



Well: Fitzgerald 05 HM (slot T)  
 Site: Fitzgerald  
 Project: Marshall County, West Virginia NAD83 UTM 17N  
 Design: rev8  
 Rig: Nabors X08  
 SECTION DETAILS

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
Fitzgerald-05HM LP r7	6956.00	824.14	-3269.38	1737874.598	1741688.596	39.803557000	-80.652992000
Fitzgerald-05HM BHL r7	7088.00	-5721.04	544.63	174448845.609	1741688.596	39.785541000	-80.639506000

ANNOTATIONS SURVEYS ORIGINAL HOLE

MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Annotation
196.09	0.57	113.930	196.09	-0.35	0.80	0.43	MWD surveys
3216.00	41.51	292.434	2978.89	352.43	-742.80	-421.26	Top of Fish @ 3216 MD 2978.89 TVD
5348.00	38.77	296.480	4584.18	960.41	-2005.66	-1146.23	Survey @ 5348.00 MD 4584.18 TVD
5416.00	38.77	296.480	4637.20	979.40	-2043.78	-1168.74	Survey Proj. to 5416.00 MD 4637.20 TVD

ANNOTATIONS SURVEYS SIDETRACK01

MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Annotation
3067.09	41.53	296.150	2867.22	312.50	-652.77	-372.95	Tie into original hole @ 3067 MD
16196.00	90.81	149.000	6997.19	-5698.39	530.73	5723.04	Survey @ 16196.00 MD 6997.19 TVD
16221.00	90.81	149.000	6996.84	-5719.81	543.61	5745.59	Survey Proj. to 16221.00 MD 6996.84 TVD

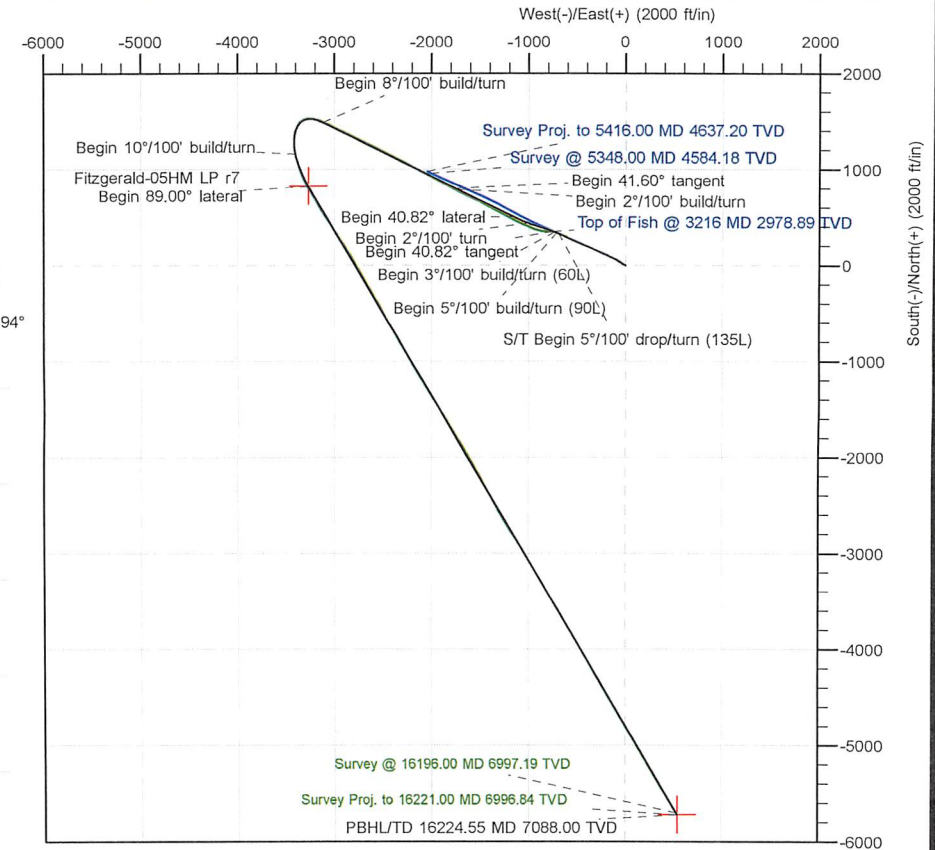
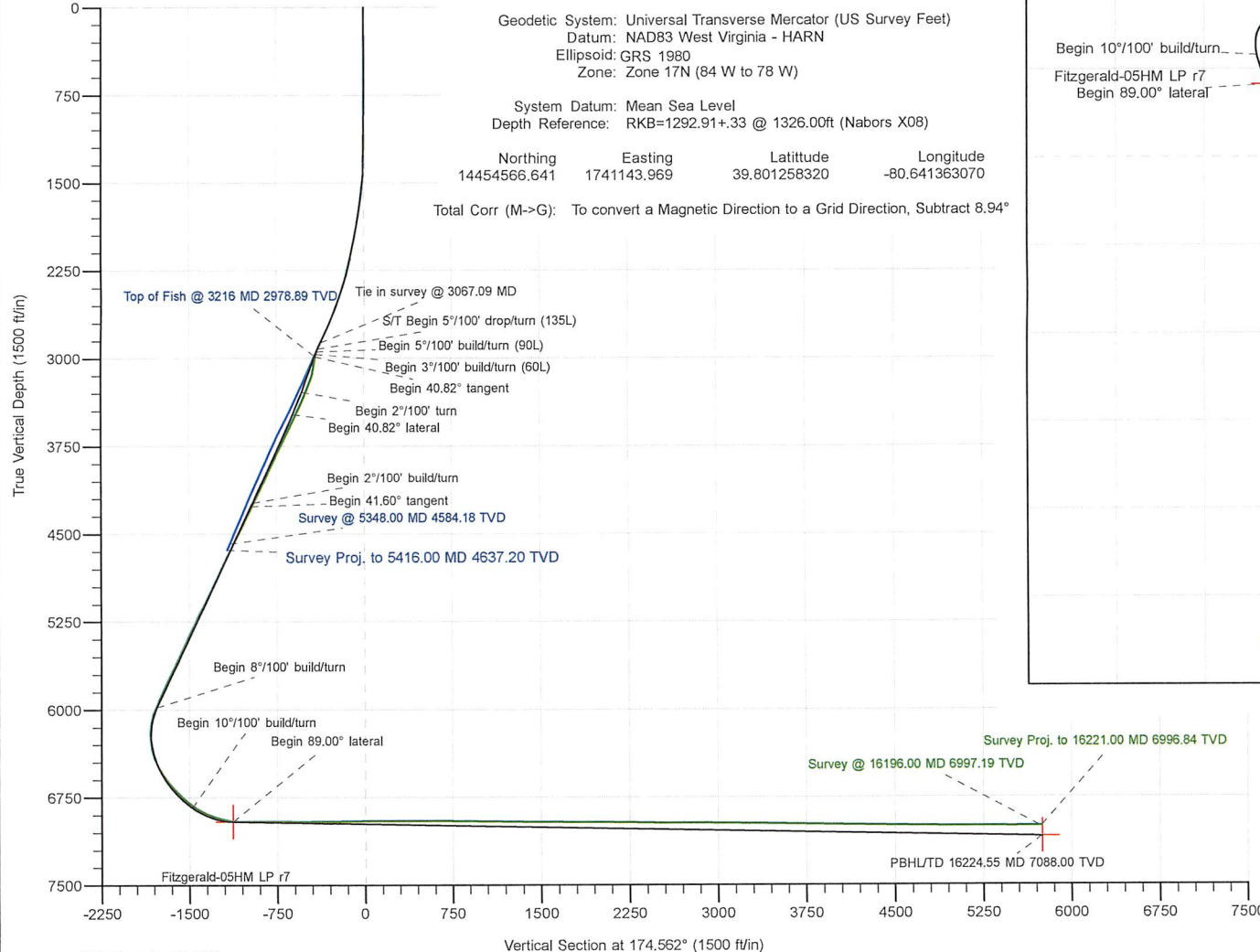
