



TUG HILL
OPERATING

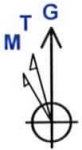
Well: Old Crow S-16 HM (slot J)
Site: Old Crow Pad
Project: Marshall County, West Virginia.
Design: rev5

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Annotation
1	6657.00	42.71	45.98	5185.81	2626.78	2714.41	0.00	0.000	1003.92	Survey @ 6657.00 MD 5185.81 TVD
2	7407.00	42.71	45.98	5736.91	2980.29	3080.23	0.00	0.000	1139.47	KOP Begin 2°/100' build/turn
3	7666.86	47.64	48.30	5920.06	3105.48	3215.38	2.00	19.307	1192.30	Begin 47.64° tangent
4	7955.69	47.64	48.30	6114.66	3247.45	3374.74	0.00	0.000	1257.46	Begin 8°/100' build/turn
5	8392.44	50.00	95.22	6411.43	3342.53	3671.06	8.00	102.341	1464.41	Begin 10°/100' build/turn
6	9024.06	89.00	150.14	6644.00	3012.58	4115.11	10.00	66.486	2014.50	Begin 89.00° lateral
7	18508.10	89.00	150.14	6810.00	-5210.87	8836.81	0.00	0.000	0258.77	PBHL/TD 18508.10 MD/6810.00 TVD

ANNOTATIONS SURVEYS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Annotation
170.00	0.09	48.36	170.00	0.09	0.10	0.04	MWD surveys
18405.00	91.30	149.05	6628.26	-5156.52	8786.46	10187.79	Survey @ 18405.00 MD 6628.26 TVD
18465.00	91.30	149.05	6626.90	-5207.97	8817.31	10240.50	Survey projected to 18465.00 MD 6626.90 TVD



Azimuths to Grid North
True North: -0.15°
Magnetic North: -8.89°

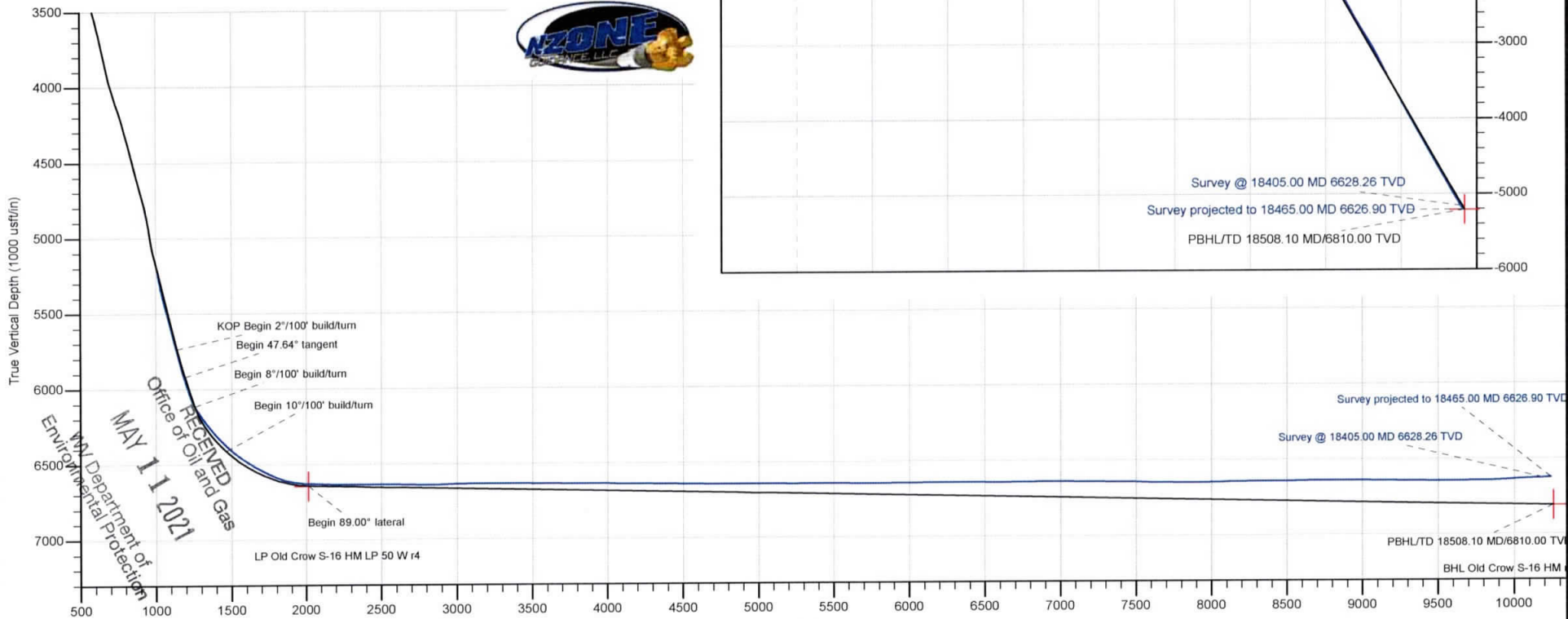
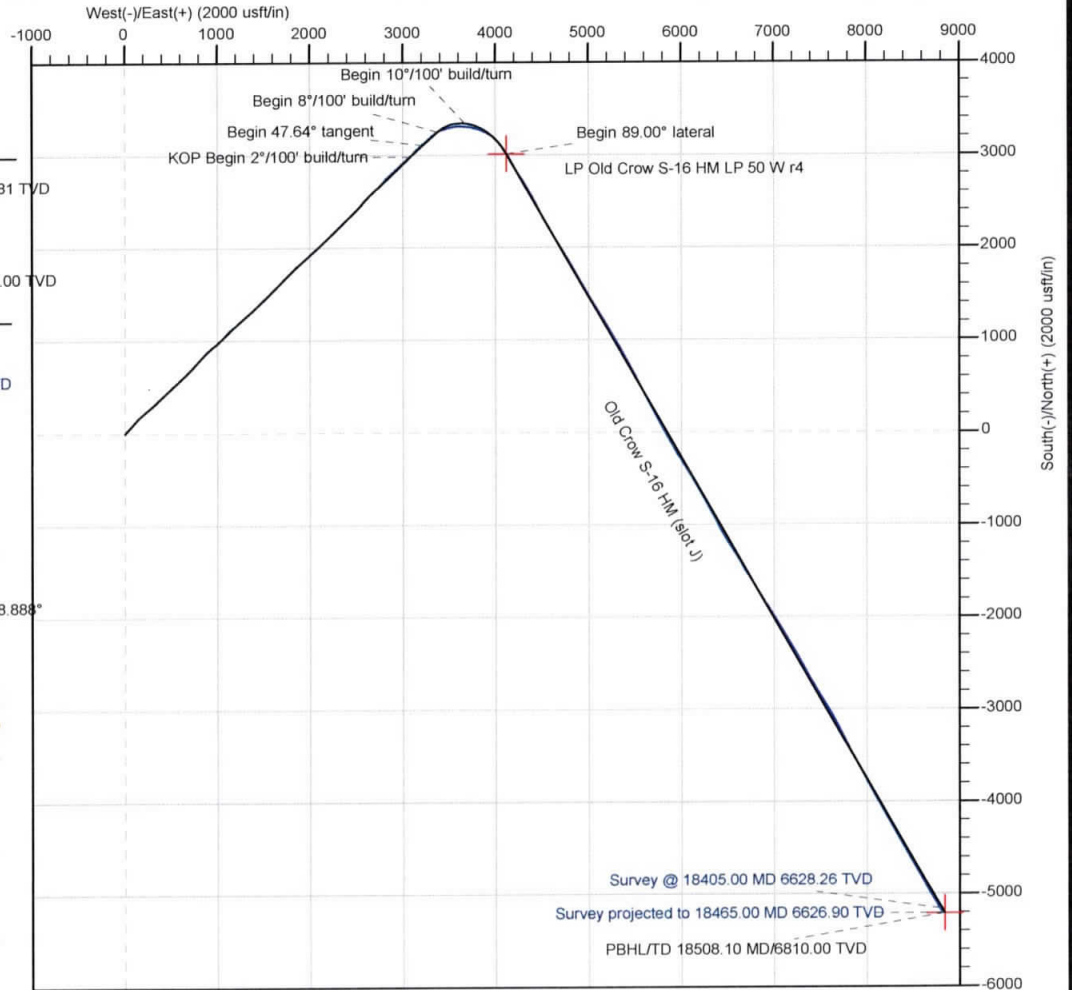
Magnetic Field
Strength: 51853.7snT
Dip Angle: 66.72°
Date: 3/31/2020
Model: IGRF2015

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+26 @ 1291.00usft (Nabors B28)

Northing	Easting	Latitude	Longitude
14446109.36	1707052.07	39.77834399	-80.76282491

Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.888°



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Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Old Crow S-16 HM (slot J)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=1265+26 @ 1291.00usft (Nabors B28)
Site:	Old Crow Pad	MD Reference:	RKB=1265+26 @ 1291.00usft (Nabors B28)
Well:	Old Crow S-16 HM (slot J)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

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

Site	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:	0.152 °

Well	Old Crow S-16 HM (slot J)					
Well Position	+N/-S	0.00 usft	Northing:	14,446,109.36 usft	Latitude:	39.77834399
	+E/-W	0.00 usft	Easting:	1,707,052.07 usft	Longitude:	-80.76282491
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)
	IGRF2015	3/31/2020	-8.736	66.724	51,853.72238806

