

LAO PDR NATIONAL UXO/MINE ACTION STANDARDS (NS)



Chapter Twelve Mine Clearance Operations

National Regulatory Authority for
the UXO/Mine Action Sector in Lao PDR

15 October 2012

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Mine Clearance Operations

1. Introduction

Mine clearance operations; the systematic locating and clearing of hand laid mines in known or suspected mined areas, are not commonly conducted in Lao PDR¹. However, it is known that mined areas exist in Lao PDR and at some stage in the future these areas will have to be cleared.

Mine clearance operations are considerably more dangerous than UXO area clearance operations and the requirements and procedures for mine clearance are more stringent. When mine clearance operations are necessary they are only to be carried out by accredited mine clearance organisations with personnel with the appropriate training and equipment and specific mine clearance operating procedures.

The Lao PDR National Regulatory Authority (NRA) is the authority responsible for the overall management of UXO/mine action within Lao PDR. This responsibility includes establishing requirements for mine clearance operations and ensuring that these requirements are met.

2. Scope of this NS

This chapter covers the minimum requirements for the conduct of manual mine clearance operations within Lao PDR.

This chapter does not cover mine clearance operations involving Mine Detection Dogs (MDD) or machines. When such operations are required to be carried out in Lao PDR specific National UXO/Mine Action Standards (NS) for MDD and mechanical operations will be developed by the NRA.

3. Accreditation for Mine Clearance Operations

UXO/mine action organisations seeking to carry out mine clearance operations in Lao PDR are to be accredited for mine clearance operations prior to any mine clearance taking place.

The process and requirements for obtaining such accreditation are the same as for obtaining accreditation for other UXO/mine action operations. These requirements are included in **Chapter 2 of NS, Accreditation of UXO/Mine Action Organisations** and in the NS Support Document **NRA Accreditation Procedures for Lao PDR**.

Organisations accredited for UXO clearance operations who are required to carry out one off or isolated mine clearance tasks may, at the discretion of the NRA, obtain approval to carry out these tasks on application to the NRA. Application must include specific details of the task and a copy of the mine clearance SOPs to be used for the task.

3.1. Standard Operating Procedures (SOPs)

UXO/mine action organisations intending to carry out mine clearance operations are to have specific mine clearance Standard Operating Procedures (SOPs). These SOPs will be required to be presented for assessment during the accreditation process.

1. Some relatively small scale mine clearance has been carried out by UXO LAO and by commercial operators in the past but mine clearance operations are not regularly carried out as a deliberate mine action activity in Lao PDR.

4. Planning and Management of Mine Clearance Operations

The general requirements for the planning and management of mine clearance operations are to conform to the requirements for the planning and management of UXO area clearance tasks. Specifically:

- a. All mine clearance tasks are to be planned to meet the priorities included in the Strategic Plan for the UXO/Mine Action Sector in Lao PDR.
- b. Mine clearance is only to be considered when land is to be used within 6 months of clearance being completed.

In addition the following requirements are to be met:

- a. All mine clearance tasks are to be subject to a detailed and comprehensive technical survey that clearly identifies the mine contaminated area(s) and surrounding safe areas. Such technical surveys are to be carried out using the mine clearance procedures specified in this chapter of NS and to the same clearance requirements specified for the task.
- b. There is to be no movement beyond the known limits of safe areas prior to mine clearance being carried out.

5. Work Routines

The work routines for mine clearance operations are the same as for UXO clearance operations. These are detailed in **Chapter 15 of NS, Occupational Safety and Health (OSH)**. There are two critical aspects concerning work routines that are mandatory requirements for mine clearance operations. These are:

- a. No mine clearance operations are to continue beyond the time that any essential support to an accident response plan is available. Travel times are to be factored in.
- b. Bases or headquarters that are responsible for providing support to an accident response plan must be staffed from the time the mine clearance teams leave in the morning until they return at the end of a day. This includes having essential communication systems functioning whilst teams are working or moving to and from worksites.

