



SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N-S	+E-W	Dleg	TFace	VSect	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	
2	1533.50	0.00	0.00	1533.50	0.00	0.00	0.00	0.000	0.00	KOP Begin 2°/100' build
3	2719.39	23.72	0.23	2685.81	241.96	0.99	2.00	0.234	-187.26	Begin 23.72° tangent
4	6043.85	23.72	0.23	5729.48	1579.16	6.44	0.00	0.000	-1222.16	Begin 8°/100' build/turn
5	6909.22	50.00	139.61	6499.83	1489.57	252.64	8.00	147.762	-997.46	Begin 10°/100' build/turn
6	7310.56	89.00	150.00	6638.00	1186.22	461.17	10.00	16.245	-630.52	Begin 89.00° lateral
7	14333.54	89.00	150.00	6760.00	-4894.94	3972.13	0.00	0.000	6303.83	PBHL/TD 14333.54 MD 6760.00 TVD

**Well: Whistlepig S-09HM (slot D)**  
**Site: Whistlepig**  
**Project: Marshall County, West Virginia**  
**Design: rev1**  
**Rig: Nabors X14**

ANNOTATIONS SURVEYS

MD	Inc	Azi	TVD	+N-S	+E-W	VSect	Annotation
194.00	0.26	284.90	194.00	0.11	-0.43	-0.36	MWD surveys
14307.00	90.37	148.76	6704.95	-4840.94	3946.22	6245.57	Survey @ 14307.00 MD 6704.95 TVD
14366.00	90.37	148.76	6704.57	-4891.39	3976.82	6304.03	Survey Proj. to 14366.00 MD 6704.57 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=1368+32.5 @ 1400.50ft (Nabors X14)

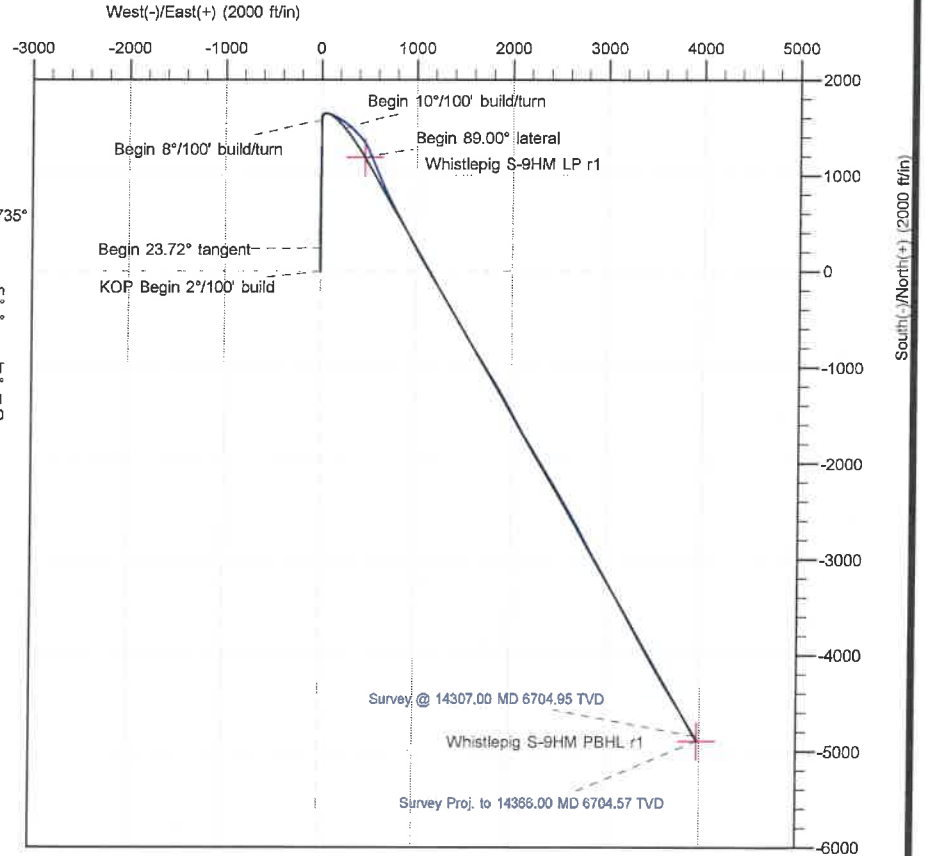
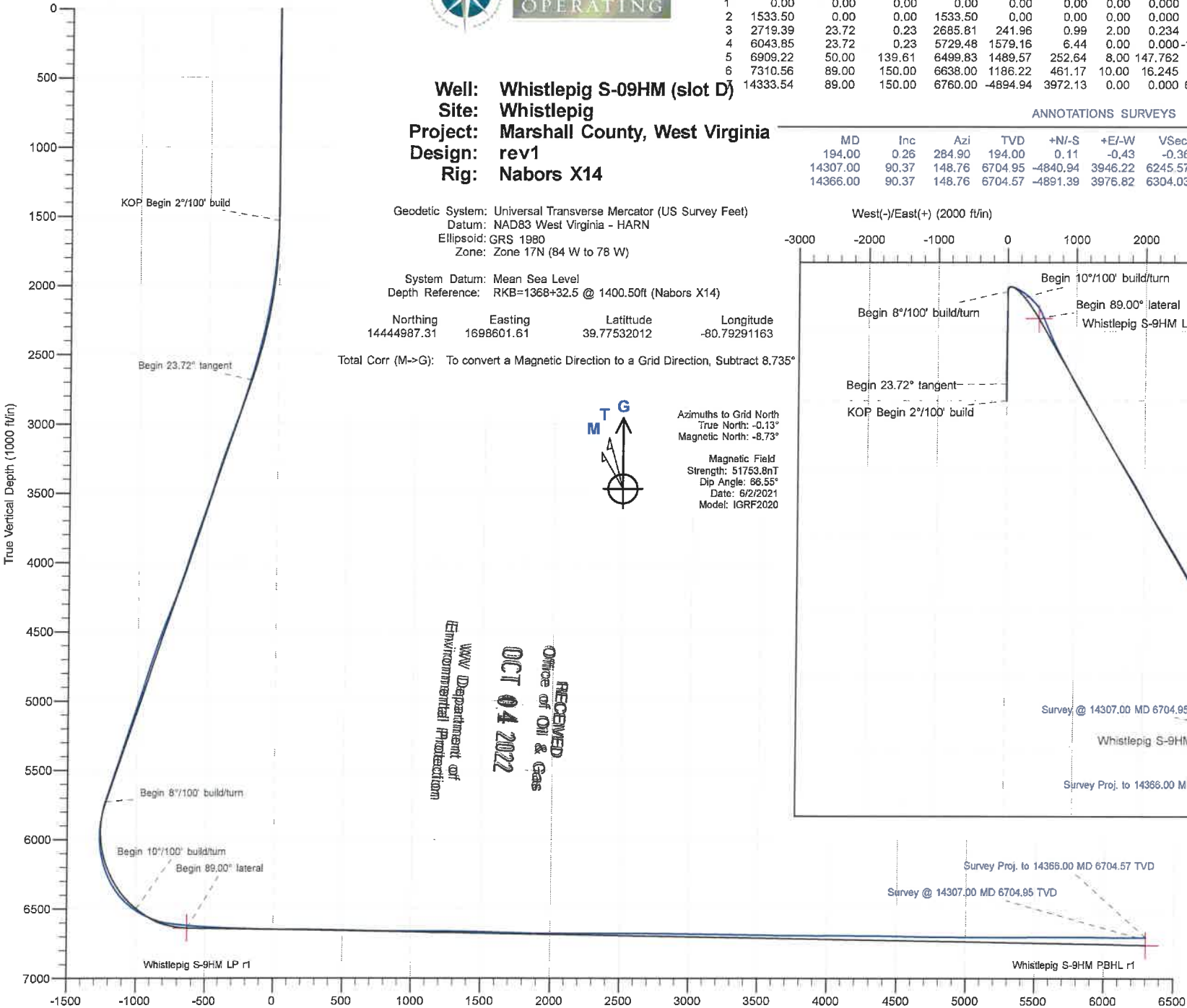
Northing 14444987.31 Easting 1698601.61 Latitude 39.77532012 Longitude -80.79291163

Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.735°



Azimuths to Grid North  
 True North: -0.13°  
 Magnetic North: -8.73°

Magnetic Field  
 Strength: 51753.8nT  
 Dip Angle: 86.55°  
 Date: 6/2/2021  
 Model: IGRF2020



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Survey Proj. to 14366.00 MD 6704.57 TVD  
 Survey @ 14307.00 MD 6704.95 TVD



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Whistlepig S-09HM (slot D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1368+32.5 @ 1400.50ft (Nabors X14)
<b>Site:</b>	Whistlepig	<b>MD Reference:</b>	RKB=1368+32.5 @ 1400.50ft (Nabors X14)
<b>Well:</b>	Whistlepig S-09HM (slot D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Dec2220_v16

