



Company: Noble Energy
 Well: Palmer X 20-5
 API #: 05-123-28000
 Rig Name: Production/Lightning
 State/County: Colorado/Weld
 Latitude: 40.126, Longitude: -104.694
 GRID North is 0.520 Degrees East of True North
 VS-Azi: 0.000 Degrees



FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : Ground Level

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro to 7250-de_01.ut

Minimum Curvature Method

Report Date/Time: 2/9/2013 / 17:12

Vaughn Energy Services

Henderson, Colorado

866-835-8333

Randy Holcomb

RKB=Ground Level

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	0.163	226.353	100.000	-0.098	-0.103	-0.098	0.142	226.353	0.163
200.000	0.314	257.526	199.999	-0.255	-0.473	-0.255	0.537	241.640	0.194
300.000	0.808	304.880	299.994	0.089	-1.319	0.089	1.322	273.847	0.638
400.000	0.850	309.529	399.984	0.964	-2.469	0.964	2.650	291.325	0.079
500.000	0.799	317.106	499.974	1.946	-3.515	1.946	4.018	298.973	0.120
600.000	0.539	312.935	599.967	2.777	-4.334	2.777	5.147	302.654	0.264
700.000	0.245	318.767	699.964	3.258	-4.819	3.258	5.817	304.064	0.297
800.000	0.152	350.538	799.964	3.550	-4.982	3.550	6.117	305.475	0.140
900.000	0.007	234.075	899.964	3.678	-5.008	3.678	6.214	306.289	0.156
1000.000	0.301	224.101	999.963	3.485	-5.196	3.485	6.257	303.851	0.294
1100.000	0.391	218.036	1099.961	3.028	-5.589	3.028	6.357	298.447	0.097
1200.000	0.234	222.983	1199.960	2.610	-5.938	2.610	6.487	293.727	0.160
1300.000	0.387	220.879	1299.958	2.206	-6.298	2.206	6.673	289.303	0.153
1400.000	0.417	241.390	1399.956	1.777	-6.838	1.777	7.065	284.563	0.146
1500.000	0.433	231.366	1499.953	1.366	-7.453	1.366	7.577	280.389	0.076
1600.000	0.356	246.715	1599.951	1.008	-8.034	1.008	8.097	277.149	0.130
1700.000	0.410	218.021	1699.949	0.603	-8.540	0.603	8.561	274.035	0.197
1800.000	0.324	230.582	1799.947	0.141	-8.979	0.141	8.980	270.900	0.118
1900.000	0.613	238.078	1899.943	-0.321	-9.651	-0.321	9.657	268.094	0.295
2000.000	0.756	246.208	1999.936	-0.870	-10.709	-0.870	10.744	265.355	0.172
2100.000	0.763	248.043	2099.927	-1.385	-11.930	-1.385	12.010	263.377	0.026
2200.000	0.797	270.446	2199.918	-1.629	-13.243	-1.629	13.342	262.988	0.305
2300.000	1.036	297.359	2299.906	-1.208	-14.741	-1.208	14.790	265.316	0.486
2400.000	1.169	302.275	2399.887	-0.248	-16.406	-0.248	16.408	269.135	0.163
2500.000	1.692	300.228	2499.856	1.041	-18.545	1.041	18.574	273.212	0.526
2600.000	2.032	302.352	2599.803	2.733	-21.318	2.733	21.493	277.305	0.346
2700.000	1.774	296.891	2699.748	4.381	-24.196	4.381	24.590	280.264	0.315
2800.000	1.693	297.920	2799.702	5.773	-26.881	5.773	27.494	282.120	0.087
2900.000	1.224	284.284	2899.669	6.728	-29.221	6.728	29.985	282.966	0.580
3000.000	1.210	292.996	2999.647	7.404	-31.227	7.404	32.093	283.338	0.185
3100.000	1.197	305.887	3099.625	8.428	-33.045	8.428	34.103	284.308	0.270
3200.000	1.383	311.849	3199.600	9.845	-34.790	9.845	36.156	285.801	0.229
3300.000	1.401	327.735	3299.571	11.683	-36.341	11.683	38.173	287.822	0.385
3400.000	1.291	327.511	3399.543	13.667	-37.598	13.667	40.005	289.976	0.110

