



COMPANY/RIG: Noble Energy/Production/VES
 WELL/API: Oster C19-27D/05-123-34390
 DECLINATION: 8.27 Degrees
 TD AS DRILLED: 7912 Feet
 COUNTY/STATE: Weld/Colorado
 VS-Azi: 0.000 Degrees
 Latitude: 40.31189, Longitude: -104.59454
 Grid North = True North -0.59 degs (NAD 27)
 Grid Correction Applied = -0.59 degs



DEPTH REFERENCE : RKB = GL Elevation = 4834

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: hgyrosurvey.ut
 Minimum Curvature Method
 Report Date/Time: 12/1/2015 / 09:52

LAT & LONG OBTAINED BY HANDHELD GPS AT WELLHEAD

NORTH REFERENCE: GRID
 HENDERSON, COLORADO
 303-853-4976

Surveyor: JUSTIN WILLIAMS / Oster C19-27D

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	0.635	303.540	99.998	0.306	-0.462	0.306	0.554	303.540	0.635
200.000	0.291	311.788	199.995	0.782	-1.113	0.782	1.361	305.074	0.350
300.000	0.111	268.975	299.994	0.949	-1.400	0.949	1.691	304.144	0.223
400.000	0.710	161.598	399.991	0.359	-1.301	0.359	1.350	285.439	0.751
500.000	2.294	152.442	499.954	-2.004	-0.179	-2.004	2.012	185.110	1.597
600.000	4.409	150.365	599.777	-7.119	2.648	-7.119	7.596	159.600	2.118
700.000	5.956	146.213	699.366	-14.773	7.434	-14.773	16.538	153.288	1.591
800.000	8.025	148.820	798.617	-25.058	13.934	-25.058	28.671	150.923	2.093
900.000	10.208	145.868	897.349	-38.366	22.521	-38.366	44.488	149.587	2.231
1000.000	13.088	143.127	995.280	-54.762	34.289	-54.762	64.611	147.947	2.932
1100.000	15.981	143.981	1092.069	-74.958	49.182	-74.958	89.652	146.730	2.900
1200.000	17.316	145.128	1187.876	-98.303	65.786	-98.303	118.284	146.209	1.375
1300.000	18.288	144.508	1283.086	-123.287	83.404	-123.287	148.849	145.921	0.991
1400.000	19.617	146.870	1377.664	-150.121	101.689	-150.121	181.321	145.887	1.534
1500.000	21.401	145.279	1471.323	-179.178	121.257	-179.178	216.352	145.912	1.869
1600.000	23.128	144.013	1563.864	-210.068	143.191	-210.068	254.229	145.720	1.793
1700.000	23.823	142.130	1655.588	-241.902	167.130	-241.902	294.022	145.359	1.022
1800.000	24.942	141.209	1746.668	-274.280	192.738	-274.280	335.227	144.904	1.182

