



Company: Noble Energy  
Well: Sandau & Bartels 25-13F  
API: 05-123-14924  
Rig Name: Production/Lightning Wireline  
State/County: Colorado/ Weld  
Latitude: 40.278, Longitude: -104.732  
GRID North is 0.500 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.ut

Minimum Curvature Method

Report Date/Time: 3/16/2012 / 16:45

Vaughn Energy Services  
Henderson, Colorado  
866-835-8333  
Jason Kinchelow

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	0.209	124.367	100.000	-0.103	0.150	-0.103	0.182	124.367	0.209
200.000	0.243	329.214	199.999	-0.023	0.192	-0.023	0.194	96.941	0.442
300.000	0.279	311.315	299.998	0.320	-0.099	0.320	0.335	342.753	0.089
400.000	0.174	236.317	399.998	0.396	-0.409	0.396	0.569	314.088	0.288
500.000	0.231	284.387	499.997	0.362	-0.731	0.362	0.816	296.325	0.173
600.000	0.284	50.051	599.997	0.571	-0.737	0.571	0.932	307.759	0.459
700.000	0.260	64.700	699.996	0.826	-0.342	0.826	0.894	337.501	0.073
800.000	0.349	10.395	799.994	1.223	-0.083	1.223	1.226	356.140	0.289
900.000	0.469	321.514	899.992	1.843	-0.282	1.843	1.864	351.286	0.356
1000.000	0.541	321.761	999.988	2.534	-0.830	2.534	2.667	341.875	0.072
1100.000	0.736	314.032	1099.982	3.351	-1.583	3.351	3.706	334.712	0.212
1200.000	0.826	291.540	1199.973	4.062	-2.716	4.062	4.886	326.237	0.317
1300.000	0.851	336.550	1299.963	5.008	-3.682	5.008	6.216	323.678	0.643
1400.000	0.876	339.203	1399.952	6.404	-4.249	6.404	7.686	326.438	0.047
1500.000	0.952	335.623	1499.939	7.875	-4.863	7.875	9.256	328.304	0.095
1600.000	1.228	336.275	1599.921	9.612	-5.637	9.612	11.143	329.612	0.276
1700.000	0.915	324.067	1699.904	11.239	-6.536	11.239	13.002	329.820	0.385
1800.000	1.433	329.734	1799.882	12.966	-7.635	12.966	15.047	329.508	0.530
1900.000	1.769	347.281	1899.844	15.552	-8.606	15.552	17.775	331.043	0.591
2000.000	1.764	343.156	1999.796	18.532	-9.391	18.532	20.775	333.125	0.127
2100.000	2.073	356.672	2099.741	21.810	-9.942	21.810	23.969	335.493	0.546
2200.000	2.130	15.353	2199.674	25.407	-9.555	25.407	27.145	339.389	0.684
2300.000	2.397	14.794	2299.596	29.221	-8.529	29.221	30.441	343.728	0.268
2400.000	1.861	20.185	2399.527	32.767	-7.435	32.767	33.600	347.216	0.572
2500.000	2.164	27.484	2499.465	35.966	-6.004	35.966	36.464	350.523	0.396
2600.000	2.070	25.289	2599.397	39.274	-4.361	39.274	39.515	353.664	0.124
2700.000	1.771	30.342	2699.341	42.240	-2.809	42.240	42.333	356.195	0.343
2800.000	1.912	19.815	2799.290	45.143	-1.463	45.143	45.167	358.144	0.366
2900.000	1.477	19.507	2899.246	47.927	-0.467	47.927	47.930	359.442	0.435
3000.000	1.772	24.269	2999.205	50.552	0.599	50.552	50.555	0.679	0.324
3100.000	1.760	3.283	3099.159	53.494	1.322	53.494	53.510	1.416	0.643
3200.000	1.590	23.949	3199.117	56.294	1.973	56.294	56.329	2.007	0.624
3300.000	0.874	44.386	3299.094	58.107	3.069	58.107	58.188	3.024	0.829
3400.000	0.259	49.237	3399.088	58.799	3.774	58.799	58.920	3.672	0.616

