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Marking explosive ordnance hazards

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Warning

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Contents

Foreword

International standards for humanitarian demining programmes were first proposed by working groups at an international technical conference in Denmark, in July 1996. Criteria were prescribed for all aspects of demining, 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) with the first edition produced in October 2001.

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 organizations. The latest version of each standard, together with information on the work of the technical committees, can be found at 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

The marking of explosive ordnance (EO) hazards is undertaken to provide a clear and unambiguous warning of danger to people at risk including women, girls, boys and men, and where possible to install a physical barrier to reduce the risk of unintentional entry into hazardous areas.

This standard draws on the three conventions in international humanitarian law which deal with land EO: 1) the Anti-personnel Mine Ban Convention (APMBC or Ottawa Convention); 2) Amended Protocols II and V to the United Nations Convention on Certain Conventional Weapons (CCW); and 3) the Convention on Cluster Munitions (CCM). Countries that are States Party to these Conventions and Protocols have certain specific obligations regarding the marking of hazards.

The provisions of this standard do not replace the legal obligations detailed in the Conventions. States that have ratified, acceded to, or consent to be bound by these respective instruments, have the obligation to comply with their specific provisions.

Marking explosive ordnance hazards

1 Scope

This standard specifies the minimum requirements for the marking of explosive ordnance (EO) hazards (isolated EO) and suspected and confirmed hazardous areas (polygons). This marking is intended to warn civilians and to prevent them from approaching EO hazards or entering suspected and confirmed hazardous areas. This standard also details the responsibilities of the national mine action authorities and mine action organizations involved.

It applies to the marking of hazardous areas on land. It applies to the marking aimed at preventing the entry into hazardous areas by people approaching by land. It does not provide guidance for approaches by air. It does not apply to the marking of underwater contamination.

This document does not cover the specification for the marking within the perimeter of hazardous areas when conducting technical survey (TS) and clearance operations. IMAS 10.20 and TNMA 10.20.02/09 provide additional guidance for the management of marking on worksite.

It does not cover the specifications for the marking of items of EO in the scope of explosive ordnance disposal (EOD) clearance of ammunition storage area explosions (see IMAS 09.12).

2 Normative references

A list of normative 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 and definitions

A complete glossary of all the terms, definitions and abbreviations used in the International Mine Action Standards (IMAS) series is given in IMAS 04.10.

In the IMAS series, the words “shall”, “should” and “may” are used to indicate the intended degree of compliance:

- “shall” is used to indicate requirements, methods or specifications that are to be applied in order to conform to the standard;
- “should” is used to indicate preferred requirements, methods or specifications; and
- “may” is used to indicate a possible method or course of action.

3.1
explosive ordnance marking
EO marking
emplacement of a measure or combination of measures, including EO signs, EO boundary markers and physical barriers, to indicate the location of a spot hazard or the boundary of a suspected or confirmed hazardous area to provide a clear warning of EO danger to civilians

3.2
explosive ordnance sign
EO sign
visual notice giving information in a written and/or symbolic form which is designed to provide warning to the public of the presence of suspected or confirmed hazardous area or spot EO hazard

3.3
explosive ordnance boundary marker
EO boundary marker
object, other than EO signs, used to identify the perimeter of a suspected hazardous area or confirmed hazardous areas

3.4
effectiveness
extent to which the intervention's objectives were achieved, or are expected to be achieved, taking into account their relative importance

3.5
efficiency
measure of how economically resources/inputs (funds, expertise, time, etc.) are converted to results (outputs and outcomes).

4 General requirements for EO marking systems

Once a suspected hazardous area (SHA), confirmed hazardous area (CHA) or spot hazard is identified, it shall be marked as soon as possible to reduce the risk to civilians. The EO marking shall be monitored and maintained and shall only be removed once the area is cleared or cancelled. If an SHA or CHA is reduced, the EO marking shall be adjusted to the new perimeter.

The EO marking shall be emplaced along the perimeter of SHA/CHA in a manner that it is visible from any direction of approach. In case a SHA/CHA or a spot hazard is limited to a building, the marking may be put directly on the external structure of the building. To ensure the continuity of the marking, such marking shall be emplaced in a manner that is visible when approaching any of its entrances.

EO marking shall be unambiguously recognizable and understandable as indicating EO hazards by persons regardless of their age, gender, language and education, especially their level of literacy.

