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# THESIS

**MINE WARFARE: AN OLD THREAT PRESENTS NEW CHALLENGES FOR NATO'S POST-COLD WAR NAVIES**

**by**

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This thesis analyzes the possible implications to global maritime interests posed by the growing international proliferation of advanced sea mines, and examines the role of NATO's mine countermeasures (MCM) forces in countering this threat in the post-Cold War security environment. It is argued that, given the Iraqi mining success during the Gulf War, the current global proliferation of sophisticated sea mines, and deficiencies in the international laws which govern their use, mine warfare will present a growing threat to vulnerable Western nations into the next century. Consequently, NATO's mine countermeasure forces will have a prominent role in future Alliance or UN-mandated out-of-area naval contingencies, ranging from counter-terrorism operations to major regional conflicts, and will be called upon to provide a credible MCM capability to protect Alliance and coalition naval forces, secure vital sea lines of communication (SLOCs), and ensure unimpeded maritime freedom of the seas prescribed under international law. NATO's capability to meet these challenges will depend largely on its ability to reorient its focus toward the requirements necessary to train and maintain a first-rate MCM rapid deployment force. As a leader within NATO, the United States Navy must assume the lead in forging multinational transatlantic MCM forces capable of dealing with any global mining contingency.

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**MINE WARFARE: AN OLD THREAT PRESENTS NEW CHALLENGES FOR NATO'S POST-COLD WAR NAVIES**

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## ABSTRACT

This thesis analyzes the possible threats to global maritime interests posed by the growing international proliferation of advanced sea mines, and examines the role of NATO's mine countermeasures (MCM) forces in countering these threats in the post-Cold War security environment. It is argued that, given the Iraqi mining success during the Gulf War, the current global proliferation of sophisticated sea mines, and deficiencies in the international laws which govern their use, mine warfare will present a growing threat to vulnerable Western nations into the next century. Consequently, NATO's mine countermeasure forces will have a prominent role in future Alliance or UN-mandated out-of-area naval contingencies, ranging from counter-terrorism operations to major regional conflicts, and will be called upon to provide a credible MCM capability to protect Alliance and coalition naval forces, secure vital sea lines of communication (SLOCs), and ensure unimpeded maritime freedom of the seas prescribed under international law. NATO's capability to meet these challenges will depend largely on its ability to reorient its focus toward the requirements necessary to train and maintain a first-rate MCM rapid deployment force. As a leader within NATO, the United States Navy must assume the lead in forging multinational transatlantic MCM forces capable of dealing with any global mining contingency.

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## EXECUTIVE SUMMARY

### A. INTRODUCTION

The collapse of the Warsaw Pact Treaty Organization and the demise of the Soviet Union have resulted in a fundamental shift in the defense perspectives of NATO away from large scale conventional and nuclear warfare toward participation in crisis management operations, low intensity regional conflicts, and peace-keeping/enforcing missions. This new international security setting will likely mean an even greater role for NATO's naval forces in out-of-area contingency operations in littoral waters. In such an environment, the sea mine will always pose a potential threat as an anonymous and cost-effective means of neutralizing a superior naval force, or as an instrument of international terror.

### B. THESIS STATEMENT

This thesis analyzes the possible threats to global maritime interests posed by the growing international proliferation of advanced sea mines, and examines the role of NATO's mine countermeasures (MCM) forces in countering these threats in the post-Cold War security environment. It is argued that, given the Iraqi mining success during the Gulf War, the current global proliferation of sophisticated sea mines, and deficiencies in the international laws which govern their use, mine warfare will present a growing threat to vulnerable Western nations into the next century. Consequently, NATO's mine countermeasure forces will have a prominent role in future Alliance or UN-mandated out-of-area naval contingencies, ranging from counter-terrorism operations to major regional conflicts, and will be called upon to provide a credible MCM capability to protect Alliance

and coalition naval forces, secure vital sea lines of communication (SLOCs), and ensure unimpeded maritime freedom of the seas prescribed under international law.

## C. KEY FINDINGS

### 1. Mine Warfare Strategic Culture

Historically, the United States has failed to maintain an adequate capability in naval mine countermeasures, particularly in comparison to its European allies. The divergence between the two sides of the Atlantic in their perceptions of mine warfare's relative importance in national security affairs can be traced to each region's differing interpretation of its historical, strategic, and economic vulnerability to mining. Europe's focus on their perceived mine warfare vulnerability has resulted in continued emphasis on MCM programs to adequately protect their national interests. Conversely, America's Cold War maritime strategy centered primarily on open ocean confrontation with the Soviet Union. As a result, the Navy sharply limited the development of MCM in order to support other warfare areas more fully. Little attention was given to the growing need for a rapidly deployable integrated MCM force capable of conducting sustained MCM operations in emerging regional "hotspots" around the globe. This requirement went largely unnoticed until events in the Arabian Gulf exposed the US Navy's unpreparedness for unilateral out-of-area MCM operations in the littorals, first, during the Iran-Iraq Tanker War, and again in Operation Desert Storm.

### 2. Current Mine Warfare Realities

As a result of the Gulf War experience, mine countermeasures have assumed greater visibility within the United States Navy. Yet despite improving US MCM capabilities, the

inherently complex and time-consuming nature of mine clearance operations are often beyond the capability or jurisdiction of individual states, thus requiring the cooperative efforts of multinational coalitions. Collectively, NATO's alliance members maintain the world's premier MCM capability and technical establishments. Moreover, NATO is the only institution capable of conducting extensive MCM operations globally. When analyzing the likely occurrence of maritime mining on the global stage, it is important to consider the enormous disparity between those nations possessing the capability to plant offensive, defensive, or protective minefields and those nations with the ability or inclination of clearing them either during or following the cessation of hostilities. The events of the Gulf War clearly reinforce the presumption that many states lacking a credible MCM capability are nevertheless undeterred from employing mine warfare as integral components of their military posture.

### 3. Mine Warfare and International Law

Current deficiencies in the various internationally recognized treaties and conventions which codify customary international laws of the sea governing the use of sea mines continue to challenge even noted scholars of maritime law, and have created notable "gray areas" which can be exploited by states seeking justification for potentially destablizing mining activities. The best known and nearly universally accepted regime governing the use of mines during armed hostilities is the 1907 Hague Convention No. VIII. Yet key provisions contained in this agreement are incomplete, outdated, or ambiguous, and thus do not always provide clear guidelines as to the geographical limits on the employment of mines, the conditions under which they may be legally used, and the specific responsibilities of the mining entity following their emplacement. These inconsistencies will continue to lead to

a wide range of differing legal interpretations with respect to the uses of sea mines among the world's maritime community until a more comprehensive convention is developed. Moreover, the recent ratification of the Third United Nations Convention on the Law of the Sea (UNCLOS III) opens new and potentially destablizing avenues for the employment of mines in the expanded and often contentious Territorial Seas, archipelagic waters, and Economic Enterprise Zones (EEZs), within the strategic maritime regions of the world.

**4. Mine Warfare Proliferation**

The ongoing proliferation of advanced mines to the developing Third World, and indirectly, to subnational organizations, increases the potential threat to continued freedom of the seas and the national security of NATO's maritime nations. The dynamics of the Cold War balance of power which served to curb the proliferation of sophisticated mine technology and hardware from the advanced military powers have given way to post-Cold War economic realities. As a result, previously unavailable state-of-the-art "smart mines" from Russian, Asian, and Western European sources are now available on the international arms market at affordable prices. Moreover, the increasingly transnational European defense technology and industrial base also raises the possibility of increased diffusion of advanced mine technology to the developing nations of the Third World. Compounding the problem is the concurrent proliferation of modern SSK diesel-electric submarines world-wide. These silent platforms offer the ultimate means of covertly delivering mines capable of sinking the largest ships and submarines in constricted geographical environments. Finally, at the subnational level, the growth of black and gray arms markets has created an avenue for further proliferation of advanced mines to stateless actors such as terrorist groups and insurgent movements.

### 5. The Role of MCM in NATO's Post-Cold War Navies

The lack of a credible near term threat to Western Europe has resulted in a reevaluation of NATO's core missions in the post-Cold War international setting. NATO's new Strategic Concept has embraced expeditionary littoral warfare as the most likely type of naval conflict in this new security environment. Moreover, all 16 member states have accepted a de facto Alliance mandate to support peace-keeping activities of the Conference on Security and Cooperation in Europe (CSCE) and the United Nations.

Against this backdrop, NATO's MCM forces can perform five primary missions: ensure North Atlantic waters are free from the threat of sporadic terrorist or insurgent mining activities; defend against Europe's economic vulnerability to mining from latent regional hegemons-including Russia; support NATO's Immediate Reaction standing naval forces; contribute to Alliance, or UN-mandated peace-keeping/enforcing missions or expeditionary operations world-wide; and finally, reduce the potential threat posed by mines to NATO's nuclear submarine forces. Common to many of these duties will be the requirement to provide an effective shallow water MCM capability during NATO or ad-hoc coalition operations in the littoral regions of the world

## E. CONCLUSION

The abysmal MCM capabilities of most Third World navies, and their inability to counter even rudimentary mine threats highlights the potential problems associated with the advent of advanced sea mine proliferation. With the possible exception of Japan, only NATO possesses effective MCM forces both in terms of assets and expertise to effectively counter the growing menace presented by the global proliferation of sophisticated mines.

Bearing this in mind, it is but a matter of time before NATO's MCM forces will again be called upon to counter a more lethal variety of mines challenging naval expeditionary forces or threatening maritime freedom of the seas. NATO's capability to meet these challenges will depend largely on its ability to reorient its focus toward the requirements necessary to train and maintain a first-rate MCM rapid deployment force. As a leader within NATO, the US Navy must assume the lead in forging multinational transatlantic MCM forces capable of dealing with any global mining contingency.

# I. INTRODUCTION

## A. PURPOSE

The twofold purpose of this thesis is to analyze the possible implications to maritime interests posed by the global proliferation of advanced sea mines, and to examine the role of NATO's mine countermeasures (MCM) forces in countering this growing threat in the post-Cold War security environment. The events of the Gulf War clearly reinforce the presumption that many countries lacking a credible MCM capability are nevertheless undeterred from employing mine warfare as integral components of their military posture. Consequently, NATO's maritime nations will undoubtedly be called upon to provide a credible mine countermeasures capability in order to protect Alliance and coalition naval forces, secure vital sea lines of communication (SLOCs), and to ensure unimpeded flow of maritime traffic through potentially vulnerable international and territorial waters. NATO's capability to meet this challenge will depend largely on its ability to reorient its focus toward the requirements necessary to train and maintain a first-rate MCM rapid deployment force. As a leader within NATO, the US Navy must assume the lead in forging multinational transatlantic MCM forces capable of dealing with any global mining contingency.

## B. BACKGROUND

The collapse of the Warsaw Pact Treaty Organization and the demise of the Soviet Union have resulted in a fundamental shift in the defense perspectives of both American and Western European navies away from large-scale open ocean warfare toward regional crisis management and peace-keeping/enforcing missions. This new security environment will

likely mean an even greater role for naval forces in out-of-area contingency operations in littoral waters.[1] In such an environment, the mine will always pose a potential threat as both a cost-effective means of defense, and as an easily deployed means of neutralizing a superior naval force. Throughout its history, the mine has proven to be a weapon that evokes psychological uncertainty, causes physical damage, and requires a countermeasures effort far out of proportion to the cost of the mining effort. Moreover, mines are covert and anonymous, making them an ideal weapon for terrorist groups or adventurous rogue states. The ongoing proliferation of advanced mines to potential Third World adversaries and, indirectly, to subnational organizations, only increases the potential threat to continued freedom of the seas and the national security of NATO's maritime nations.

Historically, the United States Navy has failed to sustain an adequate capability in naval mine countermeasures, particularly in comparison to its European allies. Yet of the 13 major US Navy vessels damaged since 1945, nine - including the USS *Princeton,* USS *Tripoli,* and the USS *Samuel B. Roberts* - have been the victims of mines. Recent events in the Arabian Gulf have highlighted Western economic and military vulnerability to even haphazard mining operations, and the inability of the US Navy alone to provide an adequate MCM capability.

As a result of the Gulf War experience, mine countermeasures have assumed greater visibility within the US Navy. The new emphasis toward rectifying acknowledged shortfalls in this warfare area is outlined in the Navy's *Mine Warfare Plan,* and portends

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[1] For the purposes of this thesis, the term "out-of-area operations" reflects those operations involving NATO's military forces and integrated command structure that lie outside the scope of Article 5 to the 1949 North Atlantic Treaty.

increased funding levels for MCM development programs, the complete reorganization and consolidation of US MCM forces under the cognizance of a component commander, Commander Mine Warfare Command (COMINEWARCOM), and the collocation of all US MCM forces at the Navy's "Center for Mine Warfare Excellence" at Naval Station Ingleside in Texas.[2] Yet despite improving US MCM capabilities, the inherently complex and time-consuming nature of most mine-clearance operations are often beyond the capability or jurisdiction of individual states, thus requiring the collective efforts of multinational coalitions. Moreover, the growing role of naval forces in regional crisis response operations and maritime peace-keeping/enforcement missions, and their vulnerability in the littoral environment are two current areas of concern relative to mine warfare. In such circumstances, the US Navy must rely increasingly on overseas allies to share the burden of maintaining global MCM commitments in today's unstable international climate.

Since 1980, all but two of the 16 crisis deployments involving the US military have included naval forces. Moreover, forces from NATO member nations have collaborated with the US in eight of these.[3] One of the key lessons of Operations Desert Shield and Desert Storm is that our nation must be prepared with little warning to project significant US forces overseas to areas of the world processing little or no infrastructure. This lesson becomes even more apparent as the United States reduces its overseas base structure in response to post-Cold War realities. In these scenarios, the presence of a mine threat may interrupt the

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[2] US Department of the Navy, *Mine Warfare Plan*, second ed., February 1994, p. 5.

[3] Mike Wells, "Seapower Conference Examines Next Decade," *Navy International*, May/June 1994, p. 151.

flow of maritime logistics and resupply critical to the successful conduct of joint or coalition military operations in littoral regions. Furthermore, recent history has demonstrated that any actual or potential threat to the harmony of the global economy presented by the closure of a strategic maritime region will result in the deployment of multinational naval forces as instruments of coercive diplomacy, or if necessary, forceful intervention. Most, if not all these regions encompass maritime shipping lanes and strategic chokepoints, not to mention crucial ports of origin and termination for the majority of the world's seaborne commerce and raw materials. These shallow and constricted waters are readily mined and subject to indefinite closure by even a modest mining campaign, particularly in areas where the adjacent nations lack a MCM capability.

Mines may also pose a significant obstacle to future naval peace-keeping/enforcing operations in support of UN-mandated resolutions. Given public intolerance of even limited casualties and the West's hesitancy of becoming involved in areas where its national interests are not perceived to be directly threatened, an opponent may conclude that it only has to"get lucky" once to deter NATO from intervention or intimidate it into withdrawing. The recent experiences of the United States in Beirut and Somalia serve to highlight this premise to potential adversaries. In future peace-keeping operations, it may be difficult for political and military leaders to justify the loss of a single naval asset in a crisis which has little significance to American or Western European national interests. Under these conditions, the presence of a definitive littoral mine threat may severely constrain the naval options of the on-scene military commanders.

Based on these considerations, the availability of capable, ready MCM assets on station with the naval task force is of paramount importance. Collectively, NATO's alliance members maintain the world's premier MCM capabilities and technical establishments. Accordingly, multinational cooperation and interoperability must be achieved between respective transatlantic MCM forces in order to provide NATO a formidable rapid response MCM capability to meet such a challenge should the need arise.

## C. THESIS OBJECTIVE

The objective of this thesis is to analyze NATO's role in countering the growing global mine threat in today's post-Cold War environment. It is hypothesized that, given the Iraqi mining success during the Gulf war, the current global proliferation of advanced mines, and current deficiencies in international laws regulating the use of sea mines in peacetime and during armed conflict, mine warfare will emerge as a growing threat to vulnerable Western states into the next century. Consequently, NATO's MCM forces will have a prominent role in Alliance or ad-hoc coalition out-of-area naval operations in the future, ranging from counter-terrorism to major regional conflicts (MRCs).

## D. RESEARCH LITERATURE AND METHODOLOGY

Research data for this thesis was obtained from a large body of available literature in the area of mine warfare including official government directives, US Department of Defense and Navy regulations and manuals, professional journals, military and political documents, NATO publications, and historical publications. Further research was conducted via interviews with American and European naval officers and government officials knowledgeable in this field. Most of the latter were conducted with professional colleagues

to acquire pertinent information not readily available from printed sources in order to provide a full spectrum of research material. Finally, the author has drawn from personal MCM expertise and experience acquired during nine years of service in the US Navy's MCM forces and participation in various NATO and UN MCM operations, including Desert Storm mine clearance operations.

## E. ORGANIZATION OF THESIS

Chapter II provides an overview of the art of mine warfare and examines the strategic, operational, and tactical advantages and disadvantages of various mine warfare and mine countermeasure strategies.

Chapter III examines possible explanations for the historical divergence in the perceived importance of MCM within the US Navy and its European alliance partners, and addresses the question, why have European navies taken mine warfare more seriously than the US Navy. An argument is presented that the US Navy's historical indifference to mine warfare is not simply the result of dereliction or ignorance but derived from the absence of three significant elements of mine warfare vulnerability-historical, strategic, and economic-specific to Europe.

Chapter IV addresses legal considerations pertaining to the use of sea mines in peacetime and during periods of armed conflict. Current international agreements which codify the customary international laws governing the use of sea mines are examined and specific weaknesses contained therein are identified. The implications of the recently ratified Third United Nations Convention on the Law of the Sea (UNCLOS III) and its potential impact on the current use of sea mines is also analyzed.

Chapter V focuses on the current proliferation of highly advanced Russian, Asian, and European mine warfare hardware and technology to developing Third World states and subnational organizations, and examines the implications of this emerging threat to maritime security.

Chapter VI analyzes the present and future roles of MCM within NATO's evolving post-Cold War maritime strategy, its prospects under the Alliance's new Strategic Concept, and its future in the evolution of the Western European Union (WEU) and the development of a genuine European Security and Defense Identity (ESDI). Current strengths and weaknesses in NATO's current ability to support expeditionary MCM operations are examined as well as possible peacekeeping/enforcing missions involving NATO's MCM forces.

Chapter VII presents specific findings and conclusions and offers recommendations toward improving transatlantic MCM cooperation and interoperability in the face of a growing international mine threat.

## II. MINE WARFARE OVERVIEW

> A war in which enemies seldom meet and battle is rarely joined, but death and destruction always mark the field. Where the big ships fight their battles, and the little mine craft have already been to do their dull and dirty duty, in which there is no glory. Where the fighting fleets sail to victory, there are the seas of glory. But where the little ships go, there is the most dangerous sea. This is mine warfare.[4]

### A. INTRODUCTION

Mine warfare comprises the strategic and tactical use of sea mines and their countermeasures. It includes both the laying of mines with the aim of sinking or damaging the opponents shipping, or at the very least, hinder his use of the seas, and countermeasures, which includes all measures for countering the mine by reducing or preventing danger or damage to ships and personnel.[5] The ancestry of the naval mine reportedly dates back to 1585, when the Dutch floated explosives down the Scheldt River in an effort to blow up Spanish fortifications blocking Antwerp from access to the sea.[6] An American inventer, David Bushnell, is generally credited with the development and employment of the first modern underwater contact mine during the American Revolution. These primitive efforts and other initial experiments with underwater explosives ushered in a new form of naval combat: mine warfare.

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[4] LCDR Arnold S. Lott, USN, *Most Dangerous Sea*, 1959, p. 3.

[5] Jan J. Van Waning, "Naval Mine Warfare," *International Military and Defense Encyclopedia*, Volume 4, 1993, pp. 1759-1760.

[6] Howard S. Levie, *Mine Warfare at Sea*, 1992, P. 9.

This chapter provides a basic overview of naval mines and analyzes some of the lesser known intricacies relating to the art of mine warfare. In order to appreciate the diverse applicability of mine warfare in today's strategic environment, one must first understand the capabilities the naval mine affords in terms of effectiveness and flexibility.

## B. THE ART OF MINE WARFARE

Through its history to the modern day, the mine has proved to be a most cost-effective weapon that causes physical damage, creates psychological uncertainty, and requires a countermeasure effort far out of proportion to the cost of the mining effort. As a force multiplier, mines serve as 24 hour-a-day sentries that continuously threaten enemy ships without the requirement of logistical or maintenance support. Historically, the mine has provided smaller naval powers with a means of countering the superior navies of their enemies. They are comparatively inexpensive, abundant, and relatively easy to deploy. Cash strapped Third World states can build a formidable mine inventory in lieu of the cost of a single warship. Larger naval powers have employed mines to effectively blockade and interdict the home waters and vital sea lanes of communications (SLOC) of their adversaries. However, while the mine provides the means to achieve a specific military or national aim, it is the minefield that must be considered as the fundamental component in mine warfare. Only in this capacity can the potential force of the mine be effectively brought to bear.

### 1. Mine Warfare Strategies

Mines can be employed under a variety of strategic, operational, or tactical scenarios. For example, at the strategic level, mining campaigns have a long-term capability to deny adversaries free access to or use of sea areas considered vital to the prosecution of their war

effort or economic viability. Furthermore, using delayed arming, mines can be laid before hostilities and enhance deterrence without posing an immediate threat.[7] Defensively, mines can be deployed in conjunction with other coastal defense systems to form a formidable barrier against enemy invasion forces or maritime blockade.

Operationally, mines can be employed to restrict enemy maneuver options or enhance friendly maneuver options. For example, the constraining nature of mines enables the channelization of enemy forces into favorable "fields of fire" for waiting air, surface, and sub-surface assets. Furthermore, the use of mines to bottle up enemy forces in port removes potential threats to maritime operations without the need to engage in direct hostilities.

Tactically, mines can be employed to support military objectives limited in time and scope. Historically, mines have not been well suited to such usage because their deployment required extensive preparation time for immediate use.[8] However, modern modular mines are better suited for short-notice deployment in support of dynamic battlespace contingencies. For example aircraft can rapidly plant mine lines across the path of an oncoming amphibious assault force were earlier none may have existed.

The flexibility of today's advanced mines also allow the planner to tailor minefields to the specific aim envisioned by the command authority directing its use. For example, if the objective is strictly harassment of enemy shipping, mine sensitivities can be adjusted to

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[7] US Joint Chiefs of Staff, JOINT PUB 3-15, *Doctrine for Barriers, Obstacles, and Mine Warfare*, 1993, p. I-2.

[8] Nevertheless, tactical employment of mines has occurred in previous conflicts. For instance, during World War I retreating naval units sometimes dropped mines over the side to deter or damage pursuing fleets. This was a main consideration in Admiral Jellicoe's decision not to pursue the German High Sea Fleet following the Battle of Jutland.

detonate at a greater distance from the target and therefore outside of the damage radius of most vessels. Moreover, mines can be programmed to self-destruct at varied time settings, thus raising the levels of anxiety and uncertainty for enemy forces. However, if the objective of the minefield is attrition of enemy forces, mine sensitivities can be set to inflict maximum material damage to intended targets.

**2. Psychological Aspects of Mine Warfare**

Although examples such as the USS *Samuel B. Roberts* highlight the physical effectiveness of sea mines, perhaps the greatest advantage of maritime mining is its psychological impact on enemy forces.[9] The psychological threat of the mine emanates from the uncertainty it creates and the inability of most vessels to effectively counter the weapon. Throughout its history, the impersonal nature of the mine has eroded the morale even of battle-hardened seamen. During the Civil War, ". . .[S]ailors hardened to the smoke, noise and pandemonium of close range cannonading were stunned and demoralized by the sudden and unexpected mine blasts."[10] In both World Wars, German submarine crews feared mines more than any other weapon. The sinister aspect of mines in general was summed up by a British officer in World War II who stated, "I don't mind a fighting chance, but I dread the mines."[11]

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[9] The USS *Samuel B. Roberts* (FFG-58) was nearly sunk by an Iranian-laid moored mine in the Arabian Gulf in 1988 during Earnest Will escort operations.

[10] A. Patterson, "Mining: A Naval Strategy," *Naval War College Review*, May 1971 p. 63.

[11] LCDR Alan Hinge RAN, "Planting a War Garden," *Journal of the Australian Naval Institute*, August/October 1994, p. 41.

The perception of vulnerability to the "unknown," and the fear created by the detonation of a single mine often generates an inflexible and exaggerated evaluation of the potential threat posed by the minefield. This proposition is supported by a major study on the psychological effects of minefields which concluded that given a choice under conditions of extreme uncertainty, combatants will exaggerate the likelihood of the more extreme consequences and act accordingly.[12] The psychology of fear and the constraining influence this has on enemy plans and movements, rather than the number of ships actually sunk or damaged as the result of mine strikes, may be the best measure of the effectiveness of mine warfare operations. The events of the Gulf War substantiate the fact that this proposition remains as valid today as it was during the American Civil War, particularly in view of the growing unwillingness of Western nations to suffer even relatively few casualties in combat operations.

The art of mine warfare requires both imagination and skill to achieve the optimal effectiveness of a particular minefield vis-a-vis the desired strategic and operational aims. Nevertheless, absent great mining skills, history has shown that there have been many blockade runners but preciously few minefield runners. In fact, an adversary is more likely to try to run a naval blockade comprised of surface ships than run the risk of passing through a minefield. Success in the first instance depends on the "battle of wits" between two human opponents who may make mistakes; the minefield does not make mistakes and its potential hazard is difficult to estimate.[13] In the final analysis, the physical and psychological impact

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[12] Ibid, p. 41.

[13] Ibid, p. 41.

of minefields, regardless of the actual threat, tends to be viewed as a serious danger and often results in a reluctance on the part of naval combatants and merchant vessels to challenge them.

## C. TYPES OF NAVAL MINES

Today's navies may expect to counter all types of mines, ranging from relatively unsophisticated and indiscriminate contact mines, to state-of-the-art influence devices incorporating stealth technology and target-selective sensor packages. Mine types can be classified according to the position they assume in the water, method of delivery, or method of actuation.

### 1. Position

When classified according to the position they assume in the water, mines fall into three categories: bottom or ground mines, moored or buoyant mines, and drifting mines.[14] Ground mines are normally found in relatively shallow water; nominally, their effectiveness diminishes significantly in water depths exceeding 70 meters. Moored mines may be encountered in water depths as shallow as 3 meters but are normally designed for placement in deeper waters. Anti-submarine moored rising vertical mines (RVMs) incorporate rocket-propelled homing torpedoes and may be found in water depths exceeding 1,000 meters.[15] Drifting mines have no anchoring mechanism and float freely near the surface of the water.

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[14] The 1907 *Hague Convention No. VIII Relative to the Laying of Automatic Submarine Contact Mines* limited the use of drifting mines to those armed with a sterilizer that disarms them within one hour of release.

[15] David Foxwell, "Naval Mine Warfare: Unfunded and Underappreciated," *International Defense Review*, 2/1993, p. 12.

As a practical matter, moored mines which break free from their anchor become drifting mines. Other mines are designed to maintain neutral buoyancy and are deployed specifically as drifting mines.

### 2. Method of Actuation

Mine types can be further subdivided according to their sensor mechanism or the manner in which the mine is detonated. The three primary methods of mine detonation are (1) physical contact with the target, (2) influence signature actuation , and (3) remote actuation. Until recently, moored mines were traditional contact types. These mines detonated either by direct contact with a ship's hull or by the ferrous hull touching a copper or brass antenna attached to the mine (antenna mine). Current generation moored mines, however, are designed for use in deeper waters out to the edge of the continental shelf. These mines primarily target submarines or deep draft surface vessels and may incorporate advanced rocket-propelled homing torpedoes.

The most common type of mine likely to be encountered in the shallow waters of the littoral seas is the ground influence mine. Older influence mines are primarily designed to react to either the acoustic or magnetic signature or a combination of both. Later generation pressure influence mines incorporate a fuse which reacts to the variations in water pressure generated by passing ships. Among the latest developments are seismic mines designed to react to the vibrations from transiting ships being transmitted through the seabed, and Underwater Electric Potential (UEP) mines, which are actuated by the small electric currents

in the water created when a metal hull passes close by. The most lethal mines are the advanced multi- influence mines which incorporate a combination of two or more sensor types in their firing circuits.

Remote controlled mines have no destructive capability until affirmatively activated by some form of arming order. Unlike"independent" mines,[16] remotely controlled minefields can be activated or de-activated by the user after they have been laid.[17] Cable-controlled mines may contain detecting mechanisms that signal the presence of a ship or submarine to a remote shore station, or they may be operated in conjunction with some separate means of detection. Unlike their predecessors, modern controlled mines no longer rely on hard wiring to a nearby shore station. Their activation depends instead on the receipt of coded Very Low Frequency (VLF) signals. The most attractive advantage of VLF-activated controlled minefields is that they may be emplaced in international waters beyond the territorial sea subject to a requirement that they do not materially disrupt or interfere with other lawful uses of the ocean.[18] Unlike independent mines, controlled minefields do not constitute a direct hazard to maritime navigation, and thus international notification of their emplacement is not required.[19] Controlled mines have typically been employed in protective or defensive minefields as a means of countering potential invasion forces. For example, Sweden and

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[16] Independent mines are mines that rely on their own sensors for firing.

[17] Mike Cashman, *Sweeping Changes for Mine Warfare: Controlling the Threat*, Naval Postgraduate School thesis, December 1994, p. 13.

[18] Ibid, p. 38.

[19] Naval Warfare Publication (NWP) 9, *Commander's Handbook of the Law of Naval Operations, Conventional Weapons and Weapons Systems*, Chapter 9, Paragraph 9.2.2, p. 9-5.

Norway have traditionally employed controlled minefields as a cornerstone in their coastal defense schemes.

### 3. Method of Delivery

Mines may be further classified according to their methods of delivery - aircraft, submarine or surface ship. Aircraft-delivered mines are normally employed in offensive operations, though helicopters may also be used to deploy defensive minefields. The speed and range of aircraft offer a variety of advantages in the conduct of offensive mine warfare. First, aircraft are versatile; any aircraft capable of dropping a bomb can lay mines. Second, aircraft provide the ability to quickly replenish minefields without exposure to existing mines. Third, aircraft are capable of laying mines in enemy held territorial or inland waters at great distances from friendly forces.[20] The disadvantages of air-laid mine delivery are diminished accuracy when compared to surface or subsurface assets, and vulnerability to enemy anti-air defenses.[21] Submarine delivered mines are configured for launch from torpedo tubes or specially designed mine-belt "girdles" attached to the submarine's outer hull. Although submarines are limited in the number of mines they can carry, they have the advantage of covert, high-accuracy placement. However, the enormous value of submarines coupled with their vulnerability to enemy mines and other submarines in relatively shallow water may preclude their use as mine delivery platforms in all but the most benign environments.

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[20] For example, B-52s operating from CONUS airbases can deliver mines to virtually any global location.

[21] This vulnerability was highlighted during the Gulf War when a US Navy A-6 Intruder was lost to enemy fire while conducting a mining sortie against Iraqi port facilities at the mouth of the Khawr Az Zubayr River near the Iraq-Kuwait border. Admiral Kelso, " Building Blocks of Naval Power," *US Naval Institute Proceedings*, November 1992, p. 41.

Finally, surface delivered mines can be deployed from almost any type or size of surface vessel. Surface mine delivery is the most economical method for deploying large minefields. Furthermore, surface-laid minefields are normally the most accurate method of delivery and, depending on the circumstances, may be accomplished clandestinely prior to the commencement of hostilities.[22]

**4. Counter-countermeasures**

Modern mines, and even many older generation mines that have been upgraded, employ a variety of sophisticated countermeasures designed to defeat MCM mine hunting and sweeping systems. Among the most common are delayed arming, ship counts, interlook dormant period, and self burial capability. Many of these mines possess onboard computer software that can be programmed to react only to influences within certain frequency or amplitude ranges. This characteristic enables the mine to discriminate between types of target and thus to react only to specific classes of ships or even in some cases specific ships. Furthermore, some mines can discriminate between actual targets and apparent targets which have been simulated by MCM influence sweeps. Still other mines incorporate doppler shift detonations so as to deliver the maximum damage on the target.

Stealth technology has been incorporated into some of the latest generation mines to impede detection by mine hunting sonars or TV cameras. These mines are constructed of Glass Reinforced Plastic (GRP) or coated with sound absorbent paints, anechoic coatings

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[22] For example, the Libyan merchant vessel *Ghat* is widely believed to have covertly laid the "Mines of August" in the Red Sea in 1984. Robert Levie, *Mine Warfare at Sea*.

and other materials to reduce sonar reflecting properties. Stealth mines may also incorporate innovative geometric designs rendering them nearly invisible to current sonar technology.

