

# ***STEEL TARGET SAFETY AND USE GUIDE***



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VERSION 3.1

# **WARNING**

## **DO NOT USE THE FOLLOWING AMMUNITION ON OUR TARGETS, OR SERIOUS INJURY, DEATH AND/OR PERMANENT DAMAGE TO THE TARGETS WILL RESULT:**

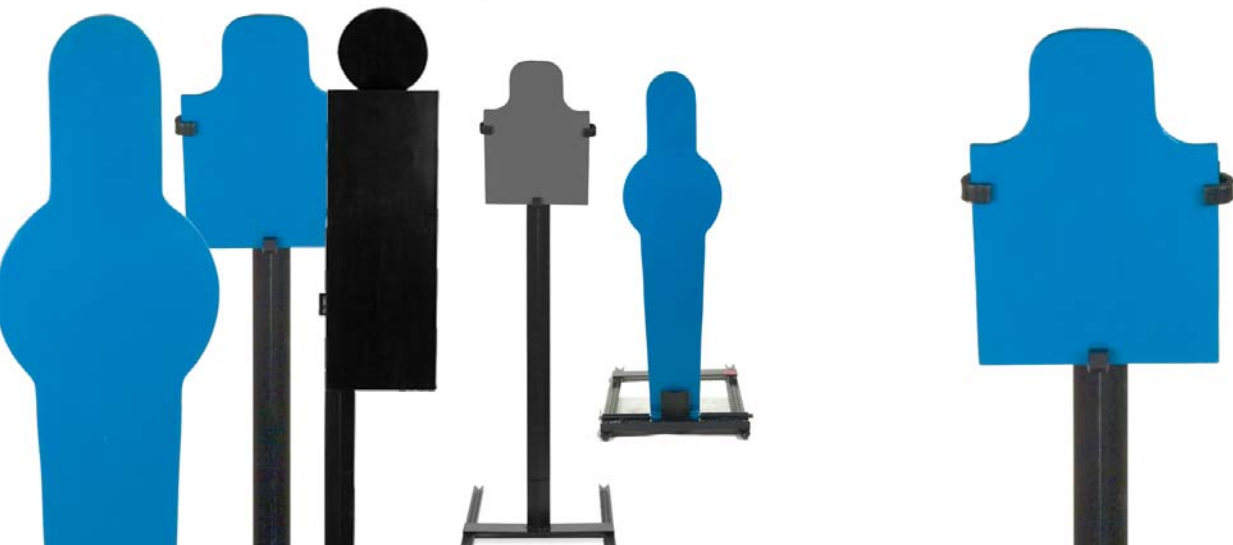
- Any ammunition above 1,500 feet per second on our Pistol Grade Targets.
- Any ammunition above 3,000 feet per second (f.p.s.) on our Rifle Grade Targets.  
\*\*Note: The 3,000 f.p.s. limit does not apply to frangible ammunition, some of which can damage our targets at velocities as low as 2,500 f.p.s. See discussion of frangible ammunition on page 20.
- Any armor-piercing ammunition or ammunition with steel or other hardened metal cores.
- Any ammunition below 750 feet per second, including low velocity, mid-range or target-type ammunition, BB's and pellets from air guns and other pellet guns, and other projectiles which lack sufficient velocity to disintegrate when they strike the plate.
- Rifled slugs, when used on our upright (not angled) steel plate targets. Rifled slugs should be used only on our angled Hi-Power Silhouettes, Non-Reactive Plate targets or Gong type targets.
- See Section VI on page 18 for further ammunition guidelines.



**READ AND UNDERSTAND THE INFORMATION  
IN THIS SAFETY GUIDE BEFORE USING YOUR  
SAVAGE RANGE SYSTEMS' STEEL TARGETS**

## **STEEL TARGETS ARE SAFER TO SHOOT WHEN:**

- SHOOTERS AND OTHERS STAY WITHIN THE SAFETY ZONE
- APPROVED EYE & EAR PROTECTION ARE WORN AT ALL TIMES
- BULLETS ARE FIRED AT RIGHT ANGLES TO THE IMPACT PLATE
- THE TARGET'S STEEL IS PROPERLY MATCHED TO THE CALIBER USED
- MULTIPLE TARGETS ARE POSITIONED IN EACH OTHER'S SAFETY ZONE
- SHOOTERS OBSERVE THE PROPER SET-BACK DISTANCES
- USERS READ AND FOLLOW THIS SAFETY AND USE GUIDE
- THE TARGET IS BUILT BY SAVAGE RANGE SYSTEMS



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# I. INTRODUCTION

Congratulations on the purchase of your new Savage Range Systems portable target! We build the safest steel targets we know of, but their safe use depends on you. We cannot control how you use our targets, so you must assume responsibility for reading, understanding and following the guidelines provided in this Safety and Use Guide (Guide).

## **WARNING**

**Failure to follow these guidelines can result in serious injury or death.**

There are several things that are important for you to know before you continue reading this Guide. First, all shooting and gun handling activities involve certain risks. Most of these risks can be reduced, but cannot be completely eliminated despite your - and our - best efforts. Our targets are intended for use by experienced, competent, knowledgeable shooters, who are in a position to evaluate and control the risks involved. Beginners and less knowledgeable shooters should use our targets only under the direct supervision of experienced shooters, or better yet, instructors or range officers.

Second, this Guide applies only to Savage Range Systems portable steel targets - not to targets from other manufacturers. We know how we make our targets - how they're designed, what kind of steel is used, and how to use them safely. We can't say the same for products from other manufacturers. What may be safe to do with our targets may be dangerous with other brands of targets! Mixing our targets with other brands on a shooting range may produce mixed (that is, dangerous) results. Obviously, we can't control the results when other brands are used, and can have no responsibility when you do so.

Third, this Guide is addressed only to the specifics of using Savage Range Systems steel targets. It is not a general course on firearms safety, gun handling, range design, or range procedures. Beginning or less experienced shooters should obtain instruction in firearms safety and gun handling procedures from a qualified instructor. Such courses are available through the NRA (call 703-267-1000), and from many local shooting ranges and gun shops. In using any particular firearm, read and follow the manufacturer's instructions for use, safety warnings and procedures.

More advanced shooting activities, such as IPSC, IDPA, speed-shooting competitions, tactical simulations, law enforcement, military and defensive firearms use that involve specialized gun handling skills (such as drawing loaded handguns,

and moving with loaded guns in hand, to name just two), will require specialized training in order to appropriately manage the risks involved.

Shooting ranges must be properly constructed, with appropriate ventilation (see the “Lead Warning” section on page 25), and with backstops that will safely stop and contain all rounds fired, including those bullets and fragments that deflect from our steel targets. Even on the best-constructed range, safe range procedures are essential to your safety and that of everyone else present or within gunshot range (usually several miles!).

Ranges (including ones built by Savage Range Systems) on which more than one or two shooters are firing should be controlled by a trained, experienced range officer or firearms instructor, who can control and coordinate the shooting activities. Shooting competitions, including ones in which steel targets are used, should be designed and run by a trained Chief Range Officer, with experience in that type of competition and the types of targets and firearms used. Trained Range Officers should control each course of fire. Training and certification for Chief Range Officers and Range Officers is available from the NRA and from the National Range Officers Institute (contact USPSA at 360-855-2245, or [office@uspsa.org](mailto:office@uspsa.org)).

**For the safest results, use Savage Range Systems steel targets exclusively and follow this Guide faithfully.**

## **II. EXPLANATION OF SAFETY HAZARD**

Bullets that hit one of our steel targets squarely will usually break into fragments that deflect or “bounce” off the surface of the target. Depending on the type of ammunition used and the exact angles involved, some of these fragments can be sizable, and can travel for a considerable distance (100 yards or more) with sufficient velocity to cause serious injury or death to any person or animal they hit.

Very low-velocity bullets, very heavily jacketed or solid metal (non-lead) bullets designed for deep penetration, and many types of shotgun pellets, may not fragment at all, even when they hit the target squarely, but may instead deflect as whole bullets or pellets which can travel hundreds of yards or more, causing serious injury or death even at their maximum extreme range.

Also, any type of bullet or projectile may deflect in whole, un-fragmented form if it glances off the very edge of the target. If not stopped by a proper range backstop,

these whole bullets and whole shot pellets can travel anywhere from hundreds of yards to as much as several miles (depending on the caliber) to cause serious injury or death at that distance.

