



**Well:** Old Crow N-06 HM (slot B)  
**Site:** Old Crow Pad  
**Project:** Marshall County, West Virginia.  
**Design:** rev4

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Annotation
1	5591.00	39.11	45.11	4797.62	1763.27	1596.62	0.00	0.00	1439.90	Survey @ 5591.00 MD 4797.62 TVD
2	5691.00	39.11	45.11	4875.21	1807.79	1641.31	0.00	0.00	1475.45	KOP Begin 2°/100' drop/turn
3	5711.35	38.84	44.62	4891.03	1816.86	1650.34	2.00	-131.47	1482.71	Begin 38.84° tangent
4	7395.34	38.84	44.62	6202.66	2568.56	2392.23	0.00	0.00	2085.30	Begin 8°/100' build/turn
5	7716.19	50.00	11.13	6434.63	2764.03	2488.24	8.00	-77.41	2259.81	Begin 10°/100' build/turn
6	8273.35	91.00	329.73	6624.00	3253.13	2380.38	10.00	-53.16	2760.40	Begin 91.00° lateral
7	16995.11	91.00	329.73	6472.00	10784.41	-2015.75	0.00	0.0010971.17		PBHL/TD 16995.11 MD 6472.00 TVD

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
BHL Old Crow N-06 HM r4 - plan hits target center	6472.00	10784.41	-2015.75	14456956.45	1704963.66	39.80814800	-80.77015900	Point
LP Old Crow N-06 HM 50E r4 - plan misses target center by 0.01usft at 8273.35usft MD (6624.00 TVD, 3253.13 N, 2380.38 E)	6624.00	3253.13	2380.38	14449425.18	1709359.80	39.78743306	-80.75457877	Point

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

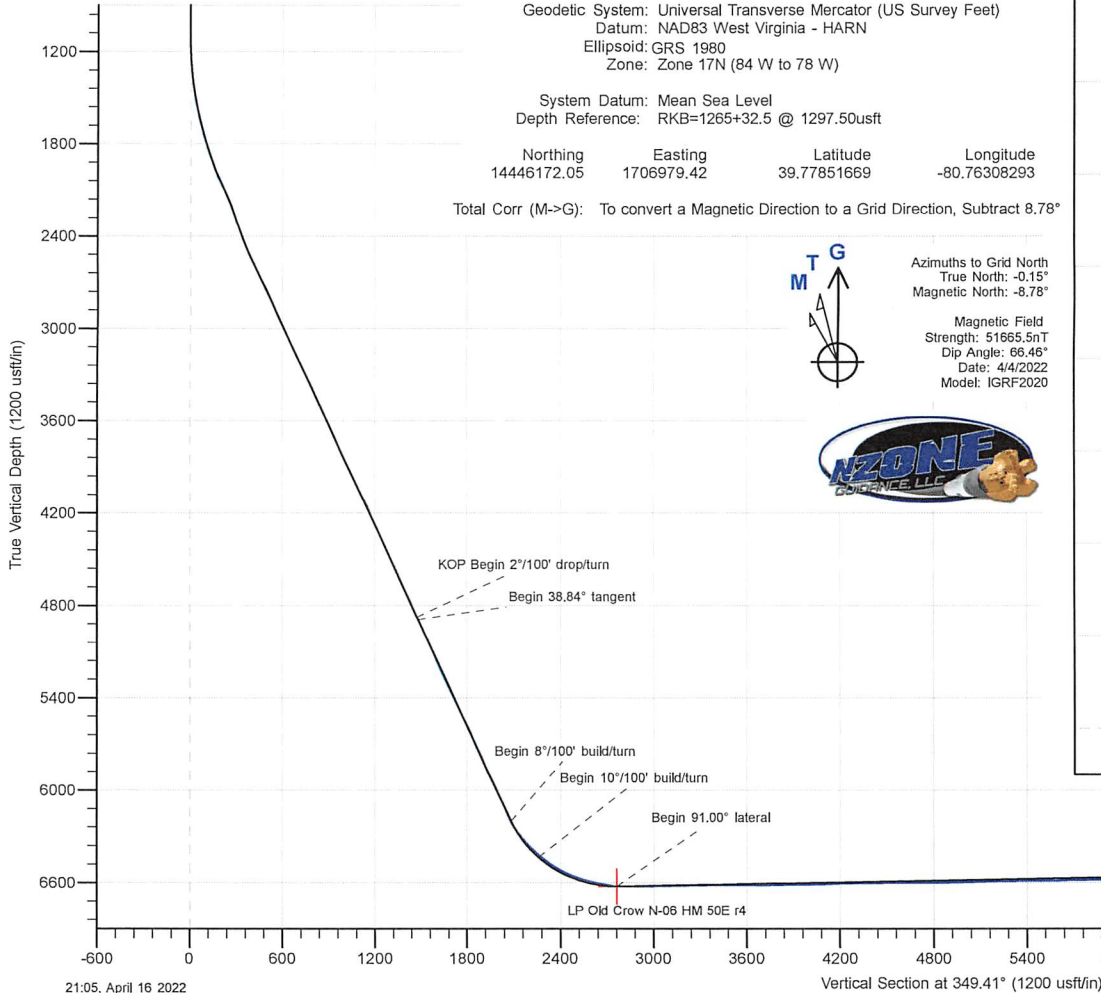
Northing	Easting	Latitude	Longitude
14446172.05	1706979.42	39.77851669	-80.76308293

