

Company: Anadarko Petroleum Corp.
 Well: HSR-Margaret #8-18
 API: 05-123-18845
 Rig Name: Production / CoreTech
 State/County: Colorado/Weld
 Latitude: 40.227, Longitude: -104.925
 Directions are relative to True North
 VS-Azi: 0.000 Degrees



FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : RKB = Ground Level

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01-de_01.ut
 Minimum Curvature Method
 Report Date/Time: 1/3/2014 / 18:59

Vaughn Energy Services
 Henderson, CO
 303-853-4976
 Charles Hines

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	0.159	173.300	100.000	-0.138	0.016	-0.138	0.139	173.300	0.159
200.000	0.336	199.125	199.999	-0.553	-0.064	-0.553	0.557	186.554	0.205
300.000	0.359	238.124	299.997	-0.996	-0.426	-0.996	1.083	203.144	0.233
400.000	0.201	268.471	399.996	-1.166	-0.867	-1.166	1.453	216.643	0.211
500.000	0.251	248.597	499.995	-1.250	-1.246	-1.250	1.765	224.911	0.092
600.000	0.410	239.465	599.994	-1.512	-1.758	-1.512	2.319	229.307	0.167
700.000	0.543	239.927	699.990	-1.931	-2.476	-1.931	3.140	232.053	0.134
800.000	0.680	255.609	799.984	-2.316	-3.461	-2.316	4.164	236.211	0.215
900.000	0.630	253.359	899.978	-2.621	-4.562	-2.621	5.261	240.124	0.056
1000.000	0.718	244.942	999.971	-3.043	-5.656	-3.043	6.423	241.716	0.132
1100.000	0.532	273.540	1099.965	-3.280	-6.686	-3.280	7.447	243.871	0.357
1200.000	0.492	253.190	1199.961	-3.375	-7.561	-3.375	8.280	245.942	0.185
1300.000	0.590	216.936	1299.957	-3.911	-8.281	-3.911	9.158	244.719	0.349
1400.000	0.737	239.504	1399.951	-4.649	-9.145	-4.649	10.259	243.052	0.297
1500.000	0.547	244.301	1499.944	-5.182	-10.129	-5.182	11.378	242.904	0.197
1600.000	0.340	287.621	1599.942	-5.299	-10.842	-5.299	12.068	243.951	0.379
1700.000	0.743	344.096	1699.937	-4.586	-11.302	-4.586	12.197	247.915	0.623
1800.000	1.089	354.795	1799.925	-3.016	-11.566	-3.016	11.953	255.386	0.385
1900.000	1.320	345.362	1899.902	-0.955	-11.944	-0.955	11.982	265.429	0.304
2000.000	1.588	355.027	1999.870	1.540	-12.355	1.540	12.450	277.104	0.362
2100.000	0.965	17.753	2099.846	3.722	-12.218	3.722	12.772	286.941	0.791
2200.000	0.504	18.866	2199.837	4.939	-11.819	4.939	12.810	292.680	0.461
2300.000	0.342	305.627	2299.835	5.529	-11.920	5.529	13.140	294.885	0.521
2400.000	0.571	301.508	2399.832	5.963	-12.587	5.963	13.928	295.350	0.231
2500.000	0.513	305.510	2499.827	6.483	-13.375	6.483	14.864	295.860	0.069
2600.000	0.452	263.090	2599.824	6.696	-14.131	6.696	15.637	295.353	0.354
2700.000	0.693	278.167	2699.819	6.734	-15.121	6.734	16.553	294.005	0.283
2800.000	0.865	262.139	2799.810	6.717	-16.468	6.717	17.785	292.189	0.276
2900.000	0.736	234.575	2899.801	6.241	-17.739	6.241	18.805	289.383	0.401
3000.000	0.976	228.736	2999.789	5.307	-18.903	5.307	19.634	285.683	0.254
3100.000	1.728	212.697	3099.761	3.477	-20.357	3.477	20.652	279.692	0.835
3200.000	1.953	211.362	3199.709	0.753	-22.059	0.753	22.071	271.956	0.229
3300.000	1.767	182.653	3299.659	-2.242	-23.017	-2.242	23.126	264.437	0.939
3400.000	1.838	187.623	3399.609	-5.371	-23.301	-5.371	23.912	257.019	0.171