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Annotation
1	3067.09	41.53	296.150	2867.22	312.50	-652.77	0.00	0.00	-372.95	Tie in survey @ 3067.09 MD
2	3137.00	41.39	293.942	2919.61	332.09	-694.70	2.10	-96.30	-396.43	S/T Begin 5°/100' drop/turn (135L)
3	3167.00	40.34	292.303	2942.30	339.80	-712.75	5.00	-135.00	-405.82	Begin 5°/100' build/turn (90L)
4	3197.00	40.36	289.987	2965.16	346.81	-730.86	5.00	-90.00	-414.51	Begin 3°/100' build/turn (60L)
5	3227.00	40.82	288.795	2987.94	353.29	-749.28	3.00	-60.00	-422.71	Begin 40.82° tangent
6	3627.00	40.82	288.795	3290.65	437.53	-996.81	0.00	0.00	-530.03	Begin 2°/100' turn
7	3877.00	40.82	296.445	3479.84	500.34	-1147.55	2.00	90.00	-606.84	Begin 40.82° lateral
8	4877.00	40.82	296.445	4236.61	791.44	-1732.83	0.00	0.00	-952.10	Begin 2°/100' build/turn
9	4917.16	41.60	296.708	4266.82	803.28	-1756.50	2.00	12.59	-966.13	Begin 41.60° tangent
10	7207.97	41.60	296.708	5979.77	1486.92	-3115.27	0.00	0.00	-1775.46	Begin 8°/100' build/turn
11	8262.82	55.00	169.209	6837.67	1158.23	-3400.80	8.00	-139.23	-1475.31	Begin 10°/100' build/turn
12	8648.08	89.00	149.770	6956.00	824.14	-3269.30	10.00	-32.29	-1130.26	Begin 89.00° lateral
13	16224.55	89.00	149.770	7088.00	-5721.04	544.63	0.00	0.00	5746.91	PBHL/TD 16224.55 MD 7088.00 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 @ 1326.00ft (Nabors X08)

