



Company/Rig: Noble Energy/ CoreTech  
WELL/API#: Hoshiko 2/05-123-11101  
DECLINATION: 8.13 Degrees  
TD AS DRILLED: 6900 Feet  
COUNTY/STATE: Weld/Colorado  
VS-Azi: 0.000 Degrees  
Latitude: 40.35041, Longitude: -104.51434  
Grid North = True North -0.64 degs (NAD 27)  
Grid Correction Applied = -0.64 degs



DEPTH REFERENCE : RKB=GL/ ELEVATION= 4652 Feet

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro\_run01-01-de\_01.ut

Minimum Curvature Method

Report Date/Time: 11/15/2016 / 11:07

LAT & LONG OBTAINED BY HANDHELD GPS AT WELLHEAD

NORTH REFERENCE: GRID

HENDERSON, COLORADO

303-853-4976

Surveyor: Sean Bratt / Hoshiko 2

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	0.682	355.362	99.998	0.593	-0.048	0.593	0.595	355.362	0.682
200.000	0.471	5.474	199.993	1.596	-0.057	1.596	1.597	357.951	0.234
300.000	0.177	3.239	299.991	2.160	-0.009	2.160	2.160	359.757	0.294
400.000	0.353	349.734	399.990	2.617	-0.055	2.617	2.618	358.790	0.185
500.000	0.124	354.112	499.989	3.027	-0.121	3.027	3.030	357.707	0.230
600.000	0.087	298.044	599.989	3.171	-0.200	3.171	3.177	356.398	0.104
700.000	0.106	345.521	699.989	3.296	-0.290	3.296	3.309	354.971	0.080
800.000	0.119	256.797	799.988	3.362	-0.414	3.362	3.387	352.980	0.157
900.000	0.273	284.074	899.988	3.396	-0.746	3.396	3.477	347.609	0.176
1000.000	0.259	249.866	999.987	3.376	-1.190	3.376	3.580	340.586	0.157
1100.000	0.189	289.382	1099.986	3.353	-1.558	3.353	3.697	335.080	0.165
1200.000	0.388	269.709	1199.985	3.406	-2.052	3.406	3.976	328.933	0.220
1300.000	0.430	249.961	1299.982	3.276	-2.743	3.276	4.273	320.057	0.146
1400.000	0.502	270.462	1399.979	3.151	-3.534	3.151	4.735	311.720	0.180
1500.000	0.525	248.382	1499.975	2.986	-4.398	2.986	5.316	304.171	0.198
1600.000	0.594	284.670	1599.971	2.948	-5.325	2.948	6.087	298.969	0.355

