



Laramie Energy, LLC

Mesa County, CO

Gunderson 20-03 Pad

Gunderson BCU 20-05E

Wellbore #1

Design: Wellbore #1

QES Survey Report

30 June, 2017





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Gunderson BCU 20-05E
Project:	Mesa County, CO	TVD Reference:	well @ 7176.0usft (H&P #522)
Site:	Gunderson 20-03 Pad	MD Reference:	well @ 7176.0usft (H&P #522)
Well:	Gunderson BCU 20-05E	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM5002

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 20-03 Pad				
Site Position:		Northing:	1,530,258.75 usft	Latitude:	39.266756
From:	Lat/Long	Easting:	2,350,219.97 usft	Longitude:	-107.795317
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-1.45 °

Well	Gunderson BCU 20-05E					
Well Position	+N/-S	0.0 usft	Northing:	1,530,317.83 usft	Latitude:	39.266919
	+E/-W	0.0 usft	Easting:	2,350,231.66 usft	Longitude:	-107.795281
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	7,146.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	6/26/2017	9.58	65.43	51,419

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	93.96	

Survey Program	Date	6/30/2017			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
111.0	7,949.0	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 @ 111.0' MD/ TVD									
111.0	1.70	106.00	111.0	-0.5	1.6	1.6	1.53	1.53	0.00
202.0	1.90	108.10	201.9	-1.3	4.3	4.4	0.23	0.22	2.31
294.0	2.20	102.40	293.9	-2.1	7.5	7.6	0.39	0.33	-6.20
384.0	3.60	88.50	383.8	-2.4	12.0	12.1	1.73	1.56	-15.44
475.0	6.70	90.30	474.4	-2.4	20.2	20.3	3.41	3.41	1.98
567.0	8.90	87.60	565.5	-2.1	32.6	32.7	2.42	2.39	-2.93
659.0	10.80	92.10	656.2	-2.1	48.4	48.4	2.23	2.07	4.89
751.0	11.60	92.70	746.4	-2.9	66.2	66.3	0.88	0.87	0.65
842.0	14.90	97.80	835.0	-4.9	87.0	87.1	3.84	3.63	5.60