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	120.53

Survey Program	Date	4/11/2020			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
170.00	950.00	MWD surf (Original Hole)	MWD	MWD - Standard	
967.00	3,284.00	MWD int (Original Hole)	MWD	MWD - Standard	
3,345.00	6,657.00	MWD (Original Hole)	MWD	MWD - Standard	
6,696.00	18,405.00	MWD Lat (Original Hole)	MWD	MWD - Standard	
18,465.00	18,465.00	Projection (Original Hole)	MWD	MWD - Standard	

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
170.00	0.09	48.36	170.00	0.09	0.10	0.04	0.05	0.05	0.00	
200.00	0.26	81.14	200.00	0.11	0.18	0.10	0.64	0.57	109.27	
231.00	0.18	182.48	231.00	0.08	0.25	0.18	1.11	-0.26	326.90	
261.00	0.26	66.81	261.00	0.06	0.31	0.24	1.25	0.27	-385.57	
291.00	0.04	81.14	291.00	0.09	0.39	0.29	0.74	-0.73	47.77	
321.00	0.13	195.66	321.00	0.05	0.39	0.31	0.66	0.30	381.73	

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Survey Report



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Old Crow S-16 HM (slot J)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=1265+26 @ 1291.00usft (Nabors B28)
Site:	Old Crow Pad	MD Reference:	RKB=1265+26 @ 1291.00usft (Nabors B28)
Well:	Old Crow S-16 HM (slot J)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
353.00	0.13	111.37	353.00	0.01	0.41	0.35	0.55	0.00	-263.41
383.00	0.40	174.74	383.00	-0.11	0.45	0.45	1.20	0.90	211.23
415.00	0.57	116.65	415.00	-0.29	0.60	0.67	1.54	0.53	-181.53
447.00	0.62	59.26	447.00	-0.28	0.90	0.91	1.79	0.16	-179.34
478.00	1.14	60.93	477.99	-0.04	1.31	1.15	1.68	1.68	5.39
508.00	1.54	65.50	507.98	0.27	1.94	1.53	1.38	1.33	15.23
539.00	2.11	48.97	538.97	0.82	2.75	1.95	2.48	1.84	-53.32
571.00	2.86	44.31	570.94	1.78	3.75	2.33	2.43	2.34	-14.56
602.00	3.69	41.06	601.89	3.08	4.94	2.69	2.74	2.68	-10.48
634.00	4.79	37.63	633.80	4.92	6.44	3.05	3.53	3.44	-10.72
665.00	5.75	39.91	664.67	7.13	8.22	3.46	3.17	3.10	7.35
697.00	6.86	37.63	696.47	9.88	10.42	3.96	3.56	3.47	-7.13
728.00	7.60	40.71	727.23	12.90	12.89	4.55	2.69	2.39	9.94
760.00	8.88	38.69	758.90	16.43	15.81	5.27	4.10	4.00	-6.31
791.00	9.80	42.29	789.49	20.25	19.08	6.15	3.51	2.97	11.61
823.00	10.72	41.24	820.97	24.50	22.88	7.26	2.93	2.88	-3.28
855.00	11.60	44.05	852.37	29.05	27.07	8.56	3.23	2.75	8.78
886.00	12.35	45.28	882.69	33.62	31.60	10.14	2.56	2.42	3.97
918.00	13.14	45.81	913.91	38.57	36.64	11.97	2.50	2.47	1.66
950.00	13.71	45.72	945.03	43.75	41.96	13.92	1.78	1.78	-0.28
967.00	14.02	44.14	961.54	46.63	44.84	14.93	2.88	1.82	-9.29
1,076.00	15.16	41.50	1,067.02	66.79	63.48	20.75	1.21	1.05	-2.42
1,169.00	16.66	40.62	1,156.45	86.01	80.21	25.40	1.63	1.61	-0.95
1,264.00	18.28	39.57	1,247.07	107.84	98.57	30.13	1.74	1.71	-1.11
1,359.00	20.12	43.34	1,336.79	131.21	119.28	36.09	2.33	1.94	3.97
1,455.00	22.72	43.87	1,426.15	156.58	143.46	44.03	2.72	2.71	0.55
1,550.00	25.44	46.42	1,512.87	183.88	170.96	53.85	3.06	2.86	2.68
1,646.00	28.56	50.91	1,598.41	212.58	203.72	67.49	3.88	3.25	4.68
1,740.00	33.13	50.82	1,679.09	242.99	241.10	84.24	4.86	4.86	-0.10
1,835.00	38.01	48.97	1,756.34	278.61	283.31	102.50	5.26	5.14	-1.95
1,930.00	41.40	47.39	1,829.42	319.09	328.51	120.87	3.72	3.57	-1.66
2,025.00	45.26	46.25	1,898.52	363.71	376.02	139.13	4.15	4.06	-1.20
2,120.00	45.48	46.77	1,965.26	410.24	425.07	157.74	0.45	0.23	0.55
2,215.00	46.63	47.73	2,031.18	456.66	475.30	177.43	1.41	1.21	1.01
2,310.00	47.99	46.69	2,095.60	504.10	526.54	197.46	1.64	1.43	-1.09
2,404.00	49.17	46.16	2,157.78	552.69	577.60	216.76	1.32	1.26	-0.56
2,499.00	50.05	45.81	2,219.34	602.97	629.63	236.04	0.97	0.93	-0.37
2,594.00	48.82	46.34	2,281.12	653.03	681.61	255.38	1.36	-1.29	0.56
2,689.00	43.55	44.14	2,346.87	701.24	730.30	272.83	5.79	-5.55	-2.32
2,783.00	39.95	42.38	2,416.99	746.79	773.21	286.66	4.03	-3.83	-1.87
2,878.00	38.67	42.73	2,490.49	791.12	813.91	299.19	1.37	1.35	0.37
2,957.00	36.56	40.89	2,553.07	827.04	846.07	308.64	3.08	-2.67	-2.33
3,052.00	38.54	45.63	2,628.40	869.14	885.76	321.44	3.69	2.08	4.99

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Well:	Old Crow S-16 HM (slot J)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1819_v14

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
3,147.00	45.53	50.82	2,698.94	911.32	933.26	340.94	8.21	7.36	5.46	
3,242.00	47.37	49.41	2,764.39	955.47	986.08	364.00	2.22	1.94	-1.48	
3,284.00	47.68	48.09	2,792.75	975.90	1,009.37	373.69	2.43	0.74	-3.14	
3,345.00	48.21	47.74	2,833.61	1,006.26	1,042.98	387.22	0.97	0.87	-0.57	
3,442.00	46.36	43.17	2,899.43	1,056.19	1,093.78	405.61	3.95	-1.91	-4.71	
3,537.00	46.55	45.28	2,964.88	1,105.53	1,141.80	421.91	1.62	0.20	2.22	
3,632.00	46.54	48.18	3,030.23	1,152.79	1,192.00	441.14	2.22	-0.01	3.05	
3,726.00	46.10	47.83	3,095.15	1,198.27	1,242.53	461.56	0.54	-0.47	-0.37	
3,820.00	47.29	48.80	3,159.62	1,243.76	1,293.62	482.46	1.47	1.27	1.03	
3,914.00	46.63	48.97	3,223.78	1,288.93	1,345.38	504.09	0.71	-0.70	0.18	
4,008.00	45.88	45.98	3,288.78	1,334.82	1,395.42	523.89	2.43	-0.80	-3.18	
4,103.00	44.82	46.34	3,355.54	1,381.63	1,444.16	542.10	1.15	-1.12	0.38	
4,197.00	44.21	46.86	3,422.57	1,426.91	1,492.05	560.34	0.76	-0.65	0.55	
4,292.00	44.60	47.04	3,490.44	1,472.29	1,540.62	579.13	0.43	0.41	0.19	
4,386.00	45.31	44.67	3,556.96	1,518.54	1,588.27	596.67	1.93	0.76	-2.52	
4,480.00	45.53	43.52	3,622.94	1,566.63	1,634.85	612.37	0.90	0.23	-1.22	
4,575.00	43.95	44.49	3,690.42	1,614.73	1,681.30	627.95	1.81	-1.66	1.02	
4,670.00	44.03	44.23	3,758.77	1,661.90	1,727.43	643.72	0.21	0.08	-0.27	
4,764.00	41.66	45.28	3,827.69	1,707.30	1,772.42	659.41	2.63	-2.52	1.12	
4,859.00	42.36	44.67	3,898.28	1,752.28	1,817.36	675.27	0.85	0.74	-0.64	
4,953.00	42.85	46.51	3,967.47	1,796.80	1,862.82	691.81	1.42	0.52	1.96	
5,048.00	43.24	50.47	4,036.91	1,839.75	1,911.36	711.80	2.87	0.41	4.17	
5,142.00	45.13	49.59	4,104.31	1,881.84	1,961.56	733.66	2.11	2.01	-0.94	
5,237.00	45.83	48.88	4,170.92	1,926.07	2,012.86	755.38	0.91	0.74	-0.75	
5,332.00	45.09	46.51	4,237.56	1,971.63	2,062.94	775.37	1.94	-0.78	-2.49	
5,426.00	46.01	46.16	4,303.38	2,017.96	2,111.48	793.64	1.01	0.98	-0.37	
5,521.00	46.32	45.46	4,369.18	2,065.73	2,160.61	811.70	0.62	0.33	-0.74	
5,615.00	45.13	45.19	4,434.80	2,113.05	2,208.47	828.89	1.28	-1.27	-0.29	
5,710.00	44.43	45.28	4,502.23	2,160.17	2,255.98	845.88	0.74	-0.74	0.09	
5,804.00	44.69	45.19	4,569.21	2,206.62	2,302.81	862.62	0.28	0.28	-0.10	
5,899.00	46.10	45.10	4,635.92	2,254.32	2,350.76	879.68	1.49	1.48	-0.09	
5,993.00	45.75	47.13	4,701.31	2,301.13	2,399.42	897.82	1.60	-0.37	2.16	
6,088.00	46.36	45.98	4,767.24	2,348.17	2,449.08	916.70	1.08	0.64	-1.21	
6,183.00	44.21	42.56	4,834.08	2,396.47	2,496.21	932.77	3.42	-2.26	-3.60	
6,278.00	42.36	42.20	4,903.23	2,444.58	2,540.12	946.14	1.96	-1.95	-0.38	
6,372.00	40.39	40.71	4,973.77	2,491.13	2,581.26	957.93	2.34	-2.10	-1.59	
6,470.00	39.90	42.12	5,048.68	2,538.51	2,623.05	969.86	1.05	-0.50	1.44	
6,562.00	44.34	47.74	5,116.93	2,582.06	2,666.67	985.31	6.33	4.83	6.11	
6,657.00	42.71	45.98	5,185.81	2,626.78	2,714.41	1,003.72	2.14	-1.72	-1.85	
6,696.00	40.62	42.88	5,214.95	2,645.27	2,732.57	1,009.96	7.52	-5.36	-7.95	
6,790.00	39.91	42.35	5,286.68	2,689.98	2,773.70	1,022.68	0.84	0.76	-0.56	
6,884.00	43.12	45.07	5,357.06	2,734.97	2,816.78	1,036.93	3.92	3.41	2.89	
6,979.00	43.43	44.64	5,426.23	2,781.14	2,862.71	1,053.04	0.45	0.33	-0.45	
7,074.00	42.95	48.50	5,495.50	2,825.83	2,909.90	1,070.99	2.83	2.57	4.06	

