



MS Directional
Survey Report



Company:	XTO Energy	Local Co-ordinate Reference:	Well Crim East Unit 12H
Project:	Marion County, West Virginia (NAD 27)	TVD Reference:	WELL @ 1247.00usft (Patterson 579)
Site:	Crim - Crands	MD Reference:	WELL @ 1247.00usft (Patterson 579)
Well:	Crim East Unit 12H	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	EDM 5000.14 Conroe Db

Project	Marion County, West Virginia (NAD 27)		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	West Virginia North 4701		

Well	Crim East Unit 12H					
Well Position	+N/-S	0.00 usft	Northing:	354,894.11 usft	Latitude:	39° 28' 17.825 N
	+E/-W	0.00 usft	Easting:	1,773,568.36 usft	Longitude:	80° 18' 7.562 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	1,221.00 usft
Grid Convergence:	-0.512 °					

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM2019	9/1/2019	-9.100	66.467	52,084.70

Design	Surveys				
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	134.99	

Survey Program	Date 8/30/2019				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
26.00	476.00	Javins Gyro (Wellbore #1)	SROIG	Surface Read Out Inertial Gyroscope	
582.00	6,171.00	Extreme EM (Wellbore #1)	MWD	OWSG MWD - Standard	
6,201.00	18,237.00	MS MWD (Wellbore #1)	MWD+HRGM	OWSG MWD + HRGM	

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)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26.00	0.00	0.00	26.00	0.00	0.00	0.00	0.00	0.00	0.00
Added to adjust for KB-26.00' MD									
76.00	0.25	13.10	76.00	0.11	0.02	-0.06	0.50	0.50	0.00
126.00	0.38	237.60	126.00	0.12	-0.09	-0.15	1.17	0.26	-271.00
176.00	0.17	136.00	176.00	-0.02	-0.18	-0.11	0.89	-0.42	-203.20
226.00	0.26	48.10	226.00	0.00	-0.04	-0.03	0.61	0.18	-175.80
276.00	0.24	42.20	276.00	0.16	0.11	-0.03	0.07	-0.04	-11.80
326.00	0.34	18.30	326.00	0.38	0.23	-0.10	0.31	0.20	-47.80
376.00	0.42	299.40	376.00	0.61	0.12	-0.35	0.97	0.16	-157.80
426.00	0.47	262.50	426.00	0.67	-0.25	-0.65	0.57	0.10	-73.80
476.00	0.41	251.80	475.99	0.59	-0.62	-0.85	0.20	-0.12	-21.40
Final Javins Gyro-476.00' MD									
582.00	0.34	243.54	581.99	0.33	-1.26	-1.13	0.08	-0.07	-7.79



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Project: Marion County, West Virginia (NAD 27)
Site: Crim - Crands
Well: Crim East Unit 12H
Wellbore: Wellbore #1
Design: Surveys

