



Company: Noble Energy
Well: Heinle 16-04
API: 05-123-14757
Rig Name: Production/Lightning Wireline
State/County: Colorado/ Weld
Latitude: 40.318, Longitude: -104.670
GRID North is 0.540 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: 3/12/2012 / 13:33

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	0.202	135.135	100.000	-0.125	0.125	-0.125	0.177	135.135	0.202
200.000	0.154	343.412	200.000	-0.122	0.211	-0.122	0.244	120.003	0.346
300.000	0.173	331.577	299.999	0.140	0.101	0.140	0.172	35.748	0.039
400.000	0.179	331.379	399.999	0.410	-0.046	0.410	0.413	353.555	0.006
500.000	0.109	327.326	499.998	0.628	-0.173	0.628	0.651	344.607	0.071
600.000	0.088	254.886	599.998	0.689	-0.298	0.689	0.750	336.580	0.118
700.000	0.101	236.325	699.998	0.620	-0.446	0.620	0.763	324.267	0.033
800.000	0.366	262.434	799.997	0.528	-0.836	0.528	0.989	302.301	0.278
900.000	0.322	253.333	899.995	0.406	-1.422	0.406	1.479	285.926	0.070
1000.000	0.148	244.060	999.995	0.269	-1.807	0.269	1.827	278.454	0.178
1100.000	0.311	283.384	1099.994	0.275	-2.187	0.275	2.205	277.167	0.218
1200.000	0.171	299.136	1199.993	0.410	-2.581	0.410	2.614	279.032	0.154
1300.000	0.629	245.666	1299.990	0.256	-3.212	0.256	3.222	274.566	0.545
1400.000	0.575	237.523	1399.985	-0.239	-4.135	-0.239	4.142	266.691	0.101
1500.000	0.199	306.622	1499.983	-0.405	-4.697	-0.405	4.715	265.073	0.537
1600.000	0.400	231.479	1599.982	-0.519	-5.109	-0.519	5.136	264.202	0.398
1700.000	0.047	304.011	1699.981	-0.713	-5.416	-0.713	5.463	262.498	0.388
1800.000	0.293	39.423	1799.980	-0.493	-5.288	-0.493	5.311	264.675	0.301
1900.000	0.184	147.403	1899.980	-0.431	-5.039	-0.431	5.057	265.116	0.391
2000.000	0.425	118.877	1999.978	-0.745	-4.628	-0.745	4.688	260.857	0.277
2100.000	0.601	121.619	2099.974	-1.199	-3.857	-1.199	4.039	252.733	0.178
2200.000	0.513	152.710	2199.970	-1.872	-3.205	-1.872	3.711	239.714	0.310
2300.000	0.333	133.298	2299.967	-2.469	-2.788	-2.469	3.724	228.476	0.228
2400.000	0.622	173.441	2399.964	-3.207	-2.515	-3.207	4.075	218.099	0.426
2500.000	0.457	212.566	2499.960	-4.082	-2.667	-4.082	4.877	213.160	0.393
2600.000	0.759	206.136	2599.954	-5.013	-3.174	-5.013	5.934	212.337	0.309
2700.000	0.560	197.015	2699.947	-6.076	-3.609	-6.076	7.067	210.710	0.224
2800.000	1.059	215.639	2799.937	-7.294	-4.290	-7.294	8.462	210.463	0.557
2900.000	0.795	222.818	2899.924	-8.554	-5.300	-8.554	10.062	211.783	0.288
3000.000	1.213	228.175	2999.908	-9.768	-6.560	-9.768	11.767	213.885	0.428
3100.000	1.213	232.735	3099.886	-11.115	-8.191	-11.115	13.807	216.389	0.096
3200.000	1.224	247.930	3199.864	-12.157	-10.023	-12.157	15.756	219.505	0.322
3300.000	0.349	258.088	3299.853	-12.621	-11.312	-12.621	16.949	221.868	0.882
3400.000	0.656	32.420	3399.851	-12.201	-11.303	-12.201	16.632	222.812	0.935

