A Guide

to Marking and Fencing

in Mine Action

Programmes

GICHD | CIDHG

The Geneva International Centre for Humanitarian Demining (GICHD) works for the elimination of anti-personnel mines and for the reduction of the humanitarian impact of other landmines and explosive remnants of war. To this end, the GICHD, in partnership with others, provides operational assistance, creates and disseminates knowledge, improves quality management and standards, and supports instruments of international law, all aimed at increasing the performance and professionalism of mine action.

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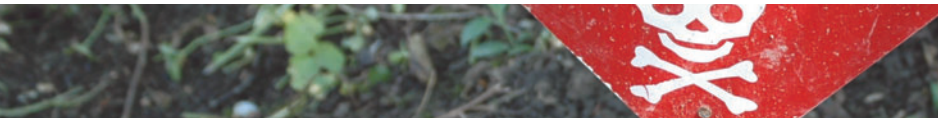

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A GUIDE TO MARKING AND FENCING

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BOXES

Marking of hazardous areas (placing warning signs around the perimeter of the affected area) tends to be carried out in one of two situations: immediately prior to clearance, as part of the general site management of a clearance operation; in situations where formal clearance is unlikely to occur for a considerable time, often measured in years, referred to in this context as long-term marking. (In some cases it is also referred to as permanent marking).

Informal (or Improvised) Marking is generally placed or erected by the local population and can be made up of a wide variety of locally available and recognisable materials and signs.

Fencing of hazardous areas, where it is possible to do so, involves installing a physical barrier to reduce the risk of unintentional entry into dangerous areas. Fencing is regarded as a form of marking under the International Mine Action Standard (IMAS definition).

Hazard Marker, the term that describes objects other than a sign, used to identify the limits of a mine or ERW hazard area (IMAS).

Hazard Marking System, a combination of measures (signs and barriers) designed to provide warning to the public and protection from mine and ERW hazards. The system may include the use of signs and markers, or the erection of physical barriers (IMAS).

Hazard Sign, a permanent manufactured sign which, when placed as part of a marking system, is designed to provide warning to the public of the presence of mines or ERW (IMAS).

Hazardous Area, a generic term for an area not in productive use due to the perceived or actual presence of mines or explosive remnants of war (ERW). (IMAS)

Suspected Hazardous Area (SHA) see above.

Risk Reduction describes actions taken to lessen the probability, negative consequences or both, associated with a particular risk. (IMAS)

Mine Risk Education, activities which seek to reduce the risk of injury from mines/ERW by raising awareness and promoting behavioural change including public information, dissemination, education and training and community mine action liaison. (IMAS)

Links: for further definitions related to marking and fencing, see IMAS 04.10 glossary: www.mineactionstandards.org

Mines and other explosive ordnance hazards are marked to provide a clear warning of danger to the local population. There are international legal obligations, agreed by states, to prevent civilians entering areas contaminated with mines or explosive remnants of war (ERW)[1] through the use of marking and fencing.

Despite these global norms, marking and fencing are rarely used as medium to long-term risk reduction techniques in mine action. Marking and fencing have typically been conducted only as site maintenance, as part of an ongoing mine clearance operation. When they are used as a means of reducing risk for the general population, it has tended to be sporadic and ad hoc.

In its current form, few mine action specialists regard marking and fencing as effective risk reduction methods. Many programme managers are unwilling to invest their scarce resources in the labour and materials needed to make signs or build fences, which are often quickly stolen or removed. Where markings remain in place, they are often ignored by the public, especially where the contaminated land is economically important to the community.

However, the GICHD believes that if implemented systematically, with adequate community involvement and in appropriate areas, marking and fencing can be relatively low cost, efficient ways to reduce risk. At the request of the United Nations Children's Fund (UNICEF), the GICHD has developed this Guide to Marking and Fencing in Mine Action Programmes to explore new models for the effective implementation of marking and fencing.

Based on research conducted in ten mine-affected states and territories by the GICHD, the Guide describes the extent to which marking and fencing are carried out in existing mine action programmes. It assesses the impact of different methods of marking hazardous areas. It also discusses the contribution of medium and long-term marking towards casualty reduction, in situations where clearance cannot be conducted immediately.

Case studies from Afghanistan, Bosnia and Herzegovina, Cambodia, Croatia, Denmark, Jordan, UNMIK/Kosovo, Nepal, Thailand and the Falkland Islands were used in this Guide. These studies are used to illustrate different practices within varied contexts. The GICHD's key findings are drawn from this research, as well as from data gathered by Landmine Monitor, the annual report of the International Campaign to Ban Landmines. Information from the IMAS 08.40 Marking Mine and ERW Hazards is also used.

FIVE PRINCIPLES FOR EFFECTIVE MARKING AND FENCING

Based on its research and review of existing practices, the GICHD recommends the following key principles for marking and fencing.

1. **Ensure marking is a specific project:** despite the existence of international legal obligations, marking and/or fencing of hazardous areas is only conducted systematically when it is a specific, stand alone project, according to our research. The employment of dedicated people, whether or not they also carry out other mine action activities, has proven to be an efficient model. There may be extra costs involved in delegating the work to others, but we argue that the end result is likely to have more impact.

