



Well: Fitzgerald 06 HM (slot E)
 Site: Fitzgerald
 Project: Marshall County, West Virginia NAD83 UTM 1
 Design: rev7
 Rig: Nabors X08



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

Magnetic Field
 Strength: 51610.2nT
 Dip Angle: 66.41°
 Date: 10/10/2022
 Model: IGRF2022

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 @ 1326.00ft (Nabors X08)

Northing: 14454584.951
 Easting: 1741154.237
 Latitude: 39.801308490
 Longitude: -80.641326250

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

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VFace	Annotation
1	3075.09	43.14	305.130	2877.26	421.38	-576.41	0.00	0.00	-556.15	Survey @ 3075.09 MD 2877.26 TVD
2	3175.09	43.14	305.130	2950.23	460.73	-632.34	0.00	0.00	-608.63	KOP Begin 2°/100' build/turn
3	3289.09	41.12	306.707	3034.77	505.57	-694.27	2.00	152.93	-667.96	Begin 41.12° tangent
4	7081.12	41.12	306.707	5891.42	1996.19	-2693.55	0.00	0.00	-2625.04	Begin 8°/100' build/turn
5	8207.33	55.00	163.076	6843.35	1715.98	-2900.72	8.00	-150.94	-2407.97	Begin 10°/100' build/turn
6	8569.20	89.00	149.777	6954.00	1407.54	-2761.87	10.00	-22.93	-2074.11	Begin 89.00° lateral
7	12887.75	89.00	149.777	7029.49	-2323.44	-588.41	0.00	0.00	2092.13	Begin 2°/100' turn
8	13124.58	89.00	145.040	7033.64	-2522.89	-460.90	2.00	-90.07	2317.78	Begin 89.00° lateral
9	16340.05	89.00	145.040	7090.00	-5157.73	1381.29	0.00	0.00	5339.49	PBHL/TD 16340.05 MD 7090.00 TVD

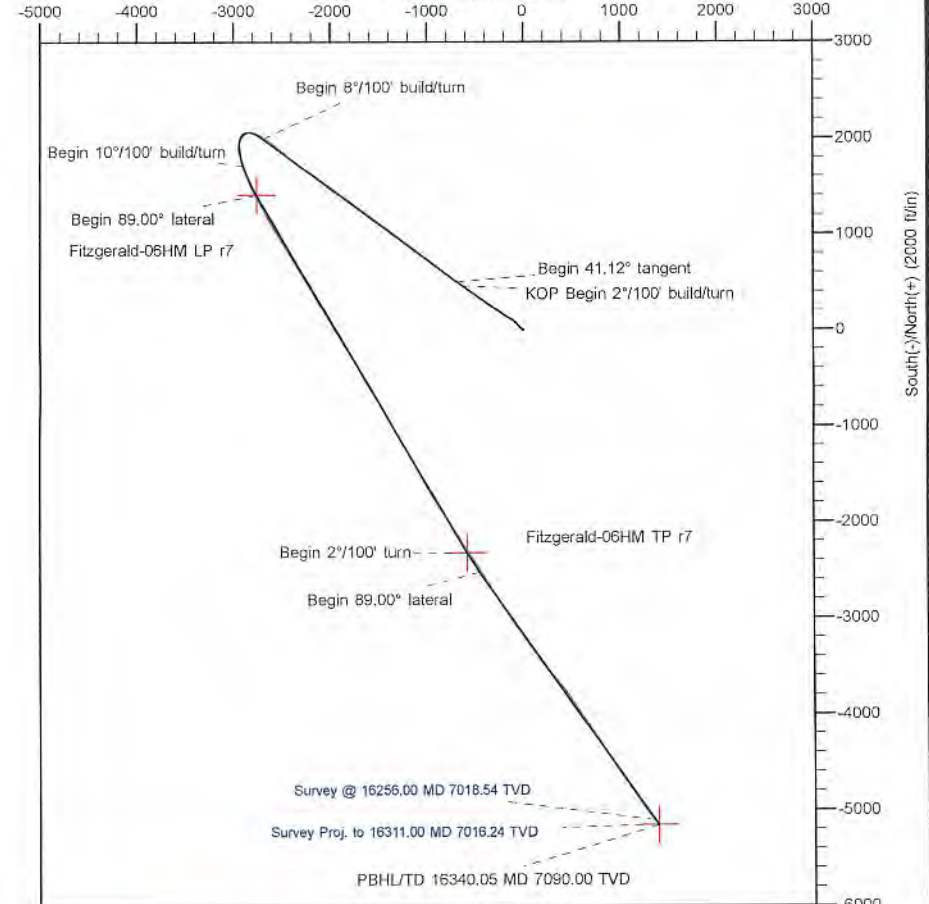
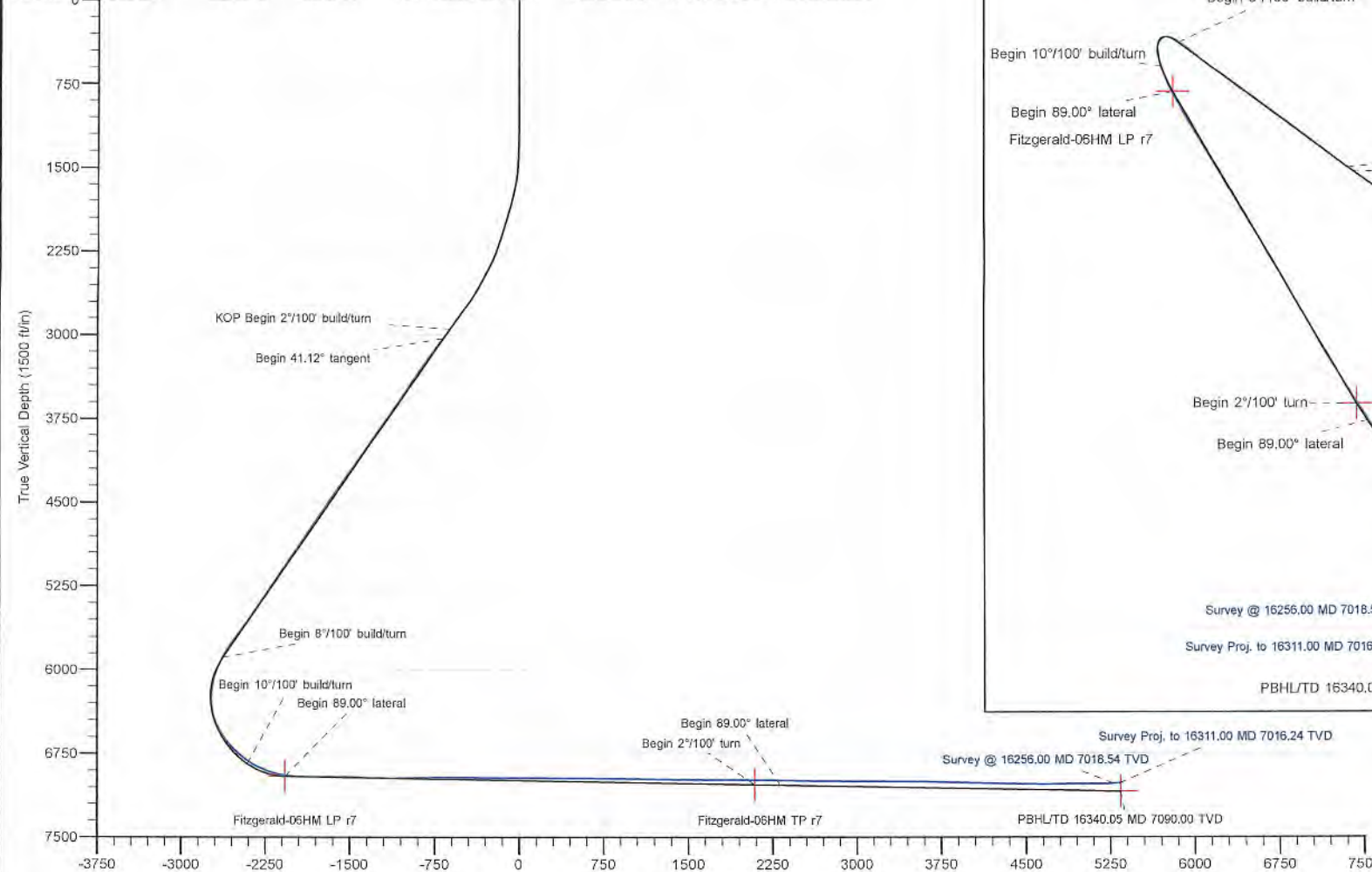
DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
Fitzgerald-06HM LP r7	6954.00	1407.58	-2761.84	4455992.526	1738392.399	39.805204000	-80.651140000
Fitzgerald-06HM TP r7	7029.49	-2323.44	-588.41	4452261.514	1740565.828	39.794934240	-80.643454180
Fitzgerald-06HM BHL r7	7090.00	-5157.73	1381.29	4449427.227	1742535.528	39.787128660	-80.636482660

