



Well: Lackawanna 2H (slot Y)
 Site: Lackawanna
 Project: Wetzel County, West Virginia (UTM17 NAD83)
 Design: rev4
 Rig: Precision 528

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Annotation
1	3123.00	0.79	303.11	3122.90	-6.59	1.49	0.00	0.000	-6.57	Survey @ 3123.00 MD 3122.90 TVD
2	3223.00	0.79	303.11	3222.89	-5.84	0.34	0.00	0.000	-5.38	KOP Begin 6°/100' build/turn
3	3724.63	29.31	127.82	3703.48	-80.97	96.66	6.00	-175.403	-115.37	Begin 29.31° tangent section
4	6104.83	29.31	127.82	5778.98	-795.44	1017.11	0.00	0.000	-1163.32	Begin 8°/100' build/turn
5	7053.86	50.00	340.04	6625.39	-560.84	1087.07	8.00	-155.097	-983.87	Begin 10°/100' build/turn
6	7474.02	91.00	330.00	6762.98	-211.89	919.53	10.00	-15.096	-596.81	Begin 91.00° lateral section
7	18667.17	91.00	330.00	6567.22	9480.13	-4676.27	0.00	0.000	0.570.73	PBHL/TD 18667.17 MD 6567.22 TVD

ANNOTATIONS SURVEYS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Annotation
3062.00	1.59	328.39	3061.90	-7.09	2.28	-7.36	Tie in survey @ 3062 MD
18591.00	90.29	328.13	6536.19	9430.68	-4676.13	10526.34	Survey @ 18591.00 MD 6536.19 TVD
18645.00	90.29	328.13	6535.91	9476.53	-4704.64	10580.09	Survey projected to 18645.00 MD 6535.91 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=1306+18 @ 1324.00ft (Precision 528)

Northing	Easting	Latitude	Longitude
14383354.87	1680776.84	39.50615285	-80.85670263

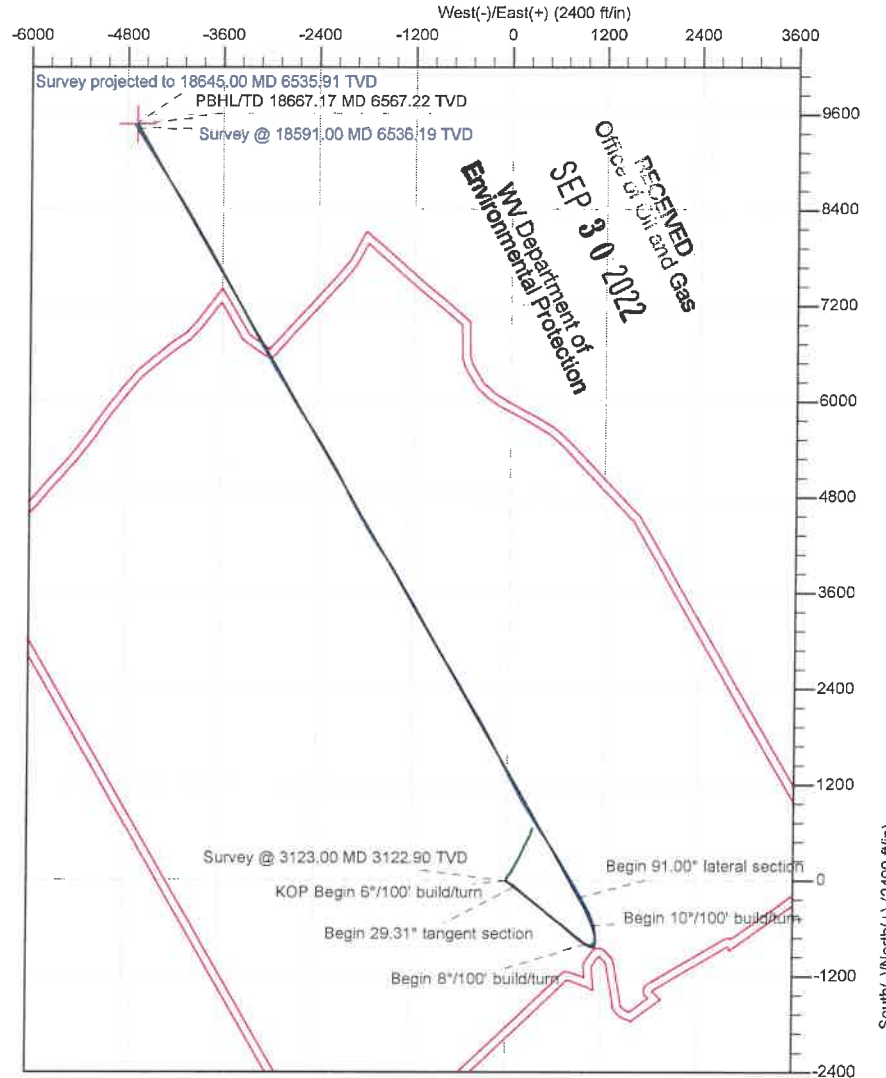
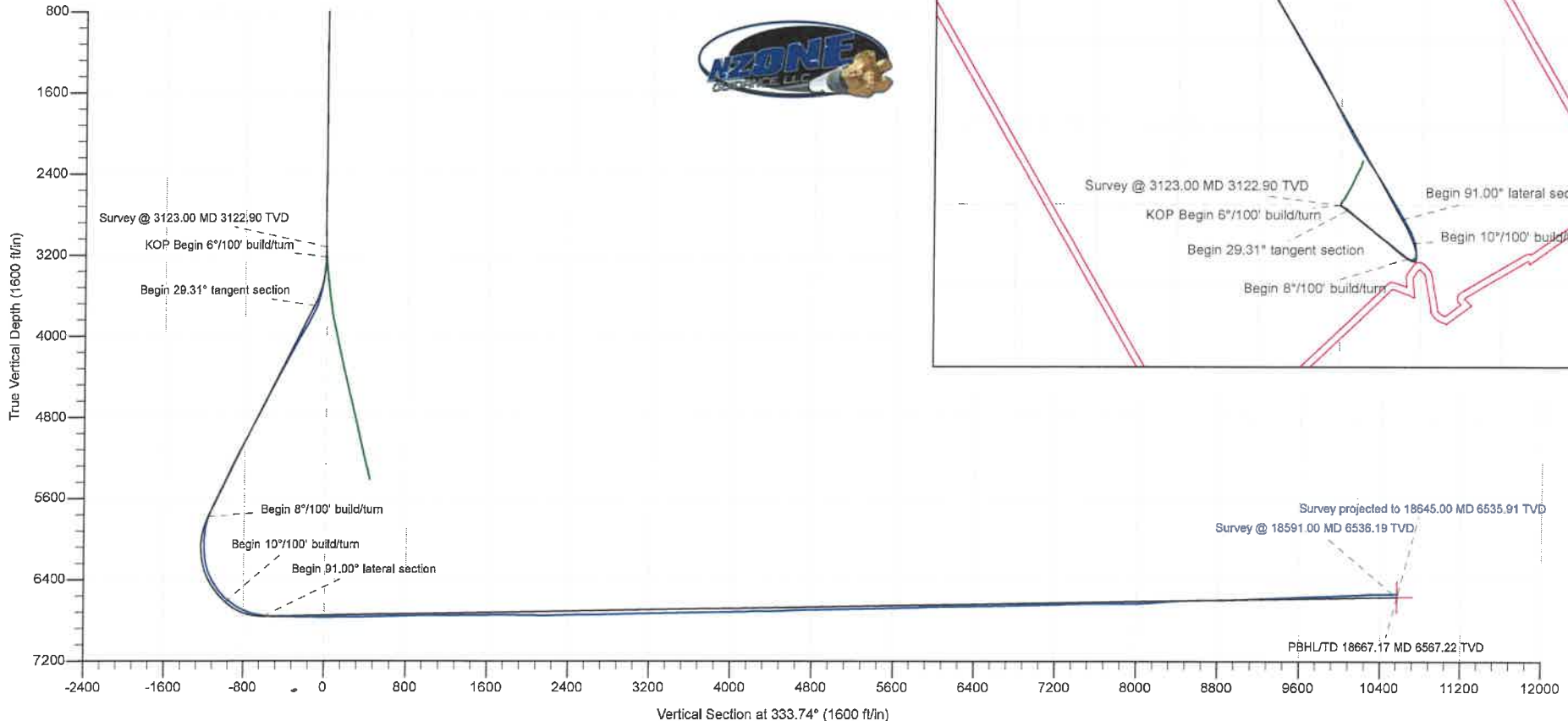


Azimuths to Grid North
 True North: -0.09°
 Magnetic North: -8.67°

Magnetic Field
 Strength: 51973.5nT
 Dip Angle: 66.75°
 Date: 7/16/2018
 Model: IGRF2015



Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.675°



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Lackawanna 2H (slot Y)
Project:	Wetzel County, West Virginia (UTM17 NAD83)	TVD Reference:	RKB=1306+18 @ 1324.00ft (Precision 528)
Site:	Lackawanna	MD Reference:	RKB=1306+18 @ 1324.00ft (Precision 528)
Well:	Lackawanna 2H (slot Y)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Aug1919_v14

Project	Wetzel County, West Virginia (UTM17 NAD83)		
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)		

RECEIVED
Office of Oil and Gas

SEP 30 2022

Site	Lackawanna				
Site Position:		Northing:	14,383,374.84 usft	Latitude:	39.60615285
From:	Lat/Long	Easting:	1,680,777.71 usft	Longitude:	-80.85669942
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.091 °

