

CHAPTER 30

CONTROL OF HAZARDOUS SUBSTANCES IN INDOOR RANGES

INTRODUCTION

GENERAL

3001. **Aim.** This Chapter lays down the MOD requirements to ensure that exposure to emissions from service weapons in indoor ranges and ranges with enclosed or semi enclosed firing points do not generate a hazard to those who enter. In particular it sets out the control measures to be taken to protect those who enter such ranges and covers:

INTRODUCTION

(1)	General	3001 - 3002
(2)	Hazards	3003 - 3006
(3)	UK Regulations	3007 – 3009
(4)	Assessment	3010 – 3016
(5)	Responsibilities	3017

RANGE DESIGN

(1)	Design	3020 - 3024
(2)	Air Extraction	3025 - 3026

INSPECTION, CLEANING, HYGIENE, RECORDS AND SIGNS

(1)	Inspection	3027- 3029
(2)	Range Cleaning	3030 - 3035
(3)	Health & Hygiene	3036 - 3039
(4)	Record Keeping	3040
(5)	Safety Signs	3041

3002. **Environmental Health Hazards Covered.** Not all emissions from weapons are of sufficient quantity to present a measurable hazard. The following emissions from service weapons and resultant dust have been identified as potentially hazardous in some circumstances:

- a. Lead.
- b. Unburnt Propellant.
- c. Accumulated Dust
- d. Carbon Monoxide.

HAZARDS

3003. **Lead.** Inhalation and ingestion of lead can be hazardous to health. When a weapon is fired, the hot gases produced by the propellant burns the lead from the base of the bullet, producing lead fume. Lead particles are also stripped from unjacketed bullets as they travel down the barrel and are subsequently released into the air around the firer. In addition lead dust is produced when the bullet impacts sand or steel bullet catchers at the end of

the range. Lead will also be present in any dust filtered by any extraction system fitted. All personnel in an indoor range are exposed to the lead hazard produced by firing. In a clean range the degree of exposure is generally very low dependent upon the number and nature of rounds fired and mitigated by the effectiveness of any ventilation provided. Personnel such as RCOs, supervisors and coaches are likely to be exposed for longer periods than the firers. Inspection, cleaning and maintenance staff will be exposed to residual dust in the range as a result of their activities. Movement forward of the firing point should be kept to a minimum as this is where some lead dust will settle. Provided that appropriate dust filters have been correctly installed and maintained within the extract ventilation system there should be no risk of exposure, externally, from the exhausted air extracted from heavily used ranges.

a. **Low Use .22" Ranges.** Low use is defined as 2 or 3 sessions per week and an average total of up to 500 rounds(.22") per week, 26,000 rounds per year. In exceptional circumstances such as an unexpected shortage of RCOs or coaches during a busy cadet training weekend or camp this limit may be extended to 1000 rounds per week provided the individual is not exposed to more than 2000 rounds per month.

b. **Full Time Use (All ammunition) Ranges.** Full time use is defined as those ranges such as MDP and Test & Evaluation ranges that are expected to be used on a daily basis or Cadet Ranges firing over 26,000 .22" rounds per year.

3004. **Unburnt Propellant.** Unburnt propellant is also released into the range when a SA is fired. It not only produces a hazard in its own right but also adds to the problem of controlling lead pollution. Long barrelled weapons with a good breech seal (obturation) may eject less than 2% unburnt propellant but some pistols can eject more than 7%. Most unburnt propellant falls in the area of the firing point and immediately in front of the firers but some will be distributed down range and may be collected in the dust filters. If unburnt propellant is allowed to accumulate in the range, particularly out of sight behind wall cladding or fixtures, it could become a significant hazard. There is currently no simple means of measuring levels of unburnt propellant. However, it can be assumed that it will always be present in dust, whether visible or hidden, in the range if that range has been used during the period.

3005. **Accumulated Dust.** Any dust allowed to accumulate in a range is likely to contain both lead and unburnt propellant. If made airborne either by movement of air or the shockwave created by the blast from the muzzle, it can become an inhalation hazard. Firers in the prone position and personnel inspecting, cleaning or maintaining the range are most at risk from this hazard. When dust is collected, such as in a vacuum cleaner bag, or if permitted to accumulate, it may also become an explosive hazard.

