



Company: Noble Energy

Rig: Production / Coretech

API # 05-123-13129

Date: 10/1/2013

Surveyor: Norman Cowan

VS: 0.000

Lat : 40.343

Long: -104.614

Well: Muirhead 1-4

Location: Weld County, Colorado

North Reference: GRID

Convergence: Grid north is 0.57 Deg East of True

Declination: 8.47 Degrees

Depth Reference: Ground Level

Elevation: 4761 Feet

Total Depth as Drilled: 7195 Feet

Lat & Long obtained by handheld GPS at wellhead

MS Gyro Survey Calculations

Depth	Inc	AzG	N/-S	E/-W	TVD	DL	VS	CD	Cbrg
0.000	0.000	0.000	0.000	0.000	0.000	****	0.000	0.000	0.000
100.000	0.169	22.556	0.136	0.057	100.000	0.169	0.136	0.147	22.556
200.000	0.209	11.960	0.450	0.151	199.999	0.053	0.450	0.475	18.514
300.000	0.162	350.575	0.768	0.165	299.999	0.082	0.768	0.786	12.144
400.000	0.101	299.118	0.951	0.065	399.999	0.127	0.951	0.953	3.931
500.000	0.126	319.412	1.077	-0.083	499.998	0.047	1.077	1.081	355.595
600.000	0.201	310.776	1.276	-0.288	599.998	0.079	1.276	1.308	347.296
700.000	0.167	301.029	1.465	-0.545	699.997	0.047	1.465	1.563	339.594
800.000	0.256	312.834	1.692	-0.833	799.997	0.099	1.692	1.886	333.776
900.000	0.187	294.397	1.912	-1.146	899.996	0.098	1.912	2.229	329.052
1000.000	0.182	320.999	2.103	-1.395	999.996	0.085	2.103	2.523	326.435
1100.000	0.226	296.372	2.314	-1.672	1099.995	0.097	2.314	2.855	324.147
1200.000	0.441	294.105	2.559	-2.201	1199.993	0.216	2.559	3.375	319.307
1300.000	0.532	310.780	3.019	-2.904	1299.990	0.167	3.019	4.189	316.121
1400.000	0.339	326.614	3.570	-3.418	1399.987	0.225	3.570	4.942	316.245
1500.000	0.304	328.962	4.044	-3.717	1499.985	0.037	4.044	5.493	317.410
1600.000	0.529	287.697	4.412	-4.294	1599.983	0.362	4.412	6.157	315.773
1700.000	0.433	326.249	4.866	-4.944	1699.979	0.330	4.866	6.937	314.545
1800.000	0.380	286.318	5.274	-5.473	1799.977	0.282	5.274	7.600	313.939
1900.000	0.437	342.157	5.730	-5.908	1899.975	0.386	5.730	8.230	314.122
2000.000	0.585	315.017	6.453	-6.385	1999.971	0.279	6.453	9.078	315.302
2100.000	0.416	345.153	7.165	-6.839	2099.967	0.307	7.165	9.905	316.333
2200.000	0.200	336.516	7.676	-7.002	2199.966	0.221	7.676	10.389	317.631
2300.000	0.093	359.251	7.917	-7.072	2299.965	0.120	7.917	10.616	318.226
2400.000	0.063	65.525	8.021	-7.023	2399.965	0.089	8.021	10.661	318.794
2500.000	0.052	0.320	8.089	-6.973	2499.965	0.063	8.089	10.679	319.238
2600.000	0.069	61.818	8.162	-6.919	2599.965	0.064	8.162	10.700	319.712
2700.000	0.051	38.930	8.225	-6.838	2699.965	0.030	8.225	10.697	320.260
2800.000	0.029	53.192	8.274	-6.791	2799.965	0.024	8.274	10.704	320.625
2900.000	0.073	6.380	8.352	-6.764	2899.965	0.057	8.352	10.747	320.999
3000.000	0.140	129.807	8.337	-6.663	2999.965	0.190	8.337	10.673	321.368
3100.000	0.108	166.287	8.167	-6.547	3099.965	0.083	8.167	10.467	321.283
3200.000	0.220	207.628	7.905	-6.613	3199.964	0.156	7.905	10.307	320.085
3300.000	0.068	327.042	7.786	-6.735	3299.964	0.260	7.786	10.295	319.140
3400.000	0.143	23.004	7.951	-6.718	3399.964	0.119	7.951	10.410	319.803

