



Well: Whistlepig N-04HM (slot C)
Site: Whistlepig
Project: Marshall County, West Virginia
Design: rev2
Rig: Nabors X-14

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	
2	1533.50	0.00	0.00	1533.50	0.00	0.00	0.00	0.000	0.00	KOP Begin 2°/100' build
3	2770.14	24.73	295.63	2732.09	113.66	-236.94	2.00	295.628	250.42	Begin 24.73° tangent
4	6589.63	24.73	295.63	6201.21	804.86	-1677.74	0.00	0.000	1773.24	Begin 8°/100' build/turn
5	6919.35	50.00	308.81	6461.54	915.81	-1841.24	8.00	23.153	1968.34	Begin 10°/100' build/turn
6	7336.34	91.00	317.13	6598.00	1180.48	-2119.93	10.00	12.564	2352.67	Begin 91.00° lateral
7	16167.76	91.00	317.13	6444.00	7652.15	-8127.24	0.00	0.000	1162.77	PBHL/TD 16167.75 MD 6444.00 TVD

ANNOTATIONS SURVEYS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Annotation
178.00	0.35	210.38	178.00	-0.47	-0.27	-0.12	MWD surveys
16106.00	90.24	318.22	6535.69	7614.23	-8102.78	11118.97	Survey @ 16106.00 MD 6535.69 TVD
16169.00	90.24	318.22	6535.43	7661.20	-8144.76	11181.73	Survey Proj. to 16169.00 MD 6535.43 TVD

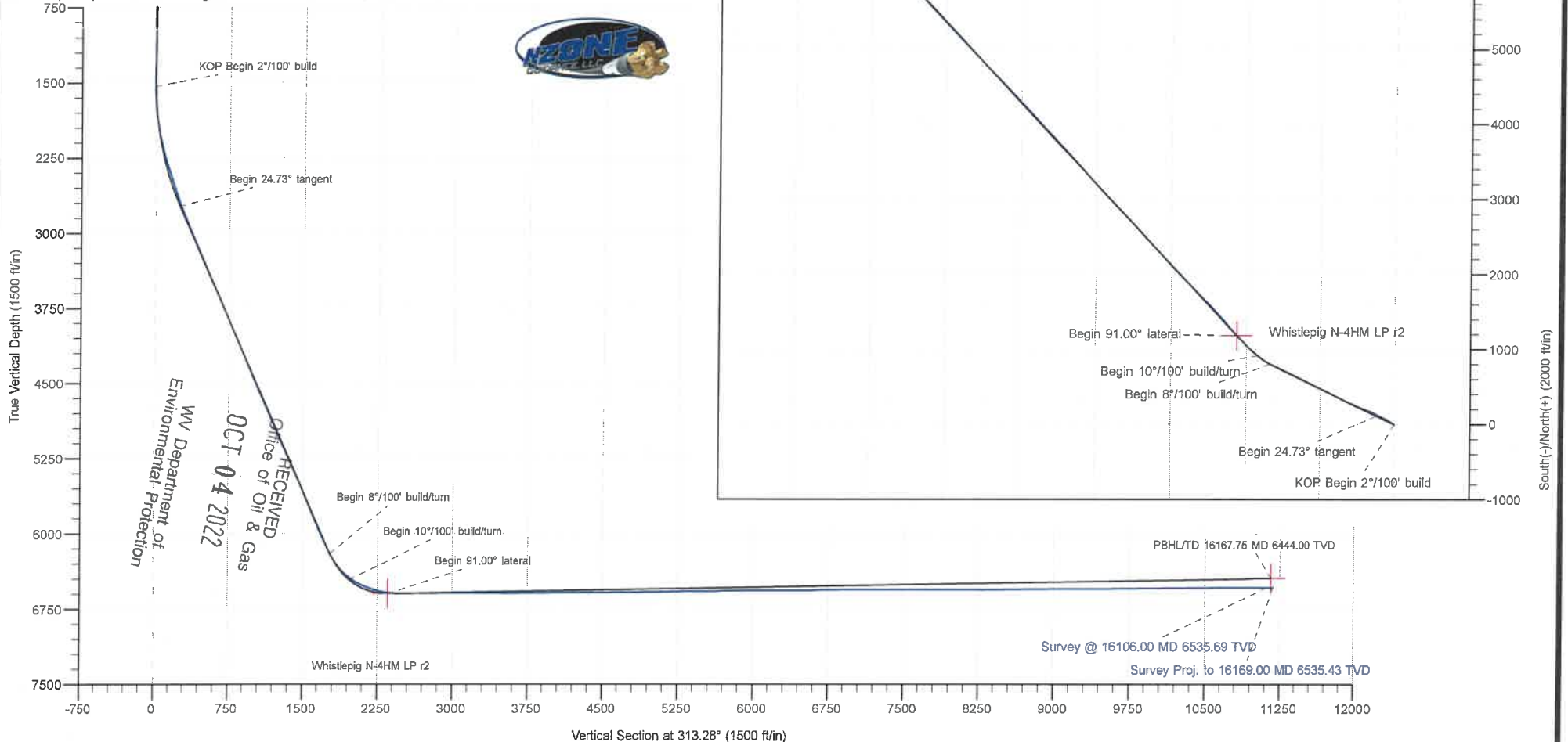
Geodetic System: Universal Transverse Mercator (US Survey Feet)
 Datum: NAD83 West Virginia - HARN
 Ellipsoid: GRS 1980
 Zone: Zone 17N (84 W to 78 W)
 System Datum: Mean Sea Level
 Depth Reference: RKB=1368+32.5 @ 1400.50ft (Nabors X-14)
 Northing Easting Latitude Longitude
 14444980.20 1698591.96 39.77530063 -80.79294605



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

Magnetic Field
 Strength: 51748.4nT
 Dip Angle: 68.54°
 Date: 6/20/2021
 Model: IGRF2020

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



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Whistlepig N-04HM (slot C)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1368+32.5 @ 1400.50ft (Nabors X-14)
Site:	Whistlepig	MD Reference:	RKB=1368+32.5 @ 1400.50ft (Nabors X-14)
Well:	Whistlepig N-04HM (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Dec2220_v16

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

Well	Whistlepig N-04HM (slot C)					
Well Position	+N/-S	0.00 ft	Northing:	14,444,980.20 usft	Latitude:	39.77530063
	+E/-W	0.00 ft	Easting:	1,698,591.96 usft	Longitude:	-80.79294605
Position Uncertainty	0.00 ft		Wellhead Elevation:	ft	Ground Level:	1,368.00 ft
Grid Convergence:	0.132 °					

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2020	6/20/2021	-8.602	66.540	51,748.40412786

Design	Surveys Original Hole				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.00	0.00	0.00	313.28	

Survey Program	Date	7/7/2021			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
178.00	1,084.00	MWD surf (Original Hole)	MWD	MWD - Standard	
1,177.00	2,809.00	MWD int (Original Hole)	MWD	MWD - Standard	
2,879.00	16,106.00	MWD (Original Hole)	MWD	MWD - Standard	
16,169.00	16,169.00	Projection (Original Hole)	MWD	MWD - Standard	

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Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
178.00	0.35	210.38	178.00	-0.47	-0.27	-0.12	0.20	0.20	0.00	
MWD surveys										
223.00	0.26	207.66	223.00	-0.68	-0.39	-0.18	0.20	-0.20	-6.04	
268.00	0.31	203.80	268.00	-0.88	-0.49	-0.25	0.12	0.11	-8.58	
314.00	0.26	194.12	314.00	-1.09	-0.56	-0.34	0.15	-0.11	-21.04	
360.00	0.26	193.77	360.00	-1.30	-0.61	-0.44	0.00	0.00	-0.76	



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Site:	Whistlepig	MD Reference:	RKB=1368+32.5 @ 1400.50ft (Nabors X-14)
Well:	Whistlepig N-04HM (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Dec2220_v16

