



Laramie Energy, LLC

Mesa County, CO

Gunderson 0993 21-05 Pad

BCU 0993-21-06E

Wellbore #1

Design: Wellbore #1

QES Survey Report

23 September, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well BCU 0993-21-06E
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 0993-21-06E	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 0993-21-06E					
Well Position	+N/-S	0.0 usft	Northing:	1,529,657.76 usft	Latitude:	39.265403
	+E/-W	0.0 usft	Easting:	2,354,508.24 usft	Longitude:	-107.780122
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	9/18/2018	9.47	65.43	51,381.90000000

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	86.63	

Survey Program	Date	9/23/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
301.0	9,184.0	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	4.10	72.60	300.7	3.2	10.3	10.4	1.36	1.36	0.00
394.0	6.30	88.70	393.4	4.3	18.5	18.8	2.82	2.37	17.31
486.0	8.60	94.20	484.6	3.9	30.5	30.6	2.61	2.50	5.98
579.0	11.50	93.20	576.1	2.9	46.7	46.7	3.12	3.12	-1.08
672.0	14.40	92.10	666.8	2.0	67.5	67.5	3.13	3.12	-1.18
764.0	18.10	86.30	755.1	2.5	93.2	93.2	4.39	4.02	-6.30
857.0	22.40	81.20	842.3	6.1	125.1	125.3	4.99	4.62	-5.48
949.0	24.80	81.00	926.6	11.8	161.5	161.9	2.61	2.61	-0.22
1,044.0	30.30	82.20	1,010.8	18.2	205.0	205.7	5.82	5.79	1.26



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Well:	BCU 0993-21-06E	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
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	33.00	82.90	1,090.8	24.6	253.9	254.9	2.90	2.87	0.74
1,233.0	32.30	86.00	1,170.8	29.5	304.9	306.1	1.91	-0.74	3.26
1,327.0	31.80	87.00	1,250.5	32.6	354.6	355.9	0.78	-0.53	1.06
1,422.0	33.50	85.80	1,330.5	35.8	405.8	407.2	1.91	1.79	-1.26
1,490.0	34.60	86.30	1,386.8	38.4	443.8	445.3	1.67	1.62	0.74
1,619.0	34.40	83.70	1,493.1	44.8	516.5	518.3	1.15	-0.16	-2.02
1,713.0	33.60	87.30	1,571.1	48.9	568.9	570.8	2.30	-0.85	3.83
1,807.0	32.60	87.50	1,649.8	51.3	620.2	622.2	1.07	-1.06	0.21
1,902.0	33.40	88.10	1,729.5	53.3	671.9	673.9	0.91	0.84	0.63
1,996.0	34.50	87.50	1,807.5	55.3	724.4	726.4	1.22	1.17	-0.64
2,090.0	33.30	87.40	1,885.5	57.6	776.7	778.8	1.28	-1.28	-0.11
