



Company: Noble Energy  
 Well: Thomson B12-12  
 API: 05-123-19265  
 Rig Name: Production/Lightning  
 Location: Weld County, Colorado  
 Latitude: 40.412, 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 / 15:13

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	0.235	119.292	100.000	-0.101	0.179	-0.101	0.206	119.292	0.235
200.000	0.129	129.071	199.999	-0.272	0.446	-0.272	0.522	121.386	0.111
300.000	0.071	147.898	299.999	-0.395	0.566	-0.395	0.690	124.933	0.066
400.000	0.184	95.678	399.999	-0.464	0.758	-0.464	0.889	121.444	0.151
500.000	0.328	62.375	499.998	-0.347	1.171	-0.347	1.221	106.498	0.201
600.000	0.352	51.671	599.996	-0.024	1.665	-0.024	1.665	90.817	0.068
700.000	0.239	59.118	699.995	0.274	2.085	0.274	2.103	82.522	0.119
800.000	0.217	52.545	799.994	0.496	2.414	0.496	2.464	78.397	0.034
900.000	0.212	26.401	899.993	0.776	2.646	0.776	2.757	73.656	0.097
1000.000	0.366	352.441	999.992	1.258	2.686	1.258	2.966	64.902	0.224
1100.000	0.332	329.329	1099.990	1.824	2.496	1.824	3.092	53.843	0.144
1200.000	0.286	334.073	1199.989	2.298	2.239	2.298	3.208	44.258	0.052
1300.000	0.278	323.207	1299.988	2.717	1.984	2.717	3.365	36.142	0.054
1400.000	0.292	80.531	1399.987	2.954	2.091	2.954	3.619	35.291	0.487
1500.000	0.207	85.663	1499.986	3.009	2.522	3.009	3.927	39.970	0.088
1600.000	0.205	16.270	1599.985	3.195	2.753	3.195	4.217	40.749	0.235
1700.000	0.111	73.837	1699.985	3.394	2.896	3.394	4.462	40.477	0.173
1800.000	0.378	96.907	1799.984	3.381	3.317	3.381	4.737	44.454	0.279
1900.000	0.618	111.354	1899.980	3.145	4.147	3.145	5.205	52.824	0.269
2000.000	0.583	119.501	1999.975	2.698	5.092	2.698	5.763	62.083	0.092
2100.000	0.725	129.058	2099.968	2.049	6.027	2.049	6.365	71.226	0.179
2200.000	0.773	133.432	2199.960	1.186	7.008	1.186	7.108	80.396	0.075
2300.000	0.685	128.572	2299.952	0.349	7.966	0.349	7.973	87.489	0.108
2400.000	0.618	115.442	2399.945	-0.255	8.920	-0.255	8.924	91.638	0.163
2500.000	0.567	100.323	2499.940	-0.576	9.894	-0.576	9.911	93.330	0.164
2600.000	0.532	99.139	2599.935	-0.738	10.840	-0.738	10.865	93.895	0.037
2700.000	0.467	132.774	2699.932	-1.089	11.597	-1.089	11.648	95.363	0.296
2800.000	0.543	114.861	2799.928	-1.565	12.327	-1.565	12.425	97.235	0.174
2900.000	0.677	110.064	2899.922	-1.967	13.311	-1.967	13.456	98.404	0.143
3000.000	0.299	215.913	2999.920	-2.381	13.713	-2.381	13.918	99.849	0.811
3100.000	0.708	226.262	3099.916	-3.020	13.113	-3.020	13.457	102.968	0.417
3200.000	1.143	258.959	3199.903	-3.638	11.688	-3.638	12.241	107.290	0.668
3300.000	1.277	267.886	3299.881	-3.870	9.595	-3.870	10.346	111.967	0.231
3400.000	1.296	260.187	3399.856	-4.104	7.367	-4.104	8.433	119.122	0.174

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	1.287	272.440	3499.830	-4.249	5.130	-4.249	6.661	129.631	0.276
3600.000	1.183	268.690	3599.807	-4.225	2.976	-4.225	5.168	144.836	0.132
3700.000	1.239	275.608	3699.785	-4.143	0.869	-4.143	4.233	168.158	0.156
3800.000	1.291	277.870	3799.761	-3.883	-1.323	-3.883	4.102	198.815	0.073
3900.000	1.092	288.459	3899.739	-3.427	-3.343	-3.427	4.787	224.289	0.296
4000.000	1.193	302.019	3999.719	-2.573	-5.129	-2.573	5.739	243.359	0.288
4100.000	0.830	324.100	4099.704	-1.434	-6.437	-1.434	6.595	257.437	0.526
4200.000	0.841	349.639	4199.694	-0.126	-6.994	-0.126	6.995	268.969	0.370
4300.000	0.773	351.582	4299.684	1.263	-7.224	1.263	7.334	279.918	0.073
4400.000	0.792	0.681	4399.674	2.621	-7.315	2.621	7.770	289.715	0.126
4500.000	0.769	342.543	4499.665	3.953	-7.508	3.953	8.485	297.765	0.247
4600.000	0.605	352.642	4599.658	5.117	-7.777	5.117	9.309	303.342	0.204
4700.000	0.636	271.617	4699.654	5.656	-8.400	5.656	10.127	303.955	0.807
4800.000	0.523	277.811	4799.649	5.734	-9.407	5.734	11.017	301.363	0.129
4900.000	0.643	289.220	4899.644	5.980	-10.389	5.980	11.987	299.927	0.166
5000.000	0.557	276.112	4999.638	6.217	-11.401	6.217	12.986	298.602	0.161
5100.000	0.459	283.371	5099.634	6.361	-12.275	6.361	13.825	297.395	0.117
5200.000	0.828	255.401	5199.628	6.272	-13.364	6.272	14.763	295.140	0.474
5300.000	0.888	228.813	5299.617	5.579	-14.647	5.579	15.674	290.851	0.399
5400.000	0.860	171.909	5399.607	4.325	-15.125	4.325	15.731	285.960	0.833
5500.000	0.810	153.077	5499.597	2.952	-14.699	2.952	14.993	281.357	0.278
5600.000	1.000	176.572	5599.585	1.451	-14.327	1.451	14.400	275.784	0.413
5700.000	1.333	216.572	5699.565	-0.354	-14.968	-0.354	14.972	268.646	0.857
5800.000	1.683	192.134	5799.532	-2.724	-15.970	-2.724	16.201	260.320	0.724
5900.000	1.190	214.008	5899.501	-5.021	-16.859	-5.021	17.591	253.417	0.729
6000.000	1.800	196.877	5999.467	-7.384	-17.896	-7.384	19.360	247.579	0.750
6100.000	1.690	220.777	6099.422	-10.003	-19.315	-10.003	21.752	242.620	0.730
6200.000	1.696	217.516	6199.378	-12.294	-21.179	-12.294	24.489	239.867	0.097
6300.000	1.833	227.086	6299.331	-14.557	-23.252	-14.557	27.433	237.952	0.325
6400.000	1.998	200.843	6399.277	-17.275	-25.044	-17.275	30.424	235.403	0.884
6500.000	2.386	210.822	6499.204	-20.691	-26.730	-20.691	33.803	232.258	0.543
6600.000	2.191	207.421	6599.124	-24.176	-28.677	-24.176	37.508	229.868	0.237

<div> HORIZONTAL DISPLACEMENT IS  37.508 FEET AT 229.868 DEGREES </div>
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