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April 7, 2005

Re: GOEX ball mill experiment black powder samples. (Express Powder)

Shooting these two experimental samples yesterday at the range was something of a pleasure. These were tested against previous GOEX production lots. The change/reduction in bore fouling was noticeable as shall be explained. You may wish to consider implementing the change/changes in production.

**Loading density and uniformity of loading density.**

Most muzzleloaders measure powder charges by volume. When dealing with granular materials there will be some variations in the weight to volume relationship when measuring powder charges. When one measures by volume there will be “throw to throw” differences in weight. When measuring charges by weight there will be some differences in the volume of space each occupies.

With black powder, the degree of variability in this weight to volume relationship is effected by the shape of the grains, their degree of surface polish and differences in grain sizes within the mass of grains being worked with.

In this work a commonly available Tresco adjustable powder measure is used. This powder measure is calibrated to throw 100 grains weight of water at the 100 setting on the adjustable slide bar. Grains is not a measure of volume thought it is commonly used as such by muzzle loading shooters.

In this work powder is slowly poured from a powder can into the powder measure while the measure is gently bumped to settle, or nest, the powder grains in the measure. A hinged funnel then levels the powder with the mouth of the measure. This is then poured into the pan of a Lyman 500 beam balance loading scale. Five charges are “thrown” and weighed. These are then averaged and the loading density is calculated.

GOEX Ffg, 02-06, 04OC05B (Express)

98.5, 97.2, 98.4, 98.2, 98.1 with 98.1 grains average

1.3 grains variation.

$0.0648 \times 98.1 \text{ grains} = 6.36 \text{ grams}$  divided by  $6.4\text{cc} = 0.99 \text{ g/cc}$

GOEX FFFg, 03-18, 04OC05B (Express)

100.2, 100.0, 100.1, 101.0, 100.0 with 100.3 grains average

1.0 grains variation.

$0.0648 \times 100.3 \text{ grains} = 6.50 \text{ grams}$  divided by  $6.4\text{cc} = 1.02 \text{ g/cc}$

The factor of 6.4cc is the volume of the powder measure at the 100 stem setting.

The results of 0.99 g/cc and 1.02 g/cc are within the normal range seen in lots of GOEX black powder. The 0.99 g/cc is the bottom of the usual range while 1.02 g/cc is the most commonly seen figure in GOEX lots.

The variation in 5 throws values are on the low end of a range commonly seen in various brands and lots of black powder.

## Velocities.



### Test rifle:

Lyman Great Plains Rifle  
.50 caliber, 32" barrel, 1 turn in 56"  
twist.  
Converted from flintlock ignition using  
a mule ear percussion lock  
manufactured by Bernie Toleno.

CCI #11 Magnum caps.  
.018" #40 cotton drill patching.  
Lehigh Valley Shooting Patch  
Lubricant, Ox-Yoke's high pH  
production.

Charges measured by volume using an old Tresco adjustable powder measure calibrated to throw 100 grains weight of water at the 100 setting on the sliding stem. Powder settled in the measure while filling to insure a minimum of weight variation in charges thrown by the measure.

Shooting over a CED Millennium chronograph operating on sunlight, placed 15 feet from the muzzle of the gun.

Bore swabbed between shots using a piece of damp cotton flannel followed by a dry piece. Wet cleaning patches observed as will be commented on after listing the velocity data.

When changing from one powder charge volume to the next higher volume the first shot data is discarded. When changing brands of powder the first two shots following the change also have their data discarded.

Shooting data that follows: April 6, 2005. Clear and sunny. Temperature 60 to 70 F with 30 to 35% R.H.

GOEX FFFg, 03-18, Packing Date Code 04OC05B (Express)

60 grs. 1537 fps ave., ES 17  
80 grs. 1722 fps ave., ES 25  
100 grs. 1874 fps ave., ES 63

GOEX Ffg, 02-06, Packing Date Code 04OC05B (Express)

60 grs. 1376 fps ave., ES 25  
80 grs. 1558 fps ave., ES 29  
100 grs. 1726 fps ave., ES 45

GOEX FFFg, 03-10, Packing Date Code 03MY01B

80 grs. 1553 fps ave., ES 14

GOEX FFFg, Lot ? Packing Date Code 02SE10B

80 grs. 1502 fps ave., ES 91

Schuetzen FFFg, 15.01.2004, WP-04A0003

80 grs. 1482 fps ave., ES 26

Schuetzen Ffg, 08.01.2004, WP-04A0002

80 grs. 1453 fps ave., ES 16

Swiss 1&1/2 Fg, Lot 1-1002, Date Code 06-01

80 grs. 1742 fps ave., ES 13

Data from the same rifle and loading configuration from August 18, 2003, 80 grain charges.

