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# Battle Area Clearance (BAC)

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## Warning

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# Contents

Contents ..... iii
Foreword ..... iv
Introduction ..... v
Battle Area Clearance ..... 1
1. Scope ..... 1
2. References ..... 1
3. Terms, definitions and abbreviations ..... 1
4. BAC General ..... 2
5. BAC requirements ..... 2
5.1 Area to be cleared ..... 2
5.2. Quality of clearance ..... 3
5.3. Depth of clearance ..... 3
5.4. Detection Equipment ..... 4
6. Safety ..... 4
7. Reporting and recording ..... 5
8. Responsibilities and obligations ..... 6
8.1 Parties to a Conflict ..... 6
8.2 United Nations ..... 6
8.3 National Mine Action Authority ..... 6
8.4 Demining organisation ..... 7
8.5 Monitoring body ..... 7
8.6 Inspection body ..... 8
Annex A (Normative) References ..... 9
Amendment record ..... 11

# Foreword

International standards for humanitarian mine clearance programmes were first proposed by working groups at an international technical conference in Denmark, in July 1996. Criteria were prescribed for all aspects of mine clearance, standards were recommended and a new universal definition of 'clearance' was agreed. In late 1996, the principles proposed in Denmark were developed by a UN-led working group and the *International Standards for Humanitarian Mine Clearance Operations* were developed. A first edition was issued by the UN Mine Action Service (UNMAS) in March 1997.

The scope of these original standards has since been expanded to include the other components of mine action and to reflect changes to operational procedures, practices and norms. The standards were re-developed and renamed as *International Mine Action Standards* (IMAS).

The United Nations has a general responsibility for enabling and encouraging the effective management of mine action programmes, including the development and maintenance of standards. UNMAS, therefore, is the office within the United Nations responsible for the development and maintenance of IMAS. IMAS are produced with the assistance of the Geneva International Centre for Humanitarian Demining.

The work of preparing, reviewing and revising IMAS is conducted by technical committees, with the support of international, governmental and non-governmental organisations. The latest version of each standard, together with information on the work of the technical committees, can be found at http://www.mineactionstandards.org/. Individual IMAS are reviewed at least every three years to reflect developing mine action norms and practices and to incorporate changes to international regulations and requirements.

# Introduction

It is accepted that despite ammunition procurement and production quality controls, on the battlefield, some munitions do not always work as intended. Historically, military operational Explosive Ordnance Disposal (EOD) planning has worked against a prediction of a 10% failure rate from munitions fired. However recent estimates of failed cluster munitions have indicated that failure rates of up to 30% - 50% can be expected.[1] Therefore, in situations where there has been high ammunition usage rates the resulting hazards from Explosive Remnants of War (ERW), including unexploded sub-munitions, can be extensive across former battle areas. In addition, in almost all post-conflict environments, there have been undesired explosive events in ammunition storage facilities because of inadequate and/or inappropriate munition management. As a result, ERW have been dispersed and scattered over a large area around the storage facility.

The hazard or risk from ERW will vary according to the munition type and a number of variable factors associated with their release, firing or arming systems. Therefore, if the condition of an item of UXO cannot be established, the principle is to treat each item as dangerous and to destroy them in situ. The availability of technical information can help considerably with risk and munition hazard assessments and decisions about whether an item is safe, or not, to move.

Lessons have been drawn from operations in Afghanistan, Kosovo, Lao PDR and Lebanon to help provide guidance on structuring this IMAS. While it is recognised that the need for operational ERW clearance activity is most intense in the short-term period following cessation of hostilities, a long-term clearance and response capability may need to established and maintained over many years.

The target of humanitarian demining is the identification and removal or destruction of all mine and ERW hazards from a specified area to a specified depth to ensure the land is safe for land users. In a war or conflict many areas may be fought over but not mined and these former battle areas may contain hazards from ERW. The ERW may then pose a humanitarian hazard and constrain development. Clearance of former battle areas differs from mine clearance but should still be conducted in a planned and systematic way to ensure safe access and land use.

Battle Area Clearance (BAC) is the systematic and controlled clearance of hazardous areas where the risk is known not to include mines.

As for all clearance operations, the beneficiaries of released land through BAC must be confident that the cleared land is safe for their use. This requires management systems and clearance procedures, which are appropriate, effective, efficient and safe. Planning for BAC should consider national and local provincial priorities. In addition, the local community should also receive regular briefings and explanations during the clearance operation as this acts as a very effective confidence building measure. A Community Liaison function should be a routine activity incorporated with operations.