The most common injuries from using unsafe steel targets, or from using steel targets in an unsafe manner, are small cuts, scratches and bruises caused by fragments hitting the shooter or bystander at close range. Even tiny fragments can cause serious eye injury or blindness if they hit the eye, and can cause serious injury to other unprotected parts of the body at close range.

Fragments from medium-velocity handgun bullets hitting a target (not made by Savage Range Systems) 50 yards away have bounced back 50 yards and penetrated heavy denim clothing to enter the shooter's body, requiring surgical removal. Higher-velocity handgun bullets, and projectiles fired from shoulder weapons, have even greater wounding potential.

Savage Range Systems steel targets are designed to deflect projectiles and fragments in predictable directions, so that they can be stopped and contained by proper range surfaces and backstops. Proper range surfaces and backstops are thus essential to the safe use of our (or any other) targets. The predictable "splatter zone" produced by our targets creates a reliable "safety zone" within which shooters and others can stand. Among other things, this Guide will show you how to create and use the safety zone most effectively.

### **WARNING**

Even when our targets are maintained and used properly, shooters and others in the "safety zone" at close range may occasionally be struck by tiny fragments. This may be due to specific bullet types, uneven range surfaces, or other targets or objects within the "splatter zone" of the target being used.

**WEARING PROPER EYE PROTECTION AT ALL TIMES** is absolutely essential in order to prevent serious eye injury from these occasional tiny fragments.

Wearing long pants and long-sleeved shirts can maximize shooter comfort, and minimize the chance of small cuts, scratches or bruises caused by these tiny fragments.

**THE SAFE USE OF OUR TARGETS DEPENDS ON YOU!**

### III. EYE PROTECTION AND OTHER PROTECTIVE EQUIPMENT

#### Eye Protection

Wearing proper eye protection is a critical safety precaution in any shooting activity, but it is especially important when using steel targets, which generate bullet fragments that leave the target surface with sufficient velocity to cause serious eye injury.

Even if you understand how to manage the “splatter zone” created when bullets strike steel targets, a damaged plate, a single round of non-standard ammunition, a shooter or spectator moving into a dangerous area, or some other change in conditions could cause fragments to fly in an unexpected direction.

Every shooter, spectator, and anyone else present while firing is in progress must wear high-quality eye protection to prevent possible injury from ejected cases, powder granules and gases, firearms lubricants and solvents, burst cartridge cases and barrels, revolver “side splatter,” hangfires, fragments bouncing back from backstops and other range equipment, etc.

Good eye protection is shatterproof, fits close to the wearer’s face to prevent or minimize gaps around the edges, and either has side panels or is of “wraparound” (curved) design to provide protection from the sides as well as from the front. This side protection is essential, as many eye injuries occur from the shooter’s side. Ejected shell casings or fragments from another shooter’s firearm and side splatter from out-of-time revolvers are just two examples of situations in which side protection is essential. In addition, anyone on the range will occasionally turn his or her head sideways to the direction of fire, exposing the sides of the eyes to any fragments bouncing off the backstop, target frames or targets.

In addition to side protection, good safety glasses often have rims around the top and bottom edges as well, helping to protect against hazards from these directions (such as hot ejected cases) which could enter between the shooter’s forehead and the top edge of the glasses. Some of the best shooting eye protection is made of impact resistant polycarbonate, that meets the requirements of both ANSI (the American National Standards Institute) standard Z87.1-1989 and CSA (Canadian Standards Association) Z94.3-99. Eyewear that meets these standards is usually marked to that effect on its packaging or on the eyewear itself. Polycarbonate safety glasses that meet these safety standards are available for under \$10 from most industrial safety supply stores, and can often be found at gun shops, sporting goods stores, the sporting goods departments of mass retailers, hardware stores,

home improvement outlets, through the mail, and over the internet. For shooters who wear prescription glasses, there are polycarbonate safety glasses and goggles designed to fit right over the prescription glasses. If the prescription glasses themselves are shatterproof, another option is to wear OSHA-approved add-on side panels, available in various styles from industrial safety supply houses listed in the yellow pages. There is simply no excuse for not wearing adequate eye protection while shooting - you only have one set of eyes, and they are easily injured and irreplaceable!

Whatever kind of eye protection you choose, it won't help you if you don't wear it. Leave it on whenever firing is in progress, whether you are doing the shooting or not. Put it on before you enter the range area, and leave it on until you leave. Serious eye injuries have occurred when shooters removed their safety glasses just prior to leaving the range, while another shooter was still firing. If your glasses fog up or need to be cleaned, or if you need to remove them momentarily for any other reason, wait for a cease-fire or leave the range before removing your glasses. In an emergency - for example, a hot cartridge case lodged behind your glasses - at least turn to face in a safe direction away from the shooting before removing your glasses.

### **Hat With A Brim**

Many large law enforcement agencies and academies, and organizations such as the NRA and the International Association of Law Enforcement Firearms Instructors (IALEFI), consider a baseball cap or similar hat with a brim an essential item of personal safety equipment.

The brim, worn pulled down tight over the top of the safety glasses, deflects fired cases, reducing the chance that they could lodge between the shooter's glasses and eye(s). The brim also prevents fragments from entering the gap between the top of the glasses and the shooter's face when he or she bends over. In addition, the hat provides some degree of protection against injuries to the head from ejected cases, fragments and the like, and keeps the sun off the shooter's head and out of his or her eyes.

Savage Range Systems recommends that shooters, spectators and others wear baseball caps or other hats with brims anytime they are on the firing range.

### **Ear Protection**

Earmuffs can be either the conventional type, or electronic muffs that amplify normal sound (such as speaking), but cut out the loud impact-type noise of

gunshots. Do not use makeshift earplugs made of cotton, tissue, fired cartridge cases or the like - they do not sufficiently protect your hearing.

Good ear protection is rated in decibels (Db) of noise reduction. Commonly available earmuffs offer 21-27 Db of noise reduction, while earplugs can provide as much as 32-33 Db of protection. In either case, the stated protection level is only achieved if you insert or position the ear protectors properly. For instance, earplugs need to be inserted so they fit snugly into the ear canal, not just placed in the outer ear. Earmuffs should fit properly and make a snug seal against the shooter's head. Read and follow the manufacturer's instructions on proper use of its product.

On especially noisy ranges, or if your ears are more sensitive than some, you may wish to give yourself even more protection by wearing both earplugs and muffs. In the interest of safety, if you decide to do this, just be sure you can still hear the range commands clearly.

### **Body Armor**

Many law enforcement agencies and academies require trainees to wear their soft body armor on the range. This not only adds realism to the training, and accustoms officers to the difficulties of drawing and using firearms and other equipment while wearing body armor, it also provides a significant increase in safety by reducing the chance of serious injuries due to accidental discharges, ricochets and other training accidents.

Wearing body armor is an especially good idea (and is required by many agencies) in shooting houses, simulators, and other tactical training involving multiple shooters, movement, various angles of fire, target identification problems, and elevated stress levels.

## **IV. WHAT HAPPENS WHEN A BULLET HITS STEEL: THE "SPLATTER PATTERN"**

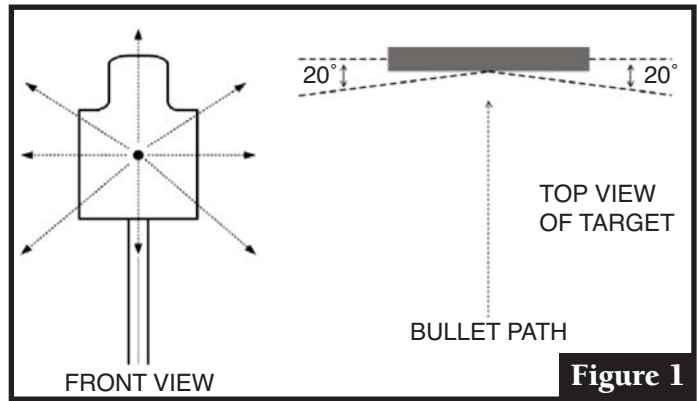
### **What happens when a bullet hits an upright plate?**

When a bullet hits an upright steel impact plate (such as on our plate racks, pepper poppers, knock downs and falling head plates) at more or less than a 90 degree angle, the bullet usually fragments into many small pieces of bullet jacket and core. Provided the impact plate is flat and smooth, these fragments

splatter off it at angles of 0 degrees (that is, flat along the surface of the plate) to about 20 degrees from the surface of the plate.

