



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Corley N-09HU (slot K)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=1254+27 @ 1281.00usft (Precision 110)
Site:	Corley Pad	MD Reference:	RKB=1254+27 @ 1281.00usft (Precision 110)
Well:	Corley N-09HU (slot K)	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	Corley Pad				
Site Position:		Northing:	14,436,832.02 usft	Latitude:	39.75286638
From:	Lat/Long	Easting:	1,706,973.98 usft	Longitude:	-80.76319015
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.15 °

Well	Corley N-09HU (slot K)					
Well Position	+N/-S	0.00 usft	Northing:	14,436,848.72 usft	Latitude:	39.75291217
	+E/-W	0.00 usft	Easting:	1,706,982.22 usft	Longitude:	-80.76316070
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	1,254.00 usft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	9/6/2017	-8.65	66.92	52,137.26249489

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	327.05	

Survey Program	Date	11/2/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
282.00	2,786.00	MWD surf (Original Hole)	MWD	MWD - Standard	
2,877.00	10,136.00	MWD int (Original Hole)	MWD	MWD - Standard	
10,226.00	20,231.00	MWD (Original Hole)	MWD	MWD - Standard	
20,287.00	20,287.00	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	14,436,848.72	1,706,982.22	39.75291217	-80.76316070	
282.00	1.00	184.70	281.99	-2.45	-0.20	14,436,846.26	1,706,982.01	39.75290544	-80.76316144	
MWD surveys										
344.00	0.81	167.37	343.98	-3.42	-0.15	14,436,845.30	1,706,982.07	39.75290278	-80.76316127	
437.00	0.80	182.10	436.97	-4.71	-0.03	14,436,844.01	1,706,982.19	39.75289924	-80.76316085	
531.00	0.55	178.23	530.96	-5.82	-0.04	14,436,842.90	1,706,982.18	39.75289620	-80.76316090	
625.00	0.67	158.71	624.96	-6.78	0.17	14,436,841.94	1,706,982.39	39.75289355	-80.76316015	
718.00	0.65	155.10	717.95	-7.76	0.59	14,436,840.95	1,706,982.81	39.75289084	-80.76315867	
814.00	0.62	153.35	813.95	-8.72	1.05	14,436,839.99	1,706,983.27	39.75288821	-80.76315703	



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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		
907.00	0.75	141.24	906.94	-9.65	1.66	14,436,839.07	1,706,983.88	39.75288567	-80.76315488		
983.00	1.12	160.13	982.93	-10.73	2.23	14,436,837.98	1,706,984.44	39.75288268	-80.76315288		
1,083.00	0.86	182.21	1,082.91	-12.40	2.53	14,436,836.31	1,706,984.75	39.75287809	-80.76315182		
1,173.00	0.34	342.03	1,172.91	-12.82	2.42	14,436,835.89	1,706,984.64	39.75287694	-80.76315221		
1,262.00	2.28	4.91	1,261.88	-10.81	2.49	14,436,837.91	1,706,984.71	39.75288247	-80.76315194		
1,352.00	4.30	329.21	1,351.74	-6.13	0.92	14,436,842.59	1,706,983.13	39.75289534	-80.76315750		
1,442.00	5.22	311.05	1,441.43	-0.54	-3.90	14,436,848.18	1,706,978.32	39.75291072	-80.76317458		
1,531.00	6.36	280.14	1,530.00	2.99	-11.81	14,436,851.71	1,706,970.41	39.75292047	-80.76320268		
1,621.00	7.75	242.40	1,619.36	1.06	-22.10	14,436,849.77	1,706,960.12	39.75291523	-80.76323931		
1,711.00	4.53	221.45	1,708.84	-4.42	-29.83	14,436,844.29	1,706,952.39	39.75290024	-80.76326688		
1,800.00	2.88	177.63	1,797.67	-9.29	-32.07	14,436,839.42	1,706,950.15	39.75288689	-80.76327488		
