



Company/Rig: Noble Energy/Cable
Well/API: Feather 31-15/05-123-21075
Declination: 8.21 Degrees
TD As Drilled: 7700 Feet
County/State: Weld/Colorado
VS-Azi: 0.000 Degrees
Latitude: 40.14489, Longitude: -104.53481
Grid North = True North -0.62 degs (NAD 27)
Grid Correction Applied = -0.62 degs



Depth Reference : RKB=GL Elevation=4972

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01_ed.ut

Minimum Curvature Method

Report Date/Time: 2/3/2016 / 08:27

Lat and Long Verified By Handheld GPS At Wellhead

North Reference: Grid

Henderson, Colorado

303-853-4976

Surveyor: Nick Campbell / Feather 31-15

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	0.463	243.068	99.999	-0.183	-0.361	-0.183	0.404	243.068	0.463
200.000	0.619	231.693	199.994	-0.701	-1.145	-0.701	1.343	238.517	0.188
300.000	1.072	247.074	299.983	-1.400	-2.430	-1.400	2.805	240.048	0.502
400.000	0.989	251.173	399.967	-2.043	-4.108	-2.043	4.588	243.558	0.111
500.000	0.894	265.939	499.954	-2.377	-5.704	-2.377	6.179	247.377	0.260
600.000	0.781	270.348	599.943	-2.428	-7.163	-2.428	7.564	251.276	0.131
700.000	0.516	269.016	699.937	-2.432	-8.295	-2.432	8.644	253.661	0.265
800.000	0.467	299.856	799.933	-2.236	-9.098	-2.236	9.369	256.191	0.266
900.000	0.483	297.720	899.930	-1.837	-9.825	-1.837	9.995	259.408	0.024
1000.000	0.429	322.634	999.927	-1.344	-10.425	-1.344	10.511	262.655	0.204
1100.000	0.381	331.497	1099.924	-0.754	-10.811	-0.754	10.837	266.008	0.079
1200.000	0.362	328.483	1199.922	-0.193	-11.134	-0.193	11.136	269.005	0.027
1300.000	0.317	331.759	1299.920	0.319	-11.430	0.319	11.435	271.600	0.049
1400.000	0.478	320.833	1399.918	0.886	-11.824	0.886	11.857	274.285	0.178
1500.000	0.402	314.778	1499.915	1.456	-12.337	1.456	12.422	276.733	0.089
1600.000	0.532	304.761	1599.912	1.968	-12.967	1.968	13.115	278.630	0.153
1700.000	0.554	301.245	1699.907	2.483	-13.762	2.483	13.984	280.230	0.040
1800.000	0.541	295.053	1799.903	2.934	-14.603	2.934	14.894	281.361	0.061

