



TUG HILL
OPERATING

Well: McMasters N-12 HU (slot C)
Site: McMasters Shields
Project: Marshall County, West Virginia NAD83 UTM 17N
Design: rev5
Rig: Nabors B28

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Annotation
1	10005.00	12.17	203.48	9946.02	-606.02	-308.30	0.00	0.000	-329.45	Survey @ 10005.00 MD 9946.03 TVD
2	10284.15	12.17	203.48	10218.90	-659.99	-331.74	0.00	0.000	-361.04	KOP Begin 6.32°/100' build/turn
3	11327.95	60.00	320.00	11088.25	-383.42	-708.70	6.32	121.957	79.19	Begin 8°/100' build/turn
4	11734.26	91.00	330.25	11189.00	-63.67	-928.50	8.00	19.339	467.20	Begin 91.00° lateral
5	22452.47	91.00	330.25	11002.00	9240.66	-6245.87	0.00	0.000	1153.51	PBHL/TD 22452.03 MD 11002.00 TVD

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
McMasters N-12 HU PBHL r5 - plan hits target center	11002.00	9240.66	-6245.87	14448677.054	1693872.279	39.785482000	-80.809716000
McMasters N-12 HU LP r5 - plan misses target center by 0.04ft at 11733.38ft MD (11189.01 TVD, -64.43 N, -928.06 E)	11189.00	-64.45	-928.10	4439371.961	1699190.045	39.759895000	-80.790864000

ANNOTATIONS SURVEYS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Annotation
171.00	0.18	227.56	171.00	-0.18	-0.20	-0.04	MWD surveys
22399.00	90.90	328.99	10986.39	9188.24	-6218.93	11094.99	Survey @ 22399.00 MD 10986.39 TVD
22456.00	90.90	328.99	10985.49	9237.09	-6248.29	11151.90	Survey Proj. to 22456.00 MD 10985.49 TVD



Azimuths to Grid North
True North: -0.14°
Magnetic North: -8.74°

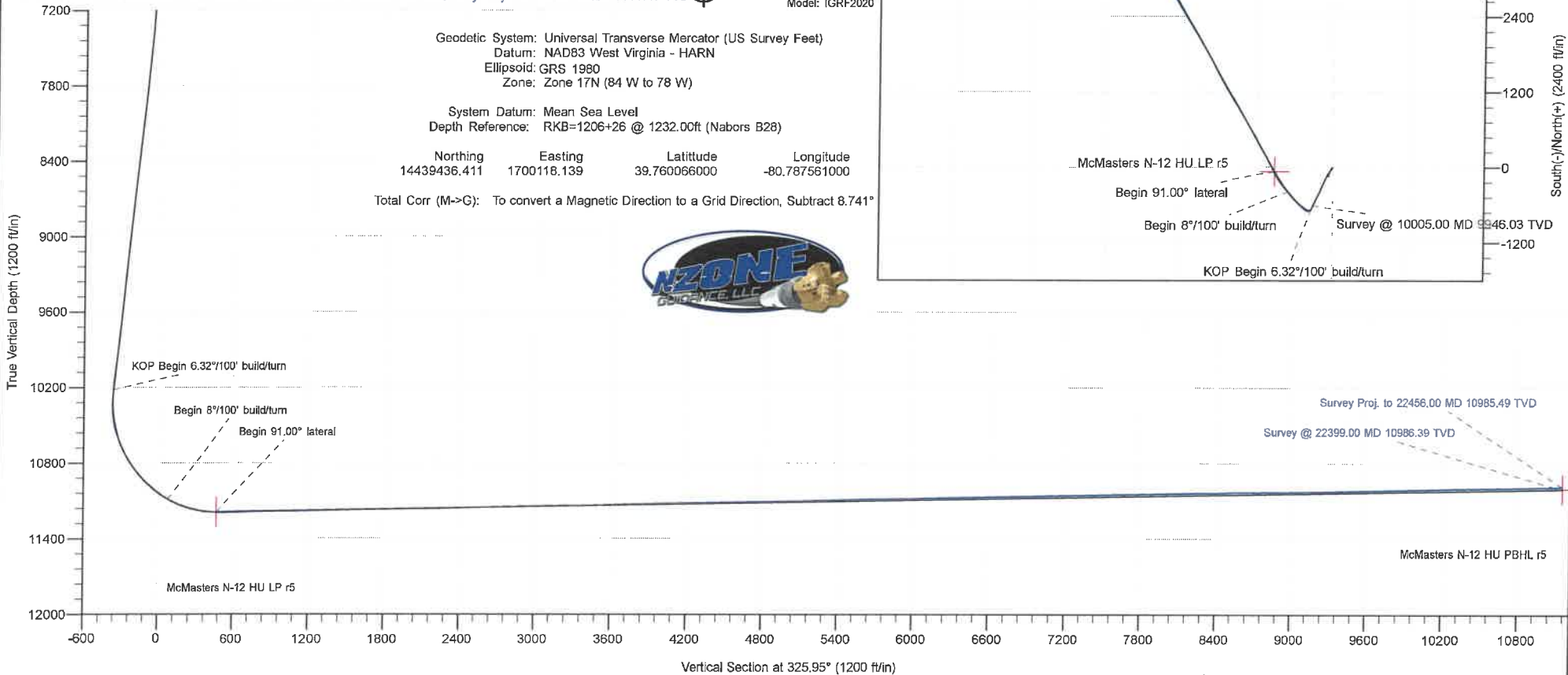
Magnetic Field
Strength: 51885.1nT
Dip Angle: 66.47°
Date: 1/3/2022
Model: IGRF2020

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=1206+26 @ 1232.00ft (Nabors B28)

Northing	Easting	Latitude	Longitude
14439436.411	1700118.139	39.760066000	-80.787561000

Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.741°



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well McMasters N-12 HU (slot C)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=1206+26 @ 1232.00ft (Nabors B28)
Site:	McMasters Shields	MD Reference:	RKB=1206+26 @ 1232.00ft (Nabors B28)
Well:	McMasters N-12 HU (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Dec2220_v16

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	McMasters Shields				
Site Position:		Northing:	14,439,441.755 usft	Latitude:	39.760080500
From:	Lat/Long	Easting:	1,700,145.187 usft	Longitude:	-80.787464710
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.136 °

Well	McMasters N-12 HU (slot C)					
Well Position	+N/-S	0.00 ft	Northing:	14,439,436.411 usft	Latitude:	39.760066000
	+E/-W	0.00 ft	Easting:	1,700,118.139 usft	Longitude:	-80.787561000
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	1,206.00 ft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2020	1/3/2022	-8.605	66.474	51,685.11242343

Design	Surveys Original Hole				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.00	0.00	0.00	325.95	