(See Figure 1). This 0-20 degree “splatter pattern” extends in a complete 360 degree circle (like a clock face) around the impact plate.

In other words, on an upright plate, the splatter pattern extends not only out to either side and down to the ground, but also straight up from the plate into the air above it.



**Figure 1**

### **How far is the side splatter dangerous?**

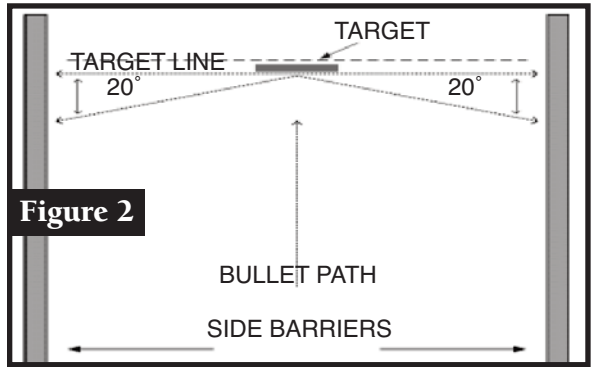
The size of the fragments, the velocity with which they splatter off the plate, and the resulting distance from the plate at which the fragments will cause injury to a person standing in the splatter zone, will depend largely on the construction, velocity and exact impact angle of the bullets being fired. Any type of ammunition will send dangerous splatter sideways at least 25-30 yards from an upright plate, and some calibers and ammunition types will create dangerous side splatter 100 yards or more to either side of the target.

Because you cannot be sure of the exact distance to which dangerous side splatter will travel - and because this distance may vary from one shot to the next, depending on the variables involved - you must assume that the side splatter can cause serious injury or death at any distance within the splatter zone, and you must keep all people, animals and property which could be damaged (such as automobiles) out of the 0-20 degree splatter zone to either side of an upright plate while firing is in progress. Also, because you cannot precisely judge the 20 degree angle of splatter - and because of the danger of “secondary splatter” (see next page) — you should keep everyone well back from the splatter zone, rather than trying to “cut it close”.

### **Using side berms or barriers to limit the side splatter danger zone.**

Side berms, walls, or range dividers can be used to stop the travel of side splatter from upright plate targets, and to protect people on adjacent ranges. Be sure the side berms, walls or dividers present a complete, unbroken surface, with no gaps through which splatter could escape to injure someone on an adjacent range or other adjacent area. (see Figure 2).

If range dividers are made of wood or similar soft material and are placed close to the steel targets, the side splatter may eventually erode or cut through the barrier material. Especially at close range to the target, where the velocity of the side splatter is still high, continued impact from splatter can even cut through a masonry wall. wood is cut through, the wood may become filled with imbedded, jagged fragments of bullet jacket or bullet metal.



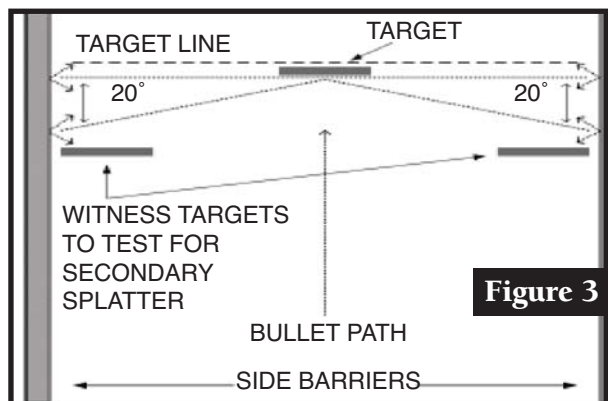
These jagged fragments can cut someone who brushes against them, and can also cause future splatter to bounce off at unpredictable angles, possibly causing injury to shooters and bystanders.

To prevent injury, wood or other soft barriers should be inspected before each use, and should be repaired or replaced if cut-through or imbedding problems are observed.

Depending on all of the variables of bullet construction, velocity, angle of impact with the target, etc., side walls or barriers may allow some side splatter to bounce off in the direction of the firing line - especially if the side walls are made of hard material and are positioned close to the targets, where the velocity of the side splatter is still high.

You can test for this “secondary splatter” by positioning some portable target frames with “witness” paper or cardboard targets at right angles to the side barriers,

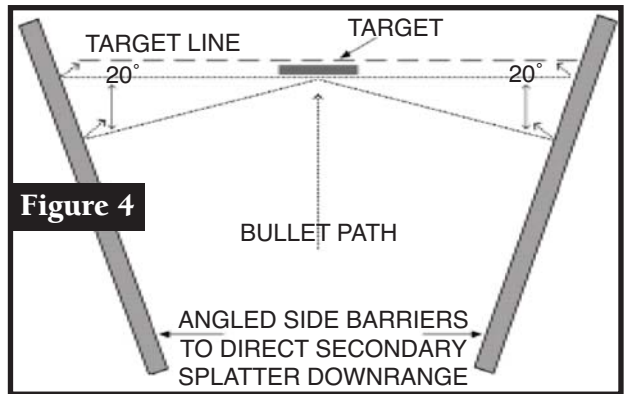
3-4 feet uprange (that is, closer to the firing line) from the point of impact of the splatter with the side walls. Then, making sure no one is close to the side walls, fire one shot at the steel target. Then check the “witness” targets to see whether any fragments bounced off the side walls in the direction of the firing line. If the “witness” targets are clean, fire 3 more shots, and again inspect the “witness” targets for evidence of secondary splatter. If they are still clean, fire extensively, using all of the types of ammunition that will be used, and firing from the full range of angles and shooting positions that will be permitted when the target is used.(see Figure 3.)



Do not take shortcuts! The more thoroughly you test your side barriers, the more certain you will be that your system is safe to use. Check the “witness” targets frequently throughout your testing process, to be sure none of your variations in firing are creating a safety problem.

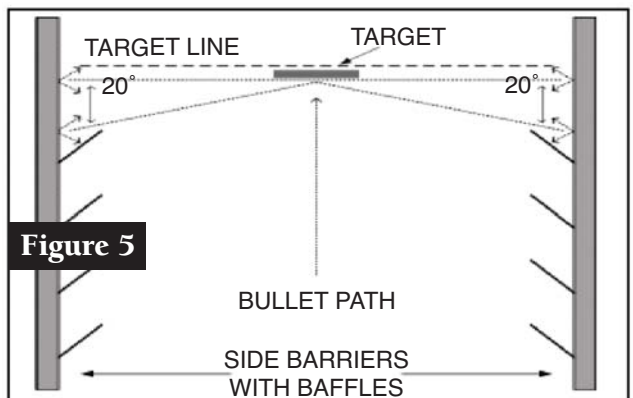
**Caution! If, at any time, the “witness” targets show that fragments are bouncing off the side barriers and traveling toward the firing line, the side barriers are not safe, and no more firing should be done until the situation is corrected!**

Problems with secondary splatter from side barriers can be remedied by changing the barrier material, angling the barriers to deflect any secondary splatter safely downrange (see Figure 4.), or building baffles outward from the barriers to contain the secondary splatter. (see Figure 5)



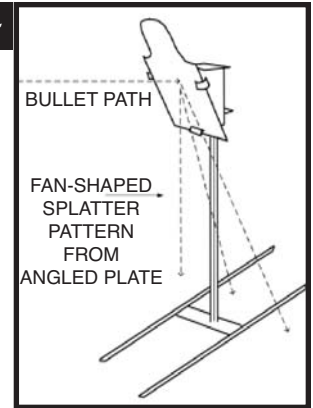
### What happens when a bullet hits an angled plate?

When a bullet hits an angled plate (such as our Hi-Power Silhouette), it usually<sup>1</sup> fragments, sending a shower of splatter off the plate. However, unlike the splatter pattern described above for upright plates, the pattern from an angled plate is directed downward in a fan-shaped configuration, into the ground below and slightly behind the plate, and sideways to about 45 degrees to both sides of the plate (see Figure 6). Provided the range surface can safely absorb the splatter without producing “secondary splatter” in dangerous directions, the angled plate design thus serves to contain the splatter closer to the plate, reducing (but not eliminating) the safety hazard to either side of the target.



