

Extraction Oil & Gas

Weld County, CO (NAD83)

Sec 26-T07N-R67W

Launer 5

Wellbore #1

Design: Wellbore #1

Standard Survey Report

12 December, 2017

Survey Report

Company:	Extraction Oil & Gas	Local Co-ordinate Reference:	Well Launer 5
Project:	Weld County, CO (NAD83)	TVD Reference:	KB=25 @ 4952.00ft (Patterson 346)
Site:	Sec 26-T07N-R67W	MD Reference:	KB=25 @ 4952.00ft (Patterson 346)
Well:	Launer 5	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1

Project	Weld County, CO (NAD83)		
Map System:	US State Plane 1983	System Datum:	Ground Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		

Site		Sec 26-T07N-R67W			
Site Position:		Northing:	1,444,245.2190 usft	Latitude:	40.551051
From:	Map	Easting:	3,179,860.1010 usft	Longitude:	-104.852759
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.42 °

Well	Launer 5					
Well Position	+N/-S	0.00 ft	Northing:	1,440,198.6837 usfi	Latitude:	40.539941
	+E/-W	0.00 ft	Easting:	3,180,010.7898 usfi	Longitude:	-104.852323
Position Uncertainty		0.00 ft	Wellhead Elevation:	0.00 ft	Ground Level:	4,927.00 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	10/12/2017	8.33	66.95	52,389

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.00	0.00	0.00		278.61

Survey Program	Date	12/12/2017			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
495.00	1,514.00	Surface Surveys (Wellbore #1)	NS-GYRO-MS	North sensing gyrocompassing m/s	
1,646.00	14,806.00	MWD Surveys (Wellbore #1)	MWD	MWD - Standard	

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
495.00	0.40	235.50	495.00	-0.98	-1.42	1.26	0.08	0.08	0.00	
591.00	0.83	226.27	590.99	-1.65	-2.20	1.93	0.46	0.45	-9.61	
686.00	1.36	332.44	685.98	-1.13	-3.22	3.02	1.87	0.56	111.76	
782.00	1.05	345.97	781.96	0.74	-3.96	4.03	0.44	-0.32	14.09	
878.00	0.57	332.18	877.95	2.01	-4.40	4.65	0.54	-0.50	-14.36	
974.00	0.44	341.23	973.94	2.78	-4.74	5.10	0.16	-0.14	9.43	
1,070.00	1.27	334.64	1,069.93	4.10	-5.31	5.87	0.87	0.86	-6.86	
1,166.00	1.93	49.96	1,165.90	6.10	-4.53	5.39	2.11	0.69	78.46	
1,261.00	1.41	7.77	1,260.87	8.28	-3.15	4.35	1.36	-0.55	-44.41	

