



Survey Report - Geographic



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Woodford 01HM (A)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1235+33 @ 1268.00ft (Nabors X08)
<b>Site:</b>	Woodford	<b>MD Reference:</b>	RKB=1235+33 @ 1268.00ft (Nabors X08)
<b>Well:</b>	Woodford 01HM (A)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Sidetrack 01	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Sidetrack 01	<b>Database:</b>	DB_Aug1919_v14

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

<b>Site</b>	Woodford
<b>Site Position:</b>	Latitude: 39.80414597
<b>From:</b>	Longitude: -80.81199526
<b>Position Uncertainty:</b>	Slot Radius: 0.00 ft
	Northing: 14,455,471.78 usft
	Eastng: 1,693,217.70 usft
	Longitude: -80.81203489
	Grid Convergence: 0.120 °

<b>Well</b>	Woodford 01HM (A)
<b>Well Position</b>	+N-S 0.00 ft
	+E-W 0.00 ft
<b>Position Uncertainty</b>	Wellhead Elevation: 0.00 ft
	Latitude: 39.80401642
	Longitude: -80.81203489
	Ground Level: 1,235.00 ft

<b>Wellbore</b>	Sidetrack 01				
<b>Magnetics</b>	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	9/14/2019	-8.691	66.796	51,935.09721497

<b>Design</b>	Surveys Sidetrack 01				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	10,464.00
<b>Vertical Section:</b>	Depth From (TVD) (ft)	+N-S (ft)	+E-W (ft)	Direction (°)	
	0.00	0.00	0.00	164.48	

<b>Survey Program</b>	From (ft)	To (ft)	Date	9/18/2019
	190.00	2,725.00	MWD surf (Original Hole)	
	2,872.00	10,464.00	MWD (Original Hole)	
	10,560.00	14,593.00	MWD ST1 (Sidetrack 01)	
	14,644.00	14,644.00	Projection (Sidetrack 01)	

Survey	Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
	0.00	0.00	0.00	0.00	0.00	0.00	14,455,424.58	1,693,206.67	39.80401642	-80.81203489
	190.00	0.91	213.39	189.99	-1.26	-0.83	14,455,423.32	1,693,205.84	39.80401297	-80.81203786
	220.00	0.95	223.73	219.99	-1.64	-1.13	14,455,422.94	1,693,205.54	39.80401193	-80.81203894
	250.00	0.67	196.16	249.99	-1.99	-1.35	14,455,422.59	1,693,205.32	39.80401097	-80.81203973
	280.00	0.51	198.08	279.98	-2.28	-1.44	14,455,422.30	1,693,205.23	39.80401016	-80.81204005
	310.00	0.54	204.55	309.98	-2.54	-1.54	14,455,422.04	1,693,205.13	39.80400946	-80.81204041
	340.00	0.59	240.02	339.98	-2.74	-1.74	14,455,421.84	1,693,204.93	39.80400890	-80.81204110
	370.00	0.30	220.43	369.98	-2.88	-1.92	14,455,421.70	1,693,204.75	39.80400852	-80.81204176
	400.00	0.34	199.03	399.98	-3.02	-2.00	14,455,421.56	1,693,204.67	39.80400813	-80.81204204



**TUG HILL**  
OPERATING

Survey Report - Geographic



**Company:** Tug Hill Operating LLC  
**Project:** Marshall County, West Virginia  
**Site:** Woodford  
**Well:** Woodford 01HM (A)  
**Wellbore:** Sidetrack 01  
**Design:** Surveys Sidetrack 01

**Local Co-ordinate Reference:**  
**TVD Reference:** Well Woodford 01HM (A)  
**MD Reference:** RKB=1235+33 @ 1268.00ft (Nabors X08)  
**North Reference:** RKB=1235+33 @ 1268.00ft (Nabors X08)  
**Survey Calculation Method:** Grid  
**Database:** Minimum Curvature  
 DB\_Aug1919\_v14

