



**Well:** Fitzgerald 03 HM (slot R)  
**Site:** Fitzgerald  
**Project:** Marshall County, West Virginia NAD83 UTM 17N  
**Design:** rev6  
**Rig:** Nabors X08

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	Easting	Latitude	Longitude
14454554.905	1741164.895	39.801225860	-80.641288730

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: 51591.8nT  
 Dip Angle: 66.39°  
 Date: 12/14/2022  
 Model: IGRF2020

DESIGN TARGET DETAILS

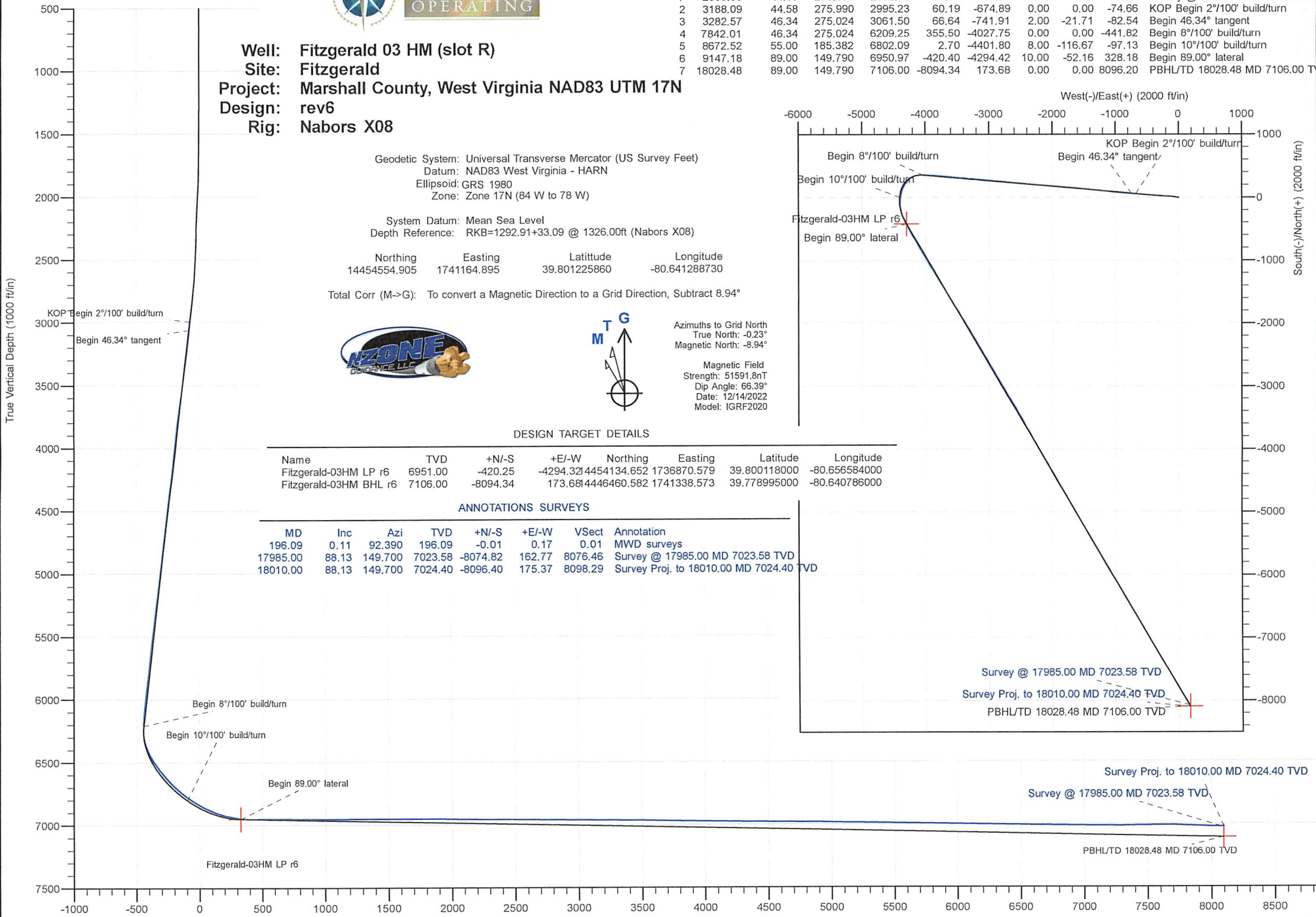
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
Fitzgerald-03HM LP r6	6951.00	-420.25	-4294.32	4454134.652	1736870.579	39.800118000	-80.656584000
Fitzgerald-03HM BHL r6	7106.00	-8094.34	173.68	4446460.582	1741338.573	39.778995000	-80.640786000

ANNOTATIONS SURVEYS

MD	Inc	Azi	TVD	+N/-S	+E/-W	V Sect	Annotation
196.09	0.11	92.390	196.09	-0.01	0.17	0.01	MWD surveys
17985.00	88.13	149.700	7023.58	-8074.82	162.77	8076.46	Survey @ 17985.00 MD 7023.58 TVD
18010.00	88.13	149.700	7024.40	-8096.40	175.37	8098.29	Survey Proj. to 18010.00 MD 7024.40 TVD

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	V Sect	Annotation
1	2988.09	44.58	275.990	2852.78	45.54	-535.27	0.00	0.00	-57.01	Survey @ 2988.09 MD 2852.78 TVD
2	3188.09	44.58	275.990	2995.23	60.19	-674.89	0.00	0.00	-74.66	KOP Begin 2°/100' build/turn
3	3282.57	46.34	275.024	3061.50	66.64	-741.91	2.00	-21.71	-82.54	Begin 46.34° tangent
4	7842.01	46.34	275.024	6209.25	355.50	-4027.75	0.00	0.00	-441.82	Begin 8°/100' build/turn
5	8672.52	55.00	185.382	6802.09	2.70	-4401.80	8.00	-116.67	-97.13	Begin 10°/100' build/turn
6	9147.18	89.00	149.790	6950.97	-420.40	-4294.42	10.00	-52.16	328.18	Begin 89.00° lateral
7	18028.48	89.00	149.790	7106.00	-8094.34	173.68	0.00	0.00	8096.20	PBHL/TD 18028.48 MD 7106.00 TVD



