



Laramie Energy, LLC

Mesa County, CO

Sup & Shep 25-11 Pad

Sup & Shep 0993-25-16W

ST01

Plan: ST01 Design #1

QES Well Planning Report

18 December, 2018





Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Sup & Shep 0993-25-16W
Company:	Laramie Energy, LLC	TVD Reference:	RKB @ 8108.0usft (H&P #522)
Project:	Mesa County, CO	MD Reference:	RKB @ 8108.0usft (H&P #522)
Site:	Sup & Shep 25-11 Pad	North Reference:	True
Well:	Sup & Shep 0993-25-16W	Survey Calculation Method:	Minimum Curvature
Wellbore:	ST01		
Design:	ST01 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	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 0993-25-16W					
Well Position	+N/-S	16.0 usft	Northing:	1,521,766.07 usft	Latitude:	39.244823
	+E/-W	-13.9 usft	Easting:	2,370,393.45 usft	Longitude:	-107.723350
Position Uncertainty		0.0 usft	Wellhead Elevation:		Ground Level:	8,078.0 usft

Wellbore	ST01				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	User Defined	12/7/2018	9.33	65.37	51,235.00000000

Design	ST01 Design #1			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	2,553.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	190.64

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
2,553.0	12.70	192.90	2,508.4	-415.0	-95.7	0.00	0.00	0.00	0.00	
2,600.0	12.70	193.54	2,554.3	-425.0	-98.0	0.30	0.00	1.36	90.31	
2,692.9	15.33	189.68	2,644.4	-447.1	-102.5	3.00	2.83	-4.16	-21.47	
6,528.1	15.33	189.68	6,343.2	-1,446.3	-272.9	0.00	0.00	0.00	0.00	
7,039.0	0.00	0.00	6,848.0	-1,513.3	-284.4	3.00	-3.00	0.00	180.00	
8,789.0	0.00	0.00	8,598.0	-1,513.3	-284.4	0.00	0.00	0.00	0.00	PBHL - Sup & Shep