3006. **Carbon Monoxide.** Carbon Monoxide (CO) is released into the air each time a weapon is discharged. The amount of CO expelled is dependent upon the ammunition cartridge used. These gasses are light and will disperse in the direction of any air flow. This hazard need only be considered in ranges that have no mechanical or natural ventilation, all ranges with small enclosed firing points and ranges with particularly high volumes of fire from inside a closed or semi-enclosed firing point.

UK REGULATIONS

3007. Control of Lead at Work (CLAW) Regulations. The following terms have been extracted with a summary from the CLAW Regulations and Approved Code of Practice. For a full explanation refer to the CLAW Regulations.

Ser	Term	Summary
1	Action level	Blood-lead concentration of: <ul style="list-style-type: none"> women of reproductive capacity 25µg/dl young person 40µg/dl others 50µg/dl
2	Biological monitoring	Includes measuring of a person's blood-lead concentration.
3	Control measure	Measures taken to reduce exposure to lead such as systems of work, cleaning, engineering controls and the provision and use of PPE.
4	OEL limit Reg.2	Occupational Exposure Limit for lead - 0.15mg/m ³
5	Risk assessment Reg.5	Identify those who may be exposed to significant levels of lead in air and apply standard Risk Assessment principles. [Identify hazards, eliminate those that may be eliminated, prioritise the remainder and apply control measures to reduce as far as possible the residual hazards.]
6	Significant exposure Reg.2	Where an employee is or is likely <ul style="list-style-type: none"> to be exposed to ½ OEL ie 0.075mg/m³ to ingest lead. to be exposed to lead alkyls.
7	Young person Reg.2	Has not attained the age of 18
8	Intermittent exposure Reg.5	Exposure to lead compounds for only a few hours over a 40hr week but that exposure may exceed ½ OEL over an 8 hr period. if <ul style="list-style-type: none"> exposure level is below OEL when averaged over 8hrs is below ½ OEL when averaged over 40hrs no substantial risk from surface or skin contamination.
9	Control measures Reg.6	<ul style="list-style-type: none"> ventilation - sufficient general ventilation reduce exposure to minimum regular cleaning - wet methods prohibiting eating and drinking provide washing facilities
10	Air monitoring Reg.9	<ul style="list-style-type: none"> Required where the employer assesses that employees may be exposed to significant levels of lead in air. Maximum period between monitoring is 12months.

11	Monitoring records Reg.9(5)	Kept for min 5yrs.
12	Medical surveillance	For those likely to be or are exposed to significant (Serial 6) levels of lead in air and all other control measures to avoid this situation are exhausted, those individuals are to be placed under Medical Surveillance. HSE require such monitoring to be coordinated through the Employment Medical Advisory Service (EMAS). In such cases refer to the respective Service Environmental Health Authority for advice.

3008. **Carbon Monoxide (CO).** The UK Regulations relating to the control of exposure to CO are contained in the Control of Substances Hazardous to Health (COSHH) Regulations. The Regulations state that control of exposure will only be treated as adequate if the principles of good practice are applied and the workplace exposure limit is not exceeded. The Army Medical Directorate Environmental Health Monitoring Team (AMD EHMT) are able to provide advice and support in this area. Below are the long and short term, Time Weighted Average (TWA), CO workplace exposure limits published in the Health & safety Executive's document EH40/2005.

Workplace Exposure Limit (WEL)			
Long term exposure limit (8hr TWA referenced period)		Short term exposure limit (15min reference period)	
ppm	mg.m ⁻³	ppm	mg.m ⁻³
30	35	200	232

3009. **Category of User.** There are several categories of range user to be considered under the CLAW regulations.

- a. Military Trainees.
 - (1) Full time operational training. (MDP, SF etc)
 - (2) Cadets, intermittent or regular use.
 - (3) Cadets, dual use ranges.
 - (4) Minors (under 18) and women of childbearing capacity.
- b. Controlled Personnel.
 - (1) Full time trials and development staff (Military and civilian).
 - (2) RCOs and Safety supervisors.
 - (3) Range Inspectors.
 - (4) Cleaners / Contractors.

ASSESSMENT

3010. Range Administering Unit (RAU) Responsibilities. RAUs are to assess each of the indoor ranges in their area of responsibility to determine the level of exposure to lead in air and CO as set out in paragraphs 3008 & 3011. Where ranges or test facilities are used full time or cadet ranges exceeding 26,000 rounds per year they are to undertake full lead in air monitoring to establish the OEL for that particular range and for each particular use. Some test ranges for instance are used also by others such as MDP. These ranges are to be monitored for each type of use. If a range is used by more than one group of users, each type of user shall be assessed.

