



# **Laramie Energy, LLC**

**Mesa County, CO**

**Sup & Shep 25-11 Pad**

**Sup & Shep 0993-25-09W**

**B-9**

**Design: B-9**

## **QES Survey Report**

**16 November, 2018**





## Survey Report



<b>Company:</b>	Laramie Energy, LLC	<b>Local Co-ordinate Reference:</b>	Well Sup & Shep 0993-25-09W
<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 0993-25-09W	<b>North Reference:</b>	True
<b>Wellbore:</b>	B-9	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	B-9	<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 0993-25-09W					
Well Position	+N/-S	0.0 usft	Northing:	1,521,762.81 usft	Latitude:	39.244812
	+E/-W	0.0 usft	Easting:	2,370,362.49 usft	Longitude:	-107.723459
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	8,078.0 usft

<b>Wellbore</b>	B-9				
<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	51,244.20000000

<b>Design</b>	B-9				
<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	340.75	

<b>Survey Program</b>	<b>Date</b>	11/16/2018			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
212.0	8,633.0	QES MWD Surveys (B-9)	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 @ 212.0' MD / 211.9' TVD</b>										
212.0	2.80	342.50	211.9	4.9	-1.6	5.2	1.32	1.32	0.00	
305.0	5.00	344.70	304.7	11.0	-3.3	11.5	2.37	2.37	2.37	
397.0	6.90	346.20	396.2	20.3	-5.7	21.0	2.07	2.07	1.63	
490.0	7.60	346.20	488.5	31.6	-8.5	32.7	0.75	0.75	0.00	
583.0	7.90	343.20	580.6	43.7	-11.8	45.2	0.54	0.32	-3.23	
675.0	7.00	334.60	671.8	54.9	-16.0	57.1	1.55	-0.98	-9.35	
768.0	7.60	332.20	764.1	65.4	-21.3	68.8	0.72	0.65	-2.58	
860.0	9.00	335.90	855.1	77.4	-27.1	82.0	1.63	1.52	4.02	
953.0	8.80	341.60	947.0	90.8	-32.3	96.3	0.97	-0.22	6.13	



