



Well: Fitzgerald 04 HM (slot S)
 Site: Fitzgerald
 Project: Marshall County, West Virginia NAD83 UTM 17N
 Design: rev7
 Rig: Nabors X08
 ANNOTATIONS SURVEYS

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Annotation
1	3039.09	42.17	281.690	2862.76	151.41	-614.42	0.00	0.00	-190.29	Survey
2	3239.09	42.17	281.690	3010.99	178.62	-745.90	0.00	0.00	-225.83	KOP Begin 2°/100' build/turn
3	3334.73	43.01	284.229	3081.41	193.14	-808.96	2.00	64.87	-244.35	Begin 43.01° tangent
4	7458.07	43.01	284.229	6096.50	884.49	-3535.35	0.00	0.00	-1108.19	Begin 8°/100' build/turn
5	8402.17	55.00	176.569	6820.43	523.85	-3875.00	8.00	-126.28	-769.95	Begin 10°/100' build/turn
6	8823.87	89.00	149.782	6951.00	152.35	-3753.00	10.00	-42.16	-391.42	Begin 89.00° lateral
7	17179.52	89.00	149.782	7097.00	-7066.81	451.67	0.00	0.00	7081.23	PBHL/TD

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
Fitzgerald-04HM LP r7	6951.00	152.35	-3753.00	4454713.119	1737401.441	39.801701000	-80.654686000
Fitzgerald-04HM BHL r7	7097.00	-7066.81	451.67	4447493.975	1741606.102	39.781830000	-80.639819000

MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Annotation
185.09	0.01	69.680	185.09	0.00	0.01	0.00	MWD surveys
17113.00	88.04	150.140	7043.19	-7021.18	419.66	7033.64	Survey @ 17113.00 MD 7043.19 TVD
17171.00	88.04	150.140	7045.17	-7071.45	448.52	7085.66	Survey proj. to 17171.00 MD 7045.17 TVD

Geodetic System: Universal Transverse Mercator (US Survey Feet)
 Datum: NAD83 West Virginia - HARN
 Ellipsoid: GRS 1980
 Zone: Zone 17N (84 W to 78 W)

System Datum: Mean Sea Level
 Depth Reference: RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)

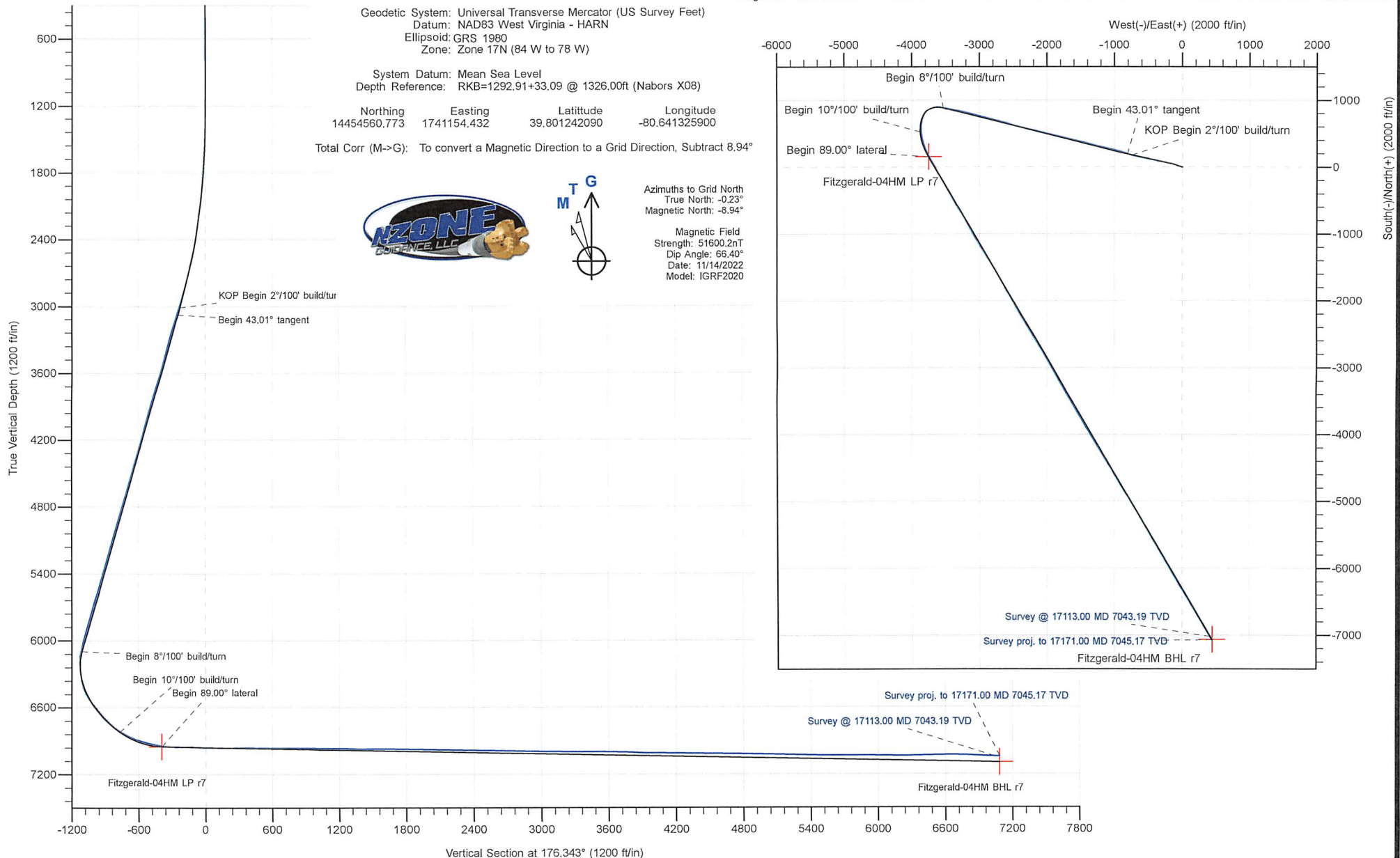
Northing: 14454560.773 Easting: 1741154.432 Latitude: 39.801242090 Longitude: -80.641325900

Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.94°



Azimuths to Grid North
 True North: -0.23°
 Magnetic North: -8.94°

Magnetic Field
 Strength: 51600.2nT
 Dip Angle: 66.40°
 Date: 11/14/2022
 Model: IGRF2020





Survey Report - Geographic

Company: Tug Hill Operating LLC	Local Co-ordinate Reference: Well Fitzgerald 04 HM (slot S)
Project: Marshall County, West Virginia NAD83 UTM 17N	TVD Reference: RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
Site: Fitzgerald	MD Reference: RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
Well: Fitzgerald 04 HM (slot S)	North Reference: Grid
Wellbore: Original Hole	Survey Calculation Method: Minimum Curvature
Design: Surveys Original Hole	Database: DB_Nov1522LT

Project Marshall County, West Virginia NAD83 UTM 17N		
Map System: Universal Transverse Mercator (US Survey Feet)	System Datum:	Mean Sea Level
Geo Datum: NAD83 West Virginia - HARN		
Map Zone: Zone 17N (84 W to 78 W)		

Site Fitzgerald					
Site Position:		Northing:	14,454,567.732 usft	Latitude:	39.801261840
From: Lat/Long		Easting:	1,741,096.260 usft	Longitude:	-80.641532920
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.23 °

Well Fitzgerald 04 HM (slot S)						
Well Position	+N/-S	0.00 ft	Northing:	14,454,560.773 usft	Latitude:	39.801242090
	+E/-W	0.00 ft	Easting:	1,741,154.432 usft	Longitude:	-80.641325900
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	1,292.91 ft

Wellbore Original Hole					
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2020	11/14/2022	-8.71	66.40	51,600.21052590

Design Surveys Original Hole					
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:		Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
		0.00	0.00	0.00	176.340

Survey Program		Date 11/27/2022		
From (ft)	To (ft)	Survey (Wellbore)		
		Tool Name		
		Description		
21.09	1,158.09	MWD surf (Original Hole)	MWD	MWD - Standard
1,213.09	3,039.09	MWD int (Original Hole)	MWD	MWD - Standard
3,170.00	17,113.00	MWD (Original Hole)	MWD	MWD - Standard
17,171.00	17,171.00	Projection (Original Hole)	MWD	MWD - Standard

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
0.00	0.00	0.000	0.00	0.00	0.00	14,454,560.773	1,741,154.432	39.801242090	-80.641325900
21.09	0.00	0.000	21.09	0.00	0.00	14,454,560.773	1,741,154.432	39.801242090	-80.641325900
185.09	0.01	69.680	185.09	0.00	0.01	14,454,560.778	1,741,154.446	39.801242103	-80.641325852
MWD surveys									
230.09	0.11	162.360	230.09	-0.03	0.03	14,454,560.739	1,741,154.463	39.801241994	-80.641325793
274.09	0.09	206.870	274.09	-0.11	0.03	14,454,560.668	1,741,154.460	39.801241799	-80.641325804
318.09	0.01	245.710	318.09	-0.14	0.01	14,454,560.635	1,741,154.441	39.801241710	-80.641325872
362.09	0.09	210.300	362.09	-0.17	-0.01	14,454,560.604	1,741,154.420	39.801241624	-80.641325947

11/27/2022

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Fitzgerald 04 HM (slot S)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
Site:	Fitzgerald	MD Reference:	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
Well:	Fitzgerald 04 HM (slot S)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Nov1522LT

