



Company/Rig: Noble Energy Inc/Production
WELL/API#: Wardlaw 35-21/05-123-18536
DECLINATION: 8.22 Degrees
TD AS DRILLED: 6935 Feet
COUNTY/STATE: Weld/Colorado
VS-Azi: 0.000 Degrees
Latitude: 40.44772, Longitude: -104.51965
Grid North = True North -0.63 degs (NAD 27)
Grid Correction Applied = -0.63 degs



DEPTH REFERENCE : RKB=GL/Elevation=4622'

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01-de_01.ut

Minimum Curvature Method

Report Date/Time: 3/2/2016 / 12:20

Lat/Long Obtained By Handheld GPS at Wellhead

North Reference: Grid

Denver, Colorado

303-853-4976

Surveyor: Jason Kinchelow / Wardlaw 35-21

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	0.187	256.721	100.000	-0.037	-0.159	-0.037	0.163	256.721	0.187
200.000	0.045	320.563	200.000	-0.045	-0.342	-0.045	0.345	262.521	0.172
300.000	0.207	18.028	299.999	0.156	-0.311	0.156	0.348	296.699	0.186
400.000	0.319	27.089	399.998	0.576	-0.129	0.576	0.590	347.404	0.119
500.000	0.313	18.160	499.997	1.083	0.083	1.083	1.086	4.390	0.050
600.000	0.348	359.042	599.995	1.645	0.163	1.645	1.653	5.660	0.115
700.000	0.331	0.404	699.993	2.237	0.160	2.237	2.243	4.091	0.019
800.000	0.271	7.206	799.992	2.761	0.192	2.761	2.768	3.973	0.069
900.000	0.151	5.323	899.991	3.127	0.234	3.127	3.136	4.274	0.121
1000.000	0.167	332.826	999.991	3.387	0.179	3.387	3.392	3.032	0.090
1100.000	0.184	315.522	1099.990	3.632	0.000	3.632	3.632	0.005	0.056
1200.000	0.197	66.277	1199.990	3.816	0.045	3.816	3.816	0.675	0.314
1300.000	0.245	359.292	1299.990	4.099	0.200	4.099	4.104	2.789	0.247
1400.000	0.130	124.014	1399.989	4.249	0.291	4.249	4.259	3.923	0.337
1500.000	0.154	310.964	1499.989	4.274	0.284	4.274	4.283	3.808	0.284
1600.000	0.213	16.495	1599.989	4.540	0.236	4.540	4.546	2.975	0.205
1700.000	0.148	150.807	1699.989	4.605	0.352	4.605	4.619	4.367	0.334
1800.000	0.539	244.745	1799.987	4.292	-0.011	4.292	4.292	359.854	0.569

