

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Ten High 1N-01HM (T)
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 1N-01HM (T)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul216dt_v14

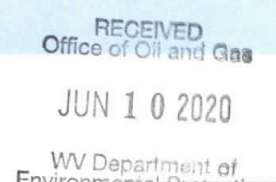
Project	Marshall County, West Virginia.		
Map System:	Universal Transverse Mercator (US Survey Feet)	System Datum:	Mean Sea Level
Geo Datum:	NAD83 West Virginia - HARN		
Map Zone:	Zone 17N (84 W to 78 W)		

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 1N-01HM (T)					
Well Position	+N/-S	0.00 usft	Northing:	14,456,527.91 usft	Latitude:	39.80676042
	+E/-W	0.00 usft	Easting:	1,729,984.57 usft	Longitude:	-80.68107030
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	8/30/2018	-8.75	66.87	52,041.71686724

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	322.81	

Survey Program	Date 10/23/2018				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
184.00	1,106.00	MWD 17 1/2 (Original Hole)	MWD	MWD - Standard	
1,106.00	2,875.00	MWD 12 3/8 (Original Hole)	MWD	MWD - Standard	
2,970.00	16,587.00	MWD 8 3/4 (Original Hole)	MWD	MWD - Standard	
16,642.00	16,642.00	Projection (Original Hole)	MWD	MWD - Standard	

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	14,456,527.91	1,729,984.57	39.80676042	-80.68107030	
184.00	0.66	253.28	184.00	-0.30	-1.01	14,456,527.60	1,729,983.56	39.80675959	-80.68107392	
MWD surveys										
215.00	0.60	262.59	214.99	-0.38	-1.35	14,456,527.53	1,729,983.23	39.80675940	-80.68107510	
246.00	0.15	183.23	245.99	-0.44	-1.51	14,456,527.47	1,729,983.06	39.80675923	-80.68107568	
277.00	0.57	295.42	276.99	-0.41	-1.65	14,456,527.49	1,729,982.92	39.80675930	-80.68107619	
308.00	0.05	165.32	307.99	-0.36	-1.79	14,456,527.55	1,729,982.79	39.80675945	-80.68107667	
341.00	0.72	278.08	340.99	-0.34	-1.99	14,456,527.56	1,729,982.58	39.80675949	-80.68107739	
381.00	0.20	179.13	380.99	-0.38	-2.24	14,456,527.53	1,729,982.34	39.80675940	-80.68107827	

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Project: Marshall County, West Virginia.
Site: Ten High
Well: Ten High 1N-01HM (T)
Wellbore: Original Hole
Design: Surveys Original Hole

