



Well: McMasters N-11 HU (slot D)
Site: McMasters Shields
Project: Marshall County, West Virginia NAD83 UTM 17N
Design: rev6
Rig: Nabors B28

West(-)/East(+) (3200 ft/in)

-11200 -9600 -8000 -6400 -4800 -3200 -1600 0 1600 3200

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	V Sect	Annotation
1	10194.00	15.38	228.35	9976.49	-1210.41	-1304.95	0.00	0.000	-192.57	Survey @ 10194.00 MD 9976.49 TVD
2	10493.00	15.38	228.35	10264.78	-1263.11	-1364.20	0.00	0.000	-199.50	KOP Begin 6°/100' build/turn
3	10842.93	25.84	283.67	10594.65	-1276.08	-1474.22	6.00	89.925	-144.25	Begin 6°/100' build/turn
4	11357.63	50.00	316.81	11001.59	-1101.59	-1724.24	6.00	54.652	144.96	Begin 8°/100' build/turn
5	11892.39	91.00	330.16	11177.00	-701.59	-2010.88	8.00	19.875	636.98	Begin 91.00° lateral
6	29061.75	91.00	330.16	10876.00	14189.51	-10552.04	0.00	0.000	17682.98	PBHL/TD 29061.75 MD 10876.00 TVD

ANNOTATIONS SURVEYS

MD	Inc	Azi	TVD	+N/-S	+E/-W	V Sect	Annotation
140.00	0.18	146.18	140.00	-0.18	0.12	-0.22	MWD surveys
29008.00	91.56	326.52	10887.47	14156.02	-10548.07	17653.73	Survey @ 29008.00 MD 10887.47 TVD
29043.00	91.56	326.52	10886.52	14185.86	-10566.34	17688.58	Survey Proj. to 29043.00 MD 10886.52 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=1206+26 @ 1232.00ft (Nabors B28)

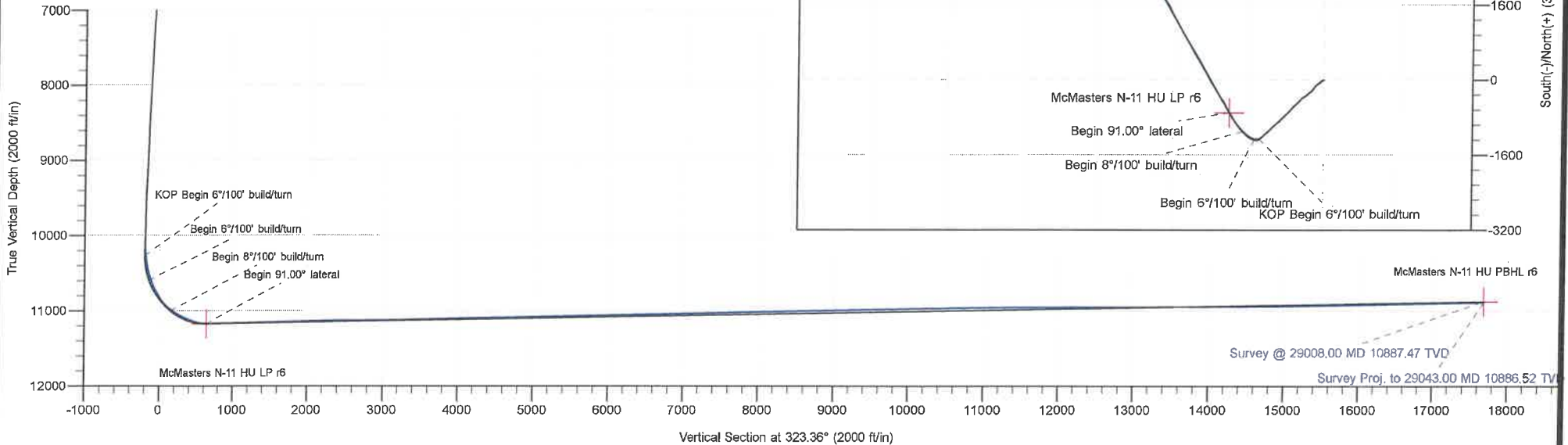


Azimuths to Grid North
 True North: -0.14°
 Magnetic North: -8.74°

Magnetic Field
 Strength: 51692.0nT
 Dip Angle: 66.48°
 Date: 12/10/2021
 Model: IGRF2020

Northing 14439448.428 Easting 1700118.391 Latitude 39.760099000 Longitude -80.787560000

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-11 HU (slot D)
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-11 HU (slot D)	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-11 HU (slot D)					
Well Position	+N/-S	0.00 ft	Northing:	14,439,448.428 usft	Latitude:	39.760099000
	+E/-W	0.00 ft	Easting:	1,700,118.392 usft	Longitude:	-80.787560000
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	12/10/2021	-8.605	66.481	51,691.97626936

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	323.36	

Survey Program	Date	1/2/2022			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
140.00	929.00	MWD surf (Original Hole)	MWD	MWD - Standard	
975.00	2,667.00	MWD int (Original Hole)	MWD	MWD - Standard	
2,761.00	10,194.00	MWD (Original Hole)	MWD	MWD - Standard	
10,272.00	29,008.00	MWD lat (Original Hole)	MWD	MWD - Standard	
29,043.00	29,043.00	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	14,439,448.428	1,700,118.392	39.760099000	-80.787560000	
140.00	0.18	146.18	140.00	-0.18	0.12	14,439,448.245	1,700,118.514	39.760098498	-80.787559566	
MWD surveys										
170.00	0.13	76.83	170.00	-0.21	0.18	14,439,448.214	1,700,118.573	39.760098411	-80.787559355	
201.00	0.18	84.74	201.00	-0.20	0.26	14,439,448.226	1,700,118.656	39.760098445	-80.787559060	
232.00	0.22	78.85	232.00	-0.19	0.37	14,439,448.242	1,700,118.763	39.760098488	-80.787558680	
263.00	0.13	78.24	263.00	-0.17	0.46	14,439,448.261	1,700,118.856	39.760098539	-80.787558349	



