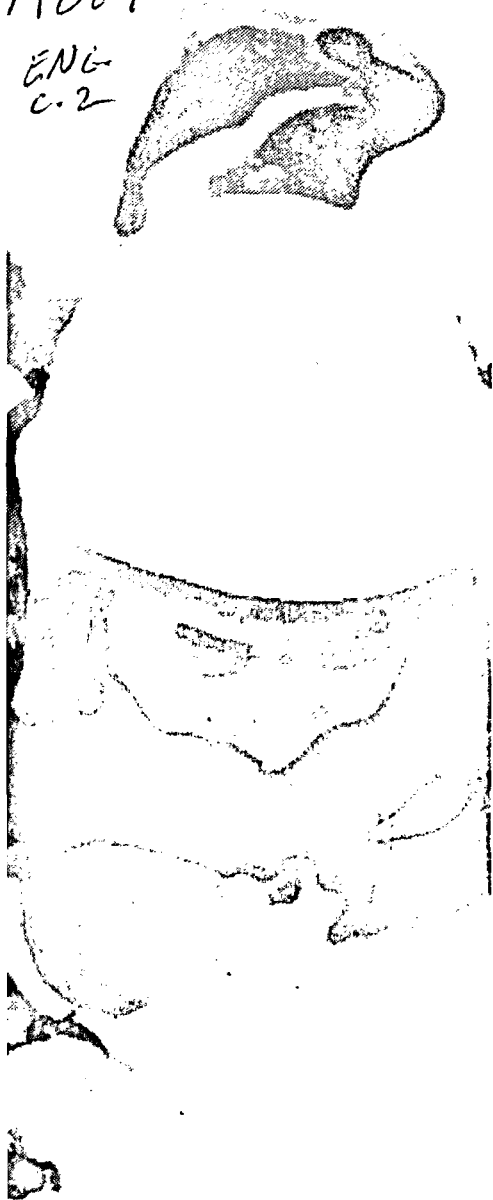


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INTERNATIONAL STANDARDS  
FOR  
HUMANITARIAN MINE CLEARANCE OPERATIONS

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# Foreword

The continuing humanitarian disaster caused by the vast number of landmines and unexploded ordnance littered throughout more than sixty countries has, in recent years, created an active and growing response from the international community that could eventually lead to the elimination of the use of landmines. In the meantime the international community continues to struggle with the removal of the millions of mines that threaten vast areas of many countries, causing injuries and fatalities that threaten the fragile existence of families within the community.

The deployment of both anti-tank and anti-personnel landmines has caused incalculable human devastation and suffering to an increasing number of non-combatants, largely women and children. Landmines have also resulted in large tracts of valuable and sustainable agricultural land lying fallow, causing serious economic problems for regions and individual communities. The economic pressure this causes further threatens the rural populations who will eventually have no alternative but to brave the danger in order to scratch a living from the explosively contaminated ground. Fragile peace agreements and reconciliation efforts, always under pressure during the initial phases of political attempts to establish lasting peace, are further impacted by the mine contamination. Expensive treatment for mine-related accidents increases the pressure on health systems that are often barely functional and the costs for survivors in treatment and rehabilitation continue to rise. The traumatic effect that these injuries and fatalities have on the population is immense and is one of the most disturbing aspects for personnel involved in humanitarian relief efforts.

The international community has been addressing, with increasing emphasis, this man-made disaster with a greater financial commitment, creating more international demining organisations and establishing an indigenous mine clearance capacity. Humanitarian demining was initially based on military methods and standards. However, as the humanitarian demining scenario has developed and changed there has been an increasing requirement to establish a coordinated approach to humanitarian demining standards. In June 1996, the Government of Denmark initiated a forum for the discussion of demining standards and technology which pioneered the groundwork for the development of the international standards. Their innovation, resulting in the production of these standards, should greatly increase donor confidence, the efficiency and effectiveness of demining operations and, more importantly, improve safety for the deminers who are involved in the hazardous task of removing the cause of so much suffering, hardship and strife.



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# Acronyms

ACEM	Aimed Controlled Effect Mine
ACS	Advanced Countermine System
AD	Anti Disturbance
ADAM	Aerial Denial Artillery Mine
ADP	Accelerated Demining Programme
ADSM	Artillery Delivered Scatterable Mine
AHD	Anti Handling Device
AP	Anti Personnel
ALS	Advanced Life Support
ASTAMIDS	Airborne Standoff Minefield Detection System
AT	Anti Tank
ATC	Afghan Technical Consultants
BAC	Battle Area Clearance
BT	Booby Trap
CDS	Central Disposal Site
CLAMS	Cleared Lane Marking System
CMAC	Cambodian Mine Action Centre
CMAO	Central Mine Action Office (Angola)
CMT	Counter Mine Training
DGPS	Differential GPS
CMV	Combat Mobility Vehicle
DI	Double Impulse
DPKO	Department of Peace Keeping Operations
DU	Demining Unit (United Nations)
EOD	Explosive Ordnance Disposal
FAE	Fuel Air Explosive
FASCAM	Family of Scatterable Mines
FFE	Free From Explosive
GIS	Geographical Information System
GPR	Ground Penetrating Radar
GPS	Global Positioning System
HALO (NGO)	Hazardous Area Life Support Organization
HEAT	High Explosive Anti-Tank
HESH	High Explosive Squash Head
HF	High Frequency
HI (NGO)	Handicap International
IED	Improvised Explosive Device
IOE	Irregular Outer Edge
LMP	Land Mine Protocol
LMW	Land Mine Warfare
MAC	Mine Action Centre

MAG (NGO)	Mines Advisory Group
MAPED	Mine Anti Personnel Effect Directional
MAT	Mine Awareness Training
MCP	Mine Clearance Programme
MCPU	Mine Clearance and Policy Unit (United Nations)
MDD	Mine Detecting Dog
MDV	Mine Detection Vehicle
MEDDS	MECHEM Explosives and Dog Detection System
mmw	millimeter wave
NGO	Non Governmental Organisation
NPA (NGO)	Norwegian Peoples Aid
OEW	Ordnance and Explosive Waste
OMA	Organisation for Mine Awareness
PTSD	Post Traumatic Stress Disorder
RMD	Remotely Delivered Mine
RF	Radio Frequency
RFP	Request For Proposal
SC	Save the Children
SM	Scatterable Mine
TNT	Tri-Nitro Toluene
TWMP	Track Width Mine Plough
UXO	Unexploded Ordnance
VOD	Velocity of Detonation
WAAPM	Wide Area Anti Personnel Mine
WAM	Wide Area Mine
WP	White Phosphorus

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# Overview

These international standards for humanitarian mine clearance operations are issued under the auspices of the United Nations and are effective upon receipt. Other standards, such as those issued by the host nation are to be complied with provided they match or exceed those set out in these documents, otherwise, these international standards will apply.

The following subjects are covered:

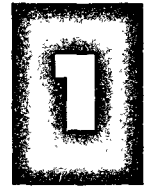
- *Safety*
- *Training and Qualifications*
- *Survey*
- *Minefield Marking*
- *Mine Clearance Operations*
- *Explosive Ordnance Disposal*
- *Medical*
- *Communications*
- *Minefield Information Management*

The standards provide a framework for the creation of Standing Operating Procedures (SOPs), which in turn detail the manner in which specific mine clearance operations are conducted. The SOPs should take into account the cultural, environmental and operational variations between countries and, therefore, procedures should be amended accordingly.

Examples of SOPs and guideline documents are included to facilitate application. Standards will be regularly reviewed and updated by the United Nations. The latest version of the standards can be obtained from the Mine Clearance Policy Unit, DHA, United Nations, New York, NY 10017 USA. Telephone (212) 963-4632; Fax (212) 963-1040 or E-mail [cassidy@un.org](mailto:cassidy@un.org). Comments and suggestions for improvement are welcome.







## **INTRODUCTION**

1.1 The safety standards outlined in this document deal with mine detection, marking, clearance, survey, and explosive ordnance disposal operations all of which demand safety considerations. These standards address the minimum requirements for humanitarian mine and UXO clearance. It should be recognised, however, that there are no comprehensive safety regulations and equipment for mine and UXO removal that can adequately cover all situations. Where conditions merit, the use of more stringent safety instructions should be encouraged. Deviations, if any, from these standards should be conveyed to the UN and should be documented, including the reasons for non-compliance.

## **SCOPE**

1.2 This document addresses the minimum safety standards for protective equipment, safety distances, procedures for survey, mine clearance and EOD operations, site requirements and layouts and standards for the construction of field stores, storage and transportation of explosives.

## **PURPOSE**

1.3 The purpose of this document is to establish minimum safety standards and procedures for all personnel involved in humanitarian mine and UXO clearance operations.

## **MANAGEMENT AND SUPERVISION**

1.4 The management and supervision of personnel involved in all aspects of the clearance activities must be undertaken using the relevant SOPs and guideline documents. Variations to the procedures detailed in the SOPs must be implemented only after permission has been given from the originator of the SOPs.

1.5 All personnel involved in clearance operations must receive the proper training, must be qualified, experienced and medically fit.

## **PERSONAL PROTECTIVE EQUIPMENT**

1.6 All personnel involved in mine clearance activities must wear adequate protective equipment when appropriate. The minimum equipment requirement is normally eye protection and a protective jacket. The following are standards for this equipment:

- a) **Eye Protection and Helmet.** Eye and face protection is to be provided by the use of a fragmentation visor. This visor must meet the minimum standard of personal protection which is to be capable of withstanding a v50 rating (dry) of 450m/s for a 1.102 g fragments (refer to STANAG 2920) and be tested in accordance with US NIJ 0101.03 standards. Visors are recommended. The visor should be long enough to cover the protective jacket collar. A helmet should be worn unless it compromises the safety of the operator. It must conform to the same protection standards as the visor.
- b) **Safety Glasses.** When used, safety glasses must be able to meet the minimum standards of personal protection and be capable of withstanding a v50 rating of 450m/s for a 1.102 fragments

(refer to STANAG 2920) and be tested in accordance with US NIJ 0101.03 standards.

- c) **Protective Jackets.** Protective jackets should be worn but are optional when operating (demi-ning) in the prone position. The jacket and visor should be designed to protect as well as deflect blast and fragmentation from the operator. Sleeves are not mandatory, but the jacket must have groin protection. The jacket must be capable of withstanding a v50 rating (dry) of 450m/s for a 1.102 g fragments (refer to STANAG 2920) and be tested in accordance with US NIJ 0101.03 standards.

#### 1.7 Other safety equipment available includes:

- a) **Coveralls or special clothing.** Special protective clothing will be necessary when the removal and destruction of certain items is involved, such as those containing toxic elements. Clothing material must be non-melting and fire resistant. The SOPs should stipulate the special protective clothing required.
- b) **Footwear.** Footwear should be comfortable and should offer protection from the normal environmental elements, such as abrasive stones, sharp grass stalks, twigs etc.

### MINE CLEARANCE SAFETY DISTANCES AND PROCEDURES

1.8 Minimum safety distances must be applied to personnel undertaking mine clearance activities. Distances should be modified based on the known danger areas of individual mines and munitions, and the terrain or where the presence of tripwires or booby traps is suspected. The following are the minimum safety distances, for an AP blast mine:

	Metres apart
a) More than one working section.....	25
b) Deminers working in the same lane.....	25
c) Access route and safety areas.....	25
d) Vehicle park, medical teams and active mine clearance sites.....	100
e) On-site explosives storage point, containing no more than 20 kgs.....	100
f) Bulk storage and any occupied building or works site.....	200

*(See also Storage Standards Annex C to Section One)*

### PROBING PROCEDURES

1.9 The maximum probing angle is 30 degrees from the horizontal. The spacing between probes is to be 5 cms unless objects are present that are smaller in size, in which case the spacing is to be reduced accordingly. The angle and spacing of the probing is to be detailed in the SOPs.

### WORKING PERIODS

1.10 Mine and UXO clearance operations should be undertaken in daylight and in dry conditions. The working period will depend on the working conditions and the ability to maintain concentration. Adequate rest periods are to be taken and all details of the working conditions are to be included in the SOPs.

## *Mine Clearance and EOD Site Standards and Procedures*

### **MARKING REQUIREMENTS**

1.11 All mine and EOD clearance sites must be clearly marked. For details see Section Five.

### **MINIMUM SIZE OF A DEMINING OR EOD TEAM**

1.12 The minimum recommended size of a mine clearance or EOD team is to be two qualified specialists one of whom is to be the team leader/supervisor. The minimum support for communications and medical are detailed in the relevant sections of these standards.

### **MINE AND DEMOLITION SAFETY DISTANCES**

1.13 Demolition tasks consist of items ranging from a few grams of explosives to several tonnes. Safety distances will vary according to the actual or perceived threat factors. Distances can be reduced depending on the terrain and the use of protective works. Reference should be made to Section Six: Explosive Ordnance Disposal and the table in Annex A to Section One.

### **SAFETY PROCEDURES - EQUIPMENT**

1.14 The method of operation of metal detectors, the frequency of checking batteries, the action to be taken if machines register a fault are to be detailed in the SOPs. All faulty equipment is to be returned for repair or replacement.

1.15 All mine and UXO clearance sites are to have equipment and procedures in place to allow quick access to mined areas in the event of an emergency.

### **SAFETY PROCEDURES DURING DEMOLITION TASKS**

1.16 Where practical, electrical initiation should be used. The rules that are to be applied for all demolition tasks are detailed in Annex B Section One.

### **MISFIRES - ACTION**

1.17 Should a misfire occur during disposal tasks the SOP must state the action to be taken and the duration of delay before the investigation of equipment, material, site and targets is undertaken. See Annex B (para. 17) to Section One.

## *Storage, Construction and Transportation of Explosives*

### **STORAGE OF EXPLOSIVES**

1.18 If a national authority has suitable storage regulations these are to be utilized as a minimum. Where there is no national body, the standards detailed in Annex C to Section One are to be used.

### **EXPLOSIVES STORE CONSTRUCTION**

1.19 In many cases semi-permanent explosives stores have to be constructed. The standards detailed in Annex D to Section One are to be used if no suitable national regulations are available.

## **TRANSPORTATION OF EXPLOSIVES**

1.20 Mine clearance and EOD work requires the frequent movement of explosives and explosive accessories. The standards detailed at Annex E to Section One are to be used if no suitable national regulations are available.