6. Management of Mine Clearance Tasks

6.1. Qualifications

EOD level 3 and 4 clearance technicians who are involved in the planning and management of mine clearance, are to have qualified in both the mine clearance technician and mine clearance supervisor training.

Technical surveyors who carry out mine clearance survey are to have qualified in both the mine clearance technician and mine clearance supervisor training.

Personnel who carry out Quality Management (QM) (internal and external) of mine clearance operations are to be qualified in both the mine clearance technician and mine clearance supervisor training.

Personnel employed as mine clearance supervisors must be mine clearance supervisor qualified.

All qualifications are in accordance with the NRA Training Standards for Lao PDR.

6.2. Clearance Supervisors

For mine clearance operations in Lao PDR there must be at least:

- a. One qualified mine clearance supervisor for each separate mine clearance task.
- b. One mine clearance supervisor for every five working mine clearance technicians on a mine clearance site.

For mine clearance sites where more than five mine clearance technicians are employed, additional mine clearance supervisors must be employed at a ratio of no more than one supervisor per five technicians.

AnEOD level 3 or 4 mine clearance supervisor must always be available on-call to a non EOD level 3 or 4 mine clearance supervisor supervising a mine clearance task.

Note: If a situation occurs where a mine clearance supervisor qualified EOD level 3 or 4 clearance technician is called to a site, then activities directly related to the call should be suspended pending arrival of the called person.

When two or more (up to a maximum of four) mine clearance supervisors are supervising parts of the same mine clearance task a mine clearance supervisor qualified EOD level 3 or 4 clearance technician must also be on-site as the overall task supervisor. The EOD level 3 or 4 clearance technician is not to be directly involved in supervising mine clearance technicians.

7. Clearance Requirements

Clearance requirements for mine clearance operations include specifications as to the depth of clearance, the area to be cleared and the quality of clearance.

Clearance requirements should be specified by the tasking authority based on the intended land use, however when the tasking authority does not specify clearance requirements, the default depth of clearance, and quality of clearance included in this chapter of NS are to apply.

Mine clearance organisations are to develop clearance drills and procedures that ensure that the specified area to be cleared is cleared to the specified depth and to the quality required. In situations where mine clearance organisations are unable to achieve the clearance requirements, they should cease operations and immediately report the matter to the tasking authority.

When mine clearance operations are carried out on areas that are both mine and UXO contaminated the clearance requirements for both mine and UXO clearance (as specified in **Chapter 7 of NS, UXO Clearance Operations**) are to be achieved.

7.1. Depth of Clearance

Depth of clearance is to be determined based on the intended land use for the area. However, where land use is unknown or depth of clearance is not specified then the default depth for mine clearance operations in Lao PDR is to be applied. **The default depth of clearance for mine clearance operations is 13cm.**

7.2. Area to be Cleared

The initial area to be cleared is to be specified by the tasking authority and this will normally be delineated by the current accepted safe and mine contaminated areas. The actual area to be cleared is then to be determined by technical survey in accordance with section 11.2 below.

7.3. Quality of Clearance

The quality requirements for mine clearance operations in Lao PDR are:

- a. All mines and UXO or hazardous components are removed from the specified area to the specified depth(s).
- b. Areas where metal detection equipment is unable to be used are to be manually excavated to the specified depth of clearance and all mines and UXO and visually identifiable parts thereof are to be removed.

All signals from metal detection equipment are to be investigated to the fullest extent possible, irrespective of the depth, to confirm that the signal does not originate from a mine or a UXO. All metal fragments located are to be removed from the ground.

Tasking authorities may specify clearance quality requirements that are more stringent than those stated above.

8. Safety Distances and Danger Areas

8.1. Safety Distances

The minimum safety distances for mine clearance operations are dependent on the hazards associated with the site. The minimum safety distances between working mine clearance technicians and other personnel to be applied during mine clearance operations are:

- a. Blast mine hazard - 10 m.
- b. Fragmentation mine hazard - 50 m.
- c. Anti Tank (AT) mine hazard - 50 m.

If there are any doubts about the likely hazards, for example during technical survey, the greater safety distance is to apply.

