



Company: Noble Energy
Rig: Production/ VES
API # 05-123-15608
Date: 5/17/2014
Surveyor: Sean Bratt
VS: 0.000
Lat : 40.380
Long: -104.743

Well: Mantel J23-15
Location: Weld County, Colorado
North Reference: GRID
Convergence: Grid north is 0.49 Degrees East of
Declination: 8.46 Degrees
Depth Reference: Ground Level
Elevation: 4790 Feet
T.D as Drilled: 7400 Feet

Lat & Long obtained by handheld GPS at wellhead

Drillog Gyro Survey Calculations

Depth	Inc	AzG	N/-S	E/-W	TVD	DL	VS	CD	Cbgr
0.000	0.000	0.000	0.000	0.000	0.000	****	0.000	0.000	0.000
100.000	0.142	41.750	0.093	0.083	100.000	0.142	0.093	0.124	41.750
200.000	0.347	72.842	0.275	0.455	199.999	0.236	0.275	0.531	58.850
300.000	0.433	239.216	0.171	0.419	299.998	0.774	0.171	0.452	67.846
400.000	0.180	144.920	-0.152	0.185	399.997	0.481	-0.152	0.239	129.416
500.000	0.183	114.278	-0.346	0.421	499.997	0.096	-0.346	0.545	129.454
600.000	0.090	295.115	-0.378	0.495	599.996	0.273	-0.378	0.623	127.402
700.000	0.485	203.466	-0.733	0.255	699.995	0.496	-0.733	0.776	160.829
800.000	0.399	247.800	-1.253	-0.236	799.993	0.343	-1.253	1.275	190.669
900.000	0.104	231.229	-1.442	-0.630	899.991	0.300	-1.442	1.573	203.589
1000.000	0.293	247.093	-1.598	-0.936	999.991	0.195	-1.598	1.852	210.359
1100.000	0.328	252.836	-1.782	-1.445	1099.989	0.047	-1.782	2.295	219.041
1200.000	0.452	235.151	-2.092	-2.043	1199.987	0.171	-2.092	2.924	224.315
1300.000	0.555	296.316	-2.103	-2.800	1299.984	0.520	-2.103	3.502	233.094
1400.000	0.535	260.756	-1.963	-3.695	1399.980	0.333	-1.963	4.184	242.016
1500.000	0.516	300.301	-1.811	-4.544	1499.976	0.356	-1.811	4.892	248.269
1600.000	0.477	290.128	-1.441	-5.324	1599.972	0.096	-1.441	5.516	254.856
1700.000	0.239	17.479	-1.099	-5.653	1699.970	0.524	-1.099	5.758	259.001
1800.000	0.648	333.635	-0.393	-5.841	1799.968	0.503	-0.393	5.854	266.148
1900.000	0.564	323.388	0.508	-6.386	1899.962	0.136	0.508	6.406	274.552
2000.000	0.197	266.037	0.892	-6.851	1999.960	0.487	0.892	6.908	277.417
2100.000	0.391	327.757	1.168	-7.204	2099.959	0.344	1.168	7.298	279.212
2200.000	0.293	269.372	1.454	-7.641	2199.957	0.344	1.454	7.778	280.773
2300.000	0.411	205.159	1.127	-8.049	2299.956	0.387	1.127	8.128	277.969
2400.000	0.393	203.752	0.488	-8.340	2399.953	0.020	0.488	8.354	273.352
2500.000	0.833	235.685	-0.236	-9.079	2499.947	0.541	-0.236	9.082	268.513
2600.000	0.955	232.047	-1.158	-10.336	2599.935	0.134	-1.158	10.401	263.608
2700.000	0.942	228.639	-2.213	-11.610	2699.922	0.058	-2.213	11.819	259.206
2800.000	0.347	226.499	-2.965	-12.446	2799.915	0.595	-2.965	12.794	256.602
2900.000	1.190	216.619	-4.007	-13.285	2899.905	0.851	-4.007	13.876	253.217
3000.000	0.563	204.112	-5.289	-14.105	2999.893	0.652	-5.289	15.064	249.447
3100.000	1.116	259.288	-5.918	-15.263	3099.883	0.919	-5.918	16.371	248.806
3200.000	1.322	264.288	-6.214	-17.369	3199.860	0.232	-6.214	18.447	250.313
3300.000	1.352	230.769	-7.075	-19.431	3299.835	0.772	-7.075	20.679	249.992
3400.000	1.664	252.237	-8.265	-21.728	3399.801	0.640	-8.265	23.246	249.174

