TUG HILL OPERATING

Survey Report - Geographic

Company:	Tug Hill Operating LLC	**Local Co-ordinate Reference:**	Well Weller 7 HM (D)
Project:	Marshall County, West Virginia.	**TVD Reference:**	RKB=1273+26 @ 1299.00usft (Nabors B28)
Site:	Lily/Weller	**MD Reference:**	RKB=1273+26 @ 1299.00usft (Nabors B28)
Well:	Weller 7 HM (D)	**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 Lily/Weller

Site Position:		**Northing:**	14,431,189.55 usft	**Latitude:**	39.73745061
From:	Lat/Long	**Easting:**	1,694,826.67 usft	**Longitude:**	-80.80645320
Position Uncertainty:	0.00 usft	**Slot Radius:**	13-3/16 "	**Grid Convergence:**	0.12 °

Well Weller 7 HM (D)

Well Position	**+N/-S**	0.00 usft	**Northing:**	14,431,164.31 usft	**Latitude:**	39.73738114
	+E/-W	0.00 usft	**Easting:**	1,694,852.32 usft	**Longitude:**	-80.80636214
Position Uncertainty		0.00 usft	**Wellhead Elevation:**	usft	**Ground Level:**	1,273.00 usft

Wellbore Original Hole

Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	IGRF2015	12/16/2017	-8.62	66.89	52,102.07053205

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	146.06

Survey Program **Date** 3/25/2019

From (usft)	**To (usft)**	**Survey (Wellbore)**	**Tool Name**	**Description**
153.00	14,225.00	MWD (Original Hole)	MWD	MWD - Standard
14,285.00	14,285.00	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	14,431,164.31	1,694,852.32	39.73738114	-80.80636214
153.00	0.36	301.24	153.00	0.25	-0.41	14,431,164.56	1,694,851.91	39.73738183	-80.80636360
MWD surveys									
183.00	0.45	8.72	183.00	0.41	-0.47	14,431,164.73	1,694,851.85	39.73738228	-80.80636382
213.00	0.10	272.22	213.00	0.53	-0.48	14,431,164.85	1,694,851.84	39.73738261	-80.80636385
244.00	0.41	43.31	244.00	0.61	-0.43	14,431,164.93	1,694,851.89	39.73738283	-80.80636368
273.00	0.36	1.57	273.00	0.78	-0.36	14,431,165.09	1,694,851.96	39.73738329	-80.80636341
304.00	0.38	54.25	304.00	0.94	-0.27	14,431,165.25	1,694,852.05	39.73738372	-80.80636311
334.00	0.54	105.95	334.00	0.96	-0.06	14,431,165.27	1,694,852.27	39.73738377	-80.80636233
364.00	0.15	324.32	364.00	0.95	0.06	14,431,165.26	1,694,852.38	39.73738375	-80.80636193
394.00	0.14	289.77	394.00	0.99	0.00	14,431,165.31	1,694,852.32	39.73738387	-80.80636214

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Site:	Lily/Weller	**MD Reference:**	RKB=1273+26 @ 1299.00usft (Nabors B28)
Well:	Weller 7 HM (D)	**North Reference:**	Grid
Wellbore:	Original Hole	**Survey Calculation Method:**	Minimum Curvature
Design:	Surveys Original Hole	**Database:**	DB_Jul2216dt_v14