Northing 14454566.641 Easting 1741143.969 Latitude 39.801258320 Longitude -80.641363070

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



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

Magnetic Field  
 Strength: 51600.8nT  
 Dip Angle: 66.40°  
 Date: 11/12/2022  
 Model: IGRF2020





<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Fitzgerald 05 HM (slot T)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>TVD Reference:</b>	RKB=1292.91+.33 @ 1326.00ft (Nabors X08)
<b>Site:</b>	Fitzgerald	<b>MD Reference:</b>	RKB=1292.91+.33 @ 1326.00ft (Nabors X08)
<b>Well:</b>	Fitzgerald 05 HM (slot T)	<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_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 05 HM (slot T)					
<b>Well Position</b>	<b>+N/-S</b>	0.00 ft	<b>Northing:</b>	14,454,566.641 usft	<b>Latitude:</b>	39.801258320
	<b>+E/-W</b>	0.00 ft	<b>Easting:</b>	1,741,143.969 usft	<b>Longitude:</b>	-80.641363070
<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	11/12/2022	-8.71	66.40	51,600.79195618

<b>Design</b>	Surveys Sidetrack 01				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	3,067.09
<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	174.562

<b>Survey Program</b>	<b>Date</b>	12/13/2022			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
21.09	860.09	MWD surf (Original Hole)	MWD	MWD - Standard	
904.09	3,067.09	MWD int (Original Hole)	MWD	MWD - Standard	
3,140.00	16,196.00	MWD ST1 (Sidetrack 01)	MWD	MWD - Standard	
16,221.00	16,221.00	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	14,454,566.641	1,741,143.969	39.801258320	-80.641363070	
21.09	0.00	0.000	21.09	0.00	0.00	14,454,566.641	1,741,143.969	39.801258320	-80.641363070	
196.09	0.57	113.930	196.09	-0.35	0.80	14,454,566.288	1,741,144.765	39.801257341	-80.641360242	
240.09	0.66	121.450	240.08	-0.57	1.21	14,454,566.067	1,741,145.181	39.801256730	-80.641358763	
284.09	0.64	123.420	284.08	-0.84	1.63	14,454,565.800	1,741,145.602	39.801255990	-80.641357267	
328.09	0.77	128.660	328.08	-1.16	2.07	14,454,565.480	1,741,146.038	39.801255107	-80.641355719	
373.09	0.52	120.500	373.08	-1.45	2.48	14,454,565.187	1,741,146.450	39.801254299	-80.641354256	
417.09	0.27	163.650	417.07	-1.66	2.68	14,454,564.986	1,741,146.652	39.801253745	-80.641353543	



