



Company: Noble Energy
Lease / Well: Richter / 13-27
API#: 05-123-22339

Rig Name: Production / Lightning Wireline
State / County: Colorado / Weld County
Latitude: 40.542, Longitude: -104.544
GRID North is 0.620 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: inrun_ed.ut
Minimum Curvature Method
Report Date/Time: 8/28/2011 / 10:56

Vaughn Energy Services
Henderson, CO
303-853-4976
Robert Davis

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	0.498	355.379	99.999	0.434	-0.035	0.434	0.435	355.379	0.498
200.000	0.472	346.188	199.995	1.267	-0.168	1.267	1.278	352.429	0.082
300.000	0.325	310.488	299.993	1.851	-0.482	1.851	1.913	345.396	0.282
400.000	0.528	266.123	399.990	2.004	-1.158	2.004	2.314	329.983	0.373
500.000	0.552	272.405	499.986	1.993	-2.099	1.993	2.894	313.521	0.064
600.000	0.507	291.531	599.982	2.175	-2.991	2.175	3.698	306.031	0.181
700.000	0.367	313.426	699.979	2.558	-3.635	2.558	4.445	305.136	0.215
800.000	0.514	285.693	799.976	2.900	-4.299	2.900	5.186	303.998	0.255
900.000	0.297	280.902	899.973	3.070	-4.986	3.070	5.855	301.623	0.219
1000.000	0.408	258.091	999.972	3.046	-5.589	3.046	6.365	298.585	0.177
1100.000	0.270	220.101	1099.970	2.792	-6.090	2.792	6.699	294.629	0.257
1200.000	0.312	235.866	1199.969	2.459	-6.467	2.459	6.919	290.817	0.090
1300.000	0.424	222.331	1299.967	2.033	-6.941	2.033	7.233	286.322	0.140
1400.000	0.422	238.345	1399.964	1.566	-7.504	1.566	7.665	281.788	0.118
1500.000	0.211	200.902	1499.962	1.201	-7.883	1.201	7.974	278.662	0.285
1600.000	0.272	186.882	1599.961	0.793	-7.977	0.793	8.016	275.678	0.085
1700.000	0.173	217.203	1699.961	0.437	-8.097	0.437	8.109	273.088	0.151
1800.000	0.311	225.184	1799.960	0.125	-8.381	0.125	8.382	270.856	0.141
1900.000	0.139	208.285	1899.959	-0.173	-8.631	-0.173	8.633	268.852	0.182
2000.000	0.155	205.376	1999.959	-0.402	-8.746	-0.402	8.756	267.367	0.017
2100.000	0.365	221.455	2099.958	-0.763	-9.015	-0.763	9.047	265.162	0.221
2200.000	0.125	256.940	2199.957	-1.027	-9.332	-1.027	9.388	263.723	0.273
2300.000	0.615	242.232	2299.954	-1.301	-9.913	-1.301	9.998	262.523	0.495
2400.000	0.974	238.234	2399.945	-1.998	-11.110	-1.998	11.288	259.804	0.363
2500.000	1.231	233.838	2499.926	-3.079	-12.699	-3.079	13.067	256.370	0.270
2600.000	1.014	230.574	2599.907	-4.275	-14.249	-4.275	14.877	253.302	0.226
2700.000	0.896	213.767	2699.893	-5.486	-15.367	-5.486	16.317	250.353	0.302
2800.000	0.822	203.461	2799.882	-6.794	-16.087	-6.794	17.463	247.105	0.171
2900.000	0.803	212.925	2899.872	-8.040	-16.754	-8.040	18.583	244.364	0.135
3000.000	0.742	229.126	2999.863	-9.052	-17.624	-9.052	19.813	242.814	0.226
3100.000	0.462	242.614	3099.857	-9.661	-18.471	-9.661	20.845	242.389	0.312
3200.000	0.392	270.038	3199.855	-9.846	-19.170	-9.846	21.551	242.815	0.213
3300.000	0.470	266.026	3299.852	-9.874	-19.922	-9.874	22.234	243.635	0.084
3400.000	0.500	287.967	3399.848	-9.768	-20.746	-9.768	22.931	244.788	0.187

