



Company: Noble Energy

RKB/Well: ALM 24/11

API: 05-123-23304

Rig Name: Production/Lightning

State/County: Colorado/Weld

Latitude: 40.496, Longitude: -104.634

GRID North is 0.560 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: 3/20/2012 / 20:38

Vaughn Energy Services

Woodward,OK

(580) 254-5000

Kris Pinson

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	0.248	334.484	100.000	0.195	-0.093	0.195	0.216	334.484	0.248
200.000	0.325	33.896	199.999	0.626	-0.028	0.626	0.627	357.412	0.292
300.000	0.168	121.900	299.998	0.784	0.254	0.784	0.824	17.950	0.360
400.000	0.165	172.737	399.998	0.564	0.396	0.564	0.689	35.117	0.143
500.000	0.166	115.631	499.997	0.358	0.545	0.358	0.652	56.732	0.158
600.000	0.183	147.081	599.997	0.161	0.763	0.161	0.780	78.062	0.096
700.000	0.037	56.207	699.997	0.046	0.877	0.046	0.878	87.021	0.187
800.000	0.281	223.776	799.996	-0.113	0.734	-0.113	0.743	98.769	0.318
900.000	0.437	306.742	899.995	-0.062	0.259	-0.062	0.266	103.511	0.490
1000.000	0.595	288.620	999.991	0.332	-0.539	0.332	0.633	301.615	0.226
1100.000	0.774	305.618	1099.984	0.891	-1.580	0.891	1.814	299.413	0.268
1200.000	0.872	293.010	1199.973	1.581	-2.829	1.581	3.241	299.204	0.205
1300.000	0.942	298.051	1299.961	2.265	-4.255	2.265	4.820	298.032	0.106
1400.000	1.177	290.782	1399.944	3.016	-5.941	3.016	6.663	296.919	0.271
1500.000	1.210	293.746	1499.922	3.806	-7.868	3.806	8.740	295.816	0.070
1600.000	1.294	290.409	1599.898	4.625	-9.893	4.625	10.921	295.057	0.111
1700.000	1.310	289.473	1699.872	5.400	-12.030	5.400	13.187	294.176	0.027
1800.000	1.352	282.677	1799.845	6.041	-14.259	6.041	15.485	292.959	0.163
1900.000	1.166	277.655	1899.821	6.435	-16.418	6.435	17.634	291.402	0.215
2000.000	0.976	264.819	1999.804	6.494	-18.275	6.494	19.394	289.562	0.305
2100.000	1.069	242.342	2099.788	5.984	-19.949	5.984	20.827	286.697	0.409
2200.000	0.956	243.936	2199.773	5.184	-21.524	5.184	22.140	283.542	0.116
2300.000	0.925	245.485	2299.759	4.483	-23.008	4.483	23.441	281.025	0.040
2400.000	0.890	247.637	2399.747	3.853	-24.461	3.853	24.762	278.951	0.049
2500.000	0.900	222.943	2499.735	2.982	-25.714	2.982	25.886	276.615	0.383
2600.000	1.029	213.010	2599.721	1.654	-26.738	1.654	26.789	273.540	0.210
2700.000	1.029	213.988	2699.705	0.157	-27.729	0.157	27.729	270.325	0.018
2800.000	0.932	208.624	2799.690	-1.301	-28.620	-1.301	28.650	267.397	0.133
2900.000	0.991	201.489	2899.676	-2.819	-29.327	-2.819	29.462	264.509	0.133
3000.000	0.837	194.220	2999.663	-4.332	-29.823	-4.332	30.136	261.736	0.192
3100.000	0.962	192.620	3099.651	-5.859	-30.186	-5.859	30.749	259.016	0.127
3200.000	0.953	197.751	3199.637	-7.469	-30.622	-7.469	31.520	256.292	0.086
3300.000	0.904	190.537	3299.624	-9.037	-31.020	-9.037	32.310	253.758	0.127
3400.000	0.759	177.158	3399.614	-10.474	-31.132	-10.474	32.846	251.405	0.242