EO signs and EO boundary markers shall:

- be understood, recognizable and appropriate to the local cultural context;
- use a contrasted and highly visible colour commonly associated with danger, such as red or orange.

EO marking shall clearly identify which side of the marked boundary is considered to be within the SHA/CHA and which side is considered to not be contaminated with EO.

EO signs shall have two sides to indicate which one is considered to be within the SHA/CHA, and which one is considered to not to be contaminated with EO. The two sides shall be of different colours. In the case when the marking is put directly on the external structure of a building, the marking shall only have one side.

Manufactured EO signs shall:

- be no smaller than 28 cm horizontally by 20 cm vertically for a triangle;
- be no smaller than 25 cm per side for a square;
- contain a symbol sensitive to the local culture and text indicating a danger due to EO. The text shall be in the language(s) and alphabet(s) that are understood by the local communities. It may contain additional text in a different language accessible to larger groups of people, for example, circulating people or displaced people.

EO signs should not distinguish between different types of EO except as noted in Annex B.

EO signs and boundary markers may be tested with a representative sample of the target audience to ensure marking is understood regardless of literacy, age and other diversity factors relevant to the affected communities.

Examples of EO signs are given in Annex B.

If EO signs are not available, or when local conditions prevent their effective use, then EO boundary markers shall be used to indicate EO hazards. An example of the use of EO boundary markers is given in Annex C.

EO marking in daylight shall be clearly visible from a distance of at least 30 m before entering an SHA or CHA. An EO sign shall be clearly visible from the next EO sign. If EO signs are obscured by vegetation or terrain, the use of a physical delineation (for example, warning tape) or barrier (like fencing) should be considered to ensure the continuity of the EO marking. If an area is known to experience a high volume of human traffic, the use of a physical barrier should be considered.

The design of hazard marking systems and material should take account of:

- the duration for which the marking system will be in place;
- the cost and availability of local materials;
- the risk of degradation of the EO marking due to local environmental conditions including the climate, the vegetation and the fauna;
- the risk of degradation of the EO marking by the population, for example, the risk of removal of EO marking material due to its intrinsic value, and the fauna.

It is generally accepted that materials used in marking systems should have little, if any, value or practical use for purposes other than EO hazard area marking in order to minimize the risk of intentional removal.

EO signs and boundary markers shall not be constructed of munition casings, materials that could have contained explosives, or discarded weapon systems.

EO marking of the perimeter of the hazardous area shall be established on safe ground, on the edge closest to the SHA/CHA without entering it. Subsurface checks should be made before driving stakes or any structure into the ground.

5 EO marking systems

5.1 Temporary EO marking

An identified SHA, CHA or isolated EO shall be marked as soon as possible.

A temporary EO marking may be installed in order to prevent the entry of the population into these areas. The concerned communities shall be informed of the temporary EO marking.

The temporary EO marking system shall remain effective until:

- the installation of a durable EO marking system if no further land release action or explosive ordnance disposal (EOD) spot task is going to take place in the near future;
- the cancellation of the hazardous area.

The temporary EO marking system shall be replaced with a durable EO marking system if no further land release action or EOD spot task is going to take place in the near future.

The national mine action authority (NMAA), or the organization acting on its behalf, shall include requirements for temporary EO marking in the national mine action standards (NMAS) and for its removal or replacement with a durable EO marking system.

5.2 Durable EO marking systems

If no further land release action, such as TS or clearance, or EOD spot task is going to take place in the near future, then a durable EO marking system shall be installed. The concerned communities shall be informed of the durable EO marking system.

The NMAA, or the organization acting on its behalf, shall include requirements for durable EO marking in the NMAS.

The EO marking system shall remain effective until such a time it is removed. Thus, it shall effectively prevent accidents resulting from the entrance of people in identified hazardous areas or from an interaction with an EO until the completion of the land release process. This overarching requirement guides the design and the choice of material for EO marking systems.

The design of such marking includes but is not limited to the following points:

- the effective exclusion of the population from the identified SHA/CHA;
- the planned or foreseeable duration after installing the EO marking system and further land release activity (TS and/or clearance);
- the cost and durability of EO marking material;
- local materials freely available in the contaminated region;
- the risk of degradation of the EO marking due to human and environmental factors;
- the impact on the environment caused by the EO marking;
- the cost and access to the EO marking to monitor and maintain it.

