Anti-personnel Landmines

Friend or Foe?

A study of the military use and effectiveness
of anti-personnel mines

ICRC

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Commissioned by the
International Committee of the Red Cross

ICRC

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PREFACE

The effects of weapons is a subject with which the International Committee of the Red Cross (ICRC) has been long concerned. In keeping with its mandate to develop and promote international humanitarian law, the ICRC has often called attention to weapons the effects of which threaten to undermine that law. In recent years the catastrophic consequences of anti-personnel landmines for hundreds of thousands of civilians in dozens of countries has received increasing attention. In 1994 the ICRC concluded that the horrendous human cost of anti-personnel mines far outweighs their limited military utility and therefore that they should be prohibited.

Despite intensive concern about the landmine crisis among humanitarian organizations and political leaders, negotiations to ban, or even strictly limit, the use of anti-personnel mines have foundered on the assumption that they are an essential weapon of high military value and that their military value outweighs their human cost. Yet no historical analysis of this assumption has been made available and an increasing number of senior military officers have questioned its validity.

In the absence of other studies the ICRC decided to commission the present analysis of the ''Military Use and Effectiveness of Anti-personnel Mines''. It represents an initial survey of the actual use and effectiveness of these weapons in conflicts over the past 55 years. The main text of the study was written by Brigadier Patrick Blagden, with editorial support from Peter Herby and Louise Doswald-Beck of the ICRC Legal Division and technical support from the ICRC's Communications Department. Brigadier Blagden, in addition to a career in combat engineering and weapons research with the British Army, brought to the study recent experience with the landmines problem in more than a dozen countries as Senior Demining Adviser to the UN's Department of Peacekeeping Operations. Additional material was added to the study by participants in a meeting of senior Military Experts convened by the ICRC in February 1996.

The study's conclusions, set out in Section XI, were unanimously agreed at the Meeting of Military Experts and have been endorsed by a

number of additional military commanders, as indicated. Participants included distinguished active and retired officers from eight countries with extensive personal experience in mine warfare as well as the conduct of military operations without these weapons. Their experience included conventional wars, counter-insurgency and defence against mine use by insurgents.

The ICRC would like to express its thanks to Brigadier Blagden and the participants of the Meeting of Military Experts for sharing with us their knowledge and experience.

EXECUTIVE SUMMARY

It has been generally assumed that anti-personnel landmines are an indispensable weapon of war, and that their indiscriminate effects can be moderated through compliance with military doctrine and the rules of international humanitarian law. This study examines the military case for continued use of these weapons in light of their employment in actual conflicts since 1940, whether by professional armed forces, by insurgents or in counter-insurgency operations. It has been undertaken in the absence of other publicly available studies on the actual use and effectiveness of anti-personnel mines.

In the 26 conflicts considered, few instances can be cited where anti-personnel mine use has been consistent with international law or, where it exists, military doctrine. The historical evidence indicates that during hostilities such mines are rarely used "correctly", whether by "developed" armies, "third-world" armies or insurgents and that their effects cannot easily be limited as law and doctrine presume. Such evidence as is available is most often of "incorrect" use, whether by intention or inadvertence or because of the impracticability of observing specific rules in the heat of battle. The study suggests that it would be unwise to justify the continued use of anti-personnel mines on the premise that they will be deployed in a carefully controlled manner.

Whether employed correctly or not, one must also ask whether the use of anti-personnel mines has achieved a legitimate military purpose. Here again the evidence considered indicates that, even when used on a massive scale, they have usually had little or no effect on the outcome of hostilities. No case was found in which the use of anti-personnel mines played a major role in determining the outcome of a conflict. At best, these weapons had a marginal tactical value under certain specific but demanding conditions which are described in the conclusions.

An often overlooked aspect of landmine warfare is also addressed, namely, the cost and dangers for forces employing anti-personnel mines. The price of properly laying, marking, observing and maintaining minefields is high, in both human and financial terms; it involves significant investment, risk to one's own forces and the loss of tactical

flexibility. Even when these costs are assumed, the effects of anti-personnel mines are very limited and may even be counterproductive.

Technological innovation, such as the introduction of remotely delivered mines, has already begun to change the nature of military doctrine and landmine use. The increased use of such mines could dramatically alter the character of future mine warfare and increase its scale. The implications of these and other developments, including the introduction of seismic fuses, fuel-air anti-personnel mines and hybrid mines for dual anti-personnel and anti-tank use, are examined from both military and humanitarian viewpoints.

Proposed technical solutions to the humanitarian problems caused by anti-personnel mines, in particular the increased use of self-destructing and self-deactivating models, are analysed. For a variety of reasons these solutions are considered unlikely to significantly reduce civilian casualties and the disruption of civilian life due to landmines.

In reviewing alternatives to anti-personnel mines, the study describes a number of options such as fences, physical obstacles and direct fire, as well as improved intelligence, mobility and observation. These means have already been employed and found effective by forces facing a variety of tactical situations. Technological developments have also opened the way to promising alternatives, considered in Section IX, which merit examination in preference to the pursuit of new mine technologies. Improved clearance techniques and reliance on more resistant mine-protected vehicles are suggested as measures which could further reduce the incentives for anti-personnel mine use.

The study's conclusions were drawn up by a meeting of active and retired senior military commanders from a variety of countries and were unanimously endorsed by all participants in their personal capacity.

I

INTRODUCTION

1. It is now becoming generally accepted that the world's mine contamination problem is reaching crisis point. The US State Department has estimated the number of uncleared landmines around the world to be about 84 million in 64 countries. The United Nations projects that if the use of mines were stopped immediately it would take 1,100 years and $33 billion dollars to clear, at current rates, those already in place.[1] The list of mine-infested States reads like the history of recent conflicts: Angola, Afghanistan, Bosnia-Herzegovina, Cambodia, Croatia, Ethiopia, Iraq, Mozambique, Rwanda, Somalia, Sudan and Yugoslavia. Each year 2-5 million new mines are put in the ground, adding to "one of the most widespread, lethal and long-lasting forms of pollution"[2] the world has ever known.

2. These weapons currently claim some 2,000 victims a month,[3] and over the last 50 years have probably inflicted more death and injury than nuclear and chemical weapons combined. Landmines, which were originally conceived to counter the use of tanks and other armoured vehicles, have been increasingly designed to target human beings. Anti-personnel (AP) mines have become the weapons of choice for parties involved in guerrilla-type operations and internal conflicts, as they are cheap, easy to lay and highly effective in killing and maiming human beings.

3. Landmines differ from most weapons, which have to be aimed and fired. Once they have been laid, mines are completely indiscriminate in their action. Unless cleared, they continue to have the potential to kill and maim long after the warring parties they targeted have ceased fighting. The United Nations has reckoned that landmines are at least ten times more likely to kill or injure a civilian after a conflict than a

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1 "Assistance in Mine Clearance", Report of the UN Secretary General, document A/49/357, 6 September 1994.

2 *Ibid.*

3 Hidden Killers: The Global Landmine Crisis, 1994 Report to US Congress, US Department of State. The ICRC estimates that about 900 of these monthly casualties result in death.

combatant during hostilities.[4] They are also long-lasting. No estimate has been given for the "life" of a mine; however, mines laid in Libya and Europe during World War II are still active and causing casualties over 50 years later. Modern plastic-cased mines, which are stable and waterproof, are likely to remain a hazard for many decades.

4. The main characteristic of a mine is that it is designed to be victim-actuated, which means it will detonate or explode through the "presence, proximity or contact"[5] of its victim (a person or a vehicle) with it or its fusing mechanism. The fuse may incorporate a tripwire, an anti-handling device or some form of electronic sensor. This is the main distinction between a mine and a classical munition. Some munitions are fused to act as mines, and detonate if touched or moved, but most are fused to explode on impact, usually with a hard target, and are generally less dangerous than mines if they fail to explode. Most munitions remain on the surface, unless they have enough momentum to penetrate the ground. Munitions can still be lethal if mishandled, and the unfortunate victims of many munition accidents are children, who cannot resist playing with them.

5. Landmines are usually designed to attack either tanks and vehicles (anti-tank mines) or people (AP mines). Anti-tank mines usually contain between 2 and 9 kg of explosive, and their fusing mechanism requires a pressure of about 100-300 kg to activate it. AP mines are smaller, with 10-250 g of explosive, and detonate under about 5-50 kg of pressure. They come in two types: blast mines, which are surface or sub-surface laid and explode when trodden on; and fragmentation mines, which are usually activated by tripwires, and on bursting project fragments of metal over a wide area. A variant of the fragmentation mine is the "jumping" mine which, when set off by tripwire, is projected upwards by a small explosive charge to about stomach height before the main charge explodes.[6] Newer types of mine can be activated by proximity rather than contact pressure, but the principle of victim activation remains the same.

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4 Quoted in UN evidence at US Congressional Sub-committee hearing, 13 May 1994.

5 The accepted legal definition is contained in Article 2 of Protocol II of the 1980 UN Convention on Certain Conventional Weapons (full title in footnote 9).

6 Typical of such mines are the Czech PP-Mi-Sr-AP and the Italian Valmara V69.

6. The majority of landmines used during and shortly after World War II had metal casings, but the development of stable and durable plastics in the 1950s and 1960s led to their common use as casing material. These improved plastics are now used in the fusing mechanisms as well; a modern, light, AP blast mine may contain so little metal that it is almost impossible to detect by an electronic mine detector, which senses the small amounts of metal in a mine. The growing difficulty in detecting mines has led to proposals that a minimum quantity of metal be used in every mine, to make it easier to locate using conventional mine-clearance techniques.

7. Landmines can be very difficult to clear, especially if they have been in the ground for more than a year. It has been estimated that a landmine which costs $3 to purchase[7] and almost nothing to lay costs between $200 and $1,000 to clear.[8] Comparatively little landmine clearance is actually carried out; the United Nations maintains about 5,000 mine clearers in the field, but they removed only some 85,000 mines during 1994, whereas it is estimated that during the same period as many as 2-5 million new mines were laid. The landmines crisis is therefore deepening every year.

8. A growing number of international bodies, including the International Committee of the Red Cross (ICRC), have been actively working for a ban on the use of AP mines. Alarmed by the increasing number of mine casualties in their hospitals, and angered by the grievous nature of mine injuries, the ICRC held a series of expert meetings on the subject which led to its decision in February 1994 to support a total ban as the only realistic solution. Growing pressure from a wide variety of non-governmental organizations (NGOs), the media and parliaments led States party to the Convention on Certain Conventional Weapons[9] to convene, at the suggestion of France, a Review Conference of the treaty, in particular to strengthen its restrictions on landmine use.

9. The first session of this Review Conference, in September-October 1995, agreed in principle to expand the scope of the original

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7 Hidden Killers, *op.cit.*, p1.

8 UN figures based on demining programmes in Afghanistan and Cambodia.

9 The full title is: 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.

Protocol governing the use of landmines, but moves towards the introduction of a ban or even stringent limitations were strongly resisted by many nations, which usually contended that the weapons of their choice (or their manufacture) should be considered consistent with the Protocol, or that the Protocol should be made consistent with their weapons.[10] A second Review Conference session in January 1996 refined some modest new technical restrictions without reaching any firm decisions. A final session is planned for April 1996.

10. It quickly became obvious that most States did not wish to forgo or strictly limit the use of landmines, even AP mines, by their armies. This was usually at the insistence of their Defence Ministries, which were reluctant to eliminate what they considered to be a highly effective weapon system from their national armouries. This attitude had already been foreshadowed at a meeting of national military experts held by the ICRC in January 1994, where the participants, citing classical military doctrine, were unanimous in claiming that the mine remained a legitimate weapon for which no viable alternative was known, and that mines were used by their own forces in a legitimate and responsible way.[11] The experts pointed to many instances of mine use in internal conflicts by irregular forces, and the resulting heavy casualties, as being the central cause of the current landmine problem. It was argued that "civilized" nations and their armies had no connection with the current landmine problem, for which irregular forces fighting internal conflicts were held largely responsible.

11. In most cases, States did not find it necessary to back up their assertions with factual evidence, and the nature of the discussions did not allow for a reasoned debate on their statements. This was partly due to the fact that the military value of AP mines has almost always been accepted without question. It appears that no systematic studies of whether their actual military effects have lived up to expectations under past combat conditions have been undertaken by professional military organizations or military analysts. Historical records in the public domain give little if any attention to role that AP mines have played.

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[10] Various post-meeting reports, including those of UNICEF, the Vietnam Veterans of America Foundation, and the ICRC.

[11] ICRC Report, Symposium of Military Experts on the Military Utility of AP Mines, Geneva, 10-12 January 1994.

12. The military arguments expressed at the Review Conference on the utility of landmines, and especially AP landmines, have severely limited prospects of attaining humanitarian goals. The purpose of this paper is to examine the military case for the continued use of AP mines, and how this case compares with the success achieved by the use of these mines in practice. It considers the measures introduced to regulate the use of AP mines, and how effective these have been on the ground, whether in international wars, internal conflicts or low-intensity operations. It examines how military doctrine relating to the use of mines by developed countries may be influenced by the mine development and production capabilities of those countries, and how this can affect the continued use of landmines, especially AP landmines, by irregular forces in internal conflicts. It then compares the contradictory attitudes taken up by governments which, while vigorously opposing the use of AP landmines and in many cases contributing to various mine-clearance programmes set up by the United Nations and others, seek to retain the AP mine as a weapon system within their own armies; it also examines some of the measures taken by governments and industry to side-step the new rules currently being called for to regulate the use of AP mines.

II

MILITARY DOCTRINE AND USE OF LANDMINES

13. The AP mine has traditionally been part of the armoury of almost every army in the world. The types of warfare in which mines have been used or were intended to be used cover a wide spectrum, from the Cold War confrontation between NATO and the Warsaw Pact in Central Europe, through smaller-scale international conflicts such as the India-Pakistan war and the Iran-Iraq and Gulf wars, to internal conflicts such as those in Angola, Cambodia and Nicaragua. At the bottom end of the scale, mines have also been used by armies, police forces, insurgent groups and warlords for purposes of population control and terrorism. Recovered mines have even been used by individual civilians to protect their own property.[12] Each type of warfare has found new uses for the AP mine.

14. In "disciplined" armies, the use of mines is both authorized and regulated by governments, usually through the medium of military doctrine. Mines, like other weapons, are used by armies because their governments permit them to do so. If a government is party to an agreement not to use a particular kind of weapon (e.g. exploding bullets or biological and chemical weapons), the service concerned is not allowed to deploy that weapon unless the government withdraws from the treaty. When a weapon is permitted, military doctrine outlines how and when the weapon can be used, and who has to authorize such use.

1. International armed conflicts

15. In larger-scale conflicts and conventional warfare, up until the time of the Gulf war, landmines were mainly used by armies as defensive weapons, to create protective obstacles, often in conjunction with other natural obstacles such as hill features or river lines. These obstacles, which are frequently linked in the form of an obstacle belt, are normally designed to delay the enemy advance by breaking up its attack

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[12] War of the Mines: Cambodia, Landmines and the Impoverishment of a Nation, Paul Davies and Nic Dunlop, Pluto Press, London, 1994, p.19.

formations and canalizing them into areas where they can be attacked by other weapons such as artillery, tank guns, rockets and ground-attack aircraft. Where a large-scale assault of armoured forces is intended, minefields usually consist of anti-tank mines; however AP mines have often been laid amongst them to prevent the enemy from hand-lifting the mines during an assault on the minefield. Such minefields still need to be covered by observation and aimed fire, as a further measure, (a) to prevent the removal of mines or the silent breaching of the minefield by the enemy, and (b) to ensure that enemy forces will be subject to defensive fire when they are stopped or canalized by the minefields.[13]

16. Conventional minefields are designed to delay opposing forces. Where these were predominantly armoured forces, as in the Libyan desert, on the Russian front during World War II, in the Gulf war or in southern Angola, most of the mines used were anti-tank. Where dismounted infantry attacks were likely, as in Korea and the Iran-Iraq war, larger numbers of AP mines were used. In "conventional" wars such as World War II, anti-tank minefields were significant obstacles to the advance of the attacker, mainly because of the extra military effort required to breach them. Nevertheless, history has shown that mines can only act as delaying elements, and have never yet stopped a determined advancing enemy. With increasingly effective breaching equipment, as was used in the war over Kuwait, the delaying value of minefields has been considerably reduced.

17. During World War II and later, "conventional" defensive minefields were mainly laid by hand, every mine being dug into the ground by means of a spade or a purpose-built tool. This was of necessity a slow process. In the mid-1950s various systems were produced which dug furrows in the soil and emplaced mines mechanically in the furrows, which were then covered over. This increased the speed of mine-laying; typically, a troop of 30 men could expect to lay 50 mines per hour by hand, but one mechanical mine-layer could lay 200 mines in the same time.[14] Even with the mechanical mine-layers of the period, the preparation of major defensive obstacle belts

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[13] See Clearing the Fields, Kevin Cahill, ed., Basic Books, New York, 1995, Chap. 2.
[14] Notes from a military engineering pamphlet on mine laying.

was a time-consuming process which required considerable advance logistic planning.

18. Mines can be used not only as defensive weapons but also by attacking armies, usually as a weapon against counter-attack. Such tactics were used by German troops in 1943: they laid mines ahead of their tanks in the advance, and removed them for re-use after the advance had been completed. Russian forces often laid mines on their flanks as they advanced, to hinder an outflanking attack by the defenders. That being said, mines were rarely used as part of the attack process until the arrival of the remotely delivered mine, as described below.

