

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Bryan N-13HU (slot E)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Site:	Bryan Pad	MD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Well:	Bryan N-13HU (slot E)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_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	Bryan Pad				
Site Position:		Northing:	14,445,110.80 usft	Latitude:	39.77562900
From:	Lat/Long	Easting:	1,703,181.57 usft	Longitude:	-80.77660992
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.143 °

Well	Bryan N-13HU (slot E)					
Well Position	+N/-S	0.00 usft	Northing:	14,445,106.19 usft	Latitude:	39.77561617
	+E/-W	0.00 usft	Easting:	1,703,207.00 usft	Longitude:	-80.77651946
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	1,191.00 usft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	11/12/2019	-8.714	66.756	51,898.57489695

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		338.62

Survey Program	Date 11/25/2019				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
234.00	920.00	MWD surf (Original Hole)	MWD	MWD - Standard	<p>RECEIVED Office of Oil and Gas AUG 14 2020 WV Department of Environmental Protection</p>
1,073.00	2,779.00	MWD int (Original Hole)	MWD	MWD - Standard	
2,937.00	10,214.00	MWD (Original Hole)	MWD	MWD - Standard	
10,271.00	22,883.00	MWD lat (Original Hole)	MWD	MWD - Standard	
22,941.00	22,941.00	Projection (Original Hole)	MWD	MWD - Standard	

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
234.00	0.13	100.57	234.00	-0.05	0.26	-0.14	0.06	0.06	0.00	
MWD surveys										
325.00	0.17	81.15	325.00	-0.05	0.50	-0.22	0.07	0.04	-21.34	
416.00	0.08	112.35	416.00	-0.05	0.69	-0.30	0.12	-0.10	34.29	
506.00	0.08	317.40	506.00	-0.03	0.70	-0.28	0.17	0.00	-172.17	
598.00	0.08	290.33	598.00	0.04	0.60	-0.18	0.04	0.00	-29.42	

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Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
690.00	0.13	158.32	690.00	-0.03	0.58	-0.24	0.21	0.05	-143.49
781.00	0.04	261.15	781.00	-0.13	0.58	-0.34	0.16	-0.10	113.00
872.00	0.09	16.11	872.00	-0.07	0.57	-0.27	0.12	0.05	126.33
920.00	0.08	81.15	920.00	-0.03	0.62	-0.25	0.19	-0.02	135.50
1,073.00	0.66	342.89	1,073.00	0.83	0.46	0.60	0.44	0.38	-64.22
1,168.00	1.32	115.87	1,167.99	0.88	1.29	0.35	1.93	0.69	139.98
1,263.00	2.55	121.49	1,262.93	-0.71	4.07	-2.14	1.31	1.29	5.92
1,357.00	3.91	124.21	1,356.78	-3.60	8.51	-6.45	1.46	1.45	2.89
1,452.00	4.52	121.66	1,451.52	-7.39	14.37	-12.12	0.67	0.64	-2.68
1,547.00	4.43	128.43	1,546.23	-11.63	20.43	-18.28	0.56	-0.09	7.13
1,642.00	4.74	138.36	1,640.93	-16.85	25.92	-25.13	0.90	0.33	10.45
1,736.00	3.64	133.18	1,734.68	-21.79	30.67	-31.47	1.24	-1.17	-5.51
1,831.00	2.02	148.03	1,829.56	-25.27	33.76	-35.84	1.86	-1.71	15.63
1,926.00	3.12	143.20	1,924.46	-28.76	36.19	-39.98	1.18	1.16	-5.08
2,021.00	4.70	134.85	2,019.24	-33.58	40.50	-46.03	1.76	1.66	-8.79
2,116.00	3.96	131.60	2,113.97	-38.50	45.71	-52.52	0.82	-0.78	-3.42
2,210.00	3.03	124.74	2,207.79	-42.07	50.18	-57.47	1.08	-0.99	-7.30
2,305.00	3.52	115.52	2,302.64	-44.76	54.88	-61.69	0.76	0.52	-9.71
2,400.00	3.78	125.71	2,397.45	-47.85	60.05	-66.44	0.73	0.27	10.73
2,494.00	3.16	136.87	2,491.28	-51.54	64.34	-71.45	0.97	-0.66	11.87
2,589.00	2.77	150.23	2,586.15	-55.45	67.27	-76.16	0.83	-0.41	14.06
2,684.00	3.34	155.86	2,681.01	-59.97	69.54	-81.19	0.68	0.60	5.93
2,779.00	3.16	145.05	2,775.86	-64.64	72.17	-86.50	0.67	-0.19	-11.38
2,937.00	3.16	135.82	2,933.62	-71.33	77.70	-94.75	0.32	0.00	-5.84
3,063.00	4.79	124.74	3,059.32	-76.82	84.45	-102.32	1.42	1.29	-8.79
3,158.00	5.98	113.93	3,153.90	-81.09	92.23	-109.13	1.64	1.25	-11.38
3,252.00	7.60	99.52	3,247.24	-84.10	102.84	-115.80	2.49	1.72	-15.33
3,347.00	9.54	94.16	3,341.18	-85.71	116.89	-122.42	2.21	2.04	-5.64
3,442.00	11.29	94.77	3,434.61	-87.06	134.01	-129.92	1.85	1.84	0.64
3,537.00	12.61	96.36	3,527.55	-88.98	153.58	-138.84	1.43	1.39	1.67
3,631.00	14.11	96.62	3,619.00	-91.44	175.16	-149.00	1.60	1.60	0.28
3,726.00	13.71	97.41	3,711.22	-94.22	197.83	-159.86	0.47	-0.42	0.83
3,821.00	13.05	97.94	3,803.64	-97.16	219.61	-170.53	0.71	-0.69	0.56
3,916.00	13.80	96.18	3,896.04	-99.86	241.50	-181.03	0.90	0.79	-1.85
4,010.00	13.49	96.36	3,987.39	-102.28	263.54	-191.32	0.33	-0.33	0.19
4,105.00	12.96	94.77	4,079.87	-104.39	285.17	-201.17	0.68	-0.56	-1.67
4,199.00	13.49	92.66	4,171.38	-105.78	306.63	-210.28	0.76	0.56	-2.24
4,297.00	13.18	96.88	4,266.74	-107.65	329.14	-220.23	1.04	-0.32	4.31
4,392.00	14.46	98.46	4,358.99	-110.69	351.63	-231.26	1.40	1.35	1.66
4,487.00	14.23	100.22	4,451.02	-114.51	374.85	-243.28	0.52	-0.24	1.85
4,582.00	15.12	99.34	4,542.92	-118.59	398.57	-255.73	0.97	0.94	-0.93
4,676.00	16.70	99.34	4,633.32	-122.77	423.99	-268.89	1.68	1.68	0.00
4,771.00	15.16	98.55	4,724.67	-126.83	449.75	-282.06	1.64	-1.62	-0.83
4,866.00	12.96	96.44	4,816.82	-129.88	472.62	-293.23	2.38	-2.32	-2.22

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4,961.00	12.26	96.09	4,909.53	-132.14	493.23	-302.86	0.74	-0.74	-0.37
5,055.00	13.10	93.89	5,001.23	-133.92	513.79	-312.01	1.03	0.89	-2.34
5,150.00	13.58	93.81	5,093.67	-135.39	535.66	-321.35	0.51	0.51	-0.08
5,245.00	12.39	91.96	5,186.24	-136.48	556.97	-330.14	1.33	-1.25	-1.95
5,340.00	12.57	92.22	5,278.99	-137.23	577.49	-338.31	0.20	0.19	0.27
5,434.00	12.58	91.87	5,370.74	-137.96	597.94	-346.45	0.08	0.01	-0.37
5,529.00	12.66	93.10	5,463.44	-138.86	618.67	-354.85	0.30	0.08	1.29
5,624.00	12.57	91.70	5,556.15	-139.73	639.40	-363.21	0.34	-0.09	-1.47
5,719.00	13.14	91.35	5,648.77	-140.29	660.53	-371.44	0.61	0.60	-0.37
5,814.00	12.04	97.06	5,741.49	-141.77	681.16	-380.33	1.75	-1.16	6.01
5,909.00	12.44	100.49	5,834.33	-144.85	701.05	-390.45	0.87	0.42	3.61
6,003.00	10.90	99.52	5,926.38	-148.16	719.78	-400.36	1.65	-1.64	-1.03
6,098.00	9.40	94.07	6,019.90	-150.20	736.37	-408.31	1.87	-1.58	-5.74
6,193.00	7.69	89.41	6,113.84	-150.68	750.47	-413.90	1.94	-1.80	-4.91
6,287.00	6.06	93.81	6,207.16	-150.95	761.71	-418.24	1.82	-1.73	4.68
6,382.00	3.96	98.20	6,301.79	-151.75	769.96	-422.00	2.25	-2.21	4.62
6,477.00	2.99	99.96	6,396.62	-152.64	775.65	-424.90	1.03	-1.02	1.85
6,593.00	3.21	114.28	6,512.45	-154.50	781.59	-428.80	0.69	0.19	12.34
6,688.00	3.87	114.20	6,607.27	-156.91	786.94	-432.99	0.69	0.69	-0.08
6,783.00	4.13	114.02	6,702.04	-159.62	792.99	-437.72	0.27	0.27	-0.19
6,878.00	4.57	116.04	6,796.76	-162.67	799.51	-442.94	0.49	0.46	2.13
6,973.00	3.87	114.64	6,891.50	-165.67	805.83	-448.03	0.74	-0.74	-1.47
7,046.00	2.81	98.20	6,964.38	-166.95	809.84	-450.69	1.94	-1.45	-22.52
7,093.00	2.32	81.15	7,011.33	-166.97	811.92	-451.47	1.92	-1.04	-36.28
7,141.00	2.68	71.65	7,059.29	-166.47	813.94	-451.74	1.14	0.75	-19.79
7,235.00	2.90	93.54	7,153.18	-165.92	818.40	-452.85	1.15	0.23	23.29
7,330.00	3.47	96.44	7,248.03	-166.39	823.66	-455.21	0.62	0.60	3.05
7,425.00	5.58	85.46	7,342.73	-166.35	831.12	-457.89	2.39	2.22	-11.56
7,520.00	8.00	82.64	7,437.06	-165.14	842.28	-460.83	2.57	2.55	-2.97
7,615.00	9.58	86.16	7,530.94	-163.76	856.73	-464.81	1.76	1.66	3.71
7,709.00	10.59	92.22	7,623.49	-163.57	873.16	-470.63	1.56	1.07	6.45
7,804.00	12.17	92.48	7,716.62	-164.34	891.89	-478.17	1.66	1.66	0.27
7,899.00	13.13	92.48	7,809.31	-165.24	912.68	-486.59	1.01	1.01	0.00
7,994.00	15.11	89.85	7,901.44	-165.68	935.84	-495.44	2.19	2.08	-2.77
8,088.00	16.35	89.06	7,991.92	-165.43	961.32	-504.50	1.34	1.32	-0.84
8,183.00	16.20	86.95	8,083.11	-164.50	987.93	-513.33	0.64	-0.16	-2.22
8,278.00	17.62	88.36	8,174.00	-163.39	1,015.53	-522.36	1.56	1.49	1.48
8,373.00	17.40	90.11	8,264.60	-163.00	1,044.11	-532.42	0.60	-0.23	1.84
8,467.00	14.28	83.61	8,355.03	-161.74	1,069.69	-540.57	3.81	-3.32	-6.91
8,562.00	14.67	86.77	8,447.01	-159.76	1,093.35	-547.35	0.93	0.41	3.33
8,657.00	18.23	92.66	8,538.12	-159.77	1,120.21	-557.15	4.13	3.75	6.20
8,752.00	19.47	92.05	8,628.02	-161.03	1,150.88	-569.50	1.32	1.31	-0.64
8,846.00	20.52	89.85	8,716.35	-161.54	1,183.01	-581.70	1.37	1.12	-2.34