These safety distances are only to be reduced with the approval of the NRA. These safety distances apply for mine clearance operations only, separate safety distances are applied for EOD. Safety distances for EOD are included in **Chapter 8 of NS, Explosive Ordnance Disposal (EOD)**.

The minimum safety distances described above are for personnel wearing Personal Protective Equipment (PPE) in accordance with the requirements of section 10.4 below.

No personnel are to move beyond the marked limits of clearance worksite control or administration areas, while mine clearance operations are ongoing, without PPE.

8.2. Danger Areas

The danger area radius delineates the maximum area that will be affected by blast or fragmentation should a mine inadvertently explode during mine clearance operations. The danger area radius is less than the safety distances applied for EOD due to the fact that for EOD an explosive charge is attached to the mine, which increases the danger area radius.

The minimum danger area radius is dependent on the hazards associated with the site. The minimum danger area radii to be applied during mine clearance operations are:

- a. Blast mine hazard - 50 m.
- b. Fragmentation mine hazard - 100 m.
- c. AT mine hazard - 100 m.

If there are any doubts about the likely hazards, for example during technical survey, the greater danger area radius is to apply.

9. Marking Systems

The following sections provide the minimum requirements for marking systems to be used on mine clearance operations conducted in Lao PDR.

9.1. Boundary Marking

Boundary marking is to be carried out around the complete perimeter of the mine contaminated area, except in cases where marking and fencing in accordance with the requirements of **Chapter 4 of NS, Marking Systems** has already been carried out. In this case, boundary marking is only to be established on parts of the mine contaminated area perimeter where mine clearance is going to start (the baseline(s)). Established marking and fencing may remain on other sections of the mine contaminated area perimeter.

Boundary marking is to be carried out using 1 m long pickets spaced at a minimum of 5 m intervals. String or tape is to be suspended between the pickets at a height of between 0.6 to 0.7 m above the ground to form a clearly visible boundary.

The marking of boundaries of mine contaminated areas is to conform to the following requirements:

- a. Boundary markings are to be established 2 m outside the boundary of the mine contaminated area as determined during technical survey. If boundary markings are being established during technical survey, boundary markings are to be established 2 m on the safe side of the known limits of the safe area.
- b. Boundary marking systems are to be clearly visible from a distance of 30 m and there is to be no possible confusion between the boundary marking system and the clearance marking system.
- c. Lines between turning points on boundaries are to be straight.
- d. Individual 1 m pickets must be visible from adjacent pickets.

Unless it is clearly impractical, boundary markings are to remain in place until the cleared area has been permanently marked.

9.2. Clearance Area Marking

Clearance, including technical survey, on a mine contaminated area is to commence from a base line established on one or more sides of the mine contaminated area.

Note: Depending on factors such as site conditions and safety distances, mine clearance may commence from more than one boundary of the mine contaminated area.

The base line(s) is/are to be established along the marked boundary of the mine contaminated area. A 2 m base lane is then to be established on the safe side of the base line. Access lanes that lead into the mine contaminated areas are to link up with the rear (safe side) of the base lane.

Both sides of the base lane (the forward edge being the base line), are to be marked with 1 m pickets spaced at a minimum of 5 m intervals (to be consistent with the boundary markings). Both the forward and rear edges of the base lane are to be marked with string or tape, however for the forward edge (the base line), the string or tape is to be run along the ground and fixed to the pickets. The rear edge is to have the string or tape suspended at a height of between 0.6 m and 0.7 m above the ground as for boundary marking.

One metre wide clearance lanes that extend into the mine contaminated area are to start at the base line and run at approximately 90 degrees to the base line. Clearance lanes are established as clearance progresses, there is no access permitted into the mine contaminated area before clearance is carried out and all lane marking is to be established in cleared ground.

Clearance lanes are to be marked using 0.5 m pickets spaced at no further than 0.5 m apart. String or tape may also be established along the ground at the sides of the clearance lanes and tied to the 0.5 m pickets.

