

Company: Anadarko Petroleum Corp.  
 Well/API: HSR-Starck 5-18/05-123-20506  
 Tool Type: North Seeking Rate Gyro  
 Rig Name: Production/CoreTech  
 County/State: Weld/Colorado  
 Latitude: 40.315, Longitude: -104.940  
 Directions are relative to True North  
 VS-Azi: 0.000 Degrees



**FIELD COPY ONLY (NOT DEFINITIVE)**

Depth Reference : RKB=GL Elevation= 4815 Feet

**DRILLOG MS GYRO SURVEY CALCULATIONS**

Filename: msgyro\_run01-01-de\_01.ut

Minimum Curvature Method

Report Date/Time: 1/28/2015 / 15:05

Lat/Long Obtained By Handheld GPS At Wellhead

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

VES Survey International - Henderson CO

Mark Simmons

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	0.575	343.048	99.998	0.480	-0.146	0.480	0.502	343.048	0.575
200.000	1.082	16.827	199.988	1.864	-0.019	1.864	1.864	359.405	0.683
300.000	1.988	27.383	299.951	4.308	1.052	4.308	4.435	13.719	0.945
400.000	2.938	31.806	399.858	8.026	3.200	8.026	8.640	21.738	0.968
500.000	4.138	31.857	499.665	13.268	6.455	13.268	14.755	25.943	1.201
600.000	5.086	32.139	599.341	20.086	10.717	20.086	22.767	28.083	0.948
700.000	5.760	36.243	698.893	27.887	16.042	27.887	32.172	29.910	0.778
800.000	5.155	40.787	798.440	35.336	21.944	35.336	41.595	31.840	0.744
900.000	4.909	36.847	898.054	42.161	27.444	42.161	50.306	33.061	0.424
1000.000	4.406	35.967	997.724	48.693	32.265	48.693	58.413	33.530	0.508
1100.000	3.663	27.232	1097.476	54.642	35.983	54.642	65.426	33.366	0.962
1200.000	2.855	22.377	1197.314	59.786	38.393	59.786	71.052	32.708	0.854
1300.000	2.452	15.232	1297.207	64.152	39.903	64.152	75.550	31.882	0.520
1400.000	2.310	17.628	1397.121	68.137	41.075	68.137	79.560	31.083	0.174
1500.000	1.838	17.546	1497.055	71.586	42.169	71.586	83.083	30.501	0.472
1600.000	1.669	11.381	1597.008	74.543	42.940	74.543	86.026	29.944	0.253
1700.000	1.479	356.766	1696.971	77.258	43.154	77.258	88.494	29.186	0.442
1800.000	1.199	330.916	1796.944	79.461	42.573	79.461	90.147	28.181	0.658
1900.000	0.909	312.359	1896.927	80.910	41.478	80.910	90.922	27.142	0.444
2000.000	0.873	301.427	1996.915	81.842	40.242	81.842	91.200	26.183	0.174
2100.000	1.049	275.698	2096.902	82.330	38.681	82.330	90.964	25.165	0.461
2200.000	1.049	282.749	2196.885	82.623	36.877	82.623	90.479	24.053	0.129
2300.000	1.113	283.468	2296.867	83.051	35.041	83.051	90.140	22.876	0.065
2400.000	1.207	282.942	2396.847	83.513	33.069	83.513	89.822	21.603	0.095
2500.000	1.338	278.701	2496.822	83.926	30.889	83.926	89.430	20.206	0.161
2600.000	1.424	279.605	2596.793	84.310	28.510	84.310	89.000	18.683	0.089
2700.000	1.493	273.714	2696.761	84.601	25.985	84.601	88.502	17.074	0.165
2800.000	1.544	274.950	2796.726	84.802	23.343	84.802	87.956	15.390	0.061
2900.000	1.722	280.592	2896.685	85.194	20.524	85.194	87.632	13.545	0.239
3000.000	1.808	286.785	2996.638	85.926	17.537	85.926	87.697	11.535	0.209
3100.000	2.099	291.794	3096.579	87.061	14.327	87.061	88.232	9.345	0.337
3200.000	1.598	305.479	3196.528	88.550	11.491	88.550	89.293	7.394	0.665
3300.000	1.658	313.003	3296.487	90.346	9.298	90.346	90.823	5.876	0.222

