



Laramie Energy, LLC

Mesa County, CO

Gunderson 0993 21-05 Pad

BCU 0993-21-08E

Wellbore #1

Design: Wellbore #1

QES Survey Report

07 September, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well BCU 0993-21-08E
Project:	Mesa County, CO	TVD Reference:	Well @ 7287.0usft (H&P #522)
Site:	Gunderson 0993 21-05 Pad	MD Reference:	Well @ 7287.0usft (H&P #522)
Well:	BCU 0993-21-08E	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	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		Gunderson 0993 21-05 Pad			
Site Position:		Northing:	1,529,627.90 usft	Latitude:	39.265321
From:	Lat/Long	Easting:	2,354,508.90 usft	Longitude:	-107.780117
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-1.44 °

Well	BCU 0993-21-08E					
Well Position	+N/-S	0.0 usft	Northing:	1,529,642.82 usft	Latitude:	39.265362
	+E/-W	0.0 usft	Easting:	2,354,508.71 usft	Longitude:	-107.780119
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	7,257.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	User Defined	9/3/2018	9.48	65.43	51,386.50000000

Design	Wellbore #1				
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	95.92	

Survey Program	Date	9/7/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
301.0	8,568.0	QES MWD Surveys (Wellbore #1)	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 @ 301.0' MD / 300.7' TVD									
301.0	4.30	97.30	300.7	-1.4	11.2	11.3	1.43	1.43	0.00
393.0	6.50	102.60	392.3	-3.0	19.7	19.9	2.45	2.39	5.76
486.0	9.10	99.90	484.4	-5.4	32.1	32.5	2.82	2.80	-2.90
579.0	11.20	97.10	576.0	-7.8	48.3	48.8	2.32	2.26	-3.01
671.0	14.00	95.00	665.8	-9.9	68.3	68.9	3.08	3.04	-2.28
764.0	17.70	92.40	755.2	-11.5	93.6	94.3	4.05	3.98	-2.80
856.0	22.10	92.60	841.7	-12.8	124.9	125.5	4.78	4.78	0.22
949.0	24.80	93.20	927.0	-14.7	161.8	162.5	2.91	2.90	0.65
1,043.0	27.80	95.70	1,011.3	-18.0	203.3	204.1	3.40	3.19	2.66



