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Landmines: Basic Facts and Congressional Concerns

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Abstract. The global proliferation of anti-personnel landmines impedes the resettlement of refugees, threatens international peacekeepers, and endangers civilians who live on previously contested territory. Congress and the Clinton Administration have attempted to address the problem of global landmine proliferation through international treaty, improved landmine and countermine technology, and humanitarian assistance. Moreover, U.S. military doctrine clearly defines guidance for the conduct of mine warfare by the Armed Forces.

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Landmines: Background and Congressional Concerns

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ABSTRACT

This is a comprehensive report on the subject of anti-personnel landmines, to include background about the use and mis-use of these small military weapons, relevant international treaties, Administration policies, and Congressional legislation. Specific subjects covered include humanitarian demining activities, Ottawa Treaty, Convention on Conventional Weapons, Conference on Disarmament, status of U.S. moratoria on export and use, and a glossary of terms. Anti-tank landmines are not addressed directly. The report is meant to assist those interested in legislation affecting U.S. military forces, foreign relations, and humanitarian concerns as related to landmines. The report will be updated occasionally as major events of interest to Congress occur.

Landmines: Basic Facts and Congressional Concerns

Summary

The decade of the 1990s saw increasing awareness of the dangers to innocent civilians posed by the indiscriminate use of anti-personnel landmines (APL) in many conflict-torn countries. The deployment of U.S. military forces to Bosnia as part of the NATO-led Implementation Force (IFOR), refocused the attention of the Congress and citizenry on the dangers of APL. Prior to participation by the U.S. military in IFOR, the U.S. Congress had manifested a concern with the larger issue of AP landmine proliferation, through hearings and legislation.

The history of warfare evinces three uses of AP landmines. The first use is as a tactical weapon employed to protect friendly forces from an enemy advance, or to canalize an enemy into fields of fire. AP landmines are also used in conjunction with antitank mines (AT mines). Second, landmines have also been used as a weapon to intimidate and control populations. Use of landmines as a terror weapon is prevalent during irregular warfare. The third, consequential role of landmines in warfare is as an indefinite hazard to civilians. Landmines left in place after the termination of hostilities have served as a hindrance to refugee resettlement, development, and peacekeeping operations.

The response of the United States Congress to landmine proliferation has been multifaceted. Moreover, to control the tactical role of landmines, the U.S. military is guided by law and doctrine. Advances in the technology of mine warfare, such as remotely delivered or scatterable mines, have been accompanied by the development of self-destructing and self-deactivating capabilities. To curtail the indiscriminate use of mines, the U.S. Congress has prohibited the export of AP mines by U.S. companies. Congress has reviewed Protocol II of The Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons; an amended protocol remains before the Senate. Public Law 104-107 will ban U.S. use of APL in 1999 — the Administration has asked for repeal. Lastly, Congress has appropriated funds for demining training and other assistance to nations with landmine problems, research and development of countermine technology, and grants for demining equipment.

Current U.S. policy is eventually to ban the use of all APL worldwide. The Administration, however, wants to retain the use of dumb mines in Korea and the use of smart mines in potential combat situations until alternative technologies are available. Advocates for more rapid action support joining the Ottawa Treaty, which was ready for signing in December 1997, immediately. The Administration prefers the step-by-step approach traditionally adopted by the Conference on Disarmament in Geneva to gain more universal participation, but has set a goal of signing the Ottawa Treaty in 2006 if alternatives to APL are then available.

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Introduction

Throughout the decade of the 1990s, thousands of innocent civilians have been injured or killed by residual anti-personnel landmines (APL) from many local and regional conflicts around the world. Humanitarian organizations and concerned individuals strove to raise world consciousness of this tragedy. The deployment of U.S. military forces to Bosnia as part of the NATO-led implementation force (IFOR), and the prospect of subsequent casualties resulting from landmines, focused the attention of Congress, journalists, and the citizenry on the larger dangers of anti-personnel (AP) landmines.

Efforts to meet the concern of a landmine threat to U.S. service members included: first, existing U.S. military doctrine for both the tactical employment of mines and demining operations; second, a legislative history[1] of the efforts of Congress and individual members to ban the use and export of AP mines; and third, an amendment to Protocol II of The Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons (CCW) by the treaty signatories. Two efforts towards an international treaty to ban APL are ongoing. In essence, the problem of landmine proliferation, particularly in countries such as Cambodia, Afghanistan, and Angola was recognized by both the Congress and the Clinton Administration prior to the creation of IFOR. Moreover, both the global proliferation of AP mines, and congressional efforts to curtail the export and production of landmines hold significant implications for several facets of American foreign policy.

The landmine, easily manufactured and transported, serves a role in the military doctrines of our own forces and those of allies and potential enemies and impedes the work of humanitarian relief workers and peace keepers. Thus, the subject of landmine proliferation is, and in all likelihood will remain, a recurring theme before the Congress. The purpose of this report is to review the basic definitions, issues, past legislation, and Administration policies concerning anti-personnel landmines as a context for understanding ongoing policy debates.

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[1]See Figure 1.

The Role of Landmines

The Current Debate: Issues

Throughout the history of warfare the role of the landmine as a weapon has been disparate and manifold. As warfare and science have evolved, so too have the design, technology, and function of the landmine. Much of the current debate within the Congress and between nations regarding AP landmine design and proliferation centers around a question of political purpose: how, for what, and by whom are AP landmines to be used?

Three distinct present, and potentially future, functions for AP landmines are discernible from witness testimony delivered during congressional hearings, existing legislation, and the various negotiating positions assumed by the signatories to Protocol II of the CCW during a series of Review Conferences. The first role is as a traditional weapon of warfare employed to canalize the advancing forces of an enemy (either armor, dismounted, or mechanized infantry) into avenues of approach that are covered by direct and indirect fire weapons. This traditional, or **tactical role** of the AP landmine has been expanded through advances in technology such as the family of scatterable mines (FASCAM). Moreover, landmines used in the first role serve as a means to channel enemy forces into terrain designated as a preplanned target where the preponderance of fire power and advanced weapons can be brought to bear, or as a weapon to erode the advancing forces of an enemy. The second role is as a weapon of warfare directed less toward specific tactical objectives and more toward broad political objectives such as denying civilian populations access to arable land, homes, and commerce. For many forces that employ AP landmines in the second role, as a weapon against civilian populations, AP mines are a primary source of their firepower.

Landmines emplaced for these two purposes, when left in place after the termination of hostilities and unmarked, create a tertiary, consequential role: indefinite hazard to civilians. The current debate concerning landmine proliferation represents an effort to reconcile the traditional role of the landmine with the objective of limiting or ending the second role and abolishing the third. In the following section, this report will briefly review the role of landmines in national defense.

Figure 1. Legislative Actions

Public Law 100-461
This appropriation provided $5,000,000 to aid victims of war for the provision of prostheses for civilians injured in civil strife and warfare. As a part of the Foreign Operations Appropriation, this Law provides humanitarian and development funds.

Public Law 102-484
Section 1365 of the National Defense Authorization Act for Fiscal Year 1993 established a unilateral moratorium on exports of AP landmines by the U.S. for a period of one year. In the National Defense Authorization Act for Fiscal Year 1994 (**Public Law 103-160**), the moratorium was extended for three years.

Public Law 104-107
Section 580 established a one year ban on the use of AP mines by U.S. personnel three years from the date of enactment (signed February 12, 1996). Section 558 of this law provides that demining equipment used for a humanitarian purpose may be disposed of on a grant basis to foreign countries.

Public Law 104-106
As a form of humanitarian assistance, the Department of Defense oversees demining training and mine awareness programs. Section 1313 of this law ensures that U.S. military personnel serving as instructors are prohibited from demining activities.

Public Law 103-160 provided $10,000,000 for humanitarian demining activities. **Public Law 103-139** provided $10,000,000 to support the clearing of mines for humanitarian purposes, as did **Public Law 103-335**. **Public Law 104-61** provided $20,000,000 for training and activities related to the clearing of mines for humanitarian purposes.

The Role of Landmines in National Defense

Mine warfare, as practiced by the Romans, consisted of burrowing beneath the fortifications of an enemy and thereby causing a resultant collapse of their defenses.[2] With the advent of gunpowder, mine warfare came to include burrowing beneath an enemy position and emplacing explosives for later detonation.[3]

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[2]Brodie, Bernard and Fawn M. *From Crossbow to H-Bomb* (Bloomington: Indiana University Press, 1973), p. 26.

[3]Dupuy, R. Ernest and Trevor N. *Military Heritage of America* (New York: McGraw-Hill Book Company, Inc., 1956). P. 294-297.

The First World War saw the introduction of tanks and antitank (AT) mines.[4] The introduction of AT mines, "often improvised from trench-mortar ammunition" provoked the development of mine breaching techniques.[5] In experiments conducted in 1918, tanks were fitted with rollers to detonate mines in their path.[6] The development of AT mines proceeded into the 1920s and, as they were relatively easy to remove in their early stage of development, provoked the introduction of anti-personnel mines.[7] Mixing AT and AP in a minefield complicated manual removal of AT mines.

Recognition by the U.S. military of the importance of mine warfare grew as the course of the Second World War unfolded. The great tank battles of North Africa became the proving ground for the Allied employment of mines, and for the general principles of mine warfare. The 1994 Department of State Report for the Congress, *Hidden Killers: The Global Landmine Crisis*, which contains an excellent synopsis of the evolution of mine warfare, observes that:

> For the Allies, North Africa was the crucible in which the principles and techniques of large-scale mine warfare in mobile, mechanized operations were tested and refined. Americans particularly, took note of the significance of mine warfare, revitalizing production and training programs that had suffered from neglect. Allied and Axis armies, whose strengths were insufficient in North Africa, used mines to compensate for shortages of artillery, armor and infantry. Neither side believed though, that the value of mines extended beyond temporary tactical advantage to strategic import.[8]

Perhaps the mine did not extend beyond strategic import, although General McNair, touring North Africa following the allied victory of 1943, concluded that the land mine was "almost a new arm of warfare".[9]

Several important developments in the tactics and technology of mine warfare grew from the Second World War. First, both the Germans and the Americans experimented with nonmetallic mines. The U.S. requirement for such a mine lessened as the war proceeded and the Allied strategy turned to the offensive. An Army Ground Forces project which sought to develop a nonmetallic AP mine was canceled in the summer of 1944.[10] Second, the AT mine came to be viewed by the Allies and the Axis as a cost effective, expedient weapon against advancing armor.

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[4]Brodie, p.197 and Stockholm International Peace Research Institute, *Anti-personnel Weapons* (London: Taylor & Francis Ltd., 1978). P. 180.

[5]Ibid., p. 180.

[6]Hogg, Ian V. *Armour in Conflict* (London: Jane's, 1980). P. 155.

[7]Stockholm International Peace Research Institute, p.181.