Survey Program	Date	1/27/2022			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
171.00	880.00	MWD surf (Original Hole)	MWD	MWD - Standard	
944.00	2,617.00	MWD int (Original Hole)	MWD	MWD - Standard	
2,667.00	10,005.00	MWD (Original Hole)	MWD	MWD - Standard	
10,076.00	22,399.00	MWD lat (Original Hole)	MWD	MWD - Standard	
22,456.00	22,456.00	Projection (Original Hole)	MWD	MWD - Standard	

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
0.00	0.00	0.00	0.00	0.00	0.00	14,439,436.411	1,700,118.139	39.760066000	-80.787561000	
171.00	0.18	227.56	171.00	-0.18	-0.20	14,439,436.230	1,700,117.941	39.760065504	-80.787561707	
MWD surveys										
202.00	0.18	300.86	202.00	-0.19	-0.28	14,439,436.222	1,700,117.863	39.760065483	-80.787561983	
232.00	0.13	153.47	232.00	-0.20	-0.30	14,439,436.216	1,700,117.838	39.760065466	-80.787562073	
263.00	0.13	311.15	263.00	-0.20	-0.31	14,439,436.207	1,700,117.827	39.760065443	-80.787562112	
294.00	0.09	256.74	294.00	-0.19	-0.36	14,439,436.225	1,700,117.777	39.760065492	-80.787562290	

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well McMasters N-12 HU (slot C)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=1206+26 @ 1232.00ft (Nabors B28)
Site:	McMasters Shields	MD Reference:	RKB=1206+26 @ 1232.00ft (Nabors B28)
Well:	McMasters N-12 HU (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Dec2220_v16

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
324.00	0.26	147.67	324.00	-0.25	-0.35	14,439,436.162	1,700,117.790	39.760065319	-80.787562243
355.00	0.26	195.04	355.00	-0.38	-0.33	14,439,436.034	1,700,117.810	39.760064969	-80.787562175
386.00	0.22	152.15	386.00	-0.50	-0.32	14,439,435.914	1,700,117.819	39.760064638	-80.787562142
416.00	0.18	181.16	416.00	-0.60	-0.29	14,439,435.816	1,700,117.845	39.760064368	-80.787562050
447.00	0.18	135.19	447.00	-0.68	-0.26	14,439,435.733	1,700,117.879	39.760064139	-80.787561932
478.00	0.31	218.86	478.00	-0.78	-0.28	14,439,435.633	1,700,117.860	39.760063865	-80.787561998
508.00	0.26	152.50	508.00	-0.90	-0.30	14,439,435.509	1,700,117.841	39.760063526	-80.787562069
539.00	0.31	200.93	539.00	-1.04	-0.30	14,439,435.369	1,700,117.843	39.760063140	-80.787562061
570.00	0.22	220.80	570.00	-1.17	-0.36	14,439,435.245	1,700,117.774	39.760062801	-80.787562307
601.00	0.31	232.57	601.00	-1.26	-0.47	14,439,435.149	1,700,117.669	39.760062538	-80.787562683
630.00	0.26	258.41	630.00	-1.32	-0.60	14,439,435.088	1,700,117.542	39.760062372	-80.787563135
661.00	0.31	200.84	661.00	-1.42	-0.70	14,439,434.996	1,700,117.443	39.760062118	-80.787563487
692.00	0.18	238.02	692.00	-1.52	-0.77	14,439,434.892	1,700,117.372	39.760061833	-80.787563741
723.00	0.44	259.82	723.00	-1.57	-0.93	14,439,434.845	1,700,117.214	39.760061705	-80.787564305
754.00	0.57	247.95	753.99	-1.65	-1.19	14,439,434.766	1,700,116.954	39.760061490	-80.787565231
785.00	0.53	228.27	784.99	-1.80	-1.44	14,439,434.612	1,700,116.704	39.760061071	-80.787566122
817.00	0.31	240.31	816.99	-1.94	-1.62	14,439,434.471	1,700,116.518	39.760060684	-80.787566784
848.00	0.26	290.49	847.99	-1.96	-1.76	14,439,434.454	1,700,116.379	39.760060638	-80.787567278
880.00	0.31	261.75	879.99	-1.94	-1.91	14,439,434.467	1,700,116.226	39.760060675	-80.787567824
944.00	0.44	216.66	943.99	-2.17	-2.23	14,439,434.245	1,700,115.908	39.760060067	-80.787568958