In certain environments, the use of physical barriers can contribute to the long-term effectiveness of the EO marking system and to the reduction of its maintenance costs. Physical barriers may include fences, walls, ditches or other obstructions that prevent the unintentional entry into an SHA, CHA or spot hazard.

However, as a general rule, it is not efficient to use physical barriers for EO marking of an SHA/CHA that is scheduled for clearance in the near future. Rather, the NMAA and the demining organizations may design and use alternative cost-effective materials for EO marking of such areas.

If, due to any reason, the clearance of an SHA or CHA is postponed to an unknown date, then the EO marking system of the area should be reinforced with the use of physical barriers.

The durable EO marking systems shall conform to the standards determined by the NMAA or the organization acting on its behalf, and required measures should be taken to make sure the EO marking system is monitored and maintained until the area is cleared.

This includes the conformance to environmental management as determined by the NMAA or the organization acting on its behalf in policy and national mine action standards (see IMAS 07.13 environmental management in mine action).

5.3 Informal EO marking systems

Informal (or improvised) EO marking systems are generally placed or erected by the local population. They likely do not follow any standard.

Mine action organizations shall avoid using informal EO marking systems except in case of emergency. The mine action organization placing an informal EO marking system shall immediately liaise with the concerned community to ensure the understanding and respect of this EO marking.

When materials are not available to install temporary or durable EO marking systems, informal EO marking systems may be used by demining organizations as an emergency action to mark:

- the spot EO hazards; or
- the perimeter of the hazardous area.

Any available material that fits purpose should be considered for informal EO marking.

When informal EO marking placed by the population is identified, the NMAA or the organization acting on its behalf shall liaise with the concerned community to ensure a mutual understanding of the nature of the hazard or the hazardous area.

Improvised EO marking systems shall be replaced with temporary or durable EO marking systems conforming with national mine action standards as soon as possible.

5.4 EO marking by parties to a conflict

Under certain conventions (see Annex A), parties to a conflict have an obligation concerning EO marking.

After the cessation of active hostilities, if such EO marking is identified, then it should be surveyed to check if it conforms with the NMAS. If this type of EO marking is assessed to prevent the entry of civilians into hazardous areas, it shall still be monitored and maintained according to the NMAS.

6 Community liaison and explosive ordnance risk education (EORE)

Community liaison is an integral component of efficient EO marking and shall be conducted before, during and after the EO marking. Mine action organizations shall liaise with communities – including, for example, community leaders, community-based organizations and community members – and local authorities concerning EO marking in order to:

- gather and disseminate information about EO marking systems including informal ones;
- record information on community priorities for EO marking (including suitable materials that will reduce the risk of removal, theft or destruction);
- test the recognition and understanding of EO signs and boundary markers with a representative sample of the EO population;
- ensure community understanding and respect for EO marking; and
- actively involve the community in the preservation of EO marking;
- inform the landowner(s) of the planned EO marking activity, in cases where there is an identified landowner(s).

The communication about EO marking shall include communities that are likely to transit by the marked areas, such as internally displaced persons, for example.

The development of awareness and appropriate behaviours regarding EO marking shall be included in EORE (see IMAS 12.10).

7 Risk management

When conducting risk management (see IMAS 07.14) for land release, the NMAA or the organization acting on its behalf, and mine action organizations shall include risks to EO marking. Risk assessments shall include possible damage, destruction, displacement, disappearance due to:

- the environment, including flora and fauna;
- human activities, including deliberate action against marking; or
- the accessibility and permissiveness of the environment.

Prior to the installation of EO marking, mine action organizations should conduct a field risk assessment (see TNMA 10.20-02/09).

8 Quality management

8.1 General

The NMAA or the organization acting on its behalf, and mine action organizations shall apply quality management (see IMAS 07.12) to marking. The quality assurance process including the accreditation shall apply to marking. The accreditation for marking should be included in the accreditation for non-technical surveys (NTS), TS and clearance. The quality control process including inspections and verification of marking shall apply.

The marking shall be monitored on the long term (see IMAS 07.40). It shall be maintained to remain effective until such a time the marked hazardous area is released.

8.2 Long-term monitoring

The NMAA or the organization acting on its behalf shall monitor the effectiveness of marking systems until their removal, once the hazardous areas are released. In particular, the NMAA or the organization acting on its behalf shall monitor accidents happening in SHAs and CHAs.