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
424.00	0.11	127.03	424.00	0.99	-0.01	14,431,165.30	1,694,852.31	39.73738386	-80.80636218
454.00	0.10	210.62	454.00	0.95	0.00	14,431,165.26	1,694,852.32	39.73738375	-80.80636214
485.00	0.14	227.79	485.00	0.90	-0.04	14,431,165.22	1,694,852.28	39.73738362	-80.80636229
515.00	0.07	119.53	515.00	0.87	-0.06	14,431,165.18	1,694,852.27	39.73738352	-80.80636233
545.00	0.10	176.78	545.00	0.83	-0.04	14,431,165.15	1,694,852.28	39.73738343	-80.80636227
575.00	0.33	33.33	575.00	0.88	0.01	14,431,165.19	1,694,852.33	39.73738355	-80.80636210
606.00	0.13	166.47	605.99	0.92	0.07	14,431,165.23	1,694,852.39	39.73738366	-80.80636189
636.00	0.10	218.42	635.99	0.86	0.06	14,431,165.18	1,694,852.38	39.73738352	-80.80636192
666.00	0.18	317.77	665.99	0.88	0.01	14,431,165.19	1,694,852.33	39.73738356	-80.80636209
695.00	0.13	324.17	694.99	0.94	-0.04	14,431,165.25	1,694,852.28	39.73738372	-80.80636227
726.00	0.07	245.38	725.99	0.96	-0.08	14,431,165.27	1,694,852.25	39.73738378	-80.80636240
758.00	0.13	54.99	757.99	0.97	-0.06	14,431,165.29	1,694,852.26	39.73738381	-80.80636236
789.00	0.23	126.26	788.99	0.96	0.01	14,431,165.27	1,694,852.34	39.73738377	-80.80636208
820.00	0.09	140.30	819.99	0.90	0.08	14,431,165.21	1,694,852.40	39.73738361	-80.80636185
851.00	0.20	51.85	850.99	0.92	0.14	14,431,165.23	1,694,852.46	39.73738365	-80.80636164
882.00	0.02	58.86	881.99	0.95	0.19	14,431,165.27	1,694,852.51	39.73738375	-80.80636147
914.00	0.10	339.89	913.99	0.98	0.18	14,431,165.30	1,694,852.50	39.73738383	-80.80636149
945.00	0.07	86.88	944.99	1.01	0.19	14,431,165.32	1,694,852.51	39.73738391	-80.80636146
977.00	0.07	310.89	976.99	1.02	0.20	14,431,165.34	1,694,852.52	39.73738394	-80.80636144
1,081.00	0.16	158.21	1,080.99	0.93	0.20	14,431,165.24	1,694,852.52	39.73738369	-80.80636142
1,176.00	0.27	102.54	1,175.99	0.76	0.47	14,431,165.07	1,694,852.79	39.73738322	-80.80636047
1,271.00	0.23	97.01	1,270.99	0.68	0.88	14,431,165.00	1,694,853.20	39.73738302	-80.80635902
1,365.00	0.38	75.70	1,364.99	0.74	1.37	14,431,165.05	1,694,853.69	39.73738316	-80.80635728
1,460.00	0.50	70.22	1,459.99	0.96	2.06	14,431,165.27	1,694,854.38	39.73738376	-80.80635480
1,554.00	0.66	71.79	1,553.98	1.26	2.96	14,431,165.58	1,694,855.28	39.73738460	-80.80635160
1,648.00	1.41	122.72	1,647.97	0.81	4.45	14,431,165.12	1,694,856.77	39.73738334	-80.80634631
1,743.00	3.02	135.77	1,742.90	-1.62	7.18	14,431,162.70	1,694,859.50	39.73737666	-80.80633662
1,837.00	5.25	148.76	1,836.65	-7.07	11.14	14,431,157.25	1,694,863.46	39.73736166	-80.80632258
