



Company: Noble Energy
Well: Palmer X20-6
API: 05-123-29612
Rig Name: Production/Lightning Wireline
State/County: Colorado/Weld
Latitude: 40.126, Longitude: -104.690
GRID North is 0.520 Degrees East of 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_ed_mrg.ut

Minimum Curvature Method

Report Date/Time: 1/9/2013 / 17:26

Vaughn Energy Services
Henderson, CO
303-853-4976
Levi Sheldon

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	0.861	201.374	99.996	-0.700	-0.274	-0.700	0.751	201.374	0.861
200.000	1.013	183.373	199.983	-2.282	-0.600	-2.282	2.359	194.726	0.329
300.000	1.474	183.713	299.959	-4.447	-0.735	-4.447	4.508	189.385	0.461
400.000	2.032	189.623	399.912	-7.479	-1.115	-7.479	7.561	188.478	0.587
500.000	1.894	198.485	499.854	-10.794	-1.935	-10.794	10.966	190.164	0.333
600.000	1.666	206.594	599.805	-13.662	-3.110	-13.662	14.011	192.824	0.339
700.000	1.397	214.643	699.770	-15.965	-4.454	-15.965	16.574	195.588	0.344
800.000	1.365	207.866	799.741	-18.021	-5.704	-18.021	18.902	197.563	0.166
900.000	0.878	214.788	899.721	-19.703	-6.697	-19.703	20.810	198.774	0.504
1000.000	1.015	264.327	999.709	-20.420	-8.016	-20.420	21.937	201.433	0.803
1100.000	0.803	274.217	1099.697	-20.456	-9.597	-20.456	22.595	205.133	0.263
1200.000	0.902	261.534	1199.686	-20.520	-11.074	-20.520	23.318	208.355	0.213
1300.000	0.793	248.528	1299.675	-20.889	-12.497	-20.889	24.342	210.890	0.221
1400.000	0.745	253.877	1399.666	-21.323	-13.765	-21.323	25.380	212.844	0.086
1500.000	0.829	242.370	1499.656	-21.839	-15.030	-21.839	26.511	214.537	0.179
1600.000	1.009	248.330	1599.644	-22.499	-16.489	-22.499	27.895	216.237	0.203
1700.000	0.946	247.193	1699.629	-23.144	-18.068	-23.144	29.362	217.978	0.066
1800.000	1.172	255.676	1799.612	-23.717	-19.820	-23.717	30.909	219.885	0.275
1900.000	1.040	264.848	1899.593	-24.052	-21.716	-24.052	32.405	222.078	0.221
2000.000	0.993	289.440	1999.578	-23.845	-23.437	-23.845	33.435	224.505	0.435
2100.000	0.860	296.331	2099.565	-23.224	-24.927	-23.224	34.069	227.025	0.173
2200.000	0.974	286.493	2199.552	-22.650	-26.414	-22.650	34.795	229.387	0.194
2300.000	1.330	332.751	2299.534	-21.377	-27.760	-21.377	35.037	232.402	0.963
2400.000	1.693	357.477	2399.500	-18.869	-28.356	-18.869	34.060	236.360	0.738
2500.000	1.723	8.995	2499.456	-15.907	-28.186	-15.907	32.365	240.561	0.344
2600.000	2.023	355.588	2599.403	-12.662	-28.087	-12.662	30.809	245.733	0.529
2700.000	1.932	355.183	2699.343	-9.222	-28.364	-9.222	29.826	251.989	0.092
2800.000	1.412	359.569	2799.300	-6.311	-28.515	-6.311	29.205	257.521	0.536
2900.000	1.006	331.330	2899.279	-4.309	-28.946	-4.309	29.265	261.534	0.709
3000.000	0.780	325.216	2999.267	-2.979	-29.755	-2.979	29.904	264.283	0.245
3100.000	1.039	338.626	3099.254	-1.576	-30.474	-1.576	30.515	267.040	0.334
3200.000	1.042	333.341	3199.238	0.081	-31.212	0.081	31.212	270.149	0.096
3300.000	1.060	315.334	3299.221	1.552	-32.271	1.552	32.308	272.753	0.329
3400.000	1.089	323.359	3399.203	2.972	-33.488	2.972	33.620	275.072	0.153