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
406.09	0.10	183.280	406.09	-0.24	-0.03	14,454,560.536	1,741,154.400	39.801241437	-80.641326018
451.09	0.04	253.080	451.09	-0.28	-0.05	14,454,560.492	1,741,154.383	39.801241317	-80.641326080
495.09	0.07	217.590	495.09	-0.31	-0.08	14,454,560.466	1,741,154.352	39.801241246	-80.641326191
539.09	0.08	241.060	539.09	-0.34	-0.12	14,454,560.430	1,741,154.308	39.801241147	-80.641326346
584.09	0.19	303.080	584.09	-0.32	-0.21	14,454,560.455	1,741,154.218	39.801241218	-80.641326666
628.09	0.12	233.610	628.09	-0.31	-0.31	14,454,560.468	1,741,154.120	39.801241254	-80.641327016
672.09	0.15	191.920	672.09	-0.39	-0.36	14,454,560.384	1,741,154.071	39.801241025	-80.641327191
716.09	0.09	160.610	716.09	-0.48	-0.36	14,454,560.295	1,741,154.071	39.801240780	-80.641327194
760.09	0.13	283.400	760.09	-0.50	-0.40	14,454,560.274	1,741,154.034	39.801240723	-80.641327326
804.09	0.11	276.030	804.09	-0.48	-0.49	14,454,560.290	1,741,153.943	39.801240768	-80.641327648
849.09	0.24	274.870	849.09	-0.47	-0.63	14,454,560.303	1,741,153.806	39.801240804	-80.641328136
893.09	0.10	278.670	893.09	-0.46	-0.76	14,454,560.316	1,741,153.677	39.801240843	-80.641328597
937.09	0.19	279.060	937.09	-0.44	-0.87	14,454,560.334	1,741,153.567	39.801240891	-80.641328989
967.09	0.21	230.270	967.09	-0.47	-0.96	14,454,560.306	1,741,153.475	39.801240817	-80.641329315
1,026.09	0.09	217.900	1,026.09	-0.57	-1.07	14,454,560.201	1,741,153.364	39.801240528	-80.641329714
1,070.09	0.05	260.650	1,070.09	-0.60	-1.11	14,454,560.170	1,741,153.323	39.801240445	-80.641329857
1,114.09	0.11	225.640	1,114.09	-0.64	-1.16	14,454,560.138	1,741,153.274	39.801240356	-80.641330033
1,158.09	0.13	303.400	1,158.09	-0.64	-1.23	14,454,560.136	1,741,153.202	39.801240351	-80.641330288
1,213.09	0.23	301.750	1,213.09	-0.55	-1.38	14,454,560.228	1,741,153.056	39.801240607	-80.641330807
1,257.09	0.31	310.340	1,257.09	-0.42	-1.54	14,454,560.351	1,741,152.891	39.801240948	-80.641331395
1,301.09	0.23	308.290	1,301.09	-0.29	-1.70	14,454,560.483	1,741,152.731	39.801241311	-80.641331963
1,345.09	0.23	331.650	1,345.09	-0.16	-1.81	14,454,560.616	1,741,152.619	39.801241676	-80.641332358
1,390.09	0.52	297.130	1,390.09	0.01	-2.04	14,454,560.788	1,741,152.395	39.801242153	-80.641333155
1,434.09	1.68	288.710	1,434.08	0.31	-2.83	14,454,561.086	1,741,151.606	39.801242980	-80.641335958
1,478.09	3.25	284.500	1,478.03	0.83	-4.64	14,454,561.605	1,741,149.787	39.801244426	-80.641342426
1,522.09	5.38	284.240	1,521.91	1.65	-7.85	14,454,562.425	1,741,146.580	39.801246712	-80.641353833
1,566.09	6.41	285.820	1,565.67	2.83	-12.21	14,454,563.602	1,741,142.218	39.801249993	-80.641369349
1,611.09	7.25	289.500	1,610.35	4.46	-17.31	14,454,565.235	1,741,137.124	39.801254532	-80.641387461
1,655.09	8.61	291.060	1,653.93	6.57	-23.00	14,454,567.345	1,741,131.433	39.801260391	-80.641407693
1,699.09	9.86	289.940	1,697.36	9.04	-29.61	14,454,569.814	1,741,124.818	39.801267242	-80.641431211
1,743.09	10.40	289.910	1,740.68	11.68	-36.89	14,454,572.451	1,741,117.542	39.801274565	-80.641457077
1,787.09	10.28	288.910	1,783.96	14.30	-44.34	14,454,575.076	1,741,110.094	39.801281855	-80.641483558
1,832.09	10.35	287.860	1,828.23	16.84	-51.98	14,454,577.617	1,741,102.448	39.801288918	-80.641510745
1,876.09	10.45	287.520	1,871.51	19.26	-59.55	14,454,580.030	1,741,094.881	39.801295629	-80.641537653
1,920.09	10.39	288.390	1,914.79	21.71	-67.12	14,454,582.483	1,741,087.311	39.801302448	-80.641564572
1,964.09	11.94	289.630	1,957.95	24.49	-75.17	14,454,585.264	1,741,079.258	39.801310174	-80.641593202
2,009.09	14.07	290.020	2,001.79	27.93	-84.70	14,454,588.701	1,741,069.733	39.801319717	-80.641627066
2,053.09	15.99	290.030	2,044.29	31.83	-95.42	14,454,592.608	1,741,059.013	39.801330565	-80.641665177
2,097.09	18.01	289.700	2,086.36	36.20	-107.52	14,454,596.977	1,741,046.914	39.801342696	-80.641708192
2,141.09	20.14	287.830	2,127.94	40.82	-121.14	14,454,601.590	1,741,033.298	39.801355514	-80.641756607
2,186.09	22.36	284.170	2,169.88	45.29	-136.81	14,454,606.058	1,741,017.621	39.801367957	-80.641812359
2,230.09	24.21	282.770	2,210.30	49.33	-153.73	14,454,610.102	1,741,000.706	39.801379247	-80.641872526
2,274.09	25.95	282.280	2,250.15	53.37	-171.93	14,454,614.144	1,740,982.499	39.801390547	-80.641937292
2,318.09	28.08	281.810	2,289.35	57.54	-191.48	14,454,618.311	1,740,962.954	39.801402207	-80.642006821
2,362.09	29.62	281.870	2,327.88	61.89	-212.26	14,454,622.667	1,740,942.176	39.801414398	-80.642080739
2,406.09	30.46	282.030	2,365.97	66.46	-233.81	14,454,627.229	1,740,920.627	39.801427161	-80.642157397
2,450.09	31.81	282.060	2,403.63	71.20	-256.06	14,454,631.976	1,740,898.378	39.801440443	-80.642236545
2,495.09	33.04	282.080	2,441.62	76.25	-279.65	14,454,637.022	1,740,874.783	39.801454558	-80.642320481
2,539.09	34.21	281.970	2,478.25	81.32	-303.48	14,454,642.097	1,740,850.953	39.801468759	-80.642405254
2,583.09	35.18	281.460	2,514.43	86.41	-328.00	14,454,647.181	1,740,826.430	39.801482989	-80.642492495
2,627.09	36.19	281.760	2,550.17	91.57	-353.14	14,454,652.347	1,740,801.289	39.801497452	-80.642581933
2,672.09	37.52	282.610	2,586.18	97.27	-379.53	14,454,658.047	1,740,774.908	39.801513394	-80.642675778
2,716.09	39.02	283.340	2,620.72	103.39	-406.08	14,454,664.168	1,740,748.354	39.801530496	-80.642770237
2,760.09	39.92	283.460	2,654.68	109.88	-433.29	14,454,670.650	1,740,721.146	39.801548595	-80.642867016