ANNOTATIONS

MD	Inc	Azi	TVD	+N/-S	+E/-W	VFace	Departure	Annotation
163.09	0.35	119.390	163.09	-0.21	0.38	0.30	0.43	MWD surveys
16256.00	92.40	143.990	7018.54	-5107.11	1340.13	5279.95	11967.86	Survey @ 16256.00 MD 7018.54 TVD
16311.00	92.40	143.990	7016.24	-5151.56	1372.44	5331.24	12022.81	Survey Proj. to 16311.00 MD 7016.24 TVD

West(-)/East(+) (2000 ft/in)





Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Fitzgerald 06 HM (slot E)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=1292.91+33 @ 1326.00ft (Nabors X08)
Site:	Fitzgerald	MD Reference:	RKB=1292.91+33 @ 1326.00ft (Nabors X08)
Well:	Fitzgerald 06 HM (slot E)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

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 06 HM (slot E)					
Well Position	+N/-S	0.00 ft	Northing:	14,454,584.951 usft	Latitude:	39.801308490
	+E/-W	0.00 ft	Easting:	1,741,154.237 usft	Longitude:	-80.641326250
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	10/10/2022	-8.71	66.41	51,610.19375860

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	165.010	

Survey Program	Date	11/2/2022			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
21.09	987.09	MWD surf (Original Hole)	MWD	MWD - Standard	
987.09	3,075.09	MWD int (Original Hole)	MWD	MWD - Standard	
3,177.00	16,256.00	MWD (Original Hole)	MWD	MWD - Standard	
16,311.00	16,311.00	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	14,454,584.951	1,741,154.237	39.801308490	-80.641326250	
21.09	0.00	0.000	21.09	0.00	0.00	14,454,584.951	1,741,154.237	39.801308490	-80.641326250	
163.09	0.35	119.390	163.09	-0.21	0.38	14,454,584.738	1,741,154.615	39.801307901	-80.641324907	
MWD surveys										
207.09	0.22	74.920	207.09	-0.26	0.58	14,454,584.694	1,741,154.814	39.801307778	-80.641324201	
252.09	0.26	168.780	252.09	-0.33	0.68	14,454,584.617	1,741,154.917	39.801307564	-80.641323834	
296.09	0.13	38.270	296.09	-0.39	0.73	14,454,584.558	1,741,154.967	39.801307402	-80.641323656	
340.09	0.04	315.390	340.09	-0.34	0.75	14,454,584.608	1,741,154.988	39.801307539	-80.641323583	



