

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Ten High 1S-05HM (P)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=1310+33 @ 1343.00usft (Nabors X08)
Site:	Ten High	MD Reference:	RKB=1310+33 @ 1343.00usft (Nabors X08)
Well:	Ten High 1S-05HM (P)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

Project	Marshall County, West Virginia.		
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	Ten High				
Site Position:		Northing:	14,456,545.60 usft	Latitude:	39.80680885
From:	Lat/Long	Easting:	1,730,001.41 usft	Longitude:	-80.68101011
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.20 °

Well	Ten High 1S-05HM (P)					
Well Position	+N/-S	0.00 usft	Northing:	14,456,508.50 usft	Latitude:	39.80670630
	+E/-W	0.00 usft	Easting:	1,730,069.86 usft	Longitude:	-80.68076686
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	1,310.00 usft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	12/20/2018	-8.76	66.84	52,006.00464578

Design	Surveys Original Hole				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	157.00	

Survey Program	Date	1/3/2019			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
192.00	2,834.00	MWD surf (Original Hole)	MWD	MWD - Standard	
2,909.00	17,464.00	MWD (Original Hole)	MWD	MWD - Standard	
17,519.00	17,519.00	Projection (Original Hole)	MWD	MWD - Standard	

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Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
0.00	0.00	0.00	0.00	0.00	0.00	14,456,508.50	1,730,069.86	39.80670630	-80.68076686	
192.00	0.08	108.78	192.00	-0.04	0.13	14,456,508.46	1,730,069.99	39.80670618	-80.68076641	
MWD surveys										
222.00	0.13	111.75	222.00	-0.06	0.18	14,456,508.44	1,730,070.04	39.80670613	-80.68076623	
252.00	0.40	167.69	252.00	-0.18	0.23	14,456,508.33	1,730,070.09	39.80670581	-80.68076604	
282.00	0.37	211.45	282.00	-0.36	0.20	14,456,508.14	1,730,070.07	39.80670530	-80.68076614	
312.00	0.55	217.31	312.00	-0.56	0.07	14,456,507.94	1,730,069.93	39.80670476	-80.68076663	
342.00	0.15	96.84	342.00	-0.68	0.02	14,456,507.83	1,730,069.88	39.80670444	-80.68076680	
372.00	0.30	288.28	372.00	-0.66	-0.02	14,456,507.85	1,730,069.84	39.80670449	-80.68076693	
404.00	0.40	2.47	404.00	-0.52	-0.09	14,456,507.98	1,730,069.77	39.80670487	-80.68076720	

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Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