<sup>1</sup>Some projectiles, including extremely low-velocity ones, solid non-lead bullets or very heavily jacketed bullets designed for deep penetration, and steel or other non-lead shotgun pellets, may not fragment when they strike the plate, but may bounce off the plate in whole form. See the list of prohibited ammunition types on the inside front cover of this Guide, and read Section VI, “Acceptable Ammunition Types For Each Grade Of Steel.”

**Figure 4**



## V. PLACING THE TARGETS ON THE RANGE

**⚠ WARNING** Your positioning of the steel targets on the range is critical for safety. Improper positioning can result in serious injury or death. Read, understand and follow the instructions in this section before you use our targets.

The elements of positioning that are most critical from a safety standpoint are:

- (1) the range surface on which the targets will be placed;
- (2) the array of multiple targets, or other objects in the splatter zone; and
- (3) safe “stand-off” distances.

### Ground or Range Surface

As previously described, when projectiles hit the steel impact plate, a shower of fragments leaves the surface of the plate at angles ranging, in the case of a straight upright plate, from 0 degrees (flat along the surface of the plate) to about 20 degrees. Or, in the case of our angled plates, in a fan-shaped configuration angling downward and rearward from the plate, and sideways about 45 degrees to both sides of the plate. In either case, the movement of these high velocity fragments after they hit the ground or range surface needs to be controlled in order to prevent them from coming back toward the shooter and others.

We recommend placing the targets on loose dirt or sand to absorb the fragments and eliminate ricochet from entering the safety zone. A range surface of growing grass is also good, as is soft mulch or sawdust. The absorbent material under the

targets must be free of rocks (from which the fragments could ricochet) to a depth of at least three (3") inches.

**DO NOT** place the targets on concrete, asphalt, hard-packed clay, rocks, gravel, or other hard or rough surfaces that can cause fragments to ricochet back toward the shooter or others, or to ricochet in any unpredictable directions.

Also, fragments repeatedly hitting a concrete or other hard, finished surface will quickly erode and damage the surface. Rough or finished surfaces under the targets can be covered with pieces of old carpeting, plywood, or other soft, absorbent material to address the problems of splashback and surface damage. Be sure to cover the entire splatter zone under the targets with the absorbent material, and test it thoroughly for safety from the distances and angles at which shooting will be conducted before allowing others to shoot at the targets. The carpeting, plywood or other absorbent material will have to be replaced before it becomes filled with bullet fragments, as it will lose its fragment-absorbing qualities and will begin to allow fragments to bounce off at unpredictable angles with the potential to cause injury. (See section on Lead Warning, page 29).

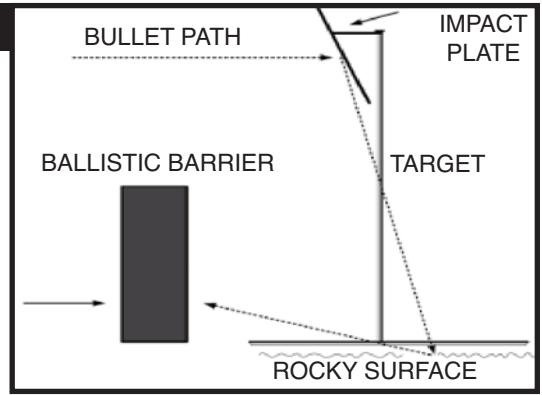
If you place the targets on a soft, absorbent surface such as loose dirt, sand, grass or mulch, repeated firing with the targets in the same position can erode (wear away) the absorbent material to expose rocks or other hard, unsafe materials underneath. Also, continued firing can cause an accumulation of metal fragments to build up in sufficient quantities that they can cause new fragments to ricochet back toward the shooter and others. Before an unsafe condition develops, either repair the range surface or move the targets to a new location on the range.

**To prevent these safety hazards, you must inspect the surface under the targets before each shooting session, and at regular intervals while shooting.**

## Splatter Barrier

For safety when using any of our steel targets on hard, rough or questionable surfaces, or when using our permanent pneumatic or electrical targets, erect a barrier - such as a railroad tie wall or low wooden wall filled with pea gravel - in front of the targets, to stop ricocheting fragments from coming back toward the shooter or others. (See Figure 7).

**Figure 7**



Depending on your needs, the “wall” can be temporary, such as railroad ties or pieces of plywood you put in place for the purpose, and then remove when you are finished using the targets.

For short-term use, a splatter barrier can even be made of heavy cardboard target backers, folded in half and placed on the ground like tents — using pieces of wood, if necessary, to hold them in place — provided you check frequently and replace the cardboard before fragments cut through and penetrate it. Replace the cardboard before fragments have penetrated the side closer to the targets. Again, this option is for short-term use only, and is not as good as a more solid splatter barrier.

Whatever kind of barrier you construct must be:

- (1) continuous (with no breaks or gaps) throughout the splatter zone,
- (2) far enough in front of the targets (that is, in the direction of the shooter), and
- (3) high enough, in order to stop all splatter from flying toward the shooter or others.

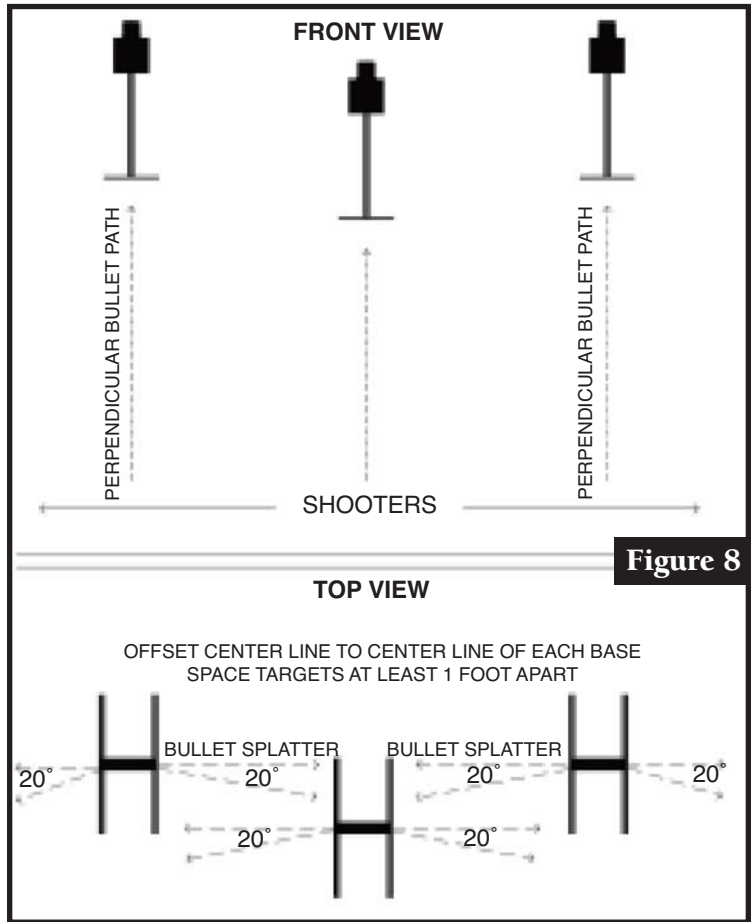
## Array of Multiple Targets (and Other Objects in the Splatter Zone)

If you use multiple targets or range props, each target or prop must be placed in each other’s safety zone, in order to prevent side splatter from one target from hitting another target or object, and ricocheting toward the shooter or others. (See Figure 8).

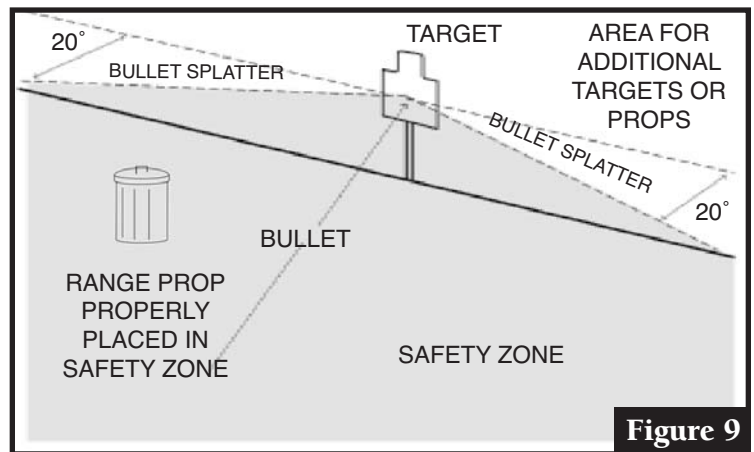
By putting all multiple targets, props and other objects in each other’s safety zone (See Figure 9), this hazard will be avoided. You must also avoid placing the targets

where side splatter will strike - and possibly ricochet from - range fixtures, such as target frames, utility poles, light stanchions, etc.

