

Company: Anadarko Petroleum Corp.
 Well: Margaret Twombly Unit C #1
 API: 05-123-08307
 Rig Name: Production / Phoenix
 State/County: Colorado/Weld
 Latitude: 40.085, Longitude: -104.797
 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: 11/30/2013 / 11:19

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	0.821	349.853	99.997	0.705	-0.126	0.705	0.717	349.853	0.821
200.000	0.451	25.881	199.991	1.765	-0.081	1.765	1.766	357.377	0.528
300.000	0.335	12.483	299.988	2.404	0.154	2.404	2.409	3.667	0.147
400.000	0.413	7.655	399.986	3.047	0.265	3.047	3.058	4.977	0.083
500.000	0.508	14.539	499.983	3.833	0.425	3.833	3.856	6.321	0.110
600.000	0.625	346.129	599.978	4.792	0.405	4.792	4.809	4.833	0.300
700.000	0.476	343.130	699.974	5.719	0.154	5.719	5.721	1.541	0.152
800.000	0.560	321.288	799.970	6.497	-0.272	6.497	6.503	357.602	0.213
900.000	0.507	338.271	899.965	7.289	-0.741	7.289	7.327	354.193	0.166
1000.000	0.504	336.860	999.961	8.105	-1.078	8.105	8.176	352.424	0.013
1100.000	0.658	349.316	1099.956	9.074	-1.357	9.074	9.175	351.492	0.198
1200.000	0.540	316.894	1199.951	9.983	-1.786	9.983	10.141	349.857	0.353
1300.000	0.687	335.549	1299.945	10.873	-2.356	10.873	11.125	347.773	0.246
1400.000	0.437	327.127	1399.940	11.739	-2.811	11.739	12.071	346.532	0.263
1500.000	0.617	351.647	1499.936	12.592	-3.097	12.592	12.967	346.184	0.284
1600.000	0.622	4.234	1599.931	13.665	-3.135	13.665	14.020	347.081	0.136
1700.000	0.339	314.751	1699.927	14.415	-3.304	14.415	14.789	347.089	0.477
1800.000	0.268	284.929	1799.926	14.683	-3.740	14.683	15.152	345.709	0.170
1900.000	0.354	8.465	1899.925	15.048	-3.921	15.048	15.551	345.397	0.419
2000.000	0.123	204.336	1999.924	15.256	-3.919	15.256	15.751	345.592	0.473
2100.000	0.335	309.352	2099.924	15.344	-4.189	15.344	15.905	344.728	0.386
2200.000	0.350	262.252	2199.922	15.488	-4.718	15.488	16.191	343.058	0.274
2300.000	0.466	253.497	2299.920	15.331	-5.410	15.331	16.258	340.563	0.132
2400.000	0.597	254.775	2399.915	15.079	-6.302	15.079	16.343	337.317	0.131
2500.000	0.788	255.920	2499.908	14.775	-7.471	14.775	16.557	333.176	0.192
2600.000	0.984	277.604	2599.896	14.722	-8.989	14.722	17.249	328.592	0.385
2700.000	0.968	265.904	2699.882	14.775	-10.683	14.775	18.232	324.132	0.200
2800.000	0.983	273.360	2799.867	14.765	-12.381	14.765	19.269	320.019	0.128
2900.000	1.112	272.736	2899.851	14.861	-14.206	14.861	20.559	316.292	0.130
3000.000	1.049	275.751	2999.833	15.000	-16.086	15.000	21.994	312.998	0.085
3100.000	1.102	275.175	3099.815	15.178	-17.955	15.178	23.511	310.209	0.054
3200.000	0.944	292.629	3199.800	15.582	-19.673	15.582	25.096	308.381	0.347
3300.000	0.695	281.440	3299.789	16.019	-21.028	16.019	26.434	307.300	0.295
3400.000	0.661	282.864	3399.782	16.268	-22.184	16.268	27.509	306.253	0.038

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	0.875	308.995	3499.774	16.876	-23.339	16.876	28.802	305.870	0.405
3600.000	0.520	299.380	3599.766	17.579	-24.328	17.579	30.015	305.852	0.373
3700.000	0.859	339.270	3699.759	18.503	-24.988	18.503	31.093	306.518	0.568
3800.000	0.680	17.193	3799.751	19.771	-25.078	19.771	31.935	308.251	0.528
3900.000	0.751	6.760	3899.743	20.989	-24.826	20.989	32.509	310.213	0.148
4000.000	1.347	19.712	3999.726	22.747	-24.352	22.747	33.323	313.048	0.637
4100.000	1.774	16.227	4099.689	25.339	-23.523	25.339	34.575	317.129	0.437
4200.000	1.626	11.851	4199.645	28.214	-22.799	28.214	36.274	321.058	0.197
4300.000	1.668	7.170	4299.603	31.046	-22.326	31.046	38.241	324.279	0.141
4400.000	1.502	28.347	4399.566	33.644	-21.522	33.644	39.939	327.393	0.605

HORIZONTAL DISPLACEMENT IS
39.939 FEET AT 327.393 DEGREES