



Company/Rig: Noble Energy/CoreTech
WELL/API#: HSR-Lundvall 8-19/05-123-20564
DECLINATION: 8.43
TD AS DRILLED: 7696'
COUNTY/STATE: Weld/Colorado
Latitude: 40.387, Longitude: -104.815
GRID North is 0.440 Degrees East of True North
VS-Azi: 0.000 Degrees



DEPTH REFERENCE : RKB=Surface Elevation=5010'

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01-de_01.ut

Minimum Curvature Method

Report Date/Time: 12/9/2014 / 14:27

Lat & Long Obtained By Handheld GPS At Wellhead

North Reference: Grid

Henderson, Co.

303-853-4976

Surveyor: Mark Simmons

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	0.678	269.691	99.998	-0.003	-0.591	-0.003	0.591	269.691	0.678
200.000	0.243	256.855	199.994	-0.055	-1.390	-0.055	1.391	267.746	0.444
300.000	0.130	213.549	299.994	-0.198	-1.659	-0.198	1.671	263.199	0.173
400.000	0.161	204.775	399.993	-0.420	-1.781	-0.420	1.830	256.728	0.037
500.000	0.269	186.132	499.993	-0.780	-1.865	-0.780	2.021	247.291	0.127
600.000	0.403	188.423	599.991	-1.362	-1.941	-1.362	2.371	234.954	0.136
700.000	0.695	193.031	699.986	-2.301	-2.130	-2.301	3.135	222.787	0.295
800.000	0.675	196.274	799.979	-3.457	-2.432	-3.457	4.227	215.120	0.044
900.000	0.736	193.213	899.972	-4.647	-2.743	-4.647	5.397	210.552	0.072
1000.000	0.660	188.751	999.964	-5.842	-2.978	-5.842	6.557	207.009	0.094
1100.000	0.793	195.735	1099.956	-7.077	-3.253	-7.077	7.789	204.686	0.160
1200.000	0.737	202.605	1199.947	-8.337	-3.688	-8.337	9.116	203.863	0.108
1300.000	0.782	204.312	1299.938	-9.552	-4.216	-9.552	10.441	203.814	0.051
1400.000	0.768	198.068	1399.929	-10.811	-4.705	-10.811	11.790	203.517	0.086
1500.000	0.915	216.485	1499.919	-12.090	-5.387	-12.090	13.236	204.017	0.306
1600.000	0.878	207.856	1599.906	-13.409	-6.220	-13.409	14.781	204.884	0.140
1700.000	0.933	214.132	1699.894	-14.760	-7.034	-14.760	16.351	205.482	0.113
1800.000	0.865	202.509	1799.882	-16.131	-7.780	-16.131	17.909	205.748	0.194
1900.000	0.834	188.295	1899.871	-17.549	-8.174	-17.549	19.359	204.976	0.212