Local Co-ordinate Reference: Well Crim East Unit 12H
TVD Reference: WELL @ 1247.00usft (Patterson 579)
MD Reference: WELL @ 1247.00usft (Patterson 579)
North Reference: True
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.14 Conroe 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)	
676.00	0.41	174.79	675.99	-0.13	-1.48	-0.96	0.45	0.07	-73.14	
771.00	0.43	137.63	770.99	-0.73	-1.21	-0.34	0.28	0.02	-39.12	
866.00	0.61	95.02	865.98	-1.04	-0.47	0.41	0.44	0.19	-44.85	
961.00	1.47	80.86	960.97	-0.89	1.24	1.51	0.94	0.91	-14.91	
1,055.00	1.22	76.48	1,054.94	-0.47	3.40	2.74	0.29	-0.27	-4.66	
1,150.00	1.00	55.95	1,149.92	0.24	5.07	3.42	0.47	-0.23	-21.61	
1,244.00	0.60	7.93	1,243.92	1.18	5.82	3.28	0.79	-0.43	-51.09	
1,339.00	0.83	324.09	1,338.91	2.23	5.49	2.30	0.61	0.24	-46.15	
1,434.00	0.61	319.70	1,433.90	3.17	4.76	1.12	0.24	-0.23	-4.62	
1,528.00	0.61	308.82	1,527.90	3.87	4.04	0.12	0.12	0.00	-11.57	
1,622.00	0.95	316.39	1,621.89	4.75	3.11	-1.15	0.38	0.36	8.05	
1,716.00	1.18	14.32	1,715.87	6.25	2.82	-2.43	1.12	0.24	61.63	
1,811.00	2.93	48.56	1,810.81	8.81	4.88	-2.77	2.17	1.84	36.04	
1,906.00	5.03	54.81	1,905.58	12.81	10.10	-1.91	2.25	2.21	6.58	
2,001.00	7.65	52.91	1,999.99	19.03	18.55	-0.33	2.77	2.76	-2.00	
2,096.00	9.55	48.54	2,093.92	28.06	29.50	1.03	2.11	2.00	-4.60	
2,190.00	9.71	54.73	2,186.60	37.80	41.82	2.85	1.11	0.17	6.59	
2,285.00	8.86	55.16	2,280.35	46.61	54.37	5.50	0.90	-0.89	0.45	
2,380.00	8.76	57.70	2,374.23	54.65	66.48	8.38	0.42	-0.11	2.67	
2,474.00	8.94	57.21	2,467.11	62.43	78.67	11.50	0.21	0.19	-0.52	
2,569.00	8.91	56.54	2,560.96	70.48	91.02	14.54	0.11	-0.03	-0.71	
2,664.00	8.99	54.60	2,654.80	78.84	103.21	17.25	0.33	0.08	-2.04	
2,759.00	9.25	53.91	2,748.60	87.64	115.43	19.67	0.30	0.27	-0.73	
HL Crossing - 2759.00' MD										
2,853.00	9.07	52.84	2,841.40	96.56	127.44	21.86	0.26	-0.19	-1.14	
2,948.00	9.01	52.50	2,935.22	105.61	139.31	23.85	0.08	-0.06	-0.36	
3,042.00	9.26	51.90	3,028.03	114.76	151.10	25.72	0.28	0.27	-0.64	
3,152.00	9.12	52.97	3,136.62	125.47	165.02	28.00	0.20	-0.13	0.97	
3,230.00	9.15	53.63	3,213.63	132.87	174.95	29.79	0.14	0.04	0.85	
3,325.00	9.97	51.37	3,307.31	142.49	187.46	31.84	0.95	0.86	-2.38	
3,420.00	12.51	54.53	3,400.48	153.59	202.26	34.46	2.75	2.67	3.33	
3,518.00	15.43	53.40	3,495.57	167.53	221.38	38.12	2.99	2.98	-1.15	
3,613.00	17.90	51.56	3,586.58	184.14	242.96	41.64	2.66	2.60	-1.94	
3,707.00	18.31	51.27	3,675.92	202.36	265.79	44.91	0.45	0.44	-0.31	
3,802.00	18.68	51.82	3,766.02	221.10	289.39	48.35	0.43	0.39	0.58	
3,897.00	18.10	54.52	3,856.16	239.07	313.37	52.61	1.08	-0.61	2.84	
3,991.00	18.00	55.23	3,945.54	255.83	337.19	57.61	0.26	-0.11	0.76	
4,086.00	17.60	54.77	4,035.99	272.49	360.98	62.65	0.45	-0.42	-0.48	
4,181.00	17.78	54.76	4,126.50	289.14	384.56	67.56	0.19	0.19	-0.01	
4,276.00	18.41	55.19	4,216.80	306.07	408.72	72.67	0.68	0.66	0.45	
4,370.00	17.74	53.67	4,306.16	323.03	432.45	77.46	0.87	-0.71	-1.62	
4,465.00	18.09	53.80	4,396.56	340.32	456.01	81.91	0.37	0.37	0.14	
4,560.00	17.11	52.97	4,487.11	357.44	479.07	86.11	1.06	-1.03	-0.87	
4,654.00	17.60	53.20	4,576.83	374.28	501.49	90.05	0.53	0.52	0.24	