WV Department of Environmental Protection
30.60620769
-80.85669942

Well	Lackawanna 2H (slot Y)					
Well Position	+N/-S	0.00 ft	Northing:	14,383,354.87 usft	Latitude:	39.60615285
	+E/-W	0.00 ft	Easting:	1,680,776.84 usft	Longitude:	-80.85670263
Position Uncertainty	0.00 ft		Wellhead Elevation:	ft	Ground Level:	1,306.00 ft

Wellbore	Sidetrack 01				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	7/16/2018	-8.584	66.745	51,973.54906711

Design	Surveys Sidetrack 01				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	3,062.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.00	0.00	0.00	333.60	

Survey Program	Date	8/26/2019			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
8.00	2,787.00	Gyro 2H (Original Hole)	NS-GYRO-MS	North sensing gyrocompassing m/s	
2,815.00	3,062.00	MWD 2H (Original Hole)	MWD	MWD - Standard	
3,075.00	18,591.00	MWD ST1 (Sidetrack 01)	MWD	MWD - Standard	
18,645.00	18,645.00	Projection (Sidetrack 01)	MWD	MWD - Standard	

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.00	0.00	150.03	8.00	0.00	0.00	0.00	0.00	0.00	0.00
18.00	0.00	150.03	18.00	0.00	0.00	0.00	0.00	0.00	0.00
108.00	0.30	150.03	108.00	-0.20	0.12	-0.24	0.33	0.33	0.00
208.00	0.08	161.88	208.00	-0.50	0.27	-0.57	0.22	-0.22	11.85
308.00	0.15	200.75	308.00	-0.69	0.25	-0.72	0.10	0.07	38.87
408.00	0.10	247.94	408.00	-0.84	0.12	-0.81	0.11	-0.05	47.19
508.00	0.26	228.01	508.00	-1.03	-0.13	-0.86	0.17	0.16	-19.93

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Lackawanna 2H (slot Y)
Project:	Wetzel County, West Virginia (UTM17 NAD83)	TVD Reference:	RKB=1306+18 @ 1324.00ft (Precision 528)
Site:	Lackawanna	MD Reference:	RKB=1306+18 @ 1324.00ft (Precision 528)
Well:	Lackawanna 2H (slot Y)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Aug1919_v14

RECEIVED
 Office of Oil and Gas
 SEP 30 2022

Survey

Measured Depth (ft)	Inclination (°)	WV Department of Environmental Protection		+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
		Azimuth (°)	Depth (ft)							
608.00	0.19	219.88	608.00	-1.30	-0.41	-0.99	0.08	-0.07	-8.13	
708.00	0.29	194.90	708.00	-1.68	-0.58	-1.24	0.14	0.10	-24.98	
808.00	0.16	131.77	808.00	-2.01	-0.54	-1.56	0.26	-0.13	-63.13	
908.00	0.15	207.61	908.00	-2.22	-0.50	-1.77	0.19	-0.01	75.84	
1,008.00	0.19	180.75	1,008.00	-2.50	-0.56	-2.00	0.09	0.04	-26.86	
1,108.00	0.21	127.10	1,107.99	-2.78	-0.41	-2.31	0.18	0.02	-53.65	
1,208.00	0.15	109.45	1,207.99	-2.94	-0.14	-2.57	0.08	-0.06	-17.65	
1,308.00	0.23	99.01	1,307.99	-3.01	0.18	-2.78	0.09	0.08	-10.44	
1,408.00	0.22	75.36	1,407.99	-2.99	0.56	-2.93	0.09	-0.01	-23.65	
1,508.00	0.21	67.67	1,507.99	-2.88	0.92	-2.98	0.03	-0.01	-7.69	
1,608.00	0.29	106.09	1,607.99	-2.88	1.33	-3.17	0.18	0.08	38.42	
1,708.00	0.11	251.18	1,707.99	-2.98	1.48	-3.33	0.39	-0.18	145.09	
1,808.00	0.42	304.67	1,807.99	-2.80	1.09	-2.99	0.37	0.31	53.49	
1,908.00	0.48	292.72	1,907.99	-2.43	0.40	-2.35	0.11	0.06	-11.95	
2,008.00	0.28	298.07	2,007.98	-2.15	-0.20	-1.84	0.20	-0.20	5.35	
2,108.00	0.21	170.74	2,107.98	-2.22	-0.39	-1.81	0.44	-0.07	-127.33	
2,208.00	0.57	127.49	2,207.98	-2.70	0.04	-2.44	0.44	0.36	-43.25	
2,308.00	0.74	123.13	2,307.98	-3.36	0.97	-3.44	0.18	0.17	-4.36	
2,408.00	0.99	117.89	2,407.96	-4.11	2.28	-4.70	0.26	0.25	-5.24	
2,508.00	1.06	121.95	2,507.95	-5.01	3.83	-6.19	0.10	0.07	4.06	
2,608.00	0.64	140.88	2,607.94	-5.93	4.96	-7.52	0.50	-0.42	18.93	
2,708.00	0.38	172.53	2,707.93	-6.69	5.36	-8.38	0.37	-0.26	31.65	
2,783.00	0.29	189.14	2,782.93	-7.13	5.36	-8.77	0.18	-0.12	22.15	
2,843.00	0.45	238.13	2,842.93	-7.40	5.14	-8.91	0.57	0.27	81.65	
2,874.00	0.43	249.74	2,873.93	-7.51	4.92	-8.91	0.29	-0.06	37.45	
2,905.00	0.74	248.79	2,904.93	-7.62	4.63	-8.88	1.00	1.00	-3.06	
2,937.00	0.93	259.29	2,936.92	-7.74	4.18	-8.79	0.76	0.59	32.81	
3,000.00	0.87	270.95	2,999.92	-7.83	3.20	-8.43	0.31	-0.10	18.51	
3,062.00	1.59	328.39	3,061.90	-7.09	2.28	-7.36	2.16	1.16	92.65	
Tie in survey @ 3062 MD										
3,075.00	0.82	291.12	3,074.90	-6.90	2.10	-7.11	8.16	-5.92	-286.69	
3,123.00	0.79	303.11	3,122.90	-6.60	1.50	-6.58	0.36	-0.06	24.98	
3,167.00	0.75	296.43	3,166.89	-6.30	0.99	-6.08	0.22	-0.09	-15.18	
3,261.00	2.94	133.01	3,260.86	-7.67	2.20	-7.85	3.90	2.33	-173.85	
3,355.00	6.00	125.11	3,354.56	-12.14	7.98	-14.43	3.31	3.26	-8.40	
3,451.00	10.12	119.62	3,449.59	-19.20	19.42	-25.84	4.36	4.29	-5.72	
3,546.00	14.01	118.60	3,542.48	-28.84	36.78	-42.18	4.10	4.09	-1.07	
3,637.00	19.74	119.15	3,629.52	-41.60	59.89	-63.90	6.30	6.30	0.60	
3,731.00	25.66	121.37	3,716.21	-59.95	91.16	-94.23	6.36	6.30	2.36	
3,825.00	29.98	131.01	3,799.36	-85.98	126.30	-133.17	6.62	4.60	10.26	
3,919.00	30.70	133.64	3,880.49	-117.95	161.39	-177.41	1.61	0.77	2.80	
4,014.00	31.28	130.68	3,961.94	-150.77	197.64	-222.93	1.72	0.61	-3.12	
4,109.00	31.96	129.58	4,042.83	-182.86	235.73	-268.61	0.94	0.72	-1.16	

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Lackawanna 2H (slot Y)
Project:	Wetzel County, West Virginia (UTM17 NAD83)	TVD Reference:	RKB=1306+18 @ 1324.00ft (Precision 528)
Site:	Lackawanna	MD Reference:	RKB=1306+18 @ 1324.00ft (Precision 528)
Well:	Lackawanna 2H (slot Y)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Aug1919_v14