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<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>TVD Reference:</b>	RKB=1292.91+.33 @ 1326.00ft (Nabors X08)
<b>Site:</b>	Fitzgerald	<b>MD Reference:</b>	RKB=1292.91+.33 @ 1326.00ft (Nabors X08)
<b>Well:</b>	Fitzgerald 05 HM (slot T)	<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_Decv0422v16

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
461.09	0.34	117.130	461.07	-1.81	2.83	14,454,564.827	1,741,146.797	39.801253307	-80.641353027
506.09	0.27	113.770	506.07	-1.92	3.04	14,454,564.724	1,741,147.013	39.801253020	-80.641352260
550.09	0.06	336.560	550.07	-1.94	3.13	14,454,564.703	1,741,147.098	39.801252962	-80.641351956
594.09	0.33	287.900	594.07	-1.88	3.00	14,454,564.763	1,741,146.969	39.801253129	-80.641352417
639.09	0.41	279.660	639.07	-1.81	2.72	14,454,564.830	1,741,146.687	39.801253315	-80.641353420
683.09	0.51	279.010	683.07	-1.75	2.37	14,454,564.887	1,741,146.338	39.801253476	-80.641354660
727.09	0.40	285.380	727.07	-1.68	2.03	14,454,564.959	1,741,145.997	39.801253676	-80.641355875
771.09	0.48	305.990	771.07	-1.53	1.73	14,454,565.108	1,741,145.699	39.801254088	-80.641356931
815.09	0.50	289.690	815.07	-1.36	1.40	14,454,565.281	1,741,145.369	39.801254567	-80.641358103
860.09	0.64	299.480	860.06	-1.17	1.00	14,454,565.470	1,741,144.966	39.801255093	-80.641359538
904.09	0.50	308.720	904.06	-0.93	0.63	14,454,565.711	1,741,144.602	39.801255759	-80.641360829
948.09	0.49	298.640	948.06	-0.72	0.32	14,454,565.922	1,741,144.287	39.801256340	-80.641361947
992.09	0.60	291.420	992.06	-0.55	-0.06	14,454,566.096	1,741,143.908	39.801256822	-80.641363296
1,037.09	0.79	302.780	1,037.05	-0.29	-0.54	14,454,566.350	1,741,143.427	39.801257525	-80.641365002
1,081.09	0.68	311.650	1,081.05	0.05	-0.99	14,454,566.688	1,741,142.977	39.801258458	-80.641366600
1,125.09	0.58	289.340	1,125.05	0.29	-1.40	14,454,566.935	1,741,142.572	39.801259141	-80.641368039
1,169.09	0.54	296.290	1,169.05	0.46	-1.79	14,454,567.101	1,741,142.176	39.801259600	-80.641369447
1,213.09	0.60	309.340	1,213.04	0.70	-2.16	14,454,567.338	1,741,141.812	39.801260258	-80.641370740
1,257.09	0.70	304.190	1,257.04	0.99	-2.56	14,454,567.636	1,741,141.412	39.801261078	-80.641372162
1,302.09	1.09	303.920	1,302.04	1.39	-3.14	14,454,568.029	1,741,140.829	39.801262164	-80.641374230
1,346.09	2.58	299.780	1,346.01	2.11	-4.35	14,454,568.754	1,741,139.622	39.801264170	-80.641378517
1,390.09	4.76	296.070	1,389.92	3.41	-6.85	14,454,570.049	1,741,137.122	39.801267752	-80.641387398
1,434.09	6.08	293.870	1,433.72	5.15	-10.62	14,454,571.794	1,741,133.352	39.801272586	-80.641400799
1,478.09	8.05	298.220	1,477.39	7.55	-15.46	14,454,574.194	1,741,128.506	39.801279231	-80.641418019
1,523.09	9.53	299.800	1,521.86	10.89	-21.47	14,454,577.535	1,741,122.496	39.801288473	-80.641439366
1,567.09	10.38	302.480	1,565.19	14.83	-27.98	14,454,581.474	1,741,115.992	39.801299362	-80.641462470
1,611.09	11.43	303.680	1,608.40	19.38	-34.95	14,454,586.021	1,741,109.020	39.801311924	-80.641487228
1,656.09	11.90	304.080	1,652.47	24.45	-42.50	14,454,591.093	1,741,101.466	39.801325937	-80.641514048
1,700.09	12.42	303.840	1,695.48	29.63	-50.19	14,454,596.270	1,741,093.779	39.801340239	-80.641541345
1,744.09	13.27	303.490	1,738.38	35.05	-58.33	14,454,601.692	1,741,085.637	39.801355218	-80.641570256
1,788.09	13.80	303.620	1,781.16	40.74	-66.91	14,454,607.384	1,741,077.056	39.801370944	-80.641600728
1,832.09	15.10	303.430	1,823.77	46.81	-76.07	14,454,613.447	1,741,067.902	39.801387695	-80.641633231
1,877.09	16.37	304.420	1,867.08	53.62	-86.19	14,454,620.261	1,741,057.779	39.801406519	-80.641669177
1,921.09	17.31	300.050	1,909.19	60.40	-96.97	14,454,627.044	1,741,046.998	39.801425266	-80.641707467
1,965.09	18.65	296.820	1,951.04	66.86	-108.92	14,454,633.497	1,741,035.052	39.801443117	-80.641749906
2,009.09	19.99	294.330	1,992.57	73.13	-122.05	14,454,639.770	1,741,021.920	39.801460489	-80.641796572
2,054.09	21.16	294.150	2,034.69	79.62	-136.47	14,454,646.262	1,741,007.500	39.801478477	-80.641847822
2,098.09	22.25	293.960	2,075.57	86.25	-151.33	14,454,652.894	1,740,992.641	39.801496853	-80.641900632
2,142.09	23.96	293.600	2,116.04	93.21	-167.13	14,454,659.854	1,740,976.840	39.801516141	-80.641956790
2,186.09	25.09	293.490	2,156.07	100.51	-183.87	14,454,667.150	1,740,960.097	39.801536360	-80.642016299
2,230.09	26.72	293.650	2,195.65	108.20	-201.49	14,454,674.837	1,740,942.479	39.801557664	-80.642078917
2,274.09	28.43	293.760	2,234.65	116.38	-220.14	14,454,683.025	1,740,923.830	39.801580357	-80.642145198
2,318.09	30.19	294.050	2,273.02	125.11	-239.83	14,454,691.755	1,740,904.140	39.801604545	-80.642215179
2,362.09	31.77	294.130	2,310.74	134.36	-260.50	14,454,700.999	1,740,883.465	39.801630160	-80.642288660
2,407.09	32.95	294.300	2,348.75	144.24	-282.47	14,454,710.878	1,740,861.499	39.801657532	-80.642366727
2,451.09	33.56	294.830	2,385.54	154.27	-304.41	14,454,720.910	1,740,839.555	39.801685321	-80.642444713
2,495.09	33.77	294.600	2,422.17	164.47	-326.57	14,454,731.107	1,740,817.399	39.801713570	-80.642523455
2,539.09	34.01	294.090	2,458.69	174.58	-348.92	14,454,741.221	1,740,795.046	39.801741588	-80.642602896
2,583.09	34.72	293.620	2,495.01	184.62	-371.64	14,454,751.264	1,740,772.331	39.801769419	-80.642683627
2,627.09	36.14	293.580	2,530.86	194.83	-395.01	14,454,761.476	1,740,748.958	39.801797718	-80.642766701
2,672.09	37.88	293.500	2,566.79	205.65	-419.84	14,454,772.293	1,740,724.125	39.801827699	-80.642854963
2,716.09	38.51	293.590	2,601.37	216.52	-444.79	14,454,783.162	1,740,699.184	39.801857819	-80.642943612
2,761.09	39.65	293.390	2,636.31	227.83	-470.80	14,454,794.468	1,740,673.167	39.801889154	-80.643036084
2,805.09	40.08	293.350	2,670.08	239.01	-496.69	14,454,805.656	1,740,647.277	39.801920160	-80.643128102