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Fitzgerald 03 HM (slot R)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>TVD Reference:</b>	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
<b>Site:</b>	Fitzgerald	<b>MD Reference:</b>	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
<b>Well:</b>	Fitzgerald 03 HM (slot R)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Decv0422v16

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

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

<b>Well</b>	Fitzgerald 03 HM (slot R)					
<b>Well Position</b>	<b>+N/-S</b>	0.00 ft	<b>Northing:</b>	14,454,554.905 usft	<b>Latitude:</b>	39.801225860
	<b>+E/-W</b>	0.00 ft	<b>Easting:</b>	1,741,164.896 usft	<b>Longitude:</b>	-80.641288730
<b>Position Uncertainty</b>		0.00 ft	<b>Wellhead Elevation:</b>	ft	<b>Ground Level:</b>	1,292.91 ft

<b>Wellbore</b>	Original Hole				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2020	12/14/2022	-8.71	66.39	51,591.83966227

<b>Design</b>	Surveys Original Hole				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.00
<b>Vertical Section:</b>		<b>Depth From (TVD) (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>
		0.00	0.00	0.00	178.770

<b>Survey Program</b>	<b>Date</b>	12/30/2022			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
21.09	1,171.09	MWD surf (Original Hole)	MWD	MWD - Standard	
1,216.09	2,988.09	MWD Int (Original Hole)	MWD	MWD - Standard	
3,091.00	17,985.00	MWD (Original Hole)	MWD	MWD - Standard	
18,010.00	18,010.00	Projection (Original Hole)	MWD	MWD - Standard	

<b>Survey</b>										
<b>Measured Depth (ft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Map Northing (usft)</b>	<b>Map Easting (usft)</b>	<b>Latitude</b>	<b>Longitude</b>	
0.00	0.00	0.000	0.00	0.00	0.00	14,454,554.905	1,741,164.896	39.801225860	-80.641288730	
21.09	0.00	0.000	21.09	0.00	0.00	14,454,554.905	1,741,164.896	39.801225860	-80.641288730	
196.09	0.11	92.390	196.09	-0.01	0.17	14,454,554.898	1,741,165.064	39.801225839	-80.641288132	
<b>MWD surveys</b>										
241.09	0.19	174.820	241.09	-0.08	0.22	14,454,554.822	1,741,165.113	39.801225629	-80.641287956	
285.09	0.18	334.720	285.09	-0.09	0.19	14,454,554.812	1,741,165.091	39.801225601	-80.641288037	
329.09	0.27	252.450	329.09	-0.06	0.07	14,454,554.843	1,741,164.962	39.801225689	-80.641288494	
373.09	0.21	268.450	373.09	-0.10	-0.11	14,454,554.810	1,741,164.783	39.801225599	-80.641289133	

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<b>Site:</b>	Fitzgerald	<b>MD Reference:</b>	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
<b>Well:</b>	Fitzgerald 03 HM (slot R)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Decv0422v16

