

Company: Noble Energy

Lease/Well: Bashor State AA / 16-13

API: 05-123-26127

Rig Name: Production / Lightning Wireline

State/County: Colorado / Weld

Latitude: 40.480, Longitude: -104.448

GRID North is 0.650 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: 7/26/2012 / 18:24

Vaughn Energy Services

Henderson Colorado

866-835-8333

Norman Cowan

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	0.220	306.779	100.000	0.115	-0.153	0.115	0.192	306.779	0.220
200.000	0.653	312.150	199.997	0.612	-0.729	0.612	0.952	309.990	0.435
300.000	0.562	296.600	299.991	1.213	-1.590	1.213	2.000	307.352	0.187
400.000	0.630	307.041	399.986	1.764	-2.467	1.764	3.033	305.567	0.128
500.000	0.722	300.653	499.979	2.416	-3.448	2.416	4.210	305.025	0.119
600.000	0.475	291.786	599.973	2.892	-4.375	2.892	5.245	303.462	0.263
700.000	0.462	282.849	699.970	3.135	-5.153	3.135	6.032	301.317	0.074
800.000	0.593	285.170	799.966	3.360	-6.045	3.360	6.916	299.068	0.133
900.000	0.813	292.955	899.958	3.772	-7.197	3.772	8.126	297.659	0.239
1000.000	0.932	286.455	999.946	4.279	-8.631	4.279	9.633	296.373	0.155
1100.000	0.957	291.746	1099.933	4.819	-10.187	4.819	11.269	295.317	0.091
1200.000	1.139	286.878	1199.916	5.417	-11.914	5.417	13.088	294.451	0.202
1300.000	0.938	290.037	1299.900	5.986	-13.634	5.986	14.891	293.704	0.209
1400.000	1.193	288.921	1399.882	6.604	-15.388	6.604	16.746	293.228	0.255
1500.000	0.981	293.225	1499.864	7.279	-17.159	7.279	18.640	292.988	0.227
1600.000	1.016	296.379	1599.849	8.011	-18.740	8.011	20.381	293.145	0.065
1700.000	1.271	295.630	1699.829	8.885	-20.535	8.885	22.374	293.396	0.255
1800.000	1.689	295.328	1799.796	9.995	-22.866	9.995	24.955	293.610	0.418
1900.000	1.736	299.970	1899.751	11.382	-25.510	11.382	27.934	294.045	0.147
2000.000	1.830	304.097	1999.702	13.034	-28.145	13.034	31.017	294.848	0.159
2100.000	1.671	311.403	2099.656	14.893	-30.561	14.893	33.997	295.981	0.274
2200.000	1.465	319.208	2199.619	16.825	-32.489	16.825	36.587	297.378	0.296
2300.000	0.799	310.417	2299.599	18.244	-33.855	18.244	38.458	298.320	0.687
2400.000	0.369	270.115	2399.593	18.697	-34.707	18.697	39.423	298.311	0.570
2500.000	0.338	242.993	2499.592	18.564	-35.292	18.564	39.876	297.744	0.168
2600.000	0.277	221.518	2599.590	18.248	-35.715	18.248	40.107	297.064	0.129
2700.000	0.274	211.576	2699.589	17.863	-36.001	17.863	40.189	296.390	0.048
2800.000	0.567	182.565	2799.586	17.166	-36.148	17.166	40.017	295.402	0.353
2900.000	0.622	157.587	2899.581	16.170	-35.963	16.170	39.431	294.210	0.263
3000.000	0.785	146.816	2999.574	15.094	-35.381	15.094	38.467	293.104	0.209
3100.000	0.810	152.270	3099.564	13.895	-34.677	13.895	37.358	291.836	0.080
3200.000	0.764	136.759	3199.555	12.784	-33.891	12.784	36.222	290.666	0.217
3300.000	1.157	93.067	3299.542	12.244	-32.427	12.244	34.661	290.686	0.802
3400.000	1.782	67.076	3399.509	12.795	-29.987	12.795	32.602	293.108	0.898

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	1.837	54.980	3499.460	14.321	-27.242	14.321	30.777	297.730	0.385
3600.000	1.706	66.776	3599.412	15.828	-24.562	15.828	29.220	302.798	0.387
3700.000	1.520	65.569	3699.373	16.963	-21.987	16.963	27.770	307.651	0.189
3800.000	1.504	63.811	3799.338	18.091	-19.602	18.091	26.674	312.704	0.049
3900.000	1.244	59.365	3899.309	19.223	-17.490	19.223	25.989	317.702	0.281
4000.000	0.824	67.181	3999.293	20.055	-15.894	20.055	25.589	321.602	0.442
4100.000	0.812	55.590	4099.283	20.734	-14.647	20.734	25.385	324.762	0.166
4200.000	0.615	78.380	4199.275	21.242	-13.537	21.242	25.189	327.492	0.342
4300.000	1.016	57.417	4299.265	21.828	-12.264	21.828	25.037	330.670	0.494
4400.000	1.257	48.676	4399.245	23.029	-10.693	23.029	25.391	335.093	0.296
4500.000	0.903	34.901	4499.227	24.400	-9.419	24.400	26.155	338.892	0.437
4600.000	0.778	32.154	4599.217	25.620	-8.607	25.620	27.027	341.430	0.131
4700.000	0.849	45.579	4699.207	26.713	-7.717	26.713	27.805	343.887	0.203
4800.000	0.841	48.398	4799.196	27.719	-6.639	27.719	28.503	346.530	0.042
4900.000	0.811	28.278	4899.186	28.829	-5.755	28.829	29.398	348.710	0.290
5000.000	0.581	341.503	4999.179	29.933	-5.581	29.933	30.449	349.439	0.591
5100.000	0.882	313.527	5099.171	30.944	-6.300	30.944	31.579	348.492	0.459
5200.000	1.288	301.534	5199.153	32.063	-7.816	32.063	33.001	346.300	0.463
5300.000	1.499	313.352	5299.123	33.548	-9.725	33.548	34.929	343.834	0.356
5400.000	1.997	324.935	5399.077	35.872	-11.677	35.872	37.725	341.969	0.608
5500.000	1.874	328.673	5499.020	38.695	-13.529	38.695	40.992	340.729	0.176
5600.000	1.850	348.837	5598.968	41.676	-14.691	41.676	44.190	340.582	0.652
5700.000	2.051	351.176	5698.910	45.028	-15.278	45.028	47.550	341.258	0.216
5800.000	1.650	17.337	5798.860	48.171	-15.124	48.171	50.489	342.570	0.924
5900.000	1.671	39.476	5898.819	50.671	-13.768	50.671	52.508	344.799	0.638
6000.000	1.695	43.631	5998.775	52.867	-11.820	52.867	54.172	347.397	0.124
6100.000	1.899	43.068	6098.726	55.148	-9.668	55.148	55.989	350.056	0.204
6200.000	1.938	49.633	6198.670	57.453	-7.249	57.453	57.909	352.809	0.223
6300.000	2.123	57.764	6298.608	59.537	-4.393	59.537	59.698	355.780	0.342
6400.000	1.609	76.937	6398.555	60.842	-1.459	60.842	60.860	358.626	0.802
6500.000	1.758	51.345	6498.514	62.117	1.106	62.117	62.127	1.020	0.760
6600.000	1.671	61.826	6598.469	63.764	3.590	63.764	63.865	3.222	0.325
6700.000	1.401	63.712	6698.433	64.994	5.971	64.994	65.267	5.249	0.275
HORIZONTAL DISPLACEMENT IS 65.267 FEET AT 5.249 DEGREES									