1,931.00	8.55	160.58	1,929.96	-17.34	15.69	14,431,146.97	1,694,868.01	39.73733343	-80.80630646
2,025.00	9.31	180.54	2,022.84	-31.54	17.94	14,431,132.78	1,694,870.27	39.73729443	-80.80629855
2,120.00	8.47	190.39	2,116.70	-46.10	16.61	14,431,118.21	1,694,868.93	39.73725443	-80.80630341
2,215.00	7.80	172.89	2,210.76	-59.38	16.15	14,431,104.93	1,694,868.47	39.73721796	-80.80630517
2,310.00	6.64	139.62	2,305.05	-69.97	20.50	14,431,094.34	1,694,872.83	39.73718886	-80.80628974
2,404.00	8.05	128.00	2,398.28	-78.16	29.21	14,431,086.15	1,694,881.53	39.73716631	-80.80625883
2,498.00	11.85	137.90	2,490.85	-89.38	40.87	14,431,074.93	1,694,893.20	39.73713543	-80.80621743
2,591.00	12.11	134.74	2,581.83	-103.33	54.21	14,431,060.98	1,694,906.53	39.73709704	-80.80617012
2,634.00	11.76	133.31	2,623.90	-109.51	60.60	14,431,054.80	1,694,912.92	39.73708003	-80.80614743
2,711.00	11.98	123.74	2,699.26	-119.34	72.95	14,431,044.98	1,694,925.28	39.73705298	-80.80610355
2,774.00	12.74	119.45	2,760.80	-126.38	84.44	14,431,037.93	1,694,936.76	39.73703356	-80.80606274
2,869.00	18.53	113.71	2,852.25	-137.61	107.40	14,431,026.70	1,694,959.73	39.73700258	-80.80598114
2,963.00	19.06	116.96	2,941.24	-150.58	134.76	14,431,013.74	1,694,987.08	39.73696681	-80.80588393
3,057.00	18.84	115.26	3,030.15	-164.01	162.17	14,431,000.30	1,695,014.49	39.73692975	-80.80578655
3,152.00	16.65	117.12	3,120.62	-176.76	188.16	14,430,987.55	1,695,040.48	39.73689457	-80.80569420
3,249.00	16.13	123.91	3,213.69	-190.62	211.71	14,430,973.70	1,695,064.03	39.73685639	-80.80561052
3,344.00	16.29	128.24	3,304.92	-206.23	233.13	14,430,958.09	1,695,085.45	39.73681339	-80.80553446
3,438.00	16.95	126.21	3,394.99	-222.48	254.54	14,430,941.83	1,695,106.86	39.73676863	-80.80545842
3,533.00	15.67	119.68	3,486.17	-237.02	276.86	14,430,927.30	1,695,129.18	39.73672857	-80.80537913
3,627.00	16.27	114.94	3,576.55	-248.86	299.83	14,430,915.46	1,695,152.15	39.73669592	-80.80529751
3,721.00	14.84	114.40	3,667.10	-259.38	322.74	14,430,904.93	1,695,175.06	39.73666688	-80.80521612
3,815.00	15.93	116.42	3,757.73	-270.09	345.25	14,430,894.22	1,695,197.57	39.73663733	-80.80513611
3,910.00	16.56	118.15	3,848.94	-282.28	368.86	14,430,882.03	1,695,221.19	39.73660371	-80.80505221
4,005.00	17.54	117.52	3,939.77	-295.28	393.50	14,430,869.03	1,695,245.82	39.73656786	-80.80496469
4,100.00	15.76	116.16	4,030.78	-307.59	417.77	14,430,856.73	1,695,270.10	39.73653392	-80.80487843
4,194.00	16.32	117.84	4,121.12	-319.38	440.91	14,430,844.93	1,695,293.23	39.73650139	-80.80479622
4,289.00	17.20	117.51	4,212.08	-332.11	465.17	14,430,832.21	1,695,317.49	39.73646631	-80.80471002

