



Company/Rig: Noble Energy Inc/Production
WELL/API#: Alles 2-23/05-123-13071
DECLINATION: 8.22 Degrees
TD AS DRILLED: 7309'
COUNTY/STATE: Weld/Colorado
VS-Azi: 0.000 Degrees
Latitude: 40.47575, Longitude: -104.74637
Grid North = True North -0.49 degs (NAD 27)
Grid Correction Applied = -0.49 degs



DEPTH REFERENCE : RKB=GL/Elevation= 4737'

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01-de_01.ut

Minimum Curvature Method

Report Date/Time: 5/22/2017 / 14:29

Lat/Long Obtained By Handheld GPS at Wellhead

North Reference: Grid

Denver, Colorado

303-853-4976

Surveyor: Jason Kinchelov / Alles 2-23

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	0.198	326.414	100.000	0.144	-0.096	0.144	0.173	326.414	0.198
200.000	0.334	327.907	199.999	0.535	-0.346	0.535	0.638	327.096	0.136
300.000	0.378	0.414	299.997	1.112	-0.499	1.112	1.219	335.833	0.203
400.000	0.394	92.251	399.995	1.428	-0.153	1.428	1.436	353.882	0.554
500.000	0.119	201.635	499.995	1.317	0.152	1.317	1.326	6.581	0.448
600.000	0.375	84.430	599.994	1.252	0.440	1.252	1.327	19.341	0.443
700.000	0.113	305.297	699.993	1.341	0.685	1.341	1.506	27.046	0.467
800.000	0.071	5.019	799.993	1.460	0.609	1.460	1.582	22.654	0.099
900.000	0.072	28.292	899.993	1.577	0.645	1.577	1.704	22.230	0.029
1000.000	0.275	91.434	999.993	1.627	0.915	1.627	1.866	29.350	0.251
1100.000	0.293	132.984	1099.992	1.446	1.342	1.446	1.973	42.852	0.202
1200.000	0.217	145.206	1199.991	1.117	1.637	1.117	1.982	55.688	0.093
1300.000	0.392	143.187	1299.989	0.687	1.950	0.687	2.067	70.579	0.176
1400.000	0.619	155.553	1399.985	-0.079	2.379	-0.079	2.380	91.892	0.250
1500.000	0.516	166.964	1499.980	-1.009	2.704	-1.009	2.886	110.471	0.152
1600.000	0.849	171.287	1599.973	-2.180	2.918	-2.180	3.642	126.769	0.336