19. Weapons development in the 1960s made it possible to deliver anti-tank and AP weapons on a massive scale by rocket, artillery and aircraft. This meant that an enemy headquarters or resupply centre could suddenly be turned into a minefield, causing chaos in rear areas. It also meant that the gaps maintained by armies withdrawing through their own minefields could be closed by remotely delivered mines before the withdrawing forces had got through. This was done in the Gulf war, when the Coalition forces used GATOR aerial-delivered mines to block enemy withdrawal gaps in the Iraqi minefields around Kuwait. However, this did not prevent the escape of a significant part of the Republican Guard divisions.

20. The development of the remotely delivered mine (RDM) is held in some quarters to have radically altered the nature of mine warfare. In many armies mines are now integrated into doctrine as weapons of attack. Mines are part of the fluid manoeuvre battle, deployed by artillery or rocket anywhere the enemy threatens to advance or to outflank. Obstacle belts can be created in response to enemy actions, and mines can be used extensively to neutralize other weapons, such as mobile artillery. Remotely delivered mines may have the potential to revolutionize the battlefields of the future, but even in this case it is doubtful whether the remotely delivered AP mine will generate a significant military advantage.

21. The practice of large-scale mining to create obstacle belts has meant that in many areas massive mine contamination has persisted for years. Mines laid as obstacle belts during World War II are still causing accidents 50 years later. There is no record of the participants in World

War II assisting the contaminated nations to effect large-scale mine clearance; the same applies to other major conflicts since World War II such as those in Korea, Viet Nam and parts of Africa.[15]

22. In "disciplined" armies mine warfare doctrine also includes restrictions on use or rules of conduct to be obeyed. It is required to mark and map minefields, first and foremost because of the hazard they present to the troops which laid them. When armies began working together, as they did in World War II, it was essential to understand one another's mine signs and eventually, when NATO was formed, a standard code of conduct for NATO armies was drawn up. This code is standardized and promulgated in STANAG 2036 — Minefield Laying and Recording.

23. STANAG 2036 clearly stipulates that minefields have to be fenced, marked, recorded and mapped; this gives the impression that if the rules are strictly obeyed mines will not constitute a threat to the civilian population. It can also give the impression that NATO armies always comply with STANAG. This is not true. Major wars between "developed" nations are rare and, under conditions of low-intensity warfare, or when operating against irregular or guerrilla forces, even the armies of "developed" nations at times use mines in a manner well outside the strict requirements of STANAG outlined above (see Section IV below). When faced with a ruthless irregular force which uses mines in an irresponsible way, there has been a tendency for even "disciplined" armies to follow suit, and to conform to the pattern of less than discriminate use adopted by their opponents. This trend has been evident during the many recent wars and internal conflicts in Africa and Asia.

24. It is always claimed that military doctrine develops over time, adapting to changes in the potential threat, experience gained in recent conflicts, changes in weapon systems and the advent of new technologies. This is open to question. It is certain that major advances in mine technology, such as the introduction of remotely delivered mines, have radically changed the military doctrine of the countries in which these weapons have been introduced. But doctrine pertaining to

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[15] An exception to this is reported in the Netherlands, where large-scale clearance was carried out by a brigade of German prisoners of war which joined the operation on a voluntary basis. Source: written submission of Brigadier General Henny van der Graaf to the ICRC, 2 February 1996.

current uses of mines may not have moved so fast. In many armies tactical doctrine is devised by groups of staff officers, many of whom may have had little combat experience so seek to evaluate doctrine by means of simulation and training exercises.

25. Although the use of remotely delivered mines has been extensively war-gamed and simulated to prove their cost-effectiveness, conventional mine warfare is rarely ''played'' seriously in training exercises and the battlefield threat that AP mines represent to one's own troops is often intentionally minimized. Few recent battles have been fought by ''conventional'' armies in heavily mined areas; considerable retraining had to take place within the Coalition forces before they were ready to face Iraqi minefields in the Gulf war. Even then the position of the minefields and the nature of the terrain allowed most of the mined areas to be outflanked, so the impact of mines on the majority of the Coalition forces was slight.

26. Despite the evidence of indiscriminate mine-laying in conflicts throughout the world, most nations still maintain that they have a use for AP mines. Even Scandinavian Defence Ministries such as those of Sweden and Finland[16] maintain that the use of AP landmines remains an essential bulwark against invasion of their territory, despite the fact that the only credible threat in both cases is from the East, and the forces most likely to be deployed in the event of an attack from the East would be predominantly armoured in nature and would be equipped with some of the most up-to-date minefield breaching equipment. Finland also maintains that the marking and mapping of minefields is an essential part of their doctrine, but marking and mapping of mines while conducting a fighting withdrawal against armoured troops is notoriously difficult.

27. Most European countries and the United States are actively seeking to retain the use of AP mines, claiming that they save soldiers' lives. The US Army, for instance, claims that landmines are a ''force multiplier'', making it possible to field a ''smaller, more capable power projection army'' and increasing the effectiveness of other weapon systems. The assumption here is that mines are a remote weapon which

[16] Statement by Defence Policy Department, Finnish Ministry of Defence, September 1995, and Brigadier Patrick Blagden's interviews with Swedish defence officials.

presents limited risk to one's own forces while maximizing the losses of an opponent.

28. The governments of the Russian Federation and China adhere to classical military doctrines and cling to the types of AP mines that they have used in the past. They are reluctant to make changes, presumably because of the financial burden of modifications, although the mines produced by these countries are arguably among the major agents of injury and death in Africa, Asia and Latin America. There is said to be strong resistance by China to making AP blast mines easier to detect by inserting a minimum quantity of metal into the casing.[17] However, most other countries are prepared to make AP mines detectable by the current range of electronic mine detectors.

29. Many other nations seem undecided about their use of AP mines. Twenty-three nations, representing mainly "developed" mine-producing States, have placed comprehensive bans on the export of AP mines, and the same number, but not the same countries, have supported a global ban on their use.[18] Mozambique, as a "victim" State, announced that it is prepared to head an international campaign against the production, use and export of landmines.[19] The pro-ban position has also been supported by the UN Secretary-General, the European Parliament, the Council of Ministers of the Organization of African Unity, the World Council of Churches, the Pope and the Foreign Ministers' meeting of the Organization of the Islamic Conference.[20]

30. Recent political pressure has led to a review of the military value of AP mines in five countries which have decided that their limited utility is far outweighed by their human cost. Austria, Belgium, Canada, the Philippines and Switzerland have already renounced or placed moratoria on the use of all AP mines by their own forces, even the

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[17] UNICEF report on Vienna Review Conference session, 25 September-14 October 1995.

[18] "Moratoria on Exports of AP Mines", ICRC, Geneva, 6 December 1995 and "States Supporting a Total Prohibition of AP Landmines", ICRC, Geneva, 22 January 1995.

[19] "Chissano/Boutros-Ghali Meeting", Mozambique News Agency dispatch, 24 October 1995.

[20] The Organization of the Islamic Conference resolution referred to the "complete elimination" of AP mines.

Claymore type when used with tripwires rather than trigger-actuated.[21] A number of other States are known to be considering similar moves and some others have never introduced these mines into their armouries.

31. In some States there seems to be a difference of opinion between national political and military leaders. Political leaders in Denmark, France, Germany, Mozambique and the United States are calling for an end to the use and transfer of AP landmines. In the US, Congressional efforts have resulted in a law[22] which will prohibit the use of AP mines by US forces for a renewable period of one year from 1999, except along internationally recognized borders and in demilitarized zones (e.g. between the two Koreas).

32. A subject seldom addressed in training or operational planning for mine warfare is the long-term effects of mines on the social and economic fabric of the victim country. This facet of mine warfare comes as a shock to engineer troops formerly involved in mine laying and minefield breaching when they become involved in humanitarian mine clearance and are faced with the damage that minefields cause. Most had no conception of the long-term effects and human suffering caused by the laying and non-removal of landmines. Although it is unrealistic to expect such training to be given at mine-layer level, political leaders, commanders, staff officers and advisers ought to be aware of the downstream effects of their mine warfare plans.

2. Internal armed conflict and violence

33. In internal armed conflict, warfare is often conducted at a lower intensity and does not involve the heavy use of armoured formations sometimes found in international armed conflict, even in cases where one of the warring parties, as in Angola and Afghanistan, had armoured forces available. Mines have been freely used in internal wars such as those in Cambodia and many places in Africa and Latin America, and are among the most popular weapons available because of their low cost and ease of use.

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[21] See Daerden-Lallemand law passed by the Belgian Senate 19 January 1995 and by the Chamber of Deputies on 2 March 1995, the statement of Philippines President Fidel Ramos, Phnom Penh, 18 December 1995, and press release by Swiss Federal Councillor Adolf Ogi, Head of the Federal Military Department, 24 November 1995.

[22] Sponsored by Senator Patrick Leahy and Congressman Lane Evans, passed by both houses of Congress and signed into law by President Clinton in January 1996.

34. In low-level and internal conflicts, few guerrilla armies or irregular forces seem to have any formal military doctrine at all, and certainly none pertaining to the indiscriminate use of landmines.[23] Since their soldiers are often illiterate, poorly trained and badly disciplined, it comes as no surprise that neither law nor doctrine causes them to use mines in a responsible way. The informal or "implicit" doctrine which prevails seems aimed at achieving (a) systematic depopulation of specific areas by harassment of the local population, (b) harassment of government forces, or (c) disruption of movements of government forces on transport routes also used by civilians.[24]

35. Government forces have used mines to create protected areas and to stop infiltration by guerrillas. Such forces have relied primarily on AP mines to protect their camps or defended locations. However, as a conflict escalates and government or allied forces perceive increased territorial control by insurgents the theatre of combat grows, often encompassing the entire national territory. When this occurs the use of mines by such professional armies increases.[25] This has the effect of putting economic, social and political pressure on insurgent forces and the large numbers of mines severely affect local populations. As a result, the situation is even worse for the civilian population than in the case of conventional international warfare.

36. The creation of barrier minefields against infiltration has posed particular problems for governments; their guarding, maintenance and repair has proved to be expensive in terms of time, resources and lives. The covering of linear borders by aimed fire has also proved impossible in many instances, and unnecessary casualties have been inflicted on the local population. A number of governments have recognized the expense, relative ineffectiveness and dangers of such minefields, and have ordered their removal, or refrained from adding mines to existing border barriers as a matter of policy.[26]

37. Where governments have the advantage in terms of vehicles, as in southern Sudan or Mozambique, rebel groups have concentrated on

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[23] "Landmines in Mozambique", Human Rights Watch, March 1994, p.28.
[24] "Cambodia at War", Human Rights Watch - Asia, March 1995.
[25] ICRC Report, Symposium of Military Experts, 10-12 January 1994.
[26] Evidence given by Indian, South African and Zimbabwe military experts at the ICRC Meeting of Military Experts on the Military Use and Effectiveness of Anti-personnel Mines, February 1996.

the use of anti-tank mines to prevent road travel.[27] They have also laid mines under railway lines and on airstrips. Sometimes, during fluid phases of internal warfare, rebel groups have occupied former government positions and added to or changed the surrounding minefields. If the positions are then retaken, it is not uncommon for another minefield to be laid outside the first. In Cambodia, Afghanistan and Angola, there are many instances where changes in the fortunes of war have led to the laying of multiple minefields.[28]

38. This has resulted in major mine contamination in countries where such internal conflicts have taken place. Large areas have become depopulated in countries such as Angola and Mozambique, where the very fear of mines is sufficient to cause local villagers to leave their homes.[29]

3. Population control and terrorism

39. One of the most pernicious uses of AP mines has been for purposes of population control and terrorism. Population control through use of AP mines is often carried out by irregular forces, who are unaware of or deliberately defy humanitarian law governing the treatment of civilians. As recently as 1992 the Khmer Rouge in Cambodia used mines to "fence off" villagers' land, which was then "leased" back to the villagers on the understanding that the major proportion of the crops now belonged to the Khmer Rouge. Having opened up one area, they sealed off the one next to it, and thus came to control major tracts of land.[30] During the war in Mozambique, RENAMO cut off and destroyed many villages and often kept them depopulated by the threat of mines. In some countries where mines are widely available, even individual civilians have begun to use mines to protect their homes, goods or crops.

40. However, mine use against the population has also been practised by governments. The Iraqi government is reported to have used mines as weapons of terror in Kurdistan, where many villages had

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27 "Landmines in Mozambique", Human Rights Watch, March 1994, p.29.

28 War of the Mines: Cambodia, Landmines and the Impoverishment of a Nation, *op.cit.*, p.18.

29 "Operations in Maputo Province", Norwegian People's Aid report, 1994.

30 War of the Mines, *op. cit.*, p.3.

their fields sown with AP mines.[31] Siad Barre used mines in northern Somalia to deny access to wells and watercourses, nomadic tracks and villages.[32] An early use of mines for this purpose was by the East German government in establishing a barrier between East and West Germany. In that case the mines were used in conjunction with an obvious fence and guard system, indicating that AP mines in themselves were considered insufficient to discourage escape to the West. Since German reunification these border minefields have been removed.[33]

41. This is the form of mine warfare whose primary aim is to kill and maim civilians. The perception of civilians as an "enemy" is common in wars, especially if local villages are alleged to be harbouring "sympathizers", whether they are in fact or not. Innocent villagers are massacred during all forms of conflict, but they are not usually subjected to deliberate terrorism by their own political leaders, which is the most likely explanation of the use of AP mines against civilians in certain countries. This form of mine warfare violates the fundamental rules of international humanitarian law.

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[31] "Hidden Death - Landmines and Civilian Casualties in Iraqi Kurdistan", Human Rights Watch - Middle East, October 1992, p.1.

[32] Landmines: A Deadly Legacy, Human Rights Watch and Physicians for Human Rights, 1993, p.224.

[33] Reported in Daily Telegraph, London, 24 November 1995.

III

LEGAL RESTRAINTS ON THE USE OF MINES[34]

42. Two sources of international law currently regulate the use of AP mines. The first is general international humanitarian law, two basic rules of which apply directly to AP mines, namely:

- Parties to a conflict must always distinguish between civilians and combatants. Civilians may not be directly attacked and indiscriminate attacks and the use of indiscriminate weapons are prohibited.[35]
- It is prohibited to use weapons which cause unnecessary suffering. Therefore, the use of weapons whose damaging effects are disproportionate to their military purpose is prohibited.[36]

As these rules are part of customary international law, they apply to all States irrespective of their treaty obligations.

43. The second source is treaty law, which applies only to States party to specific treaties. The most relevant text is 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 (hereinafter referred to as the CCW Convention), adopted in 1980. Protocol II to this treaty is entitled Protocol on Prohibitions or Restrictions on the Use of Mines, Booby-Traps and Other Devices. The main provisions of this Protocol are as follows:

- Mines may be directed only at military objectives: indiscriminate use is prohibited and all feasible precautions must be taken to protect civilians.

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[34] Taken from "Mines: Summary of the Present Law", ICRC pamphlet, February 1995.

[35] This is a fundamental principle of international humanitarian law. Its most recent codification is contained in Article 51 of Protocol I (1977) additional to the Geneva Conventions of 1949.

[36] This principle of international humanitarian law dates back to the 1868 St. Petersburg Declaration. Its most recent codification is in Article 35 of Additional Protocol I (1977).

- Remotely-delivered mines may not be used unless their location is accurately recorded or each one is fitted with an effective self-neutralizing mechanism.
- Records must be kept of the location of pre-planned minefields, and the parties to the conflict should also endeavour to keep records of the location of other minefields laid during hostilities.
- At the end of hostilities, the parties are to try to agree both among themselves and with other States and organizations to take the necessary measures to clear minefields.

44. It has always been acknowledged that there are many omissions and loopholes in this Convention, the major ones being as follows:

- It does not apply to internal armed conflicts, where most mine use occurs.
- It assigns no clear responsibility for the removal of mines.
- It does not prohibit the use of non-detectable mines.
- It has excessively weak provisions regarding remotely delivered mines.
- Its provisions concerning the use of hand-emplaced mines are also weak.
- It does not provide for any control or supervisory mechanisms for mine transfers and exports.
- It lacks implementation and monitoring mechanisms.

45. A further problem is that by the end of 1995 only 57 States had adhered to the 1980 Convention (whereas 186 States had ratified the 1949 Geneva Conventions and 143 had ratified one or both of the 1977 Protocols additional to the Geneva Conventions).[37] This low level of adherence may be attributed both to the weakness of the Convention's provisions and to the lack of mechanisms for follow-up and regular review of its implementation. Whatever the reasons, the 1980 Convention has had little or no effect on the use of AP mines in recent conflicts, and this has had devastating results for civilians in many parts of the world, even in regions whose States are party to the Convention. Current efforts to strengthen the Protocol have addressed some of the weaknesses mentioned above.

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[37] ICRC statistics, January 1996.

IV

HISTORICAL USES OF MINES

46. In practice, it is difficult to find evidence of restrictions or codes of conduct being strictly and consistently implemented in areas where mines have been used, despite the original intentions of many protagonists. In the course of this study a systematic search was conducted of publicly available documents in major military libraries.[38] On the basis of the results of this research and of consultations with military officials of a dozen countries it appears that mines, and in particular AP mines, have not been seen by military analysts or historians as weapons whose effects or effectiveness are worth recording or discussing in detail.