This standard builds on the two-stage approach covered in IMAS 09.10 Stage 1, Quality Assurance (QA), involves the accreditation and monitoring of the demining organisation before and during the clearance process. Stage 2, Quality Control (QC), relates to the inspection of safe cleared land before it is formally released to the beneficiary for use.

This combined application of QA (before and during the clearance process) with post-clearance QC will contribute to achieving an acceptable level of confidence that the land is safe for its intended use. The quality of clearance must be acceptable to both the National Mine Action Authority (NMAA) and future land users.

[1] Failure rates for munitions used in Laos are reported by the NMAA to be up 30%, Failure rates for munitions used in Lebanon in 2006 were reported by the MACC SL to be in the order of 50% or higher.

# Battle Area Clearance

## 1. Scope

This standard guides the quality system (i.e. the organisation, procedures and responsibilities) necessary to determine that former Battle Areas have been cleared to acceptable standards.

For clearance of the area around an ammunition storage site after an undesired explosion, see IATG 11.30 ASA Explosions – EOD Clearance.

## 2. References

A list of normative and informative references is given in Annex A. Normative references are important documents to which reference is made in this standard and which form part of the provisions of this standard.

## 3. Terms, definitions and abbreviations

A complete glossary of all the terms, definitions and abbreviations used in the IMAS series of standards is given in IMAS 04.10.

In the IMAS series of standards, the words 'shall', 'should' and 'may' are used to indicate the intended degree of compliance.

a) 'shall' is used to indicate requirements, methods or specifications that are to be applied in order to conform to the standard;

b) 'should' is used to indicate the preferred requirements, methods or specifications; and

c) 'may' is used to indicate a possible method or course of action.

The term 'National Mine Action Authority' (NMAA) refers to the government entity, often an interministerial committee, in an EO-affected country charged with the responsibility for broad strategic, policy and regulatory decisions related to mine action.

Note: In the absence of an NMAA, it may be necessary and appropriate for the UN, or some other body, to assume some or all of the responsibilities of an NMAA.

The term ‘battlefield’ refers to an area in which ERW including UXO and Abandoned Ordnance (AO) have been found. This may include former battle areas, defensive positions and sites where air delivered or artillery munitions have been left, fired or dropped.

The term ‘battle area clearance’ (BAC), refers to the systematic and controlled clearance of hazardous areas where the hazards are known not to include mines.

The term 'monitoring body' refers to any organisation which monitors the work of the clearance organisation and its sub-units on behalf of the NMAA or MAC.

The term 'inspection body' refers to any organisation which conducts QC on behalf of the NMAA or MAC by applying random sampling procedures, or other appropriate and agreed checks, on the clearance specifications.

Former battlefields shall be accepted as 'cleared' when the clearance organisation has ensured the removal and/or destruction of all, or specified, ERW/ EO hazards, depending on the tasking instructions, from the specified area to the specified depth.

# 4. BAC General

BAC operations involve the location and disposal of ERW, including UXO and AO, but not mines, over specific areas, which may include battlefields, defensive positions and sites where air delivered or artillery munitions, including cluster munitions, have been fired or dropped.

Depending on the humanitarian priorities and required land use, BAC may involve surface and sub-surface clearance. The requirement for BAC can be in both urban and rural environments.

BAC operations do not cover the disposal of stockpiled munitions in national storage facilities.

BAC should not be conducted in areas where a landmine hazard is expected. Conversely, landmine clearance procedures should not be used, where BAC could be more appropriate, and more efficient.

Note: In some circumstances it may be acceptable for BAC techniques to be applied in areas where it is known that only certain type of anti-vehicle mines may exist but definitely that there are no anti-personnel mines. However, this decision shall be taken based on a field risk assessment or a complete hazard analysis of the specific area. See TN 10.20.02 field risk assessment.

Explosive Ordnance (EO) dealt with on BAC operations can include:

a) munitions in former military positions and temporary ammunition storage locations, or munitions simply dropped or abandoned that have not been prepared for use and are not in a national stockpile;

b) munitions that have been primed, fuzed, armed or otherwise prepared for use but have not been fired, for example, munitions in gun positions or in former defensive positions that were over run;

c) munitions that have been fired, dropped, launched or projected but which have failed to fully function as designed. This includes unexploded sub-munitions and hazardous components of those UXO that have only partially functioned; and/or

d) booby traps and (failed, or abandoned, Improvised Explosive Devices (IEDs) left behind after hostilities have ceased[2]).

