



COMPANY/RIG: Noble Energy/Production/CoreTech
WELL/API: Tigges 30-31/05-123-20315
DECLINATION: 8.27 Degrees
TD AS DRILLED: 7289 Feet
COUNTY/STATE: Weld/Colorado
VS-Azi: 0.000 Degrees
Latitude: 40.45709, Longitude: -104.82442
Grid North = True North -0.44 degs (NAD 27)
Grid Correction Applied = -0.44 degs



DEPTH REFERENCE : RKB = GL Elevation = 4734

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyrosurvey.ut

Minimum Curvature Method

Report Date/Time: 3/30/2017 / 16:29

LAT & LONG OBTAINED BY HANDHELD GPS AT WELLHEAD

NORTH REFERENCE: GRID

HENDERSON, COLORADO

303-853-4976

Surveyor: JUSTIN WILLIAMS / Tigges 30-31

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	0.494	233.449	99.999	-0.257	-0.346	-0.257	0.431	233.449	0.494
200.000	0.505	234.685	199.995	-0.768	-1.052	-0.768	1.302	233.868	0.016
300.000	0.148	251.179	299.993	-1.065	-1.534	-1.065	1.867	235.237	0.366
400.000	0.174	187.988	399.993	-1.256	-1.677	-1.256	2.095	233.163	0.170
500.000	0.175	220.397	499.992	-1.522	-1.797	-1.522	2.355	229.728	0.097
600.000	0.071	223.343	599.992	-1.683	-1.938	-1.683	2.567	229.023	0.104
700.000	0.125	190.087	699.992	-1.836	-1.999	-1.836	2.714	227.445	0.077
800.000	0.201	220.487	799.992	-2.076	-2.132	-2.076	2.976	225.760	0.112
900.000	0.181	231.330	899.991	-2.308	-2.369	-2.308	3.308	225.747	0.041
1000.000	0.153	233.227	999.991	-2.487	-2.599	-2.487	3.597	226.268	0.029
1100.000	0.135	221.798	1099.990	-2.654	-2.785	-2.654	3.847	226.372	0.034
1200.000	0.202	239.823	1199.990	-2.831	-3.015	-2.831	4.136	226.809	0.084
1300.000	0.489	268.176	1299.988	-2.932	-3.593	-2.932	4.638	230.783	0.326
1400.000	0.767	278.564	1399.982	-2.846	-4.682	-2.846	5.479	238.701	0.300
1500.000	0.684	264.949	1499.974	-2.799	-5.938	-2.799	6.564	244.759	0.191
1600.000	0.824	275.430	1599.965	-2.784	-7.248	-2.784	7.764	248.989	0.196

