

# **Extraction Oil & Gas**

**Weld County, CO (NAD83)**

**Sec 26-T07N-R67W**

**Launer 9**

**Wellbore #1**

**Design: Wellbore #1**

## **Standard Survey Report**

**27 November, 2017**

## Survey Report

<b>Company:</b>	Extraction Oil & Gas	<b>Local Co-ordinate Reference:</b>	Well Launer 9
<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 9	<b>North Reference:</b>	True
<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 9					
Well Position	+N/-S	0.00 ft	Northing:	1,440,129.1217 usfi	Latitude:	40.539751
	+E/-W	0.00 ft	Easting:	3,179,964.0474 usfi	Longitude:	-104.852493
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	271.69	

<b>Survey Program</b>	<b>Date</b>	11/27/2017			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
495.00	1,512.00	Surface Surveys (Wellbore #1)	NS-GYRO-MS	North sensing gyrocompassing m/s	
1,646.00	14,537.00	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	1.67	295.79	494.93	3.14	-6.49	6.58	0.34	0.34	0.00	
591.00	1.27	225.48	590.90	3.00	-8.51	8.60	1.80	-0.42	-73.24	
686.00	1.58	175.99	685.88	0.96	-9.17	9.20	1.29	0.33	-52.09	
782.00	1.05	112.80	781.86	-0.71	-8.27	8.24	1.51	-0.55	-65.82	
878.00	1.19	94.32	877.84	-1.12	-6.46	6.43	0.40	0.15	-19.25	
974.00	0.62	5.40	973.83	-0.68	-5.42	5.40	1.39	-0.59	-92.63	
1,070.00	0.83	2.50	1,069.82	0.53	-5.34	5.36	0.22	0.22	-3.02	
1,166.00	0.13	260.11	1,165.82	1.21	-5.42	5.45	0.90	-0.73	-106.66	
1,261.00	1.14	274.08	1,260.81	1.26	-6.47	6.50	1.07	1.06	14.71	