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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 0993-25-09W	<b>North Reference:</b>	True
<b>Wellbore:</b>	B-9	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	B-9	<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)
1,048.0	8.90	342.30	1,040.9	104.7	-36.9	111.0	0.15	0.11	0.74
1,142.0	9.00	341.20	1,133.7	118.5	-41.4	125.6	0.21	0.11	-1.17
1,236.0	9.40	339.30	1,226.5	132.7	-46.5	140.6	0.53	0.43	-2.02
1,330.0	8.30	341.30	1,319.4	146.3	-51.4	155.1	1.21	-1.17	2.13
1,425.0	7.90	342.30	1,413.4	159.0	-55.6	168.4	0.45	-0.42	1.05
1,492.0	8.10	340.00	1,479.8	167.8	-58.6	177.8	0.56	0.30	-3.43
1,605.0	8.30	340.20	1,591.6	183.0	-64.1	193.9	0.18	0.18	0.18
1,699.0	7.90	344.00	1,684.7	195.6	-68.2	207.1	0.71	-0.43	4.04
1,793.0	8.00	345.80	1,777.8	208.1	-71.6	220.1	0.29	0.11	1.91
1,888.0	7.70	345.10	1,871.9	220.7	-74.8	233.0	0.33	-0.32	-0.74
1,982.0	7.70	340.60	1,965.1	232.7	-78.5	245.6	0.64	0.00	-4.79
2,076.0	7.20	338.50	2,058.3	244.1	-82.8	257.8	0.61	-0.53	-2.23
2,171.0	8.30	341.70	2,152.4	256.2	-87.1	270.6	1.24	1.16	3.37
2,265.0	8.00	343.10	2,245.4	268.9	-91.1	283.9	0.38	-0.32	1.49
2,359.0	7.80	343.00	2,338.5	281.2	-94.9	296.8	0.21	-0.21	-0.11
2,453.0	7.40	343.50	2,431.7	293.1	-98.5	309.2	0.43	-0.43	0.53
2,548.0	8.50	332.80	2,525.8	305.3	-103.4	322.3	1.94	1.16	-11.26
2,642.0	8.60	330.80	2,618.8	317.6	-110.0	336.1	0.33	0.11	-2.13
2,737.0	8.20	330.40	2,712.7	329.7	-116.9	349.8	0.43	-0.42	-0.42
2,831.0	8.20	336.60	2,805.8	341.6	-122.8	363.0	0.94	0.00	6.60
2,926.0	7.40	332.90	2,899.9	353.3	-128.3	375.9	0.99	-0.84	-3.89
3,020.0	8.30	343.00	2,993.0	365.2	-133.0	388.6	1.75	0.96	10.74
3,114.0	8.30	346.70	3,086.0	378.3	-136.6	402.2	0.57	0.00	3.94
3,208.0	7.50	349.50	3,179.2	390.9	-139.3	415.0	0.94	-0.85	2.98
3,303.0	8.00	345.10	3,273.3	403.4	-142.1	427.7	0.82	0.53	-4.63
3,397.0	8.00	341.80	3,366.4	415.9	-145.8	440.7	0.49	0.00	-3.51
3,491.0	7.30	342.10	3,459.5	427.8	-149.7	453.3	0.75	-0.74	0.32
3,586.0	7.60	347.40	3,553.7	439.7	-152.9	465.5	0.79	0.32	5.58
3,680.0	8.10	339.40	3,646.9	452.0	-156.6	478.3	1.28	0.53	-8.51
3,774.0	8.00	337.60	3,739.9	464.2	-161.4	491.5	0.29	-0.11	-1.91
3,868.0	7.90	337.00	3,833.0	476.2	-166.5	504.5	0.14	-0.11	-0.64
3,963.0	7.60	336.30	3,927.2	488.0	-171.5	517.2	0.33	-0.32	-0.74
4,057.0	8.80	341.50	4,020.2	500.5	-176.3	530.6	1.50	1.28	5.53
4,151.0	8.80	340.60	4,113.1	514.1	-181.0	545.0	0.15	0.00	-0.96
4,246.0	8.40	340.80	4,207.0	527.5	-185.7	559.2	0.42	-0.42	0.21
4,340.0	8.30	339.20	4,300.0	540.3	-190.3	572.9	0.27	-0.11	-1.70
4,434.0	7.90	336.00	4,393.1	552.6	-195.4	586.1	0.64	-0.43	-3.40
4,529.0	7.50	336.10	4,487.2	564.2	-200.5	598.8	0.42	-0.42	0.11
4,623.0	7.50	335.70	4,580.4	575.4	-205.6	611.0	0.06	0.00	-0.43
4,717.0	7.40	334.20	4,673.6	586.4	-210.7	623.1	0.23	-0.11	-1.60
4,811.0	7.00	332.70	4,766.9	597.0	-216.0	634.8	0.47	-0.43	-1.60
4,906.0	7.60	333.30	4,861.1	607.7	-221.5	646.8	0.64	0.63	0.63
5,000.0	8.20	335.80	4,954.2	619.4	-227.0	659.6	0.74	0.64	2.66



