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JOINT FORCES STAFF COLLEGE
JOINT ADVANCED WARFIGHTING SCHOOL

DON'T FORGET ABOUT DEDICATED SEA MINE
COUNTERMEASURES

by

Malcolm H. Potts

LCDR, United States Navy

A paper submitted to the Faculty of the Joint Advanced Warfighting School in partial satisfaction of the requirements of a Master of Science Degree in Joint Campaign Planning and Strategy.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Joint Forces Staff College or the Department of Defense.

Signature: _____

13 May 2005

CONTENTS

ABSTRACT.....	3
SCENARIO FOR DISASTER.....	4
HISTORY.....	7
CURRENT FORCE.....	14
THE WAY AHEAD.....	17
IMPORTANCE OF MINE COUNTERMEASURE.....	22
FORCE DEPLOYMENT.....	26
THREAT TO AMERICAN ECONOMIC SECURITY.....	54
DEFENDING THE HOMELAND.....	64
CONCLUSION.....	67
RECOMMENDATIONS.....	68
CLOSING.....	72
BIBLIOGRAPHY.....	73

Abstract

America's reliance on the seas cannot be overstated. The U.S. depends upon the ocean as both the highway for force deployment and as the medium for global economic security. Free access to the waterways of the world determine the United States' ability to survive and prosper. The threat and the employment of sea mines are capable of interrupting the U.S. quest for national and economic security.

Struggling through the Korean Conflict, the U.S. Navy began a slow improvement of MCM forces leading up to the first Gulf War where experiences led to the conclusion that a well equipped dedicated MCM force structure is essential. In the decade which followed, the Navy nurtured a dedicated MCM force that was capable of fully supporting COCOM requirements and combat proven in OIF.

Ironically, prior to OIF, the U.S. Navy began to consider a future plan that features the substitution of proven, dedicated MCM forces with technology-leveraged OMCM forces. This move could leave the COCOM/JFC with a vulnerability gap that would be created by the divesting of dedicated forces prior to OMCM platforms being capable of conducting the mission.

Specifically, the U.S. Navy's planned organic MCM force has three weaknesses: even with advanced technology the inventory is too small, the reliance on favorable risk and intelligence analysis results is too great, and the heavy reliance on sealift for deployment is not supported by future MCM force structure.

To prevent the vulnerability gap and cover the weakness, the U.S. Navy should field a robust dedicated MCM force beyond the currently planned timeline to ensure the successful mission completion of the COCOM/JFC.

SCENARIO FOR DISASTER

The year is 2020. A keenly focused campaign to disrupt the major shipping lanes of the world by Al Qaeda and a shadowy faction of the Indonesian terrorist group Jemaah Islamiyah comes to fruition. Two of the seven major maritime chokepoints are covertly seeded with a mix of acoustic and contact sea mines, many of which are mal-deployed and become near surface floating explosives. This coordinated effort by small teams of maritime terrorists results in the strategic placement of 50 mines in the Straits of Malacca and Straits of Hormuz. Unaware, the first of several 300,000 ton super oil tankers en route to eastern Asia approaches the dangerous and congested western chokepoint entrance of the Straits of Malacca. A thunderous explosion is reported as one of the mines is triggered by the massive acoustic signature of the tanker. The blow is devastating and cracks through the outer and inner hulls of the tanker. Immediately the large vessel begins to take on water and spill its thousands of barrels of crude oil into the sea. Within hours, as the ship goes dead in the water, swings to the right and begins to sink, it partially blocks the channel and forces other vessels to reverse course.

Several hours later, one of the U.S. Navy's new Littoral Combat Ships (LCS) collides with a partially submerged contact mine while conducting Maritime Interdiction Operations (MIO) in the Straits of Hormuz. The effects are horrific; 25 officers and Sailors are killed and the ship is sunk with a state-of-the-art Mine Countermeasure (MCM) module package and one MH-60S helicopter aboard.

The situation becomes even more serious with two new reports of suspicious activity. First, mine-like objects are found in the waters surrounding the Nigerian port of Lagos. Second, pictures are posted on Al-Jazeera's website of what appears to be men of Middle Eastern descent on an unidentified small vessel dropping mine-like objects into the waters of American sea ports.

Could this hypothetical scenario become true in the near future? Could 50 mines and knowledge to deploy them get into the hands of a terrorist? Would terrorists have the desire to carry out an attack of this magnitude? Finally, what would be the overall impact on United States national security? Although the above scenario is fictional, the dangerous facts about the asymmetrical use of sea mines are not. In terms of availability, cost-effectiveness, ease of deployment, and potential impact on world trade and economies, mines are perhaps the most attractive weapons available to any country or group for disrupting the vital global sea lanes of communication.

