



Well: Fitzgerald 01 HM (slot P)
 Site: Fitzgerald
 Project: Marshall County, West Virginia NAD83 UTM 17N
 Design: rev9
 Rig: Nabors X08

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Annotation
1	14797.00	89.36	149.35	6984.31	-5416.03	-3127.37	0.00	0.00	5765.03	Tie in survey @ 14797 MD
2	14842.00	89.07	149.85	6984.92	-5454.84	-3104.60	1.29	120.02	5800.68	S/T Begin 2°/100' drop/turn (140L)
3	14852.00	88.92	149.72	6985.10	-5463.48	-3099.57	2.00	-140.00	5808.62	Begin 2°/100' drop/turn
4	15052.00	88.57	145.74	6989.48	-5632.51	-2992.84	2.00	-95.00	5962.96	Begin 2°/100' build/turn
5	15077.14	89.00	146.00	6990.02	-5653.32	-2978.73	2.00	31.47	5981.84	Begin 89.00° lateral
6	15377.14	89.00	146.00	6995.25	-5901.99	-2811.00	0.00	0.00	6207.55	Begin 2°/100' turn
7	15574.86	89.00	149.95	6998.70	-6069.56	-2706.20	2.00	89.98	6360.68	Begin 89.00° lateral
8	18756.09	89.00	149.95	7054.00	-8822.92	-1113.65	0.00	0.00	8892.93	PBHLTD

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
Fitzgerald-01HM BHL r9	7054.00	-8822.92	-1153.65	14445720.262	1740032.177	39.776976200	-80.645446240

ANNOTATIONS SURVEYS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Annotation
153.09	0.33	174.60	153.09	-0.38	0.04	0.37	MWD surveys
15854.00	88.96	150.15	7001.52	-6332.42	-2600.93	6616.19	Top of Fish @ 15854.00 MD 7001.52 TVD
15920.00	89.12	149.53	7002.63	-6389.48	-2567.78	6668.47	Bottom of Fish @ 15920.00 MD 7002.63 TVD
18675.00	89.32	148.38	7052.07	-8770.95	-1183.61	8850.37	Survey @ 18675.00 MD 7052.07 TVD
18732.00	89.32	148.38	7052.75	-8819.48	-1153.73	8894.62	Survey Proj. to 18732.00 MD 7052.75 TVD

ANNOTATIONS SURVEYS

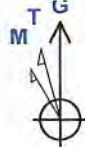
MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Annotation
14797.00	89.36	149.35	6984.31	-5416.03	-3127.37	5765.03	Tie into original hole @ 14797 MD
18712.00	90.55	151.99	7059.74	-8765.34	-1109.99	8835.35	Survey @ 18712.00 MD 7059.74 TVD
18784.00	90.55	151.99	7059.04	-8828.91	-1076.18	8894.17	Survey Proj. to 18784.00 MD 7059.04 TVD

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

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

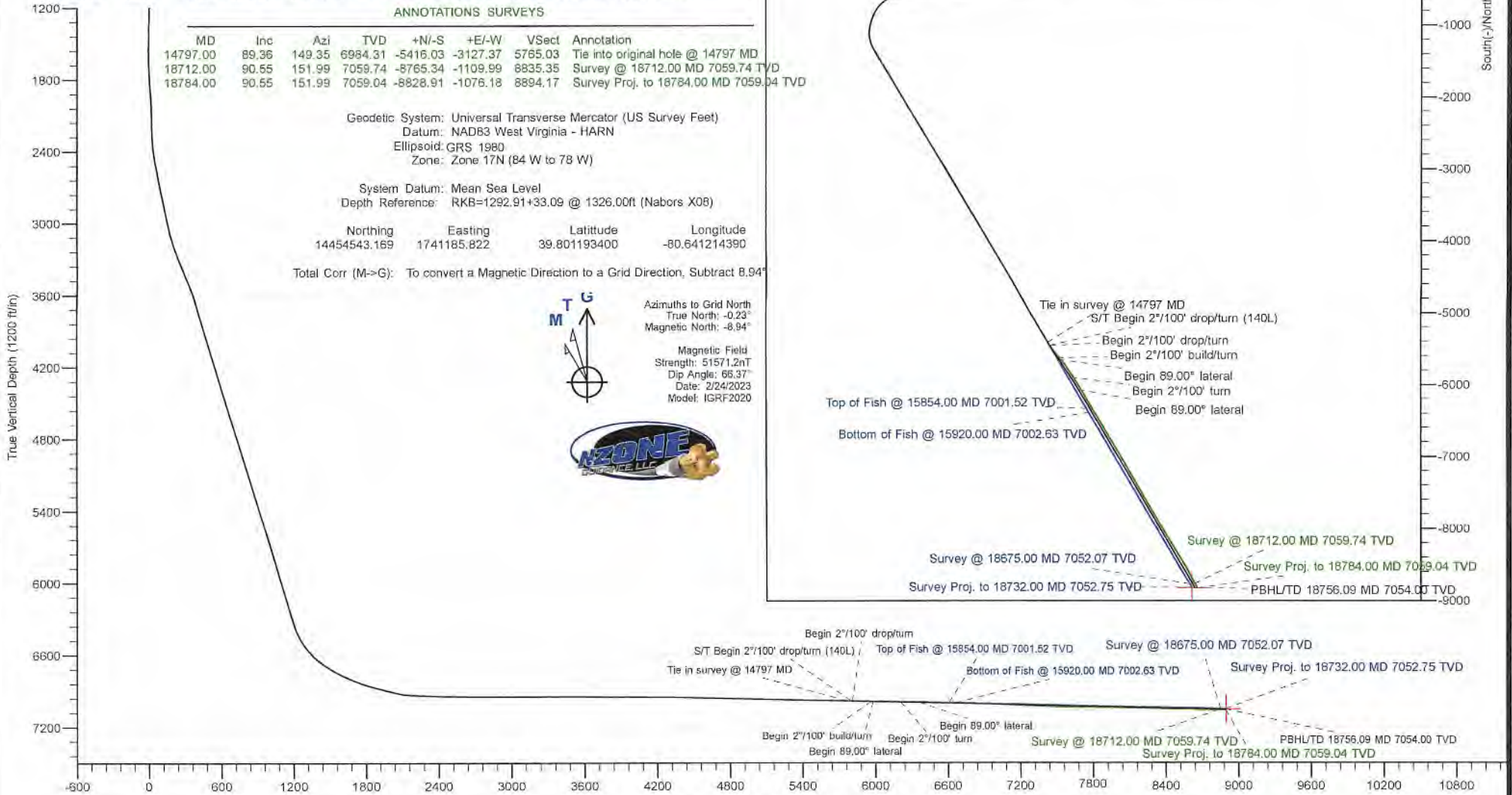
Northing	Easting	Latitude	Longitude
14454543.169	1741185.822	39.801193400	-80.641214390

