Project: Mesa County, CO
Site: Sup & Shep 25-11 Pad
Well: Sup & Shep Federal 25-15W
Wellbore: A-7
Design: Design #1
Latitude: 39.244812
Longitude: -107.723381
Ground Level: 8077.0
well @ 8107.0usft (30' RKB)

LARAMIE ENERGY

QES DIRECTIONAL DRILLING

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	
400.0	0.00	0.00	400.0	0.0	0.0	0.00	0.00	0.0	Build 3.00°/100'
566.7	5.00	185.00	566.5	-7.2	-0.6	3.00	185.00	4.5	EOB @ 5.00° Inc / 185.00° Azm (Build 3.00°/100')
1027.0	16.29	237.42	1018.8	-62.3	-87.1	3.00	68.58	81.9	EOB @ 16.29° Inc / 237.42° Azm
6535.6	16.29	237.42	6306.2	-894.3	-1359.4	0.00	0.00	1627.2	Drop @ 3.00°/100'
7078.7	0.00	0.00	6842.0	-935.6	-1424.0	3.00	180.00	1703.9	EOD @ Vertical
8828.7	0.00	0.00	8592.0	-935.6	-1424.0	0.00	0.00	1703.9	TD @ 8828.7' MD / 8592.0' TVD

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
PBHL - SUP & SHEP FEDERAL 25-15W	8592.0	-935.6	-1424.0	1520861.78	2368938.08	39.242243	-107.728409

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

WELL DETAILS: Sup & Shep Federal 25-15W

+N/-S	+E/-W	Northing	8077.0 Easting	Latitude	Longitude
0.0	0.0	1521762.28	2370384.57	39.244812	-107.723381

Azimuths to True North
Magnetic North: 9.49°

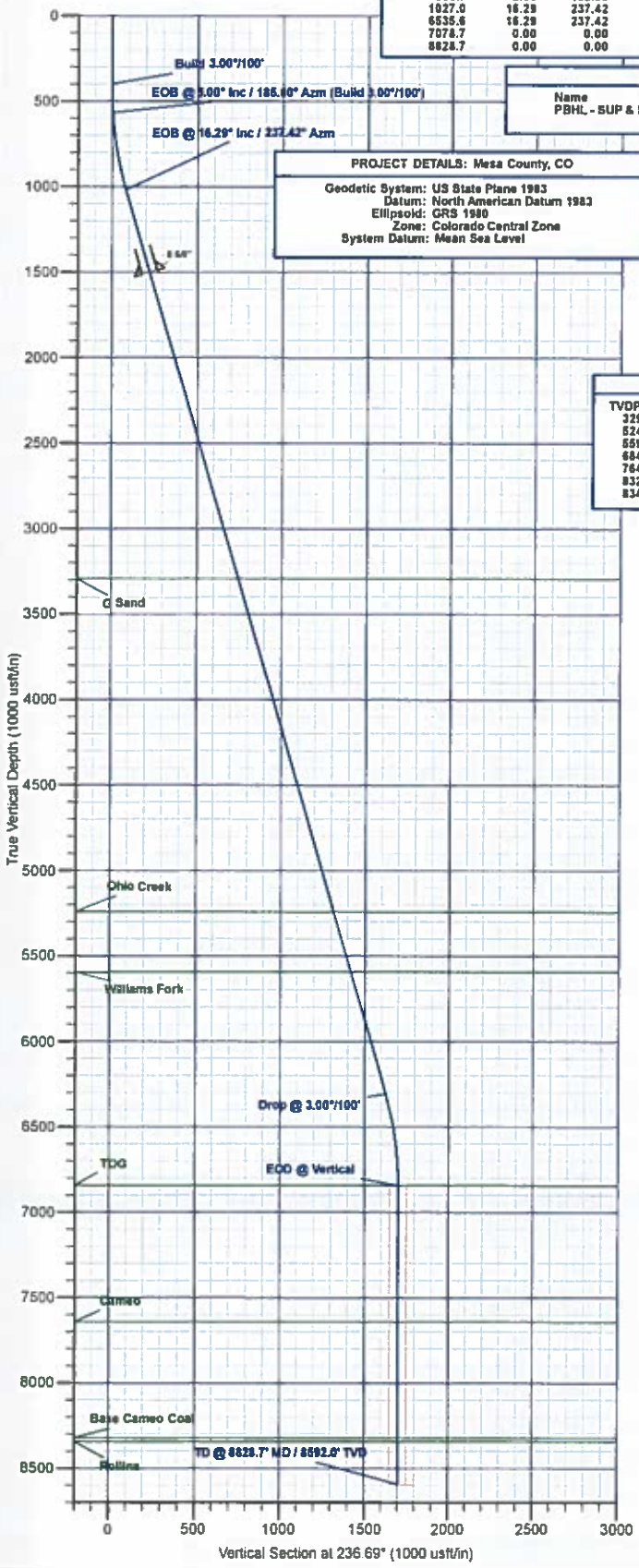
Magnetic Field
Strength: 51350.8nT
Dip Angle: 65.42°
Date: 1/2/2018
Model: IGRF2015