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Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
435.00	0.18	182.44	435.00	-0.46	-0.09	14,456,508.04	1,730,069.77	39.80670504	-80.68076719
466.00	0.38	184.35	466.00	-0.61	-0.10	14,456,507.89	1,730,069.76	39.80670462	-80.68076722
498.00	0.39	187.65	498.00	-0.83	-0.12	14,456,507.68	1,730,069.74	39.80670403	-80.68076731
529.00	0.20	186.26	529.00	-0.98	-0.14	14,456,507.52	1,730,069.72	39.80670360	-80.68076738
561.00	0.32	198.90	560.99	-1.12	-0.18	14,456,507.38	1,730,069.69	39.80670321	-80.68076751
592.00	0.25	231.72	591.99	-1.25	-0.26	14,456,507.26	1,730,069.60	39.80670288	-80.68076780
624.00	0.13	183.73	623.99	-1.33	-0.32	14,456,507.18	1,730,069.55	39.80670266	-80.68076800
655.00	0.20	241.31	654.99	-1.39	-0.37	14,456,507.12	1,730,069.50	39.80670249	-80.68076818
687.00	0.54	245.43	686.99	-1.48	-0.55	14,456,507.03	1,730,069.31	39.80670225	-80.68076884
719.00	0.43	207.45	718.99	-1.65	-0.74	14,456,506.86	1,730,069.12	39.80670178	-80.68076953
750.00	0.20	184.52	749.99	-1.81	-0.80	14,456,506.70	1,730,069.06	39.80670135	-80.68076974
782.00	0.44	236.85	781.99	-1.93	-0.91	14,456,506.58	1,730,068.95	39.80670102	-80.68077012
813.00	0.22	52.90	812.99	-1.96	-0.96	14,456,506.55	1,730,068.90	39.80670094	-80.68077031
844.00	0.33	226.29	843.99	-1.98	-0.98	14,456,506.52	1,730,068.88	39.80670087	-80.68077037
876.00	0.25	221.55	875.99	-2.10	-1.09	14,456,506.41	1,730,068.77	39.80670055	-80.68077077
907.00	0.39	196.33	906.99	-2.25	-1.17	14,456,506.25	1,730,068.70	39.80670013	-80.68077104
939.00	0.18	254.64	938.99	-2.37	-1.24	14,456,506.14	1,730,068.62	39.80669981	-80.68077132
969.00	0.22	223.62	968.99	-2.42	-1.33	14,456,506.08	1,730,068.53	39.80669966	-80.68077163
1,002.00	0.13	227.20	1,001.99	-2.49	-1.40	14,456,506.01	1,730,068.46	39.80669947	-80.68077188
1,033.00	0.31	197.91	1,032.99	-2.60	-1.45	14,456,505.91	1,730,068.41	39.80669918	-80.68077207
1,065.00	0.27	228.06	1,064.99	-2.73	-1.54	14,456,505.77	1,730,068.33	39.80669882	-80.68077236
1,096.00	0.23	212.15	1,095.99	-2.83	-1.62	14,456,505.67	1,730,068.24	39.80669854	-80.68077267
1,117.00	0.41	238.85	1,116.99	-2.91	-1.71	14,456,505.60	1,730,068.15	39.80669834	-80.68077298
1,187.00	0.09	319.59	1,186.99	-2.99	-1.96	14,456,505.51	1,730,067.90	39.80669810	-80.68077388
1,282.00	0.72	93.65	1,281.99	-2.98	-1.41	14,456,505.53	1,730,068.45	39.80669814	-80.68077193
1,376.00	1.43	93.11	1,375.97	-3.08	0.35	14,456,505.43	1,730,070.21	39.80669785	-80.68076566
1,471.00	0.90	95.77	1,470.95	-3.22	2.27	14,456,505.29	1,730,072.14	39.80669745	-80.68075880
1,566.00	0.23	262.62	1,565.95	-3.32	2.83	14,456,505.19	1,730,072.69	39.80669717	-80.68075683