On indoor ranges, and on outdoor ranges with overhead baffles or other overhead construction, you must also consider upward splatter from the plates, especially from straight upright plates. Position the targets where upward splatter will not break lights or cause other damage above the targets, and where the upward splatter will not strike anything that could cause it to ricochet back toward the shooter or others.



**Figure 8**



**Figure 9**

**⚠ WARNING** Failure to follow these instructions can result in serious injury or death.

## Recommended “Stand-Off” Distances

Under perfect conditions, most of our targets require no minimum “stand off” distances - that is, the minimum distance from which you can shoot the target for safe use.

**CAUTION! Like many other things in this Guide, this does not apply to steel targets from most other manufacturers.**

That is, provided the range surface underneath the target is suitably absorbent, and provided the surface of the plate is undamaged, and provided there is nothing in the target’s splatter zone to cause fragments to bounce back toward the shooter, and provided you are using appropriate ammunition and wearing proper safety equipment, you should be able to stand as close as you wish to the target (as long as you are not within the 20 degree downward splatter zone from a straight upright plate) and fire at it safely.

Nevertheless, while our targets have been shot thousands of times at distances of 2-3 yards or even at point blank range with no injury to the shooter, in the interest of safety, and because some of the variables involved in your own use of the targets may not always be perfect, we recommend you take a conservative approach and

**Always maintain at least a ten (10) yard set-back distance when firing at our targets with handgun, submachine gun, or shotgun..... and a twenty-five (25) yard set-back when using high powered rifle or rifled slugs.**

While these setback distances will NOT ensure your safety in the event you are using the target improperly (for instance, using a pockmarked target, or placing the target on an improper range surface), they MAY possibly reduce the likelihood or severity of an injury compared to what might occur if you were firing at closer range to the target.

Adopting this “conservative” approach will probably cost you little in training terms. You can simply do your closest range exercises on paper or cardboard targets, and it may prevent or minimize an injury. Accordingly, we recommend it.

Before you ever consider bypassing our safety recommendations to use our targets closer than 10 yards (25 yards for high power rifle or rifled slugs), test them thor-

oughly at your intended distance in the exact way in which they will be used. That is, in your own range setting, with the same ammunition and at the same angles and other conditions that will apply in your shooting program. This test should be conducted using proper safety equipment, including eye protection (preferably a full face shield plus safety glasses), long sleeved shirt and long pants, gloves, etc. with paper or cardboard “witness” targets set up in front of the steel target to evidence any splatter traveling into the expected safety zone (see prior page).

In addition to these safety considerations, one of our currently available targets requires a minimum “stand off” distance in order to prevent target damage from bullet impact. A minimum standoff distance of 200 yards should be maintained when using our Hi-Power Flopper, to prevent breakage of the bearings used in that target.

Consult our catalog for any other targets with minimum standoff distances.

### Direction of Placement

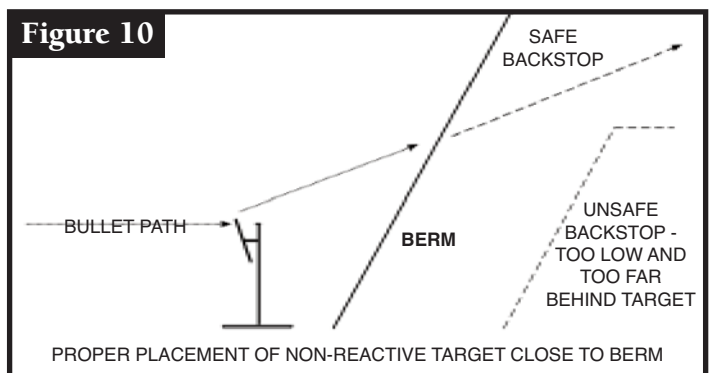
**Never place targets or stands with any concave surface or interior angle facing the shooters. Always place target impact surfaces facing directly toward the shooters.**

The uprights for many of our target stands are made of V-shaped angle iron, and are designed to be placed with the outside point of the V facing the shooter. This will deflect projectiles striking the upright safely down-range.

Also, our targets are designed to be shot from directly in front only. Never position targets where projectiles may hit the interior angle of the V, or the target’s back, sides, mechanism or supports, other than the surfaces that are exposed when the target is viewed directly from the front.

### Backstops

Place targets close to a backstop of adequate height. With any steel target - whether from Savage Range Systems or any other manufacturer - a bullet hitting or skimming off the very top edge of an impact plate may

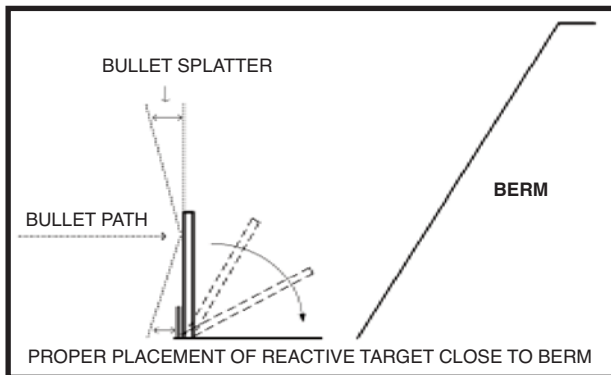


glance upward off the target, with the potential to overshoot (miss) the range backstop. This can be prevented if targets are placed close enough to a backstop of sufficient height to guarantee the containment of any stray high shots fired by the shooters.

For example, placing a target immediately in front of a 15-foot high backstop with an impact surface sloping down at an angle of 45 degrees toward the shooters should normally contain any fragments or bullets which glance off the top edge of the target, while placing the target 20 yards in front of the same backstop might not do so. (See Figure 10).

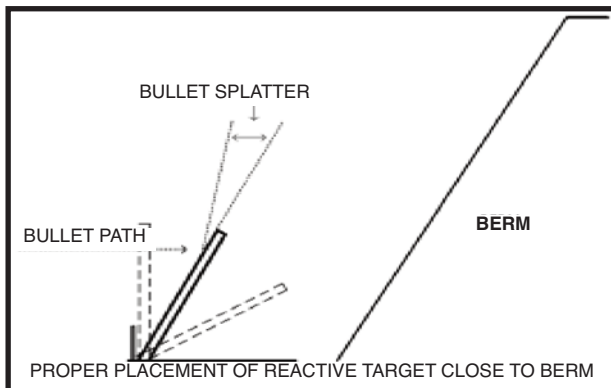
### Special Precautions on Pepper Poppers and Colt Speed Targets

Pepper Poppers and Colt Speed Targets present a constantly changing angle to a shooter who continues to fire as the target is falling. (See Figures 11a-c). This may cause fragments and whole bullets to ricochet off the falling target at a high angle, possibly overshooting the range backstop. With conventionally constructed bullets of sufficiently high velocity, fragments rather than ricocheting whole bullets will generally occur as long as the angle at which the bullet hits the plate is not less than 30 degrees. Below 30 degrees, bullets are more likely to glance off the plate

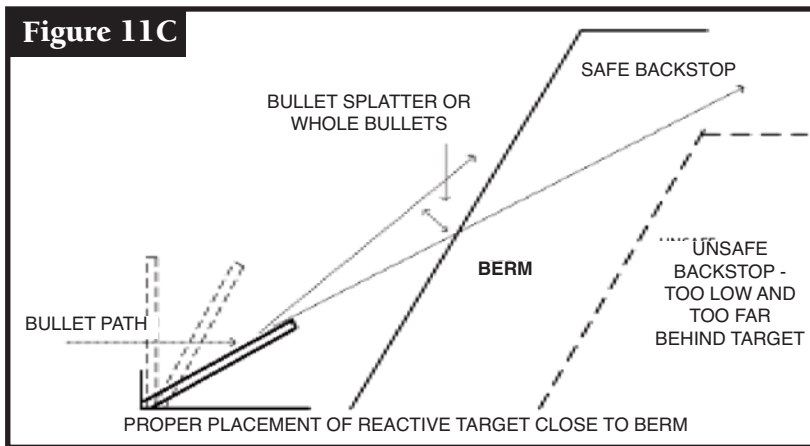


**Figure 11A**

in whole form. To prevent the safety hazard of splatter or ricochets from falling plates of this sort missing the backstop, Pepper Poppers and Colt Speed Targets should be placed close to a backstop of adequate height to contain any such high-glancing shots. In addition, do not continue to shoot at a target of this type once it has clearly begun to fall.