## D. TYPES OF MINING OPERATIONS

Mine warfare operations employ diverse systems to achieve a common aim: sea and battlespace control or denial. Minefields, particularly when backed by coastal missile batteries, as in Desert Storm, can pose a formidable, if not impenetrable, barrier to a transiting maritime force or as a counter to an amphibious assault. Mines, whether used offensively or defensively, may be employed by military forces to achieve a variety of objectives and goals. For instance, mines provide the capability to inflict significant psychological and material damage and personnel casualties on an adversary without exposing friendly forces to significant risk. Moreover, mines can be used as a force multiplier to immobilize enemy forces or blockade enemy ports and narrow sea lines of communication (SLOCs), while freeing friendly forces for other employment. Defensively, mines can form the cornerstone of coastal defense networks or provide flank protection for friendly forces against hostile platforms.

Minefields can be classified according to their particular strategic, operational, or tactical objective or aim of employment. Commonly, the three basic types of minefields are characterized as offensive, defensive, and protective.[23] Offensive minefields are planted in enemy-controlled waters. The mining of Haiphong Harbor by US Navy aircraft during the

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[23] Joint Pub 3-15, p. III-14.

Vietnam War is a classic example.[24] Defensive minefields are deployed in contested waters to intercept or deny transit of enemy forces. These minefields are often planted in international waters or straits. Iraq employed defensive mining of the Northern Arabian Gulf to stymie coalition naval operations during Operation Desert Storm. Finally, protective minefields are placed in friendly or territorial waters to protect coastal ports, harbors, beaches, and SLOCs from hostile forces. The coastal mine barriers in place along the coasts of Sweden and Norway are examples of protective minefields. Each of these types of minefields raise complex legal implications with respect to recognized international law of the seas. Chapter IV addresses these and other legal issues pertaining to mine warfare in peacetime and during periods of armed conflict.

## E. TYPES OF MINE COUNTERMEASURE OPERATIONS

MCM has been traditionally viewed as a defensive measure aimed at maintaining the integrity of internal waters and territorial seas. This assumption, however, is no longer valid in today's strategic climate. Since the Gallipoli campaign in World War I, MCM craft have often been at the forefront of offensive operations, clearing strike force assault channels in

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[24] On May 8th, 1972, US Navy and Marine aircraft from the *USS Coral Sea* commenced the mining of Haiphong, North Vietnam's principle resupply port, and other key targets in its territorial waters. Although detailed attention was paid toward compliance with customary and conventional laws of blockade, the explicit use of the word was shunned in favor of the term interdiction. Nonetheless, during the ensuing ten month period, not a single merchant ship challenged the mine blockade while 27 merchant vessels were confined inside the harbor at a cost to North Vietnam and its backers of over one billion dollars. Most importantly, over two million tons of war materials could not be brought into the country by sea and was only partially compensated for by alternate land/river transport. President Richard Nixon and Henry Kissinger- the key decision-makers regarding the Haiphong mining operation- had no doubt that the mining of Vietnamese harbors in May and December of 1972 had a decisive effect on the willingness of the Vietnamese to negotiate the peace treaty of January 1973. See Richard Nixon, *The Memoirs of Richard Nixon*, 1979, p. 689.

advance of the fleet, and following the MCM force motto, "where the fleet goes, we've been."[25] As regional conflicts continue to proliferate, alliance MCM forces will be increasingly called upon to serve as a key enabling factor for the projection of naval power from the sea.

According to current US joint doctrine, naval mine countermeasures include all actions undertaken to prevent enemy mines from altering the plans or operations of friendly forces.[26] Four major techniques or tactics are employed toward that aim. They are: prevent enemy mining through offensive or proactive MCM operations; avoid the mines through intelligence, surveillance, and reconnaissance; employ defensive MCM operations to sweep or hunt the mine threat; and finally, diminish the threat by employing passive MCM operations to reduce the threat posed by unsweepable mines. These actions are classified according to the force that accomplishes them, the degree to which the effort directly acts against a given mine threat, the methods used to do so, and the specific objective of the effort. MCM is fundamentally broken down into two broad categories: offensive or proactive MCM, and defensive or enabling MCM.[27]

**1. Offensive (proactive) MCM**

Offensive MCM is designed to counter the mine threat through the active targeting of enemy mine production, storage facilities or delivery platforms. This type of MCM

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[25] Melia, p. 4.

[26] JOINT PUB 3-15, p. IV-10.

[27] For the purposes of this thesis, the terms offensive or proactive MCM and defensive or enabling MCM are interchangeable. Current Joint Publications favor the use of proactive and enabling MCM terminology while US Naval Publications favor the use of offensive and defensive MCM.

operation involves assets not specifically oriented to or designed for mine warfare operations, such as a Navy A-6 or Army OH-6, and may require the assistance of joint component forces from the Army and Air Force. Of critical importance to the successful execution of offensive MCM operations is the availability of accurate intelligence about, and dedicated surveillance of enemy mine warfare capabilities. Although offensive MCM offers the most effective means of countering potential enemy mining, it suffers from a severely limited "window of opportunity." These specific disadvantages are discussed later in the chapter.

**2. Defensive (enabling) MCM**

Defensive or enabling MCM operations are designed to counter mines once they have been laid. Defensive MCM can be further broken down into two subcategories: passive MCM and active MCM. Passive MCM involves all measures taken to minimize the mine threat without physically attacking the mines. Examples include: localization and avoidance of threat minefields, and risk reduction by controlling the magnetic, acoustic and pressure signatures of target vessels.

Active MCM involves maritime operations designed to physically neutralize or remove the mine threat. Before certain mines can be effectively swept or hunted, however, they must first be classified and exploited for their intelligence value in order to determine how best to neutralize them. The two primary techniques involved in active MCM are mine hunting and minesweeping. Mine hunting operations involve the use of high resolution sonars and TV cameras to detect and classify mines. If necessary, Explosive Ordnance Divers (EOD) or remotely operated vehicles (ROVs) can be employed to neutralize threat mines. Minesweeping operations involve the deployment of specific systems which sever moored

mine cables, or produce magnetic and/or acoustic signatures that trigger influence-type mines. These MCM systems are primarily deployed from specially designed mine countermeasures vessels (MCMVs). The United States and Japanese navies also possess airborne MCM helicopters (AMCM) capable of conducting mine hunting and sweeping operations.

## F. PROACTIVE OFFENSIVE MINE COUNTERMEASURES: NOT A PANACEA

Following the events in the Gulf War, US MCM doctrine has addressed the importance of offensive "proactive" MCM.[28] According to the US Navy's current *Mine Warfare Plan*, offensive MCM ". . .entails preventing an adversary from laying mines in the first place. . . ." by destroying the mines at points of manufacture, storage facilities, depots or during transport.[29] Although the concept of offensive MCM is not new,[30] the re-emergence of this tactic within the Navy's MCM doctrine has coincided with renewed interest in mine warfare in general within the US Navy following Desert Storm. The concept of offensive MCM operations has been embraced by the majority of US Navy's senior leadership and has been incorporated into the Navy's Mine Warfare Doctrine publication.[31] Former CNO, Admiral Frank Kelso, addressed the importance offensive MCM doctrine in 1992 stating:

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[28] The US Navy's *Mine Warfare Plan* lists offensive (proactive) MCM as a primary objective in the Navy's evolving MCM doctrine. *Mine Warfare Plan* (1994) p. 32.

[29] *Mine Warfare Plan*, p. 32.

[30] US Naval forces actively sought out and attacked enemy minelayers in both World War II and the Korean War. Gregory K. Hartmann, *Weapons That Wait: Mine Warfare in the U.S. Navy*, 1979, p. 26.

[31] Department of the Navy, Naval Warfare Publication 3-15, *Mine Warfare*, August 1995.

> I believe there are some fundamentals about mine warfare that we should not forget. Once mines are laid, they are quite difficult to get rid of. That is not likely to change. It is probably going to get worse, because mines are going to become more sophisticated. . . . [T]here is a premium on comprehensive offensive mine countermeasures-the most effective of which is to prevent mines from being put into the water in the first place.[32]

**1 . Advantages**

Offensive MCM operations are the preferred tactic to counter the mine warfare capabilities of potential adversaries. The ability to defeat enemy mines before they are ever deployed significantly reduces the requirement for time-consuming and inherently dangerous MCM operations and negates a potential "show stopper" to naval operations in the littoral environment. Furthermore, the destruction of the enemy's capability to produce and deploy mines reduces the threat of re-seed mining at a later time or in a different location. The best known example of recent offensive MCM occurred in 1987 during Operation Earnest Will (US protection of re-flagged tankers during the Iraq-Iran War) when US forces intercepted and captured the mine-laden Iranian vessel *Iran Ajr.* The negative publicity surrounding this event effectively ended Iranian mining operations for six months. Moreover, the boarding party also recovered detailed charts which outlined the locations of earlier minefields, allowing MCM forces to clear the fields.[33] The success of this operation highlights the benefits of employing offensive MCM tactics against potential or actual adversaries. Nevertheless, offensive MCM is not the panacea for current mine warfare deficiencies that many of its advocates propose. In fact, the belligerent nature of proactive MCM may

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[32] Kelso, "Building Blocks of Naval Power," p. 41.

[33] James Giusti, "Sweeping the Gulf," *Surface Warrior,* March/April 1988, p.87.

severely limit the types of scenarios under which it can be employed. Moreover, other criteria must be analyzed before considering the effectiveness of offensive MCM tactics.

**2. Shortcomings**

Several factors severely limit the potential use of proactive MCM measures in regional contingencies. First, potential adversaries may plant protective or defensive mine fields long before the arrival of US or coalition naval forces on scene. Second, they may develop intricate mine barrier fields, including remote control mines (RECO),[34] inside internationally recognized territorial waters. Third, covert mining operations conducted by diesel-electric submarines may be difficult, if not impossible to detect, therefore limiting the number of interdiction opportunities. Finally, and most important, political or military considerations often make it impossible to conduct preemptive strikes against enemy mine storage and/or production facilities and delivery platforms. Such was the case during Operation Desert Shield. Although the coalition was aware of Iraqi mining operations in the international waters of the northern Arabian Gulf, a conscious decision was made by the National Command Authority (NCA) not to interfere despite repeated authorization requests from Vice Admiral Stanley R. Arthur, the commander of US naval forces in the Persian Gulf, to sink the Iraqi minelayers.[35] This decision was based on fears that Iraq might use the strikes as an excuse to launch a broader offensive which the coalition was not yet prepared to

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[34] RECO minefields are currently employed by several nations, most notably Sweden, as part of their coastal defense networks. RECO minefields remain dormant unless activated from a remote site. Thus, friendly vessels may pass over the mined area in question while enemy ships are kept at bay.

[35] Vice Admiral Stanley R. Arthur, USN, "Fleet Commander Recommended Hits on Iraqi Minelayers," *Navy Times*, 27 May 1992, p. 4.

counter. A disgruntled Admiral Arthur commented on his interpretation of the decision following the Gulf War, stating:

> International law makes clear that persons engaged in laying mines in international waters are involved in an act of war. We all understood that. We all say we honor that. But in fact, to my knowledge, in my professional Navy career, we've never gone out and sunk a guy laying mines the first shot out of the gun . . . .[W]e always sort of pace around the campfire. So we sometimes buy ourselves into a problem by not exercising our right.[36]

Vice Admiral Arthur's comments reflected the Navy's frustration over the NCA's refusal to allow combat operations against known Iraqi minelayers and underscored the complex dynamics of joint and coalition warfare in the post-Cold War environment. Despite the justifiable concerns of coalition naval commanders over the Iraqi mining operations, overriding political and combined military considerations prevented the execution of offensive MCM operations. It is not unreasonable to expect that similar conditions could appear in any future conflict involving joint or coalition military operations. In such a scenario, naval and joint commanders will have to rely on conventional MCM forces to counter the threat posed by known and unknown enemy mining. Thus, the continued relevance of effective conventional MCM capabilities within the respective Alliance navies is paramount.

## G. SUMMARY

Modern naval history is replete with cogent reminders of the destructive capability and psychologically demoralizing effect that mines project within the arena of maritime warfare. This chapter has provided an overview of the art of mine warfare, and it has

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[36] Ibid, p. 4.

examined the strategic and operational advantages and disadvantages of various mine warfare and mine countermeasure strategies. It has also highlighted the enormous strategic, operational and even tactical flexibility and effectiveness the mine affords military and civilian leaders in the pursuit of national security objectives. For many, it has simply been a refresher on mine-related subject matter. Perhaps for others, it has opened a new realm of possibilities and provided a foundation toward a better understanding of the enormous problems associated with an adversarial employment of sea mines against Alliance naval forces in today's evolving strategic environment. More so than any other naval weapon, the mine's longevity and continued relevance as a weapon of choice among naval forces is unmatched in modern naval history. It is truly a weapon for all seasons.

# III. MINE WARFARE: DIVERGENT EUROPEAN AND U.S. INTEREST

## A. INTRODUCTION

The United States Navy has a history of failing to provide for an adequate capability in naval mine countermeasures (MCM), particularly in comparison to its European allies. This chapter analyzes possible reasons for this divergence in the perceived importance of mine countermeasures within the NATO alliance. In other words, why have European navies taken mine warfare more seriously than the United States Navy? To answer the question, one must look beyond basic budgetary or "warfare specialization" arguments to the central issue, perceived vulnerability. The US Navy's relative indifference towards mine warfare is not simply the result of dereliction or ignorance but can be traced to the perceived absence of three significant elements of mine warfare vulnerability- historical, strategic, and economic - specific to Europe. The presence of these elements among Europe's maritime nations has resulted in an appreciation of and emphasis on mine warfare in general and MCM in particular, and has fostered European leadership and expertise in this warfare specialty. Conversely, the relative absence of these elements in North America has resulted in an American naval emphasis on other warfare specialties, particularly anti-submarine warfare (ASW), at the cost of a general neglect of mine warfare. This chapter provides a comparative analysis of each of these elements, highlighting their significance primarily from a Western European perspective. The chapter concludes with a brief discussion of recent coalition MCM operations in the Arabian Gulf and their impact on US MCM cooperation with its European Alliance partners in future out-of-area operations.

## B. BACKGROUND

On Monday, 18 February 1991, two US warships involved in UN coalition operations against Iraq, the amphibious carrier USS *Tripoli,* the flagship of US mine countermeasures operations, and the guided missile cruiser USS *Princeton,* were mined in separate instances in the northern Persian Gulf. Both ships sustained heavy damage and were lost from combat operations for the remainder of the "hot war."[37] The total cost to repair both ships exceeded $23 million, of which $19 million went to repairing the extensive damage to *Princeton's* superstructure. The total financial cost of the Iraqi investment in the two mines was a mere $21,500.[38] The success of the Iraqi mining campaign represented the only military victory scored against coalition forces during operation Desert Storm. Most important, the mining of two important US warships in waters believed to be mine-free, and the inability of coalition MCM forces to quickly clear the fields frustrated coalition plans for an amphibious assault in the liberation of Kuwait. Forty years after Wonson in Korea, an amphibious force was again kept at bay by sea mines; again, the "weapon that waits" had succeeded in stifling a world maritime superpower and prevented it from exercising command of the seas.[39]

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[37] *Tripoli* did return to her role as MCM command ship following a two week repair period in Bahrain.

[38] $1,500 for the World War I vintage LUGM contact mine that blew a 16-by-25 foot hole in *Tripoli's* hull, and$20,000 for the Italian built MANTA influence mine that detonated under *Princeton's* keel, according to Mr. Bob Backus at the Naval Coastal System Center, Panama City, Florida.

[39] During the Korean War, a planned amphibious landing by US Marines involving 250 ships and 50,000 men was delayed by a week due to unforeseen Korean mining of Wonson harbor.

The events of Desert Storm emphasized the US Navy's inadequate regard for the destructive capabilities of sea mines, and its failure to maintain an adequate combat MCM capability. Congressional inquiries into this recognized weakness in US naval capability following the Gulf War prompted a complete reorganization of the US Navy's MCM forces, and has resulted in an increased focus toward improving US MCM force structure and readiness levels.

## C. WESTERN EUROPEAN MCM: SOME GENERAL COMPARISONS

The impact of the Iraqi minefields during Desert Storm was not lost on the European members of the coalition. Their appreciation of the role of mines in naval warfare dates from the Crimean War. During the past century, every European maritime nation has experienced the physically and psychologically destructive potential of mine warfare. Consequently, European nations like the United Kingdom, France, and Germany, have placed more value on training and retaining their MCM forces and personnel. Moreover, even the smallest European nations maintain capable, well-trained MCM forces to help ensure uninhibited maritime access to the economic arteries of international commerce. For example, MCM vessels accounted for 80 percent of Belgium's naval forces and over 70 percent of the total naval budget in 1993.[40] Even larger European nations dedicate large percentages of assets and funding toward the maintenance of an MCM capability. In 1993, MCM ships comprised 33 percent and 24 percent of total British and French surface combatants

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[40] Richard Sharpe, "Very Real Dangers to the Security of Europe Still Not Acknowledged or Even Defined,"*Russian and European Navies*, 1993, p. 50.

respectively.[41] Comparatively, MCM assets comprise only 4 percent of US surface combatants. Furthermore, MCM funding accounted for only one half of one percent of the US Navy's total budget in 1993.[42]

European emphasis on MCM training and readiness is demonstrated in the commitment to annual multilateral and bilateral MCM exercises, including exercise *BLUE HARRIER*, the largest and most comprehensive exercise of its kind in the world. Furthermore, Europe boasts the world's premier mine warfare training center, *Eguermin*, located in Ostende, Belgium. There, MCM officers from all NATO and WEU nations develop, study, and train in the latest mine warfare tactics and procedures. The United States Navy, in comparison, has neither a MCM exercise comparable to *BLUE HARRIER* nor a mine warfare school that remotely resembles *Eguermin.* To the contrary, funding constraints and extended transit distances often preclude US MCM forces from participating in Fleet training exercises. Furthermore, US MCM officers have often traveled to Europe for training in the latest NATO MCM procedures and tactics due to the lack of adequate stateside training facilities. Moreover, unlike their counterparts in the US Navy, most European MCM officers and senior enlisted remain in the mine warfare community for most if not all their careers. As a result, MCM experience and expertise is cultivated and maintained within the respective navies. Finally, the European MCM community is perhaps the most closely integrated of warfare specialties within the NATO alliance. MCM flotillas from the various nations train and exercise together on such a routine basis, that most of the officers are on

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[41] Ibid, p 50.

[42] MGEN Harry Jenkins, JR., "Mine Boggling," *Navy Times*, No 38, 28 June 1993, p.14.

first name basis, and more importantly, well versed in the tactics, strengths, and limitations of their fellow European allies.

Post-Desert Storm mine clearance operations highlighted this variance between US and European MCM expertise and preparedness. While US MCM forces suffered from inadequate equipment, training, and organization, six European nations under the cognizance of the WEU successfully cleared 83 percent of the approximately 1300 Iraqi mines laid in the northern Persian Gulf.[43] Clearly, European navies have placed greater emphasis in developing and maintaining highly professional MCM forces. The question is, why? An analysis of the three "elements of vulnerability" can provide an insight toward a plausible explanation.

## D. HISTORICAL COMPARISONS[44]

Historically, the mine has provided smaller naval powers with the capability of countering the superior navies of their enemies. Through its history to the modern day, the mine has proved to be a most cost-effective weapon that causes physical damage, creates psychological effects, and requires a countermeasure effort far out of proportion to the cost of the mining effort. As a force multiplier, mines have played a significant role in naval warfare since they were first employed by the Russians during the Crimean War. Moreover, mines have decisively altered the outcomes of naval engagements in every war since the

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[43] CNO, Dept. of the Navy, "Meeting the Challenges in an Uncertain World," *Mine Warfare Plan*, 29 January 1992, p.15.

[44] Much of the analysis relating to the US Navy's misapplication of its historical mine warfare lessons is attributable to Dr. Tamara Melia. Dr. Melia is a historian for the US Navy at the Naval Historical Center and is the author of *"Damn the Torpedoes": A Short History of U.S. Naval Mine Countermeasures, 1777-1991.*

Russo-Japanese War. Nevertheless, the historical lessons learned by European navies have proven to be strikingly different from those learned by the US Navy. The greater degree of European development of and reliance on specialized MCM naval forces is directly attributable to the painful lessons learned vis-a-vis mine warfare during their naval history. Consequently, these lessons have been remembered and corrective action taken. Conversely, while mines have played a large role in US naval history, they have neither caused the same magnitude of capital losses nor significantly hindered American sea control.[45] Most often the lessons learned by the operational MCM experiences of the US Navy have been "forgotten, misinterpreted, or simply misapplied."[46] This lack of mine warfare consciousness and adequate historical perspective has resulted in a traditional neglect of MCM in US naval doctrine. The following selections of historical case studies support this argument. From the European perspective, the significant role of mines in the Crimean War, Russo-Japanese War, World War I, and World War II, perpetuated the importance of MCM naval forces. From the US perspective, the relative ease with which the threat posed from mines was overcome in the American Civil War, Spanish American War, and World Wars I and II help account for the US ambivalence toward mine warfare.

**1. Crimean War**

Russian production and use of contact-fused mines during the Crimean War, 1854-1856, led to the first systematic defensive employment of mines to counter a superior naval

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[45] Despite the problems posed by mines to US amphibious forces at Wonson, the military objective was ultimately achieved. Consequently, the potentially catastrophic effects of the delayed landing were soon forgotten in the heat of the ongoing cold war.

[46] Melia, *Damn the Torpedoes*, p. 34.

force. The Russians laid a series of minefields, mixing contact and controlled observation mines in likely British anchorages at Sevastopol and Kronstadt. The simple but effective contact mines severely damaged British ships and forced the Royal Navy to construct rudimentary countermeasures systems to counter this unforeseen threat. Lacking a more systematic approach to the problem presented by the mined harbors, the British could do little to counter mines in massive numbers. Two British vessels reconnoitered the Russian minefields near Kronstadt and brought back enough information on the threat posed by the mines to cause the British to cancel a planned attack.[47] Following this setback at Kronstadt, the British began development of mine countermeasures systems and embarked on their own mine development program. Other European nations, noting the success of the Russians, commenced mine warfare programs as well.

The United States viewed mine warfare solely as a defensive tool of inferior European navies and therefore of no concern to its national security in the Western Hemisphere. Consequently, little emphasis was placed in the development of MCM systems until after the Civil War.

**2. American Civil War**

The American Civil War offers perhaps the classic example of the divergent interests in mine warfare between European and American navies. During the war, the Confederacy actively pursued mine warfare as an inexpensive alternative to traditional sea-going naval defense against the numerically superior Union fleet. Throughout the war, the Confederacy successfully employed mines (or torpedoes as they were then commonly called), to thwart

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[47] Melia, p.134.

Union naval blockades and riverine operations. By the end of the war, over fifty Union vessels had been crippled or sunk by Confederate underwater mines.[48]

World observation of the success of defensive mining by the Confederacy made mine warfare appealing to weaker European navies seeking economical national defenses. Europe's natural geography and shallow coastal seas were well-suited for mining; therefore, the employment of defensive and protective mining schemes became central to naval doctrine in most countries. For example, the Danes and Austrians defended their harbors with minefields in the 1860s, and in 1870, the Prussians advertised defensive mining of all their harbors to keep the superior French fleet at bay.[49]

In stark contrast, press accounts of Rear Admiral Farragut's dramatic entrance into Mobile Bay and his apparent disregard of the dangers of the Confederate mine lines shaped US naval impressions towards the significance of mine warfare. This perception though was historically inaccurate. In actuality, Farragut was deeply concerned about the potential threat posed by the mine fields. Detailed scouting missions were undertaken before entering the bay to discover the scope and dimensions of the Confederate fields and disable as many mines as possible. Armed with the exact positions of the enemy mines, Farragut made a measured decision to go forward with the attack. Farragut did not, as many assert, merely "damn the torpedoes" at Mobile Bay, but rather hunted, examined and disabled them before steaming into the bay. In terms of both Farragut and the mine threat, however, the US Navy remembered the wrong lessons.

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[48] Ibid, p. 16.

[49] Ibid, p.17.

### 3. Spanish American War

A better known incident in mine warfare occurred in the harbor of Havana, Cuba, on February 15, 1898. There, the battleship *Maine* was sunk by what the United States charged was, and the Spanish insisted was not, a mine. Ironically, despite the popular belief that the *Maine* had been destroyed by a mine, there was little interest in developing new methods to counter mines or in developing an MCM force to meet the threat that had supposedly devastated a prime example of the "New Navy."

This apparent American disinterest in MCM derived, in part, from the successful exploits of Rear Admiral Dewey against the Spanish at Manila Bay. Although he had reliable reports that Manila Bay had been mined, Dewey pressed on with his attack to ultimate victory. He would later explain that he dismissed the mine threat as a "spacious bluff" based on Spain's unfamiliarity with minelaying.[50] Dewey was both lucky and a sound judge of Spanish incompetence in this domain. Spanish mines directly under the keels of passing American ships had been incorrectly set and failed to deploy properly. Nonetheless, American journalists touted Dewey's passing of an extensive and supposedly potent minefield at Manila Bay, thereby "adding Dewey to the folklore of American naval history as another successful 'damner' of mines."[51]

### 4. Russo-Japanese War

In the Russo-Japanese War of 1904-1905, mines for the first time played a decisive role in offensive naval warfare. Both the Russians, who were seeking to expand into the Far

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[50] Arnold Lott, *Most Dangerous Sea,* 1959, p.12.

[51] Melia, p. 22.

East, and the Japanese, who opposed them, used moored contact mines planted in the open sea for the first time. Hoping to dislodge the Russians from their stronghold at Port Arthur, the Japanese mined the waters off the port and then lured the Russian fleet out of the harbor. Ignoring the danger, Russian Admiral Makarov, in his battleship *Petropavlovsk*, led his ships right through the Japanese minefield. The admiral and his ship were lost, and four other ships were sunk or severely damaged. The Russians also laid defensive minefields around Port Arthur and caused the sinking of six major Japanese warships, nearly changing the naval balance in Russia's favor. These defensive minefields ultimately proved equally lethal to the Russian fleet during their forced retreat from Port Arthur. Primitive Russian minesweeping proved ineffective against their own mines, and the fleet sustained many casualties.

After closely observing the progress of the war, most European navies began to explore the possibilities of mining the open sea, thus reviving international interest in MCM.[52] The Germans especially noted the effectiveness and economy of mine warfare and by 1914 had collected a large supply of mines and were ready to use them. The uncontrolled use of mines in the Russo-Japanese War also resulted in the signing of the "Convention Relative to the Laying of Mines," drafted at the Hague Conference of 1907. The principal article required nations laying mines in international waters to remove them after hostilities ended. This requirement spurred further research in MCM among European nations possessing offensive mines. The US Navy did little to emulate the European navies. It had suffered few "perceived" operational losses due to mines during the Civil and Spanish American Wars,

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[52] Ibid, p.26.

and had found them relatively easy to avoid. Consequently, other developments in naval warfare continued to have higher priority.

### 5. World War I

The advent of World War I marked the first global use of both offensive and defensive mining. During the war, nearly 300,000 mines were laid in European waters, and all the belligerents were forced to contend with some aspect of enemy mining. With the outbreak of hostilities in 1914, the Germans swiftly mined the coast of Britain. The British in turn laid mines in the English Channel to oppose German U-boats. The Austrian and Italian navies contended with each others mines in the Adriatic. Russia's war strategy relied heavily on the placement of offensive and defensive mine barriers across the Gulf of Finland and in the Baltic and Black Seas. These mine barrages proved to be highly effective in thwarting German naval advances, particularly in the Gulfs of Finland and Riga, where 11 German ships succumbed to Russian mines.[53] Later in the war, the British and the Americans commenced mining the North Sea to stop the submarines that were preying on Allied shipping in the Atlantic. By 1918, the *North Sea Barrage* contained over 70,000 British and American mines, by far the largest minefield ever laid. Although this mine barrier was not particularly successful, others such as the *Dover Barrage* proved to be the most effective Allied weapon against German submarines, accounting for more than 30 percent of the German losses during the war.[54]

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[53] Hartmann p. 42.

[54] Dr. Jan Breemer, "Mine Warfare: The Historical Setting," *Naval Forces,* No.1 1988, p.43.

Of particular interest was the role played by mines in preventing a decisive follow-on naval engagement between the German and British battle fleets following the Battle of Jutland. The presence of extensive German defensive minefields was a major reason for the British decision not to proceed into the Heligoland Bight in pursuit of the retiring High Sea Fleet. According to Hartmann (p. 43), the British decision not to follow the German fleet was strongly related to the fear of mines. He quotes Admiral Jellicoe as having said that "If, for instance, the enemy battle-fleet were to turn away from an advancing fleet, I should assume that the intention was to lead us over mines and submarines, and should decline to be so drawn." Yet naval historians in general have been unkind in their assessment of Admiral Jellicoe's prudent decision against pursuing the High Seas fleet into a "most dangerous sea," thereby demonstrating that unfamiliarity of the lethal potential of sea mines is not strictly the domain of naval officers.

Perhaps the greatest impact of mining during the war occurred in the Near East. Hoping to attack Germany from the south and open crucial lines of communications to Russian allies, a combined British and French fleet attempted to force the heavily mined Dardanelles. The inability of the combined fleets to effectively sweep the Turkish mines eventually forced the British to abandon the attempt to take Constantinople by water, leading to the equally ill-fated Gallipoli campaign. The force's failure to pass the straits, with four battleships lost or damaged in the minefield, was a humiliating defeat for the Royal Navy. Smarting over their embarrassment, the British and French navies made considerable efforts to develop effective MCM vessels for such assaults in the future.

The US Navy escaped serious losses attributable to German mines due to its late entry into the war. US MCM vessels did assist the British in sweeping the North Sea mines for six months following the war, but long after the victory parades had ended. Thus, the American and European navies learned markedly different lessons from their experiences in mine warfare and MCM. While US interest quickly waned, the war taught America's European counterparts an enduring lesson: to operate offensively in mined waters and to defend home waters, a navy must have adequate forces to counter the mine threat. The British , Germans, and Russians learned this lesson best.

### 6. World War II

British and German innovations in mine technology during the interwar years brought mine warfare into the modern era with the development of influence mines. Disarmed by the Treaty of Versailles, Germany secretly began improving its mine warfare capability with Soviet assistance.[55] During this period, British, French, Belgian and Dutch navies carried out extensive MCM training exercises against real mines. Conversely, US naval exercises rarely included MCM scenarios and when they did, both the mines and the countermeasures were simulated (a tradition that has endured to this day). Such simulation reaffirmed the image of MCM as a problem easily solved.[56]

When war broke out in Europe in 1939, Germany quickly mined the coast of England with new magnetically activated influence mines, and later, more sophisticated acoustically activated mines. Each new German mine variant required British MCM technicians to develop

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[55] Martin Kitchen, *Europe Between the Wars*, 1990, p. 55.

[56] Melia, p. 42.

appropriate countermeasure systems. These German offensive mine warfare operations were directed primarily against the Allies' civilian merchant shipping and accounted for nearly nine percent of Allied and neutral shipping losses and over 576 British vessels alone during the World War II.[57] Germany also actively mined waters in the Gulf of Finland, having learned their lesson from the Russians during the First World War. These extensive mine barriers took a high toll on Russian submarines attempting to exit into the Baltic. The inability of the Russian Fleet to mount a credible MCM operation to counter the German mine fields effectively bottled up large portions of their submarine fleet - which at the outbreak of war, was the worlds' largest - until the latter half of 1944.

Britain again mined the English Channel and also laid extensive minefields in the Baltic Approaches. As in World War I, the primary objectives of these mine fields was to restrict the access of German submarines into the North Atlantic. Their overall effectiveness, however, was marginal at best, due primarily to the fact that German occupation of France and Norway prevented the successful employment of complementary assets (i.e., submarines and shore fortifications) required to enhance the effectiveness of a mine field barrier. Nevertheless, the evolution of military air warfare offered new methods of mine delivery, and enhanced the effectiveness of offensive mine warfare. For example, British aerial minelaying sorties against German shipping along the Mediterranean coast and the inland waterways accounting for 762 Axis ships sunk.[58]

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[57] MAJ John Chilstrom, USAF, *Mines Away! The Significance of US Army Air Forces Minelaying in World War II*, 1993, p. 7.

