



EXTRACTION OIL & GAS

Arapahoe County, Co. (NAD 83)

Sec 22-T4S-R64W

Houlihan 4-64 22A 21-1

Wellbore #1

Survey: Survey #1

Standard Survey Report

23 October, 2017





Integrity Directional Services, LLC

Survey Report



Company:	EXTRACTION OIL & GAS	Local Co-ordinate Reference:	Site Sec 22-T4S-R64W
Project:	Arapahoe County, Co. (NAD 83)	TVD Reference:	B=25 @ 5730.3usft
Site:	Sec 22-T4S-R64W	MD Reference:	B=25 @ 5730.3usft
Well:	Houlihan 4-64 22A 21-1	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

Project	Arapahoe County, Co. (NAD 83)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Central Zone		

Site		Sec 22-T4S-R64W					
Site Position:		Northing:	1,677,816.97	usft	Latitude:	39° 41' 25.500 N	
From:	Lat/Long	Easting:	3,272,633.89	usft	Longitude:	104° 31' 52.340 W	
Position Uncertainty:		0.0	usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.61 °

Well	Houlihan 4-64 22A 21-1					
Well Position	+N/-S	0.0 usft	Northing:	1,677,816.96 usft	Latitude:	39° 41' 25.500 N
	+E/-W	0.0 usft	Easting:	3,272,633.89 usft	Longitude:	104° 31' 52.340 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	5,705.3 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	10/4/2017	8.68	66.55	51,983

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	278.47	

Survey Program	Date	10/23/2017			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
146.0	17,454.0	Survey #1 (Wellbore #1)	MWD	MWD - Standard	

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)	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00	
146.0	1.10	354.87	146.0	1.4	-0.1	0.3	0.75	0.75	0.00	
1st MWD Survey										
206.0	2.30	15.69	206.0	3.1	0.1	0.3	2.22	2.00	34.70	
237.0	2.70	27.76	236.9	4.4	0.7	0.0	2.13	1.29	38.94	
267.0	3.31	29.70	266.9	5.7	1.4	-0.6	2.06	2.03	6.47	
297.0	4.02	34.20	296.8	7.4	2.4	-1.3	2.55	2.37	15.00	
327.0	4.42	35.47	326.8	9.2	3.7	-2.3	1.37	1.33	4.23	
421.0	6.58	43.18	420.3	16.1	9.5	-7.0	2.42	2.30	8.20	
516.0	8.48	45.87	514.5	24.9	18.2	-14.4	2.03	2.00	2.83	
611.0	11.18	43.36	608.1	36.5	29.6	-23.9	2.88	2.84	-2.64	