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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,356.00	0.18	194.01	1,355.86	9.30	-3.03	4.38	1.67	-1.29	-182.91
1,451.00	0.53	152.61	1,450.86	8.76	-2.86	4.14	0.43	0.37	-43.58
1,514.00	0.57	156.83	1,513.85	8.22	-2.60	3.80	0.09	0.06	6.70
1,646.00	1.02	131.35	1,645.84	6.84	-1.46	2.47	0.43	0.34	-19.30
First MWD Survey @ 1646'MD									
1,741.00	1.81	67.84	1,740.82	6.84	0.56	0.47	1.72	0.83	-66.85
1,834.00	3.40	45.15	1,833.72	9.34	3.88	-2.43	2.01	1.71	-24.40
1,929.00	4.51	30.65	1,928.49	14.54	7.78	-5.51	1.56	1.17	-15.26
2,023.00	6.32	19.77	2,022.07	22.59	11.41	-7.90	2.21	1.93	-11.57
2,118.00	8.31	24.35	2,116.30	33.77	16.01	-10.78	2.18	2.09	4.82
2,213.00	9.50	26.16	2,210.15	47.06	22.30	-15.00	1.29	1.25	1.91
2,307.00	11.00	23.16	2,302.65	62.27	29.25	-19.60	1.69	1.60	-3.19
2,402.00	12.81	17.43	2,395.60	80.65	35.97	-23.49	2.27	1.91	-6.03
2,496.00	14.32	16.24	2,486.98	101.76	42.34	-26.63	1.63	1.61	-1.27
2,590.00	16.70	15.27	2,577.55	125.95	49.15	-29.74	2.55	2.53	-1.03
2,685.00	18.69	18.14	2,668.05	153.59	57.48	-33.84	2.29	2.09	3.02
2,779.00	20.68	18.05	2,756.55	183.68	67.31	-39.06	2.12	2.12	-0.10
2,873.00	19.80	15.93	2,844.75	214.78	76.82	-43.81	1.22	-0.94	-2.26
2,967.00	18.69	13.55	2,933.50	244.73	84.72	-47.14	1.45	-1.18	-2.53
3,062.00	17.72	16.95	3,023.74	273.36	92.50	-50.54	1.51	-1.02	3.58
3,156.00	18.12	20.47	3,113.19	300.74	101.78	-55.62	1.23	0.43	3.74
3,251.00	16.62	18.84	3,203.85	327.44	111.34	-61.07	1.66	-1.58	-1.72
3,345.00	17.01	22.15	3,293.83	352.90	120.86	-66.68	1.10	0.41	3.52
3,440.00	17.59	21.75	3,384.54	379.10	131.42	-73.19	0.62	0.61	-0.42
3,534.00	18.38	20.74	3,473.94	406.15	141.93	-79.54	0.90	0.84	-1.07
3,628.00	16.70	17.74	3,563.57	432.88	151.30	-84.80	2.03	-1.79	-3.19
3,723.00	18.38	21.44	3,654.15	459.82	160.93	-90.29	2.12	1.77	3.89
3,817.00	18.38	18.93	3,743.36	487.64	171.15	-96.23	0.84	0.00	-2.67
3,911.00	18.52	18.44	3,832.53	515.82	180.68	-101.44	0.22	0.15	-0.52
4,005.00	18.12	17.65	3,921.76	543.91	189.84	-106.28	0.50	-0.43	-0.84
4,099.00	17.41	16.46	4,011.28	571.33	198.25	-110.50	0.85	-0.76	-1.27
4,193.00	17.59	17.17	4,100.93	598.38	206.43	-114.53	0.30	0.19	0.76
4,288.00	18.29	17.17	4,191.31	626.34	215.07	-118.89	0.74	0.74	0.00
4,382.00	19.09	23.47	4,280.36	654.54	225.54	-125.03	2.31	0.85	6.70
4,570.00	17.10	20.47	4,459.06	708.64	247.45	-138.59	1.17	-1.06	-1.60
4,665.00	18.69	21.66	4,549.46	735.87	257.96	-144.90	1.72	1.67	1.25
4,759.00	17.28	18.53	4,638.87	763.11	267.95	-150.71	1.82	-1.50	-3.33
4,853.00	19.40	21.35	4,728.09	790.89	278.07	-156.56	2.44	2.26	3.00
4,947.00	19.00	20.34	4,816.86	819.78	289.08	-163.11	0.55	-0.43	-1.07
5,041.00	18.12	18.75	4,905.97	847.97	299.09	-168.79	1.08	-0.94	-1.69
5,135.00	16.88	17.74	4,995.62	874.81	307.95	-173.53	1.36	-1.32	-1.07
5,229.00	17.41	24.57	5,085.45	900.60	317.96	-179.57	2.21	0.56	7.27
5,324.00	14.89	22.94	5,176.70	924.77	328.62	-186.50	2.69	-2.65	-1.72

