.0	26.77	48.93	3,031.4	962.5	713.1	1,189.6	0.00	0.00	0.00
G' Sand									
3,388.0	26.77	48.93	3,110.0	988.6	743.0	1,229.1	0.00	0.00	0.00
3,400.0	26.77	48.93	3,120.7	992.1	747.1	1,234.5	0.00	0.00	0.00
3,500.0	26.77	48.93	3,210.0	1,021.7	781.0	1,279.3	0.00	0.00	0.00
3,600.0	26.77	48.93	3,299.3	1,051.3	815.0	1,324.1	0.00	0.00	0.00
3,700.0	26.77	48.93	3,388.6	1,080.9	848.9	1,368.9	0.00	0.00	0.00
3,800.0	26.77	48.93	3,477.9	1,110.5	882.9	1,413.7	0.00	0.00	0.00
3,900.0	26.77	48.93	3,567.1	1,140.0	916.8	1,458.5	0.00	0.00	0.00
4,000.0	26.77	48.93	3,656.4	1,169.6	950.8	1,503.3	0.00	0.00	0.00
4,100.0	26.77	48.93	3,745.7	1,199.2	984.7	1,548.2	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: H Thomas 0993 28-06 Pad
 Well: H. Thomas 0993-23-21E
 Wellbore: A-1
 Design: Design #1

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

Well: H. Thomas 0993-23-21E
 well @ 7655.0usft (H&P #280)
 well @ 7655.0usft (H&P #290)
 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)
4,200.0	26.77	48.93	3,835.0	1,228.8	1,018.7	1,593.0	0.00	0.00	0.00
4,300.0	26.77	48.93	3,924.3	1,258.4	1,052.6	1,637.8	0.00	0.00	0.00
4,400.0	26.77	48.93	4,013.6	1,288.0	1,086.6	1,682.6	0.00	0.00	0.00
4,500.0	26.77	48.93	4,102.8	1,317.6	1,120.6	1,727.4	0.00	0.00	0.00
4,600.0	26.77	48.93	4,192.1	1,347.1	1,154.5	1,772.2	0.00	0.00	0.00
4,700.0	26.77	48.93	4,281.4	1,376.7	1,188.5	1,817.1	0.00	0.00	0.00
4,800.0	26.77	48.93	4,370.7	1,406.3	1,222.4	1,861.9	0.00	0.00	0.00
4,900.0	26.77	48.93	4,460.0	1,435.9	1,256.4	1,906.7	0.00	0.00	0.00
5,000.0	26.77	48.93	4,549.3	1,465.5	1,290.3	1,951.5	0.00	0.00	0.00
5,100.0	26.77	48.93	4,638.6	1,495.1	1,324.3	1,996.3	0.00	0.00	0.00
5,200.0	26.77	48.93	4,727.8	1,524.7	1,358.2	2,041.1	0.00	0.00	0.00
5,300.0	26.77	48.93	4,817.1	1,554.2	1,392.2	2,085.9	0.00	0.00	0.00
5,400.0	26.77	48.93	4,906.4	1,583.8	1,426.1	2,130.6	0.00	0.00	0.00

Williams Fork

5,460.0	26.77	48.93	4,960.0	1,601.6	1,446.5	2,157.7	0.00	0.00	0.00
5,500.0	26.77	48.93	4,995.7	1,613.4	1,460.1	2,175.6	0.00	0.00	0.00
5,600.0	26.77	48.93	5,085.0	1,643.0	1,494.0	2,220.4	0.00	0.00	0.00
5,700.0	26.77	48.93	5,174.3	1,672.6	1,528.0	2,265.2	0.00	0.00	0.00
5,800.0	26.77	48.93	5,263.6	1,702.2	1,561.9	2,310.0	0.00	0.00	0.00
5,900.0	26.77	48.93	5,352.8	1,731.8	1,595.9	2,354.8	0.00	0.00	0.00

Drop 3° / 100'

6,008.7	26.77	48.93	5,449.9	1,763.9	1,632.8	2,403.6	0.00	0.00	0.00
6,100.0	24.03	48.93	5,532.4	1,789.7	1,662.3	2,442.5	3.00	-3.00	0.00
6,200.0	21.03	48.93	5,624.7	1,814.8	1,691.2	2,480.6	3.00	-3.00	0.00
6,300.0	18.03	48.93	5,719.0	1,836.8	1,716.4	2,513.9	3.00	-3.00	0.00
6,400.0	15.03	48.93	5,814.8	1,855.5	1,737.8	2,542.2	3.00	-3.00	0.00
6,500.0	12.03	48.93	5,912.0	1,870.8	1,755.5	2,565.5	3.00	-3.00	0.00
6,600.0	9.03	48.93	6,010.3	1,882.8	1,769.2	2,583.7	3.00	-3.00	0.00
6,700.0	6.03	48.93	6,109.5	1,891.4	1,779.1	2,596.7	3.00	-3.00	0.00
6,800.0	3.03	48.93	6,209.1	1,896.6	1,785.1	2,604.5	3.00	-3.00	0.00