[8]United States Department of State Bureau of Political-Military Affairs, *Hidden Killers: The Global Landmine Crisis*, 1994 Report to the Congress (Washington, D.C.: Department of State Publication, 1994), p. 4. *Hidden Killers* is a comprehensive report concerning landmine proliferation and American foreign policy and is commended to the reader.

[9]Green, Thomson and Roots, p. 381.

[10]Ibid., p. 384.

Although mine technology has advanced further since the Second World War, the defensive role of mine warfare in the U.S. military has remained constant. U.S. Army Field Manual 20-32, *Mine/Countermine Operations*, lists the uses of minefields as to: first, "produce a specific effect on enemy maneuver, thereby creating a vulnerability that can be exploited by friendly forces"; second, to "cause the enemy to piecemeal his forces"; third, "interfere with enemy command and control"; fourth, "inflict damage to enemy personnel and equipment"; and last, "protect friendly forces from enemy maneuver."[11]

Throughout the Cold War, the U.S. military continued to use landmines for the purposes described above. During the Korean War, both the United Nations Command and the North Koreans employed landmines to stifle enemy movement and protect friendly forces. Two combat operations that were indicative of American encounters with enemy landmines were the fight for Yondungpo by U.S. Marines subsequent to the amphibious landing at Inchon and the U.S. Army battle for Bloody Ridge.[12] Two relevant aspects of mine warfare that inform the current debate were present during the Korean War: first, the danger of trafficking a minefield emplaced by friendly troops which had been poorly marked; second, the conversion of U.S. mines to enemy booby traps.[13] As one battalion report described enemy defenses, a "large number of mines and booby traps were discovered within the battalion sector. . .most of these being U.S. types which were placed by ROK troops, with only a few enemy mines scattered in the central portion of the sector."[14] The mine warfare employed in the Korean War, nevertheless, evinced a remarkable continuity with that of the Second World War.

The conduct of mine warfare in the Vietnam War was marked by both continuity and change. During the Vietnam War the U.S. military employed mines for the purposes described in FM 20-32 *Mine/Countermine Operations*: to reinforce perimeter security of defensive positions, airfields, fire bases and the local population. The U.S. also developed several mines that were delivered by air and were "usually associated with some sort of cluster bomb unit (CBU)."[15] The development of the family of scatterable mines (FASCAM), delivered by air and

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[11]Headquarters, Department of the Army, Mine/Countermine Operations, *FM20-32* (Washington, D.C.: Dept. Of the Army, 1992). P. 2-1.

[12]Lynn Montross and Captain Nicholas A. Canzona, USMC, *U.S. Marine Operations in Korea, 1950-1953, Volume II, The Inchon-Seoul Operation* (Washington, D.C.: Historical Branch, G-3, Headquarters U.S. Marine Corps, 1955). P. 209-211 and Hermes, Walter G. *Truce Tent and Fighting Front* (Washington, D.C.: Office of the Chief of Military History, U.S. Army, 1966). P. 84-85.

[13]Lynn Montross, Major Hubard D. Kuokka, USMC and Major Norman W. Hicks, USMC, *Volume IV The East-Central Front* (Washington, D.C: Historical Branch, G-3, HQMC, 1962). P. 206.

[14]Lynn Montross, Major Hubbard D. Kuokka, USMC and Major Norman W. Hicks, USMC, *U. S. Marine Operations in Korea, 1950-1953, Volume IV The East-Central Front* (Washington, D.C.: Historical Branch, G-3, HQMC, 1962). P. 206.

[15]Forecast International/DMS Market Intelligence Report, *Ordnance & Munitions* Forecast, Newton, CT., March, 1996. P. 3.

artillery "enhanced the traditional role of mines."[16] The advent of FASCAM, and the continued improvement of this technology during the late 1980s and early parts of this decade, have provided to U.S. commanders the ability to emplace a minefield during the course of attack, or as an antitank weapon deployed at the range of indirect fire weapons or aircraft.

Changes in mine warfare evolving from the Vietnam War will be discussed below in the section concerned with the second role of landmines, as a weapon directed toward the wider political purpose of denying populations access to land, water and commerce. During the Vietnam War mines were regularly used by the Viet Cong and People's Army of Vietnam, in a role described by Hidden Killers as "instruments of terror to intimidate the local population."[17] Distinctions between combatants, non-combatants, counter insurgency, and civil war hold profound implications for the current debate concerning landmines, particularly in consideration of the latest Review Conference Amendment of Protocol II of the CCW and the efforts of Congress to curtail the use of AP landmines. These matters shall also be addressed in the section below that discusses the CCW.

Prior to concluding this review of the role of land mines in national defense, there remains a final aspect of current defense policy to be considered. The disintegration of the Soviet Union and the dissolution of the Warsaw Pact provoked a reduction in U.S. military forces stationed overseas in Europe and Asia. As Secretary of the Army Togo West testified before Congress the U.S. Army, no longer concerned with a Soviet attack through the Fulda Gap, "is becoming a power projection force based largely in the continental United States."[18] As each of the armed services attempts to reconcile the requirement of the Clinton Administration's defense policy (to be prepared to fight and win two Major Regional Conflicts nearly simultaneously) with diminishing resources, two clear requirements of power projection must be balanced: speed of deployment (which mitigates against heavy forces) and lethality of the force (which demands heavier weapons which are less mobile).[19]

To compensate for the reduced U.S. military presence overseas, the services, particularly the Army, have placed a greater reliance upon prepositioned weapons and equipment.[20] These measures have improved the ability of U.S. forces to

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[16]*Hidden Killers*, p. 7.

[17]Ibid., p. 7.

[18]U.S. Congress. Senate. Committee on Appropriations. Department of Defense Appropriations for Fiscal year 1995. Part 1—Department of Defense. Hearings, 103d Congress, 2nd Session. March 1-March 24, 1994. (Washington, D.C.: U.S. Government Printing Office, 1994). P. 308.

[19]For a general discussion of deployability v. survivability, see Peter F. Herrly, "Middleweight Forces and the Army's Deployability Dilemma," *Parameters*, September 1989. P. 46-59; and Mazarr, Michael J. "Middleweight Forces for Contingency Operations," *Military Review*, August, 1991. P. 32-39.

[20]U.S. Library of Congress. Congressional Research Service. *Prepositioned Weapons, Equipment and Supplies: Overviews and Evaluations*, by John M. Collins. October 27, (continued...)

respond to a contingency in Kuwait, Saudi Arabia, and South Korea. However, the rapid deployment of U.S. military forces to an unforeseen exigency in a region without prepositioned stores complicates the trade off between speed of deployment and lethality. The regional warfighting Commanders in Chief have contingency plans which would draw upon Amphibious Ready Groups, the XVIII Airborne Corps, and a mix of other forces task organized to arrive rapidly to a given theater. The survivability of such a force in the face of an armored attack was brought into question following the initial deployment of the 82nd Airborne Division and the 7th Marine Expeditionary Brigade to Saudi Arabia in 1990 in the initial stages of Desert Shield.[21] One proposal to increase the 82nd Airborne Division's anti-armor capability was the Armored Gun System (AGS). The AGS was designed to replace the anti-armor capability of the M551 Sheridan, a light tank that could be inserted by parachute — but, Sheridan's service life has ended. Army commanders are considering anti-armor systems such as the Javelin man-portable AT missile and Enhanced Fiber Optic Guided Missiles(EFOG-M) in lieu of the canceled AGS, of which only Javelin is immediately available for deployment.[22]

One source of firepower, the M198 howitzer, is capable of firing the Area Denial Artillery Munition (ADAM), which is an "anti personnel mine system, delivered in cargo type projectiles."[23] Marine Expeditionary Units deploy with 155mm howitzers and tanks, light Army forces do not. Thus, FASCAM technology provides a limited source of protection and lethality to early entry forces.[24] Second, this limited anti-armor capability may suggest that expeditionary and airborne forces should retain the ability to emplace AP and AT mines by hand for force protection.

Moreover, while FASCAM as an example of mine warfare may seem problematic as an indefinite hazard to civilians, scatterable mines employed by U.S.

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[20](...continued)
1995. CRS Report 95-1073 S

[21]See Mazarr, and Lieutenant Colonel Charles H. Cureton, USMCR, *U.S. Marines in the Persian Gulf, 1990-1991: With the 1st Marine Division In Desert Shield and Desert Storm* (Washington, D.C.: History and Museums Division, HQMC). P.4-5, as Cureton reported, on August 26, 1990, Regimental Combat Team 7 was tasked with screening and delaying against an Iraqi attack. "The Marines would then employ long-range weapons and tank killer teams to further delay the enemy's advance". P. 5. The Marines were then to withdraw to main defensive positions which consisted of "tank hunter-killer teams, supporting arms, direct fire weapons, obstacles, and fixed strongpoints.", p. 5.

[22]Naylor, Sean D. "Domino Effect of the AGS Cancellation", *Army Times*, March 18, 1996, p. 3; Naylor,"C-17 Considered in Lieu of AGS", *Army Times*, March 25, 1996, p. 30; U.S. Library of Congress. Congressional Research Service. *Antitank Guided Missile: U.S. Army's Man-Portable Javelin*, by Edward F. Bruner. CRS Issue Brief 91130, Updated January 18, 1996.

[23]Ibid., p. 5.

[24]FASCAM systems include GATOR (AT and AP mines delivered by Air Force and Navy aircraft), VOLCANO (AT and AP mines delivered by Army ground vehicle and helicopter), MOPMS (AT and AP mines delivered by dismounted soldiers), and RAAMS (AT mines delivered by artillery). All FASCAM systems have selectable self destruct times (4 hours, 48 hours, or 15 days) and self deactivate when their battery runs down between 30 to 60 days.

forces are typically self-destructing and self-deactivating. The Army Field Manual that prescribes the emplacement of a scatterable mine field emphasizes that the characteristics of FASCAM "require impeccable communication and coordination to ensure friendly units know where mines are located, when they will be effective, and when they will self-destruct."[25] The fact that mine warfare remains a two-edged sword, requiring skill and care on the part of soldiers, was highlighted in a 1997 U.S. Army Advanced Warfighting Exercise at Fort Irwin, CA. Some 45 simulated casualties were ascribed to friendly mines, 23 in one incident when a unit inadvertently drove across a Volcano minefield recently dropped by friendly aircraft.[26]

The Second Role: Landmines Against Non-Combatants

The second role of the landmine in warfare, intimidation of the local populace, or denying to them the means of commerce, directly conflicts with the Laws of War. Despite whether one views the Vietnam War as an example of a "National Liberation Movement," a communist insurgency, a civil war or a combination of these, the conduct of the war provided examples of mines used in this second role.[27]

Several features of the Vietnam War are important in the evolution of mine warfare. First, the mobility provided to U.S. forces by the helicopter greatly nullified the concepts of the "front." This helped to somewhat diminish the importance of landmines in the tactical sense. Second, as the Viet Cong and North Vietnamese sought to avoid major conventional confrontation, and preferred to rely on surprise attack, nearly all territory was thus a battlefield. Third, due to the nature of an insurgency, distinctions between combatants and non-combatants were eroded. As Robert Leckie described the problem:

> ...a 12 year old girl leaning a bicycle up against a wall might be planting a vehicle of death whose tubular frame was packed with explosive. On patrol Americans encountered booby traps set along trails, on farmyard gates, in chicken coops and fishing nets or the very doors of schoolhouses. Mines — pressure, trip, or electronically detonated — were everywhere.[28]

Strikingly, the conduct of irregular warfare was bound to conflict with the *jus in bello* understood by the West. According to Andreopoulos, the main vehicle of irregular warfare is the civilian soldier, "a notion that encapsulates not only the

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[25]See Mine/Countermine Operations, FM20-32, p. 6-3, 7-1.