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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-11 HU (slot D)	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
293.00	0.13	77.44	293.00	-0.15	0.53	14,439,448.275	1,700,118.922	39.760098578	-80.787558113
324.00	0.22	93.79	324.00	-0.15	0.62	14,439,448.279	1,700,119.016	39.760098587	-80.787557779
355.00	0.13	99.51	355.00	-0.16	0.72	14,439,448.269	1,700,119.110	39.760098560	-80.787557444
385.00	0.13	69.27	385.00	-0.15	0.78	14,439,448.276	1,700,119.175	39.760098577	-80.787557212
416.00	0.13	77.88	416.00	-0.13	0.85	14,439,448.295	1,700,119.243	39.760098631	-80.787556972
447.00	0.04	75.95	447.00	-0.12	0.90	14,439,448.305	1,700,119.288	39.760098659	-80.787556812
477.00	0.09	18.56	477.00	-0.10	0.91	14,439,448.330	1,700,119.305	39.760098727	-80.787556749
508.00	0.13	59.16	508.00	-0.06	0.95	14,439,448.371	1,700,119.343	39.760098839	-80.787556614
539.00	0.13	41.58	539.00	-0.01	1.01	14,439,448.416	1,700,119.397	39.760098961	-80.787556423
569.00	0.04	278.89	569.00	0.02	1.02	14,439,448.443	1,700,119.409	39.760099035	-80.787556379
600.00	0.13	63.03	600.00	0.03	1.04	14,439,448.460	1,700,119.430	39.760099083	-80.787556306
631.00	0.08	52.22	631.00	0.06	1.09	14,439,448.490	1,700,119.478	39.760099163	-80.787556133
662.00	0.04	90.80	662.00	0.07	1.11	14,439,448.503	1,700,119.506	39.760099199	-80.787556033
692.00	0.09	37.98	692.00	0.09	1.14	14,439,448.521	1,700,119.531	39.760099249	-80.787555944
724.00	0.18	89.49	724.00	0.11	1.21	14,439,448.541	1,700,119.597	39.760099305	-80.787555710
755.00	0.09	75.60	755.00	0.12	1.28	14,439,448.548	1,700,119.669	39.760099322	-80.787555453
786.00	0.09	99.59	786.00	0.12	1.33	14,439,448.550	1,700,119.717	39.760099327	-80.787555284
817.00	0.22	136.86	817.00	0.07	1.39	14,439,448.502	1,700,119.781	39.760099196	-80.787555054
849.00	0.22	177.20	849.00	-0.03	1.43	14,439,448.396	1,700,119.826	39.760098904	-80.787554895
881.00	0.18	222.90	881.00	-0.13	1.40	14,439,448.298	1,700,119.795	39.760098635	-80.787555007
929.00	0.22	237.32	929.00	-0.23	1.27	14,439,448.193	1,700,119.666	39.760098348	-80.787555466
975.00	0.22	244.35	975.00	-0.32	1.12	14,439,448.107	1,700,119.512	39.760098113	-80.787556015
1,006.00	0.44	240.75	1,006.00	-0.40	0.96	14,439,448.023	1,700,119.355	39.760097883	-80.787556576
1,038.00	0.35	218.42	1,038.00	-0.54	0.80	14,439,447.887	1,700,119.187	39.760097509	-80.787557175
1,070.00	0.35	229.32	1,070.00	-0.68	0.66	14,439,447.746	1,700,119.052	39.760097125	-80.787557656
1,101.00	0.53	239.69	1,100.99	-0.82	0.46	14,439,447.612	1,700,118.856	39.760096758	-80.787558353
1,132.00	0.53	251.73	1,131.99	-0.93	0.20	14,439,447.495	1,700,118.596	39.760096437	-80.787559279
1,164.00	0.66	237.67	1,163.99	-1.08	-0.09	14,439,447.350	1,700,118.300	39.760096041	-80.787560334
1,195.00	0.88	250.24	1,194.99	-1.25	-0.47	14,439,447.174	1,700,117.925	39.760095660	-80.787561670
1,226.00	0.79	233.98	1,225.99	-1.46	-0.86	14,439,446.968	1,700,117.528	39.760094997	-80.787563084
1,258.00	0.79	239.43	1,257.98	-1.70	-1.23	14,439,446.726	1,700,117.160	39.760094335	-80.787564396
1,289.00	1.19	244.26	1,288.98	-1.95	-1.71	14,439,446.477	1,700,116.686	39.760093655	-80.787566085
1,320.00	1.19	237.05	1,319.97	-2.27	-2.27	14,439,446.163	1,700,116.126	39.760092794	-80.787568081
1,351.00	1.23	240.22	1,350.96	-2.61	-2.82	14,439,445.822	1,700,115.567	39.760091863	-80.787570072
1,383.00	1.45	246.37	1,382.96	-2.94	-3.49	14,439,445.489	1,700,114.898	39.760090953	-80.787572456
1,414.00	1.58	236.35	1,413.94	-3.33	-4.21	14,439,445.095	1,700,114.183	39.760089876	-80.787575004
1,445.00	1.63	240.57	1,444.93	-3.79	-4.95	14,439,444.642	1,700,113.443	39.760088635	-80.787577640
1,477.00	2.15	238.90	1,476.91	-4.32	-5.86	14,439,444.108	1,700,112.533	39.760087176	-80.787580884
1,508.00	2.02	239.96	1,507.89	-4.89	-6.83	14,439,443.534	1,700,111.562	39.760085606	-80.787584343
1,540.00	2.33	238.20	1,539.87	-5.52	-7.87	14,439,442.909	1,700,110.521	39.760083896	-80.787588053
1,571.00	2.42	242.94	1,570.84	-6.15	-8.99	14,439,442.279	1,700,109.402	39.760082174	-80.787592038
1,602.00	2.59	247.43	1,601.81	-6.71	-10.22	14,439,441.713	1,700,108.173	39.760080626	-80.787596418
1,633.00	2.77	256.65	1,632.78	-7.16	-11.59	14,439,441.271	1,700,106.797	39.760079422	-80.787601317
1,664.00	3.12	263.69	1,663.74	-7.42	-13.16	14,439,441.005	1,700,105.230	39.760078702	-80.787606896
1,696.00	3.34	269.40	1,695.69	-7.53	-14.96	14,439,440.900	1,700,103.432	39.760078424	-80.787613294
1,727.00	3.60	267.38	1,726.63	-7.58	-16.83	14,439,440.846	1,700,101.557	39.760078288	-80.787619967
1,759.00	3.82	264.04	1,758.57	-7.74	-18.90	14,439,440.689	1,700,099.493	39.760077872	-80.787627312
1,790.00	4.09	260.96	1,789.49	-8.02	-21.02	14,439,440.408	1,700,097.374	39.760077114	-80.787634854
1,822.00	4.13	264.74	1,821.41	-8.30	-23.29	14,439,440.123	1,700,095.100	39.760076346	-80.787642949
1,869.00	4.13	258.32	1,868.29	-8.80	-26.63	14,439,439.626	1,700,091.757	39.760075001	-80.787654848
1,916.00	4.31	254.19	1,915.16	-9.63	-29.99	14,439,438.802	1,700,088.400	39.760072760	-80.787666799
1,963.00	4.48	249.97	1,962.02	-10.74	-33.42	14,439,437.692	1,700,084.977	39.760069734	-80.787678992
2,010.00	4.61	247.60	2,008.87	-12.08	-36.89	14,439,436.344	1,700,081.506	39.760066054	-80.787691354
2,057.00	4.44	242.59	2,055.73	-13.64	-40.25	14,439,434.786	1,700,078.144	39.760061799	-80.787703327

