



Well: Jeffersons N-09 HU (slot I)
 Site: Jeffersons
 Project: Wetzel County, West Virginia (UTM17 NAD83)
 Design: rev0
 Rig:

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
Jeffersons N-09HU BHL	11191.00	14073.34	-7282.82	14426839.92	1697815.12	39.72548700	-80.79585800
- plan hits target center							
Jeffersons N-09HU LP	11467.00	374.16	626.57	14413140.77	1705724.50	39.68781200	-80.76785400
- plan misses target center by 43.26ft at 12095.90ft MD (11466.56 TVD, 395.88 N, 663.98 E)							
Jeffersons N-09HU LP 50E	1467.00	374.16	676.57	14413140.77	1705774.50	39.68781164	-80.76767628
- plan misses target center by 0.03ft at 12070.78ft MD (11467.00 TVD, 374.17 N, 676.59 E)							

SECTION DETAILS

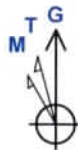
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	3100.00	0.00	0.00	3100.00	0.00	0.00	0.00	0.00	0.00	KOP Begin 2"/100' build
3	3250.00	3.00	113.78	3249.93	-1.58	3.59	2.00	113.780	-3.06	Begin 3.00° tangent
4	4250.00	3.00	113.78	4248.56	-22.69	51.49	0.00	0.000	-43.81	Begin 2"/100' drop
5	4400.00	0.00	113.78	4398.49	-24.27	55.08	2.00	180.000	-46.87	Begin vertical hold
6	7001.51	0.00	113.78	7000.00	-24.27	55.08	0.00	113.780	-46.87	Begin 2"/100' build
7	7888.15	17.73	113.78	7872.56	-79.14	179.64	2.00	113.775	-152.85	Begin 17.73° tangent
8	10489.51	17.73	113.78	10350.32	-398.57	904.72	0.00	0.000	-769.79	Begin 6"/100' build/turn
9	11551.57	50.00	337.17	11297.12	-52.41	893.75	6.00	-144.060	-457.31	Begin 8"/100' build/turn
10	12070.83	91.00	329.84	11466.99	374.21	676.57	8.00	-11.086	21.40	Begin 91.00° lateral
11	27916.79	91.00	329.84	11191.00	14073.34	-7282.82	0.00	0.000	15846.08	PBHL/TD 27916.79 MD 11191.00 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: GL @ 1217.00ft

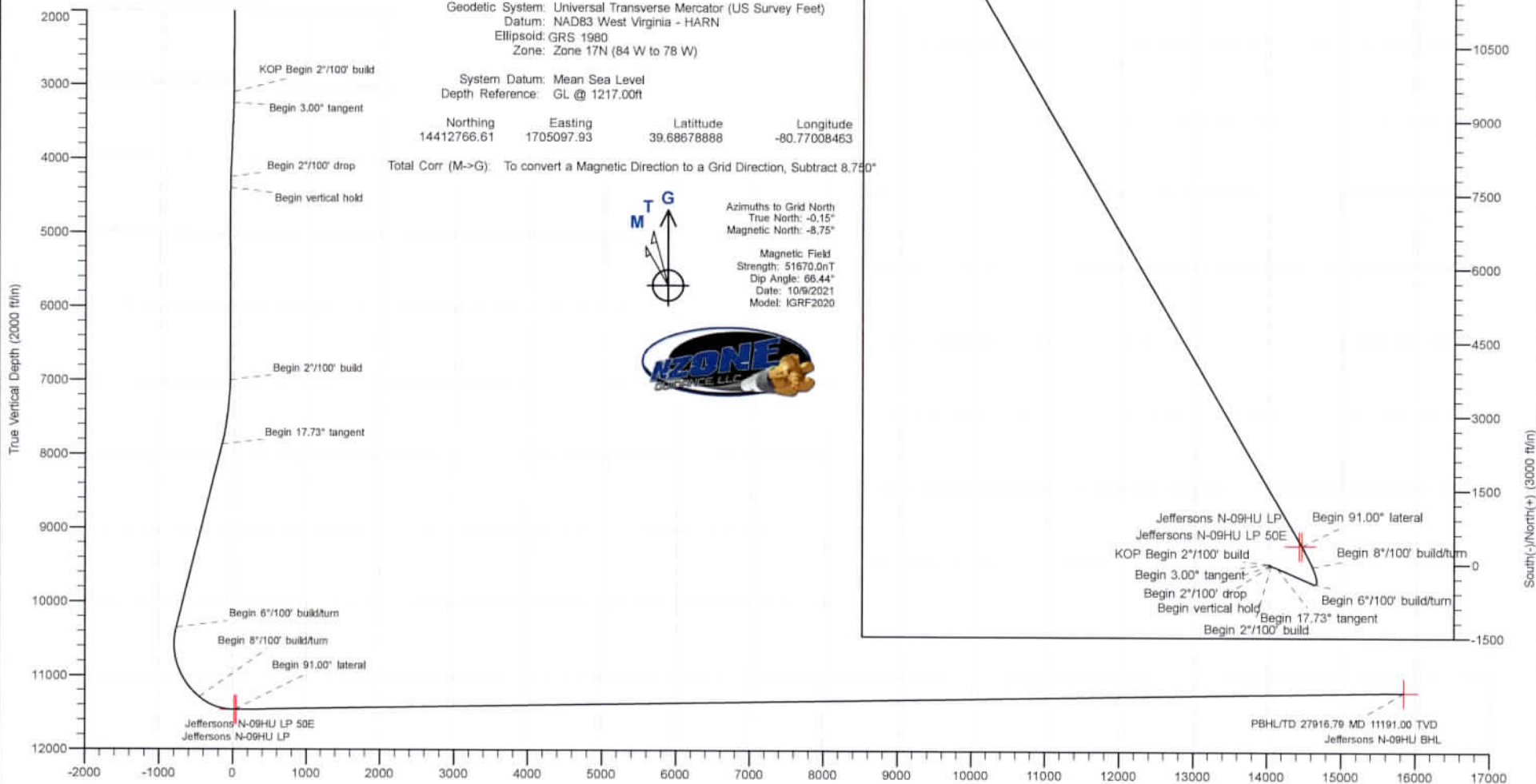
Northing: 14412766.61 Easting: 1705097.93 Latitude: 39.68678888 Longitude: -80.77008453

Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.750°



Azimuths to Grid North
 True North: -0.15°
 Magnetic North: -8.75°

Magnetic Field
 Strength: 51670.0nT
 Dip Angle: 65.44°
 Date: 10/9/2021
 Model: IGRF2020



Vertical Section at 332.64° (2000 ft/in)

