



Laramie Energy, LLC

Mesa County, CO

Gunderson 13-11 Pad

Gunderson 0994-13-16E

Wellbore #1

Design: Wellbore #1

QES Survey Report

18 April, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Gunderson 0994-13-16E
Project:	Mesa County, CO	TVD Reference:	well @ 7302.0usft (H&P #522)
Site:	Gunderson 13-11 Pad	MD Reference:	well @ 7302.0usft (H&P #522)
Well:	Gunderson 0994-13-16E	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 13-11 Pad				
Site Position:		Northing:	1,533,162.26 usft	Latitude:	39.273948
From:	Lat/Long	Easting:	2,339,102.68 usft	Longitude:	-107.834835
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-1.47 °

Well	Gunderson 0994-13-16E					
Well Position	+N/-S	0.0 usft	Northing:	1,533,118.01 usft	Latitude:	39.273824
	+E/-W	0.0 usft	Easting:	2,339,072.57 usft	Longitude:	-107.834937
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	7,272.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	User Defined	4/5/2018	9.45	65.41	51,312.40000000

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	91.96	

Survey Program	Date	4/18/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
472.0	8,838.0	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 @ 472.0' MD / 470.5' TVD									
472.0	7.80	90.30	470.5	-0.2	32.1	32.1	1.65	1.65	0.00
563.0	10.50	87.40	560.4	0.2	46.5	46.5	3.01	2.97	-3.19
654.0	13.50	90.40	649.4	0.5	65.4	65.4	3.37	3.30	3.30
745.0	16.60	89.90	737.2	0.4	89.1	89.0	3.41	3.41	-0.55
836.0	19.60	90.50	823.7	0.3	117.3	117.3	3.30	3.30	0.66
927.0	22.50	91.40	908.7	-0.2	150.0	149.9	3.21	3.19	0.99
1,018.0	25.30	92.20	991.8	-1.4	186.9	186.8	3.10	3.08	0.88
1,113.0	28.30	92.60	1,076.6	-3.2	229.7	229.6	3.16	3.16	0.42
1,207.0	30.70	91.70	1,158.4	-4.9	275.9	275.9	2.60	2.55	-0.96



