



Well: Hudson S-14 HU (slot N)  
 Site: Hudson Alt North  
 Project: Marshall County, West Virginia NAD83 UTM 17N  
 Design: rev9  
 Rig: Nabors X08

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Annotation
1	10714.00	14.77	49.72	10585.60	883.43	943.04	0.00	0.000	-182.61	Survey @ 10714.00 MD 10585.60 TVD
2	10970.00	14.77	49.72	10833.14	925.62	992.83	0.00	0.000	-188.61	KOP Begin 5.92°/100' build/turn
3	10984.81	14.96	46.38	10847.45	928.16	995.66	5.92	-79.132	-189.07	Begin 5.92°/100' build/turn
4	11864.05	50.00	138.27	11607.86	742.13	1324.97	5.92	103.959	152.22	Begin 8°/100' build/turn
5	12369.46	89.00	150.00	11782.00	362.99	1591.32	8.00	18.258	615.57	Begin 89.00° lateral
6	29708.76	89.00	150.00	12084.75	-14650.35	10260.78	0.00	0.00017886	20	PBHL/TD 29708.76 MD 12084.75 TVD

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
Hudson 14HU LP r9	11782.00	362.99	1591.32	4464898.504	1733915.032	39.829708730	-80.666964170
- plan misses target center by 0.01ft at 12369.46ft MD (11781.99 TVD, 362.99 N, 1591.32 E)							
Hudson 14HU PBHL r9	12084.75	-14650.35	10260.78	4449885.194	1742584.475	39.788386000	-80.636302000
- plan hits target center							

Geodetic System: Universal Transverse Mercator (US Survey Feet)  
 Datum: NAD83 West Virginia - HARN  
 Ellipsoid: GRS 1980  
 Zone: Zone 17N (84 W to 78 W)



Azimuths to Grid North  
 True North: -0.21°  
 Magnetic North: -8.90°  
 Magnetic Field  
 Strength: 51769.9nT  
 Dip Angle: 66.57°  
 Date: 5/27/2021  
 Model: IGRF2020

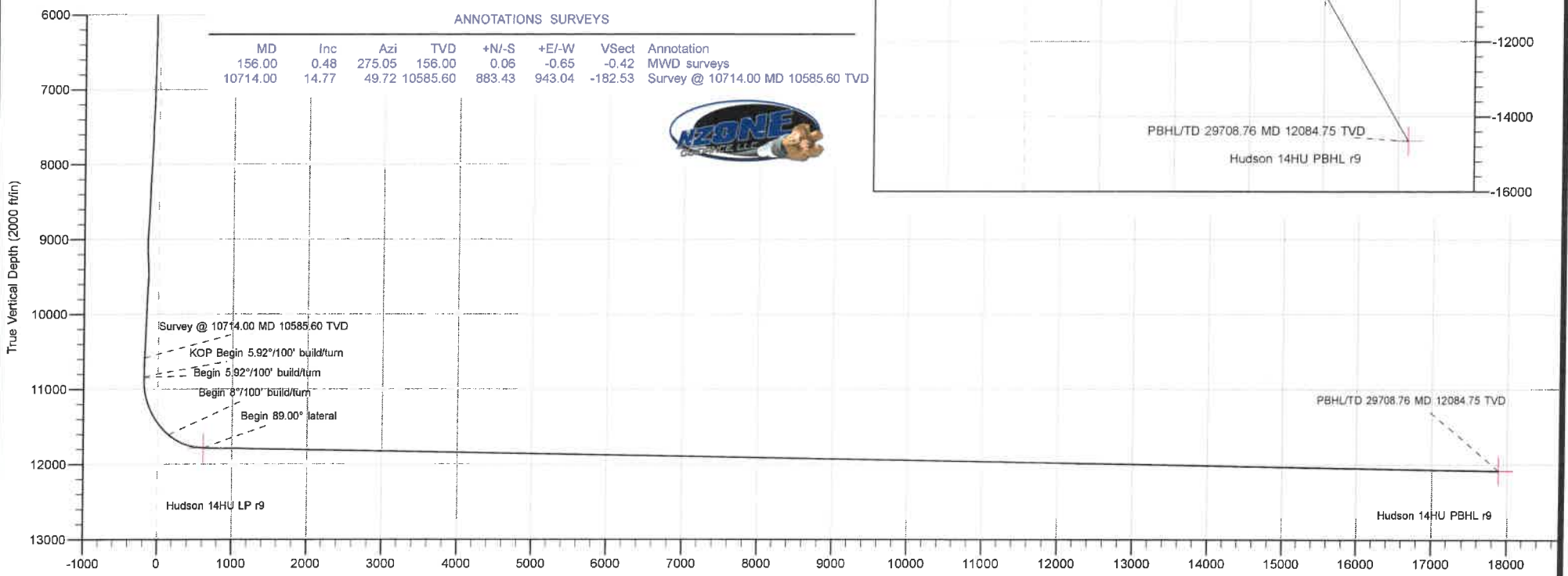
System Datum: Mean Sea Level  
 Depth Reference: RKB=1346+33 @ 1379.00ft (Nabors X08)

Northing	Easting	Latitude	Longitude
14464535.511	1732323.714	39.828728000	-80.672637000

Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.900°

ANNOTATIONS SURVEYS

MD	Inc	Azi	TVD	+N/-S	+E/-W	VSect	Annotation
156.00	0.48	275.05	156.00	0.06	-0.65	-0.42	MWD surveys
10714.00	14.77	49.72	10585.60	883.43	943.04	-182.53	Survey @ 10714.00 MD 10585.60 TVD



Vertical Section at 144.99° (2000 ft/in)



Planning Report

<b>Database:</b>	DB_Dec2220_v16	<b>Local Co-ordinate Reference:</b>	Well Hudson S-14 HU (slot N)
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>MD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Site:</b>	Hudson Alt North	<b>North Reference:</b>	Grid
<b>Well:</b>	Hudson S-14 HU (slot N)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev9		

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

<b>Site</b>	Hudson Alt North				
<b>Site Position:</b>		<b>Northing:</b>	14,464,552.095 usft	<b>Latitude:</b>	39.82877400
<b>From:</b>	Lat/Long	<b>Easting:</b>	1,732,278.451 usft	<b>Longitude:</b>	-80.67279800
<b>Position Uncertainty:</b>	0.00 ft	<b>Slot Radius:</b>	13-3/16 "		

<b>Well</b>	Hudson S-14 HU (slot N)					
<b>Well Position</b>	+N-S	0.00 ft	<b>Northing:</b>	14,464,535.511 usft	<b>Latitude:</b>	39.82872800
	+E-W	0.00 ft	<b>Easting:</b>	1,732,323.713 usft	<b>Longitude:</b>	-80.67263700
<b>Position Uncertainty</b>	0.00 ft		<b>Wellhead Elevation:</b>	ft	<b>Ground Level:</b>	1,346.00 ft
<b>Grid Convergence:</b>	0.210 °					

<b>Wellbore</b>	Original Hole				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (")</b>	<b>Dip Angle (")</b>	<b>Field Strength (nT)</b>
	IGRF2020	5/27/2021	-8.690	66.571	51,769.89368026

<b>Design</b>	rev9			
<b>Audit Notes:</b>				
<b>Version:</b>	<b>Phase:</b>	PLAN	<b>Tie On Depth:</b>	10,714.00
<b>Vertical Section:</b>	<b>Depth From (TVD) (ft)</b>	<b>+N-S (ft)</b>	<b>+E-W (ft)</b>	<b>Direction (")</b>
	0.00	0.00	0.00	144.99

<b>Plan Survey Tool Program</b>	<b>Date</b>	11/18/2021		
<b>Depth From (ft)</b>	<b>Depth To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Remarks</b>
1	156.00	1,085.00 MWD surf (Original Hole)	MWD	
			MWD - Standard	
2	1,175.00	2,845.00 MWD int (Original Hole)	MWD	
			MWD - Standard	
3	2,965.00	10,714.00 MWD (Original Hole)	MWD	
			MWD - Standard	
4	10,714.00	29,708.76 rev9 (Original Hole)	MWD	
			MWD - Standard	



Planning Report

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<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>MD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Site:</b>	Hudson Alt North	<b>North Reference:</b>	Grid
<b>Well:</b>	Hudson S-14 HU (slot N)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev9		

Plan Sections										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	TFO (°)	Target
10,714.00	14.77	49.72	10,585.60	883.43	943.04	0.00	0.00	0.00	0.000	
10,970.00	14.77	49.72	10,833.14	925.62	992.83	0.00	0.00	0.00	0.000	
10,984.81	14.96	46.38	10,847.45	928.16	995.66	5.92	1.28	-22.55	-79.132	
11,864.05	50.00	138.27	11,607.86	742.13	1,324.97	5.92	3.99	10.45	103.959	
12,369.46	89.00	150.00	11,782.00	362.99	1,591.32	8.00	7.72	2.32	18.258	
29,708.76	89.00	150.00	12,084.75	-14,650.35	10,260.78	0.00	0.00	0.00	0.000	Hudson 14HU PBHL



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<b>Site:</b>	Hudson Alt North	<b>North Reference:</b>	Grid
<b>Well:</b>	Hudson S-14 HU (slot N)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev9		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
156.00	0.48	275.05	156.00	0.06	-0.65	-0.42	0.31	0.31	0.00
186.00	0.22	287.64	186.00	0.09	-0.83	-0.55	0.90	-0.87	41.97
216.00	0.40	324.64	216.00	0.19	-0.95	-0.70	0.67	0.60	123.33
247.00	0.40	302.32	247.00	0.33	-1.10	-0.91	0.50	0.00	-72.00
278.00	0.35	343.28	278.00	0.48	-1.22	-1.10	0.86	-0.16	132.13
309.00	0.31	345.30	309.00	0.66	-1.27	-1.26	0.13	-0.13	6.52
339.00	0.18	356.99	339.00	0.78	-1.29	-1.38	0.46	-0.43	38.97
369.00	0.57	32.32	368.99	0.95	-1.21	-1.48	1.45	1.30	117.77
399.00	0.83	52.71	398.99	1.21	-0.96	-1.54	1.19	0.87	67.97
430.00	0.57	54.82	429.99	1.44	-0.66	-1.55	0.84	-0.84	6.81
461.00	0.66	61.15	460.99	1.61	-0.37	-1.53	0.36	0.29	20.42
492.00	0.88	58.77	491.99	1.82	-0.01	-1.50	0.72	0.71	-7.68
522.00	0.92	60.97	521.98	2.06	0.39	-1.46	0.18	0.13	7.33
553.00	1.01	50.25	552.98	2.35	0.82	-1.46	0.65	0.29	-34.58
574.00	0.75	49.55	573.97	2.56	1.07	-1.48	1.24	-1.24	-3.33
589.00	0.66	28.28	588.97	2.70	1.18	-1.53	1.83	-0.60	-141.80
615.00	0.09	3.31	614.97	2.85	1.26	-1.62	2.23	-2.19	-96.04
639.00	0.04	326.75	638.97	2.88	1.25	-1.64	0.26	-0.21	-152.33
669.00	0.26	277.80	668.97	2.90	1.18	-1.70	0.79	0.73	-163.17
707.00	0.18	258.90	706.97	2.90	1.04	-1.78	0.28	-0.21	-49.74
738.00	0.31	312.07	737.97	2.94	0.93	-1.88	0.80	0.42	171.52
770.00	0.26	266.37	769.97	3.00	0.79	-2.00	0.71	-0.16	-142.81
801.00	0.31	281.66	800.97	3.01	0.64	-2.10	0.29	0.16	49.32
832.00	0.62	287.91	831.97	3.08	0.39	-2.29	1.01	1.00	20.16
863.00	0.40	294.76	862.97	3.17	0.14	-2.52	0.74	-0.71	22.10
894.00	0.31	247.48	893.97	3.19	-0.04	-2.63	0.96	-0.29	-152.52
918.00	0.18	231.04	917.97	3.14	-0.13	-2.65	0.61	-0.54	-68.50
956.00	0.26	303.29	955.97	3.15	-0.25	-2.72	0.70	0.21	190.13
988.00	0.18	107.20	987.97	3.17	-0.26	-2.75	1.36	-0.25	512.22
1,018.00	0.18	0.59	1,017.97	3.21	-0.21	-2.75	0.96	0.00	-355.37
1,049.00	0.13	332.73	1,048.97	3.29	-0.23	-2.82	0.29	-0.16	-89.87
1,085.00	0.26	38.12	1,084.97	3.39	-0.20	-2.89	0.66	0.36	181.64
1,175.00	0.40	2.35	1,174.97	3.86	-0.06	-3.20	0.27	0.16	-39.74
1,268.00	1.23	10.17	1,267.96	5.17	0.13	-4.16	0.90	0.89	8.41
1,363.00	0.75	39.53	1,362.94	6.65	0.71	-5.04	0.72	-0.51	30.91
1,456.00	0.83	41.02	1,455.93	7.63	1.54	-5.37	0.09	0.09	1.60
1,550.00	1.19	80.66	1,549.92	8.30	2.95	-5.11	0.81	0.38	42.17
1,645.00	1.19	97.09	1,644.90	8.34	4.90	-4.02	0.36	0.00	17.29
1,740.00	1.85	99.55	1,739.87	7.96	7.39	-2.28	0.70	0.69	2.59
1,834.00	1.85	79.60	1,833.82	7.99	10.38	-0.59	0.68	0.00	-21.22
1,928.00	2.42	64.14	1,927.75	9.13	13.66	0.36	0.86	0.61	-16.45
2,022.00	2.15	36.10	2,021.68	11.42	16.48	0.10	1.21	-0.29	-29.83
2,116.00	2.50	33.55	2,115.60	14.55	18.65	-1.22	0.39	0.37	-2.71
2,211.00	2.85	42.07	2,210.50	18.04	21.39	-2.50	0.56	0.38	8.97
2,305.00	3.87	38.91	2,304.34	22.25	24.95	-3.91	1.09	1.07	-3.36
2,399.00	3.43	47.44	2,398.15	26.62	29.01	-5.16	0.74	-0.47	9.07
2,493.00	2.64	61.59	2,492.01	29.55	32.99	-5.28	1.15	-0.84	15.05
2,587.00	2.94	52.36	2,585.90	32.05	36.80	-5.14	0.57	0.32	-9.82
2,682.00	2.24	60.80	2,680.81	34.44	40.35	-5.06	0.84	-0.74	8.88
2,777.00	2.02	47.44	2,775.74	36.48	43.21	-5.10	0.57	-0.23	-14.06
2,845.00	2.11	35.22	2,843.70	38.31	44.81	-5.68	0.66	0.13	-17.97
2,965.00	2.33	13.60	2,963.61	42.49	46.66	-8.04	0.72	0.18	-18.02