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Survey

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4,384.00	15.37	118.24	4,303.27	-344.55	488.72	14,430,819.76	1,695,341.04	39.73643199	-80.80462634
4,478.00	16.22	117.53	4,393.72	-356.51	511.34	14,430,807.80	1,695,363.66	39.73639900	-80.80454598
4,573.00	16.91	113.82	4,484.78	-368.23	535.75	14,430,796.09	1,695,388.07	39.73636668	-80.80445926
4,668.00	15.74	111.67	4,575.95	-378.57	560.36	14,430,785.75	1,695,412.68	39.73633814	-80.80437178
4,762.00	15.74	119.04	4,666.43	-389.46	583.36	14,430,774.85	1,695,435.68	39.73630808	-80.80429006
4,857.00	17.12	120.59	4,757.55	-402.84	606.66	14,430,761.48	1,695,458.98	39.73627121	-80.80420727
4,951.00	17.02	116.74	4,847.41	-416.07	630.86	14,430,748.25	1,695,483.18	39.73623473	-80.80412130
5,046.00	15.16	112.33	4,938.69	-427.04	654.77	14,430,737.27	1,695,507.09	39.73620444	-80.80403634
5,141.00	15.63	120.89	5,030.29	-438.33	677.25	14,430,725.98	1,695,529.57	39.73617330	-80.80395647
5,235.00	17.60	121.39	5,120.36	-452.24	700.25	14,430,712.07	1,695,552.57	39.73613497	-80.80387477
5,330.00	18.19	114.75	5,210.78	-465.93	725.98	14,430,698.38	1,695,578.30	39.73609722	-80.80378335
5,424.00	17.09	108.12	5,300.36	-476.37	752.43	14,430,687.94	1,695,604.75	39.73606839	-80.80368933
5,518.00	15.97	110.24	5,390.48	-485.14	777.69	14,430,679.18	1,695,630.01	39.73604416	-80.80359954
5,612.00	16.00	113.38	5,480.85	-494.75	801.72	14,430,669.56	1,695,654.04	39.73601761	-80.80351416
5,707.00	15.43	113.89	5,572.29	-505.07	825.29	14,430,659.25	1,695,677.61	39.73598914	-80.80343039
5,802.00	16.98	117.32	5,663.52	-516.55	849.17	14,430,647.76	1,695,701.49	39.73595745	-80.80334553
5,896.00	17.03	120.08	5,753.41	-529.75	873.28	14,430,634.56	1,695,725.60	39.73592106	-80.80325988
5,990.00	18.44	116.26	5,842.94	-543.23	898.52	14,430,621.08	1,695,750.84	39.73588389	-80.80317019
6,093.00	18.20	114.00	5,940.73	-556.98	927.83	14,430,607.33	1,695,780.15	39.73584595	-80.80306606
6,117.00	17.85	114.38	5,963.55	-560.02	934.60	14,430,604.29	1,695,786.92	39.73583756	-80.80304199
6,146.00	18.95	116.05	5,991.06	-563.93	942.88	14,430,600.39	1,695,795.20	39.73582679	-80.80301257
6,164.00	20.18	117.29	6,008.03	-566.63	948.27	14,430,597.68	1,695,800.59	39.73581932	-80.80299343
6,211.00	23.78	120.98	6,051.60	-575.23	963.60	14,430,589.08	1,695,815.92	39.73579562	-80.80293895
6,258.00	28.18	123.70	6,093.85	-586.27	980.97	14,430,578.04	1,695,833.29	39.73576519	-80.80287727
6,307.00	31.82	127.22	6,136.28	-600.51	1,000.89	14,430,563.80	1,695,853.21	39.73572597	-80.80280652
6,354.00	33.98	133.72	6,175.75	-617.09	1,020.25	14,430,547.22	1,695,872.58	39.73568032	-80.80273776
6,402.00	37.36	138.55	6,214.75	-637.29	1,039.60	14,430,527.03	1,695,891.92	39.73562473	-80.80266911