1,661.00	0.74	271.97	1,660.94	-3.32	2.03	14,456,505.19	1,730,071.89	39.80669717	-80.68075969
1,755.00	0.60	286.43	1,754.94	-3.16	0.95	14,456,505.35	1,730,070.81	39.80669762	-80.68076353
1,850.00	0.55	311.12	1,849.93	-2.72	0.13	14,456,505.79	1,730,069.99	39.80669884	-80.68076645
1,945.00	0.42	311.03	1,944.93	-2.19	-0.48	14,456,506.31	1,730,069.38	39.80670029	-80.68076860
2,039.00	0.94	254.76	2,038.92	-2.17	-1.48	14,456,506.34	1,730,068.38	39.80670037	-80.68077217
2,134.00	2.85	256.58	2,133.86	-2.92	-4.53	14,456,505.58	1,730,065.33	39.80669833	-80.68078304
2,229.00	4.47	260.04	2,228.67	-4.11	-10.48	14,456,504.40	1,730,059.39	39.80669512	-80.68080422
2,323.00	4.02	257.47	2,322.41	-5.46	-17.30	14,456,503.05	1,730,052.56	39.80669149	-80.68082854
2,418.00	2.82	250.57	2,417.24	-6.96	-22.76	14,456,501.55	1,730,047.11	39.80668742	-80.68084798
2,512.00	2.68	234.97	2,511.13	-8.99	-26.74	14,456,499.52	1,730,043.13	39.80668188	-80.68086218
2,607.00	4.01	243.82	2,605.97	-11.73	-31.54	14,456,496.78	1,730,038.33	39.80667440	-80.68087930
2,702.00	4.46	263.31	2,700.71	-13.62	-38.19	14,456,494.88	1,730,031.68	39.80666926	-80.68090300
2,796.00	4.32	275.79	2,794.44	-13.69	-45.34	14,456,494.81	1,730,024.52	39.80666914	-80.68092847
2,834.00	4.48	278.18	2,832.33	-13.34	-48.23	14,456,495.17	1,730,021.63	39.80667015	-80.68093877
2,934.00	4.83	283.28	2,932.00	-11.81	-56.19	14,456,496.69	1,730,013.67	39.80667441	-80.68096710
2,980.00	4.69	283.49	2,977.84	-10.93	-59.91	14,456,497.57	1,730,009.95	39.80667687	-80.68098032
3,075.00	4.37	282.03	3,072.54	-9.27	-67.22	14,456,499.23	1,730,002.64	39.80668150	-80.68100635
3,170.00	4.99	266.63	3,167.23	-8.76	-74.89	14,456,499.75	1,729,994.97	39.80668298	-80.68103363
3,264.00	5.99	257.80	3,260.80	-10.03	-83.77	14,456,498.47	1,729,986.10	39.80667956	-80.68106525
3,359.00	5.55	256.83	3,355.32	-12.13	-93.08	14,456,496.38	1,729,976.78	39.80667390	-80.68109846
3,454.00	5.02	256.87	3,449.91	-14.12	-101.60	14,456,494.38	1,729,968.26	39.80666852	-80.68112882
3,549.00	4.49	256.48	3,544.59	-15.93	-109.27	14,456,492.57	1,729,960.59	39.80666361	-80.68115613
3,644.00	4.21	255.56	3,639.31	-17.67	-116.26	14,456,490.83	1,729,953.60	39.80665891	-80.68118105
3,739.00	4.74	267.80	3,734.02	-18.69	-123.56	14,456,489.81	1,729,946.30	39.80665618	-80.68120706
3,833.00	6.09	269.63	3,827.60	-18.87	-132.43	14,456,489.63	1,729,937.44	39.80665577	-80.68123863
3,928.00	5.88	268.53	3,922.09	-19.03	-142.33	14,456,489.47	1,729,927.53	39.80665543	-80.68127390
4,023.00	7.31	268.77	4,016.45	-19.29	-153.24	14,456,489.22	1,729,916.62	39.80665484	-80.68131274