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	1.814	188.590	3499.559	-8.526	-23.750	-8.526	25.234	250.253	0.039
3600.000	1.826	209.868	3599.509	-11.472	-24.780	-11.472	27.306	245.157	0.672
3700.000	1.740	194.745	3699.462	-14.322	-25.959	-14.322	29.648	241.114	0.477
3800.000	1.408	170.755	3799.425	-17.002	-26.148	-17.002	31.190	236.967	0.730
3900.000	1.367	187.530	3899.396	-19.397	-26.107	-19.397	32.524	233.389	0.407
4000.000	0.844	141.182	3999.379	-21.153	-25.802	-21.153	33.365	230.654	0.994
4100.000	0.515	183.148	4099.372	-22.176	-25.365	-22.176	33.692	228.837	0.576
4200.000	0.262	227.878	4199.370	-22.778	-25.559	-22.778	34.236	228.293	0.377
4300.000	0.449	220.174	4299.368	-23.230	-25.981	-23.230	34.852	228.199	0.193
4400.000	0.999	248.944	4399.360	-23.843	-27.047	-23.843	36.056	228.602	0.643
4500.000	1.589	255.771	4499.334	-24.497	-29.204	-24.497	38.117	230.009	0.609
4600.000	1.758	256.455	4599.291	-25.197	-32.039	-25.197	40.760	231.817	0.171
4700.000	1.669	261.490	4699.247	-25.771	-34.970	-25.771	43.441	233.612	0.175
4800.000	1.267	260.677	4799.214	-26.166	-37.502	-26.166	45.728	235.095	0.403
4900.000	0.791	256.791	4899.197	-26.503	-39.264	-26.503	47.372	235.981	0.481
5000.000	0.680	250.476	4999.189	-26.859	-40.495	-26.859	48.593	236.445	0.137
5100.000	0.649	262.579	5099.182	-27.130	-41.616	-27.130	49.678	236.899	0.143
5200.000	0.884	247.336	5199.173	-27.501	-42.890	-27.501	50.949	237.332	0.310
5300.000	0.979	253.919	5299.160	-28.035	-44.422	-28.035	52.529	237.744	0.142
5400.000	0.939	230.711	5399.147	-28.790	-45.877	-28.790	54.162	237.890	0.388
5500.000	1.603	203.983	5499.122	-30.587	-47.080	-30.587	56.143	236.989	0.873
5600.000	0.945	197.426	5599.097	-32.652	-47.895	-32.652	57.967	235.716	0.672
5700.000	0.869	174.147	5699.085	-34.193	-48.065	-34.193	58.987	234.572	0.374
5800.000	0.649	211.665	5799.077	-35.430	-48.285	-35.430	59.889	233.730	0.530
5900.000	0.468	201.228	5899.072	-36.293	-48.731	-36.293	60.761	233.323	0.207
6000.000	0.982	227.575	5999.064	-37.252	-49.511	-37.252	61.960	233.042	0.599
6100.000	0.855	269.064	6099.052	-37.842	-50.890	-37.842	63.418	233.365	0.661
6200.000	0.066	315.160	6199.048	-37.814	-51.676	-37.814	64.034	233.805	0.811
6300.000	0.317	191.058	6299.047	-38.045	-51.770	-38.045	64.246	233.688	0.358
6400.000	0.465	236.158	6399.045	-38.543	-52.160	-38.543	64.855	233.538	0.330
6500.000	0.372	273.970	6499.043	-38.746	-52.821	-38.746	65.508	233.738	0.285
6600.000	0.422	267.328	6599.040	-38.741	-53.513	-38.741	66.065	234.097	0.068
6700.000	0.560	180.823	6699.038	-39.247	-53.888	-39.247	66.665	233.934	0.681
6800.000	0.791	203.175	6799.031	-40.371	-54.167	-40.371	67.556	233.303	0.346
6900.000	0.881	223.335	6899.021	-41.564	-54.966	-41.564	68.912	232.904	0.305
7000.000	0.448	177.399	6999.014	-42.513	-55.476	-42.513	69.892	232.536	0.654
7050.000	0.645	204.563	7049.012	-42.964	-55.584	-42.964	70.253	232.297	0.640

HORIZONTAL DISPLACEMENT IS
70.253 FEET AT 232.297 DEGREES