



**TUG HILL**  
OPERATING

**Tug Hill Operating LLC**  
Well: Greer 1N-08M  
Site: Greer Unit N  
Project: Marshall County, WV  
Design: rev3 def

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	V Sect	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	1403.00	0.00	0.00	1403.00	0.00	0.00	0.00	0.00	0.00	KOP Begin 2"/100' build
3	1553.00	3.00	125.00	1552.93	-2.25	3.22	2.00	125.00	-3.57	Begin 3.00' tangent
4	1803.41	3.00	125.00	1803.00	-9.77	13.95	0.00	0.00	-15.48	Begin 2"/100' drop
5	1965.60	5.50	154.50	1964.74	-19.22	20.78	2.00	56.52	-27.09	Begin vertical hold section
6	5419.76	5.50	154.50	5403.00	-318.04	163.30	0.00	0.00	-356.95	Begin 6"/100' build
7	5654.76	19.60	154.50	5631.81	-364.01	185.23	8.00	0.00	-407.70	Begin 10"/100' build/turn
8	6146.72	30.00	320.00	6106.07	-342.96	138.81	10.00	170.48	-366.06	Begin 10"/100' build
9	6446.72	60.00	320.00	6315.79	-182.31	4.01	10.00	0.00	-159.29	Begin 10"/100' build/turn
0	6788.13	91.00	335.00	6400.69	93.84	-168.28	10.00	27.46	166.08	Begin 91.00° lateral
1	7163.13	91.00	335.00	6394.14	433.66	-326.74	0.00	0.00	539.36	Begin 2"/100' turn
2	7414.20	91.00	329.98	6389.76	656.24	-442.66	2.00	-90.00	790.00	Begin 91.00° lateral section
3	15222.53	91.00	329.98	6254.00	7415.90	-4348.85	0.00	0.00	8596.98	PBHL/TD 15219.53 MD 6251.00 TVD

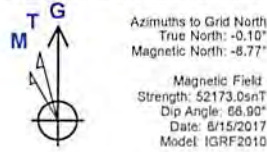
ANNOTATIONS

MD	Inc	Azi	TVD	+N/-S	+E/-W	V Sect	Annotation
159.00	0.99	119.88	158.98	-1.22	1.95	-2.04	MWD surveys
15149.00	91.30	325.24	6397.52	7346.68	-4350.24	8537.97	Survey @ 15149.00 MD 6397.52 TVD
15205.00	91.30	325.24	6396.25	7392.67	-4382.16	8593.79	Survey projected to 15205.00 MD 6396.25 TVD

