

Company: Noble Energy

Lease/Well: Sandau Bartels / 25-12 F

API: 05-123-14923

Rig Name: Production / Lightning Wireline

State/County: Colorado / Weld

Latitude: 40.281, Longitude: -104.732

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: 3/17/2012 / 20:34

Vaughn Energy Services

Henderson Colorado

866-835-8333

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	0.267	298.090	100.000	0.110	-0.205	0.110	0.233	298.090	0.267
200.000	0.317	257.215	199.998	0.158	-0.681	0.158	0.699	283.067	0.209
300.000	0.316	270.866	299.997	0.101	-1.227	0.101	1.231	274.703	0.075
400.000	0.317	295.962	399.995	0.226	-1.751	0.226	1.766	277.358	0.138
500.000	0.303	262.251	499.994	0.312	-2.262	0.312	2.284	277.841	0.180
600.000	0.523	234.157	599.992	0.009	-2.894	0.009	2.894	270.174	0.292
700.000	0.525	258.540	699.987	-0.349	-3.713	-0.349	3.730	264.625	0.221
800.000	0.521	258.659	799.983	-0.530	-4.608	-0.530	4.639	263.441	0.005
900.000	0.754	308.690	899.978	-0.208	-5.568	-0.208	5.572	267.862	0.579
1000.000	1.201	317.502	999.963	0.976	-6.789	0.976	6.859	278.181	0.470
1100.000	1.440	323.093	1099.936	2.753	-8.252	2.753	8.699	288.452	0.271
1200.000	1.356	328.373	1199.907	4.765	-9.627	4.765	10.742	296.336	0.154
1300.000	1.478	323.676	1299.876	6.811	-11.011	6.811	12.947	301.741	0.168
1400.000	1.649	328.199	1399.839	9.073	-12.533	9.073	15.472	305.903	0.211
1500.000	1.632	326.319	1499.798	11.481	-14.081	11.481	18.168	309.193	0.057
1600.000	1.888	329.311	1599.751	14.083	-15.711	14.083	21.099	311.871	0.272
1700.000	2.153	330.153	1699.688	17.129	-17.487	17.129	24.478	314.407	0.267
1800.000	2.384	332.231	1799.610	20.599	-19.391	20.599	28.290	316.730	0.245
1900.000	2.383	336.073	1899.523	24.340	-21.204	24.340	32.281	318.939	0.160
2000.000	2.452	342.613	1999.435	28.282	-22.686	28.282	36.257	321.265	0.284
2100.000	2.427	352.445	2099.344	32.422	-23.604	32.422	40.104	323.945	0.419
2200.000	2.187	0.005	2199.264	36.429	-23.882	36.429	43.560	326.752	0.387
2300.000	2.121	359.488	2299.193	40.188	-23.898	40.188	46.757	329.262	0.069
2400.000	1.910	9.330	2399.131	43.684	-23.645	43.684	49.673	331.575	0.405
2500.000	1.304	8.373	2499.091	46.455	-23.209	46.455	51.930	333.454	0.607
2600.000	1.370	16.273	2599.064	48.729	-22.708	48.729	53.760	335.014	0.196
2700.000	1.280	21.386	2699.038	50.917	-21.966	50.917	55.453	336.665	0.148
2800.000	1.328	22.298	2799.012	53.029	-21.119	53.029	57.079	338.285	0.052
2900.000	1.018	14.564	2898.991	54.960	-20.456	54.960	58.643	339.585	0.347
3000.000	0.503	3.739	2998.982	56.258	-20.204	56.258	59.776	340.245	0.533
3100.000	0.613	287.011	3098.978	56.852	-20.686	56.852	60.498	340.005	0.698
3200.000	0.947	282.221	3198.969	57.183	-22.005	57.183	61.271	338.952	0.340
3300.000	0.971	281.812	3298.955	57.531	-23.642	57.531	62.200	337.660	0.025
3400.000	0.743	278.265	3398.943	57.798	-25.113	57.798	63.018	336.515	0.234