975.00	0.48	200.49	974.99	-2.38	-2.35	14,439,434.028	1,700,115.791	39.760059472	-80.787569374
1,006.00	0.44	231.17	1,005.99	-2.58	-2.49	14,439,433.832	1,700,115.653	39.760058934	-80.787569868
1,038.00	0.31	217.02	1,037.99	-2.73	-2.63	14,439,433.686	1,700,115.505	39.760058533	-80.787570395
1,070.00	0.44	222.38	1,069.99	-2.89	-2.77	14,439,433.526	1,700,115.370	39.760058095	-80.787570877
1,101.00	0.44	240.75	1,100.99	-3.03	-2.95	14,439,433.380	1,700,115.186	39.760057695	-80.787571533
1,132.00	0.66	233.10	1,131.98	-3.20	-3.20	14,439,433.214	1,700,114.939	39.760057242	-80.787572412
1,164.00	0.62	224.75	1,163.98	-3.43	-3.47	14,439,432.981	1,700,114.670	39.760056603	-80.787573372
1,195.00	0.62	240.57	1,194.98	-3.63	-3.73	14,439,432.779	1,700,114.406	39.760056051	-80.787574314
1,226.00	0.44	211.21	1,225.98	-3.82	-3.94	14,439,432.595	1,700,114.198	39.760055546	-80.787575054
1,258.00	0.57	196.10	1,257.98	-4.07	-4.05	14,439,432.337	1,700,114.090	39.760054838	-80.787575440
1,289.00	0.53	196.27	1,288.98	-4.36	-4.13	14,439,432.051	1,700,114.008	39.760054054	-80.787575738
1,320.00	0.62	191.62	1,319.98	-4.66	-4.21	14,439,431.749	1,700,113.934	39.760053225	-80.787576003
1,351.00	0.57	217.98	1,350.97	-4.95	-4.33	14,439,431.463	1,700,113.805	39.760052441	-80.787576464
1,383.00	0.79	194.08	1,382.97	-5.29	-4.49	14,439,431.124	1,700,113.653	39.760051510	-80.787577006
1,414.00	0.66	197.15	1,413.97	-5.66	-4.59	14,439,430.746	1,700,113.549	39.760050473	-80.787577382
1,445.00	0.83	206.29	1,444.97	-6.04	-4.74	14,439,430.374	1,700,113.397	39.760049453	-80.787577926
1,477.00	0.66	213.59	1,476.96	-6.40	-4.95	14,439,430.013	1,700,113.192	39.760048462	-80.787578657
1,508.00	0.70	248.30	1,507.96	-6.62	-5.22	14,439,429.794	1,700,112.917	39.760047863	-80.787579636
1,539.00	0.70	257.97	1,538.96	-6.73	-5.58	14,439,429.685	1,700,112.556	39.760047564	-80.787580922
1,571.00	0.97	268.87	1,570.96	-6.77	-6.04	14,439,429.639	1,700,112.094	39.760047441	-80.787582567
1,602.00	0.83	275.20	1,601.95	-6.76	-6.53	14,439,429.654	1,700,111.608	39.760047486	-80.787584296
1,633.00	1.05	278.63	1,632.95	-6.69	-7.04	14,439,429.717	1,700,111.104	39.760047662	-80.787586090
1,664.00	1.32	289.35	1,663.94	-6.53	-7.65	14,439,429.878	1,700,110.486	39.760048108	-80.787588287
1,696.00	1.32	287.42	1,695.93	-6.30	-8.35	14,439,430.110	1,700,109.787	39.760048751	-80.787590774
1,727.00	1.10	269.93	1,726.93	-6.19	-8.99	14,439,430.217	1,700,109.148	39.760049048	-80.787593044
1,759.00	0.62	245.14	1,758.92	-6.27	-9.45	14,439,430.143	1,700,108.684	39.760048850	-80.787594697
1,790.00	0.70	233.01	1,789.92	-6.45	-9.76	14,439,429.959	1,700,108.381	39.760048345	-80.787595778
1,822.00	0.70	216.05	1,821.92	-6.73	-10.03	14,439,429.683	1,700,108.109	39.760047590	-80.787596745
1,853.00	0.48	189.86	1,852.92	-7.01	-10.16	14,439,429.402	1,700,107.976	39.760046819	-80.787597223
1,884.00	0.57	155.30	1,883.92	-7.28	-10.12	14,439,429.134	1,700,108.018	39.760046083	-80.787597075
1,916.00	0.66	147.85	1,915.91	-7.58	-9.96	14,439,428.834	1,700,108.183	39.760045256	-80.787596492
1,947.00	0.75	153.65	1,946.91	-7.91	-9.77	14,439,428.501	1,700,108.368	39.760044340	-80.787595836
1,979.00	1.14	164.46	1,978.91	-8.40	-9.59	14,439,428.006	1,700,108.546	39.760042981	-80.787595206
2,010.00	1.41	179.66	2,009.90	-9.08	-9.51	14,439,427.328	1,700,108.631	39.760041117	-80.787594910