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
417.09	0.28	245.280	417.09	-0.14	-0.29	14,454,554.763	1,741,164.604	39.801225471	-80.641289769	
462.09	0.09	204.540	462.09	-0.22	-0.41	14,454,554.685	1,741,164.490	39.801225258	-80.641290178	
506.09	0.36	272.240	506.09	-0.25	-0.56	14,454,554.659	1,741,164.337	39.801225188	-80.641290721	
550.09	0.34	241.270	550.09	-0.30	-0.81	14,454,554.601	1,741,164.085	39.801225033	-80.641291621	
595.09	0.65	250.330	595.09	-0.45	-1.17	14,454,554.451	1,741,163.727	39.801224625	-80.641292896	
639.09	0.51	242.510	639.08	-0.63	-1.58	14,454,554.277	1,741,163.319	39.801224151	-80.641294354	
683.09	0.54	257.320	683.08	-0.76	-1.95	14,454,554.141	1,741,162.943	39.801223782	-80.641295694	
727.09	0.46	224.250	727.08	-0.94	-2.28	14,454,553.969	1,741,162.617	39.801223313	-80.641296856	
771.09	0.42	219.900	771.08	-1.19	-2.51	14,454,553.719	1,741,162.390	39.801222628	-80.641297666	
816.09	0.51	216.650	816.08	-1.47	-2.73	14,454,553.431	1,741,162.165	39.801221842	-80.641298473	
860.09	0.50	264.540	860.08	-1.65	-3.04	14,454,553.256	1,741,161.857	39.801221363	-80.641299572	
904.09	0.46	255.050	904.07	-1.71	-3.40	14,454,553.192	1,741,161.495	39.801221192	-80.641300861	
948.09	0.32	226.000	948.07	-1.84	-3.66	14,454,553.061	1,741,161.236	39.801220835	-80.641301785	
980.09	0.57	236.650	980.07	-1.99	-3.86	14,454,552.912	1,741,161.039	39.801220427	-80.641302489	
1,037.09	0.35	272.160	1,037.07	-2.14	-4.27	14,454,552.762	1,741,160.628	39.801220021	-80.641303954	
1,081.09	0.45	270.130	1,081.07	-2.14	-4.57	14,454,552.768	1,741,160.321	39.801220040	-80.641305047	
1,126.09	0.58	255.320	1,126.07	-2.19	-4.97	14,454,552.711	1,741,159.924	39.801219887	-80.641306462	
1,171.09	0.45	246.970	1,171.07	-2.32	-5.35	14,454,552.584	1,741,159.541	39.801219543	-80.641307827	
1,216.09	0.04	262.080	1,216.07	-2.39	-5.53	14,454,552.512	1,741,159.363	39.801219349	-80.641308463	
1,260.09	0.38	357.890	1,260.06	-2.25	-5.55	14,454,552.656	1,741,159.342	39.801219744	-80.641308534	
1,304.09	0.41	359.720	1,304.06	-1.95	-5.56	14,454,552.959	1,741,159.336	39.801220576	-80.641308551	
1,349.09	0.28	60.590	1,349.06	-1.73	-5.46	14,454,553.174	1,741,159.431	39.801221166	-80.641308210	
1,393.09	0.32	21.270	1,393.06	-1.56	-5.33	14,454,553.342	1,741,159.570	39.801221624	-80.641307716	
1,437.09	0.48	12.490	1,437.06	-1.27	-5.24	14,454,553.636	1,741,159.654	39.801222431	-80.641307411	
1,482.09	0.42	11.480	1,482.06	-0.92	-5.17	14,454,553.982	1,741,159.728	39.801223380	-80.641307144	
1,526.09	0.80	330.160	1,526.06	-0.50	-5.29	14,454,554.406	1,741,159.607	39.801224547	-80.641307568	
1,570.09	1.87	287.350	1,570.05	-0.02	-6.13	14,454,554.887	1,741,158.769	39.801225876	-80.641305545	
1,614.09	3.34	273.120	1,614.00	0.27	-8.09	14,454,555.171	1,741,156.803	39.801226677	-80.641317538	
1,658.09	4.79	275.290	1,657.89	0.50	-11.20	14,454,555.410	1,741,153.694	39.801227368	-80.641328605	
1,703.09	6.83	276.570	1,702.65	0.98	-15.73	14,454,555.889	1,741,149.165	39.801228734	-80.641344725	
1,747.09	8.11	275.860	1,746.28	1.60	-21.42	14,454,556.505	1,741,143.478	39.801230489	-80.641364963	
1,792.09	8.61	277.130	1,790.80	2.34	-27.92	14,454,557.248	1,741,136.978	39.801232599	-80.641388095	
1,836.09	9.89	276.390	1,834.23	3.17	-34.94	14,454,558.077	1,741,129.954	39.801234954	-80.641413090	
1,880.09	10.86	278.400	1,877.51	4.20	-42.80	14,454,559.103	1,741,122.098	39.801237858	-80.641441046	
1,924.09	11.91	279.330	1,920.64	5.54	-51.38	14,454,560.445	1,741,113.517	39.801241637	-80.641471578	
1,969.09	12.95	281.220	1,964.59	7.27	-60.91	14,454,562.179	1,741,103.989	39.801246504	-80.641505478	
2,013.09	14.22	280.730	2,007.36	9.24	-71.05	14,454,564.144	1,741,093.843	39.801252013	-80.641541574	
2,057.09	15.62	281.370	2,049.87	11.41	-82.17	14,454,566.318	1,741,082.726	39.801258106	-80.641581126	
2,101.09	16.92	280.070	2,092.11	13.70	-94.28	14,454,568.606	1,741,070.613	39.801264521	-80.641624218	
2,146.09	18.40	278.010	2,134.99	15.84	-107.76	14,454,570.741	1,741,057.132	39.801270532	-80.641672186	
2,190.09	19.83	273.640	2,176.56	17.28	-122.09	14,454,572.182	1,741,042.806	39.801274648	-80.641723171	
2,234.09	21.43	271.140	2,217.74	17.91	-137.58	14,454,572.816	1,741,027.321	39.801276559	-80.641778298	
2,279.09	23.00	270.410	2,259.40	18.14	-154.59	14,454,573.042	1,741,010.309	39.801277368	-80.641838862	
2,323.09	24.88	270.830	2,299.61	18.33	-172.44	14,454,573.238	1,740,992.457	39.801278101	-80.641902421	
2,367.09	26.33	271.700	2,339.29	18.76	-191.45	14,454,573.662	1,740,973.448	39.801279473	-80.641970096	
2,411.09	27.77	272.600	2,378.48	19.51	-211.44	14,454,574.416	1,740,953.453	39.801281765	-80.642041274	
2,455.09	28.68	273.470	2,417.24	20.61	-232.22	14,454,575.520	1,740,932.674	39.801285025	-80.642115240	
2,500.09	28.77	274.430	2,456.71	22.10	-253.80	14,454,577.010	1,740,911.099	39.801289354	-80.642192036	
2,544.09	29.52	273.610	2,495.13	23.61	-275.17	14,454,578.511	1,740,889.723	39.801293709	-80.642268121	
2,588.09	30.19	273.350	2,533.30	24.93	-297.04	14,454,579.840	1,740,867.860	39.801297599	-80.642345943	
2,632.09	31.83	273.840	2,571.01	26.36	-319.66	14,454,581.263	1,740,845.238	39.801301757	-80.642426468	
2,676.09	33.39	274.130	2,608.07	28.01	-343.31	14,454,582.912	1,740,821.584	39.801306545	-80.642510663	
2,721.09	34.59	274.640	2,645.38	29.93	-368.40	14,454,584.838	1,740,796.501	39.801312107	-80.642599940	
2,765.09	35.66	274.790	2,681.37	32.01	-393.63	14,454,586.919	1,740,771.271	39.801318100	-80.642689739	



Survey Report - Geographic



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Fitzgerald 03 HM (slot R)
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<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Decv0422v16