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8,941.00	19.95	90.38	8,805.49	-161.61	1,215.87	-593.73	0.63	-0.60	0.56
9,036.00	18.28	89.06	8,895.25	-161.47	1,246.98	-604.94	1.82	-1.76	-1.39
9,131.00	18.63	89.58	8,985.36	-161.11	1,277.05	-615.58	0.41	0.37	0.55
9,225.00	17.66	89.49	9,074.69	-160.88	1,306.32	-626.03	1.03	-1.03	-0.10
9,320.00	17.84	89.15	9,165.17	-160.53	1,335.28	-636.26	0.22	0.19	-0.36
9,415.00	18.46	89.41	9,255.44	-160.16	1,364.87	-646.71	0.66	0.65	0.27
9,510.00	16.48	90.29	9,346.05	-160.08	1,393.39	-657.02	2.10	-2.08	0.93
9,604.00	17.14	90.64	9,436.03	-160.30	1,420.57	-667.14	0.71	0.70	0.37
9,699.00	18.24	90.38	9,526.54	-160.55	1,449.44	-677.90	1.16	1.16	-0.27
9,794.00	18.36	91.25	9,616.74	-160.98	1,479.26	-689.17	0.31	0.13	0.92
9,889.00	18.14	87.39	9,706.96	-160.63	1,508.99	-699.68	1.29	-0.23	-4.06
9,983.00	17.97	85.98	9,796.33	-158.95	1,538.08	-708.72	0.50	-0.18	-1.50
10,078.00	18.10	88.97	9,886.67	-157.66	1,567.45	-718.22	0.98	0.14	3.15
10,173.00	18.14	89.93	9,976.96	-157.37	1,596.99	-728.73	0.32	0.04	1.01
10,214.00	18.23	90.02	10,015.91	-157.37	1,609.79	-733.39	0.23	0.22	0.22
10,271.00	18.59	91.27	10,069.99	-157.57	1,627.79	-740.14	0.94	0.63	2.19
10,303.00	18.81	91.27	10,100.30	-157.80	1,638.05	-744.09	0.69	0.69	0.00
10,350.00	16.57	86.18	10,145.08	-157.52	1,652.31	-749.03	5.79	-4.77	-10.83
10,398.00	15.08	84.07	10,191.26	-156.42	1,665.35	-752.76	3.33	-3.10	-4.40
10,445.00	14.29	81.61	10,236.72	-154.94	1,677.17	-755.69	2.14	-1.68	-5.23
10,493.00	15.65	75.01	10,283.10	-152.40	1,689.29	-757.75	4.54	2.83	-13.75
10,540.00	15.74	64.47	10,328.35	-148.01	1,701.17	-757.99	6.06	0.19	-22.43
10,587.00	16.22	53.92	10,373.55	-141.40	1,712.23	-755.86	6.25	1.02	-22.45
10,634.00	16.40	45.75	10,418.66	-132.90	1,722.28	-751.62	4.89	0.38	-17.38
10,682.00	16.84	35.64	10,464.67	-122.52	1,731.19	-745.20	6.09	0.92	-21.06
10,729.00	18.02	29.31	10,509.51	-110.65	1,738.72	-736.89	4.75	2.51	-13.47
10,776.00	19.21	23.42	10,554.06	-97.21	1,745.35	-726.79	4.73	2.53	-12.53
10,823.00	20.70	17.89	10,598.24	-82.21	1,750.98	-714.87	5.11	3.17	-11.77
10,870.00	22.29	9.62	10,641.98	-65.51	1,755.02	-700.80	7.27	3.38	-17.60
10,917.00	22.99	1.89	10,685.37	-47.54	1,756.81	-684.72	6.50	1.49	-16.45
10,964.00	24.48	358.11	10,728.39	-28.64	1,756.79	-667.11	4.53	3.17	-8.04
11,011.00	27.03	356.09	10,770.72	-8.25	1,755.74	-647.74	5.74	5.43	-4.30
11,059.00	30.37	355.56	10,812.82	14.74	1,754.06	-625.72	6.98	6.96	-1.10
11,106.00	32.04	354.24	10,853.02	38.99	1,751.89	-602.35	3.84	3.55	-2.81
11,154.00	34.64	351.69	10,893.11	65.16	1,748.64	-576.79	6.15	5.42	-5.31
11,201.00	38.20	348.44	10,930.93	92.63	1,743.79	-549.45	8.61	7.57	-6.91
11,248.00	41.45	345.72	10,967.03	121.95	1,737.04	-519.68	7.84	6.91	-5.79
11,295.00	44.97	344.31	11,001.28	153.03	1,728.71	-487.71	7.77	7.49	-3.00
11,342.00	48.75	342.73	11,033.41	185.90	1,718.97	-453.54	8.41	8.04	-3.36
11,389.00	51.78	341.85	11,063.45	220.33	1,707.97	-417.48	6.61	6.45	-1.87
11,437.00	55.74	340.80	11,091.82	256.99	1,695.57	-378.82	8.44	8.25	-2.19
11,484.00	59.69	340.09	11,116.92	294.43	1,682.27	-339.11	8.50	8.40	-1.51
11,532.00	62.37	339.30	11,140.17	333.80	1,667.69	-297.13	5.77	5.58	-1.65

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Bryan N-13HU (slot E)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Site:	Bryan Pad	MD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Well:	Bryan N-13HU (slot E)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

