



Well: Fitzgerald 09 HM (slot H)  
 Site: Fitzgerald  
 Project: Marshall County, West Virginia NAD83 UTM 17N  
 Design: rev9  
 SECTION DETAILS 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=1293+33 @ 1326.00ft (Nabors X08)



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

Magnetic Field  
 Strength: 51609.3nT  
 Dip Angle: 66.41°  
 Date: 10/13/2022  
 Model: IGRF2020

Northing 14454567.347 Easting 1741185.627 Latitude 39.801259800 Longitude -80.641214740  
 Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.9°

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Annotation
1	14146.00	89.53	152.570	7017.96	-1615.31	1601.92	0.00	0.00	2232.94	S/T Begin 2°/100' drop/turn (130L)
2	14176.00	89.14	152.110	7018.31	-1641.88	1615.85	2.00	-130.00	2262.77	Begin 2°/100' turn
3	14296.00	89.15	149.710	7020.10	-1746.72	1674.18	2.00	-90.00	2382.35	Begin 89.15° lateral
4	14521.00	89.15	149.710	7023.46	-1940.98	1787.65	0.00	0.00	2606.92	Begin 2°/100' build/turn
5	14862.95	91.00	156.293	7023.02	-2245.48	1942.79	2.00	74.28	2946.31	Begin 91.00° lateral
6	15547.95	91.00	156.293	7011.07	-2872.58	2218.16	0.00	0.00	3620.74	Begin 2°/100' drop
7	15647.95	89.00	156.293	7011.07	-2964.14	2258.37	2.00	180.00	3719.21	Begin 89.00° lateral
8	15747.95	89.00	156.293	7012.81	-3055.69	2298.57	0.00	0.00	3817.67	Begin 2°/100' drop/turn
9	15809.09	87.78	156.293	7014.53	-3111.65	2323.14	2.00	-179.98	3877.85	Begin 87.78° lateral
10	16981.32	87.78	156.293	7060.00	-4184.14	2794.10	0.00	0.00	5031.31	PBHL/TD 16981.32 MD 7060.00 TVD

DESIGN TARGET DETAILS

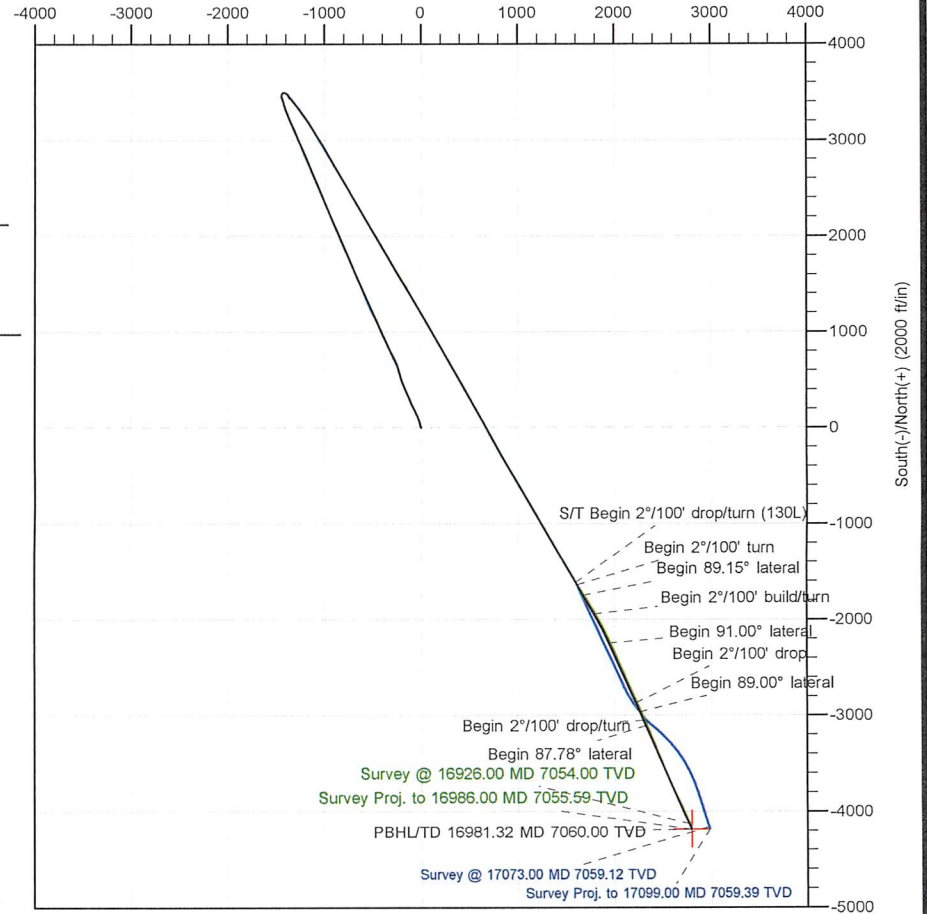
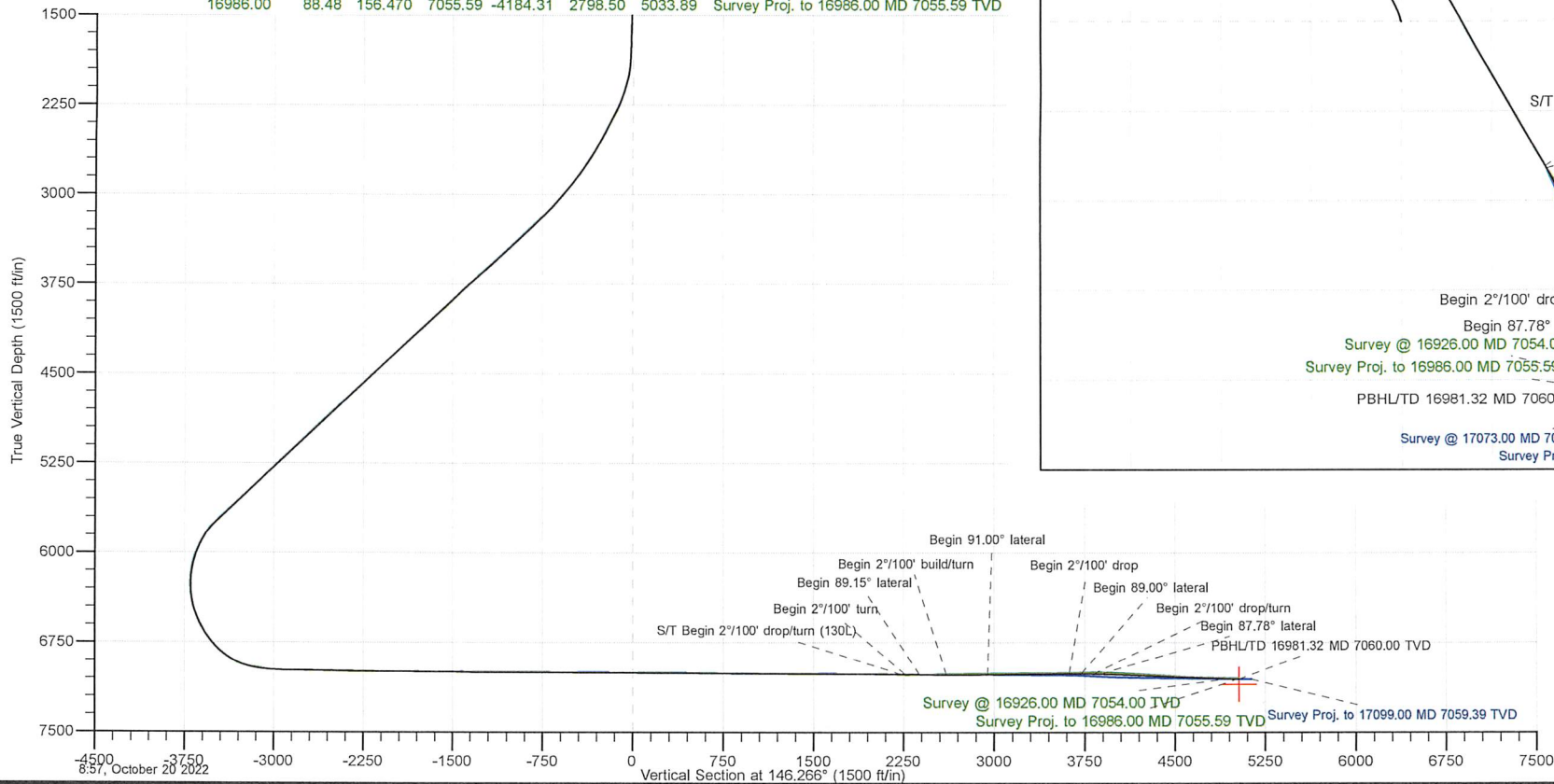
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
Fitzgerald-09HM BHL r8	7105.00	-4184.14	2794.10	4450383.211	1743979.717	39.789738000	-80.631328000