47. Although the continued use of AP landmines is justified by the belief that they can be used ''correctly'', publicly available historical records do not support that case. On the contrary, such evidence as is available is most often of ''incorrect'' use, whether by intention or inadvertence or because of the impracticability of observing specific rules in the heat of battle. Nor do such sources provide analytical evidence of the military utility of AP mines in actual battle.

48. The survey below is an initial review of publicly available information on mine use in conflicts since 1940:

a. **World War II — Egypt and Libya,** 1942. Although the World War II campaign in North Africa took place long before the adoption of the CCW Convention, many of the combatant armies were guided by codes of conduct requiring the marking and recording of minefields, mainly for their own safety. To compensate for the lack of natural obstacles in the Egyptian and Libyan deserts, colossal use was made of pre-planned minefields, which were considered indispensable for defended positions.[39] As a result, many of the bigger minefields were marked, but during the confusion of war many of these markings

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[38] Carried out by British military historian Geoffrey Best during November and December 1995.

[39] The Mediterranean and the Middle East, History of the Second World War, UK Military Series, ISO = Playfair et al, HMSO, London, Vols. III (1960) and IV (1966).

were removed. The major forces claim to have handed over their maps of mined areas;[40] they were not, however, obliged to remove the mines after the end of the war. Some contract clearance took place during the period of oil exploration in Libya, although this did not cover the entire combat area. It is almost certain that most of the minefield marking has now disappeared,[41] mines may have shifted position owing to sand movement, and any maps still in existence will be out of date. These minefields remain a hazard in Egypt and Libya to this day.

b. **World War II — Europe.** Although campaigns were fought in Europe before 1942, mines were not used extensively until the war on the Eastern Front, during the final withdrawal of the German and Italian forces following their defeat in Russia and Italy, and during the liberation of France. Mines were used copiously by all armies with the result that, even in 1996, mine clearance is still being undertaken in countries such as Holland and Slovakia.[42] In France, certain areas are still unusable owing to the presence of uncleared mines. Given the nature of the conflict, a large proportion of the mines used were probably anti-tank. However no studies of the additional value of AP mines in the World War II campaigns have been discovered in the available literature. Some evidence exists of battles in Italy in which the use of AP mines limited tactical manoeuvre and inflicted casualties among friendly forces.[43]

c. **UN operation in Korea, 1951-53.** In this conflict the US, Canadian, British, Australian, New Zealand, Turkish, Chinese, North and South Korean forces all used primarily AP mines, because of the preponderance of North Korean and Chinese infantry and the relatively few tanks. Nonetheless, the presence of some anti-vehicle mines has been recorded.[44] These minefields achieved mixed results. They were considered a vital part of defensive positions by the UN

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40 Combatant nations were asked by the UN to confirm this as recently as August 1994, at the request of Libya.

41 Brigadier Blagden, an author of this text, was involved in a mine incident in an unmarked minefield south of Benghazi in 1962.

42 Information provided by Brigadier General van der Graaf, ICRC Meeting of Military Experts, February 1996.

43 Details on such incidents are given in Section V.1.b of the present paper.

44 Send Port and Pyjamas! , Dan Raschen, Buckland Publications, London, 1987, p.82.

forces,[45] but became inconvenient when tactical changes called for their removal[46] and were sometimes as feared by friendly troops as by the enemy. In one incident Australian forces suffered 5 casualties when they "unwittingly entered an unmarked and unrecorded minefield which the Canadians had laid around an outpost position".[47]

Minefield marking suffered considerably as a result of Chinese artillery bombardment and heavy rain, and the repair of fences, where they had been erected, was a constant burden.[48] Following withdrawals it is doubtful if all the minefield marking remained. Not all minefield maps were accurate, and it is possible that the mine maps handed to the North and South Korean authorities after the war were incomplete. UN-laid AP minefields were regularly used as a source of mines and explosives by the Chinese.[49]

d. **Indochina and Viet Nam, 1958-1968.** Mines were used in all phases of the wars in Indochina. Initially laid by hand by the French forces, they were later dropped from the air by the US Air Force in support of ground troops. Viet Cong villages were often surrounded by belts of mines and booby-traps,[50] and US positions were also protected by mines.[51] The French fortifications at Dien Bien Phu lacked sufficient mines owing to time and transport constraints — only 23 tons of mines and explosives were available.[52]

Mines proved to be a doubtful asset: mines and munitions were stolen by the Viet Cong from US minefields and ammunition dumps and used against their adversaries. The US Army and Marine Corps

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45 Truce Tent and Fighting Front, US Army in the Korean War series, Walter Hermes, Office of the Chief of Military History, US Army, Washington, DC, Vol. 2, 1966, p.463.

46 Send Port and Pyjamas, *op.cit*., pp. 176 and 177.

47 Australia in the Korean War, 1950-53, Robert J. O'Neill, Australian Government Publishing Service, Vol. 2, 1985, pp.253-4.

48 *Ibid*., pp. 256 and 274.

49 Send Port and Pyjamas, *op. cit*., p.238.

50 Vietnam Task: The Fifth Battalion, The Royal Australian Regiment 1966-7, Robert J. O'Neill, Cassell, Australia, 1968.

51 We Were Soldiers Once–and Young, Ia Drang: The Battle that Changed the War in Vietnam, Harold Moore, Airlife, Salisbury, UK, 1994, p.181.

52 Hell in a Very Small Place. The Siege of Dien Bien Phu, Bernard Fall, Pall Mall Press, London, 1967.

lost many men to landmines, many of which were probably of US origin.[53] Neither the French, North Vietnamese, South Vietnamese, Americans or Australians kept full records of their minefields, especially those dropped from the air. In general, mines were not marked, especially the many tons of mines and sub-munitions dropped on the Ho Chi Minh trail in Viet Nam, Cambodia and Laos. No evidence has been found of attempts by any of the armies concerned to stop the indiscriminate use of AP mines.

e. **India-Pakistan wars, 1947-48, 1965, 1971.**[54] The mine warfare carried out by both parties during the India-Pakistan wars was almost unique in the way in which it was conducted. In the 1947-48 war in Jammu and Kashmir, a very small number of mines were laid to protect certain installations. During the protracted build-up to the 1965 war, the main minefields had been laid on the plains by both parties. In the 1971 war, very few mines were laid because the terrain was soft riverine country. In all three cases mine warfare was conducted by well-trained and disciplined soldiers.

   The wars themselves were limited in their objectives, of short duration and fairly static. Minefields were carefully mapped, and maps were made available by both parties after the conflict, allowing the early removal of the mines and the return of the land to food production soon after the end of hostilities. It was significant that most minefields were on arable land which was of value to both countries and therefore particular care was taken. Because of the disciplined way in which the mines were laid and removed, civilian casualties were reported to be negligible although there were a few casualties amongst the engineers removing the mines. The contribution of these minefields to the ultimate outcome of the conflict was considered to be marginal.

f. **India-China War, 1962.** No pre-planned minefields were laid at the start of the war but as the conflict progressed some were laid in mountainous areas. This caused major problems as AP mines had no effect in snow and, worse still, they slid down the slopes, even if they were anchored, because of snow movement and precipitation. Mapping was extremely difficult and was ineffective.

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[53] It Doesn't Take a Hero, Norman Schwarzkopf, Bantam Books, New York, 1992, pp. 163-164.

[54] Much of this section is based upon a report given by Major General Banerjee, ICRC Meeting of Military Experts, February 1996.

g. **Rhodesia/Zimbabwe, 1963, 1974-1980.**[55] On gaining independence in 1980 Zimbabwe inherited over 1.5 million AP mines, scattered in eight minefields running 766 km along her borders with Zambia and Mozambique. The oldest had been laid around the Kariba Power Station before 1963 by the Rhodesian federal government following a dispute over control of the facility with the emerging nationalist government in Northern Rhodesia (now Zambia). The rest were intended as barriers against guerrilla infiltration during the war of liberation, beginning in 1974, and stretch from the National Parks west of Victoria Falls to Mlibizi and from Kanyemba along the Mozambican border to near the South African border.

Towards the end of the civil war mine laying became quite chaotic. In the north-eastern Mutare region frustration at the inability of a 359 km minefield to deter guerrilla infiltration (by breachers using shovels) led Police Reservists to intersperse booby traps among the mines. Over time, each Army Engineer Squadron developed its own peculiar mine warfare methods so that engineers from one squadron could not safely enter another's minefield. The minefield was, when it was first laid in 1975, covered by observation and fire but in practice this could not be kept up along the entire length and was abandoned after a few months; hence its failure to prevent infiltration. Reviewing the Rhodesian experience of mine warfare and numerous other studies on the war, one authority concluded that "mine warfare in Rhodesia simply operated outside the national strategy and therefore made negligible impact on the overall course of the war".[56] Since 1980, only 10% of the minefields have been cleared. Of the those remaining, 87% run alongside inhabited areas as the Rhodesian strategy had been to use these mine barriers to separate infiltrating insurgents from this community base. Inhabitants of the surrounding communities have removed all fencing and warning signs previously demarcating the minefields. As a result more than

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[55] Section based on a written submission to the ICRC by Lt. Colonel (ret.) Martin Rupiah, author of "A Historical Study of Landmines In Zimbabwe, 1963-1995", Zambezia, Vol. 22, No. 1, 1995 and The Problem of AP Mines in Zimbabwe, Edwin Mellen Press, New York (forthcoming).

[56] *Ibid.*, based on Rupiah's research and the conclusions of several other studies of the war, *inter alia*, The Rhodesia Front War - Counter Insurgency and Guerrilla Warfare, H. Ellert, Gweru, Mambo Press, 1993, and Counter Insurgency in Rhodesia, J. Cilliers, Croom-Helm, London, 1987.

66 people, mainly peasants, have been killed and an estimated 402 maimed by AP mines since 1980. Some nine thousand cattle and an unknown number of other livestock, which often represent the life's savings of a peasant farmer, have also perished during the same period.[57] To date government-coordinated attempts at clearance have been grossly insufficient in comparison to the scale of the mine problem.

h. **South Africa and neighbouring States, 1960s-1994.**[58] Mines, mostly AP, were used in the conflicts between South Africa and insurgent forces in neighbouring countries throughout the struggle against *apartheid* and for Namibian independence. Those used by the South African Defence Force (SADF) were said to have been laid primarily in fenced and marked areas around military encampments and installations. Those employed by insurgents tended to be more randomly laid and served to harass or limit the mobility of the SADF.

Despite the strict precautions taken, maintenance of minefields by the SADF around their encampments proved difficult and dangerous. Maintenance was necessary because mines moved as a result of the effects of the weather, and animals frequently wandered into the minefields and their carcasses needed to be removed for reasons of hygiene. However, soldiers involved in maintenance suffered accidents, not only because they tried to take short cuts in the procedure but also precisely because the mines were not in the same place. Some AP mines moved as far as 30 cm in the ground over time; others rose to the surface after heavy rains and were seen floating.

Because of experience with the expense and difficulty of laying and maintaining a minefield, in 1988 plans by the SADF for deploying a protective minefield of only 30 km in length in northern Namibia were abandoned. Original plans had been to establish a barrier combining mixed (AP and anti-tank) minefields and anti-tank ditches, in order to delay a possible attack by a Cuban force on two north Namibian towns. The engineering staff convinced the command to abandon the plan for the following reasons: it would

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[57] Zimbabwe Minefields Survey Report, Mine-Tech, Harare, 1994. Study commissioned by the European Community on behalf of the government of Zimbabwe. The report acknowledges that its figures may be understated by as much as 40%.

[58] Based on information provided by Colonel A.J. Roussouw, ICRC Meeting of Military Experts, February 1996.

require a vast number of combat engineering regiments and would take months to complete; it would cost millions in terms of man-hours, machines and material; covering the whole obstacle belt with constant observation and fire would be practically impossible; and its maintenance would require a large force and cost millions of Rand. From a tactical point of view it was likely to be ineffective because the terrain between the Angolan border and the towns involved was flat and without any form of natural obstacle. Therefore an enemy force could outflank the obstacle belt with relative ease in an estimated 30 minutes. In the event, the alternatives of good intelligence, early warning and a higher state of readiness proved to be a better solution.

i. **Internal conflicts in the Philippines, 1945-present.** Since the end of World War II the Armed Forces of the Philippines (AFP) have been engaged in internal conflicts against various communist and Muslim separatist groups. These groups have used classic mobile insurgency tactics in the jungle areas, including the harassment of villages. Although the insurgents have used both commercially available and improvised mines against the AFP, the government does not permit the use of AP mines, and even M18A1 Claymore mines are being removed from their inventory and destroyed.[59] Politically, the Philippines considers that the use of AP mines would run counter to its objective of "winning the hearts and minds" of the local populace.

   Since mobility was considered an essential element of AFP counter-insurgency operations, AP mines were considered to be of little value. Instead, these forces relied on accurate intelligence, natural terrain features, barriers such as barbed and concertina wire, foxholes and trenches. In addition, command-detonated directional fragmentation munitions were employed.

j. **Arab-Israeli Wars, 1967 and 1973.** The Israeli, Egyptian and Syrian armies laid minefields on their borders. Many mines were laid in the Sinai by both sides, and although the Israeli army apparently handed over all its minefield maps, casualties were still sustained by both Egyptian and Israeli soldiers after the cease-fire. The UN disengage-

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[59] Report given by Col. Alfonso Dagudag, ICRC Meeting of Military Experts, February 1996, and "Landmines in the Philippines", paper prepared for the same meeting by the Office of Strategic and Special Studies, Armed Forces of the Philippines.

ment forces also suffered casualties, although they carried out their own mine clearance operations.[60] By 1992, most of the minefields on the Syrian side of the Golan Heights near the United Nations Disengagement Force (UNDOF) positions were known, although many minefields were unmarked and poorly fenced.[61] Israeli troops removed many but not all of their own mines.[62]

A major study on the Arab-Israeli wars concluded that fixed defensive minefields were only effective when watched over and properly maintained. In any case they were judged less useful in disrupting enemy advances than barriers, whether deep or high.[63]

k. **Chad, 1973-1994.**[64] Invading Libyan forces left anti-tank and AP mines in the Aozou strip in northern Chad. Some mines were laid in patterns, but most were randomly laid, many in food-producing areas. Minefields were neither marked nor fenced, and no maps were handed over to the Chad government at the end of the hostilities.

l. **Angola, 1975-present.** Mines were laid by the Cuban Army, the Angolan Army, UNITA and the South African army. Very little minefield marking or accurate mapping took place during the conflict. Both AP and anti-tank mines were freely used; mines were laid on routes to deny access to the centre of the country, and also laid on airstrips and railways. In many cases, minefields were laid and re-laid many times during the course of the conflict: some major towns are now reckoned to have concentric rings of minefields surrounding them. Some mine clearance by the parties took place after the Bicesse peace accords of 1991, but little clearance activity has followed the Lusaka peace accords of November 1994. Angola is now probably the most mine-infested country in Africa, with a proportion of amputees second only to that of Cambodia.[65]

m. **Mozambique, 1976-1993.**[66] Mines were originally laid by the Portuguese Army, and later by FRELIMO and RENAMO and

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60 The Sinai Peace Front, Bertil Stjernfelt, Hurst and Co., 1992, pp. 52, 72.
61 Observations of Brigadier Blagden, 8 December 1992.
62 The Lessons of Modern War, Anthony Cordesman and Abraham Wagner, Westview Press, Boulder, Colorado, 1990, Vol. I, p.70.
63 *Ibid.*, Vol. I.
64 Based on post-visit report of Brigadier Blagden, July 1995.
65 Post-visit reports by Brigadier Blagden, June 1995.
66 Based on post-visit report by Brigadier Blagden, February 1993.

the South African and Rhodesian Armies and Special Forces. None of the parties involved marked or mapped their mined areas, which in some cases were not even recorded. Mine maps were apparently kept by FRELIMO, but never handed over to the United Nations clearance headquarters. No significant marking of minefields has been found.