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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)
705.0	12.59	39.57	700.1	51.0	42.4	-34.4	1.71	1.50	-4.03
800.0	13.92	37.28	792.5	68.1	55.9	-45.2	1.50	1.40	-2.41
894.0	15.82	34.28	883.4	87.7	70.0	-56.3	2.18	2.02	-3.19
989.0	17.10	37.50	974.5	109.4	85.8	-68.7	1.65	1.35	3.39
1,084.0	16.79	36.40	1,065.4	131.6	102.4	-81.9	0.47	-0.33	-1.16
1,179.0	16.22	38.07	1,156.5	153.1	118.7	-94.9	0.78	-0.60	1.76
1,274.0	15.69	40.36	1,247.8	173.3	135.2	-108.2	0.87	-0.56	2.41
1,369.0	17.41	38.07	1,338.9	194.3	152.3	-122.0	1.94	1.81	-2.41
1,464.0	17.28	39.09	1,429.5	216.4	170.0	-136.2	0.35	-0.14	1.07
1,558.0	16.88	36.09	1,519.4	238.3	186.8	-149.7	1.03	-0.43	-3.19
1,653.0	15.51	33.18	1,610.6	260.1	201.9	-161.4	1.68	-1.44	-3.06
1,747.0	16.70	37.76	1,700.9	281.3	217.0	-173.2	1.85	1.27	4.87
1,842.0	17.99	39.57	1,791.6	303.4	234.7	-187.5	1.47	1.36	1.91
1,936.0	17.99	39.09	1,881.0	325.8	253.1	-202.4	0.16	0.00	-0.51
2,132.0	16.40	39.09	2,068.3	370.8	289.7	-231.9	0.81	-0.81	0.00
2,227.0	17.81	39.57	2,159.1	392.4	307.4	-246.2	1.49	1.48	0.51
2,322.0	17.72	39.48	2,249.5	414.8	325.8	-261.2	0.10	-0.09	-0.09
2,416.0	17.50	40.19	2,339.1	436.6	344.1	-276.0	0.33	-0.23	0.76
2,511.0	17.41	39.17	2,429.7	458.5	362.2	-290.7	0.34	-0.09	-1.07
2,606.0	17.19	38.69	2,520.4	480.5	380.0	-305.0	0.28	-0.23	-0.51
2,700.0	16.79	38.69	2,610.3	501.9	397.2	-318.9	0.43	-0.43	0.00
2,795.0	16.39	39.09	2,701.4	523.0	414.2	-332.6	0.44	-0.42	0.42
2,889.0	16.00	37.50	2,791.7	543.6	430.4	-345.6	0.63	-0.41	-1.69
2,984.0	15.38	37.19	2,883.1	564.0	446.0	-358.0	0.66	-0.65	-0.33
3,079.0	17.72	35.30	2,974.2	585.9	462.0	-370.6	2.53	2.46	-1.99
3,174.0	16.88	34.77	3,064.9	609.0	478.2	-383.3	0.90	-0.88	-0.56
3,268.0	18.12	38.78	3,154.5	631.6	495.2	-396.7	1.84	1.32	4.27
3,458.0	16.62	37.19	3,335.9	676.3	530.1	-424.6	0.83	-0.79	-0.84
3,553.0	17.99	34.37	3,426.6	699.2	546.6	-437.6	1.69	1.44	-2.97
3,648.0	17.19	34.28	3,517.1	722.9	562.8	-450.1	0.84	-0.84	-0.09
3,743.0	16.08	33.97	3,608.1	745.5	578.0	-461.9	1.17	-1.17	-0.33
3,838.0	16.88	37.59	3,699.2	767.3	593.8	-474.2	1.37	0.84	3.81
3,932.0	17.41	40.76	3,789.1	788.8	611.3	-488.4	1.14	0.56	3.37
4,027.0	16.31	39.00	3,880.0	809.9	629.0	-502.8	1.28	-1.16	-1.85
4,121.0	16.31	35.87	3,970.2	830.8	645.0	-515.5	0.94	0.00	-3.33
4,216.0	17.81	32.70	4,061.0	853.9	660.7	-527.6	1.86	1.58	-3.34
4,310.0	16.79	32.39	4,150.8	877.4	675.7	-539.0	1.09	-1.09	-0.33
4,404.0	17.81	33.27	4,240.5	900.9	690.9	-550.6	1.12	1.09	0.94
4,499.0	16.39	33.49	4,331.3	924.3	706.3	-562.3	1.50	-1.49	0.23
4,594.0	17.50	36.66	4,422.2	946.9	722.2	-574.8	1.52	1.17	3.34
4,688.0	18.52	37.68	4,511.6	970.0	739.7	-588.7	1.14	1.09	1.09
4,878.0	19.09	34.20	4,691.4	1,019.6	775.7	-616.9	0.66	0.30	-1.83
4,973.0	18.29	33.80	4,781.4	1,044.9	792.7	-630.0	0.85	-0.84	-0.42