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
2,809.09	37.10	275.190	2,716.79	34.29	-419.62	14,454,589.190	1,740,745.273	39.801324623	-80.642782271	
2,853.09	38.51	275.360	2,751.55	36.77	-446.48	14,454,591.671	1,740,718.417	39.801331728	-80.642877854	
2,897.09	40.19	275.340	2,785.58	39.37	-474.26	14,454,594.272	1,740,690.641	39.801339176	-80.642976710	
2,941.09	42.31	275.870	2,818.66	42.20	-503.13	14,454,597.108	1,740,661.771	39.801347281	-80.643079460	
2,988.09	44.58	275.990	2,852.78	45.54	-535.27	14,454,600.447	1,740,629.626	39.801356804	-80.643193861	
3,091.00	45.32	274.770	2,925.61	52.35	-607.65	14,454,607.259	1,740,557.244	39.801376302	-80.643451473	
3,184.00	46.37	272.930	2,990.40	56.82	-674.22	14,454,611.729	1,740,490.677	39.801389306	-80.643688416	
3,278.00	47.96	273.630	3,054.30	60.77	-743.03	14,454,615.678	1,740,421.862	39.801400904	-80.643933371	
3,372.00	46.59	275.390	3,118.08	66.19	-811.87	14,454,621.096	1,740,353.028	39.801416534	-80.644178373	
3,466.00	46.64	276.000	3,182.65	72.97	-879.85	14,454,627.875	1,740,285.051	39.801435893	-80.644420303	
3,557.00	46.51	274.160	3,245.21	78.82	-945.67	14,454,633.728	1,740,219.225	39.801452684	-80.644654587	
3,650.00	46.55	276.090	3,309.19	84.85	-1,012.89	14,454,639.757	1,740,152.008	39.801469973	-80.644893824	
3,744.00	46.55	276.090	3,373.84	92.09	-1,080.75	14,454,646.997	1,740,084.152	39.801490594	-80.645135319	
3,837.00	45.98	275.910	3,438.13	99.12	-1,147.57	14,454,654.021	1,740,017.324	39.801510613	-80.645373156	
3,931.00	46.02	276.180	3,503.43	106.24	-1,214.82	14,454,661.142	1,739,950.082	39.801530899	-80.645612464	
4,026.00	46.11	276.000	3,569.34	113.49	-1,282.84	14,454,668.400	1,739,882.056	39.801551570	-80.645854563	
4,120.00	46.07	275.910	3,634.53	120.52	-1,350.20	14,454,675.425	1,739,814.702	39.801571597	-80.646094276	
4,214.00	46.07	275.910	3,699.75	127.49	-1,417.53	14,454,682.396	1,739,747.364	39.801591470	-80.646333928	
4,308.00	45.98	275.650	3,765.02	134.30	-1,484.84	14,454,689.209	1,739,680.062	39.801610910	-80.646573457	
4,402.00	46.20	275.740	3,830.21	141.02	-1,552.22	14,454,695.929	1,739,612.676	39.801630095	-80.646813286	
4,497.00	46.07	274.770	3,896.04	147.30	-1,620.43	14,454,702.202	1,739,544.473	39.801648063	-80.647056029	
4,592.00	45.89	274.860	3,962.06	153.03	-1,688.50	14,454,707.937	1,739,476.400	39.801664547	-80.647298318	
4,686.00	45.98	275.030	4,027.43	158.85	-1,755.79	14,454,713.759	1,739,409.108	39.801681264	-80.647537826	
4,779.00	46.02	274.950	4,092.04	164.67	-1,822.44	14,454,719.578	1,739,342.463	39.801697965	-80.647775029	
4,873.00	45.89	274.510	4,157.39	170.24	-1,889.77	14,454,725.150	1,739,275.127	39.801713994	-80.648014696	
4,967.00	45.93	274.860	4,222.79	175.76	-1,957.06	14,454,730.664	1,739,207.837	39.801729865	-80.648254199	
5,062.00	45.89	274.950	4,288.89	181.59	-2,025.05	14,454,736.498	1,739,139.854	39.801746620	-80.648496168	
5,156.00	45.80	274.950	4,354.37	187.41	-2,092.24	14,454,742.318	1,739,072.664	39.801763326	-80.648735310	
5,250.00	46.37	274.600	4,419.57	193.05	-2,159.72	14,454,747.953	1,739,005.185	39.801779530	-80.648975487	
5,344.00	46.24	275.030	4,484.51	198.75	-2,227.44	14,454,753.658	1,738,937.461	39.801795925	-80.649216535	
5,438.00	46.68	274.950	4,549.26	204.68	-2,295.32	14,454,759.585	1,738,869.579	39.801812932	-80.649458140	
5,532.00	46.64	275.120	4,613.77	210.68	-2,363.42	14,454,765.585	1,738,801.478	39.801830141	-80.649700529	
5,627.00	46.77	275.210	4,678.92	216.90	-2,432.29	14,454,771.809	1,738,732.615	39.801847976	-80.649945625	
5,722.00	46.86	274.950	4,743.93	223.04	-2,501.28	14,454,777.943	1,738,663.618	39.801865560	-80.650191199	
5,815.00	46.77	274.770	4,807.58	228.78	-2,568.85	14,454,783.688	1,738,596.051	39.801882062	-80.650431686	
5,910.00	46.81	274.860	4,872.62	234.59	-2,637.85	14,454,789.500	1,738,527.055	39.801898763	-80.650677263	
6,005.00	46.68	274.950	4,937.72	240.51	-2,706.78	14,454,795.416	1,738,458.119	39.801915748	-80.650922623	
6,099.00	46.64	275.120	5,002.24	246.51	-2,774.88	14,454,801.416	1,738,390.017	39.801932955	-80.651165012	
6,194.00	46.59	275.210	5,067.49	252.73	-2,843.65	14,454,807.631	1,738,321.256	39.801950760	-80.651409747	
6,288.00	46.11	275.210	5,132.38	258.90	-2,911.38	14,454,813.807	1,738,253.522	39.801968445	-80.651650825	
6,383.00	46.02	275.390	5,198.29	265.22	-2,979.50	14,454,820.126	1,738,185.403	39.801986527	-80.651893273	
6,476.00	46.07	275.300	5,262.84	271.46	-3,046.16	14,454,826.363	1,738,118.745	39.802004365	-80.652130520	
6,571.00	46.15	275.300	5,328.70	277.78	-3,114.33	14,454,832.687	1,738,050.574	39.802022460	-80.652373152	
6,665.00	46.37	275.390	5,393.69	284.11	-3,181.95	14,454,839.013	1,737,982.955	39.802040555	-80.652613815	
6,759.00	46.11	275.470	5,458.71	290.53	-3,249.53	14,454,845.438	1,737,915.369	39.802058918	-80.652854363	
6,853.00	46.11	275.470	5,523.87	296.99	-3,316.97	14,454,851.895	1,737,847.935	39.802077370	-80.653094372	
6,948.00	46.33	275.560	5,589.60	303.58	-3,385.24	14,454,858.487	1,737,779.662	39.802096200	-80.653337362	
7,043.00	44.79	275.030	5,656.12	309.85	-3,452.78	14,454,864.751	1,737,712.126	39.802114118	-80.653577735	
7,129.00	43.25	273.980	5,717.96	314.55	-3,512.35	14,454,869.452	1,737,652.553	39.802127662	-80.653789779	
7,223.00	46.55	275.830	5,784.54	320.25	-3,578.44	14,454,875.155	1,737,586.462	39.802144026	-80.654025015	
7,318.00	47.12	275.740	5,849.53	327.23	-3,647.38	14,454,882.139	1,737,517.523	39.802163937	-80.654270372	
7,412.00	47.03	276.000	5,913.54	334.27	-3,715.85	14,454,889.178	1,737,449.053	39.802183995	-80.654514059	
7,505.00	46.90	273.800	5,977.02	340.08	-3,783.57	14,454,894.985	1,737,381.333	39.802200660	-80.654755095	
7,599.00	47.08	273.890	6,041.14	344.69	-3,852.15	14,454,899.595	1,737,312.752	39.802214045	-80.654999213	