## ***Visitors***

### **VISITORS - SAFETY FACTORS**

1.21 Personnel who are not part of the regular work force who visit the site are classed as visitors and must receive a formal briefing immediately upon arrival. This is to consist of an explanation of the site layout, a safety briefing and details of action to be taken in the event of an incident or accident. Visitors should not enter hazardous areas.

1.22 If visitors must enter hazardous areas, certain rules must apply, which include but are not limited to:

- a) The visitor should not interfere with the demining or UXO clearance operation;
- b) As soon as a visitor is on the base line/start line, all operations should be stopped;
- c) Visitors should wear the same measure of protection as the supervisor and deminer;
- d) Groups of visitors should not exceed four in number and each group is to have an escort.

## **Annex A to Section 1**

### **Mine and Demolition Safety Distances**

<b>Type of Munition</b>	<b>Minimum Safety Distances (open area - in metres)</b>
AP Mine Blast.....	100
AP Mine Fragmentation/Bounding/Directional.....	300/500
AT Mine Blast.....	500/1000
AT Mine Shaped Charge.....	1000
Off Route Mine.....	1000
Mortar up to 82 mm.....	500
Shell up to 80 mm.....	500
Shell up to 160 mm.....	800
Shell above 160 mm.....	1000
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: Qualified EOD specialists must stipulate safety distances for all munitions other than those detailed above. Details should be contained in the SOPs.*

*Note 3: Where possible, protective systems should be used to allow distances to be reduced.*

## *Annex B to Section 1*

### *Safety Procedures During Demolition Tasks*

The following rules are to be applied to all demolition tasks:

#### **GENERAL**

- 1) Smoking is prohibited on the demolition site.
- 2) Standards for the storage and transportation of explosives are explained in paragraph 1.18 and 1.20.
- 3) All demolition sites must have fire fighting equipment available.
- 4) Guards, and cordons where necessary, are to be posted at relevant locations with danger warning signs.
- 5) Minimum safety distances are to be applied for the safety of all personnel. Examples are detailed in paragraph 1.8 and Annex A to Section One.

#### **DEMOLITION SITE COMMANDER**

- 6) A qualified and authorised person is to be nominated as the demolition site commander.

#### **DETONATORS - SAFETY PROCEDURES**

- 7) Detonators are to be kept separate from all other types of explosive material in a special box, where possible the original shipping and transportation container is to be utilized and must be attended at all times.
- 8) Detonators (electrical or non-electrical) should never be buried.

#### **ELECTRICAL - SAFETY PROCEDURES**

- 9) All electrical firing cable is to be well maintained. Both the cable and the detonators are to be checked for continuity and discontinuity prior to being used.
- 10) Electrical cable must not be laid over other strands of cable.
- 11) Electrical firing systems are not to be used if there is a known Radio Frequency threat or in the event of weather conditions which may create static electrical conditions.
- 12) The keys/firing device and/or the exploder/blasting machines are to be held by the person in charge of the site until such time as the equipment is to be used.

#### **SAFETY FUZE - SAFETY**

- 13) Safety fuze must be tested before use. The first 30 cms is to be cut off and discarded. The second 30 cms is to be tested to ensure it performs to the designed burning rate. The last 30 cms of all reels

must be discarded. The minimum length of safety fuze is to be of sufficient length to allow the specialist to walk from the demolition site to a safe location before detonation occurs.

#### **CONTROL OF DEMOLITION TASKS**

- 14) A minimum number of personnel should be employed to place the charges.
- 15) Only qualified personnel are to supervise the placement of charges and to have charge of the explosives and accessories store.
- 16) Two people must count the number of explosions when firing multiple shots.
- 17) If a misfire occurs there must be a waiting period of 10 minutes for an electrically fired system and 30 minutes for a non-electric system before the area, equipment or targets are inspected.
- 18) On completion of the demolition task the senior supervisor (supervisor in charge of the demolition site) is to check all charge locations to confirm that all charges have fired correctly. If any misfires or partially fired munitions/charges are found, the appropriate disposal action is to be undertaken before the site is declared 'all clear'.

## *Annex C to Section 1*

### *Storage of Explosives*

There are fixed rules and regulations for the handling and storage of explosives long term. All SOPs are to conform to suitable national rules and regulations where they exist.

#### **GENERAL SAFETY RULES**

- a) Avoid heat in excess of 40° Celsius, dampness or rough handling.
- b) Protect all explosives from direct sunlight.
- c) Keep explosives in their transportation and storage packaging.
- d) The store must be clean and free of all other materials. Under no circumstances should paint, oil, petroleum, rags, packing waste and other flammable materials be stored with explosives.
- e) Explosives must not be stored with radioactive materials.
- f) An area of at least 50 metres around the store must be cleared of all vegetation. This area must be frequently maintained to ensure no overgrowth in the immediate area of the store.
- g) No smoking or open fires should be permitted within a safety area of 100 metres.
- h) Fire fighting equipment (extinguishers, fire blankets and bush brooms if required) are to be positioned outside all explosives stores.

#### **STORAGE BUILDINGS**

- i) Explosives should be stored in a cool, dry place with good ventilation and sheltered from the elements.
- j) Explosives store must be a minimum of 200 metres from any building except when there are overriding security requirements.

#### **PLACEMENT OF EXPLOSIVES**

- k) Explosives should be raised off the floor by use of 'duck boards' or shelving.
- l) Separate explosives by type.
- m) Detonators and accessories must be separated from other explosive types.
- n) Mines, munitions and UXOs should never be stored with bulk explosives.
- o) Explosives must be stored away from the walls to allow air flow and should not exceed the maximum allowable amount of each explosive type for the store. If storage regulations are not available then an EOD trained specialist, with the relevant experience, must decide how the explosives are to be stacked and the total explosive content.



- p) Explosives must be stored by compatibility group as defined in IATA dangerous goods regulations.

#### **CONTROL AND SECURITY**

- q) The store must have the appropriate signs warning of the contents, the hazard and the restrictions. Signs should be in one of the six major recognised UN languages (English, French, Russian, Arabic, Chinese or Spanish) and the local language.
- r) Radio transmission is not permitted within 100 metres of the store.
- s) Entry to the store is limited to authorised personnel only.
- t) All transactions of explosives, receipts and issues, are to be recorded and should be checked by the appropriate authorised person at a minimum of once monthly.
- u) A regular accounting system with frequent stock checks and routine inspections is to be conducted by the higher authority in the organization.
- v) Explosives stores must be secure and guarded.
- w) Frequent inspections are required for all explosives especially dynamite and nitroglycerine (NG) based explosives. When these explosives are time-expired they must be destroyed. Inspection frequencies are to be indicated by the senior EOD technician.
- x) A qualified person is to be nominated and responsible for the management of the store and explosives.

## *Annex D to Section 1*

### *Explosive Store Construction*

It is essential that a common sense, secure and safe approach is made for any field storage design criterion which is effective and easily achievable. All SOPs are to be written in conjunction with any suitable national rules and regulations. The following points should be addressed:

#### **THE BUILDING**

- a) The building must be secure.
- b) The roof should be of low density material.
- c) The roof should have a thermal shield to assist in preventing interior temperatures from rising above 40 Celsius. This shield should permit the free circulation of air.
- d) Air vents, with due regard to security, are required.
- e) The inside of the store should have at least two rooms, one for bulk explosives the other for detonators. If only one room is available, a blast wall is to be constructed utilizing some suitable blast proof material, such as sandbags, to a thickness of at least 0.3 metres.
- f) The inside of the store should be covered in a suitable material to assist in cooling and avoid the danger of friction, e.g. timber cladding inside a shipping container.
- g) The store must have solid and secure door/s.
- h) Pallets or a similar material should be used to keep explosives off the floor surface and assist the ventilation process.

#### **SECURITY AND OUTER AREA WORKS**

- i) Additional field works (for containers or similar stores) in the form of soil or sandbags should be placed along the sides of the container to roof height. This forms the first blast protective wall and assists in directing any internal blast upwards.
- j) Bund walls should be built around the entire store to a minimum of the height of the store.
- k) The outer bund walls should also have a security fence. Security lights are recommended. A security guard or patrol may be necessary.

## **Annex E to Section 1**

### ***Transportation of Explosives***

All SOPs are to be written in conjunction with national rules and regulations. The following are the key factors for the transportation of explosives:

#### **VEHICLES**

- a) Vehicles should have an adequate capacity, security and suitability for the intended use.
- b) Vehicles should be mechanically reliable with good tires.
- c) Vehicles should be clean and carry no other cargo.
- d) Vehicles are to have adequate fire fighting equipment.
- e) All vehicles must have the proper hazard warning signs and have red flags positioned at the front and rear of the vehicle.

#### **DRIVER, DRIVING AND SECURITY**

- f) The driver, supervisor and security guard (if required) are to be the only personnel in the vehicle.
- g) Drivers, supervisors and guards must have had adequate training in both hazardous load handling and emergency procedures. The relevant section of the SOPs relating to this should be in the driver's possession.
- h) Vehicles should travel with a minimum safety distance of 100 metres between them when in convoy and at a speed not exceeding 60 kms per hour.
- i) Where possible, routes should be selected to avoid built-up or heavily populated areas.
- j) The commander and driver must have written instructions on procedures to be undertaken in the event of an accident.

#### **SAFETY**

- k) Bulk explosives and detonators should not be transported in the same vehicle.
- l) Explosives should be in transportation packaging where possible. Where this is not possible detonators, electric or non-electric, must be placed into special detonator boxes. The box should be painted red, as a hazard indicator and for ease of identification.
- m) Explosives boxes are to be stored away from the vehicle exhaust pipes.
- n) Smoking is not allowed within 100 metres of the transport.



# Training and Qualifications



## **INTRODUCTION**

2.1 A high standard of training is essential to maintain good management, sound operational procedures and safety.

## **SCOPE**

2.2 This document addresses the international and national training standards and qualifications required for personnel involved in all aspects of humanitarian mine and EOD clearance operations and support.

## **PURPOSE**

2.3 To establish training and qualification standards required for personnel involved in all aspects of humanitarian mine and EOD clearance and support.

## **TRAINING CONCEPT**

2.4 Prior to undertaking demining training each organisation must have a statement which addresses policy, responsibilities, resources and a quality assurance system designed to evaluate the suitability and effectiveness of the training.

2.5 Frequent refresher training and updating is necessary. The type of training to be undertaken, course content and subject matter should be assessed during the programme and quality assurance monitoring phase.

## *Qualifications and Experience*

### **QUALIFICATIONS AND EXPERIENCE REQUIRED UNDER THE AUSPICES OF THE UNITED NATIONS**

2.6 International staff employed under UN auspices on mine and UXO clearance operations must have qualifications and experience recognised by the United Nations. A draft document for the qualifications and experience required for mine and EOD clearance activities is presently being developed.

### **MINE CLEARANCE, DEMOLITIONS AND EXPLOSIVE ORDNANCE DISPOSAL (EOD)**

2.7 Personnel involved in mine clearance, demolitions and EOD work must have the necessary recognised qualifications and experience. Detection and destruction tasks, and the relevant qualifications to conduct them, have been defined below.

- a) The detection and destruction of single mines or items of ordnance *in situ* such as mortars or shells up to 160 mm may be conducted by personnel with the relevant UN approved or nationally recognised qualifications and experience. All personnel must attend an in-country familiarisation course.
- b) Bulk ordnance disposal tasks which may consist of one or more types of munitions must be conducted by specialists who hold the appropriate UN approved or nationally recognised qualifications and experience.

- c) The detection and disposal of specialist items such as booby traps, large size ordnance (over 160 mm), missiles, rockets and bombs may be conducted by specialists who hold the appropriate UN approved or nationally recognised qualifications and have experience in bulk disposal tasks.
- d) The detection and disposal of munitions that contain a toxic element must be conducted by personnel who hold the appropriate UN approved or nationally recognised qualifications and have experience in this type of work.

#### **INTERNATIONAL QUALIFICATIONS AND EXPERIENCE**

2.8 Where international staff form the core of technical knowledge and experience for the demining, EOD, medical and managerial programme support, it is essential that these specialists are able to conduct the training and support functions to an acceptable standard. International staff should be able to satisfy the client that they hold qualifications and experience equivalent to or better than those approved by the United Nations.

#### **INTERNATIONAL MEDICAL STAFF**

2.9 International medical staff must hold current, internationally recognised qualifications.

### *Training Courses*

2.10 The majority of courses necessary for demining at the various practical and management levels are generally similar for most theatres. The course syllabus can be modified to include special to theatre subjects. All personnel should be given certificates of achievement or qualification on successfully completing the course.

#### **MINE AWARENESS TRAINING**

2.11 Mine Awareness (MA) is an educational process of teaching the population about the threat of mines and munitions, living with the threat that they impose and the changing of behaviour.

#### **SURVEY TRAINING COURSES**

2.12 It is recommended that all personnel involved in survey have experience in mine clearance and, where possible, attended EOD and team leader courses.

#### **DEMINING TRAINING COURSES**

2.13 There are several types of demining courses: basic demining, team leader, instructor and supervisor. The basic demining course should be for all personnel involved in demining activities. The team leader and supervisor's courses are for personnel who have been selected for managerial positions, having completed a basic course and practical field experience.

#### **EXPLOSIVE ORDNANCE DISPOSAL TRAINING COURSES**

2.14 There are three recommended course levels for EOD which are to be designed around the type and condition of the munitions found in country. The basic course syllabus should concentrate on basic demolition procedures for the destruction of those mines and munitions which can be disposed of easily

and safely. The second level should develop EOD expertise and skill based on the need to train team leaders and supervisors to undertake this activity without external assistance and to be able to tackle larger and more complex disposal tasks. The third level is specialist EOD courses, organised either in country or at a specialist facility such as an international EOD establishment, in order to conduct bulk demolitions and EOD tasks. See paragraph 2.8 on international qualifications and experience.

2.15 Special to Theatre and refresher courses should be arranged to train EOD operators on specialized demolition methods and to teach new techniques based on new material or equipment.

#### **MEDICAL TRAINING COURSES**

2.16 Trained medical support is required on-site should a medical emergency occur. Medical personnel should be registered with the local health authority. Where training standards are established they should be utilized.