2. **Involve local communities:** community involvement is crucial to productive and effective marking and/or fencing in the medium to long-term. The community should be involved at all levels, from the creation and maintenance (and, where safe, their emplacement) of warning signs and fencing, to local education and understanding of their importance and purpose.

3. **Make marking systematic:** we recommend that mine action programmes allocate a percentage of their annual budget to the marking and fencing of hazardous areas. Marking is more productive when it is systematic and part of a broader risk reduction strategy. Once a strategy for marking has been agreed on, national mine action standards and/or standing operating procedures (SOPs) should be drafted on best practice to be followed, including roles and responsibilities for the emplacement and maintenance of warning signs.

4. **Integrate marking in broader risk reduction efforts:** while marking and fencing should be a distinct initiative; it is more likely to have an impact if integrated into a broader risk reduction strategy. This includes incorporating messages about the meaning of warning signs, and the importance of maintaining and respecting them, into local mine risk education (MRE) programmes.

5. **Focus on areas of high risk:** concentrate on marking and fencing hazardous areas where returnees are likely to pass or settle. Travellers and newcomers to an area are at special risk and marking can prevent casualties caused by ignorance.

INTERNATIONAL LAW

Three major international legal instruments require or advise states parties to conduct marking and fencing (or alternative means) to "ensure the effective exclusion of civilians" from affected areas, whether the contamination they contain is anti-personnel mines or ERW. Box 1 sets out the relevant legal provisions from the Anti-Personnel Mine Ban Convention; Amended Protocol II to the 1980 Convention on Certain Conventional Weapons (CCW); and CCW Protocol V on ERW.

Box 1 | International legal obligations to mark, fence and monitor mined and battle areas

Article 5 | Anti-Personnel Mine Ban Convention

Each State Party to the Anti-Personnel Mine Ban Convention is obliged "to ensure as soon as possible that all anti-personnel mines in mined areas under its jurisdiction or control are perimeter-marked, monitored and protected by fencing or other means, to ensure the effective exclusion of civilians, until all anti-personnel mines contained therein have been destroyed."

Article 5 | CCW Amended Protocol II

Amended Protocol II requires States Parties to ensure the effective exclusion of civilians from an area containing non-self-destructing anti-personnel mines "by fencing or other means." Marking "must be of a distinct and durable character and must at least be visible to a person who is about to enter the perimeter-marked area."

Technical Annex, CCW Protocol V on Explosive Remnants of War (voluntary)

Article 2 | Warnings, risk education, marking, fencing and monitoring

(h) When possible, at any time during the course of a conflict and thereafter, where explosive remnants of war exist the parties to a conflict should, at the earliest possible time and to the maximum extent possible, ensure that areas containing explosive remnants of war are marked, fenced and monitored so as to ensure the effective exclusion of civilians, in accordance with the following provisions.

(i) Warning signs based on methods of marking recognised by the affected community should be used to mark suspected hazardous areas. Signs and other hazardous area boundary markers should as far as possible be visible, legible, durable and resistant to environmental effects and should clearly identify which side of the marked boundary is considered to be within the explosive remnants of war affected area and which side is considered to be safe.

(j) An appropriate structure should be put in place with responsibility for the monitoring and maintenance of permanent and temporary marking systems, integrated with national and local risk education programmes.

Formal marking: despite the international legal obligations incumbent on many states, few mine action programmes have dedicated sufficient resources to long-term[1] marking and or fencing of hazardous areas. According to GICHD research, the vast majority of marking and fencing employed globally is temporary and carried out as part of an ongoing mine clearance activity. Where longer-term marking and fencing has been erected, it often does not span the perimeter of the affected area and, unless maintained, does not last for very long.

However, the extent of existing marking and fencing of mined areas varies widely across different mine action programmes.[2] In 2006 the GICHD studied its use in Afghanistan, Bosnia and Herzegovina, Cambodia, Croatia, Denmark, Jordan, UNMIK/Kosovo, Nepal, Thailand and the Falkland Islands. The following findings are drawn from that study. Cases described in the following sections are not intended to show either good or bad practice. Cases are used to illustrate different approaches to marking and fencing, within a wide range of varied environments.

In Afghanistan, although temporary marking prior to clearance is standard practice, very little long-term marking has been carried out in the last five years. That which has been done has occurred mostly through specific "Mine Action for Peace" programmes or Disarmament, Demobilisation and Reintegration initiatives. The national mine action programme's operational work plan for 2006–2007 foresaw the long-term marking of 36 square kilometres of contaminated land but this was not implemented as no funding was allocated.

In Cambodia most marking is conducted for the benefit of demining teams rather than for the public. The Cambodian Mine Action Centre (CMAC) engages in deterrent marking of mined areas – marking aimed mainly at warning new settlers arriving in districts with mine contaminated areas. The other main demining agencies see little merit in marking for the benefit of communities that already possess detailed knowledge of mine locations.

In Nepal all mined areas are reportedly marked and/or fenced. It is not known how much of this has been done in accordance with international standards. As part of its contribution to the development of a comprehensive national mine action programme in Nepal, UNICEF has set strategic objectives for marking, in addition to those set down by the state's security forces.