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<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>MD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Site:</b>	Hudson Ait North	<b>North Reference:</b>	Grid
<b>Well:</b>	Hudson S-14 HU (slot N)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev9		

Planned Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
3,059.00	3.12	21.95	3,057.50	46.72	48.06	-10.70	0.94	0.84	8.88	
3,154.00	3.87	31.70	3,152.33	51.85	50.71	-13.37	1.00	0.79	10.26	
3,248.00	4.97	41.81	3,246.05	57.58	55.10	-15.56	1.43	1.17	10.76	
3,341.00	5.80	43.66	3,338.64	63.98	61.03	-17.40	0.91	0.89	1.99	
3,434.00	5.32	41.81	3,431.20	70.60	67.14	-19.31	0.55	-0.52	-1.99	
3,529.00	4.13	49.98	3,525.87	76.08	72.70	-20.61	1.44	-1.25	8.60	
3,622.00	4.00	55.70	3,618.64	80.06	77.95	-20.86	0.46	-0.14	6.15	
3,717.00	4.09	57.63	3,713.40	83.74	83.54	-20.66	0.17	0.09	2.03	
3,811.00	5.05	55.87	3,807.10	87.86	89.80	-20.45	1.03	1.02	-1.87	
3,905.00	4.44	54.12	3,900.78	92.31	96.17	-20.44	0.87	-0.65	-1.86	
3,999.00	3.60	44.54	3,994.55	96.55	101.19	-21.03	1.14	-0.89	-10.19	
4,093.00	3.82	38.73	4,088.35	101.09	105.22	-22.44	0.46	0.23	-6.18	
4,188.00	3.96	34.52	4,183.14	106.26	109.06	-24.48	0.33	0.15	-4.43	
4,282.00	3.91	25.02	4,276.91	111.84	112.25	-27.21	0.69	-0.05	-10.11	
4,375.00	4.39	22.21	4,369.67	118.01	114.94	-30.72	0.56	0.52	-3.02	
4,469.00	5.01	21.51	4,463.35	125.16	117.81	-34.94	0.66	0.66	-0.74	
4,566.00	4.79	37.94	4,560.00	132.30	121.85	-38.46	1.46	-0.23	16.94	
4,659.00	5.80	38.56	4,652.61	139.03	127.17	-40.93	1.09	1.09	0.67	
4,754.00	6.42	45.24	4,747.07	146.53	133.93	-43.19	0.99	0.65	7.03	
4,848.00	6.37	51.65	4,840.48	153.46	141.75	-44.38	0.76	-0.05	6.62	
4,942.00	7.29	43.74	4,933.82	161.01	149.96	-45.85	1.40	0.98	-8.41	
5,036.00	6.77	45.68	5,027.11	169.19	158.05	-47.91	0.61	-0.55	2.06	
5,130.00	6.02	49.81	5,120.53	176.24	165.78	-49.25	0.94	-0.80	4.39	
5,223.00	4.66	53.50	5,213.12	181.63	172.54	-49.79	1.51	-1.46	3.97	
5,317.00	4.75	53.06	5,306.80	186.24	178.72	-50.02	0.10	0.10	-0.47	
5,411.00	5.84	51.83	5,400.40	191.54	185.59	-50.42	1.17	1.16	-1.31	
5,505.00	5.32	53.41	5,493.96	197.09	192.85	-50.80	0.58	-0.55	1.68	
5,599.00	4.83	55.43	5,587.59	201.93	199.61	-50.89	0.55	-0.52	2.15	
5,694.00	4.13	63.08	5,682.30	205.75	205.95	-50.38	0.97	-0.74	8.05	
5,788.00	4.61	64.31	5,776.02	208.92	212.38	-49.29	0.52	0.51	1.31	
5,882.00	5.19	67.82	5,869.68	212.17	219.72	-47.74	0.69	0.62	3.73	
5,976.00	5.45	62.82	5,963.27	215.81	227.62	-46.19	0.57	0.28	-5.32	
6,069.00	5.75	61.67	6,055.83	220.04	235.65	-45.04	0.34	0.32	-1.24	
6,164.00	4.75	54.29	6,150.43	224.59	243.04	-44.54	1.27	-1.05	-7.77	
6,258.00	5.05	46.29	6,244.09	229.72	249.19	-45.21	0.79	0.32	-8.51	
6,347.00	4.61	38.30	6,332.77	235.24	254.24	-46.83	0.90	-0.49	-8.98	
6,441.00	4.39	33.02	6,426.49	241.22	258.54	-49.26	0.50	-0.23	-5.62	
6,536.00	5.58	32.58	6,521.12	248.16	263.01	-52.38	1.25	1.25	-0.46	
6,630.00	5.23	40.14	6,614.71	255.28	268.23	-55.23	0.84	-0.37	8.04	
6,725.00	5.36	49.19	6,709.30	261.49	274.38	-56.78	0.89	0.14	9.53	
6,819.00	5.54	48.31	6,802.88	267.38	281.09	-57.76	0.21	0.19	-0.94	
6,913.00	6.42	46.91	6,896.37	273.99	288.32	-59.02	0.95	0.94	-1.49	
7,007.00	6.94	43.39	6,989.73	281.71	296.06	-60.90	0.70	0.55	-3.74	
7,101.00	9.05	44.80	7,082.81	291.08	305.17	-63.36	2.25	2.24	1.50	
7,195.00	10.15	41.72	7,175.49	302.51	315.89	-66.57	1.29	1.17	-3.28	
7,290.00	11.16	37.68	7,268.85	316.03	327.08	-71.22	1.32	1.06	-4.25	
7,383.00	11.82	40.23	7,359.99	330.43	338.73	-76.33	0.90	0.71	2.74	
7,477.00	12.17	47.44	7,451.94	344.48	352.25	-80.09	1.64	0.37	7.67	
7,572.00	12.00	51.22	7,544.84	357.44	367.33	-82.05	0.85	-0.18	3.98	
7,666.00	11.87	47.26	7,636.81	370.12	382.04	-84.00	0.88	-0.14	-4.21	
7,760.00	11.82	40.67	7,728.81	383.99	395.42	-87.68	1.44	-0.05	-7.01	
7,854.00	13.10	42.43	7,820.60	399.15	408.88	-92.38	1.42	1.36	1.87	
7,948.00	14.02	45.68	7,911.98	414.97	424.21	-96.54	1.27	0.98	3.46	



Planning Report

<b>Database:</b>	DB_Dec2220_v16	<b>Local Co-ordinate Reference:</b>	Well Hudson S-14 HU (slot N)
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X0B)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>MD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X0B)
<b>Site:</b>	Hudson Alt North	<b>North Reference:</b>	Grid
<b>Well:</b>	Hudson S-14 HU (slot N)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev9		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
8,044.00	14.28	44.01	8,005.06	431.61	440.76	-100.68	0.50	0.27	-1.74
8,138.00	14.59	40.93	8,096.10	448.89	456.57	-105.76	0.88	0.33	-3.28
8,232.00	14.72	42.34	8,187.04	466.66	472.37	-111.26	0.40	0.14	1.50
8,326.00	14.63	43.13	8,277.97	484.16	488.53	-116.31	0.23	-0.10	0.84
8,421.00	14.28	49.11	8,369.97	500.58	505.59	-119.98	1.61	-0.37	6.29
8,516.00	14.63	50.25	8,461.96	515.92	523.67	-122.17	0.47	0.37	1.20
8,610.00	15.07	48.93	8,552.82	531.54	542.01	-124.45	0.59	0.47	-1.40
8,704.00	14.99	48.12	8,643.81	548.00	559.99	-127.61	0.78	-0.09	-2.99
8,797.00	14.24	41.64	8,733.60	564.88	576.26	-132.11	1.46	-0.81	-4.82
8,891.00	14.41	38.12	8,824.68	582.73	591.16	-138.17	0.94	0.18	-3.74
8,985.00	16.88	40.14	8,915.19	602.36	607.18	-145.07	2.69	2.63	2.15
9,078.00	18.37	45.33	9,003.83	622.99	626.31	-150.99	2.33	1.60	5.58
9,172.00	18.59	53.68	9,093.00	642.28	648.92	-153.82	2.82	0.23	8.88
9,265.00	17.67	64.57	9,181.41	657.13	673.62	-151.81	3.77	-0.99	11.71
9,296.00	16.70	88.97	9,211.02	660.75	682.02	-149.95	5.23	-3.13	14.19
9,326.00	15.95	71.43	9,241.73	663.80	690.48	-147.60	3.19	-2.34	7.69
9,359.00	14.28	72.48	9,271.66	666.30	698.17	-145.24	5.46	-5.39	3.39
9,391.00	12.79	72.84	9,302.77	668.54	705.32	-142.97	4.66	-4.66	1.13
9,421.00	11.82	73.19	9,332.08	670.41	711.43	-141.00	3.24	-3.23	1.17
9,453.00	10.85	70.90	9,363.46	672.34	717.41	-139.15	3.34	-3.03	-7.16
9,484.00	10.77	63.87	9,393.91	674.57	722.77	-137.90	4.26	-0.26	-22.68
9,515.00	11.12	55.43	9,424.35	677.54	727.83	-137.43	5.29	1.13	-27.23
9,546.00	12.44	49.90	9,454.69	681.39	732.85	-137.70	5.60	4.26	-17.84
9,641.00	14.11	43.57	9,547.16	696.37	748.66	-140.91	2.33	1.76	-6.66
9,735.00	14.94	42.25	9,638.15	713.64	764.71	-145.85	0.95	0.88	-1.40
9,829.00	14.72	42.95	9,729.02	731.35	780.99	-151.01	0.30	-0.23	0.74
9,923.00	13.75	47.52	9,820.14	747.64	797.37	-154.96	1.58	-1.03	4.86
10,017.00	13.89	50.25	9,911.42	762.40	814.28	-157.34	0.71	0.15	2.90
10,111.00	13.93	47.88	10,002.66	777.20	831.35	-159.68	0.61	0.04	-2.52
10,205.00	14.02	45.24	10,093.88	792.81	847.83	-163.01	0.68	0.10	-2.81
10,298.00	14.77	46.73	10,183.96	808.87	864.46	-166.62	0.90	0.81	1.60
10,392.00	15.38	46.47	10,274.72	825.66	882.22	-170.19	0.65	0.65	-0.28
10,486.00	15.21	45.77	10,365.39	842.85	900.09	-174.02	0.27	-0.18	-0.74
10,581.00	15.07	45.85	10,457.10	860.15	917.88	-177.98	0.15	-0.15	0.06
10,674.00	14.90	47.44	10,546.93	876.65	935.36	-181.47	0.48	-0.18	1.71
10,714.00	14.77	49.72	10,585.60	883.43	943.04	-182.61	1.50	-0.33	5.70
<b>Survey @ 10714.00 MD 10585.60 TVD</b>									
10,800.00	14.77	49.72	10,668.76	897.60	959.77	-184.63	0.00	0.00	0.00
10,900.00	14.77	49.72	10,765.45	914.09	979.22	-186.97	0.00	0.00	0.00
10,970.00	14.77	49.72	10,833.14	925.62	992.83	-188.61	0.00	0.00	0.00
<b>KOP Begin 5.92°/100' build/turn</b>									
10,984.81	14.96	46.38	10,847.45	928.16	995.66	-189.07	5.92	1.28	-22.55
<b>Begin 5.92°/100' build/turn</b>									
11,000.00	14.77	49.81	10,862.14	930.77	998.55	-189.54	5.92	-1.26	22.57
11,050.00	14.51	61.51	10,910.53	937.87	1,008.93	-189.41	5.92	-0.52	23.39
11,100.00	14.84	73.15	10,958.91	942.71	1,020.56	-186.70	5.92	0.65	23.28
11,150.00	15.71	83.91	11,007.15	945.29	1,033.42	-181.43	5.92	1.75	21.52
11,200.00	17.05	93.29	11,055.13	945.59	1,047.48	-173.61	5.92	2.68	18.76
11,250.00	18.76	101.18	11,102.71	943.61	1,062.69	-163.27	5.92	3.41	15.78
11,300.00	20.74	107.70	11,149.77	939.35	1,079.01	-150.42	5.92	3.86	13.05
11,350.00	22.93	113.09	11,196.19	932.84	1,096.41	-135.11	5.92	4.37	10.77
11,400.00	25.26	117.55	11,241.83	924.09	1,114.83	-117.37	5.92	4.67	8.93
11,450.00	27.71	121.30	11,286.59	913.11	1,134.23	-97.25	5.92	4.90	7.48



Planning Report

<b>Database:</b>	DB_Dec2220_v16	<b>Local Co-ordinate Reference:</b>	Well Hudson S-14 HU (slot N)
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>MD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Site:</b>	Hudson Alt North	<b>North Reference:</b>	Grid
<b>Well:</b>	Hudson S-14 HU (slot N)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev9		