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5,418.00	16.00	19.63	5,267.30	948.10	337.68	-191.96	1.51	1.18	-3.52
5,513.00	13.70	17.96	5,359.12	971.13	345.55	-196.29	2.46	-2.42	-1.76
5,606.00	11.49	16.86	5,449.88	990.48	351.63	-199.41	2.39	-2.38	-1.18
5,700.00	9.81	17.43	5,542.26	1,007.08	356.75	-201.98	1.79	-1.79	0.61
5,795.00	8.40	19.55	5,636.06	1,021.34	361.49	-204.54	1.53	-1.48	2.23
5,889.00	6.58	10.07	5,729.26	1,033.11	364.73	-205.98	2.33	-1.94	-10.09
5,983.00	5.21	2.04	5,822.76	1,042.68	365.83	-205.63	1.70	-1.46	-8.54
6,077.00	4.29	354.77	5,916.43	1,050.45	365.66	-204.30	1.17	-0.98	-7.73
6,171.00	3.58	342.34	6,010.21	1,056.75	364.45	-202.16	1.18	-0.76	-13.22
6,265.00	4.11	16.86	6,104.01	1,062.77	364.53	-201.35	2.48	0.56	36.72
6,360.00	2.12	356.53	6,198.87	1,067.78	365.41	-201.47	2.36	-2.09	-21.40
6,453.00	2.39	342.56	6,291.80	1,071.35	364.73	-200.25	0.66	0.29	-15.02
6,548.00	0.31	239.97	6,386.77	1,073.11	363.91	-199.18	2.61	-2.19	-107.99
6,643.00	0.62	279.24	6,481.77	1,073.06	363.18	-198.47	0.45	0.33	41.34
6,666.00	0.80	295.36	6,504.77	1,073.15	362.91	-198.19	1.16	0.78	70.09
6,760.00	9.72	272.93	6,598.28	1,073.84	354.38	-189.65	9.56	9.49	-23.86
6,854.00	20.99	273.64	6,688.78	1,075.32	329.57	-164.90	11.99	11.99	0.76
6,949.00	27.22	270.55	6,775.46	1,076.61	290.83	-126.40	6.69	6.56	-3.25
7,042.00	34.11	268.66	6,855.41	1,076.20	243.43	-79.60	7.48	7.41	-2.03
7,137.00	42.42	268.97	6,929.93	1,075.00	184.66	-21.67	8.75	8.75	0.33
7,231.00	48.39	266.63	6,995.90	1,072.36	117.82	44.03	6.59	6.35	-2.49
7,325.00	53.91	268.13	7,054.84	1,069.05	44.72	115.81	6.00	5.87	1.60
7,419.00	60.72	269.45	7,105.58	1,067.41	-34.33	193.72	7.34	7.24	1.40
7,513.00	72.78	270.47	7,142.62	1,067.38	-120.54	278.95	12.87	12.83	1.09
7,604.38	84.08	271.24	7,160.92	1,068.73	-209.91	367.51	12.39	12.36	0.84
LP Launer 5									
7,604.70	84.12	271.24	7,160.95	1,068.73	-210.22	367.83	12.39	12.36	0.81
Hardline Crossing Point @ 7604.70'MD (1813'FSL & 591'FEL)									
7,607.00	84.40	271.26	7,161.18	1,068.78	-212.51	370.10	12.39	12.36	0.81
7,701.00	90.01	271.96	7,165.76	1,071.42	-306.32	463.25	6.01	5.97	0.74
7,795.00	90.59	272.36	7,165.27	1,074.96	-400.26	556.65	0.75	0.62	0.43
7,889.00	92.89	271.96	7,162.42	1,078.50	-494.14	650.01	2.48	2.45	-0.43
7,983.00	93.50	272.23	7,157.18	1,081.93	-587.93	743.25	0.71	0.65	0.29
8,078.00	94.21	272.05	7,150.79	1,085.46	-682.65	837.43	0.77	0.75	-0.19
8,172.00	93.90	271.74	7,144.14	1,088.56	-776.36	930.56	0.47	-0.33	-0.33
8,266.00	93.90	271.35	7,137.75	1,091.09	-870.11	1,023.63	0.41	0.00	-0.41
8,360.00	93.59	270.25	7,131.61	1,092.39	-963.90	1,116.55	1.21	-0.33	-1.17
8,454.00	92.31	270.55	7,126.77	1,093.05	-1,057.77	1,209.46	1.40	-1.36	0.32
8,549.00	93.11	270.47	7,122.28	1,093.89	-1,152.66	1,303.41	0.85	0.84	-0.08
8,644.00	91.60	270.07	7,118.38	1,094.33	-1,247.57	1,397.32	1.64	-1.59	-0.42
8,738.00	91.69	270.47	7,115.68	1,094.77	-1,341.53	1,490.29	0.44	0.10	0.43
8,833.00	92.09	270.16	7,112.55	1,095.29	-1,436.48	1,584.25	0.53	0.42	-0.33
8,927.00	93.50	270.33	7,107.96	1,095.69	-1,530.37	1,677.13	1.51	1.50	0.18
9,023.00	92.62	270.55	7,102.84	1,096.43	-1,626.22	1,772.02	0.94	-0.92	0.23