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	0.595	266.064	3499.844	-9.669	-21.680	-9.669	23.738	245.964	0.228
3600.000	1.387	258.625	3599.828	-9.943	-23.385	-9.943	25.411	246.964	0.801
3700.000	2.193	250.777	3699.779	-10.812	-26.378	-10.812	28.508	247.712	0.841
3800.000	2.382	243.698	3799.699	-12.363	-30.048	-12.363	32.492	247.636	0.339
3900.000	2.303	238.871	3899.616	-14.323	-33.631	-14.323	36.554	246.932	0.212
4000.000	2.312	239.998	3999.534	-16.370	-37.098	-16.370	40.549	246.190	0.046
4100.000	2.259	232.157	4099.455	-18.588	-40.401	-18.588	44.472	245.294	0.317
4200.000	2.273	225.333	4199.377	-21.190	-43.368	-21.190	48.268	243.959	0.270
4300.000	2.430	205.978	4299.295	-24.490	-45.706	-24.490	51.854	241.817	0.805
4400.000	2.356	190.670	4399.208	-28.416	-47.015	-28.416	54.935	238.852	0.641
4500.000	2.575	183.444	4499.116	-32.678	-47.531	-32.678	57.680	235.491	0.379
4600.000	2.153	176.488	4599.031	-36.794	-47.551	-36.794	60.124	232.268	0.510
4700.000	1.559	176.364	4698.978	-40.026	-47.349	-40.026	62.001	229.791	0.594
4800.000	0.739	183.720	4798.957	-42.027	-47.305	-42.027	63.278	228.381	0.831
4900.000	0.198	269.836	4898.954	-42.672	-47.519	-42.672	63.867	228.077	0.752
5000.000	0.660	305.855	4998.951	-42.335	-48.159	-42.335	64.121	228.682	0.513
5100.000	0.884	330.804	5098.942	-41.325	-49.001	-41.325	64.100	229.858	0.399
5200.000	0.641	324.814	5198.933	-40.195	-49.700	-40.195	63.919	231.036	0.256
5300.000	0.645	326.818	5298.927	-39.266	-50.330	-39.266	63.835	232.039	0.023
5400.000	0.698	338.591	5398.920	-38.228	-50.861	-38.228	63.625	233.071	0.148
5500.000	0.422	320.055	5498.915	-37.378	-51.320	-37.378	63.489	233.933	0.327
5600.000	0.488	327.587	5598.912	-36.735	-51.785	-36.735	63.491	234.649	0.089
5700.000	0.449	302.623	5698.909	-36.164	-52.343	-36.164	63.621	235.359	0.206
5800.000	0.441	295.969	5798.906	-35.785	-53.019	-35.785	63.966	235.983	0.052
5900.000	0.635	298.248	5898.902	-35.354	-53.854	-35.354	64.421	236.716	0.195
6000.000	0.619	295.739	5998.896	-34.857	-54.828	-34.857	64.970	237.554	0.032
6100.000	0.688	316.281	6098.889	-34.188	-55.730	-34.188	65.381	238.472	0.243
6200.000	0.771	294.642	6198.881	-33.474	-56.757	-33.474	65.892	239.469	0.286
6300.000	1.087	309.335	6298.868	-32.592	-58.102	-32.592	66.619	240.710	0.393
6400.000	1.257	301.885	6398.847	-31.411	-59.768	-31.411	67.519	242.276	0.228
6500.000	1.338	289.677	6498.822	-30.438	-61.798	-30.438	68.888	243.778	0.287
6600.000	1.706	286.365	6598.786	-29.626	-64.326	-29.626	70.820	245.271	0.379
6700.000	2.647	294.383	6698.713	-28.253	-67.857	-28.253	73.504	247.395	0.987
6800.000	2.592	293.485	6798.609	-26.398	-72.035	-26.398	76.720	249.874	0.069
6900.000	1.657	296.528	6898.539	-24.851	-75.403	-24.851	79.392	251.759	0.942
7000.000	0.686	303.566	6998.517	-23.875	-77.195	-23.875	80.802	252.814	0.979
HORIZONTAL DISPLACEMENT IS 80.802 FEET AT 252.814 DEGREES									