

Section Five: Minefield Clearance Operations

INTRODUCTION

5.1 Mine clearance operations are undertaken in areas suspected or known to contain mines/UXO. The methods and techniques outlined in this document are designed to increase effectiveness and flexibility while reducing the possibilities of accidents. Frequent revision should be undertaken with all deminers to ensure that methods and techniques are known and practised. Where possible all mines and munitions are to be destroyed in situ. This section must be read in conjunction with the other relevant standards and supporting SOPs.

SCOPE

5.2 This document addresses humanitarian mine clearance operations and should be read in conjunction with the standards for Survey, Minefield Marking, EOD and other relevant documents.

PURPOSE

5.3 The purpose of this document is to establish standards for mine clearance activities covering the detection and destruction of mines and munitions, thereby making the area safe for productive use by the local population.

QUALIFICATION

INDIVIDUAL QUALIFICATIONS

5.4 All personnel must be trained, qualified and authorised to conduct mine clearance and EOD tasks and must not perform tasks that exceed the limits of their training and qualifications. See Section Two- Training and Qualifications.

NGO AND CONTRACTOR QUALIFICATIONS

5.5 All demining organisations must be able to produce proof of their qualifications and previous experience. All should be able to demonstrate:

- a) The competence, experience and qualifications of all personnel;
- b) Standing Operating Procedures specifying the technical procedures to be used;
- c) A written quality policy;
- d) A written safety policy;
- e) A medical support plan with a comprehensive CASEVAC procedure;
- f) An insurance policy covering personnel, medical, third party and employer's liability;
- g) Their ability to operate and implement the proposed programme.

5.6 In addition they must provide regular reports and returns as detailed in the contract.

CONTRACTORS QUALITY MANAGEMENT SYSTEM

5.7 The contractors Quality Management system is to consist of three main components:

- a) Quality Philosophy;
- b) Quality Assurance;

c) Quality Control.

5.8 The Quality Management system must be designed for a mine clearance operation and consist of:

- a) A detailed outline of the organisation including line and support functions, matrix relationships, interfaces, reporting lines and content;
- b) A definition of roles, responsibilities and authority of each function;
- c) A quality policy, which is documented and communicated through the organisation;
- d) The appointment of quality management representatives;
- e) Document plans and processes required for meeting quality requirements;
- f) A continuous review of the quality system;
- g) Defined procedures for procurement, purchasing and payments;
- h) A definition of relevant work processes and procedures for compliance, monitoring and control;
- i) Detailed standard procedures for inspection, verification and testing;
- j) Defined procedures for handling goods;
- k) Verification that all processes and procedures are utilized in a correct manner to ensure the overall goal is achieved on time, within budget and to the required standards, to the stakeholders satisfaction.

CLEARANCE STANDARDS

5.9 An area is cleared when all mines and munitions have been removed and/or destroyed. All debris, from mines and munitions, such as fuzing systems, percussion caps and other items that constitute an explosive hazard, is to be removed.

5.10 The area should be cleared of mines and UXOs to a standard and depth which is agreed to be appropriate to the residual/planned use of the land, and which is achievable in terms of the resources and time available. The contractor must achieve at least 99.6 % of the agreed standard of clearance. The target for all UN sponsored clearance programmes is the removal of all mines and UXO to a depth of 200mm.

SITE LAYOUT AND MAPPING

SITE LAYOUT

5.11 The standardisation of all clearance marking systems is paramount to safe operations. The following features are essential requirements for all sites and include points, lines and lanes to be used in minefield clearance operations:

- a) Benchmark;
- b) Datum Point;

- c) Start Line;
- d) Start Point(s);
- e) Working Lane(s);
- f) Safe Route(s);
- g) Cleared Lane(s);
- h) Scrap Metal Collection Point(s);
- i) Command Post;
- j) Vehicle Park;
- k) Medical Point(s);
- l) Visitors Reception / Briefing Area;
- m) Explosives Storage;
- n) Demolition Pit;
- o) Equipment Storage Area;
- p) Rest and Toilet Areas.

SITE MAPPING

5.12 Maps are to form part of the record of work being undertaken on the site. Two maps are necessary to record all details in respect of the site and the clearance operation: the Working or Site Map and the Completion Map. Bearings are to be magnetic bearings. The site layout explained in paragraph 5.11 forms the basis for these maps. See example diagrams below:

MINE CLEARANCE EQUIPMENT, TOOLS, METHODS, AND TECHNIQUES

GENERAL

5.13 The deminers 'Tool Box' consists of a range of equipment including mechanical clearance equipment, deminers cutting tools, survey equipment, detectors and explosives etc.

