



Company/Rig: Noble Energy/ CoreTech
WELL/API#: Roth A 30-17/05-123-32719
DECLINATION: 8.3 Degrees
TD AS DRILLED: 7108 Feet
COUNTY/STATE: Weld/Colorado
VS-Azi: 0.000 Degrees
Latitude: 40.46038, Longitude: -104.58849
Grid North = True North -0.59 degs (NAD 27)
Grid Convergence Applied = -0.59 degs



DEPTH REFERENCE : RKB=GL/ ELEVATION= 4685 Feet

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01-de_01.ut
Minimum Curvature Method
Report Date/Time: 10/13/2015 / 09:39

LAT & LONG OBTAINED BY HANDHELD GPS AT WELLHEAD
NORTH REFERENCE: GRID
HENDERSON, COLORADO
303-853-4976
Surveyor: Sean Bratt / Roth A 30-17

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	****
100.000	0.861	321.867	99.996	0.591	-0.464	0.591	0.751	321.867	0.861
200.000	0.871	307.086	199.985	1.640	-1.534	1.640	2.245	316.914	0.223
300.000	0.795	305.529	299.974	2.501	-2.704	2.501	3.684	312.763	0.079
400.000	0.868	349.492	399.965	3.649	-3.407	3.649	4.992	316.960	0.626
500.000	0.892	348.756	499.953	5.156	-3.697	5.156	6.344	324.360	0.027
600.000	1.069	342.158	599.938	6.808	-4.135	6.808	7.965	328.728	0.210
700.000	0.779	334.548	699.925	8.310	-4.713	8.310	9.553	330.442	0.314
800.000	1.023	312.646	799.913	9.529	-5.662	9.529	11.084	329.283	0.418
900.000	0.912	315.256	899.899	10.699	-6.879	10.699	12.720	327.262	0.119
1000.000	0.957	311.347	999.886	11.816	-8.066	11.816	14.307	325.682	0.078
1100.000	0.800	335.007	1099.874	13.001	-8.988	13.001	15.805	325.342	0.391
1200.000	0.973	318.098	1199.862	14.266	-9.850	14.266	17.336	325.376	0.312
1300.000	0.554	340.989	1299.853	15.355	-10.575	15.355	18.645	325.445	0.510
1400.000	0.743	344.887	1399.847	16.439	-10.902	16.439	19.725	326.449	0.194
1500.000	0.797	315.153	1499.838	17.557	-11.561	17.557	21.022	326.637	0.398
1600.000	0.421	19.662	1599.833	18.396	-11.927	18.396	21.925	327.042	0.723
1700.000	0.200	117.168	1699.832	18.663	-11.649	18.663	22.000	328.029	0.489
1800.000	0.248	210.901	1799.832	18.398	-11.604	18.398	21.752	327.759	0.328