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COMPASS 5000.14 Build 85
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Well:	Old Crow S-16 HM (slot J)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
7,169.00	42.20	47.01	5,565.46	2,869.03	2,957.48	1,090.03	1.32	-0.79	-1.57
7,263.00	43.03	47.71	5,634.64	2,912.14	3,004.30	1,108.46	1.02	0.88	0.74
7,358.00	44.13	45.78	5,703.46	2,957.02	3,051.98	1,126.73	1.82	1.16	-2.03
7,453.00	45.10	45.16	5,771.08	3,003.81	3,099.55	1,143.93	1.12	1.02	-0.65
7,548.00	46.07	46.31	5,837.57	3,051.17	3,148.14	1,161.73	1.34	1.02	1.21
7,642.00	45.80	46.66	5,902.94	3,097.67	3,197.12	1,180.30	0.39	-0.29	0.37
7,737.00	46.46	48.50	5,968.78	3,143.86	3,247.68	1,200.38	1.56	0.69	1.94
7,831.00	48.00	48.85	6,032.61	3,189.43	3,299.50	1,221.88	1.66	1.64	0.37
7,890.00	48.13	49.91	6,072.04	3,218.00	3,332.82	1,236.06	1.35	0.22	1.80
7,925.00	47.65	55.01	6,095.52	3,233.81	3,353.39	1,245.74	10.89	-1.37	14.57
7,972.00	47.56	62.13	6,127.23	3,251.89	3,382.97	1,262.04	11.19	-0.19	15.15
8,018.00	47.34	68.54	6,158.36	3,266.02	3,413.73	1,281.36	10.27	-0.48	13.93
8,065.00	47.69	72.50	6,190.11	3,277.57	3,446.40	1,303.63	6.26	0.74	8.43
8,112.00	47.52	75.40	6,221.80	3,287.17	3,479.75	1,327.48	4.57	-0.36	6.17
8,159.00	47.91	76.63	6,253.42	3,295.57	3,513.49	1,352.27	2.11	0.83	2.62
8,207.00	47.69	78.47	6,285.67	3,303.24	3,548.21	1,378.28	2.88	-0.46	3.83
8,254.00	48.44	83.48	6,317.09	3,308.71	3,582.72	1,405.23	8.09	1.60	10.66
8,301.00	49.49	87.97	6,347.95	3,311.34	3,618.05	1,434.33	7.54	2.23	9.55
8,348.00	50.11	92.71	6,378.30	3,311.12	3,653.93	1,465.35	7.81	1.32	10.09
8,396.00	51.47	97.46	6,408.65	3,307.81	3,690.96	1,498.92	8.17	2.83	9.90
8,443.00	54.64	100.62	6,436.90	3,301.89	3,728.04	1,533.87	8.62	6.74	6.72
8,491.00	56.84	104.58	6,463.93	3,293.22	3,766.73	1,571.61	8.21	4.58	8.25
8,538.00	58.29	108.27	6,489.14	3,282.00	3,804.77	1,610.07	7.31	3.09	7.85
8,583.00	59.78	110.90	6,512.30	3,269.06	3,841.12	1,647.95	6.01	3.31	5.84
8,630.00	61.45	116.27	6,535.37	3,252.67	3,878.62	1,688.58	10.57	3.55	11.43
8,677.00	63.38	119.96	6,557.14	3,233.03	3,915.35	1,730.19	8.08	4.11	7.85
8,736.00	67.38	125.93	6,581.73	3,203.85	3,960.30	1,783.73	11.42	6.78	10.12
8,773.00	70.68	130.42	6,594.98	3,182.49	3,987.43	1,817.96	14.42	8.92	12.14
8,820.00	75.87	136.22	6,608.51	3,151.62	4,020.13	1,861.81	16.17	11.04	12.34
8,850.00	78.86	140.61	6,615.08	3,129.72	4,039.55	1,889.65	17.41	9.97	14.63
8,867.00	80.40	143.78	6,618.14	3,116.51	4,049.80	1,905.19	20.46	9.06	18.65
8,897.00	83.60	146.76	6,622.31	3,092.10	4,066.72	1,932.17	14.51	10.67	9.93
8,962.00	85.67	149.31	6,628.39	3,037.21	4,100.97	1,989.56	5.04	3.18	3.92
9,009.00	88.22	149.75	6,630.90	2,996.76	4,124.77	2,030.60	5.51	5.43	0.94
9,056.00	87.69	149.93	6,632.57	2,956.15	4,148.37	2,071.56	1.19	-1.13	0.38
9,151.00	89.63	149.75	6,634.79	2,874.03	4,196.08	2,154.37	2.05	2.04	-0.19
9,246.00	89.27	147.82	6,635.71	2,792.79	4,245.31	2,238.04	2.07	-0.38	-2.03
9,341.00	90.55	147.64	6,635.86	2,712.47	4,296.03	2,322.54	1.36	1.35	-0.19
9,436.00	89.98	150.28	6,635.42	2,631.08	4,345.01	2,406.07	2.84	-0.60	2.78
9,531.00	90.51	151.25	6,635.01	2,548.18	4,391.41	2,488.15	1.16	0.56	1.02
9,626.00	89.89	152.48	6,634.68	2,464.41	4,436.20	2,569.29	1.45	0.65	1.29
9,720.00	88.92	153.09	6,635.65	2,380.82	4,479.19	2,648.77	1.22	-1.03	0.65
9,816.00	89.05	151.95	6,637.35	2,295.67	4,523.48	2,730.18	1.20	0.74	-1.19

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Company: Tug Hill Operating LLC
Project: Marshall County, West Virginia.
Site: Old Crow Pad
Well: Old Crow S-16 HM (slot J)
Wellbore: Original Hole
Design: Surveys Original Hole

Local Co-ordinate Reference: Well Old Crow S-16 HM (slot J)
TVD Reference: RKB=1265+26 @ 1291.00usft (Nabors B28)
MD Reference: RKB=1265+26 @ 1291.00usft (Nabors B28)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: DB_Aug1919_v14