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Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
11,579.00	64.88	338.95	11,161.05	373.14	1,652.69	-255.02	5.38	5.34	-0.74
11,626.00	67.65	338.51	11,179.96	413.23	1,637.08	-212.00	5.96	5.89	-0.94
11,673.00	71.21	337.02	11,196.47	453.95	1,620.43	-168.01	8.13	7.57	-3.17
11,721.00	74.07	335.79	11,210.80	495.93	1,602.09	-122.24	6.44	5.96	-2.56
11,768.00	76.92	334.99	11,222.57	537.29	1,583.14	-76.82	6.28	6.06	-1.70
11,815.00	78.95	334.29	11,232.39	578.82	1,563.45	-30.97	4.56	4.32	-1.49
11,862.00	81.45	333.24	11,240.39	620.36	1,542.98	15.17	5.76	5.32	-2.23
11,910.00	84.31	332.09	11,246.34	662.67	1,521.11	62.54	6.42	5.96	-2.40
11,957.00	87.03	330.69	11,249.89	703.81	1,498.67	109.03	6.50	5.79	-2.98
12,004.00	88.44	329.90	11,251.74	744.60	1,475.40	155.50	3.44	3.00	-1.68
12,099.00	90.73	330.51	11,252.43	827.03	1,428.20	249.46	2.49	2.41	0.64
12,194.00	90.90	330.60	11,251.08	909.75	1,381.50	343.52	0.20	0.18	0.09
12,288.00	90.64	330.42	11,249.82	991.56	1,335.23	436.57	0.34	-0.28	-0.19
12,383.00	91.78	330.60	11,247.81	1,074.24	1,288.48	530.59	1.21	1.20	0.19
12,477.00	91.96	331.04	11,244.74	1,156.26	1,242.67	623.67	0.51	0.19	0.47
12,571.00	91.87	330.78	11,241.60	1,238.36	1,197.00	716.77	0.29	-0.10	-0.28
12,666.00	91.74	330.51	11,238.61	1,321.12	1,150.45	810.81	0.32	-0.14	-0.28
12,761.00	91.69	331.04	11,235.77	1,403.99	1,104.09	904.88	0.56	-0.05	0.56
12,855.00	90.33	329.02	11,234.11	1,485.40	1,057.14	997.80	2.59	-1.45	-2.15
12,950.00	90.11	329.11	11,233.75	1,566.89	1,008.31	1,091.48	0.25	-0.23	0.09
13,044.00	89.93	328.93	11,233.71	1,647.48	959.92	1,184.16	0.27	-0.19	-0.19
13,138.00	90.86	329.46	11,233.07	1,728.21	911.78	1,276.89	1.14	0.99	0.56
13,233.00	91.08	329.46	11,231.46	1,810.02	863.52	1,370.67	0.23	0.23	0.00
13,327.00	91.08	329.72	11,229.69	1,891.08	815.94	1,463.49	0.28	0.00	0.28
13,421.00	91.08	329.28	11,227.91	1,972.06	768.24	1,556.28	0.47	0.00	-0.47
13,515.00	91.21	329.55	11,226.04	2,052.96	720.43	1,649.05	0.32	0.14	0.29
13,610.00	91.30	329.81	11,223.95	2,134.95	672.48	1,742.87	0.29	0.09	0.27
13,704.00	91.38	330.42	11,221.76	2,216.43	625.65	1,835.81	0.65	0.09	0.65
13,799.00	91.25	329.37	11,219.58	2,298.59	578.02	1,929.69	1.11	-0.14	-1.11
13,893.00	90.90	329.02	11,217.81	2,379.31	529.89	2,022.40	0.53	-0.37	-0.37
13,988.00	90.95	329.02	11,216.28	2,460.75	480.99	2,116.06	0.05	0.05	0.00
14,082.00	91.30	329.55	11,214.43	2,541.55	432.99	2,208.80	0.68	0.37	0.56
14,177.00	91.34	329.98	11,212.24	2,623.60	385.17	2,302.64	0.45	0.04	0.45
14,271.00	91.30	330.78	11,210.08	2,705.30	338.72	2,395.64	0.85	-0.04	0.85
14,366.00	91.25	331.57	11,207.97	2,788.50	292.93	2,489.82	0.83	-0.05	0.83
14,460.00	91.12	332.01	11,206.02	2,871.32	248.50	2,583.13	0.49	-0.14	0.47
14,555.00	89.71	330.51	11,205.33	2,954.61	202.83	2,677.34	2.17	-1.48	-1.58
14,650.00	89.67	330.60	11,205.85	3,037.34	156.13	2,771.40	0.10	-0.04	0.09
14,745.00	90.20	329.46	11,205.96	3,119.63	108.67	2,865.33	1.32	0.56	-1.20
14,839.00	91.47	328.40	11,204.59	3,200.14	60.17	2,957.98	1.76	1.35	-1.13
14,934.00	91.78	327.52	11,201.89	3,280.63	9.79	3,051.30	0.98	0.33	-0.93
15,029.00	92.13	329.98	11,198.65	3,361.80	-39.46	3,144.83	2.61	0.37	2.59
15,123.00	91.78	328.75	11,195.44	3,442.63	-87.33	3,237.55	1.36	-0.37	-1.31
15,218.00	92.75	331.57	11,191.69	3,524.96	-134.56	3,331.44	3.14	1.02	2.97

WV Department of Environmental Protection

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Bryan N-13HU (slot E)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Site:	Bryan Pad	MD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Well:	Bryan N-13HU (slot E)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

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Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
15,312.00	90.33	331.22	11,189.16	3,607.45	-179.55	3,424.65	2.60	-2.57	-0.37
15,406.00	91.82	330.16	11,187.40	3,689.40	-225.55	3,517.73	1.95	1.59	-1.13
15,500.00	92.18	328.58	11,184.12	3,770.23	-273.41	3,610.45	1.72	0.38	-1.68
15,595.00	92.35	330.42	11,180.36	3,852.02	-321.59	3,704.17	1.94	0.18	1.94
15,689.00	92.00	330.25	11,176.79	3,933.64	-368.08	3,797.12	0.41	-0.37	-0.18
15,784.00	91.74	330.16	11,173.69	4,016.04	-415.26	3,891.05	0.29	-0.27	-0.09
15,878.00	91.74	330.78	11,170.84	4,097.79	-461.57	3,984.06	0.66	0.00	0.66
15,973.00	91.56	330.60	11,168.11	4,180.59	-508.05	4,078.11	0.27	-0.19	-0.19
16,067.00	91.34	330.60	11,165.73	4,262.46	-554.19	4,171.16	0.23	-0.23	0.00
16,162.00	91.47	329.81	11,163.40	4,344.87	-601.38	4,265.11	0.84	0.14	-0.83
16,256.00	91.69	329.63	11,160.81	4,426.02	-648.75	4,357.94	0.30	0.23	-0.19
16,351.00	91.65	329.63	11,158.04	4,507.95	-696.76	4,451.73	0.04	-0.04	0.00
16,445.00	91.65	329.19	11,155.33	4,588.83	-744.58	4,544.48	0.47	0.00	-0.47
16,540.00	91.16	328.40	11,153.00	4,670.06	-793.79	4,638.06	0.98	-0.52	-0.83
16,635.00	92.26	329.37	11,150.17	4,751.36	-842.85	4,731.65	1.54	1.16	1.02
16,730.00	92.31	329.02	11,146.38	4,832.89	-891.47	4,825.29	0.37	0.05	-0.37
16,824.00	92.66	329.11	11,142.30	4,913.44	-939.74	4,917.90	0.38	0.37	0.10
16,919.00	91.78	330.34	11,138.62	4,995.42	-987.60	5,011.68	1.59	-0.93	1.29
17,013.00	90.73	329.37	11,136.56	5,076.69	-1,034.79	5,104.56	1.52	-1.12	-1.03
17,107.00	90.86	329.37	11,135.26	5,157.56	-1,082.68	5,197.33	0.14	0.14	0.00
17,202.00	91.43	329.55	11,133.36	5,239.37	-1,130.94	5,291.10	0.63	0.60	0.19
17,296.00	91.69	329.28	11,130.80	5,320.26	-1,178.76	5,383.85	0.40	0.28	-0.29
17,391.00	91.12	329.90	11,128.47	5,402.17	-1,226.83	5,477.65	0.89	-0.60	0.65
17,485.00	91.65	330.34	11,126.20	5,483.65	-1,273.64	5,570.59	0.73	0.56	0.47
17,580.00	91.21	330.16	11,123.83	5,566.10	-1,320.77	5,664.55	0.50	-0.46	-0.19
17,674.00	91.21	330.07	11,121.84	5,647.58	-1,367.60	5,757.49	0.10	0.00	-0.10
17,768.00	91.43	328.75	11,119.68	5,728.48	-1,415.42	5,850.25	1.42	0.23	-1.40
17,863.00	90.24	329.02	11,118.30	5,809.80	-1,464.50	5,943.87	1.28	-1.25	0.28
17,957.00	90.51	329.11	11,117.68	5,890.43	-1,512.82	6,036.57	0.30	0.29	0.10
18,052.00	90.68	329.28	11,116.69	5,972.02	-1,561.47	6,130.28	0.25	0.18	0.18
18,146.00	90.95	329.02	11,115.36	6,052.71	-1,609.67	6,222.99	0.40	0.29	-0.28
18,240.00	91.47	330.86	11,113.37	6,134.04	-1,656.74	6,315.89	2.03	0.55	1.96
18,335.00	91.47	330.69	11,110.93	6,216.92	-1,703.11	6,409.97	0.18	0.00	-0.18
18,429.00	91.78	330.60	11,108.27	6,298.82	-1,749.17	6,503.02	0.34	0.33	-0.10
18,523.00	92.31	330.25	11,104.91	6,380.52	-1,795.54	6,596.00	0.68	0.56	-0.37
18,618.00	90.95	330.25	11,102.21	6,462.97	-1,842.66	6,689.95	1.43	-1.43	0.00
18,712.00	91.30	330.60	11,100.37	6,544.70	-1,889.04	6,782.97	0.53	0.37	0.37
18,807.00	91.78	330.95	11,097.81	6,627.58	-1,935.41	6,877.05	0.63	0.51	0.37
18,901.00	90.29	331.30	11,096.12	6,709.88	-1,980.79	6,970.23	1.63	-1.59	0.37
18,995.00	90.59	330.86	11,095.39	6,792.15	-2,026.25	7,063.41	0.57	0.32	-0.47
19,090.00	91.12	331.39	11,093.98	6,875.33	-2,072.12	7,157.59	0.79	0.56	0.56
19,184.00	91.69	331.92	11,091.67	6,958.04	-2,116.73	7,250.86	0.83	0.61	0.56
19,279.00	92.18	332.18	11,088.46	7,041.91	-2,161.24	7,345.19	0.58	0.52	0.27

WV Department of Environmental Protection

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Bryan N-13HU (slot E)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Site:	Bryan Pad	MD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Well:	Bryan N-13HU (slot E)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

