



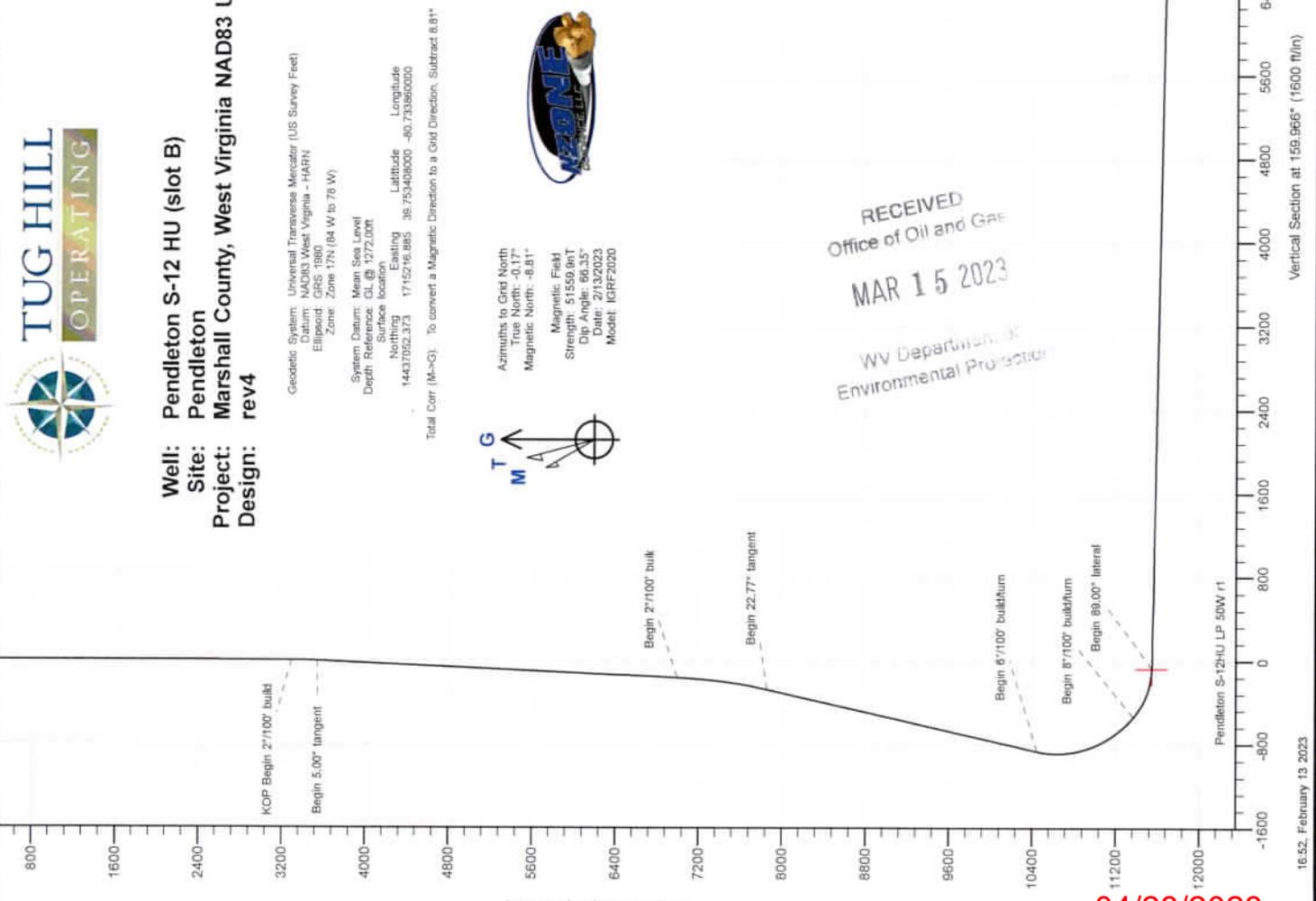
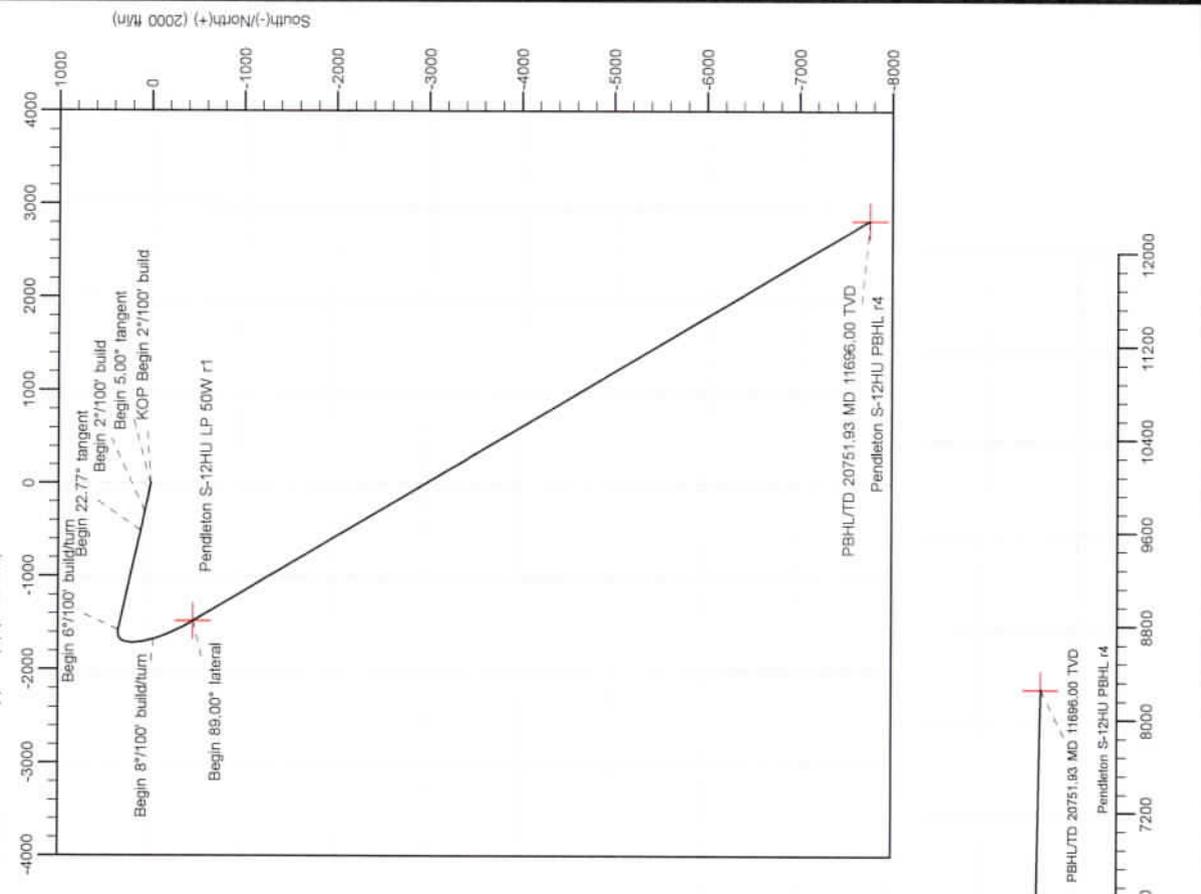
Well: Pendleton S-12 HU (slot B)  
 Site: Pendleton  
 Project: Marshall County, West Virginia NAD83 UTM 17N  
 Design: rev4