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Fitzgerald 06 HM (slot E)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=1292.91+33 @ 1326.00ft (Nabors X08)
Site:	Fitzgerald	MD Reference:	RKB=1292.91+33 @ 1326.00ft (Nabors X08)
Well:	Fitzgerald 06 HM (slot E)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
384.09	0.22	202.360	384.09	-0.41	0.71	14,454,584.541	1,741,154.945	39.801307355	-80.641323737
428.09	0.04	91.790	428.09	-0.49	0.69	14,454,584.462	1,741,154.928	39.801307139	-80.641323798
473.09	0.13	223.980	473.09	-0.53	0.67	14,454,584.425	1,741,154.908	39.801307037	-80.641323869
517.09	0.09	167.910	517.09	-0.60	0.64	14,454,584.355	1,741,154.881	39.801306846	-80.641323967
561.09	0.04	67.100	561.09	-0.62	0.66	14,454,584.328	1,741,154.902	39.801306770	-80.641323892
606.09	0.04	151.910	606.09	-0.63	0.69	14,454,584.320	1,741,154.924	39.801306748	-80.641323814
650.09	0.26	281.370	650.09	-0.63	0.60	14,454,584.326	1,741,154.833	39.801306766	-80.641324136
694.09	0.26	194.630	694.09	-0.70	0.47	14,454,584.249	1,741,154.710	39.801306556	-80.641324576
738.09	0.01	10.410	738.09	-0.79	0.45	14,454,584.156	1,741,154.686	39.801306301	-80.641324664
782.09	0.31	261.770	782.09	-0.81	0.33	14,454,584.143	1,741,154.569	39.801306266	-80.641325082
827.09	0.13	210.090	827.09	-0.87	0.19	14,454,584.081	1,741,154.422	39.801306099	-80.641325603
871.09	0.18	222.930	871.09	-0.96	0.11	14,454,583.988	1,741,154.350	39.801305842	-80.641325861
915.09	0.18	219.940	915.09	-1.07	0.02	14,454,583.884	1,741,154.259	39.801305559	-80.641326188
959.09	0.35	286.470	959.09	-1.08	-0.15	14,454,583.869	1,741,154.086	39.801305520	-80.641326805
987.09	0.31	246.660	987.09	-1.09	-0.30	14,454,583.863	1,741,153.934	39.801305505	-80.641327344
1,048.09	0.13	328.570	1,048.09	-1.09	-0.49	14,454,583.857	1,741,153.747	39.801305490	-80.641328012
1,092.09	0.31	316.350	1,092.08	-0.97	-0.60	14,454,583.986	1,741,153.638	39.801305845	-80.641328396
1,136.09	0.31	313.280	1,136.08	-0.80	-0.77	14,454,584.153	1,741,153.470	39.801306307	-80.641328994
1,212.09	0.46	275.240	1,212.08	-0.63	-1.22	14,454,584.322	1,741,153.016	39.801306776	-80.641330607
1,257.09	0.52	272.160	1,257.08	-0.60	-1.61	14,454,584.346	1,741,152.632	39.801306846	-80.641331973
1,301.09	0.99	284.630	1,301.08	-0.50	-2.17	14,454,584.450	1,741,152.065	39.801307137	-80.641333992
1,345.09	1.78	299.840	1,345.06	-0.07	-3.13	14,454,584.886	1,741,151.104	39.801308345	-80.641337405
1,389.09	2.85	300.580	1,389.03	0.83	-4.67	14,454,585.783	1,741,149.570	39.801310824	-80.641342856
1,433.09	3.97	300.230	1,432.95	2.15	-6.93	14,454,587.106	1,741,147.312	39.801314483	-80.641350876
1,478.09	5.30	302.890	1,477.80	4.07	-10.02	14,454,589.019	1,741,144.221	39.801319771	-80.641361855
1,522.09	6.92	306.970	1,521.55	6.77	-13.84	14,454,591.717	1,741,140.396	39.801327222	-80.641375433
1,566.09	8.26	309.720	1,565.16	10.38	-18.39	14,454,595.331	1,741,135.847	39.801337197	-80.641391578
1,610.09	9.62	311.760	1,608.63	14.85	-23.56	14,454,599.799	1,741,130.673	39.801349525	-80.641409935
1,655.09	11.10	314.210	1,652.89	20.37	-29.47	14,454,605.324	1,741,124.763	39.801364763	-80.641430898
1,699.09	12.74	316.170	1,695.94	26.83	-35.87	14,454,611.778	1,741,118.367	39.801382557	-80.641453580
1,743.09	14.33	317.840	1,738.72	34.36	-42.89	14,454,619.315	1,741,111.352	39.801403332	-80.641478449
1,788.09	15.54	318.690	1,782.20	43.02	-50.60	14,454,627.971	1,741,103.635	39.801427189	-80.641505803
1,832.09	16.56	318.730	1,824.48	52.16	-58.63	14,454,637.112	1,741,095.607	39.801452379	-80.641534252
1,876.09	17.85	318.150	1,866.51	61.90	-67.27	14,454,646.848	1,741,086.972	39.801479213	-80.641564859
1,920.09	19.05	315.410	1,908.25	72.04	-76.81	14,454,656.988	1,741,077.429	39.801507165	-80.641598693
1,965.09	20.24	311.940	1,950.63	82.47	-87.76	14,454,667.424	1,741,066.480	39.801535944	-80.641637527
2,009.09	21.18	308.220	1,991.79	92.48	-99.66	14,454,677.429	1,741,054.573	39.801563552	-80.641679778
2,053.09	22.22	304.420	2,032.67	102.10	-112.77	14,454,687.050	1,741,041.464	39.801590117	-80.641726313
2,097.09	22.80	301.960	2,073.32	111.31	-126.87	14,454,696.266	1,741,027.368	39.801615581	-80.641776372
2,141.09	23.75	301.150	2,113.74	120.41	-141.69	14,454,705.362	1,741,012.551	39.801640724	-80.641828994
2,185.09	24.62	301.310	2,153.88	129.76	-157.10	14,454,714.708	1,740,997.138	39.801666561	-80.641883740
2,229.09	25.85	302.330	2,193.68	139.65	-173.04	14,454,724.602	1,740,981.201	39.801693905	-80.641940340
2,273.09	26.68	302.330	2,233.13	150.06	-189.49	14,454,735.014	1,740,964.749	39.801722682	-80.641998769
2,317.09	27.92	303.340	2,272.23	161.01	-206.44	14,454,745.959	1,740,947.795	39.801752925	-80.642058975
2,362.09	29.89	303.970	2,311.63	173.07	-224.54	14,454,758.016	1,740,929.693	39.801786234	-80.642123255
2,406.09	31.32	305.490	2,349.50	185.83	-242.95	14,454,770.782	1,740,911.288	39.801821495	-80.642188603
2,450.09	32.19	305.980	2,386.91	199.36	-261.75	14,454,784.307	1,740,892.492	39.801858844	-80.642255332
2,494.09	33.40	305.740	2,423.90	213.32	-281.06	14,454,798.267	1,740,873.178	39.801897393	-80.642323902
2,538.09	33.63	305.320	2,460.58	227.43	-300.83	14,454,812.385	1,740,853.406	39.801936382	-80.642394096
2,582.09	33.65	304.770	2,497.21	241.43	-320.79	14,454,826.381	1,740,833.451	39.801975038	-80.642464947
2,626.09	33.77	304.780	2,533.81	255.36	-340.85	14,454,840.309	1,740,813.393	39.802013507	-80.642536165
2,672.09	34.34	304.930	2,571.92	270.08	-361.98	14,454,855.031	1,740,792.255	39.802054168	-80.642611216
2,716.09	36.47	304.890	2,607.79	284.67	-382.89	14,454,869.618	1,740,771.352	39.802094458	-80.642685434
2,761.09	39.43	304.210	2,643.27	300.36	-405.68	14,454,885.306	1,740,748.558	39.802137791	-80.642766355



