



Company: NOBLE ENERGY
Lease/Well: SPIECHER/ #31-15
A.P.I.#: 05-123-23539
Rig Name: PRODUCTION
State/County: COLORADO/WELD
Latitude: 40.492, Longitude: -104.533
GRID North is 0.620 Degrees East of True North
VS-Azi: 0.000 Degrees



FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : GL

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: run1-01_ed.ut
Minimum Curvature Method
Report Date/Time: 3/2/2012 / 12:39

Vaughn Energy Services
Henderson, Colorado
866-835-8333
Jay Hinman
Spiecher 31-15

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	0.245	300.849	100.000	0.110	-0.183	0.110	0.214	300.849	0.245
200.000	0.178	329.812	199.999	0.353	-0.445	0.353	0.568	308.461	0.124
300.000	0.190	304.805	299.999	0.583	-0.659	0.583	0.880	311.457	0.081
400.000	0.075	302.983	399.998	0.713	-0.851	0.713	1.110	309.963	0.115
500.000	0.050	307.746	499.998	0.776	-0.941	0.776	1.220	309.508	0.026
600.000	0.097	279.757	599.998	0.817	-1.059	0.817	1.337	307.652	0.058
700.000	0.053	190.384	699.998	0.786	-1.151	0.786	1.393	304.334	0.110
800.000	0.106	105.367	799.998	0.716	-1.070	0.716	1.287	303.788	0.114
900.000	0.485	86.036	899.996	0.721	-0.559	0.721	0.912	322.210	0.387
1000.000	0.538	79.833	999.992	0.833	0.326	0.833	0.894	21.354	0.077
1100.000	0.497	76.847	1099.988	1.015	1.211	1.015	1.580	50.035	0.049
1200.000	0.530	95.624	1199.984	1.068	2.094	1.068	2.351	62.971	0.171
1300.000	0.439	79.563	1299.981	1.092	2.931	1.092	3.128	69.560	0.163
1400.000	0.555	126.235	1399.978	0.875	3.698	0.875	3.800	76.682	0.408
1500.000	0.590	93.084	1499.973	0.561	4.603	0.561	4.637	83.046	0.329
1600.000	0.467	79.563	1599.969	0.608	5.518	0.608	5.552	83.718	0.175
1700.000	0.527	103.806	1699.965	0.572	6.365	0.572	6.391	84.868	0.217
1800.000	0.538	90.287	1799.961	0.460	7.282	0.460	7.296	86.388	0.126
1900.000	0.836	142.201	1899.954	-0.119	8.199	-0.119	8.200	90.835	0.659
2000.000	1.463	150.029	1999.934	-1.802	9.284	-1.802	9.457	100.985	0.644
2100.000	1.751	148.455	2099.894	-4.210	10.721	-4.210	11.518	111.439	0.291
2200.000	1.888	131.384	2199.844	-6.601	12.756	-6.601	14.363	117.360	0.557
2300.000	1.799	125.486	2299.793	-8.601	15.270	-8.601	17.526	119.391	0.210
2400.000	1.300	114.949	2399.756	-9.991	17.577	-9.991	20.218	119.614	0.572
2500.000	0.572	123.264	2499.742	-10.743	19.023	-10.743	21.847	119.456	0.739
2600.000	0.517	138.425	2599.738	-11.355	19.740	-11.355	22.773	119.908	0.154
2700.000	0.420	146.521	2699.734	-11.997	20.241	-11.997	23.530	120.656	0.118
2800.000	0.399	158.459	2799.732	-12.627	20.571	-12.627	24.137	121.543	0.087
2900.000	0.477	163.235	2899.729	-13.350	20.819	-13.350	24.732	122.669	0.086
3000.000	0.618	179.519	2999.724	-14.288	20.944	-14.288	25.353	124.302	0.208
3100.000	1.067	160.744	3099.713	-15.707	21.256	-15.707	26.429	126.462	0.522
3200.000	0.970	169.821	3199.698	-17.419	21.712	-17.419	27.836	128.739	0.188
3300.000	0.235	84.498	3299.693	-18.232	22.066	-18.232	28.624	129.566	0.979
3400.000	1.018	7.101	3399.687	-17.332	22.380	-17.332	28.306	127.755	0.993

