

## THE VIRGINIA MANUFACTORY OF ARMS

Educational Materials Supporting the  
American Society of Arms Collectors Display  
at the 2010 NRA Annual Meeting  
Charlotte, North Carolina  
May 14-16, 2010

The materials contained in this monograph are used with permission of Giles Cromwell, including excerpts from his definitive book on *The Virginia Manufactory of Arms*, published by University Press of Virginia. This ASAC display monograph is edited by Craig D. Bell.



## INTRODUCTION

Virginia was the first state after the Revolutionary War ended to successfully accomplish the complete manufacture of weapons for its militia.

For the period of its operation beginning in 1802 through the end of operations in 1821, the Virginia Manufactory of Arms produced approximately:

- 58,000 flintlock muskets
- 2,000 flintlock rifles
- 10,000 swords
- 4,000 flintlock pistols; and
- Almost 300 cannons

QUESTION: Why did Virginia feel the need to finance and construct a weapons manufacturing facility, and produce its own arms?

### I. REASONS FOR VIRGINIA'S ARMORY

The reasons behind the establishment of the Virginia Manufactory of Arms were varied. Perhaps one of the stronger underlying influences following the end of the American Revolution was the decline of Federalism. The rise of state's rights strongly took hold in Virginia and served as a leading catalyst for Virginia's decision to provide weapons to its own militia.

Virginia was proud of its heritage, and the possibility of being the only state in the country to operate its own armory and to arm its people was certainly something worth considering. The benefits would be manifold. Independence would be assured by not having to depend upon European or federal arms. A uniformity and a quality of weapons heretofore unavailable could be obtained under the acute eyes of the local government. Also, economically speaking, the monies spent in the arms-making endeavor could be expected to remain in circulation within the state for the benefit of all residents.

The federal government had long been aware of the problem of depending upon foreign countries for arms. This awareness probably more than any other single factor prompted the establishing of the

Springfield Armory in Massachusetts in 1795 and the Harpers Ferry Armory in Virginia 1796.

While the federal government was seeking a solution to the problem of arming the entire country, the individual states soon realized that many years would elapse before they could expect to benefit by receiving needed arms from the central government. In fact, the state quota system for the reception of federal arms did not materialize until 1808.

The continued inability to secure arms on the state level prompted Virginia's governor, James Wood, at a joint session of the state's General Assembly in 1797 to remark that every possible means had been pursued to make contracts for manufacturing arms within the state, but without success. Frustrated in attempts to obtain locally made weapons, the Executive tried to arrange out-of-state contracts and also attempted to have arms imported, but both plans were only partially successful.

Beginning in July 1797, Virginia entered into contracts with individual gun smiths to obtain arms; for the most part, these contracts led to irregular quality, uncertain delivery dates, and general disappointment.

For the period from 1797 through 1802, the Commonwealth of Virginia only managed to acquire, on average, about 2,680 muskets annually. Even to obtain these small levels, the state seemed to be continually frustrated in terms of weapon quality and delivery schedule. All of these frustrations led to a strong impetus to construct a state armory.





## II. THE BEGINNING

On January 23, 1798, the Virginia General Assembly enacted a law authorizing the Governor to establish an armory near Richmond, and with this enactment the history of the Virginia Manufactory of Arms begins.

There is little documentary evidence as to the process of selecting a person to supervise the erection of the new armory. You would think skills such as those possessed by an

- Engineer
- Artist
- Architect
- Diplomat, and a
- Businessman

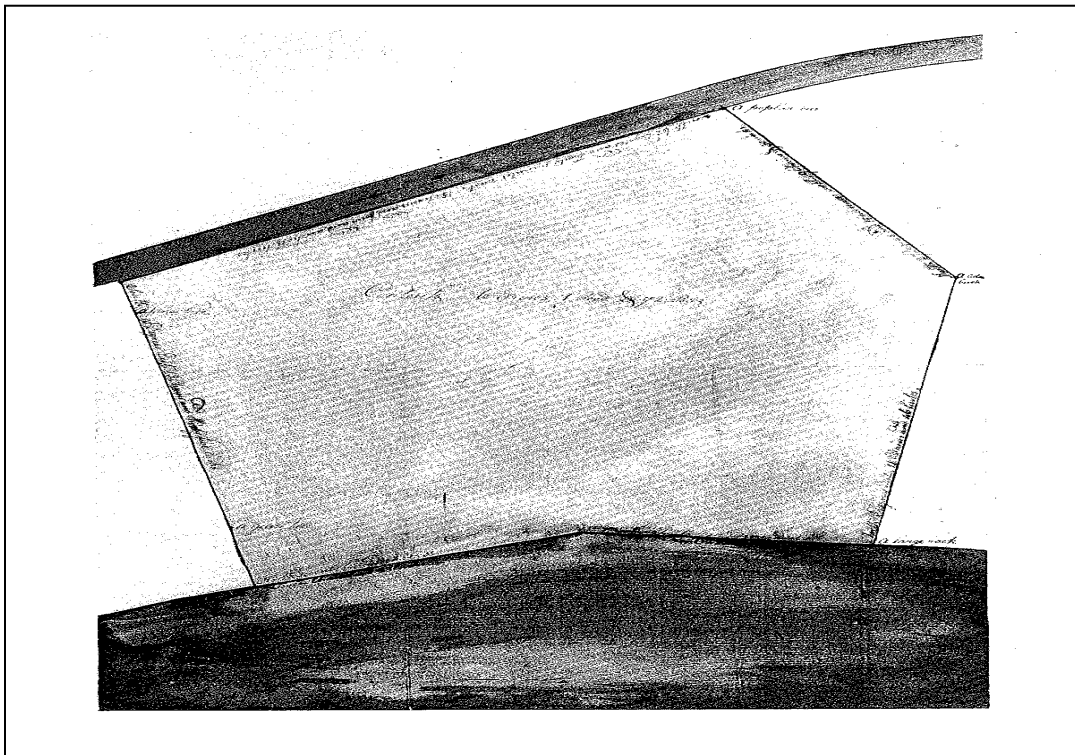
would all be required of such person.