Survey Report - Geographic



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Site:	Fitzgerald	MD Reference:	RKB=1292.91+33 @ 1326.00ft (Nabors X08)
Well:	Fitzgerald 06 HM (slot E)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
2,805.09	40.72	303.700	2,676.93	316.18	-429.18	14,454,901.126	1,740,725.062	39.802181493	-80.642849799
2,849.09	40.92	304.640	2,710.23	332.33	-452.97	14,454,917.280	1,740,701.266	39.802226117	-80.642934295
2,893.09	41.60	305.870	2,743.31	349.08	-476.67	14,454,934.030	1,740,677.573	39.802272376	-80.643018414
2,937.09	41.76	306.340	2,776.17	366.32	-500.30	14,454,951.271	1,740,653.934	39.802319983	-80.643102334
2,982.09	42.99	306.110	2,809.41	384.24	-524.77	14,454,969.194	1,740,629.468	39.802369470	-80.643189192
3,024.09	43.24	305.870	2,840.07	401.11	-548.00	14,454,986.062	1,740,606.241	39.802416049	-80.643271649
3,075.09	43.14	305.130	2,877.26	421.38	-576.41	14,455,006.332	1,740,577.825	39.802472024	-80.643372537
3,177.00	43.21	303.420	2,951.58	460.65	-634.03	14,455,045.597	1,740,520.208	39.802580488	-80.643577123
3,271.00	43.52	307.030	3,019.93	497.87	-686.73	14,455,082.818	1,740,467.504	39.802683280	-80.643764248
3,365.00	43.25	307.380	3,088.24	536.91	-738.16	14,455,121.860	1,740,416.077	39.802791060	-80.643946801
3,459.00	43.16	306.590	3,156.76	575.62	-789.57	14,455,160.575	1,740,364.673	39.802897942	-80.644129276
3,554.00	42.29	306.060	3,226.55	613.81	-841.49	14,455,198.757	1,740,312.745	39.803003367	-80.644313623
3,648.00	40.04	307.990	3,297.31	651.04	-890.90	14,455,235.990	1,740,263.341	39.803106157	-80.644489000
3,742.00	38.99	307.030	3,369.83	687.46	-938.34	14,455,272.412	1,740,215.902	39.803206696	-80.644657392
3,836.00	40.04	307.290	3,442.34	723.59	-986.00	14,455,308.540	1,740,168.238	39.803306433	-80.644826590
3,930.00	41.19	308.080	3,513.70	761.00	-1,034.42	14,455,345.950	1,740,119.817	39.803409697	-80.644998466
4,025.00	40.57	307.640	3,585.53	799.16	-1,083.51	14,455,384.110	1,740,070.730	39.803515028	-80.645172701
4,120.00	41.98	306.590	3,656.92	836.97	-1,133.49	14,455,421.917	1,740,020.754	39.803619398	-80.645350108
4,213.00	41.05	306.150	3,726.56	873.52	-1,183.12	14,455,458.472	1,739,971.122	39.803720326	-80.645526310
4,308.00	41.23	306.760	3,798.10	910.66	-1,233.39	14,455,495.609	1,739,920.852	39.803822860	-80.645704774
4,403.00	40.26	306.060	3,870.08	947.47	-1,283.29	14,455,532.415	1,739,870.954	39.803924481	-80.645881920
4,497.00	41.01	307.470	3,941.41	984.11	-1,332.32	14,455,569.058	1,739,821.921	39.804025642	-80.646055991
4,592.00	39.82	306.150	4,013.74	1,021.02	-1,381.62	14,455,605.965	1,739,772.618	39.804127533	-80.646231015
4,686.00	41.89	307.290	4,084.84	1,057.79	-1,430.90	14,455,642.737	1,739,723.342	39.804229052	-80.646405948
4,780.00	41.10	306.320	4,155.25	1,095.10	-1,480.76	14,455,680.050	1,739,673.480	39.804332065	-80.646582961
4,874.00	43.16	308.170	4,224.96	1,133.28	-1,530.94	14,455,718.224	1,739,623.303	39.804437443	-80.646761082
4,968.00	42.37	307.030	4,293.97	1,172.22	-1,581.50	14,455,757.169	1,739,572.740	39.804544942	-80.646940569
5,063.00	40.88	304.830	4,364.98	1,209.26	-1,632.58	14,455,794.207	1,739,521.661	39.804647210	-80.647121919
5,157.00	40.48	306.940	4,436.27	1,245.17	-1,682.22	14,455,830.114	1,739,472.022	39.804746357	-80.647298159
5,251.00	42.20	307.730	4,506.85	1,282.82	-1,731.58	14,455,867.773	1,739,422.862	39.804850312	-80.647473383
5,346.00	41.45	306.500	4,577.64	1,321.05	-1,782.09	14,455,906.002	1,739,372.149	39.804955845	-80.647652702
5,441.00	40.00	304.130	4,649.64	1,356.89	-1,832.65	14,455,941.841	1,739,321.594	39.805054812	-80.647832208
5,535.00	41.23	305.880	4,720.99	1,392.00	-1,882.76	14,455,976.949	1,739,271.484	39.805151768	-80.648010138
5,630.00	40.31	304.740	4,792.94	1,427.86	-1,933.38	14,456,012.809	1,739,220.865	39.805250796	-80.648189871
5,724.00	41.63	307.550	4,863.92	1,464.22	-1,983.12	14,456,049.170	1,739,171.119	39.805351187	-80.648366489
5,818.00	40.48	306.410	4,934.80	1,501.36	-2,032.43	14,456,086.311	1,739,121.807	39.805453717	-80.648541551
5,912.00	41.58	307.290	5,005.71	1,538.37	-2,081.81	14,456,123.320	1,739,072.434	39.805555886	-80.648716833
6,006.00	40.57	306.060	5,076.58	1,575.26	-2,131.34	14,456,160.213	1,739,022.905	39.805657735	-80.648892672
6,100.00	41.54	307.640	5,147.46	1,612.29	-2,180.73	14,456,197.242	1,738,973.511	39.805759958	-80.649068029
6,194.00	40.22	306.590	5,218.53	1,649.42	-2,229.78	14,456,234.368	1,738,924.460	39.805862444	-80.649242164
6,289.00	41.10	307.470	5,290.60	1,686.70	-2,279.19	14,456,271.648	1,738,875.049	39.805965355	-80.649417580
6,384.00	40.84	306.590	5,362.33	1,724.21	-2,328.92	14,456,309.160	1,738,825.325	39.806068907	-80.649594106
6,478.00	41.32	307.730	5,433.19	1,761.52	-2,378.14	14,456,346.472	1,738,776.102	39.806171903	-80.649768852
6,572.00	40.18	306.850	5,504.40	1,798.70	-2,426.95	14,456,383.649	1,738,727.291	39.806274525	-80.649942134
6,666.00	40.97	308.610	5,575.80	1,836.12	-2,475.30	14,456,421.067	1,738,678.943	39.806377801	-80.650113764
6,761.00	43.16	308.870	5,646.32	1,875.95	-2,524.94	14,456,460.896	1,738,629.304	39.806487716	-80.650289960
6,855.00	42.24	308.080	5,715.40	1,915.61	-2,574.84	14,456,500.560	1,738,579.401	39.806597176	-80.650467095
6,949.00	40.35	306.500	5,786.02	1,953.20	-2,624.18	14,456,538.152	1,738,530.064	39.806700941	-80.650642248
7,021.00	39.12	305.530	5,841.39	1,980.27	-2,661.40	14,456,565.217	1,738,492.840	39.806775668	-80.650774413
7,043.00	38.86	305.180	5,858.49	1,988.28	-2,672.69	14,456,573.227	1,738,481.551	39.806797785	-80.650814499
7,090.00	36.66	302.720	5,895.65	2,004.36	-2,696.55	14,456,589.309	1,738,457.691	39.806842206	-80.650899234
7,138.00	33.85	299.730	5,934.84	2,018.74	-2,720.22	14,456,603.688	1,738,434.020	39.806881948	-80.650983320
7,185.00	31.91	296.130	5,974.32	2,030.71	-2,742.75	14,456,615.652	1,738,411.496	39.806915046	-80.651063354
7,232.00	28.92	293.760	6,014.85	2,040.76	-2,764.31	14,456,625.704	1,738,389.937	39.806942882	-80.651139979

