



# **Laramie Energy, LLC**

**Mesa County, CO**

**Sup & Shep 25-11 Pad**

**Sup & Shep 0993-25-08W**

**B-8**

**Design: B-8**

## **QES Survey Report**

**19 November, 2018**





# Survey Report



<b>Company:</b>	Laramie Energy, LLC	<b>Local Co-ordinate Reference:</b>	Well Sup & Shep 0993-25-08W
<b>Project:</b>	Mesa County, CO	<b>TVD Reference:</b>	RKB @ 8108.0usft
<b>Site:</b>	Sup & Shep 25-11 Pad	<b>MD Reference:</b>	RKB @ 8108.0usft
<b>Well:</b>	Sup & Shep 0993-25-08W	<b>North Reference:</b>	True
<b>Wellbore:</b>	B-8	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	B-8	<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 0993-25-08W					
Well Position	+N/-S	0.0 usft	Northing:	1,521,766.96 usft	Latitude:	39.244824
	+E/-W	0.0 usft	Easting:	2,370,371.65 usft	Longitude:	-107.723427
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	8,078.0 usft

<b>Wellbore</b>	B-8				
<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	11/6/2018	9.34	65.38	51,244.00000000

<b>Design</b>	B-8				
<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	346.49	

<b>Survey Program</b>	<b>Date</b>	11/19/2018			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
305.0	8,678.0	QES MWD Surveys (B-8)	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 @ 305.0' MD / 304.7' TVD</b>									
305.0	4.40	7.10	304.7	11.6	1.4	11.0	1.44	1.44	0.00
397.0	5.70	2.80	396.3	19.7	2.1	18.6	1.47	1.41	-4.67
490.0	6.40	350.10	488.8	29.4	1.4	28.3	1.62	0.75	-13.66
583.0	7.50	341.20	581.1	40.3	-1.4	39.5	1.65	1.18	-9.57
675.0	7.40	340.80	672.4	51.5	-5.3	51.3	0.12	-0.11	-0.43
768.0	7.00	341.90	764.6	62.6	-9.0	63.0	0.45	-0.43	1.18
860.0	6.90	344.60	856.0	73.2	-12.2	74.1	0.37	-0.11	2.93
953.0	7.80	343.90	948.2	84.7	-15.5	85.9	0.97	0.97	-0.75
1,048.0	7.30	341.80	1,042.4	96.6	-19.1	98.4	0.60	-0.53	-2.21



