

IMAS 09.40

First Edition
2003-01-01

Guide for the use of mine detection dogs

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Foreword

In July 1996, international standards for humanitarian mine clearance programmes were proposed by working groups at a conference in Denmark. Criteria were prescribed for all aspects of mine clearance, standards were recommended and a new universal definition of 'clearance' was agreed. In late 1996 the principles proposed in Denmark were developed by a UN-led working group into *International Standards for Humanitarian Mine Clearance Operations*. A first edition of these standards was issued by the UN Mine Action Service (UNMAS) in March 1997.

This IMAS reflects changes to operational procedures, practices and norms which have occurred over the past three years. The scope of these standards has been expanded to include the other components of mine action, in particular those of mine risk education and victim assistance.

The United Nations has a general responsibility for enabling and encouraging the effective management of mine action programmes, including the development and maintenance of standards. UNMAS is the office within the United Nations Secretariat responsible for the development and maintenance of international mine action standards (IMAS).

The work of preparing, reviewing and revising these standards is conducted by technical committees, with the support of international, governmental and non-governmental organisations. The latest version of each standard, together with information on the work of the technical committees, can be found at www.mineactionstandards.org. IMAS will be reviewed at least every three years to reflect developing mine action norms and practices, and to incorporate changes to international regulations and requirements.

Introduction

Humanitarian demining is a relatively new activity. It was not until the late 1980s that the increasing global landmine problem raised the international community's consciousness, and generated an effort to remove landmines worldwide. From 1990, an increased number of international organisations have become involved in humanitarian demining, and with them, there has been an increasing use of dogs for mine and UXO detection. Mine dog detection has proved efficient and cost effective, and has also provided a solution to the problem of detecting mines that are undetectable with normal metal detectors. The increased use of dogs has created new challenges since there are many contradictory views about mine dog detection capabilities, and some donors and contractors have raised concern about the quality and credibility of mine dog organisations.

The first edition of *International Standards for Humanitarian Mine Clearance Operations*, which was issued by UNMAS in March 1997, did not address mine dog detection since it was felt at the time that this "technology" was too poorly understood, and very few demining organisations had implemented mine dog detection programmes. The development of international standards for mine dog detection was therefore not seen as an urgent requirement.

In September 1999, the first global mine dog conference was held in Ljubljana, Slovenia. At this conference, the mine dog community expressed their need for international standards for the use of mine detection dogs, and for their development, as part of the framework of UN standards. The GICHD was therefore tasked by the UN to develop them.

The development process has involved two specialists in the GICHD, backed up by technical committees with support of international, governmental and non-governmental organisations. Most of the major mine dog organisations have been represented in an advisory group, which has been established in support of the standards development process and the conduct of supporting studies on mine dog detection.

In addition, several global mine dog programmes have been visited during the development process, to gain their views, concerns and practises. These field visits have allowed the incorporation of much field experience, and added greatly to the understanding of the needs of the field operators.

Guide for the use of mine detection dogs

1 Scope

This document, IMAS 09.40 is a guide on the application of the IMAS 09.4 series of standards and general use of mine detection dogs. The IMAS 09.4 series of standards addresses most aspects of mine dog detection and, unlike many of the general standards, should be viewed as technical standards and guidelines. There are five IMAS in this series, including this document. They are:

- IMAS 09.40 Guides for the use of mine detection dogs
- IMAS 09.41 Operational procedures for mine dog detection
- IMAS 09.42 Operational accreditation of mine dogs
- IMAS 09.43 Remote Explosive Scent Tracing - REST
- IMAS 09.44 Guide on medical and general health care.

The level of detail in these IMAS is greater than is the case with the general mine action standards, and some specific relevant technical principles are addressed at some depth. This is due to a general shortage of basic understanding and agreement within the mine action community about essential principles of mine dog detection.

2 Format

The format used for the IMAS 09.4 series is in line with that of the general standards and guidelines for mine action, developed by the GICHD on behalf of the UN. These, in turn, are modelled on those produced under the aegis of the International Organisation for Standardisation (ISO). This brings the dog standards into line with accepted international norms and practices.

3 International and national standards and SOPs

'International standards' for mine dog detection provide a framework for the planning and implementation of mine dog detection programmes worldwide, and lay down the responsibilities of national authorities, demining organisations and Donors.

