

Company: Anadarko Petroleum Corp.
 Well: Helen Russel Perrin Gas Unit 1
 API: 05-123-08352
 Rig Name: Production/Warrior
 Location: Weld County, Colorado
 Latitude: 40.104, Longitude: -104.918
 Directions are relative to True North
 VS-Azi: 0.000 Degrees



FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : RKB = Ground Level

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: hgyro-de_01.ut
 Minimum Curvature Method
 Report Date/Time: 4/8/2014 / 13:11

Vaughn Energy Services
 Henderson, CO.
 Justin Williams
 303-853-4976

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	0.625	199.797	99.998	-0.513	-0.185	-0.513	0.546	199.797	0.625
200.000	0.501	141.180	199.994	-1.368	-0.096	-1.368	1.371	183.994	0.562
300.000	0.680	50.139	299.990	-1.328	0.634	-1.328	1.472	154.472	0.852
400.000	0.499	52.052	399.985	-0.680	1.433	-0.680	1.586	115.380	0.182
500.000	0.322	85.852	499.983	-0.392	2.057	-0.392	2.094	100.783	0.292
600.000	0.294	98.521	599.981	-0.409	2.592	-0.409	2.624	98.979	0.074
700.000	0.190	43.169	699.980	-0.327	2.959	-0.327	2.977	96.300	0.243
800.000	0.981	85.994	799.975	-0.146	3.927	-0.146	3.929	92.129	0.852
900.000	0.432	154.995	899.968	-0.428	4.940	-0.428	4.959	94.947	0.920
1000.000	0.289	99.301	999.966	-0.810	5.349	-0.810	5.410	98.610	0.360
1100.000	0.134	317.263	1099.966	-0.765	5.518	-0.765	5.571	97.888	0.404
1200.000	0.060	347.677	1199.966	-0.627	5.428	-0.627	5.464	96.592	0.088
1300.000	0.300	111.048	1299.965	-0.670	5.661	-0.670	5.700	96.750	0.337
1400.000	0.697	166.169	1399.962	-1.355	6.051	-1.355	6.201	102.621	0.580
1500.000	0.501	242.280	1499.958	-2.149	5.809	-2.149	6.194	110.302	0.755
1600.000	0.349	287.306	1599.955	-2.262	5.131	-2.262	5.608	113.789	0.355
1700.000	0.068	340.244	1699.954	-2.115	4.820	-2.115	5.264	113.693	0.313
1800.000	0.624	277.339	1799.952	-1.990	4.260	-1.990	4.702	115.036	0.596
1900.000	0.614	236.657	1899.947	-2.215	3.273	-2.215	3.952	124.086	0.430
2000.000	0.300	235.202	1999.944	-2.658	2.610	-2.658	3.726	135.519	0.314
2100.000	0.392	297.171	2099.942	-2.651	2.092	-2.651	3.377	141.729	0.365
2200.000	0.425	241.763	2199.940	-2.671	1.461	-2.671	3.044	151.328	0.381
2300.000	0.227	72.041	2299.939	-2.785	1.322	-2.785	3.083	154.613	0.650
2400.000	0.484	280.635	2399.938	-2.646	1.095	-2.646	2.864	157.528	0.692
2500.000	0.200	190.259	2499.937	-2.740	0.648	-2.740	2.816	166.692	0.525
2600.000	0.920	220.093	2599.932	-3.526	0.100	-3.526	3.527	178.379	0.754
2700.000	0.743	224.591	2699.921	-4.602	-0.872	-4.602	4.684	190.735	0.189
2800.000	0.917	223.083	2799.910	-5.648	-1.874	-5.648	5.951	198.358	0.176
2900.000	0.800	243.757	2899.899	-6.541	-3.047	-6.541	7.216	204.977	0.329
3000.000	0.690	236.623	2999.891	-7.181	-4.176	-7.181	8.307	210.178	0.144
3100.000	0.772	221.291	3099.883	-8.018	-5.123	-8.018	9.515	212.575	0.211
3200.000	0.743	235.167	3199.874	-8.895	-6.100	-8.895	10.786	214.441	0.185
3300.000	1.000	280.415	3299.864	-9.108	-7.490	-9.108	11.792	219.435	0.711
3400.000	0.832	286.928	3399.851	-8.738	-9.043	-8.738	12.575	225.982	0.197