[26]Defense News. "Fratricide in U.S. Army Exercise May Bolster Land Mine Debate," Oct. 13-19, p. 32. Army officials stressed that the exercise was a large and complicated test of new technologies, and that fratricide and other mistakes should be regarded as an unavoidable part of the learning process, not an indictment of tested concepts.

[27]For definitions and their relevance to the Laws of War, see G.I.A. Draper, "Wars of National Liberation and War Criminality", ed. Michael Howard, *Restraints on War: Studies in the Limitation of Armed Conflict* (Oxford: Oxford University Press, 1979). P. 135-160.

[28]Leckie, Robert. *The Wars of America* (New York: Harper and Row Publishers, 1968). P. 972.

inextricable link between the fighter and the population. . .but the fighter's categorical refusal to be linked to a single identity."[29]

During 1961, in reaction to the growing attention given to unconventional, guerilla, or counterinsurgent warfare, John Shy and Peter Paret published a small book, *Guerrillas in the 1960s*. The authors' observations have only grown more salient in light of the American experience in Vietnam, the Soviet experience in Afghanistan, the insurgency of the Khmer Rouge in Cambodia and several other conflicts in which the landmine has been used indiscriminately against the civilian population. The authors observed that forces engage in guerilla war in pursuit of a political objective, not as a preferred alternative to open battle, but as a matter of necessity. In describing the historical accounts of the Civil War Confederate leader John Mosby and irregular warfare as he practiced it in Northern Virginia, Paret and Shy are critical of historians for failing to consider the consequences of guerilla warfare:

"No one doubts Mosby's skill in making Union operations in this area very difficult, but in 1864, Sheridan devastated the Shenandoah Valley, and systematically and successfully destroyed the guerrillas' base. Sheridan's counter strategy was ruthless and effective, and it demonstrates some of the special costs of resorting to guerilla warfare."[30]

In irregular conflict, conventional forces are hard pressed to separate the civilian from the soldier. Insurgents, on the other hand, find security in anonymity. Coercion and control of the population is a goal of both sides. Moreover, as guerrillas or insurgents turn to irregular warfare out of necessity, they are also likely to disdain much of the law that guides conventional conflict.

One critical element of the second role of mine warfare has emerged during and since the Vietnam War: landmines have been used indiscriminately against civilians. The indiscriminate use of landmines reflects the fact that in irregular warfare, the distinction between combatants and non-combatants is blurred and at times non-existent. Or, to borrow Andreopoulos' phrase, guerilla tactics render one of "the most fundamental principles of the laws of war untenable, namely, the distinction between combatants and noncombatants."[31]

During the Vietnam War, the Viet Cong and the North Vietnamese were able to pursue the twin objectives of intimidating the local population and killing Americans through placing landmines on roads and trails. The VC/PAVN reliance

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[29]Andreopoulos, George J. "The Age of National Liberation Movements", ed. Michael Howard, George J. Andreopoulos and Mark R. Shulman, *The Laws of War: Constraints on Warfare in the Western World* (New Haven: Yale University Press, 1994). P. 193, also see Howard's preface, p.3, for a discussion of jus in bello, the laws for the conduct of war and guerre mortelle, conflict wherein "no holds were barred."

[30]Paret, Peter and John Shy, *Guerrillas in the 1960's* (New York: Praeger, 1962), p. 10.

[31]Andreopoulos, p. 195. In this section I use the terms irregular, guerrilla and insurgent somewhat interchangeably. This is not to add any political gravity to these terms, and merely to make distinctions between conventional conflict and irregular warfare.

on mine warfare was aided by their ability to appropriate mines emplaced for tactical purposes by U.S. forces.[32]

The Soviet Union also employed mines in this second role during the invasion of Afghanistan. One account of the Soviet occupation describes how Soviet helicopters and planes "strewed the provinces bordering Pakistan with thousands of 'butterfly mines', colored green for vegetated areas, beige for deserts." To terrorize the local population, anti-personnel mines were placed along fields and mountain passes.[33]

The U.S. Committee for Refugees, in a 1995 report, estimated that a total of 10 to 15 million landmines were planted in Angola. Belts of landmines were emplaced to ring cities, deny civilians access to roads and despoil agricultural lands. The U.S. Committee for Refugees Report states that among the victims of landmines "have been women and children who were killed or crippled while searching for food or firewood." The widespread use of landmines as weapons used to deny irregular forces access to territory serves the second role of denying this same land to civilians.

The central point that irregular warfare is undertaken out of necessity, rather than choice, is essential for understanding the second role of mine warfare. Mines are a political and military weapon of choice because they are plentiful, inexpensive, and effective. As such, they are likely to be employed irrespective of any restrictions that exist within the Law of War.

Two important approaches now exist for preventing mines produced for the first role in warfare from being used for the second role: the technological approach, wherein mines designed for tactical purposes would self-destruct or eventually self-inactivate; and, the legal approach, wherein the production, export, and use of AP mines would be curtailed by treaty. Both of these approaches will be discussed below following a brief review of the third role of landmines; mines left in place at termination of hostilities that then become an indefinite hazard to civilians.

The Consequential Role: Landmines as Indefinite Hazards

When employed for tactical purposes and left in place, unmarked minefields can pose an indefinite risk to civilians living, working, or traveling in once contested lands. Of even greater risk to civilians are mines emplaced to separate peoples or irregular forces from roads, wells, or arable land. This third, consequential role of landmines, as an indefinite threat to civilians, complicates the processes which follow the termination of hostilities: resettlement of refugees, peacekeeping

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[32]*Hidden Killers*, p. 6-7.

[33]Girardet, Edward. *Afghanistan: The Soviet War* (New York: St. Martin's Press, 1985). P. 213.

operations, humanitarian delivery of food and medical supplies, and development of economic infrastructure.

The example of Cambodia, as a nation stymied by the legacy of landmines, is evident in a report of the General Accounting Office, *Cambodia: Limited Progress on Free Elections, Human Rights, and Mine Clearing.* According to the GAO Report, prior to 1970 Cambodia stood as a net exporter of food. The provinces of Battambang and Svey Rieng were the most productive areas. After years of warfare, Cambodia is now an importer of food and Battambang and Svey Rieng are largely unusable due to landmines. Moreover, infrastructure development such as the repair of bridges and roads is impossible until surrounding areas are cleared of mines.[34]

A second problem created by landmines is the slowed pace of refugee resettlement. As one example, *Hidden Killers* considers Mozambique to be a country where "fear of landmines has been cited as a significant cause of the slow pace of repatriation of refugees."[35] The State Department Report also estimates that within Angola, Mozambique, Somalia, Afghanistan, and Cambodia remain approximately 30 million mines "which inhibit and endanger the return and reintegration of some 6 million refugees and 5.5 million internally displaced persons."[36] Further complicating the problems associated with repatriating refugees are the high medical costs of treating landmine victims.[37]

The medical, economic, and social effects of mines left in place after the cessation of hostilities are both astounding and well documented. The International Committee of the Red Cross, Human Rights Watch, the International Rescue Committee and the United Nations Development Program have all published reports concerning the human costs associated with the third role of landmines. Moreover, Congress has held hearings on both the global landmine crisis and developments in countermine technology.[38]

Unsurprisingly, no institution or nation advocates the third role of landmines, as it exists only as a derivative of the first and second roles. This fact, of course, does nothing to diminish the manifold problems resulting from the third role of landmines. However, apart from the remedial efforts of demining programs, any attempt to abolish the third role of landmines must address the tactical and indiscriminate use of these weapons. Demining efforts confront the staggering fact

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[34]General Accounting Office, *Cambodia: Limited Progress on Free Elections, Human Rights, and Mine Clearing*, Washington, D.C., GAO/NSIAD-96-15BR, February 1996. P. 21-25.

[35]*Hidden Killers*, p. 49.

[36]Ibid., p. 49.

[37]GAO, p. 21.

[38]U.S. Congress. Senate. Subcommittee of the Committee on Appropriations. The Global Landmine Crisis. Special Hearing, 103d Congress, 2nd Session. May 13, 1994. Washington, U.S. Govt. Print. Off., 1994; U.S. Congress. House of Representatives. House National Security Committee. Joint Hearing of the Subcommittees on Military Procurement and Military Research and Development. Landmines. Hearings, 104th Congress, 2nd Session. January 24, 1996.

that AP mines can cost as little as $3 to purchase and $300 to $1000 per mine to clear, including logistics and support expenses.[39]

The current debate concerning landmines centers upon the seemingly contradictory roles described above. Several possible avenues exist for reconciling these roles. Among these potential solutions are military doctrine, international law and treaty, national law and moratoria, the technology of AP mines, and demining programs. Each of these possible means of addressing the contradictory roles of the landmine shall be discussed below.

Addressing the Roles of Landmines

Military Doctrine

The use of AP mines by the U.S. military, as prescribed by doctrine, exemplifies the first, or tactical role of landmines in warfare. In this regard, according to Field Manual 20-32, *Mine/Countermine Operations,* minefields are used to: "produce a specific effect on enemy maneuver, thereby creating a vulnerability that can be exploited by friendly forces"; second, "cause the enemy to piecemeal his forces"; third, "interfere with enemy command and control"; fourth,"inflict damage to enemy personnel and equipment"; and fifth, "protect friendly forces from enemy maneuver." U.S. military requirements for minefields comply with the Geneva Convention, the CCW, and NATO International Standardization Agreements. Minefields are to be marked with signs "10 to 50 meters apart depending on the terrain", and documented in accordance with a standardized format.[40]

The advent of scatterable mine technology added to the capability of U.S. commanders to expeditiously deploy a minefield before advancing enemy forces. Such a capability does not allow, however, for the precise accounting of the location of each mine deployed. The locations of scatterable minefields, once emplaced, are recorded and disseminated to friendly units. All U.S. scatterable mines are designed to self-destruct or self-deactivate (i.e., a battery within the mine exhausts itself, rendering the mine inert). The location of remotely delivered FASCAM minefields are calculated and marked by either estimating the area around aimpoints, or by plotting the respective corner points of a minefield.