09/22/2023



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Fitzgerald 06 HM (slot E)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=1292.91+33 @ 1326.00ft (Nabors X08)
Site:	Fitzgerald	MD Reference:	RKB=1292.91+33 @ 1326.00ft (Nabors X08)
Well:	Fitzgerald 06 HM (slot E)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
7,279.00	25.54	290.850	6,056.63	2,048.95	-2,784.18	14,456,633.892	1,738,370.061	39.806965580	-80.651210638
7,327.00	22.42	286.900	6,100.49	2,055.29	-2,802.62	14,456,640.238	1,738,351.628	39.806983205	-80.651276187
7,374.00	19.56	279.250	6,144.37	2,059.16	-2,818.96	14,456,644.110	1,738,335.280	39.806994012	-80.651334342
7,421.00	18.77	270.200	6,188.78	2,060.45	-2,834.29	14,456,645.401	1,738,319.950	39.806997722	-80.651388912
7,468.00	19.12	261.760	6,233.24	2,059.38	-2,849.48	14,456,644.324	1,738,304.767	39.806994927	-80.651442987
7,516.00	18.95	252.800	6,278.62	2,055.94	-2,864.70	14,456,640.892	1,738,289.539	39.806985665	-80.651497259
7,563.00	20.18	241.370	6,322.93	2,049.80	-2,879.12	14,456,634.748	1,738,275.127	39.806968947	-80.651548659
7,610.00	21.14	228.980	6,366.92	2,040.35	-2,892.63	14,456,625.297	1,738,261.610	39.806943135	-80.651596920
7,657.00	23.82	217.550	6,410.37	2,027.25	-2,904.82	14,456,612.201	1,738,249.424	39.806907302	-80.651640495
7,705.00	25.80	212.460	6,453.94	2,010.75	-2,916.34	14,456,595.699	1,738,237.908	39.806862107	-80.651681728
7,728.00	27.12	210.170	6,474.53	2,002.00	-2,921.66	14,456,586.943	1,738,232.586	39.806838118	-80.651700797
7,775.00	30.64	204.190	6,515.69	1,981.80	-2,931.95	14,456,566.746	1,738,222.290	39.806782762	-80.651737741
7,821.00	33.41	193.030	6,554.72	1,958.74	-2,939.62	14,456,543.691	1,738,214.623	39.806719528	-80.651765359
7,868.00	36.35	184.950	6,593.29	1,932.24	-2,943.74	14,456,517.187	1,738,210.500	39.806646787	-80.651780405
7,915.00	39.30	175.630	6,630.45	1,903.49	-2,943.81	14,456,488.439	1,738,210.433	39.806567839	-80.651781045
7,962.00	41.63	170.090	6,666.21	1,873.26	-2,939.99	14,456,458.205	1,738,214.255	39.806484769	-80.651767852
8,010.00	44.48	165.960	6,701.29	1,841.23	-2,933.16	14,456,426.173	1,738,221.081	39.806396728	-80.651743990
8,057.00	46.73	165.520	6,734.17	1,808.68	-2,924.89	14,456,393.628	1,738,229.356	39.806307262	-80.651714980
8,103.00	49.23	165.000	6,764.96	1,775.63	-2,916.19	14,456,360.582	1,738,238.053	39.806216418	-80.651684470
8,150.00	52.35	163.590	6,794.67	1,740.59	-2,906.33	14,456,325.533	1,738,247.918	39.806120060	-80.651649828
8,198.00	55.78	162.530	6,822.83	1,703.42	-2,895.00	14,456,288.363	1,738,259.248	39.806017862	-80.651610003
8,245.00	60.09	161.570	6,847.78	1,665.54	-2,882.72	14,456,250.484	1,738,271.527	39.805913706	-80.651566805
8,292.00	64.18	159.900	6,869.74	1,626.33	-2,869.00	14,456,211.275	1,738,285.243	39.805805881	-80.651518510
8,339.00	66.77	158.320	6,889.25	1,586.39	-2,853.75	14,456,171.333	1,738,300.494	39.805696029	-80.651464761
8,386.00	69.58	157.000	6,906.72	1,546.04	-2,837.16	14,456,130.984	1,738,317.081	39.805585043	-80.651406262
8,433.00	73.14	154.710	6,921.75	1,505.41	-2,818.94	14,456,090.359	1,738,335.302	39.805473283	-80.651341947
8,481.00	76.04	153.750	6,934.50	1,463.74	-2,798.82	14,456,048.693	1,738,355.420	39.805358643	-80.651270892
8,528.00	79.87	153.480	6,944.31	1,422.58	-2,778.40	14,456,007.524	1,738,375.844	39.805245365	-80.651198742
8,575.00	84.04	152.950	6,950.88	1,381.04	-2,757.43	14,456,965.990	1,738,396.812	39.805131078	-80.651124659
8,622.00	88.18	151.370	6,954.07	1,339.59	-2,735.54	14,456,924.537	1,738,418.706	39.805017003	-80.651047276
8,670.00	87.69	149.700	6,955.80	1,297.83	-2,711.94	14,456,882.774	1,738,442.301	39.804902061	-80.650963846
8,764.00	90.02	150.410	6,957.68	1,216.40	-2,665.03	14,456,801.345	1,738,489.209	39.804677935	-80.650797954
8,858.00	89.27	149.970	6,958.26	1,134.84	-2,618.31	14,456,719.786	1,738,535.938	39.804453453	-80.650632708
8,952.00	89.76	149.880	6,959.06	1,053.50	-2,571.20	14,456,638.444	1,738,583.042	39.804229565	-80.650466119
9,047.00	89.05	149.880	6,960.04	971.33	-2,523.53	14,456,556.277	1,738,630.711	39.804003402	-80.650297533
9,141.00	88.40	149.180	6,962.13	890.33	-2,475.88	14,456,475.280	1,738,678.365	39.803780454	-80.650128987
9,235.00	89.32	148.560	6,964.00	809.88	-2,427.29	14,456,394.833	1,738,726.951	39.803559008	-80.649957115
9,329.00	87.96	148.740	6,966.23	729.63	-2,378.40	14,456,314.582	1,738,775.841	39.803338092	-80.649784159
9,424.00	88.57	149.090	6,969.11	648.31	-2,329.37	14,456,233.261	1,738,824.867	39.803114241	-80.649610733
9,518.00	90.33	147.590	6,970.01	568.31	-2,280.04	14,456,153.260	1,738,874.200	39.802894008	-80.649436199
9,613.00	89.98	149.700	6,969.76	487.19	-2,230.61	14,456,072.139	1,738,923.629	39.802670698	-80.649261339
9,707.00	89.14	149.610	6,970.48	406.07	-2,183.13	14,454,991.020	1,738,971.117	39.802447416	-80.649093393
9,801.00	90.77	149.350	6,970.55	325.10	-2,135.39	14,454,910.047	1,739,018.852	39.802224530	-80.648924564
9,895.00	92.09	149.610	6,968.21	244.15	-2,087.67	14,454,829.098	1,739,066.573	39.802001710	-80.648755787
9,989.00	90.29	149.440	6,966.25	163.15	-2,040.01	14,454,748.105	1,739,114.234	39.801778771	-80.648587225
10,083.00	89.10	149.530	6,966.75	82.18	-1,992.28	14,454,667.127	1,739,161.962	39.801555872	-80.648418424
10,178.00	89.41	149.700	6,967.99	0.23	-1,944.23	14,454,585.183	1,739,210.009	39.801330315	-80.648248501
10,272.00	89.98	149.260	6,968.49	-80.74	-1,896.50	14,454,504.208	1,739,257.745	39.801107424	-80.648079675
10,366.00	88.62	149.530	6,969.64	-161.64	-1,848.64	14,454,423.311	1,739,305.597	39.800884744	-80.647910435
10,460.00	89.67	149.610	6,971.04	-242.68	-1,801.04	14,454,342.270	1,739,353.201	39.800661672	-80.647742084
10,554.00	89.32	150.140	6,971.87	-323.98	-1,753.86	14,454,260.970	1,739,400.376	39.800437893	-80.647575261
10,648.00	90.11	150.580	6,972.34	-405.68	-1,707.38	14,454,179.272	1,739,446.862	39.800213028	-80.647410898
10,743.00	90.90	151.020	6,971.50	-488.60	-1,661.03	14,454,096.348	1,739,493.207	39.799984800	-80.647247060
10,837.00	89.93	149.090	6,970.82	-570.05	-1,614.12	14,454,014.904	1,739,540.125	39.799760627	-80.647081159



