

June 16, 2004

Spanish Black Powder

Manufactured by:
UEE
Cartucheria Deportiva, S.A.
C/. Santa Marina, s/n.
01230 Nanclares de la Oca (Alava) Spain

Brass corrosion testing for potassium nitrate chloride content.

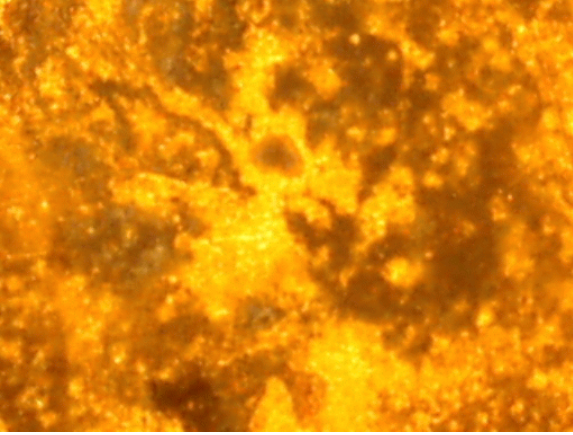
Brass corrosion testing.

Shallow pans 2" by 3" were prepared using .015" brass obtained from the local hobby shop.

60 grams of powder was flashed in the pan in 20 grain increments using a heated wire to ignite the powder in the pan.

The pan was then left overnight on the roofed over backyard deck. After 24 hours exposure with the Relative Humidity ranging from 35% on up to 90% the pan was brought inside and washed free of powder residue. After drying with a soft cloth the brass sheet was examined under a microscope.

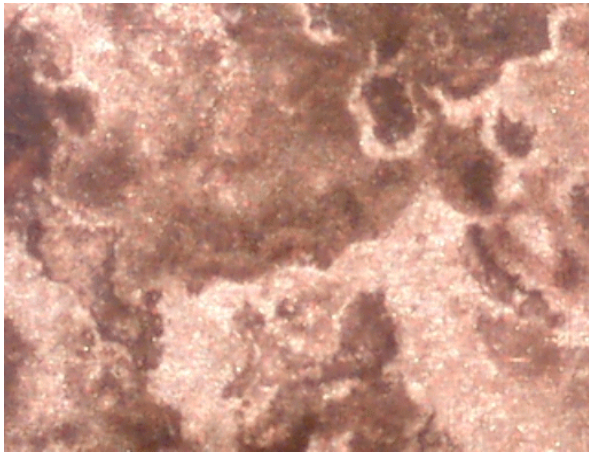
The U.E.E. 2Fg powder residue did not cause any deep pitting of the brass. Only the usual shallow leaching of copper and staining of the brass. This shows that the grade of potassium nitrate used to prepare the powder contains little, if any, potassium chloride.



GOEX powder.



Schuetzen powder.



U.E.E. powder

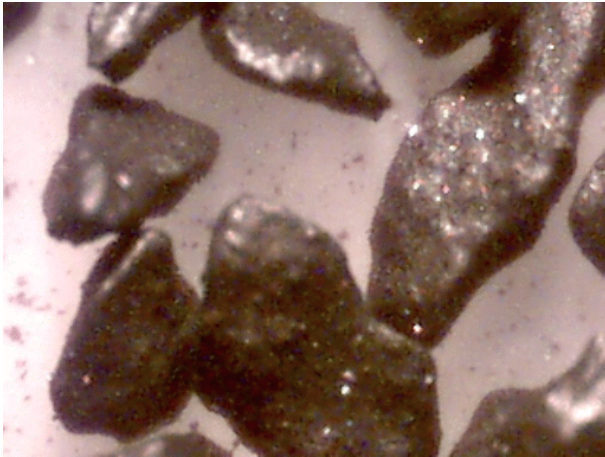
The results of the brass corrosion testing showed that the U.E.E. powder is prepared with a grade/brand of potassium nitrate almost free of residual potassium chloride.

When the respective powders were being flashed on the sheet brass the U.E.E. powder produced a large number of glowing embers of charcoal in the smoke being blown away from the burning powder.