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
405.00	0.22	184.10	405.00	-1.48	-0.64	-0.55	0.13	-0.09	-21.49
451.00	0.22	180.15	451.00	-1.66	-0.65	-0.66	0.03	0.00	-8.59
545.00	0.13	158.09	545.00	-1.94	-0.61	-0.88	0.12	-0.10	-23.47
639.00	0.13	100.39	639.00	-2.06	-0.47	-1.07	0.13	0.00	-61.38
733.00	0.09	118.18	733.00	-2.11	-0.30	-1.23	0.06	-0.04	18.93
828.00	0.13	96.04	827.99	-2.16	-0.12	-1.39	0.06	0.04	-23.31
922.00	0.18	106.93	921.99	-2.21	0.12	-1.61	0.06	0.05	11.59
1,016.00	0.18	100.69	1,015.99	-2.28	0.41	-1.86	0.02	0.00	-6.64
1,058.00	0.22	107.46	1,057.99	-2.32	0.55	-1.99	0.11	0.10	16.12
1,084.00	0.31	117.31	1,083.99	-2.37	0.66	-2.10	0.39	0.35	37.88
1,177.00	0.31	106.84	1,176.99	-2.55	1.13	-2.57	0.06	0.00	-11.26
1,272.00	0.62	111.15	1,271.99	-2.81	1.85	-3.28	0.33	0.33	4.54
1,366.00	0.70	123.99	1,365.98	-3.32	2.80	-4.31	0.18	0.09	13.66
1,460.00	0.70	129.43	1,459.98	-4.00	3.72	-5.45	0.07	0.00	5.79
1,507.00	0.22	156.77	1,506.97	-4.27	3.98	-5.82	1.09	-1.02	58.17
1,554.00	0.62	279.55	1,553.97	-4.31	3.76	-5.69	1.62	0.85	261.23
1,601.00	1.32	299.94	1,600.97	-4.00	3.04	-4.96	1.64	1.49	43.38
1,649.00	2.59	301.70	1,648.94	-3.15	1.64	-3.36	2.65	2.65	3.67
1,696.00	3.91	308.38	1,695.86	-1.60	-0.52	-0.72	2.92	2.81	14.21
1,743.00	4.88	306.89	1,742.72	0.60	-3.37	2.86	2.08	2.06	-3.17
1,790.00	6.20	310.14	1,789.50	3.43	-6.91	7.39	2.89	2.81	6.91
1,838.00	7.91	309.87	1,837.14	7.22	-11.43	13.27	3.56	3.56	-0.56
1,885.00	8.70	310.93	1,883.64	11.62	-16.60	20.05	1.71	1.68	2.26
1,931.00	9.19	308.91	1,929.08	16.21	-22.08	27.19	1.27	1.07	-4.39
1,978.00	10.19	305.48	1,975.41	20.98	-28.39	35.05	2.46	2.13	-7.30
2,024.00	11.78	306.09	2,020.57	26.11	-35.50	43.74	3.47	3.46	1.33
2,071.00	13.00	304.78	2,066.47	31.95	-43.72	53.73	2.66	2.60	-2.79
2,118.00	14.68	304.07	2,112.11	38.30	-52.99	64.84	3.59	3.57	-1.51
2,165.00	15.69	301.00	2,157.47	44.91	-63.37	76.93	2.75	2.15	-6.53
2,213.00	16.39	297.31	2,203.60	51.36	-74.96	89.78	2.58	1.46	-7.69
2,260.00	17.18	295.90	2,248.60	57.44	-87.09	102.78	1.89	1.68	-3.00
2,307.00	18.11	296.08	2,293.38	63.68	-99.90	116.38	1.98	1.98	0.38
2,354.00	18.68	296.16	2,337.98	70.21	-113.21	130.56	1.21	1.21	0.17
2,401.00	18.98	296.08	2,382.47	76.89	-126.84	145.05	0.64	0.64	-0.17
2,448.00	18.50	295.37	2,426.98	83.44	-140.44	159.45	1.13	-1.02	-1.51
2,495.00	18.68	295.37	2,471.52	89.86	-153.98	173.71	0.38	0.38	0.00
2,542.00	19.51	295.37	2,515.94	96.45	-167.87	188.34	1.77	1.77	0.00
2,588.00	20.39	296.70	2,559.18	103.34	-181.97	203.33	2.15	2.15	2.89
2,635.00	20.39	295.64	2,603.23	110.56	-196.66	218.98	0.79	0.00	-2.26
2,682.00	21.00	295.37	2,647.20	117.72	-211.66	234.79	1.31	1.30	-0.57
2,729.00	20.70	295.37	2,691.12	124.88	-226.77	250.71	0.64	-0.64	0.00
2,776.00	21.09	298.71	2,735.03	132.50	-241.69	266.80	2.67	0.83	7.11
2,809.00	21.58	300.03	2,765.77	138.39	-252.15	278.45	2.08	1.48	4.00
2,879.00	23.25	301.35	2,830.48	152.02	-275.10	304.51	2.49	2.39	1.89

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Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
2,973.00	24.35	294.36	2,916.50	169.67	-308.61	341.00	3.22	1.17	-7.44
3,066.00	25.22	287.81	3,000.95	183.65	-344.94	377.03	3.10	0.94	-7.04
3,161.00	25.58	289.13	3,086.77	196.56	-383.59	414.02	0.71	0.38	1.39
3,255.00	24.26	291.68	3,172.02	210.34	-420.71	450.50	1.81	-1.40	2.71
3,350.00	24.57	292.65	3,258.52	225.16	-457.07	487.13	0.53	0.33	1.02
3,444.00	24.92	295.02	3,343.89	241.06	-493.06	524.23	1.12	0.37	2.52
3,538.00	24.96	294.67	3,429.13	257.71	-529.02	561.83	0.16	0.04	-0.37
3,632.00	24.70	293.35	3,514.44	273.78	-565.08	599.09	0.65	-0.28	-1.40
3,726.00	24.26	296.60	3,599.99	290.21	-600.38	636.06	1.51	-0.47	3.46
3,820.00	24.61	296.87	3,685.57	307.70	-635.11	673.33	0.39	0.37	0.29
3,914.00	24.48	294.58	3,771.08	324.65	-670.28	710.56	1.02	-0.14	-2.44
4,008.00	24.83	292.82	3,856.51	340.41	-706.18	747.50	0.87	0.37	-1.87
4,102.00	24.30	295.20	3,942.01	356.30	-741.87	784.38	1.19	-0.56	2.53
4,194.00	24.04	296.43	4,025.94	372.70	-775.78	820.31	0.62	-0.28	1.34
4,288.00	24.08	296.08	4,111.77	389.65	-810.15	856.95	0.16	0.04	-0.37
4,382.00	23.86	295.46	4,197.67	406.25	-844.54	893.37	0.36	-0.23	-0.66
4,477.00	24.74	296.43	4,284.25	423.36	-879.69	930.69	1.02	0.93	1.02
4,571.00	24.13	295.37	4,369.83	440.35	-914.67	967.80	0.80	-0.65	-1.13
4,665.00	24.74	295.11	4,455.41	456.93	-949.84	1,004.77	0.66	0.65	-0.28
4,760.00	24.61	295.20	4,541.74	473.79	-985.74	1,042.47	0.14	-0.14	0.09
4,853.00	23.64	296.34	4,626.61	490.31	-1,019.97	1,078.71	1.16	-1.04	1.23
4,948.00	23.60	296.16	4,713.65	507.14	-1,054.11	1,115.11	0.09	-0.04	-0.19
5,042.00	24.70	295.20	4,799.43	523.80	-1,088.77	1,151.76	1.24	1.17	-1.02
5,136.00	24.96	297.39	4,884.74	541.29	-1,124.15	1,189.51	1.02	0.28	2.33
5,231.00	25.14	296.95	4,970.80	559.65	-1,159.93	1,228.15	0.27	0.19	-0.46
5,325.00	25.36	295.11	5,055.82	577.24	-1,195.96	1,266.44	0.87	0.23	-1.96
5,420.00	24.39	293.70	5,142.01	593.76	-1,232.35	1,304.26	1.20	-1.02	-1.48
5,514.00	24.79	295.11	5,227.48	609.93	-1,267.96	1,341.27	0.76	0.43	1.50
5,608.00	25.40	297.04	5,312.61	627.45	-1,303.76	1,379.35	1.09	0.65	2.05
5,702.00	24.92	296.87	5,397.69	645.57	-1,339.39	1,417.70	0.52	-0.51	-0.18
5,797.00	24.39	296.08	5,484.03	663.24	-1,374.86	1,455.64	0.66	-0.56	-0.83
5,891.00	24.92	296.43	5,569.46	680.59	-1,410.02	1,493.14	0.58	0.56	0.37
5,986.00	24.87	295.81	5,655.64	698.19	-1,445.93	1,531.35	0.28	-0.00	-0.65
6,080.00	24.87	295.20	5,740.92	715.22	-1,481.61	1,568.99	0.27	0.00	0.00
6,174.00	24.68	295.02	5,826.27	731.93	-1,517.28	1,606.42	0.22	-0.00	-0.00
6,268.00	24.83	295.11	5,911.63	748.61	-1,552.93	1,643.81	0.16	0.16	0.14
6,332.00	23.95	295.20	5,969.92	759.84	-1,576.85	1,668.93	1.38	0.14	0.14
6,379.00	22.95	293.88	6,013.04	767.61	-1,593.86	1,686.64	2.40	-2.13	2.81
6,426.00	24.75	294.40	6,056.02	775.39	-1,611.21	1,704.60	3.86	3.83	3.83
6,473.00	26.02	294.76	6,098.48	783.77	-1,629.53	1,723.68	2.72	2.70	0.77
6,520.00	25.98	294.23	6,140.72	792.31	-1,648.28	1,743.19	0.50	-0.09	-1.13
6,568.00	26.29	293.88	6,183.82	800.93	-1,667.58	1,763.15	0.72	0.65	-0.73
6,615.00	30.11	297.13	6,225.23	810.52	-1,687.60	1,784.30	8.76	8.13	6.91