<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Fitzgerald 03 HM (slot R)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>TVD Reference:</b>	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
<b>Site:</b>	Fitzgerald	<b>MD Reference:</b>	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
<b>Well:</b>	Fitzgerald 03 HM (slot R)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Decv0422v16

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
7,693.00	47.16	273.450	6,105.10	349.10	-3,920.89	14,454,904.004	1,737,244.012	39.802226880	-80.655243897
7,788.00	47.03	273.720	6,169.77	353.45	-3,990.34	14,454,908.355	1,737,174.563	39.802239563	-80.655491110
7,835.00	47.08	273.450	6,201.80	355.60	-4,024.68	14,454,910.506	1,737,140.226	39.802245834	-80.655613336
7,882.00	46.73	270.460	6,233.91	356.77	-4,058.97	14,454,911.679	1,737,105.933	39.802249418	-80.655735418
7,929.00	46.11	266.510	6,266.32	355.88	-4,092.99	14,454,910.785	1,737,071.911	39.802247323	-80.655856565
7,977.00	43.96	259.480	6,300.26	351.78	-4,126.66	14,454,906.687	1,737,038.242	39.802236425	-80.655976498
8,024.00	40.97	251.660	6,334.95	343.95	-4,157.35	14,454,898.854	1,737,007.550	39.802215235	-80.656085885
8,071.00	40.04	244.620	6,370.70	332.61	-4,185.65	14,454,887.519	1,736,979.250	39.802184407	-80.656186801
8,118.00	40.75	238.560	6,406.51	318.13	-4,212.41	14,454,873.032	1,736,952.492	39.802144904	-80.656282268
8,165.00	41.54	232.410	6,441.92	300.61	-4,237.86	14,454,855.517	1,736,927.044	39.802097072	-80.656373111
8,212.00	41.85	226.610	6,477.03	280.33	-4,261.61	14,454,835.232	1,736,903.293	39.802041616	-80.656457954
8,260.00	41.63	221.250	6,512.86	257.33	-4,283.77	14,454,812.238	1,736,881.137	39.801978701	-80.656537152
8,307.00	41.80	215.880	6,547.95	232.90	-4,303.25	14,454,787.802	1,736,861.657	39.801911798	-80.656606843
8,354.00	43.12	211.140	6,582.63	206.45	-4,320.74	14,454,761.354	1,736,844.165	39.801839351	-80.656669484
8,401.00	44.04	206.740	6,616.69	178.10	-4,336.40	14,454,733.009	1,736,828.504	39.801761674	-80.656725631
8,449.00	45.58	203.140	6,650.75	147.44	-4,350.65	14,454,702.340	1,736,814.258	39.801677600	-80.656776772
8,496.00	47.65	199.270	6,683.04	115.60	-4,362.98	14,454,670.502	1,736,801.926	39.801590295	-80.656821112
8,543.00	50.46	195.050	6,713.84	81.69	-4,373.42	14,454,636.591	1,736,791.484	39.801497277	-80.656858754
8,590.00	52.22	191.710	6,743.21	45.99	-4,381.90	14,454,600.894	1,736,783.007	39.801399333	-80.656889425
8,637.00	53.89	188.550	6,771.46	9.02	-4,388.49	14,454,563.924	1,736,776.413	39.801297874	-80.656913406
8,684.00	56.04	185.030	6,798.44	-29.19	-4,393.02	14,454,525.721	1,736,771.880	39.801193006	-80.656930067
8,731.00	57.80	180.820	6,824.10	-68.50	-4,395.02	14,454,486.405	1,736,769.886	39.801085058	-80.656937704
8,778.00	60.75	176.690	6,848.12	-108.88	-4,394.12	14,454,446.030	1,736,770.785	39.800974170	-80.656935051
8,826.00	64.62	173.350	6,870.15	-151.34	-4,390.40	14,454,403.562	1,736,774.508	39.800857503	-80.656922378
8,873.00	68.18	169.570	6,888.97	-193.92	-4,383.98	14,454,360.991	1,736,780.920	39.800740524	-80.656900129
8,920.00	71.60	165.440	6,905.13	-236.98	-4,374.42	14,454,317.923	1,736,790.482	39.800622149	-80.656866673
8,967.00	74.37	161.660	6,918.89	-280.07	-4,361.69	14,454,274.837	1,736,803.215	39.800503689	-80.656821926
