

Company: Noble Energy

Well: Keiser 2

API: 05-123-12982

Rig Name: Production/Lightning

Location: Weld County, Colorado

Latitude: 40.354, Longitude: -104.675

GRID North is 0.530 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: 1/15/2013 / 18:06

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	0.407	78.446	99.999	0.071	0.348	0.071	0.355	78.446	0.407
200.000	0.371	107.488	199.997	0.045	1.005	0.045	1.006	87.448	0.198
300.000	0.436	152.776	299.995	-0.391	1.488	-0.391	1.538	104.727	0.317
400.000	0.383	101.291	399.992	-0.795	1.990	-0.795	2.143	111.778	0.359
500.000	0.506	104.237	499.989	-0.969	2.746	-0.969	2.912	109.439	0.125
600.000	0.444	116.924	599.986	-1.253	3.519	-1.253	3.736	109.598	0.122
700.000	0.326	108.452	699.984	-1.518	4.135	-1.518	4.405	110.166	0.130
800.000	0.364	115.045	799.982	-1.743	4.693	-1.743	5.006	110.378	0.055
900.000	0.395	118.356	899.980	-2.042	5.284	-2.042	5.665	111.124	0.038
1000.000	0.444	120.203	999.977	-2.400	5.923	-2.400	6.391	112.062	0.051
1100.000	0.467	79.598	1099.974	-2.522	6.659	-2.522	7.120	110.744	0.317
1200.000	0.676	73.980	1199.969	-2.286	7.626	-2.286	7.961	106.684	0.216
1300.000	0.678	87.385	1299.962	-2.096	8.784	-2.096	9.031	103.420	0.158
1400.000	0.507	132.492	1399.957	-2.368	9.701	-2.368	9.986	103.715	0.481
1500.000	0.384	123.832	1499.954	-2.853	10.306	-2.853	10.693	105.473	0.140
1600.000	0.526	104.123	1599.951	-3.151	11.029	-3.151	11.471	105.946	0.210
1700.000	0.333	44.937	1699.949	-3.058	11.680	-3.058	12.074	104.669	0.456
1800.000	0.475	351.063	1799.947	-2.442	11.821	-2.442	12.071	101.671	0.388
1900.000	0.977	336.259	1899.938	-1.252	11.414	-1.252	11.482	96.258	0.532
2000.000	0.896	338.231	1999.925	0.255	10.780	0.255	10.783	88.644	0.087
2100.000	0.999	344.055	2099.911	1.820	10.251	1.820	10.411	79.933	0.141
2200.000	1.590	315.267	2199.886	3.644	9.035	3.644	9.742	68.033	0.861
2300.000	1.742	292.797	2299.845	5.219	6.657	5.219	8.459	51.902	0.666
2400.000	1.586	287.239	2399.803	6.218	3.933	6.218	7.358	32.314	0.224
2500.000	1.516	267.755	2499.767	6.577	1.290	6.577	6.702	11.095	0.529
2600.000	1.442	276.790	2599.734	6.674	-1.282	6.674	6.796	349.130	0.244
2700.000	1.574	273.050	2699.699	6.895	-3.903	6.895	7.923	330.492	0.164
2800.000	1.111	269.653	2799.671	6.963	-6.243	6.963	9.352	318.119	0.470
2900.000	0.923	272.314	2899.656	6.989	-8.017	6.989	10.636	311.083	0.194
3000.000	0.820	273.628	2999.644	7.067	-9.535	7.067	11.869	306.544	0.105
3100.000	0.552	269.911	3099.637	7.112	-10.731	7.112	12.873	303.534	0.271
3200.000	0.375	264.402	3199.634	7.079	-11.538	7.079	13.536	301.531	0.183
3300.000	0.798	210.573	3299.629	6.447	-12.218	6.447	13.815	297.820	0.652
3400.000	0.826	219.140	3399.619	5.288	-13.027	5.288	14.060	292.094	0.124