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

<b>Site</b>	Whistlepig				
<b>Site Position:</b>		<b>Northing:</b>	14,444,965.96 usft	<b>Latitude:</b>	39.77526165
<b>From:</b>	Lat/Long	<b>Easting:</b>	1,698,572.65 usft	<b>Longitude:</b>	-80.79301490
<b>Position Uncertainty:</b>	0.00 ft	<b>Slot Radius:</b>	13-3/16 "		

<b>Well</b>	Whistlepig S-09HM (slot D)					
<b>Well Position</b>	<b>+N/-S</b>	0.00 ft	<b>Northing:</b>	14,444,987.32 usft	<b>Latitude:</b>	39.77532012
	<b>+E/-W</b>	0.00 ft	<b>Easting:</b>	1,698,601.61 usft	<b>Longitude:</b>	-80.79291163
<b>Position Uncertainty</b>	0.00 ft		<b>Wellhead Elevation:</b>	ft	<b>Ground Level:</b>	1,368.00 ft
<b>Grid Convergence:</b>	0.132 °					

<b>Wellbore</b>	Original Hole				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2020	6/2/2021	-8.602	66.545	51,753.81064811

<b>Design</b>	Surveys Original Hole				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.00
<b>Vertical Section:</b>	<b>Depth From (TVD) (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>	
	0.00	0.00	0.00	140.94	

<b>Survey Program</b>	Date 6/19/2021			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>
194.00	1,088.00	MWD surf (Original Hole)	MWD	MWD - Standard
1,130.00	2,840.00	MWD int (Original Hole)	MWD	MWD - Standard
2,878.00	14,307.00	MWD (Original Hole)	MWD	MWD - Standard
14,366.00	14,366.00	Projection (Original Hole)	MWD	MWD - Standard

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<b>Survey</b>										
<b>Measured Depth (ft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Vertical Section (ft)</b>	<b>Dogleg Rate (°/100ft)</b>	<b>Build Rate (°/100ft)</b>	<b>Turn Rate (°/100ft)</b>	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
194.00	0.26	284.90	194.00	0.11	-0.43	-0.36	0.13	0.13	0.00	
<b>MWD surveys</b>										
241.00	0.26	305.29	241.00	0.20	-0.62	-0.54	0.20	0.00	43.38	
285.00	0.22	289.82	285.00	0.29	-0.78	-0.71	0.17	-0.09	-35.16	
332.00	0.18	268.38	332.00	0.32	-0.94	-0.84	0.18	-0.09	-45.62	
375.00	0.22	280.60	375.00	0.33	-1.08	-0.94	0.14	0.09	28.42	

<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Whistlepig S-09HM (slot D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1368+32.5 @ 1400.50ft (Nabors X14)
<b>Site:</b>	Whistlepig	<b>MD Reference:</b>	RKB=1368+32.5 @ 1400.50ft (Nabors X14)
<b>Well:</b>	Whistlepig S-09HM (slot D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Dec2220_v16

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)
422.00	0.18	300.28	422.00	0.38	-1.24	-1.08	0.17	-0.09	41.87
465.00	0.13	281.48	465.00	0.43	-1.34	-1.18	0.16	-0.12	-43.72
512.00	0.09	267.15	512.00	0.44	-1.43	-1.24	0.10	-0.09	-30.49
556.00	0.04	284.02	556.00	0.44	-1.48	-1.27	0.12	-0.11	38.34
603.00	0.00	102.44	603.00	0.44	-1.50	-1.29	0.09	-0.09	0.00
647.00	0.04	166.78	647.00	0.43	-1.49	-1.27	0.09	0.09	0.00
694.00	0.09	221.71	694.00	0.38	-1.51	-1.25	0.16	0.11	116.87
738.00	0.09	170.56	738.00	0.32	-1.53	-1.22	0.18	0.00	-116.25
785.00	0.04	145.86	785.00	0.27	-1.52	-1.17	0.12	-0.11	-52.55
832.00	0.13	195.96	832.00	0.21	-1.52	-1.12	0.23	0.19	106.60
879.00	0.04	197.80	879.00	0.14	-1.54	-1.08	0.19	-0.19	3.91
927.00	0.04	139.00	927.00	0.11	-1.54	-1.06	0.08	0.00	-122.50
974.00	0.13	176.89	974.00	0.05	-1.52	-1.00	0.22	0.19	80.62
1,021.00	0.04	158.60	1,021.00	-0.02	-1.51	-0.94	0.20	-0.19	-38.91
1,068.00	0.22	157.11	1,068.00	-0.12	-1.47	-0.84	0.38	0.38	-3.17
1,088.00	0.26	166.60	1,088.00	-0.20	-1.45	-0.76	0.28	0.20	47.45
1,130.00	0.40	144.19	1,130.00	-0.41	-1.34	-0.53	0.45	0.33	-53.36
1,177.00	0.26	115.36	1,177.00	-0.59	-1.15	-0.27	0.45	-0.30	-61.34
1,224.00	0.48	143.57	1,223.99	-0.79	-0.93	0.03	0.59	0.47	60.02
1,271.00	0.53	172.58	1,270.99	-1.17	-0.79	0.41	0.55	0.11	61.72
1,318.00	0.40	181.63	1,317.99	-1.55	-0.76	0.72	0.32	-0.28	19.26
1,365.00	0.13	182.86	1,364.99	-1.76	-0.77	0.88	0.57	-0.57	2.62
1,412.00	0.53	18.33	1,411.99	-1.61	-0.71	0.81	1.40	0.85	-350.06
1,459.00	0.88	7.08	1,458.99	-1.05	-0.59	0.44	0.80	0.74	-23.94
1,506.00	1.36	8.57	1,505.98	-0.14	-0.47	-0.19	1.02	1.02	3.17
1,553.00	1.85	2.07	1,552.96	1.17	-0.36	-1.14	1.11	1.04	-13.83
1,600.00	2.77	359.26	1,599.92	3.07	-0.34	-2.60	1.97	1.87	-5.98
1,647.00	4.00	0.66	1,646.84	5.84	-0.34	-4.75	2.62	2.62	2.98
1,694.00	4.88	356.97	1,693.70	9.48	-0.42	-7.63	1.97	1.97	-7.85
1,742.00	5.54	1.19	1,741.50	13.83	-0.48	-11.05	1.59	1.38	8.79
1,789.00	6.33	356.36	1,788.25	18.69	-0.60	-14.89	1.97	1.97	-10.28
1,836.00	7.21	356.80	1,834.92	24.22	-0.93	-19.39	1.88	1.88	0.94
1,883.00	7.87	357.24	1,881.51	30.38	-1.25	-24.38	1.41	1.40	0.94
1,930.00	8.39	357.94	1,928.04	37.02	-1.53	-29.71	1.13	1.11	1.49
1,977.00	8.92	358.73	1,974.50	44.09	-1.73	-35.33	1.16	1.13	1.68
2,025.00	9.76	358.20	2,021.87	51.87	-1.94	-41.50	1.76	1.75	-1.10
2,072.00	11.38	0.58	2,068.07	60.49	-2.02	-48.25	3.57	3.45	5.06
2,119.00	12.88	2.86	2,114.02	70.36	-1.71	-55.72	3.35	3.19	4.85
2,166.00	13.58	3.74	2,159.77	81.10	-1.09	-63.66	1.55	1.49	1.87
2,213.00	14.37	3.39	2,205.38	92.43	-0.39	-72.01	1.69	1.68	-0.74
2,260.00	15.21	2.69	2,250.82	104.41	0.25	-80.92	1.83	1.79	-1.49
2,305.00	16.17	2.33	2,294.14	116.57	0.78	-90.02	2.14	2.13	-0.80
2,352.00	17.09	1.63	2,339.18	130.01	1.24	-100.17	2.00	1.96	-1.49
2,400.00	17.23	359.61	2,385.04	144.17	1.39	-111.07	1.28	0.29	-4.21

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<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1368+32.5 @ 1400.50ft (Nabors X14)
<b>Site:</b>	Whistlepig	<b>MD Reference:</b>	RKB=1368+32.5 @ 1400.50ft (Nabors X14)
<b>Well:</b>	Whistlepig S-09HM (slot D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Dec2220_v16

