

# **Extraction Oil & Gas**

**Weld County, CO (NAD83)**

**Sec 26-T07N-R67W**

**Launer 8C**

**Wellbore #1**

**Design: Wellbore #1**

## **Standard Survey Report**

**29 November, 2017**

## Survey Report

<b>Company:</b>	Extraction Oil & Gas	<b>Local Co-ordinate Reference:</b>	Well Launer 8C
<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 8C	<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 8C					
Well Position	+N/-S	0.00 ft	Northing:	1,440,152.1862 usfi	Latitude:	40.539814
	+E/-W	0.00 ft	Easting:	3,179,979.4438 usfi	Longitude:	-104.852437
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	11/24/2017	8.32	66.95	52,375

<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	274.05	

<b>Survey Program</b>	<b>Date</b>	11/29/2017			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
212.00	1,513.00	Surface Surveys (Wellbore #1)	NS-GYRO-MS	North sensing gyrocompassing m/s	
1,513.00	14,804.00	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	
212.00	0.92	337.71	211.99	1.57	-0.65	0.76	0.43	0.43	0.00	
307.00	0.35	202.36	306.99	2.01	-1.05	1.18	1.26	-0.60	-142.47	
401.00	1.14	230.31	400.98	1.15	-1.87	1.95	0.90	0.84	29.73	
495.00	1.32	238.40	494.96	-0.02	-3.52	3.51	0.27	0.19	8.61	
591.00	1.45	257.20	590.93	-0.86	-5.64	5.57	0.49	0.14	19.58	
686.00	1.27	196.03	685.91	-2.14	-7.10	6.94	1.47	-0.19	-64.39	
782.00	1.36	181.09	781.88	-4.30	-7.42	7.10	0.37	0.09	-15.56	
878.00	2.24	120.18	877.84	-6.39	-5.82	5.35	2.06	0.92	-63.45	
974.00	0.70	116.32	973.81	-7.59	-3.67	3.13	1.61	-1.60	-4.02	