8.3 Maintenance of marking systems

The NMAA or the organization acting on its behalf shall direct and organize the maintenance of durable and temporary marking systems.

The NMAA or the organization acting on its behalf may request mine action organizations to maintain marking in their respective areas of operations. When and where no mine action organization is present, the NMAA may involve any competent authority, including local authorities.

In order to prevent the premature degradation of EO marking, at-risk communities should be actively involved in respecting the marking. This should be integrated with national and local EORE programmes. However, when the support of local communities for the maintenance of EO marking is envisaged, this should not be detrimental to the safety of the members of these communities.

In the absence of any local authority or stable resident community, the mine action organization that installed the EO marking system should make arrangements to maintain the marking. It should then seek to transfer the responsibility for its maintenance to the local authorities, another mine action organization or any other competent authority until such time as the EO hazardous area is released.

9 Responsibilities

9.1 National mine action authority (NMAA)

The NMAA or the organization acting on its behalf shall:

- develop and publish standards and guidelines for the design, construction, reporting, maintenance and removal of EO marking;
- establish and maintain liaisons with the regional and local authorities, and give them guidance on the retention and maintenance of EO marking systems;
- accredit organizations as capable of undertaking EO marking;
- maintain and make available, as required, data, information and documentation on EO marking;
- monitor and maintain EO marking systems;
- Where appropriate, the NMAA or the organization acting on its behalf should consult with the NMAAs of neighbouring countries where hazardous areas cross borders.

9.2 Mine action organizations

Mine action organizations shall:

- develop standard operating procedures (SOP) for EO marking in accordance with the national mine action standards for EO marking. In the absence of national standards, the mine action organizations shall apply the IMAS standards for developing the SOP, and should coordinate their EO marking systems with other mine action organizations operating locally, until a NMAA is established;
- obtain (from the NMAA, or the organization acting on its behalf) accreditation to implement EO marking (see clause 8.1);
- establish an internal monitoring system to make sure the EO marking is carried out according to the organization's SOP and the NMAS;
- maintain and make available documentation as specified by the NMAA or the organization acting on its behalf;
- establish and maintain close liaison with the EO affected communities;
- ensure women, girls, boys and men, including landowners, are informed about the EO marking;
- engage closely with affected communities including women, girls, boys, men and landowners with regards to all decisions to emplace, modify or remove the EO marking.

Annex A
(normative)
References

The following normative documents contain provisions, which, through reference in this text, constitute provisions of this standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this 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.

[1] IMAS 04.10, *Glossary of terms, definitions and abbreviations used in mine action*

[2] IMAS 07.12, *Quality management in mine action*

[3] IMAS 07.13, *Environmental management in mine action*

[4] IMAS 07.14, *Risk management in mine action*

[5] IMAS 07.40, *Monitoring of mine action organizations*

[6] IMAS 09.12, *EOD clearance of ammunition storage area explosions*

[7] IMAS 10.20, *Demining worksite safety*

[8] TNMA 10.20.02/09, *Field risk assessment*

[9] IMAS 12.10, *Explosive ordnance risk education*

[10] CCW Protocol on Prohibitions or Restrictions on the Use of Mines, Booby-Traps and Other Devices as amended on 3 May 1996 - Amended Protocol II, and CCW Protocol on ERW - Protocol V

[11] Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction

[12] Convention on Cluster Munitions

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 organizations should obtain copies before commencing mine action programmes.

Annex B
(normative)
EO hazards signs

B.1 Triangle EO sign

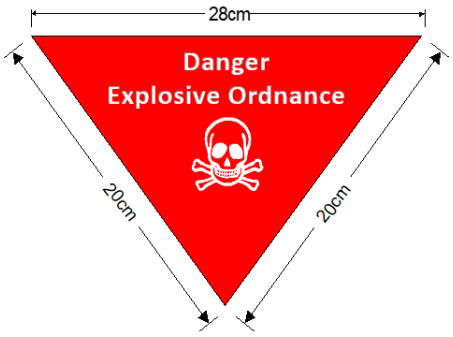

Figure B.1 – Triangle EO sign

This annex is normative because of the obligations under international law of States Parties to mark and fenced mined areas. Notwithstanding the normative nature of this annex, flexibility in the design and layout of hazard signs is permissible in accordance with the direction given in this annex.