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Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
4,117.00	9.22	263.16	4,109.48	-20.31	-166.70	14,456,488.19	1,729,903.17	39.80665215	-80.68136067
4,215.00	10.83	252.99	4,205.98	-23.94	-183.30	14,456,484.56	1,729,886.57	39.80664235	-80.68141983
4,310.00	12.13	249.68	4,299.08	-30.02	-201.19	14,456,478.49	1,729,868.67	39.80662583	-80.68148363
4,404.00	13.33	250.47	4,390.77	-37.07	-220.67	14,456,471.43	1,729,849.19	39.80660666	-80.68155306
4,499.00	15.33	261.62	4,482.83	-42.56	-243.42	14,456,465.94	1,729,826.44	39.80659179	-80.68163415
4,594.00	16.55	257.13	4,574.18	-47.41	-269.04	14,456,461.10	1,729,800.83	39.80657874	-80.68172542
4,686.00	17.00	269.52	4,662.29	-50.44	-295.27	14,456,458.06	1,729,774.60	39.80657067	-80.68181886
4,781.00	25.16	272.15	4,750.86	-49.80	-329.39	14,456,458.71	1,729,740.47	39.80657277	-80.68194036
4,876.00	26.49	263.14	4,836.40	-51.57	-370.63	14,456,456.93	1,729,699.24	39.80656830	-80.68208720
4,971.00	25.42	257.03	4,921.83	-58.68	-411.54	14,456,449.82	1,729,658.32	39.80654918	-80.68223297
5,065.00	23.67	253.45	5,007.34	-68.58	-449.29	14,456,439.92	1,729,620.57	39.80652234	-80.68236752
5,160.00	23.27	256.07	5,094.48	-78.53	-485.79	14,456,429.97	1,729,584.08	39.80649538	-80.68249760
5,254.00	24.53	261.35	5,180.43	-85.94	-523.11	14,456,422.56	1,729,546.76	39.80647540	-80.68263057
5,349.00	24.84	264.08	5,266.75	-90.96	-562.45	14,456,417.54	1,729,507.41	39.80646199	-80.68277073
5,444.00	24.26	260.36	5,353.17	-96.29	-601.54	14,456,412.21	1,729,468.32	39.80644774	-80.68290999
5,539.00	24.59	265.13	5,439.68	-101.24	-640.48	14,456,407.27	1,729,429.38	39.80643453	-80.68304870
5,633.00	23.54	263.34	5,525.51	-105.07	-678.62	14,456,403.43	1,729,391.25	39.80642436	-80.68318453
5,728.00	22.08	261.73	5,613.08	-109.84	-715.13	14,456,398.66	1,729,354.73	39.80641162	-80.68331461
5,823.00	21.83	265.99	5,701.19	-113.65	-750.42	14,456,394.86	1,729,319.44	39.80640152	-80.68344032
5,917.00	20.39	264.37	5,788.88	-116.48	-784.15	14,456,392.03	1,729,285.71	39.80639408	-80.68356047
6,011.00	20.61	263.26	5,876.93	-120.02	-816.88	14,456,388.48	1,729,252.98	39.80638465	-80.68367704
6,106.00	24.11	261.15	5,964.77	-124.97	-852.67	14,456,383.53	1,729,217.19	39.80637141	-80.68380454
6,161.00	26.41	263.23	6,014.51	-128.14	-875.92	14,456,380.36	1,729,193.94	39.80636293	-80.68388736
6,221.00	25.41	262.89	6,068.48	-131.31	-901.94	14,456,377.19	1,729,167.92	39.80635448	-80.68398007
6,314.00	23.87	261.39	6,153.01	-136.60	-940.35	14,456,371.91	1,729,129.51	39.80634034	-80.68411689
6,409.00	23.56	241.70	6,240.13	-148.49	-976.13	14,456,360.01	1,729,093.73	39.80630801	-80.68424444
6,504.00	28.26	232.91	6,325.59	-171.08	-1,010.82	14,456,337.42	1,729,059.04	39.80624632	-80.68436824