Planned Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
11,500.00	30.24	124.46	11,330.32	899.94	1,154.55	-74.81	5.92	5.07	6.34	
11,550.00	32.84	127.18	11,372.93	884.62	1,175.74	-50.10	5.92	5.20	5.43	
11,600.00	35.49	129.54	11,414.30	867.18	1,197.74	-23.19	5.92	5.30	4.71	
11,650.00	38.19	131.60	11,454.32	847.68	1,220.50	5.84	5.92	5.38	4.13	
11,700.00	40.91	133.43	11,492.67	826.15	1,243.95	36.92	5.92	5.45	3.66	
11,750.00	43.66	135.08	11,529.86	802.67	1,268.03	69.97	5.92	5.50	3.28	
11,800.00	46.43	136.56	11,565.19	777.30	1,292.68	104.89	5.92	5.54	2.97	
11,850.00	49.21	137.91	11,598.76	750.09	1,317.82	141.60	5.92	5.57	2.70	
11,864.05	50.00	138.27	11,607.86	742.13	1,324.97	152.22	5.92	5.59	2.56	
<b>Begin 8°/100' build/turn</b>										
11,900.00	52.74	139.40	11,630.30	720.99	1,343.45	180.14	8.00	7.61	3.15	
11,950.00	56.56	140.85	11,659.23	689.69	1,369.58	220.77	8.00	7.65	2.89	
12,000.00	60.40	142.17	11,685.37	656.33	1,396.09	263.30	8.00	7.68	2.64	
12,050.00	64.25	143.39	11,708.59	621.07	1,422.86	307.54	8.00	7.70	2.45	
12,100.00	68.11	144.54	11,728.78	584.09	1,449.76	353.26	8.00	7.72	2.30	
12,150.00	71.97	145.63	11,745.84	545.55	1,476.85	400.25	8.00	7.73	2.17	
12,200.00	75.85	146.67	11,759.70	505.66	1,503.40	448.27	8.00	7.75	2.08	
12,250.00	79.73	147.67	11,770.27	464.61	1,529.89	497.09	8.00	7.75	2.01	
12,300.00	83.61	148.66	11,777.52	422.58	1,555.97	546.48	8.00	7.76	1.96	
12,350.00	87.49	149.62	11,781.40	379.80	1,581.54	596.19	8.00	7.76	1.93	
12,369.46	89.00	150.00	11,782.00	362.99	1,591.32	615.57	8.00	7.77	1.92	
<b>Begin 89.00° lateral</b>										
12,400.00	89.00	150.00	11,782.53	336.54	1,606.59	645.99	0.00	0.00	0.00	
12,500.00	89.00	150.00	11,784.27	249.96	1,658.59	745.59	0.00	0.00	0.00	
12,600.00	89.00	150.00	11,786.02	163.37	1,708.59	845.20	0.00	0.00	0.00	
12,700.00	89.00	150.00	11,787.77	76.79	1,756.59	944.80	0.00	0.00	0.00	
12,800.00	89.00	150.00	11,789.51	-9.80	1,806.58	1,044.40	0.00	0.00	0.00	
12,900.00	89.00	150.00	11,791.26	-96.38	1,856.58	1,144.01	0.00	0.00	0.00	
13,000.00	89.00	150.00	11,793.00	-182.97	1,906.58	1,243.61	0.00	0.00	0.00	
13,100.00	89.00	150.00	11,794.75	-269.55	1,956.58	1,343.22	0.00	0.00	0.00	
13,200.00	89.00	150.00	11,796.50	-356.14	2,006.58	1,442.82	0.00	0.00	0.00	
13,300.00	89.00	150.00	11,798.24	-442.73	2,056.58	1,542.42	0.00	0.00	0.00	
13,400.00	89.00	150.00	11,799.99	-529.31	2,106.58	1,642.03	0.00	0.00	0.00	
13,500.00	89.00	150.00	11,801.74	-615.90	2,156.58	1,741.63	0.00	0.00	0.00	
13,600.00	89.00	150.00	11,803.48	-702.48	2,206.58	1,841.24	0.00	0.00	0.00	
13,700.00	89.00	150.00	11,805.23	-789.07	2,256.57	1,940.84	0.00	0.00	0.00	
13,800.00	89.00	150.00	11,806.97	-875.65	2,306.57	2,040.44	0.00	0.00	0.00	
13,900.00	89.00	150.00	11,808.72	-962.24	2,356.57	2,140.05	0.00	0.00	0.00	
14,000.00	89.00	150.00	11,810.47	-1,048.82	2,406.57	2,239.65	0.00	0.00	0.00	
14,100.00	89.00	150.00	11,812.21	-1,135.41	2,456.57	2,339.26	0.00	0.00	0.00	
14,200.00	89.00	150.00	11,813.96	-1,222.00	2,506.57	2,438.86	0.00	0.00	0.00	
14,300.00	89.00	150.00	11,815.70	-1,308.58	2,556.57	2,538.46	0.00	0.00	0.00	
14,400.00	89.00	150.00	11,817.45	-1,395.17	2,606.57	2,638.07	0.00	0.00	0.00	
14,500.00	89.00	150.00	11,819.20	-1,481.75	2,656.57	2,737.67	0.00	0.00	0.00	
14,600.00	89.00	150.00	11,820.94	-1,568.34	2,706.57	2,837.28	0.00	0.00	0.00	
14,700.00	89.00	150.00	11,822.69	-1,654.92	2,756.56	2,936.88	0.00	0.00	0.00	
14,800.00	89.00	150.00	11,824.43	-1,741.51	2,806.56	3,036.48	0.00	0.00	0.00	
14,900.00	89.00	150.00	11,826.18	-1,828.09	2,856.56	3,136.09	0.00	0.00	0.00	
15,000.00	89.00	150.00	11,827.93	-1,914.68	2,906.56	3,235.69	0.00	0.00	0.00	
15,100.00	89.00	150.00	11,829.67	-2,001.27	2,956.56	3,335.30	0.00	0.00	0.00	
15,200.00	89.00	150.00	11,831.42	-2,087.85	3,006.56	3,434.90	0.00	0.00	0.00	
15,300.00	89.00	150.00	11,833.16	-2,174.44	3,056.56	3,534.50	0.00	0.00	0.00	
15,400.00	89.00	150.00	11,834.91	-2,261.02	3,106.56	3,634.11	0.00	0.00	0.00	



Planning Report

<b>Database:</b>	DB_Dec2220_v16	<b>Local Co-ordinate Reference:</b>	Well Hudson S-14 HU (slot N)
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>MD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Site:</b>	Hudson Alt North	<b>North Reference:</b>	Grd
<b>Well:</b>	Hudson S-14 HU (slot N)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev9		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
15,500.00	89.00	150.00	11,836.66	-2,347.61	3,156.56	3,733.71	0.00	0.00	0.00
15,600.00	89.00	150.00	11,838.40	-2,434.19	3,206.55	3,833.32	0.00	0.00	0.00
15,700.00	89.00	150.00	11,840.15	-2,520.78	3,256.55	3,932.92	0.00	0.00	0.00
15,800.00	89.00	150.00	11,841.89	-2,607.36	3,306.55	4,032.52	0.00	0.00	0.00
15,900.00	89.00	150.00	11,843.64	-2,693.95	3,356.55	4,132.13	0.00	0.00	0.00
16,000.00	89.00	150.00	11,845.39	-2,780.54	3,406.55	4,231.73	0.00	0.00	0.00
16,100.00	89.00	150.00	11,847.13	-2,867.12	3,456.55	4,331.34	0.00	0.00	0.00
16,200.00	89.00	150.00	11,848.88	-2,953.71	3,506.55	4,430.94	0.00	0.00	0.00
16,300.00	89.00	150.00	11,850.62	-3,040.29	3,556.55	4,530.54	0.00	0.00	0.00
16,400.00	89.00	150.00	11,852.37	-3,126.88	3,606.55	4,630.15	0.00	0.00	0.00
16,500.00	89.00	150.00	11,854.12	-3,213.46	3,656.54	4,729.75	0.00	0.00	0.00
16,600.00	89.00	150.00	11,855.86	-3,300.05	3,706.54	4,829.36	0.00	0.00	0.00
16,700.00	89.00	150.00	11,857.61	-3,386.63	3,756.54	4,928.96	0.00	0.00	0.00
16,800.00	89.00	150.00	11,859.36	-3,473.22	3,806.54	5,028.56	0.00	0.00	0.00
16,900.00	89.00	150.00	11,861.10	-3,559.81	3,856.54	5,128.17	0.00	0.00	0.00
17,000.00	89.00	150.00	11,862.85	-3,646.39	3,906.54	5,227.77	0.00	0.00	0.00
17,100.00	89.00	150.00	11,864.59	-3,732.98	3,956.54	5,327.38	0.00	0.00	0.00
17,200.00	89.00	150.00	11,866.34	-3,819.56	4,006.54	5,426.98	0.00	0.00	0.00
17,300.00	89.00	150.00	11,868.09	-3,906.15	4,056.54	5,526.58	0.00	0.00	0.00
17,400.00	89.00	150.00	11,869.83	-3,992.73	4,106.53	5,626.19	0.00	0.00	0.00
17,500.00	89.00	150.00	11,871.58	-4,079.32	4,156.53	5,725.79	0.00	0.00	0.00
17,600.00	89.00	150.00	11,873.32	-4,165.90	4,206.53	5,825.40	0.00	0.00	0.00
17,700.00	89.00	150.00	11,875.07	-4,252.49	4,256.53	5,925.00	0.00	0.00	0.00
17,800.00	89.00	150.00	11,876.82	-4,339.08	4,306.53	6,024.60	0.00	0.00	0.00
17,900.00	89.00	150.00	11,878.56	-4,425.66	4,356.53	6,124.21	0.00	0.00	0.00
18,000.00	89.00	150.00	11,880.31	-4,512.25	4,406.53	6,223.81	0.00	0.00	0.00
18,100.00	89.00	150.00	11,882.05	-4,598.83	4,456.53	6,323.41	0.00	0.00	0.00
18,200.00	89.00	150.00	11,883.80	-4,685.42	4,506.53	6,423.02	0.00	0.00	0.00
18,300.00	89.00	150.00	11,885.55	-4,772.00	4,556.52	6,522.62	0.00	0.00	0.00
18,400.00	89.00	150.00	11,887.29	-4,858.59	4,606.52	6,622.23	0.00	0.00	0.00
18,500.00	89.00	150.00	11,889.04	-4,945.17	4,656.52	6,721.83	0.00	0.00	0.00
18,600.00	89.00	150.00	11,890.78	-5,031.76	4,706.52	6,821.43	0.00	0.00	0.00
18,700.00	89.00	150.00	11,892.53	-5,118.35	4,756.52	6,921.04	0.00	0.00	0.00
18,800.00	89.00	150.00	11,894.28	-5,204.93	4,806.52	7,020.64	0.00	0.00	0.00
18,900.00	89.00	150.00	11,896.02	-5,291.52	4,856.52	7,120.25	0.00	0.00	0.00
19,000.00	89.00	150.00	11,897.77	-5,378.10	4,906.52	7,219.85	0.00	0.00	0.00
19,100.00	89.00	150.00	11,899.51	-5,464.69	4,956.52	7,319.45	0.00	0.00	0.00
19,200.00	89.00	150.00	11,901.26	-5,551.27	5,006.51	7,419.06	0.00	0.00	0.00
19,300.00	89.00	150.00	11,903.01	-5,637.86	5,056.51	7,518.66	0.00	0.00	0.00
19,400.00	89.00	150.00	11,904.75	-5,724.45	5,106.51	7,618.27	0.00	0.00	0.00
19,500.00	89.00	150.00	11,906.50	-5,811.03	5,156.51	7,717.87	0.00	0.00	0.00
19,600.00	89.00	150.00	11,908.25	-5,897.62	5,206.51	7,817.47	0.00	0.00	0.00
19,700.00	89.00	150.00	11,909.99	-5,984.20	5,256.51	7,917.08	0.00	0.00	0.00
19,800.00	89.00	150.00	11,911.74	-6,070.79	5,306.51	8,016.68	0.00	0.00	0.00
19,900.00	89.00	150.00	11,913.48	-6,157.37	5,356.51	8,116.29	0.00	0.00	0.00
20,000.00	89.00	150.00	11,915.23	-6,243.96	5,406.51	8,215.89	0.00	0.00	0.00
20,100.00	89.00	150.00	11,916.98	-6,330.54	5,456.51	8,315.49	0.00	0.00	0.00
20,200.00	89.00	150.00	11,918.72	-6,417.13	5,506.50	8,415.10	0.00	0.00	0.00
20,300.00	89.00	150.00	11,920.47	-6,503.72	5,556.50	8,514.70	0.00	0.00	0.00
20,400.00	89.00	150.00	11,922.21	-6,590.30	5,606.50	8,614.31	0.00	0.00	0.00
20,500.00	89.00	150.00	11,923.96	-6,676.89	5,656.50	8,713.91	0.00	0.00	0.00
20,600.00	89.00	150.00	11,925.71	-6,763.47	5,706.50	8,813.51	0.00	0.00	0.00
20,700.00	89.00	150.00	11,927.45	-6,850.06	5,756.50	8,913.12	0.00	0.00	0.00