2.17 Three levels of training are available and the following terms, qualifications and training standards are to be used:

- a) First Aid Training
- b) Medical Orderlies
- c) Paramedics

2.18 First Aid Training is a requirement for all personnel, deminers, drivers and management staff involved in the field operations and is recommended for all staff. A first aid course consists of at least 24 hours of medical training. Regular refresher courses should form part of routine activities.

2.19 Medical Orderlies, or first level medical technicians, must successfully complete a course of at least four weeks duration. The length and content of the course will depend on their previous experience.

2.20 Medical Orderlies should receive some basic demining training.

2.21 Paramedics or personnel trained as Emergency Medical Technicians (EMT(P)) must have at least one year of training in advanced life support. Paramedics are also trained to provide trauma treatment, to run a clinic, provide basic medical attention and provide medical advice on sanitation and hygiene and the prevention of diseases. These courses are only conducted in a few countries and cannot, in most cases, be taught as part of a regular teaching curriculum. Paramedics are to be tested and given refresher training on invasive procedures each year.

2.22 Paramedics should be given some basic demining training.





## **INTRODUCTION**

3.1 In order to establish a Mine Action Plan based on governmental and regional priorities, areas that are suspected of being mined or are mined must be quickly identified. These records form part of the Mine Survey database and are a major planning tool in the prioritisation of tasks and the commitment of mine clearance resources. Information obtained from the various mine awareness programmes form an important part of the initial Level One survey data.

## **SCOPE**

3.2 This document addresses the standards for the levels of survey and covers terminology, recording and survey operations. It should be read in conjunction with the standards for mine clearance.

## **PURPOSE**

3.3 To establish standards for survey activities in order to record the location and actual area of the mine-affected locations.

## **DEFINITIONS OF SURVEY LEVELS AND REPORTS**

3.4 A survey has three specific functions or levels: information gathering of a suspected mine or UXO area, a detailed topographical survey including area reduction and marking, and the completion survey. The three 'Levels' of survey are required in order to gather, collate, refine and record all available information about the mine threat, its location and extent. All Levels survey are to be recorded on the same form, an example of which is enclosed as Annex A to Section 3. The following definitions for the levels of survey are to be used:

### **Level One: General Survey**

3.5 The objective of a Level One: General Survey is to collect information on the general locations of suspected or mined areas. Information must be collected about the areas affected by mines or UXO and areas that are not affected. Areas must be categorised and the reliability and credibility of data recorded. The categorising system is detailed in Section Nine. A Level One: General Survey is a prerequisite for the planning of a Level Two: Technical Survey. The content and level of detail will vary according to the level of survey undertaken.

3.6 Survey teams are to record survey mapping activities on a sketch at a scale no smaller than 1:10,000.

### **Level Two: Technical Survey**

3.7 The objective of a Level Two: Technical Survey is to determine and delineate the perimeter of mined locations initially identified by a Level One: General Survey. The marked perimeter forms the area for future mine clearance operations. The Level Two survey requires trained and properly equipped mine clearance personnel with the necessary skills to undertake and accurately record the survey work. Where possible, with time and resources permitting, these teams should also undertake area reduction

work in order to accurately define the outer perimeters of the minefield.

3.8 Survey teams are to record survey mapping activities on a sketch at a scale no smaller than 1:10,000.

### **Level Three: Completion Survey**

3.9 The Level Three: Completion Survey is conducted in conjunction with the mine clearance teams and accurately records the area cleared. The benchmark is to be left in the ground to serve as a minimum marker of the initial minefield area. It is also recommended that permanent markers be used to indicate turning and intermediate points of the perimeter of the mined area.

3.10 Once the clearance task has been partially or totally completed a clearance report which, with the Level Three : Completion Survey and in some cases a Quality Assurance check, will form the basis for the documentation necessary for the issuing of an authorized acceptance certificate.

### **SURVEY REPORTS**

3.11 The reporting format must be standardised at all levels of survey and an example of the standard form is enclosed as Annex A to Section Three. All survey forms are to be prepared in both the national and one of the six major UN recognised languages (Arabic, Chinese, English, French, Russian, Spanish).

## ***Information Sources, Classification and Survey Records***

### **INFORMATION SOURCES**

3.12 Information gathering should include, but is not limited to the following sources:

- a) Governmental departments;
- b) United Nations organisations such as WFP, UNICEF and UNDP;
- c) Military Units, including Force HQs and Engineer units;
- d) Police stations;
- e) Local hospitals;
- d) Mine and UXO clearance organisations;
- e) Prosthesis centres;
- f) Mine Awareness programmes and local personnel.

### **INFORMATION CLASSIFICATION**

3.13 Mine information is to be categorised as : unknown, suspected (high and low risk) , reported, and cleared. The reliability and credibility of the reported information is to be indicated using the M1 to M4 system confidence levels as detailed in Section Nine - Minefield Information Management Standards.

### **SURVEY RECORDS AND REPORTS**

3.14 Before initiating survey operations standards must be established for the recording of information so that it will be in an acceptable format for analysis. Records must be kept in both written, graphic and digital formats, where possible, so that information can be transferred by digital and hard-copy medium to facilitate archiving and to provide a back-up.

3.15 The minimum level of information depends on the requirement of the authorising body and varies depending on the survey level. The required information for the various levels of survey is identified on the Survey form.

3.16 The status of information can only be changed when supported by a written formal report.

3.17 Mine information reports form historical data and should always be archived and never destroyed.

### ***Team Composition, Training and Qualifications***

3.18 The survey team is to consist of a minimum of two personnel trained in survey and demining (one to act as the team leader) and must include a medical orderly or paramedic. Where possible the medical orderly/paramedic should have some basic knowledge of mine clearance operations. The survey teams are to be trained to the standards detailed in Section Two: Training and Qualifications, their duties and methods of operation should be outlined in greater detail in the SOPs.

### ***Coordinate Systems and GPS***

3.19 The default system for benchmark and landmark coordinates is to be latitude and longitude. UTM, MGRS or other reference systems can also be used at the local level, however, the type, projection and datum point must be indicated in the database and sketch maps. This is to allow accurate transposing of information to other base maps.

3.20 Where possible, a Global Positioning System (GPS) should be used to get a fix on the centre of a point. Because of the errors inherent in current hand held GPS systems they are not to be used for coordinates of turning points on a perimeter. Major landmarks, incidents and the minefield benchmarks may be fixed with hand held GPS. Differential GPS with an error of  $\pm 5$  cms may be used for turning points. The use of differential GPS is not covered in this document.

### ***Minefield Marking and Area Reduction***

#### **MINEFIELD MARKING**

3.21 The purpose of minefield marking is to create a visual demarcation of the mined area to warn people of the presence of mines. Mine marking may involve construction of a physical barrier to warn and prevent people and livestock from accidentally entering a mined area. The types, methods and standards for mine and minefield marking are detailed in Section Four - Minefield Marking.

#### **AREA REDUCTION AND EXPLORATORY BREACHES**

3.22 Area reduction is an essential part of the Level Two Survey task. It can be undertaken by a variety of methods. The SOP is to clearly state the manner and methods to be utilized.

3.23 If exploratory breaches are used, the drills and methods utilized are to be outlined in the SOPs.

3.24 Landmarks and benchmarks must be accurately recorded to a maximum error of  $\pm 10$  metres and the outer perimeter is to be surveyed by use of a closed traverse with an error or misclose of 1 metre.

3.25 Once the minefield outer perimeter has been clearly defined, it is recommended that a safety zone is created between the defined mined area and the perimeter fence. This area is to be marked as detailed in Section Four - Minefield Marking and details stipulated in the SOPs.

#### **DOGS AND MECHANICAL EQUIPMENT**

3.26 Dogs and mechanical equipment should be used to assist in both survey and area reduction tasks. The methods of work are to conform to the relevant standards outlined in this document. The drills and methods used are to be specified in the SOPs.

#### **MEDICAL SUPPORT**

3.27 The survey team, if detached from the immediate area of other mine and UXO clearance activities, must have the same medical support standards as that detailed in Section Seven - Medical.

### *Minefield Information Systems*

#### **MINEFIELD INFORMATION SYSTEMS**

3.28 The purpose of a minefield information system is to manage the cumulative information obtained from reports submitted by the mine awareness, minefield survey, mine clearance teams and other sources. Data should be stored in both document and digitised format.

3.29 Standards for recording and managing information resulting from minefield survey and clearance operations are explained in Section Nine - Minefield Information Management Systems.

3.30 Copies of all survey information, reports and sketches are to be given to the National or Mine Action Centre database.

## Annex A to Section 3

<b>Survey Form</b>	
<b>Type of Report:</b> <input type="checkbox"/> <b>Marking</b> <input type="checkbox"/> <b>Level 1 Survey</b> <input type="checkbox"/> <b>Level 2 Survey</b> <input type="checkbox"/> <b>Level 3 Survey</b>	
Task No:	Date into Database (dd/mm/yy):
ID No for mined Area:	Entered By:
Report No:	Report Date (dd/mm/yy):
<b>Survey Team Data</b>	
1      Organisation:	
2      Marking/Survey Team Supervisor:	
3      Marking/Survey Team Leader:	
4      Start of Marking/Survey (dd/mm/yy):	
5      Finish Of Marking/Survey (dd/mm/yy):	
6      Level 1 Survey conducted by:	
7      Level 2 Survey Conducted by:	
8      Clearance Organisation:	
9      Clearance Supervisor:	
10     Clearance Team Leader:	
11     Clearance Start (dd/mm/yy):	
12     Clearance Finish (dd/mm/yy):	
13     Level 3 Survey Conducted by:	
14     Verification Conducted by:	When (dd/mm/yy):
15     QA Conducted by:	When (dd/mm/yy):
<b>Mapping Information</b>	
16     Name of Nearest Town:	
17     Coordinates (Grid Ref):	
18     Municipality:	
19     Canton:	
20     Map Name:	Map Series:
21     Map Sheet:	Map Edition:
22     Map Scale:	Map Datum:
23     Map Projection:	Grid /Coordinate System:

## Mined Area Location Information

24	Landmark Coordinates (Lat Long (Deg/Min/Sec))
25	Landmark Description:   <div style="text-align: right; padding-right: 50px;">                     Coordinates fixed by:    <input type="checkbox"/> GPS                      <input type="checkbox"/> Resection                 </div>
26	Benchmark Coordinates ( Lat Long (Deg/Min/Sec))
27	Benchmark Description:   <div style="text-align: right; padding-right: 50px;">                     Coordinates fixed by:    <input type="checkbox"/> GPS                      <input type="checkbox"/> Resection                 </div>
28	Datum Point Coordinates ( Lat Long (Deg/Min/Sec))
29	Datum Point Description:   <div style="text-align: right; padding-right: 50px;">                     Coordinates fixed by:    <input type="checkbox"/> GPS                      <input type="checkbox"/> Resection                 </div>
30	Benchmark identified ? (shown on sketch map) <input type="checkbox"/> yes <input type="checkbox"/> no
31	Safe Lane identified ? (shown on sketch map) <input type="checkbox"/> yes <input type="checkbox"/> no
32	Datum Point identified ? (shown on sketch map) <input type="checkbox"/> yes <input type="checkbox"/> no
33	Safe Areas identified ? (shown on sketch map) <input type="checkbox"/> yes <input type="checkbox"/> no

## Perimeter of Mined Area

	From	To	Bearing	Dist(m)	Grid Coord	TP	IP
34	Landmark	Benchmark					
35	Benchmark	Datum Pt					
36	Datum Pt	TP1				1	
37							
38							
39							
40							
41							
42							
43							
44							
45							
46							
47							
48		Datum Pt					

Minefield Information				
49	Who laid the mines/UXO ?			
50	When was the minefield laid?			
51	Is the mined area marked ? <i>Show on Map</i>	<input type="checkbox"/> Yes	<input type="checkbox"/> No	By Who:
52	Was there fighting in this area?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
53	Final use for Cleared Area:			
	<input type="checkbox"/> Refugee/IDP	<input type="checkbox"/> Agriculture	<input type="checkbox"/> Utilities	<input type="checkbox"/> Development Project
	<input type="checkbox"/> UN Site	<input type="checkbox"/> NGO/Aid	<input type="checkbox"/> Line of Comms	<input type="checkbox"/> Other
54	Depth of Clearance Recommended:		Actual Depth Cleared:	
55	Reliability of Information:	<input type="checkbox"/> M1	<input type="checkbox"/> M2	<input type="checkbox"/> M3 <input type="checkbox"/> M4
56	Confidence Level:	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3 <input type="checkbox"/> 4
57	Assessed Risk:	<input type="checkbox"/> High	<input type="checkbox"/> Low	
Mine/UXO Type Information				
58	Device types in area:	<input type="checkbox"/> AT	<input type="checkbox"/> AP	<input type="checkbox"/> UXO <input type="checkbox"/> Mixed
59	Type:	Model:	Number:	BT/Anti lift fitted:
60	Type:	Model:	Number:	BT/Anti lift fitted:
61	Type:	Model:	Number:	BT/Anti lift fitted:
Clearance Operation Data				
62	Number of Clearance Units used:			
63	Manual methods used:			
64	State SOP for manual method employed:			
65	Dog methods used:			
66	State SOP for dog method employed:			
67	Mechanical method used:			
68	State SOP for mechanical method employed:			
69	Combination method used:			
70	State SOP for combination method employed:			
71	Mine/UXO destruction methods used:			
72	Metal detectors used?	Make:	Model:	Mk:
73	Metal detectors used?	Make:	Model:	Mk:
74	Maximum detection depth in cm:			
75	Total area cleared:			
76	Problems encountered during clearance task?			
77	Areas/Obstacles left uncleared:			
78	Description:			
79	Method of marking:			

