



COMPANY/RIG: Noble Energy/Production/CoreTech
WELL/API: Landwehr A 34-3X/05-123-26572
DECLINATION: 8.22 Degrees
TD AS DRILLED: 7060 Feet
COUNTY/STATE: Weld/Colorado
VS-Azi: 0.000 Degrees
Latitude: 40.44862, Longitude: -104.53896
Grid North = True North -0.62 degs (NAD 27)
Grid Correction Applied = -0.62 degs



DEPTH REFERENCE : RKB = GL Elevation = 4689

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyrosurvey.ut

Minimum Curvature Method

Report Date/Time: 3/16/2016 / 15:17

LAT & LONG OBTAINED BY HANDHELD GPS AT WELLHEAD

NORTH REFERENCE: GRID

HENDERSON, COLORADO

303-853-4976

Surveyor: JUSTIN WILLIAMS / Landwehr A 34-3X

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	0.583	353.543	99.998	0.506	-0.057	0.506	0.509	353.543	0.583
200.000	0.495	337.653	199.994	1.411	-0.279	1.411	1.438	348.825	0.173
300.000	0.557	321.303	299.990	2.190	-0.747	2.190	2.314	341.165	0.162
400.000	0.621	307.901	399.984	2.903	-1.479	2.903	3.258	333.003	0.151
500.000	0.444	307.511	499.980	3.472	-2.214	3.472	4.118	327.474	0.177
600.000	0.582	293.777	599.976	3.913	-2.986	3.913	4.922	322.649	0.184
700.000	0.531	293.041	699.971	4.299	-3.877	4.299	5.789	317.953	0.052
800.000	0.273	285.680	799.969	4.544	-4.533	4.544	6.418	315.074	0.262
900.000	0.396	283.973	899.967	4.692	-5.098	4.692	6.928	312.628	0.124
1000.000	0.617	264.810	999.963	4.727	-5.969	4.727	7.614	308.376	0.275
1100.000	0.621	255.178	1099.957	4.540	-7.029	4.540	8.367	302.858	0.104
1200.000	0.375	237.796	1199.954	4.227	-7.829	4.227	8.897	298.364	0.286
1300.000	0.419	264.017	1299.951	4.014	-8.469	4.014	9.372	295.362	0.185
1400.000	0.603	242.930	1399.947	3.737	-9.301	3.737	10.024	291.888	0.261
1500.000	0.557	236.776	1499.942	3.231	-10.177	3.231	10.677	287.612	0.077
1600.000	0.472	186.654	1599.939	2.555	-10.632	2.555	10.934	283.512	0.443
1700.000	0.498	150.224	1699.935	1.768	-10.464	1.768	10.612	279.592	0.304
1800.000	0.730	170.047	1799.930	0.764	-10.138	0.764	10.166	274.309	0.311