1,890.00	4.98	212.75	1,887.47	-14.84	-34.09	14,436,833.88	1,706,948.13	39.75287167	-80.76328212		
1,980.00	8.69	237.59	1,976.83	-21.77	-41.94	14,436,826.94	1,706,940.27	39.75285269	-80.76331014		
2,069.00	8.85	230.23	2,064.79	-29.75	-52.88	14,436,818.96	1,706,929.33	39.75283084	-80.76334913		
2,159.00	8.18	198.73	2,153.85	-40.25	-60.26	14,436,808.46	1,706,921.95	39.75280206	-80.76337549		
2,249.00	6.33	174.52	2,243.14	-51.26	-61.85	14,436,797.46	1,706,920.37	39.75277185	-80.76338123		
2,338.00	5.84	132.10	2,331.68	-59.18	-58.02	14,436,789.53	1,706,924.20	39.75275006	-80.76336767		
2,428.00	7.19	123.41	2,421.10	-65.35	-49.92	14,436,783.36	1,706,932.30	39.75273305	-80.76333892		
2,517.00	6.50	127.48	2,509.47	-71.49	-41.27	14,436,777.23	1,706,940.95	39.75271615	-80.76330821		
2,607.00	5.40	125.71	2,598.98	-77.06	-33.79	14,436,771.66	1,706,948.43	39.75270080	-80.76328164		
2,697.00	6.45	118.29	2,688.50	-81.93	-25.90	14,436,766.79	1,706,956.32	39.75268737	-80.76325361		
2,786.00	8.32	118.23	2,776.76	-87.34	-15.82	14,436,761.37	1,706,966.39	39.75267242	-80.76321781		
2,877.00	9.71	118.84	2,866.63	-94.16	-3.30	14,436,754.56	1,706,978.92	39.75265361	-80.76317332		
2,966.00	8.32	137.37	2,954.55	-102.52	7.64	14,436,746.20	1,706,989.86	39.75263057	-80.76313448		
3,056.00	6.25	155.17	3,043.83	-111.76	14.11	14,436,736.96	1,706,996.33	39.75260515	-80.76311155		
3,145.00	4.24	175.83	3,132.46	-119.44	16.38	14,436,729.28	1,706,998.60	39.75258405	-80.76310353		
3,235.00	3.15	196.67	3,222.28	-125.12	15.92	14,436,723.59	1,706,998.13	39.75256843	-80.76310525		
3,325.00	3.35	204.14	3,312.13	-129.89	14.13	14,436,718.82	1,706,996.35	39.75255535	-80.76311164		
3,414.00	4.02	198.48	3,400.95	-135.22	12.08	14,436,713.49	1,706,994.30	39.75254072	-80.76311900		
3,504.00	4.44	194.03	3,490.70	-141.60	10.23	14,436,707.12	1,706,992.45	39.75252324	-80.76312562		
3,594.00	4.79	193.99	3,580.41	-148.62	8.48	14,436,700.09	1,706,990.70	39.75250395	-80.76313192		
3,684.00	5.14	191.65	3,670.07	-156.22	6.76	14,436,692.50	1,706,988.98	39.75248311	-80.76313812		
3,773.00	5.03	190.75	3,758.72	-163.95	5.23	14,436,684.76	1,706,987.44	39.75246187	-80.76314365		
3,863.00	5.20	191.74	3,848.36	-171.82	3.66	14,436,676.89	1,706,985.88	39.75244027	-80.76314929		
3,953.00	6.11	180.80	3,937.93	-180.61	2.76	14,436,668.11	1,706,984.98	39.75241615	-80.76315257		
4,042.00	6.89	178.85	4,026.36	-190.68	2.80	14,436,658.04	1,706,985.02	39.75238849	-80.76315252		
4,132.00	7.40	179.77	4,115.66	-201.87	2.94	14,436,646.84	1,706,985.15	39.75235775	-80.76315215		
4,222.00	8.33	178.69	4,204.81	-214.19	3.11	14,436,634.53	1,706,985.32	39.75232393	-80.76315166		
4,312.00	8.18	176.27	4,293.88	-227.09	3.67	14,436,621.62	1,706,985.89	39.75228848	-80.76314976		
4,401.00	7.12	171.22	4,382.08	-238.86	4.93	14,436,609.85	1,706,987.14	39.75225615	-80.76314541		
4,491.00	5.55	164.19	4,471.53	-248.56	6.97	14,436,600.15	1,706,989.18	39.75222949	-80.76313826		
4,581.00	5.36	164.57	4,561.13	-256.80	9.27	14,436,591.91	1,706,991.49	39.75220685	-80.76313014		
4,670.00	5.06	173.42	4,649.76	-264.71	10.83	14,436,584.01	1,706,993.04	39.75218512	-80.76312468		
4,760.00	4.47	179.65	4,739.45	-272.16	11.30	14,436,576.56	1,706,993.52	39.75216466	-80.76312305		
