



Company: Noble Energy
Lease / Well: Richter / 43-27
API#: 05-123-23093

Rig Name: Production / Lightning Wireline
State / County: Colorado / Weld County
Latitude: 40.542, Longitude: -104.528
GRID North is 0.630 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: 8/26/2011 / 13:20

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	0.971	264.104	99.995	-0.087	-0.843	-0.087	0.847	264.104	0.971
200.000	1.340	288.570	199.975	0.198	-2.794	0.198	2.801	274.062	0.608
300.000	0.878	279.239	299.956	0.694	-4.659	0.694	4.710	278.471	0.495
400.000	1.223	227.757	399.941	0.100	-6.205	0.100	6.206	270.920	0.964
500.000	1.226	228.266	499.919	-1.330	-7.793	-1.330	7.906	260.317	0.011
600.000	1.167	199.700	599.898	-3.001	-8.935	-3.001	9.425	251.436	0.593
700.000	1.260	201.889	699.875	-4.980	-9.688	-4.980	10.893	242.797	0.104
800.000	1.283	202.236	799.851	-7.036	-10.521	-7.036	12.657	236.228	0.024
900.000	1.543	222.753	899.821	-9.061	-11.859	-9.061	14.924	232.619	0.564
1000.000	1.107	235.245	999.794	-10.600	-13.566	-10.600	17.216	231.999	0.520
1100.000	1.766	220.532	1099.762	-12.321	-15.361	-12.321	19.692	231.267	0.750
1200.000	1.195	227.474	1199.729	-14.197	-17.131	-14.197	22.249	230.350	0.597
1300.000	1.391	217.515	1299.703	-15.865	-18.638	-15.865	24.476	229.596	0.298
1400.000	1.180	226.021	1399.678	-17.542	-20.118	-17.542	26.692	228.913	0.284
1500.000	1.321	220.284	1499.654	-19.136	-21.604	-19.136	28.861	228.467	0.189
1600.000	1.701	236.338	1599.620	-20.839	-23.585	-20.839	31.472	228.538	0.566
1700.000	1.017	231.480	1699.591	-22.214	-25.515	-22.214	33.830	228.956	0.694
1800.000	0.963	242.358	1799.576	-23.156	-26.953	-23.156	35.534	229.333	0.195
1900.000	0.736	246.116	1899.565	-23.806	-28.285	-23.806	36.970	229.914	0.234
2000.000	0.482	191.668	1999.560	-24.478	-28.957	-24.478	37.916	229.791	0.601
2100.000	0.453	5.767	2099.559	-24.496	-29.002	-24.496	37.963	229.814	0.933
2200.000	0.575	62.255	2199.556	-23.870	-28.518	-23.870	37.189	230.071	0.498
2300.000	0.428	6.196	2299.552	-23.265	-28.033	-23.265	36.430	230.311	0.489
2400.000	0.475	331.123	2399.550	-22.531	-28.193	-22.531	36.090	231.369	0.276
2500.000	0.988	348.293	2499.541	-21.324	-28.568	-21.324	35.649	233.262	0.552
2600.000	0.902	330.403	2599.528	-19.795	-29.132	-19.795	35.221	235.804	0.306
2700.000	0.485	282.203	2699.521	-19.021	-29.935	-19.021	35.467	237.567	0.683
2800.000	0.179	233.910	2799.519	-19.024	-30.474	-19.024	35.925	238.025	0.389
2900.000	0.430	272.624	2899.518	-19.099	-30.976	-19.099	36.390	238.343	0.311
3000.000	0.156	238.389	2999.517	-19.153	-31.466	-19.153	36.837	238.672	0.314
3100.000	0.029	280.775	3099.516	-19.219	-31.607	-19.219	36.992	238.697	0.135
3200.000	0.425	321.622	3199.515	-18.924	-31.862	-18.924	37.059	239.293	0.403
3300.000	0.226	265.147	3299.514	-18.650	-32.289	-18.650	37.288	239.990	0.354
3400.000	0.232	40.725	3399.514	-18.513	-32.354	-18.513	37.276	240.221	0.424