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	0.471	292.915	1899.899	3.294	-15.408	3.294	15.757	282.067	0.072
2000.000	0.525	273.588	1999.895	3.483	-16.244	3.483	16.613	282.100	0.175
2100.000	0.367	251.806	2099.892	3.411	-17.006	3.411	17.345	281.342	0.229
2200.000	0.453	249.084	2199.889	3.170	-17.680	3.170	17.962	280.165	0.088
2300.000	0.482	249.875	2299.886	2.884	-18.444	2.884	18.668	278.887	0.030
2400.000	0.419	257.476	2399.883	2.660	-19.196	2.660	19.380	277.889	0.087
2500.000	0.401	285.490	2499.881	2.674	-19.890	2.674	20.069	277.657	0.199
2600.000	0.687	346.654	2599.877	3.351	-20.365	3.351	20.639	279.344	0.606
2700.000	0.996	14.659	2699.866	4.775	-20.284	4.775	20.838	283.247	0.505
2800.000	1.230	20.180	2799.847	6.623	-19.694	6.623	20.778	288.589	0.258
2900.000	1.196	35.404	2899.825	8.482	-18.719	8.482	20.551	294.376	0.323
3000.000	1.233	22.082	2999.803	10.329	-17.710	10.329	20.502	300.254	0.284
3100.000	1.179	20.272	3099.781	12.292	-16.949	12.292	20.937	305.951	0.066
3200.000	1.145	26.560	3199.760	14.151	-16.145	14.151	21.469	311.233	0.132
3300.000	0.997	34.545	3299.743	15.761	-15.205	15.761	21.900	316.028	0.210
3400.000	0.891	39.024	3399.729	17.082	-14.222	17.082	22.227	320.219	0.129
3500.000	0.591	356.487	3499.721	18.201	-13.764	18.201	22.819	322.902	0.606
3600.000	0.979	304.034	3599.713	19.194	-14.504	19.194	24.058	322.924	0.776
3700.000	1.342	293.793	3699.692	20.145	-16.283	20.145	25.903	321.051	0.416
3800.000	1.780	315.435	3799.656	21.723	-18.444	21.723	28.497	319.667	0.727
3900.000	1.902	325.165	3899.604	24.192	-20.482	24.192	31.698	319.747	0.335
4000.000	2.042	324.711	3999.545	27.009	-22.460	27.009	35.127	320.255	0.140
4100.000	2.095	326.356	4099.480	29.985	-24.501	29.985	38.722	320.747	0.079
4200.000	2.170	330.066	4199.411	33.147	-26.458	33.147	42.412	321.402	0.157
4300.000	2.200	331.725	4299.338	36.477	-28.312	36.477	46.175	322.183	0.070
4400.000	2.239	315.697	4399.264	39.565	-30.586	39.565	50.009	322.294	0.620
4500.000	2.275	326.254	4499.187	42.614	-33.053	42.614	53.930	322.202	0.417
4600.000	2.330	345.359	4599.108	46.231	-34.669	46.231	57.786	323.133	0.766
4700.000	2.107	327.182	4699.034	49.742	-36.179	49.742	61.508	323.970	0.734
4800.000	1.685	328.600	4798.979	52.541	-37.941	52.541	64.808	324.166	0.424
4900.000	1.573	323.072	4898.939	54.894	-39.532	54.894	67.647	324.240	0.193
5000.000	1.665	325.616	4998.899	57.190	-41.177	57.190	70.471	324.246	0.116
5100.000	1.916	335.184	5098.850	59.905	-42.699	59.905	73.565	324.520	0.390
5200.000	1.919	335.552	5198.794	62.947	-44.093	62.947	76.854	324.989	0.013
5300.000	1.561	334.803	5298.748	65.704	-45.366	65.704	79.844	325.376	0.359
5400.000	1.010	349.507	5398.723	67.804	-46.107	67.804	81.995	325.784	0.638
5500.000	0.362	301.034	5498.715	68.834	-46.538	68.834	83.090	325.937	0.817
5600.000	0.809	263.738	5598.710	68.920	-47.511	68.920	83.709	325.419	0.565
5700.000	0.803	278.089	5698.700	68.941	-48.906	68.941	84.526	324.649	0.201
5800.000	0.460	275.133	5798.694	69.076	-50.000	69.076	85.273	324.102	0.345

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	0.151	288.985	5898.693	69.155	-50.524	69.155	85.645	323.848	0.315
6000.000	0.356	190.196	5998.692	68.892	-50.704	68.892	85.540	323.647	0.408
6100.000	0.514	132.467	6098.690	68.283	-50.429	68.283	84.886	323.553	0.442
6200.000	0.517	159.264	6198.686	67.559	-49.938	67.559	84.012	323.529	0.239
6300.000	0.509	152.298	6298.682	66.744	-49.572	66.744	83.139	323.398	0.063
6400.000	0.648	156.803	6398.677	65.831	-49.143	65.831	82.151	323.259	0.146
6500.000	0.728	146.083	6498.669	64.784	-48.566	64.784	80.967	323.143	0.151
6600.000	0.614	162.496	6598.663	63.746	-48.050	63.746	79.827	322.992	0.222
6700.000	0.505	175.540	6698.658	62.795	-47.854	62.795	78.951	322.690	0.167
6800.000	0.449	174.778	6798.654	61.966	-47.785	61.966	78.251	322.363	0.056
6900.000	0.375	168.806	6898.652	61.255	-47.685	61.255	77.628	322.100	0.086
7000.000	0.442	145.339	6998.649	60.617	-47.402	60.617	76.951	321.975	0.179
7100.000	0.273	150.834	7098.647	60.091	-47.066	60.091	76.329	321.930	0.172
7200.000	0.086	125.858	7198.647	59.839	-46.889	59.839	76.021	321.918	0.199
7300.000	0.114	356.016	7298.647	59.894	-46.835	59.894	76.032	321.976	0.182
7400.000	0.240	52.960	7398.646	60.119	-46.675	60.119	76.111	322.175	0.202
7500.000	0.330	55.749	7498.645	60.407	-46.270	60.407	76.092	322.549	0.091