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Design:	Wellbore #1	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)
1,138.0	31.10	95.80	1,094.0	-22.7	249.8	250.8	3.47	3.47	0.11
1,232.0	32.80	96.00	1,173.7	-27.8	299.3	300.5	1.81	1.81	0.21
1,327.0	34.10	96.30	1,253.0	-33.4	351.3	352.9	1.38	1.37	0.32
1,421.0	36.50	95.20	1,329.7	-38.8	405.4	407.2	2.64	2.55	-1.17
1,516.0	36.50	96.00	1,406.1	-44.3	461.6	463.7	0.50	0.00	0.84
1,623.0	34.90	95.20	1,493.0	-50.4	523.8	526.2	1.56	-1.50	-0.75
1,718.0	35.50	95.20	1,570.6	-55.4	578.3	580.9	0.63	0.63	0.00
1,812.0	36.30	95.00	1,646.7	-60.3	633.2	636.0	0.86	0.85	-0.21
1,907.0	36.80	94.80	1,723.1	-65.1	689.6	692.6	0.54	0.53	-0.21
2,001.0	37.20	94.50	1,798.1	-69.7	745.9	749.2	0.47	0.43	-0.32
2,096.0	36.50	95.70	1,874.1	-74.8	802.7	806.1	1.06	-0.74	1.26
2,190.0	36.00	95.40	1,949.9	-80.1	858.0	861.7	0.56	-0.53	-0.32
2,284.0	35.30	94.60	2,026.3	-84.9	912.6	916.5	0.89	-0.74	-0.85
2,379.0	35.60	94.30	2,103.7	-89.2	967.5	971.6	0.37	0.32	-0.32
2,473.0	34.80	94.50	2,180.5	-93.4	1,021.5	1,025.7	0.86	-0.85	0.21
2,568.0	33.90	95.30	2,259.0	-97.9	1,075.0	1,079.3	1.06	-0.95	0.84
2,662.0	33.80	94.60	2,337.0	-102.4	1,127.1	1,131.7	0.43	-0.11	-0.74
2,757.0	33.60	94.70	2,416.1	-106.7	1,179.7	1,184.4	0.22	-0.21	0.11
2,851.0	33.20	97.10	2,494.5	-112.0	1,231.1	1,236.1	1.47	-0.43	2.55
2,946.0	33.20	96.70	2,574.0	-118.3	1,282.8	1,288.1	0.23	0.00	-0.42
3,040.0	33.40	96.80	2,652.6	-124.4	1,334.0	1,339.7	0.22	0.21	0.11
3,135.0	33.40	96.80	2,731.9	-130.5	1,385.9	1,392.0	0.00	0.00	0.00
3,229.0	33.40	96.50	2,810.4	-136.5	1,437.3	1,443.7	0.18	0.00	-0.32
3,324.0	33.50	96.60	2,889.7	-142.5	1,489.4	1,496.1	0.12	0.11	0.11
3,419.0	33.50	96.40	2,968.9	-148.4	1,541.4	1,548.5	0.12	0.00	-0.21
3,513.0	34.10	96.40	3,047.0	-154.3	1,593.4	1,600.8	0.64	0.64	0.00
3,608.0	34.10	95.80	3,125.7	-159.9	1,646.4	1,654.1	0.35	0.00	-0.63
3,702.0	34.90	95.80	3,203.1	-165.3	1,699.3	1,707.3	0.85	0.85	0.00
3,797.0	35.10	96.00	3,280.9	-170.9	1,753.5	1,761.8	0.24	0.21	0.21
3,891.0	35.40	95.80	3,357.7	-176.5	1,807.5	1,816.1	0.34	0.32	-0.21
3,986.0	35.60	95.50	3,435.0	-181.9	1,862.4	1,871.2	0.28	0.21	-0.32
4,080.0	35.70	95.30	3,511.4	-187.1	1,917.0	1,926.0	0.16	0.11	-0.21
4,175.0	34.50	96.70	3,589.2	-192.8	1,971.3	1,980.6	1.52	-1.26	1.47
4,269.0	34.30	96.80	3,666.7	-199.0	2,024.0	2,033.7	0.22	-0.21	0.11
4,363.0	34.30	96.30	3,744.4	-205.1	2,076.6	2,086.7	0.30	0.00	-0.53
4,458.0	34.80	96.00	3,822.6	-210.8	2,130.2	2,140.6	0.56	0.53	-0.32
4,552.0	35.30	95.40	3,899.6	-216.2	2,183.9	2,194.6	0.65	0.53	-0.64
4,646.0	35.40	94.60	3,976.2	-220.9	2,238.1	2,248.9	0.50	0.11	-0.85
4,741.0	33.40	94.60	4,054.6	-225.2	2,291.6	2,302.6	2.11	-2.11	0.00
4,835.0	33.30	95.30	4,133.1	-229.7	2,343.1	2,354.3	0.42	-0.11	0.74
4,930.0	34.00	95.50	4,212.2	-234.6	2,395.5	2,406.9	0.75	0.74	0.21
5,024.0	34.30	94.30	4,290.0	-239.2	2,448.1	2,459.7	0.78	0.32	-1.28
5,118.0	33.10	94.50	4,368.2	-243.2	2,500.1	2,511.8	1.28	-1.28	0.21