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



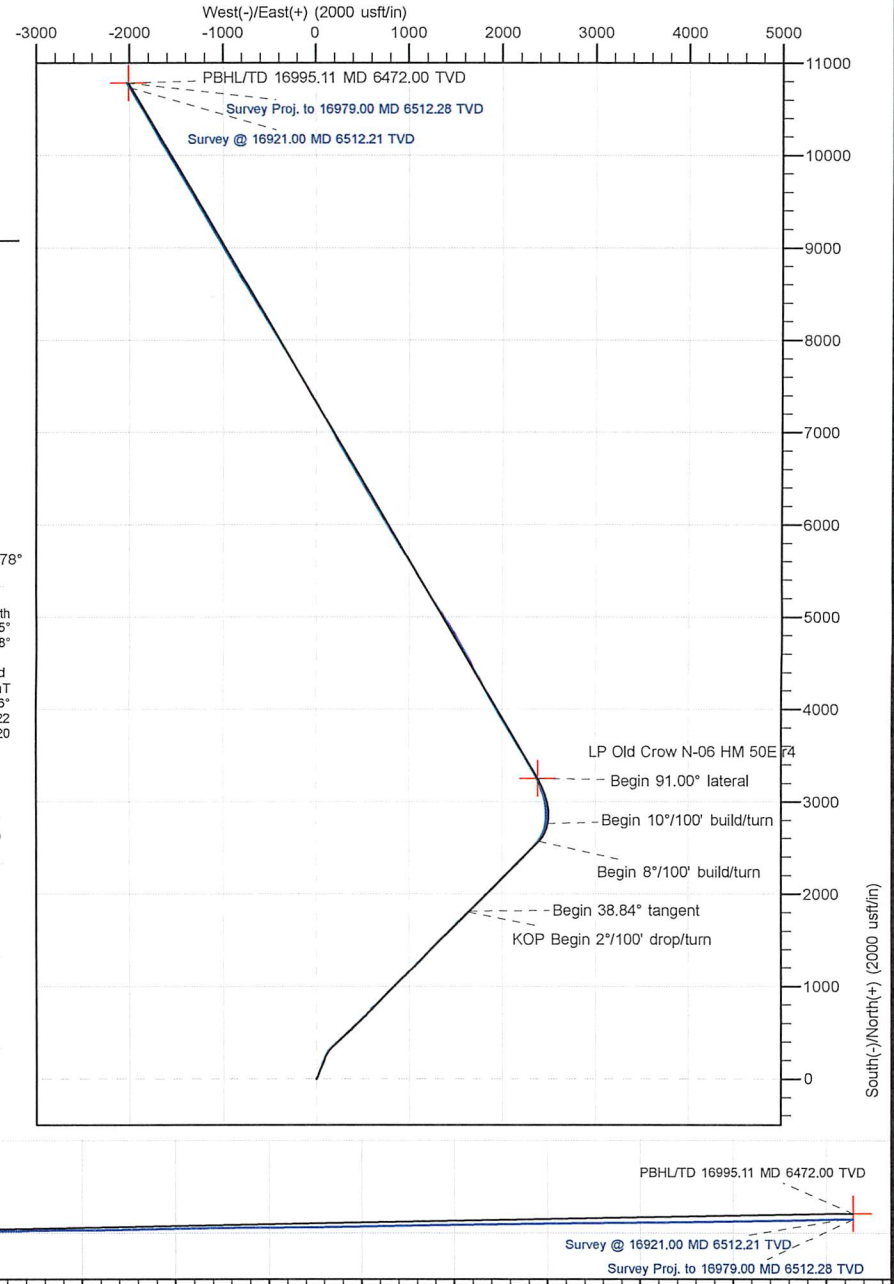
Azimuths to Grid North  
 True North: -0.15°  
 Magnetic North: -8.78°

Magnetic Field  
 Strength: 51665.5nT  
 Dip Angle: 66.46°  
 Date: 4/4/2022  
 Model: IGRF2020



ANNOTATIONS SURVEYS

MD	Inc	Azi	TVD	+N/-S	+E/-W	VSect	Annotation
182.00	0.22	259.12	182.00	-0.07	-0.34	0.00	MWD surveys
16921.00	89.93	328.81	6512.21	10734.08	-1998.32	10918.50	Survey @ 16921.00 MD 6512.21 TVD
16979.00	89.93	328.81	6512.28	10783.69	-2028.36	10972.79	Survey Proj. to 16979.00 MD 6512.28 TVD





Survey Report - Geographic



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Old Crow N-06 HM (slot B)
<b>Project:</b>	Marshall County, West Virginia.	<b>TVD Reference:</b>	RKB=1265+32.5 @ 1297.50usft
<b>Site:</b>	Old Crow Pad	<b>MD Reference:</b>	RKB=1265+32.5 @ 1297.50usft
<b>Well:</b>	Old Crow N-06 HM (slot B)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Feb2822

<b>Project</b>	Marshall County, West Virginia.		
<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>	Old Crow Pad				
<b>Site Position:</b>		<b>Northing:</b>	14,446,179.89 usft	<b>Latitude:</b>	39.77853828
<b>From:</b>	Lat/Long	<b>Easting:</b>	1,706,970.33 usft	<b>Longitude:</b>	-80.76311519
<b>Position Uncertainty:</b>	0.00 usft	<b>Slot Radius:</b>	13-3/16 "	<b>Grid Convergence:</b>	0.15 °

<b>Well</b>	Old Crow N-06 HM (slot B)					
<b>Well Position</b>	<b>+N/-S</b>	0.00 usft	<b>Northing:</b>	14,446,172.05 usft	<b>Latitude:</b>	39.77851669
	<b>+E/-W</b>	0.00 usft	<b>Easting:</b>	1,706,979.41 usft	<b>Longitude:</b>	-80.76308293
<b>Position Uncertainty</b>	0.00 usft		<b>Wellhead Elevation:</b>	usft	<b>Ground Level:</b>	1,265.00 usft

<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	4/4/2022	-8.62	66.46	51,665.54649783

<b>Design</b>	Surveys Original Hole				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.00
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>	
	0.00	0.00	0.00	349.41	

<b>Survey Program</b>	<b>Date</b>	4/16/2022			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
182.00	1,004.00	MWD surf (Original Hole)	MWD	MWD - Standard	
1,036.00	3,014.00	MWD int (Original Hole)	MWD	MWD - Standard	
3,065.00	16,921.00	MWD (Original Hole)	MWD	MWD - Standard	
16,979.00	16,979.00	Projection (Original Hole)	MWD	MWD - Standard	