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: GL @ 1272.000  
 Surface location  
 Northing: 14437052.373 Easting: 17152716.885 Latitude: 36.753498000 Longitude: -80.733860000  
 Total Corr (M-to-G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.81°

Azimuths to Grid North  
 True North: -0.17°  
 Magnetic North: -8.81°  
 Magnetic Field  
 Strength: 51559.8nT  
 Dip Angle: 66.35°  
 Date: 2/13/2023  
 Model: IGRF2020

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSEct	Annotation
1	0.00	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	
2	3300.00	0.00	0.000	3300.00	0.00	0.00	0.00	0.00	0.00	KOP Begin 2°/100° build
3	3550.00	5.00	281.490	3549.68	-2.17	-10.68	2.00	281.49	-5.70	Begin 5.00° tangent
4	7013.50	5.00	281.490	7000.00	62.30	-306.50	0.00	0.00	-163.53	Begin 2°/100° build
5	7902.29	22.77	282.665	7859.36	108.10	-513.96	2.00	1.49	-277.63	Begin 22.77° tangent
6	10711.83	22.77	282.665	10449.85	346.55	-1575.09	0.00	0.00	-865.17	Begin 6°/100° build
7	11766.45	50.00	163.833	11370.54	-36.41	-1671.81	6.00	-131.29	-538.52	Begin 8°/100° build
8	12280.70	89.00	149.436	11548.00	-465.55	-1477.83	8.00	-22.20	-68.89	Begin 89.00° lateral
9	20751.93	89.00	149.436	11696.00	-7758.68	2829.16	0.00	0.00	8258.40	PBHL/TD



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04/28/2023



Planning Report - Geographic

<b>Database:</b>	DB_Decv0422v16	<b>Local Co-ordinate Reference:</b>	Well Pendleton S-12 HU (slot B)
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	GL @ 1272.00ft
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>MD Reference:</b>	GL @ 1272.00ft
<b>Site:</b>	Pendleton	<b>North Reference:</b>	Grid
<b>Well:</b>	Pendleton S-12 HU (slot B)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev4		

<b>Project</b>	Marshall County, West Virginia NAD83 UTM 17N		
<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>	Pendleton				
<b>Site Position:</b>		<b>Northing:</b>	14,437,088.243 usft	<b>Latitude:</b>	39.753506850
<b>From:</b>	Lat/Long	<b>Easting:</b>	1,715,175.249 usft	<b>Longitude:</b>	-80.734007760
<b>Position Uncertainty:</b>	0.00 ft	<b>Slot Radius:</b>	13-3/16 "		

<b>Well</b>	Pendleton S-12 HU (slot B)					
<b>Well Position</b>	<b>+N/-S</b>	0.00 ft	<b>Northing:</b>	14,437,052.373 usft	<b>Latitude:</b>	39.753408000
	<b>+E/-W</b>	0.00 ft	<b>Easting:</b>	1,715,216.884 usft	<b>Longitude:</b>	-80.733860000
<b>Position Uncertainty</b>	0.00 ft		<b>Wellhead Elevation:</b>	ft	<b>Ground Level:</b>	1,272.00 ft
<b>Grid Convergence:</b>	0.17 °					

<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	2/13/2023	-8.64	66.35	51,559.89817215

<b>Design</b>	rev4			
<b>Audit Notes:</b>				
<b>Version:</b>	<b>Phase:</b>	PLAN	<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	159.966

<b>Plan Survey Tool Program</b>	<b>Date</b>	2/13/2023		
<b>Depth From (ft)</b>	<b>Depth To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Remarks</b>
1	0.00	20,751.93 rev4 (Original Hole)	MWD	
			MWD - Standard	

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Planning Report - Geographic

<b>Database:</b>	DB_Decv0422v16	<b>Local Co-ordinate Reference:</b>	Well Pendleton S-12 HU (slot B)
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	GL @ 1272.00ft
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>MD Reference:</b>	GL @ 1272.00ft
<b>Site:</b>	Pendleton	<b>North Reference:</b>	Grid
<b>Well:</b>	Pendleton S-12 HU (slot B)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev4		