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Site:	McMasters Shields	MD Reference:	RKB=1206+26 @ 1232.00ft (Nabors B28)
Well:	McMasters N-11 HU (slot D)	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	
2,104.00	4.48	243.12	2,102.59	-15.31	-43.50	14,439,433.119	1,700,074.892	39.760057241	-80.787714914	
2,151.00	4.31	233.19	2,149.45	-17.20	-46.55	14,439,431.231	1,700,071.841	39.760052075	-80.787725788	
2,197.00	4.48	230.81	2,195.31	-19.37	-49.33	14,439,429.060	1,700,069.065	39.760046132	-80.787735685	
2,244.00	4.61	224.40	2,242.17	-21.88	-52.07	14,439,426.550	1,700,066.320	39.760039258	-80.787745471	
2,292.00	4.61	223.61	2,290.01	-24.65	-54.75	14,439,423.776	1,700,063.640	39.760031655	-80.787755031	
2,337.00	5.05	219.92	2,334.85	-27.48	-57.27	14,439,420.947	1,700,061.122	39.760023904	-80.787764016	
2,386.00	4.97	217.46	2,383.66	-30.82	-59.94	14,439,417.608	1,700,058.447	39.760014752	-80.787773562	
2,433.00	5.05	216.93	2,430.48	-34.09	-62.43	14,439,414.339	1,700,055.966	39.760005789	-80.787782418	
2,480.00	4.53	220.58	2,477.32	-37.15	-64.88	14,439,411.276	1,700,053.516	39.759997392	-80.787791163	
2,527.00	4.48	220.80	2,524.17	-39.95	-67.28	14,439,408.476	1,700,051.109	39.759989720	-80.787799751	
2,574.00	4.48	220.27	2,571.03	-42.74	-69.67	14,439,405.686	1,700,048.723	39.759982073	-80.787808264	
2,618.00	4.70	219.48	2,614.89	-45.44	-71.93	14,439,402.984	1,700,046.466	39.759974666	-80.787816318	
2,667.00	4.61	215.08	2,663.73	-48.61	-74.33	14,439,399.823	1,700,044.058	39.759966001	-80.787824913	
2,761.00	4.09	221.15	2,757.46	-54.22	-78.71	14,439,394.207	1,700,039.681	39.759950607	-80.787840535	
2,855.00	4.39	230.90	2,851.20	-59.01	-83.71	14,439,389.414	1,700,034.683	39.759937476	-80.787858360	
2,949.00	5.71	235.56	2,944.83	-63.93	-90.36	14,439,384.500	1,700,028.034	39.759924025	-80.787882059	
3,045.00	6.89	239.07	3,040.25	-69.59	-99.24	14,439,378.839	1,700,019.156	39.759908537	-80.787913699	
3,140.00	7.60	237.31	3,134.49	-75.91	-109.41	14,439,372.518	1,700,008.981	39.759891241	-80.787949959	
3,234.00	8.57	237.32	3,227.56	-83.05	-120.54	14,439,365.378	1,699,997.854	39.759871707	-80.787989612	
3,328.00	9.40	236.97	3,320.41	-91.02	-132.87	14,439,357.412	1,699,985.523	39.759849911	-80.788033557	
3,422.00	10.06	232.31	3,413.05	-100.22	-145.80	14,439,348.209	1,699,972.590	39.759824718	-80.788079653	
3,516.00	10.50	231.08	3,505.54	-110.62	-158.96	14,439,337.808	1,699,959.430	39.759796241	-80.788126571	
3,610.00	10.81	226.07	3,597.93	-122.12	-171.97	14,439,326.311	1,699,946.417	39.759764752	-80.788172970	
3,704.00	10.85	221.50	3,690.25	-134.86	-184.19	14,439,313.569	1,699,934.206	39.759729838	-80.788216528	
3,799.00	10.68	212.53	3,783.59	-148.98	-194.85	14,439,299.450	1,699,923.547	39.759691131	-80.788254575	
3,893.00	10.20	213.94	3,876.03	-163.23	-204.18	14,439,285.201	1,699,914.216	39.759652061	-80.788287897	
3,987.00	9.36	216.66	3,968.67	-176.26	-213.39	14,439,272.164	1,699,905.005	39.759616317	-80.788320782	
4,081.00	10.11	218.86	4,061.31	-188.82	-223.13	14,439,259.608	1,699,895.265	39.759581896	-80.788355548	
4,175.00	10.50	215.17	4,153.80	-202.25	-233.24	14,439,246.182	1,699,885.154	39.759545090	-80.788391635	
4,270.00	10.42	213.85	4,247.22	-216.46	-243.01	14,439,231.971	1,699,875.383	39.759506127	-80.788426524	
4,363.00	9.76	219.04	4,338.78	-229.56	-252.66	14,439,218.863	1,699,865.733	39.759470192	-80.788460971	
4,457.00	9.36	225.19	4,431.48	-241.14	-263.10	14,439,207.287	1,699,855.291	39.759438469	-80.788498223	
4,551.00	9.84	233.54	4,524.17	-251.30	-274.98	14,439,197.127	1,699,843.408	39.759410642	-80.788540594	
4,645.00	10.77	235.12	4,616.65	-261.10	-288.65	14,439,187.331	1,699,829.743	39.759383828	-80.788589302	
4,739.00	11.51	232.05	4,708.88	-271.89	-303.25	14,439,176.541	1,699,815.142	39.759354290	-80.788641345	
4,833.00	12.04	227.30	4,800.90	-284.30	-317.85	14,439,164.124	1,699,800.541	39.759320285	-80.788693403	
4,928.00	10.77	222.38	4,894.03	-297.58	-331.12	14,439,150.847	1,699,787.276	39.759283909	-80.788740717	
5,023.00	9.67	223.34	4,987.52	-309.94	-342.58	14,439,138.487	1,699,775.817	39.759250039	-80.788781596	
5,117.00	9.67	232.06	5,080.19	-320.54	-354.22	14,439,127.891	1,699,764.171	39.759221013	-80.788823122	
5,211.00	10.42	237.14	5,172.75	-330.00	-367.59	14,439,118.424	1,699,750.804	39.759195102	-80.788870766	
5,306.00	11.47	241.01	5,266.02	-339.24	-383.07	14,439,109.185	1,699,735.325	39.759169828	-80.788925922	
5,400.00	11.60	240.39	5,358.12	-348.44	-399.46	14,439,099.985	1,699,718.933	39.759144670	-80.788984326	
5,494.00	10.99	236.97	5,450.30	-358.00	-415.19	14,439,090.432	1,699,703.205	39.759118535	-80.789040373	
5,587.00	10.55	232.48	5,541.66	-368.01	-429.37	14,439,080.415	1,699,689.020	39.759091116	-80.789090931	
5,681.00	11.33	232.48	5,633.95	-378.88	-443.52	14,439,069.550	1,699,674.871	39.759061370	-80.789141368	
5,774.00	11.16	232.83	5,725.17	-389.88	-457.94	14,439,058.548	1,699,660.454	39.759031250	-80.789192761	
5,868.00	10.77	225.01	5,817.46	-401.59	-471.40	14,439,046.842	1,699,646.993	39.758999188	-80.789240757	
5,962.00	9.62	219.39	5,909.97	-413.87	-482.60	14,439,034.562	1,699,635.796	39.758965536	-80.789280699	
6,056.00	9.14	224.13	6,002.72	-425.30	-492.78	14,439,023.133	1,699,625.613	39.758934214	-80.789317028	
6,150.00	9.27	225.63	6,095.51	-435.95	-503.39	14,439,012.480	1,699,615.003	39.758905026	-80.789354872	
6,245.00	9.89	222.55	6,189.18	-447.31	-514.38	14,439,001.119	1,699,604.016	39.758873896	-80.789394062	
6,339.00	10.68	223.96	6,281.67	-459.53	-525.88	14,438,988.902	1,699,592.511	39.758840419	-80.789435103	
6,530.00	8.44	220.80	6,470.01	-482.88	-547.33	14,438,965.548	1,699,571.063	39.758776422	-80.789511613	
6,625.00	9.89	224.57	6,563.79	-493.97	-557.61	14,438,954.458	1,699,560.782	39.758746031	-80.789548291	



