PREFACE

NJ Living History Advisory Council

"Guidelines For Living History Programs

Involving Black Powder Use"

The New Jersey Living History Advisory Council (NJLHAC) serves as an advisory board to the Commissioner of the NJ Department of Environmental Protection in the development and execution of living history events on State administered lands and acts as a liaison between living history and reenactment organizations and the government agencies responsible for the administration of public properties. The Council developed these black powder guidelines to improve the safety and authenticity of living history events that feature black powder demonstrations. The guidelines draw upon those used by various federal, state and reenactment organizations.

NJ State Park Service staff and volunteers are required to follow these guidelines for all black powder demonstrations conducted on lands administered by the NJ State Park Service. Other governmental and private organizations may use the guidelines for their own living history programming.

GUIDELINES FOR LIVING HISTORY PROGRAMS INVOLVING BLACK POWDER USE

Colonial thru Early Republic Eras
c1700-1820

New Jersey State Park Service
Division of Parks and Forestry

Written and Compiled by the
New Jersey Living History Advisory Council

Revised November 2014

Guidelines for Living History Programs
Involving Black Powder Use

Part 1

SITE MANUAL

Site Personnel, Black Powder Storage, and In-House Programs

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INTRODUCTION

Interpretive demonstrations featuring the firing of reproduction historic black powder weapons have proliferated in recent years in response to increased visitor interest. These programs now involve employees, seasonal employees and outside groups and are presented to thousands of visitors annually at parks and historic sites.

The storage and use of black powder for interpretive demonstrations brings with it the potential for accidents resulting in employee and visitor injury. To minimize these risks, this manual of guidelines, procedures and inspection has been developed and implemented for staff and volunteers who present living history programs involving black powder use on lands administered by the New Jersey Division of Parks and Forestry. These guidelines are designed to ensure that personnel are knowledgeable; the required safety procedures for storing and handling black powder are implemented; the proper procedures for firing reproduction historic weapons are identified and followed; and equipment is maintained in a safe condition. Those who are interested are encouraged to copy and distribute this information for other suitable uses.

The guidelines are divided into two parts. ***Part 1: Site Manual*** is primarily directed toward site managers and staff hosting living history events or programs**.** ***Part 2: Volunteer Manual*** is designed as a separate manual that may be duplicated and distributed to those persons who are invited to participate in events which involve either blank or live firing.

Safety officers and black powder demonstrators should be familiar and understand both parts of these guidelines. Other park staff involved with black powder programs and special events should take the opportunity to review these guidelines. Re-enactors of historical military units invited to participate in special events at a New Jersey State Park and Historic Site need only be familiar with ***Part 2*** of the guidelines

Acknowledgements

The New Jersey Living History Advisory Council (NJLHAC), an advisor to the New Jersey Department of Environmental Protection, Division of Parks and Forestry (NJDEP-P&F), developed these guidelines drawing upon those used by the National Park Service, other state agencies, especially the Maryland Forest, Park and Wildlife Service, and reenactment organizations.

The NJLHAC members initially involved with producing these guidelines are NJLHAC Past President Charles McGatha, President Andrew Drysdale, Ivins Smith, Charles Prestopine, Park Superintendent T. Mark Pitchell and Senior Historic Preservation Specialist John Mills. Paul Taylor, Supervisor of the NJP&F Office of Historic Sites and Amy Cradic, NJP&F Communications Coordinator lent their expertise and support to this project.

The Guidelines were revised in 2014 by NJLHAC members Pete Watson, Chair, Mark Texel, Director, NJ State Park Service, Beverly Weaver, Administrator, Office of Historic Sites, Ian Holmes, Stacy Roth and Resource Interpretive Specialist Garry Stone. Resource Interpretive Special John Mills lent his expertise to the revision process as did Resource Interpretive Specialist Michael Timpanaro, Robert Allegretto, Robert Healey and David Woolsey who provided their reviews, insights and suggestions.

Valuable information has also been taken from publications produced by the Brigade of the American Revolution, the Continental Line, the National Muzzle Loading Rifle Association, Parks Canada, the New York Office of Parks, Recreation, and Historic Preservation, the Georgia Department of Natural Resources, and the Pennsylvania Historical and Museum Commission. Finally, insightful review and comments from re-enactors, NJP&F staff, and staff of other state and national parks, were incorporated into the guidelines. The Guidelines are designed to suit the needs of the New Jersey Division of Parks and Forestry.

Part 1: Site Manual

Table of Contents

DEFINITIONS

Artillery: Black powder weapons generally, but not exclusively, of a bore size of 1.5" or larger including cannons, howitzers, mortars, and swivel guns.

Black Powder: A chemical propellant made of potassium nitrate, sulfur and charcoal. This is the propellant used in the muskets, rifles, and artillery in living history programs.

Black Powder Demonstrator: A staff or volunteer, 18 years or older, who has successfully demonstrated the knowledge and understanding of black powder safety and proper handling and use of the specific weapons to be fired.

Blank Firing: Firing a weapon with black powder without a projectile, as opposed to live fire, which uses a projectile.

Dragoons: Troops mounted on horseback, sometimes referred to as cavalry. Dismounted dragoons are considered in these guidelines the same as infantry.

Edged Weapons: This includes bayonets, swords, knives, tomahawks, and pole arms.

Flash Guard: Brass or steel band around outer edge on pan on lock of flintlock small arms (firearms) to prevent pan flash from striking individual standing in military formation next to lock of small arm being fired. See appendices for pattern.

Hammerstall: Leather guard for the steel (also called hammer or frizzen) on the lock of flintlock small arms to prevent accidental firing. Not used by mounted troops to prevent tangling. See appendices for pattern.

Individual Demonstration: Those demonstrations during which a weapon(s) (small arms or artillery) is loaded and fired by a Black Powder Demonstrator(s), or experienced volunteer(s) approved by the safety officer, for the purpose of demonstrating to the public how the weapons are operated. This is usually a single demonstrator but also includes military unit demonstrations involving multiple individuals demonstrating military drill but without opposing forces. This is under the supervision of the safety officer.

Infantry: Foot soldiers, whether marching and firing in formal military units or in loose formation as skirmishers and scouts. Can include dismounted dragoons.

Linstock: Short or long wood shaft with brass or iron end fitting to hold slow match used to fire artillery.

Live Firing: Firing a weapon with black powder and a projectile, as opposed to blank firing without a projectile.

Musket: Shoulder fired flintlock gun with a smooth interior bore. They vary in style and have a variety of names including Brown Bess, land pattern, Charleville, carbine, and fowler.

Non-sparking Surface: Made of material that will not produce a spark such as wood, brass or plastic.

Military Unit: A group of persons who represent a historically documented organization, incorporated or not, that is covered by insurance. This could be any number of persons.

Pass Box: A spark proof box made of wood, metal and lined with wood, or leather. This is used to transfer powder from the magazine to the area for cartridge preparation if the powder is not in its shipping cans or box. A proper period style cartridge box of leather and wood or of tinplate, or a wooden artillery limber (ammunition) chest may serve as a

pass box for finished cartridges.

Pistol: Flintlock weapon usually held in one hand to fire. Generally carried by officers and soldiers who are on horseback.

Pole Arms: Bladed weapons on a long pole and variously called a halberd, a spontoon or a pike depending on blade style. Most often carried by an officer.

Portfire: A cardboard tube filled with a composition of mealed black powder, sulfur, and saltpeter mixed with alcohol or linseed oil. Held in a wood shaft (portfire stick) a lit the portfire burns like a road flare and used to fire artillery. Use approved for static demonstrations but not tacticals. (also see slow match)

Projectile: Any solid object fired from small arms or artillery, normally a lead bullet or lead shot from small arms and a cannon ball or cement filled can from artillery.

Pyrotechnics: Chemicals used separately or added to black powder for producing smoke, noise or light beyond the normal range of the black powder alone. Also fireworks or anything that simulates ground or airbursts, rapidly burning or exploding projectiles, and smoke flares.

Reduction Chamber: Small chamber in the breech or rear of howitzer and mortar artillery barrels for the black powder charge.

Rifle: Shoulder fired flintlock gun with a grooved or rifled interior bore. They vary in style and have a variety of names including Pennsylvanian or Kentucky Long Rifle, Jaeger Rifle, and Ferguson Rifle.

Safety Officer: A staff member or volunteer, 21 years or older, who has the knowledge, understanding, and experience in black powder safety, the proper handling and use of the specific weapons to be fired, and in the type of static demonstration or battle tactical that is to be presented.

Slow Match: Twisted cotton cord that treated with Saltpeter (Potassium Nitrate) and when lit burns at a steady rate. This is held in an artillery linstock to fire an artillery piece. (also see portfire)

Small arms: Hand and shoulder-fired weapons, i.e. muskets, rifles, and pistols.

Tactical Demonstration: Those demonstrations where two or more weapons are loaded and fired with opposing forces by black powder demonstrators, or volunteers approved by a safety officer, for the purpose of demonstrating to the public the use of weapons in 18th century tactics. This includes, but is not limited to, battle reenactments.

Tampion: Wooden plug inserted into the muzzle of a small arms or artillery to keep water/debris out of the barrel.

Thumbstall: Leather cover for thumb, sometimes with padded bottom, that covers the thumb and is tied by string at the wrist. This is used by the artillery gunner tending (or thumbing) the vent on the cannon or howitzer to prevent burns from a hot barrel.

Volunteer: An individual who is recognized by the New Jersey Division of Parks & Forestry as a Volunteer in the Park and/or is officially enrolled as a member of a recreated and sponsored historical military unit, which has been invited to participate in a Division recognized and sponsored historical program or special event. Permission to demonstrate black powder weapons on Division lands may be given only to volunteers as defined above and approved by a safety officer.

GENERAL DESCRIPTION

The site administrator has the final authority for any tactical or living history demonstration.

The safety guidelines of historic weapon firing and the storage and handling of black powder used in those demonstrations consists of three parts:

1. Definition of safety officer/range officer
2. Safety guidelines for inspection of black powder storage areas and for black powder-handling procedures.
3. Safety guidelines for firing demonstrations of historic weapons.

The two types of site programs considered in these guidelines are: The ongoing and regularly scheduled living history demonstrations using reproduction historic weapons, and the living history special events using reproduction historic weapons.

GUIDELINES

SITE PERSONNEL & VOLUNTEERS – SAFETY OFFICER/RANGE OFFICER

Any interpretive demonstration of reproduction historic weapon firing conducted in any area administered by the New Jersey Division of Parks and Forestry involving either state personnel or outside groups, and all associated black powder storage and handling shall be under the supervision of an employee or volunteer who is 21 years of age or older. This employee or volunteer shall be responsible for the enforcement of all safety guidelines and precautions relating to such demonstrations or special events and shall be experienced with the type of static or tactical living history demonstration being presented. This responsible employee or volunteer will hereafter be referred in this manual as the "safety officer" or, in the case of live fire competitions (shooting match), the "range officer".

BLACK POWDER STORAGE, HANDLING AND TRANSPORTATION

BLACK POWDER SHOULD BE HANDLED AND STORED IN A COOL, DRY PLACE AWAY FROM FRICTION, COMPRESSION, HEAT, FIRE AND OTHER POSSIBLE IGNITION SOURCES REGARDLESS OF THE AMOUNT OF POWDER INVOLVED.

IN - HOUSE PROGRAMS

Black Powder Storage

This section deals with black powder storage, handling, and transportation owned by the park or historic site and used for any regular and ongoing living history programs that are presented by site staff and regular site volunteers. This does not pertain to special events that involve substantial numbers of invited volunteers, which is covered in the Volunteer Guidelines section. Relevant definitions and tables may be found on pages 18 - 21 of this manual.

In recognition of its public safety responsibility, the New Jersey Division of Parks and Forestry policy, and the policy of its lessees, are to comply with all applicable provisions of Federal, State and local safety codes and guidelines. Where the Occupational, Safety and Health Act (OSHA), the Public Employees Occupation, Safety and Health Act (PEOSHA) and the Alcohol, Tobacco and Firearms (ATF) regulations differ, the New Jersey Division of Parks and Forestry shall be governed by the more restrictive requirements.

Note: Until such time that storage facilities that comply with OSHA and PEOSHA regulations are constructed it is recommended that no more than three (3) pounds of powder normally be stored at any site for in-house programs.

Magazine storage and black powder use within the park must at all times be under the supervision of a state employee or volunteer, 21 years of age or older, who the site administrator has designated in writing to be the safety officer responsible for the enforcement of all related safety precautions. Storage of more than 5 pounds of black powder requires a permit from the New Jersey Department of Labor, Division of Workplace Guidelines.

Outdoor storage of more than 50 pounds of black powder, detonation devices, or ammunition shall only be in a Type 4 outdoor (ATF) storage facility; that is, a permanent magazine constructed according to NJAC 12:190-5.7 (see page 19) and located according to the American Table of Distances (see page 18).

Indoor storage of 50 pounds or less of black powder shall be in a Type 4 indoor (ATF) box magazine constructed according to NJAC 12:190-5.8 (see page 19). A box magazine is basically a lockable wooden box sheathed with metal. These magazines shall be located according to the American Table of Distances at least 75 feet from a public building or highway. An uninhabited building is one that is used for no purpose that causes a regular congregation of people during the period of time the powder is stored in it. A separated Type 4 indoor box magazine is required to store friction primers,

percussion caps, loaded metallic ammunition, primed cases and other detonating devices; it must be located at least 10 feet away from a Type 4 indoor box magazine containing black powder.

Visitor Centers and/or Administrative Offices shall be considered "inhabited buildings" under ATF and OSHA regulations. No portion of these buildings shall be used for magazines containing black powder, ammunition, or other explosive devices, nor shall these buildings be used for loading operations using these materials.

Historic fort magazines may be considered individually as locations for Type 4 box magazines. Proof that the facility and locations meet or exceed safety regulations must be recorded in writing, approved by a safety officer and be on file in the park.

Regular openings and inspection of magazines must be performed by the responsible employee at least every seven days to ensure that there have been no unauthorized attempts at entry or removal of materials according to NJAC 12:190-5.18. Ban on smoking and open flames in the magazine (ATF) must be enforced at all times. The black powder inventory shall be kept as small as program demand allows. Single musket demonstrations would only require an estimated 2 - 3 pounds over an average summer season but artillery demonstrations require substantially more powder.

Containers shall be dated and oldest powder used first. See the Table of Maximum Blank Loads in the appendices for a brief description of the different powder types.

Handling Black Powder Ammunition

Ammunition loading areas shall be in an uninhabited building located at least 50 feet from the storage magazine in compliance with OSHA 1910.109(5)(ii) on repacking of explosives. In addition, the loading area shall provide a non-sparking worktable or bench, adequate spark free lighting, non-sparking floor surface, and entrance controlled by the person handling the black powder. The loading area shall be cleaned after each use with water to prevent the accumulation of black powder dust.

Removal of black powder from a magazine shall be in a covered and spark proof wood or leather pass box if the powder is not in its approved shipping package. Black powder shall be attended by an employee at all times until they are used in a demonstration or returned to the magazine. The pass box is suitable for holding all non-sparking, black powder materials including loaded paper cartridges, powder horns and flasks, quill primers and assembled cannon charges, but excluding percussion caps and friction primers. Ammunition may be transferred from the pass box to suitable historical containers such as cartridge boxes or artillery limber (ammunition) chests for demonstration purposes. At the completion of each demonstration unused ammunition shall be returned to the pass box, and then to the magazine, unless locked and/or under the control of a trained park employee or trained volunteer at all times between demonstrations.

Exposed powder shall be kept at a minimum and not exceed one pound or enough for one artillery round if that is in excess of one pound. A pass box shall be used to protect any additional powder in the loading area. Loaded ammunition shall be placed in a pass box as cartridges are completed. Preparation of ammunition components shall be completed before additional powder is brought into the loading area. (Note: In the Volunteer Guidelines section, participating historical reenactors must have all ammunition prepared before they arrive at the park or historic site.)

As previously stated, loads shall not exceed the amounts specified in the appended Table of Maximum Loads for the particular weapon to be fired. Small arms cartridges shall be paper wrapped, rolled on a wood forming tube of the proper caliber for the weapon being fired, and optionally secured with glue

or string. Newsprint or heavier paper should be used. Use of metal closures, tape, coin rolls, or light paper such as printed newspaper or telephone book pages are not permitted. Artillery cartridge ammunition shall be made of heavy-duty aluminum foil, wrapped three to six times around a former of the correct size for the artillery piece. The artillery cartridge should be at least 1½ times longer than the diameter of the cartridge, which can be accomplished by folding or twisting the top into a tail. This will help prevent the cartridge from tumbling while loading and ramming down the bore of the cannon.

Ammunition shall be transported in secure, non-sparking pass boxes. Individual small arms demonstrators may transport rolled cartridges in proper period style leather or tinplate cartridge boxes so long as the boxes are in good repair, have secure leather flaps or tin cover and are kept clean of loose powder granules. Artillery ammunition may be transported in a wooden limber (ammunition) chest.

