



Company/Rig: Noble Energy/Production
 WELL/API#: Bates 20-22/05-123-24849
 DECLINATION: 8.19 Degrees
 TD AS DRILLED: 7365 Feet
 COUNTY/STATE: Weld/Colorado
 VS-Azi: 0.000 Degrees
 Latitude: 40.47940, Longitude: -104.80909
 Grid North = True North -0.45 degs (NAD 27)
 Grid Correction Applied = -0.45 degs



DEPTH REFERENCE : RKB=GL Elevation= 4780 Feet

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: run1-de_01.ut
 Minimum Curvature Method
 Report Date/Time: 12/13/2017 / 13:44

LAT & LONG OBTAINED BY HANDHELD GPS AT WELLHEAD
 NORTH REFERENCE: GRID
 HENDERSON, COLORADO
 303-853-4976
 Surveyor: Geof Davis / Bates 20-22

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	0.303	230.967	100.000	-0.167	-0.206	-0.167	0.265	230.967	0.303
200.000	0.306	174.335	199.998	-0.599	-0.385	-0.599	0.712	212.706	0.289
300.000	0.205	182.885	299.997	-1.043	-0.367	-1.043	1.106	199.394	0.108
400.000	0.223	174.366	399.997	-1.415	-0.357	-1.415	1.460	194.164	0.037
500.000	0.336	185.648	499.995	-1.901	-0.367	-1.901	1.936	190.927	0.126
600.000	0.141	202.444	599.995	-2.307	-0.443	-2.307	2.349	190.868	0.205
700.000	0.315	271.780	699.994	-2.412	-0.765	-2.412	2.530	197.598	0.297
800.000	0.498	333.932	799.992	-2.013	-1.231	-2.013	2.360	211.448	0.448
900.000	0.569	305.371	899.988	-1.336	-1.827	-1.336	2.263	233.828	0.272
1000.000	0.455	295.335	999.984	-0.878	-2.590	-0.878	2.735	251.264	0.144
1100.000	0.776	300.175	1099.978	-0.368	-3.534	-0.368	3.553	264.051	0.325
1200.000	0.708	299.824	1199.969	0.279	-4.656	0.279	4.664	273.435	0.068
1300.000	0.481	303.697	1299.964	0.820	-5.541	0.820	5.601	278.414	0.231
1400.000	0.590	266.446	1399.960	1.021	-6.404	1.021	6.484	279.055	0.357
1500.000	0.317	259.944	1499.957	0.940	-7.190	0.940	7.251	277.451	0.277
1600.000	0.790	252.357	1599.952	0.683	-8.119	0.683	8.148	274.809	0.477

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	1.084	258.768	1699.938	0.290	-9.704	0.290	9.708	271.712	0.312
1800.000	1.043	246.853	1799.921	-0.252	-11.468	-0.252	11.471	268.741	0.224
1900.000	1.017	265.565	1899.905	-0.679	-13.190	-0.679	13.207	267.055	0.336
2000.000	1.035	279.289	1999.889	-0.601	-14.965	-0.601	14.977	267.699	0.246
2100.000	1.044	285.449	2099.873	-0.213	-16.735	-0.213	16.736	269.271	0.112
2200.000	1.110	278.670	2199.855	0.176	-18.570	0.176	18.571	270.542	0.143
2300.000	1.296	291.195	2299.833	0.731	-20.582	0.731	20.595	272.033	0.321
2400.000	1.471	310.538	2399.805	1.974	-22.612	1.974	22.698	274.989	0.496
2500.000	1.510	268.976	2499.774	2.784	-24.905	2.784	25.060	276.379	1.058
2600.000	1.749	272.548	2599.733	2.829	-27.747	2.829	27.891	275.821	0.259
2700.000	1.895	283.671	2699.683	3.287	-30.878	3.287	31.053	276.077	0.382
2800.000	2.202	265.725	2799.620	3.535	-34.400	3.535	34.582	275.867	0.707
2900.000	2.218	268.472	2899.546	3.340	-38.250	3.340	38.395	274.991	0.107
3000.000	2.507	253.018	2999.462	2.650	-42.275	2.650	42.358	273.587	0.697
3100.000	2.319	269.995	3099.374	2.011	-46.390	2.011	46.433	272.482	0.736
3200.000	1.956	271.617	3199.304	2.059	-50.118	2.059	50.161	272.353	0.368
3300.000	2.346	271.835	3299.234	2.173	-53.870	2.173	53.914	272.310	0.390
3400.000	2.366	282.062	3399.150	2.670	-57.935	2.670	57.997	272.639	0.420
3500.000	1.847	282.439	3499.082	3.448	-61.528	3.448	61.624	273.208	0.520
3600.000	1.554	299.096	3599.038	4.455	-64.286	4.455	64.440	273.964	0.571
3700.000	1.802	292.747	3698.995	5.722	-66.921	5.722	67.165	274.887	0.310
3800.000	1.783	279.131	3798.947	6.577	-69.907	6.577	70.216	275.375	0.425
3900.000	1.953	293.026	3898.894	7.490	-73.011	7.490	73.394	275.858	0.482
4000.000	1.910	291.609	3998.837	8.771	-76.129	8.771	76.632	276.572	0.064
4100.000	2.351	270.475	4098.770	9.401	-79.729	9.401	80.281	276.725	0.894
4200.000	2.561	274.802	4198.678	9.605	-84.007	9.605	84.554	276.523	0.280
4230.000	2.408	278.070	4228.649	9.750	-85.299	9.750	85.854	276.521	0.695