5.14 All equipment must have SOPs written on the correct procedure for usage, maintenance, handling, transport and security. The selection of tools is dependent on the country and type of work.

BURNING AND CHEMICALS TO CLEAR VEGETATION

5.15 Burning and the use of chemicals to clear vegetation should only be used after careful consideration of the consequences of their use.

MANUAL CLEARANCE TOOLS

5.16 The following tools are used in demining operations with the objective of locating or assisting in the location of mines or munitions. Should any item be located an immediate action (IA) drill must be known to all deminers.

a) **Probing.** The most commonly used method to check sub-surface for buried mines or munitions. Details of the angle and spacing for the use of the probe must be stipulated in the SOPs. See also Section One- Safety.

b) **Excavation.** An area where the detector or other methods have indicated the presence of metal will be excavated. Details of the depth, methods and tools to be used must be outlined in the SOPs.

c) **Cutting tools.** A variety of tools are available for the task of cutting small bushes, scrub and grass. All cutting tools must be used in the horizontal plane. Details of types and methods of use are to be outlined in the SOPs.

d) **Metal Detectors.** All detectors must be able to detect the landmines used in theatre to the depth of clearance specified. Consideration must be given to the depth of laying during operations and the end use of the land. All metal detectors need a comprehensive in-country technical evaluation. The SOPs must contain the procedures for operation, action on troubleshooting faults, maintenance and battery checking. The minimum depth of clearance is 200 mm therefore detectors should be able to detect mines to at least this depth.

e) **Trip Wire Drills.** A visual inspection is necessary in the zone that is being cleared. This may also be accompanied by a tripwire feeler drill. Methods of use are to be outlined in the SOPs.

PROTECTIVE EQUIPMENT

5.17 All personnel involved in mine clearance activities must wear adequate protective equipment when appropriate. The standards for protective equipment are detailed in Section One - Safety.

MECHANICAL CLEARANCE EQUIPMENT

5.18 The standard for clearance performance is outlined in the Section Five, paragraph 5.10.

5.19 Mechanical clearance equipment forms part of a system, and it is the integrated performance of all of the clearance methods such as manual, dogs and mechanical that constitute the clearance standard.

5.20 If mechanical methods of clearance are to be utilized danger areas must be clearly defined. Danger areas are to be of sufficient size to allow for the possible fragmentation of bounding and directional mines or other similar munition types. Additional consideration is to be given to the possibility of mine or part mine projection and safe machine working distances, vehicle recovery and medical support.

5.21 The use of mechanical equipment in this role requires the writing of a special SOP particular to the equipment to cover safety distances, equipment operational procedures, clearance operations, communications, vehicle recovery and medical evacuation.

EXPLOSIVE SENSING DOGS

5.22 Dogs are a detection 'tool' and particularly effective in survey, area reduction and road and route clearance. As a minimum dogs are to be used in pairs with each dog checking the same ground individually. Special SOPs need to be developed for their operational use, environmental acclimatisation, veterinary care, administration and logistics.

MINEFIELD MARKING AND SIGNS

5.23 Details of standard minefield signs are in Section Four, paragraph 4.10.

MARKING DURING CLEARANCE OPERATIONS

5.24 All mine and EOD clearance sites must be clearly marked. As a minimum all safe lanes, safe routes and control areas must be marked in order to define the clear and uncleared areas. Marking systems must be of a semi-permanent nature and effective for the duration of the clearance task with minimum maintenance. See also Section One - Safety and Section Four - Marking. The SOPs must clearly state the marking methods and material.

LOCATION AND DESTRUCTION OF MINES AND MUNITIONS

PROCEDURE WHEN FINDING A MINE OR UXO

5.25 If a mine or UXO is located during survey or clearance operations, the lane or site is to be clearly marked, as detailed in the SOPs, and work is to cease immediately in that lane or area. The SOPs should stipulate how and when disposal should be undertaken.

DEMOLITION AND MUNITION DISPOSAL

5.26 All explosive items found are to be destroyed, either in situ or later at a controlled demolition point. These procedures must be detailed in SOPs. See also Section Six - Explosive Ordnance Disposal.

EXPLOSIVES AND SAFETY STANDARDS

5.27 In all countries, explosives are a controlled material and their procurement should only be undertaken with the written permission of the relevant authority. Where possible, military specification or other suitable explosives with a Velocity of Detonation (VoD) of more than 6500 metres per second or faster should be sought and utilized. If explosives are donated or imported they are to be under the strict control of the receiving authority. Standards for the storage and transportation of explosives are explained in Section One - Safety.