# 5. BAC requirements

## 5.1 Area to be cleared

The extent of the area to be cleared shall be determined by the tasking authority developed through the conduct of non-technical and/or technical surveys that use sources of reliable information and evidence collected during these surveys, or progressive clearance operations. For non-technical survey see IMAS 08.10 and for technical survey see IMAS 08.20.

The priorities for BAC clearance in support of development/commercial projects, e.g. road construction etc, may specify an exact area to be cleared. Different depths of clearance may be specified for different areas depending on an assessment of hazard and the future land use. The area outside of these boundaries may still be contaminated. However, for humanitarian BAC tasks, the extent of the area to be cleared cannot always be established at the outset but can be identified as clearance progresses. As such, the priorities for clearance should be determined by the impact on the individual community, and the special needs of men, women, and children within it, balanced against national infrastructure priorities.

[2] The responsibility for dealing with IEDs would normally be one for military or police authorities, with specialized equipment and a need to collect forensic evidence. Humanitarian / civilian clearance organizations should be wary of clearance of failed or abandoned IEDs for fear of being seen as taking sides in a conflict and subsequent loss of humanitarian status.

## 5.2. Quality of clearance

The quality requirements for BAC depend on the category of BAC conducted. The two categories of BAC are surface clearance and sub-surface clearance. A field risk assessment, factoring humanitarian concerns and clearance resources shall be performed in order to decide on concurrent or sequential surface and subsurface clearance. See TN 10.02.02 field risk assessment.

a) surface clearance usually relies on visual search, although there may be instances where a detector may be used to aid in the investigation of areas of vegetation, earth mounds or other limited access suspect areas. Recording of searches, munition types and locations of items found is important and may assist determining the details of any subsequent sub-surface search. Unless site-specific requirements dictate, all ERW including Small Arms Ammunition (SAA), and hazardous parts thereof, are to be removed. For clearance of Armoured Fighting Vehicles refer to TNMA 09.30.01, for clearance of Depleted Uranium refer to TNMA 09.30.02 and for clearance of cluster munitions refer to TNMA 09.30.06 2008;

b) sub-surface clearance can use various detection or excavation techniques. All specified ERW and hazardous components are removed in accordance with the requirements of the tasking authority. Disposal of UXO and AO should be carried out in accordance with IMAS 09.30 Explosive Ordnance Disposal. For EOD clearance of the area around an ammunition storage site after an undesired explosion, see also IATG 11.30 ASA Explosions – EOD Clearance.

The removal and/or destruction of all or specified ERW/UXO hazards, in the specified area to the specified depth should be achieved by:

c) using accredited BAC clearance organisation(s) with operationally accredited capabilities, such as manual BAC clearance, and with staff with appropriate levels of EOD qualification and competence, (for EOD see IMAS 09.30 and for EOD competency standards see CWA 15464:2005) using appropriate management practices, and applying safe and effective operational procedures;

d) monitoring the clearance organisation and its sub-units (see IMAS 07.40) ; and

e) conducting a process of post-clearance inspection of cleared land

A BAC task order should specify the area to be cleared, the detection target size, the clearance depth, and the requirements for monitoring and inspection. These should be specified by the NMAA or the client.

## 5.3. Depth of clearance

If a battlefield requires sub-surface clearance, the specified depth of clearance shall be determined by the tasking authority and may be developed through the use of non-technical and technical surveys, or from other reliable information which establishes the depth of the ERW hazards expected in the area and an assessment of the future intended land use. In the absence of reliable information on the depth of ERW hazard, a default depth for clearance should be established by the tasking authority.

Specifying clearance depths will depend on the intended land use, the likely ERW hazard in the area to be cleared and other environmental factors. For example:

a) ERW may be on the surface of the ground. In this case, the specification may call for the removal and or destruction only of surface ERW hazards;

b) clearance in urban areas may require the removal of many meters of rubble as part of the clearance process;

c) in situations where large bombs and missiles or heavy calibre projectiles have been used, the depth of clearance may be several meters; and/or

d) shifting sands in desert areas or coastal areas may require clearance to a depth of several meters to locate and destroy ERW which were originally on or close to the surface.