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: 51571.2nT
 Dip Angle: 66.37°
 Date: 2/24/2023
 Model: IGRF2020



Vertical Section at 187.19° (1200 ft/in)

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Fitzgerald 01 HM (slot P)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
Site:	Fitzgerald	MD Reference:	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
Well:	Fitzgerald 01 HM (slot P)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Decv0422v16

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 01 HM (slot P)					
Well Position	+N/-S	0.00 ft	Northing:	14,454,543.170 usft	Latitude:	39.801193400
	+E/-W	0.00 ft	Easting:	1,741,185.822 usft	Longitude:	-80.641214390
Position Uncertainty	0.00 ft		Wellhead Elevation:	ft	Ground Level:	1,292.91 ft

Wellbore	Sidetrack 01				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2020	2/24/2023	-8.71	66.37	51,571.18094532

Design	Surveys Sidetrack 01				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	14,797.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.00	0.00	0.00	187.19	

Survey Program	Date	3/6/2023			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
21.09	1,140.09	MWD surf (Original Hole)	MWD	MWD - Standard	
1,213.09	2,670.09	MWD int (Original Hole)	MWD	MWD - Standard	
2,797.00	14,797.00	MWD (Original Hole)	MWD	MWD - Standard	
14,848.00	18,712.00	MWD ST1 (Sidetrack 01)	MWD	MWD - Standard	
18,784.00	18,784.00	Projection (Sidetrack 01)	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	0.00	0.00	0.00	0.00	14,454,543.170	1,741,185.822	39.801193400	-80.641214390	
21.09	0.00	0.00	21.09	0.00	0.00	14,454,543.170	1,741,185.822	39.801193400	-80.641214390	
153.09	0.33	174.60	153.09	-0.38	0.04	14,454,542.791	1,741,185.858	39.801192360	-80.641214268	
198.09	0.27	98.32	198.09	-0.52	0.15	14,454,542.647	1,741,185.975	39.801191962	-80.641213853	
242.09	0.28	118.34	242.09	-0.59	0.35	14,454,542.581	1,741,186.173	39.801191779	-80.641213152	
286.09	0.05	87.83	286.09	-0.64	0.46	14,454,542.530	1,741,186.286	39.801191639	-80.641212747	
330.09	0.30	172.04	330.09	-0.75	0.50	14,454,542.417	1,741,186.321	39.801191328	-80.641212624	

