Company/Rig: Noble Energy/CoreTech
WELL: Jurgens 8-13
DECLINATION: 8.32
TD AS DRILLED: 6803'
COUNTY/STATE: Weld/Colorado
Latitude: 40.416, Longitude: -104.572
GRID North is 0.600 Degrees East of True North
VS-Azi: 0.000 Degrees

DEPTH REFERENCE : RKB=Surface Elevation=4592'

DRILLOG MS GYRO SURVEY CALCULATIONS
Filename: msgyro_run01-01-de_01.ut
Minimum Curvature Method
Report Date/Time: 10/2/2014 / 13:54

Lat & Long Obtained By Handheld GPS At Wellhead
North Reference: Grid
Henderson, Co.
303-853-4976
Surveyor: Mark Simmons

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	0.506	214.661	99.999	-0.363	-0.251	-0.363	0.442	214.661	0.506
200.000	0.352	185.048	199.996	-1.033	-0.530	-1.033	1.160	207.153	0.265
300.000	0.794	129.281	299.991	-1.777	-0.020	-1.777	1.777	180.657	0.663
400.000	1.707	110.144	399.967	-2.728	1.914	-2.728	3.333	144.946	0.992
500.000	2.276	106.834	499.906	-3.816	5.213	-3.816	6.461	126.206	0.580
600.000	2.365	105.825	599.824	-4.954	9.099	-4.954	10.360	118.567	0.098
700.000	2.370	105.672	699.739	-6.075	13.075	-6.075	14.417	114.922	0.008
800.000	2.418	110.347	799.652	-7.367	17.043	-7.367	18.567	113.377	0.201
900.000	2.557	103.381	899.558	-8.617	21.191	-8.617	22.876	112.128	0.332
1000.000	2.497	107.461	999.460	-9.787	25.439	-9.787	27.257	111.042	0.190
1100.000	2.621	110.768	1099.361	-11.251	29.655	-11.251	31.718	110.777	0.193
1200.000	2.396	105.255	1199.265	-12.612	33.810	-12.612	36.085	110.457	0.330
1300.000	2.255	103.921	1299.183	-13.635	37.736	-13.635	40.124	109.866	0.151
1400.000	1.961	116.188	1399.115	-14.864	41.181	-14.864	43.782	109.846	0.537
1500.000	1.607	118.081	1499.067	-16.279	43.954	-16.279	46.872	110.323	0.359
1600.000	1.516	124.556	1599.030	-17.689	46.281	-17.689	49.546	110.918	0.199
1700.000	1.407	139.643	1698.997	-19.375	48.165	-19.375	51.916	111.913	0.398
1800.000	1.602	149.156	1798.963	-21.511	49.677	-21.511	54.134	113.414	0.317
1900.000	1.376	158.960	1898.929	-23.832	50.825	-23.832	56.135	115.122	0.340