<b>Survey</b>										
<b>Measured Depth (usft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Map Northing (usft)</b>	<b>Map Easting (usft)</b>	<b>Latitude</b>	<b>Longitude</b>	
0.00	0.00	0.00	0.00	0.00	0.00	14,446,172.05	1,706,979.41	39.77851669	-80.76308293	
182.00	0.22	259.12	182.00	-0.07	-0.34	14,446,171.98	1,706,979.07	39.77851651	-80.76308415	
<b>MWD surveys</b>										
229.00	0.09	324.60	229.00	-0.05	-0.45	14,446,172.00	1,706,978.96	39.77851655	-80.76308454	
273.00	0.09	274.24	273.00	-0.02	-0.51	14,446,172.03	1,706,978.91	39.77851663	-80.76308474	
320.00	0.30	287.07	320.00	0.02	-0.66	14,446,172.07	1,706,978.75	39.77851674	-80.76308529	
362.00	0.09	198.30	362.00	0.02	-0.78	14,446,172.07	1,706,978.64	39.77851675	-80.76308570	
409.00	0.08	248.83	409.00	-0.03	-0.82	14,446,172.02	1,706,978.59	39.77851662	-80.76308585	
451.00	0.08	237.94	451.00	-0.06	-0.87	14,446,172.00	1,706,978.54	39.77851655	-80.76308603	



Survey Report - Geographic



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<b>Project:</b>	Marshall County, West Virginia.	<b>TVD Reference:</b>	RKB=1265+32.5 @ 1297.50usft
<b>Site:</b>	Old Crow Pad	<b>MD Reference:</b>	RKB=1265+32.5 @ 1297.50usft
<b>Well:</b>	Old Crow N-06 HM (slot B)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Feb2822

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
498.00	0.09	213.95	498.00	-0.10	-0.92	14,446,171.95	1,706,978.49	39.77851641	-80.76308621
542.00	0.09	200.67	542.00	-0.16	-0.95	14,446,171.89	1,706,978.46	39.77851625	-80.76308632
589.00	0.09	304.82	589.00	-0.18	-1.00	14,446,171.87	1,706,978.42	39.77851621	-80.76308647
632.00	0.09	287.95	632.00	-0.15	-1.06	14,446,171.90	1,706,978.36	39.77851629	-80.76308669
679.00	0.22	243.83	679.00	-0.18	-1.17	14,446,171.87	1,706,978.24	39.77851622	-80.76308710
722.00	0.09	240.14	722.00	-0.23	-1.27	14,446,171.82	1,706,978.14	39.77851607	-80.76308747
769.00	0.09	248.84	769.00	-0.26	-1.34	14,446,171.79	1,706,978.07	39.77851598	-80.76308771
816.00	0.09	249.63	816.00	-0.29	-1.41	14,446,171.76	1,706,978.00	39.77851591	-80.76308795
863.00	0.09	182.30	863.00	-0.34	-1.45	14,446,171.71	1,706,977.97	39.77851578	-80.76308808
910.00	0.09	180.90	910.00	-0.41	-1.45	14,446,171.64	1,706,977.97	39.77851557	-80.76308809
957.00	0.09	178.53	957.00	-0.49	-1.45	14,446,171.57	1,706,977.97	39.77851537	-80.76308809
1,004.00	0.22	203.40	1,004.00	-0.60	-1.48	14,446,171.45	1,706,977.93	39.77851504	-80.76308821
1,036.00	0.31	256.22	1,036.00	-0.68	-1.59	14,446,171.37	1,706,977.82	39.77851483	-80.76308860
1,076.00	0.31	256.16	1,076.00	-0.73	-1.80	14,446,171.32	1,706,977.61	39.77851469	-80.76308935
1,123.00	0.31	350.70	1,123.00	-0.64	-1.95	14,446,171.41	1,706,977.47	39.77851495	-80.76308986
1,171.00	1.49	37.72	1,170.99	-0.02	-1.58	14,446,172.03	1,706,977.83	39.77851666	-80.76308857
1,218.00	2.68	37.02	1,217.96	1.34	-0.55	14,446,173.39	1,706,978.87	39.77852039	-80.76308487
1,265.00	4.48	35.26	1,264.86	3.72	1.17	14,446,175.77	1,706,980.59	39.77852690	-80.76307872
1,312.00	6.29	29.99	1,311.66	7.45	3.52	14,446,179.50	1,706,982.93	39.77853712	-80.76307033
1,359.00	8.22	29.20	1,358.28	12.61	6.45	14,446,184.66	1,706,985.86	39.77855128	-80.76305987
1,406.00	9.49	27.27	1,404.72	18.99	9.86	14,446,191.04	1,706,989.27	39.77856877	-80.76304766
