



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Weller 4HM (A)
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 4HM (A)	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 4HM (A)					
Well Position	+N/-S	0.00 usft	Northing:	14,431,189.55 usft	Latitude:	39.73745061
	+E/-W	0.00 usft	Easting:	1,694,826.67 usft	Longitude:	-80.80645320
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	1/18/2019	-8.66	66.80	51,975.99230300

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	160.23

Survey Program	Date	2/14/2019			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
153.00	13,373.00	MWD (Original Hole)	MWD	MWD - Standard	
13,423.00	13,423.00	Projection (Original Hole)	MWD	MWD - Standard	

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	14,431,189.55	1,694,826.67	39.73745061	-80.80645320
153.00	0.32	251.93	153.00	-0.13	-0.41	14,431,189.42	1,694,826.26	39.73745025	-80.80645465
MWD surveys									
183.00	0.26	290.83	183.00	-0.13	-0.55	14,431,189.42	1,694,826.12	39.73745025	-80.80645516
214.00	0.65	319.28	214.00	0.02	-0.73	14,431,189.58	1,694,825.94	39.73745068	-80.80645580
244.00	0.60	273.28	244.00	0.16	-1.00	14,431,189.72	1,694,825.67	39.73745106	-80.80645675
274.00	0.41	347.73	274.00	0.28	-1.18	14,431,189.83	1,694,825.49	39.73745138	-80.80645739
304.00	0.43	255.17	303.99	0.35	-1.31	14,431,189.91	1,694,825.36	39.73745159	-80.80645785
335.00	0.38	329.87	334.99	0.41	-1.47	14,431,189.97	1,694,825.20	39.73745175	-80.80645844
365.00	0.21	272.90	364.99	0.50	-1.58	14,431,190.05	1,694,825.09	39.73745199	-80.80645881
396.00	0.32	80.65	395.99	0.52	-1.55	14,431,190.07	1,694,825.12	39.73745204	-80.80645871