The required clearance depth can be adjusted as clearance work progresses. Any change shall be agreed between with the NMAA and the clearance organisation, and shall be formally recorded.

The clearance process should be repeated if there is a subsequent change to the land use which requires a greater depth of clearance. Detailed records and mechanisms for monitoring potential changes should be established.

Note: There may be circumstances where a clearance organisation is funded to operate in an area with a mandate to identify its own clearance tasks based on general priorities provided by the donor and/or NMAA. In such circumstances, the clearance organisation should use guidelines provided in IMAS 07.11 land release, in advance of clearance, produce a clearance plan that indicates the area to be cleared and the intended clearance depth.

Note: During a survey, determining the season of the year that the 'battle' took place can be important and may affect the depth of munition penetration and contamination, for example wet season with soft soil, winter with frozen soils, or depending on the geographical region and climate, the reverse may be the case with summer causing hard-baked soils etc.

### 5.4. Detection Equipment

For sub-surface clearance various detecting techniques may be appropriate. Appropriate detection tools include:

a) shallow search metal detectors - the same as used during mine clearance albeit they may be too sensitive for efficiently conducting a BAC task;

b) shallow search metal detectors which are designed or calibrated against a specified ERW target instead of minimum metal mines;

c) wide area and large loop detectors;

d) deep search locators;

e) magnetometers;

f) detector arrays, manually carried or mounted on vehicles or trailers; and/or

g) mine detecting dogs (MDD)

Note: The use of MDD will be severely limited in the immediate aftermath of a cluster munition strike due to explosive contamination of the land. For further information on factors affecting MDD operations see IMAS 09.41.

For details about detection technology refer to the Metal Detector Handbook for Humanitarian Demining published by the European Commission in 2003, and Guidebook on Detection Technologies and Systems for Humanitarian Demining, published by the GICHD in March 2006.

## 6. Safety

The minimum safety distances for BAC operations are dependent on the expected hazard and the type of operation being conducted.

a) for surface clearance investigation of UXO, where there is a risk of movement or disturbance of items of UXO, a safety distance should be considered and the principle of the minimum number of people in a specified danger area applied;

b) for sub-surface clearance involving excavation a suitable safety distance related to the expected munitions should be assessed and applied. As an example a default safety distance is applied in Afghanistan of 50m and in Laos of 10m, based on effective range predictions of the most common munitions, an assessment of risk and the likelihood of detonation. Guidelines on field risk assessment and safety distance are given in IMAS 10.20. See also TNMA 10.20-02/2009 on Field Risk Assessment.

Note: Worksite preparation may allow careful vegetation cutting, and removal, and movement over a site following surface clearance to enable marking and preparation of clearance 'lanes' or 'boxes' for subsequent sub-surface clearance. Sub-surface checks should be made before driving stakes or markers in to the ground.

Note: BAC search patterns need to be carefully planned and coordinated to ensure complete coverage of an area. 'Lane' marking, similar to mine clearance operations, may be used but the speed of BAC is often much faster than mine clearance in which case the need for marking should be balanced against productivity. Some programmes will divide an area for sub-surface clearance into boxes for example 25m x 25m, or 50m x 50m, and allocate one clearance technician /deminer, or a large loop team, to each box. The boundaries of the 'box' might be marked by stakes and/or tape/string, then the internal lanes would be marked and moved quickly using tight strings, with an aim of maintaining control and ensuring full area coverage but also minimising the time spent on marking. Marking of BAC should be carried out in accordance with IMAS 08.40 Marking of hazards.

## 7. Reporting and recording

Both the Convention on Certain Conventional Weapons (CCW) - Protocol V on Explosive Remnants of War and the Convention on Cluster Munitions (CCM) emphasise certain obligations on recording, storage and release of information on UXO, AO and sub-munitions. In line with the intention of these conventions, the maintenance of comprehensive records relating, among other things, to what has been found in BAC operations, by whom and where and how deep, will assist short and longer term planning.

