Cambodian Mine Action Standards (CMAS) 10.20

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Safety and occupational health Demining worksite safety

(S & OH)

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Warning

This document is a working draft and is therefore not a Cambodia Mine Action Standard (CMAS). It is distributed for review and comment. It is subject to change without notice and may not be referred to as a Cambodia Mine Action Standard.

Contents

Introduction

The need to reduce risk and to provide a safe working environment are fundamental principles of mine action management (see CMAS 07.10). Risk reduction involves a combination of safe working practices and operating procedures, effective supervision and control, appropriate education and training, equipment of inherently safe design, and the provision of effective personal protective equipment and clothing.

The provision of a safe working environment includes the design and layout of a demining worksite by fencing and marking hazardous areas, controlling the movement of deminers, visitors and the public, enforcing safety distances, and providing effective medical cover and insurance. This requires CMAA and mine action organisations to develop and maintain appropriate policy and procedures.

It is necessary to clarify the meaning of the term 'safe' in respect of mine action. To say that a situation is safe does not necessarily imply that all risk has been removed. It merely assumes that the risk has been reduced to a 'ALARP (As low as reasonably practicable)' level, i.e. '.... to a level which is accepted in a given context based on the current values of society'. (See ISO Guide 51.)

Given the wide range of operational settings and mine action activities in Cambodia, it is not possible to provide a precise and complete set of specifications or provisions that apply to all demining worksites. Thus, mine action organisations should develop and maintain management procedures and processes that will enable safety and occupational health (S&OH) risks in the worksite to be identified, evaluated and reduced in a systematic and timely manner.

This standard provides guidance on the development and implementation of policy and documented procedures for establishing and managing a safe worksite.

Safety and occupational health - Demining worksite safety

1. Scope

This standard provides specifications and guidance on the development and implementation of policy and documented procedures and practices, which aims to establish and maintain a safe demining worksite and working environment.

2. General Requirements

The provision of a safe working environment includes the design and layout of a demining worksite by fencing and marking hazardous areas, controlling the movement of deminers, visitors and the local population, enforcing safety distances and the correct use of PPE at all times in the operational danger zone, and providing effective medical cover and casualty evacuation procedures. This requires CMAA and mine action organisations to establish policies and develop and maintain procedures for worksite safety

3. Demining Worksite Layout and Procedures

3.1. General requirements

The demining worksite shall be designed to:

a) Provide a clearly visible separation of hazardous areas including fragmentation zones, cleared areas, useable areas and unknown areas around the worksite;

b) Control the movement of deminers and visitors (including members of the public) at the worksite;

c) Limit the number of deminers and visitors allowed into the blast and fragmentation hazard zones;

d) During the controlled destruction of mines and UXO, take all reasonable precautions to exclude deminers, visitors and members of the local population from the blast and fragmentation hazard zones, or provide suitable protection inside buildings, bunkers or mobile structures; and

e) Include measures to prevent structural and environmental damage.

3.2. Marking of hazardous areas

Safe and hazardous areas within all worksites shall be separated by providing clear and consistent marking. (See CMAS 08.50)

3.3. Control of entry into blast hazard or fragmentation hazard zones

Demining often proves to be an attractive event for the local population, especially children. Procedures shall be developed for controlling the entry of unauthorised persons into mined or UXO contaminated areas, onto the demining worksite and into blast and fragmentation hazard zones. This should be achieved by:

a) Informing the local population, deminers and demining worksite visitors of the extent of the worksite, and the blast and fragmentation hazard zones; and

b) Physically controlling entry into the hazard zones during the mine or UXO hazard destruction processes by warning signs and positioning sentries (See Annex A for specifications and recommendations on the development of standards and SOPs for blast and fragmentation hazard zone safety distances).

Note 1: Warning systems should include the following.

- Warning signs on approach routes (roads, tracks or paths) informing people that they are entering a fragmentation zone. Signs should include information on the nature and extent of the fragmentation zone.

- Risk reduction education through briefings or signs or information sheets to people living or working near a demining worksite, and to the local authorities in the area. The briefings and/or information sheets should include information on the visual and audible warning methods used to advise workers and the local public of the demolition of mine or UXO hazards and hazardous material.

- Risk reduction education, including site dangers, and the implications of ignoring the directions of deminers appointed to control access into fragmentation zones.

- Documented standards and SOPs should include the use of sentries to control entry into fragmentation zones, warning signs and audible signals to be used during the destruction process.

