



Company: Noble Energy  
 Well: LHI 14-14  
 API#: 05-123-20173  
 Rig Name: Production / Lightning  
 Location: Weld County, CO  
 Latitude: 40.313, Longitude: -104.850  
 GRID North is 0.420 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-01-de\_01.ut

Minimum Curvature Method

Report Date/Time: 9/27/2012 / 12:22

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	0.269	267.497	100.000	-0.010	-0.235	-0.010	0.235	267.497	0.269
200.000	0.340	238.058	199.998	-0.178	-0.721	-0.178	0.743	256.177	0.169
300.000	0.492	316.042	299.996	-0.026	-1.271	-0.026	1.271	268.841	0.536
400.000	0.348	238.903	399.994	0.126	-1.829	0.126	1.833	273.947	0.535
500.000	0.538	308.477	499.992	0.261	-2.456	0.261	2.470	276.071	0.529
600.000	0.355	238.907	599.989	0.393	-3.089	0.393	3.114	277.253	0.531
700.000	0.696	293.419	699.986	0.475	-3.912	0.475	3.941	276.917	0.569
800.000	0.578	244.082	799.980	0.496	-4.923	0.496	4.948	275.749	0.543
900.000	0.541	266.713	899.975	0.248	-5.848	0.248	5.854	272.429	0.223
1000.000	0.899	280.165	999.967	0.360	-7.092	0.360	7.101	272.902	0.393
1100.000	1.154	256.649	1099.952	0.265	-8.845	0.265	8.849	271.719	0.487
1200.000	1.143	264.287	1199.932	-0.066	-10.817	-0.066	10.817	269.648	0.153
1300.000	1.196	278.049	1299.911	-0.020	-12.843	-0.020	12.843	269.913	0.285
1400.000	1.114	284.479	1399.891	0.370	-14.818	0.370	14.822	271.429	0.153
1500.000	1.054	282.698	1499.873	0.815	-16.657	0.815	16.676	272.801	0.069
1600.000	0.740	298.920	1599.861	1.329	-18.119	1.329	18.168	274.196	0.401
1700.000	0.386	331.767	1699.856	1.938	-18.843	1.938	18.943	275.873	0.465
1800.000	0.313	96.186	1799.855	2.206	-18.731	2.206	18.861	276.716	0.619
1900.000	0.651	142.930	1899.852	1.723	-18.117	1.723	18.199	275.433	0.492
2000.000	0.323	136.085	1999.848	1.067	-17.579	1.067	17.611	273.472	0.332
2100.000	0.266	27.604	2099.847	1.069	-17.276	1.069	17.309	273.542	0.480
2200.000	0.547	21.012	2199.845	1.721	-16.997	1.721	17.084	275.781	0.284
2300.000	0.316	291.133	2299.842	2.265	-17.083	2.265	17.233	277.554	0.631
2400.000	1.187	264.065	2399.833	2.258	-18.371	2.258	18.509	277.006	0.917
2500.000	1.376	260.514	2499.808	1.953	-20.586	1.953	20.679	275.418	0.205
2600.000	1.287	277.286	2599.781	1.897	-22.885	1.897	22.963	274.739	0.398
2700.000	1.386	254.619	2699.755	1.719	-25.165	1.719	25.224	273.907	0.534
2800.000	0.688	224.903	2799.739	0.972	-26.756	0.972	26.774	272.081	0.859
2900.000	0.930	232.828	2899.729	0.056	-27.827	0.056	27.827	270.116	0.266
3000.000	1.047	208.852	2999.714	-1.234	-28.914	-1.234	28.941	267.556	0.426
3100.000	1.092	226.081	3099.697	-2.695	-30.041	-2.695	30.162	264.874	0.323
3200.000	1.493	227.992	3199.671	-4.228	-31.696	-4.228	31.976	262.403	0.404
3300.000	1.575	231.579	3299.635	-5.953	-33.740	-5.953	34.261	259.993	0.126
3400.000	1.647	213.421	3399.597	-8.007	-35.608	-8.007	36.497	257.327	0.513

