



COMPANY/RIG: Noble Energy/Production/CoreTech
WELL/API: Bosch 13-24/05-123-20284
DECLINATION: 8.28 Degrees
TD AS DRILLED: 7109 Feet
COUNTY/STATE: Weld/Colorado
VS-Azi: 0.000 Degrees
Latitude: 40.40123, Longitude: -104.61445
Grid North = True North -0.57 degs (NAD 27)
Grid Correction Applied = -0.57 degs



DEPTH REFERENCE : RKB = GL Elevation = 4623'

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01-de_01.ut

Minimum Curvature Method

Report Date/Time: 1/18/2016 / 13:47

LAT & LONG OBTAINED BY HANDHELD GPS AT WELLHEAD

NORTH REFERENCE: GRID

HENDERSON, COLORADO

303-853-4976

Surveyor: JASON KINCHELOW / Bosch 13-24

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	0.276	153.408	100.000	-0.216	0.108	-0.216	0.241	153.408	0.276
200.000	0.179	128.187	199.999	-0.528	0.339	-0.528	0.627	147.317	0.138
300.000	0.231	123.676	299.998	-0.736	0.629	-0.736	0.969	139.479	0.055
400.000	0.182	151.316	399.998	-0.988	0.874	-0.988	1.319	138.510	0.110
500.000	0.299	151.204	499.997	-1.356	1.076	-1.356	1.731	141.576	0.116
600.000	0.464	146.576	599.994	-1.922	1.424	-1.922	2.393	143.466	0.168
700.000	0.581	140.959	699.990	-2.654	1.967	-2.654	3.304	143.462	0.128
800.000	0.580	122.691	799.985	-3.322	2.712	-3.322	4.289	140.766	0.184
900.000	0.591	127.736	899.980	-3.911	3.546	-3.911	5.279	137.798	0.053
1000.000	0.623	140.893	999.974	-4.648	4.297	-4.648	6.330	137.248	0.143
1100.000	0.686	144.491	1099.968	-5.558	4.988	-5.558	7.468	138.093	0.075
1200.000	0.630	145.972	1199.961	-6.501	5.643	-6.501	8.608	139.038	0.058
1300.000	0.663	157.544	1299.955	-7.491	6.172	-7.491	9.706	140.514	0.134
1400.000	0.580	173.277	1399.949	-8.529	6.452	-8.529	10.694	142.891	0.189
1500.000	0.834	215.324	1499.942	-9.625	6.091	-9.625	11.390	147.674	0.560
1600.000	0.930	224.371	1599.930	-10.799	5.103	-10.799	11.944	154.708	0.169
1700.000	0.627	218.105	1699.921	-11.810	4.198	-11.810	12.533	160.433	0.315
1800.000	0.382	178.069	1799.917	-12.573	3.871	-12.573	13.156	162.887	0.415