In many countries, rapid surface BAC will reduce risk to communities and enable access across land. In the longer term, additional sub-surface clearance may be or become necessary. There are significant benefits of maintaining records indicating what type of munitions may be found in different areas. For example, the surface clearance from a cluster munition strike may remove much of the hazard, but in the process it may also remove the indication of the munitions "footprint" or the area of contamination, thus recording munitions types and locations would help preserve information of strike areas for subsequent sub surface search. Every task, regardless whether it is surface or sub-surface, should be accurately documented and recorded with the NMAA.

Recording of munition types will also assist in building knowledge of munition failure rates, which, in time, may enable planning predictions about the types and quantities of UXO and AO likely to be encountered in other battle areas.

The availability of modern mapping and reporting tools (GIS, IMSMA etc) should enable accurate information management to help plan immediate and long term EOD requirements. Given that in some countries the need for clearance of ERW and EO will continue for decades, a robust and comprehensive recording system should be established from the outset and diligently maintained.

The NMAA should specify the requirement for reporting and recording.

# 8. Responsibilities and obligations

## 8.1 Parties to a Conflict

In conforming to the principles laid out in the Charter of the United Nations, Protocol V of CCW and the rules of international law of armed conflict, parties to an armed conflict have a responsibility to ensure that civilians are protected from ERW.

In cases where EO is used and which becomes ERW, the 'users' shall, after the cessation of active hostilities, provide, where feasible, technical, financial, material or human resource assistance, to facilitate the marking and clearance, removal or destruction of such ERW.

Parties to a conflict have a responsibility to:

a) survey and assess the hazard posed by ERW;

b) assess and prioritise the different needs and practicability in terms of marking and clearance, removal or destruction;

c) mark and clear, remove or destroy ERW;

d) take steps to mobilise resources to carry out these activities; and

e) In geographical areas that are now outside of the control of one or more of the parties of a conflict they should still make available records of ammunition use, by types and locations and other knowledge they have of locations of ERW.

[Reference: The Convention on Prohibitions and Restrictions on the use of Certain Conventional Weapons which may be deemed to be excessively injurious or to have indiscriminate effects (CCW)].

## 8.2 United Nations

On behalf of affected communities and states the United Nations should be prepared to assess situations and assist in the collection of relevant information from parties to a conflict.

The United Nations shall maintain information on:

a) clearance means and technologies for dealing with ERW;

b) lists of experts, expert agencies or national points of contact on clearance of ERW; and

c) technical information on relevant types of explosive ordnance.

## 8.3 National Mine Action Authority

The NMAA shall:

a) where possible, specify the area to be cleared and depth of clearance in contracts and agreements;

b) specify the criteria for clearance to allow clearance organisations the flexibility to clear out to the limits of a suspect area;

c) specify the standards and guidelines for QA and QC to be applied to clearance contracts and agreements;

d) accredit organisations to undertake clearance;

e) maintain records of cleared and uncleared land showing the clearance status for each suspected area;

f) collect and make available technical information and accident / incident information / analysis to aid the location and safe disposal of EO from former battlefields; and

g) specify the core EOD competencies to be applied within clearance organisations.

### 8.4 Demining organisation

The demining organisation shall:

a) gain from the NMAA accreditation to operate as a BAC clearance organisation;

b) apply the NMAA clearance standard. In the absence of national standards, the demining organisation shall apply the IMAS, or such standards as are specified in their contract;

c) maintain and make available documentation of clearance as specified by the NMAA;

d) apply management practices and operational procedures which aim to clear land to the requirements specified in the contract and tasking agreement(s);

e) ensure that the affected community is fully cognisant of all clearance activities in the area and the implications for the community, (particularly related to the depth of clearance); and

f) ensure that men and women employed in BAC operations are competent and suitably trained.

In the absence of a NMAA, the demining organisation shall assume additional responsibilities. These include, but are not restricted to:

g) for each Battle Area, agree the requirement and formally document in accordance with IMAS 07.11 land release:

   (1) the area of the clearance; and

   (2) the depth of the clearance;

h) establish and apply a system of monitoring the clearance activities, detailed reporting of the UXO and AO encountered and post-clearance inspections of cleared land; and

i) assist the host nation, during the establishment of a NMAA, in framing national standards for clearance quality.

### 8.5 Monitoring body

The monitoring body shall:

a) gain from the NMAA accreditation to operate as a monitoring body;

b) monitor the clearance organisation and its sub-units in accordance with the intentions of IMAS 07.40 and the requirements of the NMAA; and

c) maintain and make available documentation of monitoring inspections as specified by the NMAA.

