



Well: Keith Stern S-10 HM (slot L)
 Site: Keith Stern
 Project: Marshall County, West Virginia.
 Design: rev2
 Rig: Nabors X08

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	V Sect	Annotation
1	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.00	
2	1337.00	0.00	0.000	1337.00	0.00	0.00	0.000	0.00	0.00	KOP Begin 2°/100' build
3	1587.00	5.00	140.000	1586.68	-8.35	7.01	2.000	140.00	10.70	Begin 5.00° tangent
4	4046.68	5.00	140.000	4037.00	-172.57	144.80	0.000	0.00	221.16	Begin 2°/100' build/turn
5	4958.69	23.63	160.994	4955.77	-386.71	234.43	2.000	26.11	451.89	Begin 23.63° tangent
6	6041.39	23.63	160.994	5911.05	-781.85	370.54	0.000	0.00	863.43	Begin 8°/100' build/turn
7	6374.45	50.00	154.240	6175.44	-963.13	449.14	8.000	-11.59	1060.07	Begin 10°/100' build/turn
8	6766.12	89.00	150.322	6310.00	-1280.83	617.91	10.000	-6.21	1419.76	Begin 89.00° lateral
9	14016.24	89.00	150.322	6436.00	-7578.93	4207.10	0.000	0.00	8668.33	PBHL/TD 14016.24 MD 6436.00 TVD

ANNOTATIONS SURVEYS

MD	Inc	Azi	TVD	+N/-S	+E/-W	V Sect	Annotation
193.00	0.32	354.680	193.00	0.54	-0.05	-0.49	MWD surveys
13950.00	88.84	148.450	6438.51	-7520.27	4183.94	8605.80	Survey @ 13950.00 MD 6438.51 TVD
14011.00	88.84	148.450	6439.74	-7572.25	4215.85	8666.73	Survey Proj. to 14011.00 MD 6439.74 TVD

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

System Datum: Mean Sea Level
 Depth Reference: RKB=748+33 @ 781.00usft (Nabors X08)

Northing: 14444836.47 Easting: 1726906.06 Latitude: 39.77468240 Longitude: -80.69217513

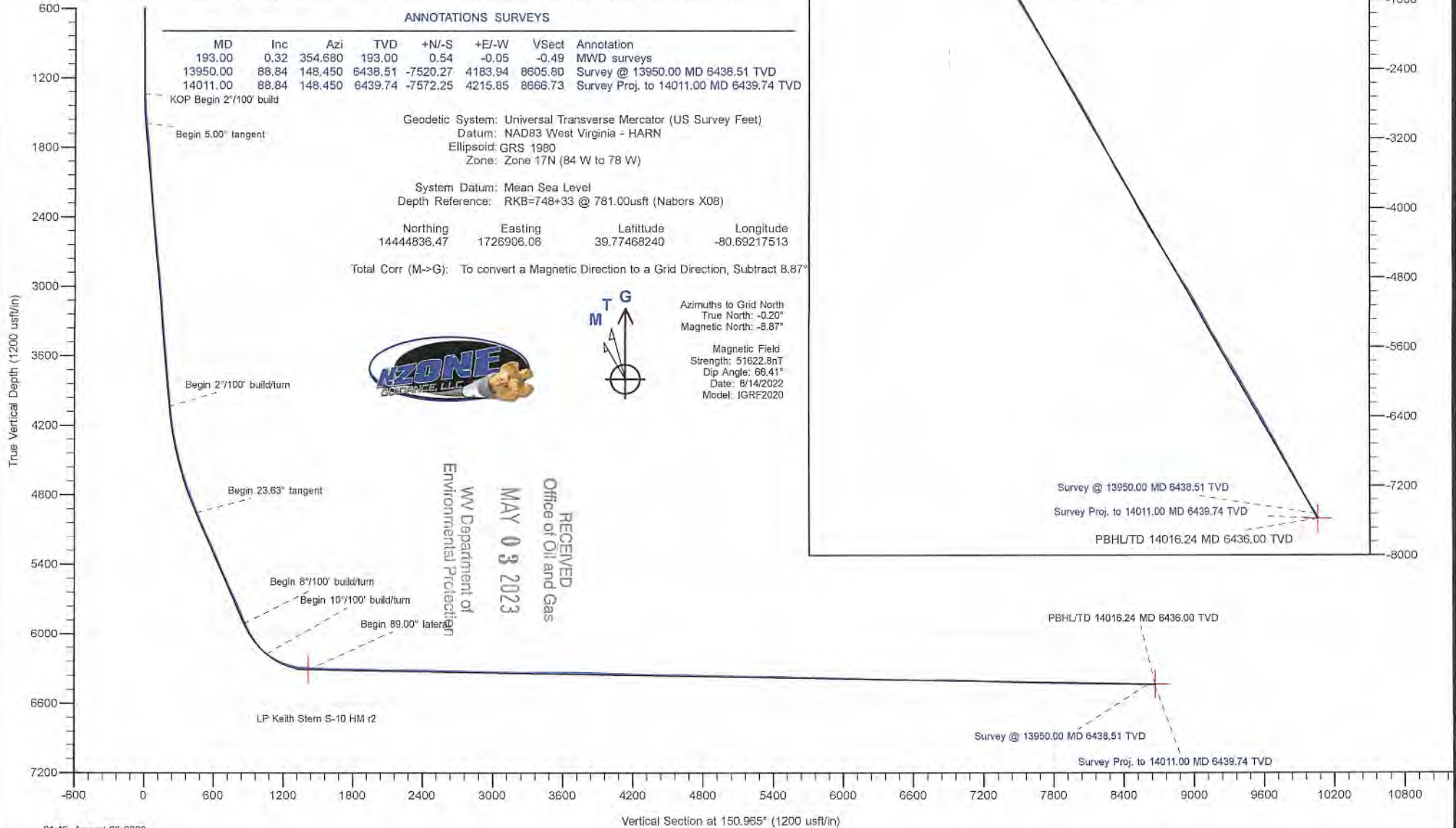
Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.87°