Planning Report

<b>Database:</b>	DB_Dec2220_v16	<b>Local Co-ordinate Reference:</b>	Well Hudson S-14 HU (slot N)
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>MD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Site:</b>	Hudson Alt North	<b>North Reference:</b>	Grid
<b>Well:</b>	Hudson S-14 HU (slot N)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev9		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
20,800.00	89.00	150.00	11,929.20	-8,936.64	5,806.50	9,012.72	0.00	0.00	0.00
20,900.00	89.00	150.00	11,930.94	-7,023.23	5,856.50	9,112.33	0.00	0.00	0.00
21,000.00	89.00	150.00	11,932.69	-7,109.81	5,906.50	9,211.93	0.00	0.00	0.00
21,100.00	89.00	150.00	11,934.44	-7,196.40	5,956.49	9,311.53	0.00	0.00	0.00
21,200.00	89.00	150.00	11,936.18	-7,282.99	6,006.49	9,411.14	0.00	0.00	0.00
21,300.00	89.00	150.00	11,937.93	-7,369.57	6,056.49	9,510.74	0.00	0.00	0.00
21,400.00	89.00	150.00	11,939.67	-7,456.16	6,106.49	9,610.35	0.00	0.00	0.00
21,500.00	89.00	150.00	11,941.42	-7,542.74	6,156.49	9,709.95	0.00	0.00	0.00
21,600.00	89.00	150.00	11,943.17	-7,629.33	6,206.49	9,809.55	0.00	0.00	0.00
21,700.00	89.00	150.00	11,944.91	-7,715.91	6,256.49	9,909.16	0.00	0.00	0.00
21,800.00	89.00	150.00	11,946.66	-7,802.50	6,306.49	10,008.76	0.00	0.00	0.00
21,900.00	89.00	150.00	11,948.40	-7,889.08	6,356.49	10,108.37	0.00	0.00	0.00
22,000.00	89.00	150.00	11,950.15	-7,975.67	6,406.48	10,207.97	0.00	0.00	0.00
22,100.00	89.00	150.00	11,951.90	-8,062.26	6,456.48	10,307.57	0.00	0.00	0.00
22,200.00	89.00	150.00	11,953.64	-8,148.84	6,506.48	10,407.18	0.00	0.00	0.00
22,300.00	89.00	150.00	11,955.39	-8,235.43	6,556.48	10,506.78	0.00	0.00	0.00
22,400.00	89.00	150.00	11,957.13	-8,322.01	6,606.48	10,606.39	0.00	0.00	0.00
22,500.00	89.00	150.00	11,958.88	-8,408.60	6,656.48	10,705.99	0.00	0.00	0.00
22,600.00	89.00	150.00	11,960.63	-8,495.18	6,706.48	10,805.59	0.00	0.00	0.00
22,700.00	89.00	150.00	11,962.37	-8,581.77	6,756.48	10,905.20	0.00	0.00	0.00
22,800.00	89.00	150.00	11,964.12	-8,668.35	6,806.48	11,004.80	0.00	0.00	0.00
22,900.00	89.00	150.00	11,965.87	-8,754.94	6,856.47	11,104.41	0.00	0.00	0.00
23,000.00	89.00	150.00	11,967.61	-8,841.53	6,906.47	11,204.01	0.00	0.00	0.00
23,100.00	89.00	150.00	11,969.36	-8,928.11	6,956.47	11,303.61	0.00	0.00	0.00
23,200.00	89.00	150.00	11,971.10	-9,014.70	7,006.47	11,403.22	0.00	0.00	0.00
23,300.00	89.00	150.00	11,972.85	-9,101.28	7,056.47	11,502.82	0.00	0.00	0.00
23,400.00	89.00	150.00	11,974.60	-9,187.87	7,106.47	11,602.43	0.00	0.00	0.00
23,500.00	89.00	150.00	11,976.34	-9,274.45	7,156.47	11,702.03	0.00	0.00	0.00
23,600.00	89.00	150.00	11,978.09	-9,361.04	7,206.47	11,801.63	0.00	0.00	0.00
23,700.00	89.00	150.00	11,979.83	-9,447.62	7,256.47	11,901.24	0.00	0.00	0.00
23,800.00	89.00	150.00	11,981.58	-9,534.21	7,306.46	12,000.84	0.00	0.00	0.00
23,900.00	89.00	150.00	11,983.33	-9,620.80	7,356.46	12,100.45	0.00	0.00	0.00
24,000.00	89.00	150.00	11,985.07	-9,707.38	7,406.46	12,200.05	0.00	0.00	0.00
24,100.00	89.00	150.00	11,986.82	-9,793.97	7,456.46	12,299.65	0.00	0.00	0.00
24,200.00	89.00	150.00	11,988.56	-9,880.55	7,506.46	12,399.26	0.00	0.00	0.00
24,300.00	89.00	150.00	11,990.31	-9,967.14	7,556.46	12,498.86	0.00	0.00	0.00
24,400.00	89.00	150.00	11,992.06	-10,053.72	7,606.46	12,598.47	0.00	0.00	0.00
24,500.00	89.00	150.00	11,993.80	-10,140.31	7,656.46	12,698.07	0.00	0.00	0.00
24,600.00	89.00	150.00	11,995.55	-10,226.89	7,706.46	12,797.67	0.00	0.00	0.00
24,700.00	89.00	150.00	11,997.29	-10,313.48	7,756.46	12,897.28	0.00	0.00	0.00
24,800.00	89.00	150.00	11,999.04	-10,400.07	7,806.45	12,996.88	0.00	0.00	0.00
24,900.00	89.00	150.00	12,000.79	-10,486.65	7,856.45	13,096.48	0.00	0.00	0.00
25,000.00	89.00	150.00	12,002.53	-10,573.24	7,906.45	13,196.09	0.00	0.00	0.00
25,100.00	89.00	150.00	12,004.28	-10,659.82	7,956.45	13,295.69	0.00	0.00	0.00
25,200.00	89.00	150.00	12,006.02	-10,746.41	8,006.45	13,395.30	0.00	0.00	0.00
25,300.00	89.00	150.00	12,007.77	-10,832.99	8,056.45	13,494.90	0.00	0.00	0.00
25,400.00	89.00	150.00	12,009.52	-10,919.58	8,106.45	13,594.50	0.00	0.00	0.00
25,500.00	89.00	150.00	12,011.26	-11,006.16	8,156.45	13,694.11	0.00	0.00	0.00
25,600.00	89.00	150.00	12,013.01	-11,092.75	8,206.45	13,793.71	0.00	0.00	0.00
25,700.00	89.00	150.00	12,014.75	-11,179.34	8,256.44	13,893.32	0.00	0.00	0.00
25,800.00	89.00	150.00	12,016.50	-11,265.92	8,306.44	13,992.92	0.00	0.00	0.00
25,900.00	89.00	150.00	12,018.25	-11,352.51	8,356.44	14,092.52	0.00	0.00	0.00
26,000.00	89.00	150.00	12,019.99	-11,439.09	8,406.44	14,192.13	0.00	0.00	0.00

<b>Database:</b>	DB_Dec2220_v16	<b>Local Co-ordinate Reference:</b>	Well Hudson S-14 HU (slot N)
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>MD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Site:</b>	Hudson Alt North	<b>North Reference:</b>	Grid
<b>Well:</b>	Hudson S-14 HU (slot N)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev9		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
26,100.00	89.00	150.00	12,021.74	-11,525.68	8,456.44	14,291.73	0.00	0.00	0.00
26,200.00	89.00	150.00	12,023.49	-11,612.26	8,506.44	14,391.34	0.00	0.00	0.00
26,300.00	89.00	150.00	12,025.23	-11,698.85	8,556.44	14,490.94	0.00	0.00	0.00
26,400.00	89.00	150.00	12,026.98	-11,785.43	8,606.44	14,590.54	0.00	0.00	0.00
26,500.00	89.00	150.00	12,028.72	-11,872.02	8,656.44	14,690.15	0.00	0.00	0.00
26,600.00	89.00	150.00	12,030.47	-11,958.61	8,706.43	14,789.75	0.00	0.00	0.00
26,700.00	89.00	150.00	12,032.22	-12,045.19	8,756.43	14,889.36	0.00	0.00	0.00
26,800.00	89.00	150.00	12,033.96	-12,131.78	8,806.43	14,988.96	0.00	0.00	0.00
26,900.00	89.00	150.00	12,035.71	-12,218.36	8,856.43	15,088.56	0.00	0.00	0.00
27,000.00	89.00	150.00	12,037.45	-12,304.95	8,906.43	15,188.17	0.00	0.00	0.00
27,100.00	89.00	150.00	12,039.20	-12,391.53	8,956.43	15,287.77	0.00	0.00	0.00
27,200.00	89.00	150.00	12,040.95	-12,478.12	9,006.43	15,387.38	0.00	0.00	0.00
27,300.00	89.00	150.00	12,042.69	-12,564.70	9,056.43	15,486.98	0.00	0.00	0.00
27,400.00	89.00	150.00	12,044.44	-12,651.29	9,106.43	15,586.58	0.00	0.00	0.00
27,500.00	89.00	150.00	12,046.18	-12,737.88	9,156.42	15,686.19	0.00	0.00	0.00
27,600.00	89.00	150.00	12,047.93	-12,824.46	9,206.42	15,785.79	0.00	0.00	0.00
27,700.00	89.00	150.00	12,049.68	-12,911.05	9,256.42	15,885.40	0.00	0.00	0.00
27,800.00	89.00	150.00	12,051.42	-12,997.63	9,306.42	15,985.00	0.00	0.00	0.00
27,900.00	89.00	150.00	12,053.17	-13,084.22	9,356.42	16,084.60	0.00	0.00	0.00
28,000.00	89.00	150.00	12,054.91	-13,170.80	9,406.42	16,184.21	0.00	0.00	0.00
28,100.00	89.00	150.00	12,056.66	-13,257.39	9,456.42	16,283.81	0.00	0.00	0.00
28,200.00	89.00	150.00	12,058.41	-13,343.98	9,506.42	16,383.42	0.00	0.00	0.00
28,300.00	89.00	150.00	12,060.15	-13,430.56	9,556.42	16,483.02	0.00	0.00	0.00
28,400.00	89.00	150.00	12,061.90	-13,517.15	9,606.41	16,582.62	0.00	0.00	0.00
28,500.00	89.00	150.00	12,063.64	-13,603.73	9,656.41	16,682.23	0.00	0.00	0.00
28,600.00	89.00	150.00	12,065.39	-13,690.32	9,706.41	16,781.83	0.00	0.00	0.00
28,700.00	89.00	150.00	12,067.14	-13,776.90	9,756.41	16,881.44	0.00	0.00	0.00
28,800.00	89.00	150.00	12,068.88	-13,863.49	9,806.41	16,981.04	0.00	0.00	0.00
28,900.00	89.00	150.00	12,070.63	-13,950.07	9,856.41	17,080.64	0.00	0.00	0.00
29,000.00	89.00	150.00	12,072.37	-14,036.66	9,906.41	17,180.25	0.00	0.00	0.00
29,100.00	89.00	150.00	12,074.12	-14,123.25	9,956.41	17,279.85	0.00	0.00	0.00
29,200.00	89.00	150.00	12,075.87	-14,209.83	10,006.41	17,379.46	0.00	0.00	0.00
29,300.00	89.00	150.00	12,077.61	-14,296.42	10,056.40	17,479.06	0.00	0.00	0.00
29,400.00	89.00	150.00	12,079.36	-14,383.00	10,106.40	17,578.66	0.00	0.00	0.00
29,500.00	89.00	150.00	12,081.11	-14,469.59	10,156.40	17,678.27	0.00	0.00	0.00
29,600.00	89.00	150.00	12,082.85	-14,556.17	10,206.40	17,777.87	0.00	0.00	0.00
29,708.76	89.00	150.00	12,084.75	-14,650.35	10,260.78	17,886.20	0.00	0.00	0.00

PBHL/TD 29708.76 MD 12084.75 TVD

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N-S (ft)	+E-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Hudson 14HU LP r9 - hit/miss target - Shape	0.00	0.00	11,782.00	362.99	1,591.32	14,464,898.504	1,733,915.032	39.829708730	-80.666964170
- plan misses target center by 0.01ft at 12369.46ft MD (11781.99 TVD, 362.99 N, 1591.32 E)									
- Point									
Hudson 14HU PBHL r9 - plan hits target center - Point	0.00	0.00	12,084.75	-14,650.35	10,260.78	14,449,885.194	1,742,584.476	39.788386000	-80.636302000



Planning Report

<b>Database:</b>	DB_Dec2220_v16	<b>Local Co-ordinate Reference:</b>	Well Hudson S-14 HU (slot N)
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>MD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Site:</b>	Hudson Alt North	<b>North Reference:</b>	Grid
<b>Well:</b>	Hudson S-14 HU (slot N)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev9		

Casing Points				
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
29,709.31	12,084.76	20" Casing	20	24

Plan Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
10,714.00	10,585.60	883.43	943.04	Survey @ 10714.00 MD 10585.60 TVD	
10,970.00	10,833.14	925.62	992.83	KOP Begin 5.92°/100' build/turn	
10,984.81	10,847.45	928.16	995.66	Begin 5.92°/100' build/turn	
11,864.05	11,607.86	742.13	1,324.97	Begin 8°/100' build/turn	
12,369.46	11,782.00	362.99	1,591.32	Begin 89.00° lateral	
29,708.76	12,084.75	-14,650.35	10,260.78	PBHLTD 29708.76 MD 12084.75 TVD	

<b>Database:</b>	DB_Dec2220_v16	<b>Local Co-ordinate Reference:</b>	Well Hudson S-14 HU (slot N)
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>MD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Site:</b>	Hudson Alt North	<b>North Reference:</b>	Grid
<b>Well:</b>	Hudson S-14 HU (slot N)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev9		

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

<b>Site</b>	Hudson Alt North				
<b>Site Position:</b>		<b>Northing:</b>	14,464,552.095 usft	<b>Latitude:</b>	39.828774000
<b>From:</b>	Lat/Long	<b>Easting:</b>	1,732,278.451 usft	<b>Longitude:</b>	-80.672798000
<b>Position Uncertainty:</b>	0.00 ft	<b>Slot Radius:</b>	13-3/16"		

<b>Well</b>	Hudson S-14 HU (slot N)					
<b>Well Position</b>	+N/-S	0.00 ft	<b>Northing:</b>	14,464,535.511 usft	<b>Latitude:</b>	39.828728000
	+E/-W	0.00 ft	<b>Easting:</b>	1,732,323.713 usft	<b>Longitude:</b>	-80.672637000
<b>Position Uncertainty</b>		0.00 ft	<b>Wellhead Elevation:</b>	ft	<b>Ground Level:</b>	1,346.00 ft
<b>Grid Convergence:</b>						

<b>Wellbore</b>	Original Hole				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2020	5/27/2021	-8.690	66.571	51,769.89388026

<b>Design</b>	rev9				
<b>Audit Notes:</b>					
<b>Version:</b>	<b>Phase:</b>	PLAN	<b>Tie On Depth:</b>	10,714.00	
<b>Vertical Section:</b>	<b>Depth From (TVD) (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>	
	0.00	0.00	0.00	144.99	

Plan Survey Tool Program		Date		
Depth From (ft)	Depth To (ft)	Survey (Wellbore)	Tool Name	Remarks
1	156.00	1,085.00 MWD surf (Original Hole)		
2	1,175.00	2,845.00 MWD int (Original Hole)		
3	2,965.00	10,714.00 MWD (Original Hole)		
4	10,714.00	29,708.76 rev9 (Original Hole)		