## Survey

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)
2,447.00	17.14	357.85	2,429.94	158.05	1.09	-122.04	1.12	-0.19	-3.74
2,494.00	17.40	356.45	2,474.82	171.99	0.39	-133.30	1.04	0.55	-2.98
2,541.00	18.72	357.50	2,519.51	186.54	-0.37	-145.08	2.89	2.81	2.23
2,588.00	20.52	358.56	2,563.78	202.31	-0.91	-157.66	3.90	3.83	2.26
2,635.00	21.45	359.43	2,607.66	219.14	-1.20	-170.91	2.09	1.98	1.85
2,682.00	21.05	358.38	2,651.46	236.17	-1.53	-184.34	1.17	-0.85	-2.23
2,729.00	20.79	358.20	2,695.36	252.94	-2.03	-197.68	0.57	-0.55	-0.38
2,776.00	20.96	358.73	2,739.28	269.68	-2.47	-210.96	0.54	0.36	1.13
2,840.00	22.37	0.05	2,798.76	293.31	-2.72	-229.46	2.33	2.20	2.06
2,878.00	23.29	1.28	2,833.78	308.05	-2.54	-240.80	2.73	2.42	3.24
2,972.00	23.29	357.76	2,920.13	345.20	-2.85	-269.84	1.48	0.00	-3.74
3,066.00	24.43	0.49	3,006.09	383.21	-3.41	-299.71	1.69	1.21	2.90
3,160.00	23.55	357.32	3,091.98	421.40	-4.13	-329.82	1.66	-0.94	-3.37
3,254.00	25.14	1.28	3,177.62	460.13	-4.56	-360.16	2.42	1.69	4.21
3,349.00	24.26	358.99	3,263.93	499.82	-4.45	-390.91	1.37	-0.93	-2.41
3,443.00	22.98	3.39	3,350.06	537.45	-3.71	-419.66	2.32	-1.36	4.68
3,541.00	24.52	3.48	3,439.76	576.85	-1.34	-448.76	1.57	1.57	0.09
3,635.00	22.76	359.17	3,525.87	614.50	-0.42	-477.42	2.62	-1.87	-4.59
3,728.00	25.31	1.54	3,610.80	652.37	-0.15	-506.65	2.93	2.74	2.55
3,822.00	24.78	359.52	3,695.97	692.16	0.23	-537.31	1.07	-0.56	-2.15
3,916.00	23.55	355.66	3,781.73	730.58	-1.36	-568.14	2.13	-1.31	-4.11
4,010.00	22.85	359.96	3,868.14	767.56	-2.79	-597.76	1.95	-0.74	4.57
4,104.00	23.60	3.83	3,954.52	804.59	-1.55	-625.73	1.81	0.80	4.12
4,196.00	22.59	1.81	4,039.15	840.63	0.24	-652.59	1.40	-1.10	-2.20
4,290.00	24.04	3.48	4,125.47	877.79	1.97	-680.35	1.70	1.54	1.78
4,385.00	23.64	1.02	4,212.37	916.15	3.49	-709.18	1.13	-0.42	-2.59
4,479.00	25.71	359.52	4,297.78	955.38	3.65	-739.54	2.30	2.20	-1.60
4,574.00	25.05	356.09	4,383.62	996.06	2.11	-772.10	1.70	-0.69	-3.61
4,668.00	25.93	1.19	4,468.48	1,036.46	1.18	-804.06	2.51	2.51	5.43
4,762.00	25.44	359.35	4,553.19	1,077.20	1.37	-835.57	1.00	1.00	-1.96
4,856.00	25.00	356.89	4,638.23	1,117.22	0.07	-867.47	1.21	1.21	-2.62
4,950.00	23.60	3.65	4,723.92	1,155.85	0.19	-897.38	3.31	-1.49	7.19
5,045.00	23.25	2.77	4,811.09	1,193.55	2.31	-925.33	0.79	0.79	-0.93
5,139.00	22.90	1.10	4,897.57	1,230.37	3.55	-953.13	0.79	0.79	-1.78
5,233.00	22.63	358.64	4,984.25	1,266.74	3.47	-981.41	1.05	-0.29	-2.62
5,328.00	23.47	2.95	5,071.67	1,303.90	4.01	-1,009.93	1.98	0.88	4.54
5,422.00	23.07	3.04	5,158.02	1,340.99	5.95	-1,037.51	0.43	-0.43	0.10
5,516.00	22.94	1.89	5,244.55	1,377.69	7.54	-1,065.01	0.50	-0.14	-1.22
5,610.00	22.54	0.31	5,331.24	1,414.02	8.24	-1,092.77	0.78	-0.43	-1.68
5,705.00	22.37	358.99	5,419.04	1,450.30	8.02	-1,121.09	0.56	-0.18	-1.39
5,790.00	23.73	357.85	5,497.25	1,483.56	7.09	-1,147.50	1.68	1.60	-1.34
5,809.00	24.04	357.24	5,514.63	1,491.25	6.76	-1,153.68	2.09	1.63	-3.21
5,903.00	21.93	357.76	5,601.16	1,527.92	5.15	-1,183.16	2.26	-2.24	0.55

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<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1368+32.5 @ 1400.50ft (Nabors X14)
<b>Site:</b>	Whistlepig	<b>MD Reference:</b>	RKB=1368+32.5 @ 1400.50ft (Nabors X14)
<b>Well:</b>	Whistlepig S-09HM (slot D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Dec2220_v16

## Survey

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)
5,997.00	22.42	356.89	5,688.21	1,563.36	3.49	-1,211.72	0.63	0.52	-0.93
6,044.00	20.97	357.85	5,731.88	1,580.71	2.69	-1,225.71	3.18	-3.09	2.04
6,091.00	17.85	2.51	5,776.20	1,596.32	2.69	-1,237.82	7.41	-6.64	9.91
6,138.00	16.00	6.29	5,821.17	1,609.95	3.72	-1,247.77	4.58	-3.94	8.04
6,186.00	14.15	18.95	5,867.52	1,622.08	6.35	-1,255.53	7.85	-3.85	26.38
6,233.00	12.97	28.88	5,913.22	1,632.14	10.76	-1,260.55	5.54	-2.51	21.13
6,280.00	11.43	42.50	5,959.17	1,640.19	16.46	-1,263.22	6.92	-3.28	28.98
6,327.00	11.52	58.23	6,005.24	1,646.10	23.59	-1,263.30	6.64	0.19	33.47
6,374.00	12.75	73.17	6,051.20	1,650.07	32.55	-1,260.75	7.15	2.62	31.79
6,421.00	15.12	88.20	6,096.83	1,651.77	43.65	-1,255.07	9.16	5.04	31.98
6,468.00	16.79	101.04	6,142.03	1,650.66	56.44	-1,246.15	8.29	3.55	27.32
6,515.00	19.96	107.63	6,186.63	1,646.93	70.76	-1,234.23	8.05	6.74	14.02
6,561.00	24.00	108.77	6,229.28	1,641.54	87.10	-1,219.74	8.83	8.78	2.48
6,608.00	27.91	111.85	6,271.53	1,634.36	106.37	-1,202.03	8.80	8.32	6.55
6,656.00	31.56	114.83	6,313.21	1,624.90	128.21	-1,180.93	8.20	7.60	6.21
6,703.00	35.78	117.21	6,352.32	1,613.45	151.60	-1,157.29	9.41	8.98	5.06
6,751.00	39.82	119.05	6,390.24	1,599.57	177.53	-1,130.18	8.74	8.42	3.83
6,798.00	44.13	121.95	6,425.17	1,583.59	204.58	-1,100.72	10.05	9.17	6.17
6,845.00	47.82	124.77	6,457.84	1,564.99	232.78	-1,068.51	8.96	7.85	6.00
6,892.00	52.09	127.93	6,488.07	1,543.65	261.73	-1,033.70	10.44	9.09	6.72
6,940.00	56.88	129.78	6,515.95	1,519.13	292.13	-995.50	10.46	9.98	3.85
6,987.00	61.80	131.62	6,539.91	1,492.77	322.76	-955.73	11.00	10.47	3.91
7,034.00	66.81	133.47	6,560.28	1,464.13	353.94	-913.85	11.23	10.66	3.94
7,081.00	71.47	136.28	6,577.02	1,433.14	385.04	-870.19	11.38	9.91	5.98
7,128.00	75.91	139.62	6,590.22	1,399.65	415.23	-825.16	11.65	9.45	7.11
7,175.00	79.56	143.75	6,600.20	1,363.62	443.69	-779.25	11.58	7.77	8.79
7,223.00	81.98	147.62	6,607.91	1,324.50	470.38	-732.05	11.42	5.04	8.06
7,270.00	84.00	152.89	6,613.65	1,284.01	493.51	-686.04	11.30	4.30	11.21
7,318.00	85.98	157.46	6,617.84	1,240.63	513.58	-639.70	10.34	3.33	9.52
7,365.00	85.63	157.29	6,621.28	1,197.36	531.61	-594.75	0.83	-0.74	-0.36
7,413.00	85.32	156.58	6,625.06	1,153.33	550.36	-548.75	0.83	-0.65	-1.48
7,460.00	85.49	156.14	6,628.83	1,110.42	569.14	-503.59	1.00	0.36	-0.94
7,507.00	87.60	157.90	6,631.66	1,067.23	587.46	-458.51	5.84	4.49	3.74
7,554.00	86.99	157.64	6,633.88	1,023.77	605.22	-413.57	1.41	-1.30	-0.55
7,601.00	86.81	157.02	6,636.42	980.47	623.31	-368.55	1.37	-0.38	-1.32
7,648.00	86.64	156.67	6,639.11	937.32	641.76	-323.42	0.83	-0.36	-0.74
7,695.00	88.00	155.44	6,641.30	894.42	660.81	-278.10	3.90	2.89	-2.62
7,742.00	88.70	154.65	6,642.66	851.82	680.63	-232.54	2.25	1.49	-1.68
7,789.00	89.10	154.82	6,643.56	809.33	700.69	-186.90	0.92	0.85	0.36
7,883.00	88.66	152.63	6,645.40	725.06	742.29	-95.26	2.38	-0.47	-2.33
7,977.00	88.84	153.07	6,647.45	641.44	785.17	-3.30	0.51	0.19	0.47
8,072.00	89.58	151.66	6,648.76	557.29	829.23	89.80	1.68	0.78	-1.48
8,166.00	90.29	152.10	6,648.87	474.38	873.54	182.09	0.89	0.76	0.47

