



# **Laramie Energy, LLC**

**Mesa County, CO**

**Sup & Shep 25-11 Pad**

**Sup & Shep 0993-25-19W**

**A-2**

**Design: A-2**

## **QES Survey Report**

**19 January, 2019**





# Survey Report



<b>Company:</b>	Laramie Energy, LLC	<b>Local Co-ordinate Reference:</b>	Well Sup & Shep 0993-25-19W
<b>Project:</b>	Mesa County, CO	<b>TVD Reference:</b>	RKB @ 8108.0usft (H&P #522)
<b>Site:</b>	Sup & Shep 25-11 Pad	<b>MD Reference:</b>	RKB @ 8108.0usft (H&P #522)
<b>Well:</b>	Sup & Shep 0993-25-19W	<b>North Reference:</b>	True
<b>Wellbore:</b>	A-2	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	A-2	<b>Database:</b>	EDM 5000.1 Single User Db

<b>Project</b>	Mesa County, CO		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		
<b>Map Zone:</b>	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 0993-25-19W					
Well Position	+N/-S	0.0 usft	Northing:	1,521,783.39 usft	Latitude:	39.244873
	+E/-W	0.0 usft	Easting:	2,370,429.85 usft	Longitude:	-107.723223
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	8,078.0 usft

<b>Wellbore</b>	A-2				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	User Defined	1/16/2019	9.32	65.37	51,223.10000000

<b>Design</b>	A-2				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.0
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>	
	0.0	0.0	0.0	188.63	

<b>Survey Program</b>	<b>Date</b>	1/19/2019			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
303.0	8,863.0	QES MWD Surveys (A-2)	MWD default	MWD - Standard	

<b>Survey</b>									
<b>Measured Depth (usft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Vertical Section (usft)</b>	<b>Dogleg Rate (°/100usft)</b>	<b>Build Rate (°/100usft)</b>	<b>Turn Rate (°/100usft)</b>
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>First MWD Survey @ 303.0' MD / 302.4' TVD</b>									
303.0	6.50	181.50	302.4	-17.2	-0.4	17.0	2.15	2.15	0.00
396.0	9.10	185.20	394.5	-29.8	-1.3	29.6	2.85	2.80	3.98
488.0	12.00	185.80	484.9	-46.5	-2.9	46.4	3.15	3.15	0.65
581.0	13.30	187.20	575.7	-66.7	-5.2	66.8	1.44	1.40	1.51
673.0	15.20	184.70	664.8	-89.3	-7.5	89.4	2.17	2.07	-2.72
766.0	16.30	182.20	754.3	-114.5	-9.0	114.5	1.39	1.18	-2.69
859.0	17.90	185.60	843.2	-141.7	-10.9	141.8	2.03	1.72	3.66
951.0	19.30	185.10	930.4	-170.9	-13.6	171.1	1.53	1.52	-0.54
1,046.0	20.00	183.20	1,019.9	-202.8	-15.9	202.9	1.00	0.74	-2.00