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
1900.000	0.758	124.596	1899.913	-13.282	4.427	-13.282	14.000	161.567	0.613
2000.000	0.896	124.333	1999.902	-14.098	5.617	-14.098	15.176	158.277	0.139
2100.000	1.157	120.264	2099.886	-15.048	7.135	-15.048	16.654	154.633	0.270
2200.000	1.345	116.492	2199.862	-16.081	9.057	-16.081	18.456	150.610	0.205
2300.000	1.258	99.348	2299.837	-16.782	11.190	-16.782	20.171	146.305	0.397
2400.000	0.859	82.843	2399.820	-16.867	13.017	-16.867	21.306	142.342	0.498
2500.000	0.498	96.909	2499.813	-16.826	14.191	-16.826	22.012	139.855	0.395
2600.000	0.402	84.313	2599.810	-16.844	14.972	-16.844	22.536	138.367	0.137
2700.000	0.291	123.321	2699.808	-16.948	15.533	-16.948	22.990	137.494	0.254
2800.000	0.239	156.229	2799.807	-17.279	15.830	-17.279	23.434	137.506	0.158
2900.000	0.378	206.093	2899.806	-17.766	15.769	-17.766	23.755	138.408	0.289
3000.000	0.569	218.068	2999.802	-18.453	15.318	-18.453	23.982	140.303	0.214
3100.000	0.674	218.822	3099.796	-19.301	14.643	-19.301	24.228	142.814	0.105
3200.000	0.416	181.902	3199.792	-20.122	14.263	-20.122	24.664	144.671	0.423
3300.000	0.977	101.215	3299.786	-20.650	15.086	-20.650	25.574	143.849	0.997
3400.000	1.848	81.491	3399.755	-20.577	17.517	-20.577	27.024	139.593	0.985
3500.000	2.705	73.168	3499.676	-19.656	21.370	-19.656	29.035	132.608	0.916
3600.000	3.315	71.613	3599.537	-18.060	26.372	-18.060	31.963	124.405	0.616
3700.000	3.278	72.799	3699.372	-16.303	31.847	-16.303	35.777	117.109	0.078
3800.000	3.024	71.061	3799.220	-14.601	37.073	-14.601	39.845	111.497	0.271
3900.000	2.231	66.918	3899.115	-12.982	41.359	-12.982	43.348	107.426	0.815
4000.000	1.495	54.790	3999.061	-11.467	44.215	-11.467	45.678	104.539	0.831
4100.000	1.298	28.715	4099.033	-9.721	45.825	-9.721	46.845	101.977	0.659
4200.000	1.115	6.849	4199.011	-7.762	46.485	-7.762	47.129	99.480	0.492
4300.000	1.238	345.361	4298.990	-5.752	46.329	-5.752	46.684	97.077	0.455
4400.000	0.987	349.697	4398.972	-3.859	45.902	-3.859	46.063	94.806	0.264
4500.000	1.204	350.653	4498.953	-1.975	45.577	-1.975	45.620	92.481	0.217
4600.000	0.643	26.744	4598.941	-0.437	45.659	-0.437	45.661	90.548	0.782
4700.000	0.522	97.835	4698.936	0.003	46.362	0.003	46.362	89.997	0.684
4800.000	1.005	99.485	4798.927	-0.204	47.678	-0.204	47.679	90.245	0.484
4900.000	1.193	102.127	4898.909	-0.567	49.561	-0.567	49.564	90.656	0.195
5000.000	0.367	112.946	4998.899	-0.911	50.874	-0.911	50.882	91.026	0.835
5100.000	0.583	243.040	5098.897	-1.267	50.716	-1.267	50.732	91.431	0.867
5200.000	0.876	249.729	5198.889	-1.762	49.545	-1.762	49.576	92.037	0.305
5300.000	1.412	253.978	5298.869	-2.367	47.643	-2.367	47.702	92.844	0.542
5400.000	0.801	280.756	5398.850	-2.577	45.773	-2.577	45.845	93.222	0.785
5500.000	0.651	326.369	5498.843	-1.974	44.772	-1.974	44.815	92.524	0.579
5600.000	0.576	321.771	5598.837	-1.106	44.146	-1.106	44.160	91.435	0.089
5700.000	0.263	303.525	5698.834	-0.584	43.644	-0.584	43.648	90.767	0.337
5800.000	0.619	142.171	5798.833	-0.885	43.784	-0.885	43.793	91.157	0.873

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
5900.000	0.954	142.726	5898.823	-1.974	44.620	-1.974	44.664	92.533	0.335
6000.000	1.053	127.576	5998.808	-3.197	45.853	-3.197	45.964	93.988	0.282
6100.000	1.361	128.236	6098.786	-4.492	47.514	-4.492	47.726	95.401	0.308
6200.000	1.492	126.132	6198.755	-5.995	49.498	-5.995	49.860	96.906	0.141
6300.000	1.788	122.717	6298.714	-7.606	51.862	-7.606	52.417	98.344	0.311
6400.000	0.937	101.480	6398.685	-8.612	53.976	-8.612	54.659	99.065	0.976
6500.000	0.146	47.426	6498.680	-8.689	54.871	-8.689	55.554	98.998	0.859
6550.000	0.219	308.174	6548.680	-8.586	54.843	-8.586	55.511	98.898	0.564