**Survey**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
430.00	0.42	203.71	429.98	-3.21	-2.07	14,455,421.37	1,693,204.60	39.80400762	-80.81204230
460.00	0.20	270.68	459.98	-3.31	-2.17	14,455,421.27	1,693,204.50	39.80400735	-80.81204265
490.00	0.17	203.64	489.98	-3.35	-2.24	14,455,421.23	1,693,204.43	39.80400724	-80.81204290
520.00	0.18	212.40	519.98	-3.43	-2.28	14,455,421.15	1,693,204.39	39.80400702	-80.81204305
550.00	0.11	296.21	549.98	-3.46	-2.34	14,455,421.12	1,693,204.33	39.80400694	-80.81204323
580.00	0.11	19.48	579.98	-3.42	-2.35	14,455,421.16	1,693,204.32	39.80400705	-80.81204329
610.00	0.34	308.48	609.98	-3.33	-2.41	14,455,421.25	1,693,204.26	39.80400728	-80.81204351
640.00	0.10	181.74	639.98	-3.31	-2.48	14,455,421.27	1,693,204.19	39.80400736	-80.81204376
670.00	0.05	287.91	669.98	-3.33	-2.50	14,455,421.25	1,693,204.17	39.80400730	-80.81204380
701.00	0.09	306.19	700.98	-3.31	-2.53	14,455,421.27	1,693,204.14	39.80400735	-80.81204392
733.00	0.30	302.33	732.98	-3.25	-2.62	14,455,421.33	1,693,204.05	39.80400751	-80.81204424
764.00	0.22	286.89	763.98	-3.19	-2.75	14,455,421.39	1,693,203.93	39.80400768	-80.81204469
796.00	0.31	349.13	795.98	-3.09	-2.82	14,455,421.49	1,693,203.85	39.80400796	-80.81204496
827.00	0.35	301.10	826.98	-2.95	-2.92	14,455,421.63	1,693,203.75	39.80400833	-80.81204530
859.00	0.53	326.53	858.98	-2.78	-3.08	14,455,421.80	1,693,203.59	39.80400880	-80.81204569
890.00	0.40	279.32	889.97	-2.64	-3.27	14,455,421.94	1,693,203.40	39.80400918	-80.81204655
922.00	0.93	215.13	981.97	-3.20	-4.01	14,455,421.38	1,693,202.66	39.80400765	-80.81204921
1,077.00	0.59	205.90	1,076.96	-4.27	-4.67	14,455,420.31	1,693,202.00	39.80400472	-80.81205156
1,172.00	0.50	359.16	1,171.96	-4.30	-4.89	14,455,420.28	1,693,201.78	39.80400465	-80.81205234
1,267.00	0.96	351.36	1,266.95	-3.10	-5.02	14,455,421.48	1,693,201.65	39.80400795	-80.81205278
1,362.00	1.13	322.21	1,361.94	-1.57	-5.71	14,455,423.01	1,693,200.96	39.80401214	-80.81205524
1,456.00	2.77	305.87	1,455.88	0.49	-8.12	14,455,425.07	1,693,198.55	39.80401783	-80.81206380
1,551.00	4.69	295.43	1,550.67	3.51	-13.49	14,455,428.09	1,693,193.18	39.80402613	-80.81206829
1,645.00	6.76	293.37	1,644.20	7.35	-22.04	14,455,431.93	1,693,184.63	39.80403674	-80.81211330
1,740.00	7.42	288.54	1,738.47	11.52	-32.99	14,455,436.10	1,693,173.68	39.80404825	-80.81215226
1,835.00	7.61	283.45	1,832.66	14.93	-44.92	14,455,439.51	1,693,161.75	39.80405769	-80.81219472
1,929.00	7.88	274.43	1,925.81	16.88	-57.40	14,455,441.46	1,693,149.27	39.80406311	-80.81223914
2,024.00	7.73	285.62	2,019.93	19.10	-70.05	14,455,443.68	1,693,136.62	39.80406929	-80.81228415