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<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Whistlepig S-09HM (slot D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1368+32.5 @ 1400.50ft (Nabors X14)
<b>Site:</b>	Whistlepig	<b>MD Reference:</b>	RKB=1368+32.5 @ 1400.50ft (Nabors X14)
<b>Well:</b>	Whistlepig S-09HM (slot D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Dec2220_v16

## Survey

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)
8,260.00	88.62	150.34	6,649.76	392.00	918.79	274.57	2.58	-1.78	-1.87
8,354.00	89.36	151.48	6,651.42	309.88	964.48	367.14	1.45	0.79	1.21
8,448.00	88.66	150.43	6,653.04	227.71	1,010.11	459.69	1.34	-0.74	-1.12
8,542.00	88.57	151.13	6,655.31	145.70	1,055.98	552.28	0.75	-0.10	0.74
8,636.00	88.40	150.87	6,657.80	63.51	1,101.54	644.80	0.33	-0.18	-0.28
8,730.00	88.62	149.11	6,660.24	-17.86	1,148.54	737.60	1.89	0.23	-1.87
8,824.00	90.15	148.23	6,661.25	-98.14	1,197.41	830.73	1.88	1.63	-0.94
8,918.00	90.29	147.79	6,660.89	-177.87	1,247.21	924.02	0.49	0.15	-0.47
9,012.00	90.37	149.46	6,660.35	-258.12	1,296.14	1,017.17	1.78	0.09	1.78
9,107.00	90.15	150.08	6,659.92	-340.20	1,343.97	1,111.04	0.69	-0.23	0.65
9,201.00	89.27	150.34	6,660.39	-421.77	1,390.67	1,203.81	0.98	-0.94	0.28
9,295.00	89.93	151.66	6,661.05	-503.98	1,436.24	1,296.36	1.57	0.70	1.40
9,389.00	88.48	149.20	6,662.35	-585.72	1,482.62	1,389.06	3.04	-1.54	-2.62
9,483.00	88.92	149.46	6,664.49	-666.55	1,530.56	1,482.03	0.54	0.47	0.28
9,578.00	87.34	148.76	6,667.59	-748.03	1,579.30	1,576.01	1.82	-1.66	-0.74
9,671.00	87.47	148.32	6,671.80	-827.28	1,627.79	1,668.10	0.49	0.14	-0.47
9,766.00	88.75	148.50	6,674.93	-908.16	1,677.52	1,762.24	1.36	1.35	0.19
9,860.00	90.02	149.29	6,675.94	-988.64	1,726.08	1,855.32	1.59	1.35	0.84
9,953.00	89.85	149.55	6,676.04	-1,068.70	1,773.39	1,947.31	0.33	-0.18	0.28
10,047.00	90.20	149.81	6,676.00	-1,149.84	1,820.85	2,040.22	0.46	0.37	0.28
10,141.00	90.55	149.20	6,675.39	-1,230.84	1,868.55	2,133.16	0.75	0.37	-0.65
10,235.00	89.85	150.25	6,675.06	-1,312.02	1,915.94	2,226.06	1.34	-0.74	1.12
10,329.00	90.02	150.52	6,675.17	-1,393.74	1,962.39	2,318.79	0.34	0.18	0.29
10,423.00	90.02	150.87	6,675.13	-1,475.71	2,008.40	2,411.43	0.37	0.00	0.37
10,518.00	89.67	150.87	6,675.39	-1,558.69	2,054.64	2,505.00	0.37	-0.37	0.00
10,612.00	89.27	149.90	6,676.26	-1,640.41	2,101.09	2,597.72	1.12	-0.43	-1.03
10,706.00	89.54	150.25	6,677.24	-1,721.87	2,147.98	2,690.53	0.47	0.29	0.37
10,800.00	89.45	150.61	6,678.07	-1,803.62	2,194.37	2,783.24	0.39	-0.10	0.38
10,893.00	89.27	150.25	6,679.10	-1,884.50	2,240.26	2,874.96	0.43	-0.19	-0.39
10,988.00	89.23	149.11	6,680.35	-1,966.50	2,288.21	2,968.84	1.20	-0.04	-1.20
11,082.00	88.97	149.20	6,681.82	-2,047.20	2,336.40	3,061.87	0.29	0.28	0.10
11,176.00	89.36	148.94	6,683.19	-2,127.82	2,384.71	3,154.91	0.50	0.41	0.00
11,269.00	89.67	148.94	6,683.98	-2,207.48	2,432.69	3,247.00	0.33	0.33	0.00
11,363.00	88.79	150.08	6,685.24	-2,288.48	2,480.38	3,339.94	1.53	-0.94	1.21
11,457.00	89.01	150.25	6,687.05	-2,370.00	2,527.14	3,432.71	0.30	0.23	0.18
11,551.00	88.88	149.81	6,688.78	-2,451.42	2,574.09	3,525.51	0.49	-0.14	0.47
11,645.00	89.19	149.73	6,690.36	-2,532.62	2,621.41	3,618.39	0.34	0.33	-0.09
11,740.00	89.05	149.29	6,691.82	-2,614.48	2,669.60	3,712.32	0.49	-0.15	-0.46
11,834.00	89.80	151.05	6,692.77	-2,696.02	2,716.36	3,805.09	2.04	0.80	1.87
11,929.00	89.80	150.78	6,693.10	-2,779.04	2,762.54	3,898.65	0.28	0.00	-0.28
12,023.00	90.24	150.69	6,693.06	-2,861.04	2,808.49	3,991.28	0.48	0.47	-0.10
12,117.00	90.51	150.69	6,692.45	-2,943.00	2,854.50	4,083.92	0.29	0.29	0.00
12,211.00	89.05	150.96	6,692.81	-3,025.07	2,900.33	4,176.52	1.58	-1.55	0.29
12,305.00	89.80	151.40	6,693.75	-3,107.43	2,945.64	4,269.02	0.93	0.80	0.47

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<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Whistlepig S-09HM (slot D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1368+32.5 @ 1400.50ft (Nabors X14)
<b>Site:</b>	Whistlepig	<b>MD Reference:</b>	RKB=1368+32.5 @ 1400.50ft (Nabors X14)
<b>Well:</b>	Whistlepig S-09HM (slot D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Dec2220_v16

**Survey**

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)
12,399.00	90.24	151.92	6,693.72	-3,190.16	2,990.26	4,361.38	0.72	0.47	0.55
12,493.00	88.35	149.99	6,694.88	-3,272.32	3,035.89	4,453.93	2.87	-2.01	-2.05
12,587.00	88.62	150.17	6,697.36	-3,353.77	3,082.76	4,546.71	0.35	0.29	0.19
12,681.00	89.23	150.78	6,699.13	-3,435.55	3,129.07	4,639.39	0.92	0.65	0.65
12,775.00	89.14	150.87	6,700.46	-3,517.61	3,174.89	4,731.98	0.14	-0.10	0.10
12,870.00	89.58	151.48	6,701.52	-3,600.84	3,220.69	4,825.47	0.79	0.46	0.64
12,964.00	89.19	151.22	6,702.53	-3,683.32	3,265.76	4,917.91	0.50	-0.41	-0.28
13,058.00	89.32	151.31	6,703.76	-3,765.74	3,310.94	5,010.38	0.17	0.14	0.10
13,152.00	89.89	149.90	6,704.40	-3,847.63	3,357.08	5,103.04	1.62	0.61	-1.50
13,246.00	90.42	150.25	6,704.15	-3,929.10	3,403.97	5,195.85	0.68	0.56	0.37
13,341.00	90.46	150.43	6,703.42	-4,011.65	3,450.98	5,289.57	0.19	0.04	0.19
13,435.00	90.86	150.34	6,702.34	-4,093.36	3,497.43	5,382.29	0.44	0.43	-0.10
13,530.00	89.71	149.46	6,701.86	-4,175.55	3,545.07	5,476.13	1.52	-1.21	-0.93
13,624.00	89.58	148.76	6,702.45	-4,256.22	3,593.33	5,569.17	0.76	-0.14	-0.74
13,719.00	89.36	148.23	6,703.33	-4,337.21	3,642.97	5,663.34	0.60	-0.23	-0.56
13,814.00	90.11	149.20	6,703.76	-4,418.39	3,692.30	5,757.47	1.29	0.79	1.02
13,909.00	89.93	149.55	6,703.73	-4,500.14	3,740.70	5,851.44	0.41	-0.19	0.37
14,003.00	90.11	149.73	6,703.70	-4,581.25	3,788.21	5,944.36	0.27	0.19	0.19
14,098.00	89.14	148.23	6,704.32	-4,662.66	3,837.16	6,038.42	1.88	-1.02	-1.58
14,191.00	89.85	148.76	6,705.14	-4,741.95	3,885.76	6,130.61	0.95	0.76	0.57
14,285.00	90.24	148.41	6,705.07	-4,822.17	3,934.76	6,223.77	0.56	0.41	-0.37
14,307.00	90.37	148.76	6,704.95	-4,840.94	3,946.22	6,245.58	1.70	0.59	1.59
<b>Survey @ 14307.00 MD 6704.95 TVD</b>									
14,366.00	90.37	148.76	6,704.57	-4,891.39	3,976.82	6,304.03	0.00	0.00	0.00
<b>Survey Proj. to 14366.00 MD 6704.57 TVD</b>									