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Survey										
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5,067.0	16.79	33.89	4,871.1	1,068.4	808.5	-642.2	1.60	-1.60	0.10	
5,162.0	15.11	32.48	4,962.4	1,090.2	822.8	-653.1	1.81	-1.77	-1.48	
5,256.0	15.69	34.90	5,053.0	1,111.0	836.6	-663.8	0.92	0.62	2.57	
5,350.0	16.88	44.59	5,143.3	1,131.1	853.5	-677.5	3.15	1.27	10.31	
5,445.0	17.28	39.97	5,234.1	1,151.8	872.2	-693.0	1.49	0.42	-4.86	
5,540.0	16.70	39.66	5,324.9	1,173.1	890.0	-707.4	0.62	-0.61	-0.33	
5,634.0	15.20	39.66	5,415.3	1,193.0	906.5	-720.8	1.60	-1.60	0.00	
5,729.0	13.61	37.50	5,507.3	1,211.4	921.2	-732.6	1.77	-1.67	-2.27	
5,823.0	10.91	35.87	5,599.2	1,227.4	933.2	-742.1	2.90	-2.87	-1.73	
5,918.0	11.00	44.20	5,692.4	1,241.2	944.8	-751.5	1.67	0.09	8.77	
6,013.0	9.28	40.76	5,786.0	1,253.5	956.1	-760.9	1.92	-1.81	-3.62	
6,107.0	10.38	43.49	5,878.6	1,265.4	966.9	-769.8	1.27	1.17	2.90	
6,201.0	10.12	39.66	5,971.1	1,277.9	978.0	-779.0	0.78	-0.28	-4.07	
6,296.0	9.50	39.09	6,064.7	1,290.4	988.2	-787.3	0.66	-0.65	-0.60	
6,390.0	7.82	32.96	6,157.6	1,301.8	996.6	-793.9	2.04	-1.79	-6.52	
6,485.0	5.30	42.17	6,252.0	1,310.5	1,003.1	-799.0	2.87	-2.65	9.69	
6,579.0	1.10	33.80	6,345.8	1,314.4	1,006.5	-801.8	4.48	-4.47	-8.90	
6,674.0	0.71	18.60	6,440.8	1,315.8	1,007.2	-802.3	0.48	-0.41	-16.00	
6,768.0	0.40	26.09	6,534.8	1,316.6	1,007.5	-802.5	0.34	-0.33	7.97	
6,886.0	0.40	18.77	6,652.8	1,317.4	1,007.8	-802.7	0.04	0.00	-6.20	
6,981.0	0.49	21.59	6,747.8	1,318.1	1,008.1	-802.8	0.10	0.09	2.97	
7,075.0	2.70	257.00	6,841.8	1,317.9	1,006.1	-800.9	3.20	2.35	-132.54	
7,169.0	17.01	277.36	6,934.2	1,319.2	990.2	-785.0	15.43	15.22	21.66	
7,264.0	23.11	289.08	7,023.4	1,327.1	958.7	-752.7	7.66	6.42	12.34	
7,358.0	30.89	282.07	7,107.1	1,338.2	917.6	-710.4	8.93	8.28	-7.46	
7,452.0	39.02	275.60	7,184.1	1,346.1	864.5	-656.7	9.50	8.65	-6.88	
7,547.0	42.82	268.19	7,255.9	1,348.0	802.4	-595.0	6.48	4.00	-7.80	
7,642.0	46.00	267.80	7,323.8	1,345.7	736.0	-529.6	3.36	3.35	-0.41	
7,737.0	55.02	269.16	7,384.1	1,343.8	662.8	-457.5	9.56	9.49	1.43	
7,831.0	63.19	267.28	7,432.3	1,341.3	582.2	-378.2	8.86	8.69	-2.00	
7,874.0	66.91	267.28	7,450.5	1,339.4	543.3	-340.0	8.65	8.65	-0.01	
Cross 460' FEL 7874 MD/7450.5 TVD 1339.4 N 543.3 E N: 1679156.3 E: 3273177.1										
7,889.2	68.23	267.27	7,456.3	1,338.7	529.2	-326.2	8.65	8.65	-0.01	
BPI Houlihan 4-64 22A 21-1										
7,926.0	71.41	267.27	7,469.0	1,337.1	494.7	-292.3	8.65	8.65	-0.01	
8,020.0	80.78	268.06	7,491.5	1,333.4	403.7	-202.8	10.00	9.97	0.84	
8,115.0	87.01	268.50	7,501.6	1,330.6	309.3	-109.8	6.57	6.56	0.46	
8,210.0	87.01	268.50	7,506.6	1,328.1	214.5	-16.4	0.00	0.00	0.00	
8,305.0	89.22	269.38	7,509.7	1,326.3	119.5	77.2	2.50	2.33	0.93	
8,400.0	88.38	268.77	7,511.7	1,324.8	24.6	170.9	1.09	-0.88	-0.64	
8,494.0	87.50	268.28	7,515.1	1,322.4	-69.3	263.5	1.07	-0.94	-0.52	
8,589.0	89.79	268.28	7,517.3	1,319.5	-164.3	356.9	2.41	2.41	0.00	
8,683.0	89.88	267.66	7,517.6	1,316.2	-258.2	449.3	0.67	0.10	-0.66	
8,778.0	90.50	267.49	7,517.3	1,312.2	-353.1	542.6	0.68	0.65	-0.18	