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6,662.00	33.45	300.29	6,265.18	822.44	-1,709.29	1,808.26	7.94	7.11	6.72
6,709.00	37.01	302.58	6,303.57	836.59	-1,732.40	1,834.79	8.08	7.57	4.87
6,756.00	40.57	304.78	6,340.20	852.93	-1,756.88	1,863.82	8.12	7.57	4.68
6,803.00	44.40	305.92	6,374.86	871.30	-1,782.76	1,895.25	8.31	8.15	2.43
6,850.00	48.79	307.24	6,407.14	891.66	-1,810.16	1,929.16	9.56	9.34	2.81
6,897.00	53.01	308.03	6,436.78	913.93	-1,839.04	1,965.45	9.07	8.98	1.68
6,944.00	57.05	309.43	6,463.71	938.03	-1,869.07	2,003.83	8.94	8.60	2.98
6,991.00	60.70	310.93	6,488.00	963.99	-1,899.79	2,044.00	8.23	7.77	3.19
7,038.00	64.00	312.86	6,509.81	991.80	-1,930.77	2,085.61	7.91	7.02	4.11
7,085.00	67.74	314.18	6,529.03	1,021.33	-1,961.86	2,128.50	8.36	7.96	2.81
7,132.00	70.73	314.97	6,545.69	1,052.17	-1,993.16	2,172.43	6.55	6.36	1.68
7,179.00	73.49	315.50	6,560.12	1,083.93	-2,024.65	2,217.12	5.97	5.87	1.13
7,226.00	76.04	316.64	6,572.47	1,116.59	-2,056.11	2,262.41	5.91	5.43	2.43
7,273.00	78.90	317.08	6,582.67	1,150.06	-2,087.48	2,308.20	6.15	6.09	0.94
7,321.00	82.68	317.96	6,590.35	1,185.00	-2,119.47	2,355.44	8.08	7.88	1.83
7,368.00	85.05	318.31	6,595.37	1,219.80	-2,150.65	2,402.00	5.10	5.04	0.74
7,416.00	86.73	318.66	6,598.81	1,255.65	-2,182.39	2,449.68	3.57	3.50	0.73
7,463.00	90.42	318.49	6,599.98	1,290.87	-2,213.47	2,496.45	7.86	7.85	-0.36
7,510.00	91.08	317.87	6,599.37	1,325.90	-2,244.80	2,543.28	1.93	1.40	-1.32
7,603.00	91.91	318.05	6,596.94	1,394.94	-2,307.06	2,635.93	0.91	0.89	0.19
7,696.00	91.52	317.78	6,594.16	1,463.93	-2,369.36	2,728.59	0.51	-0.42	-0.29
7,791.00	90.55	316.73	6,592.44	1,533.68	-2,433.83	2,823.34	1.50	-1.02	-1.11
7,886.00	89.80	316.38	6,592.15	1,602.65	-2,499.16	2,918.18	0.87	-0.79	-0.37
7,980.00	89.80	315.85	6,592.48	1,670.40	-2,564.32	3,012.07	0.56	0.00	-0.56
8,075.00	89.05	316.38	6,593.43	1,738.87	-2,630.17	3,106.94	0.97	-0.79	0.56
8,169.00	89.36	316.20	6,594.74	1,806.81	-2,695.12	3,200.81	0.38	0.33	-0.19
8,263.00	89.93	316.20	6,595.32	1,874.65	-2,760.18	3,294.68	0.61	0.61	0.00
8,358.00	90.55	315.85	6,594.92	1,943.02	-2,826.14	3,389.57	0.75	0.65	-0.37
8,453.00	91.12	315.50	6,593.54	2,010.97	-2,892.51	3,484.48	0.70	0.60	-0.37
8,548.00	90.20	317.26	6,592.44	2,079.74	-2,958.04	3,579.33	2.09	-0.97	1.85
8,642.00	90.86	317.78	6,591.57	2,149.06	-3,021.52	3,673.06	0.89	0.70	0.55
8,736.00	89.93	318.05	6,590.92	2,218.82	-3,084.52	3,766.75	1.03	-0.99	0.29
8,830.00	90.11	317.87	6,590.89	2,288.63	-3,147.47	3,860.44	0.27	0.19	0.10
8,924.00	90.29	317.61	6,590.56	2,358.20	-3,210.68	3,954.15	0.34	0.09	0.10
9,018.00	90.77	317.52	6,589.69	2,427.57	-3,274.11	4,047.88	0.52	0.51	0.10
9,113.00	90.99	316.73	6,588.24	2,497.18	-3,338.74	4,142.66	0.86	0.23	0.10
9,207.00	90.11	317.43	6,587.33	2,566.02	-3,402.74	4,236.44	1.20	0.10	0.74
9,301.00	90.59	317.34	6,586.76	2,635.19	-3,466.39	4,330.20	0.52	0.51	0.10
9,395.00	91.08	316.29	6,585.39	2,703.72	-3,530.71	4,424.01	1.23	0.52	-1.12
9,489.00	89.41	315.94	6,584.99	2,771.47	-3,595.87	4,517.89	1.82	-1.78	-0.37
9,584.00	89.80	315.94	6,585.64	2,839.74	-3,661.93	4,612.79	0.41	0.41	0.00
9,677.00	90.24	315.85	6,585.61	2,906.52	-3,726.65	4,705.69	0.48	0.47	-0.10
9,771.00	90.59	317.78	6,584.93	2,975.05	-3,790.98	4,799.50	2.09	0.37	2.05

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Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Whistlepig N-04HM (slot C)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1368+32.5 @ 1400.50ft (Nabors X-14)
Site:	Whistlepig	MD Reference:	RKB=1368+32.5 @ 1400.50ft (Nabors X-14)
Well:	Whistlepig N-04HM (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Dec2220_v16