Terrain Data	
80	Type of Location: <input type="checkbox"/> Urban <input type="checkbox"/> Coast <input type="checkbox"/> Rural <input type="checkbox"/> Wooded <input type="checkbox"/> Mountain <input type="checkbox"/> Agricultural <input type="checkbox"/> Industrial <input type="checkbox"/> Open <input type="checkbox"/> Mix <input type="checkbox"/> Battlefield <input type="checkbox"/> Other
81	Soil Type: <input type="checkbox"/> Clay <input type="checkbox"/> Chalk <input type="checkbox"/> Stony <input type="checkbox"/> Ploughed <input type="checkbox"/> Sand <input type="checkbox"/> Loam <input type="checkbox"/> Mixed <input type="checkbox"/> Other
82	Soil Conductivity/Anomalies:
83	Water Table Depth and Conditions:
84	Prominent Ground Features:
85	Slope: <input type="checkbox"/> 0-5 % <input type="checkbox"/> 5-10% <input type="checkbox"/> 10-15% <input type="checkbox"/> 15-20% <input type="checkbox"/> 20-25% <input type="checkbox"/> 25-30% <input type="checkbox"/> 30+%
86	Drainage Features: <input type="checkbox"/> Rivers <input type="checkbox"/> Lakes <input type="checkbox"/> Canals <input type="checkbox"/> Drainage <input type="checkbox"/> Ditches <input type="checkbox"/> Irrigation Channels
87	Can the vegetation be removed by burning or chemicals: <input type="checkbox"/> Burning <input type="checkbox"/> Chemicals <input type="checkbox"/> No
88	Was the vegetation be removed by: <input type="checkbox"/> Burning <input type="checkbox"/> Chemicals <input type="checkbox"/> Mechanical <input type="checkbox"/> Manual
89	Control Measures: <input type="checkbox"/> Fire Breaks <input type="checkbox"/> Local Fire Service <input type="checkbox"/> Fire Appliances <input type="checkbox"/> Run Off control
90	Description of Control Measures taken:
91	Prevailing Wind Direction : <i>AM:</i> <input type="checkbox"/> N <input type="checkbox"/> NE <input type="checkbox"/> E <input type="checkbox"/> SE <input type="checkbox"/> S <input type="checkbox"/> SW <input type="checkbox"/> W <input type="checkbox"/> NW <i>PM:</i> <input type="checkbox"/> N <input type="checkbox"/> NE <input type="checkbox"/> E <input type="checkbox"/> SE <input type="checkbox"/> S <input type="checkbox"/> SW <input type="checkbox"/> W <input type="checkbox"/> NW
Road Access Data	
92	Nearest town:
93	Distance from town to minefield (in km):
94	Travel time between town and minefield:
95	Route/highway name:
96	Route Type: <input type="checkbox"/> All weather wheeled <input type="checkbox"/> All weather tracked <input type="checkbox"/> Limited All Weather <input type="checkbox"/> Fair weather wheeled <input type="checkbox"/> Fair weather tracked <input type="checkbox"/> Other Describe:



97	Route Classification:	Load Class	Maximum Weight	
98	Number of Lanes:	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 4 <input type="checkbox"/> More
99	Width (meters):			
	Carriage way:	Shoulders:	Ditches:	Total width:
<b>Bridge Access Data</b>				
100	Bridge Classification:	Load Class	Maximum Weight	
		<input type="checkbox"/> One way	<input type="checkbox"/> Two way	
101	Bridge Type :			
102	Number of Lanes:	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 4 <input type="checkbox"/> More
103	Bridge Condition:			
		<input type="checkbox"/> Good two ways	<input type="checkbox"/> Good one way	<input type="checkbox"/> Poor one way <input type="checkbox"/> Cannot be used
104	Bridge Span (m):			
<b>Handover Data</b>				
105	Area to be handed over to:			
106	Marking maintenance confirmed:			
107	Mine Awareness conducted for local inhabitants:			
<b>Administration and Logistic Data</b>				
108	Proposed Accommodation :			
109	Nearest water supply:			
110	Nearest food supply:			
111	Electricity supply:	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
112	Fuel available:	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Where:
113	Telephone:	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Where:
114	Secure Storage/Parking:	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Where:
115	HF Radio checked to HQ and Spt elements:			
		<input type="checkbox"/> Yes	<input type="checkbox"/> Good	<input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> No
116	VHF Radio checked to HQ and Spt elements:			
		<input type="checkbox"/> Yes	<input type="checkbox"/> Good	<input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> No
117	Helicopter Landing Site:	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Coordinates :
118	Airstrip:	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Coordinates : Runway length:
<b>Contact Details</b>				
119	Nearest UN site:			
	Call sign:	Freq:	Channel:	
	Coordinates:	Appt:	Tel:	
	Contact:	Address:		
	Time to site:	Cas data: <input type="checkbox"/> Yes <input type="checkbox"/> No		

120	Police Station:			
	Call sign:	Freq:	Channel:	
	Coordinates:	Appt:	Tel:	
	Contact:	Address:		
	Time to site:		Cas data:	<input type="checkbox"/> Yes <input type="checkbox"/> No
121	Level 1 medical site:			
	Call sign:	Freq:	Channel:	
	Coordinates:	Appt:	Tel:	
	Contact:	Address:		
	Time to site:		Cas data:	<input type="checkbox"/> Yes <input type="checkbox"/> No
122	Level 2 medical site:			
	Call sign:	Freq:	Channel:	
	Coordinates:	Appt:	Tel:	
	Contact:	Address:		
	Time to site:		Cas data:	<input type="checkbox"/> Yes <input type="checkbox"/> No
123	Level 3 medical site:			
	Call sign:	Freq:	Channel:	
	Coordinates:	Appt:	Tel:	
	Contact:	Address:		
	Time to site:		Cas data:	<input type="checkbox"/> Yes <input type="checkbox"/> No
124	Medevac:			
	Call sign:	Freq:	Channel:	
	Coordinates:	Appt:	Tel:	
	Contact:	Address:		
	Time to site:		Cas data:	<input type="checkbox"/> Yes <input type="checkbox"/> No
Completed By		Checked By		
Position		Position		
Signature		Signature		
Date		Date		

Attachments :

1. Sketch map 1:10 000
2. General Area Map 1 : 50 000

# Minefield Marking



## **INTRODUCTION**

4.1 Mine marking, a major function of Mine Survey teams, provides an immediate warning for people moving in or near hazardous areas. The mine marking methods, including those of local design and manufacture, must be flexible and adaptable for implementation in the affected country and be part of a national marking system. The selected methods must be stated in the SOPs of all participating demining organisations and will vary from country to country due to language, environmental, political and cultural variances.

4.2 Mine marking must visibly delineate between known danger areas and those areas that are clear. The local population may have to be educated on the purpose of the signs and mine markings so that they will not remove the marking material.

## **SCOPE**

4.3 This document addresses the standards for the signs and marking of hazardous areas during survey, mine and EOD clearance operations and should be read in conjunction with the standards for mine and EOD clearance and other relevant documents.

## **PURPOSE**

4.4 The purpose of this document is to establish standards for minefield marking in order to clearly identify the hazardous areas by use of highly visible and, where possible, physical barriers.

## *Mine Clearance Marking*

4.5 As a minimum, all safe lanes, safe routes and control areas must be marked by sticks or pickets, mine tape, rope or stones in order to define and differentiate between cleared and uncleared areas.

4.6 Safe lanes are to be a minimum of 1 metre wide.

4.7 Marking of areas within the hazardous area are to be of the same standard as safe lanes and control areas. Working lanes are to be clearly marked by sticks, tape, rope or stones to define the safe and unsafe areas. This marking should be maintained for the duration of the task.

## *Minefield/UXO Marking Levels*

4.8 There are three levels of marking :

- a) **Emergency Marking.** Emergency marking of suspected mined areas is an immediate visual warning of the possible presence of mines and UXOs. The type of marking should consist of a

clearly recognised mine symbol that indicates danger, such as the skull and crossbones. The marking should be clearly recognised from a distance of at least 50 metres and capable of enduring local weather conditions for at least six months. Local innovations may be used when conveyed to and understood by the local population.

- b) **Temporary Marking.** Temporary marking is used to indicate a mined area boundary. Marking should use recognised mine signs, be clearly visible and placed approximately 1 metre to 1.25 metres above the ground. Signs should be spaced 50 metres apart and be securely fixed to a picket or improvised material. All marking must be monitored and maintained.
- c) **Long-Term Marking.** Long-term marking is required for areas that are not scheduled for clearance work for an extended period of time. Regular maintenance is to be undertaken. The SOPs should stipulate the long-term marking methods to be employed.

## *Marking Specifications*

### **IMPROVISED MARKING**

4.9 Improvised marking methods should become a part of the national and local mine awareness programmes in order to inform and educate the local population about their meaning and function. This education has a secondary function, which is to stop the removal of minefield marking and warning signs.

### **MINEFIELD SIGNS - STANDARDS**

4.10 The following standards are detailed for the manufacture and construction of minefield marking signs and fences:

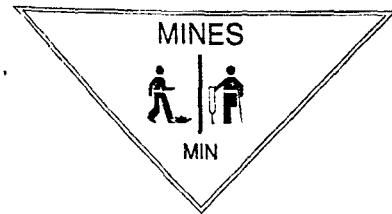
- a) **Mine Signs, Size and Shape.** There are two basic designs for the shape of this sign: square and triangular. The square sign should be at least 25 centimetres by 25 centimetres. The triangular type should be at least 28 centimetres wide along the top edge and 20 centimetres on two sides.
- b) **Mine Danger Symbol.** The recognised symbol for danger is the skull and crossbones and this must be illustrated on all mine danger signs. These standards take note of the *Amended Protocol on Prohibitions or Restrictions on the use of Mines, Booby-Traps and other Devices* (Amended Protocol II) of the *United Nations Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects* Technical Annex (para. 4) which offers its variant on international signs for minefields and mined areas as depicted in the example below.
- c) **Colour.** The background colour of the front of the sign must be red with the skull and crossbones symbol and any words in white. The reverse side of the sign is to be white. This clearly demonstrates on which side of the sign the danger lies.
- d) **Language.** 'Danger Mines' are the only words that should be used on a mine sign and should be printed in one of the six major recognised UN languages (English, French, Russian, Chinese, Arabic and Spanish) and the local language.
- e) **Material.** As a minimum requirement all signs should be able to withstand the local environment and weather conditions without deterioration for a period of at least six months and, where possible, the material should be of little local value.



Example of a square mine sign



Example of a triangular mine sign



Mine sign (as per CCW Protocol II)

**f) Perimeter marking.**

- (i) Piled stones, sticks or pickets may be used to effectively mark mined areas. Stones should be painted at the apex and, where possible, the mine warning sign should be positioned into the cairn or fixed to a stick or metal pole from above the stone apex.
- (ii) Fencing. Fencing is a barrier to restrict humans and livestock from entering hazardous areas. Strands of fencing should be placed at 0.5 metres and at 1 metre to 1.25 metres from ground level. Mine warning signs are to be affixed along the top strand between the pickets every 50 metres to act as a visual warning.

**g) Measurement Standards.** All countries should use a uniform method (metric is preferred) with bearings in either mils or degrees and, where possible, using magnetic bearings. The primary GPS coordinate system will be in longitude and latitude and the Grid Reference system. The secondary coordinate systems can be the local reference system. The following are technical parameters for identifying and measuring key survey points:

- h) Prominent Landmarks.** They must be an easily recognised and of a permanent nature. The exact position must be identified by GPS longitude/latitude and, where possible, an eight figure grid reference.
- i) Benchmarks.** Benchmarks are a permanent point of reference used as a navigational point to serve as a marker to the perimeter of the minefield. These benchmarks are to be numbered. Benchmarks can be made from metal, wood or stone material. If metal or wood, they will be a configuration of three pickets driven flush into the ground in a triangular pattern. The pickets should be spaced at 1.5 metres at the base. A picket is to be placed upright in the centre of the triangle and is to be 1.5 metres in height. The apex of the benchmark should be aligned to any intermediate markers or to the minefield start point. Benchmarks should be painted a prominent colour.
- j) Turning Points.** Turning points are to consist of steel, wood or stone markers. They should be distinctively marked and be located using bearings and distances from a previous turning point or benchmark. They are also to be given coordinates. GPS is not to be used for fixing coordinates of turning or intermediate points unless it has a maximum error of  $\pm 5$  cms.
- k) Intermediate Points.** Intermediate points are to be used between turning points to ensure that the direction between points is on a known fixed line that can be easily and accurately followed.

**MINEFIELD MARKING MAINTENANCE**

4.11 The local population must be encouraged to be responsible for the maintenance of the minefield marking systems in their immediate areas. Material, such as mine signs and fencing, should be held in a central location in order that resources can be allocated to minefield tasks. Regular inspections should be carried out by the mine clearance organisation. A handover certificate is recommended to allocate the responsibility for the maintenance to the local community.

**MINEFIELD RECORDS**

4.12 Emergency, temporary and long-term mine marking records and records completed during clearance operations must be linked into the minefield survey records and Minefield Information Database.