The number of countries possessing sea mines, the capability for manufacturing them and the intention to export those mines has grown dramatically in the last decade. With over 300 variants of the weapon, more than 50 countries currently possess sea mines and mining capabilities while multiple other countries are attempting to acquire sea mines from the untold number of exporters. (Erwin, 2002, p. 1) In addition, the types, sophistication, and lethality of the mines available on the world market are rapidly increasing. One of the most disturbing issues is the overall accountability of sea mines. As a single example, US intelligence services believe that scores of acoustic sea mines, found to have disappeared from a naval base in North Korea by a U2 spy plane, could be aboard bin Laden's fleet of 15 terror ships (No Author-World Net Daily, 2004, p. 4)

Who would handle this maritime disaster? Obviously, the U.S. Navy would be charged with removing the threat to homeland ports and the vital international waterways. Will the MCM forces of the U.S. Navy be equipped, trained and ready to solve this global problem? Furthermore, would employment of sea mines by a terrorist group or enemy nation result in the

Joint Force Commander (JFC) being unable to ensure that National Security Strategy (NSS) objectives and U.S. economic desires are fulfilled?

The history of the U.S. Navy mine warfare is marked with periods of greatness and moments of near disaster. This history is also marked with a variety of tactics and equipment as well as vacillating commitments to force structure and funding. However, the past decade has seen the culmination of an effort to train and equip a highly effective and efficient dedicated MCM force capable of defeating large mine threats. As this nurtured force begins to reach the end of its service life, it is scheduled to start a slow transformation from a heavy dedicated force to a smaller, technologically-leveraged, organic MCM force. As the U.S. Navy divests from a dedicated “911” MCM force, these transformational organic or integrated platforms will meld with Navy’s Sea Power 21 principles of Sea Basing, Sea Shield, and Sea Strike. Focusing mainly on Sea Shield, future MCM forces will play an enormous role in all of the principles as the U.S. Navy provides the JFC the access his forces need to decisively win in combat. During peacetime, this same MCM force will focus on maintaining free and open lines of communication, global trade routes, and safe maritime operations void of asymmetrical sea mine threats while preserving national security and vital U.S. economic interest.

However, uncertainties and indecisiveness concerning the future force structure and concept of operations of the U.S. Navy’s MCM force have resulted in possibly dangerous gaps in capabilities that could have monumental affects on the JFC’s ability to decisively win in combat. Specifically, MCM capabilities as currently planned for the 2015 to 2025 timeframe will leave a vulnerability due to future structure design, lapses in capable platforms, and over estimations of technological advances. This vulnerability can be exploited by the enemy. The result will render the Combatant Commander and Joint Force Commander unable to successfully accomplish and

preserve National Security Strategic objectives and promote global economic interest.

Therefore, the fielding of a robust dedicated MCM force beyond the currently planned timeline is essential to ensure success.

After a brief history of mine warfare, this paper will thoroughly discuss the current MCM force structure and the unique characteristics of MCM, which will be followed by the “way ahead” for U.S. Navy MCM forces. That in turn will be followed by a detailed analysis of the effect that mine warfare has on force deployment, homeland security, and the global economy. Next, the impacts on those areas will be related to the COCOM and JFC tasks of war-fighting and upholding the tenets of the NSS and global economic interest of the United States. Finally, a detailed discussion of recommendations to enhance the U.S. Navy’s long-term MCM plan will be presented.

HISTORY

Since the beginning of modern warfare, the sea mine has been one of the most ominous weapons, hidden while silently awaiting its victim. This insidious weapon capable of momentous impacts can be traced to as early as the American Revolution. In 1777, David Bushnell gained the blessing of George Washington to employ his gunpowder keg against British warships. (Hartmann and Truver, 1991, p. 17) Bushell, a Yale student, claimed that the keg could cause great damage to a ship or even sink certain vessels. Barring rude floating explosives, this keg was the oldest known productions of the sea mine. Even though the actual application of the mine failed, the concept had been born. (Ibid, p. 17-18)