Local Co-ordinate Reference: Well Ten High 1N-01HM (T)
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									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
413.00	0.25	310.91	412.99	-0.39	-2.29	14,456,527.52	1,729,982.29	39.80675938	-80.68107846
444.00	0.55	215.44	443.99	-0.47	-2.43	14,456,527.44	1,729,982.15	39.80675917	-80.68107895
476.00	0.62	194.38	475.99	-0.76	-2.56	14,456,527.15	1,729,982.02	39.80675836	-80.68107942
507.00	0.29	264.61	506.99	-0.93	-2.68	14,456,526.98	1,729,981.90	39.80675790	-80.68107985
539.00	0.67	248.46	538.99	-1.01	-2.93	14,456,526.90	1,729,981.64	39.80675769	-80.68108076
570.00	0.86	261.23	569.98	-1.11	-3.33	14,456,526.80	1,729,981.24	39.80675741	-80.68108218
602.00	0.14	115.75	601.98	-1.16	-3.53	14,456,526.75	1,729,981.04	39.80675727	-80.68108290
633.00	0.20	227.48	632.98	-1.21	-3.54	14,456,526.69	1,729,981.03	39.80675712	-80.68108292
665.00	0.40	246.59	664.98	-1.30	-3.68	14,456,526.61	1,729,980.89	39.80675690	-80.68108343
696.00	0.31	306.29	695.98	-1.29	-3.85	14,456,526.62	1,729,980.72	39.80675692	-80.68108402
728.00	0.43	232.40	727.98	-1.31	-4.01	14,456,526.60	1,729,980.56	39.80675686	-80.68108461
759.00	0.53	277.21	758.98	-1.36	-4.25	14,456,526.54	1,729,980.33	39.80675672	-80.68108545
791.00	0.09	239.45	790.98	-1.36	-4.42	14,456,526.55	1,729,980.16	39.80675673	-80.68108605
822.00	0.06	239.45	821.98	-1.38	-4.45	14,456,526.53	1,729,980.12	39.80675668	-80.68108617
854.00	0.21	288.31	853.98	-1.37	-4.52	14,456,526.54	1,729,980.05	39.80675671	-80.68108642
885.00	0.11	214.46	884.98	-1.38	-4.59	14,456,526.53	1,729,979.98	39.80675669	-80.68108667
917.00	0.46	203.20	916.98	-1.52	-4.66	14,456,526.39	1,729,979.91	39.80675630	-80.68108692
948.00	0.10	108.81	947.98	-1.64	-4.68	14,456,526.26	1,729,979.89	39.80675596	-80.68108700
970.00	0.04	109.55	969.98	-1.65	-4.66	14,456,526.26	1,729,979.91	39.80675593	-80.68108691
980.00	0.15	353.89	979.98	-1.64	-4.66	14,456,526.27	1,729,979.92	39.80675597	-80.68108690
1,011.00	0.17	254.45	1,010.98	-1.61	-4.71	14,456,526.30	1,729,979.87	39.80675604	-80.68108708
1,043.00	0.11	38.64	1,042.98	-1.60	-4.73	14,456,526.31	1,729,979.84	39.80675607	-80.68108717
1,075.00	0.21	20.24	1,074.98	-1.52	-4.69	14,456,526.39	1,729,979.88	39.80675629	-80.68108703
1,106.00	0.32	123.85	1,105.98	-1.52	-4.60	14,456,526.39	1,729,979.97	39.80675630	-80.68108670
1,210.00	0.29	227.64	1,209.98	-1.86	-4.55	14,456,526.05	1,729,980.02	39.80675537	-80.68108654
1,274.00	0.39	220.56	1,273.98	-2.13	-4.82	14,456,525.78	1,729,979.76	39.80675462	-80.68108748
1,368.00	0.93	222.68	1,367.97	-2.93	-5.54	14,456,524.97	1,729,979.03	39.80675242	-80.68109007
