RULES FOR CERTIFICATION OF RIFLE RANGES

FOR

NRANZ FULLBORE RIFLE SHOOTING

12 September 2006

Amended 6 September 2010

THE NATIONAL RIFLE ASSOCIATION OF NZ

RULES FOR THE CERTIFICATION OF RIFLE RANGES

1 GENERAL

This document sets out the range danger area, range construction details and the certification process approved by the National Rifle Association of New Zealand (NRA of NZ) for rifle ranges to be used for shooting controlled by itself and its affiliated Clubs and Associations.

2 NRA OF NZ RANGE DANGER AREA (RDA)

The NRANZ RDA is based on the Gallery Range (GR) RDA set out in Section 15 of "Handbook of Defence Land Ranges Safety, Volume II, Design, Construction and Maintenance of Small Arms and Infantry Weapon Systems Ranges" being JSP403 Issue 2 produced by the Ministry of Defence (UK). The GR RDA is modified to account for the calculated Cone of Fire (CofF) for NRA of NZ shooting and the maximum muzzle energy allowed under NRA of NZ Rules.

This approach ensures that the NRA of NZ RDA provides at least the same level of safety to range users and those outside the RDA as the JSP403 GR RDA provides for relevant military shooting practices. For the GR RDA the inherent level of risk of a fired projectile leaving the RDA is stated as less than 1 in one million for all shots fired with an acceptable firing error plus as much of an allowance for unacceptable firing error as is practicable. This level of risk has been accepted by the NZ Army for its ranges and is therefore adopted by the NRA of NZ also.

The NRA of NZ RDA is defined as follows:

2.1 FLAT GROUND BEYOND THE TARGETS

The NRA of NZ RDA is shown on Figure 2. The RDA consists of:

- a rectangle with its width equal to the width of the firing points or from centre to centre of the flank targets, whichever is greater, extending from the firing point at the greatest distance from the targets to 1200m beyond the targets
- plus areas to both sides of the rectangle defined by lines from the ends of the firing point at the greatest distance to points 90m outside the centre of the flank targets then to points 200m outside the rectangle at 600m beyond the targets and then parallel to the rectangle to 1200m beyond the targets.

The RDA extends to an altitude 160m above that at the centreline of the highest target over the area of the RDA from the line of the targets to a height of 30m above the centreline of the highest target to the end of the RDA 1200m beyond the targets. This clearance is known as air danger height (ADH) and allows for ricochets that may affect aircraft. It is noted that aircraft are required by law to fly at least 500feet (152m) above the terrain except in special circumstances. Shooting should be stopped at any time it appears an aircraft may cross the RDA at lower altitude than the ADH.

2.2 FALLING GROUND BEYOND THE TARGETS

The RDA on Figure 2 also applies to falling ground. The ADH remains the same.

2.3 RISING GROUND BEYOND THE TARGETS

Figure 2 applies until the ADH is intersected by the ground. The RDA terminates at that point.

3 CONDITIONS

The NRA of NZ RDA only applies when all the following conditions are met:

- NRA of NZ shooting rules are complied with. The RDA is particularly dependent on two rules. These are the requirement to remove bolts from rifles at all times except when the rifle is on the firing point and the prohibition on the bolt being closed except when the rifle is in the shoulder and pointing at the target.
- All shooting is carried out in single shot deliberate practices.
- Target rifles (TR) are limited to a maximum of 4300joules muzzle energy and 1000m/sec muzzle velocity.
- F Class shooting either complies with the limits for TR or is limited to a maximum of 5160joules muzzle energy and 1000m/sec muzzle velocity provided no shooting is carried out forward of 300yards (274m) from the targets.
- TR shooting must be sling supported from the prone position. F Class rifles must be supported by a rest, bipod, pedestal or other acceptable method at the fore-end of the rifle and controlled in position at the butt.
- Calibres do not exceed 8mm. Only ball or match ammunition is used. Tracer is explicitly prohibited.
- The range construction is as set out in the next section.