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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
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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)
4,749.00	18.38	52.87	4,667.18	391.93	524.93	94.16	0.83	0.82	-0.35
4,843.00	19.21	51.69	4,756.17	410.46	548.88	98.00	0.97	0.88	-1.26
4,938.00	18.89	54.36	4,845.97	429.11	573.64	102.32	0.98	-0.34	2.81
5,035.00	18.43	53.57	4,937.87	447.37	598.74	107.17	0.54	-0.47	-0.81
5,130.00	18.73	53.51	5,027.92	465.35	623.09	111.67	0.32	0.32	-0.06
5,224.00	18.40	54.65	5,117.03	482.91	647.32	116.39	0.52	-0.35	1.21
5,319.00	17.99	54.63	5,207.28	500.08	671.51	121.36	0.43	-0.43	-0.02
5,413.00	18.12	55.76	5,296.65	516.71	695.43	126.53	0.40	0.14	1.20
5,508.00	17.67	54.05	5,387.05	533.48	719.32	131.56	0.73	-0.47	-1.80
5,602.00	17.82	53.87	5,476.58	550.34	742.48	136.02	0.17	0.16	-0.19
5,697.00	18.08	54.55	5,566.96	567.46	766.23	140.72	0.35	0.27	0.72
5,792.00	18.26	52.73	5,657.22	585.02	790.09	145.17	0.63	0.19	-1.92
5,887.00	18.27	53.15	5,747.43	602.97	813.84	149.29	0.14	0.01	0.44
5,982.00	18.06	53.13	5,837.70	620.73	837.54	153.49	0.22	-0.22	-0.02
6,076.00	18.15	54.50	5,927.05	637.98	861.12	157.97	0.46	0.10	1.46
6,171.00	17.96	53.18	6,017.37	655.35	884.89	162.50	0.47	-0.20	-1.39
Final Extreme EM-6171.00' MD - Tie-In to Extreme MWD - 6171.00' MD									
6,201.00	17.72	52.02	6,045.93	660.93	892.19	163.72	1.43	-0.80	-3.87
6,296.00	17.23	51.01	6,136.54	678.68	914.52	166.96	0.61	-0.52	-1.06
6,390.00	16.39	49.42	6,226.52	696.07	935.42	169.45	1.02	-0.89	-1.69
6,485.00	18.82	52.81	6,317.07	714.05	957.81	172.57	2.78	2.56	3.57
6,579.00	17.94	51.05	6,406.27	732.32	981.14	176.16	1.11	-0.94	-1.87
6,673.00	17.99	58.81	6,495.70	748.94	1,004.82	181.16	2.55	0.05	8.26
6,767.00	16.62	55.15	6,585.45	764.14	1,028.28	186.99	1.86	-1.46	-3.89
6,862.00	15.64	57.31	6,676.71	778.82	1,050.20	192.12	1.21	-1.03	2.27
6,957.00	17.50	57.31	6,767.76	793.45	1,073.00	197.90	1.96	1.96	0.00
7,052.00	16.35	53.87	6,858.65	809.05	1,095.83	203.02	1.60	-1.21	-3.62
7,147.00	14.85	53.34	6,950.14	824.20	1,116.39	206.85	1.59	-1.58	-0.56
7,241.00	17.37	86.39	7,040.63	832.30	1,140.11	217.90	9.97	2.68	35.16
7,336.00	22.85	102.65	7,129.88	829.15	1,172.31	242.90	8.19	5.77	17.12
7,430.00	28.72	112.39	7,214.52	816.53	1,211.05	279.22	7.68	6.24	10.36
7,524.00	35.62	111.86	7,294.04	797.71	1,257.40	325.30	7.35	7.34	-0.56
7,619.00	44.85	116.58	7,366.50	772.36	1,313.16	382.66	10.23	9.72	4.97
7,713.00	54.57	119.89	7,427.22	738.36	1,376.17	451.26	10.68	10.34	3.52
7,807.00	65.36	124.07	7,474.22	695.20	1,444.99	530.45	12.10	11.48	4.45
7,901.00	72.56	131.52	7,507.99	641.41	1,514.12	617.37	10.64	7.66	7.93
7,996.00	82.46	133.85	7,528.51	578.58	1,582.19	709.93	10.69	10.42	2.45
8,090.00	83.21	134.21	7,540.23	513.76	1,649.25	803.18	0.88	0.80	0.38
8,185.00	88.73	135.00	7,546.91	447.24	1,716.69	897.90	5.87	5.81	0.83
8,279.00	89.75	138.75	7,548.15	378.65	1,780.93	991.83	4.13	1.09	3.99
8,362.00	91.61	143.51	7,547.17	314.05	1,832.99	1,074.32	6.16	2.24	5.73
8,456.00	90.13	137.50	7,545.74	241.56	1,892.74	1,167.83	6.58	-1.57	-6.39
8,551.00	89.87	137.96	7,545.74	171.26	1,956.64	1,262.72	0.56	-0.27	0.48



