

Company: Noble Energy

Lease/Well: Berig State K / 36-18

API: 05-123-25579

Rig Name: Production / Lightning Wireline

State/County: Colorado / Weld County

Latitude: 40.272, Longitude: -104.726

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-de_01.ut

Minimum Curvature Method

Report Date/Time: 1/25/2013 / 09:00

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	0.261	131.297	100.000	-0.150	0.171	-0.150	0.227	131.297	0.261
200.000	0.446	197.359	199.998	-0.672	0.226	-0.672	0.709	161.448	0.416
300.000	0.452	216.318	299.995	-1.361	-0.124	-1.361	1.367	185.210	0.148
400.000	0.722	196.541	399.990	-2.283	-0.537	-2.283	2.345	193.236	0.334
500.000	0.492	219.067	499.984	-3.220	-0.987	-3.220	3.368	197.038	0.327
600.000	0.883	210.775	599.977	-4.216	-1.652	-4.216	4.528	201.395	0.403
700.000	0.733	217.563	699.967	-5.385	-2.436	-5.385	5.910	204.340	0.178
800.000	0.546	212.232	799.961	-6.295	-3.080	-6.295	7.008	206.071	0.196
900.000	0.723	208.358	899.955	-7.253	-3.633	-7.253	8.112	206.610	0.183
1000.000	1.182	190.554	999.941	-8.822	-4.122	-8.822	9.738	205.044	0.541
1100.000	0.922	191.116	1099.924	-10.626	-4.466	-10.626	11.526	202.798	0.261
1200.000	0.983	189.471	1199.910	-12.262	-4.763	-12.262	13.154	201.227	0.067
1300.000	0.974	191.224	1299.895	-13.942	-5.069	-13.942	14.835	199.981	0.031
1400.000	0.616	190.555	1399.885	-15.304	-5.333	-15.304	16.207	199.212	0.358
1500.000	0.571	194.662	1499.880	-16.315	-5.558	-16.315	17.235	198.812	0.062
1600.000	0.396	191.473	1599.877	-17.135	-5.753	-17.135	18.075	198.557	0.176
1700.000	0.123	243.646	1699.875	-17.522	-5.918	-17.522	18.495	198.661	0.335
1800.000	0.262	261.765	1799.875	-17.603	-6.241	-17.603	18.676	199.521	0.150
1900.000	0.276	295.737	1899.874	-17.531	-6.685	-17.531	18.762	200.873	0.158
2000.000	0.477	328.441	1999.872	-17.071	-7.120	-17.071	18.497	202.640	0.286
2100.000	1.009	341.091	2099.863	-15.883	-7.623	-15.883	17.618	205.639	0.554
2200.000	1.266	353.235	2199.843	-13.953	-8.039	-13.953	16.103	209.947	0.350
2300.000	0.765	352.472	2299.827	-12.195	-8.256	-12.195	14.727	214.101	0.501
2400.000	0.197	20.318	2399.824	-11.371	-8.284	-11.371	14.069	216.075	0.598
2500.000	0.163	138.363	2499.823	-11.316	-8.130	-11.316	13.933	215.695	0.310
2600.000	0.108	190.417	2599.823	-11.515	-8.052	-11.515	14.051	214.964	0.129
2700.000	0.221	358.488	2699.823	-11.416	-8.074	-11.416	13.983	215.272	0.327
2800.000	0.228	20.126	2799.822	-11.036	-8.011	-11.036	13.637	215.975	0.085
2900.000	0.088	356.349	2899.822	-10.772	-7.947	-10.772	13.386	216.418	0.152
3000.000	0.797	298.321	2999.818	-10.365	-8.564	-10.365	13.446	219.564	0.754
3100.000	0.816	287.372	3099.808	-9.823	-9.856	-9.823	13.915	225.097	0.155
3200.000	1.044	291.708	3199.795	-9.273	-11.382	-9.273	14.682	230.830	0.238
3300.000	1.466	297.377	3299.771	-8.348	-13.365	-8.348	15.758	238.010	0.440
3400.000	1.626	300.753	3399.735	-7.034	-15.720	-7.034	17.222	245.893	0.183