6,551.00	30.33	221.75	6,366.60	-186.66	-1,027.61	14,456,321.85	1,729,042.25	39.80620370	-80.68442822
6,598.00	29.80	209.80	6,407.32	-205.66	-1,041.33	14,456,302.84	1,729,028.53	39.80615164	-80.68447731
6,693.00	31.74	187.65	6,489.20	-251.06	-1,056.44	14,456,257.44	1,729,013.42	39.80602711	-80.68453168
6,787.00	36.62	179.48	6,566.99	-303.66	-1,059.48	14,456,204.84	1,729,010.38	39.80588269	-80.68454316
6,881.00	42.33	171.30	6,639.56	-363.07	-1,054.43	14,456,145.43	1,729,015.43	39.80571948	-80.68452593
6,976.00	49.63	169.28	6,705.54	-430.34	-1,042.84	14,456,078.16	1,729,027.02	39.80553463	-80.68448552
7,070.00	54.37	166.82	6,763.40	-502.77	-1,027.46	14,456,005.73	1,729,042.40	39.80553558	-80.68443166
7,165.00	59.78	164.27	6,815.02	-579.94	-1,007.51	14,455,928.57	1,729,062.35	39.80512347	-80.68436160
7,259.00	68.35	164.18	6,856.10	-661.21	-984.55	14,455,847.30	1,729,085.31	39.80490005	-80.68428086
7,354.00	77.36	164.18	6,884.07	-748.46	-959.83	14,455,760.05	1,729,110.03	39.80466021	-80.68419394
7,448.00	83.03	162.25	6,900.08	-837.09	-933.08	14,455,671.41	1,729,136.78	39.80441653	-80.68409980
7,543.00	87.91	158.47	6,907.58	-926.24	-901.26	14,455,582.26	1,729,168.61	39.80417140	-80.68398761
7,637.00	88.35	157.50	6,910.65	-1,013.34	-866.04	14,455,495.16	1,729,203.82	39.80393187	-80.68386331
7,731.00	89.36	156.27	6,912.53	-1,099.77	-829.14	14,455,408.73	1,729,240.72	39.80369414	-80.68373304
7,825.00	90.33	153.37	6,912.78	-1,184.83	-789.16	14,455,323.67	1,729,280.71	39.80346017	-80.68359173
7,920.00	90.29	150.47	6,912.27	-1,268.64	-744.44	14,455,239.87	1,729,325.42	39.80322958	-80.68343359
8,014.00	90.24	149.33	6,911.83	-1,349.96	-697.30	14,455,158.54	1,729,372.56	39.80300579	-80.68326676
8,109.00	89.49	149.07	6,912.05	-1,431.56	-648.66	14,455,076.94	1,729,421.20	39.80278122	-80.68309460
8,204.00	89.93	148.63	6,912.54	-1,512.86	-599.52	14,454,995.64	1,729,470.34	39.80255747	-80.68292066
8,296.00	90.51	148.80	6,912.18	-1,591.48	-551.74	14,454,917.02	1,729,518.12	39.80234109	-80.68275155
8,391.00	90.29	148.98	6,911.52	-1,672.82	-502.66	14,454,835.69	1,729,567.20	39.80211725	-80.68257781
8,485.00	90.24	148.89	6,911.08	-1,753.34	-454.16	14,454,755.17	1,729,615.71	39.80189565	-80.68240613
8,579.00	89.85	150.12	6,911.01	-1,834.33	-406.46	14,454,674.17	1,729,663.41	39.80167275	-80.68223732
8,674.00	89.19	150.03	6,911.81	-1,916.66	-359.07	14,454,591.84	1,729,710.80	39.80144619	-80.68206963
8,769.00	90.15	150.30	6,912.35	-1,999.07	-311.80	14,454,509.44	1,729,758.06	39.80121942	-80.68190240
8,864.00	89.93	150.83	6,912.29	-2,081.81	-265.12	14,454,426.70	1,729,804.74	39.80099175	-80.68173723
8,958.00	90.59	149.68	6,911.86	-2,163.42	-218.48	14,454,345.09	1,729,851.38	39.80076717	-80.68157222
9,052.00	90.24	149.24	6,911.18	-2,244.37	-170.72	14,454,264.13	1,729,899.14	39.80054437	-80.68140319