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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)
932.0	17.90	98.00	921.3	-8.4	112.1	112.4	3.33	3.33	0.22
1,026.0	20.60	95.20	1,010.1	-11.9	142.9	143.4	3.03	2.87	-2.98
1,121.0	21.00	92.10	1,098.9	-14.1	176.6	177.1	1.23	0.42	-3.26
1,215.0	22.70	91.80	1,186.1	-15.2	211.5	212.1	1.81	1.81	-0.32
1,309.0	22.90	93.90	1,272.8	-17.1	247.9	248.5	0.89	0.21	2.23
1,403.0	23.80	94.00	1,359.1	-19.6	285.1	285.7	0.96	0.96	0.11
1,504.0	24.60	94.10	1,451.2	-22.6	326.4	327.1	0.79	0.79	0.10
1,592.0	25.10	94.80	1,531.0	-25.4	363.2	364.1	0.66	0.57	0.80
1,686.0	25.00	93.70	1,616.2	-28.4	402.9	403.9	0.51	-0.11	-1.17
1,781.0	25.40	95.80	1,702.2	-31.7	443.2	444.4	1.03	0.42	2.21
1,875.0	24.70	95.40	1,787.3	-35.6	482.8	484.1	0.77	-0.74	-0.43
1,969.0	23.70	95.20	1,873.1	-39.2	521.2	522.7	1.07	-1.06	-0.21
2,063.0	23.90	95.00	1,959.1	-42.5	559.0	560.6	0.23	0.21	-0.21
2,157.0	24.00	95.70	2,045.0	-46.1	597.0	598.7	0.32	0.11	0.74
2,252.0	24.90	95.50	2,131.4	-49.9	636.1	638.0	0.95	0.95	-0.21
2,346.0	25.00	94.70	2,216.7	-53.5	675.6	677.7	0.37	0.11	-0.85
2,440.0	23.80	93.60	2,302.3	-56.3	714.3	716.5	1.37	-1.28	-1.17
2,534.0	23.50	93.60	2,388.4	-58.7	752.0	754.2	0.32	-0.32	0.00
2,628.0	23.90	94.90	2,474.5	-61.5	789.6	792.0	0.70	0.43	1.38
2,722.0	24.50	96.00	2,560.2	-65.1	828.0	830.5	0.80	0.64	1.17
2,817.0	24.70	95.50	2,646.6	-69.1	867.4	870.1	0.30	0.21	-0.53
2,911.0	24.20	95.10	2,732.1	-72.7	906.1	908.9	0.56	-0.53	-0.43
3,005.0	23.70	95.10	2,818.0	-76.1	944.1	947.1	0.53	-0.53	0.00
3,100.0	23.20	95.10	2,905.2	-79.4	981.8	984.9	0.53	-0.53	0.00
3,194.0	22.40	94.90	2,991.9	-82.6	1,018.0	1,021.3	0.86	-0.85	-0.21
3,288.0	22.90	95.60	3,078.6	-85.9	1,054.1	1,057.5	0.60	0.53	0.74
3,382.0	23.90	96.50	3,164.9	-89.9	1,091.2	1,094.8	1.13	1.06	0.96
3,476.0	24.00	96.42	3,250.8	-94.2	1,129.1	1,132.9	0.11	0.11	-0.09
3,571.0	23.40	96.06	3,337.8	-98.3	1,167.1	1,171.1	0.65	-0.63	-0.38
3,665.0	22.90	96.30	3,424.2	-102.3	1,203.8	1,208.0	0.54	-0.53	0.26
3,759.0	24.30	97.60	3,510.3	-106.8	1,241.2	1,245.6	1.59	1.49	1.38
3,853.0	23.70	97.82	3,596.2	-112.0	1,279.1	1,283.7	0.65	-0.64	0.23
3,948.0	23.60	97.38	3,683.2	-117.0	1,316.8	1,321.8	0.21	-0.11	-0.46
4,042.0	23.30	97.38	3,769.5	-121.8	1,353.9	1,359.1	0.32	-0.32	0.00
4,136.0	22.90	97.82	3,855.9	-126.7	1,390.5	1,395.9	0.46	-0.43	0.47
4,230.0	22.50	97.20	3,942.6	-131.4	1,426.5	1,432.1	0.50	-0.43	-0.66
4,325.0	23.70	97.10	4,030.0	-136.1	1,463.4	1,469.3	1.26	1.26	-0.11
4,419.0	24.20	96.42	4,115.9	-140.6	1,501.3	1,507.5	0.61	0.53	-0.72
4,513.0	24.40	96.15	4,201.6	-144.8	1,539.8	1,546.1	0.24	0.21	-0.29
4,608.0	24.30	95.10	4,288.2	-148.6	1,578.8	1,585.3	0.47	-0.11	-1.11
4,702.0	22.80	94.22	4,374.3	-151.7	1,616.2	1,622.8	1.64	-1.60	-0.94
4,796.0	22.50	94.57	4,461.1	-154.5	1,652.3	1,659.0	0.35	-0.32	0.37
4,890.0	21.50	95.00	4,548.2	-157.4	1,687.4	1,694.2	1.08	-1.06	0.46