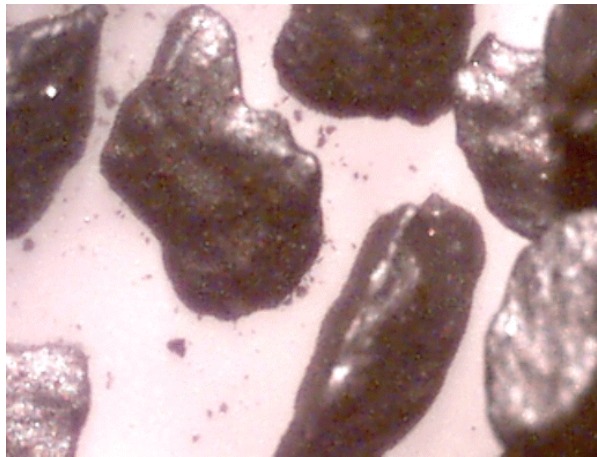
When the U.E.E. 2Fg was broken down in water and wet screened through a 200 mesh stainless steel screen it was noted that there was a large number of sharp edged chunks of charcoal present.

Both the Goex and Schuetzen samples gave some charcoal retained on the 200 mesh screen the U.E.E. stood out with its "gritty" feel and for the amount of material retained on the screen. Showing that this powder had not been worked very well in the wheel mills in addition to a lack of good preparation of the charcoal prior to its being used in a wheel mill batch.

Microscope views of powder grains.



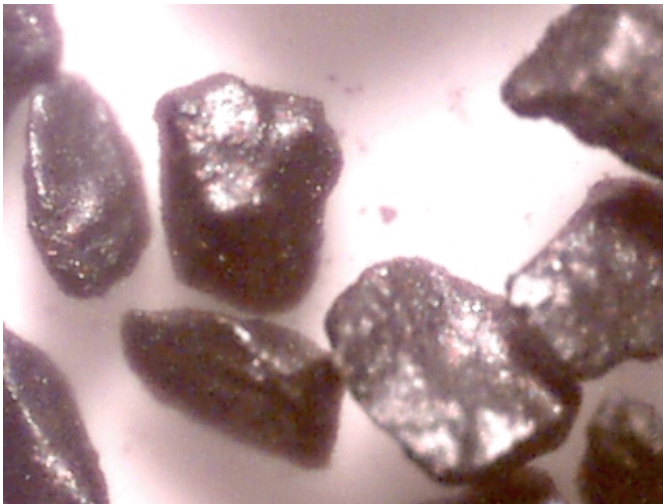
U.E.E. 2Fg at a magnification of 60X.



Another view at 60X.

Note the amount of fine grain polishing “debris” on the Scotch tape on which the powder grains were mounted. This dust/debris is seen clinging to surfaces of the grains of powder.

This powder was dusty and dirty to handle.



Arcabuz powder at a magnification of 60X.

This type of re-enactment powder is somewhat cleaner than the actual shooting powder though some dust and debris is seen clinging to the grains’ surfaces.

Hygroscopic behavior.

100 grain samples of powder were placed in shallow aluminum foil pans about 2" by 3" in size.

These pans were placed in a box out on the roofed over backyard deck. One open side of the box gives the test samples ample access to the air.

As the relative humidity changes the samples are periodically weighed to look at weight gain or weight loss as the respective powders attempt to reach an equilibrium condition with the air passing over them.

	<u>78 degrees F - 41% R.H.</u>
Schuetzen 2Fg	+ 0.2%
GOEX 2Fg	+0.2%
U.E.E. 2Fg	-0.3% (reflects a packing moisture content higher than that seen in the other two powder samples.)

	<u>59 degrees F - 80% R.H.</u>
Schuetzen 2Fg	+0.7%
GOEX 2Fg	+0.7%
U.E.E. 2Fg	+0.6%

	<u>59 degrees F - 94% R.H.</u>
Schuetzen 2Fg	+1.0%
GOEX 2Fg	+1.0%
U.E.E. 2Fg	+0.8% (probably reflects the use of a high fixed carbon content charcoal)

The data shows that the U.E.E. powder is prepared using a grade/brand of potassium nitrate free of traces of sodium nitrate.