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
9,910.00	89.67	149.84	6,638.40	2,213.55	4,569.20	2,811.28	2.34	0.66	-2.24
10,005.00	91.52	146.85	6,637.42	2,132.70	4,619.04	2,895.28	3.70	1.95	-3.15
10,100.00	91.60	148.96	6,634.83	2,052.25	4,669.50	2,979.61	2.22	0.08	2.22
10,195.00	91.03	149.14	6,632.65	1,970.80	4,718.34	3,063.06	0.63	-0.60	0.19
10,290.00	90.81	149.75	6,631.13	1,889.01	4,766.63	3,146.20	0.68	-0.23	0.64
10,384.00	89.93	149.58	6,630.52	1,807.88	4,814.10	3,228.31	0.95	-0.94	-0.18
10,479.00	88.92	149.93	6,631.47	1,725.81	4,861.95	3,311.21	1.13	-1.06	0.37
10,574.00	89.27	151.33	6,632.97	1,643.04	4,908.54	3,393.39	1.52	0.37	1.47
10,668.00	90.15	150.37	6,633.45	1,560.95	4,954.32	3,474.53	1.39	0.94	-1.02
10,762.00	89.93	149.66	6,633.38	1,479.53	5,001.30	3,556.35	0.79	-0.23	-0.76
10,857.00	89.27	148.79	6,634.05	1,397.91	5,049.91	3,639.68	1.15	-0.69	-0.92
10,952.00	90.33	148.87	6,634.38	1,316.62	5,099.07	3,723.32	1.12	1.12	0.08
11,046.00	89.85	148.35	6,634.23	1,236.38	5,148.04	3,806.26	0.75	-0.51	-0.55
11,141.00	89.36	149.31	6,634.89	1,155.10	5,197.20	3,889.90	1.13	-0.52	1.01
11,235.00	89.63	150.37	6,635.71	1,073.83	5,244.43	3,971.86	1.16	0.29	1.13
11,330.00	88.75	149.58	6,637.06	991.59	5,291.96	4,054.58	1.24	-0.93	-0.83
11,423.00	89.19	151.16	6,638.73	910.76	5,337.93	4,135.24	1.76	0.47	1.70
11,518.00	90.11	151.77	6,639.31	827.31	5,383.31	4,216.72	1.16	0.97	0.64
11,613.00	89.85	151.77	6,639.34	743.61	5,428.24	4,297.95	0.27	-0.27	0.00
11,707.00	89.05	150.37	6,640.24	661.34	5,473.71	4,378.90	1.72	-0.85	-1.49
11,801.00	89.32	152.21	6,641.58	578.91	5,518.86	4,459.66	1.98	0.29	1.96
11,895.00	89.63	151.77	6,642.44	495.93	5,563.00	4,539.84	0.57	0.33	-0.47
11,989.00	89.45	152.65	6,643.20	412.77	5,606.83	4,619.83	0.96	-0.19	0.94
12,084.00	90.11	151.60	6,643.56	328.80	5,651.24	4,700.75	1.31	0.69	-1.11
12,178.00	89.76	150.02	6,643.67	246.74	5,697.09	4,781.92	1.72	-0.37	-1.68
12,273.00	89.67	151.60	6,644.14	163.80	5,743.42	4,863.96	1.67	-0.09	1.66
12,367.00	89.01	152.74	6,645.22	80.68	5,787.30	4,943.98	1.40	-0.70	1.21
12,462.00	90.77	153.09	6,645.41	-3.89	5,830.55	5,024.20	1.89	1.85	0.37
12,556.00	90.24	149.49	6,644.58	-86.32	5,875.69	5,104.96	3.87	-0.56	-3.83
12,651.00	90.15	150.46	6,644.25	-168.57	5,923.23	5,187.68	1.03	-0.09	1.02
12,745.00	89.98	147.99	6,644.15	-249.33	5,971.32	5,270.13	2.63	-0.18	-2.63
12,839.00	90.68	149.23	6,643.61	-329.57	6,020.28	5,353.07	1.51	0.74	1.32
12,933.00	90.20	149.14	6,642.88	-410.29	6,068.43	5,435.55	0.52	-0.51	-0.10
13,028.00	89.19	148.79	6,643.39	-491.69	6,117.41	5,519.09	1.13	-1.06	-0.37
13,123.00	89.98	149.31	6,644.08	-573.16	6,166.27	5,602.56	1.00	0.83	0.55
13,217.00	89.36	150.90	6,644.62	-654.65	6,213.11	5,684.30	1.82	-0.66	1.69
13,311.00	89.93	150.81	6,645.20	-736.75	6,258.89	5,765.44	0.61	0.61	-0.10
13,406.00	89.14	150.63	6,645.97	-819.61	6,305.35	5,847.55	0.85	-0.83	-0.19
13,500.00	89.89	150.63	6,646.77	-901.52	6,351.45	5,928.87	0.80	0.80	0.00
13,595.00	91.78	154.06	6,645.38	-985.64	6,395.54	6,009.58	4.12	1.99	3.61
13,689.00	91.56	151.69	6,642.64	-1,069.26	6,438.37	6,088.95	2.53	0.23	-2.52
13,784.00	90.24	149.40	6,641.15	-1,151.97	6,485.08	6,171.19	2.78	-1.39	-2.41
13,879.00	89.76	148.08	6,641.15	-1,233.17	6,534.37	6,254.91	1.48	0.51	-1.39

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Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Old Crow S-16 HM (slot J)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=1265+26 @ 1291.00usft (Nabors B28)
Site:	Old Crow Pad	MD Reference:	RKB=1265+26 @ 1291.00usft (Nabors B28)
Well:	Old Crow S-16 HM (slot J)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
13,974.00	88.92	147.91	6,642.25	-1,313.73	6,584.72	6,339.19	0.90	-0.88	-0.18
14,068.00	90.15	148.35	6,643.01	-1,393.55	6,634.35	6,422.49	1.39	1.31	0.47
14,163.00	89.63	149.05	6,643.19	-1,474.72	6,683.70	6,506.24	0.92	-0.55	0.74
14,258.00	90.33	148.17	6,643.22	-1,555.82	6,733.18	6,590.06	1.18	0.74	-0.93
14,352.00	89.67	148.43	6,643.22	-1,635.79	6,782.58	6,673.23	0.75	-0.70	0.28
14,446.00	90.95	149.75	6,642.72	-1,716.44	6,830.86	6,755.79	1.96	1.36	1.40
14,541.00	90.42	149.05	6,641.58	-1,798.20	6,879.22	6,838.97	0.92	-0.56	-0.74
14,635.00	89.63	148.79	6,641.54	-1,878.71	6,927.74	6,921.67	0.88	-0.84	-0.28
14,729.00	90.64	147.99	6,641.32	-1,958.76	6,977.01	7,004.77	1.37	1.07	-0.85
14,823.00	90.51	146.76	6,640.37	-2,037.92	7,027.68	7,088.63	1.32	-0.14	-1.31
14,917.00	89.19	149.14	6,640.62	-2,117.59	7,077.56	7,172.06	2.90	-1.40	2.53
15,012.00	88.62	149.58	6,642.44	-2,199.31	7,125.97	7,255.27	0.76	-0.60	0.46
15,105.00	89.76	150.46	6,643.75	-2,279.86	7,172.43	7,336.21	1.55	1.23	0.95
15,199.00	89.76	150.19	6,644.14	-2,361.53	7,218.97	7,417.79	0.29	0.00	-0.29
15,292.00	89.19	150.28	6,645.00	-2,442.25	7,265.14	7,498.56	0.62	-0.61	0.10
15,386.00	88.22	150.63	6,647.12	-2,524.01	7,311.48	7,580.01	1.10	-1.03	0.37
15,481.00	89.54	151.51	6,648.98	-2,607.13	7,357.42	7,661.81	1.67	1.39	0.93
15,575.00	89.58	150.02	6,649.70	-2,689.16	7,403.33	7,743.02	1.59	0.04	-1.59
15,669.00	90.11	147.99	6,649.95	-2,769.73	7,451.73	7,825.64	2.23	0.56	-2.16
15,763.00	89.19	148.79	6,650.53	-2,849.78	7,501.00	7,908.74	1.30	-0.98	0.85
15,857.00	91.82	147.47	6,649.70	-2,929.60	7,550.62	7,992.03	3.13	2.80	-1.40
15,952.00	90.90	149.05	6,647.45	-3,010.36	7,600.58	8,076.10	1.92	-0.97	1.66
16,046.00	90.90	151.69	6,645.97	-3,092.05	7,647.05	8,157.62	2.81	0.00	2.81
16,141.00	90.77	151.77	6,644.58	-3,175.71	7,692.04	8,238.87	0.16	-0.14	0.08
16,236.00	90.33	153.71	6,643.67	-3,260.16	7,735.55	8,319.24	2.09	-0.46	2.04
16,331.00	89.63	155.03	6,643.71	-3,345.81	7,776.64	8,398.14	1.57	-0.74	1.39
16,426.00	90.46	151.69	6,643.63	-3,430.71	7,819.23	8,477.96	3.62	0.87	-3.52
16,520.00	90.29	153.09	6,643.02	-3,514.00	7,862.79	8,557.79	1.50	-0.18	1.49
16,615.00	91.03	152.39	6,641.92	-3,598.44	7,906.30	8,638.17	1.07	0.78	-0.74
16,710.00	91.16	150.54	6,640.11	-3,681.88	7,951.67	8,719.63	1.95	0.14	-1.95
16,805.00	89.67	150.98	6,639.42	-3,764.77	7,998.07	8,801.71	1.64	-1.57	0.46
16,900.00	89.63	151.60	6,640.00	-3,848.09	8,043.71	8,883.34	0.65	-0.04	0.65
16,994.00	89.27	150.19	6,640.90	-3,930.22	8,089.43	8,964.44	1.55	-0.38	-1.50
17,089.00	89.98	150.02	6,641.52	-4,012.57	8,136.77	9,047.06	0.77	0.75	-0.18
17,184.00	89.45	150.19	6,641.99	-4,094.93	8,184.12	9,129.68	0.59	-0.56	0.18
17,279.00	88.79	150.72	6,643.45	-4,177.57	8,230.96	9,212.01	0.89	-0.69	0.56
17,373.00	90.07	150.63	6,644.39	-4,259.52	8,277.00	9,293.29	1.37	1.36	-0.10
17,468.00	89.80	150.81	6,644.50	-4,342.38	8,323.46	9,375.40	0.34	-0.28	0.19
17,563.00	89.85	150.19	6,644.79	-4,425.06	8,370.24	9,457.70	0.65	0.05	-0.65
17,658.00	89.01	149.58	6,645.73	-4,507.23	8,417.90	9,540.50	1.09	-0.88	-0.64
17,752.00	89.67	150.28	6,646.81	-4,588.58	8,465.00	9,622.39	1.02		0.74
17,847.00	90.59	149.75	6,646.80	-4,670.86	8,512.47	9,705.08	1.12		-0.56
17,942.00	91.34	151.33	6,645.00	-4,753.56	8,559.19	9,787.33	1.84	0.79	1.66
18,037.00	91.47	151.16	6,642.67	-4,836.82	8,604.87	9,868.98	0.23		-0.18