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Site:	Lily/Weller	MD Reference:	RKB=1273+26 @ 1299.00usft (Nabors B28)
Well:	Weller 4HM (A)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
426.00	0.64	35.12	425.99	0.67	-1.37	14,431,190.22	1,694,825.30	39.73745245	-80.80645807
456.00	0.36	291.57	455.99	0.84	-1.36	14,431,190.39	1,694,825.31	39.73745292	-80.80645804
487.00	0.41	0.99	486.99	0.99	-1.45	14,431,190.54	1,694,825.22	39.73745333	-80.80645835
517.00	0.42	72.52	516.99	1.13	-1.34	14,431,190.68	1,694,825.32	39.73745371	-80.80645797
546.00	0.18	86.65	545.99	1.16	-1.20	14,431,190.72	1,694,825.47	39.73745381	-80.80645745
577.00	0.52	319.09	576.99	1.27	-1.24	14,431,190.82	1,694,825.43	39.73745411	-80.80645760
607.00	0.46	353.70	606.99	1.49	-1.34	14,431,191.05	1,694,825.33	39.73745472	-80.80645796
637.00	0.64	345.80	636.99	1.77	-1.40	14,431,191.33	1,694,825.27	39.73745549	-80.80645816
668.00	0.30	318.42	667.99	2.00	-1.49	14,431,191.56	1,694,825.18	39.73745612	-80.80645850
698.00	0.30	332.83	697.99	2.13	-1.58	14,431,191.69	1,694,825.09	39.73745648	-80.80645881
729.00	0.19	210.62	728.99	2.16	-1.64	14,431,191.71	1,694,825.02	39.73745655	-80.80645903
761.00	0.34	77.15	760.99	2.14	-1.58	14,431,191.69	1,694,825.09	39.73745648	-80.80645880
793.00	0.37	287.41	792.99	2.19	-1.58	14,431,191.74	1,694,825.08	39.73745663	-80.80645882
824.00	0.10	168.52	823.99	2.19	-1.67	14,431,191.75	1,694,824.99	39.73745664	-80.80645914
856.00	0.33	345.98	855.99	2.25	-1.69	14,431,191.81	1,694,824.98	39.73745681	-80.80645920
888.00	0.30	106.35	887.99	2.32	-1.63	14,431,191.87	1,694,825.03	39.73745699	-80.80645899
919.00	0.10	195.11	918.98	2.27	-1.56	14,431,191.82	1,694,825.11	39.73745685	-80.80645874
951.00	0.54	125.06	950.98	2.16	-1.45	14,431,191.71	1,694,825.22	39.73745654	-80.80645833
1,079.00	0.73	131.99	1,078.98	1.26	-0.35	14,431,190.82	1,694,826.32	39.73745409	-80.80645442
1,173.00	0.49	143.50	1,172.97	0.54	0.34	14,431,190.09	1,694,827.01	39.73745209	-80.80645200
1,269.00	0.89	196.58	1,268.96	-0.50	0.37	14,431,189.05	1,694,827.04	39.73744922	-80.80645189
1,364.00	2.49	213.92	1,363.92	-2.92	-0.99	14,431,186.63	1,694,825.67	39.73744259	-80.80645676
1,459.00	4.16	238.25	1,458.76	-6.45	-5.08	14,431,183.10	1,694,821.59	39.73743293	-80.80647131
1,552.00	5.88	228.49	1,551.40	-11.38	-11.51	14,431,178.17	1,694,815.16	39.73741942	-80.80649424
1,647.00	7.83	216.67	1,645.72	-19.80	-19.02	14,431,169.76	1,694,807.65	39.73739635	-80.80652102
1,742.00	10.75	211.33	1,739.47	-32.56	-27.49	14,431,156.99	1,694,799.17	39.73736135	-80.80655126
1,837.00	14.28	207.29	1,832.20	-50.55	-37.48	14,431,139.01	1,694,789.19	39.73731202	-80.80658690
1,932.00	16.79	202.70	1,923.73	-73.62	-48.15	14,431,115.93	1,694,778.52	39.73724871	-80.80662503
2,026.00	19.89	198.30	2,012.94	-101.34	-58.41	14,431,088.22	1,694,768.26	39.73717266	-80.80666175
2,121.00	21.43	192.35	2,101.84	-133.64	-67.20	14,431,055.92	1,694,759.47	39.73708400	-80.80669326
2,215.00	22.03	185.23	2,189.18	-167.98	-72.48	14,431,021.58	1,694,754.19	39.73698973	-80.80671230
2,310.00	23.92	180.77	2,276.64	-204.98	-74.36	14,430,984.57	1,694,752.31	39.73688811	-80.80671929
2,405.00	24.05	175.88	2,363.45	-243.55	-73.23	14,430,946.00	1,694,753.44	39.73678218	-80.80671556
2,499.00	25.66	176.80	2,448.74	-282.98	-70.72	14,430,906.58	1,694,755.95	39.73667388	-80.80670692
2,593.00	30.77	175.49	2,531.54	-327.30	-67.69	14,430,862.25	1,694,758.98	39.73655215	-80.80669649
2,676.00	34.26	173.32	2,601.53	-371.68	-63.30	14,430,817.87	1,694,763.37	39.73643023	-80.80668122
2,776.00	36.52	169.46	2,683.05	-428.91	-54.58	14,430,760.65	1,694,772.09	39.73627302	-80.80665064
2,870.00	38.68	174.88	2,757.55	-485.69	-46.84	14,430,703.87	1,694,779.83	39.73611705	-80.80662354
2,965.00	40.91	176.18	2,830.53	-546.30	-42.12	14,430,643.26	1,694,784.55	39.73595056	-80.80660721
3,062.00	42.93	173.81	2,902.71	-610.84	-36.44	14,430,578.71	1,694,790.23	39.73579327	-80.80658750
3,157.00	41.54	173.19	2,973.05	-674.29	-29.21	14,430,515.27	1,694,797.45	39.73559899	-80.80656230
3,252.00	42.42	172.75	3,043.67	-737.35	-21.43	14,430,452.20	1,694,805.23	39.73542575	-80.80653511
3,347.00	42.81	171.86	3,113.58	-801.09	-12.82	14,430,388.46	1,694,813.85	39.73525065	-80.80650496
3,442.00	41.63	171.83	3,183.93	-864.28	-3.77	14,430,325.27	1,694,822.90	39.73507705	-80.80647323
3,537.00	40.84	174.16	3,255.38	-926.42	3.88	14,430,263.13	1,694,830.55	39.73490635	-80.80644652
3,632.00	41.59	177.16	3,326.85	-988.82	8.60	14,430,200.73	1,694,835.27	39.73473495	-80.80643019
3,727.00	42.78	175.97	3,397.24	-1,052.50	12.43	14,430,137.06	1,694,839.10	39.73456006	-80.80641706
3,822.00	43.38	174.89	3,466.63	-1,117.18	17.61	14,430,072.38	1,694,844.27	39.73438240	-80.80639916
3,917.00	43.48	173.74	3,535.62	-1,182.16	24.08	14,430,007.39	1,694,850.74	39.73420389	-80.80637664
4,012.00	43.99	172.06	3,604.26	-1,247.33	32.20	14,429,942.22	1,694,858.87	39.73402487	-80.80634825
4,107.00	43.51	173.47	3,672.89	-1,312.50	40.47	14,429,877.06	1,694,867.14	39.73384586	-80.80631932
4,202.00	43.13	171.53	3,742.01	-1,377.11	48.98	14,429,812.44	1,694,875.64	39.73366836	-80.80628957
4,297.00	41.59	173.63	3,812.21	-1,440.57	57.26	14,429,748.98	1,694,883.93	39.73349402	-80.80626060
4,391.00	42.10	173.43	3,882.23	-1,502.88	64.33	14,429,686.67	1,694,890.99	39.73332286	-80.80623594
4,486.00	40.68	171.33	3,953.51	-1,565.13	72.64	14,429,624.42	1,694,899.31	39.73315185	-80.80620685

