



Company/Rig: Noble Energy/ CoreTech
WELL/API#: Gruen 22-2/05-123-11770
DECLINATION: 8.27 Degrees
TD AS DRILLED: 7064 Feet
COUNTY/STATE: Weld/Colorado
VS-Azi: 0.000 Degrees
Latitude: 40.46634, Longitude: -104.53885
Grid North = True North -0.62 degs (NAD 27)
Grid Convergence Applied = -0.62 degs



DEPTH REFERENCE : RKB=GL/ ELEVATION= 4736 Feet

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01-de_01.ut
Minimum Curvature Method
Report Date/Time: 10/12/2015 / 14:06

LAT & LONG OBTAINED BY HANDHELD GPS AT WELLHEAD
NORTH REFERENCE: GRID
HENDERSON, COLORADO
303-853-4976
Surveyor: Sean Bratt / Gruen 22-2

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	0.496	250.618	99.999	-0.144	-0.408	-0.144	0.433	250.618	0.496
200.000	0.389	294.623	199.996	-0.146	-1.125	-0.146	1.134	262.625	0.346
300.000	0.741	272.087	299.991	0.019	-2.080	0.019	2.080	270.536	0.409
400.000	0.497	288.674	399.985	0.182	-3.137	0.182	3.142	273.320	0.300
500.000	0.901	299.868	499.978	0.713	-4.230	0.713	4.289	279.562	0.425
600.000	0.903	303.749	599.965	1.542	-5.567	1.542	5.777	285.483	0.061
700.000	0.706	278.714	699.956	2.073	-6.832	2.073	7.140	286.883	0.398
800.000	0.962	299.603	799.945	2.582	-8.171	2.582	8.569	287.534	0.393
900.000	0.926	310.286	899.932	3.519	-9.517	3.519	10.147	290.290	0.179
1000.000	0.633	309.603	999.922	4.393	-10.559	4.393	11.436	292.589	0.293
1100.000	0.708	308.618	1099.916	5.131	-11.467	5.131	12.563	294.105	0.076
1200.000	0.737	300.486	1199.908	5.843	-12.505	5.843	13.802	295.045	0.107
1300.000	0.715	295.273	1299.900	6.436	-13.624	6.436	15.067	295.286	0.070
1400.000	0.487	300.259	1399.894	6.916	-14.555	6.916	16.115	295.417	0.235
1500.000	0.391	281.926	1499.891	7.201	-15.256	7.201	16.870	295.268	0.169
1600.000	0.623	258.535	1599.887	7.163	-16.123	7.163	17.643	293.956	0.306
1700.000	0.779	264.271	1699.880	6.988	-17.332	6.988	18.687	291.958	0.171
1800.000	0.572	260.465	1799.873	6.837	-18.500	6.837	19.723	290.283	0.211