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<b>Site:</b>	Sup & Shep 25-11 Pad	<b>MD Reference:</b>	RKB @ 8108.0usft (H&P #522)
<b>Well:</b>	Sup & Shep 0993-25-19W	<b>North Reference:</b>	True
<b>Wellbore:</b>	A-2	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	A-2	<b>Database:</b>	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)
1,140.0	20.20	182.90	1,108.2	-235.1	-17.7	235.1	0.24	0.21	-0.32
1,234.0	19.20	179.70	1,196.7	-266.7	-18.4	266.5	1.56	-1.06	-3.40
1,329.0	19.30	178.20	1,286.3	-298.0	-17.8	297.3	0.53	0.11	-1.58
1,423.0	19.90	179.80	1,374.9	-329.6	-17.3	328.4	0.86	0.64	1.70
1,505.0	20.40	180.40	1,451.9	-357.8	-17.3	356.4	0.66	0.61	0.73
1,609.0	20.00	178.30	1,549.5	-393.7	-16.9	391.8	0.80	-0.38	-2.02
1,704.0	19.60	184.00	1,638.9	-425.9	-17.6	423.7	2.07	-0.42	6.00
1,798.0	18.90	183.60	1,727.6	-456.8	-19.6	454.5	0.76	-0.74	-0.43
1,893.0	18.20	183.90	1,817.7	-486.9	-21.6	484.7	0.74	-0.74	0.32
1,987.0	19.20	183.90	1,906.7	-517.0	-23.6	514.7	1.06	1.06	0.00
2,081.0	18.50	184.10	1,995.7	-547.3	-25.8	545.0	0.75	-0.74	0.21
2,175.0	19.90	185.10	2,084.4	-578.1	-28.2	575.8	1.53	1.49	1.06
2,270.0	19.10	184.80	2,174.0	-609.7	-31.0	607.4	0.85	-0.84	-0.32
2,364.0	18.10	184.90	2,263.1	-639.6	-33.5	637.4	1.06	-1.06	0.11
2,458.0	19.60	186.00	2,352.0	-669.8	-36.4	667.7	1.64	1.60	1.17
2,552.0	19.20	186.00	2,440.7	-700.9	-39.7	698.9	0.43	-0.43	0.00
2,647.0	18.00	185.20	2,530.7	-731.0	-42.6	729.1	1.29	-1.26	-0.84
2,741.0	18.60	193.10	2,620.0	-760.1	-47.4	758.6	2.71	0.64	8.40
2,836.0	20.00	192.20	2,709.7	-790.7	-54.2	789.9	1.51	1.47	-0.95
2,930.0	19.20	191.60	2,798.2	-821.6	-60.7	821.4	0.88	-0.85	-0.64
3,025.0	18.30	191.70	2,888.2	-851.5	-66.9	851.9	0.95	-0.95	0.11
3,119.0	17.60	191.40	2,977.6	-879.9	-72.7	880.8	0.75	-0.74	-0.32
3,213.0	19.50	192.40	3,066.7	-909.1	-78.9	910.7	2.05	2.02	1.06
3,307.0	21.00	190.80	3,154.9	-941.0	-85.4	943.2	1.70	1.60	-1.70
3,402.0	19.70	191.30	3,244.0	-973.4	-91.7	976.2	1.38	-1.37	0.53
3,496.0	18.50	191.10	3,332.8	-1,003.6	-97.7	1,006.9	1.28	-1.28	-0.21
3,590.0	19.70	188.40	3,421.6	-1,033.9	-102.9	1,037.6	1.58	1.28	-2.87
3,685.0	18.80	188.70	3,511.3	-1,064.9	-107.5	1,068.9	0.95	-0.95	0.32
3,779.0	20.30	189.80	3,599.9	-1,095.9	-112.6	1,100.4	1.64	1.60	1.17
3,873.0	19.60	189.80	3,688.2	-1,127.5	-118.1	1,132.5	0.74	-0.74	0.00
3,967.0	18.90	190.00	3,777.0	-1,158.0	-123.4	1,163.4	0.75	-0.74	0.21
4,062.0	19.90	190.10	3,866.6	-1,189.1	-128.9	1,195.0	1.05	1.05	0.11
4,156.0	18.70	189.60	3,955.3	-1,219.7	-134.2	1,226.1	1.29	-1.28	-0.53
4,250.0	17.60	187.90	4,044.6	-1,248.7	-138.7	1,255.3	1.30	-1.17	-1.81
4,345.0	19.00	191.10	4,134.8	-1,278.1	-143.6	1,285.1	1.81	1.47	3.37
4,439.0	18.10	191.70	4,223.9	-1,307.4	-149.6	1,315.0	0.98	-0.96	0.64
4,533.0	19.80	192.30	4,312.8	-1,337.2	-155.9	1,345.5	1.82	1.81	0.64
4,628.0	19.50	191.40	4,402.3	-1,368.5	-162.5	1,377.4	0.45	-0.32	-0.95
4,722.0	18.90	189.90	4,491.1	-1,398.9	-168.2	1,408.3	0.83	-0.64	-1.60
4,816.0	17.90	188.50	4,580.3	-1,428.2	-172.9	1,437.9	1.16	-1.06	-1.49
4,910.0	19.30	190.60	4,669.4	-1,457.7	-177.9	1,467.9	1.65	1.49	2.23
5,005.0	18.50	191.00	4,759.2	-1,487.9	-183.7	1,498.7	0.85	-0.84	0.42
5,099.0	19.10	190.60	4,848.2	-1,517.7	-189.4	1,528.9	0.65	0.64	-0.43