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Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Old Crow S-16 HM (slot J)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=1265+26 @ 1291.00usft (Nabors B28)
Site:	Old Crow Pad	MD Reference:	RKB=1265+26 @ 1291.00usft (Nabors B28)
Well:	Old Crow S-16 HM (slot J)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
18,132.00	92.75	151.16	6,639.17	-4,919.98	8,650.67	9,950.67	1.35	1.35	0.00
18,227.00	93.01	150.72	6,634.40	-5,002.92	8,696.75	10,032.49	0.54	0.27	-0.46
18,322.00	91.74	149.49	6,630.46	-5,085.20	8,744.06	10,115.04	1.86	-1.34	-1.29
18,405.00	91.30	149.05	6,628.26	-5,156.52	8,786.46	10,187.79	0.75	-0.53	-0.53
18,465.00	91.30	149.05	6,626.90	-5,207.97	8,817.31	10,240.50	0.00	0.00	0.00

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
170.00	170.00	0.09	0.10	MWD surveys
18,405.00	6,628.26	-5,156.52	8,786.46	Survey @ 18405.00 MD 6628.26 TVD

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Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Old Crow S-16 HM (slot J)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=1265+26 @ 1291.00usft (Nabors B28)
Site:	Old Crow Pad	MD Reference:	RKB=1265+26 @ 1291.00usft (Nabors B28)
Well:	Old Crow S-16 HM (slot J)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

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

Site	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:	0.152 °

Well	Old Crow S-16 HM (slot J)					
Well Position	+N/-S	0.00 usft	Northing:	14,446,109.36 usft	Latitude:	39.77834399
	+E/-W	0.00 usft	Easting:	1,707,052.07 usft	Longitude:	-80.76282491
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)
	IGRF2015	3/31/2020	-8.736	66.724	51,853.72238806

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	120.53	

Survey Program	Date	4/11/2020			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
170.00	950.00	MWD surf (Original Hole)	MWD	MWD - Standard	
967.00	3,284.00	MWD int (Original Hole)	MWD	MWD - Standard	
3,345.00	6,657.00	MWD (Original Hole)	MWD	MWD - Standard	
6,696.00	18,405.00	MWD Lat (Original Hole)	MWD	MWD - Standard	
18,465.00	18,465.00	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	14,446,109.36	1,707,052.07	39.77834399	-80.76282491	
170.00	0.09	48.36	170.00	0.09	0.10	14,446,109.45	1,707,052.17	39.77834423	-80.76282455	
200.00	0.26	81.14	200.00	0.11	0.18	14,446,109.47	1,707,052.26	39.77834431	-80.76282425	
231.00	0.18	182.48	231.00	0.08	0.25	14,446,109.43	1,707,052.33	39.77834420	-80.76282401	
261.00	0.26	66.81	261.00	0.06	0.31	14,446,109.41	1,707,052.39	39.77834425	-80.76282380	
291.00	0.04	81.14	291.00	0.09	0.39	14,446,109.44	1,707,052.46	39.77834422	-80.76282354	
321.00	0.13	195.66	321.00	0.05	0.39	14,446,109.41	1,707,052.46	39.77834414	-80.76282353	
353.00	0.13	111.37	353.00	0.01	0.41	14,446,109.36	1,707,052.48	39.77834400	-80.76282345	

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West Virginia Department of Environmental Protection
 08/27/2021



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Old Crow S-16 HM (slot J)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=1265+26 @ 1291.00usft (Nabors B28)
Site:	Old Crow Pad	MD Reference:	RKB=1265+26 @ 1291.00usft (Nabors B28)
Well:	Old Crow S-16 HM (slot J)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
383.00	0.40	174.74	383.00	-0.11	0.45	14,446,109.25	1,707,052.52	39.77834368	-80.76282330	
415.00	0.57	116.65	415.00	-0.29	0.60	14,446,109.06	1,707,052.68	39.77834318	-80.76282276	
447.00	0.62	59.26	447.00	-0.28	0.90	14,446,109.08	1,707,052.97	39.77834323	-80.76282173	
478.00	1.14	60.93	477.99	-0.04	1.31	14,446,109.32	1,707,053.38	39.77834387	-80.76282025	
508.00	1.54	65.50	507.98	0.27	1.94	14,446,109.63	1,707,054.01	39.77834472	-80.76281801	
539.00	2.11	48.97	538.97	0.82	2.75	14,446,110.18	1,707,054.82	39.77834622	-80.76281513	
571.00	2.86	44.31	570.94	1.78	3.75	14,446,111.13	1,707,055.82	39.77834884	-80.76281155	
602.00	3.69	41.06	601.89	3.08	4.94	14,446,112.44	1,707,057.02	39.77835242	-80.76280728	
634.00	4.79	37.63	633.80	4.92	6.44	14,446,114.27	1,707,058.51	39.77835745	-80.76280196	
665.00	5.75	39.91	664.67	7.13	8.22	14,446,116.49	1,707,060.30	39.77836352	-80.76279558	
697.00	6.86	37.63	696.47	9.88	10.42	14,446,119.23	1,707,062.49	39.77837104	-80.76278774	
728.00	7.60	40.71	727.23	12.90	12.89	14,446,122.25	1,707,064.96	39.77837932	-80.76277893	
760.00	8.88	38.69	758.90	16.43	15.81	14,446,125.79	1,707,067.88	39.77838899	-80.76276848	
791.00	9.80	42.29	789.49	20.25	19.08	14,446,129.61	1,707,071.15	39.77839946	-80.76275681	
823.00	10.72	41.24	820.97	24.50	22.88	14,446,133.86	1,707,074.95	39.77841111	-80.76274326	
855.00	11.60	44.05	852.37	29.05	27.07	14,446,138.41	1,707,079.15	39.77842358	-80.76272827	
886.00	12.35	45.28	882.69	33.62	31.60	14,446,142.98	1,707,083.67	39.77843610	-80.76271213	
918.00	13.14	45.81	913.91	38.57	36.64	14,446,147.93	1,707,088.71	39.77844964	-80.76269415	
950.00	13.71	45.72	945.03	43.75	41.96	14,446,153.11	1,707,094.03	39.77846384	-80.76267515	
967.00	14.02	44.14	961.54	46.63	44.84	14,446,155.99	1,707,096.91	39.77847174	-80.76266489	
1,076.00	15.16	41.50	1,067.02	66.79	63.48	14,446,176.14	1,707,115.55	39.77852694	-80.76259835	
1,169.00	16.66	40.62	1,156.45	86.01	80.21	14,446,195.37	1,707,132.29	39.77857962	-80.76253860	
1,264.00	18.28	39.57	1,247.07	107.84	98.57	14,446,217.19	1,707,150.64	39.77863942	-80.76247305	
1,359.00	20.12	43.34	1,336.79	131.21	119.28	14,446,240.56	1,707,171.35	39.77870345	-80.76239912	
1,455.00	22.72	43.87	1,426.15	156.58	143.46	14,446,265.94	1,707,195.54	39.77877297	-80.76231281	
1,550.00	25.44	46.42	1,512.87	183.88	170.96	14,446,293.24	1,707,223.04	39.77884774	-80.76221466	
1,646.00	28.56	50.91	1,598.41	212.58	203.72	14,446,321.93	1,707,255.80	39.77892630	-80.76209779	
1,740.00	33.13	50.82	1,679.09	242.99	241.10	14,446,352.35	1,707,293.17	39.77900955	-80.76196449	
1,835.00	38.01	48.97	1,756.34	278.61	283.31	14,446,387.97	1,707,335.39	39.77910708	-80.76181389	
1,930.00	41.40	47.39	1,829.42	319.09	328.51	14,446,428.45	1,707,380.58	39.77921792	-80.76165263	
2,025.00	45.26	46.25	1,898.52	363.71	376.02	14,446,473.07	1,707,428.09	39.77934010	-80.76148310	
2,120.00	45.48	46.77	1,965.26	410.24	425.07	14,446,519.60	1,707,477.14	39.77946752	-80.76130808	
2,215.00	46.63	47.73	2,031.18	456.66	475.30	14,446,566.02	1,707,527.37	39.77959464	-80.76112886	
2,310.00	47.99	46.69	2,095.60	504.10	526.54	14,446,613.46	1,707,578.61	39.77972455	-80.76094604	
2,404.00	49.17	46.16	2,157.78	552.69	577.60	14,446,662.05	1,707,629.67	39.77985761	-80.76076383	
2,499.00	50.05	45.81	2,219.34	602.97	629.63	14,446,712.33	1,707,681.71	39.77999530	-80.76057814	
2,594.00	48.82	46.34	2,281.12	653.03	681.61	14,446,762.39	1,707,733.68	39.78013242	-80.76039266	
2,689.00	43.55	44.14	2,346.87	701.24	730.30	14,446,810.60	1,707,782.38	39.78026444	-80.76021889	
2,783.00	39.95	42.38	2,416.99	746.79	773.21	14,446,856.14	1,707,825.28	39.78038921	-80.76006572	
2,878.00	38.67	42.73	2,490.49	791.12	813.91	14,446,900.48	1,707,865.98	39.78051067	-80.75992043	
2,957.00	36.56	40.89	2,553.07	827.04	846.07	14,446,936.40	1,707,898.14	39.78060908	-80.75980564	
3,052.00	38.54	45.63	2,628.40	869.14	885.76	14,446,978.50	1,707,937.83	39.78072440	-80.75966397	
3,147.00	45.53	50.82	2,698.94	911.32	933.26	14,447,020.67	1,707,985.33	39.78083988	-80.75949448	
3,242.00	47.37	49.41	2,764.39	955.47	986.08	14,447,064.83	1,708,038.15	39.78096076	-80.75930605	
3,284.00	47.68	48.09	2,792.75	975.90	1,009.37	14,447,085.26	1,708,061.44	39.78101668	-80.75922296	
3,345.00	48.21	47.74	2,833.61	1,006.26	1,042.98	14,447,115.61	1,708,095.06	39.78109980	-80.75910302	
3,442.00	46.36	43.17	2,899.43	1,056.19	1,093.78	14,447,165.55	1,708,145.85	39.78123656	-80.75892174	
3,537.00	46.55	45.28	2,964.88	1,105.53	1,141.80	14,447,214.89	1,708,193.87	39.78137170	-80.75875033	
3,632.00	46.54	48.18	3,030.23	1,152.79	1,192.00	14,447,262.15	1,708,244.08	39.78150112	-80.75857119	
3,726.00	46.10	47.83	3,095.15	1,198.27	1,242.53	14,447,307.63	1,708,294.60	39.78162565	-80.75839091	
3,820.00	47.29	48.80	3,159.62	1,243.76	1,293.62	14,447,353.12	1,708,345.69	39.78175019	-80.75820863	
3,914.00	46.63	48.97	3,223.78	1,288.93	1,345.38	14,447,398.29	1,708,397.45	39.78187382	-80.75802396	
4,008.00	45.88	45.98	3,288.78	1,334.82	1,395.42	14,447,444.17	1,708,447.49	39.78199950	-80.75784540	
4,103.00	44.82	46.34	3,355.54	1,381.63	1,444.16	14,447,490.99	1,708,496.24	39.78212770	-80.75767144	
4,197.00	44.21	46.86	3,422.57	1,426.91	1,492.05	14,447,536.27	1,708,544.12	39.78225170	-80.75750057	