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well McMasters N-12 HU (slot C)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=1206+26 @ 1232.00ft (Nabors B28)
Site:	McMasters Shields	MD Reference:	RKB=1206+26 @ 1232.00ft (Nabors B28)
Well:	McMasters N-12 HU (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Dec2220_v16

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
2,041.00	1.58	184.76	2,040.89	-9.89	-9.54	14,439,426.520	1,700,108.598	39.760038901	-80.787595035	
2,072.00	1.80	180.28	2,071.87	-10.80	-9.58	14,439,425.608	1,700,108.560	39.760036394	-80.787595177	
2,104.00	1.93	192.14	2,103.86	-11.83	-9.70	14,439,424.578	1,700,108.444	39.760033568	-80.787595598	
2,151.00	2.33	193.64	2,150.83	-13.53	-10.09	14,439,422.876	1,700,108.052	39.760028896	-80.787597006	
2,197.00	2.50	194.78	2,196.78	-15.41	-10.56	14,439,420.997	1,700,107.576	39.760023739	-80.787598717	
2,244.00	2.81	197.86	2,243.73	-17.50	-11.18	14,439,418.910	1,700,106.961	39.760018010	-80.787600923	
2,292.00	3.08	203.13	2,291.67	-19.81	-12.05	14,439,416.604	1,700,106.094	39.760011683	-80.787604029	
2,339.00	3.21	206.38	2,338.60	-22.15	-13.13	14,439,414.264	1,700,105.013	39.760005264	-80.787607894	
2,386.00	3.56	213.50	2,385.52	-24.54	-14.52	14,439,411.868	1,700,103.623	39.759998694	-80.787612860	
2,433.00	3.78	219.83	2,432.42	-26.95	-16.31	14,439,409.462	1,700,101.825	39.759992096	-80.787619278	
2,479.00	3.87	225.37	2,478.32	-29.20	-18.39	14,439,407.207	1,700,099.749	39.759985917	-80.787626683	
2,526.00	3.78	226.68	2,525.21	-31.38	-20.65	14,439,405.030	1,700,097.493	39.759979953	-80.787634729	
2,573.00	3.65	221.41	2,572.12	-33.57	-22.76	14,439,402.845	1,700,095.377	39.759973966	-80.787642279	
2,617.00	3.43	217.89	2,616.03	-35.66	-24.50	14,439,400.755	1,700,093.642	39.759968240	-80.787648470	
2,667.00	3.43	213.41	2,665.94	-38.08	-26.24	14,439,398.326	1,700,091.900	39.759961580	-80.787654689	
2,761.00	2.99	211.39	2,759.80	-42.52	-29.06	14,439,393.886	1,700,089.074	39.759949405	-80.787664780	
2,855.00	2.99	206.21	2,853.67	-46.82	-31.42	14,439,389.594	1,700,086.715	39.759937632	-80.787673213	
2,949.00	2.42	211.83	2,947.56	-50.70	-33.55	14,439,385.708	1,700,084.585	39.759926975	-80.787680823	
3,042.00	2.50	206.38	3,040.48	-54.19	-35.49	14,439,382.223	1,700,082.648	39.759917416	-80.787687744	
3,137.00	2.11	209.28	3,135.40	-57.57	-37.27	14,439,378.842	1,700,080.873	39.759908141	-80.787694092	
3,232.00	2.24	200.32	3,230.33	-60.84	-38.77	14,439,375.575	1,700,079.372	39.759899180	-80.787699457	
3,326.00	2.20	209.19	3,324.26	-64.13	-40.28	14,439,372.277	1,700,077.855	39.759890133	-80.787704886	
3,419.00	2.33	209.98	3,417.19	-67.33	-42.10	14,439,369.081	1,700,076.039	39.759881368	-80.787711372	
3,514.00	2.50	215.35	3,512.10	-70.69	-44.26	14,439,365.719	1,700,073.876	39.759872148	-80.787719100	
3,608.00	2.33	211.57	3,606.02	-73.99	-46.45	14,439,362.419	1,700,071.689	39.759863099	-80.787726908	
3,702.00	2.64	206.03	3,699.93	-77.57	-48.40	14,439,358.845	1,700,069.739	39.759853298	-80.787733878	
3,796.00	2.46	205.68	3,793.84	-81.33	-50.22	14,439,355.082	1,700,067.915	39.759842975	-80.787740401	
3,891.00	2.41	199.26	3,888.75	-85.05	-51.77	14,439,351.359	1,700,066.372	39.759832761	-80.787745920	
3,984.00	2.68	193.99	3,981.66	-89.01	-52.94	14,439,347.403	1,700,065.202	39.759821905	-80.787750119	
4,081.00	2.68	194.25	4,078.56	-93.41	-54.04	14,439,343.005	1,700,064.095	39.759809833	-80.787754093	
4,173.00	2.72	190.47	4,170.45	-97.64	-54.97	14,439,338.774	1,700,063.169	39.759798218	-80.787757424	
4,267.00	2.72	198.30	4,264.35	-101.95	-56.08	14,439,334.463	1,700,062.063	39.759786387	-80.787761395	
4,363.00	2.59	191.79	4,360.25	-106.23	-57.23	14,439,330.177	1,700,060.905	39.759774624	-80.787765553	
4,457.00	2.20	190.38	4,454.16	-110.09	-57.99	14,439,326.323	1,700,060.146	39.759764045	-80.787768287	
4,551.00	2.11	187.31	4,548.10	-113.58	-58.54	14,439,322.832	1,700,059.601	39.759754461	-80.787770256	
4,645.00	1.89	181.51	4,642.04	-116.85	-58.80	14,439,319.566	1,700,059.340	39.759745494	-80.787771212	
4,739.00	1.93	173.66	4,735.99	-119.97	-58.67	14,439,316.443	1,700,059.474	39.759736917	-80.787770762	
4,833.00	2.42	171.49	4,829.92	-123.50	-58.20	14,439,312.907	1,700,059.942	39.759727203	-80.787769125	
4,928.00	2.24	167.62	4,924.84	-127.30	-57.50	14,439,309.111	1,700,060.637	39.759716771	-80.787766685	
5,023.00	1.71	167.01	5,019.78	-130.50	-56.79	14,439,305.916	1,700,061.354	39.759707993	-80.787764161	
5,117.00	0.92	231.52	5,113.76	-132.33	-57.06	14,439,304.080	1,700,061.078	39.759702952	-80.787765157	
5,164.00	1.10	248.60	5,160.76	-132.73	-57.78	14,439,303.680	1,700,060.363	39.759701860	-80.787767706	
5,211.00	1.36	275.46	5,207.75	-132.84	-58.75	14,439,303.569	1,700,059.387	39.759701560	-80.787771178	
5,258.00	1.32	289.53	5,254.73	-132.61	-59.82	14,439,303.803	1,700,058.322	39.759702209	-80.787774967	
5,306.00	1.23	291.28	5,302.72	-132.24	-60.82	14,439,304.175	1,700,057.321	39.759703237	-80.787778526	
5,399.00	1.58	324.24	5,395.69	-130.83	-62.50	14,439,305.577	1,700,055.641	39.759707100	-80.787784490	
5,494.00	1.19	334.53	5,490.67	-128.88	-63.69	14,439,307.531	1,700,054.452	39.759712472	-80.787788706	
5,587.00	1.27	339.36	5,583.64	-127.04	-64.47	14,439,309.367	1,700,053.673	39.759717521	-80.787791461	
5,681.00	1.32	345.34	5,677.62	-125.02	-65.11	14,439,311.389	1,700,053.032	39.759723079	-80.787793726	
5,774.00	1.67	346.39	5,770.59	-122.67	-65.70	14,439,313.743	1,700,052.442	39.759729546	-80.787795805	
5,868.00	2.02	346.30	5,864.54	-119.73	-66.41	14,439,316.683	1,700,051.727	39.759737626	-80.787798324	
5,962.00	2.07	351.14	5,958.48	-116.44	-67.07	14,439,319.970	1,700,051.074	39.759746658	-80.787800623	
6,056.00	1.80	359.57	6,052.43	-113.29	-67.34	14,439,323.124	1,700,050.801	39.759755320	-80.787801566	
6,150.00	1.80	350.79	6,146.38	-110.35	-67.59	14,439,326.058	1,700,050.554	39.759763378	-80.787802421	

