

Company: Noble Energy

Lease/Well: Kallas / 4-42

API: 05-123-18551

Rig Name: Production / Lightning Wireline

State/County: Colorado / Weld

Latitude: 40.339, Longitude: -104.665

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: 1/10/2012 / 14:40

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	0.478	7.609	99.999	0.413	0.055	0.413	0.417	7.609	0.478
200.000	0.368	108.720	199.997	0.723	0.414	0.723	0.834	29.811	0.657
300.000	0.408	358.006	299.996	0.976	0.706	0.976	1.205	35.874	0.639
400.000	0.467	28.880	399.993	1.689	0.891	1.689	1.910	27.797	0.240
500.000	0.580	168.380	499.991	1.550	1.189	1.550	1.954	37.497	0.983
600.000	0.384	226.911	599.988	0.825	1.046	0.825	1.333	51.743	0.501
700.000	0.684	99.757	699.986	0.495	1.390	0.495	1.475	70.392	0.966
800.000	0.728	59.880	799.979	0.713	2.528	0.713	2.626	74.250	0.483
900.000	0.781	1.087	899.972	1.713	3.090	1.713	3.533	61.000	0.742
1000.000	0.737	37.127	999.963	2.907	3.491	2.907	4.543	50.218	0.471
1100.000	0.753	341.888	1099.956	4.045	3.675	4.045	5.465	42.260	0.691
1200.000	0.584	13.007	1199.950	5.166	3.586	5.166	6.289	34.762	0.394
1300.000	0.592	13.858	1299.944	6.164	3.824	6.164	7.254	31.814	0.012
1400.000	0.522	24.295	1399.940	7.081	4.135	7.081	8.200	30.284	0.123
1500.000	0.600	73.227	1499.935	7.647	4.824	7.647	9.041	32.243	0.470
1600.000	0.799	105.905	1599.928	7.607	5.995	7.607	9.686	38.241	0.437
1700.000	1.009	111.756	1699.916	7.090	7.484	7.090	10.309	46.548	0.230
1800.000	1.108	137.410	1799.899	6.051	8.956	6.051	10.809	55.955	0.480
1900.000	1.161	140.795	1899.880	4.554	10.251	4.554	11.217	66.044	0.085
2000.000	1.247	104.292	1999.859	3.501	11.945	3.501	12.448	73.664	0.758
2100.000	1.298	143.802	2099.836	2.318	13.669	2.318	13.864	80.374	0.862
2200.000	1.413	128.087	2199.809	0.643	15.308	0.643	15.322	87.593	0.388
2300.000	1.379	160.381	2299.781	-1.251	16.682	-1.251	16.729	94.288	0.777
2400.000	1.439	145.810	2399.751	-3.423	17.792	-3.423	18.118	100.890	0.362
2500.000	1.579	138.016	2499.716	-5.486	19.419	-5.486	20.179	105.774	0.248
2600.000	1.614	141.947	2599.677	-7.618	21.209	-7.618	22.536	109.759	0.115
2700.000	1.830	140.463	2699.632	-9.958	23.093	-9.958	25.148	113.327	0.221
2800.000	2.759	132.303	2799.551	-12.810	25.889	-12.810	28.885	116.325	0.983
2900.000	3.186	143.675	2899.417	-16.669	29.316	-16.669	33.723	119.622	0.726
3000.000	2.676	156.235	2999.287	-21.044	31.903	-21.044	38.218	123.410	0.818
3100.000	1.619	162.818	3099.215	-24.530	33.261	-24.530	41.328	126.409	1.083
3200.000	1.002	185.084	3199.189	-26.751	33.601	-26.751	42.949	128.525	0.789
3300.000	0.852	237.725	3299.178	-28.019	32.894	-28.019	43.210	130.423	0.833
3400.000	0.990	267.993	3399.166	-28.446	31.403	-28.446	42.371	132.172	0.499