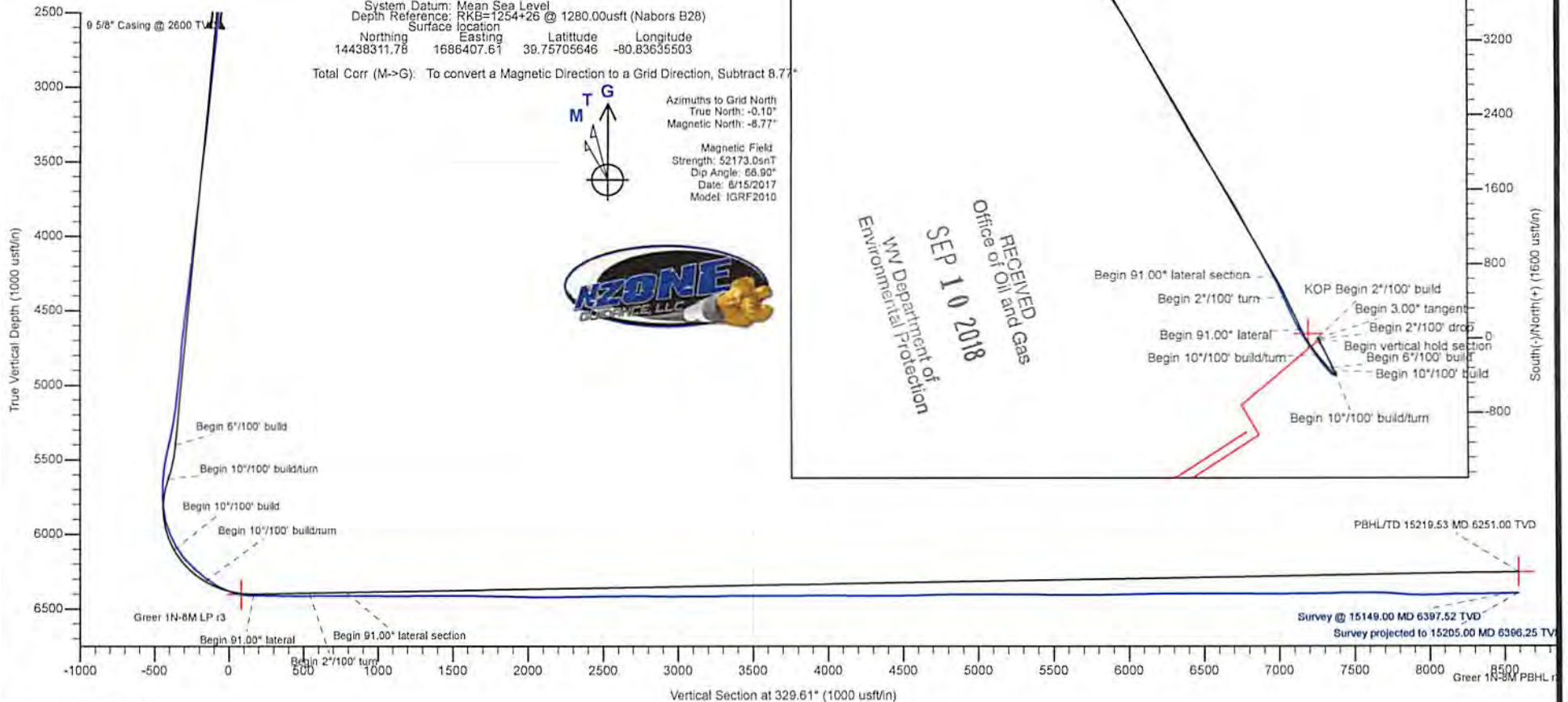
Geodetic System: Universal Transverse Mercator (US Survey Feet)  
Datum: NAD83 West Virginia - HARN  
Ellipsoid: GRS 1980  
Zone: Zone 17N (84 W to 78 W)

System Datum: Mean Sea Level  
Depth Reference: RKB=1254+26 @ 1280.00usft (Nabors B2B)  
Surface location  
Northing: 14438311.78  
Easting: 1686407.61  
Latitude: 39.75705646  
Longitude: -80.83635503

Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.77°



Azimuths to Grid North  
True North: -0.10°  
Magnetic North: -8.77°  
  
Magnetic Field  
Strength: 52173.0snT  
Dip Angle: 66.90°  
Date: 6/15/2017  
Model: IGRF2010



**Survey Report**

Service Company:	NZone Guidance, LLC	Location:	New Martinsville
Well:	Greer 1N-8HM	Rig:	Nabors B28
API or UWI:	047 051 01891	Job Number:	THO-17-019
State:	West Virginia	Operating Company:	Tug Hill Operating, LLC
County:	Marshall	Magnetic Declination:	0
Country:	USA	Proposed Azimuth:	329.61
Comment	Survey @ 15205' is a projection	North Reference:	GRID
		Latitude:	39.75706
		Longitude:	-80.8364