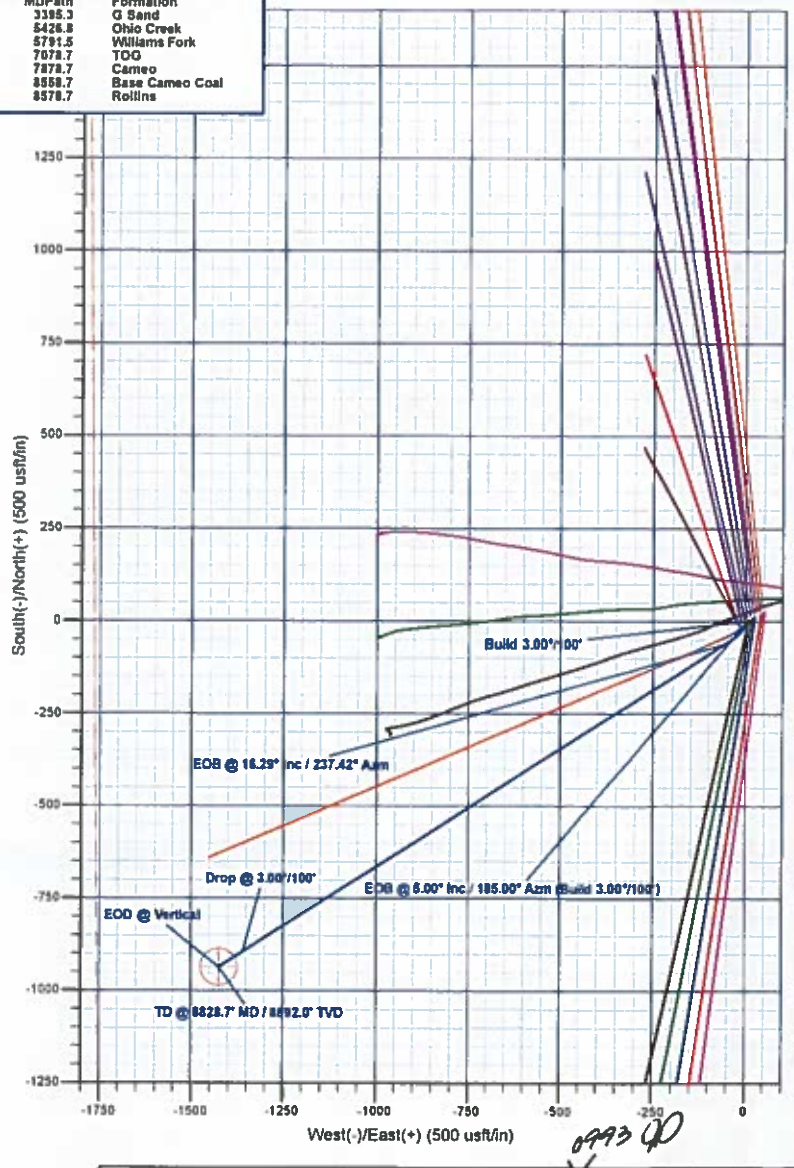
REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well Sup & Shep Federal 25-15W, True North
Vertical (TVD) Reference: well @ 8107.0usft (30' RKB)
Section (VS) Reference: Slot - (0.0N, 0.0E)
Measured Depth Reference: well @ 8107.0usft (30' RKB)
Calculation Method: Minimum Curvature