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WV Department of
Environmental Protection



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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
4,581.00	39.59	170.29	4,026.14	-1,625.58	82.41	14,429,563.97	1,694,909.08	39.73298579	-80.80617256
4,675.00	42.51	170.99	4,097.02	-1,686.48	92.44	14,429,503.07	1,694,919.11	39.73281847	-80.80613736
4,770.00	43.71	170.94	4,166.37	-1,750.60	102.63	14,429,438.95	1,694,929.30	39.73264232	-80.80610158
4,865.00	43.50	170.99	4,235.16	-1,815.31	112.92	14,429,374.25	1,694,939.59	39.73246456	-80.80606548
4,959.00	43.12	171.96	4,303.56	-1,879.07	122.48	14,429,310.48	1,694,949.15	39.73228938	-80.80603197
5,054.00	43.55	173.66	4,372.66	-1,943.75	130.64	14,429,245.80	1,694,957.31	39.73211171	-80.80600346
5,148.00	43.21	173.97	4,440.98	-2,007.94	137.60	14,429,181.62	1,694,964.26	39.73193539	-80.80597921
5,243.00	41.63	175.74	4,511.11	-2,071.75	143.36	14,429,117.80	1,694,970.02	39.73176010	-80.80595921
5,338.00	42.18	174.61	4,581.82	-2,134.98	148.70	14,429,054.58	1,694,975.36	39.73158644	-80.80594071
5,433.00	42.87	174.68	4,651.83	-2,198.91	154.69	14,428,990.65	1,694,981.36	39.73141083	-80.80591988
5,527.00	42.36	175.96	4,721.01	-2,262.34	159.88	14,428,927.22	1,694,986.55	39.73123660	-80.80590189
5,622.00	40.42	171.98	4,792.29	-2,324.77	166.44	14,428,864.78	1,694,993.11	39.73106509	-80.80587906
5,716.00	40.72	171.11	4,863.69	-2,385.24	175.43	14,428,804.31	1,695,002.10	39.73089896	-80.80584755
5,811.00	41.21	174.82	4,935.44	-2,447.03	183.04	14,428,742.52	1,695,009.71	39.73072922	-80.80582094
5,906.00	41.14	174.97	5,006.95	-2,509.33	188.61	14,428,680.22	1,695,015.28	39.73055811	-80.80580163
5,999.00	41.88	176.37	5,076.59	-2,570.79	193.26	14,428,618.77	1,695,019.92	39.73038930	-80.80578557
6,094.00	41.77	174.23	5,147.39	-2,633.92	198.45	14,428,555.64	1,695,025.11	39.73021589	-80.80576760
6,190.00	40.76	173.49	5,219.55	-2,696.87	205.21	14,428,492.68	1,695,031.88	39.73004297	-80.80574401
6,285.00	41.28	173.07	5,291.22	-2,758.79	212.51	14,428,430.76	1,695,039.18	39.72987287	-80.80571853
6,380.00	40.64	172.15	5,362.96	-2,820.55	220.52	14,428,369.01	1,695,047.19	39.72970322	-80.80569053
6,475.00	40.50	173.93	5,435.13	-2,881.87	228.01	14,428,307.68	1,695,054.67	39.72953476	-80.80566437
6,570.00	41.46	173.97	5,506.85	-2,943.83	234.57	14,428,245.73	1,695,061.24	39.72936457	-80.80564150
6,665.00	40.71	172.92	5,578.45	-3,005.85	241.69	14,428,183.71	1,695,068.36	39.72919420	-80.80561664
6,759.00	40.45	173.76	5,649.85	-3,066.58	248.79	14,428,122.97	1,695,075.45	39.72902737	-80.80559188
6,853.00	40.50	176.01	5,721.35	-3,127.35	254.23	14,428,062.21	1,695,080.89	39.72886045	-80.80557301
6,948.00	41.60	175.06	5,793.00	-3,189.54	259.09	14,428,000.01	1,695,085.76	39.72868961	-80.80555619