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4,985.0	20.00	92.72	4,637.1	-159.7	1,720.9	1,727.9	1.79	-1.58	-2.40
5,079.0	18.94	92.81	4,725.7	-161.2	1,752.2	1,759.2	1.13	-1.13	0.10
5,173.0	18.10	92.64	4,814.8	-162.6	1,782.1	1,789.0	0.90	-0.89	-0.18
5,267.0	17.40	92.46	4,904.3	-163.9	1,810.7	1,817.7	0.75	-0.74	-0.19
5,361.0	16.70	92.40	4,994.2	-165.1	1,838.2	1,845.2	0.74	-0.74	-0.06
5,456.0	14.60	91.60	5,085.7	-166.0	1,863.8	1,870.8	2.22	-2.21	-0.84
5,550.0	11.90	90.00	5,177.2	-166.3	1,885.4	1,892.4	2.90	-2.87	-1.70
5,644.0	11.10	89.80	5,269.3	-166.3	1,904.1	1,911.1	0.85	-0.85	-0.21
5,738.0	10.10	90.30	5,361.7	-166.3	1,921.4	1,928.3	1.07	-1.06	0.53
5,832.0	8.10	87.90	5,454.5	-166.1	1,936.3	1,943.1	2.17	-2.13	-2.55
5,927.0	6.00	81.00	5,548.8	-165.1	1,947.9	1,954.6	2.38	-2.21	-7.26
6,021.0	4.90	77.60	5,642.3	-163.4	1,956.6	1,963.2	1.22	-1.17	-3.62
6,115.0	4.10	53.60	5,736.1	-160.6	1,963.3	1,969.7	2.16	-0.85	-25.53
6,210.0	3.70	47.40	5,830.8	-156.5	1,968.2	1,974.4	0.61	-0.42	-6.53
6,304.0	3.40	49.00	5,924.7	-152.6	1,972.6	1,978.4	0.34	-0.32	1.70
6,398.0	2.90	45.60	6,018.5	-149.1	1,976.4	1,982.0	0.57	-0.53	-3.62
6,493.0	2.40	17.93	6,113.4	-145.5	1,978.7	1,984.0	1.43	-0.53	-29.13
6,587.0	2.10	21.18	6,207.4	-142.1	1,979.9	1,985.0	0.35	-0.32	3.46
6,681.0	1.90	20.04	6,301.3	-139.0	1,981.1	1,986.0	0.22	-0.21	-1.21
6,776.0	1.90	22.10	6,396.2	-136.1	1,982.2	1,986.9	0.07	0.00	2.17
6,870.0	0.80	341.10	6,490.2	-134.0	1,982.6	1,987.1	1.49	-1.17	-43.62
6,964.0	1.00	225.90	6,584.2	-133.9	1,981.8	1,986.3	1.62	0.21	-122.55
7,058.0	1.10	227.90	6,678.2	-135.1	1,980.5	1,985.1	0.11	0.11	2.13
7,152.0	1.10	243.37	6,772.2	-136.1	1,979.1	1,983.7	0.31	0.00	16.46
7,246.0	0.70	276.00	6,866.2	-136.5	1,977.7	1,982.4	0.68	-0.43	34.71
7,341.0	0.90	323.50	6,961.2	-135.8	1,976.7	1,981.3	0.71	0.21	50.00
7,435.0	0.80	327.80	7,055.1	-134.7	1,975.9	1,980.5	0.13	-0.11	4.57
7,529.0	1.30	239.90	7,149.1	-134.6	1,974.6	1,979.2	1.60	0.53	-93.51
7,623.0	1.60	215.20	7,243.1	-136.2	1,972.9	1,977.6	0.73	0.32	-26.28
7,718.0	1.60	212.50	7,338.1	-138.5	1,971.5	1,976.3	0.08	0.00	-2.84
7,812.0	1.50	213.50	7,432.0	-140.6	1,970.1	1,975.1	0.11	-0.11	1.06
7,894.0	1.30	223.80	7,514.0	-142.1	1,968.8	1,974.0	0.39	-0.24	12.56
Projection to TD @ 7949.0'MD / 7569.0'TVD									
7,949.0	1.30	223.80	7,569.0	-143.0	1,968.0	1,973.2	0.00	0.00	0.00

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
111.0	111.0	-0.5	1.6	First MWD survey @ 111.0' MD/ TVD
7,949.0	7,569.0	-143.0	1,968.0	Projection to TD @ 7949.0'MD / 7569.0'TVD



Survey Report



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Checked By: _____ Approved By: _____ Date: _____