Screens.

2Fg.
Trace on 20 mesh.
93% on 30 mesh.
7% thru 30 mesh.

Arcabuz.
Trace on 20 mesh.
72% on 30 mesh.
28% thru 30 mesh.

Velocities.

Shooting on June 7, 2004
80 to 85 degrees F, 40 - 50% R.H.

.50 caliber Lyman Trade Rifle, 28" barrel, 1 turn in 48" twist.
Speer balls, all weighing between 176 and 177 grains in weight.
.018" #40 cotton drill ball patching.
Lehigh Valley Shooting Patch Lubricant.
CCI #11 Magnum percussion caps.
CED Millennium Chronograph, 15 feet from muzzle, using sunlight.

Rifle was wiped with a damp patch between each shot.

Charges by volume measure from a Treso adjustable powder measure calibrated to throw 100 grains weigh of water at the 100 setting on the stem. Keep in mind that grains is a measure of weight and not volume.

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U.E.E 2Fg

80 gr. Volume	1196, 1224, 1226, 1275, 1217 - 1228 fps ave., ES 79
80 gr. Weight	1167, 1167, 1190, 1186, 1213 - 1185 fps ave., ES 46

Arcabuz

80 gr. Volume	975, 974, 938, 938, 1075 - 988 fps ave., ES 137
80 gr. Weight	966, 966, 969, 1011, 1027 - 988 fps ave., ES 61

The U.E.E 2Fg powder had been prepared with a beech wood charcoal. A 200 mesh wet screen showed that the wheel mill "grind" on this powder is somewhat coarse with a considerable amount of large "gritty" charcoal particles. The low velocities with this powder were not unexpected.

The Arcabuz powder had been prepared with a juniper wood charcoal. Also not ground well in the wheel mill.

Both of these powders did not give bore fouling problems under the weather conditions in today's shooting. Considering what had been observed in the charcoal in each, the bore fouling was not bad at all.

Comparing velocities.

Using data gathered from the .50 caliber Lyman Trade Rifle shooting 80 gr. Volume measure charges.

1228 fps ave., U.E.E. 2Fg
1427 fps ave., Schuetzen 2Fg, 2003 shipment.
1507 fps ave., Schuetzen 2Fg, 2004 shipment.
1511 fps ave., GOEX 2Fg, Date Code 03AU18B
1511 fps ave., GOEX 2Fg, Date Code 02OC07B
1516 fps ave., GOEX 2Fg, Date Code 03MA12B

200 mesh “wet screen” test for coarse charcoal.

In the open flashing on brass plates work the U.E.E. 2Fg powder gave numerous glowing embers being carried in the smoke rising from the burning powder. This indicated the presence of large, or coarse, particles of charcoal in the powder.

To quantify and examine these particles of coarse charcoal they may be separated out of the powder via a wet screen test.

500 grain samples of powder were broken down in water containing a few drops of common household dish liquid as a wetting agent.

The powder slurry is then poured into a funnel made from 200 mesh stainless steel screening. The sample being washed through the screen using a gentle flow of running water.

Any material retained on the screen is then transferred onto pieces of pre-weighed filter paper. These are then dried in an oven and weighed again.

The percentage of original weight of charcoal is then calculated.

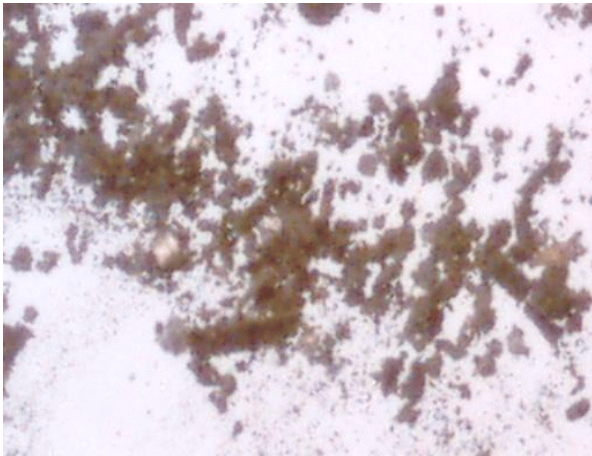
Previous work in this area has shown that almost all of what is retained on the 200 mesh screen will be charcoal particles with only a trace of sulfur present.

