TUG HILL OPERATING

Well: Old Crow N-08 HM (slot D)
Site: Old Crow Pad
Project: Marshall County, West Virginia.
Design: rev7

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Annotation
1	3042.00	46.75	53.64	2783.18	479.17	648.00	0.00	0.00	446.66	Survey @ 3042.00 MD 2783.18 TVD
2	3242.00	46.75	53.64	2920.22	565.53	765.31	0.00	0.00	527.14	Proj. Begin 2°/100' build/turn
3	3385.58	48.77	56.40	3016.75	626.43	852.41	2.00	46.21	583.67	Begin 48.77° tangent
4	8310.72	48.77	56.40	6262.76	2676.44	3937.50	0.00	0.00	2479.18	Begin 8°/100' build/turn
5	8430.46	50.00	43.87	6340.89	2734.56	4006.95	8.00	-86.75	2533.81	Begin 10°/100' build/turn
6	9216.23	91.00	329.73	6634.00	3398.23	4019.55	10.00	-78.88	3196.06	Begin 91.00° lateral
7	18290.86	91.00	329.73	6475.00	11234.33	-554.21	0.00	0.00	11247.99	PBHL/TD 18290.86 MD 6475.00 TVD

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
BHL Old Crow N-08 HM r7 - plan hits target center	6475.00	11234.33	-554.21	14457390.70	1706443.37	39.80933000	-80.76488600
LP Old Crow N-08 HM 50 E r7 - plan hits target center	6634.00	3398.23	4019.55	14449554.61	1711017.13	39.78777588	-80.74867781

ANNOTATIONS SURVEYS

MD	Inc	Azi	TVD	+N/-S	+E/-W	VSect	Annotation
178.00	0.26	302.35	178.00	0.22	-0.34	0.23	MWD surveys
18204.00	89.80	329.07	6587.87	11185.72	-523.36	11197.92	Survey @ 18204.00 MD 6587.87 TVD
18261.00	89.80	329.07	6588.07	11234.61	-552.66	11248.20	Survey Proj. to 18261.00 MD 6588.07 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)

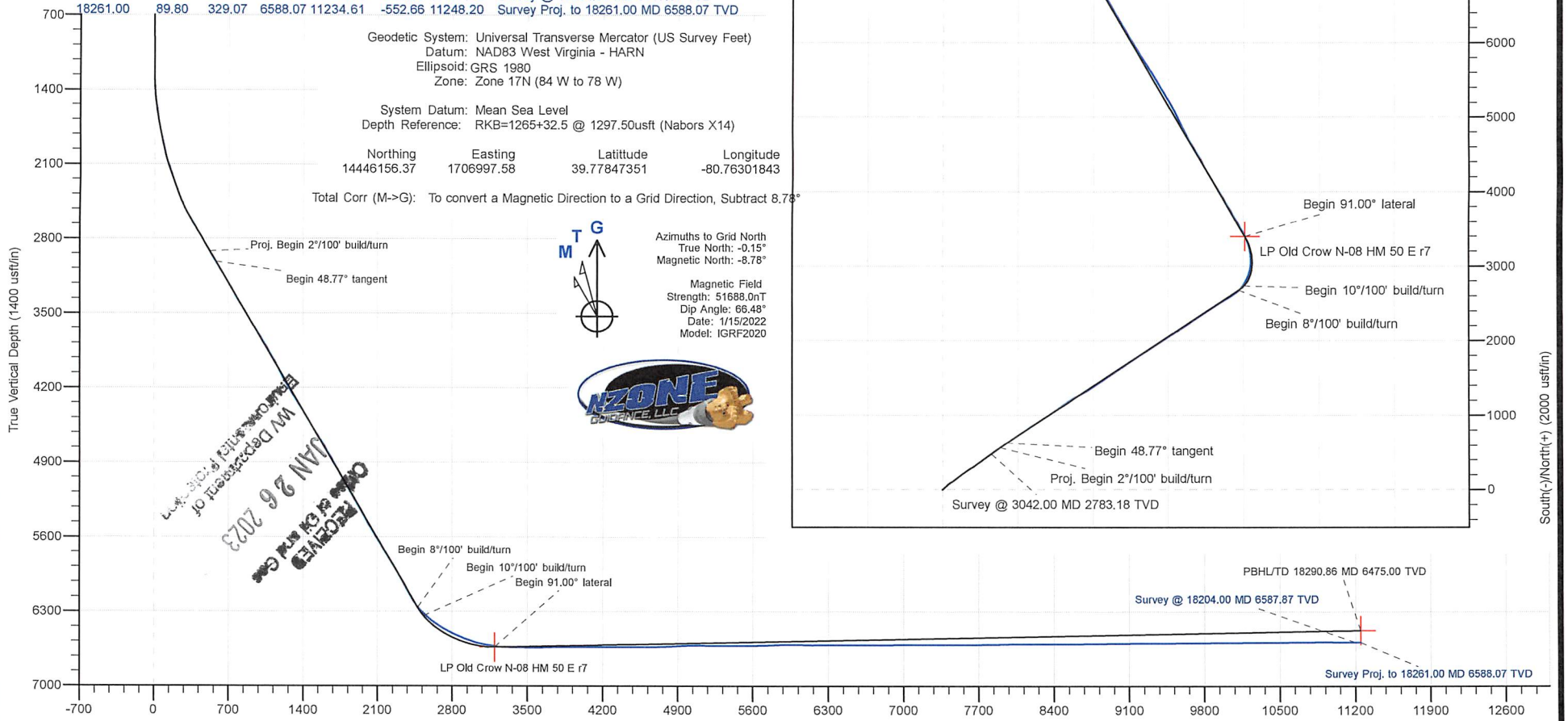
System Datum: Mean Sea Level
Depth Reference: RKB=1265+32.5 @ 1297.50usft (Nabors X14)