7,043.00	44.87	173.01	5,862.20	-3,254.25	265.88	14,427,935.31	1,695,092.55	39.72851188	-80.80553252
7,137.00	44.72	173.98	5,928.91	-3,320.05	273.39	14,427,869.51	1,695,100.06	39.72833112	-80.80550634
7,232.00	43.02	172.94	5,997.39	-3,385.45	280.88	14,427,804.10	1,695,107.54	39.72815146	-80.80548021
7,326.00	42.02	172.84	6,066.68	-3,448.49	288.74	14,427,741.06	1,695,115.41	39.72797828	-80.80545273
7,422.00	39.16	174.53	6,139.57	-3,510.56	295.63	14,427,678.99	1,695,122.30	39.72780778	-80.80542868
7,512.00	39.65	173.06	6,209.11	-3,567.36	301.81	14,427,622.20	1,695,128.48	39.72765177	-80.80540715
7,585.00	39.60	171.22	6,265.34	-3,613.47	308.18	14,427,576.08	1,695,134.85	39.72752509	-80.80538486
7,633.00	43.30	170.52	6,301.31	-3,644.83	313.23	14,427,544.72	1,695,139.90	39.72743892	-80.80536715
7,680.00	48.22	168.85	6,334.10	-3,677.95	319.27	14,427,511.61	1,695,145.94	39.72734795	-80.80534590
7,727.00	52.13	168.23	6,364.19	-3,713.31	326.45	14,427,476.24	1,695,153.12	39.72725078	-80.80532065
7,774.00	56.44	168.23	6,391.62	-3,750.66	334.23	14,427,438.89	1,695,160.90	39.72714816	-80.80529326
7,822.00	60.04	166.12	6,416.88	-3,790.45	343.30	14,427,399.11	1,695,169.97	39.72703885	-80.80526130
7,869.00	65.10	163.49	6,438.53	-3,830.68	354.25	14,427,358.88	1,695,180.92	39.72692829	-80.80522267
7,915.00	69.93	162.26	6,456.12	-3,871.28	366.77	14,427,318.27	1,695,193.44	39.72681671	-80.80517846
7,962.00	71.52	161.55	6,471.63	-3,913.45	380.55	14,427,276.10	1,695,207.22	39.72670082	-80.80512977
7,992.00	72.44	160.59	6,480.91	-3,940.44	389.81	14,427,249.12	1,695,216.48	39.72662665	-80.80509706
8,010.00	73.49	160.50	6,486.19	-3,956.66	395.54	14,427,232.89	1,695,222.21	39.72658205	-80.80507680
8,044.00	77.41	159.71	6,494.73	-3,987.60	406.74	14,427,201.95	1,695,233.41	39.72649702	-80.80503721
8,073.00	80.92	157.07	6,500.18	-4,014.07	417.23	14,427,175.48	1,695,243.90	39.72642425	-80.80500010
8,088.00	82.95	155.40	6,502.28	-4,027.67	423.21	14,427,161.89	1,695,249.88	39.72638689	-80.80497892
8,104.00	84.66	153.55	6,504.01	-4,042.02	430.07	14,427,147.54	1,695,256.74	39.72634744	-80.80495466
8,199.00	87.60	148.98	6,510.42	-4,125.10	475.63	14,427,064.46	1,695,302.29	39.72611901	-80.80479327
8,293.00	88.70	145.29	6,513.46	-4,203.99	526.60	14,426,985.56	1,695,353.27	39.72590202	-80.80461259
8,387.00	91.87	145.20	6,512.99	-4,281.21	580.18	14,426,908.34	1,695,406.85	39.72568964	-80.80442263
8,482.00	93.85	146.35	6,508.25	-4,359.66	633.54	14,426,829.90	1,695,460.21	39.72547388	-80.80423345
8,575.00	92.13	150.30	6,503.40	-4,438.68	682.30	14,426,750.87	1,695,508.96	39.72525657	-80.80406067
8,670.00	87.38	147.67	6,503.81	-4,520.07	731.23	14,426,669.49	1,695,557.90	39.72503276	-80.80388728
8,764.00	88.88	147.75	6,506.87	-4,599.49	781.41	14,426,590.07	1,695,608.08	39.72481435	-80.80370940
8,859.00	90.02	151.01	6,507.79	-4,681.22	829.79	14,426,508.33	1,695,656.46	39.72458958	-80.80353799



