



Company/Rig: Noble Energy Inc/Production
WELL/API#: LDS D 17-33/05-123-30002
DECLINATION: 8.13 Degrees
TD AS DRILLED: 7166'
COUNTY/STATE: Weld/Colorado
VS-Azi: 0.000 Degrees
Latitude: 40.22197, Longitude: -104.58376
Grid North = True North -0.59 degs (NAD 27)
Grid Correction Applied = -0.59 degs



DEPTH REFERENCE : RKB=GL/Elevation=4760'

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01-de_01.ut

Minimum Curvature Method

Report Date/Time: 3/10/2017 / 15:20

Lat/Long Obtained By Handheld GPS at Wellhead

North Reference: Grid

Denver, Colorado

303-853-4976

Surveyor: Jason Kinchelow / LDS D 17-33

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	0.220	303.608	100.000	0.106	-0.160	0.106	0.192	303.608	0.220
200.000	0.057	278.085	199.999	0.219	-0.368	0.219	0.429	300.764	0.170
300.000	0.055	169.715	299.999	0.179	-0.409	0.179	0.446	293.656	0.090
400.000	0.539	203.942	399.998	-0.298	-0.591	-0.298	0.662	243.205	0.495
500.000	0.905	209.354	499.990	-1.417	-1.169	-1.417	1.837	219.524	0.372
600.000	1.249	241.099	599.973	-2.633	-2.511	-2.633	3.638	223.642	0.675
700.000	1.985	261.655	699.933	-3.411	-5.178	-3.411	6.200	236.629	0.926
800.000	2.059	264.821	799.871	-3.824	-8.681	-3.824	9.486	246.226	0.134
900.000	2.187	260.624	899.802	-4.297	-12.353	-4.297	13.079	250.819	0.201
1000.000	2.135	258.804	999.731	-4.970	-16.063	-4.970	16.814	252.809	0.086
1100.000	2.283	260.775	1099.657	-5.651	-19.856	-5.651	20.644	254.115	0.167
1200.000	2.197	264.013	1199.580	-6.170	-23.728	-6.170	24.517	255.425	0.153
1300.000	2.333	259.059	1299.502	-6.756	-27.633	-6.756	28.447	256.261	0.238
1400.000	2.177	266.885	1399.425	-7.245	-31.528	-7.245	32.349	257.057	0.345
1500.000	1.702	261.200	1499.368	-7.576	-34.891	-7.576	35.704	257.750	0.512
1600.000	1.921	258.434	1599.318	-8.139	-38.001	-8.139	38.863	257.911	0.236