6,449.00	41.10	141.81	6,251.15	-660.13	1,058.60	14,430,504.19	1,695,910.92	39.73556189	-80.80260170
6,495.00	45.45	142.33	6,284.63	-685.00	1,077.97	14,430,479.32	1,695,930.29	39.73549347	-80.80253298
6,542.00	49.63	143.21	6,316.36	-712.60	1,098.94	14,430,451.71	1,695,951.26	39.73541753	-80.80245862
6,590.00	53.63	144.27	6,346.15	-742.95	1,121.18	14,430,421.37	1,695,973.51	39.73533406	-80.80237973
6,637.00	54.11	144.09	6,373.86	-773.73	1,143.40	14,430,390.59	1,695,995.72	39.73524939	-80.80230095
6,685.00	57.19	144.79	6,400.94	-805.97	1,166.44	14,430,358.35	1,696,018.76	39.73516072	-80.80221924
6,732.00	60.31	146.73	6,425.32	-839.18	1,189.03	14,430,325.13	1,696,041.36	39.73506936	-80.80213914
6,778.00	63.91	148.22	6,446.83	-873.46	1,210.88	14,430,290.85	1,696,063.20	39.73497509	-80.80206169
6,825.00	67.30	148.52	6,466.24	-909.90	1,233.33	14,430,254.41	1,696,085.65	39.73487488	-80.80198215
6,872.00	71.08	148.57	6,482.94	-947.37	1,256.25	14,430,216.94	1,696,108.57	39.73477183	-80.80190091
6,919.00	73.49	148.84	6,497.24	-985.63	1,279.50	14,430,178.69	1,696,131.82	39.73466663	-80.80181849
6,967.00	75.74	149.80	6,509.97	-1,025.43	1,303.11	14,430,138.89	1,696,155.43	39.73455719	-80.80173482
7,014.00	79.38	151.30	6,520.10	-1,065.39	1,325.67	14,430,098.93	1,696,177.99	39.73444731	-80.80165490
7,044.00	81.19	151.47	6,525.16	-1,091.34	1,339.83	14,430,072.97	1,696,192.15	39.73437593	-80.80160473
7,062.00	82.99	151.65	6,527.64	-1,107.02	1,348.32	14,430,057.29	1,696,200.64	39.73433283	-80.80157466
7,093.00	86.15	151.39	6,530.57	-1,134.14	1,363.03	14,430,030.17	1,696,215.36	39.73425825	-80.80152253
7,125.00	88.62	150.68	6,532.03	-1,162.11	1,378.51	14,430,002.21	1,696,230.84	39.73418136	-80.80146769
7,156.00	89.45	149.98	6,532.55	-1,189.04	1,393.86	14,429,975.27	1,696,246.18	39.73410730	-80.80141333
7,251.00	90.46	149.80	6,532.63	-1,271.22	1,441.51	14,429,893.09	1,696,293.84	39.73388132	-80.80124446
7,345.00	88.97	151.74	6,533.09	-1,353.24	1,487.41	14,429,811.07	1,696,339.73	39.73365578	-80.80108185
7,440.00	88.31	150.95	6,535.35	-1,436.58	1,532.95	14,429,727.73	1,696,385.28	39.73342662	-80.80092052
7,535.00	89.19	150.51	6,537.42	-1,519.43	1,579.39	14,429,644.88	1,696,431.71	39.73319881	-80.80075600
7,630.00	88.40	150.33	6,539.42	-1,602.03	1,626.28	14,429,562.28	1,696,478.60	39.73297168	-80.80058989
7,723.00	90.77	150.95	6,540.09	-1,683.08	1,671.87	14,429,481.23	1,696,524.19	39.73274882	-80.80042836
7,818.00	89.98	150.95	6,539.47	-1,766.13	1,718.00	14,429,398.19	1,696,570.32	39.73252047	-80.80026494
7,912.00	90.15	150.51	6,539.36	-1,848.12	1,763.95	14,429,316.19	1,696,616.28	39.73229500	-80.80010212
8,007.00	89.67	148.75	6,539.51	-1,930.08	1,811.98	14,429,234.23	1,696,664.30	39.73206962	-80.79993194
8,101.00	90.59	147.70	6,539.30	-2,009.99	1,861.48	14,429,154.32	1,696,713.80	39.73184986	-80.79975652

