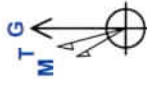




Well: Hendrickson S-13 HU (slot G)
Site: Hendrickson
Project: Marshall County, West Virginia NAD83 UTM 17N
Design: rev2
Rig:



Administs to Grid North
 True North: 0.15
 Magnetic North: -8.79
 Magnetic Field
 Strength: 51557.4nT
 Dip Angle: 66.35°
 Date: 2/13/2023
 Model: IGRF2020



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 @ 1220.00ft

Northing 14433956.324 Easting 1711273.206
 Latitude 39.7449366590 Longitude -80.747922510

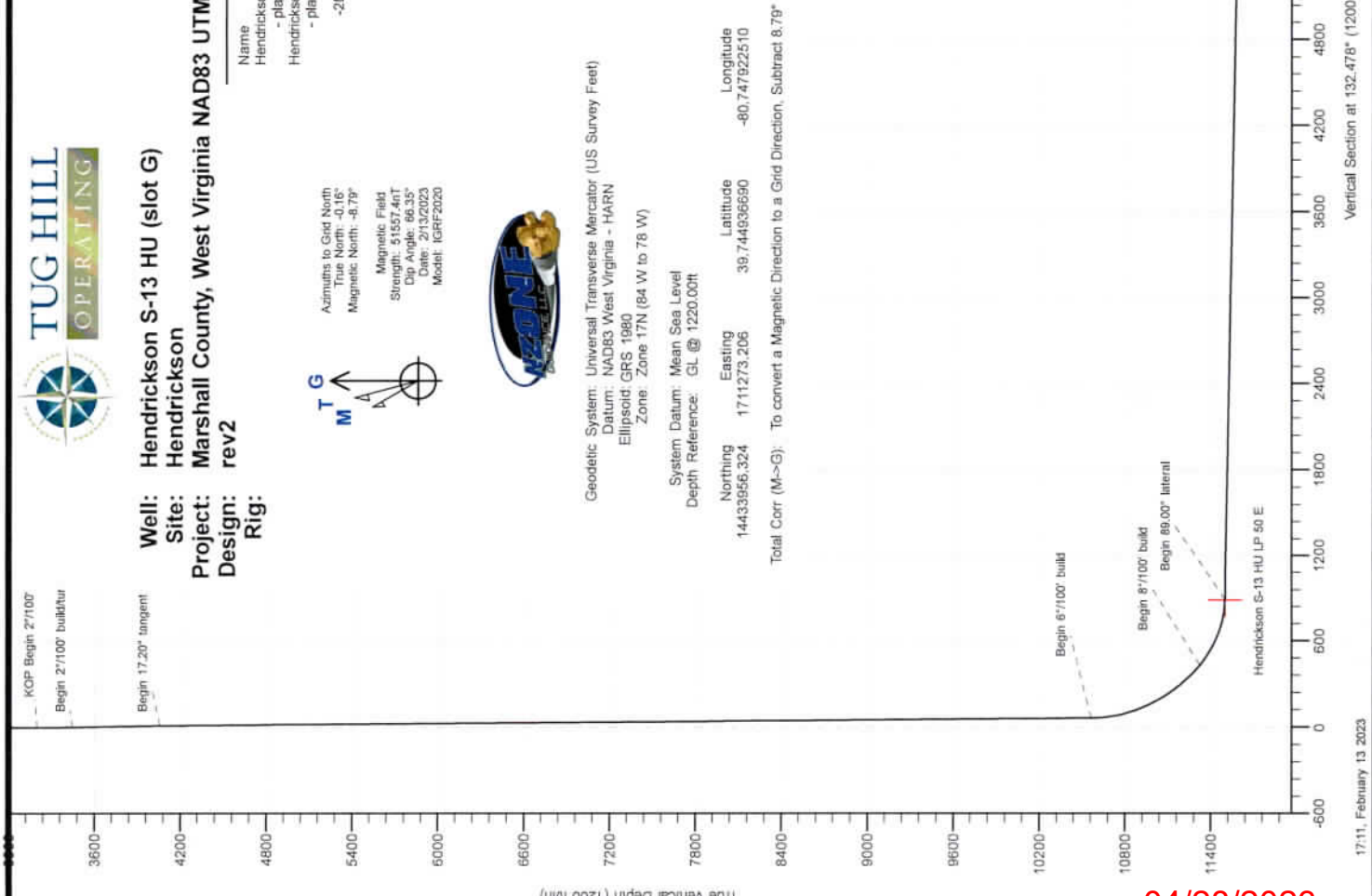
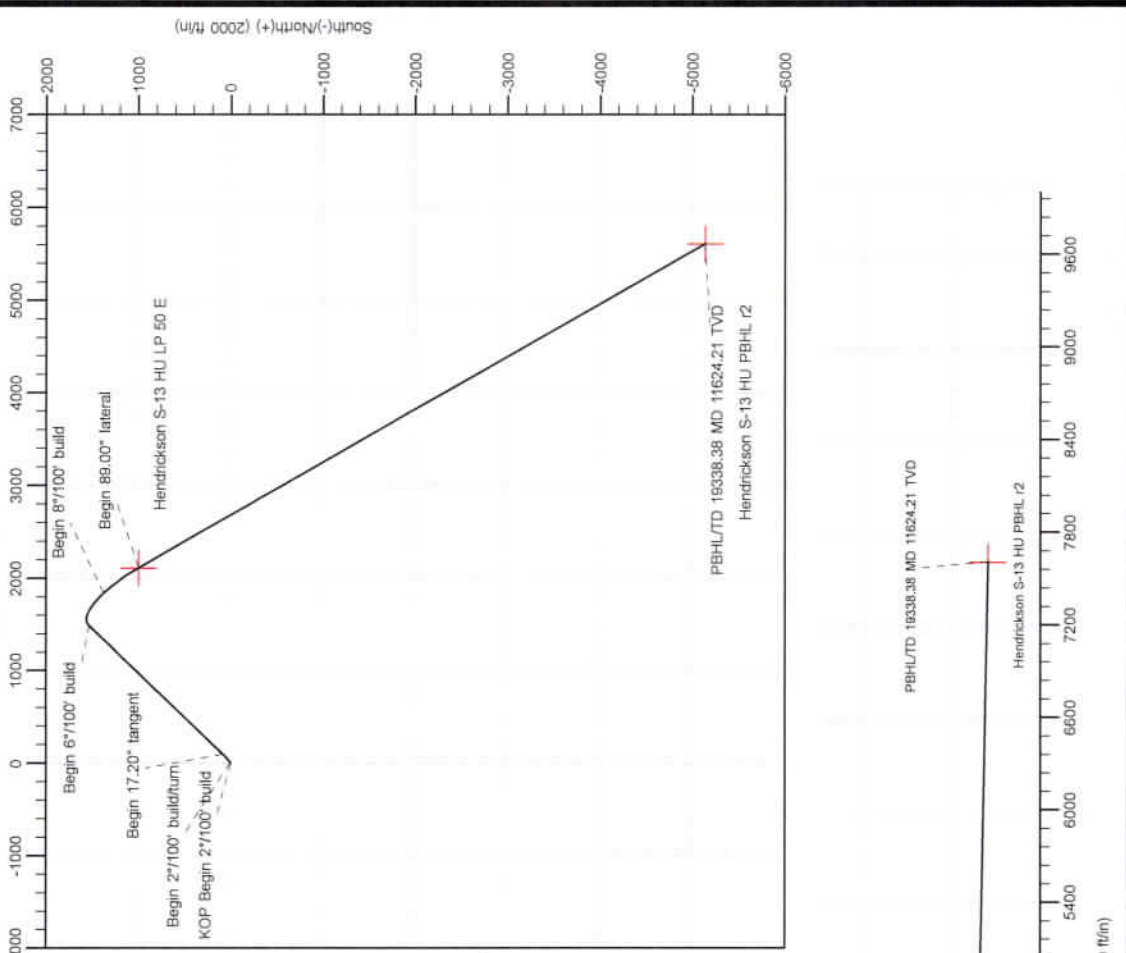
Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.79°

