

Company: Noble Energy

Lease/Well: Buckmur B / 2-25

API: 05-123-23290

Rig Name: Production / Lightning Wireline

State/County: Colorado / Weld County

Latitude: 40.424, Longitude: -104.522

GRID North is 0.630 Degrees East of True North

VS-Azi: 0.000 Degrees



FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : RKB = Ground Level

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01-de_01_mrg.ut

Minimum Curvature Method

Report Date/Time: 2/1/2013 / 12:27

Vaughn Energy Services

Henderson Colorado

303-853-4976

Norman Cowan

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	0.240	66.848	100.000	0.082	0.193	0.082	0.209	66.848	0.240
200.000	0.074	92.113	199.999	0.162	0.450	0.162	0.478	70.169	0.176
300.000	0.387	146.121	299.998	-0.120	0.703	-0.120	0.713	99.703	0.348
400.000	0.492	115.929	399.996	-0.588	1.277	-0.588	1.405	114.722	0.250
500.000	0.310	127.343	499.993	-0.939	1.878	-0.939	2.099	116.582	0.197
600.000	0.477	215.967	599.991	-1.440	1.848	-1.440	2.343	127.930	0.562
700.000	0.586	260.974	699.988	-1.857	1.099	-1.857	2.158	149.393	0.419
800.000	0.340	293.533	799.984	-1.819	0.322	-1.819	1.847	169.966	0.351
900.000	0.426	288.521	899.982	-1.583	-0.302	-1.583	1.611	190.807	0.092
1000.000	0.611	275.663	999.978	-1.412	-1.185	-1.412	1.844	220.003	0.218
1100.000	0.591	269.548	1099.973	-1.364	-2.232	-1.364	2.615	238.574	0.067
1200.000	0.565	275.715	1199.967	-1.319	-3.238	-1.319	3.497	247.845	0.068
1300.000	0.231	307.707	1299.965	-1.146	-3.888	-1.146	4.054	253.572	0.389
1400.000	0.339	252.626	1399.964	-1.112	-4.330	-1.112	4.470	255.601	0.280
1500.000	0.403	285.666	1499.962	-1.105	-4.951	-1.105	5.073	257.418	0.220
1600.000	0.248	273.002	1599.960	-0.999	-5.506	-0.999	5.595	259.719	0.170
1700.000	0.129	214.675	1699.960	-1.080	-5.786	-1.080	5.886	259.429	0.211
1800.000	0.051	260.180	1799.960	-1.180	-5.894	-1.180	6.011	258.680	0.100
1900.000	0.221	244.888	1899.959	-1.269	-6.112	-1.269	6.243	258.269	0.172
2000.000	0.454	264.552	1999.958	-1.389	-6.681	-1.389	6.824	258.259	0.257
2100.000	0.932	284.256	2099.950	-1.226	-7.864	-1.226	7.959	261.139	0.527
2200.000	1.360	297.769	2199.930	-0.473	-9.703	-0.473	9.714	267.211	0.504
2300.000	1.305	308.146	2299.903	0.784	-11.649	0.784	11.675	273.849	0.247
2400.000	1.197	313.231	2399.879	2.203	-13.305	2.203	13.486	279.400	0.155
2500.000	1.053	326.479	2499.860	3.684	-14.574	3.684	15.032	284.187	0.296
2600.000	0.921	322.538	2599.845	5.088	-15.570	5.088	16.381	288.097	0.148
2700.000	0.747	317.838	2699.835	6.209	-16.496	6.209	17.626	290.626	0.187
2800.000	0.638	338.673	2799.828	7.211	-17.136	7.211	18.591	292.821	0.272
2900.000	0.625	352.476	2899.822	8.269	-17.410	8.269	19.274	295.407	0.152
3000.000	0.591	356.576	2999.816	9.325	-17.512	9.325	19.840	298.034	0.055
3100.000	0.516	0.677	3099.811	10.290	-17.538	10.290	20.333	300.402	0.085
3200.000	0.864	148.496	3199.808	10.098	-17.138	10.098	19.892	300.506	1.329
3300.000	2.092	151.533	3299.773	7.851	-15.875	7.851	17.710	296.315	1.230
3400.000	2.145	159.258	3399.705	4.497	-14.342	4.497	15.031	287.408	0.290