Plan Sections										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	TFO (°)	Target
0.00	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,300.00	0.00	0.000	3,300.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,550.00	5.00	281.490	3,549.68	2.17	-10.68	2.00	2.00	0.00	281.49	
7,013.50	5.00	281.490	7,000.00	62.30	-306.50	0.00	0.00	0.00	0.00	
7,902.29	22.77	282.665	7,859.36	108.10	-513.96	2.00	2.00	0.13	1.49	
10,711.83	22.77	282.665	10,449.85	346.55	-1,575.09	0.00	0.00	0.00	0.00	
11,766.45	50.00	163.833	11,370.54	-36.41	-1,671.81	6.00	2.58	-11.27	-131.29	
12,280.70	89.00	149.436	11,548.00	-465.55	-1,477.83	8.00	7.58	-2.80	-22.20	
20,751.93	89.00	149.436	11,696.00	-7,758.68	2,829.16	0.00	0.00	0.00	0.00	Pendleton S-12HU PE

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Planning Report - Geographic

Database: DB\_Decv0422v16  
 Company: Tug Hill Operating LLC  
 Project: Marshall County, West Virginia NAD83 UTM 17N  
 Site: Pendleton  
 Well: Pendleton S-12 HU (slot B)  
 Wellbore: Original Hole  
 Design: rev4

Local Co-ordinate Reference:  
 TVD Reference:  
 MD Reference:  
 North Reference:  
 Survey Calculation Method:

Well Pendleton S-12 HU (slot B) RECEIVED  
 GL @ 1272.00ft  
 GL @ 1272.00ft  
 Grid  
 Minimum Curvature

Office of Oil and Gas  
 MAR 15 2023  
 WV Department of Environmental Protection

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
0.00	0.00	0.000	0.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
100.00	0.00	0.000	100.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
200.00	0.00	0.000	200.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
300.00	0.00	0.000	300.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
400.00	0.00	0.000	400.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
500.00	0.00	0.000	500.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
600.00	0.00	0.000	600.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
700.00	0.00	0.000	700.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
800.00	0.00	0.000	800.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
900.00	0.00	0.000	900.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
1,000.00	0.00	0.000	1,000.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
1,100.00	0.00	0.000	1,100.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
1,200.00	0.00	0.000	1,200.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
1,300.00	0.00	0.000	1,300.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
1,400.00	0.00	0.000	1,400.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
1,500.00	0.00	0.000	1,500.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
1,600.00	0.00	0.000	1,600.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
1,700.00	0.00	0.000	1,700.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
1,800.00	0.00	0.000	1,800.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
1,900.00	0.00	0.000	1,900.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
2,000.00	0.00	0.000	2,000.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
2,100.00	0.00	0.000	2,100.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
2,200.00	0.00	0.000	2,200.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
2,300.00	0.00	0.000	2,300.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
2,400.00	0.00	0.000	2,400.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
2,500.00	0.00	0.000	2,500.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
2,600.00	0.00	0.000	2,600.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
2,700.00	0.00	0.000	2,700.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
2,800.00	0.00	0.000	2,800.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
2,900.00	0.00	0.000	2,900.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
3,000.00	0.00	0.000	3,000.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
3,100.00	0.00	0.000	3,100.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
3,200.00	0.00	0.000	3,200.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
3,300.00	0.00	0.000	3,300.00	0.00	0.00	14,437,052.373	1,715,216.884	39.753408000	-80.733860000
<b>KOP Begin 2°/100' build</b>									
3,400.00	2.00	281.490	3,399.98	0.35	-1.71	14,437,052.720	1,715,215.174	39.753408969	-80.733866081
3,500.00	4.00	281.490	3,499.84	1.39	-6.84	14,437,053.763	1,715,210.046	39.753411874	-80.733884317
3,550.00	5.00	281.490	3,549.68	2.17	-10.68	14,437,054.544	1,715,206.202	39.753414051	-80.733897987
<b>Begin 5.00° tangent</b>									
3,600.00	5.00	281.490	3,599.49	3.04	-14.95	14,437,055.412	1,715,201.931	39.753416470	-80.733913172
3,700.00	5.00	281.490	3,699.11	4.78	-23.49	14,437,057.148	1,715,193.390	39.753421307	-80.733943542
3,800.00	5.00	281.490	3,798.73	6.51	-32.04	14,437,058.885	1,715,184.849	39.753426145	-80.733973912
3,900.00	5.00	281.490	3,898.35	8.25	-40.58	14,437,060.621	1,715,176.308	39.753430982	-80.734004282
4,000.00	5.00	281.490	3,997.97	9.98	-49.12	14,437,062.357	1,715,167.768	39.753435820	-80.734034652
4,100.00	5.00	281.490	4,097.59	11.72	-57.66	14,437,064.093	1,715,159.227	39.753440657	-80.734065022
4,200.00	5.00	281.490	4,197.21	13.46	-66.20	14,437,065.829	1,715,150.686	39.753445495	-80.734095392
4,300.00	5.00	281.490	4,296.83	15.19	-74.74	14,437,067.565	1,715,142.145	39.753450332	-80.734125762
4,400.00	5.00	281.490	4,396.45	16.93	-83.28	14,437,069.301	1,715,133.604	39.753455170	-80.734156131
4,500.00	5.00	281.490	4,496.07	18.66	-91.82	14,437,071.037	1,715,125.063	39.753460007	-80.734186501
4,600.00	5.00	281.490	4,595.69	20.40	-100.36	14,437,072.773	1,715,116.522	39.753464845	-80.734216871
4,700.00	5.00	281.490	4,695.31	22.14	-108.90	14,437,074.510	1,715,107.981	39.753469682	-80.734247241
4,800.00	5.00	281.490	4,794.93	23.87	-117.44	14,437,076.246	1,715,099.440	39.753474519	-80.734277611
4,900.00	5.00	281.490	4,894.55	25.61	-125.99	14,437,077.982	1,715,090.900	39.753479357	-80.734307981



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 Company: Tug Hill Operating LLC  
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 Well: Pendleton S-12 HU (slot B)  
 Wellbore: Original Hole  
 Design: rev4

Local Co-ordinate Reference: Well Pendleton S-12 HU (slot B)  
 TVD Reference: GL @ 1272.00ft  
 MD Reference: GL @ 1272.00ft  
 North Reference: Grid  
 Survey Calculation Method: Minimum Curvature