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Fitzgerald 04 HM (slot S)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
Site:	Fitzgerald	MD Reference:	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
Well:	Fitzgerald 04 HM (slot S)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Nov1522LT

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
2,804.09	40.95	283.660	2,688.17	116.57	-461.03	14,454,677.342	1,740,693.404	39.801567276	-80.642965693	
2,848.09	41.78	283.110	2,721.20	123.30	-489.32	14,454,684.072	1,740,665.117	39.801586068	-80.643066313	
2,893.09	42.06	283.330	2,754.68	130.17	-518.58	14,454,690.947	1,740,635.849	39.801605270	-80.643170419	
2,937.09	42.35	282.690	2,787.27	136.83	-547.38	14,454,697.601	1,740,607.050	39.801623858	-80.643272863	
2,981.09	42.33	282.490	2,819.80	143.29	-576.31	14,454,704.061	1,740,578.127	39.801641914	-80.643375748	
3,025.09	42.13	281.770	2,852.38	149.50	-605.22	14,454,710.275	1,740,549.215	39.801659296	-80.643478599	
3,039.09	42.17	281.690	2,862.76	151.41	-614.42	14,454,712.185	1,740,540.017	39.801664642	-80.643511324	
3,170.00	43.96	281.450	2,958.39	169.34	-701.99	14,454,730.109	1,740,452.447	39.801714825	-80.643822854	
3,264.00	43.87	285.670	3,026.12	184.61	-765.34	14,454,745.387	1,740,389.096	39.801757472	-80.644048196	
3,358.00	43.12	286.990	3,094.31	202.80	-827.43	14,454,763.572	1,740,327.009	39.801808092	-80.644268997	
3,452.00	43.38	286.810	3,162.78	221.52	-889.05	14,454,782.296	1,740,265.383	39.801860182	-80.644488146	
3,546.00	42.73	286.110	3,231.47	239.71	-950.59	14,454,800.481	1,740,203.841	39.801910794	-80.644707005	
3,639.00	42.90	283.560	3,299.69	255.89	-1,011.68	14,454,816.659	1,740,142.752	39.801955889	-80.644924280	
3,732.00	42.02	282.150	3,368.30	269.86	-1,072.89	14,454,830.632	1,740,081.549	39.801994930	-80.645141993	
3,826.00	43.65	283.740	3,437.23	284.19	-1,135.16	14,454,844.961	1,740,019.273	39.802034957	-80.645363522	
3,920.00	42.29	282.590	3,506.02	298.79	-1,197.54	14,454,859.561	1,739,956.891	39.802075730	-80.645585425	
4,015.00	43.03	284.610	3,575.88	313.93	-1,260.11	14,454,874.704	1,739,894.329	39.802117998	-80.645807961	
4,109.00	41.98	284.530	3,645.18	329.91	-1,321.57	14,454,890.682	1,739,832.861	39.802162543	-80.646026590	
4,203.00	44.13	285.410	3,713.86	346.49	-1,383.56	14,454,907.267	1,739,770.873	39.802208763	-80.646247063	
4,296.00	43.03	284.530	3,781.23	363.06	-1,445.49	14,454,923.832	1,739,708.941	39.802254926	-80.646467335	
4,391.00	42.59	284.610	3,850.92	379.30	-1,507.98	14,454,940.072	1,739,646.458	39.802300204	-80.646689574	
4,486.00	43.56	283.120	3,920.32	394.84	-1,570.97	14,454,955.611	1,739,583.471	39.802343561	-80.646913621	
4,581.00	43.96	282.240	3,988.93	409.26	-1,635.07	14,454,970.032	1,739,519.369	39.802383857	-80.647141652	
4,675.00	43.87	284.260	4,056.65	424.20	-1,698.52	14,454,984.973	1,739,455.913	39.802425575	-80.647367373	
4,768.00	42.64	283.210	4,124.38	439.34	-1,760.42	14,455,000.109	1,739,394.012	39.802467813	-80.647587557	
4,862.00	42.73	284.090	4,193.48	454.38	-1,822.35	14,455,015.149	1,739,332.085	39.802509785	-80.647807837	
4,956.00	41.36	282.680	4,263.29	468.96	-1,883.59	14,455,029.731	1,739,270.849	39.802550492	-80.648025662	
5,050.00	42.64	284.790	4,333.14	483.90	-1,944.68	14,455,044.677	1,739,209.761	39.802592197	-80.648242954	
5,145.00	42.99	284.530	4,402.83	500.24	-2,007.14	14,455,061.016	1,739,147.298	39.802637743	-80.648465124	
5,239.00	45.27	285.580	4,470.30	517.26	-2,070.33	14,455,078.027	1,739,084.103	39.802685141	-80.648689892	
5,333.00	44.18	284.790	4,537.08	534.59	-2,134.17	14,455,095.358	1,739,020.268	39.802733422	-80.648916935	
5,427.00	42.02	282.590	4,605.72	549.81	-2,196.55	14,455,110.580	1,738,957.882	39.802775897	-80.649138845	
5,521.00	43.38	283.030	4,674.80	563.94	-2,258.71	14,455,124.716	1,738,895.724	39.802815388	-80.649359960	
5,616.00	44.31	285.490	4,743.32	580.16	-2,322.48	14,455,140.935	1,738,831.958	39.802860614	-80.649586772	
5,711.00	42.51	283.910	4,812.33	596.74	-2,385.62	14,455,157.514	1,738,768.821	39.802906823	-80.649811343	
5,804.00	42.02	284.000	4,881.16	611.83	-2,446.32	14,455,172.598	1,738,708.119	39.802948899	-80.650027262	
5,899.00	43.03	286.550	4,951.17	628.75	-2,508.25	14,455,189.525	1,738,646.191	39.802996049	-80.650247521	
5,994.00	43.21	285.670	5,020.52	646.77	-2,570.63	14,455,207.542	1,738,583.807	39.803046197	-80.650469389	
6,088.00	43.74	284.790	5,088.73	663.76	-2,633.03	14,455,224.529	1,738,521.404	39.803093517	-80.650691339	
6,183.00	41.54	283.300	5,158.61	679.39	-2,695.45	14,455,240.161	1,738,458.987	39.803137116	-80.650913356	
6,277.00	42.55	283.380	5,228.42	693.91	-2,756.70	14,455,254.687	1,738,397.734	39.803177661	-80.651131248	
6,371.00	43.91	285.230	5,296.91	709.83	-2,819.08	14,455,270.606	1,738,335.357	39.803222046	-80.651353120	
6,465.00	42.42	283.910	5,365.47	726.02	-2,881.31	14,455,286.791	1,738,273.127	39.803267161	-80.651574467	
6,559.00	44.04	285.760	5,433.96	742.52	-2,943.54	14,455,303.289	1,738,210.901	39.803313132	-80.651795793	
6,654.00	42.42	284.880	5,503.18	759.71	-3,006.29	14,455,320.487	1,738,148.151	39.803361032	-80.652018980	
6,748.00	43.08	285.410	5,572.20	776.39	-3,067.88	14,455,337.159	1,738,086.561	39.803407475	-80.652238041	
6,842.00	42.33	284.790	5,641.28	793.00	-3,129.43	14,455,353.769	1,738,025.011	39.803453746	-80.652456961	
6,937.00	43.21	284.530	5,711.02	809.32	-3,191.84	14,455,370.094	1,737,962.601	39.803499244	-80.652678947	
7,032.00	42.37	283.300	5,780.73	824.85	-3,254.47	14,455,385.618	1,737,899.965	39.803542544	-80.652901751	
7,126.00	42.59	283.470	5,850.06	839.54	-3,316.23	14,455,400.313	1,737,838.208	39.803583559	-80.653121435	
7,221.00	43.34	284.530	5,919.58	855.21	-3,379.05	14,455,415.981	1,737,775.388	39.803627254	-80.653344894	
7,243.00	42.99	284.090	5,935.62	858.93	-3,393.63	14,455,419.701	1,737,760.805	39.803637625	-80.653396766	
7,338.00	44.35	282.150	6,004.34	873.80	-3,457.52	14,455,434.575	1,737,696.924	39.803679154	-80.653624011	
7,432.00	45.01	280.310	6,071.18	886.67	-3,522.34	14,455,447.440	1,737,632.099	39.803715172	-80.653854647	