Planning and execution of demining operations should minimize disruption to the local population, which may need to move through blast and fragmentation hazard zones if they are to subsist or survive. It is unrealistic to expect that the public can be prevented from entering associated blast and fragmentation hazard zones of whole demining worksites for the duration of the demining task. On the other hand it is important to reduce to tolerable levels the risk of harm to the public. The following example may provide guidance on the development of a reasonable and workable compromise.

c) The extent of the fragmentation zone should be equivalent to the fragmentation hazard of the likely mine/UXO contamination in the worksite.

d) The public, having been given appropriate warnings as set out above, should be allowed to pass on marked routes through the fragmentation zone, EXCEPT when demolitions are taking place. When a demolition is taking place the mine action organisation shall establish a cordon with sentries, equipped with suitable communications or signaling equipment, on routes at the entry points of the fragmentation hazard zone to prevent entry into the hazard zone. It may also be necessary to restrict entry when particular munitions with a large fragmentation radius, such as bounding mines and UXO, are being cleared.

e) An inner safety distance should also be identified. For example, a radius equivalent to the blast zone from the likely mine/UXO contamination, clearance lane separation, or RF detonator hazard (whichever is greater). The minimum radius of such a distance should be 25m. The public should not be allowed to enter this safety zone at any time when demining is being undertaken on the worksite. Should a member of the public breach this zone then all Operators must halt all operations, raise an audible alarm to others on the field and correct the hazard before returning to de-mining operations. This minimum safety distance does not apply to technical visitors or working supervisors that in the process of conducting their business require to get closer. SOP's should distinguish between the type of visitors including journalist, technical, and general visitor.

Where the location of the worksite means that this inner safety distance cuts a frequently used road or path, an alternative solution should be considered. If the worksite is small enough, the demining unit should phase operations in such a way to minimize disruption to the public. If the worksite is large, the mine action organisation should seek the assistance of the local administration, police or other appropriate emergency services or the military to identify, mark and possibly supervise the creation of a suitable diversion route. If no such diversion route is feasible, the demining unit should consider using protective works, or establishing a workable traffic control system which allows operations to continue while allowing the local population access etc at certain times.

3.4. Control areas

Establishing and clearly marking a number of areas for safety and administration will achieve effective control of the worksite. Such areas shall be outside the relevant safety distances from all contaminated areas, demining activity and explosive storage.

3.4.1. Vehicle parking area

The vehicle parking area shall be a known safe area or cleared area large enough to provide safe parking for demining unit and visitor's vehicles.

The boundary of the parking area shall be clearly marked and sign posted. The parking area sign posting shall indicate directions to the demining worksite and visitor reporting area.

In addition, it is the responsibility of the site supervisor or his delegate to ensure that all vehicles on the site are parked facing the exit and that NO vehicle either obstructs or hinders the sites ambulance or its possible operation in any way. Ambulance and site safety vehicles must have the keys left in the vehicle.

3.4.2. Helicopter landing site

In the event that helicopter casevac is an available option a helicopter-landing site (HLS) shall be established prior to demining operations commencing on the site. The size of the HLS and cleared air approaches shall be established in accordance with the requirements of the organisation providing the air casevac service. The HLS should not be located adjacent to potential hazard areas; consideration shall be given to air approaches and the threat from tripwire and prong initiation through rotor downwash and "foreign object" dispersal. The demining site number, HLS grid reference and description (including marking features) shall be provided to the organisation providing the air casevac service. Also the HLS must be sited on level ground for a radius of 20m with no steep inclines.

The HLS shall be marked with an easily visible marker (preferably fluorescent) of a minimum size of 2m x 2m, firmly secured to the ground (the organisation providing the air casevac service should provide guidance on securing arrangements). It shall also be clearly marked and signposted from all demining worksites it serves. All loose material shall be removed from the site and out to a radius stipulated by the organisation providing the air casevac service. The HLS should not be used as a car park or administration area.

In addition the Mine Action Operator must ensure that there are sufficiently trained personnel in every team who are able to signal (marshal) and direct a helicopter to the HLS safely. Also that all personnel are aware of safety procedures for approaching or working with helicopters, for example personnel should not wear unsecured clothing and equipment hats/caps etc.

3.4.3. Visitor reporting and briefing area

The visitor reporting area and briefing area shall be a clearly marked and identifiable area that is outside the fragmentation zone of the demining worksite.

