

# **Extraction Oil & Gas**

**Weld County, CO (NAD83)**

**Sec 26-T07N-R67W**

**Launer 11**

**Wellbore #1**

**Design: Wellbore #1**

## **Standard Survey Report**

**21 November, 2017**

## Survey Report

<b>Company:</b>	Extraction Oil & Gas	<b>Local Co-ordinate Reference:</b>	Well Launer 11
<b>Project:</b>	Weld County, CO (NAD83)	<b>TVD Reference:</b>	KB=25 @ 4951.00ft (Patterson 346)
<b>Site:</b>	Sec 26-T07N-R67W	<b>MD Reference:</b>	KB=25 @ 4951.00ft (Patterson 346)
<b>Well:</b>	Launer 11	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	EDM 5000.1

<b>Project</b>	Weld County, CO (NAD83)		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Ground Level
<b>Geo Datum:</b>	North American Datum 1983		
<b>Map Zone:</b>	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 11					
Well Position	+N/-S	0.00 ft	Northing:	1,440,106.0552 usft	Latitude:	40.539688
	+E/-W	0.00 ft	Easting:	3,179,948.3731 usft	Longitude:	-104.852550
Position Uncertainty		0.00 ft	Wellhead Elevation:	0.00 ft	Ground Level:	4,926.00 ft

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

<b>Design</b>	Wellbore #1				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.00
<b>Vertical Section:</b>	<b>Depth From (TVD) (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>	
	0.00	0.00	0.00	268.98	

<b>Survey Program</b>	<b>Date</b>	11/21/2017			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
495.00	1,546.00	Surface Surveys (Wellbore #1)	NS-GYRO-MS	North sensing gyrocompassing m/s	
1,647.00	14,686.00	MWD Surveys (Wellbore #1)	MWD	MWD - Standard	

<b>Survey</b>										
<b>Measured Depth (ft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Vertical Section (ft)</b>	<b>Dogleg Rate (°/100usft)</b>	<b>Build Rate (°/100usft)</b>	<b>Turn Rate (°/100usft)</b>	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
495.00	1.23	226.64	494.96	-3.65	-3.86	3.93	0.25	0.25	0.00	
591.00	0.57	143.67	590.95	-4.74	-4.33	4.41	1.34	-0.69	-86.43	
686.00	1.23	111.50	685.94	-5.49	-3.10	3.20	0.85	0.69	-33.86	
782.00	1.49	107.02	781.91	-6.24	-0.95	1.06	0.29	0.27	-4.67	
878.00	0.79	349.77	877.90	-5.95	0.13	-0.02	2.06	-0.73	-122.14	
974.00	1.27	350.12	973.89	-4.25	-0.17	0.25	0.50	0.50	0.36	
1,070.00	0.13	256.87	1,069.88	-3.23	-0.46	0.52	1.34	-1.19	-97.14	
1,166.00	0.88	263.02	1,165.87	-3.34	-1.30	1.36	0.78	0.78	6.41	
1,261.00	1.32	276.91	1,260.86	-3.30	-3.11	3.17	0.54	0.46	14.62	

