



Company: Noble Energy
Well: Kern 1
API: 05-123-07826
Rig Name: Production/ Lightning Wireline
State/County: Colorado/Weld
Latitude: 40.259, Longitude: -104.512
GRID North is 0.640 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: 10/3/2012 / 17:15

Vaughn Energy Services
Henderson, CO
303-853-4976
Levi Sheldon

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	0.381	121.111	99.999	-0.172	0.285	-0.172	0.333	121.111	0.381
200.000	0.494	296.101	199.998	-0.154	0.183	-0.154	0.239	130.151	0.874
300.000	0.480	90.769	299.997	0.030	0.215	0.030	0.217	82.164	0.950
400.000	0.316	99.381	399.994	-0.021	0.905	-0.021	0.905	91.328	0.174
500.000	0.321	107.794	499.993	-0.152	1.444	-0.152	1.452	95.993	0.047
600.000	0.327	271.682	599.992	-0.229	1.426	-0.229	1.444	99.121	0.642
700.000	0.239	18.116	699.992	-0.022	1.206	-0.022	1.206	91.052	0.456
800.000	0.158	305.648	799.991	0.256	1.159	0.256	1.187	77.521	0.244
900.000	0.065	120.311	899.991	0.308	1.096	0.308	1.138	74.299	0.222
1000.000	0.063	202.735	999.991	0.229	1.124	0.229	1.147	78.475	0.084
1100.000	0.143	214.021	1099.991	0.075	1.032	0.075	1.035	85.842	0.083
1200.000	0.059	147.612	1199.991	-0.072	0.990	-0.072	0.992	94.150	0.131
1300.000	0.035	35.512	1299.991	-0.090	1.035	-0.090	1.039	94.993	0.078
1400.000	0.142	184.833	1399.991	-0.189	1.042	-0.189	1.059	100.281	0.172
1500.000	0.176	201.823	1499.990	-0.454	0.975	-0.454	1.075	114.996	0.058
1600.000	0.351	251.056	1599.989	-0.696	0.628	-0.696	0.937	137.942	0.271
1700.000	0.277	131.363	1699.989	-0.955	0.520	-0.955	1.087	151.452	0.544
1800.000	0.091	207.137	1799.988	-1.186	0.665	-1.186	1.359	150.728	0.269
1900.000	0.442	233.991	1899.987	-1.483	0.316	-1.483	1.517	167.969	0.363
2000.000	0.840	198.451	1999.981	-2.405	-0.228	-2.405	2.416	185.413	0.545
2100.000	1.260	165.451	2099.965	-4.165	-0.184	-4.165	4.169	182.526	0.720
2200.000	1.420	141.780	2199.938	-6.202	0.859	-6.202	6.261	172.116	0.571
2300.000	1.560	159.237	2299.905	-8.447	2.108	-8.447	8.706	165.991	0.473
2400.000	1.102	157.852	2399.877	-10.611	2.953	-10.611	11.014	164.449	0.459
2500.000	0.505	151.951	2499.867	-11.891	3.523	-11.891	12.402	163.498	0.603
2600.000	0.322	341.382	2599.866	-12.013	3.640	-12.013	12.553	163.143	0.825
2700.000	0.363	94.031	2699.865	-11.769	3.866	-11.769	12.388	161.814	0.571
2800.000	0.308	8.933	2799.864	-11.526	4.224	-11.526	12.276	159.874	0.455
2900.000	0.280	262.461	2899.863	-11.293	4.024	-11.293	11.988	160.390	0.471
3000.000	0.166	124.254	2999.863	-11.406	3.901	-11.406	12.055	161.119	0.418
3100.000	0.134	309.569	3099.863	-11.413	3.931	-11.413	12.071	160.997	0.299
3200.000	0.171	91.408	3199.863	-11.343	3.990	-11.343	12.024	160.619	0.289
3300.000	0.157	11.796	3299.862	-11.212	4.168	-11.212	11.962	159.608	0.211
3400.000	0.154	25.046	3399.862	-10.956	4.253	-10.956	11.752	158.785	0.036