Planning Report - Geographic

<b>Database:</b>	DB_Dec2220_v16	<b>Local Co-ordinate Reference:</b>	Well Hudson S-14 HU (slot N)
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>MD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Site:</b>	Hudson Alt North	<b>North Reference:</b>	Grid
<b>Well:</b>	Hudson S-14 HU (slot N)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev9		

Plan Sections										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	TFO (°)	Target
10,714.00	14.77	49.72	10,585.60	883.43	943.04	0.00	0.00	0.00	0.000	
10,970.00	14.77	49.72	10,833.14	925.62	992.83	0.00	0.00	0.00	0.000	
10,984.81	14.96	46.38	10,847.45	928.16	995.66	5.92	1.28	-22.55	-79.132	
11,864.05	50.00	138.27	11,607.86	742.13	1,324.97	5.92	3.99	10.45	103.959	
12,369.46	89.00	150.00	11,782.00	362.99	1,591.32	8.00	7.72	2.32	18.258	
29,708.76	89.00	150.00	12,084.75	-14,650.35	10,260.78	0.00	0.00	0.00	0.000	Hudson 14HU PBHL r



Planning Report - Geographic

<b>Database:</b>	DB_Dec2220_v16	<b>Local Co-ordinate Reference:</b>	Well Hudson S-14 HU (slot N)
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<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>MD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Site:</b>	Hudson Alt North	<b>North Reference:</b>	Grid
<b>Well:</b>	Hudson S-14 HU (slot N)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev9		

Planned 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	14,464,535.511	1,732,323.713	39.828728000	-80.672637000	
156.00	0.48	275.05	156.00	0.06	-0.65	14,464,535.568	1,732,323.063	39.828728165	-80.672639317	
186.00	0.22	287.64	186.00	0.09	-0.83	14,464,535.597	1,732,322.882	39.828728245	-80.672639958	
216.00	0.40	324.64	216.00	0.19	-0.95	14,464,535.700	1,732,322.767	39.828728529	-80.672640368	
247.00	0.40	302.32	247.00	0.33	-1.10	14,464,535.846	1,732,322.613	39.828728931	-80.672640915	
278.00	0.35	343.28	278.00	0.48	-1.22	14,464,535.994	1,732,322.494	39.828729341	-80.672641336	
309.00	0.31	345.30	309.00	0.66	-1.27	14,464,536.166	1,732,322.446	39.828729813	-80.672641506	
339.00	0.18	366.99	339.00	0.78	-1.29	14,464,536.292	1,732,322.423	39.828730158	-80.672641387	
369.00	0.57	32.32	368.99	0.95	-1.21	14,464,536.465	1,732,322.500	39.828730633	-80.672641509	
399.00	0.83	52.71	398.99	1.21	-0.96	14,464,536.723	1,732,322.753	39.828731338	-80.672640406	
430.00	0.57	54.82	429.99	1.44	-0.66	14,464,536.948	1,732,323.057	39.828731952	-80.672639318	
461.00	0.66	61.15	460.99	1.61	-0.37	14,464,537.122	1,732,323.340	39.828732430	-80.672638310	
492.00	0.88	58.77	491.99	1.82	-0.01	14,464,537.332	1,732,323.700	39.828733002	-80.672637025	
522.00	0.92	60.97	521.98	2.06	0.39	14,464,537.568	1,732,324.107	39.828733647	-80.672635570	
553.00	1.01	50.25	552.98	2.35	0.82	14,464,537.864	1,732,324.535	39.828734454	-80.672634043	
574.00	0.75	49.55	573.97	2.56	1.07	14,464,538.071	1,732,324.782	39.828735022	-80.672633161	
589.00	0.66	28.28	588.97	2.70	1.18	14,464,538.211	1,732,324.897	39.828735404	-80.672632747	
615.00	0.09	3.31	614.97	2.85	1.28	14,464,538.363	1,732,324.970	39.828735822	-80.672632488	
639.00	0.04	326.75	638.97	2.88	1.25	14,464,538.389	1,732,324.966	39.828735893	-80.672632501	
669.00	0.26	277.80	668.97	2.90	1.18	14,464,538.407	1,732,324.893	39.828735943	-80.672632761	
707.00	0.18	258.90	706.97	2.90	1.04	14,464,538.407	1,732,324.749	39.828735945	-80.672633274	
738.00	0.31	312.07	737.97	2.94	0.93	14,464,538.454	1,732,324.639	39.828736074	-80.672633665	
770.00	0.26	266.37	769.97	3.00	0.79	14,464,538.508	1,732,324.502	39.828736222	-80.672634152	
801.00	0.31	281.66	800.97	3.01	0.64	14,464,538.520	1,732,324.350	39.828736258	-80.672634694	
832.00	0.62	287.91	831.97	3.08	0.39	14,464,538.589	1,732,324.108	39.828736449	-80.672635554	
863.00	0.40	294.76	862.97	3.17	0.14	14,464,538.686	1,732,323.850	39.828736718	-80.672636471	
894.00	0.31	247.48	893.97	3.19	-0.04	14,464,538.699	1,732,323.674	39.828736756	-80.672637097	
918.00	0.18	231.04	917.97	3.14	-0.13	14,464,538.650	1,732,323.585	39.828736623	-80.672637416	
956.00	0.26	303.29	955.97	3.15	-0.25	14,464,538.660	1,732,323.467	39.828736851	-80.672637838	
988.00	0.18	107.20	987.97	3.17	-0.26	14,464,538.685	1,732,323.454	39.828736720	-80.672637882	
1,018.00	0.18	0.59	1,017.97	3.21	-0.21	14,464,538.718	1,732,323.499	39.828736811	-80.672637720	
1,049.00	0.13	332.73	1,048.97	3.29	-0.23	14,464,538.798	1,732,323.484	39.828737030	-80.672637774	
1,085.00	0.26	38.12	1,084.97	3.39	-0.20	14,464,538.899	1,732,323.516	39.828737308	-80.672637660	
1,175.00	0.40	2.35	1,174.97	3.86	-0.08	14,464,539.373	1,732,323.655	39.828738608	-80.672637159	
1,268.00	1.23	10.17	1,267.96	5.17	0.13	14,464,540.680	1,732,323.844	39.828742195	-80.672636467	
1,363.00	0.75	39.53	1,362.94	6.65	0.71	14,464,542.163	1,732,324.420	39.828746262	-80.672634397	
1,456.00	0.83	41.02	1,455.93	7.63	1.54	14,464,543.141	1,732,325.249	39.828748939	-80.672631429	
1,550.00	1.19	80.66	1,549.92	8.30	2.95	14,464,543.813	1,732,326.659	39.828750771	-80.672626398	
1,645.00	1.19	97.09	1,644.90	8.34	4.90	14,464,543.851	1,732,326.612	39.828750856	-80.672619444	
1,740.00	1.85	99.55	1,739.87	7.96	7.39	14,464,543.475	1,732,331.103	39.828749798	-80.672610576	
1,834.00	1.85	79.60	1,833.82	7.99	10.38	14,464,543.497	1,732,334.092	39.828749829	-80.672599930	
1,928.00	2.42	64.14	1,927.75	9.13	13.66	14,464,544.637	1,732,337.370	39.828752925	-80.672588239	
2,022.00	2.15	36.10	2,021.88	11.42	16.48	14,464,546.927	1,732,340.195	39.828759187	-80.672578148	
2,116.00	2.50	33.55	2,115.60	14.55	18.65	14,464,550.061	1,732,342.366	39.828767770	-80.672570371	
2,211.00	2.86	42.07	2,210.50	18.04	21.39	14,464,553.547	1,732,345.100	39.828777316	-80.672560590	
2,305.00	3.87	38.91	2,304.34	22.25	24.95	14,464,557.756	1,732,348.663	39.828788840	-80.672547842	
2,399.00	3.43	47.44	2,398.15	26.62	29.01	14,464,562.126	1,732,352.727	39.828800801	-80.672533311	
2,493.00	2.64	61.59	2,492.01	29.55	32.99	14,464,565.058	1,732,356.703	39.828808813	-80.672519112	
2,587.00	2.94	52.36	2,585.90	32.05	36.80	14,464,567.560	1,732,360.516	39.828815646	-80.672505498	
2,682.00	2.24	60.80	2,680.81	34.44	40.35	14,464,569.954	1,732,364.065	39.828822184	-80.672492823	
2,777.00	2.02	47.44	2,775.74	36.48	43.21	14,464,571.982	1,732,366.919	39.828827752	-80.672482631	
2,845.00	2.11	35.22	2,843.70	38.31	44.81	14,464,573.825	1,732,368.524	39.828832771	-80.672476892	
2,965.00	2.33	13.60	2,963.61	42.49	46.66	14,464,578.001	1,732,370.372	39.828844219	-80.672470256	
3,059.00	3.12	21.95	3,057.50	46.72	48.06	14,464,582.231	1,732,371.777	39.828855822	-80.672465195	



Planning Report - Geographic

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<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>MD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Site:</b>	Hudson Alt North	<b>North Reference:</b>	Grid
<b>Well:</b>	Hudson S-14 HU (slot N)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev9		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
3,154.00	3.87	31.70	3,152.33	51.85	50.71	14,464,587.357	1,732,374.428	39.828869871	-80.672455686
3,248.00	4.97	41.81	3,246.05	57.58	55.10	14,464,593.091	1,732,378.810	39.828885574	-80.672440004
3,341.00	5.80	43.66	3,338.64	63.98	61.03	14,464,599.493	1,732,384.740	39.828903097	-80.672418799
3,434.00	5.32	41.81	3,431.20	70.60	67.14	14,464,606.106	1,732,390.858	39.828921197	-80.672396920
3,529.00	4.13	49.98	3,525.87	76.08	72.70	14,464,611.589	1,732,396.414	39.828936198	-80.672377058
3,622.00	4.00	55.70	3,618.64	80.06	77.95	14,464,615.570	1,732,401.659	39.828947079	-80.672358327
3,717.00	4.09	57.63	3,713.40	83.74	83.54	14,464,619.251	1,732,407.257	39.828957131	-80.672338338
3,811.00	5.05	55.87	3,807.10	87.86	89.80	14,464,623.368	1,732,413.513	39.828968372	-80.672316001
3,905.00	4.44	54.12	3,900.78	92.31	96.17	14,464,627.821	1,732,419.886	39.828980539	-80.672293244
3,999.00	3.60	44.54	3,994.55	96.55	101.19	14,464,632.057	1,732,424.904	39.828992122	-80.672275315
4,093.00	3.82	38.73	4,088.35	101.09	105.22	14,464,636.604	1,732,428.933	39.829004566	-80.672260905
4,188.00	3.96	34.52	4,183.14	106.26	109.06	14,464,641.775	1,732,432.772	39.829018730	-80.672247164
4,282.00	3.91	25.02	4,276.91	111.84	112.25	14,464,647.354	1,732,435.967	39.829034017	-80.672235711
4,375.00	4.39	22.21	4,369.67	118.01	114.94	14,464,653.522	1,732,438.653	39.829050931	-80.672226082
4,469.00	5.01	21.51	4,463.35	125.16	117.81	14,464,660.671	1,732,441.518	39.829070536	-80.672215764
4,566.00	4.79	37.94	4,560.00	132.30	121.85	14,464,667.806	1,732,445.562	39.829090089	-80.672201269
4,659.00	5.80	38.56	4,652.61	139.03	127.17	14,464,674.543	1,732,450.878	39.829108537	-80.672182244
4,754.00	6.42	45.24	4,747.07	146.53	133.93	14,464,682.037	1,732,457.642	39.829129047	-80.672158056
4,848.00	6.37	51.65	4,840.48	153.46	141.75	14,464,688.973	1,732,465.463	39.829148017	-80.672130107
4,942.00	7.29	43.74	4,933.82	161.01	149.96	14,464,696.517	1,732,473.676	39.829168853	-80.672100755
5,036.00	6.77	45.68	5,027.11	169.19	158.05	14,464,704.697	1,732,481.784	39.829191036	-80.672071842
5,130.00	6.02	49.81	5,120.53	176.24	165.78	14,464,711.749	1,732,489.493	39.829210324	-80.672044218
5,223.00	4.66	53.50	5,213.12	181.63	172.54	14,464,717.144	1,732,496.256	39.829225070	-80.672020061
5,317.00	4.75	53.06	5,306.80	186.24	178.72	14,464,721.754	1,732,502.436	39.829237669	-80.671997987
5,411.00	5.84	51.83	5,400.40	191.54	185.59	14,464,727.049	1,732,509.306	39.829252140	-80.671973446
5,505.00	5.32	53.41	5,493.96	197.09	192.85	14,464,732.602	1,732,516.565	39.829267317	-80.671947519
5,599.00	4.83	55.43	5,587.59	201.93	199.61	14,464,737.445	1,732,523.323	39.829280549	-80.671923386
5,694.00	4.13	63.08	5,682.30	205.75	205.95	14,464,741.263	1,732,529.666	39.829290971	-80.671900741
5,788.00	4.61	64.31	5,776.02	208.92	212.38	14,464,744.433	1,732,536.089	39.829299612	-80.671877824
5,882.00	5.19	67.82	5,869.68	212.17	219.72	14,464,747.676	1,732,543.430	39.829308443	-80.671851633
5,976.00	5.45	62.82	5,963.27	215.81	227.62	14,464,751.320	1,732,551.338	39.829318371	-80.671823419
6,069.00	5.75	61.67	6,055.83	220.04	235.65	14,464,755.548	1,732,559.367	39.829329902	-80.671794763
6,164.00	4.75	54.29	6,150.43	224.59	243.04	14,464,760.102	1,732,566.750	39.829342335	-80.671768406
6,258.00	5.05	46.29	6,244.09	229.72	249.19	14,464,765.233	1,732,572.901	39.829355362	-80.671746431
6,347.00	4.61	38.30	6,332.77	235.24	254.24	14,464,770.747	1,732,577.949	39.829371453	-80.671728377
6,441.00	4.39	33.02	6,426.49	241.22	258.54	14,464,776.728	1,732,582.251	39.829387835	-80.671712977
6,536.00	5.58	32.58	6,521.12	248.16	263.01	14,464,783.688	1,732,586.720	39.829406851	-80.671696970
6,630.00	5.23	40.14	6,614.71	255.28	268.23	14,464,790.795	1,732,591.943	39.829426369	-80.671678274
6,725.00	5.36	49.19	6,709.30	261.49	274.38	14,464,797.005	1,732,598.092	39.829443361	-80.671656288
6,819.00	5.54	48.31	6,802.88	267.38	281.09	14,464,802.892	1,732,604.804	39.829459461	-80.671632306
6,913.00	6.42	46.91	6,896.37	273.99	288.32	14,464,809.500	1,732,612.030	39.829477535	-80.671606480
7,007.00	6.94	43.39	6,989.73	281.71	296.06	14,464,817.217	1,732,619.769	39.829498650	-80.671578813
7,101.00	9.05	44.80	7,082.81	291.08	305.17	14,464,826.591	1,732,628.881	39.829524301	-80.671546237
7,195.00	10.15	41.72	7,175.49	302.51	315.89	14,464,838.019	1,732,639.602	39.829555578	-80.671507898
7,290.00	11.16	37.68	7,268.85	316.03	327.08	14,464,851.544	1,732,650.793	39.829592607	-80.671467861
7,383.00	11.82	40.23	7,359.99	330.43	338.73	14,464,865.939	1,732,662.446	39.829632021	-80.671426165
7,477.00	12.17	47.44	7,451.94	344.48	352.25	14,464,879.991	1,732,675.963	39.829670476	-80.671377836
7,572.00	12.00	51.22	7,544.84	357.44	367.33	14,464,892.950	1,732,691.038	39.829705911	-80.671323972
7,666.00	11.87	47.26	7,636.81	370.12	382.04	14,464,905.632	1,732,705.756	39.829740590	-80.671271382
7,760.00	11.82	40.67	7,728.81	383.99	395.42	14,464,919.495	1,732,719.131	39.829778528	-80.671223560
7,854.00	13.10	42.43	7,820.60	399.15	408.88	14,464,934.661	1,732,732.593	39.829820040	-80.671175411
7,948.00	14.02	45.68	7,911.98	414.97	424.21	14,464,950.479	1,732,747.927	39.829863326	-80.671120586
8,044.00	14.28	44.01	8,005.06	431.61	440.76	14,464,967.119	1,732,764.473	39.829908856	-80.671061434
8,138.00	14.59	40.83	8,096.10	448.89	456.57	14,464,984.402	1,732,780.284	39.829956159	-80.671004890