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Northing	Easting	VFace	VSect	Annotation
1	0.00	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00	0.00	
2	3200.00	0.00	0.000	3200.00	0.00	0.00	2116.0914434951670	1713389.252	0.00	0.00	KOP Begin 2'100' build
3	3450.00	5.00	60.000	3449.66	5.45	9.44	2116.0914434951670	1713389.252	0.00	0.00	Begin 2'100' build/thum
4	4073.51	17.20	43.867	4060.48	85.81	97.20	2116.0914434951670	1713389.252	0.00	0.00	Begin 17.20° tangent
5	10884.19	17.20	43.867	10566.65	1537.61	1492.70	2116.0914434951670	1713389.252	0.00	0.00	Begin 6'100' build
6	11763.91	50.00	136.199	11323.91	1376.63	1841.04	2116.0914434951670	1713389.252	0.00	0.00	Begin 8'100' build
7	12277.18	89.00	150.319	11500.99	995.35	2116.05	2116.0914434951670	1713389.252	0.00	0.00	Begin 89.00° lateral
8	19338.38	89.00	150.319	11624.21	-5138.45	5612.03	2116.0914434951670	1713389.252	0.00	0.00	Begin 89.00° lateral

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
Hendrickson S-13 HU LP 50 E	11501.00	995.35	2116.0914434951670	1713389.252	39.747653602	-80.740384330	
- plan misses target center by 0.01ft at 12277.18ft MD (11500.99 TVD, 995.35 N, 2116.05 E)	11624.21	-5138.45	5612.0314428617889	1716885.228	39.730780000	-80.728013000	
Hendrickson S-13 HU PBHL r2	11624.21	-5138.45	5612.0314428617889	1716885.228	39.730780000	-80.728013000	
- plan hits target center							



04/28/2023



Planning Report - Geographic

Database:	DB_Decv0422v16	Local Co-ordinate Reference:	Well Hendrickson S-13 HU (slot G)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1220.00ft
Project:	Marshall County, West Virginia NAD83 UTM 17N	MD Reference:	GL @ 1220.00ft
Site:	Hendrickson	North Reference:	Grid
Well:	Hendrickson S-13 HU (slot G)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev2		

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

Site	Hendrickson				
Site Position:		Northing:	14,433,967.927 usft	Latitude:	39.744968530
From:	Lat/Long	Easting:	1,711,276.257 usft	Longitude:	-80.747911540
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "		

Well	Hendrickson S-13 HU (slot G)					
Well Position	+N/-S	0.00 ft	Northing:	14,433,956.325 usft	Latitude:	39.744936690
	+E/-W	0.00 ft	Easting:	1,711,273.206 usft	Longitude:	-80.747922510
Position Uncertainty	0.00 ft		Wellhead Elevation:	ft	Ground Level:	1,220.00 ft
Grid Convergence:	0.16 "					

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2020	2/13/2023	-8.63	66.35	51,557.42238428

Design	rev2			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.00	0.00	0.00	132.478