Priming materials shall be kept in a separate box or separate leather pouch. A box or pouch for artillery priming quills may be kept in artillery ammunition chest. Flints may be kept in leather and wood cartridge boxes but not in tinplate cartridge boxes.

Damaged or defective cartridges shall be immersed in water and the powder thoroughly dissolved prior to disposal if they cannot be safely returned to the magazine.

Individual demonstrators and military units are required to keep ammunition secured and out of the reach of non-demonstrators and the public. Cartridges shall not be given away to the public.

Pyrotechnics may not be used unless implementing a plan approved by the site manager and operated by licensed, insured, professionals.

Transportation of Black Powder Ammunition

Transportation of black powder in quantities of more than five pounds is governed by state and federal regulations. Because the requirements are complex, transportation shall be avoided whenever possible. Black powder can be shipped directly from the supplier via UPS and other delivery companies. Explore all avenues to get direct delivery to the park by the distributor before undertaking transportation of larger quantities by park personnel.

HISTORIC WEAPONS FIRING

IN - HOUSE PROGRAMS

Blank Firing Range Location

Local zoning codes and authorities shall be consulted before designing demonstration ranges on park lands. Regulations and local sentiment regarding noise or potential hazards of blank firing must be considered before the program is implemented.

Suitability of park lands must be assured. For individual demonstrations, the minimum cleared area shown on the range drawings is essential to keeping undetected visitors out of the danger zone. Whenever possible, the site shall also provide natural barriers to noise and encroachment. (Note: For larger tactical demonstration, the site must be sufficiently large enough to maintain proper distances while allowing for public viewing.)

General (Blank Firing)

Generally, only reproduction weapons shall be fired. Original/antique firearms are considered a historic artifact and shall only be fired with the approval of the safety officer.

Black powder and range safety guidelines in this manual shall be followed strictly in preparing ammunition and conducting demonstrations.

All those involved as demonstrators in in-house public programs of historic black powder weapons firing shall be trained and tested as black powder demonstrators by the area's safety officer prior to their initial participation in a demonstration.

All historic weapon firing demonstrations within the park or site are subject to the approval of a safety officer who shall be responsible for the enforcement of all safety guidelines and precautions relating to such demonstrations in that area. The safety officer may decide whether or not he/she should be present for such demonstrations based upon the demonstrator's skills and abilities, the layout of the facility and the need for and/or the presence of competent individuals to assist with crowd control.

Visitor Safety

Physical barriers are recommended to keep visitors at the safe distances indicated on the range drawings. If natural features are inadequate to restrain visitors, ropes, fences or other artificial barriers shall be used. No visitor shall be allowed in front of the plane of the muzzle of a demonstration weapon. Minimum distances between demonstration weapons and visitors are 15 feet for small arms and 30 feet for artillery. See appendix for a diagram.

The safety officer, or a person designated and specifically trained, shall control each firing demonstration, including those of invited military units or individuals and seasonal employees, assuring that the range is clear, that all safety procedures are being followed, and that the demonstration is explained adequately to visitors.

The safety officer shall concentrate on the safety aspects of the demonstration and not become distracted from this duty by his or her participation in the demonstration or interpretation. The ideal situation is that the demonstrator be assisted by an interpreter who explains the presentation to the public. The demonstrator shall be assisted by additional lookouts as necessary.

In case the of weapon misfires the interpreter shall explain the situation and procedures to visitors, keeping them safely in place until the weapon is discharged or rendered safe. If repeated attempts fail to correct a misfire, interpreter shall conclude the program. After visitors have left the area, the prescribed unloading procedures shall be followed. The safety officer shall then inspect the weapon prior to its being used again. Where possible, visitors shall be removed from artillery areas for prescribed unloading procedures to be followed.

Before actual firing, the interpreter shall warn visitors of the loud noise, recommend caution to people with hearing aids, children or animals and request control of children and animals.

Visitors shall not be allowed to handle any weapon or equipment containing black powder. Edged weapons likewise may be observed but not handled by visitors. Empty weapons or equipment can be handled but shall remain in the control of the interpreter, i.e. a visitor could heft a rifle or musket without bayonet vertically while the interpreter holds the sling.

Demonstrator Safety

All demonstrations shall follow the appropriate historic drill for the particular weapon involved. Demonstration of types of weapons lacking formal manuals shall adhere to the basic safety precautions of the manual of arms for the most similar military weapon as specified in historic manuals and approved after review by the safety officer.

For protection from flash burns, all demonstrators firing black powder weapons shall wear long sleeved garments of natural fiber or leather as appropriate to the historical period being interpreted, unless exempted by the safety officer. Special care shall be exercised with worn, thin, or fringed clothing.

Ear and eye protection is recommended for those involved in artillery and small arms demonstrations.

For artillery firing crews, additional protection consisting of all-leather gauntlets similar to welder's gloves (i.e. loose fitting, heat resistant, heavy leather with cuffs extending to the middle of the fore arm or farther) shall be used by the crewman who sponges and rams and the crewman who worms and loads the cannon. The crewman who picks and primes the piece shall be wearing a leather thumb stall to cover the vent. Also see misfire procedures.

Inspection

Each reproduction historic weapon used in the park firing demonstrations shall be given a thorough inspection by the park's safety officer or black powder demonstrator at the beginning of each day that the weapon is used. The inspection of shoulder arms shall be based on the Musket Inspection Checklist in the appendices. In addition to this inspection, site owned weapons shall be disassembled, cleaned and inspected using the "After Disassembly" part of the attached checklist at regular intervals when in frequent use.

The inspection on artillery shall be based on the Muzzle-Loading Cannon Inspection Checklist in the appendices.

Any weapon failing to pass according to the approved checklist, shall be tagged, the serial number appearing on the barrel shall be noted if applicable, and removed for repairs. Following repairs, the inspection checklist shall be applied again to ensure compliance before removing the tag and returning the weapon to service.

It is recommended that a log be kept on each weapon owned by State Historic Sites so that there are accurate records which reflect weapon use, malfunctions, defects and repairs. See appendix.

All black powder demonstrations shall be inspected by the safety officer using the attached checklist at regular intervals to ensure adherence to these guidelines and the appropriate period drill. Usually, but not always, these inspections shall be arranged with the park in advance.

Special Event Programs

The park shall make available, either in digital access or printed form, a copy of the "Volunteers' Manual, Guidelines for Living History Involving Black Powder Use, Part 2 " to outside individuals and/or recreated military units invited to participate in special programs, prior to their participation in the program. It is the responsibility of the outside individual or military unit commander to adhere to the regulations and details in these guidelines. Any violation of the guidelines by the individual or military unit can result in immediate cancellation of the demonstration and/or the removal of the individual or unit from further weapons firing demonstrations in the park. Weapons used by volunteers at blank fire events are subject to examination by a safety officer who may require any particular weapon to be withdrawn from use until the particular weapon meets the requirements of the safety checklist to the satisfaction of the safety officer after re-inspection.

A safety officer or the site administrator or his/her appointee must personally observe and supervise all firing demonstrations conducted by outside individuals and military units within the area's boundaries, until satisfied that all safety procedures are being, and will be, followed. This individual supervising firing demonstrations must be prepared and authorized by the Park Superintendent or Park Police to act immediately on any violation of the Guidelines for Living History Involving Black Powder Use. Any recommendations for canceling the program and stopping and/or removing the individual or military unit from further firing demonstrations in the park will be made to the Park Superintendent and/or Park Police on duty for their consideration.

Each reproduction historic weapon used in the park firing demonstrations shall be given a thorough inspection by the park's safety officer or his representative, which could be the commanders of the participating military units, at the beginning of each day that the weapon is scheduled to be fired. The inspection of weapons shall be based on the appropriate checklist found in the appendices. The weapons are to be also inspected while in military formation, just prior to marching out to, and at the conclusion of, each individual or tactical demonstration.

On rare occasion blackpowder weapons, particularly artillery, may set grass or brush on fire in dry conditions. Have buckets of water and/or fire extinguishers on hand nearby. These may be hidden from public view on the demonstration or tactical field or placed off field nearby. During periods of moderate or high risk fire warnings site staff will need to evaluate whether conditions will permit demonstrations or tacticals to be held. Individual demonstrations may be moved to a low fire risk area such as paved patio, parking lot or to a grass area that has been soaked with water. High risk fire warnings may also prevent campfires from being permitted.

New Jersey Division of Parks & Forestry
Quick Reference List of Safety Points for Black Powder Programs

Participant Units

- Must be members of an organization invited to participate.
- Must provide proof of unit liability insurance.
- Shall designate a unit safety officer responsible for ensuring inspection of all weapons and accoutrements in their respective unit and for unit member's proper adherence to safety regulations during individual and tactical demonstrations.
- All participants under the age of 18 must be accompanied by a member of their immediate family or legal guardian. (Written delegation of authority from parent/guardian to re-enactment guardian is also permitted.).

Weapons

- Weapons shall be modern reproductions of appropriate historical style portrayed.
- No one under the age of 16 shall be permitted to operate a firearm, act as a member of an artillery crew, or handle black powder.
- Shoulder arms and pistols will be inspected by unit commanders/safety officers to insure weapons are unloaded, in good condition (no cracked wood or metal, good metal to wood fit, etc.), and are equipped with proper safety devices.
- Artillery will be inspected by unit commanders/safety officers to insure weapons are unloaded, in good condition (no cracked wood or metal, good metal to wood fit, etc), and are equipped with proper implements, equipment, lockable ammunition chest, and safety devices.
- Edged weapons shall remain sheathed except for parades, sentry duty, special ceremonies, and in approved demonstrations.
- All weapons and camp cutting tools (food knives, axes, etc.) shall be kept under participant control and secured safely away from the reach of the visiting public.

Ammunition

- Black powder only.
- No loose or canned powder on site. All powder brought to the site will already be in pre-made cartridges for both firearms and artillery.
- Cartridges shall be stored in period cartridge boxes and ammunition chests or in modern spark proof and closed containers. All cartridges shall remain under the security of the participants.
- Powder horns may not be used for loading or priming in tactical demonstrations.
- The visiting public shall not be allowed to handle black powder in any form.
- Pyrotechnics may not be used unless implementing a plan approved by the site manager and operated by licensed, insured, professionals.

Firearms Demonstrations

- In individual demonstrations no visitor shall be allowed in front of the plane of the muzzle of a demonstration weapon.
- Individual demonstrations minimum distances between loaded weapons and visitors are 15 feet for small arms and 30 feet for artillery.

Horses, Livestock

- All out-of-state horses and mules shall have a negative Coggins test for Equine Infectious Anemia.
- Only animals trained to "stand fire" may be in tactical demonstrations.

Camps

- Camp fires must be monitored by an adult participant at all times. A bucket of water and/or a woolen blanket and/or a hidden fire extinguisher must be kept near the fire for emergency use. High risk fire warnings may prevent campfires from being permitted.
- All weapons, edged and hazardous tools (food preparation knives, axes, etc), and black powder shall be under the control of the participants and secured safely away from the reach of the visiting public.
- Modern intrusions are to be kept concealed.

Tactical Demonstrations/Re-enactments

- All tactical demonstrations with opposing forces are to be proceeded by a meeting of the officers of both sides. The meeting will review safety and plans for the demonstration.
- Immediately prior to and following all demonstrations, the unit safety officer will inspect their men under the observation of the Commanding Field Officer. The safety officer will make sure all firearms are unloaded and no live cartridges (cartridges with projectile) are being carried by participants.
- All participants are responsible for safety. If, during a tactical, a participant observes a safety violation, he shall immediately notify his commander or safety officer. If the problem is within the unit, the commander/safety officer will immediately and discretely deal with the problem. If the safety problem is with the opposing force, the safety officer/unit commander will signal the opposing force to correct the problem. If the problem is not immediately corrected, the officer will notify the Commanding Field Officer to halt the tactical demonstration.
- Tactical demonstrations shall be staged so that spectators are a safe distance (try to maintain a minimum of 15 feet for infantry, 30 feet for artillery, 60 feet for horse) and at right angles to the forces engaged. Weapons shall not be fired in the general direction of the visiting public unless there is an interval of 100 feet or more for small arms and 150 feet for artillery.
- Opposing forces must cease fire when the distance between the forces is less than 100 feet. Artillery shall not be fired when the opposing force is within 150 feet.
- Weapons must be raised and aimed at a point above all participants' heads.
- Artillery will be searched and sponged twice between firings.
- Officers and dragoons may carry an unsheathed sword or polearm on the tactical field. Bayonets are to remain sheathed, parade and ceremonial formations excepted, unless prior approval has worked out between commanding officers of both sides and with site staff. No hand-to-hand combat is permitted unless a scripted encounter has been planned and approved by officers of both sides and site staff.
- No one under the age of 12 is permitted on the tactical field. Participants aged 12-15 may participate only as functional musicians.
- Use of music on the tactical field must be appropriate for the historical situation being recreated and should not interfere with the ability to hear officer's commands.
- On rare occasions blackpowder weapons, particularly artillery, may set grass or brush on fire in dry conditions. Have water buckets and/or fire extinguishers on hand nearby. Moderate or high risk fire warnings may cause cancellation of demonstration or tactical programs
- All site rules and regulations must be followed.

SAMPLE NOTICE FORM FOR LIVING HISTORY
PROGRAMS USING BLACK POWDER

&

TABLES AND REGULATIONS FOR THE
TRANSPORTATION AND STORAGE OF BLACK POWDER

New Jersey Division of Parks and Forestry
NOTICE OF LIVING HISTORY PROGRAM
INVOLVING BLACK POWDER FIRING

TO:_____ Date

FROM:_____

PROGRAM DATE: From_____ To_____

TYPE: Blank _____ Live

NAME OF SAFETY OFFICER:

_____

NAME OF RANGE OFFICER IF "LIVE":

_____

_____

DESCRIPTION OF PROGRAM:

TABLE OF DISTANCES
FOR STORAGE OF LOW EXPLOSIVES

Pounds of powder		From inhabited building distance	From public railroad & highway distance	From above ground magazine
Over	Not Over	(feet)	(feet)	(feet)
0	1,000	75'	75'	50'
1,000	5,000	115'	115'	75'

Table: Department of Defense Ammunition and Explosives Guidelines, Table 5-4.1 extract; 4145.27 M, March 1969.

Definitions

Low explosives: Explosive materials which can be caused to deflagrate when confined. (For Example, black powder; safety fuses; igniters; igniter cords; fuse lighters; and "special fireworks" defined as Class B explosives by U.S. Department of Transportation regulations in 49 CFR Part 173.)

Magazine: Any building or structure, other than an explosives manufacturing building, used for storage of explosive materials.

Inhabited building: Any building regularly occupied in whole or in part as a habitation for human beings, or any church, schoolhouse, railroad station, store or other structure where people are accustomed to assemble, except any building occupied in connection with the manufacture, transportation, storage or use of explosive materials.

Highway: Any public street, alley or road. Public highways of class A to D are highways with an average traffic volume of 3,000 or less vehicles per day as specified in "American Civil Engineering Practice" (Abbett, Vol.1, Table 46, Sec. 3-74, 1956 Edition, John Wiley and Sons).

When two or more storage magazines are located on the same property, each magazine must comply with the minimum distances specified from inhabited buildings, railways and highways, and, in addition, they should be separated from each other by not less than the distances shown for "Separation of Magazines" (see table above), …. If any two or more magazines are separated from each other by less than the specified "Separation of Magazines" distances, then such two or more magazines, as a group, must be considered as one magazine, and the total quantity of explosives stored in such group must be treated as if stored in a single magazine located on the site of any magazine of the group, and must comply with the minimum of distances specified from other magazines, inhabited buildings, railways and highways.(excerpted from: ATF Explosives Law & Regulations, ATF P 5400.7 [11/82])

CONSTRUCTION OF TYPE 4 MAGAZINES

NJAC 12:190-5.7 Construction of type 4 outdoor magazines

(a) This section shall apply to the construction of Type 4 outdoor magazines.

(b) A Type 4 outdoor magazine shall be a building, igloo, tunnel, dugout, box, trailer, semitrailer, or other mobile magazine.

(c) Type 4 outdoor magazine shall be fire-resistant, weather-resistant, and theft-resistant.

(d) Type 4 outdoor magazines shall be constructed of masonry, metal-covered wood, fabricated metal, or a combination of these materials.

(e) The walls and floors shall be constructed of, or covered with, a non-sparking material, or lattice work.

(f) Foundations shall be constructed of brick, concrete, cement block, stone, or metal or wood posts. If piers or posts are used, in lieu of a continuous foundation, the spaces under the buildings shall be enclosed with fire-resistant material.

(g) The doors or covers shall be metal or solid wood covered with metal.

(h) Hinges and hasps, locks, padlocks, padlock protection, and sparking material shall comply with NJAC. 12:190-5.3 (j - n) respectively (see following).

[" NJAC 12:190-5.3

(j) Hinges and hasps shall be attached to the doors by welding, riveting, or bolting with nuts on the inside of door. The hinges and hasps shall be installed in such a manner that they cannot be removed when the doors are closed.

