



Company: Noble Energy
 Lease/Well: Balboa/C20-9X
 API #: 05-123-24194
 Rig Name: Production
 State/County: Colorado/Weld
 Latitude: 40.296, Longitude: -104.567
 GRID North is 0.600 Degrees West of True North
 VS-Azi: 0.000 Degrees



FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : Ground Level

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: balboac20-9x-01_ed.ut

Minimum Curvature Method

Report Date/Time: 9/29/2011 / 09:16

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	0.739	287.146	99.997	0.190	-0.616	0.190	0.645	287.146	0.739
200.000	0.508	288.763	199.991	0.523	-1.651	0.523	1.732	287.559	0.231
300.000	0.491	263.459	299.988	0.616	-2.497	0.616	2.572	283.866	0.219
400.000	1.250	293.347	399.976	1.000	-3.924	1.000	4.049	284.295	0.860
500.000	2.181	293.626	499.930	2.195	-6.669	2.195	7.021	288.217	0.932
600.000	2.624	312.715	599.843	4.510	-10.094	4.510	11.056	294.075	0.908
700.000	2.584	321.157	699.740	7.818	-13.189	7.818	15.332	300.658	0.385
800.000	2.487	319.386	799.642	11.221	-16.016	11.221	19.555	305.016	0.124
900.000	2.503	308.311	899.548	14.222	-19.142	14.222	23.847	306.612	0.482
1000.000	2.454	320.461	999.455	17.227	-22.218	17.227	28.114	307.788	0.527
1100.000	2.396	322.981	1099.366	20.547	-24.840	20.547	32.236	309.597	0.122
1200.000	2.197	317.254	1199.286	23.624	-27.399	23.624	36.177	310.768	0.303
1300.000	2.248	316.620	1299.210	26.457	-30.047	26.457	40.035	311.364	0.056
1400.000	2.192	319.866	1399.135	29.344	-32.627	29.344	43.882	311.968	0.138
1500.000	2.155	320.945	1499.063	32.266	-35.044	32.266	47.636	312.637	0.055
1600.000	1.952	321.207	1598.999	35.054	-37.296	35.054	51.184	313.225	0.204
1700.000	1.805	316.589	1698.945	37.525	-39.445	37.525	54.443	313.571	0.211
1800.000	1.636	313.034	1798.900	39.644	-41.571	39.644	57.444	313.640	0.200
1900.000	1.157	336.557	1898.871	41.544	-43.016	41.544	59.802	314.003	0.738
2000.000	1.200	347.473	1998.850	43.492	-43.645	43.492	61.615	314.900	0.228
2100.000	1.270	348.985	2098.827	45.602	-44.084	45.602	63.427	315.970	0.077
2200.000	1.278	351.198	2198.802	47.793	-44.466	47.793	65.279	317.065	0.050
2300.000	1.276	0.841	2298.777	50.008	-44.621	50.008	67.021	318.259	0.215
2400.000	1.235	357.743	2398.753	52.199	-44.647	52.199	68.688	319.459	0.079
2500.000	1.037	354.856	2498.734	54.177	-44.770	54.177	70.282	320.431	0.206
2600.000	1.121	3.078	2598.716	56.055	-44.799	56.055	71.757	321.368	0.176
2700.000	0.902	357.988	2698.700	57.819	-44.774	57.819	73.128	322.246	0.237
2800.000	1.011	359.165	2798.686	59.487	-44.815	59.487	74.479	323.008	0.111
2900.000	0.761	1.148	2898.674	61.033	-44.814	61.033	75.719	323.712	0.252
3000.000	0.591	356.208	2998.667	62.212	-44.835	62.212	76.684	324.221	0.180
3100.000	0.711	351.983	3098.661	63.341	-44.956	63.341	77.673	324.635	0.129
3200.000	0.640	338.305	3198.654	64.475	-45.249	64.475	78.768	324.939	0.176