4,850.00	4.63	189.51	4,829.17	-279.25	10.72	14,436,569.47	1,706,992.94	39.75214520	-80.76312518		
4,939.00	5.61	181.08	4,917.81	-287.14	10.05	14,436,561.57	1,706,992.26	39.75212353	-80.76312765		
5,029.00	5.40	176.13	5,007.40	-295.77	10.25	14,436,552.95	1,706,992.47	39.75209984	-80.76312701		
5,119.00	4.19	164.09	5,097.08	-303.15	11.44	14,436,545.56	1,706,993.65	39.75207954	-80.76312286		
5,209.00	4.28	164.97	5,186.84	-309.56	13.21	14,436,539.16	1,706,995.43	39.75206194	-80.76311661		
5,298.00	4.20	163.90	5,275.59	-315.90	14.97	14,436,532.82	1,706,997.19	39.75204452	-80.76311039		
5,388.00	4.15	160.88	5,365.35	-322.14	16.96	14,436,526.58	1,706,999.17	39.75202736	-80.76310341		
5,478.00	4.22	168.06	5,455.11	-328.46	18.71	14,436,520.26	1,707,000.92	39.75201000	-80.76309723		
5,568.00	4.31	170.06	5,544.87	-335.03	19.98	14,436,513.69	1,707,002.19	39.75199194	-80.76309278		
5,657.00	5.48	174.85	5,633.54	-342.55	20.93	14,436,506.16	1,707,003.15	39.75197127	-80.76308944		
5,747.00	5.62	176.08	5,723.12	-351.23	21.62	14,436,497.48	1,707,003.84	39.75194743	-80.76308708		



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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
5,837.00	4.79	169.34	5,812.75	-359.32	22.62	14,436,489.39	1,707,004.83	39.75192521	-80.76308361
5,926.00	5.08	167.58	5,901.42	-366.82	24.15	14,436,481.89	1,707,006.37	39.75190460	-80.76307822
6,016.00	5.10	170.03	5,991.06	-374.65	25.70	14,436,474.06	1,707,007.92	39.75188308	-80.76307278
6,106.00	3.39	163.26	6,080.81	-381.14	27.16	14,436,467.57	1,707,009.38	39.75186525	-80.76306765
6,195.00	3.22	168.42	6,169.66	-386.11	28.42	14,436,462.61	1,707,010.64	39.75185160	-80.76306321
6,285.00	3.79	164.21	6,259.50	-391.45	29.74	14,436,457.27	1,707,011.95	39.75183693	-80.76305858
6,375.00	4.75	158.74	6,349.25	-397.78	31.90	14,436,450.93	1,707,014.11	39.75181951	-80.76305095
6,465.00	5.69	159.06	6,438.87	-405.42	34.84	14,436,443.29	1,707,017.06	39.75179851	-80.76304054
6,554.00	4.48	157.30	6,527.52	-412.75	37.76	14,436,435.97	1,707,019.98	39.75177837	-80.76303023
6,641.00	4.25	161.83	6,614.27	-418.95	40.08	14,436,429.77	1,707,022.30	39.75176133	-80.76302204
6,731.00	5.02	165.52	6,703.97	-425.93	42.10	14,436,422.79	1,707,024.32	39.75174214	-80.76301491
6,820.00	5.96	164.08	6,792.56	-434.14	44.34	14,436,414.57	1,707,026.56	39.75171957	-80.76300701
6,910.00	5.80	163.90	6,882.09	-443.01	46.89	14,436,405.71	1,707,029.10	39.75169521	-80.76299805
6,999.00	5.42	167.68	6,970.66	-451.43	49.03	14,436,397.28	1,707,031.25	39.75167205	-80.76299050
7,089.00	5.42	172.97	7,060.26	-459.80	50.46	14,436,388.91	1,707,032.68	39.75164905	-80.76298550
7,179.00	6.09	173.54	7,149.81	-468.77	51.52	14,436,379.95	1,707,033.73	39.75162443	-80.76298182
7,268.00	5.82	175.01	7,238.33	-477.95	52.44	14,436,370.76	1,707,034.66	39.75159919	-80.76297862
7,358.00	4.86	174.90	7,327.94	-486.30	53.18	14,436,362.42	1,707,035.39	39.75157628	-80.76297608
7,447.00	4.98	168.75	7,416.61	-493.84	54.26	14,436,354.88	1,707,036.48	39.75155555	-80.76297228
7,537.00	5.93	165.02	7,506.20	-502.16	56.23	14,436,346.55	1,707,038.44	39.75153268	-80.76296537
7,716.00	5.30	172.54	7,684.34	-519.29	59.69	14,436,329.42	1,707,041.91	39.75148561	-80.76295321