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<b>Well:</b>	Launer 8C	<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)
1,070.00	0.44	8.91	1,069.80	-7.48	-3.09	2.55	0.97	-0.27	-111.89
1,166.00	1.85	342.11	1,165.78	-5.65	-3.51	3.10	1.53	1.47	-27.92
1,261.00	1.93	348.26	1,260.73	-2.62	-4.31	4.11	0.23	0.08	6.47
1,356.00	2.02	344.39	1,355.68	0.56	-5.08	5.11	0.17	0.09	-4.07
1,451.00	1.41	61.38	1,450.64	2.73	-4.51	4.69	2.30	-0.64	81.04
1,513.00	1.71	72.55	1,512.62	3.37	-2.95	3.18	0.69	0.48	18.02
1,646.00	1.50	47.41	1,645.57	5.15	0.22	0.14	0.55	-0.16	-18.90
<b>First MWD Survey @ 1646'MD</b>									
1,740.00	1.41	44.63	1,739.54	6.80	1.94	-1.45	0.12	-0.10	-2.96
1,834.00	1.68	41.81	1,833.50	8.65	3.67	-3.05	0.30	0.29	-3.00
1,928.00	1.68	40.71	1,927.46	10.72	5.49	-4.72	0.03	0.00	-1.17
2,023.00	3.49	38.64	2,022.36	14.04	8.20	-7.19	1.91	1.91	-2.18
2,117.00	4.82	45.34	2,116.12	19.05	12.80	-11.42	1.50	1.41	7.13
2,212.00	6.50	42.12	2,210.65	25.84	19.24	-17.37	1.80	1.77	-3.39
2,307.00	8.31	44.72	2,304.85	34.71	27.68	-25.16	1.94	1.91	2.74
2,401.00	9.72	46.04	2,397.69	45.05	38.17	-34.90	1.52	1.50	1.40
2,495.00	9.59	44.23	2,490.36	56.17	49.35	-45.26	0.35	-0.14	-1.93
2,590.00	9.19	43.93	2,584.09	67.30	60.13	-55.23	0.42	-0.42	-0.32
2,684.00	9.01	42.52	2,676.90	78.13	70.31	-64.62	0.30	-0.19	-1.50
2,779.00	8.62	42.03	2,770.78	88.90	80.11	-73.63	0.42	-0.41	-0.52
2,873.00	8.09	41.72	2,863.78	99.07	89.22	-82.01	0.57	-0.56	-0.33
2,967.00	9.50	41.81	2,956.67	109.79	98.80	-90.80	1.50	1.50	0.10
3,061.00	9.41	40.00	3,049.40	121.46	108.91	-100.06	0.33	-0.10	-1.93
3,155.00	8.79	38.51	3,142.21	132.97	118.32	-108.64	0.71	-0.66	-1.59
3,250.00	8.22	35.91	3,236.17	144.15	126.82	-116.33	0.72	-0.60	-2.74
3,344.00	9.41	40.93	3,329.06	155.40	135.80	-124.49	1.51	1.27	5.34
3,439.00	8.88	38.64	3,422.85	166.99	145.47	-133.32	0.68	-0.56	-2.41
3,534.00	8.88	38.51	3,516.71	178.45	154.61	-141.63	0.02	0.00	-0.14
3,628.00	9.59	43.13	3,609.49	189.85	164.48	-150.67	1.09	0.76	4.91
3,722.00	9.50	41.81	3,702.19	201.34	175.01	-160.36	0.25	-0.10	-1.40
3,816.00	9.41	41.02	3,794.92	212.92	185.22	-169.73	0.17	-0.10	-0.84
3,911.00	9.28	39.30	3,888.66	224.71	195.17	-178.82	0.32	-0.14	-1.81
4,005.00	9.19	38.42	3,981.44	236.46	204.63	-187.43	0.18	-0.10	-0.94
4,098.00	8.31	38.11	4,073.35	247.56	213.40	-195.39	0.95	-0.95	-0.33
4,287.00	8.62	40.53	4,260.30	269.07	231.03	-211.46	0.25	0.16	1.28
4,381.00	9.19	47.80	4,353.17	279.47	241.17	-220.84	1.34	0.61	7.73
4,475.00	8.88	45.51	4,446.00	289.60	251.91	-230.84	0.51	-0.33	-2.44
4,570.00	8.22	43.13	4,539.94	299.69	261.78	-239.97	0.79	-0.69	-2.51
4,664.00	9.28	41.11	4,632.85	310.31	271.36	-248.78	1.17	1.13	-2.15
4,758.00	8.79	39.30	4,725.68	321.58	280.89	-257.49	0.60	-0.52	-1.93
4,852.00	8.48	36.13	4,818.62	332.73	289.53	-265.32	0.60	-0.33	-3.37
4,946.00	10.21	41.50	4,911.37	344.57	299.13	-274.07	2.06	1.84	5.71
5,040.00	9.72	40.14	5,003.95	356.88	309.77	-283.81	0.58	-0.52	-1.45