Virginia Governor John Woods selected 31 year old John Clarke of Powhatan County as his man.



12. John Clarke, superintendent of the Virginia  
Manufactory of Arms, 1802-9

John Clarke was well known and respected as a successful millwright.



James  
River  
Canal

James  
River

Clarke selected a parcel of land just over 6 acres in size, just outside the city limits of Richmond, boarded by the James River to the property's south and the James River Canal on the property's border to its north (sketch of land parcel on bottom of prior page). The land sloped from the higher canal side of the property down to the James River.

The topography of this land parcel allowed for several waterfalls, thereby permitting reuse of the same water 3 times before it reached the lower river. The land was ideal to minimize water rent, produce bricks, and its location outside city limits protects the city and its inhabitants should a fire should break out in either the armory or the city.

The parcel was also located adjacent to the state penitentiary, a source of labor.

Virginia paid a total of 550 pounds [\$2,667.00] for the land – a huge sum in 1798.

Clarke travelled to the Springfield Armory, in the north, to locate ideas on the layout of the armory. He borrowed many ideas, methods of bookkeeping and manufacturing designs from the Springfield Armory.

In 1798 Clarke drew up his plans which were approved in 1799. By the summer of 1799 construction began on the armory. Virginia wanted to be able to produce 4,000 stands of arms per year.

As planned, at full capacity, Clarke's designs for the armory would employ 150 workmen, who would manufacture 4,992 stands of arms annually [16/day x 312 labor days].

This larger capacity would allow for:

- training the workforce
- accidents
- sickness
- holidays, etc.

The manufactory was designed to not only produce the desired muskets but also pistols and swords. The armory could also produce ordnance; thus both iron and brass furnaces were incorporated into the manufactory.

In 1801, with construction of the Virginia Manufactory nearing completion, Clarke travelled north again to locate trained, experienced workers.

Clarke looked at specialized laborers, as opposed to one worker who would make all parts for the manufacture of an entire weapon. Thus, the start of industrial specialization began.

David Ames (Springfield Arsenal) did not want Clarke to visit any further as a number of his trained artificers decided they wanted to go to Richmond and work for John Clarke.

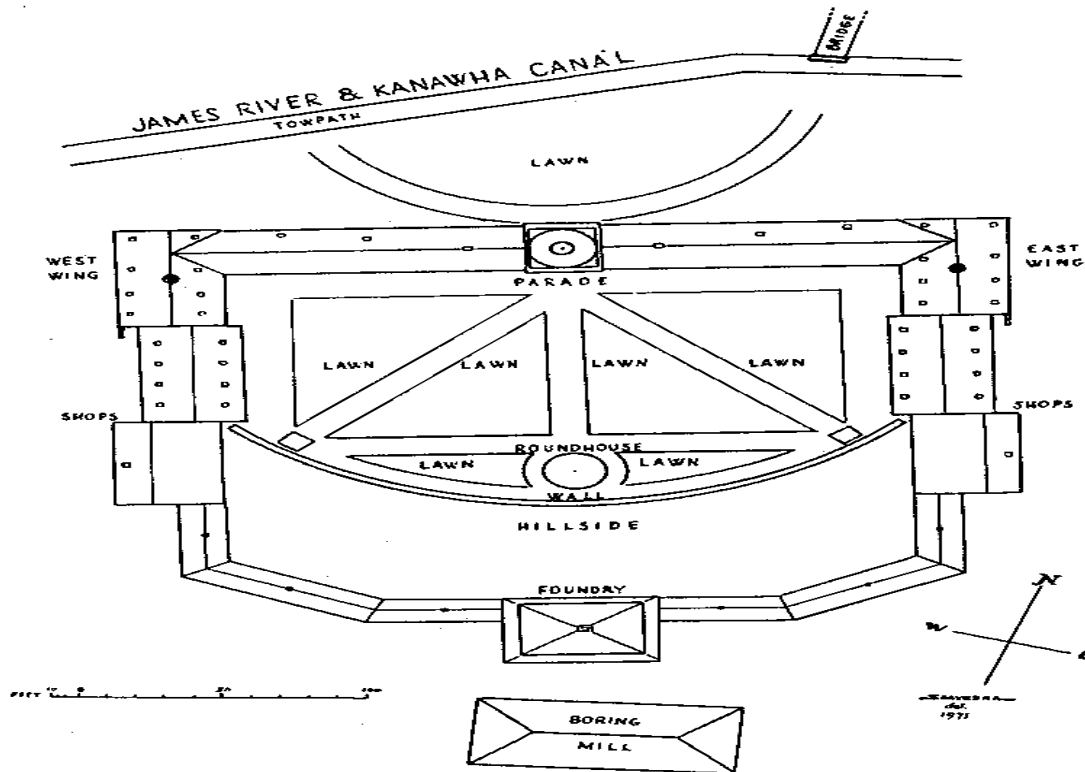
By the end of 1801, the area of the manufactory that would produce small arms (muskets and pistols) was essentially complete.

The portions of the manufactory designed to produce cannon, the large foundry, were not completed until early January 1809.

Total expenses incurred to erect the armory amounted to \$164,210.55.

### **III. WHAT DID THE NEW VIRGINIA MANUFACTORY LOOK LIKE?**

The original architectural plans of the Virginia Manufactory of Arms have not yet been located and may be lost forever. There are existing records from the armory, located primarily in the Library of Virginia, that allow us to “reconstruct” the interior of the armory.