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<b>Site:</b>	Fitzgerald	<b>MD Reference:</b>	RKB=1292.91+.33 @ 1326.00ft (Nabors X08)
<b>Well:</b>	Fitzgerald 05 HM (slot T)	<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_Decv0422v16

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
2,849.09	40.79	293.490	2,703.57	250.36	-522.88	14,454,816.998	1,740,621.091	39.801951598	-80.643221177	
2,893.09	41.13	294.030	2,736.80	261.98	-549.28	14,454,828.620	1,740,594.693	39.801983802	-80.643315001	
2,937.09	41.21	295.470	2,769.92	274.11	-575.58	14,454,840.746	1,740,568.390	39.802017391	-80.643408478	
2,982.09	41.57	296.690	2,803.68	287.19	-602.30	14,454,853.827	1,740,541.668	39.802053606	-80.643503435	
3,026.09	41.70	296.840	2,836.56	300.35	-628.40	14,454,866.991	1,740,515.567	39.802090044	-80.643596179	
3,067.09	41.53	296.150	2,867.22	312.50	-652.77	14,454,879.139	1,740,491.199	39.802123670	-80.643682771	
<b>Tie into original hole @ 3067 MD</b>										
3,140.00	38.51	294.900	2,923.05	332.71	-695.07	14,454,899.353	1,740,448.903	39.802179645	-80.643833075	
3,171.00	38.24	284.090	2,947.38	339.12	-713.15	14,454,905.759	1,740,430.823	39.802197436	-80.643897356	
3,265.00	41.76	274.070	3,019.45	348.44	-772.67	14,454,915.076	1,740,371.303	39.802223672	-80.644109145	
3,296.00	42.02	275.560	3,042.53	350.17	-793.29	14,454,916.814	1,740,350.679	39.802228670	-80.644182552	
3,328.00	41.80	274.860	3,066.34	352.11	-814.58	14,454,918.755	1,740,329.392	39.802234233	-80.644258313	
3,359.00	41.98	274.160	3,089.42	353.74	-835.21	14,454,920.382	1,740,308.758	39.802238928	-80.644331758	
3,390.00	41.49	276.790	3,112.55	355.71	-855.75	14,454,922.349	1,740,288.220	39.802244552	-80.644404857	
3,421.00	41.23	281.450	3,135.83	358.95	-875.97	14,454,925.591	1,740,268.006	39.802253678	-80.644476781	
3,452.00	41.27	285.050	3,159.14	363.63	-895.85	14,454,930.275	1,740,248.117	39.802266756	-80.644547528	
3,546.00	41.19	293.400	3,229.89	383.99	-954.24	14,454,950.633	1,740,189.728	39.802323301	-80.644755134	
3,639.00	41.10	293.490	3,299.92	408.34	-1,010.38	14,454,974.979	1,740,133.589	39.802390772	-80.644954671	
3,733.00	40.88	292.170	3,370.87	432.26	-1,067.21	14,454,998.902	1,740,076.765	39.802457090	-80.645156651	
3,827.00	40.84	297.180	3,441.99	457.92	-1,123.05	14,455,024.556	1,740,020.922	39.802528150	-80.645355117	
3,921.00	41.63	299.380	3,512.68	487.28	-1,177.60	14,455,053.916	1,739,966.370	39.802609372	-80.645548936	
4,016.00	40.92	297.890	3,584.08	517.31	-1,232.60	14,455,083.951	1,739,911.372	39.802692455	-80.645744330	
4,110.00	41.76	299.640	3,654.66	547.19	-1,287.02	14,455,113.834	1,739,856.953	39.802775111	-80.645937666	
4,203.00	41.05	298.770	3,724.41	577.21	-1,340.70	14,455,143.848	1,739,803.267	39.802858120	-80.646128392	
4,297.00	42.42	298.850	3,794.56	607.36	-1,395.53	14,455,174.003	1,739,748.440	39.802941527	-80.646323181	
4,392.00	41.76	297.970	3,865.05	637.66	-1,451.54	14,455,204.301	1,739,692.434	39.803025341	-80.646522164	
4,487.00	40.66	296.300	3,936.52	666.21	-1,507.23	14,455,232.853	1,739,636.744	39.803104356	-80.646720045	
4,580.00	40.66	295.070	4,007.07	692.48	-1,561.83	14,455,259.116	1,739,582.138	39.803177070	-80.646914102	
4,674.00	40.66	296.920	4,078.38	719.32	-1,616.88	14,455,285.958	1,739,527.092	39.803251380	-80.647109717	
4,767.00	41.32	297.010	4,148.58	746.98	-1,671.25	14,455,313.619	1,739,472.723	39.803327932	-80.647302909	
4,861.00	42.33	297.800	4,218.63	775.83	-1,726.90	14,455,342.474	1,739,417.077	39.803407777	-80.647500634	
4,955.00	42.46	297.360	4,288.05	805.18	-1,783.07	14,455,371.817	1,739,360.901	39.803488967	-80.647700239	
5,050.00	40.57	297.710	4,359.18	834.28	-1,838.91	14,455,400.921	1,739,305.067	39.803569499	-80.647898629	
5,145.00	40.18	299.470	4,431.56	863.72	-1,892.94	14,455,430.364	1,739,251.034	39.803650940	-80.648090603	
5,238.00	41.14	299.820	4,502.10	893.70	-1,945.60	14,455,460.338	1,739,198.372	39.803733822	-80.648277691	
5,332.00	42.51	298.850	4,572.15	924.40	-2,000.25	14,455,491.040	1,739,143.724	39.803818728	-80.648471835	
5,426.00	42.68	297.450	4,641.35	954.41	-2,056.34	14,455,521.052	1,739,087.632	39.803901753	-80.648671136	
5,521.00	41.76	297.450	4,711.70	983.84	-2,112.99	14,455,550.480	1,739,030.982	39.803983178	-80.648872430	
5,615.00	40.66	297.450	4,782.42	1,012.39	-2,167.95	14,455,579.027	1,738,976.026	39.804062167	-80.649067704	
5,710.00	40.35	298.150	4,854.65	1,041.16	-2,222.53	14,455,607.803	1,738,921.444	39.804141782	-80.649261644	
5,803.00	41.14	296.740	4,925.11	1,069.13	-2,276.40	14,455,635.773	1,738,867.576	39.804219172	-80.649453055	
5,898.00	41.80	297.270	4,996.30	1,097.70	-2,332.45	14,455,664.340	1,738,811.526	39.804298228	-80.649652228	
5,996.00	41.89	297.890	5,069.30	1,127.97	-2,390.40	14,455,694.609	1,738,753.578	39.804381976	-80.649858132	
6,090.00	41.58	297.800	5,139.45	1,157.20	-2,445.72	14,455,723.836	1,738,698.249	39.804462836	-80.650054728	
6,185.00	41.71	298.150	5,210.44	1,186.81	-2,501.48	14,455,753.449	1,738,642.497	39.804544758	-80.650252825	
6,279.00	41.71	297.180	5,280.61	1,215.85	-2,556.87	14,455,782.488	1,738,587.105	39.804625099	-80.650449650	
6,373.00	41.67	297.010	5,350.81	1,244.32	-2,612.53	14,455,810.963	1,738,531.447	39.804703896	-80.650647429	
6,467.00	41.67	296.220	5,421.02	1,272.32	-2,668.40	14,455,838.960	1,738,475.575	39.804781380	-80.650845976	
6,561.00	41.71	296.130	5,491.22	1,299.90	-2,724.51	14,455,866.538	1,738,419.468	39.804857717	-80.651045371	
6,656.00	41.76	296.300	5,562.11	1,327.84	-2,781.24	14,455,894.474	1,738,362.732	39.804935043	-80.651246995	
6,750.00	41.71	296.220	5,632.26	1,355.52	-2,837.36	14,455,922.160	1,738,306.616	39.805011675	-80.651446419	
6,844.00	41.63	296.300	5,702.47	1,383.17	-2,893.40	14,455,949.810	1,738,250.571	39.805088208	-80.651645590	
6,939.00	41.63	296.300	5,773.48	1,411.13	-2,949.98	14,455,977.772	1,738,193.993	39.805165604	-80.651846653	
7,034.00	41.76	296.130	5,844.42	1,439.05	-3,006.67	14,456,005.686	1,738,137.303	39.805242867	-80.652048121	



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Fitzgerald 05 HM (slot T)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>TVD Reference:</b>	RKB=1292.91+.33 @ 1326.00ft (Nabors X08)
<b>Site:</b>	Fitzgerald	<b>MD Reference:</b>	RKB=1292.91+.33 @ 1326.00ft (Nabors X08)
<b>Well:</b>	Fitzgerald 05 HM (slot T)	<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_Decv0422v16