SAFETY VEHICLE

5.28 Mine and UXO clearance operations are not to commence unless a dedicated serviceable safety vehicle, with a driver, that is capable of carrying a stretcher is on site.

COMMUNICATIONS

5.29 All Team Leaders, Supervisors and Medical Teams must be able to communicate with each other during mine and UXO clearance operations. The senior supervisor and medical staff must be able to communicate with the higher authorities. Regular communication checks are to be made.

SENTRIES

5.30 During demolition activities sentries must be posted to prevent unauthorized access to the demolition site. They should be briefed on their responsibilities and equipped with appropriate danger warning signs or red flags.

EXTRACTION FROM THE ACCIDENT SITE

5.31 If an accident occurs during mine or UXO clearance operations the immediate action or extraction drill must be undertaken. The sequence must be clearly defined in the SOPs. Frequent revision of the extraction procedures should form part of the on-site refresher training programme.

REPORTS AND REPORTING

5.32 Report format and required frequency should be stipulated in the SOPs. All task sites should have a Daily or Task Record which must be maintained within the appropriate reporting system and must record the daily activities including the following:

- a) Manpower, equipment and material state;
- b) Task status;

- c) Visitors;
- d) QA and QC activities;
- e) Mines and munitions found and action taken;
- f) Areas marked in square metres;
- g) Area surveyed in square metres;
- h) Area cleared in square metres;
- i) Accidents and incidents and the action taken.

5.33 In addition the Daily or Task Record must have available copies of:

- a) CASEVAC and MEDEVAC requests;
- b) Incident or accident reports;
- c) Copies of previous Completion Certificates in the immediate area.

DEFINITION OF A MINE ACCIDENT AND A MINE INCIDENT

5.34 A mine accident is the result of an explosion caused during mine clearance operations, whereas a mine incident is the result of an explosive occurrence that occurs away from the mine clearance sites.

ACCIDENT AND INCIDENT INVESTIGATIONS

5.35 All mine accidents that occur during mine or UXO clearance operations are to be the subject of a full and independent investigation as soon as possible after the accident to attempt to identify the cause, to determine the responsible party(ies), and to recommend preventative action for future operations. Accidents or incidents not related to explosives could occur, for instance enroute to the work site, where there may be injuries to personnel. These are to be investigated when considered necessary. If the reasons for the accident/incidents are attributable to errors or inaccuracies in the SOPs, modifications are to be made immediately.

5.36 Lessons learned and recommendations made in the report are to be incorporated into the training doctrine. Reports of investigations must be distributed to relevant organisations and the United Nations Headquarters.

COMPLETION AND ACCEPTANCE CERTIFICATES

5.37 On completion of the clearance task a Level Three Survey must be undertaken to provide accurate and specific details of the cleared area. This survey report is to be included in the Task Completion Report which has been finalized by the mine or UXO clearance team(s). See Section Three: Survey.

5.38 On receipt of the completion and the Quality Assurance Report by the competent authority stating that the area has been cleared to the correct performance criteria, an acceptance approval should be prepared and submitted to the relevant authorities. It is normal to have a period of time, referred to as the maintenance period, between the completion of the task and the issuing of the acceptance certificate. This period of time should be defined in the contract.

MEDICAL

5.39 Demining and demolition activities must be conducted with suitable medical cover on site and available within set time limits. See Section Seven - Medical. Additional information on medical support, the equipment, material and procedures can be obtained from the Medical Support Manual for United Nations Field Operations. This manual is available from the DPKO Medical Support Unit, United Nations, New York. Telephone +1 212 963 1017 Fax + 1 212 963 2614.

QUALITY ASSURANCE

5.40 Quality Assurance addresses the managerial process that determines the organisation, programme design, goals and objectives, resources, and provides the programme team, client and stakeholders with feedback on the programme's performance in relation to standards, specifications and requirements for all aspects of the programme. The core processes and procedures must be formally defined and documented within each organisation, and used as the basis for verification of conformance by QA staff.

QUALITY CONTROL

5.41 Quality Control is the technical process and procedure necessary to measure, examine, analyse and report the programme's progress and conformity to performance requirements and technical specifications. Organisations involved with demining programmes must formally define and document their processes, procedures and standards utilized to measure, examine, analyse and report the programme's progress and conformance. The contractor is responsible to achieve the required level of quality performance.