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Survey										
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5,213.0	30.50	95.30	4,448.9	-247.4	2,549.9	2,561.9	2.77	-2.74	0.84	
5,307.0	27.60	96.70	4,531.1	-252.2	2,595.3	2,607.5	3.17	-3.09	1.49	
5,401.0	25.40	96.80	4,615.2	-257.1	2,637.0	2,649.4	2.34	-2.34	0.11	
5,495.0	23.90	96.10	4,700.7	-261.5	2,675.9	2,688.6	1.63	-1.60	-0.74	
5,590.0	23.10	95.70	4,787.8	-265.4	2,713.6	2,726.5	0.86	-0.84	-0.42	
5,684.0	21.00	95.40	4,874.9	-268.8	2,748.7	2,761.8	2.24	-2.23	-0.32	
5,778.0	18.00	95.70	4,963.5	-271.8	2,780.0	2,793.2	3.19	-3.19	0.32	
5,872.0	16.50	94.00	5,053.3	-274.2	2,807.7	2,821.0	1.68	-1.60	-1.81	
5,966.0	15.20	95.50	5,143.7	-276.3	2,833.3	2,846.7	1.45	-1.38	1.60	
6,060.0	13.90	96.60	5,234.7	-278.8	2,856.8	2,870.3	1.41	-1.38	1.17	
6,154.0	11.50	97.70	5,326.4	-281.4	2,877.3	2,891.0	2.57	-2.55	1.17	
6,248.0	9.00	98.20	5,418.9	-283.7	2,893.9	2,907.7	2.66	-2.66	0.53	
6,343.0	6.70	90.90	5,513.0	-284.8	2,906.8	2,920.6	2.63	-2.42	-7.68	
6,437.0	5.00	81.80	5,606.5	-284.3	2,916.3	2,930.1	2.05	-1.81	-9.68	
6,535.0	3.00	86.10	5,704.2	-283.5	2,923.1	2,936.7	2.06	-2.04	4.39	
6,625.0	2.20	97.00	5,794.1	-283.6	2,927.1	2,940.8	1.04	-0.89	12.11	
6,719.0	1.90	95.40	5,888.1	-283.9	2,930.5	2,944.1	0.32	-0.32	-1.70	
6,814.0	1.90	88.60	5,983.0	-284.1	2,933.6	2,947.3	0.24	0.00	-7.16	
6,908.0	1.70	92.20	6,077.0	-284.1	2,936.6	2,950.2	0.24	-0.21	3.83	
7,002.0	1.80	79.70	6,170.9	-283.9	2,939.4	2,953.0	0.42	0.11	-13.30	
7,096.0	1.60	83.70	6,264.9	-283.5	2,942.2	2,955.7	0.25	-0.21	4.26	
7,191.0	1.10	96.50	6,359.9	-283.4	2,944.4	2,957.9	0.61	-0.53	13.47	
7,285.0	0.70	108.10	6,453.9	-283.7	2,945.9	2,959.4	0.47	-0.43	12.34	
7,379.0	0.60	133.50	6,547.9	-284.2	2,946.8	2,960.4	0.32	-0.11	27.02	
7,473.0	0.50	127.30	6,641.9	-284.8	2,947.4	2,961.1	0.12	-0.11	-6.60	
7,568.0	0.30	130.40	6,736.9	-285.2	2,948.0	2,961.7	0.21	-0.21	3.26	
7,662.0	0.10	34.20	6,830.9	-285.3	2,948.2	2,961.9	0.35	-0.21	-102.34	
7,756.0	0.30	51.60	6,924.9	-285.1	2,948.4	2,962.1	0.22	0.21	18.51	
7,851.0	0.20	341.50	7,019.8	-284.8	2,948.6	2,962.2	0.31	-0.11	-73.79	
7,945.0	0.50	315.30	7,113.8	-284.3	2,948.2	2,961.8	0.35	0.32	-27.87	
8,039.0	1.10	314.00	7,207.8	-283.4	2,947.3	2,960.8	0.64	0.64	-1.38	
8,133.0	1.80	311.60	7,301.8	-281.8	2,945.5	2,958.9	0.75	0.74	-2.55	
8,227.0	2.10	311.60	7,395.8	-279.7	2,943.1	2,956.3	0.32	0.32	0.00	
8,321.0	2.30	301.00	7,489.7	-277.6	2,940.2	2,953.2	0.48	0.21	-11.28	
8,416.0	2.50	304.80	7,584.6	-275.4	2,936.9	2,949.6	0.27	0.21	4.00	
8,508.0	2.40	302.70	7,676.5	-273.2	2,933.6	2,946.2	0.15	-0.11	-2.28	
PBHL - BCU 0993-21-08E										
8,560.3	2.40	302.70	7,728.7	-272.0	2,931.8	2,944.2	0.00	0.00	0.00	
Projection to TD @ 8568.0' MD / 7736.5' TVD										
8,568.0	2.40	302.70	7,736.5	-271.8	2,931.5	2,943.9	0.00	0.00	0.00	



Survey Report



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Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
301.0	300.7	-1.4	11.2	First MWD Survey @ 301.0' MD / 300.7' TVD
8,568.0	7,736.5	-271.8	2,931.5	Projection to TD @ 8568.0' MD / 7736.5' TVD

Checked By: _____ Approved By: _____ Date: _____