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Fitzgerald 04 HM (slot S)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
Site:	Fitzgerald	MD Reference:	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
Well:	Fitzgerald 04 HM (slot S)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Nov1522LT

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
7,479.00	41.67	278.460	6,105.36	891.94	-3,554.16	14,455,452.715	1,737,600.283	39.803729996	-80.653967855
7,526.00	37.89	274.420	6,141.48	895.36	-3,584.02	14,455,456.128	1,737,570.424	39.803739685	-80.654074123
7,573.00	35.78	270.460	6,179.10	896.58	-3,612.15	14,455,457.351	1,737,542.288	39.803743342	-80.654174286
7,619.00	33.98	265.370	6,216.84	895.65	-3,638.42	14,455,456.421	1,737,516.020	39.803741067	-80.654267825
7,666.00	31.82	260.710	6,256.31	892.59	-3,663.75	14,455,453.359	1,737,490.694	39.803732928	-80.654358043
7,714.00	31.38	254.560	6,297.20	887.22	-3,688.29	14,455,447.988	1,737,466.153	39.803718438	-80.654445495
7,761.00	31.87	249.020	6,337.23	879.51	-3,711.67	14,455,440.286	1,737,442.768	39.803697534	-80.654528866
7,808.00	32.48	241.810	6,377.03	869.11	-3,734.39	14,455,429.878	1,737,420.051	39.803669192	-80.654609893
7,855.00	32.97	233.810	6,416.59	855.59	-3,755.84	14,455,416.359	1,737,398.597	39.803632292	-80.654686467
7,903.00	34.33	227.310	6,456.56	838.69	-3,776.34	14,455,399.463	1,737,378.099	39.803586111	-80.654759680
7,950.00	35.56	219.930	6,495.10	819.22	-3,794.86	14,455,379.988	1,737,359.577	39.803532823	-80.654825897
7,997.00	37.14	212.460	6,532.97	796.75	-3,811.26	14,455,357.524	1,737,343.181	39.803471305	-80.654884585
8,044.00	39.30	206.480	6,569.91	771.45	-3,825.52	14,455,332.217	1,737,328.922	39.803401958	-80.654935700
8,092.00	41.19	201.030	6,606.56	743.08	-3,837.97	14,455,303.847	1,737,316.468	39.803324178	-80.654980435
8,139.00	42.33	195.850	6,641.62	713.40	-3,847.85	14,455,274.169	1,737,306.588	39.803242779	-80.655016017
8,185.00	43.03	191.190	6,675.45	683.09	-3,855.13	14,455,243.865	1,737,299.311	39.803159634	-80.655042346
8,232.00	44.35	186.790	6,709.44	651.04	-3,860.19	14,455,211.813	1,737,294.255	39.803071665	-80.655060786
8,280.00	46.90	184.420	6,743.01	616.90	-3,863.52	14,455,177.674	1,737,290.920	39.802977946	-80.655073128
8,327.00	50.29	181.780	6,774.09	581.71	-3,865.40	14,455,142.483	1,737,289.036	39.802881323	-80.655080321
8,375.00	54.68	178.710	6,803.32	543.65	-3,865.54	14,455,104.427	1,737,288.903	39.802776815	-80.655081316
8,422.00	59.12	174.580	6,828.99	504.37	-3,863.20	14,455,065.147	1,737,291.241	39.802668918	-80.655073528
8,469.00	63.65	170.620	6,851.50	463.49	-3,857.86	14,455,024.258	1,737,296.583	39.802556571	-80.655050571
8,516.00	67.34	167.190	6,871.00	421.54	-3,849.61	14,454,982.310	1,737,304.828	39.802441285	-80.655026290
8,563.00	70.20	163.500	6,888.02	379.17	-3,838.52	14,454,939.942	1,737,315.922	39.802324815	-80.654987373
8,610.00	72.97	161.300	6,902.87	336.67	-3,825.03	14,454,897.446	1,737,329.410	39.802207967	-80.654939933
8,657.00	75.91	158.760	6,915.47	294.13	-3,809.56	14,454,854.902	1,737,344.877	39.802090968	-80.654885447
8,704.00	77.76	157.170	6,926.18	251.71	-3,792.39	14,454,812.485	1,737,362.047	39.801974298	-80.654824895
8,752.00	79.91	155.420	6,935.47	208.60	-3,773.46	14,454,769.372	1,737,380.980	39.801855699	-80.654758078
8,799.00	80.84	153.480	6,943.33	166.79	-3,753.47	14,454,727.568	1,737,400.965	39.801740684	-80.654687495
8,846.00	84.44	151.020	6,949.35	125.56	-3,731.77	14,454,686.328	1,737,422.667	39.801627200	-80.654610794
8,893.00	87.65	149.180	6,952.59	84.92	-3,708.40	14,454,645.689	1,737,446.037	39.801515348	-80.654528144
8,941.00	89.19	149.260	6,953.92	43.69	-3,683.85	14,454,604.467	1,737,470.591	39.801401883	-80.654441290
9,035.00	89.71	151.020	6,954.82	-37.82	-3,637.05	14,454,522.954	1,737,517.388	39.801177531	-80.654275795
9,130.00	88.62	151.200	6,956.21	-120.99	-3,591.16	14,454,439.787	1,737,563.279	39.800948648	-80.654113546
9,224.00	87.82	150.230	6,959.12	-202.93	-3,545.20	14,454,357.842	1,737,609.236	39.800723119	-80.653951049
9,319.00	88.70	150.230	6,962.01	-285.36	-3,498.06	14,454,275.418	1,737,656.383	39.800496264	-80.653784322
9,412.00	89.45	150.320	6,963.51	-366.11	-3,451.95	14,454,194.667	1,737,702.490	39.800274011	-80.653621278
9,506.00	90.24	151.200	6,963.77	-448.13	-3,406.03	14,454,112.646	1,737,748.405	39.800048275	-80.653458935
9,601.00	89.80	149.530	6,963.73	-530.70	-3,359.06	14,454,030.076	1,737,795.378	39.799821018	-80.653292833
9,694.00	90.55	149.700	6,963.45	-610.92	-3,312.02	14,453,949.851	1,737,842.417	39.799600201	-80.653126464
9,789.00	88.84	149.440	6,963.95	-692.83	-3,263.91	14,453,867.942	1,737,890.531	39.799374747	-80.652956295
9,883.00	89.14	149.790	6,965.61	-773.91	-3,216.37	14,453,786.866	1,737,938.069	39.799151587	-80.652788163
9,978.00	90.33	152.250	6,966.05	-857.01	-3,170.35	14,453,703.770	1,737,984.092	39.798922895	-80.652625456
10,072.00	89.49	150.050	6,966.20	-939.33	-3,124.99	14,453,621.443	1,738,029.445	39.798696321	-80.652465122
10,166.00	89.54	149.880	6,966.99	-1,020.71	-3,077.95	14,453,540.068	1,738,076.493	39.798472346	-80.652298744
10,261.00	89.85	149.790	6,967.50	-1,102.84	-3,030.21	14,453,457.935	1,738,124.229	39.798246277	-80.652129928
10,355.00	89.93	149.350	6,967.68	-1,183.89	-2,982.60	14,453,376.883	1,738,171.838	39.798023184	-80.651961548
10,449.00	90.07	148.470	6,967.68	-1,264.39	-2,934.06	14,453,296.386	1,738,220.378	39.797801603	-80.651789851
10,543.00	89.54	148.740	6,968.00	-1,344.63	-2,885.09	14,453,216.149	1,738,269.345	39.797580729	-80.651616627
10,638.00	88.79	149.090	6,969.38	-1,425.98	-2,836.05	14,453,134.800	1,738,318.389	39.797356802	-80.651443149
10,732.00	88.35	148.210	6,971.73	-1,506.23	-2,787.16	14,453,054.550	1,738,367.278	39.797135892	-80.651270207
10,826.00	90.42	149.970	6,972.74	-1,586.86	-2,738.88	14,452,973.913	1,738,415.557	39.796913926	-80.651099442
10,920.00	89.32	151.020	6,972.95	-1,668.67	-2,692.59	14,452,892.106	1,738,461.851	39.796688770	-80.650935765
11,015.00	89.71	150.850	6,973.76	-1,751.70	-2,646.44	14,452,809.073	1,738,508.000	39.796460246	-80.650772618