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	1.243	220.384	3499.149	-29.302	29.837	-29.302	41.819	134.482	0.930
3600.000	1.177	249.056	3599.127	-30.495	28.175	-30.495	41.519	137.264	0.602
3700.000	1.261	281.616	3699.106	-30.641	26.138	-30.641	40.275	139.534	0.688
3800.000	1.244	259.453	3799.083	-30.618	23.993	-30.618	38.899	141.916	0.482
3900.000	1.305	281.663	3899.058	-30.586	21.811	-30.586	37.566	144.507	0.495
4000.000	0.826	239.888	3999.042	-30.718	20.072	-30.718	36.694	146.838	0.882
4100.000	0.747	239.443	4099.033	-31.411	18.887	-31.411	36.652	148.981	0.080
4200.000	1.219	276.545	4199.019	-31.621	17.269	-31.621	36.029	151.359	0.769
4300.000	1.339	270.311	4298.994	-31.493	15.044	-31.493	34.902	154.467	0.184
4400.000	1.480	283.477	4398.964	-31.186	12.619	-31.186	33.642	157.969	0.352
4500.000	1.564	314.423	4498.930	-29.930	10.389	-29.930	31.681	160.857	0.816
4600.000	1.408	278.853	4598.899	-28.785	8.201	-28.785	29.931	164.098	0.920
4700.000	1.280	237.288	4698.873	-29.200	6.047	-29.200	29.820	168.299	0.961
4800.000	1.861	240.950	4798.835	-30.592	3.688	-30.592	30.813	173.125	0.589
4900.000	2.254	227.101	4898.771	-32.719	0.828	-32.719	32.729	178.550	0.631
5000.000	1.848	204.153	4998.709	-35.529	-1.272	-35.529	35.551	182.050	0.908
5100.000	1.163	214.651	5098.674	-37.835	-2.509	-37.835	37.918	183.794	0.735
5200.000	1.080	216.860	5198.655	-39.424	-3.651	-39.424	39.593	185.291	0.094
5300.000	0.770	223.782	5298.642	-40.663	-4.681	-40.663	40.931	186.567	0.329
5400.000	0.708	175.878	5398.634	-41.764	-5.102	-41.764	42.074	186.964	0.603
5500.000	0.796	188.793	5498.626	-43.066	-5.163	-43.066	43.375	186.837	0.190
5600.000	0.361	238.293	5598.621	-43.918	-5.538	-43.918	44.266	187.187	0.625
5700.000	0.546	262.564	5698.618	-44.145	-6.279	-44.145	44.590	188.095	0.263
5800.000	0.780	230.088	5798.611	-44.644	-7.273	-44.644	45.232	189.253	0.433
5900.000	1.203	232.259	5898.596	-45.723	-8.625	-45.723	46.529	190.683	0.424
6000.000	1.921	228.999	5998.558	-47.465	-10.721	-47.465	48.661	192.727	0.724
6100.000	1.967	204.655	6098.502	-50.125	-12.702	-50.125	51.709	194.219	0.821
6200.000	0.722	160.077	6198.475	-52.278	-13.203	-52.278	53.919	194.174	1.539
6300.000	1.488	149.473	6298.456	-53.989	-12.329	-53.989	55.378	192.863	0.789
6400.000	2.228	110.142	6398.406	-55.777	-9.844	-55.777	56.639	190.009	1.431
6500.000	3.146	74.389	6498.302	-55.707	-5.376	-55.707	55.966	185.512	1.866
6600.000	3.912	67.815	6598.112	-53.681	0.427	-53.681	53.682	179.545	0.865
6700.000	3.922	55.593	6697.880	-50.460	6.407	-50.460	50.865	172.764	0.833
6800.000	4.224	45.634	6797.629	-45.952	11.861	-45.952	47.459	165.527	0.768
HORIZONTAL DISPLACEMENT IS 47.459 FEET AT 165.527 DEGREES									