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	1.964	302.595	3499.685	-5.386	-18.383	-5.386	19.155	253.670	0.343
3600.000	1.762	303.533	3599.632	-3.613	-21.108	-3.613	21.415	260.287	0.204
3700.000	1.445	310.460	3699.593	-1.946	-23.349	-1.946	23.430	265.236	0.372
3800.000	0.477	323.220	3799.578	-0.794	-24.558	-0.794	24.571	268.148	0.985
3900.000	0.518	323.547	3899.574	-0.097	-25.076	-0.097	25.076	269.779	0.041
4000.000	0.998	317.033	3999.565	0.904	-25.938	0.904	25.953	271.995	0.486
4100.000	1.844	313.551	4099.534	2.649	-27.697	2.649	27.823	275.464	0.850
4200.000	2.433	313.712	4199.464	5.224	-30.397	5.224	30.843	279.752	0.589
4300.000	2.806	304.801	4299.359	8.087	-33.941	8.087	34.891	283.403	0.551
4400.000	3.020	302.626	4399.230	10.905	-38.169	10.905	39.696	285.944	0.242
4500.000	3.164	309.581	4499.085	14.083	-42.515	14.083	44.787	288.328	0.401
4600.000	3.219	303.052	4598.930	17.373	-46.995	17.373	50.103	290.288	0.367
4700.000	3.165	313.575	4698.776	20.807	-51.348	20.807	55.403	292.058	0.587
4800.000	3.564	320.623	4798.604	25.112	-55.319	25.112	60.752	294.415	0.574
4900.000	3.037	323.833	4898.438	29.653	-58.855	29.653	65.903	296.741	0.558
5000.000	2.714	321.133	4998.312	33.635	-61.903	33.635	70.451	298.517	0.350
5100.000	2.492	332.612	5098.209	37.409	-64.389	37.409	74.467	300.156	0.565
5200.000	2.320	336.123	5198.121	41.190	-66.209	41.190	77.976	301.887	0.226
5300.000	2.014	339.387	5298.049	44.686	-67.647	44.686	81.073	303.448	0.331
5400.000	1.649	343.293	5397.998	47.708	-68.679	47.708	83.623	304.786	0.385
5500.000	1.213	337.370	5497.967	50.064	-69.500	50.064	85.654	305.767	0.461
5600.000	0.764	337.628	5597.952	51.657	-70.161	51.657	87.126	306.363	0.449
5700.000	0.901	6.442	5697.941	53.055	-70.326	53.055	88.094	307.031	0.435
5800.000	0.705	352.221	5797.932	54.446	-70.321	54.446	88.935	307.749	0.278
5900.000	0.682	15.630	5897.925	55.628	-70.244	55.628	89.603	308.377	0.282
6000.000	0.851	58.212	5997.916	56.592	-69.453	56.592	89.590	309.174	0.578
6100.000	0.693	87.066	6097.908	57.014	-68.218	57.014	88.906	309.888	0.414
6200.000	0.177	255.836	6197.906	57.007	-67.764	57.007	88.554	310.072	0.867
6300.000	0.970	240.981	6297.900	56.559	-68.655	56.559	88.951	309.482	0.800
6400.000	1.174	227.352	6397.882	55.454	-70.148	55.454	89.420	308.327	0.325
6500.000	1.330	230.350	6497.859	54.020	-71.795	54.020	89.848	306.958	0.169
6600.000	1.550	232.710	6597.827	52.460	-73.765	52.460	90.517	305.420	0.228
6700.000	1.801	225.446	6697.784	50.538	-75.960	50.538	91.236	303.637	0.328
6800.000	2.336	226.357	6797.719	48.029	-78.555	48.029	92.074	301.442	0.537
6900.000	2.711	235.826	6897.622	45.294	-81.987	45.294	93.666	298.918	0.559
7000.000	3.271	239.546	6997.485	42.519	-86.403	42.519	96.298	296.202	0.593
7100.000	3.372	242.035	7097.318	39.694	-91.459	39.694	99.702	293.461	0.176
7200.000	1.627	256.665	7197.219	37.988	-95.438	37.988	102.720	291.704	1.844

HORIZONTAL DISPLACEMENT IS
102.720 FEET AT 291.704 DEGREES