**Design Annotations**

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
194.00	194.00	0.11	-0.43	MWD surveys
14,307.00	6,704.95	-4,840.94	3,946.22	Survey @ 14307.00 MD 6704.95 TVD

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<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Whistlepig S-09HM (slot D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1368+32.5 @ 1400.50ft (Nabors X14)
<b>Site:</b>	Whistlepig	<b>MD Reference:</b>	RKB=1368+32.5 @ 1400.50ft (Nabors X14)
<b>Well:</b>	Whistlepig S-09HM (slot D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Dec2220_v16

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

<b>Site</b>	Whistlepig				
<b>Site Position:</b>		<b>Northing:</b>	14,444,965.96 usft	<b>Latitude:</b>	39.77526165
<b>From:</b>	Lat/Long	<b>Easting:</b>	1,698,572.65 usft	<b>Longitude:</b>	-80.79301490
<b>Position Uncertainty:</b>	0.00 ft	<b>Slot Radius:</b>	13-3/16 "	<b>Grid Convergence:</b>	0.132 °

<b>Well</b>	Whistlepig S-09HM (slot D)					
<b>Well Position</b>	<b>+N/-S</b>	0.00 ft	<b>Northing:</b>	14,444,987.32 usft	<b>Latitude:</b>	39.77532012
	<b>+E/-W</b>	0.00 ft	<b>Easting:</b>	1,698,601.61 usft	<b>Longitude:</b>	-80.79291163
<b>Position Uncertainty</b>	0.00 ft		<b>Wellhead Elevation:</b>	ft	<b>Ground Level:</b>	1,368.00 ft

<b>Wellbore</b>	Original Hole				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2020	6/2/2021	-8.602	66.545	51,753.81064811

<b>Design</b>	Surveys Original Hole				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.00
<b>Vertical Section:</b>	<b>Depth From (TVD) (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>	
	0.00	0.00	0.00	140.94	

<b>Survey Program</b>	Date 6/19/2021				
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
194.00	1,088.00	MWD surf (Original Hole)	MWD	MWD - Standard	
1,130.00	2,840.00	MWD int (Original Hole)	MWD	MWD - Standard	
2,878.00	14,307.00	MWD (Original Hole)	MWD	MWD - Standard	
14,366.00	14,366.00	Projection (Original Hole)	MWD	MWD - Standard	

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<b>Survey</b>										
<b>Measured Depth (ft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Map Northing (usft)</b>	<b>Map Easting (usft)</b>	<b>Latitude</b>	<b>Longitude</b>	
0.00	0.00	0.00	0.00	0.00	0.00	14,444,987.32	1,698,601.61	39.77532012	-80.79291163	
194.00	0.26	284.90	194.00	0.11	-0.43	14,444,987.43	1,698,601.19	39.77532044	-80.79291314	
<b>MWD surveys</b>										
241.00	0.26	305.29	241.00	0.20	-0.62	14,444,987.52	1,698,601.00	39.77532068	-80.79291382	
285.00	0.22	289.82	285.00	0.29	-0.78	14,444,987.61	1,698,600.84	39.77532092	-80.79291439	
332.00	0.18	268.38	332.00	0.32	-0.94	14,444,987.63	1,698,600.68	39.77532100	-80.79291496	
375.00	0.22	280.60	375.00	0.33	-1.08	14,444,987.65	1,698,600.53	39.77532104	-80.79291549	
422.00	0.18	300.28	422.00	0.38	-1.24	14,444,987.70	1,698,600.38	39.77532118	-80.79291603	
465.00	0.13	281.48	465.00	0.43	-1.34	14,444,987.75	1,698,600.27	39.77532131	-80.79291641	



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Whistlepig S-09HM (slot D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1368+32.5 @ 1400.50ft (Nabors X14)
<b>Site:</b>	Whistlepig	<b>MD Reference:</b>	RKB=1368+32.5 @ 1400.50ft (Nabors X14)
<b>Well:</b>	Whistlepig S-09HM (slot D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Dec2220_v16