**Figure 11B**



## Shooting from High and Low Angles

Our targets are designed to be shot approximately horizontally - that is, by a shooter firing a gun held on the same level as the target's impact plate. Changing the angle of fire may change the splatter zone that is produced.

For instance, firing at targets placed higher than the shooters, including firing at our angled targets like our High-Power Silhouette from a prone or low kneeling position at very close range (typically, closer than about 10 yards) can partially or totally negate the safety effects of the angled impact surface, by allowing the bullet to strike the plate at close to a right angle. The result may be splatter directed back toward the shooters or observers.

Shooting at a target which is lower than the shooter may allow high rounds that go over the top of the impact plate to hit the target bracket or frame behind the plate, causing dangerous splashback. Be sure that only the impact plate and upright stand are visible to the shooter when firing.

## Special Precautions With Bianchi Plate Racks

The safety of Bianchi Plate Racks depends on all of the standing impact plates being aligned with each other - that is, positioned in the same plane. If a bullet is fired at a plate which is, for example, leaning back an inch from the other plates which are still standing on either side of it, side splatter may glance off the edges of the neighboring plates and come back toward the shooter and observers, causing injury.


When you position the plate rack on the range, check to be sure all of the plates are aligned, and that there are no fragments of bullet metal or other debris that can

keep the plates from aligning when they are set up again after each shot. In use, check the plate rack periodically to remove any such debris. Do not shoot at any plate which is not fully upright, or appears to be out of alignment with the other plates.

### **Secure All Steel Targets (or the Range) When Not In Use**

It should be apparent to you by now that the safe use of steel targets requires some knowledge on the part of the shooters as to proper calibers, minimum stand-off distances, personal safety equipment, angles of fire, and many other factors. Steel targets are often ruined, and unsafe conditions created, when targets left out on ranges are fired at by shooters who don't know what they are doing, are using unsafe calibers, ammunition types, distances or angles, or are otherwise failing to take proper safety precautions. A steel target left out on an unsupervised range is an "attractive nuisance" to the untrained shooter. To prevent targets from being ruined and shooters from being injured, either the targets or the range itself should be secured when knowledgeable instructors or range officers are not present to supervise the shooting activities.

## **VI. Acceptable Ammunition Types for Each Grade of Steel**

 **WARNING** Use of improper calibers, types or velocities of ammunition on steel or other targets can result in serious injury or death, as well as permanent damage to the targets.

Safe use of your Savage Range Systems steel targets depends on using appropriate ammunition calibers, types and velocities. Use of inappropriate ammunition can not only create a serious hazard to your safety and that of everyone else in the vicinity, it may also permanently damage your targets, making them unusable without extensive and costly repair or replacement.

### **Pistol Grade Targets**

Our Pistol Grade Targets are designed to be used with conventional ammunition having muzzle velocities below 1,500 feet per second (f.p.s.). Since October 1998, all of our Pistol Grade impact plates have been painted black when they leave the factory, to differentiate them from our Rifle Grade plates, which are painted blue. (Prior to October 1998, all of our plates were painted black, whether Pistol Grade

or Rifle Grade. Of course, either grade of plate may have been repainted in any color by the users after leaving the factory. If in doubt about the grade of steel of any plate, reserve it for pistol use.) The 1,500 f.p.s. velocity limit of our pistol grade targets includes most (but not all) service ammunition fired from handguns, plus shotgun buckshot and birdshot, and most submachine gun ammunition. It may not include some of the higher velocity Magnum handgun rounds, especially when fired from long-barreled handguns, nor does it include rifle rounds fired from Thompson-Center Contender and similar single-shot hunting handguns. Some types of shotgun slugs may also exceed 1,500 f.p.s., depending on the specific ammunition brand and type and the barrel length of the shotgun. Law enforcement pistol caliber carbines may or may not exceed 1,500 f.p.s., depending on caliber, load, and barrel length. For instance, 9mm carbines using standard (not +P+) ammunition with bullet weights of 115 to 147 grains usually produce muzzle velocities below 1,500 f.p.s., as do most .40 S&W and .45 Auto (ACP) carbines. On the other hand, .357 Magnum carbines with 16" and longer barrels (commonly lever-action or pump-action) often produce velocities in excess of 1,800 f.p.s. Firing ammunition in excess of 1,500 f.p.s. at our Pistol Grade Targets may result in deeply pock-marking (cratering) or penetrating the steel impact plates, ruining the target and possibly causing splash-back or ricochets that can seriously injure, blind or kill the shooter or others. If you have any doubt about the velocity of the firearm/ammunition combination you or others intend to use, CHRONOGRAPH THE AMMUNITION FIRST, BEFORE FIRING AT THE STEEL TARGETS!

## **Chronographing**

Inexpensive chronographs (in the \$100-\$200 range - less than the cost of the target you may ruin!) are available from several manufacturers. You may be able to borrow the use of a chronograph from a fellow shooter, or one may be available for use at your local gun shop or range. We suggest you chronograph ten (10) rounds of the ammunition you plan to use, fired through the firearm you will use, at about the same air temperature in which you will be shooting. (Ammunition pressures and velocities are often higher on a hot day than a cold one. Ammunition allowed to sit in direct sunlight on a hot summer day can sometimes produce a velocity which is as much as 150 f.p.s. higher than the same ammunition would if kept in the shade.) In chronographing the ammunition, it is not the average velocity that matters for this purpose, but rather the highest velocity displayed by any of the 10 rounds. Even if 9 out of the 10 rounds are below 1,500 f.p.s., if the tenth round exceeds the plate's velocity limit, it may damage the plate and/or cause serious injury. Every round must be within the velocity limit for proper use. Good quality ammunition should be quite uniform in velocities from shot to shot, not varying more than about 50 f.p.s. for pistol ammunition (80 f.p.s. for rifle) from highest to lowest velocity over ten rounds chronographed. Be suspicious of ammunition that

varies wildly from shot to shot, especially if the higher velocities are close to the 1,500 f.p.s. limit of the plate. With erratically-performing ammunition of this sort, you cannot predict whether or not some of the rounds to be fired will exceed the plate's velocity limit.

## **Frangible Ammunition**

The increasing demand for environmentally cleaner, and lead free ammunition set in motion the development of frangible ammunition during the early 1990's.

Frangible projectiles are usually made of tungsten and copper powder in a nylon polymer matrix. These composite metal and nylon bullets are designed to shatter into tiny fragments upon impact with hard surfaces, thus reducing back splatter.

However, not all frangible ammunition is alike, and all types do not work well on steel targets. Certain frangible projectiles will damage steel targets, including ours, and can create a risk of serious injury to the shooter and others. Some frangible projectiles become extremely hard during the manufacturing process and act almost like an armor piercing round, damaging our hardened steel targets at only 2,600 f.p.s. And because of the light weight of frangible rifle projectiles, they often exceed our 3,000 f.p.s. maximum for use on our rifle grade targets with conventional (non-frangible) ammunition.