2,119.00	8.80	295.92	2,113.95	24.00	-82.74	14,455,448.58	1,693,123.94	39.80408281	-80.81232930
2,213.00	10.14	298.10	2,206.66	31.04	-96.50	14,455,455.62	1,693,110.17	39.80410223	-80.81237827
2,308.00	10.60	293.30	2,300.11	38.44	-111.90	14,455,463.02	1,693,094.77	39.80412262	-80.81243305
2,403.00	10.69	289.23	2,393.37	44.98	-128.79	14,455,469.56	1,693,077.88	39.80414070	-80.81249312
2,498.00	11.64	282.93	2,486.62	50.03	-146.19	14,455,474.61	1,693,060.48	39.80415467	-80.81255505
2,592.00	10.01	275.68	2,579.11	52.79	-162.78	14,455,477.36	1,693,043.89	39.80416232	-80.81261410
2,687.00	9.60	277.35	2,672.72	54.62	-178.85	14,455,479.20	1,693,027.82	39.80416744	-80.81267131
2,725.00	9.50	278.32	2,710.19	55.47	-185.10	14,455,480.05	1,693,021.57	39.80416984	-80.81269354
2,872.00	8.46	275.32	2,855.39	58.23	-207.87	14,455,482.81	1,692,998.80	39.80417754	-80.81277460
2,967.00	8.67	295.50	2,949.35	61.96	-221.29	14,455,486.54	1,692,985.38	39.80418787	-80.81282237
3,061.00	10.88	296.05	3,041.98	68.91	-235.66	14,455,493.49	1,692,971.01	39.80420703	-80.81287347
3,156.00	10.48	292.22	3,135.33	76.12	-251.71	14,455,500.70	1,692,954.96	39.80422690	-80.81293058
3,251.00	16.57	295.91	3,227.66	85.31	-271.92	14,455,509.89	1,692,934.75	39.80425227	-80.81310226
3,345.00	22.93	299.23	3,316.09	100.13	-299.98	14,455,524.71	1,692,906.69	39.80429312	-80.81323538
3,440.00	27.97	287.47	3,401.91	115.86	-337.40	14,455,540.44	1,692,869.27	39.80433655	-80.81339956
3,534.00	32.93	281.16	3,482.94	127.43	-383.54	14,455,552.01	1,692,823.13	39.80436859	-80.81358762
3,629.00	35.75	276.34	3,561.36	136.46	-436.37	14,455,561.04	1,692,770.30	39.80439369	-80.81378639
3,726.00	36.37	284.92	3,639.80	147.98	-492.22	14,455,572.56	1,692,714.45	39.80442565	-80.81397387
3,821.00	34.72	289.78	3,717.11	164.39	-544.91	14,455,586.97	1,692,661.76	39.80445249	-80.81415927
3,915.00	37.90	291.28	3,792.85	183.94	-597.02	14,455,608.52	1,692,609.65	39.80452499	-80.81435405
4,010.00	38.67	291.78	3,867.42	203.54	-651.77	14,455,630.12	1,692,554.90	39.80458462	-80.81454924
4,104.00	38.64	289.94	3,940.83	226.45	-706.63	14,455,651.02	1,692,500.04	39.80464235	-80.81474527
4,199.00	36.85	287.26	4,015.95	245.02	-761.72	14,455,669.59	1,692,444.95	39.80469366	-80.81494137
4,294.00	37.56	285.52	4,091.62	261.22	-816.83	14,455,685.80	1,692,389.84	39.80473847	-80.81513777
4,388.00	37.30	284.42	4,166.27	275.98	-872.02	14,455,700.55	1,692,334.65	39.80477931	-80.81533300
4,483.00	36.70	288.13	4,242.15	291.98	-926.88	14,455,716.56	1,692,279.79	39.80482357	-80.81551847
4,578.00	34.71	291.65	4,319.29	310.80	-979.01	14,455,735.37	1,692,227.66	39.80487554	-80.81551847