1,462.00	1.52	225.22	1,461.95	-4.37	-6.94	14,456,523.53	1,729,977.63	39.80674848	-80.68109508
1,557.00	3.18	212.83	1,556.86	-7.47	-9.27	14,456,520.43	1,729,975.31	39.80673999	-80.68110339
1,652.00	3.60	207.61	1,651.70	-12.33	-12.08	14,456,515.58	1,729,972.50	39.80672668	-80.68111346
1,746.00	4.00	199.81	1,745.49	-18.03	-14.56	14,456,509.88	1,729,970.02	39.80671105	-80.68112236
1,841.00	4.24	198.91	1,840.25	-24.47	-16.82	14,456,503.44	1,729,967.76	39.80669338	-80.68113049
1,936.00	4.83	200.19	1,934.95	-31.55	-19.34	14,456,496.36	1,729,965.24	39.80667398	-80.68113955
2,031.00	5.26	207.70	2,029.58	-39.16	-22.74	14,456,488.75	1,729,961.83	39.80665311	-80.68115177
2,125.00	5.26	217.94	2,123.19	-46.37	-27.39	14,456,481.54	1,729,957.18	39.80663335	-80.68116843
2,220.00	6.20	225.47	2,217.71	-53.40	-33.73	14,456,474.51	1,729,950.85	39.80661410	-80.68119107
2,314.00	5.76	222.45	2,311.20	-60.44	-40.53	14,456,467.47	1,729,944.04	39.80659483	-80.68121538
2,409.00	4.30	215.20	2,405.83	-66.87	-45.80	14,456,461.04	1,729,938.77	39.80657723	-80.68123423
2,504.00	3.83	198.89	2,500.60	-72.78	-48.88	14,456,455.12	1,729,935.69	39.80656102	-80.68124527
2,598.00	4.03	198.26	2,594.38	-78.89	-50.93	14,456,449.02	1,729,933.64	39.80654427	-80.68125265
2,693.00	4.50	181.98	2,689.12	-85.78	-52.11	14,456,442.12	1,729,932.47	39.80652535	-80.68125693
2,761.00	5.14	179.22	2,756.88	-91.50	-52.16	14,456,436.41	1,729,932.42	39.80650966	-80.68125718
2,875.00	5.71	178.05	2,870.37	-102.27	-51.90	14,456,425.64	1,729,932.68	39.80648007	-80.68125638
2,970.00	4.49	193.47	2,964.99	-110.61	-52.60	14,456,417.30	1,729,931.97	39.80645717	-80.68125900
3,064.00	4.36	222.81	3,058.72	-116.81	-55.89	14,456,411.10	1,729,928.69	39.80644018	-80.68127078
3,159.00	4.20	241.30	3,153.46	-121.13	-61.39	14,456,406.78	1,729,923.18	39.80642837	-80.68129043
3,257.00	3.90	238.34	3,251.22	-124.60	-67.38	14,456,403.30	1,729,917.20	39.80641889	-80.68131179
3,352.00	3.55	237.76	3,346.02	-127.87	-72.61	14,456,400.04	1,729,911.96	39.80640997	-80.68133048
3,446.00	3.48	234.71	3,439.84	-131.07	-77.40	14,456,396.84	1,729,907.17	39.80640123	-80.68134758
3,540.00	3.03	234.64	3,533.69	-134.15	-81.76	14,456,393.75	1,729,902.82	39.80639280	-80.68136312
3,635.00	4.18	230.45	3,628.50	-137.81	-86.48	14,456,390.09	1,729,898.10	39.80638280	-80.68137996
3,730.00	5.07	239.80	3,723.19	-142.13	-92.77	14,456,385.78	1,729,891.80	39.80637101	-80.68140244
3,824.00	5.83	242.68	3,816.77	-146.41	-100.61	14,456,381.50	1,729,883.97	39.80635933	-80.68143038
3,920.00	5.34	239.65	3,912.31	-150.90	-108.79	14,456,377.00	1,729,875.78	39.80634707	-80.68145959
4,014.00	6.26	240.96	4,005.83	-155.60	-117.05	14,456,372.30	1,729,867.53	39.80633424	-80.68148905