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<b>Site:</b>	Sec 26-T07N-R67W	<b>MD Reference:</b>	KB=25 @ 4951.00ft (Patterson 346)
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<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	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	0.40	300.64	1,355.85	-3.00	-4.48	4.53	1.02	-0.97	24.98
1,451.00	0.66	145.43	1,450.84	-3.28	-4.46	4.51	1.09	0.27	-163.38
1,546.00	0.66	129.78	1,545.84	-4.08	-3.72	3.80	0.19	0.00	-16.47
1,647.00	0.62	171.25	1,646.83	-4.99	-3.19	3.28	0.45	-0.04	41.06
<b>First MWD Survey @ 1647'MD</b>									
1,742.00	0.62	177.33	1,741.83	-6.02	-3.09	3.20	0.07	0.00	6.40
1,836.00	0.49	196.72	1,835.82	-6.91	-3.18	3.31	0.24	-0.14	20.63
1,930.00	0.49	208.62	1,929.82	-7.65	-3.49	3.63	0.11	0.00	12.66
2,025.00	0.40	214.12	2,024.82	-8.28	-3.87	4.02	0.10	-0.09	5.79
2,119.00	2.12	128.24	2,118.79	-9.62	-2.69	2.86	2.26	1.83	-91.36
2,214.00	4.82	118.94	2,213.61	-12.64	2.18	-1.96	2.89	2.84	-9.79
2,308.00	4.60	119.34	2,307.29	-16.40	8.92	-8.63	0.24	-0.23	0.43
2,403.00	6.50	110.35	2,401.85	-20.14	17.29	-16.93	2.19	2.00	-9.46
2,497.00	7.20	97.83	2,495.18	-22.79	28.11	-27.70	1.75	0.74	-13.32
2,591.00	6.89	97.43	2,588.47	-24.32	39.54	-39.10	0.33	-0.33	-0.43
2,686.00	8.79	106.82	2,682.58	-27.16	52.14	-51.65	2.41	2.00	9.88
2,780.00	8.31	105.94	2,775.54	-31.11	65.55	-64.98	0.53	-0.51	-0.94
2,874.00	7.82	105.32	2,868.61	-34.66	78.25	-77.62	0.53	-0.52	-0.66
2,968.00	7.11	104.62	2,961.81	-37.82	90.04	-89.35	0.76	-0.76	-0.74
3,063.00	6.58	104.44	3,056.13	-40.66	101.00	-100.26	0.56	-0.56	-0.19
3,157.00	5.92	103.12	3,149.57	-43.10	110.94	-110.15	0.72	-0.70	-1.40
3,346.00	6.32	97.04	3,337.50	-46.59	130.76	-129.90	0.40	0.21	-3.22
3,441.00	5.61	98.45	3,431.98	-47.91	140.54	-139.66	0.76	-0.75	1.48
3,535.00	6.32	111.14	3,525.48	-50.46	149.91	-148.99	1.59	0.76	13.50
3,629.00	5.48	109.24	3,618.98	-53.80	158.97	-157.99	0.92	-0.89	-2.02
3,724.00	6.50	117.53	3,713.46	-57.78	168.02	-166.97	1.41	1.07	8.73
3,818.00	6.41	116.34	3,806.86	-62.57	177.45	-176.30	0.17	-0.10	-1.27
3,912.00	8.40	111.62	3,900.08	-67.43	188.53	-187.30	2.21	2.12	-5.02
4,006.00	8.09	110.21	3,993.10	-72.24	201.12	-199.80	0.39	-0.33	-1.50
4,100.00	7.20	110.21	4,086.27	-76.56	212.86	-211.46	0.95	-0.95	0.00
4,194.00	6.01	109.95	4,179.64	-80.28	223.01	-221.54	1.27	-1.27	-0.28
4,289.00	6.72	101.05	4,274.06	-83.04	233.14	-231.62	1.28	0.75	-9.37
4,383.00	6.32	98.14	4,367.45	-84.82	243.66	-242.11	0.55	-0.43	-3.10
4,477.00	5.79	97.04	4,460.93	-86.14	253.49	-251.91	0.58	-0.56	-1.17
4,571.00	8.09	103.91	4,554.23	-88.31	264.62	-263.00	2.60	2.45	7.31
4,666.00	6.89	102.63	4,648.42	-91.16	276.67	-275.00	1.28	-1.26	-1.35
4,760.00	8.09	105.41	4,741.62	-94.15	288.54	-286.82	1.33	1.28	2.96
4,854.00	7.38	103.65	4,834.76	-97.34	300.79	-299.00	0.80	-0.76	-1.87
4,948.00	6.89	102.63	4,928.03	-99.99	312.16	-310.32	0.54	-0.52	-1.09
5,042.00	6.19	101.44	5,021.42	-102.23	322.63	-320.75	0.76	-0.74	-1.27
5,137.00	6.81	108.23	5,115.81	-105.01	333.00	-331.07	1.04	0.65	7.15
5,230.00	7.69	105.94	5,208.07	-108.44	344.22	-342.23	1.00	0.95	-2.46
5,325.00	5.79	104.75	5,302.41	-111.41	354.96	-352.92	2.01	-2.00	-1.25