[58] Ibid, p.8.

Mines also played a pivotal if little known role in the Allied landings at Normandy. Hitler's hesitancy to employ Germany's most sophisticated pressure actuated mines prior to the Allied landings is generally acknowledged as a major tactical error that contributed to the successful Allied penetration into Europe.[59] Nevertheless, over 300 Allied MCM vessels were still required to clear routes to the invasion beaches before the D-day landings. Of these, only 32 were from the US Navy with the remainder coming from other Allied nations, primarily Britain.[60] Thus, the US Navy established a tradition of dependence on European MCM support in wartime- a tradition that would return to haunt it during the Tanker Wars and in Desert Storm. Furthermore, the successful landings at Normandy reinforced American perceptions that mines were a threat that could easily be overcome. Fortunately for the Allies, most of the anti-invasion minefields had either passed their timed life-cycles and become inert by 1944, or were simply missed.[61] Again, US naval forces had successfully played "Russian Roulette" with mines and escaped with relatively few losses. The French, however, took away a far different appreciation for the difficulties associated with MCM. Following the war, the French Navy was forced to develop and operate an MCM fleet capable of clearing French coastal waters infested with German mines.

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[59] Although the Germans developed the first pressure activated influence mines (called "Oyster" by the Allies), they did not employ them for fear that Allied forces would recover one, and develop a countermeasure, as was the case with Germany's first magnetic mines. Instead, the Germans held their pressure mines in reserve for the Allied cross-Channel invasion which was viewed as inevitable. Unfortunately for Hitler and the Germans, the eventual Normandy invasion occurred at an unanticipated time, in an unanticipated location. As a result, few of the advanced "Oyster" mines were deployed. See Lott, p. 132 and Levie, p. 81.

[60] Melia, p. 57.

[61] Melia, p. 58.

From the US perspective, the mine threat was strictly a European problem. With the exception of occasional German harassment mining of America's Atlantic ports and coastal waterways, the United States was virtually immune to any significant mine threat directed against the homeland. The total of 338 mines laid off the U.S. east-coast by German submarines during the course of the war was infinitesimally small, when compared to the nearly 600,000 mines that were laid in European waters. Interestingly, the United States implemented perhaps the most successful employment of offensive mine warfare during its 1945 aerial mining campaign against Japan's home islands, codenamed Operation Starvation. This mining campaign accounted for the sinking of 670 Japanese ships and, in conjunction with the concurrent submarine offensive, succeeded in decimating Japan's entire economic lifeline. To this day, there is an ongoing debate among scholars as to whether the mining campaign if allowed to remain in force, would have brought about the surrender of Japan without the use of the atomic bomb. What is undeniable, is that by the end of the war, the US mining offensive proved to be the most effective component of the Allied blockade of Japan, and ten times as economical as submarine anti-shipping operations.[62] Surprisingly, the American success in conducting crippling offensive mining operations did not translate into increased emphasis in developing a credible MCM capability within the US Navy. This

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[62] During the last six months of the war, American mines sank more Japanese tonnage than all other sources combined while demanding only 5.7 percent of the XXI Bomber Command's total sorties. Childstrom, p.34. Furthermore, on the basis of the effort required to produce one enemy ton casualty, attacks on shipping using airborne influence mines alone were about ten times as economical as submarine attacks in World War II. When submarine and surface laid mines are considered, the figure rises to a factor of almost twenty. See Ellis A. Johnson, *Mines Against Japan*, 1973, p. 13, and James A. Meacham, "Four Mining Campaigns: An Historical Analysis of Decisions of the Commanders," *Naval College Review*, June 1967, p. 75.

shortsightedness was highlighted during the ensuing Korean conflict in the early fifties, when US naval forces were woefully unprepared to counter rudimentary mine fields sown by the North Koreans and their Soviet agents.

### 7. The Lessons of Historical Experience

The preceding historical case studies have offered poignant examples of the decisive role mine warfare has played in naval operations dating to the mid-nineteenth century. Limitations in space and time preclude further analysis of the role of mines in numerous smaller regional conflicts which have occurred in the interceding periods. What is apparent from the foregoing analysis, however, is that the divergent perceptions of past, and to a lessor extent, present vulnerability to sea mines among Western European and American navies is derived from historical experiences that have colored respective viewpoints concerning the relative importance of MCM vis-a-vis other warfare areas. The events of the Cold War era further amplified these differing doctrinal approaches between the transatlantic allies.

## E. STRATEGIC VULNERABILITY

During the Cold War, Europe's location as the probable battle ground in any superpower confrontation resulted in renewed Western European interest in mine warfare. Western Europe's proximity to the Soviet Union and its favorable mining environment left it highly susceptible to Soviet mining. Aware that Soviet mines could delay, if not stop in their entirety, seaborne reinforcements from North America, Britain, Norway, Belgium, and the Netherlands- countries most likely to be at the receiving end of early reinforcement convoys

from the United States- stepped up MCM readiness levels with a new sense of urgency.[63] In the Baltic, Germany and Denmark, the "Harbormasters" of the Baltic, also emphasized MCM in addition to their mining requirements as a critical component of their navies. In the Mediterranean, Italy and Turkey placed key attention on mine warfare in view of their geo-strategic positions relative to the Adriatic and Black Seas respectively. Finally, France, though not participating in NATO's integrated military structure, developed an impressive MCM naval force to ensure the safety of its strategic submarine force and maintain an autonomous naval capability.[64]

The United States, far removed from the threat of serious Soviet mining of its own ports, and dependent on NATO MCM cooperation in the European theater, downgraded the requirement for serious investment in American MCM force structure. This is not to say that the U.S. discounted the Soviet mine threat, but rather in the overall scheme of the US-Soviet naval confrontation, mine warfare played a relatively minor role- a role that could be adequately filled by European allies. Not until the US found itself "going it alone" in extra-European regional conflicts, such as the Tanker Wars in the late 1980's, did its MCM inadequacies finally surface. This divergence in the perceived Soviet/Russian mine threat between European navies and US Navy during the Cold War period is integral to an understanding of the differing emphasis placed on MCM within the respective navies.

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[63] Desmond Wettern, "The Receiving End: European NATO Builds Up Its Mine Warfare Forces," *Sea Power*, October 1988, p. 44.

[64] ADM Alaine Coatanea, "The French Navy-New Risks and Force Specialization," *NATO'S Sixteen Nations*, no. 3/92, p.29.

Therefore, this perception of "strategic vulnerability" bears further examination from both perspectives.

**1. Europe**

During the Cold War, Soviet military planners were well aware of NATO's dependence on shipping from North America to support military operations in Europe, regardless of whether the war would be conventional or nuclear. They also recognized NATO's dependence on Middle Eastern and North Sea oil. Therefore, Soviet maritime strategy toward Western Europe was predicated on the denial or destruction of this oil and logistical support pipeline.[65] To achieve this aim, Soviet doctrine called for the establishment of a "naval blockade" around key European ports. Mines would play a pivotal role in the execution of this strategy, blockading key areas of the oceans and inland seas, thereby isolating these areas from resupply. [66] The shallow seas along the whole of the west coast of Europe and around the United Kingdom are readily mineable; mines could be covertly laid by submarines or merchant/fishing vessels in a period of tension well before hostilities occurred and later re-seeded by aircraft. European navies, faced with a Soviet mine threat

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[65] Bruce Watson, *The Soviet Naval Threat to Europe,* 1989, p.14.

[66] The employment of offensive mine warfare in the "Soviet School" of naval warfare is outlined in an article by Captain Second Rank V.A. Belli, whose 1938 dissertation entitled "Fundamentals of the Conduct of Operations at Sea" Admiral Gorshkov later quoted to such significant effect. While this is one interpretation of Soviet naval doctrine, the general thesis is widely accepted by most naval strategists as the likely course of Soviet naval action in the event of an East-West European war. See Watson p. 136 and Robert Herrick, *Soviet Naval Theory and Policy, p.*111.

that included a stockpile exceeding 350,000 sea mines,[67] a formidable minelaying capability, and a naval doctrine advocating its aggressive employment, were compelled to develop credible MCM capabilities to ensure their own survival. Additionally, with their abdication of the defenses of Europe's global maritime interests to the United States, smaller European navies viewed MCM as a cost-effective contribution to NATO's maritime alliance.

The Soviet mine threat affected all European navies to some extent. The United Kingdom, Western Europe's premier naval power, relied heavily on its MCM forces to support and protect the three "pillars" of Prime Minister Thatcher's defense policy: strategic nuclear deterrence; home defense; and the amphibious reinforcement of Europe's Northern Flank.[68] Wartime conditions required British MCM forces to clear mines from the approaches to the Royal Navy's SSBN base at Faslane and key reinforcement ports, while concurrently supporting amphibious operations in Norway. France maintained a sizable MCM force to protect the approaches to the strategic submarine base at Brest and maintain her traditional naval independence and national autonomy. The Germans and the Danes required both mining and MCM forces to block Soviet access to the vital Baltic approaches and later clear them of enemy and allied mines. The Dutch and the Belgians required a relatively large MCM force to clear the great receiving ports vital to the reinforcement of Europe. The immense traffic, exceeding over 570 million tons of trade per year and over 500 ships per day, calling on these Northwestern European ports emphasized their importance to any successful NATO

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[67] James Hessman, "Mine Warfare: The Lessons Not Learned," *Sea Power*, October 1988, p. 39.

[68] Eric Grove, *Maritime Strategy and European Security*, 1990, p. 40.

war effort. It was no accident that Admiral Gorshkov could declare in 1983 that the primary characteristic of the Soviet Navy was its ability to deny access to these receiving ports.[69] The renowned MCM reputations of the Dutch and Belgian navies are owed in part to the awesome responsibility of maintaining these ports free of mines.

European vulnerability to potential Soviet mining led to the establishment of a standing multinational MCM alert force: Standing Naval Force Channel, composed solely of MCM vessels from various NATO nations. Recently redesignated Standing Naval MCM Force (STANAVMINFOR), this flotilla serves as NATO's MCM "fire brigade." Its units conduct year-round training and exercises throughout the European maritime theater of operations under alternating WEU national commands. The high levels of interoperability and tactical commonality cultivated between the various European MCM forces participating in this multinational MCM task force paid handsome dividends during WEU Desert Storm MCM operations.

The end of the Cold War has nullified the danger of large scale offensive mining of Western European waters. Nevertheless, Russia's great-power ideology and expansionist rhetoric is now openly espoused by some part of official state policy.[70] Since Russia's mine warfare capabilities remain formidable, they must still considered a threat to European security, particularly in view of the uncertain political situation in Moscow.[71] Consequently,

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[69] Watson, p.220.

[70] Yuri N. Afanasyev, "Russian Reform is Dead," *Foreign Affairs*, March/April 1994, p. 23.

[71] See "Naval Policy," *Naval Forces*, 3/95, p. 10.

European MCM considerations discussed above should continue to figure prominently in NATO's current maritime planning.

**2. United States**

The United States did not have to contend with the severe threat of Soviet mining that faced its European allies for three reasons. First, it seems unlikely that a Soviet large-scale mining campaign aimed at interrupting the transatlantic flow of supplies would have been directed against US ports. The European terminals of the Atlantic SLOCs were a much more attractive and economical targets. Their relative proximity made the Soviet submarine fleet a viable mine-laying capability.[72] Moreover, Soviet aircraft could re-seed minefields in the European theater quickly following the commencement of overt hostilities. Finally, the abundance of Soviet bloc merchant ships and fishing vessels in European waters would have facilitated their use in covert mining operations. Second, the relative abundance of large, modern port facilities along the eastern seaboard and Gulf coast of the United States would have required the Soviets to expend an inordinate amount of time and resources to generate effective minefields against even a fraction of the larger ones. Conversely, Europe possesses few port facilities capable of off-loading large-capacity Roll on-Roll off (RO-RO) ships favored for landing the US Army's heavy mechanized equipment. Most inbound shipping from North America was to be directed through Dutch and Belgian ports, since only these

[72] The Soviets believed that the submarine's greatest shortcoming as a mine platform is its relatively small mine-carrying capacity, since it can usually carry only two mines per torpedo. The requirement to off-load torpedoes left the submarines virtually defenseless if detected by US submarines protecting the US mainland.

ports could adequately satisfy the demands in time and space of the Central Front.[73] Third, the lack of geographic choke points and relative open access to the Atlantic Ocean would have made effective mining of US ports extremely difficult for Soviet minefield planners.

Based on these assumptions, US MCM force levels were solely predicated on the possible need for a short-term port breakout of warships and submarines from key naval bases without the threat of re-seed mining. From the US perspective, the threat from Soviet hunter-killer and ballistic submarines posed a far greater threat to national security and the reinforcement of Europe than did minefields. From the Soviet perspective, the choice of which side of the Atlantic to conduct the majority of its mining operations was obvious.

## F. ECONOMIC VULNERABILITY

The final element of Europe's "mine vulnerability triangle" vis-a-vis the United States is its greater economic dependence on seaborne trade in peace as well as in war. In 1987, the ports of the European Community loaded 458,221 million tons of goods and offloaded 1,576,568 million tons, 23 percent of world tonnage. North America's percentage was only 12 percent.[74] The port of Rotterdam is arguably the busiest commercial sea terminal in the world and accounts for as much tonnage as the top two US commercial ports combined.[75] As far as exports are concerned, the Netherlands, Norway, Belgium, and the United Kingdom all export over 20 percent of their GNP by sea. France, Germany, and Italy export between

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[73] Watson, p.220.

[74] Eric Grove, p. 2.

[75] According to the 1995 edition of the *World Almanac*, Rotterdam's commercial tonnage exceeded the combined totals of New York and New Orleans in 1992-1993.

15 and 20 percent while the United States exports less than 10 percent.[76]

European and American divergence in terms of economic dependence on imports is even more pronounced. Europe imports most of its supplies of non-fuel materials required for industrial production. The US also imports large quantities of seaborne supplies to maintain its economic well-being, but the requirement for these products is more a matter of convenience than a necessity. Moreover, Europe's clearest and most crucial import dependence is energy supplies. Europe either extracts oil from the seabed or imports it from abroad. Western Europe is the world's largest regional importer of oil and oil products, 303 million tons of crude in 1992 plus another 84 million tons of oil products.[77] Moreover, 55 percent of Western Europe's oil comes from the Middle East compared with less than five percent for the United States. Certain European countries are more dependent on overseas fuel imports than others. For example, the United Kingdom produces far more oil than it consumes whereas Germany, France, and the Netherlands all rely on imports for 44 percent of their total fuel demands and Italy as high as 61 percent.[78] Most important, Europe's food self-sufficiency is dependent on imported oil and phosphates for continued production.[79]

Given Europe's economic dependence on maritime commerce, one can see the magnified economic impact of mining on the national level. In contrast to the United States, most European nations possess only one or two major commercial ports. The closure of any

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[76] Ibid, p. 2.

[77] David Miller, "The Silent Threat," *International Defense Review*, 8/93, p. 615.

[78] Grove, p.3.

[79] Ibid, p.11.

major European ports would be disastrous on a purely national basis. One can imagine the economic consequences presented by a real or threatened mining of Rotterdam for the Dutch, Antwerp for the Belgians, or the Baltic Approaches for Germans and Danes. Conversely, the mining of a single US port might have an economic impact over a relatively small geographic region but would be rather insignificant to the economic well-being of the country as a whole. Therefore, MCM continues to play a pivotal role in European naval posture.

The breakup of the Soviet Union and the apparent end of the Cold War has not entirely diminished the threat of mining to Western Europe. To the contrary, the proliferation of former Soviet mines to Third World and terrorist organizations is a major concern for European (and American) navies. Mines, even those from Western sources, can be easily bought on the international arms market. They are economical and anonymous, making them an attractive weapon for radical Third World countries or terrorist organizations. Libya's suspected mining of the Red Sea and Gulf of Suez in 1984 is an example of state-sponsored terrorism that cannot be discounted in today's unstable political climate. Moreover, history has shown that the mere threat of mining can be sufficient to close an important domestic port or waterway, and requires an extensive MCM effort before safe passage could be assured.[80] Finally, on a national level, economic blackmail is always a possibility for "high

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[80] During the early stages of World War II, Britain declared that a large area of the North Sea had been mined and was dangerous for shipping. In fact, no mines had actually been laid nor was Britain in a position to conduct near-term mining operations at that time. Nevertheless, the mere threat of an extensive mining campaign succeeded in keeping German ships well clear of the supposedly mined areas. (Hartmann, *Weapons That Wait*, p. 59). As recently as 1980, an unknown group , "The Patriotic Scuba Divers of America", claimed that they had mined the Sacramento River to prevent a Soviet grain ship from leaving port. Though it was later proven to

tech" extortionists with a few thousand dollars to spare.[81]

Europe's greater dependence on maritime commerce vis-a-vis the United States and its vulnerability to various potential mine threats even in today's peacetime environment have resulted in the continued commitment to high MCM force levels in most European navies despite defense cutbacks in other areas. Furthermore, recent European willingness to deploy MCM forces outside European waters to the Persian Gulf (1987-1988 & 1990-1991) in support of national interests further supports an argument of European economic vulnerability to mining. Chapter VI provides a more detailed analysis of the role of MCM in NATO's post-Cold War navies.

## G. RECENT DEVELOPMENTS IN TRANSATLANTIC MCM COOPERATION

The breakup of the Soviet Union and the apparent end to the Cold War have caused dramatic reductions in defense spending in almost all Western navies. Nevertheless, mine warfare has maintained a prominent position in European navies and is enjoying a renaissance in the US Navy following the lessons re-learned during Desert Storm. Indeed, both the Navy-Marine Corps white paper, *...From the Sea* and the Secretary of Defense's *Bottom-Up* Review, acknowledge the "...grave threat that mines present to sea control in the open ocean and power projection in joint littoral operations."[82] Moreover, since the Gulf War, the US Navy has put in place a well-structured and comprehensive *Mine Warfare Plan* designed to

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be a hoax, the threat of mining closed the Sacramento waterway for three days until exploratory MCM operations were completed. Brian Paritt, *Violence at Sea*, 1986, p. 79.

[81] According to officials at the US Navy's Mine Warfare Command, rudimentary former Soviet mines can now be purchased on the open market for as little as $500.

[82] *Mine Warfare Plan*, second ed. (1994-1995), p.2.

improve its mine warfare posture.[83] A major initiative of the Navy's *Mine Warfare Plan* has been directed toward developing renewed ties with allied MCM forces, especially those in Europe.

These ties were strained during the Tanker War in 1987-1988, when European NATO allies balked at requests from the United States to provide MCM ships under American command in support of escort operations for re-flagged Kuwaiti tankers. Western Europe's hesitancy to commit its MCM forces to operations in the Arabian Gulf following the mining of the *Bridgeton* and USS *Samuel B. Roberts* left the United States to fend for itself against the Iranian mine threat. Unfortunately, decades of reliance on the Europeans to "handle" the mine problem left the United States Navy woefully unprepared to conduct unilateral MCM operations in the Gulf.

The event which led to an eventual European MCM presence in the Gulf was the Iranian decision to move its mining offensive beyond the straits of Hormuz to the busy waters off Al Fujairah.[84] Following a special meeting of the WEU foreign ministers, France, Belgium, Italy, and the Netherlands agreed to send MCM flotillas in concert with other WEU member nations. For the most part, the European MCM forces operated in conjunction with but independently of US MCM forces. Furthermore, joint operations involving European and

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[83] Key elements of the *Mine Warfare Plan* include: increased funding for MCM programs; the reorganization of US MCM forces under the operational command of a single Flag Officer (COMINEWARCOM); the establishment of the Program Executive Office for Mine Warfare-PEO(MIW)-that has acquisition responsibility and management accountability for all MCM research and development programs; and the collocation of all air, surface and EOD MCM assets at the Navy's mine warfare center of excellence located at Naval Station Ingleside Texas. See *Mine Warfare Plan*, pp. 6-10.

[84] Grove, p.59.

American MCM forces were problematic due to the differing nuances of the respective operating, communicating and reporting procedures. While the WEU had succeeded in uniting European MCM forces in a common purpose, years of non-interaction with American MCM forces created problems with coordination and efficiency, and often led to duplicated effort.

Desert Storm MCM operations further strained relations between the United States and her European allies, at least initially. Except for the United Kingdom, European MCM forces were prohibited by national authority from entering the Persian Gulf until after the cessation of hostilities.[85] As a result, American and British MCM forces were left shorthanded to clear Battleship Fire Support Areas through Iraqi minefields in support of coalition naval operations in the northern Arabian Gulf. For the second time in five years, dedicated European MCM support was not guaranteed outside the European theater of operation. This revelation forced American naval commanders to rethink their informal abdication of MCM responsibility to European navies. Future American naval operations outside European waters would now have to be predicated on unilateral American MCM support and US MCM force levels planned accordingly.

Post-Desert Storm mine clearance operations accounted for over 1300 Iraqi mines, and involved MCM flotillas from France, Belgium, Germany, Italy, the United Kingdom, The Netherlands, the United States, and Japan. Germany's participation in the MCM operation was significant in that it represented the *Bundeswehr's* first participation in an "out-

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[85] House Armed Services Committee, *Defense for a New Era: Lessons of the Gulf War,* 1992, p. 27.

of-area" role. For legal reasons, this was advertised by the German government as a contribution to a coordinated "humanitarian mission" that was at the same time aimed at restoring peace in the Gulf in accordance with Security Council Resolution 678. The "surprisingly uncontroversial decision, supported by the opposition, came closer than any previous one to committing *Bundeswehr* forces to out-of-area coalition operations."[86]

Armed with captured Iraqi minefield plans, the international MCM armada still required over four months of intense operations to clear the Gulf waters of mines. Again, American and WEU MCM forces experienced coordination difficulties stemming from dissimilar tactical procedures and conflicting national policies regarding "risk directives" to MCM forces.[87] For example, MCM forces from two European states were prohibited from operating in mine danger areas (MDA) containing known sensitive acoustic mines without precursor sweeping by US Airborne MCM (AMCM) helicopters.[88] This limitation handcuffed coalition options in prosecuting specific mines in the northernmost MDA, which fell in waters claimed by Iran and thus, was not accessible to US MCM assets. Ultimately, Japanese MCM units agreed to clear the area after European forces declined citing political reasons.[89] The restrictive "risk directives" were a source of frustration and underscored, from

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[86] Karl Kaiser and Klaus Bedher, "Germany and the Iraq Conflict," *Western Europe in the Gulf*, 1992, p. 54.

[87] Captain Leslie Hewett, the Commander US MCM forces during post-Desert Storm MCM operations discussed the problematic nature of the European "Risk Directives" at an MCM conference at *Eguermin* Mine Warfare School on 19 November, 1993.

[88] Scott C. Truver, "Exploding the Mine Warfare Myth," *US Naval Institute Proceedings*, October 1994, pp. 37-38.

[89] Hewett, MCM Conference, 19 November 1993

the US perspective, the strict control exercised by European national authority over their military MCM commanders in the field.[90]

On the positive side, the coordination problems between American and WEU MCM commands spurred renewed interest in reviving US participation in European MCM exercises. Ultimately this led to the first-ever integration of US AMCM forces with European MCM ships during exercise *BLUE HARRIER* 93 in the Baltic Approaches. Furthermore, the demonstrated success of European-designed unmanned remote control influence sweeps such as the German "Troika" and the Swedish "SAM" systems resulted in the establishment of an active Euro-American data-exchange program.[91] Several formal international mine warfare collaborative developments were also announced, including one for a closed loop degaussing system with France and another for a MCM tactical simulator development effort with Italy, the Netherlands and Belgium. Current operational plans call for a series of biennial US mine countermeasure force deployments to Europe and extended participation of US *Avenger*-class MCM ships in STANAVMINFOR operations on an annual basis. While the US military presence in Europe may be on the decline, America's integration and cooperation with its European allies in the area of mine warfare appears to be growing.

## H. SUMMARY

This chapter has presented a comparative analysis of the differing priorities given to mine warfare in general and mine countermeasures in particular in certain Western European

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[90] For example, Belgian MCM commanders had to obtain permission from Den Helder and Brussels prior to employing divers to deactivate mines. Geipel, p. 23.

[91] *Mine Warfare Plan*, p. 23.

navies and in the US Navy. The historical divergence between the two sides of the Atlantic in their perceptions of mine warfare's relative importance in national security affairs is traced to each region's differing interpretations of its historical, strategic, and economic vulnerability to mining.

In 1989, the Chief of Naval Operations, Admiral Carlisle A.H. Trost observed:

> . . .[U]ntil recently, the United States has not given enough sustained attention to maintaining a superior capability in mine warfare, particularly mine countermeasures. . . .I intend to keep attention focused on our vulnerability, and continue to press for resources to put us in a position where we can adequately protect our interests and deter potential adversaries.[92]

Admiral Trost's statement touches on the central themes of this chapter. First, Europe's focus on their perceived mine warfare "elements of vulnerability" has resulted in continued emphasis on mine countermeasures programs to adequately protect their national interests. Second, the United States Navy's lack of overall mine warfare consciousness has resulted in a false sense of immunity from enemy mining operations directed at American commerce ports.

Modern US naval doctrine developed from the classic sea power theories of Captain Alfred Thayer Mahan. His writings during the latter nineteenth and early twentieth centuries emphasized a strategy that focused on the clash of great battle fleets fighting for sea control and naval supremacy. During the Cold War, America's maritime strategy centered primarily on a Mahanian open ocean confrontation with the Soviet Union. Consequently, the Navy's program decisions were often based on perceptions of the magnitude of risk solely in that

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[92] Melia, p. 133.

arena. Under these conditions, the Navy assessed the development of only minimal MCM capability as less risky than limiting other warfare areas. If NATO's Western European navies had abdicated the security of their global maritime interests to the United States Navy, the reverse could be implied of American responsibilities in MCM.

Admiral Trost's statement or one quite like it was probably made by British admirals following the Crimean War; Russian admirals following the Russo-Japanese War; and German admirals following World War I. These and other European nations remembered the hard lessons meted out by the "weapons that wait" and dedicated the funds and resources required to produce capable MCM forces to counter the threat. Perhaps the mine warfare lessons of the Arabian Gulf and the recent increased emphasis in upgrading American MCM capabilities signal an end to the institutionalized neglect of MCM within the US Navy.

# IV. MINE WARFARE AND INTERNATIONAL LAW

## A. INTRODUCTION

This chapter addresses legal considerations pertaining to the use of sea mines in times of peace and war. Specifically, it discusses existing international agreements which codify the customary international laws governing the use of sea mines, and highlights some of the weaknesses contained therein. Finally, the chapter analyzes the implications of the recently ratified Third United Nations Convention on the Law of the Sea (UNCLOS III) and its potential impact on the current use of sea mines.

In today's international climate, NATO's maritime nations must be careful to have a legal mandate before undertaking actions at sea, including mine warfare operations. However as experience in the two recent Arabian Gulf conflicts has demonstrated, there is no assurance that potential adversaries that may challenge NATO's naval forces in the future - including various substate actors - will hold to the same principles regarding international law. Nevertheless, an analysis of the customary laws of the sea and the various internationally recognized treaties and conventions which govern the use of sea mines provides some guidance as to the legally acceptable employment options for sea mines in times of peace and during periods of armed conflict.

Unfortunately, many of the international provisions pertaining to mine warfare are incomplete or ambiguous, and thus do not always provide clear guidelines as to the geographical limits on the employment of mines or the specific responsibilities of the mining entity following their emplacement. This problem has often led to a wide range of differing

interpretations of these laws among various nations, particularly in wartime. Without clearly articulated laws governing the use of sea mines, NATO's naval forces can expect to face widely divergent uses of offensive, defensive and protective minefields in future operations. Some of these mine threats will be clearly illicit, as was the case during Iran's clandestine mining campaign against neutral maritime shipping in the Arabian Gulf and Gulf of Oman in 1987-1988. Most, however, will probably fall into one of the many "gray areas" that currently exist within the various international agreements that govern the use of sea mines. Within this context, many adversaries will likely conclude that the adage, "it is easier to ask forgiveness than permission," applies to the field of mine warfare.

## B. BACKGROUND: CUSTOMARY AND INTERNATIONAL LAW

International law and practice regulate the use of the sea, each nation's rights regarding its national territory and waters, the initiation and conduct of armed conflict, and limitations regarding the employment and types of weapons.[93] Fundamental to international law of armed conflict is the requirement to mitigate the potential risk to noncombatants posed by weapons, such as armed sea mines, which by their nature are incapable of being directed specifically against military targets.

The best-known and nearly universally accepted regime governing the use of sea mines during war is the 1907 Hague Convention No. VIII. Yet, scrutiny of this convention reveals language sufficiently vague as to render many of the convention's provisions virtually meaningless. Furthermore, recent international agreements regarding such issues as conventional arms limitation and maritime territorial jurisdiction have complicated the

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[93] Naval Warfare Publication (NWP) 9, Chapter 9, para. 9.1, p. 9-3.

legal aspects of the peacetime employment of sea mines in both international and territorial waters. Since these conventions and treaties form the foundation of commonly accepted international law regarding the use of sea mines, analysis of their impact on current mine-warfare-related issues confronting NATO's naval forces is warranted.

## C. INTERNATIONAL AGREEMENTS RELATING TO MINE WARFARE

Naval mines are lawful weapons, but their indiscriminate nature and potential to inflict uncontrolled damage and casualties on noncombatants has resulted in a variety of measures designed to regulate the conditions and locations under which these weapons may be used. Principal among the international agreements that bear either directly or indirectly on maritime mine warfare are: Article 51 of the UN Charter, the 1907 Hague Conventions Relative to the Laying of Automatic Submarine Mines (Hague VIII) and Concerning the Rights and Duties of Neutral Powers in Naval War (Hague XIII), the 1971 Seabed Arms Control Treaty, Protocol II to the 1980 Conventional Weapons Treaty, and finally, the 1982 Law of the Sea Convention (UNCLOS III). The significance, complexity, and applicability of these treaties vary as they relate to mine warfare. Bearing this in mind, the following discussion highlights the key provisions contained within the more basic agreements (Art. 51, Seabed Treaty, Protocol II), and their implications for the deployment and employment of sea mines in peace as well as war. Hague Convention (VIII) and the UNCLOS III require a more detailed analysis owing to their greater impact on current maritime-related mine warfare issues and are examined in separate sections.

### 1. Article 51 of the UN Charter

Under Article 51 of the UN charter, the use of force, and by extension, the use of sea mines in armed conflict is prohibited except in two situations. The first is an internationally (UN) sanctioned coalition operation against an identified aggressor. The second, is the use of force for collective or unilateral self-defense against imminent or ongoing attack.[94] A strict interpretation of Article 51 forbids the offensive emplacement of armed sea mines prior to the commencement of hostilities.[95] However, the employment of protective and, in extreme cases, defensive minefields in peacetime is largely dependent in practice on the severity of the "imminent threat" which a particular country or coalition faces and may therefore be legally justified under certain circumstances. Consequently, Article 51 does not offer clear guidance relative to the employment of mines except in the most clear cut cases of international conflict.

### 2. The Seabed Arms Control Treaty of 1971

The 1971 Seabed Treaty, developed jointly by the United States and the Soviet Union, prohibits the employment of any nuclear or other weapon of mass destruction on the seabed or subsoil thereof beyond a 12-mile coastal zone.[96] Although mines are not specifically

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[94] JOINT PUB 3-15, p. I-5.

[95] Paragraph 9.2.1 of NWP 9 classifies naval mines as either armed or controlled. Armed mines are either emplaced with all safety devices withdrawn or are armed following emplacement, so as to detonate when preset parameters (if any) are satisfied. Controlled mines (including remote control activation devices) have no destructive capability until affirmatively activated by some form of controlled arming order (whereupon they become armed mines). NWP 9, p. 9-4.

[96] JOINT PUB 3-15, p. I-5.

mentioned in the treaty text, nuclear mines are unquestionably one of the major objects of the treaty's prohibitions.[97] During the Cold War, both the United States and the Soviet Union feared the employment of nuclear mines within the high seas which were designed to counter the threat posed by each nation's respective submarine fleets. Nonetheless, while the motivation of this treaty was obviously to restrict the use of nuclear weapons attached to the ocean floor, it does not prohibit the emplacement of nuclear mines within a coastal state's own internal waters and territorial seas.

The end of the Cold War has diminished the significance of this treaty to some extent, and Russia is currently the only country still believed to possess nuclear mines in its arsenals.[98] However, the ongoing proliferation of nuclear technology to the developing Third World could result in the emergence of a nuclear mine capability among the growing litany of emerging regional naval powers.