3300.000	0.647	333.168	3298.648	65.497	-45.710	65.497	79.870	325.089	0.058
3400.000	0.881	328.961	3398.639	66.659	-46.361	66.659	81.196	325.182	0.241
3500.000	1.067	314.738	3498.625	67.973	-47.418	67.973	82.879	325.100	0.304
3600.000	0.980	289.230	3598.609	68.910	-48.887	68.910	84.490	324.647	0.460
3700.000	1.032	284.176	3698.594	69.412	-50.567	69.412	85.878	323.926	0.103
3800.000	0.969	289.357	3798.578	69.913	-52.238	69.913	87.274	323.233	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
3900.000	0.835	294.750	3898.566	70.499	-53.698	70.499	88.620	322.704	0.159
4000.000	0.754	314.368	3998.557	71.264	-54.830	71.264	89.916	322.425	0.282
4100.000	0.722	323.706	4098.548	72.232	-55.673	72.232	91.197	322.376	0.124
4200.000	0.781	327.003	4198.540	73.312	-56.418	73.312	92.507	322.419	0.073
4300.000	0.583	329.992	4298.533	74.324	-57.044	74.324	93.691	322.494	0.201
4400.000	0.840	312.522	4398.525	75.260	-57.838	75.260	94.918	322.457	0.333
4500.000	0.452	331.380	4498.518	76.101	-58.567	76.101	96.029	322.418	0.437
4600.000	0.511	335.836	4598.515	76.854	-58.938	76.854	96.852	322.516	0.070
4700.000	0.330	315.217	4698.512	77.465	-59.324	77.465	97.571	322.555	0.233
4800.000	0.227	291.963	4798.511	77.743	-59.710	77.743	98.027	322.474	0.151
4900.000	0.330	231.720	4898.510	77.639	-60.119	77.639	98.194	322.248	0.293
5000.000	0.313	229.191	4998.509	77.282	-60.552	77.282	98.179	321.921	0.023
5100.000	0.110	196.970	5098.508	77.012	-60.787	77.012	98.111	321.715	0.227
5200.000	0.334	128.584	5198.507	76.739	-60.587	76.739	97.773	321.708	0.310
5300.000	0.529	105.274	5298.504	76.436	-59.914	76.436	97.119	321.909	0.259
5400.000	0.807	101.184	5398.497	76.177	-58.779	76.177	96.218	322.346	0.282
5500.000	0.864	106.775	5498.487	75.823	-57.366	75.823	95.079	322.890	0.100
5600.000	0.966	84.934	5598.474	75.680	-55.805	75.680	94.030	323.596	0.361
5700.000	1.168	99.902	5698.457	75.579	-53.961	75.579	92.865	324.474	0.343
5800.000	0.919	89.555	5798.441	75.410	-52.155	75.410	91.689	325.332	0.311
5900.000	0.696	100.715	5898.431	75.303	-50.756	75.303	90.812	326.019	0.272
6000.000	0.403	98.442	5998.426	75.139	-49.812	75.139	90.150	326.458	0.294
6100.000	0.363	142.384	6098.424	74.837	-49.271	74.837	89.600	326.640	0.289
6200.000	0.405	195.415	6198.422	74.245	-49.172	74.245	89.052	326.484	0.345
6300.000	0.612	193.895	6298.418	73.386	-49.394	73.386	88.460	326.056	0.207
6400.000	0.801	203.789	6398.410	72.228	-49.804	72.228	87.734	325.412	0.224
6500.000	1.024	209.330	6498.398	70.809	-50.524	70.809	86.986	324.491	0.240
6600.000	1.376	210.276	6598.376	68.993	-51.567	68.993	86.135	323.225	0.352
6700.000	1.809	208.274	6698.337	66.566	-52.920	66.566	85.039	321.515	0.437
6800.000	2.369	198.765	6798.270	63.219	-54.333	63.219	83.359	319.323	0.657
6900.000	2.035	208.504	6898.197	59.701	-55.845	59.701	81.749	316.911	0.500

HORIZONTAL DISPLACEMENT IS
81.749 FEET AT 316.911 DEGREES