



Laramie Energy, LLC

Mesa County, CO

Gunderson 0993 21-05 Pad

BCU 0993-21-05E

Wellbore #1

Design: Wellbore #1

QES Survey Report

04 October, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well BCU 0993-21-05E
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 0993-21-05E	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 0993-21-05E					
Well Position	+N/-S	0.0 usft	Northing:	1,529,665.43 usft	Latitude:	39.265424
	+E/-W	0.0 usft	Easting:	2,354,508.15 usft	Longitude:	-107.780123
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	82.03	

Survey Program	Date	10/4/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
293.0	8,588.0	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 @ 293.0' MD / 293.0' TVD									
293.0	1.80	77.00	293.0	1.0	4.5	4.6	0.61	0.61	0.00
386.0	3.40	85.60	385.9	1.6	8.7	8.8	1.77	1.72	9.25
478.0	5.10	80.50	477.6	2.5	15.4	15.6	1.89	1.85	-5.54
571.0	7.90	91.80	570.0	2.9	25.9	26.0	3.30	3.01	12.15
663.0	11.10	90.90	660.7	2.6	41.1	41.0	3.48	3.48	-0.98
756.0	14.40	87.90	751.4	2.9	61.6	61.4	3.62	3.55	-3.23
849.0	18.70	82.90	840.5	5.2	87.9	87.8	4.87	4.62	-5.38
941.0	22.60	82.70	926.6	9.2	120.1	120.2	4.24	4.24	-0.22
1,036.0	26.30	81.40	1,013.1	14.7	159.0	159.5	3.94	3.89	-1.37