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Fitzgerald 01 HM (slot P)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
Site:	Fitzgerald	MD Reference:	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
Well:	Fitzgerald 01 HM (slot P)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	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	
374.09	0.26	201.57	374.09	-0.96	0.48	14,454,542.210	1,741,186.301	39.801190760	-80.641212700	
418.09	0.32	171.12	418.09	-1.17	0.46	14,454,541.996	1,741,186.283	39.801190171	-80.641212767	
462.09	0.25	259.55	462.09	-1.31	0.39	14,454,541.857	1,741,186.208	39.801189791	-80.641213037	
506.09	0.06	139.50	506.09	-1.35	0.31	14,454,541.822	1,741,186.128	39.801189696	-80.641213321	
551.09	0.46	258.73	551.09	-1.40	0.14	14,454,541.769	1,741,185.966	39.801189552	-80.641213898	
595.09	0.21	278.51	595.09	-1.42	-0.11	14,454,541.746	1,741,185.713	39.801189492	-80.641214799	
639.09	0.13	187.65	639.08	-1.46	-0.20	14,454,541.709	1,741,185.627	39.801189390	-80.641215107	
683.09	0.11	217.72	683.08	-1.54	-0.23	14,454,541.626	1,741,185.594	39.801189163	-80.641215224	
728.09	0.13	323.14	728.08	-1.54	-0.29	14,454,541.633	1,741,185.537	39.801189182	-80.641215427	
772.09	0.08	242.07	772.08	-1.51	-0.34	14,454,541.658	1,741,185.480	39.801189253	-80.641215629	
816.09	0.09	348.62	816.08	-1.49	-0.38	14,454,541.678	1,741,185.446	39.801189307	-80.641215750	
861.09	-0.01	27.26	861.08	-1.45	-0.38	14,454,541.716	1,741,185.441	39.801189411	-80.641215768	
905.09	0.07	249.75	905.08	-1.46	-0.40	14,454,541.710	1,741,185.418	39.801189396	-80.641215852	
949.09	0.21	259.65	949.08	-1.48	-0.51	14,454,541.686	1,741,185.313	39.801189331	-80.641216224	
993.09	0.16	263.76	993.08	-1.50	-0.65	14,454,541.665	1,741,185.173	39.801189275	-80.641216724	
1,037.09	0.57	233.02	1,037.08	-1.64	-0.89	14,454,541.527	1,741,184.937	39.801188897	-80.641217566	
1,081.09	0.59	300.50	1,081.08	-1.66	-1.26	14,454,541.510	1,741,184.567	39.801188856	-80.641218884	
1,125.09	0.79	272.73	1,125.08	-1.53	-1.75	14,454,541.639	1,741,184.069	39.801189217	-80.641220656	
1,140.09	0.57	291.70	1,140.08	-1.50	-1.93	14,454,541.672	1,741,183.896	39.801189308	-80.641221270	
1,213.09	0.66	284.23	1,213.07	-1.26	-2.67	14,454,541.909	1,741,183.151	39.801189969	-80.641223919	
1,257.09	1.53	321.87	1,257.07	-0.74	-3.28	14,454,542.434	1,741,182.543	39.801191415	-80.641226077	
1,301.09	2.14	331.08	1,301.04	0.45	-4.04	14,454,543.615	1,741,181.783	39.801194667	-80.641228766	
1,345.09	2.26	338.82	1,345.01	1.97	-4.75	14,454,545.143	1,741,181.072	39.801198871	-80.641231275	
1,390.09	1.44	339.35	1,389.99	3.33	-5.27	14,454,546.499	1,741,180.552	39.801202602	-80.641233107	
1,434.09	0.70	334.27	1,433.98	4.09	-5.58	14,454,547.259	1,741,180.240	39.801204691	-80.641234206	
1,478.09	0.66	44.23	1,477.98	4.51	-5.52	14,454,547.683	1,741,180.301	39.801205854	-80.641233986	
1,522.09	1.50	86.25	1,521.97	4.73	-4.77	14,454,547.902	1,741,181.052	39.801206448	-80.641231307	
1,566.09	2.42	92.58	1,565.94	4.73	-3.27	14,454,547.898	1,741,182.555	39.801206420	-80.641225957	
1,611.09	2.69	100.74	1,610.90	4.49	-1.28	14,454,547.658	1,741,184.541	39.801205741	-80.641218887	
1,655.09	2.77	121.36	1,654.85	3.74	0.64	14,454,546.912	1,741,186.464	39.801203672	-80.641212054	
1,699.09	2.48	143.06	1,698.80	2.43	2.12	14,454,545.598	1,741,187.944	39.801200046	-80.641206803	
1,743.09	3.02	165.90	1,742.75	0.54	2.98	14,454,543.713	1,741,188.798	39.801194860	-80.641203787	
1,787.09	3.52	195.16	1,786.69	-1.88	2.90	14,454,541.285	1,741,188.727	39.801188193	-80.641204074	
1,831.09	4.46	208.73	1,830.58	-4.69	1.73	14,454,538.481	1,741,187.552	39.801180505	-80.641208300	
1,875.09	5.49	218.48	1,874.41	-7.84	-0.40	14,454,535.333	1,741,185.419	39.801171883	-80.641215936	
1,920.09	6.35	225.87	1,919.17	-11.25	-3.53	14,454,531.915	1,741,182.294	39.801162531	-80.641227114	
1,964.09	6.57	241.95	1,962.90	-14.13	-7.50	14,454,529.037	1,741,178.325	39.801154671	-80.641241284	
2,008.09	7.12	258.48	2,006.59	-15.86	-12.39	14,454,527.309	1,741,173.431	39.801149978	-80.641258733	
2,052.09	8.61	268.33	2,050.18	-16.50	-18.36	14,454,526.668	1,741,167.467	39.801148284	-80.641279979	
2,097.09	10.25	271.65	2,094.57	-16.48	-25.73	14,454,526.685	1,741,160.097	39.801148413	-80.641306217	
2,141.09	12.46	273.25	2,137.70	-16.10	-34.38	14,454,527.067	1,741,151.444	39.801149557	-80.641337021	
2,185.09	14.42	272.99	2,180.50	-15.55	-44.59	14,454,527.622	1,741,141.233	39.801151193	-80.641373369	
2,229.09	16.38	271.27	2,222.91	-15.12	-56.26	14,454,528.045	1,741,129.558	39.801152484	-80.641414930	
2,273.09	18.53	269.49	2,264.89	-15.05	-69.46	14,454,528.120	1,741,116.362	39.801152836	-80.641461911	
2,317.09	20.55	267.91	2,306.35	-15.39	-84.17	14,454,527.777	1,741,101.652	39.801152053	-80.641514291	
2,362.09	21.05	262.74	2,348.42	-16.70	-100.08	14,454,526.467	1,741,085.741	39.801148632	-80.641570959	
2,406.09	20.94	256.50	2,389.50	-19.54	-115.57	14,454,523.633	1,741,070.255	39.801141018	-80.641626136	
2,450.09	21.91	254.90	2,430.45	-23.51	-131.14	14,454,519.659	1,741,054.683	39.801130276	-80.641681634	
2,494.09	22.67	253.45	2,471.18	-28.07	-147.19	14,454,515.105	1,741,038.629	39.801117946	-80.641738858	
2,538.09	23.96	254.13	2,511.58	-32.92	-163.92	14,454,510.246	1,741,021.907	39.801104787	-80.641798465	
2,582.09	25.39	254.49	2,551.56	-37.89	-181.60	14,454,505.280	1,741,004.223	39.801091344	-80.641861499	
2,626.09	26.71	254.72	2,591.09	-43.02	-200.23	14,454,500.151	1,740,985.593	39.801077464	-80.641927899	
2,670.09	28.45	255.77	2,630.09	-48.20	-219.93	14,454,494.969	1,740,965.894	39.801063447	-80.641998111	
2,797.00	30.20	253.15	2,740.74	-64.89	-279.79	14,454,478.284	1,740,906.036	39.801018283	-80.642211466	

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 17N
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Wellbore: Sidetrack 01
Design: Surveys Sidetrack 01