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5,135.00	8.62	36.43	5,097.73	368.74	319.17	-292.34	1.31	-1.16	-3.91
5,229.00	9.01	45.12	5,190.63	379.60	328.57	-300.95	1.47	0.41	9.24
5,347.00	7.60	40.00	5,307.39	392.10	340.13	-311.61	1.35	-1.19	-4.34
5,441.00	8.31	38.64	5,400.48	402.16	348.37	-319.11	0.78	0.76	-1.45
5,536.00	6.10	35.91	5,494.73	411.62	355.62	-325.67	2.35	-2.33	-2.87
5,629.00	6.89	40.31	5,587.13	419.87	362.12	-331.58	1.00	0.85	4.73
5,723.00	8.88	39.83	5,680.24	429.74	370.42	-339.16	2.12	2.12	-0.51
5,818.00	7.60	38.81	5,774.26	440.27	379.05	-347.03	1.36	-1.35	-1.07
5,913.00	5.08	29.03	5,868.67	448.84	385.03	-352.39	2.88	-2.65	-10.29
6,007.00	5.39	37.80	5,962.28	455.97	389.76	-356.60	0.91	0.33	9.33
6,101.00	3.80	29.82	6,055.97	462.16	394.01	-360.41	1.82	-1.69	-8.49
6,195.00	2.52	7.03	6,149.83	466.92	395.81	-361.87	1.88	-1.36	-24.24
6,289.00	2.61	344.91	6,243.74	471.03	395.51	-361.27	1.05	0.10	-23.53
6,383.00	2.61	320.54	6,337.65	474.75	393.59	-359.10	1.17	0.00	-25.93
6,477.00	0.49	244.92	6,431.61	476.24	391.87	-357.27	2.69	-2.26	-80.45
6,571.00	1.50	215.70	6,525.60	475.07	390.79	-356.28	1.17	1.07	-31.09
6,666.00	2.30	222.31	6,620.54	472.65	388.78	-354.45	0.87	0.84	6.96
6,760.00	13.52	270.74	6,713.55	471.39	376.47	-342.26	12.89	11.94	51.52
6,854.00	22.09	276.91	6,802.97	473.66	347.89	-313.58	9.32	9.12	6.56
6,948.00	28.28	276.82	6,888.00	478.44	308.19	-273.65	6.59	6.59	-0.10
7,042.00	39.90	274.62	6,965.71	483.53	255.85	-221.08	12.43	12.36	-2.34
7,136.00	45.38	271.40	7,034.84	486.78	192.30	-157.46	6.27	5.83	-3.43
7,231.00	44.19	268.71	7,102.27	486.86	125.39	-90.71	2.36	-1.25	-2.83
7,325.00	57.80	268.01	7,161.30	484.73	52.55	-18.20	14.49	14.48	-0.74
7,419.00	69.51	270.12	7,202.94	483.43	-31.53	65.57	12.62	12.46	2.24
7,512.00	74.50	269.64	7,231.67	483.24	-119.95	153.76	5.39	5.37	-0.52
7,572.77	77.22	269.35	7,246.51	482.73	-178.87	212.50	4.49	4.47	-0.47
<b>Hardline Crossing @ 7572.77'MD (1181'FSL &amp; 591'FEL)</b>									
7,606.00	78.70	269.20	7,253.45	482.32	-211.37	244.88	4.49	4.47	-0.46
7,700.00	91.21	272.02	7,261.70	483.33	-304.80	338.16	13.64	13.31	3.00
7,795.00	98.98	274.13	7,253.27	488.39	-399.21	432.69	8.47	8.18	2.22
7,889.00	95.89	269.64	7,241.10	491.45	-492.34	525.80	5.76	-3.29	-4.78
7,983.00	94.21	269.82	7,232.82	491.00	-585.97	619.16	1.80	-1.79	0.19
8,077.00	92.09	271.14	7,227.66	491.79	-679.81	712.83	2.66	-2.26	1.40
8,172.00	91.38	270.74	7,224.78	493.35	-774.76	807.65	0.86	-0.75	-0.42
8,266.00	92.89	271.23	7,221.28	494.96	-868.67	901.44	1.69	1.61	0.52
8,360.00	91.69	270.04	7,217.52	496.01	-962.59	995.20	1.80	-1.28	-1.27
8,454.00	90.50	269.51	7,215.73	495.64	-1,056.57	1,088.92	1.39	-1.27	-0.56
8,549.00	91.60	270.21	7,213.99	495.40	-1,151.55	1,183.65	1.37	1.16	0.74
8,643.00	89.88	269.11	7,212.77	494.85	-1,245.54	1,277.36	2.17	-1.83	-1.17
8,738.00	88.51	269.73	7,214.11	493.88	-1,340.52	1,372.04	1.58	-1.44	0.65
8,833.00	89.31	268.80	7,215.91	492.67	-1,435.49	1,466.69	1.29	0.84	-0.98
8,927.00	90.72	269.20	7,215.89	491.03	-1,529.48	1,560.32	1.56	1.50	0.43
9,022.00	89.62	268.14	7,215.61	488.82	-1,624.45	1,654.90	1.61	-1.16	-1.12