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well McMasters N-11 HU (slot D)
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-11 HU (slot D)	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
6,720.00	12.08	228.88	6,657.05	-506.32	-570.83	14,438,942.107	1,699,547.566	39.758712197	-80.789595419
6,814.00	12.74	230.11	6,748.85	-519.44	-586.19	14,438,928.991	1,699,532.203	39.758676276	-80.789650193
6,909.00	15.16	227.65	6,841.05	-534.53	-603.41	14,438,913.903	1,699,514.983	39.758634950	-80.789711594
7,003.00	15.65	225.36	6,931.67	-551.72	-621.52	14,438,896.714	1,699,496.878	39.758587861	-80.789776161
7,099.00	15.73	223.70	7,024.09	-570.22	-639.72	14,438,878.208	1,699,478.674	39.758537155	-80.789841089
7,193.00	15.56	221.85	7,114.61	-588.82	-656.93	14,438,859.604	1,699,461.459	39.758486175	-80.789902499
7,287.00	15.16	219.13	7,205.25	-607.75	-673.10	14,438,840.678	1,699,445.290	39.758434303	-80.789960189
7,380.00	14.50	219.65	7,295.16	-626.15	-688.21	14,438,822.280	1,699,430.187	39.758383875	-80.790014085
7,474.00	15.99	224.13	7,385.85	-644.50	-704.73	14,438,803.925	1,699,413.661	39.758333572	-80.790073039
7,568.00	15.38	222.46	7,476.35	-662.99	-722.16	14,438,785.436	1,699,396.231	39.758282907	-80.790135214
7,662.00	16.08	222.81	7,566.83	-681.74	-739.42	14,438,766.689	1,699,378.969	39.758231534	-80.790196792
7,756.00	16.70	228.00	7,657.01	-700.33	-758.31	14,438,748.100	1,699,360.085	39.758180606	-80.790264143
7,850.00	17.40	228.18	7,746.88	-718.74	-778.82	14,438,729.691	1,699,339.573	39.758130181	-80.790337281
7,944.00	18.28	227.74	7,836.36	-738.02	-800.21	14,438,710.405	1,699,318.188	39.758077353	-80.790413535
8,038.00	19.29	226.51	7,925.35	-758.62	-822.38	14,438,689.805	1,699,296.012	39.758020922	-80.790492613
8,133.00	19.69	224.93	8,014.91	-780.75	-845.07	14,438,667.675	1,699,273.325	39.757960292	-80.790573523
8,228.00	19.12	225.98	8,104.51	-802.90	-867.56	14,438,645.532	1,699,250.834	39.757899626	-80.790653736
8,322.00	18.50	226.07	8,193.49	-823.94	-889.37	14,438,624.488	1,699,229.023	39.757841971	-80.790731519
8,416.00	18.98	223.17	8,282.51	-845.44	-910.57	14,438,602.992	1,699,207.824	39.757783074	-80.790807129
8,505.00	17.93	223.17	8,366.93	-865.99	-929.84	14,438,582.444	1,699,188.549	39.757726768	-80.790875885
8,599.00	17.18	225.98	8,456.55	-886.19	-949.73	14,438,562.244	1,699,168.666	39.757671419	-80.790946800
8,692.00	17.14	227.56	8,545.41	-904.98	-969.72	14,438,543.452	1,699,148.676	39.757619938	-80.791018085
8,787.00	18.72	228.62	8,635.80	-924.50	-991.49	14,438,523.926	1,699,126.905	39.757566455	-80.791095712
8,880.00	19.25	229.50	8,723.74	-944.33	-1,014.34	14,438,504.104	1,699,104.049	39.757512164	-80.791177202
8,975.00	18.76	229.32	8,813.56	-964.45	-1,037.84	14,438,483.976	1,699,080.556	39.757457037	-80.791260962
9,068.00	18.33	228.97	8,901.73	-983.80	-1,060.21	14,438,464.628	1,699,058.183	39.757404045	-80.791340729
9,162.00	18.94	227.56	8,990.80	-1,003.80	-1,082.62	14,438,444.631	1,699,035.774	39.757349269	-80.791420629
9,256.00	20.17	225.28	9,079.38	-1,025.50	-1,105.39	14,438,422.932	1,699,013.000	39.757289823	-80.791501845
9,317.00	20.65	223.34	9,136.55	-1,040.72	-1,120.25	14,438,407.709	1,698,998.145	39.757248112	-80.791554828
9,350.00	21.14	223.17	9,167.38	-1,049.29	-1,128.31	14,438,399.137	1,698,990.080	39.757224622	-80.791583595
9,443.00	18.33	223.34	9,254.91	-1,072.16	-1,149.83	14,438,376.266	1,698,968.566	39.757161948	-80.791660337
9,538.00	16.83	225.19	9,345.47	-1,092.72	-1,169.84	14,438,355.707	1,698,948.555	39.757105617	-80.791731709
9,630.00	15.82	227.83	9,433.76	-1,110.53	-1,188.58	14,438,337.902	1,698,929.811	39.757056837	-80.791798550
9,724.00	16.26	230.11	9,524.10	-1,127.57	-1,208.18	14,438,320.860	1,698,910.217	39.757010161	-80.791868410
9,818.00	16.30	231.25	9,614.33	-1,144.27	-1,228.56	14,438,304.164	1,698,889.832	39.756964438	-80.791941081
9,911.00	16.04	229.93	9,703.66	-1,160.71	-1,248.57	14,438,287.724	1,698,869.822	39.756919417	-80.792012418
10,005.00	15.47	228.79	9,794.12	-1,177.33	-1,267.94	14,438,271.105	1,698,850.452	39.756873900	-80.792081475
10,099.00	15.03	227.83	9,884.81	-1,193.77	-1,286.41	14,438,254.663	1,698,831.987	39.756828863	-80.792147311
10,194.00	15.38	228.35	9,976.49	-1,210.41	-1,304.95	14,438,238.021	1,698,813.445	39.756783278	-80.792213427
10,272.00	16.31	231.61	10,051.53	-1,224.09	-1,321.26	14,438,224.345	1,698,797.130	39.756745823	-80.792271588
10,366.00	15.38	243.07	10,141.98	-1,237.93	-1,342.73	14,438,210.499	1,698,775.665	39.756707934	-80.792348078
10,461.00	15.29	242.58	10,233.59	-1,249.41	-1,365.08	14,438,199.025	1,698,753.315	39.756676566	-80.792427700
10,508.00	15.47	246.55	10,278.91	-1,254.75	-1,376.33	14,438,193.676	1,698,742.063	39.756661949	-80.792467779
10,555.00	17.06	257.88	10,324.04	-1,258.70	-1,388.83	14,438,189.733	1,698,729.568	39.756651199	-80.792512271
10,602.00	18.52	265.10	10,368.80	-1,260.78	-1,403.01	14,438,187.648	1,698,715.388	39.756645562	-80.792562744
10,649.00	19.80	268.89	10,413.19	-1,261.57	-1,418.40	14,438,186.856	1,698,699.991	39.756643486	-80.792617536
10,696.00	21.21	271.36	10,457.22	-1,261.53	-1,434.86	14,438,186.903	1,698,683.531	39.756643721	-80.792676101
10,744.00	22.40	274.93	10,501.78	-1,260.53	-1,452.66	14,438,187.896	1,698,665.737	39.756646559	-80.792739406
10,791.00	23.73	278.54	10,545.03	-1,258.36	-1,470.93	14,438,190.070	1,698,647.462	39.756652646	-80.792804416
10,838.00	25.06	283.83	10,587.84	-1,254.58	-1,489.95	14,438,193.854	1,698,628.441	39.756663159	-80.792872063
10,885.00	26.20	288.85	10,630.22	-1,248.84	-1,509.44	14,438,199.587	1,698,608.954	39.756679026	-80.792941355
10,933.00	27.40	293.83	10,673.06	-1,240.96	-1,529.58	14,438,207.474	1,698,588.820	39.756700814	-80.793012931
10,980.00	28.55	298.81	10,714.58	-1,231.17	-1,549.31	14,438,217.257	1,698,569.082	39.756727808	-80.793083078
11,028.00	30.23	301.59	10,756.40	-1,219.31	-1,569.66	14,438,229.116	1,698,548.737	39.756760504	-80.793155374