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Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
5,000.00	5.00	281.490	4,994.17	27.35	-134.53	14,437,079.718	1,715,082.359	39.753484194	-80.734338351
5,100.00	5.00	281.490	5,093.78	29.08	-143.07	14,437,081.454	1,715,073.818	39.753489032	-80.734368721
5,200.00	5.00	281.490	5,193.40	30.82	-151.61	14,437,083.190	1,715,065.277	39.753493869	-80.734399091
5,300.00	5.00	281.490	5,293.02	32.55	-160.15	14,437,084.926	1,715,056.736	39.753498706	-80.734429461
5,400.00	5.00	281.490	5,392.64	34.29	-168.69	14,437,086.662	1,715,048.195	39.753503544	-80.734459831
5,500.00	5.00	281.490	5,492.26	36.03	-177.23	14,437,088.399	1,715,039.654	39.753508381	-80.734490201
5,600.00	5.00	281.490	5,591.88	37.76	-185.77	14,437,090.135	1,715,031.113	39.753513218	-80.734520571
5,700.00	5.00	281.490	5,691.50	39.50	-194.31	14,437,091.871	1,715,022.572	39.753518056	-80.734550942
5,800.00	5.00	281.490	5,791.12	41.23	-202.85	14,437,093.607	1,715,014.032	39.753522893	-80.734581312
5,900.00	5.00	281.490	5,890.74	42.97	-211.39	14,437,095.343	1,715,005.491	39.753527730	-80.734611682
6,000.00	5.00	281.490	5,990.36	44.71	-219.94	14,437,097.079	1,714,996.950	39.753532568	-80.734642052
6,100.00	5.00	281.490	6,089.98	46.44	-228.48	14,437,098.815	1,714,988.409	39.753537405	-80.734672422
6,200.00	5.00	281.490	6,189.60	48.18	-237.02	14,437,100.551	1,714,979.868	39.753542242	-80.734702792
6,300.00	5.00	281.490	6,289.22	49.91	-245.56	14,437,102.287	1,714,971.327	39.753547080	-80.734733162
6,400.00	5.00	281.490	6,388.84	51.65	-254.10	14,437,104.024	1,714,962.786	39.753551917	-80.734763532
6,500.00	5.00	281.490	6,488.46	53.39	-262.64	14,437,105.760	1,714,954.245	39.753556754	-80.734793902
6,600.00	5.00	281.490	6,588.08	55.12	-271.18	14,437,107.496	1,714,945.704	39.753561592	-80.734824272
6,700.00	5.00	281.490	6,687.70	56.86	-279.72	14,437,109.232	1,714,937.163	39.753566429	-80.734854642
6,800.00	5.00	281.490	6,787.32	58.60	-288.26	14,437,110.968	1,714,928.623	39.753571266	-80.734885012
6,900.00	5.00	281.490	6,886.94	60.33	-296.80	14,437,112.704	1,714,920.082	39.753576103	-80.734915382
7,000.00	5.00	281.490	6,986.55	62.07	-305.34	14,437,114.440	1,714,911.541	39.753580941	-80.734945752
7,013.50	5.00	281.490	7,000.00	62.30	-306.50	14,437,114.675	1,714,910.388	39.753581593	-80.734949851
<b>Begin 2°/100' build</b>									
7,100.00	6.73	281.874	7,086.05	64.10	-315.15	14,437,116.468	1,714,901.733	39.753586590	-80.734980626
7,200.00	8.73	282.128	7,185.13	66.90	-328.31	14,437,119.269	1,714,888.579	39.753594387	-80.735027398
7,300.00	10.73	282.289	7,283.69	70.47	-344.82	14,437,122.844	1,714,872.064	39.753604342	-80.735086123
7,400.00	12.73	282.399	7,381.60	74.82	-364.68	14,437,127.192	1,714,852.206	39.753616441	-80.735156729
7,500.00	14.73	282.480	7,478.74	79.93	-387.85	14,437,132.305	1,714,829.032	39.753630672	-80.735239129
7,600.00	16.73	282.542	7,574.99	85.81	-414.32	14,437,138.178	1,714,802.569	39.753647015	-80.735332223
7,700.00	18.73	282.591	7,670.23	92.43	-444.04	14,437,144.803	1,714,772.849	39.753665452	-80.735438897
7,800.00	20.73	282.631	7,764.36	99.80	-476.98	14,437,152.174	1,714,739.908	39.753685960	-80.735556022
7,902.29	22.77	282.665	7,859.36	108.10	-513.96	14,437,160.473	1,714,702.924	39.753709053	-80.735687525
<b>Begin 22.77° tangent</b>									
8,000.00	22.77	282.665	7,949.45	116.39	-550.87	14,437,168.766	1,714,666.019	39.753732127	-80.735818744
8,100.00	22.77	282.665	8,041.65	124.88	-588.63	14,437,177.253	1,714,628.251	39.753755740	-80.735953035
8,200.00	22.77	282.665	8,133.86	133.37	-626.40	14,437,185.740	1,714,590.482	39.753779353	-80.736087327
8,300.00	22.77	282.665	8,226.06	141.85	-664.17	14,437,194.227	1,714,552.713	39.753802966	-80.736221619
8,400.00	22.77	282.665	8,318.27	150.34	-701.94	14,437,202.714	1,714,514.945	39.753826579	-80.736355910
8,500.00	22.77	282.665	8,410.47	158.83	-739.71	14,437,211.201	1,714,477.176	39.753850192	-80.736490202
8,600.00	22.77	282.665	8,502.67	167.32	-777.48	14,437,219.688	1,714,439.408	39.753873805	-80.736624494
8,700.00	22.77	282.665	8,594.88	175.80	-815.25	14,437,228.175	1,714,401.639	39.753897417	-80.736758786
8,800.00	22.77	282.665	8,687.08	184.29	-853.02	14,437,236.662	1,714,363.870	39.753921030	-80.736893079
8,900.00	22.77	282.665	8,779.28	192.78	-890.78	14,437,245.149	1,714,326.102	39.753944642	-80.737027371
9,000.00	22.77	282.665	8,871.49	201.26	-928.55	14,437,253.636	1,714,288.333	39.753968254	-80.737161663
9,100.00	22.77	282.665	8,963.69	209.75	-966.32	14,437,262.123	1,714,250.564	39.753991866	-80.737295956
9,200.00	22.77	282.665	9,055.89	218.24	-1,004.09	14,437,270.610	1,714,212.796	39.754015477	-80.737430248
9,300.00	22.77	282.665	9,148.10	226.72	-1,041.86	14,437,279.097	1,714,175.027	39.754039089	-80.737564541
9,400.00	22.77	282.665	9,240.30	235.21	-1,079.63	14,437,287.584	1,714,137.259	39.754062700	-80.737698834
9,500.00	22.77	282.665	9,332.50	243.70	-1,117.40	14,437,296.071	1,714,099.490	39.754086312	-80.737833126
9,600.00	22.77	282.665	9,424.71	252.19	-1,155.17	14,437,304.558	1,714,061.721	39.754109923	-80.737967419
9,700.00	22.77	282.665	9,516.91	260.67	-1,192.93	14,437,313.045	1,714,023.953	39.754133534	-80.738101712
9,800.00	22.77	282.665	9,609.12	269.16	-1,230.70	14,437,321.532	1,713,986.184	39.754157144	-80.738236005
9,900.00	22.77	282.665	9,701.32	277.65	-1,268.47	14,437,330.019	1,713,948.415	39.754180755	-80.738370298