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
3292.0	3395.3	G Sand
5242.0	5426.8	Ohio Creek
5592.0	5791.5	Williams Fork
6842.0	7078.7	TDG
7642.0	7878.7	Cameo
8322.0	8558.7	Base Cameo Coal
8342.0	8578.7	Rollins





0993 A0

Plan: Design #1 (Sup & Shep Federal 25-15W/A-7)

Created By: Will Jircik Date: 11:38, March 04 2018

Laramie Energy, LLC

Mesa County, CO
Sup & Shep 25-11 Pad
Sup & Shep Federal 25-15W

0993

A-7

Plan: Design #1

QES Well Planning Report

04 March, 2018

DIRECTIONAL DRILLING

0993 QD

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well Sup & Shep Federal 25-15W
Company:	Laramie Energy, LLC	**TVD Reference:**	well @ 8107.0usft (30' RKB)
Project:	Mesa County, CO	**MD Reference:**	well @ 8107.0usft (30' RKB)
Site:	Sup & Shep 25-11 Pad	**North Reference:**	True
Well:	Sup & Shep Federal 25-15W	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	A-7		
Design:	Design #1		

0993 QD

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	Sup & Shep 25-11 Pad				
Site Position:		**Northing:**	1,521,749.72 usft	**Latitude:**	39.244779
From:	Lat/Long	**Easting:**	2,370,406.93 usft	**Longitude:**	-107.723301
Position Uncertainty:	0.0 usft	**Slot Radius:**	13-3/16 "	**Grid Convergence:**	-1.40 °
Well	Sup & Shep Federal 25-15W				
Well Position	**+N/-S** 12.0 usft	**Northing:**	1,521,762.28 usft	**Latitude:**	39.244812
	+E/-W -22.7 usft	**Easting:**	2,370,384.57 usft	**Longitude:**	-107.723381
Position Uncertainty	0.0 usft	**Wellhead Elevation:**		**Ground Level:**	8,077.0 usft
Wellbore	A-7				

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	1/2/2018	9.49	65.42	51,350.83704091

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	236.69

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	
566.7	5.00	185.00	566.5	-7.2	-0.6	3.00	3.00	0.00	185.00	
1,027.0	16.29	237.42	1,018.8	-62.3	-57.1	3.00	2.45	11.39	66.68	
6,535.6	16.29	237.42	6,306.2	-894.3	-1,359.4	0.00	0.00	0.00	0.00	
7,078.7	0.00	0.00	6,842.0	-935.6	-1,424.0	3.00	-3.00	0.00	180.00	
8,828.7	0.00	0.00	8,592.0	-935.6	-1,424.0	0.00	0.00	0.00	0.00	PBHL - SUP & SHEP