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MD Reference: RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: 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
2,891.00	31.38	257.28	2,821.50	-77.13	-326.29	14,454,466.040	1,740,859.530	39.800985170	-80.642377222
2,984.00	34.55	260.97	2,899.52	-86.60	-375.97	14,454,456.566	1,740,809.849	39.800959698	-80.642554241
3,078.00	37.23	262.11	2,975.67	-94.69	-430.48	14,454,448.478	1,740,755.347	39.800938083	-80.642748402
3,172.00	40.09	260.80	3,049.07	-103.44	-488.53	14,454,439.733	1,740,697.289	39.800914704	-80.642955235
3,266.00	43.34	259.30	3,119.23	-114.27	-550.13	14,454,428.902	1,740,635.697	39.800885633	-80.643174682
3,360.00	45.27	258.25	3,186.49	-127.06	-614.52	14,454,416.112	1,740,571.303	39.800851213	-80.643404131
3,453.00	47.08	257.98	3,250.89	-140.88	-680.17	14,454,402.292	1,740,505.649	39.800813978	-80.643638080
3,546.00	49.85	258.77	3,312.55	-154.89	-748.36	14,454,388.275	1,740,437.468	39.800776232	-80.643881031
3,640.00	52.44	258.77	3,371.51	-169.15	-820.15	14,454,374.021	1,740,365.674	39.800737870	-80.644136845
3,734.00	55.60	259.74	3,426.73	-183.32	-894.87	14,454,359.854	1,740,290.950	39.800699779	-80.644403093
3,865.00	55.87	260.27	3,500.49	-202.11	-1,001.49	14,454,341.064	1,740,184.330	39.800649341	-80.644782966
3,959.00	55.38	262.38	3,553.57	-213.81	-1,078.18	14,454,329.359	1,740,107.642	39.800618032	-80.645056170
4,052.00	55.38	262.64	3,606.40	-223.79	-1,154.06	14,454,319.383	1,740,031.762	39.800591461	-80.645326472
4,147.00	55.16	264.93	3,660.53	-232.24	-1,231.67	14,454,310.930	1,739,954.154	39.800569090	-80.645602904
4,241.00	55.12	265.19	3,714.26	-238.88	-1,308.52	14,454,304.288	1,739,877.309	39.800551685	-80.645876594
4,336.00	55.16	265.02	3,768.56	-245.53	-1,386.18	14,454,297.636	1,739,799.641	39.800534261	-80.646153214
4,430.00	55.08	265.28	3,822.31	-252.05	-1,463.02	14,454,291.116	1,739,722.805	39.800517190	-80.646426873
4,525.00	55.08	265.19	3,876.69	-258.52	-1,540.65	14,454,284.645	1,739,645.178	39.800500262	-80.646703342
4,619.00	55.16	264.75	3,930.45	-265.29	-1,617.46	14,454,277.884	1,739,568.363	39.800482526	-80.646979929
4,711.00	55.12	264.84	3,983.03	-272.13	-1,692.64	14,454,271.036	1,739,493.184	39.800464533	-80.647244691
4,805.00	55.08	264.75	4,036.82	-279.13	-1,769.42	14,454,264.042	1,739,416.407	39.800446156	-80.647518141
4,900.00	55.25	265.19	4,091.08	-285.96	-1,847.09	14,454,257.205	1,739,338.732	39.800428222	-80.647794789
4,995.00	55.03	264.93	4,145.38	-292.88	-1,924.76	14,454,250.493	1,739,261.070	39.800410627	-80.648071390
5,089.00	55.03	265.02	4,199.26	-299.42	-2,001.49	14,454,243.746	1,739,184.337	39.800392925	-80.648344680
5,182.00	55.03	264.58	4,252.56	-306.33	-2,077.38	14,454,236.839	1,739,108.442	39.800374777	-80.648614990
5,277.00	55.03	264.58	4,307.01	-313.68	-2,154.88	14,454,229.486	1,739,030.943	39.800355418	-80.648891020
5,371.00	55.08	264.93	4,360.85	-320.73	-2,231.61	14,454,222.442	1,738,954.214	39.800336901	-80.649164302
5,466.00	55.08	265.19	4,415.23	-327.44	-2,309.22	14,454,215.735	1,738,876.608	39.800319315	-80.649440700
5,560.00	54.95	265.19	4,469.13	-333.89	-2,385.96	14,454,209.277	1,738,799.865	39.800302406	-80.649714023
5,655.00	54.99	264.66	4,523.66	-340.77	-2,463.45	14,454,202.395	1,738,722.379	39.800284340	-80.649989995
5,748.00	54.99	264.58	4,577.01	-347.92	-2,539.28	14,454,195.254	1,738,646.543	39.800265541	-80.650260098
5,843.00	54.81	264.58	4,631.64	-355.26	-2,616.66	14,454,187.912	1,738,569.167	39.800246209	-80.650535689
5,938.00	54.77	264.75	4,686.41	-362.48	-2,693.94	14,454,180.695	1,738,491.884	39.800227218	-80.650810943
6,033.00	55.12	264.75	4,740.98	-369.59	-2,771.38	14,454,173.579	1,738,414.444	39.800208506	-80.651086758
6,127.00	54.90	264.84	4,794.88	-376.58	-2,848.08	14,454,166.593	1,738,337.752	39.800190141	-80.651359906
6,221.00	55.21	264.93	4,848.72	-383.45	-2,924.82	14,454,159.724	1,738,261.007	39.800172096	-80.651633241
6,316.00	55.43	264.58	4,902.78	-390.59	-3,002.62	14,454,152.582	1,738,183.212	39.800153314	-80.651910317
6,409.00	55.56	264.58	4,955.46	-397.83	-3,078.91	14,454,145.343	1,738,106.915	39.800134249	-80.652182060
6,504.00	55.56	264.84	5,009.19	-405.05	-3,156.93	14,454,138.119	1,738,028.901	39.800115244	-80.652459918
6,598.00	55.43	264.93	5,062.44	-411.96	-3,234.08	14,454,131.213	1,737,951.746	39.800097100	-80.652734711
6,692.00	55.60	265.02	5,115.66	-418.74	-3,311.27	14,454,124.426	1,737,874.563	39.800079284	-80.653009606
6,787.00	55.34	264.66	5,169.51	-425.78	-3,389.21	14,454,117.388	1,737,796.616	39.800060784	-80.653282719
6,881.00	55.30	265.19	5,222.99	-432.82	-3,466.21	14,454,110.550	1,737,719.620	39.800042824	-80.653561448
6,976.00	54.81	264.75	5,277.41	-439.45	-3,543.78	14,454,103.723	1,737,642.049	39.800024901	-80.653837723
7,071.00	55.25	264.66	5,331.86	-446.63	-3,621.30	14,454,096.539	1,737,564.533	39.800005994	-80.654113804
7,165.00	54.77	264.84	5,385.76	-453.68	-3,697.98	14,454,089.492	1,737,487.847	39.799987456	-80.654386930
7,259.00	55.16	264.49	5,439.72	-460.83	-3,774.62	14,454,082.336	1,737,411.214	39.799968614	-80.654659870
7,353.00	55.21	264.58	5,493.39	-468.18	-3,851.44	14,454,074.986	1,737,334.391	39.799949243	-80.654933487
7,447.00	55.03	264.66	5,547.15	-475.42	-3,928.21	14,454,067.755	1,737,257.618	39.799930199	-80.655206926
7,541.00	54.99	264.75	5,601.05	-482.52	-4,004.89	14,454,060.649	1,737,180.937	39.799911493	-80.655480033
7,635.00	55.60	264.66	5,654.57	-489.65	-4,081.84	14,454,053.517	1,737,103.990	39.799892721	-80.655754087
7,730.00	55.60	265.45	5,708.24	-496.41	-4,159.93	14,454,046.760	1,737,025.897	39.799874990	-80.656032217
7,824.00	55.56	265.54	5,761.37	-502.50	-4,237.24	14,454,040.670	1,736,948.595	39.799859080	-80.656307523
7,919.00	55.30	265.81	5,815.28	-508.40	-4,315.24	14,454,034.770	1,736,870.591	39.799843700	-80.656585322