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9,117.00	90.41	267.83	7,215.58	485.48	-1,719.39	1,749.37	0.89	0.83	-0.33
9,211.00	91.69	270.52	7,213.86	484.13	-1,813.35	1,843.00	3.17	1.36	2.86
9,305.00	93.50	271.62	7,209.60	485.88	-1,907.23	1,936.77	2.25	1.93	1.17
9,400.00	92.09	270.04	7,204.97	487.25	-2,002.11	2,031.50	2.23	-1.48	-1.66
9,494.00	92.71	268.93	7,201.04	486.41	-2,096.02	2,125.12	1.35	0.66	-1.18
9,589.00	92.00	269.11	7,197.13	484.79	-2,190.92	2,219.68	0.77	-0.75	0.19
9,683.00	91.30	269.82	7,194.42	483.91	-2,284.88	2,313.34	1.06	-0.74	0.76
9,777.00	92.18	269.20	7,191.57	483.10	-2,378.83	2,407.00	1.15	0.94	-0.66
9,872.00	91.78	270.21	7,188.29	482.62	-2,473.77	2,501.67	1.14	-0.42	1.06
9,966.00	90.59	271.31	7,186.34	483.86	-2,567.74	2,595.49	1.72	-1.27	1.17
10,060.00	92.09	271.93	7,184.15	486.52	-2,661.67	2,689.38	1.73	1.60	0.66
10,155.00	90.50	269.90	7,182.00	488.04	-2,756.63	2,784.20	2.71	-1.67	-2.14
10,248.00	89.00	270.21	7,182.40	488.12	-2,849.62	2,876.97	1.65	-1.61	0.33
10,342.00	90.41	270.21	7,182.89	488.47	-2,943.62	2,970.76	1.50	1.50	0.00
10,437.00	89.70	271.23	7,182.80	489.66	-3,038.61	3,065.60	1.31	-0.75	1.07
10,532.00	91.12	271.62	7,182.12	492.03	-3,133.58	3,160.49	1.55	1.49	0.41
10,626.00	89.70	269.42	7,181.45	492.88	-3,227.56	3,254.30	2.79	-1.51	-2.34
10,721.00	88.29	269.20	7,183.11	491.73	-3,322.54	3,348.96	1.50	-1.48	-0.23
10,815.00	87.89	269.64	7,186.24	490.78	-3,416.48	3,442.60	0.63	-0.43	0.47
10,909.00	88.60	270.74	7,189.12	491.09	-3,510.43	3,536.34	1.39	0.76	1.17
11,003.00	88.29	269.82	7,191.67	491.55	-3,604.40	3,630.10	1.03	-0.33	-0.98
11,097.00	90.99	271.01	7,192.26	492.24	-3,698.38	3,723.90	3.14	2.87	1.27
11,191.00	90.50	271.23	7,191.04	494.07	-3,792.36	3,817.77	0.57	-0.52	0.23
11,286.00	89.79	269.20	7,190.80	494.43	-3,887.35	3,912.55	2.26	-0.75	-2.14
11,380.00	90.72	270.21	7,190.38	493.94	-3,981.34	4,006.28	1.46	0.99	1.07
11,474.00	90.10	268.93	7,189.71	493.24	-4,075.34	4,099.99	1.51	-0.66	-1.36
11,568.00	91.52	269.33	7,188.38	491.81	-4,169.31	4,193.63	1.57	1.51	0.43
11,663.00	91.52	269.02	7,185.86	490.44	-4,264.27	4,288.25	0.33	0.00	-0.33
11,758.00	91.12	268.93	7,183.67	488.75	-4,359.23	4,382.86	0.43	-0.42	-0.09
11,851.00	89.22	270.30	7,183.40	488.12	-4,452.22	4,475.57	2.52	-2.04	1.47
11,946.00	89.79	269.42	7,184.22	487.89	-4,547.22	4,570.31	1.10	0.60	-0.93
12,041.00	89.79	270.74	7,184.57	488.02	-4,642.21	4,665.08	1.39	0.00	1.39
12,135.00	90.10	270.92	7,184.66	489.38	-4,736.20	4,758.93	0.38	0.33	0.19
12,229.00	90.50	272.64	7,184.16	492.30	-4,830.15	4,852.86	1.88	0.43	1.83
12,272.98	91.29	272.86	7,183.48	494.41	-4,874.08	4,896.82	1.86	1.79	0.51
<b>Section Line Crossing @ 12272.98'MD</b>									
12,323.00	92.18	273.12	7,181.97	497.02	-4,924.01	4,946.81	1.86	1.79	0.51
12,417.00	92.09	271.53	7,178.46	500.83	-5,017.86	5,040.70	1.69	-0.10	-1.69
12,512.00	90.01	270.74	7,176.72	502.72	-5,112.82	5,135.55	2.34	-2.19	-0.83
12,606.00	90.10	269.11	7,176.63	502.59	-5,206.82	5,229.30	1.74	0.10	-1.73
12,700.00	87.50	268.14	7,178.60	500.34	-5,300.76	5,322.85	2.95	-2.77	-1.03
12,795.00	89.62	269.42	7,180.99	498.32	-5,395.70	5,417.42	2.61	2.23	1.35
12,889.00	89.31	269.20	7,181.87	497.18	-5,489.69	5,511.09	0.40	-0.33	-0.23