1,453.00	10.81	24.89	1,450.98	26.43	13.49	14,446,198.48	1,706,992.91	39.77858918	-80.76303466
1,500.00	12.22	24.45	1,497.03	34.96	17.40	14,446,207.01	1,706,996.82	39.77861257	-80.76302065
1,547.00	13.32	22.96	1,542.87	44.47	21.58	14,446,216.52	1,707,000.99	39.77863867	-80.76300572
1,594.00	14.19	20.94	1,588.52	54.84	25.75	14,446,226.89	1,707,005.16	39.77866711	-80.76299078
1,642.00	15.20	19.97	1,634.95	66.25	30.00	14,446,238.30	1,707,009.41	39.77869841	-80.76297553
1,689.00	16.48	20.06	1,680.16	78.30	34.39	14,446,250.35	1,707,013.80	39.77873148	-80.76295979
1,735.00	17.80	19.97	1,724.12	91.04	39.03	14,446,263.09	1,707,018.44	39.77876643	-80.76294316
1,782.00	19.51	21.46	1,768.65	105.10	44.35	14,446,277.15	1,707,023.77	39.77880499	-80.76292407
1,829.00	20.70	24.63	1,812.79	119.95	50.69	14,446,292.00	1,707,030.10	39.77884575	-80.76290139
1,876.00	22.19	26.39	1,856.53	135.45	58.10	14,446,307.51	1,707,037.51	39.77888827	-80.76287488
1,923.00	22.81	24.01	1,899.96	151.73	65.75	14,446,323.78	1,707,045.16	39.77893290	-80.76284749
1,970.00	23.77	20.94	1,943.13	168.90	72.84	14,446,340.95	1,707,052.25	39.77898000	-80.76282208
2,017.00	25.18	18.56	1,985.90	187.22	79.41	14,446,359.27	1,707,058.82	39.77903028	-80.76279853
2,064.00	28.47	18.21	2,027.84	207.35	86.09	14,446,379.40	1,707,065.51	39.77908550	-80.76277455
2,104.00	30.50	19.79	2,062.66	225.96	92.51	14,446,398.01	1,707,071.92	39.77913657	-80.76275153
2,151.00	29.18	24.10	2,103.43	247.64	101.23	14,446,419.69	1,707,080.64	39.77919605	-80.76272030
2,198.00	28.21	28.85	2,144.66	267.84	111.27	14,446,439.89	1,707,090.68	39.77925143	-80.76268437
2,245.00	28.61	33.15	2,186.01	286.99	122.78	14,446,459.04	1,707,102.20	39.77930395	-80.76264320
2,293.00	29.31	37.99	2,228.01	305.87	136.30	14,446,477.92	1,707,115.72	39.77935571	-80.76259491
2,340.00	30.01	41.94	2,268.86	323.68	151.24	14,446,495.74	1,707,130.65	39.77940452	-80.76254157
2,387.00	31.11	44.05	2,309.33	341.16	167.54	14,446,513.21	1,707,146.95	39.77945238	-80.76248340
2,434.00	32.21	45.90	2,349.33	358.60	184.98	14,446,530.65	1,707,164.39	39.77950016	-80.76242116
2,481.00	33.88	47.22	2,388.73	376.22	203.59	14,446,548.27	1,707,183.00	39.77954840	-80.76235475
2,528.00	35.90	48.10	2,427.28	394.32	223.46	14,446,566.37	1,707,202.88	39.77959797	-80.76228384
2,575.00	38.28	48.36	2,464.77	413.20	244.60	14,446,585.25	1,707,224.02	39.77964966	-80.76220842
2,620.00	40.08	46.95	2,499.65	432.35	265.61	14,446,604.40	1,707,245.02	39.77970211	-80.76213347
2,667.00	40.30	46.60	2,535.55	453.12	287.71	14,446,625.17	1,707,267.12	39.77975899	-80.76205461
2,762.00	40.87	46.95	2,607.70	495.45	332.74	14,446,667.50	1,707,312.16	39.77987491	-80.76189392
2,856.00	40.69	46.07	2,678.88	537.70	377.29	14,446,709.75	1,707,356.70	39.77999062	-80.76173497
2,951.00	40.21	45.46	2,751.17	580.70	421.45	14,446,752.75	1,707,400.86	39.78010837	-80.76157738
3,014.00	39.77	45.81	2,799.44	609.01	450.39	14,446,781.06	1,707,429.80	39.78018591	-80.76147409
3,065.00	39.38	47.66	2,838.75	631.28	474.05	14,446,803.33	1,707,453.46	39.78024689	-80.76138968
3,159.00	38.19	44.40	2,912.03	672.13	516.43	14,446,844.18	1,707,475.84	39.78035877	-80.76123845
3,253.00	39.51	43.26	2,985.24	714.67	557.25	14,446,886.72	1,707,497.36	39.78047530	-80.76109273