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	0.805	180.510	3499.604	-11.837	-31.105	-11.837	33.281	249.166	0.065
3600.000	0.801	192.553	3599.594	-13.222	-31.263	-13.222	33.944	247.076	0.168
3700.000	0.865	184.642	3699.584	-14.657	-31.476	-14.657	34.721	245.031	0.131
3800.000	0.960	178.476	3799.571	-16.247	-31.515	-16.247	35.456	242.728	0.137
3900.000	1.077	182.866	3899.555	-18.023	-31.540	-18.023	36.326	240.255	0.141
4000.000	1.135	169.978	3999.537	-19.937	-31.414	-19.937	37.207	237.598	0.255
4100.000	1.096	182.065	4099.518	-21.869	-31.276	-21.869	38.164	235.039	0.238
4200.000	1.193	212.706	4199.499	-23.701	-31.873	-23.701	39.719	233.366	0.612
4300.000	1.306	240.988	4299.476	-25.129	-33.433	-25.129	41.824	233.070	0.620
4400.000	1.148	238.453	4399.453	-26.206	-35.283	-26.206	43.950	233.397	0.167
4500.000	1.242	241.523	4499.432	-27.247	-37.089	-27.247	46.022	233.698	0.114
4600.000	1.137	240.706	4599.410	-28.249	-38.907	-28.249	48.081	234.018	0.107
4700.000	0.882	276.153	4699.395	-28.652	-40.538	-28.652	49.641	234.747	0.661
4800.000	1.462	300.645	4799.375	-27.919	-42.401	-27.919	50.767	236.637	0.754
4900.000	1.753	320.737	4899.336	-26.084	-44.467	-26.084	51.553	239.604	0.630
5000.000	2.123	330.860	4999.279	-23.282	-46.337	-23.282	51.857	243.323	0.502
5100.000	2.447	341.191	5099.200	-19.643	-47.927	-19.643	51.797	247.713	0.523
5200.000	2.512	338.849	5199.106	-15.579	-49.406	-15.579	51.804	252.498	0.120
5300.000	1.755	349.538	5299.036	-12.030	-50.475	-12.030	51.889	256.594	0.852
5400.000	1.259	2.301	5399.002	-9.426	-50.709	-9.426	51.577	259.469	0.595
5500.000	1.536	29.663	5498.973	-7.164	-50.001	-7.164	50.512	261.846	0.713
5600.000	1.533	46.472	5598.938	-5.078	-48.368	-5.078	48.634	264.006	0.448
5700.000	1.667	43.840	5698.899	-3.108	-46.391	-3.108	46.495	266.167	0.152
5800.000	1.073	73.991	5798.871	-1.801	-44.484	-1.801	44.520	267.682	0.914
5900.000	0.921	131.765	5898.858	-2.078	-42.984	-2.078	43.034	267.232	0.973
6000.000	1.013	146.616	5998.844	-3.352	-41.898	-3.352	42.032	265.426	0.266
6100.000	1.075	147.440	6098.827	-4.881	-40.907	-4.881	41.197	263.196	0.063
6200.000	1.124	181.772	6198.810	-6.651	-40.433	-6.651	40.976	260.658	0.651
6300.000	1.487	210.436	6298.785	-8.750	-41.120	-8.750	42.041	257.987	0.736
6400.000	1.691	180.635	6398.748	-11.345	-41.794	-11.345	43.306	254.813	0.841
6500.000	1.387	179.610	6498.712	-14.031	-41.802	-14.031	44.094	251.446	0.305
6600.000	1.496	158.181	6598.681	-16.453	-41.308	-16.453	44.465	248.282	0.547
6700.000	1.319	164.508	6698.651	-18.774	-40.516	-18.774	44.654	245.138	0.236
6800.000	1.139	170.342	6798.628	-20.864	-40.042	-20.864	45.151	242.478	0.219
6900.000	1.247	159.684	6898.606	-22.864	-39.497	-22.864	45.637	239.934	0.246
7100.000	0.842	141.417	7098.573	-26.053	-37.826	-26.053	45.929	235.443	0.260
HORIZONTAL DISPLACEMENT IS 45.929 FEET AT 235.443 DEGREES									