INTERNATIONAL AMMUNITION TECHNICAL GUIDELINES

IATG 11.20

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Ammunition storage area explosions – EOD clearance

UN SaferGuard
Securing ammunition, protecting lives

IATG 11.20:2021[E]

Warning

The International Ammunition Technical Guidelines (IATG) are subject to regular review and revision. This document is current with effect from the date shown on the cover page. To verify its status, users should consult www.un.org/disarmament/ammunition

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Foreword

Ageing, unstable and excess conventional ammunition stockpiles pose the dual risks of **accidental explosions at munition sites** and **diversion to illicit markets**.

The humanitarian impact of ammunition-storage-area explosions, particularly in populated areas, has resulted in death, injury, environmental damage, displacement and disruption of livelihoods in over 100 countries. Accidental ammunition warehouse detonations count among the heaviest explosions ever recorded.

Diversion from ammunition stockpiles has fuelled armed conflict, terrorism, organized crime and violence, and contributes to the manufacture of improvised explosive devices. Much of the ammunition circulating among armed non-State actors has been illicitly diverted from government forces.[1] In recognition of these dual threats of explosion and diversion, the General Assembly requested the United Nations to develop **guidelines for adequate ammunition management**.[2] Finalized in 2011, the International Ammunition Technical Guidelines (IATG) provide voluntary, practical, modular guidance to support national authorities (and other stakeholders) in safely and securely managing conventional ammunition stockpiles. The UN SaferGuard Programme was simultaneously established as the corresponding knowledge-management platform to oversee and disseminate the IATG.

The IATG also ensure that the United Nations entities consistently deliver high-quality advice and support – from mine action to counter-terrorism, from child protection to disarmament, from crime reduction to development.

The IATG consist of 12 volumes that provide practical guidance for 'through-life management' approach to ammunition management. The IATG can be applied at the guidelines' **basic, intermediate, or advanced levels**, making the IATG relevant for all situations by taking into account the diversity in capacities and resources available. Interested States and other stakeholders can **utilize the IATG for the development of national standards and standing operating procedures**.

The IATG are reviewed and updated at a minimum every five years, to reflect evolving ammunition stockpile-management norms and practices, and to incorporate changes due to changing international regulations and requirements. The review is undertaken by the UN SaferGuard Technical Review Board composed of national technical experts with the support of a corresponding Strategic Coordination Group comprised of expert organizations applying the IATG in practice.

The latest version of each IATG module can be found at www.un.org/disarmament/ammunition.

[1] S/2008/258.

[2] See also the urgent need to address poorly-maintained stockpiles as formulated by the United Nations Secretary-General in his Agenda for Disarmament, *Securing Our Common Future* (2018).

WARNING

The clearance of an Ammunition Storage Area that has undergone an unplanned explosive event carries significant risk.

This operation shall only be conducted by suitably qualified and experienced personnel.

The personnel involved in the planning and conduct of such a clearance operation require a technical understanding of the ammunition involved **and** knowledge of appropriate EOD techniques.

The principles and guidance within the IATG and IMAS shall be utilized to formulate a suitable clearance plan

Introduction

It is widely acknowledged that a physical risk exists to individuals and communities from the presence of abandoned, damaged or inappropriately stored and managed stockpiles of ammunition and explosives.

Inadequate or inappropriate stockpile management increases the probability of accidental explosions at ammunition storage areas. A database of such events shows that these events are a global problem, and that a single explosive event can result in dozens of casualties and millions of dollars in damages to nearby buildings, infrastructure, and homes.[3] Research indicates that these incidents are widespread and increasingly common: between 1979 and 2019, there were more than 623 incidents in at least 106 countries and territories.[4] The majority of these may have been preventable with even very limited implementation of effective stockpile management policies and procedures[5]. Whilst other IATG modules provide guidelines for the safety, security and destruction of ammunition and explosives; this IATG concentrates on the management and techniques of the explosive ordnance disposal (EOD) clearance operation once an undesirable explosive event has resulted.

The present set of specifications and guidelines for the Explosive Ordnance Disposal (EOD) clearance of ammunition storage explosions is also included in the International Mine Action Standards (IMAS) as IMAS 09.12.[6] Future updates of IATG 11.20 and IMAS 09.12 will therefore be undertaken in a coordinated manner.

There are a number of examples in the recent past where the post-explosive clearance of ammunition storage areas have been based primarily on 'demining' standing operating procedures (SOP). Whilst this may seem a practical step at the outset, in real terms it is not particularly efficient, or at times even safe. The threat is different, the clearance options much wider, and further technical knowledge is required than that needed for mine and unexploded ordnance (UXO) clearance.[7]

[3] Small Arms Survey. N.d. Unplanned Explosions at Munitions Sites (UEMS) Database. Accessed Sep 2020. Geneva: Small Arms Survey. Available at http://www.smallarmssurvey.org/weapons-and-markets/stockpiles/unplanned-explosions-at-munitions-sites.html

[4] Small Arms Survey. N.d. Unplanned Explosions at Munitions Sites (UEMS) Database. Accessed Sep 2020. Geneva: Small Arms Survey. Available at http://www.smallarmssurvey.org/weapons-and-markets/stockpiles/unplanned-explosions-at-munitions-sites.html

[5] Berman, Eric G. and Pilar Reina, eds. 2014. Unplanned Explosions at Munitions Sites (UEMS): Excess Stockpiles as Liabilities Rather than Assets. Handbook. Geneva: Small Arms Survey

[6] United Nations, International Mine Action Standards 09.12, EOD clearance of ammunition storage explosions, First Edition Amendment 1, 29 January 2020

[7] This is not to suggest safe clearance operations have not taken place. However, it is unlikely that they were as effective and efficient as possible in terms of operational and explosive efficiency. Effectiveness and efficiency can be improved by the application of ammunition technology and explosive engineering knowledge, combined with planning operations based on first principles. Techniques such as 'rotary kiln furnaces', hydro-abrasive cutting at the logistic level; pollution control systems to international best practices, contained demolition chambers, etc all have the potential to improve clearance efficiency at an ammunition depot explosion beyond 'normal' mine and UXO clearance procedures.

Ammunition storage area explosions – EOD clearance

1 Scope

This IATG module provides specifications and guidelines for the Explosive Ordnance Disposal (EOD) clearance of the effects of an undesired explosion in an ammunition storage area, (in either a post-conflict controlled stockpile or abandoned explosive ordnance (AXO) scenario).

In this standard, the term 'ammunition and explosives' is used to refer to ammunition, explosives, propellants, explosive ancillaries and other explosive materials, unless stated otherwise in the text. (See Clause 3 below).

2 Normative references

A list of normative references is given in Annex A. These documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

A further list of informative references is given in Annex B in the form of a bibliography, which lists documents that contain additional information related to the contents of this IATG module.