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TUG HILL OPERATING

Survey Report - Geographic

Company:	Tug Hill Operating LLC	**Local Co-ordinate Reference:**	Well Weller 7 HM (D)
Project:	Marshall County, West Virginia.	**TVD Reference:**	RKB=1273+26 @ 1299.00usft (Nabors B28)
Site:	Lily/Weller	**MD Reference:**	RKB=1273+26 @ 1299.00usft (Nabors B28)
Well:	Weller 7 HM (D)	**North Reference:**	Grid
Wellbore:	Original Hole	**Survey Calculation Method:**	Minimum Curvature
Design:	Surveys Original Hole	**Database:**	DB_Jul2216dt_v14

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
8,196.00	89.67	148.13	6,539.08	-2,090.48	1,911.94	14,429,073.83	1,696,764.26	39.73162850	-80.79957767
8,290.00	90.15	148.13	6,539.23	-2,170.31	1,961.57	14,428,994.00	1,696,813.89	39.73140896	-80.79940178
8,384.00	90.51	148.40	6,538.69	-2,250.26	2,011.02	14,428,914.06	1,696,863.34	39.73118910	-80.79922655
8,479.00	90.33	148.40	6,537.99	-2,331.17	2,060.79	14,428,833.15	1,696,913.11	39.73096659	-80.79905015
8,573.00	90.95	149.28	6,536.94	-2,411.60	2,109.43	14,428,752.71	1,696,961.75	39.73074540	-80.79887780
8,667.00	90.20	150.33	6,536.00	-2,492.84	2,156.70	14,428,671.47	1,697,009.02	39.73052200	-80.79871031
8,761.00	89.14	151.47	6,536.54	-2,574.97	2,202.41	14,428,589.34	1,697,054.74	39.73029616	-80.79854837
8,856.00	88.48	151.65	6,538.51	-2,658.49	2,247.65	14,428,505.83	1,697,099.97	39.73006652	-80.79838816
8,951.00	89.05	150.68	6,540.56	-2,741.69	2,293.45	14,428,422.63	1,697,145.77	39.72983774	-80.79822590
9,046.00	89.71	150.60	6,541.59	-2,824.48	2,340.03	14,428,339.83	1,697,192.35	39.72961008	-80.79806091
9,140.00	90.37	150.07	6,541.52	-2,906.16	2,386.55	14,428,258.15	1,697,238.87	39.72938548	-80.79789609
9,235.00	89.58	150.24	6,541.57	-2,988.56	2,433.83	14,428,175.75	1,697,286.15	39.72915889	-80.79772860
9,330.00	90.68	149.89	6,541.35	-3,070.88	2,481.23	14,428,093.43	1,697,333.55	39.72893251	-80.79756065
9,424.00	90.20	149.54	6,540.63	-3,152.05	2,528.64	14,428,012.26	1,697,380.96	39.72870930	-80.79739270
9,519.00	90.86	150.33	6,539.75	-3,234.27	2,576.23	14,427,930.05	1,697,428.55	39.72848322	-80.79722410
9,614.00	90.11	150.51	6,538.95	-3,316.88	2,623.12	14,427,847.43	1,697,475.44	39.72825604	-80.79705798
9,709.00	89.49	150.33	6,539.28	-3,399.50	2,670.02	14,427,764.82	1,697,522.34	39.72802886	-80.79689185
9,804.00	90.73	152.18	6,539.09	-3,482.79	2,715.70	14,427,681.53	1,697,568.02	39.72779984	-80.79673004
9,899.00	90.07	151.56	6,538.43	-3,566.56	2,760.49	14,427,597.75	1,697,612.81	39.72756949	-80.79657142
9,994.00	89.32	150.77	6,538.94	-3,649.78	2,806.30	14,427,514.53	1,697,658.63	39.72734066	-80.79640914
10,090.00	90.37	150.16	6,539.20	-3,733.30	2,853.63	14,427,431.01	1,697,705.95	39.72711098	-80.79624150
10,184.00	89.45	150.86	6,539.34	-3,815.12	2,899.90	14,427,349.19	1,697,752.22	39.72688599	-80.79607759
10,279.00	90.02	150.16	6,539.78	-3,897.81	2,946.66	14,427,266.50	1,697,798.99	39.72665860	-80.79591193
10,374.00	89.49	150.07	6,540.19	-3,980.18	2,994.00	14,427,184.13	1,697,846.32	39.72643210	-80.79574425
10,469.00	90.51	149.72	6,540.19	-4,062.36	3,041.65	14,427,101.95	1,697,893.97	39.72620610	-80.79557545
