

Company: Anadarko Petroleum Corp.

Lease/Well: State / 12-16

API: 05-123-29023

Rig Name: Production / Canary

State/County: Colorado / Weld County

Latitude: 40.049, Longitude: -105.011

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: 8/21/2013 / 17:00

Vaughn Energy Services

Henderson Colorado

303-853-4976

Norman Cowan

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	0.578	14.858	99.998	0.487	0.129	0.487	0.504	14.858	0.578
200.000	0.814	338.829	199.991	1.637	0.002	1.637	1.637	0.078	0.485
300.000	1.321	282.054	299.976	2.540	-1.381	2.540	2.891	331.461	1.108
400.000	2.022	277.485	399.933	3.010	-4.257	3.010	5.214	305.264	0.713
500.000	2.504	284.061	499.855	3.771	-8.125	3.771	8.958	294.896	0.547
600.000	2.969	284.645	599.741	4.956	-12.750	4.956	13.679	291.243	0.466
700.000	3.664	280.436	699.573	6.190	-18.398	6.190	19.412	288.595	0.737
800.000	4.063	278.880	799.345	7.316	-25.042	7.316	26.088	286.286	0.412
900.000	4.345	272.842	899.076	8.051	-32.326	8.051	33.313	283.985	0.524
1000.000	4.134	279.280	998.803	8.820	-39.666	8.820	40.635	282.536	0.520
1100.000	5.741	302.958	1098.439	12.122	-47.421	12.122	48.946	284.339	2.563
1200.000	7.894	310.765	1197.728	19.328	-56.820	19.328	60.017	288.786	2.340
1300.000	10.767	299.078	1296.404	28.354	-70.188	28.354	75.699	291.997	3.427
1400.000	13.835	293.953	1394.099	37.751	-89.283	37.751	96.936	292.920	3.253
1500.000	15.728	276.750	1490.832	44.201	-113.684	44.201	121.974	291.247	4.758
1600.000	16.709	275.301	1586.852	47.123	-141.458	47.123	149.101	288.424	1.061
1700.000	17.913	272.257	1682.322	49.057	-171.141	49.057	178.033	285.995	1.506
1800.000	18.185	268.998	1777.403	49.389	-202.111	49.389	208.058	283.732	1.046
1900.000	16.572	266.229	1872.837	48.179	-231.946	48.179	236.897	281.734	1.812
2000.000	16.428	263.523	1968.720	45.646	-260.228	45.646	264.201	279.949	0.782
2100.000	16.825	264.568	2064.539	42.681	-288.686	42.681	291.824	278.410	0.497
2200.000	17.020	266.224	2160.210	40.347	-317.697	40.347	320.249	277.238	0.520
2300.000	17.474	266.372	2255.713	38.433	-347.285	38.433	349.405	276.315	0.456
2400.000	16.614	262.842	2351.322	35.702	-376.455	35.702	378.144	275.418	1.345
2500.000	18.175	264.038	2446.747	32.300	-406.153	32.300	407.436	274.547	1.601
2600.000	17.405	265.351	2541.965	29.468	-436.573	29.468	437.566	273.861	0.869
2700.000	16.285	266.564	2637.673	27.415	-465.476	27.415	466.282	273.371	1.174
2800.000	15.865	263.268	2733.765	24.972	-493.046	24.972	493.678	272.900	1.004
2900.000	15.808	267.770	2829.973	22.840	-520.232	22.840	520.733	272.514	1.230
3000.000	16.169	272.760	2926.109	22.980	-547.751	22.980	548.233	272.402	1.421
3100.000	15.960	273.738	3022.204	24.547	-575.378	24.547	575.901	272.443	0.342
3200.000	15.957	277.792	3118.353	27.307	-602.716	27.307	603.335	272.594	1.114
3300.000	17.386	280.668	3214.149	31.937	-631.019	31.937	631.827	272.897	1.650
3400.000	17.896	276.623	3309.450	36.475	-660.965	36.475	661.971	273.159	1.327