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**Wellbore:** Sidetrack 01  
**Design:** Surveys Sidetrack 01

**Local Co-ordinate Reference:**  
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**MD Reference:** RKB=1235+33 @ 1268.00ft (Nabors X08)  
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**Survey Calculation Method:** Grid  
**Database:** Minimum Curvature  
 DB\_Aug1919\_v14

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Map Northing (ustf)	Map Easting (ustf)	Latitude	Longitude
4,672.00	34.79	292.21	4,396.53	330.81	-1,028.71	14,455,755.38	1,692,177.96	39.80493078	-80.81569530
4,767.00	36.42	289.44	4,473.77	350.44	-1,080.40	14,455,775.02	1,692,126.27	39.80498499	-80.81587921
4,861.00	37.57	286.03	4,548.86	367.64	-1,134.27	14,455,792.22	1,692,072.40	39.80503254	-80.81607087
4,955.00	38.94	288.47	4,622.67	384.92	-1,189.84	14,455,809.49	1,692,016.84	39.80508029	-80.81626860
5,050.00	39.09	288.99	4,696.49	404.12	-1,246.47	14,455,828.70	1,691,960.20	39.80513335	-80.81647012
5,144.00	38.94	290.14	4,769.52	423.93	-1,302.23	14,455,848.51	1,691,904.44	39.80518608	-80.81666851
5,241.00	35.17	292.31	4,846.92	445.04	-1,356.72	14,455,869.98	1,691,849.96	39.80524636	-80.81686236
5,335.00	34.79	292.07	4,923.94	465.40	-1,406.61	14,455,889.98	1,691,800.06	39.80530253	-80.81703988
5,430.00	37.13	289.76	5,000.84	485.28	-1,458.72	14,455,909.86	1,691,747.95	39.80535742	-80.81722528
5,525.00	38.17	287.87	5,076.06	503.98	-1,513.65	14,455,928.56	1,691,693.02	39.80540909	-80.81742072
5,619.00	38.54	285.05	5,149.77	520.50	-1,569.58	14,455,945.08	1,691,637.10	39.80545477	-80.81761974
5,714.00	38.01	289.81	5,224.37	538.10	-1,625.69	14,455,962.68	1,691,580.98	39.80550342	-80.81781941
5,809.00	35.15	287.49	5,300.65	556.24	-1,679.31	14,455,980.81	1,691,527.37	39.80555353	-80.81801019
5,834.00	34.20	286.60	5,321.21	560.41	-1,692.90	14,455,984.98	1,691,513.77	39.80556505	-80.81823516
5,927.00	33.76	288.00	5,398.33	575.86	-1,742.53	14,456,000.44	1,691,464.15	39.80560777	-80.81823516
6,022.00	33.54	283.60	5,477.43	590.19	-1,793.15	14,456,014.77	1,691,413.53	39.80564741	-80.81841530
6,116.00	32.79	265.94	5,556.30	594.50	-1,843.90	14,456,019.08	1,691,362.78	39.80565854	-80.81859598
6,210.00	29.14	247.74	5,637.07	584.01	-1,890.59	14,456,008.58	1,691,316.09	39.80563096	-80.81876230
6,305.00	25.10	227.35	5,721.79	561.53	-1,926.91	14,455,986.11	1,691,279.77	39.80556945	-80.81889178
6,400.00	23.25	222.52	5,808.46	534.06	-1,954.40	14,455,958.64	1,691,252.27	39.80549415	-80.81898989
6,495.00	26.46	207.14	5,894.74	501.36	-1,976.76	14,455,925.94	1,691,229.91	39.80540448	-80.81906973
6,590.00	31.21	199.23	5,977.97	459.25	-1,994.54	14,455,883.82	1,691,212.14	39.80528892	-80.81913333
6,684.00	39.96	193.07	6,054.36	406.73	-2,009.42	14,455,831.31	1,691,197.25	39.80496580	-80.81921931
6,779.00	48.09	183.41	6,122.69	341.54	-2,018.45	14,455,766.12	1,691,188.23	39.80477044	-80.81920529
6,873.00	51.03	170.31	6,183.81	270.41	-2,014.37	14,455,694.99	1,691,192.31	39.80456734	-80.81913999
