



Extraction Oil & Gas

Weld County, CO (NAD83)

Stromberger

8

OH / Job #60892

Survey: Phoenix MWD Surveys

Standard Survey Report

10 April, 2017





Phoenix Technology Services LP

Survey Report



Company:	Extraction Oil & Gas	Local Co-ordinate Reference:	Well 8
Project:	Weld County, CO (NAD83)	TVD Reference:	RKB @ 4803.00usft (Patterson 346)
Site:	Stromberger	MD Reference:	RKB @ 4803.00usft (Patterson 346)
Well:	8	North Reference:	True
Wellbore:	OH / Job #60892	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Patterson 346)	Database:	Compass 5000 RMR

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

Site		Stromberger				
Site Position: From:	Lat/Long	Northing:	1,416,273.20	usft	Latitude:	40° 28' 27.721 N
		Easting:	3,175,028.32	usft	Longitude:	104° 52' 15.096 W
		Position Uncertainty:	0.00	usft	Slot Radius:	13-3/16 "

Well	8					
Well Position	+N/-S	0.00 usft	Northing:	1,416,161.34 usft	Latitude:	40° 28' 26.616 N
	+E/-W	0.00 usft	Easting:	3,175,028.56 usft	Longitude:	104° 52' 15.103 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	4,778.00 usft

Wellbore	OH / Job #60892				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	3/15/2017	8.43	66.93	52,481

Design	Surveys (Patterson 346)				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	91.83	

Survey Program	Date	4/10/2017			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
178.00	1,589.00	Phoenix MWD Surveys (OH / Job #60914)	MWD+HDGM	OWSG Rev.2 MWD + HDGM	
1,524.00	16,782.00	Phoenix MWD Surveys (OH / Job #60892)	MWD+HDGM	OWSG Rev.2 MWD + HDGM	

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
1,524.00	0.35	248.64	1,523.77	0.49	6.01	5.99	0.00	0.00	0.00	
Tie-In										
1,667.00	1.77	209.45	1,666.75	-1.59	4.51	4.56	1.06	0.99	-27.41	
First Phoenix MWD Survey										
1,762.00	2.70	182.73	1,761.68	-5.11	3.69	3.85	1.45	0.98	-28.13	
1,856.00	3.44	184.20	1,855.54	-10.13	3.37	3.70	0.79	0.79	1.56	
1,950.00	5.09	179.04	1,949.28	-17.11	3.24	3.78	1.80	1.76	-5.49	
2,044.00	6.00	177.06	2,042.84	-26.19	3.56	4.39	0.99	0.97	-2.11	
2,138.00	5.54	175.18	2,136.36	-35.62	4.19	5.33	0.53	-0.49	-2.00	