WV Department of Environmental Protection

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Ten High 1S-05HM (P)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=1310+33 @ 1343.00usft (Nabors X08)
Site:	Ten High	MD Reference:	RKB=1310+33 @ 1343.00usft (Nabors X08)
Well:	Ten High 1S-05HM (P)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

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Survey										WV Department of Environmental Protection	
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude		
9,147.00	89.63	149.77	6,911.29	-2,326.23	-122.51	14,454,182.27	1,729,947.35	39.80031910	-80.68123258		
9,242.00	90.07	149.42	6,911.54	-2,408.17	-74.43	14,454,100.34	1,729,995.43	39.80009362	-80.68106244		
9,337.00	89.54	149.95	6,911.86	-2,490.18	-26.48	14,454,018.33	1,730,043.38	39.79986793	-80.68089276		
9,431.00	91.65	150.56	6,910.88	-2,571.78	20.15	14,453,936.72	1,730,090.01	39.79964337	-80.68072777		
9,525.00	91.25	150.91	6,908.50	-2,653.76	66.09	14,453,854.75	1,730,135.95	39.79941779	-80.68056526		
9,620.00	90.81	150.83	6,906.80	-2,736.73	112.33	14,453,771.78	1,730,182.19	39.79918948	-80.68040169		
9,715.00	90.20	150.30	6,905.96	-2,819.46	159.01	14,453,689.04	1,730,228.87	39.79896182	-80.68023653		
9,810.00	90.15	150.30	6,905.67	-2,901.98	206.08	14,453,606.52	1,730,275.94	39.79873473	-80.68007001		
9,904.00	90.24	150.21	6,905.35	-2,983.59	252.72	14,453,524.91	1,730,322.58	39.79851014	-80.67990500		
9,999.00	91.65	148.28	6,903.78	-3,065.22	301.29	14,453,443.29	1,730,371.15	39.79828551	-80.67973312		
10,093.00	91.16	147.22	6,901.48	-3,144.69	351.43	14,453,363.81	1,730,421.29	39.79806677	-80.67955561		
10,188.00	90.59	146.87	6,900.03	-3,224.39	403.10	14,453,284.11	1,730,472.96	39.79784737	-80.67937266		
10,283.00	90.11	148.36	6,899.45	-3,304.62	453.98	14,453,203.89	1,730,523.84	39.79762656	-80.67919254		
10,377.00	90.07	148.54	6,899.30	-3,384.72	503.17	14,453,123.78	1,730,573.03	39.79740609	-80.67901845		
10,472.00	89.63	148.19	6,899.55	-3,465.60	552.99	14,453,042.90	1,730,622.86	39.79718347	-80.67884209		
10,567.00	88.75	148.36	6,900.89	-3,546.40	602.94	14,452,962.10	1,730,672.81	39.79696110	-80.67866529		
10,661.00	89.67	149.42	6,902.19	-3,626.87	651.51	14,452,881.63	1,730,721.37	39.79673962	-80.67849343		
10,756.00	90.59	148.98	6,901.97	-3,708.47	700.15	14,452,800.03	1,730,770.01	39.79651505	-80.67832129		
10,851.00	90.46	150.03	6,901.10	-3,790.33	748.36	14,452,718.18	1,730,818.22	39.79628978	-80.67815072		
10,945.00	90.24	150.03	6,900.53	-3,871.75	795.31	14,452,636.75	1,730,865.17	39.79606569	-80.67798459		
11,040.00	89.54	150.30	6,900.71	-3,954.16	842.57	14,452,554.34	1,730,912.44	39.79583891	-80.67781738		
11,134.00	90.11	151.26	6,901.00	-4,036.20	888.46	14,452,472.30	1,730,958.32	39.79561317	-80.67765507		
11,229.00	89.85	150.39	6,901.03	-4,119.15	934.77	14,452,389.36	1,731,004.63	39.79538491	-80.67749127		
11,324.00	91.60	151.53	6,899.83	-4,202.19	980.88	14,452,306.31	1,731,050.74	39.79515640	-80.67732818		
11,418.00	90.81	150.12	6,897.85	-4,284.25	1,026.69	14,452,224.26	1,731,096.55	39.79493060	-80.67716614		