Azimuths to Grid North
 True North: -0.20°
 Magnetic North: -8.87°

Magnetic Field
 Strength: 51622.8nT
 Dip Angle: 66.41°
 Date: 8/14/2022
 Model: IGRF2020

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Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Keith Stern S-10 HM (slot L)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=748+33 @ 781.00usft (Nabors X08)
Site:	Keith Stern	MD Reference:	RKB=748+33 @ 781.00usft (Nabors X08)
Well:	Keith Stern S-10 HM (slot L)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

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	Keith Stern				
Site Position:		Northing:	14,444,890.33 usft	Latitude:	39.77483004
From:	Lat/Long	Easting:	1,726,932.47 usft	Longitude:	-80.69208048
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.20 °

Well	Keith Stern S-10 HM (slot L)					
Well Position	+N/-S	0.00 usft	Northing:	14,444,836.48 usft	Latitude:	39.77468240
	+E/-W	0.00 usft	Easting:	1,726,906.06 usft	Longitude:	-80.69217513
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	748.00 usft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2020	8/14/2022	-8.67	66.41	51,622.79509728

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	150.965	

Survey Program	Date 8/23/2022				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
193.00	545.00	MWD surf (Original Hole)	MWD	MWD - Standard	
616.00	2,867.00	MWD int (Original Hole)	MWD	MWD - Standard	
2,962.00	13,950.00	MWD (Original Hole)	MWD	MWD - Standard	
14,011.00	14,011.00	Projection (Original Hole)	MWD	MWD - Standard	

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Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
0.00	0.00	0.000	0.00	0.00	0.00	14,444,836.48	1,726,906.06	39.77468240	-80.69217513	
193.00	0.32	354.680	193.00	0.54	-0.05	14,444,837.01	1,726,906.01	39.77468388	-80.69217530	
MWD surveys										
223.00	0.45	324.070	223.00	0.72	-0.13	14,444,837.19	1,726,905.93	39.77468437	-80.69217557	
253.00	0.43	340.950	253.00	0.92	-0.23	14,444,837.39	1,726,905.83	39.77468492	-80.69217595	
284.00	0.31	355.980	284.00	1.11	-0.28	14,444,837.59	1,726,905.78	39.77468546	-80.69217610	
314.00	0.53	338.370	314.00	1.32	-0.33	14,444,837.80	1,726,905.73	39.77468603	-80.69217630	
344.00	0.48	319.960	343.99	1.55	-0.47	14,444,838.02	1,726,905.60	39.77468665	-80.69217677	
374.00	0.32	323.520	373.99	1.71	-0.60	14,444,838.18	1,726,905.46	39.77468710	-80.69217723	