9,015.00	76.84	158.490	6,930.82	-323.77	-4,345.84	14,454,231.139	1,736,819.062	39.800383518	-80.656766099
9,062.00	80.31	155.150	6,940.13	-366.10	-4,327.71	14,454,188.805	1,736,837.198	39.800267069	-80.656702108
9,110.00	83.91	151.990	6,946.72	-408.66	-4,306.54	14,454,146.244	1,736,858.360	39.800149964	-80.656627347
9,157.00	87.69	149.610	6,950.17	-449.57	-4,283.68	14,454,105.339	1,736,881.224	39.800037387	-80.656546501
9,203.00	89.32	149.970	6,951.37	-489.31	-4,260.54	14,454,065.601	1,736,904.361	39.799928014	-80.656464668
9,298.00	89.27	150.410	6,952.54	-571.73	-4,213.32	14,453,983.178	1,736,951.585	39.799701163	-80.656297664
9,392.00	89.36	150.670	6,953.66	-653.57	-4,167.09	14,453,901.339	1,736,997.812	39.799475924	-80.656134199
9,486.00	89.36	149.610	6,954.71	-735.08	-4,120.29	14,453,819.824	1,737,044.609	39.799251572	-80.655968701
9,580.00	90.29	150.320	6,955.00	-816.46	-4,073.25	14,453,738.449	1,737,091.658	39.799027598	-80.655802308
9,673.00	90.46	150.230	6,954.39	-897.22	-4,027.13	14,453,657.688	1,737,137.770	39.798805323	-80.655639242
9,768.00	90.46	149.790	6,953.62	-979.50	-3,979.65	14,453,575.410	1,737,185.254	39.798578867	-80.655471314
9,863.00	89.98	149.350	6,953.26	-1,061.41	-3,931.53	14,453,493.498	1,737,233.369	39.798353407	-80.655301133
9,957.00	90.02	149.440	6,953.26	-1,142.32	-3,883.68	14,453,412.592	1,737,281.226	39.798130715	-80.655131859
10,051.00	89.98	149.180	6,953.26	-1,223.15	-3,835.70	14,453,331.757	1,737,329.203	39.797908217	-80.654962159
10,146.00	90.02	148.820	6,953.26	-1,304.58	-3,786.77	14,453,250.327	1,737,378.131	39.797684071	-80.654789080
10,240.00	90.07	149.090	6,953.19	-1,385.12	-3,738.30	14,453,169.791	1,737,426.608	39.797462388	-80.654617598
10,335.00	89.89	149.180	6,953.22	-1,466.66	-3,689.56	14,453,088.245	1,737,475.344	39.797237927	-80.654445207
10,429.00	90.02	149.090	6,953.29	-1,547.35	-3,641.34	14,453,007.558	1,737,523.568	39.797015829	-80.654274631
10,522.00	90.68	149.090	6,952.73	-1,627.14	-3,593.56	14,452,927.768	1,737,571.340	39.796796201	-80.654105651
10,618.00	90.90	148.740	6,951.40	-1,709.35	-3,544.00	14,452,845.562	1,737,620.900	39.796569916	-80.653930337
10,712.00	89.80	147.940	6,950.83	-1,789.35	-3,494.67	14,452,765.555	1,737,670.237	39.796349673	-80.653755793
10,805.00	89.32	149.000	6,951.54	-1,868.62	-3,446.03	14,452,686.289	1,737,718.868	39.796131473	-80.653583749
10,900.00	89.45	149.260	6,952.56	-1,950.16	-3,397.29	14,452,604.752	1,737,767.609	39.795907035	-80.653411348
10,994.00	89.49	149.350	6,953.43	-2,030.98	-3,349.31	14,452,523.925	1,737,815.591	39.795684556	-80.653241641
11,089.00	89.45	148.910	6,954.31	-2,112.52	-3,300.57	14,452,442.387	1,737,864.332	39.795460115	-80.653069241
11,183.00	89.41	149.260	6,955.24	-2,193.16	-3,252.28	14,452,361.746	1,737,912.624	39.795238141	-80.652898431
11,278.00	89.14	149.180	6,956.45	-2,274.77	-3,203.67	14,452,280.135	1,737,961.235	39.795013499	-80.652726496

<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Fitzgerald 03 HM (slot R)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>TVD Reference:</b>	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
<b>Site:</b>	Fitzgerald	<b>MD Reference:</b>	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
<b>Well:</b>	Fitzgerald 03 HM (slot R)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Decv0422v16

