



Company: Noble Energy  
Well: Betz 9-44  
API #: 05-123-15209  
Rig Name: Production/Lightning  
State/County: Colorado/Weld  
Latitude: 40.322, Longitude: -104.661  
GRID North is 0.540 Degrees East of True North  
VS-Azi: 0.000 Degrees



FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : Ground Level

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro to 7000-de\_01.ut

Minimum Curvature Method

Report Date/Time: 1/30/2013 / 16:43

Vaughn Energy Services

Henderson, Colorado

866-835-8333

Randy Holcomb

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	0.799	355.951	99.997	0.696	-0.049	0.696	0.698	355.951	0.799
200.000	0.162	350.616	199.993	1.532	-0.122	1.532	1.536	355.460	0.638
300.000	0.063	42.752	299.993	1.712	-0.107	1.712	1.715	356.409	0.133
400.000	0.366	115.594	399.992	1.614	0.218	1.614	1.629	7.690	0.353
500.000	0.155	92.182	499.991	1.471	0.641	1.471	1.604	23.551	0.232
600.000	0.244	74.829	599.990	1.521	0.981	1.521	1.810	32.824	0.106
700.000	0.382	123.137	699.989	1.395	1.466	1.395	2.023	46.420	0.285
800.000	0.409	122.772	799.986	1.019	2.045	1.019	2.285	63.510	0.027
900.000	0.250	77.346	899.985	0.874	2.558	0.874	2.703	71.144	0.294
1000.000	0.094	193.413	999.985	0.842	2.752	0.842	2.878	72.999	0.304
1100.000	0.185	128.680	1099.984	0.661	2.859	0.661	2.935	76.984	0.168
1200.000	0.110	249.300	1199.984	0.526	2.895	0.526	2.943	79.696	0.259
1300.000	0.087	269.577	1299.984	0.492	2.730	0.492	2.774	79.786	0.042
1400.000	0.285	229.678	1399.983	0.330	2.464	0.330	2.486	82.365	0.225
1500.000	0.182	274.461	1499.983	0.182	2.116	0.182	2.124	85.091	0.202
1600.000	0.227	217.268	1599.982	0.037	1.838	0.037	1.839	88.853	0.199
1700.000	0.231	265.482	1699.981	-0.136	1.518	-0.136	1.524	95.133	0.187
1800.000	0.393	187.902	1799.980	-0.492	1.270	-0.492	1.362	111.166	0.411
1900.000	0.481	206.576	1899.977	-1.207	1.035	-1.207	1.590	139.375	0.166
2000.000	0.579	209.844	1999.973	-2.021	0.596	-2.021	2.107	163.569	0.103
2100.000	0.730	217.633	2099.967	-2.964	-0.045	-2.964	2.964	180.862	0.175
2200.000	0.668	244.763	2199.959	-3.717	-0.961	-3.717	3.839	194.494	0.333
2300.000	0.766	280.787	2299.952	-3.840	-2.145	-3.840	4.399	209.187	0.453
2400.000	0.741	297.238	2399.943	-3.419	-3.377	-3.419	4.806	224.646	0.217
2500.000	0.797	289.923	2499.935	-2.886	-4.606	-2.886	5.435	237.926	0.113
2600.000	0.836	291.333	2599.924	-2.384	-5.939	-2.384	6.399	248.127	0.044
2700.000	0.948	294.213	2699.912	-1.779	-7.373	-1.779	7.584	256.431	0.121
2800.000	0.848	297.851	2799.900	-1.094	-8.781	-1.094	8.849	262.897	0.116
2900.000	0.865	305.230	2899.889	-0.313	-10.052	-0.313	10.057	268.216	0.112
3000.000	0.924	305.484	2999.877	0.591	-11.326	0.591	11.342	272.986	0.059
3100.000	1.063	294.231	3099.862	1.440	-12.829	1.440	12.909	276.403	0.238
3200.000	1.128	284.433	3199.843	2.066	-14.627	2.066	14.772	278.038	0.198
3300.000	1.254	289.636	3299.822	2.679	-16.611	2.679	16.826	279.160	0.166
3400.000	1.230	285.849	3399.798	3.340	-18.674	3.340	18.971	280.139	0.086