12/08/2023

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Keith Stern S-10 HM (slot L)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=748+33 @ 781.00usft (Nabors X08)
Site:	Keith Stern	MD Reference:	RKB=748+33 @ 781.00usft (Nabors X08)
Well:	Keith Stern S-10 HM (slot L)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
405.00	0.39	341.700	404.99	1.88	-0.68	14,444,838.35	1,726,905.38	39.77468757	-80.69217753	
435.00	0.41	313.010	434.99	2.05	-0.79	14,444,838.52	1,726,905.27	39.77468804	-80.69217792	
464.00	0.67	317.730	463.99	2.25	-0.98	14,444,838.72	1,726,905.08	39.77468858	-80.69217859	
495.00	0.66	325.010	494.99	2.53	-1.21	14,444,839.00	1,726,904.86	39.77468935	-80.69217939	
525.00	0.67	314.730	524.99	2.79	-1.43	14,444,839.27	1,726,904.63	39.77469008	-80.69218018	
545.00	0.74	317.550	544.99	2.97	-1.60	14,444,839.44	1,726,904.46	39.77469057	-80.69218079	
616.00	0.54	240.810	615.98	3.14	-2.20	14,444,839.62	1,726,903.86	39.77469106	-80.69218293	
707.00	1.75	190.470	706.96	1.57	-2.83	14,444,838.04	1,726,903.23	39.77468674	-80.69218518	
801.00	1.35	202.620	800.93	-0.87	-3.51	14,444,835.61	1,726,902.55	39.77468006	-80.69218765	
895.00	1.50	178.820	894.90	-3.12	-3.92	14,444,833.36	1,726,902.15	39.77467388	-80.69218910	
989.00	0.42	131.440	988.89	-4.58	-3.63	14,444,831.90	1,726,902.43	39.77466987	-80.69218811	
1,083.00	0.66	107.900	1,082.88	-4.97	-2.86	14,444,831.51	1,726,903.20	39.77466878	-80.69218536	
1,177.00	1.09	131.220	1,176.87	-5.73	-1.67	14,444,830.75	1,726,904.39	39.77466869	-80.69218115	
1,271.00	0.40	179.380	1,270.87	-6.64	-0.99	14,444,829.83	1,726,905.07	39.77466417	-80.69217875	
1,365.00	1.00	187.260	1,364.86	-7.78	-1.09	14,444,828.69	1,726,904.97	39.77466103	-80.69217912	
1,459.00	2.68	161.560	1,458.81	-10.68	-0.50	14,444,825.79	1,726,905.56	39.77465307	-80.69217705	
1,553.00	4.84	148.470	1,552.60	-16.15	2.27	14,444,820.33	1,726,908.33	39.77463803	-80.69217626	
1,648.00	5.94	141.100	1,647.18	-23.39	7.45	14,444,813.08	1,726,913.51	39.77461809	-80.69214890	
1,743.00	5.30	146.530	1,741.72	-30.88	12.96	14,444,805.60	1,726,919.02	39.77459748	-80.69212940	
1,837.00	4.42	148.610	1,835.39	-37.59	17.24	14,444,798.88	1,726,923.30	39.77457901	-80.69211424	
1,930.00	4.13	138.360	1,928.13	-43.15	21.33	14,444,793.32	1,726,927.39	39.77456369	-80.69209975	
2,024.00	3.98	126.560	2,021.89	-47.63	26.20	14,444,788.85	1,726,932.26	39.77455136	-80.69208247	
2,118.00	4.16	129.250	2,115.66	-51.73	31.46	14,444,784.75	1,726,937.52	39.77454005	-80.69206380	
2,213.00	5.28	132.930	2,210.33	-56.88	37.33	14,444,779.59	1,726,943.39	39.77452583	-80.69204297	
2,302.00	5.75	127.360	2,298.92	-62.38	43.87	14,444,774.10	1,726,949.93	39.77451068	-80.69201976	
2,396.00	5.16	120.500	2,392.50	-67.38	51.26	14,444,769.09	1,726,957.32	39.77449687	-80.69199354	