 WV DEPARTMENT OF
 Office of Oil and Gas
 AUG 14 2020

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
19,373.00	91.56	330.69	11,085.40	7,124.42	-2,206.16	7,438.40	1.72	-0.66	-1.59
19,468.00	89.76	330.69	11,084.30	7,207.25	-2,252.66	7,532.48	1.89	-1.89	0.00
19,562.00	90.42	330.69	11,084.15	7,289.21	-2,298.67	7,625.58	0.70	0.70	0.00
19,657.00	90.95	328.49	11,083.02	7,371.13	-2,346.75	7,719.39	2.38	0.56	-2.32
19,752.00	91.96	329.11	11,080.61	7,452.36	-2,395.95	7,812.96	1.25	1.06	0.65
19,847.00	92.44	329.02	11,076.96	7,533.79	-2,444.75	7,906.58	0.51	0.51	-0.09
19,942.00	90.77	329.37	11,074.30	7,615.35	-2,493.38	8,000.25	1.80	-1.76	0.37
20,036.00	91.52	330.25	11,072.42	7,696.58	-2,540.64	8,093.12	1.23	0.80	0.94
20,131.00	90.73	330.42	11,070.55	7,779.12	-2,587.65	8,187.11	0.85	-0.83	0.18
20,226.00	91.08	330.42	11,069.05	7,861.72	-2,634.54	8,281.13	0.37	0.37	0.00
20,321.00	91.52	329.63	11,066.90	7,944.00	-2,681.99	8,375.04	0.95	0.46	-0.83
20,416.00	92.26	329.72	11,063.77	8,025.95	-2,729.93	8,468.83	0.78	0.78	0.09
20,511.00	90.95	330.60	11,061.10	8,108.32	-2,777.18	8,562.76	1.66	-1.38	0.93
20,605.00	91.56	331.39	11,059.05	8,190.51	-2,822.75	8,655.90	1.06	0.65	0.84
20,700.00	90.42	331.30	11,057.40	8,273.86	-2,868.30	8,750.12	1.20	-1.20	-0.09
20,795.00	90.46	330.07	11,056.67	8,356.69	-2,914.81	8,844.21	1.30	0.04	-1.29
20,890.00	90.81	329.46	11,055.62	8,438.76	-2,962.64	8,938.07	0.74	0.37	-0.64
20,984.00	91.16	328.75	11,054.01	8,519.41	-3,010.90	9,030.76	0.84	0.37	-0.76
21,080.00	91.74	329.28	11,051.58	8,601.69	-3,060.30	9,125.39	0.82	0.60	0.55
21,175.00	91.82	328.75	11,048.63	8,683.09	-3,109.19	9,219.01	0.56	0.08	-0.56
21,270.00	90.51	328.93	11,046.69	8,764.37	-3,158.33	9,312.61	1.39	-1.38	0.19
21,365.00	89.80	329.46	11,046.44	8,845.96	-3,206.98	9,406.32	0.93	-0.75	0.56
21,460.00	90.51	329.72	11,046.18	8,927.89	-3,255.07	9,500.14	0.80	0.75	0.27
21,555.00	90.68	329.72	11,045.19	9,009.93	-3,302.97	9,594.00	0.18	0.18	0.00
21,650.00	90.59	329.37	11,044.14	9,091.82	-3,351.12	9,687.80	0.38	-0.09	-0.37
21,745.00	91.12	328.67	11,042.72	9,173.25	-3,400.01	9,781.46	0.92	0.56	-0.74
21,840.00	90.99	328.49	11,040.97	9,254.31	-3,449.53	9,874.99	0.23	-0.14	-0.19
21,935.00	91.82	328.05	11,038.65	9,335.09	-3,499.47	9,968.41	0.99	0.87	-0.46
22,030.00	90.46	328.84	11,036.75	9,416.02	-3,549.18	10,061.90	1.66	-1.43	0.83
22,125.00	91.25	330.42	11,035.34	9,497.97	-3,597.20	10,155.72	1.86	0.83	1.66
22,219.00	92.04	331.74	11,032.64	9,580.21	-3,642.64	10,248.86	1.64	0.84	1.40
22,314.00	92.79	331.65	11,028.64	9,663.78	-3,687.64	10,343.09	0.80	0.79	-0.09
22,409.00	91.69	331.22	11,024.92	9,747.15	-3,733.03	10,437.27	1.24	-1.16	-0.45
22,504.00	90.02	330.86	11,023.51	9,830.26	-3,779.02	10,531.42	1.80	-1.76	-0.38
22,599.00	90.42	330.86	11,023.14	9,913.23	-3,825.28	10,625.55	0.42	0.42	0.00
22,694.00	90.51	330.25	11,022.37	9,995.96	-3,871.98	10,719.61	0.65	0.09	-0.64
22,788.00	90.77	329.72	11,021.32	10,077.35	-3,919.00	10,812.54	0.63	0.28	-0.56
22,883.00	91.03	329.55	11,019.83	10,159.31	-3,967.02	10,906.36	0.33	0.27	-0.18
Survey @ 22883.00 MD 11019.83 TVD									
22,941.00	91.03	329.55	11,018.78	10,209.30	-3,996.41	10,963.62	0.00	0.00	0.00
Survey projected to 22941.00 MD 11018.78 TVD									

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Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Bryan N-13HU (slot E)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Site:	Bryan Pad	MD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Well:	Bryan N-13HU (slot E)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
234.00	234.00	-0.05	0.26	MWD surveys
22,883.00	11,019.83	10,159.31	-3,967.02	Survey @ 22883.00 MD 11019.83 TVD
22,941.00	11,018.78	10,209.30	-3,996.41	Survey projected to 22941.00 MD 11018.78 TVD

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Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Bryan N-13HU (slot E)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Site:	Bryan Pad	MD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Well:	Bryan N-13HU (slot E)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_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	Bryan Pad				
Site Position:		Northing:	14,445,110.80 usft	Latitude:	39.77562900
From:	Lat/Long	Easting:	1,703,181.57 usft	Longitude:	-80.77660992
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.143 °

Well	Bryan N-13HU (slot E)					
Well Position	+N/-S	0.00 usft	Northing:	14,445,106.19 usft	Latitude:	39.77561617
	+E/-W	0.00 usft	Easting:	1,703,207.00 usft	Longitude:	-80.77651946
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	1,191.00 usft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
	IGRF2015	11/12/2019	(°) -8.714	(°) 66.756	(nT) 51,898.57489695

Design	Surveys Original Hole				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:		Depth From (TVD)	+N/-S	+E/-W	Direction
		(usft)	(usft)	(usft)	(°)
		0.00	0.00	0.00	338.62

Survey Program	Date	11/25/2019			
From	To	Survey (Wellbore)	Tool Name	Description	
(usft)	(usft)				
234.00	920.00	MWD surf (Original Hole)	MWD	MWD - Standard	
1,073.00	2,779.00	MWD int (Original Hole)	MWD	MWD - Standard	
2,937.00	10,214.00	MWD (Original Hole)	MWD	MWD - Standard	
10,271.00	22,883.00	MWD lat (Original Hole)	MWD	MWD - Standard	
22,941.00	22,941.00	Projection (Original Hole)	MWD	MWD - Standard	

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Survey	WV Department of Environmental Protection									
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Map	Map	Latitude	Longitude	
Depth	(°)	(°)	Depth	(usft)	(usft)	Northing	Easting			
(usft)			(usft)	(usft)	(usft)	(usft)	(usft)			
0.00	0.00	0.00	0.00	0.00	0.00	14,445,106.19	1,703,207.00	39.77561617	-80.77651946	
234.00	0.13	100.57	234.00	-0.05	0.26	14,445,106.14	1,703,207.26	39.77561604	-80.77651853	
MWD surveys										
325.00	0.17	81.15	325.00	-0.05	0.50	14,445,106.14	1,703,207.50	39.77561604	-80.77651770	
416.00	0.08	112.35	416.00	-0.05	0.69	14,445,106.14	1,703,207.69	39.77561603	-80.77651701	
506.00	0.08	317.40	506.00	-0.03	0.70	14,445,106.16	1,703,207.71	39.77561609	-80.77651696	
598.00	0.08	290.33	598.00	0.04	0.60	14,445,106.23	1,703,207.60	39.77561628	-80.77651733	
690.00	0.13	158.32	690.00	-0.03	0.58	14,445,106.16	1,703,207.58	39.77561608	-80.77651740	