3 Terms and definitions

For the purposes of this module the following terms and definitions, as well as the more comprehensive list given in IATG 01.40 *Glossary of terms, definitions and abbreviations,* shall apply:

The term 'national authority' refers to *the government department(s), organisation(s) or institution(s) in each country charged with the regulation, management and co-ordination of SALW activities*.

The term 'explosives' is used to refer to *a substance or mixture of substances, which, under external influences, is capable of rapidly releasing energy in the form of gases and heat.*

The term ‘ammunition’ (or munition) *is used to refer to a complete device charged with explosives, propellants, pyrotechnics, initiating composition, or nuclear, biological or chemical material for use in military operations, including demolitions.*[8]

The term “Non-technical Survey” (NTS) refers to the collection and analysis of data, without the use of technical interventions, about the presence, type, distribution and surrounding environment of explosive ordnance (EO) contamination, in order to define better where EO contamination is present, and where it is not, and to support land release prioritisation and decision-making processes through the provision of evidence.

NOTE 1 In common usage, ‘munitions’ (plural) can be military weapons, ammunition and equipment.

In all modules of the International Ammunition Technical Guidelines, the words 'shall', 'should', 'may' and 'can' are used to express provisions in accordance with their usage in ISO standards.

a) **'shall' indicates a requirement**: It is used to indicate requirements strictly to be followed in order to conform to the document and from which no deviation is permitted.

[8] AAP-6 (Edition 2016), *NATO Glossary of Terms and Definitions*. NATO Standardization Office (NSO).

b) **'should' indicates a recommendation**: It is used to indicate that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required, or that (in the negative form, 'should not') a certain possibility or course of action is deprecated but not prohibited.

c) **'may' indicates permission**: It is used to indicate a course of action permissible within the limits of the document.

d) **'can' indicates possibility and capability**: It is used for statements of possibility and capability, whether material, physical or casual.

4 Hazards and risks

4.1 In storage

It is an unfortunate fact that ammunition and explosive storage can never be 100% safe in terms of the 'absence of risk', and the best that can be achieved is 'tolerable risk'.[9] This can only be achieved by a wide range of technical responses that are explained in the other IATG modules. It is appropriate, however, to highlight that in terms of national ammunition stockpiles the hazard is the physical presence of the ammunition and explosives, whereas the risk is primarily dependent on:

A) the physical and chemical condition of the ammunition and explosives;

B) the training and education of the personnel responsible for the storage and surveillance of the stockpiles;

C) the handling, repair, maintenance and disposal systems in place; and

D) the storage infrastructure and environment.

The concept of tolerable risk can only be achieved if the ammunition management systems and storage infrastructure are to appropriate standards or in accordance with good practices. Past desk studies[10] by the Geneva International Centre for Humanitarian Demining (GICHD), supplemented by further research, initially identified a significant number of recent explosive events that have occurred due to inappropriate storage or explosive safety procedures.[11] These studies clearly indicate that a physical risk exists for communities from the presence of abandoned, damaged or inappropriately stored and managed stockpiles of ammunition and explosives.

There are many possible causes of undesirable explosions in Ammunition Storage Areas, but these can usually be attributed under the following generic areas:

A) deterioration of the physical or chemical condition of the ammunition and explosives.

B) unsafe storage practices and infrastructure;

C) unsafe handling and transport practices;

D) external effects, (such as fire); or

[9] An alternative methodology is that the risk should be As Low as is Reasonably Practicable (ALARP).

[10] *Explosive Remnants of War (ERW) - Undesirable Explosive Events in Ammunition Storage Areas*, ISBN 2-88487-006-7, GICHD, Geneva, November 2002; *Undesirable Explosive Events in Ammunition Storage Areas*, SEESAC, 2002 – 2007; *Undesirable Explosive Events in Ammunition Storage Areas*, Explosive Capabilities Limited, 2008 – 2011, UEMS 2012 – To Date.

[11] There is absolutely no intention on the part of the authors to allocate or imply blame for any of the explosive events referred to in this paper; indeed, the States involved should be congratulated on their transparency in allowing lessons to be learned from these unfortunate events.

E) deliberate sabotage.

Regrettably, the dramatic consequences of an ammunition explosion normally make the key witnesses to the event its first victims. Therefore, any subsequent investigation tends to concentrate on the practices and regulations in force at the time, as key witnesses are not available. Since a degree of technical knowledge is required for an effective investigation, the investigating authority is also usually the authority responsible for the ammunition management and storage in the first place. This complicates impartiality, independence of investigation and can lead to a reluctance to allocate responsibility.

4.2 Post explosion

Many, or even all, of the following hazards will exist after an undesired explosive event within an ammunition storage area:

A) ammunition may have been projected some distance from the explosion site, (e.g. there have been examples of free flight rockets travelling up to 20km). If the ammunition has been stored in a fuzed state, then it is very possible that the forces imparted to the ammunition during the explosion are similar to the forces required to arm the fuze. Therefore, all fuzed ammunition, either within or at any distance from the explosion site, shall be regarded as unexploded ordnance (UXO) and dealt with appropriately;

B) the explosive content of ammunition natures may be either partially or fully burnt out. If partially burnt out then there will be the normal hazards presented by exposed explosive. Additionally, there may be the hazards associated with melted explosives re-crystallising and forming undesirable, more sensitive isomers e.g. TNT;

C) ammunition may have been broken open leading to exposed explosive or other fillings (white phosphorous, bomblets etc) being spread across the site;

D) ammunition may have been broken open leading to exposed electrical leads;

E) propellant may not have burnt during the explosion(s)and subsequent fire, therefore exposed propellant may be spread across the site. This may spontaneously ignite during EOD clearance operations; such ignition will be dependent on the chemical condition of the propellant and the ambient temperature;

F) ammunition that has been projected out of the site may well penetrate the ground surface, thereby leading to a requirement for sub-surface clearance;

G) at the ‘seat of the initial explosion’, if that can be identified, a crater will have resulted. There are, however, likely to be a multitude of craters after a serious event. It shall be assumed that ammunition is still contained within the crater, and subsequent explosions may have partially ‘filled in’ craters, thereby in effect burying ammunition;

H) the ammunition that has been involved in the explosion, but did not deflagrate or detonate, will be very susceptible to the weather; risks will increase significantly during lightning storms and further explosive events initiated by lightning strikes may occur. UV radiation can quickly change the appearance of exposed munitions, obscuring or eliminating key identification features, coloured bands, etc.;

I) the infrastructure (buildings, roads etc) is very likely to be in an unstable condition, and be at risk of collapsing;

J) subsequent bad weather may have led to flooding and mud slides covering up ammunition and UXO; and K)exposed and scattered explosive fillers may contaminate surface and subsurface water. Water may become coloured due to explosive contamination (e.g. 'pink water' for TNT and its breakdown products). Most explosives show both acute and long-term toxicity to humans; for example, people exposed to TNT over a prolonged period tend to experience anemia and abnormal liver functions. Personal protective equipment (PPE) (face masks and protective gloves) may therefore be required when collecting explosives that have been pulverized during an explosion, as will a thorough clean-down procedure. Care must be taken when collecting bare explosive residues as they will invariably be contaminated with foreign particles such as dirt, soil or sand and hence show a significantly higher friction and impact sensitiveness than pure explosives (grit sensitization).