7,806.00	6.01	172.13	7,773.90	-528.08	60.88	14,436,320.63	1,707,043.09	39.75146147	-80.76294908
7,896.00	5.87	174.85	7,863.42	-537.33	61.93	14,436,311.38	1,707,044.15	39.75143605	-80.76294540
7,986.00	4.81	177.81	7,953.03	-545.69	62.49	14,436,303.03	1,707,044.71	39.75141310	-80.76294349
8,075.00	4.74	182.08	8,041.72	-553.09	62.50	14,436,295.63	1,707,044.72	39.75139277	-80.76294353
8,164.00	5.13	184.39	8,130.39	-560.73	62.06	14,436,287.98	1,707,044.28	39.75137179	-80.76294516
8,254.00	5.19	186.57	8,220.03	-568.79	61.29	14,436,279.93	1,707,043.51	39.75134967	-80.76294799
8,344.00	4.77	187.04	8,309.69	-576.55	60.37	14,436,272.17	1,707,042.58	39.75132837	-80.76295135
8,433.00	4.29	191.88	8,398.41	-583.48	59.23	14,436,265.24	1,707,041.44	39.75130935	-80.76295547
8,523.00	4.22	195.97	8,488.16	-589.95	57.62	14,436,258.76	1,707,039.84	39.75129157	-80.76296124
8,613.00	5.12	194.06	8,577.86	-597.03	55.74	14,436,251.68	1,707,037.95	39.75127214	-80.76296802
8,702.00	5.19	199.21	8,666.50	-604.69	53.45	14,436,244.03	1,707,035.66	39.75125114	-80.76297623
8,792.00	5.32	205.36	8,756.12	-612.30	50.32	14,436,236.41	1,707,032.54	39.75123025	-80.76298743
8,882.00	5.12	216.12	8,845.75	-619.32	46.17	14,436,229.40	1,707,028.38	39.75121102	-80.76300228
8,971.00	5.05	225.88	8,934.40	-625.25	41.01	14,436,223.46	1,707,023.23	39.75119476	-80.76302067
9,061.00	4.34	235.57	9,024.10	-629.93	35.36	14,436,218.78	1,707,017.58	39.75118194	-80.76304082
9,151.00	3.39	241.55	9,113.90	-633.13	30.21	14,436,215.59	1,707,012.43	39.75117320	-80.76305917
9,240.00	4.06	240.51	9,202.71	-635.93	25.15	14,436,212.78	1,707,007.37	39.75116554	-80.76307718
9,330.00	4.40	239.53	9,292.46	-639.25	19.41	14,436,209.46	1,707,001.62	39.75115646	-80.76309767
9,420.00	4.36	231.50	9,382.20	-643.13	13.75	14,436,205.58	1,706,995.97	39.75114585	-80.76311782
9,509.00	4.96	226.43	9,470.91	-647.89	8.32	14,436,200.83	1,706,990.53	39.75113282	-80.76313720
9,599.00	6.33	225.29	9,560.47	-654.06	1.97	14,436,194.65	1,706,984.19	39.75111592	-80.76315983
9,688.00	6.09	232.48	9,648.95	-660.39	-5.26	14,436,188.33	1,706,976.96	39.75109859	-80.76318562
9,778.00	6.16	237.18	9,738.43	-665.91	-13.10	14,436,182.80	1,706,969.11	39.75108348	-80.76321358
9,867.00	6.07	231.67	9,826.93	-671.42	-20.81	14,436,177.30	1,706,961.41	39.75106841	-80.76324105
9,957.00	5.03	217.76	9,916.51	-677.49	-26.96	14,436,171.23	1,706,955.26	39.75105178	-80.76326298
10,046.00	4.92	208.83	10,005.18	-683.92	-31.19	14,436,164.80	1,706,951.03	39.75103416	-80.76327809
10,136.00	6.42	201.59	10,094.73	-691.98	-34.90	14,436,156.74	1,706,947.32	39.75101205	-80.76329138
10,226.00	6.45	205.64	10,184.17	-701.21	-38.94	14,436,147.50	1,706,943.28	39.75098672	-80.76330583
10,335.00	7.10	209.10	10,292.41	-712.62	-44.86	14,436,136.09	1,706,937.35	39.75095544	-80.76332702
10,380.00	6.64	210.75	10,337.08	-717.29	-47.55	14,436,131.43	1,706,934.67	39.75094264	-80.76333661
10,470.00	4.84	224.37	10,426.63	-724.47	-52.86	14,436,124.24	1,706,929.35	39.75092294	-80.76335559
10,559.00	9.58	290.20	10,515.03	-724.60	-62.46	14,436,124.12	1,706,919.76	39.75092266	-80.76338973
10,649.00	13.67	302.77	10,603.18	-716.25	-78.44	14,436,132.46	1,706,903.78	39.75094570	-80.76344651
