



Company/Rig: NOBLE ENERGY/ CORETECH  
WELL/API#: BILLY 22-45/05-123-24111  
DECLINATION: 8.3 DEGREES  
TD AS DRILLED: 7,170 FEET  
COUNTY/STATE: WELD/COLORADO  
VS-Azi: 0.000 Degrees  
Latitude: 40.38167, Longitude: -104.64517  
Grid North = True North -0.55 degs (NAD 27)  
Grid Correction Applied = -0.55 degs



DEPTH REFERENCE : RKB=SURFACE ELEVATION=4,634 FEET

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro\_run01-01-de\_01.ut

Minimum Curvature Method

Report Date/Time: 12/14/2015 / 13:19

LAT & LONG OBTAINED BY HANDHELD GPS AT WELLHEAD

NORTH REFERENCE: GRID

HENDERSON, COLORADO

303-853-4976

SURVEYOR: LEVI SHELDON

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	0.538	175.750	99.999	-0.469	0.035	-0.469	0.470	175.750	0.538
200.000	0.357	193.904	199.995	-1.240	-0.005	-1.240	1.240	180.242	0.228
300.000	0.626	201.484	299.992	-2.050	-0.280	-2.050	2.069	187.780	0.276
400.000	0.824	211.793	399.984	-3.170	-0.859	-3.170	3.284	195.165	0.237
500.000	1.015	208.423	499.971	-4.560	-1.660	-4.560	4.853	200.000	0.198
600.000	1.232	196.286	599.952	-6.372	-2.383	-6.372	6.803	200.506	0.321
700.000	1.169	206.591	699.930	-8.316	-3.141	-8.316	8.890	200.693	0.225
800.000	1.252	195.851	799.908	-10.280	-3.896	-10.280	10.993	200.758	0.241
900.000	1.291	209.084	899.883	-12.315	-4.742	-12.315	13.197	201.061	0.296
1000.000	1.262	191.565	999.859	-14.379	-5.511	-14.379	15.399	200.970	0.390
1100.000	1.317	199.843	1099.833	-16.538	-6.122	-16.538	17.635	200.312	0.194
1200.000	1.337	204.917	1199.807	-18.677	-7.003	-18.677	19.947	200.554	0.119
1300.000	1.201	204.336	1299.782	-20.689	-7.926	-20.689	22.155	200.962	0.136
1400.000	1.128	199.870	1399.762	-22.570	-8.692	-22.570	24.186	201.063	0.116
1500.000	1.041	190.369	1499.744	-24.389	-9.190	-24.389	26.063	200.648	0.200
1600.000	1.079	194.026	1599.727	-26.196	-9.582	-26.196	27.893	200.092	0.078
1700.000	0.782	205.073	1699.713	-27.727	-10.099	-27.727	29.509	200.014	0.345
1800.000	0.843	208.220	1799.703	-28.993	-10.736	-28.993	30.917	200.320	0.075