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
11,372.00	89.71	150.230	6,957.39	-2,355.93	-3,156.25	14,452,198.977	1,738,008.650	39.794790115	-80.652558815
11,466.00	89.85	149.700	6,957.75	-2,437.31	-3,109.20	14,452,117.601	1,738,055.700	39.794566134	-80.652392442
11,560.00	89.89	149.790	6,957.96	-2,518.51	-3,061.84	14,452,036.405	1,738,103.061	39.794342645	-80.652224954
11,654.00	89.85	150.230	6,958.18	-2,599.92	-3,014.86	14,451,954.991	1,738,150.047	39.794118561	-80.652058810
11,749.00	90.02	149.790	6,958.29	-2,682.20	-2,967.37	14,451,872.710	1,738,197.532	39.793892093	-80.651890899
11,843.00	89.36	149.700	6,958.79	-2,763.39	-2,920.01	14,451,791.516	1,738,244.893	39.793668607	-80.651723417
11,937.00	89.27	149.610	6,959.92	-2,844.51	-2,872.52	14,451,710.400	1,738,292.379	39.793445335	-80.651555491
12,031.00	89.36	149.790	6,961.04	-2,925.66	-2,825.10	14,451,629.247	1,738,339.801	39.793221962	-80.651387793
12,125.00	89.49	149.350	6,961.98	-3,006.71	-2,777.49	14,451,548.200	1,738,387.408	39.792998879	-80.651219436
12,219.00	89.85	149.610	6,962.53	-3,087.69	-2,729.76	14,451,467.225	1,738,435.144	39.792775992	-80.651050621
12,314.00	89.80	149.970	6,962.82	-3,169.78	-2,681.96	14,451,385.128	1,738,482.944	39.792550021	-80.650881591
12,407.00	90.33	149.790	6,962.71	-3,250.23	-2,635.29	14,451,304.686	1,738,529.613	39.792328608	-80.650716571
12,501.00	89.45	149.790	6,962.89	-3,331.46	-2,587.99	14,451,223.453	1,738,576.910	39.792105017	-80.650549323
12,596.00	89.10	149.260	6,964.09	-3,413.33	-2,539.81	14,451,141.584	1,738,625.086	39.791879669	-80.650378957
12,691.00	89.27	150.930	6,965.44	-3,495.67	-2,492.46	14,451,059.245	1,738,672.443	39.791653037	-80.650211515
12,786.00	89.05	151.200	6,966.84	-3,578.80	-2,446.50	14,450,976.113	1,738,718.401	39.791424243	-80.650049067
12,880.00	89.23	151.200	6,968.25	-3,661.16	-2,401.22	14,450,893.750	1,738,763.680	39.791197567	-80.649889022
12,974.00	89.19	150.580	6,969.54	-3,743.28	-2,355.50	14,450,811.631	1,738,809.405	39.790971560	-80.649727389
13,068.00	89.19	151.110	6,970.87	-3,825.36	-2,309.71	14,450,729.549	1,738,855.195	39.790745651	-80.649565528
13,163.00	89.36	149.350	6,972.08	-3,907.82	-2,262.54	14,450,647.097	1,738,902.359	39.790518709	-80.649398781
13,257.00	89.36	149.260	6,973.13	-3,988.64	-2,214.56	14,450,566.272	1,738,950.340	39.790296228	-80.64929103
13,351.00	89.36	149.610	6,974.18	-4,069.57	-2,166.76	14,450,485.338	1,738,998.137	39.790073450	-80.649060081
13,446.00	89.41	149.000	6,975.19	-4,151.26	-2,118.27	14,450,403.653	1,739,046.628	39.789848602	-80.648888601
13,540.00	89.27	149.700	6,976.28	-4,232.12	-2,070.35	14,450,322.792	1,739,094.545	39.789626019	-80.648719155
13,634.00	89.32	150.050	6,977.43	-4,313.42	-2,023.18	14,450,241.494	1,739,141.719	39.789402249	-80.648552361
13,727.00	89.63	149.880	6,978.29	-4,393.93	-1,976.63	14,450,160.986	1,739,188.266	39.789180652	-80.648387788
13,821.00	89.32	150.230	6,979.15	-4,475.38	-1,929.71	14,450,079.538	1,739,235.186	39.788956471	-80.648221903
13,915.00	89.54	150.320	6,980.08	-4,557.00	-1,883.11	14,449,997.912	1,739,281.792	39.788731801	-80.648057138
14,010.00	89.54	150.410	6,980.85	-4,639.57	-1,836.13	14,449,915.341	1,739,328.765	39.788504535	-80.647891080
14,104.00	89.36	149.970	6,981.75	-4,721.13	-1,789.41	14,449,833.783	1,739,375.493	39.788280053	-80.647725884
14,197.00	90.24	150.230	6,982.07	-4,801.75	-1,743.05	14,449,753.164	1,739,421.851	39.788058150	-80.647561990
14,291.00	89.49	149.880	6,982.29	-4,883.20	-1,696.13	14,449,671.713	1,739,468.772	39.787833960	-80.647396105
14,385.00	89.27	150.320	6,983.31	-4,964.68	-1,649.27	14,449,590.230	1,739,515.627	39.787609681	-80.647230457
14,479.00	89.41	149.610	6,984.39	-5,046.06	-1,602.23	14,449,508.859	1,739,562.673	39.787385706	-80.647064129
14,573.00	89.41	149.700	6,985.36	-5,127.17	-1,554.74	14,449,427.741	1,739,610.160	39.787162424	-80.646896229
14,667.00	89.27	149.700	6,986.44	-5,208.33	-1,507.32	14,449,346.588	1,739,657.582	39.786939042	-80.646728560
14,761.00	89.49	149.790	6,987.46	-5,289.52	-1,459.96	14,449,265.396	1,739,704.941	39.786715558	-80.646561119
14,856.00	89.14	149.790	6,988.60	-5,371.61	-1,412.16	14,449,183.305	1,739,752.739	39.786489596	-80.646392130
14,951.00	89.36	149.530	6,989.84	-5,453.59	-1,364.18	14,449,101.323	1,739,800.722	39.786263934	-80.646222480
15,045.00	89.14	150.050	6,991.07	-5,534.82	-1,316.88	14,449,020.097	1,739,848.016	39.786040354	-80.646055274
15,140.00	89.14	150.410	6,992.50	-5,617.27	-1,269.72	14,448,937.644	1,739,895.180	39.785813406	-80.645888549
15,235.00	89.63	150.490	6,993.52	-5,699.91	-1,222.87	14,448,855.006	1,739,942.029	39.785585954	-80.645722948
15,328.00	88.88	150.140	6,994.73	-5,780.70	-1,176.82	14,448,774.219	1,739,988.081	39.785363592	-80.645560159
15,423.00	88.92	149.610	6,996.55	-5,862.85	-1,129.15	14,448,692.066	1,740,035.751	39.785137462	-80.645391630
15,516.00	89.19	149.350	6,998.08	-5,942.95	-1,081.92	14,448,611.962	1,740,082.974	39.784916964	-80.645224668
15,611.00	89.05	149.970	6,999.54	-6,024.93	-1,033.94	14,448,529.983	1,740,130.955	39.784691307	-80.645055032
15,705.00	89.14	150.050	7,001.03	-6,106.34	-986.96	14,448,448.579	1,740,177.935	39.784467240	-80.644888954
15,800.00	89.32	149.260	7,002.30	-6,188.31	-938.97	14,448,366.602	1,740,225.925	39.784241589	-80.644719290
15,894.00	89.27	149.790	7,003.46	-6,269.32	-891.30	14,448,285.595	1,740,273.594	39.784018604	-80.644550754
15,989.00	89.41	149.350	7,004.56	-6,351.23	-843.19	14,448,203.687	1,740,321.707	39.783793141	-80.644380654
16,083.00	89.32	149.610	7,005.60	-6,432.20	-795.46	14,448,122.716	1,740,369.441	39.783570253	-80.644211890
16,177.00	89.41	149.530	7,006.64	-6,513.25	-747.85	14,448,041.670	1,740,417.047	39.783347161	-80.644043581
16,270.00	89.49	149.350	7,007.53	-6,593.33	-700.57	14,447,961.592	1,740,464.330	39.783126730	-80.643876413
16,364.00	89.32	149.880	7,008.51	-6,674.41	-653.02	14,447,880.508	1,740,511.873	39.782903535	-80.643708333