1676 fps ave., GOEX FFFg, 03AP22B  
1722 fps ave., GOEX FFFg, 04OC05B  
1553 fps ave., GOEX FFFg, 03MY01B \*  
1502 fps ave., GOEX FFFg, 02SE10B \*

\* An interesting note here. The data from shooting on August 18, 2003 exactly matches the velocities obtained when using them as “control” samples during shooting on April 6, 2005.

Same rifle and loading configuration but shot 1 year and 6 months later. This shows that the GOEX made at the Minden plant exhibits a high degree of chemical stability. Ingredient purity and water purity “set” this high degree of chemical stability in the powder. That the velocity data exactly matches speaks well for the powders.

### Comments on bore fouling characteristics.

Several years ago I set up a project where I was able to measure bore fouling in a muzzle loading rifle as a percentage of the charge weight. While the powder produces about 55% of its original weight as solid products of combustion there will be variations on how much of that is retained in the bore as bore fouling versus how much is blown out of the muzzle with the spent gases behind the projectile. For a given loading configuration on a given day all of the brands of black powder leave about the same percentage of the original charge weight as bore fouling. There are however considerable differences in the physical properties of the fouling that changes with brand of powder, lot of powder, barrel temperature and ambient temperature.

What shooters perceive as differences in bore fouling is generally this issue of physical form coupled by how soluble the bore fouling is in a damp cloth patch used to swab the bore between shots. When the powder's combustion residue is deposited in a bore at low ambient temperatures it is very fine in particle size and readily soluble in water. With increasing ambient temperatures and increasing barrel temperatures the particle size of the powder's combustion residue grows and becomes less readily soluble in water. The bore fouling begins to feel gritty when a damp patch is run down the bore to clean the barrel.

Today's shooting started with the two samples of experimental powder with date codes of 04OC05B proved to be something of a surprise. The FFFg produced light fouling in both 60 and 80 grain charges. All of the powder combustion residue readily dissolved into the wet patches staining them dark green. Numerous red beads and flakes were seen on the patches. Only the 100 grain charge produced bore fouling that both dissolved into the patch and left a tarry residue clinging to the cloth. But given a 100 grain charge of FFFg in the .50 caliber this is not surprising and proved to be less than was found to be normal in lighter charges of previous lots of GOEX FFFg.

The FFFg was a very pleasant surprise. You will see/hear muzzleloaders talk about using reduced charges of FFFg powder in .50 and .54 caliber bores. Claiming that in using FFFg they avoid excessive fouling in the bore. The experimental lot of FFFg produced less fouling throughout the range of charges than the FFFg powder did and far less than the older lots of GOEX used as control samples. Again, judging this by the amount of readily soluble fouling that dissolves into the wet cleaning patch versus the amount that simply clings to the patch appearing to be a tarry like material.

In today's shooting I used a sample of FFFg produced in May 2003 and another produced in Sept. 2002.

It was almost as if there was a progression. The 2004 experimental samples were a noticeable improvement over the 2003 and compared to the 2002 sample there was a dramatic improvement.

### **Ingredient particle size.**

After retiring from industrial laboratory work I no longer have the ability to break down black powder and do a complete ingredient particle size scan of selected lots of powder. Using the wife's kitchen as a laboratory I have had to resort to more low-tech approaches.

An indication of how well the charcoal ingredient, in the powder, is ground may be viewing through the use of a rather simple test.

- A. A 500 grain sample of powder is weighed on a Lyman 500 beam balance loading scale.
- B. This powder is placed in an 8 ounce drinking glass.
- C. Hot water is added with a few drops of dish liquid as a wetting agent and stirred to dissolve the potassium nitrate, in the powder. The charcoal and sulfur ingredients will then be dispersed in the water.
- D. This is then poured slowly through a funnel made from 200 mesh stainless steel screening. Weighed prior to use for a tare weight.
- E. Warm slowly running water is used to wash the material through the screen funnel.
- F. When it appears that no more of the charcoal and sulfur mixture will pass through the screen with continued washing the screen is placed in an oven to dry. The oven temperature is set to 250 degrees F which will drive off any moisture present and vaporize, or volatilize, any traces of sulfur with the charcoal.
- G. At constant weight, or zero moisture, the screen is weighed.

Using 500 grain powder samples as a starting weight, there would be about 250 grains of charcoal in the powder.

Compared to the 250 grains of charcoal as a starting figure the amount retained on the 200 mesh screen may seem minuscule. The data acts as an indicator of overall ingredient particle size.