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Fitzgerald 01 HM (slot P)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
Site:	Fitzgerald	MD Reference:	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
Well:	Fitzgerald 01 HM (slot P)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	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	
8,013.00	55.60	265.28	5,868.59	-514.41	-4,392.43	14,454,028.756	1,736,793.404	39.799827996	-80.656860215	
8,107.00	55.69	265.19	5,921.63	-520.86	-4,469.76	14,454,022.309	1,736,716.070	39.799811107	-80.657135638	
8,201.00	55.56	265.28	5,974.71	-527.31	-4,547.08	14,454,015.865	1,736,638.755	39.799794221	-80.657410995	
8,296.00	55.60	265.28	6,028.41	-533.75	-4,625.18	14,454,009.416	1,736,560.654	39.799777332	-80.657689149	
8,390.00	55.69	265.45	6,081.45	-540.03	-4,702.53	14,454,003.145	1,736,483.305	39.799760923	-80.657964621	
8,484.00	55.69	265.28	6,134.44	-546.30	-4,779.92	14,453,996.871	1,736,405.915	39.799744504	-80.658240240	
8,579.00	55.60	265.63	6,188.05	-552.51	-4,858.10	14,453,990.656	1,736,327.734	39.799728256	-80.658518675	
8,673.00	55.78	265.45	6,241.03	-558.55	-4,935.51	14,453,984.618	1,736,250.326	39.799712465	-80.658794358	
8,768.00	55.69	265.63	6,294.52	-564.66	-5,013.78	14,453,978.513	1,736,172.052	39.799696537	-80.659073123	
8,862.00	55.96	265.37	6,347.32	-570.76	-5,091.31	14,453,972.411	1,736,094.523	39.799680591	-80.659349233	
8,909.00	55.56	264.14	6,373.77	-574.31	-5,130.00	14,453,968.860	1,736,055.833	39.799671244	-80.659487032	
8,956.00	53.85	260.09	6,400.93	-579.56	-5,167.98	14,453,963.614	1,736,017.847	39.799657233	-80.659622343	
9,003.00	52.13	255.44	6,429.23	-587.49	-5,204.65	14,453,955.681	1,735,981.184	39.799635830	-80.659752984	
9,050.00	51.87	250.95	6,458.18	-598.19	-5,240.09	14,453,944.981	1,735,945.745	39.799606814	-80.659879306	
9,097.00	50.37	246.56	6,487.68	-611.43	-5,274.18	14,453,931.743	1,735,911.654	39.799570816	-80.660000858	
9,145.00	50.20	242.52	6,518.36	-627.29	-5,307.50	14,453,915.878	1,735,878.329	39.799527594	-80.660119722	
9,192.00	50.64	237.77	6,548.32	-645.32	-5,338.90	14,453,897.850	1,735,846.930	39.799478413	-80.660231754	
9,240.00	52.22	233.73	6,578.25	-666.45	-5,369.90	14,453,876.725	1,735,815.930	39.799420722	-80.660342410	
9,287.00	53.71	229.60	6,606.57	-689.72	-5,399.31	14,453,853.453	1,735,786.521	39.799357118	-80.660447431	
9,333.00	54.86	223.97	6,633.43	-715.28	-5,426.50	14,453,827.887	1,735,759.329	39.799287191	-80.660544587	
9,380.00	56.26	218.26	6,660.03	-744.48	-5,451.96	14,453,798.694	1,735,733.871	39.799207285	-80.660635621	
9,428.00	57.80	212.98	6,686.16	-777.20	-5,475.39	14,453,765.969	1,735,710.444	39.799117658	-80.660719468	
9,475.00	59.78	208.68	6,710.52	-811.71	-5,495.97	14,453,731.458	1,735,689.865	39.799023095	-80.660793201	
9,520.00	61.58	205.16	6,732.56	-846.69	-5,513.72	14,453,696.479	1,735,672.116	39.798927219	-80.660856866	
9,567.00	63.34	201.82	6,754.30	-884.91	-5,530.31	14,453,658.263	1,735,655.518	39.798822443	-80.660916475	
9,616.00	65.05	198.83	6,775.63	-926.27	-5,545.63	14,453,616.901	1,735,640.206	39.798709013	-80.660971547	
9,663.00	66.90	196.28	6,794.77	-967.19	-5,558.57	14,453,575.977	1,735,627.267	39.798596758	-80.661018167	
9,709.00	68.13	194.09	6,812.36	-1,008.21	-5,569.69	14,453,534.961	1,735,616.138	39.798484234	-80.661058341	
9,756.00	69.10	189.60	6,829.51	-1,051.03	-5,578.67	14,453,492.142	1,735,607.164	39.798366737	-80.661090870	
9,804.00	71.65	182.75	6,845.65	-1,095.95	-5,583.51	14,453,447.227	1,735,602.326	39.798243439	-80.661108700	
9,851.00	74.24	176.33	6,859.44	-1,140.85	-5,583.13	14,453,402.326	1,735,602.704	39.798120129	-80.661107960	
9,898.00	75.69	170.18	6,871.65	-1,185.90	-5,577.79	14,453,357.276	1,735,608.040	39.797996355	-80.661089568	
9,945.00	76.79	164.47	6,882.83	-1,230.41	-5,567.78	14,453,312.759	1,735,618.057	39.797873999	-80.661054504	
9,993.00	77.41	159.46	6,893.56	-1,274.88	-5,553.29	14,453,268.286	1,735,632.540	39.797751714	-80.661003542	
10,040.00	78.15	154.45	6,903.51	-1,317.14	-5,535.32	14,453,226.033	1,735,650.518	39.797635490	-80.660940107	
10,087.00	78.24	149.79	6,913.13	-1,357.79	-5,513.81	14,453,185.380	1,735,672.025	39.797523622	-80.660864085	
10,134.00	80.88	148.47	6,921.65	-1,397.46	-5,490.09	14,453,145.711	1,735,695.740	39.797414436	-80.660780188	
10,181.00	84.40	148.38	6,927.67	-1,437.17	-5,465.69	14,453,106.006	1,735,720.144	39.797305141	-80.660693843	
10,276.00	87.74	148.47	6,934.18	-1,517.90	-5,416.07	14,453,025.272	1,735,769.763	39.797082910	-80.660518278	
10,370.00	88.35	149.44	6,937.38	-1,598.39	-5,367.62	14,452,944.785	1,735,818.210	39.796861367	-80.660346882	
10,464.00	88.31	150.05	6,940.12	-1,679.55	-5,320.28	14,452,863.623	1,735,865.552	39.796637965	-80.660179435	
10,559.00	88.18	150.14	6,943.03	-1,761.86	-5,272.94	14,452,781.311	1,735,912.893	39.796411442	-80.660012005	
10,653.00	89.32	150.23	6,945.08	-1,843.40	-5,226.21	14,452,699.774	1,735,959.618	39.796187035	-80.659846760	
10,747.00	89.85	149.09	6,945.76	-1,924.52	-5,178.73	14,452,618.652	1,736,007.098	39.795963758	-80.659678821	
10,841.00	89.76	149.97	6,946.08	-2,005.54	-5,131.07	14,452,537.635	1,736,054.763	39.795740769	-80.659510223	
10,936.00	89.80	149.26	6,946.45	-2,087.49	-5,083.02	14,452,455.685	1,736,102.814	39.795515213	-80.659340266	
11,030.00	89.23	149.61	6,947.24	-2,168.42	-5,035.22	14,452,374.750	1,736,150.612	39.795292445	-80.659171195	
11,125.00	89.76	148.91	6,948.08	-2,250.07	-4,986.66	14,452,293.102	1,736,199.169	39.795067713	-80.658999437	
11,219.00	89.80	148.82	6,948.44	-2,330.53	-4,938.06	14,452,212.643	1,736,247.771	39.794846245	-80.658827498	
11,313.00	89.71	149.09	6,948.84	-2,411.06	-4,889.58	14,452,132.109	1,736,296.248	39.794624570	-80.658656012	
11,406.00	89.98	148.74	6,949.10	-2,490.71	-4,841.57	14,452,052.464	1,736,344.264	39.794405343	-80.658486152	
11,502.00	90.51	149.00	6,948.69	-2,572.88	-4,791.94	14,451,970.289	1,736,393.894	39.794179152	-80.658310584	
11,595.00	90.29	149.18	6,948.04	-2,652.67	-4,744.17	14,451,890.500	1,736,441.665	39.793959530	-80.658141598	
11,690.00	90.42	149.09	6,947.45	-2,734.22	-4,695.43	14,451,808.956	1,736,490.401	39.793735078	-80.657969207	