**3. Protocol II to the 1980 Conventional Weapons Treaty**

The 1980 Conventional Weapons Treaty places restrictions and prohibitions on the use of certain conventional weapons which may be deemed excessively injurious or to have indiscriminate effects. The convention has three protocols that place restrictions on the employment of specific types of weapon systems. Article 1 of Protocol II relates to the use of landmines, booby traps, and other devices laid to interdict beaches, waterway crossings,

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[97] Levie, p. 136.

[98] M. Consentino, "Mine Warfare-General Analysis and Prospects For Development," *Rivista Marittima*, March 1992, p. 43.

or river crossing.[99] However the Protocol does not apply to the use of anti-ship mines at sea or in inland waterways, stating:

> This Protocol relates to the use on land of the mines, booby traps and other devices defined herein, including mines laid to interdict beaches, waterway crossings, or river crossings, but does not apply to the use of anti-ship mines at sea or in inland waterways.[100]

The omission of any rules governing the use of mines in maritime operations by the treaty's drafters highlights international ambivalence toward the regulation of mine warfare at sea and effectively sanctions the right of sovereign nations to employ sea mines in pursuit of legitimate national security objectives. Nevertheless, some legal scholars have mistakenly attempted to apply the provisions of this treaty to naval warfare in general and naval mine warfare in particular despite specific language to the contrary within the provisions of the Protocol.[101]

## D. 1907 HAGUE CONVENTION NO. VIII

The extensive and uncontrolled use of sea mines by Russian and Japanese naval forces during the Russo-Japanese war of 1904-1905 inflicted great damage on innocent shipping both during and after the termination of the conflict. The outgrowth of international concern over the threat to neutral shipping posed by the indiscriminate use of

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[99] Protocol II of the 1980 Conventional Weapons Convention Treaty is entitled *Protocol on the Prohibitions or Restrictions on the Use of Mines, Booby Traps, and Other Devices.*

[100] Levie, p. 137.

[101] Ibid, p. 109.

sea mines led to the inclusion, in the proposed agenda for the Second Peace Conference at The Hague, of laws and customs of maritime warfare, including the "laying of torpedoes."[102]

The resulting Convention No. VIII "Relative to the Laying of Automatic Submarine Contact Mines" which emerged from the often tumultuous debate was arguably one of the Conference's least successful efforts, primarily because of the "mutually exclusive and irreconcilable positions taken by various participants," most notably Great Britain and Germany.[103] The compromises necessary to achieve eventual passage of the Convention eliminated provisions on many important matters, such as geographical limitations on mining and restrictions on the mining of international straits, and resulted in an ambiguous convention of little practical value. The nonspecific nature of the Convention No. VIII was highlighted in the preamble which stated:

> [A]lthough the existing position of affairs makes it impossible to forbid the employment of automatic submarine contact mines, it is nevertheless desirable to restrict and regulate their employment in order to mitigate the severity of war and to ensure, as far as possible, to peaceful navigation the security to which it is entitled, despite the existence of war.[104]

The foregoing statement highlights the basic polarization of interests at the time between continental powers like Germany, which favored liberal rules relating to mine warfare, and maritime powers like Britain, which favored strict regulation on the use of sea mines. According to Professor Howard S. Levie, a noted authority on maritime law, the

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[102] Ibid, p. 24.

[103] Ibid, p. 25.

[104] Preamble, *Convention (VIII) Relative to the Laying of Automatic Submarine Contact Mines*, 18 October, 1907.

differing perceptions of mine warfare among maritime and non-maritime nations continues to be a primary impediment to the establishment of a modern day convention on sea mines.[105] Curiously, the major provision regulating the use of sea mines in war did not arise from Hague Convention No. VIII, but rather from the Hague Convention No. XIII, " Concerning the Rights and Duties of Neutral Powers in Naval War," which emerged from the same Conference. Convention (XIII) codified the long standing principle that hostile operations, including mining, could not be conducted in the internal waters or territorial seas of a neutral state.[106]

### 1. Hague Convention (VIII) Articles and Shortcomings

Articles 1, 2, 3, and 5, represent the key provisions of the 13 Articles which comprise Hague Convention (VIII). Article 1 attempted to restrict the lethality of drifting mines. It required naval mines to be so constructed as to become harmless within one hour should they break loose from their mooring cable and become drifting mines. This article represents the only provision of the Convention that actually placed any real restrictions on the use of mines during wartime.

Article 2 forbids the laying of mines off the coasts and ports of an enemy with the sole object of intercepting commercial shipping. Whether by design or neglect, this Article is so nebulous that insurmountable difficulties in its interpretation and application have

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[105] One reason for the reluctance of major maritime powers to submit to international regulations governing the use of sea mines centers on the threat of non-maritime states dictating what the regulations should be-resulting in a convention unfavorable to maritime states and thus one which these very states would refuse to ratify. Levie, p. 63.

[106] Horace B. Robertson, Jr., "The 'New' Law of the Sea and the Law of Armed Conflict at Sea," *The Newport Papers*, June 1994, p. 14.

resulted in many abuses and recriminations between belligerents since its inception. For instance, during World Wars I and II, both the United Kingdom and Germany laid extensive mine barriers specifically to interdict commercial shipping, and later accused each other of violating Article 2. Furthermore, The United State's aerial mining campaign (Operation Starvation) against the Japanese home waters during the latter stages of World War II clearly violated the spirit of Article 2 in that it specifically targeted commercial shipping in order to starve both Japan's industry and population.[107] Finally, the international acceptance of what the US originally claimed was not-and later conceded was-a mine blockade of Haiphong harbor during the Vietnam conflict has set a legal precedent for blockades established by mines alone, not withstanding Article 2.[108]

Article 3 requires that mine field danger areas be identified to all maritime shipping interests "as soon as military exigencies permit." Again, the wording of the Article is fundamentally flawed. The phrase "military exigencies permit" cannot be quantitatively measured or qualitatively defined and therefore is enforceable only under the most grievous violations of the article's requirements.[109]

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[107] Major John S. Chilstrom, USAF, *Mines Away! The Significance of US Army Air Forces Minelaying in World War II,* October 1993, p. 22.

[108] See Levie, p.157 and NWP-27-4 para. 1.2.5.2.4, *Use of Mines in Blockade-A Legally Acceptable Procedure.*

[109] For example, during World War II, Germany interpreted "military exigencies" relating to its minefields to last until the end of the war.

Finally, Paragraph 1 of Article 5 requires belligerents to "undertake to their utmost" the removal of mines which they have laid in international waters.[110] Once again, the nonspecific wording of the article does not make the requirement absolute, and its provisions have rarely been adhered to or even enforced, as evidenced by Iraq's inability to clear its own minefields following the Gulf War, or Germany's failure to clear its mines following World War II.

Clearly, the 1907 Hague Convention (VIII) suffers from serious inadequacies in terms of applicability and enforceability. Furthermore, two central issues - geographic limitations on mining in international waters, and the prohibition on mining in international straits - were omitted entirely. With respect to the latter, a Dutch proposal restricting the use of mines in international straits faced strong opposition from Turkey, which was concerned with its right to control passage through the Dardanelles, and ambivalence on the part of Russia, Germany, Spain and the United States. As a result, Conference attendees voted to omit all mention of straits in the Draft Regulations and issued the following statement that was adopted into the provisions of the Convention:

> [A]t the same time the committee has decided unanimously to suppress all provisions relating to straits, which should be left out of the discussion in the present Conference. It was clearly understood that under the stipulations of the Convention to be concluded nothing whatever has been changed as regards the actual status of straits. [111]

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[110] Paragraph two of this article requires each belligerent to remove mines in its territorial waters even if they are laid by enemy forces. According to the Committee report, this wording was necessary to prevent new conflicts which might ensue if former adversaries were required to clear the coasts of the other. Levie, p. 51.

[111] Levie, p. 44.

What the Convention fails to provide, however, is some definite indication of what the "actual status of the straits" was deemed to be in 1907. Failing this, the provision quoted above offered little, if any, guidance relative to the use of mines in international straits. Although there have been attempts to preserve peacetime freedom of navigation through international straits,[112] and current NATO policy restricts the use of mines to impede the transit passage of neutral shipping through straits, Professor Levie's comprehensive study on the legal implications of mine warfare at sea concludes that passage of international straits "has been barred by mines in past conflicts and undoubtedly will be again in the future."[113]

Finally, and perhaps more excusably, the drafters of the Hague Convention failed to anticipate future improvements in mine technology that now render many tenets open to challenge. At the time of the Hague Conference only two types of mines had been developed: controlled mines that were fired electrically, and contact mines that required physical contact with the target to detonate. The subsequent development of highly advanced influence mines has created potential problems regarding strict compliance with the wording of Hague Convention (VIII). This is particularly evident concerning the

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[112] The 1949 Corfu Channel Case provided the basis for current maritime law of the sea regarding peacetime mining of international straits. This case centered on a dispute between the United Kingdom and Albania over the mining of two British destroyers, allegedly by Albanian mines, in the North Corfu Channel. Ultimately, the International Court of Justice sided against Albania. However in its ruling, the Court stipulated that Albania's sole obligation (which it had failed to adhere to) was the issuance of proper notification "... for the benefit of shipping in general, [of] the existence of a minefield in Albanian territorial waters." Consequently, the mining of international straits in peace, not to mention war, is not in and of itself, expressly prohibited. See David L. Scott, "Piracy, Terrorism, and Crime at Sea," *Maritime Security and Conflict Resolution Colloquium,* Halifax, Canada, June 1993, pp. 42-44, and Levie, pp. 138-141.

[113] Levie, p.178.

emplacement of unsupervised self propelled homing mines, which some legal scholars contend violate the provisions set forth in Article 1 of the Convention.[114] Moreover, according to Professor Levie, no legal writings have adequately answered the question raised by the fact that many of today's modern mines are no longer moored and even fewer are under the positive control of the mining forces. Therefore, "a strict application of Article 1 of the Convention would require that [modern ground mines] disarm themselves one hour after control over them ends."[115] Obviously, these types of mines have been employed with impunity by virtually all belligerents in the armed conflicts that have followed the 1907 Hague Conference, further signifying the growing obsolescence of the original Convention if nothing more than in strictly legal terms.

**2. New International Mine Warfare Convention Overdue**

More than four decades ago James M. Spaight, a British expert on the law of war, stated that the 1907 Hague Convention No. VIII " . . . was never a very satisfactory convention and is now badly in need of overhaul."[116] Yet since the drafting and adoption of this Convention in 1907, little if any action has been taken to update or improve upon the original document. Today, Hague Convention (VIII) still serves as the basis on which the United States and various Western states formulate their policies regarding the employment of mines during periods of armed conflict. Moreover, Hague Convention No. (VIII) remains

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[114] Thomas W. Mallison, "A Survey of the International Law of Naval Blockade," *US Naval Institute Proceedings* 102, February 1976, p. 46.

[115] Levie, p. 106.

[116] Levie, p. 53.

to this day the only internationally accepted regime codifying rules specifically addressing the emplacement of conventional naval sea mines.[117]

Although several members of NATO, including the United States, have never ratified the 1907 Hague Convention (VIII), NATO continues to abide by its restrictions and principles.[118] Unfortunately, the same cannot be assumed for NATO's potential adversaries. Of particular concern is the growing use of novel approaches or suspect interpretations of international law to circumvent the original intent of Hague Convention (VIII) and the apparent willingness of the international community to tolerate these transgressions. Professor Levie's study concludes that "despite the obvious need for regulation, the existing provisions regulating mine warfare at sea, which were inadequate over eighty years ago, have become increasingly so."[119] A new convention regulating today's advanced mine technology is long overdue.

## E. THE 1982 LAW OF THE SEA CONVENTION

The recent ratification of the Third UN Convention on the Law of the Sea (UNCLOS III) has had a direct impact on international restrictions regarding the peacetime employment of mines at sea.[120] Moreover, although essentially concerned with peacetime use

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[117] The US Navy's NWP 9, para. 9.2 states that "the general principles of law embodied in the 1907 Convention continue to serve as a guide to lawful employment of naval mines."

[118] France, Great Britain, and Germany all made reservations to provisions contained within the treaty. (Levie, p. 63) However the official position of NATO countries is that the 1907 Hague Convention No. VIII does apply to current generation mines. Levie, p. 57.

[119] Ibid. p. 53.

[120] On 16 November 1993, Guyana became the sixtieth state to ratify or accede to the convention. In accordance with Article 308, the 1982 Convention came into force one year later

of the sea, UNCLOS III also contains provisions that have an impact on wartime operations, particularly as it applies to mine warfare.

The feature of the UNCLOS III that has had the greatest impact on the maritime practice of states is the establishment of the new expanded jurisdictional zones. These include an expansion of the three-mile territorial sea to twelve nautical miles, the establishment of a 24 nautical mile contiguous zone, and finally, the creation of a 200 nautical mile exclusive economic zone (EEZ). These revisions to the 1958 Law of the Sea Convention have greatly expanded territorial sovereignty rights over the continental shelf and archipelagic waters while reducing the areas in which high seas freedoms may be exercised.[121]

Naval mines are arguably the weapon system most seriously affected by the expanded jurisdictional zones outlined in UNCLOS III. Since mines are usually planted in shallow water, they are most likely to impinge on the territorial waters subject to the jurisdiction of the coastal state. As discussed previously, the Hague Convention No. VIII contains no geographical limitations on where mines may be employed other than the vague term "off the coast and ports of the enemy" in Article 2, and this deals primarily with the targeting of commercial shipping. As a result, current international law allows belligerents to place mines in their own waters for self defense, in the waters of the enemy as a means of attack, or within the high seas as a means of sea denial during periods of armed conflict. In fact, the only generally accepted geographical restriction regarding mining in wartime is that

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on 16 November 1994. As of 25 September 1995, the United States has not yet ratified the Treaty but has accepted its substantive provisions other than those relating to deep sea-bed mining.

[121] Robertson, p. 3.

established by Hague XIII: that they may not be placed in the territorial seas or inland waterways of neutrals.[122] During peacetime, nations may place mines within their own territorial waters subject to certain notification requirements, and under certain situations may even emplace them in international waters. Consequently, the expanded EEZ's and territorial seas have created additional ramifications relating to the use of mines in times of peace and war, particularly as it applies to the wartime relationships between belligerents and neutral states, and the peacetime protective mining of territorial seas and overlapping archipelagic waters. Therefore, a closer examination of peacetime mining in the expanded EEZs, archipelagic waters, and territorial seas is warranted.

**1. Exclusive Economic Zones**

The first area of discussion concerns the debate regarding the sovereignty of neutral states over their EEZ's. Several states have indicated that they regard the 1982 UNCLOS III regime as encompassing the right of the coastal state to control military operations of belligerents within the EEZ.[123] Nevertheless, there is no basis for concluding that the sovereignty rights equated to territorial seas as outlined in the LOS Convention extend to the EEZ insofar as the application of the rules of neutrality is concerned. Consequently, there is no prohibition preventing the use of mines on the seabed or in the waters within the EEZ of a neutral state in time of war unless they interfere with the sovereign state's exploitation

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[122] The freedom to navigate the high seas and EEZ's under right of innocent passage outlined in UNCLOS III require that sufficient notice to mariners be issued following mining operations in accordance with Article IV of the Hague (VIII) Convention. Levie, p. 177.

[123] For example Brazil, Uruguay and unofficially, Sweden. Robertson, p. 25.

of resources within the EEZ or continental shelf.[124] By the same measure, many states may view their EEZ's as a first line of defense in times of potential hostilities and therefore open to defensive mining operations under the provisions outlined in Article 51 of the UN Charter. Consequently, possible scenarios can be envisioned whereby neutral EEZs are mined by belligerents during time of war, or an EEZ is mined by the nation exercising sovereignty therein during periods of "imminent threat."

**2. Archipelagic Waters**

The situation relative to archipelagic waters is more complex. According to Horace B. Robertson, these waters are subject to the full sovereignty of the archipelagic state and thus legally equivalent to the territorial sea. Technically, the "same principles that govern mining in territorial seas whether of a belligerent or neutral should govern archipelagic waters, and by the same rationale, principles applicable to international straits should apply to archipelagic sea lanes.[125] This interpretation of international law severely restricts belligerent options regarding mining operations within the immense archipelagic waters claimed by many nations throughout the world. Conversely, the same provisions greatly enhance the territorial waters open to protective mining by the same archipelagic states.

**3. Territorial Seas**

The implications for peacetime mining of the expanded territorial seas present potential hazards for naval forces. UNCLOS III allows protective mining of the territorial seas, and even the temporary restriction of the right of innocent passage given the presence

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[124] Ibid, p. 25.

[125] Robertson, p. 40.

of a credible threat to national security and the issuance of a published notice to mariners. The ramifications of this vague provision present an opportunity for any coastal state, including potentially hostile nations, to legally extend the waters open to protective mining from the previous three miles out to twelve miles and, in some instances, beyond.

For example, State X may view State Y as an imminent threat and emplace "protective minefields" in its territorial waters which also constitute a threat to international shipping. Neighboring states, however, may not view the situation in the same light and demand that State X remove its minefields. In this case, State X is simply exercising its rights guaranteed under UN Article 51 and UNCLOS III. Nevertheless, international consensus may not support State X thereby creating a circumstance requiring international intervention to clear the mine threat. In this example, neither State X nor its neighbors have acted outside international law in the strict sense of the term. Yet the differing interpretation among the respective states over what constitutes a national security threat has resulted in an international dispute affecting numerous other maritime states.

**4. Mine Warfare and UNCLOS III**

The foregoing example only serves to illustrate the potential problems which may arise from well-intentioned international agreements concerning the use of mines, and highlights the type of situation under which NATO's MCM forces may be called upon to act in the near future. Furthermore, naval forces involved in blockade or other forms of maritime interdiction may encounter enemy "protective minefields" as far out as twelve miles from shore and possibly extending into the 24 nautical mile contiguous zone. Although the preamble of the 1982 UNCLOS III envisions the treaty as a vehicle toward the ". . .

strengthening of peace, security, cooperation, and friendly relations among all nations. . . ," many key provisions may indeed serve to facilitate the opposite. With respect to mine warfare, this may certainly be the case.

## F. NATO AND U.S. POLICY CONCERNING THE USE OF MINE WARFARE

Current NATO policy regarding peace and wartime mining generally conforms with provisions set forth in UNCLOS III and Hague Convention (VIII).[126] Current US policy regarding the legal aspects of mine warfare is addressed in Chapter Nine of the *Commanders Handbook on the Law of Naval Operations* (NWP 9). As with NATO mine warfare publications, NWP 9 closely adheres to internationally accepted principles outlined in the 1982 Convention on the Law of the Sea concerning the peacetime employment of mines stating:

> **9.2.2 Peacetime Mining.** Consistent with the safety of its own citizenry, a nation may emplace both armed and controlled mines in its own internal waters at any time with or without notification. A nation may also mine its own archipelagic waters and territorial sea during peacetime when deemed necessary for national security purposes. If armed mines are emplaced in archipelagic waters or the territorial sea, appropriate international notification of the existence and location of such mines is required.
>
> Because the right of innocent passage can be suspended only temporarily, armed mines must be removed or rendered harmless as soon as the security threat that prompted their emplacement has terminated. Emplacement of controlled mines in a nation's own archipelagic waters or territorial sea is not subject to such notification or removal requirements.
>
> Naval mines may not be emplaced in the internal, territorial, or archipelagic waters of another nation in peacetime without that nation's consent. Controlled mines , however, may be emplaced in international waters beyond the territorial sea subject to only the requirement that they do not unreasonably interfere with other lawful uses of the oceans.

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[126] See ATP 6 (B) Volume I, *Mine Warfare Principles*, 1991, p. V-17, para. 0523.

Like Hague Convention (VIII), the language contained in paragraph 9.2.2 of NWP 9 is highly ambiguous in many respects, and leaves open the possibility of differing interpretations among various nations as to what constitutes "national security purposes." Moreover, individual states may have differing criteria for determining when a particular security threat "has terminated."

With respect to mining during armed conflict, NWP 9 states:

> **9.2.3 Mining During Armed Conflict.** Naval mines may be lawfully employed by parties to an armed conflict subject to the following restrictions:
>
> 1. International notification of the location of emplaced armed mines must be made as soon as military exigencies permit.
>
> 2. Mines may not be emplaced by belligerent in neutral waters.
>
> 3. Anchored mines must become harmless as soon as they have broken their moorings.
>
> 4. Unanchored mines not actually affixed or embedded in the bottom must become harmless within one hour after loss of control over them.
>
> 5. The location of minefields must be carefully recorded to ensure accurate notification and to facilitate subsequent removal and/or deactivation.
>
> 6. Naval mines may be employed to channelize neutral shipping, but not in a manner to impede the transit passage of international straits or archipelagic sea lanes.
>
> 7. Naval mines may not be emplaced off the coasts and ports of the enemy with the sole objective of intercepting commercial shipping, but may otherwise be employed in the strategic blockade of enemy ports, coasts and waterways.
>
> 8. Mining of areas of indefinite extent in international waters is prohibited. Reasonably limited barred areas may be established by naval mines, provided neutral shipping retains alternative routes around or through such an area with reasonable assurance of safety.

The provisions contained in this paragraph closely parallel the general principles of law embodied in the 1907 Hague Convention (VIII). Consequently, many of the shortcomings of Hague (VIII) addressed earlier in the chapter apply to current NATO and US policy relating to the employment of naval mines during periods of armed conflict.

## G. MINE WARFARE IMPLICATIONS OF INTERNATIONAL LAW

The expansion of the territorial sea to 12 nautical miles, coupled with the advent of the 200 nautical mile EEZ, has served to sharpen the appetite for ocean territory and to legitimize efforts to establish sovereign control over natural resources in disputed waters. As a result, many coastal states have taken intransigent legal positions concerning ocean boundary demarcations on issues ranging from the exploitation of natural resources to fishery interests. These contentious issues present potential problems relating to the peacetime emplacement of both armed and controlled mines. For instance, the accepted rules for mining outlined in NWP 9 could allow the emplacement of controlled minefields as "robot policemen" in EEZ's extending out to 200 nautical miles to enforce fishing rights, combat criminal elements, or to defend national claims on and access to vital natural resources contained therein. Along similar lines, the rationale used to establish the various zones of control outlined in UNCLOS III could also serve as justification, however distorted, for the planting of armed minefields in disputed territorial waters under the pretext of self proclaimed national security concerns.[127] Finally, the international acceptance

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[127] Possible examples include Libya's claim to the Gulf of Sidra, Chile and Peru with their claims to an extensive "mar presencial" in the Southeast Pacific, and the competing claims of China, Vietnam, the Philippines, Malaysia, Taiwan, and Brunei to the Spratly archipelago in the South China Sea.

of the US mine blockade of Haiphong Harbor has established a legal precedent for maritime blockades comprised solely of minefields.[128] Thus, the international community may have difficulty challenging a future Chinese mine blockade of Taiwan's territorial waters in the event of bilateral conflict between the two nations.

With rare exceptions, the historical track record of compliance among nations with the aforementioned international conventions and treaties relative to sea mines has been poor. The intermingling of various regimes governing the use of the seas in peace as well as war has created a legal nightmare that challenges even noted scholars of international maritime law, and has created identifiable "gray areas" which can be used by rogue states as justification for potentially destabilizing mining activity. Finally, substate actors such as terrorist organizations and insurgent groups have rarely adhered to customary or conventional international law. There is little evidence to suggest that they will honor international laws concerning the uses of sea mines if and when they employ these weapons in support of their political, economic, or ideological aims.

## H. SUMMARY

This chapter has summarized existing international laws which govern the use of sea mines in times of peace and during periods of armed conflict, and analyzed current deficiencies contained therein. Although customary laws of the sea have been codified in such universally accepted conventions as Hague No. VIII and UNCLOS III, many potential

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[128] For a full discussion on the legal implications arising from the US mining of Haiphong Harbor in 1972, see Levie pp. 144-162.

loopholes and differing interpretations remain with respect to the lawful uses of sea mines, particularly during time of war.

The relative inability of the international community to formulate restrictive regimes specifically aimed at limiting the use of sea mines may suggest an underlying reluctance to restrict the political as well as military uses of the "weapon that waits." This lack of international consensus has resulted in continued reliance on the outdated and ambiguous Hague (VIII) Convention as the model for existing wartime ROE relative to mine warfare. Consequently, as was the case during the Gulf War, NATO's maritime navies will undoubtedly face future adversaries who fail to adhere to even the limited provisions set forth in Hague (VIII). Finally, the recent ratification of the UNCLOS III opens new and potentially destabilizing avenues for the peacetime employment of sea mines in the expanded and often contentious territorial and archipelagic waters within several strategic maritime regions of the world. The inevitable collision between the rights of the sovereign state and the international right of innocent passage in contested waters such as the South China Sea, may soon require an international MCM effort involving NATO assets to ensure the continued freedom of the seas.

# V. MINE WARFARE PROLIFERATION: AN EMERGING GLOBAL THREAT

## A. INTRODUCTION

The dynamics of the Cold War balance of power served to curb the proliferation of state-of-the-art mine technology and hardware from the advanced military powers to their respective Third World client states. As a result, mostly antiquated or "second tier" mines were routinely sold or transferred outside the "two-bloc" alliance system. Nonetheless, recent history has shown that even when deployed haphazardly, these older mines can still produce devastating effects against modern warships and merchant vessels. Fortunately, successful coalition MCM operations following the Gulf War demonstrated that with adequate intelligence, time, and capable MCM assets, these mines remain susceptible to current mine hunting and sweeping systems and techniques.

This is not necessarily the case with current generation high-tech mines like the Swedish GL-100 *Rockan* and the Intelligent Self-burying Mine (ISBHM). These state-of-the-art mines and others like them possess the latest in counter-countermeasure technology that makes them virtually impervious to present MCM techniques. The emergence of such advanced mines on the international arms market following the end of the Cold War has significantly altered the dimensions of the global mine threat and directly impacts international maritime security. Moreover, mine weapon systems which may be arrayed against NATO's naval forces in the next century will, in all likelihood, be developed and manufactured within the defense establishments of fellow Alliance members. Iraq's use of foreign produced mines against coalition forces during the Gulf War and the subsequent

damage suffered by the *USS Princeton* as the direct result of an Italian-made *Manta* detonation only serve to highlight this trend.

This chapter provides an overview of the current proliferation of highly sophisticated mine warfare hardware and technology to the developing Third World, and examines the implications of this new threat. The availability of "smart" mines, incorporating the latest sensor and stealth technologies, to emerging Third World states - many of which are mired in potential regional disputes - adds an additional element of instability to many strategic littoral regions. Moreover, the concurrent proliferation of advanced diesel-electric submarines to these same states further compounds the potential impact of mine warfare in the littoral areas of the world. Finally, the growing availability of these weapons on the gray and black markets to stateless actors such as terrorist groups, criminal organizations, and insurgent movements, creates a potentially new dimension to an old problem among vulnerable maritime nations.

## B. PROLIFERATION AND MINE WARFARE

### 1. Overview

The end of the Cold War has led most governments within the NATO Alliance and former Warsaw Pact to undertake substantial cuts in defense spending. In this era of shrinking defense budgets and increasingly competitive defense markets, transnational arms sales and transfers are regarded by many governments and defense firms as essential to preserving national defense industrial and technological bases.[129] Consequently, indigenous armaments

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[129] Richard A. Bitzinger, "The Globalization of the Arms Industry," *International Security*, Vol. 19, No. 2 (Fall 94), p. 189.

industries within these countries have sought to expand into lucrative foreign markets in the Third World. As a result, proliferation in the post-Cold War environment has become largely a function of dynamic interactions between corporate and governmental actors participating in highly competitive technology markets.[130] An added dimension in the evolution of arms proliferation involves the growing trend among many nations and regional trading blocs toward collaborative development of military hardware and technology. This globalization of arms production and increased proliferation of conventional weaponry following the end of the Cold War has been called the "quiet revolution" in the arms industry.[131]

**2. The International Arms Market**

Since 1989, the advanced military powers in both the West and East, no longer saddled with Cold War security concerns or ideological conflict, have sought to expand into the highly competitive foreign arms market, creating a glut of military hardware available to security conscience nations of the developing Third World. As a result, exporting nations have become more willing to offer front line equipment, including current generation sea mines, at affordable prices.

In the West, relations among European and North American military allies are no longer governed by the mutual threat posed by the Soviet Union. Instead, economic competition has come to dominate bilateral and multilateral relations among the advanced

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[130] LT Daniel M. Green, USN, *Monitoring Technology: An Open Source Methodology for Generating Proliferation Intelligence*, US Naval Postgraduate School thesis, December 1993, p. viii.

[131] Richard Bitzinger, "The Globalization of the Arms Industry," p. 189.

Western nations. Consequently, the old Cold War consensus of countering technology and arms proliferation through the implementation of export controls has given way to the economic realities of the "new world order."[132] These capitalist market forces have in effect opened a "pandoras' box" of previously controlled export markets for American and European military technologies and hardware transfers.

In the East, the countries of the former Soviet Bloc, facing mounting domestic economic unrest, rising international debt, and foreign capital shortfalls, have relied on sales of advanced weapons inventories to obtain crucial hard currency reserves required for economic revitalization programs. In effect, these countries have become reliant on military arms sales and transfers as a key "cash crop."

The trend toward foreign arms sales and transfers, primarily from Western and Russian sources, has been particularly evident among the more advanced nations of the developing world, most notably the newly industrialized countries (NICs) of Southeast Asia and the wealthy oil states of the Middle East. Furthermore, states hoping to establish or expand regional hegemony, such as Iran, India and China, have actively pursued modernization programs for their respective navies and, in some cases, have developed indigenous armaments industries for both domestic defense purposes and export. Most notable among these nations is China which has become an active exporter of military hardware and technology to such nations as North Korea, Iran, and Rump Yugoslavia.

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[132] The demise in 1994 of the Coordinating Committee for Multilateral Export Controls (COCOM), which during the Cold War attempted to restrict Western high-tech exports to the communist bloc and other threatening countries is the most visible example of faltering resolve among Western nations in this domain.

Finally, other emerging states such as Israel and Brazil, have themselves become arms exporters, thus injecting a new variable into efforts to control or account for the spread of conventional weaponry.[133]

## C. THE GLOBAL MINE THREAT

This section discusses the growing global mine threat and the problems encountered in estimating the size and scope of the current proliferation of mine warfare hardware and technology to the various geographic regions of the world. While these sales and transfers still primarily involve older vintage mines, they also include some of the most sophisticated mines incorporating state-of-the-art microprocessors, sensor packages, non-metallic construction materials, and counter-countermeasure technologies.[134]

There are three primary areas of concern with respect to advanced mine warfare technology proliferation. The first is the introduction onto the world market of modular Target Detection Devices (TDD) upgrade kits. The second is the inability of international organizations and intelligence services to accurately track the extent of current mine warfare-related sales and transfers on the world market. The third area is an off-shoot of the second and involves the growing potential for black or gray market transfers of advanced mines to stateless terrorist cells, criminal organizations, or nationalist insurgent groups. Since little mention is made of mine warfare-related transfers in present arms control literature, a further analysis of these three areas will hopefully shed light on this aspect of conventional weapons proliferation.

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[133] Ibid, p. 186.

[134] Kelso, "Building Blocks of Naval Power," p.39.

### 1. TDD Proliferation

Many smaller nations are finding that the introduction of TDD modular upgrade kits which can be retrofitted into older mines offers an inexpensive method of modernizing existing mine inventories. These kits replace a mine's firing circuits with modern microprocessors, thereby turning relatively antiquated mines into multi-sensor "smart" weapons.[135] The growing popularity and sophistication of these kits pose severe problems and may present major implications for future MCM operations for several reasons. First, TDD upgraded mines may invalidate known intelligence on foreign mine orders of battle, actuation parameters, and sweep techniques, thereby rendering present countermeasure systems and strategies unreliable at best and obsolete at worst. Second, external identification of the mine, often required in mine hunting, is no longer a valid indicator of the mines true capability.[136] This in turn places MCM vessels at greater risk when conducting mine hunting operations. For instance, a mine countermeasure vessel (MCMV) prosecuting what appears to be a simple moored contact mine may in fact be dealing with a more dangerous upgraded influence mine requiring a much larger safe stand-off distance. Third, TDD sensors have dual-use applications making it difficult to gauge whether their acquisition is intended for purely civilian or military purposes. Finally, TDD upgrade kits may negate the potential intelligence gleaned from ongoing Western efforts to obtain parent mines

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[135] Jason Glashow, "U.S. Confronts Non-traditional Mine Threats," *Defense News*, November 14-20, 1994, p. 6.