In Thailand, the slow pace of mine clearance and survey has increased the importance of long-term marking. Although the extent of such marking was not independently confirmed, one of the Thai demining units confirmed that warning signs have been placed at regular intervals around the perimeter of all land in its operating area (along the Cambodian border) identified as suspect by the Landmine Impact Survey. Survey teams also respond to local reports of the presence of mines or UXO by putting up warning signs around or on the approaches to the particular hazard.

In Croatia marking and fencing is given priority and considered to be a medium to long-term risk reduction method. In 2005, some 4,000 signs were placed around suspected mined areas in the country. As of 31 December 2006, the Croatian Mine Action Centre (CROMAC), which is responsible for marking suspected mined areas in the country, reported that there were 12,328 warning signs on suspected areas.

In Bosnia and Herzegovina, marking and fencing has always been a part of the national mine action programme. The issue is addressed in a specific sub-chapter of each annual mine action plan and report issued by the programme and is integrated within the goals of the national mine action strategy. There are plans to conduct long-term marking on a total area of 140 square kilometres and to place 76,512 urgent marking signs on a total area of 510 square kilometres by 2009.

The mine action community in Bosnia and Herzegovina consider medium to long-term marking and fencing to be an important risk reduction measure. One expert observed that ten years after the end of the war the frontlines are likely to be overgrown with bushes and grass, making it crucial to inform the local communities about the location of mine and ERW hazards.

Similarly, in UNMIK/Kosovo, long-term marking and fencing is considered to be an inexpensive way of saving lives. Although marking and fencing is not specifically mentioned in the Explosive Ordnance Disposal Management Section's work plan for 2005–2006 or corresponding annual report, marking – and to a lesser extent fencing – has always been a part of the mine action programme.

Informal marking: the GICHD found examples of informal marking by civilian populations in a number of countries and territories studied. This demonstrated that in some areas local populations believe marking can be a practical way of reducing risk, at least in the short to medium-term, until land is cleared.

In Cambodia, in the western provinces and districts most exposed to mines, anecdotal evidence suggests there is some informal marking of mine hazards, which may have been taught during MRE sessions. It is quite common in some

areas for mines to be moved to one side of a path or track and left on a tree stump or similar. The presence of a mine is also sometimes marked by a stick with a bottle on the top. A suspect mine may also be covered with a thorn bush or branches. The extent of such practices or variations of warning markers is not known.

In Bosnia and Herzegovina, there are also cases of improvised, unofficial marking, especially in the forests. For example, hunters and people collecting wood remove some of the exterior covering of the tree trunks to warn of mined areas. This kind of marking is believed to have had no significant impact on risk reduction since only one small group of the community is familiar with it.

In Croatia, unofficial mine warning signs were sometimes placed by local people just after the end of the war. But after 10 years of systematic marking of mined areas by the mine action programme, there is no longer much unofficial mine marking going on, according to CROMAC.

In UNMIK/Kosovo, unofficial warning of suspected areas was common just after the conflict, but is no longer so prevalent. Some unofficial warning of suspected areas still occurs, often in the form of crossed sticks, piles of stones, plastic bottles or cans on top of sticks and roads and tracks blocked with trees.

Thai villagers on the Thai-Cambodian border are often taught to mark any mine or ERW hazards they locate before reporting them, as part of MRE. They are advised to use any materials available – for example, a stick with a piece of cloth attached or a piece of paper marked with a cross.

In Afghanistan, community involvement in marking contaminated areas appears limited. In a few cases, civilians have put local warning signs, such as a pile of stones or small flags, for marking a hazardous item or device, or have placed a stone to block entry to dangerous ground or a contaminated road. This type of marking is not widespread.

Current MRE programmes in Nepal neither encourage nor teach people to create improvised signs. Although civilians improvise signs to warn others of certain types of danger – for instance, using a piece of red cloth, branches and a pile of rocks – they are not known to have used such signs to mark explosive devices.

The extent to which MRE programmes should encourage informal marking remains controversial. Although it is generally agreed that children should not be asked to do so, adults are sometimes encouraged to mark hazards, for example in Thailand. Other experts contend that this unnecessarily exposes civilians to danger and that – at least in the case of suspected mined areas – civilians should not be asked to carry out marking.

Key points:

- marking hazardous areas will reduce casualties
- some people will enter hazardous areas regardless of how well they are marked
- community ownership is the key to sustainability and respect for marking

Marking can save lives by alerting the unsuspecting, especially non-locals, to the risks of entering a particular area. It is important that the warning is not only visible, but also understood.

Allocate resources to marking: although more costly at the outset, a dedicated marking team will help to ensure the efficient implementation of the project and ensure it is more cost-effective in the long term. The GICHD recognises that resources are often limited; however, it is also recommended that the national authority should allocate a percentage of the annual programme budget to marking. This will help to ensure the longevity of the marking project and its funding.

Concentrate marking in areas of resettlement and return: population movement increases the risk of mine or ERW casualties. Recent returnees – whether internally displaced persons or refugees – tend to make up the majority of casualties in contaminated countries. The presence of mines and/or ERW can often deter refugees from returning home. In Cambodia, the CMAC considers new settlers to be the main beneficiaries of minefield marking. Accordingly, CMAC pays particular attention to new or recently-established villages.