Well Planning Report



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Site:	Sup & Shep 25-11 Pad	North Reference:	True
Well:	Sup & Shep 0993-25-16W	Survey Calculation Method:	Minimum Curvature
Wellbore:	ST01		
Design:	ST01 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
303.0	2.10	174.70	302.9	-5.5	0.5	5.3	0.69	0.69	0.00
395.0	3.00	183.40	394.8	-9.6	0.5	9.3	1.06	0.98	9.46
488.0	3.90	192.70	487.7	-15.1	-0.3	14.9	1.14	0.97	10.00
580.0	4.60	199.50	579.4	-21.7	-2.2	21.7	0.94	0.76	7.39
673.0	5.30	193.50	672.1	-29.3	-4.5	29.7	0.94	0.75	-6.45
766.0	6.60	190.00	764.6	-38.8	-6.4	39.3	1.45	1.40	-3.76
858.0	8.30	192.70	855.8	-50.5	-8.8	51.2	1.89	1.85	2.93
951.0	10.30	194.10	947.6	-65.1	-12.3	66.2	2.16	2.15	1.51
1,045.0	12.60	195.30	1,039.7	-83.1	-17.0	84.8	2.46	2.45	1.28
1,140.0	13.20	193.90	1,132.3	-103.7	-22.4	106.0	0.71	0.63	-1.47
1,234.0	13.30	191.70	1,223.8	-124.7	-27.2	127.5	0.55	0.11	-2.34
1,328.0	13.40	191.10	1,315.2	-145.9	-31.4	149.2	0.18	0.11	-0.64
1,422.0	13.80	191.40	1,406.6	-167.6	-35.8	171.3	0.43	0.43	0.32
1,506.0	13.70	192.10	1,488.2	-187.2	-39.8	191.3	0.23	-0.12	0.83
1,610.0	13.70	191.70	1,589.2	-211.3	-44.9	215.9	0.09	0.00	-0.38
1,705.0	13.20	190.30	1,681.6	-232.9	-49.1	238.0	0.63	-0.53	-1.47
1,799.0	14.20	195.70	1,773.0	-254.6	-54.2	260.2	1.73	1.06	5.74
1,894.0	13.90	196.40	1,865.1	-276.8	-60.5	283.2	0.36	-0.32	0.74
1,988.0	13.60	196.10	1,956.4	-298.2	-66.8	305.4	0.33	-0.32	-0.32
2,082.0	13.20	194.80	2,047.9	-319.2	-72.6	327.1	0.53	-0.43	-1.38
2,176.0	12.70	193.90	2,139.5	-339.6	-77.8	348.2	0.57	-0.53	-0.96
2,271.0	12.20	193.90	2,232.2	-359.5	-82.7	368.6	0.53	-0.53	0.00
2,365.0	11.50	192.80	2,324.2	-378.3	-87.2	387.9	0.78	-0.74	-1.17
2,459.0	11.00	193.20	2,416.4	-396.2	-91.3	406.2	0.54	-0.53	0.43
Last MWD Survey									
2,553.0	12.70	192.90	2,508.4	-415.0	-95.7	425.5	1.81	1.81	-0.32
PTB / Build 3° / 100'									
2,600.0	12.70	193.54	2,554.3	-425.0	-98.0	435.8	0.30	0.00	1.36
EOB @ 15.33° Inc. / 189.68° Azm									
2,692.9	15.33	189.68	2,644.4	-447.1	-102.5	458.3	3.00	2.83	-4.16
2,700.0	15.33	189.68	2,651.3	-448.9	-102.8	460.2	0.00	0.00	0.00
2,800.0	15.33	189.68	2,747.7	-475.0	-107.3	486.6	0.00	0.00	0.00
2,900.0	15.33	189.68	2,844.1	-501.0	-111.7	513.0	0.00	0.00	0.00
3,000.0	15.33	189.68	2,940.6	-527.1	-116.1	539.5	0.00	0.00	0.00
3,100.0	15.33	189.68	3,037.0	-553.1	-120.6	565.9	0.00	0.00	0.00
3,200.0	15.33	189.68	3,133.5	-579.2	-125.0	592.3	0.00	0.00	0.00
3,300.0	15.33	189.68	3,229.9	-605.2	-129.5	618.7	0.00	0.00	0.00
G Sand									
3,370.6	15.33	189.68	3,298.0	-623.6	-132.6	637.4	0.00	0.00	0.00
3,400.0	15.33	189.68	3,326.4	-631.3	-133.9	645.2	0.00	0.00	0.00
3,500.0	15.33	189.68	3,422.8	-657.4	-138.4	671.6	0.00	0.00	0.00
3,600.0	15.33	189.68	3,519.2	-683.4	-142.8	698.0	0.00	0.00	0.00
3,700.0	15.33	189.68	3,615.7	-709.5	-147.3	724.5	0.00	0.00	0.00
3,800.0	15.33	189.68	3,712.1	-735.5	-151.7	750.9	0.00	0.00	0.00
3,900.0	15.33	189.68	3,808.6	-761.6	-156.1	777.3	0.00	0.00	0.00
4,000.0	15.33	189.68	3,905.0	-787.6	-160.6	803.7	0.00	0.00	0.00
4,100.0	15.33	189.68	4,001.5	-813.7	-165.0	830.2	0.00	0.00	0.00
4,200.0	15.33	189.68	4,097.9	-839.7	-169.5	856.6	0.00	0.00	0.00
4,300.0	15.33	189.68	4,194.4	-865.8	-173.9	883.0	0.00	0.00	0.00
4,400.0	15.33	189.68	4,290.8	-891.9	-178.4	909.5	0.00	0.00	0.00
4,500.0	15.33	189.68	4,387.2	-917.9	-182.8	935.9	0.00	0.00	0.00
4,600.0	15.33	189.68	4,483.7	-944.0	-187.3	962.3	0.00	0.00	0.00
4,700.0	15.33	189.68	4,580.1	-970.0	-191.7	988.7	0.00	0.00	0.00



