



Company/Rig: Noble Energy Inc/Production
WELL/API#: Alles 1-23 /05-123-13070
DECLINATION: 8.22 Degrees
TD AS DRILLED: 7306'
COUNTY/STATE: Weld/Colorado
VS-Azi: 0.000 Degrees
Latitude: 40.47930, Longitude: -104.74734
Grid North = True North -0.49 degs (NAD 27)
Grid Correction Applied = -0.49 degs



DEPTH REFERENCE : RKB=GL/Elevation= 4746'

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01-de_01.ut

Minimum Curvature Method

Report Date/Time: 5/22/2017 / 14:10

Lat/Long Obtained By Handheld GPS at Wellhead

North Reference: Grid

Denver, Colorado

303-853-4976

Surveyor: Jason Kinchelow / Alles 1-23

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	0.543	326.826	99.999	0.397	-0.259	0.397	0.474	326.826	0.543
200.000	0.369	337.885	199.995	1.091	-0.640	1.091	1.265	329.622	0.195
300.000	0.120	273.331	299.994	1.396	-0.865	1.396	1.642	328.202	0.335
400.000	0.177	272.602	399.994	1.409	-1.124	1.409	1.802	321.415	0.057
500.000	0.141	251.121	499.994	1.376	-1.395	1.376	1.959	314.617	0.069
600.000	0.170	206.864	599.993	1.204	-1.578	1.204	1.985	307.353	0.120
700.000	0.128	184.132	699.993	0.961	-1.653	0.961	1.912	300.179	0.072
800.000	0.120	275.092	799.993	0.859	-1.765	0.859	1.963	295.957	0.177
900.000	0.140	208.651	899.993	0.761	-1.928	0.761	2.073	291.536	0.144
1000.000	0.241	239.370	999.992	0.546	-2.168	0.546	2.236	284.149	0.140
1100.000	0.179	242.400	1099.991	0.367	-2.487	0.367	2.514	278.398	0.063
1200.000	0.117	286.068	1199.991	0.323	-2.723	0.323	2.743	276.765	0.124
1300.000	0.442	285.531	1299.990	0.455	-3.194	0.455	3.226	278.104	0.326
1400.000	0.337	298.376	1399.988	0.698	-3.824	0.698	3.887	280.341	0.137
1500.000	0.535	303.796	1499.985	1.097	-4.471	1.097	4.604	283.789	0.203
1600.000	0.441	290.514	1599.981	1.492	-5.220	1.492	5.429	285.952	0.147