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	0.212	80.379	3499.088	58.977	4.127	58.977	59.122	4.003	0.134
3600.000	0.187	233.660	3599.087	58.912	4.178	58.912	59.060	4.057	0.388
3700.000	0.108	198.825	3699.087	58.726	4.017	58.726	58.864	3.913	0.116
3800.000	0.401	61.074	3799.086	58.807	4.293	58.807	58.963	4.175	0.486
3900.000	0.305	13.657	3899.085	59.234	4.661	59.234	59.417	4.500	0.297
4000.000	0.852	31.873	3999.079	60.124	5.117	60.124	60.341	4.864	0.571
4100.000	0.171	329.593	4099.075	60.884	5.434	60.884	61.126	5.100	0.787
4200.000	0.444	291.751	4199.074	61.156	4.999	61.156	61.360	4.673	0.326
4300.000	0.929	291.172	4299.066	61.592	3.883	61.592	61.715	3.608	0.485
4400.000	0.654	278.969	4399.057	61.974	2.564	61.974	62.027	2.369	0.321
4500.000	0.814	308.002	4499.049	62.500	1.440	62.500	62.517	1.320	0.399
4600.000	1.196	292.149	4599.033	63.331	-0.086	63.331	63.331	359.922	0.470
4700.000	1.162	296.427	4699.012	64.176	-1.961	64.176	64.206	358.250	0.095
4800.000	0.863	319.481	4798.997	65.199	-3.358	65.199	65.286	357.052	0.499
4900.000	0.841	305.654	4898.986	66.200	-4.444	66.200	66.349	356.160	0.206
5000.000	0.773	308.890	4998.976	67.051	-5.565	67.051	67.282	355.255	0.082
5100.000	0.863	324.353	5098.966	68.087	-6.530	68.087	68.399	354.522	0.237
5200.000	0.781	316.453	5198.956	69.193	-7.438	69.193	69.591	353.864	0.139
5300.000	1.108	346.183	5298.942	70.626	-8.138	70.626	71.093	353.427	0.578
5400.000	1.468	345.223	5398.917	72.803	-8.696	72.803	73.320	353.188	0.361
5500.000	1.675	342.808	5498.879	75.437	-9.455	75.437	76.027	352.856	0.217
5600.000	1.257	357.554	5598.847	77.929	-9.933	77.929	78.560	352.736	0.560
5700.000	1.469	357.011	5698.818	80.305	-10.047	80.305	80.931	352.869	0.212
5800.000	1.823	338.849	5798.778	83.068	-10.688	83.068	83.753	352.668	0.626
5900.000	0.968	326.831	5898.747	85.258	-11.724	85.258	86.061	352.170	0.899
6000.000	1.632	352.727	5998.722	87.378	-12.366	87.378	88.249	351.945	0.871
6100.000	0.970	357.727	6098.696	89.637	-12.580	89.637	90.515	352.011	0.672
6200.000	1.467	10.827	6198.673	91.739	-12.373	91.739	92.570	352.319	0.567
6300.000	1.505	351.774	6298.640	94.296	-12.321	94.296	95.097	352.556	0.493
6400.000	2.185	7.460	6398.588	97.486	-12.261	97.486	98.254	352.831	0.841
6500.000	1.911	343.242	6498.526	100.973	-12.494	100.973	101.743	352.946	0.900
6600.000	0.461	322.228	6598.502	102.888	-13.222	102.888	103.734	352.677	1.490
6700.000	0.271	256.732	6698.500	103.152	-13.698	103.152	104.057	352.435	0.427
6800.000	0.471	189.754	6798.499	102.692	-13.998	102.692	103.642	352.238	0.443
6900.000	0.341	211.386	6898.496	102.033	-14.223	102.033	103.019	352.064	0.199
7000.000	0.882	205.982	6998.490	101.087	-14.715	101.087	102.153	351.718	0.544
7100.000	0.523	207.590	7098.482	99.991	-15.263	99.991	101.150	351.321	0.360
7200.000	1.020	170.012	7198.474	98.710	-15.320	98.710	99.892	351.178	0.685

HORIZONTAL DISPLACEMENT IS 99.892 FEET AT 351.178 DEGREES									
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