5 Impact and effects

The damage, casualties and impact on communities of an explosion within an Ammunition Storage Area can be devastating. Furthermore the economic costs of the subsequent EOD clearance can be far greater than the prior implementation of safer procedures, limited infrastructure development and stockpile disposal would have been.

It is also important to remember that there will inevitably have been a number of 'near misses', where an undesirable explosive event has been prevented or contained by the ammunition management or storage practices in place at the time. A major problem, however, is that during conflict, in post-conflict environments or during force restructuring as part of security sector reform, the specialist technical personnel that should be responsible for ammunition management may well have become casualties or left the armed forces; they are very difficult to replace without a comprehensive and effective training programme.

There are also economic costs in terms of the capital value of the stockpile itself; although this is really a factor for national consideration, the international donor community should be interested, as national finance for replacement stocks could potentially have been committed to social and economic development. Clearance principles

Safety during EOD clearance operations of ammunition storage areas after an explosive event shall be paramount and shall be based upon the principles of:

A) appropriate threat assessment;[12]

B) planning;

C) good training and technical education;

D) lessons identified from previous operational experience and competency standards;[13]

E) appropriate and effective operating procedures;

F) identification and use of appropriate equipment; and

[12] This is critical to the safety, effectiveness and efficiency of the clearance operation. The risks, hazards, threats, opportunities, technical skills and operating procedures for the clearance of an ammunition depot explosion, as opposed to Battlefield Area Clearance or Mine and UXO Clearance, are different. Ammunition technical skills are critical to the development of a safe, effective and efficient clearance.

[13] Competency standards are now becoming the accepted way of assessing an individual's suitability for a particular task. An individual's competency is based on a balanced combination of their training, education and operational experience. Just because an individual has 20 years experience does not necessarily mean that they are competent, if the initial training was inappropriate; they may just have been lucky.

G) use of Personal Protective Equipment as the 'last resort' safety measure against explosive ordnance hazards.[14]

6 Clearance requirements

The future land use of the ammunition depot involved in the undesired explosion shall be a key factor in determining the exact EOD clearance requirements, and hence the allocation of necessary resources. Future land use should determine the level of clearance required; for example, it would be inappropriate and wasteful in resources to clear the land to a depth of 2 metres if the land was going to be used for forestry. This is consistent with IMAS procedures[15] .

The specified area to be cleared shall be determined by a non-technical and/or technical survey or from other reliable information that establishes the extent of the hazard area. IMAS 08.10 for non-technical survey and IMAS 08.20 for technical survey can be consulted for guidance.

Land shall be accepted as 'cleared' when the clearance organisation has ensured the removal and/or destruction of all explosive hazards from the specified area to the specified depth.

NOTE 1 The priorities for clearance shall be determined by the impact on the individual community balanced against national infrastructure priorities.

Therefore, the clearance requirements should be strategically developed based on; 1) the threat; and 2) future land use. It is very likely that 'surface clearance' may be appropriate for the majority of the land within the danger area radius, whereas sub-surface clearance would be appropriate for the 'crater' areas of the individual storage site[16] explosions. Once the clearance depth requirements have been formally established then the appropriate clearance methodology and technical equipment requirements may be established.

7 Development of EOD clearance methodology

The following factors shall be considered during the development of the EOD clearance methodology;

A) a technical evaluation shall be conducted, to include:

- the identification of ammunition types, and possible instability or UXO risks;
- the identification of sub-surface risks; and
- an assessment of the UXO and ammunition density across the site and danger area radius (/m^2).

B) a formal risk assessment, based on the principles within ISO Guide 51, shall be made;

C) the clearance plan (see Annex B) shall be based on the technical evaluation and risk assessment. It should include:

- effective and appropriate SOPs;

[14] PPE must be considered as the 'last resort' safety measure during EOD operations. It should be the final protective measure after all planning; training and procedural efforts to reduce risk have been taken. There are a number of reasons for this approach. Firstly, PPE only protects the person wearing it, whereas measures controlling the risk at source can protect everyone at the workplace. Secondly, theoretical maximum levels of protection are seldom achieved with PPE in practice, and the effective level of protection is difficult to assess. Thirdly, effective protection is only achieved by suitable PPE, correctly fitted, properly maintained and used, AND appropriate to the task rather than just a line item on a check list. Finally, the restrictive effects of PPE versus task efficiency must be considered. PPE is rarely used for Conventional Munition Disposal (CMD) in low risk environments when appropriate training, education, operational experience and competency are present in the task organization.

[15] IMAS 09.10 (Edition 2 Amendment 5) *Clearance requirements*. IMAS. June 2013

[16] In this case a 'storage site' being defined as an individual Explosive Storehouse (ESH) or Exposed Stack.

- resource requirements, (including protected heavy lift vehicles to gain access); and
- a training programme to meet SOPs.

D) the time taken for the EOD clearance will always be difficult to estimate due to the large number of variables. The matrix below at Table 1 may be of assistance,[17] as it is based on experience to date, although it will require updating as experience is gained on each operational task.

Ground Preparation Factor [18]						
Type of Terrain	**Area (Ha)**	**Factor [19]**	**Man Days**	**Staff Available**	**Estimated Time (Days)**	**Remarks**
	(a)	(b)	(a) x (b) = (c)	(d)	= (c) / (d)	
Short Grass	20	0	0	0	0.0	
Light Vegetation	5	10	50	10	5.0	
Dense Vegetation	5	30	150	14	10.7	Consider other techniques.
Search and Marking Factor						
Type of Search	**Area (Ha)**	**Factor**	**Man Days**	**Staff Available**	**Estimated Time (Days)**	**Remarks**
	(a)	(b)	(a) x (b) = (c)	(d)	= (c) / (d)	
Visual	26	1.3	33.8	20	1.7	
Metal Detector	4	2.5	10	4	2.5	Factor for Low Density UXO and ammunition contamination only to shallow depth =. For High Density UXO and ammunition contamination a much higher factor will need to be applied.
Destruction [20] / Recovery [21] Factor						
UXO / Ammunition Density[22]	**Area (Ha)**	**Factor [23]**	**Man Days**	**Staff Available**	**Estimated Time (Days)**	**Remarks**
	(a)	(b)	(a) x (b) = (c)	(d)	= (c) / (d)	
Very Heavy (10.0/m^2)	2	180	360	10	36	
Heavy (5.0/m^2)	6	90	540	10	54	
Medium (1.0/m^2)	12	50	600	4	150	
Light (0.2/m^2)	10	10	100	4	25	
Estimated Task Clearance (Days)					**284.9**	

Table 1: Example of EOD clearance planning matrix

[17] It has been completed for an EOD clearance task of 30Ha with 30 staff available. The balance of staff between EOD trained personnel and general staff will also make a difference to the factors shown.

