



Company: Noble Energy
Well: Wardell PC H 20-24
API: 05-123-29604
Rig Name: Production/Lightning
Location: Weld County, Colorado
Latitude: 40.207, Longitude: -104.687
GRID North is 0.530 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_run02-02_ed.ut

Minimum Curvature Method

Report Date/Time: 5/30/2012 / 12:31

Vaughn Energy Services

Henderson, CO.

Justin Williams

303-853-4976

RKB = Ground Level

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	0.577	66.756	99.998	0.199	0.463	0.199	0.504	66.756	0.577
200.000	0.316	108.463	199.995	0.310	1.188	0.310	1.227	75.361	0.401
300.000	0.341	111.349	299.994	0.115	1.726	0.115	1.730	86.203	0.029
400.000	0.271	95.782	399.992	-0.017	2.238	-0.017	2.238	90.447	0.108
500.000	0.180	133.962	499.992	-0.150	2.586	-0.150	2.591	93.328	0.170
600.000	0.341	201.010	599.991	-0.538	2.593	-0.538	2.648	101.715	0.318
700.000	0.459	237.239	699.988	-1.032	2.149	-1.032	2.384	115.657	0.273
800.000	0.584	239.794	799.984	-1.505	1.372	-1.505	2.037	137.655	0.127
900.000	0.552	225.248	899.979	-2.101	0.589	-2.101	2.182	164.329	0.147
1000.000	0.527	243.385	999.975	-2.646	-0.164	-2.646	2.651	183.537	0.172
1100.000	0.545	234.179	1099.971	-3.130	-0.960	-3.130	3.274	197.054	0.088
1200.000	1.062	237.800	1199.961	-3.903	-2.130	-3.903	4.446	208.627	0.518
1300.000	1.101	254.325	1299.943	-4.656	-3.839	-4.656	6.035	219.509	0.313
1400.000	0.935	261.772	1399.927	-5.032	-5.572	-5.032	7.508	227.912	0.212
1500.000	0.620	272.414	1499.918	-5.126	-6.920	-5.126	8.612	233.470	0.345
1600.000	0.578	224.508	1599.913	-5.463	-7.815	-5.463	9.535	235.042	0.488
1700.000	0.138	204.250	1699.911	-5.933	-8.218	-5.933	10.136	234.173	0.452
1800.000	0.076	122.587	1799.911	-6.078	-8.211	-6.078	10.216	233.492	0.147
1900.000	0.155	199.587	1899.911	-6.241	-8.201	-6.241	10.305	232.729	0.156
2000.000	0.593	285.898	1999.909	-6.226	-8.744	-6.226	10.734	234.545	0.603
2100.000	0.530	5.438	2099.905	-5.624	-9.197	-5.624	10.781	238.554	0.720
2200.000	0.508	24.607	2199.901	-4.761	-8.969	-4.761	10.154	242.040	0.174
2300.000	0.918	14.973	2299.893	-3.583	-8.577	-3.583	9.296	247.326	0.426
2400.000	0.937	359.056	2399.880	-1.992	-8.384	-1.992	8.617	256.635	0.257
2500.000	0.975	344.246	2499.866	-0.356	-8.628	-0.356	8.635	267.639	0.249
2600.000	0.925	340.198	2599.853	1.222	-9.132	1.222	9.214	277.624	0.084
2700.000	0.847	346.554	2699.841	2.701	-9.578	2.701	9.951	285.747	0.125
2800.000	1.025	343.738	2799.827	4.278	-10.000	4.278	10.877	293.161	0.183
2900.000	1.031	338.211	2899.811	5.972	-10.584	5.972	12.153	299.432	0.099
3000.000	0.980	338.506	2999.796	7.603	-11.232	7.603	13.563	304.095	0.051
3100.000	1.392	331.245	3099.774	9.464	-12.130	9.464	15.385	307.963	0.438
3200.000	1.704	332.736	3199.738	11.851	-13.395	11.851	17.886	311.500	0.315
3300.000	1.633	311.543	3299.696	14.118	-15.143	14.118	20.704	312.994	0.618
3400.000	1.091	343.355	3399.669	15.976	-16.483	15.976	22.954	314.106	0.910