6,968.00	55.91	161.87	6,240.41	196.49	-1,995.88	14,455,583.40	1,691,210.80	39.80463870	-80.81909435
7,015.00	59.96	160.38	6,265.36	158.82	-1,982.98	14,455,544.56	1,691,223.69	39.80435707	-80.81904363
7,062.00	63.52	159.15	6,287.61	119.98	-1,968.66	14,455,505.31	1,691,253.31	39.80424918	-80.81898984
7,109.00	63.87	158.27	6,308.44	80.73	-1,953.36	14,455,464.78	1,691,270.32	39.80413777	-80.81892919
7,157.00	68.84	156.25	6,327.68	40.20	-1,936.36	14,455,423.91	1,691,287.77	39.80402546	-80.81886735
7,204.00	73.19	157.48	6,342.97	-0.66	-1,918.91	14,455,382.20	1,691,305.63	39.80391079	-80.81880403
7,251.00	76.75	156.16	6,355.16	-42.38	-1,901.04	14,455,340.36	1,691,324.67	39.80379572	-80.81873657
7,298.00	79.21	154.93	6,364.95	-84.22	-1,882.01	14,455,297.77	1,691,345.35	39.80367878	-80.81866323
7,346.00	81.89	153.26	6,372.83	-126.81	-1,861.32	14,455,256.42	1,691,367.07	39.80356504	-80.81858620
7,393.00	85.49	151.33	6,377.99	-168.16	-1,839.61	14,455,215.87	1,691,390.68	39.80345355	-80.81850242
7,440.00	88.57	148.25	6,380.43	-208.71	-1,815.99	14,455,175.29	1,691,410.78	39.80323172	-80.81832463
7,535.00	88.13	148.07	6,383.16	-289.38	-1,765.90	14,455,135.20	1,691,440.26	39.80301222	-80.81814901
7,629.00	87.16	148.34	6,387.02	-369.21	-1,716.41	14,455,095.37	1,691,490.26	39.80278917	-80.81797423
7,724.00	87.65	149.13	6,391.33	-450.33	-1,667.16	14,454,974.26	1,691,539.51	39.80256681	-80.81780449
7,818.00	89.23	149.66	6,393.88	-531.20	-1,619.32	14,454,893.38	1,691,587.35	39.80233942	-80.81763873
7,913.00	91.30	151.41	6,393.45	-613.90	-1,572.60	14,454,810.68	1,691,634.08	39.80211291	-80.81747829
8,007.00	90.68	151.06	6,391.82	-696.29	-1,527.37	14,454,728.29	1,691,679.30	39.80201682	-80.81731502
8,102.00	89.98	150.98	6,391.27	-779.39	-1,481.34	14,454,645.19	1,691,725.33	39.80188443	-80.81715198
8,197.00	89.36	151.15	6,391.82	-862.53	-1,435.38	14,454,562.05	1,691,771.29	39.80165585	-80.81698985
8,292.00	89.67	151.33	6,392.63	-945.81	-1,389.67	14,454,478.77	1,691,817.00	39.80142688	-80.81682830
8,386.00	88.84	150.71	6,393.85	-1,028.03	-1,344.14	14,454,396.55	1,691,862.54	39.80120083	-80.81666348
8,481.00	88.26	150.71	6,396.25	-1,110.86	-1,297.67	14,454,313.72	1,691,909.00	39.80097310	-80.81666348
8,575.00	90.95	150.54	6,396.90	-1,192.76	-1,251.57	14,454,231.82	1,691,955.10	39.80074790	-80.81649993
8,669.00	90.51	150.27	6,395.70	-1,274.49	-1,205.15	14,454,150.09	1,692,001.52	39.80052319	-80.81633526
8,764.00	89.89	150.54	6,395.37	-1,357.10	-1,158.23	14,454,067.48	1,692,048.44	39.80029607	-80.81616882
8,858.00	89.23	149.92	6,396.09	-1,438.69	-1,111.56	14,453,985.89	1,692,095.11	39.80007174	-80.81600325
8,953.00	88.40	149.31	6,398.06	-1,520.62	-1,063.52	14,453,903.96	1,692,143.15	39.79984646	-80.81583280
9,047.00	89.27	149.74	6,399.97	-1,601.62	-1,015.86	14,453,822.96	1,692,190.81	39.79962375	-80.81566370
9,142.00	89.05	149.57	6,401.36	-1,683.60	-967.87	14,453,740.99	1,692,238.80	39.79939835	-80.81549344
9,237.00	89.63	149.83	6,402.46	-1,765.61	-919.94	14,453,658.97	1,692,286.73	39.79917284	-80.81532341