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Fitzgerald 04 HM (slot S)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
Site:	Fitzgerald	MD Reference:	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
Well:	Fitzgerald 04 HM (slot S)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Nov1522LT

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
11,109.00	90.29	150.320	6,973.76	-1,833.58	-2,600.27	14,452,727.192	1,738,554.166	39.796234886	-80.650609398	
11,204.00	89.14	150.930	6,974.23	-1,916.37	-2,553.67	14,452,644.409	1,738,600.764	39.796007046	-80.650444652	
11,299.00	89.71	149.970	6,975.18	-1,999.00	-2,506.82	14,452,561.772	1,738,647.613	39.795779602	-80.650279012	
11,392.00	88.40	150.320	6,976.72	-2,079.65	-2,460.54	14,452,481.127	1,738,693.902	39.795557636	-80.650115341	
11,487.00	88.70	149.880	6,979.12	-2,161.98	-2,413.19	14,452,398.799	1,738,741.243	39.795331034	-80.649947948	
11,580.00	88.92	149.610	6,981.05	-2,242.29	-2,366.35	14,452,318.484	1,738,788.090	39.795109967	-80.649782283	
11,675.00	89.41	149.790	6,982.44	-2,324.31	-2,318.42	14,452,236.470	1,738,836.015	39.794884223	-80.649612810	
11,769.00	89.71	149.610	6,983.16	-2,405.46	-2,271.00	14,452,155.314	1,738,883.439	39.794660838	-80.649445107	
11,863.00	90.02	149.180	6,983.38	-2,486.37	-2,223.14	14,452,074.409	1,738,931.296	39.794438139	-80.649275863	
11,957.00	88.97	149.530	6,984.21	-2,567.24	-2,175.23	14,451,993.541	1,738,979.206	39.794215542	-80.649106427	
12,051.00	88.84	149.350	6,986.00	-2,648.16	-2,127.45	14,451,912.613	1,739,026.991	39.793992779	-80.648937441	
12,146.00	89.01	148.380	6,987.79	-2,729.46	-2,078.33	14,451,831.313	1,739,076.102	39.793768981	-80.648763740	
12,239.00	89.36	149.260	6,989.11	-2,809.02	-2,030.19	14,451,751.757	1,739,124.245	39.793549981	-80.648593461	
12,334.00	88.48	150.850	6,990.90	-2,891.32	-1,982.78	14,451,669.457	1,739,171.656	39.793323455	-80.648425829	
12,428.00	88.75	151.370	6,993.17	-2,973.60	-1,937.38	14,451,587.180	1,739,217.056	39.793097013	-80.648265353	
12,522.00	89.10	150.580	6,994.94	-3,055.78	-1,891.78	14,451,505.001	1,739,262.656	39.792870838	-80.648104170	
12,617.00	89.14	149.700	6,996.39	-3,138.16	-1,844.49	14,451,422.623	1,739,309.949	39.792644099	-80.647936962	
12,711.00	89.49	148.650	6,997.52	-3,218.87	-1,796.32	14,451,341.909	1,739,358.112	39.792421918	-80.647766634	
12,807.00	89.58	151.990	6,998.30	-3,302.26	-1,748.80	14,451,258.519	1,739,405.638	39.792192394	-80.647598610	
12,901.00	89.36	151.810	6,999.17	-3,385.18	-1,704.52	14,451,175.603	1,739,449.911	39.791964208	-80.647442163	
12,995.00	89.41	150.490	7,000.18	-3,467.50	-1,659.17	14,451,093.276	1,739,495.264	39.791737629	-80.647281864	
13,089.00	89.85	150.050	7,000.78	-3,549.13	-1,612.56	14,451,011.652	1,739,541.879	39.791512963	-80.647117065	
13,184.00	90.68	150.050	7,000.34	-3,631.44	-1,565.13	14,450,929.339	1,739,589.306	39.791286401	-80.646949385	
13,278.00	89.58	149.530	7,000.13	-3,712.67	-1,517.83	14,450,848.108	1,739,636.603	39.791062807	-80.646782153	
13,372.00	88.26	149.790	7,001.90	-3,793.78	-1,470.36	14,450,766.998	1,739,684.075	39.790839546	-80.646614296	