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	0.923	247.284	3499.840	-8.838	-10.480	-8.838	13.709	229.860	0.601
3600.000	1.145	287.909	3599.825	-8.842	-12.174	-8.842	15.046	234.011	0.748
3700.000	1.164	251.253	3699.806	-8.861	-14.087	-8.861	16.642	237.831	0.726
3800.000	1.489	250.105	3799.779	-9.629	-16.271	-9.629	18.907	239.382	0.326
3900.000	1.356	250.484	3899.748	-10.467	-18.608	-10.467	21.349	240.643	0.134
4000.000	1.374	250.683	3999.720	-11.258	-20.854	-11.258	23.699	241.637	0.019
4100.000	1.029	274.428	4099.698	-11.586	-22.881	-11.586	25.647	243.144	0.599
4200.000	0.573	280.805	4199.688	-11.423	-24.267	-11.423	26.821	244.793	0.464
4300.000	0.578	287.270	4299.683	-11.179	-25.240	-11.179	27.605	246.110	0.065
4400.000	0.455	300.910	4399.679	-10.826	-26.062	-10.826	28.221	247.443	0.174
4500.000	1.190	337.399	4499.669	-9.663	-26.802	-9.663	28.490	250.175	0.868
4600.000	1.266	305.567	4599.647	-8.061	-28.099	-8.061	29.233	253.993	0.677
4700.000	0.841	335.156	4699.631	-6.753	-29.306	-6.753	30.074	257.024	0.677
4800.000	1.247	299.906	4799.615	-5.544	-30.558	-5.544	31.057	259.716	0.741
4900.000	1.251	330.611	4899.592	-4.051	-32.037	-4.051	32.292	262.793	0.661
5000.000	0.878	299.377	4999.576	-2.724	-33.240	-2.724	33.351	265.315	0.676
5100.000	1.202	330.768	5099.560	-1.433	-34.420	-1.433	34.450	267.616	0.643
5200.000	1.213	341.647	5199.538	0.487	-35.266	0.487	35.269	270.791	0.229
5300.000	1.224	347.731	5299.515	2.536	-35.826	2.536	35.916	274.049	0.130
5400.000	1.181	337.227	5399.493	4.530	-36.452	4.530	36.732	277.084	0.224
5500.000	1.151	325.351	5499.473	6.306	-37.422	6.306	37.949	279.565	0.243
5600.000	0.280	319.695	5599.464	7.318	-38.151	7.318	38.846	280.859	0.872
5700.000	0.639	299.810	5699.460	7.782	-38.792	7.782	39.565	281.343	0.387
5800.000	0.498	300.137	5799.456	8.277	-39.652	8.277	40.506	281.791	0.141
5900.000	1.342	319.349	5899.442	9.384	-40.790	9.384	41.856	282.956	0.887
6000.000	1.179	330.227	5999.418	11.165	-42.064	11.165	43.521	284.866	0.289
6100.000	0.491	290.982	6099.407	12.212	-42.975	12.212	44.676	285.863	0.857
6200.000	0.327	311.017	6199.405	12.553	-43.591	12.553	45.362	286.065	0.215
6300.000	0.434	47.736	6299.403	12.995	-43.526	12.995	45.425	286.623	0.573
6400.000	0.850	342.718	6399.398	13.958	-43.466	13.958	45.652	287.802	0.774
6500.000	1.134	10.202	6499.383	15.640	-43.511	15.640	46.237	289.771	0.546
6600.000	0.998	58.438	6599.368	17.070	-42.594	17.070	45.887	291.839	0.880
6700.000	1.856	56.231	6699.336	18.426	-40.505	18.426	44.500	294.461	0.859
6800.000	1.585	59.767	6799.291	20.023	-37.965	20.023	42.921	297.807	0.291
6900.000	2.686	55.686	6899.220	22.040	-34.834	22.040	41.221	302.322	1.111
7000.000	2.327	44.753	6999.125	24.803	-31.469	24.803	40.069	308.244	0.596
7100.000	2.692	32.771	7099.029	28.219	-28.768	28.219	40.298	314.448	0.637
7200.000	1.929	28.548	7198.947	31.672	-26.693	31.672	41.420	319.876	0.781
7300.000	2.031	34.276	7298.888	34.615	-24.891	34.615	42.635	324.281	0.222
7400.000	2.697	28.455	7398.802	38.148	-22.772	38.148	44.427	329.165	0.707
7500.000	2.890	19.840	7498.684	42.588	-20.795	42.588	47.394	333.974	0.462
7590.000	3.189	29.655	7588.558	46.898	-18.786	46.898	50.521	338.170	0.666
HORIZONTAL DISPLACEMENT IS 50.521 FEET AT 338.170 DEGREES									