RECEIVED  
Office of Oil and Gas

SEP 10 2018

WV Department of  
Environmental Protection

**Tie-In Data**

MD	Inclination	Azimuth	TVD	NS	EW
	0	0	0	0	0

**Survey Data**

MD	Inclination	Azimuth	TVD	NS	EW	CA	CD	VS	DLS
100	1.29	122.74	99.99	-0.61	0.95	122.74	1.13	-1	1.29
200	0.78	116.54	199.97	-1.52	2.5	121.3	2.93	-2.58	0.52
300	0.23	73.01	299.97	-1.77	3.3	118.14	3.75	-3.2	0.63
400	0.21	3.57	399.97	-1.53	3.51	113.51	3.82	-3.09	0.25
500	0.12	298.81	499.97	-1.29	3.43	110.66	3.66	-2.85	0.19
600	0.2	302.2	599.97	-1.15	3.19	109.82	3.39	-2.6	0.08
700	0.07	283.7	699.97	-1.04	2.98	109.26	3.16	-2.41	0.14
800	0.23	319.87	799.97	-0.87	2.79	107.38	2.92	-2.17	0.18
900	0.15	301.41	899.97	-0.65	2.55	104.34	2.63	-1.85	0.1
1000	0.34	31.66	999.97	-0.33	2.59	97.27	2.62	-1.6	0.37
1100	1.36	76.23	1099.96	0.2	3.9	87.01	3.91	-1.8	1.14
1200	2.02	79.59	1199.91	0.8	6.79	83.24	6.84	-2.74	0.67
1300	1.8	85.42	1299.86	1.25	10.09	82.94	10.16	-4.03	0.29
1400	0.88	89.85	1399.83	1.38	12.42	83.68	12.5	-5.1	0.93
1500	0.96	140.23	1499.82	0.73	13.72	86.94	13.74	-6.31	0.79
1600	2.29	153.52	1599.77	-1.7	15.15	96.39	15.25	-9.13	1.37
1700	2.39	157.43	1699.69	-5.41	16.84	107.81	17.69	-13.19	0.19
1800	1.72	188.38	1799.63	-8.82	17.42	116.85	19.53	-16.42	1.27
1900	1.93	196.02	1899.58	-11.93	16.74	125.46	20.55	-18.76	0.32
2000	3.18	178.96	1999.48	-16.32	16.33	134.98	23.08	-22.33	1.45
2100	4.94	169.94	2099.22	-23.33	17.13	143.71	28.94	-28.79	1.87
2200	6.19	160.9	2198.75	-32.66	19.65	148.98	38.12	-38.11	1.52
2300	6.46	158.32	2298.14	-42.99	23.49	151.35	48.99	-48.96	0.39
2400	4.66	144.88	2397.67	-51.54	27.9	151.57	58.61	-58.57	2.21
2500	4.35	147.03	2497.37	-58.04	32.3	150.9	66.43	-66.41	0.35
2578	5.04	149.79	2575.1	-63.49	35.64	150.69	72.8	-72.79	0.93
2668	5.43	142.92	2664.73	-70.3	40.19	150.24	80.98	-80.97	0.82
2700	5.31	140.95	2696.59	-72.66	42.04	149.95	83.94	-83.94	0.69
2795	6.3	144.11	2791.1	-80.29	47.87	149.2	93.48	-93.48	1.09
2890	6.36	147.52	2885.52	-88.95	53.75	148.86	103.93	-103.92	0.4
2985	7	156.88	2979.88	-98.72	58.85	149.2	114.93	-114.92	1.33
3080	6.64	154	3074.21	-108.98	63.53	149.76	126.14	-126.14	0.52