## **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.

## *Qualifications*

### **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.

### **HGO 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 mine-field clearance operations:

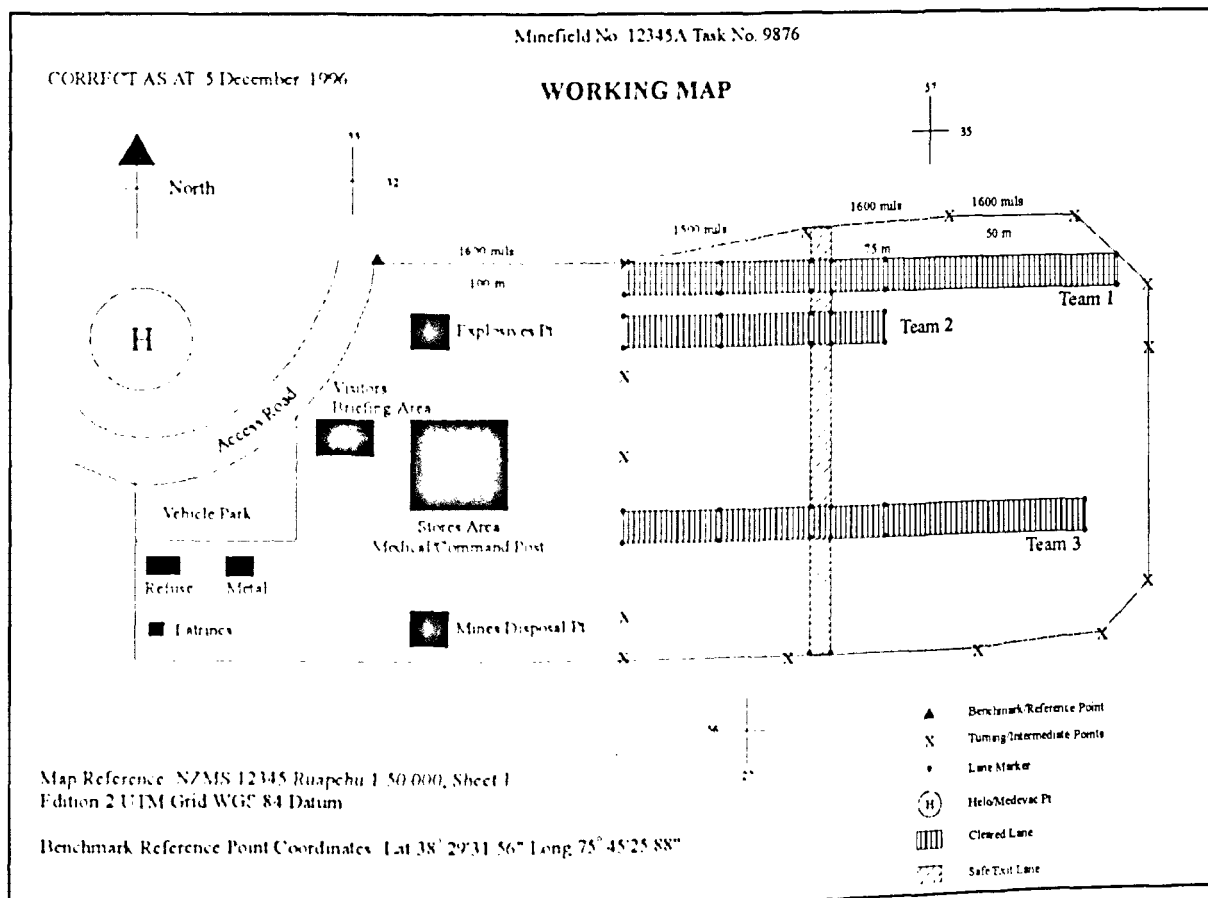
- a) Benchmark;
- b) Datum Point;
- c) Start Line;
- d) Start Point(s);



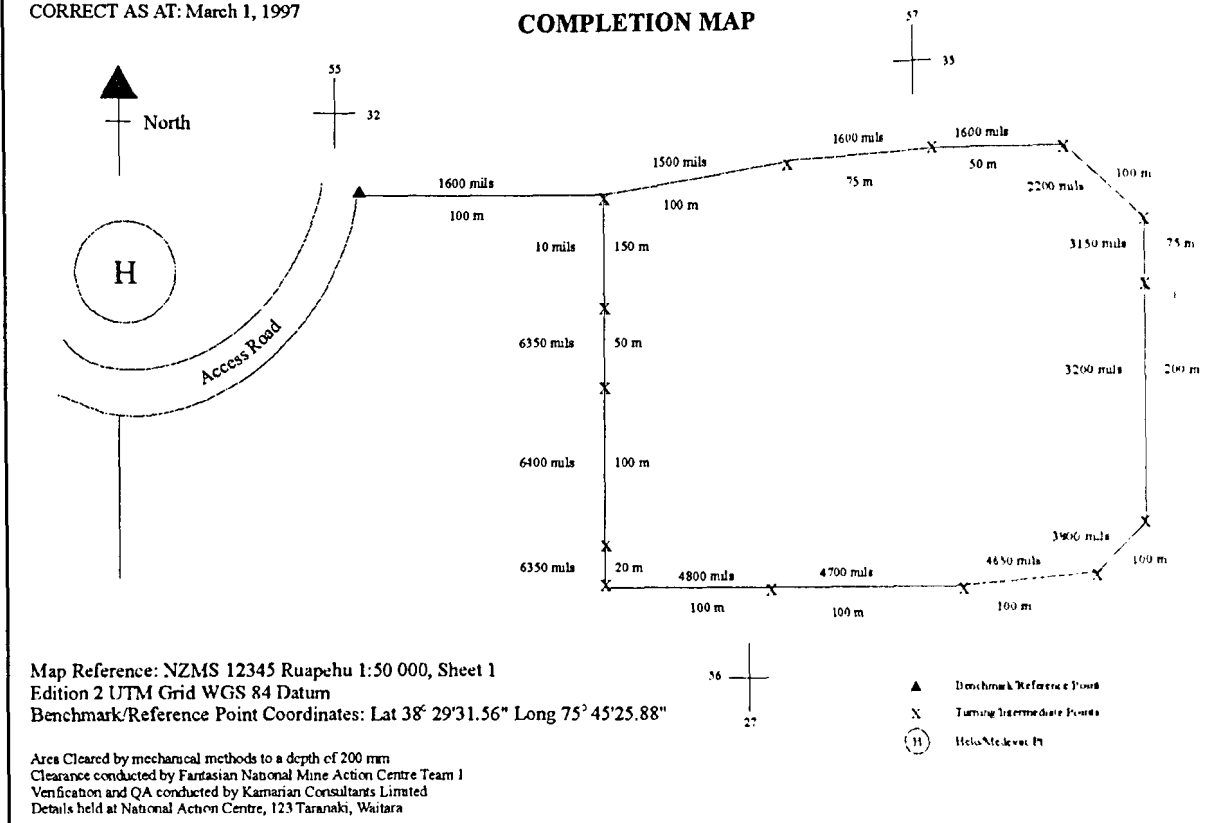
- e) Working Lane(s);
- f) Safe Route(s);
- g) Cleared Lane(s);
- h) Scrap Metal Collection Point(s);
- i) Command Post;
- j) Vehicle Park;
- k) Medical Point(s);
- l) Visitors Reception / Briefing Area;
- m) Explosives Storage;
- n) Demolition Pit;
- o) Equipment Storage Area;
- p) Rest and Toilet Areas.

### 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:



### COMPLETION MAP



## GENERAL

## BURNING AND CHEMICALS TO CLEAR VEGETATION

## MANUAL CLEARANCE TOOLS

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.

# *Explosive Ordnance Disposal*



## **INTRODUCTION**

6.1 The disposal of mines and UXOs as part of the clearance task, as well as the authorization to undertake such tasks must be clearly defined in SOPs. Simple demolition tasks, such as the disposal of single mines, small items of ordnance, small mortars, grenades, should be undertaken by team leaders and supervisors of demining teams.

6.2 Specialist EOD work, consisting of bulk demolition tasks or the disposal of large or unusual items of ordnance, must be undertaken by specially trained and qualified personnel. Should large tasks or unusual items of ordnance need to be disposed of, or the destruction of munitions containing toxic material, special advice should be sought from a competent authority.

## **SCOPE**

6.3 This document addresses the identification, removal and destruction of commonly found munitions in areas where humanitarian mine and UXO clearance is being undertaken. It should be read in conjunction with the standards for Safety, Training and Qualifications, Mine Clearance and other technical documents.

## **PURPOSE**

6.4 The purpose of this document is to establish standards for the identification, removal where necessary, and disposal of all items of ordnance found in mine and UXO clearance activities.

## **GENERAL DISPOSAL METHODS**

6.5 This section deals with disposal methods for items of explosive ordnance.

6.6 There are four methods for the disposal of munitions. The selected method will be dependent on the explosive content of the munition. The methods are:

- a) **Detonation**, which includes the act of disruption. Mainly used with high-explosives (HE) and white phosphorus (WP) filled items, but small quantities of other items, such as smoke and pyrotechnics, can also be disposed of by their inclusion in mixed demolition shots during large-scale demolitions.
- b) **Burning**, a method used with propellant, both bagged and loose, smoke and pyrotechnic items. It can also be used for certain explosives, such as CE, TNT and nitroglycerine (NG), however detonation is the preferred method.
- c) **Incineration**, a specialised form of burning for certain items which contain a minimal amount of explosive content.
- d) **Render Safe Procedures (RSP)**. The rendering safe and/or dismantling of a munition is used so that the munition can be removed and the explosive elements destroyed.

6.7 This document only deals with destruction by detonation and burning (para 6.6a and b) since it is assumed that the capability for specialised incineration will not be readily available in countries where

humanitarian demining operations are being conducted. RSP procedures are only to be used in special circumstances and are not covered in this document.

### **DISPOSAL OPTIONS**

6.8 There are six main options for the disposal of munitions in both the urban and rural environments, they are:

- a) Removal to a central demolition and disposal site;
- b) Blow in situ;
- c) Blow in situ using protective works;
- d) Render safe procedures then removal to a central site for destruction;
- e) Low-order techniques (cutting or deflagration techniques);
- f) Disruption.

### **LEVELS FOR THE DESTRUCTION OF MUNITIONS**

6.9 The destruction of munitions is categorised in four separate levels:

- a) The destruction of single mines or items of ordnance in situ such as mortars or shells up to 160 mm may be conducted by personnel with the relevant UN approved or nationally recognised qualifications and experience. All personnel must attend an in-country familiarisation course.
- b) Bulk ordnance disposal tasks which may consist of one or more types of munitions may be conducted by specialists who hold the appropriate UN approved or nationally recognised qualifications and experience.
- c) Disposal of specialist items such as booby traps, large size ordnance (over 160 mm), missiles, rockets and bombs may be conducted by specialists who hold the appropriate UN approved or nationally recognised qualifications and have experience in bulk disposal tasks.
- d) Disposal of munitions that contain a toxic element may be conducted by personnel who hold the appropriate UN approved or nationally recognised qualifications and have experience in this type of work.

### **TRAINING AND QUALIFICATIONS**

6.10 The necessary training and qualifications required for the control and supervision of the various levels of the destruction of munitions, outlined in paragraph 6.6 are explained in Section Two - Training and Qualifications, paragraph 2.6, 2.7 and 2.8.

### **AUTHORISATION TO CONDUCT DEMOLITION/DISPOSAL WORK**

6.11 All personnel involved in the disposal of munitions must be authorised, in accordance with the national regulations where they exist or by the Mine Action Centre, to conduct demolition tasks based on their qualifications and experience.

### ***Demolition/Disposal Methods, Techniques and Size***

6.12 The demolition and disposal techniques, methods and quantities of explosives to be used must be stipulated in the SOPs.



## **DANGER AREA REDUCTION**

6.13 Many items of UXOs cannot be moved for safety reasons and must be destroyed in situ. It is therefore necessary for preventative measures to be taken to reduce damage to the surrounding infrastructure by containing fragmentation and explosive blast effects. The methods, damage limitation techniques, protective works, estimates for the material requirements and methods of use should be detailed in the SOPs.

## ***Safety Procedures***

### **RENDER SAFE PROCEDURES**

6.14 Most mines and munitions have Render Safe Procedures (RSP) to conduct neutralisation and/or disarming drills of the fuze mechanism. The preferred procedure is to destroy all items in situ. There will be occasions when items will have to be moved. In this case, the recommended RSP, equipment and authorisation for each munition must be available and stipulated in an authorised SOP document.

6.15 EOD tasks that require the use of RSPs should only be undertaken by trained, qualified, and authorised personnel with the appropriate equipment.

### **DEMOLITION SAFETY PROCEDURES**

6.16 Demolition safety procedures are explained in Annex B to Section One.

### **COORDINATION AND CONTROL**

6.17 Demolition tasks must be planned with the local and national authorities. If no suitable national regulations exist UN standards must be applied.

6.18 The demolition tasks must be conducted in strict accordance with the sequence detailed in the SOP which must state the coordination function, site layout, explosive charge limits, methods for disposal to the relevant level of destruction, use of sentries or cordons and safety procedures. A qualified person must be responsible for the coordination, control and execution of the task.

### **MEDICAL SUPPORT**

6.19 See Section Seven - Medical, for detail.





## **INTRODUCTION**

7.1 Medical support is one of the principle planning considerations of any demining operation, as the inherent risk to those involved in the demining task is always high. A rapid and effective medical response must be available to respond to any mine related accidents and incidents.

7.2 Where suitable national medical regulations are in existence these are to be utilized. If no suitable regulations are available then the standards outlined in this document should be adopted by all demining organisations, who should attempt not only to achieve these standards but to surpass them.

## **SCOPE**

7.3 This document addresses the medical support required for all humanitarian survey, mine clearance and EOD operations and should be read in conjunction with other relevant standards.

## **PURPOSE**

7.4 The purpose of this document is to establish medical support standards for rapid resuscitation and stabilization of the casualty and the prompt evacuation to a facility where emergency surgery (e.g. amputation) can be undertaken.

## **LEVELS OF MEDICAL SUPPORT**

7.5 There are four levels of medical support;

- a) **Level One:** Casualty evacuation and a Level One medical capability. Located on the operational site, the organization must be able to conduct casualty collection and Basic Life Support and have Advanced Life Support available within 15 minutes. Off-site it should be able to tend to basic medical treatment and advise on preventative measures against disease and stress.
- b) **Level Two:** Casualty sustainment and a Level Two medical capability. Consists of additional paramedics and equipment to sustain the casualty and assist the evacuation. Used when the site is more than 2 hours from a Level Three facility.
- c) **Level Three:** A medical facility (hospital) with life saving surgical capability. Provide facilities for Level One and Two medical support and be able to conduct life and limb saving surgery. Be able to investigate, diagnose and treat patients suffering from serious or life threatening conditions. Should have dental facilities and where possible provide hygiene support, supervision and medical investigation.
- d) **Level Four:** Definitive care - A medical facility (hospital) with the capability for reconstructive surgery and rehabilitation. Full medical support facilities.

## **TRAINING STANDARDS**

7.6 The following are the minimum standards :

- a) All personnel are to be trained to administer first aid. The training syllabus is detailed in Annex A to Section Seven.
- b) **Medical Orderly.** Trained to respond to a medical emergency and provide Basic Life Support and resuscitation to the casualty. The training syllabus is detailed in Annex B to Section Seven..

- c) **Paramedic.** Trained to provide Advanced Life Support to casualties, to undertake CASEVAC planning, to supervise training, administer basic health care and assist the Medical Officer in his duties.
- d) **Medical Officer** (Doctor with trauma training). Provides Advanced Life Support to casualties but is also responsible for aspects of training, evacuation plans, priorities and general health care.