The mine clearance area marking systems must conform to the following requirements:

- a. Clearance markings systems must always provide a clear delineation between cleared areas and uncleared areas. There must be no possibility of confusion about what areas are safe and what is cleared.
- b. Any materials or colours may be used provided that the clearance marking systems are clearly visible from a distance of 10 m.
- c. The sides of clearance lanes are to be parallel and straight.
- d. When tape or string is used as part of a marking system, sufficient pickets must be used to ensure that the tape or string remains straight and where necessary, fixed to the ground.
- e. A safe and effective system is to be used for the marking of mines (or UXO) that are located.

In addition, and where possible, base lines should be:

- a. Established on the longest side(s) of an area to be cleared.
- b. Sited to avoid sunlight or the effects of the weather on the eyes of working personnel.
- c. Sited to avoid working down hill.

10. Mine Clearance Operations Preliminary Requirements

Prior to any mine clearance operations (including technical survey) commencing there are certain preliminary requirements that must be in place. The preliminary requirements are discussed in more detail below.

10.1. Training

Clearance technicians trained and qualified to carry out UXO clearance operations are not to be employed on mine clearance operations without training in mine clearance operations. The training is to be in accordance with the NRA Training Standards for Lao PDR. This also covers the training and qualifications for personnel to be employed as supervisors for mine clearance operations.

If a person qualified as a mine clearance technician or supervisor does not work on mine clearance for a period of 12 months or more, that person is to attend refresher training on mine clearance before being permitted to work on mine clearance again.

Ideally, mine clearance technicians should be staff dedicated to carrying out mine clearance only.

10.2. Medical Support

The medical support requirements for mine clearance operations are the same as for UXO clearance operations, except that each mine clearance worksite is to have its own dedicated medic. See **Chapter 16 of NS, Medical Support to UXO Clearance Operations**.

10.2.1. Accident Response Plans

There is a significant difference between accident response plans for UXO clearance and mine clearance:

- a. Due to the need to maintain safety distances the site will be larger and the mine clearance technicians more dispersed.
- b. The accident response plan should detail a specific place for all clearance and support staff to report to in the case of an accident.
- c. Movement over the site will be more strictly controlled by marking and there will be a need to follow access lanes.
- d. There is to be no entry into the danger area until a mine clearance technician has cleared up to and around the casualty.
- e. The casualty may be moved outside the danger area before treatment is carried out.

These factors and/or requirements are to be included in accident response plans developed for mine clearance operations.

10.3. Communications

A radio or telephone communication link in accordance with **Chapter 17 of NS, Communications** is to be established and functioning on clearance worksites before any mine clearance operations commence. If for any reason a radio or telephone communication link is unavailable then mine clearance operations are not to take place.

10.4. Personal Protective Equipment (PPE)

PPE in accordance with the requirements of this section is to be available on the worksite and used by all personnel involved in a mine clearance task whenever they move within the assessed danger area radius while mine clearance is ongoing.

The requirements for PPE are dependant on the known or suspected mine hazards in any mine contaminated area. This should be determined through technical survey. If there are any doubts about the likely hazards, for example during technical survey, the greater level of protection is to be provided. Details are as follows:

- a. Blast mine hazard. PPE to be used is; full face visor, blast vest and protective gloves. A visor may be part of a combined helmet and visor assembly if necessary.
- b. Fragmentation or AT mine hazard. The same PPE as for a blast mine hazard is to be used except that a ballistic vest is to be provided.

PPE provided for mine clearance operations in Lao PDR is to conform to the specifications contained in **IMAS 10.30 S&OH Personal protective equipment**.