3011. Factors Included in the Assessment. The lead and CO exposure assessment should take into account the nature of all activities taking place in the range including dry training, inspecting, maintaining, monitoring and cleaning, as well as all shooting practices. The assessment should consider both users and visitors. Personnel such as RCOs, supervisors and coaches, who are employed routinely in the range are potentially at the greatest risk as they may be in the range for extended periods whether or not firing is taking place. Cleaners, works officers and inspectors are likely to be exposed to higher levels of lead for shorter periods.

AIR MONITORING

3012. Requirement. Full lead in air monitoring is to be carried out in accordance with current CLAW Regulations where the risk assessment indicates that anyone using the range is liable to receive significant exposure to lead and in the following circumstances:

- a. When a new or a refurbished full time use indoor firing range is commissioned.
- b. An existing indoor range has a change of use that may expose users to significant levels of lead or cadet ranges that has more than 26,000 rounds fired in it each year.

3013. Air Monitoring. Air monitoring may be carried out by the Service Environmental Health Monitoring Team (EHMT) staff or a specialist contractor. For CO it is a direct measurement undertaken in the range. For lead, air filters are placed on the firers and at several points down range during peak maximum capacity firing in the range. The amount of lead collected by these filters is then measured to determine the lead in air levels for that range.

3014. Recording Results. All monitoring must be recorded in the MOD Form 906. A certificate giving the results should be provided and displayed following each measurement of lead in air from air monitoring stating the conditions, if any, under which the range may operate.

3015. Significant Levels of Lead in Air. If following lead in air assessment of a range indicates that exposure to lead is significant, ie greater than 0.075mg/m^3 , then TAS (RE) should be consulted to determine the way forward. Where an assessment finds that there is a significant level of lead at the target end of a range personnel who maintain and inspect the bullet trap shall if not already doing so, undergo medical surveillance.

3016. **Significant Levels of CO.** In ranges where there is little or no air flow, particularly in smaller firing rooms, it will be necessary to improve the ventilation arrangements if personal CO exposures exceed the WEL.

RESPONSIBILITIES

3017. **RAU.** The RAU is responsible for ensuring that anybody using or working in its indoor range is not put at unacceptable risk from hazards listed above. They are to ensure the following:

a. **Works.** Where ranges with ventilation systems depend on the system's efficiency to meet CLAW Regulations, the systems are to be subject to annual inspection, thorough examination and test by a competent person. This is required to determine the suitability of the system and future inspection and/or maintenance. Works officers are to ensure that deep cleaning by contract is properly completed in accordance with paragraph 3032b. TAS(RE) is to be consulted by Project Sponsors, Property Managers and RF&C Works Officers when indoor ranges are to be constructed or modified.

b. **Information and Training.** Directors, Heads of Establishments and COs are responsible for ensuring that adequate information and training on the precautions to be observed are given to all personnel under their control who operate, use, maintain or clean indoor ranges on the risks from lead and unburnt propellant. Local Health & Safety officers can provide information and training on the correct use and disposal of PPE. Fire Officers should be consulted where units collect and store dust from ranges that have been used for live firing that will contain small amounts of unburnt propellant.

c. **Range Usage.** The CLAW Regulations require that the number of persons exposed should be reduced to a minimum. An indoor range should therefore not be used for any purpose other than weapon training or evaluation. Where it is absolutely necessary for a range to be used for other purposes, the RAU must ensure that it is free of surface dust prior to use.

3018 – 3019 Spare

RANGE DESIGN

DESIGN

3020. **Design Concept.** The design of indoor ranges must address each of the hazards listed in this chapter as far as is reasonably practicable. The aim of the design should be to provide sufficient fresh air into the range to ensure that lead particles generated on the firing point(s) are taken clear of the breathing zone. It will not be possible to take all lead dust out of the range as most will settle out between the firing point and bullet catcher. The range envelope should be designed in such a way to minimise air turbulence and have surfaces that are easily cleaned.

3021. **Design Solution.** Each range will have different problems to address. Clearly the ideal solution is to remove contaminants at source with local exhaust ventilation. Where this might be possible in test ranges with fixed firing benches it will not be possible for variable firing positions on several firing points. A combination of local control (directed airflow) and dilution should be achievable in most circumstances.