7.7 The course syllabus and frequency of refresher training should be detailed in SOPs.

7.8 National medical staff should be registered with the national medical authorities, where they exist.

#### **MEDICAL EQUIPMENT**

7.9 Medical staff are to have the correct equipment and material to undertake their role in providing medical support to casualties and general health care. A complete equipment and material list for all levels of medical support is detailed in Annex C to Section Seven.

7.10 All clearance sites are to have a serviceable evacuation vehicle. The vehicle must be able to carry at least two stretchers and be equipped with an ambulance medical kit and communications equipment. This should include the equipment, material, drugs and consumables detailed at Annex D to Section Seven.

#### **PRIMARY HEALTH CARE**

7.11 Medical health checks should be conducted before recruitment, and include both sight and hearing checks.

7.12 Basic medical treatment and advice on preventative measures against disease should, where possible, be given to clearance personnel.

### ***Deployment, CASEVAC and MEDEVAC Procedures***

#### **DEPLOYMENT OF MEDICAL RESOURCES**

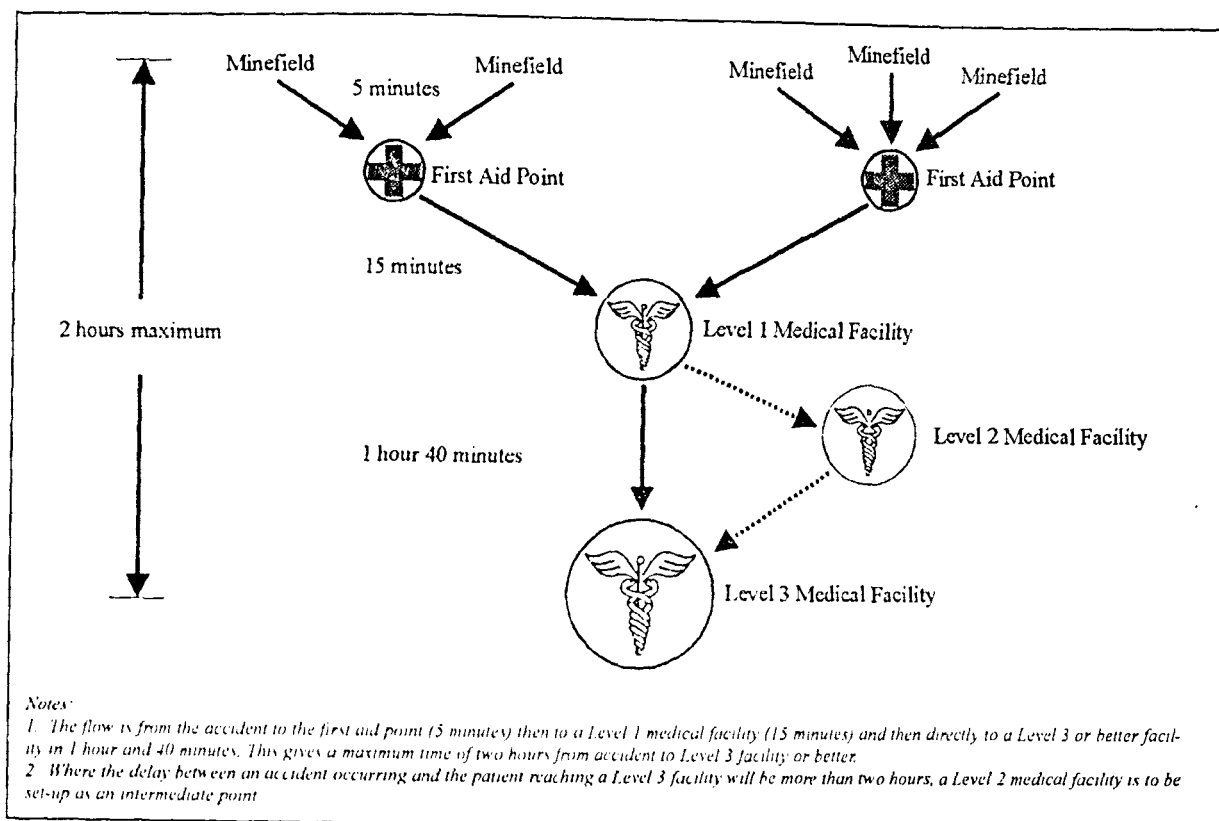
7.13 The demining site should have at least one medical orderly able to provide Basic Life Support. The medic should be no more than 5 minutes from the site location.

7.14 A paramedic or a trauma trained doctor is to be in the immediate vicinity to assist the medical orderly in providing Advanced Life Support and enable resuscitation and stabilisation before the casualty is evacuated to a Level Three facility. They should be no more than 15 minutes from the site. Should a Level Three medical facility be more than two hours distant from the site then a Level Two facility/capability will be required.

#### **CASEVAC AND MEDEVAC**

7.15 CASEVAC is the evacuation of a casualty from the injury site to the nearest medical facility. MEDEVAC is the evacuation of the casualty from the medical facility to the next higher level facility. The CASEVAC and MEDEVAC procedures must follow established evacuation plans.

7.16 The casualty is to be evacuated from the accident site to the safety point. The medical orderly should not enter the minefield unless there are extenuating circumstances. Emergency procedures, including the entry into a mined area, are to be detailed in the SOPs. At the safety point, Basic Life Support treatment will be administered. A paramedic/Doctor is to be available within 15 minutes to administer Advanced Life Support treatment prior to evacuation to a Level Three facility.



**Medical Deployment Diagram**

7.17 If the time to get between the site and the Level Three facility is more than two hours, a Level Two facility has to be available in order to resuscitate and stabilize the casualty between the Level One and the Level Three facility.

7.18 Transfer of the casualty to a Level Four facility either in or outside the country must be recommended by a senior Medical Officer or Medical Coordinator in consultation with the medical staff of the demining organisation.

#### **REHABILITATION SURGERY**

7.19 In cases where rehabilitation surgery is necessary this can be accomplished at a later stage and is not an urgent requirement. It will be necessary for organisations to have the relevant insurance coverage for rehabilitation. This type of treatment would only be available at Level Four medical facilities.

#### **COMMUNICATIONS AND REPORTING**

7.20 All mine incidents and accidents are to be reported (see Section Five paragraph 5.32), however, it should be noted that Medical Reports may be required through separate medical channels. Details on medical reporting should be contained in the SOPs.

7.21 There is to be an adequate communication network established that will guarantee communication between the medical personnel and supporting elements. See Section Eight - Communications, for details.

## **Annex A to Section 7**

### ***SYLLABUS FOR FIRST-AID LESSONS FOR ALL DEMINERS***

- 1) All mine clearance personnel are to receive the following training :
  - A) **Basic CPR**
    - i. One-Person CPR
    - ii. Two-Person CPR
  - B) **Arrest of Hemorrhage**
    - i. Direct Pressure method
    - ii. Pressure Points
    - iii. Tourniquet application
  - C) **Bandaging of Wounds**
  - D) **Casualty Transportation**
    - i. Fireman's-Lift
    - ii. Two-person method without stretcher
    - iii. Use of stretcher
- 2) Experience has shown that this course requires at least 24 hours of instruction.

## **Annex B to Section 7**

### **SYLLABUS FOR MEDICAL ORDERLY**

1. Medical Orderlies are to be instructed in the following subjects:

**A) Anatomy and Physiology**

- i. Elements of human body structure
- ii. The musculoskeletal system
- iii. The circulatory system
- iv. The respiratory system
- v. The digestive system
- vi. The nervous system
- vii. The excretory and reproductive system
- viii. The skin

**B) Non-trauma Emergency/First Aid**

- i. Airway Management
  - (1) Causes of airway obstruction
  - (2) Diagnosis of airway obstruction
  - (3) Techniques of removing secretions from casualty's mouth
  - (4) Chin lift / jaw thrust methods
  - (5) Artificial airway
  - (6) Positioning SSLP ( Semi-Supine Lying Position )
  - (7) Artificial Respiration
    - (a) Technique of artificial respiration (without ventilation bag)
    - (b) Technique of artificial respiration (with ventilation bag)
- ii. Arrest of Hemorrhage
  - (1) Direct manual pressure and application of pressure dressing
  - (2) Tourniquets and their application
  - (3) Conversion of Tourniquet to pressure dressing
  - (4) Pressure points and their application
- iii. Infusion
  - (1) Indications for intravenous infusion
  - (2) Sites for infusion
  - (3) Equipment needed for infusion
  - (4) Preparations for infusion
  - (5) Live infusion practice

- iv. Bandaging of Wounds
  - (1) Dressing of the head
  - (2) Dressing of the face, back of the head
  - (3) Dressing of the eyes
  - (4) Dressing of the cheek, jaw and ear
  - (5) Dressing of the scapula
  - (6) Dressing of the shoulder
  - (7) Dressing of the axilla
  - (8) Dressing of the upper limb
  - (9) Dressing of the palm and back of the hand
  - (10) Dressing of the elbow and the knee
  - (11) Dressing of chest and back
  - (12) Dressing of the hip
  - (13) Dressing of the lower limb
- v. Immobilisation of Fractures
  - (1) Splintless methods
  - (2) Splint methods
- vi. Treatment of Head Injuries
  - (1) Diagnosis of head injury
  - (2) Dangers of head injury
  - (3) Treatment of head injury
- vii. Treatment of Chest Injuries
  - (1) Diagnosis of chest injury
  - (2) Treatment of chest injury
- viii. Treatment of Abdominal Injuries
  - (1) Diagnosis of abdominal injury
  - (2) Complications of abdominal injury
  - (3) Treatment of abdominal injury
- ix. Treatment of Spinal and Pelvic Injuries
  - (1) Diagnosis of spinal injuries
  - (2) Management of spinal injuries
  - (3) Lifting and transportation of spine-injured casualty
  - (4) Diagnosis of pelvic injuries
  - (5) Management of pelvic fractures
- x. Treatment of Burns and Blast Injuries
  - (1) Diagnosis of burns and blast injuries
  - (2) Treatment of burns and blast injuries
  - (3) Treatment of phosphorus burns



- xi. Resuscitation Equipment
  - (1) Acquaintance of air-viva
  - (2) Acquaintance of ambu-suction
  - (3) Acquaintance of oxygen administration

**C) Medical Evacuation**

- i. Different means of evacuation
- ii. Requests for evacuation
- iii. Structure of medical support

**D) Drug and Dispensing**

**E) Mass Casualty Management**

- i. Single Casualty - primary and secondary survey
- ii. Multiple casualties management

**F) Theory and Practical Test**

- i. It is expected that the course for an untrained person would take from 4 to 8 weeks depending on the basic medical knowledge of the trainee. To determine the length of the course, a pretest to assess the trainees' medical knowledge may be conducted.

## Annex C to Section 7

### **Medical Orderly Pouch Contents**

<b>Serial</b>	<b>Items</b>	<b>Quantity</b>
1.	Airway, disposable	1 (adult)
2.	Pocket mask (artificial respirator)	1 ea
3.	Cervical collar	1 ea
<b>Dressings For Medical Orderly Pouch</b>		
4.	Personal field dressing	4 ea
5.	Abdominal/Chest dressing	2 ea
6.	Burn dressing	2 ea
7.	Triangular bandages	3 ea
8.	Elastic aid bandages	2 ea
9.	Adhesive tape 2.5 cm wide	1 roll
10.	Gauze pads 15 x 15 cm	5 ea
11.	Gauze rolls 15 x 15 cm	5 rolls
<b>Intravenous Fluids/Equipment For Medical Orderly Pouch</b>		
12.	Ringer Solution (1 litre)	2 ea
13.	Intravenous sets	2 ea
14.	IV Cannula 18 g	3 ea
15.	Alcohol swabs	25 ea
<b>Non-disposable Equipment For Medical Orderly Pouch</b>		
16.	Thermometers (with disposable sheaths)	1
17.	Scissors (Super shear paramedic scissors)	1
18.	Tourniquet - Arterial (1 metre)	2
19.	Kramer Splint (for upper limbs)	1 ea
20.	Kramer Splint (for lower limbs)	1 ea
21.	Stretcher (foldable)	1
<b>Disposable Items For Medical Orderly Pouch</b>		
22.	Casualty tags	5 ea
23.	Antiseptic cream	1 tube
24.	Antiseptic solution	100 cc
<b>Drugs For Medical Orderly Pouch</b>		
25.	Morphine auto-injectors	5 ea

## Paramedic Kit

<b>Serial</b>	<b>Items</b>	<b>Qty</b>
1.	Airway, disposable (adult)	2
2.	Laryngoscope set	1
3.	Endotracheal tubes (adult size)	3
4.	Coniotomy set	1
5.	Cervical collar	1
<b>Dressings For Paramedic Kit</b>		
6.	Personal field dressing	4 ea
7.	Abdominal/Chest dressing	2 ea
8.	Burn dressing	2 ea
9.	Triangular bandages	3 ea
10.	Elastic aid bandages	2 ea
11.	Adhesive tape 2.5 cm wide	1 roll
12.	Gauze pads 15 X 15 cm	5 ea
13.	Gauze rolls 15 X 15 cm	5 rolls
<b>Intravenous Fluids/Equipment For Paramedic Kit</b>		
14.	Hartmann solution (1 litre)	2
15.	Intravenous sets	2
16.	IV Cannula 18g ea	3
17.	Alcohol swabs	25
<b>Non-disposable Equipment For Paramedic Kit</b>		
18.	Scissors (Super shear paramedic scissors)	1
19.	Tourniquet - Arterial (1 metre)	2
20.	Kramer Splints for upper limbs	1
21.	Kramer Splints for lower limbs	1
22.	Stethoscope	1
23.	Blood Pressure manometer (aneroid)	1
24.	Surgical kit for venous cutdown	1
25.	Intercostal drain set, including 20 g chest tube	1
<b>Disposable Items For Paramedic Kit</b>		
26.	Casualty Tags	5 ea
27.	Antiseptic Solution 100 cc	1
28.	Antiseptic Cream tube	1
<b>Drugs For Paramedic Kit</b>		
29.	Morphine auto-injector	5 ea