Thus, U.S. military doctrine attempts to fulfill the first role of mine warfare through both doctrine and technology. U.S. military doctrine does not provide for, or allow, the indiscriminate use of landmines against non-combatants. Last, U.S. military doctrine attempts to end the third role of mine warfare by using mines with short and finite lifespans.

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[39]Subcommittee on Foreign Operations, Senate Appropriations Committee Hearing, *The Global Landmine Crisis*. P. 99, 137.

[40]*FM20-32, Mine/Countermine Operations*, p. 2-1, 2-41.

Criticism of Military Doctrine

Within the current debate concerning the role of landmines, several critics have argued that the tactical use of landmines by the U.S. military undermines the larger foreign policy goal of abolishing the third role of landmines. A second criticism leveled against military doctrine is that landmines do not provide any appreciable value to battlefield commanders.

Are AP Landmines Effective in a Tactical Role? Critics of the tactical role of landmines frequently observe that landmines produce friendly and enemy casualties alike. Second, critics argue that once deployed FASCAM minefields are difficult to mark and therefore contribute to fratricide and the indiscriminate killing of civilians. Third, critics have also contended that until the design of scatterable mines achieve complete reliability in the capacity to self-destruct or self-deactivate, they should not be used.[41]

Mine warfare is an integral part of U.S. military doctrine, and has become more important as Army force structure becomes smaller. In recent Battle Lab simulations and exercises at the National Training Center, the Army found that friendly casualties were lower and enemy casualties were higher, by a factor of two, when advanced landmines were used rather than not used.[42] Second, AP mines were developed to prevent enemy forces from breaching or tampering with anti-tank minefields. This presents a stark difference with mines emplaced around a village to deny the local populace food and water. Ground combat is intrinsically dangerous, disorderly and confusing. U.S. military doctrine places strict guidelines on the employment of mines by U.S. forces. These restrictions were designed to minimize the loss of American life and the occurrence of fratricide.

When used in accordance with planning guidelines which seek to avoid civilian casualties, scatterable mines, whether dropped by aircraft, or emplaced from an artillery projectile, pose comparatively little risk to civilians; arguably much less than from concentrated gunfire, the common alternative to mines. To impose a rate of reliability of 100 percent on these weapons, as some critics have suggested, suggests that a foreign policy goal of abolishing landmines supersedes any tactical value AP mines may hold for U.S. forces. This reasoning further assumes that a ban

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[41]LTC John J. Spinelli, U.S. Army, commented to the author that when both the self-destructing and self-deactivating (battery expires) features of US scatterable mines are considered, the reliability rate exceeds 99.9% that a scatterable mine will cease to be a hazard to civilian population over a given timeframe. The principal hazard is nearly gone at the scheduled self-destruct time of the mine(4 hours, 48 hours or 15 days), with very minor risks out to the battery's expiration time.

[42]"Army Protests Pending Congressional Action on Landmine Moratorium", *Inside the Army*, June 13, 1994. P. 8-9.

on the use of AP mines by U.S. forces will somehow lead other nations, or irregular forces to adopt a similar practice.[43]

Proponents of a ban on landmines early noted that many combat veterans were either ambivalent or skeptical about the military utility of the weapon. Many had been frustrated by the difficulties of countering enemy use of such weapons and the gruesome casualties they may have witnessed. Others may have suffered from accidental encounters with friendly minefields. Many found that mines seemed to be a net benefit to the less technologically advanced foes of the United States. On April 3, 1996 a group of fifteen retired generals and admirals wrote a letter to President Clinton "strongly" urging him to renounce mines.[44] The signers included Army General H. Norman Schwarzkopf of Persian Gulf War fame and Air Force General David Jones, a former Chairman of the Joint Chiefs of Staff.

Most early press treatment of the issue seemed to favor proponents of a ban. An exception was retired Marine Corps officer, Lieutenant General Bernard E. Trainor, who noted that land mines had saved his life in Korea and took the position that banning them could put U.S. troops in danger in the future.[45] The Pentagon was late in marshalling support against a total ban. On July 10, 1997 the Chairman of the Joint Chiefs of Staff, all Service Chiefs, and all Commanders of Unified and Specified Commands signed a letter to the Chairman of the Senate Armed Services Committee opposing a bill that would unilaterally ban all use of APL by U.S. forces.[46] It made a case for retaining "smart" mines until all nations agreed on a total ban, since such a weapon was not a humanitarian threat and was a combat multiplier for down-sized U.S. land forces. On September 11, 1997 twenty-four retired U.S. generals and admirals wrote President Clinton to urge him not to sign the Ottawa Treaty that would ban all use of APL.[47]

In the debate over a total, immediate ban on APL, studies have been used by advocates on both sides. Supporters of the Ottawa Treaty argued against the U.S. position that APL should remain deployed against the threat of an invasion by North Korea, claiming that APL would be a marginal factor in determining the outcome.[48] Some in Congress have been concerned about the wisdom of legislation imposing moratoria on U.S. use of APL; the Defense Authorization Bill for FY1996 required

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[43]"An Unacceptable Weapon", *The Economist*, March 23, 1996. P. 15.

[44]The Washington Post. "Shalikashvili Awaits Study on Banning Land Mines," April 4, 1996, p. A16.

[45]New York Times. "Land Mines Saved My Life," March 28, 1996, p. A25.

[46]Reprinted in full by The Center for Security Policy. Decision Brief, "Celestial Navigation: Pentagon's Extraordinary "64-Star" Letter Shows Why The U.S. Cannot Agree To Ban All Landmines," Washington, DC, 14 July 1997.

[47]Reprinted by The Center for Security Policy. "Former Military Leaders Urge President To Hold That (Red) Line On The Emerging, Defective Landmine Ban." Washington, DD, 11 September 1997.

[48]Demilitarization for Democracy. "Exploding the Landmine Myth in Korea: Why the United States Can Sign the Ottawa Landmines Treaty at Minimal Risk to US and South Korean Troops," Washington, DC August 1997.

the DoD to report on the probable effects of such a ban. The JCS presented the report in September 1997. Because it was based on war plans, the report was classified. It reportedly stated that, "The legislation in its present form constitutes an increased risk to the lives of U.S. forces, particularly in Korea and Southwest Asia, and threatens mission accomplishment." It cited potential increases in casualties of from 15 to 35 percent, depending on theaters involved.[49]

Addressing the Roles of Landmines: International Treaties

The international community has and is addressing the problem of AP landmines in several ways. For some time, efforts to restrict landmine use in order to protect innocent civilians were embodied in the Convention on Conventional Weapons (CCW) treaty. This treaty was, however, ignored by many combatants and judged inadequate by most observers in light of continuing and appalling innocent casualties in many regions of the world. Recently, efforts to improve that treaty have been overshadowed by initiatives to achieve a universal ban on AP landmines. The Canadian government sponsored the Ottawa Treaty, presented for signing by interested parties in December, 1997; and, the United Nations is sponsoring landmine ban negotiations under the Conference on Disarmament framework in Geneva.

Convention on Conventional Weapons

An early effort of the international community to reconcile the divergent roles of landmines is represented by *The 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*(CCW), specifically embodied in the Protocol on Prohibitions or Restrictions on the Use of Mines, Booby-traps and Other Devices (Protocol II). This Convention was concluded at Geneva on October 10, 1980, was signed by the United States on April 8, 1982 entered into force on December 2, 1983, and was approved by the Senate on March 24, 1995.

In existing form, CCW provisions greatly resemble guidelines and restrictions resident in U.S. military doctrine. Original restrictions within Protocol II were:

Article 1 limits the protocol to landmines as opposed to anti-ship mines.

[49]Colin Clark, *Defense Week*. "JCS: Casualties Could Rise By a Third Without Mines," September 15, 1997, p. 2.

Article 2 sets forth other definitions, such as mine,[50] booby trap, and civilian objects.

Article 3 restates existing international law regarding the use of landmines and prohibits the use of weapons directed against the civilian population.

Article 4 prohibits the use of booby traps against civilians.

Article 5 restricts the use of remotely delivered, or scatterable mines. The article imposes restrictions on use and design of FASCAM; minefields must be recorded or be equipped with either automatically self-destructing or self-detonating mechanisms. Mines may also be destroyed through command detonation. To quote the Senate Foreign Relations Committee Report on the CCW, the restrictions contained in Article 5, "do not affect the operations of the U.S. military, since all U.S. remotely delivered mines are equipped with self-destruct devices."

Article 6, "consistent with U.S. military doctrine and practice," restricts the use of booby-traps attached to food, drink, toys, and casualties.

Article 7 directs the recording of all pre-planned minefields and contains requirements to protect civilians.

Article 8 directs the parties to a conflict to remove, render harmless, and transmit information concerning minefields to any United Nations peacekeeping force.

Article 9 directs former belligerents to "endeavor to reach agreement" to demining operations. The CCW also contains a technical annex which contains guidelines for marking minefields.[51]

A formal Review Conference of the CCW, conducted by States Parties to the Convention, met in several sessions from September 1995 through May 3, 1996 to consider technical cooperation and implementation mechanisms. The purpose of the Review Conference was to strengthen CCW restrictions against inhumane use of landmines, particularly against non-combatants. Consensus was difficult. The issue of self-destructing mines was contentious in that many nations do not currently produce these weapons. Nations that possess existing stockpiles of scatterable mines that do not meet CCW standards will incur considerable expense in converting to

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[50]The CCW defines mine as "any munition placed under, on or near the ground or other surface area and designed to detonate or explode by the presence, proximity or contact of a person or vehicle, and 'remotely delivered vehicle' means any mine so defined delivered by artillery, rocket, mortar or similar means or dropped by aircraft." see U.N. Document A/CONF. 95/15 of October 27, 1980, Annex I; Senate. Treaty Document 103-25. Message From the President of the United States. 103d Congress, 2nd Session. May 12, 1994. Washington, D.C., U.S. Govt. Print. Off.,1995; and U.S. Congress. Senate. Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons. Executive Report 104-1, 104th Congress, 1st Session. March 22, 1995.

[51]Committee on Foreign Relations, see pp. 8-14 for article by article provisions.

U.S. standards. The costs of conversion also affect nations that hold stockpiles of undetectable landmines (detectable mines contain at least eight grams of metal).[52]

The Review Conference did agree to an amended protocol, and the President transmitted it to the Senate on January 7, 1997.[53] Major objectives achieved by the amendment are: (1) scope expanded to include internal armed conflicts; (2) all remotely delivered AP mines must include self-destruct devices and backup self-deactivation features — "smart mines"; (3) requires all nonremotely delivered AP mines without self-destruct features — "dumb mines" — to be used only within controlled, marked, and monitored minefields; (4) all AP mines must be detectable using commonly available technology; (5) parties laying mines assume responsibility for them to ensure against irresponsible and indiscriminate use; and (6) more effective compliance so that restrictions are actually observed.