3500.000	0.164	210.361	7.943	-6.742	3499.964	0.306	7.943	10.418	319.677
3600.000	0.204	142.744	7.678	-6.706	3599.964	0.207	7.678	10.195	318.866
3700.000	0.356	13.980	7.838	-6.523	3699.963	0.509	7.838	10.198	320.230
3800.000	0.422	16.828	8.492	-6.342	3799.961	0.069	8.492	10.599	323.248
3900.000	0.467	0.550	9.252	-6.231	3899.958	0.133	9.252	11.155	326.040
4000.000	0.474	2.190	10.073	-6.211	3999.954	0.016	10.073	11.834	328.340
4100.000	0.548	346.440	10.951	-6.308	4099.950	0.158	10.951	12.638	330.058
4200.000	0.840	321.875	11.992	-6.872	4199.943	0.411	11.992	13.822	330.185
4300.000	0.971	321.218	13.229	-7.855	4299.931	0.131	13.229	15.385	329.298
4400.000	1.061	316.259	14.558	-9.026	4399.915	0.126	14.558	17.129	328.201
4500.000	1.080	311.782	15.856	-10.369	4499.897	0.086	15.856	18.945	326.816
4600.000	1.095	313.713	17.144	-11.763	4599.879	0.039	17.144	20.791	325.545
4700.000	1.027	301.951	18.278	-13.214	4699.862	0.227	18.278	22.554	324.136
4800.000	1.009	283.064	18.951	-14.832	4799.847	0.335	18.951	24.065	321.953
4900.000	1.077	273.024	19.200	-16.628	4899.830	0.195	19.200	25.399	319.106
5000.000	1.004	266.613	19.198	-18.441	4999.814	0.137	19.198	26.620	316.152
5100.000	0.810	257.953	18.999	-20.007	5099.801	0.237	18.999	27.590	313.519
5200.000	0.403	257.051	18.772	-21.041	5199.796	0.407	18.772	28.198	311.739
5300.000	0.162	254.446	18.656	-21.519	5299.794	0.241	18.656	28.480	310.923
5400.000	0.130	161.788	18.510	-21.620	5399.794	0.212	18.510	28.461	310.568
5500.000	0.390	182.586	18.062	-21.600	5499.793	0.272	18.062	28.156	309.903
5600.000	0.287	217.514	17.524	-21.767	5599.791	0.225	17.524	27.945	308.836
5700.000	0.215	113.953	17.249	-21.749	5699.791	0.396	17.249	27.759	308.419
5800.000	0.468	129.716	16.912	-21.263	5799.789	0.268	16.912	27.169	308.498
5900.000	0.364	112.385	16.530	-20.656	5899.786	0.163	16.530	26.456	308.670
6000.000	0.484	142.169	16.076	-20.103	5999.784	0.247	16.076	25.740	308.648
6100.000	0.502	88.525	15.753	-19.406	6099.780	0.445	15.753	24.995	309.069
6200.000	0.270	345.006	15.992	-19.029	6199.779	0.623	15.992	24.857	310.043
6300.000	0.598	0.823	16.740	-19.083	6299.776	0.346	16.740	25.385	311.259
6400.000	0.516	350.761	17.706	-19.147	6399.771	0.127	17.706	26.079	312.761
6500.000	0.466	344.490	18.542	-19.328	6499.768	0.073	18.542	26.785	313.811
6600.000	0.214	194.433	18.754	-19.484	6599.767	0.660	18.754	27.043	313.906
6700.000	0.590	165.126	18.075	-19.398	6699.764	0.417	18.075	26.514	312.978
6800.000	0.874	155.463	16.884	-18.949	6799.756	0.309	16.884	25.380	311.701
6900.000	0.908	137.925	15.601	-18.101	6899.744	0.274	15.601	23.897	310.758
7000.000	1.169	125.650	14.419	-16.741	6999.728	0.341	14.419	22.094	310.737

☞ North