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Site: Ten High	MD Reference: RKB=1310+33 @ 1343.00usft (Nabors X08)
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Wellbore: Original Hole	Survey Calculation Method: Minimum Curvature
Design: Surveys Original Hole	Database: DB_Jul2216dt_v14

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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
14,060.00	93.93	328.13	6,776.95	5,336.42	-4,459.57	14,461,864.33	1,725,525.00	39.82145808	-80.69688518
14,155.00	92.62	328.49	6,771.52	5,417.12	-4,509.39	14,461,945.03	1,725,475.18	39.82168017	-80.69706165
14,249.00	91.96	329.80	6,767.76	5,497.75	-4,557.56	14,462,025.66	1,725,427.01	39.82190205	-80.69723223
14,343.00	90.95	331.56	6,765.38	5,579.68	-4,603.58	14,462,107.59	1,725,381.00	39.82212747	-80.69739512
14,437.00	90.42	332.09	6,764.25	5,662.53	-4,647.96	14,462,190.44	1,725,336.62	39.82235542	-80.69755218
14,532.00	90.77	332.53	6,763.27	5,746.65	-4,692.10	14,462,274.56	1,725,292.47	39.82258683	-80.69770838
14,626.00	91.47	331.91	6,761.43	5,829.80	-4,735.90	14,462,357.71	1,725,248.67	39.82281559	-80.69786339
14,720.00	90.15	332.09	6,760.10	5,912.79	-4,780.03	14,462,440.69	1,725,204.55	39.82304390	-80.69801954
14,815.00	90.81	332.09	6,759.30	5,996.73	-4,824.49	14,462,524.64	1,725,160.08	39.82327485	-80.69817690
14,909.00	90.11	329.54	6,758.55	6,078.79	-4,870.33	14,462,606.70	1,725,114.25	39.82350062	-80.69833915
15,004.00	90.81	329.80	6,757.79	6,160.78	-4,918.30	14,462,688.69	1,725,066.28	39.82372624	-80.69850902
15,098.00	91.69	329.80	6,755.74	6,242.00	-4,965.57	14,462,769.91	1,725,019.01	39.82394973	-80.69867641
15,192.00	92.48	329.96	6,752.32	6,323.26	-5,012.71	14,462,851.16	1,724,971.87	39.82417331	-80.69884332
15,286.00	90.51	328.46	6,749.86	6,403.97	-5,060.81	14,462,931.88	1,724,923.77	39.82439542	-80.69901366
15,381.00	91.25	328.55	6,748.41	6,484.97	-5,110.43	14,463,012.88	1,724,874.14	39.82461831	-80.69918944
15,475.00	92.09	328.29	6,745.67	6,565.01	-5,159.64	14,463,092.92	1,724,824.94	39.82483859	-80.69936373
15,570.00	89.98	328.64	6,743.95	6,645.97	-5,209.31	14,463,173.87	1,724,775.26	39.82506136	-80.69953969
15,664.00	90.42	328.55	6,743.62	6,726.20	-5,258.29	14,463,254.10	1,724,726.28	39.82528214	-80.69971319
15,759.00	91.08	329.69	6,742.38	6,807.72	-5,307.05	14,463,335.63	1,724,677.53	39.82550647	-80.69988585
15,853.00	91.60	329.87	6,740.18	6,888.92	-5,354.34	14,463,416.83	1,724,630.23	39.82572991	-80.70005335
15,947.00	92.35	330.04	6,736.94	6,970.24	-5,401.38	14,463,498.15	1,724,583.19	39.82595367	-80.70021990
16,042.00	91.82	327.85	6,733.48	7,051.57	-5,450.35	14,463,579.47	1,724,534.22	39.82617746	-80.70039335
16,137.00	91.78	328.11	6,730.50	7,132.07	-5,500.70	14,463,659.98	1,724,483.88	39.82639901	-80.70057171
16,231.00	90.90	327.93	6,728.30	7,211.79	-5,550.47	14,463,739.69	1,724,434.11	39.82661838	-80.70074803
16,325.00	90.81	329.08	6,726.90	7,291.93	-5,599.57	14,463,819.84	1,724,385.01	39.82683892	-80.70092196
16,420.00	91.34	328.73	6,725.12	7,373.26	-5,648.62	14,463,901.17	1,724,335.95	39.82706273	-80.70109572
16,514.00	90.68	328.64	6,723.46	7,453.56	-5,697.47	14,463,981.46	1,724,287.10	39.82728368	-80.70126875
16,587.00	91.56	331.27	6,722.03	7,516.73	-5,734.01	14,464,044.64	1,724,250.56	39.82745751	-80.70139814
Survey @ 16587.00 MD 6722.03 TVD									
16,642.00	91.56	331.27	6,720.54	7,564.94	-5,760.44	14,464,092.85	1,724,224.14	39.82759015	-80.70149170
Survey projected to 16642.00 MD 6720.54 TVD									

Measured Depth (usft)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Comment
184.00	184.00	-0.30	-1.01	MWD surveys
16,587.00	6,722.03	7,516.73	-5,734.01	Survey @ 16587.00 MD 6722.03 TVD
16,642.00	6,720.54	7,564.94	-5,760.44	Survey projected to 16642.00 MD 6720.54 TVD

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