



Extraction Oil & Gas

Weld County, CO (NAD83)

Sec 26-T07N-R67W

Launer 2C

Wellbore #1

Survey: MWD Surveys

Standard Survey Report

15 February, 2018

Company:	Extraction Oil & Gas	Local Co-ordinate Reference:	Well Launer 2C
Project:	Weld County, CO (NAD83)	TVD Reference:	KB=25 @ 4954.00ft (Patterson 346)
Site:	Sec 26-T07N-R67W	MD Reference:	KB=25 @ 4954.00ft (Patterson 346)
Well:	Launer 2C	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 2C					
Well Position	+N/-S	0.00 ft	Northing:	1,440,245.1880 usfl	Latitude:	40.540068
	+E/-W	0.00 ft	Easting:	3,180,042.1350 usfl	Longitude:	-104.852209
Position Uncertainty		0.00 ft	Wellhead Elevation:	0.00 ft	Ground Level:	4,929.00 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	283.02	

Survey Program	Date 2/15/2018			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
495.00	1,534.00	Surface Surveys (Wellbore #1)	NS-GYRO-MS	North sensing gyrocompassing m/s
1,647.00	15,159.00	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)	
1,534.00	0.70	330.33	1,533.89	2.77	-6.20	6.67	0.00	0.00	0.00	
1,647.00	1.19	345.62	1,646.87	4.51	-6.83	7.67	0.48	0.43	13.53	
First MWD Survey @ 1647'MD										
1,741.00	4.11	8.01	1,740.76	8.79	-6.61	8.42	3.24	3.11	23.82	
1,835.00	6.19	12.43	1,834.38	17.08	-5.05	8.77	2.25	2.21	4.70	
1,929.00	7.60	10.84	1,927.70	28.13	-2.79	9.05	1.51	1.50	-1.69	
2,024.00	10.21	8.33	2,021.54	42.64	-0.38	9.98	2.78	2.75	-2.64	
2,118.00	12.68	14.94	2,113.67	60.85	3.48	10.32	2.97	2.63	7.03	
2,213.00	14.32	14.01	2,206.04	82.32	9.02	9.77	1.74	1.73	-0.98	
2,308.00	16.48	13.93	2,297.63	106.81	15.10	9.35	2.27	2.27	-0.08	

