

Company: ANADARKO PETROLEUM

Well: KERN 13-4-5Y

API: 05-123-21557

Rig Name: PRODUCTION/CANARY

State/County: COLORADO / WELD

Latitude: 40.248, Longitude: -104.790

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: 10/11/2013 / 15:51

VAUGHN ENERGY SERVICES

HENDERSON, COLORADO

303-853-4976

NICK KULA

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	0.870	88.875	99.996	0.015	0.759	0.015	0.759	88.875	0.870
200.000	0.795	116.174	199.986	-0.276	2.140	-0.276	2.158	97.352	0.400
300.000	0.165	288.374	299.983	-0.537	2.626	-0.537	2.680	101.550	0.959
400.000	0.828	65.996	399.980	-0.197	3.149	-0.197	3.155	93.582	0.957
500.000	1.039	69.659	499.967	0.412	4.659	0.412	4.677	84.949	0.219
600.000	0.333	56.889	599.959	0.886	5.752	0.886	5.820	81.248	0.718
700.000	0.911	49.962	699.953	1.556	6.604	1.556	6.785	76.746	0.582
800.000	0.130	55.200	799.948	2.132	7.306	2.132	7.611	73.734	0.781
900.000	0.311	114.903	899.947	2.082	7.645	2.082	7.924	74.765	0.270
1000.000	0.802	0.685	999.944	2.667	7.900	2.667	8.338	71.343	0.972
1100.000	0.802	10.028	1099.934	4.056	8.030	4.056	8.997	63.201	0.131
1200.000	0.102	217.355	1199.931	4.675	8.098	4.675	9.351	60.005	0.894
1300.000	0.073	224.073	1299.931	4.558	8.000	4.558	9.207	60.327	0.031
1400.000	0.458	280.275	1399.930	4.584	7.562	4.584	8.843	58.779	0.422
1500.000	0.820	338.189	1499.925	5.319	6.903	5.319	8.714	52.383	0.695
1600.000	0.033	184.542	1599.921	5.954	6.635	5.954	8.915	48.093	0.850
1700.000	0.644	294.219	1699.919	6.156	6.120	6.156	8.680	44.832	0.656
1800.000	0.283	267.550	1799.916	6.376	5.361	6.376	8.330	40.056	0.411
1900.000	0.099	95.772	1899.915	6.357	5.200	6.357	8.212	39.283	0.381
2000.000	0.621	0.217	1999.914	6.890	5.288	6.890	8.685	37.505	0.638
2100.000	1.108	46.934	2099.903	8.091	5.996	8.091	10.071	36.539	0.818
2200.000	0.415	62.460	2199.894	8.919	7.023	8.919	11.352	38.218	0.717
2300.000	0.073	352.439	2299.893	9.149	7.335	9.149	11.726	38.722	0.396
2400.000	0.398	241.070	2399.892	9.043	7.023	9.043	11.450	37.833	0.429
2500.000	1.029	218.171	2499.884	8.170	6.164	8.170	10.234	37.037	0.681
2600.000	1.039	224.269	2599.868	6.814	4.977	6.814	8.438	36.141	0.110
2700.000	1.204	228.691	2699.848	5.471	3.554	5.471	6.524	33.008	0.186
2800.000	0.837	260.366	2799.833	4.655	2.044	4.655	5.084	23.710	0.660
2900.000	0.772	268.101	2899.823	4.511	0.651	4.511	4.557	8.216	0.127