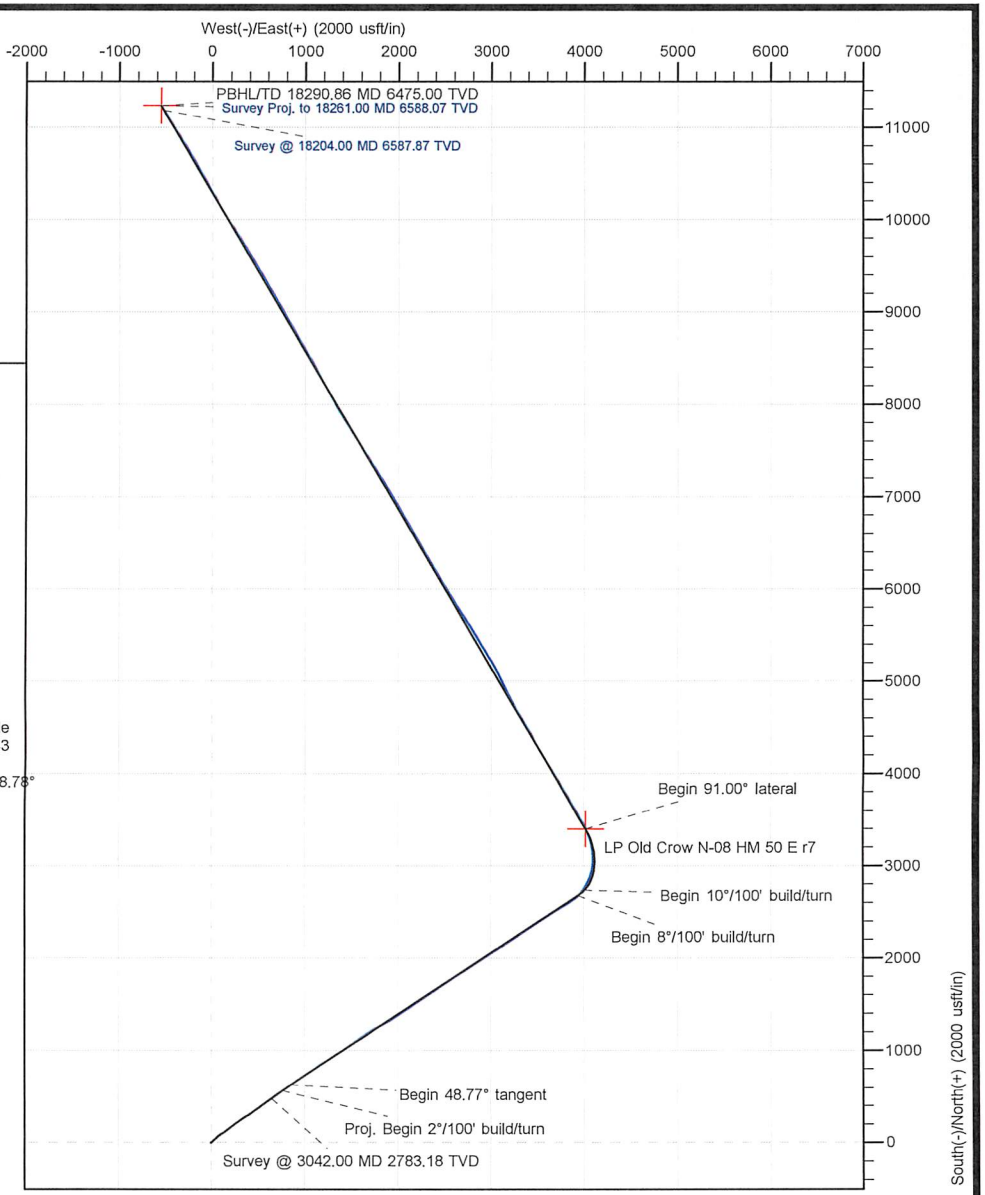
Northing	Easting	Latittude	Longitude
14446156.37	1706997.58	39.77847351	-80.76301843

Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.78°

Azimuths to Grid North
True North: -0.15°
Magnetic North: -8.78°

Magnetic Field
Strength: 51688.0nT
Dip Angle: 66.48°
Date: 1/15/2022
Model: IGRF2020





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5:46, March 15 2022

Survey Report - Geographic

Company:	Tug Hill Operating LLC	**Local Co-ordinate Reference:**	Well Old Crow N-08 HM (slot D)
Project:	Marshall County, West Virginia.	**TVD Reference:**	RKB=1265+32.5 @ 1297.50usft (Nabors X14)
Site:	Old Crow Pad	**MD Reference:**	RKB=1265+32.5 @ 1297.50usft (Nabors X14)
Well:	Old Crow N-08 HM (slot D)	**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 Old Crow Pad

Site Position:		**Northing:**	14,446,179.89 usft	**Latitude:**	39.77853828
From:	Lat/Long	**Easting:**	1,706,970.33 usft	**Longitude:**	-80.76311519
Position Uncertainty:	0.00 usft	**Slot Radius:**	13-3/16 "	**Grid Convergence:**	0.15 °

Well Old Crow N-08 HM (slot D)

Well Position	**+N/-S**	0.00 usft	**Northing:**	14,446,156.38 usft	**Latitude:**	39.77847351
	+E/-W	0.00 usft	**Easting:**	1,706,997.58 usft	**Longitude:**	-80.76301843
Position Uncertainty		0.00 usft	**Wellhead Elevation:**	usft	**Ground Level:**	1,265.00 usft

Wellbore Original Hole

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2020	1/15/2022	-8.62	66.48	51,688.03246862

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	357.18

Survey Program Date 3/15/2022

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
178.00	1,001.00	MWD surf (Original Hole)	MWD	MWD - Standard
1,072.00	3,042.00	MWD int (Original Hole)	MWD	MWD - Standard
3,127.00	18,204.00	MWD (Original Hole)	MWD	MWD - Standard
18,261.00	18,261.00	Projection (Original Hole)	MWD	MWD - Standard

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
0.00	0.00	0.00	0.00	0.00	0.00	14,446,156.38	1,706,997.58	39.77847351	-80.76301843
178.00	0.26	302.35	178.00	0.22	-0.34	14,446,156.59	1,706,997.24	39.77847411	-80.76301964
MWD surveys									
225.00	0.24	257.89	225.00	0.25	-0.53	14,446,156.63	1,706,997.05	39.77847421	-80.76302031
269.00	0.13	282.33	269.00	0.24	-0.67	14,446,156.62	1,706,996.91	39.77847419	-80.76302080
316.00	0.30	235.97	316.00	0.19	-0.82	14,446,156.56	1,706,996.76	39.77847403	-80.76302135
358.00	0.08	170.97	358.00	0.10	-0.91	14,446,156.47	1,706,996.67	39.77847378	-80.76302166
405.00	0.18	209.62	405.00	0.00	-0.94	14,446,156.38	1,706,996.64	39.77847352	-80.76302177
448.00	0.13	245.17	448.00	-0.08	-1.02	14,446,156.30	1,706,996.56	39.77847330	-80.76302205