16. An artist's concept of the armory ca. 1855

**GENERAL LAYOUT DIMENSIONS OF THE VIRGINIA MANUFACTORY BUILDINGS:**

- 310 feet long (front) – adjacent to James River Canal
- First Floor: Housed 12 rooms (clerk, superintendent, master armorer, armory section, guards' room, storage rooms)
- Second Floor: Living quarters for workmen
- Center of building had a cupola and belfry
- The area beneath the cupola was 12.5' wide by 17' high arch
- Two 172 foot long, two-storied, wings, perpendicular from each end of the main armory building. Here is where the small arms were manufactured
- Each wing contained 4 large water wheels (16' x 5')



- Each wing also contained 2 small water wheels to operate trip-hammers in the forge areas of the two wings

East Wing (first floor) contained 15 rooms (18' ceilings):

- trip-hammer forge
- 4 boring works
- large shears (cutting iron)
- a Smith's forge
- a rifle shop
- a tilt hammer
- a buffing shop
- a large filing shop

Second floor contained an arsenal

West Wing (first floor) contained 10 rooms:

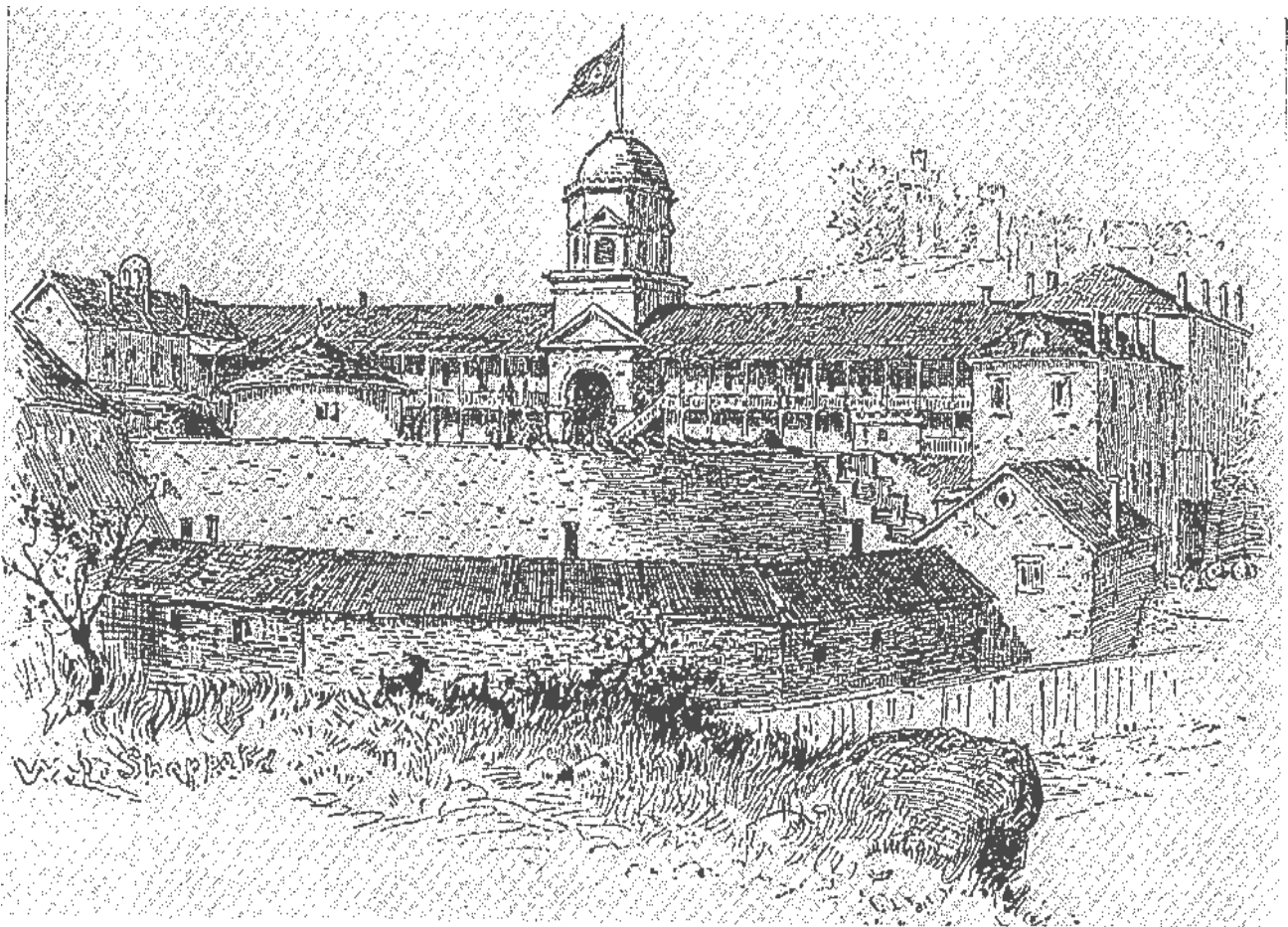
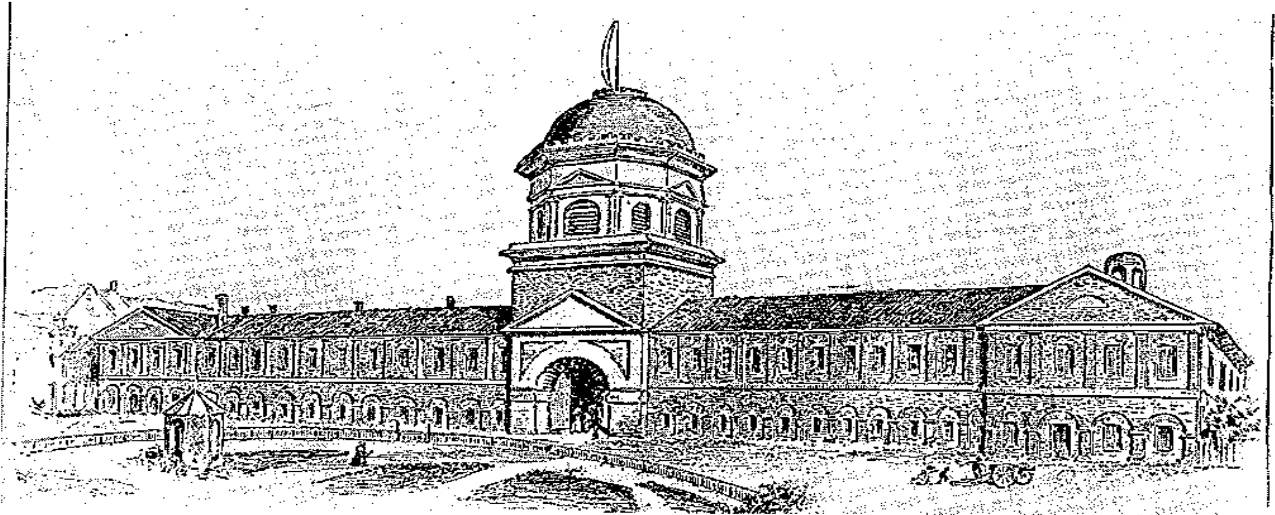
- Various forges
- A breeching shop
- A tilt hammer shop
- A buffing shop
- A trip-hammer forge
- At least one storage room