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Bryan N-13HU (slot E)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Site:	Bryan Pad	MD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Well:	Bryan N-13HU (slot E)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
781.00	0.04	261.15	781.00	-0.13	0.58	14,445,106.06	1,703,207.59	39.77561580	-80.77651728
872.00	0.09	16.11	872.00	-0.07	0.57	14,445,106.12	1,703,207.58	39.77561598	-80.77651742
920.00	0.08	81.15	920.00	-0.03	0.62	14,445,106.16	1,703,207.62	39.77561609	-80.77651727
1,073.00	0.66	342.89	1,073.00	0.83	0.46	14,445,107.02	1,703,207.47	39.77561845	-80.77651780
1,168.00	1.32	115.87	1,167.99	0.88	1.29	14,445,107.06	1,703,208.29	39.77561857	-80.77651487
1,263.00	2.55	121.49	1,262.93	-0.71	4.07	14,445,105.48	1,703,211.08	39.77561421	-80.77650497
1,357.00	3.91	124.21	1,356.78	-3.60	8.51	14,445,102.59	1,703,215.51	39.77560623	-80.77648921
1,452.00	4.52	121.66	1,451.52	-7.39	14.37	14,445,098.80	1,703,221.37	39.77559579	-80.77646837
1,547.00	4.43	128.43	1,546.23	-11.63	20.43	14,445,094.56	1,703,227.44	39.77558409	-80.77644684
1,642.00	4.74	138.36	1,640.93	-16.85	25.92	14,445,089.34	1,703,232.92	39.77556973	-80.77642738
1,736.00	3.64	133.18	1,734.68	-21.79	30.67	14,445,084.40	1,703,237.67	39.77555612	-80.77641049
1,831.00	2.02	148.03	1,829.56	-25.27	33.76	14,445,080.92	1,703,240.76	39.77554653	-80.77639954
1,926.00	3.12	143.20	1,924.46	-28.76	36.19	14,445,077.42	1,703,243.20	39.77553693	-80.77639090
2,021.00	4.70	134.85	2,019.24	-33.58	40.50	14,445,072.61	1,703,247.50	39.77552367	-80.77637561
2,116.00	3.96	131.60	2,113.97	-38.50	45.71	14,445,067.69	1,703,252.72	39.77551012	-80.77635710
2,210.00	3.03	124.74	2,207.79	-42.07	50.18	14,445,064.12	1,703,257.18	39.77550028	-80.77634123
2,305.00	3.52	115.52	2,302.64	-44.76	54.88	14,445,061.43	1,703,261.88	39.77549287	-80.77632454
2,400.00	3.78	125.71	2,397.45	-47.85	60.05	14,445,058.34	1,703,267.05	39.77548436	-80.77630615
2,494.00	3.16	136.87	2,491.28	-51.54	64.34	14,445,054.64	1,703,271.34	39.77547417	-80.77629093
2,589.00	2.77	150.23	2,586.15	-55.45	67.27	14,445,050.74	1,703,274.27	39.77546343	-80.77628053
2,684.00	3.34	155.86	2,681.01	-59.97	69.54	14,445,046.22	1,703,276.54	39.77545101	-80.77627249
2,779.00	3.16	145.05	2,775.86	-64.64	72.17	14,445,041.55	1,703,279.18	39.77543816	-80.77626316
2,937.00	3.16	135.82	2,933.62	-71.33	77.70	14,445,034.86	1,703,284.70	39.77541975	-80.77624354
3,063.00	4.79	124.74	3,059.32	-76.82	84.45	14,445,029.37	1,703,291.45	39.77540463	-80.77621959
3,158.00	5.98	113.93	3,153.90	-81.09	92.23	14,445,025.10	1,703,299.23	39.77539285	-80.77619193
3,252.00	7.60	99.52	3,247.24	-84.10	102.84	14,445,022.09	1,703,309.84	39.77538450	-80.77615420
3,347.00	9.54	94.16	3,341.18	-85.71	116.89	14,445,020.48	1,703,323.89	39.77537998	-80.77610421
3,442.00	11.29	94.77	3,434.61	-87.06	134.01	14,445,019.13	1,703,341.01	39.77537617	-80.77604329
3,537.00	12.61	96.36	3,527.55	-88.98	153.58	14,445,017.21	1,703,360.58	39.77537076	-80.77597364
3,631.00	14.11	96.62	3,619.00	-91.44	175.16	14,445,014.75	1,703,382.16	39.77536386	-80.77589686
3,726.00	13.71	97.41	3,711.22	-94.22	197.83	14,445,011.97	1,703,404.83	39.77535605	-80.77581621
3,821.00	13.05	97.94	3,803.64	-97.16	219.61	14,445,009.03	1,703,426.62	39.77534784	-80.77573869
3,916.00	13.80	96.18	3,896.04	-99.86	241.50	14,445,006.33	1,703,448.50	39.77534028	-80.77566082
4,010.00	13.49	96.36	3,987.39	-102.28	263.54	14,445,003.91	1,703,470.55	39.77533347	-80.77558239
4,105.00	12.96	94.77	4,079.87	-104.39	285.17	14,445,001.80	1,703,492.17	39.77532752	-80.77550543
4,199.00	13.49	92.66	4,171.38	-105.78	306.63	14,445,000.41	1,703,513.63	39.77532357	-80.77542907
4,297.00	13.18	96.88	4,266.74	-107.65	329.14	14,444,998.54	1,703,536.14	39.77531828	-80.77534897
4,392.00	14.46	98.46	4,358.99	-110.69	351.63	14,444,995.50	1,703,558.63	39.77530977	-80.77526897
4,487.00	14.23	100.22	4,451.02	-114.51	374.85	14,444,991.68	1,703,581.85	39.77529913	-80.77518635
4,582.00	15.12	99.34	4,542.92	-118.59	398.57	14,444,987.60	1,703,605.57	39.77528775	-80.77510198
4,676.00	16.70	99.34	4,633.32	-122.77	423.99	14,444,983.42	1,703,630.99	39.77527609	-80.77501152
4,771.00	15.16	98.55	4,724.67	-126.83	449.75	14,444,979.36	1,703,656.75	39.77526476	-80.77491989
4,866.00	12.96	96.44	4,816.82	-129.88	472.62	14,444,976.31	1,703,679.62	39.77525625	-80.77483852
4,961.00	12.26	96.09	4,909.53	-132.14	493.23	14,444,974.05	1,703,700.24	39.77524988	-80.77476516
5,055.00	13.10	93.89	5,001.23	-133.92	513.79	14,444,972.27	1,703,720.79	39.77524485	-80.77469203
5,150.00	13.58	93.81	5,093.67	-135.39	535.66	14,444,970.80	1,703,742.66	39.77524066	-80.77461421
5,245.00	12.39	91.96	5,186.24	-136.48	556.97	14,444,969.71	1,703,763.97	39.77523752	-80.77453835
5,340.00	12.57	92.22	5,278.99	-137.23	577.49	14,444,968.96	1,703,784.49	39.77523532	-80.77446534
5,434.00	12.58	91.87	5,370.74	-137.96	597.94	14,444,968.23	1,703,804.94	39.77523317	-80.77439256
5,529.00	12.66	93.10	5,463.44	-138.86	618.67	14,444,967.33	1,703,825.68	39.77523056	-80.77431877
5,624.00	12.57	91.70	5,556.15	-139.73	639.40	14,444,966.46	1,703,846.40	39.77522802	-80.77424500
5,719.00	13.14	91.35	5,648.77	-140.29	660.53	14,444,965.90	1,703,867.53	39.77522634	-80.77416981
5,814.00	12.04	97.06	5,741.49	-141.77	681.16	14,444,964.42	1,703,888.16	39.77522215	-80.77409640
5,909.00	12.44	100.49	5,834.33	-144.85	701.05	14,444,961.34	1,703,908.06	39.77521355	-80.77402562
6,003.00	10.90	99.52	5,926.38	-148.16	719.78	14,444,958.03	1,703,926.78	39.77520432	-80.77395901

