



Company/Rig: NOBLE ENERGY / PRODUCTION

WELL/API#: SOUTHARD 2 / 05-123-12378

DECLINATION: 8.4 DEGREES

TD AS DRILLED: 7330 FEET

COUNTY/STATE: WELD / COLORADO

Latitude: 40.505, Longitude: -104.733

GRID North is 0.500 Degrees East of True North

VS-Azi: 0.000 Degrees



DEPTH REFERENCE : RKB=SURFACE ELEVATION=4802 FEET

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01-de_01.ut

Minimum Curvature Method

Report Date/Time: 12/3/2014 / 14:40

LAT & LONG OBTAINED BY HANDHELD GPS AT WELLHEAD

NORTH REFERENCE: GRID

HENDERSON, COLORADO

303-853-4976

SURVEYOR: NORMAN COWAN

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	0.507	331.386	99.999	0.388	-0.212	0.388	0.442	331.386	0.507
200.000	0.456	291.999	199.995	0.925	-0.793	0.925	1.219	319.414	0.328
300.000	0.090	257.889	299.994	1.058	-1.239	1.058	1.629	310.508	0.385
400.000	0.213	328.888	399.994	1.201	-1.411	1.201	1.853	310.393	0.202
500.000	0.145	342.171	499.993	1.480	-1.546	1.480	2.140	313.753	0.079
600.000	0.078	167.949	599.993	1.533	-1.570	1.533	2.195	314.323	0.223
700.000	0.071	311.046	699.993	1.507	-1.603	1.507	2.200	313.248	0.142
800.000	0.218	7.504	799.993	1.737	-1.625	1.737	2.378	316.915	0.188
900.000	0.186	80.355	899.992	1.953	-1.440	1.953	2.426	323.602	0.241
1000.000	0.087	170.051	999.992	1.905	-1.267	1.905	2.288	326.383	0.205
1100.000	0.238	181.122	1099.992	1.622	-1.257	1.622	2.052	322.215	0.154
1200.000	0.135	176.563	1199.991	1.296	-1.254	1.296	1.804	315.937	0.104
1300.000	0.306	169.087	1299.990	0.916	-1.197	0.916	1.507	307.441	0.173
1400.000	0.248	150.390	1399.989	0.466	-1.039	0.466	1.139	294.151	0.106
1500.000	0.119	130.124	1499.989	0.210	-0.852	0.210	0.878	283.858	0.142
1600.000	0.117	196.078	1599.989	0.045	-0.801	0.045	0.802	273.242	0.128
1700.000	0.112	142.652	1699.988	-0.130	-0.770	-0.130	0.781	260.414	0.103
1800.000	0.323	157.859	1799.988	-0.468	-0.604	-0.468	0.765	232.231	0.217
1900.000	0.397	181.627	1899.986	-1.075	-0.508	-1.075	1.189	205.296	0.165