MS



Planning Report - Geographic

Database:	DB_Dec2220_v16	Local Co-ordinate Reference:	Well Jeffersons N-09 HU (slot I)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1217.00ft
Project:	Wetzel County, West Virginia (UTM17 NAD83)	MD Reference:	GL @ 1217.00ft
Site:	Jeffersons	North Reference:	Grid
Well:	Jeffersons N-09 HU (slot I)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev0		

Project	Wetzel County, West Virginia (UTM17 NAD83)		
Map System:	Universal Transverse Mercator (US Survey Feet)	System Datum:	Mean Sea Level
Geo Datum:	NAD83 West Virginia - HARN		
Map Zone:	Zone 17N (84 W to 78 W)		

Site	Jeffersons				
Site Position:		Northing:	14,412,666.05 usft	Latitude:	39.68651309
From:	Lat/Long	Easting:	1,705,043.41 usft	Longitude:	-80.77027935
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "		

Well	Jeffersons N-09 HU (slot I)					
Well Position	+N/-S	0.00 ft	Northing:	14,412,766.61 usft	Latitude:	39.68678888
	+E/-W	0.00 ft	Easting:	1,705,097.93 usft	Longitude:	-80.77008463
Position Uncertainty	0.00 ft		Wellhead Elevation:	ft	Ground Level:	1,217.00 ft
Grid Convergence:						

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2020	10/9/2021	-8.603	66.437	51,670.01201090

Design	rev0			
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	332.64

Plan Survey Tool Program		Date			
Depth From (ft)	Depth To (ft)	Survey (Wellbore)	Tool Name	Remarks	
1	0.00	27,916.79 rev0 (Original Hole)			

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Project:	Wetzel County, West Virginia (UTM17 NAD83)	MD Reference:	GL @ 1217.00ft
Site:	Jeffersons	North Reference:	Grid
Well:	Jeffersons N-09 HU (slot I)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev0		

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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000		
3,100.00	0.00	0.00	3,100.00	0.00	0.00	0.00	0.00	0.00	0.000		
3,250.00	3.00	113.78	3,249.93	-1.58	3.59	2.00	2.00	0.00	113.780		
4,250.00	3.00	113.78	4,248.56	-22.69	51.49	0.00	0.00	0.00	0.000		
4,400.00	0.00	113.78	4,398.49	-24.27	55.08	2.00	-2.00	0.00	180.000		
7,001.51	0.00	113.78	7,000.00	-24.27	55.08	0.00	0.00	0.00	113.780		
7,888.15	17.73	113.78	7,872.56	-79.14	179.64	2.00	2.00	0.00	113.775		
10,489.51	17.73	113.78	10,350.32	-398.57	904.72	0.00	0.00	0.00	0.000		
11,551.57	50.00	337.17	11,297.12	-52.41	893.75	6.00	3.04	-12.86	-144.060		
12,070.83	91.00	329.84	11,466.99	374.21	676.57	8.00	7.90	-1.41	-11.086		
27,916.79	91.00	329.84	11,191.00	14,073.34	-7,282.82	0.00	0.00	0.00	0.000	Jeffersons N-09HU BI	

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Site:	Jeffersons	North Reference:	Grid
Well:	Jeffersons N-09 HU (slot I)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev0		

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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
0.00	0.00	0.00	0.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
100.00	0.00	0.00	100.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
200.00	0.00	0.00	200.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
300.00	0.00	0.00	300.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
400.00	0.00	0.00	400.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
500.00	0.00	0.00	500.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
600.00	0.00	0.00	600.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
700.00	0.00	0.00	700.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
800.00	0.00	0.00	800.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
900.00	0.00	0.00	900.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
1,000.00	0.00	0.00	1,000.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
1,100.00	0.00	0.00	1,100.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
1,200.00	0.00	0.00	1,200.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
1,300.00	0.00	0.00	1,300.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
1,400.00	0.00	0.00	1,400.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
1,500.00	0.00	0.00	1,500.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
1,600.00	0.00	0.00	1,600.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
1,700.00	0.00	0.00	1,700.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
1,800.00	0.00	0.00	1,800.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
1,900.00	0.00	0.00	1,900.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
2,000.00	0.00	0.00	2,000.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
2,100.00	0.00	0.00	2,100.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
2,200.00	0.00	0.00	2,200.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
2,300.00	0.00	0.00	2,300.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
2,400.00	0.00	0.00	2,400.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
2,500.00	0.00	0.00	2,500.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
2,600.00	0.00	0.00	2,600.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
2,700.00	0.00	0.00	2,700.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
2,800.00	0.00	0.00	2,800.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
2,900.00	0.00	0.00	2,900.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
3,000.00	0.00	0.00	3,000.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
3,100.00	0.00	0.00	3,100.00	0.00	0.00	14,412,766.61	1,705,097.93	39.68678888	-80.77008463
KOP Begin 2°/100' build									
3,200.00	2.00	113.78	3,199.98	-0.70	1.60	14,412,765.91	1,705,099.53	39.68678694	-80.77007896
3,250.00	3.00	113.78	3,249.93	-1.58	3.59	14,412,765.03	1,705,101.52	39.68678451	-80.77007187
Begin 3.00° tangent									
3,300.00	3.00	113.78	3,299.86	-2.64	5.99	14,412,763.98	1,705,103.92	39.68678159	-80.77006337
3,400.00	3.00	113.78	3,399.73	-4.75	10.78	14,412,761.87	1,705,108.71	39.68677576	-80.77004637
3,500.00	3.00	113.78	3,499.59	-6.86	15.57	14,412,759.76	1,705,113.50	39.68676993	-80.77002936
3,600.00	3.00	113.78	3,599.45	-8.97	20.36	14,412,757.65	1,705,118.29	39.68676411	-80.77001236
3,700.00	3.00	113.78	3,699.31	-11.08	25.14	14,412,755.54	1,705,123.07	39.68675828	-80.76999535
3,800.00	3.00	113.78	3,799.18	-13.19	29.93	14,412,753.42	1,705,127.86	39.68675245	-80.76997835
3,900.00	3.00	113.78	3,899.04	-15.30	34.72	14,412,751.31	1,705,132.65	39.68674662	-80.76996135
4,000.00	3.00	113.78	3,998.90	-17.41	39.51	14,412,749.20	1,705,137.44	39.68674079	-80.76994434
4,100.00	3.00	113.78	4,098.77	-19.52	44.30	14,412,747.09	1,705,142.23	39.68673496	-80.76992734
4,200.00	3.00	113.78	4,198.63	-21.63	49.09	14,412,744.98	1,705,147.02	39.68672913	-80.76991033
4,250.00	3.00	113.78	4,248.56	-22.69	51.49	14,412,743.93	1,705,149.42	39.68672621	-80.76990183
Begin 2°/100' drop									
4,300.00	2.00	113.78	4,298.51	-23.57	53.48	14,412,743.05	1,705,151.41	39.68672379	-80.76989474
4,400.00	0.00	113.78	4,398.49	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907
Begin vertical hold									
4,500.00	0.00	113.78	4,498.49	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907
4,600.00	0.00	113.78	4,598.49	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907
4,700.00	0.00	113.78	4,698.49	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907