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Well:	Sup & Shep 0993-25-16W	Survey Calculation Method:	Minimum Curvature
Wellbore:	ST01		
Design:	ST01 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)
4,800.0	15.33	189.68	4,676.6	-996.1	-196.1	1,015.2	0.00	0.00	0.00
4,900.0	15.33	189.68	4,773.0	-1,022.1	-200.6	1,041.6	0.00	0.00	0.00
5,000.0	15.33	189.68	4,869.5	-1,048.2	-205.0	1,068.0	0.00	0.00	0.00
5,100.0	15.33	189.68	4,965.9	-1,074.2	-209.5	1,094.5	0.00	0.00	0.00
5,200.0	15.33	189.68	5,062.3	-1,100.3	-213.9	1,120.9	0.00	0.00	0.00
5,300.0	15.33	189.68	5,158.8	-1,126.4	-218.4	1,147.3	0.00	0.00	0.00
Ohio Creek									
5,392.5	15.33	189.68	5,248.0	-1,150.5	-222.5	1,171.8	0.00	0.00	0.00
5,400.0	15.33	189.68	5,255.2	-1,152.4	-222.8	1,173.7	0.00	0.00	0.00
5,500.0	15.33	189.68	5,351.7	-1,178.5	-227.2	1,200.2	0.00	0.00	0.00
5,600.0	15.33	189.68	5,448.1	-1,204.5	-231.7	1,226.6	0.00	0.00	0.00
5,700.0	15.33	189.68	5,544.6	-1,230.6	-236.1	1,253.0	0.00	0.00	0.00
Williams Fork									
5,755.4	15.33	189.68	5,598.0	-1,245.0	-238.6	1,267.7	0.00	0.00	0.00
5,800.0	15.33	189.68	5,641.0	-1,256.6	-240.6	1,279.5	0.00	0.00	0.00
5,900.0	15.33	189.68	5,737.4	-1,282.7	-245.0	1,305.9	0.00	0.00	0.00
6,000.0	15.33	189.68	5,833.9	-1,308.8	-249.5	1,332.3	0.00	0.00	0.00
6,100.0	15.33	189.68	5,930.3	-1,334.8	-253.9	1,358.7	0.00	0.00	0.00
6,200.0	15.33	189.68	6,026.8	-1,360.9	-258.4	1,385.2	0.00	0.00	0.00
6,300.0	15.33	189.68	6,123.2	-1,386.9	-262.8	1,411.6	0.00	0.00	0.00
6,400.0	15.33	189.68	6,219.7	-1,413.0	-267.2	1,438.0	0.00	0.00	0.00
6,500.0	15.33	189.68	6,316.1	-1,439.0	-271.7	1,464.5	0.00	0.00	0.00
Drop 3° / 100'									
6,528.1	15.33	189.68	6,343.2	-1,446.3	-272.9	1,471.9	0.00	0.00	0.00
6,600.0	13.17	189.68	6,412.9	-1,463.8	-275.9	1,489.6	3.00	-3.00	0.00
6,700.0	10.17	189.68	6,510.8	-1,483.7	-279.3	1,509.8	3.00	-3.00	0.00
6,800.0	7.17	189.68	6,609.7	-1,498.6	-281.8	1,524.9	3.00	-3.00	0.00
6,900.0	4.17	189.68	6,709.2	-1,508.3	-283.5	1,534.7	3.00	-3.00	0.00
7,000.0	1.17	189.68	6,809.0	-1,512.9	-284.3	1,539.4	3.00	-3.00	0.00
EOB @ 0.00° Inc. / 0.00° Azm - TOG									
7,039.0	0.00	0.00	6,848.0	-1,513.3	-284.4	1,539.8	3.00	-3.00	0.00
7,100.0	0.00	0.00	6,909.0	-1,513.3	-284.4	1,539.8	0.00	0.00	0.00
7,200.0	0.00	0.00	7,009.0	-1,513.3	-284.4	1,539.8	0.00	0.00	0.00
7,300.0	0.00	0.00	7,109.0	-1,513.3	-284.4	1,539.8	0.00	0.00	0.00
7,400.0	0.00	0.00	7,209.0	-1,513.3	-284.4	1,539.8	0.00	0.00	0.00
7,500.0	0.00	0.00	7,309.0	-1,513.3	-284.4	1,539.8	0.00	0.00	0.00
7,600.0	0.00	0.00	7,409.0	-1,513.3	-284.4	1,539.8	0.00	0.00	0.00
7,700.0	0.00	0.00	7,509.0	-1,513.3	-284.4	1,539.8	0.00	0.00	0.00
7,800.0	0.00	0.00	7,609.0	-1,513.3	-284.4	1,539.8	0.00	0.00	0.00
Cameo									
7,839.0	0.00	0.00	7,648.0	-1,513.3	-284.4	1,539.8	0.00	0.00	0.00
7,900.0	0.00	0.00	7,709.0	-1,513.3	-284.4	1,539.8	0.00	0.00	0.00
8,000.0	0.00	0.00	7,809.0	-1,513.3	-284.4	1,539.8	0.00	0.00	0.00
8,100.0	0.00	0.00	7,909.0	-1,513.3	-284.4	1,539.8	0.00	0.00	0.00
8,200.0	0.00	0.00	8,009.0	-1,513.3	-284.4	1,539.8	0.00	0.00	0.00
8,300.0	0.00	0.00	8,109.0	-1,513.3	-284.4	1,539.8	0.00	0.00	0.00
8,400.0	0.00	0.00	8,209.0	-1,513.3	-284.4	1,539.8	0.00	0.00	0.00
8,500.0	0.00	0.00	8,309.0	-1,513.3	-284.4	1,539.8	0.00	0.00	0.00
Base Cameo Coal									
8,519.0	0.00	0.00	8,328.0	-1,513.3	-284.4	1,539.8	0.00	0.00	0.00
Rollins									
8,539.0	0.00	0.00	8,348.0	-1,513.3	-284.4	1,539.8	0.00	0.00	0.00
8,600.0	0.00	0.00	8,409.0	-1,513.3	-284.4	1,539.8	0.00	0.00	0.00