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5,419.00	7.29	111.32	5,395.79	-114.78	365.10	-363.00	1.78	1.60	6.99
5,514.00	8.79	110.83	5,489.86	-119.56	377.50	-375.31	1.58	1.58	-0.52
5,607.00	7.11	113.34	5,581.96	-124.36	389.43	-387.15	1.84	-1.81	2.70
5,701.00	8.31	102.55	5,675.11	-128.15	401.40	-399.06	2.00	1.28	-11.48
5,796.00	6.32	98.93	5,769.34	-130.45	413.27	-410.88	2.15	-2.09	-3.81
5,890.00	4.29	91.22	5,862.93	-131.33	421.90	-419.49	2.28	-2.16	-8.20
5,984.00	2.92	81.83	5,956.74	-131.06	427.78	-425.38	1.58	-1.46	-9.99
6,078.00	1.90	61.74	6,050.66	-129.98	431.53	-429.14	1.39	-1.09	-21.37
6,173.00	1.28	22.52	6,145.62	-128.26	433.32	-430.97	1.28	-0.65	-41.28
6,267.00	1.19	352.32	6,239.60	-126.32	433.59	-431.27	0.69	-0.10	-32.13
6,361.00	1.19	339.23	6,333.58	-124.44	433.12	-430.83	0.29	0.00	-13.93
6,455.00	1.50	320.24	6,427.56	-122.58	431.98	-429.73	0.57	0.33	-20.20
6,573.00	1.59	306.14	6,545.52	-120.43	429.67	-427.46	0.33	0.08	-11.95
6,668.00	10.78	273.84	6,639.87	-119.05	419.72	-417.53	9.97	9.67	-34.00
6,762.00	22.32	281.55	6,729.84	-114.88	393.37	-391.26	12.47	12.28	8.20
6,856.00	30.40	270.22	6,814.05	-111.20	352.00	-349.97	10.09	8.60	-12.05
6,950.00	39.90	269.12	6,890.82	-111.58	297.95	-295.92	10.13	10.11	-1.17
7,044.00	45.69	268.72	6,959.76	-112.79	234.13	-232.08	6.17	6.16	-0.43
7,138.00	55.02	268.15	7,019.67	-114.79	161.86	-159.78	9.94	9.93	-0.61
7,155.96	57.06	268.48	7,029.71	-115.23	146.97	-144.89	11.44	11.34	1.83
<b>Hardline Crossing @ 7155.96'MD (539'FSL &amp; 591'FEL)</b>									
7,233.00	65.80	269.74	7,066.52	-116.25	79.38	-77.30	11.44	11.35	1.64
7,326.00	72.12	270.22	7,099.89	-116.27	-7.37	9.44	6.81	6.80	0.52
7,420.00	73.40	269.83	7,127.75	-116.23	-97.15	99.20	1.42	1.36	-0.41
7,514.00	78.22	272.34	7,150.79	-114.49	-188.23	190.24	5.74	5.13	2.67
7,608.00	86.92	273.75	7,162.93	-109.53	-281.21	283.12	9.37	9.26	1.50
7,702.00	90.90	272.43	7,164.72	-104.46	-375.04	376.84	4.46	4.23	-1.40
7,796.00	93.28	269.21	7,161.29	-103.12	-468.95	470.71	4.26	2.53	-3.43
7,890.00	91.91	268.24	7,157.03	-105.21	-562.82	564.61	1.79	-1.46	-1.03
7,985.00	92.31	267.71	7,153.54	-108.56	-657.70	659.53	0.70	0.42	-0.56
8,079.00	93.68	267.71	7,148.63	-112.31	-751.49	753.38	1.46	1.46	0.00
8,173.00	93.42	269.21	7,142.81	-114.83	-845.28	847.19	1.62	-0.28	1.60
8,268.00	92.80	269.34	7,137.65	-116.03	-940.13	942.05	0.67	-0.65	0.14
8,362.00	91.52	267.84	7,134.11	-118.35	-1,034.03	1,035.97	2.10	-1.36	-1.60
8,456.00	92.00	268.02	7,131.22	-121.74	-1,127.92	1,129.91	0.55	0.51	0.19
8,550.00	89.79	267.23	7,129.75	-125.63	-1,221.82	1,223.87	2.50	-2.35	-0.84
8,740.00	90.19	267.31	7,129.79	-134.68	-1,411.61	1,413.78	0.21	0.21	0.04
8,835.00	90.19	269.65	7,129.47	-137.20	-1,506.57	1,508.77	2.46	0.00	2.46
9,024.00	92.31	270.62	7,125.35	-136.76	-1,695.51	1,697.68	1.23	1.12	0.51
9,118.00	92.49	270.13	7,121.41	-136.14	-1,789.42	1,791.57	0.55	0.19	-0.52
9,213.00	93.50	269.91	7,116.45	-136.11	-1,884.29	1,886.42	1.09	1.06	-0.23
9,307.00	92.89	271.24	7,111.21	-135.17	-1,978.14	1,980.24	1.55	-0.65	1.41
9,402.00	93.90	271.02	7,105.58	-133.30	-2,072.95	2,075.00	1.09	1.06	-0.23
9,496.00	91.69	270.05	7,101.00	-132.42	-2,166.83	2,168.85	2.57	-2.35	-1.03