'National standards' are developed by the national mine action authority or by an agency appointed by the host nation to undertake this work. The UN may also take on this responsibility in the absence of national authorities. Whilst national standards may apply restrictions and specifications beyond what is required by the international standards, they should be based on the principles and specifications provided in the international standards.

'Standing Operating procedures' (SOPs) are detailed procedures established by each mine action organisation for its own mine action programme. Although more detailed in scope than any other IMAS standards, the IMAS 09.4 series of standards do not attempt to act as, or duplicate, SOPs. Each demining organisation should develop its own SOPs, based on national and international standards. An SOP should generally be specific about all aspects of a demining organisation's current operation. It should, as a minimum, detail all operational procedures including demining drills, supervision, internal quality control, safety and security, medical evacuation, communication, transportation and management.

4 Why dogs are used for mine and UXO detection

Mine dog detection is a system in which dogs are used as one of the main the detection tools. Dogs can detect extremely low concentrations of many substances. In fact dogs are capable of detecting concentrations that are several magnitudes lower than the detection threshold of the best technological "sniffers". In mathematical terms, a human can smell concentrations of about one part per million, the best chemical analysers can "sniff" concentrations of about one part per billion, but dogs can smell concentrations of about one tenth of one part per trillion, or about ten thousand times

smaller - the equivalent of detecting the result of pouring twenty bottles of whisky into the Lake of Geneva. Dogs can also discriminate between a variety of substances: the vapour emanating from mines contains many different substances, which dogs can be trained to recognise. Dogs can therefore be extremely useful for mine detection.

For that reason, mine dog detection has rapidly become the second most common mine clearance approach, and today, more than 25 organisations use mine dogs world-wide. There are two major reasons for this:

- Mine dog detection can be faster and more cost effective than manual demining if implemented correctly, and estimated improvements of 200% to 700% have been quoted depending on environmental conditions, type of tasks and the operational concept of each organisation. Dogs can also detect mines with a low metal content and mines buried in areas with a high metal contamination or background, such as on railway lines.
- Many mine clearance organisations are using a demining approach in which many demining "tools", such as mechanical pre-clearance, manual clearance and dog detection are used together in a complementary role, and the dog component is an important part of this mix.

In summary, whilst dogs cannot replace manual mine clearance, it is a powerful tool when used in combination with manual and mechanical clearance, and can often have a large potential within humanitarian demining operations.

5 How dogs can be used

Mine dog detection can be applied in many different roles. Dogs are at their best when indicating individual mines, rather than concentrations of mines. As such they are best for area reduction and delineation of minefield boundaries (technical survey); mine and UXO verification (technical survey); clearance of roads and road verges; clearance verification, including the rapid sampling of cleared areas (Quality Control), which can be done behind both manual and mechanical demining; battle area clearance verification (removal of UXO); the elimination of pockets of land unreachable to mechanical clearance devices; clearance of railways and heavily contaminated sites; creation of safe lanes for clearance start points, and for many other purposes. Of these, the first three are the most common:

- The use of dogs for area reduction and mine verification shows possibly their greatest potential. One of the greatest challenges in many of the mine-infested countries is the accurate establishment of minefield boundaries as part of clearance operations, or during technical surveys to determine the scope of the mine problem. Dogs can work fast in areas with a low density of mines and are thus extremely suitable in the boundary detection role. Manual demining teams can then be deployed to deal with a much reduced minefield area.
- Dogs are extremely suitable for establishing that there are no mines in an area, for use in initial surveys. It is often possible to eliminate wide areas much faster than by manual mine clearance.
- A road may be difficult to demine manually due to the hard soil surface. A road is also typically free from tripwires and vegetation although this may not always be the case, if the road has been out of use for some while. Roads typically have a low density of mines, which often makes the use of dogs suitable and cost effective compared to manual mine clearance.

Many of the above areas of use are described in more detail in IMAS 09.41. There is no uniform set of operational procedures that will have an application under all conditions. There are, however, many principle aspects that are common within most mine dog programmes. IMAS 09.41 provides relevant principles with a general application within all mine dog operations. It has few restrictions, which is mainly due to a general lack of scientific evidence to shed light on many of the factors influencing mine dog detection. It is, however, envisaged that further research coupled with a general acknowledgement of the principles of IMAS 09.41 will allow the development of more specific and accurate standards in the future.

