



Company: Noble Energy

Well: Thomson B12-13

API: 05-123-19266

Rig Name: Production/Lightning

Location: Weld County, Colorado

Latitude: 40.408, Longitude: -104.506

GRID North is 0.640 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: 11/27/2012 / 15:48

Vaughn Energy Services

Henderson, CO.

Justin Williams

303-853-4976

RKB = Ground Level

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	0.387	245.690	99.999	-0.139	-0.308	-0.139	0.338	245.690	0.387
200.000	0.270	258.348	199.998	-0.326	-0.847	-0.326	0.908	248.955	0.137
300.000	0.272	291.998	299.997	-0.285	-1.299	-0.285	1.329	257.641	0.157
400.000	0.409	313.363	399.995	0.049	-1.779	0.049	1.779	271.594	0.184
500.000	0.434	313.328	499.992	0.554	-2.313	0.554	2.379	283.472	0.025
600.000	0.500	287.599	599.989	0.946	-3.005	0.946	3.150	287.474	0.218
700.000	0.768	323.479	699.983	1.616	-3.819	1.616	4.147	292.937	0.466
800.000	0.738	311.338	799.974	2.580	-4.701	2.580	5.363	298.756	0.162
900.000	0.583	309.642	899.968	3.329	-5.576	3.329	6.495	300.841	0.156
1000.000	0.525	304.873	999.963	3.916	-6.343	3.916	7.455	301.686	0.074
1100.000	0.533	300.011	1099.959	4.410	-7.122	4.410	8.377	301.767	0.046
1200.000	0.567	315.575	1199.954	4.996	-7.871	4.996	9.323	302.405	0.153
1300.000	0.868	296.942	1299.946	5.693	-8.893	5.693	10.559	302.625	0.377
1400.000	0.796	280.246	1399.936	6.159	-10.252	6.159	11.960	300.998	0.252
1500.000	0.924	278.806	1499.925	6.406	-11.732	6.406	13.367	298.637	0.129
1600.000	0.807	266.865	1599.913	6.491	-13.232	6.491	14.738	296.132	0.214
1700.000	0.653	351.962	1699.908	7.017	-14.015	7.017	15.673	296.596	0.994
1800.000	0.687	80.170	1799.903	7.683	-13.504	7.683	15.536	299.638	0.933
1900.000	0.610	132.245	1899.898	7.427	-12.519	7.427	14.557	300.680	0.573
2000.000	0.360	310.398	1999.896	7.273	-12.364	7.273	14.345	300.466	0.970
2100.000	0.479	154.503	2099.895	7.100	-12.424	7.100	14.309	299.747	0.821
2200.000	0.586	261.187	2199.893	6.644	-12.750	6.644	14.377	297.526	0.857
2300.000	0.718	252.632	2299.886	6.379	-13.853	6.379	15.251	294.724	0.164
2400.000	1.015	313.508	2399.876	6.802	-15.094	6.802	16.556	294.257	0.915
2500.000	0.785	305.598	2499.864	7.810	-16.294	7.810	18.069	295.610	0.261
2600.000	0.914	9.406	2599.855	8.996	-16.721	8.996	18.987	298.280	0.904
2700.000	0.960	337.302	2699.842	10.555	-16.914	10.555	19.937	301.967	0.520
2800.000	0.878	335.821	2799.830	12.027	-17.551	12.027	21.276	304.422	0.086
2900.000	0.804	324.904	2899.819	13.300	-18.268	13.300	22.597	306.057	0.176
3000.000	0.765	326.245	2999.809	14.429	-19.042	14.429	23.892	307.153	0.043
3100.000	0.810	317.908	3099.800	15.509	-19.887	15.509	25.220	307.949	0.123
3200.000	1.257	271.637	3199.785	16.066	-21.458	16.066	26.806	306.822	0.910
3300.000	1.580	256.765	3299.755	15.781	-23.896	15.781	28.637	303.442	0.487
3400.000	1.578	264.715	3399.717	15.339	-26.609	15.339	30.714	299.962	0.219

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	1.858	259.533	3499.672	14.918	-29.575	14.918	33.124	296.766	0.320
3600.000	2.053	256.437	3599.614	14.203	-32.911	14.203	35.845	293.343	0.221
3700.000	2.085	264.118	3699.549	13.596	-36.461	13.596	38.914	290.451	0.279
3800.000	2.098	259.055	3799.482	13.063	-40.067	13.063	42.143	288.057	0.185
3900.000	2.282	258.946	3899.409	12.333	-43.818	12.333	45.520	285.720	0.184
4000.000	2.576	255.495	3999.319	11.389	-47.947	11.389	49.281	283.362	0.328
4100.000	2.315	260.803	4099.228	10.503	-52.116	10.503	53.164	281.395	0.345
4200.000	2.248	263.199	4199.149	9.948	-56.057	9.948	56.933	280.063	0.116
4300.000	2.210	255.366	4299.073	9.229	-59.871	9.229	60.578	278.763	0.307
4400.000	2.000	236.844	4399.007	7.787	-63.198	7.787	63.675	277.025	0.708
4500.000	1.839	242.476	4498.951	6.091	-66.081	6.091	66.361	275.267	0.248
4600.000	1.744	223.006	4598.903	4.237	-68.542	4.237	68.673	273.537	0.613
4700.000	1.341	212.686	4698.867	2.140	-70.212	2.140	70.244	271.745	0.488
4800.000	1.307	188.824	4798.841	0.028	-71.018	0.028	71.018	270.022	0.548
4900.000	1.024	189.459	4898.820	-1.980	-71.340	-1.980	71.368	268.410	0.284
5000.000	0.682	220.613	4998.809	-3.313	-71.874	-3.313	71.950	267.361	0.564
5100.000	0.770	250.148	5098.802	-3.992	-72.893	-3.992	73.002	266.865	0.380
5200.000	1.076	267.024	5198.789	-4.269	-74.463	-4.269	74.585	266.718	0.406
5300.000	1.320	273.214	5298.767	-4.254	-76.551	-4.254	76.669	266.820	0.276
5400.000	1.551	280.731	5398.735	-3.937	-79.030	-3.937	79.128	267.148	0.297
5500.000	1.210	260.535	5498.707	-3.859	-81.401	-3.859	81.492	267.286	0.589
5600.000	0.736	261.009	5598.692	-4.133	-83.077	-4.133	83.180	267.152	0.474
5700.000	0.973	280.914	5698.681	-4.072	-84.545	-4.072	84.643	267.242	0.377
5800.000	0.772	249.972	5798.670	-4.142	-86.012	-4.142	86.112	267.243	0.504
5900.000	0.832	279.748	5898.661	-4.250	-87.360	-4.250	87.464	267.215	0.416
6000.000	0.939	299.952	5998.649	-3.717	-88.786	-3.717	88.864	267.602	0.328
6100.000	0.632	323.088	6098.640	-2.867	-89.828	-2.867	89.873	268.172	0.436
6200.000	0.886	312.174	6198.631	-1.908	-90.731	-1.908	90.751	268.795	0.291
6300.000	1.336	321.288	6298.612	-0.479	-92.033	-0.479	92.034	269.702	0.483
6400.000	0.988	284.175	6398.593	0.641	-93.598	0.641	93.600	270.393	0.810
6500.000	0.366	287.811	6498.585	0.950	-94.738	0.950	94.743	270.575	0.623
6600.000	0.157	148.688	6598.585	0.931	-94.971	0.931	94.976	270.562	0.496
HORIZONTAL DISPLACEMENT IS 94.976 FEET AT 270.562 DEGREES									