Involve the community at all levels: encourage respect and understanding for marking signs by encouraging local communities to become involved in the construction, design and maintenance of long-term markers. In Bosnia and Herzegovina, Bosnia-Herzogovina Mine Action Centre (BHMAC), the national mine action centre, correlates the level of maintenance of the long-term marking and fencing with the extent to which the community is mobilised. BHMAC believes local communities should be encouraged to take more ownership of the marking and fencing. Often, BHMAC, or NGOs working in the area, give the community a supply of warning signs for maintenance use.

Warning signs must be clearly visible: ideally from any direction. Vegetation can grow quickly and obscure signs, so pick locations carefully. Ensure there is not too much distance between each marking, dependant upon local conditions. Agree on national SOPs on where to place marking signs to ensure their accessibility and visibility.

Box 2 summarises the relevant provisions of the IMAS on the marking of mine and ERW hazards.

Box 2 | IMAS requirements for marking mined and battle areas*

The design of mine and UXO hazard marking systems should take account of local materials freely available in the contaminated region and the period for which the marking system will be in place.

Hazard marking symbols shall be clearly visible. Markers and signs shall clearly identify which side of the marked boundary is considered to be within the mine and ERW hazard area and which side is considered to be safe. The warning sign should be clearly displayed facing outwards from the mined area or suspected hazardous area.

Hazard signs and markers should be clearly visible in daylight at a distance of 30 metres, and from adjacent signs and markers. If markers are masked by vegetation or terrain, the use of a physical barrier should be considered.

Hazard signs and markers should not be constructed of munitions casing, materials that have contained explosives or discarded weapons systems.

* IMAS 08.40: Marking mine and UXO hazards, Second Edition (incorporating amendment number 1), 1 January 2003.

Marking must be a clear warning of danger: It must be clearly understood from the warning signs that anyone entering the marked area risks death or serious injury from mines or ERW. This is facilitated by common agreement on warning signs so that people can easily recognise dangerous areas and are not confused by many different forms of marking.

Standardising warning signs is a task for the national mine action authority and/or mine action centre. Of course, local communities sometimes use their own informal markings such as crossed sticks, piles of stones, plastic bottles or cans on top of sticks, stones or trees laid to block roads and tracks, or covering an item of explosive ordnance the mine with a thorn bush or branches.

Make your markings understood: combining marking with MRE increases the effectiveness of both these risk reduction measures. It is generally accepted that marking dangerous areas is only effective when local communities are clearly informed and aware of the danger of mines/ERW and the meaning of colours and/or signs used. MRE, especially through community liaison activities, can promote local understanding and respect for warning signs.

BEST PRACTICE

Key points:

- involve communities in the marking process to promote the effective maintenance and preservation of the warning signs
- marking should be as consistent and unambiguous as possible

This section contains practical information regarding six key procedures for the medium to long-term marking of mined and battle areas.

Visible warning signs: as set out in Box 2 above, the IMAS recommend that warning signs should be clearly visible in daylight at 30 metres and from adjacent signs and markers. There are a number of ways of achieving this, including placing marking signs on poles (see figure 1); placing marking signs on trees (see figure 2); or painting stones or building painted markers using cement.

Long-term marking systems in Afghanistan are required to be in red and white. The red side faces the dangerous side of the mined area. The paint used for marking is a durable, all-weather type, capable of lasting under extreme conditions for a minimum of one year.

Figure 1 | In Thailand, tall marker poles with flags provide warning of mine clearance activity highly visible from a distance and above surrounding crops and vegetation.

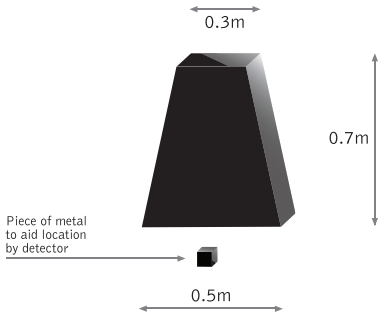
Visible warning signs: as set out in Box 2 hereunder, the IMAS recommend that warning signs should be clearly visible in daylight at 30 metres, and from adjacent signs and markers. There are a number of ways of achieving this, including placing marking signs on poles (see figure 1); placing marking signs on trees (see figure 2); or painting stones or building painted markers using cement.

Figure 2 | In Thailand, warning signs are often fixed to trees

Durable markings of minimal value: warning signs are often stolen. So aim to use durable materials of little or no value. In Croatia 1,227 mine warning signs disappeared during 2006 and the country prosecuted its first case of mine sign theft. This is despite attempts by CROMAC to ensure signs would be difficult to remove, by fixing them to trees and rocks etc.

In Afghanistan, after considerable experimentation, new materials for casting markers are soil, cement, sand/gravel and lime. These are designed to last and it is not expected that they will be removed by the local population because, unlike metal or wood alternatives, they are of little value.

Figure 3 | Size and construction of long-term markers in Afghanistan



Rather than use valuable metal or wood as poles, it may be better to fix signs to natural resources such as trees or rock outcroppings, whenever possible. In Thailand, long-term marking of suspect areas is carried out by survey teams, who put up red squares marked with a white skull and crossbones and the word "danger" in Thai and English. The teams have switched from using wooden signs, which lasted only a year or two, to plastic which they find more durable.

