



Company/Rig: NOBLE ENERGY/ VES
WELL/API#: RICHTER USX AB 27-19/05-123-24537
DECLINATION: 8.26 Degrees
TD AS DRILLED: 7,319 FEET
COUNTY/STATE: WELD/COLORADO
VS-Azi: 0.000 Degrees
Latitude: 40.54785, Longitude: -104.54064
Grid North = True North -0.62 degs (NAD 27)
Grid Correction Applied = -0.62 degs



DEPTH REFERENCE : RKB=SURFACE ELEVATION=4,900 FEET

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: hagyar_run01-de_01.ut

Minimum Curvature Method

Report Date/Time: 12/1/2015 / 10:54

LAT & LONG OBTAINED BY HANDHELD GPS AT WELLHEAD

NORTH REFERENCE: GRID

HENDERSON, COLORADO

303-853-4976

Surveyor: LEVI SHELTON / Richter USX AB 27-19

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	0.480	259.936	99.999	-0.073	-0.412	-0.073	0.419	259.936	0.480
200.000	0.143	256.116	199.997	-0.176	-0.946	-0.176	0.962	259.442	0.338
300.000	0.401	213.500	299.996	-0.498	-1.260	-0.498	1.354	248.441	0.311
400.000	0.172	257.363	399.995	-0.822	-1.599	-0.822	1.798	242.797	0.301
500.000	0.389	219.736	499.994	-1.116	-1.963	-1.116	2.259	240.381	0.274
600.000	0.676	241.932	599.989	-1.655	-2.701	-1.655	3.168	238.503	0.348
700.000	0.530	281.464	699.984	-1.841	-3.675	-1.841	4.111	243.393	0.431
800.000	0.553	276.880	799.980	-1.691	-4.607	-1.691	4.908	249.843	0.049
900.000	0.780	268.459	899.973	-1.652	-5.767	-1.652	5.999	254.017	0.247
1000.000	0.788	270.915	999.964	-1.659	-7.135	-1.659	7.325	256.909	0.034
1100.000	1.099	269.507	1099.950	-1.656	-8.781	-1.656	8.936	259.317	0.312
1200.000	1.106	270.800	1199.931	-1.651	-10.705	-1.651	10.831	261.232	0.026
1300.000	0.876	277.209	1299.916	-1.542	-12.429	-1.542	12.524	262.929	0.255
1400.000	0.991	280.794	1399.903	-1.284	-14.037	-1.284	14.096	264.775	0.129
1500.000	0.881	256.077	1499.890	-1.307	-15.633	-1.307	15.688	265.222	0.415
1600.000	0.869	268.462	1599.879	-1.512	-17.138	-1.512	17.205	264.957	0.189
1700.000	0.898	266.436	1699.867	-1.581	-18.679	-1.581	18.745	265.161	0.042
1800.000	0.872	248.562	1799.855	-1.908	-20.169	-1.908	20.259	264.595	0.276