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	1.280	64.150	3499.837	-11.230	-9.991	-11.230	15.031	221.657	0.800
3600.000	1.953	81.012	3599.797	-10.477	-7.302	-10.477	12.771	214.876	0.817
3700.000	1.972	109.549	3699.741	-10.786	-3.998	-10.786	11.503	200.337	0.967
3800.000	1.977	111.204	3799.682	-11.986	-0.769	-11.986	12.010	183.671	0.057
3900.000	2.190	106.735	3899.616	-13.160	2.669	-13.160	13.428	168.536	0.268
4000.000	1.608	107.902	3999.560	-14.141	5.834	-14.141	15.298	157.580	0.583
4100.000	0.588	97.566	4099.541	-14.640	7.678	-14.640	16.532	152.324	1.036
4200.000	0.408	19.482	4199.538	-14.372	8.306	-14.372	16.599	149.976	0.643
4300.000	0.357	347.288	4299.536	-13.732	8.356	-13.732	16.075	148.679	0.218
4400.000	0.513	33.854	4399.533	-13.057	8.537	-13.057	15.600	146.822	0.373
4500.000	0.344	1.562	4499.530	-12.385	8.795	-12.385	15.190	144.622	0.288
4600.000	0.192	138.607	4599.530	-12.211	8.913	-12.211	15.118	143.873	0.501
4700.000	0.677	135.371	4699.527	-12.757	9.439	-12.757	15.869	143.502	0.486
4800.000	0.874	114.248	4799.518	-13.491	10.549	-13.491	17.126	141.975	0.344
4900.000	1.094	101.991	4899.503	-14.002	12.179	-14.002	18.558	138.984	0.303
5000.000	1.167	114.481	4999.484	-14.623	14.040	-14.623	20.271	136.165	0.256
5100.000	1.517	113.849	5099.456	-15.580	16.177	-15.580	22.459	133.923	0.350
5200.000	0.967	124.409	5199.432	-16.591	18.083	-16.591	24.541	132.537	0.594
5300.000	0.962	110.950	5299.418	-17.368	19.563	-17.368	26.160	131.599	0.226
5400.000	1.359	132.180	5399.398	-18.464	21.225	-18.464	28.132	131.021	0.579
5500.000	1.074	141.040	5499.376	-19.989	22.693	-19.989	30.241	131.375	0.340
5600.000	1.297	147.119	5599.354	-21.668	23.897	-21.668	32.258	132.200	0.256
5700.000	0.853	125.856	5699.337	-23.055	25.114	-23.055	34.092	132.552	0.590
5800.000	0.814	119.679	5799.326	-23.843	26.335	-23.843	35.525	132.156	0.098
5900.000	0.757	120.963	5899.317	-24.534	27.519	-24.534	36.867	131.718	0.060
6000.000	0.866	93.848	5999.307	-24.925	28.839	-24.925	38.117	130.836	0.395
6100.000	1.025	89.030	6099.293	-24.960	30.486	-24.960	39.401	129.308	0.178
6200.000	0.832	104.672	6199.280	-25.129	32.083	-25.129	40.752	128.070	0.317
6300.000	0.853	108.000	6299.270	-25.543	33.493	-25.543	42.121	127.330	0.054
6400.000	0.736	151.209	6399.261	-26.336	34.510	-26.336	43.411	127.348	0.595
6500.000	0.678	101.943	6499.254	-27.021	35.398	-27.021	44.533	127.356	0.592
6600.000	0.425	156.188	6599.250	-27.483	36.127	-27.483	45.392	127.261	0.551
6700.000	0.402	119.893	6699.248	-27.997	36.581	-27.997	46.065	127.428	0.259
6800.000	0.948	86.128	6799.241	-28.116	37.711	-28.116	47.038	126.707	0.653
6900.000	0.966	133.890	6899.228	-28.644	39.144	-28.644	48.505	126.196	0.775
7000.000	0.653	96.829	6999.219	-29.297	40.317	-29.297	49.838	126.004	0.594
7100.000	0.891	114.134	7099.210	-29.682	41.593	-29.682	51.098	125.513	0.331
HORIZONTAL DISPLACEMENT IS 51.098 FEET AT 125.513 DEGREES									