SEP 10 2018

WV Department of  
Environmental Protection

3175	6.09	150.25	3168.62	-118.29	68.43	149.95	136.66	-136.66	0.73
3270	6.61	157.83	3263.04	-127.73	73	150.25	147.12	-147.11	1.04
3365	6.29	158.49	3357.44	-137.63	76.97	150.78	157.69	-157.66	0.35
3460	5.61	154.27	3451.93	-146.66	80.89	151.12	167.49	-167.43	0.85
3555	6.35	153.72	3546.41	-155.55	85.24	151.28	177.38	-177.3	0.78
3649	6.26	152.49	3639.84	-164.76	89.91	151.38	187.69	-187.6	0.17
3744	5.5	147.14	3734.34	-173.18	94.77	151.31	197.41	-197.32	0.99
3839	6.29	157.37	3828.84	-181.81	99.24	151.37	207.13	-207.03	1.38
3934	6.94	157.89	3923.21	-191.93	103.4	151.69	218.01	-217.87	0.69
4028	6.33	153.25	4016.58	-201.82	107.87	151.87	228.84	-228.66	0.86
4123	7.16	157.71	4110.92	-211.97	112.48	152.05	239.96	-239.75	1.03
4217	6.81	155.22	4204.22	-222.45	117.03	152.25	251.36	-251.09	0.49
4312	6.2	151.76	4298.61	-232.08	121.82	152.3	262.11	-261.82	0.76
4406	5.94	147.69	4392.08	-240.67	126.82	152.21	272.04	-271.76	0.53
4500	6.62	153.45	4485.52	-249.62	131.85	152.16	282.3	-282.03	0.99
4594	7.49	150.33	4578.81	-259.8	137.3	152.14	293.85	-293.56	1.01
4688	6.84	155.92	4672.07	-270.23	142.62	152.18	305.55	-305.25	1.01
4783	5.27	170.28	4766.55	-279.7	145.66	152.49	315.35	-314.95	2.28
4877	5.08	179.14	4860.17	-288.11	146.45	153.05	323.2	-322.61	0.87
4972	5.94	162.81	4954.73	-297.01	147.97	153.52	331.83	-331.06	1.87
5067	6.8	155.56	5049.15	-306.83	151.75	153.68	342.31	-341.44	1.24
5161	7.16	152.3	5142.45	-317.08	156.78	153.69	353.72	-352.83	0.57
5265	10	143.19	5245.28	-330.06	165.2	153.41	369.09	-368.28	3.02
5352	11.97	142.98	5330.68	-343.31	175.16	152.97	385.41	-384.75	2.26
5446	13.51	145.05	5422.36	-360.09	187.32	152.52	405.9	-405.38	1.71
5471	14.33	145.85	5446.63	-365.05	190.73	152.41	411.87	-411.37	3.37
5564	8.97	160.44	5537.7	-381.42	199.63	152.37	430.5	-430	6.53
5660	4.18	199.46	5633.08	-391.78	200.97	152.84	440.32	-439.61	6.56
5755	4.04	220.21	5727.84	-397.6	197.65	153.57	444.02	-442.96	1.56
5849	14.02	261.69	5820.63	-401.79	184.2	155.37	442	-439.77	12.03
5945	17.71	306.25	5913.28	-394.81	160.83	157.84	426.31	-421.92	12.9
6039	21.19	324.27	6001.98	-372.53	139.35	159.49	397.75	-391.85	7.34
6135	31.52	316.89	6087.91	-340.03	111.99	161.77	358	-349.97	11.27
6228	40.92	319.61	6162.86	-298.99	75.56	165.82	308.39	-296.14	10.25
6323	47.74	322.95	6230.79	-247.17	34.16	172.13	249.52	-230.49	7.59
6419	53	324.4	6292	-187.6	-9.59	182.93	187.85	-156.98	5.6
6513	59.87	326.55	6343.94	-123.08	-53.9	203.65	134.37	-78.9	7.55
6576	66.11	326.64	6372.54	-76.25	-84.79	228.04	114.03	-22.88	9.91
6671	78.64	327.35	6401.25	-0.46	-133.99	269.8	133.99	67.39	13.21
6766	89.8	330.69	6410.8	80.45	-182.54	293.78	199.48	161.74	12.26
6861	88.57	334.9	6412.15	164.91	-225.95	306.12	279.73	256.56	4.62
6956	89.1	334.64	6414.09	250.83	-266.44	313.27	365.93	351.15	0.62
7050	90.64	335.34	6414.3	336.01	-306.18	317.66	454.59	444.73	1.8
7145	89.63	335.34	6414.08	422.34	-345.82	320.69	545.86	539.26	1.06
7240	91.16	336.4	6413.42	509.04	-384.65	322.92	638.02	633.68	1.96
7333	90.46	334.11	6412.11	593.48	-423.57	324.48	729.13	726.22	2.57
7428	89.58	332.18	6412.07	678.23	-466.48	325.48	823.17	821.03	2.23