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<b>Wellbore:</b>	B-9	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	B-9	<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)
5,094.0	8.30	344.70	5,047.3	632.1	-231.5	673.1	1.36	0.11	9.47
5,189.0	8.30	346.70	5,141.3	645.3	-234.9	686.7	0.30	0.00	2.11
5,283.0	7.90	343.80	5,234.3	658.1	-238.3	699.9	0.61	-0.43	-3.09
5,377.0	7.40	342.90	5,327.5	670.1	-241.9	712.4	0.55	-0.53	-0.96
5,471.0	6.70	348.70	5,420.8	681.3	-244.7	723.9	1.06	-0.74	6.17
5,566.0	6.90	349.40	5,515.1	692.3	-246.9	735.0	0.23	0.21	0.74
5,660.0	6.80	347.20	5,608.4	703.3	-249.1	746.1	0.30	-0.11	-2.34
5,755.0	5.90	346.00	5,702.9	713.5	-251.6	756.6	0.96	-0.95	-1.26
5,849.0	5.60	341.40	5,796.4	722.6	-254.2	766.0	0.58	-0.32	-4.89
5,943.0	4.50	343.00	5,890.0	730.5	-256.7	774.3	1.18	-1.17	1.70
6,037.0	3.70	345.40	5,983.8	736.9	-258.6	781.0	0.87	-0.85	2.55
6,132.0	3.40	342.20	6,078.6	742.6	-260.2	786.8	0.38	-0.32	-3.37
6,226.0	2.40	346.00	6,172.5	747.1	-261.5	791.6	1.08	-1.06	4.04
6,320.0	2.20	11.40	6,266.4	750.8	-261.7	795.1	1.10	-0.21	27.02
6,414.0	1.80	5.50	6,360.3	754.0	-261.2	798.0	0.48	-0.43	-6.28
6,508.0	1.40	6.80	6,454.3	756.7	-260.9	800.4	0.43	-0.43	1.38
6,603.0	1.40	22.20	6,549.3	758.9	-260.3	802.3	0.39	0.00	16.21
6,697.0	1.00	30.00	6,643.3	760.7	-259.5	803.7	0.46	-0.43	8.30
6,791.0	1.00	44.10	6,737.2	762.0	-258.5	804.6	0.26	0.00	15.00
6,886.0	0.80	38.50	6,832.2	763.1	-257.5	805.3	0.23	-0.21	-5.89
6,981.0	0.60	36.00	6,927.2	764.0	-256.8	805.9	0.21	-0.21	-2.63
7,075.0	0.20	77.20	7,021.2	764.4	-256.3	806.2	0.50	-0.43	43.83
7,169.0	0.30	179.20	7,115.2	764.2	-256.2	805.9	0.42	0.11	108.51
7,264.0	0.40	181.00	7,210.2	763.6	-256.2	805.4	0.11	0.11	1.89
7,358.0	0.50	201.50	7,304.2	762.9	-256.3	804.8	0.20	0.11	21.81
7,453.0	0.62	212.80	7,399.2	762.1	-256.8	804.1	0.17	0.13	11.89
7,547.0	0.80	204.70	7,493.2	761.1	-257.3	803.4	0.22	0.19	-8.62
7,642.0	1.05	190.00	7,588.2	759.6	-257.7	802.1	0.36	0.26	-15.47
7,736.0	0.90	238.70	7,682.2	758.4	-258.5	801.2	0.87	-0.16	51.81
7,830.0	0.80	257.70	7,776.2	757.9	-259.8	801.1	0.32	-0.11	20.21
7,925.0	1.00	273.30	7,871.2	757.8	-261.3	801.5	0.33	0.21	16.42
8,019.0	1.60	285.10	7,965.1	758.2	-263.3	802.6	0.70	0.64	12.55
8,113.0	1.40	294.40	8,059.1	759.0	-265.7	804.1	0.33	-0.21	9.89
8,208.0	1.50	308.40	8,154.1	760.2	-267.7	806.0	0.39	0.11	14.74
8,302.0	1.70	330.50	8,248.0	762.2	-269.3	808.4	0.69	0.21	23.51
8,397.0	1.60	318.30	8,343.0	764.4	-270.9	811.0	0.38	-0.11	-12.84
8,491.0	1.10	323.40	8,437.0	766.1	-272.3	813.1	0.55	-0.53	5.43
8,573.0	1.20	319.70	8,519.0	767.4	-273.4	814.6	0.15	0.12	-4.51
TD @ 8633.0' MD / 8578.9' TVD									
8,633.0	1.20	319.70	8,578.9	768.4	-274.2	815.8	0.00	0.00	0.00



## Survey Report



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<b>Well:</b>	Sup & Shep 0993-25-09W	<b>North Reference:</b>	True
<b>Wellbore:</b>	B-9	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	B-9	<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)	
212.0	211.9	4.9	-1.6	First MWD Survey @ 212.0' MD / 211.9' TVD
8,633.0	8,578.9	768.4	-274.2	TD @ 8633.0' MD / 8578.9' TVD

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