



Company/Rig: Noble Energy/ CoreTech  
WELL/API#: Howard E 26-17/05-123-21750  
DECLINATION: 8.32 Degrees  
TD AS DRILLED: 7126 Feet  
COUNTY/STATE: Weld/Colorado  
VS-Azi: 0.000 Degrees  
Latitude: 40.46095, Longitude: -104.62561  
Grid North = True North -0.56 degs (NAD 27)  
Grid Convergence Applied = -0.56 degs



DEPTH REFERENCE : RKB=GL/ ELEVATION= 4694 Feet

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro\_run01-01-de\_01.ut  
Minimum Curvature Method  
Report Date/Time: 10/12/2015 / 16:10

LAT & LONG OBTAINED BY HANDHELD GPS AT WELLHEAD  
NORTH REFERENCE: GRID  
HENDERSON, COLORADO  
303-853-4976  
Surveyor: Sean Bratt / Howard E 26-17

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	0.108	336.766	100.000	0.086	-0.037	0.086	0.094	336.766	0.108
200.000	0.300	224.221	199.999	-0.015	-0.257	-0.015	0.257	266.695	0.355
300.000	0.198	43.781	299.999	-0.077	-0.319	-0.077	0.329	256.376	0.498
400.000	0.202	289.819	399.999	0.107	-0.366	0.107	0.381	286.362	0.336
500.000	0.131	3.586	499.998	0.282	-0.525	0.282	0.596	298.204	0.208
600.000	0.351	77.578	599.998	0.462	-0.219	0.462	0.511	334.659	0.339
700.000	0.503	81.939	699.995	0.589	0.515	0.589	0.782	41.164	0.155
800.000	0.887	118.552	799.988	0.280	1.630	0.280	1.654	80.235	0.569
900.000	0.538	134.591	899.980	-0.419	2.644	-0.419	2.677	99.013	0.399
1000.000	0.459	92.409	999.977	-0.766	3.379	-0.766	3.465	102.775	0.366
1100.000	0.599	141.420	1099.973	-1.191	4.105	-1.191	4.274	106.186	0.457
1200.000	0.758	139.961	1199.966	-2.107	4.856	-2.107	5.293	113.451	0.161
1300.000	0.606	146.377	1299.959	-3.053	5.575	-3.053	6.356	118.711	0.171
1400.000	1.024	119.029	1399.949	-3.927	6.649	-3.927	7.722	120.569	0.560
1500.000	0.520	137.065	1499.939	-4.694	7.740	-4.694	9.052	121.233	0.554
1600.000	0.718	175.047	1599.934	-5.650	8.104	-5.650	9.879	124.886	0.444
1700.000	0.933	176.680	1699.923	-7.087	8.205	-7.087	10.842	130.819	0.217
1800.000	0.945	186.272	1799.910	-8.720	8.162	-8.720	11.944	136.893	0.158