## Survey Report

<b>Company:</b>	Extraction Oil & Gas	<b>Local Co-ordinate Reference:</b>	Well Launer 8C
<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 8C	<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)
12,983.00	90.41	270.21	7,182.10	496.70	-5,583.68	5,604.82	1.59	1.17	1.07
13,078.00	89.40	268.80	7,182.25	495.88	-5,678.68	5,699.52	1.83	-1.06	-1.48
13,172.00	88.82	269.73	7,183.71	494.67	-5,772.66	5,793.18	1.17	-0.62	0.99
13,267.00	88.91	270.61	7,185.60	494.96	-5,867.64	5,887.94	0.93	0.09	0.93
13,361.00	88.60	269.82	7,187.64	495.31	-5,961.61	5,981.71	0.90	-0.33	-0.84
13,455.00	89.40	271.62	7,189.28	496.49	-6,055.59	6,075.53	2.10	0.85	1.91
13,550.00	89.40	271.01	7,190.27	498.67	-6,150.56	6,170.41	0.64	0.00	-0.64
13,644.00	89.09	270.30	7,191.51	499.74	-6,244.54	6,264.24	0.82	-0.33	-0.76
13,738.00	89.00	270.04	7,193.08	500.02	-6,338.53	6,358.01	0.29	-0.10	-0.28
13,832.00	89.22	271.01	7,194.54	500.88	-6,432.51	6,451.82	1.06	0.23	1.03
13,927.00	88.91	271.01	7,196.09	502.56	-6,527.48	6,546.68	0.33	-0.33	0.00
14,021.00	88.29	270.04	7,198.39	503.42	-6,621.45	6,640.47	1.22	-0.66	-1.03
14,115.00	89.48	271.23	7,200.22	504.46	-6,715.42	6,734.28	1.79	1.27	1.27
14,210.00	89.31	270.83	7,201.22	506.17	-6,810.40	6,829.14	0.46	-0.18	-0.42
14,304.00	88.51	270.21	7,203.01	507.02	-6,904.38	6,922.95	1.08	-0.85	-0.66
14,399.00	89.70	271.40	7,204.49	508.36	-6,999.36	7,017.78	1.77	1.25	1.25
14,493.00	89.79	272.11	7,204.91	511.24	-7,093.31	7,111.70	0.76	0.10	0.76
14,587.00	89.31	269.64	7,205.65	512.67	-7,187.29	7,205.55	2.68	-0.51	-2.63
14,650.00	89.62	270.92	7,206.24	512.98	-7,250.28	7,268.41	2.09	0.49	2.03
14,738.00	90.01	270.52	7,206.52	514.09	-7,338.28	7,356.26	0.63	0.44	-0.45
<b>Final MWD Survey @ 14738'MD</b>									
14,804.00	90.01	270.52	7,206.51	514.68	-7,404.27	7,422.13	0.00	0.00	0.00
<b>PTD @ 14804'MD (1222'FSL &amp; 2530'FEL)</b>									

### Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
1,646.00	1,645.57	5.15	0.22	First MWD Survey @ 1646'MD
7,572.77	7,246.51	482.73	-178.87	Hardline Crossing @ 7572.77'MD (1181'FSL & 591'FEL)
12,272.98	7,183.48	494.41	-4,874.08	Section Line Crossing @ 12272.98'MD
14,738.00	7,206.52	514.09	-7,338.28	Final MWD Survey @ 14738'MD
14,804.00	7,206.51	514.68	-7,404.27	PTD @ 14804'MD (1222'FSL & 2530'FEL)

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