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Planning Report - Geographic

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 Design: rev0

Local Co-ordinate Reference: Well Jeffersons N-09 HU (slot I)
 TVD Reference: GL @ 1217.00ft
 MD Reference: GL @ 1217.00ft
 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
4,800.00	0.00	113.78	4,798.49	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907
4,900.00	0.00	113.78	4,898.49	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907
5,000.00	0.00	113.78	4,998.49	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907
5,100.00	0.00	113.78	5,098.49	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907
5,200.00	0.00	113.78	5,198.49	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907
5,300.00	0.00	113.78	5,298.49	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907
5,400.00	0.00	113.78	5,398.49	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907
5,500.00	0.00	113.78	5,498.49	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907
5,600.00	0.00	113.78	5,598.49	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907
5,700.00	0.00	113.78	5,698.49	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907
5,800.00	0.00	113.78	5,798.49	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907
5,900.00	0.00	113.78	5,898.49	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907
6,000.00	0.00	113.78	5,998.49	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907
6,100.00	0.00	113.78	6,098.49	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907
6,200.00	0.00	113.78	6,198.49	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907
6,300.00	0.00	113.78	6,298.49	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907
6,400.00	0.00	113.78	6,398.49	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907
6,500.00	0.00	113.78	6,498.49	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907
6,600.00	0.00	113.78	6,598.49	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907
6,700.00	0.00	113.78	6,698.49	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907
6,800.00	0.00	113.78	6,798.49	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907
6,900.00	0.00	113.78	6,898.49	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907
7,001.51	0.00	0.00	7,000.00	-24.27	55.08	14,412,742.35	1,705,153.01	39.68672184	-80.76988907
Begin 2°/100' build									
7,100.00	1.97	113.78	7,098.47	-24.95	56.63	14,412,741.66	1,705,154.56	39.68671996	-80.76988357
7,200.00	3.97	113.78	7,198.33	-27.04	61.37	14,412,739.57	1,705,159.30	39.68671419	-80.76988674
7,300.00	5.97	113.78	7,297.95	-30.53	69.30	14,412,736.08	1,705,167.23	39.68670454	-80.76983859
7,400.00	7.97	113.78	7,397.21	-35.42	80.40	14,412,731.19	1,705,178.33	39.68669103	-80.76979917
7,500.00	9.97	113.78	7,495.98	-41.71	94.67	14,412,724.90	1,705,192.60	39.68667367	-80.76974851
7,600.00	11.97	113.78	7,594.15	-49.38	112.08	14,412,717.23	1,705,210.01	39.68665248	-80.76968668
7,700.00	13.97	113.78	7,691.59	-58.43	132.62	14,412,708.19	1,705,230.55	39.68662748	-80.76961376
7,800.00	15.97	113.78	7,788.19	-68.84	156.26	14,412,697.77	1,705,254.19	39.68659872	-80.76952983
7,888.15	17.73	113.78	7,872.56	-79.14	179.64	14,412,687.47	1,705,277.57	39.68657026	-80.76944680
Begin 17.73° tangent									
7,900.00	17.73	113.78	7,883.84	-80.60	182.94	14,412,686.02	1,705,280.87	39.68656624	-80.76943508
8,000.00	17.73	113.78	7,979.09	-92.88	210.82	14,412,673.74	1,705,308.75	39.68653232	-80.76933612
8,100.00	17.73	113.78	8,074.34	-105.16	238.69	14,412,661.46	1,705,336.62	39.68649840	-80.76923715
8,200.00	17.73	113.78	8,169.59	-117.44	266.56	14,412,649.18	1,705,364.49	39.68646449	-80.76913819
8,300.00	17.73	113.78	8,264.84	-129.72	294.44	14,412,636.90	1,705,392.37	39.68643057	-80.76903922
8,400.00	17.73	113.78	8,360.09	-141.99	322.31	14,412,624.62	1,705,420.24	39.68639665	-80.76894026
8,500.00	17.73	113.78	8,455.33	-154.27	350.18	14,412,612.34	1,705,448.11	39.68636273	-80.76884130
8,600.00	17.73	113.78	8,550.58	-166.55	378.06	14,412,600.06	1,705,475.99	39.68632881	-80.76874233
8,700.00	17.73	113.78	8,645.83	-178.83	405.93	14,412,587.78	1,705,503.86	39.68629489	-80.76864337
8,800.00	17.73	113.78	8,741.08	-191.11	433.80	14,412,575.50	1,705,531.73	39.68626097	-80.76854440
8,900.00	17.73	113.78	8,836.33	-203.39	461.68	14,412,563.23	1,705,559.61	39.68622705	-80.76844544
9,000.00	17.73	113.78	8,931.58	-215.67	489.55	14,412,550.95	1,705,587.48	39.68619313	-80.76834648
9,100.00	17.73	113.78	9,026.83	-227.95	517.42	14,412,538.67	1,705,615.35	39.68615921	-80.76824751
9,200.00	17.73	113.78	9,122.07	-240.23	545.30	14,412,526.39	1,705,643.23	39.68612529	-80.76814855
9,300.00	17.73	113.78	9,217.32	-252.51	573.17	14,412,514.11	1,705,671.10	39.68609137	-80.76804959
9,400.00	17.73	113.78	9,312.57	-264.79	601.04	14,412,501.83	1,705,698.97	39.68605745	-80.76795062
9,500.00	17.73	113.78	9,407.82	-277.06	628.92	14,412,489.55	1,705,726.85	39.68602353	-80.76785166
9,600.00	17.73	113.78	9,503.07	-289.34	656.79	14,412,477.27	1,705,754.72	39.68598961	-80.76775270
9,700.00	17.73	113.78	9,598.32	-301.62	684.66	14,412,464.99	1,705,782.59	39.68595569	-80.76765374
9,800.00	17.73	113.78	9,693.57	-313.90	712.54	14,412,452.71	1,705,810.46	39.68592177	-80.76755477



Planning Report - Geographic

Database:	DB_Dec2220_v16	Local Co-ordinate Reference:	Well Jeffersons N-09 HU (slot I)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1217.00ft
Project:	Wetzel County, West Virginia (UTM17 NAD83)	MD Reference:	GL @ 1217.00ft
Site:	Jeffersons	North Reference:	Grid
Well:	Jeffersons N-09 HU (slot I)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev0		