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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	EDM 5000.14 Conroe Db

Survey									
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8,645.00	89.79	138.26	7,546.02	101.29	2,019.41	1,356.58	0.33	-0.09	0.32
8,740.00	88.78	138.94	7,547.20	30.03	2,082.22	1,451.38	1.28	-1.06	0.72
8,834.00	87.19	133.93	7,550.51	-38.02	2,146.94	1,545.26	5.59	-1.69	-5.33
8,909.00	88.98	133.78	7,553.02	-89.95	2,200.99	1,620.20	2.40	2.39	-0.20
9,003.00	89.93	133.53	7,553.91	-154.83	2,269.00	1,714.17	1.05	1.01	-0.27
9,098.00	89.51	133.82	7,554.38	-220.44	2,337.71	1,809.14	0.54	-0.44	0.31
9,191.00	88.92	133.37	7,555.65	-284.56	2,405.05	1,902.11	0.80	-0.63	-0.48
9,286.00	88.81	131.77	7,557.53	-348.81	2,475.00	1,997.00	1.69	-0.12	-1.68
9,381.00	90.29	132.35	7,558.28	-412.45	2,545.53	2,091.87	1.67	1.56	0.61
9,475.00	90.13	134.10	7,557.93	-476.82	2,614.02	2,185.82	1.87	-0.17	1.86
9,570.00	89.73	132.66	7,558.05	-542.07	2,683.07	2,280.78	1.57	-0.42	-1.52
9,665.00	90.10	133.06	7,558.19	-606.69	2,752.70	2,375.71	0.57	0.39	0.42
9,760.00	90.18	132.96	7,557.96	-671.49	2,822.17	2,470.66	0.13	0.08	-0.11
9,854.00	90.04	132.83	7,557.78	-735.47	2,891.03	2,564.59	0.20	-0.15	-0.14
9,948.00	90.24	134.96	7,557.55	-800.64	2,958.77	2,658.57	2.28	0.21	2.27
10,043.00	90.27	132.76	7,557.13	-866.46	3,027.26	2,753.54	2.32	0.03	-2.32
10,137.00	89.99	133.33	7,556.91	-930.62	3,095.96	2,847.49	0.68	-0.30	0.61
10,232.00	90.41	137.06	7,556.58	-998.01	3,162.89	2,942.47	3.95	0.44	3.93
10,326.00	89.99	134.10	7,556.25	-1,065.14	3,228.68	3,036.46	3.18	-0.45	-3.15
10,420.00	90.32	134.55	7,556.00	-1,130.82	3,295.92	3,130.45	0.59	0.35	0.48
10,515.00	90.07	133.76	7,555.68	-1,197.00	3,364.08	3,225.44	0.87	-0.26	-0.83
10,610.00	90.24	132.78	7,555.42	-1,262.12	3,433.25	3,320.39	1.05	0.18	-1.03
10,705.00	90.41	135.69	7,554.88	-1,328.38	3,501.31	3,415.37	3.07	0.18	3.06
10,799.00	90.83	135.50	7,553.86	-1,395.53	3,567.08	3,509.36	0.49	0.45	-0.20
10,894.00	90.38	135.68	7,552.86	-1,463.39	3,633.55	3,604.35	0.51	-0.47	0.19
10,988.00	88.90	135.43	7,553.45	-1,530.49	3,699.37	3,698.34	1.60	-1.57	-0.27
11,084.00	89.48	134.31	7,554.81	-1,598.21	3,767.40	3,794.33	1.31	0.60	-1.17
11,179.00	89.62	135.36	7,555.55	-1,665.19	3,834.77	3,889.33	1.12	0.15	1.11
11,273.00	89.85	136.85	7,555.99	-1,732.93	3,899.94	3,983.30	1.60	0.24	1.59
11,368.00	89.96	136.11	7,556.15	-1,801.82	3,965.35	4,078.27	0.79	0.12	-0.78
11,463.00	89.06	134.82	7,556.96	-1,869.53	4,031.98	4,173.26	1.66	-0.95	-1.36
11,557.00	89.93	137.29	7,557.79	-1,937.20	4,097.20	4,267.23	2.79	0.93	2.63
11,651.00	89.93	138.87	7,557.90	-2,007.14	4,160.00	4,361.09	1.68	0.00	1.68
11,745.00	90.66	138.75	7,557.42	-2,077.88	4,221.90	4,454.88	0.79	0.78	-0.13
11,840.00	89.06	132.36	7,557.65	-2,145.66	4,288.39	4,549.83	6.93	-1.68	-6.73
11,934.00	89.65	134.64	7,558.71	-2,210.36	4,356.56	4,643.78	2.51	0.63	2.43
12,029.00	90.21	133.82	7,558.82	-2,276.63	4,424.63	4,738.77	1.05	0.59	-0.86
12,124.00	90.07	132.10	7,558.59	-2,341.36	4,494.16	4,833.71	1.82	-0.15	-1.81
12,218.00	90.32	134.76	7,558.27	-2,405.98	4,562.41	4,927.66	2.84	0.27	2.83
12,313.00	90.01	132.55	7,558.00	-2,471.56	4,631.14	5,022.63	2.35	-0.33	-2.33
12,407.00	90.96	134.03	7,557.20	-2,536.01	4,699.56	5,116.58	1.87	1.01	1.57
12,502.00	90.41	133.77	7,556.07	-2,601.87	4,768.01	5,211.56	0.64	-0.58	-0.27
12,597.00	90.13	136.03	7,555.62	-2,668.93	4,835.29	5,306.55	2.40	-0.29	2.38