11,514.00	90.24	150.39	6,896.97	-4,367.59	1,074.32	14,452,140.91	1,731,144.18	39.79470124	-80.67699765		
11,608.00	89.71	150.30	6,897.01	-4,449.28	1,120.83	14,452,059.22	1,731,190.69	39.79447644	-80.67683313		
11,703.00	89.32	150.39	6,897.82	-4,531.83	1,167.83	14,451,976.67	1,731,237.69	39.79424926	-80.67666686		
11,797.00	88.88	149.42	6,899.29	-4,613.15	1,214.96	14,451,895.35	1,731,284.82	39.79402548	-80.67650012		
11,892.00	89.85	151.09	6,900.35	-4,695.63	1,262.09	14,451,812.88	1,731,331.95	39.79379852	-80.67633341		
11,986.00	89.32	151.70	6,901.03	-4,778.15	1,307.09	14,451,730.35	1,731,376.95	39.79357144	-80.67617426		
12,081.00	90.07	151.44	6,901.53	-4,861.69	1,352.32	14,451,646.81	1,731,422.18	39.79334156	-80.67601433		
12,176.00	89.89	151.35	6,901.56	-4,945.09	1,397.80	14,451,563.41	1,731,467.66	39.79311206	-80.67585348		
12,270.00	89.05	151.09	6,902.43	-5,027.48	1,443.05	14,451,481.03	1,731,512.91	39.79288537	-80.67569344		
12,365.00	89.19	151.09	6,903.89	-5,110.63	1,488.97	14,451,397.87	1,731,558.84	39.79265655	-80.67553103		
12,459.00	91.91	150.83	6,902.99	-5,192.80	1,534.60	14,451,315.70	1,731,604.46	39.79243044	-80.67536968		
12,553.00	91.12	151.00	6,900.51	-5,274.92	1,580.27	14,451,233.59	1,731,650.14	39.79220447	-80.67520813		
12,647.00	90.59	151.62	6,899.10	-5,357.37	1,625.40	14,451,151.14	1,731,695.26	39.79197759	-80.67504856		
12,741.00	89.76	151.88	6,898.82	-5,440.17	1,669.89	14,451,068.33	1,731,739.75	39.79174975	-80.67489125		
12,835.00	90.42	149.86	6,898.67	-5,522.28	1,715.64	14,450,986.23	1,731,785.50	39.79152381	-80.67472942		
12,930.00	89.98	151.53	6,898.34	-5,605.12	1,762.14	14,450,903.39	1,731,832.00	39.79129585	-80.67456497		
13,024.00	90.95	150.39	6,897.57	-5,687.29	1,807.77	14,450,821.21	1,731,877.63	39.79106972	-80.67440361		
13,119.00	89.89	149.33	6,896.88	-5,769.44	1,855.46	14,450,739.06	1,731,925.33	39.79084363	-80.67423487		
13,213.00	89.36	149.42	6,897.49	-5,850.33	1,903.35	14,450,658.17	1,731,973.21	39.79062102	-80.67406546		
13,308.00	90.11	148.28	6,897.93	-5,931.63	1,952.49	14,450,576.87	1,732,022.35	39.79039726	-80.67389158		
13,402.00	89.67	149.77	6,898.11	-6,012.22	2,000.86	14,450,496.28	1,732,070.73	39.79017545	-80.67372041		
13,497.00	91.12	149.33	6,897.46	-6,094.12	2,049.01	14,450,414.39	1,732,118.87	39.78995007	-80.67355010		
13,593.00	90.33	148.72	6,896.24	-6,176.42	2,098.41	14,450,332.09	1,732,168.27	39.78972355	-80.67337530		
13,686.00	90.07	149.24	6,895.92	-6,256.12	2,146.34	14,450,252.39	1,732,216.20	39.78950420	-80.67320572		
13,780.00	89.41	149.33	6,896.35	-6,336.93	2,194.35	14,450,171.58	1,732,264.21	39.78928179	-80.67303586		
13,875.00	88.88	149.24	6,897.76	-6,418.59	2,242.86	14,450,089.91	1,732,312.73	39.78905703	-80.67286421		
13,970.00	88.04	148.98	6,900.32	-6,500.09	2,291.62	14,450,008.42	1,732,361.48	39.78883274	-80.67269172		
14,064.00	88.88	149.33	6,902.84	-6,580.76	2,339.80	14,449,927.74	1,732,409.66	39.78861070	-80.67252127		
14,159.00	89.05	150.21	6,904.56	-6,662.83	2,387.62	14,449,845.68	1,732,457.48	39.78838485	-80.67235210		
14,254.00	90.33	150.39	6,905.07	-6,745.35	2,434.68	14,449,763.16	1,732,504.55	39.78815776	-80.67218563		