Plan Survey Tool Program	Date	2/13/2023		
Depth From (ft)	Depth To (ft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	19,338.38 rev2 (Original Hole)	MWD	MWD - Standard

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	
3,200.00	0.00	0.000	3,200.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,450.00	5.00	60.000	3,449.68	5.45	9.44	2.00	2.00	0.00	60.00	
4,073.51	17.20	43.867	4,060.48	85.81	97.20	2.00	1.96	-2.59	-22.36	
10,884.19	17.20	43.867	10,566.65	1,537.61	1,492.70	0.00	0.00	0.00	0.00	
11,763.91	50.00	136.199	11,323.91	1,376.63	1,841.04	6.00	3.73	10.50	106.02	
12,277.18	89.00	150.319	11,501.00	995.35	2,116.05	8.00	7.60	2.75	21.80	
19,338.38	89.00	150.319	11,624.21	-5,138.45	5,612.03	0.00	0.00	0.00	0.00	Hendrickson S-13 HU



Planning Report - Geographic

Database:	DB_Decv0422v16	Local Co-ordinate Reference:	Well Hendrickson S-13 HU (slot G)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1220.00ft
Project:	Marshall County, West Virginia NAD83 UTM 17N	MD Reference:	GL @ 1220.00ft
Site:	Hendrickson	North Reference:	Grid
Well:	Hendrickson S-13 HU (slot G)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev2		

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	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
100.00	0.00	0.000	100.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
200.00	0.00	0.000	200.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
300.00	0.00	0.000	300.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
400.00	0.00	0.000	400.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
500.00	0.00	0.000	500.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
600.00	0.00	0.000	600.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
700.00	0.00	0.000	700.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
800.00	0.00	0.000	800.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
900.00	0.00	0.000	900.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
1,000.00	0.00	0.000	1,000.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
1,100.00	0.00	0.000	1,100.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
1,200.00	0.00	0.000	1,200.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
1,300.00	0.00	0.000	1,300.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
1,400.00	0.00	0.000	1,400.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
1,500.00	0.00	0.000	1,500.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
1,600.00	0.00	0.000	1,600.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
1,700.00	0.00	0.000	1,700.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
1,800.00	0.00	0.000	1,800.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
1,900.00	0.00	0.000	1,900.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
2,000.00	0.00	0.000	2,000.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
2,100.00	0.00	0.000	2,100.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
2,200.00	0.00	0.000	2,200.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
2,300.00	0.00	0.000	2,300.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
2,400.00	0.00	0.000	2,400.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
2,500.00	0.00	0.000	2,500.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
2,600.00	0.00	0.000	2,600.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
2,700.00	0.00	0.000	2,700.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
2,800.00	0.00	0.000	2,800.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
2,900.00	0.00	0.000	2,900.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
3,000.00	0.00	0.000	3,000.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
3,100.00	0.00	0.000	3,100.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
3,200.00	0.00	0.000	3,200.00	0.00	0.00	14,433,956.325	1,711,273.206	39.744936690	-80.747922510	
KOP Begin 2°/100' build										
3,300.00	2.00	60.000	3,299.98	0.87	1.51	14,433,957.197	1,711,274.717	39.744939075	-80.747917124	
3,400.00	4.00	60.000	3,399.84	3.49	6.04	14,433,959.814	1,711,279.250	39.744946226	-80.747900975	
3,450.00	5.00	60.000	3,449.68	5.45	9.44	14,433,961.776	1,711,282.647	39.744951586	-80.747888869	
Begin 2°/100' build/turn										
3,500.00	5.94	56.319	3,499.45	7.97	13.48	14,433,964.299	1,711,286.686	39.744958485	-80.747874475	
3,600.00	7.86	51.625	3,598.73	15.09	23.14	14,433,971.411	1,711,296.349	39.744977943	-80.747840026	
3,700.00	9.81	48.777	3,697.54	24.94	34.91	14,433,981.270	1,711,308.116	39.745004926	-80.747798065	
3,800.00	11.78	46.870	3,795.76	37.54	48.77	14,433,993.862	1,711,321.973	39.745039402	-80.747748642	
3,900.00	13.76	45.503	3,893.29	52.85	64.70	14,434,009.173	1,711,337.903	39.745081327	-80.747691817	
4,000.00	15.74	44.475	3,989.99	70.86	82.68	14,434,027.185	1,711,355.887	39.745130652	-80.747627661	
4,073.51	17.20	43.867	4,060.48	85.81	97.20	14,434,042.134	1,711,370.402	39.745171594	-80.747575870	
Begin 17.20° tangent										
4,100.00	17.20	43.867	4,085.79	91.46	102.62	14,434,047.781	1,711,375.831	39.745187061	-80.747556502	
4,200.00	17.20	43.867	4,181.32	112.77	123.11	14,434,069.097	1,711,396.320	39.745245444	-80.747483395	
4,300.00	17.20	43.867	4,276.84	134.09	143.60	14,434,090.414	1,711,416.810	39.745303826	-80.747410287	
4,400.00	17.20	43.867	4,372.37	155.41	164.09	14,434,111.730	1,711,437.300	39.745362209	-80.747337179	
4,500.00	17.20	43.867	4,467.90	176.72	184.58	14,434,133.047	1,711,457.790	39.745420592	-80.747264071	
4,600.00	17.20	43.867	4,563.43	198.04	205.07	14,434,154.363	1,711,478.280	39.745478974	-80.747190963	
4,700.00	17.20	43.867	4,658.96	219.36	225.56	14,434,175.680	1,711,498.770	39.745537357	-80.747117855	