2,490.00	6.19	134.840	2,486.04	-73.10	58.49	14,444,763.38	1,726,964.55	39.77448110	-80.69196785	
2,584.00	5.72	133.680	2,579.53	-79.91	65.47	14,444,756.57	1,726,971.53	39.77446233	-80.69194309	
2,679.00	5.47	129.180	2,674.08	-86.04	72.41	14,444,750.44	1,726,978.47	39.77444543	-80.69191849	
2,773.00	4.89	145.830	2,767.70	-92.18	78.13	14,444,744.29	1,726,984.19	39.77442850	-80.69189819	
2,867.00	4.65	145.920	2,861.38	-98.66	82.52	14,444,737.82	1,726,988.58	39.77441069	-80.69188266	
2,962.00	4.06	143.430	2,956.10	-104.55	86.68	14,444,731.93	1,726,992.74	39.77439447	-80.69186792	
3,059.00	5.68	137.370	3,052.75	-110.84	91.97	14,444,725.64	1,726,998.03	39.77437715	-80.69184915	
3,154.00	5.55	134.110	3,147.29	-117.49	98.46	14,444,718.98	1,727,004.52	39.77435881	-80.69182616	
3,248.00	5.10	132.430	3,240.89	-123.47	104.80	14,444,713.00	1,727,010.86	39.77434232	-80.69180364	
3,343.00	4.62	151.400	3,335.55	-129.68	109.75	14,444,706.79	1,727,015.81	39.77432522	-80.69178610	
3,437.00	5.34	142.920	3,429.20	-136.50	114.20	14,444,699.98	1,727,020.26	39.77430647	-80.69177035	
3,531.00	4.61	140.320	3,522.84	-142.89	119.25	14,444,693.58	1,727,025.31	39.77428885	-80.69175246	
3,626.00	5.67	138.480	3,617.46	-149.35	124.80	14,444,687.13	1,727,030.86	39.77427108	-80.69173279	
3,720.00	5.51	138.000	3,711.01	-156.18	130.90	14,444,680.30	1,727,036.96	39.77425226	-80.69171117	
3,814.00	4.82	131.870	3,804.63	-162.17	136.86	14,444,674.31	1,727,042.92	39.77423576	-80.69169003	
3,907.00	4.51	144.880	3,897.32	-167.76	141.87	14,444,668.71	1,727,047.93	39.77422034	-80.69167226	
4,001.00	4.10	141.220	3,991.06	-173.41	146.10	14,444,663.07	1,727,052.16	39.77420480	-80.69165727	
4,096.00	5.75	145.870	4,085.71	-179.99	150.90	14,444,656.48	1,727,056.96	39.77418666	-80.69164027	
4,190.00	8.51	146.020	4,178.97	-189.66	157.43	14,444,646.81	1,727,063.09	39.77418005	-80.69161715	
4,285.00	9.74	151.760	4,272.77	-202.57	165.16	14,444,633.90	1,727,071.22	39.77412453	-80.69158979	
4,378.00	11.76	158.060	4,364.13	-218.29	172.43	14,444,618.18	1,727,078.49	39.77408128	-80.69156413	
4,475.00	13.26	158.190	4,458.83	-237.79	180.25	14,444,598.68	1,727,086.31	39.77402766	-80.69153851	
4,569.00	15.22	157.080	4,549.94	-259.17	189.06	14,444,577.31	1,727,095.13	39.77396887	-80.69150542	
4,664.00	17.50	159.520	4,641.08	-284.04	198.92	14,444,552.44	1,727,104.98	39.77390048	-80.69147065	
4,758.00	19.39	161.700	4,730.25	-312.10	208.77	14,444,524.38	1,727,114.83	39.77382333	-80.69143595	
4,853.00	22.43	161.950	4,818.99	-344.31	219.33	14,444,492.17	1,727,125.40	39.77373477	-80.69139873	
4,947.00	20.73	158.260	4,906.40	-376.81	231.05	14,444,459.66	1,727,137.12	39.77364539	-80.69135741	
5,041.00	22.37	159.670	4,993.82	-409.04	243.43	14,444,427.43	1,727,149.49	39.77355676	-80.69131376	
5,136.00	23.96	159.920	5,081.16	-444.11	256.34	14,444,392.36	1,727,162.40	39.77346032	-80.69126826	