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Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Bryan N-13HU (slot E)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Site:	Bryan Pad	MD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Well:	Bryan N-13HU (slot E)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
6,098.00	9.40	94.07	6,019.90	-150.20	736.37	14,444,955.99	1,703,943.38	39.77519861	-80.77389996	
6,193.00	7.69	89.41	6,113.84	-150.68	750.47	14,444,955.51	1,703,957.47	39.77519718	-80.77384980	
6,287.00	6.06	93.81	6,207.16	-150.95	761.71	14,444,955.24	1,703,968.71	39.77519638	-80.77380979	
6,382.00	3.96	98.20	6,301.79	-151.75	769.96	14,444,954.44	1,703,976.96	39.77519412	-80.77378043	
6,477.00	2.99	99.96	6,396.62	-152.64	775.65	14,444,953.55	1,703,982.65	39.77519162	-80.77376020	
6,593.00	3.21	114.28	6,512.45	-154.50	781.59	14,444,951.69	1,703,988.59	39.77518647	-80.77373907	
6,688.00	3.87	114.20	6,607.27	-156.91	786.94	14,444,949.28	1,703,993.94	39.77517982	-80.77372006	
6,783.00	4.13	114.02	6,702.04	-159.62	792.99	14,444,946.57	1,703,999.99	39.77517235	-80.77369855	
6,878.00	4.57	116.04	6,796.76	-162.67	799.51	14,444,943.52	1,704,006.51	39.77516392	-80.77367536	
6,973.00	3.87	114.64	6,891.50	-165.67	805.83	14,444,940.52	1,704,012.83	39.77515564	-80.77365291	
7,046.00	2.81	98.20	6,964.38	-166.95	809.84	14,444,939.24	1,704,016.84	39.77515209	-80.77363865	
7,093.00	2.32	81.15	7,011.33	-166.97	811.92	14,444,939.22	1,704,018.92	39.77515203	-80.77363124	
7,141.00	2.68	71.65	7,059.29	-166.47	813.94	14,444,939.72	1,704,020.95	39.77515339	-80.77362403	
7,235.00	2.90	93.54	7,153.18	-165.92	818.40	14,444,940.27	1,704,025.40	39.77515486	-80.77360816	
7,330.00	3.47	96.44	7,248.03	-166.39	823.66	14,444,939.80	1,704,030.66	39.77515353	-80.77358945	
7,425.00	5.58	85.46	7,342.73	-166.35	831.12	14,444,939.84	1,704,038.12	39.77515360	-80.77356290	
7,520.00	8.00	82.64	7,437.06	-165.14	842.28	14,444,941.05	1,704,049.28	39.77515685	-80.77352316	
7,615.00	9.58	86.16	7,530.94	-163.76	856.73	14,444,942.43	1,704,063.73	39.77516053	-80.77347174	
7,709.00	10.59	92.22	7,623.49	-163.57	873.16	14,444,942.62	1,704,080.17	39.77516093	-80.77341323	
7,804.00	12.17	92.48	7,716.62	-164.34	891.89	14,444,941.85	1,704,098.89	39.77515868	-80.77334659	
7,899.00	13.13	92.48	7,809.31	-165.24	912.68	14,444,940.95	1,704,119.68	39.77515607	-80.77327262	
7,994.00	15.11	89.85	7,901.44	-165.68	935.84	14,444,940.51	1,704,142.84	39.77515471	-80.77319018	
8,088.00	16.35	89.06	7,991.92	-165.43	961.32	14,444,940.76	1,704,168.32	39.77515522	-80.77309948	
8,183.00	16.20	86.95	8,083.11	-164.50	987.93	14,444,941.69	1,704,194.93	39.77515757	-80.77300479	
8,278.00	17.62	88.36	8,174.00	-163.39	1,015.53	14,444,942.80	1,704,222.54	39.77516045	-80.77290652	
8,373.00	17.40	90.11	8,264.60	-163.00	1,044.11	14,444,943.19	1,704,251.11	39.77516130	-80.77280481	
8,467.00	14.28	83.61	8,355.03	-161.74	1,069.69	14,444,944.45	1,704,276.70	39.77516460	-80.77271374	
8,562.00	14.67	86.77	8,447.01	-159.76	1,093.35	14,444,946.43	1,704,300.35	39.77516987	-80.77262954	
8,657.00	18.23	92.66	8,538.12	-159.77	1,120.21	14,444,946.42	1,704,327.22	39.77516965	-80.77253392	
8,752.00	19.47	92.05	8,628.02	-161.03	1,150.88	14,444,945.16	1,704,357.88	39.77516599	-80.77242479	
8,846.00	20.52	89.85	8,716.35	-161.54	1,183.01	14,444,944.65	1,704,390.01	39.77516435	-80.77231043	
8,941.00	19.95	90.38	8,805.49	-161.61	1,215.87	14,444,944.58	1,704,422.87	39.77516394	-80.77219349	
9,036.00	18.28	89.06	8,895.25	-161.47	1,246.98	14,444,944.72	1,704,453.98	39.77516410	-80.77208278	
9,131.00	18.63	89.58	8,985.36	-161.11	1,277.05	14,444,945.08	1,704,484.05	39.77516487	-80.77197575	
9,225.00	17.66	89.49	9,074.69	-160.88	1,306.32	14,444,945.31	1,704,513.32	39.77516531	-80.77187156	
9,320.00	17.84	89.15	9,165.17	-160.53	1,335.28	14,444,945.66	1,704,542.28	39.77516606	-80.77176849	
9,415.00	18.46	89.41	9,255.44	-160.16	1,364.87	14,444,946.03	1,704,571.87	39.77516687	-80.77166317	
9,510.00	16.48	90.29	9,346.05	-160.08	1,393.39	14,444,946.11	1,704,600.39	39.77516690	-80.77156167	
9,604.00	17.14	90.64	9,436.03	-160.30	1,420.57	14,444,945.89	1,704,627.57	39.77516610	-80.77146493	
9,699.00	18.24	90.38	9,526.54	-160.55	1,449.44	14,444,945.64	1,704,656.44	39.77516520	-80.77136219	
9,794.00	18.36	91.25	9,616.74	-160.98	1,479.26	14,444,945.21	1,704,686.26	39.77516382	-80.77125605	
9,889.00	18.14	87.39	9,706.96	-160.63	1,508.99	14,444,945.56	1,704,716.00	39.77516457	-80.77115022	
9,983.00	17.97	85.98	9,796.33	-158.95	1,538.08	14,444,947.24	1,704,745.08	39.77516899	-80.77104670	
10,078.00	18.10	88.97	9,886.67	-157.66	1,567.45	14,444,948.53	1,704,774.45	39.77517233	-80.77094214	
10,173.00	18.14	89.93	9,976.96	-157.37	1,596.99	14,444,948.82	1,704,804.00	39.77517290	-80.77083699	
10,214.00	18.23	90.02	10,015.91	-157.37	1,609.79	14,444,948.82	1,704,816.79	39.77517283	-80.77079145	
10,271.00	18.59	91.27	10,069.99	-157.57	1,627.79	14,444,948.62	1,704,834.79	39.77517214	-80.77072739	
10,303.00	18.81	91.27	10,100.30	-157.80	1,638.05	14,444,948.39	1,704,845.05	39.77517144	-80.77069089	
10,350.00	16.57	86.18	10,145.08	-157.52	1,652.31	14,444,948.67	1,704,859.31	39.77517211	-80.77064011	
10,398.00	15.08	84.07	10,191.26	-156.42	1,665.35	14,444,949.77	1,704,872.35	39.77517504	-80.77059369	
10,445.00	14.29	81.61	10,236.72	-154.94	1,677.17	14,444,951.25	1,704,884.17	39.77517901	-80.77055161	
10,493.00	15.65	75.01	10,283.10	-152.40	1,689.29	14,444,953.79	1,704,896.29	39.77518590	-80.77050846	
10,540.00	15.74	64.47	10,328.35	-148.01	1,701.17	14,444,958.18	1,704,908.17	39.77519787	-80.77046614	
10,587.00	16.22	53.92	10,373.55	-141.40	1,712.23	14,444,964.79	1,704,919.23	39.77521596	-80.77042672	
10,634.00	16.40	45.75	10,418.66	-132.90	1,722.28	14,444,973.29	1,704,929.29	39.77523922	-80.77039084	

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Bryan N-13HU (slot E)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Site:	Bryan Pad	MD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Well:	Bryan N-13HU (slot E)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