The Administration sees this amendment as a step forward in dealing with APL problems and a precursor to its goal of an eventual total international ban of such weapons. The Senate Foreign Relations Committee endorsed ratification on July 23, 1998 by a vote of 13-4. Opponents were concerned that the resolution might, to some degree, compromise U.S. signing of the Ottawa Treaty — it addressed concerns over Administration landmine policies through conditions placed in its recommended advice on ratification. Such issues included: assurance that the Pursuit Deterrent Munition, used to help special operations forces escape dangerous situations, is not restricted by the Protocol; that proposed export moratoria in other treaties are not more restrictive than the Protocol; and, that the President will not *de facto* implement the Ottawa Treaty without advice and consent to ratification by the Senate.

The Ottawa Treaty

Beginning in 1991, a number of non-governmental organizations concerned with the humanitarian toll of casualties mounted a campaign to eliminate AP landmines as a weapon category. In 1996, Canada took the initiative to organize a coalition of like-minded countries, international organizations, and non-governmental organizations in a "fast-track" diplomatic process to complete a treaty for signature in December 1997. The effort gained momentum and 89 nations agreed to sign the resulting treaty on December 2, 1997 in Ottawa. Some 125 nations and the Holy See have signed to date. The rapid, unprecedented success of this effort earned the 1997 Nobel Peace Prize for the International Campaign to Ban Landmines and its founder.[54]

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[52]See Mintz, John. "U.S. Aides See China Impeding Pact on Restricting Land Mines", Washington Post, March 22, 1996, p. A31. Mintz states that the current negotiations are stalled by the PRC's stance regarding self-destructing mines and detectability.

[53]Message from the President of the United States transmitting Protocols to the 1980 Conventional Weapons Convention. Treaty Doc. 105-1. USGPO, Washington: 1997. The protocols were referred to the Committee on Foreign Relations.

[54]*The Washington Post*, U.S. Activist Receives Nobel Peace Prize for Land Mine Campaign, October 11, 1997, p. A1.

The Ottawa Treaty is titled *Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction*. The treaty is short and to the point, admits for no exceptions, and basically relies upon voluntary compliance. It will enter into force after 40 nations have deposited their ratification instruments. Although the United States supported the Ottawa fast-track effort by participating in its negotiation, the Administration could not achieve accommodation to its concerns and decided not to sign the treaty. President Clinton's explanation was, "There is a line that I simply cannot cross, and that line is the safety and security of our men and women in uniform."[55]

A general impediment to treaty effectiveness would be the many nations not participating, to include major users of land mines, such as China, India, and Russia. Other nations that perceive serious security concerns and consequent utility for landmines include: Cuba, Egypt, Finland, Iran, Israel, Kuwait, North Korea, Vietnam, and South Korea. Specific U.S. concerns were that the treaty would not allow a special case for use of APL along the border with North Korea until a suitable substitute could be devised, and that "smart" APL could not continue to be mixed into "smart" anti-tank minefields to protect those temporary barriers from dismounted enemy. For those reasons, the President's obligations to provide security to U.S. and allied troops took precedence over his desire to sign immediately the Ottawa Treaty. He has, however, established a goal to sign the Ottawa Treaty by the year 2006, provided the Pentagon can develop suitable alternatives to APL by then.[56]

Conference on Disarmament Landmine Agenda

The Clinton Administration's preferred vehicle for pursuing an international ban on AP landmines is the standing Conference on Disarmament (CD) in Geneva, Switzerland. An independent deliberative body sponsored by the United Nations, it has produced such treaties as the Nuclear Nonproliferation Treaty (NPT) and the Chemical Weapons Convention (CWC). On November 4, 1996 Ambassador Madeleine Albright introduced a resolution on landmines to the U.N. General Assembly. Co-sponsored by the United States and 84 other nations, the resolution passed 185-0 (with 10 abstentions) and placed the issue of landmines on the CD agenda. Abstaining nations, reserving their right to use landmines in self-defense, were: Belarus, China, Cuba, North Korea, Israel, Pakistan, South Korea, Russia, Syria, and Turkey.[57]

Among other things, the U.N. resolution "Urges states to pursue vigorously an effective, legally-binding international agreement to ban the use, stockpiling, production and transfer of anti-personnel landmines with a view to completing the

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[55] *Defense News*, "U.S. Supporters Will Keep Fighting for Land Mine Ban," October 13-19, 1997, p. 32.

[56] *Christian Science Monitor*, "US and Land-Mine Ban," June 4, 1998, p. 11.

[57] *Jane's Defense Weekly*. "Divided nations delay UN mine ban decision," 4 June 1997, p. 5.

negotiation as soon as possible."[58] CD sessions during 1997 were largely mired in contentious debate over nuclear arms control issues, but some attention was given to the landmine issue. A Special Coordinator on Anti-personnel Landmines was appointed, John Campbell of Australia. He believed that most CD members would support, or not oppose, treaty work; the approach would be step-by-step, probably beginning with elimination of APL exports, imports, and transfers. Many nations in the CD supported reappointment of the Special Coordinator for the 1998 Session; to include the nations of Belarus, Russia, and Turkey who had originally voted against placing landmines on the CD agenda. The United States continued to push for pursuit of a CD landmine treaty. Some Ottawa signatories support CD action as complementary and a way to include reluctant nations; others fear dilution of effort and may prefer greater emphasis on enforcing CCW Protocols. Since the CD proceeds by consensus, and includes nations that were opposed to the Ottawa fast-track process, formulation of a viable treaty may take a long time.

Critiques of International Treaties

The CCW is the most long-standing international attempt to reconcile the divergent roles of landmines. Notably, the CCW greatly resembles U.S. military doctrine, in that mines used responsibly can serve a limited, tactical role on the battlefield without unduly endangering civilians. Second, the CCW attempts to restrict the use of scatterable, or remotely delivered mines. Some deficiencies in the CCW, as noted by the Senate Foreign Relations Committee Report, and the Clinton Administration, were addressed by amendment: the CCW must deal with civil war if it is to include the second role of landmines; and, the treaty requires some form of verification mechanism. Strong verification measures, which would include U.N. inspections, were opposed by China, Pakistan, Cuba, and India.[59]

The CCW continues to be criticized by non-government organizations, such as the International Committee of the Red Cross, that believe the only measure that will abolish the third role of landmines is a total ban on landmine production and use.[60] This position rests upon the assumption that the first and third roles of landmines are indivisible. According to this view, the humanitarian interest of ending the third role of landmines enjoys precedent over any tactical advantage the U.S. military may gain from landmines. Moreover, this position depends upon the notion that a complete and total ban will somehow end the second role of mine warfare, which in itself was inherently unlawful from inception. As Robert W. Tucker observed:

Any weapon may be put to unlawful use. For example, it would be unlawful to use an otherwise legal weapon against the civilian population of an enemy state or as a means of inflicting unnecessary suffering or destruction.[61]

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[58]United Nations General Assembly, An international agreement to ban anti-personnel landmines, 31 October 1996.

[59]Hitchens, Theresa. "Verification, Exports Weigh on Mine Pact", *Defense News*, August 21-27, 1995. P. 8, 26.

[60]*Foreign Policy Bulletin*, p. 52.

[61]Tucker, Robert W. "Chapter 13" ed. By Peter D. Trooboff in *Law and Responsibility in* (continued...)

Last, this position assumes that a total ban will prevent nations from illicitly producing, exporting and using AP landmines or create an international norm against such behavior. This last assumption exists despite the growing record of illegal arms and technology transfers, even of weapons of mass destruction, by and between several nations in violation of existing arms control treaties and regimes.[62]

There is no question, however, that the idea of banning AP landmines from the world's military arsenals is in ascendancy. Such a long-term goal is stated U.S. policy. Many nations will voluntarily do so under the Ottawa Treaty. An effort has begun in the Conference on Disarmament to craft a treaty that all nations could embrace.

Addressing the Roles of Landmines: Legislative Actions

The breadth of difficulties caused by global landmine proliferation was early acknowledged by Congress. Several legislative initiatives have supported, if not led, efforts to solve the problem. Individual members, such as Senator Patrick Leahy and Congressman Lane Evans, have gained national and international recognition for their efforts. The Subcommittee on Foreign Operations of the Senate Appropriations Committee conducted a special hearing during May, 1994 which addressed the global landmine crisis. Ratification of the CCW was approved by the Senate in March 1995. More recently, the House National Security Committee Military Procurement and Military Research and Development Subcommittees held a hearing which considered the technological response to the landmine threat in Bosnia. The subject matter of these hearings ranged from demining technology, the tactical role of landmines, protection of non-combatants, and the economic effects of landmine proliferation.

In response to the global landmine crisis, Congress has debated and passed varied legislative proposals, each of which addresses the problem of landmine proliferation. A number of these proposals, such as bills that appropriate money for demining training, attempt to alleviate a single role of landmines in warfare. In the case of demining operations, the intent is to protect civilians from the after-effects of armed conflict. On the other hand, some legislative proposals, such as the ban against landmine use by the U.S. military (Public Law 104-107), seek a larger end.

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Warfare (Chapel Hill: University of North Carolina Press, 1975). P. 163.

[62]Smith, R. Jeffrey and Ann Devroy, "U.S. Asks China to End Shipments", *Washington Post*, February 28, 1996, p. 23; "U.S., Waiving Ban, Will Send Arms to Pakistan", *New York Times*, March 21, 1996, p. 4; Richard A. Bitzinger, "Arms to Go: Chinese Arms Sales to the Third World", *International Security*, Fall 1992, Vol. 17, No.2, p. 84-111; as Bitzinger observed in 1992, "[d]uring the past decade or so, the PRC has experienced considerable success in expanding its arms export to the Third World. Bangladesh, Iran, Tanzania, and Zimbabwe (along with Cambodia's Khmer Rouge) have come to rely overwhelmingly upon Chinese arms, while Egypt, Iraq, Pakistan, and Thailand greatly depend upon Chinese weapons to supplement their arsenals.", p. 93.

In the case of **P.L. 104-107** the intent of the legislation is to begin a process whose ultimate goal is to make the tactical use of landmines "a war crime."[63] Listed below is a brief summary of the significant legislation drafted with the intent of influencing the role of landmines in warfare.

Public Law 100-461. Foreign Operations, Export Financing, and Related Programs Appropriations Act, 1989: This appropriation provided $5,000,000 to aid the victims of war. The appropriation directed that funds be used for "the provision of prostheses for civilians who have been injured as a result of civil strife and warfare."