RECEIVED
Office of Oil and Gas
SEP 30 2022

WV Department of Environmental Protection										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical			Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
			Depth (ft)	+N/-S (ft)	+E/-W (ft)					
4,204.00	30.56	128.04	4,124.04	-213.77	274.13	-313.37	1.70	-1.47	-1.62	
4,298.00	30.25	128.19	4,205.11	-243.13	311.56	-356.31	0.34	-0.33	0.16	
4,391.00	31.10	129.33	4,285.10	-272.84	348.55	-399.37	1.11	0.91	1.23	
4,487.00	29.91	128.08	4,367.81	-303.32	386.57	-443.58	1.40	-1.24	-1.30	
4,581.00	29.86	128.97	4,449.31	-332.49	423.21	-486.00	0.47	-0.05	0.95	
4,675.00	29.76	131.12	4,530.88	-362.55	458.98	-528.83	1.14	-0.11	2.29	
4,771.00	28.33	131.69	4,614.80	-393.37	493.94	-571.98	1.52	-1.49	0.59	
4,865.00	28.87	129.80	4,697.33	-422.73	528.03	-613.44	1.12	0.57	-2.01	
4,961.00	29.91	127.78	4,780.98	-452.23	564.76	-656.19	1.50	1.08	-2.10	
5,055.00	31.09	127.78	4,861.97	-481.46	602.46	-699.13	1.26	1.26	0.00	
5,150.00	30.92	127.08	4,943.40	-511.20	641.32	-743.05	0.42	-0.18	-0.74	
5,245.00	29.37	125.74	5,025.55	-539.52	679.71	-785.49	1.78	-1.63	-1.41	
5,338.00	30.09	127.83	5,106.31	-567.15	716.63	-826.65	1.36	0.77	2.25	
5,433.00	30.69	130.40	5,188.26	-597.47	753.91	-870.39	1.51	0.63	2.71	
5,528.00	29.26	130.56	5,270.55	-628.28	790.01	-914.04	1.51	-1.51	0.17	
5,622.00	29.48	128.42	5,352.47	-657.59	825.58	-956.11	1.14	0.23	-2.28	
5,717.00	30.17	127.51	5,434.89	-686.65	862.83	-998.71	0.87	0.73	-0.96	
5,812.00	29.19	126.98	5,517.42	-715.12	900.28	-1,040.86	1.07	-1.03	-0.56	
5,907.00	27.90	126.35	5,600.87	-742.23	936.69	-1,081.33	1.39	-1.36	-0.66	
5,945.00	27.43	125.63	5,684.53	-772.60	975.96	-1,124.96	1.52	-1.24	-1.89	
6,040.00	27.25	129.14	5,768.92	-799.08	1,015.62	-1,166.09	1.71	-0.19	3.69	
6,087.00	24.62	122.20	5,854.20	-826.56	1,056.26	-1,207.25	1.90	-5.60	-14.77	
6,135.00	22.07	112.71	5,940.28	-853.91	1,097.91	-1,248.61	2.09	-5.31	-19.77	
6,230.00	17.76	95.13	6,026.66	-881.10	1,139.58	-1,290.71	2.28	-4.54	-18.51	
6,324.00	13.76	80.10	6,113.14	-908.46	1,181.29	-1,332.39	2.47	-4.26	-15.99	
6,419.00	13.49	59.62	6,200.52	-935.91	1,223.99	-1,374.83	2.66	-0.28	-21.56	
6,466.00	13.14	55.93	6,288.26	-963.15	1,266.15	-1,417.74	2.85	-0.74	-7.85	
6,514.00	15.12	39.23	6,376.82	-990.24	1,308.63	-1,461.43	3.04	4.13	-34.79	
6,561.00	18.20	25.87	6,465.86	-1,017.88	1,351.72	-1,505.40	3.23	6.55	-28.43	
6,609.00	19.78	16.47	6,555.26	-1,045.34	1,395.29	-1,549.86	3.42	3.29	-19.58	
6,656.00	22.37	9.61	6,644.12	-1,072.89	1,438.04	-1,594.79	3.61	5.51	-14.60	
6,704.00	26.02	3.46	6,733.90	-1,100.36	1,480.20	-1,640.26	3.80	7.60	-12.81	
6,751.00	29.58	359.42	6,823.47	-1,127.47	1,521.71	-1,686.87	3.99	7.57	-8.60	
6,799.00	31.78	354.67	6,913.76	-1,154.03	1,563.41	-1,733.41	4.18	4.58	-9.90	
6,894.00	38.46	349.84	7,004.44	-1,180.97	1,605.87	-1,780.63	4.37	7.03	-5.08	
6,989.00	49.41	345.70	7,095.76	-1,207.72	1,648.70	-1,828.79	4.56	11.53	-4.36	
7,036.00	55.25	343.60	7,187.47	-1,234.88	1,691.83	-1,877.29	4.75	12.43	-4.47	
7,084.00	56.40	338.59	7,279.44	-1,261.33	1,735.96	-1,926.94	4.94	2.40	-10.44	
7,131.00	57.89	339.03	7,371.94	-1,288.52	1,780.69	-1,977.62	5.13	3.17	0.94	
7,180.00	61.67	335.51	7,465.60	-1,315.49	1,825.31	-2,029.39	5.32	7.71	-7.18	
7,227.00	66.55	332.52	7,559.12	-1,342.51	1,870.78	-2,082.12	5.51	10.38	-6.36	
7,275.00	71.21	331.38	7,653.42	-1,369.01	1,916.72	-2,135.38	5.70	9.71	-2.38	
7,322.00	73.80	331.73	7,748.54	-1,395.60	1,963.37	-2,189.59	5.89	5.51	0.74	
7,370.00	76.57	330.68	7,844.82	-1,422.94	2,010.02	-2,244.23	6.08	5.77	-2.19	

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Lackawanna 2H (slot Y)
Project:	Wetzel County, West Virginia (UTM17 NAD83)	TVD Reference:	RKB=1306+18 @ 1324.00ft (Precision 528)
Site:	Lackawanna RECEIVED	MD Reference:	RKB=1306+18 @ 1324.00ft (Precision 528)
Well:	Lackawanna 2H (slot Y) Office of Oil and Gas	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Aug1919_v14

 WV Department of
 Environmental Protection

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
7,463.00	86.46	329.09	6,760.52	-173.48	926.91	-567.56	10.77	10.63	-1.71
7,496.00	89.67	329.45	6,761.64	-145.13	910.06	-534.67	9.79	9.73	1.09
7,558.00	89.63	329.09	6,762.02	-91.84	878.38	-472.85	0.58	-0.06	-0.58
7,653.00	89.05	328.30	6,763.11	-10.68	829.03	-378.21	1.03	-0.61	-0.83
7,748.00	88.66	328.21	6,765.01	70.09	779.05	-283.64	0.42	-0.41	-0.09
7,844.00	87.91	328.04	6,767.88	151.58	728.38	-188.12	0.80	-0.78	-0.18
7,939.00	88.88	329.36	6,770.54	232.72	679.05	-93.51	1.72	1.02	1.39
8,034.00	90.99	328.04	6,770.65	313.89	629.70	1.14	2.62	2.22	-1.39
8,129.00	89.98	326.54	6,769.85	393.81	578.36	95.56	1.90	-1.06	-1.58
8,223.00	91.03	327.69	6,769.02	472.75	527.33	188.95	1.66	1.12	1.22
8,319.00	90.07	325.58	6,768.10	552.91	474.54	284.23	2.41	-1.00	-2.20
8,412.00	90.77	327.25	6,767.41	630.38	423.10	376.49	1.95	0.75	1.80
8,507.00	90.42	326.28	6,766.43	709.84	371.03	470.81	1.09	-0.37	-1.02
8,601.00	92.57	327.42	6,763.98	788.51	319.65	564.12	2.59	2.29	1.21
8,696.00	91.87	330.15	6,760.29	869.69	270.46	658.71	2.96	-0.74	2.87
8,790.00	91.52	330.06	6,757.51	951.14	223.63	752.49	0.38	-0.37	-0.10
8,885.00	91.56	331.38	6,754.96	1,033.97	177.19	847.34	1.39	0.04	1.39
8,979.00	91.38	330.85	6,752.55	1,116.25	131.79	941.22	0.60	-0.19	-0.56
9,074.00	90.90	330.15	6,750.66	1,198.92	85.02	1,036.06	0.89	-0.51	-0.74
9,170.00	90.07	332.35	6,749.85	1,283.07	38.85	1,131.97	2.45	-0.86	2.29
9,265.00	89.05	332.26	6,750.58	1,367.19	-5.30	1,226.94	1.08	-1.07	-0.09
9,360.00	90.73	333.40	6,750.76	1,451.70	-48.68	1,321.92	2.14	1.77	1.20
9,455.00	90.02	334.45	6,750.14	1,537.03	-90.43	1,416.92	1.33	-0.75	1.11
9,550.00	91.25	332.52	6,749.08	1,622.02	-132.84	1,511.91	2.41	1.29	-2.03
9,645.00	90.81	331.82	6,747.38	1,706.02	-177.18	1,606.86	0.87	-0.46	-0.74
9,739.00	90.24	331.64	6,746.51	1,788.81	-221.70	1,700.81	0.64	-0.61	-0.19
9,834.00	89.58	331.47	6,746.66	1,872.34	-266.95	1,795.75	0.72	-0.69	-0.18
9,928.00	88.84	331.38	6,747.96	1,954.88	-311.90	1,889.67	0.79	-0.79	-0.10
10,023.00	89.27	329.09	6,749.53	2,037.33	-359.06	1,984.49	2.45	0.45	-2.41
10,117.00	88.57	328.83	6,751.30	2,117.85	-407.52	2,078.16	0.79	-0.74	-0.28
10,213.00	90.99	329.53	6,751.67	2,200.29	-456.70	2,173.87	2.62	2.52	0.73
10,308.00	89.89	328.83	6,750.94	2,281.87	-505.37	2,268.58	1.37	-1.16	-0.74
10,401.00	92.13	329.45	6,749.30	2,361.68	-553.06	2,361.28	2.50	2.41	0.67
10,496.00	91.78	328.92	6,746.06	2,443.22	-601.70	2,455.94	0.67	-0.37	-0.56
10,591.00	90.73	329.18	6,743.98	2,524.68	-650.54	2,550.62	1.14	-1.11	0.27
10,686.00	89.76	329.18	6,743.57	2,606.26	-699.21	2,645.33	1.02	-1.02	0.00
10,780.00	91.52	329.53	6,742.52	2,687.12	-747.12	2,739.07	1.91	1.87	0.37
10,876.00	91.52	329.09	6,739.97	2,769.65	-796.10	2,834.76	0.46	0.00	-0.46
10,971.00	90.42	330.32	6,738.37	2,851.66	-844.02	2,929.53	1.74	-1.16	1.29
11,066.00	89.71	330.24	6,738.26	2,934.16	-891.11	3,024.37	0.75	-0.75	-0.08
11,161.00	92.31	330.68	6,736.58	3,016.80	-937.94	3,119.20	2.78	2.74	0.46
11,255.00	91.82	330.76	6,733.20	3,098.73	-983.88	3,213.02	0.53	-0.52	0.09
11,350.00	90.81	331.38	6,731.02	3,181.85	-1,029.83	3,307.90	1.25	-1.06	0.65

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Lackawanna 2H (slot Y)
Project:	Wetzel County, West Virginia (UTM17 NAD83)	TVD Reference:	RKB=1306+18 @ 1324.00ft (Precision 528)
Site:	Lackawanna	MD Reference:	RKB=1306+18 @ 1324.00ft (Precision 528)
Well:	Lackawanna 2H (slot Y)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Aug1919_v14