03/17/2023

Company:	Tug Hill Operating LLC	**Local Co-ordinate Reference:**	Well Old Crow N-08 HM (slot D)
Project:	Marshall County, West Virginia.	**TVD Reference:**	RKB=1265+32.5 @ 1297.50usft (Nabors X14)
Site:	Old Crow Pad	**MD Reference:**	RKB=1265+32.5 @ 1297.50usft (Nabors X14)
Well:	Old Crow N-08 HM (slot D)	**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
495.00	0.20	220.49	495.00	-0.16	-1.12	14,446,156.21	1,706,996.46	39.77847307	-80.76302241
538.00	0.08	151.63	538.00	-0.25	-1.15	14,446,156.13	1,706,996.43	39.77847284	-80.76302253
585.00	0.03	64.87	585.00	-0.27	-1.13	14,446,156.10	1,706,996.45	39.77847277	-80.76302244
628.00	0.14	224.77	628.00	-0.30	-1.15	14,446,156.07	1,706,996.43	39.77847268	-80.76302253
675.00	0.17	218.13	675.00	-0.40	-1.24	14,446,155.98	1,706,996.34	39.77847242	-80.76302283
718.00	0.03	27.17	718.00	-0.44	-1.27	14,446,155.94	1,706,996.31	39.77847231	-80.76302295
765.00	0.00	81.23	765.00	-0.43	-1.26	14,446,155.95	1,706,996.31	39.77847234	-80.76302293
812.00	0.13	251.14	812.00	-0.45	-1.31	14,446,155.93	1,706,996.26	39.77847230	-80.76302311
859.00	0.21	240.99	859.00	-0.51	-1.44	14,446,155.87	1,706,996.14	39.77847213	-80.76302356
906.00	0.00	81.23	906.00	-0.55	-1.52	14,446,155.83	1,706,996.06	39.77847202	-80.76302383
953.00	0.21	241.98	953.00	-0.59	-1.59	14,446,155.79	1,706,995.99	39.77847191	-80.76302410
1,001.00	0.08	160.72	1,001.00	-0.66	-1.66	14,446,155.72	1,706,995.92	39.77847171	-80.76302434
1,072.00	0.28	176.12	1,072.00	-0.88	-1.63	14,446,155.50	1,706,995.95	39.77847111	-80.76302424
1,119.00	0.30	226.76	1,119.00	-1.08	-1.71	14,446,155.30	1,706,995.87	39.77847056	-80.76302454
1,167.00	0.21	135.43	1,167.00	-1.23	-1.74	14,446,155.15	1,706,995.84	39.77847015	-80.76302464
1,214.00	0.24	62.96	1,214.00	-1.24	-1.59	14,446,155.13	1,706,995.98	39.77847011	-80.76302412
1,261.00	1.41	45.66	1,260.99	-0.80	-1.09	14,446,155.58	1,706,996.49	39.77847133	-80.76302233
1,308.00	2.70	45.37	1,307.96	0.39	0.11	14,446,156.76	1,706,997.69	39.77847457	-80.76301804
1,355.00	4.09	51.51	1,354.87	2.21	2.21	14,446,158.58	1,706,999.79	39.77847956	-80.76301055
1,402.00	5.85	50.79	1,401.70	4.76	5.38	14,446,161.14	1,707,002.95	39.77848656	-80.76299925
1,449.00	7.81	45.67	1,448.36	8.51	9.52	14,446,164.89	1,707,007.10	39.77849682	-80.76298448
1,496.00	9.46	45.56	1,494.83	13.45	14.56	14,446,169.82	1,707,012.14	39.77851033	-80.76296648
1,544.00	10.71	46.75	1,542.08	19.26	20.62	14,446,175.64	1,707,018.20	39.77852627	-80.76294484
1,591.00	11.79	46.82	1,588.18	25.54	27.31	14,446,181.92	1,707,024.89	39.77854346	-80.76292100
1,638.00	12.83	46.14	1,634.10	32.44	34.57	14,446,188.82	1,707,032.15	39.77856236	-80.76289507
1,685.00	14.76	45.89	1,679.74	40.23	42.63	14,446,196.60	1,707,040.21	39.77858368	-80.76286631
1,731.00	16.48	45.45	1,724.04	48.89	51.49	14,446,205.26	1,707,049.07	39.77860739	-80.76283470
1,778.00	18.26	48.38	1,768.90	58.45	61.75	14,446,214.83	1,707,059.33	39.77863359	-80.76279810
1,825.00	19.23	52.03	1,813.40	68.11	73.35	14,446,224.48	1,707,070.93	39.77866002	-80.76275670
1,872.00	19.71	54.44	1,857.72	77.48	85.90	14,446,233.85	1,707,083.48	39.77868566	-80.76271194
1,919.00	20.69	56.18	1,901.83	86.71	99.25	14,446,243.08	1,707,096.83	39.77871092	-80.76266435
1,966.00	21.60	55.74	1,945.66	96.20	113.30	14,446,252.58	1,707,110.88	39.77873688	-80.76261426
2,013.00	23.21	55.30	1,989.11	106.34	128.06	14,446,262.72	1,707,125.64	39.77876463	-80.76256161
2,060.00	25.29	54.40	2,031.96	117.46	143.84	14,446,273.84	1,707,141.42	39.77879505	-80.76250535
2,107.00	27.44	52.80	2,074.07	129.85	160.63	14,446,286.23	1,707,158.21	39.77882896	-80.76244547
2,154.00	28.92	51.30	2,115.50	143.51	178.13	14,446,299.88	1,707,175.71	39.77886633	-80.76238306
2,201.00	30.31	50.57	2,156.36	158.15	196.16	14,446,314.52	1,707,193.74	39.77890640	-80.76231875
2,248.00	32.00	51.31	2,196.58	173.46	215.04	14,446,329.84	1,707,212.62	39.77894833	-80.76225140
2,295.00	33.53	52.01	2,236.10	189.24	234.99	14,446,345.62	1,707,232.57	39.77899151	-80.76218023
2,342.00	34.75	53.45	2,275.00	205.21	255.99	14,446,361.58	1,707,253.56	39.77903521	-80.76210537
2,390.00	35.57	55.32	2,314.24	221.30	278.46	14,446,377.68	1,707,276.04	39.77907923	-80.76202523
2,437.00	36.23	56.54	2,352.32	236.74	301.29	14,446,393.11	1,707,298.86	39.77912146	-80.76194383
2,484.00	37.48	56.99	2,389.92	252.18	324.87	14,446,408.56	1,707,322.44	39.77916371	-80.76185976
2,531.00	39.99	57.10	2,426.58	268.18	349.54	14,446,424.56	1,707,347.12	39.77920746	-80.76177178
2,578.00	42.44	56.45	2,461.94	285.15	375.44	14,446,441.53	1,707,373.02	39.77925388	-80.76167943
2,625.00	44.53	56.58	2,496.03	302.99	402.42	14,446,459.37	1,707,399.99	39.77930268	-80.76158325
2,672.00	45.43	56.33	2,529.28	321.35	430.10	14,446,477.73	1,707,427.68	39.77935290	-80.76148452
2,719.00	45.63	55.23	2,562.21	340.21	457.84	14,446,496.59	1,707,455.42	39.77940449	-80.76138564
2,767.00	45.75	54.32	2,595.74	360.02	485.89	14,446,516.40	1,707,483.47	39.77945869	-80.76128558
2,814.00	46.10	52.94	2,628.43	380.05	513.08	14,446,536.42	1,707,510.66	39.77951348	-80.76118863
2,861.00	46.95	52.93	2,660.77	400.60	540.30	14,446,556.98	1,707,537.87	39.77956974	-80.76109156
2,955.00	48.03	54.50	2,724.29	441.60	596.15	14,446,597.98	1,707,593.73	39.77968192	-80.76089236
3,042.00	46.75	53.64	2,783.18	479.17	648.00	14,446,635.55	1,707,645.58	39.77978471	-80.76070746
3,127.00	45.58	54.41	2,842.05	515.19	697.62	14,446,671.57	1,707,695.20	39.77988327	-80.76053052
3,174.00	45.93	54.50	2,874.85	534.76	725.01	14,446,691.14	1,707,722.59	39.77993682	-80.76043282