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	0.360	211.481	1899.870	6.487	-19.156	6.487	20.225	288.707	0.432
2000.000	0.235	178.027	1999.868	6.014	-19.313	6.014	20.228	287.296	0.209
2100.000	0.337	158.155	2099.867	5.536	-19.197	5.536	19.979	286.086	0.140
2200.000	0.366	197.446	2199.865	4.959	-19.183	4.959	19.814	284.493	0.238
2300.000	0.572	143.651	2299.862	4.253	-18.983	4.253	19.454	282.627	0.462
2400.000	0.935	155.589	2399.854	3.108	-18.350	3.108	18.611	279.612	0.394
2500.000	0.859	179.987	2499.842	1.615	-18.013	1.615	18.085	275.123	0.386
2600.000	0.761	168.107	2599.832	0.216	-17.875	0.216	17.877	270.691	0.194
2700.000	0.449	166.898	2699.826	-0.816	-17.650	-0.816	17.669	267.352	0.312
2800.000	0.225	265.425	2799.825	-1.214	-17.757	-1.214	17.798	266.090	0.531
2900.000	0.305	202.137	2899.824	-1.476	-18.053	-1.476	18.113	265.326	0.286
3000.000	0.282	294.355	2999.823	-1.621	-18.377	-1.621	18.449	264.960	0.424
3100.000	0.148	1.389	3099.823	-1.390	-18.599	-1.390	18.650	265.725	0.263
3200.000	0.198	279.694	3199.822	-1.232	-18.766	-1.232	18.806	266.244	0.230
3300.000	0.469	285.952	3299.821	-1.091	-19.330	-1.091	19.360	266.771	0.272
3400.000	0.620	295.755	3399.816	-0.743	-20.210	-0.743	20.223	267.894	0.177
3500.000	0.784	304.933	3499.809	-0.116	-21.258	-0.116	21.258	269.686	0.199
3600.000	0.926	303.302	3599.797	0.719	-22.494	0.719	22.506	271.831	0.144
3700.000	0.767	309.771	3699.786	1.591	-23.684	1.591	23.737	273.843	0.186
3800.000	0.795	313.062	3799.777	2.492	-24.705	2.492	24.830	275.761	0.053
3900.000	0.765	322.822	3899.768	3.498	-25.615	3.498	25.852	277.776	0.136
4000.000	0.685	315.701	3999.760	4.458	-26.436	4.458	26.809	279.571	0.120
4100.000	0.557	340.512	4099.754	5.344	-27.016	5.344	27.539	281.189	0.295
4200.000	0.343	303.798	4199.751	5.969	-27.427	5.969	28.069	282.278	0.349
4300.000	0.278	305.878	4299.750	6.277	-27.872	6.277	28.570	282.692	0.066
4400.000	0.534	54.397	4399.748	6.691	-27.689	6.691	28.486	283.584	0.675
4500.000	0.850	72.825	4499.741	7.181	-26.602	7.181	27.554	285.106	0.382
4600.000	0.726	94.432	4599.732	7.351	-25.262	7.351	26.309	286.224	0.319
4700.000	0.784	52.068	4699.724	7.722	-24.090	7.722	25.298	287.773	0.548
4800.000	0.926	71.972	4799.713	8.392	-22.783	8.392	24.279	290.222	0.327
4900.000	1.350	60.239	4899.693	9.227	-20.992	9.227	22.930	293.728	0.482
5000.000	1.680	41.865	4999.658	10.903	-18.991	10.903	21.899	299.862	0.583
5100.000	1.090	56.691	5099.629	12.517	-17.218	12.517	21.287	306.016	0.686
5200.000	0.817	76.138	5199.615	13.210	-15.731	13.210	20.542	310.021	0.419
5300.000	0.939	130.102	5299.605	12.853	-14.412	12.853	19.311	311.727	0.804
5400.000	1.465	169.146	5399.584	11.070	-13.545	11.070	17.494	309.258	0.944
5500.000	2.219	186.630	5499.533	7.892	-13.528	7.892	15.662	300.259	0.932
5600.000	2.781	203.456	5599.439	3.744	-14.717	3.744	15.186	284.272	0.919
5700.000	3.477	208.627	5699.289	-1.144	-17.136	-1.144	17.174	266.182	0.750
5800.000	3.889	213.821	5799.083	-6.623	-20.476	-6.623	21.520	252.077	0.530

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	4.478	218.569	5898.816	-12.492	-24.797	-12.492	27.766	243.263	0.682
6000.000	4.039	226.779	5998.541	-17.956	-29.797	-17.956	34.789	238.927	0.750
6100.000	3.308	234.491	6098.335	-22.043	-34.712	-22.043	41.120	237.583	0.881
6200.000	3.159	242.910	6198.177	-24.974	-39.514	-24.974	46.744	237.706	0.497
6300.000	2.784	253.204	6298.043	-26.930	-44.292	-26.930	51.837	238.700	0.651
6400.000	2.749	238.641	6397.927	-28.880	-48.666	-28.880	56.590	239.313	0.702
6500.000	2.562	242.222	6497.820	-31.170	-52.691	-31.170	61.220	239.393	0.251
6600.000	2.268	250.479	6597.731	-32.872	-56.533	-32.872	65.395	239.823	0.454
6700.000	1.947	255.684	6697.664	-33.954	-60.044	-33.954	68.979	240.513	0.373
6800.000	1.827	232.361	6797.611	-35.347	-62.952	-35.347	72.197	240.686	0.772
6900.000	0.934	215.388	6897.581	-36.985	-64.687	-36.985	74.513	240.241	0.973