The sign should have a red or orange background with a white symbol for danger. The universal symbol for danger is the skull and crossbones. However, the NMAA or the organization acting on its behalf may specify another symbol if the skull and crossbones is not appropriate.

The words “Danger Explosive Ordnance” (in case there is one type of EO and there is no risk of confusion, “Explosive Ordnance” may be replaced with the term designating the type of EO, e.g., “Mines”) should appear on the sign in the local language(s). Amended Protocol II recommends that the warning should also appear in one of the six recognized UN languages (English, French, Russian, Chinese, Arabic and Spanish), but this recommendation is not a requirement for the purposes of this standard.

Amended Protocol II recommends that the sign should include a yellow border of reflective material, but this recommendation is not a requirement for the purposes of this standard.

The rear surface of the sign should be white or of a colour other than the one indicating the danger.

Dimensions should not be less than indicated in Figure B.1.

B.2 Square EO sign

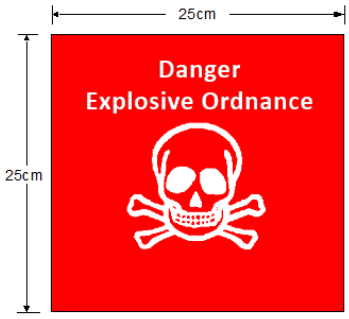

Figure B.2 – Square EO sign

The sign should have a red or orange background with a white symbol for danger. The universal symbol for danger is the skull and crossbones, however the NMAA or the organization acting on its behalf may specify another symbol if the skull and crossbones is not appropriate.

The words “Danger Explosive Ordnance” (in case there is one type of EO and there is no risk of confusion, “Explosive Ordnance” may be replaced with the term designating the type of EO, e.g., “Mines”) should appear on the sign in the local language(s). Amended Protocol II recommends that the warning should also appear in one of the six recognized UN languages (English, French, Russian, Chinese, Arabic and Spanish), but this recommendation is not a requirement for the purposes of this standard.

Amended Protocol II recommends that the sign should include a yellow border of reflective material, but this recommendation is not a requirement for the purposes of this standard.

The rear surface of the sign should be white or of a colour other than the one indicating the danger.

Dimensions should not be less than indicated in Figure B.2.

B.3 Physical barrier fence

Physical barriers may include fences, walls, ditches or other obstructions that prevent the unintentional entry into EO hazardous area.

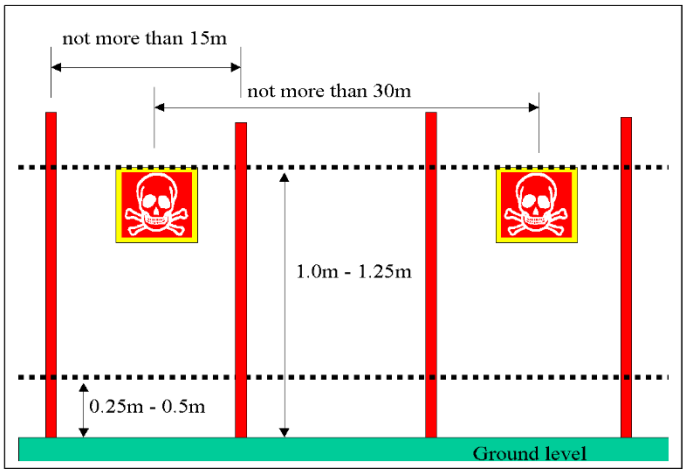

Figure B.3 – Example of physical barrier fence

Fences should be erected with two strands attached to uprights at 0.25 m to 0.5 m, and 1.0 m to 1.25 m above the ground (See Figure B.3). Fencing strands may be of any suitable durable material including wire, string, synthetic cord or tape. Uprights may include trees, buildings or existing structures and posts erected as part of the warning system and should be positioned not more than 15 m apart. EO hazard signs shall be attached to the top strand of the fence not more than 30 m apart and within 5 m of each turning point. If necessary, they may also be attached to uprights.

Annex C
(informative)
Examples of marking systems – Boundary lane using painted rocks

C.1. General guidelines

Painted rocks may be used to signal an EO hazard. These should normally be coloured red, but if that colour has cultural sensitivities, any other “strong” colour may be used.

The basic rule is that no-one should cross the line indicated by the red coloured rocks.