3022. Air Flow Within the Range. The ideal air flow is a laminar flow pulled down range with an extraction system rated 10% greater than the inlet producing a negative pressure down range. The optimum design to deliver steady air flows across a single firing point is to bring air into the range through a full cross sectional grill. This is clearly an expensive proposition as such volumes of air will need to be heated. An alternative solution is to provide positional grills behind the firers. Where firing takes place from prone, kneeling and standing positions directional vents may provide the solution. All solutions should ensure there are no "dead zones" or excessive turbulence generated within the range.

3023. Air Speed. During trials it was observed that the greater the air speed over the firers the more turbulence in front of the firers breathing zone. Optimum air speeds to minimise such turbulence recorded were 0.15 - 0.2m/s. Air speeds of 0.1m/s or less will not provide sufficient fresh air in the range. Air speeds in excess of 0.3m/s may need to be heated. In ranges with more than one firing point it may be necessary to increase the air flow at the rear of the range to ensure adequate air flow over the firing points down range. Complex solutions involving intermediate air intakes should only be considered in ranges that are heavily used on a daily basis. In low use ranges where there is a simple fan input (single or multiple) and simple extract fan (single or multiple) it is sufficient to ensure the fan is inputting air at the firing point and extracting air at the target end. A wet hand or strand of cotton is all that is required to check this. With these simple fans efficiency is not such an issue. Where there is air handling plant, ductwork and filters the inspection of the air handling system should be undertaken by competent mechanical engineers in accordance with the manufactures recommendations.

3024. Air Changes. Domestic and office designs often revolve around the number of air changes per hour to establish comfortable conditions. In ranges the issues are local air flow and dilution. Air changes can of course be likened to dilution but it will not ensure local airflow over the firing points has been achieved. It is expected that for most ranges air change rates of between 6 - 10 changes/hr will deliver adequate dilution.

AIR EXTRACTION

3025. Extraction System. The air extraction system should provide an air extraction rate that is at least 10% greater than the air input to assist in pulling a laminar air flow down range. The extractor unit(s) will need to handle dust and unburnt propellant safely. Access for maintenance and inspection is essential. Air systems are to be switched on 20 minutes before use of the range and left on 30 minutes after use to ensure the systems are running to optimum capacity and that any residual dust is removed from the system after firing ceases.

3026. Extract Filter. The extract filter system where fitted must be suitable to hold unburned propellant safely. Replacement instructions must be clearly displayed warning of the hazards presented by filters containing lead dust and unburned propellant. Refer also to Building Regulations Part F for location of the extract.

INSPECTION, CLEANING, HYGIENE, RECORDS AND SIGNS

INSPECTION

3027. Inspection of Ranges Used for Firing. Between the annual and independent inspections the RAU is to ensure the following conditions are maintained:

- a. The cleaning regime is effective. The cleaning regime must ensure there is no accumulation of dust in the range. Any visible dust will contain both lead and unburnt propellant.
- b. There are no areas to harbour dust. Equipment, material, apertures or areas in the structure where dust may gather out of sight are to be avoided.
- c. The bullet catcher is maintained to ensure backsplash will not result from attrition of the trap, a build up of bullets or bullets captured in the anti backsplash curtain where fitted. Cleaning the bullet trap including any anti backsplash curtain is to be undertaken only by competent personnel or specialist contractors.
- d. The ventilation system, when fitted, works correctly and filters (where fitted) are checked and maintained at the intervals recommended by the manufacture by contractors appointed by the local works officers.
- e. Any change in use of the range or any increase in the amount of dust generated the RAU is to initiate a further risk assessment to determine if this results in a change in the level of lead exposure.

3028. Dust. The level of dust in the range is a matter of observation. Any dust generated from the firing of weapons must be considered a hazard from lead and unburnt propellant. Where this dust is gathered such as in a vacuum cleaner bag or permitted to accumulate, it becomes an explosive hazard. Only authorised spark free vacuum cleaners are to be used. Refer to TAS(RE) for details.

3029. Confined Spaces. Inspectors may need to work in tubes and behind anti-splash curtains to complete their inspection. In such cases inspectors should refer to the local Authorised Person (AP) Confined Spaces. The risk assessment will also determine what Personal Protection Equipment (PPE) will be necessary. Local RAU shall ensure works inspections ensure all potential confined spaces are identified by an AP.

RANGE CLEANING

3030. Scope. Maintaining a clean range is the single most effective way to ensure that the risk of exposure to both lead and unburnt propellant are minimised. This section refers to all types of indoor ranges including tube, test ranges and ranges with enclosed or semi enclosed firing points. Ranges where dust from live firing is allowed to accumulate in the working areas, firing point and on surfaces down range due to inadequate cleaning, will potentially expose users to significant levels of lead in air and an explosive hazard. Local works inspections shall undertake the necessary assessment to ensure Dangerous Substances & Explosive Atmospheres Regulations (DSEAR) requirements are met.