 RECEIVED
 Office of Oil and Gas

Measured Depth (ft)	Inclination (°)	Vertical Error (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)			
11,444.00	89.71	331.64	6,730.59	3,264.47	-1,074.66	3,401.84	1.20	-1.17	0.28
11,539.00	92.13	330.41	6,729.06	3,347.56	-1,120.67	3,496.72	2.86	2.55	-1.29
11,634.00	91.43	330.32	6,726.11	3,430.09	-1,167.63	3,591.52	0.74	-0.74	-0.09
11,729.00	90.68	329.80	6,724.36	3,512.40	-1,215.03	3,686.33	0.96	-0.79	-0.55
11,823.00	91.82	329.80	6,722.31	3,593.62	-1,262.30	3,780.09	1.21	1.21	0.00
11,918.00	91.12	329.53	6,719.88	3,675.59	-1,310.27	3,874.84	0.79	-0.74	-0.28
12,013.00	90.20	329.62	6,718.78	3,757.50	-1,358.37	3,969.60	0.97	-0.97	0.09
12,108.00	92.57	328.39	6,716.49	3,838.90	-1,407.28	4,064.26	2.81	2.49	-1.29
12,203.00	91.96	327.78	6,712.73	3,919.48	-1,457.46	4,158.74	0.91	-0.64	-0.64
12,298.00	91.12	327.69	6,710.18	3,999.78	-1,508.15	4,253.21	0.89	-0.88	-0.09
12,392.00	90.24	327.42	6,709.06	4,079.10	-1,558.58	4,346.68	0.98	-0.94	-0.29
12,486.00	91.03	329.62	6,708.02	4,159.25	-1,607.66	4,440.30	2.49	0.84	2.34
12,580.00	92.97	329.09	6,704.74	4,240.07	-1,655.54	4,533.98	2.14	2.06	-0.56
12,675.00	92.40	328.57	6,700.29	4,321.27	-1,704.66	4,628.55	0.81	-0.60	-0.55
12,769.00	91.25	328.48	6,697.30	4,401.40	-1,753.71	4,722.13	1.23	-1.22	-0.10
12,863.00	90.02	328.65	6,696.26	4,481.59	-1,802.73	4,815.76	1.32	-1.31	0.18
12,958.00	91.47	330.94	6,695.02	4,563.68	-1,850.52	4,910.53	2.85	1.53	2.41
13,053.00	90.86	331.38	6,693.09	4,646.88	-1,896.33	5,005.43	0.79	-0.64	0.46
13,148.00	90.11	331.20	6,692.28	4,730.20	-1,941.97	5,100.35	0.81	-0.79	-0.19
13,243.00	92.44	332.52	6,690.17	4,813.94	-1,986.76	5,195.27	2.82	2.45	1.39
13,338.00	92.09	331.99	6,686.42	4,897.95	-2,030.95	5,290.17	0.67	-0.37	-0.56
13,432.00	91.12	332.26	6,683.78	4,981.01	-2,074.88	5,384.10	1.07	-1.03	0.29
13,526.00	90.20	332.79	6,682.70	5,064.40	-2,118.24	5,478.08	1.13	-0.98	0.56
13,621.00	92.31	330.85	6,680.62	5,148.11	-2,163.09	5,573.00	3.02	2.22	-2.04
13,716.00	91.43	330.41	6,677.52	5,230.86	-2,209.66	5,667.82	1.04	-0.93	-0.46
13,811.00	90.55	330.59	6,675.88	5,313.53	-2,256.43	5,762.66	0.95	-0.93	0.19
13,905.00	92.57	329.88	6,673.32	5,395.09	-2,303.08	5,856.46	2.28	2.15	-0.76
14,000.00	92.04	329.88	6,669.50	5,477.20	-2,350.71	5,951.19	0.56	-0.56	0.00
14,095.00	91.47	328.65	6,666.59	5,558.81	-2,399.24	6,045.87	1.43	-0.60	-1.29
14,190.00	90.86	326.98	6,664.66	5,639.19	-2,449.83	6,140.36	1.87	-0.64	-1.76
14,284.00	89.98	325.84	6,663.97	5,717.49	-2,501.83	6,233.62	1.53	-0.94	-1.21
14,379.00	91.47	328.74	6,662.77	5,797.41	-2,553.16	6,328.02	3.43	1.57	3.05
14,474.00	90.99	328.92	6,660.73	5,878.68	-2,602.31	6,422.67	0.54	-0.51	0.19
14,569.00	90.11	329.62	6,659.81	5,960.33	-2,650.86	6,517.39	1.18	-0.93	0.74
14,664.00	92.22	329.80	6,657.88	6,042.34	-2,698.76	6,612.15	2.23	2.22	0.19
14,759.00	91.52	329.53	6,654.78	6,124.29	-2,746.71	6,706.88	0.79	-0.74	-0.28
14,853.00	90.86	328.83	6,652.83	6,205.00	-2,794.86	6,800.57	1.02	-0.70	-0.74
14,948.00	90.46	327.60	6,651.74	6,285.74	-2,844.90	6,895.15	1.36	-0.42	-1.29
15,043.00	91.30	329.53	6,650.28	6,366.79	-2,894.43	6,989.76	2.22	0.88	2.03
15,138.00	90.59	329.88	6,648.71	6,448.80	-2,942.35	7,084.53	0.83	-0.75	0.37
15,233.00	92.66	330.94	6,646.02	6,531.37	-2,989.24	7,179.34	2.45	2.18	1.12
15,327.00	92.57	331.03	6,641.73	6,613.49	-3,034.79	7,273.14	0.14	-0.10	0.10
15,421.00	91.91	330.94	6,638.05	6,695.63	-3,080.34	7,366.97	0.71	-0.70	-0.10

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Lackawanna 2H (slot Y)
Project:	Wetzel County, West Virginia (UTM17 NAD83)	TVD Reference:	RKB=1306+18 @ 1324.00ft (Precision 528)
Site:	Lackawanna	MD Reference:	RKB=1306+18 @ 1324.00ft (Precision 528)
Well:	Lackawanna 2H (slot Y)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Aug1919_v14

RECEIVED
 Office of Oil and Gas
SEP 30 2022

Survey											
Measured Depth (ft)	Inclination (°)	WV Department of Environmental Protection		Azimuth (°)	Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
		Vertical Section	Depth								
15,516.00	91.38		331.12	6,635.33	6,778.71	-3,126.34	7,461.84	0.59	-0.56	0.19	
15,610.00	90.90		330.94	6,633.46	6,860.93	-3,171.86	7,555.73	0.55	-0.51	-0.19	
15,705.00	90.02		331.12	6,632.69	6,944.04	-3,217.87	7,650.63	0.95	-0.93	0.19	
15,801.00	89.85		331.38	6,632.80	7,028.20	-3,264.04	7,746.55	0.32	-0.18	0.27	
15,895.00	88.70		331.47	6,633.99	7,110.75	-3,309.00	7,840.47	1.23	-1.22	0.10	
15,990.00	91.38		331.47	6,633.93	7,194.20	-3,354.37	7,935.40	2.82	2.82	0.00	
16,083.00	90.42		331.29	6,632.47	7,275.83	-3,398.91	8,028.31	1.05	-1.03	-0.19	
16,178.00	94.90		331.47	6,628.06	7,359.11	-3,444.36	8,123.12	4.72	4.72	0.19	
16,272.00	94.73		330.85	6,620.17	7,441.16	-3,489.54	8,216.70	0.68	-0.18	-0.66	
16,367.00	94.29		330.94	6,612.70	7,523.91	-3,535.60	8,311.30	0.47	-0.46	0.09	
16,462.00	92.31		330.41	6,607.23	7,606.59	-3,582.05	8,406.01	2.16	-2.08	-0.56	
16,557.00	91.78		330.68	6,603.84	7,689.26	-3,628.74	8,500.82	0.63	-0.56	0.28	
16,652.00	91.47		331.03	6,601.15	7,772.20	-3,674.99	8,595.67	0.49	-0.33	0.37	
16,746.00	91.03		331.20	6,599.09	7,854.48	-3,720.38	8,689.56	0.50	-0.47	0.18	
16,841.00	90.73		330.94	6,597.64	7,937.62	-3,766.33	8,784.46	0.42	-0.32	-0.27	
16,937.00	89.67		330.85	6,597.30	8,021.49	-3,813.03	8,880.35	1.11	-1.10	-0.09	
17,032.00	91.74		330.06	6,596.13	8,104.13	-3,859.86	8,975.19	2.33	2.18	-0.83	
17,127.00	91.12		329.36	6,593.76	8,186.13	-3,907.76	9,069.94	0.98	-0.65	-0.74	
17,221.00	93.14		328.57	6,590.27	8,266.62	-3,956.19	9,163.56	2.31	2.15	-0.84	
17,316.00	92.53		329.53	6,585.57	8,347.99	-4,004.99	9,258.15	1.20	-0.64	1.01	
17,412.00	93.76		328.92	6,580.30	8,430.35	-4,054.03	9,353.72	1.43	1.28	-0.64	
17,507.00	93.19		328.65	6,574.54	8,511.44	-4,103.18	9,448.21	0.66	-0.60	-0.28	
17,602.00	92.44		327.95	6,569.88	8,592.17	-4,153.03	9,542.69	1.08	-0.79	-0.74	
17,695.00	91.56		326.81	6,566.63	8,670.45	-4,203.14	9,635.08	1.55	-0.95	-1.23	
17,790.00	92.18		329.18	6,563.53	8,750.96	-4,253.46	9,729.57	2.58	0.65	2.49	
17,885.00	91.78		329.01	6,560.25	8,832.43	-4,302.22	9,824.22	0.46	-0.42	-0.18	
17,980.00	92.97		329.18	6,556.31	8,913.87	-4,350.97	9,918.85	1.27	1.25	0.18	
18,075.00	92.70		328.39	6,551.61	8,995.01	-4,400.14	10,013.40	0.88	-0.28	-0.83	
18,169.00	92.26		327.42	6,547.55	9,074.57	-4,450.04	10,106.84	1.13	-0.47	-1.03	
18,264.00	91.69		326.63	6,544.27	9,154.22	-4,501.72	10,201.16	1.03	-0.60	-0.83	
18,360.00	92.22		328.13	6,541.00	9,235.03	-4,553.43	10,296.54	1.66	0.55	1.56	
18,455.00	91.34		327.78	6,538.05	9,315.51	-4,603.81	10,391.03	1.00	-0.93	-0.37	
18,549.00	90.55		327.86	6,536.50	9,395.06	-4,653.87	10,484.54	0.84	-0.84	0.09	
18,591.00	90.29		328.13	6,536.19	9,430.68	-4,676.13	10,526.34	0.89	-0.62	0.64	
Survey @ 18591.00 MD 6536.19 TVD											
18,645.00	90.29		328.13	6,535.91	9,476.53	-4,704.64	10,580.09	0.00	0.00	0.00	
Survey projected to 18645.00 MD 6535.91 TVD											

