

Tug Hill Operating LLC
Well: Greer 1W-14HM
Site: Greer Unit N
Project: Marshall County, WV
Design: rev5

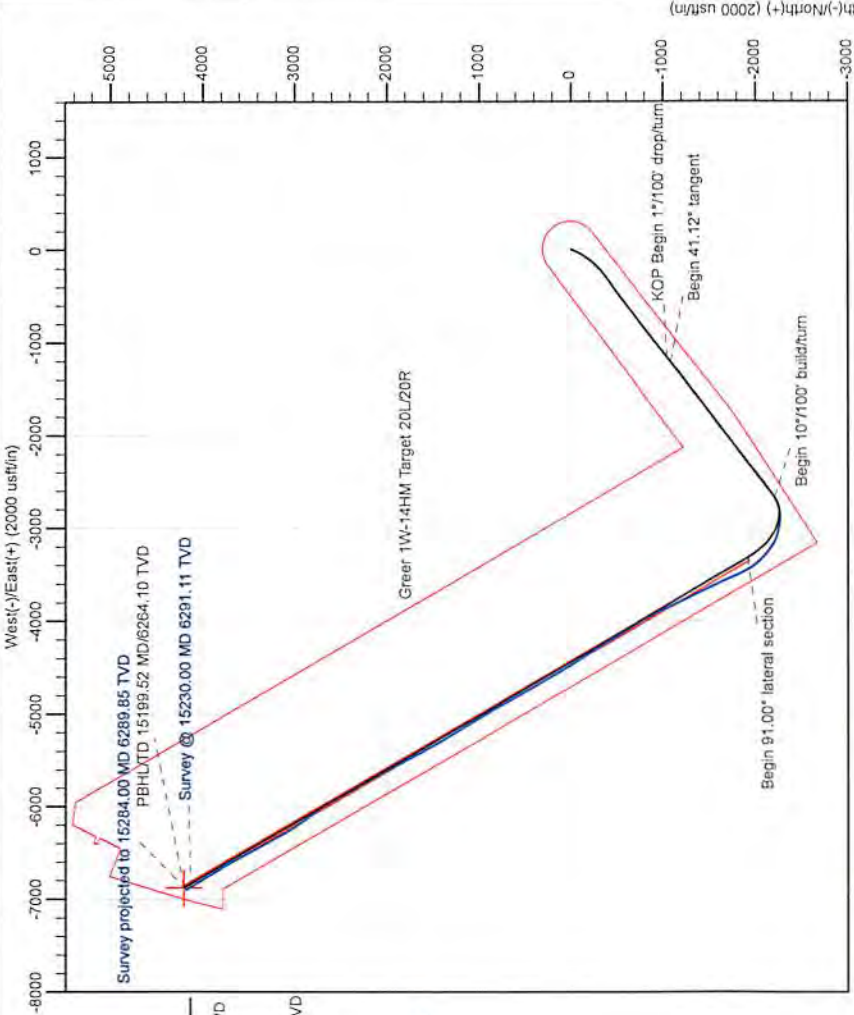


SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	VFace	Vsect	Annotation
1	4148.00	41.80	231.39	3652.10	-998.15	-1102.90	0.00	0.00	419.48	Survey @ 4148.00 MD 3652.10 TVD
2	4248.00	41.80	231.39	3726.65	-1039.74	-1154.98	0.00	0.00	442.18	KOP Begin 1°/100' drop/turn
3	4347.92	41.12	232.49	3801.54	-1080.53	-1207.07	1.00	133.39	455.31	Begin 41.12° tangent
4	7163.47	41.12	232.49	5922.62	-2207.94	-2675.90	0.00	0.00	1129.44	Begin 10°/100' build/turn
5	8119.52	91.00	329.88	6387.66	-1914.33	-3322.64	10.00	94.52	1834.28	Begin 91.00° lateral section
6	15199.52	91.00	329.88	6264.10	4208.77	-8874.93	0.00	0.00	8050.92	PBHLTD 15199.52 MD 6264.10 TVD

