



Company: Noble Energy
Lease/Well: ALM USX E 11/#13
API: 05-123-24484
Rig Name: Production/Lightning
State/County: Colorado/Weld
Latitude: 40.496, Longitude: -104.638
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_ed.ut

Minimum Curvature Method

Report Date/Time: 3/19/2012 / 14:31

Vaughn Energy Services
Henderson, CO.
303-853-4976
Troy Hardin

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	0.156	188.885	100.000	-0.135	-0.021	-0.135	0.136	188.885	0.156
200.000	0.382	179.198	199.999	-0.602	-0.037	-0.602	0.603	183.556	0.229
300.000	0.235	104.323	299.998	-0.986	0.166	-0.986	1.000	170.448	0.393
400.000	0.089	84.795	399.997	-1.030	0.442	-1.030	1.121	156.752	0.154
500.000	0.662	171.785	499.995	-1.594	0.603	-1.594	1.704	159.293	0.663
600.000	0.973	209.441	599.985	-2.905	0.268	-2.905	2.917	174.733	0.604
700.000	1.564	213.265	699.960	-4.785	-0.898	-4.785	4.869	190.630	0.597
800.000	1.585	211.208	799.923	-7.109	-2.363	-7.109	7.492	198.388	0.060
900.000	1.643	220.962	899.883	-9.374	-4.019	-9.374	10.200	203.208	0.280
1000.000	1.707	214.423	999.840	-11.685	-5.801	-11.685	13.046	206.402	0.202
1100.000	1.421	212.698	1099.803	-13.958	-7.313	-13.958	15.757	207.652	0.290
1200.000	1.544	213.366	1199.770	-16.126	-8.724	-16.126	18.335	208.412	0.123
1300.000	1.569	222.444	1299.733	-18.261	-10.388	-18.261	21.009	209.635	0.248
1400.000	1.778	225.555	1399.690	-20.358	-12.420	-20.358	23.847	211.387	0.228
1500.000	1.690	230.641	1499.644	-22.380	-14.668	-22.380	26.758	213.241	0.177
1600.000	1.652	229.036	1599.602	-24.260	-16.897	-24.260	29.565	214.857	0.060
1700.000	1.535	236.799	1699.563	-25.939	-19.106	-25.939	32.216	216.375	0.246
1800.000	1.420	233.741	1799.530	-27.405	-21.226	-27.405	34.664	217.759	0.139
1900.000	1.033	234.092	1899.507	-28.666	-22.955	-28.666	36.725	218.687	0.388
2000.000	1.035	219.085	1999.491	-29.896	-24.254	-29.896	38.497	219.052	0.270
2100.000	0.981	228.822	2099.475	-31.161	-25.468	-31.161	40.244	219.260	0.179
2200.000	1.106	220.573	2199.459	-32.457	-26.741	-32.457	42.054	219.484	0.195
2300.000	0.871	211.746	2299.444	-33.837	-27.768	-33.837	43.772	219.374	0.279
2400.000	0.905	212.176	2399.432	-35.151	-28.588	-35.151	45.309	219.121	0.034
2500.000	1.012	201.103	2499.418	-36.643	-29.326	-36.643	46.933	218.671	0.213
2600.000	0.932	184.565	2599.404	-38.277	-29.709	-38.277	48.453	217.817	0.290
2700.000	0.982	196.237	2699.390	-39.910	-30.013	-39.910	49.936	216.944	0.201
2800.000	1.034	201.208	2799.375	-41.574	-30.579	-41.574	51.609	216.336	0.102
2900.000	1.049	188.477	2899.358	-43.320	-31.041	-43.320	53.293	215.623	0.231
3000.000	1.069	208.522	2999.342	-45.045	-31.621	-45.045	55.035	215.068	0.369
3100.000	1.045	213.568	3099.325	-46.624	-32.570	-46.624	56.873	214.937	0.096
3200.000	1.094	200.111	3199.307	-48.279	-33.402	-48.279	58.708	214.678	0.255
3300.000	1.046	217.411	3299.290	-49.900	-34.285	-49.900	60.543	214.492	0.325
3400.000	0.717	229.671	3399.278	-51.030	-35.316	-51.030	62.059	214.686	0.377