BEST PRACTICE

Record the location of markings: if the local context permits, record the precise location of all marking signs, if possible with Global Positioning System (GPS), and pass them on to the national mine action centre so they can be stored. In Croatia, the location of mine warning signs is one of the basic elements in CROMAC's mine information system and the exact coordinates of each warning sign are entered into the database. The signs are shown on mine contamination maps, which are provided to local authorities in municipalities and counties, police administrations and other individuals on request.

Maintain the markings: be clear about exactly who is responsible – financially and physically – for doing this. Consider the appointment of one person from a nearby community to be responsible for maintaining warning signs and (where relevant) refreshing colours. Ensure this nominated person receives training. See if the cost can be shared with the local authorities.

In Afghanistan, demining organisations are responsible for the maintenance of marking systems on land they are working on. They must maintain them while operations are ongoing and until such time as the land is handed over to another demining organisation, or has been cleared. The organisations erecting marking systems are also responsible for ensuring that local communities are briefed on the location and meaning of the marking systems used. Staff from Area Mine Action Centres in the country periodically visit the sites and, if the paint from markers has faded, they are expected to task an organisation to refresh the marking.

Monitor the status of the markings – and any casualties: record any casualties in the areas which have been marked to try and understand how these have occurred. Monitor whether marking signs are being removed. In Croatia, CROMAC provides the affected communities with maps showing the locality of the mine signs and distributes questionnaires asking how many signs are missing, where and why.

Remove markings when no longer needed: to ensure that land is used once clearance has been completed. In Cambodia, many long-term minefield markers are found located beside property with well-established houses and gardens. Others stand in the middle of land that has already been cleared for cultivation or can be seen in the middle of large fields of cassava or rice. The frequency of these findings almost certainly diminishes the value and relevance of marking. It should be noted here that some organisations or programmes deliberately leave buried metal markings in cleared areas, as reference points. These are not intended to be visible warnings, but are left as a permanent record that clearance has taken place, for historical and information management purposes.

Key points:

- fencing can contribute to risk reduction; however, it is rarely an actual physical barrier, but rather a form of awareness or warning
- fencing should follow IMAS guidance but should be appropriate to the threat in each context

International law requires that mined areas be "protected by fencing or other means, to ensure the effective exclusion of civilians". However, the evidence is that fencing is typically more of a reinforced warning than an effective method of excluding civilians.

Fencing can reduce casualties: research has found that, in practice, fencing fulfils the same purpose as marking. Fences rarely prevent determined civilians from entering a hazardous area, but, as with marking, they can deter people from entering.

The fencing of mined Nepal Army and Armed Police Force posts, installed primarily to protect security personnel, has also been effective in preventing civilian casualties. In the six months leading up to June 2006, only one of 30 recorded casualties was injured in a fenced area. It is not known if it was marked as well. It should be noted, however, that these fenced areas are actively guarded by the military or police, which undoubtedly contributes to the exclusion of the civilian population.

Fencing acts as a warning, not a barrier: as with marking, where individuals are determined to enter affected areas, fencing will not prevent them from doing so.

In Jordan, mine and ERW casualties continue to occur every year, despite the fencing of all known mined areas. The movement of mines into unfenced areas – caused by flooding in the Jordan Valley and along the Yarmuk River - is one cause, but, as figure 7 illustrates, smugglers routinely ignore fences and walk through minefields.

Figure 4 | Fenced minefields laid to stop smugglers crossing the northern border with Syria have not been entirely successful.

Fencing is often stolen: fencing is even more vulnerable to theft than warning signs. As with warning signs, use materials of minimal value. None of Cambodia's operators currently fence suspected mined areas. Deminers recall there was some attempt at fencing in the 1980s using barbed wire but it did not survive long and no effort was made to sustain or generalise the practice. Poor local communities in the past quickly removed fencing materials for other uses.

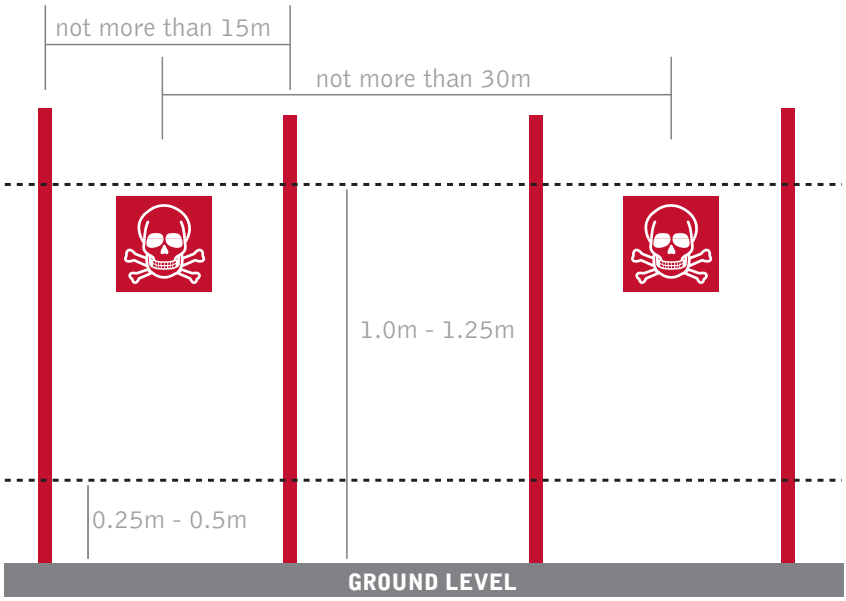
BEST PRACTICE

Key points:

- be selective about where fencing is placed
- monitor and maintain fencing

International Standards: recommend that long-term marking systems should employ a combination of markers, signs and physical barriers. The IMAS note that physical barriers may include walls, fences or other obstructions that prevent the unintentional entry into a mine or ERW-contaminated area. The relevant standards recommend that fences be erected with two strands attached to uprights at 25 to 50 centimetres and 1 to 1.25 metres above the ground (see figure 5).

Figure 5 | IMAS standards on fencing of mined and battle areas



Fencing strands may be of any suitable durable material including wire, string, synthetic cord or tape. Uprights may include trees, buildings or existing structures and posts erected as part of the warning system, and should be not more than 15 metres apart. Warning signs must be attached to the top strand of the fence, not more than 30 metres apart and within five metres of each turning point. If necessary, they may also be attached to uprights.

BEST PRACTICE

Be selective in use of fencing: concentrate on military installations or heavily UXO/submunition-contaminated sites close to heavily populated areas. In UNMIK/Kosovo, although UXO-affected sites were marked with specific warning signs (differing from those used to mark mined areas), long-term fencing is only used today in Lukare (Pristina) around a previous ammunition storage depot and military barracks.

On the Falklands, although the conflict ended in the early 1980s, no civilian mine/UXO casualties have since been recorded. This could be partly attributed to comprehensive fencing of mined areas (see Box 3). However, the success of fencing around mined and submunition-contaminated areas on the Falkland Islands should be considered exceptional. There is no pressure on land for economic reasons and earmarked funding to maintain the fencing has been provided by the Government. The cooperation of the local population is also important in this case. The fencing is not insurmountable and could be easily breached if anyone chose to do so (see figure 8).

Livestock and other animals, notably penguins, still occasionally wander in to suspected dangerous areas. Climbing over the fences is prohibited by law, with a penalty of £1,500 or one year in jail for infringement, and these penalties even apply to local landowners, but when their sheep wander into the fenced areas they are still permitted to send their dogs in to recover them.

Figure 6 | Penguins crossing fencing around a mined area on the Falkland Islands.

Box 3 | The fencing of mined areas on the Falkland Islands

During the Falklands conflict, 137 minefields were laid, mostly around garrison positions in the capital, Stanley, and the major settlements, such as Fox Bay and Goose Green. After the conflict, British Army engineers cleared about 20 of these minefields, but clearance was stopped in June 1983 due to the number of casualties taken, and priority shifted to marking and fencing the 126 uncleared individual mined areas that remained.

The minefields fencing programmes, both immediately after the conflict and subsequently in 1990, were designed to ensure that none of the Falkland Islands residents or their livestock should be killed or injured by the mines and booby-traps. The materials and techniques used in the 1990–1993 fencing programme were adopted from the normal stock fencing that had evolved in the Falklands over many years, and designed for a 40-year life. A standing operating procedure was written for their construction.

The materials used have been wooden fence posts about 7 x 7 centimetres about every 15-20 metres, about 1.2 metres high, with five strands of wire, the top being barbed wire and the remainder either barbed wire or 14-gauge fencing wire. There are two vertical "stretchers" between each post, keeping the wires apart, with sometimes special protection where the fence crosses a gulley or stream. The fences are marked with plastic square or triangular markers about every 10 metres.

The fencing programmes have been a complete success. There have been no human casualties due to mines since the start of the conflict, and recorded stock losses have declined to almost zero since 1985-1986. Penguin rookeries have well-marked routes under or through the fences between the beaches and their nesting grounds, but no signs of explosions or casualties have been seen.

Monitor and maintain fencing: wherever fencing is erected, it must be monitored and maintained to ensure its longevity. This can require significant resources as Denmark has discovered on the Skallingen Peninsula. When the Germans cleared their minefields in Denmark after the 1939–1945 War they left an area uncleared on the Skallingen Peninsula on Jutland's west coast. The clearance was aborted in 1947, due to the drifting sand which made total clearance impracticable. The uncleared area was fenced with a three-stringed barbed wire fence with metal poles and metal warning signs every 100 metres.

The Danish Authorities maintained the fence in the following years, but from the 1960s it was more or less neglected, with only random repair of smaller sections and more frequent maintenance of warning posters at parking areas. For the last 20 years, there has been no fence. Only the poles indicated where the fence once was and, as some of these poles had also disappeared, it was not possible for the public to identify the dangerous area.

BEST PRACTICE

In 2005, based on a new threat assessment of the minefield, the Danish Coastal Authority decided to erect a new fence, compliant with the IMAS and adding a considerable margin to the 1947 fence, which had disappeared completely over long stretches. The new fence (see figure 12) has soft metal mesh mounted on wooden poles with red painted tops and with a single-string barbed wire 10 centimetres above the grid, 110 centimetres above ground. Mine warning signs are placed every 50 metres.