[18] This assumes that the ground is prepared by hand or with light mechanical systems. . Preparing the ground in a hazardous area by mechanical means could involve removing or reducing obstacles to clearance e.g. vegetation, soil and metal contamination to make subsequent EOD clearance operations quicker and safer.

[19] The Factor is an estimate of the time in Days for 1 Person to complete the task for 1 Hectare.

[20] Destruction of fuzed ammunition 'in situ' by demolition.

[21] Recovery of unfuzed ammunition and scrap for further processing. The destruction by demolition of stockpiles of recovered unfuzed ammunition should be a concurrent activity. Do not forget to allocate separate staff for this task.

[22] UXO / Ammunition Density includes; 1) fuzed ammunition that must be destroyed in situ as UXO; 2) unfuzed ammunition that may be manually cleared; and 3) metallic fragments from detonated or deflagrated ammunition.

[23] This Factor estimates the time taken to lay clearance charges and manually recover unfuzed ammunition and metallic fragments. The Factor may have to be altered dependent on the proportion of fuzed ammunition versus unfuzed ammunition. It assumes access times have been considered under Ground Preparation, Search and Marking.

8 EOD clearance operation

9.1 EOD clearance process

There are a range of process options for the conduct of the EOD clearance operation after an ammunition storage site explosion. Other options are possible, but the one that follows is based on proven operational practices;

A) establish the radius of the danger area[24] that requires EOD clearance;

B) grid the area from the outside to the inside, (consider the danger area and the ammunition storage area as separate clearance requirements);[25]

C) the clearance of routes and of locations within the danger area radius where civilians are at highest risk shall be the first priority;

D) conduct marking operations using appropriately qualified ammunition personnel;[26] [27]

E) conduct the initial surface clearance, (unless the threat assessment makes sub-surface clearance an absolute necessity or priority). All fuzed ammunition shall be destroyed by detonation or deflagration 'in situ';

F) establish a demolition ground for the destruction of recovered unfuzed ammunition;

G) establish a 'Free From Explosive' (FFE) verification and scrap processing system, including a burning area to prove any scrap where explosive contamination may be present; and

H) establish an ammunition accounting system for the EOD clearance and demolitions (it may be possible to reconcile the ammunition account after EOD clearance has been completed in order to identify stock losses).

9.2 Safe to Move (STM) inspections

9.2.1 STM certification – post explosion hazards (LEVEL 3)

The certification of ammunition that has been involved in an explosion will be complicated by some, or even all, of the following hazards:

A) ammunition may have been projected some distance from the explosion site, (e.g. there have been examples of free flight rockets travelling up to 20km). If the ammunition has been stored in a fuzed state, then it is very possible that the forces imparted to the ammunition during the explosion are similar to the forces required to arm the fuze. Normal evidence of firing such as driving band engravement etc will NOT be present. Therefore, all fuzed ammunition, either within or at any distance from the explosion site, shall be regarded as unexploded ordnance (UXO) and dealt with appropriately;

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[24] The radius of the danger area should be based on the maximum range of the ammunition contained within the depot assuming a ballistically stable flight path. This will be the maximum range at which a very small amount of ammunition may be expected to have been projected. The majority of the ammunition will have been projected in a ballistically unstable manner and therefore the range will be much reduced from the theoretical maximum.

[25] Aerial photography and 1:10,000 scale mapping are very useful for planning and conduct of operations. Infrared aerial photography may also be useful in terms of identifying threats at depth.

[26] Ammunition qualified personnel, as opposed to EOD Operators, are strongly recommended for this component of the clearance operation. They can save time, negate the requirement for destruction in situ and, in some cases, make recommendations for movement of munitions that a general EOD operator can't. Their training in the detailed ammunition design means that they may effectively speed up the clearance operation within the bounds of acceptable safety.

[27] The basic paint marking system should be; 1) GREEN - No explosive content and can be moved to scrap recovery by anyone; 2) YELLOW - Certified as 'Safe to Move' by an Ammunition Specialist for destruction at a central demolition point. The ammunition can then be moved by support personnel; and 3) RED - Destroy in situ by EOD teams in a planned daily demolition series

B) the explosive content of ammunition natures may be either partially or fully burnt out. If partially burnt out then there will be the normal hazards presented by exposed explosive. Additionally, there may be the hazards associated with melted explosives re-crystallising and forming undesirable, more sensitive isomers e.g. TNT;
C) ammunition may have been broken open leading to exposed explosives, electrical leads or sensitive components; and/or
D) propellant may not have burnt during the explosion and fires, therefore exposed propellant may be present. This may spontaneously ignite during EOD clearance operations or subsequent movement; such ignition will be dependent on the chemical condition of the propellant and the ambient temperature.
E) the filling and propellant may have become powderised due to being subjected to a blast. Even if the munition looks undamaged, the shockwave passing through may cause this. This can cause the filling or propellant to become more sensitive, thus presenting a new hazard.

The decision as to whether ammunition is STM post explosion shall only be taken by an individual deemed by the clearance organization to be a Level 5 Ammunition Inspector[28] or an IMAS Level 3+ (EOD) operator (Depot Explosions).[29] Due consideration should be given to the external stimuli experienced by the fuze during 'kick out' from the explosion(s). The movement by hand of fuzed ammunition post-explosion shall only be permitted if:

A) the Level 5 Ammunition Inspector or an IMAS Level 3+ (EOD) operator has personal knowledge of the fuze design and modus operandi, access to the technical drawings and is certain that the fuze can not be armed by the external stimuli it has experienced (for example an Electronic Time Fuze); or

B) should there be any doubts then diagnostic techniques such as X-Ray shall be used to determine the fuze condition of a statistically representative sample.

Notwithstanding the competence level of the individuals determining which type of ammunition is safe to move post explosion, a formal risk assessment for each clearance operation shall be carried out in accordance with IATG 02.10 *Introduction to risk management principles and processes.* This is because once the STM decision has been taken the ammunition will be moved by staff at a lower competence level; it is a duty of care issue. The risk assessment shall include an evaluation of the types of fuzing systems that may present particular hazards for the clearance operation.