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Weil McMasters N-11 HU (slot D)
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-11 HU (slot D)	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
11,075.00	32.57	305.34	10,796.52	-1,205.80	-1,590.06	14,438,242.634	1,698,528.334	39.756797759	-80.793227859
11,122.00	35.09	307.80	10,835.56	-1,190.20	-1,611.06	14,438,258.235	1,698,507.336	39.756840736	-80.793302447
11,169.00	38.84	309.96	10,873.11	-1,172.44	-1,633.04	14,438,275.988	1,698,485.356	39.756889629	-80.793380509
11,216.00	42.51	312.12	10,908.75	-1,152.32	-1,656.12	14,438,296.111	1,698,462.272	39.756945040	-80.793462481
11,263.00	47.33	314.11	10,942.02	-1,129.63	-1,680.32	14,438,318.802	1,698,438.072	39.757007510	-80.793548403
11,311.00	51.75	314.81	10,973.16	-1,104.05	-1,706.38	14,438,344.381	1,698,412.017	39.757077921	-80.793640900
11,358.00	55.19	316.66	11,001.14	-1,077.00	-1,732.72	14,438,371.429	1,698,385.672	39.757152371	-80.793734417
11,405.00	58.02	317.45	11,027.00	-1,048.28	-1,759.45	14,438,400.153	1,698,358.945	39.757231424	-80.793829285
11,452.00	61.20	318.42	11,050.78	-1,018.18	-1,786.60	14,438,430.250	1,698,331.791	39.757314251	-80.793925658
11,500.00	64.12	318.78	11,072.82	-986.20	-1,814.80	14,438,462.231	1,698,303.598	39.757402258	-80.794025711
11,547.00	65.36	321.73	11,092.88	-953.52	-1,841.97	14,438,494.912	1,698,276.430	39.757492180	-80.794122113
11,592.00	66.46	323.80	11,111.25	-920.81	-1,866.82	14,438,527.618	1,698,251.577	39.757582157	-80.794210276
11,639.00	69.55	325.12	11,128.85	-885.35	-1,892.14	14,438,563.077	1,698,226.254	39.757679696	-80.794300091
11,687.00	72.38	326.49	11,144.50	-847.82	-1,917.64	14,438,600.605	1,698,200.760	39.757782922	-80.794390499
11,734.00	76.67	328.21	11,157.04	-809.69	-1,942.06	14,438,638.737	1,698,176.335	39.757887797	-80.794477096
11,781.00	81.44	330.23	11,165.96	-770.06	-1,965.66	14,438,678.372	1,698,152.735	39.757996794	-80.794560749
11,828.00	85.86	330.72	11,171.16	-729.42	-1,988.67	14,438,719.008	1,698,129.721	39.758108537	-80.794642303
11,875.00	90.01	330.45	11,172.85	-688.52	-2,011.74	14,438,759.913	1,698,106.658	39.758221020	-80.794724034
11,922.00	90.90	329.84	11,172.48	-647.76	-2,035.13	14,438,800.673	1,698,083.262	39.758333107	-80.794806949
11,970.00	91.21	329.88	11,171.60	-606.25	-2,059.23	14,438,842.177	1,698,059.165	39.758447239	-80.794892355
12,064.00	91.25	330.15	11,169.58	-524.85	-2,106.20	14,438,923.576	1,698,012.197	39.758671081	-80.795058816
12,158.00	91.34	330.45	11,167.45	-443.22	-2,152.76	14,439,005.207	1,697,965.636	39.758895554	-80.795223828
12,252.00	91.30	325.87	11,165.29	-363.41	-2,202.32	14,439,085.019	1,697,916.073	39.759115054	-80.795399539
12,346.00	91.56	328.82	11,162.94	-284.30	-2,253.02	14,439,164.128	1,697,865.374	39.759332626	-80.795579298
12,440.00	91.12	330.85	11,160.74	-203.06	-2,300.24	14,439,245.371	1,697,818.156	39.759556041	-80.795746656
12,534.00	91.25	326.75	11,158.80	-122.69	-2,348.91	14,439,325.741	1,697,769.482	39.759777064	-80.795919200
12,628.00	91.03	331.20	11,156.93	-42.17	-2,397.34	14,439,406.257	1,697,721.055	39.759998488	-80.796090866
12,721.00	92.05	327.41	11,154.43	37.76	-2,444.79	14,439,486.184	1,697,673.609	39.760218285	-80.796259049
12,816.00	91.78	332.17	11,151.25	119.78	-2,492.55	14,439,568.212	1,697,625.849	39.760443855	-80.796428333
12,911.00	91.74	330.63	11,148.33	203.15	-2,538.00	14,439,651.578	1,697,580.396	39.760673087	-80.796598397
13,006.00	92.14	329.62	11,145.12	285.48	-2,585.29	14,439,733.905	1,697,533.104	39.760899476	-80.796757016
13,101.00	91.21	331.56	11,142.34	368.20	-2,631.92	14,439,816.622	1,697,486.476	39.761126931	-80.796922266
13,195.00	91.25	327.63	11,140.32	449.23	-2,679.47	14,439,897.660	1,697,438.922	39.761349779	-80.797090828
13,290.00	91.03	333.14	11,138.43	531.77	-2,726.39	14,439,980.201	1,697,392.004	39.761576754	-80.797257117
13,384.00	91.25	328.56	11,136.56	613.83	-2,772.16	14,440,062.257	1,697,346.238	39.761802389	-80.797419310
13,478.00	90.63	330.45	11,135.02	694.81	-2,819.85	14,440,143.240	1,697,298.546	39.762025085	-80.797588369
13,572.00	91.07	333.41	11,133.62	777.74	-2,864.07	14,440,226.164	1,697,254.324	39.762253094	-80.797745063
13,667.00	91.21	331.07	11,131.73	861.78	-2,908.31	14,440,310.207	1,697,210.088	39.762484176	-80.797901800
13,761.00	90.68	328.16	11,130.18	942.85	-2,955.84	14,440,391.276	1,697,162.554	39.762707107	-80.798070299
13,856.00	90.19	332.44	11,129.46	1,025.35	-3,002.90	14,440,473.774	1,697,115.498	39.762933962	-80.798237085
13,950.00	90.54	329.75	11,128.86	1,107.63	-3,048.33	14,440,556.054	1,697,070.067	39.763160208	-80.798398089
14,045.00	90.32	332.04	11,128.15	1,190.63	-3,094.54	14,440,639.050	1,697,023.863	39.763388425	-80.798561844
14,139.00	90.63	329.31	11,127.37	1,272.57	-3,140.57	14,440,720.994	1,696,977.831	39.763613750	-80.798724992
14,233.00	90.85	333.10	11,126.15	1,354.92	-3,185.83	14,440,803.349	1,696,932.566	39.763840199	-80.798885412
14,328.00	91.34	332.26	11,124.34	1,439.31	-3,229.43	14,440,887.736	1,696,888.973	39.764072219	-80.799039864
14,422.00	91.21	330.23	11,122.24	1,521.69	-3,274.63	14,440,970.119	1,696,843.767	39.764298746	-80.799200076
14,516.00	91.12	331.86	11,120.33	1,603.92	-3,320.13	14,441,052.349	1,696,798.270	39.764524853	-80.799361322
14,611.00	91.30	329.44	11,118.33	1,686.71	-3,366.68	14,441,135.130	1,696,751.721	39.764752481	-80.799526313
14,706.00	91.25	330.90	11,116.21	1,769.10	-3,413.92	14,441,217.520	1,696,704.478	39.764979038	-80.799693773
14,800.00	91.25	329.48	11,114.16	1,850.64	-3,460.64	14,441,299.061	1,696,657.761	39.765203257	-80.799859373
14,893.00	91.16	330.63	11,112.21	1,931.20	-3,507.05	14,441,379.626	1,696,611.349	39.765424799	-80.800023893
14,986.00	91.30	330.01	11,110.17	2,013.72	-3,554.08	14,441,462.143	1,696,564.320	39.765651702	-80.800190594
15,082.00	91.30	331.34	11,108.03	2,095.65	-3,600.10	14,441,544.074	1,696,518.296	39.765876991	-80.800353729
15,177.00	92.00	330.67	11,105.30	2,178.71	-3,646.13	14,441,627.132	1,696,472.266	39.766105372	-80.800516874