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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)	
2,402.00	18.29	10.62	2,387.33	134.25	21.03	9.76	2.19	1.93	-3.52	
2,497.00	20.42	10.05	2,476.96	165.22	26.67	11.25	2.25	2.24	-0.60	
2,591.00	22.18	9.34	2,564.53	198.88	32.41	13.24	1.89	1.87	-0.76	
2,685.00	24.79	8.33	2,650.74	235.89	38.15	15.99	2.81	2.78	-1.07	
2,780.00	27.09	11.72	2,736.17	276.78	45.43	18.12	2.88	2.42	3.57	
2,874.00	27.62	10.14	2,819.66	319.19	53.61	19.70	0.96	0.56	-1.68	
2,968.00	28.28	8.95	2,902.69	362.64	60.91	22.38	0.92	0.70	-1.27	
3,062.00	26.78	6.73	2,986.05	405.67	66.86	26.28	1.93	-1.60	-2.36	
3,157.00	28.19	9.43	3,070.33	449.06	73.05	30.04	1.98	1.48	2.84	
3,251.00	27.88	12.82	3,153.30	492.40	81.56	31.51	1.73	-0.33	3.61	
3,345.00	26.29	11.33	3,236.99	534.24	90.53	32.20	1.84	-1.69	-1.59	
3,440.00	26.91	11.81	3,321.94	575.92	99.06	33.28	0.69	0.65	0.51	
3,535.00	27.22	11.81	3,406.53	618.23	107.91	34.19	0.33	0.33	0.00	
3,629.00	28.19	12.65	3,489.76	660.93	117.17	34.80	1.11	1.03	0.89	
3,723.00	27.71	13.84	3,572.79	703.82	127.26	34.63	0.78	-0.51	1.27	
3,912.00	30.71	16.53	3,737.75	792.78	151.51	31.05	1.73	1.59	1.42	
4,006.00	30.80	17.14	3,818.53	838.78	165.43	27.86	0.35	0.10	0.65	
4,099.00	31.11	16.75	3,898.28	884.54	179.37	24.59	0.40	0.33	-0.42	
4,193.00	31.11	15.51	3,978.76	931.20	192.87	21.96	0.68	0.00	-1.32	
4,288.00	28.50	14.15	4,061.19	976.83	204.97	20.45	2.84	-2.75	-1.43	
4,382.00	27.80	11.64	4,144.07	1,020.05	214.88	20.54	1.46	-0.74	-2.67	
4,476.00	29.39	10.84	4,226.61	1,064.17	223.64	21.94	1.74	1.69	-0.85	
4,571.00	29.70	12.34	4,309.25	1,110.06	233.05	23.11	0.84	0.33	1.58	
4,665.00	30.58	12.43	4,390.54	1,156.16	243.18	23.64	0.94	0.94	0.10	
4,759.00	31.82	12.12	4,470.95	1,203.74	253.53	24.28	1.33	1.32	-0.33	
4,853.00	29.61	11.15	4,551.76	1,250.76	263.22	25.43	2.41	-2.35	-1.03	
4,947.00	29.39	14.32	4,633.57	1,295.89	273.42	25.67	1.68	-0.23	3.37	
5,041.00	28.41	18.02	4,715.87	1,339.51	286.04	23.20	2.17	-1.04	3.94	
5,136.00	27.80	17.85	4,799.67	1,382.09	299.82	19.37	0.65	-0.64	-0.18	
5,230.00	26.69	17.01	4,883.24	1,423.14	312.72	16.06	1.25	-1.18	-0.89	
5,324.00	25.41	15.65	4,967.69	1,462.75	324.33	13.67	1.50	-1.36	-1.45	
5,418.00	20.50	7.74	5,054.24	1,498.51	332.00	14.26	6.16	-5.22	-8.41	
5,513.00	15.60	3.12	5,144.54	1,527.77	334.94	17.99	5.37	-5.16	-4.86	
5,607.00	12.68	359.24	5,235.69	1,550.71	335.49	22.62	3.26	-3.11	-4.13	
5,700.00	11.62	358.84	5,326.60	1,570.28	335.16	27.35	1.14	-1.14	-0.43	
5,795.00	10.52	356.02	5,419.83	1,588.50	334.37	32.23	1.29	-1.16	-2.97	
5,890.00	10.12	3.25	5,513.30	1,605.49	334.24	36.18	1.43	-0.42	7.61	
5,984.00	10.30	1.13	5,605.81	1,622.13	334.87	39.32	0.44	0.19	-2.26	
6,078.00	9.72	6.11	5,698.38	1,638.43	335.88	42.01	1.11	-0.62	5.30	
6,172.00	8.09	359.72	5,791.25	1,652.93	336.69	44.48	2.03	-1.73	-6.80	
6,360.00	5.61	4.61	5,977.90	1,675.32	337.37	48.87	1.35	-1.32	2.60	
6,454.00	3.49	6.33	6,071.59	1,682.75	338.05	49.88	2.26	-2.26	1.83	
6,549.00	1.41	325.13	6,166.51	1,686.58	337.70	51.08	2.74	-2.19	-43.37	