Figure 7 | The new fence around the mined areas on the Skallingen Peninsula in Denmark.

The Coastal Authority had to convince the local population and visitors about the danger of the mines, as they had used the area for 60 years without accidents and access to a popular beach was now cut off. The new fence was quickly vandalised: mesh and wires were cut, mine warning signs were stolen and improvised ladders were erected for easy access to the minefield. The Authority countered this by holding a series of information meetings with the local population, advertising in the media, putting up posters and displays and distributing flyers both to the local population and tourists.

CONCLUSION

Marking, when carried out correctly, can make a significant medium to long-term contribution to risk reduction. However, according to the Centre's research, marking is often not implemented effectively and significant opportunities for risk reduction have been missed.

Fencing can also contribute to risk reduction; however it is important to understand that it is rarely a physical barrier. Fencing cannot stop determined civilians from entering dangerous areas. It can be easily ignored, bypassed or climbed, and should therefore be viewed as a form of marking.

Three major legal instruments require or advise states to use marking and fencing (or alternate means) to ensure that civilians are aware of danger and therefore do not enter areas contaminated by mines/ERW. Despite these agreed specific legal requirements to "ensure the effective exclusion of civilians" from affected areas, marking is rarely conducted systematically.

Many mine action practitioners argue that these legal requirements are too difficult and costly to meet in practice. As a consequence marking is often viewed as a short term solution, and it is implemented in an ad hoc, ineffective way.

Problems with marking include: the regular theft of marking materials, even when they are of minimal value; community resources, such as local knowledge and labour, not being used effectively; the high cost of marking, in relation to its impact.

RECOMMENDATIONS

The GICHD considers that marking (including fencing) is a potentially valuable risk reduction tool.

While it is important to acknowledge that every environment is different, the Centre believes that the problems often associated with marking, as outlined in the conclusion, can be addressed and that marking can be sustainable and effective. The GICHD recommends:

1. that marking be carried out as a specific project, where possible
2. that it be carried out by appropriate people, such as community members with specific, dedicated roles and tasks
3. marking should be accompanied by community liaison, and involve the local community

4. marking should be systematic, ie the budget for marking should be incorporated into the overall programme budget
5. marking should be focused on high risk areas
6. use low or zero value materials to create markings where possible
7. monitor and maintain marking

FURTHER READING

For more information on the subject of marking and fencing, see:
IMAS 08.40 Marking Mine and UXO Hazards
http://www.mineactionstandards.org/IMAS_archive/Amended/Amended1/IMAS_0840_1.pdf

IMAS 08.20 Technical Survey
http://www.mineactionstandards.org/IMAS_archive/Amended/Amended1/IMAS_0820_1.pdf

ENDNOTES

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[1] Defined as unexploded ordnance (UXO) and abandoned explosive ordnance (AXO), linked to an armed conflict.

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[1] Terminology differs widely. Bosnia and Herzegovina, for example, refers to "urgent" and "permanent" marking. Urgent marking is defined as an MRE preventive measure, conducted through marking of the borders of mine suspected areas, usually employed as part of general survey. Permanent marking involves the placement of signs by qualified organisations using more resistant material with a five-year duration. See Government of Bosnia and Herzegovina, Article 5 deadline Extension Request, April 2008, p. 17, available at www.gichd.org.

[2] In the Landmine Monitor report for 2006, for example, the International Campaign to Ban Landmines observes a lack of appropriate marking (and fencing) on the territory of a number of States Parties to the Anti-Personnel Mine Ban Convention, including Burundi, Malawi, Niger, Senegal, and Uganda.

APPENDIX A

EXTRACTS FROM CROATIA'S STANDING OPERATING PROCEDURES FOR MINE SUSPECTED AREA MARKING

4.2. Permanent Marking

Permanent marking system should be used to mark the perimeter of a mine and UXO hazard areas, determined by technical survey, that are not scheduled for clearance in the near future.

Permanent marking should represent a visual obstacle for people, and must resist all weather conditions in the period of minimum five years.

Permanent marking should employ physical barrier to mined areas for animals and local population to prevent the entrance.

The design of permanent marking system shall include permanent physical barriers made of metal or concrete uprights. Fences should be erected with two strands attached to uprights that are 1.80 m high and positioned not more than 15 m apart.

Mine hazard signs shall be attached to the top strand of the fence not more than 15 m apart.

Mine hazard signs should be clearly visible and clearly identify which side of the marked boundary is considered to be within MSA and which side is considered to be safe.

The warning signs are displayed on the safe area, facing outwards from mine suspected area and/or building.

4.4. Improvised Marking System

Improvised marking system is designed by local population that recognises mine-contaminated area or suspects the area to be mine contaminated. By using improvised marking system, local population warns about the potential danger until it is replaced with permanent or temporary marking system provided by the Croatian Mine Action Centre.

Improvised marking systems should use locally available means (rocks, crossed woods, piece of fabric, etc.)

Improvised marking systems should be replaced with temporary/permanent marking system as soon as possible.

Full document is available at: www.hcr.hr/en/sop.asp.