10.5. Worksite Preparation

Due to the nature of mine clearance operations a greater degree of control is necessary particularly in relation to personnel moving around the worksite. Accordingly, mine clearance worksites including when technical survey is being carried out, **are to** have established and marked the following control and administration areas:

- a. Command Post (CP) including a visitor briefing area.
- b. Medical treatment post. May be collocated with the CP.
- c. Administration area. May be collocated with the CP.
- d. Stores/equipment area. May be collocated with the CP.
- e. Rest areas.
- f. Vehicle parking area.
- g. Field explosive store, unless explosives are to be stored in a vehicle on the site.
- h. Access routes. Access routes are to be 2 m wide and clearly marked in accordance with section 10.5.1 below. Access routes are required:
 - (1) From the vehicle parking area to the CP.
 - (2) On all paths that lead from the CP into the mine contaminated area. Access routes are not to proceed passed the established boundaries of the mine contaminated area, or in the case of the boundaries not yet being marked, the limit of the known safe area.
- i. Metal collection point(s). Located adjacent to access routes into the mine contaminated area.

All control and administration areas are to be established outside of the assessed danger area radius for the task subject to the following conditions:

- a. Rest areas may be established inside the assessed danger area provided all mine clearance is stopped during rest breaks.
- b. Access routes that lead into the mine contaminated areas will have sections that are inside the assessed danger area radius.
- c. Metal collection points may be inside the assessed danger area with metal being deposited in collection points as the clearance technicians move back from the mine contaminated area during rest breaks.

Unless specified otherwise in this chapter of NS, the requirements for the establishment of control and administration area are to be in accordance with **Chapter 5 of NS, Worksite Preparation**.

Control and administration areas and access routes are to be surface cleared prior to use. Subsurface clearance is to be carried out in areas where fires are to be lit (cooking areas) or where digging is to occur (rubbish areas or toilets).

10.5.1. Marking of Control and Administration Areas

Control and administration areas and access routes are to be marked with 1 m long pickets spaced at a minimum of 5 m intervals around/along the boundaries of the areas/access routes. String or tape is to be suspended between the pickets at a height of between 0.6 to 0.7 m above the ground to form a clearly visible boundary.

10.5.2. Use of Signs for Control and Administration Areas

The minimum requirements for signs for control and administration areas are:

- a. Signs are to be placed on all access routes that lead into the mine contaminated area at the limit of the assessed danger area radius. These signs are to warn personnel that:
 - (1) They are entering the danger area.
 - (2) Access beyond the point is only permitted to authorised personnel.
 - (3) When mine clearance operations are ongoing, personnel proceeding past the point are to be wearing PPE.
- b. No smoking within 30 m signs are to be posted at field explosive stores.
- c. Unless the location of the CP is obvious from the vehicle parking area, signs are to be positioned at the parking area indicating directions to the CP.
- d. Signs are to be positioned at the CP, medical treatment post, rest areas and toilet(s).

Signs are to be written in Lao and English and clearly visible from 30 m.

10.5.3. Vegetation Clearance

No vegetation clearance is to be carried out on the mine contaminated area prior to mine clearance (including technical survey) commencing.

10.5.4. Community Liaison

The requirements for community liaison before and during mine clearance operations as covered in **Chapter 5 of NS, Worksite Preparation** are also required for mine clearance operations. However, greater emphasis is to be placed on the dangers associated with the work, the warning systems in place and the implications of ignoring warnings.

11. Survey

11.1. General Survey

Any suspected mine contaminated areas should be put through a general survey process, similar to the general survey process described in **Chapter 6 of NS, Survey** to confirm the need for mine clearance or further technical survey.

A critical exception to the requirements for general survey described in **Chapter 6 of NS, Survey** is that there is to be no movement beyond the known limits of safe areas during the survey.

11.2. Technical Survey

Technical survey is to be carried out for all mine clearance operations in Lao PDR. Technical survey may be carried out as a stand-alone activity prior to mine clearance being carried out, or it may be carried out as part of an integrated survey/clearance operation.

Technical survey is to:

- a. Identify the true extent of the mine contaminated area and the area to be cleared. This must be done in order to minimise a waste of mine clearance resources on non-mine contaminated areas.
- b. Identify and confirm the hazards associated with the area.
- c. Identify any factors that may affect the follow-on mine clearance operations.
- d. Establish a Reference point (RP) and Bench Marks (BMs) for the site.
- e. Establish the boundary for the mine contaminated area by the use of a Start Point (SP), Turning Points (TPs) and Intermediate Points (IPs).
- f. If necessary, establish mine contaminated area boundary marking systems in accordance with section 9.1 above.