Prior experience had shown that if a particular lot of powder was "rich" in these plus 200 mesh charcoal the lot of powder could be expected to give bore fouling problems in the gun. That the particle size distribution/range of the charcoal in lots of powder would vary. You could say that some lots exhibited a coarse charcoal particle size while another lot may have charcoal in smaller particle sizes.

The amount of charcoal retained on the 200 mesh screen in this test may be said to be indicative of the particle size range of the charcoal in the powder.

To better explain this I have included a particle size distribution graph of a sample of old du Pont black powder that was removed from an old Winchester Repeating Arms shotgun cartridge.

In the 200 mesh wet screen test we are looking at the charcoal that would be in the very right portion of the particle size graph.

Keep in mind that the charcoal particle size distribution seen as a dash line is the result of both the ball milling of the charcoal and sulfur and the wheel milling of the batches of powder. In essence, there are two grinding steps in the black powder manufacturing process that act to reduce ingredient particle size.

In the ball milling of the charcoal and sulfur there is a point in ball milling time where any additional time in the ball mill will result in no additional reduction in ingredient particle size. In a particle size graph run on the ball mill product the main peak of the particle size distribution curve would be towards the right portion of the graph, larger particle size. During wheel milling there is additional reductions in ingredient particle size shifting the peak of the particle size towards the left side of the graph, or smaller sizes.

As the particle size, of the charcoal, is steadily reduced that “tail”, of sorts, on the very right of the graph is reduced in amount. This is what the wet screen is looking at.

As I had pointed out previously. Optimizing ball mill will act to reduce fouling in the bore of the muzzle loader or what a shooter would perceive as differences in bore fouling.

I have added two particle size distribution graphs to illustrate the point about looking at the charcoal in the finished powder using a 200 mesh screen.

The powder found in the New Rival W.R.A. Co. shotgun cartridge was most likely du Pont rifle powder out of the original plant along the Brandywine creek.

Compare this graph to the one on Chilworth powder.

This English Chilworth Powder Company was formed in 1885 as a joint venture between a group of English investors and a German powder company known for their high-quality sporting type (burn rate) powders. Chilworth competed with C&H in England and beat C&H on their home turf. German sporting black powder manufacturing technology was slightly ahead of C&H's level of manufacturing technology. This C&H sporting powder was a bit slower in the gun when compared to C&H but was said to burn cleaner.

In these graphs the particle size distribution (range) curves shows the difference between a rifle burn rate powder, du Pont, and a sporting burn rate powder, Chilworth. An indication of powder type burn rates may be gained from viewing how much of the charcoal, seen in the graph, is between 2 microns and 10 microns. The weight percentage of the mass in that range.

Then you see that there are no charcoal particles in the Chilworth larger than 40.3 microns.

200 mesh wet screen data.

GOEX Ffg, 02-06, 04OC05B (Express)

1.0 grains retained on the screen.

GOEX FFFg, 03-18, 04OC05B (Express)

1.5 grains retained on the screen.

GOEX Ffg, 02-95, 03AU18B

3.5 grains retained on the screen.