(k) Each door shall be equipped with one or more of the following: 1. Two mortise locks, 2. Two padlocks fastened in separate hasps and staples, 3. A combination of a mortise and padlock, 4. A mortise lock that requires two keys to open, 5. A three-point lock, or 6. A bolt, lock or bar which cannot be actuated from the outside.

(l) Padlocks shall have at least five tumblers and a case-hardened shackle of at least 3/8 inch diameter.

(m) Outdoor padlocks shall be protected with 1/4 inch steel hoods constructed so as to prevent sawing or lever action on the locks or hasps.

(n) No sparking material shall be exposed to contact with stored explosive materials. All ferrous nails in the floor and side walls which might be exposed to contact with explosive materials shall be blind nailed or countersunk on the floor and side walls covered with a non-sparking lattice works or other non-sparking material."]

NJAC 12:190-5.8 Construction of Type 4 indoor magazines

(a) This section shall apply to the construction of Type 4 indoor magazines.

(b) Type 4 indoor magazines shall be fire-resistant and theft-resistant. They need not be bullet- resistant and weather-resistant if the buildings in which they are stored provide protection from the weather and from bullet penetration.

(c) Type 4 indoor magazines shall be constructed in accordance with (c)1 or (c)2 below.

1. Wood magazines shall have sides, bottoms, and covers or doors constructed of one inch of hardwood and shall be braced at corners. They shall be covered with sheet metal of not less than number 26 gauge. Ferrous nails exposed to the interior of magazine shall be countersunk.

2. Metal magazines shall have sides, bottoms, and covers or doors constructed of not less than 16 gauge metal and shall be lined on the inside with a non-sparking material.

(d) Hinges and hasps, locks, padlocks, padlock protection, and non-sparking material shall comply with N.J.A.C. 12:190-5.3 (j-n) (see above); except that only one padlock shall be required on a type 4 indoor magazine that is located in a room that is also secured by a lock.

NJAC 12:190-5.9 Construction of services for magazines

(a) Magazines shall not be provided with artificial lighting.

(b) No lighting shall be placed or used in a storage facility of type 1, 2, 3, or 4 magazines except approved battery activated safety lights or battery activated safety lanterns.

(c) Magazines shall be ventilated to prevent dampness or heating of stored explosive materials adversely affected by lack of ventilation. Vents in the foundation, roof, or gables shall be offset or shielded and screened to prevent the entrance of sparks.

(d) The ground around all outdoor magazines shall slope away for drainage or other adequate drainage shall be provided.

(e) Unattended vehicular magazines shall have wheels removed or shall be effectively immobilized by kingpin locking devices or other approved methods.

NJAC 12:190-5.18 excerpts

(a) All magazines shall be in the charge of competent person at least 21 years of age.

(b) Explosives shall not be stored in any amount exceeding the quantity stated on the storage permit.

(c) Explosives may be stored unattended in Types 1, 2, and 4 magazines

(f) Low explosives in excess of 50 pounds shall not be stored in a type 4 indoor magazine. This quantity limit shall not apply to smokeless powder which is covered in N.J.A.C. 12:190-10.2.

(g) Any person storing explosive materials shall open and inspect his magazines at least every seven days. This inspection need not be an inventory, but shall be sufficient to determine whether there has been unauthorized removal of their contents

(k) Explosive materials within Type 1, 2, or 4 magazines shall not be placed directly against interior walls and shall be stored so as not to interfere with ventilation. To prevent contact of stored explosive materials with walls, a non-sparking lattice work or other nonsparking material shall be used.

(l) Containers of explosive materials shall be stored by being laid flat with top sides up. Corresponding classes as defined in 49 CFR Part 173, grades, and brands of explosives shall be stored together within a magazine in such a manner that grade, brand, and USDOT class marks are easily visible upon inspection. Stocks of explosive materials shall be stored so as to be easily counted and checked.

(m) Except with respect to fiberboard or other nonmetal containers of explosive materials shall not be unpacked or repacked inside a magazine or within 50 feet of a magazine, and shall not be unpacked or repacked near other explosive materials. Containers of explosive materials shall be securely closed while being stored.

(n) Tools used for opening or closing containers of explosive materials shall be of non-sparking materials, except that metal slitters may be used for opening fiberboard containers. A wood wedge and a fiber, rubber, or wooden mallet shall be used for opening or closing wood containers of explosive materials. Metal tools other than non-sparking transfer conveyors shall not be stored in any magazine containing high explosives.

Guidelines for Living History Programs
Involving Black Powder Use

Part 2

VOLUNTEERS MANUAL

Invited Recreated Military Units, Tactical Demonstrations, Live Fire Matches and Appendices

Colonial thru Early Republic Eras
c1700-1820

NJ State Park Service
Division of Parks and Forestry

Written & Compiled by the
New Jersey Living History Advisory Council

Revised November 2014

INTRODUCTION

Interpretive demonstrations featuring the firing of reproduction historic black powder weapons have proliferated in recent years in response to increased visitor interest. These programs now involve employees, seasonal employees and outside groups and are presented to thousands of visitors annually at parks and historic sites.

The storage and use of black powder for interpretive demonstrations brings with it the potential for accidents resulting in employee and visitor injury. To minimize these risks, this manual of guidelines, procedures and inspection has been developed and implemented for staff and volunteers who present living history programs involving black powder use on lands administered by the New Jersey Division of Parks and Forestry. These guidelines are designed to ensure that personnel are knowledgeable; the required safety procedures for storing and handling black powder are implemented; the proper procedures for firing reproduction historic weapons are identified and followed; and equipment is maintained in a safe condition. Those who are interested are encouraged to copy and distribute this information for other suitable uses.

The guidelines are divided into two parts. ***Part 1: Site Manual*** is primarily directed toward site managers and staff hosting living history events or programs**.** ***Part 2: Volunteer Manual*** is designed as a separate manual that may be duplicated and distributed to those persons who are invited to participate in events which involve either blank or live firing.

Safety officers and black powder demonstrators should be familiar and understand both parts of these guidelines. Other park staff involved with black powder programs and special events should take the opportunity to review these guidelines. Re-enactors of historical military units invited to participate in special events at a New Jersey State Park and Historic Site need only be familiar with ***Part 2*** of the guidelines

Acknowledgements

The New Jersey Living History Advisory Council (NJLHAC), an advisor to the New Jersey Department of Environmental Protection, Division of Parks and Forestry (NJDEP-P&F), developed these guidelines drawing upon those used by the National Park Service, other state agencies, especially the Maryland Forest, Park and Wildlife Service, and reenactment organizations.

The NJLHAC members initially involved with producing these guidelines are NJLHAC Past President Charles McGatha, President Andrew Drysdale, Ivins Smith, Charles Prestopine, Park Superintendent T. Mark Pitchell and Senior Historic Preservation Specialist John Mills. Paul Taylor, Supervisor of the NJP&F Office of Historic Sites and Amy Cradic, NJP&F Communications Coordinator lent their expertise and support to this project.

The Guidelines were revised in 2014 by NJLHAC members Pete Watson, Chair, Mark Texel, Director, NJ State Park Service, Beverly Weaver, Administrator, Office of Historic Sites, Ian Holmes, Stacy Roth and Resource Interpretive Specialist Garry Stone. Resource Interpretive Special John Mills lent his expertise to the revision process as did Resource Interpretive Specialist Michael Timpanaro, Robert Allegretto, Robert Healey and David Woolsey who provided their reviews, insights and suggestions.

Valuable information has also been taken from publications produced by the Brigade of the American Revolution, the Continental Line, the National Muzzle Loading Rifle Association, Parks Canada, the New York Office of Parks, Recreation, and Historic Preservation, the Georgia Department of Natural Resources, and the Pennsylvania Historical and Museum Commission. Finally, insightful review and comments from re-enactors, NJP&F staff, and staff of other state and national parks, were incorporated into the guidelines. The Guidelines are designed to suit the needs of the New Jersey Division of Parks and Forestry.

Part 2: Volunteers Manual

Table of Contents

DEFINITIONS

Artillery: Black powder weapons generally, but not exclusively, of a bore size of 1.5" or larger including cannons, howitzers, mortars, and swivel guns.

Black Powder: A chemical propellant made of potassium nitrate, sulfur and charcoal. This is the propellant used in the muskets, rifles, and artillery in living history programs.

Black Powder Demonstrator: A staff or volunteer, 18 years or older, who has successfully demonstrated the knowledge and understanding of black powder safety and proper handling and use of the specific weapons to be fired.

Blank Firing: Firing a weapon with black powder without a projectile, as opposed to live fire, which uses a projectile.

Dragoons: Troops mounted on horseback, sometimes referred to as cavalry. Dismounted dragoons are considered in these guidelines the same as infantry.

Edged Weapons: This includes bayonets, swords, knives, tomahawks, and pole arms.

Flash Guard: Brass or steel band around outer edge on pan on lock of flintlock small arms (firearms) to prevent pan flash from striking individual standing in military formation next to lock of small arm being fired. See appendices for pattern.

Hammerstall: Leather guard for the steel (also called hammer or frizzen) on the lock of flintlock small arms to prevent accidental firing. Not used by mounted troops to prevent tangling. See appendices for pattern.

Individual Demonstration: Those demonstrations during which a weapon(s) (small arms or artillery) is loaded and fired by a Black Powder Demonstrator(s), or experienced volunteer(s) approved by the safety officer, for the purpose of demonstrating to the public how the weapons are operated. This is usually a single demonstrator but also includes military unit demonstrations involving multiple individuals demonstrating military drill but without opposing forces. This is under the supervision of the safety officer.

Infantry: Foot soldiers, whether marching and firing in formal military units or in loose formation as skirmishers and scouts. Can include dismounted dragoons.

Linstock: Short or long wood shaft with brass or iron end fitting to hold slow match used to fire artillery.

Live Firing: Firing a weapon with black powder and a projectile, as opposed to blank firing without a projectile.

Musket: Shoulder fired flintlock gun with a smooth interior bore. They vary in style and have a variety of names including Brown Bess, land pattern, Charleville, carbine, and fowler.

Non-sparking Surface: Made of material that will not produce a spark such as wood, brass or plastic.

Military Unit: A group of persons who represent a historically documented organization, incorporated or not, that is covered by insurance. This could be any number of persons.

Pass Box: A spark proof box made of wood, metal and lined with wood, or leather. This is used to transfer powder from the magazine to the area for cartridge preparation if the powder is not in its shipping cans or box. A proper period

style cartridge box of leather and wood or of tinplate, or a wooden artillery limber (ammunition) chest may serve as a pass box for finished cartridges.

Pistol: Flintlock weapon usually held in one hand to fire. Generally carried by officers and soldiers who are on horseback.

Pole Arms: Bladed weapons on a long pole and variously called a halberd, a spontoon or a pike depending on blade style. Most often carried by an officer.

Portfire: A cardboard tube filled with a composition of mealed black powder, sulfur, and saltpeter mixed with alcohol or linseed oil. Held in a wood shaft (portfire stick) a lit the portfire burns like a road flare and used to fire artillery. Use approved for static demonstrations but not tacticals. (also see slow match)

Projectile: Any solid object fired from small arms or artillery, normally a lead bullet or lead shot from small arms and a cannon ball or cement filled can from artillery.

Pyrotechnics: Chemicals used separately or added to black powder for producing smoke, noise or light beyond the normal range of the black powder alone. Also fireworks or anything that simulates ground or airbursts, rapidly burning or exploding projectiles, and smoke flares.

Reduction Chamber: Small chamber in the breech or rear of howitzer and mortar artillery barrels for the black powder charge.

Rifle: Shoulder fired flintlock gun with a grooved or rifled interior bore. They vary in style and have a variety of names including Pennsylvanian or Kentucky Long Rifle, Jaeger Rifle, and Ferguson Rifle.

Safety Officer: A staff member or volunteer, 21 years or older, who has the knowledge, understanding, and experience in black powder safety, the proper handling and use of the specific weapons to be fired, and in the type of static demonstration or battle tactical that is to be presented.

Slow Match: Twisted cotton cord that treated with Saltpeter (Potassium Nitrate) and when lit burns at a steady rate. This is held in an artillery linstock to fire an artillery piece. (also see portfire)

Small arms: Hand and shoulder-fired weapons, i.e. muskets, rifles, and pistols.

Tactical Demonstration: Those demonstrations where two or more weapons are loaded and fired with opposing forces by black powder demonstrators, or volunteers approved by a safety officer, for the purpose of demonstrating to the public the use of weapons in 18th century tactics. This includes, but is not limited to, battle reenactments.

Tampion: Wooden plug inserted into the muzzle of a small arms or artillery to keep water/debris out of the barrel.

Thumbstall: Leather cover for thumb, sometimes with padded bottom, that covers the thumb and is tied by string at the wrist. This is used by the artillery gunner tending (or thumbing) the vent on the cannon or howitzer to prevent burns from a hot barrel.

Volunteer: An individual who is recognized by the New Jersey Division of Parks & Forestry as a Volunteer in the Park and/or is officially enrolled as a member of a recreated and sponsored historical military unit, which has been invited to participate in a Division recognized and sponsored historical program or special event. Permission to demonstrate black powder weapons on Division lands may be given only to volunteers as defined above and approved by a safety officer.

Guidelines

*Neither alcoholic beverages nor drugs are permitted in New Jersey State Parks. Any person using intoxicating beverages or drugs in the State Parks shall be removed from any demonstrations or tacticals and reported to the State Park Police

INDIVIDUAL DEMONSTRATIONS

Safety Officer

All historic weapon firing demonstrations within the park or site are subject to the approval of a safety officer who shall be responsible for the enforcement of all safety guidelines and precautions relating to such demonstrations in that area. The safety officer may decide whether or not he/she should be present for such demonstrations based upon the demonstrator's skills and abilities, the layout of the facility and the need for and/or the presence of competent individuals to assist with crowd control.

The safety officer or his designee shall oversee each firing demonstration, including those of invited military units or individuals and seasonal employees, assuring that the range is clear, that all safety procedures are being followed, and that the demonstration is explained adequately to visitors.

In most cases the safety officer or his designee, shall concentrate on the safety aspects of the demonstration and not become distracted from this duty by his or her participation in the demonstration or interpretation. Exceptions include when the safety officer is the only experienced person on site to present an individual demonstration. The safety officer shall be assisted by additional personnel as necessary to secure public safety.

Visitors

Physical barriers are recommended to keep visitors at the safe distances indicated on the demonstration range drawings. If natural features are inadequate to restrain visitors, ropes, fences or other artificial barriers shall be used. No visitor shall be allowed in front of the plane of the muzzle of a demonstration weapon. Minimum distances between demonstration weapons and visitors are 15 feet for small arms and 30 feet for artillery. See appendix for a diagram.

In case of weapon misfires the interpreter shall explain the situation and procedures to visitors, keeping them safely in place until the weapon is discharged or rendered safe. If repeated attempts fail to correct a misfire, interpreter shall conclude the program. After visitors have left the area the prescribed unloading procedures shall be followed. The safety officer shall then inspect the weapon prior to its being used again.

Before actual firing the interpreter shall warn visitors of the loud noise, recommend caution to people with hearing aids, children or animals and request control of children and animals.

Visitors shall not be allowed to handle any weapon or equipment containing black powder. Edged weapons likewise may be observed but not handled by visitors. Empty weapons or equipment can be handled but shall remain in the control of the interpreter, i. e. a visitor could heft a rifle or musket, without bayonet , vertically while the interpreter holds the sling.

INDIVIDUAL SMALL ARMS DEMONSTRATION

Weapons

The only weapons authorized for 18th century small arms demonstrations are reproduction muzzleloading black powder shoulder arms. These include flintlock muskets, rifles, and carbines. Pistols may not be demonstrated unless a special exception is made by a safety officer at historic sites where demonstrations of pistols and other types of weapons appropriate to the period would be suitable.

Weapons being demonstrated are subject to inspection by a safety officer using the checklist in the appendices and shall have flashguards and hammerstalls installed as detailed in the appendices. (exception: hammerstalls not used by mounted troops.) The demonstrator is to keep the weapon in compliance with the checklist at all times.

Demonstrators

While not required, it is recommended that a second volunteer (or staff) be present for a small arms demonstration when possible. One volunteer is the demonstrator of the weapon and the other is the interpreter of the demonstration. The volunteer responsible for the weapon shall be at least 18 years of age. The other shall be at least 16 years old and both shall have the prior approval of a safety officer and/or site administrator for the conduct, location and time of each and every demonstration. A safety officer, the site administrator or his designee may serve in the place of the either volunteer.

If the demonstration involves infantry units or mounted maneuvers an interpreter shall be present to explain the demonstration to visitors.

Demonstration Range

Demonstrations of a black powder weapons must be held on a range as detailed in the appended diagram. The required features of the range are as follows:

- There is a 15-foot buffer between demonstrator and viewers. It is the responsibility of the demonstrator or, if present, the non-shooting volunteer to maintain this interval.