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	1.141	291.662	3499.777	4.000	-20.633	4.000	21.017	280.973	0.149
3600.000	0.945	313.475	3599.761	4.935	-22.157	4.935	22.700	282.557	0.439
3700.000	0.668	312.804	3699.751	5.898	-23.183	5.898	23.921	284.275	0.277
3800.000	0.507	327.586	3799.746	6.668	-23.847	6.668	24.762	285.622	0.220
3900.000	0.405	318.813	3899.742	7.308	-24.317	7.308	25.392	286.726	0.124
4000.000	0.450	331.751	3999.740	7.920	-24.736	7.920	25.973	287.753	0.106
4100.000	1.139	1.904	4099.730	9.259	-24.889	9.259	26.555	290.405	0.783
4200.000	1.279	3.586	4199.707	11.366	-24.786	11.366	27.268	294.634	0.145
4300.000	1.625	351.886	4299.675	13.883	-24.916	13.883	28.523	299.127	0.453
4400.000	2.052	348.026	4399.624	17.038	-25.488	17.038	30.658	303.762	0.445
4500.000	2.417	351.708	4499.548	20.877	-26.163	20.877	33.472	308.587	0.392
4600.000	2.450	348.618	4599.457	25.059	-26.889	25.059	36.756	312.982	0.135
4700.000	2.613	353.758	4699.360	29.421	-27.559	29.421	40.312	316.871	0.279
4800.000	2.878	351.269	4799.245	34.168	-28.188	34.168	44.295	320.478	0.291
4900.000	3.185	352.518	4899.105	39.404	-28.931	39.404	48.884	323.713	0.313
5000.000	3.276	354.486	4998.946	45.002	-29.567	45.002	53.846	326.695	0.144
5100.000	2.753	8.703	5098.809	50.220	-29.478	50.220	58.233	329.588	0.909
5200.000	1.914	12.469	5198.725	54.225	-28.755	54.225	61.377	332.064	0.852
5300.000	1.738	36.945	5298.676	57.067	-27.483	57.067	63.340	334.285	0.793
5400.000	1.483	53.836	5398.637	59.042	-25.527	59.042	64.324	336.619	0.536
5500.000	1.468	40.637	5498.604	60.777	-23.648	60.777	65.216	338.739	0.339
5600.000	1.054	60.452	5598.580	62.203	-22.014	62.203	65.983	340.511	0.595
5700.000	0.843	40.459	5698.566	63.216	-20.737	63.216	66.530	341.839	0.389
5800.000	0.810	8.784	5798.557	64.474	-20.152	64.474	67.550	342.643	0.452
5900.000	0.388	37.377	5898.551	65.442	-19.838	65.442	68.383	343.136	0.505
6000.000	0.612	106.533	5998.548	65.559	-19.121	65.559	68.291	343.740	0.596
6100.000	0.598	106.066	6098.542	65.263	-18.108	65.263	67.728	344.492	0.014
6200.000	0.663	91.533	6198.536	65.103	-17.029	65.103	67.293	345.342	0.172
6300.000	0.750	77.517	6298.529	65.229	-15.812	65.229	67.118	346.374	0.193
6400.000	0.794	71.081	6398.520	65.595	-14.518	65.595	67.182	347.520	0.097
6500.000	0.424	54.419	6498.514	66.035	-13.561	66.035	67.413	348.395	0.407
6600.000	0.395	55.069	6598.512	66.447	-12.978	66.447	67.703	348.949	0.029
6700.000	0.408	66.672	6698.509	66.786	-12.368	66.786	67.921	349.508	0.082
6800.000	0.649	69.096	6798.505	67.128	-11.513	67.128	68.109	350.268	0.242
6900.000	0.575	64.221	6898.499	67.549	-10.532	67.549	68.365	351.138	0.090
7000.000	0.305	54.002	6998.496	67.923	-9.865	67.923	68.636	351.736	0.281
HORIZONTAL DISPLACEMENT IS 68.636 FEET AT 351.736 DEGREES									