ANNOTATIONS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Annotation
100.00	0.78	125.27	100.00	-0.39	0.56	-0.68	Gyro
2773.00	37.61	234.92	2622.26	-442.39	-382.38	96.40	MWD surveys
15230.00	91.34	327.23	6291.10	4139.02	-6870.59	8020.90	Survey @ 15230.00 MD 6291.11 TVD
15284.00	91.34	327.23	6289.84	4184.41	-6869.81	8059.47	Survey projected to 15284.00 MD 6289.85 TVD



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

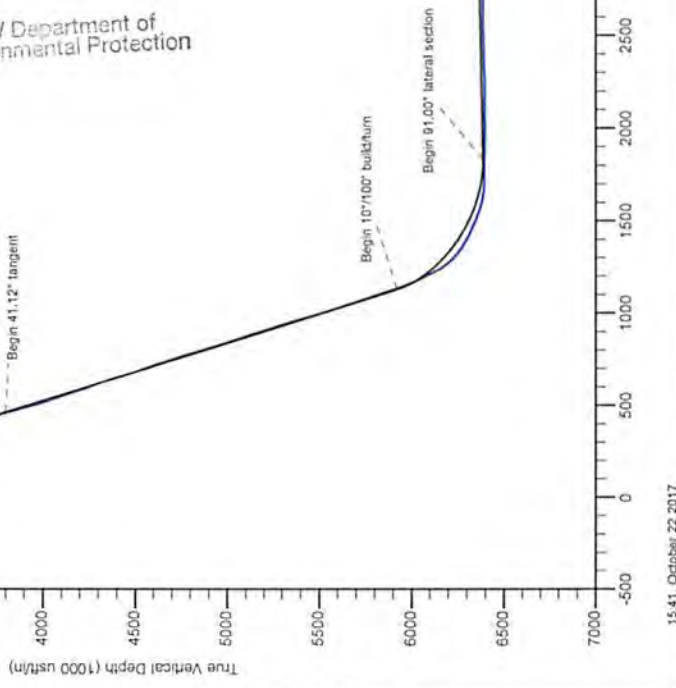
System Datum: Mean Sea Level
Depth Reference: RIG-1254+25 @ 1280.00usf (Nazore B28)
Surface location: Northing: 14438371.24, Easting: 1686450.59, 39.75706218-80.83616643
Latitude: 39.75706218
Longitude: -80.83616643

Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.70°

Azimuths to Grid North: Magnetic North: -8.70°
Magnetic Field: Strength: 52144.45nT, Dip Angle: 66.93°
Date: 9/15/2017
Model: IGRF2015



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Survey Report

Service Company:	NZONE GUIDANCE	Location:	New Martinsville, WV
Well:	GREER 1W-14HM	Rig:	NABORS B28
API or UWI:	47-051-01954-00-00	Job Number:	THO-17-036
State:	West Virginia	Operating Company:	TUG HILL OPERATING
County:	MARSHALL	Magnetic Declination:	-8.6
Country:	United States	Proposed Azimuth:	301.35
Comment		North Reference:	GRID
		Latitude:	39.75708
		Longitude:	-80.8362