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well McMasters N-11 HU (slot D)
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-11 HU (slot D)	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
15,271.00	92.05	330.94	11,101.98	2,260.72	-3,691.96	14,441,709.139	1,696,426.443	39.766330867	-80.800679292
15,365.00	91.56	329.44	11,099.02	2,342.23	-3,738.66	14,441,790.657	1,696,379.738	39.766555026	-80.800844855
15,460.00	91.56	330.19	11,096.43	2,424.32	-3,786.41	14,441,872.745	1,696,331.991	39.766780753	-80.801014122
15,554.00	91.16	328.78	11,094.20	2,505.28	-3,834.12	14,441,953.700	1,696,284.276	39.767003371	-80.801183285
15,649.00	91.12	330.01	11,092.31	2,587.03	-3,882.48	14,442,035.449	1,696,235.920	39.767228170	-80.801354722
15,743.00	91.03	330.15	11,090.55	2,668.48	-3,929.36	14,442,116.906	1,696,189.042	39.767452161	-80.801520905
15,837.00	90.94	328.74	11,088.93	2,749.42	-3,977.14	14,442,197.839	1,696,141.264	39.767674717	-80.801690295
15,931.00	91.03	330.90	11,087.31	2,830.66	-4,024.38	14,442,279.080	1,696,094.019	39.767898116	-80.801857790
16,026.00	90.68	329.04	11,085.90	2,912.89	-4,071.92	14,442,361.315	1,696,046.483	39.768124244	-80.802026310
16,119.00	91.03	330.06	11,084.51	2,993.06	-4,119.04	14,442,441.477	1,695,999.358	39.768344679	-80.802193386
16,213.00	91.07	329.22	11,082.79	3,074.15	-4,166.54	14,442,522.572	1,695,951.856	39.768567677	-80.802361798
16,308.00	91.12	330.32	11,080.97	3,156.22	-4,214.36	14,442,604.637	1,695,904.035	39.768793340	-80.802531336
16,402.00	91.16	328.96	11,079.10	3,237.31	-4,261.86	14,442,685.728	1,695,856.536	39.769016327	-80.802699742
16,497.00	91.07	330.50	11,077.25	3,319.34	-4,309.74	14,442,767.758	1,695,808.659	39.769241893	-80.802869482
16,591.00	91.21	330.63	11,075.38	3,401.19	-4,355.93	14,442,849.607	1,695,762.473	39.769466955	-80.803033208
16,686.00	91.07	330.72	11,073.49	3,484.00	-4,402.45	14,442,932.417	1,695,715.955	39.769694655	-80.803198110
16,781.00	91.74	329.13	11,071.16	3,566.18	-4,450.04	14,443,014.599	1,695,668.364	39.769920638	-80.803366837
16,875.00	90.46	329.75	11,069.36	3,647.10	-4,497.82	14,443,095.525	1,695,620.581	39.770143172	-80.803536258
16,969.00	91.30	329.22	11,067.91	3,728.07	-4,545.54	14,443,176.495	1,695,572.857	39.770365826	-80.803705467
17,063.00	90.68	329.66	11,066.29	3,809.01	-4,593.33	14,443,257.425	1,695,525.071	39.770588371	-80.803874900
17,158.00	91.52	330.32	11,064.46	3,891.25	-4,640.83	14,443,339.673	1,695,477.567	39.770814532	-80.804043324
17,252.00	91.16	331.12	11,062.27	3,973.22	-4,686.79	14,443,421.640	1,695,431.606	39.771039913	-80.804206253
17,346.00	91.96	329.75	11,059.71	4,054.95	-4,733.16	14,443,503.368	1,695,385.245	39.771264640	-80.804370614
17,440.00	91.07	330.94	11,057.22	4,136.61	-4,779.65	14,443,585.025	1,695,338.754	39.771489172	-80.804535438
17,535.00	91.07	330.28	11,055.45	4,219.36	-4,826.26	14,443,667.783	1,695,292.141	39.771716730	-80.804700687
17,629.00	91.21	330.63	11,053.58	4,301.13	-4,872.60	14,443,749.544	1,695,245.798	39.771941545	-80.804864984
17,724.00	91.16	330.37	11,051.61	4,383.79	-4,919.37	14,443,832.210	1,695,199.028	39.772168849	-80.805030796
17,818.00	91.12	331.12	11,049.74	4,465.78	-4,965.30	14,443,914.203	1,695,153.100	39.772394301	-80.805193617
17,912.00	91.03	330.32	11,047.98	4,547.76	-5,011.27	14,443,996.179	1,695,107.135	39.772619703	-80.805356570
18,006.00	91.60	330.37	11,045.82	4,629.43	-5,057.76	14,444,077.845	1,695,060.639	39.772844258	-80.805521419
18,101.00	91.52	331.07	11,043.24	4,712.26	-5,104.21	14,444,160.676	1,695,014.194	39.773072014	-80.805686076
18,200.00	90.94	329.93	11,041.11	4,798.40	-5,152.95	14,444,246.819	1,694,965.456	39.773308878	-80.805858869
18,295.00	91.12	328.82	11,039.40	4,880.14	-5,201.33	14,444,328.554	1,694,917.070	39.773533633	-80.806030446
18,388.00	92.62	327.41	11,036.37	4,959.06	-5,250.43	14,444,407.475	1,694,867.975	39.773750665	-80.806204568
18,483.00	91.65	325.96	11,032.83	5,038.39	-5,302.57	14,444,486.805	1,694,815.835	39.773968836	-80.806389525
18,577.00	90.85	331.38	11,030.78	5,118.63	-5,351.41	14,444,567.049	1,694,766.989	39.774189499	-80.806562754
18,671.00	91.03	331.38	11,029.23	5,201.13	-5,396.43	14,444,649.552	1,694,721.969	39.774416344	-80.806722348
18,765.00	91.47	326.22	11,027.18	5,281.49	-5,445.10	14,444,729.910	1,694,673.303	39.774637317	-80.806894937
18,859.00	91.07	325.70	11,025.10	5,359.37	-5,497.70	14,444,807.783	1,694,620.698	39.774851490	-80.807081566
18,953.00	90.72	330.63	11,023.63	5,439.19	-5,547.27	14,444,887.608	1,694,571.137	39.775071006	-80.807257347
19,046.00	91.25	328.25	11,022.03	5,519.26	-5,594.54	14,444,967.672	1,694,523.863	39.775291164	-80.807424988
19,141.00	90.90	328.38	11,020.25	5,600.08	-5,644.43	14,445,048.498	1,694,473.973	39.775513428	-80.807601934
19,235.00	91.03	333.27	11,018.66	5,682.12	-5,690.23	14,445,130.535	1,694,428.170	39.775738998	-80.807764324
19,329.00	91.47	332.31	11,016.61	5,765.70	-5,733.20	14,445,214.112	1,694,385.200	39.775968776	-80.807916625
19,424.00	91.03	331.12	11,014.54	5,849.33	-5,778.21	14,445,297.747	1,694,340.195	39.776198277	-80.808076167
19,517.00	91.03	331.29	11,012.87	5,930.82	-5,823.00	14,445,379.234	1,694,295.406	39.776422777	-80.808234956
19,610.00	91.21	330.90	11,011.05	6,012.22	-5,867.94	14,445,460.633	1,694,250.463	39.776646584	-80.808394298
19,705.00	90.94	333.72	11,009.27	6,096.31	-5,912.07	14,445,544.729	1,694,206.330	39.776877797	-80.808550735
19,799.00	91.65	331.82	11,007.14	6,179.87	-5,955.07	14,445,628.286	1,694,163.332	39.777107520	-80.808703137
19,893.00	91.96	328.82	11,004.18	6,261.49	-6,001.59	14,445,709.904	1,694,116.816	39.777331938	-80.808868077
19,987.00	91.21	327.94	11,001.58	6,341.50	-6,050.85	14,445,789.917	1,694,067.553	39.777551965	-80.809042807
20,081.00	90.37	331.16	11,000.29	6,422.52	-6,098.48	14,445,870.932	1,694,019.927	39.777774735	-80.809211706
20,175.00	90.99	329.75	10,999.17	6,504.29	-6,144.82	14,445,952.701	1,693,973.580	39.777999566	-80.809376048
20,269.00	90.32	328.43	10,998.10	6,584.93	-6,193.11	14,446,033.343	1,693,925.297	39.778221314	-80.809547287