9.3 Process efficiency

The EOD clearance of an area after an ammunition storage area explosion presents a range of process complications beyond that of 'normal' humanitarian mine and UXO clearance operations (UXO density, ammunition components, exposed explosive and propellant, collapsed storage buildings complicating access, etc). Whilst safety shall be paramount, there are a range of proven techniques and systems that contribute to improved clearance efficiency. Time should not be a factor that influences safety, but there will often be political pressures for 'quick' clearance; this pressure should be resisted. Notwithstanding this, a major financial factor will be the human resources necessary for the task, and therefore the use of more effective systems can contribute to cost-effectiveness, whilst improving safe clearance times.

[28] See IATG 01.90 *Ammunition management personnel competences*.

[29] See Clause 4.2d to IMAS 09.30 *Explosive Ordnance Disposal.* (Amendment 5). The Level 3+ being specifically awarded for for specialist EOD operators who have been trained in areas that needed to address specific hazards, such as the planning, supervision and conduct of EOD clearance of post explosion ammunition depots.

Equipment	Use	Examples
Shock Initiation System	▪ Shock Initiation Systems are much easier to handle and cheaper than military detonating cord. It should be considered due to the potentially very large number of 'in situ' demolitions necessary for destruction of the fuzed ammunition.	Several types of Non-Electric initiation systems are available.
Radio Controlled Initiator	▪ The use of this type of system negates the requirement for the deployment of long firing cables. ▪ Safety and control of demolitions is improved as all can be fired from a central point, without the excessive use of firing cable. ▪ RC initiation is quicker to set up and take down than long runs of firing cable.	
Armoured Engineer Vehicles	▪ Specialist armoured vehicles are an efficient alternative for the clearance of the 'explosion craters' and surrounding area, where large quantities of earth require safe processing. These areas are likely to have high density UXO contamination. ▪	
'Alternative' or Deflagration techniques	▪ Deflagration, rather than detonation, techniques may be appropriate for fuzed ammunition that is lying near sensitive locations (power lines, routes, etc). Although detonation must be assumed for the establishment of danger areas, deflagration techniques now routinely achieve a 80% success rate for 'low order' results.	Point Focal Charges

Table 2: Systems for clearance efficiency

9.4 Staff competences

Staff planning or engaged in the EOD clearance of ASA explosion areas should be fully compliant with the following competency standards:

Test and Evaluation Protocol 09.30/01/2014 Version 1.0 dated 30 October 2014 Explosive Ordnance Disposal (EOD) Competency Standards

Annex A
(normative)
References

The following normative documents contain provisions, which, through reference in this text, constitute provisions of this module. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this pmodule are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO maintain registers of currently valid ISO or EN:

a) AAP-6 (Edition 2016), *NATO Glossary of Terms and Definitions*. NATO Standardization Office (NSO). http://nso.nato.int/nso/nsdd/listpromulg.html;

b) Test and Evaluation Protocol 09.30/01/2014 Version 1.0 dated 30 October 2014 Explosive Ordnance Disposal (EOD) Competency Standards

a) IATG 07.30 *Inspection of ammunition*. UNODA;

b) IATG 08.10 *Transport of ammunition*. UNODA;

c) IMAS 09.10 (Second Edition, Amendment 5) *Clearance requirements*. IMAS. June 2013. https://www.mineactionstandards.org;

d) IMAS 09.30 (Second Edition, Amendment 5) *Explosive Ordnance Disposal*. IMAS. October 2014

e) ISO Guide 51:2014 *Safety aspects – Guidelines for their inclusion in standards*. ISO. 2014.

The latest version/edition of these references should be used. The UN Office for Disarmament Affairs (UNODA) holds copies of all references[30] used in this guideline and these can be found at: www.un.org/disarmament/un-saferguard/references. A register of the latest version/edition of the International Ammunition Technical Guidelines is maintained by UNODA, and can be read on the IATG website: www.un.org/disarmament/ammunition. National authorities, employers and other interested bodies and organisations should obtain copies before commencing conventional ammunition stockpile management programmes.

[30] Where copyright permits.

Annex B
(informative)
Example EOD Operation Order (OpO)

Copy No of copies

Total pages:

General Staff
Ministry of Defence
BLUETOWN
Redland

Civil: (+99) (12) 26648

July 2020

File Number

EOD OPO 1/11 (LOCATION 1)

References:

A. EOD SOPs 6 and 7.
B. Map Sheet K-34-112-D-d, 1:25,000.
C. The Pink Book.

Time Zone Used Throughout the Order: LOCAL

Task Organisation:[31]

SER	RANK	NAME	APPOINTMENT	TASK
(a)	(b)	(c)	(d)	(e)
1			Chief EOD	Technical Direction
2			D/Chief EOD	Operations Officer
3			EOD Team (Ground) Commander	Command and control of operation on the ground.
4			EOD Team Deputy (Ground) Commander	
5			Ammunition Specialist	Technical Advisor on Ammunition Types.
6			EOD Team (1) Leader	Clearance
7			EOD Team (2) Leader	Logistic Destruction and Demolitions
8			Medical Doctor	

[31] Options included, which are task dependent.

1. SITUATION

a. EOD and UXO Background Intelligence.

(1) During the civil unrest in Redland in 2020 there were a number of explosions at the BLUETOWN Ammunition Storage Area (ASA) on the 18 April 2020.

(2) Three Explosive Storehouses (ESH) and an Ammunition Process Building (APB) were involved in the explosions; these contained approximately 1,200 tonnes of ammunition and explosives at the time of the explosive events. One of the ESH and its contents, bulk HE and mines, was completely destroyed by a detonation. **This area will be referred to as Area 1.** See Annex A.

(3) Subsequent to these explosions there were a series of fires set to piles of ammunition placed in front of the remaining 12 underground ammunition storage bunkers on site, which are still in use. These had no impact on the bunkers but resulted in UXO contamination of surrounding areas. This area will be referred to as Area 2. See Annex A.

(4) EOD clearance Operations to clear access roads and the areas around the exploded ESH were carried out in March 2020*.* As a consequence of these operations there has been significant consolidation of UXOs and access roads appear to be clear

(5) A total area of 45 Hectares (Ha) requires EOD clearance. This area has Very Heavy (10.0/m^2) to Heavy Density (5.0/m^2) UXO and ammunition contamination.

(6) BLUETOWN ASA is still an active stockholding unit. Throughout any EOD clearance task it will be essential, for safety and operational reasons, that close liaison is maintained with the Commander BLUETOWN ASA.