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Tie-In Data

MD	Inclination	Azimuth	TVD	NS	EW
0	0	0	0	0	0

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Survey Data

MD	Inclination	Azimuth	TVD	NS	EW	CA	CD	VS	DLS
100	0.78	125.27	100	-0.39	0.56	125.27	0.68	-0.68	0.78
200	0.86	151.73	199.99	-1.45	1.47	134.61	2.06	-2.01	0.38
300	0.49	144.38	299.98	-2.46	2.07	139.85	3.21	-3.05	0.38
400	0.25	170.96	399.98	-3.02	2.35	142.04	3.83	-3.58	0.29
500	0.2	187.35	499.98	-3.41	2.37	145.22	4.15	-3.79	0.08
600	0.07	187.94	599.98	-3.64	2.34	147.32	4.33	-3.89	0.13
700	0.1	171.17	699.98	-3.79	2.34	148.28	4.45	-3.97	0.04
800	0.09	237.6	799.98	-3.92	2.29	149.7	4.54	-3.99	0.1
900	0.1	288.06	899.98	-3.93	2.14	151.45	4.47	-3.87	0.08
1000	0.07	246.69	999.98	-3.93	2	153.02	4.41	-3.75	0.07
1100	0.09	199.58	1099.98	-4.03	1.92	154.54	4.46	-3.73	0.07
1200	1.23	204.3	1199.97	-5.08	1.45	164.07	5.28	-3.88	1.14
1300	2.82	190.27	1299.9	-8.48	0.57	176.16	8.5	-4.9	1.65
1400	5.72	195.37	1399.61	-15.7	-1.19	184.34	15.75	-7.15	2.92
1500	9.19	201.42	1498.76	-27.95	-5.43	190.99	28.47	-9.9	3.55
1600	12.54	207.98	1596.95	-44.97	-13.44	196.64	46.94	-11.92	3.57
1700	15.82	208.33	1693.89	-66.57	-25.01	200.59	71.11	-13.28	3.28
1800	18.93	209.94	1789.32	-92.63	-39.57	203.13	100.73	-14.39	3.15
1900	21.75	210.49	1883.07	-122.65	-57.07	204.95	135.28	-15.07	2.83
2000	26.03	211.65	1974.49	-157.31	-78	206.37	175.59	-15.23	4.31
2100	30.39	216.09	2062.6	-196.46	-104.43	207.99	222.49	-13.03	4.84
2200	32.94	221.17	2147.72	-237.38	-137.24	210.03	274.19	-6.3	3.69
2300	33.31	224.18	2231.47	-277.54	-174.27	212.13	327.72	4.44	1.69
2400	31.86	227.2	2315.73	-315.17	-212.78	214.02	380.27	17.74	2.18
2500	32.93	231.42	2400.18	-350.05	-253.4	215.9	432.14	34.28	2.5
2600	35.31	234.76	2482.97	-383.69	-298.26	217.86	485.98	55.1	3.03
2670	36.06	235.33	2539.83	-407.08	-331.73	219.18	525.13	71.51	1.17
2773	37.61	234.92	2622.26	-442.39	-382.38	220.84	584.74	96.4	1.52
2820	37.52	234.39	2659.52	-458.97	-405.76	221.48	612.61	107.73	0.71
2914	41.41	233.42	2732.07	-494.17	-454.01	222.57	671.07	130.63	4.19
3009	43.61	232.89	2802.1	-532.67	-505.38	223.49	734.26	154.46	2.35
3103	43.88	232.8	2870.01	-571.93	-557.18	224.25	798.46	178.28	0.29

