



Company/Rig: Noble Energy Inc/Production
WELL/API#: Johnson 22-34 I/05-123-26604
DECLINATION: 8.3 Degrees
TD AS DRILLED: 9100'
COUNTY/STATE: Weld/Colorado
VS-Azi: 0.000 Degrees
Latitude: 40.46743, Longitude: -104.65163
Grid North = True North -0.55 degs (NAD 27)
Grid Correction Applied = -0.55 degs



DEPTH REFERENCE : RKB=GL/Elevation=4709'

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01-de_01.ut

Minimum Curvature Method

Report Date/Time: 2/15/2016 / 13:30

Lat/Long Obtained By Handheld GPS at Wellhead

North Reference: Grid

Denver, Colorado

303-853-4976

Surveyor: Jason Kinchelow /Johnson 22-34I

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	0.196	265.101	100.000	-0.015	-0.170	-0.015	0.171	265.101	0.196
200.000	0.122	245.510	199.999	-0.073	-0.438	-0.073	0.444	260.496	0.091
300.000	0.297	232.619	299.999	-0.275	-0.740	-0.275	0.789	249.642	0.180
400.000	0.170	227.432	399.998	-0.533	-1.056	-0.533	1.182	243.227	0.128
500.000	0.162	245.023	499.997	-0.693	-1.293	-0.693	1.467	241.818	0.052
600.000	0.028	189.790	599.997	-0.776	-1.425	-0.776	1.623	241.421	0.147
700.000	0.020	135.453	699.997	-0.813	-1.417	-0.813	1.633	240.164	0.023
800.000	0.039	175.110	799.997	-0.859	-1.402	-0.859	1.644	238.496	0.027
900.000	0.297	102.346	899.997	-0.948	-1.145	-0.948	1.487	230.375	0.288
1000.000	0.496	0.356	999.995	-0.571	-0.890	-0.571	1.057	237.305	0.629
1100.000	0.388	43.856	1099.993	0.106	-0.652	0.106	0.661	279.252	0.343
1200.000	0.402	349.797	1199.990	0.696	-0.479	0.696	0.845	325.431	0.359
1300.000	0.250	336.915	1299.989	1.242	-0.627	1.242	1.391	333.204	0.168
1400.000	0.406	48.073	1399.988	1.679	-0.449	1.679	1.738	345.031	0.402
1500.000	0.490	16.213	1499.985	2.326	-0.066	2.326	2.327	358.375	0.259
1600.000	0.205	9.520	1599.983	2.913	0.083	2.913	2.914	1.630	0.287
1700.000	0.258	49.477	1699.982	3.236	0.284	3.236	3.248	5.012	0.166
1800.000	0.102	27.162	1799.981	3.462	0.496	3.462	3.497	8.152	0.168

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	0.626	172.821	1899.980	2.999	0.605	2.999	3.060	11.402	0.713
2000.000	1.198	189.046	1999.967	1.425	0.509	1.425	1.513	19.648	0.622
2100.000	1.233	194.005	2099.944	-0.651	0.084	-0.651	0.656	172.632	0.111
2200.000	1.127	199.062	2199.923	-2.624	-0.497	-2.624	2.671	190.732	0.148
2300.000	1.076	185.957	2299.905	-4.488	-0.916	-4.488	4.580	191.536	0.256
2400.000	0.952	190.592	2399.889	-6.238	-1.166	-6.238	6.346	190.588	0.149
2500.000	0.469	192.766	2499.881	-7.454	-1.409	-7.454	7.586	190.706	0.484
2600.000	0.715	210.105	2599.876	-8.392	-1.812	-8.392	8.585	192.186	0.302
2700.000	0.640	187.244	2699.869	-9.485	-2.195	-9.485	9.736	193.032	0.278
2800.000	0.226	265.556	2799.866	-10.054	-2.462	-10.054	10.352	193.761	0.634
2900.000	0.080	41.476	2899.866	-10.018	-2.613	-10.018	10.353	194.618	0.289
3000.000	0.074	59.485	2999.866	-9.932	-2.511	-9.932	10.245	194.186	0.025
3100.000	0.183	266.899	3099.866	-9.908	-2.614	-9.908	10.247	194.779	0.251
3200.000	0.579	238.883	3199.864	-10.178	-3.206	-10.178	10.671	197.483	0.427
3300.000	1.195	205.224	3299.852	-11.383	-4.083	-11.383	12.093	199.733	0.782
3400.000	1.249	173.373	3399.830	-13.409	-4.402	-13.409	14.113	198.174	0.672
3500.000	1.546	163.840	3499.800	-15.786	-3.901	-15.786	16.261	193.879	0.376
3600.000	2.379	154.439	3599.741	-18.954	-2.630	-18.954	19.136	187.899	0.890
3700.000	2.748	138.589	3699.642	-22.624	-0.149	-22.624	22.625	180.377	0.795
3800.000	2.906	133.153	3799.521	-26.155	3.285	-26.155	26.361	172.841	0.311
3900.000	3.035	130.287	3899.386	-29.601	7.154	-29.601	30.453	166.413	0.197
4000.000	2.492	132.534	3999.270	-32.783	10.776	-32.783	34.508	161.804	0.554
4100.000	1.618	132.587	4099.204	-35.208	13.417	-35.208	37.678	159.139	0.875
4200.000	0.831	148.878	4199.181	-36.784	14.832	-36.784	39.662	158.040	0.852
4300.000	0.665	152.527	4299.173	-37.920	15.474	-37.920	40.956	157.801	0.173
4400.000	0.611	185.043	4399.167	-38.965	15.695	-38.965	42.008	158.061	0.361
4500.000	0.778	227.612	4499.160	-39.954	15.147	-39.954	42.728	159.238	0.527
4600.000	0.793	258.889	4599.151	-40.544	13.967	-40.544	42.883	160.992	0.424
4700.000	1.785	259.903	4699.124	-40.951	11.755	-40.951	42.604	163.984	0.992
4800.000	1.377	270.599	4799.086	-41.211	9.020	-41.211	42.187	167.655	0.502
4900.000	0.628	252.966	4899.071	-41.359	7.294	-41.359	41.998	169.998	0.801
5000.000	0.848	232.924	4999.062	-41.966	6.180	-41.966	42.418	171.623	0.336
5100.000	0.698	192.353	5099.054	-43.007	5.459	-43.007	43.352	172.766	0.554
5200.000	0.655	188.426	5199.047	-44.167	5.245	-44.167	44.478	173.228	0.064
5300.000	0.621	150.484	5299.041	-45.204	5.428	-45.204	45.529	173.152	0.416
5400.000	1.143	97.535	5399.030	-45.807	6.684	-45.807	46.292	171.698	0.915
5500.000	1.307	81.690	5499.008	-45.772	8.802	-45.772	46.611	169.115	0.375
5600.000	0.809	45.350	5598.992	-45.111	10.434	-45.111	46.302	166.977	0.812
5700.000	0.394	358.783	5698.986	-44.271	10.929	-44.271	45.600	166.133	0.610
5800.000	0.585	320.458	5798.983	-43.533	10.596	-43.533	44.804	166.320	0.368