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	1.073	255.998	1899.840	-2.413	-21.787	-2.413	21.920	263.679	0.237
2000.000	1.073	261.642	1999.823	-2.776	-23.621	-2.776	23.784	263.298	0.106
2100.000	0.871	256.113	2099.809	-3.094	-25.285	-3.094	25.474	263.023	0.222
2200.000	1.082	237.241	2199.794	-3.787	-26.817	-3.787	27.083	261.961	0.382
2300.000	0.973	252.494	2299.778	-4.554	-28.421	-4.554	28.783	260.897	0.293
2400.000	1.152	225.783	2399.762	-5.511	-29.952	-5.511	30.454	259.575	0.521
2500.000	0.944	242.031	2499.745	-6.598	-31.400	-6.598	32.085	258.133	0.361
2600.000	1.137	254.247	2599.729	-7.254	-33.082	-7.254	33.868	257.633	0.293
2700.000	1.066	271.809	2699.711	-7.494	-34.966	-7.494	35.760	257.904	0.343
2800.000	1.312	242.939	2799.690	-7.985	-36.916	-7.985	37.769	257.795	0.639
2900.000	1.074	261.152	2899.668	-8.650	-38.860	-8.650	39.811	257.451	0.445
3000.000	1.254	245.552	2999.648	-9.247	-40.782	-9.247	41.817	257.225	0.363
3100.000	1.166	244.180	3099.626	-10.142	-42.693	-10.142	43.882	256.636	0.093
3200.000	1.339	245.460	3199.602	-11.071	-44.672	-11.071	46.023	256.081	0.176
3300.000	1.386	232.119	3299.574	-12.299	-46.690	-12.299	48.283	255.243	0.320
3400.000	1.495	245.549	3399.542	-13.582	-48.833	-13.582	50.686	254.457	0.354
3500.000	1.828	265.043	3499.501	-14.260	-51.610	-14.260	53.543	254.554	0.651
3600.000	1.515	248.194	3599.459	-14.889	-54.427	-14.889	56.426	254.701	0.579
3700.000	1.401	263.160	3699.427	-15.526	-56.868	-15.526	58.950	254.730	0.396
3800.000	1.405	248.279	3799.397	-16.125	-59.221	-16.125	61.377	254.768	0.363
3900.000	1.601	249.206	3899.363	-17.074	-61.665	-17.074	63.986	254.523	0.197
4000.000	1.858	237.629	3999.317	-18.438	-64.340	-18.438	66.930	254.009	0.432
4100.000	2.110	234.277	4099.258	-20.381	-67.203	-20.381	70.226	253.129	0.278
4200.000	2.215	232.809	4199.186	-22.623	-70.237	-22.623	73.791	252.146	0.118
4300.000	2.220	229.236	4299.111	-25.056	-73.243	-25.056	77.410	251.115	0.138
4400.000	2.440	250.385	4399.031	-27.035	-76.715	-27.035	81.340	250.587	0.882
4500.000	2.285	232.187	4498.947	-28.972	-80.296	-28.972	85.362	250.160	0.763
4600.000	2.546	225.211	4598.858	-31.759	-83.447	-31.759	89.286	249.164	0.393
4700.000	2.483	231.722	4698.762	-34.666	-86.724	-34.666	93.396	248.212	0.292
4800.000	2.619	234.411	4798.663	-37.337	-90.282	-37.337	97.698	247.532	0.181
4900.000	2.363	232.988	4898.568	-39.908	-93.786	-39.908	101.924	246.949	0.264
5000.000	2.497	226.199	4998.479	-42.657	-97.005	-42.657	105.969	246.263	0.317
5100.000	2.059	223.821	5098.400	-45.461	-99.821	-45.461	109.685	245.514	0.447
5200.000	2.323	227.185	5198.326	-48.135	-102.552	-48.135	113.287	244.856	0.293
5300.000	2.329	209.410	5298.245	-51.282	-105.037	-51.282	116.887	243.977	0.719
5400.000	2.204	219.050	5398.167	-54.546	-107.246	-54.546	120.320	243.042	0.401
5500.000	2.491	221.027	5498.083	-57.678	-109.883	-57.678	124.101	242.305	0.298
5600.000	2.163	210.594	5598.001	-60.942	-112.270	-60.942	127.744	241.506	0.534
5700.000	2.052	228.024	5697.935	-63.764	-114.562	-63.764	131.111	240.900	0.648
5800.000	2.044	229.742	5797.871	-66.113	-117.253	-66.113	134.608	240.583	0.062

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	2.133	236.986	5897.804	-68.280	-120.175	-68.280	138.218	240.396	0.279
6000.000	2.040	218.273	5997.739	-70.691	-122.838	-70.691	141.727	240.080	0.685
6100.000	2.206	225.413	6097.671	-73.440	-125.312	-73.440	145.246	239.627	0.312
6200.000	2.095	222.196	6197.600	-76.145	-127.910	-76.145	148.859	239.234	0.164
6300.000	1.801	226.052	6297.543	-78.590	-130.269	-78.590	152.139	238.898	0.321
6400.000	1.383	215.638	6397.504	-80.662	-132.104	-80.662	154.783	238.592	0.507
6500.000	1.071	224.027	6497.481	-82.315	-133.457	-82.315	156.800	238.334	0.360
6600.000	1.031	202.262	6597.465	-83.819	-134.447	-83.819	158.435	238.059	0.399
6700.000	1.049	208.032	6697.448	-85.459	-135.218	-85.459	159.960	237.707	0.106
6800.000	0.737	223.207	6797.436	-86.736	-136.088	-86.736	161.379	237.489	0.388
6900.000	0.987	224.745	6897.425	-87.817	-137.135	-87.817	162.843	237.366	0.250
7000.000	1.387	223.762	6997.403	-89.302	-138.578	-89.302	164.860	237.202	0.401
7050.000	1.115	240.649	7047.391	-89.978	-139.421	-89.978	165.934	237.163	0.911