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8,873.0	91.12	267.09	7,515.9	1,307.7	-448.0	635.8	0.78	0.65	-0.42
8,967.0	89.70	268.99	7,515.3	1,304.5	-541.9	728.3	2.52	-1.51	2.02
9,062.0	89.99	271.50	7,515.5	1,304.9	-636.9	822.3	2.66	0.31	2.64
9,156.0	88.60	272.07	7,516.7	1,307.8	-730.9	915.6	1.60	-1.48	0.61
9,251.0	88.29	272.07	7,519.3	1,311.2	-825.8	1,010.0	0.33	-0.33	0.00
9,346.0	87.72	272.38	7,522.6	1,314.9	-920.6	1,104.4	0.68	-0.60	0.33
9,440.0	89.31	272.60	7,525.0	1,319.0	-1,014.5	1,197.8	1.71	1.69	0.23
9,535.0	89.67	272.60	7,525.9	1,323.3	-1,109.4	1,292.3	0.38	0.38	0.00
9,629.0	89.48	272.38	7,526.6	1,327.4	-1,203.3	1,385.8	0.31	-0.20	-0.23
9,724.0	91.21	273.35	7,526.0	1,332.1	-1,298.2	1,480.3	2.09	1.82	1.02
9,818.0	91.38	272.86	7,523.9	1,337.2	-1,392.0	1,573.9	0.55	0.18	-0.52
9,913.0	91.38	272.86	7,521.6	1,342.0	-1,486.9	1,668.4	0.00	0.00	0.00
10,008.0	91.12	272.38	7,519.5	1,346.3	-1,581.8	1,762.9	0.57	-0.27	-0.51
10,102.0	91.38	271.63	7,517.4	1,349.6	-1,675.7	1,856.3	0.84	0.28	-0.80
10,196.0	89.09	270.40	7,517.1	1,351.3	-1,769.7	1,949.5	2.77	-2.44	-1.31
10,291.0	88.69	270.00	7,518.9	1,351.6	-1,864.6	2,043.5	0.60	-0.42	-0.42
10,386.0	88.60	269.69	7,521.1	1,351.3	-1,959.6	2,137.4	0.34	-0.09	-0.33
10,481.0	88.51	269.56	7,523.5	1,350.7	-2,054.6	2,231.2	0.17	-0.09	-0.14
10,575.0	90.28	270.30	7,524.5	1,350.6	-2,148.6	2,324.2	2.04	1.88	0.79
10,670.0	90.59	270.09	7,523.8	1,350.9	-2,243.6	2,418.2	0.39	0.33	-0.22
10,765.0	90.72	269.84	7,522.7	1,350.9	-2,338.6	2,512.1	0.30	0.14	-0.26
10,860.0	90.59	269.56	7,521.6	1,350.4	-2,433.6	2,606.0	0.32	-0.14	-0.29
10,955.0	90.10	269.56	7,521.1	1,349.6	-2,528.6	2,699.8	0.52	-0.52	0.00
11,050.0	89.62	269.78	7,521.3	1,349.1	-2,623.6	2,793.7	0.56	-0.51	0.23
11,144.0	89.09	269.78	7,522.4	1,348.7	-2,717.5	2,886.6	0.56	-0.56	0.00
11,239.0	88.60	269.69	7,524.3	1,348.3	-2,812.5	2,980.5	0.52	-0.52	-0.09
11,334.0	88.29	270.00	7,526.9	1,348.0	-2,907.5	3,074.4	0.46	-0.33	0.33
11,428.0	87.72	270.09	7,530.1	1,348.1	-3,001.4	3,167.3	0.61	-0.61	0.10
11,522.0	90.90	269.87	7,531.3	1,348.1	-3,095.4	3,260.3	3.39	3.38	-0.23
11,617.0	90.72	270.18	7,529.9	1,348.1	-3,190.4	3,354.2	0.38	-0.19	0.33
11,711.0	90.19	270.40	7,529.2	1,348.6	-3,284.4	3,447.3	0.61	-0.56	0.23
11,806.0	89.88	270.48	7,529.1	1,349.3	-3,379.4	3,541.3	0.34	-0.33	0.08
11,900.0	90.19	270.66	7,529.1	1,350.3	-3,473.4	3,634.5	0.38	0.33	0.19
11,994.0	90.41	271.37	7,528.6	1,351.9	-3,567.4	3,727.7	0.79	0.23	0.76
12,089.0	89.62	270.79	7,528.5	1,353.7	-3,662.4	3,821.9	1.03	-0.83	-0.61
12,278.0	89.88	270.57	7,529.4	1,355.9	-3,851.3	4,009.1	0.18	0.14	-0.12
12,373.0	89.22	269.56	7,530.1	1,356.1	-3,946.3	4,103.1	1.27	-0.69	-1.06
12,467.0	88.82	269.47	7,531.7	1,355.3	-4,040.3	4,195.9	0.44	-0.43	-0.10
12,562.0	88.29	269.38	7,534.1	1,354.3	-4,135.3	4,289.7	0.57	-0.56	-0.09
12,656.0	90.10	269.47	7,535.4	1,353.4	-4,229.3	4,382.5	1.93	1.93	0.10
12,675.0	90.14	269.36	7,535.4	1,353.2	-4,248.3	4,401.3	0.63	0.19	-0.60
Cross Section Line 12675 MD/7535.4 TVD 1353.2 N -4248.3 W N: 1679170.1 E: 3268385.6									
12,751.0	90.28	268.90	7,535.1	1,352.0	-4,324.3	4,476.3	0.63	0.19	-0.60