SEP 10 2018

WV Department of  
Environmental Protection

7523	90.2	331.56	6412.25	762.01	-511.27	326.14	917.64	915.96	0.92
7617	88.79	331.13	6413.08	844.49	-556.35	326.62	1011.28	1009.91	1.57
7712	89.63	330.86	6414.39	927.57	-602.41	327	1106.02	1104.87	0.93
7807	91.21	330.86	6413.7	1010.54	-648.66	327.3	1200.81	1199.84	1.66
7901	90.68	331.04	6412.15	1092.7	-694.3	327.57	1294.62	1293.8	0.6
7995	89.54	331.13	6411.97	1174.98	-739.75	327.81	1388.46	1387.77	1.22
8090	90.51	331.39	6411.92	1258.28	-785.43	328.03	1483.29	1482.73	1.06
8184	89.23	331.56	6412.14	1340.87	-830.32	328.23	1577.13	1576.68	1.37
8279	89.67	329.19	6413.05	1423.44	-877.27	328.35	1672.06	1671.66	2.54
8374	88.04	328.84	6414.95	1504.86	-926.17	328.39	1767.03	1766.63	1.75
8468	89.49	328.31	6416.97	1585.05	-975.16	328.4	1861	1860.59	1.64
8562	88.09	329.89	6418.96	1665.69	-1023.42	328.43	1954.97	1954.56	2.25
8656	88.79	329.02	6421.52	1746.61	-1071.18	328.48	2048.92	2048.52	1.19
8751	91.43	330.33	6421.34	1828.61	-1119.14	328.53	2143.89	2143.51	3.1
8846	90.02	328.22	6420.13	1910.26	-1167.67	328.56	2238.87	2238.49	2.67
8941	91.21	327.26	6419.11	1990.59	-1218.37	328.53	2333.85	2333.44	1.61
9036	90.51	328.93	6417.69	2071.22	-1268.57	328.51	2428.83	2428.39	1.91
9130	91.96	328.93	6415.66	2151.71	-1317.07	328.53	2522.81	2522.36	1.54
9223	90.55	329.98	6413.63	2231.79	-1364.32	328.56	2615.77	2615.33	1.89
9318	88.62	330.51	6414.31	2314.26	-1411.47	328.62	2710.72	2710.32	2.11
9413	89.93	330.51	6415.52	2396.94	-1458.23	328.68	2805.66	2805.3	1.38
9508	88.92	330.42	6416.47	2479.59	-1505.05	328.74	2900.61	2900.28	1.07
9602	90.33	330.42	6417.08	2561.33	-1551.45	328.8	2994.57	2994.27	1.5
9697	91.38	329.89	6415.67	2643.72	-1598.73	328.84	3089.53	3089.25	1.24
9791	89.93	331.04	6414.59	2725.5	-1645.06	328.89	3183.48	3183.23	1.97
9886	90.68	330.95	6414.09	2808.58	-1691.12	328.95	3278.42	3278.2	0.8
9981	91.87	330.51	6411.97	2891.43	-1737.56	329	3373.35	3373.16	1.34
10075	90.42	330.95	6410.09	2973.41	-1783.5	329.04	3467.29	3467.12	1.61
10170	89.45	331.04	6410.2	3056.5	-1829.57	329.1	3562.23	3562.09	1.03
10265	90.64	331.21	6410.13	3139.68	-1875.44	329.15	3657.17	3657.05	1.27
10358	89.23	330.16	6410.23	3220.77	-1920.98	329.19	3750.13	3750.03	1.89
10454	89.93	329.89	6410.94	3303.93	-1968.94	329.21	3846.12	3846.03	0.78
10548	91.38	330.25	6409.86	3385.38	-2015.83	329.23	3940.1	3940.01	1.59
10644	88.53	327.7	6409.94	3467.63	-2065.3	329.22	4036.08	4035.99	3.98
10738	88.92	326.47	6412.03	3546.52	-2116.37	329.17	4129.99	4129.87	1.37
10832	90.9	328.22	6412.18	3625.66	-2167.09	329.13	4223.94	4223.79	2.81
10927	89.98	329.1	6411.45	3706.79	-2216.49	329.12	4318.93	4318.77	1.34
11021	89.32	328.93	6412.02	3787.38	-2264.88	329.12	4412.93	4412.77	0.73
11116	90.59	328.75	6412.1	3868.67	-2314.04	329.11	4507.93	4507.76	1.35
11211	92.26	328.31	6409.73	3949.67	-2363.62	329.1	4602.89	4602.71	1.82
11306	91.69	330.6	6406.46	4031.43	-2411.87	329.11	4697.82	4697.64	2.48
11401	91.12	331.13	6404.13	4114.39	-2458.1	329.14	4792.75	4792.59	0.82
11495	90.33	331.3	6402.94	4196.76	-2503.36	329.18	4886.68	4886.55	0.86
11590	89.05	331.56	6403.45	4280.19	-2548.79	329.23	4981.61	4981.49	1.37
11685	90.29	332	6404	4363.9	-2593.71	329.27	5076.51	5076.42	1.38
11780	90.02	332	6403.74	4447.78	-2638.31	329.32	5171.4	5171.34	0.28
11875	91.03	333.5	6402.87	4532.23	-2681.81	329.39	5266.23	5266.19	1.9