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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)
1,130.0	29.60	80.20	1,096.1	21.8	202.5	203.6	3.56	3.51	-1.28
1,225.0	33.80	80.00	1,176.9	30.3	251.7	253.5	4.42	4.42	-0.21
1,319.0	36.40	79.60	1,253.8	39.9	304.9	307.5	2.78	2.77	-0.43
1,413.0	35.80	79.40	1,329.8	50.0	359.3	362.8	0.65	-0.64	-0.21
1,508.0	37.50	79.70	1,406.0	60.3	415.1	419.5	1.80	1.79	0.32
1,524.0	38.10	79.30	1,418.6	62.1	424.7	429.2	4.05	3.75	-2.50
1,618.0	37.60	78.90	1,492.9	73.0	481.4	486.9	0.59	-0.53	-0.43
1,713.0	37.30	79.00	1,568.3	84.1	538.1	544.5	0.32	-0.32	0.11
1,807.0	36.70	81.40	1,643.3	93.7	593.8	601.1	1.66	-0.64	2.55
1,902.0	36.10	81.20	1,719.8	102.2	649.5	657.4	0.64	-0.63	-0.21
1,996.0	35.20	81.00	1,796.2	110.7	703.7	712.2	0.97	-0.96	-0.21
2,091.0	34.10	80.30	1,874.3	119.5	757.0	766.2	1.23	-1.16	-0.74
2,186.0	36.10	81.50	1,952.1	128.1	810.9	820.8	2.23	2.11	1.26
2,280.0	35.80	83.30	2,028.2	135.4	865.6	876.0	1.17	-0.32	1.91
2,374.0	34.80	82.80	2,104.9	142.0	919.5	930.3	1.11	-1.06	-0.53
2,468.0	33.90	81.80	2,182.5	149.1	972.1	983.3	1.13	-0.96	-1.06
2,563.0	35.60	83.20	2,260.5	156.1	1,025.7	1,037.5	1.98	1.79	1.47
2,658.0	34.70	82.60	2,338.2	162.9	1,080.0	1,092.2	1.01	-0.95	-0.63
2,752.0	34.00	82.90	2,415.8	169.6	1,132.6	1,145.2	0.77	-0.74	0.32
2,846.0	32.40	81.50	2,494.5	176.5	1,183.6	1,196.7	1.89	-1.70	-1.49
2,941.0	33.80	82.40	2,574.1	183.8	1,235.0	1,248.6	1.56	1.47	0.95
3,036.0	35.60	84.00	2,652.2	190.2	1,288.7	1,302.6	2.12	1.89	1.68
3,130.0	34.50	83.40	2,729.1	196.1	1,342.3	1,356.6	1.23	-1.17	-0.64
3,224.0	33.60	82.80	2,807.0	202.4	1,394.6	1,409.2	1.02	-0.96	-0.64
3,319.0	35.70	84.10	2,885.1	208.6	1,448.3	1,463.2	2.34	2.21	1.37
3,414.0	35.00	84.60	2,962.6	214.0	1,503.0	1,518.1	0.80	-0.74	0.53
3,508.0	34.30	84.90	3,040.0	218.9	1,556.2	1,571.5	0.77	-0.74	0.32
3,603.0	34.10	81.60	3,118.5	225.1	1,609.2	1,624.9	1.96	-0.21	-3.47
3,698.0	35.60	80.80	3,196.5	233.5	1,662.8	1,679.1	1.65	1.58	-0.84
3,792.0	35.20	82.00	3,273.1	241.6	1,716.7	1,733.6	0.85	-0.43	1.28
3,887.0	34.10	81.80	3,351.3	249.2	1,770.1	1,787.6	1.16	-1.16	-0.21
3,981.0	33.00	81.90	3,429.6	256.6	1,821.6	1,839.5	1.17	-1.17	0.11
4,075.0	31.90	81.60	3,508.9	263.8	1,871.5	1,890.0	1.18	-1.17	-0.32
4,170.0	33.50	84.00	3,588.9	270.2	1,922.4	1,941.3	2.17	1.68	2.53
4,264.0	33.50	83.90	3,667.3	275.7	1,974.0	1,993.1	0.06	0.00	-0.11
4,358.0	32.70	83.70	3,746.0	281.2	2,025.0	2,044.4	0.86	-0.85	-0.21
4,453.0	34.30	82.70	3,825.2	287.4	2,077.1	2,096.9	1.78	1.68	-1.05
4,547.0	33.50	81.70	3,903.2	294.6	2,129.0	2,149.3	1.04	-0.85	-1.06
4,641.0	32.00	81.30	3,982.3	302.1	2,179.3	2,200.1	1.61	-1.60	-0.43
4,736.0	33.80	82.00	4,062.1	309.6	2,230.4	2,251.7	1.94	1.89	0.74
4,830.0	32.90	81.20	4,140.6	317.1	2,281.5	2,303.4	1.07	-0.96	-0.85
4,925.0	32.50	82.80	4,220.5	324.2	2,332.3	2,354.7	1.00	-0.42	1.68
5,019.0	31.80	82.50	4,300.1	330.6	2,381.9	2,404.7	0.76	-0.74	-0.32