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
7,128.00	41.80	296.040	5,914.51	1,466.59	-3,062.92	14,456,033.224	1,738,081.052	39.805319094	-80.652248025	
7,175.00	41.85	295.860	5,949.54	1,480.30	-3,091.11	14,456,046.939	1,738,052.870	39.805357059	-80.652348182	
7,223.00	40.70	294.810	5,985.61	1,493.85	-3,119.72	14,456,060.491	1,738,024.254	39.805394581	-80.652449886	
7,270.00	38.46	292.260	6,021.84	1,505.82	-3,147.16	14,456,072.460	1,737,996.812	39.805427744	-80.652547432	
7,317.00	35.69	288.220	6,059.34	1,515.65	-3,173.72	14,456,082.287	1,737,970.253	39.805455014	-80.652641861	
7,364.00	33.27	282.330	6,098.09	1,522.69	-3,199.35	14,456,089.330	1,737,944.625	39.805474628	-80.652733015	
7,411.00	30.59	276.350	6,137.98	1,526.77	-3,223.84	14,456,093.407	1,737,920.135	39.805486086	-80.652820161	
7,458.00	28.40	269.850	6,178.90	1,528.06	-3,246.91	14,456,094.701	1,737,897.063	39.805489885	-80.652902292	
7,505.00	26.51	262.990	6,220.62	1,526.75	-3,268.51	14,456,093.391	1,737,875.468	39.805486518	-80.652979203	
7,552.00	25.71	256.750	6,262.83	1,523.14	-3,288.85	14,456,089.774	1,737,855.130	39.805476800	-80.653051671	
7,599.00	26.86	250.430	6,304.98	1,517.24	-3,308.78	14,456,083.879	1,737,835.197	39.805460825	-80.653122723	
7,646.00	27.82	240.670	6,346.75	1,508.31	-3,328.35	14,456,074.946	1,737,815.621	39.805436500	-80.653192549	
7,693.00	28.70	228.980	6,388.18	1,495.52	-3,346.45	14,456,062.157	1,737,797.531	39.805401570	-80.653257139	
7,740.00	29.71	217.910	6,429.23	1,478.91	-3,362.13	14,456,045.548	1,737,781.848	39.805356126	-80.653313207	
7,787.00	31.08	210.080	6,469.79	1,459.21	-3,375.37	14,456,025.853	1,737,768.606	39.805302179	-80.653360630	
7,834.00	32.35	203.050	6,509.78	1,437.14	-3,386.38	14,456,003.776	1,737,757.598	39.805241667	-80.653400130	
7,882.00	34.11	198.480	6,549.94	1,412.55	-3,395.67	14,455,979.188	1,737,748.302	39.805174243	-80.653433570	
7,929.00	36.79	194.700	6,588.23	1,386.43	-3,403.43	14,455,953.068	1,737,740.551	39.805102594	-80.653461528	
7,977.00	39.74	190.310	6,625.92	1,357.42	-3,409.82	14,455,924.058	1,737,734.155	39.805022994	-80.653484702	
8,024.00	42.33	185.120	6,661.38	1,326.86	-3,413.92	14,455,893.501	1,737,730.052	39.804939121	-80.653499732	
8,071.00	44.18	180.730	6,695.61	1,294.71	-3,415.55	14,455,861.353	1,737,728.430	39.804850852	-80.653505948	
8,118.00	46.07	177.390	6,728.78	1,261.42	-3,414.98	14,455,828.063	1,737,728.993	39.804759422	-80.653504406	
8,165.00	48.00	174.140	6,760.81	1,227.14	-3,412.43	14,455,793.775	1,737,731.547	39.804665233	-80.653495783	
8,212.00	50.86	171.320	6,791.38	1,191.73	-3,407.89	14,455,758.373	1,737,736.082	39.804567962	-80.653480123	
8,259.00	54.07	168.600	6,820.02	1,155.05	-3,401.38	14,455,721.688	1,737,742.596	39.804467147	-80.653457434	
8,306.00	57.45	166.140	6,846.46	1,117.15	-3,392.87	14,455,683.788	1,737,751.106	39.804362974	-80.653427658	
8,354.00	61.67	163.770	6,870.78	1,077.20	-3,382.11	14,455,643.841	1,737,761.863	39.804253155	-80.653389909	
8,401.00	66.33	161.130	6,891.38	1,036.95	-3,369.36	14,455,603.586	1,737,774.614	39.804142470	-80.653345062	
8,448.00	70.77	159.460	6,908.56	995.78	-3,354.61	14,455,562.418	1,737,789.368	39.804029257	-80.653293096	
8,495.00	73.58	157.790	6,922.95	954.12	-3,338.30	14,455,520.760	1,737,805.679	39.803914680	-80.653235597	
8,542.00	76.44	155.940	6,935.10	912.38	-3,320.46	14,455,479.019	1,737,823.518	39.803799859	-80.653172654	
8,589.00	80.22	153.220	6,944.61	870.82	-3,300.70	14,455,437.462	1,737,843.277	39.803685523	-80.653102875	
8,636.00	84.04	150.850	6,951.05	829.71	-3,278.87	14,455,396.353	1,737,865.107	39.803572398	-80.653025715	
8,683.00	88.48	149.530	6,954.11	789.03	-3,255.56	14,455,355.671	1,737,888.417	39.803460427	-80.652943281	
8,731.00	89.27	150.930	6,955.05	747.38	-3,231.73	14,455,314.015	1,737,912.245	39.803345776	-80.652859018	
8,825.00	89.71	151.020	6,955.89	665.18	-3,186.12	14,455,231.825	1,737,957.851	39.803119575	-80.652697772	
8,920.00	89.76	149.000	6,956.33	582.91	-3,138.64	14,455,149.549	1,738,005.333	39.802893121	-80.652529848	
9,014.00	89.45	148.210	6,956.98	502.67	-3,089.68	14,455,069.314	1,738,054.300	39.802672254	-80.652356613	
9,109.00	90.02	147.590	6,957.42	422.20	-3,039.19	14,454,988.839	1,738,104.781	39.802450713	-80.652177987	
9,203.00	90.24	147.590	6,957.20	342.84	-2,988.81	14,454,909.482	1,738,155.163	39.802232240	-80.651999704	
9,298.00	90.20	147.940	6,956.84	262.48	-2,938.14	14,454,829.125	1,738,205.834	39.802011021	-80.651820402	
9,392.00	90.64	147.590	6,956.15	182.98	-2,888.00	14,454,749.616	1,738,255.972	39.801792135	-80.651642993	
9,485.00	90.81	147.510	6,954.97	104.50	-2,838.11	14,454,671.144	1,738,305.868	39.801576097	-80.651466428	
9,580.00	90.73	150.230	6,953.70	23.20	-2,789.00	14,454,589.839	1,738,354.972	39.801352291	-80.651292724	
9,673.00	90.29	150.490	6,952.87	-57.63	-2,743.01	14,454,509.012	1,738,400.963	39.801129827	-80.651130099	
9,768.00	90.29	150.760	6,952.39	-140.41	-2,696.41	14,454,426.227	1,738,447.562	39.800901983	-80.650965337	
9,862.00	90.07	150.670	6,952.09	-222.40	-2,650.43	14,454,344.241	1,738,493.542	39.800676338	-80.650802768	
9,957.00	90.11	150.490	6,951.94	-305.15	-2,603.77	14,454,261.493	1,738,540.207	39.800448590	-80.650637775	
10,051.00	90.73	150.850	6,951.25	-387.10	-2,557.72	14,454,179.545	1,738,586.250	39.800223049	-80.650474983	
10,145.00	89.89	151.280	6,950.75	-469.36	-2,512.25	14,454,097.282	1,738,631.728	39.799996646	-80.650314211	
10,240.00	90.20	151.020	6,950.67	-552.57	-2,466.41	14,454,014.073	1,738,677.567	39.799767643	-80.650152166	
10,335.00	90.15	150.490	6,950.38	-635.46	-2,420.00	14,453,931.183	1,738,723.978	39.799539508	-80.649988080	
10,428.00	90.15	150.490	6,950.14	-716.40	-2,374.19	14,453,850.248	1,738,769.787	39.799316750	-80.649826112	
10,522.00	89.93	150.490	6,950.07	-798.20	-2,327.88	14,453,768.443	1,738,816.089	39.799091596	-80.649662402	