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2,233.00	5.22	174.48	2,230.94	-44.49	4.99	6.41	0.34	-0.34	-0.74	
2,327.00	4.90	174.63	2,324.58	-52.74	5.78	7.46	0.34	-0.34	0.16	
2,422.00	4.72	174.59	2,419.24	-60.67	6.53	8.46	0.19	-0.19	-0.04	
2,516.00	6.34	169.64	2,512.80	-69.63	7.83	10.05	1.79	1.72	-5.27	
2,610.00	6.33	169.14	2,606.23	-79.82	9.74	12.28	0.06	-0.01	-0.53	
2,705.00	5.98	171.24	2,700.68	-89.86	11.48	14.34	0.44	-0.37	2.21	
2,799.00	5.72	171.86	2,794.19	-99.33	12.89	16.05	0.28	-0.28	0.66	
2,893.00	5.40	171.82	2,887.75	-108.35	14.18	17.63	0.34	-0.34	-0.04	
2,988.00	4.67	171.10	2,982.38	-116.59	15.41	19.13	0.77	-0.77	-0.76	
3,082.00	4.11	171.14	3,076.10	-123.70	16.52	20.47	0.60	-0.60	0.04	
3,177.00	4.97	178.45	3,170.81	-131.18	17.16	21.34	1.09	0.91	7.69	
3,271.00	6.21	179.35	3,264.36	-140.33	17.33	21.80	1.32	1.32	0.96	
3,366.00	5.32	179.17	3,358.88	-149.88	17.45	22.23	0.94	-0.94	-0.19	
3,460.00	4.54	178.09	3,452.53	-157.95	17.64	22.67	0.84	-0.83	-1.15	
3,554.00	6.37	179.46	3,546.10	-166.89	17.81	23.13	1.95	1.95	1.46	
3,649.00	7.06	178.67	3,640.44	-177.99	17.99	23.67	0.73	0.73	-0.83	
3,743.00	7.03	177.67	3,733.74	-189.51	18.36	24.40	0.13	-0.03	-1.06	
3,838.00	7.12	177.68	3,828.01	-201.21	18.84	25.25	0.09	0.09	0.01	
3,931.00	6.38	177.50	3,920.37	-212.13	19.30	26.06	0.80	-0.80	-0.19	
4,025.00	5.43	180.45	4,013.87	-221.79	19.49	26.56	1.06	-1.01	3.14	
4,119.00	4.93	177.64	4,107.48	-230.28	19.62	26.96	0.60	-0.53	-2.99	
4,213.00	4.20	182.79	4,201.18	-237.75	19.62	27.20	0.89	-0.78	5.48	
4,307.00	5.20	186.55	4,294.87	-245.42	18.97	26.79	1.11	1.06	4.00	
4,402.00	4.97	185.84	4,389.49	-253.79	18.06	26.15	0.25	-0.24	-0.75	
4,496.00	4.82	170.88	4,483.15	-261.74	18.27	26.62	1.36	-0.16	-15.91	
4,590.00	3.74	166.18	4,576.89	-268.62	19.63	28.19	1.21	-1.15	-5.00	
4,684.00	4.61	182.40	4,670.64	-275.37	20.20	28.98	1.55	0.93	17.26	
4,779.00	4.42	181.18	4,765.35	-282.84	19.96	28.99	0.22	-0.20	-1.28	
4,873.00	3.98	181.78	4,859.10	-289.73	19.79	29.03	0.47	-0.47	0.64	
4,967.00	4.27	169.05	4,952.86	-296.42	20.35	29.81	1.02	0.31	-13.54	
5,062.00	3.64	164.78	5,047.63	-302.80	21.82	31.47	0.73	-0.66	-4.49	
5,156.00	5.23	167.47	5,141.34	-309.87	23.53	33.41	1.71	1.69	2.86	
5,250.00	4.33	167.43	5,235.02	-317.51	25.23	35.36	0.96	-0.96	-0.04	
5,344.00	5.66	174.52	5,328.66	-325.59	26.45	36.83	1.56	1.41	7.54	
5,438.00	4.83	183.90	5,422.27	-334.15	26.62	37.28	1.27	-0.88	9.98	
5,532.00	5.17	161.77	5,515.92	-342.12	27.67	38.59	2.07	0.36	-23.54	
5,627.00	4.23	159.23	5,610.60	-349.47	30.26	41.40	1.01	-0.99	-2.67	
5,721.00	3.40	157.68	5,704.39	-355.29	32.54	43.87	0.89	-0.88	-1.65	
5,815.00	2.74	154.28	5,798.25	-359.89	34.58	46.05	0.73	-0.70	-3.62	
5,909.00	0.29	123.76	5,892.21	-362.05	35.75	47.29	2.65	-2.61	-32.47	
6,004.00	0.22	142.72	5,987.21	-362.32	36.06	47.61	0.11	-0.07	19.96	
6,098.00	0.17	52.39	6,081.21	-362.38	36.28	47.83	0.30	-0.05	-96.10	
6,286.00	0.32	282.00	6,269.21	-362.10	35.99	47.53	0.24	0.08	-69.36	

