



COMPANY/RIG: Noble Energy/Production/CoreTech
WELL/API: Landwehr A 34-4/05-123-26571
DECLINATION: 8.22 Degrees
TD AS DRILLED: 7062 Feet
COUNTY/STATE: Weld/Colorado
VS-Azi: 0.000 Degrees
Latitude: 40.44857, Longitude: -104.54408
Grid North = True North -0.62 degs (NAD 27)
Grid Correction Applied = -0.62 degs



DEPTH REFERENCE : RKB = GL Elevation = 4665

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyrosurvey.ut

Minimum Curvature Method

Report Date/Time: 3/16/2016 / 15:32

LAT & LONG OBTAINED BY HANDHELD GPS AT WELLHEAD

NORTH REFERENCE: GRID

HENDERSON, COLORADO

303-853-4976

Surveyor: JUSTIN WILLIAMS / API 05-123-26571

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	0.466	341.186	99.999	0.385	-0.131	0.385	0.406	341.186	0.466
200.000	0.079	34.738	199.998	0.826	-0.223	0.826	0.855	344.881	0.424
300.000	0.325	133.497	299.997	0.687	0.022	0.687	0.687	1.803	0.346
400.000	0.078	217.560	399.997	0.438	0.186	0.438	0.476	22.998	0.326
500.000	0.380	64.947	499.996	0.524	0.445	0.524	0.688	40.318	0.451
600.000	0.420	107.847	599.994	0.552	1.095	0.552	1.226	63.217	0.295
700.000	0.090	199.119	699.993	0.366	1.418	0.366	1.464	75.528	0.432
800.000	0.672	222.115	799.990	-0.143	0.999	-0.143	1.009	98.150	0.590
900.000	1.048	217.948	899.979	-1.299	0.044	-1.299	1.300	178.079	0.381
1000.000	1.124	219.485	999.961	-2.777	-1.142	-2.777	3.002	202.360	0.081
1100.000	1.221	223.950	1099.940	-4.300	-2.505	-4.300	4.977	210.221	0.133
1200.000	1.165	222.626	1199.918	-5.815	-3.933	-5.815	7.020	214.070	0.062
1300.000	1.086	228.733	1299.899	-7.188	-5.333	-7.188	8.950	216.574	0.144
1400.000	0.922	263.231	1399.884	-7.908	-6.844	-7.908	10.458	220.876	0.615
1500.000	0.841	258.312	1499.873	-8.151	-8.361	-8.151	11.677	225.729	0.111
1600.000	0.848	254.567	1599.862	-8.497	-9.793	-8.497	12.965	229.054	0.056
1700.000	0.875	268.742	1699.851	-8.710	-11.270	-8.710	14.244	232.301	0.214
1800.000	0.647	278.706	1799.842	-8.642	-12.593	-8.642	15.273	235.540	0.263