VES Survey Date: 09/24/2014

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
2000.000	1.075	165.534	1998.906	-25.861	51.490	-25.861	57.619	116.668	0.331
2100.000	1.110	164.271	2098.888	-27.702	51.987	-27.702	58.907	118.052	0.042
2200.000	0.895	171.520	2198.873	-29.407	52.365	-29.407	60.057	119.318	0.250
2300.000	0.755	172.539	2298.862	-30.833	52.566	-30.833	60.941	120.394	0.140
2400.000	0.633	184.311	2398.855	-32.037	52.610	-32.037	61.597	121.340	0.187
2500.000	0.514	182.656	2498.850	-33.036	52.547	-33.036	62.069	122.157	0.120
2600.000	0.758	181.961	2598.844	-34.145	52.504	-34.145	62.630	123.038	0.244
2700.000	0.742	179.710	2698.835	-35.454	52.485	-35.454	63.337	124.039	0.034
2800.000	0.819	181.106	2798.826	-36.815	52.474	-36.815	64.101	125.053	0.079
2900.000	0.870	185.115	2898.815	-38.286	52.393	-38.286	64.891	126.157	0.078
3000.000	0.932	177.693	2998.803	-39.854	52.358	-39.854	65.800	127.278	0.132
3100.000	0.766	169.540	3098.792	-41.325	52.512	-41.325	66.822	128.201	0.205
3200.000	0.445	180.436	3198.786	-42.371	52.630	-42.371	67.566	128.836	0.340
3300.000	0.492	12.832	3298.785	-42.341	52.723	-42.341	67.620	128.768	0.931
3400.000	0.930	23.885	3398.777	-41.180	53.147	-41.180	67.234	127.770	0.458
3500.000	1.320	22.810	3498.758	-39.376	53.922	-39.376	66.769	126.138	0.391
3600.000	1.344	12.135	3598.731	-37.167	54.615	-37.167	66.062	124.237	0.249
3700.000	1.428	22.989	3698.702	-34.874	55.348	-34.874	65.419	122.214	0.275
3800.000	1.097	12.819	3798.677	-32.794	56.047	-32.794	64.936	120.332	0.398
3900.000	1.123	16.141	3898.659	-30.919	56.532	-30.919	64.435	118.676	0.069
4000.000	0.642	357.334	3998.647	-29.418	56.778	-29.418	63.947	117.390	0.555
4100.000	0.886	281.465	4098.640	-28.705	55.994	-28.705	62.923	117.142	0.959
4200.000	1.519	270.845	4198.618	-28.532	53.911	-28.532	60.995	117.890	0.669
4300.000	2.424	260.094	4298.558	-28.876	50.502	-28.876	58.174	119.760	0.974
4400.000	2.807	259.396	4398.453	-29.691	46.012	-29.691	54.760	122.833	0.384
4500.000	3.621	253.602	4498.295	-31.033	40.576	-31.033	51.082	127.409	0.876
4600.000	3.679	253.126	4598.093	-32.855	34.476	-32.855	47.624	133.621	0.066
4700.000	2.730	252.298	4697.935	-34.511	29.136	-34.511	45.166	139.827	0.951
4800.000	2.485	259.941	4797.832	-35.614	24.733	-35.614	43.360	145.221	0.425
4900.000	2.382	259.375	4897.742	-36.375	20.556	-36.375	41.782	150.529	0.105
5000.000	2.191	258.914	4997.662	-37.126	16.637	-37.126	40.684	155.861	0.192
5100.000	1.750	261.944	5097.602	-37.708	13.249	-37.708	39.968	160.640	0.453
5200.000	1.531	264.708	5197.561	-38.045	10.407	-38.045	39.443	164.702	0.233
5300.000	1.463	266.949	5297.527	-38.236	7.802	-38.236	39.024	168.468	0.090
5400.000	1.323	303.190	5397.500	-37.672	5.561	-37.672	38.081	171.603	0.877
5500.000	1.300	314.833	5497.474	-36.241	3.790	-36.241	36.438	174.029	0.267
5600.000	1.408	322.314	5597.446	-34.468	2.235	-34.468	34.541	176.291	0.207
5700.000	1.240	320.780	5697.419	-32.658	0.800	-32.658	32.668	178.597	0.172
5800.000	1.290	323.080	5797.395	-30.920	-0.560	-30.920	30.925	181.038	0.071
5900.000	1.239	316.040	5897.370	-29.242	-1.987	-29.242	29.310	183.887	0.163

VES Survey Date: 09/24/2014

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
6000.000	1.473	296.875	5997.343	-27.884	-3.883	-27.884	28.153	187.928	0.507
6100.000	1.377	315.606	6097.312	-26.444	-5.870	-26.444	27.088	192.516	0.473
6200.000	1.273	311.615	6197.286	-24.848	-7.541	-24.848	25.967	196.882	0.139
6300.000	1.341	303.049	6297.260	-23.472	-9.352	-23.472	25.267	201.725	0.207
6400.000	1.189	307.578	6397.235	-22.201	-11.156	-22.201	24.846	206.679	0.182
6500.000	1.579	310.317	6497.206	-20.677	-13.028	-20.677	24.439	212.215	0.395
6600.000	1.003	306.503	6597.180	-19.265	-14.782	-19.265	24.283	217.499	0.582
6700.000	0.695	353.803	6697.170	-18.142	-15.551	-18.142	23.895	220.602	0.737

VES Survey Date: 09/24/2014