



Company/Rig: NOBLE ENERGY / CORETECH
WELL/API#: HARKIS 31-2/05-123-22186
DECLINATION: 8.29 Degrees
TD AS DRILLED: 7745 Feet
COUNTY/STATE: WELD / COLORADO
VS-Azi: 0.000 Degrees
Latitude: 40.17288, Longitude: -104.62917
Grid North = True North -0.56 degs (NAD 27)
Grid Correction Applied = -0.56 degs



DEPTH REFERENCE : RKB=SURFACE ELEVATION=4850

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01-de_01.ut

Minimum Curvature Method

Report Date/Time: 10/19/2015 / 16:19

LAT & LONG OBTAINED BY HANDHELD GPS AT WELLHEAD

NORTH REFERENCE: GRID

HENDERSON, COLORADO

303-853-4976

Surveyor: BRIAN BREWBAKER / Harkis 31-2

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	0.358	41.485	99.999	0.234	0.207	0.234	0.312	41.485	0.358
200.000	0.484	21.061	199.997	0.862	0.566	0.862	1.031	33.269	0.194
300.000	0.407	3.534	299.994	1.611	0.739	1.611	1.772	24.658	0.156
400.000	0.130	316.683	399.993	2.047	0.684	2.047	2.159	18.463	0.332
500.000	0.183	287.053	499.992	2.177	0.453	2.177	2.223	11.758	0.095
600.000	0.301	321.585	599.991	2.429	0.137	2.429	2.433	3.230	0.182
700.000	0.378	306.394	699.990	2.831	-0.292	2.831	2.846	354.115	0.118
800.000	0.345	315.109	799.988	3.240	-0.770	3.240	3.330	346.632	0.064
900.000	0.573	32.132	899.985	3.877	-0.717	3.877	3.942	349.527	0.599
1000.000	0.643	38.150	999.980	4.741	-0.104	4.741	4.742	358.739	0.095
1100.000	0.642	38.735	1099.973	5.619	0.593	5.619	5.650	6.020	0.007
1200.000	0.560	42.576	1199.968	6.416	1.274	6.416	6.541	11.229	0.091
1300.000	0.463	45.168	1299.964	7.060	1.891	7.060	7.309	14.992	0.100
1400.000	0.481	37.844	1399.960	7.676	2.434	7.676	8.053	17.596	0.063
1500.000	0.482	13.985	1499.957	8.416	2.793	8.416	8.867	18.362	0.199
1600.000	0.648	36.367	1599.952	9.279	3.230	9.279	9.825	19.194	0.273
1700.000	0.777	36.024	1699.944	10.283	3.964	10.283	11.020	21.082	0.130
1800.000	0.798	46.195	1799.935	11.313	4.866	11.313	12.315	23.272	0.141

