



Company/Rig: Noble Energy/CoreTech
WELL/API#: Arnbrecht 02-27/05-123-12647
DECLINATION: 8.22 Degrees
TD AS DRILLED: 7316 Feet
COUNTY/STATE: Weld/Colorado
VS-Azi: 0.000 Degrees
Latitude: 40.45763, Longitude: -104.76196
Grid North = True North -0.48 degs (NAD 27)
Grid Correction Applied = -0.48 degs



DEPTH REFERENCE : RKB=GL Elevation= 4713 Feet

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01-de_01.ut

Minimum Curvature Method

Report Date/Time: 5/22/2017 / 14:41

LAT & LONG OBTAINED BY HANDHELD GPS AT WELLHEAD

NORTH REFERENCE: GRID

HENDERSON, COLORADO

303-853-4976

Surveyor: Geof Davis / Arnbrecht 02-27

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	0.544	122.883	99.998	-0.258	0.399	-0.258	0.475	122.883	0.544
200.000	0.164	127.671	199.996	-0.603	0.910	-0.603	1.092	123.508	0.381
300.000	0.536	162.528	299.994	-1.136	1.164	-1.136	1.627	134.316	0.413
400.000	0.357	169.553	399.991	-1.889	1.361	-1.889	2.328	144.235	0.187
500.000	0.801	146.670	499.986	-2.780	1.801	-2.780	3.312	147.055	0.492
600.000	0.728	155.304	599.977	-3.940	2.451	-3.940	4.640	148.123	0.136
700.000	0.166	196.644	699.974	-4.656	2.674	-4.656	5.370	150.128	0.613
800.000	0.417	234.228	799.973	-5.008	2.338	-5.008	5.527	154.974	0.303
900.000	0.186	164.866	899.971	-5.377	2.085	-5.377	5.767	158.804	0.392
1000.000	0.286	163.734	999.971	-5.773	2.197	-5.773	6.177	159.162	0.100
1100.000	0.475	245.271	1099.969	-6.186	1.891	-6.186	6.469	163.001	0.517
1200.000	0.372	258.340	1199.966	-6.425	1.197	-6.425	6.535	169.449	0.140
1300.000	0.223	342.946	1299.965	-6.304	0.821	-6.304	6.357	172.577	0.416
1400.000	0.380	319.913	1399.964	-5.864	0.551	-5.864	5.890	174.636	0.195
1500.000	0.462	285.826	1499.961	-5.501	-0.050	-5.501	5.501	180.526	0.259
1600.000	0.277	355.243	1599.960	-5.150	-0.458	-5.150	5.170	185.083	0.447