3500.000	0.999	279.624	-8.562	-23.970	3499.774	0.903	-8.562	25.453	250.343
3600.000	1.381	289.837	-8.007	-25.963	3599.752	0.436	-8.007	27.169	252.859
3700.000	1.108	262.612	-7.723	-28.055	3699.730	0.643	-7.723	29.098	254.609
3800.000	1.497	300.320	-7.187	-30.141	3799.705	0.919	-7.187	30.987	256.588
3900.000	1.118	303.087	-5.995	-32.087	3899.679	0.384	-5.995	32.642	259.416
4000.000	1.569	287.939	-5.041	-34.207	3999.652	0.570	-5.041	34.576	261.617
4100.000	1.564	292.063	-4.107	-36.774	4099.614	0.113	-4.107	37.002	263.628
4200.000	1.379	285.479	-3.273	-39.198	4199.581	0.250	-3.273	39.334	265.226
4300.000	1.540	269.746	-2.958	-41.701	4299.549	0.430	-2.958	41.806	265.942
4400.000	1.355	289.686	-2.566	-44.158	4399.518	0.533	-2.566	44.233	266.675
4500.000	1.342	307.349	-1.457	-46.202	4499.491	0.414	-1.457	46.225	268.194
4600.000	1.292	270.793	-0.731	-48.261	4599.466	0.827	-0.731	48.266	269.132
4700.000	0.995	248.390	-1.035	-50.196	4699.446	0.531	-1.035	50.206	268.819
4800.000	0.932	190.414	-2.155	-51.150	4799.435	0.936	-2.155	51.195	267.588
4900.000	0.945	189.684	-3.768	-51.436	4899.421	0.018	-3.768	51.574	265.810
5000.000	0.655	229.401	-4.953	-52.009	4999.412	0.608	-4.953	52.244	264.560
5100.000	0.787	192.615	-5.996	-52.593	5099.405	0.472	-5.996	52.933	263.496
5200.000	0.641	198.673	-7.197	-52.922	5199.397	0.164	-7.197	53.409	262.256
5300.000	0.446	225.751	-7.998	-53.380	5299.392	0.318	-7.998	53.976	261.478
5400.000	0.703	332.274	-7.727	-53.944	5399.389	0.933	-7.727	54.494	261.849
5500.000	0.125	257.656	-7.207	-54.335	5499.387	0.681	-7.207	54.811	262.445
5600.000	0.668	6.483	-6.651	-54.376	5599.384	0.718	-6.651	54.781	263.026
5700.000	0.602	59.479	-5.806	-53.858	5699.379	0.569	-5.806	54.170	263.847
5800.000	0.846	57.453	-5.142	-52.783	5799.371	0.245	-5.142	53.033	264.436
5900.000	0.402	106.032	-4.842	-51.824	5899.365	0.654	-4.842	52.050	264.663
6000.000	0.738	31.153	-4.388	-51.155	5999.361	0.742	-4.388	51.342	265.098
6100.000	0.542	67.713	-3.657	-50.384	6099.356	0.442	-3.657	50.516	265.848
6200.000	0.308	123.402	-3.626	-49.721	6199.353	0.448	-3.626	49.853	265.829
6300.000	0.572	50.178	-3.454	-49.113	6299.351	0.566	-3.454	49.234	265.977
6400.000	0.271	118.317	-3.246	-48.520	6399.348	0.534	-3.246	48.629	266.172
6500.000	0.270	7.277	-3.125	-48.282	6499.348	0.446	-3.125	48.383	266.296
6600.000	0.325	254.723	-2.967	-48.526	6599.347	0.496	-2.967	48.617	266.501
6700.000	0.744	27.893	-2.468	-48.496	6699.345	0.995	-2.468	48.559	267.087
6800.000	1.501	29.117	-0.750	-47.555	6799.325	0.758	-0.750	47.561	269.097
6900.000	2.210	43.332	1.797	-45.594	6899.272	0.840	1.797	45.630	272.257
7000.000	1.833	56.045	4.093	-42.944	6999.210	0.584	4.093	43.139	275.445
7100.000	1.397	26.345	6.079	-41.076	7099.172	0.929	6.079	41.524	278.418

True North