03/17/2023

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Well:	Old Crow N-08 HM (slot D)	**North Reference:**	Grid
Wellbore:	Original Hole	**Survey Calculation Method:**	Minimum Curvature
Design:	Surveys Original Hole	**Database:**	DB_Feb2822

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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
3,269.00	48.26	55.56	2,939.52	574.63	782.04	14,446,731.01	1,707,779.61	39.78004589	-80.76022947
3,363.00	48.18	55.38	3,002.15	614.37	839.78	14,446,770.74	1,707,837.36	39.78015459	-80.76002355
3,457.00	47.43	54.41	3,065.28	654.41	896.76	14,446,810.79	1,707,894.34	39.78026414	-80.75982038
3,550.00	48.88	55.29	3,127.32	694.29	953.41	14,446,850.67	1,707,950.98	39.78037324	-80.75961837
3,645.00	48.22	54.41	3,190.21	735.28	1,011.63	14,446,891.66	1,708,009.20	39.78048539	-80.75941074
3,739.00	47.65	56.61	3,253.19	774.80	1,069.13	14,446,931.17	1,708,066.71	39.78059348	-80.75920567
3,833.00	48.48	58.10	3,316.01	812.51	1,128.01	14,446,968.89	1,708,125.59	39.78069662	-80.75899574
3,927.00	50.29	57.58	3,377.20	850.49	1,188.42	14,447,006.87	1,708,185.99	39.78080049	-80.75878038
4,021.00	49.41	56.79	3,437.81	889.43	1,248.80	14,447,045.80	1,708,246.38	39.78090696	-80.75856507
4,115.00	49.63	56.26	3,498.84	928.87	1,308.44	14,447,085.24	1,708,306.02	39.78101483	-80.75835242
4,209.00	47.87	55.56	3,560.81	968.47	1,366.97	14,447,124.85	1,708,364.55	39.78112316	-80.75814371
4,303.00	49.85	55.91	3,622.65	1,008.32	1,425.47	14,447,164.70	1,708,423.05	39.78123217	-80.75793508
4,397.00	48.35	55.38	3,684.20	1,048.41	1,484.13	14,447,204.79	1,708,481.71	39.78134183	-80.75772592
4,492.00	49.58	55.29	3,746.57	1,089.17	1,543.07	14,447,245.55	1,708,540.64	39.78145333	-80.75751574
4,587.00	49.27	56.26	3,808.36	1,129.76	1,602.73	14,447,286.13	1,708,600.30	39.78156434	-80.75730299
4,681.00	46.51	54.94	3,871.39	1,169.13	1,660.27	14,447,325.51	1,708,657.85	39.78167206	-80.75709780
4,775.00	46.59	55.73	3,936.03	1,207.95	1,716.40	14,447,364.32	1,708,713.97	39.78177823	-80.75689764
4,869.00	49.32	60.65	3,999.00	1,244.66	1,775.71	14,447,401.04	1,708,773.29	39.78187862	-80.75668616
4,963.00	49.85	61.53	4,059.94	1,279.26	1,838.36	14,447,435.63	1,708,835.94	39.78197316	-80.75646282
5,057.00	50.51	61.01	4,120.14	1,313.96	1,901.67	14,447,470.34	1,708,899.25	39.78206800	-80.75623715
5,151.00	50.07	56.00	4,180.22	1,351.71	1,963.30	14,447,508.09	1,708,960.88	39.78217120	-80.75601741
5,246.00	49.71	54.41	4,241.42	1,393.17	2,022.96	14,447,549.54	1,709,020.54	39.78228461	-80.75580464
5,340.00	49.45	55.73	4,302.37	1,434.14	2,081.63	14,447,590.52	1,709,079.21	39.78239669	-80.75559541
5,435.00	49.23	54.94	4,364.27	1,475.13	2,140.90	14,447,631.51	1,709,138.48	39.78250881	-80.75538403
5,529.00	48.92	57.23	4,425.86	1,514.76	2,199.83	14,447,671.13	1,709,197.41	39.78261720	-80.75517389
5,623.00	48.31	55.38	4,488.00	1,553.88	2,258.51	14,447,710.25	1,709,256.09	39.78272419	-80.75496465
5,716.00	50.07	57.14	4,548.78	1,592.96	2,317.04	14,447,749.33	1,709,314.62	39.78283107	-80.75475591
5,810.00	50.46	57.05	4,608.87	1,632.23	2,377.73	14,447,788.60	1,709,375.31	39.78293846	-80.75453950
5,904.00	50.59	56.26	4,668.63	1,672.11	2,438.35	14,447,828.49	1,709,435.93	39.78304753	-80.75432336
5,998.00	49.45	56.35	4,729.03	1,712.07	2,498.27	14,447,868.44	1,709,495.85	39.78315682	-80.75410966
6,092.00	47.69	56.26	4,791.23	1,751.17	2,556.91	14,447,907.54	1,709,554.49	39.78326375	-80.75390056
6,186.00	47.21	55.29	4,854.79	1,790.11	2,614.17	14,447,946.49	1,709,611.75	39.78337027	-80.75369637
6,280.00	48.04	56.43	4,918.15	1,829.08	2,671.64	14,447,985.45	1,709,669.22	39.78347685	-80.75349141
6,373.00	47.38	55.82	4,980.73	1,867.42	2,728.76	14,448,023.80	1,709,726.34	39.78358172	-80.75328771
6,467.00	48.62	55.47	5,043.62	1,906.84	2,786.43	14,448,063.22	1,709,784.01	39.78368955	-80.75308206
6,561.00	48.57	57.05	5,105.79	1,946.00	2,845.06	14,448,102.38	1,709,842.63	39.78379664	-80.75287299
6,655.00	47.69	56.70	5,168.53	1,984.25	2,903.68	14,448,140.63	1,709,901.26	39.78390124	-80.75266395
6,750.00	48.66	56.61	5,231.88	2,023.17	2,962.82	14,448,179.54	1,709,960.39	39.78400766	-80.75245306
6,844.00	47.74	55.73	5,294.54	2,062.17	3,021.03	14,448,218.55	1,710,018.60	39.78411435	-80.75224547
6,938.00	48.79	56.35	5,357.11	2,101.35	3,079.21	14,448,257.73	1,710,076.79	39.78422151	-80.75203799
7,032.00	49.89	57.31	5,418.36	2,140.36	3,138.90	14,448,296.74	1,710,136.47	39.78432818	-80.75182514
7,126.00	49.27	56.87	5,479.31	2,179.24	3,198.98	14,448,335.62	1,710,196.55	39.78443450	-80.75161089
7,220.00	49.98	56.61	5,540.20	2,218.52	3,258.85	14,448,374.89	1,710,256.43	39.78454190	-80.75139736
7,314.00	49.19	55.47	5,601.14	2,258.49	3,318.22	14,448,414.87	1,710,315.79	39.78465123	-80.75118566
7,408.00	48.79	57.23	5,662.83	2,297.80	3,377.26	14,448,454.17	1,710,374.83	39.78475872	-80.75097512
7,503.00	47.96	55.91	5,725.93	2,336.91	3,436.52	14,448,493.29	1,710,434.10	39.78486569	-80.75076377
7,597.00	48.66	56.52	5,788.45	2,375.94	3,494.86	14,448,532.32	1,710,492.44	39.78497243	-80.75055571
7,691.00	49.14	55.12	5,850.25	2,415.74	3,553.46	14,448,572.12	1,710,551.04	39.78508127	-80.75034674
7,785.00	49.27	56.26	5,911.66	2,455.85	3,612.24	14,448,612.23	1,710,609.81	39.78519098	-80.75013711
7,879.00	48.97	57.93	5,973.19	2,494.46	3,671.90	14,448,650.84	1,710,669.48	39.78529655	-80.74992434
7,973.00	48.13	57.23	6,035.41	2,532.23	3,731.38	14,448,688.61	1,710,728.95	39.78539982	-80.74971226
8,067.00	48.88	57.84	6,097.69	2,570.02	3,790.78	14,448,726.40	1,710,788.36	39.78550315	-80.74950043
8,103.00	48.88	57.49	6,121.37	2,584.53	3,813.70	14,448,740.90	1,710,811.27	39.78554281	-80.74941871
8,178.00	48.53	56.00	6,170.86	2,615.42	3,860.82	14,448,771.80	1,710,858.39	39.78562730	-80.74925068
8,225.00	48.44	54.94	6,202.01	2,635.37	3,889.81	14,448,791.75	1,710,887.39	39.78568186	-80.74914728