Planning Report - Geographic

Database: DB\_Decv0422v16  
 Company: Tug Hill Operating LLC  
 Project: Marshall County, West Virginia NAD83 UTM 17N  
 Site: Pendleton  
 Well: Pendleton S-12 HU (slot B)  
 Wellbore: Original Hole  
 Design: rev4

Local Co-ordinate Reference:  
 TVD Reference:  
 MD Reference:  
 North Reference:  
 Survey Calculation Method:

Well Pendleton S-12 HU (slot B)  
 GL @ 1272.00ft  
 GL @ 1272.00ft  
 Grid  
 Minimum Curvature

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 WV Department of Environmental Protection

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
10,000.00	22.77	282.665	9,793.52	286.13	-1,306.24	14,437,338.506	1,713,910.647	39.754204365	-80.738504592
10,100.00	22.77	282.665	9,885.73	294.62	-1,344.01	14,437,346.993	1,713,872.878	39.754227976	-80.738638885
10,200.00	22.77	282.665	9,977.93	303.11	-1,381.78	14,437,355.480	1,713,835.109	39.754251586	-80.738773179
10,300.00	22.77	282.665	10,070.13	311.59	-1,419.55	14,437,363.967	1,713,797.341	39.754275196	-80.738907472
10,400.00	22.77	282.665	10,162.34	320.08	-1,457.32	14,437,372.454	1,713,759.572	39.754298806	-80.739041766
10,500.00	22.77	282.665	10,254.54	328.57	-1,495.08	14,437,380.941	1,713,721.804	39.754322415	-80.739176060
10,600.00	22.77	282.665	10,346.74	337.06	-1,532.85	14,437,389.428	1,713,684.035	39.754346025	-80.739310353
10,700.00	22.77	282.665	10,438.95	345.54	-1,570.62	14,437,397.915	1,713,646.266	39.754369634	-80.739444647
10,711.83	22.77	282.665	10,449.85	346.55	-1,575.09	14,437,398.918	1,713,641.800	39.754372426	-80.739460528
<b>Begin 6°/100' build/turn</b>									
10,750.00	21.33	277.929	10,485.23	349.12	-1,589.17	14,437,401.496	1,713,627.713	39.754379618	-80.739510623
10,800.00	19.67	270.786	10,532.07	350.49	-1,606.60	14,437,402.867	1,713,610.290	39.754383520	-80.739572601
10,850.00	18.33	262.520	10,579.36	349.59	-1,622.81	14,437,401.958	1,713,594.076	39.754381154	-80.739630301
10,900.00	17.41	253.211	10,626.95	346.40	-1,637.77	14,437,398.773	1,713,579.115	39.754372527	-80.739683564
10,950.00	16.95	243.159	10,674.73	340.95	-1,651.44	14,437,393.321	1,713,565.449	39.754357663	-80.739732244
11,000.00	17.00	232.873	10,722.57	333.24	-1,663.77	14,437,385.616	1,713,553.115	39.754336602	-80.739776209
11,050.00	17.56	222.936	10,770.32	323.31	-1,674.74	14,437,375.680	1,713,542.147	39.754309402	-80.739815337
11,100.00	18.57	213.822	10,817.86	311.17	-1,684.31	14,437,363.540	1,713,532.574	39.754276138	-80.739849521
11,150.00	19.98	205.784	10,865.07	296.86	-1,692.46	14,437,349.228	1,713,524.424	39.754236900	-80.739878668
11,200.00	21.70	198.864	10,911.80	280.41	-1,699.17	14,437,332.786	1,713,517.718	39.754191797	-80.739902697
11,250.00	23.66	192.977	10,957.94	261.88	-1,704.41	14,437,314.256	1,713,512.475	39.754140951	-80.739921544
11,300.00	25.82	187.981	11,003.35	241.32	-1,708.18	14,437,293.691	1,713,508.709	39.754084503	-80.739935155
11,350.00	28.12	183.728	11,047.92	218.77	-1,710.46	14,437,271.146	1,713,506.431	39.754022608	-80.739943494
11,400.00	30.53	180.083	11,091.51	194.31	-1,711.24	14,437,246.684	1,713,505.646	39.753955433	-80.739946539
11,450.00	33.03	176.931	11,134.01	168.00	-1,710.53	14,437,220.371	1,713,506.358	39.753983165	-80.739944280
11,500.00	35.60	174.182	11,175.31	139.91	-1,708.33	14,437,192.280	1,713,508.563	39.753806001	-80.739936724
11,550.00	38.22	171.759	11,215.29	110.11	-1,704.63	14,437,162.487	1,713,512.256	39.753724152	-80.739923891
11,600.00	40.89	169.606	11,253.84	78.70	-1,699.46	14,437,131.074	1,713,517.427	39.753637842	-80.739905817
11,650.00	43.60	167.673	11,290.85	45.75	-1,692.83	14,437,098.128	1,713,524.061	39.753547309	-80.739882552
11,700.00	46.33	165.925	11,326.22	11.37	-1,684.75	14,437,063.738	1,713,532.141	39.753452801	-80.739854159
11,750.00	49.09	164.329	11,359.87	-24.37	-1,675.24	14,437,027.999	1,713,541.645	39.753354576	-80.739820716
11,766.45	50.00	163.833	11,370.54	-36.41	-1,671.81	14,437,015.963	1,713,545.078	39.753321494	-80.739808625
<b>Begin 8°/100' build/turn</b>									
11,800.00	52.49	162.555	11,391.54	-61.45	-1,664.24	14,436,990.921	1,713,552.647	39.753252660	-80.739781954
11,850.00	56.23	160.800	11,420.67	-100.01	-1,651.46	14,436,952.360	1,713,565.432	39.753146659	-80.739736863
11,900.00	59.99	159.193	11,447.08	-139.89	-1,636.93	14,436,912.481	1,713,579.962	39.753037026	-80.739685577
11,950.00	63.77	157.703	11,470.65	-180.89	-1,620.72	14,436,871.480	1,713,596.167	39.752924294	-80.739628344
12,000.00	67.56	156.307	11,491.25	-222.82	-1,602.92	14,436,829.555	1,713,613.968	39.752809014	-80.739565444
12,050.00	71.36	154.986	11,508.79	-265.46	-1,583.61	14,436,786.910	1,713,633.277	39.752691747	-80.739497183
12,100.00	75.18	153.723	11,523.18	-308.62	-1,562.89	14,436,743.755	1,713,654.002	39.752573065	-80.739423893
12,150.00	79.00	152.504	11,534.35	-352.08	-1,540.85	14,436,700.298	1,713,676.040	39.752453544	-80.739345933
12,200.00	82.82	151.316	11,542.25	-395.62	-1,517.60	14,436,656.752	1,713,699.285	39.752333769	-80.739263680
12,250.00	86.65	150.148	11,546.83	-439.04	-1,493.26	14,436,613.329	1,713,723.623	39.752214321	-80.739177537
12,280.70	89.00	149.436	11,548.00	-465.55	-1,477.83	14,436,586.819	1,713,739.057	39.752141395	-80.739122899
<b>Begin 89.00° lateral</b>									
12,300.00	89.00	149.436	11,548.34	-482.17	-1,468.02	14,436,570.203	1,713,748.870	39.752095684	-80.739088158
12,400.00	89.00	149.436	11,550.08	-568.26	-1,417.18	14,436,484.110	1,713,799.712	39.751858843	-80.738908158
12,500.00	89.00	149.436	11,551.83	-654.36	-1,366.33	14,436,398.018	1,713,850.555	39.751622001	-80.738728158
12,600.00	89.00	149.436	11,553.58	-740.45	-1,315.49	14,436,311.925	1,713,901.397	39.751385159	-80.738548161
12,700.00	89.00	149.436	11,555.33	-826.54	-1,264.65	14,436,225.832	1,713,952.240	39.751148316	-80.738368164
12,800.00	89.00	149.436	11,557.07	-912.63	-1,213.80	14,436,139.740	1,714,003.082	39.750911473	-80.738188169
12,900.00	89.00	149.436	11,558.82	-998.73	-1,162.96	14,436,053.647	1,714,053.925	39.750674630	-80.738008174
13,000.00	89.00	149.436	11,560.57	-1,084.82	-1,112.12	14,435,967.554	1,714,104.767	39.750437787	-80.737828181



