
NEW ZEALAND CLAY TARGET ASSN INC.



Lead Management Plan For Shooting Ranges

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Introduction

This Plan sets out the practices and procedures for managing the lead resulting for lead projectiles/shot being deposited on the shooting ranges.

Scope

This Lead Management Plan covers the land within all exclusive lease areas for all ranges established within New Zealand for NZCTA shooting clubs.

Objectives

To provide for the continuous, long-term usage and viability of shooting ranges.

To adopt the best practicable option in terms of Section 16(1) of the Resource Management Act to ensure that the impact of depositing lead projectiles/shot within the exclusive lease areas do not exceed a reasonable, but undefined, level.

To avoid, remedy or mitigate any adverse effects on the surrounding environment as a result of the deposit of lead projectiles/shot arising from the shooting clubs normal activities.

Legislative and policy context

There does not appear to be any legislation in New Zealand that specifically sets maximum concentrations for lead on shooting ranges. However, there are a number of New Zealand legislative and policy provisions which govern the proposed use of the land as well as overseas guideline documents which are discussed in the following sections.

Resource Management Act

Section 15.1b (Discharge of contaminants into environment) states:

1) *No person may discharge any—*

(a) *contaminant or water into water; or*

(b) *contaminant onto or into land in circumstances which may result in that contaminant (or any other contaminant emanating as a result of natural processes from that contaminant) entering water; or*

(c) *contaminant from any industrial or trade premises into air; or*

(d) *contaminant from any industrial or trade premises onto or into land—*

unless the discharge is expressly allowed by a national environmental standard or other regulations, a rule in a regional plan as well as a rule in a proposed regional plan for the same region (if there is one), or a resource consent.

And Section 2 (Interpretation) of the RMA defines “contaminant” as:

Contaminant includes any substance (including gas, odorous compounds, liquids, solids, and micro-organisms) or energy (excluding noise) or heat, that either by itself or in combination with the same, similar, or other substances, energy, or heat -

(a) *When discharged into water, changes or is likely to change the physical, chemical, or biological condition of water; or*

(b) *When discharged on to or into land or into air, changes or is likely to change the physical, chemical, or biological condition of the land or air on to or into which it is discharged.*

Therefore, in terms of the RMA, contamination means:

a) if there is an applicable national environmental standard on contaminants in soil, the land is more contaminated than the standard allows; or

b) if there is no applicable national environmental standard on contaminants in soil, the land has a hazardous substance in or on it that

(i) has significant adverse effects on the environment; or

(ii) is reasonably likely to have significant adverse effects on the environment

The depositing of lead shot and lead projectiles onto land does not in itself constitute “contamination”, although contamination could occur if the substances escape from safe storage.

Regional Environment - Regional Water and Land Plans

The purpose of Regional Water and Land Plans is to promote the sustainable and integrated management of land and water resources within the region. To achieve this, the Regional Water and Land Plan has policies and methods (which include rules) to address issues of use, development and protection of land resources, geothermal resources and freshwater resources, including the beds and margins of water bodies.

The Regional Water and Land Plan do not generally have any specific control measures or rules relating to activities on shooting ranges.

Ministry For the environment

The Ministry for the Environment has developed a series of contaminated land management guidelines in partnership with regional councils and unitary authorities.

These guidelines include a Hazardous Activities and Industries List (HAIL) is a compilation of activities and industries that are considered likely to cause land contamination resulting from hazardous substance use, storage or disposal. The HAIL is intended to identify most situations in New Zealand where hazardous substances could cause, and in many cases have caused, land contamination.

Item 25 on the HAIL list is: Gun, pistol or rifle ranges or areas with lead shot deposition.

The fact that an activity or industry appears on the list does not mean that hazardous substances were used or stored on all sites occupied by that activity or industry, nor that a site of this sort will have hazardous substances present in the land. The list merely indicates that such activities and industries are more likely to use or store hazardous substances and therefore there is a greater probability of site contamination occurring than other uses or activities.

Overseas Guidelines

Given that there are no definitive standards, the following guideline documents have been used in the formulating this Lead Management Plan:

- US Army Corps of Engineering (USACE), Chemical Stabilisation of Lead on Small Arms Firing Range Soils, September 2003.
- US Environmental Protection Agency (USEPA), Best Management Practices for Lead at Outdoor Shooting Ranges, EPA-902-B-01-001, June 2005.

Food Safety & Animal Welfare Code of Practice for Clay Target Shooting Ranges

The New Zealand Clay Target Association has adopted a Food Safety & Animal Welfare Code of Practice for Clay Target Shooting Ranges. This has been endorsed by the following:

- Ministry of Primary Industries
- Dairy NZ
- Beef + lamb
- Fonterra
- Meat Industry Assn

- Federated Farmers
- NZ Vets Assn
- Dairy Co Assn

This document should be read in conjunction with this Lead Management Plan and is available on the NZCTA web site.

Control Measures

Solid projectiles and shotgun pellets require different containment and management techniques due to the differing shooting techniques involved.

The following sections detail the different control measures required for each discipline.

