



Company: Noble Energy  
Well: Velvet 21-17  
API: 05-123-10381  
Rig Name: Production/Lightning Wireline  
State/County: Colorado/ Weld  
Latitude: 40.840, Longitude: -104.233  
GRID North is 0.820 Degrees East of True North  
VS-Azi: 0.000 Degrees



FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : RKB = Ground Level

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro\_run01-02.ut  
Minimum Curvature Method  
Report Date/Time: 11/23/2012 / 11:45

Vaughn Energy Services  
Henderson, Colorado  
866-835-8333  
Jason Kinchelow

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	0.339	133.319	99.999	-0.203	0.215	-0.203	0.296	133.319	0.339
200.000	0.089	167.911	199.999	-0.482	0.447	-0.482	0.657	137.149	0.271
300.000	0.262	134.073	299.998	-0.716	0.627	-0.716	0.952	138.791	0.195
400.000	0.189	180.321	399.997	-1.040	0.790	-1.040	1.306	142.766	0.189
500.000	0.094	160.258	499.997	-1.282	0.817	-1.282	1.520	147.490	0.106
600.000	0.119	21.593	599.997	-1.263	0.883	-1.263	1.541	145.032	0.200
700.000	0.152	27.893	699.997	-1.049	0.983	-1.049	1.438	136.858	0.036
800.000	0.090	191.752	799.997	-1.009	1.029	-1.009	1.441	134.432	0.239
900.000	0.089	27.689	899.997	-1.017	1.049	-1.017	1.461	134.094	0.177
1000.000	0.069	280.528	999.997	-0.937	1.026	-0.937	1.389	132.392	0.128
1100.000	0.089	310.837	1099.997	-0.875	0.908	-0.875	1.261	133.939	0.046
1200.000	0.228	190.848	1199.996	-1.019	0.811	-1.019	1.303	141.473	0.283
1300.000	0.154	194.812	1299.996	-1.344	0.739	-1.344	1.534	151.189	0.075
1400.000	0.161	222.671	1399.995	-1.578	0.610	-1.578	1.692	158.865	0.076
1500.000	0.199	259.423	1499.995	-1.713	0.344	-1.713	1.747	168.633	0.119
1600.000	0.296	286.964	1599.994	-1.669	-0.073	-1.669	1.671	182.507	0.151
1700.000	0.266	298.539	1699.993	-1.483	-0.524	-1.483	1.573	199.453	0.064
1800.000	0.082	0.079	1799.992	-1.301	-0.728	-1.301	1.490	209.225	0.238
1900.000	0.231	308.140	1899.992	-1.104	-0.886	-1.104	1.416	218.747	0.192
2000.000	0.176	310.538	1999.991	-0.880	-1.162	-0.880	1.457	232.866	0.055
2100.000	0.207	330.402	2099.991	-0.623	-1.368	-0.623	1.503	245.521	0.073
2200.000	0.184	333.449	2199.990	-0.322	-1.529	-0.322	1.562	258.093	0.025
2300.000	0.305	289.305	2299.989	-0.091	-1.851	-0.091	1.854	267.191	0.215
2400.000	0.271	352.441	2399.988	0.232	-2.134	0.232	2.146	276.203	0.303
2500.000	0.240	286.173	2499.988	0.525	-2.366	0.525	2.423	282.511	0.281
2600.000	0.229	291.754	2599.987	0.657	-2.752	0.657	2.830	283.432	0.025
2700.000	0.292	291.953	2699.986	0.827	-3.175	0.827	3.280	284.597	0.063

HORIZONTAL DISPLACEMENT IS  
3.280 FEET AT 284.597 DEGREES