Planning Report - Geographic

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<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>MD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Site:</b>	Hudson Alt North	<b>North Reference:</b>	Grid
<b>Well:</b>	Hudson S-14 HU (slot N)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev9		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
8,232.00	14.72	42.34	8,187.04	468.66	472.37	14,465,002.174	1,732,796.084	39.830004806	-80.670948379
8,326.00	14.63	43.13	8,277.97	484.16	488.53	14,465,019.665	1,732,812.243	39.830052677	-80.670890592
8,421.00	14.28	49.11	8,369.97	500.58	505.59	14,465,036.092	1,732,829.303	39.830097615	-80.670829609
8,516.00	14.63	50.25	8,461.96	515.92	523.67	14,465,051.433	1,732,847.385	39.830139563	-80.670765004
8,610.00	15.07	48.93	8,552.82	531.54	542.01	14,465,067.052	1,732,865.725	39.830182271	-80.670699474
8,704.00	14.99	46.12	8,643.61	548.00	559.99	14,465,083.507	1,732,883.700	39.830227278	-80.670635232
8,797.00	14.24	41.64	8,733.60	564.88	576.26	14,465,100.393	1,732,899.970	39.830273486	-80.670577058
8,891.00	14.41	38.12	8,824.68	582.73	591.16	14,465,118.235	1,732,914.872	39.830322334	-80.670523743
8,985.00	16.88	40.14	8,915.19	602.36	607.18	14,465,137.873	1,732,930.893	39.830376102	-80.670466421
9,078.00	18.37	45.33	9,003.83	622.99	626.31	14,465,158.500	1,732,950.021	39.830432554	-80.670398017
9,172.00	18.59	53.68	9,093.00	642.28	648.92	14,465,177.791	1,732,972.632	39.830485304	-80.670317227
9,265.00	17.67	64.57	9,181.41	657.13	673.62	14,465,192.636	1,732,997.330	39.830525823	-80.670229058
9,296.00	16.70	68.97	9,211.02	660.75	682.02	14,465,196.255	1,733,005.737	39.830535676	-80.670199066
9,328.00	15.95	71.43	9,241.73	663.80	690.48	14,465,199.305	1,733,014.197	39.830543967	-80.670168893
9,359.00	14.28	72.48	9,271.66	666.30	698.17	14,465,201.813	1,733,021.881	39.830550776	-80.670141490
9,391.00	12.79	72.84	9,302.77	668.54	705.32	14,465,204.046	1,733,029.029	39.830556836	-80.670116000
9,421.00	11.82	73.19	9,332.08	670.41	711.43	14,465,205.915	1,733,035.143	39.830561905	-80.670094196
9,453.00	10.85	70.90	9,363.46	672.34	717.41	14,465,207.848	1,733,041.127	39.830567154	-80.670072858
9,484.00	10.77	63.87	9,393.91	674.57	722.77	14,465,210.078	1,733,046.484	39.830573225	-80.670053745
9,515.00	11.12	55.43	9,424.35	677.54	727.83	14,465,213.050	1,733,051.547	39.830581336	-80.670035674
9,546.00	12.44	49.90	9,454.69	681.39	732.85	14,465,216.898	1,733,056.563	39.830591850	-80.670017757
9,641.00	14.11	43.57	9,547.16	696.37	748.66	14,465,231.880	1,733,072.373	39.830632836	-80.669961246
9,735.00	14.94	42.25	9,638.15	713.64	764.71	14,465,249.151	1,733,088.417	39.830680104	-80.669903869
9,829.00	14.72	42.95	9,729.02	731.35	780.99	14,465,266.862	1,733,104.701	39.830728575	-80.669845634
9,923.00	13.75	47.52	9,820.14	747.64	797.37	14,465,283.148	1,733,121.078	39.830773136	-80.669787086
10,017.00	13.89	50.25	9,911.42	762.40	814.28	14,465,297.907	1,733,137.992	39.830813496	-80.669726646
10,111.00	13.93	47.88	10,002.66	777.20	831.35	14,465,312.711	1,733,155.059	39.830853976	-80.669665659
10,205.00	14.02	45.24	10,093.88	792.81	847.83	14,465,328.317	1,733,171.537	39.830896867	-80.669606761
10,298.00	14.77	46.73	10,183.96	808.87	864.46	14,465,344.375	1,733,188.168	39.830940598	-80.669547311
10,392.00	15.38	46.47	10,274.72	825.66	882.22	14,465,361.173	1,733,205.930	39.830986550	-80.669483822
10,486.00	15.21	45.77	10,365.39	842.85	900.09	14,465,378.360	1,733,223.803	39.831033567	-80.669419933
10,581.00	15.07	45.85	10,457.10	860.15	917.88	14,465,395.655	1,733,241.594	39.831080882	-80.669356335
10,674.00	14.90	47.44	10,548.93	876.65	935.36	14,465,412.163	1,733,259.076	39.831128039	-80.669293848
10,714.00	14.77	49.72	10,585.60	883.43	943.04	14,465,418.938	1,733,266.754	39.831144568	-80.669266411
<b>Survey @ 10714.00 MD 10585.60 TVD</b>									
10,800.00	14.77	49.72	10,668.76	897.60	959.77	14,465,433.113	1,733,283.480	39.831183323	-80.669206646
10,900.00	14.77	49.72	10,765.45	914.09	979.22	14,465,449.595	1,733,302.929	39.831228390	-80.669137151
10,970.00	14.77	49.72	10,833.14	925.62	992.83	14,465,461.133	1,733,316.544	39.831259937	-80.669088505
<b>KOP Begin 5.92°/100' build/turn</b>									
10,984.81	14.96	46.38	10,847.45	928.16	995.66	14,465,463.671	1,733,319.367	39.831266880	-80.669078415
<b>Begin 5.92°/100' build/turn</b>									
11,000.00	14.77	49.81	10,862.14	930.77	998.55	14,465,466.274	1,733,322.266	39.831273998	-80.669068054
11,050.00	14.51	61.51	10,910.53	937.87	1,008.93	14,465,473.376	1,733,332.641	39.831293396	-80.669031008
11,100.00	14.84	73.15	10,958.91	942.71	1,020.56	14,465,478.221	1,733,344.274	39.831306583	-80.668989504
11,150.00	15.71	83.91	11,007.15	945.29	1,033.42	14,465,480.796	1,733,357.135	39.831313524	-80.668943659
11,200.00	17.05	93.29	11,055.13	945.59	1,047.48	14,465,481.094	1,733,371.190	39.831314200	-80.668893595
11,250.00	18.76	101.18	11,102.71	943.61	1,062.69	14,465,479.115	1,733,386.399	39.831308610	-80.668839444
11,300.00	20.74	107.70	11,149.77	939.35	1,079.01	14,465,474.863	1,733,402.724	39.831296768	-80.668781352
11,350.00	22.93	113.09	11,196.19	932.84	1,096.41	14,465,468.351	1,733,420.120	39.831278706	-80.668719474
11,400.00	25.26	117.55	11,241.83	924.09	1,114.83	14,465,459.594	1,733,438.541	39.831254472	-80.668653975
11,450.00	27.71	121.30	11,286.59	913.11	1,134.23	14,465,448.618	1,733,457.938	39.831224131	-80.668585030
11,500.00	30.24	124.46	11,330.32	899.94	1,154.55	14,465,435.451	1,733,478.258	39.831187764	-80.668512823
11,550.00	32.84	127.18	11,372.93	884.62	1,175.74	14,465,420.128	1,733,499.448	39.831145468	-80.668437548





Planning Report - Geographic

<b>Database:</b>	DB_Dec2220_v16	<b>Local Co-ordinate Reference:</b>	Well Hudson S-14 HU (slot N)
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>MD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Site:</b>	Hudson Alt North	<b>North Reference:</b>	Grid
<b>Well:</b>	Hudson S-14 HU (slot N)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev9		