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well McMasters N-12 HU (slot C)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=1206+26 @ 1232.00ft (Nabors B28)
Site:	McMasters Shields	MD Reference:	RKB=1206+26 @ 1232.00ft (Nabors B28)
Well:	McMasters N-12 HU (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Dec2220_v16

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
6,244.00	1.36	348.76	6,240.34	-107.80	-68.04	14,439,328.609	1,700,050.100	39.759770388	-80.787804014
6,339.00	1.10	354.65	6,335.32	-105.79	-68.34	14,439,330.623	1,700,049.795	39.759775920	-80.787805082
6,627.00	0.75	21.72	6,623.29	-101.29	-67.90	14,439,335.126	1,700,050.235	39.759788285	-80.787803479
6,722.00	0.92	20.40	6,718.28	-99.99	-67.41	14,439,336.419	1,700,050.731	39.759791831	-80.787801703
6,816.00	0.97	16.62	6,812.26	-98.52	-66.92	14,439,337.888	1,700,051.221	39.759795865	-80.787799945
6,911.00	0.75	356.59	6,907.25	-97.13	-66.72	14,439,339.280	1,700,051.414	39.759799684	-80.787799247
6,958.00	1.32	206.21	6,954.25	-97.31	-66.98	14,439,339.101	1,700,051.157	39.759799195	-80.787800164
7,005.00	2.24	208.58	7,001.23	-98.60	-67.66	14,439,337.809	1,700,050.479	39.759795650	-80.787802589
7,099.00	4.22	212.62	7,095.07	-103.13	-70.40	14,439,333.282	1,700,047.735	39.759783237	-80.787812390
7,193.00	5.84	205.59	7,188.71	-110.36	-74.33	14,439,326.055	1,700,043.805	39.759763416	-80.787826436
7,286.00	7.47	205.77	7,281.08	-120.07	-79.01	14,439,316.343	1,700,039.133	39.759736774	-80.787843143
7,380.00	9.14	208.13	7,374.09	-132.16	-85.18	14,439,304.256	1,700,032.956	39.759703618	-80.787865224
7,474.00	10.72	207.08	7,466.68	-146.52	-92.68	14,439,289.887	1,700,025.455	39.759664206	-80.787892033
7,568.00	11.91	209.02	7,558.85	-162.79	-101.37	14,439,273.620	1,700,016.770	39.759619590	-80.787923076
7,662.00	11.78	207.17	7,650.85	-179.81	-110.46	14,439,256.602	1,700,007.683	39.759572912	-80.787955554
7,756.00	11.60	202.95	7,742.90	-197.05	-118.52	14,439,239.363	1,699,999.616	39.759525620	-80.787984403
7,850.00	10.81	202.34	7,835.11	-213.90	-125.56	14,439,222.506	1,699,992.580	39.759479374	-80.788009580
7,944.00	10.72	200.82	7,927.45	-230.23	-132.02	14,439,206.181	1,699,986.122	39.759434583	-80.788032697
8,038.00	11.65	203.04	8,019.67	-247.14	-138.84	14,439,189.276	1,699,979.300	39.759388199	-80.788057114
8,133.00	12.61	203.22	8,112.55	-265.49	-146.68	14,439,170.919	1,699,971.458	39.759337836	-80.788085175
8,227.00	11.65	205.68	8,204.45	-283.48	-154.84	14,439,152.935	1,699,963.299	39.759288501	-80.788114356
8,322.00	10.50	206.64	8,297.68	-299.86	-162.88	14,439,136.553	1,699,955.261	39.759243563	-80.788143096
8,416.00	11.51	204.97	8,389.95	-316.02	-170.68	14,439,120.395	1,699,947.462	39.759199239	-80.788170986
8,505.00	11.82	201.63	8,477.11	-332.54	-177.79	14,439,103.872	1,699,940.353	39.759153908	-80.788196419
8,599.00	12.17	201.72	8,569.06	-350.69	-185.00	14,439,085.718	1,699,933.138	39.759104098	-80.788222246
8,692.00	12.17	206.47	8,659.97	-368.58	-193.00	14,439,067.835	1,699,925.140	39.759055040	-80.788250853
8,786.00	12.30	209.37	8,751.83	-386.17	-202.33	14,439,050.240	1,699,915.813	39.759006779	-80.788284189
8,881.00	11.87	208.58	8,844.73	-403.57	-211.96	14,439,032.842	1,699,906.176	39.758959061	-80.788318626
8,974.00	12.22	206.73	8,935.68	-420.76	-220.97	14,439,015.652	1,699,897.174	39.758911911	-80.788350805
9,069.00	12.09	207.26	9,028.55	-438.58	-230.04	14,438,997.828	1,699,888.095	39.758863021	-80.788383260
9,163.00	12.57	206.73	9,120.38	-456.47	-239.15	14,438,979.942	1,699,878.985	39.758813959	-80.788415825
9,256.00	12.22	206.82	9,211.22	-474.29	-248.15	14,438,962.120	1,699,869.992	39.758765072	-80.788447973
9,350.00	10.24	203.83	9,303.41	-490.82	-256.01	14,438,945.597	1,699,862.127	39.758719747	-80.788476098
9,443.00	9.93	201.99	9,394.98	-505.81	-262.35	14,438,930.600	1,699,855.785	39.758678602	-80.788498792
9,537.00	10.77	202.87	9,487.45	-521.42	-268.80	14,438,914.992	1,699,849.337	39.758635780	-80.788521868
9,631.00	11.03	205.68	9,579.75	-537.62	-276.11	14,438,898.795	1,699,842.027	39.758591347	-80.788548015
9,725.00	11.29	206.64	9,671.97	-553.95	-284.14	14,438,882.467	1,699,834.004	39.758546556	-80.788576698
9,818.00	11.82	205.94	9,763.09	-570.65	-292.38	14,438,866.764	1,699,825.756	39.758500739	-80.788606188
9,912.00	11.95	203.74	9,855.07	-588.21	-300.51	14,438,848.199	1,699,817.626	39.758452551	-80.788635261
10,005.00	12.17	203.48	9,946.02	-606.02	-308.30	14,438,830.394	1,699,809.845	39.758403705	-80.788663101
10,076.00	12.35	201.81	10,015.40	-619.93	-314.10	14,438,816.480	1,699,804.042	39.758365532	-80.788683865
10,129.00	12.79	199.79	10,067.13	-630.71	-318.19	14,438,805.698	1,699,799.950	39.758335947	-80.788698516
10,223.00	11.52	204.01	10,159.02	-649.08	-325.53	14,438,787.333	1,699,792.607	39.758285558	-80.788724797
10,270.00	11.12	207.00	10,205.11	-657.41	-329.50	14,438,779.007	1,699,788.640	39.758262719	-80.788738983
10,317.00	11.25	214.73	10,251.22	-665.21	-334.17	14,438,771.200	1,699,783.970	39.758241310	-80.788755665
10,364.00	12.31	226.42	10,297.24	-672.43	-340.41	14,438,763.977	1,699,777.728	39.758221514	-80.788777938
10,411.00	13.41	239.25	10,343.07	-678.68	-348.73	14,438,757.736	1,699,769.412	39.758204426	-80.788807578
10,458.00	14.99	247.34	10,388.63	-683.81	-359.02	14,438,752.606	1,699,759.118	39.758190406	-80.788844251
10,505.00	16.09	255.25	10,433.92	-687.81	-370.93	14,438,748.606	1,699,747.209	39.758179497	-80.788886660
10,552.00	16.97	271.51	10,479.00	-689.28	-384.09	14,438,747.128	1,699,734.047	39.758175522	-80.788933507
10,600.00	18.24	285.22	10,524.77	-687.13	-398.35	14,438,749.285	1,699,719.789	39.758181540	-80.788984221
10,647.00	19.74	299.54	10,569.24	-681.28	-412.36	14,438,755.133	1,699,705.778	39.758197691	-80.789034028
10,695.00	21.54	306.05	10,614.16	-672.10	-426.54	14,438,764.317	1,699,691.598	39.758223004	-80.789084405
10,742.00	24.22	310.18	10,657.46	-660.79	-440.89	14,438,775.617	1,699,677.253	39.758254131	-80.789135354

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well McMasters N-12 HU (slot C)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=1206+26 @ 1232.00ft (Nabors B28)
Site:	McMasters Shields	MD Reference:	RKB=1206+26 @ 1232.00ft (Nabors B28)
Well:	McMasters N-12 HU (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Dec2220_v16

