



Company: Noble Energy
Lease/Well: Doering 1/28-23
API: 05-123-21985
Rig Name: Production/VES
State/County: Colorado/Weld
Latitude: 40.456, Longitude: -104.778
GRID North is 0.470 Degrees East of True North
VS-Azi: 0.000 Degrees



FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : Ground Level

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: doering 1 28-23_ed.ut

Minimum Curvature Method

Report Date/Time: 2/27/2013 / 11:19

Vaughn Energy Services
Fort Worth, Texas
817-741-3610
Robert Hooper

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	0.609	314.338	99.998	0.371	-0.380	0.371	0.532	314.338	0.609
200.000	0.382	337.832	199.994	1.051	-0.886	1.051	1.375	319.881	0.300
300.000	0.575	358.691	299.991	1.862	-1.023	1.862	2.125	331.212	0.258
400.000	1.301	35.577	399.978	3.288	-0.374	3.288	3.309	353.510	0.909
500.000	2.172	44.597	499.931	5.561	1.617	5.561	5.791	16.216	0.910
600.000	2.242	41.925	599.857	8.365	4.255	8.365	9.385	26.958	0.124
700.000	2.218	39.760	699.781	11.308	6.799	11.308	13.194	31.016	0.088
800.000	2.437	33.368	799.699	14.571	9.206	14.571	17.235	32.284	0.339
900.000	2.135	36.907	899.619	17.836	11.494	17.836	21.218	32.798	0.333
1000.000	2.034	32.868	999.553	20.816	13.575	20.816	24.851	33.111	0.179
1100.000	1.851	35.438	1099.495	23.621	15.474	23.621	28.239	33.229	0.203
1200.000	2.003	32.672	1199.439	26.408	17.354	26.408	31.600	33.311	0.179
1300.000	1.762	35.441	1299.385	29.132	19.189	29.132	34.884	33.373	0.258
1400.000	1.493	32.366	1399.344	31.484	20.778	31.484	37.722	33.422	0.283
1500.000	1.343	30.513	1499.314	33.594	22.070	33.594	40.195	33.303	0.157
1600.000	1.313	21.973	1599.287	35.665	23.093	35.665	42.489	32.923	0.200
1700.000	1.083	12.415	1699.265	37.651	23.725	37.651	44.502	32.216	0.304
1800.000	0.818	355.478	1799.252	39.285	23.872	39.285	45.969	31.285	0.384
1900.000	0.976	334.864	1899.240	40.767	23.454	40.767	47.032	29.912	0.357
2000.000	1.096	316.547	1999.223	42.233	22.434	42.233	47.822	27.977	0.350
2100.000	0.935	298.039	2099.208	43.311	21.056	43.311	48.158	25.927	0.363
2200.000	0.962	293.777	2199.194	44.033	19.568	44.033	48.185	23.960	0.075
2300.000	0.758	276.760	2299.183	44.449	18.143	44.449	48.009	22.204	0.325
2400.000	0.623	276.671	2399.176	44.590	16.945	44.590	47.701	20.808	0.135
2500.000	0.661	267.497	2499.170	44.628	15.829	44.628	47.352	19.529	0.110
2600.000	0.656	258.185	2599.163	44.486	14.692	44.486	46.849	18.276	0.107
2700.000	0.689	248.193	2699.156	44.145	13.574	44.145	46.185	17.091	0.121
2800.000	0.703	241.198	2799.149	43.626	12.478	43.626	45.376	15.962	0.086
2900.000	0.836	223.294	2899.140	42.800	11.441	42.800	44.303	14.966	0.273
3000.000	0.791	228.569	2999.130	41.813	10.423	41.813	43.092	13.998	0.087
3100.000	0.877	232.264	3099.119	40.888	9.301	40.888	41.932	12.815	0.101
3200.000	1.046	241.353	3199.105	39.982	7.895	39.982	40.754	11.170	0.227
3300.000	1.089	274.194	3299.089	39.614	6.146	39.614	40.088	8.820	0.605
3400.000	1.085	298.846	3399.071	40.141	4.369	40.141	40.378	6.212	0.464