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well McMasters N-11 HU (slot D)
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-11 HU (slot D)	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
20,363.00	91.38	328.21	10,996.70	6,664.91	-6,242.47	14,446,113.326	1,693,875.937	39.778441259	-80.809722369
20,457.00	91.07	330.45	10,994.69	6,745.74	-6,290.40	14,446,194.154	1,693,828.003	39.778663514	-80.809892370
20,551.00	91.38	330.94	10,992.68	6,827.69	-6,336.40	14,446,276.105	1,693,782.005	39.778888843	-80.810055473
20,646.00	91.52	331.03	10,990.28	6,910.74	-6,382.46	14,446,359.155	1,693,735.941	39.779117190	-80.810218802
20,740.00	91.43	331.47	10,987.86	6,993.13	-6,427.66	14,446,441.539	1,693,690.743	39.779343705	-80.810379054
20,833.00	91.12	335.96	10,985.79	7,076.47	-6,468.82	14,446,524.881	1,693,649.580	39.779572824	-80.810524938
20,928.00	91.87	333.98	10,983.31	7,162.51	-6,509.00	14,446,610.925	1,693,609.403	39.779809359	-80.810667296
21,022.00	90.59	329.18	10,981.29	7,245.14	-6,553.72	14,446,693.551	1,693,564.689	39.780036532	-80.810825827
21,116.00	89.97	330.23	10,980.83	7,326.30	-6,601.13	14,446,774.712	1,693,517.272	39.780259697	-80.810993992
21,210.00	91.30	331.34	10,979.79	7,408.33	-6,647.01	14,446,856.746	1,693,471.396	39.780485253	-80.811156665
21,305.00	91.34	333.58	10,977.60	7,492.54	-6,690.92	14,446,940.953	1,693,427.486	39.780716764	-80.811312326
21,398.00	91.16	328.87	10,975.57	7,574.01	-6,735.66	14,447,022.427	1,693,382.742	39.780940772	-80.811470979
21,493.00	91.07	330.10	10,973.72	7,655.84	-6,783.89	14,447,104.252	1,693,334.514	39.781165765	-80.811642027
21,587.00	91.07	328.91	10,971.97	7,736.82	-6,831.58	14,447,185.233	1,693,286.822	39.781388439	-80.811811178
21,681.00	91.03	329.84	10,970.24	7,817.70	-6,879.46	14,447,266.108	1,693,238.945	39.781610819	-80.811980987
21,775.00	91.12	330.76	10,968.48	7,899.33	-6,926.02	14,447,347.743	1,693,192.381	39.781835282	-80.812146121
21,869.00	91.38	326.62	10,966.43	7,979.61	-6,974.85	14,447,428.017	1,693,143.555	39.782056018	-80.812319317
21,963.00	91.30	322.79	10,964.23	8,056.29	-7,029.14	14,447,504.704	1,693,089.268	39.782266932	-80.812511978
22,057.00	91.47	326.36	10,961.96	8,132.86	-7,083.60	14,447,581.267	1,693,034.807	39.782477510	-80.812705261
22,151.00	90.85	330.98	10,960.05	8,213.11	-7,132.45	14,447,661.522	1,692,985.954	39.782698193	-80.812878556
22,245.00	91.07	337.11	10,958.48	8,297.58	-7,173.57	14,447,745.988	1,692,944.839	39.782930398	-80.813024277
22,340.00	90.85	331.51	10,956.88	8,383.14	-7,214.73	14,447,831.551	1,692,903.678	39.783165614	-80.813170153
22,435.00	90.01	328.25	10,956.17	8,465.30	-7,262.39	14,447,913.710	1,692,856.014	39.783391517	-80.813339205
22,529.00	90.01	328.52	10,956.15	8,545.35	-7,311.67	14,447,993.759	1,692,806.739	39.783611637	-80.813514010
22,623.00	90.28	328.47	10,955.92	8,625.49	-7,360.79	14,448,073.902	1,692,757.617	39.783832014	-80.813688267
22,717.00	90.01	328.56	10,955.68	8,705.65	-7,409.88	14,448,154.063	1,692,708.524	39.784052438	-80.813862425
22,811.00	89.09	331.29	10,956.42	8,786.99	-7,456.98	14,448,235.396	1,692,661.423	39.784276071	-80.814029480
22,906.00	90.01	335.48	10,957.16	8,871.90	-7,499.53	14,448,320.307	1,692,618.876	39.784509503	-80.814180305
22,999.00	90.59	330.50	10,956.68	8,954.73	-7,541.75	14,448,403.136	1,692,576.654	39.784737214	-80.814329985
23,092.00	91.43	331.73	10,955.04	9,036.14	-7,586.67	14,448,484.551	1,692,531.739	39.784961058	-80.814489267
23,186.00	89.88	330.06	10,953.96	9,118.26	-7,632.38	14,448,566.670	1,692,486.022	39.785186841	-80.814651396
23,280.00	90.46	330.32	10,953.68	9,199.82	-7,679.11	14,448,648.231	1,692,439.293	39.785411096	-80.814817134
23,373.00	90.59	330.19	10,952.83	9,280.57	-7,725.25	14,448,728.974	1,692,393.154	39.785633101	-80.814980779
23,467.00	90.28	330.37	10,952.12	9,362.20	-7,771.85	14,448,810.606	1,692,346.553	39.785857551	-80.815146059
23,562.00	90.15	333.14	10,951.76	9,445.88	-7,816.81	14,448,894.286	1,692,301.600	39.786087613	-80.815305463
23,656.00	90.06	330.19	10,951.59	9,528.61	-7,861.42	14,448,977.014	1,692,256.990	39.786315061	-80.815463653
23,751.00	90.06	328.30	10,951.49	9,610.24	-7,909.99	14,449,058.650	1,692,208.413	39.786539529	-80.815635976
23,845.00	90.06	328.65	10,951.39	9,690.37	-7,959.14	14,449,138.776	1,692,159.263	39.786759857	-80.815810347
23,939.00	90.01	328.12	10,951.33	9,770.42	-8,008.42	14,449,218.825	1,692,109.988	39.786979972	-80.815985167
24,033.00	90.10	328.96	10,951.24	9,850.60	-8,057.48	14,449,299.007	1,692,060.929	39.787200450	-80.816159215
24,128.00	90.10	328.47	10,951.08	9,931.79	-8,106.81	14,449,380.193	1,692,011.597	39.787423687	-80.816334234
24,223.00	90.10	328.69	10,950.91	10,012.86	-8,156.33	14,449,461.262	1,691,962.073	39.787646606	-80.816509936
24,317.00	90.10	328.34	10,950.75	10,093.02	-8,205.43	14,449,541.423	1,691,912.979	39.787867026	-80.816684113
24,412.00	90.15	329.35	10,950.54	10,174.31	-8,254.58	14,449,622.720	1,691,863.831	39.788090566	-80.816858476
24,506.00	90.10	330.28	10,950.34	10,254.70	-8,301.34	14,449,703.108	1,691,817.072	39.788311598	-80.817024343
24,599.00	90.19	329.84	10,950.10	10,336.16	-8,348.25	14,449,784.563	1,691,770.158	39.788535559	-80.817190757
24,693.00	90.37	330.37	10,949.64	10,417.65	-8,395.10	14,449,866.054	1,691,723.308	39.788759619	-80.817356941
24,787.00	90.32	330.37	10,949.07	10,499.35	-8,441.57	14,449,947.761	1,691,676.835	39.788984268	-80.817521782
24,880.00	90.32	330.23	10,948.56	10,580.14	-8,487.65	14,450,028.542	1,691,630.759	39.789206374	-80.817685221
24,974.00	90.41	330.19	10,947.96	10,661.71	-8,534.35	14,450,110.118	1,691,584.058	39.789430666	-80.817850876
25,068.00	90.37	330.37	10,947.32	10,743.35	-8,580.95	14,450,191.751	1,691,537.458	39.789655113	-80.818016176
25,163.00	89.53	333.58	10,947.40	10,827.19	-8,625.58	14,450,275.600	1,691,492.828	39.789885634	-80.818174447
25,257.00	90.50	333.36	10,947.37	10,911.30	-8,667.57	14,450,359.700	1,691,445.842	39.790116832	-80.818323304
25,351.00	90.68	331.29	10,946.41	10,994.53	-8,711.22	14,450,442.937	1,691,407.188	39.790345667	-80.818478107

