



Company: Noble Energy  
Well: Wells Ranch AE 05-12  
API: 05-123-33225  
Rig Name: Production/ VES  
State/County: Colorado/ Weld  
Latitude: 40.513, Longitude: -104.354  
GRID North is 0.740 Degrees East of True North  
VS-Azi: 0.000 Degrees



FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : RKB= Ground Level

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: ha gyro-de\_01.ut

Minimum Curvature Method

Report Date/Time: 2/26/2013 / 14:49

Vaughn Energy Services  
Henderson, Colorado  
303-853-4976  
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	0.512	44.995	99.999	0.316	0.316	0.316	0.447	44.995	0.512
200.000	0.732	11.894	199.993	1.257	0.763	1.257	1.471	31.268	0.413
300.000	0.713	6.973	299.985	2.500	0.971	2.500	2.681	21.220	0.065
400.000	0.568	25.500	399.979	3.565	1.260	3.565	3.781	19.461	0.251
500.000	0.571	29.425	499.974	4.446	1.718	4.446	4.767	21.125	0.039
600.000	0.413	355.026	599.970	5.239	1.932	5.239	5.584	20.237	0.328
700.000	0.724	12.593	699.965	6.215	2.038	6.215	6.541	18.156	0.353
800.000	0.719	286.056	799.960	7.005	1.573	7.005	7.180	12.654	0.989
900.000	0.755	233.831	899.953	6.790	0.438	6.790	6.804	3.687	0.650
1000.000	0.834	286.027	999.944	6.602	-0.794	6.602	6.650	353.140	0.703
1100.000	0.918	241.089	1099.934	6.416	-2.196	6.416	6.781	341.107	0.674
1200.000	0.556	239.599	1199.925	5.783	-3.315	5.783	6.666	330.173	0.363
1300.000	0.662	204.362	1299.920	5.011	-3.972	5.011	6.394	321.600	0.382
1400.000	0.780	227.607	1399.912	4.027	-4.713	4.027	6.198	310.512	0.312
1500.000	0.236	263.874	1499.908	3.546	-5.420	3.546	6.477	303.194	0.605
1600.000	0.764	233.063	1599.904	3.123	-6.158	3.123	6.905	296.895	0.574
1700.000	0.502	275.487	1699.899	2.765	-7.127	2.765	7.644	291.201	0.519
1800.000	0.330	321.015	1799.896	3.030	-7.745	3.030	8.317	291.370	0.359
1900.000	0.213	5.997	1899.895	3.439	-7.907	3.439	8.622	293.510	0.234
2000.000	0.179	345.136	1999.895	3.776	-7.927	3.776	8.781	295.469	0.078
2100.000	0.658	109.316	2099.892	3.737	-7.426	3.737	8.313	296.716	0.773
2200.000	0.976	88.025	2199.882	3.577	-6.032	3.577	7.013	300.666	0.435
2300.000	0.978	98.952	2299.868	3.473	-4.338	3.473	5.557	308.685	0.186
2400.000	0.949	117.814	2399.854	2.954	-2.762	2.954	4.044	316.920	0.317
2500.000	0.847	179.159	2499.844	1.829	-2.019	1.829	2.724	312.172	0.920
2600.000	0.813	168.240	2599.833	0.396	-1.864	0.396	1.905	281.997	0.161
2700.000	0.572	200.344	2699.826	-0.766	-1.893	-0.766	2.042	247.961	0.447
2800.000	0.390	228.043	2799.823	-1.461	-2.319	-1.461	2.741	237.783	0.290
2900.000	0.476	197.565	2899.820	-2.085	-2.697	-2.085	3.409	232.298	0.242
3000.000	0.393	252.901	2999.818	-2.582	-3.150	-2.582	4.073	230.664	0.410
3100.000	0.448	266.124	3099.815	-2.709	-3.868	-2.709	4.722	234.996	0.112
3200.000	0.160	288.308	3199.814	-2.692	-4.391	-2.692	5.150	238.495	0.306
3300.000	0.392	180.395	3299.813	-2.989	-4.526	-2.989	5.424	236.558	0.466
3400.000	0.867	150.529	3399.807	-3.990	-4.156	-3.990	5.761	226.172	0.562