Integrity Directional Services, LLC

Survey Report



Company:	EXTRACTION OIL & GAS	Local Co-ordinate Reference:	Site Sec 22-T4S-R64W
Project:	Arapahoe County, Co. (NAD 83)	TVD Reference:	B=25 @ 5730.3usft
Site:	Sec 22-T4S-R64W	MD Reference:	B=25 @ 5730.3usft
Well:	Houlihan 4-64 22A 21-1	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

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)	
12,846.0	90.50	268.77	7,534.5	1,350.1	-4,419.2	4,569.9	0.27	0.23	-0.14	
12,940.0	89.48	267.88	7,534.5	1,347.3	-4,513.2	4,662.5	1.44	-1.09	-0.95	
13,035.0	89.62	268.06	7,535.2	1,344.0	-4,608.1	4,755.9	0.24	0.15	0.19	
13,129.0	90.10	268.37	7,535.5	1,341.0	-4,702.1	4,848.4	0.61	0.51	0.33	
13,224.0	89.31	268.50	7,536.0	1,338.4	-4,797.0	4,941.9	0.84	-0.83	0.14	
13,319.0	89.22	268.50	7,537.2	1,336.0	-4,892.0	5,035.5	0.09	-0.09	0.00	
13,414.0	89.09	268.50	7,538.6	1,333.5	-4,987.0	5,129.0	0.14	-0.14	0.00	
13,508.0	90.50	269.69	7,538.9	1,332.0	-5,080.9	5,221.8	1.96	1.50	1.27	
13,603.0	90.72	270.09	7,537.9	1,331.8	-5,175.9	5,315.7	0.48	0.23	0.42	
13,698.0	90.59	270.00	7,536.8	1,331.9	-5,270.9	5,409.7	0.17	-0.14	-0.09	
13,792.0	90.59	269.78	7,535.8	1,331.7	-5,364.9	5,502.6	0.23	0.00	-0.23	
13,886.0	90.50	269.78	7,534.9	1,331.3	-5,458.9	5,595.5	0.10	-0.10	0.00	
13,980.0	90.50	269.87	7,534.1	1,331.1	-5,552.9	5,688.4	0.10	0.00	0.10	
14,075.0	90.19	269.78	7,533.6	1,330.8	-5,647.9	5,782.4	0.34	-0.33	-0.09	
14,169.0	90.10	270.00	7,533.3	1,330.6	-5,741.9	5,875.3	0.25	-0.10	0.23	
14,264.0	89.70	270.04	7,533.5	1,330.6	-5,836.9	5,969.3	0.42	-0.42	0.04	
14,358.0	89.62	269.69	7,534.0	1,330.4	-5,930.9	6,062.2	0.38	-0.09	-0.37	
14,452.0	89.70	270.09	7,534.6	1,330.2	-6,024.9	6,155.2	0.43	0.09	0.43	
14,547.0	89.43	270.09	7,535.3	1,330.4	-6,119.9	6,249.1	0.28	-0.28	0.00	