Survey Report - Geographic



Company: Tug Hill Operating LLC
 Project: Marshall County, West Virginia NAD83 UTM 17N
 Site: Fitzgerald
 Well: Fitzgerald 01 HM (slot P)
 Wellbore: Sidetrack 01
 Design: Surveys Sidetrack 01

Local Co-ordinate Reference: Well Fitzgerald 01 HM (slot P)
 TVD Reference: RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
 MD Reference: RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Database: DB_Decv0422v16

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
11,784.00	90.46	148.91	6,946.73	-2,814.79	-4,647.02	14,451,728.385	1,736,538.813	39.793513302	-80.657797955
11,877.00	89.89	148.65	6,946.44	-2,894.32	-4,598.81	14,451,648.853	1,736,587.017	39.793294385	-80.657627432
11,972.00	90.07	149.18	6,946.47	-2,975.68	-4,549.77	14,451,567.496	1,736,636.066	39.793070441	-80.657453926
12,066.00	89.36	150.14	6,946.94	-3,056.80	-4,502.28	14,451,486.372	1,736,683.547	39.792847158	-80.657286000
12,160.00	89.41	149.35	6,947.95	-3,137.99	-4,454.93	14,451,405.181	1,736,730.905	39.792623690	-80.657118511
12,255.00	89.41	149.88	6,948.93	-3,219.94	-4,406.88	14,451,323.235	1,736,778.954	39.792398139	-80.656948577
12,349.00	89.89	149.53	6,949.50	-3,301.10	-4,359.46	14,451,242.074	1,736,826.371	39.792174751	-80.656780881
12,443.00	90.02	149.35	6,949.58	-3,382.04	-4,311.67	14,451,161.131	1,736,874.165	39.791951959	-80.656611845
12,538.00	89.98	149.61	6,949.58	-3,463.88	-4,263.42	14,451,079.293	1,736,922.409	39.791726704	-80.656441215
12,632.00	89.76	149.88	6,949.79	-3,545.08	-4,216.06	14,450,998.097	1,736,969.772	39.791503222	-80.656273721
12,727.00	89.76	149.70	6,950.19	-3,627.18	-4,168.26	14,450,916.000	1,737,017.573	39.791272759	-80.656104678
12,821.00	89.58	149.35	6,950.73	-3,708.19	-4,120.59	14,450,834.988	1,737,065.245	39.791054277	-80.655936078
12,915.00	89.93	149.35	6,951.13	-3,789.06	-4,072.67	14,450,754.121	1,737,113.165	39.790831691	-80.655766595
13,010.00	88.75	150.23	6,952.23	-3,871.15	-4,024.87	14,450,672.031	1,737,160.961	39.790605747	-80.655597589
13,104.00	88.75	149.61	6,954.28	-3,952.47	-3,977.77	14,450,590.710	1,737,208.063	39.790381923	-80.655431006
13,198.00	88.75	149.09	6,956.33	-4,033.31	-3,929.86	14,450,509.862	1,737,255.972	39.790159387	-80.655261566
13,293.00	88.75	150.58	6,958.40	-4,115.43	-3,882.13	14,450,427.749	1,737,303.696	39.789933380	-80.655092803
13,387.00	88.79	150.05	6,960.42	-4,197.07	-3,835.59	14,450,346.105	1,737,350.237	39.789708672	-80.654928246
13,481.00	89.27	150.05	6,962.01	-4,278.51	-3,788.67	14,450,264.669	1,737,397.159	39.789484534	-80.654762330
13,575.00	89.27	149.97	6,963.21	-4,359.92	-3,741.69	14,450,183.261	1,737,444.141	39.789260471	-80.654596202
13,669.00	89.32	149.53	6,964.36	-4,441.11	-3,694.34	14,450,102.067	1,737,491.492	39.789036990	-80.654428758
13,762.00	89.05	149.53	6,965.69	-4,521.26	-3,647.18	14,450,021.920	1,737,538.646	39.788816385	-80.654262001
13,857.00	88.53	149.97	6,967.69	-4,603.30	-3,599.34	14,449,939.874	1,737,586.493	39.788590561	-80.654092803
13,951.00	88.57	150.14	6,970.07	-4,684.73	-3,552.43	14,449,858.449	1,737,633.400	39.788366449	-80.653926947