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	1.688	210.396	3499.554	-10.477	-37.145	-10.477	38.594	254.249	0.097
3600.000	2.154	214.084	3599.498	-13.304	-38.943	-13.304	41.153	251.139	0.481
3700.000	2.353	210.704	3699.420	-16.624	-41.044	-16.624	44.283	247.950	0.239
3800.000	2.406	213.707	3799.334	-20.136	-43.257	-20.136	47.714	245.039	0.136
3900.000	2.537	206.385	3899.241	-23.865	-45.406	-23.865	51.295	242.274	0.342
4000.000	2.019	198.487	3999.162	-27.518	-46.948	-27.518	54.418	239.624	0.605
4100.000	1.441	186.489	4099.117	-30.437	-47.649	-30.437	56.540	237.430	0.679
4200.000	1.116	190.252	4199.092	-32.645	-47.964	-32.645	58.019	235.760	0.335
4300.000	1.489	226.851	4299.067	-34.492	-49.085	-34.492	59.992	234.905	0.891
4400.000	1.597	205.194	4399.032	-36.641	-50.626	-36.641	62.495	234.104	0.589
4500.000	0.921	181.185	4499.008	-38.705	-51.236	-38.705	64.212	232.931	0.844
4600.000	1.716	156.524	4598.981	-40.882	-50.656	-40.882	65.095	231.095	0.959
4700.000	1.880	135.798	4698.933	-43.431	-48.916	-43.431	65.414	228.399	0.667
4800.000	1.868	126.745	4798.880	-45.582	-46.467	-45.582	65.091	225.551	0.296
4900.000	1.506	146.139	4898.837	-47.648	-44.428	-47.648	65.148	222.997	0.671
5000.000	1.236	178.618	4998.810	-49.818	-43.670	-49.818	66.248	221.237	0.810
5100.000	1.193	203.632	5098.788	-51.849	-44.061	-51.849	68.042	220.358	0.528
5200.000	1.490	217.386	5198.761	-53.836	-45.267	-53.836	70.338	220.059	0.436
5300.000	1.664	224.641	5298.723	-55.901	-47.077	-55.901	73.083	220.102	0.265
5400.000	1.707	222.381	5398.680	-58.035	-49.101	-58.035	76.019	220.233	0.079
5500.000	1.587	214.773	5498.639	-60.272	-50.895	-60.272	78.886	220.178	0.249
5600.000	1.267	215.192	5598.607	-62.313	-52.321	-62.313	81.366	220.019	0.320
5700.000	1.234	231.715	5698.584	-63.884	-53.804	-63.884	83.523	220.105	0.361
5800.000	1.502	247.138	5798.556	-65.060	-55.857	-65.060	85.749	220.647	0.453
5900.000	1.466	260.346	5898.522	-65.784	-58.325	-65.784	87.917	221.561	0.343
6000.000	1.332	249.285	5998.493	-66.409	-60.673	-66.409	89.952	222.415	0.301
6100.000	1.416	263.994	6098.464	-66.950	-62.989	-66.950	91.923	223.254	0.362
6200.000	1.709	266.499	6198.427	-67.170	-65.706	-67.170	93.963	224.369	0.300
6300.000	1.683	252.681	6298.384	-67.698	-68.596	-67.698	96.377	225.377	0.409
6400.000	1.757	255.985	6398.339	-68.507	-71.485	-68.507	99.012	226.219	0.124
6500.000	1.715	272.901	6498.293	-68.802	-74.468	-68.802	101.386	227.264	0.512
6600.000	1.892	268.819	6598.244	-68.761	-77.613	-68.761	103.691	228.461	0.218
6700.000	1.990	275.045	6698.187	-68.642	-80.993	-68.642	106.168	229.719	0.232
6800.000	1.943	263.748	6798.128	-68.674	-84.408	-68.674	108.815	230.868	0.390
6900.000	1.571	270.144	6898.081	-68.855	-87.464	-68.855	111.315	231.789	0.420
7000.000	1.936	259.134	6998.034	-69.170	-90.494	-69.170	113.902	232.607	0.495
7100.000	1.809	262.348	7097.981	-69.698	-93.717	-69.698	116.793	233.361	0.165
7200.000	1.582	248.259	7197.938	-70.420	-96.563	-70.420	119.513	233.898	0.473

HORIZONTAL DISPLACEMENT IS 119.513 FEET AT 233.898 DEGREES									
---	--	--	--	--	--	--	--	--	--