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Survey									
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6,381.00	3.72	82.19	6,364.15	-361.63	38.78	50.31	4.23	3.58	168.62
6,475.00	15.62	82.60	6,456.65	-359.58	54.41	65.87	12.66	12.66	0.44
6,499.00	18.03	78.57	6,479.62	-358.43	61.26	72.67	11.15	10.04	-16.79
6,593.00	24.19	83.77	6,567.27	-353.45	94.69	105.93	6.84	6.55	5.53
6,687.00	34.14	88.88	6,649.27	-350.83	140.33	151.47	10.90	10.59	5.44
6,782.00	45.97	89.13	6,721.85	-349.79	201.35	212.42	12.45	12.45	0.26
6,876.00	58.04	89.53	6,779.61	-348.95	275.29	286.29	12.84	12.84	0.43
6,970.00	66.44	90.33	6,823.36	-348.87	358.39	369.35	8.97	8.94	0.85
7,064.00	69.26	90.89	6,858.79	-349.80	445.44	456.38	3.05	3.00	0.60
7,158.00	75.32	89.67	6,887.38	-350.22	534.94	545.85	6.56	6.45	-1.30
7,253.00	79.39	89.56	6,908.17	-349.60	627.62	638.46	4.29	4.28	-0.12
7,347.00	85.55	91.29	6,920.48	-350.30	720.75	731.57	6.80	6.55	1.84
7,441.00	87.89	90.47	6,925.86	-351.74	814.58	825.40	2.64	2.49	-0.87
7,535.00	90.93	90.85	6,926.83	-352.82	908.56	919.36	3.26	3.23	0.40
7,629.00	89.43	90.77	6,926.53	-354.15	1,002.55	1,013.35	1.60	-1.60	-0.09
7,724.00	90.35	90.97	6,926.71	-355.59	1,097.53	1,108.33	0.99	0.97	0.21
7,818.00	90.10	90.76	6,926.35	-357.01	1,191.52	1,202.32	0.35	-0.27	-0.22
7,913.00	91.23	90.23	6,925.24	-357.83	1,286.51	1,297.28	1.31	1.19	-0.56
8,007.00	89.88	90.74	6,924.33	-358.63	1,380.50	1,391.25	1.54	-1.44	0.54
8,101.00	90.89	91.26	6,923.70	-360.27	1,474.48	1,485.24	1.21	1.07	0.55
8,196.00	90.10	90.42	6,922.88	-361.66	1,569.47	1,580.22	1.21	-0.83	-0.88
8,290.00	90.89	89.91	6,922.07	-361.93	1,663.46	1,674.17	1.00	0.84	-0.54
8,384.00	88.87	89.87	6,922.26	-361.75	1,757.46	1,768.11	2.15	-2.15	-0.04
8,479.00	89.13	89.76	6,923.92	-361.45	1,852.44	1,863.04	0.30	0.27	-0.12
8,573.00	90.44	90.32	6,924.28	-361.51	1,946.44	1,956.99	1.52	1.39	0.60
8,668.00	88.87	89.24	6,924.85	-361.15	2,041.43	2,051.92	2.01	-1.65	-1.14
8,762.00	89.82	89.44	6,925.92	-360.06	2,135.42	2,145.83	1.03	1.01	0.21
8,856.00	91.40	89.34	6,924.92	-359.06	2,229.41	2,239.73	1.68	1.68	-0.11
8,951.00	89.48	89.30	6,924.19	-357.94	2,324.39	2,334.64	2.02	-2.02	-0.04
9,140.00	90.73	89.78	6,923.85	-356.42	2,513.38	2,523.48	0.71	0.66	0.25
9,234.00	89.03	89.22	6,924.04	-355.60	2,607.37	2,617.40	1.90	-1.81	-0.60
9,328.00	89.30	89.75	6,925.41	-354.75	2,701.36	2,711.31	0.63	0.29	0.56
9,423.00	90.81	90.73	6,925.32	-355.15	2,796.35	2,806.27	1.89	1.59	1.03
9,517.00	88.56	90.69	6,925.84	-356.32	2,890.34	2,900.24	2.39	-2.39	-0.04
9,611.00	89.00	91.54	6,927.84	-358.14	2,984.30	2,994.21	1.02	0.47	0.90
9,706.00	89.75	92.44	6,928.88	-361.44	3,079.23	3,089.21	1.23	0.79	0.95
9,800.00	90.49	90.57	6,928.68	-363.91	3,173.20	3,183.20	2.14	0.79	-1.99
9,895.00	91.62	90.07	6,926.93	-364.44	3,268.18	3,278.15	1.30	1.19	-0.53
9,990.00	89.63	89.45	6,925.89	-364.04	3,363.17	3,373.08	2.19	-2.09	-0.65
10,084.00	89.83	89.33	6,926.34	-363.04	3,457.16	3,466.99	0.25	0.21	-0.13
10,273.00	91.29	90.01	6,924.49	-361.96	3,646.14	3,655.84	0.85	0.77	0.36
10,367.00	89.55	89.79	6,923.80	-361.79	3,740.14	3,749.78	1.87	-1.85	-0.23
10,462.00	89.82	89.30	6,924.32	-361.04	3,835.13	3,844.70	0.59	0.28	-0.52
10,556.00	90.86	89.17	6,923.76	-359.78	3,929.12	3,938.60	1.11	1.11	-0.14