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Lackawanna 2H (slot Y)
Project:	Wetzel County, West Virginia (UTM17 NAD83)	TVD Reference:	RKB=1306+18 @ 1324.00ft (Precision 528)
Site:	Lackawanna	MD Reference:	RKB=1306+18 @ 1324.00ft (Precision 528)
Well:	Lackawanna 2H (slot Y)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Aug1919_v14

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
3,062.00	3,061.90	-7.09	2.28	Tie in survey @ 3062 MD
18,591.00	6,536.19	9,430.68	-4,676.13	Survey @ 18591.00 MD 6536.19 TVD
18,645.00	6,535.91	9,476.53	-4,704.64	Survey projected to 18645.00 MD 6535.91 TVD

RECEIVED
 Office of Oil and Gas

SEP 30 2022

 WV Department of
 Environmental Protection

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Lackawanna 2H (slot Y)
Project:	Wetzel County, West Virginia (UTM17 NAD83)	TVD Reference:	RKB=1306+18 @ 1324.00ft (Precision 528)
Site:	Lackawanna	MD Reference:	RKB=1306+18 @ 1324.00ft (Precision 528)
Well:	Lackawanna 2H (slot Y)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Aug1919_v14

Project	Wetzel County, West Virginia (UTM17 NAD83)		
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)		

RECEIVED
Office of Oil and Gas
SEP 30 2022

Site	Lackawanna		
Site Position:		Northing:	14,383,374.84 usft
From:	Lat/Long	Easting:	1,680,777.71 usft
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "
		Latitude:	
		Longitude:	
		Grid Convergence:	0.091 °

WV Department of Environmental Protection
0620769
-80.8567042

Well	Lackawanna 2H (slot Y)		
Well Position	+N/-S	0.00 ft	Northing:
	+E/-W	0.00 ft	Easting:
			14,383,354.87 usft
			1,680,776.84 usft
Position Uncertainty	0.00 ft	Wellhead Elevation:	ft
		Latitude:	39.60615285
		Longitude:	-80.85670263
		Ground Level:	1,306.00 ft

Wellbore	Sidetrack 01				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
	IGRF2015	7/16/2018	(°)	(°)	(nT)
			-8.584	66.745	51,973.54906711

Design	Surveys Sidetrack 01				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	3,062.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction	
	(ft)	(ft)	(ft)	(°)	
	0.00	0.00	0.00	333.60	

Survey Program	Date	8/26/2019			
From	To	Survey (Wellbore)	Tool Name	Description	
(ft)	(ft)				
8.00	2,787.00	Gyro 2H (Original Hole)	NS-GYRO-MS	North sensing gyrocompassing m/s	
2,815.00	3,062.00	MWD 2H (Original Hole)	MWD	MWD - Standard	
3,075.00	18,591.00	MWD ST1 (Sidetrack 01)	MWD	MWD - Standard	
18,645.00	18,645.00	Projection (Sidetrack 01)	MWD	MWD - Standard	

Survey										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Map	Map	Latitude	Longitude	
Depth	(°)	(°)	Depth	(ft)	(ft)	Northing	Easting			
(ft)			(ft)			(usft)	(usft)			
0.00	0.00	0.00	0.00	0.00	0.00	14,383,354.87	1,680,776.84	39.60615285	-80.85670263	
8.00	0.00	150.03	8.00	0.00	0.00	14,383,354.87	1,680,776.84	39.60615285	-80.85670263	
18.00	0.00	150.03	18.00	0.00	0.00	14,383,354.87	1,680,776.84	39.60615285	-80.85670263	
108.00	0.30	150.03	108.00	-0.20	0.12	14,383,354.67	1,680,776.96	39.60615229	-80.85670221	
208.00	0.08	161.88	208.00	-0.50	0.27	14,383,354.38	1,680,777.11	39.60615148	-80.85670167	
308.00	0.15	200.75	308.00	-0.69	0.25	14,383,354.19	1,680,777.09	39.60615097	-80.85670176	
408.00	0.10	247.94	408.00	-0.84	0.12	14,383,354.03	1,680,776.96	39.60615054	-80.85670222	
508.00	0.26	228.01	508.00	-1.03	-0.13	14,383,353.85	1,680,776.71	39.60615003	-80.85670310	
608.00	0.19	219.88	608.00	-1.30	-0.41	14,383,353.57	1,680,776.43	39.60614927	-80.85670408	

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Lackawanna 2H (slot Y)
Project:	Wetzel County, West Virginia (UTM17 NAD83)	TVD Reference:	RKB=1306+18 @ 1324.00ft (Precision 528)
Site:	Lackawanna	MD Reference:	RKB=1306+18 @ 1324.00ft (Precision 528)
Well:	Lackawanna 2H (slot Y)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Aug1919_v14