ANNOTATIONS SURVEYS ORIGINAL HOLE

MD	Inc	Azi	TVD	+N/-S	+E/-W	VSec	Annotation
209.09	0.09	351.690	209.09	0.15	-0.02	-0.13	MWD surveys
17073.00	89.40	163.540	7059.12	-4158.73	2976.09	5111.23	Survey @ 17073.00 MD 7059.12 TVD
17099.00	89.40	163.540	7059.39	-4183.67	2983.45	5136.05	Survey Proj. to 17099.00 MD 7059.39 TVD

ANNOTATIONS SURVEYS SIDETRACK 01

MD	Inc	Azi	TVD	+N/-S	+E/-W	VSec	Annotation
14052.00	89.53	149.790	7017.19	-1532.96	1556.61	2139.29	Tie into original hole @ 14052 MD
16926.00	88.48	156.470	7054.00	-4129.32	2774.55	4974.86	Survey @ 16926.00 MD 7054.00 TVD
16986.00	88.48	156.470	7055.59	-4184.31	2798.50	5033.89	Survey Proj. to 16986.00 MD 7055.59 TVD





<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Fitzgerald 09 HM (slot H)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>TVD Reference:</b>	RKB=1293+33 @ 1326.00ft (Nabors X08)
<b>Site:</b>	Fitzgerald	<b>MD Reference:</b>	RKB=1293+33 @ 1326.00ft (Nabors X08)
<b>Well:</b>	Fitzgerald 09 HM (slot H)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Sidetrack 01	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Sidetrack 01	<b>Database:</b>	DB_Feb2822

<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 09 HM (slot H)					
<b>Well Position</b>	<b>+N/-S</b>	0.00 ft	<b>Northing:</b>	14,454,567.347 usft	<b>Latitude:</b>	39.801259800
	<b>+E/-W</b>	0.00 ft	<b>Easting:</b>	1,741,185.627 usft	<b>Longitude:</b>	-80.641214740
<b>Position Uncertainty</b>		0.00 ft	<b>Wellhead Elevation:</b>	ft	<b>Ground Level:</b>	1,292.91 ft

<b>Wellbore</b>	Sidetrack 01				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2020	10/13/2022	-8.71	66.41	51,609.30307518

<b>Design</b>	Surveys Sidetrack 01				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	14,052.00
<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		146.266

<b>Survey Program</b>	<b>Date</b>	10/20/2022			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
21.09	828.09	MWD surf (Original Hole)	MWD	MWD - Standard	
872.09	2,979.09	MWD int (Original Hole)	MWD	MWD - Standard	
3,024.00	14,052.00	MWD (Original Hole)	MWD	MWD - Standard	
14,131.00	16,926.00	MWD ST1 (Sidetrack 01)	MWD	MWD - Standard	
16,986.00	16,986.00	Projection ST1 (Sidetrack 01)	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	14,454,567.347	1,741,185.627	39.801259800	-80.641214740	
21.09	0.00	0.000	21.09	0.00	0.00	14,454,567.347	1,741,185.627	39.801259800	-80.641214740	
209.09	0.09	351.690	209.09	0.15	-0.02	14,454,567.493	1,741,185.606	39.801260201	-80.641214814	
253.09	0.18	281.290	253.09	0.19	-0.09	14,454,567.541	1,741,185.533	39.801260333	-80.641215072	
269.09	0.18	269.950	269.09	0.20	-0.14	14,454,567.546	1,741,185.483	39.801260347	-80.641215249	
298.09	0.31	277.680	298.09	0.21	-0.27	14,454,567.556	1,741,185.360	39.801260377	-80.641215688	
328.09	0.09	1.620	328.09	0.24	-0.35	14,454,567.591	1,741,185.280	39.801260472	-80.641215972	