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	0.785	264.729	3498.935	57.828	-26.437	57.828	63.585	335.432	0.185
3600.000	0.962	264.685	3598.923	57.688	-27.955	57.688	64.104	334.145	0.178
3700.000	1.249	265.461	3698.904	57.524	-29.878	57.524	64.820	332.552	0.287
3800.000	1.510	277.524	3798.875	57.610	-32.271	57.610	66.033	330.744	0.389
3900.000	1.887	272.277	3898.831	57.848	-35.223	57.848	67.728	328.663	0.407
4000.000	2.063	271.642	3998.772	57.965	-38.668	57.965	69.679	326.293	0.177
4100.000	2.159	275.853	4098.704	58.209	-42.340	58.209	71.979	323.968	0.183
4200.000	2.543	281.903	4198.620	58.858	-46.385	58.858	74.939	321.759	0.457
4300.000	2.507	280.977	4298.523	59.732	-50.703	59.732	78.350	319.674	0.054
4400.000	2.698	300.295	4398.421	61.336	-54.883	61.336	82.306	318.178	0.893
4500.000	2.840	305.532	4498.305	63.963	-58.931	63.963	86.972	317.345	0.290
4600.000	2.705	307.288	4598.188	66.833	-62.825	66.833	91.726	316.771	0.159
4700.000	2.499	316.372	4698.085	69.841	-66.207	69.841	96.235	316.530	0.460
4800.000	2.168	317.778	4798.002	72.820	-68.982	72.820	100.306	316.550	0.336
4900.000	2.194	326.613	4897.930	75.819	-71.307	75.819	104.082	316.757	0.337
5000.000	2.035	338.164	4997.862	79.065	-73.020	79.065	107.626	317.276	0.454
5100.000	1.948	336.678	5097.802	82.274	-74.354	82.274	110.894	317.895	0.102
5200.000	1.666	328.879	5197.752	85.079	-75.778	85.079	113.933	318.309	0.374
5300.000	1.034	308.892	5297.724	86.890	-77.231	86.890	116.252	318.368	0.779
5400.000	0.920	314.064	5397.710	88.015	-78.510	88.015	117.942	318.267	0.144
5500.000	1.173	299.623	5497.693	89.079	-79.977	89.079	119.713	318.082	0.364
5600.000	0.925	327.054	5597.677	90.262	-81.306	90.262	121.482	317.988	0.553
5700.000	1.102	23.124	5697.663	91.824	-81.367	91.824	122.688	318.455	0.966
5800.000	0.659	333.431	5797.653	93.223	-81.247	93.223	123.659	318.927	0.842
5900.000	0.410	32.436	5897.649	94.040	-81.312	94.040	124.319	319.152	0.570
6000.000	0.484	32.697	5997.646	94.698	-80.892	94.698	124.544	319.496	0.074
6100.000	0.495	359.343	6097.642	95.485	-80.668	95.485	124.999	319.808	0.281
6200.000	0.193	26.006	6197.641	96.068	-80.599	96.068	125.401	320.004	0.333
6300.000	0.217	142.517	6297.640	96.070	-80.410	96.070	125.281	320.071	0.349
6400.000	0.120	311.322	6397.640	95.989	-80.374	95.989	125.195	320.060	0.336
6500.000	0.078	168.380	6497.640	95.991	-80.439	95.991	125.239	320.038	0.189
6600.000	0.151	192.173	6597.640	95.796	-80.453	95.796	125.098	319.975	0.085
6700.000	0.402	164.239	6697.639	95.330	-80.386	95.330	124.698	319.861	0.277
6800.000	0.605	204.842	6797.635	94.514	-80.512	94.514	124.157	319.574	0.398
6900.000	0.747	169.425	6897.628	93.394	-80.614	93.394	123.374	319.201	0.433
7000.000	0.906	176.161	6997.618	91.965	-80.442	91.965	122.182	318.824	0.186
7100.000	1.056	181.339	7097.603	90.255	-80.410	90.255	120.879	318.301	0.174
7200.000	1.181	180.147	7197.584	88.304	-80.434	88.304	119.446	317.670	0.127

HORIZONTAL DISPLACEMENT IS  
119.446 FEET AT 317.670 DEGREES