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
512.00	0.09	267.15	512.00	0.44	-1.43	14,444,987.75	1,698,600.18	39.77532133	-80.79291672
556.00	0.04	284.02	556.00	0.44	-1.48	14,444,987.76	1,698,600.13	39.77532134	-80.79291690
603.00	0.00	102.44	603.00	0.44	-1.50	14,444,987.76	1,698,600.12	39.77532135	-80.79291695
647.00	0.04	166.78	647.00	0.43	-1.49	14,444,987.75	1,698,600.12	39.77532131	-80.79291694
694.00	0.09	221.71	694.00	0.38	-1.51	14,444,987.70	1,698,600.10	39.77532119	-80.79291702
738.00	0.09	170.56	738.00	0.32	-1.53	14,444,987.64	1,698,600.08	39.77532102	-80.79291708
785.00	0.04	145.86	785.00	0.27	-1.52	14,444,987.59	1,698,600.10	39.77532088	-80.79291702
832.00	0.13	195.96	832.00	0.21	-1.52	14,444,987.53	1,698,600.09	39.77532071	-80.79291704
879.00	0.04	197.80	879.00	0.14	-1.54	14,444,987.46	1,698,600.07	39.77532052	-80.79291712
927.00	0.04	139.00	927.00	0.11	-1.54	14,444,987.43	1,698,600.08	39.77532044	-80.79291709
974.00	0.13	176.89	974.00	0.05	-1.52	14,444,987.37	1,698,600.09	39.77532026	-80.79291705
1,021.00	0.04	158.60	1,021.00	-0.02	-1.51	14,444,987.30	1,698,600.10	39.77532008	-80.79291702
1,068.00	0.22	157.11	1,068.00	-0.12	-1.47	14,444,987.20	1,698,600.14	39.77531981	-80.79291687
1,088.00	0.26	166.60	1,088.00	-0.20	-1.45	14,444,987.12	1,698,600.17	39.77531959	-80.79291678
1,130.00	0.40	144.19	1,130.00	-0.41	-1.34	14,444,986.91	1,698,600.27	39.77531901	-80.79291640
1,177.00	0.26	115.36	1,177.00	-0.59	-1.15	14,444,986.73	1,698,600.47	39.77531851	-80.79291572
1,224.00	0.48	143.57	1,223.99	-0.79	-0.93	14,444,986.53	1,698,600.68	39.77531795	-80.79291496
1,271.00	0.53	172.58	1,270.99	-1.17	-0.79	14,444,986.15	1,698,600.82	39.77531692	-80.79291444
1,318.00	0.40	181.63	1,317.99	-1.55	-0.76	14,444,985.77	1,698,600.85	39.77531588	-80.79291436
1,365.00	0.13	182.86	1,364.99	-1.76	-0.77	14,444,985.55	1,698,600.84	39.77531528	-80.79291439
1,412.00	0.53	18.33	1,411.99	-1.61	-0.71	14,444,985.71	1,698,600.91	39.77531570	-80.79291416
1,459.00	0.88	7.08	1,458.99	-1.05	-0.59	14,444,986.27	1,698,601.02	39.77531725	-80.79291375
1,506.00	1.36	8.57	1,505.98	-0.14	-0.47	14,444,987.18	1,698,601.15	39.77531975	-80.79291329
1,553.00	1.85	2.07	1,552.96	1.17	-0.36	14,444,988.49	1,698,601.26	39.77532335	-80.79291289
1,600.00	2.77	359.26	1,599.92	3.07	-0.34	14,444,990.39	1,698,601.27	39.77532855	-80.79291282
1,647.00	4.00	0.66	1,646.84	5.84	-0.34	14,444,993.16	1,698,601.27	39.77533617	-80.79291279
1,694.00	4.88	356.97	1,693.70	9.48	-0.42	14,444,996.80	1,698,601.19	39.77534615	-80.79291307
1,742.00	5.54	1.19	1,741.50	13.83	-0.48	14,445,001.15	1,698,601.13	39.77535811	-80.79291324
1,789.00	6.33	356.36	1,788.25	18.69	-0.60	14,445,006.01	1,698,601.01	39.77537145	-80.79291362
1,836.00	7.21	356.80	1,834.92	24.22	-0.93	14,445,011.54	1,698,600.68	39.77538664	-80.79291475
1,883.00	7.87	357.24	1,881.51	30.38	-1.25	14,445,017.69	1,698,600.36	39.77540355	-80.79291583
1,930.00	8.39	357.94	1,928.04	37.02	-1.53	14,445,024.34	1,698,600.08	39.77542179	-80.79291677
1,977.00	8.92	358.73	1,974.50	44.09	-1.73	14,445,031.41	1,698,599.88	39.77544121	-80.79291744
2,025.00	9.76	358.20	2,021.87	51.87	-1.94	14,445,039.19	1,698,599.67	39.77546260	-80.79291812
2,072.00	11.38	0.58	2,068.07	60.49	-2.02	14,445,047.81	1,698,599.59	39.77548627	-80.79291833
2,119.00	12.88	2.86	2,114.02	70.36	-1.71	14,445,057.68	1,698,599.55	39.77551337	-80.79291715
2,166.00	13.58	3.74	2,159.77	81.10	-1.09	14,445,068.42	1,698,600.52	39.77554285	-80.79291485
2,213.00	14.37	3.39	2,205.38	92.43	-0.39	14,445,079.75	1,698,601.00	39.77557396	-80.79291225
2,260.00	15.21	2.69	2,250.82	104.41	0.25	14,445,091.73	1,698,601.86	39.77560686	-80.79290989
2,305.00	16.17	2.33	2,294.14	116.57	0.78	14,445,103.89	1,698,602.39	39.77564024	-80.79290790
2,352.00	17.09	1.63	2,339.18	130.01	1.24	14,445,117.33	1,698,602.88	39.77567716	-80.79290614
2,400.00	17.23	359.61	2,385.04	144.17	1.39	14,445,131.49	1,698,603.01	39.77571604	-80.79290548
2,447.00	17.14	357.85	2,429.94	158.05	1.09	14,445,145.37	1,698,602.70	39.77575417	-80.79290646
2,494.00	17.40	356.45	2,474.82	171.99	0.39	14,445,159.30	1,698,602.00	39.77579244	-80.79290882
2,541.00	18.72	357.50	2,519.51	186.54	-0.37	14,445,173.85	1,698,601.24	39.77583240	-80.79291142
2,588.00	20.52	358.56	2,563.78	202.31	-0.91	14,445,189.62	1,698,600.70	39.77587572	-80.79291320
2,635.00	21.45	359.43	2,607.66	219.14	-1.20	14,445,206.45	1,698,600.41	39.77592194	-80.79291410
2,682.00	21.05	358.38	2,651.46	236.17	-1.53	14,445,223.48	1,698,600.09	39.77596871	-80.79291512
2,729.00	20.79	358.20	2,695.36	252.94	-2.03	14,445,240.26	1,698,599.59	39.77601478	-80.79291676
2,776.00	20.96	358.73	2,739.28	269.68	-2.47	14,445,257.00	1,698,599.14	39.77606076	-80.79291822
2,840.00	22.37	0.05	2,798.76	293.31	-2.72	14,445,280.62	1,698,598.90	39.77612564	-80.79291889
2,878.00	23.29	1.28	2,833.78	308.05	-2.54	14,445,295.37	1,698,599.07	39.77616612	-80.79291815
2,972.00	23.29	357.76	2,920.13	345.20	-2.85	14,445,332.51	1,698,598.76	39.77626815	-80.79291895
3,066.00	24.43	0.49	3,006.09	383.21	-3.41	14,445,370.52	1,698,598.20	39.77637253	-80.79292063
3,160.00	23.55	357.32	3,091.98	421.40	-4.13	14,445,408.72	1,698,597.49	39.77647744	-80.79292285

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<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Whistlepig S-09HM (slot D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1368+32.5 @ 1400.50ft (Nabors X14)
<b>Site:</b>	Whistlepig	<b>MD Reference:</b>	RKB=1368+32.5 @ 1400.50ft (Nabors X14)
<b>Well:</b>	Whistlepig S-09HM (slot D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Dec2220_v16

## Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
3,254.00	25.14	1.28	3,177.62	460.13	-4.56	14,445,447.45	1,698,597.05	39.77658380	-80.79292407
3,349.00	24.26	358.99	3,263.93	499.82	-4.45	14,445,487.14	1,698,597.16	39.77669279	-80.79292336
3,443.00	22.98	3.39	3,350.06	537.45	-3.71	14,445,524.77	1,698,597.91	39.77679613	-80.79292040
3,541.00	24.52	3.48	3,439.76	576.85	-1.34	14,445,564.16	1,698,600.27	39.77690431	-80.79291166
3,635.00	22.76	359.17	3,525.87	614.50	-0.42	14,445,601.82	1,698,601.19	39.77700772	-80.79290807
3,728.00	25.31	1.54	3,610.80	652.37	-0.15	14,445,639.69	1,698,601.47	39.77711171	-80.79290678
3,822.00	24.78	359.52	3,695.97	692.16	0.23	14,445,679.47	1,698,601.84	39.77722097	-80.79290512
3,916.00	23.55	355.66	3,781.73	730.58	-1.36	14,445,717.90	1,698,600.25	39.77732651	-80.79291045
4,010.00	22.85	359.96	3,868.14	767.56	-2.79	14,445,754.88	1,698,598.82	39.77742808	-80.79291525
4,104.00	23.60	3.83	3,954.52	804.59	-1.55	14,445,791.91	1,698,600.06	39.77752976	-80.79291052
4,196.00	22.59	1.81	4,039.15	840.63	0.24	14,445,827.94	1,698,601.85	39.77762872	-80.79290386
4,290.00	24.04	3.48	4,125.47	877.79	1.97	14,445,865.10	1,698,603.59	39.77773076	-80.79289738
4,385.00	23.64	1.02	4,212.37	916.15	3.49	14,445,903.46	1,698,605.10	39.77783609	-80.79289168
4,479.00	25.71	359.52	4,297.78	955.38	3.65	14,445,942.70	1,698,605.26	39.77794385	-80.79289077
4,574.00	25.05	356.09	4,383.62	996.06	2.11	14,445,983.37	1,698,603.72	39.77805556	-80.79289593
4,668.00	25.93	1.19	4,468.48	1,036.46	1.18	14,446,023.78	1,698,602.79	39.77816653	-80.79289891
4,762.00	25.44	359.35	4,553.19	1,077.20	1.37	14,446,064.52	1,698,602.99	39.77827840	-80.79289787
4,856.00	25.00	356.89	4,638.23	1,117.22	0.07	14,446,104.54	1,698,601.68	39.77838833	-80.79290219
4,950.00	23.60	3.65	4,723.92	1,155.85	0.19	14,446,143.16	1,698,601.80	39.77849439	-80.79290145
5,045.00	23.25	2.77	4,811.09	1,193.55	2.31	14,446,180.87	1,698,603.92	39.77859793	-80.79289360
5,139.00	22.90	1.10	4,897.57	1,230.37	3.55	14,446,217.69	1,698,605.17	39.77869903	-80.79288886
5,233.00	22.63	358.64	4,984.25	1,266.74	3.47	14,446,254.05	1,698,605.09	39.77879891	-80.79288884
5,328.00	23.47	2.95	5,071.67	1,303.90	4.01	14,446,291.22	1,698,605.63	39.77890098	-80.79288661
5,422.00	23.07	3.04	5,158.02	1,340.99	5.95	14,446,328.30	1,698,607.57	39.77900281	-80.79287940
5,516.00	22.94	1.89	5,244.55	1,377.69	7.54	14,446,365.00	1,698,609.15	39.77910359	-80.79287347
5,610.00	22.54	0.31	5,331.24	1,414.02	8.24	14,446,401.33	1,698,609.85	39.77920335	-80.79287067
5,705.00	22.37	358.99	5,419.04	1,450.30	8.02	14,446,437.61	1,698,609.63	39.77930299	-80.79287116
5,790.00	23.73	357.85	5,497.25	1,483.56	7.09	14,446,470.88	1,698,608.70	39.77939435	-80.79287418
5,809.00	24.04	357.24	5,514.63	1,491.25	6.76	14,446,478.56	1,698,608.37	39.77941546	-80.79287529
5,903.00	21.93	357.76	5,601.16	1,527.92	5.15	14,446,515.23	1,698,606.76	39.77951617	-80.79288072
5,997.00	22.42	356.89	5,688.21	1,563.36	3.49	14,446,550.67	1,698,605.11	39.77961351	-80.79288633
6,044.00	20.97	357.85	5,731.88	1,580.71	2.69	14,446,568.03	1,698,604.30	39.77966118	-80.79288904
6,091.00	17.85	2.51	5,776.20	1,596.32	2.69	14,446,583.63	1,698,604.30	39.77970403	-80.79288891
6,138.00	16.00	6.29	5,821.17	1,609.95	3.72	14,446,597.27	1,698,605.33	39.77974148	-80.79288515
6,186.00	14.15	18.95	5,867.52	1,622.08	6.35	14,446,609.40	1,698,607.57	39.77977477	-80.79287569
6,233.00	12.97	28.88	5,913.22	1,632.14	10.76	14,446,619.45	1,698,612.37	39.77980235	-80.79285989
6,280.00	11.43	42.50	5,959.17	1,640.19	16.46	14,446,627.51	1,698,618.07	39.77982443	-80.79283955
6,327.00	11.52	58.23	6,005.24	1,646.10	23.59	14,446,633.41	1,698,634.17	39.77984061	-80.79281410
6,374.00	12.75	73.17	6,051.20	1,650.07	32.55	14,446,637.38	1,698,634.17	39.77985146	-80.79278219
6,421.00	15.12	88.20	6,096.83	1,651.77	43.65	14,446,639.08	1,698,645.26	39.77985605	-80.79274268
6,468.00	16.79	101.04	6,142.03	1,650.66	56.44	14,446,637.97	1,698,658.05	39.77985292	-80.79269715
6,515.00	19.96	107.63	6,186.63	1,646.93	70.76	14,446,634.24	1,698,672.37	39.77984259	-80.79264623
6,561.00	24.00	108.77	6,229.28	1,641.54	87.10	14,446,628.85	1,698,688.71	39.77982768	-80.79258809
6,608.00	27.91	111.85	6,271.53	1,634.36	106.37	14,446,621.68	1,698,707.98	39.77980786	-80.79251957
6,656.00	31.56	114.83	6,313.21	1,624.90	128.21	14,446,612.22	1,698,729.82	39.77978174	-80.79244193
6,703.00	35.78	117.21	6,352.32	1,613.45	151.60	14,446,600.77	1,698,753.21	39.77975014	-80.79235876
6,751.00	39.82	119.05	6,390.24	1,599.57	177.53	14,446,586.88	1,698,779.14	39.77971184	-80.79226659
6,798.00	44.13	121.95	6,425.17	1,583.59	204.58	14,446,570.90	1,698,806.19	39.77966780	-80.79217042
6,845.00	47.82	124.77	6,457.84	1,564.99	232.78	14,446,552.31	1,698,834.40	39.77961654	-80.79207020
6,892.00	52.09	127.93	6,488.07	1,543.65	261.73	14,446,530.97	1,698,863.34	39.77955775	-80.79196734
6,940.00	56.88	129.78	6,515.95	1,519.13	292.13	14,446,506.45	1,698,893.74	39.77949022	-80.79185933
6,987.00	61.80	131.62	6,539.91	1,492.77	322.76	14,446,480.08	1,698,924.37	39.77941762	-80.79175053
7,034.00	66.81	133.47	6,560.28	1,464.13	353.94	14,446,451.44	1,698,955.55	39.77933877	-80.79163978
7,081.00	71.47	136.28	6,577.02	1,433.14	385.04	14,446,420.46	1,698,986.65	39.77925347	-80.79152935
7,128.00	75.91	139.62	6,590.22	1,399.65	415.23	14,446,386.97	1,699,016.84	39.77916130	-80.79142217