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3197	44.41	232.1	2937.46	-611.83	-609.08	224.87	863.31	201.85	0.77
3292	42.82	231.92	3006.24	-652.16	-660.73	225.37	928.37	224.97	1.68
3387	41.89	231.92	3076.44	-691.63	-711.11	225.8	991.98	247.46	0.98
3485	41.1	231.61	3149.84	-731.82	-762.11	226.16	1056.58	270.11	0.83
3579	40.21	232.89	3221.15	-769.31	-810.52	226.49	1117.49	291.95	1.3
3674	39.59	232.4	3294.04	-806.29	-858.96	226.81	1178.1	314.08	0.73
3769	39.51	233.51	3367.29	-842.73	-907.24	227.11	1238.26	336.35	0.75
3863	39.68	232.32	3439.72	-878.85	-955.04	227.38	1297.87	358.37	0.83
3958	41.71	231.21	3511.75	-917.2	-1003.68	227.58	1359.64	379.96	2.27
4053	43	230.29	3581.95	-957.69	-1053.24	227.72	1423.55	401.21	1.51
4148	41.8	231.39	3652.1	-998.15	-1102.9	227.85	1487.51	422.58	1.48
4243	40.21	232.1	3723.79	-1036.75	-1151.84	228.01	1549.7	444.29	1.74
4338	40.08	231.3	3796.41	-1074.71	-1199.91	228.15	1610.83	465.59	0.56
4432	40.21	229.98	3868.27	-1113.14	-1246.76	228.24	1671.37	485.61	0.92
4527	40.21	230.29	3940.82	-1152.45	-1293.84	228.31	1732.67	505.36	0.21
4622	41.8	233.02	4012.52	-1191.09	-1342.73	228.42	1794.89	527.01	2.52
4717	42.69	233.42	4082.84	-1229.33	-1393.88	228.59	1858.54	550.8	0.98
4812	42.11	233.51	4152.99	-1267.47	-1445.35	228.75	1922.37	574.92	0.61
4906	42.42	233.81	4222.56	-1304.93	-1496.28	228.91	1985.37	598.92	0.39
5001	42.69	232.58	4292.54	-1343.42	-1547.72	229.04	2049.44	622.82	0.92
5096	43.08	231.7	4362.15	-1383.1	-1598.76	229.14	2114	645.77	0.75
5191	42.29	231.48	4431.98	-1423.11	-1649.22	229.21	2178.35	668.05	0.85
5285	41.32	232.71	4502.05	-1461.61	-1698.66	229.29	2240.93	690.24	1.35
5380	41.18	234.61	4573.48	-1498.73	-1749.11	229.41	2303.38	714.01	1.33
5474	42.29	235.09	4643.62	-1534.75	-1800.27	229.55	2365.68	738.97	1.23
5568	42.42	233.2	4713.09	-1571.84	-1851.6	229.67	2428.81	763.5	1.36
5663	41.49	230.69	4783.74	-1610.98	-1901.61	229.73	2492.26	785.85	2.02
5758	40.7	230.51	4855.34	-1650.61	-1949.86	229.75	2554.69	806.44	0.84
5852	40.3	231.92	4926.82	-1688.85	-1997.44	229.79	2615.72	827.18	1.06
5947	41.01	233.11	4998.89	-1726.51	-2046.55	229.85	2677.54	849.53	1.11
6042	41.1	235.09	5070.53	-1763.09	-2097.09	229.95	2739.76	873.65	1.37
6126	40.09	233.8	5134.31	-1794.87	-2141.56	230.03	2794.25	895.1	1.56
6218	40.35	232.57	5204.56	-1830.47	-2189.12	230.1	2853.57	917.19	0.91
6312	41.32	231.96	5275.68	-1868.09	-2237.72	230.14	2914.99	939.13	1.12
6405	40.97	231.52	5345.72	-1905.98	-2285.77	230.18	2976.15	960.45	0.49
6500	40.97	230.99	5417.45	-1944.96	-2334.35	230.2	3038.43	981.66	0.37
6595	41.45	230.46	5488.91	-1984.58	-2382.8	230.21	3101.02	1002.42	0.62
6690	41.98	230.55	5559.83	-2024.79	-2431.58	230.22	3164.23	1023.16	0.56
6785	42.29	231.69	5630.28	-2064.79	-2481.2	230.23	3227.95	1044.72	0.87
6878	42.37	233.54	5699.03	-2102.81	-2530.95	230.28	3290.52	1067.43	1.34
6972	42.02	235.12	5768.68	-2139.62	-2582.24	230.36	3353.5	1092.08	1.19
7066	41.1	234.07	5839.01	-2175.75	-2633.07	230.43	3415.69	1116.69	1.23
7160	38.15	235.38	5911.41	-2210.38	-2681.99	230.51	3475.46	1140.45	3.26
7254	35.43	245.67	5986.75	-2238.13	-2730.77	230.66	3530.77	1167.67	7.16
7348	34.11	256.13	6064.04	-2255.69	-2781.23	230.96	3580.97	1201.63	6.49
7443	34.02	265.36	6142.79	-2264.23	-2833.61	231.37	3627.14	1241.92	5.44
7536	47.3	270.54	6213.2	-2266.02	-2894	231.94	3675.61	1292.56	14.72