Planned Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
11,600.00	35.49	129.54	11,414.30	867.18	1,197.74	14,465,402.690	1,733,521.451	39.831097356	-80.668359405	
11,650.00	38.19	131.60	11,454.32	847.68	1,220.50	14,465,383.185	1,733,544.208	39.831043558	-80.668278603	
11,700.00	40.91	133.43	11,492.87	826.15	1,243.95	14,465,361.663	1,733,567.658	39.830994216	-80.668195359	
11,750.00	43.66	135.08	11,529.86	802.67	1,268.03	14,465,338.183	1,733,591.739	39.830919489	-80.668109894	
11,800.00	46.43	136.56	11,565.19	777.30	1,292.68	14,465,312.806	1,733,616.386	39.830849549	-80.668022438	
11,850.00	49.21	137.91	11,598.76	750.09	1,317.82	14,465,285.602	1,733,641.534	39.830774584	-80.667933223	
11,864.05	50.00	138.27	11,607.86	742.13	1,324.97	14,465,277.639	1,733,648.681	39.830752643	-80.667907870	
<b>Begin 8°/100' build/turn</b>										
11,900.00	52.74	139.40	11,630.30	720.99	1,343.45	14,465,256.496	1,733,667.160	39.830694391	-80.667842329	
11,950.00	56.56	140.85	11,659.23	689.69	1,369.58	14,465,225.199	1,733,693.290	39.830608175	-80.667749669	
12,000.00	60.40	142.17	11,685.37	656.33	1,396.09	14,465,191.840	1,733,719.805	39.830516294	-80.667655686	
12,050.00	64.25	143.39	11,708.59	621.07	1,422.86	14,465,156.582	1,733,746.575	39.830419194	-80.667560780	
12,100.00	68.11	144.54	11,728.78	584.09	1,449.76	14,465,119.597	1,733,773.470	39.830317349	-80.667465471	
12,150.00	71.97	145.63	11,745.84	545.55	1,476.65	14,465,081.064	1,733,800.359	39.830211255	-80.667370205	
12,200.00	75.85	146.67	11,759.70	505.66	1,503.40	14,465,041.172	1,733,827.111	39.830101429	-80.667275445	
12,250.00	79.73	147.67	11,770.27	464.61	1,529.89	14,465,000.115	1,733,853.596	39.829988406	-80.667181654	
12,300.00	83.61	148.66	11,777.52	422.58	1,555.97	14,464,958.093	1,733,879.684	39.829872737	-80.667089288	
12,350.00	87.49	149.62	11,781.40	379.80	1,581.54	14,464,915.310	1,733,905.248	39.829754984	-80.666998797	
12,369.46	89.00	150.00	11,782.00	362.99	1,591.32	14,464,898.499	1,733,915.029	39.829708718	-80.666964182	
<b>Begin 89.00° lateral</b>										
12,400.00	89.00	150.00	11,782.53	336.54	1,606.59	14,464,872.055	1,733,930.299	39.829635940	-80.666910142	
12,500.00	89.00	150.00	11,784.27	249.96	1,656.59	14,464,785.469	1,733,980.298	39.829397645	-80.666733201	
12,600.00	89.00	150.00	11,786.02	163.37	1,706.59	14,464,698.884	1,734,030.297	39.829159350	-80.666556261	
12,700.00	89.00	150.00	11,787.77	76.79	1,756.59	14,464,612.299	1,734,080.296	39.828921055	-80.666379323	
12,800.00	89.00	150.00	11,789.51	-9.80	1,806.58	14,464,525.713	1,734,130.294	39.828682760	-80.666202386	
12,900.00	89.00	150.00	11,791.26	-96.38	1,856.58	14,464,439.128	1,734,180.293	39.828444464	-80.666025450	
13,000.00	89.00	150.00	11,793.00	-182.97	1,906.58	14,464,352.543	1,734,230.292	39.828206168	-80.665848515	
13,100.00	89.00	150.00	11,794.75	-269.55	1,956.58	14,464,265.957	1,734,280.291	39.827967872	-80.665671581	
13,200.00	89.00	150.00	11,796.50	-356.14	2,006.58	14,464,179.372	1,734,330.290	39.827729575	-80.665494469	
13,300.00	89.00	150.00	11,798.24	-442.73	2,056.58	14,464,092.786	1,734,380.288	39.827491278	-80.665317718	
13,400.00	89.00	150.00	11,799.99	-529.31	2,106.58	14,464,006.201	1,734,430.287	39.827252981	-80.665140788	
13,500.00	89.00	150.00	11,801.74	-615.90	2,156.58	14,463,919.616	1,734,480.286	39.827014684	-80.664963859	
13,600.00	89.00	150.00	11,803.48	-702.48	2,206.58	14,463,833.030	1,734,530.285	39.826776386	-80.664786932	
13,700.00	89.00	150.00	11,805.23	-789.07	2,256.57	14,463,746.445	1,734,580.284	39.826538088	-80.664610006	
13,800.00	89.00	150.00	11,806.97	-875.65	2,306.57	14,463,659.859	1,734,630.282	39.826299790	-80.664433081	
13,900.00	89.00	150.00	11,808.72	-962.24	2,356.57	14,463,573.274	1,734,680.281	39.826061491	-80.664256157	
14,000.00	89.00	150.00	11,810.47	-1,048.82	2,406.57	14,463,486.689	1,734,730.280	39.825823193	-80.664079234	
14,100.00	89.00	150.00	11,812.21	-1,135.41	2,456.57	14,463,400.103	1,734,780.279	39.825584894	-80.663902313	
14,200.00	89.00	150.00	11,813.96	-1,222.00	2,506.57	14,463,313.518	1,734,830.278	39.825346594	-80.663725393	
14,300.00	89.00	150.00	11,815.70	-1,308.58	2,556.57	14,463,226.932	1,734,880.276	39.825108295	-80.663548474	
14,400.00	89.00	150.00	11,817.45	-1,395.17	2,606.57	14,463,140.347	1,734,930.275	39.824869995	-80.663371556	
14,500.00	89.00	150.00	11,819.20	-1,481.75	2,656.57	14,463,053.762	1,734,980.274	39.824631695	-80.663194639	
14,600.00	89.00	150.00	11,820.94	-1,568.34	2,706.57	14,462,967.176	1,735,030.273	39.824393394	-80.663017724	
14,700.00	89.00	150.00	11,822.69	-1,654.92	2,756.56	14,462,880.591	1,735,080.272	39.824155094	-80.662840810	
14,800.00	89.00	150.00	11,824.43	-1,741.51	2,806.56	14,462,794.006	1,735,130.270	39.823916793	-80.662663897	
14,900.00	89.00	150.00	11,826.18	-1,828.09	2,856.56	14,462,707.420	1,735,180.269	39.823678491	-80.662486986	
15,000.00	89.00	150.00	11,827.93	-1,914.68	2,906.56	14,462,620.835	1,735,230.268	39.823440190	-80.662310075	
15,100.00	89.00	150.00	11,829.67	-2,001.27	2,956.56	14,462,534.249	1,735,280.267	39.823201888	-80.662133166	
15,200.00	89.00	150.00	11,831.42	-2,087.85	3,006.56	14,462,447.664	1,735,330.266	39.822963586	-80.661956258	
15,300.00	89.00	150.00	11,833.16	-2,174.44	3,056.56	14,462,361.079	1,735,380.265	39.822725284	-80.661779351	
15,400.00	89.00	150.00	11,834.91	-2,261.02	3,106.56	14,462,274.493	1,735,430.263	39.822486981	-80.661602446	
15,500.00	89.00	150.00	11,836.66	-2,347.61	3,156.56	14,462,187.908	1,735,480.262	39.822248678	-80.661425541	
15,600.00	89.00	150.00	11,838.40	-2,434.19	3,206.55	14,462,101.322	1,735,530.261	39.822010375	-80.661248638	



Planning Report - Geographic

<b>Database:</b>	DB_Dec2220_v16	<b>Local Co-ordinate Reference:</b>	Well Hudson S-14 HU (slot N)
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>MD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
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<b>Well:</b>	Hudson S-14 HU (slot N)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev9		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
15,700.00	89.00	150.00	11,840.15	-2,520.78	3,256.55	14,462,014.737	1,735,580.260	39.821772072	-80.661071736
15,800.00	89.00	150.00	11,841.89	-2,607.36	3,306.55	14,461,928.152	1,735,630.259	39.821533768	-80.660894836
15,900.00	89.00	150.00	11,843.64	-2,693.95	3,356.55	14,461,841.566	1,735,680.257	39.821295464	-80.660717936
16,000.00	89.00	150.00	11,845.39	-2,780.54	3,406.55	14,461,754.981	1,735,730.256	39.821057160	-80.660541038
16,100.00	89.00	150.00	11,847.13	-2,867.12	3,456.55	14,461,668.395	1,735,780.255	39.820818855	-80.660364141
16,200.00	89.00	150.00	11,848.88	-2,953.71	3,506.55	14,461,581.810	1,735,830.254	39.820580550	-80.660187245
16,300.00	89.00	150.00	11,850.62	-3,040.29	3,556.55	14,461,495.225	1,735,880.253	39.820342245	-80.660010351
16,400.00	89.00	150.00	11,852.37	-3,126.88	3,606.55	14,461,408.639	1,735,930.251	39.820103940	-80.659833457
16,500.00	89.00	150.00	11,854.12	-3,213.46	3,656.54	14,461,322.054	1,735,980.250	39.819865634	-80.659656565
16,600.00	89.00	150.00	11,855.86	-3,300.05	3,706.54	14,461,235.469	1,736,030.249	39.819627328	-80.659479674
16,700.00	89.00	150.00	11,857.61	-3,386.63	3,756.54	14,461,148.883	1,736,080.248	39.819389022	-80.659302785
16,800.00	89.00	150.00	11,859.36	-3,473.22	3,806.54	14,461,062.298	1,736,130.247	39.819150716	-80.659125896
16,900.00	89.00	150.00	11,861.10	-3,559.81	3,856.54	14,460,975.712	1,736,180.245	39.818912409	-80.658949009
17,000.00	89.00	150.00	11,862.85	-3,646.39	3,906.54	14,460,889.127	1,736,230.244	39.818674102	-80.658772123
17,100.00	89.00	150.00	11,864.59	-3,732.98	3,956.54	14,460,802.542	1,736,280.243	39.818435795	-80.658595238
17,200.00	89.00	150.00	11,866.34	-3,819.56	4,006.54	14,460,715.956	1,736,330.242	39.818197487	-80.658418354
17,300.00	89.00	150.00	11,868.09	-3,906.15	4,056.54	14,460,629.371	1,736,380.241	39.817959179	-80.658241472
17,400.00	89.00	150.00	11,869.83	-3,992.73	4,106.53	14,460,542.785	1,736,430.239	39.817720871	-80.658064591
17,500.00	89.00	150.00	11,871.58	-4,079.32	4,156.53	14,460,456.200	1,736,480.238	39.817482563	-80.657887711
17,600.00	89.00	150.00	11,873.32	-4,165.90	4,206.53	14,460,369.615	1,736,530.237	39.817244254	-80.657710832
17,700.00	89.00	150.00	11,875.07	-4,252.49	4,256.53	14,460,283.029	1,736,580.236	39.817005945	-80.657533954
17,800.00	89.00	150.00	11,876.82	-4,339.08	4,306.53	14,460,196.444	1,736,630.235	39.816767636	-80.657357078
17,900.00	89.00	150.00	11,878.56	-4,425.66	4,356.53	14,460,109.858	1,736,680.234	39.816529327	-80.657180203
18,000.00	89.00	150.00	11,880.31	-4,512.25	4,406.53	14,460,023.273	1,736,730.232	39.816291017	-80.657003329
18,100.00	89.00	150.00	11,882.05	-4,598.83	4,456.53	14,459,936.688	1,736,780.231	39.816052707	-80.656826457
18,200.00	89.00	150.00	11,883.80	-4,685.42	4,506.53	14,459,850.102	1,736,830.230	39.815814397	-80.656649585
18,300.00	89.00	150.00	11,885.55	-4,772.00	4,556.52	14,459,763.517	1,736,880.229	39.815576086	-80.656472715
18,400.00	89.00	150.00	11,887.29	-4,858.59	4,606.52	14,459,676.932	1,736,930.228	39.815337775	-80.656295846
18,500.00	89.00	150.00	11,889.04	-4,945.17	4,656.52	14,459,590.346	1,736,980.227	39.815099464	-80.656118978
18,600.00	89.00	150.00	11,890.78	-5,031.76	4,706.52	14,459,503.761	1,737,030.226	39.814861153	-80.655942112
18,700.00	89.00	150.00	11,892.53	-5,118.35	4,756.52	14,459,417.175	1,737,080.225	39.814622841	-80.655765246
18,800.00	89.00	150.00	11,894.28	-5,204.93	4,806.52	14,459,330.590	1,737,130.224	39.814384529	-80.655588382
18,900.00	89.00	150.00	11,896.02	-5,291.52	4,856.52	14,459,244.005	1,737,180.223	39.814146217	-80.655411519
19,000.00	89.00	150.00	11,897.77	-5,378.10	4,906.52	14,459,157.419	1,737,230.221	39.813907904	-80.655234657
19,100.00	89.00	150.00	11,899.51	-5,464.69	4,956.52	14,459,070.834	1,737,280.220	39.813669592	-80.655057797
19,200.00	89.00	150.00	11,901.26	-5,551.27	5,006.51	14,458,984.248	1,737,330.219	39.813431279	-80.654880938
19,300.00	89.00	150.00	11,903.01	-5,637.86	5,056.51	14,458,897.663	1,737,380.218	39.813192965	-80.654704080
19,400.00	89.00	150.00	11,904.75	-5,724.45	5,106.51	14,458,811.078	1,737,430.217	39.812954652	-80.654527223
19,500.00	89.00	150.00	11,906.50	-5,811.03	5,156.51	14,458,724.492	1,737,480.215	39.812716338	-80.654350367
19,600.00	89.00	150.00	11,908.25	-5,897.62	5,206.51	14,458,637.907	1,737,530.214	39.812478024	-80.654173513
19,700.00	89.00	150.00	11,909.99	-5,984.20	5,256.51	14,458,551.321	1,737,580.213	39.812239709	-80.653996660
19,800.00	89.00	150.00	11,911.74	-6,070.79	5,306.51	14,458,464.736	1,737,630.212	39.812001395	-80.653819808
19,900.00	89.00	150.00	11,913.48	-6,157.37	5,356.51	14,458,378.151	1,737,680.211	39.811763080	-80.653642957
20,000.00	89.00	150.00	11,915.23	-6,243.96	5,406.51	14,458,291.565	1,737,730.209	39.811524765	-80.653466107
20,100.00	89.00	150.00	11,916.98	-6,330.54	5,456.51	14,458,204.980	1,737,780.208	39.811286449	-80.653289259
20,200.00	89.00	150.00	11,918.72	-6,417.13	5,506.50	14,458,118.395	1,737,830.207	39.811048133	-80.653112412
20,300.00	89.00	150.00	11,920.47	-6,503.72	5,556.50	14,458,031.809	1,737,880.206	39.810809817	-80.652935566
20,400.00	89.00	150.00	11,922.21	-6,590.30	5,606.50	14,457,945.224	1,737,930.205	39.810571501	-80.652758722
20,500.00	89.00	150.00	11,923.96	-6,676.89	5,656.50	14,457,858.638	1,737,980.204	39.810333184	-80.652581878
20,600.00	89.00	150.00	11,925.71	-6,763.47	5,706.50	14,457,772.053	1,738,030.202	39.810094868	-80.652405036
20,700.00	89.00	150.00	11,927.45	-6,850.06	5,756.50	14,457,685.468	1,738,080.201	39.809856550	-80.652228195
20,800.00	89.00	150.00	11,929.20	-6,936.64	5,806.50	14,457,598.882	1,738,130.200	39.809618233	-80.652051355
20,900.00	89.00	150.00	11,930.94	-7,023.23	5,856.50	14,457,512.297	1,738,180.199	39.809379915	-80.651874517
21,000.00	89.00	150.00	11,932.69	-7,109.81	5,906.50	14,457,425.711	1,738,230.198	39.809141597	-80.651697679



Planning Report - Geographic

<b>Database:</b>	DB_Dec2220_v16	<b>Local Co-ordinate Reference:</b>	Well Hudson S-14 HU (slot N)
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>MD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Site:</b>	Hudson Alt North	<b>North Reference:</b>	Grid
<b>Well:</b>	Hudson S-14 HU (slot N)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev9		