(7) Since April 2020 there have been at least 14 wounded as a result of explosions in these areas, and the subsequent civilian handling of the unexploded ammunition.

b. Ammunition Natures. The following general ammunition natures were stored in BLUETOWN and can be expected to be found during the EOD clearance operation. Technical References, together with the associated components, are at Annex B:

SER	AMMUNITION NATURE	REMARKS
(a)	(b)	(c)
1	152mm HE	Fuzed - MUST be treated as UXO.
2	122mm HE	UNFUZED - Destroy in Bulk (If safe to move)
3	122mm Rocket	Fuzed - MUST he treated as UXO.
4	82mm Mortar HE	UNFUZED - Destroy in Bulk (If safe to move)

2. MISSION

To conduct a safe EOD clearance operation of the BLUETOWN ammunition storage area, within the boundaries indicated at Annex A, in order to restore the situation to normality.

3. EXECUTION

a. Concept of Operations.

(1) Assembly Phase:

(a) Serviceable ammunition stocks pre-positioned at BLUETOWN.

(b) Confirm the availability of personnel.

(c) Equipment and expense stores pre-positioned at Unit No 5013, BFU Bluetown and checked for presence and serviceability.

(e) Briefings as required.

(2) Deployment Phase:

(a) Advance party deploy with equipment and stores to the BLUETOWN site.

(b) Preparation of administrative and clearance area.

(c) Arrival of main body.

(d) Briefings – to include Clearance Operation Safety Brief.

(3) Clearance Phase - Area1:

(a) Visual surface and electronic subsurface, search for and identification of UXO and ammunition up to the boundaries of the ESHs and APB.

(b) Removal of ammunition and items identified as safe to move.

(c) Demolition of UXO in situ.

(d) Demolition of safe to move items on the Demolition Ground. (Separate Demolition Order to be issued by Comd EOD).

(e) Mechanical removal of ESH/APB roof slabs and remaining substantial structures.

(f) Recovery and demolition of ammunition assessed as safe to move.

(g) Demolition of UXO in situ.

(h) Free From Explosive (FFE) certification of inert metal scrap/ammunition items. Prove free from explosives by burning if there is a possibility of explosive traces remaining in ammunition scrap.

(i) Quality checks of cleared areas and demolition site.

(4) Clearance Phase - Area 2

(a) Visual surface search for and identification of UXO and ammunition, along the Underground Bunker/BLUETOWN ammunition storage area access road including pedestrian accessible verges.

(b) Recovery and subsequent demolition of ammunition assessed as safe to move.

(c) Demolition of UXO in situ.

(d) Free From Explosive (FFE) certification of inert metal scrap/ammunition items. If there is doubt as to whether these ‘scrap’ items still have traces of explosives in them, prove them by burning.

(e) Quality checks of cleared areas and demolition ground.

(f) Post warning notices along the BLUETOWN road at the base of the downhill slope of uncleared mountain scree area (some 8 hectares).

(5) Recovery Phase:

(a) Check and pack equipment, expense stores and ammunition and explosives.

(b) Return to base location.

b. Detailed Tasks. The following detailed tasks have been identified:

(1) Conduct a detailed recce of the BLUETOWN site in conjunction with the Deputy EOD Team Ground Commander and Ammunition Specialist.

(2) Route power lines to the BLUETOWN ASA away from the clearance area; demolition activity has the potential to cause inadvertent interruption of supply.

(3) If at any stage there is a possibility of area defence weapons (mines etc) being present, stop the task, withdraw, investigate, reassess and replan.

(4) Mark the outer limits of the UXO and ammunition contaminated ground to be cleared.

(5) Identify and establish a Demolition Ground to safely dispose of the recovered munitions.

(6) Identify, mark and remove munitions that are “Safe to Move”.

(7) Dispose of remaining munitions in situ by demolition.

(8) Conduct sub-surface search using Metal Detectors.

(9) Dispose of recovered munitions as appropriate.

(10) Continually certify that recovered scrap is Free From Explosive (FFE) and arrange its final disposal.

(11) Conduct final clearance.

c. Limitations. The EOD Team will have the following operational limitations:

(1) Render Safe Procedures. The only authorised Render Safe Procedures (RSPs) to be used are:

(a) If positively identified by both the EOD Team and Ammunition Specialist as ‘Safe to Move’, then ammunition may be recovered for disposal at the adjacent Demolition Ground. These munitions are to be clearly marked with **YELLOW** paint. **UXO requiring demolition in situ will be indicated by RED PAINT and marker poles in the ground immediately adjacent to the item.**

(b) If positively identified by the Ammunition Specialist as ‘Free From Explosive’, an item or inert ammunition should be clearly marked with **GREEN** paint marking. This inert ammunition can then be recovered directly to the Scrap Storage Area.

(c) Disposal in situ by alternative deflagration techniques.

(d) Disposal in situ by detonation.

(2) Under Cover Requirements. During the physical clearance of UXO by detonation or deflagration **ALL** personnel, with the exception of the nominated EOD Operator, are to be under cover during the 'detting up'/priming phase and unnecessary equipment and vehicles shall be removed from the danger area

(3) Control. The EOD Team Leader controlling UXO clearance operations **must stop** operations if he feels that safety has been, or is about to be, compromised. He must ensure that **ALL** personnel are aware of the system for them to stop operations if they feel safety is, or is about to be, compromised.

(4) Search Techniques. Only those Search Techniques laid down in EOD SOP 6 are to be used.

d. Fire Fighting. The following fire fighting and preventative measures are to be observed:

(1) Smoking and the use of flame producing equipment such as cookers are to be limited to those areas specified by the EOD team Ground Commander.

(2) A manned Fire Service tender is to be on site during all demolitions.

(3) The siting of Fire Fighting Points and all fire fighting activities are to be co-ordinated by the EOD Team Ground Commander in consultation with the Commander BLUETOWN ASA and any local Fire Service resources in attendance.