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	0.108	74.950	3499.803	-4.624	-3.693	-4.624	5.918	218.612	0.847
3600.000	0.023	105.305	3599.803	-4.605	-3.583	-4.605	5.834	217.885	0.089
3700.000	0.384	130.505	3699.802	-4.828	-3.309	-4.828	5.853	214.428	0.364
3800.000	0.527	122.922	3799.799	-5.295	-2.668	-5.295	5.929	206.741	0.155
3900.000	0.580	142.111	3899.794	-5.945	-1.971	-5.945	6.263	198.342	0.192
4000.000	0.136	192.776	3999.792	-6.460	-1.686	-6.460	6.677	194.628	0.505
4100.000	0.511	97.637	4099.791	-6.635	-1.271	-6.635	6.756	190.842	0.540
4200.000	0.139	255.558	4199.790	-6.725	-0.947	-6.725	6.791	188.012	0.641
4300.000	0.398	249.277	4299.788	-6.878	-1.389	-6.878	7.017	191.415	0.260
4400.000	1.103	271.130	4399.779	-6.982	-2.676	-6.982	7.477	200.967	0.748
4500.000	0.953	280.408	4499.763	-6.813	-4.456	-6.813	8.140	213.186	0.223
4600.000	1.058	270.873	4599.748	-6.648	-6.197	-6.648	9.089	222.988	0.197
4700.000	1.179	255.821	4699.729	-6.886	-8.117	-6.886	10.645	229.692	0.316
4800.000	0.964	264.806	4799.712	-7.214	-9.952	-7.214	12.292	234.062	0.272
4900.000	1.038	273.025	4899.696	-7.243	-11.694	-7.243	13.756	238.230	0.162
5000.000	1.133	284.708	4999.679	-6.944	-13.556	-6.944	15.231	242.877	0.240
5100.000	1.141	307.935	5099.659	-6.080	-15.298	-6.080	16.462	248.324	0.458
5200.000	1.282	301.217	5199.637	-4.888	-17.040	-4.888	17.728	253.995	0.200
5300.000	1.311	302.472	5299.611	-3.694	-18.963	-3.694	19.319	258.977	0.040
5400.000	1.268	299.388	5399.586	-2.537	-20.892	-2.537	21.045	263.077	0.082
5500.000	1.401	298.013	5499.559	-1.419	-22.935	-1.419	22.979	266.459	0.137
5600.000	1.435	306.873	5599.529	-0.094	-25.017	-0.094	25.017	269.786	0.222
5700.000	1.535	304.038	5699.495	1.407	-27.128	1.407	27.165	272.970	0.124
5800.000	1.886	298.132	5799.450	2.933	-29.689	2.933	29.834	275.642	0.392
5900.000	2.097	294.915	5899.390	4.480	-32.800	4.480	33.104	277.777	0.239
6000.000	2.414	297.534	5999.312	6.224	-36.327	6.224	36.856	279.723	0.333
6100.000	2.825	290.484	6099.208	8.060	-40.504	8.060	41.298	281.255	0.522
6200.000	3.036	291.511	6199.077	9.894	-45.276	9.894	46.345	282.327	0.217
6300.000	3.389	286.723	6298.920	11.716	-50.571	11.716	51.910	283.043	0.443
6400.000	3.596	295.144	6398.735	13.898	-56.240	13.898	57.931	283.881	0.552
6500.000	3.447	294.728	6498.546	16.488	-61.809	16.488	63.971	284.937	0.150
6600.000	2.335	318.147	6598.420	19.263	-65.899	19.263	68.657	286.295	1.601
6700.000	2.286	298.035	6698.341	21.718	-69.019	21.718	72.355	287.467	0.808
6800.000	3.275	297.326	6798.222	23.967	-73.317	23.967	77.135	288.102	0.989
6850.000	3.222	301.997	6848.142	25.367	-75.778	25.367	79.911	288.508	0.540

HORIZONTAL DISPLACEMENT IS  
79.911 FEET AT 288.508 DEGREES