11970	88.79	332.53	6403.02	4616.88	-2724.91	329.45	5361.03	5361.01	2.57
12065	88.13	328.84	6405.58	4699.67	-2771.4	329.47	5455.96	5455.95	3.94
12159	89.14	328.66	6407.82	4780	-2820.15	329.46	5549.93	5549.91	1.09
12254	90.68	327.26	6407.97	4860.53	-2870.54	329.43	5644.89	5644.86	2.19
12348	90.07	329.12	6407.35	4940.41	-2920.09	329.41	5738.86	5738.83	2.08
12442	91.08	328.75	6406.41	5020.92	-2968.59	329.41	5832.85	5832.81	1.14
12537	90.64	329.63	6404.98	5102.5	-3017.24	329.4	5927.84	5927.8	1.04
12632	91.69	329.81	6403.05	5184.52	-3065.13	329.41	6022.82	6022.78	1.12
12726	90.51	329.72	6401.24	5265.72	-3112.46	329.41	6116.8	6116.76	1.26
12821	91.38	328.58	6399.68	5347.26	-3161.16	329.41	6211.78	6211.74	1.51
12916	89.67	330.6	6398.81	5429.18	-3209.25	329.41	6306.77	6306.73	2.79
13011	91.12	331.65	6398.15	5512.37	-3255.12	329.44	6401.72	6401.69	1.88
13106	89.54	331.04	6397.61	5595.73	-3300.67	329.47	6496.66	6496.64	1.78
13201	90.33	330.51	6397.71	5678.63	-3347.05	329.48	6591.64	6591.62	1
13296	90.55	326.55	6396.98	5759.64	-3396.64	329.47	6686.6	6686.58	4.17
13391	88.66	324.45	6397.64	5837.93	-3450.44	329.42	6781.36	6781.33	2.97
13485	88.31	327.43	6400.12	5915.76	-3503.06	329.37	6875.15	6875.09	3.19
13580	90.99	329.28	6400.7	5996.63	-3552.89	329.35	6970.12	6970.05	3.43
13675	90.11	331.04	6399.79	6079.02	-3600.16	329.36	7065.1	7065.04	2.07
13769	91.38	331.04	6398.57	6161.26	-3645.67	329.39	7159.05	7159	1.35
13863	90.51	330.95	6397.02	6243.46	-3691.24	329.41	7253	7252.96	0.93
13957	91.87	330.6	6395.07	6325.47	-3737.13	329.43	7346.95	7346.92	1.49
14050	90.68	328.31	6393	6405.54	-3784.38	329.43	7439.92	7439.88	2.77
14144	90.24	329.63	6392.24	6486.09	-3832.83	329.42	7533.91	7533.87	1.48
14239	89.41	331.04	6392.53	6568.63	-3879.84	329.43	7628.9	7628.86	1.72
14333	85.93	328.31	6396.36	6649.68	-3927.25	329.43	7722.8	7722.76	4.7
14427	86.46	328.66	6402.59	6729.64	-3976.28	329.42	7816.58	7816.54	0.68
14522	87.65	329.72	6407.47	6811.12	-4024.87	329.42	7911.45	7911.4	1.68
14617	90.51	329.81	6409	6893.18	-4072.7	329.42	8006.42	8006.38	3.01
14712	93.41	330.07	6405.75	6975.35	-4120.25	329.43	8101.35	8101.31	3.06
14806	91.43	329.1	6401.78	7056.33	-4167.79	329.43	8195.26	8195.22	2.35
14901	90.11	328.93	6400.5	7137.77	-4216.7	329.43	8290.25	8290.21	1.4
14996	90.02	327.08	6400.4	7218.33	-4267.03	329.41	8385.22	8385.17	1.95
15091	91.65	327.7	6399.01	7298.35	-4318.22	329.39	8480.15	8480.08	1.84
15149	91.3	325.24	6397.52	7346.68	-4350.24	329.37	8538.05	8537.97	4.28
15205	91.3	325.24	6396.25	7392.67	-4382.16	329.34	8593.89	8593.79	0

DigiDrill DataLogger

1-Jan

www.digidrill.com

RECEIVED  
Office of Oil and Gas

SEP 10 2018

WV Department of  
Environmental Protection