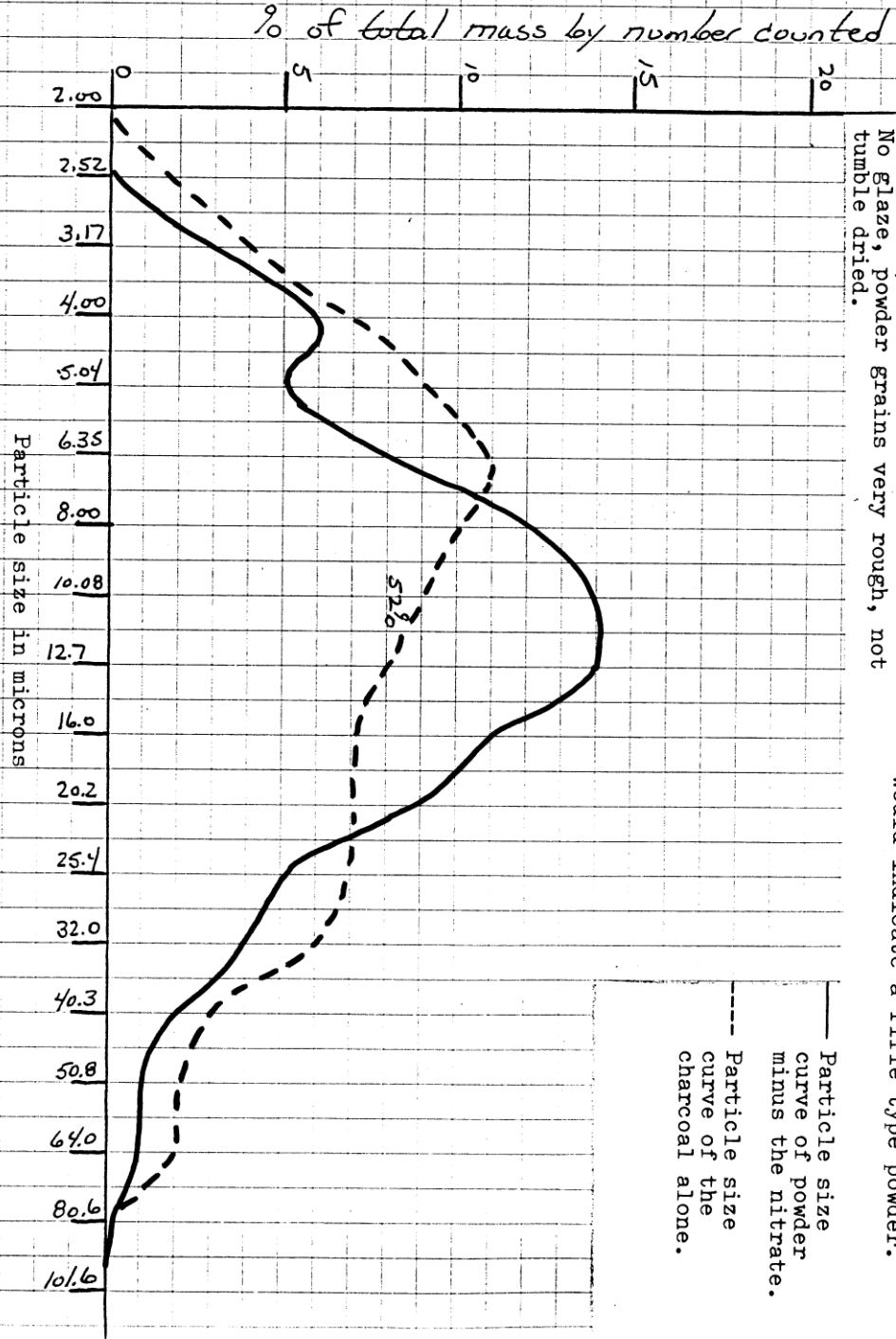
GOEX Cowboy, 06-01, 04AP12B

3.1 grains retained on the screen.

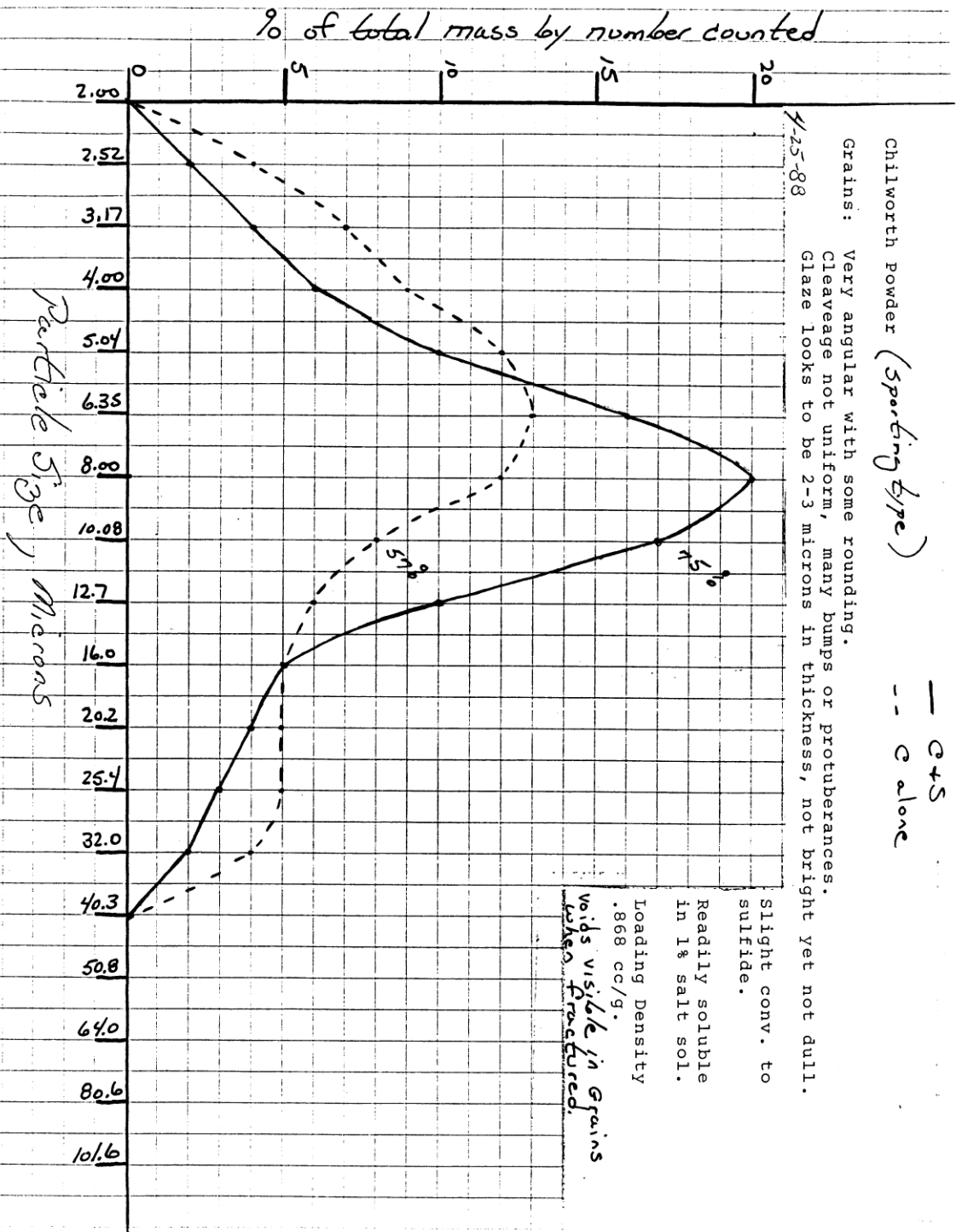
In Conclusion.