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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	1.98	199.55	1,355.78	-0.22	-7.96	7.95	2.11	0.88	-78.45
1,451.00	0.97	199.37	1,450.75	-2.53	-8.78	8.70	1.06	-1.06	-0.19
1,512.00	0.62	207.46	1,511.75	-3.31	-9.10	9.00	0.60	-0.57	13.26
1,646.00	1.28	218.13	1,645.73	-5.13	-10.36	10.20	0.51	0.49	7.96
<b>First MWD Survey</b>									
1,740.00	1.10	213.64	1,739.71	-6.70	-11.51	11.30	0.22	-0.19	-4.78
1,834.00	1.02	223.64	1,833.69	-8.06	-12.58	12.34	0.21	-0.09	10.64
1,928.00	0.80	234.35	1,927.68	-9.05	-13.69	13.42	0.29	-0.23	11.39
2,023.00	0.49	224.52	2,022.67	-9.73	-14.52	14.22	0.35	-0.33	-10.35
2,118.00	2.78	211.52	2,117.63	-11.98	-16.01	15.65	2.43	2.41	-13.68
2,212.00	1.68	131.32	2,211.57	-14.83	-16.16	15.72	3.18	-1.17	-85.32
2,307.00	3.71	51.25	2,306.49	-13.83	-12.72	12.30	4.00	2.14	-84.28
2,401.00	5.92	47.33	2,400.15	-8.64	-6.78	6.52	2.38	2.35	-4.17
2,496.00	7.38	53.63	2,494.51	-1.70	1.73	-1.78	1.72	1.54	6.63
2,590.00	9.10	60.02	2,587.54	5.60	13.03	-12.86	2.07	1.83	6.80
2,685.00	9.72	67.91	2,681.26	12.37	26.97	-26.60	1.50	0.65	8.31
2,779.00	9.50	66.23	2,773.94	18.48	41.43	-40.86	0.38	-0.23	-1.79
2,873.00	8.71	63.63	2,866.76	24.76	54.90	-54.15	0.95	-0.84	-2.77
2,967.00	8.71	68.83	2,959.68	30.50	67.92	-66.98	0.84	0.00	5.53
3,062.00	8.40	67.82	3,053.62	35.71	81.05	-79.96	0.36	-0.33	-1.06
3,156.00	7.82	63.94	3,146.68	41.11	93.15	-91.90	0.85	-0.62	-4.13
3,250.00	8.00	69.63	3,239.79	46.20	105.03	-103.62	0.85	0.19	6.05
3,345.00	7.20	67.42	3,333.95	50.79	116.72	-115.17	0.90	-0.84	-2.33
3,439.00	6.41	71.21	3,427.29	54.74	127.13	-125.46	0.97	-0.84	4.03
3,534.00	6.98	74.12	3,521.64	58.03	137.70	-135.93	0.70	0.60	3.06
3,628.00	7.69	66.32	3,614.87	62.12	148.96	-147.06	1.30	0.76	-8.30
3,722.00	9.01	69.67	3,707.88	67.20	161.62	-159.56	1.50	1.40	3.56
3,816.00	9.10	67.82	3,800.71	72.56	175.40	-173.18	0.32	0.10	-1.97
3,911.00	9.01	66.23	3,894.52	78.40	189.17	-186.77	0.28	-0.09	-1.67
4,005.00	9.01	66.15	3,987.36	84.34	202.64	-200.06	0.01	0.00	-0.09
4,099.00	7.51	61.12	4,080.39	90.28	214.75	-211.99	1.77	-1.60	-5.35
4,193.00	6.98	68.92	4,173.64	95.31	225.46	-222.54	1.19	-0.56	8.30
4,288.00	7.91	71.74	4,267.84	99.43	237.05	-234.01	1.05	0.98	2.97
4,382.00	6.98	68.83	4,361.04	103.52	248.52	-245.35	1.07	-0.99	-3.10
4,475.00	8.40	73.64	4,453.20	107.47	260.31	-257.02	1.68	1.53	5.17
4,570.00	7.20	71.92	4,547.32	111.28	272.63	-269.22	1.29	-1.26	-1.81
4,664.00	8.09	71.21	4,640.49	115.24	284.49	-280.96	0.95	0.95	-0.76
4,758.00	6.98	69.54	4,733.67	119.36	296.10	-292.44	1.20	-1.18	-1.78
4,852.00	8.48	70.73	4,826.82	123.65	307.99	-304.21	1.60	1.60	1.27
4,946.00	7.51	68.22	4,919.90	128.21	320.24	-316.31	1.10	-1.03	-2.67
5,040.00	8.31	70.51	5,013.01	132.76	332.35	-328.28	0.91	0.85	2.44
5,135.00	6.32	65.13	5,107.23	137.25	343.57	-339.36	2.21	-2.09	-5.66
5,229.00	7.60	69.72	5,200.54	141.58	354.09	-349.75	1.48	1.36	4.88