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Survey Report - Geographic



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Whistlepig S-09HM (slot D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1368+32.5 @ 1400.50ft (Nabors X14)
<b>Site:</b>	Whistlepig	<b>MD Reference:</b>	RKB=1368+32.5 @ 1400.50ft (Nabors X14)
<b>Well:</b>	Whistlepig S-09HM (slot D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Dec2220_v16

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
7,175.00	79.56	143.75	6,600.20	1,363.62	443.69	14,446,350.94	1,699,045.30	39.77906218	-80.79132120
7,223.00	81.98	147.62	6,607.91	1,324.50	470.38	14,446,311.81	1,699,071.99	39.77895456	-80.79122650
7,270.00	84.00	152.89	6,613.65	1,284.01	493.51	14,446,271.33	1,699,095.12	39.77884322	-80.79114451
7,318.00	85.98	157.46	6,617.84	1,240.63	513.58	14,446,227.94	1,699,115.19	39.77872394	-80.79107344
7,365.00	85.63	157.29	6,621.28	1,197.36	531.61	14,446,184.67	1,699,133.22	39.77860501	-80.79100962
7,413.00	85.32	156.58	6,625.06	1,153.33	550.36	14,446,140.65	1,699,151.97	39.77848398	-80.79094326
7,460.00	85.49	156.14	6,628.83	1,110.42	569.14	14,446,097.73	1,699,170.76	39.77836600	-80.79087675
7,507.00	87.60	157.90	6,631.66	1,067.23	587.46	14,446,054.54	1,699,189.07	39.77824728	-80.79081193
7,554.00	86.99	157.64	6,633.88	1,023.77	605.22	14,446,011.09	1,699,206.83	39.77812781	-80.79074908
7,601.00	86.81	157.02	6,636.42	980.47	623.31	14,445,967.78	1,699,224.92	39.77800877	-80.79068505
7,648.00	86.64	156.67	6,639.11	937.32	641.76	14,445,924.64	1,699,243.37	39.77789017	-80.79061974
7,695.00	88.00	155.44	6,641.30	894.42	660.81	14,445,881.73	1,699,262.42	39.77777221	-80.79055228
7,742.00	88.70	154.65	6,642.66	851.82	680.63	14,445,839.14	1,699,282.24	39.77765511	-80.79048209
7,789.00	89.10	154.82	6,643.56	809.33	700.69	14,445,796.64	1,699,302.30	39.77753828	-80.79041106
7,833.00	88.66	152.63	6,645.40	725.06	742.29	14,445,712.38	1,699,343.90	39.77730659	-80.79026369
7,977.00	88.84	153.07	6,647.45	641.44	785.17	14,445,628.75	1,699,386.79	39.77707667	-80.79011176
8,072.00	89.58	151.66	6,648.76	557.29	829.23	14,445,544.60	1,699,430.84	39.77684528	-80.78995564
8,166.00	90.29	152.10	6,648.87	474.38	873.54	14,445,461.70	1,699,475.15	39.77661732	-80.78979865
8,260.00	88.62	150.34	6,649.76	392.00	918.79	14,445,379.32	1,699,520.40	39.77639079	-80.78963829
8,354.00	89.36	151.48	6,651.42	309.88	964.48	14,445,297.19	1,699,566.09	39.77616495	-80.78947634
8,448.00	88.66	150.43	6,653.04	227.71	1,010.11	14,445,215.03	1,699,611.72	39.77593901	-80.78931463
8,542.00	88.57	151.13	6,655.31	145.70	1,055.98	14,445,133.01	1,699,657.59	39.77571348	-80.78915205
8,636.00	88.40	150.87	6,657.80	63.51	1,101.54	14,445,050.83	1,699,703.15	39.77548748	-80.78899060
8,730.00	88.62	149.11	6,660.24	-17.86	1,148.54	14,444,969.46	1,699,750.15	39.77526372	-80.78882401
8,824.00	90.15	148.23	6,661.25	-98.14	1,197.41	14,444,889.18	1,699,799.02	39.77504291	-80.78865075
8,918.00	90.29	147.79	6,660.89	-177.87	1,247.21	14,444,809.45	1,699,848.82	39.77482365	-80.78847418
9,012.00	90.37	149.46	6,660.35	-258.12	1,296.14	14,444,729.20	1,699,897.75	39.77460294	-80.78830068
9,107.00	90.15	150.08	6,659.92	-340.20	1,343.97	14,444,647.12	1,699,945.58	39.77437721	-80.78813115
9,201.00	89.27	150.34	6,660.39	-421.77	1,390.67	14,444,565.55	1,699,992.28	39.77415288	-80.78796563
9,295.00	89.93	151.66	6,661.05	-503.98	1,436.24	14,444,483.34	1,700,037.85	39.77392681	-80.78780414
9,389.00	88.48	149.20	6,662.35	-585.72	1,482.62	14,444,401.59	1,700,084.23	39.77370203	-80.78763976
9,483.00	88.92	149.46	6,664.49	-666.55	1,530.56	14,444,320.76	1,700,132.17	39.77347973	-80.78746984
9,578.00	87.34	148.76	6,667.59	-748.03	1,579.30	14,444,239.29	1,700,180.91	39.77325565	-80.78729705
9,671.00	87.47	148.32	6,671.80	-827.28	1,627.79	14,444,160.04	1,700,229.40	39.77303770	-80.78712515
9,766.00	88.75	148.50	6,674.93	-908.16	1,677.52	14,444,079.16	1,700,279.13	39.77281526	-80.78694883
9,860.00	90.02	149.29	6,675.94	-988.64	1,726.08	14,443,998.68	1,700,327.69	39.77259993	-80.78677669
9,953.00	89.85	149.55	6,676.04	-1,068.70	1,773.39	14,443,918.62	1,700,375.00	39.77237334	-80.78660899
10,047.00	90.20	149.81	6,676.00	-1,149.84	1,820.85	14,443,837.48	1,700,422.46	39.77214505	-80.78644079
10,141.00	90.55	149.20	6,675.39	-1,230.84	1,868.55	14,443,756.48	1,700,470.16	39.77191676	-80.78627172
10,235.00	89.85	150.25	6,675.06	-1,312.02	1,915.94	14,443,675.30	1,700,517.84	39.77168847	-80.78610375
10,329.00	90.02	150.52	6,675.17	-1,393.74	1,962.39	14,443,593.58	1,700,564.00	39.77146018	-80.78593913
10,423.00	90.02	150.87	6,675.13	-1,475.71	2,008.40	14,443,511.61	1,700,610.01	39.77123189	-80.78577608
10,518.00	89.67	150.87	6,675.39	-1,558.69	2,054.64	14,443,428.63	1,700,656.25	39.77100360	-80.78561221
10,612.00	89.27	149.90	6,676.26	-1,640.41	2,101.09	14,443,346.91	1,700,702.70	39.77077531	-80.78544760
10,706.00	89.54	150.25	6,677.24	-1,721.87	2,147.98	14,443,265.45	1,700,749.59	39.77054702	-80.78528142
10,800.00	89.45	150.61	6,678.07	-1,803.62	2,194.37	14,443,183.70	1,700,795.98	39.77031873	-80.78511703
10,893.00	89.27	150.25	6,679.10	-1,884.50	2,240.26	14,443,102.82	1,700,841.87	39.77009044	-80.78495440
10,988.00	89.23	149.11	6,680.35	-1,966.50	2,288.21	14,443,020.82	1,700,889.82	39.76986215	-80.78478444
11,082.00	88.97	149.20	6,681.82	-2,047.20	2,336.40	14,442,940.13	1,700,938.01	39.76963386	-80.78461448
11,176.00	89.36	148.94	6,683.19	-2,127.82	2,384.71	14,442,859.50	1,700,986.32	39.76940557	-80.78444452
11,269.00	89.67	148.94	6,683.98	-2,207.48	2,432.69	14,442,779.84	1,701,034.30	39.76917728	-80.78427456
11,363.00	88.79	150.08	6,685.24	-2,288.48	2,480.38	14,442,698.85	1,701,081.99	39.76894899	-80.78410460
11,457.00	89.01	150.25	6,687.05	-2,370.00	2,527.14	14,442,617.32	1,701,128.75	39.76872070	-80.78393464
11,551.00	88.88	149.81	6,688.78	-2,451.42	2,574.09	14,442,535.90	1,701,175.70	39.76849241	-80.78376468
11,645.00	89.19	149.73	6,690.36	-2,532.62	2,621.41	14,442,454.70	1,701,223.02	39.76826412	-80.78359472