MS Directional
Survey Report



Company:	XTO Energy	Local Co-ordinate Reference:	Well Crim East Unit 12H
Project:	Marion County, West Virginia (NAD 27)	TVD Reference:	WELL @ 1247.00usft (Patterson 579)
Site:	Crim - Crands	MD Reference:	WELL @ 1247.00usft (Patterson 579)
Well:	Crim East Unit 12H	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	EDM 5000.14 Conroe Db

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)
12,692.00	90.55	135.59	7,555.06	-2,737.04	4,901.51	5,401.54	0.64	0.44	-0.46
12,787.00	90.66	134.68	7,554.05	-2,804.37	4,968.52	5,496.53	0.96	0.12	-0.96
12,882.00	90.41	134.51	7,553.16	-2,871.07	5,036.17	5,591.53	0.32	-0.26	-0.18
12,977.00	89.76	134.28	7,553.02	-2,937.53	5,104.05	5,686.52	0.73	-0.68	-0.24
13,072.00	90.04	133.47	7,553.19	-3,003.37	5,172.53	5,781.50	0.90	0.29	-0.85
13,167.00	90.07	132.18	7,553.10	-3,067.95	5,242.20	5,876.43	1.36	0.03	-1.36
13,262.00	90.04	135.68	7,553.01	-3,133.85	5,310.61	5,971.40	3.68	-0.03	3.68
13,357.00	89.29	132.23	7,553.56	-3,199.77	5,378.99	6,066.37	3.72	-0.79	-3.63
13,452.00	90.24	136.88	7,553.95	-3,266.41	5,446.66	6,161.34	5.00	1.00	4.89
13,546.00	89.68	136.87	7,554.02	-3,335.01	5,510.92	6,255.29	0.60	-0.60	-0.01
13,640.00	89.40	135.53	7,554.77	-3,402.85	5,575.98	6,349.26	1.46	-0.30	-1.43
13,734.00	89.65	136.76	7,555.55	-3,470.63	5,641.10	6,443.24	1.34	0.27	1.31
13,829.00	88.29	136.74	7,557.26	-3,539.82	5,706.18	6,538.17	1.43	-1.43	-0.02
13,923.00	87.64	135.96	7,560.60	-3,607.79	5,771.02	6,632.09	1.08	-0.69	-0.83
14,017.00	88.67	137.03	7,563.62	-3,675.93	5,835.70	6,726.00	1.58	1.10	1.14
14,111.00	90.54	136.79	7,564.27	-3,744.57	5,899.91	6,819.94	2.01	1.99	-0.26
14,206.00	91.66	137.03	7,562.45	-3,813.93	5,964.80	6,914.87	1.21	1.18	0.25
14,300.00	90.04	135.17	7,561.05	-3,881.65	6,029.96	7,008.84	2.62	-1.72	-1.98
14,394.00	90.13	134.62	7,560.91	-3,948.00	6,096.55	7,102.84	0.59	0.10	-0.59
