



Laramie Energy, LLC

Mesa County, CO

Sup & Shep 25-11 Pad

Sup & Shep 0993-25-10W

A-9

Design: A-9

QES Survey Report

12 November, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Sup & Shep 0993-25-10W
Project:	Mesa County, CO	TVD Reference:	RKB @ 8108.0usft (H&P #522)
Site:	Sup & Shep 25-11 Pad	MD Reference:	RKB @ 8108.0usft (H&P #522)
Well:	Sup & Shep 0993-25-10W	North Reference:	True
Wellbore:	A-9	Survey Calculation Method:	Minimum Curvature
Design:	A-9	Database:	EDM 5000.1 Single User Db

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 0993-25-10W					
Well Position	+N/-S	0.0 usft	Northing:	1,521,753.61 usft	Latitude:	39.244787
	+E/-W	0.0 usft	Easting:	2,370,366.51 usft	Longitude:	-107.723444
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	8,078.0 usft

Wellbore	A-9				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	User Defined	11/6/2018	9.34	65.38	51,244.20000000

Design	A-9				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	331.64	

Survey Program	Date	11/12/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
212.0	8,627.0	QES MWD Surveys (A-9)	MWD default	MWD - Standard	

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
First MWD Survey @ 212.0' MD / 212.0' TVD									
212.0	0.40	268.80	212.0	0.0	-0.7	0.3	0.19	0.19	0.00
305.0	0.60	224.10	305.0	-0.4	-1.4	0.3	0.45	0.22	-48.06
397.0	0.60	234.70	397.0	-1.0	-2.1	0.1	0.12	0.00	11.52
490.0	0.70	210.30	490.0	-1.8	-2.8	-0.2	0.31	0.11	-26.24
583.0	0.90	243.50	583.0	-2.6	-3.8	-0.5	0.53	0.22	35.70
675.0	1.40	302.80	675.0	-2.3	-5.3	0.5	1.32	0.54	64.46
768.0	1.70	323.40	767.9	-0.6	-7.1	2.9	0.68	0.32	22.15
860.0	1.50	330.40	859.9	1.6	-8.5	5.4	0.30	-0.22	7.61
953.0	1.30	331.90	952.9	3.6	-9.6	7.7	0.22	-0.22	1.61



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Well:	Sup & Shep 0993-25-10W	North Reference:	True
Wellbore:	A-9	Survey Calculation Method:	Minimum Curvature
Design:	A-9	Database:	EDM 5000.1 Single User Db