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9,590.00	91.43	269.91	7,098.44	-132.46	-2,260.80	2,262.80	0.31	-0.28	-0.15
9,685.00	94.52	270.53	7,093.51	-132.09	-2,355.66	2,357.64	3.32	3.25	0.65
9,779.00	93.90	268.81	7,086.61	-132.63	-2,449.40	2,451.37	1.94	-0.66	-1.83
9,873.00	91.91	268.72	7,081.85	-134.66	-2,543.25	2,545.24	2.12	-2.12	-0.10
9,968.00	89.40	268.94	7,080.76	-136.60	-2,638.21	2,640.23	2.65	-2.64	0.23
10,062.00	89.00	269.03	7,082.07	-138.26	-2,732.19	2,734.22	0.44	-0.43	0.10
10,157.00	89.22	268.81	7,083.55	-140.05	-2,827.16	2,829.21	0.33	0.23	-0.23
10,250.00	89.88	269.65	7,084.28	-141.30	-2,920.15	2,922.20	1.15	0.71	0.90
10,344.00	91.52	272.03	7,083.13	-139.92	-3,014.12	3,016.14	3.07	1.74	2.53
10,439.00	91.91	271.72	7,080.29	-136.82	-3,109.03	3,110.97	0.52	0.41	-0.33
10,533.00	92.49	272.25	7,076.68	-133.56	-3,202.90	3,204.77	0.84	0.62	0.56
10,627.00	92.49	270.13	7,072.59	-131.61	-3,296.79	3,298.61	2.25	0.00	-2.26
10,722.00	91.12	269.74	7,069.60	-131.72	-3,391.74	3,393.55	1.50	-1.44	-0.41
10,816.00	89.22	269.52	7,069.32	-132.33	-3,485.73	3,487.54	2.03	-2.02	-0.23
10,910.00	89.22	269.12	7,070.60	-133.44	-3,579.72	3,581.53	0.43	0.00	-0.43
11,004.00	89.48	268.42	7,071.67	-135.46	-3,673.69	3,675.52	0.79	0.28	-0.74
11,099.00	90.01	268.81	7,072.09	-137.76	-3,768.66	3,770.52	0.69	0.56	0.41
11,193.00	90.81	268.94	7,071.42	-139.60	-3,862.64	3,864.51	0.86	0.85	0.14
11,287.00	91.12	268.42	7,069.84	-141.77	-3,956.60	3,958.50	0.64	0.33	-0.55
11,382.00	92.18	268.02	7,067.10	-144.72	-4,051.51	4,053.45	1.19	1.12	-0.42
11,476.00	91.60	269.34	7,064.00	-146.88	-4,145.43	4,147.39	1.53	-0.62	1.40
11,570.00	90.10	270.44	7,062.61	-147.06	-4,239.42	4,241.37	1.98	-1.60	1.17
11,664.00	89.09	270.84	7,063.27	-146.01	-4,333.41	4,335.32	1.16	-1.07	0.43
11,759.00	89.22	270.93	7,064.67	-144.54	-4,428.39	4,430.26	0.17	0.14	0.09
11,853.00	90.19	271.41	7,065.15	-142.62	-4,522.37	4,524.19	1.15	1.03	0.51
11,947.00	90.99	271.32	7,064.19	-140.39	-4,616.33	4,618.10	0.86	0.85	-0.10
12,042.00	89.79	271.02	7,063.54	-138.45	-4,711.31	4,713.03	1.30	-1.26	-0.32
12,136.00	90.81	271.41	7,063.05	-136.45	-4,805.29	4,806.95	1.16	1.09	0.41
12,174.50	90.11	271.82	7,062.74	-135.37	-4,843.77	4,845.41	2.10	-1.81	1.07
<b>Sec 26 &amp; 27 Crossing @ 12174.5'MD</b>									
12,231.00	89.09	272.43	7,063.13	-133.27	-4,900.23	4,901.82	2.10	-1.81	1.07
12,324.00	89.22	272.43	7,064.50	-129.33	-4,993.13	4,994.65	0.14	0.14	0.00
12,419.00	89.00	272.43	7,065.98	-125.30	-5,088.04	5,089.46	0.23	-0.23	0.00
12,513.00	89.70	272.73	7,067.04	-121.07	-5,181.93	5,183.27	0.81	0.74	0.32
12,607.00	89.00	268.33	7,068.11	-120.20	-5,275.90	5,277.20	4.74	-0.74	-4.68
12,702.00	89.40	268.55	7,069.44	-122.79	-5,370.86	5,372.19	0.48	0.42	0.23
12,796.00	90.28	268.81	7,069.70	-124.95	-5,464.83	5,466.19	0.98	0.94	0.28
12,890.00	88.29	269.03	7,070.87	-126.72	-5,558.80	5,560.18	2.13	-2.12	0.23
12,985.00	88.38	269.34	7,073.63	-128.07	-5,653.75	5,655.14	0.34	0.09	0.33
13,079.00	88.82	269.74	7,075.93	-128.83	-5,747.72	5,749.10	0.63	0.47	0.43
13,267.00	89.79	270.31	7,078.21	-128.75	-5,935.70	5,937.05	0.60	0.52	0.30
13,456.00	89.79	269.34	7,078.90	-129.32	-6,124.70	6,126.03	0.51	0.00	-0.51
13,550.00	89.40	268.15	7,079.57	-131.38	-6,218.67	6,220.03	1.33	-0.41	-1.27