Survey Report - Geographic



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<b>Project:</b>	Marshall County, West Virginia.	<b>TVD Reference:</b>	RKB=1265+32.5 @ 1297.50usft
<b>Site:</b>	Old Crow Pad	<b>MD Reference:</b>	RKB=1265+32.5 @ 1297.50usft
<b>Well:</b>	Old Crow N-06 HM (slot B)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Feb2822

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
3,348.00	40.30	44.84	3,058.12	758.46	599.63	14,446,930.51	1,707,579.04	39.78059526	-80.76094149
3,442.00	40.69	45.19	3,129.60	801.61	642.80	14,446,973.66	1,707,622.22	39.78071345	-80.76078740
3,536.00	40.87	43.52	3,200.78	845.51	685.72	14,447,017.56	1,707,665.13	39.78083369	-80.76063422
3,631.00	38.67	44.31	3,273.79	889.29	727.86	14,447,061.34	1,707,707.27	39.78095361	-80.76048381
3,726.00	38.58	45.19	3,348.01	931.41	769.61	14,447,103.46	1,707,749.02	39.78106896	-80.76033481
3,819.00	39.59	43.79	3,420.20	973.24	810.69	14,447,145.29	1,707,790.10	39.78118354	-80.76018819
3,914.00	39.38	44.67	3,493.52	1,016.52	852.82	14,447,188.57	1,707,832.24	39.78130210	-80.76003780
4,008.00	38.89	47.04	3,566.44	1,057.84	895.39	14,447,229.89	1,707,874.80	39.78141526	-80.75988591
4,104.00	39.20	46.16	3,641.00	1,099.39	939.32	14,447,271.44	1,707,918.74	39.78152905	-80.75972913
4,198.00	38.28	44.93	3,714.32	1,140.58	981.31	14,447,312.63	1,707,960.73	39.78164186	-80.75957927
4,292.00	38.41	44.76	3,788.04	1,181.93	1,022.44	14,447,353.98	1,708,001.85	39.78175511	-80.75943249
4,386.00	38.89	43.79	3,861.45	1,223.97	1,063.42	14,447,396.02	1,708,042.83	39.78187025	-80.75928622
4,480.00	38.98	44.23	3,934.57	1,266.45	1,104.46	14,447,438.50	1,708,083.88	39.78198662	-80.75913972
4,574.00	39.38	43.35	4,007.44	1,309.32	1,145.56	14,447,481.37	1,708,124.97	39.78210405	-80.75899304
4,668.00	38.28	41.59	4,080.67	1,352.78	1,185.36	14,447,524.84	1,708,164.77	39.78222312	-80.75885096
4,762.00	38.41	43.26	4,154.39	1,395.83	1,224.70	14,447,567.88	1,708,204.11	39.78234104	-80.75871052
4,856.00	38.10	44.84	4,228.21	1,437.66	1,265.16	14,447,609.71	1,708,244.57	39.78245561	-80.75856609
4,950.00	39.11	46.69	4,301.67	1,478.56	1,307.18	14,447,650.61	1,708,286.60	39.78256763	-80.75841611
5,044.00	39.90	46.51	4,374.19	1,519.65	1,350.63	14,447,691.70	1,708,330.04	39.78268015	-80.75826107
5,138.00	40.21	45.55	4,446.14	1,561.65	1,394.16	14,447,733.70	1,708,373.58	39.78279516	-80.75810571
5,233.00	39.99	45.63	4,518.81	1,604.47	1,437.87	14,447,776.52	1,708,417.29	39.78291244	-80.75794970
5,326.00	38.50	43.79	4,590.84	1,646.26	1,479.27	14,447,818.31	1,708,458.69	39.78302691	-80.75780195
5,421.00	38.58	44.67	4,665.14	1,688.68	1,520.56	14,447,860.73	1,708,499.97	39.78314308	-80.75765458
5,515.00	38.80	46.25	4,738.52	1,729.89	1,562.44	14,447,901.94	1,708,541.85	39.78325595	-80.75750511
5,591.00	39.11	45.11	4,797.62	1,763.27	1,596.62	14,447,935.32	1,708,576.04	39.78334737	-80.75738311
5,624.00	39.60	43.78	4,823.13	1,778.21	1,611.27	14,447,950.26	1,708,590.69	39.78338829	-80.75733081
5,718.00	40.40	44.57	4,895.14	1,821.54	1,653.38	14,447,993.59	1,708,632.80	39.78350698	-80.75718051
5,812.00	39.12	46.59	4,967.40	1,863.62	1,696.30	14,448,035.68	1,708,675.72	39.78362223	-80.75702732
5,907.00	38.99	46.68	5,041.18	1,904.72	1,739.82	14,448,076.78	1,708,719.23	39.78373478	-80.75687203
6,001.00	37.05	45.18	5,115.23	1,944.98	1,781.43	14,448,117.03	1,708,760.84	39.78384502	-80.75672354
6,095.00	37.76	43.87	5,189.90	1,985.69	1,821.46	14,448,157.74	1,708,800.87	39.78395652	-80.75658065
6,188.00	38.95	43.43	5,262.82	2,027.45	1,861.29	14,448,199.50	1,708,840.70	39.78407090	-80.75643846
6,282.00	40.04	43.95	5,335.36	2,070.67	1,902.59	14,448,242.72	1,708,882.00	39.78418930	-80.75629104
6,377.00	40.09	44.22	5,408.07	2,114.60	1,945.13	14,448,286.65	1,708,924.54	39.78430961	-80.75613918
6,471.00	39.34	44.92	5,480.37	2,157.39	1,987.28	14,448,329.44	1,708,966.69	39.78442681	-80.75598874
6,563.00	38.73	45.10	5,551.84	2,198.35	2,028.25	14,448,370.40	1,709,007.67	39.78453900	-80.75584248
6,658.00	38.51	44.75	5,626.06	2,240.33	2,070.13	14,448,412.38	1,709,049.54	39.78465398	-80.75569302
6,752.00	39.08	44.92	5,699.32	2,282.09	2,111.65	14,448,454.15	1,709,091.07	39.78476836	-80.75554481
6,846.00	38.90	44.92	5,772.38	2,323.97	2,153.41	14,448,496.02	1,709,132.83	39.78488306	-80.75539574
6,940.00	38.29	44.22	5,845.85	2,365.74	2,194.57	14,448,537.80	1,709,173.98	39.78499746	-80.75524885
7,034.00	38.33	43.43	5,919.61	2,407.79	2,234.92	14,448,579.84	1,709,214.33	39.78511261	-80.75510481
7,128.00	38.64	43.51	5,993.19	2,450.24	2,275.16	14,448,622.29	1,709,254.58	39.78522890	-80.75496114
7,221.00	36.75	42.55	6,066.78	2,491.80	2,313.97	14,448,663.85	1,709,293.38	39.78534274	-80.75482259
7,295.00	36.40	43.60	6,126.21	2,524.01	2,344.08	14,448,696.06	1,709,323.50	39.78543097	-80.75471509
7,330.00	36.57	44.04	6,154.35	2,539.02	2,358.49	14,448,711.07	1,709,337.91	39.78547210	-80.75466365
7,377.00	37.10	41.93	6,191.97	2,559.63	2,377.70	14,448,731.68	1,709,357.11	39.78552856	-80.75459508
7,424.00	39.43	36.13	6,228.88	2,582.25	2,395.98	14,448,754.30	1,709,375.39	39.78559052	-80.75452979
7,471.00	41.19	30.95	6,264.73	2,607.58	2,412.75	14,448,779.63	1,709,392.16	39.78565997	-80.75446986
7,518.00	43.65	26.46	6,299.43	2,635.39	2,427.94	14,448,807.44	1,709,407.35	39.78573622	-80.75441551
7,569.00	45.63	21.81	6,335.72	2,668.08	2,442.56	14,448,840.13	1,709,421.97	39.78582589	-80.75436314
7,611.00	47.08	16.71	6,364.72	2,696.76	2,452.56	14,448,868.81	1,709,431.98	39.78590458	-80.75432726
7,658.00	49.63	11.79	6,395.96	2,730.78	2,461.17	14,448,902.84	1,709,440.59	39.78599796	-80.75429627
7,706.00	51.03	7.92	6,426.61	2,767.18	2,467.48	14,448,939.23	1,709,446.90	39.78609785	-80.75427346
7,753.00	53.32	3.88	6,455.44	2,804.09	2,471.28	14,448,976.14	1,709,450.69	39.78619919	-80.75425959
7,800.00	56.09	0.98	6,482.59	2,842.41	2,472.89	14,449,014.46	1,709,452.30	39.78630441	-80.75425349