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e. Assessment of Tasks. An assessment of the detailed tasks, in Man-Days, is as follows:

GROUND PREPARATION FACTOR [32]						
TYPE OF TERRAIN	AREA (Ha)	FACTOR [33]	MAN DAYS	STAFF AVAILABLE	ESTIMATED TIME (DAYS)	REMARKS
	(a)	(b)	(a) x (b) = (c)	(d)	= (c) / (d)	
Short Grass	35	0	0			
Light Vegetation	5	10	50			
Dense Vegetation	5	30	150			Consider other techniques.
SEARCH AND MARKING FACTOR						
TYPE OF SEARCH	AREA (Ha)	FACTOR	MAN DAYS	STAFF AVAILABLE	ESTIMATED TIME (DAYS)	REMARKS
	(a)	(b)	(a) x (b) = (c)	(d)	= (c) / (d)	
Visual	41	1.3	53.3			
Metal Detector	4	2.5	10			Factor for Low Density UXO and ammunition contaminatio n only to shallow depth (130mm). For High Density UXO and ammunition contaminatio n a much higher factor will need to be applied.
DESTRUCTION [34] / RECOVERY [35] FACTOR						
UXO / AMMUNITION DENSITY [36]	AREA (Ha)	FACTOR [37]	MAN DAYS	STAFF AVAILABLE	ESTIMATED TIME (DAYS)	REMARKS
	(a)	(b)	(a) x (b) = (c)	(d)	= (c) / (d)	
Very Heavy (10.0/m^2)	30	180	5400			
Heavy (5.0/m^2)	15	90	1350			
Medium (1.0/m^2)	0	50	0			
Light (0.2/m^2)	0	10	0			
ESTIMATED TASK CLEARANCE TIME (DAYS)					**7,014**	

f. Co-ordinating Instructions

(1) Timings

SER	DATE	TIME	EVENT	REMARKS
(a)	(b)	(c)	(d)	(e)
1	11 May 20	0600	Initial EOD Recce.	

[32] This assumes that the ground is prepared by hand or with light mechanical systems.

[33] The Factor is an estimate of the time in Days for 1 Person to complete the task for 1 Hectare.

[34] Destruction of fuzed ammunition 'in situ' by demolition.

[35] Recovery of unfuzed ammunition and scrap for further processing. The destruction by demolition of stockpiles of recovered unfuzed ammunition should be a concurrent activity. Do not forget to allocate separate staff for this task.

[36] UXO / Ammunition Density includes; 1) fuzed ammunition that must be destroyed in situ as UXO; 2) unfuzed ammunition that may be manually cleared; and 3) metallic fragments from detonated or deflagrated ammunition.

[37] This Factor estimates the time taken to lay clearance charges and manually recover unfuzed ammunition and metallic fragments. The Factor may have to be altered dependent on the proportion of fuzed ammunition versus unfuzed ammunition. It assumes access times have been considered under Ground Preparation, Search and Marking.

SER	DATE	TIME	EVENT	REMARKS
(a)	(b)	(c)	(d)	(e)
2	To Be Notified		Detailed recce.	
3	D Day		Advance party deploys	
4	D +1		Preparation of clearance area.	
5	D + 2		Main party deploys.	
6	D + 3		Clearance commences	Ongoing till completion.

4. SERVICE SUPPORT

a. Personal Equipment. Team personnel are to deploy with the appropriate personal equipment for field operations.

b. Accommodation. All personnel are to be accommodated at Unit No 5013, BFU BLUETOWN.

c. Rations. Rations are to be provided through Unit No 5013, BFU BLUETOWN on the basis of:

(1) Breakfast and evening meals at Unit No 5013, BFU BLUETOWN with packed rations for lunch at the clearance site on working days.

(2) On non-working days rations to be provided in accordance with local routine at Unit No 5013, BFU BLUETOWN.

(3) Daily ration strengths/nominal rolls will be provided by the EOD Team Ground Commander as required.

d. Transport. The following transport will be required to support the task:

SER	DATES	TYPE	QTY	TASK
(a)	(b)	(c)	(d)	(e)
1	21 Apr 20	4 x 4 Car	1	Recce
2	D day onward	4 x 4 Car	1	Safety Vehicle
3	D day onward	4 x 4 Truck	1	Serviceable Ammunition and stores.
4	D day onward	4 x 4 Truck	1	Movement of Unserviceable Ammunition to the Demolition Ground.
5	D day onward	4 x 4 Car	1	Movement of personnel and miscellaneous stores.
6	D +1 onward	Ambulance	1	Medical Support
7	D + 2 onward	Winch Veh/Crane	1	Removal of roof slabs. Completion estimated for D + 5.

e. Equipment. The equipment at Annex C will be required:

f. Serviceable Ammunition and Explosives. The list at Annex D is an estimate of the serviceable ammunition and explosive requirements; **this will be re-assessed as the operation continues.** Serviceable ammunition and explosives are to be stored and accounted for in accordance with National Regulations. A usage sheet is at Annex I.

g. Medical.

(1) First Aid. Trained medical staff **MUST** be present during all operations at the site. The EOD Team Leader **MUST** cease operations if there is no medical cover available. Medical staff should be suitably qualified in the treatment of explosive shock and trauma injuries. They should render all appropriate medical support to any casualties but must not expose himself to any unnecessary risk from UXOs by doing so.

(2) MEDEVAC. An Ambulance is to be available to MEDEVAC casualties to the nearest medical facility. A helicopter should be on standby during the EOD clearance operation to evacuate any very serious casualties.

(3) Surgery/Hospital.

(a) BLUETOWN.
Tel: (062) 34222.

(b) Disney. Any very serious casualties are to be evacuated to the Disney Military Hospital on the advice of medical personnel.
Tel: (042) 26601 Ext 344

h. Copious amounts of drinking water must be supplied in all working areas. Quantity depends on heat and humidity, and the number of people working in each area.

5. COMMAND AND SIGNAL

a. Operation Commander. Maj MOUSE, Chief EOD, REDLAND.

b. EOD Team Ground Commander. To Be Notified.

c. Deputy EOD Team Ground Commander. To Be Notified.

d. Reports and Returns. The following information is to be compiled and submitted to the EOD Cell, MOD on a weekly basis:

(1) Ammunition Recovered for Disposal by Demolition and certificate of disposal when destroyed. (Annex E)

(2) Ammunition Disposed of In Situ by Detonation. (Annex F)

(3) Ammunition Recovered for Storage. (Annex G)

(4) Scrap Recovered. (Annex H)

(5) Serviceable explosive used. (Annex I)

e. Contact Numbers.

SER	UNIT	NAME	TEL [1]	FAX/EMAIL
(a)	(b)	(c)	(d)	(e)
1	Chief EOD			
2	D/Chief EOD			
3	Ground Commander			
4	EOD Ammunition Specialist			
5	D/EOD Team Ground Commander			
6	Commander 5013			

SER	UNIT	NAME	TEL [1]	FAX/EMAIL
(a)	(b)	(c)	(d)	(e)
7	BFU BLUETOWN			
8	Commander BLUETOWN ASA			

f. A post operation report is to be completed within 2 weeks of completion of the clearance task and submitted to the Chief of EOD.

Annexes:

A. Map – Boundary of Clearance Area**.**
B. Technical References for expected UXO.
C. Equipment Requirements.
D. Serviceable Explosive Requirements.
E. Ammunition Recovered for Disposal by Demolition and certified destroyed.
F. Ammunition Disposed of In Situ by Detonation.
G. Ammunition Recovered for Storage.
H. Scrap Recovered.
I. Serviceable explosives used.