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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)
1,301.0	30.90	91.00	1,239.2	-6.1	324.0	324.0	0.44	0.21	-0.74
1,395.0	31.50	90.10	1,319.6	-6.5	372.7	372.7	0.81	0.64	-0.96
1,489.0	31.90	89.30	1,399.6	-6.3	422.1	422.1	0.62	0.43	-0.85
1,522.0	32.30	89.20	1,427.5	-6.0	439.6	439.6	1.22	1.21	-0.30
1,607.0	31.90	89.50	1,499.5	-5.5	484.8	484.7	0.51	-0.47	0.35
1,696.0	31.00	91.20	1,575.4	-5.8	531.2	531.1	1.42	-1.01	1.91
1,790.0	30.00	92.20	1,656.4	-7.2	578.9	578.8	1.19	-1.06	1.06
1,884.0	29.80	91.70	1,737.9	-8.8	625.8	625.7	0.34	-0.21	-0.53
1,978.0	29.00	91.10	1,819.8	-9.9	671.9	671.8	0.91	-0.85	-0.64
2,072.0	28.70	92.60	1,902.2	-11.4	717.2	717.2	0.83	-0.32	1.60
2,167.0	28.60	93.60	1,985.5	-13.9	762.7	762.7	0.52	-0.11	1.05
2,261.0	29.20	94.70	2,067.8	-17.2	808.0	808.1	0.85	0.64	1.17
2,355.0	29.80	94.40	2,149.6	-20.8	854.1	854.4	0.66	0.64	-0.32
2,449.0	30.40	94.30	2,231.0	-24.4	901.1	901.5	0.64	0.64	-0.11
2,544.0	28.90	93.70	2,313.5	-27.7	948.0	948.4	1.61	-1.58	-0.63
2,638.0	28.30	93.40	2,396.0	-30.5	992.9	993.4	0.66	-0.64	-0.32
2,732.0	26.70	93.20	2,479.4	-33.0	1,036.3	1,036.8	1.70	-1.70	-0.21
2,826.0	27.00	93.40	2,563.3	-35.4	1,078.7	1,079.2	0.33	0.32	0.21
2,921.0	25.80	94.30	2,648.4	-38.2	1,120.8	1,121.5	1.33	-1.26	0.95
3,015.0	26.70	94.60	2,732.7	-41.5	1,162.2	1,163.0	0.97	0.96	0.32
3,109.0	27.40	94.30	2,816.4	-44.8	1,204.9	1,205.7	0.76	0.74	-0.32
3,203.0	28.10	93.20	2,899.6	-47.6	1,248.5	1,249.4	0.92	0.74	-1.17
3,298.0	28.90	91.60	2,983.1	-49.5	1,293.8	1,294.8	1.16	0.84	-1.68
3,392.0	30.20	91.70	3,064.8	-50.9	1,340.2	1,341.1	1.38	1.38	0.11
3,486.0	30.50	92.80	3,146.0	-52.7	1,387.6	1,388.6	0.67	0.32	1.17
3,580.0	30.70	91.40	3,226.9	-54.5	1,435.4	1,436.5	0.79	0.21	-1.49
3,674.0	31.20	91.10	3,307.5	-55.5	1,483.8	1,484.8	0.56	0.53	-0.32
3,769.0	30.30	91.10	3,389.1	-56.5	1,532.3	1,533.4	0.95	-0.95	0.00
3,863.0	31.10	90.83	3,470.0	-57.3	1,580.3	1,581.3	0.86	0.85	-0.29
3,957.0	29.90	91.80	3,551.0	-58.4	1,628.0	1,629.1	1.38	-1.28	1.03
4,052.0	30.40	91.90	3,633.1	-59.9	1,675.7	1,676.8	0.53	0.53	0.11
4,146.0	29.90	92.10	3,714.4	-61.6	1,722.9	1,724.0	0.54	-0.53	0.21
4,240.0	30.40	90.10	3,795.7	-62.5	1,770.1	1,771.2	1.19	0.53	-2.13
4,334.0	29.40	89.90	3,877.2	-62.5	1,816.9	1,818.0	1.07	-1.06	-0.21
4,428.0	29.80	90.30	3,958.9	-62.5	1,863.4	1,864.4	0.47	0.43	0.43
4,522.0	28.40	90.50	4,041.0	-62.9	1,909.1	1,910.1	1.49	-1.49	0.21
4,617.0	28.90	90.80	4,124.4	-63.4	1,954.6	1,955.7	0.55	0.53	0.32
4,711.0	29.00	91.40	4,206.6	-64.3	2,000.1	2,001.1	0.33	0.11	0.64
4,805.0	29.20	91.00	4,288.8	-65.2	2,045.8	2,046.9	0.30	0.21	-0.43
4,899.0	27.90	91.50	4,371.3	-66.2	2,090.7	2,091.8	1.41	-1.38	0.53
4,993.0	27.30	89.70	4,454.7	-66.6	2,134.3	2,135.3	1.09	-0.64	-1.91
5,088.0	29.90	90.60	4,538.1	-66.8	2,179.8	2,180.8	2.77	2.74	0.95
5,182.0	30.80	89.60	4,619.2	-66.9	2,227.2	2,228.2	1.10	0.96	-1.06