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	0.999	314.019	3499.523	15.223	-38.831	15.223	41.708	291.408	0.395
3600.000	0.290	240.399	3599.517	15.704	-39.678	15.704	42.673	291.593	0.959
3700.000	0.562	228.345	3699.514	15.253	-40.265	15.253	43.057	290.747	0.285
3800.000	0.861	269.956	3799.507	14.926	-41.383	14.926	43.992	289.834	0.577
3900.000	1.143	249.201	3899.492	14.572	-43.066	14.572	45.465	288.693	0.455
4000.000	1.781	270.665	3999.460	14.236	-45.553	14.236	47.725	287.354	0.831
4100.000	2.220	277.273	4099.399	14.499	-49.028	14.499	51.127	286.474	0.495
4200.000	2.181	276.837	4199.325	14.971	-52.839	14.971	54.919	285.819	0.042
4300.000	1.825	279.653	4299.264	15.464	-56.298	15.464	58.383	285.359	0.370
4400.000	1.304	275.522	4399.226	15.841	-59.000	15.841	61.090	285.029	0.533
4500.000	1.295	289.880	4499.201	16.334	-61.196	16.334	63.338	284.945	0.325
4600.000	1.474	285.535	4599.172	17.063	-63.498	17.063	65.751	285.041	0.208
4700.000	1.628	287.642	4699.135	17.838	-66.091	17.838	68.456	285.104	0.163
4800.000	1.709	282.762	4799.093	18.598	-68.898	18.598	71.364	285.106	0.164
4900.000	2.039	276.989	4899.039	19.144	-72.118	19.144	74.616	284.866	0.380
5000.000	2.260	271.792	4998.969	19.422	-75.855	19.422	78.302	284.362	0.294
5100.000	2.478	270.371	5098.883	19.498	-79.988	19.498	82.330	283.699	0.225
5200.000	2.839	266.133	5198.775	19.345	-84.620	19.345	86.803	282.877	0.411
5300.000	2.391	262.165	5298.671	18.893	-89.157	18.893	91.137	281.965	0.483
5400.000	0.501	263.646	5398.635	18.561	-91.658	18.561	93.519	281.447	1.890
5500.000	0.366	157.058	5498.633	18.218	-91.968	18.218	93.756	281.205	0.700
5600.000	0.936	130.491	5598.626	17.394	-91.223	17.394	92.866	280.795	0.630
5700.000	1.039	143.180	5698.612	16.138	-90.058	16.138	91.493	280.159	0.241
5800.000	1.106	158.752	5798.594	14.512	-89.165	14.512	90.338	279.244	0.298
5900.000	0.583	221.589	5898.585	13.232	-89.153	13.232	90.130	278.442	0.987
6000.000	0.559	255.263	5998.580	12.727	-89.963	12.727	90.859	278.052	0.332
6100.000	0.491	252.794	6098.576	12.476	-90.844	12.476	91.697	277.820	0.072
6200.000	0.443	237.337	6198.573	12.141	-91.578	12.141	92.380	277.552	0.134
6300.000	0.373	230.683	6298.570	11.726	-92.156	11.726	92.899	277.251	0.084
6400.000	0.351	247.533	6398.568	11.403	-92.691	11.403	93.389	277.013	0.108
6500.000	0.277	237.754	6498.567	11.157	-93.178	11.157	93.843	276.828	0.091
6600.000	0.292	255.168	6598.566	10.963	-93.628	10.963	94.268	276.678	0.087
6700.000	0.383	259.045	6698.564	10.834	-94.203	10.834	94.824	276.561	0.094
6800.000	0.169	239.131	6798.563	10.695	-94.657	10.695	95.259	276.446	0.232
6900.000	0.153	227.857	6898.562	10.530	-94.882	10.530	95.465	276.333	0.035
7000.000	0.237	235.680	6998.562	10.324	-95.152	10.324	95.711	276.192	0.089
7100.000	0.384	187.134	7098.560	9.875	-95.365	9.875	95.875	275.912	0.288
7200.000	0.454	151.945	7198.558	9.194	-95.220	9.194	95.663	275.515	0.262
7250.000	0.524	127.351	7248.556	8.880	-94.945	8.880	95.360	275.343	0.439
HORIZONTAL DISPLACEMENT IS 95.360 FEET AT 275.343 DEGREES									