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Survey										
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5,193.0	18.60	191.00	4,937.2	-1,547.5	-195.1	1,559.3	0.55	-0.53	0.43	
5,288.0	19.20	190.50	5,027.1	-1,577.8	-200.8	1,590.0	0.65	0.63	-0.53	
5,382.0	20.10	190.60	5,115.6	-1,608.8	-206.6	1,621.6	0.96	0.96	0.11	
5,476.0	19.00	190.70	5,204.2	-1,639.8	-212.4	1,653.1	1.17	-1.17	0.11	
5,570.0	19.20	191.30	5,293.0	-1,669.9	-218.3	1,683.8	0.30	0.21	0.64	
5,665.0	18.20	191.10	5,383.0	-1,699.8	-224.2	1,714.2	1.05	-1.05	-0.21	
5,759.0	19.10	191.30	5,472.0	-1,729.3	-230.0	1,744.2	0.96	0.96	0.21	
5,853.0	18.10	191.60	5,561.1	-1,758.7	-236.0	1,774.2	1.07	-1.06	0.32	
5,948.0	16.70	192.20	5,651.8	-1,786.5	-241.8	1,802.6	1.49	-1.47	0.63	
6,042.0	15.80	191.10	5,742.0	-1,812.3	-247.1	1,828.8	1.01	-0.96	-1.17	
6,136.0	15.20	188.90	5,832.6	-1,837.0	-251.5	1,853.9	0.89	-0.64	-2.34	
6,230.0	14.40	189.60	5,923.5	-1,860.7	-255.4	1,877.9	0.87	-0.85	0.74	
6,324.0	13.30	188.60	6,014.7	-1,882.9	-258.9	1,900.4	1.20	-1.17	-1.06	
6,419.0	12.60	194.40	6,107.3	-1,903.7	-263.1	1,921.7	1.55	-0.74	6.11	
6,513.0	11.60	195.30	6,199.2	-1,922.8	-268.2	1,941.3	1.08	-1.06	0.96	
6,607.0	9.80	197.00	6,291.6	-1,939.6	-273.0	1,958.6	1.94	-1.91	1.81	
6,702.0	9.30	195.80	6,385.3	-1,954.7	-277.5	1,974.2	0.57	-0.53	-1.26	
6,796.0	7.80	195.50	6,478.2	-1,968.1	-281.2	1,988.1	1.60	-1.60	-0.32	
6,891.0	7.50	196.50	6,572.4	-1,980.3	-284.7	2,000.6	0.35	-0.32	1.05	
6,985.0	5.90	194.30	6,665.8	-1,990.9	-287.7	2,011.5	1.72	-1.70	-2.34	
7,079.0	4.40	195.40	6,759.4	-1,999.0	-289.8	2,019.9	1.60	-1.60	1.17	
7,174.0	3.90	196.60	6,854.1	-2,005.6	-291.7	2,026.7	0.53	-0.53	1.26	
7,268.0	3.70	197.80	6,947.9	-2,011.6	-293.6	2,032.8	0.23	-0.21	1.28	
7,363.0	3.70	202.70	7,042.7	-2,017.3	-295.7	2,038.8	0.33	0.00	5.16	
7,457.0	2.00	197.10	7,136.6	-2,021.7	-297.3	2,043.4	1.83	-1.81	-5.96	
7,551.0	1.50	200.00	7,230.6	-2,024.4	-298.2	2,046.2	0.54	-0.53	3.09	
7,646.0	1.80	213.70	7,325.5	-2,026.8	-299.5	2,048.8	0.52	0.32	14.42	
7,740.0	1.90	228.50	7,419.5	-2,029.1	-301.5	2,051.3	0.52	0.11	15.74	
7,835.0	0.70	235.40	7,514.4	-2,030.5	-303.1	2,052.9	1.27	-1.26	7.26	
7,929.0	1.30	248.00	7,608.4	-2,031.2	-304.6	2,053.9	0.68	0.64	13.40	
8,024.0	1.40	249.60	7,703.4	-2,032.0	-306.7	2,055.0	0.11	0.11	1.68	
8,118.0	1.70	253.50	7,797.4	-2,032.8	-309.1	2,056.1	0.34	0.32	4.15	
8,212.0	1.80	248.80	7,891.3	-2,033.7	-311.8	2,057.5	0.19	0.11	-5.00	
8,306.0	1.80	243.90	7,985.3	-2,034.9	-314.5	2,059.0	0.16	0.00	-5.21	
8,401.0	2.20	242.50	8,080.2	-2,036.4	-317.5	2,061.0	0.42	0.42	-1.47	
8,495.0	1.70	247.80	8,174.2	-2,037.8	-320.3	2,062.8	0.56	-0.53	5.64	
8,590.0	1.40	268.30	8,269.1	-2,038.3	-322.8	2,063.7	0.66	-0.32	21.58	
8,684.0	1.40	252.40	8,363.1	-2,038.7	-325.1	2,064.4	0.41	0.00	-16.91	
8,778.0	1.20	253.30	8,457.1	-2,039.3	-327.1	2,065.3	0.21	-0.21	0.96	
8,803.0	1.10	252.60	8,482.1	-2,039.5	-327.6	2,065.5	0.40	-0.40	-2.80	
Projection to TD @ 8863.0' MD / 8542.1' TVD										
8,863.0	1.10	252.60	8,542.1	-2,039.8	-328.7	2,066.0	0.00	0.00	0.00	



## Survey Report



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<b>Well:</b>	Sup & Shep 0993-25-19W	<b>North Reference:</b>	True
<b>Wellbore:</b>	A-2	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	A-2	<b>Database:</b>	EDM 5000.1 Single User Db

### Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
303.0	302.4	-17.2	-0.4	First MWD Survey @ 303.0' MD / 302.4' TVD
8,863.0	8,542.1	-2,039.8	-328.7	Projection to TD @ 8863.0' MD / 8542.1' TVD

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_