4 RANGE CONSTRUCTION

4.1 FIRING POINTS

Firing points may be constructed of earth, concrete, timber, etc. No firing point may be within the cone of fire from a further firing point. This provision will be satisfied if they are not within an angle of 4 mils (1mil is the angle subtended by 1unit at 1000units distance and equals approximately 3.44minutes of angle) below the line of sight from the further firing point. The line of sight is a direct line from 300mm above the firing point to the centre of the target in its fully raised position. No fences or steel posts or other metal objects may intrude into the cone of fire from a further firing point.

4.2 OBJECTS IN THE RANGE AREA

During shooting there may not be any objects made of metal, concrete or other materials that could induce ricochets within the cone of fire from any firing point. The cone of fire may be taken as 3mils above to 4mils below the line of sight and 30mils on each side. This requirement will normally affect poles for wind flags, (timber preferred and care with fixing bolts etc. out of the way from any stray shot) structures such as fences around firing points, (which may need to be dropped while shooting is in progress) bridge handrails, etc. Where ricochet inducing surfaces are within the cone of fire they can be protected by earth banks with facing slopes of at least 25º or 375mm thickness of softwood or 250mm thickness of hardwood.

4.3 TARGETS

Targets must be constructed from timber, cardboard, paper or similar materials through which a bullet can easily pass and their frames from timber or other non-metallic material. There must not be any metal or other components that could cause a bullet to be deflected out of the RDA.

4.4 TARGET CARRIERS

The design of target carriers must be such that no metal part can be struck by a bullet just clearing the mantlet. This provision will be achieved if the highest metal is more than 75mm below a line of sight that just clears the top of the mantlet, taken from any firing point. When the carrier is lowered to allow marking of the target the top of the target must be at least 75mm below the line of sight that just clears the mantlet from any firing point. When the targets are fully raised the lower edge must be at least 75mm above the line of sight to the top of the mantlet from the firing point.

Targets must be supported by the carriers on timber legs or by other methods that preclude the use of any metal above the top of the carrier. Fixings must be such that they will not cause ricochets if they are hit by a bullet. The same restriction applies to any scoring device, spotter, etc that is raised above the mantlet.

4.5 MANTLET AND MARKERS' GALLERY

The height of the mantlet above the range floor must be such that the bottom shots within the cone of fire will impact the mantlet and not the range floor. This provision will be satisfied if the base of the mantlet is at least 3mils below the line of sight to the centre of a fully raised target from any firing point at the long ranges (more than 600m) and 4mils below at shorter ranges. This will normally equate to a minimum height of 1800mm for 1000yard (914.4m) ranges and 1300mm at 600yards (548.6m) but these may be reduced for targets held higher above the mantlet top than usual. The minimum height of the mantlet must be visible from every firing point. The mantlet must extend at least 4m past the centre of the flank target at each end.

The mantlet is required as protection for the markers' gallery. If it is constructed of soil there must be at least 1.5m thickness at any point with at least 600mm depth of stone free cover to the front face. The angle of the front face must never be less than 25º to the horizontal and must be maintained above that angle. The top of the mantlet and the cover over the markers' gallery must fall back at a minimum slope of 1 in 12.

Other constructions that will stop a bullet without causing ricochets may also be used but must be sufficiently thick to protect the markers at all times even after repeated impacts at the same point. It is noted that the maximum angles at which there is high level of confidence that 7.62mm ball ammunition will not ricochet off steel is 14º, off earth is 17º and off damp sand is 25º.

The roof over the markers' gallery must protect the markers from rain and splashes from ricochets. A minimum of 1m cover from the back wall of the gallery is recommended. The distance from the back wall of the gallery to the face of the target when lowered for marking should be no less than 2m. The roof should be designed for any loads it may credibly have to support such as livestock, snow etc.

4.6 STOP BUTT

All shots fired within the cone of fire must be stopped by either the mantlet or the stop butt (after passing through the target). It is not necessary to construct a stop butt if there is a natural hill complying with the stop butt requirements behind the targets. Stop butts are normally constructed of soil but may be made of other constructions that provide the same stopping function without inducing ricochets or backsplash of bullets into the markers' gallery.