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)
1,047.0	1.10	343.70	1,046.8	5.4	-10.4	9.7	0.34	-0.21	12.55
1,142.0	1.30	343.10	1,141.8	7.3	-11.0	11.6	0.21	0.21	-0.63
1,236.0	0.80	352.50	1,235.8	8.9	-11.4	13.3	0.56	-0.53	10.00
1,331.0	0.50	33.10	1,330.8	9.9	-11.2	14.1	0.56	-0.32	42.74
1,425.0	0.80	23.10	1,424.8	10.9	-10.7	14.7	0.34	0.32	-10.64
1,494.0	1.90	357.90	1,493.8	12.5	-10.6	16.0	1.77	1.59	-36.52
1,604.0	3.70	38.10	1,603.6	17.1	-8.5	19.1	2.33	1.64	36.55
1,699.0	5.00	354.00	1,698.4	23.6	-7.0	24.1	3.66	1.37	-46.42
1,793.0	7.20	337.50	1,791.9	33.1	-9.7	33.8	2.97	2.34	-17.55
1,887.0	8.80	330.20	1,884.9	44.8	-15.5	46.8	2.01	1.70	-7.77
1,982.0	8.60	327.90	1,978.9	57.1	-22.9	61.2	0.42	-0.21	-2.42
2,076.0	8.20	326.80	2,071.8	68.7	-30.3	74.9	0.46	-0.43	-1.17
2,170.0	7.90	326.60	2,164.9	79.7	-37.5	88.0	0.32	-0.32	-0.21
2,265.0	8.50	330.20	2,259.0	91.3	-44.6	101.5	0.83	0.63	3.79
2,358.0	8.40	330.60	2,350.9	103.1	-51.4	115.2	0.12	-0.11	0.43
2,453.0	8.30	330.00	2,444.9	115.1	-58.2	129.0	0.14	-0.11	-0.63
2,547.0	8.00	330.10	2,538.0	126.7	-64.9	142.3	0.32	-0.32	0.11
2,642.0	7.60	330.30	2,632.1	137.9	-71.3	155.2	0.42	-0.42	0.21
2,736.0	8.20	326.60	2,725.2	148.9	-78.0	168.1	0.84	0.64	-3.94
2,831.0	7.90	326.00	2,819.3	159.9	-85.4	181.3	0.33	-0.32	-0.63
2,925.0	7.50	326.80	2,912.4	170.4	-92.4	193.8	0.44	-0.43	0.85
3,020.0	8.40	330.70	3,006.5	181.7	-99.2	207.0	1.10	0.95	4.11
3,114.0	8.30	328.90	3,099.5	193.4	-106.0	220.6	0.30	-0.11	-1.91
3,208.0	8.20	328.70	3,192.5	205.0	-113.0	234.1	0.11	-0.11	-0.21
3,302.0	7.90	328.20	3,285.6	216.2	-119.9	247.2	0.33	-0.32	-0.53
3,397.0	7.70	329.30	3,379.7	227.2	-126.6	260.1	0.26	-0.21	1.16
3,491.0	7.20	329.10	3,472.9	237.7	-132.8	272.3	0.53	-0.53	-0.21
3,585.0	8.70	334.70	3,566.0	249.2	-138.9	285.3	1.79	1.60	5.96
3,680.0	8.30	333.80	3,660.0	261.8	-145.0	299.3	0.44	-0.42	-0.95
3,774.0	8.10	334.30	3,753.0	273.9	-150.9	312.7	0.23	-0.21	0.53
3,868.0	7.80	333.20	3,846.1	285.5	-156.6	325.7	0.36	-0.32	-1.17
3,962.0	7.50	333.70	3,939.3	296.7	-162.2	338.2	0.33	-0.32	0.53
4,057.0	7.20	334.50	4,033.5	307.7	-167.5	350.3	0.33	-0.32	0.84
4,151.0	7.60	332.70	4,126.7	318.5	-172.9	362.4	0.49	0.43	-1.91
4,245.0	8.90	334.10	4,219.8	330.6	-178.9	375.9	1.40	1.38	1.49
4,340.0	8.50	334.40	4,313.7	343.5	-185.2	390.2	0.42	-0.42	0.32
4,434.0	8.60	331.50	4,406.6	356.0	-191.5	404.2	0.47	0.11	-3.09
4,528.0	8.60	326.80	4,499.6	368.0	-198.7	418.2	0.75	0.00	-5.00
4,623.0	8.50	327.00	4,593.5	379.8	-206.4	432.3	0.11	-0.11	0.21
4,717.0	8.40	325.10	4,686.5	391.3	-214.2	446.1	0.32	-0.11	-2.02
4,811.0	8.00	327.40	4,779.5	402.4	-221.6	459.4	0.55	-0.43	2.45
4,905.0	7.70	327.40	4,872.6	413.3	-228.5	472.2	0.32	-0.32	0.00
5,000.0	7.30	328.70	4,966.8	423.8	-235.1	484.6	0.46	-0.42	1.37