[136] Green, p. 76.

from exporting countries.[137] For example, should the Belgians or Dutch exploit a mine acquired on the open arms market, there is little evidence to suggest that MCM tactics developed to counter that particular mine would necessarily be effective, for instance, against a similar Iraqi mine upgraded with an TDD kit.

The availability of TDD upgrade kits on the international market offers cash-strapped Third World nations a variety of options in upgrading their ability to deny sea control to NATO's maritime forces. Moreover, TDD kits further complicate the already arduous task of clearing mine fields and may expose MCMV's to additional risks.

**2. Accountability**

The legal and illegal transfer of advanced mine warfare systems and technology has become a large, if hidden part of the international arms trade. For instance, like many other smaller weapons systems, mines may initially be sold legitimately from one nation to another and subsequently be passed on to a third state.[138] Furthermore, the accurate reporting and tracking of mine warfare related sales or transfers is difficult to quantify. Unlike larger military systems such as naval combatants, artillery, and fighter aircraft, mine transfers between nations or even multinational corporations (MNCs) are easily concealed from international monitors for several reasons. First, mines do not pose the same magnitude of

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[137] The U.S. Navy's *Mine Warfare Plan* states " One positive aspect [of mine warfare proliferation] is the potential access our Navy may have to these weapons." *Mine Warfare Plan*, p. 44.

[138] For example, South African ground mines sold initially to Iraq, have now been passed on to Libya. Furthermore, Soviet mines sold to North Korea were later transferred to Iran where they were widely used during the Iraq-Iran War. Wettern, "Coping With the Hidden Threat," *Sea Power*, March 1991, p. 36.

risk as other weapons, most notably weapons of mass destruction (WMD). These higher priority threats justifiably consume the bulk of scrutiny among the various international non-governmental organizations (INGOs) and regimes concerned with weapons proliferation issues.[139] Secondly, these proliferation regimes require the cooperation of the signatories to ensure proper accountability. Unfortunately, many countries simply do not adhere to voluntary disclosures of foreign arms sales or transfers. Hence, the global arms activities of countries such as Israel or China-considered to be at the forefront of the covert arms trade-are often not captured in reviews of data.[140] Third, the mine inventories of some nations, most notably Russia, are so immense and the size of most of the weapons so small that the "misappropriation" of even a relatively large number of weapons may not be noticed under most circumstances. Finally, since mines are not included in most nations' arms inventories, mine transfers between various states or to third party organizations such as terrorist groups or criminal elements are easily hidden.[141]

### 3. Mine Proliferation and Stateless Actors

The alarming growth of gray and black arms markets over the past decade has created an avenue for the proliferation of advanced mines to various stateless actors including terrorist groups, organized crime syndicates, and nationalist insurgent movements. Noted proliferation expert, Aaron Karp, states that "[T]he significance of the black market is

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[139] Of the 31 international organizations and regimes concerned with proliferation, two thirds deal exclusively with weapons of mass destruction. Green, p.16.

[140] Richard Bitzinger, "Arms to go: Chinese Arms Sales to the Third World," *International Security,* Vol. 17, No. 2 (Fall 1992) p. 105.

[141] Desmond Wettern, "Coping With the Hidden Threat," *Sea Power,* March 1991, p. 37.

greatest for international renegades, be they terrorist cells, ethnic insurgents, or states fenced off by UN embargoes. . .[ The black market's] greatest power is felt in the small scale arming of [these] sub-state actors and the efforts of pariah states to obtain weapons."[142] State-sponsored gray markets are much larger than black markets and potentially more destablizing in that larger volumes of armaments can be transferred. Furthermore, gray market transfers allow specific nations to cultivate relationships and influence with sub-state actors while minimizing embarrassment or danger.[143] These covert, clandestine transfers either with (gray) or without (black) the knowledge or involvement by supplier state governments are an attractive source of advanced weapons, including mines.

The mine is well suited for black market transactions for a variety of reasons. Mines do not suffer from many of the obstacles or drawbacks that befall black market transfers involving larger armaments. For example, mines are relatively inexpensive and thus remain affordable even at black market prices, which may run from three to ten times the equivalent open market value.[144] Furthermore, as previously discussed, the relatively small size of most mines enables them to be easily smuggled in and out of foreign port facilities, particularly

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[142] Aaron Karp, "The Rise of Gray and Black Markets," *The Arms Trade: Problems and Prospects in the Post-Cold War World,* 1994, p. 178.

[143] The covert transfer of arms from the United States and Pakistan to the Afghan resistance movement against Russia is a prime example. Ibid, p.178

[144] Most black market arms transactions require cash payment up front. With the exception of some state-sponsored organizations or perhaps drug cartels, most sub-state actors do not have access to the large amounts of cash required for the purchase of advanced weaponry. Mines, however, can be purchased for as little as $500, well within the price range of virtually any interested buyer. L.D. Simmons, "Assessment of Near Term Naval Mine Capabilities," *IDA Paper P-2964*, November 1994, p.4.

ports with reputations as permissive trans-shipment centers. Recent measures designed to curtail the growing international black market arms trade through such ports including the introduction of End User Certificates (EUC's) have been marginally successful. Still, many holes remain in the net, as evidenced by North Korea's recent black market acquisition of eighty-seven American-made helicopters.[145]

With some notable exceptions, mines have yet to play a major role in terrorist or insurgent activities.[146] Nevertheless, the potential uses of sea mines as an instrument of terror or extortion is seemingly limitless. The growing availability of mines on both the open and, undoubtedly, black markets may facilitate their use against highly vulnerable maritime shipping and inshore installations in future criminal, terrorist, or insurgent campaigns. The implications and ramifications of this potential threat are discussed further in Chapter VI.

Based on the foregoing discussion of the current mine-related proliferation concerns, the size and scope of global mine warfare proliferation is difficult if not impossible to ascertain. Nevertheless, the US Navy's *Mine Warfare Plan* states that "[C]urrently, 48 world navies are estimated to have some degree of mine warfare capability, 27 countries have a mine manufacturing capability and 20 are known exporters of naval mines."[147] Moreover,

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[145] Karp, p.187.

[146] Between 1961 and 1986 there were forty two mine-related terrorist acts committed against maritime targets. The best known is the state-sponsored mining of the Suez Canal and Red Sea by a suspected Libyan freighter in August, 1984. Brian A.H. Parritt, *Violence at Sea*, 1986, pp. 235-256.

[147] 1994 *Mine Warfare Plan*, p. 21.

45 navies count some type of submarine in their inventories.[148] Most if not all these submarines have the capability to covertly lay mines or conduct mine related operations. The question that must be asked is: what are the potential ramifications for the world's maritime nations in view of the known and estimated proliferation of advanced mine warfare hardware and technology to virtually every region of the world. The remainder of the chapter explores the current mine warfare capabilities of the world's major exporters and analyzes the possible implications of the globalization of mine warfare-related production and proliferation.

## D. THE MARKET

This section presents a brief overview of the export trends among the principal traders in the global mine warfare arms field and provides a general description of the known available inventory of sophisticated mines which may be currently on the export market.

### 1. Land Mines Versus Sea Mines

The United States government has joined the growing international movement to forge an international agreement to restrict the production, export and use of anti-personnel land mines.[149] While the measure faces criticism from various quarters, including poorer countries, the growing list of nations urging the enactment of a regime for the control of land mine proliferation bodes well for the eventual imposition of an international moratorium on land mine export. Such is not the case with respect to sea mines. While land mines are widely viewed as inhumane and deadly to civilian populations, the sea mine is considered by

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[148] David A. Schnell, *Stormy Waters: Technology, Sea Control, and Regional Warfare*, Naval Postgraduate School thesis, 1994, p. 69.

[149] Theresa Hitchens, "U.S. Land Mine Plan Faces Two-sided Criticism," *Defense News*, November 14-20, 1994, p.12.

most states to be a useful tool for achieving operational or even strategic national maritime objectives. Consequently, the export potential of and demand for sea mines is both secure and growth oriented, particularly given the growing numbers of potential regional confrontations in and around littoral seas.

**2. Mine Producers**

Currently, Western Europe and Russia are the technological leaders in the design, development, and production of advanced sea mines.[150] Not surprisingly, these countries also represent the nucleus of the current exporters of mine warfare hardware and technology.[151] Asian nations, such as China and North Korea, also produce less sophisticated indigenous mines for export. Furthermore, the rapidly developing capitalist nations of the Asian-Pacific region could emerge as major producers and exporters of advanced mines early in the next century. The following discussion analyzes the key exporting nations of mine-related hardware on the global market and the ramifications of the growing globalization of mine production and technology transfer. Finally, based on the growing evidence that proliferation is primarily a function of corporate and not government activity, the major companies involved in the development of current generation mine warfare technology are also profiled.

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[150] The United States does not maintain superiority in mine technology and is only now, after more than a decade of fiscal neglect, commencing an upgrade of its mine inventories. Furthermore, the United States is not an active exporter of current generation mines. See David Foxwell, "Naval Mine Warfare: Unfunded and Underappreciated," *International Defense Review*, Vol. 2,1993, p.128 and Green, p. 70.

[151] The 1994 *Mine Warfare Plan* offers a comprehensive listing of the major mine producing countries.

### *a. Russia*

The collapse of the Soviet Union and the end of the Cold War have had a devastating effect on the former state-owned defense industries in Russia and the CIS. In grappling with Russia's economic crisis, the government has reduced spending for defense procurement dramatically. According to Russia's Finance Ministry, only 20 percent of the annual defense budget for 1996 has been allocated funding while the "prospects for adequate funding of production programs this year are bleak."[152] To offset the dramatic decline in domestic arms procurement, Russia has pursued an aggressive marketing strategy in the foreign arms export arena.[153] Russian government officials reportedly claim that arms exports are a means for Russia to regain its "independence from the humiliation of Western aid."[154] Furthermore, Eduard Makisimov, former deputy director of *Oboronexport*, one of the predecessors of Russia's current arms exporter, *Rosvooruzhenie*, recently stated *"[*A]rms trade is not only an effective source of revenue, it also is a means to conduct foreign policy."[155] Russia's recent willingness to use arms exports in pursuit of both these stated policy objectives was recently demonstrated in its decision to proceed with the sale of three Kilo-class diesel-electric submarines to Iran over the objections of Western and Gulf State nations.

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[152] "Russian Industry Feels the Cold," *Janes Defence Weekly*, 7 May 1994, p. 30.

[153] Dr. Ian Anthony, "Arms Transfers," *SIPRI*, January 1995, p. 2.

[154] Peter Adams, "Arms Firms Struggle to Survive," *Defense News*, 3-9 October 1994, p. 15.

[155] Ibid, p. 15.

Russia's mine warfare capability continues to rank among the most advanced in the world and boasts an inventory which may include as many as half a million mines by some western estimates.[156] Furthermore, during the Cold War, the Soviet Union was among the world leaders in the sale and export of mines to numerous Third World nations and revolutionary groups. The fall of the communist Soviet state has not curbed the flow of former Soviet and Russian mines on the global arms market. To the contrary, Russia has recently advertised the availability of its most advanced mine inventory, including anti-submarine mines never before offered on the export market.[157]

In Russia, the development and refinement of mine warfare weapon systems continue to be the responsibility of the Central Research Institute *Gidropribor,* which has been at the forefront of an aggressive international marketing campaign for Russian mine warfare-related hardware. *Rosvooruzhenie*, the new unified Russian arms export agency, is the main conduit for the foreign sales and export of Russian military hardware, including mine warfare technology. According to a recent advertisement placed by *Rosvooruzhenie* in *Military Parade Magazine*, Russia is actively marketing a large assortment of its vast mine inventory, ranging from the World War I vintage M08 moored contact mine, which severely damaged the USS *Samuel B. Roberts,* to highly sophisticated self-propelled SMDM bottom mines, and PMK-1 and MSHM anti-submarine rising mines.[158] These three advanced mines

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[156] Desmond Wettern, "Coping with the Hidden Threat," p. 37.

[157] See Foxwell, p. 129 and Wettern, p. 40.

[158] See *Military Parade Magazine*, May/June 1994 and the *U.S. Navy Mine Warfare Plan*, p. 44.

incorporate the latest acoustic influence technology in terms of both sensor packaging and counter-countermeasure characteristics. Furthermore, all three of these mines can be laid covertly by submarines, with the PMK-1 and MSHM capable of targeting either submarines or surface vessels in water depths exceeding 300 meters.[159]

The competitive nature of the international arms market, combined with the abundance of available Russian mines, has resulted in bargain basement prices for interested buyers. Recent transactions involving Russian mines have involved such nations as Iraq, Iran, India, and North Korea.[160] Furthermore, the proliferation of Soviet and Russian designed mines has spawned indigenous "copy-cat" mines from less advanced states which are subtly different in key aspects from the original model. These indigenously produced clones have been marketed by the former Yugoslavia, and were used by Iraq during the Gulf War. Moreover, North Korea is believed to have supplied domestic versions of mines obtained from the Soviet Union to a number of regimes, including Iran.[161]

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[159] The SMDM series mine is a self propelled bottom influence mine launched from a submarine torpedo tube at a stand-off distance of up to 25 nm. It is well suited for mining defended areas such as ports and harbors or confined areas such as narrow channels. The PMK-1 is a combination mine/launcher containing an rocket powered torpedo. The mine contains a double passive-active acoustic sensor which detects a target then fires its torpedo at the appropriate interception trajectory when the target approaches the optimum range. The MSHM "Sea Shelf Mine" is a more advanced version rising vertical mine (RVM) which incorporates a homing device into the torpedo to ensure terminal accuracy. See Alexander Zakhartchenko, "Russian Naval Mine Developments," *Naval Forces,* Vol 14, No. 1, 1993, p. 51.

[160] Sheila Galatowitsch, "Undersea Mines Grow Smarter and Deadlier," *Defense Electronics*, March 1991, p. 57.

[161] Foxwell, p.129.

### *b. Western Europe*

Western European defense firms currently boast the world's premier mine warfare technology in terms of research, development and production. These firms, specializing in undersea warfare in general and mine warfare in particular, have applied cutting edge technology to the latest generation of "smart mines." Many of these mines have been marketed almost exclusively abroad. Among the latest technology incorporated into European mines are intelligent hunter mines with a "home-on -ping" capability that targets the sonar frequencies of mine hunting sonars on MCM vessels.[162] Furthermore, European manufacturers have developed mines that incorporate stealth technology and still others that are capable of self-burial. These revolutionary advances in mine technology have created a new generation of mines that are virtually impervious to conventional mine hunting or sweeping techniques. Finally, many of these newer mines are the product of collaborative development efforts among various European nations. The security considerations surrounding this growing trend among Western European governments and their interlinked defense firms must be considered.[163]

The emergence of an increasingly transnational European defense technology and industrial base presents certain security concerns regarding illegal transfers of military technology and raises the possibility of increased diffusion of advanced mine technology to

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[162] "Mines Aimed at MCMV's," *Janes Defense Weekly*, 26 May 1990, p. 95.

[163] The phenomenon of emerging transnational defense industries is both "underexplored and unappreciated." Internationalized armaments development and manufacture, coupled with formalized and integrative interfirm linkages," blur the concept of 'indigenous' weapons systems." Bitzinger, "The Globalization of the Arms Industry," p.189.

the developing nations of the Third World. According to noted defense analyst Richard B. Bitzinger, the growth of international arms collaboration, involving the permanent shareout of resources, skills, and technology has become so highly pilferable that it is more destabilizing than outright arms sales. He further states that technology transfers and licensed production agreements have enabled some Third World countries to build up their indigenous defense industries to the point where they become exporters of arms to other developing nations.[164] Consequently, agreements between the various European governments and defense industries that are intended to limit or control the export of advanced European mines to the developing world could make little difference if technology transfers permit these countries to produce by themselves their own sophisticated mine inventories. In the final analysis, Europe must weigh the economic benefits derived from continued collaborative development, production, and marketing of advanced mine technology against the increased vulnerability to industrial espionage and possible compromise of its technological superiority in this domain.

The following country studies briefly analyze the leading European producers and exporters of current generation mines and their respective capabilities. While this study is hardly exhaustive, it does provide a basis for better understanding the magnitude and capability of Western Europe's present mine technology which if it has not already, may soon become available on the global export market.

(1) United Kingdom. The United Kingdom has long been at the forefront of mine research and development. Recently, the UK has actively pursued the export of its

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[164] Ibid, p.190.

*Stonefish* and *Sea Urchin* family of modular bottom mines with a variety of multi-sensor arrays and programmable electronic packages. These mines, developed by GEC-Marconi Naval Systems and British Aerospace respectively, can be adapted to target specific ships, and are known to have been exported to Pakistan, Finland, and Australia, among others.[165] Another mine that has been developed in the UK and other European countries is the revolutionary Intelligent Self-burying Hunter Mine (ISBHM). Its three key features include: self-burial to a predetermined depth in the sea bottom, programmable microprocessor sensor logic, and a target-homing torpedo warhead. This mine represents the height of current mine technology and is virtually undetectable by any current minehunting sonar.[166]

(2) Germany. One of the German Navy's primary Cold War responsibilities involved the rapid mining of the Baltic approaches to bottle up the Soviet Baltic Fleet's access into the Atlantic. Consequently, Germany has developed an impressive array of sophisticated influence mines which may now be available for export. Krup Atlas Elektroik (KAE) is the prime contractor for the development of German mine warfare technology. Among the various German mines, the SMG2 is specifically designed for blocking shipping lanes and for defensive coastal barrier defenses.[167] These mines would provide a formidable capability if offered on the foreign market.

(3) Denmark. Denmark has been the leader in the development and production of RVM type mines that target MCMV's. The Danish firm NEA Lindberg has

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[165] "Underwater Weapons," *Navy International*, January/February 1994, p.14.

[166] Ibid, p.14.

[167] Ibid, p13.

developed a mine which counters MCMVs by firing an encapsulated torpedo that homes in on the distinct high frequency sonar emissions of mine hunting sonars.[168] Furthermore, Denmark has entered into collaborative development projects with Germany on a number of other mine programs.

(4) Italy. Italy has rapidly emerged as a leading producer and exporter of sophisticated mines. The principal Italian export firm is Whitehead (formerly Misar of Brescia), which has exported its products to various countries and has developed, in collaboration with the Italian Navy, an export version of the MP-80 bottom mine, called the MRP.[169] This weapon employs a triple influence activation device that using microprocessors; it is highly resistant to countermeasures. Perhaps the most well known Italian export mine is the *Manta* anti-invasion bottom influence mine that heavily damaged the USS *Princeton*. The truncated geometric design of this dual sensor mine makes it difficult to detect with most minehunting sonars. The demonstrated effectiveness of this mine during the Gulf War has made it one of the most sought after mines among third world countries.[170]

(5) France and Spain. As a world leader in foreign arms sales, France has not neglected the growing mine warfare export market. France's leader in mine warfare technology, Thomson Sintra ASM, has had its MCC-23C bottom influence mine widely

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[168] "Mine Aimed at MCMV's," *Janes Defense Weekly*, June 24 1992, p. 15.

[169] M. Cosentino, "Mine Warfare- General Analysis and Prospects for Development," *Rivista Marittima (Italy)*, Mar 1992, pp. 43-65.

[170] Ibid, p. 53.

exported. This mine has also been manufactured under license in Spain as the MAE-10.[171] Additionally, Spain's SAES has entered the mine market, and the country recently completed initial delivery of the MO-90, a new multi-influence moored mine that incorporates the latest in mine technology, including GRP construction and microprocessor based controlled software functions.[172]

(6) Sweden and Norway. Sweden and Norway have long exploited the defensive concept of underwater warfare to its fullest extent and lead the world in the development of mine warfare technology.[173] Sweden's Bofors Underwater Systems is arguably the world's premier producer of advanced mine technology. The GMI 100 *Rockan* and the *Bunny* anti-invasion ground influence mines are among latest generation of Swedish mines that may be offered for export. Both mines incorporate revolutionary geometric design and sophisticated logic and sensor units. Furthermore, the *Bunny* was developed to complement the new generation of diesel-electric submarines and is carried in a "girdle" attached to the outer hull. This design feature will most certainly place this mine in high demand among Third World navies that operate these types of diesel-electric submarines.

The Royal Norwegian Navy has recently placed a contract with several of Norway's defense firms for the development of a next generation rising mine as part of its New Independent Mine Programme that is designed to upgrade Norway's existing inventory

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[171] Foxwell, p.129

[172] Ibid, p.126.

[173] Tony Watts, "Beware the Enemy Below," *Janes Defence Weekly*, 7 May, 1994, p. 28.

of coast-defense mines.[174]

*c. Asia*

The enormous economic growth of the Asian- Pacific Rim, in conjunction with the end of the Cold War, has dramatically altered the geo-strategic composition of the region. The rapid emergence of Asia's economic "Tigers" has resulted in the availability of excess capital which has benefited the modernization of regional naval capabilities. Moreover, the emergence of an apparent naval arms race among some Asian countries coincides with the rising hegemonic aspirations of several Pacific nations, most notably, China. Consequently, the proliferation of mine warfare-related hardware is a major concern among Asia's vulnerable maritime nations.[175] Within the region, the primary exporters of mines are China and North Korea.

(1) China. While most of the world' s major powers have reduced their defense budgets, China is increasing its military allocations. Since 1989, China has increased defense related spending by at least 10 percent annually; this growth rate is expected to continue at the same pace over the next several years.[176] In an effort to raise supplemental funds to support its military build up, China has become a major arms dealer on the international market. As a result, the country has emerged as a leading proliferator of both

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[174] "New Mines," *Naval Forces*, 3/95, p. 55.

[175] Anthony Preston, "Mine Countermeasures for Asian and Pacific Navies," *Asian Defence Journal*, 5/93, p. 49.

[176] Andrea L. Siew, " China/Japan: Cooperation or Competition," *Maritime Forces in Global Security*, June 24, 1994, p. 4.

advanced and older version mine technologies and hardware to various Third World regimes. Of particular concern is China's marketing of its indigenously produced EM-52 rocket-propelled rising vertical mine, which can be deployed against both submarines and surface ships. Iran is reported to have purchased an unknown number of these mines, possibly to bolster its ability to block shipping through the Straits of Hormuz. [177]

In the Pacific region, China has been North Korea's primary supplier of mine warfare related technology and hardware. Based on the historical relationship between the two countries, it must be assumed that China has also provided EM 52s and other sophisticated mines.

(2) North Korea. Little is known about North Korean mine production or its level of sophistication, though it is generally considered to be substantially below that of the advanced military powers. It is unlikely however that a nation that places such faith in mine warfare has neglected means to produce a formidable indigenous production capability. Moreover, it is generally acknowledged that North Korea has and probably continues to export indigenous equivalents to older Soviet and Chinese style mines.[178]

**3. Assumptions**

The foregoing overview of the formidable capability of the world's leading mine warfare exporters is hardly exhaustive or complete. The main purpose is to demonstrate the size of the potential market in mine warfare related technology currently available among

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[177] Philip Finnegan, "Iran Pursues Chinese Mine to Bolster Gulf Clout," *Defense News,* January 17-23, 1994, p.1.

[178] Iranian mines confiscated during the seizure of the *Iran-Ajr* in 1987 were of North Korean origin. C. Grusti, "Sweeping the Gulf," *Naval Forces*, No. III 1989, p. 87.

Russian, Western European and, to a lesser extent, Asian defense firms. The actual quantities and specific types of mines currently available for export from among these countries is not fully known. Nonetheless, one must assume that some, if not all, of these advanced mines have found their way- whether by legal or illicit means- into the inventories of various developing and Third World nations. Furthermore, the transfer of mine technology is highly fungible and difficult to control, particularly as it applies to collaborative multinational ventures. Therefore, one must also assume that even the most highly classified technology will eventually be "bootlegged" by rapidly developing Third World states and incorporated into indigenous defense industries.

## E. THE SUBMARINE MENACE

The marriage of "smart" mines such as the MSHM and SMDM with Third World submarine delivery platforms represents a significant escalation in the potential uses of mine warfare against regional adversaries or Western naval forces. From a Third World perspective, the ability to conduct future mining campaigns - particularly offensively oriented ones - will ultimately hinge on possessing a capability to deliver the weapons accurately, covertly, and in some instances, anonymously. The submarine, more than any other mine delivery platform, maintains the initiative and freedom of action necessary to meet these requirements. Recent advances in diesel submarine technology development, such as the air-independent propulsion systems (AIPs), enable some of today's diesel-electric submarines (SSKs) to remain submerged for several weeks at a time.[179] Other modern

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[179] David Miller, "Worlds First Production AIP Submarine," *International Defense Review*, February 1995, p. 1.

innovations have significantly reduced tell-tale acoustic signatures often used by ASW forces to track submarines. These advances have greatly enhanced the SSK's operational capabilities, especially in the littoral environment where shallow waters and sharp thermolayers aggravate the inherent difficulties of ASW operations. Moreover, the SSK's relatively small size makes it well suited for mining operations in the world's coastal regions and maritime chokepoints. The increasing sophistication and lethality of modern diesel-electric submarines, combined with their relative cost-effectiveness, have made them the apparent platform of choice among developing nations heading into the twenty-first century. This section evaluates the potential mine warfare related implications of these platforms and the grave threat they represent to continued international maritime freedom of navigation.

Today, approximately 425 diesel-electric submarines are in service with 45 navies.[180] Furthermore, in contrast with reductions in surface warship inventories, the number of navies operating submarines continues to increase, as does the number of nations capable of constructing them for export. Regionally, diesel-electric submarines are present in large numbers. In the Mediterranean, 40 modernized or newly built diesel-electric submarines are operated by 11 countries including Israel, Turkey, Greece, Yugoslavia, and Libya.[181] In the Arabian Sea and Indian Ocean, Iran, India, Pakistan and Indonesia all possess modern diesel-electric submarine assets. In the Asia/Pacific region, 130 diesel-electric

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[180] David Miller, "The Silent Menace," *International Defense Review,* 8/1993, p. 613.

[181] Joris Janssen Lok, "Submarine Forces: Silent but Deadly Threat," *Janes Defence Weekly*, 12 September 1992, p. 46.

submarines are operated by China, Japan, North Korea, South Korea, and Taiwan.[182] The navies of South America operate arguably the most uniformly modern diesel-electric submarine fleets in the world. [183] Brazil builds its own Type 209 class boats, while Peru, Argentina, and Chile all have very capable diesel-electrics of their own. For example, the Argentine Type 209, *San Luis*, stifled British ASW efforts during the Falklands War in 1982.

For the purpose of precision and covert minelaying, the diesel-electric submarine is the preferred delivery platform. Its stealth and stand-off capabilities allow the diesel-electric submarine to plant minefields in constricted or well-defended locations, such as ports and harbors, or in the shallow waters associated with littoral environments. Furthermore, the submarine's ability to operate clandestinely hinders pro-active, offensively oriented MCM operations designed to prevent the laying of minefields in the first place. This covert capability has become particularly relevant given NATO's apparent shift toward a more offensive-minded MCM philosophy following the Gulf War.[184]

The historical weakness of submarines as minelayers has been their relatively small payload and the requirement to substitute torpedoes for mines, usually on a one for two basis. These disadvantages have been overcome to some extent with the development of "strap-on" external "girdles" or minebelts which allow larger numbers of mines to be carried in addition

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[182] Ibid, p.46.

[183] Schnell, p. 85.

[184] Kelso, "Building Blocks of Naval Power," p. 41.

to, rather than in place of torpedoes. Currently Sweden, Germany, Russia, and Australia have developed this capability for their own submarine fleets as well as export models.[185]

As with mines, Europe and Russia lead the world in both the design and development of diesel-electric submarines, as well as their export to the Third World. Most of the attention of late surrounding the proliferation of diesel-electric submarines has centered on the sale of three Russian Kilo-class submarines to Iran. Yet a total of 37 Kilos are operated in seven navies including India, Algeria, and Syria among others.[186] Moreover, other navies, e.g., Libya, North Korea, and China, continue to operate older Russian submarines such as the Foxtrot, Romeo and Whiskey-classes. China alone boasts a fleet of over 84 submarines.[187] Many of these submarines could be transferred to lesser developed states of the Third World in the coming years as emerging NIC states seek to modernize their own fleets.[188]

European exporters of diesel-electric submarines include France, the United Kingdom, The Netherlands, Germany, and possibly Sweden. Of these countries, Germany is clearly the leading producer of diesel-electric submarines for the export market. The German Type 209 is the most widely operated modern SSK among foreign nations, with 50 boats in service

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[185] Miller, "The Silent Menace," p.613.

[186] John Jordan, "The Kilo Class Submarine," *Jane's Intelligence Review,* September 1992, p. 428.

[187] Miller, "The Silent Menace," p. 614.

[188] For example, China has transferred former-Soviet Romeo class submarines to Egypt and North Korea.

in 13 navies.[189] France has exported four Daphne-class to Pakistan and is planning to transfer or sell its remaining *Daphne* and more modern *Agosta*-class SSK's between 2000-2005. Britain is currently marketing four *Upholder*- class SSK's and the Netherlands has been approached by Taiwan on the availability of two of their *Sea Dragon*-class boats.[190] The sophistication, flexibility, and affordability of diesel-electric submarines, combined with the willingness of producing nations to export them, means that the proliferation of these boats will almost certainly continue. The high demand for these platforms among the worlds emerging regional naval powers, coupled with the proliferation of sophisticated mines, represents a significant potential to jeopardize regional stability, particularly in the Arabian Gulf. For instance, Iran's concurrent acquisition of three Kilo diesel-electric submarines and advanced Chinese EM-52 rocket propelled mines is a cornerstone toward building its ability to block shipping through the Strait of Hormuz. Vice Admiral Katz, the former commander of US Naval forces Central Command, recently stated, "[T]he biggest threat to the [Persian] Gulf is mines. They are the fastest way to clog up the Strait of Hormuz, which would have a major impact on the world [oil] supplies."[191] The emergence of an Iranian diesel-electric submarine threat in the Arabian Gulf and with it an offensive mining capability, have altered the naval balance of power vis-a-vis its Arab neighbors and fueled long felt suspicions concerning Iran's hegemonic geo-political aims within this volatile region.

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[189] Miller, p. 613.

[190] Ibid, pp. 614-617.

[191] "Interview With Admiral Katz," *Defense News*, November 16, 1993, p. 63.

The foregoing discussion highlights the fact that submarines, particularly when armed with mines, are overtly offensive in nature. Few, if any, nations require submarines to covertly plant protective minefields. Conversely, the inherent mine-laying capability of advanced diesel-electric submarines is optimized to covertly or anonymously cut off the passage of naval combatants or merchant shipping through the world's maritime chokepoints and vital commerce ports. Therefore, prudence dictates that the growing availability of both advanced mines and modern subsurface delivery platforms among rival regional naval powers and Third World states can only signal an intent to project or deny sea control and freedom of innocent passage in both territorial and non-territorial bodies of water. Chapter VI addresses the implications of this new threat with regard to NATO's naval forces.

## F. IMPLICATIONS OF GLOBAL MINE WARFARE PROLIFERATION

### 1. Maritime Geopolitics

The political and economic collapse of the Soviet Union, leaving in its wake a vast surplus of sophisticated weaponry and arms production capabilities in both East and West, has created a strategic vacuum in many of the world's unstable yet strategic littoral subregions. The resulting Balkanization in much of the world has aggravated a number of endemic maritime problems. As a result, growing regional threats permeate throughout Eastern Europe, the Middle East, and Asia. For example, there are at least 50 outstanding maritime-related sovereignty claims currently in dispute worldwide.[192] The growing problem associated with the demarcation of expanded and often overlapping EEZ boundaries between adjacent states-especially when precious economic resources are involved- is but one

[192] Charles Koburger Jr., *Narrow Seas, Small Navies, and Fat Merchantmen*, 1992, p. 96.

source of future potential conflict. These growing regional tensions in combination with recent foreign mining successes, have encouraged the improvement of Third World mining and mine countermeasure capabilities. Following the Gulf War experience, these countries have come to appreciate the inherent capability to exercise littoral sea control or denial associated with the acquisition of even rudimentary mine warfare capabilities.

**2. Mine Warfare and the Littoral**

The shallow seas of the littoral is mine country. In these waters, a lesser navy's ability to employ defensive minefields and inflict unacceptable losses or damage quotients on even the most powerful navies can create indecision within civilian and military leadership, limit the range of military options, and quite possibly forestall military intervention altogether. Offensively, larger developing navies can effectively blockade or otherwise neutralize the naval potential of adversaries simply by mining vital ports, harbors, straits, and inland waterways. Consequently, mines have been among the most sought after weapons in the ongoing global arms proliferation.[193]

This growing mine threat poses a serious long term challenge to the free flow of commerce and freedom of navigation through some of the key strategic SLOC's of the world for commercial and naval vessels alike. Heightening the potential importance of the ongoing mine proliferation to global maritime affairs is Third World geography. No fewer than 25 of the world's principal straits are located in waters which are either exclusively or

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[193] *Mine Warfare Plan*, second ed., p.43.

partly controlled by Third World countries.[194] Moreover, other regional powers consider themselves threatened by these developments and have taken measures to protect their access to the vital arteries of international commerce.