The stop butt should be at least 25m behind the targets. The line of sight to the top of the stop butt from 300mm above each firing point must be above the centre of a fully raised target by the amount shown in the table for that distance:

Distance	300yds	500yds	600yds	800yds	900yds	1000yds
Height above centre of target	2.0m	2.3m	2.5m	2.6m	2.8m	3.0m

The toe of the stop butt should be low enough to ensure that a bullet that has passed over the mantlet cannot impact the range floor in front of the stop butt. This needs to be calculated depending on the distance from the target line to the stop butt. The calculation is carried out by taking the vertical drop of the bullet from the target line to the stop butt below the line of sight from 300mm above the firing point that just clears the mantlet. Typical maximum drops for 7.62mm beyond the targets are:

Distance fired	300yds	500yds	600yds	800yds	900yds	1000yds
Drop after targets over 30m	0.2m	0.3m	0.4m	0.6m	0.7m	0.8m
Drop after targets over 100m	0.6m	0.8m	1.4m	2.2m	2.7m	3.3m

The stop butt must be wide enough to capture the extremes of the cone of fire and all credible firer errors. This is to be calculated for the longest range to be fired. The end of the full height of the stop butt must be outside a line set at the following angle to the centre of the flank target from the furthest firing point.

Longest firing distance	300yds	500yds	600yds	800yds	900yds	1000yds
Min. distance between flank target centre and end of stop butt	4m	4m	4m	6m	8m	10m

For soil stop butts the face angle must be maintained at more than 25º at all times. The top is to fall to the rear so that rain landing on the top does not run down the front face and there is no ricochet inducing surface created. The minimum thickness of an earth stop butt must be 1.5m at any point with at least 600mm of the front face free of stones larger than 25mm.

4.7 COMMUNICATIONS

An effective means of communication between the firing point and the butts must be available at all times that shooting is taking place.

Appropriate warning signs must be placed strategically so that they are effective in warning the general public to keep clear of the range when it is being fired on.

5 RANGE CERTIFICATION

The NRA will keep a register of rifle ranges that have been inspected and certified as complying with these rules. It will also keep a register of rifle ranges for which it has granted dispensations from these rules.

5.1 CERTIFICATION

To be included in the register a rifle range must be inspected and certified by an NRA Range Inspector approved by the Council of the NRA of NZ.

5.2 APPROVAL OF RANGE INSPECTORS

Before approving NRA Range Inspectors the Council must satisfy itself that each candidate has relevant knowledge and experience. A pass in a recognised Range Inspecting Officers' Course will be taken as proof of that level of knowledge. A Chartered Professional Engineer with professional qualifications in civil engineering will also be considered to have the necessary knowledge. Candidates with the appropriate knowledge can be approved by the Council as NRA Range Inspectors provided it is satisfied that they also have sufficient understanding of NRA shooting procedures and rules.

Approval by the NRA of NZ as a NRA Range Inspector only entitles the individual to inspect and certify ranges used by the NRA of NZ and its affiliated clubs and associations for shooting carried out in accordance with NRA rules. Certification of other types of ranges and use of ranges for other shooting practices will require approvals from other organisations.

5.3 REGISTER OF NRA RANGE INSPECTORS

The NRA of NZ will maintain a register of all individuals approved as NRA Range Inspectors.

5.4 RENEWAL OF CERTIFICATION

Certificates of compliance with these rules are for 5 years after which a further inspection is to be made and certificate issued. After the first inspection has confirmed compliance with these rules, it is expected that subsequent inspections will be purely to ensure there have been no changes which would void the certification and that maintenance has been carried out sufficiently to ensure the range is still compliant.

5.5 DISPENSATIONS

The Council may issue dispensations to all or part of these rules as it sees fit. Such dispensations must be based on evidence that the risk of a bullet leaving the RDA is no greater than would be the case if the range complied with these rules, or that such risks can be safely managed, or that the consequences of such an event are such that no hazard occurs to humans and any other effects are acceptable. In considering dispensations the Council will take into account the safety record of the range and the recommendations of an NRA Range Inspector.