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7631	58.42	278.01	6270.52	-2260.03	-2969.28	232.72	3731.54	1359.97	13.26
7726	65.54	285.75	6315.17	-2242.61	-3051.17	233.68	3786.68	1438.96	10.38
7821	68.09	296.29	6352.66	-2211.28	-3132.5	234.78	3834.36	1524.72	10.54
7916	76.48	304.55	6381.59	-2165.41	-3210.31	236	3872.35	1615.04	12.1
8011	87.43	309.92	6394.87	-2108.56	-3285.03	237.3	3903.51	1708.42	12.81
8106	91.65	317.39	6395.63	-2043.04	-3353.69	238.65	3926.99	1801.15	9.03
8200	87.87	325.3	6396.03	-1969.71	-3412.35	240.01	3940.03	1889.4	9.32
8295	89.58	332.5	6398.14	-1888.44	-3461.37	241.38	3943	1973.54	7.79
8389	90.29	336.37	6398.25	-1803.66	-3501.93	242.75	3939.12	2052.29	4.19
8484	90.77	337.07	6397.37	-1716.39	-3539.47	244.13	3933.69	2129.75	0.89
8579	90.51	335.4	6396.31	-1629.46	-3577.75	245.51	3931.34	2207.67	1.78
8674	90.64	334.09	6395.36	-1543.54	-3618.28	246.9	3933.76	2286.98	1.39
8770	91.38	333.91	6393.67	-1457.27	-3660.36	248.29	3939.78	2367.8	0.79
8864	91.34	334	6391.43	-1372.84	-3701.62	249.65	3948	2446.96	0.1
8960	91.03	335.14	6389.45	-1286.17	-3742.83	251.04	3957.65	2527.25	1.23
9054	89.76	333.73	6388.8	-1201.37	-3783.4	252.38	3969.56	2606.01	2.02
9148	89.45	332.94	6389.45	-1117.37	-3825.58	253.72	3985.42	2685.73	0.9
9244	92.31	336.81	6387.97	-1030.49	-3866.32	255.08	4001.3	2765.73	5.01
9339	91.96	334.35	6384.43	-944.06	-3905.57	256.41	4018.05	2844.21	2.61
9433	91.3	333.21	6381.76	-859.77	-3947.08	257.71	4039.64	2923.52	1.4
9528	91.34	330.92	6379.57	-775.87	-3991.57	259	4066.28	3005.17	2.41
9624.33	90.77	328.99	6377.8	-692.5	-4039.79	260.27	4098.71	3089.72	2.09
9716	91.96	328.46	6375.61	-614.17	-4087.37	261.45	4133.25	3171.1	1.42
9811	90.68	328.28	6373.43	-533.31	-4137.17	262.65	4171.41	3255.71	1.36
9905	91.87	328.28	6371.33	-453.37	-4186.58	263.82	4211.06	3339.49	1.27
10000	90.73	327.41	6369.18	-372.96	-4237.13	264.97	4253.51	3424.49	1.51
10095	90.55	328.02	6368.12	-292.66	-4287.87	266.1	4297.84	3509.6	0.67
10190	91.74	328.72	6366.22	-211.79	-4337.68	267.2	4342.85	3594.21	1.45
10283	90.73	327.85	6364.22	-132.69	-4386.56	268.27	4388.56	3677.1	1.43
10378	89.41	328.28	6364.1	-52.07	-4436.81	269.33	4437.11	3761.96	1.46
10473	90.37	328.28	6364.28	28.73	-4486.75	270.37	4486.84	3846.66	1.01
10568	90.11	329.87	6363.88	110.23	-4535.57	271.39	4536.91	3930.75	1.7
10663	90.86	330.22	6363.08	192.53	-4583.01	272.41	4587.05	4014.08	0.87
10757	91.47	329.16	6361.17	273.66	-4630.43	273.38	4638.51	4096.79	1.3
10851	90.29	330.66	6359.72	354.98	-4677.55	274.34	4691.01	4179.34	2.03
10946	90.77	330.04	6358.85	437.54	-4724.55	275.29	4744.77	4262.43	0.83
11041	91.56	330.22	6356.91	519.9	-4771.85	276.22	4800.09	4345.67	0.85
11136	90.33	331.01	6355.35	602.67	-4818.46	277.13	4856	4428.53	1.54
11231	91.6	330.83	6353.75	685.68	-4864.62	278.02	4912.71	4511.15	1.35
11325	90.51	331.98	6352.02	768.19	-4909.6	278.89	4969.34	4592.49	1.69
11420	91.82	332.42	6350.09	852.21	-4953.9	279.76	5026.67	4674.03	1.45
11514	89.05	328.28	6349.37	933.87	-5000.39	280.58	5086.85	4756.22	5.3
11609	89.71	328.2	6350.4	1014.64	-5050.39	281.36	5151.3	4840.94	0.7
11703	90.29	328.11	6350.4	1094.49	-5099.98	282.11	5216.11	4924.84	0.62
11798	90.24	329.34	6349.96	1175.69	-5149.3	282.86	5281.81	5009.2	1.3
11893	90.77	328.55	6349.12	1257.07	-5198.31	283.59	5348.14	5093.39	1
11988	91.08	328.81	6347.59	1338.21	-5247.68	284.31	5415.62	5177.77	0.43

