



Company: Noble Energy
Well: Sandau & Bartels 25-14F
API: 05-123-16274
Rig Name: Production/Lightning Wireline
State/County: Colorado/ Weld
Latitude: 40.278, Longitude: -104.728
GRID North is 0.500 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_ed.ut

Minimum Curvature Method

Report Date/Time: 3/16/2012 / 12:51

Vaughn Energy Services
Henderson, Colorado
866-835-8333
Jason Kinchelow

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	0.130	292.805	100.000	0.044	-0.104	0.044	0.113	292.805	0.130
200.000	0.168	112.210	200.000	0.032	-0.073	0.032	0.080	293.900	0.298
300.000	0.072	156.776	300.000	-0.081	0.088	-0.081	0.119	132.640	0.127
400.000	0.478	306.261	399.999	0.109	-0.224	0.109	0.249	295.850	0.542
500.000	0.673	336.314	499.994	0.893	-0.797	0.893	1.197	318.268	0.353
600.000	0.454	11.264	599.989	1.820	-0.956	1.820	2.055	332.294	0.398
700.000	0.402	342.066	699.986	2.541	-0.986	2.541	2.726	338.792	0.221
800.000	0.412	337.638	799.984	3.208	-1.231	3.208	3.436	339.006	0.033
900.000	0.334	322.976	899.982	3.773	-1.543	3.773	4.077	337.753	0.123
1000.000	0.632	355.148	999.978	4.556	-1.766	4.556	4.886	338.816	0.392
1100.000	0.275	313.936	1099.975	5.272	-1.985	5.272	5.634	339.367	0.462
1200.000	0.587	330.110	1199.972	5.883	-2.413	5.883	6.359	337.695	0.331
1300.000	0.606	344.266	1299.967	6.835	-2.812	6.835	7.391	337.640	0.148
1400.000	0.628	336.840	1399.961	7.848	-3.171	7.848	8.464	338.001	0.083
1500.000	0.640	334.995	1499.955	8.858	-3.622	8.858	9.570	337.759	0.024
1600.000	0.421	319.178	1599.951	9.642	-4.098	9.642	10.476	336.972	0.262
1700.000	0.575	331.417	1699.947	10.360	-4.578	10.360	11.327	336.159	0.187
1800.000	0.557	337.011	1799.942	11.249	-5.009	11.249	12.314	335.999	0.058
1900.000	0.532	300.274	1899.938	11.931	-5.600	11.931	13.180	334.858	0.344
2000.000	0.283	300.127	1999.935	12.289	-6.214	12.289	13.771	333.175	0.249
2100.000	0.139	334.896	2099.935	12.523	-6.479	12.523	14.100	332.642	0.187
2200.000	0.332	292.372	2199.934	12.743	-6.799	12.743	14.443	331.918	0.248
2300.000	0.185	35.943	2299.933	12.984	-6.972	12.984	14.737	331.764	0.416
2400.000	0.459	314.567	2399.932	13.395	-7.163	13.395	15.190	331.865	0.468
2500.000	0.529	324.624	2499.928	14.053	-7.715	14.053	16.031	331.232	0.111
2600.000	0.724	352.835	2599.922	15.056	-8.062	15.056	17.078	331.834	0.359
2700.000	0.468	325.854	2699.917	16.020	-8.369	16.020	18.075	332.416	0.373
2800.000	0.441	331.731	2799.914	16.697	-8.781	16.697	18.865	332.260	0.054
2900.000	0.520	338.331	2899.910	17.457	-9.131	17.457	19.701	332.390	0.096
3000.000	0.651	322.926	2999.905	18.332	-9.640	18.332	20.712	332.261	0.204
3100.000	0.972	318.599	3099.895	19.422	-10.544	19.422	22.099	331.502	0.327
3200.000	0.811	327.137	3199.883	20.653	-11.489	20.653	23.634	330.912	0.208
3300.000	0.732	295.803	3299.874	21.526	-12.448	21.526	24.866	329.959	0.424
3400.000	0.565	281.912	3399.868	21.905	-13.506	21.905	25.734	328.343	0.228