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
3000.000	0.544	304.545	2999.817	4.757	-0.412	4.757	4.775	355.045	0.465
3100.000	0.842	240.648	3099.811	4.666	-1.444	4.666	4.884	342.805	0.776
3200.000	0.980	247.956	3199.798	3.985	-2.877	3.985	4.915	324.172	0.179
3300.000	1.404	262.258	3299.777	3.499	-4.883	3.499	6.007	305.624	0.515
3400.000	0.941	272.007	3399.755	3.363	-6.918	3.363	7.692	295.926	0.502
3500.000	1.148	318.741	3499.741	4.144	-8.399	4.144	9.366	296.264	0.850
3600.000	0.641	331.269	3599.728	5.387	-9.328	5.387	10.772	300.009	0.540
3700.000	1.134	333.879	3699.716	6.766	-10.032	6.766	12.101	303.998	0.495
3800.000	1.737	359.913	3799.685	9.170	-10.470	9.170	13.918	311.213	0.873
3900.000	1.774	28.696	3899.640	12.043	-9.729	12.043	15.482	321.066	0.873
4000.000	1.025	27.474	3999.609	14.195	-8.573	14.195	16.583	328.868	0.749
4100.000	0.585	331.897	4099.601	15.439	-8.401	15.439	17.577	331.447	0.846
4200.000	2.292	286.431	4199.567	16.455	-10.560	16.455	19.552	327.309	1.928
4300.000	2.349	291.991	4299.486	17.788	-14.379	17.788	22.873	321.050	0.232
4400.000	1.448	300.999	4399.430	19.206	-17.362	19.206	25.891	317.887	0.947
4500.000	1.680	310.714	4499.393	20.813	-19.556	20.813	28.559	316.783	0.352
4600.000	1.532	306.959	4599.353	22.573	-21.735	22.573	31.336	316.083	0.182
4700.000	2.305	293.977	4699.297	24.194	-24.641	24.194	34.533	314.475	0.882
4800.000	2.692	287.572	4799.202	25.720	-28.717	25.720	38.551	311.848	0.477
4900.000	2.843	269.853	4899.087	26.423	-33.436	26.423	42.616	308.317	0.865
5000.000	2.290	272.896	4998.987	26.517	-37.911	26.517	46.265	304.971	0.570
5100.000	1.401	270.616	5098.934	26.631	-41.129	26.631	48.998	302.923	0.891
5200.000	0.421	272.766	5198.920	26.662	-42.718	26.662	50.356	301.970	0.981
5300.000	0.890	247.417	5298.913	26.382	-43.802	26.382	51.133	301.060	0.540
5400.000	0.462	331.736	5398.908	26.439	-44.710	26.439	51.942	300.598	0.961
5500.000	0.520	339.570	5498.904	27.219	-45.059	27.219	52.642	301.135	0.088
5600.000	0.426	350.487	5598.901	28.011	-45.279	28.011	53.242	301.742	0.130
5700.000	0.739	26.623	5698.896	28.953	-45.051	28.953	53.553	302.728	0.468
5800.000	1.361	24.930	5798.879	30.606	-44.262	30.606	53.813	304.663	0.623
5900.000	0.523	22.268	5898.864	32.105	-43.588	32.105	54.136	306.374	0.839
6000.000	0.346	311.184	5998.862	32.726	-43.642	32.726	54.550	306.865	0.525
6100.000	0.507	219.656	6098.860	32.585	-44.152	32.585	54.874	306.428	0.621
6200.000	0.233	342.617	6198.859	32.438	-44.494	32.438	55.064	306.094	0.663
6300.000	0.737	232.773	6298.856	32.244	-45.067	32.244	55.414	305.582	0.845
6400.000	0.574	188.377	6398.850	31.359	-45.652	31.359	55.385	304.486	0.518
6500.000	0.485	157.929	6498.846	30.472	-45.566	30.472	54.816	303.772	0.291
6600.000	0.419	30.741	6598.845	30.395	-45.220	30.395	54.486	303.907	0.810
6700.000	0.517	54.596	6698.841	30.971	-44.666	30.971	54.353	304.737	0.216
6800.000	0.616	65.499	6798.836	31.455	-43.810	31.455	53.932	305.678	0.146
6900.000	0.493	34.426	6898.832	32.032	-43.078	32.032	53.682	306.634	0.320
7000.000	0.455	60.498	6998.829	32.582	-42.490	32.582	53.544	307.482	0.217
7100.000	0.294	53.904	7098.826	32.928	-41.937	32.928	53.320	308.139	0.166
7200.000	0.501	75.538	7198.824	33.189	-41.306	33.189	52.987	308.782	0.252
HORIZONTAL DISPLACEMENT IS 52.987 FEET AT 308.782 DEGREES									