We have tested many brands of frangible ammunition and have found some brands work well while others do not. **We cannot be responsible for damage to targets or physical injuries caused by the use of inappropriate ammunition.**

## **Rifle Grade Targets**

Our Rifle Grade Targets are designed to be used with conventional ammunition having velocities below 3,000 f.p.s. Since October 1998, all of our Rifle Grade impact plates have been painted blue when they leave the factory, to designate them from our Pistol Grade plates, which are black (see prior page). The 3,000 f.p.s. velocity limit will safely accommodate most conventional pistol, submachine gun, shotgun (including rifled slugs) and machine gun ammunition, plus rifle ammunition including such calibers as 7.62 Nato (.308 Winchester), 7.62x39mm, .30-06, and .300 Winchester Magnum. Most (but not all) 55-grain and heavier .223 Remington (5.56mm NATO) ammunition, fired from typical military and police rifles (e.g., AR-15/M16, Ruger Mini-14, etc.) will develop velocities in the 2,700 to 2,900 f.p.s. range, and will thus be safe to use on our Rifle Grade Targets. However, we have occasionally chronographed batches of foreign military surplus 5.56mm ammunition (certain Malaysian ball, for instance), and sometimes even lots of domestically-produced .223 from major U.S. manufacturers - in which ve-

locities of some rounds can reach or exceed 3,400 f.p.s.! This exceeds the level that our plates (or, to the best of our knowledge, any of our competitors' plates) can withstand without cratering, cracking or other serious damage, with risk of injury to the shooter and others when additional rounds are fired at the damaged plate. In addition, the lightweight .223 40-grain "Blitz" or "varmint" bullets loaded by some manufacturers, and used by some tactical teams for reduced penetration in indoor environments, will usually produce velocities far in excess of 3,000 f.p.s., even from 16" and shorter AR-15 and CAR-15 barrels. If a given ammunition loading is "borderline" (for instance, right around 3,000 f.p.s., with the fastest rounds not exceeding 3,100 f.p.s.) you may be able to get away with using it on our Rifle Grade Targets, provided you use a sufficient set-back distance (distance from shooter to target) - say, 100 yards - to allow the ammunition velocity to fall below the 3,000 f.p.s. limit before the bullets reach the target. If you guess wrong, however, the result may be ruined plates and/or a serious injury. The only reliably safe procedure, when using a previously-untried brand and loading of a round like the .223 that may approach or exceed the 3,000 f.p.s. limit that our plates are designed to withstand, is to chronograph the ammunition before using it, to be sure it will not damage the plates or create a safety hazard.

### **Rifled Shotgun Slugs**

 **WARNING** Use of shotgun rifled slugs on upright steel plates can cause serious injury or death!

Conventional Foster-type (hollow-base) lead rifled slugs should not be used on any upright (not angled) steel target, such as our Pepper Poppers, Colt Speed Targets, or Bianchi Plate Racks. Rifled slugs should be used only on our angled Hi-Power Silhouettes, Non-Reactive Plate Targets or Gong Stands. Use of hollow-based rifled slugs on an upright (not angled) steel plate can cause the hollow base of the slug to invert on impact, sending a large, teardrop-shaped piece of lead bouncing straight back toward the shooter to a distance of 50 yards or more from the plate. Again, do not fire rifled slugs at any upright (not angled) steel plate - use them **ONLY** on our angled Hi-Power Silhouettes, Non-Reactive Plate targets or Gong type targets!

### **Non-Lead Shotgun Birdshot**

Recently, a number of manufacturers have introduced non-lead shotgun birdshot, including steel shot (Federally required for waterfowl hunting), and shot made of

bismuth, tungsten and other metals. Some of these non-lead shot pellets may not flatten and disintegrate in the same way as standard lead birdshot when they hit steel targets. Nevertheless, so far we have not encountered or heard of any safety problems in using any types of birdshot on our steel targets. However, because new types of birdshot are appearing on the market more rapidly than we can evaluate them, we recommend that you avoid using other than conventional lead birdshot, unless you are certain that what you are about to use is safe on our steel targets. In addition, you should of course follow our recommended 10-yard setback distance for shotgun (see Recommended Stand Off Distances on page 14), and all shooters and others present should wear proper side-panel or wraparound eye protection at all times.

### **Unconventional and Specialty Ammunition**

As explained earlier in this booklet, our plates are designed to deflect, in a controlled and predictable pattern, the splatter of fragments and particles produced when a conventional lead, jacketed lead, or frangible projectile hits them. The predictability of the splatter pattern allows the targets to be placed in a safe array on the range, and provides a “safety zone” in which shooters and others can stand, outside the splatter pattern of the targets.

Unconventional or specialty ammunition that varies from the lead, jacketed lead, or frangible projectile format, may produce splatter, fragments or ricochets that deviate from the controlled, predictable splatter pattern which our targets are designed to produce, possibly invading the “safety zone” and making it unsafe. Also, such unconventional or specialty ammunition may damage the steel impact plates, even though the projectiles do not exceed the velocity limit of the plates.

### **DO NOT USE ANY OF THE FOLLOWING TYPES OF AMMUNITION ON OUR PLATES:**

Armor-piercing ammunition or ammunition with steel or other hardened metal cores or projectiles. Armor-piercing ammunition (often, but not always, designated in military ammunition by black-painted bullet tips) is made to penetrate steel armor and not to fragment on impact the way conventional ammunition would. Accordingly, it may damage our steel plates and/or may send whole projectiles and/or steel or other hardened metal cores ricocheting in dangerous and unpredictable directions to great distances, with chance of serious injury or death to the shooter or anyone else within range! This includes steel-core military armor-piercing ammunition in calibers such as 7.62mm NATO, .30-06 and .50 BMG (Browning Machine Gun), and 5.56mm steel-core SS109 military ammuni-


tion (often designated by green painted bullet tips). It also includes certain armor-piercing or specialty handgun ammunitions which use hardened tungsten, bronze, brass or similar non-lead and non-frangible projectiles. We are aware of a recent case (NOT involving a Savage Range Systems product!) in which the steel core from a military armor-piercing round caused serious injury to a shooter standing over 100 yards from the target! Serious injury or death at even greater distances is possible. Such types of ammunition should not be fired at steel targets - ours or anyone else's.

BB's, Air Gun Pellets, Low-Velocity and "Mid-Range" Target-Type Ammunition, and other Ammunition below 750 Feet Per Second. BB's from a spring-loaded, air or CO2 gun will bounce straight back toward the shooter from an upright steel plate, and should not be used on our targets. Similarly, air gun pellets, .38 Special hollow-based wadcutters, and other low-velocity, mid-range or target-type ammunition, including any ammunition below 750 f.p.s. muzzle velocity, may not have sufficient velocity to cause the projectiles to disintegrate and splatter predictably when they strike the impact plate. Despite their low velocity and energy, such projectiles can cause serious injury or death, and **SHOULD NOT BE USED** on our steel targets. Again, our targets are designed for use with conventional, service-type and sporting ammunition, not for lightly-loaded, specialty, or target ammunition.

New and Unusual Ammunition Types. The varieties of ammunition, including specialty ammunition and handloaded ammunition, are endless, and new ammunition types appear on the market weekly. There are undoubtedly types of ammunition we have never seen, and have never tried on our targets. Because there is no way we can test (or even know about) all possible types of ammunition, our recommendation is that you stick to conventional types of ammunition, and that you **DO NOT USE EXOTIC, SPECIALTY, UNCONVENTIONAL OR UNKNOWN AMMUNITION TYPES ON OUR STEEL TARGETS**. Use those types of ammunition on paper or cardboard targets instead, and do not risk our targets or anyone's safety by shooting untested ammunition on steel, with unpredictable results!

**IF IN DOUBT ABOUT THE SAFETY FOR USE ON STEEL TARGETS OF THE AMMUNITION YOU INTEND TO SHOOT, DO NOT EXPERIMENT!**

The results could be disastrous.

 **WARNING** Failure to read and follow the above ammunition guidelines may result in serious injury or death to shooters or anyone else within gunshot range!

## VII. MAINTENANCE OF STEEL TARGETS

The safe use of steel targets depends on the target's impact surfaces remaining flat and free of concave or pockmarked surfaces that will direct splatter back toward the shooters or in any unpredictable directions. In order to keep your Savage Range Systems steel targets safe for use, you will need to do the following:

### **Inspect Impact Plates Before Each Use**

If appropriate calibers and ammunition types are used, the impact plates of your Savage Range Systems steel targets should remain quite flat and undamaged indefinitely. Inspect your targets before each use, and periodically during use, and replace or remove from use any plate that has a pockmark or dimple deeper than the thickness of two (2) dimes (about 0.100 inches). You should determine what ammunition is causing the damage, so that other plates are not damaged by continuing to use the same ammunition. Also replace any plates that show cracks or other damage.

### **Reverse Impact Plates Before They Become Curved**

Continued heavy use of an impact plate will eventually cause the edges of the plate to curve away from the shooters. In order to preserve plates in a flat condition, and get the longest use out of them, most of our targets are designed so that impact plates can be reversed easily. Reverse your plates frequently, before they become deformed by heavy use. A straightedge placed horizontally across the concave side of the plate should be less than 1/4" away from the plate at its center regardless of the width of the plate. Once plates have become curved more than this, do not use them with the concave surface facing the shooters.