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	0.460	278.727	3499.864	22.068	-14.385	22.068	26.343	326.901	0.110
3600.000	0.447	278.183	3599.861	22.184	-15.168	22.184	26.874	325.639	0.013
3700.000	0.785	286.266	3699.855	22.432	-16.211	22.432	27.676	324.145	0.348
3800.000	0.844	279.039	3799.845	22.739	-17.596	22.739	28.752	322.267	0.119
3900.000	0.509	278.454	3899.838	22.920	-18.762	22.920	29.620	320.696	0.335
4000.000	0.731	291.021	3999.832	23.214	-19.797	23.214	30.509	319.543	0.259
4100.000	0.717	292.308	4099.824	23.680	-20.971	23.680	31.631	318.473	0.021
4200.000	0.928	324.879	4199.814	24.581	-22.016	24.581	32.999	318.150	0.504
4300.000	0.455	317.369	4299.806	25.536	-22.751	25.536	34.201	318.300	0.481
4400.000	1.179	343.721	4399.796	26.815	-23.309	26.815	35.530	319.002	0.797
4500.000	1.218	356.164	4499.774	28.863	-23.668	28.863	37.327	320.648	0.263
4600.000	1.286	349.049	4599.750	31.026	-23.952	31.026	39.196	322.332	0.170
4700.000	1.343	358.542	4699.724	33.299	-24.195	33.299	41.162	323.998	0.225
4800.000	1.275	26.663	4799.699	35.465	-23.726	35.465	42.670	326.218	0.639
4900.000	1.450	19.125	4899.671	37.655	-22.812	37.655	44.026	328.792	0.250
5000.000	0.909	42.044	4999.650	39.440	-21.866	39.440	45.096	330.995	0.708
5100.000	0.714	40.210	5099.640	40.504	-20.933	40.504	45.594	332.669	0.197
5200.000	1.125	40.103	5199.627	41.731	-19.899	41.731	46.232	334.507	0.411
5300.000	1.248	21.160	5299.605	43.498	-18.873	43.498	47.416	336.545	0.409
5400.000	1.176	10.415	5399.583	45.523	-18.294	45.523	49.061	338.106	0.238
5500.000	1.040	357.585	5499.565	47.439	-18.147	47.439	50.791	339.066	0.282
5600.000	1.506	3.756	5599.540	49.657	-18.099	49.657	52.852	339.974	0.486
5700.000	1.465	350.592	5699.506	52.230	-18.222	52.230	55.317	340.767	0.343
5800.000	1.248	4.596	5799.479	54.576	-18.344	54.576	57.576	341.422	0.395
5900.000	1.051	33.847	5899.459	56.422	-17.746	56.422	59.147	342.541	0.611
6000.000	1.002	30.379	5999.443	57.938	-16.793	57.938	60.323	343.836	0.079
6100.000	0.861	85.168	6099.432	58.755	-15.602	58.755	60.792	345.128	0.866
6200.000	1.765	101.055	6199.405	58.523	-13.343	58.523	60.025	347.157	0.966
6300.000	1.898	131.345	6299.356	57.134	-10.588	57.134	58.107	349.501	0.966
6400.000	2.301	155.508	6399.291	54.213	-8.512	54.213	54.877	351.077	0.963
6500.000	2.329	159.917	6499.209	50.477	-6.982	50.477	50.958	352.125	0.180
6600.000	2.197	159.589	6599.131	46.773	-5.616	46.773	47.109	353.154	0.133
6700.000	3.133	161.456	6699.022	42.386	-4.078	42.386	42.581	354.504	0.940
6800.000	2.891	175.310	6798.885	37.282	-3.003	37.282	37.402	355.395	0.765
6900.000	1.969	172.534	6898.794	33.065	-2.574	33.065	33.165	355.549	0.929
7000.000	1.474	179.595	6998.749	30.075	-2.341	30.075	30.166	355.549	0.538
7100.000	0.925	183.197	7098.726	27.983	-2.377	27.983	28.084	355.144	0.553
7200.000	0.711	179.312	7198.716	26.557	-2.415	26.557	26.667	354.805	0.222

HORIZONTAL DISPLACEMENT IS
26.667 FEET AT 354.805 DEGREES