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10,650.00	88.92	89.56	6,923.94	-358.74	4,023.11	4,032.51	2.11	-2.06	0.41	
10,744.00	89.85	89.07	6,924.95	-357.62	4,117.09	4,126.42	1.12	0.99	-0.52	
10,838.00	91.04	89.93	6,924.22	-356.80	4,211.09	4,220.33	1.56	1.27	0.91	
10,933.00	89.97	89.73	6,923.39	-356.51	4,306.08	4,315.27	1.15	-1.13	-0.21	
11,027.00	90.90	90.23	6,922.67	-356.48	4,400.08	4,409.22	1.12	0.99	0.53	
11,121.00	89.17	89.72	6,922.62	-356.44	4,494.07	4,503.16	1.92	-1.84	-0.54	
11,215.00	89.62	89.42	6,923.61	-355.73	4,588.06	4,597.08	0.58	0.48	-0.32	
11,310.00	91.02	89.78	6,923.08	-355.07	4,683.06	4,692.01	1.52	1.47	0.38	
11,498.00	90.48	89.06	6,920.62	-353.17	4,871.03	4,879.82	0.48	-0.29	-0.38	
11,592.00	89.13	89.42	6,920.94	-351.92	4,965.02	4,973.73	1.49	-1.44	0.38	
11,782.00	89.00	88.61	6,924.04	-348.66	5,154.96	5,163.47	0.43	-0.07	-0.43	
11,875.00	89.97	89.50	6,924.87	-347.12	5,247.95	5,256.35	1.42	1.04	0.96	
11,970.00	90.99	90.21	6,924.08	-346.88	5,342.94	5,351.29	1.31	1.07	0.75	
12,065.00	89.61	89.60	6,923.58	-346.72	5,437.94	5,446.23	1.59	-1.45	-0.64	
12,160.00	89.76	89.72	6,924.10	-346.16	5,532.93	5,541.17	0.20	0.16	0.13	
12,255.00	90.58	90.38	6,923.82	-346.24	5,627.93	5,636.12	1.11	0.86	0.69	
12,350.00	91.52	90.41	6,922.08	-346.90	5,722.91	5,731.07	0.99	0.99	0.03	
12,446.00	89.82	90.40	6,920.96	-347.58	5,818.90	5,827.03	1.77	-1.77	-0.01	
12,540.00	89.92	90.78	6,921.17	-348.54	5,912.89	5,921.01	0.42	0.11	0.40	
12,636.00	90.70	91.26	6,920.65	-350.25	6,008.88	6,017.00	0.95	0.81	0.50	
12,731.00	91.46	92.04	6,918.86	-352.99	6,103.82	6,111.98	1.15	0.80	0.82	
12,826.00	91.04	89.95	6,916.79	-354.64	6,198.78	6,206.94	2.24	-0.44	-2.20	
12,921.00	92.31	89.26	6,914.01	-353.98	6,293.73	6,301.82	1.52	1.34	-0.73	
13,016.00	90.31	89.37	6,911.84	-352.85	6,388.69	6,396.70	2.11	-2.11	0.12	
13,111.00	90.25	89.48	6,911.37	-351.89	6,483.69	6,491.62	0.13	-0.06	0.12	
13,206.00	91.36	90.05	6,910.04	-351.50	6,578.68	6,586.55	1.31	1.17	0.60	
13,302.00	92.52	90.58	6,906.79	-352.03	6,674.62	6,682.46	1.33	1.21	0.55	
13,397.00	90.80	89.87	6,904.04	-352.40	6,769.57	6,777.37	1.96	-1.81	-0.75	
13,492.00	90.58	89.36	6,902.89	-351.77	6,864.56	6,872.30	0.58	-0.23	-0.54	
13,587.00	90.99	89.04	6,901.59	-350.44	6,959.55	6,967.19	0.55	0.43	-0.34	
13,682.00	92.19	89.30	6,898.96	-349.06	7,054.50	7,062.05	1.29	1.26	0.27	
13,776.00	91.16	88.56	6,896.21	-347.31	7,148.44	7,155.88	1.35	-1.10	-0.79	
13,871.00	91.09	85.99	6,894.34	-342.79	7,243.30	7,250.56	2.71	-0.07	-2.71	
13,966.00	90.10	89.95	6,893.36	-339.43	7,338.22	7,345.32	4.30	-1.04	4.17	
14,060.00	91.41	92.11	6,892.12	-341.12	7,432.19	7,439.29	2.69	1.39	2.30	
14,155.00	89.53	91.03	6,891.34	-343.72	7,527.14	7,534.28	2.28	-1.98	-1.14	
14,250.00	89.88	90.55	6,891.83	-345.03	7,622.13	7,629.26	0.63	0.37	-0.51	
14,344.00	91.54	92.06	6,890.66	-347.17	7,716.10	7,723.25	2.39	1.77	1.61	
14,439.00	90.99	89.78	6,888.56	-348.70	7,811.05	7,818.21	2.47	-0.58	-2.40	
14,534.00	89.23	86.05	6,888.38	-345.24	7,905.97	7,912.96	4.34	-1.85	-3.93	
14,628.00	89.91	88.50	6,889.09	-340.77	7,999.85	8,006.66	2.70	0.72	2.61	
14,722.00	90.29	89.41	6,888.92	-339.06	8,093.84	8,100.54	1.05	0.40	0.97	
14,816.00	90.63	89.85	6,888.17	-338.45	8,187.83	8,194.46	0.59	0.36	0.47	