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<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Whistlepig S-09HM (slot D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1368+32.5 @ 1400.50ft (Nabors X14)
<b>Site:</b>	Whistlepig	<b>MD Reference:</b>	RKB=1368+32.5 @ 1400.50ft (Nabors X14)
<b>Well:</b>	Whistlepig S-09HM (slot D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Dec2220_v16

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
11,740.00	89.05	149.29	6,691.82	-2,614.48	2,669.60	14,442,372.85	1,701,271.21	39.76812270	-80.78343272
11,834.00	89.80	151.05	6,692.77	-2,696.02	2,716.36	14,442,291.31	1,701,317.97	39.76789846	-80.78326704
11,929.00	89.80	150.78	6,693.10	-2,779.04	2,762.54	14,442,208.29	1,701,364.14	39.76767016	-80.78310341
12,023.00	90.24	150.69	6,693.06	-2,861.04	2,808.49	14,442,126.29	1,701,410.10	39.76744465	-80.78294059
12,117.00	90.51	150.69	6,692.45	-2,943.00	2,854.50	14,442,044.32	1,701,456.11	39.76721925	-80.78277754
12,211.00	89.05	150.96	6,692.81	-3,025.07	2,900.33	14,441,962.25	1,701,501.93	39.76699355	-80.78261519
12,305.00	89.80	151.40	6,693.75	-3,107.43	2,945.64	14,441,879.90	1,701,547.24	39.76676709	-80.78245465
12,399.00	90.24	151.92	6,693.72	-3,190.16	2,990.26	14,441,797.16	1,701,591.87	39.76653958	-80.78229657
12,493.00	88.35	149.99	6,694.88	-3,272.32	3,035.89	14,441,715.00	1,701,637.49	39.76631363	-80.78213491
12,587.00	88.62	150.17	6,697.36	-3,353.77	3,082.76	14,441,633.56	1,701,684.36	39.76608965	-80.78196882
12,681.00	89.23	150.78	6,699.13	-3,435.55	3,129.07	14,441,551.78	1,701,730.68	39.76586476	-80.78180471
12,775.00	89.14	150.87	6,700.46	-3,517.61	3,174.89	14,441,469.71	1,701,776.50	39.76563907	-80.78164237
12,870.00	89.58	151.48	6,701.52	-3,600.84	3,220.69	14,441,386.49	1,701,822.30	39.76541021	-80.78148011
12,964.00	89.19	151.22	6,702.53	-3,683.32	3,265.76	14,441,304.00	1,701,867.36	39.76518338	-80.78132045
13,058.00	89.32	151.31	6,703.76	-3,765.74	3,310.94	14,441,221.59	1,701,912.55	39.76495674	-80.78116037
13,152.00	89.89	149.90	6,704.40	-3,847.63	3,357.08	14,441,139.69	1,701,958.69	39.76473152	-80.78099690
13,246.00	90.42	150.25	6,704.15	-3,929.10	3,403.97	14,441,058.23	1,702,005.58	39.76450748	-80.78083074
13,341.00	90.46	150.43	6,703.42	-4,011.65	3,450.98	14,440,975.68	1,702,052.59	39.76428045	-80.78066417
13,435.00	90.86	150.34	6,702.34	-4,093.36	3,497.43	14,440,893.96	1,702,099.04	39.76405573	-80.78049960
13,530.00	89.71	149.46	6,701.86	-4,175.55	3,545.07	14,440,811.78	1,702,146.68	39.76382970	-80.78033078
13,624.00	89.58	148.76	6,702.45	-4,256.22	3,593.33	14,440,731.11	1,702,194.94	39.76360785	-80.78015976
13,719.00	89.36	148.23	6,703.33	-4,337.21	3,642.97	14,440,650.12	1,702,244.58	39.76338509	-80.77998382
13,814.00	90.11	149.20	6,703.76	-4,418.39	3,692.30	14,440,568.93	1,702,293.91	39.76316180	-80.77980898
13,909.00	89.93	149.55	6,703.73	-4,500.14	3,740.70	14,440,487.19	1,702,342.30	39.76293697	-80.77963748
14,003.00	90.11	149.73	6,703.70	-4,581.25	3,788.21	14,440,406.08	1,702,389.81	39.76271390	-80.77946913
14,098.00	89.14	148.23	6,704.32	-4,662.66	3,837.16	14,440,324.67	1,702,438.77	39.76248999	-80.77929564
14,191.00	89.85	148.76	6,705.14	-4,741.95	3,885.76	14,440,245.38	1,702,487.36	39.76227192	-80.77912341
14,285.00	90.24	148.41	6,705.07	-4,822.17	3,934.76	14,440,165.16	1,702,536.36	39.76205128	-80.77894977
14,307.00	90.37	148.76	6,704.95	-4,840.94	3,946.22	14,440,146.38	1,702,547.83	39.76199964	-80.77890913
<b>Survey @ 14307.00 MD 6704.95 TVD</b>									
14,366.00	90.37	148.76	6,704.57	-4,891.39	3,976.82	14,440,095.94	1,702,578.43	39.76186090	-80.77880069
<b>Survey Proj. to 14366.00 MD 6704.57 TVD</b>									

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
194.00	194.00	0.11	-0.43	MWD surveys
14,307.00	6,704.95	-4,840.94	3,946.22	Survey @ 14307.00 MD 6704.95 TVD
14,366.00	6,704.57	-4,891.39	3,976.82	Survey Proj. to 14366.00 MD 6704.57 TVD

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