03/17/2023

Company:	Tug Hill Operating LLC	**Local Co-ordinate Reference:**	Well Old Crow N-08 HM (slot D)
Project:	Marshall County, West Virginia.	**TVD Reference:**	RKB=1265+32.5 @ 1297.50usft (Nabors X14)
Site:	Old Crow Pad	**MD Reference:**	RKB=1265+32.5 @ 1297.50usft (Nabors X14)
Well:	Old Crow N-08 HM (slot D)	**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
8,273.00	48.57	52.48	6,233.82	2,656.65	3,918.78	14,448,813.02	1,710,916.36	39.78574007	-80.74904393
8,320.00	51.34	44.13	6,264.09	2,680.58	3,945.57	14,448,836.96	1,710,943.14	39.78580558	-80.74894834
8,366.00	52.70	39.65	6,292.40	2,707.57	3,969.76	14,448,863.94	1,710,967.33	39.78587951	-80.74886197
8,413.00	53.85	34.11	6,320.52	2,737.69	3,992.34	14,448,894.06	1,710,989.91	39.78596206	-80.74878129
8,461.00	54.11	33.41	6,348.75	2,769.96	4,013.91	14,448,926.34	1,711,011.49	39.78605053	-80.74870417
8,508.00	54.51	29.19	6,376.18	2,802.57	4,033.73	14,448,958.95	1,711,031.31	39.78613992	-80.74863329
8,555.00	56.57	25.06	6,402.78	2,837.05	4,051.38	14,448,993.43	1,711,048.96	39.78623449	-80.74857013
8,602.00	58.64	21.01	6,427.96	2,873.57	4,066.89	14,449,029.94	1,711,064.46	39.78633465	-80.74851456
8,650.00	60.09	15.83	6,452.44	2,912.74	4,079.92	14,449,069.11	1,711,077.49	39.78644211	-80.74846779
8,697.00	61.63	11.26	6,475.33	2,952.63	4,089.51	14,449,109.01	1,711,087.09	39.78655160	-80.74843322
8,744.00	63.25	8.10	6,497.08	2,993.70	4,096.51	14,449,150.07	1,711,094.09	39.78666433	-80.74840790
8,791.00	65.23	3.61	6,517.51	3,035.79	4,100.81	14,449,192.17	1,711,098.39	39.78677989	-80.74839217
8,838.00	65.85	359.31	6,536.98	3,078.54	4,101.90	14,449,234.92	1,711,099.48	39.78689730	-80.74838787
8,885.00	67.52	354.74	6,555.59	3,121.63	4,099.65	14,449,278.01	1,711,097.23	39.78701564	-80.74839545
8,932.00	70.68	351.22	6,572.36	3,165.19	4,094.27	14,449,321.57	1,711,091.85	39.78713532	-80.74841416
8,979.00	73.67	348.06	6,586.75	3,209.20	4,086.22	14,449,365.57	1,711,083.79	39.78725622	-80.74844239
9,027.00	76.22	344.98	6,599.22	3,254.26	4,075.41	14,449,410.63	1,711,072.98	39.78738006	-80.74848042
9,074.00	79.08	341.11	6,609.27	3,298.16	4,062.01	14,449,454.54	1,711,059.59	39.78750073	-80.74852766
9,122.00	81.32	338.74	6,617.44	3,342.58	4,045.78	14,449,498.95	1,711,043.35	39.78762284	-80.74858501
9,169.00	82.81	335.58	6,623.93	3,385.47	4,027.71	14,449,541.85	1,711,025.29	39.78774077	-80.74864890
9,216.00	84.09	331.01	6,629.30	3,427.17	4,006.73	14,449,583.55	1,711,004.31	39.78785545	-80.74872317
9,263.00	87.08	330.48	6,632.92	3,468.05	3,983.83	14,449,624.42	1,710,981.41	39.78796789	-80.74880427
9,311.00	87.21	329.86	6,635.31	3,509.64	3,959.98	14,449,666.01	1,710,957.56	39.78808229	-80.74888875
9,358.00	90.07	330.04	6,636.42	3,550.30	3,936.46	14,449,706.68	1,710,934.03	39.78819415	-80.74897209
9,405.00	90.29	329.95	6,636.27	3,591.00	3,912.95	14,449,747.38	1,710,910.53	39.78830611	-80.74905535
9,499.00	89.80	329.25	6,636.20	3,672.08	3,865.39	14,449,828.46	1,710,862.96	39.78852913	-80.74922387