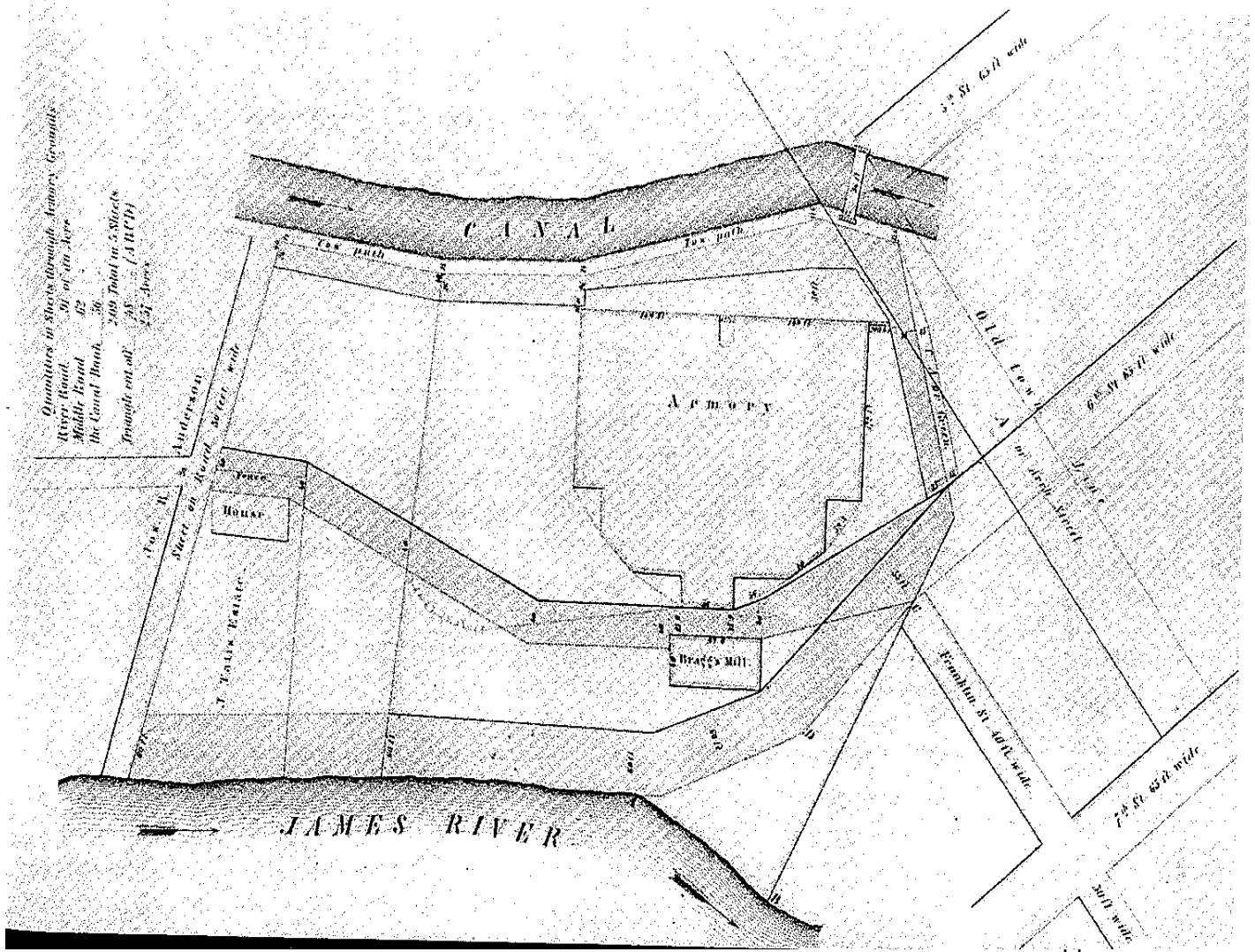
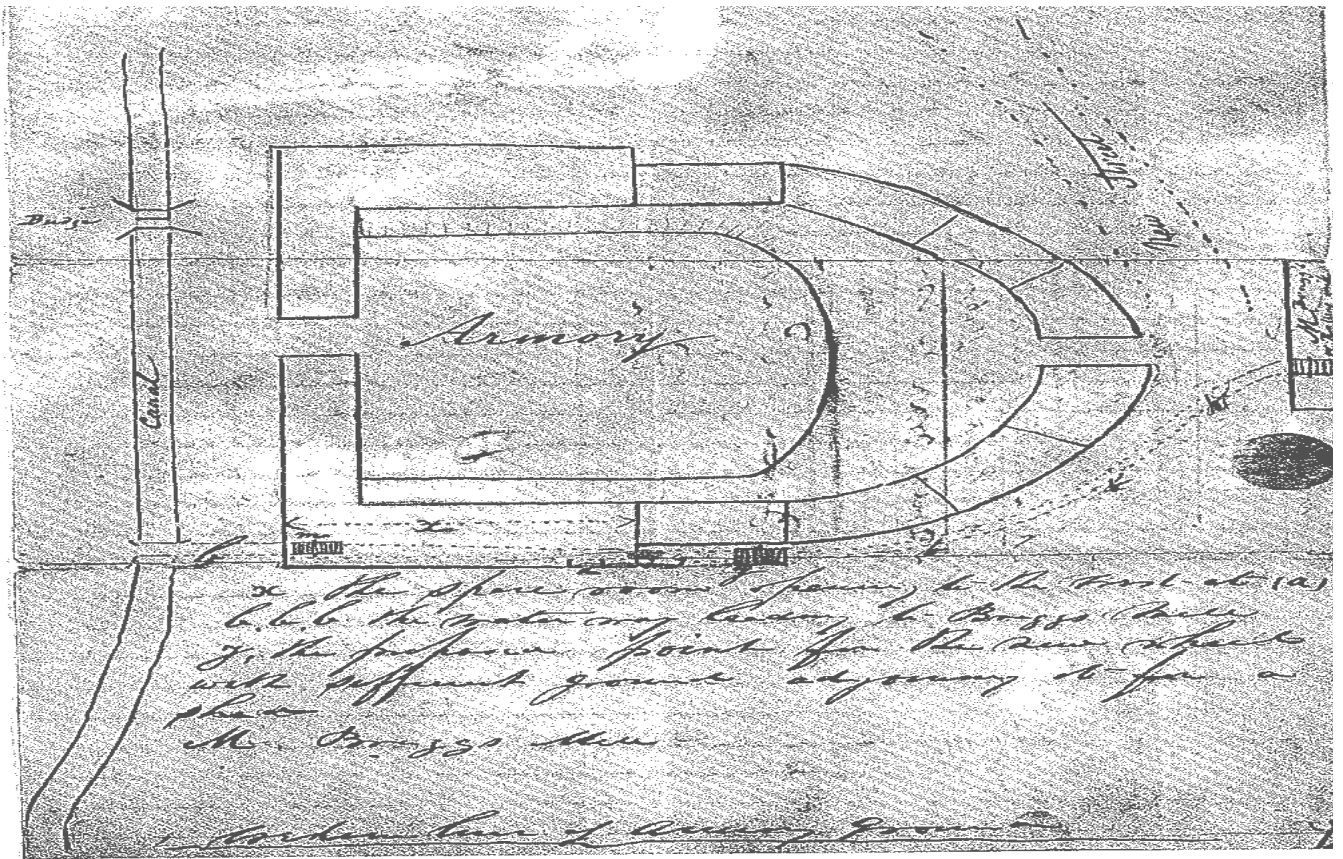
Second floor also contained completed arms storage and repair parts storage for machinery