3.4.4. Personal Protective Equipment (PPE)

All deminers conducting mine clearance and all visitors to demining worksites, during demining operations must wear PPE in accordance with CMAS 10.30 PPE.

3.4.5. Safety lanes

In some circumstances the setup of the site requires teams working in different locations within a mined area. When this is the case the the establishment of a safety lane must be conducted. In this case the mine action organisation must establish cleared safety lanes to provide access to and around the demining worksite. Cleared safety lanes shall be marked and documented as specified in CMAS. Cleared safety lanes shall be wide enough to provide safe access for personnel and equipment to the worksite. ALL safety lanes cleared for medevac shall be wide enough for the safe execution of documented medevac procedures. Safety lanes should be not less than 2.0m wide

3.4.6. First aid

Each demining worksite shall include a first aid post, organised and equipped as recommended in CMAS 10.40. The first aid post shall:

a) Be identifiable and clearly marked;

b) Be equipped with appropriate first aid and medical supplies and equipment;

c) Be attended by suitably qualified and experienced medical or para-medical staff; and

d) Provide easy access to the clearance area of the worksite and easy access for ambulances where possible, if not then a 2m wide lane must be maintained as debris/vegetation free for the evacuation of casualties. .

e) Ideally there must be on every site a fully equipped and fitted out ambulance, however in the absence of one ambulance/site safety vehicle per site, it can be acceptable for one ambulance to cover more than one site if:

- The ambulance can get to all the sites within 10 minutes.
- The ambulance driver has full knowledge of all the site locations, and has visited them.
- All the sites covered by an ambulance are within 7 kilometres
- In the case of an accident/incident where the one ambulance is being utilised, then all sites in its coverage area must cease operations, until another fully equipped ambulance takes up the station or until the original ambulance returns. At no time can site(s) be left without the full cover of a fully equipped ambulance and qualified medical person.
- The ambulance driver knows and has driven the route to the nearest medical facility.

3.4.7. Rest areas

The worksite shall include clearly identifiable and marked rest areas for deminers unless the entire site stops for breaks at the same time. Rest areas shall be located outside the fragmentation zone and should be equipped to provide staff with protection from adverse or extreme weather conditions. Also a suitable sand/water filled container must be in the rest area for the safe disposal of cigarettes. A suitable latrine should also be established within this area if not practable to walk to the administration area.

3.4.8. Explosive storage area(s)

Explosives or mine and/or UXO hazardous material may be stored on a demining worksite. Explosives used in the demining process should be stored in a container approved for the type and quantity of explosive being stored, which will be located outside the fragmentation zone of the demining worksite (See CMAS 10.50 for standards for the construction of storage boxes and magazines for explosive materials used in the demining process). As stated in the safety distance tables, distances can be reduced by the application of suitable protective works. If a suitable site can not be established outside the fragmentation zone then it is to have adequate protection.

Where provision of this standard of container storage is impracticable, the mine action organisation shall be responsible for providing approved and recognised safety measures (protective works, safety distances, physical security etc.) and should include protection against environmental factors in accordance with explosive manufacturers' instructions. Such storage should be considered as a temporary measure only.

4. Demining Accidents and Incidents

Procedures for the response to a demining accident and incidents shall be established and formally documented as SOPs. The SOPs should include:

a) The organisation and capabilities needed to respond to a demining accidents or incident, including the procedures, training, responding to single and multiple casualties, the safe casualty recovery from any mechanical asset, the safe recovery of MDD assets,, equipment and material (see CMAS 10.40); and

b) Procedures for the safe investigation, analysis and corrective action to be taken following a demining accident or incident (see CMAS 10.60).

5. Responsibilities and Obligations

5.1. CMAA

The CMAA shall develop a policy and establish and maintain documented procedures for safety and occupational health on demining worksites. The documented procedures should include:

a) Standards for the safety markings to be used on Demining vehicles;

b) Standards for an emergency response and casualty evacuation procedures on demining worksites; and

c) Procedures for the reporting and investigation of demining accidents and incidents.

5.2. Mine action organisation

The mine action organisation shall establish and maintain documented SOPs that comply with the provisions of IMAS and CMAS.