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well McMasters N-11 HU (slot D)
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-11 HU (slot D)	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
25,445.00	90.54	329.35	10,945.41	11,076.19	-8,757.76	14,450,524.596	1,691,360.648	39.790570184	-80.818643194
25,539.00	90.19	329.84	10,944.81	11,157.26	-8,805.33	14,450,605.666	1,691,313.075	39.790793090	-80.818811965
25,634.00	90.23	330.45	10,944.46	11,239.65	-8,852.62	14,450,688.057	1,691,265.784	39.791019622	-80.818979725
25,728.00	90.46	330.45	10,943.89	11,321.42	-8,898.98	14,450,769.829	1,691,219.426	39.791244446	-80.819144169
25,822.00	90.41	330.06	10,943.18	11,403.04	-8,945.62	14,450,851.441	1,691,172.790	39.7914668834	-80.819309603
25,917.00	90.15	329.09	10,942.71	11,484.95	-8,993.73	14,450,933.356	1,691,124.683	39.791694064	-80.819480276
26,010.00	90.10	330.41	10,942.51	11,565.29	-9,040.58	14,451,013.691	1,691,077.833	39.791914944	-80.819646483
26,105.00	89.57	328.87	10,942.79	11,647.26	-9,088.59	14,451,095.660	1,691,029.819	39.792140320	-80.819816825
26,199.00	91.03	329.09	10,942.29	11,727.81	-9,137.03	14,451,176.213	1,690,981.379	39.792361809	-80.819988693
26,293.00	91.03	329.79	10,940.60	11,808.74	-9,184.82	14,451,257.143	1,690,933.594	39.792584327	-80.820158230
26,388.00	91.03	329.40	10,938.90	11,890.66	-9,232.89	14,451,339.064	1,690,885.522	39.792809571	-80.820328783
26,482.00	91.03	329.40	10,937.21	11,971.56	-9,280.73	14,451,419.960	1,690,837.679	39.793031998	-80.820498525
26,577.00	90.85	329.71	10,935.65	12,053.45	-9,328.86	14,451,501.850	1,690,789.549	39.793257155	-80.820669288
26,671.00	91.03	329.84	10,934.11	12,134.66	-9,376.17	14,451,583.060	1,690,742.236	39.793480441	-80.820837146
26,766.00	90.85	329.62	10,932.55	12,216.69	-9,424.05	14,451,665.096	1,690,694.355	39.793705999	-80.821007019
26,859.00	90.90	329.66	10,931.13	12,296.93	-9,471.05	14,451,745.334	1,690,647.356	39.793926610	-80.821173771
26,953.00	91.07	329.71	10,929.51	12,378.07	-9,518.49	14,451,826.468	1,690,599.916	39.794149688	-80.821342083
27,047.00	90.94	329.75	10,927.86	12,459.24	-9,565.87	14,451,907.639	1,690,552.540	39.794372867	-80.821510169
27,141.00	91.69	329.40	10,925.70	12,540.27	-9,613.46	14,451,988.673	1,690,504.951	39.794595667	-80.821679018
27,235.00	91.03	329.53	10,923.47	12,621.21	-9,661.20	14,452,069.613	1,690,457.207	39.794818213	-80.821848420
27,329.00	91.16	329.84	10,921.68	12,702.34	-9,708.64	14,452,150.745	1,690,409.769	39.795041283	-80.822016731
27,423.00	91.16	329.93	10,919.77	12,783.64	-9,755.80	14,452,232.040	1,690,362.615	39.795264799	-80.822184029
27,517.00	91.25	330.10	10,917.80	12,865.04	-9,802.76	14,452,313.441	1,690,315.647	39.795488603	-80.822350668
27,610.00	91.34	329.97	10,915.70	12,945.59	-9,849.20	14,452,393.989	1,690,269.208	39.795710063	-80.822515429
27,704.00	91.16	330.15	10,913.65	13,027.02	-9,896.11	14,452,475.424	1,690,222.305	39.795933963	-80.822681839
27,798.00	91.25	330.06	10,911.67	13,108.50	-9,942.95	14,452,556.899	1,690,175.464	39.796157969	-80.822848025
27,892.00	91.30	330.06	10,909.58	13,189.93	-9,989.85	14,452,638.334	1,690,128.561	39.796381867	-80.823014436
27,985.00	91.07	329.79	10,907.65	13,270.40	-10,036.45	14,452,718.796	1,690,081.966	39.796603091	-80.823179759
28,079.00	91.21	329.71	10,905.78	13,351.58	-10,083.79	14,452,799.980	1,690,034.621	39.796826302	-80.823347748
28,172.00	91.12	329.97	10,903.89	13,431.97	-10,130.51	14,452,880.373	1,689,987.906	39.797047337	-80.823513500
28,266.00	91.12	330.06	10,902.06	13,513.38	-10,177.48	14,452,961.776	1,689,940.936	39.797271147	-80.823680153
28,359.00	91.12	329.75	10,900.24	13,593.82	-10,224.10	14,453,042.224	1,689,894.312	39.797492330	-80.823845584
28,454.00	91.16	330.50	10,898.35	13,676.18	-10,271.41	14,453,124.583	1,689,847.001	39.797718765	-80.824013446
28,549.00	91.12	330.06	10,896.46	13,758.67	-10,318.50	14,453,207.069	1,689,799.913	39.797945551	-80.824180515
28,643.00	91.03	330.23	10,894.69	13,840.18	-10,365.28	14,453,288.580	1,689,753.128	39.798169654	-80.824346515
28,737.00	91.07	330.23	10,892.97	13,921.76	-10,411.95	14,453,370.161	1,689,706.463	39.798393948	-80.824512087
28,831.00	91.12	330.23	10,891.17	14,003.34	-10,458.61	14,453,451.741	1,689,659.799	39.798618239	-80.824677657
28,925.00	91.07	329.84	10,889.38	14,084.76	-10,505.56	14,453,533.161	1,689,612.857	39.798842092	-80.824844217
29,008.00	91.56	328.52	10,887.47	14,156.02	-10,548.07	14,453,604.419	1,689,570.345	39.799038015	-80.824995078
Survey @ 29008.00 MD 10887.47 TVD									
29,043.00	91.56	328.52	10,886.52	14,185.86	-10,566.34	14,453,634.257	1,689,552.075	39.799120056	-80.825059919
Survey Proj. to 29043.00 MD 10886.52 TVD									

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
140.00	140.00	-0.18	0.12	MWD surveys
29,008.00	10,887.47	14,156.02	-10,548.07	Survey @ 29008.00 MD 10887.47 TVD
29,043.00	10,886.52	14,185.86	-10,566.34	Survey Proj. to 29043.00 MD 10886.52 TVD

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well McMasters N-11 HU (slot D)
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-11 HU (slot D)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Dec2220_v16