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5,324.00	8.48	72.23	5,294.60	145.89	366.66	-362.18	1.00	0.93	2.64
5,417.00	6.89	69.32	5,386.77	149.96	378.41	-373.81	1.76	-1.71	-3.13
5,512.00	7.29	76.33	5,481.04	153.39	389.59	-384.89	1.00	0.42	7.38
5,606.00	6.10	74.92	5,574.40	156.10	400.21	-395.42	1.28	-1.27	-1.50
5,700.00	4.51	70.82	5,667.99	158.62	408.52	-403.66	1.74	-1.69	-4.36
5,795.00	3.31	60.33	5,762.77	161.20	414.44	-409.49	1.47	-1.26	-11.04
5,889.00	2.21	39.93	5,856.66	163.94	417.96	-412.93	1.55	-1.17	-21.70
5,983.00	0.49	127.93	5,950.64	165.08	419.44	-414.38	2.39	-1.83	93.62
6,077.00	0.62	291.11	6,044.64	165.01	419.28	-414.22	1.17	0.14	173.60
6,171.00	1.02	295.03	6,138.63	165.55	418.05	-412.97	0.43	0.43	4.17
6,265.00	1.41	290.32	6,232.61	166.31	416.21	-411.11	0.43	0.41	-5.01
6,383.00	1.59	303.23	6,350.57	167.71	413.47	-408.34	0.32	0.15	10.94
6,477.00	11.00	254.93	6,443.92	166.09	403.70	-398.62	10.65	10.01	-51.38
6,571.00	17.41	269.03	6,535.03	163.51	380.95	-375.95	7.70	6.82	15.00
6,666.00	24.61	261.23	6,623.67	160.25	347.14	-342.25	8.11	7.58	-8.21
6,760.00	33.32	263.92	6,705.83	154.52	302.03	-297.33	9.37	9.27	2.86
6,854.00	43.22	268.64	6,779.56	151.01	244.03	-239.46	10.97	10.53	5.02
6,948.00	52.32	269.83	6,842.67	150.14	174.50	-169.99	9.73	9.68	1.27
7,042.00	61.91	268.02	6,893.65	148.59	95.68	-91.25	10.33	10.20	-1.93
7,137.00	68.71	271.81	6,933.32	148.54	9.44	-5.04	8.02	7.16	3.99
7,231.00	76.98	273.84	6,961.03	153.00	-80.19	84.67	9.04	8.80	2.16
7,316.33	78.90	272.48	6,978.85	157.59	-163.50	168.09	2.74	2.25	-1.60
<b>Hardline Crossing @ 7316.33'MD (834'FSL &amp; 591'FEL)</b>									
7,325.00	79.10	272.34	6,980.51	157.95	-172.01	176.60	2.74	2.26	-1.58
7,419.00	82.02	270.31	6,995.93	160.09	-264.69	269.31	3.77	3.11	-2.16
7,512.00	86.79	270.53	7,004.99	160.77	-357.22	361.81	5.13	5.13	0.24
7,607.00	89.09	270.13	7,008.40	161.31	-452.15	456.72	2.46	2.42	-0.42
7,700.00	89.09	269.43	7,009.88	160.96	-545.14	549.66	0.75	0.00	-0.75
7,795.00	89.00	269.12	7,011.46	159.76	-640.12	644.56	0.34	-0.09	-0.33
7,889.00	89.00	268.33	7,013.11	157.66	-734.08	738.42	0.84	0.00	-0.84
7,983.00	90.50	269.52	7,013.52	155.90	-828.06	832.30	2.04	1.60	1.27
8,078.00	90.10	268.94	7,013.02	154.62	-923.05	927.21	0.74	-0.42	-0.61
8,172.00	90.59	270.53	7,012.45	154.19	-1,017.04	1,021.15	1.77	0.52	1.69
8,266.00	92.40	271.15	7,010.00	155.57	-1,110.99	1,115.11	2.04	1.93	0.66
8,360.00	93.20	271.24	7,005.41	157.52	-1,204.86	1,208.99	0.86	0.85	0.10
8,454.00	92.00	271.81	7,001.14	160.02	-1,298.73	1,302.89	1.41	-1.28	0.61
8,549.00	91.91	271.54	6,997.90	162.80	-1,393.63	1,397.83	0.30	-0.09	-0.28
8,643.00	92.40	271.24	6,994.37	165.08	-1,487.54	1,491.77	0.61	0.52	-0.32
8,738.00	92.62	271.15	6,990.21	167.06	-1,582.43	1,586.67	0.25	0.23	-0.09
8,833.00	92.00	271.02	6,986.38	168.85	-1,677.33	1,681.59	0.67	-0.65	-0.14
8,927.00	92.49	270.84	6,982.70	170.38	-1,771.25	1,775.51	0.56	0.52	-0.19
9,023.00	93.11	270.05	6,978.01	171.12	-1,867.13	1,871.37	1.05	0.65	-0.82
9,117.00	93.99	269.91	6,972.19	171.09	-1,960.95	1,965.15	0.95	0.94	-0.15
9,211.00	93.90	270.22	6,965.72	171.20	-2,054.72	2,058.88	0.34	-0.10	0.33