The Zimbabwe National Army (ZNA) was deployed in Mozambique, in aid of FRELIMO, to guard the Beira corridor and its road, oil pipeline and railway which were repeatedly sabotaged by RENAMO from 1983/84 until the Rome Treaty of 1992. In the conflict, RENAMO liberally resorted to mines against installations and routes used by the ZNA. The ZNA relied on aggressive patrolling and ambushes, as well as the deployment of ground and air reaction forces and did not employ AP mines in the conflict. This is significant as a large portion of the ZNA forces had formerly been insurgents, themselves using these mines against the Rhodesian Security Forces before independence in 1980.

n. **Cambodia, 1978-present.** None of the warring factions in Cambodia carried out any meaningful mapping or marking of minefields, and as a result no minefield maps were available when mine clearance started. Nor did the parties make any attempt to control the spread of mines, many of which were deployed for the purpose of population control.[67] The use of mines against the lives and property of the civilian population has been a systematic tactic of the Khmer Rouge. Government calls for bans on landmines and the destruction of mine stocks have coincided with the remining of areas laboriously cleared by humanitarian organizations.[68] Despite the recent restoration of peace, both the government and the Khmer Rouge have apparently continued mining.[69] There has been a reported increase in the numbers of casualties in 1994 as compared with 1991, and Cambodia is now the country with the highest number of amputees in proportion to the population. To date, the Khmer Rouge has actively prevented the United Nations and Cambodian government survey teams from assessing the extent of contamination in areas under its control.[70]

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67 War of the Mines, *op. cit.*, p.13.
68 "Cambodia at War", Human Rights Watch Project, p.100.
69 *Ibid.*, p. 100.
70 Remarks to Brigadier Blagden during visit in November 1993.

o. **Afghanistan, 1979-present.** The Soviet Army, the Afghan Army and many factions of the Mujaheddin laid AP mines in profusion, including the air-dropping of many light AP mines on villages, with the result that Afghanistan is, with Cambodia and Angola, one of the three most heavily mined nations in the world.[71] Although the Soviets claimed that minefields were initially marked and mapped, these minefield maps became increasingly inaccurate, partly owing to "overlaying" by the various factions. The indiscriminate way in which mines were used by all sides have made mine maps largely irrelevant.[72] Nearly all the national infrastructure has been mined, as has much arable land. There are also extensive minefields along the borders with Pakistan and Iran.[73]

More than 30 types of mine were laid, originating from six different countries. They included air-dropped "Green Parrot" (Soviet PFM-1) AP mines and jumping mines linked to seismic detectors. Anti-tank mines were used infrequently, because the Mujaheddin perfected traps based on anti-tank mines to blow up tanks fitted with mine-clearance rollers.[74] Minefields were rarely marked, with the result that the influx of returning refugees after the withdrawal of the Soviet Army gave rise to horrendous casualties. Some minefield maps were made available to the Afghan government when the Soviet Army withdrew, but few were accurate enough for clearance purposes and many unmarked minefields remained.[75]

p. **Iran-Iraq War, 1980-89.** During the Iran-Iraq war, both parties used mines freely. Probably the most extensive use was in Kurdistan, which was the scene of many large-scale attacks by the Iranian Army against entrenched, heavily mined and heavily fortified positions. Breaching of minefields was at times carried out, in the absence of modern means, by "martyrs", including children, who stormed across minefields to open the way for professional forces. The casualties this entailed were regarded as acceptable. Few of the mines

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71 Hidden Killers, *op.cit.*, p.44.

72 Landmines: A Deadly Legacy, *op.cit.*, p.145.

73 The Lessons of Modern War; *op.cit.*, Vol.III, pp.164-169.

74 One such trap killed three members of the HALO Trust clearance team operating a T55 mine clearance tank in 1993.

75 Conversations in November 1992 between Brigadier Blagden and the Commander of Afghan Technical Consultants, one of the most successful mine clearance NGOs in Afghanistan.

used by either side were marked or mapped, nor have they been cleared, except by volunteer organizations. The mines left from the Iran-Iraq war in Kurdistan have since been added to by the Iraqi government as part of a deliberate act of harassment of the civilian population.[76]

q. **El Salvador, 1980-1991.** Home-made mines and booby-traps were deployed extensively by the FMLN, without either marking or mapping, although after the fighting the FMLN cooperated with the government and the United Nations in their removal. Often the mine-layers themselves were made available to assist in the demining process.[77]

r. **Falkland/Malvinas Islands, 1983.** Argentine forces laid anti-tank and AP mines extensively, including some scattered by air. Many minefields were not marked or mapped. Attempts were made to clear the mines, but were abandoned after the clearance group sustained casualties. The most heavily contaminated tracts of countryside have had to be marked off for clearance when a better method of detection becomes available. However, the Argentine government is currently setting up a mine-clearance programme in some affected areas. The UK forces laid a small number of mines which were mapped and removed after the conflict.[78]

s. **Somalia, 1985-1991.** The main minefields were laid by the forces of Siad Barre. The sketchiest of maps were made, which are largely useless for clearance purposes, and the minefields were left unmarked. Mines were used extensively for harassment of the civilian population, and were laid by various parties in furtherance of inter-clan and inter-factional fighting.[79]

t. **Liberia, 1989-present** Limited numbers of anti-tank mines were originally laid by the NPFL against both government forces and the ECOMOG peace-keeping forces. It is probable that mine laying has been extended during the most recent phases of the internal conflict

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[76] Hidden Death - Land Mines and Civilian Casualties in Iraqi Kurdistan, Human Rights Watch October 1992, p.4 et seq.

[77] Observations of Brigadier Blagden, June 1993.

[78] Statement from British Major Alistair Craib RE, involved with early clearance measures.

[79] Observations of Brigadier Blagden, June 1994.

in Liberia. No marking or mapping was noted or reported during a United Nations reconnaissance mission in 1993.[80]

u. **Rwanda, 1989-present**[81] Between the genocide of April-June 1994 and the eviction of the government forces, the latter laid AP mines, anti-tank mines and booby-traps against the Rwandan Patriotic Front in a fairly well-defined belt in the north of the country that later became the projected demilitarized area. Some minefield records were maintained and made available to the United Nations, but they were incomplete. During the withdrawal of the Hutu forces to Zaire, AP mines were buried at random in front of defended localities, many of which were in cities such a Ruhengeri and Kigali. These were unmarked and unrecorded.

v. **Croatia, 1991-95.** During the conflicts between Croatia and the Federal Republic of Yugoslavia and between Croatian forces and Bosnia Serbs, many anti-tank and AP mines were laid in Croatia,[82] along the borders with Yugoslavia and with Serb-held areas of Bosnia-Herzegovina. Most of these were reported to be along the confrontation lines, but some isolated minefields outside these areas have also been discovered. The existence of these minefields appears to have offered little or no protection to Serb forces in Krajina when the Croatian Army decided to move into the region in August 1995. No significant marking of minefields has been reported, but some clearance was attempted. Maps shown in 1993 to the United Nations were of poor quality and incomplete, but some better maps are reported to have been made available more recently. Croatia has agreed to surrender all minefield maps it holds to the United Nations.[83] Croatia is a party to the CCW Convention's landmine Protocol.

w. **Operation Desert Storm, 1992.** The Iraqi defences erected after the capture of Kuwait included an estimated 9 million mines, laid on the beaches to the east and in protective mine belts to the south and west. These mine belts mainly contained mixed AP and anti-tank mines. Most of the mines were laid in patterns, and on the surface,

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80 Observations of Brigadier Blagden, March 1993.

81 Based on post-visit report of Brigadier Blagden, August 1994.

82 The Croatian government estimates 2.5 million mines on its territory. Source: Croatian speech to Vienna Review Conference of the CCW, September 1995.

83 Observations of Brigadier Blagden, January 1996.

but they soon became partially or totally covered by sand. Reasonably accurate maps of Iraqi minefields were made by the Coalition forces and handed over to the Kuwaiti government. Despite the massive use of mines against them, Coalition forces, with modern breaching techniques and high mobility, suffered little delay in advancing on Kuwait once the ground war began.[84]

x. **Bosnia-Herzegovina, 1992-1995.** The years of conflict in Bosnia-Herzegovina have left areas of major contamination, with an estimated 3-6 million mines remaining uncleared, including some sophisticated AP mines. Mines were used by all parties to the conflict, most of which were of former Yugoslav manufacture and primarily made of plastic. Some mine maps were made, and those supplied by the Bosnian-Croat Federation were integrated into the United Nations database set up under UNPROFOR. This database is now being shared with NATO (IFOR), which is updating it with maps surrendered under the Dayton Agreement. Although few minefields were adequately marked, so far civilian casualties have been kept artificially low by the absence of returning refugees. Some clearance by military groups has been attempted but significant losses have occurred among deminers. Bosnia-Herzegovina is a party to the landmine Protocol to the CCW Convention.[85]

y. **Georgia, 1993-94.** Mines were laid along the border between the area held by the Georgian Army and that held by the Abkhaz separatists. These border mines are not known to have been marked, and may not be completely mapped.

z. **Ecuador-Peru, 1995.** In the course of the brief armed conflict between Ecuador and Peru in 1995, which lasted only one month, tens of thousands of mines were scattered along parts of the border between the two countries. Following the cessation of hostilities a large number of these mines were removed. However, to date, in the absence of a border agreement between the two parties or of the designation of a demining team acceptable to both sides, an estimated 6,000 mines still remain in disputed territory. Many of these are in remote jungle terrain and constitute a threat to the local civilian population living in or passing through the region.

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[84] Additional details in para. 51.
[85] Observations of Brigadier Blagden, January 1996.

Pressure activated blast mine
© ICRC photo T. Gassmann

A lightweight scatterable anti-personnel fragmentation mine © The Military Picture Library photo P. Russell

"Butterfly" anti-personnel blast mines produced in camouflage and colours attractive to children
© The Military Picture Library photo P. Russell

Afghanistan 1995, Anti-personnel mines and other ordnance on display in hospital with the reflection of two young victims
© ICRC photo Ahad Zalmaï

Methods of scattering landmines

Figure 6-14 Multiple-delivery mine system (Volcano)

Figure 6-5 Gator mine system

Figure 6-18 Modular Pack Mine system (MOPMS)

Figure 5-7 M128 Ground-Emplaced Mine Scattering System (GEMSS)

Figure 6-4 ADAM and RAAM mines

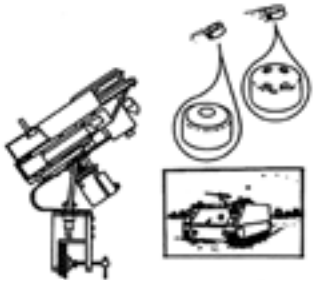

Figure 6-10 Flipper (GEMSS) auxiliary dispenser

Launching system for scatterable antipersonnel mines: more than a thousand mines can be spread over a large area within a few minutes © The Military Picture Library photo T. Simpson

Cambodia 1995, Living with anti-personnel mines © ICRC/Grabhorn

Angola 1996, Many minefields surround entire villages in Angola © ICRC/Grabhorn

Cambodia 1995, Half hidden anti-personnel mine found in a village upon the return of displaced persons © ICRC/Grabhorn

Afghanistan 1995, Anti-personnel mine detonation near Kabul © ICRC photo M. Iavelli

© ICRC photo Dr H. Stirnemann

Anti-personnel mines cause inimaginable suffering to thousands of victims every month

Chechnya 1995

© ICRC photo C. Page

Cambodia 1995, A young mine-injured mother with her child © ICRC/Grabhorn

Angola © ICRC/Grabhorn

Kenya/Sudan © ICRC/Grabhorn

Children, often unaware of the danger of mines, are among the most vulnerable of potential victims. Once injured, they require sustained medical care as their amputated limbs continue to grow

A military minefield breaching vehicle can use flails to open a path for advancing forces. However, their clearance rate is inadequate for humanitarian clearance operations, which must achieve a clearance rate of 99.6%.
© Military Picture Library photo R. Adshed

US Army armoured personnel carrier drives through a marked gap in a breached Iraqi minefield during the Gulf War 1991
© US Army Y. Debay

Mozambique 1993, Mine clearance teams often face dense vegetation or difficult terrain © ICRC photo L. Chessex

Mines with sufficient metallic content can be detected by electronic means. Nonetheless, in many post-conflict situations, hundreds of pieces of metallic debris are detected for every mine found. Each metallic fragment must be treated as a live mine until its identity is known. © Military Picture Library photo P. Russell

Cambodia 1995, Detection of buried mines usually requires probing every few centimeters of soil over vast areas of land © Handicap International

Angola 1995, Mine clearance in a country like Angola is tedious, dangerous and likely to take decades, even if adequate funding becomes available © ICRC/Grabhorn

49. The examples given above are admittedly incomplete. However, they clearly indicate that few instances can be cited where mine use has been consistent with international law or, where it exists, with military doctrine. It would therefore be unwise to base the continued use of landmines on the premise that mines can be used in a lawful and responsible fashion. The historical evidence would indicate that they rarely are, whether by "developed" armies, "third-world" armies or insurgents, and that their effects cannot be limited as doctrine presumes. The examples given above reflect the real effects of AP mine use: a horrific world-wide legacy of mine infestation.

The ICRC has received from the Minister of Defence of Australia, The Honourable Ian McLachlan MP, the following comments on paragraph 48 (d) on page 28-29 of the present study:

The minefields laid by Australian Forces were recorded by Australians in accordance with our doctrine. These records were forwarded to the Headquarters of the Australian Forces, Viet Nam, and then distributed to all Allied headquarters operating in Viet Nam. Copies of these records are available in Army archives.

The Australian Army Engineer commander at that time has confirmed the scrupulous manner in which these minefields were fenced, marked and recorded. Further, these minefields were cleared of mines prior to Australians withdrawing from the area. (Excerpt from letter dated 17 May 1996, reprinted with permission.)

Commentaries on the historical record of landmine use from other sources are also welcome.

V
MILITARY EFFECTIVENESS OF THE USE OF ANTI-PERSONNEL MINES

1. International armed conflict

a. Effects on opposing forces

50. The panel of military experts convened by the ICRC in January 1994 was unanimous in claiming the effectiveness of the mine as a weapon of war, and in restating the utility of both anti-tank and AP mines.[86] A recent US Army briefing paper[87] has reiterated this claim, saying that AP mines save the lives of American soldiers (interestingly, World Wars I and II, Korea, Desert Shield and Desert Storm are cited, but not Viet Nam). However these claims, especially in the case of AP mines, are worth examination with special reference to their effect on opposing forces. In "conventional" wars, no campaign can be found in which the AP mine was by itself a battle-winning weapon. In all the major campaigns using armoured warfare, such as those involving the laying of massive minefields in the North African desert during World War II, battles were slowed down by the presence of mines, but their outcome was decided by leadership and materiel.[88]

51. In the Gulf war, mines may have given the Iraqi Army a false sense of security as regards the strength of their defensive positions around Kuwait, whereas when the ground war began most minefields were simply bypassed.[89] Where it was necessary to pass through them, the Coalition forces used tank-mounted ploughs and armoured hoses, and breached the Iraqi minefields where and when they wanted to with apparent ease. The effectiveness of Iraq's mines had also been overestimated by US forces, which later reported: "Instead of needing 18 hours to break through Iraqi positions as originally calculated, the

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86 Notes from ICRC Symposium of Military Experts, January 1994.

87 US Army briefing for Conference on Landmines sponsored by the US Arms Control and Disarmament Agency, 16 August 1995.

88 Approach to Battle, A Commentary, Eighth Army, November 1941 to May 1943, Lt. General Francis Tuker, Cassell, London, 1963, p.163.

89 It Doesn't Take a Hero, *op.cit.*, p.170.

1st Infantry Division successfully breached them in 2''.[90] Although the Iraqi army laid an estimated 9 million mines in Kuwait, few, if any, reported Coalition casualties were due to mines. However, a number of damaged civilian vehicles were discovered in these minefields after the conflict.[91] It could hardly be claimed that the many AP mines laid by Iraqi were ''force multipliers''.

52. Two other examples of ''conventional'' armoured warfare, which is becoming more and more the exception, are the Arab-Israeli wars and the India-Pakistan wars. The India-Pakistan wars were remarkable for the restraint and responsibility shown by both sides. The limited nature of the wars and their short duration ensured that the mine problem remained relatively small, and both parties had the resources to clear the mines almost immediately after each confrontation. It was decided as a matter of political choice to limit the effects of mines. The resulting rapid clearance prevented civilian casualties and allowed the combat areas, which in some cases were high-quality agricultural land, to be returned to civilian use. It was also decided not to deploy AP mines along the India-Pakistan border in the struggle against infiltration during peacetime, even though their use might have slightly decreased movement across these borders.[92]

53. A factor which is regularly underestimated is the time, expense and manpower that is necessary to create a barrier minefield, to maintain it properly[93] and to keep it constantly surveyed and covered by fire. If this is not done, such a barrier will not slow down an enemy advance or prevent infiltration. The lack of proper maintenance and surveillance has rendered many minefields useless,[94] whether they were created for border control, the protection of bases or the protection of

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90 Certain Victory: United States Army in the Gulf War, Desert Storm Study Project, Office of the Chief of Staff, US Army, 1993, p. 232.

91 Observation by Brigadier Blagden during mine clearance operations, January - June 1992.

92 Report by Major General Banerjee, ICRC Meeting of Military Experts, February 1996.

93 For more details on the need for maintenance and the difficulties involved, see paragraph 66.

94 See, for example, the case of Rhodesian barrier minefields, para. 48.g above.

certain infrastructure installations.[95] In other cases where these facts were realized, plans to create such minefields were abandoned and other tactics were successfully adopted instead.[96]

54. In addition, certain terrains are particularly unsuitable for minefields because the mines can move considerable distances and therefore do not create the intended obstacle, for example in areas of shifting sands or steep terrain. This was given as a reason the Indian Army did not lay mines in the Rajasthan desert and used them only on a small scale during the 1962 war with China in the Himalayas.[97]

55. In none of the cases of "conventional" war so far studied has the AP mine become as much of a "force multiplier" as has been claimed, mainly because of the increased use of armoured formations and the decreasing use of dismounted infantry in such conflicts. It has been claimed that the AP mine is still necessary in armoured combat to stop sappers dismounting during an armoured advance and clearing anti-tank mines by hand, but this does not seem to be a likely contingency in armoured warfare.[98]

56. Soviet tactics, on which much of NATO mine warfare doctrine is based, involved the deployment of mine-removing tanks in the leading echelons of the attack, but not the deployment of dismounted sappers in an area where they would almost certainly be under fire. Other nations continue to plan on the use of dismounted infantry and engineers preparing breaches in minefields for the armour to pass through, but even in these cases it is agreed that the AP mine is only a delaying element that does not stop the creation of the breach or the subsequent attack. It can therefore be argued that the AP mine has become less relevant to modern armoured warfare.