### 3. Third World MCM: A Non-Player

The resurgence in the procurement of MCM platforms and technology among the world's navies can be attributed largely to the growing global mine threat following the dramatic increases in the availability of advanced mine warfare technology and hardware to the Third World and most probably terrorist and criminal organizations.[195] Unfortunately, the procurement of MCM vessels and equipment among the navies of the developing world has not matched the quantity or quality of its mine acquisitions. Even those states that have acquired MCM vessels have generally neglected to amass the level of capacity commensurate with the potential task at hand. As a rule, three to four MCMV's are required to keep open a port.[196] With this yardstick in mind, and according to a recent survey conducted by the editors of *Navy International*, few, if any, Third World countries, including emerging regional naval powers, possess an adequate MCM force when measured against the growing international proliferation of mines and mine delivery assets.[197] An inspection of the Third

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[194] Some of the more important include the Straits of Hormuz, Gibraltar, and Malacca. Daniel Todd, "Mine Warfare in the Third World: Increasing Threats and Capabilities," *Navy International*, May/June 1994, p. 108.

[195] See "The Commander's Respond," US *Naval Institute Proceedings*, March 1994, pp. 34-43 and Anthony Preston, "Minehunters and Minehunting," *Asian Defence Journal*, 9/93, pp. 84-88.

[196] Todd, p. 110.

[197] "Mine Countermeasures Forces," *Naval Forces*, July/ August 1994, pp. 279-284.

World's naval order of battle contained in the most recent edition of *Janes Fighting Ship's* further supports these findings.[198] Additionally, even those Third World countries possessing some form of MCM capability are lacking properly trained and experienced personnel to operate the high-tech MCM platforms and equipment.[199] Only the navies of Western Europe, Japan, and latterly the United States possess effective MCM forces both in terms of assets and expertise to effectively counter the growing menace presented by the global proliferation of sophisticated mines. Consequently, the task of countering future mine threats - whether under the aegis of a UN peace keeping mandate, as members of an ad-hoc regional coalition, or even unilaterally - will likely fall in varying degrees upon US, NATO or WEU MCM forces.

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[198] For example, the Philippines and Indonesia, the worlds largest archipelagos are woefully deficient in both MCM assets and experience. Indonesia possesses only two modern MCMV's to protect all its internal shipping routes and ports not to mention 54,716 miles of coastline. The situation relative to the Philippines is even worse. Persistent economic problems have thwarted the procurement of even minimal MCM assets. As a result, the country has no MCM capability save for several converted World War II vintage patrol boats. The most arresting aspect of the Philippines non-existent MCM capability is that, dependent as it is on maritime shipping, the whole country could easily be disrupted by a modest mine-laying effort. The woeful MCM capabilities of the Arabian Gulf states can be summed up by the events during the Tanker War and the Gulf War. In both instances, European and U.S. MCM assets were required to clear the mine threat. Little if anything has changed to alter this requirement should a future mine threat arise in the area.

[199] The mere presence of MCM platforms in a particular countries order of battle does not constitute a functional MCM capability. Numerous third world states have recently purchased or are in the process of procuring advanced MCM vessels and related equipment from various European shipbuilders. Nevertheless, the art of mine countermeasures requires years of training in contemporary MCM techniques before neophyte MCM forces can develop a nucleus of proficient personnel to prosecute modern mine threats. See Vincent C. Thomas interview with Admiral John D. Pearson, Commander Mine Warfare Command, entitled "Equipment Capabilities, and the Human Element," *Sea Power*, March 1992, pp. 8-15.

## G. SUMMARY

This chapter has provided an overview of the current global threat associated with the proliferation of advanced mine warfare technology, and has addressed some implications for the global security environment. Certainly the sale and transfer of mine warfare hardware and technology is not a new phenomenon. What is alarming, however, is the apparent willingness of militarily advanced Western and Eastern states to market previously unavailable state-of-the-art mines on the current international market. These modern weapons, many of which are virtually impossible to detect or sweep, have the potential to severely affect regional if not global maritime access to vital SLOC's and commerce ports. Furthermore, the ease by which mine warfare technology and hardware can be transferred, coupled with relatively few monitoring agencies, makes the task of accounting for mine sales and transfers between states and organizations next to impossible. Western intelligence agencies, preoccupied with higher priority concerns such as nuclear proliferation, simply do not have the resources to rigorously monitor ongoing mine proliferation activity. Consequently, the mine orders of battle and delivery capabilities of most Third World states and NIC's remain purely speculative. Compounding the problem is the concurrent proliferation of modern SSK diesel-electric submarines. These silent platforms offer the ultimate means of covertly delivering mines capable of sinking the largest ships, and even other submarines, in constricted geographic environments.

What must be assumed is that many of the advanced Russian and European mine technology discussed in this chapter have found their way into the inventories of Third World states and most certainly, those developing states with aspirations of regional dominance.

Furthermore, the abysmal MCM capabilities of most Third World's navies to counter even rudimentary mine threats further highlights the potential problems associated with the advent of sophisticated mine proliferation. Bearing this in mind, it is but a matter of time before NATO's MCM forces will again be called upon to counter a more lethal variety of mines threatening maritime freedom of navigation.

# VI. THE ROLE OF MCM IN NATO's POST-COLD WAR NAVIES

## A. INTRODUCTION

The demise of the Soviet Union and the collapse of the Warsaw Pact Treaty Organization have resulted in a fundamental shift in NATO's defense perspectives away from the conventional and nuclear defense of Europe toward out-of-area crisis management and peace-keeping/peace-enforcing missions. Two Gulf wars and current international instability have awakened many Europeans to the risk of resource and trade interruptions originating outside NATO's traditional Euro-centric boundary area. As a result, several NATO members have followed the lead of the US Navy's strategic vision codified in *Forward... From the Sea,* and reoriented the focus of their respective naval services toward expeditionary operations and the development of a robust power projection capability.[200] This new security orientation will likely mean an even greater role for NATO's naval forces in out-of-area contingency operations in littoral waters. In such conditions, the mine will always pose a potential threat, not only to Alliance and coalition partners but also to the effectiveness of maritime deterrence in today's unstable international setting.

This chapter analyzes the present and future roles of MCM within NATO and the requirement for continued emphasis in this warfare area. The primary focus is on the role of MCM within NATO's evolving maritime strategy, its current prospects under the Alliance's new Strategic Concept, and finally, its future in the evolution of the Western European Union (WEU) and the development of a genuine European Security and Defense Identity (ESDI).

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[200] See French, British, German *1994 White Papers* and the US Navy-Marine Corps White Paper, *Forward...From the Sea.*

Three central conclusions are drawn. First, that the diversified role of MCM naval forces remains a critical element of NATO and Europe's present and future security posture. Second, that Europe's integrated MCM establishment is well suited to serve as a successful model of the collaborative European defense structure envisioned under ESDI. Finally, the US Navy must promote continued American cooperation and integration with European MCM partners to help ensure the success of future combined MCM operations either under the auspices of NATO, or as the core element of a larger UN-mandated multinational coalition.

## B. NATO's RELEVANCE IN THE POST-COLD WAR

The demise of the Soviet Union and the lack of a credible near-term threat to the region have resulted in a reevaluation of NATO's core missions in post -Cold War Europe. Except for revanchist Russian neo-imperialism, Western Europe has little to fear as direct threats to its security. Under these conditions, NATO is evolving from a defensive alliance designed to protect the territories of member states from attack, to an alliance for the projection of force - a different mission with a vastly different set of political and military risks and obligations.[201] Effectively, NATO has converted from an institution designed primarily to achieve clear and limited security objectives in a relatively stable Cold War environment into a nebulous crisis-management organization in a highly unstable post-Cold War setting.

In the political arena, NATO's continued viability in the post-Cold War is presently under intense scrutiny on both sides of the Atlantic for differing reasons. The growing

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[201] Ted G. Carpenter, *Beyond NATO: Staying Out of Europe's Wars*, 1994, p. 4.

movement within Europe toward the development of a European defence identity, and with it the establishment of an independent out-of-area crisis response force under the cognizance of the WEU, or later perhaps, the European Union (EU), presents a challenge to NATO's long-held position as the preeminent security institution within Europe.[202] The issue of multinational out-of-area missions - including naval operations - involving NATO and non-NATO member nations has been a particular sticking point among European states since the 1987 Gulf War. Today, many European nations require a legal UN mandate or at the very least, WEU involvement, before committing military forces to out-of-area operations.[203]

The current debate within Europe over the appropriate security mechanism for future out-of-area operations has created a rift between Atlanticist and Europeanist members of the EU. Not surprisingly, France favors the extreme Europeanist viewpoint. The reactivation of the WEU in 1984 and the subsequent drive for an independent European defense force have been largely French initiatives, and have remained a vehicle for France to challenge US dominance of European security within NATO.[204] Further, France favors maximum distinction between NATO and the WEU, and supports the development of a European naval force under the WEU/EC flag.[205] The positions of Spain, Belgium and to a lesser extent,

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[202] According to a recent poll released January 26, 1995 by the European Commission, 81 percent of the European Union's 370 million people say that Europe should work toward a common defense policy. Brooks Tigner, "Europe Edges Toward Unity," *Defense News*, April 12-19, 1995, p. 28.

[203] Gary Geipel, *Multinational Naval Cooperation Options With North Atlantic Countries*, CNA 92-193/December 1992, p. 8.

[204] Geipel, p. 12.

[205] Ibid, p.13.

Germany, resemble that of France. On the other extreme is the United Kingdom which prefers the WEU as strictly subordinate to NATO and resists any EU overtures that might weaken American commitment to Europe's security. The Netherlands, Portugal, and Italy, appear closer to the British view as do non-WEU members Norway, Denmark, and Iceland.

Within the United States, there are serious uncertainties among the public concerning continued American involvement in NATO, particularly in increasingly unpopular out-of-area operations such as Bosnia. Moreover, declining European defense budgets and readiness levels have led many members of the US Congress to openly question the relevance of further American funding for Europe's defense. Growing congressional displeasure with perceived European "free-riding" was recently highlighted with proposed legislation calling for significantly increased European contributions to the cost of maintaining US forces in Europe.[206] Even NATO's strongest supporters have voiced clear interest in a new, regionally-oriented charter for NATO in today's evolving international environment. For example, Senator Richard Lugar (R-Ind.) has flatly stated that the Alliance "must go out of area" or "it will go out of business."[207] Former President Richard Nixon echoed these sentiments stating, "While the European defense must remain NATO's core mission, so-called 'out-of-area' security cooperation must become its cutting edge."[208]

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[206] For instance the Frank Amendment. John Roper, "Relations Between the Different European Security Organizations," *Transatlantic Relations and International Security Conference*, September 22-23, 1994, pp. 8-9.

[207] Carpenter, p. 5.

[208] Ibid, p. 111.

Faced with mounting challenges to its continued relevancy, NATO has addressed its future roles and missions during recent summits. Major steps toward reorienting NATO's core missions were undertaken at its Council meetings in Oslo and Brussels in June and December 1992, respectively, when all 16 member countries accepted a de facto Alliance mandate to support peacekeeping activities on behalf of the Conference on Security and Cooperation in Europe (CSCE) and the UN.[209] NATO's mandate for out-of-area missions and affirmation of ESDI was further clarified at the Brussels's Summit of January 1994. The endorsement of the Combined Joint Task Force (CJTF) concept following the Summit "which will provide separable but not separate military capabilities that could be employed by NATO or WEU," has provided an apparently suitable solution to the WEU/NATO primacy issue concerning out-of-area operations, at least for the moment.

The CJTF concept involves the development of multinational, deployable elements from among NATO's existing command chain, but adapted where necessary to incorporate elements from other nations who are not currently within NATO's integrated force structure.[210] In short, the CJTF concept allows states such as France and Spain - countries outside NATO's integrated command structure- as well as non-NATO countries (e.g., Eastern Europe), to actively participate in specific NATO operations without acquiescing to NATO security commitments in other areas. Moreover, if NATO elects not to take action in a given situation, the CJTF may respond under the auspices of the WEU. In such a scenario,

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[209] Mathias Jopp, "The Strategic Implications of European Integration," *Adelphi Paper 290,* July 1994, p. 29.

[210] "The Brussels Summit-a Military Perspective," *NATO Review*, February 1994, p. 16.

some of NATO's command and control assets would be made available to the WEU force commander. Not surprisingly, many questions surrounding the implementation of the CJTF concept remain to be answered. For instance, the US and French governments are currently split over how much autonomy the WEU should have over the use of NATO assets for future European-led military operations.[211] Nevertheless, as long as the WEU's security policy remains compatible with that of the NATO Alliance, this arrangement should not pose serious problems, particularly as it applies to future multinational mine countermeasure operations.

## C. THE EVOLVING EXPEDITIONARY ROLE OF EUROPE'S NAVIES

Irrespective of its composition or political nomenclature, NATO's future appears to lie within the sphere of multinational military cooperation in out-of-area operations either under the aegis of UN-mandated peace-keeping/policing functions, or regionally, in a strictly Alliance or CJTF orchestrated operation. In the maritime realm, NATO's naval forces are poised to assume a primary role within the CJTF concept for two main reasons. First, the international nature of naval operations confers greater freedom of military and political maneuver in comparison to land and air forces. Second, the historically close interaction between European navies and their North American partners has resulted in a larger degree of interoperability than is found in other services.

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[211] Theresa Hitchens, "US, France Argue WEU Use of Assets," *Defense News*, September 19-25, 1994, p.1.

Not surprisingly, seven of the nine commanders of NATO/WEU navies recently listed out-of-area crisis management as a primary mission of their post-Cold War navies.[212] The pervading view of naval commanders representing the larger European navies was summarized by Admiral Sir Benjamin Bathurst of the British Royal Navy who stated:

> [N]ew patterns of international tension imply a requirement to project power, often at short notice and over great distances. . . . [M]ilitary forces which are deployed in response to a crisis may be called upon in turn to exercise deterrence, coercion, and-finally - intervention. . . . Maritime forces, therefore are highly relevant to the new strategic environment. . . . [T]heir broad range of capabilities mean that, throughout a crisis, they can be employed as distant and precise instruments of a government's diplomatic will.

NATO's ongoing involvement in the former Yugoslavia is a prominent example of the types of multinational operations that underlie the current uses of its naval forces. NATO has achieved many firsts during its maritime arms embargo against rump Yugoslavia (Sharp Guard). It has engaged in actual combat operations, operated out-of-area, participated in joint UN/NATO planning and operations, and taken part in joint WEU/NATO operations. Moreover, during these operations, France has operated under NATO's integrated command structure.[213]

Although the global security environment is increasingly complex, defense resources have been subject to severe reductions in most Western European countries. Given the more

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[212] The answers given were in response to the question, "What makes your navy relevant today?" The CNOs queried represented France, the United Kingdom, The Netherlands, Italy, Canada, Denmark, Belgium, Norway, and Portugal. Of these, only Denmark and Norway failed to list out-of-area operations as a primary mission. See "The Commander's Respond," *US Naval Institute Proceedings*, March 1995, pp. 28-40.

[213] "Moving From Theory to Action: NATO in the 1990s,"*Institute for Strategic Studies* No. 12, November 1994, p. 5.

enduring nature of maritime security and the many peacetime missions for which navies are useful, European navies appear to be faring better than other services in the defense funding arena.[214] Recent naval appropriations and ship construction programs among many NATO and WEU navies reflect an identifiable shift in Western Europe's maritime philosophy and structure toward expeditionary naval warfare. For example, Europe's major maritime nations - France, Italy, Germany, the Netherlands, Spain, and the United Kingdom - are all continuing to modernize - and in some cases expand - their naval power projection capabilities, even at a time when there is considerable austerity elsewhere in their defense budgets.

France's defense white paper emphasizes strengthening the Navy's supply, transport and logistics capability while enhancing the projection capabilities of naval air power.[215] Accordingly, the French Navy has recently announced the formation of the *Force d' Action Navale,* which will comprise an aircraft carrier battle force and serve as the nation's rapid reaction force. Additionally, the French Navy will buy two new amphibious troop ships and is awaiting funding decisions for a second nuclear-powered aircraft carrier.[216] Perhaps the most telling example of France's shifting strategic orientation is in its increased funding for conventional programs at the expense of nuclear programs. France's 1995 funding for

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[214] Among non-US NATO states, naval force reductions between 1994 and 1998 are expected to be 10 percent. Comparatively, air and ground force reductions are expected to be 20 and 30 percent respectively over the same period. Institute for National Strategic Studies, *Strategic Assessment 1995: US Security Challenges in Transition,* 1995, p. 36.

[215] Ministry of Defence (France), *Livre Blanc sur la Defense*, 1994, p. 78.

[216] Brooks Tigner, "Germany, France, UK, Plan Broad Modernization Programs," *Defense News*, September 19-25, 1994, p. 14.

nuclear programs dropped from 23 percent in 1994 to 21 percent while conventional programs increased form 39 percent in 1995 to 44 percent.[217]

The United Kingdom is similarly investing in a more robust expeditionary capability with the formation of its own rapid-deployment force centered around its two *Invincible*-class carriers and the new amphibious helicopter carrier (LPH) HMS *Ocean* scheduled for commissioning in 1997. Further, the Ministry of Defence has funded replacements for the aging LPH assault ships HMS *Fearless* and HMS *Intrepid,* and is currently backing construction of new fleet replenishment ships and advanced assault hovercraft as part of its amphibious modernization program.[218]

Similar procurement programs for new amphibious transport and replenishment ships are underway in at least five other NATO countries: Spain, Italy, Germany, Turkey, and the Netherlands.[219] Yet, obscured by the more glamorous expeditionary naval programs among various European states, has been a concerted modernization and development program in MCM as well. The remaining sections of this chapter will analyze the current status of Europe's maritime MCM forces and discuss evolving missions of NATO's MCM forces against today's diverse and advanced mine threat.

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[217] Giovanni de Briganti, "French Defy Trend in Falling Defense Budgets," *Defense News*, May 23-29, 1994, p. 14.

[218] Ministry of Defence (UK), *Statement of Defence Estimates*, April 1994, p. 55. Also see "Survey of World Naval Construction 1993-1994," *Navy International*, May/June 1994, pp. 153-155.

[219] Brooks Tigner, "Allied Nations Commit to Increase Sealift Capacity," *Defense News*, September 19-25, 1994, pp. 14-15.

## D. THE CURRENT STATE OF WESTERN EUROPEAN MCM

The elimination of the Soviet threat to Western Europe has resulted in force level drawdowns and severe budget cuts in many Western European navies. Britain projects a 15 percent reduction in naval strength by 1995, while France is undertaking a more modest 4.5 percent reduction.[220] The decision of the Belgian and Dutch governments to reduce their military forces by almost one half by the end of the year , and the announcement in July 1993, that the German government will cut back its defense structure even further, all serve to illustrate the downward trend in defense spending and force structure downsizing among European nations.[221] On the whole, Europe's MCM forces have fared better in this regard than their colleagues in other warfare areas. With the exception of Belgium, which plans to reduce its fleet of frontline *Tripartite* minehunters by 30 percent, NATO's overall MCM capabilities have actually improved significantly as older vessels are being replaced by a smaller number of more capable ones.[222]

During the past decade, virtually every European maritime nation - Britain, Italy, Denmark, Norway, France, the Netherlands, Spain, and even Germany - have modernized their respective MCM fleets with ships incorporating state-of-the-art glass reinforced plastic (GRP) hulls and advanced mine-hunting sonar technology. Further, European defense firms are working on venture development projects in the new fields of Semi-Autonomous

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[220] Paul Gebhard, "The United States and European Security," *Adelphi Paper* No. 286, February 1994, p. 30.

[221] Jaccquelyn K. Davis, "Restructuring Military Forces in Europe," *Adelphi Paper No. 284*, January 1994, p. 80.

[222] Geipel, p. 66.

Unmanned Vehicles (SAUVs), Buried Mine Detection technology, and Propelled Variable Depth Sonars (PVDS). These revolutionary systems are increasingly seen within NATO as the future of MCM heading into the next century.[223]

### 1. European MCM Capabilities

The following is a brief synopsis of current MCM capabilities among the major European navies.

#### *a. United Kingdom.*

The United Kingdom has recently completed orders for seven additional *Sandown* advanced mine-hunting ships to join the five already in service.[224] With the addition of the 12 new *Sandowns* to the existing fleet of 13 battle-tested *Hunt*-class multi-role MCMVs, the UK will maintain arguably the world's most formidable surface MCM capability. The UK has also been active in research and development of SAUV vehicles and low frequency sonars capable of detecting buried mines.[225]

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[223] SAUVs operate independently of the parent ship and at deeper depths and greater distances than conventional ROVs which are connected via an umbilical cord for power and transmission of data to the ship. Moreover, SAUVs provide the task force commander with a clandestine mine surveillance, reconnaissance, and detection capability without exposing manned platforms to inherent dangers of VSW MCM operations. Finally, the PVDS system allows the MCMV to mine hunt at significantly faster rates (5 knots versus 1-2 knots with conventional hull mounted sonar), and at greater safe stand-off distances. See "Mine Countermeasures -ROVs the Second Revolution," *Naval Forces*, 3/95, pp. 38-39, and *Mine Warfare Plan*, p. 25

[224] H. Steele, Royal Navy: Building a New Force For the Next Century," *Janes Defence Weekly*, 2 September 1995, p. 30.

[225] David Foxwell, "MCM Philosophies and Torpedo Defense Re-defined," *International Defense Review*, 9/1992, p. 879.

### *b. France, Belgium, and The Netherlands.*

The French, Dutch, and Belgian navies are undertaking a $160 million sonar, ROV, and data processing *Capability Upgrade* program which will adopt PVDS for the 32 *Tripartite* mine hunters which were developed jointly between the three countries.[226] The remarkable success of this collaborative program, which incorporates French hull design, Belgian electronics, and Dutch propulsion systems, has become the model for current European joint development programs for other major ships.

### *c. Denmark*

A modern MCM capability is being developed in Denmark based on the STANFLEX 300 multi-role design. The 14 *Flyvefisken*-class GRP patrol boats incorporate modular "plug-in" systems which allow them to be rapidly reconfigured to perform a variety of different missions including MCM. This revolutionary multi-role ship may foreshadow the wave of the future in naval ship design, in view of current funding shortages among European navies.

### *d. Spain*

Spain is rapidly emerging as a major player in mine warfare within NATO. The Spanish navy is committing significant resources to modernizing its MCM forces, having ordered four GRP MCMVs based on the Royal Navy's *Sandown* design.[227] Current plans are

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[226] Henry Van Loon, "Sailing Ahead: Europeans Launch Two Major Ship Programs," *Defense News*, January 16, 1995, p. 8.

[227] Preston, "Minehunters and Minehunting," *Naval Forces*, No. I, 1994, p. 28.

to build eight more, some configured as minesweepers.[228]

*e. Germany*

The German defense ministry is radically revising its mine countermeasures plans and has presented its basic MCM concepts in a document entitled *Mine Countermeasures Systems 2000.* Despite funding problems in other areas, the German navy has recently completed an impressive MCM modernization program including the introduction of ten Type-332 *Frankenthal* mine hunters, the last of which should be delivered this year.[229] These ships, when added to the over 50 MCMVs currently in service, makes Germany's MCM fleet NATO's largest. Moreover, the recent ruling of the Federal Constitutional Court on the deployment of the German armed forces has resulted in a reorientation of Germany's naval focus outside its traditional Baltic region toward a more robust expeditionary capability.[230] The precedent for German out-of-area naval deployment was established during Desert Storm when German MCM vessels participated in multinational mine clearance operations in the Arabian Gulf.

*f. Italy*

Italy is rapidly becoming a world leader in the field of MCM ship construction and associated warfare system technology. A major Italian MCM modernization program is nearly complete with the construction of eight *Gaeta*-class mine hunters to complement

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[228] Friedman, "The Naval Balance 1994," *Naval Forces,* No. II, 1994. p. 13.

[229] Captain Henning Gieseke, GN, "The Mine Warfare Flotilla: A Flotilla With a Great Tradition at a Time of Transition," *Soldat Und Technik*, No. 9, 22 October 1993.

[230] Captain Adriano Sarto, "Launching a European Expeditionary Force," US *Naval Institute Proceedings*, March 1994, p. 66.

its fleet of four *Lerici*-class vessels.[231] Moreover, Italy has emerged as a leader in the design of ROV mine neutralization systems which can operate at a considerable distance from the MCMV.[232]

### 2. MCM Areas of Concern

Collectively, NATO's MCM force structure is more than adequate to meet even the most ambitious enemy mining campaign directed against the security interests of the Alliance. Nevertheless, two areas of concern relative to NATO's long term MCM capability must be addressed: complacency, as evidenced by recent budget-related cancellations of several follow-on MCM programs, and current over-reliance on minehunting system development at the expense of influence sweep capabilities.

#### *a. MCM Funding for Future Systems*

One of the key areas of concern is the growing trend within some European navies of eliminating or scaling back next generation MCM ship programs and reducing funds for research and development in follow-on MCM mission systems. For example, France recently announced the cancellation of its new class of ocean going minehunter, the *Batiment Anti-Mines Oceanique* (BAMO) while the Netherlands, Belgium, and Portugal have also abandoned plans to build a new class of inshore minesweeper (MSI).[233] This trend is particularly disappointing in view of the enormous advances in MCM technology that have occurred during the past decade. For the first time, MCM appears to be in the ascendancy

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[231] Preston, p. 27.

[232] Ibid, p. 38.

[233] Anthony Preston, "Minehunters and Minehunting," *Sea Power, No. 1*, 1994, p. 25.

in the technological contest between the two branches of minewarfare. However the new sophisticated mine hunting sonars, remotely-operated submersible mine hunting vehicles (ROVs), precision GPS navigation systems, and revolutionary MCM ship design that worked wonders in the Arabian Gulf have not come cheaply.[234] Furthermore, the recent advances in MCM have spurred new research and development in mine design technology toward returning the advantage to the miner. Paradoxically, Europe has led the resurgence in this area as well. Stealth-oriented design has been incorporated in the Swedish *Rockan* and the Italian *Manta* influence ground mines that defeat the minehunting sonar, while the ISBHM is impervious to minehunting and can also be actuated by minehunting sonars.[235] The dangers posed by creeping complacency regarding the capabilities of current MCM technologies to effectively counter tomorrow's sophisticated mine threat is a dangerous precedent. At a minimum, for every dollar spent on mine research and production, two should be spent on developing appropriate countermeasure systems. In the never-ending mine warfare game of cat-and-mouse, MCM must not be allowed to continually play the role of the mouse, as so often has been the case in the past.

### *b. Minesweeping Deficiencies*

Another disturbing MCM trend within NATO is its flagging interest in developing more advanced influence sweep systems. Although most of the emphasis on current MCM research and development is focused on minehunting, it should not be inferred

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[234] Ton for ton, MCMVs are more expensive than any other surface combatant. Preston, "Minehunters and Minehunting," p. 24.

[235] RADM I. B. Rodholm RDN (Ret), "Advances in Mine Warfare," *Sea Power,* No. 4, 1990, p. 49.

that influence sweeping no longer has a role to play in MCM. On the contrary, mine warfare advances such as Intelligent Self-burying Hunter Mines and other similar innovations in sea mine technology may soon render most, if not all, minehunting systems obsolete, requiring a shift in the focus of NATO's MCM doctrine away from minehunting and back to minesweeping.[236] This requirement for capable mine sweeping systems certainly applies when one considers the types of rapid "in stride" mine clearance operations required in advance of amphibious operations.[237] In these scenarios, the limited window allotted for preparatory MCM does not allow adequate time for slow, tedious minehunting operations. Consequently, further support is required to develop the advanced sweep systems necessary to counter the new generation of "invisible" mines. Unfortunately, the predilection of some European governments and navies to maintain the status quo in the area of mine sweeping capabilities while concurrently funding the development of new and increasingly more lethal "stealth" mines, often for export, is indeed a dangerous precedent within NATO - which may one day find itself tasked with clearing these very same mines.

## E. MCM IN NATO's NEW STRATEGIC CONCEPT

NATO's new Strategic Concept adopted at the London and Rome Summits outlines three essential missions of the maritime forces: ensure sea control to safeguard Allied sea

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[236] Current NATO MCM doctrine advocates mine hunting as the primary element of mine countermeasures operations. This strategy is summed in the old MCM adage, "hunt where you can, sweep where you must." See ATP 6 Volume II, *Mine Countermeasures Operations Planning and Evaluation*, 1991, p. I-16, para. 0110c.

[237] The term "in stride" as it applies in the context of MCM operations, describes the requirement to adequately clear minefields in advance of amphibious assault forces without slowing their speed of advance toward the objective area. *Mine Warfare Plan*, p. 27.

lanes of communication; support land and amphibious operations; and protect the deployment of the Alliance's sea-based nuclear deterrent.[238] NATO's MCM forces will be called upon to perform several new functions beyond their more traditional roles in support of this shift away from Cold War naval doctrine. Furthermore, NATO's involvement in the former Yugoslavia and the decisions of its Council at meetings in Oslo and Brussels in June and December of 1992 accepting a mandate supporting peacekeeping missions directed by the UN, foreshadow future operations outside of NATO's traditional boundaries. Against this backdrop, NATO's MCM forces can perform five basic missions: ensure North Atlantic waters are free from the threat of sporadic terrorist or insurgent mining activities; defend against Europe's economic vulnerability to mining from latent regional hegemons - including Russia; support Alliance, WEU, and/or UN-mandated peace-keeping/peace-making operations worldwide; support NATO's Immediate Rapid Deployment standing naval forces; and finally, reduce the potential threat posed by mines to NATO's ballistic and attack submarine forces. Common to many of these duties will be the requirement to provide an effective shallow water MCM capability during NATO or ad-hoc coalition operations in the littoral regions of the world.[239] The nature and rationale for these missions bear further examination from an Alliance and national perspective.

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[238] "The Alliance's New Strategic Concept," *NATO Review*, December 1991, p. 31.

[239] According to the *Mine Warfare Plan*, the term shallow water encompasses water depths ranging from 200 feet into the high water mark (HWM).

### 1. North Atlantic Responsibilities

The threat of large-scale offensive mining of Western Europe by Soviet and Warsaw-bloc forces no longer exists, although Russia remains the largest navy in Europe and continues to maintain a sizable mining capability. Nonetheless, the breakup of the Soviet Union has not entirely diminished the threat of mining to Western Europe. To the contrary, the proliferation of advanced European and former Soviet mines to Third World countries and stateless organizations is a major concern for European navies.[240] Mines, even those from Western sources, can be easily bought on the international arms market. They are economical and anonymous, making them an attractive weapon for Third World countries or stateless organizations. Libya's suspected mining of the Red Sea and Gulf of Suez in 1984 is an example of state-sponsored terrorism that cannot be discounted in today's unstable international climate. Moreover, recent history has shown that the mere threat of mining is sufficient to close an important domestic port or waterway, and to require an extensive MCM effort before safe passage can be assured.[241] Finally, the use of mines as a weapon for economic extortion is always a possibility.

The proliferation of mines, coupled with the growing number of potential perpetrators, must be measured against Europe's economic vulnerability to mining and its dependence on seaborne trade in peace as well as war. The specific nature of Europe's economic dependence on maritime commerce has already been addressed in Chapter III. The

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[240] Statements made to the author by various European naval officers during visits to Eguermin in April and December 1993.

[241] For example, the alleged mining of the Sacramento River in 1980 by the "Patriotic Scuba Divers of America."

question that must be answered is from where does the threat emanate? The following discussion attempts to answer this question.

*a. Terrorism*

Maritime terrorism involves attacks on ships or maritime installations by non-governmental groupings for reasons other than financial gain.[242] With today's terrorist organizations constantly seeking new and more vulnerable targets and, given their growing technical proficiency and willingness to use destructive weapons indiscriminately, it may be a matter of time before sea mines join the repertoire of more traditional terrorist weapons. The list of terrorist states and organization with the means and motivation to conduct mining operations is well known. Given the capability of these terrorist groups to obtain sophisticated weaponry, the use of sea mines to block the access to ports and even international straits for a limited time may prove to be a relatively safe and effective means of gaining an international forum and achieving political or ideological objectives.