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	0.374	258.239	3499.513	-18.426	-32.542	-18.426	37.396	240.480	0.576
3600.000	0.254	37.718	3599.512	-18.318	-32.726	-18.318	37.504	240.763	0.591
3700.000	0.404	52.968	3699.511	-17.930	-32.309	-17.930	36.951	240.971	0.173
3800.000	0.564	108.562	3799.508	-17.874	-31.561	-17.874	36.271	240.475	0.473
3900.000	0.899	89.753	3899.499	-18.028	-30.310	-18.028	35.266	239.257	0.408
4000.000	0.915	80.527	3999.487	-17.893	-28.737	-17.893	33.852	238.092	0.147
4100.000	1.196	127.608	4099.472	-18.398	-27.123	-18.398	32.774	235.850	0.881
4200.000	1.573	112.610	4199.443	-19.562	-25.030	-19.562	31.767	231.990	0.520
4300.000	1.630	116.306	4299.404	-20.720	-22.488	-20.720	30.578	227.342	0.118
4400.000	1.753	114.863	4399.360	-21.993	-19.825	-21.993	29.610	222.032	0.130
4500.000	1.049	114.218	4499.329	-23.012	-17.603	-23.012	28.973	217.414	0.704
4600.000	0.941	139.221	4599.315	-24.009	-16.231	-24.009	28.981	214.060	0.443
4700.000	0.949	144.096	4699.301	-25.303	-15.209	-25.303	29.522	211.009	0.081
4800.000	0.239	76.825	4799.296	-25.926	-14.520	-25.926	29.716	209.252	0.885
4900.000	0.720	277.275	4899.294	-25.799	-14.941	-25.799	29.813	210.076	0.947
5000.000	1.282	328.025	4999.280	-24.771	-16.156	-24.771	29.574	213.113	0.997
5100.000	1.217	301.770	5099.257	-23.263	-17.651	-23.263	29.202	217.189	0.571
5200.000	1.563	322.507	5199.228	-21.622	-19.384	-21.622	29.039	221.875	0.605
5300.000	1.560	324.456	5299.191	-19.433	-21.005	-19.433	28.615	227.225	0.053
5400.000	0.844	305.781	5399.169	-17.895	-22.393	-17.895	28.665	231.371	0.807
5500.000	1.052	283.270	5499.155	-17.254	-23.884	-17.254	29.464	234.155	0.422
5600.000	1.062	275.325	5599.138	-16.957	-25.700	-16.957	30.790	236.583	0.147
5700.000	1.373	295.652	5699.116	-16.353	-27.703	-16.353	32.169	239.447	0.527
5800.000	1.115	301.243	5799.092	-15.330	-29.614	-15.330	33.347	242.632	0.285
5900.000	0.871	305.609	5899.077	-14.382	-31.064	-14.382	34.232	245.156	0.255
6000.000	0.669	280.617	5999.069	-13.832	-32.256	-13.832	35.097	246.789	0.387
6100.000	0.395	323.573	6099.064	-13.447	-33.035	-13.447	35.667	247.851	0.466
6200.000	0.084	96.696	6199.064	-13.178	-33.167	-13.178	35.689	248.331	0.456
6300.000	0.065	62.402	6299.064	-13.160	-33.044	-13.160	35.569	248.284	0.047
6400.000	0.468	352.152	6399.062	-12.729	-33.050	-12.729	35.417	248.936	0.451
6500.000	0.445	257.733	6499.060	-12.407	-33.486	-12.407	35.710	249.670	0.671
6600.000	0.323	28.665	6599.059	-12.242	-33.730	-12.242	35.883	250.052	0.701
6700.000	0.209	271.912	6699.059	-11.989	-33.777	-11.989	35.842	250.458	0.457
6800.000	0.325	290.399	6799.058	-11.884	-34.224	-11.884	36.229	250.851	0.143
6900.000	0.320	332.304	6899.056	-11.538	-34.620	-11.538	36.492	251.568	0.231
7000.000	0.285	342.482	6999.055	-11.054	-34.824	-11.054	36.537	252.390	0.064
HORIZONTAL DISPLACEMENT IS 36.537 FEET AT 252.390 DEGREES									