Survey Report - Geographic



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Old Crow N-06 HM (slot B)
<b>Project:</b>	Marshall County, West Virginia.	<b>TVD Reference:</b>	RKB=1265+32.5 @ 1297.50usft
<b>Site:</b>	Old Crow Pad	<b>MD Reference:</b>	RKB=1265+32.5 @ 1297.50usft
<b>Well:</b>	Old Crow N-06 HM (slot B)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Feb2822

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
7,847.00	59.21	358.60	6,507.74	2,882.10	2,472.73	14,449,054.15	1,709,452.14	39.78641343	-80.75425367
7,893.00	63.08	355.35	6,529.94	2,922.32	2,470.58	14,449,094.37	1,709,449.99	39.78652389	-80.75426092
7,940.00	66.11	352.01	6,550.11	2,964.50	2,465.89	14,449,136.55	1,709,445.31	39.78663977	-80.75427719
7,985.00	69.71	348.14	6,567.03	3,005.55	2,458.69	14,449,177.60	1,709,438.10	39.78675256	-80.75430243
8,032.00	72.97	345.24	6,582.07	3,048.87	2,448.43	14,449,220.92	1,709,427.85	39.78687161	-80.75433852
8,079.00	75.21	343.22	6,594.96	3,092.36	2,436.14	14,449,264.41	1,709,415.56	39.78699114	-80.75438184
8,126.00	78.15	339.97	6,605.79	3,135.75	2,421.70	14,449,307.80	1,709,401.11	39.78711039	-80.75443283
8,173.00	80.48	338.30	6,614.50	3,178.90	2,405.25	14,449,350.95	1,709,384.66	39.78722901	-80.75449097
8,220.00	83.43	336.19	6,621.08	3,221.80	2,387.25	14,449,393.86	1,709,366.66	39.78734698	-80.75455462
8,267.00	87.16	333.38	6,624.93	3,264.17	2,367.30	14,449,436.22	1,709,346.71	39.78746348	-80.75462524
8,314.00	90.68	331.01	6,625.82	3,305.73	2,345.38	14,449,477.78	1,709,324.80	39.78757777	-80.75470284
8,361.00	90.77	328.98	6,625.23	3,346.42	2,321.88	14,449,518.47	1,709,301.30	39.78768971	-80.75478610
8,455.00	90.99	330.74	6,623.78	3,427.70	2,274.69	14,449,599.75	1,709,254.10	39.78791328	-80.75495330
8,549.00	91.52	330.39	6,621.72	3,509.55	2,228.51	14,449,681.60	1,709,207.92	39.78813839	-80.75511690
8,643.00	91.25	329.51	6,619.45	3,590.89	2,181.45	14,449,762.94	1,709,160.86	39.78836213	-80.75528362
8,737.00	90.55	329.60	6,617.97	3,671.91	2,133.82	14,449,843.97	1,709,113.24	39.78858501	-80.75545237
8,832.00	90.55	329.25	6,617.06	3,753.70	2,085.50	14,449,925.75	1,709,064.92	39.78880999	-80.75562359
8,926.00	90.29	329.69	6,616.37	3,834.67	2,037.75	14,450,006.72	1,709,017.17	39.78903270	-80.75579278
9,020.00	90.20	329.07	6,615.97	3,915.56	1,989.88	14,450,087.61	1,708,969.29	39.78925521	-80.75596243
9,114.00	89.58	328.98	6,616.15	3,996.15	1,941.50	14,450,168.21	1,708,920.91	39.78947690	-80.75613387
9,208.00	89.49	330.21	6,616.92	4,077.22	1,893.93	14,450,249.27	1,708,873.34	39.78969989	-80.75630243
9,302.00	90.64	330.92	6,616.81	4,159.09	1,847.73	14,450,331.14	1,708,827.15	39.78992506	-80.75646608
9,396.00	91.65	331.18	6,614.93	4,241.32	1,802.24	14,450,413.37	1,708,781.66	39.79015124	-80.75662722
9,489.00	91.21	331.18	6,612.61	4,322.78	1,757.42	14,450,494.83	1,708,736.84	39.79037527	-80.75678598
9,584.00	90.51	330.65	6,611.18	4,405.79	1,711.25	14,450,577.84	1,708,690.66	39.79060359	-80.75694955
9,678.00	91.96	332.06	6,609.16	4,488.26	1,666.20	14,450,660.31	1,708,645.62	39.79083041	-80.75710913
9,772.00	91.60	331.44	6,606.24	4,571.02	1,621.73	14,450,743.07	1,708,601.15	39.79105803	-80.75726664
9,867.00	91.12	330.13	6,603.98	4,653.91	1,575.38	14,450,825.96	1,708,554.79	39.79128602	-80.75743086
9,961.00	90.64	330.57	6,602.54	4,735.59	1,528.88	14,450,907.65	1,708,508.29	39.79151068	-80.75759559
10,055.00	90.24	329.77	6,601.82	4,817.14	1,482.12	14,450,989.19	1,708,461.54	39.79173497	-80.75776126
10,149.00	90.51	327.93	6,601.20	4,897.58	1,433.50	14,451,069.63	1,708,412.92	39.79195624	-80.75793357
10,243.00	89.49	327.84	6,601.20	4,977.19	1,383.53	14,451,149.24	1,708,362.95	39.79217526	-80.75811071
10,338.00	90.24	327.84	6,601.43	5,057.62	1,332.96	14,451,229.67	1,708,312.38	39.79239650	-80.75828995
10,433.00	90.81	328.28	6,600.56	5,138.23	1,282.71	14,451,310.28	1,708,262.12	39.79261825	-80.75846808
10,527.00	90.77	329.25	6,599.26	5,218.60	1,233.97	14,451,390.65	1,708,213.39	39.79283932	-80.75864082
10,621.00	91.74	329.77	6,597.20	5,299.58	1,186.29	14,451,471.63	1,708,165.70	39.79306207	-80.75880979
10,715.00	92.09	329.95	6,594.06	5,380.82	1,139.12	14,451,552.87	1,708,118.53	39.79328554	-80.75897695
10,809.00	91.16	329.34	6,591.39	5,461.90	1,091.63	14,451,633.95	1,708,071.05	39.79350856	-80.75914522
10,903.00	90.68	329.07	6,589.88	5,542.64	1,043.51	14,451,714.69	1,708,022.93	39.79373063	-80.75931575
10,998.00	90.02	329.16	6,589.30	5,624.16	994.75	14,451,796.22	1,707,974.16	39.79395489	-80.75948857
11,092.00	91.03	329.16	6,588.44	5,704.87	946.56	14,451,876.92	1,707,925.98	39.79417688	-80.75965934
11,186.00	90.24	329.34	6,587.40	5,785.65	898.51	14,451,957.70	1,707,877.92	39.79439907	-80.75982966
11,280.00	91.30	328.98	6,586.14	5,866.35	850.32	14,452,038.40	1,707,829.74	39.79462105	-80.76000043
11,374.00	91.12	329.16	6,584.15	5,946.96	802.02	14,452,119.01	1,707,781.43	39.79484280	-80.76017163
11,469.00	90.29	329.07	6,582.98	6,028.48	753.26	14,452,200.54	1,707,732.67	39.79506704	-80.76034445
11,563.00	89.54	328.63	6,583.12	6,108.93	704.63	14,452,280.98	1,707,684.05	39.79528832	-80.76051679
11,657.00	90.46	329.60	6,583.12	6,189.60	656.38	14,452,361.65	1,707,635.80	39.79551021	-80.76068780
11,751.00	90.86	330.04	6,582.04	6,270.85	609.13	14,452,442.90	1,707,588.55	39.79573370	-80.76085525
11,845.00	90.24	328.98	6,581.14	6,351.85	561.44	14,452,523.90	1,707,540.85	39.79595649	-80.76102427
11,939.00	91.30	330.30	6,579.87	6,432.95	513.93	14,452,605.00	1,707,493.35	39.79617956	-80.76119263
12,033.00	91.16	330.13	6,577.86	6,514.51	467.25	14,452,686.56	1,707,446.67	39.79640389	-80.76135805
12,127.00	90.42	329.86	6,576.56	6,595.90	420.25	14,452,767.96	1,707,399.66	39.79662777	-80.76152462
12,221.00	91.43	329.95	6,575.04	6,677.22	373.12	14,452,849.27	1,707,352.54	39.79685143	-80.76169163
12,315.00	91.65	330.39	6,572.52	6,758.74	326.38	14,452,930.79	1,707,305.79	39.79707563	-80.76185727
12,410.00	90.99	330.57	6,570.33	6,841.38	279.58	14,453,013.43	1,707,259.00	39.79730294	-80.76202309