3031. Frequency of Cleaning. The frequency of cleaning will be dependent on works inspectors risk assessment and how the range is used. Ranges used only one or two evenings a week may need only a weekly clean. Ranges used more frequently and where more rounds are fired may need cleaning after each use. The aim is to ensure there is no build up of dust in the range working areas and this is a matter of observation. Factors that will influence the frequency of cleaning necessary to keep the work areas of the range free of visible dust include:

- a. The type of SA ammunition fired, e.g. centrefire pistols firing unjacketed ammunition will create a need for more frequent cleaning than rimfire rifle. Pistols eject a considerable amount of unburnt propellant and unjacketed ammunition will create more lead dust than jacketed.
- b. The frequency of use and number of rounds fired.
- c. The efficiency of ventilation and extraction.
- d. The porosity of surfaces down range.

3032. Cleaning Methods. So as neither to create a risk from lead and unburnt propellant to cleaning staff or other personnel nor to spread contamination, cleaning the range ceiling, floor and walls, and adjoining rooms is to be by damp sweeping or, preferably, by a vacuum cleaner approved specifically for indoor ranges and used in accordance with the manufacturer's instructions. Dry sweeping and dusting is strictly forbidden.

a. **Routine Cleaning.** Cleaning the range between deep cleans should only be undertaken by staff with adequate PPE and who have received sufficient training on the hazards in the range and use of the PPE. It is essential to ensure the firing point and the area behind and directly in front of the firing point is kept clean and free of visible surface dust. Where it is necessary for firers to move forward to targets, the range floor is also to be kept free of dust. Routine cleaning should not include confined spaces or restricted areas such as that between steel plate and anti splash curtains. Where there are small tubes (<600mm diameter) routine cleaning should extend as far as possible into the tube with wet wipe without entering the tube. Routine cleaning should include wet wipe of all exposed surfaces to remove any dust and removal of any lead or debris build up in the trap area. Authorised vacuum cleaners (see paragraph 3028) may be used for the range floor and dependant upon type, vertical surfaces in the range. All dust collected in authorised vacuum cleaners is to be disposed of as a hazardous waste. Cadets must not undertake any cleaning in the range where lead dust may be present. Routine cleaning should not include confined spaces or restricted areas such as that between the steel plate and anti splash curtain except in the following circumstances:

- (1) Where permanent staff ensure there is no build up of dust in the range and trap area by cleaning all surfaces after each shoot or regularly enough to ensure no accumulation of dust on any surfaces.
- (2) Where during the monthly inspections a build up of lead is identified as generating a potential backslash or ricochet hazard or preventing the anti splash curtains from hanging freely.

b. **Deep Cleaning.** Deep cleaning must be undertaken by specialist contractors. An example of a deep cleaning contract for ranges is provided at ANNEX A to chapter 30. Deep cleaning involves removing all residual dust from the structure including roof spaces, tubes; target and bullet trap area including any anti backsplash curtains. It is sensible to de-lead and maintain bullet traps just before a deep clean as this process can generate considerable dust. A deep clean is necessary periodically dependent upon range use. As a guide for .22" ammunition:

Total number of rounds fired irrespective of number of lanes:	Frequency of Deep Clean
0-5000 rounds	Every 2yrs
5000 -10,000 rounds	Annually
10,000+	Every 6mths

3033. **Dual Use Facilities.** RAUs with dual use facilities must ensure that prior to the alternate use of the room following use as a range, the surfaces are free of lead dust and unburnt propellant.

3034. **Personnel Involved in Cleaning.** Only competent personnel provided with PPE and adequate training on the hazards involved and the use of the PPE should carry out cleaning in an indoor firing range. At no stage should those cleaning ranges enter small tubes (<900mm dia.) unless they are specialist contractors. Minors and women of childbearing capability must not be involved in the cleaning of ranges.