The failure of the first mine temporarily slowed the desires of leadership to operationally employ the device but did not slow the development of future mines. In 1810, Robert Fulton

attempted to use an underwater bomb (the first known moored mine - a mine that is connected to a sea floor anchor system via a line) to destroy a sloop. In what was most likely the first known use of mine countermeasure equipment, the Captain of the sloop deployed a crude shielding net that prevented the mine from detonating. (Ibid, p. 29) Both Bushnell and Fulton's developments revolved around the idea of striking ships' hulls with an explosive device commonly known as the contact mine concept. However, their "torpedoes," as they called them, were not usually stationary objects laid in fields like modern sea mines. Many of the early variants of the weapon were propelled to their targets by currents, harpoons, boats, or underwater craft. (Ibid, p. 31)

After these failures of sea mines, the mid 1800's saw the perseverance of Samuel Colt. The later inventor and manufacturer of the Colt Revolver approached the U.S. government with plans for mines detonated by electrical signal from observers on shore. Colt's system used an electrical current to heat a strip of exposed wire, which then ignited the black powder in the mine. He demonstrated his system to President John Tyler, his Cabinet and military officials by sinking a schooner on the Potomac River in 1842. Impressed, Congress voted to fund additional experiments and demonstrations. (Melia, 1991, p. 8-9) With improvements in his timing and technique, he sank several more stationary and moving ships during the course of his experiments, proving that his concept could be potentially valuable for U.S. harbor and coastal defenses, offensive warfare and defensive posturing. Unfortunately, Colt kept his designs and innovations close hold which resulted in the U.S. halting funding for Colt's work in 1844. (<http://www.exwar.org/Htm/8000.htm>, 2004) To the dismay of some, U.S. interest in controlled minefields - and mine warfare in general - waned until the Civil War. (Ibid, p. 4).

Categorized mainly as an irregular tactical weapon prior to that point, sea mine technology did not improve greatly during the American Civil War. However, sea mines began

to be used in the strategic and operational as well as the tactical arenas. The Confederate use of mines at the opening of Mobile Bay was designed to have an impact on the western front by disrupting the flow of supplies to Union forces along the Mississippi River. This use of mines combined with land fortifications proved to be only a nuisance to Union shipping, and Commodore Farraugut was able to evade the mined areas at the mouth of Mobile Bay. (Melia, 1991, p. 14). In areas other than Mobile Bay, the Confederate minefields displayed a dual use; the mines were used both tactically as a herding tool to get vessels in firing range of land-based guns and strategically to prevent much needed supplies from reaching Union units upriver in hopes of strangling them out of the war. (Ibid, p. 14)

During the same time period, the use of the sea mine grew in popularity worldwide. Although the technology was changing very little, the rate of employment greatly increased and sea mines began to emerge as a favored strategic, operational and tactical maritime weapon in Europe, South American and Asia.

In one of the first demonstrations of how mines could be used as a deception tool, the Prussians, in 1870, advertised defensive mining to keep the French out of their harbors; the mines were actually dummies but had a tremendous psychological effect. (Ibid, p. 17) Later, the Turks laid mines in the Dardanelles to prevent the deployment of Russian troops to the Black Sea, displaying how mines had begun to become valuable to the joint commander and steadily climb to the position of an invaluable force multiplier. (Ibid, p. 17) By World War I, the strategic significance of the sea mine began to take hold with the German seeding of mine fields along European and the American coasts in hopes of having catastrophic effects on shipping inbound to Europe in support of the war effort. However, the German efforts were met by

monumental British and American advancements in mine clearance operations, much of which was completed in the unforgiving waters of the North Atlantic. (Ibid, p. 28)

World War II brought new challenges in minesweeping for the Force Commanders in all theaters. In early 1942, the waters off Delaware Bay, Chesapeake Bay, Jacksonville (Florida), and Charleston (South Carolina) were mined with small fields sown by German U-boats. (Ibid, p. 51) The fields closed the ports for several days until MCM units completed the mammoth task units of eliminating the mines. Even though the ports were closed for only a short period, these minefields presented significant strategic effects by preventing mobilization and deployment of some forces to the European Theater. Moreover, the close proximity of the minefields had an enormous psychological impact on the U.S. military and the American public. To further exacerbate the tenuous maritime situation on the east coast of the United States, the German submarines returned in June of that same year and again mined the entrance to the Chesapeake Bay, resulting in the sinking of two ships, damage to one and the sealing off of the strategic ports of the Chesapeake Bay for four days. (Ibid, p. 51) In the Pacific, U.S. Navy minesweepers saw action in such places as Leyte Gulf, Lingayen Gulf, Corregidor, Iwo Jima and Okinawa as the Japanese exploited the force multiplying capability of the minefield by inflicting numerous casualties while keeping the aggressive island hopping Pacific fleet at bay for as long as possible. (Ibid, p. 61)

The following section from the book *Weapons That Wait* provides an outstanding description of the evolution of MCM starting just after World War II and continuing into the 1980s:

Relegated to a position of strategic and tactical inferiority in the U.S. Navy throughout much of the post- World War II period, as was the case before the war, mine warfare nonetheless emerged during the 1980s as an effective tool of the disadvantaged states, terrorist groups and great powers intent on political intimidation.