JAN 26 2023

WV Department of Environmental Protection

03/17/2023

<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Old Crow N-06 HM (slot B)
<b>Project:</b>	Marshall County, West Virginia.	<b>TVD Reference:</b>	RKB=1265+32.5 @ 1297.50usft
<b>Site:</b>	Old Crow Pad	<b>MD Reference:</b>	RKB=1265+32.5 @ 1297.50usft
<b>Well:</b>	Old Crow N-06 HM (slot B)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	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	
12,504.00	90.55	330.83	6,569.07	6,923.35	233.59	14,453,095.40	1,707,213.00	39.79752838	-80.76218608	
12,598.00	90.29	330.92	6,568.38	7,005.46	187.84	14,453,177.51	1,707,167.25	39.79775421	-80.76234819	
12,692.00	89.89	330.83	6,568.23	7,087.58	142.08	14,453,259.63	1,707,121.50	39.79798006	-80.76251030	
12,786.00	91.03	330.65	6,567.47	7,169.58	96.14	14,453,341.63	1,707,075.56	39.79820559	-80.76267309	
12,881.00	90.64	329.60	6,566.09	7,251.94	48.83	14,453,423.99	1,707,028.24	39.79843213	-80.76284077	
12,975.00	89.93	329.34	6,565.62	7,332.91	1.08	14,453,504.96	1,706,980.49	39.79865484	-80.76301001	
13,070.00	91.08	329.60	6,564.79	7,414.74	-47.18	14,453,586.79	1,706,932.24	39.79887990	-80.76318105	
13,165.00	90.59	329.86	6,563.40	7,496.77	-95.06	14,453,668.82	1,706,884.35	39.79910555	-80.76335075	
13,259.00	89.89	329.25	6,563.01	7,577.81	-142.69	14,453,749.86	1,706,836.72	39.79932844	-80.76351957	
13,352.00	91.56	329.86	6,561.83	7,657.98	-189.81	14,453,830.03	1,706,789.60	39.79954895	-80.76368657	
13,447.00	91.03	329.34	6,559.68	7,739.90	-237.87	14,453,911.95	1,706,741.54	39.79977426	-80.76385692	
13,541.00	90.02	328.46	6,558.82	7,820.38	-286.42	14,453,992.43	1,706,692.99	39.79999564	-80.76402902	
13,635.00	91.30	328.98	6,557.74	7,900.71	-335.22	14,454,072.76	1,706,644.19	39.80021660	-80.76420202	
13,730.00	90.90	329.07	6,555.92	7,982.15	-384.11	14,454,154.20	1,706,595.31	39.80044060	-80.76437530	
13,823.00	91.52	329.77	6,553.95	8,062.19	-431.41	14,454,234.24	1,706,548.00	39.80066077	-80.76454297	
13,917.00	90.77	329.25	6,552.07	8,143.18	-479.09	14,454,315.23	1,706,500.32	39.80088352	-80.76471199	
14,011.00	89.80	328.28	6,551.61	8,223.55	-527.84	14,454,395.60	1,706,451.58	39.80110460	-80.76488478	
14,105.00	90.51	328.81	6,551.35	8,303.73	-576.89	14,454,475.78	1,706,402.53	39.80132516	-80.76505867	
14,199.00	91.96	329.86	6,549.33	8,384.57	-624.82	14,454,556.62	1,706,354.60	39.80154749	-80.76522857	
14,293.00	91.47	329.07	6,546.51	8,465.49	-672.55	14,454,637.54	1,706,306.86	39.80177008	-80.76539777	
14,387.00	91.21	329.42	6,544.31	8,546.25	-720.61	14,454,718.30	1,706,258.81	39.80199221	-80.76556812	
14,482.00	90.29	328.63	6,543.07	8,627.69	-769.50	14,454,799.75	1,706,209.92	39.80221623	-80.76574143	
14,575.00	90.24	329.86	6,542.64	8,707.61	-817.05	14,454,879.66	1,706,162.36	39.80243605	-80.76591000	
14,669.00	89.85	329.34	6,542.57	8,788.69	-864.62	14,454,960.74	1,706,114.80	39.80265905	-80.76607861	
14,764.00	91.34	331.01	6,541.58	8,871.10	-911.86	14,455,043.15	1,706,067.55	39.80288570	-80.76624606	
14,858.00	90.99	329.60	6,539.67	8,952.73	-958.42	14,455,124.78	1,706,021.00	39.80311023	-80.76641106	
14,953.00	90.81	329.25	6,538.18	9,034.51	-1,006.73	14,455,206.56	1,705,972.68	39.80333516	-80.76658233	