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Survey

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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
10,682.00	16.84	35.64	10,464.67	-122.52	1,731.19	14,444,983.67	1,704,938.19	39.77526767	-80.77035905
10,729.00	18.02	29.31	10,509.51	-110.65	1,738.72	14,444,995.54	1,704,945.72	39.77530022	-80.77033215
10,776.00	19.21	23.42	10,554.06	-97.21	1,745.35	14,445,008.98	1,704,952.35	39.77533708	-80.77030842
10,823.00	20.70	17.89	10,598.24	-82.21	1,750.98	14,445,023.98	1,704,957.98	39.77537824	-80.77028826
10,870.00	22.29	9.62	10,641.98	-65.51	1,755.02	14,445,040.68	1,704,962.02	39.77542407	-80.77027372
10,917.00	22.99	1.89	10,685.37	-47.54	1,756.81	14,445,058.64	1,704,963.81	39.77547339	-80.77026717
10,964.00	24.48	358.11	10,728.39	-28.64	1,756.79	14,445,077.55	1,704,963.80	39.77552532	-80.77026707
11,011.00	27.03	356.09	10,770.72	-8.25	1,755.74	14,445,097.94	1,704,962.75	39.77558133	-80.77027062
11,059.00	30.37	355.56	10,812.82	14.74	1,754.06	14,445,120.93	1,704,961.06	39.77564446	-80.77027640
11,106.00	32.04	354.24	10,853.02	38.99	1,751.89	14,445,145.18	1,704,958.89	39.77571108	-80.77028391
11,154.00	34.64	351.69	10,893.11	65.16	1,748.64	14,445,171.35	1,704,955.64	39.77578298	-80.77029523
11,201.00	38.20	348.44	10,930.93	92.63	1,743.79	14,445,198.82	1,704,950.80	39.77585845	-80.77031223
11,248.00	41.45	345.72	10,967.03	121.95	1,737.04	14,445,228.14	1,704,944.05	39.77593902	-80.77033599
11,295.00	44.97	344.31	11,001.28	153.03	1,728.71	14,445,259.22	1,704,935.71	39.77602442	-80.77036536
11,342.00	48.75	342.73	11,033.41	185.90	1,718.97	14,445,292.09	1,704,925.97	39.77611477	-80.77039973
11,389.00	51.78	341.85	11,063.45	220.33	1,707.97	14,445,326.52	1,704,914.97	39.77620939	-80.77043856
11,437.00	55.74	340.80	11,091.82	256.99	1,695.57	14,445,363.18	1,704,902.57	39.77631017	-80.77048237
11,484.00	59.69	340.09	11,116.92	294.43	1,682.27	14,445,400.61	1,704,889.27	39.77641306	-80.77052937
11,532.00	62.37	339.30	11,140.17	333.80	1,667.69	14,445,439.99	1,704,874.70	39.77652131	-80.77058088
11,579.00	64.88	338.95	11,161.05	373.14	1,652.69	14,445,479.33	1,704,859.69	39.77662946	-80.77063393
11,626.00	67.65	338.51	11,179.96	413.23	1,637.08	14,445,519.42	1,704,844.08	39.77673966	-80.77068911
11,673.00	71.21	337.02	11,196.47	453.95	1,620.43	14,445,560.14	1,704,827.43	39.77685161	-80.77074802
11,721.00	74.07	335.79	11,210.80	495.93	1,602.09	14,445,602.12	1,704,809.09	39.77696702	-80.77081291
11,768.00	76.92	334.99	11,222.57	537.29	1,583.14	14,445,643.48	1,704,790.14	39.77708074	-80.77087997
11,815.00	78.95	334.29	11,232.39	578.82	1,563.45	14,445,685.01	1,704,770.46	39.77719494	-80.77094966
11,862.00	81.45	333.24	11,240.39	620.36	1,542.98	14,445,726.55	1,704,749.98	39.77730916	-80.77102215
11,910.00	84.31	332.09	11,246.34	662.67	1,521.11	14,445,768.86	1,704,728.11	39.77742549	-80.77109960
11,957.00	87.03	330.69	11,249.89	703.81	1,498.67	14,445,810.00	1,704,705.67	39.77753863	-80.77117910
12,004.00	88.44	329.90	11,251.74	744.60	1,475.40	14,445,850.79	1,704,682.40	39.77765081	-80.77126155
12,099.00	90.73	330.51	11,252.43	827.03	1,428.20	14,445,933.22	1,704,635.20	39.77787753	-80.77142880
12,194.00	90.90	330.60	11,251.08	909.75	1,381.50	14,446,015.94	1,704,588.51	39.77810503	-80.77159425
12,288.00	90.64	330.42	11,249.82	991.56	1,335.23	14,446,097.75	1,704,542.24	39.77833004	-80.77175820
12,383.00	91.78	330.60	11,247.81	1,074.24	1,288.48	14,446,180.43	1,704,495.48	39.77855740	-80.77192386
12,477.00	91.96	331.04	11,244.74	1,156.26	1,242.67	14,446,262.45	1,704,449.68	39.77878299	-80.77208615
12,571.00	91.87	330.78	11,241.60	1,238.36	1,197.00	14,446,344.55	1,704,404.00	39.77900877	-80.77224798
12,666.00	91.74	330.51	11,238.61	1,321.12	1,150.45	14,446,427.31	1,704,357.45	39.77923638	-80.77241291
12,761.00	91.69	331.04	11,235.77	1,403.99	1,104.09	14,446,510.18	1,704,311.09	39.77946429	-80.77257718
12,855.00	90.33	329.02	11,234.11	1,485.40	1,057.14	14,446,591.59	1,704,264.14	39.77968819	-80.77274354
12,950.00	90.11	329.11	11,233.75	1,566.89	1,008.31	14,446,673.08	1,704,215.31	39.77991232	-80.77291663
13,044.00	89.93	328.93	11,233.71	1,647.48	959.92	14,446,753.67	1,704,166.92	39.78013398	-80.77308812
13,138.00	90.86	329.46	11,233.07	1,728.21	911.78	14,446,834.40	1,704,118.79	39.78035603	-80.77325873
13,233.00	91.08	329.46	11,231.46	1,810.02	863.52	14,446,916.21	1,704,070.52	39.78058104	-80.77342979
13,327.00	91.08	329.72	11,229.69	1,891.08	815.94	14,446,997.27	1,704,022.95	39.78080397	-80.77359839
13,421.00	91.08	329.28	11,227.91	1,972.06	768.24	14,447,078.24	1,703,975.25	39.78102669	-80.77376745
13,515.00	91.21	329.55	11,226.04	2,052.96	720.43	14,447,159.15	1,703,927.43	39.78124921	-80.77393693
13,610.00	91.30	329.81	11,223.95	2,134.95	672.48	14,447,241.14	1,703,879.48	39.78147470	-80.77410686
13,704.00	91.38	330.42	11,221.76	2,216.43	625.65	14,447,322.61	1,703,832.66	39.78169878	-80.77427279
13,799.00	91.25	329.37	11,219.58	2,298.59	578.02	14,447,404.78	1,703,785.02	39.78192475	-80.77444162
13,893.00	90.90	329.02	11,217.81	2,379.31	529.89	14,447,485.50	1,703,736.89	39.78214677	-80.77461221
13,988.00	90.95	329.02	11,216.28	2,460.75	480.99	14,447,566.94	1,703,688.00	39.78237076	-80.77478552
14,082.00	91.30	329.55	11,214.43	2,541.55	432.99	14,447,647.74	1,703,639.99	39.78259298	-80.77495566
14,177.00	91.34	329.98	11,212.24	2,623.60	385.17	14,447,729.79	1,703,592.17	39.78281866	-80.77512516
14,271.00	91.30	330.78	11,210.08	2,705.30	338.72	14,447,811.48	1,703,545.72	39.78304333	-80.77528975
14,366.00	91.25	331.57	11,207.97	2,788.50	292.93	14,447,894.69	1,703,499.93	39.78327216	-80.77545200
14,460.00	91.12	332.01	11,206.02	2,871.32	248.50	14,447,977.51	1,703,455.51	39.78349991	-80.77560940

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Bryan N-13HU (slot E)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Site:	Bryan Pad	MD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Well:	Bryan N-13HU (slot E)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_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	
14,555.00	89.71	330.51	11,205.33	2,954.61	202.83	14,448,060.80	1,703,409.83	39.78372896	-80.77577124	
14,650.00	89.67	330.60	11,205.85	3,037.34	156.13	14,448,143.53	1,703,363.13	39.78395647	-80.77593673	
14,745.00	90.20	329.46	11,205.96	3,119.63	108.67	14,448,225.82	1,703,315.67	39.78418280	-80.77610492	
14,839.00	91.47	328.40	11,204.59	3,200.14	60.17	14,448,306.33	1,703,267.17	39.78440422	-80.77627686	
14,934.00	91.78	327.52	11,201.89	3,280.63	9.79	14,448,386.82	1,703,216.79	39.78462563	-80.77645547	
15,029.00	92.13	329.98	11,198.65	3,361.80	-39.46	14,448,467.98	1,703,167.54	39.78484886	-80.77663006	
15,123.00	91.78	328.75	11,195.44	3,442.63	-87.33	14,448,548.82	1,703,119.67	39.78507118	-80.77679975	
15,218.00	92.75	331.57	11,191.69	3,524.96	-134.56	14,448,631.15	1,703,072.44	39.78529760	-80.77696713	
15,312.00	90.33	331.22	11,189.16	3,607.45	-179.55	14,448,713.64	1,703,027.46	39.78552445	-80.77712653	
15,406.00	91.82	330.16	11,187.40	3,689.40	-225.55	14,448,795.59	1,702,981.45	39.78574982	-80.77728957	
15,500.00	92.18	328.58	11,184.12	3,770.23	-273.41	14,448,876.42	1,702,933.59	39.78597214	-80.77745922	
15,595.00	92.35	330.42	11,180.36	3,852.02	-321.59	14,448,958.21	1,702,885.41	39.78619707	-80.77762999	
15,689.00	92.00	330.25	11,176.79	3,933.64	-368.08	14,449,039.83	1,702,838.92	39.78642154	-80.77779476	
15,784.00	91.74	330.16	11,173.69	4,016.04	-415.26	14,449,122.22	1,702,791.74	39.78664815	-80.77796198	
15,878.00	91.74	330.78	11,170.84	4,097.79	-461.57	14,449,203.98	1,702,745.43	39.78687298	-80.77812610	
15,973.00	91.56	330.60	11,168.11	4,180.59	-508.05	14,449,286.78	1,702,698.95	39.78710070	-80.77829085	
16,067.00	91.34	330.60	11,165.73	4,262.46	-554.19	14,449,368.65	1,702,652.82	39.78732584	-80.77845434	
16,162.00	91.47	329.81	11,163.40	4,344.87	-601.38	14,449,451.06	1,702,605.63	39.78755250	-80.77862160	
16,256.00	91.69	329.63	11,160.81	4,426.02	-648.75	14,449,532.21	1,702,558.25	39.78777567	-80.77878955	
16,351.00	91.65	329.63	11,158.04	4,507.95	-696.76	14,449,614.14	1,702,510.24	39.78800099	-80.77895973	
16,445.00	91.65	329.19	11,155.33	4,588.83	-744.58	14,449,695.02	1,702,462.42	39.78822345	-80.77912923	
16,540.00	91.16	328.40	11,153.00	4,670.06	-793.79	14,449,776.25	1,702,413.22	39.78844686	-80.77930368	
16,635.00	92.26	329.37	11,150.17	4,751.36	-842.85	14,449,857.55	1,702,364.15	39.78867045	-80.77947764	
16,730.00	92.31	329.02	11,146.38	4,832.89	-891.47	14,449,939.08	1,702,315.54	39.78889469	-80.77964998	
16,824.00	92.66	329.11	11,142.30	4,913.44	-939.74	14,450,019.63	1,702,267.26	39.78911623	-80.77982113	
16,919.00	91.78	330.34	11,138.62	4,995.42	-987.60	14,450,101.61	1,702,219.40	39.78934169	-80.77999077	
17,013.00	90.73	329.37	11,136.56	5,076.69	-1,034.79	14,450,182.88	1,702,172.21	39.78956519	-80.78015806	
17,107.00	90.86	329.37	11,135.26	5,157.56	-1,082.68	14,450,263.75	1,702,124.32	39.78978762	-80.78032783	
17,202.00	91.43	329.55	11,133.36	5,239.37	-1,130.94	14,450,345.56	1,702,076.06	39.79001261	-80.78049893	
17,296.00	91.69	329.28	11,130.80	5,320.26	-1,178.76	14,450,426.45	1,702,028.25	39.79023508	-80.78066842	
17,391.00	91.12	329.90	11,128.47	5,402.17	-1,226.83	14,450,508.35	1,701,980.17	39.79046034	-80.78083884	
17,485.00	91.65	330.34	11,126.20	5,483.65	-1,273.64	14,450,589.83	1,701,933.36	39.79068442	-80.78100479	
17,580.00	91.21	330.16	11,123.83	5,566.10	-1,320.77	14,450,672.29	1,701,886.23	39.79091117	-80.78117183	
17,674.00	91.21	330.07	11,121.84	5,647.58	-1,367.60	14,450,753.77	1,701,839.41	39.79113526	-80.78133782	
17,768.00	91.43	328.75	11,119.68	5,728.48	-1,415.42	14,450,834.67	1,701,791.59	39.79135774	-80.78150736	
17,863.00	90.24	329.02	11,118.30	5,809.80	-1,464.50	14,450,915.99	1,701,742.50	39.79158140	-80.78168140	
17,957.00	90.51	329.11	11,117.68	5,890.43	-1,512.82	14,450,996.61	1,701,694.18	39.79180315	-80.78185272	
18,052.00	90.68	329.28	11,116.69	5,972.02	-1,561.47	14,451,078.21	1,701,645.53	39.79202755	-80.78202520	
18,146.00	90.95	329.02	11,115.36	6,052.71	-1,609.67	14,451,158.90	1,701,597.33	39.79224947	-80.78219608	
18,240.00	91.47	330.86	11,113.37	6,134.04	-1,656.74	14,451,240.23	1,701,550.26	39.79247316	-80.78236296	
18,335.00	91.47	330.69	11,110.93	6,216.92	-1,703.11	14,451,323.11	1,701,503.89	39.79270108	-80.78252731	
18,429.00	91.78	330.60	11,108.27	6,298.82	-1,749.17	14,451,405.01	1,701,457.83	39.79292630	-80.78269058	
18,523.00	92.31	330.25	11,104.91	6,380.52	-1,795.54	14,451,486.71	1,701,411.47	39.79315098	-80.78285494	
18,618.00	90.95	330.25	11,102.21	6,462.97	-1,842.66	14,451,569.15	1,701,364.34	39.79337770	-80.78302198	
18,712.00	91.30	330.60	11,100.37	6,544.70	-1,889.04	14,451,650.89	1,701,317.96	39.79360248	-80.78318641	
18,807.00	91.78	330.95	11,097.81	6,627.58	-1,935.41	14,451,733.77	1,701,271.59	39.79383039	-80.78335076	
18,901.00	90.29	331.30	11,096.12	6,709.88	-1,980.79	14,451,816.07	1,701,226.21	39.79405671	-80.78351162	
18,995.00	90.59	330.86	11,095.39	6,792.15	-2,026.25	14,451,898.34	1,701,180.75	39.79428296	-80.78367274	
19,090.00	91.12	331.39	11,093.98	6,875.33	-2,072.12	14,451,981.52	1,701,134.88	39.79451170	-80.78383533	
19,184.00	91.69	331.92	11,091.67	6,958.04	-2,116.73	14,452,064.23	1,701,090.27	39.79473912	-80.78399345	
19,279.00	92.18	332.18	11,088.46	7,041.91	-2,161.24	14,452,148.10	1,701,045.77	39.79496975	-80.78415116	
19,373.00	91.56	330.69	11,085.40	7,124.42	-2,206.16	14,452,230.61	1,701,000.85	39.79519664	-80.78431038	
19,468.00	89.76	330.69	11,084.30	7,207.25	-2,252.66	14,452,313.44	1,700,954.34	39.79542442	-80.78447522	
19,562.00	90.42	330.69	11,084.15	7,289.21	-2,298.67	14,452,395.40	1,700,908.33	39.79564983	-80.78463834	
19,657.00	90.95	328.49	11,083.02	7,371.13	-2,346.75	14,452,477.32	1,700,860.25	39.79587512	-80.78480881	