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1900.000	0.492	307.061	1899.830	18.471	-12.058	18.471	22.058	326.864	0.574
2000.000	0.516	253.962	1999.827	18.605	-12.833	18.605	22.602	325.404	0.451
2100.000	0.701	288.556	2099.822	18.675	-13.846	18.675	23.248	323.447	0.402
2200.000	0.571	277.224	2199.816	18.932	-14.920	18.932	24.105	321.760	0.180
2300.000	0.593	356.461	2299.812	19.511	-15.446	19.511	24.885	321.633	0.742
2400.000	0.998	30.982	2399.803	20.774	-15.030	20.774	25.641	324.114	0.610
2500.000	0.896	29.438	2499.789	22.201	-14.197	22.201	26.353	327.402	0.105
2600.000	0.090	349.077	2599.784	22.959	-13.828	22.959	26.802	328.940	0.829
2700.000	0.297	246.907	2699.784	22.935	-14.081	22.935	26.913	328.452	0.328
2800.000	0.479	223.977	2799.782	22.532	-14.610	22.532	26.854	327.041	0.236
2900.000	0.870	211.259	2899.775	21.582	-15.294	21.582	26.452	324.677	0.417
3000.000	0.738	182.270	2999.765	20.289	-15.714	20.289	25.663	322.242	0.422
3100.000	0.577	123.073	3099.760	19.371	-15.318	19.371	24.695	321.665	0.664
3200.000	0.687	89.933	3199.754	19.097	-14.296	19.097	23.855	323.182	0.376
3300.000	0.660	5.627	3299.749	19.671	-13.639	19.671	23.937	325.263	0.905
3400.000	0.959	334.171	3399.739	20.997	-13.947	20.997	25.207	326.406	0.524
3500.000	1.658	341.050	3499.713	23.118	-14.782	23.118	27.440	327.405	0.716
3600.000	1.154	327.674	3599.683	25.338	-15.790	25.338	29.855	328.069	0.598
3700.000	1.109	329.806	3699.663	27.025	-16.815	27.025	31.829	328.110	0.062
3800.000	1.068	330.334	3799.645	28.671	-17.763	28.671	33.727	328.220	0.042
3900.000	1.262	301.280	3899.625	30.052	-19.165	30.052	35.643	327.473	0.614
4000.000	1.577	305.578	3999.594	31.424	-21.225	31.424	37.921	325.963	0.333
4100.000	1.897	306.102	4099.548	33.200	-23.682	33.200	40.781	324.499	0.320
4200.000	2.547	310.452	4199.473	35.617	-26.710	35.617	44.520	323.133	0.672
4300.000	2.477	329.076	4299.378	38.913	-29.512	38.913	48.838	322.823	0.816
4400.000	2.529	347.168	4399.284	42.917	-31.112	42.917	53.008	324.060	0.788
4500.000	1.637	358.603	4499.218	46.496	-31.637	46.496	56.239	325.768	0.979
4600.000	0.768	68.577	4599.199	48.169	-31.048	48.169	57.308	327.196	1.552
4700.000	1.570	90.594	4699.178	48.400	-29.054	48.400	56.450	329.024	0.905
4800.000	1.317	106.577	4799.146	48.058	-26.582	48.058	54.920	331.052	0.473
4900.000	0.491	83.312	4899.133	47.780	-25.055	47.780	53.951	332.328	0.887
5000.000	0.428	2.271	4999.131	48.203	-24.614	48.203	54.124	332.949	0.599
5100.000	0.563	113.270	5099.129	48.383	-24.148	48.383	54.074	333.476	0.821
5200.000	0.998	100.846	5199.119	48.025	-22.841	48.025	53.180	334.564	0.464
5300.000	0.773	107.899	5299.107	47.653	-21.343	47.653	52.215	335.873	0.250
5400.000	0.489	92.776	5399.101	47.425	-20.275	47.425	51.578	336.852	0.327
5500.000	0.140	304.370	5499.100	47.474	-19.950	47.474	51.495	337.206	0.612
5600.000	0.613	53.256	5599.098	47.863	-19.622	47.863	51.729	337.708	0.672
5700.000	0.669	53.328	5699.092	48.531	-18.725	48.531	52.018	338.902	0.055
5800.000	0.579	100.094	5799.087	48.791	-17.759	48.791	51.923	340.000	0.502

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
5900.000	0.524	50.000	5899.083	48.997	-16.911	48.997	51.833	340.958	0.470
6000.000	0.363	86.135	5999.080	49.312	-16.245	49.312	51.919	341.767	0.315
6100.000	0.365	15.015	6099.078	49.641	-15.846	49.641	52.109	342.296	0.423
6200.000	0.458	8.804	6199.076	50.344	-15.703	50.344	52.736	342.677	0.103
6300.000	0.866	4.313	6299.069	51.493	-15.585	51.493	53.799	343.161	0.410
6400.000	0.675	349.088	6399.060	52.824	-15.639	52.824	55.091	343.508	0.278
6500.000	0.713	338.586	6499.053	53.982	-15.978	53.982	56.297	343.512	0.133
6600.000	1.058	318.992	6599.041	55.258	-16.811	55.258	57.759	343.079	0.454
6700.000	0.879	327.456	6699.026	56.601	-17.829	56.601	59.343	342.515	0.229
6800.000	1.083	335.701	6799.012	58.109	-18.631	58.109	61.023	342.223	0.248
6850.000	1.558	332.050	6848.998	59.140	-19.144	59.140	62.161	342.063	0.964