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Survey Report - Geographic



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Project:	Marshall County, West Virginia.	TVD Reference:	RKB=1265+26 @ 1291.00usft (Nabors B28)
Site:	Old Crow Pad	MD Reference:	RKB=1265+26 @ 1291.00usft (Nabors B28)
Well:	Old Crow S-16 HM (slot J)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
4,292.00	44.60	47.04	3,490.44	1,472.29	1,540.62	14,447,581.64	1,708,592.69	39.78237596	-80.75732723
4,386.00	45.31	44.67	3,556.96	1,518.54	1,588.27	14,447,627.90	1,708,640.34	39.78250264	-80.75715719
4,480.00	45.53	43.52	3,622.94	1,566.63	1,634.85	14,447,675.99	1,708,686.93	39.78263434	-80.75699090
4,575.00	43.95	44.49	3,690.42	1,614.73	1,681.30	14,447,724.09	1,708,733.37	39.78276609	-80.75682510
4,670.00	44.03	44.23	3,758.77	1,661.90	1,727.43	14,447,771.26	1,708,779.51	39.78289530	-80.75666044
4,764.00	41.66	45.28	3,827.69	1,707.30	1,772.42	14,447,816.66	1,708,824.50	39.78301964	-80.75649986
4,859.00	42.36	44.67	3,898.28	1,752.28	1,817.36	14,447,861.63	1,708,869.43	39.78314282	-80.75633947
4,953.00	42.85	46.51	3,967.47	1,796.80	1,862.82	14,447,906.16	1,708,914.89	39.78326475	-80.75617724
5,048.00	43.24	50.47	4,036.91	1,839.75	1,911.36	14,447,949.11	1,709,963.43	39.78338235	-80.75600403
5,142.00	45.13	49.59	4,104.31	1,881.84	1,961.56	14,447,991.20	1,709,013.63	39.78349756	-80.75582493
5,237.00	45.83	48.88	4,170.92	1,926.07	2,012.86	14,448,035.43	1,709,064.93	39.78361864	-80.75564190
5,332.00	45.09	46.51	4,237.56	1,971.63	2,062.94	14,448,080.99	1,709,115.01	39.78374339	-80.75546321
5,426.00	46.01	46.16	4,303.38	2,017.96	2,111.48	14,448,127.32	1,709,163.55	39.78387027	-80.75528998
5,521.00	46.32	45.46	4,369.18	2,065.73	2,160.61	14,448,175.09	1,709,212.68	39.78400108	-80.75511461
5,615.00	45.13	45.19	4,434.80	2,113.05	2,208.47	14,448,222.41	1,709,260.54	39.78413067	-80.75494379
5,710.00	44.43	45.28	4,502.23	2,160.17	2,255.98	14,448,269.53	1,709,308.06	39.78425972	-80.75477422
5,804.00	44.69	45.19	4,569.21	2,206.62	2,302.81	14,448,315.97	1,709,354.88	39.78438692	-80.75460707
5,899.00	46.10	45.10	4,635.92	2,254.32	2,350.76	14,448,363.68	1,709,402.83	39.78451757	-80.75443594
5,993.00	45.75	47.13	4,701.31	2,301.13	2,399.42	14,448,410.49	1,709,451.49	39.78464576	-80.75426226
6,088.00	46.36	45.98	4,767.24	2,348.17	2,449.08	14,448,457.53	1,709,501.15	39.78477456	-80.75408504
6,183.00	44.21	42.56	4,834.08	2,396.47	2,496.21	14,448,505.82	1,709,548.29	39.78490684	-80.75391679
6,278.00	42.36	42.20	4,903.23	2,444.58	2,540.12	14,448,553.93	1,709,592.19	39.78503864	-80.75376004
6,372.00	40.39	40.71	4,973.77	2,491.13	2,581.26	14,448,600.49	1,709,633.33	39.78516617	-80.75361314
6,470.00	39.90	42.12	5,048.68	2,538.51	2,623.05	14,448,647.87	1,709,675.12	39.78529598	-80.75346391
6,562.00	44.34	47.74	5,116.93	2,582.06	2,666.67	14,448,691.41	1,709,718.74	39.78541523	-80.75330821
6,657.00	42.71	45.98	5,185.81	2,626.78	2,714.41	14,448,736.13	1,709,766.49	39.78553768	-80.75313782
6,696.00	40.62	42.88	5,214.95	2,645.27	2,732.57	14,448,754.63	1,709,784.64	39.78558835	-80.75307302
6,790.00	39.91	42.35	5,286.68	2,689.98	2,773.70	14,448,799.34	1,709,825.78	39.78571082	-80.75292615
6,884.00	43.12	45.07	5,357.06	2,734.97	2,816.78	14,448,844.33	1,709,868.85	39.78583404	-80.75277238
6,979.00	43.43	44.64	5,426.23	2,781.14	2,862.71	14,448,890.49	1,709,914.78	39.78596048	-80.75260843
7,074.00	42.95	48.50	5,495.50	2,825.83	2,909.90	14,448,935.18	1,709,961.97	39.78608285	-80.75244000
7,169.00	42.20	47.01	5,565.46	2,869.03	2,957.48	14,448,978.39	1,710,009.55	39.78620113	-80.75227020
7,263.00	43.03	47.71	5,634.64	2,912.14	3,004.30	14,449,021.50	1,710,056.37	39.78631917	-80.75210312
7,358.00	44.13	45.78	5,703.46	2,957.02	3,051.98	14,449,066.38	1,710,104.06	39.78644206	-80.75193294
7,453.00	45.10	45.16	5,771.08	3,003.81	3,099.55	14,449,113.17	1,710,151.62	39.78657020	-80.75176317
7,548.00	46.07	46.31	5,837.57	3,051.17	3,148.14	14,449,160.52	1,710,200.21	39.78669988	-80.75158971
7,642.00	45.80	46.66	5,902.94	3,097.67	3,197.12	14,449,207.03	1,710,249.20	39.78682723	-80.75141489
7,737.00	46.46	48.50	5,968.78	3,143.86	3,247.68	14,449,253.22	1,710,299.75	39.78695369	-80.75123447
7,831.00	48.00	48.85	6,032.61	3,189.43	3,299.50	14,449,298.78	1,710,351.57	39.78707842	-80.75104955
7,890.00	48.13	49.91	6,072.04	3,218.00	3,332.82	14,449,327.36	1,710,384.89	39.78715664	-80.75093068
7,925.00	47.65	55.01	6,095.52	3,233.81	3,353.39	14,449,343.17	1,710,405.46	39.78719991	-80.75085729
7,972.00	47.56	62.13	6,127.23	3,251.89	3,382.97	14,449,361.25	1,710,435.04	39.78724934	-80.75075181
8,018.00	47.34	68.54	6,158.36	3,266.02	3,413.73	14,449,375.38	1,710,465.81	39.78728791	-80.75064216
8,065.00	47.69	72.50	6,190.11	3,277.57	3,446.40	14,449,386.93	1,710,498.47	39.78731938	-80.75052577
8,112.00	47.52	75.40	6,221.80	3,287.17	3,479.75	14,449,396.53	1,710,531.82	39.78734548	-80.75040696
8,159.00	47.91	76.63	6,253.42	3,295.57	3,513.49	14,449,404.93	1,710,565.56	39.78736829	-80.75028677
8,207.00	47.69	78.47	6,285.67	3,303.24	3,548.21	14,449,412.60	1,710,600.28	39.78738908	-80.75016310
8,254.00	48.44	83.48	6,317.09	3,308.71	3,582.72	14,449,418.07	1,710,634.79	39.78740384	-80.75004020
8,301.00	49.49	87.97	6,347.95	3,311.34	3,618.05	14,449,420.70	1,710,670.13	39.78741080	-80.74991438
8,348.00	50.11	92.71	6,378.30	3,311.12	3,653.93	14,449,420.48	1,710,706.01	39.78740999	-80.74978667
8,396.00	51.47	97.46	6,408.65	3,307.81	3,690.96	14,449,417.17	1,710,743.03	39.78740005	-80.74965490
8,443.00	54.64	100.62	6,436.90	3,301.89	3,728.04	14,449,411.25	1,710,780.11	39.78738400	-80.74952297
8,491.00	56.84	104.58	6,463.93	3,293.22	3,766.73	14,449,402.58	1,710,818.81	39.78735988	-80.74938530
8,538.00	58.29	108.27	6,489.14	3,282.00	3,804.77	14,449,391.36	1,710,856.84	39.78732878	-80.74925002
8,583.00	59.78	110.90	6,512.30	3,269.06	3,841.12	14,449,378.42	1,710,893.19	39.78729297	-80.74912076