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Fitzgerald 09 HM (slot H)
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<b>Site:</b>	Fitzgerald	<b>MD Reference:</b>	RKB=1293+33 @ 1326.00ft (Nabors X08)
<b>Well:</b>	Fitzgerald 09 HM (slot H)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Sidetrack 01	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Sidetrack 01	<b>Database:</b>	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	
358.09	0.26	21.920	358.09	0.33	-0.32	14,454,567.678	1,741,185.306	39.801260710	-80.641215877	
386.09	0.18	57.780	386.09	0.41	-0.26	14,454,567.760	1,741,185.367	39.801260936	-80.641215659	
430.09	0.26	337.010	430.09	0.54	-0.24	14,454,567.889	1,741,185.387	39.801261289	-80.641215588	
474.09	0.31	316.880	474.09	0.72	-0.36	14,454,568.068	1,741,185.266	39.801261781	-80.641216014	
519.09	0.13	244.900	519.09	0.79	-0.49	14,454,568.135	1,741,185.137	39.801261967	-80.641216474	
563.09	0.09	255.710	563.09	0.76	-0.57	14,454,568.105	1,741,185.058	39.801261887	-80.641216755	
607.09	0.26	2.410	607.09	0.85	-0.60	14,454,568.196	1,741,185.029	39.801262138	-80.641216858	
651.09	0.13	265.110	651.09	0.94	-0.64	14,454,568.292	1,741,184.983	39.801262400	-80.641217018	
695.09	0.26	332.790	695.09	1.03	-0.74	14,454,568.376	1,741,184.888	39.801262633	-80.641217357	
739.09	0.18	264.150	739.09	1.11	-0.85	14,454,568.458	1,741,184.774	39.801262859	-80.641217763	
783.09	0.18	285.420	783.09	1.12	-0.99	14,454,568.469	1,741,184.638	39.801262892	-80.641218245	
828.09	0.22	330.680	828.09	1.22	-1.10	14,454,568.563	1,741,184.528	39.801263152	-80.641218637	
872.09	0.26	345.530	872.09	1.39	-1.17	14,454,568.734	1,741,184.462	39.801263620	-80.641218870	
916.09	0.22	37.300	916.09	1.55	-1.14	14,454,568.898	1,741,184.488	39.801264070	-80.641218775	
960.09	0.09	62.700	960.09	1.63	-1.06	14,454,568.981	1,741,184.570	39.801264297	-80.641218482	
986.09	0.26	320.480	986.09	1.69	-1.08	14,454,569.036	1,741,184.550	39.801264448	-80.641218550	
1,049.09	0.26	15.680	1,049.09	1.94	-1.13	14,454,569.283	1,741,184.498	39.801265129	-80.641218733	
1,093.09	0.18	27.460	1,093.08	2.09	-1.07	14,454,569.441	1,741,184.557	39.801265561	-80.641218521	
1,137.09	0.31	327.960	1,137.08	2.26	-1.10	14,454,569.603	1,741,184.526	39.801266007	-80.641218630	
1,178.09	0.35	345.450	1,178.08	2.47	-1.19	14,454,569.818	1,741,184.435	39.801266599	-80.641218948	
1,226.09	0.22	18.760	1,226.08	2.70	-1.20	14,454,570.047	1,741,184.428	39.801267228	-80.641218971	
1,270.09	0.44	343.690	1,270.08	2.94	-1.22	14,454,570.290	1,741,184.408	39.801267893	-80.641219040	
1,314.09	0.57	352.740	1,314.08	3.32	-1.29	14,454,570.669	1,741,184.333	39.801268936	-80.641219302	
1,358.09	0.71	345.090	1,358.08	3.80	-1.39	14,454,571.149	1,741,184.235	39.801270256	-80.641219643	
1,403.09	0.79	340.350	1,403.07	4.36	-1.57	14,454,571.711	1,741,184.059	39.801271801	-80.641220262	
1,447.09	1.10	341.140	1,447.07	5.05	-1.81	14,454,572.396	1,741,183.820	39.801273685	-80.641221101	
1,491.09	1.10	323.820	1,491.06	5.79	-2.19	14,454,573.137	1,741,183.434	39.801275723	-80.641222464	
1,536.09	1.36	333.400	1,536.05	6.62	-2.69	14,454,573.963	1,741,182.940	39.801277998	-80.641224212	
1,580.09	1.41	317.410	1,580.04	7.48	-3.29	14,454,574.828	1,741,182.340	39.801280381	-80.641226336	
1,624.09	1.71	330.860	1,624.02	8.45	-3.97	14,454,575.800	1,741,181.654	39.801283058	-80.641228765	
1,668.09	1.98	327.780	1,668.00	9.67	-4.70	14,454,577.017	1,741,180.929	39.801286406	-80.641231329	
1,712.09	2.11	330.240	1,711.97	11.02	-5.51	14,454,578.363	1,741,180.122	39.801290112	-80.641234184	
1,756.09	2.15	336.390	1,755.94	12.48	-6.24	14,454,579.823	1,741,179.389	39.801294128	-80.641236771	
1,801.09	2.77	339.120	1,800.90	14.26	-6.96	14,454,581.612	1,741,178.664	39.801299050	-80.641239329	
1,845.09	3.25	340.350	1,844.84	16.43	-7.76	14,454,583.780	1,741,177.865	39.801305013	-80.641242141	
1,889.09	3.87	341.580	1,888.75	19.02	-8.65	14,454,586.363	1,741,176.977	39.801312117	-80.641245268	
1,933.09	6.86	349.580	1,932.55	23.01	-9.60	14,454,590.357	1,741,176.032	39.801323097	-80.641248574	
1,978.09	9.89	347.380	1,977.07	29.43	-10.93	14,454,596.773	1,741,174.701	39.801340731	-80.641253221	
2,022.09	12.88	341.930	2,020.20	37.78	-13.27	14,454,605.125	1,741,172.354	39.801363692	-80.641261459	
2,066.09	15.60	350.100	2,062.85	48.27	-15.81	14,454,615.618	1,741,169.815	39.801392537	-80.641270349	
2,110.09	17.71	347.730	2,105.00	60.64	-18.25	14,454,627.987	1,741,167.375	39.801426532	-80.641278859	
2,155.09	18.59	344.920	2,147.76	74.25	-21.57	14,454,641.602	1,741,164.054	39.801463958	-80.641290488	
2,199.09	20.92	343.600	2,189.17	88.56	-25.62	14,454,655.912	1,741,160.011	39.801503300	-80.641304679	
2,243.09	22.85	340.350	2,230.00	104.15	-30.71	14,454,671.495	1,741,154.920	39.801546152	-80.641322585	
2,287.09	24.57	336.660	2,270.29	120.59	-37.21	14,454,687.942	1,741,148.422	39.801591390	-80.641345485	
2,331.09	25.80	332.880	2,310.10	137.52	-45.20	14,454,704.865	1,741,140.432	39.801637953	-80.641373691	
2,376.09	26.63	330.240	2,350.48	154.99	-54.67	14,454,722.337	1,741,130.962	39.801686039	-80.641407161	
2,420.09	27.38	333.760	2,389.68	172.63	-64.03	14,454,739.974	1,741,121.593	39.801734577	-80.641440266	
2,464.09	26.98	333.230	2,428.82	190.61	-73.00	14,454,757.960	1,741,112.624	39.801784070	-80.641471942	
2,508.09	26.89	332.880	2,468.05	208.38	-82.03	14,454,775.727	1,741,103.593	39.801832963	-80.641503844	
2,552.09	27.16	334.280	2,507.25	226.28	-90.93	14,454,793.631	1,741,094.699	39.801882229	-80.641535256	
2,597.09	27.69	336.040	2,547.19	245.09	-99.63	14,454,812.439	1,741,085.995	39.801933976	-80.641565975	
2,641.09	29.62	338.410	2,585.80	264.55	-107.79	14,454,831.894	1,741,077.842	39.801987494	-80.641594729	
2,685.09	30.45	337.970	2,623.89	284.99	-115.97	14,454,852.341	1,741,069.659	39.802043734	-80.641623573	