Distribution: Copy No

External:

Action:

Commander 5013 -
EOD Team Leader -

Internal:

Action:

Chief EOD -
D/Chief EOD -
EOD / Ammunition Specialist -

Information:

Chief Engineer -
Chief Ammunition and Armaments -

ANNEX B TO
EOD OPO 1/11

TECHNICAL REFERENCES

SER	AMMUNITION NATURE		ASSOCIATED FUZES		REMARKS
	TYPE	"PINK BOOK"[38] REFERENCE	TYPE	"PINK BOOK" REFERENCE	
(a)	(b)	(c)	(d)	(e)	(f)

[38] The 'Pink Book' is a generic title for any national set of technical publications on ammunition and explosives.

ANNEX C TO
EOD OPO 1/11

EQUIPMENT REQUIREMENTS

SER	ITEM	QTY	REMARKS
(a)	(b)	(c)	(d)
1	Crackerbarrel	50	Deflagration Technique
2	Baldrick	20	Deflagration Technique
3	Plastic Adhesive Tape	30	
4	RC Initiation System	2	
5	RC Initiation System Battery Charger	2	
6	EOD Tool Kit	2	
7	Hook and Line Set	2	
8	Knives Steel	4	
9	Shovels General Purpose	10	
10	First Aid Kit	2	
11	Search Equipment Electronic	4	
12	Tape Barrier Marking	10000m	
13	Hand Shovel	10	
14	Marker Posts (1m)	150	
15	Marker Posts (20cm)	500	
16	Crowbar	2	
17	Sand Bags	1000	
18	Sand		As Required
19	Sledge Hammer	2	
20	Pick Axe	3	
21	Whistles	10	
22	Flag Red	20	
23	Flag White	20	
24	Radio Set	10	
25	Radio Battery	TBN	
26	Charger Radio Battery	TBN	
27	Camera Photographic	1	
28	Photographic Film	4 rolls	
29	Pliers General Purpose	2	
30	Loping Shears	6	
31	Hand Shears	6	
32	Torch Hand	4	
33	Lamp Gas/Kerosene	2	
34	Kerosene/Gas Cylinder		As Required – see Ser 33
35	Batteries Hand Torch	TBN	
36	Battery Electronic Search Equipment	TBN	
37	Measuring Tape 100m	1	
38	Gloves Industrial Leather	25 Pairs	
39	Table	4	
40	Chairs	25	
41	Camp Bed	2	
42	Typewriter	1	

SER	ITEM	QTY	REMARKS
(a)	(b)	(c)	(d)
43	Stationery		As Required
44	Grappling Hook	4	
45	Pulley	4	
46	Grappling Hook Rope	500m	
47	Tent	2	
48	Technical Publications	2	Ammunition “Pink Book” AAF EOD SOPs 1 to 7
49	Earthing tool	2	
50	Winch gear, pulleys and ground anchors.	TBN	Removal of roof slabs.
51	Face Masks (half and quarter)	TBN	As required – to BS EN 140 or equivalent – collecting bare explosives involved in the Incident.
52	Nitrile Gloves	TBN	As required – handling bare explosives.

ANNEX D TO
EOD OPO 1/11

SERVICEABLE EXPLOSIVE REQUIREMENTS

SER	NATURE	QTY	REMARKS
(a)	(b)	(c)	(d)
1	Detonators (Plain)	20	
2	Detonators (Electric)	300	Based on 33% failure rate.
3	Detonating Cord (Metres)	1000	
4	Safety Fuze (Metres)	25	
5	Plastic Explosive (KG)	200	
6	Match Igniter Safety Fuse	40	
7	Nonel Shock Tube System	10,000	

Nb. The above list is dependent on the ammunition to be disposed of and the situation.

ANNEX E TO
EOD OPO 1/11

AMMUNITION RECOVERED FOR DISPOSAL BY DEMOLITION AND CERTIFICATE OF DISPOSAL

WEEK:		**WEEK ENDING:**	

SER	AMMUNITION TYPE	WEEKLY TOTAL			OPERATION TOTAL			REMARKS, INCLUDING ITEMS CERTIFIED DESTROYED, DATE AND SIGNATURE
		QTY	AUW (KG)	NEQ (KG)	QTY	AUW (KG)	NEQ (KG)	
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(j)
	TOTALS							

ANNEX F TO
EOD OPO 1/11

AMMUNITION DISPOSED OF IN SITU BY DETONATION/DEFLAGRATION

WEEK:		**WEEK ENDING:**	

SER	AMMUNITION TYPE	WEEKLY TOTAL			OPERATION TOTAL			REMARKS
		QTY	AUW (KG)	NEQ (KG)	QTY	AUW (KG)	NEQ (KG)	
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(j)
	TOTALS							

ANNEX G TO
EOD OPO 1/06

AMMUNITION RECOVERED FOR STORAGE

WEEK:		**WEEK ENDING:**	

SER	AMMUNITION TYPE	WEEKLY TOTAL			OPERATION TOTAL			REMARKS
		QTY	AUW (KG)	NEQ (KG)	QTY	AUW (KG)	NEQ (KG)	
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(j)
	TOTALS							

ANNEX H TO
EOD OPO 1/11

SCRAP RECOVERED

An ESTIMATE should be made of the amount of scrap recovered during the operation, as it is a type of Performance Indicator that is necessary for estimating manpower requirements for future operations.

Free From Explosive procedures must be strictly followed to ensure that dangerous munitions do not end up in the possession of the civilian population.

WEEK:		**WEEK ENDING:**	

SER	SCRAP TYPE	QUANTITY (KG)	REMARKS
(a)	(b)	(c)	(d)
	Ferrous		
	Non Ferrous		
	Copper		
	Miscellaneous		
	Packaging		
	TOTALS		

ANNEX H TO
EOD OPO 1/11

SERVICEABLE EXPLOSIVE USED

Ser	Item	Qty	Date used	Where	By (name)	Signature	Remarks

Amendment record

Management of IATG amendments

The IATG are subject to formal review on a five-yearly basis. This does not preclude amendments being made within these five-year periods for reasons of operational safety, efficacy and efficiency or for editorial purposes.

As amendments are made to this IATG module they will be given a number, and the date and general details of the amendment will be shown in the table below. The amendment will also be shown on the cover page of the IATG by the inclusion of the amendment number and date.

As the formal reviews of each the IATG module is completed, new editions will be issued. Amendments will be incorporated into the new edition and the amendment record table cleared. Recording of amendments will then start again until a further review is carried out.

The most recently amended, and thus extant, IATG module is posted on www.un.org/disarmament/ammunition

Number	Date	Amendment Details
0	01 Feb 15	Release of Edition 2 of IATG.
1	31 March 21	Release of Edition 3 of IATG.