10,739.00	16.04	307.61	10,690.16	-702.91	-97.23	14,436,145.81	1,706,884.98	39.75098249	-80.76351325



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Corley N-09HU (slot K)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=1254+27 @ 1281.00usft (Precision 110)
Site:	Corley Pad	MD Reference:	RKB=1254+27 @ 1281.00usft (Precision 110)
Well:	Corley N-09HU (slot K)	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		
10,829.00	18.07	327.12	10,776.27	-683.58	-114.68	14,436,165.14	1,706,867.54	39.75103570	-80.76357513		
10,918.00	20.40	326.15	10,860.30	-659.10	-130.81	14,436,189.61	1,706,851.40	39.75110304	-80.76363231		
11,008.00	23.25	328.26	10,943.84	-630.96	-148.90	14,436,217.76	1,706,833.32	39.75118045	-80.76369640		
11,097.00	27.65	333.45	11,024.19	-597.53	-167.38	14,436,251.19	1,706,814.84	39.75127240	-80.76376184		
11,187.00	33.23	332.39	11,101.76	-556.96	-188.16	14,436,291.75	1,706,794.06	39.75138396	-80.76383539		
11,300.00	40.88	330.46	11,191.88	-497.26	-220.79	14,436,351.45	1,706,761.43	39.75154814	-80.76395093		
11,365.00	43.60	329.49	11,239.99	-459.44	-242.66	14,436,389.27	1,706,739.56	39.75165217	-80.76402838		
11,454.00	43.87	335.73	11,304.33	-404.86	-270.93	14,436,443.85	1,706,711.29	39.75180226	-80.76412845		
11,544.00	55.91	335.99	11,362.21	-342.16	-299.02	14,436,506.56	1,706,683.20	39.75197467	-80.76422779		
11,633.00	71.74	333.36	11,401.35	-270.25	-333.18	14,436,578.46	1,706,649.03	39.75217239	-80.76434868		
11,723.00	86.64	329.23	11,418.19	-192.99	-375.58	14,436,655.73	1,706,606.63	39.75238488	-80.76449881		
11,768.00	91.16	329.14	11,419.05	-154.36	-398.62	14,436,694.36	1,706,583.59	39.75249114	-80.76458043		
11,813.00	91.21	330.46	11,418.12	-115.48	-421.26	14,436,733.24	1,706,560.96	39.75259809	-80.76466059		
11,902.00	90.90	327.73	11,416.48	-39.13	-466.96	14,436,809.58	1,706,515.26	39.75280808	-80.76482247		
11,992.00	91.12	324.22	11,414.89	35.43	-517.30	14,436,884.15	1,706,464.92	39.75301323	-80.76500090		
12,081.00	91.74	323.51	11,412.67	107.29	-569.76	14,436,956.01	1,706,412.45	39.75321094	-80.76518690		
12,171.00	91.91	325.54	11,409.81	180.54	-621.97	14,437,029.26	1,706,360.25	39.75341249	-80.76537195		
12,261.00	91.56	327.82	11,407.08	255.71	-671.38	14,437,104.42	1,706,310.84	39.75361927	-80.76554706		
12,350.00	92.75	329.67	11,403.73	331.73	-717.52	14,437,180.45	1,706,264.70	39.75382839	-80.76571053		
12,440.00	92.48	329.05	11,399.63	409.09	-763.34	14,437,257.80	1,706,218.88	39.75404115	-80.76587283		
12,529.00	91.38	332.57	11,396.63	486.73	-806.71	14,437,335.44	1,706,175.50	39.75425469	-80.76602643		
12,619.00	91.03	332.57	11,394.74	566.59	-848.16	14,437,415.31	1,706,134.05	39.75447431	-80.76617317		
12,709.00	91.16	332.22	11,393.02	646.33	-889.86	14,437,495.05	1,706,092.36	39.75469360	-80.76632079		
12,798.00	91.47	332.48	11,390.97	725.15	-931.15	14,437,573.86	1,706,051.06	39.75491034	-80.76646698		
12,888.00	91.60	331.42	11,388.56	804.55	-973.46	14,437,653.26	1,706,008.76	39.75512870	-80.76661677		
12,977.00	91.74	331.07	11,385.97	882.54	-1,016.25	14,437,731.25	1,705,965.96	39.75534319	-80.76676832		
13,067.00	91.96	331.07	11,383.06	961.26	-1,059.77	14,437,809.98	1,705,922.45	39.75555971	-80.76692241		