RECEIVED
Office of Oil and Gas

SEP 30 2022

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
708.00	0.29	194.90	708.00	-1.68	-0.58	14,383,353.20	1,680,776.26	39.60614825	-80.85670469
808.00	0.16	131.77	808.00	-2.01	-0.54	14,383,352.86	1,680,776.30	39.60614732	-80.85670455
908.00	0.15	207.61	908.00	-2.22	-0.50	14,383,352.65	1,680,776.35	39.60614675	-80.85670440
1,008.00	0.19	180.75	1,008.00	-2.50	-0.56	14,383,352.37	1,680,776.28	39.60614597	-80.85670463
1,108.00	0.21	127.10	1,107.99	-2.78	-0.41	14,383,352.09	1,680,776.43	39.60614521	-80.85670412
1,208.00	0.15	109.45	1,207.99	-2.94	-0.14	14,383,351.94	1,680,776.70	39.60614479	-80.85670316
1,308.00	0.23	99.01	1,307.99	-3.01	0.18	14,383,351.86	1,680,777.02	39.60614458	-80.85670202
1,408.00	0.22	75.36	1,407.99	-2.99	0.56	14,383,351.88	1,680,777.40	39.60614463	-80.85670066
1,508.00	0.21	67.67	1,507.99	-2.88	0.92	14,383,352.00	1,680,777.76	39.60614495	-80.85669939
1,608.00	0.29	106.09	1,607.99	-2.88	1.33	14,383,352.00	1,680,778.17	39.60614495	-80.85669793
1,708.00	0.11	251.18	1,707.99	-2.98	1.48	14,383,351.90	1,680,778.32	39.60614467	-80.85669739
1,808.00	0.42	304.67	1,807.99	-2.80	1.09	14,383,352.07	1,680,777.93	39.60614516	-80.85669878
1,908.00	0.48	292.72	1,907.99	-2.43	0.40	14,383,352.44	1,680,777.24	39.60614618	-80.85670122
2,008.00	0.28	298.07	2,007.98	-2.15	-0.20	14,383,352.72	1,680,776.64	39.60614694	-80.85670336
2,108.00	0.21	170.74	2,107.98	-2.22	-0.39	14,383,352.65	1,680,776.45	39.60614676	-80.85670402
2,208.00	0.57	127.49	2,207.98	-2.70	0.04	14,383,352.17	1,680,776.88	39.60614543	-80.85670251
2,308.00	0.74	123.13	2,307.98	-3.36	0.97	14,383,351.52	1,680,777.81	39.60614363	-80.85669920
2,408.00	0.99	117.89	2,407.96	-4.11	2.28	14,383,350.76	1,680,779.12	39.60614154	-80.85669457
2,508.00	1.06	121.95	2,507.95	-5.01	3.83	14,383,349.86	1,680,780.67	39.60613908	-80.85668908
2,608.00	0.64	140.88	2,607.94	-5.93	4.96	14,383,348.94	1,680,781.80	39.60613654	-80.85668504
2,708.00	0.38	172.53	2,707.93	-6.69	5.36	14,383,348.18	1,680,782.20	39.60613445	-80.85668364
2,783.00	0.29	189.14	2,782.93	-7.13	5.36	14,383,347.75	1,680,782.20	39.60613325	-80.85668444
2,843.00	0.45	238.13	2,842.93	-7.40	5.14	14,383,347.47	1,680,781.98	39.60613250	-80.85668444
2,874.00	0.43	249.74	2,873.93	-7.51	4.92	14,383,347.37	1,680,781.76	39.60613222	-80.85668519
2,905.00	0.74	248.79	2,904.93	-7.62	4.63	14,383,347.25	1,680,781.47	39.60613191	-80.85668624
2,937.00	0.93	259.29	2,936.92	-7.74	4.18	14,383,347.13	1,680,781.02	39.60613157	-80.85668783
3,000.00	0.87	270.95	2,999.92	-7.83	3.20	14,383,347.04	1,680,780.04	39.60613134	-80.85669132
3,062.00	1.59	328.39	3,061.90	-7.09	2.28	14,383,347.78	1,680,779.12	39.60613337	-80.85669458
Tie in survey @ 3062 MD									
3,075.00	0.82	291.12	3,074.90	-6.90	2.10	14,383,347.97	1,680,778.94	39.60613389	-80.85669523
3,123.00	0.79	303.11	3,122.90	-6.60	1.50	14,383,348.28	1,680,778.34	39.60613473	-80.85669735
3,167.00	0.75	296.43	3,166.89	-6.30	0.99	14,383,348.57	1,680,777.83	39.60613554	-80.85669916
3,261.00	2.94	133.01	3,260.86	-7.67	2.20	14,383,347.20	1,680,779.04	39.60613177	-80.85669486
3,355.00	6.00	125.11	3,354.56	-12.14	7.98	14,383,342.73	1,680,784.82	39.60611946	-80.85667436
3,451.00	10.12	119.62	3,449.59	-19.20	19.42	14,383,335.67	1,680,796.26	39.60610003	-80.85663378
3,546.00	14.01	118.60	3,542.48	-28.84	36.78	14,383,326.04	1,680,813.62	39.60607350	-80.85657220
3,637.00	19.74	119.15	3,629.52	-41.60	59.89	14,383,313.27	1,680,836.73	39.60603833	-80.85649021
3,731.00	25.66	121.37	3,716.21	-59.95	91.16	14,383,294.92	1,680,868.00	39.60598781	-80.85637930
3,825.00	29.98	131.01	3,799.36	-85.98	126.30	14,383,268.89	1,680,903.14	39.60591616	-80.85625470
3,919.00	30.70	133.64	3,880.49	-117.95	161.39	14,383,236.92	1,680,938.23	39.60582820	-80.85613030
4,014.00	31.28	130.68	3,961.94	-150.77	197.64	14,383,204.11	1,680,974.48	39.60573792	-80.85600176
4,109.00	31.96	129.58	4,042.83	-182.86	235.73	14,383,172.01	1,681,012.57	39.60564960	-80.85586674
4,204.00	30.56	128.04	4,124.04	-213.77	274.13	14,383,141.11	1,681,050.97	39.60556456	-80.85573057
4,298.00	30.25	128.19	4,205.11	-243.13	311.56	14,383,111.74	1,681,088.40	39.60548375	-80.85559784
4,391.00	31.10	129.33	4,285.10	-272.84	348.55	14,383,082.03	1,681,125.39	39.60540200	-80.85546668
4,487.00	29.91	128.08	4,367.81	-303.32	386.57	14,383,051.56	1,681,163.41	39.60531813	-80.85533187
4,581.00	29.86	128.97	4,449.31	-332.49	423.21	14,383,022.39	1,681,200.05	39.60523785	-80.85520194
4,675.00	29.76	131.12	4,530.88	-362.55	458.98	14,382,992.33	1,681,235.82	39.60515514	-80.85507512
4,771.00	28.33	131.69	4,614.80	-393.37	493.94	14,382,961.51	1,681,270.78	39.60507034	-80.85495117
4,865.00	28.87	129.80	4,697.33	-422.73	528.03	14,382,932.14	1,681,304.87	39.60498955	-80.85483031
4,961.00	29.91	127.78	4,780.98	-452.23	564.76	14,382,902.64	1,681,341.60	39.60490837	-80.85470009
5,055.00	31.09	127.78	4,861.97	-481.46	602.46	14,382,873.42	1,681,379.30	39.60482794	-80.85456638
5,150.00	30.92	127.08	4,943.40	-511.20	641.32	14,382,843.67	1,681,418.16	39.60474608	-80.85442859
5,245.00	29.37	125.74	5,025.55	-539.52	679.71	14,382,815.35	1,681,456.54	39.60466812	-80.85429248
5,338.00	30.09	127.83	5,106.31	-567.15	716.63	14,382,787.73	1,681,493.47	39.60459210	-80.85416154

WV Department of Environmental Protection

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Lackawanna 2H (slot Y)
Project:	Wetzel County, West Virginia (UTM17 NAD83)	TVD Reference:	RKB=1306+18 @ 1324.00ft (Precision 528)
Site:	Lackawanna	MD Reference:	RKB=1306+18 @ 1324.00ft (Precision 528)
Well:	Lackawanna 2H (slot Y)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Aug1919_v14

RECEIVED
 Office of Oil and Gas
 SEP 30 2022

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	WV Department of Environmental Protection	
								Latitude	Longitude
5,433.00	30.69	130.40	5,188.26	-597.47	753.91	14,382,757.41	1,681,530.74	39.60450866	-80.85402937
5,528.00	29.26	130.56	5,270.55	-628.28	790.01	14,382,726.60	1,681,566.85	39.60442388	-80.85390137
5,622.00	29.48	128.42	5,352.47	-657.59	825.58	14,382,697.29	1,681,602.42	39.60434322	-80.85377524
5,717.00	30.17	127.51	5,434.89	-686.65	862.83	14,382,668.22	1,681,639.67	39.60426324	-80.85364315
5,812.00	29.19	126.98	5,517.42	-715.12	900.28	14,382,639.75	1,681,677.12	39.60418488	-80.85351038
5,907.00	27.90	126.35	5,600.87	-742.23	936.69	14,382,612.64	1,681,713.53	39.60411026	-80.85338127
5,945.00	27.43	125.63	5,634.53	-752.60	950.96	14,382,602.27	1,681,727.80	39.60408172	-80.85333065
6,040.00	27.25	129.14	5,718.92	-779.08	985.62	14,382,575.80	1,681,762.46	39.60400885	-80.85320776
6,087.00	24.62	122.20	5,761.20	-791.09	1,002.26	14,382,563.78	1,681,779.09	39.60397578	-80.85314877
6,135.00	22.07	112.71	5,805.28	-799.91	1,019.04	14,382,554.97	1,681,795.88	39.60395150	-80.85308921
6,230.00	17.76	95.13	5,894.66	-808.10	1,049.98	14,382,546.77	1,681,826.82	39.60392885	-80.85297943
6,324.00	13.76	80.10	5,985.14	-807.46	1,075.29	14,382,547.41	1,681,852.13	39.60393049	-80.85288955
6,419.00	13.49	59.62	6,077.52	-799.91	1,095.99	14,382,554.96	1,681,872.83	39.60395113	-80.85281601
6,466.00	13.14	55.93	6,123.26	-794.15	1,105.15	14,382,560.73	1,681,881.99	39.60396693	-80.85278348
6,514.00	15.12	39.23	6,169.82	-786.24	1,113.63	14,382,568.64	1,681,890.47	39.60398861	-80.85275331
6,561.00	18.20	25.87	6,214.86	-774.88	1,120.72	14,382,580.00	1,681,897.55	39.60401978	-80.85272810
6,609.00	19.78	16.47	6,260.26	-760.34	1,126.29	14,382,594.53	1,681,903.13	39.60405968	-80.85270822
6,656.00	22.37	9.61	6,304.12	-743.89	1,130.04	14,382,610.98	1,681,906.88	39.60410484	-80.85269482
6,704.00	26.02	3.46	6,347.90	-724.36	1,132.20	14,382,630.51	1,681,909.04	39.60415845	-80.85268703
6,751.00	29.58	359.42	6,389.47	-702.47	1,132.71	14,382,652.41	1,681,909.54	39.60421859	-80.85268511
6,799.00	31.78	354.67	6,430.76	-678.03	1,131.41	14,382,676.85	1,681,908.25	39.60428572	-80.85268956
6,894.00	38.46	349.84	6,508.44	-623.97	1,123.87	14,382,730.91	1,681,900.70	39.60443422	-80.85261604
6,989.00	49.41	345.70	6,576.76	-559.72	1,109.70	14,382,795.15	1,681,886.54	39.60461072	-80.85276596
7,036.00	55.25	343.60	6,605.47	-523.88	1,099.83	14,382,831.00	1,681,876.67	39.60470922	-80.85280079
7,084.00	56.40	338.59	6,632.44	-486.33	1,086.96	14,382,868.54	1,681,863.80	39.60481239	-80.85284627
7,131.00	57.89	339.03	6,657.94	-449.52	1,072.69	14,382,905.36	1,681,849.53	39.60491355	-80.85289672
7,180.00	61.67	335.51	6,682.60	-410.49	1,056.31	14,382,944.38	1,681,833.15	39.60502080	-80.85295463
7,227.00	66.55	332.52	6,703.12	-372.51	1,037.78	14,382,982.36	1,681,814.61	39.60512520	-80.85302023
7,275.00	71.21	331.38	6,720.42	-333.01	1,016.72	14,383,021.86	1,681,793.56	39.60523378	-80.85309475
7,322.00	73.80	331.73	6,734.54	-293.60	995.37	14,383,061.28	1,681,772.21	39.60534211	-80.85317032
7,370.00	76.57	330.68	6,746.82	-252.94	973.02	14,383,101.94	1,681,749.86	39.60545388	-80.85324944
7,463.00	86.46	329.09	6,760.52	-173.48	926.91	14,383,181.39	1,681,703.75	39.60567230	-80.85341268
7,496.00	89.67	329.45	6,761.64	-145.13	910.06	14,383,209.74	1,681,686.90	39.60575023	-80.85347234
7,558.00	89.63	329.09	6,762.02	-91.84	878.38	14,383,263.03	1,681,655.22	39.60589673	-80.85358451
7,653.00	89.05	328.30	6,763.11	-10.68	829.03	14,383,344.19	1,681,605.86	39.60611986	-80.85375928
7,748.00	88.66	328.21	6,765.01	70.09	779.05	14,383,424.97	1,681,555.89	39.60634191	-80.85393625
7,844.00	87.91	328.04	6,767.88	151.58	728.38	14,383,506.45	1,681,505.22	39.60656593	-80.85411568
7,939.00	88.88	329.36	6,770.54	232.72	679.05	14,383,587.59	1,681,455.89	39.60678898	-80.85429037
8,034.00	90.99	328.04	6,770.65	313.89	629.70	14,383,668.76	1,681,406.54	39.60701212	-80.85446512
8,129.00	89.98	326.54	6,769.85	393.81	578.36	14,383,748.69	1,681,355.20	39.60723186	-80.85464692
8,223.00	91.03	327.69	6,769.02	472.75	527.33	14,383,827.62	1,681,304.17	39.60744886	-80.85482766
8,319.00	90.07	325.58	6,768.10	552.91	474.54	14,383,907.79	1,681,251.38	39.60766927	-80.85501464
8,412.00	90.77	327.25	6,767.41	630.38	423.10	14,383,985.26	1,681,199.94	39.60788225	-80.85519684
8,507.00	90.42	326.28	6,766.43	709.84	371.03	14,384,064.71	1,681,147.87	39.60810070	-80.85538124
8,601.00	92.57	327.42	6,763.98	788.51	319.65	14,384,143.38	1,681,096.49	39.60831698	-80.85556322
8,696.00	91.87	330.15	6,760.29	869.69	270.46	14,384,224.56	1,681,047.30	39.60854014	-80.85573742
8,790.00	91.52	330.06	6,757.51	951.14	223.63	14,384,306.01	1,681,000.47	39.60876405	-80.85590323
8,885.00	91.56	331.38	6,754.96	1,033.97	177.19	14,384,388.84	1,680,954.03	39.60899174	-80.85607666
8,979.00	91.38	330.85	6,752.55	1,116.25	131.79	14,384,471.12	1,680,908.63	39.60921791	-80.85622836
9,074.00	90.90	330.15	6,750.66	1,198.92	85.02	14,384,553.79	1,680,861.86	39.60944514	-80.85639396
9,170.00	90.07	332.35	6,749.85	1,283.07	38.85	14,384,637.95	1,680,815.69	39.60967647	-80.85655741
9,265.00	89.05	332.26	6,750.58	1,367.19	-5.30	14,384,722.06	1,680,771.54	39.60990767	-80.85671370
9,360.00	90.73	333.40	6,750.76	1,451.70	-48.68	14,384,806.57	1,680,728.17	39.61013996	-80.85686724
9,455.00	90.02	334.45	6,750.14	1,537.03	-90.43	14,384,891.90	1,680,686.41	39.61037449	-80.85701502
9,550.00	91.25	332.52	6,749.08	1,622.02	-132.84	14,384,976.89	1,680,644.00	39.61060810	-80.85716510