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Survey										
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5,094.0	7.60	334.10	5,060.0	434.5	-240.9	496.8	0.81	0.32	5.74	
5,188.0	7.50	334.30	5,153.2	445.6	-246.3	509.1	0.11	-0.11	0.21	
5,283.0	7.00	333.00	5,247.5	456.3	-251.6	521.1	0.55	-0.53	-1.37	
5,377.0	4.00	337.30	5,341.0	464.5	-255.5	530.1	3.22	-3.19	4.57	
5,471.0	3.00	330.40	5,434.9	469.6	-258.0	535.8	1.15	-1.06	-7.34	
5,565.0	1.50	326.80	5,528.8	472.8	-259.8	539.5	1.60	-1.60	-3.83	
5,660.0	1.00	333.60	5,623.8	474.6	-260.9	541.5	0.55	-0.53	7.16	
5,754.0	0.50	33.20	5,717.7	475.7	-261.0	542.6	0.92	-0.53	63.40	
5,848.0	1.10	111.20	5,811.7	475.7	-260.0	542.1	1.18	0.64	82.98	
5,943.0	1.10	113.60	5,906.7	475.0	-258.3	540.7	0.05	0.00	2.53	
6,037.0	1.00	120.50	6,000.7	474.2	-256.7	539.2	0.17	-0.11	7.34	
6,131.0	1.00	134.20	6,094.7	473.2	-255.5	537.8	0.25	0.00	14.57	
6,225.0	1.20	134.20	6,188.7	472.0	-254.2	536.0	0.21	0.21	0.00	
6,320.0	1.20	131.90	6,283.7	470.6	-252.7	534.2	0.05	0.00	-2.42	
6,414.0	1.20	145.00	6,377.6	469.1	-251.4	532.3	0.29	0.00	13.94	
6,508.0	1.30	135.50	6,471.6	467.6	-250.1	530.3	0.24	0.11	-10.11	
6,603.0	1.30	119.00	6,566.6	466.3	-248.4	528.3	0.39	0.00	-17.37	
6,697.0	1.45	113.60	6,660.6	465.3	-246.4	526.5	0.21	0.16	-5.74	
6,791.0	1.50	121.10	6,754.5	464.2	-244.2	524.5	0.21	0.05	7.98	
6,886.0	1.20	131.80	6,849.5	462.9	-242.4	522.5	0.41	-0.32	11.26	
6,980.0	1.25	150.00	6,943.5	461.3	-241.2	520.5	0.42	0.05	19.36	
7,075.0	1.10	169.30	7,038.5	459.5	-240.5	518.6	0.44	-0.16	20.32	
7,169.0	1.00	180.60	7,132.4	457.8	-240.3	517.0	0.24	-0.11	12.02	
7,263.0	1.30	199.50	7,226.4	456.0	-240.7	515.6	0.51	0.32	20.11	
7,358.0	1.20	201.90	7,321.4	454.1	-241.4	514.2	0.12	-0.11	2.53	
7,452.0	1.10	192.10	7,415.4	452.3	-242.0	512.9	0.23	-0.11	-10.43	
7,547.0	1.30	203.30	7,510.4	450.4	-242.6	511.6	0.32	0.21	11.79	
7,641.0	0.40	170.80	7,604.4	449.1	-243.0	510.6	1.05	-0.96	-34.57	
7,735.0	0.50	322.80	7,698.4	449.1	-243.2	510.7	0.93	0.11	161.70	
7,830.0	1.10	303.30	7,793.3	449.9	-244.2	511.9	0.68	0.63	-20.53	
7,924.0	1.40	281.30	7,887.3	450.6	-246.1	513.4	0.60	0.32	-23.40	
8,019.0	1.70	260.00	7,982.3	450.6	-248.6	514.6	0.68	0.32	-22.42	
8,113.0	2.20	270.70	8,076.2	450.4	-251.8	515.9	0.66	0.53	11.38	
8,207.0	2.50	265.60	8,170.2	450.3	-255.6	517.6	0.39	0.32	-5.43	
8,302.0	2.50	264.00	8,265.1	449.9	-259.7	519.3	0.07	0.00	-1.68	
8,396.0	2.10	250.80	8,359.0	449.1	-263.4	520.3	0.70	-0.43	-14.04	
8,491.0	2.00	249.60	8,453.9	448.0	-266.6	520.8	0.11	-0.11	-1.26	
8,567.0	1.78	243.50	8,529.9	447.0	-268.9	521.1	0.39	-0.29	-8.03	
Projection to TD @ 8627.0' MD / 8589.9' TVD										
8,627.0	1.70	243.50	8,589.9	446.2	-270.5	521.1	0.13	-0.13	0.00	



Survey Report



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Wellbore:	A-9	Survey Calculation Method:	Minimum Curvature
Design:	A-9	Database:	EDM 5000.1 Single User Db

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
212.0	212.0	0.0	-0.7	First MWD Survey @ 212.0' MD / 212.0' TVD
8,627.0	8,589.9	446.2	-270.5	Projection to TD @ 8627.0' MD / 8589.9' TVD

Checked By: _____ Approved By: _____ Date: _____