Well Planning Report



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Well:	Sup & Shep 0993-25-16W	Survey Calculation Method:	Minimum Curvature
Wellbore:	ST01		
Design:	ST01 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)
8,700.0	0.00	0.00	8,509.0	-1,513.3	-284.4	1,539.8	0.00	0.00	0.00
TD @ 8789.0' MD / 8598.0' TVD									
8,789.0	0.00	0.00	8,598.0	-1,513.3	-284.4	1,539.8	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 - Sup & Shep 0	0.00	0.00	8,598.0	-1,513.3	-284.4	1,520,260.17	2,370,072.14	39.240668	-107.724354
- plan hits target center									
- Circle (radius 50.0)									

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
3,370.6	3,298.0	G Sand				
5,392.5	5,248.0	Ohio Creek				
5,755.4	5,598.0	Williams Fork				
7,039.0	6,848.0	TOG				
7,839.0	7,648.0	Cameo				
8,519.0	8,328.0	Base Cameo Coal				
8,539.0	8,348.0	Rollins				

Plan Annotations				
Measured Depth (usft)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Comment
2,553.0	2,508.4	-415.0	-95.7	Last MWD Survey
2,600.0	2,554.3	-425.0	-98.0	PTB / Build 3° / 100'
2,692.9	2,644.4	-447.1	-102.5	EOB @ 15.33° Inc. / 189.68° Azm
6,528.1	6,343.2	-1,446.3	-272.9	Drop 3° / 100'
7,039.0	6,848.0	-1,513.3	-284.4	EOB @ 0.00° Inc. / 0.00° Azm
8,789.0	8,598.0	-1,513.3	-284.4	TD @ 8789.0' MD / 8598.0' TVD