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<b>Site:</b>	Sup & Shep 25-11 Pad	<b>MD Reference:</b>	RKB @ 8108.0usft
<b>Well:</b>	Sup & Shep 0993-25-08W	<b>North Reference:</b>	True
<b>Wellbore:</b>	B-8	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	B-8	<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)
1,142.0	7.20	351.60	1,135.6	108.1	-21.9	110.2	1.32	-0.11	10.43
1,236.0	8.20	349.10	1,228.8	120.5	-24.0	122.8	1.12	1.06	-2.66
1,330.0	8.70	344.10	1,321.8	133.9	-27.2	136.6	0.94	0.53	-5.32
1,425.0	9.50	346.10	1,415.6	148.5	-31.1	151.6	0.91	0.84	2.11
1,497.0	9.40	345.90	1,486.6	159.9	-33.9	163.4	0.15	-0.14	-0.28
1,604.0	9.30	344.00	1,592.2	176.7	-38.4	180.8	0.30	-0.09	-1.78
1,699.0	8.90	345.70	1,686.0	191.2	-42.4	195.8	0.51	-0.42	1.79
1,793.0	8.80	344.80	1,778.8	205.2	-46.0	210.3	0.18	-0.11	-0.96
1,888.0	8.70	344.70	1,872.7	219.1	-49.8	224.7	0.11	-0.11	-0.11
1,982.0	9.80	345.60	1,965.5	233.7	-53.7	239.8	1.18	1.17	0.96
2,076.0	9.10	346.00	2,058.2	248.7	-57.5	255.3	0.75	-0.74	0.43
2,170.0	8.80	344.30	2,151.1	262.8	-61.2	269.9	0.43	-0.32	-1.81
2,265.0	10.10	349.70	2,244.8	278.0	-64.7	285.5	1.65	1.37	5.68
2,359.0	9.80	349.40	2,337.4	294.0	-67.6	301.7	0.32	-0.32	-0.32
2,453.0	9.50	340.90	2,430.1	309.2	-71.7	317.4	1.55	-0.32	-9.04
2,547.0	9.10	340.20	2,522.8	323.5	-76.7	332.5	0.44	-0.43	-0.74
2,642.0	8.70	340.20	2,616.7	337.4	-81.7	347.1	0.42	-0.42	0.00
2,736.0	9.10	345.20	2,709.6	351.2	-86.0	361.6	0.93	0.43	5.32
2,831.0	8.50	344.70	2,803.4	365.3	-89.8	376.1	0.64	-0.63	-0.53
2,925.0	10.20	347.50	2,896.2	380.1	-93.4	391.4	1.87	1.81	2.98
3,020.0	9.70	347.60	2,989.8	396.1	-96.9	407.8	0.53	-0.53	0.11
3,114.0	9.30	347.80	3,082.5	411.3	-100.2	423.3	0.43	-0.43	0.21
3,208.0	9.10	348.60	3,175.3	426.0	-103.3	438.3	0.25	-0.21	0.85
3,302.0	10.30	344.90	3,267.9	441.4	-107.0	454.2	1.44	1.28	-3.94
3,397.0	9.80	345.00	3,361.5	457.4	-111.3	470.7	0.53	-0.53	0.11
3,491.0	9.10	343.30	3,454.2	472.3	-115.5	486.2	0.80	-0.74	-1.81
3,585.0	8.90	343.80	3,547.0	486.4	-119.7	500.9	0.23	-0.21	0.53
3,680.0	8.40	343.70	3,640.9	500.1	-123.7	515.1	0.53	-0.53	-0.11
3,774.0	8.70	346.90	3,733.9	513.6	-127.2	529.1	0.60	0.32	3.40
3,868.0	8.60	346.60	3,826.8	527.3	-130.4	543.2	0.12	-0.11	-0.32
3,962.0	9.70	347.00	3,919.6	541.9	-133.8	558.2	1.17	1.17	0.43
4,057.0	9.40	346.00	4,013.3	557.2	-137.5	573.9	0.36	-0.32	-1.05
4,151.0	8.80	344.20	4,106.1	571.6	-141.3	588.8	0.71	-0.64	-1.91
4,245.0	8.20	343.90	4,199.1	585.0	-145.1	602.7	0.64	-0.64	-0.32
4,340.0	10.00	346.90	4,292.9	599.5	-148.9	617.7	1.96	1.89	3.16
4,434.0	9.40	348.10	4,385.6	615.0	-152.3	633.5	0.67	-0.64	1.28
4,528.0	8.70	350.70	4,478.4	629.5	-155.1	648.3	0.86	-0.74	2.77
4,623.0	9.50	348.20	4,572.2	644.3	-157.8	663.3	0.94	0.84	-2.63
4,717.0	9.30	347.30	4,664.9	659.3	-161.1	678.6	0.26	-0.21	-0.96
4,811.0	9.10	344.80	4,757.7	673.8	-164.7	693.7	0.48	-0.21	-2.66
4,905.0	8.50	343.90	4,850.6	687.7	-168.6	708.0	0.65	-0.64	-0.96
5,000.0	9.40	346.10	4,944.5	702.0	-172.4	722.8	1.01	0.95	2.32
5,094.0	9.10	345.50	5,037.2	716.6	-176.1	737.9	0.34	-0.32	-0.64