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Fitzgerald 05 HM (slot T)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>TVD Reference:</b>	RKB=1292.91+.33 @ 1326.00ft (Nabors X08)
<b>Site:</b>	Fitzgerald	<b>MD Reference:</b>	RKB=1292.91+.33 @ 1326.00ft (Nabors X08)
<b>Well:</b>	Fitzgerald 05 HM (slot T)	<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_Decv0422v16

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
10,617.00	89.80	150.490	6,950.30	-880.88	-2,281.09	14,453,685.768	1,738,862.884	39.798864048	-80.649496953
10,711.00	89.41	150.580	6,950.94	-962.72	-2,234.85	14,453,603.928	1,738,909.120	39.798638800	-80.649333479
10,805.00	89.45	150.930	6,951.88	-1,044.73	-2,188.93	14,453,521.914	1,738,955.041	39.798413075	-80.649171132
10,900.00	89.23	149.440	6,952.97	-1,127.15	-2,141.70	14,453,439.497	1,739,002.270	39.798186229	-80.649004133
10,994.00	89.10	148.650	6,954.34	-1,207.75	-2,093.36	14,453,358.893	1,739,050.615	39.797964355	-80.648833140
11,089.00	89.41	148.820	6,955.58	-1,288.95	-2,044.06	14,453,277.697	1,739,099.915	39.797740838	-80.648658753
11,183.00	89.32	149.090	6,956.62	-1,369.48	-1,995.58	14,453,197.166	1,739,148.389	39.797519160	-80.648487302
11,278.00	89.27	149.000	6,957.79	-1,450.94	-1,946.72	14,453,115.703	1,739,197.250	39.797294916	-80.648314486
11,372.00	89.23	148.740	6,959.02	-1,531.40	-1,898.13	14,453,035.247	1,739,245.842	39.797073439	-80.648142615
11,466.00	89.58	148.820	6,960.00	-1,611.78	-1,849.41	14,452,954.864	1,739,294.562	39.796852163	-80.647970288
11,560.00	89.36	148.650	6,960.86	-1,692.13	-1,800.63	14,452,874.519	1,739,343.345	39.796630989	-80.647797735
11,654.00	89.27	148.120	6,961.99	-1,772.17	-1,751.36	14,452,794.476	1,739,392.617	39.796410639	-80.647623441
11,748.00	89.27	148.820	6,963.19	-1,852.28	-1,702.20	14,452,714.360	1,739,441.769	39.796190091	-80.647449574
11,842.00	89.41	148.910	6,964.27	-1,932.74	-1,653.60	14,452,633.906	1,739,490.369	39.795968620	-80.647277679
11,936.00	89.58	149.180	6,965.10	-2,013.35	-1,605.25	14,452,553.298	1,739,538.718	39.795746727	-80.647106684
12,030.00	90.02	151.020	6,965.43	-2,094.83	-1,558.40	14,452,471.814	1,739,585.573	39.795522446	-80.646941017
12,125.00	90.95	151.370	6,964.62	-2,178.07	-1,512.63	14,452,388.573	1,739,631.345	39.795293351	-80.646779235
12,219.00	90.20	151.370	6,963.68	-2,260.57	-1,467.59	14,452,306.071	1,739,676.382	39.795066293	-80.646620056
12,313.00	88.66	152.160	6,964.61	-2,343.38	-1,423.12	14,452,223.263	1,739,720.849	39.794838400	-80.646462915
12,407.00	88.79	151.720	6,966.70	-2,426.31	-1,378.92	14,452,140.333	1,739,765.055	39.794610176	-80.646306705
12,501.00	89.14	151.720	6,968.40	-2,509.08	-1,334.39	14,452,057.567	1,739,809.583	39.794382395	-80.646149347
12,596.00	89.89	149.260	6,969.21	-2,591.74	-1,287.60	14,451,974.901	1,739,856.372	39.794154868	-80.645983939
12,691.00	90.20	149.090	6,969.13	-2,673.32	-1,238.92	14,451,893.322	1,739,905.051	39.793930302	-80.645811787
12,785.00	89.85	148.740	6,969.09	-2,753.83	-1,190.39	14,451,812.820	1,739,953.584	39.793708699	-80.645640143
12,879.00	89.89	149.000	6,969.30	-2,834.29	-1,141.79	14,451,732.357	1,740,002.180	39.793487199	-80.645468275
12,973.00	89.63	148.560	6,969.70	-2,914.68	-1,093.07	14,451,651.971	1,740,050.902	39.793265910	-80.645295958
13,068.00	89.49	148.820	6,970.43	-2,995.84	-1,043.70	14,451,570.809	1,740,100.269	39.793042481	-80.645121358
13,163.00	89.32	148.740	6,971.41	-3,077.08	-994.46	14,451,489.571	1,740,149.507	39.792818846	-80.644947218
13,257.00	89.54	149.970	6,972.35	-3,157.94	-946.55	14,451,408.704	1,740,197.417	39.792596246	-80.644777802
13,351.00	88.92	150.050	6,973.61	-3,239.35	-899.57	14,451,327.298	1,740,244.398	39.792372172	-80.644611701
13,445.00	88.97	150.580	6,975.34	-3,321.00	-853.03	14,451,245.648	1,740,290.942	39.792147436	-80.644447162
13,540.00	89.19	149.790	6,976.87	-3,403.41	-805.80	14,451,163.235	1,740,338.169	39.791920592	-80.644282021
13,634.00	89.85	150.050	6,977.66	-3,484.75	-758.69	14,451,081.897	1,740,385.281	39.791696707	-80.644113638
13,727.00	89.58	149.530	6,978.12	-3,565.12	-711.90	14,451,001.530	1,740,432.075	39.791475486	-80.643948193
13,820.00	89.80	149.790	6,978.62	-3,645.38	-664.92	14,450,921.268	1,740,479.051	39.791254556	-80.643782099
13,915.00	89.19	150.320	6,979.46	-3,727.69	-617.50	14,450,838.954	1,740,526.470	39.791027984	-80.643614460
14,009.00	89.23	149.970	6,980.76	-3,809.21	-570.71	14,450,757.437	1,740,573.259	39.790803607	-80.643449052
14,104.00	89.27	150.050	6,982.00	-3,891.48	-523.23	14,450,675.164	1,740,620.740	39.790577145	-80.643281191
14,196.00	89.27	150.230	6,983.17	-3,971.26	-477.43	14,450,595.384	1,740,666.542	39.790357549	-80.643119277
14,291.00	89.32	149.440	6,984.34	-4,053.39	-429.70	14,450,513.256	1,740,714.274	39.790131482	-80.642950522
14,384.00	88.70	150.320	6,985.95	-4,133.82	-383.03	14,450,432.826	1,740,760.935	39.789910093	-80.642785559
14,479.00	88.70	149.700	6,988.10	-4,216.08	-335.56	14,450,350.567	1,740,808.408	39.789683670	-80.642617732
14,573.00	89.71	150.140	6,989.41	-4,297.41	-288.45	14,450,269.236	1,740,855.517	39.789459797	-80.642451192
14,666.00	89.67	149.610	6,989.91	-4,377.85	-241.78	14,450,188.799	1,740,902.191	39.789238386	-80.642286184
14,761.00	89.27	150.230	6,990.79	-4,460.05	-194.17	14,450,106.597	1,740,949.804	39.789012118	-80.642117863
14,855.00	89.10	149.970	6,992.13	-4,541.53	-147.31	14,450,025.117	1,740,996.657	39.788787840	-80.641952237
14,950.00	89.23	149.880	6,993.51	-4,623.73	-99.71	14,449,942.916	1,741,044.259	39.788561573	-80.641783954
15,045.00	89.10	149.970	6,994.89	-4,705.94	-52.11	14,449,860.715	1,741,091.862	39.788335305	-80.641615673
15,139.00	89.10	149.790	6,996.37	-4,787.23	-4.94	14,449,779.417	1,741,139.026	39.788111524	-80.641448938
15,234.00	89.14	149.440	6,997.83	-4,869.17	43.10	14,449,697.476	1,741,187.072	39.787885965	-80.641279076
15,328.00	89.76	149.440	6,998.73	-4,950.11	90.89	14,449,616.537	1,741,234.863	39.787663161	-80.641110109
15,422.00	89.76	149.260	6,999.13	-5,030.98	138.81	14,449,535.670	1,741,282.783	39.787440553	-80.640940683
15,516.00	89.54	149.440	6,999.70	-5,111.85	186.73	14,449,454.804	1,741,330.702	39.787217947	-80.640771259
15,611.00	89.76	150.050	7,000.28	-5,193.91	234.60	14,449,372.746	1,741,378.567	39.786992068	-80.640602049