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	0.110	355.076	3499.862	-10.738	4.301	-10.738	11.568	158.172	0.080
3600.000	0.360	2.160	3599.861	-10.329	4.305	-10.329	11.190	157.375	0.251
3700.000	0.557	32.160	3699.858	-9.604	4.575	-9.604	10.638	154.526	0.304
3800.000	0.632	279.870	3799.855	-9.098	4.290	-9.098	10.059	154.752	0.988
3900.000	0.618	256.857	3899.849	-9.126	3.222	-9.126	9.678	160.554	0.250
4000.000	0.607	239.727	3999.843	-9.515	2.240	-9.515	9.775	166.756	0.183
4100.000	1.071	234.810	4099.832	-10.321	1.018	-10.321	10.371	174.366	0.470
4200.000	1.342	268.189	4199.811	-10.897	-0.917	-10.897	10.935	184.808	0.740
4300.000	1.428	264.516	4299.782	-11.053	-3.328	-11.053	11.543	196.755	0.123
4400.000	1.439	256.260	4399.751	-11.470	-5.788	-11.470	12.848	206.775	0.207
4500.000	1.536	277.570	4499.718	-11.592	-8.336	-11.592	14.278	215.721	0.558
4600.000	1.519	310.124	4599.684	-10.561	-10.678	-10.561	15.019	225.315	0.856
4700.000	1.510	305.971	4699.649	-8.933	-12.758	-8.933	15.575	234.999	0.110
4800.000	1.383	277.337	4799.619	-8.005	-15.021	-8.005	17.021	241.945	0.726
4900.000	1.399	289.664	4899.589	-7.441	-17.368	-7.441	18.894	246.809	0.299
5000.000	1.219	294.298	4999.563	-6.592	-19.486	-6.592	20.571	251.309	0.209
5100.000	1.192	275.693	5099.542	-6.052	-21.490	-6.052	22.326	254.273	0.391
5200.000	1.100	267.380	5199.522	-5.992	-23.484	-5.992	24.236	255.686	0.190
5300.000	0.783	292.789	5299.509	-5.771	-25.073	-5.771	25.728	257.037	0.516
5400.000	0.551	345.785	5399.503	-5.041	-25.821	-5.041	26.308	258.954	0.631
5500.000	0.618	29.608	5499.498	-4.106	-25.673	-4.106	25.999	260.913	0.440
5600.000	0.628	20.860	5599.492	-3.126	-25.211	-3.126	25.404	262.933	0.096
5700.000	0.673	10.034	5699.486	-2.035	-24.914	-2.035	24.997	265.329	0.131
5800.000	0.647	1.021	5799.479	-0.893	-24.801	-0.893	24.817	267.938	0.107
5900.000	0.754	22.525	5899.472	0.279	-24.539	0.279	24.541	270.652	0.282
6000.000	0.713	2.265	5999.464	1.509	-24.263	1.509	24.309	273.559	0.261
6100.000	0.730	22.358	6099.456	2.720	-23.996	2.720	24.149	276.467	0.252
6200.000	0.630	25.045	6199.449	3.807	-23.520	3.807	23.827	279.195	0.105
6300.000	0.390	49.355	6299.445	4.527	-23.029	4.527	23.470	281.122	0.319
6400.000	0.543	52.231	6399.441	5.039	-22.397	5.039	22.957	282.681	0.155
6500.000	0.449	19.615	6499.438	5.698	-21.890	5.698	22.620	284.591	0.293
6600.000	0.509	61.522	6599.435	6.279	-21.369	6.279	22.272	286.375	0.347
6650.000	0.417	44.339	6649.433	6.515	-21.046	6.515	22.032	287.201	0.331
HORIZONTAL DISPLACEMENT IS 22.032 FEET AT 287.201 DEGREES									