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9,305.00	93.28	269.43	6,959.83	170.91	-2,148.54	2,152.65	1.07	-0.66	-0.84
9,400.00	93.59	269.43	6,954.14	169.97	-2,243.36	2,247.40	0.33	0.33	0.00
9,494.00	94.70	268.81	6,947.35	168.53	-2,337.10	2,341.06	1.35	1.18	-0.66
9,589.00	94.30	268.81	6,939.89	166.56	-2,431.79	2,435.65	0.42	-0.42	0.00
9,683.00	93.99	270.13	6,933.10	165.69	-2,525.54	2,529.33	1.44	-0.33	1.40
9,777.00	93.28	271.15	6,927.14	166.74	-2,619.34	2,623.12	1.32	-0.76	1.09
9,872.00	94.21	270.84	6,920.93	168.39	-2,714.12	2,717.91	1.03	0.98	-0.33
9,966.00	93.02	270.05	6,915.01	169.12	-2,807.93	2,811.70	1.52	-1.27	-0.84
10,060.00	93.59	270.22	6,909.59	169.34	-2,901.77	2,905.51	0.63	0.61	0.18
10,155.00	92.71	268.81	6,904.37	168.53	-2,996.62	3,000.29	1.75	-0.93	-1.48
10,249.00	93.11	268.64	6,899.60	166.45	-3,090.48	3,094.05	0.46	0.43	-0.18
10,342.00	91.52	269.03	6,895.84	164.56	-3,183.38	3,186.85	1.76	-1.71	0.42
10,437.00	90.19	265.64	6,894.42	160.14	-3,278.25	3,281.55	3.83	-1.40	-3.57
10,531.00	91.69	266.52	6,892.88	153.71	-3,372.01	3,375.08	1.85	1.60	0.94
10,626.00	91.21	268.24	6,890.47	149.37	-3,466.88	3,469.78	1.88	-0.51	1.81
10,720.00	91.60	268.64	6,888.17	146.82	-3,560.82	3,563.60	0.59	0.41	0.43
10,814.00	92.62	270.93	6,884.71	146.46	-3,654.75	3,657.48	2.67	1.09	2.44
10,909.00	90.72	270.31	6,881.94	147.49	-3,749.69	3,752.42	2.10	-2.00	-0.65
11,003.00	90.50	271.54	6,880.94	149.01	-3,843.68	3,846.40	1.33	-0.23	1.31
11,097.00	89.88	267.31	6,880.63	148.06	-3,937.65	3,940.30	4.55	-0.66	-4.50
11,191.00	90.81	265.02	6,880.06	141.78	-4,031.43	4,033.86	2.63	0.99	-2.44
11,286.00	91.91	267.23	6,877.81	135.36	-4,126.18	4,128.38	2.60	1.16	2.33
11,380.00	92.62	270.22	6,874.09	133.27	-4,220.07	4,222.16	3.27	0.76	3.18
11,474.00	92.00	272.03	6,870.30	135.11	-4,313.97	4,316.08	2.03	-0.66	1.93
11,568.00	90.10	272.03	6,868.58	138.44	-4,407.89	4,410.06	2.02	-2.02	0.00
11,662.00	90.59	272.51	6,868.01	142.17	-4,501.82	4,504.05	0.73	0.52	0.51
11,757.00	91.38	272.65	6,866.38	146.44	-4,596.70	4,599.02	0.84	0.83	0.15
11,851.00	89.88	272.65	6,865.35	150.79	-4,690.60	4,693.00	1.60	-1.60	0.00
11,946.00	89.22	271.41	6,866.09	154.15	-4,785.53	4,788.00	1.48	-0.69	-1.31
12,020.17	90.30	273.78	6,866.40	157.51	-4,859.62	4,862.15	3.51	1.46	3.19
<b>Sec 26/27 Crossing Point @ 12020.17'MD</b>									
12,040.00	90.59	274.41	6,866.25	158.92	-4,879.40	4,881.96	3.51	1.46	3.19
12,135.00	90.99	273.13	6,864.94	165.17	-4,974.18	4,976.89	1.41	0.42	-1.35
12,229.00	88.69	272.03	6,865.20	169.40	-5,068.08	5,070.87	2.71	-2.45	-1.17
12,323.00	89.00	271.94	6,867.10	172.66	-5,162.00	5,164.85	0.34	0.33	-0.10
12,417.00	89.48	272.25	6,868.34	176.09	-5,255.93	5,258.84	0.61	0.51	0.33
12,511.00	88.11	271.24	6,870.32	178.95	-5,349.86	5,352.81	1.81	-1.46	-1.07
12,605.00	88.20	271.41	6,873.35	181.13	-5,443.79	5,446.76	0.20	0.10	0.18
12,700.00	88.51	271.94	6,876.07	183.90	-5,538.71	5,541.72	0.65	0.33	0.56
12,794.00	89.62	270.13	6,877.61	185.60	-5,632.67	5,635.70	2.26	1.18	-1.93
12,888.00	89.79	269.34	6,878.09	185.16	-5,726.67	5,729.64	0.86	0.18	-0.84
12,983.00	90.41	269.74	6,877.92	184.40	-5,821.67	5,824.57	0.78	0.65	0.42
13,077.00	90.59	268.72	6,877.10	183.14	-5,915.65	5,918.48	1.10	0.19	-1.09