Planned Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
21,100.00	89.00	150.00	11,934.44	-7,196.40	5,956.49	14,457,339.126	1,738,280.196	39.808903279	-80.651520843	
21,200.00	89.00	150.00	11,936.18	-7,282.99	6,006.49	14,457,252.541	1,738,330.195	39.808664961	-80.651344008	
21,300.00	89.00	150.00	11,937.93	-7,369.57	6,056.49	14,457,165.955	1,738,380.194	39.808426642	-80.651167175	
21,400.00	89.00	150.00	11,939.67	-7,456.16	6,106.49	14,457,079.370	1,738,430.193	39.808188323	-80.650990342	
21,500.00	89.00	150.00	11,941.42	-7,542.74	6,156.49	14,456,992.784	1,738,480.192	39.807950003	-80.650813511	
21,600.00	89.00	150.00	11,943.17	-7,629.33	6,206.49	14,456,906.199	1,738,530.190	39.807711684	-80.650636681	
21,700.00	89.00	150.00	11,944.91	-7,715.91	6,256.49	14,456,819.614	1,738,580.189	39.807473364	-80.650459852	
21,800.00	89.00	150.00	11,946.66	-7,802.50	6,306.49	14,456,733.028	1,738,630.188	39.807235044	-80.650283024	
21,900.00	89.00	150.00	11,948.40	-7,889.08	6,356.49	14,456,646.443	1,738,680.187	39.806996723	-80.650106198	
22,000.00	89.00	150.00	11,950.15	-7,975.67	6,406.48	14,456,559.858	1,738,730.186	39.806758403	-80.649929373	
22,100.00	89.00	150.00	11,951.90	-8,062.26	6,456.48	14,456,473.272	1,738,780.184	39.806520082	-80.649752549	
22,200.00	89.00	150.00	11,953.64	-8,148.84	6,506.48	14,456,386.687	1,738,830.183	39.806281760	-80.649575266	
22,300.00	89.00	150.00	11,955.39	-8,235.43	6,556.48	14,456,300.101	1,738,880.182	39.806043439	-80.649398905	
22,400.00	89.00	150.00	11,957.13	-8,322.01	6,606.48	14,456,213.516	1,738,930.181	39.805805117	-80.649222084	
22,500.00	89.00	150.00	11,958.88	-8,408.60	6,656.48	14,456,126.931	1,738,980.180	39.805566795	-80.649045265	
22,600.00	89.00	150.00	11,960.63	-8,495.18	6,706.48	14,456,040.345	1,739,030.178	39.805328473	-80.648868447	
22,700.00	89.00	150.00	11,962.37	-8,581.77	6,756.48	14,455,953.760	1,739,080.177	39.805090150	-80.648691631	
22,800.00	89.00	150.00	11,964.12	-8,668.35	6,806.48	14,455,867.174	1,739,130.176	39.804851827	-80.648514815	
22,900.00	89.00	150.00	11,965.87	-8,754.94	6,856.47	14,455,780.589	1,739,180.175	39.804613504	-80.648338001	
23,000.00	89.00	150.00	11,967.61	-8,841.53	6,906.47	14,455,694.004	1,739,230.174	39.804375181	-80.648161188	
23,100.00	89.00	150.00	11,969.36	-8,928.11	6,956.47	14,455,607.418	1,739,280.173	39.804136857	-80.647984376	
23,200.00	89.00	150.00	11,971.10	-9,014.70	7,006.47	14,455,520.833	1,739,330.171	39.803898533	-80.647807566	
23,300.00	89.00	150.00	11,972.85	-9,101.28	7,056.47	14,455,434.247	1,739,380.170	39.803660209	-80.647630756	
23,400.00	89.00	150.00	11,974.60	-9,187.87	7,106.47	14,455,347.662	1,739,430.169	39.803421884	-80.647453948	
23,500.00	89.00	150.00	11,976.34	-9,274.45	7,156.47	14,455,261.077	1,739,480.168	39.803183559	-80.647277141	
23,600.00	89.00	150.00	11,978.09	-9,361.04	7,206.47	14,455,174.491	1,739,530.167	39.802945234	-80.647100335	
23,700.00	89.00	150.00	11,979.83	-9,447.62	7,256.47	14,455,087.905	1,739,580.165	39.802706909	-80.646923531	
23,800.00	89.00	150.00	11,981.58	-9,534.21	7,306.46	14,455,001.321	1,739,630.164	39.802468583	-80.646746728	
23,900.00	89.00	150.00	11,983.33	-9,620.80	7,356.46	14,454,914.735	1,739,680.163	39.802230257	-80.646569926	
24,000.00	89.00	150.00	11,985.07	-9,707.38	7,406.46	14,454,828.150	1,739,730.162	39.801991931	-80.646393125	
24,100.00	89.00	150.00	11,986.82	-9,793.97	7,456.46	14,454,741.564	1,739,780.161	39.801753605	-80.646216325	
24,200.00	89.00	150.00	11,988.56	-9,880.55	7,506.46	14,454,654.979	1,739,830.159	39.801515278	-80.646039521	
24,300.00	89.00	150.00	11,990.31	-9,967.14	7,556.46	14,454,568.394	1,739,880.158	39.801276951	-80.645862730	
24,400.00	89.00	150.00	11,992.06	-10,053.72	7,606.46	14,454,481.808	1,739,930.157	39.801038624	-80.645685934	
24,500.00	89.00	150.00	11,993.80	-10,140.31	7,656.46	14,454,395.223	1,739,980.156	39.800800296	-80.645509139	
24,600.00	89.00	150.00	11,995.55	-10,226.89	7,706.46	14,454,308.637	1,740,030.155	39.800561968	-80.645332345	
24,700.00	89.00	150.00	11,997.29	-10,313.48	7,756.46	14,454,222.052	1,740,080.153	39.800323640	-80.645155553	
24,800.00	89.00	150.00	11,999.04	-10,400.07	7,806.45	14,454,135.467	1,740,130.152	39.800085312	-80.644978762	
24,900.00	89.00	150.00	12,000.79	-10,486.65	7,856.45	14,454,048.881	1,740,180.151	39.799846983	-80.644801972	
25,000.00	89.00	150.00	12,002.53	-10,573.24	7,906.45	14,453,962.296	1,740,230.150	39.799608654	-80.644625183	
25,100.00	89.00	150.00	12,004.28	-10,659.82	7,956.45	14,453,875.710	1,740,280.149	39.799370325	-80.644448396	
25,200.00	89.00	150.00	12,006.02	-10,746.41	8,006.45	14,453,789.125	1,740,330.147	39.799131996	-80.644271610	
25,300.00	89.00	150.00	12,007.77	-10,832.99	8,056.45	14,453,702.540	1,740,380.146	39.798893666	-80.644094825	
25,400.00	89.00	150.00	12,009.52	-10,919.58	8,106.45	14,453,615.954	1,740,430.145	39.798655336	-80.643918041	
25,500.00	89.00	150.00	12,011.26	-11,006.16	8,156.45	14,453,529.369	1,740,480.144	39.798417006	-80.643741258	
25,600.00	89.00	150.00	12,013.01	-11,092.75	8,206.45	14,453,442.784	1,740,530.143	39.798178675	-80.643564477	
25,700.00	89.00	150.00	12,014.75	-11,179.34	8,256.44	14,453,356.197	1,740,580.142	39.797940344	-80.643387697	
25,800.00	89.00	150.00	12,016.50	-11,265.92	8,306.44	14,453,269.612	1,740,630.140	39.797702013	-80.643210918	
25,900.00	89.00	150.00	12,018.25	-11,352.51	8,356.44	14,453,183.026	1,740,680.139	39.797463682	-80.643034140	
26,000.00	89.00	150.00	12,019.99	-11,439.09	8,406.44	14,453,096.441	1,740,730.138	39.797225350	-80.642857363	
26,100.00	89.00	150.00	12,021.74	-11,525.68	8,456.44	14,453,009.855	1,740,780.137	39.796987018	-80.642680588	
26,200.00	89.00	150.00	12,023.49	-11,612.26	8,506.44	14,452,923.270	1,740,830.136	39.796748686	-80.642503814	
26,300.00	89.00	150.00	12,025.23	-11,698.85	8,556.44	14,452,836.685	1,740,880.134	39.796510353	-80.642327041	
26,400.00	89.00	150.00	12,026.98	-11,785.43	8,606.44	14,452,750.099	1,740,930.133	39.796272021	-80.642150270	



Planning Report - Geographic

<b>Database:</b>	DB_Dec2220_v16	<b>Local Co-ordinate Reference:</b>	Well Hudson S-14 HU (slot N)
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>MD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Site:</b>	Hudson Alt North	<b>North Reference:</b>	Grid
<b>Well:</b>	Hudson S-14 HU (slot N)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev9		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
26,500.00	89.00	150.00	12,028.72	-11,872.02	8,656.44	14,452,863.514	1,740,980.132	39.796033688	-80.641973499
26,600.00	89.00	150.00	12,030.47	-11,958.61	8,706.43	14,452,576.929	1,741,030.131	39.795795354	-80.641796730
26,700.00	89.00	150.00	12,032.22	-12,045.19	8,756.43	14,452,490.343	1,741,080.130	39.795557022	-80.641619962
26,800.00	89.00	150.00	12,033.96	-12,131.78	8,806.43	14,452,403.758	1,741,130.128	39.795318688	-80.641443195
26,900.00	89.00	150.00	12,035.71	-12,218.36	8,856.43	14,452,317.172	1,741,180.127	39.795080354	-80.641266430
27,000.00	89.00	150.00	12,037.45	-12,304.95	8,906.43	14,452,230.587	1,741,230.126	39.794842019	-80.641089665
27,100.00	89.00	150.00	12,039.20	-12,391.53	8,956.43	14,452,144.002	1,741,280.125	39.794603685	-80.640912902
27,200.00	89.00	150.00	12,040.95	-12,478.12	9,006.43	14,452,057.416	1,741,330.124	39.794365350	-80.640736140
27,300.00	89.00	150.00	12,042.69	-12,564.70	9,056.43	14,451,970.831	1,741,380.122	39.794127015	-80.640559380
27,400.00	89.00	150.00	12,044.44	-12,651.29	9,106.43	14,451,884.246	1,741,430.121	39.793888679	-80.640382620
27,500.00	89.00	150.00	12,046.18	-12,737.88	9,156.42	14,451,797.660	1,741,480.120	39.793650343	-80.640205862
27,600.00	89.00	150.00	12,047.93	-12,824.46	9,206.42	14,451,711.075	1,741,530.119	39.793412007	-80.640029105
27,700.00	89.00	150.00	12,049.68	-12,911.05	9,256.42	14,451,624.489	1,741,580.118	39.793173671	-80.639852349
27,800.00	89.00	150.00	12,051.42	-12,997.63	9,306.42	14,451,537.904	1,741,630.116	39.792935334	-80.639675594
27,900.00	89.00	150.00	12,053.17	-13,084.22	9,356.42	14,451,451.319	1,741,680.115	39.792696998	-80.639498841
28,000.00	89.00	150.00	12,054.91	-13,170.80	9,406.42	14,451,364.733	1,741,730.114	39.792458660	-80.639322089
28,100.00	89.00	150.00	12,056.66	-13,257.39	9,456.42	14,451,278.148	1,741,780.113	39.792220323	-80.639145338
28,200.00	89.00	150.00	12,058.41	-13,343.98	9,506.42	14,451,191.562	1,741,830.112	39.791981985	-80.638968588
28,300.00	89.00	150.00	12,060.15	-13,430.56	9,556.42	14,451,104.977	1,741,880.111	39.791743647	-80.638791839
28,400.00	89.00	150.00	12,061.90	-13,517.15	9,606.41	14,451,018.392	1,741,930.109	39.791505309	-80.638615092
28,500.00	89.00	150.00	12,063.64	-13,603.73	9,656.41	14,450,931.806	1,741,980.108	39.791266971	-80.638438346
28,600.00	89.00	150.00	12,065.39	-13,690.32	9,706.41	14,450,845.221	1,742,030.107	39.791028632	-80.638261601
28,700.00	89.00	150.00	12,067.14	-13,776.90	9,756.41	14,450,758.635	1,742,080.106	39.790790293	-80.638084857
28,800.00	89.00	150.00	12,068.88	-13,863.49	9,806.41	14,450,672.050	1,742,130.105	39.790551954	-80.637908115
28,900.00	89.00	150.00	12,070.63	-13,950.07	9,856.41	14,450,585.465	1,742,180.103	39.790313614	-80.637731374
29,000.00	89.00	150.00	12,072.37	-14,036.66	9,906.41	14,450,498.879	1,742,230.102	39.790075274	-80.637554634
29,100.00	89.00	150.00	12,074.12	-14,123.25	9,956.41	14,450,412.294	1,742,280.101	39.789836934	-80.637377895
29,200.00	89.00	150.00	12,075.87	-14,209.83	10,006.41	14,450,325.709	1,742,330.100	39.789598594	-80.637201157
29,300.00	89.00	150.00	12,077.61	-14,296.42	10,056.40	14,450,239.123	1,742,380.099	39.789360253	-80.637024421
29,400.00	89.00	150.00	12,079.36	-14,383.00	10,106.40	14,450,152.538	1,742,430.097	39.789121912	-80.636847686
29,500.00	89.00	150.00	12,081.11	-14,469.59	10,156.40	14,450,065.952	1,742,480.096	39.788883571	-80.636670952
29,600.00	89.00	150.00	12,082.85	-14,556.17	10,206.40	14,449,979.367	1,742,530.095	39.788645229	-80.636494219
29,708.76	89.00	150.00	12,084.75	-14,650.35	10,260.78	14,449,885.194	1,742,584.476	39.788386000	-80.636302000

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Hudson 14HU LP r9 - hit/miss target - Shape	0.00	0.00	11,782.00	362.99	1,591.32	14,464,898.504	1,733,915.032	39.829708730	-80.666964170
- plan misses target center by 0.01ft at 12369.46ft MD (11781.99 TVD, 362.99 N, 1591.32 E)									
- Point									
Hudson 14HU PBHL r9 - plan hits target center - Point	0.00	0.00	12,084.75	-14,650.35	10,260.78	14,449,885.194	1,742,584.476	39.788386000	-80.636302000



Planning Report - Geographic

<b>Database:</b>	DB_Dec2220_v16	<b>Local Co-ordinate Reference:</b>	Well Hudson S-14 HU (slot N)
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>MD Reference:</b>	RKB=1346+33 @ 1379.00ft (Nabors X08)
<b>Site:</b>	Hudson Alt North	<b>North Reference:</b>	Grid
<b>Well:</b>	Hudson S-14 HU (slot N)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev9		

Casing Points					
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")	
29,709.31	12,084.76	20" Casing	20	24	

Plan Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
10,714.00	10,585.60	883.43	943.04	Survey @ 10714.00 MD 10585.60 TVD	
10,970.00	10,833.14	925.62	992.83	KOP Begin 5.92°/100' build/turn	
10,984.81	10,847.45	928.16	995.66	Begin 5.92°/100' build/turn	
11,864.05	11,607.86	742.13	1,324.97	Begin 8°/100' build/turn	
12,369.46	11,782.00	362.99	1,591.32	Begin 89.00° lateral	
29,708.76	12,084.75	-14,650.35	10,260.78	PBHL/TD 29708.76 MD 12084.75 TVD	