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
3400.000	1.408	333.299	3396.452	92.431	7.687	92.431	92.750	4.754	0.594
3500.000	1.768	322.111	3496.414	94.746	6.188	94.746	94.948	3.737	0.473
3600.000	1.917	308.587	3596.363	97.006	3.933	97.006	97.086	2.322	0.459
3700.000	1.897	306.478	3696.307	99.034	1.295	99.034	99.042	0.749	0.073
3800.000	2.209	315.992	3796.243	101.404	-1.375	101.404	101.413	359.223	0.461
3900.000	3.051	319.669	3896.137	104.819	-4.437	104.819	104.913	357.576	0.858
4000.000	3.031	322.654	3995.996	108.950	-7.763	108.950	109.226	355.924	0.160
4100.000	3.435	323.702	4095.837	113.467	-11.141	113.467	114.012	354.392	0.409
4200.000	3.542	326.072	4195.652	118.444	-14.639	118.444	119.346	352.954	0.179
4300.000	3.575	326.401	4295.459	123.604	-18.088	123.604	124.921	351.674	0.039
4400.000	3.715	325.403	4395.256	128.869	-21.653	128.869	130.675	350.462	0.154
4500.000	3.493	323.983	4495.059	134.000	-25.284	134.000	136.365	349.315	0.240
4600.000	3.410	322.336	4594.877	138.818	-28.893	138.818	141.793	348.243	0.130
4700.000	3.448	318.722	4694.698	143.432	-32.693	143.432	147.111	347.160	0.219
4800.000	3.417	318.571	4794.519	147.926	-36.649	147.926	152.398	346.085	0.032
4900.000	3.532	317.995	4894.335	152.449	-40.682	152.449	157.784	345.058	0.120
5000.000	3.661	314.175	4994.138	156.962	-45.033	156.962	163.295	343.992	0.272
5100.000	3.499	310.250	5093.943	161.159	-49.652	161.159	168.634	342.876	0.293
5200.000	3.560	310.608	5193.754	165.152	-54.338	165.152	173.861	341.788	0.064
5300.000	3.643	317.744	5293.557	169.524	-58.831	169.524	179.442	340.861	0.456
5400.000	3.835	318.818	5393.344	174.392	-63.170	174.392	185.480	340.088	0.204
5500.000	3.646	308.022	5493.132	178.868	-67.876	178.868	191.313	339.219	0.728
5600.000	2.873	315.519	5592.970	182.614	-72.137	182.614	196.346	338.445	0.881
5700.000	3.226	312.774	5692.828	186.314	-75.959	186.314	201.203	337.820	0.382
5800.000	3.487	301.988	5792.657	189.836	-80.604	189.836	206.239	336.994	0.682
5900.000	3.210	307.336	5892.487	193.145	-85.409	193.145	211.186	336.145	0.418
6000.000	2.596	307.241	5992.358	196.213	-89.438	196.213	215.636	335.495	0.614
6100.000	2.329	299.691	6092.266	198.590	-93.007	198.590	219.291	334.905	0.419
6200.000	2.663	303.417	6192.171	200.877	-96.711	200.877	222.945	334.292	0.371
6300.000	2.935	303.233	6292.052	203.559	-100.792	203.559	227.146	333.658	0.271
6400.000	3.159	303.162	6391.910	206.469	-105.240	206.469	231.743	332.992	0.224
6500.000	2.825	302.740	6491.774	209.309	-109.620	209.309	236.277	332.358	0.334
6600.000	2.793	297.679	6591.654	211.774	-113.851	211.774	240.438	331.737	0.250
6700.000	2.769	297.843	6691.536	214.034	-118.145	214.034	244.477	331.102	0.025
6800.000	2.802	290.305	6791.418	216.011	-122.573	216.011	248.365	330.428	0.368
6900.000	2.572	288.147	6891.308	217.558	-126.998	217.558	251.913	329.726	0.251
7000.000	2.437	278.734	6991.213	218.580	-131.232	218.580	254.949	329.020	0.432
7100.000	2.129	278.240	7091.133	219.169	-135.173	219.169	257.501	328.336	0.308
HORIZONTAL DISPLACEMENT IS 257.501 FEET AT 328.336 DEGREES									