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	0.983	175.702	1699.960	-3.767	3.094	-3.767	4.875	140.604	0.152
1800.000	1.185	178.735	1799.942	-5.657	3.181	-5.657	6.490	150.646	0.210
1900.000	1.026	194.056	1899.924	-7.559	2.987	-7.559	8.127	158.439	0.334
2000.000	0.986	205.897	1999.909	-9.201	2.394	-9.201	9.507	165.417	0.211
2100.000	0.689	228.685	2099.898	-10.372	1.566	-10.372	10.489	171.413	0.440
2200.000	0.586	251.883	2199.892	-10.928	0.629	-10.928	10.946	176.708	0.276
2300.000	0.266	287.121	2299.889	-11.018	-0.079	-11.018	11.018	180.413	0.399
2400.000	0.574	24.846	2399.887	-10.495	-0.091	-10.495	10.495	180.497	0.665
2500.000	0.855	32.002	2499.879	-9.407	0.515	-9.407	9.421	176.867	0.294
2600.000	0.668	45.215	2599.871	-8.364	1.324	-8.364	8.468	171.004	0.255
2700.000	0.729	62.832	2699.863	-7.663	2.304	-7.663	8.002	163.268	0.222
2800.000	0.650	66.137	2799.856	-7.143	3.388	-7.143	7.906	154.627	0.089
2900.000	0.687	107.756	2899.850	-7.097	4.477	-7.097	8.391	147.755	0.476
3000.000	1.028	112.061	2999.839	-7.616	5.879	-7.616	9.621	142.336	0.347
3100.000	1.014	115.153	3099.823	-8.329	7.511	-8.329	11.216	137.957	0.057
3200.000	1.016	122.539	3199.807	-9.182	9.060	-9.182	12.899	135.385	0.131
3300.000	1.035	138.124	3299.791	-10.332	10.410	-10.332	14.667	134.784	0.279
3400.000	1.150	166.798	3399.774	-11.981	11.242	-11.981	16.429	136.822	0.552
3500.000	1.164	178.228	3499.754	-13.973	11.502	-13.973	18.098	140.538	0.231
3600.000	1.114	182.954	3599.734	-15.958	11.484	-15.958	19.661	144.261	0.106
3700.000	1.168	211.954	3699.715	-17.793	10.894	-17.793	20.864	148.522	0.574
3800.000	1.051	208.075	3799.696	-19.467	9.924	-19.467	21.850	152.989	0.139
3900.000	1.184	204.859	3899.677	-21.214	9.057	-21.214	23.067	156.880	0.147
4000.000	1.065	201.580	3999.658	-23.016	8.281	-23.016	24.460	160.211	0.136
4100.000	1.141	200.563	4099.639	-24.812	7.590	-24.812	25.947	162.992	0.079
4200.000	0.904	207.378	4199.623	-26.446	6.877	-26.446	27.325	165.424	0.266
4300.000	0.638	202.906	4299.614	-27.659	6.297	-27.659	28.367	167.174	0.273
4400.000	0.759	205.211	4399.607	-28.771	5.798	-28.771	29.350	168.606	0.124
4500.000	0.715	208.823	4499.598	-29.917	5.215	-29.917	30.369	170.111	0.063
4600.000	1.136	202.094	4599.585	-31.383	4.542	-31.383	31.710	171.766	0.434
4700.000	1.240	193.123	4699.564	-33.355	3.923	-33.355	33.585	173.292	0.213
4800.000	1.342	194.681	4799.538	-35.542	3.380	-35.542	35.703	174.567	0.108
4900.000	1.393	196.522	4899.510	-37.841	2.738	-37.841	37.940	175.862	0.067
5000.000	1.421	192.645	4999.480	-40.217	2.121	-40.217	40.272	176.982	0.099
5100.000	1.287	197.058	5099.452	-42.500	1.520	-42.500	42.527	177.952	0.170
5200.000	1.314	192.671	5199.426	-44.693	0.939	-44.693	44.703	178.797	0.103
5300.000	0.676	205.934	5299.411	-46.342	0.429	-46.342	46.344	179.469	0.675
5400.000	0.630	228.226	5399.404	-47.239	-0.239	-47.239	47.239	180.290	0.256
5500.000	0.464	229.129	5499.400	-47.870	-0.955	-47.870	47.880	181.143	0.166

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	0.408	272.212	5599.397	-48.122	-1.618	-48.122	48.149	181.925	0.325
5700.000	0.615	235.739	5699.393	-48.410	-2.417	-48.410	48.470	182.858	0.376
5800.000	0.450	254.668	5799.389	-48.816	-3.239	-48.816	48.923	183.797	0.239
5900.000	0.681	268.402	5899.384	-48.936	-4.212	-48.936	49.117	184.920	0.266
6000.000	0.700	240.534	5999.377	-49.254	-5.339	-49.254	49.542	186.186	0.333
6100.000	0.697	236.485	6099.370	-49.890	-6.377	-49.890	50.296	187.285	0.049
6200.000	0.872	253.242	6199.360	-50.445	-7.613	-50.445	51.016	188.582	0.287
6300.000	0.960	245.839	6299.348	-51.007	-9.106	-51.007	51.814	190.122	0.147
6400.000	1.131	248.444	6399.331	-51.712	-10.788	-51.712	52.826	191.784	0.178
6500.000	1.108	256.282	6499.312	-52.304	-12.645	-52.304	53.811	193.591	0.155
6600.000	1.120	259.505	6599.293	-52.712	-14.545	-52.712	54.682	195.426	0.064
6700.000	1.324	268.631	6699.270	-52.917	-16.661	-52.917	55.478	197.477	0.282
6800.000	1.495	259.123	6799.240	-53.191	-19.097	-53.191	56.515	199.750	0.289
6900.000	1.888	289.516	6899.198	-52.887	-21.930	-52.887	57.253	202.522	0.964
7000.000	2.257	272.205	6999.134	-52.261	-25.450	-52.261	58.128	205.965	0.722
7100.000	2.345	265.583	7099.053	-52.342	-29.457	-52.342	60.062	209.370	0.280