The ball mill experiment appears to have made a noticeable improvement in the bore fouling characteristics of the powder.





C.T. #18  
 #10 Shotgun, DuPont #4, 1 1/8 #6. New Rival, W.R.A. Co.  
 Type questionable. Charcoal curve typical of sporting but historical information  
 120 grains, 2f.  
 No glaze, powder grains very rough, not  
 tumble dried.  
 would indicate a rifle type powder.



Goex developed this Express powder in response to the Swiss powder used in black powder cartridge rifle competition. By 2004 most of the shooters using black powder in the big well known events were shooting Swiss black powder.

Someone at Goex thought that ball milling the charcoal and sulfur longer would improve their powder. The batches of powder would also be run in the wheel mill for a longer period of time to speed up the burn rate in the finished powder.

The increase in time in the ball mill for the charcoal and sulfur is simply something of a return to the way Du Pont produced rifle powder at the old Moosic, PA black powder plant. When Gearhart-Owen, later to become Goex, purchased the operation from Du Pont they reduced the amount of time the charcoal and sulfur were ground in the ball mill as a means of reducing production costs. At the same time, the size of the batches in the wheel mills were increased without adding time to the wheel mill cycle to compensate. So Goex batches out of Moosic were a bit slower than Du Pont production and did not burn as clean in the gun.

Increasing the ball milling time for the charcoal and sulfur mix will do two things in the powder. While it will not reduce the actual amount of fouling left in the bore it will make the bore fouling more user friendly, for want of a better term. The powder residue will be more readily soluble in water or more easily hydrated with a blow tube. Given Goex's normal ball milling time, the increase in ball milling time with the Express powder will promote more uniform burn rates in the batches of powder after wheel milling.

Increasing the length of time a batch of powder is worked in the wheel mill will speed up the burning of the finished powder giving a bit more velocity compared to the regular production powder.

Black powder cartridges today tend to push their rifles to the limit in velocities. This approach being required for long range shooting. When the very fast burning Swiss powder came onto the U.S. market it quickly gained acceptance in black powder cartridges because it gives higher velocities. Depending on the loading configuration this may come with a high price in regards to bore fouling. When you shoot charges of powder behind heavy bullets you may see gas temperatures high enough to produce a fused glass-like fouling in the bore. Some shooters have developed bullet lubes that will combat this hard fouling. Others cannot deal with it.

The Goex Express powder falls somewhat midway between a rifle burn rate powder and a sporting burn rate powder. The views of shooters will depend on what cartridge and load they are shooting.

Swiss powder, except for one shipment, is noted for lot to lot uniformity. Most cartridge shooters would not have to work up new loads when changing powder lots.

The development of this Express Powder put Goex in a position to regain most of the business they lost to the Swiss powder in black powder cartridge use.

Rather than take the logical path they priced the Express Powder just a bit cheaper than the price of the Swiss powder. Then soon after the introduction of the Express Powder they had their yearly price increase which put the price of the Express Powder above that of the Swiss powder.

When Goex first began to ship the Express Powder they did not give any information on it on their web site. As various shooters discussed the powder on Internet message boards there was a good bit of conjecture and confusion.