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Lackawanna 2H (slot Y)
Project:	Wetzel County, West Virginia (UTM17 NAD83)	TVD Reference:	RKB=1306+18 @ 1324.00ft (Precision 528)
Site:	Lackawanna	MD Reference:	RKB=1306+18 @ 1324.00ft (Precision 528)
Well:	Lackawanna 2H (slot Y)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Aug1919_v14

RECEIVED
Office of Oil and Gas

SEP 30 2022

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Map Northing (usft)	Map Easting (usft)	WV Department of Environmental Protection Latitude	Longitude
9,645.00	90.81	331.82	6,747.38	1,706.02	-177.18	14,385,060.89	1,680,599.66	39.61083898	-80.85732208
9,739.00	90.24	331.64	6,746.51	1,788.81	-221.70	14,385,143.68	1,680,555.14	39.61106653	-80.85747969
9,834.00	89.58	331.47	6,746.66	1,872.34	-266.95	14,385,227.21	1,680,509.89	39.61129614	-80.85763988
9,928.00	88.84	331.38	6,747.96	1,954.88	-311.90	14,385,309.75	1,680,464.94	39.61152302	-80.85779905
10,023.00	89.27	329.09	6,749.53	2,037.33	-359.06	14,385,392.20	1,680,417.78	39.61174966	-80.85796601
10,117.00	88.57	328.83	6,751.30	2,117.85	-407.52	14,385,472.72	1,680,369.32	39.61197102	-80.85813763
10,213.00	90.99	329.53	6,751.67	2,200.29	-456.70	14,385,555.16	1,680,320.14	39.61219764	-80.85831180
10,308.00	89.89	328.83	6,750.94	2,281.87	-505.37	14,385,636.74	1,680,271.47	39.61242189	-80.85848416
10,401.00	92.13	329.45	6,749.30	2,361.68	-553.06	14,385,716.55	1,680,223.78	39.61264130	-80.85865306
10,496.00	91.78	328.92	6,746.06	2,443.22	-601.70	14,385,798.09	1,680,175.14	39.61286545	-80.85882530
10,591.00	90.73	329.18	6,743.98	2,524.68	-650.54	14,385,879.55	1,680,126.30	39.61308936	-80.85899829
10,686.00	89.76	329.18	6,743.57	2,606.26	-699.21	14,385,961.13	1,680,077.63	39.61331363	-80.85917065
10,780.00	91.52	329.53	6,742.52	2,687.12	-747.12	14,386,041.99	1,680,029.72	39.61353591	-80.85934032
10,876.00	91.52	329.09	6,739.97	2,769.65	-796.10	14,386,124.52	1,679,980.74	39.61376277	-80.85951378
10,971.00	90.42	330.32	6,738.37	2,851.66	-844.02	14,386,206.53	1,679,932.82	39.61398821	-80.85968346
11,066.00	89.71	330.24	6,738.26	2,934.16	-891.11	14,386,289.03	1,679,885.73	39.61421499	-80.85985024
11,161.00	92.31	330.68	6,736.58	3,016.80	-937.94	14,386,371.66	1,679,838.90	39.61444213	-80.86001606
11,255.00	91.82	330.76	6,733.20	3,098.73	-983.88	14,386,453.60	1,679,792.96	39.61466735	-80.86017874
11,350.00	90.81	331.38	6,731.02	3,181.85	-1,029.83	14,386,536.72	1,679,747.02	39.61489583	-80.86034142
11,444.00	89.71	331.64	6,730.59	3,264.47	-1,074.66	14,386,619.33	1,679,702.18	39.61512291	-80.86050018
11,539.00	92.13	330.41	6,729.06	3,347.56	-1,120.67	14,386,702.43	1,679,656.17	39.61535131	-80.86066310
11,634.00	91.43	330.32	6,726.11	3,430.09	-1,167.63	14,386,784.96	1,679,609.22	39.61557817	-80.86082937
11,729.00	90.68	329.80	6,724.36	3,512.40	-1,215.03	14,386,867.27	1,679,561.81	39.61580442	-80.86099725
11,823.00	91.82	329.80	6,722.31	3,593.62	-1,262.30	14,386,948.49	1,679,514.54	39.61602768	-80.86116466
11,918.00	91.12	329.53	6,719.88	3,675.59	-1,310.27	14,387,030.45	1,679,466.57	39.61625299	-80.86133453
12,013.00	90.20	329.62	6,718.78	3,757.50	-1,358.37	14,387,112.36	1,679,418.47	39.61647816	-80.86150490
12,108.00	92.57	328.39	6,716.49	3,838.90	-1,407.28	14,387,193.77	1,679,369.57	39.61670193	-80.86167811
12,203.00	91.96	327.78	6,712.73	3,919.48	-1,457.46	14,387,274.34	1,679,319.38	39.61692343	-80.86185587
12,298.00	91.12	327.69	6,710.18	3,999.78	-1,508.15	14,387,354.64	1,679,268.69	39.61714418	-80.86203545
12,392.00	90.24	327.42	6,709.06	4,079.10	-1,558.58	14,387,433.96	1,679,218.26	39.61736224	-80.86221408
12,486.00	91.03	329.62	6,708.02	4,159.25	-1,607.66	14,387,514.12	1,679,169.18	39.61758258	-80.86238793
12,580.00	92.97	329.09	6,704.74	4,240.07	-1,655.54	14,387,594.94	1,679,121.30	39.61780474	-80.86255752
12,675.00	92.40	328.57	6,700.29	4,321.27	-1,704.66	14,387,676.13	1,679,072.19	39.61802793	-80.86273149
12,769.00	91.25	328.48	6,697.30	4,401.40	-1,753.71	14,387,756.26	1,679,023.13	39.61824820	-80.86290525
12,863.00	90.02	328.65	6,696.26	4,481.59	-1,802.73	14,387,836.46	1,678,974.11	39.61846865	-80.86307889
12,958.00	91.47	330.94	6,695.02	4,563.68	-1,850.52	14,387,918.54	1,678,926.33	39.61869430	-80.86324814
13,053.00	90.86	331.38	6,693.09	4,646.88	-1,896.33	14,388,001.74	1,678,880.51	39.61892298	-80.86341038
13,148.00	90.11	331.20	6,692.28	4,730.20	-1,941.97	14,388,085.06	1,678,834.88	39.61915199	-80.86357199
13,243.00	92.44	332.52	6,690.17	4,813.94	-1,986.76	14,388,168.80	1,678,790.09	39.61938217	-80.86373059
13,338.00	92.09	331.99	6,686.42	4,897.95	-2,030.95	14,388,252.81	1,678,745.90	39.61961308	-80.86388706
13,432.00	91.12	332.26	6,683.78	4,981.01	-2,074.88	14,388,335.87	1,678,701.97	39.61984137	-80.86404262
13,526.00	90.20	332.79	6,682.70	5,064.40	-2,118.24	14,388,419.26	1,678,658.60	39.62007057	-80.86419617
13,621.00	92.31	330.85	6,680.62	5,148.11	-2,163.09	14,388,502.98	1,678,613.75	39.62030066	-80.86435498
13,716.00	91.43	330.41	6,677.52	5,230.86	-2,209.66	14,388,585.72	1,678,567.19	39.62052810	-80.86451991
13,811.00	90.55	330.59	6,675.88	5,313.53	-2,256.43	14,388,668.39	1,678,520.41	39.62075533	-80.86468556
13,905.00	92.57	329.88	6,673.32	5,395.09	-2,303.08	14,388,749.95	1,678,473.77	39.62097953	-80.86485077
14,000.00	92.04	329.88	6,669.50	5,477.20	-2,350.71	14,388,832.06	1,678,426.14	39.62120522	-80.86501949
14,095.00	91.47	328.65	6,666.59	5,558.81	-2,399.24	14,388,913.68	1,678,377.61	39.62142957	-80.86519139
14,190.00	90.86	326.98	6,664.66	5,639.19	-2,449.83	14,388,994.06	1,678,327.02	39.62165053	-80.86537062
14,284.00	89.98	325.84	6,663.97	5,717.49	-2,501.83	14,389,072.36	1,678,275.02	39.62186578	-80.86555487
14,379.00	91.47	328.74	6,662.77	5,797.41	-2,553.16	14,389,152.27	1,678,223.69	39.62208548	-80.86573672
14,474.00	90.99	328.92	6,660.73	5,878.68	-2,602.31	14,389,233.54	1,678,174.53	39.62230887	-80.86591087
14,569.00	90.11	329.62	6,659.81	5,960.33	-2,650.86	14,389,315.19	1,678,125.99	39.62253332	-80.86608282
14,664.00	92.22	329.80	6,657.88	6,042.34	-2,698.76	14,389,397.20	1,678,078.09	39.62275874	-80.86625250
14,759.00	91.52	329.53	6,654.78	6,124.29	-2,746.71	14,389,479.15	1,678,030.13	39.62298400	-80.86642237