Planning Report - Geographic

Database: DB\_Decv0422v16  
 Company: Tug Hill Operating LLC  
 Project: Marshall County, West Virginia NAD83 UTM 17N  
 Site: Pendleton  
 Well: Pendleton S-12 HU (slot B)  
 Wellbore: Original Hole  
 Design: rev4

Local Co-ordinate Reference: Well Pendleton S-12 HU (slot B)  
 TVD Reference: GL @ 1272.00ft  
 MD Reference: GL @ 1272.00ft  
 North Reference: Grid  
 Survey Calculation Method: Minimum Curvature

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WV Department of  
 Environmental Protection

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
13,100.00	89.00	149.436	11,562.31	-1,170.91	-1,061.28	14,435,881.462	1,714,155.609	39.750200944	-80.737648190
13,200.00	89.00	149.436	11,564.06	-1,257.01	-1,010.43	14,435,795.369	1,714,206.452	39.749964100	-80.737468199
13,300.00	89.00	149.436	11,565.81	-1,343.10	-959.59	14,435,709.276	1,714,257.294	39.749727255	-80.737288210
13,400.00	89.00	149.436	11,567.56	-1,429.19	-908.75	14,435,623.184	1,714,308.137	39.749490411	-80.737108222
13,500.00	89.00	149.436	11,569.30	-1,515.28	-857.91	14,435,537.091	1,714,358.979	39.749253566	-80.736928235
13,600.00	89.00	149.436	11,571.05	-1,601.38	-807.06	14,435,450.998	1,714,409.822	39.749016721	-80.736748250
13,700.00	89.00	149.436	11,572.80	-1,687.47	-756.22	14,435,364.906	1,714,460.664	39.748779876	-80.736568265
13,800.00	89.00	149.436	11,574.54	-1,773.56	-705.38	14,435,278.813	1,714,511.507	39.748543030	-80.736388282
13,900.00	89.00	149.436	11,576.29	-1,859.66	-654.54	14,435,192.720	1,714,562.349	39.748306185	-80.736208300
14,000.00	89.00	149.436	11,578.04	-1,945.75	-603.69	14,435,106.628	1,714,613.192	39.748069338	-80.736028320
14,100.00	89.00	149.436	11,579.78	-2,031.84	-552.85	14,434,676.164	1,714,664.034	39.747832492	-80.735848340
14,200.00	89.00	149.436	11,581.53	-2,117.93	-502.01	14,434,934.442	1,714,714.877	39.747595645	-80.735668362
14,300.00	89.00	149.436	11,583.28	-2,204.03	-451.17	14,434,848.350	1,714,765.719	39.747358798	-80.735488385
14,400.00	89.00	149.436	11,585.03	-2,290.12	-400.32	14,434,762.257	1,714,816.562	39.747121951	-80.735308409
14,500.00	89.00	149.436	11,586.77	-2,376.21	-349.48	14,434,676.164	1,714,867.404	39.746885104	-80.735128435
14,600.00	89.00	149.436	11,588.52	-2,462.31	-298.64	14,434,590.071	1,714,918.247	39.746648256	-80.734948462
14,700.00	89.00	149.436	11,590.27	-2,548.40	-247.80	14,434,503.979	1,714,969.089	39.746411408	-80.734768490
14,800.00	89.00	149.436	11,592.01	-2,634.49	-196.95	14,434,417.886	1,715,019.932	39.746174559	-80.734588519
14,900.00	89.00	149.436	11,593.76	-2,720.58	-146.11	14,434,331.793	1,715,070.774	39.745937710	-80.734408549
15,000.00	89.00	149.436	11,595.51	-2,806.68	-95.27	14,434,245.701	1,715,121.617	39.745700861	-80.734228581
15,100.00	89.00	149.436	11,597.26	-2,892.77	-44.43	14,434,159.608	1,715,172.459	39.745464012	-80.734048614
15,200.00	89.00	149.436	11,599.00	-2,978.86	6.42	14,434,073.515	1,715,223.301	39.745227163	-80.733868648
15,300.00	89.00	149.436	11,600.75	-3,064.96	57.26	14,433,987.423	1,715,274.144	39.744990313	-80.733688683
15,400.00	89.00	149.436	11,602.50	-3,151.05	108.10	14,433,901.330	1,715,324.986	39.744753463	-80.733508720