Planning Report - Geographic

Database:	DB_Decv0422v16	Local Co-ordinate Reference:	Well Hendrickson S-13 HU (slot G)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1220.00ft
Project:	Marshall County, West Virginia NAD83 UTM 17N	MD Reference:	GL @ 1220.00ft
Site:	Hendrickson	North Reference:	Grid
Well:	Hendrickson S-13 HU (slot G)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev2		

Planned Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
4,800.00	17.20	43.867	4,754.49	240.67	246.05	14,434,196.996	1,711,519.260	39.745595739	-80.747044747	
4,900.00	17.20	43.867	4,850.02	261.99	266.54	14,434,218.313	1,711,539.749	39.745654121	-80.746971639	
5,000.00	17.20	43.867	4,945.55	283.31	287.03	14,434,239.629	1,711,560.239	39.745712504	-80.746898530	
5,100.00	17.20	43.867	5,041.08	304.62	307.52	14,434,260.946	1,711,580.729	39.745770886	-80.746825422	
5,200.00	17.20	43.867	5,136.60	325.94	328.01	14,434,282.262	1,711,601.219	39.745829268	-80.746752313	
5,300.00	17.20	43.867	5,232.13	347.25	348.50	14,434,303.579	1,711,621.709	39.745887650	-80.746679204	
5,400.00	17.20	43.867	5,327.66	368.57	368.99	14,434,324.895	1,711,642.199	39.745946032	-80.746606095	
5,500.00	17.20	43.867	5,423.19	389.89	389.48	14,434,346.212	1,711,662.688	39.746004415	-80.746532986	
5,600.00	17.20	43.867	5,518.72	411.20	409.97	14,434,367.528	1,711,683.178	39.746062797	-80.746459877	
5,700.00	17.20	43.867	5,614.25	432.52	430.46	14,434,388.845	1,711,703.668	39.746121179	-80.746386768	
5,800.00	17.20	43.867	5,709.78	453.84	450.95	14,434,410.161	1,711,724.158	39.746179561	-80.746313658	
5,900.00	17.20	43.867	5,805.31	475.15	471.44	14,434,431.478	1,711,744.648	39.746237942	-80.746240549	
6,000.00	17.20	43.867	5,900.84	496.47	491.93	14,434,452.794	1,711,765.138	39.746296324	-80.746167439	
6,100.00	17.20	43.867	5,996.36	517.79	512.42	14,434,474.111	1,711,785.627	39.746354706	-80.746094329	
6,200.00	17.20	43.867	6,091.89	539.10	532.91	14,434,495.427	1,711,806.117	39.746413088	-80.746021219	
6,300.00	17.20	43.867	6,187.42	560.42	553.40	14,434,516.744	1,711,826.607	39.746471470	-80.745948109	
6,400.00	17.20	43.867	6,282.95	581.74	573.89	14,434,538.060	1,711,847.097	39.746529851	-80.745874999	
6,500.00	17.20	43.867	6,378.48	603.05	594.38	14,434,559.377	1,711,867.587	39.746588233	-80.745801889	
6,600.00	17.20	43.867	6,474.01	624.37	614.87	14,434,580.693	1,711,888.077	39.746646614	-80.745728779	
6,700.00	17.20	43.867	6,569.54	645.69	635.36	14,434,602.010	1,711,908.567	39.746704996	-80.745655668	
6,800.00	17.20	43.867	6,665.07	667.00	655.85	14,434,623.326	1,711,929.056	39.746763377	-80.745582557	
6,900.00	17.20	43.867	6,760.60	688.32	676.34	14,434,644.643	1,711,949.546	39.746821759	-80.745509447	
7,000.00	17.20	43.867	6,856.12	709.64	696.83	14,434,665.959	1,711,970.036	39.746880140	-80.745436336	
7,100.00	17.20	43.867	6,951.65	730.95	717.32	14,434,687.276	1,711,990.526	39.746938521	-80.745363225	
7,200.00	17.20	43.867	7,047.18	752.27	737.81	14,434,708.592	1,712,011.016	39.746996903	-80.745290113	
7,300.00	17.20	43.867	7,142.71	773.59	758.30	14,434,729.909	1,712,031.506	39.747055284	-80.745217002	
7,400.00	17.20	43.867	7,238.24	794.90	778.79	14,434,751.225	1,712,051.995	39.747113665	-80.745143891	
7,500.00	17.20	43.867	7,333.77	816.22	799.28	14,434,772.542	1,712,072.485	39.747172046	-80.745070779	
7,600.00	17.20	43.867	7,429.30	837.54	819.77	14,434,793.858	1,712,092.975	39.747230427	-80.744997668	
7,700.00	17.20	43.867	7,524.83	858.85	840.26	14,434,815.175	1,712,113.465	39.747288808	-80.744924556	
7,800.00	17.20	43.867	7,620.36	880.17	860.75	14,434,836.491	1,712,133.955	39.747347189	-80.744851444	
7,900.00	17.20	43.867	7,715.88	901.48	881.24	14,434,857.808	1,712,154.445	39.747405570	-80.744778332	
8,000.00	17.20	43.867	7,811.41	922.80	901.73	14,434,879.124	1,712,174.934	39.747463951	-80.744705220	
8,100.00	17.20	43.867	7,906.94	944.12	922.22	14,434,900.441	1,712,195.424	39.747522332	-80.744632107	
8,200.00	17.20	43.867	8,002.47	965.43	942.71	14,434,921.757	1,712,215.914	39.747580713	-80.744558995	
8,300.00	17.20	43.867	8,098.00	986.75	963.20	14,434,943.074	1,712,236.404	39.747639094	-80.744485883	
8,400.00	17.20	43.867	8,193.53	1,008.07	983.69	14,434,964.390	1,712,256.894	39.747697475	-80.744412770	
8,500.00	17.20	43.867	8,289.06	1,029.38	1,004.18	14,434,985.707	1,712,277.384	39.747755855	-80.744339657	
8,600.00	17.20	43.867	8,384.59	1,050.70	1,024.67	14,435,007.023	1,712,297.874	39.747814236	-80.744266544	
8,700.00	17.20	43.867	8,480.12	1,072.02	1,045.16	14,435,028.340	1,712,318.363	39.747872616	-80.744193431	
8,800.00	17.20	43.867	8,575.64	1,093.33	1,065.65	14,435,049.656	1,712,338.853	39.747930997	-80.744120318	
8,900.00	17.20	43.867	8,671.17	1,114.65	1,086.14	14,435,070.973	1,712,359.343	39.747989377	-80.744047205	
9,000.00	17.20	43.867	8,766.70	1,135.97	1,106.63	14,435,092.289	1,712,379.833	39.748047758	-80.743974091	
9,100.00	17.20	43.867	8,862.23	1,157.28	1,127.12	14,435,113.606	1,712,400.323	39.748106138	-80.743900978	
9,200.00	17.20	43.867	8,957.76	1,178.60	1,147.61	14,435,134.922	1,712,420.813	39.748164519	-80.743827864	
9,300.00	17.20	43.867	9,053.29	1,199.92	1,168.10	14,435,156.239	1,712,441.302	39.748222899	-80.743754751	
9,400.00	17.20	43.867	9,148.82	1,221.23	1,188.59	14,435,177.555	1,712,461.792	39.748281279	-80.743681637	
9,500.00	17.20	43.867	9,244.35	1,242.55	1,209.08	14,435,198.872	1,712,482.282	39.748339659	-80.743608523	
9,600.00	17.20	43.867	9,339.88	1,263.87	1,229.57	14,435,220.188	1,712,502.772	39.748398039	-80.743535409	
9,700.00	17.20	43.867	9,435.40	1,285.18	1,250.06	14,435,241.505	1,712,523.262	39.748456420	-80.743462294	
9,800.00	17.20	43.867	9,530.93	1,306.50	1,270.55	14,435,262.821	1,712,543.752	39.748514800	-80.743389180	
9,900.00	17.20	43.867	9,626.46	1,327.82	1,291.04	14,435,284.138	1,712,564.241	39.748573180	-80.743316065	
10,000.00	17.20	43.867	9,721.99	1,349.13	1,311.53	14,435,305.454	1,712,584.731	39.748631560	-80.743242951	
10,100.00	17.20	43.867	9,817.52	1,370.45	1,332.02	14,435,326.771	1,712,605.221	39.748689940	-80.743169836	