10,564.00	89.63	150.42	6,540.07	-4,144.69	3,089.05	14,427,019.62	1,697,941.37	39.72597971	-80.79540754
10,659.00	90.73	149.10	6,539.78	-4,226.76	3,136.89	14,426,937.55	1,697,989.21	39.72575402	-80.79523805
10,753.00	90.07	149.19	6,539.12	-4,307.46	3,185.10	14,426,856.86	1,698,037.42	39.72553211	-80.79506725
10,848.00	89.71	148.22	6,539.30	-4,388.63	3,234.44	14,426,775.68	1,698,086.76	39.72530886	-80.79489241
10,942.00	90.33	149.37	6,539.27	-4,469.03	3,283.14	14,426,695.28	1,698,135.47	39.72508776	-80.79471986
11,037.00	90.20	148.57	6,538.83	-4,550.44	3,332.11	14,426,613.88	1,698,184.44	39.72486389	-80.79454636
11,132.00	90.20	149.10	6,538.50	-4,631.72	3,381.28	14,426,532.59	1,698,233.60	39.72464034	-80.79437217
11,226.00	90.02	150.95	6,538.32	-4,713.15	3,428.24	14,426,451.17	1,698,280.56	39.72441643	-80.79420581
11,321.00	89.85	150.86	6,538.43	-4,796.16	3,474.43	14,426,368.15	1,698,326.75	39.72418816	-80.79404220
11,415.00	89.49	151.04	6,538.97	-4,878.33	3,520.08	14,426,285.98	1,698,372.40	39.72396220	-80.79388054
11,510.00	89.05	149.01	6,540.18	-4,960.61	3,567.53	14,426,203.70	1,698,419.86	39.72373593	-80.79371244
11,605.00	90.11	148.13	6,540.87	-5,041.67	3,617.07	14,426,122.64	1,698,469.39	39.72351301	-80.79353693
11,700.00	90.42	150.16	6,540.43	-5,123.22	3,665.79	14,426,041.09	1,698,518.11	39.72328874	-80.79336433
11,794.00	89.85	150.07	6,540.21	-5,204.72	3,712.63	14,425,959.59	1,698,564.95	39.72306462	-80.79319843
11,889.00	89.49	149.54	6,540.76	-5,286.83	3,760.40	14,425,877.48	1,698,612.73	39.72283882	-80.79302918
11,983.00	90.37	150.07	6,540.87	-5,368.07	3,807.68	14,425,796.24	1,698,660.00	39.72261540	-80.79286171
12,078.00	89.63	149.80	6,540.87	-5,450.29	3,855.27	14,425,714.02	1,698,707.59	39.72238930	-80.79269313
12,173.00	90.55	150.77	6,540.73	-5,532.80	3,902.36	14,425,631.52	1,698,754.68	39.72216241	-80.79252634
12,266.00	90.20	150.24	6,540.12	-5,613.74	3,948.15	14,425,550.57	1,698,800.47	39.72193982	-80.79236417
12,361.00	89.41	151.56	6,540.44	-5,696.75	3,994.35	14,425,467.57	1,698,846.67	39.72171157	-80.79220055
12,457.00	88.84	151.56	6,541.91	-5,781.15	4,040.06	14,425,383.16	1,698,892.38	39.72147948	-80.79203867
12,552.00	89.19	150.95	6,543.54	-5,864.43	4,085.74	14,425,299.88	1,698,938.06	39.72125048	-80.79187691
12,647.00	88.48	150.68	6,545.47	-5,947.35	4,132.06	14,425,216.96	1,698,984.38	39.72102245	-80.79171288
12,742.00	89.76	150.51	6,546.93	-6,030.10	4,178.69	14,425,134.21	1,699,031.02	39.72079490	-80.79154771
12,837.00	90.24	148.93	6,546.93	-6,112.14	4,226.59	14,425,052.17	1,699,078.92	39.72056929	-80.79137804
12,932.00	89.93	148.31	6,546.79	-6,193.24	4,276.06	14,424,971.07	1,699,128.38	39.72034624	-80.79120279
13,026.00	90.29	148.40	6,546.61	-6,273.27	4,325.38	14,424,891.05	1,699,177.70	39.72012616	-80.79102807
13,120.00	89.85	149.19	6,546.49	-6,353.67	4,374.08	14,424,810.65	1,699,226.40	39.71990504	-80.79085554
13,215.00	89.36	149.63	6,547.15	-6,435.44	4,422.42	14,424,728.87	1,699,274.74	39.71968015	-80.79068430
13,310.00	90.99	151.30	6,546.86	-6,518.09	4,469.25	14,424,646.22	1,699,321.57	39.71945287	-80.79051846