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[95] See para. 73 for an example in an internal armed conflict, but the problems are identical in international armed conflicts.

[96] For example, see the case of the proposed SADF minefield in Namibia, para. 48.h above.

[97] Remarks by Maj. General Banerjee, ICRC Meeting of Military Experts, February 1996. See also para. 48.f and Section VI.

[98] In the advance of US forces, as the 2nd Brigade, 1st Infantry Division, breached Iraqi minefields "none of the infantry had to dismount through the breach; they fought from inside their Bradleys to cover the battalion's tank teams as the tankers used mine plows to collapse Iraqi trenches". Source: Certain Victory, *op.cit.*, p. 230.

57. The use of the mine on the battlefield has led to the development by the military of many types of mine-removal systems, which in turn have prompted the development of countermeasures to those removal systems. In "conventional" armoured warfare, nations have devised a whole range of mine-clearance equipment, such as flails, ploughs and explosive devices, to actuate the mines ahead of the advancing forces or to remove them. This has led to the development of mine fuses that destroy the clearance ploughs mounted on the front of tanks, and fuses that are specifically resistant to the short, high-pressure pulse of explosive hose or gas explosion.

58. This battle of wits between designers has mainly been concentrated in the area of anti-tank mines; AP mines, being smaller and often simpler in design, are more easily breached by modern techniques. Some favoured minefield breaching solutions involve pushing the mines to one side rather than destroying them, so the benefit of this technology for civilians in post-war situations is minimal. The main aim of these technological developments has been to ensure that the mine does not become a "force multiplier", as it is currently intended to be.

59. A factor often overlooked in estimating the value of AP mines is the opponent's willingness to accept casualties. In cases such as the Iran-Iraq war, the Korean war and highly-motivated revolutionary struggles, the utility of AP mines is vastly reduced and forces simply cross the minefields, accepting the risks this entails. In the India-Pakistan wars the casualty rates in breaching attempts by well-trained forces were estimated to be as low as 1-3%.[99]

60. In Korea, the Chinese employed mass infantry attacks, frequently passing through the extensive AP minefields erected around United Nations positions.[100] It is highly likely that a detailed study of the use of mines by French, US and Australian forces in Viet Nam would indicate that the Viet Cong were equally willing to suffer losses in the same way. In the Iran-Iraq war, mass frontal attacks by young Iranian volunteers passed straight over Iraqi AP minefields. On the other hand, the success of the Viet Cong minefields against US and

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[99] Estimate of Maj. General Banerjee, ICRC Meeting of Military Experts, February 1996.

[100] Send Port and Pyjamas, *op.cit.*, p. 237.

Australian troops may have been substantial, but it probably did not affect the outcome of the war except by adding to the numbers of dead and injured, and to the political effect of those numbers in their home countries.

61. In Afghanistan, the Soviet Army used many millions of mines, including thousands of air-dropped "butterfly" (PFM-1) mines. This resulted in appalling casualties amongst the local people in the areas concerned. During the war over the Falkland/Malvinas Islands, helicopter-dropped AP mines were used by the Argentine Army. In neither case did the party that laid the majority of the mines achieve military success. In both cases the other party had sufficient training or determination to overcome the problem posed by minefields.

62. A number of authoritative analysts have concluded that AP mines have proven to be weapons of severely limited utility. General Åke Sagrèn, while Commander-in-Chief of the Swedish Army, stated as early as 1994 that "Anti-personnel landmines are not of vital importance to the Swedish national Defence".[101] British General Sir Hugh Beach testified to the House of Commons in 1995: "[W]here 'Regular military use' is concerned there is no case known where AP mines as such have influenced a campaign, a battle or even a skirmish in any decisive way. They marginally increase the usefulness of anti-tank mine fields as instruments of delay and marginally raise the human cost of breaching them. My point is that these effects (marginal, not multiplicatory) while not negligible are nevertheless simply not worth the candle when measured against the scale of human suffering they cause".[102]

63. Former US Marine Corps Commandant Alfred Gray made the point even more strongly: "I know of no situation in the Korean War, nor in the five years I served in Southeast Asia, nor in Panama, nor Desert Shield-Desert Storm where our use of mine warfare truly channelized the enemy and brought him into a destructive pattern. I'm not aware of any operational advantage from [the] broad deployment of

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[101] Sydsvenska Dagbladet, 4 June 1994.

[102] Evidence put before the UK Parliamentary Foreign Affairs Committee by General Sir Hugh Beach, Hansard, 30 March 1995, Appendix 38, p.385. Beach was a Royal Engineer who served *inter alia in* north-western Europe in WWII where mines were heavily used. His last appointment was as Master General of the Ordnance which included responsibility for procurement of all land warfare equipment, including mines.

mines''.[103] A Pentagon-commissioned study conducted by the Institute for Defense Analysis reached similar conclusions:

- ''[A]ntipersonnel mines are of substantially more restricted utility than antitank mines'', and
- ''[F]or the utility of *antipersonnel* mines to be so high as to preclude further consideration [of arms control] requires an especially demanding set of assumptions about the nature of future warfare. It is far from obvious that the required assumptions can be sustained''.[104]

b. Effects on forces using anti-personnel mines

64. AP mines can frequently become as much of a liability as an asset, and military doctrine on their use does not appear to have learnt many lessons from the past. During World War II there were many instances where hastily-constructed and badly-marked minefields impeded the movement of friendly forces[105] and resulted in fratricidal accidents.[106] Speaking of the Italian campaign, Ernest Fischer records that ''commanders at all echelons constantly sought to develop methods of eliminating losses from friendly mine fields, but the basic problem remained''.[107] More recently the Commander-in Chief of the Swedish army recommended that his government get rid of a particular pressureactivated AP mine precisely because of the threat it posed to his own troops.[108]

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[103] Cited in ''To Fight Without Landmines'', Stephen Rosenfeld, Washington Post, 22 September 1995.

[104] ''The Military Utility of Landmines: Implications for Arms Control'', Institute for Defense Analyses, June 1994, pp. 70-71. The assumptions presented are that use occurs in a defensive posture in which (a) the attacker reaches close-in positions, (b) the attackers' infantry dismounts and conducts the assault on foot, and (c) that the attacker manoeuvres its dismounted infantry and its accompanying armoured vehicles independently.

[105] The Campaign in Italy, Official History of the Indian Armed Forces in the Second World War series, Dharm Pal, Orient Longmans (for India and Pakistan Combined Inter-Services Historical Section), 1960.

[106] The Mediterranean Theater of Operations, Cassino to the Alps, Ernest Fisher Jr., Center of Military History, US Army, Washington, DC, 1977.

[107] *Ibid.*

[108] ''The anti-personnel landmine of the Swedish type 10 is a pressure-activated mine which is as dangerous to us as to the enemy. I invite our government authorities to immediately take it out of service''. General Åke Sagrèn, quoted in Sydsvenska Dagbladet, 3 June 1994.

65. In Korea, the British, Canadian, South Korean and Turkish troops all laid extensive AP minefields to repel the North Koreans and their Chinese allies. These minefields were hard to maintain; fences were knocked down, soldiers wandered into them and were injured or killed,[109] and frequent changes in the tactical situation resulted in minefields being in the wrong place[110] and becoming a hindrance rather than a protection, owing to the limitations they placed on tactical flexibility. There were also indications that patrols were frightened of using the "safe lanes" through minefields and patrolled up to the minefield edge and no further, thus reducing rather than enhancing the security of the position.[111] These experiences were repeated in Viet Nam, where, as mentioned, the US forces lost many troops to their own mines.

66. Mines used to protect military encampments are considered to have a certain deterrent value while at the same time creating a number of specific problems.[112] In order to prevent easy infiltration they need constant monitoring, as do other minefields. They need constant maintenance because the minefield is regularly damaged by heavy precipitation, erosion of the soil (especially when chemical means are used to keep down vegetation), enemy attacks and frequent incursions by animals. Dead animals mean that the mines they detonated are no longer active; moreover the carcasses begin to rot and cause both a stench and a health hazard. Soldiers therefore have to enter these areas regularly to clean up the mess and replace the mines. Accidents are not uncommon, not only because mines may have moved from their original position, but also because the soldiers are often not as careful as they should be. Another significant problem is that mines around military encampments hem in the forces that laid them. Should they need to leave the base because of an enemy assault, they are canalized into the exit or exits they have provided for themselves and may come under direct fire in attempting to escape.

67. The mines laid by the Iraqis in Kuwait had almost no effect on the Coalition forces, and there are no records of how many of their own

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109 Truce Tent and Fighting Front, *op. cit.*, Vol. 2, p.256.
110 Send Port and Pyjamas, *op. cit.*, pp. 176 & 190.
111 *Ibid.*, p.224.
112 See the example of South African military bases, para. 48.h above. based on information provided by Colonel A.J. Roussouw, ICRC Meeting of Military Experts, February 1996.

soldiers were killed in the deployment of the enormous protective mine belts around Kuwait City and on the beaches. Several blown-up Iraqi vehicles could be found in the minefields, but none belonging to Coalition forces; in fact, the majority of vehicle casualties to be seen in the minefields were local Kuwaiti civilian cars, destroyed as their owners tried to escape from Kuwait during the occupation.[113]

68. It would be interesting to know what effect, if any, the types of experiences mentioned above have had on the doctrine of the armies mentioned regarding the use of AP mines. A central problem is that those with the most experience of working in mined environments have long since retired from the service. Many interesting lessons on the havoc minefields can cause have recently been learnt by commanders of United Nations contingents, especially in Somalia and Bosnia-Herzegovina, but it will be some years before their experiences will be woven into the fabric of military doctrine.

2. Internal armed conflict and violence against civilians

69. In internal conflicts and low-intensity operations, mines have been more successful in disrupting military operations because the military proficiency of many of the parties has been of a lower standard. Also, mines have been used randomly, unmarked and unrecorded, thus rendering their detection and avoidance more difficult. Even under these circumstances, mines have not proved to be a decisive "battle-winning" weapon but a double-edged killer. In the long-running (and ongoing) struggle in Cambodia, mines have been used by all parties and now continue to be used by the Khmer Rouge, who have lost their own soldiers to them. This may prolong the conflict, but will not in itself topple the government.

70. In limited wars, the support given to government forces has sometimes been eroded by civilian mine casualties. In some cases casualties due to government-laid mines and those due to mines used by insurgents have paradoxically both been blamed on the government. In the first case the government is held responsible for its own actions, and in the second for the disruption caused by the insurgents' reaction to

[113] Observations of Brigadier Blagden while removing mines from the UK clearance sector of Kuwait, November 1991 - June 1992.

government operations against them. Such loss of political support has rarely been taken into account when the efficacy of the mine as a weapon in such confrontations is being considered.

71. In Mozambique, neither FRELIMO nor RENAMO achieved outright victory, although both sides used mines on a large scale. They did, however, aggravate the starvation that subsequently brought the RENAMO leadership to the negotiating table. The same is true of the struggles between the government forces and UNITA in Angola, where both sides used mines to deadly effect. Many of the mine casualties must be attributed to the level of training of the armies concerned; it is probably true that the only party in the struggle for Angola that sustained relatively few casualties were South African troops assisting UNITA, because they were well trained and equipped with mine-protected vehicles.

72. In the former Rhodesia, border minefields which were originally laid in a belt 25 m wide were breached by infiltrators using shovels in about two hours. Eventually the width of the belt was increased to 300 m and then 2 km, but it was still breached; at this point booby traps were added but determined forces continued to accept the risks of crossing.

73. The use of AP mines to protect infrastructure such as power stations, railway lines and electricity pylons has had doubtful results. When the Kariba power station in Rhodesia was not also protected by observation and direct fire, saboteurs simply shovelled their way across the minefield, did their damage and left. In Bosnia, soldiers simply blew out insulators on power pylons with direct fire from outside the mined areas. In both cases casualties were more likely to occur among clearance and reconstruction crews which entered the area to repair the damaged facilities.

74. Sadly, the only purpose for which mines have been used with total success by the layer and total impact on the target is for the containment or harassment of civilians. The mines placed by Iraqi government forces around villages in Kurdistan have been extremely effective in achieving their aim of paralysing the area and preventing the resumption of farming.[114] Likewise, the mines used to contaminate civilian areas of northern Somalia by the forces of Siad Barre in 1990 and the mines laid in Cambodia by the Khmer Rouge have had a major

[114] "Hidden Death: Land Mines and Civilian Casualties in Iraqi Kurdistan", *op. cit.*, p.1.

effect on the life of nomadic Somali clans and the local Cambodian population. However, the use of mines for such purposes has no military value, and the success of the AP mine in this role cannot be used as a military justification for their retention.

75. Mines, and especially AP mines, have proved so frightening to the civilian population in lower-level internal conflicts that the very threat of their presence can depopulate an area or close a road network. During a mine-clearance operation in the Maputo province of Mozambique a team was sent to clear the village of Mapulenge, which had been the centre of a community of about 10,000 people, and which had been deserted for four years because it was reputed to be heavily mined. After three months of work, the clearance team reported finding four mines; these, and the rumour of many more, had been sufficient to depopulate the area.[115] Also in Mozambique, the United Nations concluded a contract for the clearance of 2,010 km of roads. Many of these roads had been closed for several years by the threat of mines, but in the event only 28 mines were found, although the search process also turned up many less hazardous items of ordnance.[116]

76. It is therefore clear that the effectiveness of the mine is in inverse proportion to the standard of equipment and training of the people against whom it is used. Soldiers are best equipped to cope in a mined environment; the higher the standard of discipline, equipment and training, the better the countermeasures and precautions that can be taken. Innocent civilians, because they are ill-equipped and untrained to deal with mines, and have to carry on the tasks of daily life in mine-contaminated areas after a conflict has ceased, prove easy long-term victims.

77. Totally unprepared for the effects of mine warfare, civilians suffer terribly: figures for amputations alone are one in 236 people in Cambodia, one in 470 in Angola, and one in 650 in Somalia. These figures are startling when compared with that of one in 22,000 in mine-free USA.[117] If it is estimated that only about 50% of mine victims live

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[115] Norwegian People's Aid report to the UN, March 1994.
[116] Report by the Lonrho/Mechem/Royal Ordnance contractor to the UN, January 1994.
[117] Quoted in The Long Shadow: Landmines and the Law of Armed Conflicts, Françoise Hampson, Essex University, 1995, p.3.

long enough to reach hospital,[118] and taking into account the fact that many deaths are never recorded, the figures become significantly higher. Although during the conflict as many as 49% of casualties may be soldiers,[119] after the conflict is over, and especially when refugees start to return to their homes, the ratio of civilian injured increases dramatically.[120]

78. The lack of preparedness of civilians in the face of a mine threat extends to the self-help measures attempted in many areas. A group of 60 Somali ex-soldiers began mine-clearance operations in 1991 without training or adequate equipment; 40% were killed or injured in the first six months, and the initiative was stopped.[121] There are many stories of local demining efforts in Cambodia, but without proper training and equipment few such ventures survive for long.

79. In considering the effect of landmines on civilians in a post-war situation, this paper has focused mainly on AP mines, as these normally represent a more direct threat to local villagers. The arguments in favour of the military retention of anti-tank mines are more understandable.[122] These are both more difficult and more expensive to scatter in vast quantities and their intended targets are usually of high military value. However, it should be noted that anti-tank mines can also be a major hazard for the civilian population and humanitarian agencies.

80. Anti-tank mines cause severe damage as civilians return to their homelands in vehicles, or resume cultivation using tractors and powered agricultural implements. In 1993, a trailer carrying 18 people ran over an anti-tank mine in Mozambique — all were killed. In 1995, an overloaded Land Rover with 19 people squeezed into and onto it, was

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[118] A UN estimate based on the numbers of dead found in minefields, and on the fact that in many countries, the dead (and especially dead children) are buried without record. Confirmed by ICRC estimates and two epidemiological studies: "Deaths and Injuries Caused by Landmines In Mozambique", Ascherio et al., The Lancet, Vol. 346, 1995, pp. 721-724, and "Social Cost of Landmines in Four Countries: Afghanistan, Bosnia, Cambodia and Mozambique", Andersson et al., British Medical Journal, Vol. 311, 1995, pp. 718-721.

[119] "Landmine Injury in Cambodia - a Case Study", Fiona King, MSc. Thesis, September 1992, p. 43.

[120] "The Worldwide Epidemic of Landmine Injuries", ICRC brochure, September 1995, p.2.

[121] Landmines: A Deadly Legacy, *op.cit*., p. 229.

[122] Evidence put before the UK Parliamentary Foreign Affairs Committee by General Sir Hugh Beach, Hansard, 30 March 1995, Appendix 38, p. 383.

blown up in Angola, killing all on board. Moreover, some irregular groups with excessive stocks of anti-tank mines tamper with the fusing system so that these mines detonate under the weight of a human being. Ideally, therefore, the use of anti-tank mines should be strictly controlled. Minimum measures would be: (a) the requirement that anti-tank mines be detectable in order to facilitate post-conflict clearance; (b) strengthened recording requirements; and (c) the use of self-neutralization mechanisms to render the mine harmless after a given period. Prohibitions on anti-handling devices and on anti-tank mines which explode under the weight of a person[123] also merit consideration.