12/08/2023

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Well:	Keith Stern S-10 HM (slot L)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
5,230.00	23.83	160.420	5,167.11	-479.93	269.25	14,444,356.54	1,727,175.31	39.77336184	-80.69122273
5,325.00	24.13	161.340	5,253.91	-516.41	281.90	14,444,320.06	1,727,187.96	39.77326154	-80.69117818
5,420.00	23.02	158.500	5,340.98	-552.09	294.92	14,444,284.38	1,727,200.98	39.77316342	-80.69113227
5,514.00	22.63	162.980	5,427.62	-586.49	306.95	14,444,249.99	1,727,213.01	39.77306885	-80.69108988
5,608.00	24.94	163.210	5,513.63	-622.76	317.97	14,444,213.71	1,727,224.03	39.77296913	-80.69105110
5,701.00	24.30	160.240	5,598.18	-659.54	330.10	14,444,176.93	1,727,236.16	39.77286800	-80.69100837
5,780.00	24.33	157.750	5,670.18	-689.90	341.76	14,444,146.57	1,727,247.82	39.77278451	-80.69096725
5,815.00	24.84	156.630	5,702.00	-703.32	347.41	14,444,133.15	1,727,253.47	39.7724760	-80.69094733
5,909.00	23.82	158.910	5,787.66	-739.16	362.07	14,444,097.31	1,727,268.13	39.77264905	-80.69089558
6,004.00	21.63	156.630	5,875.28	-773.14	375.92	14,444,063.34	1,727,281.98	39.77255561	-80.69084671
6,051.00	23.12	156.450	5,918.74	-789.55	383.04	14,444,046.93	1,727,289.10	39.77251047	-80.69082156
6,098.00	26.02	156.980	5,961.48	-807.50	390.76	14,444,028.98	1,727,296.82	39.77246110	-80.69079430
6,145.00	29.93	157.330	6,002.98	-827.81	399.32	14,444,008.66	1,727,305.38	39.77240523	-80.69076411
6,192.00	33.93	158.560	6,042.86	-850.85	408.64	14,443,985.62	1,727,314.70	39.77234187	-80.69073123
6,239.00	38.07	159.880	6,080.88	-876.68	418.42	14,443,959.79	1,727,324.48	39.77227085	-80.69069673
6,286.00	42.46	161.110	6,116.73	-905.31	428.54	14,443,931.16	1,727,334.61	39.77219212	-80.69066104
6,333.00	47.21	162.080	6,150.05	-936.75	438.99	14,443,899.73	1,727,345.05	39.77210569	-80.69062425
6,381.00	52.00	161.550	6,181.15	-971.47	450.40	14,443,865.01	1,727,356.47	39.77201024	-80.69058406
6,428.00	57.58	160.140	6,208.24	-1,007.72	463.01	14,443,828.75	1,727,369.08	39.77191056	-80.69053963
6,475.00	62.90	159.350	6,231.56	-1,045.98	477.14	14,443,790.49	1,727,383.20	39.77180535	-80.69048982
6,522.00	68.48	158.470	6,250.90	-1,085.93	492.55	14,443,750.55	1,727,398.62	39.77169550	-80.69043546
6,570.00	72.04	156.450	6,267.11	-1,127.64	509.88	14,443,708.83	1,727,415.94	39.77158078	-80.69037432
6,617.00	76.13	154.430	6,280.00	-1,168.74	528.67	14,443,667.74	1,727,434.73	39.77146774	-80.69030796
6,664.00	80.84	152.410	6,289.38	-1,209.91	549.27	14,443,626.57	1,727,455.33	39.77135448	-80.69023513
6,711.00	84.92	150.480	6,295.20	-1,250.86	571.56	14,443,585.62	1,727,477.62	39.77124180	-80.69015631
6,758.00	88.31	148.370	6,297.98	-1,291.24	595.42	14,443,545.23	1,727,501.49	39.77113067	-80.69007188
6,805.00	88.26	148.280	6,300.82	-1,372.06	645.29	14,443,464.42	1,727,551.35	39.77090826	-80.68989543