Rifle and pistol Ranges

Static-target based disciplines (Pistol/Rifle) result in the lead projectiles being deposited at the backstop behind the target line(s). The lead management techniques used are physical (bullet traps, prevention of “float-off” in rainwater) and chemical (soil amendment), which are well-tried and proven.

Target Backstop Lead Traps

Static target line backstops will be fitted with sand/sawdust-filled bullet traps (See Figure 1). These will require periodic refurbishment to maintain back-stop integrity, which will provide the opportunity to remove the accumulated Lead for refining & re-casting or disposal as scrap metal.

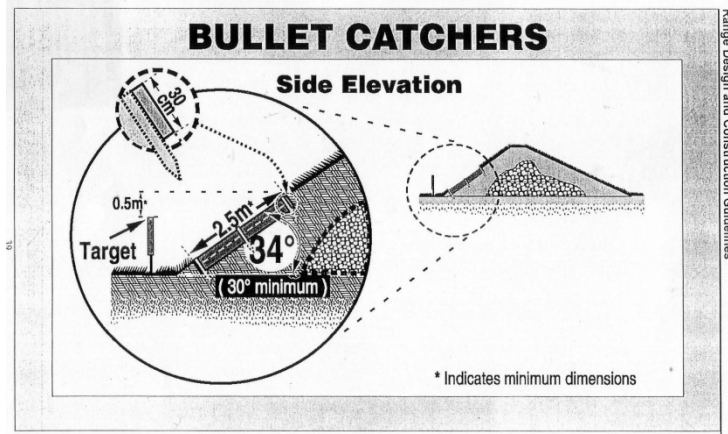


Figure 1

Soil pH Control & Amendment

Appropriate range projectile impact areas should be limed to increase soil pH to 5.5 to 7.5. This will require approximately 3 to 6 kg of Lime per 10 m², depending on soil acidity. (See Table 1 and Figure 2). This should be done on an as-required basis but probably biennially.

Table 1 – Calculating Weight of Lime (kg/m ²) to Increase Soil pH Level									
		Current pH							
		4.0	4.3	4.5	4.8	5.0	5.5	6.0	6.5
Desired pH	5.0-6.0	0.7	0.5	0	0.2	0.1			
	6.5-8.5				1.0	0.8	0.5	0.5	

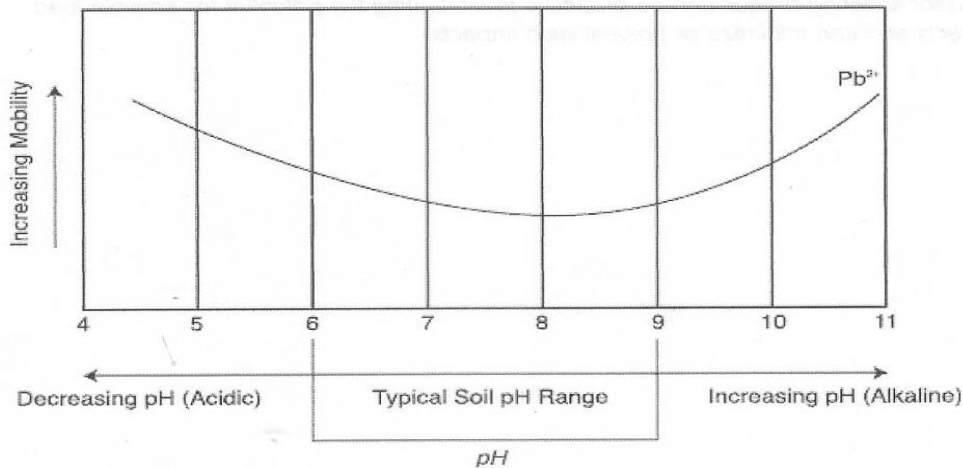


Figure 2 Generalised Relationship of Lead Mobility Vs Soil pH

Likewise these areas should also be amended with phosphate material or bonemeal not “blood and bone” as this introduces organic matter, which interferes with the Lead sequestration). The recommended dose rate is 7 to 9 kg per 100 m² (Source, USACE “BMP for Lead on Outdoor Shooting Ranges”, Sept. 2003). This immobilises Lead as hydroxypyromorphites (Pb₁₀(PO₄)₆(OH)₂) which are virtually insoluble (See Table 2). Soil amendment will follow a biennial to quintennial cycle.

Table 2 Solubility Products of Selected Pb Minerals		
Mineral	Formula	Log K _{sp} ¹
Lead chloride	PbCl ₂	-4.8
Anglesite	PbSO ₄	-7.8
Cerussite	PbCO ₃	-12.8
Pyromorphite	Pb ₅ (PO ₄) ₃ Cl	-84.4
Hydroxypyromorphite	Pb ₅ (PO ₄) ₃ OH	-76.8
Fluoropyromorphite	Pb ₅ (PO ₄) ₃ F	-71.6
Bromopyromorphite	Pb ₅ (PO ₄) ₃ Br	-78.1
Cerckite	PbFe ₃ (PO ₄)(SO ₄)(OH) ₅	-112.6
Hinsdaleite	PbAl ₂ (PO ₄)(SO ₄)(OH) ₅	-99.1
Plumbogummite	PbAl ₂ (PO ₄)(OH) ₅ ·H ₂ O	-99.3

¹ Log of the solubility product at 25° C. Cited in Traina and Lapereche (1999).