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Bryan N-13HU (slot E)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Site:	Bryan Pad	MD Reference:	RKB=1191+25 @ 1216.00usft (H&P 611)
Well:	Bryan N-13HU (slot E)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
19,752.00	91.96	329.11	11,080.61	7,452.36	-2,395.95	14,452,558.55	1,700,811.05	39.79609853	-80.78498327
19,847.00	92.44	329.02	11,076.96	7,533.79	-2,444.75	14,452,639.98	1,700,762.25	39.79632247	-80.78515631
19,942.00	90.77	329.37	11,074.30	7,615.35	-2,493.38	14,452,721.54	1,700,713.62	39.79654678	-80.78532874
20,036.00	91.52	330.25	11,072.42	7,696.58	-2,540.64	14,452,802.77	1,700,666.36	39.79677017	-80.78549631
20,131.00	90.73	330.42	11,070.55	7,779.12	-2,587.65	14,452,885.31	1,700,619.35	39.79699714	-80.78566296
20,226.00	91.08	330.42	11,069.05	7,861.72	-2,634.54	14,452,967.91	1,700,572.46	39.79722431	-80.78582920
20,321.00	91.52	329.63	11,066.90	7,944.00	-2,681.99	14,453,050.19	1,700,525.01	39.79745056	-80.78599744
20,416.00	92.26	329.72	11,063.77	8,025.95	-2,729.93	14,453,132.14	1,700,477.07	39.79767595	-80.78616742
20,511.00	90.95	330.60	11,061.10	8,108.32	-2,777.18	14,453,214.51	1,700,429.82	39.79790247	-80.78633494
20,605.00	91.56	331.39	11,059.05	8,190.51	-2,822.75	14,453,296.70	1,700,384.26	39.79812848	-80.78649647
20,700.00	90.42	331.30	11,057.40	8,273.86	-2,868.30	14,453,380.05	1,700,338.71	39.79835769	-80.78665793
20,795.00	90.46	330.07	11,056.67	8,356.69	-2,914.81	14,453,462.88	1,700,292.20	39.79858547	-80.78682282
20,890.00	90.81	329.46	11,055.62	8,438.76	-2,962.64	14,453,544.95	1,700,244.36	39.79881117	-80.78699243
20,984.00	91.16	328.75	11,054.01	8,519.41	-3,010.90	14,453,625.60	1,700,196.10	39.79903297	-80.78716356
21,080.00	91.74	329.28	11,051.58	8,601.69	-3,060.30	14,453,707.88	1,700,146.70	39.79925924	-80.78733877
21,175.00	91.82	328.75	11,048.63	8,683.09	-3,109.19	14,453,789.28	1,700,097.81	39.79948311	-80.78751212
21,270.00	90.51	328.93	11,046.69	8,764.37	-3,158.33	14,453,870.56	1,700,048.67	39.79970664	-80.78768641
21,365.00	89.80	329.46	11,046.44	8,845.96	-3,206.98	14,453,952.15	1,700,000.02	39.79993104	-80.78785893
21,460.00	90.51	329.72	11,046.18	8,927.89	-3,255.07	14,454,034.08	1,699,951.93	39.80015635	-80.78802945
21,555.00	90.68	329.72	11,045.19	9,009.93	-3,302.97	14,454,116.12	1,699,904.03	39.80038195	-80.78819930
21,650.00	90.59	329.37	11,044.14	9,091.82	-3,351.12	14,454,198.00	1,699,855.89	39.80060715	-80.78837004
21,745.00	91.12	328.67	11,042.72	9,173.25	-3,400.01	14,454,279.44	1,699,806.99	39.80083112	-80.78854344
21,840.00	90.99	328.49	11,040.97	9,254.31	-3,449.53	14,454,360.50	1,699,757.47	39.80105404	-80.78871906
21,935.00	91.82	328.05	11,038.65	9,335.09	-3,499.47	14,454,441.27	1,699,707.53	39.80127620	-80.78889621
22,030.00	90.46	328.84	11,036.75	9,416.02	-3,549.18	14,454,522.21	1,699,657.82	39.80149879	-80.78907250
22,125.00	91.25	330.42	11,035.34	9,497.97	-3,597.20	14,454,604.16	1,699,609.80	39.80172416	-80.78924279
22,219.00	92.04	331.74	11,032.64	9,580.21	-3,642.64	14,454,686.40	1,699,564.36	39.80195031	-80.78940388
22,314.00	92.79	331.65	11,028.64	9,663.78	-3,687.64	14,454,769.97	1,699,519.36	39.80218010	-80.78956343
22,409.00	91.69	331.22	11,024.92	9,747.15	-3,733.03	14,454,853.34	1,699,473.97	39.80240935	-80.78972434
22,504.00	90.02	330.86	11,023.51	9,830.26	-3,779.02	14,454,936.45	1,699,427.98	39.80263789	-80.78988740
22,599.00	90.42	330.86	11,023.14	9,913.23	-3,825.28	14,455,019.42	1,699,381.72	39.80286606	-80.79005141
22,694.00	90.51	330.25	11,022.37	9,995.96	-3,871.98	14,455,102.15	1,699,335.02	39.80309354	-80.79021700
22,788.00	90.77	329.72	11,021.32	10,077.35	-3,919.00	14,455,183.54	1,699,288.00	39.80331736	-80.79038373
22,883.00	91.03	329.55	11,019.83	10,159.31	-3,967.02	14,455,265.50	1,699,239.98	39.80354275	-80.79055401
Survey @ 22883.00 MD 11019.83 TVD									
22,941.00	91.03	329.55	11,018.78	10,209.30	-3,996.41	14,455,315.49	1,699,210.59	39.80368023	-80.79065824
Survey projected to 22941.00 MD 11018.78 TVD									

Measured Depth (usft)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Comment
234.00	234.00	-0.05	0.26	MWD surveys
22,883.00	11,019.83	10,159.31	-3,967.02	Survey @ 22883.00 MD 11019.83 TVD
22,941.00	11,018.78	10,209.30	-3,996.41	Survey projected to 22941.00 MD 11018.78 TVD

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