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	0.813	212.942	1899.899	-10.135	7.686	-10.135	12.720	142.825	0.425
2000.000	0.964	226.874	1999.887	-11.306	6.686	-11.306	13.135	149.400	0.263
2100.000	1.234	226.901	2099.868	-12.617	5.286	-12.617	13.679	157.268	0.269
2200.000	1.421	222.027	2199.841	-14.273	3.670	-14.273	14.737	165.581	0.219
2300.000	1.501	227.755	2299.809	-16.075	1.870	-16.075	16.183	173.364	0.166
2400.000	1.534	235.286	2399.774	-17.717	-0.199	-17.717	17.718	180.645	0.202
2500.000	1.607	240.368	2499.736	-19.173	-2.519	-19.173	19.338	187.484	0.157
2600.000	1.513	233.933	2599.699	-20.643	-4.804	-20.643	21.195	193.102	0.199
2700.000	1.641	240.857	2699.662	-22.118	-7.122	-22.118	23.236	197.850	0.230
2800.000	1.442	240.070	2799.625	-23.443	-9.464	-23.443	25.282	201.984	0.200
2900.000	1.496	253.582	2899.593	-24.440	-11.807	-24.440	27.143	205.785	0.350
3000.000	1.511	257.304	2999.558	-25.099	-14.345	-25.099	28.909	209.750	0.099
3100.000	1.099	260.136	3099.532	-25.553	-16.576	-25.553	30.458	212.971	0.417
3200.000	1.151	264.911	3199.513	-25.806	-18.521	-25.806	31.764	215.666	0.107
3300.000	0.882	234.308	3299.498	-26.344	-20.146	-26.344	33.165	217.406	0.596
3400.000	0.117	257.572	3399.493	-26.816	-20.871	-26.816	33.981	217.894	0.776
3500.000	0.565	0.661	3499.492	-26.344	-20.965	-26.344	33.668	218.513	0.603
3600.000	0.203	20.414	3599.489	-25.685	-20.898	-25.685	33.113	219.132	0.381
3700.000	0.077	293.993	3699.489	-25.492	-20.898	-25.492	32.963	219.344	0.212
3800.000	0.544	347.342	3799.487	-25.001	-21.063	-25.001	32.691	220.114	0.502
3900.000	0.429	267.820	3899.485	-24.552	-21.542	-24.552	32.663	221.264	0.629
4000.000	0.023	175.535	3999.484	-24.586	-21.914	-24.586	32.935	221.712	0.431
4100.000	0.594	294.357	4099.482	-24.392	-22.385	-24.392	33.107	222.544	0.606
4200.000	1.005	274.660	4199.472	-24.107	-23.732	-24.107	33.828	224.552	0.488
4300.000	1.096	277.011	4299.456	-23.919	-25.555	-23.919	35.003	226.895	0.101
4400.000	1.000	278.058	4399.439	-23.680	-27.368	-23.680	36.191	229.133	0.098
4500.000	0.773	287.711	4499.427	-23.352	-28.875	-23.352	37.136	231.036	0.271
4600.000	0.423	278.204	4599.421	-23.094	-29.882	-23.094	37.766	232.302	0.362
4700.000	0.170	351.892	4699.420	-22.895	-30.268	-22.895	37.952	232.896	0.409
4800.000	0.385	6.014	4799.419	-22.414	-30.254	-22.414	37.652	233.467	0.224
4900.000	0.369	356.103	4899.417	-21.759	-30.241	-21.759	37.256	234.264	0.067
5000.000	0.334	317.767	4999.415	-21.222	-30.459	-21.222	37.123	235.133	0.233
5100.000	0.225	349.000	5099.414	-20.814	-30.692	-20.814	37.084	235.857	0.184
5200.000	0.410	271.160	5199.413	-20.614	-31.087	-20.614	37.301	236.451	0.424
5300.000	0.706	231.075	5299.408	-20.994	-31.924	-20.994	38.208	236.670	0.473
5400.000	0.778	180.530	5399.401	-22.060	-32.410	-22.060	39.205	235.759	0.637
5500.000	1.545	153.040	5499.380	-23.940	-31.805	-23.940	39.808	233.031	0.928
5600.000	2.454	145.451	5599.318	-26.905	-29.979	-26.905	40.282	228.093	0.945
5700.000	2.389	144.911	5699.229	-30.374	-27.567	-30.374	41.018	222.227	0.069
5800.000	1.592	134.178	5799.168	-33.047	-25.373	-33.047	41.664	217.517	0.876

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	1.548	157.616	5899.132	-35.264	-23.863	-35.264	42.579	214.086	0.639
6000.000	1.623	158.773	5999.093	-37.833	-22.835	-37.833	44.191	211.114	0.082
6100.000	1.345	181.692	6099.061	-40.327	-22.357	-40.327	46.109	209.004	0.650
6200.000	1.780	200.141	6199.024	-42.958	-22.927	-42.958	48.693	208.089	0.660
6300.000	1.946	210.189	6298.971	-45.884	-24.315	-45.884	51.928	207.920	0.365
6400.000	3.484	213.567	6398.856	-49.883	-26.849	-49.883	56.650	208.291	1.546
6500.000	4.369	215.325	6498.620	-55.523	-30.731	-55.523	63.460	208.964	0.893
6600.000	4.780	206.334	6598.303	-62.365	-34.782	-62.365	71.408	209.149	0.826
6700.000	4.242	202.642	6697.993	-69.513	-38.054	-69.513	79.248	208.698	0.611
6800.000	2.616	208.313	6797.811	-74.936	-40.561	-74.936	85.209	208.425	1.659
6850.000	1.758	214.435	6847.774	-76.574	-41.536	-76.574	87.114	208.477	1.776