



Laramie Energy, LLC

Mesa County, CO

Sup & Shep 25-11 Pad

Sup & Shep Federal 0993-25-14W

A-8

Design: A-8

QES Survey Report

26 November, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Sup & Shep Federal 0993-25-14W
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 Federal 0993-25-14W	North Reference:	True
Wellbore:	A-8	Survey Calculation Method:	Minimum Curvature
Design:	A-8	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 Federal 0993-25-14W					
Well Position	+N/-S	0.0 usft	Northing:	1,521,757.75 usft	Latitude:	39.244799
	+E/-W	0.0 usft	Easting:	2,370,375.39 usft	Longitude:	-107.723413
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	8,078.0 usft

Wellbore	A-8				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	User Defined	11/2/2018	9.34	65.38	51,244.00000000

Design	A-8				
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	246.23	

Survey Program	Date	11/25/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
245.0	8,745.0	QES MWD Surveys (A-8)	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 @ 245.0' MD / 244.9' TVD									
245.0	2.60	188.00	244.9	-5.5	-0.8	2.9	1.06	1.06	0.00
305.0	3.80	187.10	304.8	-8.8	-1.2	4.7	2.00	2.00	-1.50
397.0	4.20	209.90	396.6	-14.8	-3.3	8.9	1.77	0.43	24.78
490.0	5.10	224.00	489.3	-20.7	-7.8	15.5	1.56	0.97	15.16
583.0	6.80	232.90	581.8	-27.0	-15.1	24.7	2.07	1.83	9.57
675.0	7.70	240.80	673.1	-33.3	-24.8	36.1	1.46	0.98	8.59
768.0	8.90	247.80	765.1	-39.0	-36.9	49.5	1.68	1.29	7.53
860.0	10.80	247.30	855.7	-45.1	-51.5	65.3	2.07	2.07	-0.54
953.0	12.60	247.60	946.8	-52.3	-68.9	84.1	1.94	1.94	0.32



Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Sup & Shep Federal 0993-25-14W
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 Federal 0993-25-14W	North Reference:	True
Wellbore:	A-8	Survey Calculation Method:	Minimum Curvature
Design:	A-8	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)
1,048.0	14.20	248.30	1,039.2	-60.5	-89.3	106.1	1.69	1.68	0.74
1,142.0	14.30	248.60	1,130.3	-69.0	-110.8	129.2	0.13	0.11	0.32
1,236.0	14.50	247.80	1,221.4	-77.7	-132.5	152.6	0.30	0.21	-0.85
1,330.0	14.00	246.30	1,312.5	-86.7	-153.8	175.7	0.66	-0.53	-1.60
1,425.0	12.90	245.20	1,404.9	-95.8	-174.0	197.8	1.19	-1.16	-1.16
1,493.0	13.30	245.90	1,471.1	-102.2	-188.0	213.2	0.63	0.59	1.03
1,602.0	14.90	249.00	1,576.8	-112.3	-212.5	239.8	1.62	1.47	2.84
1,697.0	14.60	249.60	1,668.7	-120.9	-235.2	263.9	0.35	-0.32	0.63
1,791.0	14.30	249.60	1,759.7	-129.1	-257.1	287.3	0.32	-0.32	0.00
1,885.0	14.20	249.50	1,850.8	-137.1	-278.8	310.4	0.11	-0.11	-0.11
1,980.0	14.10	249.60	1,942.9	-145.3	-300.6	333.6	0.11	-0.11	0.11
2,074.0	15.30	248.90	2,033.8	-153.7	-322.9	357.5	1.29	1.28	-0.74
2,168.0	15.30	249.00	2,124.5	-162.6	-346.0	382.2	0.03	0.00	0.11
2,262.0	15.00	245.30	2,215.2	-172.1	-368.7	406.8	1.08	-0.32	-3.94
2,356.0	14.50	245.10	2,306.2	-182.2	-390.4	430.7	0.53	-0.53	-0.21
2,451.0	15.60	244.90	2,397.9	-192.6	-412.7	455.4	1.16	1.16	-0.21
2,545.0	15.30	244.60	2,488.5	-203.3	-435.4	480.4	0.33	-0.32	-0.32
2,640.0	15.00	243.70	2,580.2	-214.1	-457.7	505.2	0.40	-0.32	-0.95
2,734.0	16.10	245.90	2,670.8	-224.8	-480.5	530.4	1.33	1.17	2.34
2,828.0	15.60	245.30	2,761.2	-235.4	-503.9	556.1	0.56	-0.53	-0.64
2,923.0	15.30	245.20	2,852.7	-246.0	-526.9	581.4	0.32	-0.32	-0.11
3,018.0	15.10	245.10	2,944.4	-256.5	-549.5	606.3	0.21	-0.21	-0.11
3,112.0	14.90	245.30	3,035.2	-266.7	-571.6	630.6	0.22	-0.21	0.21
3,206.0	14.50	244.60	3,126.1	-276.8	-593.2	654.5	0.47	-0.43	-0.74
3,300.0	15.60	246.40	3,216.9	-286.9	-615.4	678.9	1.27	1.17	1.91
3,395.0	15.20	246.00	3,308.5	-297.1	-638.5	704.1	0.44	-0.42	-0.42
3,489.0	14.80	247.00	3,399.3	-306.8	-660.8	728.4	0.51	-0.43	1.06
3,583.0	14.20	246.80	3,490.3	-316.0	-682.5	751.9	0.64	-0.64	-0.21
3,677.0	15.30	247.80	3,581.2	-325.3	-704.5	775.9	1.20	1.17	1.06
3,772.0	15.10	247.40	3,672.9	-334.7	-727.6	800.8	0.24	-0.21	-0.42
3,866.0	14.60	247.30	3,763.7	-344.0	-749.8	824.9	0.53	-0.53	-0.11
3,960.0	14.40	247.40	3,854.8	-353.1	-771.5	848.4	0.21	-0.21	0.11
4,055.0	14.10	247.10	3,946.8	-362.1	-793.1	871.8	0.33	-0.32	-0.32
4,149.0	15.50	249.50	4,037.7	-371.0	-815.4	895.8	1.63	1.49	2.55
4,243.0	15.10	249.80	4,128.4	-379.6	-838.7	920.5	0.43	-0.43	0.32
4,338.0	14.80	249.60	4,220.2	-388.1	-861.6	945.0	0.32	-0.32	-0.21
4,432.0	14.20	250.10	4,311.2	-396.2	-883.7	968.5	0.65	-0.64	0.53
4,526.0	14.20	248.80	4,402.3	-404.3	-905.3	991.5	0.34	0.00	-1.38
4,621.0	13.80	248.90	4,494.5	-412.6	-926.8	1,014.4	0.42	-0.42	0.11
4,715.0	15.70	248.60	4,585.4	-421.3	-949.1	1,038.4	2.02	2.02	-0.32
4,809.0	16.00	246.30	4,675.8	-431.1	-972.8	1,064.0	0.74	0.32	-2.45
4,903.0	15.60	245.40	4,766.2	-441.6	-996.1	1,089.6	0.50	-0.43	-0.96
4,998.0	15.20	244.70	4,857.8	-452.2	-1,019.0	1,114.8	0.46	-0.42	-0.74



Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Sup & Shep Federal 0993-25-14W
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 Federal 0993-25-14W	North Reference:	True
Wellbore:	A-8	Survey Calculation Method:	Minimum Curvature
Design:	A-8	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)	
5,092.0	16.30	248.10	4,948.3	-462.4	-1,042.4	1,140.3	1.53	1.17	3.62	
5,186.0	15.90	247.90	5,038.6	-472.2	-1,066.5	1,166.4	0.43	-0.43	-0.21	
5,281.0	15.80	246.80	5,130.0	-482.2	-1,090.5	1,192.3	0.33	-0.11	-1.16	
5,375.0	15.70	250.00	5,220.5	-491.6	-1,114.2	1,217.8	0.93	-0.11	3.40	
5,469.0	15.90	250.00	5,310.9	-500.3	-1,138.3	1,243.4	0.21	0.21	0.00	
5,563.0	15.20	248.50	5,401.5	-509.2	-1,161.8	1,268.5	0.86	-0.74	-1.60	
5,658.0	14.50	247.10	5,493.3	-518.4	-1,184.4	1,292.9	0.83	-0.74	-1.47	
5,752.0	14.20	246.50	5,584.4	-527.6	-1,205.8	1,316.2	0.36	-0.32	-0.64	
5,846.0	14.10	245.70	5,675.5	-536.9	-1,226.8	1,339.1	0.23	-0.11	-0.85	
5,941.0	13.40	244.30	5,767.8	-546.5	-1,247.3	1,361.7	0.82	-0.74	-1.47	
6,035.0	12.70	241.70	5,859.4	-556.1	-1,266.2	1,382.9	0.97	-0.74	-2.77	
6,129.0	12.00	243.40	5,951.2	-565.4	-1,284.0	1,403.0	0.84	-0.74	1.81	
6,223.0	11.30	245.60	6,043.3	-573.5	-1,301.1	1,421.9	0.88	-0.74	2.34	
6,318.0	10.50	244.70	6,136.6	-581.1	-1,317.4	1,439.9	0.86	-0.84	-0.95	
6,412.0	10.20	246.70	6,229.0	-588.0	-1,332.8	1,456.8	0.50	-0.32	2.13	
6,506.0	9.40	247.30	6,321.6	-594.3	-1,347.5	1,472.8	0.86	-0.85	0.64	
6,601.0	8.70	245.40	6,415.5	-600.3	-1,361.2	1,487.7	0.80	-0.74	-2.00	
6,695.0	7.90	243.70	6,508.5	-606.1	-1,373.5	1,501.3	0.89	-0.85	-1.81	
6,791.0	7.30	241.00	6,603.6	-612.0	-1,384.7	1,513.9	0.73	-0.63	-2.81	
6,884.0	6.50	245.80	6,696.0	-617.0	-1,394.7	1,525.1	1.06	-0.86	5.16	
6,978.0	6.20	245.90	6,789.4	-621.3	-1,404.2	1,535.5	0.32	-0.32	0.11	
7,072.0	5.50	244.80	6,882.9	-625.2	-1,412.9	1,545.1	0.75	-0.74	-1.17	
7,167.0	4.00	245.60	6,977.6	-628.5	-1,420.0	1,552.9	1.58	-1.58	0.84	
7,261.0	3.50	241.60	7,071.4	-631.3	-1,425.5	1,559.1	0.60	-0.53	-4.26	
7,356.0	3.20	239.10	7,166.2	-634.0	-1,430.4	1,564.6	0.35	-0.32	-2.63	
7,450.0	2.50	244.60	7,260.1	-636.2	-1,434.5	1,569.2	0.80	-0.74	5.85	
7,545.0	1.80	252.80	7,355.0	-637.6	-1,437.8	1,572.8	0.80	-0.74	8.63	
7,639.0	1.90	257.90	7,449.0	-638.3	-1,440.7	1,575.8	0.20	0.11	5.43	
7,733.0	1.60	254.70	7,542.9	-639.0	-1,443.5	1,578.6	0.34	-0.32	-3.40	
7,828.0	1.40	239.70	7,637.9	-639.9	-1,445.8	1,581.1	0.46	-0.21	-15.79	
7,922.0	1.40	237.60	7,731.9	-641.1	-1,447.7	1,583.3	0.05	0.00	-2.23	
8,017.0	2.10	230.50	7,826.8	-642.9	-1,450.1	1,586.2	0.77	0.74	-7.47	
8,111.0	1.10	230.60	7,920.8	-644.5	-1,452.1	1,588.7	1.06	-1.06	0.11	
8,205.0	1.20	246.20	8,014.8	-645.5	-1,453.7	1,590.6	0.35	0.11	16.60	
8,300.0	1.90	248.80	8,109.7	-646.5	-1,456.1	1,593.1	0.74	0.74	2.74	
8,394.0	1.50	233.90	8,203.7	-647.8	-1,458.5	1,595.9	0.63	-0.43	-15.85	
8,488.0	1.50	233.90	8,297.7	-649.2	-1,460.5	1,598.3	0.00	0.00	0.00	
8,583.0	1.80	235.20	8,392.6	-650.8	-1,462.7	1,601.0	0.32	0.32	1.37	
8,677.0	1.80	237.50	8,486.6	-652.4	-1,465.2	1,603.9	0.08	0.00	2.45	
8,685.0	1.50	233.80	8,494.6	-652.6	-1,465.4	1,604.1	3.98	-3.75	-46.25	
Projection to TD @ 8745.0' MD / 8554.5' TVD										
8,745.0	1.50	233.80	8,554.5	-653.5	-1,466.6	1,605.6	0.00	0.00	0.00	



Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Sup & Shep Federal 0993-25-14W
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 Federal 0993-25-14W	North Reference:	True
Wellbore:	A-8	Survey Calculation Method:	Minimum Curvature
Design:	A-8	Database:	EDM 5000.1 Single User Db

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
245.0	244.9	-5.5	-0.8	First MWD Survey @ 245.0' MD / 244.9' TVD
8,745.0	8,554.5	-653.5	-1,466.6	Projection to TD @ 8745.0' MD / 8554.5' TVD

Checked By: _____ Approved By: _____ Date: _____