81. Another threat to civilians is the increased use of command-detonated or time-fused improvised explosive devices. Though largely deployed by irregular forces against government troops in such places as Northern Ireland, Spain and Sri Lanka, more civilians than soldiers are usually killed by these devices. Control of their use is notoriously difficult, since they are generally deployed by people who care little whom they kill or mutilate.[124]

[123] See paragraph 107 on hybrid mines.
[124] Evidence given by Maj. General Banerjee, ICRC Meeting of Military Experts, February 1996.

VI

HOW FEASIBLE AND USEFUL ARE REQUIREMENTS TO MAP AND MARK MINEFIELDS?

82. The CCW Protocol and STANAG require that the marking of minefields must be conspicuous; it should also be maintained for as long as the minefield remains uncleared. This means that the marking of minefields has to be done in such a way that the marks remain, do not rot away and cannot be removed. This can become a test of ingenuity for the marking agency. In poorer countries, posts and wire are soon removed by local villagers and used for housing or livestock pens. Small metal signs become excellent corner reinforcement; large plastic signs become collectors' items or, if impermeable, roof tiles.[125] In many countries, painted stones are the only form of marking that is not commercially attractive enough to be worth removing. Where fences are used local villagers need the fencing materials and, as they know where the mines are, they may consider that no other form of warning system is needed. But when refugees and displaced persons return to or pass through such areas, the casualty rate increases sharply.

83. In practical terms, military groups that withdraw from an area leaving marked minefields behind them will find it difficult to maintain the minefield markings, even if they wish to do so, as they will often have left the area permanently. It is rare that any other agency, except mine-action agencies such as the United Nations and various NGOs, will take responsibility for maintaining the protective fencing and warning signs.[126] The only real solution is for the mine-laying forces themselves to carry out early mine clearance in the affected areas.

84. It has already been noted that in low-intensity warfare there are very few cases in which mine mapping and recording has been even

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[125] Discussions between Brigadier Blagden and Lt. Colonel Focseneanu, Cambodian Mine Action Centre, 1 November 1993.

[126] Notable exceptions include the United Kingdom, which is said to maintain the markings around the AP minefields left by the Argentines in the Falkland-Malvinas Islands, and some Israeli minefields which have recently been turned over to Jordanian control and surveillance.

partially carried out. When they do exist, minefield maps are often lost or become inaccurate owing to shifting soil conditions. In some isolated instances where mapping efforts have been made, as in Cambodia, they were soon abandoned. In Rwanda, a certain amount of mine mapping was carried out, but the maps were not precise enough for clearance purposes, and in the later stages of the Rwandan conflict mines were laid around defended localities with no effort being made to mark or map them.

85. In situations such as those in Afghanistan, Cambodia, Mozambique and Angola, the warring parties appeared unable to produce accurate mapping. Maps drawn up by all sides are incomplete and impossible to reconcile with the maps of the opposing parties. Where four or five parties are involved, as in Cambodia and Angola, it is almost impossible to get a comprehensive picture. Some forces strenuously deny using mines at all, and some factions have troops that cannot read or write, so expecting them to produce an accurate map is perhaps unreasonable. In addition, warring parties may well be very reluctant to supply this kind of information, even when the conflict is over, for fear that fighting will resume and the information will become militarily valuable.

86. Even for professional armies, accurate mapping of mines is a highly demanding exercise requiring technical skills that are not always available. Such operations are particularly difficult in hilly or forested terrain. The compilation, integration and safe storage of minefield maps in a central location can be a daunting logistical and administrative task. While such operations can be carried out reasonably well for pre-planned minefields, carrying them out under fire is extremely difficult and most often simply does not happen.

87. In a few cases mines have been properly marked, fenced, mapped and guarded. However, at least two of these cases, the East German border fence and the US barrier around Guantánamo Bay in Cuba, were not in fact acts of war, but acts of a State in peacetime, and therefore fall outside the scope of the CCW Convention's Protocol II.

VII

NEW MINE TECHNOLOGIES AND THEIR IMPLICATIONS

88. Unlike mine-clearance technology, new mine-production technology has been heavily funded by both government armament factories and private industry. Many of the new technological developments have concentrated on increasing the availability, lethality and cost-effectiveness of remotely delivered mines. Improved gun and rocket delivery systems are being manufactured in many countries, and at the same time fusing systems are being made more robust, discriminating and versatile.

89. Mines can now be delivered to any area of the battlefield within rocket or gun range, that is up to 40 km from the launch point. Those delivered by aircraft can be deployed at even greater ranges. The only limitation on the use of such **"remotely delivered" mines** will therefore be the ability and range of delivery systems and of remote sensor equipment, such as intelligence-collecting satellites or drones, to detect concentrations of enemy forces which will justify their use. A recent authoritative report, Trends in Land Mine Warfare, confirmed that "the future is probably linked to the remote/airborne delivery of mines over large distances" and that "the old style hand or mechanical emplacement is far too slow for present day realities". The same report confidently predicted "that during the next fifty years many millions of mines of all types will continue to be manufactured and that large profits will be made in this sector."[127]

90. The increased use of remotely delivered mines on the battlefield will have many potential long-term effects which can be still be prevented while relatively few countries possess them. The first is that landmines will be deployed in greater numbers and may remain on the battlefield in greater numbers. It has been claimed that commanders will in fact use fewer mines than before because, knowing the enemy positions, they will be able to be more selective about the areas to be

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[127] Trends in Land Mine Warfare, Special Report, Jane's Information Group, London, July 1995, pp. 5-6.

mined. However, a more likely scenario is that, with mines so much easier to deliver to the battlefield, commanders will be tempted to put more minefields down to cover all contingencies. Locations suspected of being likely enemy concentration sites will probably be saturated with mines to ensure maximum damage.

91. The introduction of remotely delivered mines will have profound humanitarian implications, because of the way in which they are used. One of their likely purposes will be to halt advancing enemy columns or flanking movements by sowing remotely delivered mines in their path. Another is the disruption of field headquarters, stores and ammunition replenishment points. These can be paralysed by sowing the whole area with mines, thus harassing the command structure and preventing vehicles from getting into or out of the area.

92. However, such mine use relies not only on considerable accuracy in locating target areas, but also on timely information on convoy speeds and directions, so that the mines can be delivered to exactly the right place. The less precise the information, the greater the area that will have to be mined to counter the threat or achieve the desired effect. Examples from the Gulf war show that such timely information was not always available, despite the sophistication of the Coalition forces' battlefield intelligence organization,[128] which is unlikely to be matched by many nations. When the precise location of enemy forces can be determined, the relevance of remotely delivered mines must be questioned; one could probably achieve more kills with conventional artillery or air support. Thus the better the intelligence the less the need for remotely delivered mines; and the worse the intelligence the more their use will tend to be widespread or indiscriminate.

93. Where mines are delivered by the Multiple Launch Rocket System (MLRS), a weapon system in service with many armies, each rocket launcher carries 12 rockets, and altogether these can deliver almost 8,000 small bomblets to a range of 15 km. A later variant of the MLRS will launch the German AT2 mines. This means that many hundreds of mines can be launched into a small area in a matter of seconds. American GATOR mines are dropped in containers, each container carrying 94 mines (72 anti-tank and 22 AP). A single fighter

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[128] Certain Victory: The US Army in the Gulf War, *op.cit.*, pp. 371 and 372.

aircraft can drop up to 600 such mines in one sortie. Thus the overall numbers of mines that can be emplaced in a short time has increased enormously, and the numbers remaining after the battle are also likely to increase.

94. Another long-term effect of the use of remotely delivered mines is that it is virtually impossible to map them or to mark the boundaries of the areas in which they have been dropped. This means that it is difficult, if not impossible, to comply with the spirit of Protocol II to the CCW Convention. The only guide to finding the many mines left behind after the battle will be tactical battle maps, if they are made available to the victim country, and the locations of civilian casualties.

95. Because of the vast numbers involved, and the complete absence of any marking, it is likely that the number of civilian casualties resulting from a large-scale strike with remotely delivered mines will greatly exceed the casualty rates seen with conventional minefields. Although the mines may lie on the surface, they will not be visible in any depth of vegetation. Trained military units will be able to cope with the situation, but civilian populations will not. Even the doubtful benefit of self-destruction or self-deactivation at a later date will not prevent widespread casualties in the initial days after the strike. There is little doubt that the development of remotely delivered mines has increased the probability of a major rise in post-conflict mine casualties.

96. The decreasing cost and increasing effectiveness of electronic components have led to the introduction of electronic fuses into many types of landmine. Sophisticated fuses are now becoming common in all but the cheapest mines. Developments are proceeding in two main areas: introduction of self-destruction or self-neutralization mechanisms into mines and making mines more hazardous to clear.

97. **Self-neutralization or self-destruction mechanisms** have been incorporated in the fuses of some mines since the 1970s, and these features are held by some to be a viable alternative to mapping and fencing minefields. In the US and most NATO countries it has now been decided that all remotely delivered mines must have this type of fusing. But these mechanisms will also be used for non-remotely delivered mines in non-fenced and guarded areas; such mines will have indiscriminate effects on civilians for as long as they remain live.

98. The problem is that fuses of this type have not yet demonstrated sufficient reliability under battlefield conditions. To provide acceptable protection for the civilian population, the reliability rate must be 99.6%, that is, the level achieved by humanitarian mine clearance operations. If this level of reliability is not achieved, the same slow and costly clearance procedures will have to be carried out as in areas containing long-life mines. As mentioned previously, even the fear of mines can keep civilians out of areas of land for many years. These fears can only be overcome by a very high level of assurance that no live mines are present.

99. The US Army states that "the U.S. does not currently contribute to" the humanitarian crisis caused by landmines and that all AP mines procured since 1974 have been fitted with self-destruct fuses.[129] However, a US clearance contractor working in Kuwait reported that some 1,700 mines equipped with such fuses in the Gulf war failed to self-destruct within the time specified in their design.[130]

100. A reason for the high failure level of self-destruct systems is that the manufacturers' dud rates are calculated on the basis of the design reliability of the component parts of the munition, whereas in reality the munition is only part of a system which includes human operators, and it is here that reliability expectations become most suspect. Human operators under the stress of war rarely function at maximum efficiency. Owing to a mistake in dropping height or speed, or in the fuse setting, the mine may fail to self-destruct as it is designed to do.[131]

101. The use of AP mines in snow and in mountainous areas has always been problematic. Fresh falls of snow can cover mines, making them ineffective; ski troops may not exert sufficient pressure to activate even AP mines. In mountainous areas, explosions can cause landslides and avalanches: a series of self-destructing mines exploding in a short period of time could have a major effect on mountainous terrain or its snow cover.[132] With heavy rain or melting snow, mines can be washed

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[129] US Army briefing for Conference on Landmines sponsored by the US Arms Control and Disarmament Agency, 16 August 1995.

[130] CMS Environmental, Inc., Tampa, Florida.

[131] A number of instances of inaccurate delivery were discovered by Brigadier Blagden during clearance operations in Kuwait following the Gulf war.

[132] Evidence given by Maj. General Banerjee, ICRC Meeting of Military Experts, February 1996.

into streams and may migrate many kilometres from their original point of emplacement.

102. As a further means of ensuring that mines do not remain live for extended periods, some have proposed making both the detonator and the self-destruction system dependent upon a battery which inevitably runs down over time, thus "deactivating" the mine and rendering it harmless. It has been suggested that a reliability rate of 99.9% can be achieved for this type of deactivation over a given period. Undoubtedly self-destruction, if accompanied by **backup self-deactivation**, would render a very high percentage of mines inert after a given period if (a) most or all mines were so equipped, (b) strict quality control were exercised over production lines and (c) the mines were laid correctly.

103. However, no government has yet proposed a system to ensure that high technical standards of mine production are enforced and many have even opposed verification of suspected illegal use of mines. And under combat conditions the more sensitive procedures for the laying of hi-tech mines will often not be observed. Given the choice between slightly more expensive "smart mines" and cheaper long-lived ones, many poor armies and insurgent forces will continue to buy long-lived mines from among the estimated 100 million such mines remaining in stockpiles around the world.

104. In general, areas infested by dud self-destruct mines or suspected of being so infested will have to be cleared, and shown to be cleared, just as if they were contaminated with conventional mines. The unreliability of most technical solutions means that a significant number of active mines will remain. The presence of these mines, or fear of their presence, may prevent both the intended manoeuvres of the laying forces and the use of land by locals or returning refugees. Alternatively, civilians will be driven by the need to venture into mined areas, with tragic consequences.

105. There is another, more peripheral, effect of the introduction of self-destruct/self-deactivating fuses. Nations which have the capability of designing and manufacturing such fuses are now attempting to have the relatively unrestricted use of these mines accepted as "lawful", while having the use of conventionally fused mines severely restricted or banned. This trend has already raised many queries among those

nations which do not have the technological expertise to design self-destructing mines, and are unwilling to purchase them at high prices from developed nations when they can manufacture conventional mines locally at a much lower cost.

106. It is therefore quite possible that the introduction of the self-destruct mine will lead to a proliferation of sites for the production both of self-destructing mines (in industrialized countries) and of conventional long-lived mines (in less developed countries). Thus, the "eventual elimination" of AP mines, called for in UN General Assembly resolutions in 1994 and 1995, will not take place. Conventional mines, which few countries have proposed banning outright, will continue to be employed in large numbers in low-intensity wars, as they have in the past. Some richer nations or factions will also be able to afford the newer remotely delivered mines for use in both defence and attack.[133]

107. Trends are moving towards the increased use of **hybrid mines** which have both anti-personnel and anti-tank characteristics. Their dual effects are produced by surrounding the anti-tank warhead with a pre-formed frangible case, optimized to attack personnel. The fusing of such mines is also responsive to both vehicles and humans. Jane's Information Group reports that "the rise of scatterable mines has blurred the already thin line between anti-personnel and anti-tank weapons, as most systems include sets of interchangeable anti-personnel and anti-tank mines utilizing common delivery systems".[134] *These trends towards dual AP and anti-tank fuses and dual delivery systems make it essential that mines which can injure persons be considered and regulated as anti-personnel mines whether they are said to be "primarily" designed as such or not.*[135]

108. **Mine fuses which are designed to explode if the mine is disturbed** are already being produced and used. The Chinese T72B is such a

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[133] Angola has already purchased the Avibras Astros rocket system, which may have a landmine delivery capability. Source: "Angola: Arms Trade and Violations of the Laws of War since the 1992 Elections", Human Rights Watch, 1994, p. 41.

[134] Trends in Land Mine Warfare, *op.cit.*, p.72.

[135] The definition of a mine currently under consideration in negotiations of amendments to Protocol II of the CCW Convention refers to an AP mine as one "primarily designed" to kill or injure persons, thus introducing a dangerous ambiguity into the definition and a possibly fatal weakness into the entire effort to control AP mines.

weapon; fitted with a tilt switch, it detonates if the mine is tilted by 15°. Thus if a prodder hits the mine during a clearance operation in soft ground, the mine may explode in the face of the mine-clearer. There are other fuses which fire the mine if an electronic mine detector is passed over them, or even if they are exposed to daylight. Fortunately, there is a good chance that mines which explode upon detection will be prohibited.

109. It is probable that **seismic fuses** are under development which can discriminate between an animal and a human, detonating only under the latter. The Soviet Army deployed acoustic sensor systems in Afghanistan which "listened" for approaching human footfalls. These sensors were electrically linked to a series of mines, which they fired when the target was close enough. By now the circuitry for such fuses can probably be contained within the mine itself.

110. The implications of such new fuses are that mines will become more hazardous to the civilian population than ever before. A conventional mine fuse acts only if trodden on in the area of the fuse pressure plate, which may be small, so the statistical risk of treading on it will be relatively small. If the fuse will activate when the victim comes within a radius of several metres, the lethality of the system is vastly enhanced, and there will be a heavier toll of civilian victims after a conflict. Mine clearance too will be adversely affected by such fusing; manual mine clearance, currently the only "effective" method, will become a slower, more expensive and more hazardous procedure unless new clearance technologies are developed. In some areas mine-clearance operators are currently killed or injured at a rate of one for every 2,000 mines cleared; this ratio is likely to increase if sophisticated fusing becomes widely used.

111. In addition to this increase in the radius of the trigger mechanism, mines with **greatly increased lethality and blast radius** are currently under development. A report on trends in mine warfare by Jane's Information Group anticipates an "increased scope for emplaced fuel air anti-personnel mines in the future" and provides details on some such systems.[136] Such mines could dramatically increase both the radius

[136] Trends in Land Mine Warfare, *op.cit.*, p.16.

and the power of a mine blast. They would inevitably kill individuals or groups of persons within a given radius. Those at the periphery might be spared or suffer lesser degrees of injury.

112. As indicated above, new technological developments may soon dramatically increase the range of delivery, the lethality and the triggering capabilities of AP mines, as well as the quantities used. It has not been demonstrated that the increased use of "smart" self-destructing mines will lead to large-scale abandonment of long-lived AP mines or that necessary controls will be in place to ensure that the "smart" mines used in conflicts around the world will function as planned. It is highly unlikely that the investment required for the conversion of mine stocks to newer high-tech models will be a step towards the "eventual elimination" of AP mines which most States have now accepted as a goal. Investment in new AP mine warfare capabilities indicates a clear choice not to pursue the elimination of these weapons rather than a step towards that goal.