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Fitzgerald 05 HM (slot T)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>TVD Reference:</b>	RKB=1292.91+.33 @ 1326.00ft (Nabors X08)
<b>Site:</b>	Fitzgerald	<b>MD Reference:</b>	RKB=1292.91+.33 @ 1326.00ft (Nabors X08)
<b>Well:</b>	Fitzgerald 05 HM (slot T)	<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_Decv0422v16

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
15,705.00	89.80	149.610	7,000.64	-5,275.17	281.84	14,449,291.480	1,741,425.807	39.786768373	-80.640435049
15,799.00	90.11	149.610	7,000.72	-5,356.26	329.39	14,449,210.396	1,741,473.360	39.786545171	-80.640266937
15,894.00	90.20	149.700	7,000.46	-5,438.24	377.39	14,449,128.411	1,741,521.354	39.786319492	-80.640097268
15,988.00	90.55	149.610	6,999.84	-5,519.36	424.87	14,449,047.291	1,741,568.843	39.786096193	-80.639929388
16,083.00	90.77	149.530	6,998.75	-5,601.27	472.99	14,448,965.383	1,741,616.955	39.785870723	-80.639759298
16,196.00	90.81	149.000	6,997.19	-5,698.39	530.73	14,448,868.265	1,741,674.700	39.785603374	-80.639555140
<b>Survey @ 16196.00 MD 6997.19 TVD</b>									
16,221.00	90.81	149.000	6,996.84	-5,719.81	543.61	14,448,846.838	1,741,687.575	39.785544388	-80.639509619
<b>Survey Proj. to 16221.00 MD 6996.84 TVD</b>									

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
3,067.09	2,867.22	312.50	-652.77	Tie into original hole @ 3067 MD
16,196.00	6,997.19	-5,698.39	530.73	Survey @ 16196.00 MD 6997.19 TVD
16,221.00	6,996.84	-5,719.81	543.61	Survey Proj. to 16221.00 MD 6996.84 TVD

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