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	0.501	291.927	1699.978	1.790	-5.986	1.790	6.248	286.650	0.061
1800.000	0.441	296.634	1799.974	2.126	-6.735	2.126	7.062	287.517	0.071
1900.000	0.409	321.476	1899.972	2.578	-7.301	2.578	7.743	289.445	0.185
2000.000	0.367	314.956	1999.969	3.084	-7.751	3.084	8.341	291.696	0.061
2100.000	0.336	330.446	2099.967	3.565	-8.122	3.565	8.870	293.699	0.100
2200.000	0.469	345.774	2199.965	4.217	-8.367	4.217	9.370	296.747	0.170
2300.000	0.533	341.191	2299.961	5.054	-8.618	5.054	9.990	300.389	0.076
2400.000	0.483	357.945	2399.957	5.915	-8.783	5.915	10.589	303.961	0.156
2500.000	0.453	349.655	2499.954	6.725	-8.869	6.725	11.130	307.173	0.074
2600.000	0.343	16.423	2599.952	7.401	-8.855	7.401	11.541	309.888	0.213
2700.000	0.266	1.372	2699.950	7.920	-8.765	7.920	11.813	312.101	0.111
2800.000	0.184	324.871	2799.949	8.283	-8.852	8.283	12.123	313.100	0.161
2900.000	0.099	217.067	2899.949	8.346	-8.996	8.346	12.271	312.852	0.234
3000.000	0.261	198.668	2999.949	8.061	-9.121	8.061	12.173	311.471	0.170
3100.000	0.274	199.246	3099.948	7.620	-9.273	7.620	12.002	309.413	0.013
3200.000	0.324	167.269	3199.946	7.119	-9.289	7.119	11.703	307.464	0.172
3300.000	0.923	148.062	3299.940	6.159	-8.801	6.159	10.742	304.986	0.626
3400.000	1.358	146.296	3399.920	4.490	-7.717	4.490	8.929	300.192	0.436
3500.000	0.809	143.428	3499.902	2.938	-6.639	2.938	7.260	293.867	0.551
3600.000	0.307	245.941	3599.898	2.261	-6.463	2.261	6.847	289.286	0.925
3700.000	0.669	347.706	3699.896	2.723	-6.832	2.723	7.354	291.733	0.791
3800.000	0.694	333.052	3799.889	3.834	-7.231	3.834	8.184	297.934	0.176
3900.000	0.680	346.976	3899.882	4.952	-7.639	4.952	9.104	302.956	0.167
4000.000	0.939	345.028	3999.872	6.322	-7.984	6.322	10.184	308.373	0.260
4100.000	1.433	358.223	4099.850	8.363	-8.235	8.363	11.737	315.444	0.561
4200.000	1.507	358.705	4199.817	10.927	-8.303	10.927	13.724	322.771	0.075
4300.000	1.438	350.457	4299.784	13.479	-8.541	13.479	15.957	327.640	0.223
4400.000	1.472	343.913	4399.752	15.950	-9.105	15.950	18.366	330.281	0.169
4500.000	1.578	349.416	4499.717	18.537	-9.713	18.537	20.928	332.345	0.181
4600.000	1.474	339.856	4599.681	21.098	-10.409	21.098	23.526	333.739	0.274
4700.000	1.445	344.307	4699.649	23.518	-11.193	23.518	26.046	334.549	0.117
4800.000	1.370	338.515	4799.619	25.844	-11.972	25.844	28.482	335.145	0.161
4900.000	0.980	343.585	4899.598	27.777	-12.651	27.777	30.522	335.513	0.402
5000.000	0.727	344.945	4999.586	29.210	-13.058	29.210	31.996	335.914	0.254
5100.000	0.643	329.969	5099.579	30.309	-13.503	30.309	33.181	335.986	0.197
5200.000	0.586	355.113	5199.574	31.304	-13.828	31.304	34.222	336.168	0.273
5300.000	0.211	330.520	5299.571	31.974	-13.962	31.974	34.890	336.410	0.403
5400.000	0.600	299.736	5399.569	32.394	-14.508	32.394	35.494	335.875	0.432
5500.000	0.289	345.309	5499.566	32.897	-15.026	32.897	36.166	335.452	0.448

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	0.262	56.479	5599.565	33.267	-14.899	33.267	36.451	335.874	0.321
5700.000	0.453	77.718	5699.563	33.477	-14.323	33.477	36.412	336.837	0.230
5800.000	0.359	112.148	5799.561	33.443	-13.646	33.443	36.120	337.802	0.257
5900.000	0.157	41.312	5899.560	33.429	-13.266	33.429	35.965	338.355	0.341
6000.000	0.437	158.185	5999.559	33.178	-13.034	33.178	35.646	338.553	0.527
6100.000	0.236	5.317	6099.558	33.029	-12.873	33.029	35.449	338.707	0.655
6200.000	0.160	90.107	6199.558	33.234	-12.714	33.234	35.583	339.065	0.273
6300.000	0.152	139.823	6299.557	33.132	-12.488	33.132	35.407	339.347	0.132
6400.000	0.172	84.241	6399.557	33.045	-12.254	33.045	35.244	339.655	0.152
6500.000	0.137	136.010	6499.557	32.975	-12.022	32.975	35.098	339.969	0.138
6600.000	0.096	221.012	6599.556	32.825	-11.994	32.825	34.948	339.928	0.160
6700.000	0.210	195.039	6699.556	32.585	-12.097	32.585	34.758	339.633	0.130
6800.000	0.222	195.222	6799.555	32.221	-12.195	32.221	34.451	339.269	0.013
6900.000	0.198	233.082	6899.555	31.930	-12.384	31.930	34.247	338.800	0.138
7000.000	0.324	192.551	6999.554	31.550	-12.584	31.550	33.967	338.254	0.216
7100.000	0.168	222.420	7099.553	31.165	-12.744	31.165	33.671	337.759	0.197