3035. **Waste Disposal.**

a. **General.** Waste generated from routine cleaning in low use (see paragraph 3003a) .22" and air weapon ranges need not be treated as hazardous waste. Any waste from a high use indoor range which may be contaminated with lead and unburnt propellant is subjected to disposal in accordance with the Hazardous Waste (England & Wales)_Regulations 2005. Details are also provided in JSP 418. It is not to be dumped or disposed of as ordinary waste but stored in sealed containers for proper disposal. This includes:

- (1) Water and other fluids from a bullet catcher.
- (2) Sand from stop butts and bullet catchers.
- (3) Vacuum cleaner waste bag contents and used filters.
- (4) Ventilation filters.

b. **Authorised Vacuum Cleaners.** Vacuum cleaners are to be emptied each time after use to avoid build up of potentially explosive dust. Emptying vacuum cleaners should be conducted with extreme care to avoid dust exposure to the individual and contamination of the surrounding area.

c. **Storage.** The waste from ranges should be removed from the range or stored dry in sealed containers and placed in a secure area. Normal HAZMAT labelling should be used in accordance with Chemicals Hazard Information and Packaging for Supply Regulations 2002. Divisional Fire Officers will advise on the limits that may be stored dependent on the storage facility.

d. **Disposal.** The Hazardous Waste (England and Wales) Regulations 2005 require sites producing hazardous waste to register annually with the Environment Agency. The regulations, together with the List of Wastes (England) Regulations 2005, stipulate how hazardous wastes should be classified and tracked during movement. Transportation of hazardous waste must be undertaken by a registered carrier in accordance with the Controlled Waste (Registration of Carriers and Seizure of Vehicles) Regulations 1998 to a licensed hazardous waste treatment or disposal facility.

HEALTH & HYGIENE

3036. **Washing.** Hand washing facilities are to be conveniently available as all who use the range will come into contact with dust and range orders are to stipulate that hands are to be washed on leaving the range.

3037. **Eating, Drinking and Smoking.** Eating, gum chewing, drinking and smoking are forbidden in an indoor training range. All personnel are to be instructed that on leaving an indoor training range not to eat drink or smoke until they have washed their hands. Permanent staff rest room facilities may be provided separated from the range.

3038. **Personal Protective Equipment.** PPE, which is normally disposable coveralls, gloves and dust masks, may be required for routine cleaning but must be worn for working, inspecting, maintaining and cleaning in or around, bullet catchers that have accumulated lead dust. Re usable PPE has to be maintained properly and facilities for its storage are to be provided in accordance with PPE Regulations. Where disposable PPE is used, it should be bagged after use and sealed for disposal by authorised contractors.

3039. **Additional Measures for Minors.** The CLAW Regulations require RAUs to ensure minors and women of childbearing capacity receive particular care, supervision and training when exposed to lead in air at any level. This is only pertinent for those exposed to significant levels of lead in air and require medical surveillance.

KEEPING OF RECORDS

3040. Records

- a. **General.** The dates of all assessments, maintenance, air monitoring, medical surveillance (excluding health records of identifiable individuals) and inspections of the range are to be recorded in the Land Range Log (MOD Form 906). The reports and details are to be kept in the Range File for a period of at least 5 years, as required by the current CLAW Regulations.
- b. **Monitoring.** The user unit is to keep details of personnel who are exposed to significant levels ($>0.075\text{mg/m}^3$) of lead in air in an indoor range and the period they were present. This may be a copy of the RASP. The records are to be kept for 10 years and are subject to auditing.
- c. **Cleaning and De-leading.** All cleaning and de-leading is to be recorded in the Land Range Log (MOD Form 906) together with the name, rank or job status of the person responsible for the overall supervision.
- d. **Ventilation.** The dates of inspections, checks and any failures or defects found in the mechanical ventilation system if fitted are to be recorded with the name of the inspector in the Land Range Log (MOD Form 906).
- e. **Inspection and Audit.** Records are to be available for inspection by COs, Service and Independent Inspectors and, when required, by the enforcing authority (eg HSE). The procedures for completing and auditing the range usage record are to be stated in the range standing orders.

SAFETY SIGNS

3041. **Safety Signs.** Hygiene and PPE signs— refer to Chapter 3.