Goex uses a man by the name of Bill Bagwell as their front man, mainly with the black powder cartridge shooters. The following messages are from the Goex web site forum as Goex began to release Express Powder for shipment.

Goex Powder, Inc. :: View topic - Questions about Goex Express from the MSN board  
Questions about Goex Express from the MSN board  
Goex Powder, Inc. Forum Index -> Black Powder Cartridge Rifles

AuthorMessage

Tailhook

Joined: 30 Sep 2003

Posts: 8

Location: Way Soutn Louisiana

Posted: Thu Dec 15, 2005 6:43 pm Post subject: Questions about Goex Express from the MSN board

I'm posting this here in hopes some of the shooters asking questions and posting comments on the MSN BPCR board will take a look here. Inputs concerning powders came from a call to Don McDonald and questions about cost/availability came from Don and Jerry at Powder Inc.

Currently, Powder Inc. is the only distributor with the powder in stock. Prices are \$16.50/# for a 5# order, \$16.00/# for a 10# order and \$15.50/# for a 25# order plus shipping and hazmat.

Cartridge and 2f start as the same powder, cartridge is screened more to remove all fines and receives an extra coat of graphite. According to Don, 2f will probably produce more mv due to the presence of fines.

The Express powder processing steps are extended. The result is that in processing, the yield is less than 1/2 of that for the standard Goex powder. Longer time in processing increases costs.

Wally

John Boy

Joined: 13 May 2004

Posts: 52

Location: Below the Mason-Dixon Line ... Latitude 39.3 N x Longitude 74.7 W

Posted: Fri Dec 16, 2005 6:06 pm Post subject:

Quote:

The Express powder processing steps are extended. The result is that in processing, the yield is less than 1/2 of that for the standard Goex powder. Longer time in processing increases costs.

Wally, here is an excellent article by Bill Knight about the process of making black powder:

A Brief History of Black Powder Production

The comment from Goex that the yield is less than 1/2 ... is normal. From Bill Knight's article: Press densification is little more than a compacting process. During pressing, a rifle type powder would loose about 45% of it's original volume. Sporting type powders would loose about 40% of the original volume while a musket type would loose about 50%

...processing steps are extended

It's my understanding that the ball mill grinding time is the only extended processing step and ... it's supposedly only a few hours

Did Don McDonald say there was any 'material labor costs' required to make Express? Running a ball mill for additional hours is not a material cost ... the machine runs by itself and an extra coat of graphite is also not in the realm of 'material cost' either

Regards

John

rdnck

Joined: 17 Sep 2003

Posts: 246

Posted: Fri Dec 16, 2005 8:29 pm Post subject: What??

John Boy--To suggest that all Goex does to make Express powder is to run the ball mill a little longer and sprinkle on some additional graphite shows that you boys really don't have a clue as to what really goes into manufacturing black powder.

First things first. Goex does NOT have a ball mill. Neither do the Swiss, the Germans, or the Slovenians, who make KIK. All these manufacturers use a WHEEL MILL. The only people that use an archaic ball mill are the Chinese, and their primary product is fireworks powder. A

couple of years ago, The History channel came to Goex and filmed the Goex operation. You saw the wheel mill there, if you watched the segment.

Express is a premium powder and as such is not made to a price point. It costs more to make it due to time and materials, AND a lower yield of finished powder from a given amount of raw material.

No one bitches about the cost of Swiss. It is premium powder and delivers premium performance. Express is premium powder, and delivers outstanding performance. It delivers high velocities, single digit extreme spreads, and sd numbers of 2 and 3 on a consistent basis. It produces very light fouling that stays moist. It also costs more to make than does the standard line of Goex powders, rumors and speculation not with standing.

The fact that the cost of Goex Express and Swiss are close together simply means that they both have comparable manufacturing costs. There are some shooters that can't justify the cost of either, and there are frankly some shooting applications where all the additional benefits of a premium powder are not required. Those men who can shoot well enough to know the difference and have a real need for a high performance powder will appreciate what Goex Express brings to the table.

Shoot straight, rdnc.

John Boy

Joined: 13 May 2004

Posts: 52

Location: Below the Mason-Dixon Line ... Latitude 39.3 N x Longitude 74.7 W

Posted: Sat Dec 17, 2005 12:40 am Post subject:

Mr Bagwell ... your so right, it is a wheel mill now. This is my error. Even the \*.gif on the Goex site is a wheel mill.

But referencing 'The only people that use an archaic ball mill are the Chinese,' tell me that the Lyman Black Powder Handbook, page 16 is wrong in what they say about Moosic, PA made Goex ... "Charcoal and sulfur are taken from storage and processed through the Ball Mill facility. Proper amounts of the two ingredients are combined in each mill unit, according to the desired powder formula, and the units are activated. A ball mill could best be described as a big barrel roughly seven feet long and seven feet in diameter. The pulverizing is done by approximately two thousand pounds of stainless steel balls which do their work as each ball mill rotates slowly for an extended period..."