Survey Report - Geographic



**Company:** Tug Hill Operating LLC  
**Project:** Marshall County, West Virginia  
**Site:** Woodford  
**Well:** Woodford 01HM (A)  
**Wellbore:** Sidetrack 01  
**Design:** Surveys Sidetrack 01

**Local Co-ordinate Reference:**  
**TVD Reference:** Well Woodford 01HM (A)  
**MD Reference:** RKB=1235+33 @ 1268.00ft (Nabors X08)  
**North Reference:** RKB=1235+33 @ 1268.00ft (Nabors X06)  
**Survey Calculation Method:** Grid  
**Database:** Minimum Curvature  
 DB\_Aug1919\_v14

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
9,331.00	89.45	149.74	6,403.21	-1,846.84	-872.64	14,453,577.74	1,692,334.03	39.79894950	-80.81515559
9,425.00	90.15	148.87	6,403.54	-1,927.67	-824.66	14,453,496.92	1,692,382.02	39.79872725	-80.81498535
9,520.00	90.07	148.43	6,403.36	-2,008.80	-775.23	14,453,415.79	1,692,431.44	39.79850416	-80.81480998
9,614.00	89.36	148.25	6,403.82	-2,088.81	-725.89	14,453,335.78	1,692,480.78	39.79828416	-80.81463491
9,709.00	89.63	149.39	6,404.66	-2,170.08	-676.71	14,453,254.51	1,692,529.96	39.79806068	-80.81446041
9,803.00	89.93	149.83	6,405.02	-2,251.16	-629.16	14,453,173.42	1,692,577.51	39.79783773	-80.81429171
9,898.00	89.14	149.66	6,405.79	-2,333.22	-581.30	14,453,091.36	1,692,625.37	39.79761211	-80.81412191
9,992.00	89.98	151.24	6,406.51	-2,414.99	-534.94	14,453,009.60	1,692,671.73	39.79738729	-80.81395747
10,086.00	90.07	151.41	6,406.47	-2,497.46	-489.84	14,452,927.13	1,692,716.84	39.79716054	-80.81379750
10,180.00	89.23	151.15	6,407.05	-2,579.89	-444.67	14,452,844.69	1,692,762.00	39.79693390	-80.81363730
10,275.00	89.85	150.82	6,407.81	-2,662.88	-398.45	14,452,761.70	1,692,808.23	39.79670572	-80.81347335
10,370.00	90.42	149.92	6,407.59	-2,745.38	-351.33	14,452,679.21	1,692,855.34	39.79647889	-80.81330624
10,464.00	90.15	150.54	6,407.12	-2,826.97	-304.66	14,452,597.61	1,692,902.01	39.79625455	-80.81314068
<b>Tie into original hole @ 10464 MD</b>									
10,560.00	88.22	149.74	6,408.48	-2,910.21	-256.87	14,452,514.37	1,692,949.80	39.79602567	-80.81297116
10,655.00	89.93	146.58	6,410.02	-2,990.90	-206.77	14,452,433.69	1,692,999.90	39.79580381	-80.81279339
10,750.00	90.02	147.02	6,410.06	-3,070.39	-154.75	14,452,354.20	1,693,051.92	39.79558521	-80.81260879
10,845.00	89.76	146.76	6,410.24	-3,149.96	-102.86	14,452,274.62	1,693,103.81	39.79536638	-80.81242463
10,939.00	89.63	147.72	6,410.74	-3,229.01	-51.99	14,452,195.58	1,693,154.68	39.79514900	-80.81224414
11,034.00	90.24	148.13	6,410.85	-3,309.94	-2.25	14,452,114.64	1,693,204.42	39.79492645	-80.81206766
11,128.00	89.23	149.57	6,411.28	-3,390.81	45.67	14,452,033.78	1,693,252.34	39.79470409	-80.81189766
11,223.00	89.71	149.74	6,412.16	-3,472.79	93.66	14,451,951.80	1,693,300.33	39.79447867	-80.81172742
11,318.00	89.85	150.80	6,412.53	-3,555.28	140.77	14,451,869.30	1,693,347.44	39.79425185	-80.81156032
11,410.00	89.10	152.29	6,413.37	-3,636.16	184.60	14,451,788.43	1,693,391.27	39.79402948	-80.81140488
11,505.00	89.93	151.68	6,414.18	-3,720.03	229.22	14,451,704.56	1,693,435.89	39.79379891	-80.81124666