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	0.797	316.193	5898.976	-42.637	9.790	-42.637	43.747	167.069	0.218
6000.000	0.865	321.026	5998.965	-41.549	8.834	-41.549	42.477	167.997	0.097
6100.000	0.898	328.776	6098.953	-40.292	7.953	-40.292	41.069	168.834	0.124
6200.000	1.155	339.323	6198.937	-38.679	7.191	-38.679	39.342	169.468	0.318
6300.000	1.638	325.992	6298.907	-36.552	6.036	-36.552	37.047	170.623	0.579
6400.000	1.416	324.834	6398.872	-34.357	4.525	-34.357	34.654	172.497	0.224
6500.000	1.917	328.404	6498.829	-31.922	2.937	-31.922	32.057	174.744	0.512
6600.000	2.145	329.375	6598.766	-28.887	1.107	-28.887	28.908	177.806	0.231
6700.000	2.130	316.072	6698.697	-25.937	-1.136	-25.937	25.962	182.508	0.495
6800.000	1.705	313.734	6798.641	-23.570	-3.501	-23.570	23.828	188.448	0.432
6900.000	2.404	331.972	6898.577	-20.690	-5.562	-20.690	21.424	195.046	0.949
7000.000	2.840	344.646	6998.473	-16.449	-7.203	-16.449	17.957	203.649	0.723
7100.000	2.521	347.288	7098.364	-11.915	-8.343	-11.915	14.545	215.002	0.342
7200.000	1.610	356.552	7198.298	-8.367	-8.912	-8.367	12.224	226.806	0.967
7300.000	0.860	28.303	7298.275	-6.304	-8.641	-6.304	10.696	233.887	0.989
7400.000	1.145	68.483	7398.261	-5.277	-7.355	-5.277	9.053	234.343	0.739
7500.000	1.282	83.474	7498.239	-4.783	-5.314	-4.783	7.150	228.010	0.345
7600.000	0.979	94.422	7598.219	-4.722	-3.351	-4.722	5.790	215.360	0.371
7700.000	0.857	107.494	7698.206	-5.013	-1.785	-5.013	5.321	199.604	0.242
7800.000	0.796	98.551	7798.196	-5.341	-0.385	-5.341	5.355	184.126	0.143
7900.000	0.748	113.966	7898.187	-5.710	0.898	-5.710	5.780	171.060	0.212
8000.000	0.573	116.692	7998.180	-6.199	1.941	-6.199	6.496	162.611	0.179
8100.000	0.706	125.723	8098.174	-6.783	2.888	-6.783	7.372	156.940	0.166
8200.000	0.732	148.887	8198.166	-7.690	3.718	-7.690	8.541	154.198	0.290
8300.000	0.549	199.589	8298.161	-8.689	3.887	-8.689	9.518	155.897	0.573
8400.000	0.882	223.488	8398.153	-9.699	3.197	-9.699	10.212	161.758	0.440
8500.000	0.839	224.632	8498.142	-10.779	2.152	-10.779	10.991	168.708	0.046
8600.000	1.003	214.629	8598.129	-12.020	1.140	-12.020	12.074	174.581	0.229