(Hartmann and Truver, 1991, p. 229)

Not understanding the fact that the enemy of the late 1940s to 1950 valued sea mines more than the U.S. Navy valued MCM forces, the robust MCM force that was created during World War II was quickly decommissioned at the completion of clean-up operations. The sudden and unexpected onset of the Korea conflict found the U.S. Navy minesweeping force ill-suited to clear the mine infested waters as required for the accomplishment of major amphibious operations. Many of the minesweeping vessels, like the *USS Incredible*, were returned from the Russian lend-lease program to the U.S. and forced into service after a short rehabilitation in Japan. Taking months to return to combat readiness, many of the minesweepers were thrust into a fleet of rag-tag vessels tasked with clearing the way for major amphibious operations. (Potts, personal interview)

The mined waters of Inchon harbor resulted in dangerous delays to amphibious operations and subsequent challenging warfare obstacles for the force commanders. Had North Korea sown more congested and technically advanced minefields at Inchon, MacArthur would have faced a greater chance of mission failure. After the U.S. amphibious assault at Wonsan was cancelled due to the inability to clear the mines from the Korean coast, RADM Allan E. Emith, who at the time commanded MacArthur's amphibious task force stated, "We have lost control of the seas to a nation without a navy, using pre-World War I weapons, laid by vessels that were utilized at the time of the birth of Christ." (Johnson, 2003, p. 3) (Ibid, p. 3)

Consistently considered a force that is not required for peacetime and minimally required for wartime operations, the U.S. Navy's MCM force has "waxed and waned" over the years in terms of investment and service interest. (Donovan, 2005) The short revival of mine warfare during the Korean War could not overcome the negative momentum created by the U.S. Navy

shortly after World War II and therefore MCM lost much of its funding, experience, and technology.

Minesweeping operations in Vietnam were centered on a strategic offensive move made by the Joint Commander. In an attempt to prevent the flow of supplies into North Vietnam, the U.S Air Force and Navy conducted aerial offensive mining operations in Haiphong harbor. (Melia, 1991, p. 101) The operations were a complete success and prevented strategically important supply ship from entering the harbor to unload. After the conflict was complete and a truce was signed, U.S. forces removed the mines from the harbor as an act of good faith and under the tenets of good international law of sea warfare.

After successes in Operation Nimbus Star, which involved the clearance of mines in the Red Sea and Suez Canal after the October 1973 Middle East War, and in Operation Ernest Will, which involved the escort through and clearance of Persian Gulf mine fields laid by the Iranians during the Iran-Iraq War, the U.S. Navy's MCM force's next major task unfolded in Desert Shield and Desert Storm. (Melia, 1991, p. 111) During those operations, a coalition of MCM forces was faced with the challenge of removing the mine threat areas in the Northern Arabian Gulf (NAG) and the waters around the besieged Kuwait coastline. Had United States Central Command (CENTCOM) desired to conduct an amphibious landing on the Kuwaiti coast, landing forces would have encountered several mine fields while attempting to make an opposed beach landing. Casualties were estimated to have been high, and therefore the landing was reduced to a diversion designed to make the occupying force in Kuwait City believe that U.S. Marines were attacking from the sea. (www.geocities.com/Pentagon/bunker/2170/desertshield_desertstorm.html) Adding insult to injury, the U.S. Navy suffered a significant setback when mine attacks on the *USS Tripoli* (which at the time was the MCM command ship) and *USS*

Princeton caused considerable damage to the two vessels. Even though many of the nearly 1200 mines were improperly deployed, the Iraqis created a considerably formidable and dangerous obstacle to the approaches of the NAG that took U.S. Navy and coalition MCM forces multiple months to remove or neutralize. (Lai, 1998, p. 3) Upon considering the magnitude of effort required to clear the Persian Gulf, the damaging of the two ships, the loss of access to Kuwaiti beaches and the fact that the MCM force was operating with equipment that was over 30 years old, the naval leaders commissioned a campaign to improve MCM capabilities focused on sound training, integrated command and control, improved procedures, quality equipment and new technology.