APPENDIX A

EXTRACTS FROM CROATIA'S STANDING OPERATING PROCEDURES FOR MINE SUSPECTED AREA MARKING

6. Marking Procedure

Marking as independent activity is executed based on monthly operational plans and order from head of a regional office.

Marking refers to the following activities

- Placing mine hazard signs and boards
- Fencing mined and mine suspected areas/buildings
- Removal or replacement of marking signs upon completion of demining works
- Control and maintenance of marking
- Reporting and input into the Mine Information System.

Marking is carried out on a safe terrain, without entering into mine suspected area. Equipment includes the following

a Measuring equipment
- Hand compass
- Laser distance meter
- Measuring tape
- GPS

b Viewing device
- Binoculars

c Documenting equipment
- PC
- Digital camera
- Drawing tool

d Working tool
- Drill
- Hammer (5 kg)
- Elbow pipe wrench
- Riveting tool
- Spray
- Screwdriver

e Marking tool (type, quantity and quality)
- Mine hazard signs and mine hazard tables
- Uprights (wooden and plastic)
- String, barbed wire, mine tape
- Nails

f Off road vehicle

g Communications
- Mobile phone

h Working suit and shoes

APPENDIX A

EXTRACTS FROM CROATIA'S STANDING OPERATING PROCEDURES FOR MINE SUSPECTED AREA MARKING

8.3 Marking Procedure Criteria

Marking procedure assessment is based on mine hazard level threatening to local population and others passing by the MSA and also the need to prevent animal entering into MSA.

(a) Marking with mine hazard boards – commonly used for temporary and permanent marking.

They are placed either individually or in combination with other hazard marking signs. Because of simplicity of their placement, they are also used for temporary marking of mined and MSA/buildings until physical barriers are being erected.

(b) Marking with mine hazard signs (triangle) – used for marking of MSA together with physical barriers.

They are placed as a marker of mine/UXO findings. Mine hazard signs could be used in combination with mine hazard boards as adequate marker for spatially small mined and mine suspected areas and buildings.

In addition, mine hazard signs could be used as individual method for temporary marking in case mine hazard boards are not available.

(c) Marking by erecting temporary physical barriers - mine fence is used to mark the perimeter of mine/UXO hazard area (determined by general or technical survey) in preparation for clearance operations (Annual plan).

Also, emplacement of temporary physical barrier is needed to mark the MSA (without determining the existence of mines and UXO) that is in the vicinity of local population everyday activities (close to schools, churches, cemeteries, sport terrains, swimming pools, etc.)

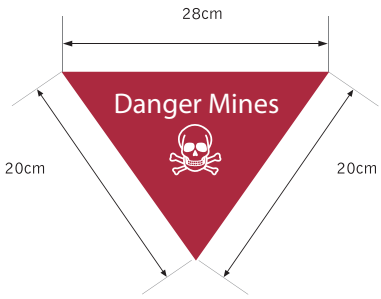
(d) Marking by erecting permanent physical barriers – mine fence is used to mark the perimeter of mine/UXO hazard area that is not scheduled for clearance in near future.

Also, emplacement of permanent physical barriers is needed for marking mine and UXO hazard areas that are in vicinity of local population everyday activities regardless their priority set by the Annual plan (close to schools, churches, cemeteries, sport terrains, swimming pools etc).

APPENDIX B

HAZARD SIGNS - MINEFIELD AND MINED AREAS

Figure C1 | Hazard sign triangle



1. This is a normative Annex because of the obligations under international law of States Parties to mark and fenced mined areas. Notwithstanding the normative nature of this Annex, flexibility in the design and layout of hazard signs is permissible in accordance with the direction given in the remainder of these notes.

2. The sign should have a red or orange background with a white symbol for danger. The universal symbol for danger is the skull and crossbones, however the NMAA may specify another symbol if the skull and crossbones is not appropriate.

3. The words 'Danger Mines' (or 'Danger UXO' depending on the predominant hazard) should appear on the sign in the local language(s). Amended Protocol II recommends that the warning should also appear in one of the six recognised UN languages (English, French, Russian, Chinese, Arabic and Spanish), but this recommendation is not a requirement for the purposes of this standard.

4. Amended Protocol II recommends that the sign should include a yellow border of reflective material, but this recommendation is not a requirement for the purposes of this standard.

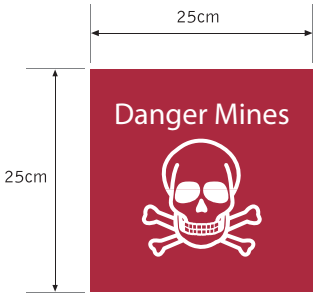
5. The rear surface of the sign should be white.

6. Dimensions should not be less than indicated on the diagram.

APPENDIX B

HAZARD SIGNS - MINEFIELD AND MINED AREAS

Figure C2 | Hazard sign square



1. The sign should have a red or orange background with a white symbol for danger. The universal symbol for danger is the skull and crossbones, however the NMAA may specify another symbol if the skull and crossbones is not appropriate.

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3. Amended Protocol II recommends that the sign should include a yellow border of reflective material, but this recommendation is not a requirement for the purposes of this standard.

4. The rear surface of the sign should be white.

5. Dimensions should not be less than indicated on the diagram.

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