Company:	Extraction Oil & Gas	Local Co-ordinate Reference:	Well 8
Project:	Weld County, CO (NAD83)	TVD Reference:	RKB @ 4803.00usft (Patterson 346)
Site:	Stromberger	MD Reference:	RKB @ 4803.00usft (Patterson 346)
Well:	8	North Reference:	True
Wellbore:	OH / Job #60892	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Patterson 346)	Database:	Compass 5000 RMR

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
14,911.00	91.87	90.26	6,886.10	-338.54	8,282.81	8,289.39	1.37	1.31	0.43	
15,005.00	90.45	89.23	6,884.19	-338.12	8,376.78	8,383.31	1.87	-1.51	-1.10	
15,100.00	91.45	89.26	6,882.62	-336.87	8,471.76	8,478.20	1.05	1.05	0.03	
15,195.00	92.56	89.32	6,879.30	-335.70	8,566.69	8,573.04	1.17	1.17	0.06	
15,289.00	90.18	89.71	6,877.05	-334.90	8,660.66	8,666.93	2.57	-2.53	0.41	
15,383.00	90.61	89.73	6,876.40	-334.44	8,754.65	8,760.87	0.46	0.46	0.02	
15,477.00	91.00	89.60	6,875.08	-333.89	8,848.64	8,854.79	0.44	0.41	-0.14	
15,570.00	89.54	90.00	6,874.64	-333.57	8,941.64	8,947.73	1.63	-1.57	0.43	
15,664.00	91.42	90.66	6,873.85	-334.11	9,035.63	9,041.69	2.12	2.00	0.70	
15,757.00	90.08	91.14	6,872.64	-335.57	9,128.61	9,134.67	1.53	-1.44	0.52	
15,851.00	90.70	92.48	6,872.00	-338.54	9,222.55	9,228.66	1.57	0.66	1.43	
15,945.00	90.37	89.62	6,871.12	-340.26	9,316.52	9,322.64	3.06	-0.35	-3.04	
16,039.00	91.07	89.38	6,869.94	-339.44	9,410.51	9,416.55	0.79	0.74	-0.26	
16,132.00	89.63	90.32	6,869.37	-339.20	9,503.51	9,509.49	1.85	-1.55	1.01	
16,226.00	89.93	92.08	6,869.73	-341.17	9,597.48	9,603.48	1.90	0.32	1.87	
16,320.00	89.37	90.95	6,870.30	-343.65	9,691.45	9,697.48	1.34	-0.60	-1.20	
16,413.00	89.62	90.77	6,871.12	-345.05	9,784.43	9,790.46	0.33	0.27	-0.19	
16,507.00	90.98	91.92	6,870.63	-347.25	9,878.40	9,884.45	1.89	1.45	1.22	
16,600.00	89.48	91.26	6,870.26	-349.83	9,971.36	9,977.45	1.76	-1.61	-0.71	
16,709.00	91.22	92.37	6,869.59	-353.28	10,080.30	10,086.44	1.89	1.60	1.02	
Final Phoenix MWD Survey										
16,782.00	91.22	92.37	6,868.04	-356.30	10,153.22	10,159.42	0.00	0.00	0.00	
Projection to TD										

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
1,524.00	1,523.77	0.49	6.01	Tie-In	
1,667.00	1,666.75	-1.59	4.51	First Phoenix MWD Survey	
16,709.00	6,869.59	-353.28	10,080.30	Final Phoenix MWD Survey	
16,782.00	6,868.04	-356.30	10,153.22	Projection to TD	