Planned Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
9,900.00	17.73	113.78	9,788.82	-326.18	740.41	14,412,440.43	1,705,838.34	39.68588785	-80.76745581	
10,000.00	17.73	113.78	9,884.06	-338.46	768.28	14,412,428.16	1,705,866.21	39.68585393	-80.76735685	
10,100.00	17.73	113.78	9,979.31	-350.74	796.16	14,412,415.88	1,705,894.08	39.68582001	-80.76725789	
10,200.00	17.73	113.78	10,074.56	-363.02	824.03	14,412,403.60	1,705,921.96	39.68578608	-80.76715892	
10,300.00	17.73	113.78	10,169.81	-375.30	851.90	14,412,391.32	1,705,949.83	39.68575216	-80.76705996	
10,400.00	17.73	113.78	10,265.06	-387.58	879.78	14,412,379.04	1,705,977.70	39.68571824	-80.76696100	
10,489.51	17.73	113.78	10,350.32	-398.57	904.72	14,412,368.05	1,706,002.65	39.68568788	-80.76687242	
Begin 6°/100' build/tum										
10,500.00	17.23	112.53	10,360.32	-399.81	907.62	14,412,366.81	1,706,005.55	39.68568446	-80.76686213	
10,550.00	14.94	105.49	10,408.37	-404.37	920.68	14,412,362.25	1,706,018.60	39.68567184	-80.76681577	
10,600.00	12.94	96.17	10,456.90	-406.69	932.46	14,412,359.93	1,706,030.39	39.68566538	-80.76677392	
10,650.00	11.39	83.96	10,505.78	-406.77	942.94	14,412,359.84	1,706,040.87	39.68566508	-80.76673667	
10,700.00	10.47	68.84	10,554.88	-404.61	952.08	14,412,362.00	1,706,050.01	39.68567094	-80.76670414	
10,750.00	10.36	52.19	10,604.07	-400.21	959.87	14,412,366.40	1,706,057.80	39.68568296	-80.76667641	
10,800.00	11.08	36.48	10,653.21	-393.59	966.28	14,412,373.02	1,706,064.21	39.68570110	-80.76665357	
10,850.00	12.49	23.48	10,702.16	-384.77	971.29	14,412,381.85	1,706,069.22	39.68572530	-80.76663567	
10,900.00	14.40	13.46	10,750.80	-373.76	974.90	14,412,392.86	1,706,072.83	39.68575551	-80.76662276	
10,950.00	16.62	5.90	10,798.98	-360.60	977.08	14,412,406.02	1,706,075.01	39.68579163	-80.76661488	
11,000.00	19.05	0.15	10,846.57	-345.32	977.84	14,412,421.29	1,706,075.76	39.68583358	-80.76661205	
11,050.00	21.62	355.69	10,893.46	-327.98	977.16	14,412,438.64	1,706,075.09	39.68588123	-80.76661428	
11,100.00	24.29	352.15	10,939.50	-308.60	975.07	14,412,458.01	1,706,072.99	39.68593445	-80.76662156	
11,150.00	27.02	349.28	10,984.57	-287.25	971.55	14,412,479.36	1,706,069.48	39.68599311	-80.76663387	
11,200.00	29.80	346.90	11,028.54	-263.99	966.62	14,412,502.63	1,706,064.55	39.68605703	-80.76665117	
11,250.00	32.61	344.90	11,071.31	-238.88	960.29	14,412,527.74	1,706,058.22	39.68612604	-80.76667343	
11,300.00	35.45	343.18	11,112.74	-211.98	952.58	14,412,554.63	1,706,050.51	39.68619996	-80.76670058	
11,350.00	38.32	341.69	11,152.73	-183.38	943.52	14,412,583.24	1,706,041.45	39.68627858	-80.76673254	
11,400.00	41.20	340.38	11,191.16	-153.14	933.12	14,412,613.47	1,706,031.05	39.68636168	-80.76676923	
11,450.00	44.09	339.21	11,227.94	-121.36	921.41	14,412,645.25	1,706,019.34	39.68644905	-80.76681054	
11,500.00	47.00	338.16	11,262.95	-88.12	908.43	14,412,678.49	1,706,006.36	39.68654043	-80.76685637	
11,551.57	50.00	337.17	11,297.12	-52.41	893.75	14,412,714.20	1,705,991.68	39.68663861	-80.76690823	
Begin 8°/100' build/tum										
11,600.00	53.81	336.25	11,327.00	-17.41	878.67	14,412,749.20	1,705,976.60	39.68673484	-80.76696149	
11,650.00	57.74	335.38	11,355.12	20.29	861.74	14,412,786.91	1,705,959.66	39.68683850	-80.76702136	
11,700.00	61.68	334.59	11,380.33	59.41	843.48	14,412,826.02	1,705,941.41	39.68694606	-80.76708589	
11,750.00	65.63	333.86	11,402.51	99.75	824.00	14,412,866.36	1,705,921.93	39.68705698	-80.76715477	
11,800.00	69.58	333.17	11,421.56	141.11	803.38	14,412,907.73	1,705,901.31	39.68717073	-80.76722767	
11,850.00	73.53	332.52	11,437.38	183.31	781.73	14,412,949.92	1,705,879.66	39.68728676	-80.76730423	
11,900.00	77.48	331.89	11,449.89	226.12	759.16	14,412,992.73	1,705,857.09	39.68740450	-80.76738407	
11,950.00	81.44	331.28	11,459.03	269.34	735.77	14,413,035.95	1,705,833.70	39.68752337	-80.76746682	
12,000.00	85.39	330.68	11,464.77	312.76	711.67	14,413,079.38	1,705,809.60	39.68764279	-80.76755206	
12,050.00	89.35	330.09	11,467.06	356.18	687.00	14,413,122.79	1,705,784.93	39.68776219	-80.76763939	
12,070.83	91.00	329.84	11,466.99	374.21	676.57	14,413,140.83	1,705,774.50	39.68781180	-80.76767628	
Begin 91.00° lateral										
12,100.00	91.00	329.84	11,466.49	399.43	661.92	14,413,166.04	1,705,759.85	39.68788115	-80.76772813	
12,200.00	91.00	329.84	11,464.74	485.88	611.69	14,413,252.49	1,705,709.62	39.68811893	-80.76790588	
12,300.00	91.00	329.84	11,463.00	572.33	561.46	14,413,338.94	1,705,659.39	39.68835671	-80.76808364	
12,400.00	91.00	329.84	11,461.26	658.78	511.23	14,413,425.40	1,705,609.16	39.68859449	-80.76826139	
12,500.00	91.00	329.84	11,459.52	745.24	461.00	14,413,511.85	1,705,558.93	39.68883227	-80.76843915	
12,600.00	91.00	329.84	11,457.78	831.69	410.77	14,413,598.30	1,705,508.70	39.68907005	-80.76861690	
12,700.00	91.00	329.84	11,456.04	918.14	360.54	14,413,684.75	1,705,458.47	39.68930783	-80.76879466	
12,800.00	91.00	329.84	11,454.29	1,004.59	310.31	14,413,771.20	1,705,408.24	39.68954561	-80.76897242	
12,900.00	91.00	329.84	11,452.55	1,091.04	260.08	14,413,857.66	1,705,358.01	39.68978339	-80.76915018	
13,000.00	91.00	329.84	11,450.81	1,177.49	209.85	14,413,944.11	1,705,307.78	39.69002117	-80.76932795	
13,100.00	91.00	329.84	11,449.07	1,263.95	159.62	14,414,030.56	1,705,257.55	39.69025895	-80.76950571	