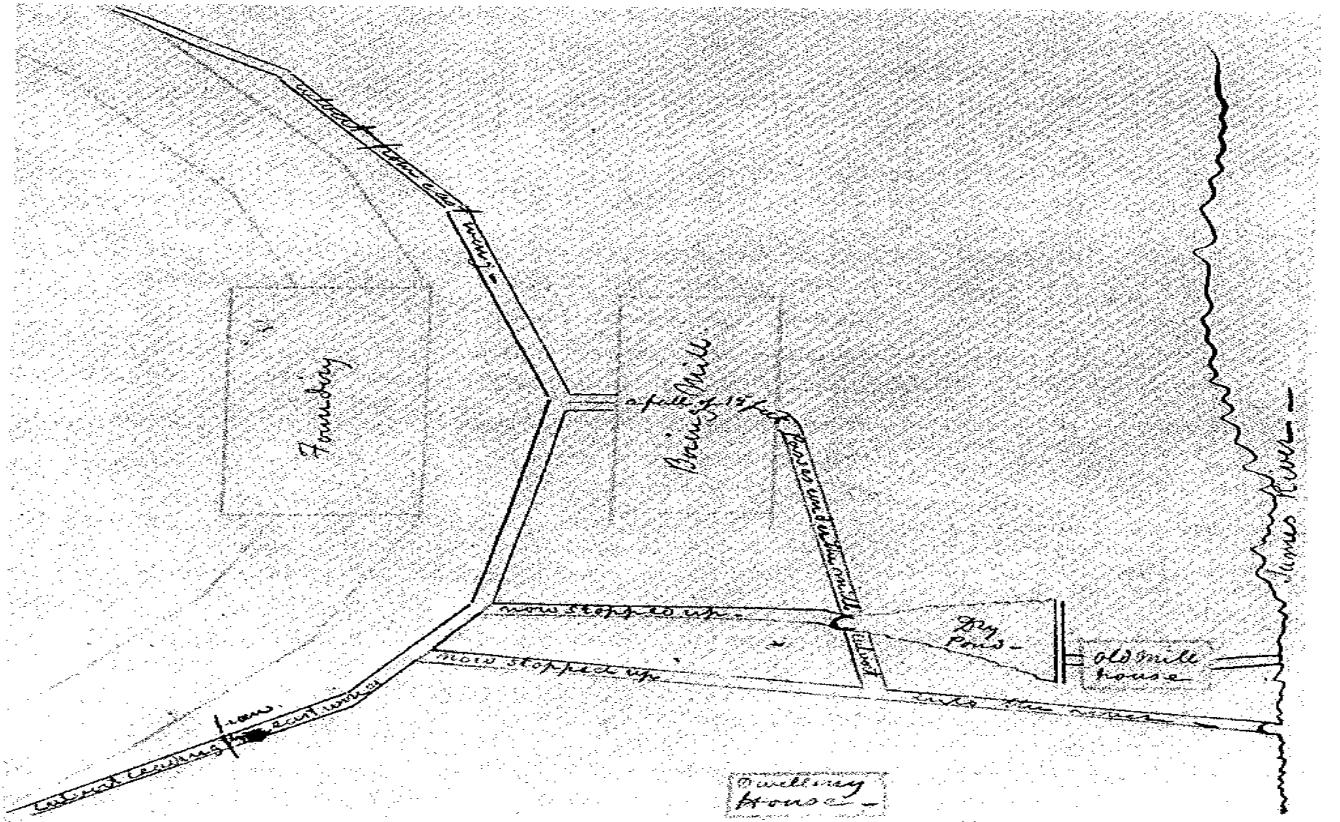
Foundry – independent building [40' wide by 55' long] located closer to the James River

Boring Mill – independent building [40' wide by 95' long] located behind the foundry to the south

Later constructions at the time of the Civil War included two small cannon houses and a circular one-story powder magazine that were built within the courtyard. No information has been located concerning these additions.