13,156.00	91.87	331.07	11,380.09	1,039.12	-1,102.80	14,437,887.83	1,705,879.42	39.75577382	-80.76707480		
13,246.00	90.51	329.84	11,378.22	1,117.39	-1,147.17	14,437,966.11	1,705,835.05	39.75598911	-80.76723194		
13,336.00	89.76	330.19	11,378.01	1,195.35	-1,192.14	14,438,044.06	1,705,790.07	39.75620351	-80.76739126		
13,425.00	89.36	329.58	11,378.69	1,272.33	-1,236.80	14,438,121.04	1,705,745.42	39.75641525	-80.76754943		
13,515.00	89.27	329.58	11,379.77	1,349.93	-1,282.36	14,438,198.65	1,705,699.85	39.75662870	-80.76771085		
13,604.00	89.41	329.75	11,380.79	1,426.74	-1,327.31	14,438,275.46	1,705,654.90	39.75683996	-80.76787007		
13,694.00	89.63	329.40	11,381.55	1,504.35	-1,372.89	14,438,353.06	1,705,609.33	39.75705340	-80.76803152		
13,784.00	89.76	329.75	11,382.03	1,581.95	-1,418.46	14,438,430.67	1,705,563.75	39.75726685	-80.76819297		
13,873.00	89.85	329.23	11,382.33	1,658.63	-1,463.65	14,438,507.34	1,705,518.57	39.75747775	-80.76835304		
13,963.00	89.76	329.67	11,382.64	1,736.13	-1,509.39	14,438,584.85	1,705,472.82	39.75769093	-80.76851510		
14,052.00	89.85	329.67	11,382.94	1,812.95	-1,554.34	14,438,661.67	1,705,427.88	39.75790221	-80.76867431		
14,142.00	89.71	329.58	11,383.28	1,890.60	-1,599.84	14,438,739.31	1,705,382.37	39.75811577	-80.76883552		
14,232.00	91.74	329.75	11,382.14	1,968.27	-1,645.29	14,438,816.98	1,705,336.92	39.75832939	-80.76899653		
14,321.00	91.96	329.40	11,379.27	2,044.97	-1,690.34	14,438,893.69	1,705,291.88	39.75854036	-80.76915611		
14,411.00	92.22	329.32	11,375.99	2,122.35	-1,736.18	14,438,971.07	1,705,246.04	39.75875320	-80.76931850		
14,500.00	90.81	329.75	11,373.64	2,199.04	-1,781.28	14,439,047.75	1,705,200.93	39.75896412	-80.76947830		
14,590.00	90.64	330.02	11,372.50	2,276.88	-1,826.44	14,439,125.60	1,705,155.78	39.75917822	-80.76963826		
14,680.00	90.77	329.67	11,371.39	2,354.70	-1,871.64	14,439,203.41	1,705,110.57	39.75939224	-80.76979841		
14,770.00	90.86	330.81	11,370.11	2,432.82	-1,916.31	14,439,281.53	1,705,065.90	39.75960710	-80.76995663		
14,859.00	90.99	330.81	11,368.67	2,510.50	-1,959.71	14,439,359.22	1,705,022.50	39.75982076	-80.77011036		
14,949.00	90.81	330.19	11,367.26	2,588.83	-2,004.02	14,439,437.54	1,704,978.19	39.76003616	-80.77026732		
15,039.00	90.64	329.84	11,366.12	2,666.77	-2,049.00	14,439,515.49	1,704,933.22	39.76025054	-80.77042665		
15,128.00	90.68	329.67	11,365.10	2,743.65	-2,093.83	14,439,592.37	1,704,888.39	39.76046200	-80.77058545		
15,218.00	90.55	329.93	11,364.13	2,821.43	-2,139.10	14,439,670.15	1,704,843.12	39.76067592	-80.77074583		
15,307.00	90.46	329.84	11,363.35	2,898.42	-2,183.75	14,439,747.13	1,704,798.47	39.76088765	-80.77090402		
15,397.00	90.55	329.67	11,362.55	2,976.16	-2,229.08	14,439,824.88	1,704,753.14	39.76110148	-80.77106462		
15,487.00	90.73	329.75	11,361.55	3,053.87	-2,274.47	14,439,902.59	1,704,707.75	39.76131521	-80.77122543		
15,577.00	90.55	329.32	11,360.54	3,131.44	-2,320.10	14,439,980.16	1,704,662.12	39.76152856	-80.77138709		



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Corley N-09HU (slot K)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=1254+27 @ 1281.00usft (Precision 110)
Site:	Corley Pad	MD Reference:	RKB=1254+27 @ 1281.00usft (Precision 110)