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	1.634	255.357	1699.269	-8.835	-41.022	-8.835	41.963	257.845	0.303
1800.000	1.674	254.340	1799.228	-9.590	-43.807	-9.590	44.845	257.652	0.050
1900.000	1.733	254.640	1899.184	-10.385	-46.672	-10.385	47.814	257.456	0.060
2000.000	1.260	270.943	1999.150	-10.767	-49.230	-10.767	50.394	257.663	0.632
2100.000	1.445	258.508	2099.122	-11.000	-51.565	-11.000	52.725	257.957	0.346
2200.000	1.276	259.867	2199.094	-11.448	-53.896	-11.448	55.099	258.009	0.171
2300.000	1.071	256.636	2299.073	-11.860	-55.902	-11.860	57.147	258.022	0.215
2400.000	1.192	241.400	2399.053	-12.574	-57.726	-12.574	59.079	257.712	0.323
2500.000	1.936	225.502	2499.016	-14.256	-59.844	-14.256	61.518	256.601	0.854
2600.000	2.402	221.625	2598.944	-17.006	-62.441	-17.006	64.715	254.765	0.489
2700.000	2.495	222.101	2698.853	-20.187	-65.292	-20.187	68.341	252.819	0.095
2800.000	2.320	223.635	2798.764	-23.267	-68.148	-23.267	72.010	251.149	0.186
2900.000	2.213	226.438	2898.686	-26.062	-70.943	-26.062	75.579	249.828	0.154
3000.000	1.949	233.573	2998.620	-28.402	-73.710	-28.402	78.993	248.927	0.369
3100.000	1.478	231.827	3098.575	-30.209	-76.092	-30.209	81.870	248.347	0.474
3200.000	0.692	263.304	3198.557	-31.076	-77.706	-31.076	83.689	248.202	0.959
3300.000	1.022	301.492	3298.547	-30.681	-79.065	-30.681	84.809	248.791	0.641
3400.000	0.682	240.892	3398.537	-30.505	-80.346	-30.505	85.942	249.210	0.908
3500.000	1.385	230.797	3498.521	-31.559	-81.802	-31.559	87.679	248.904	0.723
3600.000	1.548	234.449	3598.488	-33.107	-83.837	-33.107	90.138	248.451	0.188
3700.000	1.786	182.329	3698.451	-35.450	-84.999	-35.450	92.095	247.361	1.480
3800.000	1.288	181.026	3798.415	-38.130	-85.083	-38.130	93.236	245.860	0.499
3900.000	1.160	179.053	3898.392	-40.266	-85.086	-40.266	94.133	244.675	0.135
4000.000	0.343	210.079	3998.383	-41.536	-85.219	-41.536	94.803	244.015	0.884
4100.000	0.712	301.064	4098.379	-41.474	-85.901	-41.474	95.389	244.228	0.795
4200.000	1.701	306.814	4198.356	-40.265	-87.621	-40.265	96.430	245.320	0.996
4300.000	2.388	314.731	4298.292	-37.909	-90.290	-37.909	97.925	247.225	0.742
4400.000	2.199	312.116	4398.212	-35.156	-93.193	-35.156	99.604	249.332	0.216
4500.000	1.910	314.118	4498.148	-32.709	-95.812	-32.709	101.242	251.151	0.298
4600.000	0.976	313.088	4598.115	-30.968	-97.630	-30.968	102.424	252.401	0.934
4700.000	0.708	6.463	4698.105	-29.772	-98.182	-29.772	102.597	253.131	0.793
4800.000	1.088	49.927	4798.094	-28.547	-97.386	-28.547	101.484	253.663	0.753
4900.000	1.531	88.093	4898.069	-27.891	-95.325	-27.891	99.322	253.691	0.953
5000.000	1.410	102.683	4998.037	-28.117	-92.790	-28.117	96.956	253.142	0.392
5100.000	1.290	85.763	5098.009	-28.304	-90.467	-28.304	94.791	252.627	0.415
5200.000	1.391	90.457	5197.982	-28.231	-88.131	-28.231	92.542	252.238	0.149
5300.000	1.235	52.521	5297.958	-27.585	-86.063	-27.585	90.375	252.228	0.866
5400.000	1.688	50.817	5397.925	-25.999	-84.066	-25.999	87.994	252.815	0.455
5500.000	1.810	61.495	5497.878	-24.314	-81.537	-24.314	85.085	253.395	0.348

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	1.959	62.538	5597.824	-22.772	-78.632	-22.772	81.863	253.849	0.153
5700.000	1.391	49.387	5697.782	-21.194	-76.193	-21.194	79.086	254.456	0.682
5800.000	1.909	70.256	5797.741	-19.841	-73.704	-19.841	76.328	254.933	0.785
5900.000	2.627	56.717	5897.662	-18.020	-70.221	-18.020	72.496	255.607	0.891
6000.000	6.041	56.506	5997.362	-13.857	-63.914	-13.857	65.399	257.767	3.414
6100.000	5.279	54.602	6096.873	-8.288	-55.776	-8.288	56.388	261.548	0.785
6200.000	4.359	54.112	6196.519	-3.395	-48.946	-3.395	49.064	266.032	0.921
6300.000	3.440	54.010	6296.286	0.595	-43.440	0.595	43.444	270.785	0.920
6400.000	2.672	54.145	6396.143	3.724	-39.123	3.724	39.300	275.437	0.767
6500.000	1.983	54.311	6496.060	6.098	-35.829	6.098	36.344	279.660	0.689
6600.000	1.029	108.220	6596.029	6.827	-33.570	6.827	34.257	281.495	1.608
6700.000	0.847	132.774	6696.016	6.044	-32.174	6.044	32.737	280.639	0.437
6800.000	0.533	128.188	6796.008	5.254	-31.266	5.254	31.704	279.540	0.318
6900.000	0.691	150.962	6896.003	4.440	-30.607	4.440	30.928	278.253	0.287