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well Sup & Shep Federal 25-15W
Company:	Laramie Energy, LLC	**TVD Reference:**	well @ 8107.0usft (30' RKB)
Project:	Mesa County, CO	**MD Reference:**	well @ 8107.0usft (30' RKB)
Site:	Sup & Shep 25-11 Pad	**North Reference:**	True
Well:	Sup & Shep Federal 25-15W	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	A-7 0993 CD		
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
Build 3.00°/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	185.00	500.0	-2.6	-0.2	1.6	3.00	3.00	0.00
EOB @ 5.00° Inc / 185.00° Azm (Build 3.00°/100')									
566.7	5.00	185.00	566.5	-7.2	-0.6	4.5	3.00	3.00	0.00
600.0	5.44	194.87	599.7	-10.2	-1.2	6.6	3.00	1.33	29.60
700.0	7.45	215.08	699.0	-20.1	-6.1	16.1	3.00	2.01	20.21
800.0	9.97	225.99	797.9	-31.4	-16.1	30.7	3.00	2.52	10.91
900.0	12.69	232.41	895.9	-44.1	-31.0	50.1	3.00	2.73	6.41
1,000.0	15.52	236.55	992.9	-58.2	-50.9	74.5	3.00	2.83	4.14
EOB @ 16.29° Inc / 237.42° Azm									
1,027.0	16.29	237.42	1,018.8	-62.3	-57.1	81.9	3.00	2.87	3.24
1,100.0	16.29	237.42	1,088.9	-73.3	-74.3	102.4	0.00	0.00	0.00
1,200.0	16.29	237.42	1,184.9	-88.4	-98.0	130.4	0.00	0.00	0.00
1,300.0	16.29	237.42	1,280.9	-103.5	-121.6	158.5	0.00	0.00	0.00
1,400.0	16.29	237.42	1,376.9	-118.6	-145.3	186.5	0.00	0.00	0.00
1,500.0	16.29	237.42	1,472.9	-133.7	-168.9	214.6	0.00	0.00	0.00
8 5/8"									
1,530.0	16.29	237.42	1,501.7	-138.2	-176.0	223.0	0.00	0.00	0.00
1,600.0	16.29	237.42	1,568.8	-148.8	-192.5	242.6	0.00	0.00	0.00
1,700.0	16.29	237.42	1,664.8	-163.9	-216.2	270.7	0.00	0.00	0.00
1,800.0	16.29	237.42	1,760.8	-179.0	-239.8	298.7	0.00	0.00	0.00
1,900.0	16.29	237.42	1,856.8	-194.1	-263.5	326.8	0.00	0.00	0.00
2,000.0	16.29	237.42	1,952.8	-209.2	-287.1	354.8	0.00	0.00	0.00
2,100.0	16.29	237.42	2,048.8	-224.3	-310.7	382.9	0.00	0.00	0.00
2,200.0	16.29	237.42	2,144.8	-239.4	-334.4	410.9	0.00	0.00	0.00
2,300.0	16.29	237.42	2,240.7	-254.5	-358.0	439.0	0.00	0.00	0.00
2,400.0	16.29	237.42	2,336.7	-269.7	-381.7	467.1	0.00	0.00	0.00
2,500.0	16.29	237.42	2,432.7	-284.8	-405.3	495.1	0.00	0.00	0.00
2,600.0	16.29	237.42	2,528.7	-299.9	-429.0	523.2	0.00	0.00	0.00
2,700.0	16.29	237.42	2,624.7	-315.0	-452.6	551.2	0.00	0.00	0.00
2,800.0	16.29	237.42	2,720.7	-330.1	-476.2	579.3	0.00	0.00	0.00
2,900.0	16.29	237.42	2,816.6	-345.2	-499.9	607.3	0.00	0.00	0.00
3,000.0	16.29	237.42	2,912.6	-360.3	-523.5	635.4	0.00	0.00	0.00
3,100.0	16.29	237.42	3,008.6	-375.4	-547.2	663.4	0.00	0.00	0.00
3,200.0	16.29	237.42	3,104.6	-390.5	-570.8	691.5	0.00	0.00	0.00
3,300.0	16.29	237.42	3,200.6	-405.6	-594.4	719.5	0.00	0.00	0.00
G Sand									
3,395.3	16.29	237.42	3,292.0	-420.0	-617.0	746.2	0.00	0.00	0.00
3,400.0	16.29	237.42	3,296.6	-420.7	-618.1	747.6	0.00	0.00	0.00
3,500.0	16.29	237.42	3,392.5	-435.8	-641.7	775.6	0.00	0.00	0.00
3,600.0	16.29	237.42	3,488.5	-450.9	-665.4	803.7	0.00	0.00	0.00
3,700.0	16.29	237.42	3,584.5	-466.0	-689.0	831.7	0.00	0.00	0.00
3,800.0	16.29	237.42	3,680.5	-481.1	-712.7	859.8	0.00	0.00	0.00
3,900.0	16.29	237.42	3,776.5	-496.2	-736.3	887.8	0.00	0.00	0.00
4,000.0	16.29	237.42	3,872.5	-511.3	-759.9	915.9	0.00	0.00	0.00
4,100.0	16.29	237.42	3,968.4	-526.4	-783.6	943.9	0.00	0.00	0.00
4,200.0	16.29	237.42	4,064.4	-541.5	-807.2	972.0	0.00	0.00	0.00
4,300.0	16.29	237.42	4,160.4	-556.6	-830.9	1,000.1	0.00	0.00	0.00
4,400.0	16.29	237.42	4,256.4	-571.8	-854.5	1,028.1	0.00	0.00	0.00