Planning Report - Geographic

Database:	DB_Dec2220_v16	Local Co-ordinate Reference:	Well Jeffersons N-09 HU (slot I)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1217.00ft
Project:	Wetzel County, West Virginia (UTM17 NAD83)	MD Reference:	GL @ 1217.00ft
Site:	Jeffersons	North Reference:	Grid
Well:	Jeffersons N-09 HU (slot I)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev0		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
13,200.00	91.00	329.84	11,447.33	1,350.40	109.39	14,414,117.01	1,705,207.32	39.69049673	-80.76968347
13,300.00	91.00	329.84	11,445.59	1,436.85	59.16	14,414,203.46	1,705,157.09	39.69073451	-80.76986124
13,400.00	91.00	329.84	11,443.84	1,523.30	8.93	14,414,289.91	1,705,106.86	39.69097228	-80.77003901
13,500.00	91.00	329.84	11,442.10	1,609.75	-41.30	14,414,376.37	1,705,056.63	39.69121006	-80.77021678
13,600.00	91.00	329.84	11,440.36	1,696.21	-91.53	14,414,462.82	1,705,006.40	39.69144784	-80.77039454
13,700.00	91.00	329.84	11,438.62	1,782.66	-141.76	14,414,549.27	1,704,956.17	39.69168562	-80.77057232
13,800.00	91.00	329.84	11,436.88	1,869.11	-191.99	14,414,635.72	1,704,905.94	39.69192339	-80.77075009
13,900.00	91.00	329.84	11,435.14	1,955.56	-242.22	14,414,722.17	1,704,855.71	39.69216117	-80.77092786
14,000.00	91.00	329.84	11,433.39	2,042.01	-292.45	14,414,808.62	1,704,805.48	39.69239894	-80.77110564
14,100.00	91.00	329.84	11,431.65	2,128.47	-342.68	14,414,895.08	1,704,755.25	39.69263672	-80.77128341
14,200.00	91.00	329.84	11,429.91	2,214.92	-392.91	14,414,981.53	1,704,705.02	39.69287450	-80.77146119
14,300.00	91.00	329.84	11,428.17	2,301.37	-443.14	14,415,067.98	1,704,654.79	39.69311227	-80.77163897
14,400.00	91.00	329.84	11,426.43	2,387.82	-493.37	14,415,154.43	1,704,604.56	39.69335005	-80.77181674
14,500.00	91.00	329.84	11,424.68	2,474.27	-543.60	14,415,240.88	1,704,554.33	39.69358782	-80.77199453
14,600.00	91.00	329.84	11,422.94	2,560.73	-593.83	14,415,327.33	1,704,504.10	39.69382559	-80.77217231
14,700.00	91.00	329.84	11,421.20	2,647.18	-644.06	14,415,413.79	1,704,453.88	39.69406337	-80.77235009
14,800.00	91.00	329.84	11,419.46	2,733.63	-694.29	14,415,500.24	1,704,403.65	39.69430114	-80.77252787
14,900.00	91.00	329.84	11,417.72	2,820.08	-744.52	14,415,586.69	1,704,353.42	39.69453892	-80.77270566
15,000.00	91.00	329.84	11,415.98	2,906.53	-794.75	14,415,673.14	1,704,303.19	39.69477669	-80.77288345
15,100.00	91.00	329.84	11,414.23	2,992.98	-844.98	14,415,759.59	1,704,252.96	39.69501446	-80.77306123
15,200.00	91.00	329.84	11,412.49	3,079.44	-895.21	14,415,846.04	1,704,202.73	39.69525223	-80.77323902
15,300.00	91.00	329.84	11,410.75	3,165.89	-945.44	14,415,932.50	1,704,152.50	39.69549001	-80.77341681
15,400.00	91.00	329.84	11,409.01	3,252.34	-995.67	14,416,018.95	1,704,102.27	39.69572778	-80.77359460
15,500.00	91.00	329.84	11,407.27	3,338.79	-1,045.90	14,416,105.40	1,704,052.04	39.69596555	-80.77377240
15,600.00	91.00	329.84	11,405.53	3,425.24	-1,096.13	14,416,191.85	1,704,001.81	39.69620332	-80.77395019
15,700.00	91.00	329.84	11,403.78	3,511.70	-1,146.35	14,416,278.30	1,703,951.58	39.69644109	-80.77412799
15,800.00	91.00	329.84	11,402.04	3,598.15	-1,196.58	14,416,364.76	1,703,901.35	39.69667886	-80.77430578
15,900.00	91.00	329.84	11,400.30	3,684.60	-1,246.81	14,416,451.21	1,703,851.12	39.69691664	-80.77448358
16,000.00	91.00	329.84	11,398.56	3,771.05	-1,297.04	14,416,537.66	1,703,800.89	39.69715441	-80.77466138
16,100.00	91.00	329.84	11,396.82	3,857.50	-1,347.27	14,416,624.11	1,703,750.66	39.69739218	-80.77483918
16,200.00	91.00	329.84	11,395.08	3,943.96	-1,397.50	14,416,710.56	1,703,700.43	39.69762995	-80.77501698
16,300.00	91.00	329.84	11,393.33	4,030.41	-1,447.73	14,416,797.01	1,703,650.20	39.69786772	-80.77519478
16,400.00	91.00	329.84	11,391.59	4,116.86	-1,497.96	14,416,883.47	1,703,599.97	39.69810548	-80.77537259
16,500.00	91.00	329.84	11,389.85	4,203.31	-1,548.19	14,416,969.92	1,703,549.74	39.69834325	-80.77555039
16,600.00	91.00	329.84	11,388.11	4,289.76	-1,598.42	14,417,056.37	1,703,499.51	39.69858102	-80.77572820
16,700.00	91.00	329.84	11,386.37	4,376.22	-1,648.65	14,417,142.82	1,703,449.28	39.69881879	-80.77590600
16,800.00	91.00	329.84	11,384.63	4,462.67	-1,698.88	14,417,229.27	1,703,399.05	39.69905656	-80.77608381
16,900.00	91.00	329.84	11,382.88	4,549.12	-1,749.11	14,417,315.72	1,703,348.82	39.69929433	-80.77626162
17,000.00	91.00	329.84	11,381.14	4,635.57	-1,799.34	14,417,402.18	1,703,298.59	39.69953210	-80.77643943
17,100.00	91.00	329.84	11,379.40	4,722.02	-1,849.57	14,417,488.63	1,703,248.36	39.69976986	-80.77661725
17,200.00	91.00	329.84	11,377.66	4,808.47	-1,899.80	14,417,575.08	1,703,198.13	39.70000763	-80.77679506
17,300.00	91.00	329.84	11,375.92	4,894.93	-1,950.03	14,417,661.53	1,703,147.90	39.70024540	-80.77697287
17,400.00	91.00	329.84	11,374.17	4,981.38	-2,000.26	14,417,747.98	1,703,097.67	39.70048316	-80.77715069
17,500.00	91.00	329.84	11,372.43	5,067.83	-2,050.49	14,417,834.43	1,703,047.44	39.70072093	-80.77732851
17,600.00	91.00	329.84	11,370.69	5,154.28	-2,100.72	14,417,920.89	1,702,997.21	39.70095869	-80.77750633
17,700.00	91.00	329.84	11,368.95	5,240.73	-2,150.95	14,418,007.34	1,702,946.98	39.70119646	-80.77768414
17,800.00	91.00	329.84	11,367.21	5,327.19	-2,201.18	14,418,093.79	1,702,896.75	39.70143423	-80.77786197
17,900.00	91.00	329.84	11,365.47	5,413.64	-2,251.41	14,418,180.24	1,702,846.52	39.70167199	-80.77803979
18,000.00	91.00	329.84	11,363.72	5,500.09	-2,301.64	14,418,266.69	1,702,796.29	39.70190976	-80.77821761
18,100.00	91.00	329.84	11,361.98	5,586.54	-2,351.87	14,418,353.15	1,702,746.06	39.70214752	-80.77839543
18,200.00	91.00	329.84	11,360.24	5,672.99	-2,402.10	14,418,439.60	1,702,695.83	39.70238528	-80.77857326
18,300.00	91.00	329.84	11,358.50	5,759.45	-2,452.33	14,418,526.05	1,702,645.61	39.70262305	-80.77875109
18,400.00	91.00	329.84	11,356.76	5,845.90	-2,502.56	14,418,612.50	1,702,595.38	39.70286081	-80.77892892
18,500.00	91.00	329.84	11,355.02	5,932.35	-2,552.79	14,418,698.95	1,702,545.15	39.70309858	-80.77910674
18,600.00	91.00	329.84	11,353.27	6,018.80	-2,603.02	14,418,785.40	1,702,494.92	39.70333634	-80.77928457