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	2.024	152.413	3499.639	1.182	-12.862	1.182	12.916	275.249	0.277
3600.000	2.153	144.658	3599.573	-1.916	-10.957	-1.916	11.123	260.081	0.310
3700.000	1.967	145.678	3699.508	-4.866	-8.903	-4.866	10.146	241.341	0.190
3800.000	1.841	142.574	3799.453	-7.559	-6.959	-7.559	10.274	222.634	0.163
3900.000	1.459	111.186	3899.413	-9.295	-4.795	-9.295	10.459	207.291	0.965
4000.000	1.168	103.982	3999.387	-10.001	-2.619	-10.001	10.338	194.676	0.335
4100.000	1.199	92.618	4099.365	-10.295	-0.586	-10.295	10.312	183.257	0.236
4200.000	0.915	87.021	4199.348	-10.301	1.256	-10.301	10.378	173.047	0.302
4300.000	0.868	70.275	4299.336	-10.004	2.766	-10.004	10.380	164.544	0.264
4400.000	0.870	71.090	4399.325	-9.503	4.197	-9.503	10.388	156.170	0.013
4500.000	0.937	57.724	4499.313	-8.820	5.607	-8.820	10.451	147.556	0.221
4600.000	1.009	49.516	4599.298	-7.811	6.968	-7.811	10.468	138.265	0.157
4700.000	0.565	50.479	4699.289	-6.926	8.018	-6.926	10.595	130.819	0.445
4800.000	0.199	37.755	4799.286	-6.475	8.505	-6.475	10.689	127.285	0.374
4900.000	0.171	61.889	4899.286	-6.268	8.742	-6.268	10.757	125.640	0.082
5000.000	0.186	95.733	4999.285	-6.214	9.035	-6.214	10.965	124.518	0.105
5100.000	0.287	172.836	5099.285	-6.478	9.227	-6.478	11.274	125.071	0.305
5200.000	0.455	201.902	5199.283	-7.094	9.111	-7.094	11.547	127.908	0.247
5300.000	0.991	239.058	5299.275	-7.907	8.221	-7.907	11.406	133.887	0.686
5400.000	1.405	229.935	5399.253	-9.141	6.541	-9.141	11.240	144.416	0.454
5500.000	1.693	245.549	5499.216	-10.542	4.258	-10.542	11.369	158.006	0.508
5600.000	1.779	260.066	5599.171	-11.421	1.385	-11.421	11.504	173.087	0.447
5700.000	2.444	266.661	5699.103	-11.813	-2.273	-11.813	12.029	190.890	0.708
5800.000	3.205	276.428	5798.981	-11.624	-7.179	-11.624	13.662	211.702	0.898
5900.000	2.607	279.605	5898.852	-10.931	-12.200	-10.931	16.381	228.138	0.620
6000.000	1.241	290.465	5998.794	-10.173	-15.457	-10.173	18.504	236.648	1.407
6100.000	0.584	333.034	6098.781	-9.340	-16.703	-9.340	19.137	240.785	0.902
6200.000	0.705	70.423	6198.777	-8.680	-16.354	-8.680	18.515	242.043	0.971
6300.000	0.905	72.618	6298.768	-8.238	-15.022	-8.238	17.132	241.258	0.202
6400.000	1.329	56.842	6398.749	-7.368	-13.297	-7.368	15.202	241.009	0.521
6500.000	1.523	57.812	6498.717	-6.026	-11.201	-6.026	12.719	241.723	0.195
6600.000	1.380	181.934	6598.702	-6.521	-10.117	-6.521	12.037	237.195	2.566
6700.000	2.110	189.815	6698.655	-9.538	-10.471	-9.538	14.164	227.670	0.767
HORIZONTAL DISPLACEMENT IS 14.164 FEET AT 227.670 DEGREES									