0993 CP

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well Sup & Shep Federal 25-15W
Company:	Laramie Energy, LLC	**TVD Reference:**	well @ 8107.0usft (30' RKB)
Project:	Mesa County, CO	**MD Reference:**	well @ 8107.0usft (30' RKB)
Site:	Sup & Shep 25-11 Pad	**North Reference:**	True
Well:	Sup & Shep Federal 25-15W	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	A-7 0993 CP		
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	16.29	237.42	4,352.4	-586.9	-878.1	1,056.2	0.00	0.00	0.00
4,600.0	16.29	237.42	4,448.4	-602.0	-901.8	1,084.2	0.00	0.00	0.00
4,700.0	16.29	237.42	4,544.3	-617.1	-925.4	1,112.3	0.00	0.00	0.00
4,800.0	16.29	237.42	4,640.3	-632.2	-949.1	1,140.3	0.00	0.00	0.00
4,900.0	16.29	237.42	4,736.3	-647.3	-972.7	1,168.4	0.00	0.00	0.00
5,000.0	16.29	237.42	4,832.3	-662.4	-996.4	1,196.4	0.00	0.00	0.00
5,100.0	16.29	237.42	4,928.3	-677.5	-1,020.0	1,224.5	0.00	0.00	0.00
5,200.0	16.29	237.42	5,024.3	-692.6	-1,043.6	1,252.5	0.00	0.00	0.00
5,300.0	16.29	237.42	5,120.3	-707.7	-1,067.3	1,280.6	0.00	0.00	0.00
5,400.0	16.29	237.42	5,216.2	-722.8	-1,090.9	1,308.6	0.00	0.00	0.00
Ohio Creek									
5,426.8	16.29	237.42	5,242.0	-726.9	-1,097.3	1,316.2	0.00	0.00	0.00
5,500.0	16.29	237.42	5,312.2	-737.9	-1,114.6	1,336.7	0.00	0.00	0.00
5,600.0	16.29	237.42	5,408.2	-753.0	-1,138.2	1,364.7	0.00	0.00	0.00
5,700.0	16.29	237.42	5,504.2	-768.1	-1,161.8	1,392.8	0.00	0.00	0.00
Williams Fork									
5,791.5	16.29	237.42	5,592.0	-781.9	-1,183.5	1,418.5	0.00	0.00	0.00
5,800.0	16.29	237.42	5,600.2	-783.2	-1,185.5	1,420.8	0.00	0.00	0.00
5,900.0	16.29	237.42	5,696.2	-798.3	-1,209.1	1,448.9	0.00	0.00	0.00
6,000.0	16.29	237.42	5,792.1	-813.4	-1,232.8	1,477.0	0.00	0.00	0.00
6,100.0	16.29	237.42	5,888.1	-828.5	-1,256.4	1,505.0	0.00	0.00	0.00
6,200.0	16.29	237.42	5,984.1	-843.6	-1,280.1	1,533.1	0.00	0.00	0.00
6,300.0	16.29	237.42	6,080.1	-858.7	-1,303.7	1,561.1	0.00	0.00	0.00
6,400.0	16.29	237.42	6,176.1	-873.9	-1,327.3	1,589.2	0.00	0.00	0.00
6,500.0	16.29	237.42	6,272.1	-889.0	-1,351.0	1,617.2	0.00	0.00	0.00
Drop @ 3.00°/100'									
6,535.6	16.29	237.42	6,306.2	-894.3	-1,359.4	1,627.2	0.00	0.00	0.00
6,600.0	14.36	237.42	6,368.3	-903.5	-1,373.7	1,644.2	3.00	-3.00	0.00
6,700.0	11.36	237.42	6,465.8	-915.5	-1,392.5	1,666.5	3.00	-3.00	0.00
6,800.0	8.36	237.42	6,564.3	-924.7	-1,406.9	1,683.6	3.00	-3.00	0.00
6,900.0	5.36	237.42	6,663.6	-931.1	-1,417.0	1,695.5	3.00	-3.00	0.00
7,000.0	2.36	237.42	6,763.4	-934.8	-1,422.7	1,702.3	3.00	-3.00	0.00
EOD @ Vertical - TOG									
7,078.7	0.00	0.00	6,842.0	-935.6	-1,424.0	1,703.9	3.00	-3.00	0.00
7,100.0	0.00	0.00	6,863.3	-935.6	-1,424.0	1,703.9	0.00	0.00	0.00
7,200.0	0.00	0.00	6,963.3	-935.6	-1,424.0	1,703.9	0.00	0.00	0.00
7,300.0	0.00	0.00	7,063.3	-935.6	-1,424.0	1,703.9	0.00	0.00	0.00
7,400.0	0.00	0.00	7,163.3	-935.6	-1,424.0	1,703.9	0.00	0.00	0.00
7,500.0	0.00	0.00	7,263.3	-935.6	-1,424.0	1,703.9	0.00	0.00	0.00
7,600.0	0.00	0.00	7,363.3	-935.6	-1,424.0	1,703.9	0.00	0.00	0.00
7,700.0	0.00	0.00	7,463.3	-935.6	-1,424.0	1,703.9	0.00	0.00	0.00
7,800.0	0.00	0.00	7,563.3	-935.6	-1,424.0	1,703.9	0.00	0.00	0.00
Cameo									
7,878.7	0.00	0.00	7,642.0	-935.6	-1,424.0	1,703.9	0.00	0.00	0.00
7,900.0	0.00	0.00	7,663.3	-935.6	-1,424.0	1,703.9	0.00	0.00	0.00
8,000.0	0.00	0.00	7,763.3	-935.6	-1,424.0	1,703.9	0.00	0.00	0.00
8,100.0	0.00	0.00	7,863.3	-935.6	-1,424.0	1,703.9	0.00	0.00	0.00
8,200.0	0.00	0.00	7,963.3	-935.6	-1,424.0	1,703.9	0.00	0.00	0.00
8,300.0	0.00	0.00	8,063.3	-935.6	-1,424.0	1,703.9	0.00	0.00	0.00
8,400.0	0.00	0.00	8,163.3	-935.6	-1,424.0	1,703.9	0.00	0.00	0.00
8,500.0	0.00	0.00	8,263.3	-935.6	-1,424.0	1,703.9	0.00	0.00	0.00
Base Cameo Coal									
8,558.7	0.00	0.00	8,322.0	-935.6	-1,424.0	1,703.9	0.00	0.00	0.00