14,489.00	89.68	136.32	7,561.07	-4,015.72	6,163.17	7,197.83	1.85	-0.47	1.79
14,544.00	91.78	133.72	7,560.37	-4,054.62	6,202.04	7,252.82	6.08	3.82	-4.73
14,638.00	91.38	134.16	7,557.78	-4,119.82	6,269.70	7,346.76	0.63	-0.43	0.47
14,733.00	91.30	134.69	7,555.56	-4,186.30	6,337.53	7,441.73	0.56	-0.08	0.56
14,828.00	91.12	134.16	7,553.55	-4,252.78	6,405.36	7,536.71	0.59	-0.19	-0.56
14,923.00	90.81	133.81	7,551.95	-4,318.75	6,473.70	7,631.68	0.49	-0.33	-0.37
15,017.00	90.68	133.46	7,550.73	-4,383.61	6,541.73	7,725.64	0.40	-0.14	-0.37
15,113.00	90.51	133.28	7,549.73	-4,449.53	6,611.51	7,821.60	0.26	-0.18	-0.19
15,208.00	89.98	133.63	7,549.33	-4,514.86	6,680.47	7,916.57	0.67	-0.56	0.37
15,303.00	90.90	133.02	7,548.60	-4,580.04	6,749.58	8,011.52	1.16	0.97	-0.64
15,398.00	90.99	134.01	7,547.03	-4,645.45	6,818.46	8,106.48	1.05	0.09	1.04
15,493.00	92.48	131.96	7,544.15	-4,710.18	6,887.92	8,201.37	2.67	1.57	-2.16
15,588.00	92.70	135.39	7,539.86	-4,775.71	6,956.55	8,296.23	3.61	0.23	3.61
15,683.00	92.31	135.13	7,535.71	-4,843.13	7,023.36	8,391.14	0.49	-0.41	-0.27
15,777.00	91.38	135.74	7,532.68	-4,910.06	7,089.28	8,485.08	1.18	-0.99	0.65
15,872.00	90.11	136.01	7,531.45	-4,978.25	7,155.42	8,580.06	1.37	-1.34	0.28
15,966.00	90.51	136.27	7,530.94	-5,046.02	7,220.55	8,674.04	0.51	0.43	0.28
16,062.00	89.10	136.80	7,531.26	-5,115.70	7,286.58	8,770.00	1.57	-1.47	0.55
16,156.00	89.10	136.80	7,532.74	-5,184.21	7,350.92	8,863.95	0.00	0.00	0.00
16,251.00	89.32	137.06	7,534.05	-5,253.60	7,415.79	8,958.88	0.36	0.23	0.27
16,346.00	89.19	136.71	7,535.29	-5,322.95	7,480.72	9,053.82	0.39	-0.14	-0.37
16,440.00	89.19	137.24	7,536.61	-5,391.66	7,544.85	9,147.76	0.56	0.00	0.56
16,535.00	89.19	137.68	7,537.96	-5,461.65	7,609.07	9,242.66	0.46	0.00	0.46
16,629.00	89.49	137.68	7,539.04	-5,531.15	7,672.35	9,336.55	0.32	0.32	0.00
16,724.00	88.62	137.06	7,540.61	-5,601.03	7,736.68	9,431.45	1.12	-0.92	-0.65