15,500.00	89.00	149.436	11,604.24	-3,237.14	158.94	14,433,815.237	1,715,375.829	39.744516612	-80.733328758
15,600.00	89.00	149.436	11,605.99	-3,323.23	209.79	14,433,729.145	1,715,426.671	39.744279762	-80.733148797
15,700.00	89.00	149.436	11,607.74	-3,409.33	260.63	14,433,643.052	1,715,477.514	39.744042911	-80.732968837
15,800.00	89.00	149.436	11,609.49	-3,495.42	311.47	14,433,556.959	1,715,528.356	39.743806059	-80.732788878
15,900.00	89.00	149.436	11,611.23	-3,581.51	362.32	14,433,470.867	1,715,579.199	39.743569208	-80.732608921
16,000.00	89.00	149.436	11,612.98	-3,667.61	413.16	14,433,384.774	1,715,630.041	39.743332356	-80.732428965
16,100.00	89.00	149.436	11,614.73	-3,753.70	464.00	14,433,298.681	1,715,680.884	39.743095504	-80.732249010
16,200.00	89.00	149.436	11,616.47	-3,839.79	514.84	14,433,212.589	1,715,731.726	39.742858651	-80.732069057
16,300.00	89.00	149.436	11,618.22	-3,925.88	565.69	14,433,126.496	1,715,782.569	39.742621799	-80.731889104
16,400.00	89.00	149.436	11,619.97	-4,011.98	616.53	14,433,040.403	1,715,833.411	39.742384946	-80.731709153
16,500.00	89.00	149.436	11,621.72	-4,098.07	667.37	14,432,954.311	1,715,884.255	39.742148092	-80.731529203
16,600.00	89.00	149.436	11,623.46	-4,184.16	718.21	14,432,868.218	1,715,935.097	39.741911239	-80.731349255
16,700.00	89.00	149.436	11,625.21	-4,270.26	769.06	14,432,782.125	1,715,985.940	39.741674385	-80.731169307
16,800.00	89.00	149.436	11,626.96	-4,356.35	819.90	14,432,696.033	1,716,036.782	39.741437531	-80.730989361
16,900.00	89.00	149.436	11,628.70	-4,442.44	870.74	14,432,609.940	1,716,087.625	39.741200677	-80.730809416
17,000.00	89.00	149.436	11,630.45	-4,528.53	921.58	14,432,523.847	1,716,138.467	39.740963822	-80.730629472
17,100.00	89.00	149.436	11,632.20	-4,614.63	972.43	14,432,437.755	1,716,189.309	39.740726967	-80.730449530
17,200.00	89.00	149.436	11,633.94	-4,700.72	1,023.27	14,432,351.661	1,716,240.152	39.740490112	-80.730269588
17,300.00	89.00	149.436	11,635.69	-4,786.81	1,074.11	14,432,265.568	1,716,290.994	39.740253256	-80.730089648
17,400.00	89.00	149.436	11,637.44	-4,872.91	1,124.95	14,432,179.475	1,716,341.837	39.740016400	-80.729909709
17,500.00	89.00	149.436	11,639.19	-4,959.00	1,175.80	14,432,093.383	1,716,392.679	39.739779544	-80.729729772
17,600.00	89.00	149.436	11,640.93	-5,045.09	1,226.64	14,432,007.290	1,716,443.522	39.739542688	-80.729549835
17,700.00	89.00	149.436	11,642.68	-5,131.18	1,277.48	14,431,921.197	1,716,494.364	39.739305831	-80.729369900
17,800.00	89.00	149.436	11,644.43	-5,217.28	1,328.32	14,431,835.105	1,716,545.207	39.739068974	-80.729189966
17,900.00	89.00	149.436	11,646.17	-5,303.37	1,379.17	14,431,749.012	1,716,596.049	39.738832117	-80.729010034
18,000.00	89.00	149.436	11,647.92	-5,389.46	1,430.01	14,431,662.919	1,716,646.892	39.738595259	-80.728830102
18,100.00	89.00	149.436	11,649.67	-5,475.56	1,480.85	14,431,576.827	1,716,697.734	39.738358402	-80.728650172
18,200.00	89.00	149.436	11,651.42	-5,561.65	1,531.69	14,431,490.734	1,716,748.577	39.738121544	-80.728470243
18,300.00	89.00	149.436	11,653.16	-5,647.74	1,582.54	14,431,404.641	1,716,799.419	39.737884685	-80.728290315
18,400.00	89.00	149.436	11,654.91	-5,733.83	1,633.38	14,431,318.549	1,716,850.262	39.737647827	-80.728110389



