



Company: Noble Energy  
Lease/Well: Powers X22/31  
API: 05-123-32608  
Rig Name: Production/Lightning  
State/County: Colorado/Weld  
Latitude: 40.375, Longitude: -104.930  
GRID North is 0.370 Degrees East of True North  
VS-Azi: 0.000 Degrees



FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : Ground Level

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: powers x22-31 \_ed.ut  
Minimum Curvature Method  
Report Date/Time: 3/22/2012 / 15:35

Vaughn Energy Services  
Henderson, Colorado  
303-853-4976  
Troy Hardin

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	0.530	229.807	99.999	-0.298	-0.353	-0.298	0.462	229.807	0.530
200.000	0.518	221.322	199.994	-0.936	-1.005	-0.936	1.374	227.021	0.078
300.000	0.550	291.754	299.991	-1.098	-1.749	-1.098	2.065	237.871	0.616
400.000	0.755	322.133	399.985	-0.400	-2.599	-0.400	2.630	261.242	0.395
500.000	0.698	313.633	499.977	0.540	-3.445	0.540	3.487	278.914	0.122
600.000	0.696	271.890	599.970	0.981	-4.492	0.981	4.598	282.314	0.497
700.000	0.576	314.532	699.964	1.353	-5.458	1.353	5.623	283.927	0.476
800.000	1.028	20.531	799.956	2.546	-5.502	2.546	6.063	294.835	0.952
900.000	1.122	54.996	899.939	3.948	-4.385	3.948	5.901	311.998	0.643
1000.000	1.016	54.830	999.922	5.021	-2.858	5.021	5.777	330.347	0.106
1100.000	1.052	53.495	1099.906	6.077	-1.396	6.077	6.236	347.066	0.043
1200.000	0.970	50.606	1199.890	7.161	-0.004	7.161	7.161	359.970	0.096
1300.000	0.457	59.669	1299.882	7.899	0.995	7.899	7.962	7.178	0.524
1400.000	0.613	66.923	1399.878	8.311	1.831	8.311	8.510	12.426	0.169
1500.000	0.295	50.025	1499.875	8.685	2.520	8.685	9.044	16.181	0.342
1600.000	0.162	3.808	1599.874	8.992	2.727	8.992	9.396	16.870	0.217
1700.000	0.249	12.256	1699.873	9.345	2.782	9.345	9.751	16.580	0.092
1800.000	0.218	343.244	1799.872	9.740	2.774	9.740	10.127	15.895	0.121
1900.000	0.433	269.476	1899.871	9.919	2.341	9.919	10.192	13.276	0.427
2000.000	0.407	283.638	1999.868	9.999	1.617	9.999	10.129	9.187	0.107
2100.000	0.656	264.439	2099.864	10.028	0.703	10.028	10.052	4.008	0.303
2200.000	0.679	256.220	2199.857	9.831	-0.443	9.831	9.841	357.421	0.098
2300.000	0.950	240.686	2299.847	9.284	-1.741	9.284	9.446	349.376	0.348
2400.000	1.396	230.845	2399.826	8.109	-3.409	8.109	8.796	337.198	0.487
2500.000	1.408	234.122	2499.796	6.620	-5.349	6.620	8.511	321.064	0.081
2600.000	1.284	249.409	2599.769	5.506	-7.393	5.506	9.218	306.679	0.378
2700.000	1.694	262.357	2699.735	4.916	-9.906	4.916	11.059	296.391	0.528
2800.000	2.496	264.905	2799.668	4.526	-13.540	4.526	14.276	288.482	0.807
2900.000	2.470	257.432	2899.574	3.863	-17.811	3.863	18.225	282.239	0.325
3000.000	2.322	247.251	2999.487	2.611	-21.783	2.611	21.939	276.836	0.450
3100.000	2.571	238.194	3099.396	0.646	-25.557	0.646	25.565	271.447	0.459
3200.000	2.189	239.042	3199.310	-1.519	-29.101	-1.519	29.141	267.012	0.384
3300.000	1.259	239.652	3299.263	-3.057	-31.687	-3.057	31.834	264.490	0.930
3400.000	0.795	194.537	3399.248	-4.283	-32.810	-4.283	33.088	262.563	0.897