GUIDELINES FOR DEEP CLEANING CONTRACTS
SMALL ARMS RANGES

Typical Detail for a Range Deep Clean contract.	Ref. para.
<p>1. Essential Information to be passed to contractors where pertinent.</p> <p>a. Lead. All ranges contain some levels of lead in the form of bullets, bullet fragments and dust.</p> <p>b. Un burnt Propellant. Dust in ranges will also contain un burnt propellant which is an explosive hazard when collected in any quantity. In ranges where only air pellets are fired this hazard should not exist.</p> <p>c. Antimony (Sb). In high use ranges that permit 7.62mm or similar ammunition to be fired there may be levels of Antimony in excess of EU recommended limits.</p> <p>d. Risk Assessment – Confined spaces. There are some ranges particularly where there are small tubes or box sections where the work environment may be classed as a confined space. In all cases it would not be safe to allow personnel to work alone nor allow access into small tubes unless there are personnel monitoring activity from outside the small tube or box section. Advice in relation to Confined Spaces or Potential Confined Areas should be sought from Authorised Person Confined Spaces.</p>	<p>3002 3003 3028</p>
<p>2. Requirements.</p> <p>a. Range Structure. All internal surfaces are to be free of dust. This includes any open roof structures, furniture and fixings. Surfaces that may absorb dust are to be pressure jetted where this is possible or vacuumed¹. Particular care is required to clean out joints in any surface finishes. Mechanical scrubbing machines are particularly effective for use on floors.</p> <p>b. Bullet Trap. Cleaning bullet traps will be dependant upon the type of trap.</p> <p>i. Steel plate traps. Remove all bullet debris and wipe down all surfaces. This includes any antislash curtain which may contain bullet debris and will be covered in fine lead dust. Buckled, loose or damaged steel surfaces should be reported to the authority.</p> <p>ii. Snail traps. Remove all bullet debris and wipe down all surfaces. Empty and wash out any wet or dry collection chambers. Report any damage or distortion on impact surfaces to the authority.</p> <p>iii. Granulated rubber or sand traps. Arrange for de leading prior to deep clean or combine with deep clean contract and ensure the de leading is completed prior to starting the deep clean.</p> <p>iv. Lamella / curtain / Venetian traps. Remove all bullet debris and wipe down all visible surfaces. These traps should be dismantled if it is not easily determined that there is no build up within the trap.</p> <p>1. See approved vacuum specification.</p> <p>c. Baffles and vertical traps. Where baffles and vertical wall traps are sealed at the bottom, bullet debris will collect between the steel plate and the off set antislash timber or tile. A deep cleaning contract should include removing any bullet debris from this gap. Baffles that show no indication of bullet strike may not need to be cleaned out.</p> <p>d. Electrical fittings. Dust is to be removed from all electrical fittings, lighting and any switch gear. Where there is an indication that dust is building up in or around any electrical fitting the authority is to be notified.</p> <p>e. Air handling plant and fans. All filters in air handling plant and fans are to be removed, cleaned or replaced in accordance with manufactures recommendations. All ductwork is to be cleaned through. Input and extract fan grills are to be removed and ducts, blades, grills and motors are to be cleaned free of dust.</p> <p>f. Requirement Tube Ranges. Small tubes or rectangular section ranges where it is not possible to enter the tube to deep clean are to be deep cleaned with methods that ensure all dust and bullet debris within the tube or box section is removed.</p>	<p>3031b</p>

<p>3. Cleaning Guidelines.</p> <p>a. General. Deep cleaning contractors are to take every measure to avoid raising dust during cleaning operations.</p> <p>b. Ventilation. Any ventilation system in the range is to be run at full capacity during cleaning in the range. The ventilation system, once shut down at the end of cleaning operations is then to be cleaned as previously described.</p> <p>c. Cleaning methods. Dry sweeping is prohibited. Wash down, wet wipe limits airborne dust.</p> <p>d. Vacuums. Only approved spark free equipment is to be used in ranges with the exception of those ranges where only air pellets have been fired. ATEX equipment category 1D with T4 135°C; this is required as there is a Category B Zone 20 hazardous area, within the vacuum cleaner. See below for examples available at the time of writing. There may well be others not listed that meet the performance specification.</p> <p>e. Cleaning small tube or box section ranges (where access is not possible). Below are some options that contractors might consider.</p> <p>i. Pressure jetting the tube or box section would safely remove bullet debris and dust however the water will need to be collected and removed.</p> <p>ii. Where pressure jetting is not possible and the target room could be sealed, the tubes or box sections can be dry brushed with a positive airflow directed down the tube. A vacuum/s at the target end inside the sealed space will take out the dust. Vacuum/s extract rate to exceed input air flow rate. Bullet debris can be collected once the dust has settled at the target end.</p>	3031
<p>4. PPE.</p> <p>The deep cleaning contractor is responsible to assess the hazards in a particular range and provide all operatives involved with adequate PPE and instruction in it's proper use.</p>	3033
<p>5. Compliance with Regulations.</p> <p>The contractor is to ensure full compliance with the CLAW Regulations for all work undertaken within the range and the Hazardous Waste Regulations regarding all waste disposals from the range.</p>	3007 3034
<p>6. MOD Form 906 / Certification.</p> <p>On completion of the works the authority is to confirm that all scheduled work has been completed and the contractor is to sign the Range Log MOD Form 906 to certify that the deep clean has been completed.</p>	3039c

