



Company: Anadarko Petroleum Corp.
 Well/API: HSR Loma Alta 1-21/05-001-09332
 Tool Type: North Seeking Rate Gyro
 Rig Name: Production/Summit
 County/State: Adams/Colorado
 VS-Azi: 0.000 Degrees
 Latitude: 39.95422, Longitude: -104.66423
 All Azimuths referenced to True North
 No Grid Convergence Applied



Depth Reference : RKB= GL Elevation= 5229 Feet

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01-de_01.ut

Minimum Curvature Method

Report Date/Time: 3/24/2017 / 09:57

Lat/Long Obtained by Handheld GPS at Wellhead

Handheld GPS Reference: NAD83/ Device Error: ± 9 Feet

VES Survey International- Henderson Co

Surveyor: Geof Davis / HSR-Loma Alta 1-21

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	0.535	1.320	99.999	0.467	0.011	0.467	0.467	1.320	0.535
200.000	0.543	6.198	199.994	1.404	0.073	1.404	1.406	2.962	0.047
300.000	0.465	332.713	299.990	2.236	-0.062	2.236	2.237	358.408	0.300
400.000	0.203	202.397	399.989	2.432	-0.316	2.432	2.453	352.609	0.616
500.000	0.369	298.118	499.989	2.420	-0.667	2.420	2.511	344.596	0.438
600.000	0.163	178.420	599.988	2.430	-0.947	2.430	2.608	338.714	0.471
700.000	0.469	321.327	699.987	2.608	-1.199	2.608	2.870	335.316	0.607
800.000	0.431	341.646	799.984	3.285	-1.573	3.285	3.642	334.413	0.163
900.000	0.327	7.505	899.982	3.925	-1.654	3.925	4.259	337.146	0.198
1000.000	0.318	37.768	999.980	4.426	-1.447	4.426	4.657	341.898	0.168
1100.000	0.544	27.120	1099.977	5.068	-1.061	5.068	5.178	348.179	0.239
1200.000	0.760	6.750	1199.971	6.150	-0.766	6.150	6.197	352.896	0.314
1300.000	0.268	315.219	1299.967	6.974	-0.853	6.974	7.026	353.027	0.630
1400.000	0.533	285.779	1399.965	7.267	-1.465	7.267	7.413	348.601	0.327
1500.000	0.405	270.698	1499.961	7.397	-2.266	7.397	7.737	342.967	0.176
1600.000	0.301	275.962	1599.959	7.429	-2.882	7.429	7.968	338.800	0.109

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
1700.000	0.280	230.440	1699.958	7.301	-3.331	7.301	8.025	335.475	0.226
1800.000	0.357	188.441	1799.957	6.838	-3.565	6.838	7.711	332.465	0.239
1900.000	0.360	96.404	1899.956	6.495	-3.298	6.495	7.284	333.077	0.516
2000.000	0.490	132.733	1999.953	6.170	-2.672	6.170	6.723	336.584	0.292
2100.000	0.338	152.196	2099.950	5.619	-2.220	5.619	6.041	338.438	0.205
2200.000	0.165	236.987	2199.950	5.279	-2.204	5.279	5.721	337.343	0.362
2300.000	0.454	117.464	2299.949	5.018	-1.973	5.018	5.392	338.535	0.554
2400.000	0.261	40.930	2399.947	5.007	-1.473	5.007	5.219	343.612	0.468
2500.000	0.279	156.313	2499.947	4.956	-1.226	4.956	5.105	346.108	0.456
2600.000	0.267	97.777	2599.946	4.702	-0.897	4.702	4.786	349.197	0.267
2700.000	0.161	23.721	2699.945	4.799	-0.610	4.799	4.837	352.761	0.271
2800.000	0.290	7.766	2799.944	5.178	-0.519	5.178	5.204	354.279	0.142
2900.000	1.004	49.452	2899.938	5.998	0.181	5.998	6.001	1.730	0.811
3000.000	0.835	60.462	2999.925	6.927	1.481	6.927	7.084	12.065	0.244
3100.000	1.111	71.105	3099.910	7.600	3.032	7.600	8.183	21.747	0.329
3200.000	1.174	86.974	3199.891	7.968	4.972	7.968	9.392	31.962	0.321
3300.000	1.054	82.956	3299.872	8.135	6.907	8.135	10.672	40.333	0.143
3400.000	1.030	54.364	3399.856	8.772	8.550	8.772	12.249	44.268	0.515
3500.000	0.872	67.725	3499.842	9.584	9.985	9.584	13.840	46.175	0.271
3600.000	1.176	64.545	3599.826	10.314	11.616	10.314	15.534	48.400	0.309
3700.000	1.021	80.602	3699.808	10.900	13.422	10.900	17.291	50.920	0.343
3800.000	1.012	122.368	3799.794	10.573	15.046	10.573	18.390	54.904	0.724
3900.000	0.844	93.670	3899.781	10.053	16.526	10.053	19.344	58.687	0.488
4000.000	0.348	0.151	3999.777	10.310	17.262	10.310	20.106	59.152	0.932
4100.000	0.912	356.281	4099.770	11.407	17.211	11.407	20.648	56.464	0.566
4200.000	1.235	335.356	4199.753	13.181	16.710	13.181	21.283	51.733	0.502
4300.000	1.456	307.683	4299.727	14.937	15.255	14.937	21.350	45.604	0.678
4400.000	2.089	287.415	4399.679	16.259	12.511	16.259	20.516	37.577	0.881
4500.000	2.265	269.124	4499.608	16.774	8.797	16.774	18.941	27.673	0.713
4600.000	2.000	270.372	4599.539	16.756	5.077	16.756	17.508	16.856	0.269
4700.000	2.134	275.340	4699.474	16.940	1.479	16.940	17.005	4.988	0.224
4800.000	2.279	278.328	4799.400	17.401	-2.342	17.401	17.558	352.333	0.186
4900.000	2.973	285.040	4899.294	18.362	-6.815	18.362	19.586	339.639	0.758
5000.000	3.247	284.547	4999.147	19.747	-12.060	19.747	23.138	328.585	0.275
5100.000	3.180	291.999	5098.990	21.497	-17.373	21.497	27.640	321.056	0.423
5200.000	2.484	279.332	5198.868	22.888	-22.084	22.888	31.805	316.024	0.932
5300.000	1.800	269.208	5298.798	23.217	-25.793	23.217	34.703	311.992	0.779
5400.000	2.114	290.268	5398.741	23.835	-29.093	23.835	37.610	309.326	0.779
5500.000	1.543	311.326	5498.691	25.362	-31.834	25.362	40.702	308.544	0.873