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	1.278	337.964	3499.182	4.768	-34.474	4.768	34.802	277.875	0.354
3600.000	1.479	343.227	3599.153	7.037	-35.264	7.037	35.960	281.286	0.238
3700.000	1.670	347.682	3699.116	9.697	-35.948	9.697	37.233	285.096	0.226
3800.000	2.039	357.458	3799.063	12.898	-36.337	12.898	38.559	289.542	0.485
3900.000	2.278	354.244	3898.992	16.652	-36.616	16.652	40.224	294.455	0.267
4000.000	2.376	355.241	3998.910	20.695	-36.987	20.695	42.383	299.228	0.107
4100.000	2.434	367.1	4098.822	24.881	-37.023	24.881	44.607	303.902	0.358
4200.000	2.703	357.789	4198.722	29.356	-36.978	29.356	47.214	308.445	0.376
4300.000	2.511	346.008	4298.619	33.838	-37.599	33.838	50.583	311.986	0.568
4400.000	2.210	326.483	4398.535	37.571	-39.193	37.571	54.293	313.790	0.854
4500.000	2.601	327.234	4498.447	41.087	-41.486	41.087	58.388	314.723	0.392
4600.000	2.926	321.545	4598.331	44.994	-44.301	44.994	63.143	315.444	0.425
4700.000	3.079	313.322	4698.194	48.835	-47.842	48.835	68.365	315.588	0.457
4800.000	3.171	313.706	4798.045	52.588	-51.795	52.588	73.813	315.435	0.094
4900.000	3.308	309.234	4897.886	56.324	-56.030	56.324	79.446	315.150	0.288
5000.000	3.697	308.819	4997.699	60.170	-60.776	60.170	85.523	314.713	0.389
5100.000	3.724	309.540	5097.489	64.258	-65.792	64.258	91.966	314.324	0.054
5200.000	3.727	313.810	5197.278	68.576	-70.642	68.576	98.453	314.150	0.277
5300.000	3.934	314.810	5297.055	73.244	-75.422	73.244	105.133	314.161	0.217
5400.000	4.030	315.426	5396.813	78.164	-80.321	78.164	112.076	314.220	0.105
5500.000	3.370	325.850	5496.605	83.100	-84.437	83.100	118.470	314.543	0.940
5600.000	2.483	323.439	5596.474	87.272	-87.378	87.272	123.496	314.965	0.895
5700.000	1.954	329.403	5696.399	90.479	-89.536	90.479	127.291	315.300	0.577
5800.000	1.633	332.619	5796.350	93.211	-91.058	93.211	130.307	315.669	0.337
5900.000	1.552	345.512	5896.311	95.787	-92.052	95.787	132.849	316.139	0.366
6000.000	1.452	10.288	5996.278	98.345	-92.165	98.345	134.782	316.858	0.652
6100.000	1.369	19.745	6096.248	100.716	-91.535	100.716	136.097	317.734	0.247
6200.000	0.695	13.886	6196.231	102.429	-90.986	102.429	137.004	318.386	0.681
6300.000	0.498	15.738	6296.226	103.436	-90.723	103.436	137.585	318.746	0.198
6400.000	0.110	165.272	6396.225	103.761	-90.580	103.761	137.736	318.880	0.596
6500.000	0.214	119.484	6496.224	103.575	-90.393	103.575	137.473	318.888	0.159
6600.000	0.091	240.702	6596.224	103.445	-90.299	103.445	137.313	318.881	0.273
6700.000	0.377	154.942	6696.223	103.107	-90.229	103.107	137.012	318.811	0.382
6800.000	0.375	223.570	6796.221	102.572	-90.315	102.572	136.667	318.636	0.424
6900.000	0.339	198.555	6896.220	102.054	-90.635	102.054	136.491	318.391	0.159
7000.000	0.224	119.391	6996.219	101.678	-90.559	101.678	136.159	318.310	0.369
7100.000	0.165	156.452	7096.218	101.450	-90.331	101.450	135.837	318.318	0.136
7200.000	0.722	168.697	7196.215	100.700	-90.150	100.700	135.157	318.164	0.562
7250.000	0.973	162.645	7246.209	99.985	-89.962	99.985	134.500	318.021	0.533
HORIZONTAL DISPLACEMENT IS 134.500 FEET AT 318.021 DEGREES									