



Company/Rig: Noble Energy Inc/Production
WELL/API#: Bruce 17-35/05-123-22847
DECLINATION: 8.16 Degrees
TD AS DRILLED: 7132'
COUNTY/STATE: Weld/Colorado
VS-Azi: 0.000 Degrees
Latitude: 40.48219, Longitude: -104.57903
Grid North = True North -0.60 degs (NAD 27)
Grid Correction Applied = -0.60 degs



DEPTH REFERENCE : RKB=GL/Elevation= 4730'

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01-de_01.ut

Minimum Curvature Method

Report Date/Time: 1/25/2017 / 15:11

Lat/Long Obtained By Handheld GPS at Wellhead

North Reference: Grid

Denver, Colorado

303-853-4976

Surveyor: Jason Kinchelow / Bruce 17-35

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	0.239	101.270	100.000	-0.041	0.205	-0.041	0.209	101.270	0.239
200.000	0.203	98.232	199.999	-0.107	0.585	-0.107	0.595	100.366	0.038
300.000	0.117	118.338	299.999	-0.181	0.850	-0.181	0.869	102.014	0.101
400.000	0.162	195.333	399.998	-0.365	0.903	-0.365	0.974	112.037	0.177
500.000	0.039	198.166	499.998	-0.534	0.855	-0.534	1.008	121.982	0.123
600.000	0.131	178.035	599.998	-0.680	0.848	-0.680	1.087	128.727	0.095
700.000	0.246	198.013	699.998	-0.998	0.786	-0.998	1.271	141.804	0.131
800.000	0.222	203.037	799.997	-1.381	0.644	-1.381	1.523	155.012	0.032
900.000	0.165	187.354	899.996	-1.702	0.549	-1.702	1.788	162.108	0.077
1000.000	0.305	198.233	999.995	-2.098	0.448	-2.098	2.145	167.953	0.146
1100.000	0.121	203.602	1099.995	-2.447	0.322	-2.447	2.468	172.496	0.185
1200.000	0.062	235.884	1199.994	-2.573	0.236	-2.573	2.584	174.767	0.076
1300.000	0.236	203.667	1299.994	-2.793	0.108	-2.793	2.795	177.777	0.187
1400.000	0.122	265.077	1399.994	-2.991	-0.080	-2.991	2.992	181.542	0.208
1500.000	0.265	265.855	1499.993	-3.017	-0.418	-3.017	3.045	187.880	0.143
1600.000	0.354	292.586	1599.992	-2.915	-0.934	-2.915	3.061	197.768	0.167