Database:	DB_Decv0422v16	Local Co-ordinate Reference:	Well Hendrickson S-13 HU (slot G)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1220.00ft
Project:	Marshall County, West Virginia NAD83 UTM 17N	MD Reference:	GL @ 1220.00ft
Site:	Hendrickson	North Reference:	Grid
Well:	Hendrickson S-13 HU (slot G)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev2		

Planned Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
10,200.00	17.20	43.867	9,913.05	1,391.77	1,352.51	14,435,348.087	1,712,625.711	39.748748319	-80.743096721	
10,300.00	17.20	43.867	10,008.58	1,413.08	1,373.00	14,435,369.404	1,712,646.201	39.748806699	-80.743023608	
10,400.00	17.20	43.867	10,104.11	1,434.40	1,393.49	14,435,390.720	1,712,666.691	39.748865079	-80.742950491	
10,500.00	17.20	43.867	10,199.64	1,455.71	1,413.98	14,435,412.037	1,712,687.181	39.748923459	-80.742877376	
10,600.00	17.20	43.867	10,295.16	1,477.03	1,434.47	14,435,433.353	1,712,707.670	39.748981838	-80.742804261	
10,700.00	17.20	43.867	10,390.69	1,498.35	1,454.96	14,435,454.670	1,712,728.160	39.749040218	-80.742731145	
10,800.00	17.20	43.867	10,486.22	1,519.66	1,475.45	14,435,475.986	1,712,748.650	39.749098598	-80.742658029	
10,884.19	17.20	43.867	10,566.65	1,537.61	1,492.70	14,435,493.933	1,712,765.901	39.749147749	-80.742596471	
Begin 6°/100' build										
10,900.00	16.96	46.994	10,581.76	1,540.87	1,496.00	14,435,497.190	1,712,769.206	39.749156669	-80.742584678	
10,950.00	16.54	57.314	10,629.65	1,549.69	1,507.33	14,435,506.009	1,712,780.531	39.749180798	-80.742544300	
11,000.00	16.64	67.831	10,677.58	1,556.23	1,519.95	14,435,512.554	1,712,793.150	39.749198672	-80.742499336	
11,050.00	17.25	77.922	10,725.42	1,560.48	1,533.83	14,435,516.806	1,712,807.030	39.749210241	-80.742449911	
11,100.00	18.33	87.102	10,773.04	1,562.43	1,548.93	14,435,518.756	1,712,822.132	39.749215475	-80.742396159	
11,150.00	19.79	95.134	10,820.31	1,562.07	1,565.21	14,435,518.396	1,712,838.416	39.749214357	-80.742338229	
11,200.00	21.56	101.999	10,867.09	1,559.41	1,582.63	14,435,515.728	1,712,855.837	39.749206893	-80.742276278	
11,250.00	23.57	107.808	10,913.27	1,554.44	1,601.14	14,435,510.759	1,712,874.346	39.749193101	-80.742210477	
11,300.00	25.77	112.716	10,958.71	1,547.18	1,620.69	14,435,503.503	1,712,893.894	39.749173020	-80.742141006	
11,350.00	28.10	116.882	11,003.28	1,537.66	1,641.22	14,435,493.980	1,712,914.426	39.749146705	-80.742068056	
11,400.00	30.54	120.444	11,046.88	1,525.89	1,662.68	14,435,482.216	1,712,935.886	39.749114228	-80.741991825	
11,450.00	33.07	123.519	11,089.37	1,511.92	1,685.01	14,435,468.243	1,712,958.216	39.749075678	-80.741912525	
11,500.00	35.66	126.199	11,130.64	1,495.78	1,708.15	14,435,452.100	1,712,981.354	39.749031161	-80.741830371	
11,550.00	38.30	128.558	11,170.58	1,477.51	1,732.03	14,435,433.830	1,713,005.237	39.748980798	-80.741745589	
11,600.00	40.99	130.655	11,209.08	1,457.16	1,756.60	14,435,413.484	1,713,029.799	39.748924728	-80.741658411	
11,650.00	43.71	132.536	11,246.03	1,434.80	1,781.77	14,435,391.118	1,713,054.973	39.748863104	-80.741569077	
11,700.00	46.45	134.237	11,281.34	1,410.47	1,807.49	14,435,366.792	1,713,080.691	39.748796096	-80.741477831	
11,750.00	49.23	135.790	11,314.90	1,384.25	1,833.68	14,435,340.574	1,713,106.880	39.748723886	-80.741384924	
11,763.91	50.00	136.199	11,323.91	1,376.63	1,841.04	14,435,332.952	1,713,114.242	39.748702895	-80.741358810	
Begin 8°/100' build										
11,800.00	52.69	137.546	11,346.45	1,356.06	1,860.30	14,435,312.383	1,713,133.500	39.748646254	-80.741290507	
11,850.00	56.44	139.262	11,375.44	1,325.59	1,887.33	14,435,281.916	1,713,160.527	39.748562367	-80.741194664	
11,900.00	60.21	140.834	11,401.69	1,292.97	1,914.63	14,435,249.297	1,713,187.835	39.748472571	-80.741097845	
11,950.00	63.99	142.292	11,425.08	1,258.36	1,942.09	14,435,214.686	1,713,215.291	39.748377302	-80.741000521	
12,000.00	67.79	143.659	11,445.50	1,221.93	1,969.56	14,435,178.252	1,713,242.761	39.748277024	-80.740903167	
12,050.00	71.61	144.953	11,462.85	1,183.85	1,996.91	14,435,140.171	1,713,270.111	39.748172227	-80.740806256	
12,100.00	75.43	146.191	11,477.03	1,144.31	2,024.01	14,435,100.630	1,713,297.207	39.748063420	-80.740710261	
12,150.00	79.25	147.387	11,487.99	1,103.50	2,050.72	14,435,059.821	1,713,323.919	39.747951134	-80.740615649	
12,200.00	83.08	148.552	11,495.67	1,061.62	2,076.91	14,435,017.943	1,713,350.115	39.747835916	-80.740522883	
12,250.00	86.92	149.699	11,500.03	1,018.88	2,102.47	14,434,975.199	1,713,375.669	39.747718327	-80.740432412	
12,277.18	89.00	150.319	11,501.00	995.35	2,116.05	14,434,951.672	1,713,389.247	39.747653608	-80.740384347	
Begin 89.00° lateral										
12,300.00	89.00	150.319	11,501.39	975.53	2,127.34	14,434,931.852	1,713,400.544	39.747599086	-80.740344362	
12,400.00	89.00	150.319	11,503.14	888.66	2,176.85	14,434,844.986	1,713,450.053	39.747360133	-80.740169118	
12,500.00	89.00	150.319	11,504.88	801.80	2,226.36	14,434,758.120	1,713,499.563	39.747121179	-80.739993876	
12,600.00	89.00	150.319	11,506.63	714.93	2,275.87	14,434,671.254	1,713,549.073	39.746882226	-80.739818635	
12,700.00	89.00	150.319	11,508.37	628.06	2,325.38	14,434,584.388	1,713,598.583	39.746643272	-80.739643395	
12,800.00	89.00	150.319	11,510.12	541.20	2,374.89	14,434,497.522	1,713,648.092	39.746404318	-80.739468156	
12,900.00	89.00	150.319	11,511.86	454.33	2,424.40	14,434,410.656	1,713,697.602	39.746165364	-80.739292919	
13,000.00	89.00	150.319	11,513.61	367.47	2,473.91	14,434,323.790	1,713,747.112	39.745926409	-80.739117683	
13,100.00	89.00	150.319	11,515.35	280.60	2,523.42	14,434,236.924	1,713,796.621	39.745687454	-80.738942448	
13,200.00	89.00	150.319	11,517.10	193.73	2,572.93	14,434,150.058	1,713,846.131	39.745448499	-80.738767214	
13,300.00	89.00	150.319	11,518.84	106.87	2,622.44	14,434,063.192	1,713,895.641	39.745209544	-80.738591981	
13,400.00	89.00	150.319	11,520.59	20.00	2,671.95	14,433,976.326	1,713,945.151	39.744970588	-80.738416750	