As a facet of development efforts and humanitarian assistance, foreign aid granted to war victims helps to reduce the medical costs incurred by developing countries. Many of the victims of landmines employed in the second role of mine warfare were non-combatants. This appropriation also complements the work of non-governmental organizations such as the International Committee of the Red Cross that have labored to mitigate the effects of civil wars. As J. Brian Atwood, Administrator of the United States Agency for International Development testified, "AID regards the War Victims Fund as an investment in sustainable development."[64]

Public Law 102-484. 22 U.S.C. 2778, Section 1365 of the National Defense Authorization Act for Fiscal Year 1993: This law established a unilateral moratorium on U.S. exports of AP landmines for a period of one year. In the National Defense Authorization Act for Fiscal Year 1994 (Public Law 103-160), the moratorium was extended for three years.

During the ten years prior to the passage of the ban on exports, the U.S. Department of State had approved ten licenses for the commercial export of AP landmines valued at $980,000. *Forecast International* predicts that any efforts by the U.S. and some European nations to limit the exports of AP mines "will mean that the unmet demand will be taken up by the firms in the international sector." Forecast International further concluded that over the next ten years, the People's Republic of China "should remain the largest producer of landmines of all types in the international sector."[65]

Effects of the export moratorium have not altered the tactical role of landmines. Nor has the export moratorium altered the use of landmines in the second and third roles of mine warfare. However, the proponents of the export moratorium claim that this law provides the U.S. a basis for international leadership on the issue of landmine proliferation. Second, proponents of the moratorium believe that this law is only the first step in a process that will conclude in an international ban on landmine use.

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[63]See remarks of Senator Patrick Leahy (D-Vt.) In *Congressional Record*, January 26, 1996, 104th Congress, Second Session, Vol. 142, No. 11, S425.

[64]Remarks of J. Brian Atwood before the Senate Foreign Relations Committee Hearing, *The Global Landmine Crisis*, p. 101.

[65]Ordnance & Munitions Forecast, Landmines (International), Forecast International/DMS Market Intelligence Report, March 1996. P. 11.

Public Law 104-107, Sec. 580, the Foreign Operations, Export Financing, and Related Programs Appropriations Act, 1996 was signed February 12, 1996: this law established a one year ban on the use of AP mines by U.S. personnel three years from the date of enactment. The law allows use of command detonated Claymore mines and use of AP mines along internationally recognized national borders or in demilitarized zones. The moratorium places further restrictions on the use of mines along a demilitarized zone (DMZ), such as marking and monitoring, to protect civilians.

As the law did not limit the use of landmines until passage of three years, the actual effects of the legislation have yet to be determined. The law does ban the use of FASCAM, and thereby must result in a change in the first role of mines for the U.S. military. Three of the military's principal scatterable mine systems are manufactured with a mix of AP and AT mines in each system. Therefore, the whole scatterable mine dispensing system cannot be used, resulting in a loss of two-thirds of the military's scatterable anti-tank capability, to include all of its aircraft delivery systems.[66] Thus, according to the law, U.S. military doctrine will have to be altered barring a change in the legislation. For example, U.S. soldiers and Marines will be denied the ability to lay an AP minefield as part of either a planned defense or retrograde operation. Special Forces members are concerned that they may lose their "pursuit denial munitions," a form of mine they employ when being chased.[67]

In 1997, concern over this law was, however, registered by the House National Security Committee. In the National Defense Authorization Act for FY1998, H.R. 1119, Section 1055, the Secretary of Defense would be required to certify that any implementation of a ban on use of APL would not adversely impact U.S. military combat capabilities. In May, 1998 Secretary Cohen and Chairman of the Joint Chiefs of Staff Shelton sent a letter to the Senate Armed Services Committee asking for relief from the moratorium due to start on February 12, 1999. The problem is, no technological alternatives to APL are likely to be fielded before 2003. The only alternatives immediately available are more troops and conventional weapons; in the case of Korea, for example, they estimated that 17,000 additional troops would be required.[68]

The 1996 legislation will have no effect on the second and third role of mines in war, as existing U.S. military doctrine and law prohibits indiscriminate use of mine warfare against civilians. Section 558 of this law provides that demining equipment used for a humanitarian purpose may be disposed of on a grant basis to foreign countries.

Public Law 104-106, National Defense Authorization Act For 1996, signed February 10, 1996. As a form of humanitarian assistance, the Department of Defense oversees mine awareness and clearance programs for foreign governments. A critical component of the DOD approach to landmine proliferation is fostering

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[66]Comments of LTC. John J. Spinelli, U.S. Army.

[67]*Time*. "The Military Frets over a Potential Mine Disaster," September 15, 1997.

[68]*American Forces Press Service.* Jim Garamore, "Cohen, Shelton Ask Relief from Land Mine Ban," June 11, 1998.

cooperation between the United Nations, local governments, and non-governmental organization representatives. The most well known of the U.S. programs, `Train the Trainer,' involves the training by U.S. forces of host nation instructor candidates. Once trained, these students serve as instructor cadre for their home country's demining programs. This law, in Sec. 1313, contains provisions to ensure that the U.S. military does not engage in actual demining operations in conjunction with Train the Trainer activities. The demining activities of DOD are: mine awareness programs, train the trainer, research and development, and sharing technical data. Congress has also appropriated money to operational Commanders in Chief for demining efforts.[69]

Over the last several years, Congress has expressed a sustained commitment to demining as an aspect of humanitarian assistance. **Public Law 103-160**, the National Defense Authorization Act for Fiscal Year 1994 provided $10,000,000 for activities to support the clearing of landmines for humanitarian purposes. **Public Law 103-139**, the Department of Defense Appropriations Act, 1994 signed November 11, 1993, provided $10,000,000 to support the clearing of landmines for humanitarian purposes, as did **Public Law 103-335**, the DOD Appropriations Act, 1995. **Public Law 104-61**, the DOD Appropriations Act, 1996 provided $20,000,000 for training and activities related to the clearing of mines for humanitarian purposes. The 105th Congress continued to support demining efforts. In the Defense Authorization Bill for FY1998, for example, the SASC recommended adding $6.6 million to the Administration request for $19.3 million for research on countermine technologies, particularly for field testing of vehicular mounted detection equipment. Defense Appropriations for FY1998, H.R. 2266, included $47,130,000 for overseas humanitarian, disaster, and civic aid. Conferees specifically directed that no across-the-board reduction would be applied to demining efforts.

The major landmine legislation before the 105th Congress is the *Landmine Elimination Act of 1997*. This bill would prevent the U.S. Government from expending or obligating any funds for new deployments of APL beginning January 1, 2000. This act would codify the Administration's general moratorium on use already in effect, but with fewer exceptions. It would be similar to enforcing the Ottawa Treaty, except that it does allow a waiver for use in Korea. In the Senate, S.896 has been referred to the Armed Services Committee; and, in the House, H.R. 2459 has been referred to the National Security and International Relations Committees.

Evident from the legislation described above is an acute awareness within Congress of the problem of landmine proliferation. Also evident is an understanding of the three roles of landmines. For example, the moratorium on the use of AP landmines described above seeks to ban the tactical use of these weapons by the U.S. military (with exceptions for the Claymore[70] and in demilitarized zones). The unilateral export moratorium seeks to prevent the second role of landmines by

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[69]See the testimony of Colonel Richard H. Johnson, U.S. Army, Retired before the Senate Committee on Appropriations, *The Global Landmine Crisis*, May 13, 1994. P. 112.

[70]See Glossary.

removing AP mines from the international arms market. Congress has also expressed sustained support for demining programs in an effort to combat the third role of mine warfare. Additionally, Congress has inserted into several pieces of legislation expressions of support for the CCW. Finally, Congress has expressed an interest in one other approach to reconciling the roles of landmines in warfare, through technology. The role of technology is discussed below in a separate section.

Addressing the Roles of Landmines: Administration Policy

Banning Anti-Personnel Landmines

At a press conference on May 16, 1996, President Clinton announced a new policy to ban anti-personnel landmines and to "lead a global effort to eliminate these terrible weapons and to stop the enormous loss of human life."[71] The policy was comprehensive and consisted of several types of unilateral initiatives, stated as four steps:

First, U.S. forces would immediately discontinue use of all "dumb" APL and destroy existing stockpiles of some 4,000,000 devices by 1999. Exceptions would be those mines retained for countermine training and those used along the border between North and South Korea until the threat abates or alternatives to APL are available. "Smart" mines, which pose no residual threat to civilians, could continue to be used in combat when necessary until such a time as they might be banned by international treaty.

Second, the United States would propose a resolution at the United Nations General Assembly urging support for a worldwide ban on landmines. This was done, and details are described in the International Treaties Section above. Consultations with Canada on the Ottawa initiative were affirmed under press questioning.

Third, the Department of Defense was directed to begin research and development on alternative technologies that would not pose new dangers to civilians and would end reliance on APL.

Fourth, DoD would expand its efforts to develop better mine detection and clearing technology that could be used by all nations afflicted with mines. The ongoing programs for training and assisting other nations in demining efforts would be strengthened.

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[71]Federal Document Clearing House, Inc. Transcript, President Clinton Holds News Briefing to Discuss a New Policy on the Use of Landmines, May 16, 1996.

After two years, events in the international arena and Congress had put pressure on the Administration to increase efforts to ban landmines; at the same time, various military voices raised the case for caution in forfeiting a system still uniquely useful for protecting American troops. On September 17, 1997, when explaining his reasons for not signing the Ottawa Treaty, President Clinton established specific goals for the process of eliminating APL. DoD must develop alternatives so that use of APL — even self-destructing systems — would end in 2003. For Korea, the deadline was extended to 2006. Former Chairman, JCS, David Jones was appointed personal advisor to the President and Secretary of Defense to assist.[72] In May, 1998 the President's National Security Advisor wrote Senator Leahy to say that the United States would sign the Ottawa Treaty in 2006, provided the Pentagon can develop suitable APL alternatives by then.. In light of that, he requested support to repeal Public Law 104-107 that mandated a one-year moratorium on use of APL by U.S. forces starting in 1999.[73]

A positive benchmark for Administration policy was reached on June 30, 1998 when the U.S. Army completed destruction of over 3.3 million non-self-destructing APL. That represented the entire U.S. stockpile of "dumb" AP landmines, except for about one million maintained for use in the Korean Peninsula and small numbers at various training locations for demining training purposes.[74] The remaining obstacle to U.S. landmine-banning policy centers around "smart" APL. These self-destructing or self-deactivating devices were designed to negate the indefinite hazard threat of landmines; but, they were also banned by the Ottawa Treaty. Initial efforts to devise effective substitutes were disappointing. Faced with daunting deadlines, the Pentagon rejuvenated its search for APL alternatives in late 1997, but funding and definitive technological directions were not clear.[75] Finding suitable APL alternatives for U.S. troops remains an obstacle to further progress on banning landmines.