- Viewers are kept behind the plane of the muzzle when the weapon is pointed downrange for firing. This, too, also is the responsibility of demonstrator or a non-shooting volunteer.

- There is a downrange distance of at least 150 feet clear sight, fanning out 30 degrees from the line of fire, from which people are kept clear at all times during the demonstration.

Ammunition Preparation

In addition to following strictly the procedures described in the approved guidelines for the demonstrations, the safety officer shall ensure that paper cartridges are made neatly using the proper caliber former (wood dowel), and that powder loads do not exceed maximums listed in the attached table of maximum loads. Blank charges are not to exceed the maximum load designated in the appended Table of Maximum Loads for the particular weapon being demonstrated.

Military shoulder arms (muskets, musketoons, rifles, and carbines) are to be loaded from pre-wrapped paper cartridges prepared off site before the date of the demonstration and according to correct period procedures. Cartridges made with or which contain aluminum foil, coin wrappers, tape of any kind, metal staples, or any projectiles are not to be used in demonstrations. (aluminum foil exception for live fire only)

The demonstrator must carry cartridges in an authentic leather or tin cartridge box, or leather hunting bag with a flap, worn either slung over the shoulder, or on a waist belt (belly box). Shoulder slung, with box well around on the right hip, is preferable but a waist belt box may be used if appropriate for the historical impression of the volunteer. In any case, especially if the demonstrator is using a belly box, the demonstrator must take care that the flap or lid is kept down except when a cartridge is being withdrawn. If present the non-shooting demonstrator must watch the shooter to be certain this is observed.

Powderhorns

Powder horns and flasks may only be used in individual demonstrations and are not permitted for use in tactical demonstrations. If a powder flask or powder horn is employed, a non-sparking measuring device (of brass, horn, bone, etc.) must be used to transfer powder from horn or flask to the firearm muzzle. Horns may contain only enough powder to be used during that demonstration and in no case shall the maximum of 300 grains be exceeded.

The main charge must never be poured directly from flask or horn into the barrel. The priming charge may be poured from a flask or horn directly into the priming pan. A loading block may be used to insert a wad, if used. Blank charges are not to exceed the maximum load designated in the appended Table of Maximum Loads for the particular weapon being demonstrated.

The horn or flask must be well maintained and shall be kept stoppered and well around on the hip, except during the loading process. If present, the non-shooting demonstrator must watch to be sure that this is observed.

Loading Demonstration

When loading and firing, the shooting demonstrator shall follow the appropriate historic manual for the type small arm being fired. Those demonstrating a civilian weapon that does not have a prescribed manual shall follow safe procedures as follows:

- While the main charge is being loaded, the barrel shall be nearly upright and inclined downrange.

- When loaded the small arm is to be kept pointed downrange.

- When the small arm is fired, it is elevated and pointed downrange.

- The small arm is never pointed at the public.

The safety officer may permit wadding and ramming for individual demonstrations, but not in tactical demonstrations.

It is the responsibility of the non-shooting demonstrator to see that the shooter observes correct loading and firing procedures as detailed in the Small Arms Demonstration Checklist in the appendices.

At no time is the shooting demonstrator to surrender control of their small arm to a member of the public. The demonstrator may let a viewer feel the heft of the shoulder arm while the demonstrator holds onto the sling and the barrel remains vertical. The demonstrator may also hold the weapon up for close inspection by the public. Likewise, edged weapons must remain under the control of the demonstrator.

At no time shall any member of the public be allowed to fire a weapon.

At no time shall a demonstrator carry live ammunition (cartridge with powder and projectile) about his person.

Small Arms Misfire Procedures

Failure to Spark

- Hold small arm in firing position for up to 10 seconds to make sure there is no hang fire.

- Return to the priming position.

- Half cock the firelock.

- Check priming, flint and steel (frizzen). Wipe the steel (frizzen) face and flint. Do not attempt to knap the flint on the firing line. If replacing the flint, dump the priming and attach hammerstall. Re-prime if necessary.

- Full cock, take aim and fire again. This is done without reloading and ramming.

- After the third time the weapon misfires remain on the demonstration range and notify the safety officer and await instructions. If no safety officer, then continue following procedures.

- Dump priming.

- Dump powder if not wadded, then clean barrel bore to remove clinging powder grains.

- If wadded pour water in barrel, wait 5 minutes, then worm out wadding and clean weapon.

- Weapon shall be inspected by the safety officer or designee at the completion of the demonstration for cause of misfire.

Flash in the Pan

- Hold weapon in firing position for up to 10 seconds to make sure there is no hang fire.

- Return to the top priming position.

- Half cock the firelock.

- Pick touch hole and reprime.

- Full cock, take aim and fire again. This is done without reloading or ramming.

- After the third time the weapon misfires notify the safety officer or his designee and await instructions.

- Weapon shall be cleared by the safety officer or demonstrator at the completion of the demonstration.

INDIVIDUAL ARTILLERY DEMONSTRATIONS

Artillery Pieces

The only artillery authorized for 18th century artillery demonstrations are reproduction cannon, howitzers, and mortars. The artillery piece being demonstrated is subject to inspection by a safety officer using the checklist in the appendices. The artillery piece must also have the equipment listed as essential under Equipment in this section of the guidelines that is dedicated or least appropriate for the individual artillery piece. The demonstrator is to keep the artillery piece in compliance with the checklist at all times.

Demonstrators / Artillery Crew

A volunteer artillery crew must have a minimum of five members. Six or more members are recommended. If available, a non-crew interpreter should be present to explain the demonstration to the public. Otherwise the gun commander shall also act as interpreter.
The required five members are:

First Matross (right side front with sponge/rammer) - Sponges and rams the piece. Will be wearing heavy leather glove(s) on right or both hands.

Second Matross (left side front with worm/rammer) - Searches and loads the piece. Will be wearing heavy leather glove(s) on left or both hands.

First Gunner (right side rear) - Tends the vent and picks and primes the piece. Will be wearing a leather thumbstall on left thumb.

*Second Gunner (left side rear) - Tends the linstock and fires the piece.

*First Bombardier - Tends the ammunition box and places the cannon charge in a secure haversack of the Second Bombardier.

(* If only a five member crew then either the bombardier or second gunner shall act as gun commander. See gun commander reference below.)

The recommended 6th and 7th members are:

Gun Commander - This man has overall command of the gun and crew. He is generally responsible for giving all commands and assuring that all crew members execute their duties correctly and safely. He does not take part in any of the loading or firing procedures except elevating the barrel and directing a shift of the trail to point the piece (*unless the crew is comprised of just 5 members).

Second Bombardier- (This position is optional) Advances the charge to the front of the piece and hands it to the Second Matross. If there is no Second Bombardier available, the First Bombardier assumes the responsibility for both operations.

Artillery crews must demonstrate their loading, firing, and misfire drill to the satisfaction of the safety officer. This shall include the use of the artillery's implements.

*Important: The artillery shall be searched and sponged at least twice (more if necessary) between shots.

Artillery crews are advised, but not required, to use in-the-ear type hearing protectors.

All drills performed by volunteer artillery crews are subject to the approval of a safety officer using the Artillery Demonstration Checklist in the appendices and including misfire drill and loaded artillery warning procedures during tactical demonstrations.

Demonstration Range

Demonstrations shall be held on a range that conforms to the appended Range Diagram for Artillery Firing. The salient features of this diagram are:

- The limber box shall be 30 feet behind the gun. Viewers shall not be permitted within 30 feet of the limber box during the demonstration. The limber box is to be kept locked at all times when not in use for the demonstration.

- Viewers are kept behind the plane of the weapon axle when it is pointed downrange for firing.

- There shall be a clear view extending 36 feet to either side of the line of fire at the muzzle and for 30 degree angle either side of the line of fire a minimum of 150 feet downrange. People shall be kept clear of this zone during the demonstrations.

Ammunition Preparation

In addition to following strictly the procedures required in these guidelines, the safety officer shall ensure that aluminum foil cartridges are made correctly and neatly. Ammunition for artillery is to be prepared off-site before the date of demonstration. Cartridges are to be of heavy gauge aluminum foil made of three to six wrappings around a former of a diameter corresponding to the bore of the gun they are to be used with. Cannon cartridges shall be made so they are at least one and one-half times in length the diameter of the bore in which they are to be used, to prevent tumbling in the bore while loading.

Howitzer and mortar cartridges shall conform to the size of their reduction chambers. The length can be increased with the use of a twisted or folding tail on the top of the cartridge. Powder charges shall not exceed the specifications in the appended Table of Maximum Loads.

Only quill (tube) primers shall be used. Quills (tubes) shall never be stored loose and shall be in a separate container when stored in the ammunition chest with the cartridges. Powder horns and paper cartridges shall not be used for priming (unless permitted by safety officer for misfire drill). **Loose powder must never be allowed in the demonstration area.**

Prepare only enough cartridges for scheduled demonstrations. All cartridges and quills are to be strictly accounted for. All torn or damaged cartridges shall be destroyed by soaking in water until the powder is dissolved and the remains of which shall be disposed of in a safe place.

Pyrotechnics are hazardous and shall not be used.

Equipment

Artillery used in firing demonstrations must be reproductions and must conform to the specifications in the appended Muzzleloading Artillery Inspection Checklist. The safety officer shall inspect the artillery implements, powder box, and secure haversack for proper condition and suitability to the piece. Original artillery barrels may not be used.

Volunteer demonstration crews are required to have the following implements in their kits for each cannon:

* Essential - Non-sparking, hardwood ammunition box with securely closeable hinged lid and lock. The box shall be equipped with a spark arresting canvas cover that extends down the box two or three inches past the seam between the lid and box. A metal sheathed lid shall have a cloth or leather pinking (flap) covering the seam between the lid and box. In addition the lid must be secured so that it cannot open past approximately a 75-degree angle. This shall insure that the lid does not remain open when the box is unattended.

* Essential - Secure haversack of leather to carry cartridges from ammunition box to muzzle.

* Essential - Quill or tube box of tin or leather and wood to hold priming quills.

* Essential - Vent pick or priming wire.

* Essential - Rammer/sponge (sponge must be wool or imitation lamb's wool and must fit the bore snugly).

* Essential - Worm/rammer.

* Essential - Water bucket.

* Essential Appropriate priming supplies (quills).

* Essential - Linstock and slowmatch.

* Essential - Lead or leather apron to cover the touch hole.

* Essential - Tompion and strap.

* Essential - Gun book which includes the following:
- Diagram of gun tube with bore size, vent size, and location of vent opening inside bore.
- Construction of equipment (sponge, worm, etc.) and materials used.
- Inspection dates.
- Maintenance performed and dates.
- Repairs to equipment, including sponge head replacements, with date and type of repair.
- Method of cartridge manufacture.

- Number of shots per event with amount and type of powder used, any filler if used, and type and weight of projectile if used.

Recommended but not required in gun book:
- Drill manual used.
- Individuals and their position on the gun at each event.
- Notes of any strange or unusual sounds the gun may have made during use.

* Essential - Leather thumbstall.

* Essential - pair of heavy leather gloves.

- Vent brush or cleaning device.

Optional but encouraged:

- Extra sponge cover (wool).

- Spare rammer/sponge.

- Gimlet (small boring tool to clear vent)

- Extra slow match.

- Small mirror.

- Portfire stick

Artillery Misfire Procedures

In the event of a misfire, volunteer crews are required to follow the following misfire procedures. All artillery military units are required to demonstrate their understanding and use of such a drill.

Stage One: The fire command is given and the priming just goes "zipp" and nothing happens. Don't panic. Call out "Misfire" to notify all of the misfire. All crewmembers shall remain alert for movement of people into the fire zone of the artillery. If part of a tactical demonstration, then matrosses #1 (sponge/rammer) and matross #2 (worm/rammer) shall cross their rammers over the gun barrel to warn reenactors that the cannon remains loaded. If an individual demonstration, the interpreter shall explain what is occurring to the public. All crewmembers shall wait in their firing positions for 3 minutes.

After three minutes the gun commander has Gunner #1 remove the spent quill with vent pick. Pick the charge again and prime with quill. Gunner #1 shall stay clear of the wheel. A musket cartridge may be used to prime only upon approval by the safety officer.

With Gunner #1 clear, the gun commander gives the fire command again and Gunner #2 attempts to fire. This should work in most cases. If not, on to the next step. Do not prime again. Do not attempt to reseat the main charge in the barrel with rammer. Remain in position for three minutes again and continue with the Stage Two procedure.

Stage Two: A second priming has not been effective. Do not prime again. All Gunners and Matrosses remain in position and take one of the two following steps:

#1 - If a CO2 artillery discharger is available, make sure down range is clear of people then attach discharger to vent and blow cartridge clear of bore. Wait one minute then place cartridge in bucket of water.

or

#2 - With a turkey baster, canteen, or water bucket flood the vent with water.

- Gently bring the muzzle to full elevation.

- Matross #2 inserts a flooding device, a 3 foot length of hose with an attached funnel, into the bore and holds it while Matross #1 slowly empties a bucket of water into it. If hose is not available, pour water from bucket into bore of barrel.

- The water is allowed to sit in the bore for at least 10 minutes. The crew stays to keep the area secure.

- The wad hook or worm is gently introduced into the bore, hooked into the charge and withdrawn. The charge shall then be placed in a bucket of water and pulled apart. The remains shall be disposed of safely.

- The gun shall be sponged, searched and sponged and searched again before being placed back in service

BLANK FIRING TACTICAL DEMONSTRATIONS

Tactical demonstrations are inherently more dangerous than individual demonstrations for several reasons. There are a large number of demonstrators involved. The demonstrators are in close proximity to each other. In the case of reenactment activities, the weapons are being discharged at opposing forces and there is greater difficulty in observing safety violations.

Each military unit shall have at least one member who has been designated by the unit as their safety officer. This person's name must be supplied to the event safety officer prior to any demonstration or tactical.

Safety Officer in Tactical

Tactical Demonstrations shall be held only under the direct supervision of a safety officer, site administrator, or designee. The scenario for each demonstration is subject to his or her prior approval. For large events it is advisable to have more than one safety officer on site to help work with all the reenactment military units present. The safety officer has the power to order immediate correction of safety violations. This power shall extend to stopping the tactical if he/she feels that is a necessary course of action. To assure maximum safety for demonstrators and visitors, the following guidelines shall govern tactical demonstrations.

Site for Tactical

Tactical Demonstrations are usually held in areas of relative open spaces allowing clear fields of vision for participants but can include wooded terrain. There shall be at least one physical barrier between demonstrators and spectators, for example, a rope approximately 3 feet above ground level. Where possible there shall be a second physical or visual safety line between demonstrators and spectators. The inner line defines the border beyond which demonstrators may not go when discharging weapons. The outer line is the physical barrier line behind which spectators must stay. These two lines shall be at least 15 feet apart. The interval is a no-man's land that is to be kept clear of spectators and demonstrators at all times during the demonstration. Site staff or volunteers shall patrol or oversee the line(s) to enforce this safety recommendation.

Site selection to accommodate dragoons must be based on the availability of open space for proper exercise, deployment and picketing of horses. Additional allowances shall be made for rough, uneven or partially wooded terrain. Holes and depressions must be filled and compacted and unsafe areas for horses must be flagged or marked in a highly visible manner prior to the event. Safety officer shall work with the mounted participates to determine the type of demonstration or tactical suitable to the site.

Tactical demonstration participants or a designated crew shall sweep the field to be certain that no loaded cartridges, used cartridge papers, or aluminum foil from artillery is left on the field. Persons less than 16 years old shall not participate in sweeping.

Distances in Tactical

Opposing forces shall not discharge weapons at each other at less than 100 feet for small arms, and 150 feet for artillery, between them. There shall be no simulation of hand-to-hand combat without prior approval by the safety officer. Weapons shall be elevated above the head of opposing forces when being discharged unless terrain elevation differences between opposing forces make this impractical. Weapons shall not be fired in the general direction of the public unless there is the same 100/150 feet distance. In all cases, small arms and artillery fire shall be aimed over the heads of opposing forces or spectators.

Participants in Tactical

Participation in tactical demonstrations shall be limited to members of recreated military units who have been invited to take part by the New Jersey Division of Parks and Forestry. The recreated military units must carry liability insurance that covers their participation in tactical demonstrations with limits of at least one million dollars per occurrence. Military unit commanders take responsibility for the members, whether regular or temporary members, of their units. Walk-on and uninvited participants are not permitted

Participants must be at least 16 years of age to handle a musket, handle black powder, or act as a member of an artillery crew. Any participant under the age of 16 must be a functional musician. No "powder monkeys", "couriers" or other historically unjustifiable functions will be served by participants under 16. No one under the age of 12 is permitted on the field.

All horses participating will have necessary immunizations; Coggins test documentation, etc., upon arrival at State Park sites.