<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Fitzgerald 03 HM (slot R)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>TVD Reference:</b>	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
<b>Site:</b>	Fitzgerald	<b>MD Reference:</b>	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
<b>Well:</b>	Fitzgerald 03 HM (slot R)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Decv0422v16

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
16,459.00	89.19	149.700	7,009.74	-6,756.50	-605.23	14,447,798.417	1,740,559.670	39.782677572	-80.643539365
16,553.00	89.45	149.440	7,010.86	-6,837.55	-557.62	14,447,717.372	1,740,607.276	39.782454481	-80.643371062
16,648.00	89.27	149.790	7,011.92	-6,919.49	-509.57	14,447,635.426	1,740,655.325	39.782228912	-80.643201198
16,742.00	89.36	150.050	7,013.04	-7,000.83	-462.46	14,447,554.091	1,740,702.435	39.782005031	-80.643034667
16,836.00	89.19	150.140	7,014.23	-7,082.31	-415.60	14,447,472.614	1,740,749.296	39.781780761	-80.642869026
16,931.00	89.71	149.440	7,015.14	-7,164.40	-367.80	14,447,390.521	1,740,797.094	39.781554790	-80.642700058
17,025.00	89.76	150.140	7,015.58	-7,245.63	-320.50	14,447,309.289	1,740,844.392	39.781331189	-80.642532863
17,118.00	90.73	149.700	7,015.18	-7,326.10	-273.89	14,447,228.815	1,740,891.003	39.781109678	-80.642368100
17,212.00	90.77	149.530	7,013.95	-7,407.19	-226.35	14,447,147.734	1,740,938.545	39.780886487	-80.642200034
17,307.00	90.86	149.260	7,012.60	-7,488.94	-177.99	14,447,065.976	1,740,986.906	39.780661429	-80.642029063
17,402.00	90.81	149.350	7,011.22	-7,570.63	-129.50	14,446,984.295	1,741,035.395	39.780436580	-80.641857636
17,496.00	90.37	149.090	7,010.25	-7,651.38	-81.40	14,446,903.540	1,741,083.496	39.780214280	-80.641687579
17,590.00	87.87	150.140	7,011.69	-7,732.45	-33.86	14,446,822.469	1,741,131.032	39.779991116	-80.641519538
17,685.00	88.26	150.410	7,014.90	-7,814.90	13.21	14,446,740.017	1,741,178.109	39.779764165	-80.641353150
17,779.00	88.40	150.140	7,017.64	-7,896.50	59.80	14,446,658.421	1,741,224.698	39.779539570	-80.641188490
17,874.00	88.31	149.970	7,020.37	-7,978.78	107.20	14,446,576.137	1,741,272.099	39.779313077	-80.641020949
17,967.00	88.40	149.970	7,023.04	-8,059.27	153.73	14,446,495.655	1,741,318.622	39.779091539	-80.640856510
17,985.00	88.13	149.700	7,023.58	-8,074.82	162.77	14,446,480.099	1,741,327.663	39.779048721	-80.640824554
<b>Survey @ 17985.00 MD 7023.58 TVD</b>									
18,010.00	88.13	149.700	7,024.40	-8,096.40	175.37	14,446,458.526	1,741,340.269	39.778989336	-80.640779992
<b>Survey Proj. to 18010.00 MD 7024.40 TVD</b>									

Design Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
196.09	196.09	-0.01	0.17	MWD surveys
17,985.00	7,023.58	-8,074.82	162.77	Survey @ 17985.00 MD 7023.58 TVD
18,010.00	7,024.40	-8,096.40	175.37	Survey Proj. to 18010.00 MD 7024.40 TVD

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_