14,045.00	88.57	150.41	6,972.42	-4,766.33	-3,505.84	14,449,776.844	1,737,679.994	39.788141846	-80.653762207
14,138.00	88.53	150.14	6,974.77	-4,847.07	-3,459.74	14,449,696.107	1,737,726.092	39.787919634	-80.653599222
14,232.00	88.84	149.35	6,976.93	-4,928.25	-3,412.39	14,449,614.933	1,737,773.441	39.787696207	-80.653431792
14,326.00	89.32	149.53	6,978.44	-5,009.18	-3,364.60	14,449,534.001	1,737,821.228	39.787473439	-80.653262799
14,420.00	89.27	149.61	6,979.59	-5,090.22	-3,317.00	14,449,452.956	1,737,868.834	39.787250364	-80.653094454
14,514.00	89.23	149.97	6,980.82	-5,171.45	-3,269.70	14,449,371.729	1,737,916.128	39.787026793	-80.652927224
14,608.00	89.32	149.70	6,982.01	-5,252.71	-3,222.47	14,449,290.465	1,737,963.358	39.786803119	-80.652760221
14,702.00	89.27	150.05	6,983.17	-5,334.01	-3,175.30	14,449,209.168	1,738,010.532	39.786579355	-80.652593421
14,797.00	89.36	149.35	6,984.31	-5,416.03	-3,127.37	14,449,127.152	1,738,058.458	39.786353608	-80.652423953
Tie into original hole @ 14797 MD									
14,848.00	87.08	149.09	6,985.89	-5,459.82	-3,101.29	14,449,083.360	1,738,084.543	39.786233066	-80.652331707
14,863.00	87.30	147.51	6,986.63	-5,472.57	-3,093.41	14,449,070.614	1,738,092.415	39.786197978	-80.652303861
14,878.00	87.69	145.13	6,987.28	-5,485.04	-3,085.10	14,449,058.145	1,738,100.725	39.786163645	-80.652274453
14,941.00	89.14	139.42	6,989.02	-5,534.82	-3,046.59	14,449,008.356	1,738,139.242	39.786026503	-80.652138036
15,035.00	89.10	139.86	6,990.47	-5,606.44	-2,985.72	14,448,936.738	1,738,200.108	39.785829172	-80.651922367
15,129.00	88.70	141.88	6,992.27	-5,679.34	-2,926.41	14,448,863.838	1,738,259.415	39.785628338	-80.651712264
15,224.00	89.80	145.75	6,993.52	-5,756.00	-2,870.34	14,448,787.184	1,738,315.486	39.785417229	-80.651513737
15,318.00	90.77	146.10	6,993.05	-5,833.85	-2,817.68	14,448,709.326	1,738,368.150	39.785202848	-80.651327351
15,415.00	91.03	146.89	6,991.53	-5,914.73	-2,764.14	14,448,628.455	1,738,421.688	39.784980182	-80.651137900
15,509.00	89.05	149.61	6,991.46	-5,994.65	-2,714.68	14,448,548.533	1,738,471.145	39.784760169	-80.650962964
15,604.00	87.52	149.09	6,994.30	-6,076.34	-2,666.28	14,448,466.844	1,738,519.552	39.784535313	-80.650791791
15,699.00	88.92	149.61	6,997.25	-6,158.02	-2,617.87	14,448,385.158	1,738,567.957	39.784310464	-80.650620625
15,793.00	88.00	150.23	6,999.78	-6,239.33	-2,570.77	14,448,303.848	1,738,615.053	39.784086662	-80.650454115
15,887.00	89.23	150.49	7,002.05	-6,321.01	-2,524.30	14,448,222.174	1,738,661.526	39.783861866	-80.650289829
15,980.00	87.82	150.14	7,004.45	-6,401.77	-2,478.26	14,448,141.408	1,738,707.566	39.783639570	-80.650127073
16,074.00	88.70	150.05	7,007.30	-6,483.22	-2,431.42	14,448,059.962	1,738,754.409	39.783415397	-80.649961469
16,169.00	90.24	149.97	7,008.18	-6,565.49	-2,383.94	14,447,977.688	1,738,801.891	39.783188941	-80.649793603
16,263.00	88.35	149.70	7,009.34	-6,646.76	-2,336.71	14,447,896.427	1,738,849.119	39.782965272	-80.649626626
16,357.00	88.62	149.35	7,011.82	-6,727.74	-2,289.05	14,447,815.442	1,738,896.775	39.782742354	-80.649458123
16,452.00	88.26	149.70	7,014.41	-6,809.59	-2,240.89	14,447,733.597	1,738,944.938	39.782517070	-80.649287832

