

Company: Noble Energy

Lease/Well: Petrikin A / 34-16

API: 05-123-13478

Rig Name: Production / V.E.S.

State/County: Colorado / Weld County

Latitude: 40.437, Longitude: -104.529

GRID North is 0.630 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: hagro-de_01.ut

Minimum Curvature Method

Report Date/Time: 2/6/2013 / 12:52

Vaughn Energy Services

Henderson Colorado

303-853-4976

Norman Cowan

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	0.706	46.776	99.997	0.422	0.449	0.422	0.616	46.776	0.706
200.000	0.682	44.233	199.990	1.270	1.313	1.270	1.826	45.948	0.039
300.000	0.418	51.969	299.985	1.921	2.015	1.921	2.784	46.369	0.274
400.000	0.374	12.177	399.983	2.465	2.372	2.465	3.421	43.894	0.273
500.000	0.476	2.378	499.980	3.199	2.458	3.199	4.034	37.536	0.125
600.000	0.476	1.403	599.977	4.029	2.485	4.029	4.733	31.669	0.008
700.000	0.732	0.808	699.971	5.082	2.504	5.082	5.666	26.231	0.256
800.000	0.709	25.027	799.964	6.282	2.775	6.282	6.868	23.833	0.303
900.000	0.766	14.500	899.955	7.490	3.204	7.490	8.147	23.162	0.147
1000.000	0.978	19.642	999.944	8.940	3.658	8.940	9.660	22.254	0.226
1100.000	0.951	10.920	1099.930	10.559	4.102	10.559	11.328	21.232	0.149
1200.000	0.800	355.628	1199.918	12.071	4.206	12.071	12.782	19.213	0.277
1300.000	0.806	359.846	1299.908	13.470	4.151	13.470	14.095	17.129	0.059
1400.000	0.785	2.500	1399.899	14.858	4.179	14.858	15.435	15.710	0.042
1500.000	0.773	10.024	1499.890	16.207	4.327	16.207	16.775	14.947	0.103
1600.000	0.526	10.908	1599.883	17.322	4.531	17.322	17.905	14.658	0.247
1700.000	0.548	15.515	1699.879	18.234	4.746	18.234	18.841	14.589	0.048
1800.000	0.566	25.991	1799.874	19.139	5.090	19.139	19.804	14.894	0.103
1900.000	0.911	32.322	1899.865	20.255	5.732	20.255	21.051	15.801	0.354
2000.000	0.852	11.507	1999.854	21.655	6.305	21.655	22.555	16.234	0.324
2100.000	0.998	6.886	2099.841	23.249	6.558	23.249	24.156	15.753	0.164
2200.000	1.284	15.150	2199.821	25.195	6.955	25.195	26.137	15.433	0.330
2300.000	1.044	0.151	2299.800	27.188	7.251	27.188	28.138	14.933	0.386
2400.000	1.314	352.312	2399.779	29.235	7.100	29.235	30.084	13.650	0.314
2500.000	1.285	10.305	2499.754	31.474	7.147	31.474	32.275	12.794	0.407
2600.000	1.344	7.785	2599.728	33.738	7.506	33.738	34.563	12.543	0.083
2700.000	1.518	15.409	2699.697	36.178	8.017	36.178	37.055	12.495	0.258
2800.000	1.200	359.199	2799.669	38.502	8.355	38.502	39.398	12.243	0.496
2900.000	1.398	354.409	2899.643	40.763	8.221	40.763	41.584	11.402	0.225
3000.000	1.764	5.740	2999.605	43.508	8.256	43.508	44.285	10.745	0.480
3100.000	1.602	350.040	3099.562	46.416	8.168	46.416	47.129	9.981	0.487
3200.000	1.644	333.954	3199.523	49.081	7.297	49.081	49.621	8.456	0.456
3300.000	1.299	355.393	3299.490	51.501	6.576	51.501	51.919	7.276	0.644
3400.000	1.131	353.116	3399.468	53.611	6.366	53.611	53.987	6.772	0.175

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	0.937	333.399	3499.452	55.321	5.882	55.321	55.633	6.069	0.402
3600.000	0.638	3.637	3599.443	56.608	5.551	56.608	56.879	5.601	0.502
3700.000	0.257	20.458	3699.439	57.374	5.665	57.374	57.653	5.639	0.399
3800.000	0.367	337.368	3799.438	57.880	5.620	57.880	58.152	5.546	0.251
3900.000	0.228	275.662	3899.437	58.196	5.299	58.196	58.436	5.203	0.328
4000.000	0.045	172.455	3999.437	58.176	5.106	58.176	58.400	5.016	0.243
4100.000	0.228	301.494	4099.436	58.241	4.941	58.241	58.450	4.850	0.259
4200.000	0.384	289.792	4199.435	58.458	4.457	58.458	58.628	4.360	0.167
4300.000	0.612	284.035	4299.431	58.701	3.623	58.701	58.813	3.532	0.234
4400.000	0.815	253.386	4399.424	58.627	2.424	58.627	58.677	2.367	0.425
4500.000	0.549	247.366	4499.417	58.239	1.300	58.239	58.254	1.278	0.275
4600.000	0.825	219.242	4599.410	57.497	0.402	57.497	57.499	0.400	0.428
4700.000	0.435	192.634	4699.403	56.570	-0.137	56.570	56.570	359.861	0.478
4800.000	0.341	189.006	4799.401	55.905	-0.266	55.905	55.906	359.727	0.097
4900.000	0.613	174.666	4899.398	55.078	-0.263	55.078	55.079	359.726	0.295
5000.000	0.671	160.572	4999.391	53.993	-0.019	53.993	53.993	359.980	0.168
5100.000	0.568	169.657	5099.386	52.953	0.265	52.953	52.954	0.287	0.142
5200.000	0.540	140.443	5199.381	52.103	0.654	52.103	52.107	0.719	0.281
5300.000	0.861	131.656	5299.374	51.240	1.516	51.240	51.262	1.694	0.338
5400.000	0.731	126.661	5399.364	50.359	2.589	50.359	50.426	2.943	0.148
5500.000	1.082	127.706	5499.351	49.401	3.847	49.401	49.551	4.453	0.351
5600.000	0.949	126.365	5599.335	48.333	5.260	48.333	48.619	6.211	0.135
5700.000	1.259	113.768	5699.317	47.400	6.932	47.400	47.904	8.321	0.393
5800.000	0.755	129.258	5799.301	46.540	8.448	46.540	47.301	10.289	0.569
5900.000	1.214	127.121	5899.286	45.484	9.803	45.484	46.528	12.163	0.461
6000.000	1.448	114.979	5999.259	44.311	11.793	44.311	45.853	14.903	0.365
6100.000	1.602	119.832	6099.224	43.082	14.151	43.082	45.346	18.183	0.201
6200.000	1.676	124.862	6199.183	41.550	16.564	41.550	44.730	21.734	0.162
6300.000	2.360	115.808	6299.121	39.818	19.618	39.818	44.388	26.229	0.752
6400.000	2.440	111.621	6399.033	38.137	23.450	38.137	44.770	31.587	0.192
6500.000	2.856	103.612	6498.927	36.766	27.850	36.766	46.124	37.144	0.556
6600.000	2.279	95.713	6598.826	35.982	32.250	35.982	48.320	41.869	0.676
6700.000	2.902	104.410	6698.724	35.154	36.680	35.154	50.806	46.217	0.735
6800.000	2.593	119.046	6798.610	33.426	41.109	33.426	52.983	50.885	0.764
HORIZONTAL DISPLACEMENT IS 52.983 FEET AT 50.885 DEGREES									