Goex moved to LA about 1997-8, if I remember correctly

As for the high quality of Express, how about being able to read the technical specifications that makes it a premium powder compared to the other premium powder - Swiss

- \* What is the density (g/cc)?
  - \* What is the SpG (specific gravity)?
  - \* What are the pass - stop sieve standards yielding an average grain size of what?
  - \* What is the moisture content of the powder (weight to humidity)?
  - \* 'Light fouling' is subjective ... what is the average percentage of solid residues for a given charge left in the barrel
  - \* 'Moist fouling' is also subjective - what is the moisture content of the residue for a given charge
  - \* Why does it produce high velocities? Would you or Goex management care to educate us shooters what Goex is doing with Express to create this high velocity that is different than
- \* As for " It costs more to make it due to time and materials ..." - if this be the case, what are the more costly materials and labor? Higher grade of suflur being used? Charcoal is now Alder Blackthron instead of Maple? Higher purity of saltpeter? Has Goex gone to distilled water to eliminate all mineral impurities? Machinery that requires additional manpower to operate?

If Goex has developed a premium powder that is the USofA answer to Swiss, lay it on the line and tell us folks what the comparison specifications are ... with side by side comparisons: Express to Swiss grades

And Mr Bagwell, you have forgotten to mention one important factor when you compare the cost of premium Express to the premium cost of Swiss. The cost of Swiss includes overseas shipping charges to the US and a Customs Import Tariff for resale of the product, plus import authorizations, permits, etc. There are no such product costs from LA to US Distributors

rdnck, please don't take this post as a personal affront. If you can help make these comparisons available and the educational identification of "what really goes into manufacturing black powder" happen for the new Express powder... you have done a service to the BPRC shooting community.

Regards  
John

rdnck

Joined: 17 Sep 2003

Posts: 246

Posted: Sat Dec 17, 2005 5:56 am Post subject: Goex Express

John Boy--We are not talking about equipment that may or may not have been in use at Moosic prior to 1997. I don't know where Lyman got their information about the use of a ball mill at Moosic, I'll have to check. We are talking about Express powder that is made at the Goex plant in Doyline, La. in 2005. It is made with a wheel mill, as is all the powder made by Goex.

The information concerning the specifics of the manufacture of Express is considered proprietary by Goex. They are not in the business of telling people how to make powder, and frankly, I don't think that information needs to be in the public domain. Besides, why should they broadcast technically specific information that could cost the company a competitive edge?

You have 5 pounds of Express on order. When it arrives, shoot it and make your own determination as to whether you think it is a powder you will want to shoot. If you like it and choose to continue to use it in the future, Goex, like any company, will appreciate your support.

Shoot straight, rdnck.

13Echo

Joined: 31 Oct 2003

Posts: 11

Posted: Sat Dec 17, 2005 11:01 am Post subject:

Charcoal and sulphur are initially incorporated together with a ball mill according to the Mad Monk. The incorporation of saltpeter to make the final mix is done with a wheel mill. I suspect that is how it is done at Doyline.

Jerry Liles



Smokin  
Joined: 10 Sep 2003  
Posts: 139  
Location: The Frozen Tundra  
Posted: Sat Dec 17, 2005 11:19 pm Post subject:

John Boy,

I admire the scientific and manufacturing questions you have directed to GOEX about the production of black powder and can only assume you have asked similar questions of the makers of Swiss and KIK powders and perhaps also of the Chinese. Until you are able to post a full report, and in the meanwhile, can you let us know what you have learned of the means of production and the standards to which these other manufactureres adhere?

For instance, what are the finishing methods and standards that the Swiss manufacturer uses to produce its premium powder? If I can read between the lines here and elsewhere, Swiss is currently being used as the touchstone for evaluating all other powders and as such its standards should be available for comparison or as a reference guide.

In your testing, how has the GOEX standard powder compared to the Swiss standard in your tests for uniformity in granulation and internal and external ballistic performance? When you recieve the new GOEX Express powder what standards will you apply to test it against the Swiss standard? Please include what lots of Swiss and GOEX you have tested as this will be of great benefit to those of us who are unable to perform these tests ourselves over the range of manufaturing lots avalable for purchase.