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<b>Site:</b>	Fitzgerald	<b>MD Reference:</b>	RKB=1293+33 @ 1326.00ft (Nabors X08)
<b>Well:</b>	Fitzgerald 09 HM (slot H)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Sidetrack 01	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Sidetrack 01	<b>Database:</b>	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	
2,729.09	31.68	338.150	2,661.58	306.05	-124.45	14,454,873.400	1,741,061.176	39.802101662	-80.641653474	
2,773.09	32.78	338.150	2,698.80	327.83	-133.18	14,454,895.180	1,741,052.443	39.802161571	-80.641684258	
2,817.09	33.93	336.740	2,735.55	350.17	-142.47	14,454,917.519	1,741,043.160	39.802223019	-80.641716991	
2,861.09	35.29	336.040	2,771.77	373.07	-152.48	14,454,940.416	1,741,033.149	39.802286011	-80.641752310	
2,906.09	35.90	336.040	2,808.36	397.00	-163.12	14,454,964.351	1,741,022.512	39.802351860	-80.641789840	
2,950.09	37.00	336.660	2,843.75	420.95	-173.60	14,454,988.297	1,741,012.027	39.802417736	-80.641826829	
2,979.09	37.62	336.830	2,866.81	437.10	-180.54	14,455,004.447	1,741,005.088	39.802462163	-80.641851308	
3,024.00	39.11	338.050	2,902.03	462.84	-191.23	14,455,030.188	1,740,994.399	39.802532972	-80.641888998	
3,118.00	40.57	341.660	2,974.21	519.37	-211.93	14,455,086.713	1,740,973.694	39.802688429	-80.641961911	
3,211.00	43.35	348.050	3,043.39	579.34	-228.07	14,455,146.687	1,740,957.558	39.802853309	-80.642018508	
3,305.00	43.35	340.250	3,111.80	641.32	-245.66	14,455,208.661	1,740,939.963	39.803023699	-80.642080274	
3,399.00	45.96	333.160	3,178.70	701.88	-271.84	14,455,269.222	1,740,913.785	39.803190299	-80.642172618	
3,493.00	46.97	332.100	3,243.45	762.39	-303.17	14,455,329.734	1,740,882.453	39.803356823	-80.642283316	
3,588.00	47.02	334.830	3,308.25	824.53	-334.21	14,455,391.877	1,740,851.423	39.803527825	-80.642392916	
3,682.00	47.46	337.910	3,372.08	887.75	-361.86	14,455,455.093	1,740,823.772	39.803701735	-80.642490468	
3,776.00	47.02	333.950	3,435.91	950.74	-389.99	14,455,518.087	1,740,795.642	39.803875037	-80.642589727	
3,870.00	46.97	335.620	3,500.03	1,012.93	-419.27	14,455,580.274	1,740,766.359	39.804046139	-80.642693108	
3,964.00	47.55	335.360	3,563.82	1,075.74	-447.91	14,455,643.089	1,740,737.718	39.804218959	-80.642794193	
4,059.00	47.55	335.760	3,627.94	1,139.56	-476.91	14,455,706.905	1,740,708.716	39.804394530	-80.642896549	
4,154.00	47.95	335.310	3,691.82	1,203.57	-506.03	14,455,770.911	1,740,679.593	39.804570624	-80.642999334	
4,247.00	48.08	336.940	3,754.03	1,266.78	-534.01	14,455,834.121	1,740,651.617	39.804744519	-80.643098050	
4,342.00	48.17	336.770	3,817.44	1,331.82	-561.82	14,455,899.165	1,740,623.813	39.804923449	-80.643196125	
4,437.00	47.95	336.460	3,880.94	1,396.68	-589.86	14,455,964.025	1,740,595.766	39.805101878	-80.643295069	
4,531.00	47.99	336.810	3,943.87	1,460.78	-617.55	14,456,028.122	1,740,568.075	39.805278205	-80.643392755	
4,626.00	48.12	336.460	4,007.37	1,525.64	-645.58	14,456,092.987	1,740,540.052	39.805456646	-80.643491613	
4,720.00	47.90	336.810	4,070.26	1,589.78	-673.28	14,456,157.124	1,740,512.344	39.805633084	-80.643589363	
4,815.00	47.99	336.810	4,133.89	1,654.62	-701.06	14,456,221.962	1,740,484.568	39.805811449	-80.643687346	
4,908.00	47.86	336.280	4,196.21	1,717.95	-728.54	14,456,285.289	1,740,457.092	39.805985659	-80.643784279	
5,002.00	48.12	336.940	4,259.12	1,782.05	-756.26	14,456,349.393	1,740,429.366	39.806162008	-80.643882095	
5,097.00	47.99	336.990	4,322.62	1,847.08	-783.91	14,456,414.419	1,740,401.717	39.806340886	-80.643979622	
5,191.00	47.42	336.770	4,385.88	1,911.02	-811.21	14,456,478.365	1,740,374.416	39.806516795	-80.644075926	
5,285.00	47.59	336.720	4,449.38	1,974.70	-838.58	14,456,542.044	1,740,347.051	39.806691970	-80.644172463	
5,380.00	47.24	336.240	4,513.66	2,038.84	-866.49	14,456,606.178	1,740,319.138	39.806868404	-80.644270942	
5,475.00	47.37	337.610	4,578.08	2,103.07	-893.85	14,456,670.412	1,740,291.775	39.807045102	-80.644367468	
5,569.00	47.42	337.780	4,641.72	2,167.08	-920.11	14,456,734.422	1,740,265.516	39.807221177	-80.644460063	
5,664.00	47.33	336.810	4,706.05	2,231.56	-947.09	14,456,798.905	1,740,238.536	39.807398555	-80.644555219	
5,758.00	47.50	337.690	4,769.66	2,295.39	-973.86	14,456,862.729	1,740,211.773	39.807574124	-80.644649612	
5,852.00	47.42	337.390	4,833.21	2,359.39	-1,000.32	14,456,926.735	1,740,185.313	39.807750187	-80.644742923	
5,946.00	47.64	337.610	4,896.68	2,423.45	-1,026.85	14,456,990.794	1,740,158.779	39.807926398	-80.644836499	
6,040.00	47.24	337.170	4,960.26	2,487.37	-1,053.47	14,457,054.710	1,740,132.161	39.808102216	-80.644930375	
6,134.00	47.46	337.650	5,023.95	2,551.20	-1,080.03	14,457,118.543	1,740,105.604	39.808277805	-80.645024038	
6,228.00	47.24	337.520	5,087.63	2,615.12	-1,106.39	14,457,182.457	1,740,079.241	39.808453614	-80.645117008	
6,323.00	47.15	337.080	5,152.19	2,679.41	-1,133.29	14,457,246.756	1,740,052.344	39.808630488	-80.645211874	
6,418.00	47.28	337.170	5,216.72	2,743.65	-1,160.39	14,457,310.994	1,740,025.242	39.808807195	-80.645307472	
6,512.00	47.15	337.120	5,280.57	2,807.22	-1,187.18	14,457,374.565	1,739,998.448	39.808982067	-80.645401985	
6,606.00	47.42	337.560	5,344.33	2,870.96	-1,213.79	14,457,438.299	1,739,971.840	39.809157384	-80.645495830	
6,700.00	47.50	337.520	5,407.89	2,934.96	-1,240.25	14,457,502.305	1,739,945.380	39.809333447	-80.645589146	
6,795.00	47.33	337.560	5,472.17	2,999.60	-1,266.97	14,457,566.945	1,739,918.658	39.809511255	-80.645683387	
6,889.00	47.33	336.060	5,535.88	3,063.13	-1,294.19	14,457,630.473	1,739,891.444	39.809686012	-80.645779399	
6,983.00	47.46	336.500	5,599.52	3,126.47	-1,322.02	14,457,693.815	1,739,863.612	39.809860267	-80.645877610	
7,077.00	47.28	336.860	5,663.18	3,189.98	-1,349.40	14,457,757.325	1,739,836.234	39.810034977	-80.645974205	
7,172.00	47.24	337.560	5,727.65	3,254.31	-1,376.42	14,457,821.648	1,739,809.208	39.810211919	-80.646069536	
7,219.00	45.69	337.300	5,760.02	3,285.77	-1,389.50	14,457,853.111	1,739,796.132	39.810298464	-80.646115656	
7,266.00	40.92	339.410	5,794.22	3,315.71	-1,401.41	14,457,883.052	1,739,784.221	39.810380820	-80.646157645	