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	17.778	268.894	3404.656	37.953	-691.495	37.953	692.536	273.142	2.369
3600.000	17.790	264.288	3499.883	36.137	-721.961	36.137	722.865	272.866	1.406
3700.000	13.742	267.039	3596.102	34.003	-749.034	34.003	749.806	272.599	4.115
3800.000	13.942	270.574	3693.199	33.510	-772.943	33.510	773.669	272.482	0.869
3900.000	15.211	270.760	3789.979	33.805	-798.108	33.805	798.824	272.425	1.270
4000.000	15.476	265.005	3886.420	32.817	-824.519	32.817	825.171	272.279	1.545
4100.000	15.777	263.553	3982.724	30.129	-851.318	30.129	851.851	272.027	0.493
4200.000	17.341	257.301	4078.582	25.326	-879.369	25.326	879.734	271.650	2.369
4300.000	16.715	259.559	4174.198	19.444	-908.050	19.444	908.258	271.227	0.910
4400.000	17.295	260.075	4269.826	14.276	-936.835	14.276	936.944	270.873	0.599
4500.000	16.624	263.633	4365.479	10.127	-965.694	10.127	965.747	270.601	1.236
4600.000	16.589	266.500	4461.310	7.670	-994.159	7.670	994.188	270.442	0.820
4700.000	17.138	270.194	4557.013	6.848	-1023.14	6.848	1023.164	270.383	1.204
4800.000	14.968	277.141	4653.116	8.504	-1050.69	8.504	1050.729	270.464	2.894
4900.000	15.174	278.675	4749.677	12.083	-1076.45	12.083	1076.514	270.643	0.449
5000.000	16.381	273.001	4845.914	14.795	-1103.47	14.795	1103.568	270.768	1.958
5100.000	14.167	272.255	4942.375	16.015	-1129.78	16.015	1129.896	270.812	2.223
5200.000	12.588	273.489	5039.659	17.160	-1152.89	17.160	1153.016	270.853	1.604
5300.000	10.704	277.200	5137.597	18.987	-1172.98	18.987	1173.135	270.927	2.027
5400.000	8.861	273.844	5236.140	20.668	-1189.88	20.668	1190.061	270.995	1.929
5500.000	6.689	272.186	5335.215	21.406	-1203.39	21.406	1203.578	271.019	2.183
5600.000	4.941	267.565	5434.697	21.446	-1213.51	21.446	1213.700	271.012	1.808
5700.000	2.900	261.182	5534.458	20.875	-1220.31	20.875	1220.492	270.980	2.084
5800.000	1.293	245.821	5634.389	20.025	-1223.84	20.025	1224.007	270.937	1.689
5900.000	0.844	241.358	5734.371	19.210	-1225.52	19.210	1225.670	270.898	0.456
6000.000	0.185	237.850	5834.366	18.770	-1226.30	18.770	1226.446	270.877	0.660
6100.000	0.627	24.537	5934.365	19.182	-1226.21	19.182	1226.362	270.896	0.789
6200.000	1.094	20.510	6034.353	20.574	-1225.65	20.574	1225.823	270.962	0.470
6300.000	0.949	36.059	6134.337	22.137	-1224.83	22.137	1225.029	271.035	0.312
6400.000	0.975	21.107	6234.323	23.601	-1224.04	23.601	1224.263	271.105	0.252
6500.000	0.346	64.294	6334.317	24.526	-1223.46	24.526	1223.702	271.148	0.761
6600.000	0.692	105.096	6434.313	24.500	-1222.60	24.500	1222.846	271.148	0.486
6700.000	0.617	111.575	6534.306	24.144	-1221.52	24.144	1221.756	271.132	0.106
6800.000	0.420	176.347	6634.303	23.581	-1220.99	23.581	1221.221	271.106	0.579
6900.000	0.451	182.622	6734.300	22.822	-1220.99	22.822	1221.201	271.071	0.057
7000.000	0.759	138.343	6834.295	21.933	-1220.57	21.933	1220.763	271.029	0.538
7100.000	0.712	189.389	6934.288	20.825	-1220.23	20.825	1220.404	270.978	0.635
7200.000	0.826	171.162	7034.279	19.500	-1220.22	19.500	1220.373	270.916	0.268
7300.000	0.912	198.178	7134.268	18.031	-1220.36	18.031	1220.488	270.847	0.415
7400.000	1.269	204.904	7234.249	16.270	-1221.07	16.270	1221.178	270.763	0.379
7500.000	1.443	211.680	7334.221	14.194	-1222.20	14.194	1222.280	270.665	0.236
7600.000	1.790	211.787	7434.181	11.795	-1223.68	11.795	1223.738	270.552	0.347
7700.000	1.838	221.306	7534.132	9.263	-1225.56	9.263	1225.598	270.433	0.305
7800.000	1.169	199.741	7634.097	7.098	-1226.97	7.098	1226.987	270.331	0.865
7900.000	0.751	160.753	7734.084	5.519	-1227.09	5.519	1227.107	270.258	0.753
8000.000	0.409	144.047	7834.079	4.611	-1226.67	4.611	1226.678	270.215	0.377

HORIZONTAL DISPLACEMENT IS
1226.678 FEET AT 270.215 DEGREES