6,848.00	87.74	147.660	6,304.14	-1,452.55	695.64	14,443,383.93	1,727,601.70	39.77068674	-80.68971722
7,042.00	88.35	148.190	6,307.34	-1,532.15	745.53	14,443,304.33	1,727,651.59	39.77046765	-80.68954066
7,136.00	89.27	149.250	6,309.30	-1,612.47	794.32	14,443,224.01	1,727,700.38	39.77024662	-80.68936800
7,231.00	89.19	149.510	6,310.57	-1,694.21	842.71	14,443,142.26	1,727,748.77	39.77002166	-80.68919682
7,325.00	88.62	148.370	6,312.37	-1,774.72	891.19	14,443,061.76	1,727,797.25	39.76980010	-80.68902526
7,419.00	89.67	149.420	6,313.77	-1,855.19	939.75	14,442,981.28	1,727,845.81	39.76957864	-80.68885346
7,513.00	89.36	149.860	6,314.57	-1,936.30	987.26	14,442,900.18	1,727,893.32	39.76935545	-80.68868539
7,607.00	90.07	150.120	6,315.04	-2,017.70	1,034.27	14,442,818.78	1,727,940.33	39.76913146	-80.68851908
7,702.00	89.14	149.600	6,315.69	-2,099.85	1,081.97	14,442,736.63	1,727,988.03	39.76890539	-80.68835035
7,795.00	88.57	148.980	6,317.55	-2,179.79	1,129.45	14,442,656.68	1,728,035.51	39.76868540	-80.68818235
7,891.00	88.26	148.980	6,320.20	-2,262.03	1,178.91	14,442,574.45	1,728,084.97	39.76845907	-80.68800738
7,985.00	88.88	148.370	6,322.55	-2,342.30	1,227.76	14,442,494.17	1,728,133.82	39.76823816	-80.68783452
8,080.00	88.09	148.810	6,325.06	-2,423.35	1,277.25	14,442,413.12	1,728,183.31	39.76801510	-80.68765940
8,174.00	87.78	149.070	6,328.45	-2,503.82	1,325.72	14,442,332.65	1,728,231.78	39.76779364	-80.68748792
8,269.00	88.44	149.510	6,331.58	-2,585.45	1,374.21	14,442,251.02	1,728,280.27	39.76756900	-80.68731637
8,363.00	89.10	149.770	6,333.60	-2,666.54	1,421.71	14,442,169.93	1,728,327.77	39.76734584	-80.68714835
8,457.00	88.84	149.950	6,335.29	-2,747.82	1,468.90	14,442,088.65	1,728,374.95	39.76712218	-80.68698142
8,551.00	90.02	150.560	6,336.22	-2,829.43	1,515.53	14,442,007.04	1,728,421.59	39.76689761	-80.68681648
8,644.00	90.07	150.740	6,336.15	-2,910.49	1,561.12	14,441,925.98	1,728,467.18	39.76667456	-80.68665527
8,738.00	90.29	151.090	6,335.86	-2,992.64	1,606.81	14,441,843.84	1,728,512.87	39.76644852	-80.68649369
8,832.00	90.68	151.090	6,335.06	-3,074.92	1,652.25	14,441,761.55	1,728,558.31	39.76622212	-80.68633301
8,926.00	89.67	151.880	6,334.77	-3,157.52	1,697.12	14,441,678.96	1,728,603.18	39.76599486	-80.68617435
9,021.00	89.10	152.230	6,335.79	-3,241.43	1,741.64	14,441,595.04	1,728,647.70	39.76576397	-80.68601698
9,115.00	88.79	152.590	6,337.52	-3,324.73	1,785.17	14,441,511.74	1,728,691.23	39.76553460	-80.68586312
9,210.00	88.35	153.110	6,339.90	-3,409.24	1,828.50	14,441,427.24	1,728,734.57	39.76530230	-80.68570996
9,304.00	88.31	150.390	6,342.63	-3,492.00	1,872.97	14,441,344.48	1,728,779.03	39.76507459	-80.68555275
9,399.00	87.87	150.480	6,345.80	-3,574.58	1,919.82	14,441,261.89	1,728,825.88	39.76484734	-80.68538707
9,492.00	87.47	150.120	6,349.58	-3,655.30	1,965.86	14,441,181.18	1,728,871.92	39.76462523	-80.68522424