### 8.6 Inspection body

The inspection body shall:

a) gain from the NMAA or organisation acting on its behalf accreditation to operate as an inspection body;

b) apply sampling procedures in accordance with the requirements of the NMAA; and

c) maintain and make available documentation of inspections as specified by the NMAA.

# Annex A
(Normative)
# References

The following normative documents contain provisions, which, through reference in this text, constitute provisions of this part of the standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of the standard 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 and IEC maintain registers of currently valid ISO or EN:

a) IATG 11.30 ASA Explosions – EOD Clearance;

b) IMAS 07.10 Guide for the management of demining operations;

c) IMAS 07.30 Accreditation of demining organisations and operations;

d) IMAS 07.40 Monitoring of demining organizations;

e) IMAS 07.11 Land release;

f) IMAS 08.10 Non-technical survey;

g) IMAS 08.20 Technical survey;

h) IMAS 08.40 Marking of hazards;

i) IMAS 09.10 Clearance requirements;

j) IMAS 09.30 Explosive ordnance disposal;

k) IMAS 09.41 Operational procedures for Mine Detection Dogs

l) IMAS 10.20 S&OH demining worksite safety;

m) IMAS 10.30 S&OH PPE; and

n) CWA 15464:2005 EOD competency standards.

Other informative references:

o) Protocol V on Explosive Remnants of War to the CCW;

p) The UN Charter;

q) Convention Cluster Munitions (CCM);

r) TN 09.30.01 2001 – EOD Clearance of Armoured Fighting Vehicles (AFV);

s) TN 09.30.02 2001 – Clearance of Depleted Uranium (DU) Hazards;

t) TN 09.30.06 2007 – Clearance of cluster munitions based on Lebanon experience;

u) TN 10.20-02/2009 on Field Risk Assessment;

v) Metal Detectors Handbook for Humanitarian Demining published by the European Commission in 2003; and

w) Guidebook on Detection Technologies and Systems for Humanitarian Demining - published by GICHD in March 2006.

The latest version/edition of these references should be used. GICHD hold copies of all references used in this standard. A register of the latest version/edition of the IMAS standards, guides and references is maintained by GICHD, and can be read on the IMAS website (http://www.mineactionstandards.org/). NMAA, employers and other interested bodies and organisations should obtain copies before commencing mine action programmes.

# Amendment record

**Management of IMAS amendments**

The IMAS series of standards are subject to formal review on a three-yearly basis, however this does not preclude amendments being made within these three-year periods for reasons of operational safety and efficiency or for editorial purposes.

As amendments are made to this IMAS they will be given a number, and the date and general details of the amendment shown in the table below. The amendment will also be shown on the cover page of the IMAS by the inclusion under the edition date of the phrase 'incorporating amendment number(s) 1 etc.'

As the formal reviews of each IMAS are completed new editions may be issued. Amendments up to the date of the new edition 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 IMAS will be the versions that are posted on the IMAS website at www.mineactionstandards.org.

| Number | Date | Amendment Details |
|---|---|---|
| 1 | 01 Mar 2010 | 1. Changing definition of NMAA.<br>2. Changing UNMAS address.<br>3. Removal of Annex B and its reference in Clause 3.<br>4. Integration of the land release concept and inclusion of references to land release IMAS 08.20, 08.21 and 08.22.<br>5. Ensuring inclusion of gender and diversity issues - minor additions to that effect.<br>6. Inclusion of a normative reference to UNDP/SEESAC RAMD/S 05.55.<br>7. Inclusion of a reference to CWA on EOD competency standards.<br>8. Minor changes throughout to include cluster munitions issues and inclusion of a reference to CCM. |
| 2 | 01 Aug 2012 | 1. Deletion of UNDP/SEESAC RMDS/G 05.55 as normative reference and throughout document.<br>2. Inclusion of IATG 11.30 ASA Explosions – EOD Clearance as a normative reference and throughout document.<br>3. Reviewed for impact of IATG development.<br>4. Minor typographical amendments. |
| 3 | 01 Jun 2013 | 1. Reviewed for the impact of new land release IMAS.<br>2. Amendment No included in the title and header.<br>3. References updated to IMAS NTS, TS and land release in clauses 5.1, 5.3, 8.4 and Annex A |
| 4 | 29 Jan 2020 | 1. Removal or references to IMAS 09.20. |
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