9,594.00	89.89	329.42	6,636.46	3,753.80	3,816.94	14,449,910.17	1,710,814.51	39.78875391	-80.74939553
9,686.00	90.37	329.51	6,636.25	3,833.04	3,770.19	14,449,989.41	1,710,767.77	39.78897189	-80.74956113
9,780.00	90.55	329.51	6,635.49	3,914.04	3,722.50	14,450,070.41	1,710,720.08	39.78919470	-80.74973010
9,873.00	90.81	329.51	6,634.39	3,994.17	3,675.32	14,450,150.54	1,710,672.89	39.78941513	-80.74989727
9,967.00	89.71	328.81	6,633.96	4,074.88	3,627.13	14,450,231.25	1,710,624.71	39.78963714	-80.75006801
10,061.00	88.66	329.42	6,635.30	4,155.54	3,578.88	14,450,311.91	1,710,576.46	39.78985903	-80.75023896
10,156.00	89.36	330.39	6,636.94	4,237.72	3,531.26	14,450,394.09	1,710,528.83	39.79008508	-80.75040769
10,250.00	91.38	331.18	6,636.34	4,319.75	3,485.38	14,450,476.13	1,710,482.96	39.79031072	-80.75057019
10,305.00	91.98	330.83	6,634.72	4,367.84	3,458.73	14,450,524.21	1,710,456.31	39.79044298	-80.75066458
10,401.00	89.78	330.13	6,633.25	4,451.36	3,411.44	14,450,607.74	1,710,409.01	39.79067272	-80.75083211
10,495.00	89.52	327.67	6,633.82	4,531.84	3,362.89	14,450,688.22	1,710,360.47	39.79089411	-80.75100415
10,589.00	90.84	329.95	6,633.53	4,612.25	3,314.21	14,450,768.62	1,710,311.79	39.79111530	-80.75117663
10,683.00	90.31	333.29	6,632.58	4,694.93	3,269.54	14,450,851.31	1,710,267.12	39.79134272	-80.75133484
10,777.00	89.96	332.59	6,632.36	4,778.64	3,226.78	14,450,935.02	1,710,224.36	39.79157293	-80.75148624
10,870.00	88.81	332.94	6,633.36	4,861.33	3,184.22	14,451,017.70	1,710,181.80	39.79180033	-80.75163693
10,908.00	90.07	335.05	6,633.73	4,895.47	3,167.56	14,451,051.85	1,710,165.14	39.79189423	-80.75169590
11,002.00	93.93	334.43	6,630.45	4,980.42	3,127.48	14,451,136.79	1,710,125.06	39.79212782	-80.75183774
11,095.00	92.88	332.50	6,624.93	5,063.47	3,086.01	14,451,219.84	1,710,083.59	39.79235621	-80.75198456
11,190.00	91.47	331.44	6,621.32	5,147.26	3,041.40	14,451,303.64	1,710,038.98	39.79258667	-80.75214255
11,284.00	90.02	329.42	6,620.10	5,229.00	2,995.02	14,451,385.38	1,709,992.60	39.79281151	-80.75230686
11,378.00	89.05	328.72	6,620.86	5,309.63	2,946.71	14,451,466.01	1,709,944.28	39.79303331	-80.75247806
11,472.00	89.85	328.63	6,621.77	5,389.93	2,897.84	14,451,546.30	1,709,895.42	39.79325418	-80.75265123
11,566.00	89.71	328.90	6,622.13	5,470.30	2,849.10	14,451,626.68	1,709,846.67	39.79347528	-80.75282397
11,660.00	90.07	328.72	6,622.31	5,550.71	2,800.42	14,451,707.09	1,709,797.99	39.79369648	-80.75299649
11,754.00	90.37	327.84	6,621.95	5,630.67	2,751.00	14,451,787.05	1,709,748.57	39.79391644	-80.75317164
11,849.00	90.15	327.14	6,621.52	5,710.78	2,699.94	14,451,867.16	1,709,697.52	39.79413684	-80.75335262
11,943.00	90.64	326.96	6,620.87	5,789.66	2,648.81	14,451,946.04	1,709,646.39	39.79435384	-80.75353386
12,036.00	91.43	326.61	6,619.19	5,867.45	2,597.88	14,452,023.83	1,709,595.46	39.79456787	-80.75371443
12,130.00	92.04	329.16	6,616.34	5,947.03	2,547.93	14,452,103.40	1,709,545.51	39.79478677	-80.75389146