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9,117.00	93.11	270.47	7,098.14	1,097.26	-1,720.10	1,864.97	0.53	0.52	-0.09
9,211.00	92.71	271.04	7,093.37	1,098.49	-1,813.97	1,957.96	0.74	-0.43	0.61
9,306.00	92.62	269.63	7,088.95	1,099.05	-1,908.87	2,051.87	1.49	-0.09	-1.48
9,400.00	93.02	270.33	7,084.32	1,099.01	-2,002.75	2,144.69	0.86	0.43	0.74
9,495.00	90.99	270.86	7,081.00	1,099.99	-2,097.68	2,238.70	2.21	-2.14	0.56
9,589.00	90.41	270.16	7,079.85	1,100.83	-2,191.67	2,331.76	0.97	-0.62	-0.74
9,683.00	90.81	270.64	7,078.85	1,101.48	-2,285.66	2,424.79	0.66	0.43	0.51
9,778.00	90.50	271.35	7,077.77	1,103.13	-2,380.64	2,518.94	0.82	-0.33	0.75
9,872.00	91.60	272.76	7,076.04	1,106.50	-2,474.56	2,612.31	1.90	1.17	1.50
10,061.00	90.59	272.23	7,072.43	1,114.72	-2,663.35	2,800.20	0.60	-0.53	-0.28
10,155.00	89.62	272.85	7,072.26	1,118.88	-2,757.25	2,893.67	1.22	-1.03	0.66
10,249.00	89.40	273.77	7,073.06	1,124.30	-2,851.09	2,987.26	1.01	-0.23	0.98
10,437.00	90.99	273.46	7,072.42	1,136.15	-3,038.71	3,174.54	0.86	0.85	-0.16
10,532.00	91.21	271.83	7,070.60	1,140.53	-3,133.59	3,269.00	1.73	0.23	-1.72
10,626.00	90.01	270.95	7,069.60	1,142.81	-3,227.55	3,362.25	1.58	-1.28	-0.94
10,720.00	89.70	269.54	7,069.84	1,143.21	-3,321.55	3,455.25	1.54	-0.33	-1.50
10,814.00	90.10	268.84	7,070.00	1,141.88	-3,415.54	3,547.98	0.86	0.43	-0.74
10,909.00	90.10	268.84	7,069.84	1,139.95	-3,510.52	3,641.60	0.00	0.00	0.00
11,003.00	90.81	269.36	7,069.09	1,138.47	-3,604.50	3,734.31	0.94	0.76	0.55
11,097.00	88.60	270.16	7,069.57	1,138.08	-3,698.49	3,827.18	2.50	-2.35	0.85
11,191.00	88.38	269.85	7,072.05	1,138.08	-3,792.46	3,920.09	0.40	-0.23	-0.33
11,286.00	88.82	270.07	7,074.37	1,138.02	-3,887.43	4,013.98	0.52	0.46	0.23
11,380.00	89.22	269.85	7,075.98	1,137.95	-3,981.42	4,106.90	0.49	0.43	-0.23
11,474.00	89.70	270.16	7,076.86	1,137.95	-4,075.41	4,199.83	0.61	0.51	0.33
11,568.00	90.72	270.25	7,076.52	1,138.29	-4,169.41	4,292.82	1.09	1.09	0.10
11,662.00	91.21	270.25	7,074.94	1,138.69	-4,263.40	4,385.81	0.52	0.52	0.00
11,757.00	89.70	270.55	7,074.18	1,139.36	-4,358.39	4,479.83	1.62	-1.59	0.32
11,851.00	89.62	270.95	7,074.74	1,140.58	-4,452.38	4,572.95	0.43	-0.09	0.43
11,946.00	92.00	270.55	7,073.40	1,141.82	-4,547.35	4,667.04	2.54	2.51	-0.42
12,041.00	92.31	271.04	7,069.82	1,143.14	-4,642.28	4,761.09	0.61	0.33	0.52
12,135.00	91.12	271.74	7,067.01	1,145.42	-4,736.21	4,854.30	1.47	-1.27	0.74
12,229.00	89.31	271.96	7,066.66	1,148.45	-4,830.15	4,947.64	1.94	-1.93	0.23
12,302.50	89.31	271.65	7,067.54	1,150.76	-4,903.61	5,020.62	0.41	0.00	-0.41
Section Line Crossing @ 12302.50'MD									
12,323.00	89.31	271.57	7,067.79	1,151.34	-4,924.10	5,040.96	0.41	0.00	-0.41
12,417.00	89.70	271.17	7,068.60	1,153.58	-5,018.07	5,134.21	0.59	0.41	-0.43
12,511.00	88.82	271.26	7,069.82	1,155.58	-5,112.04	5,227.42	0.94	-0.94	0.10
12,605.00	89.00	271.83	7,071.61	1,158.11	-5,205.99	5,320.69	0.64	0.19	0.61
12,795.00	89.70	270.55	7,073.76	1,162.05	-5,395.93	5,509.08	0.77	0.37	-0.67
12,888.00	89.79	269.94	7,074.17	1,162.44	-5,488.93	5,601.09	0.66	0.10	-0.66
13,078.00	89.79	269.85	7,074.87	1,162.09	-5,678.93	5,788.89	0.05	0.00	-0.05
13,172.00	88.51	270.73	7,076.27	1,162.56	-5,772.91	5,881.89	1.65	-1.36	0.94
13,266.00	88.69	271.35	7,078.56	1,164.27	-5,866.87	5,975.04	0.69	0.19	0.66