2,185.0	35.30	87.60	1,964.0	59.9	830.2	832.3	2.11	2.11	0.21
2,279.0	35.10	87.30	2,040.8	62.4	884.4	886.5	0.28	-0.21	-0.32
2,374.0	34.10	86.60	2,119.0	65.2	938.2	940.4	1.13	-1.05	-0.74
2,468.0	33.00	85.90	2,197.3	68.6	990.1	992.4	1.24	-1.17	-0.74
2,562.0	34.50	86.80	2,275.5	71.9	1,042.2	1,044.6	1.68	1.60	0.96
2,657.0	34.10	87.10	2,353.9	74.8	1,095.6	1,098.1	0.46	-0.42	0.32
2,751.0	32.80	86.70	2,432.4	77.6	1,147.4	1,149.9	1.40	-1.38	-0.43
2,846.0	34.20	88.70	2,511.6	79.7	1,199.8	1,202.4	1.88	1.47	2.11
2,940.0	33.30	88.60	2,589.8	80.9	1,252.0	1,254.6	0.96	-0.96	-0.11
3,035.0	32.80	89.00	2,669.4	82.0	1,303.8	1,306.3	0.57	-0.53	0.42
3,129.0	34.80	88.20	2,747.5	83.3	1,356.0	1,358.6	2.18	2.13	-0.85
3,224.0	34.20	88.00	2,825.8	85.1	1,409.8	1,412.4	0.64	-0.63	-0.21
3,318.0	33.20	88.10	2,904.0	86.8	1,461.9	1,464.5	1.07	-1.06	0.11
3,413.0	32.30	87.80	2,983.9	88.7	1,513.3	1,515.9	0.96	-0.95	-0.32
3,507.0	33.50	89.80	3,062.8	89.7	1,564.3	1,566.9	1.72	1.28	2.13
3,602.0	33.30	88.60	3,142.1	90.4	1,616.6	1,619.1	0.73	-0.21	-1.26
3,696.0	32.10	88.50	3,221.2	91.7	1,667.4	1,669.9	1.28	-1.28	-0.11
3,791.0	34.20	87.40	3,300.8	93.6	1,719.3	1,721.8	2.30	2.21	-1.16
3,886.0	33.80	86.00	3,379.5	96.7	1,772.3	1,775.0	0.93	-0.42	-1.47
3,980.0	32.60	86.80	3,458.2	99.9	1,823.7	1,826.4	1.36	-1.28	0.85
4,075.0	32.90	85.20	3,538.1	103.5	1,875.0	1,877.8	0.96	0.32	-1.68
4,170.0	34.40	84.50	3,617.1	108.2	1,927.4	1,930.4	1.63	1.58	-0.74
4,264.0	34.00	84.60	3,694.9	113.2	1,980.0	1,983.2	0.43	-0.43	0.11
4,358.0	32.50	84.20	3,773.5	118.3	2,031.3	2,034.7	1.61	-1.60	-0.43
4,453.0	33.80	82.40	3,853.0	124.3	2,082.9	2,086.6	1.72	1.37	-1.89
4,547.0	33.10	81.90	3,931.5	131.4	2,134.2	2,138.2	0.80	-0.74	-0.53
4,642.0	33.30	84.40	4,011.0	137.6	2,185.8	2,190.1	1.46	0.21	2.63
4,736.0	32.60	85.10	4,089.8	142.3	2,236.7	2,241.2	0.85	-0.74	0.74
4,830.0	33.70	88.60	4,168.6	145.1	2,288.0	2,292.6	2.35	1.17	3.72
4,925.0	33.30	87.50	4,247.8	146.9	2,340.4	2,345.0	0.77	-0.42	-1.16
5,019.0	32.90	87.10	4,326.5	149.3	2,391.7	2,396.4	0.48	-0.43	-0.43
5,113.0	31.50	86.60	4,406.1	152.0	2,441.7	2,446.5	1.52	-1.49	-0.53