Office of Oil and Gas
 Environmental Protection
 WV Department of Environmental Protection
 IMPASS 5000.14 Build 85
 08/27/2021



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Old Crow S-16 HM (slot J)
Project:	Marshall County, West Virginia.	TVD Reference:	RKB=1265+26 @ 1291.00usft (Nabors B28)
Site:	Old Crow Pad	MD Reference:	RKB=1265+26 @ 1291.00usft (Nabors B28)
Well:	Old Crow S-16 HM (slot J)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
8,630.00	61.45	116.27	6,535.37	3,252.67	3,878.62	14,449,362.03	1,710,930.69	39.78724767	-80.74898742
8,677.00	63.38	119.96	6,557.14	3,233.03	3,915.35	14,449,342.39	1,710,967.42	39.78719346	-80.74885689
8,736.00	67.38	125.93	6,581.73	3,203.85	3,960.30	14,449,313.21	1,711,012.37	39.78711297	-80.74869717
8,773.00	70.68	130.42	6,594.98	3,182.49	3,987.43	14,449,291.85	1,711,039.51	39.78705411	-80.74860078
8,820.00	75.87	136.22	6,608.51	3,151.62	4,020.13	14,449,260.97	1,711,072.21	39.78696906	-80.74848469
8,850.00	78.86	140.61	6,615.08	3,129.72	4,039.55	14,449,239.08	1,711,091.62	39.78690879	-80.74841579
8,867.00	80.40	143.78	6,618.14	3,116.51	4,049.80	14,449,225.87	1,711,101.87	39.78687243	-80.74837944
8,897.00	83.60	146.76	6,622.31	3,092.10	4,066.72	14,449,201.46	1,711,118.79	39.78680526	-80.74831946
8,922.00	85.67	149.31	6,628.39	3,037.21	4,100.97	14,449,146.56	1,711,153.04	39.78665423	-80.74819808
9,009.00	88.22	149.75	6,630.90	2,996.76	4,124.77	14,449,106.12	1,711,176.84	39.78654297	-80.74811377
9,056.00	87.69	149.93	6,632.57	2,956.15	4,148.37	14,449,065.50	1,711,200.44	39.78643126	-80.74803018
9,151.00	89.63	149.75	6,634.79	2,874.03	4,196.08	14,448,983.39	1,711,248.15	39.78620538	-80.74786115
9,246.00	89.27	147.82	6,635.71	2,792.79	4,245.31	14,448,902.15	1,711,297.38	39.78598190	-80.74768673
9,341.00	90.55	147.64	6,635.86	2,712.47	4,296.03	14,448,821.83	1,711,348.10	39.78576091	-80.74750699
9,436.00	89.98	150.28	6,635.42	2,631.08	4,345.01	14,448,740.44	1,711,397.08	39.78553702	-80.74733345
9,531.00	90.51	151.25	6,635.01	2,548.18	4,391.41	14,448,657.54	1,711,443.48	39.78530900	-80.74716913
9,626.00	89.89	152.48	6,634.68	2,464.41	4,436.20	14,448,573.77	1,711,488.27	39.78507859	-80.74701052
9,720.00	88.92	153.09	6,635.65	2,380.82	4,479.19	14,448,490.18	1,711,531.26	39.78484870	-80.74685834
9,816.00	89.05	151.95	6,637.35	2,295.67	4,523.48	14,448,405.03	1,711,575.55	39.78461451	-80.74670155
9,910.00	89.67	149.84	6,638.40	2,213.55	4,569.20	14,448,322.91	1,711,621.27	39.78438863	-80.74653964
10,005.00	91.52	146.85	6,637.42	2,132.70	4,619.04	14,448,242.06	1,711,671.11	39.78416620	-80.74636303
10,100.00	91.60	148.96	6,634.83	2,052.25	4,669.50	14,448,161.61	1,711,721.57	39.78394488	-80.74618424
10,195.00	91.03	149.14	6,632.65	1,970.80	4,718.34	14,448,080.16	1,711,770.41	39.78372081	-80.74601120
10,290.00	90.81	149.75	6,631.13	1,889.01	4,766.63	14,447,998.36	1,711,818.70	39.78349580	-80.74584014
10,384.00	89.93	149.58	6,630.52	1,807.88	4,814.10	14,447,917.24	1,711,866.17	39.78327263	-80.74567198
10,479.00	88.92	149.93	6,631.47	1,725.81	4,861.95	14,447,835.17	1,711,914.02	39.78304689	-80.74550249
10,574.00	89.27	151.33	6,632.97	1,643.04	4,908.54	14,447,752.39	1,711,960.61	39.78281920	-80.74533751
10,668.00	90.15	150.37	6,633.45	1,560.95	4,954.32	14,447,670.30	1,712,006.39	39.78259339	-80.74517537
10,762.00	89.93	149.66	6,633.38	1,479.53	5,001.30	14,447,588.89	1,712,053.37	39.78236943	-80.74500897
10,857.00	89.27	148.79	6,634.05	1,397.91	5,049.91	14,447,507.27	1,712,101.98	39.78214490	-80.74483679
10,952.00	90.33	148.87	6,634.38	1,316.62	5,099.07	14,447,425.98	1,712,151.15	39.78192129	-80.74466260
11,046.00	89.85	148.35	6,634.23	1,236.38	5,148.04	14,447,345.74	1,712,200.11	39.78170054	-80.74448914
11,141.00	89.36	149.31	6,634.89	1,155.10	5,197.20	14,447,264.46	1,712,249.28	39.78147693	-80.74431496
11,235.00	89.63	150.37	6,635.71	1,073.83	5,244.43	14,447,183.19	1,712,296.50	39.78125337	-80.74414769
11,330.00	88.75	149.58	6,637.06	991.59	5,291.96	14,447,100.95	1,712,344.03	39.78102714	-80.74397935
11,423.00	89.19	151.16	6,638.73	910.76	5,337.93	14,447,020.12	1,712,390.00	39.78080482	-80.74381655
11,518.00	90.11	151.77	6,639.31	827.31	5,383.31	14,446,936.67	1,712,435.38	39.78057526	-80.74365587
11,613.00	89.85	151.77	6,639.34	743.61	5,428.24	14,446,852.97	1,712,480.32	39.78034505	-80.74349678
11,707.00	89.05	150.37	6,640.24	661.34	5,473.71	14,446,770.70	1,712,525.78	39.78011877	-80.74333579
11,801.00	89.32	152.21	6,641.58	578.91	5,518.86	14,446,688.27	1,712,570.93	39.77989204	-80.74317593
11,895.00	89.63	151.77	6,642.44	495.93	5,563.00	14,446,605.28	1,712,615.08	39.77966379	-80.74301965
11,989.00	89.45	152.65	6,643.20	412.77	5,606.83	14,446,522.13	1,712,658.90	39.77943508	-80.74286452
12,084.00	90.11	151.60	6,643.56	328.80	5,651.24	14,446,438.15	1,712,703.32	39.77920411	-80.74270729
12,178.00	89.76	150.02	6,643.67	246.74	5,697.09	14,446,356.09	1,712,749.16	39.77897839	-80.74254496
12,273.00	89.67	151.60	6,644.14	163.80	5,743.42	14,446,273.16	1,712,795.49	39.77875027	-80.74238091
12,367.00	89.01	152.74	6,645.22	80.68	5,787.30	14,446,190.04	1,712,839.37	39.77852165	-80.74222558
12,462.00	90.77	153.09	6,645.41	-3.89	5,830.55	14,446,105.46	1,712,882.62	39.77828904	-80.74207250
12,556.00	90.24	149.49	6,644.58	-86.32	5,875.69	14,446,023.04	1,712,927.77	39.77806231	-80.74191266
12,651.00	90.15	150.46	6,644.25	-168.57	5,923.23	14,445,940.79	1,712,975.30	39.77783605	-80.74174431
12,745.00	89.98	147.99	6,644.15	-249.33	5,971.32	14,445,860.03	1,713,023.40	39.77761389	-80.74157397
12,839.00	90.68	149.23	6,643.61	-329.57	6,020.28	14,445,779.79	1,713,072.35	39.77739175	-80.74140053
12,933.00	90.20	149.14	6,642.88	-410.29	6,068.43	14,445,699.06	1,713,120.51	39.77716967	-80.74122998
13,028.00	89.19	148.79	6,643.39	-491.69	6,117.41	14,445,617.67	1,713,169.48	39.77694713	-80.74105650
13,123.00	89.98	149.31	6,644.08	-573.16	6,166.27	14,445,536.20	1,713,218.34	39.77672491	-80.74088345
13,217.00	89.36	150.90	6,644.62	-654.65	6,213.11	14,445,454.71	1,713,265.19	39.77649885	-80.74071755