VIII

MILITARY-INDUSTRIAL INTERFACE

113. Most landmines were originally designed by State arsenals or by the defence sector of industry in response to a request from the operational requirements branch of an army. In many countries, mines were made only if requested by the national army. The army, having considered its tactical doctrine and the likely threats, set out a detailed performance requirement, which the manufacturer or arsenal then attempted to meet. This performance requirement often laid down the size, weight and lethality of the mine, together with various operating characteristics, such as its compatibility with existing in-service mine-laying equipment. At the end of the development phase, the mine would be sent for trial with troops on exercises. If the trials were successful, the design would be passed on to the manufacturer or State arsenal for production for the army concerned, which then adopted an operating doctrine as to how the mine would be used.

114. Industrial manufacturers and State arsenals have sought to recoup research, design and development costs by finding other buyers for their mines outside the home market, as they do for other weapon systems. This has not proved difficult because foreign buyers tend to favour equipment and munitions that have gained acceptance with "home" armies. Responsible governments usually attempt to place some restraints on such sales by requiring exporters to provide end-user certificates, to ensure that the mines do not get into the wrong hands. However, end-user certificates are notoriously easy to obtain[137] and are often falsified by the recipient, with or without the knowledge of the supplier. It is probable that even when the transfer of mines is carefully regulated in a given country their ease of transfer on international markets has made them readily available to groups engaged in internal conflict.

115. The situation is aggravated by the fact that during the Cold War era some governments distributed mines rather freely to "client"

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[137] See evidence given by F. Petracco, Report of ICRC Symposium on AP Mines, Montreux, 21-23 April 1993.

armies or irregular forces to support their ideological struggles.[138] The result was a flood of cheap AP mines on the arms market, which created further demand as mines became increasingly popular as a weapon for low-intensity and guerrilla warfare. Industrial companies eventually began to develop and produce mines for foreign sales rather than for the needs of the "home" army.

116. Many countries have now changed their procurement procedures, relying on private-sector manufacturers to carry out research and development and to propose the resulting munitions to home armies, rather than waiting for a formal request.[139] This has placed the responsibility for mine design and production more squarely in the hands of industry, and the number of different types of mine available from some manufacturers, and the rate at which they are developed, are in many cases wholly in excess of domestic military requirements, which are usually based on a 5-10 year cycle. This has resulted in vast overproduction of mines and almost universal availability. It has also contributed to the continuing and increasing worldwide mine problem.

117. Another factor contributing to the availability of landmines is the "down-sizing" of armies in line with the reduction in tension following the end of the Cold War. Ammunition and weapon holdings have often been significantly reduced to save storage costs, and nations tend to sell off the surplus rather than destroy it. Thus the end of the Cold War has hastened the transfer of large and cheap mine stocks from developed countries.

118. The linkage between the stated need for mines on the part of developed nations and the actual use of mines in internal conflicts by warlords and irregular forces is well documented. Almost all the mines used in all forms of warfare, both "conventional" and low-intensity, originated from major manufacturing countries, where they were probably initially designed to meet the requirements of those countries' own armies. Had the armies of the manufacturing countries not used

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[138] The Soviet Union's supply of arms to Angola is mentioned in "Angola - Arms Trade and Violations of the Laws of War since the 1992 Elections", Human Rights Watch, 1994.

[139] This policy was adopted by the UK following the privatization of its national armaments industry and the reduction of government-funded research and development in the 1980s.

mines, these weapons would not have been designed, manufactured or exported.

119. To refute this linkage, it has been pointed out that where mines have not been available, irregular troops have manufactured their own improvised versions, for example by converting bombs and sub-munitions in Viet Nam, and by making home-made mines in El Salvador and Guatemala. Such mines were costly in terms of manpower and time, and in general proved less reliable than purpose-designed mines, because they were difficult to waterproof and depended upon commercial batteries.[140] Because of their unreliability, lower numbers and short life, home-made AP mines tend to pose a lesser threat to the civilian community after the end of the conflict than factory-produced mines.

120. Mine production is estimated to have taken place in more than 46 countries.[141] In some cases mines are produced under licence[142] and are exact copies of the original, making it difficult to determine the country of origin. Copies of mine designs have also been produced unlawfully. Moreover, it is possible that overseas licensed production is being used as a method of evading national export moratoria. Moreover, the export of plastic cases, or the non-explosive components of fuses, is not necessarily covered by national bans. This means that mine components can be exported, and the mines can be assembled and fitted with the explosive components (often easily emplaced pressed explosive pellets) outside the country which designed them, in countries which are not bound by any form of legal restraint.

121. It should therefore be recognized that changes in the interface between the military and industry, and the selling-off of arms and munition stocks following the Cold War, have contributed to the availability of AP landmines on both the legal and the illegal arms markets.

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[140] Specimens of these mines were seen by Brigadier Blagden during clearance operations at San José las Flores and San Francisco Javier, 8-10 June 1993.

[141] Landmines: A Deadly Legacy, *op.cit.*, p. 102.

[142] Evidence from F. Petracco, ICRC Symposium on AP Mines, *op.cit.*

IX

POSSIBLE ALTERNATIVES TO ANTI-PERSONNEL MINES

122. Recent calls for a ban on AP mines have prompted examination of alternatives to landmines. The United States and British Armies have carried out some studies on this subject, but the results have been negative. Consideration has also been given to **engineered obstacles** in general, but no obvious alternative to the mine has emerged. Most of the alternative solutions considered were aimed against vehicles as opposed to unprotected soldiers.

123. **Ditches, lights, spikes, slippery surfaces and foam** are possible adjuncts to an obstacle system, but they have less of a deterrent effect than mines. **Barbed-wire entanglements**, if used properly and covered by aimed fire, can exert an equivalent delaying effect on enemy troops, although they are slow and labour-intensive to deploy and maintain.[143] **Protective fences**, often in combination with sensors, have played an important role in the Western Sahara, the Punjab and the Golan Heights.

124. In at least one instance it has been demonstrated that **good intelligence, normal vigilance and tactical flexibility** are viable alternatives to the use of AP mines, and can make static defence systems such as the AP mine decreasingly relevant.[144]

125. An increasing number of armies are renouncing the use of AP mines on the grounds that other **munitions** are an acceptable substitute with less long-term effects on the civilian population. The M18A1 Claymore AP munition (otherwise known as a directional fragmentation mine and widely produced under other names) lies on the borderline between a mine and a munition. In some modes it can be

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[143] However the demands of these alternatives must be weighed against those of AP mines as described in paragraphs 48.h, 53, 66 and Section VI of the current paper.

[144] Report given by Colonel Alfonso Dagudag, ICRC Meeting of Military Experts, February 1996, on tactics used by government troops against insurgents in the Philippines. As a result, the country is virtually free of mines despite decades of internal armed conflict.

command-detonated, i.e., it can be fired by a soldier when a military target presents itself. Under these circumstances it is usually classified as a munition. However, it can also be triggered by a tripwire firing device, thus becoming victim-actuated, which puts it in the mine category.

126. If the Claymore-type mine were only designed to be used by command detonation, and did not include the possibility of fitting a tripwire firing system to it, it could be classified as a munition and as such would be an acceptable alternative to the normal blast and fragmentation-type mines. Such munitions are easily emplaced, and equally easy to remove when no longer tactically relevant. Even if left behind they would be easy to detect, having a high metal content, and would not cause civilian casualties unless badly mishandled.

127. South African forces, in the struggle against insurgents, used a border system which is claimed to have resulted in no accidental killings or civilian casualties. This involved the use of perimeter demarcation, harmless mechanical and electronic sensors, and command-detonated directional fragmentation munitions (Claymore-type dual use directional mine-munitions, used in munition mode) visibly mounted on posts 6 metres above the ground. The link between the sensors and the weapons was a soldier in an armoured control post outside the minefield who confirmed the firing command initiated by the triggering of a sensor. This system eliminated the traditional risks associated with minefield maintenance, as the system could simply be switched off. It thus allowed for safe passage by forces, farmers and cattle under appropriate conditions. With the end of *apartheid* the sensors were switched off and the mines easily removed.[145]

128. It is suggested that the use of continuous electronic or electro-optical sensors linked to direct fire weapons such as fragmentation mines, mounted machine guns, rifle grenades, etc. would be far more effective than minefields in preventing infiltration. While the statistical chance of an infiltrator stepping on a traditional pressure mine are

[145] Source: written submission to the ICRC by Dr Vernon Joynt, Mechem Consultants (military and mine clearance), Pretoria, February 1996.

estimated to be low,[146] his chance of hitting a continuous sensor approach 100%. If a human confirmation of the threat and a human decision to fire is interposed between sensor triggering and the firing of the weapon, one could achieve both greater effectiveness and far fewer indiscriminate casualties.

129. Increased use of **remote surveillance methods** such as electronic sensing devices, real-time satellite intelligence and drone aircraft with infrared and photographic capabilities could, for countries with access to such technology, substitute for mine use. The early-warning capabilities of such devices could offer military advantages similar to the delaying effect of minefields. Upon detection, advancing forces could be targeted with ordnance other than mines, delivered by artillery, aircraft or direct fire.

130. Many of these technologies are currently available to modern armies whose enhanced ability to "see" large areas of the battlefield has been among the most significant developments in modern warfare. There is no reason why this capability should not be harnessed in the interests of eliminating the need for an indiscriminate weapon with staggering clearance and humanitarian costs. Currently available equipment such as **trip flares and night vision equipment** could also serve an early warning purpose similar to that of mines in detecting attempts at breaching or infiltration.

131. Surprisingly, there is no evidence that any government has tried to **reduce the lethality of the AP mine**. It has been argued that mine injuries are no worse than those caused by other weapon systems, but medical evidence tends to refute this, as the effects of AP mine explosions are usually death or permanent mutilation.[147] Such severe injury is arguably not necessary to take a soldier out of action.[148] The amount of explosive used in current AP mines is far in excess of the

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[146] *Ibid.*, interview 8 February 1996. Assumes traditional laying of 3 AP mines per metre of front. Estimated chance of a person stepping on an AP mine is about 10% and of a tracked vehicle hitting an anti-tank mine about 25% or less. Owing to the extended period during which civilians are exposed to these same mines the probability of casualties approaches 100% for mines in civilian areas.

[147] ICRC war surgeons have stated that mine injuries are among the most horrific they regularly encounter.

[148] International humanitarian law prohibits the use of weapons of a nature to cause unnecessary suffering; that is, those which cause injury in excess of that required to take a soldier out of action.

amount needed to incapacitate an active soldier.[149] Moreover, the very mechanism of wounding by pressure-activated mines embedded in the earth ensures maximum foreign-object contamination in the wound. This excessive capacity to injure is a matter of deliberate design. It is interesting to note that a mine incorporating a rifle bullet was developed by the British in the late 1950's, but was never produced.[150] The relatively clean wound caused by a rifle bullet would have been sufficiently incapacitating, but might have generated less permanent damage.

132. **Improved clearance technologies and more resistant mine-protected vehicles** could reduce or eliminate the incentive for parties to conflict to use AP mines. The use of even older models of mine-resistant vehicles was said to have rendered mines relatively ineffective during the struggle against *apartheid* in South Africa and to have been a reason for the reduced use of mines by the insurgents after a campaign of about 18 months.[151] This, together with the policy of not using traditional minefields on its borders, has resulted in a country which is virtually mine-free, whereas other post-conflict societies in southern Africa are ravaged by mine contamination.

133. Although no one of the above solutions fulfils all the purposes of an AP mine, one must ask whether an AP mine itself does either. It is perhaps time for a major research effort to review possible alternatives in the light of recent advances in technology.

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[149] The explosive content of the Canadian C3 AP mine is 9.4 g, that of the Soviet PMN1 is 240 g.

[150] Identified as UK AP No. 8 (SAM).

[151] Written submission to ICRC by Dr Vernon Joynt, *op.cit*.

X

POLITICAL RESPONSIBILITY

134. At present, governments which permit their forces to lay mines in foreign countries rarely cooperate in the joint operations necessary for the removal of those mines, although they are encouraged to do so in accordance with Article 9 of Protocol II of the CCW Convention.[152] Unfortunately there is no mechanism for obliging mine-laying nations to cooperate, so the removal of the mines becomes the responsibility of the victim State. When mine contamination is brought about by warring factions within a State, there is even greater reluctance to accept responsibility. Attempts are made to shift the blame onto the ''Western'' nations who made the mines,[153] ignoring the fact that the factions knowingly polluted their own country with mines purchased from manufacturers all over the world.

135. One reason for the reluctance of governments to accept responsibility for mine contamination of a victim State is the difficulty of establishing ''ownership'' of mines. Some governments strenuously deny using such weapons even when their armed forces have admitted to doing so. The mine market is now so diverse that mines of almost every type are available and, as noted above, the apparent country of manufacture is not necessarily the actual source. However, in many internal conflicts the history of the progress of the war could give a good indication of who laid the mines, and it should not be impossible to arrive at some form of international or independent arbitration whereby nations which have laid mines are each apportioned part of the responsibility to fund their removal and/or to directly assist in clearance operations.

136. It is also a strange fact that governments which actively support mine removal by contributing to UN and other mine-clearance

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[152] Although Argentina is starting a clearance programme in the Falkland-Malvinas Islands. The Guatemalan National Revolutionary Union has also undertaken to remove mines which no longer serve a military purpose and to provide information to the UN's MINUGUA operation on the location of abandoned mines in areas no longer under its control.

[153] E.g. a remark made to Brigadier Blagden in Mozambique, January 1993.

programmes still encourage the production and export of the very mines which cause the problem, even when they know that a mine which one of their companies can sell to a customer for, say, $4 will cost themselves and other contributing nations between $200 and $1,000 to clear. If the profit made on each mine amounts to as much as 100%, i.e. $2 for each mine and the government gets 10% back in direct taxation, this means that if the government donates $1 million for mine clearance in any one year it will have to agree to the sale of 5 million mines during the same period to pay for the donation. Other governments, without mine production, will have to find the balance of the donations necessary to clear those 5 million mines, which could amount to between $1 and 5 billion. Perhaps if there were closer liaison between the trade and foreign aid ministries in each country this kind of anomaly would receive more attention.

137. It is a disturbing paradox that governments which express in national, regional and international fora their horror about the worldwide mine situation or about their condition as victim States show so little responsibility when it comes to permitting their own armed forces to stockpile and use landmines. Two Central European presidents have actively sought international assistance in solving their landmine problem, while at the same time permitting their own armies to compound that problem. One North African country has sought financial aid for mine clearance, while at the same time laying mines in the territory of a neighbour. A Latin American country has urged the imposition of greater penalties on countries producing mines, while at the same time laying mines on its own borders. This kind of double standard will have to be eradicated if the worldwide mine problem is to be effectively addressed.

XI

CONCLUSIONS

(Unanimously endorsed in their personal capacity by members of a Group of Military Experts, 12-13 February 1996 and by other military experts whose names appear in the annex to this report.)

1. The military value of landmines, as used in actual conflicts over the past 55 years, has received little attention in published military studies. The specific added value of AP mines, as compared to that of anti-tank mines, has barely received any attention. There is also little evidence that dedicated research on the value of AP mines, based on historical experience, has been carried out within professional military organizations.

2. The material which is available on the use of AP landmines does not substantiate claims that AP mines are indispensable weapons of high military value. On the other hand, their value for indiscriminate harassment when used by irregular forces can be high. Their use for population control has regrettably been all too effective.

3. The cases reviewed in this study, together with the personal experience of members of the Group of Experts, provide a basis for a number of initial conclusions regarding traditionally emplaced mines:

- Establishing, monitoring and maintaining an extensive border minefield is time-consuming, expensive and dangerous. In order to have any efficacy at all they need to be under continuous observation and direct fire, which is not always possible. Because of these practical difficulties some armed forces have entirely refrained from using such minefields. Moreover, these minefields have not proved successful in preventing infiltration.
- Under battlefield conditions the use, marking, and mapping of mines in accordance with classical military doctrine and international humanitarian law is extremely difficult, even for professional armed forces. History indicates that effective marking and mapping of mines has rarely occurred.

- The cost to forces using AP mines in terms of casualties, limitation of tactical flexibility and loss of sympathy of the indigenous population is higher than has been generally acknowledged.
- Use in accordance with traditional military doctrine appears to have occurred infrequently and only when the following specific conditions were met:
  - both parties to the conflict were disciplined professional armies with a high sense of responsibility and engaged in a short-lived international conflict;
  - the tactical situations were fairly static;
  - mines were not a major component of the conflict;
  - forces possessed adequate time and resources to mark, monitor and maintain minefields in accordance with law and doctrine;
  - mined areas were of sufficient economic or military value to ensure that mine clearance occurred;
  - the parties had sufficient resources to ensure clearance and it was carried out without delay; and
  - the political will existed to strictly limit the use of mines and to clear them as indicated above.

4. Although the military value of anti-tank mines is acknowledged, the value of AP mines is questionable. Their use to protect anti-tank mines is generally claimed to be an important purpose of AP mines, but there are few historical examples to substantiate the effectiveness of such use.