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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)	
5,208.0	29.80	86.40	4,487.8	155.0	2,490.1	2,494.9	1.79	-1.79	-0.21	
5,302.0	27.80	85.70	4,570.2	158.1	2,535.3	2,540.2	2.16	-2.13	-0.74	
5,396.0	27.60	85.70	4,653.4	161.4	2,578.8	2,583.9	0.21	-0.21	0.00	
5,491.0	24.00	88.70	4,738.9	163.5	2,620.1	2,625.2	4.03	-3.79	3.16	
5,585.0	21.50	90.50	4,825.6	163.7	2,656.4	2,661.5	2.76	-2.66	1.91	
5,679.0	19.40	89.20	4,913.7	163.8	2,689.3	2,694.3	2.29	-2.23	-1.38	
5,773.0	17.80	89.30	5,002.7	164.2	2,719.3	2,724.2	1.70	-1.70	0.11	
5,868.0	16.50	90.10	5,093.5	164.4	2,747.3	2,752.2	1.39	-1.37	0.84	
5,962.0	15.00	89.10	5,184.0	164.5	2,772.8	2,777.7	1.62	-1.60	-1.06	
6,056.0	14.00	89.60	5,275.0	164.8	2,796.3	2,801.2	1.07	-1.06	0.53	
6,151.0	13.10	89.50	5,367.3	165.0	2,818.6	2,823.4	0.95	-0.95	-0.11	
6,244.0	11.20	88.90	5,458.3	165.2	2,838.1	2,843.0	2.05	-2.04	-0.65	
6,338.0	7.80	85.80	5,551.0	165.9	2,853.6	2,858.5	3.66	-3.62	-3.30	
6,432.0	6.00	84.60	5,644.3	166.8	2,864.9	2,869.7	1.92	-1.91	-1.28	
6,527.0	5.20	85.00	5,738.8	167.7	2,874.1	2,879.0	0.84	-0.84	0.42	
6,621.0	4.60	81.50	5,832.5	168.6	2,882.1	2,887.0	0.71	-0.64	-3.72	
6,715.0	4.00	79.50	5,926.2	169.7	2,889.0	2,894.0	0.66	-0.64	-2.13	
6,809.0	3.80	79.90	6,020.0	170.9	2,895.3	2,900.4	0.21	-0.21	0.43	
6,904.0	2.90	80.80	6,114.8	171.8	2,900.8	2,905.9	0.95	-0.95	0.95	
6,998.0	2.70	82.50	6,208.7	172.5	2,905.4	2,910.5	0.23	-0.21	1.81	
7,092.0	2.30	85.80	6,302.6	172.9	2,909.4	2,914.6	0.45	-0.43	3.51	
7,186.0	2.00	85.50	6,396.6	173.2	2,912.9	2,918.1	0.32	-0.32	-0.32	
7,280.0	1.50	66.10	6,490.5	173.8	2,915.7	2,920.9	0.82	-0.53	-20.64	
7,375.0	1.30	83.10	6,585.5	174.4	2,917.9	2,923.1	0.48	-0.21	17.89	
7,469.0	1.10	95.70	6,679.5	174.5	2,919.9	2,925.1	0.35	-0.21	13.40	
7,563.0	0.80	87.30	6,773.5	174.4	2,921.4	2,926.6	0.35	-0.32	-8.94	
7,657.0	0.70	68.80	6,867.4	174.7	2,922.6	2,927.8	0.28	-0.11	-19.68	
7,751.0	0.40	21.40	6,961.4	175.2	2,923.3	2,928.5	0.55	-0.32	-50.43	
7,846.0	0.70	312.50	7,056.4	175.9	2,923.0	2,928.2	0.70	0.32	-72.53	
7,940.0	0.80	272.30	7,150.4	176.3	2,921.9	2,927.2	0.56	0.11	-42.77	
8,034.0	1.80	261.40	7,244.4	176.1	2,919.8	2,925.1	1.09	1.06	-11.60	
8,129.0	1.80	252.70	7,339.4	175.4	2,916.9	2,922.1	0.29	0.00	-9.16	
8,223.0	1.90	240.90	7,433.3	174.2	2,914.1	2,919.3	0.42	0.11	-12.55	
8,317.0	1.60	234.60	7,527.3	172.7	2,911.7	2,916.8	0.38	-0.32	-6.70	
8,411.0	1.50	229.90	7,621.2	171.2	2,909.7	2,914.7	0.17	-0.11	-5.00	
8,506.0	1.40	247.70	7,716.2	169.9	2,907.6	2,912.6	0.48	-0.11	18.74	
8,600.0	1.30	243.10	7,810.2	169.0	2,905.6	2,910.5	0.16	-0.11	-4.89	
8,694.0	0.80	257.20	7,904.2	168.4	2,904.0	2,908.9	0.59	-0.53	15.00	
8,788.0	1.00	276.00	7,998.1	168.3	2,902.6	2,907.4	0.38	0.21	20.00	
8,882.0	1.20	271.50	8,092.1	168.4	2,900.8	2,905.7	0.23	0.21	-4.79	
8,976.0	0.80	274.70	8,186.1	168.5	2,899.1	2,904.0	0.43	-0.43	3.40	
9,071.0	1.30	261.20	8,281.1	168.4	2,897.4	2,902.3	0.58	0.53	-14.21	
9,124.0	1.40	286.90	8,334.1	168.5	2,896.2	2,901.1	1.15	0.19	48.49	



Survey Report



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Well:	BCU 0993-21-06E	North Reference:	True
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Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

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Projection to TD @ 9184.0' MD / 8394.1' TVD									
9,184.0	1.40	286.90	8,394.1	168.9	2,894.8	2,899.7	0.00	0.00	0.00

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
301.0	300.7	3.2	10.3	First MWD Survey @ 301.0' MD / 300.7' TVD	
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