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
5600.000	1.234	317.706	5598.661	27.047	-33.570	27.047	43.110	308.859	0.345
5700.000	1.176	330.028	5698.639	28.733	-34.807	28.733	45.134	309.540	0.265
5800.000	1.227	339.514	5798.618	30.625	-35.694	30.625	47.031	310.629	0.205
5900.000	1.224	1.155	5898.595	32.695	-36.047	32.695	48.666	312.208	0.460
6000.000	1.329	24.462	5998.571	34.818	-35.546	34.818	49.757	314.408	0.526
6100.000	1.042	65.204	6098.551	36.255	-34.240	36.255	49.868	316.637	0.868
6200.000	0.782	125.853	6198.541	36.236	-32.861	36.236	48.917	317.797	0.948
6300.000	1.181	160.259	6298.527	34.866	-31.959	34.866	47.297	317.491	0.695
6400.000	1.173	162.894	6398.505	32.918	-31.310	32.918	45.430	316.434	0.055
6500.000	0.741	151.736	6498.491	31.370	-30.703	31.370	43.894	315.616	0.469
6600.000	1.197	162.600	6598.477	29.803	-30.084	29.803	42.347	314.731	0.490
6700.000	0.843	112.091	6698.463	28.530	-29.090	28.530	40.745	314.443	0.928
6800.000	0.897	140.466	6798.452	27.649	-27.910	27.649	39.287	314.731	0.430
6900.000	0.820	117.684	6898.441	26.713	-26.778	26.713	37.824	314.930	0.347
7000.000	0.819	130.225	6998.431	25.919	-25.599	25.919	36.430	315.356	0.179
7100.000	0.599	77.784	7098.424	25.568	-24.542	25.568	35.441	316.173	0.657
7200.000	0.411	340.352	7198.421	26.017	-24.152	26.017	35.499	317.129	0.769
7300.000	0.656	53.890	7298.418	26.692	-23.810	26.692	35.768	318.266	0.668
7400.000	0.558	66.919	7398.412	27.220	-22.899	27.220	35.571	319.928	0.169
7500.000	0.331	72.937	7498.409	27.496	-22.176	27.496	35.324	321.114	0.232
7600.000	0.528	96.567	7598.406	27.528	-21.442	27.528	34.893	322.085	0.261
7700.000	0.415	51.580	7698.403	27.700	-20.700	27.700	34.580	323.229	0.376
7800.000	0.656	97.354	7798.399	27.852	-19.849	27.852	34.201	324.524	0.472
7900.000	0.522	71.276	7898.394	27.925	-18.849	27.925	33.691	325.981	0.296