Planning Report - Geographic

Database:	DB_Decv0422v16	Local Co-ordinate Reference:	Well Hendrickson S-13 HU (slot G)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1220.00ft
Project:	Marshall County, West Virginia NAD83 UTM 17N	MD Reference:	GL @ 1220.00ft
Site:	Hendrickson	North Reference:	Grid
Well:	Hendrickson S-13 HU (slot G)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev2		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
13,500.00	89.00	150.319	11,522.33	-66.87	2,721.46	14,433,889.460	1,713,994.660	39.744731632	-80.738241520
13,600.00	89.00	150.319	11,524.08	-153.73	2,770.97	14,433,802.594	1,714,044.170	39.744492676	-80.738066291
13,700.00	89.00	150.319	11,525.82	-240.60	2,820.48	14,433,715.728	1,714,093.680	39.744253720	-80.737891063
13,800.00	89.00	150.319	11,527.57	-327.46	2,869.99	14,433,628.862	1,714,143.189	39.744014763	-80.737715836
13,900.00	89.00	150.319	11,529.31	-414.33	2,919.50	14,433,541.996	1,714,192.699	39.743775806	-80.737540611
14,000.00	89.00	150.319	11,531.06	-501.20	2,969.01	14,433,455.130	1,714,242.209	39.743536849	-80.737365387
14,100.00	89.00	150.319	11,532.80	-588.06	3,018.52	14,433,368.264	1,714,291.719	39.743297891	-80.737190164
14,200.00	89.00	150.319	11,534.55	-674.93	3,068.03	14,433,281.398	1,714,341.228	39.743058933	-80.737014942
14,300.00	89.00	150.319	11,536.29	-761.79	3,117.54	14,433,194.532	1,714,390.738	39.742819975	-80.736839721
14,400.00	89.00	150.319	11,538.04	-848.66	3,167.05	14,433,107.666	1,714,440.248	39.742581017	-80.736664502
14,500.00	89.00	150.319	11,539.78	-935.53	3,216.56	14,433,020.800	1,714,489.757	39.742342058	-80.736489284
14,600.00	89.00	150.319	11,541.53	-1,022.39	3,266.07	14,432,933.934	1,714,539.267	39.742103099	-80.736314067
14,700.00	89.00	150.319	11,543.27	-1,109.26	3,315.58	14,432,847.068	1,714,588.777	39.741864140	-80.736138851
14,800.00	89.00	150.319	11,545.02	-1,196.13	3,365.09	14,432,760.202	1,714,638.286	39.741625181	-80.735963637
14,900.00	89.00	150.319	11,546.76	-1,282.99	3,414.60	14,432,673.336	1,714,687.796	39.741386221	-80.735788423
15,000.00	89.00	150.319	11,548.51	-1,369.86	3,464.11	14,432,586.470	1,714,737.306	39.741147261	-80.735613211
15,100.00	89.00	150.319	11,550.25	-1,456.72	3,513.62	14,432,499.604	1,714,786.816	39.740908301	-80.735438000
15,200.00	89.00	150.319	11,552.00	-1,543.59	3,563.13	14,432,412.738	1,714,836.325	39.740669340	-80.735262791
15,300.00	89.00	150.319	11,553.74	-1,630.46	3,612.64	14,432,325.871	1,714,885.835	39.740430379	-80.735087582
15,400.00	89.00	150.319	11,555.49	-1,717.32	3,662.15	14,432,239.005	1,714,935.345	39.740191418	-80.734912375
15,500.00	89.00	150.319	11,557.23	-1,804.19	3,711.66	14,432,152.139	1,714,984.854	39.739952457	-80.734737169
15,600.00	89.00	150.319	11,558.98	-1,891.05	3,761.17	14,432,065.273	1,715,034.364	39.739713495	-80.734561964
15,700.00	89.00	150.319	11,560.72	-1,977.92	3,810.68	14,431,978.407	1,715,083.874	39.739474533	-80.734386760
15,800.00	89.00	150.319	11,562.47	-2,064.79	3,860.19	14,431,891.541	1,715,133.384	39.739235571	-80.734211558
15,900.00	89.00	150.319	11,564.21	-2,151.65	3,909.70	14,431,804.675	1,715,182.893	39.738996609	-80.734036357