Inspections in Tactical

The safety officer shall have the officers/ NCOs inspect all arms and cartridge boxes used by volunteer participants in their military units. This initial inspection shall be prior to or just after morning formation, a second inspection as the military unit is formed to march on the field for the tactical demonstration, and a third inspection as they are formed to leave the tactical demonstration area. Initial morning inspection should follow the Inspection Checklist in the appendices. Inspection in formation to enter or leave the tactical demonstration area shall include inspection for flash guard and hammerstall (exception: no hammerstall for mounted troops), and of the cartridge box looking for live, damaged, or improperly made cartridges. Ramrods are to be sprung and both listened to for a metallic ring and to visually inspect its height in the barrel to insure that the ramrod is at the bottom of the breech without any obstructions or projectiles present.

The safety officer may participate in these inspections or may ask for a re-inspection if they have concerns on the safety of the weapons. Weapons, ammunition, ammunition containers and weapons drills may be subject to inspection by a safety officer, site administrator, or designee, who has authority to withdraw any weapons found to be deficient, from use until deficiencies are corrected to the safety officer's satisfaction. Failure to comply may result in non-participation of the individual or military unit.

No walk-ons will be permitted in the tactical demonstration area after troops have formed up, been inspected, and marched into position. No firearms shall be carried away from the location of the tactical demonstration until it is inspected by the military unit officers/ NCO or by a safety officer.

Under no circumstances shall a weapon be discharged anywhere other than in the tactical demonstration area. Weapons shall not be discharged in camp or anywhere off the field of the demonstrations. Misfire of shoulder weapons, muskets or cannons shall be cleared or dumped before leaving the demonstration area.

Small Arms and Edged Weapons in Tactical

Weapons and blank rounds of ammunition used in Tactical Demonstrations shall conform to the specifications laid down in the Individual Small Arms Guidelines section. Powder loads shall not exceed the amounts specified in the Table of Maximum Loads (see appendix). No projectiles nor are small arms' tampions permitted on the tactical demonstration area. Small arms drills shall conform to period manuals except that ramrods shall not be used and rounds are not to be wadded. Under no circumstances shall a long arm's ramrod be removed during a tactical demonstration. All ramrods shall remain in their pipes and shall not be withdrawn except during safety inspections prior to and after the tactical demonstrations or to inspect the weapon of sick or injured participant being removed from the field. Pistols are not to be discharged unless by mounted troops who have received prior approval of the safety officer.

Bayonets and swords will remain in their scabbards during tactical demonstrations with following exceptions: marching on or off field; officers may use their swords and polearms to direct

troops; or by specific command of the demonstration's designated field commanders. The designated field commander will give such a command only with prior approval of the safety officer. Also mounted troop are allowed to perform sword exercises according to period manuals with prior approval of the safety officer. As with infantry, there shall be no simulation of hand to hand combat by mounted troops without prior approval of the safety officer. Demonstrators are not to surrender control of their weapons to members of the public or permit the public to fire a weapon.

Artillery in Tactical

Weapons and blank rounds of ammunition used in Tactical Demonstrations shall conform to the specifications laid down in the Artillery Guidelines section. Artillery crews shall follow the appropriate manual for their pieces observing all safety procedures specified above. Guns shall be operated by a minimum of six crewmembers. Cannon shall not be discharged at opposing forces at ranges of less than 150 feet. Placement and use of artillery during the tactical demonstration shall be planned beforehand. Cannon misfires shall be handled utilizing the approved misfire drill and procedures.

If opposing forces approach loaded artillery at less than the minimum safety distance then matross #1 (sponge/rammer) and matross #2 (worm/rammer) shall cross their rammers over the gun barrel to warn reenactors that the cannon remains loaded. The gun commander should be made aware of the situation so he may take appropriate action. Only unloaded artillery may be overrun or surrendered in tactical scenarios. Ammunition boxes must be closed and under the care of an artillery crewmember.

Mounted Troops in Tactical

Dragoon participation shall be strictly monitored. The safe handling of horses shall be the responsibility of the owners at all times. Horses shall be picketed tethered, or confined to trailers in designated areas when not in use. During tactical demonstrations, mounted troops shall try to maintain a 60-foot buffer zone from the public and 15 feet from infantry. Passes closer than 15 feet are permitted with infantry trained to work with mounted troops or in pre-arranged scenarios. Should a rider become unseated or lose control of a mount the tactical demonstration shall be halted and remain so until the mount is once again under control.

Mounted officers and mounted troops that either approach or proceed with their own infantry troops must keep mounts at a speed no greater than a walk. The rider is expected to use good judgment.

Pistols may be discharged by mounted troops who have received prior approval of the safety officer. The safety officer shall determine if mounted troops may pre-load and wad their pistols if properly holstered. Mounted troops may use long arms with the same guidelines and distance as applies to infantry (exception: no hammerstalls) provided their horses have been trained and approved by their recreated regiment for this purpose. Also mounted troop are allowed to perform sword exercises according to period manuals with prior approval of the safety officer. As with infantry, there shall be no simulation of hand to hand combat by mounted troops without prior approval of the safety officer.

Note: Site administrators are advised that horses are unpredictable, especially in surroundings unfamiliar to the animal or surroundings involving crowds of people and sudden noises. Site administrators shall carefully consider the safety concerns of employing mounted dragoons in tactical scenarios.

Watercraft in Tactical

If watercraft are involved with a tactical or demonstration, special precautions must be observed. Due to watercrafts' confined spaces and their generally unsteady nature, the utmost care must be taken in the discharge of firearms. All small arms and artillery shall meet the same guidelines for condition, safety, and equipment required for blank firing as previously described. All firearms are to be in an unloaded condition during boarding and disembarking any craft. Artillery may only be used on craft capable of bearing its weight, resisting the recoil of the artillery when fired, and having sufficient space on deck to keep the ammunition boxes at or close to the recommended distances from the artillery. Only as much powder as is necessary for the event shall be brought on board. The safety officer shall decide which, if any, craft may be used for the discharge of firearms. All applicable maritime rules and regulations must be observed.

LIVE FIRING COMPETITIONS

The New Jersey Division of Parks and Forestry has allowed some of its park facilities to be used for competitive muzzle loading firearm and artillery shooting matches. Permission for any shooting matches must meet requirements for a safe range and appropriate site, adequate experienced staff, site programming needs, and other site specific issues and concerns. The guidelines for the matches are based on the National Muzzle Loading Rifle Association guidelines. These guidelines shall be followed to provide a safe and enjoyable event for the public.

The Firing Range in Live Fire

A suitable range for live fire shall be clear of stone and metal or if such stone or metal cannot be removed they shall be blocked by thick wood to prevent ricochets. The area behind the targets shall be banked, sloped, or have a high backstop, or a combination of these to stop projectiles. A barrier shall be erected to prevent public access to the range area. The barrier shall be at least 15 feet behind the firing line for small arms and at least 50 feet for artillery. All access points to sides and rear of the range must be blocked and monitored. All areas of the range shall be visible to the Range Officers. For artillery the greater power and range of the projectiles must be considered in your selection of a range, especially for round cannon balls which may skip. The area beyond the range backstops

Range Personnel and Responsibilities in Live Fire

The Chief Range Officer, an individual 21 years or older and who is a safety officer, has responsibility for over all supervision and maintenance of safety during the conduct of live firing competition. All decisions by the chief range officer with regard to safety, equipment, event rules and scoring are final. He can act as a range officer.

The Range Officer, who shall be age 21 or older, shall be appointed by the chief range officer prior to the competitive event and shall be experienced in muzzle loading competitions. The range officer has complete control of the firing line, calls the shooters to the ready point, gives firing commands and keeps time. He/she is responsible to the chief range officer. A range officer must be physically present and directly supervising the firing line at any time a competitor is on the field. A range officer shall always be on duty. If he/she is participating in the competition another properly trained and qualified range officer must take over the safety function. The range officer shall not be a competitor and act as a range officer simultaneously.

The Range Monitors, who shall be age 18 or older, shall patrol any access points to the range and down range areas to prevent public entry into the range area and watch for hazardous situations. Down range

monitors shall have radio access to the range officer. Monitors are responsible to the range officer and are not required to have experience in black powder use. Appointment of range monitors can be subject to approval by the chief range officer.

Additional personnel are needed to register shooters, issue targets, and interpret to the public.

Weapons in Live Fire

Small arms and artillery shall meet all of the same guidelines for condition, safety and accessories required for blank firing in the Blank Firing Chapter. Small arms sights are to be open metallic and appropriate to the historic firearm. Accoutrements shall also meet the same guidelines required in the Blank Firing Chapter. All weapons and shooting equipment shall be inspected by the chief range officer, or his designee, before they are allowed on the firing line. A colored sticker shall be placed on the weapon to indicate passage of inspection.

Ammunition in Live Fire

Small arms projectiles shall be round lead ball of a caliber suitable to the firearm. Powder is recommended to be in individual cartridges. When powder horns or flasks are used, a measuring device must be used to transfer powder from horn to muzzle, but horns can be used to prime the pan directly. No loose or bulk powder is allowed on the firing range.

Artillery projectiles vary and include, but are not limited to, cast iron shot, cast plaster shot, tin cans filled with cement, lead or plaster, and grape or canister shot. Exploding or flaming shot such as bombs, shells, spherical case shot, or carcasses may not be used for competition or demonstration purposes. Artillery is not loaded with loose powder but rather with cartridges made from heavy-duty aluminum foil that is wrapped three to six times. Tubes (quills) must be used for primers unless safety officer approves the use of musket cartridges to prime. Fixed shot of projectile and powder attached together may be used.

Targets are most often paper, but wood and clay pottery, if allowed on range, may also be used. Glass targets shall not be used. Artillery targets may include barrels, steel drums or other targets approved by the chief range officer.

Safety Regulations for Live Fire

Shooters must be at least 13 years old. Shooters 13 to 17 years old shall be directly and constantly supervised by an experienced adult shooter age 18 or older who is not engaged in shooting at the same time. (NJSA 2C: 58-6.1)

Only shooters and officials shall be allowed on the range. The firing line shall be kept clear of all spectators. Any person or competitor interfering with or annoying the competitors in any way shall be warned, and upon failure to comply, shall be ordered to leave the firing line area.

Neither alcoholic beverages nor illegal drugs are allowed on the range. Any person participating in live firing using alcoholic beverages or abusing drugs, even when those drugs are legal and/or prescribed medication, or if that participant's behavior shows unsafe impairment, that person shall be disqualified and removed from the range as judged by the range officer.

Smoking is not permitted on the range.

All safety rules and regulations shall be posted at the firing range.

Each shooter at live fire events shall sign a statement that he/she has read the posted safety rules and regulations shall abide by the provisions stated.

Weapons must be unloaded when coming to and leaving the firing line. No firearms shall be loaded until the command "Commence Loading." Guns shall be carried muzzle up between loading benches (if used) and firing line with muzzle above the shooters' heads. Firearms shall be pointed down range except during loading.

Hammer stalls (frizzen covers) shall be in place at all times except when firing and flashguards are required.

Modern eye and ear protection is recommended, but left to the shooter's option.

All commands of the range officer(s) shall be obeyed on the firing line. Failure to obey commands, to observe safety regulations or to interfere with other shooters, after a proper warning, shall result in disqualification from the competition.

Safety is the responsibility of all participants. Anyone who sees a hazardous situation shall immediately shout "Cease Fire" at which time all firing shall immediately stop and steels (frizzens) covered. If order to "ground weapons" is given shooters shall take one step forward to lay down the firearms, muzzles down range and locks up. Firearms shall remain there until the range officer gives orders to "take up weapons." Firing ceases until the order to fire is given by the range officer.

Each shooter shall drop a ramrod down the barrel of his/her firearm to demonstrate to the range officer that the firearm is unloaded before taking the firearm from the firing line. Each shooter shall police his or her area for trash before leaving the firing line

Range officers and participants shall sweep the range to be certain that no live cartridges, used cartridge papers or aluminum foil from artillery is left on the range. Persons less than 16 years old shall not participate in sweeping.

Small Arms Misfire Procedures

Misfire procedures are the same as those for blank fire, page 30, except for following:

FAILURE TO SPARK or FLASH IN THE PAN

- After the weapon misfires a third time, notify the range officer and await instructions on changing flints if failure to spark.
- If misfire persists, notify range officer and weapon will be cleared with range officer at the completion of firing relay. Weapon clearing will be done by a CO2 musket discharger if equipment is available, or by pouring water down the bore waiting several minutes, then pull the ball and clean out bore.

Artillery Misfire Procedures

Misfire procedures are the same as for blank firing, page 35, except if a CO2 artillery discharger is not available the projectile will need to be removed by scoop or worm after water has sat in bore for 10 minutes. This will be done with range officer present.

APPENDICES

Sources for the diagrams, tables, and checklists in these appendices are:

The National Park Service

The Brigade of the American Revolution

New Jersey State Parks

Drawings of Charles William Rudyerd at the Royal Military Academy 1791-93

TABLE OF MAXIMUM BLANK LOADS
Eighteenth Century

** Loads indicated are absolute maximums. Good practice indicates that a load of two-thirds (66%) of the maximum load will produce sufficient effect, will increase the safety margin and will reduce wear on the weapon.

The safety officer may reduce the maximum permitted load at events or at locations when the demonstration site size or location, noise level, structural integrity, or other concerns warrant it.

18th Century Small Arms

Weapon Type	Caliber	Recommended Blank Load	Maximum Blank Load
Muskets & Fowlers	.66 -.80 Cal.	90 grains FFg	120 grains FFg
Rifles & small bore Fowlers	.45 -.65 Cal.	60 grains FFg	90 grains FFg
	.40 Cal or less	30 grains FFFg	50 grains FFFg
Pistols	.60 -.80 Cal.	60 grains FFg	90 grains FFg
	Less than .60 Cal.	Charges set by safety officer	

If using a powder granulation one grade finer than above, lower blank load amounts by 10 - 20 grains.

Powder granulation size:	FFg	1.19 - 0.59 mm
	FFFg	0.84-0.29 mm
	FFFFg	0.42 - 0.15 mm

18th Century Artillery

Cannon Ball Weight	Bore Diameter	Recommended Blank Loads	Maximum Blank Loads
1 pounder	2.0"	1 oz. Fg or 2 oz. cannon/FFa	2 oz. Fg or 4 oz. cannon/FFa
1.5 pounder	2.3"	2 oz. Fg or 3 oz. cannon/FFa	3 oz. Fg or 5 oz. cannon/FFa
2 pounder	2.5"	2 oz. Fg or 3 oz. cannon/FFa	4 oz. Fg or 6 oz. cannon/FFa
3 pounder	2.9"	3 oz. Fg or 4 oz. cannon/FFa	6 oz. Fg or 8 oz. cannon/FFa
4 pounder	3.2"	4 oz. Fg or 5 oz. cannon/FFa	8 oz. Fg or 10 oz. cannon/FFa
5 pounder	3.4"	5 oz. Fg or 6 oz. cannon/FFa	10 oz. Fg or 12 oz. cannon/FFa
6 pounder	3.66"	6 oz. Fg or 8 oz. cannon/FFa	12 oz. Fg or 16 oz. cannon/FFa

Powder charges for larger cannon will be set by the safety officer in charge of the event.

Howitzer * Bore / Reduction Diameters	Recommended Blank Loads	Maximum Blank Loads
4.5"/ 2.8"	3 oz. Fg or 4 oz. cannon/FFa	6 oz. Fg or 8 oz. cannon/FFa
5.5" / 3.2"	4 oz. Fg or 5 oz. cannon/FFa	8 oz. Fg or 10 oz. cannon/FFa
8.0" / 4.6"	8 oz. Fg or 10 oz. cannon/FFa	16 oz. Fg or 20 oz. cannon/FFa
10" / 5.7"	14 oz. Fg or 18 oz. cannon/FFa	28 oz. Fg or 36 oz. cannon/FFa

Mortar * Bore / Reduction Diameters	Recommended Blank Loads	Maximum Blank Loads
4.5"/ 2.2"	2 oz. Fg or 3 oz. cannon/FFa	4 oz. Fg or 6 oz. cannon/FFa
5.5" / 2.8"	3 oz. Fg or 4 oz. cannon/FFa	6 oz. Fg or 8 oz. cannon/FFa
8.0" / 4.1"	5 oz. Fg or 7 oz. cannon/FFa	8 oz. Fg or 10 oz. cannon/FFa
10" / 4.7"	11 oz. Fg or 14 oz. cannon/FFa	16 oz. Fg or 20 oz. cannon/FFa
13" / 6.5"	25 oz. Fg or 30 oz. cannon/FFa	36 oz. Fg or 42 oz. cannon/FFa

* Howitzers and mortars that are bored straight, without a reduction chamber, will follow the loading table for cannon of similar diameter listed above.

Powder Granulation Size:	Fg:	1.68 - 1.19 mm
	Cannon & FFa	4.76- 1.68 mm

Powder Types: Both type 'g' and type 'a' black powders are made of the same ingredients (Potassium Nitrate, Sulfur, and Charcoal) and milled the same way. The difference is in the finishing process. Fireworks type 'a' powders (occasionally called blasting powder) are not tumbled, or tumbled only briefly, to knock off any sharp or long projections on the granules. Sporting type 'g' powders are tumbled with a small amount of graphite, which modifies and slows the burn rate, and gives a small measure of resistance to moisture absorption.