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Fitzgerald 09 HM (slot H)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>TVD Reference:</b>	RKB=1293+33 @ 1326.00ft (Nabors X08)
<b>Site:</b>	Fitzgerald	<b>MD Reference:</b>	RKB=1293+33 @ 1326.00ft (Nabors X08)
<b>Well:</b>	Fitzgerald 09 HM (slot H)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Sidetrack 01	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Sidetrack 01	<b>Database:</b>	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	
7,313.00	36.41	342.590	5,830.91	3,343.45	-1,411.00	14,457,910.788	1,739,774.629	39.810457093	-80.646191412	
7,361.00	32.17	343.730	5,870.56	3,369.32	-1,418.85	14,457,936.660	1,739,766.783	39.810528228	-80.646218987	
7,408.00	27.97	343.950	5,911.23	3,391.93	-1,425.40	14,457,959.273	1,739,760.227	39.810590400	-80.646242013	
7,455.00	24.61	343.910	5,953.36	3,411.93	-1,431.16	14,457,979.274	1,739,754.466	39.810645389	-80.646262246	
7,502.00	23.20	344.520	5,996.33	3,430.26	-1,436.35	14,457,997.600	1,739,749.283	39.810695772	-80.646280445	
7,550.00	19.05	350.080	6,041.09	3,447.10	-1,440.22	14,458,014.437	1,739,745.408	39.810742052	-80.646294007	
7,597.00	15.25	357.010	6,086.00	3,460.83	-1,441.87	14,458,028.171	1,739,743.763	39.810779789	-80.646299670	
7,644.00	12.55	6.040	6,131.63	3,472.09	-1,441.65	14,458,039.426	1,739,743.978	39.810810694	-80.646298746	
7,691.00	10.30	16.440	6,177.70	3,481.20	-1,439.93	14,458,048.536	1,739,745.705	39.810835694	-80.646292469	
7,739.00	8.53	31.380	6,225.06	3,488.35	-1,436.86	14,458,055.692	1,739,748.774	39.810855314	-80.646281440	
7,786.00	8.88	55.620	6,271.53	3,493.38	-1,432.05	14,458,060.718	1,739,753.584	39.810869064	-80.646264239	
7,833.00	10.12	76.110	6,317.90	3,496.42	-1,425.04	14,458,063.759	1,739,760.589	39.810877339	-80.646239254	
7,880.00	11.67	95.900	6,364.06	3,496.92	-1,416.30	14,458,064.262	1,739,769.329	39.810878625	-80.646208123	
7,926.00	14.36	117.450	6,408.91	3,493.81	-1,406.60	14,458,061.152	1,739,779.026	39.810869978	-80.646173636	
7,973.00	16.70	131.280	6,454.20	3,486.67	-1,396.35	14,458,054.006	1,739,789.278	39.810850244	-80.646137231	
8,021.00	19.09	137.800	6,499.88	3,476.30	-1,385.89	14,458,043.639	1,739,799.736	39.810821659	-80.646100137	
8,068.00	21.70	143.310	6,543.93	3,463.63	-1,375.54	14,458,030.975	1,739,810.093	39.810786767	-80.646063436	
8,114.00	25.06	144.550	6,586.15	3,448.87	-1,364.80	14,458,016.215	1,739,820.828	39.810746117	-80.646025419	
8,161.00	28.72	139.040	6,628.07	3,432.23	-1,351.62	14,457,999.570	1,739,834.010	39.810700264	-80.645978713	
8,209.00	32.57	135.780	6,669.36	3,414.25	-1,335.04	14,457,981.594	1,739,850.588	39.810650717	-80.645919934	
8,256.00	35.66	138.470	6,708.27	3,394.93	-1,317.13	14,457,962.266	1,739,868.499	39.810597443	-80.645856425	
8,304.00	38.71	142.830	6,746.51	3,372.48	-1,298.78	14,457,939.823	1,739,886.851	39.810535609	-80.645791392	
8,351.00	42.95	144.630	6,782.07	3,347.70	-1,280.62	14,457,915.043	1,739,905.008	39.810467361	-80.645727087	
8,398.00	47.37	145.160	6,815.20	3,320.44	-1,261.47	14,457,887.782	1,739,924.164	39.810392288	-80.645659260	
8,445.00	51.92	144.150	6,845.63	3,291.24	-1,240.74	14,457,858.582	1,739,944.886	39.810311873	-80.645585882	
8,492.00	55.90	143.490	6,873.31	3,260.59	-1,218.32	14,457,827.935	1,739,967.307	39.810227466	-80.645506478	
8,539.00	60.54	144.590	6,898.06	3,228.26	-1,194.88	14,457,795.600	1,739,990.753	39.810138410	-80.645423443	
8,586.00	65.53	145.820	6,919.36	3,193.87	-1,170.99	14,457,761.206	1,740,014.641	39.810043696	-80.645338867	
8,633.00	70.70	147.500	6,936.88	3,157.44	-1,147.04	14,457,724.778	1,740,038.592	39.809943397	-80.645254095	
8,681.00	75.43	148.690	6,950.85	3,118.46	-1,122.78	14,457,685.806	1,740,062.848	39.809836105	-80.645168273	
8,728.00	78.92	148.780	6,961.29	3,079.30	-1,099.00	14,457,646.640	1,740,086.629	39.809728286	-80.645084148	
8,776.00	81.62	149.440	6,969.40	3,038.70	-1,074.72	14,457,606.044	1,740,110.913	39.809616538	-80.644998246	
8,823.00	84.45	149.570	6,975.10	2,998.51	-1,051.04	14,457,565.848	1,740,134.586	39.809505893	-80.644914521	
8,869.00	86.39	150.410	6,978.77	2,958.80	-1,028.11	14,457,526.145	1,740,157.517	39.809396607	-80.644833426	
8,963.00	89.04	149.750	6,982.52	2,877.40	-981.27	14,457,444.746	1,740,204.362	39.809172556	-80.644667771	
9,058.00	89.17	149.700	6,984.00	2,795.37	-933.38	14,457,362.712	1,740,252.251	39.808946751	-80.644498409	
9,153.00	89.09	150.720	6,985.44	2,712.94	-886.19	14,457,280.277	1,740,299.443	39.808719850	-80.644331534	
9,246.00	88.86	150.010	6,987.11	2,632.11	-840.21	14,457,199.456	1,740,345.421	39.808497394	-80.644168960	
9,341.00	88.51	150.670	6,989.29	2,549.58	-793.21	14,457,116.926	1,740,392.419	39.808270234	-80.644002778	
9,435.00	88.73	150.230	6,991.55	2,467.83	-746.86	14,457,035.177	1,740,438.764	39.808045226	-80.643838911	
9,530.00	89.48	149.790	6,993.03	2,385.56	-699.38	14,456,952.907	1,740,486.244	39.807818775	-80.643671015	
9,624.00	89.40	149.790	6,993.95	2,304.33	-652.09	14,456,871.677	1,740,533.540	39.807595183	-80.643503759	
9,719.00	89.53	149.880	6,994.84	2,222.20	-604.35	14,456,789.546	1,740,581.274	39.807369104	-80.643334954	
9,813.00	89.31	150.230	6,995.79	2,140.76	-557.44	14,456,708.099	1,740,628.193	39.807144923	-80.643169044	
9,907.00	89.48	149.920	6,996.78	2,059.29	-510.54	14,456,626.636	1,740,675.084	39.806920693	-80.643003237	
10,001.00	89.44	149.830	6,997.67	1,977.99	-463.37	14,456,545.336	1,740,722.259	39.806696907	-80.642836416	
10,095.00	90.23	148.640	6,997.94	1,897.22	-415.29	14,456,464.567	1,740,770.340	39.806474570	-80.642666362	
10,189.00	90.06	149.090	6,997.70	1,816.76	-366.68	14,456,384.108	1,740,818.943	39.806253078	-80.642494447	
10,283.00	89.57	149.040	6,998.01	1,736.14	-318.36	14,456,303.481	1,740,867.265	39.806031126	-80.642323537	
10,377.00	89.70	149.530	6,998.61	1,655.33	-270.35	14,456,222.669	1,740,915.276	39.805808671	-80.642153737	
10,471.00	88.86	149.880	6,999.79	1,574.17	-222.94	14,456,141.513	1,740,962.690	39.805585278	-80.641986068	
10,566.00	89.93	149.970	7,000.79	1,491.96	-175.33	14,456,059.309	1,741,010.294	39.805359003	-80.641817738	
10,660.00	89.88	149.920	7,000.95	1,410.60	-128.26	14,455,977.948	1,741,057.372	39.805135049	-80.641651272	
10,754.00	90.06	150.410	7,000.99	1,329.06	-81.49	14,455,896.407	1,741,104.137	39.804910605	-80.641485922	



