



Company/Rig: Noble Energy/Frontier
WELL/API#: Freedom Two C 19-4/05-123-14624
DECLINATION: 8.46 Degrees
TD AS DRILLED: 7256 Feet
COUNTY/STATE: Weld/Colorado
VS-Azi: 0.000 Degrees
Latitude: 40.30357, Longitude: -104.60027
Grid North = True North -0.58 degs (NAD 27)



DEPTH REFERENCE : RKB=SURFACE ELEVATION=4850'

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01-de_01.ut

Minimum Curvature Method

Report Date/Time: 12/7/2015 / 08:15

LAT & LONG OBTAINED BY HANDHELD GPS AT WELLHEAD

VES SURVEY INTERNATIONAL

HENDERSON, COLORADO

303-853-4976

SURVEYOR: CJ HINES

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	0.403	197.417	99.999	-0.335	-0.105	-0.335	0.351	197.417	0.403
200.000	0.166	166.689	199.998	-0.812	-0.177	-0.812	0.831	192.297	0.273
300.000	0.260	186.075	299.997	-1.179	-0.168	-1.179	1.191	188.091	0.117
400.000	0.281	209.189	399.996	-1.618	-0.311	-1.618	1.648	190.881	0.110
500.000	0.231	277.357	499.995	-1.807	-0.631	-1.807	1.913	199.244	0.290
600.000	0.324	294.169	599.994	-1.665	-1.089	-1.665	1.989	213.175	0.122
700.000	0.329	304.309	699.993	-1.387	-1.584	-1.387	2.105	228.780	0.058
800.000	0.150	257.542	799.992	-1.254	-1.949	-1.254	2.317	237.247	0.251
900.000	0.341	248.725	899.991	-1.390	-2.354	-1.390	2.734	239.440	0.194
1000.000	0.362	255.640	999.989	-1.576	-2.937	-1.576	3.333	241.781	0.047
1100.000	0.139	232.215	1099.988	-1.729	-3.339	-1.729	3.760	242.626	0.241
1200.000	0.304	209.262	1199.987	-2.034	-3.565	-2.034	4.104	240.286	0.184
1300.000	0.241	208.074	1299.986	-2.451	-3.793	-2.451	4.516	237.130	0.063
1400.000	0.386	253.207	1399.985	-2.734	-4.215	-2.734	5.024	237.030	0.276
1500.000	0.250	236.147	1499.983	-2.953	-4.719	-2.953	5.566	237.963	0.165
1600.000	0.394	267.968	1599.982	-3.086	-5.243	-3.086	6.084	239.517	0.225
1700.000	0.328	233.269	1699.980	-3.270	-5.816	-3.270	6.673	240.656	0.224
1800.000	0.370	274.076	1799.978	-3.418	-6.368	-3.418	7.227	241.774	0.246
1900.000	0.427	264.704	1899.976	-3.430	-7.061	-3.430	7.849	244.092	0.086
2000.000	0.099	279.690	1999.974	-3.450	-7.516	-3.450	8.270	245.348	0.332