13,467.00	88.35	149.610	7,004.71	-3,875.77	-1,422.45	14,450,685.012	1,739,731.985	39.790613872	-80.646444898	
13,561.00	88.13	149.180	7,007.60	-3,956.64	-1,374.62	14,450,604.145	1,739,779.819	39.790391273	-80.646275753	
13,655.00	90.07	148.820	7,009.08	-4,037.20	-1,326.21	14,450,523.585	1,739,828.224	39.790169511	-80.646104571	
13,748.00	89.41	149.260	7,009.50	-4,116.94	-1,278.37	14,450,443.837	1,739,876.066	39.789949984	-80.645933585	
13,842.00	89.27	148.740	7,010.58	-4,197.51	-1,229.96	14,450,363.269	1,739,924.476	39.789728199	-80.645764188	
13,936.00	89.32	148.210	7,011.74	-4,277.63	-1,180.81	14,450,283.149	1,739,973.622	39.789507635	-80.645590367	
14,031.00	89.58	149.350	7,012.65	-4,358.87	-1,131.58	14,450,201.912	1,740,022.859	39.789284003	-80.645416236	
14,125.00	89.27	148.910	7,013.59	-4,439.55	-1,083.35	14,450,121.233	1,740,071.087	39.789061915	-80.645245692	
14,218.00	88.88	149.700	7,015.09	-4,519.51	-1,035.88	14,450,041.274	1,740,118.554	39.788841812	-80.645077849	
14,312.00	89.01	149.350	7,016.82	-4,600.51	-988.22	14,449,960.274	1,740,166.219	39.788618847	-80.644909316	
14,406.00	88.92	148.650	7,018.52	-4,681.07	-939.81	14,449,879.714	1,740,214.624	39.788397083	-80.644738143	
14,500.00	89.41	150.230	7,019.89	-4,762.00	-892.02	14,449,798.782	1,740,262.411	39.788174304	-80.644569179	
14,594.00	89.27	149.970	7,020.98	-4,843.48	-845.17	14,449,717.300	1,740,309.265	39.787950023	-80.644403541	
14,688.00	89.67	149.610	7,021.84	-4,924.71	-797.87	14,449,636.070	1,740,356.561	39.787726430	-80.644236331	
14,782.00	89.63	149.000	7,022.42	-5,005.54	-749.89	14,449,555.242	1,740,404.544	39.787503933	-80.644066670	
14,877.00	88.92	150.410	7,023.62	-5,087.56	-701.97	14,449,473.224	1,740,452.462	39.787278170	-80.643897259	
14,972.00	88.84	149.350	7,025.48	-5,169.71	-654.31	14,449,391.069	1,740,500.124	39.787052030	-80.643728759	
15,066.00	88.88	148.910	7,027.35	-5,250.38	-606.09	14,449,310.402	1,740,548.345	39.786829972	-80.643558252	
15,161.00	89.05	150.490	7,029.06	-5,332.39	-558.17	14,449,228.395	1,740,596.265	39.786604238	-80.643388833	
15,256.00	88.88	150.230	7,030.78	-5,414.94	-511.19	14,449,145.840	1,740,643.240	39.786377007	-80.643222792	
15,349.00	89.32	150.140	7,032.24	-5,495.62	-464.96	14,449,065.160	1,740,689.473	39.786154935	-80.643059361	
15,444.00	89.67	149.790	7,033.08	-5,577.86	-417.41	14,448,982.920	1,740,737.022	39.785928564	-80.642891275	
15,537.00	89.67	149.260	7,033.61	-5,658.01	-370.25	14,448,902.770	1,740,784.187	39.785707935	-80.642724523	
15,632.00	90.02	148.650	7,033.87	-5,739.41	-321.25	14,448,821.378	1,740,833.179	39.785483877	-80.642551288	
15,726.00	90.20	151.720	7,033.69	-5,820.95	-274.52	14,448,739.831	1,740,879.910	39.785259415	-80.642386103	
15,821.00	88.79	151.550	7,034.53	-5,904.54	-229.39	14,448,656.242	1,740,925.040	39.785029365	-80.642226648	
15,915.00	89.41	151.810	7,036.00	-5,987.28	-184.81	14,448,573.504	1,740,969.627	39.784801656	-80.642069113	
16,010.00	89.45	149.970	7,036.95	-6,070.27	-138.59	14,448,490.511	1,741,015.839	39.784573231	-80.641905800	
16,104.00	89.85	149.700	7,037.52	-6,151.54	-91.36	14,448,409.242	1,741,063.072	39.784349529	-80.641738829	