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<b>Wellbore:</b>	B-8	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	B-8	<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)
5,188.0	8.90	345.90	5,130.1	730.9	-179.7	752.6	0.22	-0.21	0.43
5,283.0	8.30	343.60	5,224.0	744.6	-183.5	766.8	0.73	-0.63	-2.42
5,377.0	9.60	345.80	5,316.9	758.7	-187.3	781.4	1.43	1.38	2.34
5,471.0	8.90	346.80	5,409.6	773.3	-190.9	796.5	0.76	-0.74	1.06
5,565.0	10.50	346.60	5,502.3	788.8	-194.5	812.4	1.70	1.70	-0.21
5,660.0	9.80	345.90	5,595.8	805.0	-198.5	829.1	0.75	-0.74	-0.74
5,754.0	9.00	345.90	5,688.5	819.9	-202.2	844.5	0.85	-0.85	0.00
5,848.0	8.00	345.30	5,781.5	833.4	-205.7	858.4	1.07	-1.06	-0.64
5,943.0	8.20	345.50	5,875.6	846.3	-209.1	871.7	0.21	0.21	0.21
6,037.0	9.10	348.30	5,968.5	860.1	-212.2	885.9	1.06	0.96	2.98
6,131.0	8.90	347.90	6,061.3	874.5	-215.3	900.6	0.22	-0.21	-0.43
6,225.0	8.20	345.40	6,154.3	888.1	-218.5	914.6	0.84	-0.74	-2.66
6,320.0	7.90	346.30	6,248.3	901.0	-221.7	927.9	0.34	-0.32	0.95
6,414.0	6.90	348.20	6,341.6	912.8	-224.4	940.0	1.10	-1.06	2.02
6,508.0	6.20	350.60	6,435.0	923.3	-226.4	950.7	0.80	-0.74	2.55
6,603.0	5.40	350.00	6,529.5	932.8	-228.0	960.2	0.84	-0.84	-0.63
6,697.0	4.70	348.20	6,623.1	940.9	-229.6	968.5	0.76	-0.74	-1.91
6,791.0	4.10	347.90	6,716.8	948.0	-231.1	975.7	0.64	-0.64	-0.32
6,886.0	3.30	346.80	6,811.6	953.9	-232.4	981.8	0.85	-0.84	-1.16
6,980.0	3.00	349.40	6,905.5	959.0	-233.5	987.0	0.35	-0.32	2.77
7,075.0	2.40	352.80	7,000.4	963.4	-234.2	991.5	0.65	-0.63	3.58
7,169.0	2.10	354.20	7,094.3	967.1	-234.6	995.1	0.32	-0.32	1.49
7,264.0	2.00	0.20	7,189.2	970.5	-234.8	998.5	0.25	-0.11	6.32
7,358.0	1.60	6.20	7,283.2	973.4	-234.6	1,001.3	0.47	-0.43	6.38
7,452.0	1.00	18.90	7,377.2	975.5	-234.2	1,003.2	0.70	-0.64	13.51
7,547.0	0.35	85.90	7,472.2	976.3	-233.7	1,003.9	0.97	-0.68	70.53
7,641.0	0.62	99.34	7,566.2	976.2	-232.9	1,003.6	0.31	0.29	14.30
7,736.0	0.66	107.70	7,661.2	976.0	-231.9	1,003.1	0.11	0.04	8.80
7,830.0	0.35	170.90	7,755.2	975.5	-231.3	1,002.6	0.63	-0.33	67.23
7,924.0	0.10	182.00	7,849.1	975.2	-231.2	1,002.2	0.27	-0.27	11.81
8,079.0	0.09	279.30	8,004.1	975.1	-231.4	1,002.1	0.09	-0.01	62.77
8,113.0	0.80	249.30	8,038.1	975.0	-231.6	1,002.1	2.13	2.09	-88.24
8,207.0	1.00	247.90	8,132.1	974.4	-233.0	1,001.9	0.21	0.21	-1.49
8,302.0	1.40	238.00	8,227.1	973.5	-234.7	1,001.4	0.47	0.42	-10.42
8,396.0	1.60	229.20	8,321.1	972.0	-236.7	1,000.4	0.32	0.21	-9.36
8,490.0	1.10	240.60	8,415.1	970.7	-238.5	999.6	0.60	-0.53	12.13
8,585.0	0.90	242.60	8,510.0	970.0	-239.9	999.2	0.21	-0.21	2.11
8,618.0	0.70	239.70	8,543.0	969.7	-240.4	999.1	0.62	-0.61	-8.79
Projection to TD @ 8678.0' MD / 8603.0' TVD									
8,678.0	0.70	239.70	8,603.0	969.4	-241.0	998.8	0.00	0.00	0.00



## Survey Report



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<b>Project:</b>	Mesa County, CO	<b>TVD Reference:</b>	RKB @ 8108.0usft
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Design Annotations					
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		+N/-S (usft)	+E/-W (usft)	Comment	
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8,678.0	8,603.0	969.4	-241.0	Projection to TD @ 8678.0' MD / 8603.0' TVD	