- Where minefields are cleared by roller, plough, flail, explosive-filled hose, fuel-air explosive or bombardment, the value of AP mines has not been demonstrated.
- The effect of AP mines against unprotected infantry is limited; a relatively small percentage of troops is rendered *hors de combat*. Infantry have in the past advanced through AP minefields, accepting the risk and casualties this entails.
- The use of AP mines for harassment, whether in international or internal conflicts, is of doubtful military value. Historically, this use has ultimately targeted civilians.

5. Remotely delivered AP mines are not solely defensive weapons. In practice they will probably be used in huge quantities to saturate target areas. Even so, the mobility of professional armies will not be significantly hindered.

Remotely delivered AP mines will almost certainly cause vastly increased civilian casualties, even if such mines are designed to be self-destructing and self-deactivating, for the following reasons:

- they will be dangerous during their intended active life;
- the marking and mapping of such mines will be virtually impossible;
- in extended conflicts they may be re-laid many times;
- self-destructing and deactivating devices may be unreliable;
- inactive mines, like unexploded ordnance, can still be dangerous; and
- the mere presence of mined areas will produce fear, keeping civilians out of areas important for their livelihood.

6. Some barrier systems and other tactical methods offer alternatives to AP mines. Additional alternatives should be pursued rather than further development of any new AP mine technologies. Developments which further increase the lethality of AP mines are to be deplored and are unnecessary.

7. Improved mine clearance technologies for military, humanitarian and civilian agencies should be vigorously developed with a goal of making AP mines progressively less useful.

8. The limited military utility of AP mines is far outweighed by the appalling humanitarian consequences of their use in actual conflicts. On this basis their prohibition and elimination should be pursued as a matter of utmost urgency by governments and the entire international community.

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ANNEXES

Annex I

Meeting of Experts on the Military Use and Effectiveness of Anti-personnel Mines

Geneva
12-13 February 1996

List of participants

All attended and endorsed the conclusions in their personal capacity.

Maj. General Dipankar Banerjee, Co-Director, Institute for Peace and Conflict Studies, New Delhi; former commander *inter alia* of a mountain division in counter-insurgency operations; author and researcher on national, regional and international security issues.

Brigadier (ret.) Patrick Blagden, Senior Adviser on mine clearance, UN Department of Peacekeeping Operations (1992-95), former British Army officer responsible for weapons research, former defence industry executive.

Colonel Alfonso Dagudag, Chief of Staff, Seventh Division, Armed Forces of the Philippines; member of Strategic Group on Modernization of AFP Weaponry.

Brig. General (ret.) Henny van der Graaf, Director, Center for Arms Control and Verification Technology, Eindhoven, the Netherlands; member of Advisory Board on Disarmament to the UN Secretary General, member of UN Mission to Mali on the control of small arms transfers.

Colonel Marcel Fantoni, Federal Military Department, Bern, Switzerland; Chief of Staff, Light Infantry Division; Ecole de Recrue, Birmensdorf.

Maj. (ret.) Ted Itani, Consultant on security and humanitarian policy, Ottawa, Canada; Technical Consultant for the War Crimes Tribunal at the Hague; former officer for humanitarian and mine clearance operations in Bosnia-Herzegovina, Pakistan/Afghanistan and Iraq; former artillery officer and instructor in combined arms operations in the Canadian Army.

Colonel A.J. Roussouw, Senior Staff Officer, Combat Engineers, South African National Defence Force; former commander of field

squadrons; mine warfare and clearance operations in Angola and Namibia.

Lt. Colonel (ret.) Martin Rupiah, Lecturer, University of Zimbabwe, writer on landmines in Zimbabwe, former director and unit commander, Army of Zimbabwe.

Other military commanders endorsing the study's conclusions:
(as at 1 August 1997)

Austria

Major General Günther G. Greindl, Director General for International Policies, Austrian Ministry of Defence.

Brigadier (ret.) Leo Jedlicka, former deputy head, Austrian Army proving ground; head of training for Austrian Army and UN peacekeeping forces.

Benin

Lieutenant Colonel Amoussa Chabi Mathieu Boni, General Staff of the Army.

Colonel Feliçien Dos Santos, Head of General Staff of the Army.

Lieutenant Colonel Florent Fagla, First Inter-Army Battalion.

Colonel Paul Sagbo, Directorate, Army Health Service.

Canada

Major General (ret.) John A. MacInnis CMM, MSC, CD, Chief, Mine Clearance and Policy Unit, Department of Humanitarian Affairs, United Nations, New York.

Major General (ret.) Lewis MacKenzie, MSC, CD, Canadian Army, first Commander of UNPROFOR forces, sector Sarajevo (1992).

General (ret.) Paul D. Manson; former Chief of the Defence Staff, Canadian Army.

Cape Verde

Captain Arlindo José Rodrigues, Director, Direction of Operations, Joint Chiefs of Staff.

Major Antonio Carlos Tavares, Director, Department of Operations, Joint Chiefs of Staff.

Croatia

Major General (ret.) Ivo Prodan, former head of the Medical Corps, Croatian Army.

General (ret.) Anton Tus, former Chief-of-Staff, Croatian Army.

France

General (ret.) Jacques Saulnier, former head of the Joint Chiefs of Staff of French Armed Forces.

Germany

Brigadier General (ret.) Hermann Hagena, former Deputy Commander, Command and General Staff College, Hamburg.

Ghana

Colonel A.B. Donkor, Judge Advocate General, Armed Forces of Ghana.

Jordan

Field Marshal (ret.) Fathi Abu Taleb, former chairman of the joint chiefs of staff, Jordanian Armed Forces.

Brigadier General (ret.) Fawwaz B. al-Khriesha, former commander of engineering field battallions, Jordanian Armed Forces.

Major General PSC. (ret.) Shafik Jumean, former director of the staff college.

Major General PSC. (ret.) Yousef A. Kawash, former director of morale guidance, Jordanian Armed Forces.

Norway

Vice Admiral (ret.) Roy Breivik, Norwegian Navy.

Major General (ret.) Bjørn Egge, Norwegian Army; President, World Veterans Federation.

Peru

Vice Admiral (ret.) José Carcelen Basurto, former commander of naval zones.

Admiral (ret.) Hugo Ramirez Canaval, former Commodore of the Navy.

Major General (ret.) Cesar E. Rosas Cresto, former Minister of Housing.

Major General (ret.) Eduardo Angeles Figueroa, Air Force of Peru.

Major General (ret.) Julian Julia Freyre, former Minster of Defence and Commander in Chief of the Army.

Colonel (ret.) José Bailetti Mac-Kee, former head of the National Planning Institute.

Major General (ret.) Alfredo Rodriguez Martinez, former Commander in Chief of the Army.

Lieutenant General (ret.) Pedro Sala Orosco, former Minister of Labour.

Major General (ret.) Pedro Richter Prada, former Minister of Defence and Commander in Chief of the Army.

* Major General (ret.) Alejandro Cuadra Rabines, former Minister of Defence and Commander in Chief of the Army.

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* deceased

Major General (ret.) Otto Elespuru Revoredo, former Commander in Chief of the Army.

Major General (ret.) Luis Alcantara Vallejo, former head of the National Defence Secretariat.

Philippines

General Arturo T. Enrile, Chief of Staff, Armed Forces of the Philippines.

Slovenia

Major General (ret.) Lado Ambrozic, Army.

Colonel General (ret.) Ivan Dolnicar, Air Force.

Colonel General (ret.) Rudolf Hribernik, Army.

Major General (ret.) Lado Kocijan, Army; Professor of Defense Studies.

Colonel General (ret.) Stane Potocar, Army.

Major General (ret.) Jamez Slopar, Army.

Colonel-General (ret.) Avgust Vrtar, Army.

United Kingdom

General Sir Hugh Beach (ret.), British Army, former Master General of the Ordnance, commandant of the Army Staff College, and involved in Royal Engineers mine clearance operations in north-western Europe (1944).

General (ret.) Sir Peter de la Billiere, Commander of British forces in Middle East, 1990-91, Commander of British forces in Falklands/ Malvinas Islands, 1984-85.

Brigadier (ret.) J.H. Hooper, OBE, DL, former Royal Engineer officer, British Army.

General (ret.) Sir David Ramsbotham GCB, CBE; Chief Inspector of Prisons, Adjutant General 1990-93.

Zimbabwe

Brigadier G.M. Chiweshe, Judge Advocate General, Ministry of Defence.

Total endorsements: 55 active and retired officers from 19 countries.

The ICRC welcomes additional endorsements of the conclusions of this paper by active or retired military officers, acting in their personal capacity. Such endorsements will be added to a list to be updated periodically and added to future editions of this study.

Annex II

Anti-personnel Mines: What Future for Asia? Regional Seminar for Asian Military and Strategic Studies Experts

Manila
20-23 July 1997

Final Declaration of Participants

The undersigned Asian military and strategic studies analysts from 14 countries gathered in Manila to examine the experience of anti-personnel mine use in the region. The analysts discussed the military effectiveness of anti-personnel mines based on their actual combat performance in Asian and other conflicts. The military value of AP mines was considered in the context of the long-term human, social and economic costs incurred in many of the conflicts in which this weapon has been used. Particular attention was given to the difficulties and extremely high costs of post-conflict mine clearance.

The seminar sought to develop recommendations which will promote and broaden dialogue within Asian military and political circles on the question of anti-personnel mines. It is hoped that the work of the Manila seminar can contribute to the development of a common approach within the region to the humanitarian problems which anti-personnel mines have caused in Asia and globally. The following statement was adopted by participants acting in their personal capacities.

The undersigned participants in the regional seminar "Anti-personnel Landmines: What Future for Asia?" agree that:

1. The global scourge of anti-personnel landmines, which kill and injure some 2,000 persons per month, most of whom are civilians, is unacceptable and must be stopped. These mines not only kill and maim combatants in an inhumane way, but also indiscriminately affect civilians and inflict on them enormous physical and psychological damage long after the conflict is over. This must be a grave and continuous concern of the international community;

2. In most conflicts, the appalling humanitarian consequences of the use of anti-personnel mines have far outweighed their military utility;

3. The use of anti-personnel landmines in internal armed conflicts, either by State or non-State actors, should not be condoned;

4. The cases considered during the seminar, and the personal experience of participants, lead to some initial conclusions concerning traditionally emplaced mines:

- Establishing, monitoring and maintaining extensive border minefields is time-consuming, expensive and dangerous. In order to be effective they need to be under continuous observation and direct fire, which is not always possible. Because of these practical difficulties some armed forces have entirely refrained from using such minefields. Moreover, these minefields have not always proved successful in preventing infiltration.
- Under battlefield conditions the use, marking, mapping and removal of mines in accordance with classical military doctrine and international humanitarian law is extremely difficult, even for professional armed forces. History indicates that effective marking, mapping and removal of mines have rarely occurred.[1] The cost to forces using anti-personnel mines, in terms of casualties to one's own forces and civilians, the limitation of tactical flexibility and the loss of sympathy of the indigenous population is higher than has been generally acknowledged.
- Use in accordance with traditional military doctrine appears to have occurred infrequently and only when the following specific conditions were met:
  - both parties to the conflict were disciplined professional armies with a high sense of responsibility and engaged in a short-lived international conflict,
  - the tactical situations were fairly static,
  - mines were not a major component of the conflict,
  - forces possessed adequate time and resources to mark, monitor and maintain minefields in accordance with law and doctrine,
  - mined areas were of sufficient economic or military value to ensure that mine clearance occurred,

[1] According to a number of participants these requirements were successfully carried out in the India-Pakistan wars.

– parties had sufficient resources to ensure clearance and it was carried out without delay, and
– the political will existed to limit strictly the use of mines and to clear them as indicated above;

5. Remotely delivered anti-personnel mines are not exclusively defensive weapons. They can easily be used in an offensive manner behind frontlines to prevent reinforcement and escape, and to saturate target areas.

Remotely delivered anti-personnel mines can cause vastly increased civilian casualties, even if such mines are designed to be self-destructing and self-deactivating, for the following reasons:

- they will be dangerous during their intended active life-time,
- the fencing and marking of such mines will be virtually impossible,
- in extended conflicts minefields may be re-laid many times,
- self-destructing and deactivating devices may be unreliable,
- inactive mines, as unexploded ordnance, can still be dangerous, and
- the mere presence of mined areas will produce fear, keeping civilians out of areas important for their livelihood:

6. Some barrier systems and other methods offer more humane alternatives to anti-personnel mines under certain circumstances. Additional alternatives should be pursued rather than further development of any new anti-personnel mine technologies. Developments which further increase, rather than reduce, the lethality of anti-personnel mines are to be deplored and are unnecessary;

7. Those who have used and those who have supplied anti-personnel mines bear a joint responsibility to ensure the clearance of these weapons and the provision of adequate care to their victims;

8. Improved mine clearance technologies for military, humanitarian and civilian agencies that are affordable and easy to use should be vigorously developed with a goal of making the use of anti-personnel mines progressively less useful;

9. Since resources are not currently available even to clear mines currently in the ground, any attempt to deploy additional anti-personnel mines is likely to impose an unacceptable level of cost to countries that are least able to bear it;

10. Countries in Asia, including Afghanistan, Cambodia, Laos and Viet Nam are among those most affected by anti-personnel mines and similar remnants of war; and

11. Notwithstanding successive UN resolutions since 1994 calling for increased assistance by all States to mine-affected countries, the actual assistance rendered has fallen far short of the requirements.

The undersigned participants therefore call upon States of the Asian region to consider the following urgent measures:

1. The adoption of national prohibitions on the production, stockpiling, transfer and use of anti-personnel mines;

2. For those States which are not yet Parties, adherence to the 1980 United Nations Convention on Certain Conventional Weapons, including its Protocol II on landmines (as amended on 3 May 1996), and for current States party to this Convention that have not yet done so adherence to its amended Protocol II at the earliest possible date to ensure its early entry into force;

3. A substantial increase in assistance to mine-affected countries in the region, including Afghanistan, Cambodia, Laos and Viet Nam. Such assistance might include provision of trained manpower, specialized equipment and funds to cope with the problems of landmines laid in those countries. The delivery of such assistance should be considered a purely humanitarian measure, should be free of political considerations, and should not be at the expense of other forms of humanitarian assistance;

4. The initiation, through all appropriate institutions, including the Asian Development Bank, of programmes of regional cooperation in the fields of mine clearance, mine-risk education and victim assistance;

5. The rapid adoption of a regional agreement to prohibit remotely delivered anti-personnel landmines in Asia so as to prevent an escalation of mine warfare in the region and even higher levels of civilian casualties; and

6. Participation in upcoming negotiations aimed at the conclusion of a new treaty comprehensively prohibiting anti-personnel landmines by the end of 1997.

7. To build on and work towards the implementation of United Nations General Assembly Resolution 51/45S calling for the conclusion of a legally-binding agreement totally prohibiting anti-personnel landmines.

The undersigned participants appeal to **the international community**:

1. To pursue as a matter of urgency the prohibition and elimination of anti-personnel mines;

2. For those States which are not yet Parties, to adhere to the 1980 United Nations Convention on Certain Conventional Weapons, including its Protocol II on landmines (as amended on 3 May 1996), and for current States party to this Convention that have not yet done so to adhere to its amended Protocol II at the earliest possible date to ensure its early entry into force;

3. To recognize that the use of anti-personnel landmines in internal armed conflicts, either by State or non-State actors, should not be condoned;

4. To explore how non-State actors involved in internal armed conflicts can be encouraged to end the use of anti-personnel mines;

5. To assist mine-affected countries in Asia in ending the scourge of anti-personnel mines on their soil, in particular through the provision of technical, financial and other assistance in the clearance and destruction of mines, assistance to victims and mine awareness programmes; and

6. To adopt a compassionate approach to the reunification of mine victims with family members living in mine-free countries.

Participants express their thanks to the International Committee of the Red Cross for convening the seminar, and for its ongoing efforts on behalf of war victims in many of the countries of the region and to the Government of the Republic of the Philippines and Philippine National Red Cross for the generous hospitality they have provided in Manila.

Manila, 23 July 1997

A. UNDERSIGNED PARTICIPANTS

Afghanistan

1. Mr Sayed Aqa
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Australia

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3. Major Don Hughes
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4. Lieutenant Colonel (ret.) Ian Mansfield
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5. Mr. Niem Chouleng
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6. Mr. John English
   former Member of Parliament, Representative of the Department of Foreign Affairs and Trade

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   Co-Director, Institute for Peace and Conflict Studies, New Delhi
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Thailand

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United Kingdom

23. Brigadier (ret.) Paddy Blagden
former UN Mines Advisor, Farnham, U.K.
24. Dr. Chris Smith
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United States of America

25. Lt. Gen. (ret.) Robert G. Gard, Jr.
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B. OTHER PARTICIPANTS

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1. Colonel (ret.) Xia Liping*
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   Defence Analyst, International Politics and Military Affairs, Tokyo

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* *Some participants shared the humanitarian concerns expressed in this document but consider that the proposed prohibitions and restrictions on anti-personnel landmines should be pursued on a step-by-step basis according to the prevailing conditions faced by their countries.*

MISSION

The International Committee of the Red Cross (ICRC) is an impartial, neutral and independent organization whose exclusively humanitarian mission is to protect the lives and dignity of victims of war and internal violence and to provide them with assistance. It directs and coordinates the international relief activities conducted by the Movement in situations of conflict. It also endeavours to prevent suffering by promoting and strengthening humanitarian law and universal humanitarian principles. Established in 1863, the ICRC is at the origin of the International Red Cross and Red Crescent Movement.

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