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
3500.000	1.437	24.463	3499.646	18.030	-16.236	18.030	24.263	317.997	0.945
3600.000	0.962	353.243	3599.625	20.005	-15.815	20.005	25.502	321.671	0.791
3700.000	0.899	332.128	3699.612	21.533	-16.281	21.533	26.995	322.906	0.347
3800.000	0.523	347.242	3799.605	22.672	-16.749	22.672	28.187	323.544	0.417
3900.000	0.894	3.345	3899.597	23.896	-16.804	23.896	29.213	324.884	0.418
4000.000	0.590	310.167	3999.589	25.008	-17.152	25.008	30.325	325.554	0.718
4100.000	0.749	258.251	4099.583	25.207	-18.186	25.207	31.083	324.190	0.604
4200.000	0.986	220.292	4199.573	24.418	-19.383	24.418	31.176	321.557	0.607
4300.000	1.818	228.309	4299.542	22.707	-21.123	22.707	31.013	317.069	0.853
4400.000	2.458	210.452	4399.473	19.803	-23.394	19.803	30.651	310.248	0.917
4500.000	1.677	193.922	4499.408	16.535	-24.833	16.535	29.834	303.657	0.975
4600.000	1.715	162.332	4599.366	13.688	-24.731	13.688	28.267	298.964	0.924
4700.000	2.333	140.254	4699.305	10.698	-22.976	10.698	25.344	294.967	0.984
4800.000	3.340	118.113	4799.184	7.760	-19.105	7.760	20.621	292.106	1.471
4900.000	3.931	109.374	4898.983	5.251	-13.302	5.251	14.301	291.540	0.808
5000.000	3.833	96.289	4998.756	3.747	-6.746	3.747	7.717	299.051	0.889
5100.000	3.481	89.372	5098.552	3.415	-0.388	3.415	3.437	353.517	0.564
5200.000	2.595	84.188	5198.411	3.677	4.900	3.677	6.126	53.116	0.927
5300.000	2.872	82.909	5298.297	4.216	9.639	4.216	10.520	66.377	0.284
5400.000	2.826	78.164	5398.174	5.030	14.537	5.030	15.383	70.913	0.240
5500.000	2.313	78.749	5498.073	5.930	18.929	5.930	19.837	72.606	0.513
5600.000	1.432	73.934	5598.018	6.669	22.110	6.669	23.094	73.214	0.894
5700.000	0.966	78.275	5697.996	7.187	24.136	7.187	25.183	73.419	0.475
5800.000	0.655	93.217	5797.986	7.326	25.531	7.326	26.561	73.990	0.373
5900.000	0.685	94.774	5897.979	7.244	26.698	7.244	27.663	74.819	0.036
6000.000	0.872	89.616	5997.970	7.199	28.055	7.199	28.964	75.608	0.199
6100.000	1.033	73.807	6097.956	7.456	29.682	7.456	30.604	75.900	0.307
6200.000	1.002	68.109	6197.941	8.033	31.358	8.033	32.371	75.632	0.106
6300.000	1.372	56.457	6297.919	9.021	33.168	9.021	34.372	74.785	0.440
6400.000	1.599	51.639	6397.886	10.548	35.260	10.548	36.804	73.345	0.259
6500.000	1.897	42.773	6497.839	12.630	37.478	12.630	39.549	71.377	0.401
6600.000	2.186	45.989	6597.776	15.170	39.974	15.170	42.756	69.219	0.311
6700.000	1.992	43.718	6697.709	17.751	42.547	17.751	46.102	67.353	0.211
6800.000	2.040	32.627	6797.648	20.507	44.708	20.507	49.187	65.360	0.392
6900.000	2.437	9.428	6897.573	24.103	46.016	24.103	51.947	62.355	0.980
7000.000	2.949	351.486	6997.464	28.745	45.984	28.745	54.229	57.990	0.980
7100.000	3.286	351.429	7097.316	34.123	45.176	34.123	56.615	52.935	0.337
7200.000	3.614	347.214	7197.135	40.031	44.051	40.031	59.523	47.738	0.414

HORIZONTAL DISPLACEMENT IS
59.523 FEET AT 47.738 DEGREES