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Survey									
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5,113.0	29.90	84.20	4,380.8	336.2	2,429.8	2,452.9	2.22	-2.02	1.81
5,208.0	28.50	82.90	4,463.7	341.4	2,475.8	2,499.3	1.62	-1.47	-1.37
5,302.0	27.20	81.20	4,546.8	347.5	2,519.3	2,543.2	1.62	-1.38	-1.81
5,396.0	27.30	82.20	4,630.4	353.7	2,561.9	2,586.2	0.50	0.11	1.06
5,490.0	26.10	81.70	4,714.4	359.6	2,603.7	2,628.4	1.30	-1.28	-0.53
5,585.0	25.70	81.30	4,799.8	365.8	2,644.8	2,669.9	0.46	-0.42	-0.42
5,679.0	25.40	81.40	4,884.7	371.9	2,684.8	2,710.5	0.32	-0.32	0.11
5,773.0	22.00	80.70	4,970.7	377.7	2,722.2	2,748.2	3.63	-3.62	-0.74
5,867.0	21.00	80.70	5,058.2	383.3	2,756.2	2,782.7	1.06	-1.06	0.00
5,961.0	19.10	81.10	5,146.5	388.4	2,788.0	2,814.9	2.03	-2.02	0.43
6,055.0	15.50	82.10	5,236.2	392.5	2,815.6	2,842.9	3.84	-3.83	1.06
6,149.0	12.20	81.70	5,327.5	395.7	2,837.9	2,865.3	3.51	-3.51	-0.43
6,244.0	9.30	79.90	5,420.8	398.4	2,855.4	2,883.1	3.07	-3.05	-1.89
6,338.0	7.40	73.90	5,513.8	401.5	2,868.7	2,896.6	2.22	-2.02	-6.38
6,432.0	6.30	70.30	5,607.1	404.9	2,879.4	2,907.7	1.26	-1.17	-3.83
6,526.0	5.40	69.60	5,700.6	408.2	2,888.4	2,917.1	0.96	-0.96	-0.74
6,620.0	4.80	70.10	5,794.2	411.0	2,896.2	2,925.2	0.64	-0.64	0.53
6,715.0	4.30	68.90	5,888.9	413.7	2,903.3	2,932.6	0.54	-0.53	-1.26
6,809.0	3.60	66.00	5,982.7	416.1	2,909.3	2,938.9	0.77	-0.74	-3.09
6,903.0	3.30	68.00	6,076.6	418.4	2,914.5	2,944.3	0.34	-0.32	2.13
6,997.0	2.60	89.20	6,170.4	419.4	2,919.1	2,949.1	1.37	-0.74	22.55
7,092.0	1.70	97.50	6,265.4	419.2	2,922.6	2,952.5	1.00	-0.95	8.74
7,186.0	1.50	99.50	6,359.3	418.9	2,925.2	2,955.1	0.22	-0.21	2.13
7,280.0	1.20	98.20	6,453.3	418.5	2,927.4	2,957.2	0.32	-0.32	-1.38
7,374.0	0.70	79.70	6,547.3	418.5	2,929.0	2,958.7	0.62	-0.53	-19.68
7,468.0	0.60	77.20	6,641.3	418.7	2,930.0	2,959.8	0.11	-0.11	-2.66
7,563.0	1.00	54.70	6,736.3	419.3	2,931.2	2,961.0	0.53	0.42	-23.68
7,657.0	1.20	44.00	6,830.3	420.5	2,932.5	2,962.5	0.30	0.21	-11.38
7,751.0	0.90	20.40	6,924.2	421.9	2,933.5	2,963.6	0.55	-0.32	-25.11
7,846.0	0.60	344.10	7,019.2	423.0	2,933.6	2,963.9	0.58	-0.32	-38.21
7,940.0	1.30	322.00	7,113.2	424.4	2,932.8	2,963.3	0.83	0.74	-23.51
8,034.0	1.40	299.40	7,207.2	425.8	2,931.1	2,961.9	0.57	0.11	-24.04
8,128.0	1.70	299.60	7,301.2	427.0	2,928.9	2,959.9	0.32	0.32	0.21
8,222.0	1.40	303.20	7,395.1	428.3	2,926.8	2,957.9	0.34	-0.32	3.83
8,316.0	1.40	298.50	7,489.1	429.5	2,924.8	2,956.1	0.12	0.00	-5.00
8,411.0	1.00	297.70	7,584.1	430.4	2,923.0	2,954.5	0.42	-0.42	-0.84
8,505.0	1.20	285.60	7,678.1	431.1	2,921.4	2,952.9	0.32	0.21	-12.87
8,528.0	1.10	277.60	7,701.1	431.2	2,920.9	2,952.5	0.82	-0.43	-34.78
TD @ 8588.0' MD / 7761.0' TVD									
8,588.0	1.10	277.60	7,761.0	431.3	2,919.8	2,951.4	0.00	0.00	0.00



Survey Report



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Site:	Gunderson 0993 21-05 Pad	MD Reference:	Well @ 7287.0usft (H&P #522)
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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Design Annotations

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		+N/-S (usft)	+E/-W (usft)	
293.0	293.0	1.0	4.5	First MWD Survey @ 293.0' MD / 293.0' TVD
8,588.0	7,761.0	431.3	2,919.8	TD @ 8588.0' MD / 7761.0' TVD

Checked By: _____ Approved By: _____ Date: _____