Planning Report - Geographic

Database:	DB_Dec2220_v16	Local Co-ordinate Reference:	Well Jeffersons N-09 HU (slot I)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1217.00ft
Project:	Wetzel County, West Virginia (UTM17 NAD83)	MD Reference:	GL @ 1217.00ft
Site:	Jeffersons	North Reference:	Grid
Well:	Jeffersons N-09 HU (slot I)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev0		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
18,700.00	91.00	329.84	11,351.53	6,105.25	-2,653.25	14,418,871.86	1,702,444.69	39.70357410	-80.77946241
18,800.00	91.00	329.84	11,349.79	6,191.71	-2,703.48	14,418,958.31	1,702,394.46	39.70381186	-80.77964024
18,900.00	91.00	329.84	11,348.05	6,278.16	-2,753.71	14,419,044.76	1,702,344.23	39.70404963	-80.77981807
19,000.00	91.00	329.84	11,346.31	6,364.61	-2,803.94	14,419,131.21	1,702,294.00	39.70428739	-80.77999591
19,100.00	91.00	329.84	11,344.57	6,451.06	-2,854.17	14,419,217.66	1,702,243.77	39.70452515	-80.78017375
19,200.00	91.00	329.84	11,342.82	6,537.51	-2,904.40	14,419,304.11	1,702,193.54	39.70476291	-80.78035158
19,300.00	91.00	329.84	11,341.08	6,623.96	-2,954.63	14,419,390.57	1,702,143.31	39.70500067	-80.78052942
19,400.00	91.00	329.84	11,339.34	6,710.42	-3,004.86	14,419,477.02	1,702,093.08	39.70523843	-80.78070726
19,500.00	91.00	329.84	11,337.60	6,796.87	-3,055.09	14,419,563.47	1,702,042.85	39.70547620	-80.78088510
19,600.00	91.00	329.84	11,335.86	6,883.32	-3,105.32	14,419,649.92	1,701,992.62	39.70571396	-80.78106295
19,700.00	91.00	329.84	11,334.11	6,969.77	-3,155.55	14,419,736.37	1,701,942.39	39.70595172	-80.78124079
19,800.00	91.00	329.84	11,332.37	7,056.22	-3,205.78	14,419,822.82	1,701,892.16	39.70618948	-80.78141864
19,900.00	91.00	329.84	11,330.63	7,142.68	-3,256.01	14,419,909.28	1,701,841.93	39.70642724	-80.78159648
20,000.00	91.00	329.84	11,328.89	7,229.13	-3,306.24	14,419,995.73	1,701,791.70	39.70666499	-80.78177433
20,100.00	91.00	329.84	11,327.15	7,315.58	-3,356.47	14,420,082.18	1,701,741.47	39.70690275	-80.78195218
20,200.00	91.00	329.84	11,325.41	7,402.03	-3,406.70	14,420,168.63	1,701,691.24	39.70714051	-80.78213003
20,300.00	91.00	329.84	11,323.66	7,488.48	-3,456.93	14,420,255.08	1,701,641.01	39.70737827	-80.78230788
20,400.00	91.00	329.84	11,321.92	7,574.94	-3,507.16	14,420,341.54	1,701,590.78	39.70761603	-80.78248573
20,500.00	91.00	329.84	11,320.18	7,661.39	-3,557.39	14,420,427.99	1,701,540.55	39.70785379	-80.78266358
20,600.00	91.00	329.84	11,318.44	7,747.84	-3,607.62	14,420,514.44	1,701,490.32	39.70809154	-80.78284144
20,700.00	91.00	329.84	11,316.70	7,834.29	-3,657.85	14,420,600.89	1,701,440.09	39.70832930	-80.78301930
20,800.00	91.00	329.84	11,314.96	7,920.74	-3,708.08	14,420,687.34	1,701,389.86	39.70856706	-80.78319715
20,900.00	91.00	329.84	11,313.21	8,007.20	-3,758.31	14,420,773.79	1,701,339.63	39.70880482	-80.78337501
21,000.00	91.00	329.84	11,311.47	8,093.65	-3,808.54	14,420,860.25	1,701,289.40	39.70904257	-80.78355287
21,100.00	91.00	329.84	11,309.73	8,180.10	-3,858.77	14,420,946.70	1,701,239.17	39.70928033	-80.78373073