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Fitzgerald 06 HM (slot E)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=1292.91+33 @ 1326.00ft (Nabors X08)
Site:	Fitzgerald	MD Reference:	RKB=1292.91+33 @ 1326.00ft (Nabors X08)
Well:	Fitzgerald 06 HM (slot E)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
10,931.00	89.10	149.700	6,971.61	-650.95	-1,566.26	14,453,934.003	1,739,587.979	39.799537934	-80.646911917
11,026.00	89.54	149.440	6,972.74	-732.86	-1,518.15	14,453,852.095	1,739,636.092	39.799312475	-80.646741772
11,120.00	90.42	148.820	6,972.78	-813.54	-1,469.92	14,453,771.413	1,739,684.321	39.799090381	-80.646571194
11,215.00	89.32	148.910	6,972.99	-894.85	-1,420.80	14,453,690.100	1,739,733.441	39.798866541	-80.646397458
11,309.00	90.07	149.350	6,973.49	-975.53	-1,372.57	14,453,609.418	1,739,781.670	39.798644448	-80.646226882
11,403.00	89.23	149.880	6,974.07	-1,056.62	-1,325.03	14,453,528.332	1,739,829.215	39.798421250	-80.646058753
11,498.00	90.15	150.930	6,974.58	-1,139.22	-1,278.11	14,453,445.730	1,739,876.130	39.798193894	-80.645892885
11,592.00	88.97	150.140	6,975.30	-1,221.06	-1,231.87	14,453,363.891	1,739,922.365	39.797968648	-80.645729430
11,686.00	87.96	150.580	6,977.82	-1,302.73	-1,185.40	14,453,282.222	1,739,968.835	39.797743859	-80.645565136
11,780.00	88.62	150.320	6,980.62	-1,384.47	-1,139.07	14,453,200.486	1,740,015.173	39.797518889	-80.645401314
11,875.00	89.63	150.850	6,982.07	-1,467.21	-1,092.41	14,453,117.744	1,740,061.825	39.797291153	-80.645236394
11,970.00	88.66	150.050	6,983.49	-1,549.84	-1,045.57	14,453,035.112	1,740,108.671	39.797063716	-80.645070778
12,063.00	89.14	150.140	6,985.28	-1,630.44	-999.21	14,452,954.510	1,740,155.028	39.796841858	-80.644906875
12,157.00	89.80	150.580	6,986.15	-1,712.14	-952.73	14,452,872.815	1,740,201.513	39.796616996	-80.644742534
12,250.00	89.01	148.740	6,987.11	-1,792.39	-905.75	14,452,792.560	1,740,248.485	39.796396086	-80.644576440
12,345.00	89.80	148.740	6,988.10	-1,873.60	-856.46	14,452,711.357	1,740,297.780	39.796172546	-80.644402092
12,439.00	89.54	148.740	6,988.64	-1,953.95	-807.68	14,452,631.006	1,740,346.558	39.795951349	-80.644229573
12,534.00	90.11	148.300	6,988.93	-2,034.97	-758.07	14,452,549.989	1,740,396.166	39.795728315	-80.644054107
12,628.00	89.14	147.680	6,989.53	-2,112.97	-709.31	14,452,471.980	1,740,444.930	39.795513553	-80.643881605
12,721.00	89.76	147.240	6,990.45	-2,193.06	-658.21	14,452,391.898	1,740,496.027	39.795293070	-80.643700830
12,814.00	90.33	146.890	6,990.37	-2,271.11	-607.65	14,452,313.845	1,740,546.589	39.795078165	-80.643521929
12,909.00	90.68	148.560	6,989.53	-2,351.43	-556.92	14,452,233.529	1,740,597.314	39.794857044	-80.643342485
13,003.00	88.70	148.820	6,990.04	-2,431.73	-508.08	14,452,153.224	1,740,646.159	39.794635972	-80.643169730
13,096.00	88.48	147.860	6,992.33	-2,510.87	-459.28	14,452,074.089	1,740,694.957	39.794418116	-80.642997129
13,190.00	88.35	146.800	6,994.93	-2,589.96	-408.56	14,451,994.992	1,740,745.678	39.794200341	-80.642817684
13,285.00	88.66	146.980	6,997.41	-2,669.51	-356.68	14,451,915.445	1,740,797.554	39.793981318	-80.642634134
13,380.00	89.41	146.010	6,999.01	-2,748.71	-304.25	14,451,836.244	1,740,849.986	39.793763236	-80.642448599
13,474.00	90.29	145.920	6,999.26	-2,826.61	-251.64	14,451,758.347	1,740,902.597	39.793548738	-80.642262411
13,569.00	90.64	145.220	6,998.49	-2,904.96	-197.93	14,451,679.993	1,740,956.308	39.793332968	-80.642072316
13,664.00	89.54	145.660	6,998.34	-2,983.20	-144.04	14,451,601.759	1,741,010.197	39.793117527	-80.641881584
13,758.00	89.27	144.690	6,999.31	-3,060.36	-90.36	14,451,524.600	1,741,063.874	39.792905040	-80.641691594
13,852.00	90.02	144.600	6,999.90	-3,137.02	-35.97	14,451,447.937	1,741,118.265	39.792693908	-80.641499057
13,946.00	89.10	144.960	7,000.62	-3,213.81	18.24	14,451,371.148	1,741,172.474	39.792482430	-80.641307170
14,040.00	89.98	145.660	7,001.37	-3,291.10	71.73	14,451,293.861	1,741,225.970	39.792269593	-80.641117829
14,134.00	89.19	144.170	7,002.05	-3,368.01	125.76	14,451,216.946	1,741,279.997	39.792057770	-80.640926595
14,229.00	90.02	144.340	7,002.71	-3,445.11	181.26	14,451,139.844	1,741,335.492	39.791845419	-80.640730138
14,324.00	89.23	142.940	7,003.33	-3,521.61	237.57	14,451,063.344	1,741,391.810	39.791634711	-80.640530743
14,418.00	89.98	143.290	7,003.98	-3,596.80	293.99	14,450,986.161	1,741,448.228	39.791427619	-80.640330976
14,512.00	89.05	143.110	7,004.77	-3,672.06	350.30	14,450,912.896	1,741,504.534	39.791220302	-80.640131611
14,607.00	88.09	142.060	7,007.14	-3,747.49	408.00	14,450,837.468	1,741,562.234	39.791012520	-80.639927283
14,700.00	88.70	145.310	7,009.75	-3,822.39	463.05	14,450,762.570	1,741,617.281	39.790806226	-80.639732394
14,794.00	89.85	145.400	7,010.94	-3,899.71	516.48	14,450,685.245	1,741,670.714	39.790593282	-80.639543289
14,888.00	88.13	146.270	7,012.60	-3,977.48	569.26	14,450,607.483	1,741,723.492	39.790379145	-80.639356523
14,983.00	89.10	146.540	7,014.89	-4,056.58	621.81	14,450,528.376	1,741,776.041	39.790161315	-80.639170591
15,077.00	88.00	146.800	7,017.27	-4,135.10	673.44	14,450,449.863	1,741,827.673	39.789945130	-80.638987917
15,172.00	88.66	146.710	7,020.04	-4,214.51	725.50	14,450,370.446	1,741,879.731	39.789726454	-80.638803739
15,265.00	88.09	146.100	7,022.68	-4,291.95	776.93	14,450,293.012	1,741,931.169	39.789513231	-80.638621745
15,361.00	88.97	145.920	7,025.14	-4,371.52	830.58	14,450,213.442	1,741,984.819	39.789294119	-80.638431904
15,454.00	89.85	146.100	7,026.10	-4,448.62	882.57	14,450,136.337	1,742,036.807	39.789081795	-80.638247946
15,548.00	89.27	145.570	7,026.82	-4,526.40	935.36	14,450,058.563	1,742,089.593	39.788867621	-80.638061158
15,642.00	89.58	145.040	7,027.76	-4,603.68	988.86	14,449,981.281	1,742,143.096	39.788654792	-80.637871815
15,737.00	90.68	145.920	7,027.55	-4,681.95	1,042.70	14,449,903.010	1,742,196.930	39.788439244	-80.637681305
15,831.00	91.47	145.310	7,025.78	-4,759.51	1,095.77	14,449,825.450	1,742,250.007	39.788225656	-80.637493484
15,926.00	90.59	145.400	7,024.07	-4,837.65	1,149.77	14,449,747.308	1,742,304.004	39.788010458	-80.637302396