IMPORTANT: Never use Sodium Nitrate based type "b" blasting black powder in original or reproduction firearms or artillery. The Sodium Nitrate black powder can deliver a higher shock value than the Potassium Nitrate type "g" and type "a" black powders. This higher shock can damage the firearm or artillery barrels and be hazardous to the user.

HISTORIC WEAPONS INSPECTION

AND

DEMONSTRATION CHECKLISTS

Any weapon that fails an inspection is automatically excluded from a firing demonstration. Weapons may be offered for re-inspection if needed adjustments or repairs have been completed.

All Factors on the Demonstration Checklist are critical and must be followed or the safety officer shall halt the demonstration.

MUSKET INSPECTION CHECKLIST

Beginning inspection

- ☐ The weapon is confirmed to be unloaded by springing the rammer.
- ☐ Weapon equipped with a hammerstall and a flashguard.

The Stock:

- ☐ No major unrepaired cracks or splits.
- ☐ Butt plate, trigger guard, etc., fit tightly.
- ☐ No burrs on butt plate or trigger guard screw heads that would snag clothing or hands.
- ☐ Barrel bands shall be secure.
- ☐ If pin-fastened, pins all there, tight, wood not splintered.
- ☐ Generally, no splinters or rough edges.
- ☐ Two-piece stocks have sections securely in place

The Lock:

- ☐ Lock works smoothly.
- ☐ The hammer or cock fits tightly on the tumbler.
- ☐ All the positions are firm and solid.
- ☐ The half-cock (safety) position works properly.
- ☐ When trigger pulled, it lets off smoothly without catching on half cock.
- ☐ Trigger pull is proper; not too heavy, not "hair" trigger. (exception if set trigger for rifle)
- ☐ If a set trigger, it is adjusted properly and works smoothly.
- ☐ Lock fits properly into the stock and snugly against the barrel.
- ☐ The cock screw works smoothly; jaws use lead or leather to grip flint securely.
- ☐ The flint is in good condition and set at a proper angle.
- ☐ The steel (hammer, frizzen) is in good condition and functions smoothly.
- ☐ The pan is clean and fits snugly against the barrel.

The Barrel:

- ☐ Barrel fits the stock properly.
- ☐ Free from visible dents or cracks.
- ☐ The flint is not striking the barrel.
- ☐ The muzzle is not dented or worn.
- ☐ The touchhole is clear and of an acceptable size.
- ☐ No signs of heavy corrosion around the touchhole.
- ☐ The barrel bands or pins hold the barrel securely.
- ☐ The ramrod is straight and fits the stock properly.

**Additional comments:

MUSKET INSPECTION CHECKLIST
(Site-owned Muskets)

After Disassembly for Maintenance

The Stock:

- ☐ Shiny spots in the lock recess may indicate rubbing by moving parts. Investigate possibility of improper lock function.
- ☐ Lock recesses clean and free of splinters; no splitting or cracking.
- ☐ No splitting or cracking around the tang screw hold.
- ☐ The bed for the barrel is clean.
- ☐ Any ramrod spoon or spring works freely; its recess is clean.
- ☐ Any nosecap is securely fastened to the stock.
- ☐ Careful check of two-piece stock shows firm joint.

The Lock:

- ☐ All internal screws are tight.
- ☐ No internal parts are broken, cracked, or chipped.
- ☐ The nose of the sear and the tumbler notches are sharp and in good condition.
- ☐ No signs of metal rubbing on the inside of the lockplate.
- ☐ No signs of improper repairs or incorrect replacements.
- ☐ The steel (hammer, frizzen) fits down snugly on top of the pan.
- ☐ With cock fully forward, the mainspring does not disconnect from the tumbler nor does any part of it protrude below the lockplate.
- ☐ All parts are clean and lightly oiled.

The Barrel:

- ☐ The breach plug is fully seated and properly aligned.
- ☐ On modern "patent breeches," there is no indication of separation.
- ☐ Check the bore with lights and reflectors. It is clean and in good condition. A patch goes in smoothly and comes out clean.
- ☐ On pin-fastened pieces, all lugs under the barrel for the pins are complete and in good condition.
- ☐ Previous users report no problems with the weapon.

**Additional comments:

SMALL ARMS DEMONSTRATION CHECKLIST

- ☐ The demonstrator approaches the demonstration area carrying the weapon in a safe manner.
- ☐ The demonstrator has all the equipment needed for the demonstration (weapon, cartridge box, cartridges, etc.).
- ☐ Demonstrator is knowledgeable and familiar with the manual of arms for the demonstration firearm.
- ☐ There are sufficient additional helpers for interpretation and crowd control.
- ☐ The demonstration area is safe for the size of the audience and visitors are kept at a safe distance.
- ☐ The weapon is pointed in a safe direction at all times.
- ☐ At no time are there any parts of the demonstrator's body placed in a hazardous position in relation to the weapon.
- ☐ In the event of a misfire or other unscheduled event the demonstrator and helpers react properly.
- ☐ After the demonstration the interpreter remains to answer the public's questions regarding the demonstration and leaves the area carrying the weapon safely.

**Additional Comments:

ARTILLERY INSPECTION CHECKLIST

☐ Your overall first impression is favorable

The Tube (barrel):

- ☐ Tube is clean and free of major rust or corrosion.
- ☐ No sign of major external damage or strain (dents, cracks, etc).
- ☐ Inside of the bore is clean and relatively smooth (Check with a mirror or flashlight).
- ☐ No internal signs of damage (bulges, lodgments, pits, etc).
- ☐ No sign of corrosion damage at breech of the bore.
- ☐ On iron guns with liners, the liner is secure.
- ☐ The vent is clear and of acceptable size.
- ☐ No signs of cracks or bending around the trunnions.
- ☐ No signs of weakness at the chaplets on bronze tubes. (chaplets are bronze cylindrical casting supports incorporated into tube body during casting process)

The Carriage:

- ☐ Carriage and wheels made of white oak or other historically correct hardwood
- ☐ Wheels are tight and free of rot and insect infestation.
- ☐ Body of the carriage is free of rot and insect infestation.
- ☐ No pieces or parts missing, broken, bent, or with major cracks.
- ☐ Wheels move freely.
- ☐ Elevating mechanism works smoothly and properly.
- ☐ The ironwork is secure.
- ☐ Tube rotates freely on its trunnions.
- ☐ Trunnion caps fit snugly and are properly keyed.
- ☐ Side boxes and limber (ammunition) chest lids fit snugly and are canvas or metal covered including seam between lid and box.
- ☐ Limber (ammunition) chest and side boxes are clean and free of spilled powder.
- ☐ Wood generally free of serious checking and splintering.
- ☐ Wheel hub does not gouge the end of the axletree.
- ☐ Linchpin is not digging into wheel hub.

Equipment:

- ☐ All necessary equipment is present.
- ☐ Sponge is in good condition and fitted to the bore.
- ☐ Rammer head is secure and free of cracks.
- ☐ Small items in good condition (linstock, thumbstall, buckets, etc).
- ☐ Prongs of the worm are sharp and not bent.
- ☐ Haversack is clean and free of spilled powder.
- ☐ Cartridges are properly made of aluminum foil and quills prepared.
- ☐ The gun book is being kept up to date.

**Additional comments:

ARTILLERY DEMONSTRATION CHECKLIST

Before

- ☐ The gun has been inspected, inside and out. Bore is clean of foreign material.
- ☐ The carriage is in good condition and all keys secure.
- ☐ The accessory equipment is in good condition--sponge head in good repair, rammer and sponge head secure on staff, etc. Ammunition chest is in good repair and locked when not in use.
- ☐ Sponge head fits bore snugly but not too tight.
- ☐ Ammunition boxes, haversacks, etc., are clean and free of spilled powder.
- ☐ Cartridges are properly made of aluminum foil and not torn.
- ☐ The equipment is on hand to handle a misfire.
- ☐ The required number of personnel is present to safely fire the piece.
- ☐ The gun is situated safely in relation to the visitors.
- ☐ There is good visibility for the visitors.
- ☐ The interpreter can see all of the visitors and also see down range.
- ☐ The carriage is free to recoil if necessary.
- ☐ The visitors are properly contained and at a safe distance.
- ☐ The ammunition boxes are at a safe distance from the piece as well as from the visitors.
- ☐ The wind is not too strong for a safe demonstration.
- ☐ Conditions are not so dry as to risk a range fire from the muzzle blast. Equipment is available should one develop.
- ☐ There are no open fires nearby--campfires, etc.

During

- ☐ The crew is following the appropriate period manual with each person where he is supposed to be at any given moment.
- ☐ The sponge is adequately damp but not soaking wet.
- ☐ The man ramming is holding the rammer properly and the vent is being properly tended at the same time.
- ☐ The rammer and loading men are wearing gauntlets, but they are not so stiff and heavy as to cause fumbling or other difficulty.
- ☐ The sponge head does not contact the ground at any time during demonstration to prevent grass, sand, etc., from sticking to it.
- ☐ If there is a misfire, it is handled safely and properly in accordance with recommended procedures.

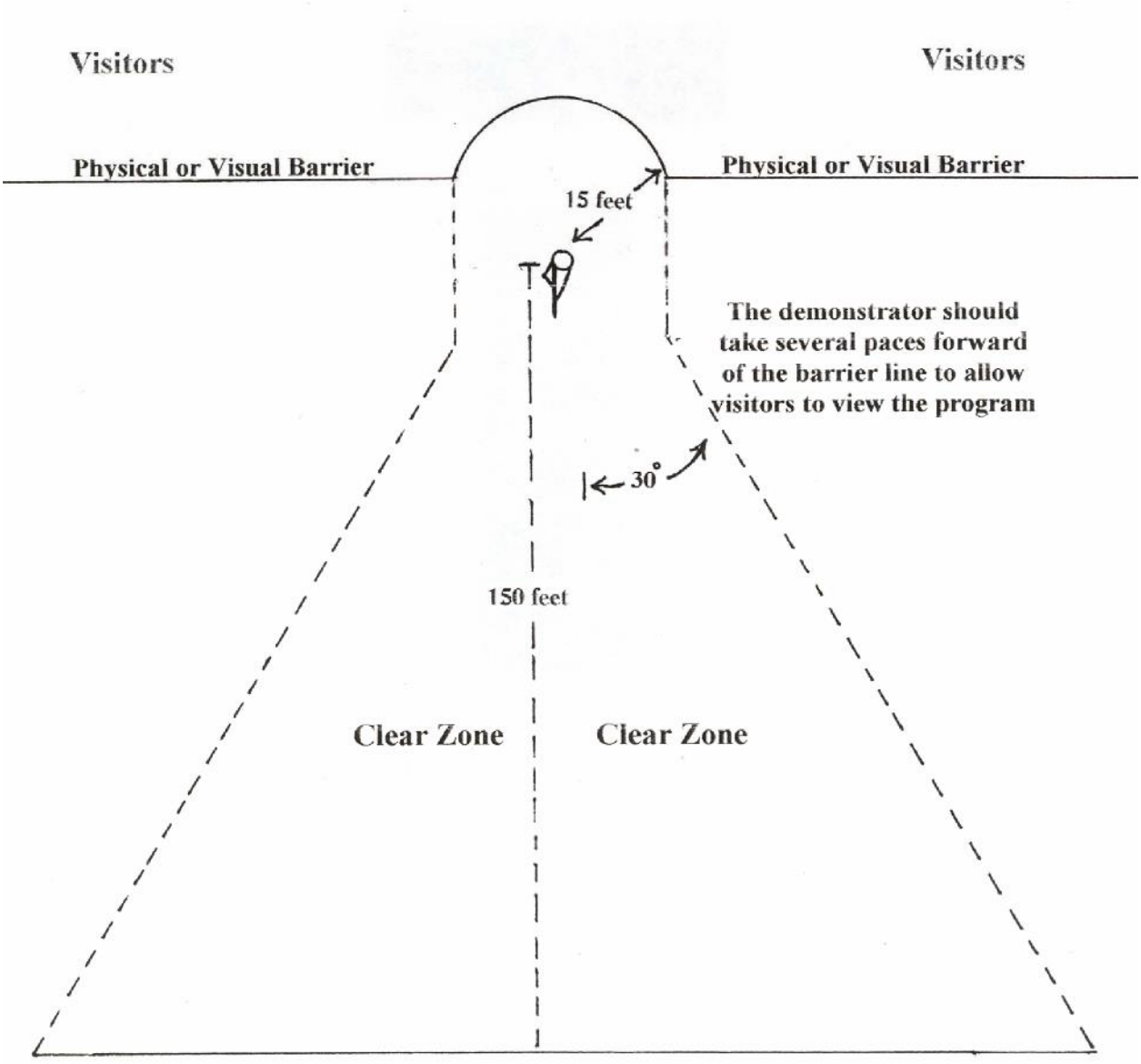
After

- ☐ After firing, the piece is wormed twice, sponged twice and secured with tampion and apron. If possible, washed out and dried prior to securing.
- ☐ All weapons, black powder, and accessory pieces are accounted for. Black Powder cartridges are kept under lock and key.

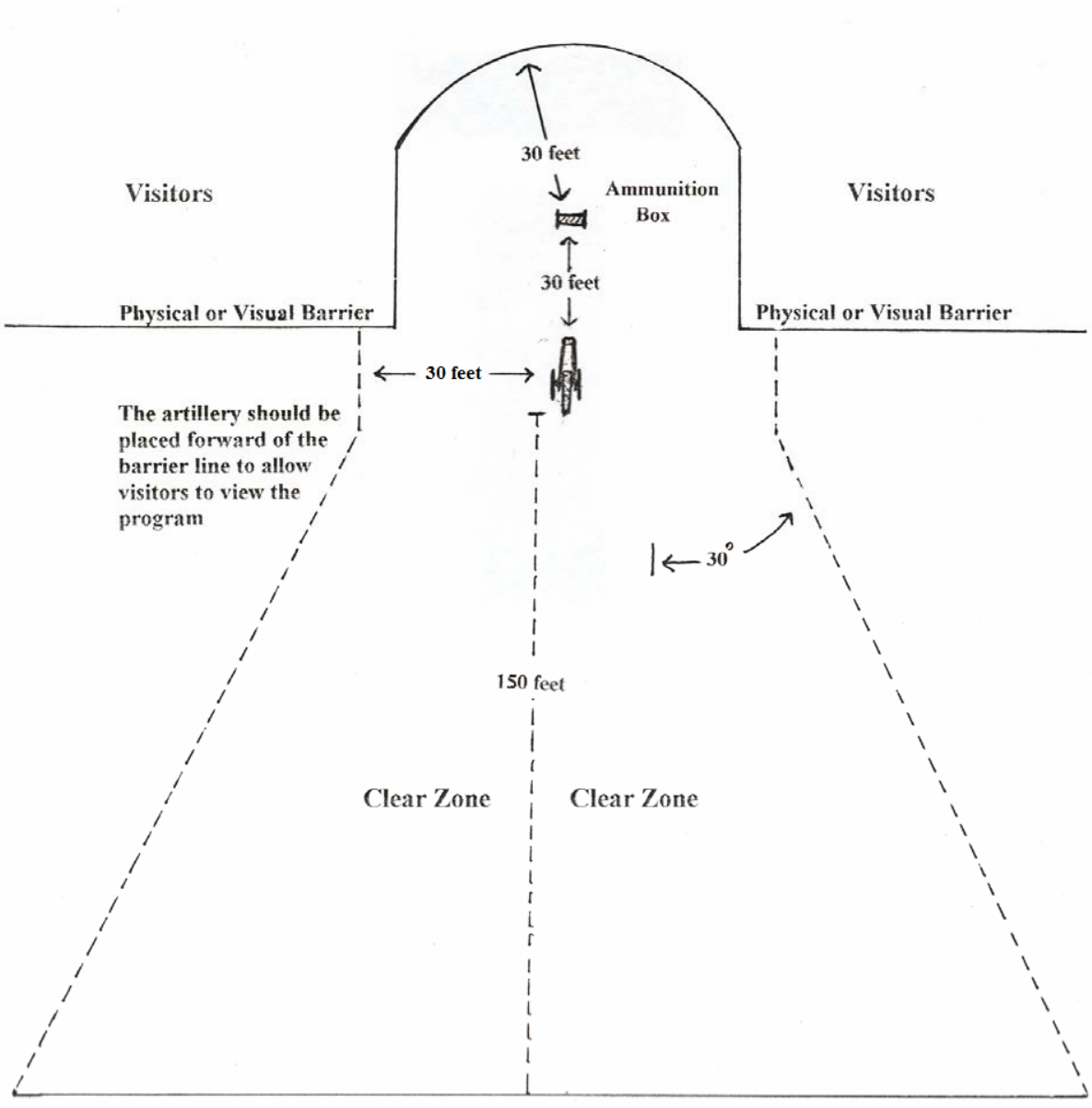
- ☐ The weapon is secured and stored properly.
- ☐ The demonstration area is inspected carefully for smoldering residue, unused quills, aluminum foil and other refuse created by the demonstration.
- ☐ Sponge head is thoroughly rinsed out and dried.
- ☐ Remaining black powder cartridges are promptly returned to proper storage area.