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Weller 4HM (A)
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 4HM (A)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
8,954.00	88.88	154.26	6,508.70	-4,765.58	873.45	14,426,423.98	1,695,700.12	39.72435766	-80.80338337
9,048.00	85.93	155.75	6,512.95	-4,850.67	913.12	14,426,338.88	1,695,739.79	39.72412372	-80.80324293
9,142.00	84.00	153.82	6,521.20	-4,935.38	953.01	14,426,254.17	1,695,779.68	39.72389085	-80.80310174
9,237.00	87.56	152.24	6,528.19	-5,019.80	995.97	14,426,169.75	1,695,822.64	39.72365874	-80.80294961
9,332.00	89.05	148.37	6,531.00	-5,102.27	1,043.00	14,426,087.28	1,695,869.67	39.72343197	-80.80278299
9,427.00	91.91	146.96	6,530.21	-5,182.53	1,093.81	14,426,007.03	1,695,920.48	39.72321126	-80.80260294
9,521.00	89.58	144.24	6,528.99	-5,260.07	1,146.90	14,425,929.49	1,695,973.57	39.72299798	-80.80241472
9,616.00	90.99	146.26	6,528.51	-5,338.12	1,201.05	14,425,851.44	1,696,027.71	39.72278331	-80.80222277
9,712.00	88.57	145.82	6,528.88	-5,417.74	1,254.67	14,425,771.82	1,696,081.34	39.72256433	-80.80203269
9,807.00	91.65	150.04	6,528.70	-5,498.21	1,305.09	14,425,691.34	1,696,131.76	39.72234301	-80.80185400
9,901.00	92.22	151.80	6,525.53	-5,580.31	1,350.75	14,425,609.24	1,696,177.42	39.72211726	-80.80169226
9,997.00	91.74	151.88	6,522.21	-5,664.90	1,396.03	14,425,524.66	1,696,222.70	39.72188469	-80.80153190
10,092.00	91.12	150.74	6,519.84	-5,748.21	1,441.62	14,425,441.35	1,696,268.29	39.72165562	-80.80137041
10,187.00	90.07	151.09	6,518.85	-5,831.22	1,487.80	14,425,358.33	1,696,314.47	39.72142735	-80.80120685
10,282.00	89.41	151.18	6,519.28	-5,914.42	1,533.66	14,425,275.14	1,696,360.33	39.72119859	-80.80104441
10,376.00	89.27	150.39	6,520.37	-5,996.45	1,579.54	14,425,193.10	1,696,406.20	39.72097302	-80.80088190
10,472.00	88.88	151.09	6,521.92	-6,080.19	1,626.45	14,425,109.36	1,696,453.12	39.72074275	-80.80071572
10,567.00	90.07	152.32	6,522.79	-6,163.84	1,671.48	14,425,025.72	1,696,498.15	39.72051277	-80.80055625
10,661.00	88.92	151.88	6,523.61	-6,246.91	1,715.46	14,424,942.65	1,696,542.13	39.72028437	-80.80040049
10,756.00	88.22	150.65	6,525.99	-6,330.18	1,761.12	14,424,859.38	1,696,587.79	39.72005539	-80.80023878
10,850.00	89.10	150.48	6,528.18	-6,412.02	1,807.30	14,424,777.53	1,696,633.97	39.71983035	-80.80007519
10,945.00	89.32	148.72	6,529.49	-6,493.95	1,855.37	14,424,695.61	1,696,682.04	39.71960505	-80.79990490
11,040.00	90.73	148.90	6,529.45	-6,575.21	1,904.56	14,424,614.34	1,696,731.23	39.71938157	-80.79973059
11,135.00	90.29	148.37	6,528.61	-6,656.33	1,954.01	14,424,533.23	1,696,780.68	39.71915850	-80.79955540
11,228.00	91.69	148.63	6,527.00	-6,735.61	2,002.59	14,424,453.94	1,696,829.26	39.71894047	-80.79938326
11,323.00	90.86	148.98	6,524.89	-6,816.85	2,051.78	14,424,372.70	1,696,878.45	39.71871705	-80.79920896
11,418.00	89.19	149.51	6,524.84	-6,898.49	2,100.36	14,424,291.07	1,696,927.03	39.71849255	-80.79903686