White rocks shall be used to signal “safety” placed:

1) along the edges of useable areas;

2) before the line of coloured rocks used to mark the edges of danger areas (i.e. on the “useable” side of the EO hazard area); and

3) between two rows of coloured rocks (for example, a safety lane cleared by TS or clearance team between two EO hazard areas so that the safety lane is obvious).

The spacing between rocks should be no more than 5 m except at turning points, where the spacing should be reduced to approximately 2 m.

C.2. Boundary line and safety lane marking

Boundary lines and safety lanes should be cleared and marked as follows (see Figure C.1):

1) when there is a useable area on one side and a hazard area on the other side, the hazardous area should be marked as shown in Example A in Figure C.1; and

2) when a lane has hazard areas on both sides, the lane should be marked as shown in Example B in Figure C.1.

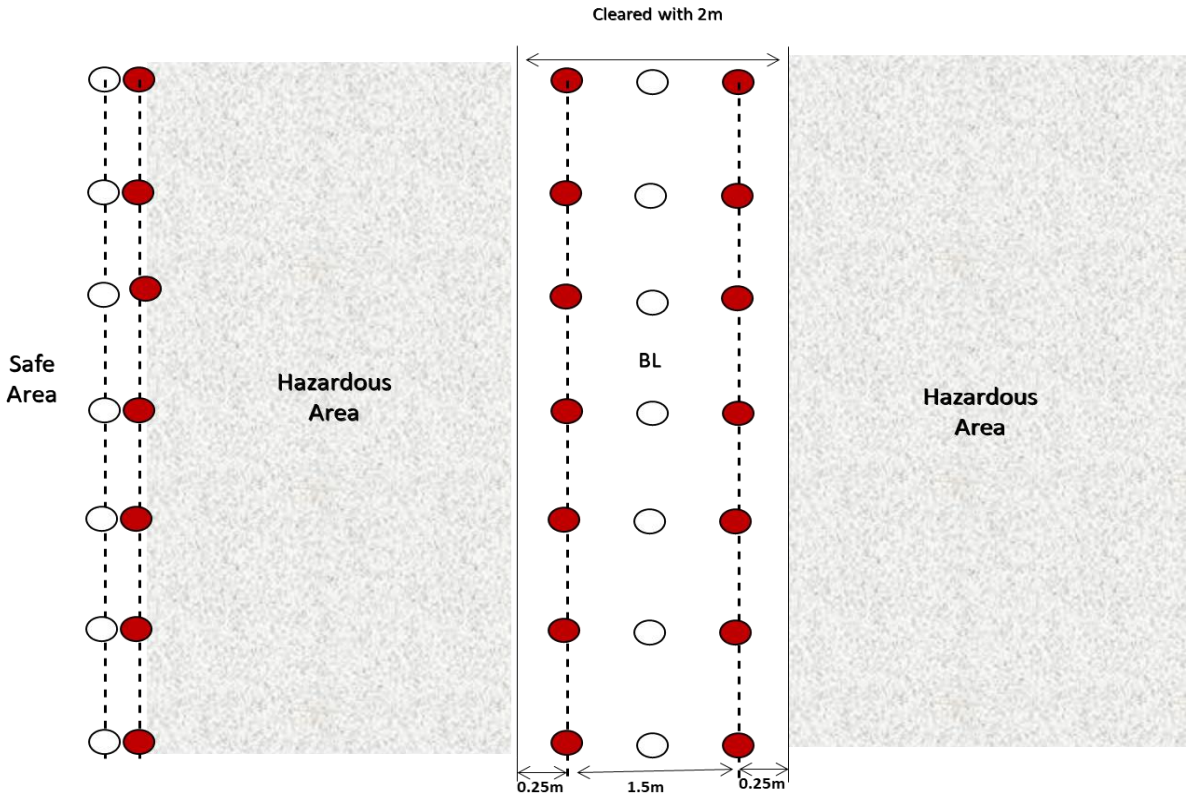

Figure C1: Example of marking using rocks

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 are given a number. The date and general details of the amendment shown in the table below. The amendment is also shown on the cover page of the IMAS by the inclusion under the edition date of the phrase "*incorporating amendment* #."

As the formal reviews of each IMAS are completed, new editions may be issued. In this case, amendments up to the date of the new edition are incorporated into the new edition and the amendment record table cleared. Recording of amendments then starts again until a further review is carried out.

The most recently amended IMAS are posted on the IMAS website at www.mineactionstandards.org.

Number	Date	Amendment details