21,200.00	91.00	329.84	11,307.99	8,266.55	-3,909.00	14,421,033.15	1,701,188.94	39.70951808	-80.78390859
21,300.00	91.00	329.84	11,306.25	8,353.00	-3,959.22	14,421,119.60	1,701,138.71	39.70975584	-80.78408646
21,400.00	91.00	329.84	11,304.51	8,439.45	-4,009.45	14,421,206.05	1,701,088.48	39.70999360	-80.78426432
21,500.00	91.00	329.84	11,302.76	8,525.91	-4,059.68	14,421,292.50	1,701,038.25	39.71023135	-80.78444219
21,600.00	91.00	329.84	11,301.02	8,612.36	-4,109.91	14,421,378.96	1,700,988.02	39.71046911	-80.78462005
21,700.00	91.00	329.84	11,299.28	8,698.81	-4,160.14	14,421,465.41	1,700,937.79	39.71070686	-80.78479792
21,800.00	91.00	329.84	11,297.54	8,785.26	-4,210.37	14,421,551.86	1,700,887.56	39.71094461	-80.78497579
21,900.00	91.00	329.84	11,295.80	8,871.71	-4,260.60	14,421,638.31	1,700,837.34	39.71118237	-80.78515366
22,000.00	91.00	329.84	11,294.05	8,958.17	-4,310.83	14,421,724.76	1,700,787.11	39.71142012	-80.78533153
22,100.00	91.00	329.84	11,292.31	9,044.62	-4,361.06	14,421,811.21	1,700,736.88	39.71165788	-80.78550941
22,200.00	91.00	329.84	11,290.57	9,131.07	-4,411.29	14,421,897.67	1,700,686.65	39.71189563	-80.78568728
22,300.00	91.00	329.84	11,288.83	9,217.52	-4,461.52	14,421,984.12	1,700,636.42	39.71213338	-80.78586516
22,400.00	91.00	329.84	11,287.09	9,303.97	-4,511.75	14,422,070.57	1,700,586.19	39.71237113	-80.78604303
22,500.00	91.00	329.84	11,285.35	9,390.43	-4,561.98	14,422,157.02	1,700,535.96	39.71260889	-80.78622091
22,600.00	91.00	329.84	11,283.60	9,476.88	-4,612.21	14,422,243.47	1,700,485.73	39.71284664	-80.78639879
22,700.00	91.00	329.84	11,281.86	9,563.33	-4,662.44	14,422,329.92	1,700,435.50	39.71308439	-80.78657667
22,800.00	91.00	329.84	11,280.12	9,649.78	-4,712.67	14,422,416.38	1,700,385.27	39.71332214	-80.78675455
22,900.00	91.00	329.84	11,278.38	9,736.23	-4,762.90	14,422,502.83	1,700,335.04	39.71355989	-80.78693244
23,000.00	91.00	329.84	11,276.64	9,822.69	-4,813.13	14,422,589.28	1,700,284.81	39.71379764	-80.78711032
23,100.00	91.00	329.84	11,274.90	9,909.14	-4,863.36	14,422,675.73	1,700,234.58	39.71403539	-80.78728821
23,200.00	91.00	329.84	11,273.15	9,995.59	-4,913.59	14,422,762.18	1,700,184.35	39.71427314	-80.78746609
23,300.00	91.00	329.84	11,271.41	10,082.04	-4,963.82	14,422,848.64	1,700,134.12	39.71451089	-80.78764398
23,400.00	91.00	329.84	11,269.67	10,168.49	-5,014.05	14,422,935.09	1,700,083.89	39.71474864	-80.78782187
23,500.00	91.00	329.84	11,267.93	10,254.94	-5,064.28	14,423,021.54	1,700,033.66	39.71498639	-80.78799976
23,600.00	91.00	329.84	11,266.19	10,341.40	-5,114.51	14,423,107.99	1,699,983.43	39.71522414	-80.78817765
23,700.00	91.00	329.84	11,264.45	10,427.85	-5,164.74	14,423,194.44	1,699,933.20	39.71546189	-80.78835554
23,800.00	91.00	329.84	11,262.70	10,514.30	-5,214.97	14,423,280.89	1,699,882.97	39.71569964	-80.78853344
23,900.00	91.00	329.84	11,260.96	10,600.75	-5,265.20	14,423,367.34	1,699,832.74	39.71593739	-80.78871133
24,000.00	91.00	329.84	11,259.22	10,687.20	-5,315.43	14,423,453.80	1,699,782.51	39.71617514	-80.78888923
24,100.00	91.00	329.84	11,257.48	10,773.66	-5,365.66	14,423,540.25	1,699,732.28	39.71641289	-80.78906713