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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)
6,642.00	0.49	332.14	6,259.49	1,687.87	336.86	52.19	1.00	-0.99	7.54
6,737.00	1.19	299.53	6,354.48	1,688.72	335.81	53.40	0.86	0.74	-34.33
6,831.00	1.81	288.73	6,448.45	1,689.67	333.56	55.82	0.72	0.66	-11.49
6,926.00	1.53	300.41	6,543.41	1,690.80	331.04	58.52	0.46	-0.29	12.29
7,043.00	0.62	316.63	6,660.39	1,692.05	329.26	60.54	0.81	-0.78	13.86
7,137.00	10.91	268.24	6,753.80	1,692.15	320.00	69.59	11.18	10.95	-51.48
7,232.00	19.80	273.35	6,845.32	1,692.81	294.90	94.19	9.46	9.36	5.38
7,326.00	28.02	269.34	6,931.18	1,693.49	256.86	131.41	8.91	8.74	-4.27
7,420.00	33.98	264.71	7,011.73	1,690.81	208.57	177.85	6.82	6.34	-4.93
7,513.00	42.29	265.11	7,084.82	1,685.74	151.42	232.39	8.94	8.94	0.43
7,607.00	52.89	265.11	7,148.13	1,679.83	82.37	298.33	11.28	11.28	0.00
7,701.00	65.40	266.34	7,196.24	1,673.88	2.05	375.24	13.36	13.31	1.31
7,796.00	72.60	268.72	7,230.27	1,670.11	-86.49	460.65	7.93	7.58	2.51
7,890.00	80.12	270.31	7,252.42	1,669.36	-177.77	549.41	8.17	8.00	1.69
7,954.21	87.48	269.92	7,259.35	1,669.48	-241.56	611.59	11.48	11.47	-0.61
Hardline Crossing POint @ 7954.21'MD (2462'FSL & 592'FEL)									
7,955.66	87.65	269.91	7,259.41	1,669.48	-243.01	613.00	11.48	11.47	-0.60
LP Launer 2C									
7,984.00	90.90	269.74	7,259.77	1,669.39	-271.34	640.59	11.48	11.47	-0.60
8,078.00	88.82	270.05	7,260.00	1,669.22	-365.34	732.12	2.24	-2.21	0.33
8,173.00	88.51	269.12	7,262.21	1,668.53	-460.31	824.50	1.03	-0.33	-0.98
8,267.00	89.09	270.62	7,264.18	1,668.32	-554.28	916.01	1.71	0.62	1.60
8,361.00	90.90	271.81	7,264.19	1,670.31	-648.26	1,008.01	2.30	1.93	1.27
8,455.00	91.12	272.25	7,262.53	1,673.64	-742.18	1,100.27	0.52	0.23	0.47
8,550.00	91.12	271.54	7,260.67	1,676.78	-837.11	1,193.47	0.75	0.00	-0.75
8,644.00	93.20	271.54	7,257.13	1,679.31	-931.00	1,285.51	2.21	2.21	0.00
8,739.00	93.02	271.24	7,251.98	1,681.61	-1,025.84	1,378.42	0.37	-0.19	-0.32
8,834.00	94.08	271.94	7,246.10	1,684.24	-1,120.62	1,471.36	1.34	1.12	0.74
8,928.00	93.99	271.41	7,239.48	1,686.98	-1,214.34	1,563.29	0.57	-0.10	-0.56
9,023.00	92.40	271.24	7,234.19	1,689.17	-1,309.17	1,656.17	1.68	-1.67	-0.18
9,118.00	93.02	271.32	7,229.69	1,691.29	-1,404.04	1,749.08	0.66	0.65	0.08
9,306.00	91.60	271.94	7,222.12	1,696.64	-1,591.80	1,933.22	0.82	-0.76	0.33
9,401.00	91.60	271.81	7,219.46	1,699.74	-1,686.71	2,026.39	0.14	0.00	-0.14
9,495.00	92.18	271.24	7,216.36	1,702.24	-1,780.63	2,118.45	0.86	0.62	-0.61
9,590.00	92.49	270.84	7,212.49	1,703.97	-1,875.53	2,211.30	0.53	0.33	-0.42
9,778.00	91.12	268.94	7,206.57	1,703.60	-2,063.43	2,394.28	1.25	-0.73	-1.01
9,873.00	91.38	268.72	7,204.50	1,701.67	-2,158.38	2,486.36	0.36	0.27	-0.23
9,967.00	92.18	268.33	7,201.58	1,699.25	-2,252.31	2,577.32	0.95	0.85	-0.41
10,061.00	91.78	267.31	7,198.33	1,695.67	-2,346.18	2,667.97	1.16	-0.43	-1.09
10,156.00	88.38	268.81	7,198.20	1,692.46	-2,441.11	2,759.73	3.91	-3.58	1.58
10,249.00	90.81	271.63	7,198.86	1,692.82	-2,534.09	2,850.40	4.00	2.61	3.03
10,438.00	90.19	271.41	7,197.21	1,697.83	-2,723.02	3,035.60	0.35	-0.33	-0.12
10,532.00	90.72	270.53	7,196.46	1,699.42	-2,817.00	3,127.52	1.09	0.56	-0.94
10,627.00	92.09	268.24	7,194.13	1,698.40	-2,911.96	3,219.81	2.81	1.44	-2.41