Humanitarian Demining

The U.S. Government has been particularly active in overseas humanitarian demining activities since 1993. It is claimed that the United States spends almost as much on demining as the rest of the world combined[76]. Emphasis has been on training and assisting people to accomplish demining within their own countries — U.S. troops are not allowed to do the task directly. The overall program is overseen by The Interagency Working Group on Humanitarian Demining, with participants from a variety of State Department, Defense Department, and other offices, to

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[72]Federal Document Clearing House, Inc. Transcript, President Clinton Holds News Conference on Land Mine Treaty, September 17, 1997.

[73]Michael O'Hanlon, "US and Land-Mine Ban," *Christian Science Monitor,* June 4, 1998, p. 11.

[74]Department of Defense. News Release, "Destruction of Last Non-Self-Destructing Anti-Personnel Landmines in U.S.-Based Stockpile," June 25, 1998.

[75]Colin Clark. "Pentagon OK Likely For Landmine Alternatives," *Defense Week,* Dec. 1, 1997, p. 6.

[76]John D. Holum. Statement to the United Nations General Assembly, October 14, 1997.

include the National Security Council. The responsible official is the Assistant Secretary of State for Political-Military Affairs. Funding, however, comes through a variety of accounts in both the Departments of Defense and State (see Figure 2). The DOS can provide demining funds, once approved, to private contractors, non-governmental organizations (NGO's), and other governments.

Since FY1993, the United States has committed over $245 million to global humanitarian demining, with some $92 million being spent in FY1998. Those funds have supported ongoing operations in 14 nations; 3 more programs are being started, and 2 more are planned — a total of 19 nations.[77] The pattern of annual increases continues, as President Clinton pledged to raise the U.S. donation by 25% for FY1999.[78]

The President has also announced an international initiative to enhance the global effort to rid all nations of emplaced landmines. His 2010 Global Initiative on Humanitarian Demining seeks to create a sustained and coordinated international effort to help mine-affected countries. To that end, Ambassador Karl F. Inderfurth was appointed Special Representative to the President and Secretary of State to lead the effort. The overall purpose is to create greater involvement of more nations, with specific goals to raise global investment to $1 billion annually and to eliminate the threat of landmines to civilians by Year 2010[79]. In May, 1998 Washington hosted a meeting of interested nations to examine future tasks; other nations will host subsequent meetings. One necessary project will be to support collaborative efforts headed by the United Nations Mine Action Service to improve and standardize surveys of actual landmine problems and demining strategies throughout the world. Earlier attempts to estimate numbers of mines in the ground, though dramatic and attention-getting, may have inflated the problem — accurate statistics will better serve effective solutions at reasonable time and expense.[80]

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[77]Information from Department of State. Nations assisted to date: Afghanistan, Angola, Bosnia-Herzegovina, Cambodia, Costa Rica, Ethiopia, Eritrea, Honduras, Jordan, Laos, Mozambique, Namibia, Nicaragua, and Rwanda. New starts: Yemen, Chad, and Lebanon. Approved for future: Guatemala and Zimbabwe.

[78]Holum, *op. cit.*

[79]Department of State. Fact Sheet, *Global Humanitarian Demining 2010 Initiative*, undated.

[80]Laurie H. Boulden. "A Mine Field, Statistically Speaking," *The Washington Post,* February 8, 1998, p. C1.

Figure 2. Appropriations Sources for U.S. Demining Activities

Department of Defense: Overseas Humanitarian, Disaster, and Civic Aid (OHDACA)
Department of Defense: Research, Development, Test and Evaluation (RDT&E)
Department of State: Foreign Military Financing (FMF); Nonproliferation, Anti-Terrorism, Demining and Related Programs (NADR)
U.S. Agency for International Development (USAID): Foreign Operations; International Disaster Assistance Fund
Department of State Bureau of Population, Refugees and Migration (State/PRM): Migration and Refugee Assistance
Department of State Bureau of International Organization Affairs (State/IO): Contributions for International Peacekeeping Activities (CIPA); International Organizations and Programs (IO&P)

Source: Department of State, PM/ISP.

Technology

Reconciling the divergent roles of landmines in warfare through the development and application of technology appears to be both promising and problematic. The differing roles of landmines in warfare are mirrored by important distinctions between countermine techniques and resources. In conventional, combined arms warfare, minefields represent obstacles which are to be breached and transited in pursuit of an objective. U.S. Army doctrine also provides for clearing operations in the support of a continued passage of forces or as part of post-war nation assistance. In post-war settlement, or humanitarian and peacekeeping operations, minefields must be demined to allow for habitation of the land. The distinction between breaching and demining has informed the research and development of countermine technology.

Changes in landmine technology have paradoxically blurred and clarified the different roles of landmines in warfare. For example, scatterable or remotely delivered mines have augmented the ability of the U.S. military to defend against or canalize an advancing enemy force. Moreover, self-destructing and self-deactivating mines seem to provide a solution to ending the third role of mines in warfare. FASCAM mines are surface laid, not buried, and are visible to the naked eye. Conversely, in the hands of military forces intent on terrorizing a civilian population, remotely delivered mines simplify their task and are unlikely to be marked or recorded. Changes in landmine technology have also yielded non-detectable mines and anti-handling devices, both of which complicate the task of demining.

Common Technology of Anti-Personnel Mines

Mines can be very simple devices, easily manufactured from universally available materials. The primary component is an explosive charge that damages the victim by blast or from dispersal of the casing fragments. Another necessary component is a detonator fuse, which can be mechanical, chemical, or electrical. Finally, a sensing device is needed to initiate the chain of detonation. In simple mines, the sensing can be achieved by direct pressure of a footstep, the pull of a tripwire, or release of pressure when the mine is picked up or uncovered. The simple blast mine is difficult to detect because it can be very small and encased in plastic. A larger, somewhat more mechanical mine—the bounding, fragmentation mine—is more lethal. An additional component projects the main charge one or two meters into the air where it explodes and propels fragments throughout a radius of ten to thirty meters. This technology is over thirty years old, but still effective. It will deny an area and create casualties until trained and equipped personnel clear or `demine' the mined area.

Advanced Technologies

Because current technology for anti-personnel mines is very cost-effective, there exists little incentive for advancing AP mines *per se*. Most recent research and development has been in conjunction with creating more effective anti-tank systems, many of these systems continue to include AP mines. Most of the new systems being devised are incorporated into modern, mechanized forces and include automatic self-destruction. The most advanced components are often the sensing methods. These include seismic, sonic, and infra-red sensors in conjunction with computer software recognition of target signatures. Most of this technology is not cost-effective against personnel, and is not likely to exacerbate current problems with control of AP mines.[81]

To alleviate incidents of fratricide, the U.S. military employs self-destructing mines. Some anti-personnel mines employed by the U.S. military are not self-destructing. Three examples are the M14, a nonmetallic blast mine, the M16A1, a fragmentation mine, and the M18A1 Claymore, a command detonated, nonmetallic fragmentation mine. Each of these type of mines is removable and provides U.S. forces with the capability to emplace a hasty protective minefield. In a tactical environment all "mines are picked up by the emplacing unit upon leaving the area, unless enemy pressure prevents mine retrieval or the minefield is being transferred to a relieving commander."[82] According to the deputy program manager for landmines, since 1970, the U.S. has not designed a mine without a finite life.[83] Some critics have suggested that modern U.S. landmines are not reliable enough to

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[81] Based in part on Headquarters, Department of the Army, *Mine/Countermine Operations, FM20-32*, Washington, D.C., 30 September 1992 and on subsequent interviews by Edward F. Bruner with officials of Picatinny Arsenal and the U.S. Army Foreign Science and Technology Center.

[82] *FM20-32 Mine/Countermine Operations*, p. 2-2.

[83] Roos, John G. "The Unending Menace: Military Countermine Efforts Are No Solution", *Armed Forces Journal International*, July, 1994. P. 15.

guarantee no consequent hazard to civilians. According to the Army, however, no U.S. self-destructing mines will remain on any battlefield — the self-destruct reliability is rated at 99.9999 percent, backed up by self-deactivation through battery exhaustion. In 32,000 tests, all systems self-destructed.[84]

Advanced technologies have also yielded mines that are not detectable. Non-detectable mines have complicated the CCW negotiations, as some nations must convert existing stockpiles to a level of detectability. The issue of self-destructing mines has also created a requirement for some nations to convert existing stockpiles.

Countermine Technology[85]

Countermine operations generally consist of detecting, breaching, marking and clearing mines. The actions support a larger military concept of operations and scheme of maneuver. Means of detection range from visual, physical (probing), electronic, mechanical, and even the use of dogs.[86] The DOD Report to the Congress *Conduct of the Persian Gulf War* concluded that during Desert Storm:

> Breaching minefields under enemy fire proved demanding. Requirements for countermine and engineer equipment should be reviewed carefully.[87]

Existing technologies for tactical breaching include the M58A4 Mine-Clearing Line Charge (MICLIC), a rocket-propelled explosive line charge which basically blasts a vehicle width lane through a minefield. Another example of the line charge is the Antipersonnel Obstacle Breaching System (APOBS). The APOBS is a man-portable line-charge capable of blasting a footpath through a minefield.[88] Other methods of breaching or clearing, essentially expanding footpaths created by a line charge, are through the use of plows, blades and rollers attached to a tank. Each of the methods described above was employed in Desert Storm, as was manual probing.

In reaction to the finding in the report *Conduct of the Persian Gulf War*, the Congress added funds to the Countermine Research, Development, Test and Evaluation program. In the Senate Armed Services Committee Report on the FY93 National Defense Authorization Act, the Committee linked countermine technology for tactical purposes to humanitarian demining programs. "An accelerated

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[84]OASD/Special Operations and Low-Intensity Conflict. *Annual Report to Congress on Use by Armed Forces of Anti-Personnel Landmines*, February, 1998.

[85]For greater detail, see CRS Report for Congress 97-399, *Developing Technology for Humanitarian Landmine Clearing Operations*, by John D. Moteff, March 26, 1997.

[86]Mine sniffing dogs have also been trained to detect mines. Please see "MEDDS Detecting the 'Undetectable' Mine", *International Defense Review*, 2/1993.

[87]U.S. Department of Defense. *Conduct of the Persian Gulf War: Final Report to Congress*. Pursuant to Title V of the Persian Gulf Conflict Supplemental Authorization and Personnel Benefits Act of 1991 (Public Law 102-25). April 1992. P. 417.