11,599.00	90.02	151.24	6,414.22	-3,802.60	274.13	14,451,621.98	1,693,480.80	39.79357187	-80.81108740
11,694.00	89.14	151.41	6,414.91	-3,885.95	319.71	14,451,538.64	1,693,526.38	39.79334271	-80.81092574
11,789.00	90.55	151.41	6,415.17	-3,969.36	365.17	14,451,455.23	1,693,571.84	39.79311337	-80.81076453
11,883.00	90.42	151.24	6,414.37	-4,051.83	410.28	14,451,372.76	1,693,616.95	39.79288663	-80.81060458
11,978.00	89.98	151.41	6,414.04	-4,135.18	455.86	14,451,289.41	1,693,662.53	39.79265747	-80.81044293
12,072.00	89.45	151.33	6,414.51	-4,217.68	500.90	14,451,206.90	1,693,707.57	39.79243062	-80.81028321
12,167.00	89.76	150.62	6,415.60	-4,300.75	546.99	14,451,123.84	1,693,753.66	39.79220223	-80.81011975
12,261.00	89.71	150.01	6,415.17	-4,382.41	593.54	14,451,042.18	1,693,800.21	39.79197770	-80.80995465
12,356.00	90.02	149.66	6,415.82	-4,464.55	641.28	14,450,960.04	1,693,847.95	39.79175185	-80.80978533
12,450.00	90.73	149.04	6,415.21	-4,545.41	689.20	14,450,879.18	1,693,896.87	39.79152950	-80.80961535
12,544.00	90.37	148.78	6,414.31	-4,625.91	737.74	14,450,798.68	1,693,944.41	39.79130815	-80.80944317
12,639.00	90.95	148.07	6,413.21	-4,706.84	787.48	14,450,717.75	1,693,994.15	39.79108561	-80.80926672
12,734.00	90.59	149.66	6,411.94	-4,788.14	836.59	14,450,636.45	1,694,043.26	39.79086203	-80.80909249
12,828.00	90.59	149.57	6,410.97	-4,869.23	884.13	14,450,555.36	1,694,090.80	39.79063908	-80.80892385
12,923.00	90.33	149.66	6,410.20	-4,951.17	932.18	14,450,473.41	1,694,138.85	39.79041374	-80.80875342
13,018.00	90.11	149.92	6,409.84	-5,033.27	979.99	14,450,391.32	1,694,186.65	39.79018800	-80.80858388
13,113.00	89.67	148.78	6,410.02	-5,115.00	1,028.41	14,450,309.59	1,694,235.08	39.78996327	-80.80841210
13,207.00	89.76	149.57	6,410.49	-5,195.72	1,076.58	14,450,228.87	1,694,283.25	39.78974131	-80.80824125
13,302.00	89.54	147.89	6,411.07	-5,276.96	1,125.82	14,450,147.63	1,694,332.49	39.78951792	-80.80806659
13,397.00	90.42	150.36	6,411.10	-5,358.53	1,174.50	14,450,066.06	1,694,381.16	39.78929361	-80.80789394
13,491.00	90.51	150.45	6,410.34	-5,440.26	1,220.92	14,449,984.33	1,694,427.59	39.78906887	-80.80772931
13,586.00	90.55	150.18	6,409.46	-5,522.79	1,267.96	14,449,901.80	1,694,474.63	39.78884195	-80.80756247
13,681.00	89.67	147.72	6,409.28	-5,604.17	1,316.96	14,449,820.42	1,694,523.63	39.78861816	-80.80739868
13,775.00	89.05	151.06	6,410.33	-5,685.06	1,364.81	14,449,739.53	1,694,571.48	39.78839575	-80.80721893
13,870.00	87.30	151.33	6,413.35	-5,768.26	1,410.56	14,449,656.33	1,694,617.23	39.78816699	-80.80705673
13,965.00	87.16	150.80	6,417.95	-5,851.30	1,456.47	14,449,573.29	1,694,663.14	39.78793866	-80.80689394
14,059.00	87.12	150.10	6,422.64	-5,932.97	1,502.77	14,449,491.62	1,694,709.44	39.78771410	-80.80672975
14,154.00	87.08	150.27	6,427.44	-6,015.29	1,549.94	14,449,409.30	1,694,756.61	39.78748774	-80.80656245
14,249.00	87.43	150.36	6,431.99	-6,097.73	1,596.94	14,449,326.86	1,694,803.60	39.78726107	-80.80639581
14,344.00	89.98	150.10	6,434.14	-6,180.16	1,644.09	14,449,244.43	1,694,850.76	39.78703440	-80.80622859