## Survey Report

<b>Company:</b>	Extraction Oil & Gas	<b>Local Co-ordinate Reference:</b>	Well Launer 9
<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 9	<b>North Reference:</b>	True
<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)
13,172.00	90.99	268.94	6,875.79	181.20	-6,010.62	6,013.35	0.48	0.42	0.23
13,266.00	89.40	268.42	6,875.47	179.03	-6,104.60	6,107.22	1.78	-1.69	-0.55
13,361.00	89.48	268.02	6,876.40	176.08	-6,199.55	6,202.04	0.43	0.08	-0.42
13,455.00	90.41	268.15	6,876.49	172.94	-6,293.49	6,295.85	1.00	0.99	0.14
13,549.00	90.59	267.62	6,875.67	169.47	-6,387.42	6,389.64	0.60	0.19	-0.56
13,643.00	91.91	270.53	6,873.62	167.95	-6,481.38	6,483.51	3.40	1.40	3.10
13,737.00	89.88	271.94	6,872.15	169.98	-6,575.34	6,577.49	2.63	-2.16	1.50
13,832.00	89.62	273.04	6,872.57	174.11	-6,670.24	6,672.48	1.19	-0.27	1.16
13,926.00	89.22	273.44	6,873.52	179.42	-6,764.09	6,766.44	0.60	-0.43	0.43
14,020.00	89.00	270.05	6,874.98	182.28	-6,858.02	6,860.41	3.61	-0.23	-3.61
14,115.00	88.91	270.22	6,876.71	182.51	-6,953.00	6,955.36	0.20	-0.09	0.18
14,210.00	89.48	269.43	6,878.05	182.22	-7,047.99	7,050.30	1.03	0.60	-0.83
14,304.00	89.62	269.65	6,878.79	181.46	-7,141.99	7,144.23	0.28	0.15	0.23
14,398.00	90.81	270.75	6,878.43	181.79	-7,235.98	7,238.19	1.72	1.27	1.17
<b>Final MWD Survey @ 14398'MD</b>									
14,537.00	90.81	270.75	6,876.47	183.61	-7,374.96	7,377.16	0.00	0.00	0.00
<b>PTD @ 14537'MD (868'FSL &amp; 2516' FEL)</b>									

### Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
1,646.00	1,645.73	-5.13	-10.36	First MWD Survey
7,316.33	6,978.85	157.59	-163.50	Hardline Crossing @ 7316.33'MD (834'FSL & 591'FEL)
12,020.17	6,866.40	157.51	-4,859.62	Sec 26/27 Crossing Point @ 12020.17'MD
14,398.00	6,878.43	181.79	-7,235.98	Final MWD Survey @ 14398'MD
14,537.00	6,876.47	183.61	-7,374.96	PTD @ 14537'MD (868'FSL & 2516' FEL)

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_