Operating systems also exist where the explosive vapour can be collected by suction probes with special filters, carried either by men or vehicles. In this case the explosive scent is brought to the dog, rather than the dog to the scent. The filter probes with the vapour contaminant are returned to special locations where specifically trained sniffer dogs are used to detect traces of the target scent trapped in the filters, each of which represents known sectors of road or areas. This method of dog detection, known as Remote Explosive Scent Tracing (REST) is currently only used for road and road verge clearance, but could have a wider potential. Because of the fundamental differences between remote sensing and normal dog use, REST is described in more detail in a separate standard document, IMAS 09.43.

6 Unknown factors in the use of dogs

Dog detection is only recently beginning to be widely used, and this delay in application probably stems from the perceived limitations in their use, many of which are due to the many factors that are still not known about the way in which dogs detect explosive and other scents. Despite a ten years successful worldwide implementation of mine dog detection and a fair build-up of empirical experience, there are still many unanswered questions. For instance, even in the same operating area, some dogs perform consistently better than others. The lack of scientific evidence needed to interpret the relevant factors has previously made it impossible to develop an understanding of the basic factors underlying the anomalies. Training methodology is and will always be subjective and different views will always exist. The effects of certain environmental factors are also currently disputed.

Another major challenge with dog detection of mines and UXO is that it is not known exactly which substance the dog detects. It appears logical that dogs should be trained to detect the explosives in the mine. A majority of the landmines and ammunition currently deployed have either been filled with TNT or a composition of explosives where TNT is a component. But when dogs detect mines or UXO, they may detect the explosives, the casing material or a bouquet of several odours. Indeed many mine dog organisations currently train their dogs to detect a combination of casing material and the explosive content rather than mines.

The IMAS 09.4 series of standards does not specify that TNT should be the target substance. It is, however, important that the mine dog organisation be fully aware of what they are actually training their dogs to detect, and to ensure that these substances emanate from all mines/UXO in the area of operation.

7 Limitations to mine dog detection

Experience has shown that mine dogs cannot be used successfully under all circumstances. For instance, in areas of dense vegetation, dogs are impeded, and their search pattern may be disturbed giving rise to un-searched areas. In addition the handler may be prevented from controlling the search and observing the dog's signals. Dense minefields are also confusing to dogs, and their work is severely curtailed in winter, during periods of heavy rain or in excessive heat. The presence of tripwires may also present a special hazard, unless the dogs have been specifically trained to detect them.

Dogs can also show random periods of unreliability, missing out some mines during detection. This may be blamed on faults in the training, or handler errors. It may also be a result of certain unfortunate environmental conditions that prohibit the dog from detecting certain mines or mines under certain conditions. Until it has been established why dogs sometimes have lapses in reliability and miss out mines, it is necessary to use a minimum of two different dogs in order to gain confidence in the clearance. Much fundamental work needs to be done on training and environmental factors to establish the causes of random unreliability.

Training methodology is also an area where many unknown factors exist. The training of dogs is extremely complex, and it can be undertaken in many different ways and still prove more or less successful. Many organisations therefore fear to implement mine dog programmes because dog specialists (in the role of advisors) are unable to agree on appropriate training methods for dogs and handlers. The IMAS 09.4 series of standards only marginally addresses training methodology since

no one preferred methodology can be identified. A study on training methodology is, however, part of the overall standards programme, and may act as a guide for the future.

8 Need for standards

When the first UN standards were introduced in 1997, no attempt was made to include standards for detection by dogs. The UN decided in 1999 that this gap in the standards needed to be filled as soon as possible, and despite the lack of scientific knowledge to back the empirical assumptions on which dog detection was (and still is) based, it was decided to carry out a two-track process.

The first track was to draft intermediate standards as quickly as possible, based on the knowledge and experience available. The second track was to carry out a linked series of research programmes to provide the necessary scientific and objective underpinning for the interim standards. These programmes are now in progress, and their output will be used to update the interim standards where and when possible.

9 Operational accreditation of mine dogs

A major component of the implementation of standards must be the operational accreditation of mine dogs and their handlers, because this is one of the only ways in which it can be confirmed that the new international standards are being met, and this can be found in IMAS 09.42.

In the past, the testing and operational accreditation of mine action organisations and their “tools” has been considered as an internal affair and not a matter for national authorities or donors. This view has changed, both for mine action organisations and mine dogs. Regular testing and operational accreditation of mine dogs have been implemented in several countries while the testing of manual deminers has been slower to develop. There are, however, a few distinct differences between mine dog detection and other demining technology, which may justify this discrimination.