The requirements for the establishment of a RP, BMs, SP, TPs and IPs are the same as for UXO clearance operations and included in **Chapter 4 of NS, Marking Systems** and **Chapter 6 of NS, Survey**.

When technical survey is carried out, the following requirements are to be met:

- a. The technical survey is to be carried out on a representative sample of the area identified as mine contaminated, with the sample to be of sufficient size to clearly indicate whether the area has mine contamination or not.
- b. The depth of clearance achieved during technical survey is to be as specified by the tasking authority commensurate with the intended land use or the default depth for mine clearance in Lao PDR.

- c. The quality of clearance is to be as specified in section 7.3 above.

Only personnel with qualifications as indicated in section 6.1 to this chapter are to carry out technical survey of mine clearance operations.

Technical surveys for mine clearance require the same operational support as teams carrying out mine clearance operations.

Except when technical surveys for mine contaminated areas are always to be carried out as part of a combined survey/clearance task, internal procedures for reporting the results of technical survey are to be included in clearance organisations SOPs.

11.3. Completion Survey and Handover

Land cleared on mine clearance operations is required to be marked, completion surveyed and handed over in accordance with the requirements included in **Chapter 6 of NS, Survey** and **Chapter 11 of NS, Released Land Handover Procedures**.

Completion Survey Reports for mine clearance operations are to be clearly annotated to indicate that mine clearance was carried out, and if applicable, show the depths of clearance achieved for both mines and UXO. Unless specified prior to the task being undertaken, these depths should be the default depths for the two types of clearance.

During the handover of a cleared mine contaminated area, as part of the on-site handover the cleared area is to be walked over by the clearance organisation representative as a demonstration of confidence in the quality of clearance.

12. Clearance Drills and Procedures

Mine clearance organisations are to ensure that mine clearance drills, procedures and equipment used are capable of achieving the clearance requirements for the task. Clearance drills and procedures developed by mine clearance organisations are to ensure the following requirements are complied with:

- a. Clearance lanes are to be 1m wide.
- b. A base stick is to be used to show the limit of clearance longitudinally down a clearance lane and to mark the required 10cm overlap into adjacent lanes. See section 12.1 below on the use of a base stick. Clearance drills and procedures are to describe the use of the base stick including:
 - (1) Maximum distances that the base stick is to be moved forward in each step.
 - (2) The requirements for longitudinal overlaps down the lane.
- c. The area to be cleared in a lane is to be inspected visually, and if necessary by touch, before any other mine clearance drills are applied.
- d. On mine clearance sites where tripwires are suspected, a tripwire drill, including the action on locating a tripwire, is to be used before any vegetation cutting, detection or excavation is carried out.
- e. Where vegetation affects mine clearance operations, a vegetation cutting drill is to be used that ensures that vegetation is cut and removed safely before any detection or excavation is carried out.

- f. When metal detection equipment is used, metal detection drills are to be carried out to ensure that the entire area to be cleared, including overlaps into adjacent lanes, is searched. These drills are also to include procedures for pinpointing and marking detections.
- g. Drills for the excavation and uncovering of objects located by metal detection equipment are to be used that ensure that excavation and uncovering of detections is carried out safely.
- h. The actions to be taken on locating a mine or UXO are to be covered. This is to include the marking of the mine/UXO and if necessary the closing of the lane until the mine/UXO is disposed of.
- i. The actions to be taken to identify and dispose of mines or UXO located are to be covered. This is to include specific responsibilities for the identification, where necessary recovery, and disposal of mines and UXO. All sub surface mines recovered from a mine contaminated area are to be pulled from the ground using a hook and line with the pulling being carried out from a safe area. Drills for pulling mines are to be included in the organisation's mine clearance SOPs.
- j. Procedures for the recovering and removal of metal located during excavation are to be covered. Where metal detection equipment is used the ground is to be rechecked after metal has been removed.
- k. Procedures for the marking of lanes as clearance progresses are covered. Marking systems are to be in accordance with section 9 above.
- l. Where metal detection equipment cannot be used and mine clearance must be carried out, excavation drills are to be used that ensure that the depth of clearance is achieved and that all mines and UXOs or visually identifiable parts thereof are located and uncovered safely.
- m. Procedures are to include the actions to be taken when a mine clearance technician or two-person team leaves a working lane for a break and for when the technician/team returns to resume work again.