#### IV. MUSKETS

The primary objective of the Virginia Manufactory of Arms was manufacturing muskets for the state's infantry. These muskets were directly and greatly influenced by those made at the Springfield and Harpers Ferry Armories. While visiting these institutions, Clarke had recognized the advantages of the French Charleville Model 1763 musket, from which the federal muskets were basically designed. The future Virginia Manufactory muskets would be made upon a compromise using the best features of each of the muskets made at the two federal armories.

Initial work on muskets began at the Virginia Manufactory around March 1802, and by April 1802 a Council advice stated: "The Superintendent having presented to the Executive the model of a Gun Lock made at the public manufactory of arms, and the executive having compared the model with the various others, particularly the Charleville & British tower Locks, advise the model proposed be adopted, and that the device be Virginia in Roman characters & manufactory in Italics, and Richmond with the year." The first thirty-eight Virginia Manufactory muskets completed were finished in October 1802. By the end of this first production year, approximately 336 muskets complete with bayonets had been finished.

Table 1. General trends and design changes in musket production at the Virginia Manufactory of Arms, 1802-21.

1802-17 Iron Flashpan	1802	<ul style="list-style-type: none"> <li>A. Lock plate design similar to unofficial U.S. Model 1795</li> <li>B. Goosenecked cock</li> <li>C. Frizzen tail curls</li> <li>D. Frizzen spring ends before forward side-lock screw</li> <li>E. Approx. barrel Lengths: 36, 39, 42, And 44 in.</li> <li>F. Very slight comb to stock</li> </ul>
	1803	
	1804	
	1805	
	1806	
	1807	
	1808	
	1809	
	1810	
	1811	
1818-21 Brass flashpin	1812	<ul style="list-style-type: none"> <li>A. Lock plate design similar to unofficial U.S. Model 1812</li> <li>B. Reinforced cock</li> <li>C. Frizzen tail straight</li> <li>D. Frizzen spring encircled forward side-lock screw</li> <li>E. Approx. barrel Lengths: 36, 39, and 42 in.</li> <li>F. Very slight comb to stock</li> </ul>
	1813	
	1814	
	1815	
	1816	
	1817	
	1818	
	1819	
	1820	
	1821	

1816-21  
A. Trigger-guard finials rounded  
B. Barrel-band springs located forward of lower and middle bands

## **A. First Model VM Muskets (1802-1809)**

- Unofficial U.S. M-1795 musket style
- Lockplate
  - “VIRGINIA” Roman capitals stamped between hammer (cock) and frizzen spring
  - “Manufactory” in script stamped below
  - “Richmond” small Roman characters stamped in a vertical curve to the rear of the cock
  - Date is stamped in straight vertical line between “Richmond” and rear of lock plate
  - Gooseneck cock (graceful and well proportioned)
  - Iron flashpan
  - Musket stock is usually walnut – no pronounced comb on stock
  - .69 caliber smooth bore
  - Barrel lengths 36, 39, 42 and 44 inches
  - Shorter barrels were for “short muskets” a/k/a carbines

## **B. Transitional Model VM Muskets (1810-1811)**

- Experimental period
- Lockplate and cock are different
  - Lockplate shortened by 3/8 inches and narrowed by 1/16 inch

(1810) - Gooseneck cock, while about the same shape, now has a rounded shape on face (1<sup>st</sup> model is flat)

- Slotted cap screw

(1811) - Gooseneck cock is replaced with reinforced double cock

- Stamping on lockplate is lighter

## **C. Second Model VM Muskets (1812-1821)**

- Unofficial U.S. M-1812 musket
- Lockplate design conforms to U.S. M-1812 lockplate
- Lockplate has a flat face with beveled edges
- Rear of lockplate comes to a point, not a teat
- Strong reinforced cock (flat with beveled edges)

- 1812-1815 – iron flashpan – integrally forged, or founded bottom
- Frizzen forged without a bend or angle at its top
- .69 caliber
- Barrel lengths are 36, 39 and 42 (no 44 inch barrels like with 1<sup>st</sup> Model

Table 2. Approximate number of Virginia Manufactory muskets made yearly

<i>Date</i>	<i>Number finished</i>	<i>Date</i>	<i>Number finished</i>
1802	336	1812	3715
1803	2,032	1813	3,185
1804	2,007	1814	2,804
1805	2,135	1815	4,609
1806	1,330	1816	4,104
1807	1,680	1817	4,536
1808	1,470	1818	5,292
1809	3,177	1819	3,348
1810	3,435	1820	3,024
1811	3,701	1821	<u>2,508</u>
Approximate total			58,428

Source: Va. Mfg. Papers, 1802-21, box nos. 1-3; Clarke Letter Book; Staples Ledger; Staples Account Book; Jour. H. Del., 1802-22; Senate Jour., 1802-22.

## V. BAYONETS

Of all the weapons produced at the Virginia Manufactory of Arms, the bayonet is one of the most elusive items to describe as so few have been identified. What scattered information is known, however, indicate that it also underwent its own evolutionary process.

Bayonet manufacture began simultaneously with musket production, and by the end of 1802, 336 had been fitted to muskets. The first Virginia Manufactory bayonets made during 1802-4 generally conform in socket design and blade length to the unofficial U.S. Model 1795 bayonet. The socket measures approximately 2¾ inches long with an L-shaped transverse locking slot, or mortise. The socket does not have a reinforcing ferrule or a bridge. Usually a number is stamped forward of the transfer locking slot.