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	0.428	217.926	3499.612	4.434	-13.712	4.434	14.411	287.922	0.398
3600.000	0.729	188.073	3599.607	3.510	-14.031	3.510	14.463	284.044	0.417
3700.000	0.937	194.606	3699.597	2.089	-14.326	2.089	14.478	278.295	0.228
3800.000	0.642	213.992	3799.587	0.833	-14.846	0.833	14.869	273.211	0.393
3900.000	0.761	223.016	3899.580	-0.117	-15.612	-0.117	15.613	269.570	0.161
4000.000	1.130	202.397	3999.566	-1.515	-16.441	-1.515	16.510	264.737	0.497
4100.000	1.030	203.291	4099.549	-3.252	-17.172	-3.252	17.477	259.275	0.101
4200.000	0.898	220.946	4199.535	-4.670	-18.041	-4.670	18.636	255.486	0.323
4300.000	0.859	225.653	4299.523	-5.786	-19.091	-5.786	19.949	253.138	0.082
4400.000	0.870	224.745	4399.512	-6.850	-20.162	-6.850	21.293	251.236	0.018
4500.000	1.005	217.445	4499.498	-8.085	-21.229	-8.085	22.716	249.151	0.180
4600.000	1.198	196.164	4599.480	-9.785	-22.053	-9.785	24.127	246.073	0.449
4700.000	1.519	189.837	4699.452	-12.096	-22.571	-12.096	25.607	241.813	0.354
4800.000	1.602	177.354	4799.415	-14.798	-22.733	-14.798	27.125	236.938	0.349
4900.000	1.707	187.622	4899.374	-17.670	-22.866	-17.670	28.897	232.304	0.314
5000.000	1.452	191.802	4999.336	-20.386	-23.322	-20.386	30.976	228.843	0.279
5100.000	1.211	195.203	5099.309	-22.646	-23.858	-22.646	32.895	226.494	0.254
5200.000	0.767	215.722	5199.294	-24.208	-24.526	-24.208	34.461	225.374	0.561
5300.000	0.728	204.754	5299.285	-25.328	-25.182	-25.328	35.716	224.835	0.148
5400.000	0.637	218.111	5399.278	-26.342	-25.791	-26.342	36.866	224.395	0.183
5500.000	0.351	201.028	5499.274	-27.065	-26.244	-27.065	37.700	224.118	0.318
5600.000	0.311	262.575	5599.273	-27.387	-26.624	-27.387	38.195	224.191	0.341
5700.000	0.409	238.093	5699.271	-27.611	-27.196	-27.611	38.756	224.567	0.180
5800.000	0.195	248.987	5799.270	-27.861	-27.659	-27.861	39.258	224.792	0.221
5900.000	0.221	30.005	5899.269	-27.755	-27.721	-27.755	39.228	224.966	0.392
6000.000	0.275	37.511	5999.268	-27.397	-27.479	-27.397	38.803	225.085	0.063
6100.000	0.261	17.384	6099.267	-26.989	-27.264	-26.989	38.363	225.291	0.095
6200.000	0.241	7.481	6199.266	-26.563	-27.169	-26.563	37.997	225.646	0.048
6300.000	0.409	79.326	6299.265	-26.288	-26.791	-26.288	37.534	225.543	0.405
6400.000	0.446	85.619	6399.262	-26.193	-26.053	-26.193	36.943	224.847	0.060
6500.000	0.617	105.460	6499.258	-26.306	-25.146	-26.306	36.391	223.708	0.249
6600.000	0.515	87.146	6599.253	-26.428	-24.178	-26.428	35.819	222.455	0.207
6700.000	0.344	119.301	6699.251	-26.552	-23.468	-26.552	35.436	221.471	0.289
6800.000	0.325	72.729	6799.249	-26.615	-22.935	-26.615	35.134	220.753	0.265
6900.000	0.499	95.914	6899.247	-26.575	-22.232	-26.575	34.648	219.914	0.238
7000.000	0.633	64.265	6999.242	-26.381	-21.301	-26.381	33.907	218.920	0.334
HORIZONTAL DISPLACEMENT IS 33.907 FEET AT 218.920 DEGREES									