



Company/Rig: Noble Energy Inc/Production
WELL/API#: Carlson A18-17/05-123-32627
DECLINATION: 8.16 Degrees
TD AS DRILLED: 7142'
COUNTY/STATE: Weld/Colorado
VS-Azi: 0.000 Degrees
Latitude: 40.48952, Longitude: -104.58881
Grid North = True North -0.59 degs (NAD 27)
Grid Correction Applied = -0.59 degs



DEPTH REFERENCE : RKB=GL/Elevation= 4703'

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01-de_01.ut

Minimum Curvature Method

Report Date/Time: 2/9/2017 / 09:15

Lat/Long Obtained By Handheld GPS at Wellhead

North Reference: Grid

Denver, Colorado

303-853-4976

Surveyor: Jason Kinchelow / Carlson A18-17

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	0.100	31.148	100.000	0.075	0.045	0.075	0.087	31.148	0.100
200.000	0.425	79.946	199.999	0.215	0.456	0.215	0.504	64.801	0.367
300.000	0.797	124.770	299.993	-0.117	1.393	-0.117	1.398	94.820	0.579
400.000	1.516	144.838	399.973	-1.595	2.726	-1.595	3.158	120.340	0.814
500.000	1.186	136.933	499.945	-3.433	4.194	-3.433	5.420	129.299	0.378
600.000	0.753	126.466	599.930	-4.580	5.430	-4.580	7.103	130.146	0.466
700.000	0.866	83.327	699.921	-4.882	6.709	-4.882	8.297	126.047	0.604
800.000	1.016	96.900	799.908	-4.901	8.339	-4.901	9.672	120.446	0.267
900.000	0.880	88.000	899.894	-4.981	9.986	-4.981	11.159	116.510	0.200
1000.000	0.921	83.945	999.882	-4.869	11.553	-4.869	12.537	112.855	0.076
1100.000	0.881	89.828	1099.870	-4.782	13.121	-4.782	13.965	110.026	0.101
1200.000	0.770	89.649	1199.859	-4.776	14.562	-4.776	15.325	108.158	0.111
1300.000	0.736	75.958	1299.851	-4.616	15.857	-4.616	16.515	106.230	0.183
1400.000	0.264	45.089	1399.847	-4.298	16.643	-4.298	17.188	104.479	0.527
1500.000	0.390	60.918	1499.845	-3.970	17.103	-3.970	17.558	103.066	0.154
1600.000	0.415	35.422	1599.843	-3.509	17.611	-3.509	17.957	101.269	0.179