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	0.850	60.019	1899.925	12.167	6.011	12.167	13.571	26.294	0.205
2000.000	0.854	77.881	1999.914	12.694	7.383	12.694	14.684	30.182	0.265
2100.000	0.991	95.606	2099.901	12.766	8.972	12.766	15.603	35.100	0.315
2200.000	1.053	122.875	2199.886	12.183	10.604	12.183	16.151	41.037	0.485
2300.000	1.173	126.233	2299.867	11.079	12.201	11.079	16.481	47.760	0.137
2400.000	0.978	126.879	2399.849	9.962	13.709	9.962	16.947	53.996	0.195
2500.000	0.865	117.741	2499.836	9.098	15.060	9.098	17.595	58.864	0.185
2600.000	1.014	115.234	2599.823	8.370	16.529	8.370	18.527	63.144	0.154
2700.000	1.040	118.303	2699.807	7.562	18.128	7.562	19.642	67.356	0.061
2800.000	1.228	117.947	2799.787	6.630	19.873	6.630	20.950	71.551	0.188
2900.000	1.466	125.794	2899.760	5.380	21.857	5.380	22.509	76.173	0.301
3000.000	1.413	105.886	2999.729	4.294	24.081	4.294	24.460	79.889	0.500
3100.000	1.836	137.826	3099.690	2.769	26.342	2.769	26.488	83.999	0.982
3200.000	1.859	145.655	3199.638	0.243	28.333	0.243	28.334	89.509	0.253
3300.000	1.976	141.868	3299.582	-2.452	30.312	-2.452	30.411	94.625	0.173
3400.000	1.702	140.277	3399.531	-4.951	32.326	-4.951	32.703	98.707	0.279
3500.000	1.478	126.549	3499.493	-6.861	34.311	-6.861	34.990	101.307	0.440
3600.000	0.789	108.371	3599.473	-7.845	36.000	-7.845	36.845	102.294	0.769
3700.000	0.720	102.393	3699.464	-8.197	37.266	-8.197	38.157	102.405	0.105
3800.000	0.971	50.664	3799.455	-7.795	38.535	-7.795	39.315	101.435	0.771
3900.000	1.258	50.892	3899.435	-6.565	40.042	-6.565	40.577	99.311	0.288
4000.000	1.223	46.132	3999.412	-5.133	41.664	-5.133	41.979	97.023	0.109
4100.000	1.490	39.553	4099.384	-3.391	43.261	-3.391	43.393	94.482	0.308
4200.000	1.607	29.432	4199.348	-1.168	44.777	-1.168	44.792	91.494	0.297
4300.000	1.471	26.408	4299.312	1.203	46.037	1.203	46.053	88.503	0.158
4400.000	1.358	25.735	4399.281	3.420	47.123	3.420	47.247	85.848	0.115
4500.000	1.035	20.113	4499.259	5.336	47.948	5.336	48.244	83.650	0.343
4600.000	0.881	30.405	4599.245	6.848	48.648	6.848	49.127	81.987	0.230
4700.000	1.437	45.825	4699.225	8.385	49.936	8.385	50.635	80.468	0.632
4800.000	2.349	51.517	4799.169	10.534	52.440	10.534	53.487	78.642	0.930
4900.000	2.633	59.412	4899.075	12.978	56.021	12.978	57.504	76.957	0.444
5000.000	2.961	59.605	4998.956	15.453	60.226	15.453	62.177	75.609	0.329
5100.000	3.012	59.221	5098.820	18.105	64.711	18.105	67.196	74.370	0.055
5200.000	3.149	60.909	5198.675	20.785	69.369	20.785	72.416	73.320	0.164
5300.000	2.945	62.187	5298.534	23.319	74.041	23.319	77.627	72.518	0.215
5400.000	2.786	43.689	5398.411	26.275	77.993	26.275	82.300	71.382	0.934
5500.000	2.153	35.925	5498.318	29.554	80.774	29.554	86.011	69.903	0.715
5600.000	2.103	52.805	5598.250	32.184	83.338	32.184	89.336	68.884	0.627
5700.000	2.176	44.112	5698.180	34.656	86.120	34.656	92.832	68.079	0.332
5800.000	1.511	27.917	5798.129	37.184	88.059	37.184	95.588	67.107	0.838

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	0.812	44.110	5898.108	38.858	89.169	38.858	97.268	66.453	0.765
6000.000	0.759	83.064	5998.099	39.447	90.320	39.447	98.559	66.407	0.526
6100.000	0.706	118.857	6098.091	39.230	91.517	39.230	99.571	66.797	0.453
6200.000	0.858	117.979	6198.082	38.581	92.718	38.581	100.425	67.407	0.153
6300.000	1.018	116.137	6298.069	37.839	94.176	37.839	101.494	68.111	0.162
6400.000	1.061	133.737	6398.052	36.807	95.643	36.807	102.481	68.951	0.321
6500.000	1.101	121.460	6498.035	35.666	97.131	35.666	103.472	69.837	0.235
6600.000	1.072	133.435	6598.017	34.521	98.630	34.521	104.497	70.710	0.228
6700.000	0.580	131.052	6698.006	33.545	99.691	33.545	105.184	71.402	0.493
6800.000	0.543	123.125	6798.001	32.954	100.470	32.954	105.736	71.841	0.086
6900.000	0.523	121.950	6897.997	32.453	101.254	32.453	106.328	72.229	0.023
7000.000	0.515	119.289	6997.993	31.992	102.033	31.992	106.931	72.592	0.025