**Additional comments:

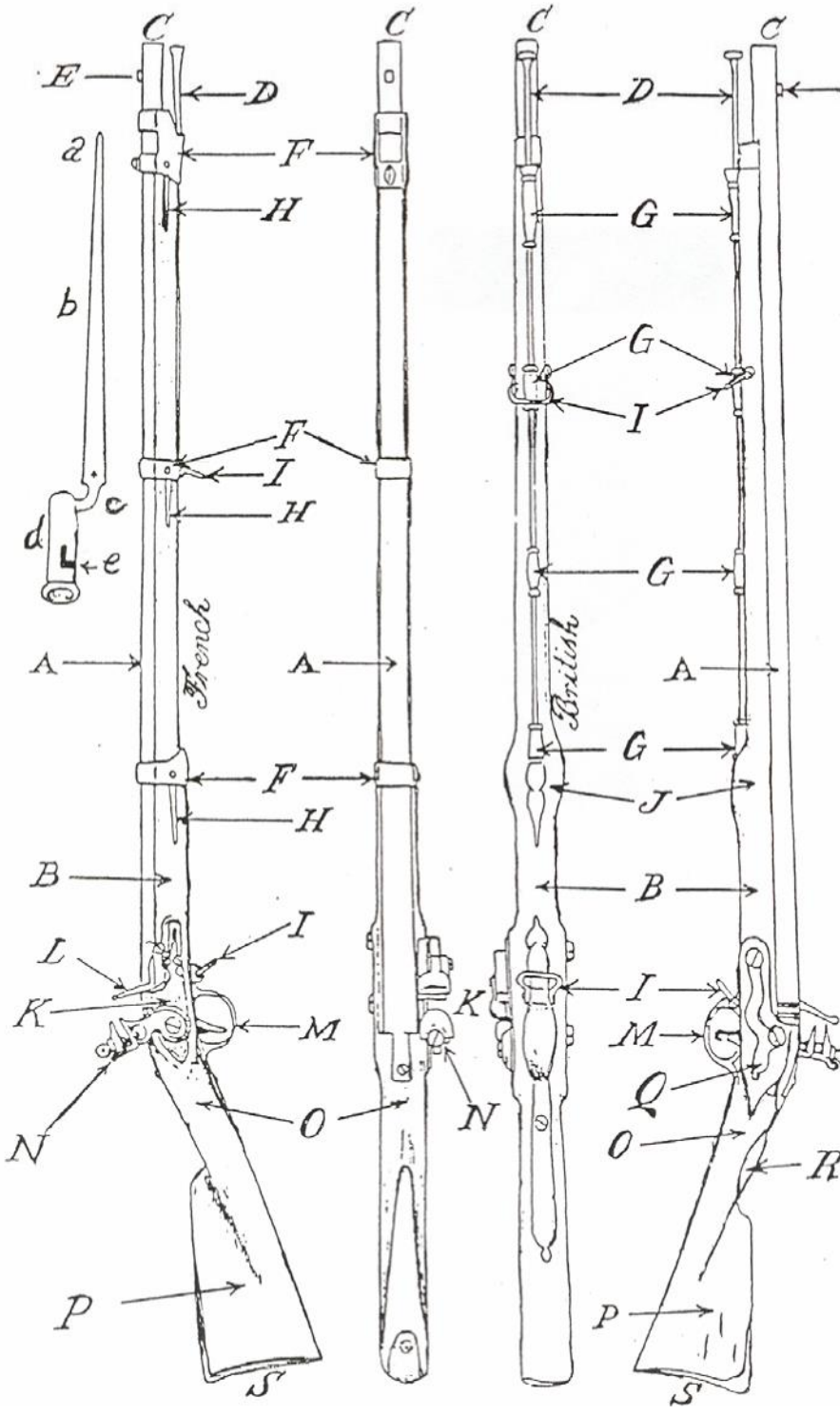
RANGE FOR SMALL ARMS BLANK FIRING



RANGE FOR ARTILLERY BLANK FIRING



FLINTLOCK SMALL ARMS NOMENCLATURE

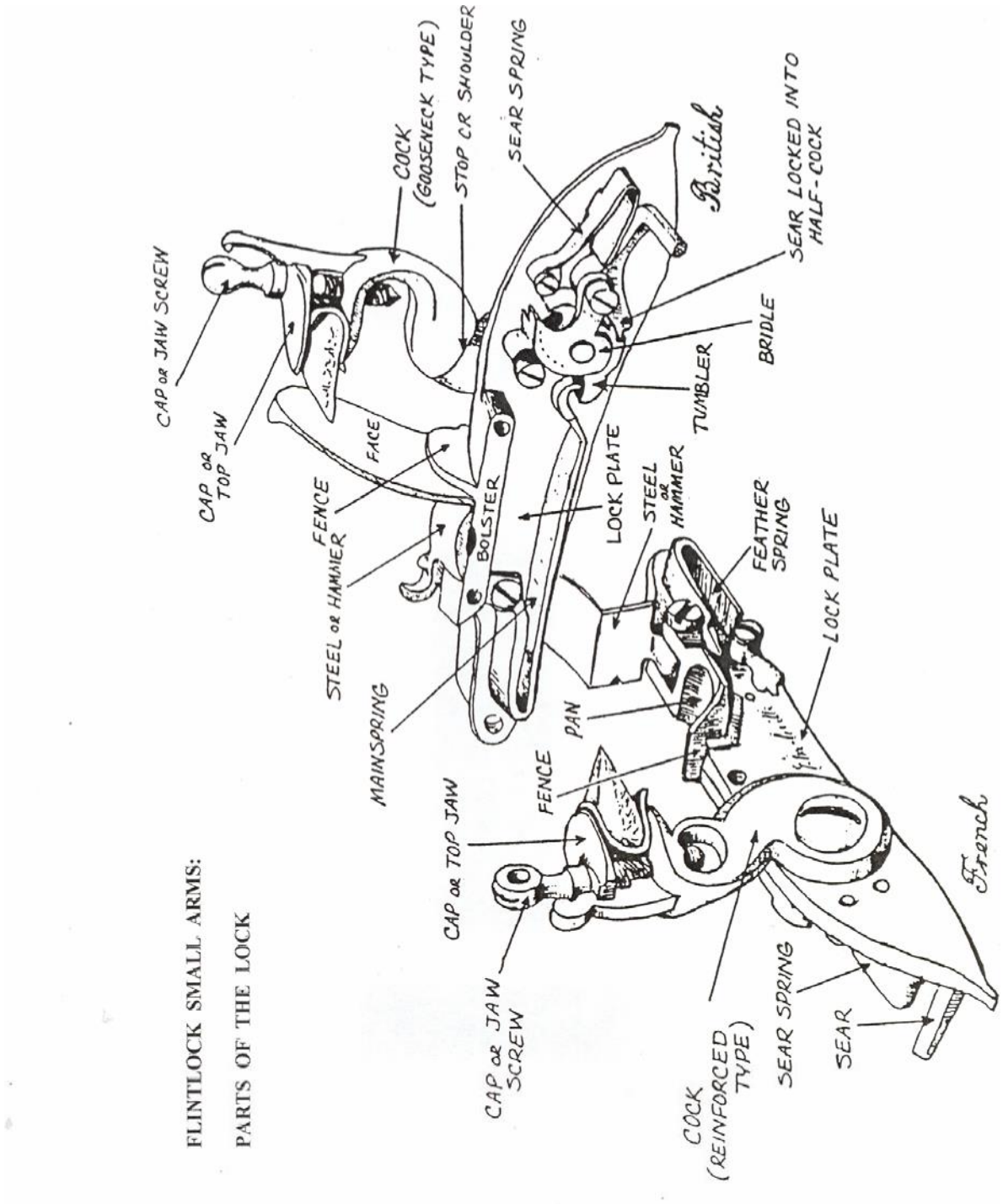


MUSKET

A. Barrel
B. Stock
C. Muzzle
D. Ramrod
E. Sight or Bayonet stud
F. Barrel Bands
G. Loops or Pipes
H. Band retaining
I. Sling swivels
J. Swell or tail of pipe
K. Lock
L. Steel or Hammer
M. Trigger and Trigger guard
N. Cock
O. Small of stock
P. Butt of stock
Q. Side plate
R. Escutcheon plate
S. Butt plate

Bayonet:

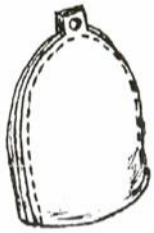
a. Point
b. Blade
c. Shank
d. Socket
e. Slot


FLINTLOCK SMALL ARMS:
PARTS OF THE LOCK
CAP or JAW SCREW
CAP or TOP JAW
FENCE
FACE
STEEL or HAMMER
BOLSTER
MAINSPRING
COCK (GOOSENECK TYPE)
STOP OR SHOULDER
SEAR SPRING
British
SEAR LOCKED INTO HALF-COCK
BRIDLE
TUMBLER
LOCK PLATE
STEEL or HAMMER
FEATHER SPRING
LOCK PLATE
PAN
FENCE
CAP or TOP JAW
CAP or JAW SCREW
COCK (REINFORCED TYPE)
SEAR SPRING
SEAR
French

HAMMERSTALLS AND FLASHGUARDS

Hammerstalls (frizzen covers) are used to prevent the flint from striking the steel and causing it to spark. Every flintlock firearm shall be equipped with a hammerstall made of leather thick enough to prevent the flint from making contact with the steel. The hammerstall should have a friction fit that will prevent it from slipping off on it's own and the hammerstall is attached to the triggerguard or sling of the firearm by means of a string or leather thong. The hammerstall maybe made from one piece of leather formed and stitched as a tube or two pieces stitched around the sides and top to form a pouch.

Pouch shape



Tube shape

Fitted to steel or hammer (frizzen)

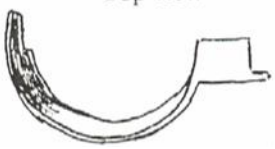
Flashguards are used to prevent flash of gunpowder from the pan and vent from striking the person standing next in line. The flashguard is generally attached on the lock to the hammer screw or feather spring screw and forms a semi circle around the pan. Every flintlock firearm shall be equipped with a flashguard with the exception of pistols in use by mounted troops and carried in period saddle holsters. (The guard can catch on the holsters and will not be fired in a line of people.) The flashguard shall be made of brass or steel strong enough (approximately 1/16" thick) to withstand the vent blast without bending. The flashguard should have tabs that will prevent it from rotating out of position.

Front (muzzle) view

Rough pattern

Side view

Top view

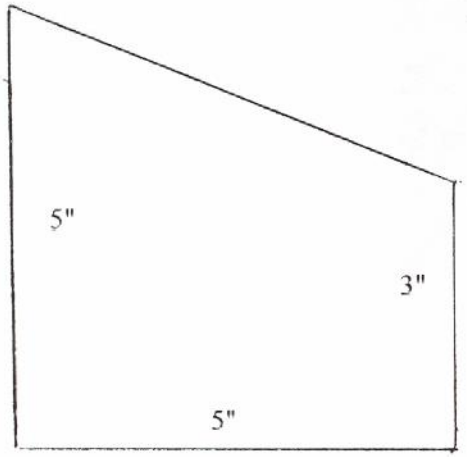


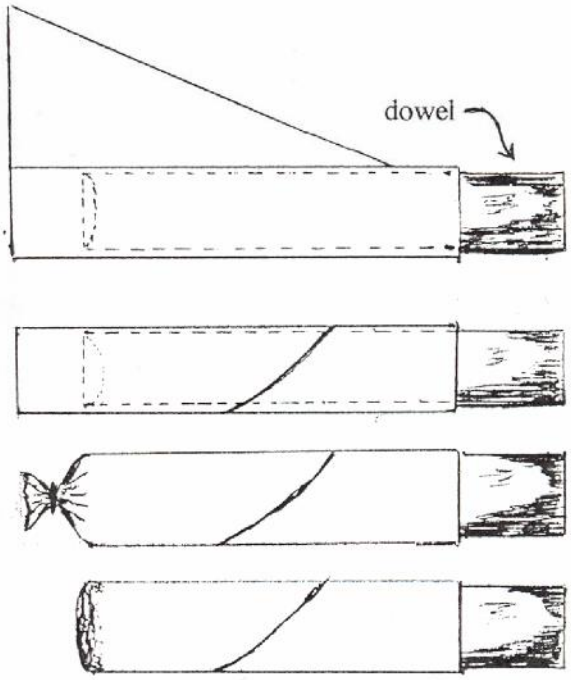
Small Arms Cartridge Construction: Blank and Live Fire

Blank fire:

Blank cartridges are to be made of strong paper to resist accidental ignition from stray sparks. Suitable paper includes but is not limited to copier paper, brown wrapping paper, unprinted newsprint paper, and note pad paper. No tissue paper, printed newspapers, telephone book paper, and the like are permitted. Paper should be white to dark brown, plain, or printed with period text or ink manuscript to suggest period broadsides, newspapers, and personal letters.

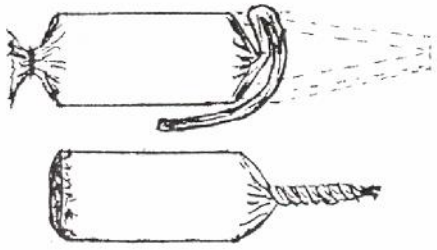
The pattern below suggests the best way to cut the paper but some variation is permitted. A dowel slightly smaller than the caliber of the flintlock barrel is used to form the cartridge by rolling the paper around it. The bottom of the cartridge is closed by either tying with string, folding and gluing, or folding in and crushing flat. Staples or tape are not to be used on the cartridges. The measured black powder is poured in the cartridge and the top folded or twisted shut.



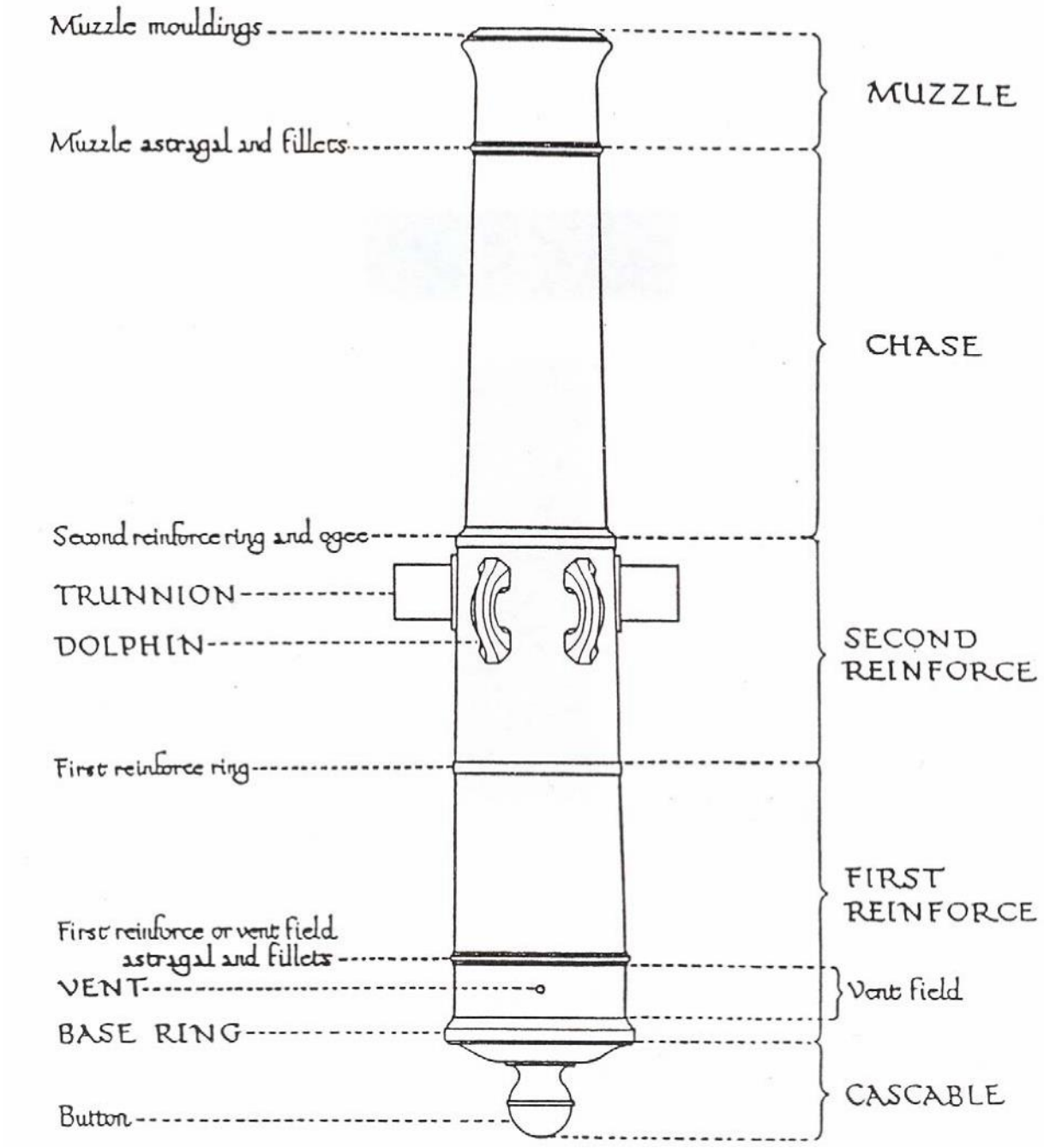


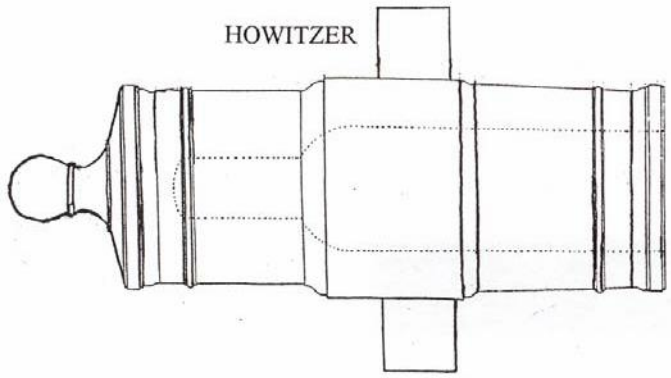
Live fire:

Live cartridges for target shooting are made in the same manner as blank cartridges except that aluminum foil is used instead of paper and the lead ball is seated on the lower end of the dowel as the cartridge is rolled. Aluminum foil is used so that live cartridges can immediately be recognized from blank rounds during any inspections, to prevent their accidental use in tacticals. Live round may also be dipped in appropriate lubricants such as wax or tallow.