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
10,790.00	27.78	312.03	10,700.60	-646.95	-456.72	14,438,789.464	1,699,661.416	39.758292259	-80.789191588	
10,837.00	29.76	312.29	10,741.79	-631.76	-473.49	14,438,804.647	1,699,644.650	39.758334066	-80.789251119	
10,884.00	32.26	312.11	10,782.07	-615.50	-491.43	14,438,820.910	1,699,626.713	39.758378844	-80.789314808	
10,931.00	35.08	313.78	10,821.18	-597.74	-510.49	14,438,838.669	1,699,607.652	39.758427740	-80.789382483	
10,979.00	38.37	313.69	10,859.65	-577.90	-531.22	14,438,858.509	1,699,586.915	39.758482359	-80.789456103	
11,026.00	41.41	313.17	10,895.71	-557.19	-553.11	14,438,879.225	1,699,565.026	39.758539391	-80.789533819	
11,073.00	44.88	313.96	10,930.00	-535.04	-576.39	14,438,901.377	1,699,541.746	39.758600378	-80.789616470	
11,120.00	47.60	315.19	10,962.50	-511.21	-600.57	14,438,925.204	1,699,517.574	39.758665970	-80.789702279	
11,167.00	49.58	316.42	10,993.59	-485.93	-625.13	14,438,950.479	1,699,493.008	39.758735540	-80.789789482	
11,214.00	52.70	317.65	11,023.07	-459.15	-650.07	14,438,977.262	1,699,468.075	39.758809254	-80.789877977	
11,262.00	55.87	318.88	11,051.09	-430.07	-676.00	14,439,006.345	1,699,442.141	39.758889293	-80.789970012	
11,309.00	58.11	319.50	11,076.70	-400.24	-701.75	14,439,036.176	1,699,416.387	39.758971382	-80.790061405	
11,356.00	62.15	319.85	11,100.10	-369.17	-728.12	14,439,067.243	1,699,390.020	39.759056871	-80.790154966	
11,403.00	66.33	320.02	11,120.52	-336.78	-755.36	14,439,099.632	1,699,362.781	39.759145995	-80.790251619	
11,450.00	69.80	320.64	11,138.07	-303.22	-783.18	14,439,133.187	1,699,334.957	39.759238326	-80.790350347	
11,497.00	73.14	322.04	11,153.01	-268.43	-811.01	14,439,167.982	1,699,307.127	39.759334063	-80.790449083	
11,545.00	76.13	324.33	11,165.73	-231.38	-838.74	14,439,205.033	1,699,279.403	39.759435993	-80.790547427	
11,592.00	78.99	327.05	11,175.85	-193.47	-864.60	14,439,242.939	1,699,253.543	39.759540260	-80.790639130	
11,640.00	82.55	329.52	11,183.55	-153.18	-889.49	14,439,283.235	1,699,228.646	39.759651086	-80.790727383	
11,687.00	84.88	331.36	11,188.70	-112.54	-912.54	14,439,323.868	1,699,205.603	39.759762823	-80.790809041	
11,734.00	87.74	332.15	11,191.72	-71.23	-934.73	14,439,365.182	1,699,183.410	39.759876425	-80.790887668	
11,829.00	91.03	332.06	11,192.74	12.72	-979.17	14,439,449.127	1,699,138.973	39.760107247	-80.791045094	
11,922.00	92.00	331.98	11,190.28	94.82	-1,022.78	14,439,531.226	1,699,095.356	39.760332995	-80.791199614	
12,017.00	91.87	332.06	11,187.08	178.66	-1,067.33	14,439,615.074	1,699,050.811	39.760563549	-80.791357426	
12,112.00	91.60	331.89	11,184.20	262.49	-1,111.95	14,439,698.896	1,699,006.196	39.760794033	-80.791515491	
12,206.00	89.98	331.01	11,182.90	345.04	-1,156.86	14,439,781.454	1,698,961.277	39.761021048	-80.791674645	
12,300.00	90.73	329.87	11,182.32	426.80	-1,203.24	14,439,863.215	1,698,914.905	39.761245884	-80.791838976	
12,395.00	90.99	329.52	11,180.89	508.81	-1,251.17	14,439,945.224	1,698,866.974	39.761471410	-80.792008858	
12,489.00	91.52	329.95	11,178.84	589.98	-1,298.53	14,440,026.392	1,698,819.609	39.761694622	-80.792176730	
12,583.00	91.43	329.69	11,176.42	671.21	-1,345.77	14,440,107.623	1,698,772.370	39.761918007	-80.792344158	
12,677.00	90.90	329.87	11,174.51	752.42	-1,393.07	14,440,188.831	1,698,725.068	39.762141329	-80.792511810	
12,775.00	91.34	329.16	11,172.59	836.86	-1,442.78	14,440,273.267	1,698,675.361	39.762373530	-80.792687993	
12,870.00	91.56	329.43	11,170.19	918.51	-1,491.27	14,440,354.922	1,698,626.868	39.762598087	-80.792859881	
12,964.00	91.30	329.43	11,167.84	999.42	-1,539.07	14,440,435.831	1,698,579.075	39.762820591	-80.793029283	
13,058.00	90.95	329.08	11,165.99	1,080.20	-1,587.11	14,440,516.604	1,698,531.030	39.763042720	-80.793199587	
13,152.00	90.51	328.99	11,164.80	1,160.79	-1,635.47	14,440,597.200	1,698,482.670	39.763264367	-80.793371014	
13,246.00	90.73	329.78	11,163.78	1,241.68	-1,683.34	14,440,678.092	1,698,434.802	39.763486822	-80.793540688	
13,340.00	91.34	330.48	11,162.08	1,323.18	-1,730.15	14,440,759.590	1,698,387.995	39.763710936	-80.793706583	
13,434.00	90.90	331.10	11,160.24	1,405.21	-1,776.01	14,440,841.620	1,698,342.132	39.763936505	-80.793869119	
13,528.00	90.81	331.36	11,158.84	1,487.60	-1,821.25	14,440,924.007	1,698,296.895	39.764163049	-80.794029421	
13,622.00	90.86	330.92	11,157.47	1,569.92	-1,866.61	14,441,006.324	1,698,251.529	39.764389400	-80.794190185	
13,717.00	91.60	330.57	11,155.43	1,652.78	-1,913.03	14,441,089.187	1,698,205.114	39.764617258	-80.794354679	
13,811.00	91.12	330.83	11,153.20	1,734.73	-1,959.02	14,441,171.138	1,698,159.125	39.764842609	-80.794517663	
13,904.00	91.69	330.48	11,150.92	1,815.77	-2,004.58	14,441,252.179	1,698,113.563	39.765065460	-80.794679139	
13,998.00	91.69	330.66	11,148.15	1,897.61	-2,050.75	14,441,334.014	1,698,067.395	39.765290490	-80.794842764	
14,092.00	91.78	330.75	11,145.30	1,979.55	-2,096.72	14,441,415.954	1,698,021.422	39.765515812	-80.795005698	
14,187.00	90.99	329.25	11,143.01	2,061.79	-2,144.21	14,441,498.199	1,697,973.937	39.765741979	-80.795174008	
14,280.00	91.08	327.93	11,141.33	2,141.15	-2,192.66	14,441,577.556	1,697,925.479	39.765960220	-80.795345809	
14,374.00	90.64	328.55	11,139.92	2,221.06	-2,242.14	14,441,657.471	1,697,876.007	39.766179999	-80.795521212	
14,469.00	90.68	329.52	11,138.82	2,302.52	-2,291.01	14,441,738.925	1,697,827.132	39.766404002	-80.795694480	
14,563.00	90.55	329.78	11,137.81	2,383.63	-2,338.51	14,441,820.038	1,697,779.638	39.766627059	-80.795862835	
14,656.00	90.68	330.04	11,136.81	2,464.09	-2,385.13	14,441,900.500	1,697,733.015	39.766848323	-80.796028102	
14,751.00	91.52	329.78	11,134.99	2,546.28	-2,432.75	14,441,982.682	1,697,685.395	39.767074315	-80.796196900	
14,844.00	91.65	329.78	11,132.42	2,626.61	-2,479.54	14,442,063.012	1,697,638.604	39.767295218	-80.796362764	