03/17/2023

Company:	Tug Hill Operating LLC	**Local Co-ordinate Reference:**	Well Old Crow N-08 HM (slot D)
Project:	Marshall County, West Virginia.	**TVD Reference:**	RKB=1265+32.5 @ 1297.50usft (Nabors X14)
Site:	Old Crow Pad	**MD Reference:**	RKB=1265+32.5 @ 1297.50usft (Nabors X14)
Well:	Old Crow N-08 HM (slot D)	**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
12,225.00	91.47	329.51	6,613.43	6,028.70	2,499.50	14,452,185.08	1,709,497.08	39.79501144	-80.75406308
12,319.00	89.01	329.25	6,613.04	6,109.59	2,451.63	14,452,265.96	1,709,449.21	39.79523394	-80.75423272
12,413.00	89.23	329.25	6,614.48	6,190.36	2,403.57	14,452,346.74	1,709,401.15	39.79545613	-80.75440302
12,508.00	89.27	330.21	6,615.72	6,272.40	2,355.69	14,452,428.78	1,709,353.27	39.79568179	-80.75457269
12,601.00	89.71	329.86	6,616.55	6,352.97	2,309.24	14,452,509.34	1,709,306.82	39.79590340	-80.75473727
12,695.00	89.41	329.86	6,617.27	6,434.26	2,262.05	14,452,590.63	1,709,259.62	39.79612699	-80.75490450
12,790.00	90.24	329.95	6,617.56	6,516.45	2,214.41	14,452,672.82	1,709,211.99	39.79635307	-80.75507330
12,884.00	91.03	331.01	6,616.52	6,598.24	2,168.10	14,452,754.61	1,709,165.67	39.79657804	-80.75523738
12,978.00	90.20	330.65	6,615.51	6,680.31	2,122.28	14,452,836.69	1,709,119.86	39.79680378	-80.75539969
13,072.00	89.67	329.95	6,615.62	6,761.96	2,075.71	14,452,918.34	1,709,073.29	39.79702836	-80.75556470
13,166.00	90.64	329.34	6,615.37	6,843.07	2,028.21	14,452,999.45	1,709,025.79	39.79725147	-80.75573303
13,260.00	90.20	329.16	6,614.68	6,923.86	1,980.15	14,453,080.23	1,708,977.73	39.79747368	-80.75590335
13,355.00	91.16	329.77	6,613.55	7,005.67	1,931.89	14,453,162.05	1,708,929.46	39.79769874	-80.75607438
13,449.00	89.49	329.16	6,613.02	7,086.63	1,884.13	14,453,243.01	1,708,881.71	39.79792143	-80.75624362
13,543.00	90.46	329.25	6,613.06	7,167.38	1,836.01	14,453,323.76	1,708,833.59	39.79814354	-80.75641418
13,637.00	89.49	328.37	6,613.10	7,247.79	1,787.33	14,453,404.17	1,708,784.91	39.79836473	-80.75658671
13,731.00	90.42	328.72	6,613.17	7,327.98	1,738.28	14,453,484.35	1,708,735.85	39.79858531	-80.75676057
13,825.00	89.49	328.02	6,613.25	7,408.01	1,688.98	14,453,564.39	1,708,686.56	39.79880547	-80.75693530
13,920.00	90.11	328.02	6,613.58	7,488.59	1,638.67	14,453,644.97	1,708,636.24	39.79902715	-80.75711366
14,015.00	90.95	326.87	6,612.70	7,568.66	1,587.55	14,453,725.04	1,708,585.13	39.79924741	-80.75729488
14,108.00	89.54	327.75	6,612.30	7,646.93	1,537.32	14,453,803.30	1,708,534.90	39.79946273	-80.75747295
14,203.00	89.98	329.42	6,612.70	7,728.00	1,487.81	14,453,884.37	1,708,485.39	39.79968574	-80.75764846
14,297.00	90.99	329.51	6,611.90	7,808.96	1,440.05	14,453,965.33	1,708,437.63	39.79990843	-80.75781770
14,390.00	91.43	329.60	6,609.94	7,889.12	1,392.94	14,454,045.49	1,708,390.52	39.80012891	-80.75798467
14,484.00	91.47	330.13	6,607.56	7,970.38	1,345.76	14,454,126.76	1,708,343.34	39.80035245	-80.75815186
14,578.00	90.86	330.57	6,605.65	8,052.06	1,299.27	14,454,208.43	1,708,296.85	39.80057710	-80.75831660
14,673.00	90.07	331.18	6,604.88	8,135.04	1,253.04	14,454,291.42	1,708,250.61	39.80080534	-80.75848042
14,768.00	88.84	331.71	6,605.78	8,218.48	1,207.63	14,454,374.86	1,708,205.21	39.80103482	-80.75864129
14,862.00	89.63	332.24	6,607.04	8,301.45	1,163.47	14,454,457.83	1,708,161.04	39.80126300	-80.75879773
14,957.00	90.55	331.18	6,606.89	8,385.10	1,118.44	14,454,541.48	1,708,116.02	39.80149306	-80.75895723
15,051.00	89.67	330.21	6,606.71	8,467.07	1,072.44	14,454,623.45	1,708,070.01	39.80171851	-80.75912025
15,145.00	90.46	330.13	6,606.60	8,548.62	1,025.68	14,454,704.99	1,708,023.26	39.80194280	-80.75928595
15,239.00	91.52	329.77	6,604.98	8,629.97	978.61	14,454,786.34	1,707,976.19	39.80216656	-80.75945274
15,333.00	91.34	329.51	6,602.63	8,711.05	931.12	14,454,867.43	1,707,928.70	39.80238959	-80.75962108
15,427.00	90.42	330.30	6,601.19	8,792.37	883.99	14,454,948.74	1,707,881.57	39.80261325	-80.75978810
15,521.00	89.27	330.48	6,601.44	8,874.09	837.55	14,455,030.47	1,707,835.12	39.80283803	-80.75995268
15,616.00	90.07	330.74	6,601.99	8,956.86	790.93	14,455,113.24	1,707,788.50	39.80306568	-80.76011789
15,710.00	90.90	330.48	6,601.19	9,038.76	744.80	14,455,195.14	1,707,742.38	39.80329094	-80.76028135
15,804.00	90.55	330.21	6,600.00	9,120.44	698.29	14,455,276.82	1,707,695.87	39.80351560	-80.76044615
15,898.00	90.02	328.90	6,599.54	9,201.48	650.66	14,455,357.85	1,707,648.24	39.80373849	-80.76061497
15,993.00	90.86	330.39	6,598.81	9,283.45	602.66	14,455,439.83	1,707,600.24	39.80396396	-80.76078512
16,086.00	90.24	329.42	6,597.91	9,363.91	556.03	14,455,520.28	1,707,553.61	39.80418526	-80.76095038
16,180.00	91.03	329.16	6,596.87	9,444.72	508.03	14,455,601.10	1,707,505.60	39.80440754	-80.76112053
16,275.00	90.24	328.98	6,595.82	9,526.20	459.20	14,455,682.58	1,707,456.78	39.80463168	-80.76129361
16,369.00	88.88	329.42	6,596.54	9,606.94	411.07	14,455,763.32	1,707,408.65	39.80485376	-80.76146421
16,463.00	90.37	328.90	6,597.16	9,687.65	362.88	14,455,844.02	1,707,360.46	39.80507575	-80.76163502
16,557.00	91.12	327.40	6,595.93	9,767.48	313.29	14,455,923.86	1,707,310.87	39.80529536	-80.76181086
16,652.00	90.37	328.02	6,594.70	9,847.78	262.54	14,456,004.16	1,707,260.12	39.80551626	-80.76199078
16,746.00	91.38	328.02	6,593.26	9,927.51	212.76	14,456,083.88	1,707,210.34	39.80573557	-80.76216727
16,840.00	90.37	329.07	6,591.83	10,007.68	163.72	14,456,164.06	1,707,161.30	39.80595611	-80.76234115
16,934.00	89.45	329.42	6,591.98	10,088.46	115.65	14,456,244.84	1,707,113.23	39.80617830	-80.76251154
17,027.00	90.07	329.95	6,592.37	10,168.74	68.71	14,456,325.12	1,707,066.29	39.80639911	-80.76267792
17,122.00	91.08	331.62	6,591.41	10,251.65	22.35	14,456,408.03	1,707,019.92	39.80662714	-80.76284223
17,216.00	89.89	330.92	6,590.62	10,334.07	-22.83	14,456,490.45	1,706,974.74	39.80685382	-80.76300233
17,310.00	90.29	331.01	6,590.47	10,416.26	-68.46	14,456,572.64	1,706,929.12	39.80707986	-80.76316401