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	0.542	282.223	3499.273	-51.334	-36.256	-51.334	62.847	215.232	0.579
3600.000	0.463	325.801	3599.269	-50.900	-36.945	-50.900	62.895	215.974	0.380
3700.000	0.503	358.322	3699.266	-50.127	-37.185	-50.127	62.414	216.569	0.273
3800.000	0.417	23.453	3799.263	-49.355	-37.053	-49.355	61.716	216.897	0.217
3900.000	0.613	40.647	3899.259	-48.615	-36.560	-48.615	60.828	216.944	0.248
4000.000	0.971	34.711	3999.249	-47.512	-35.729	-47.512	59.447	216.943	0.366
4100.000	1.035	12.827	4099.234	-45.935	-35.046	-45.935	57.778	217.341	0.386
4200.000	1.021	30.366	4199.218	-44.286	-34.395	-44.286	56.074	217.835	0.314
4300.000	1.187	39.240	4299.200	-42.715	-33.290	-42.715	54.155	217.931	0.238
4400.000	0.936	53.958	4399.183	-41.433	-31.974	-41.433	52.336	217.658	0.369
4500.000	0.958	39.468	4499.169	-40.307	-30.782	-40.307	50.717	217.369	0.240
4600.000	0.680	39.817	4599.159	-39.206	-29.871	-39.206	49.289	217.304	0.278
4700.000	0.997	358.635	4699.149	-37.881	-29.512	-37.881	48.020	217.921	0.660
4800.000	1.200	324.486	4799.132	-36.159	-30.141	-36.159	47.074	219.813	0.674
4900.000	1.919	314.408	4899.094	-34.136	-31.946	-34.136	46.752	223.102	0.767
5000.000	2.950	312.430	4999.003	-31.228	-35.041	-31.228	46.937	228.293	1.034
5100.000	2.213	301.767	5098.901	-28.476	-38.581	-28.476	47.952	233.570	0.876
5200.000	1.840	297.299	5198.838	-26.723	-41.649	-26.723	49.485	237.315	0.405
5300.000	0.514	228.634	5298.818	-26.283	-43.412	-26.283	50.749	238.808	1.720
5400.000	1.125	172.156	5398.809	-27.552	-43.615	-27.552	51.588	237.719	0.944
5500.000	1.555	141.322	5498.782	-29.584	-42.633	-29.584	51.892	235.243	0.824
5600.000	1.738	133.273	5598.741	-31.682	-40.681	-31.682	51.563	232.089	0.294
5700.000	1.322	140.356	5698.705	-33.610	-38.841	-33.610	51.364	229.130	0.456
5800.000	1.320	176.847	5798.681	-35.648	-38.042	-35.648	52.134	226.860	0.827
5900.000	1.231	188.881	5898.656	-37.860	-38.144	-37.860	53.743	225.214	0.282
6000.000	0.760	159.723	5998.641	-39.543	-38.080	-39.543	54.898	223.920	0.678
6100.000	0.646	193.077	6098.634	-40.715	-37.978	-40.715	55.678	223.008	0.418
6200.000	0.667	186.560	6198.627	-41.842	-38.172	-41.842	56.638	222.374	0.077
6300.000	0.495	206.855	6298.622	-42.806	-38.434	-42.806	57.528	221.920	0.265
6400.000	0.470	212.702	6398.619	-43.536	-38.851	-43.536	58.350	221.745	0.055
6500.000	0.675	208.588	6498.614	-44.399	-39.354	-44.399	59.329	221.553	0.209
6600.000	0.710	209.753	6598.607	-45.454	-39.943	-45.454	60.510	221.308	0.037
6700.000	0.761	217.397	6698.598	-46.519	-40.654	-46.519	61.780	221.151	0.111
6800.000	0.777	229.096	6798.589	-47.491	-41.570	-47.491	63.115	221.197	0.158
6900.000	0.891	220.310	6898.579	-48.528	-42.586	-48.528	64.564	221.269	0.171
7000.000	0.872	203.157	6998.567	-49.821	-43.388	-49.821	66.065	221.052	0.264
7100.000	0.870	187.593	7098.556	-51.273	-43.788	-51.273	67.426	220.498	0.236
HORIZONTAL DISPLACEMENT IS 67.426 FEET AT 220.498 DEGREES									