14,641.0	89.31	270.40	7,536.4	1,330.8	-6,213.9	6,342.2	0.35	-0.13	0.33	
14,736.0	89.31	270.48	7,537.5	1,331.5	-6,308.9	6,436.2	0.08	0.00	0.08	
14,831.0	89.40	270.48	7,538.6	1,332.3	-6,403.9	6,530.3	0.09	0.09	0.00	
14,926.0	89.31	270.79	7,539.6	1,333.3	-6,498.9	6,624.4	0.34	-0.09	0.33	
15,021.0	88.91	271.28	7,541.1	1,335.1	-6,593.8	6,718.6	0.67	-0.42	0.52	
15,115.0	89.31	271.10	7,542.6	1,337.0	-6,687.8	6,811.8	0.47	0.43	-0.19	
15,210.0	88.69	271.50	7,544.2	1,339.2	-6,782.8	6,906.1	0.78	-0.65	0.42	
15,305.0	90.50	270.79	7,544.9	1,341.1	-6,877.7	7,000.3	2.05	1.91	-0.75	
15,400.0	90.41	270.66	7,544.1	1,342.3	-6,972.7	7,094.4	0.17	-0.09	-0.14	
15,494.0	90.10	270.88	7,543.7	1,343.5	-7,066.7	7,187.6	0.40	-0.33	0.23	
15,589.0	89.40	270.57	7,544.1	1,344.7	-7,161.7	7,281.7	0.81	-0.74	-0.33	
15,684.0	91.38	270.66	7,543.5	1,345.8	-7,256.7	7,375.8	2.09	2.08	0.09	
15,778.0	91.78	270.88	7,540.9	1,347.0	-7,350.7	7,468.9	0.49	0.43	0.23	
15,874.0	90.90	270.48	7,538.7	1,348.2	-7,446.6	7,564.0	1.01	-0.92	-0.42	
15,968.0	90.41	269.78	7,537.6	1,348.4	-7,540.6	7,657.0	0.91	-0.52	-0.74	
16,062.0	90.19	269.69	7,537.1	1,347.9	-7,634.6	7,749.9	0.25	-0.23	-0.10	
16,155.0	89.79	269.47	7,537.1	1,347.3	-7,727.6	7,841.8	0.49	-0.43	-0.24	
16,250.0	89.40	269.16	7,537.8	1,346.1	-7,822.6	7,935.6	0.52	-0.41	-0.33	
16,344.0	89.62	270.26	7,538.6	1,345.6	-7,916.6	8,028.5	1.19	0.23	1.17	
16,439.0	88.60	270.40	7,540.1	1,346.2	-8,011.6	8,122.5	1.08	-1.07	0.15	
16,534.0	88.11	270.48	7,542.8	1,346.9	-8,106.5	8,216.5	0.52	-0.52	0.08	
16,629.0	90.01	270.00	7,544.3	1,347.3	-8,201.5	8,310.5	2.06	2.00	-0.51	
16,723.0	90.10	270.00	7,544.3	1,347.3	-8,295.5	8,403.5	0.10	0.10	0.00	
16,817.0	89.70	270.20	7,544.4	1,347.5	-8,389.5	8,496.5	0.48	-0.43	0.21	