## Survey Report

<b>Company:</b>	Extraction Oil & Gas	<b>Local Co-ordinate Reference:</b>	Well Launer 11
<b>Project:</b>	Weld County, CO (NAD83)	<b>TVD Reference:</b>	KB=25 @ 4951.00ft (Patterson 346)
<b>Site:</b>	Sec 26-T07N-R67W	<b>MD Reference:</b>	KB=25 @ 4951.00ft (Patterson 346)
<b>Well:</b>	Launer 11	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	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)
13,644.00	89.70	267.71	7,080.31	-134.78	-6,312.61	6,314.01	0.57	0.32	-0.47
13,739.00	90.10	269.83	7,080.47	-136.82	-6,407.58	6,409.00	2.27	0.42	2.23
13,833.00	90.50	269.21	7,079.98	-137.60	-6,501.57	6,502.99	0.78	0.43	-0.66
13,927.00	90.50	268.64	7,079.16	-139.37	-6,595.55	6,596.99	0.61	0.00	-0.61
14,022.00	91.38	268.33	7,077.60	-141.88	-6,690.51	6,691.97	0.98	0.93	-0.33
14,116.00	90.10	271.24	7,076.39	-142.23	-6,784.49	6,785.94	3.38	-1.36	3.10
14,211.00	90.10	270.75	7,076.22	-140.58	-6,879.47	6,880.88	0.52	0.00	-0.52
14,305.00	91.12	270.93	7,075.22	-139.20	-6,973.45	6,974.83	1.10	1.09	0.19
14,400.00	89.22	271.41	7,074.94	-137.26	-7,068.43	7,069.75	2.06	-2.00	0.51
14,493.00	89.70	271.41	7,075.81	-134.97	-7,161.40	7,162.66	0.52	0.52	0.00
14,588.00	90.19	270.93	7,075.91	-133.03	-7,256.38	7,257.59	0.72	0.52	-0.51
<b>Final MWD Survey @ 14588'MD</b>									
14,686.00	90.19	270.93	7,075.58	-131.44	-7,354.36	7,355.54	0.00	0.00	0.00
<b>PTD @ 14686'MD (583'FSL &amp; 2511'FEL)</b>									

### Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
1,647.00	1,646.83	-4.99	-3.19	First MWD Survey @ 1647'MD
7,155.96	7,029.71	-115.23	146.97	Hardline Crossing @ 7155.96'MD (539'FSL & 591'FEL)
12,174.50	7,062.74	-135.37	-4,843.77	Sec 26 & 27 Crossing @ 12174.5'MD
14,588.00	7,075.91	-133.03	-7,256.38	Final MWD Survey @ 14588'MD
14,686.00	7,075.58	-131.44	-7,354.36	PTD @ 14686'MD (583'FSL & 2511'FEL)

Checked By: _____	Approved By: _____	Date: _____
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