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
9,865.00	91.47	318.14	6,583.24	3,044.85	-3,853.92	4,893.17	1.01	0.94	0.38
9,960.00	91.25	317.61	6,580.98	3,115.29	-3,917.62	4,987.84	0.60	-0.23	-0.56
10,054.00	90.64	317.96	6,579.43	3,184.90	-3,980.77	5,081.53	0.75	-0.65	0.37
10,148.00	91.25	317.96	6,577.88	3,254.70	-4,043.71	5,175.21	0.65	0.65	0.00
10,242.00	91.82	317.78	6,575.37	3,324.39	-4,106.74	5,268.87	0.64	0.61	-0.19
10,336.00	90.95	317.96	6,573.09	3,394.08	-4,169.78	5,362.54	0.95	-0.93	0.19
10,430.00	89.67	317.34	6,572.58	3,463.55	-4,233.10	5,456.26	1.51	-1.36	-0.66
10,524.00	90.24	317.70	6,572.66	3,532.87	-4,296.58	5,550.00	0.72	0.61	0.38
10,619.00	91.08	319.01	6,571.56	3,603.86	-4,359.70	5,644.62	1.64	0.88	1.38
10,713.00	91.08	317.34	6,569.79	3,673.89	-4,422.38	5,738.26	1.78	0.00	-1.78
10,807.00	90.59	317.43	6,568.42	3,743.06	-4,486.01	5,832.01	0.53	-0.52	0.10
10,901.00	90.86	317.61	6,567.23	3,812.38	-4,549.49	5,925.74	0.35	0.29	0.19
10,995.00	89.63	317.43	6,566.83	3,881.70	-4,612.97	6,019.48	1.32	-1.31	-0.19
11,088.00	90.20	317.87	6,566.97	3,950.43	-4,675.62	6,112.21	0.77	0.61	0.47
11,182.00	89.27	316.38	6,567.40	4,019.32	-4,739.57	6,205.99	1.87	-0.99	-1.59
11,276.00	89.49	316.47	6,568.42	4,087.41	-4,804.36	6,299.84	0.25	0.23	0.10
11,371.00	91.03	316.73	6,567.99	4,156.44	-4,869.63	6,394.68	1.64	1.62	0.27
11,465.00	90.42	316.90	6,566.80	4,224.97	-4,933.96	6,488.49	0.67	-0.65	0.18
11,559.00	92.04	316.73	6,564.78	4,293.49	-4,998.27	6,582.29	1.73	1.72	-0.18
11,653.00	92.66	317.08	6,560.93	4,362.07	-5,062.44	6,676.02	0.76	0.66	0.37
11,749.00	91.52	316.64	6,557.43	4,432.08	-5,128.04	6,771.77	1.27	-1.19	-0.46
11,841.00	89.49	316.47	6,556.62	4,498.86	-5,191.29	6,863.61	2.21	-2.21	-0.18
11,936.00	89.54	316.64	6,557.42	4,567.84	-5,256.62	6,958.45	0.19	0.05	0.18
12,029.00	89.98	316.47	6,557.81	4,635.36	-5,320.57	7,051.30	0.51	0.47	-0.18
12,123.00	90.90	316.73	6,557.09	4,703.65	-5,385.15	7,145.13	1.02	0.98	0.28
12,217.00	89.27	315.59	6,556.95	4,771.45	-5,450.26	7,239.01	2.12	-1.73	-1.21
12,311.00	89.41	315.50	6,558.03	4,838.54	-5,516.09	7,332.93	0.18	0.15	-0.10
12,405.00	89.58	315.50	6,558.86	4,905.58	-5,581.97	7,426.86	0.18	0.18	0.00
12,498.00	89.98	316.11	6,559.22	4,972.26	-5,646.80	7,519.76	0.78	0.43	0.66
12,592.00	90.42	316.11	6,558.89	5,040.00	-5,711.97	7,613.65	0.47	0.47	0.00
12,686.00	91.08	317.08	6,557.66	5,108.29	-5,776.55	7,707.48	1.25	0.70	1.03
12,781.00	90.55	317.17	6,556.31	5,177.90	-5,841.19	7,802.26	0.57	-0.56	0.09
12,875.00	90.99	317.52	6,555.04	5,247.03	-5,904.87	7,896.01	0.60	0.47	0.37
12,969.00	89.23	317.08	6,554.86	5,316.11	-5,968.62	7,989.77	1.93	0.88	-0.47
13,064.00	90.07	316.99	6,555.44	5,385.62	-6,033.36	8,084.57	0.89	0.88	-0.09
13,158.00	88.70	317.08	6,556.45	5,454.40	-6,097.42	8,178.36	1.46	-1.46	0.10
13,252.00	88.79	316.99	6,558.51	5,523.17	-6,161.47	8,272.13	0.14	0.10	-0.10
13,346.00	90.07	318.57	6,559.45	5,592.78	-6,224.63	8,365.83	2.16	2.16	1.68
13,440.00	91.38	319.10	6,558.26	5,663.54	-6,286.50	8,459.38	1.50	1.50	0.56
13,534.00	91.87	318.66	6,555.59	5,734.32	-6,348.29	8,552.89	0.70	0.52	-0.47
13,628.00	91.69	318.05	6,552.67	5,804.53	-6,410.73	8,646.48	0.68	-0.19	-0.65
13,722.00	90.37	318.31	6,550.98	5,874.57	-6,473.39	8,740.12	1.43	-1.40	0.28
13,816.00	89.98	317.96	6,550.70	5,944.57	-6,536.13	8,833.78	0.56	-0.41	-0.37
13,910.00	90.11	317.61	6,550.62	6,014.19	-6,599.29	8,927.49	0.40	0.14	-0.37

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Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Whistlepig N-04HM (slot C)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1368+32.5 @ 1400.50ft (Nabors X-14)
Site:	Whistlepig	MD Reference:	RKB=1368+32.5 @ 1400.50ft (Nabors X-14)
Well:	Whistlepig N-04HM (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Dec2220_v16

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
14,005.00	90.24	317.87	6,550.33	6,084.50	-6,663.17	9,022.20	0.31	0.14	0.27
14,099.00	90.86	317.08	6,549.43	6,153.77	-6,726.70	9,115.94	1.07	0.66	-0.84
14,193.00	91.08	317.34	6,547.84	6,222.75	-6,790.55	9,209.71	0.36	0.23	0.28
14,287.00	89.89	317.08	6,547.04	6,291.72	-6,854.40	9,303.48	1.30	-1.27	-0.28
14,381.00	90.02	316.73	6,547.12	6,360.36	-6,918.62	9,397.29	0.40	0.14	-0.37
14,476.00	89.67	316.99	6,547.37	6,429.68	-6,983.58	9,492.10	0.46	-0.37	0.27
14,570.00	89.54	317.17	6,548.02	6,498.52	-7,047.59	9,585.89	0.24	-0.14	0.19
14,665.00	89.98	317.34	6,548.42	6,568.28	-7,112.07	9,680.66	0.50	0.46	0.18
14,759.00	89.89	316.73	6,548.53	6,637.07	-7,176.14	9,774.46	0.66	-0.10	-0.65
14,854.00	91.78	316.47	6,547.14	6,706.08	-7,241.40	9,869.29	2.01	1.99	-0.27
14,949.00	91.65	316.03	6,544.30	6,774.68	-7,307.07	9,964.12	0.48	-0.14	-0.46
15,044.00	90.42	315.50	6,542.58	6,842.73	-7,373.33	10,059.01	1.41	-1.29	-0.56
15,138.00	90.46	315.76	6,541.86	6,909.92	-7,439.06	10,152.93	0.28	0.04	0.28
15,233.00	90.95	315.85	6,540.69	6,978.03	-7,505.28	10,247.83	0.52	0.52	0.09
15,326.00	91.03	314.80	6,539.08	7,044.15	-7,570.65	10,340.75	1.13	0.09	-1.13
15,420.00	89.76	315.76	6,538.44	7,110.94	-7,636.79	10,434.69	1.69	-1.35	1.02
15,514.00	90.02	315.85	6,538.62	7,178.34	-7,702.32	10,528.60	0.29	0.28	0.10
15,608.00	90.86	316.29	6,537.90	7,246.03	-7,767.53	10,622.48	1.01	0.89	0.47
15,702.00	90.42	317.08	6,536.85	7,314.42	-7,832.01	10,716.31	0.96	-0.47	0.84
15,796.00	90.95	317.52	6,535.72	7,383.50	-7,895.75	10,810.07	0.73	0.56	0.47
15,889.00	89.54	318.22	6,535.32	7,452.47	-7,958.14	10,902.77	1.69	-1.52	0.75
15,982.00	89.89	318.22	6,535.79	7,521.82	-8,020.10	10,995.42	0.38	0.38	0.00
16,075.00	90.11	318.14	6,535.79	7,591.12	-8,082.11	11,088.08	0.25	0.24	-0.09
16,106.00	90.24	318.22	6,535.69	7,614.23	-8,102.78	11,118.97	0.49	0.42	0.26
Survey @ 16106.00 MD 6535.69 TVD									
16,169.00	90.24	318.22	6,535.43	7,661.20	-8,144.76	11,181.73	0.00	0.00	0.00
Survey Proj. to 16169.00 MD 6535.43 TVD									

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
178.00	178.00	-0.47	-0.27	MWD surveys
16,106.00	6,535.69	7,614.23	-8,102.78	Survey @ 16106.00 MD 6535.69 TVD