The blade is approximately fifteen inches long and triangularly shaped with the top, or face, of the blade flat, whereas the two sides or back flutes are likely to be deeply hollow ground. The blade usually has a number of flaws, and these hairline imperfections are also frequently evident in the sword blades. The entire bayonet is finished bright.

The first design change in the bayonet took place in 1805. At this time some bayonets were made with increased blade lengths; this resulted in some bayonets having an overall length of two feet. By the end of 1806 most of the earlier shorter bayonets had been phased out; the longer ones became standard by 1807. The socket design remained unchanged.

Complaints over the longer blade, however, prompted an armory committee investigation in 1808, and the committee reported that “the very long bayonets will probably be found inconvenient in service.

In 1809 the length of the Virginia Manufactory bayonet was reduced to about 16  $\frac{3}{4}$  inch blade.

## **VI. RIFLES**

After musket production was well underway, John Clarke was next directed to begin rifle making at the armory

### **A. First Model Rifles**

The first rifles, 24 in all, were completed by the end of October 1803.

Between 1803-1804, 72 rifles were made; they had plain patchboxes – no surviving examples are known to exist.

1805 1<sup>st</sup> year of snake patch – brass; possibly only 1 has survived.

Table 3. General trends and design changes in rifle production at the Virginia Manufactory of Arms, 1803-21.

Lock plate stamped forward of cock "Virginia" and "Manufactory" and behind cock "Richmond" and the date	Rattlesnake patch box, patch-box cover release located on top of butt in the butt plate tang, brass furniture, fully octagonal barrel 46 in. long	1803	Plain patch box, patch-box cover release located on top of butt in butt plate tang, brass furniture, fully octagonal barrel 46 in. long
		1804	
		1805	
		1806	Rattlesnake patch box, patch-box cover release located on top of butt in butt plate tang, iron furniture, octagonal to round barrel 46 in. long
		1807	
		1808	
		1809	Plain patch box, patch-box cover release located on top of butt in butt plate tang, iron furniture, fully octagonal barrel 45 in. long
No rifle locks finished, earlier locks fitted to rifles		1810	
		1811	No complete rifles produced but various component parts finished
		1812	
		1813	
Lock plate stamped similarly except the word "Manufactory" omitted		1814	
		1815	
		1816	Relatively plain patch box, patch-box cover release located on bottom of butt in the heel plate, brass furniture, fully octagonal barrel 39 in. long
		1817	
		1818	
		1819	
		1820	
		1821	

- Barrels are rifled
- Brass hardware
- Barrel is pin fastened to stock
- Rifle's length is 62 ½ inches
- Rifle weighs 9 ½ pounds
- Octagonal-to-round barrel, 46 inches long
- Rifle stock is oil finished walnut
- .45 caliber
- Front sight is brass

## B. Second Model Rifles (1812-1821)

- Many second model rifles, with standard patchboxes, had 1<sup>st</sup> model locks dated 1803-1810 because the armory had 556 1<sup>st</sup> model locks on hand when it changed the style of the rifle over to the Second Model.

- Lock production resumed in 1817 and the locks were stamped with the word “VIRGINIA” in Roman capitals between lock and frizzen spring. The word “Manufactory” was omitted.
- Iron flashpan with rounded bottom

Most Virginia Manufactory rifles that are known to exist have been converted from flint to percussion.

Our display includes five rifles (one 1<sup>st</sup> Model snake patch, two 2<sup>nd</sup> model rifles in original flint, and two flint altered to percussion rifles).



## VII. SWORDS

*Table 5. General trends and design changes in sword production at the Virginia Manufactory of Arms, 1804-21*

<p style="text-align: center;"><i>1804-6</i></p> <p>First Model Cavalry Sword          A. Square nut on pommel          B. Extremely curved on relatively straight, double fuller, 40-in.-long blade          C. Leather or polished iron Scabbard</p>	<p>1804</p> <p>1805</p> <p>1806</p>		
<p style="text-align: center;"><i>1806-8</i></p> <p>Second Model Cavalry Sword          A. Rounded pommel          B. Extremely curved, double Fuller, 40-in.-long blade          C. Polished iron scabbard</p>	<p>1807</p> <p>1808</p> <p>1809</p> <p>1810</p>	<p style="text-align: center;"><i>1806-1810</i></p> <p>Artillery Model Sword          A. Rounded pommel          B. Relatively straight, double fuller, 30-in.-long blade          C. Leather scabbard with iron mountings</p>	
<p style="text-align: center;"><i>1808-14, 1921</i></p> <p>Third Model Cavalry Sword          A. Rounded pommel          B. Relatively straight, double fuller, 36-in.-long blade          C. Japanned iron scabbard</p>	<p>1811</p> <p>1812</p> <p>1813</p> <p>1814</p>	<p style="text-align: center;"><i>1811-12</i></p> <p>No artillery swords finished</p> <p style="text-align: center;"><i>1813-14</i></p> <p>Artillery Model Sword          Identical features as above ca. 1806-10</p>	
<p style="text-align: center;"><i>1815-20</i></p> <p>No cavalry swords finished</p>	<p>1815</p> <p>1816</p> <p>1817</p> <p>1818</p> <p>1819</p> <p>1820</p>	<p style="text-align: center;"><i>1815-20</i></p> <p>No artillery swords finished</p>	
<p style="text-align: center;">1821</p> <p>Third Model Cavalry Sword          Identical features as above ca. 1808-14</p>	<p>1821</p>	<p style="text-align: center;"><i>1821</i></p> <p>Artillery Model Sword          Identical features as above ca. 1806-10, 1813-14</p>	

### A. First Model Swords (1804-1806)

- Cavalry swords were made
- Iron half-basket hit with seven slots
- Leather covered, wire wrapped handle
- Prominent feature of this model is the nut located on the flat pommel that secures the half-basket hilt to the blade tang