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	0.647	209.095	1899.695	-30.134	-11.359	-30.134	32.204	200.653	0.196
2000.000	0.558	203.850	1999.689	-31.073	-11.830	-31.073	33.249	200.842	0.104
2100.000	0.312	235.632	2099.686	-31.673	-12.252	-31.673	33.960	201.148	0.336
2200.000	0.621	231.074	2199.683	-32.167	-12.898	-32.167	34.657	201.850	0.311
2300.000	1.055	225.101	2299.672	-33.157	-13.972	-33.157	35.981	202.850	0.442
2400.000	1.051	229.751	2399.655	-34.399	-15.324	-34.399	37.658	204.012	0.085
2500.000	1.118	221.600	2499.637	-35.721	-16.672	-35.721	39.420	205.019	0.168
2600.000	1.116	229.351	2599.618	-37.085	-18.058	-37.085	41.248	205.963	0.151
2700.000	1.101	223.080	2699.600	-38.421	-19.453	-38.421	43.065	206.854	0.122
2800.000	1.154	222.870	2799.580	-39.861	-20.794	-39.861	44.959	207.550	0.054
2900.000	1.106	225.008	2899.561	-41.282	-22.163	-41.282	46.855	208.230	0.064
3000.000	1.073	222.115	2999.543	-42.659	-23.473	-42.659	48.691	208.822	0.065
3100.000	0.938	220.431	3099.527	-43.976	-24.631	-43.976	50.404	209.254	0.138
3200.000	0.768	154.042	3199.519	-45.201	-24.869	-45.201	51.591	208.819	0.945
3300.000	1.351	123.999	3299.502	-46.463	-23.598	-46.463	52.112	206.926	0.786
3400.000	1.372	114.005	3399.474	-47.609	-21.528	-47.609	52.250	204.331	0.238
3500.000	1.073	93.847	3499.451	-48.159	-19.500	-48.159	51.957	202.043	0.519
3600.000	1.359	98.946	3599.429	-48.406	-17.394	-48.406	51.436	199.765	0.305
3700.000	1.299	85.028	3699.402	-48.492	-15.093	-48.492	50.787	197.289	0.327
3800.000	1.538	90.151	3799.371	-48.398	-12.621	-48.398	50.016	194.616	0.270
3900.000	1.217	94.852	3899.342	-48.491	-10.221	-48.491	49.556	191.903	0.341
4000.000	0.371	116.329	3999.332	-48.724	-8.873	-48.724	49.526	190.321	0.882
4100.000	0.506	201.346	4099.330	-49.280	-8.744	-49.280	50.049	190.061	0.601
4200.000	0.750	268.936	4199.325	-49.703	-9.559	-49.703	50.614	190.886	0.727
4300.000	0.782	288.886	4299.316	-49.494	-10.859	-49.494	50.672	192.374	0.267
4400.000	1.043	288.170	4399.303	-48.990	-12.369	-48.990	50.527	194.170	0.261
4500.000	1.191	288.455	4499.284	-48.377	-14.220	-48.377	50.423	196.380	0.149
4600.000	1.346	295.801	4599.260	-47.537	-16.263	-47.537	50.242	198.887	0.224
4700.000	1.554	300.010	4699.228	-46.347	-18.495	-46.347	49.901	201.754	0.234
4800.000	0.923	282.286	4799.204	-45.498	-20.456	-45.498	49.885	204.209	0.731
4900.000	0.713	250.144	4899.195	-45.537	-21.828	-45.537	50.498	205.610	0.496
5000.000	0.898	263.346	4999.185	-45.839	-23.191	-45.839	51.372	206.835	0.261
5100.000	1.401	287.592	5099.165	-45.561	-25.134	-45.561	52.034	208.884	0.689
5200.000	1.546	292.667	5199.132	-44.671	-27.545	-44.671	52.481	211.659	0.195
5300.000	1.733	299.874	5299.091	-43.398	-30.101	-43.398	52.815	214.746	0.278
5400.000	1.570	302.497	5399.049	-41.908	-32.568	-41.908	53.075	217.852	0.180
5500.000	1.244	298.554	5499.019	-40.654	-34.677	-40.654	53.434	220.463	0.340
5600.000	0.938	296.623	5599.001	-39.768	-36.362	-39.768	53.886	222.438	0.307
5700.000	0.408	282.080	5698.994	-39.327	-37.442	-39.327	54.300	223.594	0.553
5800.000	0.429	318.159	5798.991	-38.973	-38.040	-38.973	54.460	224.306	0.260

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	0.092	197.364	5898.990	-38.771	-38.314	-38.771	54.508	224.660	0.483
6000.000	0.102	165.534	5998.990	-38.933	-38.316	-38.933	54.625	224.542	0.054
6100.000	0.172	18.454	6098.990	-38.877	-38.246	-38.877	54.536	224.531	0.264
6200.000	0.188	68.460	6198.990	-38.674	-38.046	-38.674	54.251	224.531	0.153
6300.000	0.119	103.001	6298.989	-38.638	-37.792	-38.638	54.047	224.366	0.112
6400.000	0.052	39.372	6398.989	-38.626	-37.662	-38.626	53.948	224.276	0.107
6500.000	0.183	156.422	6498.989	-38.738	-37.569	-38.738	53.963	224.122	0.212
6600.000	0.289	81.248	6598.988	-38.846	-37.255	-38.846	53.823	223.803	0.300
6700.000	0.254	86.894	6698.987	-38.795	-36.784	-38.795	53.462	223.475	0.044
6800.000	0.153	107.843	6798.987	-38.824	-36.435	-38.824	53.243	223.182	0.124
6850.000	0.091	152.652	6848.987	-38.880	-36.353	-38.880	53.228	223.076	0.219