### **Impact Plates Should Be Replaced Only By Savage Range Systems**

Unlike target stands and uprights which can be repaired locally, impact plates with pockmarks, pits, holes or cracks, or plates which have become severely curved, should be replaced only by Savage Range Systems. Your local welder will have neither the knowledge nor the type of steel needed to do a safe and proper repair on our impact plates.

### **Repair Holes and Damage to Uprights and Target Stands**

The angle iron used in our target stands and uprights is not hardened, and may become pockmarked or penetrated when struck by rifle rounds and other high-pow-

ered projectiles. Penetration of the stands by rifle bullets will leave jagged edges, which can easily cut anyone handling or touching the target. In addition, other rounds (including pistol, submachine gun and shotgun projectiles) hitting the damaged uprights and stands may no longer be safely deflected in a downrange direction, instead sending splatter back toward the shooters or observers to cause injury. To prevent these hazards, inspect target stands and uprights before each use, and periodically during use. Do not use damaged stands or uprights. Holes and pockmarks in stands and uprights can be repaired by your local welding shop or similar facility by grinding off any sharp edges, welding up the holes or pockmarks, and grinding the weld flush with the original surface of the stand or upright.



## VIII. LEAD WARNING

### **About Lead Poisoning**

Most bullets and shotgun pellets are made of lead. Lead can be poisonous to humans and animals. When breathed in, swallowed, or absorbed through the skin in sufficient quantity, lead can cause nervous system damage and digestive system disorders, birth defects, reproductive harm, and other ailments. In addition to the lead contained in projectiles, cartridge primers often contain lead, barium, antimony, and other toxic substances. Lead and these other toxic materials tend to accumulate in the body, especially in the bones and certain other organs. Young children are particularly vulnerable to lead poisoning. Pregnant women are also particularly at risk, as lead can be passed through the mother's circulatory system to the fetus. But anyone, including any adult, is a potential victim of lead poisoning, even if all their firing is done on outdoor ranges.

## How Lead Poisoning Occurs

When a cartridge containing a lead projectile and/or a primer containing lead or other toxic substances is fired, lead is expelled into the air near the shooter in the form of molecules and tiny fragments which are melted, vaporized, blasted or rubbed off the surface of the projectile during the firing process. Lead and other toxic substances also enter the air in the form of primer gas, which is expelled from the firearm. The surface of the firearm, holster, shooter's clothing and other equipment, as well as the shooter's skin (especially the hands, arms and face) and hair, are likely to be covered with lead dust and other toxic substances after firing even a few shots. Also, when lead projectiles hit and/or fragment on a hard surface (such as one of our steel targets, target frames or range backstops), the hard surface - and the surfaces around it - will likely be covered with lead dust and particles.

Shooters, instructors, and others present at firing ranges absorb lead and other dangerous firing by-products by breathing in air containing particles or vapors. While lead exposure in this manner is most often viewed as a concern on indoor ranges due to their limited ventilation, it can be a problem even on an outdoor firing range, especially if there are several shooters firing and it is a calm day with little air movement.

Lead dust deposited on the hands and face, and on beverage cans and other food items brought into firing ranges, enters the mouth and is swallowed when shooters drink, eat, smoke, or chew gum or tobacco products while on the range, or after leaving the range but before washing. Lead dust clinging to mustaches and beards after firing is particularly likely to be ingested unless proper hygiene is practiced.

Shooters and instructors also get lead on their hands by handling ammunition, fired cartridge cases, targets and target frames, from casting bullets, from hand-loading ammunition, cleaning firearms, and cleaning indoor ranges. Collecting fired cases in one's hat - a bad practice - fills the hat with lead dust, which is then transferred onto the scalp and can be absorbed into the body. Collecting fired cases in one's pockets fills the pockets with lead dust, which then re-contaminates the hands every time you reach into your pocket.

Shooters can transfer significant quantities of lead via their clothing, shoes and range bags into the interior of their automobiles, and into their homes. For a regular shooter whose lead level is already a matter of concern, or for members of the shooter's family - especially young children — lead dust which has accumulated in vehicles, clothes closets and other parts of the home presents a toxic hazard which can and should be minimized by proper health habits.

## **Precautions You Should Take**

You can reduce the chance of lead poisoning in yourself, your children and others by taking the following common-sense precautions:

**Ventilation.** First, be sure indoor ranges have proper ventilation, and that the ventilation systems are operating while you are present on the range, whether or not firing is actually in progress. OSHA sets ventilation standards for ranges used by employees. In some cases, state or local health laws and regulations also set such standards. Range doors should be constructed to keep lead from leaving the range. Double sets of doors which create an “air lock” vestibule are sometimes used for this purpose. You should also have proper ventilation while cleaning firearms (both to reduce the lead hazard and because of the solvents and other chemicals used) and while casting bullets.

**Don't Eat, Drink, Smoke or Chew while shooting, or after shooting before washing, as these hand-to-mouth activities put lead and other toxic substances in your mouth.** Don't have uncovered beverage containers, food items, cigarettes and the like where firing is in progress.

**Wash, especially your hands, arms and face, as soon as possible after firing or other exposure to lead and other toxic substances, and always before eating or drinking.** Use cool water and soap (hot water opens your pores and can cause more lead to be absorbed through your skin). Be sure to wash mustaches and beards thoroughly. Firearms instructors and others regularly spending extended sessions on indoor firing ranges should shower and shampoo the hair as soon as possible after leaving the range. Firing soot containing lead should be removed from the nostrils using a dampened handkerchief, tissue or washcloth. On outdoor ranges where running water is not available, consider bringing bottled water for washing, or using prepackaged towelettes or baby wipes until you can wash more thoroughly.

**Clothing and Shooting Gear.** Wash the clothes you wear on the range after firing. Don't wear your range hat and range jacket for everyday wear. Firearms instructors and others who spend lots of time on the range should consider having range jackets, hats, coveralls and footwear that are kept at the range, so the lead they contain does not contaminate the instructor's vehicle and home. Consider washing your range clothing separately from other clothing. Range bags, gun cases and shooting clothing should be placed in the vehicle's trunk, rather than in the passenger compartment, whenever possible. Don't allow children to play with your range bags, gun cases, ammunition, fired cases, or firearms.

**Range Habits.** Don't collect fired cases in your hat or pockets. When possible, stand "upwind" of firing, not "downwind," whether in the ventilation pattern of an indoor range, or on an outdoor range when a breeze is blowing. Wear work gloves when handling steel targets and other target equipment, both to keep lead off your hands and to reduce the risk of cuts and abrasions from sharp edges or bullet fragments. Firearms instructors and others who do a lot of shooting should reduce their lead exposure by minimizing the time they spend on the range, especially if it is an indoor one. For example, when firing is over, don't remain on the range engaged in casual conversation - leave the range promptly and have your conversation outside.

**Cleaning guns should be done in a properly ventilated area.** Wear rubber gloves to protect you not only from lead but from toxic solvents as well. Do not eat, drink, smoke or chew while cleaning guns. Wash your hands, arms and face thoroughly after cleaning guns and before eating, drinking, smoking or chewing.

**Lead-free Ammunition.** Ammunition is available from many manufacturers utilizing lead-free (or totally jacketed) bullets or shot pellets and, in some cases, primers that are free of lead, barium, and other harmful substances. Use of such ammunition, especially on indoor ranges, can greatly reduce the health hazard, and can in some cases also reduce the level of ventilation required to maintain a safe range environment.

**Cleaning Ranges and Bullet Traps should be done only with proper safety equipment and precautions.** Sweeping indoor ranges and cleaning conventional bullet traps raise clouds of toxic dust. It is safer to use a vacuum with HEPA filters, designed and approved for vacuuming lead dust and other dangerous particles. Good ventilation is essential while cleaning indoor ranges, and OSHA-approved face masks/filters or respirators, coveralls and other protective clothing should be worn. Personnel cleaning ranges should wash immediately after leaving the range, and should remove and launder their coveralls and other clothes worn during the cleaning operation.

**Lead Level Testing.** Firearms instructors and other range personnel, especially those working daily on indoor ranges, and others who are regularly exposed to lead and other shooting-related toxins through bullet casting, ammunition reloading, and weapon cleaning, should have their blood lead level checked at least annually, or more frequently if so advised by physicians or environmental health specialists. Those with elevated blood lead levels should receive medical treatment and follow the doctor's recommendations, including instituting rigorous hygiene measures and limiting their exposure to lead.