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Fitzgerald 01 HM (slot P)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
Site:	Fitzgerald	MD Reference:	RKB=1292.91+33.09 @ 1326.00ft (Nabors X08)
Well:	Fitzgerald 01 HM (slot P)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	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
16,547.00	87.69	149.97	7,017.76	-6,891.67	-2,193.18	14,447,651.513	1,738,992.644	39.782291136	-80.649119168
16,641.00	89.05	149.53	7,020.44	-6,972.83	-2,145.85	14,447,570.348	1,739,039.979	39.782067726	-80.648951817
16,735.00	87.30	150.14	7,023.43	-7,054.06	-2,098.64	14,447,489.122	1,739,087.187	39.781844152	-80.648784917
16,829.00	88.40	150.49	7,026.96	-7,135.67	-2,052.12	14,447,407.518	1,739,133.705	39.781619545	-80.648620480
16,922.00	88.04	150.14	7,029.85	-7,216.42	-2,006.09	14,447,326.762	1,739,179.739	39.781397274	-80.648457755
17,017.00	87.43	149.44	7,033.60	-7,298.45	-1,958.32	14,447,244.730	1,739,227.502	39.781171478	-80.648288894
17,112.00	88.79	149.79	7,036.73	-7,380.36	-1,910.30	14,447,162.825	1,739,275.526	39.780946029	-80.648119104
17,206.00	89.98	150.23	7,037.74	-7,461.77	-1,863.32	14,447,081.417	1,739,322.508	39.780721955	-80.647953017
17,301.00	89.14	151.11	7,038.47	-7,544.59	-1,816.79	14,446,998.599	1,739,369.041	39.780494014	-80.647788551
17,394.00	90.33	151.02	7,038.90	-7,625.97	-1,771.79	14,446,917.211	1,739,414.034	39.780270016	-80.647629544
17,489.00	89.23	150.14	7,039.27	-7,708.72	-1,725.13	14,446,834.465	1,739,460.698	39.780042270	-80.647464614
17,583.00	89.71	150.05	7,040.14	-7,790.20	-1,678.27	14,446,752.984	1,739,507.560	39.779817999	-80.647298957
17,678.00	88.40	149.53	7,041.70	-7,872.28	-1,630.47	14,446,670.900	1,739,555.354	39.779592057	-80.647129997
17,772.00	89.41	149.61	7,043.50	-7,953.32	-1,582.87	14,446,589.865	1,739,602.954	39.779368999	-80.646961711
17,866.00	88.44	149.61	7,045.26	-8,034.39	-1,535.33	14,446,508.795	1,739,650.498	39.779145848	-80.646793627
17,961.00	89.32	149.18	7,047.12	-8,116.14	-1,486.97	14,446,427.046	1,739,698.854	39.778920820	-80.646622662
18,056.00	88.09	149.09	7,049.27	-8,197.66	-1,438.25	14,446,345.522	1,739,747.577	39.778696409	-80.646450390
18,150.00	89.32	149.09	7,051.39	-8,278.29	-1,389.97	14,446,264.895	1,739,795.851	39.778474463	-80.646279706
18,245.00	88.79	149.09	7,052.96	-8,359.79	-1,341.18	14,446,183.399	1,739,844.644	39.778250125	-80.646107183
18,340.00	89.67	148.47	7,054.24	-8,441.02	-1,291.95	14,446,102.165	1,739,893.880	39.778026503	-80.645933086
18,433.00	89.05	149.79	7,055.27	-8,520.84	-1,244.23	14,446,022.348	1,739,941.593	39.777806785	-80.645764388
18,528.00	88.26	151.20	7,057.50	-8,603.49	-1,197.46	14,445,939.694	1,739,988.366	39.777579289	-80.645599077
18,622.00	89.23	151.64	7,059.56	-8,686.02	-1,152.50	14,445,857.169	1,740,033.323	39.777352166	-80.645440231
18,712.00	90.55	151.99	7,059.74	-8,765.34	-1,109.99	14,445,777.842	1,740,075.831	39.777133855	-80.645290057
Survey @ 18712.00 MD 7059.74 TVD									
18,784.00	90.55	151.99	7,059.05	-8,828.91	-1,076.18	14,445,714.279	1,740,109.642	39.776958926	-80.645170613
Survey Proj. to 18784.00 MD 7059.04 TVD									

Design Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
14,797.00	6,984.31	-5,416.03	-3,127.37	Tie into original hole @ 14797 MD
18,712.00	7,059.74	-8,765.34	-1,109.99	Survey @ 18712.00 MD 7059.74 TVD
18,784.00	7,059.05	-8,828.91	-1,076.18	Survey Proj. to 18784.00 MD 7059.04 TVD