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
3500.000	0.708	133.987	3499.241	-5.383	-32.539	-5.383	32.981	260.606	0.761
3600.000	0.423	117.968	3599.236	-5.985	-31.769	-5.985	32.328	259.331	0.323
3700.000	0.506	160.585	3699.233	-6.574	-31.296	-6.574	31.979	258.136	0.346
3800.000	0.731	163.308	3799.228	-7.602	-30.966	-7.602	31.886	256.207	0.227
3900.000	1.675	162.463	3899.204	-9.607	-30.343	-9.607	31.827	252.431	0.944
4000.000	1.846	160.870	3999.157	-12.522	-29.374	-12.522	31.932	246.911	0.178
4100.000	1.024	160.705	4099.125	-14.888	-28.551	-14.888	32.200	242.460	0.822
4200.000	1.671	140.674	4199.097	-16.860	-27.332	-16.860	32.113	238.332	0.790
4300.000	1.830	118.079	4299.052	-18.739	-24.999	-18.739	31.243	233.145	0.703
4400.000	2.081	90.882	4398.996	-19.519	-21.775	-19.519	29.242	228.128	0.951
4500.000	2.039	65.259	4498.933	-18.802	-18.344	-18.802	26.268	224.293	0.914
4600.000	2.273	39.734	4598.864	-16.532	-15.460	-16.532	22.634	223.081	0.979
4700.000	2.609	42.063	4698.774	-13.317	-12.667	-13.317	18.380	223.568	0.350
4800.000	3.123	42.103	4798.648	-9.607	-9.317	-9.607	13.382	224.122	0.514
4900.000	3.117	32.241	4898.501	-5.287	-6.040	-5.287	8.027	228.806	0.536
5000.000	2.487	40.189	4998.381	-1.329	-3.189	-1.329	3.455	247.373	0.738
5100.000	2.257	35.926	5098.295	1.923	-0.634	1.923	2.025	341.766	0.290
5200.000	1.692	46.670	5198.236	4.531	1.596	4.531	4.804	19.405	0.673
5300.000	1.359	43.280	5298.200	6.408	3.483	6.408	7.294	28.529	0.345
5400.000	1.243	52.748	5398.175	7.928	5.160	7.928	9.459	33.058	0.244
5500.000	1.363	61.261	5498.149	9.156	7.066	9.156	11.566	37.657	0.228
5600.000	1.320	52.629	5598.121	10.427	9.024	10.427	13.790	40.874	0.206
5700.000	1.523	26.392	5698.092	12.317	10.530	12.317	16.205	40.528	0.675
5800.000	1.661	34.880	5798.053	14.696	11.950	14.696	18.942	39.115	0.273
5900.000	1.379	31.102	5898.018	16.916	13.400	16.916	21.580	38.385	0.299
6000.000	0.986	32.299	5997.996	18.673	14.481	18.673	23.631	37.794	0.394
6100.000	0.268	50.204	6097.990	19.550	15.121	19.550	24.715	37.720	0.736
6200.000	0.330	43.169	6197.989	19.910	15.497	19.910	25.230	37.897	0.073
6300.000	0.483	83.857	6297.986	20.165	16.114	20.165	25.813	38.628	0.317
6400.000	0.173	125.972	6397.985	20.121	16.655	20.121	26.120	39.616	0.373
6500.000	0.358	70.320	6497.984	20.138	17.072	20.138	26.401	40.290	0.297
6600.000	0.501	96.986	6597.981	20.190	17.801	20.190	26.917	41.401	0.242
6700.000	0.249	139.831	6697.979	19.971	18.375	19.971	27.138	42.617	0.360
6800.000	0.706	104.719	6797.975	19.648	19.111	19.648	27.409	44.206	0.522
6900.000	0.574	42.867	6897.970	19.859	20.048	19.859	28.218	45.271	0.667
7000.000	0.445	89.970	6997.966	20.226	20.777	20.226	28.996	45.770	0.424
7100.000	0.649	332.986	7097.964	20.731	20.908	20.731	29.443	45.244	0.939
7200.000	0.310	55.480	7197.961	21.389	20.874	21.389	29.886	44.302	0.682
7300.000	0.233	3.911	7297.960	21.745	21.111	21.745	30.307	44.152	0.246
7400.000	0.300	8.758	7397.959	22.207	21.165	22.207	30.677	43.623	0.071
7500.000	0.329	351.515	7497.958	22.750	21.162	22.750	31.071	42.930	0.098
7600.000	0.352	358.559	7597.956	23.340	21.112	23.340	31.472	42.131	0.048

HORIZONTAL DISPLACEMENT IS  
31.472 FEET AT 42.131 DEGREES