16,000.00	89.00	150.319	11,565.96	-2,238.52	3,959.21	14,431,717.809	1,715,232.403	39.738757646	-80.733861157
16,100.00	89.00	150.319	11,567.70	-2,325.39	4,008.71	14,431,630.943	1,715,281.913	39.738518683	-80.733685958
16,200.00	89.00	150.319	11,569.45	-2,412.25	4,058.22	14,431,544.077	1,715,331.422	39.738279720	-80.733510760
16,300.00	89.00	150.319	11,571.19	-2,499.12	4,107.73	14,431,457.211	1,715,380.932	39.738040756	-80.733335564
16,400.00	89.00	150.319	11,572.94	-2,585.98	4,157.24	14,431,370.345	1,715,430.442	39.737801793	-80.733160369
16,500.00	89.00	150.319	11,574.68	-2,672.85	4,206.75	14,431,283.479	1,715,479.952	39.737562829	-80.732985175
16,600.00	89.00	150.319	11,576.43	-2,759.72	4,256.26	14,431,196.613	1,715,529.461	39.737323864	-80.732809982
16,700.00	89.00	150.319	11,578.17	-2,846.58	4,305.77	14,431,109.747	1,715,578.971	39.737084900	-80.732634790
16,800.00	89.00	150.319	11,579.92	-2,933.45	4,355.28	14,431,022.881	1,715,628.481	39.736845935	-80.732459600
16,900.00	89.00	150.319	11,581.66	-3,020.32	4,404.79	14,430,936.015	1,715,677.990	39.736606970	-80.732284411
17,000.00	89.00	150.319	11,583.41	-3,107.18	4,454.30	14,430,849.149	1,715,727.500	39.736368004	-80.732109223
17,100.00	89.00	150.319	11,585.15	-3,194.05	4,503.81	14,430,762.283	1,715,777.010	39.736129039	-80.731934036
17,200.00	89.00	150.319	11,586.90	-3,280.91	4,553.32	14,430,675.417	1,715,826.519	39.735890073	-80.731758850
17,300.00	89.00	150.319	11,588.64	-3,367.78	4,602.83	14,430,588.551	1,715,876.029	39.735651106	-80.731583666
17,400.00	89.00	150.319	11,590.39	-3,454.65	4,652.34	14,430,501.685	1,715,925.540	39.735412140	-80.731408483
17,500.00	89.00	150.319	11,592.13	-3,541.51	4,701.85	14,430,414.819	1,715,975.050	39.735173173	-80.731233301
17,600.00	89.00	150.319	11,593.88	-3,628.38	4,751.36	14,430,327.953	1,716,024.559	39.734934206	-80.731058120
17,700.00	89.00	150.319	11,595.62	-3,715.24	4,800.87	14,430,241.087	1,716,074.069	39.734695239	-80.730882941
17,800.00	89.00	150.319	11,597.37	-3,802.11	4,850.38	14,430,154.221	1,716,123.579	39.734456271	-80.730707762
17,900.00	89.00	150.319	11,599.11	-3,888.98	4,899.89	14,430,067.355	1,716,173.088	39.734217304	-80.730532585
18,000.00	89.00	150.319	11,600.86	-3,975.84	4,949.40	14,429,980.489	1,716,222.598	39.733978335	-80.730357409
18,100.00	89.00	150.319	11,602.60	-4,062.71	4,998.91	14,429,893.623	1,716,272.108	39.733739367	-80.730182235
18,200.00	89.00	150.319	11,604.35	-4,149.58	5,048.42	14,429,806.757	1,716,321.618	39.733500398	-80.730007061
18,300.00	89.00	150.319	11,606.09	-4,236.44	5,097.93	14,429,719.891	1,716,371.127	39.733261430	-80.729831889
18,400.00	89.00	150.319	11,607.84	-4,323.31	5,147.44	14,429,633.025	1,716,420.637	39.733022460	-80.729656718
18,500.00	89.00	150.319	11,609.58	-4,410.17	5,196.95	14,429,546.159	1,716,470.147	39.732783491	-80.729481548
18,600.00	89.00	150.319	11,611.33	-4,497.04	5,246.46	14,429,459.293	1,716,519.656	39.732544521	-80.729306379
18,700.00	89.00	150.319	11,613.07	-4,583.91	5,295.97	14,429,372.427	1,716,569.166	39.732305551	-80.729131212
18,800.00	89.00	150.319	11,614.82	-4,670.77	5,345.48	14,429,285.561	1,716,618.676	39.732066581	-80.728956046