The dried retained material is then examined under a microscope to look at the size and shape of the particles retained on the screen.

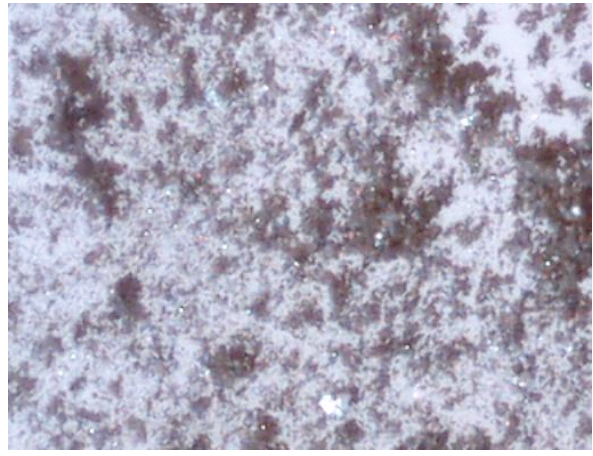
Percentage of charcoal retained on a 200 mesh screen.

Trace, GOEX 2Fg, 02-95, Packing Date Code 03AU18B
3.5%, Schuetzen 2Fg, 08.01.2004, WP-04A0002
10%, U.E.E. 2Fg

Microscope views.

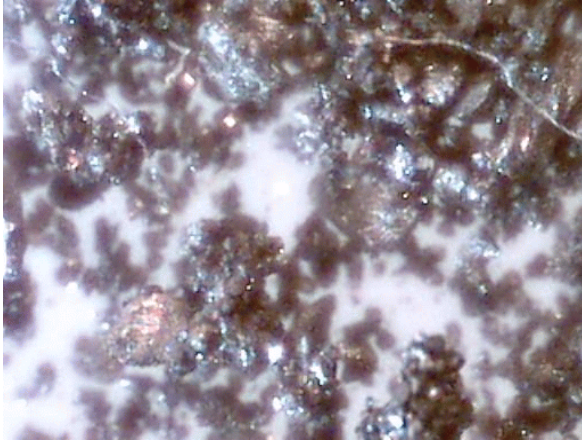


From GOEX 2Fg, 03AU18B At 60X

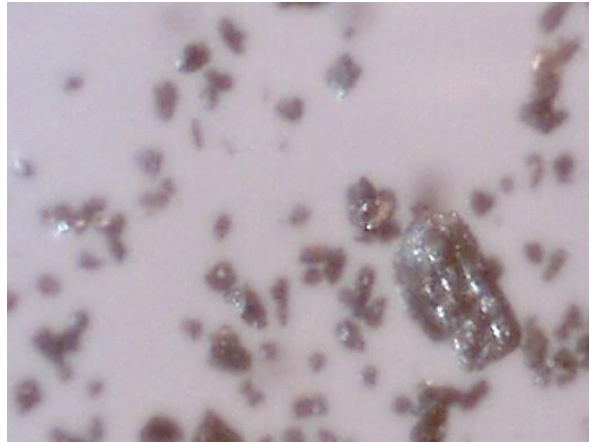


From Schuetzen 2Fg, 2004 At 60X

In the Schuetzen powder. The plus 200 mesh charcoal is composed almost entirely of very fine fibers that are typical wood structure in European Black Alder wood charcoal. If stood on end, the fibers would easily pass through the 200 mesh screen.



U.E.E. at 60X, view #1



U.E.E. at 60X, view #2

Compared to the 200 mesh screen retained material in the other two powders the over sized charcoal in these two views is huge in size.

Given the present state of the U.S. market for small-arms black powder the Spanish U.E.E. powders would simply not be commercially viable in the market today. In terms of velocities and cleanliness it is considerably inferior to both GOEX and Schuetzen brand black powders.

William A. Knight