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Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Whistlepig N-04HM (slot C)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1368+32.5 @ 1400.50ft (Nabors X-14)
Site:	Whistlepig	MD Reference:	RKB=1368+32.5 @ 1400.50ft (Nabors X-14)
Well:	Whistlepig N-04HM (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Dec2220_v16

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

Well	Whistlepig N-04HM (slot C)					
Well Position	+N/-S	0.00 ft	Northing:	14,444,980.20 usft	Latitude:	39.77530063
	+E/-W	0.00 ft	Easting:	1,698,591.96 usft	Longitude:	-80.79294605
Position Uncertainty	0.00 ft	Wellhead Elevation:	ft	Ground Level:	1,368.00 ft	

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2020	6/20/2021	-8.602	66.540	51,748.40412786

Design	Surveys Original Hole				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.00	0.00	0.00	313.28	

Survey Program	Date 7/7/2021				
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
178.00	1,084.00	MWD surf (Original Hole)	MWD	MWD - Standard	
1,177.00	2,809.00	MWD int (Original Hole)	MWD	MWD - Standard	
2,879.00	16,106.00	MWD (Original Hole)	MWD	MWD - Standard	
16,169.00	16,169.00	Projection (Original Hole)	MWD	MWD - Standard	

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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	14,444,980.20	1,698,591.96	39.77530063	-80.79294605	
178.00	0.35	210.38	178.00	-0.47	-0.27	14,444,979.73	1,698,591.68	39.77529935	-80.79294703	
MWD surveys										
223.00	0.26	207.66	223.00	-0.68	-0.39	14,444,979.52	1,698,591.57	39.77529877	-80.79294745	
268.00	0.31	203.80	268.00	-0.88	-0.49	14,444,979.32	1,698,591.47	39.77529822	-80.79294780	
314.00	0.26	194.12	314.00	-1.09	-0.56	14,444,979.10	1,698,591.39	39.77529763	-80.79294807	
360.00	0.26	193.77	360.00	-1.30	-0.61	14,444,978.90	1,698,591.34	39.77529707	-80.79294825	
405.00	0.22	184.10	405.00	-1.48	-0.64	14,444,978.72	1,698,591.31	39.77529656	-80.79294836	
451.00	0.22	180.15	451.00	-1.66	-0.65	14,444,978.54	1,698,591.31	39.77529608	-80.79294838	

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Whistlepig N-04HM (slot C)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1368+32.5 @ 1400.50ft (Nabors X-14)
Site:	Whistlepig	MD Reference:	RKB=1368+32.5 @ 1400.50ft (Nabors X-14)
Well:	Whistlepig N-04HM (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Dec2220_v16

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
545.00	0.13	158.09	545.00	-1.94	-0.61	14,444,978.26	1,698,591.35	39.77529531	-80.79294825
639.00	0.13	100.39	639.00	-2.06	-0.47	14,444,978.14	1,698,591.49	39.77529499	-80.79294773
733.00	0.09	118.18	733.00	-2.11	-0.30	14,444,978.09	1,698,591.66	39.77529484	-80.79294713
828.00	0.13	96.04	827.99	-2.16	-0.12	14,444,978.04	1,698,591.83	39.77529471	-80.79294651
922.00	0.18	106.93	921.99	-2.21	0.12	14,444,977.99	1,698,592.08	39.77529456	-80.79294563
1,016.00	0.18	100.69	1,015.99	-2.28	0.41	14,444,977.92	1,698,592.37	39.77529436	-80.79294461
1,058.00	0.22	107.46	1,057.99	-2.32	0.55	14,444,977.88	1,698,592.51	39.77529426	-80.79294411
1,084.00	0.31	117.31	1,083.99	-2.37	0.66	14,444,977.83	1,698,592.62	39.77529413	-80.79294372
1,177.00	0.31	106.84	1,176.99	-2.55	1.13	14,444,977.64	1,698,593.08	39.77529361	-80.79294207
1,272.00	0.62	111.15	1,271.99	-2.81	1.85	14,444,977.38	1,698,593.81	39.77529289	-80.79293949
1,366.00	0.70	123.99	1,365.98	-3.32	2.80	14,444,976.88	1,698,594.76	39.77529150	-80.79293611
1,460.00	0.70	129.43	1,459.98	-4.00	3.72	14,444,976.19	1,698,595.68	39.77528961	-80.79293284
1,507.00	0.22	156.77	1,506.97	-4.27	3.98	14,444,975.93	1,698,595.94	39.77528888	-80.79293193
1,554.00	0.62	279.55	1,553.97	-4.31	3.76	14,444,975.89	1,698,595.72	39.77528877	-80.79293269
1,601.00	1.32	299.94	1,600.97	-4.00	3.04	14,444,976.20	1,698,595.00	39.77528963	-80.79293525
1,649.00	2.59	301.70	1,648.94	-3.15	1.64	14,444,977.05	1,698,593.60	39.77529197	-80.79294024
1,696.00	3.91	308.38	1,695.86	-1.60	-0.52	14,444,978.60	1,698,591.44	39.77529624	-80.79294791
1,743.00	4.88	306.89	1,742.72	0.60	-3.37	14,444,980.79	1,698,588.58	39.77530229	-80.79295805
1,790.00	6.20	310.14	1,789.50	3.43	-6.91	14,444,983.63	1,698,585.04	39.77531010	-80.79297063
1,838.00	7.91	309.87	1,837.14	7.22	-11.43	14,444,987.42	1,698,580.53	39.77532053	-80.79298667
1,885.00	8.70	310.93	1,883.64	11.62	-16.60	14,444,991.82	1,698,575.36	39.77533266	-80.79300503
1,931.00	9.19	308.91	1,929.08	16.21	-22.08	14,444,996.41	1,698,569.87	39.77534529	-80.79302452
1,978.00	10.19	305.48	1,975.41	20.98	-28.39	14,445,001.18	1,698,563.57	39.77535843	-80.79304692
2,024.00	11.78	306.09	2,020.57	26.11	-35.50	14,445,006.31	1,698,556.46	39.77537256	-80.79307218
2,071.00	13.00	304.78	2,066.47	31.95	-43.72	14,445,012.15	1,698,548.24	39.77538865	-80.79310139
2,118.00	14.68	304.07	2,112.11	38.30	-52.99	14,445,018.50	1,698,538.96	39.77540616	-80.79313435
2,165.00	15.69	301.00	2,157.47	44.91	-63.37	14,445,025.11	1,698,528.58	39.77542437	-80.79317124
2,213.00	16.39	297.31	2,203.60	51.36	-74.96	14,445,031.56	1,698,517.00	39.77544216	-80.79321241
2,260.00	17.18	295.90	2,248.60	57.44	-87.09	14,445,037.63	1,698,504.87	39.77545892	-80.79325555
2,307.00	18.11	296.08	2,293.38	63.68	-99.90	14,445,043.88	1,698,492.06	39.77547615	-80.79330107
2,354.00	18.68	296.16	2,337.98	70.21	-113.21	14,445,050.41	1,698,478.74	39.77549416	-80.79334842
2,401.00	18.98	296.08	2,382.47	76.89	-126.84	14,445,057.09	1,698,465.12	39.77551259	-80.79339684
2,448.00	18.50	295.37	2,426.98	83.44	-140.44	14,445,063.64	1,698,451.52	39.77553068	-80.79344520
2,495.00	18.68	295.37	2,471.52	89.86	-153.98	14,445,070.06	1,698,437.98	39.77554840	-80.79349333
2,542.00	19.51	295.37	2,515.94	96.45	-167.87	14,445,076.65	1,698,424.09	39.77556658	-80.79354272
2,588.00	20.39	296.70	2,559.18	103.34	-181.97	14,445,083.54	1,698,409.99	39.77558559	-80.79359285
2,635.00	20.39	295.64	2,603.23	110.56	-196.66	14,445,090.76	1,698,395.29	39.77560552	-80.79364509
2,682.00	21.00	295.37	2,647.20	117.72	-211.66	14,445,097.91	1,698,380.30	39.77562525	-80.79369839
2,729.00	20.70	295.37	2,691.12	124.88	-226.77	14,445,105.08	1,698,365.19	39.77564503	-80.79375213
2,776.00	21.09	298.71	2,735.03	132.50	-241.69	14,445,112.70	1,698,350.27	39.77566606	-80.79380518
2,809.00	21.58	300.03	2,765.77	138.39	-252.15	14,445,118.59	1,698,339.80	39.77568230	-80.79384236
2,879.00	23.25	301.35	2,830.48	152.02	-275.10	14,445,132.22	1,698,316.86	39.77571988	-80.79392392
2,973.00	24.35	294.36	2,916.50	169.67	-308.61	14,445,149.87	1,698,283.35	39.77576856	-80.79404302
3,066.00	25.22	287.81	3,000.95	183.65	-344.94	14,445,163.84	1,698,247.02	39.77581706	-80.79417224
3,161.00	25.58	289.13	3,086.77	196.56	-383.59	14,445,176.76	1,698,208.37	39.77586536	-80.79430968
3,255.00	24.26	291.68	3,172.02	210.34	-420.71	14,445,190.54	1,698,171.25	39.77591382	-80.79444168
3,350.00	24.57	292.65	3,258.52	225.16	-457.07	14,445,205.36	1,698,134.89	39.77596232	-80.79457099
3,444.00	24.92	295.02	3,343.89	241.06	-493.06	14,445,221.26	1,698,098.90	39.77599577	-80.79469892
3,538.00	24.96	294.67	3,429.13	257.71	-529.02	14,445,237.91	1,698,062.94	39.77602917	-80.79482680
3,632.00	24.70	293.35	3,514.44	273.78	-565.08	14,445,253.98	1,698,026.88	39.77606257	-80.79495500
3,726.00	24.26	296.60	3,599.99	290.21	-600.38	14,445,270.41	1,697,991.58	39.77610142	-80.79508050
3,820.00	24.61	296.87	3,685.57	307.70	-635.11	14,445,287.90	1,697,956.85	39.77614968	-80.79520396
3,914.00	24.48	294.58	3,771.08	324.65	-670.28	14,445,304.85	1,697,921.68	39.77619644	-80.79532900
4,008.00	24.83	292.82	3,856.51	340.41	-706.18	14,445,320.60	1,697,885.78	39.77623994	-80.79545666
4,102.00	24.30	295.20	3,942.01	356.30	-741.87	14,445,336.49	1,697,850.09	39.77628380	-80.79558356