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
2100.000	0.146	254.065	2099.974	-3.470	-7.724	-3.470	8.467	245.807	0.071
2200.000	0.316	217.858	2199.973	-3.723	-8.015	-3.723	8.838	245.087	0.216
2300.000	0.649	175.912	2299.970	-4.506	-8.144	-4.506	9.308	241.046	0.465
2400.000	1.122	149.879	2399.958	-5.918	-7.613	-5.918	9.643	232.141	0.609
2500.000	1.162	133.373	2499.938	-7.461	-6.385	-7.461	9.820	220.556	0.330
2600.000	1.232	135.508	2599.917	-8.924	-4.894	-8.924	10.178	208.742	0.083
2700.000	1.175	137.562	2699.895	-10.448	-3.449	-10.448	11.002	198.267	0.071
2800.000	1.416	121.592	2799.869	-11.852	-1.704	-11.852	11.974	188.184	0.431
2900.000	1.255	134.323	2899.842	-13.264	0.131	-13.264	13.265	179.433	0.336
3000.000	1.440	122.167	2999.815	-14.698	1.978	-14.698	14.831	172.335	0.339
3100.000	1.671	136.689	3099.778	-16.428	4.042	-16.428	16.918	166.178	0.455
3200.000	1.521	136.404	3199.739	-18.451	5.957	-18.451	19.389	162.105	0.150
3300.000	1.642	156.344	3299.702	-20.724	7.448	-20.724	22.022	160.233	0.560
3400.000	1.721	162.468	3399.659	-23.468	8.475	-23.468	24.951	160.145	0.196
3500.000	1.624	173.393	3499.617	-26.308	9.090	-26.308	27.834	160.938	0.333
3600.000	1.169	205.630	3599.588	-28.635	8.812	-28.635	29.961	162.895	0.890
3700.000	0.552	222.668	3699.577	-29.909	8.045	-29.909	30.972	164.945	0.661
3800.000	0.431	206.839	3799.573	-30.598	7.549	-30.598	31.515	166.141	0.181
3900.000	0.431	235.420	3899.570	-31.147	7.070	-31.147	31.939	167.212	0.213
4000.000	0.243	268.562	3999.569	-31.366	6.548	-31.366	32.042	168.208	0.264
4100.000	0.287	227.089	4099.568	-31.542	6.153	-31.542	32.136	168.962	0.192
4200.000	0.214	236.326	4199.567	-31.816	5.814	-31.816	32.343	169.645	0.083
4300.000	0.416	262.476	4299.565	-31.967	5.298	-31.967	32.403	170.590	0.243
4400.000	0.488	282.886	4399.562	-31.920	4.523	-31.920	32.238	171.935	0.175
4500.000	0.484	302.424	4499.559	-31.598	3.751	-31.598	31.820	173.229	0.165
4600.000	0.462	314.498	4599.555	-31.089	3.108	-31.089	31.244	174.292	0.102
4700.000	0.587	323.681	4699.551	-30.394	2.516	-30.394	30.498	175.267	0.151
4800.000	0.697	299.872	4799.545	-29.678	1.685	-29.678	29.726	176.750	0.286
4900.000	0.574	326.378	4899.539	-28.958	0.880	-28.958	28.971	178.258	0.315
5000.000	0.422	319.746	4999.535	-28.259	0.365	-28.259	28.262	179.260	0.162
5100.000	0.290	325.028	5099.533	-27.771	-0.018	-27.771	27.771	180.038	0.136
5200.000	0.464	325.613	5199.531	-27.229	-0.392	-27.229	27.232	180.824	0.174
5300.000	0.220	320.330	5299.529	-26.748	-0.743	-26.748	26.758	181.591	0.246
5400.000	0.181	321.561	5399.529	-26.476	-0.964	-26.476	26.494	182.084	0.039
5500.000	0.275	337.366	5499.528	-26.131	-1.154	-26.131	26.157	182.529	0.112
5600.000	0.172	357.197	5599.527	-25.760	-1.254	-25.760	25.790	182.786	0.127
5700.000	0.904	13.688	5699.522	-24.844	-1.074	-24.844	24.867	182.476	0.740
5800.000	0.969	41.060	5799.509	-23.439	-0.332	-23.439	23.442	180.812	0.448
5900.000	0.495	60.130	5899.501	-22.586	0.598	-22.586	22.594	178.483	0.527
6000.000	0.435	92.786	5999.498	-22.390	1.351	-22.390	22.431	176.546	0.268

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
6100.000	0.707	75.567	6099.493	-22.255	2.328	-22.255	22.376	174.029	0.319
6200.000	0.869	50.172	6199.483	-21.615	3.508	-21.615	21.898	170.782	0.381
6300.000	1.170	45.949	6299.467	-20.419	4.824	-20.419	20.982	166.709	0.309
6400.000	1.363	59.064	6399.443	-19.098	6.577	-19.098	20.199	160.996	0.347
6500.000	1.687	53.750	6499.408	-17.616	8.785	-17.616	19.685	153.495	0.353
6600.000	2.104	64.337	6599.353	-15.951	11.627	-15.951	19.739	143.910	0.543
6700.000	2.325	61.603	6699.278	-14.191	15.066	-14.191	20.697	133.286	0.245
6800.000	2.554	60.689	6799.188	-12.136	18.793	-12.136	22.371	122.852	0.232
6900.000	2.651	69.151	6899.085	-10.222	22.897	-10.222	25.075	114.057	0.396
7000.000	2.600	72.298	6998.980	-8.709	27.219	-8.709	28.578	107.743	0.153
7090.000	2.037	73.636	7088.906	-7.638	30.698	-7.638	31.634	103.972	0.629