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	0.252	272.819	1699.990	-2.785	-1.439	-2.785	3.135	207.328	0.145
1800.000	0.402	262.219	1799.989	-2.822	-2.006	-2.822	3.462	215.415	0.161
1900.000	0.576	283.916	1899.985	-2.748	-2.842	-2.748	3.953	225.958	0.251
2000.000	0.451	293.592	1999.981	-2.470	-3.690	-2.470	4.440	236.206	0.152
2100.000	0.604	284.150	2099.977	-2.184	-4.561	-2.184	5.057	244.419	0.175
2200.000	0.505	297.963	2199.972	-1.848	-5.461	-1.848	5.765	251.301	0.166
2300.000	0.440	278.023	2299.969	-1.588	-6.230	-1.588	6.429	255.697	0.176
2400.000	0.290	298.312	2399.967	-1.415	-6.833	-1.415	6.978	258.303	0.196
2500.000	0.344	303.169	2499.965	-1.131	-7.307	-1.131	7.394	261.205	0.060
2600.000	0.389	280.640	2599.963	-0.904	-7.892	-0.904	7.944	263.467	0.150
2700.000	0.289	288.821	2699.961	-0.760	-8.465	-0.760	8.499	264.871	0.111
2800.000	0.376	289.236	2799.960	-0.570	-9.013	-0.570	9.031	266.380	0.087
2900.000	0.046	350.098	2899.959	-0.423	-9.330	-0.423	9.339	267.406	0.356
3000.000	0.186	267.770	2999.959	-0.390	-9.499	-0.390	9.507	267.651	0.185
3100.000	0.251	269.509	3099.958	-0.398	-9.880	-0.398	9.888	267.694	0.065
3200.000	0.057	219.973	3199.958	-0.438	-10.131	-0.438	10.140	267.527	0.218
3300.000	0.221	194.538	3299.957	-0.662	-10.211	-0.662	10.232	266.290	0.171
3400.000	0.304	110.607	3399.957	-0.942	-10.011	-0.942	10.055	264.625	0.356
3500.000	0.781	106.796	3499.952	-1.232	-9.110	-1.232	9.193	262.297	0.478
3600.000	1.056	106.395	3599.939	-1.689	-7.574	-1.689	7.760	257.426	0.275
3700.000	1.178	124.178	3699.920	-2.527	-5.839	-2.527	6.362	246.601	0.366
3800.000	1.070	105.845	3799.901	-3.359	-4.091	-3.359	5.293	230.608	0.374
3900.000	1.084	109.751	3899.884	-3.934	-2.302	-3.934	4.558	210.339	0.075
4000.000	1.114	141.749	3999.866	-5.017	-0.810	-5.017	5.082	189.177	0.606
4100.000	1.058	114.579	4099.849	-6.164	0.631	-6.164	6.196	174.154	0.513
4200.000	1.053	113.473	4199.832	-6.914	2.314	-6.914	7.291	161.498	0.021
4300.000	1.063	110.868	4299.815	-7.611	4.023	-7.611	8.609	152.136	0.049
4400.000	0.734	117.151	4399.802	-8.233	5.460	-8.233	9.879	146.448	0.344
4500.000	0.783	102.487	4499.794	-8.673	6.697	-8.673	10.958	142.325	0.200
4600.000	0.531	83.075	4599.787	-8.765	7.825	-8.765	11.750	138.245	0.333
4700.000	0.275	71.069	4699.785	-8.631	8.512	-8.631	12.122	135.399	0.268
4800.000	0.435	88.973	4799.783	-8.547	9.119	-8.547	12.498	133.144	0.193
4900.000	0.527	98.300	4899.779	-8.606	9.954	-8.606	13.159	130.847	0.121
5000.000	0.697	88.829	4999.773	-8.660	11.018	-8.660	14.014	128.168	0.197
5100.000	0.389	91.662	5099.769	-8.658	11.965	-8.658	14.769	125.889	0.310
5200.000	0.440	115.785	5199.766	-8.834	12.650	-8.834	15.429	124.930	0.180
5300.000	0.313	212.146	5299.765	-9.233	12.850	-9.233	15.823	125.698	0.568
5400.000	0.351	187.059	5399.763	-9.768	12.667	-9.768	15.996	127.638	0.149
5500.000	0.083	191.142	5499.762	-10.143	12.615	-10.143	16.187	128.801	0.268

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	0.167	61.382	5599.762	-10.145	12.729	-10.145	16.277	128.554	0.230
5700.000	0.332	100.050	5699.761	-10.126	13.142	-10.126	16.591	127.613	0.226
5800.000	0.210	153.480	5799.760	-10.340	13.509	-10.340	17.012	127.432	0.267
5900.000	0.566	60.572	5899.759	-10.262	14.021	-10.262	17.375	126.199	0.614
6000.000	0.729	60.866	5999.752	-9.709	15.007	-9.709	17.874	122.901	0.163
6100.000	1.297	40.914	6099.736	-8.544	16.304	-8.544	18.408	117.656	0.660
6200.000	1.151	35.281	6199.714	-6.870	17.625	-6.870	18.917	111.293	0.189
6300.000	0.738	34.631	6299.700	-5.520	18.571	-5.520	19.374	106.553	0.412
6400.000	0.787	351.036	6399.692	-4.311	18.830	-4.311	19.318	102.896	0.568
6500.000	0.473	359.941	6499.686	-3.221	18.723	-3.221	18.998	99.760	0.328
6600.000	0.516	37.996	6599.682	-2.453	19.000	-2.453	19.157	97.358	0.325
6700.000	0.181	60.269	6699.680	-2.020	19.414	-2.020	19.519	95.941	0.354
6800.000	0.313	111.474	6799.679	-2.042	19.805	-2.042	19.910	95.886	0.244
6900.000	0.423	99.018	6899.677	-2.200	20.424	-2.200	20.542	96.147	0.136