10/27/2023

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Fitzgerald 04 HM (slot S)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
Site:	Fitzgerald	MD Reference:	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
Well:	Fitzgerald 04 HM (slot S)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Nov1522LT

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
16,198.00	89.45	150.140	7,038.10	-6,232.88	-44.25	14,448,327.904	1,741,110.185	39.784125635	-80.641572290
16,291.00	90.77	149.440	7,037.92	-6,313.25	2.55	14,448,247.537	1,741,156.978	39.783904414	-80.641406873
16,385.00	91.60	149.350	7,035.98	-6,394.14	50.39	14,448,166.650	1,741,204.824	39.783681751	-80.641237718
16,480.00	90.81	148.820	7,033.98	-6,475.62	99.19	14,448,085.165	1,741,253.621	39.783457439	-80.641065190
16,574.00	91.47	148.740	7,032.11	-6,555.99	147.90	14,448,004.795	1,741,302.333	39.783236185	-80.640892945
16,668.00	90.81	150.140	7,030.24	-6,636.92	195.68	14,447,923.870	1,741,350.116	39.783013420	-80.640724021
16,763.00	88.40	149.880	7,030.89	-6,719.19	243.16	14,447,841.598	1,741,397.596	39.782786957	-80.640556190
16,857.00	87.65	149.700	7,034.13	-6,800.37	290.43	14,447,760.413	1,741,444.866	39.782563483	-80.640389097
16,952.00	88.31	149.440	7,037.48	-6,882.24	338.52	14,447,678.551	1,741,492.952	39.782338139	-80.640219109
17,046.00	87.74	149.700	7,040.72	-6,963.24	386.10	14,447,597.548	1,741,540.533	39.782115161	-80.640050906
17,113.00	88.04	150.140	7,043.19	-7,021.18	419.66	14,447,539.611	1,741,574.091	39.781955681	-80.639932288
Survey @ 17113.00 MD 7043.19 TVD									
17,171.00	88.04	150.140	7,045.17	-7,071.45	448.52	14,447,489.341	1,741,602.951	39.781817307	-80.639830283
Survey proj. to 17171.00 MD 7045.17 TVD									

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
185.09	185.09	0.00	0.01	MWD surveys
17,113.00	7,043.19	-7,021.18	419.66	Survey @ 17113.00 MD 7043.19 TVD
17,171.00	7,045.17	-7,071.45	448.52	Survey proj. to 17171.00 MD 7045.17 TVD