Integrity Directional Services, LLC

Survey Report



Company:	EXTRACTION OIL & GAS	Local Co-ordinate Reference:	Site Sec 22-T4S-R64W
Project:	Arapahoe County, Co. (NAD 83)	TVD Reference:	B=25 @ 5730.3usft
Site:	Sec 22-T4S-R64W	MD Reference:	B=25 @ 5730.3usft
Well:	Houlihan 4-64 22A 21-1	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

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)
16,911.0	89.09	269.47	7,545.4	1,347.2	-8,483.5	8,589.4	1.01	-0.65	-0.78
17,007.0	88.51	269.29	7,547.4	1,346.2	-8,579.5	8,684.2	0.63	-0.60	-0.19
17,102.0	87.98	269.16	7,550.3	1,344.9	-8,674.4	8,777.9	0.57	-0.56	-0.14
17,197.0	87.10	269.38	7,554.4	1,343.7	-8,769.3	8,871.6	0.95	-0.93	0.23
17,292.0	88.69	270.09	7,557.9	1,343.2	-8,864.3	8,965.4	1.83	1.67	0.75
17,387.0	88.69	270.09	7,560.1	1,343.4	-8,959.2	9,059.4	0.00	0.00	0.00
Last MWDSurvey 17387 MD/7560.1 TVD 1343.4 N -8959.2 W N: 1679160.3 E: 3263674.6									
17,454.0	88.69	270.09	7,561.6	1,343.5	-9,026.2	9,125.7	0.00	0.00	0.00
PTB 17454 MD/7561.6 TVD 1343.5 N -9026.2 W N: 1679160.4 E: 3263607.6 - BHL Houlihan 4-64 22A 21-1									

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
146.0	146.0	1.4	-0.1	1st MWD Survey
7,874.0	7,450.5	1,339.4	543.3	Cross 460' FEL 7874 MD/7450.5 TVD 1339.4 N 543.3 E N: 1679156.3 E: 32731
12,675.0	7,535.4	1,353.2	-4,248.3	Cross Section Line 12675 MD/7535.4 TVD 1353.2 N -4248.3 W N: 1679170.1 E
17,387.0	7,560.1	1,343.4	-8,959.2	Last MWDSurvey 17387 MD/7560.1 TVD 1343.4 N -8959.2 W N: 1679160.3 E:
17,454.0	7,561.6	1,343.5	-9,026.2	PTB 17454 MD/7561.6 TVD 1343.5 N -9026.2 W N: 1679160.4 E: 3263607.6

Checked By: _____ Approved By: _____ Date: _____