Company: Tug Hill Operating LLC
Project: Marshall County, West Virginia.
Site: Ten High
Well: Ten High 1S-05HM (P)
Wellbore: Original Hole
Design: Surveys Original Hole

Local Co-ordinate Reference: Well Ten High 1S-05HM (P)
TVD Reference: RKB=1310+33 @ 1343.00usft (Nabors X08)
MD Reference: RKB=1310+33 @ 1343.00usft (Nabors X08)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: DB_Jul2216dt_v14

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Survey

 WV Department of
 Environmental Protection

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
14,349.00	89.45	149.16	6,905.25	-6,827.43	2,482.51	14,449,681.08	1,732,552.37	39.78793186	-80.67201647
14,443.00	89.58	149.95	6,906.05	-6,908.46	2,530.13	14,449,600.04	1,732,600.00	39.78770884	-80.67184798
14,538.00	88.70	150.21	6,907.48	-6,990.79	2,577.51	14,449,517.71	1,732,647.38	39.78748226	-80.67168040
14,632.00	90.07	151.70	6,908.48	-7,072.96	2,623.15	14,449,435.54	1,732,693.01	39.78725615	-80.67151904
14,727.00	89.49	152.93	6,908.85	-7,157.08	2,667.28	14,449,351.42	1,732,737.14	39.78702468	-80.67136303
14,822.00	89.85	153.64	6,909.40	-7,241.94	2,709.99	14,449,266.56	1,732,779.85	39.78679122	-80.67121211
14,916.00	89.14	153.11	6,910.23	-7,325.97	2,752.11	14,449,182.54	1,732,821.97	39.78656003	-80.67106327
15,011.00	89.85	152.50	6,911.06	-7,410.46	2,795.53	14,449,098.04	1,732,865.39	39.78632755	-80.67090983
15,106.00	90.33	150.56	6,910.91	-7,493.97	2,840.81	14,449,014.54	1,732,910.67	39.78609776	-80.67074973
15,201.00	89.58	150.12	6,910.99	-7,576.52	2,887.82	14,448,931.98	1,732,957.68	39.78587058	-80.67058347
15,296.00	89.10	150.65	6,912.08	-7,659.10	2,934.76	14,448,849.40	1,733,004.63	39.78564331	-80.67041745
15,391.00	89.45	149.33	6,913.28	-7,741.36	2,982.27	14,448,767.14	1,733,052.14	39.78541693	-80.67024941
15,485.00	90.29	148.98	6,913.50	-7,822.06	3,030.47	14,448,686.44	1,733,100.33	39.78519481	-80.67007892
15,580.00	90.20	149.42	6,913.09	-7,903.66	3,079.11	14,448,604.84	1,733,148.97	39.78497023	-80.66990684
15,674.00	89.54	150.12	6,913.30	-7,984.88	3,126.44	14,448,523.62	1,733,196.30	39.78474671	-80.66973945
15,769.00	89.98	149.33	6,913.70	-8,066.92	3,174.33	14,448,441.58	1,733,244.19	39.78452091	-80.66957004
15,863.00	90.11	149.07	6,913.63	-8,147.66	3,222.46	14,448,360.84	1,733,292.33	39.78429869	-80.66939978
15,958.00	89.54	148.80	6,913.92	-8,229.04	3,271.48	14,448,279.47	1,733,341.35	39.78407472	-80.66922636
16,053.00	90.42	147.92	6,913.95	-8,309.92	3,321.32	14,448,198.59	1,733,391.18	39.78385210	-80.66905003
16,148.00	89.71	148.10	6,913.84	-8,390.49	3,371.65	14,448,118.02	1,733,441.51	39.78363032	-80.66887195
16,243.00	88.70	148.36	6,915.16	-8,471.25	3,421.66	14,448,037.26	1,733,491.52	39.78340803	-80.66869499
16,337.00	88.04	148.63	6,917.84	-8,551.36	3,470.76	14,447,957.15	1,733,540.62	39.78318753	-80.66852127
16,432.00	88.53	149.68	6,920.68	-8,632.88	3,519.45	14,447,875.62	1,733,589.31	39.78296314	-80.66834905
16,526.00	88.09	149.07	6,923.45	-8,713.74	3,567.31	14,447,794.77	1,733,637.17	39.78274061	-80.66817975
16,621.00	88.92	148.54	6,925.93	-8,794.97	3,616.50	14,447,713.53	1,733,686.36	39.78251702	-80.66800573
16,716.00	88.31	148.89	6,928.23	-8,876.13	3,665.82	14,447,632.37	1,733,735.68	39.78229363	-80.66783126
16,810.00	88.62	149.86	6,930.74	-8,956.99	3,713.68	14,447,551.51	1,733,783.55	39.78207108	-80.66766195
16,904.00	88.70	149.86	6,932.94	-9,038.26	3,760.87	14,447,470.24	1,733,830.73	39.78184741	-80.66749507
16,999.00	88.26	149.24	6,935.46	-9,120.13	3,809.00	14,447,388.38	1,733,878.86	39.78162209	-80.66732484
17,094.00	88.44	149.42	6,938.20	-9,201.81	3,857.44	14,447,306.70	1,733,927.30	39.78139729	-80.66715351
17,188.00	88.88	150.21	6,940.40	-9,283.04	3,904.69	14,447,225.47	1,733,974.55	39.78117373	-80.66698641
17,283.00	88.97	148.63	6,942.18	-9,364.81	3,953.01	14,447,143.70	1,734,022.87	39.78094867	-80.66681550
17,372.00	88.09	147.40	6,944.46	-9,440.27	4,000.13	14,447,068.24	1,734,069.99	39.78074095	-80.66664876
17,464.00	87.60	147.13	6,947.92	-9,517.60	4,049.85	14,446,990.90	1,734,119.71	39.78052807	-80.66647284
Survey @ 17464.00 MD 6947.92 TVD									
17,519.00	87.60	147.13	6,950.22	-9,563.76	4,079.67	14,446,944.75	1,734,149.53	39.78040101	-80.66636729
Survey projected to 17519.00 MD 6950.22 TVD									

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
192.00	192.00	-0.04	0.13	MWD surveys
17,464.00	6,947.92	-9,517.60	4,049.85	Survey @ 17464.00 MD 6947.92 TVD
17,519.00	6,950.22	-9,563.76	4,079.67	Survey projected to 17519.00 MD 6950.22 TVD