A mine dog operational accreditation test can be compared with a drivers license test, whose aim is to establish confidence in the ability to perform under some conditions without testing against all possible conditions. The same principle applies for a mine dog operational accreditation test. Its purpose is to provide confidence in a basic capability to detect mines or tripwires. It is anticipated that a dog equipage, which has demonstrated the necessary good skills in basic mine/tripwire detection will apply the same professional attitude and skills when dealing with other challenges of mine dog detection. Passing an operational accreditation test is an evidence of confidence and trust. It proves that the national mine action authority, or authority carrying out the tests, has gained confidence in, and trusts, the skills of an equipage or a demining organisation.

When attempting to establish a credible operational accreditation system a major apparent problem is the basic lack of knowledge and understanding; about the fundamental factors influencing dog detection, including explosive migration and vaporisation, odour thresholds and training methodology. Some research, and some systematic test and evaluation are therefore imperative, and are being pursued as part of the development of these standards.

IMAS 09.42 has been designed to provide practical and thorough procedures for testing, removing all the anomalies in current tests, whilst still remaining fair and objective. The test site preparations may currently appear too restrictive and labour-intensive, but as research gives more information to back testing, it may be that increased knowledge will allow a simplified test preparation process.

10 Occupational health and general dog care

A successful mine dog programme is totally reliant on well fed, trained and treated dogs, and for this reason this group of standards includes a special standard on occupational health of dogs, and general dog care, IMAS 09.44. Poor attention to the health of dogs, and their treatment when sick, may result in prolonged training periods and a limited operational output during active detection. Dogs may also die as a result of lack of vaccinations and neglect of vital disease symptoms. It is, however, difficult to generalise all aspects of occupational health and dog care, and the principles of IMAS

09.45 have to be adapted to the specific situation in the country of operation. IMAS 09.44 applies few restrictions on the demining organisations, but It is strongly recommended that the principles contained in the standard are adopted by all mine dog organisations. In this way, IMAS 09.44 can be accepted as a guide to occupational health within mine dog operations worldwide.

11 Roles and responsibilities

11.1 General

All IMAS, including the IMAS 09.4 series, contain sections outlining the various agencies who have responsibility for the implementation of the standards. The main agencies involved are the national mine action authorities, the mine action agencies, the individual deminers themselves, the donor organisations funding the mine action, and the international community supporting mine action in the victim state concerned.

11.2 The national mine action authority

The national mine action authority has the ultimate responsibility for the establishment of an objective and unambiguous national policy on mine dog detection. This policy should impose equal requirements on both national and international mine dog organisations. Other important responsibilities of the national mine action authority are to establish an unambiguous test and operational accreditation system including suitable test sites and a professional and objective test regime. The authority should also assist the demining organisations in the location and establishment of suitable training fields, and by the provision of regulations for mine dog detection and testing/operational accreditation procedures.

11.3 The demining organisation

The demining organisation is ultimately responsible for the implementation of mine detection in accordance with international and national standards. Ideally, rules and regulations for testing and operational accreditation should be based on the principles outlined in the IMAS 09.4 series. However, standards must be established and maintained even in the absence of a national mine action authority, when such an authority has not yet been formed, or when it is just establishing itself. Under these circumstances, the demining organisations themselves are responsible for the establishment of the correct standards. The testing, and if necessary the operational accreditation of mine dogs should still take place as an internal responsibility of each mine dog organisation in the country. It may be applicable to establish a broad cooperation and consensus between the different mine dog organisations, for the purpose of testing and operational accreditation mine dogs. This should be encouraged by donors.

Mine dog detection is a relatively new activity, and it is therefore important that demining organisations share experiences relating to problems with the environment, certain demining scenarios or certain mine/UXO types with other demining organisations. This will assist further improvement of mine dog detection and facilitate increased safety, efficiency and credibility.

11.4 Donors and the international community

Donors and the international community are responsible for providing assistance to the national mine action authority, or in the absence of such a body, to the demining organisations, in establishing a suitable mine dog detection policy and system. It is in the interest of all stakeholders, including donors, to ensure a high quality product and a cost-effective demining programme. Donors should therefore press for the establishment of a credible test and operational accreditation system. In the absence of a recognised mine action authority, the donors should jointly undertake some of the responsibility of the national mine action authority by pressing the demining agencies to establish test regimes. In some countries the donors may ask the United Nations, or a suitably qualified third party, to manage the establishment of suitable operational and practical mechanisms for dog testing and operational accreditation on their behalf.