The following links are to suppliers of ATEX certified vacuum cleaners:

<http://www.barloworldvt.com/cgi-bin/rangepicker.cgi?catid=1>
http://www.chapelcleaning.co.uk/cleaning_machines/gunpowder_vacuum_01.html
<http://www.tiger-vac.com/>
http://www.depureco.co.uk/166_ATEX-Vacuums.asp
<http://www.morclean.co.uk/content.php?categoryId=518>
http://www.lattaequipment.com/products/ruwac_industrial_vacuums/explosion_proof_vacuums/
http://www.cfm.it/eng/sez_aspiratori_lista.html?linea=9
http://www.clydematerials.co.uk/media/documents/pdf/Cougar%20Data%20Sheet_June04.pdf

Typical Detail for a Range Deep Clean contract.	Ref. para.
<p>1. Essential Information to be passed to contractors where pertinent.</p> <p>a. Lead (Pb). All ranges contain significant levels of lead in the form of bullets, bullet fragments and dust.</p> <p>b. Un burnt Propellant. Dust in ranges will also contain un burnt propellant which is an explosive hazard when collected in any quantity. In ranges where only air pellets are fired this hazard should not exist.</p> <p>c. Antimony (Sb). In high use ranges that permit 7.62mm or similar ammunition to be fired there may be levels of Antimony in excess of EU recommended limits.</p> <p>d. Risk Assessment – Confined spaces. There are some ranges particularly where there are small tubes or box sections where the work environment may be classed as a confined space. In all cases it would not be safe to allow personnel to work alone nor allow access into small tubes unless there are personnel monitoring activity from outside the small tube or box section.</p>	<p>3003</p> <p>3004</p> <p>3029</p>
<p>2. Requirements.</p> <p>a. Range Structure. All internal surfaces are to be free of dust. This includes any open roof structures, furniture and fixings. Surfaces that may absorb dust are to be pressure jetted where this is possible or vacuumed¹. Particular care is required to clean out joints in any surface finishes. Mechanical scrubbing machines are particularly effective for use on floors.</p> <p>1. See approved vacuum specification (Para 3d).</p> <p>b. Bullet Trap. Cleaning bullet traps will be dependant upon the type of trap.</p> <p>i. Steel plate traps. Remove all bullet debris and wipe down all surfaces. This includes any antisplash curtain which may contain bullet debris and will be covered in fine lead dust. Buckled, loose or damaged steel surfaces should be reported to the authority.</p> <p>ii. Snail traps. Remove all bullet debris and wipe down all surfaces. Empty and wash out any wet or dry collection chambers. Report any damage or distortion on impact surfaces to the authority.</p> <p>iii. Granulated rubber or sand traps. Arrange for de leading prior to deep clean or combine with deep clean contract and ensure the de leading is completed prior to starting the deep clean.</p> <p>iv. Lamella / curtain / Venetian traps. Remove all bullet debris and wipe down all visible surfaces. These traps should be dismantled if it is not easily determined that there is no build up within the trap.</p> <p>c. Baffles and vertical traps. Where baffles and vertical wall traps are sealed at the bottom, bullet debris will collect between the steel plate and the off set antisplash timber or tile. A deep cleaning contract should include removing any bullet debris from this gap. Baffles that show no indication of bullet strike may not need to be cleaned out.</p> <p>d. Electrical fittings. Dust is to be removed from all electrical fittings, lighting and any switch gear. Where there is an indication that dust is building up in or around any electrical fitting the authority is to be notified.</p> <p>e. Air handling plant and fans. All filters in air handling plant and fans are to be removed, cleaned or replaced in accordance with manufactures recommendations. All ductwork is to be cleaned through. Input and extract fan grills are to be removed and ducts, blades, grills and motors are to be cleaned free of dust.</p> <p>f. Requirement Tube Ranges. Small tubes or rectangular section ranges where it is not possible to enter the tube to deep clean are to be deep cleaned with methods that ensure all dust and bullet debris within the tube or box section is removed.</p>	<p>3032b</p>