[88]The Bangalore Torpedo, which creates a footpath through a minefield, will be replaced by APOBS. Replacing the MICLIC is the Explosive Stand-off Minefield Breacher.

countermine RDT&E program could develop improved mine detection methods to support mine clearing operations."[89]

This linkage between tactical countermine technology and demining operations has been accelerated due to the deployment of U.S. forces to Bosnia as part of the NATO implementation force. To support U.S. forces in Bosnia the Army assembled a Countermine Task Force. Lightweight armor that can be attached to vehicles has been used successfully in Bosnia. Army commanders in Europe have also requested the integration of existing technologies to provide for better locating, marking and tracking of all minefields. The advanced technologies currently being developed for countermine operations largely rely upon thermal imaging and infra-red (IR) sensors. One program currently in testing is the Airborne Standoff Minefield Detection System (ASTAMIDS), which employs either a laser and/or an IR sensor placed on an unmanned aerial vehicle to detect mines.[90] The Close-In Man Portable Mine Detector also uses an IR sensor to detect mines and is man- portable.[91] Various IR detection systems are also being tested in conjunction with remotely-controlled mine-detection vehicles. For clearance of mines, one system being explored is the Standoff Minefield Breacher, "a net containing shaped charges which, when hurled over a minefield and detonated, trigger mines beneath the surface."[92]

As evident from the above review, the preponderance of technological development focuses on mine detection. Two areas of research that may advance demining programs are: foams which either destroy mines in place or prevent activation of pressure and tension-release mine fuzes, and demining vehicles that clear and destroy mines.[93] Mine clearing and demining for the foreseeable future will involve the painstaking tasks of exploding or disarming landmines.

Alternatives to Anti-Personnel Landmines

Since 1996, the U.S. Department of Defense has searched for alternatives to APL. Initial studies were discouraging and determined that short-term solutions would have to involve increased use of manpower, rather than technology. The search was rejuvenated in late 1997 with the signing of the Ottawa Treaty and the

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[89]U.S. Congress. Senate. Committee on Armed Services. National Defense Authorization Act for Fiscal Year 1993; report to accompany S. 3114. July 31, 1992. Washington, D.C., U.S. Govt. Print. Off., 1992 (102d Congress, 2d Session. Report 102-352). P. 91, 95-96.

[90]"Airborne Minefield Detection System Not Likely for Bosnia, Developer Says", *Inside the Army*, February 12, 1996. P. 5-6.

[91]The new name for the Close-In Man Portable Mine Detector is HSTAMIDS (Handheld Standoff Minefield Detection System) and the new name for the Standoff Minefield Breacher is the ESMB (Explosive Standoff Minefield Breacher). The Army is also developing a vehicle mounted metallic/non-metallic mine detection system, the Ground Standoff Minefield Detection System (GSTAMIDS). The Interim Vehicle Mounted Mine Detector (IVMMD) which is being used until GSTAMIDS can be fielded.

[92]Roos, p. 15.

[93]"Technology Faces Challenges in Bosnia", *Jane's International Defense Review*, Vol. 29, February 1996. P. 5-6, 25. LTC David W. Wasechek, U.S. Army, provided valuable comments concerning the current state of landmine technology.

President's setting of a 2003 goal for ending use of APL except in Korea. The Army has the lead (Track 1) for acquiring a near-term solution and has several defense contractors pursuing concepts for a compliant munitions or sensor field that could delay an armored attack by 15 to 20 minutes. Early user experiments are planned within 12 months, with an eye to fielding systems by early FY2004. The program is projected to cost $11.5 million in FY1998 and $22.5 million in FY1999.[94]

The Defense Advanced Research Projects Agency (DARPA) is charged with pursuing a Track 2 that might discover more sophisticated technological alternatives to current APL. General categories of weapons concepts being considered are: on-site sensors with remote response; remote sensors with remote response; obstacles and diversions; and, mobile robots. Other nations, such as South Africa, Sweden, and the United Kingdom, also are researching APL alternatives. Many options attempt to use existing weapons with more precise command and control, remote sensing, and "man in the loop." Another tack suggested by some is wider application of many non-lethal technologies being developed for lower-intensity conflict situations.[95]

Criticisms of Technology

Advances in landmine technology have allowed for increased lethality, increased rates of dispersal, and self-destruction capability. Advances in countermine technology allow for detection by thermal imaging and rapid breaching. One criticism of the technological approach to landmine proliferation is that mines will continue to be used indiscriminately absent an international ban on production, export, and use. A criticism of the CCW is that some nations cannot afford the costs of converting existing stockpiles of mines to those that self-destruct.

Conclusion

The United States, as an advanced industrial power in possession of the world's most advanced weaponry, is unlikely to confront opposing military forces which seek battle according to our own preferred strategy. Two examples from past wars and one from a current conflict should illuminate the role of landmines. During Union General William T. Sherman's March to the Sea in 1864, the General came upon a group of soldiers tending to a young officer whose foot had been destroyed by a "torpedo"—a mine—planted in the road. As Sherman described the incident, there "...had been no resistance at that point, nothing to give warning of danger, and the rebels had planted eight-inch shells in the road, with friction matches to explode them by being trodden on." To the Union General, this "...was not war, but murder, and it made me very angry".[96] In discussing an incident from the war novel *Fields*

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[94]DoD, *Annual Report to Congress on Use by Armed Forces of Anti-Personnel Landmines,* 1998.

[95]*Ibid.,* also, see Mark Hewish and Rupert Pengelley, *Jane's International Defense Review,* "In search of a successor to the anti-personnel landmine," 3/98, pp. 30-37.

[96]Sherman, William Tecumseh. *Memoirs of General W.T. Sherman* (New York: Literary (continued...)

of Fire by James Webb, in which a Marine in the An Hoa Basin triggers the pressure-release detonator of a buried artillery round, Robert Timberg observed that in Vietnam ". ..landmines and booby traps were a fixture, the great leveler. . .".[97] According to Major Giangaetano Carancini, an Italian mine removal specialist currently serving in Bosnia, the main danger is "many of the mines are homemade, not traditional, and that makes them harder to recognize. They are made with materials found in the markets, like water pipes filled with nails and dynamite." [98] Because landmines serve as a leveler, they are unlikely to soon vanish from the international arms market.

Addressing the roles of landmines poses a significant challenge to American foreign policy. The tactical role of landmines is an element of U.S. military doctrine and contingency planning that is currently being reviewed.[99] Some proponents believe that U.S. soldiers should continue to have AP mines in their arsenal, while some critics of U.S. military doctrine believe that a ban on the military use of AP mines will serve to reduce landmine proliferation.[100] Proponents of a total ban also reason that such a measure will reduce the indiscriminate use of AP mines against civilians, during and after war.

During war, the laws for the conduct of armed conflict, *jus in bello*, are occasionally subsumed by the right to go to war, *jus ad bellum*.[101] Thus, it is unlikely that legislation enacted by the Congress to ban the use of landmines by the U.S. military will result in the disappearance, anytime soon, of these small, cheap weapons from all battlefields.

Nevertheless, the U.S. response to landmine proliferation has been multifaceted and accelerating. To control the tactical role of landmines, the U.S. military is guided by law and doctrine. Second, the development of FASCAM technology has

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[96](...continued)
Classics of the United States, 1990). P. 670.

[97]Timberg, Robert. *The Nightingale's Song* (New York: Simon and Schuster, 1995). P. 155.

[98]Katz, Gregory. "NATO Fears Land Mines Being Stored", *Dallas Morning News*, March 22, 1996. P. 1.

[99]Bonner, Raymond. "Pentagon Weighs Ending Opposition To a Ban on Mines", *New York Times*, March 17, 1996. P. A1.

[100]For a concise view of these issues please see Lt. Gen. Bernard E. Trainor, USMC (Ret.), "Land Mines Saved My Life", *New York Times*, March 28, 1996, p.25 and Robert O. Muller, "The Land Mine Scourge-How Much Longer?", *Christian Science Monitor*, February 8, 1996, p.19.

[101]Andreopoulos, p. 213; also see Samuel P. Huntington, "The Clash of Civilizations?", Foreign Affairs, Summer 1993, Vol. 72, No. 3, p. 22-49. Discussing nuclear,chemical and biological weapons, and their means of delivery, Huntington noted, "The West promotes non-proliferation as a universal norm and non-proliferation treaties and inspections as means of realizing that norm." The non-western nations, "assert their right to acquire and to deploy whatever weapons they think necessary for their security.", p. 46. Comprehensive bans on landmine use and export are subject to the same differences. See, John Mintz, "U.S. Aides See China Impeding Pact on Restricting Land Mines", *Washington Post*, March 22, 1996, p. A31.

been mirrored by self-destructing capabilities. To curtail the indiscriminate use of mines, Congress has prohibited the export of AP mines by U.S. companies. To fight against the debris of mine warfare, the United States has appropriated significant humanitarian funds for demining training and grants for demining equipment to nations in need. Lastly, the United States has unilaterally restricted its own use of APL, is searching for alternative military weapons, and is pressing negotiations toward a global ban on anti-personnel landmines. The major political issues revolve around how quickly and how carefully to proceed.

Glossary

Landmine: Any munition designed and manufactured to be laid on or in the ground and subsequently detonated by the presence, proximity, or contact of a person or vehicle.

Self-destructing mine: A mine that automatically destroys itself by means of an incorporated mechanism. U.S. mines self-destruct within a matter of hours.

Self-neutralizing mine: A mine that automatically renders itself inoperable by means of an incorporated mechanism.

Command-destructing mine: A mine that is designed to be detonated by a remotely delivered command.

Self-deactivating mine: A mine that renders itself inoperable by means of exhaustion of a component of the mine essential to the operation of the mine, such as a battery. All current U.S. self-destructing mines also have this feature as a back-up; it renders mines safe within days.

Non-reconstitutable mine: A self-deactivating, self-neutralizing, or command-neutralizing mine that, once it has self-deactivated, self-neutralized, or command-neutralized, cannot be re-activated by means available outside its manufacturing plant or a comparable facility.

Self-eliminating mine: A mine that is self-destructing, self-deactivating, and non-reconstitutable.

Demining: The complete removal of all landmines from an area in order to safeguard civilian populations. It is a much more intensive task than the mere breaching and clearing of minefields required during military operations.

Antihandling device: A device arranged to detonate a mine when it is disturbed.

FASCAM: Family of scatterable mines. Modern group of U.S. mines that can be remotely scattered by a range of techniques. Includes: MOPMS and GATOR. All are self-destructing and self-deactivating.

Claymore mine (M18A1 Antipersonnel fragmentation): A directional fragmentation mine that contains 700 steel balls and 1.5 lbs of Composition C4 explosive. The mine can be detonated by human command, the normal mode, or trip wire. The moratorium on use of anti-personnel landmines (SEC. 580) contained in H.R. 2880 excludes Claymore mines.

GATOR: U.S. mixed anti-tank mine system, bomb encased, for delivery to deep battlefield targets by Air Force and Navy aircraft.

MOPMS: Modular Packed Mine System. Mixed anti-tank mine system, man-portable, for close-in battlefield protection. Can be command detonated or set to self-destruct in four hour increments up to 16 hours.

VOLCANO: Mine dispensing system for emplacement by helicopters or ground vehicles, provides mid-range battlefield protection from armor attack. Existing stocks are mixed AT and AP; current production is AT only.