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Survey										
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5,276.0	29.20	89.40	4,700.6	-66.5	2,274.2	2,275.2	1.71	-1.70	-0.21	
5,370.0	27.60	88.50	4,783.3	-65.6	2,318.9	2,319.8	1.76	-1.70	-0.96	
5,464.0	26.00	90.60	4,867.2	-65.3	2,361.3	2,362.2	1.98	-1.70	2.23	
5,558.0	23.20	90.10	4,952.6	-65.5	2,400.4	2,401.3	2.99	-2.98	-0.53	
5,652.0	21.00	89.80	5,039.7	-65.5	2,435.8	2,436.6	2.34	-2.34	-0.32	
5,747.0	18.70	87.80	5,129.1	-64.9	2,468.0	2,468.8	2.52	-2.42	-2.11	
5,841.0	16.70	89.10	5,218.6	-64.1	2,496.6	2,497.3	2.17	-2.13	1.38	
5,935.0	14.80	89.70	5,309.1	-63.8	2,522.1	2,522.8	2.03	-2.02	0.64	
6,029.0	12.50	90.60	5,400.4	-63.8	2,544.3	2,545.0	2.46	-2.45	0.96	
6,123.0	11.20	92.50	5,492.4	-64.3	2,563.6	2,564.3	1.44	-1.38	2.02	
6,218.0	8.00	92.70	5,586.1	-65.1	2,579.4	2,580.1	3.37	-3.37	0.21	
6,312.0	4.70	95.70	5,679.5	-65.8	2,589.8	2,590.5	3.53	-3.51	3.19	
6,406.0	3.40	95.00	5,773.2	-66.4	2,596.4	2,597.2	1.38	-1.38	-0.74	
6,500.0	2.80	95.50	5,867.1	-66.8	2,601.5	2,602.2	0.64	-0.64	0.53	
6,595.0	1.90	94.20	5,962.0	-67.2	2,605.3	2,606.1	0.95	-0.95	-1.37	
6,689.0	1.10	99.40	6,056.0	-67.4	2,607.8	2,608.6	0.86	-0.85	5.53	
6,783.0	0.50	99.40	6,150.0	-67.7	2,609.1	2,609.9	0.64	-0.64	0.00	
6,877.0	0.40	260.60	6,244.0	-67.8	2,609.2	2,610.0	0.94	-0.11	171.49	
6,971.0	1.10	274.30	6,338.0	-67.8	2,607.9	2,608.7	0.76	0.74	14.57	
7,066.0	1.80	269.60	6,432.9	-67.7	2,605.5	2,606.3	0.75	0.74	-4.95	
7,160.0	1.30	303.20	6,526.9	-67.1	2,603.2	2,603.9	1.08	-0.53	35.74	
7,254.0	0.90	302.30	6,620.9	-66.2	2,601.7	2,602.4	0.43	-0.43	-0.96	
7,348.0	1.20	277.60	6,714.9	-65.6	2,600.1	2,600.8	0.57	0.32	-26.28	
7,442.0	1.20	268.10	6,808.8	-65.5	2,598.1	2,598.8	0.21	0.00	-10.11	
7,537.0	0.90	291.60	6,903.8	-65.3	2,596.4	2,597.1	0.55	-0.32	24.74	
7,631.0	1.60	276.90	6,997.8	-64.9	2,594.4	2,595.1	0.81	0.74	-15.64	
7,725.0	2.70	266.70	7,091.7	-64.8	2,590.9	2,591.6	1.23	1.17	-10.85	
7,819.0	3.50	270.80	7,185.6	-64.9	2,585.8	2,586.5	0.88	0.85	4.36	
7,914.0	3.10	249.50	7,280.5	-65.8	2,580.5	2,581.3	1.35	-0.42	-22.42	
8,008.0	3.20	237.30	7,374.3	-68.1	2,575.9	2,576.8	0.72	0.11	-12.98	
8,102.0	3.10	216.60	7,468.2	-71.5	2,572.2	2,573.1	1.21	-0.11	-22.02	
8,197.0	3.40	214.20	7,563.0	-75.9	2,569.1	2,570.2	0.35	0.32	-2.53	
8,291.0	3.30	219.20	7,656.9	-80.3	2,565.8	2,567.1	0.33	-0.11	5.32	
8,385.0	3.40	225.00	7,750.7	-84.4	2,562.1	2,563.5	0.38	0.11	6.17	
8,479.0	3.10	226.90	7,844.5	-88.1	2,558.3	2,559.8	0.34	-0.32	2.02	
8,574.0	3.50	226.60	7,939.4	-91.9	2,554.3	2,556.0	0.42	0.42	-0.32	
8,668.0	3.90	233.60	8,033.2	-95.7	2,549.7	2,551.4	0.64	0.43	7.45	
8,778.0	4.00	235.60	8,142.9	-100.1	2,543.5	2,545.4	0.15	0.09	1.82	
Projection to TD @ 8838.0' MD / 8202.8' TVD										
8,838.0	4.00	235.60	8,202.8	-102.5	2,540.0	2,542.1	0.00	0.00	0.00	



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Design Annotations

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		+N/-S (usft)	+E/-W (usft)	
472.0	470.5	-0.2	32.1	First MWD Survey @ 472.0' MD / 470.5' TVD
8,838.0	8,202.8	-102.5	2,540.0	Projection to TD @ 8838.0' MD / 8202.8' TVD

Checked By: _____ Approved By: _____ Date: _____