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Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Whistlepig N-04HM (slot C)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1368+32.5 @ 1400.50ft (Nabors X-14)
Site:	Whistlepig	MD Reference:	RKB=1368+32.5 @ 1400.50ft (Nabors X-14)
Well:	Whistlepig N-04HM (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Dec2220_v16

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
4,194.00	24.04	296.43	4,025.94	372.70	-775.78	14,445,352.89	1,697,816.18	39.77632905	-80.79570412
4,288.00	24.08	296.08	4,111.77	389.65	-810.15	14,445,369.85	1,697,781.81	39.77637583	-80.79582631
4,382.00	23.86	295.46	4,197.67	406.25	-844.54	14,445,386.45	1,697,747.42	39.77642164	-80.79594857
4,477.00	24.74	296.43	4,284.25	423.36	-879.69	14,445,403.56	1,697,712.27	39.77646884	-80.79607354
4,571.00	24.13	295.37	4,369.83	440.35	-914.67	14,445,420.55	1,697,677.29	39.77651571	-80.79619788
4,665.00	24.74	295.11	4,455.41	456.93	-949.84	14,445,437.13	1,697,642.12	39.77656147	-80.79632293
4,760.00	24.61	295.20	4,541.74	473.79	-985.74	14,445,453.98	1,697,606.22	39.77660799	-80.79645056
4,853.00	23.64	296.34	4,626.61	490.31	-1,019.97	14,445,470.50	1,697,571.99	39.77665356	-80.79657227
4,948.00	23.60	296.16	4,713.65	507.14	-1,054.11	14,445,487.34	1,697,537.85	39.77670001	-80.79669364
5,042.00	24.70	295.20	4,799.43	523.80	-1,088.77	14,445,504.00	1,697,503.19	39.77674598	-80.79681687
5,136.00	24.96	297.39	4,884.74	541.29	-1,124.15	14,445,521.48	1,697,467.81	39.77679422	-80.79694265
5,231.00	25.14	296.95	4,970.80	559.65	-1,159.93	14,445,539.85	1,697,432.03	39.77684488	-80.79706987
5,325.00	25.36	295.11	5,055.82	577.24	-1,195.96	14,445,557.44	1,697,396.00	39.77689342	-80.79719796
5,420.00	24.39	293.70	5,142.01	593.76	-1,232.35	14,445,573.96	1,697,359.62	39.77693901	-80.79732732
5,514.00	24.79	295.11	5,227.48	609.93	-1,267.96	14,445,590.12	1,697,324.00	39.77698362	-80.79745396
5,608.00	25.40	297.04	5,312.61	627.45	-1,303.76	14,445,607.65	1,697,288.20	39.77703198	-80.79758124
5,702.00	24.92	296.87	5,397.69	645.57	-1,339.39	14,445,625.77	1,697,252.58	39.77708195	-80.79770788
5,797.00	24.39	296.08	5,484.03	663.24	-1,374.86	14,445,643.44	1,697,217.10	39.77713070	-80.79783399
5,891.00	24.92	296.43	5,569.46	680.59	-1,410.02	14,445,660.78	1,697,181.94	39.77717856	-80.79795901
5,986.00	24.87	295.81	5,655.64	698.19	-1,445.93	14,445,678.39	1,697,146.03	39.77722713	-80.79808667
6,080.00	24.87	295.20	5,740.92	715.22	-1,481.61	14,445,695.41	1,697,110.35	39.77727410	-80.79821352
6,174.00	24.68	295.02	5,826.27	731.93	-1,517.28	14,445,712.13	1,697,074.68	39.77732023	-80.79834034
6,268.00	24.83	295.11	5,911.63	748.61	-1,552.93	14,445,728.80	1,697,039.03	39.77736624	-80.79846711
6,332.00	23.95	295.20	5,969.92	759.84	-1,576.85	14,445,746.04	1,697,015.11	39.77739724	-80.79855217
6,379.00	22.95	293.88	6,013.04	767.61	-1,593.86	14,445,747.81	1,696,998.10	39.77741869	-80.79861265
6,426.00	24.75	294.40	6,056.02	775.39	-1,611.21	14,445,755.58	1,696,980.76	39.77744015	-80.79867430
6,473.00	26.02	294.76	6,098.48	783.77	-1,629.53	14,445,763.97	1,696,962.43	39.77746328	-80.79873945
6,520.00	25.98	294.23	6,140.72	792.31	-1,648.28	14,445,772.51	1,696,943.69	39.77748685	-80.79880611
6,568.00	26.29	293.88	6,183.82	800.93	-1,667.58	14,445,781.13	1,696,924.38	39.77751064	-80.79887476
6,615.00	30.11	297.13	6,225.23	810.52	-1,687.60	14,445,790.72	1,696,904.36	39.77753711	-80.79894593
6,662.00	33.45	300.29	6,265.18	822.44	-1,709.29	14,445,802.63	1,696,882.68	39.77756996	-80.79902302
6,709.00	37.01	302.58	6,303.57	836.59	-1,732.40	14,445,816.79	1,696,859.56	39.77760898	-80.79910517
6,756.00	40.57	304.78	6,340.20	852.93	-1,756.88	14,445,833.13	1,696,835.08	39.77765401	-80.79919218
6,803.00	44.40	305.92	6,374.86	871.30	-1,782.76	14,445,851.50	1,696,809.20	39.77770462	-80.79928414
6,850.00	48.79	307.24	6,407.14	891.66	-1,810.16	14,445,871.86	1,696,781.80	39.77776069	-80.79938152
6,897.00	53.01	308.03	6,436.78	913.93	-1,839.04	14,445,894.13	1,696,752.92	39.77782204	-80.79948411
6,944.00	57.05	309.43	6,463.71	938.03	-1,869.07	14,445,918.23	1,696,722.89	39.77788840	-80.79959080
6,991.00	60.70	310.93	6,488.00	963.99	-1,899.79	14,445,944.19	1,696,692.17	39.77795989	-80.79969995
7,038.00	64.00	312.86	6,509.81	991.80	-1,930.77	14,445,971.99	1,696,661.19	39.77803643	-80.79980999
7,085.00	67.74	314.18	6,529.03	1,021.33	-1,961.86	14,446,001.53	1,696,630.10	39.77811774	-80.79992042
7,132.00	70.73	314.97	6,545.69	1,052.17	-1,993.16	14,446,032.37	1,696,598.80	39.77820263	-80.80003157
7,179.00	73.49	315.50	6,560.12	1,083.93	-2,024.65	14,446,064.12	1,696,567.31	39.77829003	-80.80014341
7,226.00	76.04	316.64	6,572.47	1,116.59	-2,056.11	14,446,096.78	1,696,535.85	39.77837991	-80.80025511
7,273.00	78.90	317.08	6,582.67	1,150.06	-2,087.48	14,446,130.26	1,696,504.48	39.77847204	-80.80036650
7,321.00	82.68	317.96	6,590.35	1,185.00	-2,119.47	14,446,165.20	1,696,472.49	39.77856818	-80.80048008
7,368.00	85.05	318.31	6,595.37	1,219.80	-2,150.65	14,446,200.00	1,696,441.31	39.77866994	-80.80059080
7,416.00	86.73	318.66	6,598.81	1,255.65	-2,182.39	14,446,235.84	1,696,409.58	39.77877623	-80.80070346
7,463.00	90.42	318.49	6,599.98	1,290.87	-2,213.47	14,446,271.07	1,696,378.49	39.77888591	-80.80081381
7,510.00	91.08	317.87	6,599.37	1,325.90	-2,244.80	14,446,306.09	1,696,347.16	39.77899579	-80.80092507
7,603.00	91.91	318.05	6,596.94	1,394.94	-2,307.06	14,446,375.14	1,696,284.90	39.77911481	-80.80114611
7,696.00	91.52	317.78	6,594.16	1,463.93	-2,369.36	14,446,444.12	1,696,222.60	39.77923572	-80.80136732
7,791.00	90.55	316.73	6,592.44	1,533.68	-2,433.83	14,446,513.88	1,696,158.13	39.77935268	-80.80159623
7,886.00	89.80	316.38	6,592.15	1,602.65	-2,499.16	14,446,582.85	1,696,092.80	39.77947149	-80.80182821
7,980.00	89.80	315.85	6,592.48	1,670.40	-2,564.32	14,446,650.60	1,696,027.64	39.77959394	-80.80205961
8,075.00	89.05	316.38	6,593.43	1,738.87	-2,630.17	14,446,719.06	1,695,961.79	39.78009237	-80.80229346