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	26.455	140.319	1836.774	-307.859	220.172	-307.859	378.488	144.429	1.562
2000.000	27.707	142.112	1925.810	-343.352	248.673	-343.352	423.945	144.086	1.494
2100.000	29.063	141.798	2013.786	-380.787	277.972	-380.787	471.453	143.871	1.364
2200.000	29.590	140.739	2100.970	-418.991	308.618	-418.991	520.383	143.626	0.740
2300.000	29.275	141.766	2188.064	-457.313	339.375	-457.313	569.483	143.421	0.595
2400.000	28.884	143.513	2275.460	-495.937	368.870	-495.937	618.077	143.359	0.935
2500.000	28.141	142.209	2363.331	-533.992	397.683	-533.992	665.808	143.324	0.969
2600.000	28.289	141.424	2451.449	-571.154	426.910	-571.154	713.070	143.224	0.399
2700.000	28.627	143.042	2539.367	-608.821	456.089	-608.821	760.711	143.162	0.842
2800.000	28.699	142.294	2627.113	-646.959	485.176	-646.959	808.673	143.133	0.366
2900.000	28.784	141.764	2714.794	-684.866	514.762	-684.866	856.750	143.071	0.269
3000.000	29.719	143.023	2802.042	-723.580	544.572	-723.580	905.608	143.035	1.119
3100.000	29.688	141.594	2888.903	-762.788	574.866	-762.788	955.152	142.997	0.708
3200.000	30.163	140.648	2975.571	-801.621	606.181	-801.621	1005.013	142.904	0.670
3300.000	28.397	141.238	3062.791	-839.592	637.001	-839.592	1053.891	142.812	1.790
3400.000	28.623	139.806	3150.666	-876.431	667.348	-876.431	1101.583	142.713	0.720
3500.000	28.246	142.813	3238.606	-913.580	697.110	-913.580	1149.170	142.654	1.481
3600.000	27.130	144.972	3327.156	-951.105	724.500	-951.105	1195.617	142.702	1.500
3700.000	27.170	143.544	3416.139	-988.140	751.154	-988.140	1241.230	142.759	0.653
3800.000	27.710	141.006	3504.891	-1024.57	779.351	-1024.57	1287.300	142.741	1.288
3900.000	27.921	140.645	3593.337	-1060.75	808.827	-1060.75	1333.937	142.674	0.270
4000.000	27.155	141.190	3682.007	-1096.63	837.976	-1096.63	1380.149	142.615	0.806
4100.000	27.522	142.532	3770.838	-1132.76	866.334	-1132.76	1426.068	142.591	0.717
4200.000	28.667	143.180	3859.053	-1170.30	894.765	-1170.30	1473.159	142.600	1.185
4300.000	30.378	141.944	3946.067	-1209.41	924.729	-1209.41	1522.432	142.598	1.816
4400.000	31.055	139.693	4032.040	-1248.99	957.002	-1248.99	1573.478	142.540	1.334
4500.000	31.083	141.331	4117.697	-1288.82	989.817	-1288.82	1625.049	142.476	0.846
4600.000	30.126	142.605	4203.767	-1328.91	1021.187	-1328.91	1675.955	142.460	1.156
4700.000	29.534	143.417	4290.517	-1368.64	1051.118	-1368.64	1725.694	142.476	0.716
4800.000	30.907	144.756	4376.926	-1409.41	1080.629	-1409.41	1776.003	142.522	1.529
4900.000	30.346	145.976	4462.977	-1451.32	1109.585	-1451.32	1826.884	142.601	0.837
5000.000	30.258	144.503	4549.315	-1492.77	1138.350	-1492.77	1877.285	142.672	0.748
5100.000	29.759	143.283	4635.911	-1533.18	1167.817	-1533.18	1927.284	142.704	0.788
5200.000	29.516	144.137	4722.828	-1573.03	1197.087	-1573.03	1976.727	142.729	0.487
5300.000	28.726	146.279	4810.189	-1612.99	1224.861	-1612.99	2025.342	142.788	1.308
5400.000	28.039	146.985	4898.168	-1652.68	1251.008	-1652.68	2072.772	142.876	0.764
5500.000	28.516	148.672	4986.235	-1692.78	1276.227	-1692.78	2119.969	142.987	0.931
5600.000	29.746	145.586	5073.589	-1733.64	1302.661	-1733.64	2168.512	143.079	1.941
5700.000	28.978	145.463	5160.742	-1774.06	1330.415	-1774.06	2217.501	143.133	0.770
5800.000	27.606	145.489	5248.794	-1813.11	1357.277	-1813.11	2264.858	143.182	1.372

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	26.078	144.808	5338.017	-1850.17	1383.073	-1850.17	2309.983	143.220	1.559
6000.000	25.946	143.371	5427.888	-1885.69	1408.792	-1885.69	2353.831	143.237	0.644
6100.000	25.921	143.961	5517.819	-1920.92	1434.703	-1920.92	2397.562	143.245	0.259
6200.000	25.667	145.349	5607.856	-1956.41	1459.876	-1956.41	2441.059	143.270	0.655
6300.000	25.955	148.368	5697.884	-1992.86	1483.667	-1992.86	2484.501	143.333	1.345
6400.000	25.055	146.686	5788.139	-2029.18	1506.775	-2029.18	2527.442	143.404	1.155
6500.000	24.958	143.092	5878.770	-2063.75	1531.076	-2063.75	2569.681	143.429	1.522
6600.000	25.497	143.802	5969.233	-2097.99	1556.457	-2097.99	2612.301	143.429	0.618
6700.000	24.366	146.965	6059.917	-2132.65	1580.415	-2132.65	2654.417	143.460	1.748
6800.000	24.306	151.089	6151.038	-2167.97	1601.612	-2167.97	2695.411	143.544	1.700
6900.000	21.612	150.954	6243.108	-2202.09	1620.506	-2202.09	2734.087	143.651	2.695
7000.000	17.791	148.392	6337.238	-2231.21	1637.461	-2231.21	2767.593	143.725	3.916
7100.000	16.427	147.030	6432.811	-2256.08	1653.164	-2256.08	2796.939	143.768	1.422
7200.000	14.393	143.266	6529.213	-2277.91	1668.294	-2277.91	2823.488	143.782	2.265
7300.000	13.647	142.418	6626.234	-2297.22	1682.923	-2297.22	2847.710	143.774	0.775
7400.000	12.122	141.465	6723.713	-2314.78	1696.659	-2314.78	2869.995	143.760	1.540
7500.000	11.254	141.162	6821.639	-2330.60	1709.320	-2330.60	2890.234	143.743	0.870
7600.000	9.483	138.494	6920.003	-2344.37	1720.899	-2344.37	2908.187	143.719	1.834
7650.000	7.977	138.215	6969.422	-2350.04	1725.941	-2350.04	2915.743	143.705	3.015