Seaborne commerce accounts for over 80 percent of trade among nations.[243] Yet, by their nature, maritime zones vital to seaborne commerce, such as ports, harbors and inland waterways, are extremely difficult to protect and thus provide an ideal means of threatening the vital interests of a nation. These dubious attributes make coastal waters and the associated economic infrastructure contained therein attractive terrorist targets. Terrorist mining campaigns have the capacity to interrupt the free flow of commerce, restrict naval vessels from leaving or entering port, create environmental catastrophes, or threaten

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[242] Thomas C. Schiller, "Maritime Terrorism: The Threat," *Violence at Sea*, p. 88.

[243] *Strategic Assessment 1995*, p. 107.

the economic infrastructure (e.g., oil terminals) of a target nation. Moreover, the abundance of principal ports, harbors, and even straits susceptible to temporary closure after even modest mining campaigns may well be irresistible to terrorist groups disaffected with the actions of Western nations or oil-producing states such as Saudi Arabia and Kuwait. Western Europe, which experiences about 40 percent of all international terrorist incidents annually, is especially susceptible to the threat of terrorist attack against maritime targets, given the openness of its societies and the ease of movement across and within its borders.[244]

Many European as well as other terrorist organizations have resorted to maritime terrorism in the past-a point that has not been lost on Europe's maritime nations.[245] For example, Britain has long feared an IRA sponsored mining of one or more of its ports[246] and Spain's recent commitment to modernizing its MCM forces is due in part to the threat of mining posed by Basque terrorists.[247] Finally, France, currently besieged by a wave of terrorist bombings linked to Algerian Islamic terrorist cells, cannot discount a mining threat against one or more of its commerce ports. Further, although the threat posed by the self-styled alliance of European leftist terrorist groups which proliferated during the 1980's has

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[244] Paul Wilkinson, "Terrorism and the International Environment," *Violence at Sea*, 1986, p. 27.

[245] For example, the IRA mining of Lord Mountbatten aboard his pleasure boat in 1980 and the damaging of the Spanish destroyer, *Marques De la Ensenada*, by Basque separatists in 1981. *Violence at Sea*, p. 240.

[246] Comments of British MCM officer to the author during exercise *BLUE HARRIER* on or about 28 April 1994.

[247] Shimidt Okhatovich Mustafin, "The Project 266ME Ocean Minesweeper," *Sea Power*, No.III, 1994 p. 16-21.

receded, their place may be taken by equally dangerous xenophobic right-wing cells emerging throughout Europe, particularly in Germany. Finally, escalating ethnic nationalism and religious fanaticism emanating from Western Europe's "near abroad" have replaced political ideology as the primary engines of modern terrorism that may threaten European maritime interests in the future. [248]

On the state level, many regimes frequently sponsor, support, and utilize terrorism as a foreign policy tool. The maritime environment is a favored medium for state-sponsored terrorism given the relative ease in which states may carry out subnational activities - either directly or through surrogates - in such a way as to minimize publicity or maximize their ability to deny overt involvement. Iran, Libya, and Iraq all have a recent history of state-sponsored mining operations of neighboring countries and in international waters. While these states may pose little direct threat to North Atlantic waters, they do have the capacity to threaten Western economic interests, such as access to oil and other raw materials through the closure of strategic narrows in other locations around the world. For instance, information regarding the extent of Iraqi mining in the Arabian Gulf and the danger it presented, caused shipping insurance rates to skyrocket and brought Gulf commerce to a virtual halt. At one point, 117 ships were anchored at Fujairah, United Arab Emirates, unwilling to sail further in the Gulf due to concern about mines.[249] Similar state-sponsored mining campaigns in other vital maritime areas of the world could have a similar impact on

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[248] Brian M. Jenkins, "Future Trends in International Terrorism," *Violence at Sea*, p. 44.

[249] Edward J. Walsh, "Navy Adopts New Doctrine, New Technologies to Address Changing Mine Countermeasures," *Defense Electronics*, July 1992, p. 41.

commercial shipping given probable increases in insurance premiums and the dangers of material or environmental damage resulting from potential mine strikes .

***b. Other Stateless Threats***

Insurgent movements also pose a distinct threat as potential minelayers. These organizations, which tend to be larger and better financed than most terrorist groups, have the resources to conduct mining campaigns on a much larger scale. Moreover, many insurgent movements may obtain advanced sea mines from sympathetic countries or ethno-political groups. The CIA-backed mining of Nicaraguan ports by so-called *Contra* insurgents in 1984 is a perfect case in point.

Early in 1984, the CIA supplied the *Contras* with as many as 500 mines as part of its campaign to assist insurgents seeking to topple the Sandinista regime.[250] Thirty-nine of these mines were eventually placed in Nicaragua's three principal harbors and ports as part an insurgent operation aimed at crippling the Sandinista government economically. This insurgent mining campaign proved highly successful, as the 39 mines accounted for the damage (and in one case sinking) of 19 ships, and the closure of Nicaragua's three main port facilities for several months at an economic cost of $200 million.[251] Moreover, the Sandinista government-totally bereft of even a rudimentary MCM force - was forced to rely on fishing boats - taken up from trade and enlisted for mine sweeping duties - to counter the

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[250] "Blast U.S. Failure to Tell Ships of Mines," *New York Times*, 15 April 1984, p. 6.

[251] Captain James M. Martin USNR (Ret.), "Sea Mines in Nicaragua," *US Naval Institute Proceedings*, September 1990, pp. 113-115.

threat.[252] Predictably, the few mines located by these "mine sweepers" were usually at the cost of the vessels themselves.

The foregoing example highlights the potential use of sea mines by insurgent groups - especially when backed by a state-sponsor - to attack or harass a nation's vital commercial and military ports, harbors, inland waterways, and even SLOCs with virtual impunity.[253] Although this example highlights a situation where a US-sponsored insurgent group conducted the minelaying campaign, a similar scenario could evolve in the future which may threaten the maritime security of a NATO member state or ally.[254] Perhaps the most visible example of NATO's potential susceptibility to an insurgent mining campaign is the vulnerability of the Turkish Straits to mining by Kurdish insurgents in that country. Such an act would shut down a vital strategic chokepoint and require NATO MCM forces to deal with the threat.

**2. Russia as a Dormant Threat**

Despite the disintegration of Russia's capability to project significant naval power outside its near abroad, Russia's mine warfare capabilities remain formidable and still must be considered a threat to European security in view of the uncertain political situation in

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[252] Ibid, p. 115.

[253] The Contra mining campaign was accomplished using very modest Q-boat platforms.

[254] The recent sinking of a German passenger ship on the Danube River inside Yugoslavia by a suspected home-made Croatian-Serb mine is a chilling reminder of the destructive potential of insurgent mining even within Europe. Ernest Fortin, "Those Damn Mines", *US Naval Institute Proceedings*, July 1992, p. 30.

Moscow.[255] Recent gains by the ultra-nationalist "Liberal-Democratic Party" and the former Communists in recent legislative elections, and Russia's recalcitrant position regarding NATO's eastward expansion point to a potential rift between NATO and Russian foreign policy objectives in the future.

As part of its shift away from "Atlanticism," the Russian government has revised its attitudes towards NATO. Recent public statements emanating from Moscow have characterized the Alliance as "wedded to the stereotype of bloc thinking," and "meddling in Russia's internal affairs."[256] Moreover, Russian intelligence services still consider NATO as a threat to Russia's national security, depicting it as "the biggest military grouping in the world that possesses an enormous offensive potential."[257] Diplomatically, Russian political leaders- faced with mounting political discontent at home - have increased their anti-Western rhetoric in recent months, particularly regarding NATO. An angry President Yeltzin recently stated that expansion of the North Atlantic Alliance onto Russia's western frontier "will mean a conflagration of war throughout Europe."[258] He went on to threaten a return to Cold War relations between Russia and the West if NATO were expanded to include Eastern Europe.[259]

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[255] Estimates on the time frame requirements for complete Russian military reconstitution range between three years to as much as a decade. Nevertheless, Russia's ability to reconstitute a credible mine warfare threat would fall well inside this window. Anderson, *Beyond Mahan*, p. 37.

[256] Hannes Adomeit, "Russia as a 'Great Power'," *International Affairs 71*, I, 1995, p. 49.

[257] Ibid, p. 47.

[258] "Yeltzin Warns of Impending Cold War", *Washington Post*, September 9, 1995, p. 1.

[259] Ibid, p. 1.

Yeltsin's comments concerning the eastward expansion of NATO were the strongest denunciation yet to originate from Moscow and reflect Russia's growing sense of international isolation. Finally, Russian politicians and military officers are wary of NATO member Turkey, suspecting that Istanbul is attempting to gain influence in the unstable Caucasus at the expense of Russia.[260] While most of Russia's current bravado may be dismissed as empty rhetoric, the apparent wedge between Western security interests and traditional Russian geo-strategic fears relating to its near abroad appear to be widening.

Although Russia does not pose a threat to Western Europe in the foreseeable future, its prospect for continued democratic reform is marginal at best. Consequently, Russian geopolitical considerations discussed above should continue to figure prominently in NATO's traditional boundary area and beyond despite the end of the Cold War. Given Russia's continuing mine warfare capability, prudence dictates the maintenance of a robust MCM capability until such time as political developments in Russia stabilize.

### 3. MCM Within NATO's Naval Rapid Reaction Forces

The current instability presented by the spread of extreme ethno-nationalism, religious fundamentalism, weapons of mass destruction, territorial disputes (which could spill across international borders) and the collapse of governmental authority in Western Europe's "near abroad" signal a growing requirement for crisis management. Should a crisis emerge that threatens NATO's interests, Rapid Reaction Forces (RRF) are now available to respond either as a self-sustained force, or as a NATO-organized contribution to a larger UN out-

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[260] John W. R. Lepingwell, "The Russian Military and Security Policy in the Near Abroad," *Survival*, Autumn 1994, p. 75.

of-area operation.[261] NATO's naval Reaction Forces (RF) have been designed using a building block approach that calls for the formation of a multinational naval force from Alliance resources.[262] The size and configuration of the force is dictated by the nature and location of the crisis. These forces consist of two primary Immediate Reaction Forces (IRF)- Standing Naval Force Atlantic (STANAVFORLANT) and Standing Naval Force Mediterranean (STANAVFORMED)- which serve as the core elements around which naval RF forces may be built. Alliance vessels from STANAVFORMED currently form the basis for the NATO/WEU naval force conducting SHARP GUARD operations in the Adriatic, relieved from time to time by STANVFORLANT. A lesser known though no less important "junior member" of NATO's three Standing Naval Forces is the Standing Naval Mine Countermeasures Force (STANAVMINFOR). This force, comprised solely of mine countermeasures vessels from various NATO member states, currently serves as NATO's rapid reaction mine warfare "fire brigade."

### *a. Standing Naval Force Mine Countermeasures*

Europe's vulnerability to potential Soviet mining led to the establishment of a standing naval multinational MCM alert force - Standing Naval Force Channel - composed solely of MCM vessels from various NATO member nations. Redesignated STANAVMINFOR in July of 1994, this flotilla has emerged as a prime example of NATO's new Strategic Concept. STANAVMINFOR units conduct year-around training and

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[261] LT GEN Richard Evraire, "Designing NATO's New Military Force Structure," *Canadian Defence Quarterly*, February 1992, p. 12.

[262] Ibid, p. 13.

exercises under alternating national commands. Once limited primarily to the narrow seas surrounding the UK and northwest Europe, STANAVMINFOR now routinely operates in various geographic locations within NATO's traditional boundary area, including the Mediterranean. The high levels of interoperability and tactical commonality cultivated between the various European MCM forces participating in this multinational MCM task force paid handsome dividends during post-Desert Storm WEU MCM operations. STANAVMINFOR will undoubtedly be called upon to perform similar functions should mine warfare-related security threats arise in the future.

### *b. Current RF MCM Deficiencies*

The most likely theater of operations requiring NATO's MCM forces is undoubtedly the Arabian Gulf. The difficulties encountered in dispatching rapid response naval MCM forces to this area and others like it is highlighted when one considers the lengthy transit times involved for MCMV's when compared to other naval combatants.[263] For example, MCMVs from CONUS require over 35 days transit time to the Arabian Gulf at an enormous cost in terms of wear and tear.[264] Transit times from Europe are substantially shorter, especially from the Mediterranean. Still, whatever their point of origin, MCM vessels are incapable of transiting with the primary naval task force due to their significantly slower

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[263] A standard naval task force routinely transits at an economical speed of advance (SOA) of approximately 16-20 knots depending on the composition of the task elements. Comparatively, most MCM vessels are restricted to maximum transit speeds of between 8-10 knots -a significant difference especially if rapid, trans-oceanic deployments are considered. David Miller, "Anywhere, Anytime: Rapid-Deployment Forces and Their Future," *International Defense Review Special Report*, 10/1994, p. 15.

[264] Rear Admiral Pearson testimony before the House Subcommittee on Seapower, *HASC No. 102-43,* 17 March 1992, p. 121

speeds and requirement for constant replenishment. This deficiency with respect to surface MCM forces was highlighted during the Falklands campaign in 1982 when British *Hunt*-class MCMVs were unable to accompany the primary task force. As a result, British expeditionary naval forces were woefully unprepared to meet the threat posed by 20 or so Argentine mines planted in the approaches to Port Stanley.[265] While no ships were lost, the very existence of the minefield complicated British plans for amphibious operations and compelled the Royal Navy to employ its smaller combatants as "guinea pig" sweepers.[266] The importance of deploying MCM assets alongside other naval combatants in any crisis situation requiring naval forces was further demonstrated during the Iran-Iraq Tanker War between 1987 and 1988. During this crisis, American and European naval vessels conducting escort operations were put at risk by Iranian mining of the Arabian Gulf and later in the Gulf of Oman. Faced with the probable disruption or even loss of vital maritime oil supplies from the region due to the unforeseen mine threat, the United States, Britain, France, Italy, Belgium, and the Netherlands hastily dispatched MCM flotillas to assist in mine clearance operations.

One possible solution to this problem is to have an alternating NATO MCM ready force consisting of three or four ships forces forward deployed to the Gulf region.[267] Homeporting the force in Bahrain would be the most likely choice given the existing

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[265] Lindberg and Todd, p. 107.

[266] Ibid, p. 107.

[267] The US Navy is already developing plans to forward deploy two *Avenger*-class MCMVs to the Gulf in the near future according to sources at COMINEWARCOM.

infrastructure already in place to support MCM operations. While this proposal makes good military sense and is strategically prudent given the Gulf's past mine warfare track record, overriding political and budgetary concerns probably make its implementation unlikely, at least in the near term. Another option is transporting MCMVs onboard heavy-lift ships, as was done during the Desert Shield deployment of US forces to the Gulf region. NATO, however, does not possess organic heavy-lift assets and must rely on commercially leased ships to meet its heavy-lift requirements.[268] Furthermore, only 19 international merchant heavy-lift ships are available for MCMV transport, and political problems or scheduling conflicts could make some of them unavailable on short notice.[269] A final point that must be considered is that, while the availability of these ships reduces transit wear and tear on the MCMVs, the time required to load and off-load the MCMVs and the relatively slow transit speeds of the heavy-lift vessels themselves preclude their ability to transit in company with the primary task force.

The only practical solution to this significant problem appears to be the deployment of Airborne MCM helicopter assets as part of a NATO-coordinated expeditionary task force to areas where probable mining is expected or has already taken place. AMCM assets embarked aboard the new MCM Command Ship, *USS Inchon,* or other air-capable amphibious ships can provide the battle force with organic MCM forces capable of executing a variety of MCM operations in conjunction with embarked or in theater EOD

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[268] R.J. Wallace, *Mine Warfare: Its Implications for the Future of Amphibious Operations*, Industrial College of the Armed Forces Research Report, April 1993, p. 21.

[269] Ibid, p. 21.

units. If no air-capable ships are available for the transit due to overriding priorities, AMCM squadrons can quickly deploy in theater by way of strategic airlift and be ready to conduct shore-based operations within a very short period- probably before the arrival of the expeditionary task force. These units could execute initial exploratory and clearance operations in preparation of the arrival of surface MCM forces from Europe and the United States.

The important contribution of AMCM to NATO's rapid deployment MCM capability has not been lost on America's Alliance partners. Admiral Klaus Rehder, FGN, former commander of Naval Forces Baltic Approaches, recently observed:

> AMCM has added a new dimension to the conventional [surface] MCM and is extremely valuable. . . From an alliance point of view, it would hurt less if [the US Navy] decides to reduce [surface] MCM rather than AMCM. We would otherwise lose a full dimension of operational capabilities which only the US Navy can provide. [270]

If NATO's Rapid Response MCM forces are truly to be an "enabling asset" for the Alliance's expeditionary naval forces, then provisions must be made to ensure, at a minimum, their concurrent arrival on station with the main task force, if not before. Failing this, the enormous threat posed by prepared mine fields may derail or postpone the projection of naval expeditionary power from the sea. Clearly, the MCM adage "where the fleet goes, we've been," can hardly apply given the aforementioned deficiency in MCM rapid deployment capability without the availability of dedicated AMCM assets.

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[270] Text taken from personal letter from Admiral Rehder to Admiral Kelso following exercise BLUE HARRIER 1993. *Mine Warfare Plan*, p. 15.

### 4. Peace-keeping/Peace-Enforcement Operations

Following the Cold War, the United Nations has attained considerable influence in formulating and directing global policy, and the world now views the UN as a legitimate arbiter in the conduct of international events, notwithstanding its troubles in the former Yugoslavia. Barring the unlikely creation of a "UN standing naval force," only NATO maintains the range and depth of naval capabilities necessary for the successful execution of maritime peace-keeping/peace-making operations, particularly in the area of mine warfare.[271] Consequently, NATO's growing role as a military enforcement arm of UN-mandated international resolutions and sanctions has generated an additional, if not entirely new, role for NATO's naval forces.[272] Many of these missions will have or require some type of mine warfare component in which MCM will play an important role.

Although the historical use of naval forces in peace-keeping has been relatively rare, recent maritime developments, including the ratification of the UNCLOS III, have opened new areas for future involvement. Moreover, political leaders are slowly recognizing the advantages of maritime forces in the execution of politically sensitive peace-keeping/ enforcement operations in today's international setting. Unlike land-based peace-keeping operations, UN maritime operations do not require the consent of the parties to the conflict -

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[271] The US Government does not support the establishment of a standing UN Army, Navy or Air Force. *Office of the Assistant Secretary of Defense*, "Key Elements of the Clinton Administration's Policy on Reforming Multinational Peace Operations," May 1994, p. 1.

[272] The willingness of the UN to delegate to NATO the military responsibility for carrying out a peace agreement for Bosnia, if and when one is made, is an example of this trend. Eugene V. Rostow, "Is UN Peacekeeping a Growth Industry?" *Joint Force Quarterly*, Spring 1994, p. 103.

be they belligerent governments, insurgent movements, or ethnic/religious groups. Naval vessels have the ability to operate unhindered in international waters and, under Article 105 of the UN Charter, may also operate within the Territorial Seas of member states when fulfilling UN-endorsed operations.[273] Herein lies the fundamental value of maritime forces for UN peace-keeping/enforcement operations.

Based on the greater degree of mobility and flexibility inherent in maritime forces, naval operations under UN auspices are more likely to involve more dangerous peace-enforcement, rather than peace-keeping duties. In today's political climate, the level of acceptable risk in these scenarios is very low. The loss of a single asset or life from unforeseen mining could have debilitating consequences to the success of the operation. Consequently, any maritime operation in potentially hostile waters will require an MCM component to establish the presence or absence of a mine threat or reduce the danger to major combatants and merchant shipping should mines be discovered.

Today, there are several out-of-area peace-keeping/making maritime missions that might involve NATO's MCM forces under UN cognizance. These missions include post-conflict mine clearance operations, maritime blockade operations, EEZ patrols, naval support to peace-keeping forces ashore, and non-combatant evacuation operations.

***a. Post-conflict MCM Operations***

As discussed in Chapter V, the proliferation of sophisticated mines to the Third World, coupled with increasing intra-regional instability in many areas of the world,

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[273] See Captain George Allison, USN, "The United States Navy in United Nations Peace-keeping Operations," *Naval War College Review*, Spring 1994, p. 32.

enhances the likelihood of future armed conflicts involving the employment of mines. In view of the nonexistent MCM capabilities among most Third World countries, the likelihood that any of the belligerent states will have the capacity to conduct required mine clearance operations of territorial and international waters following the cessation of hostilities is exceedingly low. Recent history has provided poignant examples to support this presumption. For instance, US, French, and British MCM forces were required to conduct lengthy and costly clearance operations of Egyptian mines in the Gulf of Suez and Red Sea following the 1973 Arab-Israeli War.[274] During the Iran-Iraq War, European and American MCM forces were again required to clear mines laid in international waters by both belligerents.

Future regional peace accords mediated by the UN will doubtless require the commitment of naval forces as part of ensuing peace-keeping operations. In many cases, MCM forces will be required to clear remaining mines that continue to pose a threat to maritime freedom of the seas. Only NATO can provide the required MCM expertise and capability necessary to successfully conduct extensive UN-mandated mine clearance operations against today's complex mines.

***b. Maritime Sanctions, Embargoes, and Blockades***

In recent years, maritime blockades and embargoes have reemerged as a favored means of enforcing UN sanctions or exercising international pressure, and have become the *raison d' etre* of sorts for NATO and WEU conventional naval forces. Currently, two UN-mandated international blockades (Rump Yugoslavia in the Adriatic and Iraq in the Arabian Gulf) remain in force, and a third (Haiti) has recently terminated.

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[274] Lindberg and Todd, p. 107.

Although historical evidence suggests that few peacetime naval blockades or embargoes have fully achieved their desired objective, they still fill a significant role as tangible manifestations of international political resolve.[275] Moreover, naval blockades and embargoes offer convenient political cover for statesmen wishing to contribute to an international coalition effort without exposing national military forces to high levels of risk.

The extension of the Territorial Sea out to 12 nautical miles has expanded the area to be covered in enforcing a blockade if no infringement of national sovereignty is to take place. The enlargement has also opened a far greater and potentially lethal area of water available for protective or defensive mining operations on the part of a sanctioned nation. Blockading naval forces may be extremely vulnerable to minelaying if political circumstances prohibit attack or other measures designed to prevent the laying of mines through offensive means. For example, protective minefields barriers could be laid in such a manner as to allow friendly vessels to pass while blocking pursuing coalition naval forces. In extreme cases, isolated states may simply elect to release drifting mines in an attempt to harass blockading forces. At the very least, such a mine threat could render the blockade ineffective or cause the withdrawal of lesser committed nations; in the worst case this could result in severe damage to (or loss of) a blockading vessel with resulting loss of life. Clearly, ships participating in future blockade operations must be capable of operating in a multi-threat environment that includes sea mines. The presence of MCM assets, however, could nullify

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[275] See Captain Robert H. Thomas, USN, *The Use of Naval Forces in Imposing and Enforcing Sanctions, Embargoes, and Blockades*, 1993, p. 2.

the potential mine threat and help ensure at a minimum, the continued appearance of an effective and unified blockade.

### *c. EEZ Patrols*

Since EEZ's have been expanded out to 200 miles from the boundaries of the Territorial Sea, these formerly international waters have assumed great significance to states exercising resource sovereignty rights therein. International quarrels over jurisdictional demarcation boundaries, exploitation of resource-rich seabeds, and fishing rights, exist in a number of strategic and not so strategic areas of the world. These politically charged disputes have the potential to flare into open hostilities, and may require international intervention in order to assure continued freedom of the seas within the contested waters. As discussed in Chapter IV, mines may be employed in the future by various states as a means of protecting or otherwise enforcing national sovereignty claims within contested EEZs. Under international law, NATO's MCM forces may be tasked to conduct clearance operations in order to maintain maritime security of the seas. Such MCM operations would presumably fall under the auspices of the UN. Nevertheless, minefields that clearly violate recognized international law or pose a direct threat to the West's economic security may facilitate a purely Alliance-driven MCM response.

### *d. Maritime Support for Peacekeeping Forces Ashore*

NATO's naval forces may be called upon to support UN operations on land in many ways, including command and control, logistics, surveillance, and fire support. Recent examples of these types of naval missions include UN operations in Somalia, Haiti, and current UN operations in the former Yugoslavia. In many instances, naval forces off

shore may provide the only lifeline for logistic supply, strike support, or avenue of evacuation to highly vulnerable peacekeepers ashore. This is particularly true in areas lacking modern air facilities, roadways systems, and communication networks, areas most likely to require UN peacekeeping missions in the first place. The potential threat generated by mines could cut off sea-based support to ground forces. In such situations, the availability of MCM forces can ensure the continued security and maneuverability of coalition naval assets, and help maintain the vital link between sea-based and land-based forces.

*e. Non-combatant evacuation operations*

NATO's naval forces may be called upon to assist in the evacuation of non-combatants from Third World countries undergoing internal upheaval. While larger nations may conduct these operations on a strictly national basis, smaller countries without such a naval capability may appeal to the UN for assistance.[276] Regardless of the coordinating institution, only NATO's naval forces possess the projection capability necessary to conduct these types of short notice operations. In these types of hostile and often anarchic environments, the threat of sea-mines in the near shore staging areas cannot be discounted. In such a scenario, MCM forces may be required to protect friendly evacuation forces from the threat of mines.

*f. Surveillance*

MCM forces can perform other useful peacekeeping roles outside their traditional role. For instance MCM vessels, although military, are lightly armed and thus non-provocative and non-offensive. They are not perceived as a threat. Therefore, forward

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[276] Allison, p. 25

surveillance in benign peace-keeping operations could become a new role for MCM vessels as part of a larger naval force.[277]

In summary, although MCM forces will not be required for all types of peace-keeping missions, they will continue to play a large role in guaranteeing unimpeded maritime freedom of the sea to naval peacekeeping forces, Rapid Reaction forces, and commercial shipping during times of crisis.

**5. Protection of Sea-Based Nuclear Deterrent**

One of the major roles of MCM within NATO has changed relatively little since the end of the Cold War: the protection of the sea-based nuclear deterrent force of SSBN submarines. The specific nature of this mission is beyond the classification level of this thesis. Nonetheless, some basic presumptions are obvious. Mines, particularly deep moored self-propelled rising vertical mines (RVM) and self-propelled bottom mines (SMDM) present a significant threat to NATO's submarine fleet. Until recently, these relatively sophisticated mines were limited to the arsenals of the major superpowers. However, *ROSVOOROUZHENIE,* The State Corporation on Export and Import of Russia's Arms and Military Equipment has recently begun offering these and other sophisticated mines for export in numerous military journals and trade publications.[278] The significance of the proliferation of these mines to potentially hostile Third World countries or sophisticated terrorist cells, and the correlating threat to Alliance submarines, including SSBNs, is self-

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[277] Rear Admiral Herteleer, BN, "Mine warfare in Peacekeeping Operations," *NATO'S Sixteen Nations* No.1, 1994. p.15.

[278] Shimidt Okhatovich Mustafin, "The Project 266ME Ocean Minesweeper," *Sea Power,* No. III, 1994, p. 16-21. Also refer to the May/June 1994 edition of *Military Parade Magazine*.

evident. Consequently, NATO must maintain a capability to counter this threat should the need arise. NATO's MCM forces will continue to fill this requirement. Finally, British and French MCM forces are assigned national responsibilities to ensure the safe passage of their respective SSBN forces to and from their bases at Faslane and Brest. It is for this reason that each countries' MCM forces and headquarters are co-located at these same bases.

## F. LITTORAL WARFARE

NATO's new Strategic Concept has embraced the concept of littoral warfare as the most likely type of naval conflict in the post-Cold War environment.[279] Consequently, the support of amphibious warfare operations as outlined in the US Navy-Marine Corps white paper, *Forward. . . From the Sea,* has become a top priority within the various NATO commands.[280] The worlds' littoral regions encompass some 122 countries and close to 70 percent of the world population.[281] These areas are characterized by confined, shallow waters, and congested airspace occupied by friends, enemies and neutrals. In this environment, mines become an even more lethal threat to both ships and landing craft. The ability or inability to deal with mines within this area could spell the difference between success and failure of expeditionary or amphibious-type naval operations, particularly in areas with a shallow or gently sloping sea bottom gradient. Paramount to the success of maritime littoral operations in the attainment of air, surface and sub-surface superiority over the enemy.

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[279] Richard Sharpe, p. 52.

[280] John Jordan, "Littoral Warfare- The Shape of Things to Come?" *Janes Intelligence Review*, March 1993, p. 140.

[281] General Carl E. Mundy, Jr., USMC, "Thunder and Lightning: Joint Littoral Warfare," *Joint Force Quarterly*, Spring 1994, p. 47.

In essence, littoral warfare is about the ability to dominate the waters and airspace of another country in order to facilitate amphibious landings or other forms of naval power projection from the sea. The operating environment of the littorals favors the opponent, because they have the defensive advantage, the shortest logistic trail, and greater knowledge of the operating area. Under these circumstances, the unknown threat posed by mines can negate the inherent naval advantage of agility, surprise, and maneuver critical to US and Alliance military doctrine and strategy. Clausewitz warns of postponing action in time and space to a point where further waiting brings disadvantage.[282] One can appreciate the tremendous difficulties that would be encountered if enemy forces are allowed to fortify and reinforce beachheads while Alliance amphibious forces remain bogged down, clearing and navigating mined waters.

The ease with which Iraqi mines blocked coalition efforts to achieve maritime battlespace dominance in the littoral seas of the northern Arabian Gulf spurred increased awareness and development of MCM systems and tactics on both sides of the Atlantic. The capability of naval forces to adequately clear mines ahead of an amphibious assault without impeding the speed of advance, commonly called "sweep in stride," is currently a top priority of the US Naval Service and particularly within the Marine Corps.[283] If and when the need arises, NATO MCM forces may play a critical role in conjunction with other allies, clearing landing approach lanes to the beach for American, British and Dutch Marines in the event of full scale NATO amphibious operations in the future. To achieve success in this

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[282] Ibid, p. 48.

[283] Lee M. Hunt, "In Stride," *US Naval Institute Proceedings,* April 1994, p. 59.

endeavor, Alliance MCM forces must overcome the challenges posed by MCM operations in the shallow water and beach zones. The US Navy defines the shallow water zone as ranging from a depth of 200 feet in to the high water mark (HWM). Contained within the shallow water zone are the very shallow water (VSW) zone (depth of 40 feet to 10 feet) and the surf zone (10 feet to the HWM).[284]

This relatively new form of very shallow water (VSW) MCM poses the most severe challenge for NATO's MCM forces. First, VSW MCM is unfamiliar and relatively unpopular with most European MCM officers who have trained for years in port breakout and Q-Route clearance operations against the Soviet mine threat.[285] VSW MCM operations require surface MCM vessels to operate in shallow water depths outside the generally accepted "safe envelope." Consequently, European and American surface MCM forces may require precursor sweep operations by US Airborne Mine Countermeasures Helicopters before conducting many types VSW operations. Nevertheless, recent NATO MCM training exercises, including BLUE HARRIER 94, have altered scenarios to emphasize tactical development in the nuances of VSW MCM operations among the European MCM naval forces.

Another area of concern relative to future NATO VSW MCM operations is the probable reluctance among some Alliance members to authorize the use of national assets in such a high risk threat environment. Iraq's ability to foil planned coalition amphibious

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[284] Col Thomas L. Blickensderfer, "Amphibious Mines: Silent Enemy of the Landing Force," *Marine Corps Gazette*, November 1992, p. 85.

[285] Opinions given by European MCM officers during Exercise BLUE HARRIER 94.

operations with rudimentary mine fields during the Gulf War highlights the importance of abundant MCM forces to successful amphibious operations. In the case of Desert Storm, insufficient MCM forces prevented the timely clearance of the mine threat to acceptable levels.[286] This shortfall in MCM assets was due largely to the unwillingness of European MCM forces, with the exception of the United Kingdom, to enter the Gulf until after the cessation of hostilities. Consequently, American and British MCM forces were left short-handed to clear the required invasion routes and Battleship Fire Support Areas (FSA). The vital lessons learned from this experience need to be implemented in NATO's littoral warfare doctrine in which continental European MCM forces must figure more prominently.

## G. REGIONAL THREAT CASE STUDY: SOUTHEAST ASIA

With the end of the Cold War and the resulting demise of the bipolar balance of power, traditional regional rivalries in Europe, Asia and the Middle East are all poised to reassert themselves. Potential conflicts can be found throughout virtually every regional littoral: along the Mediterranean, Adriatic, and Black Seas, in the Persian Gulf, throughout the Indian Ocean, and in Northeast and Southeast Asia. Common to all these regions is the geographic vulnerability to mining, and the existence of large, modern mine inventories and mine delivery platforms among the various potential adversaries.