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Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Whistlepig N-04HM (slot C)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1368+32.5 @ 1400.50ft (Nabors X-14)
Site:	Whistlepig	MD Reference:	RKB=1368+32.5 @ 1400.50ft (Nabors X-14)
Well:	Whistlepig N-04HM (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Dec2220_v16

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
8,169.00	89.36	316.20	6,594.74	1,806.81	-2,695.12	14,446,787.00	1,695,896.84	39.78027935	-80.80252410
8,263.00	89.93	316.20	6,595.32	1,874.65	-2,760.18	14,446,854.85	1,695,831.78	39.78046606	-80.80275514
8,358.00	90.55	315.85	6,594.92	1,943.02	-2,826.14	14,446,923.21	1,695,765.82	39.78065421	-80.80298939
8,453.00	91.12	315.50	6,593.54	2,010.97	-2,892.51	14,446,991.17	1,695,699.45	39.78084123	-80.80322510
8,548.00	90.20	317.26	6,592.44	2,079.74	-2,958.04	14,447,059.93	1,695,633.92	39.78103047	-80.80345781
8,642.00	90.86	317.78	6,591.57	2,149.06	-3,021.52	14,447,129.25	1,695,570.44	39.78122123	-80.80368321
8,736.00	89.93	318.05	6,590.92	2,218.82	-3,084.52	14,447,199.01	1,695,507.44	39.78141319	-80.80390691
8,830.00	90.11	317.87	6,590.89	2,288.63	-3,147.47	14,447,268.83	1,695,444.50	39.78160529	-80.80413042
8,924.00	90.29	317.61	6,590.56	2,358.20	-3,210.68	14,447,338.39	1,695,381.28	39.78179673	-80.80435489
9,018.00	90.77	317.52	6,589.69	2,427.57	-3,274.11	14,447,407.77	1,695,317.86	39.78198762	-80.80458010
9,113.00	90.99	316.73	6,588.24	2,497.18	-3,338.74	14,447,477.38	1,695,253.23	39.78217918	-80.80480961
9,207.00	90.11	317.43	6,587.33	2,566.02	-3,402.74	14,447,546.21	1,695,189.22	39.78236860	-80.80503691
9,301.00	90.59	317.34	6,586.76	2,635.19	-3,466.39	14,447,615.39	1,695,125.58	39.78255895	-80.80526291
9,395.00	91.08	316.29	6,585.39	2,703.72	-3,530.71	14,447,683.92	1,695,061.26	39.78274754	-80.80549133
9,489.00	89.41	315.94	6,584.99	2,771.47	-3,595.87	14,447,751.66	1,694,996.10	39.78293398	-80.80572274
9,584.00	89.80	315.94	6,585.64	2,839.74	-3,661.93	14,447,819.93	1,694,930.04	39.78312185	-80.80595737
9,677.00	90.24	315.85	6,585.61	2,906.52	-3,726.65	14,447,886.71	1,694,865.31	39.78330563	-80.80618724
9,771.00	90.59	317.78	6,584.93	2,975.05	-3,790.98	14,447,955.24	1,694,800.99	39.78349423	-80.80641568
9,865.00	91.47	318.14	6,583.24	3,044.85	-3,853.92	14,448,025.04	1,694,738.05	39.78368629	-80.80666391
9,960.00	91.25	317.61	6,580.98	3,115.29	-3,917.62	14,448,095.48	1,694,674.35	39.78388012	-80.80686538
10,054.00	90.64	317.96	6,579.43	3,184.90	-3,980.77	14,448,165.09	1,694,611.20	39.78407166	-80.80708964
10,148.00	91.25	317.96	6,577.88	3,254.70	-4,043.71	14,448,234.89	1,694,548.26	39.78426372	-80.80731313
10,242.00	91.82	317.78	6,575.37	3,324.39	-4,106.74	14,448,304.58	1,694,485.22	39.78445548	-80.80753697
10,336.00	90.95	317.96	6,573.09	3,394.08	-4,169.78	14,448,374.27	1,694,422.19	39.78464724	-80.80776083
10,430.00	89.67	317.34	6,572.58	3,463.55	-4,233.10	14,448,443.74	1,694,358.87	39.78483839	-80.80798570
10,524.00	90.24	317.70	6,572.66	3,532.87	-4,296.58	14,448,513.06	1,694,295.39	39.78502915	-80.80821114
10,619.00	91.08	319.01	6,571.56	3,603.86	-4,359.70	14,448,584.05	1,694,232.26	39.78522447	-80.80843529
10,713.00	91.08	317.34	6,569.79	3,673.89	-4,422.38	14,448,654.08	1,694,169.59	39.78541716	-80.80865784
10,807.00	90.59	317.43	6,568.42	3,743.06	-4,486.01	14,448,723.25	1,694,105.95	39.78560749	-80.80888384
10,901.00	90.86	317.61	6,567.23	3,812.38	-4,549.49	14,448,792.57	1,694,042.48	39.78579824	-80.80910927
10,995.00	89.63	317.43	6,566.83	3,881.70	-4,612.97	14,448,861.89	1,693,979.00	39.78598899	-80.80933471
11,088.00	90.20	317.87	6,566.97	3,950.43	-4,676.62	14,448,930.62	1,693,916.35	39.78617811	-80.80955720
11,182.00	89.27	316.38	6,567.40	4,019.32	-4,739.57	14,448,999.51	1,693,852.40	39.78636766	-80.80978433
11,276.00	89.49	316.47	6,568.42	4,087.41	-4,804.36	14,449,067.60	1,693,787.60	39.78655505	-80.81001445
11,371.00	91.03	316.73	6,567.99	4,156.44	-4,869.63	14,449,136.63	1,693,722.33	39.78674498	-80.81024628
11,465.00	90.42	316.90	6,566.80	4,224.97	-4,933.96	14,449,205.16	1,693,658.01	39.78693357	-80.81047474
11,559.00	92.04	316.73	6,564.78	4,293.49	-4,998.27	14,449,273.68	1,693,593.70	39.78712212	-80.81070315
11,653.00	92.66	317.08	6,560.93	4,362.07	-5,062.44	14,449,342.26	1,693,529.53	39.78731084	-80.81093106
11,749.00	91.52	316.64	6,557.43	4,432.08	-5,128.04	14,449,412.27	1,693,463.93	39.78750346	-80.81116404
11,841.00	89.49	316.47	6,556.62	4,498.86	-5,191.29	14,449,479.05	1,693,400.67	39.78768725	-80.81138873
11,936.00	89.54	316.64	6,557.42	4,567.84	-5,256.62	14,449,548.02	1,693,335.35	39.78787704	-80.81162075
12,029.00	89.98	316.47	6,557.81	4,635.36	-5,320.57	14,449,615.55	1,693,271.40	39.78806284	-80.81184790
12,123.00	90.90	316.73	6,557.09	4,703.65	-5,385.15	14,449,683.84	1,693,206.81	39.78825077	-80.81207729
12,217.00	89.27	315.59	6,556.95	4,771.45	-5,450.26	14,449,751.64	1,693,142.17	39.78843733	-80.81230855
12,311.00	89.41	315.50	6,558.03	4,838.54	-5,516.09	14,449,818.73	1,693,075.88	39.78862197	-80.81254238
12,405.00	89.58	315.50	6,558.86	4,905.58	-5,581.97	14,449,885.77	1,693,009.80	39.78880646	-80.81277641
12,498.00	89.98	316.11	6,559.22	4,972.26	-5,646.80	14,449,952.45	1,692,945.17	39.78898995	-80.81300670
12,592.00	90.42	316.11	6,558.89	5,040.00	-5,711.97	14,450,020.19	1,692,880.00	39.78917636	-80.81323818
12,686.00	91.08	317.08	6,557.66	5,108.29	-5,776.55	14,450,088.48	1,692,815.00	39.78936426	-80.81346759
12,781.00	90.55	317.17	6,556.31	5,177.90	-5,841.19	14,450,158.09	1,692,750.00	39.78955581	-80.81369715
12,875.00	90.99	317.52	6,555.04	5,247.03	-5,904.87	14,450,227.21	1,692,687.10	39.78974601	-80.81392335
12,969.00	89.23	317.08	6,554.86	5,316.11	-5,968.62	14,450,296.29	1,692,623.35	39.78993608	-80.81414976
13,064.00	90.07	316.99	6,555.44	5,385.62	-6,033.36	14,450,365.81	1,692,558.61	39.79012736	-80.81437973
13,158.00	88.70	317.08	6,556.45	5,454.40	-6,097.42	14,450,434.59	1,692,494.55	39.79031662	-80.81460728
13,252.00	88.79	316.99	6,558.51	5,523.17	-6,161.47	14,450,503.36	1,692,430.50	39.79050584	-80.81483478