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	0.190	218.791	1699.842	-3.343	17.717	-3.343	18.030	100.685	0.604
1800.000	0.176	224.436	1799.842	-3.581	17.506	-3.581	17.869	101.562	0.023
1900.000	0.652	275.932	1899.839	-3.632	16.833	-3.632	17.220	102.176	0.560
2000.000	0.842	294.040	1999.830	-3.274	15.595	-3.274	15.935	101.855	0.301
2100.000	0.220	59.983	2099.827	-2.878	15.090	-2.878	15.362	100.798	0.988
2200.000	0.513	100.223	2199.825	-2.861	15.697	-2.861	15.956	100.331	0.373
2300.000	1.404	122.905	2299.810	-3.607	17.166	-3.607	17.541	101.865	0.952
2400.000	1.640	111.587	2399.775	-4.799	19.526	-4.799	20.107	103.808	0.381
2500.000	1.418	111.122	2499.740	-5.771	22.010	-5.771	22.754	104.692	0.223
2600.000	0.988	116.424	2599.717	-6.600	23.936	-6.600	24.830	105.416	0.443
2700.000	1.011	126.301	2699.702	-7.507	25.420	-7.507	26.505	106.452	0.174
2800.000	0.950	132.336	2799.688	-8.587	26.743	-8.587	28.088	107.801	0.120
2900.000	0.985	119.632	2899.674	-9.570	28.104	-9.570	29.688	108.806	0.217
3000.000	1.267	140.493	2999.655	-10.849	29.554	-10.849	31.483	110.157	0.493
3100.000	0.796	159.318	3099.638	-12.352	30.503	-12.352	32.909	112.044	0.575
3200.000	0.874	197.670	3199.628	-13.728	30.517	-13.728	33.462	114.221	0.554
3300.000	0.934	260.564	3299.618	-14.589	29.481	-14.589	32.893	116.329	0.945
3400.000	1.518	295.831	3399.596	-14.145	27.485	-14.145	30.912	117.233	0.928
3500.000	2.432	307.431	3499.536	-12.279	24.609	-12.279	27.502	116.518	0.993
3600.000	3.026	323.854	3599.424	-8.858	21.367	-8.858	23.131	112.517	0.976
3700.000	3.146	323.153	3699.279	-4.530	18.165	-4.530	18.721	104.004	0.126
3800.000	2.955	325.237	3799.137	-0.216	15.049	-0.216	15.050	90.824	0.221
3900.000	2.790	335.717	3899.012	4.120	12.578	4.120	13.236	71.864	0.550
4000.000	2.239	329.571	3998.916	8.023	10.588	8.023	13.284	52.847	0.612
4100.000	1.866	318.588	4098.852	10.928	8.521	10.928	13.858	37.945	0.541
4200.000	1.397	301.310	4198.811	12.783	6.403	12.783	14.297	26.608	0.674
4300.000	1.142	275.505	4298.788	13.512	4.370	13.512	14.201	17.923	0.619
4400.000	0.941	309.809	4398.772	14.133	2.747	14.133	14.397	11.001	0.644
4500.000	1.024	249.748	4498.760	14.349	1.279	14.349	14.406	5.092	0.986
4600.000	1.645	240.032	4598.732	13.323	-0.803	13.323	13.347	356.551	0.659
4700.000	2.387	231.276	4698.670	11.303	-3.671	11.303	11.885	342.007	0.801
4800.000	2.703	237.496	4798.571	8.734	-7.285	8.734	11.373	320.168	0.419
4900.000	3.582	240.919	4898.420	5.948	-12.004	5.948	13.396	296.359	0.898
5000.000	3.202	237.719	4998.245	2.938	-17.095	2.938	17.346	279.751	0.424
5100.000	2.364	240.012	5098.126	0.415	-21.242	0.415	21.247	271.120	0.846
5200.000	1.441	244.354	5198.070	-1.159	-24.162	-1.159	24.189	267.253	0.933
5300.000	0.615	260.906	5298.053	-1.788	-25.825	-1.788	25.886	266.039	0.869
5400.000	0.333	120.500	5398.051	-2.020	-26.104	-2.020	26.182	265.574	0.897
5500.000	1.197	106.107	5498.042	-2.458	-24.850	-2.458	24.972	264.352	0.878

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	1.487	116.214	5598.014	-3.320	-22.683	-3.320	22.925	261.672	0.373
5700.000	2.173	121.805	5697.963	-4.892	-19.908	-4.892	20.501	256.193	0.708
5800.000	2.839	133.259	5797.867	-7.589	-16.493	-7.589	18.155	245.292	0.830
5900.000	3.686	131.533	5897.704	-11.418	-12.283	-11.418	16.770	227.091	0.853
6000.000	3.586	132.057	5997.503	-15.644	-7.555	-15.644	17.373	205.776	0.106
6100.000	2.088	130.141	6097.377	-18.914	-3.840	-18.914	19.300	191.475	1.500
6200.000	1.163	130.131	6197.336	-20.743	-1.671	-20.743	20.810	184.605	0.925
6300.000	0.452	357.302	6297.330	-21.003	-0.913	-21.003	21.023	182.490	1.507
6400.000	0.745	349.388	6397.324	-19.971	-1.051	-19.971	19.998	183.014	0.304
6500.000	0.970	348.655	6497.313	-18.502	-1.338	-18.502	18.551	184.135	0.225
6600.000	1.102	323.081	6597.297	-16.904	-2.081	-16.904	17.032	187.020	0.476
6700.000	0.882	299.076	6697.283	-15.762	-3.332	-15.762	16.110	191.935	0.465
6800.000	1.094	309.757	6797.268	-14.777	-4.738	-14.777	15.518	197.778	0.280
6900.000	0.846	263.137	6897.255	-14.255	-6.206	-14.255	15.547	203.525	0.801