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TUG HILL OPERATING

Survey Report - Geographic

Company:	Tug Hill Operating LLC	**Local Co-ordinate Reference:**	Well Weller 7 HM (D)
Project:	Marshall County, West Virginia.	**TVD Reference:**	RKB=1273+26 @ 1299.00usft (Nabors B28)
Site:	Lily/Weller	**MD Reference:**	RKB=1273+26 @ 1299.00usft (Nabors B28)
Well:	Weller 7 HM (D)	**North Reference:**	Grid
Wellbore:	Original Hole	**Survey Calculation Method:**	Minimum Curvature
Design:	Surveys Original Hole	**Database:**	DB_Jul2216dt_v14

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
13,404.00	90.33	151.30	6,545.78	-6,600.54	4,514.39	14,424,563.78	1,699,366.71	39.71922616	-80.79035862
13,499.00	89.67	150.33	6,545.78	-6,683.48	4,560.71	14,424,480.84	1,699,413.03	39.71899809	-80.79019457
13,593.00	89.14	149.28	6,546.75	-6,764.72	4,607.99	14,424,399.60	1,699,460.31	39.71877467	-80.79002713
13,689.00	89.49	148.66	6,547.90	-6,846.97	4,657.47	14,424,317.34	1,699,509.79	39.71854846	-80.78985185
13,783.00	89.93	148.84	6,548.38	-6,927.33	4,706.23	14,424,236.98	1,699,558.55	39.71832745	-80.78967910
13,877.00	90.64	149.10	6,547.91	-7,007.88	4,754.69	14,424,156.43	1,699,607.01	39.71810593	-80.78950746
13,972.00	90.42	149.10	6,547.03	-7,089.39	4,803.47	14,424,074.92	1,699,655.79	39.71788175	-80.78933466
14,067.00	89.76	149.37	6,546.88	-7,171.02	4,852.07	14,423,993.29	1,699,704.39	39.71765726	-80.78916253
14,162.00	89.41	149.28	6,547.57	-7,252.73	4,900.53	14,423,911.59	1,699,752.85	39.71743256	-80.78899087
14,225.00	89.01	149.45	6,548.44	-7,306.93	4,932.63	14,423,857.38	1,699,784.95	39.71728350	-80.78887717
Survey @ 14225.00 MD 6548.44 TVD									
14,285.00	89.01	149.45	6,549.47	-7,358.59	4,963.12	14,423,805.72	1,699,815.44	39.71714142	-80.78876917
Survey projected to 14285.00 MD 6549.47 TVD									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
153.00	153.00	0.25	-0.41	MWD surveys
14,225.00	6,548.44	-7,306.93	4,932.63	Survey @ 14225.00 MD 6548.44 TVD
14,285.00	6,549.47	-7,358.59	4,963.12	Survey projected to 14285.00 MD 6549.47 TVD