15,048.00	90.64	329.42	6,536.97	9,116.22	-1,055.18	14,455,288.27	1,705,924.23	39.80355991	-80.76675408	
15,142.00	91.08	329.95	6,535.56	9,197.36	-1,102.62	14,455,369.41	1,705,876.79	39.80378307	-80.76692224	
15,236.00	90.11	330.30	6,534.59	9,278.86	-1,149.44	14,455,450.91	1,705,829.97	39.80400723	-80.76708819	
15,330.00	89.19	329.86	6,535.16	9,360.33	-1,196.33	14,455,532.38	1,705,783.09	39.80423130	-80.76725437	
15,424.00	90.51	330.13	6,535.41	9,441.73	-1,243.33	14,455,613.78	1,705,736.08	39.80445519	-80.76742099	
15,524.00	90.20	329.86	6,534.79	9,528.33	-1,293.34	14,455,700.38	1,705,686.08	39.80469336	-80.76759824	
15,619.00	91.21	329.86	6,533.62	9,610.48	-1,341.04	14,455,782.53	1,705,638.38	39.80491930	-80.76776731	
15,713.00	91.21	329.25	6,531.63	9,691.50	-1,388.66	14,455,863.55	1,705,590.76	39.80514214	-80.76793612	
15,808.00	91.08	328.54	6,529.74	9,772.82	-1,437.72	14,455,944.87	1,705,541.69	39.80536583	-80.76811009	
15,902.00	90.20	328.98	6,528.69	9,853.19	-1,486.47	14,456,025.24	1,705,492.94	39.80558688	-80.76828292	
15,996.00	90.64	329.51	6,528.00	9,933.96	-1,534.54	14,456,106.02	1,705,444.88	39.80580906	-80.76845332	
16,089.00	90.77	329.95	6,526.85	10,014.28	-1,581.41	14,456,186.33	1,705,398.00	39.80602995	-80.76861949	
16,183.00	91.08	329.60	6,525.33	10,095.49	-1,628.73	14,456,267.54	1,705,350.69	39.80625331	-80.76878721	
16,277.00	91.30	330.21	6,523.38	10,176.80	-1,675.85	14,456,348.85	1,705,303.56	39.80647695	-80.76895426	
16,371.00	90.46	329.86	6,521.94	10,258.22	-1,722.79	14,456,430.27	1,705,256.62	39.80670089	-80.76912067	
16,465.00	90.77	330.30	6,520.93	10,339.69	-1,769.68	14,456,511.74	1,705,209.74	39.80692496	-80.76928686	
16,559.00	91.60	330.74	6,518.99	10,421.50	-1,815.93	14,456,593.55	1,705,163.49	39.80714996	-80.76945079	
16,654.00	91.43	330.13	6,516.47	10,504.10	-1,862.78	14,456,676.15	1,705,116.63	39.80737714	-80.76961688	
16,746.00	91.60	329.77	6,514.04	10,583.71	-1,908.84	14,456,755.76	1,705,070.58	39.80759608	-80.76978014	
16,840.00	90.37	329.16	6,512.43	10,664.66	-1,956.59	14,456,836.71	1,705,022.83	39.80781873	-80.76994942	
16,921.00	89.93	328.81	6,512.21	10,734.08	-1,998.32	14,456,906.13	1,704,981.09	39.80800966	-80.77009740	
<b>Survey @ 16921.00 MD 6512.21 TVD</b>										
16,979.00	89.93	328.81	6,512.28	10,783.69	-2,028.36	14,456,955.75	1,704,951.05	39.80814614	-80.77020390	
<b>Survey Proj. to 16979.00 MD 6512.28 TVD</b>										

<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Old Crow N-06 HM (slot B)
<b>Project:</b>	Marshall County, West Virginia.	<b>TVD Reference:</b>	RKB=1265+32.5 @ 1297.50usft
<b>Site:</b>	Old Crow Pad	<b>MD Reference:</b>	RKB=1265+32.5 @ 1297.50usft
<b>Well:</b>	Old Crow N-06 HM (slot B)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Feb2822

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
182.00	182.00	-0.07	-0.34	MWD surveys
16,921.00	6,512.21	10,734.08	-1,998.32	Survey @ 16921.00 MD 6512.21 TVD
16,979.00	6,512.28	10,783.69	-2,028.36	Survey Proj. to 16979.00 MD 6512.28 TVD

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**JAN 26 2023**  
 WV Department of  
 Environmental Protection