Planning Report - Geographic

<b>Database:</b>	DB_Decv0422v16	<b>Local Co-ordinate Reference:</b>	Well Pendleton S-12 HU (slot B)
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	GL @ 1272.00ft
<b>Project:</b>	Marshall County, West Virginia NAD83 UTM 17N	<b>MD Reference:</b>	GL @ 1272.00ft
<b>Site:</b>	Pendleton	<b>North Reference:</b>	Grid
<b>Well:</b>	Pendleton S-12 HU (slot B)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev4		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
18,500.00	89.00	149.436	11,656.66	-5,819.93	1,684.22	14,431,232.456	1,716,901.104	39.737410968	-80.727930463
18,600.00	89.00	149.436	11,658.40	-5,906.02	1,735.06	14,431,146.363	1,716,951.947	39.737174108	-80.727750539
18,700.00	89.00	149.436	11,660.15	-5,992.11	1,785.91	14,431,060.271	1,717,002.789	39.736937249	-80.727570616
18,800.00	89.00	149.436	11,661.90	-6,078.21	1,836.75	14,430,974.178	1,717,053.632	39.736700389	-80.727390695
18,900.00	89.00	149.436	11,663.65	-6,164.30	1,887.59	14,430,888.085	1,717,104.474	39.736463529	-80.727210774
19,000.00	89.00	149.436	11,665.39	-6,250.39	1,938.44	14,430,801.993	1,717,155.317	39.736226669	-80.727030855
19,100.00	89.00	149.436	11,667.14	-6,336.48	1,989.28	14,430,715.900	1,717,206.159	39.735989808	-80.726850937
19,200.00	89.00	149.436	11,668.89	-6,422.58	2,040.12	14,430,629.807	1,717,257.001	39.735752947	-80.726671020
19,300.00	89.00	149.436	11,670.63	-6,508.67	2,090.96	14,430,543.715	1,717,307.844	39.735516086	-80.726491105
19,400.00	89.00	149.436	11,672.38	-6,594.76	2,141.81	14,430,457.622	1,717,358.686	39.735279224	-80.726311191
19,500.00	89.00	149.436	11,674.13	-6,680.86	2,192.65	14,430,371.529	1,717,409.529	39.735042362	-80.726131278
19,600.00	89.00	149.436	11,675.88	-6,766.95	2,243.49	14,430,285.437	1,717,460.371	39.734805500	-80.725951366
19,700.00	89.00	149.436	11,677.62	-6,853.04	2,294.33	14,430,199.344	1,717,511.214	39.734568638	-80.725771455
19,800.00	89.00	149.436	11,679.37	-6,939.13	2,345.18	14,430,113.251	1,717,562.056	39.734331775	-80.725591546
19,900.00	89.00	149.436	11,681.12	-7,025.23	2,396.02	14,430,027.159	1,717,612.899	39.734094912	-80.725411638
20,000.00	89.00	149.436	11,682.86	-7,111.32	2,446.86	14,429,941.066	1,717,663.741	39.733858049	-80.725231731
20,100.00	89.00	149.436	11,684.61	-7,197.41	2,497.70	14,429,854.973	1,717,714.584	39.733621186	-80.725051825
20,200.00	89.00	149.436	11,686.36	-7,283.51	2,548.55	14,429,768.880	1,717,765.426	39.733384322	-80.724871921
20,300.00	89.00	149.436	11,688.10	-7,369.60	2,599.39	14,429,682.788	1,717,816.269	39.733147458	-80.724692017
20,400.00	89.00	149.436	11,689.85	-7,455.69	2,650.23	14,429,596.695	1,717,867.111	39.732910594	-80.724512115
20,500.00	89.00	149.436	11,691.60	-7,541.78	2,701.07	14,429,510.602	1,717,917.954	39.732673729	-80.724332215
20,600.00	89.00	149.436	11,693.35	-7,627.88	2,751.92	14,429,424.510	1,717,968.796	39.732436864	-80.724152315
20,700.00	89.00	149.436	11,695.09	-7,713.97	2,802.76	14,429,338.417	1,718,019.639	39.732199999	-80.723972417
20,751.93	89.00	149.436	11,696.00	-7,758.68	2,829.16	14,429,293.711	1,718,046.040	39.732077000	-80.723879000

PBHL/TD 20751.93 MD 11696.00 TVD

Design Targets									
Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Pendleton S-12HU LP 5' - plan hits target center - Point	0.00	0.000	11,548.00	-465.55	-1,477.83	14,436,586.821	1,713,739.058	39.752141400	-80.739122896
Pendleton S-12HU PBH - plan hits target center - Point	0.00	0.000	11,696.00	-7,758.68	2,829.16	14,429,293.711	1,718,046.040	39.732077000	-80.723879000

Plan Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
3,300.00	3,300.00	0.00	0.00	KOP Begin 2°/100' build	
3,550.00	3,549.68	2.17	-10.68	Begin 5.00° tangent	
7,013.50	7,000.00	62.30	-306.50	Begin 2°/100' build	
7,902.29	7,859.36	108.10	-513.96	Begin 22.77° tangent	
10,711.83	10,449.85	346.55	-1,575.09	Begin 6°/100' build/turn	
11,766.45	11,370.54	-36.41	-1,671.81	Begin 8°/100' build/turn	
12,280.70	11,548.00	-465.55	-1,477.83	Begin 89.00° lateral	
20,751.93	11,696.00	-7,758.68	2,829.16	PBHL/TD 20751.93 MD 11696.00 TVD	