## Medical Equipment - Level 1 Emergency Kit

<b>Serial</b>	<b>Items</b>	<b>Qty</b>
1	Airway Guedel	2
2	Manual Ventilation Bag & Mask (Ambu)	1
3	Resuscitator (Oxygen, Suction and Ventilator Functions)	1
4	Defibrillator and ECG Portable	1
5	Laryngoscope Set	1
6	Coniotomy Set	1
7	Stethoscope	1
8	Blood Pressure Set (Aneroid - Automatic)	1
9	Surgical Set (Venous Cutdown)	1
10	Intercostal Drain Set	1
11	Scissors (Super Shear - Paramedic)	1
12	Tourniquet - Arterial (1 Metre)	2
13	Tourniquet - Venous	1
14	Needle Holder - Straight	1
15	Scissors Sterile (for Sutures)	1
16	Surgical Blade Holder	1
17	Torch Light	1

### **Emergency Drugs - Level 1 Emergency Kit**

18	Adrenaline Injection	10
19	Atropine Sulphate Injection	10
20	Dopamine Injection	5
21	Calcium Gluconate Solution (10 %)	5
22	Lignocaine Injection (150 G Vial)	5
23	Sodium Bicarbonate (50 cc 8.4 % Bottle)	2
24	Morphine for Injection (10mg Vial)	10
25	Fursemide Injection (20 mg Vial)	5
26	Aminophylline Injection (250 mg Vial)	2
27	Hydrocortisone Injection (100 mg Vial)	10
28	Promethazine Injection (50 mg Vial)	10
29	Doctor Bag - to Store Consumables / Drugs	1

## Medical Consumables - Level 1 Emergency Kit

<b>Serial</b>	<b>Items</b>	<b>Qty</b>
1	Ringer Solution (1 Litre)	2
2	Colloid Solution (500 cc)	2
3	Intravenous Sets	3
4	Intravenous Cannula (Gage 18)	3
5	Syringes ( 10 cc )	10
6	Syringes (5 cc )	10
7	Glucose 5 % Solution (1 Litre)	1
8	Water for Injection	20
9	Alcohol Swabs	100
10	Suction Tubes (Oropharyngeal)	5
11	Endotracheal Tubes	3
12	Chest Tubes	2
13	Pneumatic Valve (for Pneumothorax)	2
14	Urinary Catheter	2
15	Urinary bag	2
16	Personal Field Dressing	4
17	Gauze Pads 15 x 15 cm	5
18	Gauze Rolls 15 x 15 cm	5
19	Triangular Bandages	2
20	Casualty Tags	5
21	Sutures Silk ( 2 "O" )	5

## Annex D to Section 7

### **Ambulance Medical Equipment**

<b>Serial</b>	<b>Items</b>	<b>Qty</b>
1.	Airway, disposable (adult)	2
2.	Manual ventilation bag & masks set	1
3.	Foot operated suction pump set	1
4.	Oxygen cylinder 3, 5 kg & valve with disposable mask	1
5.	Hartmann solution (1 litre bag)	5
6.	Personal field dressing	15
7.	Abdominal/Chest dressing	5
8.	Burn dressing	5
9.	Triangular bandages	5
10.	Elastic aid bandages	5
11.	Adhesive tape rolls	2
12.	Splints (Kramer Splints 1 m)	2
13.	Splints (Thomas Splints) or similar	1
14.	Back Boards (long)	2
15.	Cervical Collars	3
16.	Stretchers Army style	4
17.	Blankets	5
18.	Strobe Light	1
19.	Signal smoke grenade (colour)	4
20.	Water Purifying Tablets Sufficient for 60 litres ( packets)	2
21.	Intravenous sets	5
22.	IV cannula (sizes 18 G)	10
23.	Arterial tourniquet	1
24.	Scissors (super shear paramedic scissors)	1
25.	Casualty tags	5
26.	Water Container (20 litres capacity)	3



## **INTRODUCTION**

8.1 An effective communications network is essential for the safety of all clearance operations and necessary to ensure an effective and safe demining operation. Demining activities must not be undertaken without suitable and effective communications between the personnel on-site and the support elements.

## **SCOPE**

8.2 This document addresses the communications requirement for mine survey, clearance and EOD operations and should be read in conjunction with other relevant standards.

## **PURPOSE**

8.3 The purpose of this document is to establish standards for the communications network between all agencies involved in mine and UXO clearance activities

## **LEVELS OF COMMUNICATIONS**

8.4 There are several levels of communications necessary to ensure that mine and UXO clearance, management and support personnel are able to communicate as and when required. This is to be defined in the SOP.

## *Radio Communication*

### **FREQUENCY ALLOCATION**

8.5 Where radios are used, frequencies are to be allocated by the appropriate authority. All agencies should know the demining frequency and channels and, in particular, the emergency frequency/channel.

### **EMERGENCY FREQUENCY**

8.6 A separate emergency frequency or channel must be established.

### **BASE STATIONS**

8.7 Site locations should have continuous communications with support elements and higher formations. This normally requires both HF and VHF base station communications equipment. The use of existing telecommunications equipment should be reviewed against the needs of the demining operation.

8.8 The communication means are to be staffed during all operational activities and should cover the travel period to and from the site.

### **VEHICLE AND HAND-HELD RADIOS**

8.9 Selected personnel are to be equipped with the appropriate communications capability. In some cases there may be instances of an individual having hand-held and vehicle radios.

**CALL SIGNS**

8.10 Fixed call signs are to be used.



# Minefield Information Management



## **INTRODUCTION**

9.1 Clear and concise information, projected tasks, planning data and past performance assist in improving the efficiency of a programme. In concert with the ability to store data and track it, the ability to present it in an appropriate manner for its end use is required.

## **SCOPE**

9.2 This document addresses the standards for minefield information systems and should be read in conjunction with survey standards.

## **STANDARDS**

9.3 The minefield information management system used must be capable of the following:

- a) Producing lists, reports and spreadsheets.
- b) Perform arithmetical, textual and geographic queries and statistical functions.
- c) Producing large format maps and/or overlays at any scale on paper or transparent film.
- d) Calculate and show mined areas and measurements.
- e) Display text and symbols in the local language.
- f) Plotting data with coordinates.
- g) Allow analysis of information to be conducted.

9.4 Where computers are used, the software platforms and applications used must be compatible and allow data transfer without requiring additional adjustment. In the UN, PC based operating systems are used, Paradox<sup>®</sup> is the common platform for databases and all files are saved as dBase IV<sup>®</sup>. For text and word processing, Word Perfect<sup>®</sup> is the platform and MapInfo<sup>®</sup> is used for mapping. The computer system used must be able to display Vector and Raster graphics, and allow input of data via digitizing table and scanner.

9.5 Data backups are to be made and are to be secured. The details on when backups are to be made and how they are to be secured is to be detailed in SOP.

9.6 Mine information is to be categorised as: Unknown, suspected, reported, and cleared. The suspected areas are to be further defined as high risk or low risk. In all cases there is to be no change of category or status unless it is documented. Changes of status will only be made after marking, survey, clearance or other physical inspection. The reliability and credibility of the information reported and placed into a database must be noted. The following is recommended:

Code	Evaluation	Information	Source
M1	Mines or UXO physically verified	Confirmed	Reliable
M2	Area reported with observed evidence of mines or UXO	Unconfirmed	Reliable
M3	Area reported with observed evidence of mines or UXO	Unconfirmed	Unreliable
M4	Area reported as mined with no evidence or indications of mines or UXO	Unconfirmed	Unreliable

9.7 All reported incidents, UXO, mines and mined areas are to be marked on a map.

9.8 Levels of confidence are used to further indicate the degree to which the processed information released from a MAC has been verified. The highest level of confidence is 1 and the lowest is 4.

Action taken	Level of Confidence	High Risk	Low Risk
Mine Clearance Operation Completed	1	Cleared	Cleared
Level 2 Survey	2	Mines/UXO located	No items located
Level 1 Survey	3	Mines/UXO located	No items located
No verification conducted of information received	4		

9.9 Information gathered for humanitarian activities is considered to be public domain.

9.10 Information is not to be destroyed or deleted. It is to be archived. Details on archiving and storage are to be detailed in SOP.

## **Annex A to Section 9**

### ***Information to be Included in Database***

In order to support analysis and the production of reports, maps and overlays, the following minimum information is recommended in a database:

- Mission/Programme Name
- Country
- Project Name/ID (as appropriate)
- Task No/ID (as appropriate)
- Managed By
- Type of Data
  - Minefield
  - Mine incident
  - UXO
  - Accident
  - Marking
  - Survey
  - Clearance
  - Casualty, (UN pers, Local pers, Others)
  - Mine Awareness
  - QA/QC
- ID No for each entry
- X and Y Coordinates for each entry ( Latitude and Longitude default system and local coord system)
- Coordinates for benchmarks, reference points, turning points, intermediate points
- Plot of activity sites including coordinates for perimeters, sketch maps.
- Map Projection
- Map Scale
- Datum for Coordinate System used
- Type of Coordinate System
- Date Time Group
- Report Details
  - Unknown
  - Suspected
  - Reported By
  - Reliability Grade ( M1 - M4)
  - Reported To
  - Cleared

- Mine
  - Type
  - Mine model
  - Number
- UXO
  - Type
  - UXO model
  - Number
- Antilift /Booby Trapping devices
  - Number
- Task Status as at (date)
  - Survey Level
  - Planning Level
  - Started
  - Suspended
  - % Complete
  - Area Cleared/Surveyed/Marked,
  - Verification
  - Completion Survey
  - Acceptance Certificate Issued
  - Working days in period,
  - Personnel State
  - Equipment State

Where there are standard report and return formats, the data fields used are to be reflected in the database. An example of the reports is to be included in SOP.

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# Glossary

**Ammunition** — Ammunition is anything that contains an active ingredient such as explosives, or a chemical, smoke, pyrotechnical or an incendiary composition.

**Anti-Handling Device** — A device fitted to, added on, placed under, attached to or near that acts as part of a mine or munitions mechanism, which can be electrically or mechanically operated when the mine or munition is disturbed.

**Anti-Personnel Mine** — An explosive or material, normally encased, designed to wound, kill or otherwise incapacitate personnel. It may be detonated by the action of its victim, by the passage of time or by controlled means.

**Anti-Tank Mine** — A mine which is designed to disable or destroy vehicles and tanks. The explosive can be activated by many types of fuse mechanism normally by pressure, tilt rod, influence or command detonated.

**Area Reduction** — The act of defining and marking the extent of a mined area, usually undertaken as a part of a Level 2 survey. (see survey)

**Armed Delay Device** — A device which has been fitted to the mine or fuse in order to prevent activation for a set period after being activated. Normally used to ensure that the person or laying equipment has been able to withdraw from the immediate area.

**Armed Period** — The period in which a mine or munition is electronically and/or mechanical armed and active.

**Ballistic Protection** — Protection from projectiles, often referred to for protection against sniper or small arms ammunition but in demining terms is used for protection against fragmentation and blast. See body armor.

**Barrier Minefield** — A minefield which aims to block a direction.

**Base Line** — The line which is used to initiate all demining operations and is the point from which all clearance lanes start. Also known as the start line.

**Battle Area Clearance** — The term used for the clearance of all mines and UXO from an area of land.

**Belleville Spring** — A metal or plastic disc shaped diaphragm, with a metal striker on the concave side, which inverts when pressure has been exerted to one side. This causes the metal striker to come into contact with a detonator causing an explosion.

**Benchmark** — A fixed point of reference outside the minefield. This point has known coordinates that have been either ascertained by survey, resection or use of DGPS.

**Black Widow** — A name given to the Russian PMN mine so called because of its effectiveness and color of the pressure plate.

**Blasting Cap** — See detonator

**Blind** — Any ammunition that has been thrown, projected at or placed upon a target and which fails to function completely at the point of delivery or placement.

**Blow *in situ*** — The destruction of any item of ordnance by explosives without moving the item from where it was found, normally by placing a explosive charge alongside. Sometimes referred to as Blow in Place (BIP).

**Body Armour** — In demining, the term protective armour normally refers to the flak jacket, but for EOD work this refers to the full body 'Bomb Suit'.

**Bomb Disposal** — The act of disposing of UXO and IED. (*NATO definition*)

**Bomblet** — A term used to describe types of sub-munitions especially those packed within cluster bombs. Bomblets are designed to explode on contact with the target or ground.

**Booby Trap** — Any device or material which is designed, constructed or adapted to kill or injure and which functions unexpectedly when a person or object (vehicle) disturbs or approaches an apparently harmless object or performs an apparently safe act.

**Booster Charge** — The addition of explosives in order to increase the detonation capability of the detonator in order to detonate the main charge. Sometimes used in order to increase the explosive content. This can be done by stacking mines and/or adding explosives.

**Bounding Mine** — An Anti Personnel mine which is activated by either a trip wire or pressure. The activation of the fuse causes a primary charge to be initiated which ejects the mine to a predetermined height before the main fragmentation charge is initiated.

**Box Mine** — A mine normally manufactured from plastic or timber, containing the explosive charge

and the activating mechanism. Mainly used for AP mines but has also been used for some AT mine models.

**Breaching** — Operations which clear a path through a mine field using a variety of military equipment, manual means, Mine Detecting Dogs or mechanical means.

**Bund Walls** — Earth protections generally surrounding explosives storage.

**Call Signs** — Names or means of identification assigned to specific personnel used when communicating by radio.

**CASEVAC** — (Casualty Evacuation) The process of moving a casualty from the site of the accident to medical facilities.

**Claymore Mine** — A directional AP mine, the claymore consists of a curved outer case containing a huge number of fragments. Behind the fragments is a layer of explosive. The mine can be initiated by either pull or command detonation.

**Clearance** — Clearing an area of all mines, UXO and IED to a predefined standard.

**Clearance Site** — The site where demining activities (the removal of mines and/or UXO) are being conducted.

**Clearance Standards** — The standards that are to be applied to clearance operations. Normally specified in the contract document or clearance plan. In the UN it is normally achieved to a clearance standard of 100 per cent with a tolerance error of not more than 0.4 per cent.

**Clear Lane** — A lane that has been cleared of all mines and UXO.

**Cluster Munition** — A number of sub-munitions in one container that is aerially delivered.

**Countermine** — The activities, equipment or process, used to counter mines.

**Crimp** — The act of fixing (crimping) the open end of a non electric detonator to a length of safety fuse.

**Crimper** — The tool used to crimp.

**Datum point** — A point on the perimeter of a mine field that has been surveyed in from the benchmark. It has known coordinates and it can also be the start point of the first lane. Turning points and intermediate points are also datum points as they have known coordinates.