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
2000.000	0.898	192.291	1999.859	-19.036	-8.446	-19.036	20.825	203.927	0.088
2100.000	0.811	196.589	2099.848	-20.480	-8.815	-20.480	22.297	203.288	0.108
2200.000	0.704	162.915	2199.840	-21.746	-8.837	-21.746	23.473	202.115	0.451
2300.000	0.863	136.260	2299.831	-22.878	-8.135	-22.878	24.281	199.575	0.393
2400.000	0.856	137.863	2399.820	-23.976	-7.113	-23.976	25.009	196.525	0.025
2500.000	0.881	133.944	2499.808	-25.063	-6.059	-25.063	25.785	193.590	0.065
2600.000	0.623	152.469	2599.800	-26.080	-5.254	-26.080	26.603	191.390	0.351
2700.000	0.630	183.037	2699.794	-27.111	-5.031	-27.111	27.574	190.513	0.330
2800.000	0.666	194.565	2799.788	-28.222	-5.207	-28.222	28.698	190.453	0.135
2900.000	0.652	201.628	2899.781	-29.314	-5.563	-29.314	29.837	190.745	0.082
3000.000	0.658	222.405	2999.775	-30.267	-6.160	-30.267	30.888	191.503	0.236
3100.000	0.630	236.096	3099.768	-30.998	-7.003	-30.998	31.779	192.731	0.156
3200.000	0.541	224.148	3199.763	-31.644	-7.788	-31.644	32.588	193.827	0.150
3300.000	0.406	254.751	3299.760	-32.076	-8.459	-32.076	33.173	194.774	0.282
3400.000	0.356	257.139	3399.758	-32.238	-9.104	-32.238	33.499	195.770	0.053
3500.000	0.191	251.526	3499.756	-32.360	-9.565	-32.360	33.744	196.467	0.167
3600.000	0.418	234.589	3599.755	-32.624	-10.021	-32.624	34.129	197.074	0.242
3700.000	0.472	248.084	3699.752	-32.989	-10.700	-32.989	34.681	197.970	0.117
3800.000	0.867	285.973	3799.745	-32.935	-11.809	-32.935	34.988	199.725	0.573
3900.000	0.845	295.694	3899.734	-32.407	-13.200	-32.407	34.992	202.163	0.147
4000.000	0.972	289.047	3999.722	-31.811	-14.666	-31.811	35.029	204.752	0.165
4100.000	0.853	295.093	4099.709	-31.218	-16.141	-31.218	35.144	207.341	0.153
4200.000	0.895	287.910	4199.698	-30.663	-17.558	-30.663	35.334	209.797	0.117
4300.000	0.945	293.368	4299.685	-30.095	-19.058	-30.095	35.622	212.345	0.101
4400.000	1.049	289.883	4399.670	-29.457	-20.676	-29.457	35.989	215.065	0.120
4500.000	1.076	297.417	4499.652	-28.714	-22.370	-28.714	36.399	217.921	0.142
4600.000	1.168	295.796	4599.633	-27.838	-24.121	-27.838	36.834	220.908	0.098
4700.000	1.157	299.057	4699.613	-26.904	-25.921	-26.904	37.359	223.935	0.067
4800.000	0.870	325.442	4799.597	-25.788	-27.235	-25.788	37.507	226.563	0.540
4900.000	0.519	334.638	4899.590	-24.753	-27.859	-24.753	37.268	228.379	0.368
5000.000	0.384	310.471	4999.587	-24.126	-28.309	-24.126	37.195	229.560	0.230
5100.000	0.515	297.284	5099.584	-23.702	-28.963	-23.702	37.426	230.704	0.166
5200.000	0.326	298.238	5199.581	-23.362	-29.614	-23.362	37.719	231.731	0.189
5300.000	0.340	279.054	5299.579	-23.180	-30.157	-23.180	38.037	232.452	0.112
5400.000	0.183	204.175	5399.579	-23.279	-30.515	-23.279	38.381	232.661	0.341
5500.000	0.291	222.213	5499.578	-23.613	-30.751	-23.613	38.771	232.481	0.130
5600.000	0.601	245.399	5599.575	-24.019	-31.399	-24.019	39.532	232.585	0.352
5700.000	1.296	263.814	5699.561	-24.359	-33.000	-24.359	41.017	233.566	0.751
5800.000	1.515	253.131	5799.531	-24.865	-35.390	-24.865	43.252	234.908	0.341
5900.000	1.052	231.021	5899.506	-25.826	-37.369	-25.826	45.425	235.351	0.670

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
6000.000	0.731	186.959	5999.495	-27.037	-38.160	-27.037	46.767	234.682	0.732
6100.000	0.619	183.184	6099.488	-28.209	-38.267	-28.209	47.540	233.604	0.120
6200.000	0.425	185.895	6199.483	-29.116	-38.335	-29.116	48.139	232.783	0.195
6300.000	0.463	193.717	6299.481	-29.877	-38.469	-29.877	48.709	232.165	0.071
6400.000	0.474	204.487	6399.477	-30.646	-38.736	-30.646	49.393	231.651	0.089
6500.000	0.404	203.715	6499.474	-31.345	-39.049	-31.345	50.073	231.246	0.071
6600.000	0.373	222.669	6599.472	-31.907	-39.412	-31.907	50.708	231.007	0.131
6700.000	0.487	198.421	6699.469	-32.550	-39.767	-32.550	51.390	230.699	0.212
6800.000	0.531	234.085	6799.466	-33.225	-40.276	-33.225	52.212	230.480	0.314
6900.000	0.650	233.413	6899.460	-33.835	-41.107	-33.835	53.241	230.542	0.120
7000.000	0.671	232.026	6999.454	-34.534	-42.024	-34.534	54.393	230.588	0.026
7100.000	0.823	232.530	7099.445	-35.331	-43.056	-35.331	55.696	230.628	0.152
7200.000	1.003	240.925	7199.432	-36.193	-44.391	-36.193	57.275	230.809	0.224
7300.000	0.840	227.934	7299.419	-37.109	-45.700	-37.109	58.869	230.923	0.264
7400.000	1.264	225.023	7399.402	-38.380	-47.024	-38.380	60.698	230.780	0.427