The organisation is to inform CMAA of any intended modification to the SOPs. The CMAA will determine whether the announced changes require a desk or on-site re-assessment. The criteria for SOP amendments are covered in CMAS 07.30

5.3. Deminers

Deminers shall;

a) Take all reasonable care for their own safety and that of other persons on the worksite;

b) Comply with instructions given for their own conduct and safety, especially those contained in SOPs;

c) Comply with national instructions and regulations on conduct and safety on worksites; and

d) Report forthwith to their superior any situation, which they have reason to believe could present a worksite hazard, which they cannot themselves correct.

e) Have reasonable access to question instructions that they feel could put them at risk.

Annex A
(Normative)
Safety distances for blast and fragmentation hazard zones

1. General

Hazard distance calculations can be extremely complex requiring consideration of a range of factors including:

a) The hazard division and compatibility classification of the mine or UXO hazards that may be on the demining worksite;

b) The protective measures included in the documented SOPs, CMAS and IMAS

c) Protection offered by vegetation, topography or structures surrounding the worksite and available to the deminers, visitors and the public; and

d) Climatic conditions.

e) Environmental concerns.

2. Default safety distances

In the absence of a detailed risk assessment and calculations carried out by a suitably qualified EOD Expert the safety distances provided in the following table shall apply.

2.1. Default safety distances on demining worksites

Activity	Metres apart
More than one working section	25
Deminers working in parallel lanes	25
Deminers and mechanical surface vegetation removal	50
Deminers and mechanical sub surface intervention	100
Access route and safety areas	25
Distances between working MDD	25
Vehicle park, medical teams and active mine clearance sites	100

Note 2: Distances between working sections and deminers may be reduced utilising a sound risk assessment in a AP Blast Mine area.

Note 3: When using approved 2-man drills and in an area that contains only AP Blast Mines after a sound risk assessment the distances between members of the 2-man team may be reduced.

Note 4: Utilising a sound risk assessment and/or the use of protective works the safety distances may be reduced.

Note 5: Distances in this table should be applied to worksites assessed as having an AP blast mine hazard. Safety distances for fragmentation hazards should be considerably greater, depending on the nature of the risk.

Note 6: See CMAS 07.50 for distances to applied to storage of explosives on site

Figure 1. Demining worksite AP blast mine safety distances

Safety distances for the destruction of mines and UXO

Demolition minimum safety distances	
Type of munition	**(Open area – metres)**
AP mine – Blast	100
AP mine – Fragmentation/bounding/directional	200/500
AT mine – Blast	300/1,000
AT mine - Shaped charge (A shaped charge jet can travel up to 1800m in free air.)	1,800
Off route mine	1,000
Mortar up to 82 mm	500
Shell up to 80 mm	500
Shell up to 160 mm	800
Shell above 160 mm	1,000
Rocket up to 88 mm	500
Hand and rifle grenade	300

Note 1: Buried boosted charges estimated at 10 kilograms have a safety distance of 500 metres. 100 metres should be added for each additional 10 kilogram charge.

Note 2: Organisations shall seek the advice of qualified EOD specialists to determine safety distances for all munitions other than those detailed above. All safety distances shall be specified in documented SOPs.

Note 3: Protective measures should be used to allow distances to be reduced.

Figure 2. Demolition minimum safety distances

Annex B
(Informative)
Dealing with visitors to demining worksites

1. General

Demining activities attract a range of visitors from the donor community, government and other officials, including CMAA QA personnel, and the media. These visitors should not be discouraged from visiting demining sites as they can assist in much needed advocacy and resource mobilisation for the mine action sector.

2. SOPs

The mine action organisation shall develop and maintain documented procedures for dealing safely with visitors to demining worksites. These SOPs should include:

a) Procedures for establishing and maintaining signs that:

- Provide warning that the visitor or public are approaching or entering a demining worksite blast hazard or fragmentation hazard zone;
- Direct visitors to a safe vehicle parking area; and
- Direct visitors to a reporting area.

b) Safety briefing including information on:

- The site layout, safety marking system and any restrictions, this may include restriction on movement, the use of equipment that may be an RF hazard (mobile telephones, radios etc) and the use of other electronic equipment or cameras, and when on a MDD site additional information regarding approaching feeding and distracting the MDD must be included.
- The requirements to wear PPE; and
- Action to be taken in the event of a demining incident or accident.

c) Liabilities in case of accident

3. Insurance

The mine action organisation should have third party liability insurance to cover risk of harm to visitors to demining worksites. This should cover liability not only of the mine action organisation, but also of its employees. Insurance for employees of the mine action organisation is covered in CMAS 10.10 (S&OH general requirements).