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
1900.000	1.189	152.085	1899.916	-0.781	-9.542	-0.781	9.574	265.323	0.544
2000.000	1.764	143.574	1999.882	-2.936	-8.142	-2.936	8.655	250.172	0.613
2100.000	2.059	155.743	2099.827	-5.812	-6.490	-5.812	8.712	228.156	0.501
2200.000	1.501	173.224	2199.779	-8.751	-5.598	-8.751	10.388	212.605	0.773
2300.000	0.856	195.979	2299.758	-10.770	-5.649	-10.770	12.161	207.676	0.785
2400.000	0.781	210.660	2399.748	-12.074	-6.202	-12.074	13.574	207.187	0.222
2500.000	0.834	206.443	2499.738	-13.312	-6.873	-13.312	14.982	207.308	0.080
2600.000	0.621	203.553	2599.729	-14.462	-7.414	-14.462	16.252	207.144	0.216
2700.000	0.599	175.499	2699.724	-15.480	-7.590	-15.480	17.240	206.120	0.297
2800.000	0.400	157.025	2799.720	-16.322	-7.413	-16.322	17.926	204.427	0.253
2900.000	0.505	150.714	2899.717	-17.027	-7.061	-17.027	18.433	202.524	0.116
3000.000	0.687	157.167	2999.712	-17.965	-6.613	-17.965	19.143	200.208	0.194
3100.000	1.023	172.692	3099.701	-19.403	-6.266	-19.403	20.389	197.899	0.405
3200.000	1.611	171.145	3199.674	-21.677	-5.936	-21.677	22.475	195.316	0.590
3300.000	2.374	172.725	3299.612	-25.121	-5.458	-25.121	25.707	192.257	0.765
3400.000	2.116	172.011	3399.536	-29.004	-4.939	-29.004	29.421	189.664	0.260
3500.000	1.451	180.657	3499.487	-32.098	-4.697	-32.098	32.440	188.325	0.715
3600.000	1.153	180.574	3599.461	-34.371	-4.721	-34.371	34.693	187.822	0.298
3700.000	1.257	192.723	3699.439	-36.447	-4.973	-36.447	36.785	187.770	0.275
3800.000	1.064	191.500	3799.418	-38.427	-5.400	-38.427	38.804	187.999	0.195
3900.000	1.284	202.289	3899.397	-40.373	-6.010	-40.373	40.818	188.467	0.311
4000.000	0.713	225.342	3999.382	-41.847	-6.878	-41.847	42.408	189.333	0.687
4100.000	0.696	235.091	4099.375	-42.632	-7.819	-42.632	43.343	190.392	0.121
4200.000	0.820	263.174	4199.366	-43.065	-9.028	-43.065	44.001	191.839	0.387
4300.000	0.813	289.858	4299.356	-42.909	-10.406	-42.909	44.153	193.631	0.377
4400.000	0.645	302.911	4399.348	-42.363	-11.545	-42.363	43.908	195.244	0.235
4500.000	0.264	341.605	4499.345	-41.838	-12.090	-41.838	43.550	196.117	0.469
4600.000	0.316	314.369	4599.344	-41.427	-12.360	-41.427	43.232	196.612	0.146
4700.000	0.217	322.324	4699.343	-41.085	-12.672	-41.085	42.995	197.142	0.105
4800.000	0.415	8.271	4799.341	-40.577	-12.736	-40.577	42.528	197.426	0.307
4900.000	0.546	355.675	4899.338	-39.744	-12.720	-39.744	41.729	197.747	0.167
5000.000	0.343	6.706	4999.335	-38.972	-12.721	-38.972	40.995	198.077	0.219
5100.000	0.213	9.046	5099.334	-38.491	-12.657	-38.491	40.519	198.202	0.131
5200.000	0.351	52.739	5199.333	-38.123	-12.384	-38.123	40.084	197.996	0.246
5300.000	0.374	58.157	5299.331	-37.765	-11.862	-37.765	39.584	197.438	0.041
5400.000	0.135	326.149	5399.330	-37.495	-11.650	-37.495	39.263	197.261	0.402
5500.000	0.413	309.840	5499.329	-37.166	-11.992	-37.166	39.053	197.883	0.286
5600.000	0.727	317.579	5599.323	-36.467	-12.697	-36.467	38.614	199.197	0.323
5700.000	0.704	346.129	5699.316	-35.402	-13.272	-35.402	37.808	200.551	0.354
5800.000	0.827	356.027	5799.307	-34.086	-13.470	-34.086	36.651	201.562	0.180

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
5900.000	1.090	5.342	5899.293	-32.420	-13.431	-32.420	35.092	202.504	0.305
6000.000	1.199	354.134	5999.273	-30.432	-13.449	-30.432	33.271	203.843	0.249
6100.000	0.371	343.798	6099.263	-29.080	-13.647	-29.080	32.123	205.139	0.837
6200.000	0.526	209.197	6199.262	-29.170	-13.961	-29.170	32.339	205.575	0.829
6300.000	0.688	186.328	6299.256	-30.167	-14.251	-30.167	33.364	205.286	0.288
6400.000	0.964	178.576	6399.246	-31.604	-14.296	-31.604	34.687	204.339	0.297
6500.000	0.929	167.353	6499.232	-33.236	-14.097	-33.236	36.102	202.985	0.188
6600.000	1.009	157.105	6599.218	-34.838	-13.578	-34.838	37.390	201.293	0.190
6700.000	0.955	147.849	6699.203	-36.354	-12.792	-36.354	38.539	199.385	0.167
6800.000	0.716	125.475	6799.193	-37.422	-11.839	-37.422	39.250	197.556	0.400