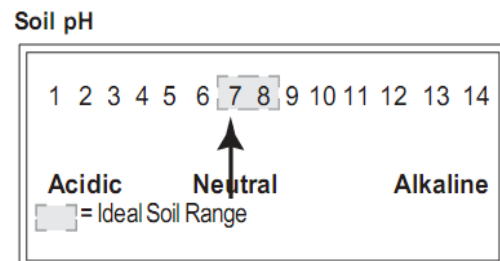


Figure 2-1 – pH scale

Soil acidity is measured as pH on a scale (illustrated as Figure 2-1) between 1 (most acidic) and 14 (most alkaline, or basic), where 7 is termed neutral. Ideal soil pH for shooting ranges is 6.5 to 8.5.¹

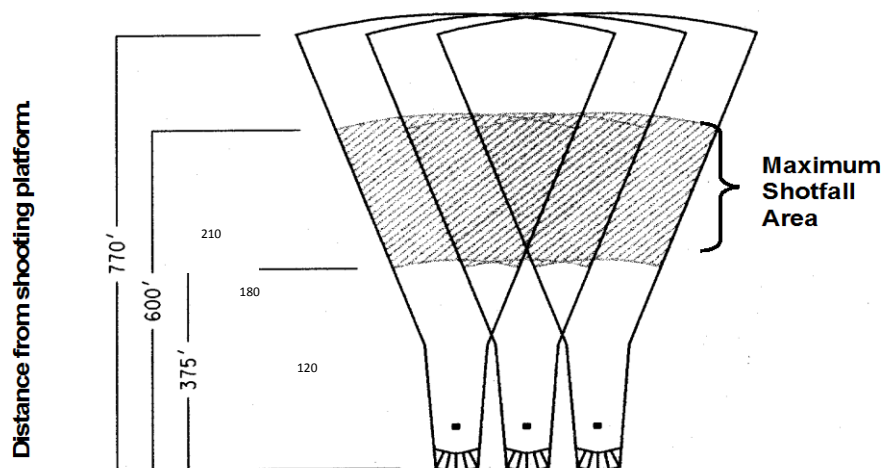
¹ National Shooting Sports Foundation, “Environmental Aspects of Construction and Management of Outdoor Shooting Ranges,” June 1997.

Surface Water Runoff

Run-off flow-ways will be identified at the time of range surveying. Noted run-off flow-ways around target lines & back-stops will be bunded and wired to minimise “float-off” & transport of Lead away from the impact zone. Lead should be removed from the associated settlement sumps periodically as required.

Shotgun Ranges

Clay target shooting involves a shot pattern of small lead pellets being fired at a moving target, thus dispersing particulate lead and fragments widely down-range, but without much penetrative force. The residual Lead is thus on the surface, mainly located at 120 -180 M from the point of discharge, with a maximum distance around 200 – 210 M. Discharge dust and target-impact fragments accumulate around 45 – 60 M, within the open area of the field. (See Figure 3). The tried and proven methods used to contain and immobilise the lead are rain-water run-off management and chemical amendment of the shot-fall area soil.



Lead Shot Collection

Where flat grassed areas of Shotgun Shooting Ranges are mowed, mowings should be composted in a controlled area, limed & phosphated to immobilise the Lead “pick-up”.

Soil pH Control & Amendment

The discharge and shotfall areas should be limed to increase soil pH to 5.5 to 7.5. This will require approximately 3 to 6 kg of Lime per 10 m², depending on soil acidity. (See Table 1 and Figure 2). This should be done on an as-required basis but probably biennially.

Likewise these areas should also be amended with phosphate material or bonemeal (not “blood and bone” as this introduces organic matter, which interferes with the Lead sequestration). The recommended dose rate is 7 to 9 kg per 100 m² (Source, USACE “BMP for Lead on Outdoor Shooting Ranges”, Sept. 2003). This immobilises Lead as hydroxypyromorphites (Pb₁₀(PO₄)₆(OH)₂) which are virtually insoluble (See Table 2). Soil amendment will follow a biennial to quintennial cycle.

The reference documents cited suggest it may be necessary to remove surface Lead on a decadal basis, although this is a costly exercise if no untoward leachage is observed.

Surface Water Runoff

All run-off flow-ways identified after levelling earthworks should be bundled and wired to minimise “float-off” & transport of Lead away from the shotfall zone. Lead should be removed from the associated settlement sumps periodically as required.

Monitoring and Review

Monitoring

Each Club's Safety Officer will monitor compliance with the Lead Management Plan as part of his responsibilities and report to the Club's Committee, who will advise Council as necessary

Review

As a result of any issues arising from monitoring, the Lead Management Plan may be reviewed and updated as necessary by respective Club representatives and a copy of the current lead management plan shall be provided to the Council's Senior Monitoring Officer. Further monitoring will take place if requested by Western Bay of Plenty District Council.