Well:	Corley N-09HU (slot K)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
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
15,666.00	90.73	328.88	11,359.55	3,207.81	-2,365.80	14,440,056.52	1,704,616.42	39.76173859	-80.77154902
15,756.00	90.51	329.67	11,358.57	3,285.17	-2,411.78	14,440,133.88	1,704,570.44	39.76195137	-80.77171193
15,845.00	90.55	329.84	11,357.75	3,362.05	-2,456.61	14,440,210.76	1,704,525.61	39.76216283	-80.77187075
15,935.00	90.64	329.32	11,356.82	3,439.65	-2,502.18	14,440,288.37	1,704,480.04	39.76237627	-80.77203220
16,025.00	90.59	329.40	11,355.85	3,517.09	-2,548.04	14,440,365.80	1,704,434.18	39.76258924	-80.77219471
16,114.00	91.03	329.58	11,354.59	3,593.75	-2,593.22	14,440,442.47	1,704,389.00	39.76280011	-80.77235478
16,204.00	91.34	330.19	11,352.73	3,671.59	-2,638.37	14,440,520.30	1,704,343.85	39.76301418	-80.77251473
16,293.00	91.74	330.19	11,350.34	3,748.78	-2,682.59	14,440,597.50	1,704,299.62	39.76322649	-80.77267142
16,383.00	91.78	330.19	11,347.57	3,826.84	-2,727.32	14,440,675.55	1,704,254.90	39.76344116	-80.77282985
16,473.00	92.18	330.19	11,344.46	3,904.88	-2,772.03	14,440,753.60	1,704,210.19	39.76365580	-80.77298826
16,562.00	90.99	329.67	11,342.00	3,981.87	-2,816.61	14,440,830.59	1,704,165.61	39.76386755	-80.77314619
16,652.00	89.98	329.49	11,341.24	4,059.48	-2,862.17	14,440,908.20	1,704,120.04	39.76408100	-80.77330765
16,742.00	91.08	329.84	11,340.41	4,137.15	-2,907.63	14,440,985.87	1,704,074.59	39.76429463	-80.77346869
16,832.00	88.79	330.11	11,340.51	4,215.07	-2,952.66	14,441,063.79	1,704,029.56	39.76450892	-80.77362824
16,921.00	88.92	330.02	11,342.29	4,292.18	-2,997.06	14,441,140.90	1,703,985.16	39.76472100	-80.77378556
17,011.00	89.14	330.37	11,343.81	4,370.27	-3,041.79	14,441,218.98	1,703,940.43	39.76493575	-80.77394402
17,100.00	89.27	331.07	11,345.05	4,447.89	-3,085.31	14,441,296.60	1,703,896.90	39.76514922	-80.77409821
17,190.00	91.16	331.07	11,344.71	4,526.65	-3,128.85	14,441,375.37	1,703,853.37	39.76536583	-80.77425242
17,280.00	91.47	330.63	11,342.64	4,605.23	-3,172.67	14,441,453.95	1,703,809.54	39.76558194	-80.77440768
17,369.00	91.56	330.72	11,340.29	4,682.80	-3,216.25	14,441,531.52	1,703,765.97	39.76579527	-80.77456205
17,459.00	91.65	331.07	11,337.77	4,761.40	-3,260.01	14,441,610.12	1,703,722.21	39.76601144	-80.77471707
17,548.00	91.91	331.34	11,335.01	4,839.36	-3,302.86	14,441,688.08	1,703,679.36	39.76622583	-80.77486886
17,638.00	91.30	330.55	11,332.49	4,918.00	-3,346.55	14,441,766.72	1,703,635.67	39.76644210	-80.77502363
17,727.00	90.90	330.02	11,330.78	4,995.29	-3,390.65	14,441,844.00	1,703,591.56	39.76665464	-80.77517991
17,817.00	91.08	329.93	11,329.22	5,073.20	-3,435.68	14,441,921.91	1,703,546.54	39.76686892	-80.77533945
17,906.00	89.98	330.37	11,328.40	5,150.38	-3,479.98	14,441,999.10	1,703,502.24	39.76708120	-80.77549639
17,996.00	90.29	330.90	11,328.19	5,228.82	-3,524.11	14,442,077.54	1,703,458.11	39.76729692	-80.77565275
18,085.00	90.95	330.55	11,327.22	5,306.45	-3,567.63	14,442,155.16	1,703,414.59	39.76751040	-80.77580693
18,175.00	90.81	330.19	11,325.84	5,384.67	-3,612.12	14,442,233.39	1,703,370.10	39.76772553	-80.77596456