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Lackawanna 2H (slot Y)
Project:	Wetzel County, West Virginia (UTM17 NAD83)	TVD Reference:	RKB=1306+18 @ 1324.00ft (Precision 528)
Site:	Lackawanna	MD Reference:	RKB=1306+18 @ 1324.00ft (Precision 528)
Well:	Lackawanna 2H (slot Y)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Aug1919_v14

 RECEIVED
Office of Oil and Gas
SEP 30 2022

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	WV Department of Environmental Protection	
								Latitude	Longitude
14,853.00	90.86	328.83	6,652.83	6,205.00	-2,794.86	14,389,559.86	1,677,981.98	39.62320585	-80.86659294
14,948.00	90.46	327.60	6,651.74	6,285.74	-2,844.90	14,389,640.61	1,677,931.95	39.62342781	-80.86677020
15,043.00	91.30	329.53	6,650.28	6,366.79	-2,894.43	14,389,721.65	1,677,882.41	39.62365058	-80.86694570
15,138.00	90.59	329.88	6,648.71	6,448.80	-2,942.35	14,389,803.66	1,677,834.50	39.62387602	-80.86711543
15,233.00	92.66	330.94	6,646.02	6,531.37	-2,989.24	14,389,886.23	1,677,787.61	39.62410298	-80.86728152
15,327.00	92.57	331.03	6,641.73	6,613.49	-3,034.79	14,389,968.35	1,677,742.06	39.62432869	-80.86744284
15,421.00	91.91	330.94	6,638.05	6,695.63	-3,080.34	14,390,050.49	1,677,696.50	39.62455445	-80.86760421
15,516.00	91.38	331.12	6,635.33	6,778.71	-3,126.34	14,390,133.57	1,677,650.51	39.62478280	-80.86776711
15,610.00	90.90	330.94	6,633.46	6,860.93	-3,171.86	14,390,215.79	1,677,604.99	39.62500880	-80.86792834
15,705.00	90.02	331.12	6,632.69	6,944.04	-3,217.87	14,390,298.90	1,677,558.98	39.62523723	-80.86809132
15,801.00	89.85	331.38	6,632.80	7,028.20	-3,264.04	14,390,383.06	1,677,512.80	39.62546857	-80.86825486
15,895.00	88.70	331.47	6,633.99	7,110.75	-3,309.00	14,390,465.81	1,677,467.85	39.62569544	-80.86841410
15,990.00	91.38	331.47	6,633.93	7,194.20	-3,354.37	14,390,549.06	1,677,422.48	39.62592482	-80.86857479
16,083.00	90.42	331.29	6,632.47	7,275.83	-3,398.91	14,390,630.69	1,677,377.94	39.62614917	-80.86873255
16,178.00	94.90	331.47	6,628.06	7,359.11	-3,444.36	14,390,713.97	1,677,332.49	39.62637807	-80.86889351
16,272.00	94.73	330.85	6,620.17	7,441.16	-3,489.54	14,390,796.02	1,677,287.31	39.62660359	-80.86905355
16,367.00	94.29	330.94	6,612.70	7,523.91	-3,535.60	14,390,878.76	1,677,241.24	39.62683103	-80.86921673
16,462.00	92.31	330.41	6,607.23	7,606.59	-3,582.05	14,390,961.45	1,677,194.80	39.62705830	-80.86938126
16,557.00	91.78	330.68	6,603.84	7,689.26	-3,628.74	14,391,044.12	1,677,148.11	39.62728552	-80.86954664
16,652.00	91.47	331.03	6,601.15	7,772.20	-3,674.99	14,391,127.05	1,677,101.86	39.62751348	-80.86971046
16,746.00	91.03	331.20	6,599.09	7,854.48	-3,720.38	14,391,209.34	1,677,056.47	39.62773965	-80.86987127
16,841.00	90.73	330.94	6,597.64	7,937.62	-3,766.33	14,391,292.48	1,677,010.52	39.62796815	-80.87003403
16,937.00	89.67	330.85	6,597.30	8,021.49	-3,813.03	14,391,376.35	1,676,963.82	39.62819869	-80.87019944
17,032.00	91.74	330.06	6,596.13	8,104.13	-3,859.86	14,391,458.99	1,676,916.98	39.62842582	-80.87036537
17,127.00	91.12	329.36	6,593.76	8,186.13	-3,907.76	14,391,540.99	1,676,869.08	39.62865123	-80.87053507
17,221.00	93.14	328.57	6,590.27	8,266.62	-3,956.19	14,391,621.47	1,676,820.66	39.62887246	-80.87070665
17,316.00	92.53	329.53	6,585.57	8,347.99	-4,004.99	14,391,702.85	1,676,771.86	39.62909613	-80.87087954
17,412.00	93.76	328.92	6,580.30	8,430.35	-4,054.03	14,391,785.20	1,676,722.82	39.62932250	-80.87105331
17,507.00	93.19	328.65	6,574.54	8,511.44	-4,103.18	14,391,866.30	1,676,673.67	39.62954541	-80.87122744
17,602.00	92.44	327.95	6,569.88	8,592.17	-4,153.03	14,391,947.03	1,676,623.81	39.62976732	-80.87140411
17,695.00	91.56	326.81	6,566.63	8,670.45	-4,203.14	14,392,025.31	1,676,573.71	39.62998250	-80.87158165
17,790.00	92.18	329.18	6,563.53	8,750.96	-4,253.46	14,392,105.82	1,676,523.39	39.63020381	-80.87175996
17,885.00	91.78	329.01	6,560.25	8,832.43	-4,302.22	14,392,187.28	1,676,474.63	39.63042773	-80.87193274
17,980.00	92.97	329.18	6,556.31	8,913.87	-4,350.97	14,392,268.72	1,676,425.88	39.63065158	-80.87210548
18,075.00	92.70	328.39	6,551.61	8,995.01	-4,400.14	14,392,349.87	1,676,376.71	39.63087463	-80.87227972
18,169.00	92.26	327.42	6,547.55	9,074.57	-4,450.04	14,392,429.43	1,676,326.81	39.63109332	-80.87245654
18,264.00	91.69	326.63	6,544.27	9,154.22	-4,501.72	14,392,509.07	1,676,275.13	39.63131226	-80.87263967
18,360.00	92.22	328.13	6,541.00	9,235.03	-4,553.43	14,392,589.88	1,676,223.42	39.63153439	-80.87282295
18,455.00	91.34	327.78	6,538.05	9,315.51	-4,603.81	14,392,670.37	1,676,173.03	39.63175563	-80.87300149
18,549.00	90.55	327.86	6,536.50	9,395.06	-4,653.87	14,392,749.91	1,676,122.98	39.63197429	-80.87317888
18,591.00	90.29	328.13	6,536.19	9,430.68	-4,676.13	14,392,785.53	1,676,100.72	39.63207219	-80.87325776
Survey @ 18591.00 MD 6536.19 TVD									
18,645.00	90.29	328.13	6,535.91	9,476.53	-4,704.64	14,392,831.39	1,676,072.21	39.63219824	-80.87335879
Survey projected to 18645.00 MD 6535.91 TVD									

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
3,062.00	3,061.90	-7.09	2.28	Tie in survey @ 3062 MD
18,591.00	6,536.19	9,430.68	-4,676.13	Survey @ 18591.00 MD 6536.19 TVD
18,645.00	6,535.91	9,476.53	-4,704.64	Survey projected to 18645.00 MD 6535.91 TVD

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Lackawanna 2H (slot Y)
Project:	Wetzel County, West Virginia (UTM17 NAD83)	TVD Reference:	RKB=1306+18 @ 1324.00ft (Precision 528)
Site:	Lackawanna	MD Reference:	RKB=1306+18 @ 1324.00ft (Precision 528)
Well:	Lackawanna 2H (slot Y)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Aug1919_v14

RECEIVED
Office of Oil and Gas

SEP 30 2022

WV Department of
Environmental Protection