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Keith Stern S-10 HM (slot L)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=748+33 @ 781.00usft (Nabors X08)
Site:	Keith Stern	MD Reference:	RKB=748+33 @ 781.00usft (Nabors X08)
Well:	Keith Stern S-10 HM (slot L)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
9,586.00	88.00	150.120	6,353.30	-3,736.74	2,012.65	14,441,099.74	1,728,918.71	39.76440112	-80.68505875
9,680.00	88.92	150.830	6,355.82	-3,818.50	2,058.96	14,441,017.97	1,728,965.02	39.76417613	-80.68489499
9,774.00	89.45	151.790	6,357.16	-3,900.95	2,104.08	14,440,935.52	1,729,010.14	39.76394927	-80.68473546
9,867.00	89.27	151.350	6,358.20	-3,982.73	2,148.35	14,440,853.75	1,729,054.41	39.76372425	-80.68457894
9,961.00	90.02	151.530	6,358.78	-4,065.29	2,193.29	14,440,771.19	1,729,099.35	39.76349709	-80.68442006
10,054.00	88.66	149.330	6,359.85	-4,146.16	2,239.18	14,440,690.31	1,729,145.24	39.76327454	-80.68425779
10,148.00	88.22	149.510	6,362.41	-4,227.06	2,286.98	14,440,609.41	1,729,193.04	39.76305192	-80.68408869
10,242.00	88.62	148.980	6,365.00	-4,307.81	2,335.03	14,440,528.67	1,729,241.09	39.76282969	-80.68391872
10,337.00	88.53	149.510	6,367.37	-4,389.42	2,383.60	14,440,447.05	1,729,289.66	39.76260509	-80.68374693
10,431.00	89.76	149.680	6,368.77	-4,470.48	2,431.17	14,440,365.99	1,729,337.23	39.76238201	-80.68357869
10,525.00	88.79	148.450	6,369.96	-4,551.10	2,479.48	14,440,285.37	1,729,385.54	39.76216014	-80.68340777
10,619.00	89.76	149.160	6,371.15	-4,631.50	2,528.17	14,440,204.97	1,729,434.23	39.76193887	-80.68323555
10,713.00	89.27	148.720	6,371.94	-4,712.02	2,576.66	14,440,124.45	1,729,482.72	39.76171727	-80.68306399
10,807.00	88.40	148.810	6,373.85	-4,792.38	2,625.39	14,440,044.09	1,729,531.46	39.76149611	-80.68289159
10,901.00	88.53	148.450	6,376.37	-4,872.61	2,674.31	14,439,963.86	1,729,580.37	39.76127530	-80.68271855
10,996.00	88.09	146.960	6,379.17	-4,952.88	2,725.04	14,439,883.60	1,729,631.10	39.76105437	-80.68253903
11,090.00	89.14	150.480	6,381.45	-5,033.18	2,773.83	14,439,803.30	1,729,679.89	39.76083337	-80.68236646
11,184.00	88.97	150.300	6,383.00	-5,114.89	2,820.26	14,439,721.58	1,729,726.33	39.76060852	-80.68219225
11,279.00	88.79	150.650	6,384.85	-5,197.54	2,867.07	14,439,638.94	1,729,773.13	39.76038109	-80.68201804
11,372.00	88.97	150.830	6,386.67	-5,278.66	2,912.52	14,439,557.82	1,729,818.58	39.76015787	-80.68184383
11,467.00	88.22	150.740	6,389.00	-5,361.55	2,958.87	14,439,474.93	1,729,864.93	39.75992978	-80.68166962
11,561.00	87.30	149.510	6,392.68	-5,442.99	3,005.66	14,439,393.48	1,729,911.72	39.75970566	-80.68149541
11,655.00	88.26	151.790	6,396.32	-5,524.86	3,051.69	14,439,311.62	1,729,957.75	39.75948038	-80.68132120
11,749.00	89.05	150.480	6,398.52	-5,607.15	3,097.06	14,439,229.32	1,730,003.12	39.75925393	-80.68114699
11,843.00	89.80	149.600	6,399.47	-5,688.59	3,144.00	14,439,147.89	1,730,050.06	39.75902983	-80.68097278
11,938.00	89.89	149.160	6,399.72	-5,770.34	3,192.38	14,439,066.13	1,730,096.45	39.75880484	-80.68079857
12,032.00	89.45	149.070	6,400.27	-5,851.01	3,240.64	14,438,985.46	1,730,146.70	39.75858283	-80.68062436