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
1700.000	0.760	263.184	1699.956	-2.794	-8.622	-2.794	9.064	252.043	0.180
1800.000	0.648	283.178	1799.949	-2.744	-9.832	-2.744	10.207	254.405	0.268
1900.000	0.461	289.628	1899.944	-2.480	-10.761	-2.480	11.043	257.023	0.197
2000.000	0.346	332.180	1999.942	-2.078	-11.281	-2.078	11.471	259.563	0.312
2100.000	0.460	8.885	2099.939	-1.415	-11.360	-1.415	11.448	262.901	0.276
2200.000	0.615	6.954	2199.935	-0.486	-11.233	-0.486	11.244	267.525	0.156
2300.000	0.537	7.554	2299.930	0.511	-11.107	0.511	11.118	272.636	0.078
2400.000	0.224	3.501	2399.927	1.171	-11.033	1.171	11.095	276.057	0.314
2500.000	0.182	43.341	2499.927	1.481	-10.912	1.481	11.012	277.731	0.144
2600.000	0.133	76.709	2599.926	1.623	-10.691	1.623	10.813	278.634	0.102
2700.000	0.111	193.849	2699.926	1.556	-10.601	1.556	10.715	278.351	0.208
2800.000	0.265	247.419	2799.926	1.373	-10.838	1.373	10.924	277.222	0.218
2900.000	0.345	233.934	2899.924	1.107	-11.295	1.107	11.349	275.598	0.107
3000.000	0.462	240.247	2999.922	0.730	-11.888	0.730	11.910	273.514	0.124
3100.000	0.774	274.123	3099.916	0.579	-12.912	0.579	12.925	272.566	0.468
3200.000	1.258	277.143	3199.900	0.764	-14.675	0.764	14.694	272.979	0.486
3300.000	1.388	276.906	3299.874	1.046	-16.966	1.046	16.998	273.527	0.130
3400.000	1.558	277.209	3399.841	1.362	-19.516	1.362	19.564	273.992	0.170
3500.000	2.015	275.371	3499.792	1.697	-22.615	1.697	22.679	274.291	0.461
3600.000	2.371	271.502	3599.718	1.916	-26.433	1.916	26.502	274.145	0.385
3700.000	2.460	272.852	3699.629	2.077	-30.644	2.077	30.714	273.877	0.106
3800.000	2.703	273.591	3799.528	2.331	-35.141	2.331	35.218	273.796	0.246
3900.000	2.674	273.738	3899.418	2.631	-39.823	2.631	39.909	273.780	0.030
4000.000	2.454	269.498	3999.318	2.764	-44.291	2.764	44.377	273.572	0.291
4100.000	2.616	275.202	4099.220	2.953	-48.704	2.953	48.793	273.469	0.300
4200.000	2.653	264.711	4199.115	2.946	-53.280	2.946	53.362	273.165	0.483
4300.000	2.811	264.652	4299.001	2.504	-58.026	2.504	58.080	272.471	0.158
4400.000	2.743	255.926	4398.884	1.694	-62.788	1.694	62.811	271.545	0.428
4500.000	2.803	243.817	4498.768	0.033	-67.304	0.033	67.304	270.028	0.588
4600.000	3.046	233.300	4598.638	-2.634	-71.629	-2.634	71.677	267.894	0.588
4700.000	2.894	222.291	4698.505	-6.089	-75.458	-6.089	75.703	265.386	0.589
4800.000	2.827	221.874	4798.380	-9.793	-78.802	-9.793	79.409	262.916	0.070
4900.000	2.611	225.553	4898.268	-13.225	-82.075	-13.225	83.134	260.847	0.278
5000.000	2.358	224.956	4998.174	-16.276	-85.155	-16.276	86.697	259.179	0.254
5100.000	1.953	234.499	5098.103	-18.722	-87.996	-18.722	89.966	257.989	0.540
5200.000	1.258	238.612	5198.063	-20.283	-90.321	-20.283	92.570	257.343	0.705
5300.000	0.897	261.932	5298.046	-20.964	-92.033	-20.964	94.390	257.167	0.561
5400.000	0.341	278.737	5398.040	-21.029	-93.102	-21.029	95.447	257.272	0.579
5500.000	0.179	238.553	5498.039	-21.065	-93.529	-21.065	95.872	257.307	0.234

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
5600.000	0.364	212.607	5598.037	-21.415	-93.834	-21.415	96.247	257.144	0.218
5700.000	0.379	317.089	5698.036	-21.440	-94.231	-21.440	96.639	257.182	0.588
5800.000	0.266	193.305	5798.035	-21.424	-94.510	-21.424	96.908	257.228	0.572
5900.000	0.591	179.968	5898.032	-22.166	-94.563	-22.166	97.126	256.808	0.338
6000.000	0.430	153.972	5998.029	-23.019	-94.398	-23.019	97.164	256.296	0.278
6100.000	0.389	146.472	6098.026	-23.639	-94.046	-23.639	96.972	255.891	0.068
6200.000	0.411	155.796	6198.024	-24.249	-93.712	-24.249	96.798	255.492	0.069
6300.000	0.322	169.786	6298.022	-24.853	-93.515	-24.853	96.761	255.117	0.126
6400.000	0.627	151.371	6398.018	-25.609	-93.203	-25.609	96.657	254.636	0.338
6500.000	0.356	135.683	6498.014	-26.312	-92.723	-26.312	96.384	254.158	0.300
6600.000	0.307	60.174	6598.013	-26.402	-92.274	-26.402	95.977	254.033	0.408
6700.000	0.779	29.046	6698.009	-25.674	-91.712	-25.674	95.237	254.361	0.541
6800.000	0.811	44.917	6797.999	-24.578	-90.882	-24.578	94.147	254.867	0.222
6900.000	0.609	60.767	6897.991	-23.817	-89.918	-23.817	93.019	255.164	0.280
7000.000	0.692	103.416	6997.985	-23.698	-88.867	-23.698	91.972	255.069	0.479