Survey Report - Geographic



**Company:** Tug Hill Operating LLC  
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**Well:** Woodford 01HM (A)  
**Wellbore:** Sidetrack.01  
**Design:** Surveys Sidetrack 01

**Local Co-ordinate Reference:**  
**TVD Reference:** Well Woodford 01HM (A)  
**MD Reference:** RKB=1235+33 @ 1288.00ft (Nabors X08)  
**North Reference:** RKB=1235+33 @ 1288.00ft (Nabors X08)  
**Survey Calculation Method:** Grid  
**Database:** Minimum Curvature  
 DB\_Aug1919\_v14

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
14,438.00	89.32	150.01	6,434.71	-6,261.61	1,691.01	14,449,162.98	1,694,897.68	39.78681044	-80.80606219
14,533.00	90.20	150.01	6,435.11	-6,343.89	1,738.50	14,449,080.70	1,694,945.16	39.78658420	-80.80589379
14,593.00	89.71	150.54	6,435.16	-6,396.00	1,768.25	14,449,028.60	1,694,974.91	39.78644092	-80.80578829
<b>Survey @ 14593.00 MD 6435.16 TVD</b>									
14,644.00	89.71	150.54	6,435.42	-6,440.40	1,793.33	14,448,984.19	1,694,999.99	39.78631883	-80.80569935
<b>Survey projected to 14644.00 MD 6435.42 TVD</b>									

Design Annotations	Measured Depth (ft)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Local Coordinates	Comment
	10,464.00	6,407.12	-2,826.97	-304.66		Tie into original hole @ 10464 MD
	14,593.00	6,435.16	-6,396.00	1,768.25		Survey @ 14593.00 MD 6435.16 TVD
	14,644.00	6,435.42	-6,440.40	1,793.33		Survey projected to 14644.00 MD 6435.42 TVD