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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
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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)
10,721.00	92.31	267.71	7,190.52	1,695.08	-3,005.83	3,310.51	0.61	0.23	-0.56
10,815.00	92.62	268.94	7,186.48	1,692.34	-3,099.70	3,401.35	1.35	0.33	1.31
10,910.00	93.59	268.72	7,181.33	1,690.40	-3,194.54	3,493.32	1.05	1.02	-0.23
11,003.00	93.99	268.55	7,175.19	1,688.19	-3,287.31	3,583.20	0.47	0.43	-0.18
11,098.00	92.71	269.91	7,169.64	1,686.92	-3,382.13	3,675.30	1.96	-1.35	1.43
11,192.00	89.62	269.65	7,167.72	1,686.55	-3,476.10	3,766.77	3.30	-3.29	-0.28
11,287.00	90.10	269.74	7,167.96	1,686.05	-3,571.10	3,859.21	0.51	0.51	0.09
11,381.00	90.90	269.34	7,167.14	1,685.29	-3,665.09	3,950.61	0.95	0.85	-0.43
11,475.00	91.30	270.31	7,165.33	1,685.01	-3,759.07	4,042.11	1.12	0.43	1.03
11,569.00	91.38	271.24	7,163.13	1,686.28	-3,853.04	4,133.95	0.99	0.09	0.99
11,663.00	88.51	271.42	7,163.22	1,688.46	-3,947.00	4,225.98	3.06	-3.05	0.19
11,758.00	88.29	271.72	7,165.88	1,691.06	-4,041.93	4,319.06	0.39	-0.23	0.32
11,852.00	89.62	272.12	7,167.59	1,694.21	-4,135.86	4,411.28	1.48	1.41	0.43
11,947.00	90.81	272.65	7,167.23	1,698.16	-4,230.77	4,504.64	1.37	1.25	0.56
12,041.00	89.62	271.94	7,166.88	1,701.93	-4,324.70	4,597.00	1.47	-1.27	-0.76
12,136.00	90.50	271.63	7,166.78	1,704.89	-4,419.65	4,690.17	0.98	0.93	-0.33
12,230.00	89.31	271.43	7,166.94	1,707.40	-4,513.61	4,782.29	1.28	-1.27	-0.21
12,418.00	90.19	271.63	7,167.76	1,712.42	-4,701.54	4,966.51	0.48	0.47	0.11
12,512.00	90.81	271.72	7,166.94	1,715.16	-4,795.50	5,058.67	0.67	0.66	0.10
12,606.00	88.91	272.25	7,167.17	1,718.42	-4,889.44	5,150.93	2.10	-2.02	0.56
12,650.02	88.77	272.37	7,168.06	1,720.19	-4,933.41	5,194.17	0.43	-0.33	0.27
Section Crossing Point @ 12650.02'MD									
12,701.00	88.60	272.51	7,169.23	1,722.36	-4,984.33	5,244.27	0.43	-0.33	0.27
12,795.00	89.00	272.25	7,171.20	1,726.27	-5,078.23	5,336.63	0.51	0.43	-0.28
12,889.00	89.62	272.65	7,172.33	1,730.28	-5,172.14	5,429.03	0.78	0.66	0.43
12,984.00	90.19	272.73	7,172.49	1,734.74	-5,267.03	5,522.49	0.61	0.60	0.08
13,078.00	90.19	272.51	7,172.18	1,739.04	-5,360.93	5,614.94	0.23	0.00	-0.23
13,173.00	89.48	271.72	7,172.45	1,742.55	-5,455.87	5,708.22	1.12	-0.75	-0.83
13,361.00	89.09	268.81	7,174.80	1,743.42	-5,643.83	5,891.54	1.56	-0.21	-1.55
13,456.00	89.70	268.64	7,175.80	1,741.30	-5,738.80	5,983.59	0.67	0.64	-0.18
13,550.00	90.81	268.33	7,175.38	1,738.82	-5,832.76	6,074.58	1.23	1.18	-0.33
13,644.00	88.82	267.31	7,175.69	1,735.24	-5,926.69	6,165.29	2.38	-2.12	-1.09
13,738.00	90.59	267.84	7,176.17	1,731.26	-6,020.60	6,255.88	1.97	1.88	0.56
13,833.00	92.18	269.03	7,173.87	1,728.67	-6,115.53	6,347.79	2.09	1.67	1.25
13,927.00	91.78	269.21	7,170.63	1,727.23	-6,209.47	6,438.98	0.47	-0.43	0.19
14,021.00	88.11	269.34	7,170.72	1,726.04	-6,303.44	6,530.27	3.91	-3.90	0.14
14,116.00	87.32	267.62	7,174.50	1,723.52	-6,398.33	6,622.15	1.99	-0.83	-1.81
14,210.00	88.20	268.94	7,178.18	1,720.70	-6,492.21	6,712.98	1.69	0.94	1.40
14,305.00	89.70	269.74	7,179.92	1,719.61	-6,587.19	6,805.27	1.79	1.58	0.84
14,399.00	90.19	270.05	7,180.01	1,719.44	-6,681.18	6,896.81	0.62	0.52	0.33
14,493.00	90.41	269.91	7,179.52	1,719.40	-6,775.18	6,988.38	0.28	0.23	-0.15
14,588.00	90.99	269.65	7,178.36	1,719.04	-6,870.18	7,080.85	0.67	0.61	-0.27
14,682.00	89.48	270.31	7,177.97	1,719.01	-6,964.17	7,172.42	1.75	-1.61	0.70