18,264.00	90.33	330.63	11,324.96	5,462.06	-3,656.06	14,442,311.77	1,703,326.15	39.76793836	-80.77612026
18,354.00	90.42	331.07	11,324.37	5,540.66	-3,699.90	14,442,389.37	1,703,282.32	39.76815452	-80.77627557
18,443.00	90.86	330.81	11,323.37	5,618.45	-3,743.13	14,442,467.16	1,703,239.09	39.76836845	-80.77642871
18,533.00	90.86	330.90	11,322.02	5,697.05	-3,786.95	14,442,545.76	1,703,195.26	39.76858460	-80.77658398
18,622.00	90.51	330.37	11,320.96	5,774.60	-3,830.59	14,442,623.32	1,703,151.62	39.76879789	-80.77673860
18,712.00	90.64	330.02	11,320.05	5,852.69	-3,875.33	14,442,701.41	1,703,106.89	39.76901266	-80.77689710
18,801.00	91.03	329.40	11,318.76	5,929.54	-3,920.21	14,442,778.25	1,703,062.01	39.76922400	-80.77705615
18,891.00	90.99	329.32	11,317.17	6,006.96	-3,966.07	14,442,855.67	1,703,016.14	39.76943693	-80.77721867
18,980.00	90.51	329.14	11,316.01	6,083.42	-4,011.60	14,442,932.14	1,702,970.62	39.76964724	-80.77738002
19,070.00	90.99	328.52	11,314.83	6,160.42	-4,058.18	14,443,009.14	1,702,924.04	39.76985902	-80.77754510
19,160.00	90.37	328.17	11,313.76	6,237.03	-4,105.41	14,443,085.74	1,702,876.81	39.77006972	-80.77771250
19,249.00	90.59	328.17	11,313.01	6,312.64	-4,152.34	14,443,161.36	1,702,829.87	39.77027769	-80.77787888
19,339.00	90.73	328.35	11,311.98	6,389.18	-4,199.69	14,443,237.89	1,702,782.53	39.77048820	-80.77804669
19,428.00	90.51	328.70	11,311.01	6,465.08	-4,246.15	14,443,313.79	1,702,736.06	39.77069696	-80.77821139
19,518.00	91.21	328.79	11,309.66	6,542.01	-4,292.84	14,443,390.72	1,702,689.37	39.77090855	-80.77837688
19,608.00	91.30	329.32	11,307.69	6,619.18	-4,339.11	14,443,467.89	1,702,643.11	39.77112079	-80.77854086
19,697.00	90.90	329.75	11,305.98	6,695.87	-4,384.23	14,443,544.59	1,702,597.99	39.77133173	-80.77870075
19,787.00	91.16	329.75	11,304.37	6,773.61	-4,429.56	14,443,622.32	1,702,552.66	39.77154552	-80.77886140
19,876.00	91.34	330.02	11,302.42	6,850.58	-4,474.20	14,443,699.29	1,702,508.01	39.77175720	-80.77901961
19,966.00	91.65	330.28	11,300.08	6,928.61	-4,518.98	14,443,777.32	1,702,463.23	39.77197180	-80.77917829
20,056.00	91.74	330.19	11,297.41	7,006.70	-4,563.64	14,443,855.42	1,702,418.57	39.77218657	-80.77933655
20,145.00	92.35	330.37	11,294.24	7,083.94	-4,607.74	14,443,932.66	1,702,374.48	39.77239900	-80.77949281
20,231.00	92.44	330.81	11,290.64	7,158.79	-4,649.93	14,444,007.51	1,702,332.28	39.77260484	-80.77964232
Survey @ 20231.00 MD 11290.64 TVD									
20,287.00	92.44	330.81	11,288.26	7,207.64	-4,677.22	14,444,056.35	1,702,305.00	39.77273917	-80.77973900
Survey projected to 20287.00 MD 11288.26 TVD									

WV Department of Environmental Protection



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Corley N-09HU (slot K)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=1254+27 @ 1281.00usft (Precision 110)
Site:	Corley Pad	MD Reference:	RKB=1254+27 @ 1281.00usft (Precision 110)
Well:	Corley N-09HU (slot K)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
282.00	281.99	-2.45	-0.20	MWD surveys
20,231.00	11,290.64	7,158.79	-4,649.93	Survey @ 20231.00 MD 11290.64 TVD
20,287.00	11,288.26	7,207.64	-4,677.22	Survey projected to 20287.00 MD 11288.26 TVD

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