Also, I think we who have read the history of black powder cartridge shooting all understand that the greatest and best of all powders was the vaunted Curtis and Harvey Diamond #6. What is your estimation of the comparison of Swiss powder to C&H and will you comment on the GOEX Express performance compared to the reports of C&H #6. We shooters of the reproductions of the great old rifles think that our new rifles are the equal or better of the old and also think that the new powders are similar in their being equal or better than their predecessors. I'm sure we are all very curious how your tests in modern rifles with modern powders will enable us to learn essential lessons about the performance of the critical elements of our sport.

Please keep us posted on the results of your experiments. Your empirical data will be of inestimable value to all of us BPCR shooters.

Goex Powder, Inc. Forum Index -> Black Powder Cartridge

For some unknown reason GOEX failed to inform prospective customers (black powder cartridge shooters) what to expect from this new powder or how it differed from their regular production powder.

When shooters began to ask questions about the powder and pricing Goex's front man would respond in several of the Internet message boards. This man being Bill Bagwell. He started out in the early 1990's testing powder for Goex. They then took him on as something of an agent or spokesperson for the company. He is a shooter but knows utterly nothing as to how they produce black powder. He knows only what they want him to know and to be made public.

If a shooter persists in asking questions Mr. Bagwell will get into personal attacks on the shooter to shut the individual up and drive them off the message boards. He has friends who then jump into the message threads to back him up. The idea being to make the shooter look like a fool.

The GOEX message board postings shown on pages 12 thru 16 shows this pattern of behavior. Why Goex allows this to go on is unknown. It certainly does not speak well for Goex's customer relations.

Bill Bagwell cites manufacturing costs as a justification for the price of the Express powder relative to the price of the Swiss powder.

The message board posting at the bottom of Page 12 quotes Don MacDonald, production manager at Goex, stating that the yield of Express powder is less than half that for the standard Goex production powder.

That is a total fabrication. The additional machine time in the ball mill for the charcoal and sulfur, along with longer batch time in the wheel mill reduces the plant's overall pounds per manhour productivity, but not cutting it in half. The additional machine time does not result in any product loss.

The pricing of the Express powder is simply an example of corporate ego and corporate greed. Nothing more, nothing less.

In the message board posting by Bill Bagwell, also known as "rdnck", we see two themes that have been pushed by Goex for at least 20 years.

The first being that Goex's black powder manufacturing process is proprietary information. In effect, a company secret.

This ignores the fact that the process used by Goex is an extension of the Du Pont powder making technology that came with the business when Goex purchased the Moosic, PA black powder plant from Du Pont in 1972.

When one reads the writings of Capt. Alfred Mordecai working at the Washington Arsenal in 1844 and 1845 one sees various portions of the Du Pont manufacturing process described. During the first half of the 20<sup>th</sup> century Du Pont engineers wrote extensively on the entire process in chapters on black powder in industrial process and industrial chemistry texts.

To quote Bill Bagwell from his posting.

“And frankly, I don’t think that information needs to be in the public domain.”

The explanation for this has varied over the years. At first it was claimed that somebody might use this information to make their own black powder and injure themselves in the process. More recently the claim has been that terrorists could use the information to make black powder for use in improvised explosive devices for use in terrorists activities.

The truth of the matter is that Goex simply does not want the shooters to understand how a good black powder should behave in a gun versus a less than the best powder. When Goex operated the Moosic, PA plant they tried to convince everyone that Goex’s process and raw materials were state-of-art and that Goex was producing the fastest and best powder ever made. Those who commented on their shooting with C&H powder brought into the U.S. in the 1960's were either ignored or made fools of.

Goex was in effect creating a fantasy world in which they operated. This would prove to be a costly error recently.

In the year 2000 the black powder plant in Switzerland sent a container of their black powder to the U.S. in care of Goex. The powder arrived in bulk boxes. Goex then had to repackage the powder into one pound cans for sale on the U.S. market. Goex’s testing of the Swiss powder showed it to be considerably faster in the gun when compared to Goex’s production at that time. Goex attributed this higher velocities to a smaller grain size in the Swiss powder. In actuality, the grain size of the Swiss powder was larger than that of Goex powders in the same grain size designation range. Goex flatly refused to accept the fact that the Swiss powder was a “stronger” powder.

Goex did not aggressively market the Swiss powder the first year it was in their hands. One got the impression that they were simply trying to bury it. It was proving to be something of an embarrassment to them given the quality problems they were encountering in their own production.

The Swiss soon tired of Goex and contracted with another powder company to import and distribute the Swiss powder. This other company aggressively marketed the Swiss powder which then took a good bite out of Goex sales.

This Goex Express powder is an attempt by Goex to recover some of the business lost to the Swiss powder.

Had Goex priced this Express powder between the price of the Swiss powder and the price of their regular production powder they would have been in a position to drive the Swiss powder out of the U.S. market.