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
1700.000	0.582	243.395	1699.958	-5.136	-0.932	-5.136	5.220	190.288	0.732
1800.000	0.676	225.586	1799.952	-5.776	-1.808	-5.776	6.053	197.378	0.216
1900.000	1.045	212.847	1899.940	-6.955	-2.724	-6.955	7.470	201.385	0.413
2000.000	1.519	206.639	1999.915	-8.906	-3.813	-8.906	9.688	203.175	0.493
2100.000	1.848	225.728	2099.873	-11.216	-5.561	-11.216	12.519	206.373	0.646
2200.000	2.373	235.900	2199.805	-13.503	-8.430	-13.503	15.918	211.978	0.643
2300.000	2.631	234.232	2299.709	-16.005	-12.007	-16.005	20.008	216.877	0.268
2400.000	2.130	242.724	2399.623	-18.198	-15.521	-18.198	23.918	220.461	0.611
2500.000	2.227	252.424	2499.551	-19.637	-19.026	-19.637	27.342	224.095	0.381
2600.000	2.174	253.062	2599.477	-20.776	-22.692	-20.776	30.767	227.524	0.059
2700.000	2.225	274.786	2699.406	-21.167	-26.441	-21.167	33.869	231.322	0.830
2800.000	2.440	273.594	2799.323	-20.871	-30.499	-20.871	36.957	235.615	0.220
2900.000	2.374	275.669	2899.234	-20.533	-34.684	-20.533	40.306	239.374	0.109
3000.000	1.793	278.777	2999.168	-20.090	-38.292	-20.090	43.242	242.316	0.592
3100.000	1.857	273.751	3099.117	-19.745	-41.455	-19.745	45.917	244.531	0.172
3200.000	1.363	266.893	3199.078	-19.704	-44.259	-19.704	48.447	246.002	0.529
3300.000	0.830	274.238	3299.059	-19.715	-46.169	-19.715	50.202	246.877	0.551
3400.000	0.993	239.175	3399.047	-20.105	-47.635	-20.105	51.704	247.117	0.571
3500.000	0.550	261.434	3499.038	-20.620	-48.854	-20.620	53.027	247.116	0.527
3600.000	0.450	226.123	3599.034	-20.964	-49.612	-20.964	53.859	247.093	0.318
3700.000	0.517	243.370	3699.031	-21.438	-50.297	-21.438	54.675	246.915	0.159
3800.000	0.460	327.923	3799.028	-21.300	-50.913	-21.300	55.189	247.298	0.658
3900.000	0.058	73.541	3899.027	-20.945	-51.078	-20.945	55.206	247.703	0.479
4000.000	0.112	12.684	3999.027	-20.836	-51.008	-20.836	55.100	247.781	0.098
4100.000	0.685	191.769	4099.025	-21.326	-51.109	-21.326	55.379	247.351	0.797
4200.000	0.750	200.644	4199.017	-22.523	-51.461	-22.523	56.174	246.362	0.129
4300.000	0.851	214.170	4299.008	-23.750	-52.109	-23.750	57.266	245.498	0.213
4400.000	0.874	209.157	4398.996	-25.031	-52.898	-25.031	58.521	244.677	0.079
4500.000	0.493	198.261	4498.989	-26.106	-53.404	-26.106	59.443	243.949	0.400
4600.000	0.496	193.084	4598.985	-26.936	-53.637	-26.936	60.021	243.334	0.045
4700.000	0.464	175.497	4698.982	-27.762	-53.704	-27.762	60.455	242.664	0.150
4800.000	0.480	225.469	4798.979	-28.459	-53.970	-28.459	61.014	242.197	0.399
4900.000	0.796	234.129	4898.973	-29.160	-54.832	-29.160	62.103	241.996	0.330
5000.000	0.697	244.771	4998.964	-29.826	-55.945	-29.826	63.399	241.937	0.170
5100.000	0.619	278.900	5098.958	-30.002	-57.029	-30.002	64.439	242.252	0.393
5200.000	0.758	313.443	5198.951	-29.463	-58.043	-29.463	65.093	243.087	0.430
5300.000	0.448	307.940	5298.945	-28.768	-58.832	-28.768	65.488	243.942	0.316
5400.000	0.761	37.854	5398.941	-28.003	-58.732	-28.003	65.067	244.508	0.882
5500.000	1.204	23.501	5498.927	-26.516	-57.906	-26.516	63.688	245.396	0.503

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
5600.000	0.689	20.971	5598.913	-24.991	-57.272	-24.991	62.487	246.425	0.517
5700.000	1.123	30.414	5698.900	-23.585	-56.561	-23.585	61.281	247.364	0.458
5800.000	0.625	346.406	5798.889	-22.211	-56.193	-22.211	60.423	248.433	0.801
5900.000	1.055	15.733	5898.878	-20.794	-56.071	-20.794	59.803	249.653	0.595
6000.000	0.937	2.017	5998.863	-19.091	-55.793	-19.091	58.969	251.110	0.265
6100.000	0.654	355.257	6098.854	-17.705	-55.811	-17.705	58.553	252.399	0.297
6200.000	0.500	330.442	6198.849	-16.757	-56.074	-16.757	58.524	253.362	0.290
6300.000	0.878	325.392	6298.841	-15.747	-56.724	-15.747	58.869	254.485	0.383
6400.000	1.161	331.186	6398.825	-14.229	-57.648	-14.229	59.378	256.135	0.300
6500.000	1.211	322.203	6498.804	-12.506	-58.783	-12.506	60.099	257.989	0.192
6600.000	1.968	307.231	6598.765	-10.633	-60.798	-10.633	61.721	260.080	0.857
6700.000	1.472	318.613	6698.720	-8.630	-63.014	-8.630	63.602	262.201	0.600
6800.000	1.599	297.929	6798.685	-7.013	-65.096	-7.013	65.472	263.851	0.565
6900.000	0.958	265.298	6898.661	-6.429	-67.161	-6.429	67.468	264.532	0.945
7000.000	0.988	251.279	6998.647	-6.774	-68.811	-6.774	69.144	264.378	0.239
7100.000	1.135	210.752	7098.631	-7.901	-70.134	-7.901	70.577	263.572	0.748