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Fitzgerald 06 HM (slot E)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=1292.91+33 @ 1326.00ft (Nabors X08)
Site:	Fitzgerald	MD Reference:	RKB=1292.91+33 @ 1326.00ft (Nabors X08)
Well:	Fitzgerald 06 HM (slot E)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
16,019.00	90.07	145.130	7,023.54	-4,914.08	1,202.76	14,449,670.883	1,742,356.992	39.787799987	-80.637114874
16,114.00	90.95	144.520	7,022.69	-4,991.73	1,257.48	14,449,593.235	1,742,411.716	39.787586137	-80.636921193
16,208.00	91.91	144.430	7,020.35	-5,068.20	1,312.08	14,449,516.756	1,742,466.318	39.787375501	-80.636727932
16,256.00	92.40	143.990	7,018.54	-5,107.11	1,340.13	14,449,477.848	1,742,494.369	39.787268337	-80.636628641
Survey @ 16256.00 MD 7018.54 TVD									
16,311.00	92.40	143.990	7,016.24	-5,151.56	1,372.44	14,449,433.397	1,742,526.677	39.787145904	-80.636514278
Survey Proj. to 16311.00 MD 7016.24 TVD									

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
163.09	163.09	-0.21	0.38	MWD surveys
16,256.00	7,018.54	-5,107.11	1,340.13	Survey @ 16256.00 MD 7018.54 TVD
16,311.00	7,016.24	-5,151.56	1,372.44	Survey Proj. to 16311.00 MD 7016.24 TVD

Checked By: _____ Approved By: _____ Date: _____