Personnel carrying out mine clearance operations are not permitted to carry mobile telephones into the clearance area.

12.1. Use of a Base Stick

The base stick is a tool used during mine clearance operations to mark the limit of the cleared area and the uncleared area in a working clearance lane. The mine clearance technician is required to always remain behind the base stick.

Normally, base sticks are 1.2 metre long, wooden, painted white for 10 cm at each end and red in the centre. See diagram 1 below.

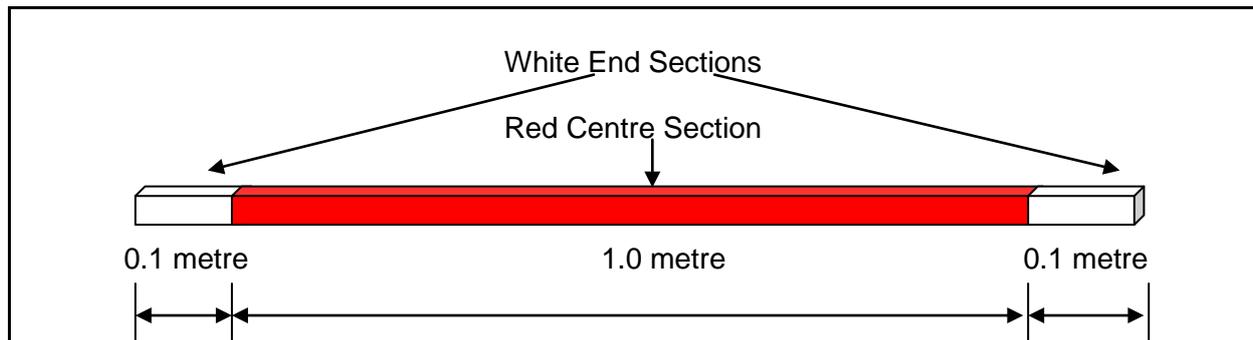


Diagram 1: Base stick

The base stick has a number of uses:

- a. The 0.1 metre white sections mark the limit of overlaps into adjacent lanes.
- b. The middle one metre section indicates the correct lane width.

12.2. Handover Drill for Two-Man Teams

When two-person mine clearance teams are used, the specific responsibilities of each mine clearance technician are to be detailed and the procedures for the handover of work between the two mine clearance technicians are to be covered.

12.3. Non-Standard Situations

When necessary, mine clearance organisations are to develop drills and procedures for safely dealing with non-standard situations that may occur on mine clearance tasks. Such situations may include:

- a. Mine clearance through wire obstacles.
- b. Mine clearance where the required depth of clearance exceeds the detection capability of metal detection equipment.
- c. Mine clearance through areas covered with large boulders.
- d. Dealing with obstacles on mine clearance sites, such as:
 - (1) Old military defensive systems.
 - (2) Abandoned/damaged vehicles.
 - (3) Entangled wire.
 - (4) Water courses, ponds or wells.
 - (5) Derelict or collapsed buildings.
 - (6) Heaped vegetation.
 - (7) Insect constructions. Termite mounds and anthills.

- (8) Burial grounds.

Where mine clearance organisations encounter non standard situations they are unable to safely deal with, they are to report the matter to the tasking authority.

12.4. Marking and Recording

Procedures are to include systems that accurately record by marking, measurement and the use of scaled drawings, areas that have been cleared and the type of clearance carried out.

13. Quality Management (QM) of Mine Clearance

Only personnel with qualifications as indicated in section 6.1 to this chapter are to carry out QM of mine clearance operations.