- Handle is 5 inches in length, and has a spiral grooved grip
- Blade is very curved (40 inches in length)
- Blade has two fullers on each side
  - A narrow deep fuller running along the top portion of the blade
  - A wider, but shallower fuller, running directly beneath the top fuller
  - Workman's stamp is usually stamped on right hand side of the ricasso of the blade near the hilt
- 1804-1806 (March) – leather scabbards
- April 1806+ iron scabbards

## **B. Second Model Swords**

- Hilt, grip handle are same as on 1<sup>st</sup> model
- Different pommel; pommel is rounded (bird's head style)
- Blade is also 40 inches long like 1<sup>st</sup> model
- Two fullers on each side
- Top edge of blade is wider and may be marked with one of the four Virginia Reg't markings
- Polished iron scabbard with frog stud
- Sword weights 2.5 pounds

## **C. Third Model Swords (much more popular as blade is shorter and less curved)**

- Hilt is same as on 1<sup>st</sup> and 2<sup>nd</sup> model swords
- Pommel is same as 2<sup>nd</sup> model sword (rounded, bird's head)
- Same handle, leathered wrapped grip with wire
- Same 2 fullers
- Blade is only slightly curved and four inches shorter (36 inch blade)
- Blade has a clipped point and seems to be a finer made blade than 1<sup>st</sup> and 2<sup>nd</sup> made sword blades
- Scabbard is iron but japanned coated to prevent rust (which was common on cavalry swords due to heavy use)

## D. Artillery Model Swords

- Reverse iron P-guard hilt
- Leather-cover wire-wrapped handle
- Rounded pommel, blade tang peened rather than attached by a nut
- It is believed the rounded bird's head pommel (first used on artillery swords is reason switched to the 2<sup>nd</sup> and 3<sup>rd</sup> model cavalry swords
- 5-inch grooved walnut handle, covered with leather and wrapped with either a single or double twisted strand of brass wire
- Blade has two fullers
- Blade is 30 inches long, slightly curved
- Leather scabbard with iron mountings
- Very few leather scabbards survive





## Total sword production

Table 6. Approximate number of Virginia Manufactory swords made yearly

<i>Date</i>	<i>Cavalry Swords Finished</i>	<i>Artillery Swords Finished</i>
1804	56	-
1805	699	-
1806	852	161
1807	1,277	99
1808	1,382	73
1809	540	533
1810	723	693
1811	400	-
1812	544	-
1813	976	299
1814	760	152
1815	-	-
1816	-	-
1817	-	-
1818	-	-
1819	-	-
1820	-	-
1821	60	30
Approximate totals	8,269	2,040

## VIII. PISTOLS

In 1804, the Virginia Manufactory explored making pistols from burst musket barrels, provided no flaws or other defects existed in the shortened sections. The pistols would be the same caliber as the muskets: .69 caliber.

Pistol making began in earnest in 1805. The pistols were made in two models. The First Model pistol was produced between 1805-1811 and the Second Model pistol was produced between 1812-1815.



*Table 5. General trends and design changes in pistol production at the Virginia Manufactory of Arms, 1804-21*

<p><i>1805-11</i> First Model Pistol Lock plate marked "VIRGINIA" and "<i>Manufactory</i>" between the cock and the frizzen spring, "Richmond" and the date to the rear of the cock</p>	<p>1805 1806 1807 1808 1809 1810 1811</p>	<p><i>1805-11</i> First Model Pistol A. Iron Mounted B. Gooseneck cock C. Full walnut stock D. .69 caliber E. Steel ramrod F. Over length 17 in.</p>
<p><i>1812-14</i> Second Model Pistol Lock plate marked "VIRGINIA" between cock and the frizzen spring, "Richmond" and the date to the rear of the cock</p>	<p>1812 1813 1814</p>	<p><i>1812-15</i> Second Model Pistol A. Brass mounted B. Reinforced cock C. Half-walnut stock D. .54 caliber</p>
<p><i>1815</i> Second Model Pistol Lock plate marked "Richmond: in a curve between the cock and the frizzen spring. Only the date stamped to the rear of the cock</p>	<p>1815</p>	<p>E. Ramrods: 1) 1812-13 hickory or steel swivel ramrod 2) 1814-15 steel swivel ramrod F. Overall length 16 in.</p>

### **Important Second Model Variation (1812-1813)**

For a period of about 4 ½ months, a hickory ramrod, in lieu of the steel swivel ramrod was used. As of today only 7 known hickory ramrod pistols survive. Two of these pistols are located in our lighted display case, resting on the early 19<sup>th</sup> Century American leather horseman's pistol holsters.

Table 8. Approximate number of Virginia Manufactory pistols made yearly

<i>Date</i>	<i>Number Finished</i>
1805	211
1806	579
1807	343
1808	390
1809	260
1810	334
1811	91
1812	386
1813	689
1814	603
1815	366
Approximate total	4,252

The pistols were not made as pairs. Only one pistol was issued to a cavalry man due to the limited supply of pistols and the fact that the sword was a cavalryman's primary weapon.

## IX. END OF OPERATIONS

The demise of the Virginia Manufactory was gradual. The primary reasons for the Virginia Manufactory's demise are:

- Virginia's economy deteriorated after War of 1812
- U.S. just emerging from second war with England
- 1820 recession
- Virginia Manufactory was now 20 years old and repairs and refurbishing were needed
- Virginia neglected its own arms manufacturers

By 1820 the federal government was now able to meet its quota to its state so perhaps the Virginia Manufactory out grew its reason for existence. The Virginia Manufactory closed on December 31, 1821.

In 1861 the Confederate Government reopened the armory, where it was known as the Richmond Armory. The armory was used during the Civil War primarily to alter existing Virginia's militia inventory of arms into more effective weapons. Pistols, rifles, and muskets were altered from flint to percussion firing mechanisms. Swords were slimmed and shortened in length to fit the standard of the mid-nineteenth century style. The armory was completely gutted by fire on April 3, 1865.