12082	89.8	331.89	6346.87	1419.89	-5294.18	285.01	5481.28	5259.97	3.55
12176	90.77	331.1	6346.4	1502.49	-5339.03	285.72	5546.42	5341.26	1.33
12270	92.04	329.69	6344.09	1584.19	-5385.46	286.39	5613.63	5423.41	2.02
12364	91.87	330.83	6340.89	1665.76	-5432.06	287.05	5681.73	5505.64	1.23
12459	91.52	331.62	6338.08	1749	-5477.77	287.71	5750.21	5587.98	0.91
12553	90.68	332.5	6336.27	1832.02	-5521.8	288.35	5817.78	5668.78	1.29
12647	89.89	331.8	6335.81	1915.13	-5565.71	288.99	5885.99	5749.52	1.12
12742	91.21	332.59	6334.89	1999.16	-5610.03	289.61	5955.59	5831.08	1.62
12835	90.11	331.62	6333.82	2081.34	-5653.53	290.21	6024.48	5910.99	1.58
12930	88.35	330.48	6335.1	2164.46	-5699.51	290.79	6096.66	5993.5	2.21
13025	89.36	331.71	6337	2247.61	-5745.42	291.37	6169.4	6075.97	1.68
13119	90.33	328.2	6337.25	2328.96	-5792.47	291.9	6243.14	6158.48	3.87
13214	91.82	331.19	6335.47	2410.95	-5840.4	292.43	6318.46	6242.06	3.52
13309	90.68	330.66	6333.4	2493.96	-5886.55	292.96	6393.07	6324.66	1.32
13404	90.9	333.56	6332.09	2577.91	-5930.98	293.49	6467	6406.28	3.06
13498	90.81	329.08	6330.68	2660.35	-5976.07	294	6541.48	6487.68	4.77
13593	90.86	324.68	6329.3	2739.88	-6027.96	294.44	6621.43	6573.38	4.63
13688	91.74	322.84	6327.14	2816.48	-6084.11	294.84	6704.4	6661.17	2.15
13783	91.38	323.8	6324.56	2892.64	-6140.83	295.22	6788.02	6749.24	1.08
13878	99.16	324.15	6315.84	2969.09	-6196.43	295.6	6871.04	6836.49	8.2
13973	94.86	328.28	6304.24	3047.43	-6248.82	296	6952.31	6922	6.25
14068	88.04	330.13	6301.84	3128.96	-6297.41	296.42	7031.91	7005.91	7.44
14162	86.86	332.06	6306.02	3211.16	-6342.8	296.85	7109.34	7087.44	2.4
14257	90.2	331.8	6308.46	3294.95	-6387.48	297.29	7187.25	7169.19	3.53
14352	92.04	331.62	6306.6	3378.58	-6432.5	297.71	7265.8	7251.14	1.95
14447	91.38	331.36	6303.77	3462.02	-6477.82	298.12	7344.91	7333.26	0.75
14541	89.05	331.1	6303.41	3544.41	-6523.06	298.52	7423.82	7414.76	2.49
14637	89.63	330.04	6304.52	3628.02	-6570.22	298.91	7505.36	7498.53	1.26
14731	89.98	330.22	6304.84	3709.53	-6617.04	299.28	7585.9	7580.92	0.42
14825	91.21	330.13	6303.86	3791.07	-6663.79	299.64	7666.7	7663.27	1.31
14919	92.35	329.6	6300.94	3872.33	-6710.96	299.99	7748.02	7745.82	1.34
15012	91.43	329.87	6297.88	3952.61	-6757.8	300.32	7828.86	7827.6	1.03
15107	92.31	328.99	6294.78	4034.36	-6806.09	300.66	7911.95	7911.37	1.31
15200	91.34	328.2	6291.81	4113.69	-6854.53	300.97	7994.18	7994.01	1.34
15230	91.34	327.23	6291.11	4139.05	-6870.55	301.07	8020.98	8020.88	3.23

Projected Survey

MD	Inclination	Azimuth	TVD	NS	EW	CA	CD	VS	DLS	
15284	91.34	327.23	6289.85	4184.44	-6899.77	301.24	8069.47	8069.45	0	
DigiDrill DataLogger		1-Jan							www.digidrill.com	

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