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Fitzgerald 09 HM (slot H)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>TVD Reference:</b>	RKB=1293+33 @ 1326.00ft (Nabors X08)
<b>Site:</b>	Fitzgerald	<b>MD Reference:</b>	RKB=1293+33 @ 1326.00ft (Nabors X08)
<b>Well:</b>	Fitzgerald 09 HM (slot H)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Sidetrack 01	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Sidetrack 01	<b>Database:</b>	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	
10,848.00	89.66	149.750	7,001.22	1,247.59	-34.60	14,455,814.936	1,741,151.023	39.804686351	-80.641320144	
10,942.00	89.79	149.790	7,001.68	1,166.38	12.72	14,455,733.720	1,741,198.349	39.804462792	-80.641152796	
11,037.00	89.84	149.790	7,001.98	1,084.28	60.52	14,455,651.623	1,741,246.150	39.804236807	-80.640983770	
11,132.00	89.44	150.720	7,002.58	1,001.80	107.65	14,455,569.143	1,741,293.281	39.804009778	-80.640817133	
11,226.00	89.75	150.100	7,003.24	920.06	154.07	14,455,487.405	1,741,339.696	39.803784795	-80.640653040	
11,320.00	90.01	150.010	7,003.44	838.61	200.99	14,455,405.954	1,741,386.618	39.803560594	-80.640487138	
11,414.00	89.75	149.880	7,003.64	757.25	248.07	14,455,324.593	1,741,433.696	39.803336639	-80.640320680	
11,509.00	89.84	149.530	7,003.98	675.22	295.99	14,455,242.567	1,741,481.618	39.803110848	-80.640151226	
11,604.00	89.88	149.790	7,004.21	593.23	343.98	14,455,160.579	1,741,529.605	39.802885158	-80.639981542	
11,698.00	89.97	149.880	7,004.33	511.96	391.21	14,455,079.308	1,741,576.839	39.802661449	-80.639814530	
11,792.00	89.75	151.070	7,004.56	430.17	437.54	14,454,997.517	1,741,623.162	39.802436319	-80.639650772	
11,887.00	89.57	150.410	7,005.13	347.29	483.97	14,454,914.640	1,741,669.594	39.802208206	-80.639486640	
11,981.00	89.93	151.330	7,005.54	265.18	529.73	14,454,832.531	1,741,715.351	39.801982210	-80.639324901	
12,075.00	89.62	151.770	7,005.90	182.54	574.51	14,454,749.885	1,741,760.132	39.801754747	-80.639166650	
12,168.00	89.40	151.380	7,006.70	100.75	618.77	14,454,668.100	1,741,804.399	39.801529657	-80.639010215	
12,262.00	89.88	151.160	7,007.29	18.33	663.96	14,454,585.674	1,741,849.582	39.801302796	-80.638850528	
12,356.00	89.31	151.240	7,007.96	-64.04	709.24	14,454,503.304	1,741,894.865	39.801076086	-80.638690484	
12,450.00	89.53	151.910	7,008.91	-146.71	753.98	14,454,420.641	1,741,939.607	39.800848579	-80.638532373	
12,545.00	89.48	150.630	7,009.73	-230.01	799.64	14,454,337.341	1,741,985.269	39.800619311	-80.638370997	
12,638.00	89.79	150.890	7,010.32	-311.15	845.07	14,454,256.193	1,742,030.696	39.800395956	-80.638210429	
12,732.00	89.35	151.510	7,011.03	-393.52	890.35	14,454,173.823	1,742,075.979	39.800169246	-80.638050391	
12,826.00	89.84	150.540	7,011.69	-475.76	935.89	14,454,091.593	1,742,121.513	39.799942916	-80.637889457	
12,920.00	89.70	150.190	7,012.07	-557.46	982.37	14,454,009.889	1,742,167.993	39.799718023	-80.637725150	
13,014.00	89.70	149.970	7,012.56	-638.93	1,029.25	14,453,928.419	1,742,214.879	39.799493765	-80.637559397	
13,107.00	89.79	149.920	7,012.97	-719.42	1,075.83	14,453,847.924	1,742,261.455	39.799272190	-80.637394730	
13,202.00	90.01	149.350	7,013.14	-801.39	1,123.85	14,453,765.957	1,742,309.478	39.799046553	-80.637224937	
13,296.00	89.75	149.090	7,013.34	-882.15	1,171.96	14,453,685.198	1,742,357.582	39.798824236	-80.637054840	
13,392.00	89.88	149.440	7,013.65	-964.67	1,221.02	14,453,602.683	1,742,406.644	39.798597084	-80.636881357	
13,486.00	89.53	149.390	7,014.13	-1,045.59	1,268.85	14,453,521.762	1,742,454.472	39.798374323	-80.636712246	
13,580.00	89.88	149.610	7,014.61	-1,126.58	1,316.55	14,453,440.770	1,742,502.179	39.798151369	-80.636543565	
13,676.00	89.75	149.260	7,014.92	-1,209.24	1,365.37	14,453,358.109	1,742,550.996	39.797923820	-80.636370960	
13,769.00	89.62	149.660	7,015.44	-1,289.34	1,412.63	14,453,278.012	1,742,598.253	39.797703327	-80.636203876	
13,864.00	89.66	148.950	7,016.03	-1,371.02	1,461.12	14,453,196.324	1,742,646.746	39.797478452	-80.636032412	
13,957.00	89.70	149.570	7,016.55	-1,450.96	1,508.66	14,453,116.393	1,742,694.281	39.797258411	-80.635864335	
14,052.00	89.53	149.790	7,017.19	-1,532.96	1,556.61	14,453,034.389	1,742,742.238	39.797032674	-80.635694784	
<b>Tie into original hole @ 14052 MD</b>										
14,131.00	88.00	151.810	7,018.89	-1,601.90	1,595.14	14,452,965.450	1,742,780.767	39.796842921	-80.635558613	
14,146.00	86.86	151.550	7,019.57	-1,615.09	1,602.25	14,452,952.259	1,742,787.876	39.796806615	-80.635533496	
14,163.00	86.02	150.850	7,020.62	-1,629.96	1,610.43	14,452,937.391	1,742,796.050	39.796765692	-80.635504611	
14,194.00	88.04	148.470	7,022.23	-1,656.67	1,626.06	14,452,910.676	1,742,811.686	39.796692152	-80.635449330	
14,226.00	89.76	147.330	7,022.84	-1,683.77	1,643.06	14,452,883.575	1,742,828.687	39.796617535	-80.635389197	
14,257.00	90.15	147.240	7,022.87	-1,709.86	1,659.82	14,452,857.493	1,742,845.441	39.796545720	-80.635329928	
14,289.00	91.43	147.510	7,022.42	-1,736.81	1,677.07	14,452,830.545	1,742,862.692	39.796471522	-80.635268905	
14,320.00	91.82	147.150	7,021.55	-1,762.89	1,693.80	14,452,804.460	1,742,879.419	39.796399699	-80.635209732	
14,415.00	91.08	147.940	7,019.14	-1,843.03	1,744.76	14,452,724.325	1,742,930.382	39.796179059	-80.635029459	
14,509.00	91.30	149.180	7,017.19	-1,923.21	1,793.78	14,452,644.144	1,742,979.401	39.795958315	-80.634856107	
14,603.00	89.63	150.760	7,016.43	-2,004.58	1,840.82	14,452,562.771	1,743,026.439	39.795734317	-80.634689829	
14,696.00	89.41	154.270	7,017.21	-2,087.07	1,883.73	14,452,480.283	1,743,069.352	39.795507308	-80.634538254	
14,790.00	89.10	153.660	7,018.43	-2,171.52	1,924.98	14,452,395.830	1,743,110.606	39.795274916	-80.634392611	
14,884.00	91.25	157.260	7,018.14	-2,257.01	1,964.02	14,452,310.340	1,743,149.638	39.795039704	-80.634254897	
14,979.00	91.08	156.120	7,016.21	-2,344.24	2,001.60	14,452,223.114	1,743,187.222	39.794799739	-80.634122365	
15,073.00	91.78	157.260	7,013.86	-2,430.54	2,038.78	14,452,136.816	1,743,224.406	39.794562326	-80.633991244	
15,168.00	90.29	154.710	7,012.15	-2,517.29	2,077.44	14,452,050.063	1,743,263.058	39.794323649	-80.633854902	
15,262.00	91.08	159.370	7,011.02	-2,603.81	2,114.09	14,451,963.541	1,743,299.714	39.794085627	-80.633725667	