**Demining** — Term used to describe all aspects of mine clearance. ( see mine clearance).

**Demolition Pit** — A hole in which mines and UXOs are placed for destruction.

**Density** — The amount of mines in the minefield divided by the minefield length. This is normally referred to as mines per metre of minefield frontage.

**Destruction *in situ*** — Destruction of the mine or UXO normally by explosives, without moving the item. See also Blow in Situ.

**Detonator** — A sensitive explosive item that can be initiated by either electrical or non electrical means. The first item in the explosive chain, used to initiate the main or booster charge. (*NATO definition*)

**Detonation Wave** — A shock wave which passes through high explosive as a uniform front, from the point of ignition, breaking the chemical bindings at molecular level.( > 3000m/s)

**Differential GPS** — A GPS which can provide readings to an accuracy of  $\pm 5$  cm.

**Disposal Work** — EOD work.

**Disarming** — The act of making a mine safe by removing the fuse or igniter. The procedure normally removes one or more links from the firing chain. See also neutralization.

**Double Impulse Mine** — A mine, normally a Anti Tank, that is fitted with a Double Impulse fuse which requires two separate pressures on the fuse in order to initiate the detonation chain.

**Electrical Initiation** — Initiation of an electrical detonator.

**Exploder** — A device used to safely produce an electrical current through electrical cable in order to initiate electric detonators or safety fuse igniters. Also known as a blasting machine or firing device.

**Exploratory Breach** — A method of breaching the suspect mined area in order to identify the actual location of the mine strips or rows and obtain mines information.

**Explosive** — A substance or mixture of substances which under external influences, is able of rapidly releasing energy in the form of gases and heat. (*NATO definition*)

**Explosive Detector Dogs (or Explosive Sensing Dogs)** — Dogs that are specially trained to detect the vapours emitted by explosives contained in IEDs, mines and munitions. Some dogs can also be trained to detect tripwires and non-explosive booby traps. The dogs are normally referred to as explosive or mine detection dogs.



**Explosive Ordnance** — Munitions that contain explosives, nuclear fission or fusion material, biological and chemical agents. This includes bombs and warheads, guided and ballistic missiles, artillery, mortar, small arms ammunition, mines, torpedoes, depth charges, demolition stores, pyrotechnics, cluster munitions and dispensers, cartridges and propelled actuated devices, electric explosive devices and similar items that are explosive in nature.

**Explosive Ordnance Disposal (EOD)** — The detection, identification, field evaluation, render safe, recovery and disposal of Unexploded Ordnance (UXO). EOD may be undertaken:

- a) As a routine part of mine clearance operations, upon the discovery of UXO.
- b) To dispose of UXO discovered outside mined areas, ( this may be a single UXO, or a larger number inside a specific area).
- c) To dispose of explosive ordnance which has become hazardous by damage or destruction.

**Extraction Drill** — The immediate action undertaken in response to an uncontrolled detonation which has caused injury to personnel. It involves team members in the recovery of injured personnel and the provision of first aid. Also known as man down drill.

**Firing Device** — A device such as an exploder, used to produce an electrical current in order to initiate an electrical detonator. See exploder.

**Free From Explosive (FFE)** — The state of a particular manufactured munitions which has had all the explosive removed. All mines or munitions being used for training and demonstrative aids should have the explosives removed and be marked 'FFE'.

**Fragmentation Zone** — The area covered by that fragmentation will travel from the point of detonation. There are several factors which require to be reviewed when determining this zone; the amount of explosive, body construction, type of material, ground conditions etc. See also secondary fragmentation.

**Full Width Clearance** — Clearance of a lane to the total vehicle width. This normally includes a small margin at each side. Associated with mechanical mine clearance equipment such as flails, rollers in tandem, sifters and full width ploughs.

**Fuse** — A designed and manufactured mechanism to activate a mine or munition. It can be designed for use by electrical, chemical or mechanical systems; by push, pull, pressure, release and time activation, singly or in combination. Usually consists of an igniter and detonator.

**Gunpowder** — An explosive that must be confined in order to create a low order explosion. It decomposes through a combustion reaction at a very fast rate. This reaction takes place on the surface of the composition and burns layer by layer.

**Hand Clearance** — The act of clearing hazardous areas manually. Normally refers to clearance teams using mine detectors and probes.

**Hollow charge** — See shaped charge.

**Humanitarian Mine Clearance** — The removal of mines and UXO under the auspices of a humanitarian organization in order to allow the land to be returned to the local community.

**Horizontal Action Mine** — An Anti Tank /Vehicle mine placed at the side of the track or road which will normally be activated by a vehicle. The Horizontal Action Mine will propel a shaped charge warhead into the side of the vehicle or tank. See also Off Route Mine.

**Improvised Explosive Device (IED)** — An improvised explosive device is normally of local manufacture and is often associated with booby traps. It has all the elements of a mass manufactured mine or booby trap.

**Inert** — A mine or munition without explosives, made from the actual parts of the real explosive item and assembled by the manufacturer. It is identical to the actual live object but has no explosive content. Used for training and should be marked “inert”. (*NATO definition*) See also FFE.

**Influence Fuse Mine** — A mine with a fuse which has been designed to be activated by the actual magnetic or other influences such IR, radar, seismic or combinations thereof.

**Intermediate Lane** — A lane forward of the start or base line where all cleared lanes finish and successive lanes commence. Intermediate lanes are numbered successively forward of the start line.

**Intermediate Marker** — A marker used between the start and finish markers or between turning points on the perimeter of a mine field to indicate an intermediate point. There can be several such markers.

**Irregular Outer Edge** — Short mine strips laid in an irregular manner or pattern in front of minefields, facing the enemy, to deceive them as to the shape and density of the main minefield. It can consist of both AT and AP mines.

**Landmark** — A permanent feature or object that has known coordinates and is easy to identify on the ground. Used in conjunction with a benchmark to locate the start point of a mine field perimeter. Also called a reference point.

**Low Order Technique** — A specific EOD technique which uses a small explosive charge to disrupt a UXO without initiating the main charge.

**Main Charge** — The main and normally the largest explosive charge of a mine or munition. Normally initiated by either the detonator or a booster charge.

**Mine** — An explosive or other material, normally encased, designed to destroy or damage vehicles, boats, or aircraft, or designed to wound, kill, or otherwise incapacitate personnel. It may be detonated by the action of its target, the passage of time or by controlled means. *(NATO definition)*

**Mine Action** — All aspects at a national programme to address the mine problem in a country.

**Mine Action Centre** — Mine Action Centre usually refers to a facility, containing personnel who coordinate and assist the national mine action activities in a country.

**Mined Area** — An area declared dangerous due to the presence or suspected presence of mines. *(NATO definition)*

**Mine Awareness** — A method of informing, teaching and relaying messages about landmines to the public, normally through a mine awareness programme. Mine awareness encompasses mine risk education, mine awareness training (MAT) for peacekeepers, multi media presentations, and what action to take when a mine or UXO is found. It is intended to modify behaviour patterns to reduce casualties. A result of Mine Awareness is the flow of information back to a MAC about mine and ordnance locations.

**Mine Clearance** — The clearance of mines and UXO from a specified area to a predefined standard.

**Mine Cluster** — Anti Tank or Anti Personnel mines are often laid in groups or clusters. They can consist of one or several mines of one or various types.

**Mine Data Base** — A collection of information on land mines and UXO, used for determining national plan priorities, collating and analyzing the mine information, surveys, performance and other mine clearance related details. Most MACs also contain a limited map producing capability.

**Mine Field** — In land warfare, an area of ground containing mines laid with or without a pattern. *(NATO definition)*

**Mine Investigation** — An investigation into a mine related accident or incident.

**Mine Protected Vehicles** — Vehicles that have been specially designed or have additional protection from land mines in order to deflect the shock waves past the vehicle.

**Minefield Survey** — One of three disciplines in demining which involves the gathering of intelligence in order to identify suspect or known minefields areas. It also involves the reduction and marking of the areas prior to demining activities. There are three levels of survey. ( See Survey)

**Mine Verification** — The act of verifying that an area or road is clear of mines and munitions. Normally undertaken when roads have been frequently used but actual mine clearance operations have not taken place.

**Minimum Metal Content** — A term given to both AT and AP mines, but more commonly to AP mines with a limited amount of metal content. Minimum metal content mines normally have a few very small components of metal, for example a spring, ball bearing/s and the striker pin. In addition these metal components may have been manufactured from specialised material such as stainless steel which can be difficult to detect. It has been recommended that protocol II of the Geneva Convention be amended to specify a metal content of at least 8 grams.

**Misfire** — The failure of a munition or explosive charge to fire or explode as intended.

**Monitoring** — The authorised observation, by qualified personnel, in order to report on a clearance or demining activity, without taking responsibility for the quality or effectiveness.

**Neutralization** — The act of replacing safety devices, such as pins or rods into an explosive item to prevent the fuse or ignitor from functioning. It does not make the item completely safe as removal of the pins or rods will immediately make the item active again. It should not be confused with Disarming.

**NG-Based Explosives** — Nitro-Glycerine based explosives.

**Non-Metallic Mine** — A mine that contains no metal content but is a title often used, incorrectly for mines that have minimum metal content.

**Nuisance Minefield** — The term used for a few mines placed randomly around locations that will disorganize or demoralize an enemy.

**Off-Route Mine** — A mine that fires a projectile into the side of a tank or vehicle, the mine sensor or fuse normally being activated by the vehicle. Sometimes referred to as a Horizontal Action Mine.

**Osteomyelitis** — The infection of the bone cortex and marrow which occurs if metal, explosive fragments, or other foreign bodies are not removed from an amputees wound.

**Patterned Minefield** — An Anti Tank, Anti Personnel or mixed minefield where the mines are laid out in known mine clusters, rows or mine strips. Can be laid by hand or mechanical means.

**Perimeter Marking** — The outer visible marking of a minefield, consisting normally of wire, tape and/or mine field warning signs.

**Plastic Explosive** — A moldable form of high explosive.

**Phony Minefield** — An area of ground prepared using fences, mine boxes and other minefield identification material to give the impression of a live minefield without it containing any landmines. Used to deceive.

**Probe** — A tool, consisting of one or more pointed rods or tines that is used to probe the subsurface of the ground at a predetermined angle in order to locate buried ordnance. Also known as a prodder.

**Prodder** — See Probe

**Propellant** — A chemical material or combination of materials which have a high and uniform combustion rate, producing a large quantity of gas and heat upon ignition.

**Protective Minefield** — A minefield laid by a unit in order to assist its local, close in protection. Normally consists of only Anti Personnel mines.

**Pulling** — The act of attaching a wire or cable to a mine or munition in order to move the item in case an anti lift or anti disturbance device has been attached.

**Quality Assurance** — These process and procedures, management oriented, which if followed would result in a quality product or outcome.

**Quality control** — Activities focussed on determining through measurement, the level of compliance with technical standard.

**Quality Management System: QMS** — The combination of an organization's quality philosophy, quality assurance and quality control measures.

**Reference Point** — A fixed point of reference outside the minefield. This point has known coordinate that have been either ascertained by survey, resection or use of GPS. Also called a benchmark. *(NATO definition)*

**Ribbon Charge** — Specific technique for emplacing explosives.

**Render Safe Procedures (RSPs)** — Render Safe Procedures are the procedures that enable the neutralisation and/or disarming of mines and munitions to occur in a recognised and safe manner. *(NATO definition)*

**Safe Lane** — A lane that is clear of all mines and UXO

**Secondary Fragmentation** — The material not belonging to the mine resulting from the detonation such as rocks, branches and dirt. Depending on the material, secondary fragmentation can travel long distances.

**Shaped Charge** — A charge shaped so as to concentrate its explosive force in a particular direction.

**Single Impulse Mine** — A mine activated by pressure which is designed to activate after a single actuation on the pressure mechanism.

**Site Mapping** — A diagram which details the organization of a working site.

**Soak Time** — A term given to a period of time, when the device or munition is left undisturbed before any further predetermined action will be taken. Normally used when referring to Improvised Explosive Devices (IED) or when a misfire has occurred. Derived from earlier times when items were placed in water to make it inert. *(NATO definition)*

**Start Line** — A line related to the Bench Mark or reference point forward of which all demining occurs. The line does not have to be straight. See also base line.

**Start Point** — A point where demining commences within a allotted clearance area. Normally the Start Point is the location where the first clearance lane intersects the start line.

**Stopping Power** — The term given to the stopping power of any minefield indicating the capability of the minefield to stop vehicles and tanks before as a percentage of target hits. It is not normally associated with anti personnel minefields.

**Sub-munitions** — A sub-munition are minelets or bomblets that form part of a cluster bomb or artillery shell payload.

**Survey** — The method of determining the location of suspect or verified mined areas and further determining through survey methods the perimeters of the actual mined area. This is undertaken by use of three levels of survey:

- Level one : General Survey
- Level two : Technical Survey
- Level three : Completion Survey

**Tethering Wire** — A wire connecting the internal body to the outer container of a central portion of the bounding mine which determines the height at which the main charge will detonate.

**Tilt Rod** — A post or pole normally attached to a fuse mechanism on top of a mine. Pressure against the tilt rod activates by breaking or releasing mechanical retaining devices, thereby starting the activation chain of the fuzing mechanism.

**Track Width Clearance** — Normally associated with mechanical clearance devices that clear the width of the vehicle tracks only, such as rollers and ploughs. See also full width clearance.

**Tripwire** — A wire attached to one or more mines in order to increase the activation area of the mine. Pressure or the breaking of this trip wire will result in activation of the mine fuse. Normally attached to bounding and fragmentation type mines.

**Turning Point** — A surveyed point on the perimeter of a mine field where there is a change in direction. This point has known coordinates and is related by bearing (azimuth) and distance to either an ear-

lier turning point or intermediate point.

**Unexploded Ordnance** — Explosive ordnance which has been primed, fuzed, armed or otherwise prepared for use or used. It could have been fired, dropped, launched, projected yet remains unexploded either through malfunction or design or for any other cause.

**Working Lane** — The lane where one or more deminers are working.