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	1.251	308.876	3499.051	41.283	2.690	41.283	41.370	3.728	0.262
3600.000	1.307	313.405	3599.026	42.751	1.011	42.751	42.763	1.355	0.116
3700.000	1.420	316.913	3698.997	44.440	-0.664	44.440	44.445	359.144	0.141
3800.000	1.429	312.784	3798.967	46.192	-2.425	46.192	46.256	356.995	0.103
3900.000	1.726	318.614	3898.929	48.169	-4.336	48.169	48.363	354.856	0.338
4000.000	1.654	316.203	3998.885	50.340	-6.330	50.340	50.737	352.833	0.101
4100.000	1.189	320.201	4098.854	52.179	-7.993	52.179	52.788	351.291	0.476
4200.000	1.341	329.512	4198.830	53.984	-9.251	53.984	54.771	350.276	0.255
4300.000	1.429	331.882	4298.801	56.093	-10.432	56.093	57.055	349.464	0.105
4400.000	1.447	331.791	4398.769	58.306	-11.617	58.306	59.452	348.732	0.018
4500.000	1.500	329.266	4498.736	60.543	-12.883	60.543	61.899	347.987	0.084
4600.000	1.800	326.529	4598.694	62.979	-14.418	62.979	64.608	347.105	0.310
4700.000	2.117	331.390	4698.636	65.910	-16.169	65.910	67.864	346.217	0.357
4800.000	2.243	325.496	4798.564	69.144	-18.162	69.144	71.490	345.283	0.257
4900.000	2.237	332.559	4898.487	72.489	-20.170	72.489	75.243	344.451	0.276
5000.000	2.145	324.945	4998.415	75.754	-22.144	75.754	78.924	343.705	0.305
5100.000	2.004	329.061	5098.349	78.785	-24.118	78.785	82.394	342.979	0.205
5200.000	1.804	326.704	5198.294	81.601	-25.881	81.601	85.607	342.403	0.214
5300.000	1.828	315.687	5298.244	84.058	-27.860	84.058	88.555	341.663	0.350
5400.000	1.408	307.014	5398.204	85.939	-29.955	85.939	91.010	340.783	0.486
5500.000	1.054	297.297	5498.181	87.101	-31.753	87.101	92.708	339.970	0.410
5600.000	0.612	285.952	5598.170	87.669	-33.084	87.669	93.704	339.325	0.469
5700.000	0.794	301.725	5698.163	88.180	-34.187	88.180	94.576	338.809	0.264
5800.000	1.199	305.545	5798.147	89.153	-35.628	89.153	96.008	338.217	0.409
5900.000	0.762	294.727	5898.132	90.039	-37.083	90.039	97.377	337.616	0.472
6000.000	1.217	309.913	5998.117	90.999	-38.502	90.999	98.809	337.067	0.521
6100.000	1.151	308.730	6098.096	92.309	-40.100	92.309	100.643	336.519	0.070
6200.000	1.161	306.247	6198.076	93.537	-41.701	93.537	102.412	335.971	0.051
6300.000	1.458	307.467	6298.049	94.910	-43.528	94.910	104.416	335.362	0.298
6400.000	1.180	306.266	6398.023	96.293	-45.368	96.293	106.445	334.773	0.280
6500.000	1.084	294.258	6498.004	97.290	-47.060	97.290	108.074	334.187	0.255
6600.000	1.132	262.539	6597.986	97.550	-48.901	97.550	109.121	333.376	0.607
6700.000	0.729	261.099	6697.972	97.324	-50.509	97.324	109.650	332.572	0.403
6800.000	0.959	259.381	6797.961	97.071	-51.961	97.071	110.103	331.841	0.231
6900.000	0.686	269.589	6897.951	96.912	-53.382	96.912	110.642	331.153	0.309
7000.000	0.622	270.152	6997.945	96.910	-54.523	96.910	111.194	330.637	0.064
7075.000	0.977	274.232	7072.937	96.958	-55.567	96.958	111.752	330.183	0.480
HORIZONTAL DISPLACEMENT IS 111.752 FEET AT 330.183 DEGREES									