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
1700.000	0.698	293.210	1699.964	3.319	-6.386	3.319	7.197	297.464	0.141
1800.000	0.738	309.991	1799.957	3.973	-7.440	3.973	8.434	298.106	0.213
1900.000	0.838	324.150	1899.947	4.980	-8.361	4.980	9.732	300.778	0.218
2000.000	1.036	334.714	1999.934	6.390	-9.176	6.390	11.181	304.853	0.262
2100.000	1.265	328.014	2099.914	8.143	-10.146	8.143	13.010	308.749	0.265
2200.000	1.281	330.039	2199.889	10.047	-11.289	10.047	15.112	311.669	0.048
2300.000	1.450	320.423	2299.861	11.990	-12.653	11.990	17.432	313.460	0.284
2400.000	1.443	326.230	2399.829	14.012	-14.159	14.012	19.920	314.702	0.147
2500.000	1.525	329.751	2499.795	16.209	-15.529	16.209	22.447	316.226	0.123
2600.000	1.456	324.760	2599.762	18.396	-16.933	18.396	25.003	317.372	0.147
2700.000	1.531	320.201	2699.728	20.460	-18.521	20.460	27.598	317.848	0.140
2800.000	1.398	318.566	2799.695	22.401	-20.183	22.401	30.153	317.981	0.139
2900.000	1.261	334.011	2899.668	24.304	-21.473	24.304	32.431	318.540	0.382
3000.000	1.204	335.676	2999.645	26.250	-22.387	26.250	34.500	319.541	0.067
3100.000	0.811	10.812	3099.630	27.902	-22.687	27.902	35.962	320.885	0.714
3200.000	0.985	18.839	3199.618	29.411	-22.277	29.411	36.895	322.858	0.215
3300.000	1.014	30.705	3299.603	30.985	-21.547	30.985	37.741	325.185	0.209
3400.000	1.178	36.098	3399.585	32.577	-20.490	32.577	38.485	327.831	0.193
3500.000	1.011	40.278	3499.566	34.080	-19.314	34.080	39.173	330.459	0.185
3600.000	1.018	42.396	3599.551	35.409	-18.145	35.409	39.788	332.868	0.038
3700.000	1.072	56.027	3699.534	36.588	-16.770	36.588	40.248	335.375	0.254
3800.000	1.034	39.507	3799.518	37.807	-15.421	37.807	40.831	337.810	0.305
3900.000	0.811	20.672	3899.505	39.165	-14.597	39.165	41.796	339.559	0.374
4000.000	0.802	40.587	3999.495	40.358	-13.892	40.358	42.682	341.005	0.279
4100.000	0.577	13.660	4099.488	41.378	-13.318	41.378	43.469	342.159	0.388
4200.000	0.521	5.169	4199.484	42.320	-13.158	42.320	44.319	342.728	0.099
4300.000	0.854	3.953	4299.476	43.516	-13.066	43.516	45.436	343.287	0.334
4400.000	0.503	347.527	4399.469	44.689	-13.109	44.689	46.572	343.651	0.398
4500.000	0.447	320.625	4499.466	45.419	-13.452	45.419	47.369	343.502	0.228
4600.000	0.589	319.717	4599.462	46.113	-14.032	46.113	48.200	343.076	0.142
4700.000	0.656	260.046	4699.457	46.406	-14.928	46.406	48.748	342.168	0.622
4800.000	0.577	306.393	4799.452	46.606	-15.897	46.606	49.242	341.165	0.491
4900.000	0.696	282.512	4899.446	47.036	-16.896	47.036	49.979	340.241	0.288
5000.000	0.597	310.717	4999.439	47.508	-17.884	47.508	50.762	339.371	0.330
5100.000	0.494	328.662	5099.435	48.215	-18.503	48.215	51.644	339.005	0.198
5200.000	0.136	59.490	5199.434	48.644	-18.624	48.644	52.087	339.049	0.514
5300.000	0.124	174.880	5299.434	48.596	-18.512	48.596	52.003	339.146	0.220
5400.000	0.189	334.730	5399.433	48.637	-18.573	48.637	52.063	339.100	0.309
5500.000	0.421	119.622	5499.433	48.605	-18.324	48.605	51.944	339.343	0.585

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
5600.000	0.468	143.032	5599.430	48.097	-17.759	48.097	51.271	339.734	0.186
5700.000	0.058	62.779	5699.429	47.793	-17.469	47.793	50.886	339.923	0.462
5800.000	0.499	120.945	5799.427	47.593	-17.050	47.593	50.555	340.290	0.471
5900.000	0.338	125.152	5899.424	47.199	-16.436	47.199	49.979	340.801	0.163
6000.000	0.312	104.649	5999.423	46.960	-15.931	46.960	49.589	341.261	0.119
6100.000	0.285	108.982	6099.422	46.810	-15.432	46.810	49.288	341.754	0.035
6200.000	0.157	120.017	6199.421	46.661	-15.078	46.661	49.036	342.092	0.135
6300.000	0.089	303.656	6299.421	46.635	-15.025	46.635	48.996	342.143	0.246
6400.000	0.137	24.648	6399.421	46.787	-15.040	46.787	49.145	342.180	0.151
6500.000	0.232	155.432	6499.420	46.712	-14.906	46.712	49.033	342.302	0.338
6600.000	0.597	218.550	6599.418	46.121	-15.146	46.121	48.544	341.820	0.533
6700.000	0.978	232.623	6699.408	45.196	-16.148	45.196	47.994	340.338	0.425