Survey Report

Company:	Extraction Oil & Gas	Local Co-ordinate Reference:	Well Launer 5
Project:	Weld County, CO (NAD83)	TVD Reference:	KB=25 @ 4952.00ft (Patterson 346)
Site:	Sec 26-T07N-R67W	MD Reference:	KB=25 @ 4952.00ft (Patterson 346)
Well:	Launer 5	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
13,361.00	88.91	271.61	7,080.55	1,166.72	-5,961.82	6,069.29	0.36	0.23	0.27
13,455.00	90.41	273.64	7,081.11	1,171.02	-6,055.71	6,162.77	2.69	1.60	2.16
13,549.00	89.88	272.14	7,080.87	1,175.76	-6,149.59	6,256.30	1.69	-0.56	-1.60
13,643.00	89.00	270.86	7,081.79	1,178.21	-6,243.55	6,349.57	1.65	-0.94	-1.36
13,738.00	89.88	272.54	7,082.72	1,181.03	-6,338.50	6,443.87	2.00	0.93	1.77
13,832.00	88.29	270.33	7,084.22	1,183.38	-6,432.44	6,537.11	2.90	-1.69	-2.35
13,926.00	88.51	271.04	7,086.84	1,184.50	-6,526.40	6,630.17	0.79	0.23	0.76
14,021.00	89.22	271.66	7,088.73	1,186.74	-6,621.35	6,724.39	0.99	0.75	0.65
14,116.00	89.88	271.57	7,089.47	1,189.41	-6,716.31	6,818.68	0.70	0.69	-0.09
14,210.00	87.41	269.23	7,091.70	1,190.07	-6,810.27	6,911.68	3.62	-2.63	-2.49
14,305.00	85.90	269.36	7,097.24	1,188.90	-6,905.10	7,005.26	1.60	-1.59	0.14
14,399.00	89.09	270.16	7,101.35	1,188.50	-6,999.00	7,098.04	3.50	3.39	0.85
14,493.00	88.82	269.63	7,103.06	1,188.33	-7,092.98	7,190.94	0.63	-0.29	-0.56
14,588.00	89.70	270.86	7,104.29	1,188.73	-7,187.97	7,284.92	1.59	0.93	1.29
14,682.00	90.90	271.17	7,103.80	1,190.39	-7,281.95	7,378.09	1.32	1.28	0.33
Final MWD Survey @ 14682'MD									
14,806.00	90.90	271.17	7,101.85	1,192.92	-7,405.91	7,501.03	0.00	0.00	0.00
PTD @ 14806'MD (1947'FSL & 2503'FEL) - PBHL Launer 5									

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
1,646.00	1,645.84	6.84	-1.46	First MWD Survey @ 1646'MD
7,604.70	7,160.95	1,068.73	-210.22	Hardline Crossing Point @ 7604.70'MD (1813'FSL & 591'FEL)
12,302.50	7,067.54	1,150.76	-4,903.61	Section Line Crossing @ 12302.50'MD
14,682.00	7,103.80	1,190.39	-7,281.95	Final MWD Survey @ 14682'MD
14,806.00	7,101.85	1,192.92	-7,405.91	PTD @ 14806'MD (1947'FSL & 2503'FEL)

Checked By: _____ Approved By: _____ Date: _____