QM teams carrying out Quality Control (QC) on mine clearance operations are to have the same operational support; medic, medical equipment, safety vehicle, communications and accident response plan as teams carrying out mine clearance operations. These may be provided by the organisations being inspected; however if an external QM team is conducting external QC on completed work, operational support is to be integral to the team.

When conducting QC on mine clearance, QM teams are to treat cleared mined areas as unsafe until proven otherwise.

Except for the above, the general requirements for QM as covered in Chapter 19 of NS Quality Management also apply to mine clearance operations.

14. Disposal of Mines and UXO

All mines and UXO located on areas of land being cleared or technically surveyed are to be disposed of by the mine clearance organisation in accordance with the requirements of **Chapter 8 of NS, Explosive Ordnance Disposal (EOD)**.

Where practicable, mines and UXO should be disposed of on a daily basis, however in some cases such as during technical survey, the daily disposal of mines and UXO is not possible. Mines and UXOs located during technical survey may be marked and disposed of at a later date. However, on no account are mines and UXOs located on areas of land being cleared to be left without being disposed of.

When carrying out mine or UXO disposal on or adjacent to a clearance site where metal detection equipment is used, action should be taken to prevent the contamination of the worksite by fragmentation.

When UXO that exceed the authority limitations of a mine clearance supervisor are located, the tasking authority is to be notified and EOD support obtained.

15. Testing of Metal Detection Equipment

When metal detection equipment is being used on mine clearance operations it is to be tested in accordance with the manufacturers specifications every time it is turned on and when a new operator takes over the equipment. It is also to be routinely tested during operations to ensure that the equipment is functioning.

Metal detection equipment is to be tested in a test box each day prior to use. Test boxes are to be established at each mine clearance worksite where metal detection equipment is used. Separate test boxes may be required for different metal detection equipment or for the different soil types that may be encountered in the mine contaminated area. Test boxes are to include separate areas; one that is confirmed as metal free and one that contains a detector test piece or an FFE sample of the target mine which has the least metal content.

Note: If an FFE sample of a target mine is used, the sample is to be of a similar condition in terms of corrosion and weathering to those normally found during mine clearance in Lao PDR.

The depth at which the metal target is to be set is determined as follows:

- a. When no depth of clearance is specified, the metal target is to be set at the default depth for mine clearance in Lao PDR (13cm).
- b. When a depth of clearance deeper than the default depth is specified, but which is within the detection depth capability of the detection equipment being used, the metal target is to be set at the required depth of clearance.
- c. When a depth of clearance deeper than the detection capability depth of the detection equipment being used is specified, the metal target is to be set at the detection capability depth of the detection equipment being used.

The detection depth of the detection equipment being used is to be established by the mine clearance organisation based on trials conducted on site before work commences. This is to involve more than one item of detection equipment and a record of the trial is to be maintained with worksite documentation.

16. Mine Clearance Technician's Equipment

The minimum equipment to be provided to each mine clearance technician (one-person) or pair of mine clearance technicians (two-person drill) for the conduct of mine clearance operations is to include:

- a. Metal detector.
- b. Excavation tool.
- c. Prodding tool.
- d. Tripwire feeler.
- e. Saw type vegetation cutting tool.
- f. Shears type vegetation cutting tool.
- g. Wire cutters.
- h. A stiff brush.
- i. Tools and materials for the cleaning and maintenance of hand tools.
- j. A base stick.
- k. A bag suitable for carrying the tools, less the metal detector.

- l. PPE and protective clothing. Individual mine clearance technicians should have their own PPE.
- m. A plastic bucket or similar receptacle for the collection of scrap metal.

17. Miscellaneous Provisions

Where applicable, the requirements for progress reporting, clearance worksite documentation and dealing with visitors as described in **Chapter 7 of NS, UXO Clearance Operations** also apply to mine clearance operations.

In addition the requirements for Quality Management, Post Clearance Assessments, Environmental Management and Reporting and Investigation of UXO/Mine Action Incidents as described in the relevant chapters of NS also apply to mine clearance operations.