Planning Report - Geographic

Database:	DB_Dec2220_v16	Local Co-ordinate Reference:	Well Jeffersons N-09 HU (slot I)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1217.00ft
Project:	Wetzel County, West Virginia (UTM17 NAD83)	MD Reference:	GL @ 1217.00ft
Site:	Jeffersons	North Reference:	Grid
Well:	Jeffersons N-09 HU (slot I)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev0		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
24,200.00	91.00	329.84	11,255.74	10,860.11	-5,415.89	14,423,626.70	1,699,682.05	39.71665063	-80.78924502
24,300.00	91.00	329.84	11,254.00	10,946.56	-5,466.12	14,423,713.15	1,699,631.82	39.71688838	-80.78942292
24,400.00	91.00	329.84	11,252.25	11,033.01	-5,516.35	14,423,799.60	1,699,581.59	39.71712613	-80.78960083
24,500.00	91.00	329.84	11,250.51	11,119.46	-5,566.58	14,423,886.06	1,699,531.36	39.71736387	-80.78977873
24,600.00	91.00	329.84	11,248.77	11,205.92	-5,616.81	14,423,972.51	1,699,481.13	39.71760162	-80.78995663
24,700.00	91.00	329.84	11,247.03	11,292.37	-5,667.04	14,424,058.96	1,699,430.90	39.71783937	-80.79013454
24,800.00	91.00	329.84	11,245.29	11,378.82	-5,717.27	14,424,145.41	1,699,380.67	39.71807711	-80.79031244
24,900.00	91.00	329.84	11,243.54	11,465.27	-5,767.50	14,424,231.86	1,699,330.44	39.71831486	-80.79049035
25,000.00	91.00	329.84	11,241.80	11,551.72	-5,817.73	14,424,318.31	1,699,280.21	39.71855260	-80.79066826
25,100.00	91.00	329.84	11,240.06	11,638.18	-5,867.96	14,424,404.77	1,699,229.98	39.71879035	-80.79084617
25,200.00	91.00	329.84	11,238.32	11,724.63	-5,918.19	14,424,491.22	1,699,179.75	39.71902809	-80.79102408
25,300.00	91.00	329.84	11,236.58	11,811.08	-5,968.42	14,424,577.67	1,699,129.52	39.71926584	-80.79120199
25,400.00	91.00	329.84	11,234.84	11,897.53	-6,018.65	14,424,664.12	1,699,079.30	39.71950358	-80.79137990
25,500.00	91.00	329.84	11,233.09	11,983.98	-6,068.88	14,424,750.57	1,699,029.07	39.71974133	-80.79155782
25,600.00	91.00	329.84	11,231.35	12,070.43	-6,119.11	14,424,837.03	1,698,978.84	39.71997907	-80.79173573
25,700.00	91.00	329.84	11,229.61	12,156.89	-6,169.34	14,424,923.48	1,698,928.61	39.72021681	-80.79191365
25,800.00	91.00	329.84	11,227.87	12,243.34	-6,219.57	14,425,009.93	1,698,878.38	39.72045456	-80.79209157
25,900.00	91.00	329.84	11,226.13	12,329.79	-6,269.80	14,425,096.38	1,698,828.15	39.72069230	-80.79226949
26,000.00	91.00	329.84	11,224.39	12,416.24	-6,320.03	14,425,182.83	1,698,777.92	39.72093004	-80.79244741
26,100.00	91.00	329.84	11,222.64	12,502.69	-6,370.26	14,425,269.28	1,698,727.69	39.72116778	-80.79262533
26,200.00	91.00	329.84	11,220.90	12,589.15	-6,420.49	14,425,355.74	1,698,677.46	39.72140553	-80.79280325
26,300.00	91.00	329.84	11,219.16	12,675.60	-6,470.72	14,425,442.19	1,698,627.23	39.72164327	-80.79298118
26,400.00	91.00	329.84	11,217.42	12,762.05	-6,520.95	14,425,528.64	1,698,577.00	39.72188101	-80.79315910
26,500.00	91.00	329.84	11,215.68	12,848.50	-6,571.18	14,425,615.09	1,698,526.77	39.72211875	-80.79333703
26,600.00	91.00	329.84	11,213.94	12,934.95	-6,621.41	14,425,701.54	1,698,476.54	39.72235649	-80.79351496
26,700.00	91.00	329.84	11,212.19	13,021.41	-6,671.64	14,425,787.99	1,698,426.31	39.72259423	-80.79369289
26,800.00	91.00	329.84	11,210.45	13,107.86	-6,721.86	14,425,874.45	1,698,376.08	39.72283197	-80.79387082
26,900.00	91.00	329.84	11,208.71	13,194.31	-6,772.09	14,425,960.90	1,698,325.85	39.72306971	-80.79404875
27,000.00	91.00	329.84	11,206.97	13,280.76	-6,822.32	14,426,047.35	1,698,275.62	39.72330745	-80.79422668
27,100.00	91.00	329.84	11,205.23	13,367.21	-6,872.55	14,426,133.80	1,698,225.39	39.72354519	-80.79440462
27,200.00	91.00	329.84	11,203.48	13,453.67	-6,922.78	14,426,220.25	1,698,175.16	39.72378293	-80.79458255
27,300.00	91.00	329.84	11,201.74	13,540.12	-6,973.01	14,426,306.70	1,698,124.93	39.72402067	-80.79476049
27,400.00	91.00	329.84	11,200.00	13,626.57	-7,023.24	14,426,393.16	1,698,074.70	39.72425841	-80.79493843
27,500.00	91.00	329.84	11,198.26	13,713.02	-7,073.47	14,426,479.61	1,698,024.47	39.72449615	-80.79511637
27,600.00	91.00	329.84	11,196.52	13,799.47	-7,123.70	14,426,566.06	1,697,974.24	39.72473388	-80.79529431
27,700.00	91.00	329.84	11,194.78	13,885.92	-7,173.93	14,426,652.51	1,697,924.01	39.72497162	-80.79547225
27,800.00	91.00	329.84	11,193.03	13,972.38	-7,224.16	14,426,738.96	1,697,873.78	39.72520936	-80.79565019
27,900.00	91.00	329.84	11,191.29	14,058.83	-7,274.39	14,426,825.41	1,697,823.55	39.72544710	-80.79582813
27,916.79	91.00	329.84	11,191.00	14,073.34	-7,282.82	14,426,839.93	1,697,815.12	39.72548700	-80.79585800

PBHL/TD 27916.79 MD 11191.00 TVD - 20" Casing

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Office of Oil and Gas
JAN 26 2023
WV Department of
Environmental Protection



Planning Report - Geographic

Database:	DB_Dec2220_v16	Local Co-ordinate Reference:	Well Jeffersons N-09 HU (slot I)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1217.00ft
Project:	Wetzel County, West Virginia (UTM17 NAD83)	MD Reference:	GL @ 1217.00ft
Site:	Jeffersons	North Reference:	Grid
Well:	Jeffersons N-09 HU (slot I)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev0		

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
Jeffersons N-09HU BHL - plan hits target center - Point	0.00	0.00	11,191.00	14,073.34	-7,282.82	14,426,839.93	1,697,815.12	39.72548700	-80.79585800
Jeffersons N-09HU LP - plan misses target center by 43.26ft at 12095.90ft MD (11466.56 TVD, 395.88 N, 663.98 E) - Point	0.00	0.00	11,467.00	374.16	626.57	14,413,140.77	1,705,724.50	39.68781200	-80.76785400
Jeffersons N-09HU LP 5 - plan misses target center by 0.03ft at 12070.78ft MD (11467.00 TVD, 374.17 N, 676.59 E) - Point	0.00	0.00	11,467.00	374.16	676.57	14,413,140.77	1,705,774.50	39.68781165	-80.76767628

Casing Points					
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")	
27,916.79	11,191.00	20" Casing	20	24	

Plan Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
3,100.00	3,100.00	0.00	0.00	KOP Begin 2°/100' build	
3,250.00	3,249.93	-1.58	3.59	Begin 3.00° tangent	
4,250.00	4,248.56	-22.69	51.49	Begin 2°/100' drop	
4,400.00	4,398.49	-24.27	55.08	Begin vertical hold	
7,001.51	7,000.00	-24.27	55.08	Begin 2°/100' build	
7,888.15	7,872.56	-79.14	179.64	Begin 17.73° tangent	
10,489.51	10,350.32	-398.57	904.72	Begin 6°/100' build/turn	
11,551.57	11,297.12	-52.41	893.75	Begin 8°/100' build/turn	
12,070.83	11,466.99	374.21	676.57	Begin 91.00° lateral	
27,916.79	11,191.00	14,073.34	-7,282.82	PBHL/TD 27916.79 MD 11191.00 TVD	