EOD @ Vertical - TOG

6,900.9	0.00	0.00	6,310.0	1,898.4	1,787.1	2,607.2	3.00	-3.00	0.00
7,000.0	0.00	0.00	6,409.1	1,898.4	1,787.1	2,607.2	0.00	0.00	0.00
7,100.0	0.00	0.00	6,509.1	1,898.4	1,787.1	2,607.2	0.00	0.00	0.00
7,200.0	0.00	0.00	6,609.1	1,898.4	1,787.1	2,607.2	0.00	0.00	0.00
7,300.0	0.00	0.00	6,709.1	1,898.4	1,787.1	2,607.2	0.00	0.00	0.00
7,400.0	0.00	0.00	6,809.1	1,898.4	1,787.1	2,607.2	0.00	0.00	0.00
7,500.0	0.00	0.00	6,909.1	1,898.4	1,787.1	2,607.2	0.00	0.00	0.00
7,600.0	0.00	0.00	7,009.1	1,898.4	1,787.1	2,607.2	0.00	0.00	0.00
7,700.0	0.00	0.00	7,109.1	1,898.4	1,787.1	2,607.2	0.00	0.00	0.00
7,800.0	0.00	0.00	7,209.1	1,898.4	1,787.1	2,607.2	0.00	0.00	0.00

Cameo

7,850.9	0.00	0.00	7,260.0	1,898.4	1,787.1	2,607.2	0.00	0.00	0.00
7,900.0	0.00	0.00	7,309.1	1,898.4	1,787.1	2,607.2	0.00	0.00	0.00
8,000.0	0.00	0.00	7,409.1	1,898.4	1,787.1	2,607.2	0.00	0.00	0.00
8,100.0	0.00	0.00	7,509.1	1,898.4	1,787.1	2,607.2	0.00	0.00	0.00
8,200.0	0.00	0.00	7,609.1	1,898.4	1,787.1	2,607.2	0.00	0.00	0.00
8,300.0	0.00	0.00	7,709.1	1,898.4	1,787.1	2,607.2	0.00	0.00	0.00
8,400.0	0.00	0.00	7,809.1	1,898.4	1,787.1	2,607.2	0.00	0.00	0.00
8,500.0	0.00	0.00	7,909.1	1,898.4	1,787.1	2,607.2	0.00	0.00	0.00

Base Cameo Coal

8,510.9	0.00	0.00	7,920.0	1,898.4	1,787.1	2,607.2	0.00	0.00	0.00
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Rollins



Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well H. Thomas 0993-23-21E
Company:	Laramie Energy, LLC	TVD Reference:	well @ 7655.0usft (H&P #290)
Project:	Mesa County, CO	MD Reference:	well @ 7655.0usft (H&P #290)
Site:	H Thomas 0993 26-06 Pad	North Reference:	True
Well:	H. Thomas 0993-23-21E	Survey Calculation Method:	Minimum Curvature
Wellbore:	A-1		
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)
8,550.9	0.00	0.00	7,960.0	1,898.4	1,787.1	2,607.2	0.00	0.00	0.00
8,600.0	0.00	0.00	8,009.1	1,898.4	1,787.1	2,607.2	0.00	0.00	0.00
8,700.0	0.00	0.00	8,109.1	1,898.4	1,787.1	2,607.2	0.00	0.00	0.00
TD @ 8800.9' MD / 8210.0' TVD									
8,800.9	0.00	0.00	8,210.0	1,898.4	1,787.1	2,607.2	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 - H. Thomas 0993	0.00	0.00	8,210.0	1,898.4	1,787.1	1,525,351.29	2,366,851.88	39.254425	-107.736163
- plan hits target center									
- Circle (radius 40.0)									

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,530.0	1,451.0	8 5/8"	8-5/8	11

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
3,388.0	3,110.0	G ⁺ Sand			
5,460.0	4,960.0	Williams Fork			
6,900.9	6,310.0	TOG			
7,850.9	7,260.0	Cameo			
8,510.9	7,920.0	Base Cameo Coal			
8,550.9	7,960.0	Rollins			

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
200.0	200.0	0.0	0.0	KOP (Build 3° / 100')
1,092.3	1,060.2	165.6	120.3	EOB @ 26.77° Inc. / 36.00° Azm
3,092.3	2,845.9	894.4	849.8	Turn 3° / 100'
3,286.1	3,019.0	958.4	708.4	EOT @ 48.93° Azm
6,008.7	5,449.9	1,763.9	1,632.8	Drop 3° / 100'
6,900.9	6,310.0	1,898.4	1,787.1	EOD @ Vertical
8,800.9	8,210.0	1,898.4	1,787.1	TD @ 8800.9' MD / 8210.0' TVD