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	0.928	284.130	1899.832	-8.358	-13.936	-8.358	16.251	239.046	0.290
2000.000	1.222	271.877	1999.815	-8.126	-15.787	-8.126	17.756	242.764	0.372
2100.000	1.479	271.166	2099.787	-8.065	-18.143	-8.065	19.854	246.034	0.257
2200.000	2.055	272.165	2199.739	-7.971	-21.225	-7.971	22.672	249.417	0.578
2300.000	1.992	276.400	2299.676	-7.709	-24.744	-7.709	25.917	252.695	0.163
2400.000	1.293	274.091	2399.635	-7.435	-27.596	-7.435	28.580	254.921	0.702
2500.000	0.855	281.105	2499.617	-7.211	-29.453	-7.211	30.323	256.243	0.457
2600.000	0.970	263.089	2599.604	-7.169	-31.026	-7.169	31.844	256.989	0.308
2700.000	0.798	238.634	2699.593	-7.633	-32.461	-7.633	33.347	256.767	0.411
2800.000	0.802	222.092	2799.583	-8.515	-33.525	-8.515	34.589	255.749	0.230
2900.000	0.799	248.633	2899.574	-9.288	-34.643	-9.288	35.867	254.991	0.368
3000.000	1.122	250.534	2999.560	-9.869	-36.215	-9.869	37.536	254.757	0.324
3100.000	1.062	221.487	3099.542	-10.889	-37.752	-10.889	39.291	253.911	0.551
3200.000	1.885	210.611	3199.509	-12.999	-39.204	-12.999	41.302	251.656	0.866
3300.000	2.861	210.609	3299.422	-16.563	-41.312	-16.563	44.508	248.153	0.976
3400.000	2.679	194.723	3399.306	-20.972	-43.177	-20.972	48.001	244.094	0.786
3500.000	2.042	181.742	3499.221	-25.013	-43.825	-25.013	50.461	240.285	0.828
3600.000	2.156	176.824	3599.154	-28.672	-43.775	-28.672	52.329	236.776	0.213
3700.000	2.026	181.864	3699.088	-32.317	-43.728	-32.317	54.374	233.534	0.225
3800.000	2.013	187.673	3799.026	-35.825	-44.020	-35.825	56.756	230.860	0.205
3900.000	2.131	210.578	3898.962	-39.167	-45.201	-39.167	59.809	229.091	0.831
4000.000	1.817	229.245	3998.904	-41.803	-47.348	-41.803	63.161	228.559	0.711
4100.000	1.828	253.986	4098.855	-43.278	-50.082	-43.278	66.191	229.168	0.781
4200.000	1.630	261.944	4198.809	-43.918	-53.023	-43.918	68.849	230.366	0.310
4300.000	1.706	268.037	4298.767	-44.168	-55.919	-44.168	71.258	231.697	0.193
4400.000	1.893	277.586	4398.718	-44.001	-59.044	-44.001	73.636	233.306	0.353
4500.000	1.849	274.085	4498.665	-43.668	-62.290	-43.668	76.072	234.968	0.122
4600.000	1.355	298.243	4598.626	-42.993	-64.942	-42.993	77.884	236.494	0.826
4700.000	1.572	294.860	4698.594	-41.857	-67.228	-41.857	79.193	238.093	0.233
4800.000	1.612	312.601	4798.556	-40.329	-69.507	-40.329	80.360	239.877	0.492
4900.000	1.871	321.139	4898.509	-38.105	-71.567	-38.105	81.079	241.968	0.366
5000.000	1.953	312.571	4998.454	-35.681	-73.846	-35.681	82.015	244.211	0.297
5100.000	1.866	320.213	5098.399	-33.277	-76.143	-33.277	83.097	246.393	0.269
5200.000	1.216	307.814	5198.362	-31.375	-78.024	-31.375	84.096	248.094	0.727
5300.000	1.006	313.809	5298.343	-30.117	-79.495	-30.117	85.009	249.251	0.240
5400.000	0.607	299.830	5398.333	-29.246	-80.588	-29.246	85.731	250.054	0.442
5500.000	0.427	242.472	5498.330	-29.155	-81.378	-29.155	86.443	250.289	0.520
5600.000	0.410	249.083	5598.327	-29.455	-82.043	-29.455	87.171	250.251	0.051
5700.000	0.112	198.495	5698.326	-29.676	-82.409	-29.676	87.589	250.196	0.350
5800.000	0.386	100.194	5798.325	-29.828	-82.109	-29.828	87.359	250.035	0.417

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	0.318	59.587	5898.324	-29.747	-81.538	-29.747	86.794	249.957	0.252
6000.000	0.637	2.263	5998.320	-29.051	-81.276	-29.051	86.312	250.331	0.537
6100.000	1.400	10.522	6098.304	-27.294	-81.031	-27.294	85.504	251.385	0.775
6200.000	1.715	13.506	6198.267	-24.638	-80.458	-24.638	84.146	252.974	0.326
6300.000	2.227	20.840	6298.208	-21.367	-79.418	-21.367	82.242	254.942	0.569
6400.000	2.243	38.078	6398.133	-18.010	-77.519	-18.010	79.584	256.920	0.670
6500.000	2.038	42.668	6498.063	-15.162	-75.107	-15.162	76.622	258.587	0.267
6600.000	2.678	36.413	6597.978	-11.974	-72.515	-11.974	73.497	260.624	0.689
6700.000	2.525	27.605	6697.875	-8.142	-70.107	-8.142	70.578	263.376	0.428
6800.000	2.347	36.868	6797.785	-4.552	-67.858	-4.552	68.011	266.162	0.431