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
1900.000	0.587	238.988	1899.982	3.827	-0.876	3.827	3.926	347.113	0.074
2000.000	0.380	220.324	1999.979	3.310	-1.530	3.310	3.646	335.198	0.257
2100.000	0.759	213.282	2099.973	2.503	-2.108	2.503	3.272	319.898	0.384
2200.000	0.827	202.249	2199.964	1.281	-2.745	1.281	3.029	295.028	0.167
2300.000	0.573	215.993	2299.956	0.209	-3.312	0.209	3.318	273.610	0.302
2400.000	0.413	289.075	2399.954	-0.078	-3.946	-0.078	3.947	268.868	0.601
2500.000	0.474	332.996	2499.951	0.409	-4.475	0.409	4.494	275.218	0.337
2600.000	0.417	355.302	2599.948	1.140	-4.693	1.140	4.829	283.655	0.181
2700.000	0.466	359.687	2699.945	1.909	-4.725	1.909	5.096	292.002	0.059
2800.000	0.464	353.229	2799.942	2.718	-4.775	2.718	5.494	299.649	0.052
2900.000	0.396	339.977	2899.939	3.445	-4.941	3.445	6.024	304.888	0.120
3000.000	0.423	313.789	2999.936	4.026	-5.326	4.026	6.676	307.085	0.187
3100.000	0.338	270.871	3099.934	4.286	-5.887	4.286	7.282	306.053	0.289
3200.000	0.412	275.845	3199.932	4.327	-6.540	4.327	7.842	303.488	0.081
3300.000	0.798	293.312	3299.927	4.639	-7.537	4.639	8.851	301.611	0.424
3400.000	1.318	330.393	3399.910	5.914	-8.745	5.914	10.558	304.070	0.834
3500.000	1.386	337.628	3499.882	8.033	-9.774	8.033	12.651	309.415	0.184
3600.000	1.660	338.341	3599.847	10.497	-10.769	10.497	15.039	314.268	0.274
3700.000	1.493	342.948	3699.809	13.089	-11.685	13.089	17.546	318.243	0.209
3800.000	1.438	327.030	3799.777	15.388	-12.750	15.388	19.984	320.355	0.410
3900.000	1.238	314.907	3899.750	17.203	-14.198	17.203	22.305	320.466	0.346
4000.000	0.872	296.636	3999.733	18.306	-15.643	18.306	24.080	319.485	0.493
4100.000	0.858	253.976	4099.723	18.441	-17.043	18.441	25.110	317.256	0.629
4200.000	0.897	246.550	4199.711	17.922	-18.481	17.922	25.744	314.122	0.120
4300.000	0.976	233.156	4299.698	17.100	-19.880	17.100	26.223	310.701	0.232
4400.000	1.054	234.978	4399.682	16.062	-21.315	16.062	26.689	307.000	0.084
4500.000	1.739	217.446	4499.652	14.330	-22.990	14.330	27.090	301.935	0.799
4600.000	2.532	207.662	4599.582	11.169	-24.938	11.169	27.325	294.127	0.870
4700.000	2.959	209.098	4699.467	6.958	-27.218	6.958	28.094	284.339	0.432
4800.000	3.617	207.227	4799.302	1.898	-29.917	1.898	29.977	273.630	0.667
4900.000	3.773	209.702	4899.094	-3.765	-32.990	-3.765	33.204	263.489	0.223
5000.000	3.546	208.269	4998.890	-9.347	-36.085	-9.347	37.276	255.478	0.245
5100.000	1.692	208.901	5098.781	-13.363	-38.263	-13.363	40.530	250.749	1.855
5200.000	0.818	212.027	5198.756	-15.261	-39.356	-15.261	42.211	248.805	0.876
5300.000	0.821	359.484	5298.753	-15.150	-39.741	-15.150	42.531	249.132	1.574
5400.000	1.373	19.244	5398.734	-13.302	-39.352	-13.302	41.540	251.323	0.662
5500.000	1.380	21.787	5498.705	-11.053	-38.510	-11.053	40.065	253.986	0.061
5600.000	1.200	38.239	5598.680	-9.112	-37.415	-9.112	38.509	256.312	0.410
5700.000	1.539	38.299	5698.652	-7.236	-35.935	-7.236	36.656	258.615	0.339
5800.000	1.505	53.440	5798.617	-5.400	-34.048	-5.400	34.473	260.988	0.402

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
5900.000	0.735	42.095	5898.597	-4.142	-32.563	-4.142	32.826	262.751	0.798
6000.000	0.535	331.648	5998.592	-3.255	-32.355	-3.255	32.518	264.255	0.750
6100.000	0.445	320.487	6098.588	-2.545	-32.823	-2.545	32.922	265.566	0.131
6200.000	0.473	302.054	6198.585	-2.027	-33.420	-2.027	33.481	266.530	0.150
6300.000	0.501	301.893	6298.582	-1.577	-34.141	-1.577	34.178	267.356	0.029
6400.000	0.322	236.345	6398.580	-1.501	-34.747	-1.501	34.779	267.526	0.471
6500.000	0.689	190.970	6498.576	-2.247	-35.095	-2.247	35.167	266.336	0.516
6600.000	0.564	243.172	6598.571	-3.060	-35.649	-3.060	35.780	265.094	0.563
6700.000	0.693	225.921	6698.565	-3.703	-36.523	-3.703	36.710	264.211	0.227