Database:	DB_Decv0422v16	Local Co-ordinate Reference:	Well Hendrickson S-13 HU (slot G)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1220.00ft
Project:	Marshall County, West Virginia NAD83 UTM 17N	MD Reference:	GL @ 1220.00ft
Site:	Hendrickson	North Reference:	Grid
Well:	Hendrickson S-13 HU (slot G)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev2		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
18,900.00	89.00	150.319	11,616.56	-4,757.64	5,394.99	14,429,198.695	1,716,668.186	39.731827610	-80.728780881
19,000.00	89.00	150.319	11,618.31	-4,844.51	5,444.50	14,429,111.829	1,716,717.695	39.731588640	-80.728605717
19,100.00	89.00	150.319	11,620.05	-4,931.37	5,494.01	14,429,024.963	1,716,767.205	39.731349669	-80.728430554
19,200.00	89.00	150.319	11,621.80	-5,018.24	5,543.52	14,428,938.097	1,716,816.715	39.731110697	-80.728255393
19,300.00	89.00	150.319	11,623.54	-5,105.10	5,593.03	14,428,851.231	1,716,866.224	39.730871726	-80.728080233
19,338.38	89.00	150.319	11,624.21	-5,138.45	5,612.03	14,428,817.888	1,716,885.228	39.730780000	-80.728013000
PBHL/TD 19338.38 MD 11624.21 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
Hendrickson S-13 HU LF - plan misses target center by 0.01ft at 12277.19ft MD (11500.99 TVD, 995.35 N, 2116.05 E) - Point	0.00	0.000	11,501.00	995.35	2,116.05	14,434,951.670	1,713,389.252	39.747653602	-80.740384331
Hendrickson S-13 HU PI - plan hits target center - Point	0.00	0.000	11,624.21	-5,138.45	5,612.03	14,428,817.888	1,716,885.228	39.730780000	-80.728013000

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
3,200.00	3,200.00	0.00	0.00	KOP Begin 2°/100' build
3,450.00	3,449.68	5.45	9.44	Begin 2°/100' build/turn
4,073.51	4,060.48	85.81	97.20	Begin 17.20° tangent
10,884.19	10,566.65	1,537.61	1,492.70	Begin 6°/100' build
11,763.91	11,323.91	1,376.63	1,841.04	Begin 8°/100' build
12,277.18	11,501.00	995.35	2,116.05	Begin 89.00° lateral
19,338.38	11,624.21	-5,138.45	5,612.03	PBHL/TD 19338.38 MD 11624.21 TVD