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
2000.000	0.417	183.702	1999.983	-1.785	-0.542	-1.785	1.865	196.878	0.025
2100.000	0.427	194.409	2099.981	-2.509	-0.658	-2.509	2.593	194.690	0.079
2200.000	0.541	224.887	2199.977	-3.204	-1.084	-3.204	3.382	198.687	0.277
2300.000	0.679	228.448	2299.971	-3.932	-1.861	-3.932	4.350	205.324	0.143
2400.000	0.640	232.951	2399.965	-4.661	-2.750	-4.661	5.412	210.536	0.065
2500.000	0.544	250.329	2499.960	-5.157	-3.642	-5.157	6.313	215.228	0.202
2600.000	0.519	273.298	2599.955	-5.291	-4.541	-5.291	6.972	220.639	0.213
2700.000	0.414	288.119	2699.952	-5.152	-5.337	-5.152	7.418	226.008	0.159
2800.000	0.446	280.751	2799.949	-4.967	-6.063	-4.967	7.838	230.672	0.064
2900.000	0.368	274.975	2899.947	-4.867	-6.765	-4.867	8.334	234.269	0.088
3000.000	0.463	229.241	2999.944	-5.103	-7.391	-5.103	8.982	235.379	0.335
3100.000	0.490	232.411	3099.941	-5.627	-8.036	-5.627	9.811	234.998	0.038
3200.000	0.463	256.636	3199.938	-5.982	-8.768	-5.982	10.614	235.698	0.202
3300.000	0.703	323.023	3299.933	-5.585	-9.530	-5.585	11.046	239.627	0.669
3400.000	0.771	347.642	3399.925	-4.438	-10.043	-4.438	10.980	246.160	0.321
3500.000	0.898	345.973	3499.915	-3.020	-10.377	-3.020	10.808	253.772	0.129
3600.000	1.117	3.636	3599.899	-1.287	-10.505	-1.287	10.584	263.017	0.378
3700.000	1.194	356.283	3699.879	0.726	-10.511	0.726	10.536	273.952	0.167
3800.000	1.157	358.862	3799.858	2.775	-10.599	2.775	10.956	284.674	0.065
3900.000	0.828	336.604	3899.843	4.448	-10.906	4.448	11.778	292.189	0.501
4000.000	0.763	322.304	3999.834	5.639	-11.600	5.639	12.898	295.924	0.208
4100.000	0.658	315.057	4099.826	6.572	-12.413	6.572	14.045	297.899	0.138
4200.000	0.521	326.010	4199.821	7.356	-13.073	7.356	15.000	299.365	0.177
4300.000	0.512	309.650	4299.817	8.018	-13.671	8.018	15.848	300.391	0.147
4400.000	0.455	310.748	4399.813	8.562	-14.315	8.562	16.680	300.883	0.057
4500.000	0.303	321.944	4499.811	9.030	-14.780	9.030	17.320	301.423	0.168
4600.000	0.459	324.631	4599.809	9.565	-15.175	9.565	17.938	302.224	0.157
4700.000	0.255	317.513	4699.807	10.056	-15.557	10.056	18.524	302.878	0.208
4800.000	0.326	252.986	4799.806	10.137	-15.980	10.137	18.924	302.388	0.316
4900.000	0.371	228.348	4899.804	9.838	-16.494	9.838	19.205	300.815	0.155
5000.000	0.490	205.594	4999.801	9.238	-16.920	9.238	19.278	298.632	0.206
5100.000	0.764	201.383	5099.795	8.231	-17.348	8.231	19.202	295.383	0.278
5200.000	0.444	153.926	5199.790	7.263	-17.421	7.263	18.874	292.631	0.567
5300.000	0.877	182.967	5299.783	6.151	-17.290	6.151	18.352	289.582	0.534
5400.000	0.600	179.418	5399.775	4.863	-17.324	4.863	17.994	285.679	0.280
5500.000	0.795	200.736	5499.768	3.691	-17.565	3.691	17.948	281.866	0.321
5600.000	0.665	201.897	5599.759	2.504	-18.026	2.504	18.199	277.909	0.131
5700.000	0.742	199.993	5699.752	1.357	-18.464	1.357	18.514	274.205	0.081
5800.000	0.605	194.703	5799.745	0.238	-18.820	0.238	18.821	270.724	0.150
5900.000	0.643	203.403	5899.739	-0.788	-19.177	-0.788	19.193	267.646	0.102

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
6000.000	0.590	216.190	5999.733	-1.718	-19.703	-1.718	19.778	265.015	0.147
6100.000	0.542	249.501	6099.729	-2.299	-20.450	-2.299	20.579	263.585	0.328
6200.000	0.484	234.139	6199.725	-2.713	-21.236	-2.713	21.409	262.721	0.149
6300.000	0.484	246.480	6299.721	-3.128	-21.965	-3.128	22.187	261.894	0.104
6400.000	0.379	268.329	6399.718	-3.307	-22.683	-3.307	22.923	261.706	0.193
6500.000	0.312	260.274	6499.717	-3.362	-23.282	-3.362	23.524	261.783	0.083
6600.000	0.186	294.973	6599.716	-3.340	-23.698	-3.340	23.932	261.979	0.191
6700.000	0.309	276.336	6699.715	-3.241	-24.113	-3.241	24.330	262.344	0.145
6800.000	0.336	293.416	6799.713	-3.095	-24.650	-3.095	24.843	262.843	0.099
6900.000	0.065	27.200	6899.713	-2.928	-24.893	-2.928	25.064	263.291	0.346
7000.000	0.217	312.763	6999.712	-2.749	-25.006	-2.749	25.156	263.726	0.209
7100.000	0.129	21.479	7099.712	-2.516	-25.104	-2.516	25.229	264.276	0.208
7150.000	0.231	96.614	7149.712	-2.476	-24.983	-2.476	25.105	264.340	0.468