0993 1 ✓

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well Sup & Shep Federal 25-15W
Company:	Laramie Energy, LLC	**TVD Reference:**	well @ 8107.0usft (30' RKB)
Project:	Mesa County, CO	**MD Reference:**	well @ 8107.0usft (30' RKB)
Site:	Sup & Shep 25-11 Pad	**North Reference:**	True
Well:	Sup & Shep Federal 25-15W	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	A-7		
Design:	Design #1 0993 ✓		

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)
Rollins									
8,578.7	0.00	0.00	8,342.0	-935.6	-1,424.0	1,703.9	0.00	0.00	0.00
8,600.0	0.00	0.00	8,363.3	-935.6	-1,424.0	1,703.9	0.00	0.00	0.00
8,700.0	0.00	0.00	8,463.3	-935.6	-1,424.0	1,703.9	0.00	0.00	0.00
8,800.0	0.00	0.00	8,563.3	-935.6	-1,424.0	1,703.9	0.00	0.00	0.00
TD @ 8828.7' MD / 8592.0' TVD									
8,828.7	0.00	0.00	8,592.0	-935.6	-1,424.0	1,703.9	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 - SUP & SHEP FE - plan hits target center - Circle (radius 50.0)	0.00	0.00	8,592.0	-935.6	-1,424.0	1,520,861.79	2,368,938.08	39.242243	-107.728409

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,530.0	1,501.7	8 5/8"	8-5/8	11

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
3,395.3	3,292.0	G Sand			
5,426.8	5,242.0	Ohio Creek			
5,791.5	5,592.0	Williams Fork			
7,078.7	6,842.0	TOG			
7,878.7	7,642.0	Cameo			
8,558.7	8,322.0	Base Cameo Coal			
8,578.7	8,342.0	Rollins			

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
400.0	400.0	0.0	0.0	Build 3.00°/100'
566.7	566.5	-7.2	-0.6	EOB @ 5.00° Inc / 185.00° Azm (Build 3.00°/100')
1,027.0	1,018.8	-62.3	-57.1	EOB @ 16.29° Inc / 237.42° Azm
6,535.6	6,306.2	-894.3	-1,359.4	Drop @ 3.00°/100'
7,078.7	6,842.0	-935.6	-1,424.0	EOD @ Vertical
8,828.7	8,592.0	-935.6	-1,424.0	TD @ 8828.7' MD / 8592.0' TVD