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Fitzgerald 09 HM (slot H)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>TVD Reference:</b>	RKB=1293+33 @ 1326.00ft (Nabors X08)
<b>Site:</b>	Fitzgerald	<b>MD Reference:</b>	RKB=1293+33 @ 1326.00ft (Nabors X08)
<b>Well:</b>	Fitzgerald 09 HM (slot H)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Sidetrack 01	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Sidetrack 01	<b>Database:</b>	DB_Feb2822

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
15,357.00	90.37	155.770	7,009.82	-2,691.60	2,150.33	14,451,875.751	1,743,335.953	39.793844126	-80.633597935
15,451.00	91.08	153.750	7,008.63	-2,776.62	2,190.41	14,451,790.737	1,743,376.030	39.793610207	-80.633456500
15,544.00	90.64	158.140	7,007.23	-2,861.51	2,228.30	14,451,705.844	1,743,413.924	39.793376646	-80.633322834
15,638.00	90.86	155.420	7,006.00	-2,947.88	2,265.36	14,451,619.474	1,743,450.978	39.793139036	-80.633192182
15,733.00	91.65	156.030	7,003.92	-3,034.46	2,304.40	14,451,532.896	1,743,490.024	39.792900832	-80.633054441
15,828.00	89.05	156.730	7,003.34	-3,121.49	2,342.46	14,451,445.864	1,743,528.083	39.792661395	-80.632920222
15,922.00	87.43	158.140	7,006.23	-3,208.25	2,378.51	14,451,359.107	1,743,564.135	39.792422733	-80.632793145
16,016.00	85.76	158.050	7,011.81	-3,295.30	2,413.52	14,451,272.050	1,743,599.140	39.792183261	-80.632669800
16,111.00	86.24	158.760	7,018.44	-3,383.42	2,448.40	14,451,183.935	1,743,634.019	39.791940882	-80.632546923
16,205.00	86.68	156.470	7,024.24	-3,470.16	2,484.12	14,451,097.190	1,743,669.746	39.791702258	-80.632421004
16,299.00	87.38	156.730	7,029.11	-3,556.32	2,521.41	14,451,011.038	1,743,707.027	39.791465243	-80.632289545
16,393.00	86.55	156.380	7,034.09	-3,642.43	2,558.75	14,450,924.920	1,743,744.374	39.791228323	-80.632157855
16,488.00	86.51	156.120	7,039.84	-3,729.23	2,596.94	14,450,838.125	1,743,782.565	39.790989532	-80.632023170
16,583.00	87.65	156.120	7,044.68	-3,815.98	2,635.35	14,450,751.372	1,743,820.972	39.790750854	-80.631887714
16,677.00	88.26	155.850	7,048.04	-3,901.79	2,673.58	14,450,665.564	1,743,859.203	39.790514773	-80.631752873
16,772.00	89.01	155.940	7,050.30	-3,988.48	2,712.37	14,450,578.874	1,743,897.991	39.790276263	-80.631616065
16,867.00	88.44	156.210	7,052.41	-4,075.30	2,750.89	14,450,492.059	1,743,936.507	39.790037412	-80.631480225
16,926.00	88.48	156.470	7,054.00	-4,129.32	2,774.55	14,450,438.038	1,743,960.176	39.789888790	-80.631396760
<b>Survey @ 16926.00 MD 7054.00 TVD</b>									
16,986.00	88.48	156.470	7,055.59	-4,184.31	2,798.50	14,450,383.046	1,743,984.121	39.789737500	-80.631312326
<b>Survey Proj. to 16986.00 MD 7055.59 TVD</b>									

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
14,052.00	7,017.19	-1,532.96	1,556.61	Tie into original hole @ 14052 MD
16,926.00	7,054.00	-4,129.32	2,774.55	Survey @ 16926.00 MD 7054.00 TVD
16,986.00	7,055.59	-4,184.31	2,798.50	Survey Proj. to 16986.00 MD 7055.59 TVD

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