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well McMasters N-12 HU (slot C)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=1206+26 @ 1232.00ft (Nabors B28)
Site:	McMasters Shields	MD Reference:	RKB=1206+26 @ 1232.00ft (Nabors B28)
Well:	McMasters N-12 HU (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Dec2220_v16

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
14,938.00	91.52	329.43	11,129.82	2,707.66	-2,527.08	14,442,144.061	1,697,591.062	39.767518098	-80.796531296
15,033.00	90.95	331.01	11,127.77	2,790.09	-2,574.25	14,442,226.493	1,697,543.891	39.767744774	-80.796698498
15,127.00	91.38	331.10	11,125.86	2,872.33	-2,619.74	14,442,308.734	1,697,498.408	39.767970914	-80.796859698
15,221.00	91.43	331.54	11,123.55	2,954.77	-2,664.84	14,442,391.176	1,697,453.309	39.768197605	-80.797019527
15,315.00	91.25	331.62	11,121.36	3,037.42	-2,709.56	14,442,473.825	1,697,408.584	39.768424860	-80.797178027
15,409.00	91.12	331.19	11,119.41	3,119.94	-2,754.54	14,442,556.341	1,697,363.604	39.768651753	-80.797337436
15,503.00	90.99	330.66	11,117.68	3,202.08	-2,800.21	14,442,638.481	1,697,317.932	39.768877617	-80.797499310
15,597.00	90.77	330.39	11,116.24	3,283.90	-2,846.46	14,442,720.305	1,697,271.686	39.769102615	-80.797663234
15,692.00	91.08	330.31	11,114.70	3,366.45	-2,893.45	14,442,802.855	1,697,224.696	39.769329612	-80.797829799
15,786.00	91.03	330.22	11,112.97	3,448.06	-2,940.06	14,442,884.464	1,697,178.081	39.769554022	-80.797995038
15,880.00	90.73	330.92	11,111.53	3,529.92	-2,986.25	14,442,966.323	1,697,131.899	39.769779118	-80.798158735
15,974.00	90.33	331.27	11,110.66	3,612.21	-3,031.68	14,443,048.609	1,697,086.465	39.770005379	-80.798319766
16,068.00	90.46	331.01	11,110.01	3,694.53	-3,077.05	14,443,130.932	1,697,041.095	39.770231743	-80.798480571
16,162.00	91.16	330.83	11,108.68	3,776.67	-3,122.73	14,443,213.074	1,696,995.414	39.770457609	-80.798642489
16,256.00	92.13	330.83	11,105.98	3,858.71	-3,168.53	14,443,295.118	1,696,949.617	39.770683207	-80.798804816
16,350.00	91.60	330.31	11,102.93	3,940.54	-3,214.69	14,443,376.943	1,696,903.454	39.770908209	-80.798968451
16,444.00	90.73	330.13	11,101.01	4,022.11	-3,261.37	14,443,458.512	1,696,856.777	39.771132507	-80.799133918
16,538.00	91.38	330.31	11,099.28	4,103.68	-3,308.05	14,443,540.084	1,696,810.099	39.771356813	-80.799299393
16,632.00	91.65	329.95	11,096.80	4,185.17	-3,354.85	14,443,621.567	1,696,763.300	39.771580879	-80.799465296
16,727.00	91.38	329.87	11,094.29	4,267.33	-3,402.46	14,443,703.736	1,696,715.688	39.771806831	-80.799634091
16,822.00	91.91	329.60	11,091.56	4,349.35	-3,450.32	14,443,785.754	1,696,667.828	39.772032368	-80.799803769
16,916.00	91.56	329.69	11,088.71	4,430.43	-3,497.80	14,443,866.830	1,696,620.346	39.772255318	-80.799972109
17,010.00	91.03	329.52	11,086.59	4,511.49	-3,545.35	14,443,947.889	1,696,572.798	39.772478221	-80.800140686
17,105.00	90.51	328.81	11,085.31	4,593.05	-3,594.04	14,444,029.452	1,696,524.109	39.772702515	-80.800313321
17,198.00	91.12	329.25	11,083.99	4,672.78	-3,641.89	14,444,109.185	1,696,476.258	39.772921777	-80.800482992
17,293.00	90.99	329.16	11,082.24	4,754.38	-3,690.52	14,444,190.776	1,696,427.629	39.773146147	-80.800655414
17,386.00	90.99	329.16	11,080.63	4,834.21	-3,738.19	14,444,270.614	1,696,379.961	39.773365696	-80.800824435
17,480.00	91.34	330.04	11,078.72	4,915.27	-3,785.74	14,444,351.673	1,696,332.404	39.773588596	-80.800993050
17,574.00	90.95	330.13	11,076.84	4,996.73	-3,832.61	14,444,433.132	1,696,285.534	39.773812593	-80.801159216
17,668.00	90.90	330.75	11,075.33	5,078.49	-3,878.98	14,444,514.886	1,696,239.167	39.774037394	-80.801323593
17,762.00	91.69	331.54	11,073.20	5,160.79	-3,924.33	14,444,597.193	1,696,193.816	39.774263708	-80.801484353
17,856.00	91.69	331.89	11,070.43	5,243.53	-3,968.85	14,444,679.933	1,696,149.293	39.774491207	-80.801642161
17,950.00	91.38	331.71	11,067.91	5,326.35	-4,013.26	14,444,762.745	1,696,104.889	39.774718904	-80.801799545
18,044.00	91.21	332.15	11,065.79	5,409.27	-4,057.48	14,444,845.667	1,696,060.669	39.774946899	-80.801956276
18,139.00	90.86	330.75	11,064.07	5,492.70	-4,102.87	14,444,929.099	1,696,015.275	39.775176302	-80.802117183
18,233.00	91.65	329.78	11,062.01	5,574.30	-4,149.48	14,445,010.700	1,695,968.664	39.775400686	-80.802282434
18,327.00	91.52	330.04	11,059.41	5,655.60	-4,196.59	14,445,092.002	1,695,921.554	39.775624247	-80.802449465
18,421.00	91.38	330.13	11,057.03	5,737.05	-4,243.46	14,445,173.451	1,695,874.690	39.775848215	-80.802615621
18,516.00	91.16	330.31	11,054.93	5,819.49	-4,290.63	14,445,255.885	1,695,827.518	39.776074887	-80.802782867
18,611.00	91.16	330.48	11,053.01	5,902.07	-4,337.55	14,445,338.466	1,695,780.596	39.776301961	-80.802949223
18,705.00	91.03	331.45	11,051.21	5,984.24	-4,383.17	14,445,420.636	1,695,734.983	39.776527899	-80.803110926
18,800.00	90.90	331.19	11,049.61	6,067.57	-4,428.75	14,445,503.969	1,695,689.397	39.776757030	-80.803272522
18,894.00	90.51	331.19	11,048.45	6,149.93	-4,474.05	14,445,586.327	1,695,644.102	39.776983482	-80.803433094
18,987.00	90.59	331.01	11,047.56	6,231.34	-4,518.99	14,445,667.741	1,695,599.159	39.777207340	-80.803592420
19,081.00	91.30	330.39	11,046.01	6,313.31	-4,564.98	14,445,749.704	1,695,553.164	39.777432708	-80.803755487
19,175.00	90.86	329.87	11,044.24	6,394.80	-4,611.79	14,445,831.201	1,695,506.357	39.777656805	-80.803921447
19,268.00	90.99	330.13	11,042.74	6,475.33	-4,658.29	14,445,911.731	1,695,459.863	39.777878242	-80.804086303
19,362.00	91.03	331.01	11,041.08	6,557.19	-4,704.47	14,445,993.587	1,695,413.683	39.778103320	-80.804250033
19,456.00	90.81	331.27	11,039.57	6,639.50	-4,749.83	14,446,075.902	1,695,368.318	39.778329651	-80.804410859
19,551.00	91.21	332.33	11,037.90	6,723.21	-4,794.72	14,446,159.611	1,695,323.434	39.778559809	-80.804569965
19,645.00	90.90	331.62	11,036.16	6,806.18	-4,838.87	14,446,242.574	1,695,279.275	39.778787913	-80.804726495
19,739.00	91.25	331.71	11,034.40	6,888.90	-4,883.48	14,446,325.297	1,695,234.668	39.779015361	-80.804884622
19,833.00	90.81	331.01	11,032.71	6,971.38	-4,928.53	14,446,407.781	1,695,189.621	39.779242156	-80.805044319
19,927.00	90.33	329.69	11,031.78	7,053.07	-4,975.03	14,446,489.467	1,695,143.123	39.779466766	-80.805209189