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	1.263	14.307	3499.667	-15.382	22.762	-15.382	27.472	124.049	0.284
3600.000	1.233	39.529	3599.644	-13.484	23.720	-13.484	27.284	119.617	0.546
3700.000	1.626	53.689	3699.613	-11.814	25.547	-11.814	28.147	114.818	0.525
3800.000	1.967	68.550	3799.564	-10.347	28.288	-10.347	30.121	110.091	0.575
3900.000	2.228	72.424	3899.497	-9.132	31.738	-9.132	33.026	106.052	0.296
4000.000	2.266	71.641	3999.420	-7.922	35.468	-7.922	36.342	102.591	0.049
4100.000	1.872	77.576	4099.355	-6.948	38.940	-6.948	39.555	100.117	0.448
4200.000	1.038	90.974	4199.322	-6.612	41.441	-6.612	41.965	99.065	0.896
4300.000	0.937	147.557	4299.309	-7.317	42.785	-7.317	43.407	99.705	0.940
4400.000	1.593	179.858	4399.286	-9.397	43.227	-9.397	44.237	102.265	0.945
4500.000	1.978	191.728	4499.237	-12.478	42.880	-12.478	44.658	106.225	0.532
4600.000	2.084	173.324	4599.175	-15.974	42.740	-15.974	45.628	110.493	0.658
4700.000	1.087	172.282	4699.136	-18.720	43.079	-18.720	46.971	113.488	0.997
4800.000	0.770	165.524	4799.123	-20.311	43.375	-20.311	47.895	115.093	0.335
4900.000	0.943	98.691	4899.114	-21.087	44.356	-21.087	49.113	115.426	0.955
5000.000	1.040	82.759	4999.099	-21.097	46.070	-21.097	50.670	114.604	0.291
5100.000	1.146	55.486	5099.081	-20.416	47.794	-20.416	51.971	113.131	0.525
5200.000	1.024	62.199	5199.063	-19.433	49.407	-19.433	53.092	111.471	0.176
5300.000	0.902	76.175	5299.049	-18.828	50.962	-18.828	54.329	110.277	0.264
5400.000	0.934	86.290	5399.037	-18.587	52.541	-18.587	55.731	109.482	0.165
5500.000	0.941	94.020	5499.023	-18.592	54.174	-18.592	57.275	108.942	0.127
5600.000	0.970	95.826	5599.009	-18.735	55.835	-18.735	58.895	108.549	0.041
5700.000	0.878	116.050	5698.997	-19.158	57.365	-19.158	60.480	108.467	0.337
5800.000	0.716	133.871	5798.987	-19.928	58.505	-19.928	61.805	108.810	0.294
5900.000	0.966	150.983	5898.976	-21.098	59.364	-21.098	63.002	109.565	0.352
6000.000	1.113	174.676	5998.960	-22.802	59.863	-22.802	64.059	110.852	0.450
6100.000	1.122	170.510	6098.941	-24.735	60.115	-24.735	65.005	112.365	0.082
6200.000	0.992	171.726	6198.924	-26.557	60.401	-26.557	65.982	113.734	0.133
6300.000	1.206	178.227	6298.906	-28.465	60.558	-28.465	66.914	115.176	0.247
6400.000	1.140	181.003	6398.885	-30.511	60.573	-30.511	67.823	116.734	0.087
6500.000	1.329	181.926	6498.862	-32.664	60.517	-32.664	68.769	118.358	0.191
6600.000	1.339	181.298	6598.835	-34.992	60.451	-34.992	69.848	120.064	0.018
6650.000	1.541	180.241	6648.819	-36.248	60.435	-36.248	70.472	120.954	0.406

HORIZONTAL DISPLACEMENT IS
70.472 FEET AT 120.954 DEGREES