11,513.00	88.26	150.57	6,526.96	-6,980.77	2,147.79	14,424,208.78	1,696,974.46	39.71826629	-80.79886885
11,607.00	89.01	150.21	6,529.20	-7,062.47	2,194.22	14,424,127.08	1,697,020.89	39.71804163	-80.79870438
11,702.00	87.16	151.18	6,532.37	-7,145.26	2,240.69	14,424,044.29	1,697,067.36	39.71781397	-80.79853979
11,796.00	88.31	150.65	6,536.09	-7,227.34	2,286.35	14,423,962.21	1,697,113.02	39.71758827	-80.79837808
11,891.00	90.20	151.36	6,537.32	-7,310.43	2,332.40	14,423,879.13	1,697,159.06	39.71735982	-80.79821501
11,986.00	90.29	150.21	6,536.92	-7,393.34	2,378.76	14,423,796.21	1,697,205.43	39.71713182	-80.79805078
12,081.00	91.69	150.13	6,535.27	-7,475.74	2,426.01	14,423,713.82	1,697,252.68	39.71690524	-80.79788342
12,175.00	90.15	149.51	6,533.77	-7,556.98	2,473.26	14,423,632.57	1,697,299.93	39.71668182	-80.79771606
12,269.00	88.79	150.39	6,534.63	-7,638.34	2,520.33	14,423,551.21	1,697,346.99	39.71645809	-80.79754933
12,364.00	88.79	151.44	6,536.64	-7,721.34	2,566.49	14,423,468.21	1,697,393.16	39.71622986	-80.79738582
12,459.00	88.44	150.48	6,538.94	-7,804.37	2,612.60	14,423,385.18	1,697,439.26	39.71600154	-80.79722255
12,554.00	88.53	149.60	6,541.45	-7,886.65	2,660.02	14,423,302.90	1,697,486.69	39.71577529	-80.79705456
12,649.00	88.70	149.77	6,543.74	-7,968.64	2,707.96	14,423,220.92	1,697,534.63	39.71554984	-80.79688475
12,744.00	88.22	147.75	6,546.30	-8,049.83	2,757.21	14,423,139.73	1,697,583.88	39.71532655	-80.79671028
12,839.00	89.27	147.40	6,548.38	-8,130.00	2,808.13	14,423,059.56	1,697,634.80	39.71510607	-80.79652983
12,934.00	90.33	148.46	6,548.71	-8,210.50	2,858.57	14,422,979.06	1,697,685.24	39.71488468	-80.79635112
13,028.00	90.07	149.51	6,548.38	-8,291.06	2,907.01	14,422,898.50	1,697,733.67	39.71466313	-80.79617954
13,122.00	89.54	149.34	6,548.70	-8,371.99	2,954.82	14,422,817.57	1,697,781.49	39.71444058	-80.79601017
13,218.00	89.05	149.95	6,549.88	-8,454.82	3,003.33	14,422,734.74	1,697,830.00	39.71421279	-80.79583834
13,312.00	88.62	150.21	6,551.79	-8,536.27	3,050.21	14,422,653.28	1,697,876.87	39.71398879	-80.79567231
13,373.00	87.60	150.92	6,553.81	-8,589.37	3,080.17	14,422,600.19	1,697,906.83	39.71384279	-80.79556620
Survey @ 13373.00 MD 6553.81 TVD									
13,423.00	87.60	150.92	6,555.90	-8,633.03	3,104.45	14,422,556.53	1,697,931.11	39.71372274	-80.79548021
Survey projected to 13423.00 MD 6555.90 TVD									



Survey Report - Geographic



Company: Tug Hill Operating LLC
Project: Marshall County, West Virginia
Site: Lily/Weller
Well: Weller 4HM (A)
Wellbore: Original Hole
Design: Surveys Original Hole

Local Co-ordinate Reference: Well Weller 4HM (A)
TVD Reference: RKB=1273+26 @ 1299.00usft (Nabors B28)
MD Reference: RKB=1273+26 @ 1299.00usft (Nabors B28)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: DB_Jul2216dt_v14

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
153.00	153.00	-0.13	-0.41	MWD surveys
13,373.00	6,553.81	-8,589.37	3,080.17	Survey @ 13373.00 MD 6553.81 TVD
13,423.00	6,555.90	-8,633.03	3,104.45	Survey projected to 13423.00 MD 6555.90 TVD