MS Directional
Survey Report



Company: XTO Energy
Project: Marion County, West Virginia (NAD 27)
Site: Crim - Crands
Well: Crim East Unit 12H
Wellbore: Wellbore #1
Design: Surveys

Local Co-ordinate Reference: Well Crim East Unit 12H
TVD Reference: WELL @ 1247.00usft (Patterson 579)
MD Reference: WELL @ 1247.00usft (Patterson 579)
North Reference: True
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.14 Conroe 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)
16,818.00	88.22	137.33	7,543.20	-5,669.97	7,800.53	9,525.35	0.51	-0.43	0.29
16,913.00	88.31	135.83	7,546.08	-5,738.94	7,865.80	9,620.26	1.58	0.09	-1.58
17,007.00	88.48	135.57	7,548.71	-5,806.19	7,931.42	9,714.22	0.33	0.18	-0.28
17,102.00	88.40	135.92	7,551.29	-5,874.20	7,997.70	9,809.18	0.38	-0.08	0.37
17,196.00	88.88	134.07	7,553.53	-5,940.64	8,064.15	9,903.15	2.03	0.51	-1.97
17,291.00	89.19	134.43	7,555.13	-6,006.92	8,132.19	9,998.12	0.50	0.33	0.38
17,386.00	89.41	134.43	7,556.29	-6,073.42	8,200.02	10,093.11	0.23	0.23	0.00
17,481.00	89.19	133.99	7,557.45	-6,139.66	8,268.11	10,188.10	0.52	-0.23	-0.46
17,575.00	89.01	133.72	7,558.92	-6,204.78	8,335.89	10,282.07	0.35	-0.19	-0.29
17,670.00	89.01	133.99	7,560.56	-6,270.59	8,404.38	10,377.03	0.28	0.00	0.28
17,765.00	88.70	134.51	7,562.46	-6,336.87	8,472.41	10,472.01	0.64	-0.33	0.55
17,860.00	88.09	133.81	7,565.12	-6,403.02	8,540.54	10,566.96	0.98	-0.64	-0.74
17,955.00	87.52	134.51	7,568.76	-6,469.16	8,608.64	10,661.88	0.95	-0.60	0.74
18,049.00	88.09	133.99	7,572.36	-6,534.70	8,675.92	10,755.80	0.82	0.61	-0.55
18,144.00	87.91	132.93	7,575.68	-6,600.00	8,744.84	10,850.71	1.13	-0.19	-1.12
18,172.00	87.60	132.93	7,576.78	-6,619.06	8,765.32	10,878.67	1.11	-1.11	0.00
18,237.00	87.60	132.93	7,579.50	-6,663.29	8,812.87	10,943.57	0.00	0.00	0.00
Projection to TD-18237.00' MD									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
26.00	26.00	0.00	0.00	Added to adjust for KB-26.00' MD
476.00	475.99	0.59	-0.62	Final Javins Gyro-476.00' MD
2,759.00	2,748.60	87.64	115.43	HL Crossing - 2759.00' MD
6,171.00	6,017.37	655.35	884.89	Final Extreme EM-6171.00' MD
6,171.00	6,017.37	655.35	884.89	Tie-In to Extreme MWD - 6171.00' MD
18,237.00	7,579.50	-6,663.29	8,812.87	Projection to TD-18237.00' MD