Clearly, current instability in the Middle East presents the most obvious latent threat to maritime peace and freedom of navigation. Both the Iran-Iraq War and the Gulf War demonstrate the nature and extent of the threat in this economically vital region, particularly in the area of mine warfare. Nevertheless, the geo-strategic situation within the Middle East

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[286] *Lessons from the Gulf War*, p. 26.

is a topic on which much has already been written. Consequently, this section examines Southeast Asia instead, and analyzes two scenarios in which the employment of mines is a distinct possibility and where NATO's MCM forces may be called into action in some manner. While the scenarios are purely conjectural, the historical basis and strategic logic behind them are certainly plausible.

**1. Southeast Asia**

The abrupt end of the Cold War coupled with the area's enormous economic growth has dramatically altered its geo-strategic landscape of the Asian-Pacific region. Despite increasing economic interdependence among the various regional actors, there also exists the possibility of increasing friction, especially in the maritime arena. Mounting regional insecurities, combined with the rapid emergence of Asia's economic Tigers, has resulted in the availability of excess capital earmarked for the modernization of various Asian naval forces. Arms sales in the region are rising dramatically at a time when the global market for military weaponry is declining. For example, between 1985 and 1993, Asian Pacific defense expenditures soared 68 percent while US and European defense expenditures declined by 9 percent over the same period.[287]

The emergence of an apparent naval arms race among many Asian countries coincides with the rising hegemonic aspirations of several Pacific nations, most notably, China.[288] Furthermore, growing economic competition and the contentious issue of overlapping EEZs

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[287] *Strategic Assessment 1995*, p. 21.

[288] Since the end of the Cold War, Asian nations- less China- have accounted for about 38 percent of arms purchase agreements by developing nations. *Strategic Assessment 1995, p. 139.*

have generated competing claims over various resource-rich maritime areas. This is hardly surprising since the ocean has become the prime source of income for many Pacific nations and the main focus of their plans for economic development.[289] From a mine warfare perspective, the presence of well-equipped naval forces and economically driven territorial disputes raise the spectrum of future conflict between the various regional maritime states. Two potentially volatile areas particularly susceptible to mining operations are the South China Sea and the Formosa Strait.

**2. South China Sea**

Among the various territorial disagreements within the region, the contested Spratly and Paracel Island groups in the South China Sea represent East Asia's most dangerous and contentious multilateral dispute. Seven states - Brunei, China, Indonesia, Malaysia, the Philippines, Taiwan, and Vietnam - have competing claims to the islands.[290] Beijing, however, claims the entire sea as Chinese territory and reserves the right to use force to prevent free passage of foreign vessels through it.[291] The relatively new interest in these islands dates from the late 1960's and centers primarily on the expectation that vast deposits of oil and natural gas lie beneath the seabed floor adjacent to these islands. The potential for economic exploitation of resources lying within the waters surrounding the Spratly Islands

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[289] Robert S. Staley II, *The Wave of the Future: The United Nations and Naval Peacekeeping*, 1992, p. 27.

[290] Siew, p. 2

[291] *The Map of the People's Republic of China* produced by Beijing's Cartographic Publishing House shows the entire South China Sea falling within China's sphere. Michael Forsythe, "China's Navy Stirs," *US Naval Institute Proceedings*, August 1994, p. 44.

has led to mounting regional tensions and, in some cases, armed conflict among the protagonists. For instance, open hostilities between China and Vietnam over sovereignty erupted in armed hostilities in March of 1988, resulting in the sinking of three Vietnamese vessels sunk and the deaths of 72 personnel. More recently, Sino-Philippine relations have soured over China's occupation of a small atoll lying well within the Philippine's 200 mile EEZ.[292]

Beijing's strong declaratory position regarding its territorial claims in the South China Sea has provoked a measure of anxiety within the region, particularly in light of China's growing naval power projection capability.[293] In order to assert their claim, the Chinese have constructed numerous military facilities within the Spratly Island group. Further complicating the Spratly dispute are the island's proximity to the major SLOC through the South China Sea. It is not inconceivable that China may one day employ minefields to safeguard the integrity of what it perceives to be its legitimate territorial waters. China's minelaying capacity is considerable, and it could deny the entire area to foreign vessels including tankers.[294] Any significant mining campaign in the South China Sea would pose a severe threat to international commerce given the importance of the maritime navigational routes which pass through this strategic body of water. This factor, coupled with the lack of

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[292] Brian Cloughley, "No Need for War in the South China Sea," *International Defense Review*, 6/1995, p. 22.

[293] In February 1992, China passed the "Law of the PRC on the Territorial Sea and the Contiguous Zone" which claimed the Spratly Islands, the rights to surrounding areas, and the right to evict foreign occupiers militarily. Jan Sparks, RAN, "The Spratly Disputes: The Possible Outcomes and Their Effects on Australia's Interest," *Asian Defence Journal*, 2/95, p. 48.

[294] Cloughley, p. 26.

strategic cohesion within the Association of South East Asian Nations (ASIAN) could lead to the requirement for an ad-hoc coalition MCM effort possibly involving NATO MCM forces.

### 3. Formosa Strait

The growing friction between Taiwan and the China over the issue of sovereignty is potentially the most disruptive problem in southeast Asia. China's leadership already judges that US political, military, and economic support of Taiwan - which it considers a renegade province- have fostered the increasingly independence-minded fervor that permeates the island today.[295] The recent visit of Taiwan's president to the United States set off an angry response from China which recalled its ambassador to the United States for consultations. Militarily, China has recently displayed an increasingly hostile posture toward Taiwan, including numerous military exercises off the Taiwanese coast. Moreover, Taiwanese fears of a Chinese attack were heightened recently when China tested guided missiles off northern Taiwan.[296]

In December 1992 the Associated press and the Xinhua News Agency reported that Beijing officials threatened the use of military force if Taiwan moved toward independence or if China's sovereignty or territory were threatened. [297] If China were compelled to use force against Taiwan, a blockade would be more likely than a actual assault. Beijing could

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[295] Ibid, p. 26.

[296] "Taiwan Pushes Region Security," *Associated Press*, 19 August 1995

[297] Joseph R. Morgan, "Porpoises Among the Whales: Small Navies in Asia and the Pacific," *East-West Center Special Reports*, March 1994, p. 22.

justify a blockade internationally on the grounds that Taiwan is part of China and thus subject to its control like any of its other internal provinces.[298] Such a blockade would undoubtedly employ the use of mines as perhaps the key element or at the very least as a force multiplier. In such a scenario and in view of Taiwan's nonexistent MCM capability, coalition MCM forces would be required to counter the Chinese minefields either during or following the termination of the blockade.

**4. Does NATO Have A Role In Asia?**

In the absence of a viable Asian alliance resembling NATO, future conflicts involving Asian states will probably require UN intervention in order to mediate a peace settlement. Under most conditions, the resultant peace accord will require the presence of foreign naval forces representing disinterested parties. While these parties may be comprised of Asian nations, the deep-seated mistrust inherent within the region makes this solution appear unlikely. Most probably, any peacekeeping naval presence will require the participation of American and European assets, particularly former colonial powers, such as the United Kingdom, France, and the Netherlands. The precedent for post-World War II European naval involvement in Asia under UN auspices was established during the Korean War where ten nations, including several NATO member states, served in Task Force 95, the "United Nations Blockading and Escort Force."[299] Finally, Asia's generally poor MCM capability further supports the premise that any large scale MCM operations in Asian waters will have to be carried out by combined forces of the United States, Europe and possibly Japan.

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[298] Ibid, p. 22.

[299] Staley, p. 30.

The foregoing case studies serve as examples of the types of UN-mandated or even unilateral MCM operations which NATO's MCM forces may be called upon to perform in the future. Similar scenarios can be developed for other regional areas including the Indian Ocean, the Mediterranean, Korea, and most notably, the Middle East. The intent of this section is not to provide an assessment of the world's potential geo-strategic "hotspots." It is solely an avenue by which the possible scenarios necessitating the employment of NATO's MCM forces discussed earlier in this chapter may come to pass in today's increasingly uncertain and unstable strategic climate.

## H. MCM IN EUROPE'S EMERGING DEFENSE IDENTITY

Western Europe's gradual movement over the past four years away from dependence on US security guarantees and toward deeper integration within the European Union have driven the evolution of a new security strategy and motivated the debate over the need for, and role of, a European defense identity.[300] Some European nations, most notably Britain and the Netherlands argue that this defense identity should primarily evolve within the framework of the NATO Alliance. Other nations, most notably France, are examining the possible role of the WEU in contributing to European security and the development of an independent defense structure outside of NATO. Still other nations favor some combination of both concepts that allow the EC to act as a single political entity within the Alliance without geographical or functional limits on its charter.[301]

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[300] Scott Harris, *European Defense and the Future of Transatlantic Cooperation,* 1993, p. 5.

[301] Jacques Delors, "European Unification and European Security," *Adelphi Paper 284,* January 1994, p. 10.

Whatever the eventual form of the European defense identity, three major elements will be required to ensure its success. First, the WEU must emerge as an institutional framework for defense collaboration, and play a more active role in coordinating its member's future activities outside of NATO. Second, any future defense identity must involve closer cooperation in defense procurement to shepherd scarce resources, avoid duplicity of effort, and promote commonality in weapons systems. Third, it must maintain the health of Europe's defense industries and research and development programs. European MCM as a warfare area has been in the forefront at all three of these levels in the shaping of Europe's security identity. This assertion may appear at first to be somewhat of an overestimation of the contribution of MCM in this area. Therefore, a more detailed analysis is warranted.

**1. MCM and the WEU**

The WEU is currently being developed simultaneously as the defense component of the EU and as a means of strengthening the European pillar of the NATO Alliance.[302] As such, it is now the most visible embodiment of ESDI. Europe's MCM forces have been closely associated with the reemergence of the WEU since its reactivation following the Rome Declaration in 1984. MCM first served as a conduit in the revitalization of the WEU following Iranian mining in the Persian Gulf and Gulf of Oman in 1988. This crisis demonstrated that Europe did indeed have requirements for naval defense outside of NATO which did not necessarily coincide with those of the United States. In this case, the various European states wished to maintain their own national policy nuances, both toward the Gulf

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[302] Ministry of Defence (UK), *Statement on Defence Estimates,* London, April 1994, p. 16.

states and the United States.[303] Following a special meeting of senior officials of the defense and foreign ministries of the WEU states, France Belgium, Italy, and the Netherlands took their national decisions to send MCM forces to the Gulf. It was within this framework that European MCM forces conducted the first-ever concerted naval action outside Europe under the cognizance of the WEU.

Since 1988, the WEU has gradually expanded its activities both operationally (participation in the Gulf War and former Yugoslavia) and politically (moving its headquarters to Brussels). The growing role of the WEU in coordinating European MCM operations occurred most recently during post-Desert Storm mine clearance operations in the Arabian Gulf. This highly successful operation accounted for over 1,300 Iraqi mines, and involved MCM flotillas from France, the United Kingdom, the Netherlands, Belgium, Germany, and Italy. Germany's participation in the MCM operation was significant in that it represented the *Bundeswehr's* first participation in such an out-of-area operation coordinated by the WEU. During the operation, European MCM forces once again operated in conjunction with but independently of US MCM forces outside the NATO framework.

The precedents set and the lessons garnered from these collaborative MCM operations laid the groundwork for the conduct of WEU coordinated out-of-area naval operations which are being implemented today in the Adriatic. Finally, if recent history is any indication, Europe's MCM forces may soon find themselves again operating jointly under WEU auspices in support of European security interests in the Adriatic, the Middle East, or elsewhere.

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[303] Grove, p. 64.

### 2. Weapon System Procurement

Economic realities - such as declining defense budgets and the growing need to share the costs and risks of developing and manufacturing new generation weapon systems - are increasingly driving European arms production. Moreover, increased armaments cooperation within Europe is seen as a means toward achieving increased levels of standardization and interoperability among its military forces.[304] To date, the aerospace and electronics defense sectors have led the Europeanization of previously nationalized armament industries. Some of the most prominent examples include the Euromissile in the 1970s, the Tornado fighter in the 1980's, and more recently, the Eurocopter program. Somewhat surprisingly, European integration in the design and production of combat ships have lagged behind other defense sectors and are still primarily structured along national lines.[305] Nevertheless, European collaboration in successful joint development projects involving MCM ship design and construction as well as associated countermeasures systems has set the stage for increased numbers of collaborative ventures in other naval warfare areas.[306]

Currently, several collaborative MCM efforts are in progress or under consideration among various EC members. France and Britain are entering preliminary discussions on the joint development of a new oceangoing minesweeper as are the Dutch and the Belgians. In the electronics field, the United Kingdom, France, and the Netherlands are developing a

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[304] Bitzinger, "The Globalization of the Arms Industry," p. 190.

[305] Elisabeth Skons, "The Internationalization of the Arms Industry," *Annals*, 535, September 1994, p. 49.

[306] The French-sponsored *Tripartite* program is the best-known example of many successful European joint efforts within the MCM warfare area.

parametric buried-mine detection sonar under the tri-national Experimental Parametric Mine Detection Sonar (EPMDS) Joint Naval Committee.[307] Finally, several European nations recently collaborated in the funding, development, and production of a first of its kind mine warfare simulator located at *Eguermin* - NATO's only warfare school run jointly by two allied navies.[308] This simulator can reproduce environmental conditions in any region of the world and simulate MCM vessels and mine hunting systems of every NATO member country. The simulator will serve a two-fold purpose. First, it will save precious defense funds by allowing ships to train without the requirement of costly underway time at sea. Second, it will allow MCM crews to train in operational scenarios that are not possible to encounter in European waters or would otherwise be too dangerous to perform under actual training conditions. The European Union has explicitly promoted intra-European arms collaboration as part of its quest for a common defense identity.[309] A recent European Parliament resolution in support of a European Defense Agency that would eventually centralize all European arms purchases is rapidly gaining support in many European capitals.[310] Although the concept of multinational naval arms procurement, such as the forthcoming trilateral *Horizon* air-defense frigate, is relatively new, such is not the case within Europe's MCM

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[307] Foxwell, "MCM Philosophies," p. 879.

[308] Guy Toremans, "A School for Mine Warfare," *Navy International*, February 1994, p. 114.

[309] Trevor Taylor, "Western European Security and Defense Cooperation: Maastricht and Beyond," *International Affairs*, January 1994, p. 2.

[310] Tigner, "Europe Edges Toward Unity," p. 28.

establishment which has been at the vanguard of joint European development programs for many years.

### 3. Defense Technology

Europe currently leads the world in the area of MCM ship design and construction, sweep system development, and mine technology. Furthermore, MCM is one of the few defense industries where Europe holds comparative advantage vis-a-vis its international competitors in the overseas export market.[311] The growth of the MCM export industry following the Gulf War has been a bonanza for many leading European shipbuilding nations. The effectiveness of Iraq's mine campaign during combat operations in the Persian Gulf, and the potential escalation of mine terrorism is compelling many Third World countries and NICs to acquire MCM vessels for protection of their naval bases, ports, shipping lanes and popular tourist routes.[312] Since 1988, West European shipbuilders have built and exported over 60 MCM vessels to various NIC, Third World, and Middle Eastern countries with more on order.[313]

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[311] European designed and constructed MCM ships and equipment dominate the global export market. Malaysia, Nigeria, and South Korea have acquired Italy's *Lerichi*-class MCMVs for their respective MCM fleets. Saudi Arabia and Kuwait have purchased British *Sandown* mine hunters and Indonesia and Pakistan operate French *Tripartites*. Singapore has recently ordered Sweden's *Landsort*-class MCMVs as part of their naval modernization program while several countries have shown interest in German-built *Type 343* MCM ships including Thailand, Venezuela, Brazil and Turkey. A. Preston, "Minehunting and Mine Hunters," *Naval Forces* No. I, 1994, pp. 24-33.

[312] Mustafin, p. 16.

[313] Ibid, p. 16.

Europe's near global monopoly of MCM ship design and construction is likely to continue well into the next century. Most shipyards outside Europe remain wary of venturing into the MCMV market because of their reluctance to invest in sophisticated and costly GRP construction facilities or train the highly skilled labor force required for GRP ship molding.[314] Moreover, research and development costs associated with entry into the electronic-intensive field of MCM systems and equipment such as sonars, ROVs and SAUVs are prohibitive given the increasingly complex nature of today's mines. For these reasons emerging NICs - which have aggressively pursued the development of indigenous armaments programs in other sectors - have been content to purchase MCM vessels and systems from European suppliers rather than pursuing domestic production. Even the United States has found it necessary to procure European-designed non-magnetic engines for its *Avenger*-class MCMVs and has incorporated Italian GRP hull design for the *Osprey*-class coastal mine hunter.[315]

As Europe consolidates its defense programs, MCM should continue to hold its position of importance within the European defense industry in view of the growing recognition of mine warfare as a first-class threat among the world's maritime nations, and Europe's unchallenged industry leadership in mine warfare technology development and export production.

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[314] Todd, "Mine Warfare in the Third World," p. 112.

[315] Mine Warfare Plan, p. 54.

### 4. MCM as a Model for ESDI

From a US perspective, it is entirely in the its interest for European countries to assume greater responsibility for their own defense in view of the present relative stability on the continent.[316] A unified European defense structure allows the US to safely scale down the magnitude and expense of its Cold War commitment to Europe while still remaining engaged. Moreover, like-minded nations, including NATO states, may not always agree on which regional crisis deserve attention. Consequently, a strong ESDI allows Western Europe the necessary latitude to intervene militarily in certain regional crisis where the United States may wish to abstain from direct involvement or may simply not be invited to participate.

If Western European navies wish to develop a capability for crisis response outside the region independent of the United States, however, they must integrate forces and develop joint command arrangements that go well beyond current plans. Europe's MCM forces should continue to figure prominently in this aspect of the evolving ESDI. The proven interoperability within Europe's MCM forces and the near universal support of and identification with MCM among the various EC nations makes it an obvious foundation on which to pursue the more controversial issues relating to military integration within Europe.

## I. SUMMARY

This chapter has provided an overview of the present and future role of MCM in NATO's post-Cold War navies. The demise of the Soviet Union and with it the threat of a large-scale European general war has not diminished the importance of this role in today's unstable global environment. The growing proliferation of advanced mines to potentially

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[316] *National Security Strategy of the United States*, August 1991, p. 7.

hostile Third World nations and stateless organizations has only increased Europe's vulnerability to the economically debilitating effects of mining both at home and abroad. Europe's continued dependence on imported oil from the Middle East is but one example. Furthermore, the growing propensity for NATO involvement in out-of-area international crisis management, including UN-mandated peace-keeping operations, requires the continued maintenance of a credible MCM capability to ensure the safety of national and coalition assets and to ensure continued international freedom of the seas.

Historically, the mine has provided smaller naval powers the capability of countering the superior navies of their enemies or denying them unhindered command of the seas. Recent conflicts such as Desert Storm have only served to reinforce this axiom. Consequently, despite ongoing reductions in defense spending, European nations must continue to invest in the research and development of new MCM systems capable of countering the rapid innovations in mine technology. This does not necessarily mean more money, but rather better management of resources and closer cooperation in all phases of procurement among the various nations. For its part, the United States must better integrate its own MCM assets, and particularly its AMCM forces, with its European partners through regularly scheduled transatlantic deployments and active participation within STANAVMINFOR.

Finally, as a warfare specialty, MCM should continue to be a standard-setter in the ongoing evolution of ESDI. Its proven track record of successful interoperability between respective forces, commonality of weapons systems, and world leadership in technological innovation offers a strong foundation on which Europe can build.

# VII. CONCLUSIONS AND RECOMMENDATIONS

## A. INTRODUCTION

More than 200 hundred years after David Bushnell first cabled together a double line of contact "torpedoes" to attack the British frigate *Cerberus,* modern descendants of these primitive mines still pose a significant risk to maritime freedom of the seas and the ability of naval forces to project power from the sea. In the age of "information warfare" and the so-called "new revolution in military affairs," Western navies must still grapple for methods to counter World War I vintage mines laid by vessels "designed at the time of Christ." As post-Cold War naval doctrine moves beyond the classic sea power theories of Captain Alfred Thayer Mahan toward regionally oriented littoral power projection, the sea mine will emerge as a major impediment to naval operations and the free-flow of maritime commerce in inshore waters and the narrow seas. This thesis has analyzed the implications of the global proliferation of advanced mine warfare hardware and technology in today's unstable international environment, and examined NATO's role in countering this threat not only in North Atlantic waters, but globally if necessary. Today's mine threat is unique in one key respect - although a growing litany of Third World nations possess or have access to the poison (mines) only NATO's maritime nations are capable of administering the antidote (MCM). Paradoxically, NATO's continuing predilection toward developing new and more sophisticated sea mines, places at risk its ability to adequately counter these very same mines should the need arise in the future.

## B. GENERAL CONCLUSIONS

Today's international mine threat must be analyzed from both military and economic viewpoints. Militarily, mines pose a significant threat to sea control and battlespace dominance critical to littoral naval operations. In this environment, the unknown threat posed by mines can negate the inherent advantages of strategic agility, surprise, and maneuver, vital to US and Allied military doctrine and strategy. Clausewitz warns of postponing action in time and space to a point where further waiting brings disadvantage.[317] One can appreciate the potential difficulties involved if enemy forces are allowed to fortify and reinforce beachheads while Alliance amphibious forces remain bogged down, clearing and navigating mined waters. Moreover, success in a major regional contingency is dependent largely on the unhindered seaborne delivery of heavy equipment and sustained logistical resupply. The closure of strategic SLOCs by enemy mining could significantly delay the arrival of prepositioned and surge sealift assets critical to the sustainment of Alliance or coalition military operations. Consequently, future naval expeditionary operations, regardless of the pretext, will require readily available MCM forces capable of countering, or at the very least, reducing the threat posed by unforeseen enemy mining.

Economically, we live in an increasingly interdependent world in which transoceanic trade accounts for 90 percent of international commerce.[318] The mining and subsequent closure of strategic maritime trade routes and key commerce ports will not only disrupt the economies of adjacent states, but also resource dependent Western nations as well. In

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[317] Carl Von Clausewitz , *On War*, 1984, p. 530.

[318] Naval Doctrine Publication 1, *Naval Warfare*, p. 3.

today's unstable international setting, potential conflicts can be found throughout virtually every regional littoral: along the Mediterranean, Adriatic, and Black Seas, in the Arabian Gulf, throughout the Indian Ocean, and in Northeast and Southwest Asia. While these conflicts may not involve NATO member states directly, the global impact of intraregional mining campaigns may compel NATO to intervene unilaterally in areas where its security interests are at risk, or as a contributing element to UN peace-keeping missions or humanitarian operations. Finally, the economic threat posed by today's advanced mines is no longer limited to individual nation-states. The availability of these mines to subnational organizations means that enterprising terrorist cells, insurgent groups, or criminal organizations may soon take advantage of the enormous psychological impact presented by the mining of vulnerable maritime terminals or tourist locales.

Recent events in the Arabian Gulf have highlighted Western economic and military vulnerability to even haphazard mining operations, and the inability of the US Navy alone to provide an adequate MCM capability. The complexity and cost of the MCM platforms and systems required to effectively prosecute advanced modern mines has progressed to the point where few, if any, nations can afford to have enough MCM assets to meet its security needs unilaterally. Now more than ever, international mining contingencies require the collaborative efforts of multinational MCM forces to adequately counter today's sophisticated mine threat. From a US perspective, collaborative MCM operations under the cognizance of NATO or the UN lend legitimacy to US interests and also reduce the burden of undertaking overseas naval action unilaterally. However, if the United States Navy is

to orchestrate coordinated Alliance MCM operations in the future, it must first assume the same leadership role in mine warfare that it has in other naval disciplines.

## C. SPECIFIC FINDINGS AND CONCLUSIONS

Specific findings and conclusions of the thesis are these:

### 1. Mine Warfare Strategic Culture

In the past, Western Europe has placed a greater premium on maintaining an adequate MCM capability than has the United States. The divergence between the two sides of the Atlantic in their perceptions of mine warfare's relative importance in national security affairs can be traced to each region's differing interpretation of its historical, strategic, and economic vulnerability to mining. Europe's focus on their perceived mine warfare vulnerability has resulted in continued emphasis on MCM programs to adequately protect their national interests. Conversely, America's Cold War maritime strategy centered primarily on open ocean confrontation with the Soviet Union. As a result, the Navy assessed the development of only minimal MCM as less risky than limiting other warfare areas.

### 2. Mine Warfare Proliferation

Unmonitored global proliferation of advanced sea mines to the developing Third World, and, indirectly, to subnational organizations, increases the potential threat to continued freedom of the seas and the national security of NATO's maritime nations. The concurrent proliferation of diesel- electric submarines worldwide further compounds the problem. Moreover, while the Third World's mine warfare capability is formidable its mine countermeasure capability is nonexistent.

### 3. Terrorism

Mines may soon become the new weapon of choice for today's increasingly sophisticated terrorist cells and insurgent groups worldwide. These stateless actors have rarely adhered to customary or conventional international law. There is little evidence to suggest that they will honor international laws concerning the use of sea mines if and when they employ these weapons in support of their political, economic, or ideological aims.

### 4. International Law

International law does not adequately address the legal implications of mine warfare in time of peace or during periods of armed conflict. Current deficiencies in the various internationally recognized treaties and conventions which codify customary international laws of the sea governing the use of sea mines continue to challenge even noted scholars of maritime law, and have created notable "gray areas" which can be exploited by states seeking justification for potentially destablizing mining activities. These inconsistencies will continue to lead to a wide range of differing legal interpretations with respect to the uses of sea mines among the world's maritime community until a more comprehensive convention is developed.

### 5. Current Mine Warfare Realities

When analyzing the likely occurrence of maritime mining on the global stage, it is important to consider the enormous disparity between those nations possessing the capability to plant offensive, defensive, or protective minefields and those nations with the ability or inclination of clearing them either during or following the cessation of hostilities. With the

exception of Japan, only NATO possesses the capability to adequately counter worldwide maritime mining threats. Moreover, NATO is the only institution capable of conducting extensive MCM operations globally.

**6. Expeditionary Warfare**

NATO can expect future adversaries to exploit mine warfare weaknesses exposed during the Gulf War. The recent successes of the Iranian and Iraqi mining campaigns have not been lost on other potential adversaries. NATO will doubtless face the threat of sea mines during future military operations in support of Western or international security interests in today's unstable international environment. Ships such as the *Samuel B. Roberts* and *Princeton* continue to serve as cogent reminders of the potential destruction meted out by the "weapon that waits."

**7. MCM in NATO's Post-Cold War Navies**

Changes in Europe's strategic environment have brought about a fundamental reorientation of NATO's larger navies toward the development of a robust expeditionary capability. Despite the development of a more autonomous and self-reliant WEU, NATO remains the only alliance capable of exercising sustained naval power projection or conducting peace-keeping/enforcing missions globally. As such, the Alliance will remain as the primary organizing mechanism for out-of-area naval collaboration in the foreseeable future.

Against this backdrop, NATO's MCM forces can perform five primary missions: ensure North Atlantic waters are free from the threat of sporadic terrorist or insurgent mining activities; defend against Europe's economic vulnerability to mining from latent regional

hegemons-including Russia; support NATO's Immediate Reaction standing naval forces; contribute to Alliance, or UN-mandated peace-keeping/enforcing missions or expeditionary operations worldwide; and finally, reduce the potential threat posed by mines to NATO's nuclear submarine forces. Common to many of these duties will be the requirement to provide an effective shallow water MCM capability during NATO or ad-hoc coalition operations in the littoral regions of the world.

## D. RECOMMENDATIONS

The following recommendations deal with mine warfare issues specific to the US Navy as well as to NATO. Implementation of these recommendations will enhance US and Alliance rapid deployment MCM capabilities should the need arise in the future.

### 1. United States Naval Strategic Culture

#### *a. Mine Warfare Expertise*

During the Cold War, senior US naval officers could afford to be less than proficient in the art of mine warfare. However, in abdicating MCM responsibilities to European allies, American naval leadership also squandered its mine warfare expertise and corporate memory. This lack of flag-level mine warfare experience was evident during the Gulf War. In theater command level knowledge of MCM was virtually nonexistent and resulted in mismanagement and poor command and control of the US MCM forces. As the US Navy tailors its future force structure and doctrine toward littoral operations, improved mine warfare expertise at the flag level becomes imperative if the United States is to assume a position of leadership in future Alliance or coalition MCM operations.

### *b. Mine Warfare Training*

The US Navy's failure to foresee the emerging role of mine warfare in regional contingency operations and the requirements for an MCM force structure to meet this challenge clouded its threat perceptions and therefore its training priorities. Historically, participation by MCM units in fleet exercises has been rare due to funding constraints and extended transit distances. Future fleet exercises must physically integrate MCM into operational scenarios. All too often, exercise mine threats are simulated and subsequently removed when they pose an excessive problem or delay "more pressing" training objectives. It is highly unlikely, however, that future adversaries will be as accommodating when their minefields stymie US or Alliance naval operations. In real life, mines do not simply "go away" when they become a nuisance. We must train like we will fight.

### *c. Mine Warfare Funding*

The US Navy's new strategic vision is codified in . . . *From the Sea* and its follow on companion, *Forward . . . From the Sea*. Yet to effectively carry out the missions outlined in these documents entails a shift away from the practices of blue water naval operations toward providing our naval forces with the equipment and training necessary to execute the new littoral strategy. Unfortunately, our recapitalization strategy continues to focus on improving the areas where we presently have an overwhelming dominance (power projection) while neglecting areas in which we are potentially vulnerable (sea control and battlespace dominance).[319] Although the US Navy has committed increased resources toward rectifying acknowledged shortcomings in its MCM program, current outlays ($320 million)

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[319] Schnell, p. 147.

still account for less than one half of one percent of the Navy's total budget. Future funding levels for MCM must demand a level of priority befitting the mine's emergence as a world-class threat to Western security. Moreover, funding decisions for MCM programs should be coordinated through the operational commander, COMINEWARCOM, rather than strictly in the Washington arena.

### 2. Transatlantic MCM Cooperation Within NATO

#### *a. Intelligence*

The mining of the USS *Tripoli* and later the *USS Princeton*, in waters believed to be free of mines was largely attributable to inadequate intelligence on the size and location of the Iraqi minefields. These events highlight the requirement for increased intelligence on and surveillance of international mine warfare capabilities by NATO's intelligence-gathering community. Moreover, Alliance members must share mine warfare intelligence, particularly concerning mine exploitation data and human source intelligence on Third World mine warfare capabilities, inventories, and storage locations.

#### *b. MCM Doctrine Within NATO*

NATO must shed outdated Cold War doctrine and update MCM exercise scenarios that continue to focus on large scale enemy mining campaigns directed against Western European waters. Collectively, NATO must understand that MCM is now primarily an enabling element for expeditionary sea control, power projection, and peacekeeping/enforcing operations. Consequently, greater emphasis must be placed on developing rapidly deployable MCM flotillas capable of conducting out-of-area MCM operations on short notice. Tactically, NATO should improve its present influence sweep

capability to complement recent advances in minehunting technology.

*c. Multinational MCM Cooperation*

US MCM forces must integrate into Western Europe's established mine warfare community in order to facilitate multinational out-of-area MCM operations in the future. This is especially true with respect to US AMCM forces, which rarely train with European MCM units. Closer cooperation with European allies in MCM exercises emphasizing both benign and hostile littoral operations will increase tactical proficiency and establish a foundation for professional familiarity crucial to success in future real world contingency operations. Furthermore, NATO's MCM forces must also conduct out-of-area exercises in the regions where they are likely to be employed in the future, such as the Arabian Gulf. In other words, they must train where they will fight.

**3. Bottom Line**

Many of the foregoing recommendations require increased political as well as military commitments on both sides of the Atlantic at a time of acknowledged military drawdowns and dwindling defense resources. Nevertheless, success in today's regionally oriented security environment depends largely on the capability and credibility of NATO's collective MCM forces to deal with the ever-increasing global mine threat. Increased transatlantic MCM cooperation will foster improved levels of coordination, interoperability, and readiness among the respective European and North American MCM forces necessary to meet these challenges into the next century. As the acknowledged leader within NATO, the United States must assume the lead in prioritizing mine warfare as a critical warfare area not only within the US Navy, but also within the Alliance as well.

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