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Whistlepig N-04HM (slot C)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1368+32.5 @ 1400.50ft (Nabors X-14)
Site:	Whistlepig	MD Reference:	RKB=1368+32.5 @ 1400.50ft (Nabors X-14)
Well:	Whistlepig N-04HM (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Dec2220_v16

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
13,346.00	90.07	318.57	6,559.45	5,592.78	-6,224.63	14,450,572.97	1,692,367.34	39.79069736	-80.81505911
13,440.00	91.38	319.10	6,558.26	5,663.54	-6,286.50	14,450,643.72	1,692,305.47	39.79089203	-80.81527883
13,534.00	91.87	318.66	6,555.59	5,734.32	-6,348.29	14,450,714.51	1,692,243.68	39.79108677	-80.81549829
13,628.00	91.69	318.05	6,552.67	5,804.53	-6,410.73	14,450,784.72	1,692,181.24	39.79127994	-80.81572004
13,722.00	90.37	318.31	6,550.98	5,874.57	-6,473.39	14,450,854.76	1,692,118.58	39.79147264	-80.81594261
13,816.00	89.98	317.96	6,550.70	5,944.57	-6,536.13	14,450,924.76	1,692,055.84	39.79166524	-80.81616543
13,910.00	90.11	317.61	6,550.62	6,014.19	-6,599.29	14,450,994.38	1,691,992.68	39.79185679	-80.81638977
14,005.00	90.24	317.87	6,550.33	6,084.50	-6,663.17	14,451,064.69	1,691,928.80	39.79205024	-80.81661669
14,099.00	90.86	317.08	6,549.43	6,153.77	-6,726.70	14,451,133.96	1,691,865.27	39.79224084	-80.81684236
14,193.00	91.08	317.34	6,547.84	6,222.75	-6,790.55	14,451,202.93	1,691,801.42	39.79243061	-80.81706915
14,287.00	89.89	317.08	6,547.04	6,291.72	-6,854.40	14,451,271.91	1,691,737.57	39.79262040	-80.81729596
14,381.00	90.02	316.73	6,547.12	6,360.36	-6,918.62	14,451,340.55	1,691,673.35	39.79280927	-80.81752409
14,476.00	89.67	316.99	6,547.37	6,429.68	-6,983.58	14,451,409.87	1,691,608.39	39.79300000	-80.81775484
14,570.00	89.54	317.17	6,548.02	6,498.52	-7,047.59	14,451,478.70	1,691,544.38	39.79318940	-80.81798222
14,665.00	89.98	317.34	6,548.42	6,568.28	-7,112.07	14,451,548.47	1,691,479.90	39.79338135	-80.81821127
14,759.00	89.89	316.73	6,548.53	6,637.07	-7,176.14	14,451,617.26	1,691,415.83	39.79357062	-80.81843884
14,854.00	91.78	316.47	6,547.14	6,706.08	-7,241.40	14,451,686.27	1,691,350.57	39.79376051	-80.81867069
14,949.00	91.65	316.03	6,544.30	6,774.68	-7,307.07	14,451,754.86	1,691,284.91	39.79394925	-80.81890396
15,044.00	90.42	315.50	6,542.58	6,842.73	-7,373.33	14,451,822.92	1,691,218.65	39.79413651	-80.81913936
15,138.00	90.46	315.76	6,541.86	6,909.92	-7,439.06	14,451,890.11	1,691,152.92	39.79432141	-80.81937289
15,233.00	90.95	315.85	6,540.69	6,978.03	-7,505.28	14,451,958.22	1,691,086.70	39.79450882	-80.81960815
15,326.00	91.03	314.80	6,539.08	7,044.15	-7,570.65	14,452,024.34	1,691,021.32	39.79469077	-80.81984042
15,420.00	89.76	315.76	6,538.44	7,110.94	-7,636.79	14,452,091.13	1,690,955.18	39.79487455	-80.82007541
15,514.00	90.02	315.85	6,538.62	7,178.34	-7,702.32	14,452,158.52	1,690,889.65	39.79506000	-80.82030821
15,608.00	90.86	316.29	6,537.90	7,246.03	-7,767.53	14,452,226.22	1,690,824.44	39.79524627	-80.82053989
15,702.00	90.42	317.08	6,536.85	7,314.42	-7,832.01	14,452,294.60	1,690,759.96	39.79543443	-80.82076896
15,796.00	90.95	317.52	6,535.72	7,383.50	-7,895.75	14,452,363.68	1,690,696.22	39.79562449	-80.82099540
15,889.00	89.54	318.22	6,535.32	7,452.47	-7,958.14	14,452,432.65	1,690,633.84	39.79581424	-80.82121701
15,982.00	89.89	318.22	6,535.79	7,521.82	-8,020.10	14,452,502.00	1,690,571.87	39.79600503	-80.82143711
16,075.00	90.11	318.14	6,535.79	7,591.12	-8,082.11	14,452,571.31	1,690,509.86	39.79619571	-80.82165739
16,106.00	90.24	318.22	6,535.69	7,614.23	-8,102.78	14,452,594.41	1,690,489.19	39.79625926	-80.82173082
Survey @ 16106.00 MD 6535.69 TVD									
16,169.00	90.24	318.22	6,535.43	7,661.20	-8,144.76	14,452,641.39	1,690,447.22	39.79638851	-80.82187993
Survey Proj. to 16169.00 MD 6535.43 TVD									

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
178.00	178.00	-0.47	-0.27	MWD surveys
16,106.00	6,535.69	7,614.23	-8,102.78	Survey @:16106.00 MD 6535.69 TVD
16,169.00	6,535.43	7,661.20	-8,144.76	Survey Proj. to 16169.00 MD 6535.43 TVD

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 Environmental Protection