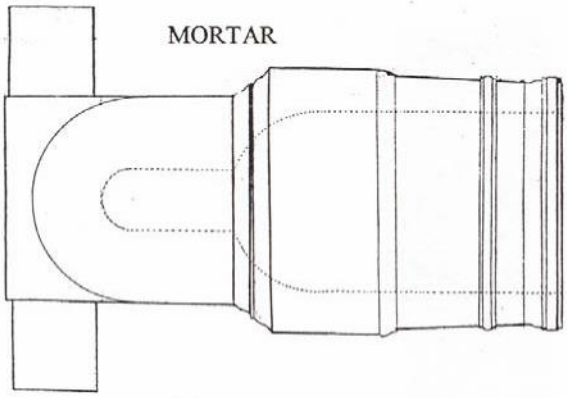


The Parts of a Gun

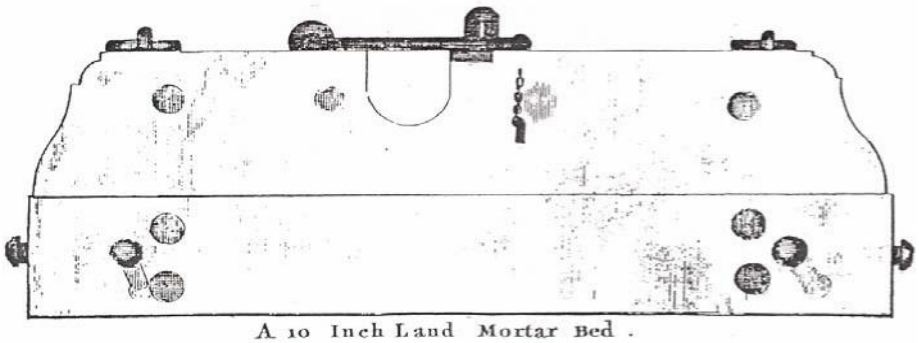




The Howitzer barrel is shorter than the Cannon barrel and has a reduction chamber at the breech or back of the bore. *Note the dotted lines show the bore. The Howitzer is mounted on a field carriage.



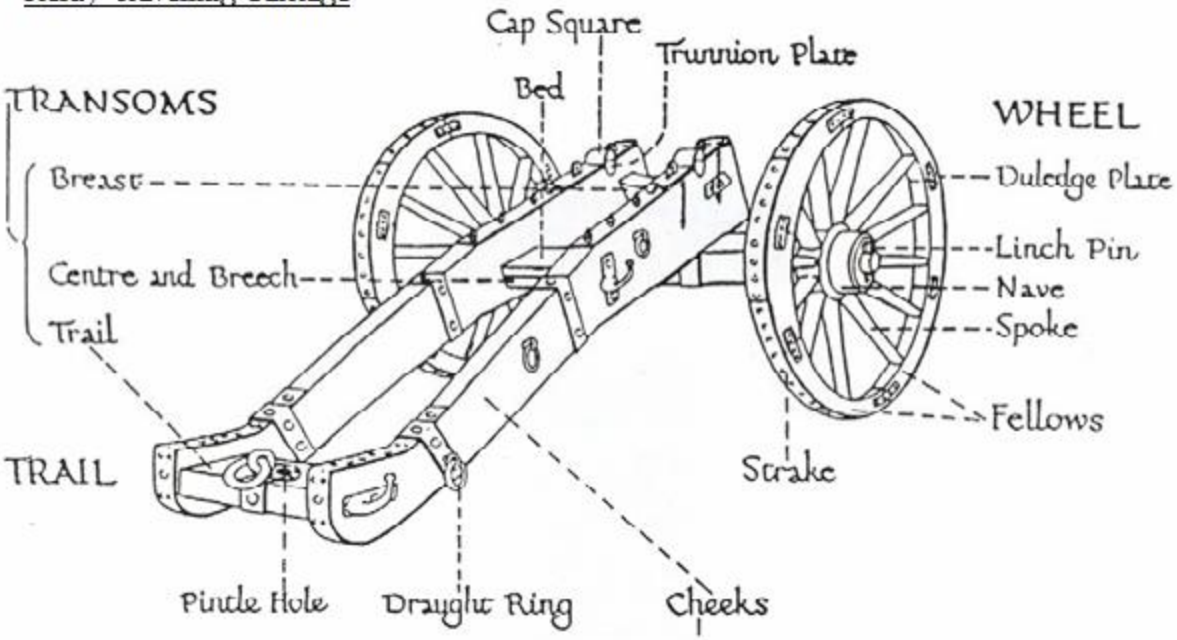
The Mortar barrel trunnions are placed at the rear and the barrel has a reduction chamber at the breech or back of the bore. *Note the dotted lines show the bore. The Mortar is mounted on a solid wood bed that varies in size depending on the size of the Mortar barrel.



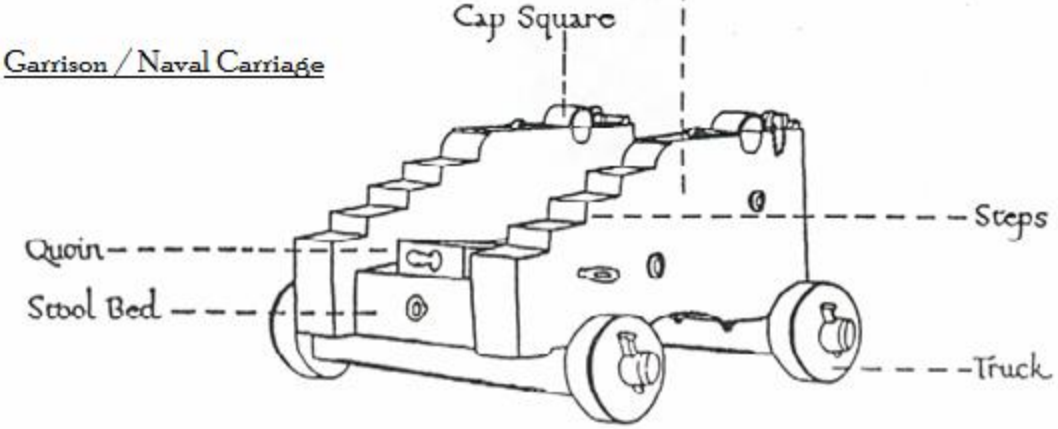
A 10 Inch Land Mortar Bed .

The Parts of a Carriage

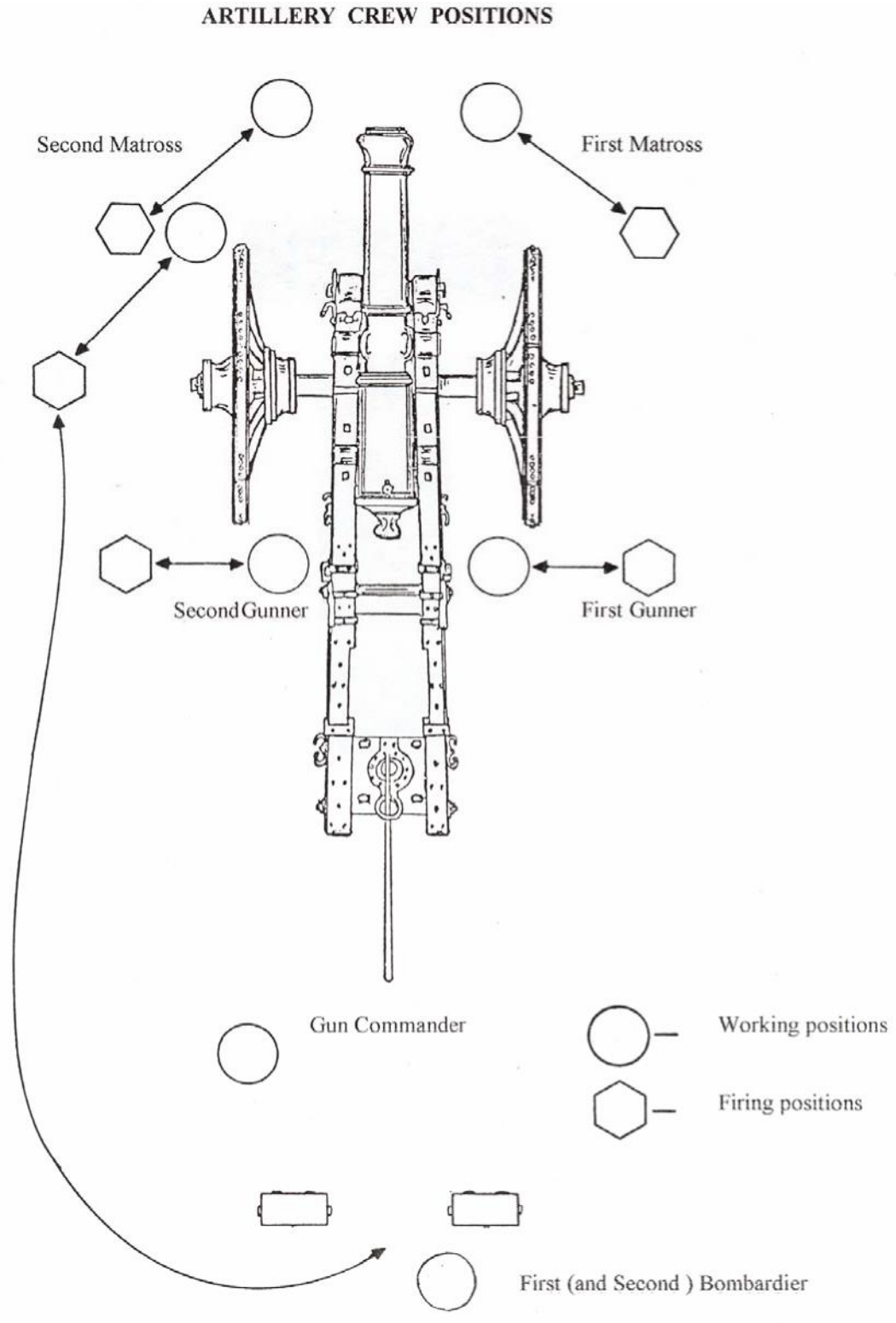
Field / Travelling Carriage



Garrison / Naval Carriage



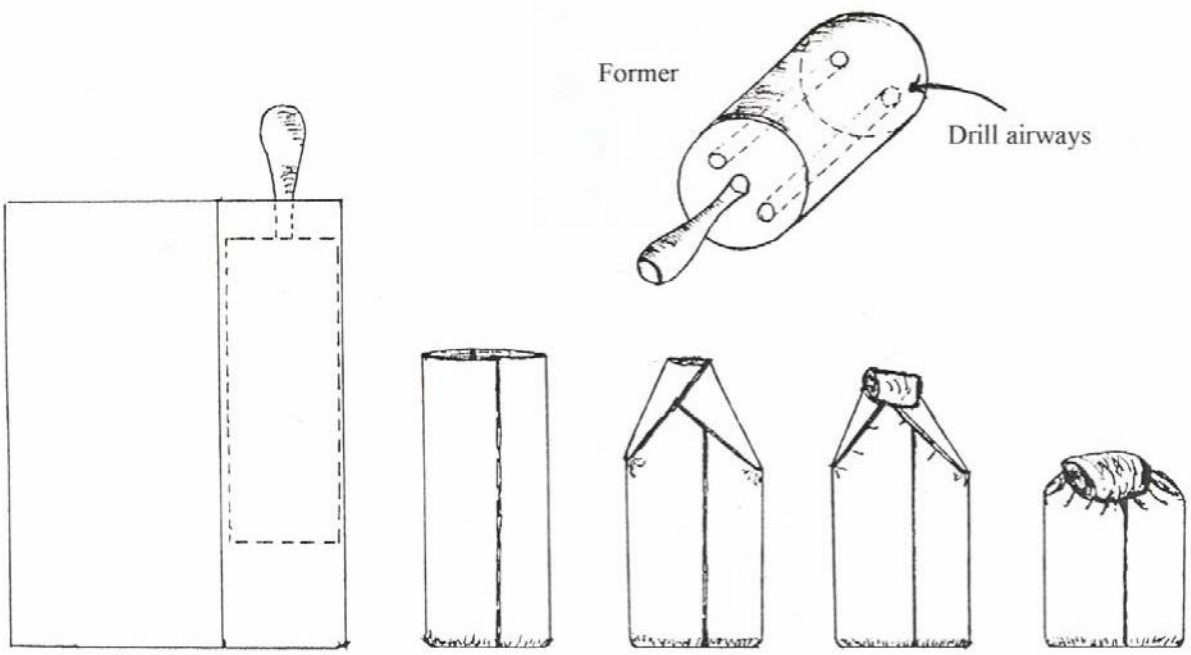
ARTILLERY CREW POSITIONS



Artillery Cartridges

Artillery cartridges are made from heavy weight aluminum foil cut to a minimum length of three but can be up to six times the circumference of the former tool. The width of the foil must be sufficient to tightly seal the bottom and give material to fold or twist the top tightly closed. The normal widths of commercially available aluminum foil work well; the full width of standard foil, half the width of the wider foil (either cut in half or doubled over). Lay the former on the foil and roll up to form a tube being sure the foil goes at least three times around. Fold and flatten the bottom of the tube to seal bottom of cartridge and then remove former. Measure blackpowder according to the table of loads and pour into cartridge. The fold edges of cartridge top in and roll down to blackpowder to seal shut. The top can also be twisted shut instead. No tape, staples, or clips of any kind may be used.

The former is made of wood and is to be .2" less than the bore size of the artillery piece it is used for. A handle is usual fixed to the top and airways are drilled from top to bottom of the former. This will allow air to pass when removing the former from the new cartridge making it easier to remove.



Artillery Quills

Artillery quills are made from straws, gummed labels, white glue, and 4F blackpowder. The straw can be either paper or plastic and should fit easily in the vent hole of the cannon and cut at least 1/2" longer than the length of the vent. One end of the straw is cut lengthwise with a series of snips about 1/4"- 3/8" long to allow the end to fan out like the spokes of a wheel. Two gummed labels, preferably 1" diameter to mimic period quills but which can be square or rectangular in shape, have their centers punched with a paper punch. With the sticky side up run the straw through one label then place the second label, also sticky side up, on top of the straw and pinch the fanned end of the straw between the two labels working your fingers around to seal the labels. Then take a small amount of white glue on a cotton swab and run the swab through the straw to coat the inside of the tube lightly. Be careful not to allow much, and/or any, white glue on the top of the label. Too much glue will make ignition difficult. Then lightly drop pinches of 4F blackpowder down the straw tube from both the top and bottom to get a good coating inside the tube and dip the top of the gummed label in the blackpowder to coat the exposed sticky surface. This will give you a 1" disk at the top with a coat of blackpowder and a light train of blackpowder down the tube. Note that the straw tube is not packed with powder but only has a light coating on the glue. This will allow a quick ignition when firing the cannon. An alternative to running glue down the straw is to take a thin strip of gum label, run the sticky side through 4F blackpowder and twist the strip down the straw until the strip pokes out both end of the straw.