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well McMasters N-12 HU (slot C)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=1206+26 @ 1232.00ft (Nabors B28)
Site:	McMasters Shields	MD Reference:	RKB=1206+26 @ 1232.00ft (Nabors B28)
Well:	McMasters N-12 HU (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Dec2220_v16

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
20,022.00	89.93	329.69	11,031.56	7,135.08	-5,022.97	14,446,571.481	1,695,095.179	39.779692285	-80.805379204
20,116.00	90.51	329.52	11,031.20	7,216.16	-5,070.53	14,446,652.560	1,695,047.619	39.779915236	-80.805547858
20,211.00	90.64	330.04	11,030.25	7,298.25	-5,118.34	14,446,734.645	1,694,999.806	39.780140949	-80.805717407
20,305.00	91.12	328.37	11,028.80	7,378.98	-5,166.46	14,446,815.378	1,694,951.689	39.780362953	-80.805888051
20,399.00	91.21	328.11	11,026.89	7,458.89	-5,215.93	14,446,895.286	1,694,902.221	39.780582696	-80.806063510
20,492.00	91.03	327.85	11,025.07	7,537.73	-5,265.23	14,446,974.122	1,694,852.921	39.780799495	-80.806238382
20,586.00	91.16	327.05	11,023.28	7,616.95	-5,315.79	14,447,053.342	1,694,802.354	39.781017354	-80.806417756
20,681.00	91.08	327.93	11,021.42	7,697.04	-5,366.84	14,447,133.439	1,694,751.307	39.781237626	-80.806598838
20,774.00	91.34	329.78	11,019.46	7,776.62	-5,414.93	14,447,213.012	1,694,703.220	39.781456443	-80.806769389
20,869.00	91.16	329.87	11,017.38	7,858.72	-5,462.67	14,447,295.119	1,694,655.481	39.781682215	-80.806938685
20,963.00	90.86	330.13	11,015.73	7,940.12	-5,509.66	14,447,376.513	1,694,608.488	39.781908023	-80.807105329
21,056.00	91.60	330.57	11,013.73	8,020.92	-5,555.66	14,447,457.316	1,694,562.492	39.782128203	-80.807268431
21,150.00	91.47	330.75	11,011.21	8,102.83	-5,601.70	14,447,539.229	1,694,516.450	39.782353431	-80.807431691
21,243.00	91.21	331.01	11,009.04	8,184.06	-5,646.95	14,447,620.451	1,694,471.205	39.782576758	-80.807592118
21,337.00	90.64	331.10	11,007.52	8,266.30	-5,692.43	14,447,702.698	1,694,425.718	39.782802899	-80.807753400
21,431.00	91.43	331.10	11,005.82	8,348.58	-5,737.85	14,447,784.977	1,694,380.297	39.783029129	-80.807914447
21,525.00	91.38	331.19	11,003.52	8,430.89	-5,783.20	14,447,867.282	1,694,334.947	39.783255427	-80.808075244
21,618.00	91.12	331.19	11,001.49	8,512.36	-5,828.01	14,447,948.751	1,694,290.140	39.783479428	-80.808234113
21,712.00	91.21	331.10	10,999.58	8,594.67	-5,873.36	14,448,031.063	1,694,244.786	39.783705746	-80.808394927
21,805.00	91.16	330.22	10,997.65	8,675.72	-5,918.92	14,448,112.115	1,694,199.227	39.783928606	-80.808556480
21,899.00	90.95	329.87	10,995.92	8,757.15	-5,965.85	14,448,193.545	1,694,152.299	39.784152509	-80.808722903
21,994.00	90.55	328.99	10,994.68	8,838.94	-6,014.16	14,448,275.332	1,694,103.988	39.784377404	-80.808894250
22,088.00	91.38	330.83	10,993.10	8,920.26	-6,061.28	14,448,356.649	1,694,056.869	39.784600998	-80.809061356
22,183.00	91.08	329.60	10,991.06	9,002.69	-6,108.46	14,448,439.078	1,694,009.690	39.784827648	-80.809228669
22,277.00	91.47	328.90	10,988.97	9,083.45	-6,156.51	14,448,519.841	1,693,961.641	39.785049728	-80.809399094
22,371.00	91.08	329.52	10,986.87	9,164.18	-6,204.62	14,448,600.571	1,693,913.535	39.785271716	-80.809569720
22,399.00	90.90	328.99	10,986.39	9,188.24	-6,218.93	14,448,624.632	1,693,899.223	39.785337878	-80.809620483
Survey @ 22399.00 MD 10986.39 TVD									
22,456.00	90.90	328.99	10,985.49	9,237.09	-6,248.29	14,448,673.479	1,693,869.861	39.785472198	-80.809724632
Survey Proj. to 22456.00 MD 10985.49 TVD									

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
171.00	171.00	-0.18	-0.20	MWD surveys
22,399.00	10,986.39	9,188.24	-6,218.93	Survey @ 22399.00 MD 10986.39 TVD
22,456.00	10,985.49	9,237.09	-6,248.29	Survey Proj. to 22456.00 MD 10985.49 TVD