03/17/2023

Company:	Tug Hill Operating LLC	**Local Co-ordinate Reference:**	Well Old Crow N-08 HM (slot D)
Project:	Marshall County, West Virginia.	**TVD Reference:**	RKB=1265+32.5 @ 1297.50usft (Nabors X14)
Site:	Old Crow Pad	**MD Reference:**	RKB=1265+32.5 @ 1297.50usft (Nabors X14)
Well:	Old Crow N-08 HM (slot D)	**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
17,403.00	90.02	331.44	6,590.22	10,497.78	-113.22	14,456,654.15	1,706,884.35	39.80730404	-80.76332264
17,497.00	90.29	329.34	6,589.96	10,579.50	-159.67	14,456,735.87	1,706,837.91	39.80752881	-80.76348724
17,591.00	90.99	329.42	6,588.91	10,660.38	-207.54	14,456,816.76	1,706,790.04	39.80775129	-80.76365695
17,685.00	90.24	328.81	6,587.90	10,741.05	-255.79	14,456,897.42	1,706,741.79	39.80797317	-80.76382800
17,780.00	91.34	328.54	6,586.59	10,822.19	-305.17	14,456,978.57	1,706,692.40	39.80819637	-80.76400308
17,874.00	89.89	328.98	6,585.59	10,902.55	-353.92	14,457,058.93	1,706,643.66	39.80841742	-80.76417590
17,968.00	89.14	328.90	6,586.38	10,983.07	-402.42	14,457,139.45	1,706,595.16	39.80863890	-80.76434783
18,061.00	89.89	329.34	6,587.17	11,062.89	-450.15	14,457,219.26	1,706,547.43	39.80885843	-80.76451704
18,154.00	89.58	329.16	6,587.60	11,142.81	-497.69	14,457,299.19	1,706,499.88	39.80907826	-80.76468561
18,204.00	89.80	329.07	6,587.87	11,185.72	-523.36	14,457,342.10	1,706,474.22	39.80919629	-80.76477660
Survey @ 18204.00 MD 6587.87 TVD									
18,261.00	89.80	329.07	6,588.07	11,234.61	-552.66	14,457,390.99	1,706,444.92	39.80933078	-80.76488047
Survey Proj. to 18261.00 MD 6588.07 TVD									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
178.00	178.00	0.22	-0.34	MWD surveys
18,204.00	6,587.87	11,185.72	-523.36	Survey @ 18204.00 MD 6587.87 TVD
18,261.00	6,588.07	11,234.61	-552.66	Survey Proj. to 18261.00 MD 6588.07 TVD

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