12,127.00	89.63	150.040	6,401.03	-5,932.91	3,288.77	14,438,903.57	1,730,194.83	39.75835745	-80.68044997
12,222.00	89.27	150.210	6,401.94	-6,015.28	3,336.09	14,438,821.20	1,730,242.15	39.75813077	-80.68027558
12,315.00	88.88	150.390	6,403.44	-6,096.05	3,382.16	14,438,740.42	1,730,288.22	39.75790850	-80.68010119
12,410.00	88.40	150.480	6,405.70	-6,178.66	3,429.02	14,438,657.82	1,730,335.08	39.75768118	-80.67992680
12,503.00	87.69	150.210	6,408.87	-6,259.43	3,475.01	14,438,577.04	1,730,381.07	39.75745891	-80.67975241
12,598.00	87.69	150.210	6,412.70	-6,341.81	3,522.17	14,438,494.67	1,730,428.23	39.75723221	-80.67957802
12,691.00	88.31	151.000	6,415.94	-6,422.79	3,567.79	14,438,413.69	1,730,473.85	39.75700938	-80.67940363
12,785.00	88.26	151.440	6,418.76	-6,505.14	3,613.02	14,438,331.34	1,730,519.08	39.75678278	-80.67922924
12,880.00	88.09	150.480	6,421.78	-6,588.15	3,659.11	14,438,248.32	1,730,565.17	39.75655434	-80.67905485
12,974.00	88.31	151.090	6,424.74	-6,670.15	3,704.97	14,438,166.32	1,730,611.03	39.75632870	-80.67888046
13,067.00	89.01	152.060	6,426.91	-6,751.92	3,749.23	14,438,084.56	1,730,655.29	39.75610371	-80.67870607
13,161.00	89.45	150.740	6,428.17	-6,834.44	3,794.22	14,438,002.04	1,730,700.28	39.75587665	-80.67853168
13,256.00	89.41	150.740	6,429.12	-6,917.31	3,840.65	14,437,919.16	1,730,746.71	39.75564859	-80.67835729
13,350.00	89.41	150.480	6,430.09	-6,999.21	3,886.78	14,437,837.26	1,730,792.84	39.75542322	-80.67818290
13,444.00	88.35	150.560	6,431.92	-7,081.02	3,933.03	14,437,755.45	1,730,839.09	39.75519809	-80.67800851
13,538.00	90.02	151.350	6,433.26	-7,163.19	3,978.66	14,437,673.29	1,730,884.72	39.75497199	-80.67783412
13,632.00	89.80	151.270	6,433.41	-7,245.65	4,023.78	14,437,590.83	1,730,929.84	39.75474509	-80.67765973
13,726.00	89.41	150.480	6,434.06	-7,327.76	4,069.53	14,437,508.71	1,730,975.59	39.75451913	-80.67748534
13,821.00	88.70	149.330	6,435.62	-7,409.94	4,117.16	14,437,426.53	1,731,023.22	39.75429297	-80.67731095
13,915.00	88.70	148.540	6,437.76	-7,490.44	4,165.65	14,437,346.04	1,731,071.71	39.75407143	-80.67713656
13,950.00	88.84	148.450	6,438.51	-7,520.27	4,183.94	14,437,316.20	1,731,090.00	39.75384627	-80.67696217
Survey @ 13950.00 MD 6438.51 TVD									
14,011.00	88.84	148.450	6,439.74	-7,572.25	4,215.85	14,437,264.23	1,731,121.91	39.75384627	-80.67726779
Survey Proj. to 14011.00 MD 6439.74 TVD									

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Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Keith Stern S-10 HM (slot L)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=748+33 @ 781.00usft (Nabors X08)
Site:	Keith Stern	MD Reference:	RKB=748+33 @ 781.00usft (Nabors X08)
Well:	Keith Stern S-10 HM (slot L)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
193.00	193.00	0.54	-0.05	MWD surveys
13,950.00	6,438.51	-7,520.27	4,183.94	Survey @ 13950.00 MD 6438.51 TVD
14,011.00	6,439.74	-7,572.25	4,215.85	Survey Proj. to 14011.00 MD 6439.74 TVD

Checked By: _____ Approved By: _____ Date: _____

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