Company:	Extraction Oil & Gas	Local Co-ordinate Reference:	Well Launer 2C
Project:	Weld County, CO (NAD83)	TVD Reference:	KB=25 @ 4954.00ft (Patterson 346)
Site:	Sec 26-T07N-R67W	MD Reference:	KB=25 @ 4954.00ft (Patterson 346)
Well:	Launer 2C	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)
14,776.00	89.31	269.91	7,178.96	1,719.19	-7,058.17	7,264.03	0.46	-0.18	-0.43
14,871.00	89.40	269.34	7,180.03	1,718.56	-7,153.16	7,356.44	0.61	0.09	-0.60
14,965.00	89.62	268.72	7,180.84	1,716.97	-7,247.14	7,447.65	0.70	0.23	-0.66
15,059.00	89.88	268.72	7,181.25	1,714.87	-7,341.12	7,538.73	0.28	0.28	0.00
Final MWD Survey @ 15059'MD									
15,159.00	89.88	268.72	7,181.46	1,712.64	-7,441.09	7,635.63	0.00	0.00	0.00
PTD @ 15159'MD (2512'FSL & 2508'FEL) - PBHL Launer 2C									

Survey Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
1,647.00	1,646.87	4.51	-6.83	First MWD Survey @ 1647'MD
7,954.21	7,259.35	1,669.48	-241.56	Hardline Crossing Point @ 7954.21'MD (2462'FSL & 592'FEL)
12,650.02	7,168.06	1,720.19	-4,933.41	Section Crossing Point @ 12650.02'MD
15,059.00	7,181.25	1,714.87	-7,341.12	Final MWD Survey @ 15059'MD
15,159.00	7,181.46	1,712.64	-7,441.09	PTD @ 15159'MD (2512'FSL & 2508'FEL)

Checked By: _____	Approved By: _____	Date: _____
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