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Survey Report - Geographic



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Well:	Old Crow S-16 HM (slot J)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
13,311.00	89.93	150.81	6,645.20	-736.75	6,258.89	14,445,372.61	1,713,310.97	39.77627302	-80.74055546
13,406.00	89.14	150.63	6,645.97	-819.61	6,305.35	14,445,289.75	1,713,357.43	39.77604510	-80.74039096
13,500.00	89.89	150.63	6,646.77	-901.52	6,351.45	14,445,207.84	1,713,403.53	39.77581977	-80.74022773
13,595.00	91.78	154.06	6,645.38	-985.64	6,395.54	14,445,123.72	1,713,447.61	39.77558840	-80.74007171
13,689.00	91.56	151.69	6,642.64	-1,069.26	6,438.37	14,445,040.10	1,713,490.44	39.77535842	-80.73992011
13,784.00	90.24	149.40	6,641.15	-1,151.97	6,485.08	14,444,957.39	1,713,537.15	39.77513092	-80.73975474
13,879.00	89.76	148.08	6,641.15	-1,233.17	6,534.37	14,444,876.19	1,713,586.45	39.77490751	-80.73958013
13,974.00	88.92	147.91	6,642.25	-1,313.73	6,584.72	14,444,795.63	1,713,636.79	39.77468589	-80.73940178
14,068.00	90.15	148.35	6,643.01	-1,393.55	6,634.35	14,444,715.81	1,713,686.42	39.77446627	-80.73922597
14,163.00	89.63	149.05	6,643.19	-1,474.72	6,683.70	14,444,634.64	1,713,735.77	39.77424295	-80.73905116
14,258.00	90.33	148.17	6,643.22	-1,555.82	6,733.18	14,444,553.54	1,713,785.26	39.77401985	-80.73887590
14,352.00	89.67	148.43	6,643.22	-1,635.79	6,782.58	14,444,473.56	1,713,834.65	39.77379982	-80.73870093
14,446.00	90.95	149.75	6,642.72	-1,716.44	6,830.86	14,444,392.92	1,713,882.93	39.77357796	-80.73852992
14,541.00	90.42	149.05	6,641.58	-1,798.20	6,879.22	14,444,311.16	1,713,931.29	39.77335302	-80.73835868
14,635.00	89.63	148.79	6,641.54	-1,878.71	6,927.74	14,444,230.65	1,713,979.81	39.77313154	-80.73818681
14,729.00	90.64	147.99	6,641.32	-1,958.76	6,977.01	14,444,150.60	1,714,029.08	39.77291130	-80.73801230
14,823.00	90.51	146.76	6,640.37	-2,037.92	7,027.68	14,444,071.44	1,714,079.76	39.77269349	-80.73783278
14,917.00	89.19	149.14	6,640.62	-2,117.59	7,077.56	14,443,991.77	1,714,129.63	39.77247431	-80.73765610
15,012.00	88.62	149.58	6,642.44	-2,199.31	7,125.97	14,443,910.05	1,714,178.04	39.77224949	-80.73748467
15,105.00	89.76	150.46	6,643.75	-2,279.86	7,172.43	14,443,829.50	1,714,224.51	39.77202791	-80.73732014
15,199.00	89.76	150.19	6,644.14	-2,361.53	7,218.97	14,443,747.83	1,714,271.04	39.77180325	-80.73715537
15,292.00	89.19	150.28	6,645.00	-2,442.25	7,265.14	14,443,667.11	1,714,317.21	39.77158118	-80.73699191
15,386.00	88.22	150.63	6,647.12	-2,524.01	7,311.48	14,443,585.35	1,714,363.55	39.77135628	-80.73682785
15,481.00	89.54	151.51	6,648.98	-2,607.13	7,357.42	14,443,502.22	1,714,409.50	39.77112762	-80.73666520
15,575.00	89.58	150.02	6,649.70	-2,689.16	7,403.33	14,443,420.20	1,714,455.40	39.77090200	-80.73650269
15,669.00	90.11	147.99	6,649.95	-2,769.73	7,451.73	14,443,339.63	1,714,503.81	39.77068033	-80.73633127
15,763.00	89.19	148.79	6,650.53	-2,849.78	7,501.00	14,443,259.58	1,714,553.07	39.77046009	-80.73615677
15,857.00	91.82	147.47	6,649.70	-2,929.60	7,550.62	14,443,179.76	1,714,602.70	39.77024049	-80.73598101
15,952.00	90.90	149.05	6,647.45	-3,010.36	7,600.58	14,443,098.99	1,714,652.66	39.77001828	-80.73580406
16,046.00	90.90	151.69	6,645.97	-3,092.05	7,647.05	14,443,017.30	1,714,699.12	39.76979356	-80.73563956
16,141.00	90.77	151.77	6,644.58	-3,175.71	7,692.04	14,442,933.64	1,714,744.11	39.76956344	-80.73548033
16,236.00	90.33	153.71	6,643.67	-3,260.16	7,735.55	14,442,849.20	1,714,787.62	39.76933119	-80.73532638
16,331.00	89.63	155.03	6,643.71	-3,345.81	7,776.64	14,442,763.55	1,714,828.71	39.76909564	-80.73518104
16,426.00	90.46	151.69	6,643.63	-3,430.71	7,819.23	14,442,678.65	1,714,871.30	39.76886213	-80.73503037
16,520.00	90.29	153.09	6,643.02	-3,514.00	7,862.79	14,442,595.36	1,714,914.86	39.76863303	-80.73487621
16,615.00	91.03	152.39	6,641.92	-3,598.44	7,906.30	14,442,510.92	1,714,958.37	39.76840077	-80.73472227
16,710.00	91.16	150.54	6,640.11	-3,681.88	7,951.67	14,442,427.47	1,715,003.74	39.76817125	-80.73456168
16,805.00	89.67	150.98	6,639.42	-3,764.77	7,998.07	14,442,344.58	1,715,050.14	39.76794324	-80.73439743
16,900.00	89.63	151.60	6,640.00	-3,848.09	8,043.71	14,442,261.27	1,715,095.78	39.76771405	-80.73423590
16,994.00	89.27	150.19	6,640.90	-3,930.22	8,089.43	14,442,179.14	1,715,141.50	39.76748814	-80.73407407
17,089.00	89.98	150.02	6,641.52	-4,012.57	8,136.77	14,442,096.78	1,715,188.85	39.76726158	-80.73390644
17,184.00	89.45	150.19	6,641.99	-4,094.93	8,184.12	14,442,014.43	1,715,236.19	39.76703501	-80.73373882
17,279.00	88.79	150.72	6,643.45	-4,177.57	8,230.96	14,441,931.79	1,715,283.03	39.76680769	-80.73357301
17,373.00	90.07	150.63	6,644.39	-4,259.52	8,277.00	14,441,849.84	1,715,329.07	39.76658226	-80.73341005
17,468.00	89.80	150.81	6,644.50	-4,342.38	8,323.46	14,441,766.98	1,715,375.53	39.76635431	-80.73324559
17,563.00	89.85	150.19	6,644.79	-4,425.06	8,370.24	14,441,684.30	1,715,422.31	39.76612686	-80.73307999
17,658.00	89.01	149.58	6,645.73	-4,507.23	8,417.90	14,441,602.12	1,715,469.97	39.76590081	-80.73291125
17,752.00	89.67	150.28	6,646.81	-4,588.58	8,465.00	14,441,520.78	1,715,517.07	39.76567703	-80.73274452
17,847.00	90.59	149.75	6,646.60	-4,670.86	8,512.47	14,441,438.50	1,715,564.55	39.76545067	-80.73257644
17,942.00	91.34	151.33	6,645.00	-4,753.56	8,559.19	14,441,355.80	1,715,611.26	39.76522571	-80.73241108
18,037.00	91.47	151.16	6,642.67	-4,836.82	8,604.87	14,441,272.54	1,715,656.95	39.76499413	-80.73224939
18,132.00	92.75	151.16	6,639.17	-4,919.98	8,650.67	14,441,189.38	1,715,702.74	39.76476536	-80.73208731
18,227.00	93.01	150.72	6,634.40	-5,002.92	8,696.75	14,441,106.44	1,715,748.83	39.76453124	-80.73192420
18,322.00	91.74	149.49	6,630.46	-5,085.20	8,744.06	14,441,024.16	1,715,796.13	39.76429108	-80.73176173
18,405.00	91.30	149.05	6,628.26	-5,166.52	8,786.46	14,440,952.84	1,715,838.53	39.76411466	-80.73160662

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18,465.00	91.30	149.05	6,626.90	-5,207.97	8,817.31	14,440,901.39	1,715,869.38	39.76397313	-80.73149739

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
170.00	170.00	0.09	0.10	MWD surveys
18,405.00	6,628.26	-5,156.52	8,786.46	Survey @ 18405.00 MD 6628.26 TVD
18,465.00	6,626.90	-5,207.97	8,817.31	Survey projected to 18465.00 MD 6626.90 TVD

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