6 REFERENCES

Handbook of Defence Land Ranges Safety, Volume II Design, Construction and Maintenance of Small Arms and Infantry Weapon Systems Ranges; Ministry of Defence (UK) JSP403 Issue 2

IRSAG Discussional Document No 7/98 A Study into Small Arms Range Safety Major Chris Holland, UK

Excerpts from US Army Ricochet Trial Report Army GS7795/7/1 30 Sept 2002

Assessment of Cone of Fire for NRANZ Shooting and Range Danger Area for Seddon Range, Trentham; Tony Loughnan, August 2001 amended November 2001

Summary of Calculations supporting the paper above; Tony Loughnan, June 2002

Hatchers Notebook; Maj. Gen. (US) Julian S Hatcher

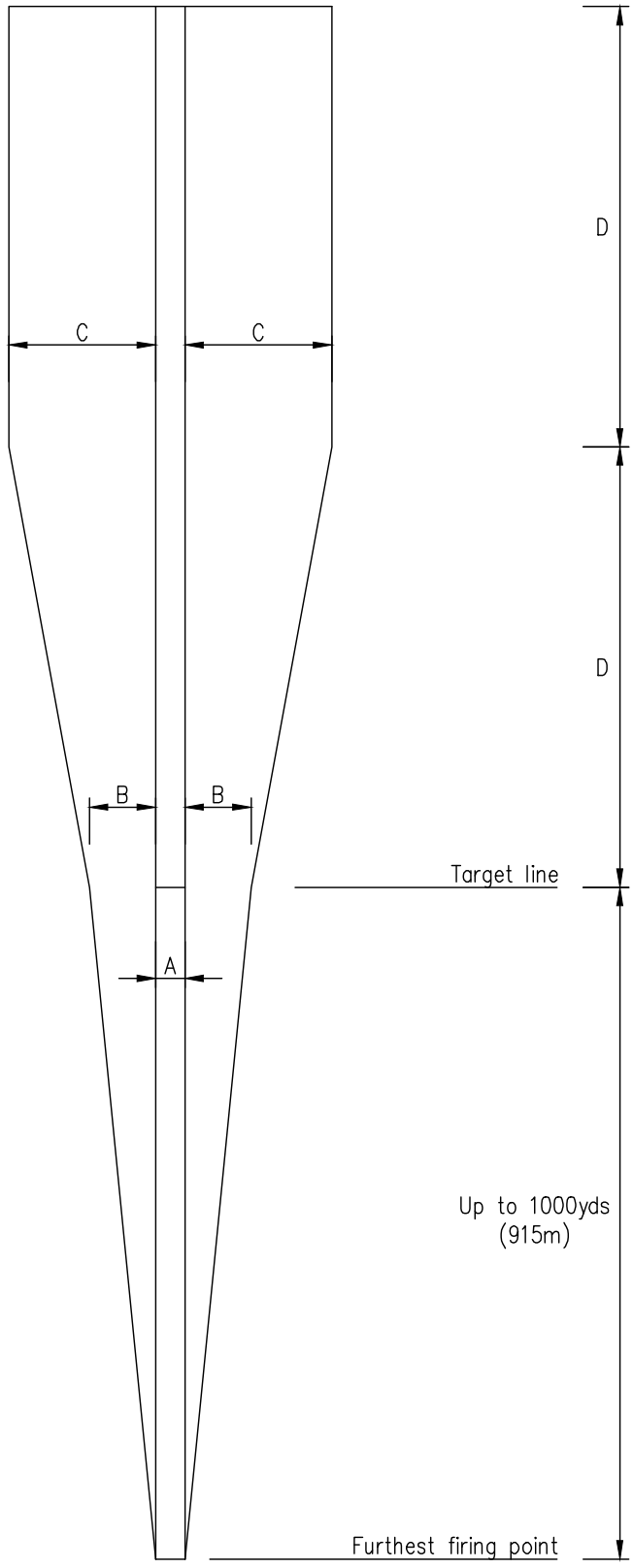
Development of Rules for Certification of Rifle Ranges for National Rifle Association of NZ: Tony Loughnan, September 2006 amended September 2010

7 APPENDIX

Figure 2 – NRANZ Range Danger Area

FIGURE 2.

NRANZ RDA



A = Width of firing points and targets

B = 90m

C = 200m

D = 600m

For cases where no shooting at less than 300yds(274m) and F Class ME no greater than 4130joules:

B = 75m

C = 160m

D = 450m

Scale 1:10000