Just over eleven years later, MCM forces found themselves back in the NAG in support of Operation Iraqi Freedom. A sizeable MCM force was required to secure the waters in the NAG and Iraq to ensure the safe deployment of forces and humanitarian goods for the war effort. Afterwards, the CNO testified before the House Armed Services Committee about the complete success of dedicated MCM forces that were operationally mixed with advanced technology programs designed to remove the man from the minefield:

Our OIF mine warfare efforts cleared 913 nautical miles of water in the Khor Abd Allah and Umm Qasr waterways, opening 21 berths in the Umm Qasr port and clearing the way for operations in the littoral areas of the Northern Persian Gulf and for humanitarian aid shipments into Iraq. These operations included the use of the High Speed Vessel X1 (JOINT VENTURE), Navy patrol craft and six unmanned, autonomous underwater vehicles (AUV) directly from our science and technology (S&T) program in the littoral for special operations and mine clearance operations, and gave us important insights into our vision for both future littoral and mine warfare concepts and capabilities.

(Clark ADM, House Armed Services Committee 2004, p. 3)

CURRENT FORCE

The U.S. Navy's MCM force make-up that deployed to the Persian Gulf in 1991 was similar in size but lacking in capability when compared to today's MCM force. Included in the current very capable force is a highly structured command element known as Commander, Mine Warfare Command (COMINEWARCOM). COMINEWARCOM has three MCM squadrons which are equipped and tasked with leadership of MCM forces and operations throughout the world. The MCM squadron commanders have a variety of dedicated MCM platforms to employ in counter-mine operations.

This highly capable standing dedicated MCM force is comprised of surface, air and underwater forces that operate in unison to form the MCM triad. Included in the surface forces are 14 Avenger-class mine countermeasures ships which employ the AN/SQQ-32 sonar that is capable of detecting, classifying and marking sea mines. Although slow, the Avenger class ship is a superb asset for clearing mines from open sea-lanes and littoral areas. The 12 Osprey-class coastal mine hunters are outstanding platforms to perform coastal mine clearance operations. Adding speed to the equation are two squadrons of MH-53E helicopters totaling 30 helicopters that are ready to respond, in some cases in less than 72 hours, to a mine threat.

(<http://www.nationaldefensemagazine.org/issues>, 2005) These Airborne Mine Countermeasure (AMCM) helicopters bring a full range of identification and neutralization systems to the fight. Coupled with those forces are fifteen explosive ordnance disposal (EOD) units, consisting of 150 divers and support personnel. In addition, Naval Special Clearance Team (NSCT)-1 is standing ready to defeat the most challenging shallow water mine problems with the latest in unmanned underwater vehicles, marine mammals and divers. (Ibid)

A significant portion of the current MCM force was deployed to handle the mine threat during Operation Iraqi Freedom (OIF). Although only a few mines were sown by the Iraqis, the threat of sea mines was very high. Therefore, a full range of the MCM force employment was deployed to ensure that strategic, tactical and operational objectives of two COCOMs were met. Both multi-national and joint U.S forces relied on the successful application of MCM force to ensure the deployment of forces to theater and the access of shipping throughout the campaign. The coalition sent the following mine warfare forces to OIF: 15 MH-53E AMCM helicopters, seven U.S. Navy MCM surface vessels, four British MCM vessels, four British mobile combat dive teams, two Australian combat dive teams, 10 EOD mobile unit teams and NSCT-1 with its marine mammals and advanced unmanned vehicles. (Sparks, 2005) Additionally, the High Speed Vessel (HSV) -2 and the amphibious assault ships *USS Ponce (LPD-15)* and *USS Guston Hall (LSD-48)* were attached to act as MCM support vessels for all of the participating MCM forces. (Ibid)

All the units except for four MH-53Es and three MCM vessels were assigned to Combined Task Force (CTF) 50, who in turn reported to the Joint Maritime Component Commander (JFMCC) in the Arabian Gulf. This robust force was primarily tasked with ensuring that a passage from the Northern Arabian Gulf to the port of Iraqi port of Umm Qasr remained clear of sea mines. Its secondary task was to be on call for any mine threat in the entire CENTCOM area of responsibility (AOR) that would effect the operation or jeopardize the U.S. and coalition interests. (Ibid)

Prior to the start of combat, portions of this force initially surveyed the sea lines of communication (SLOC) leading into the seaports of Bahrain, Kuwait and Qatar. This action was designed to ensure that the region's SLOC were free of mine-like objects. This preparatory work

began several months in advance with forward deployed MCM forces to include 4 MCM surface vessels, 4 AMCM helicopters and two EOD mobile teams supplemented by several British units. (Ibid) This work was critical to the safe passage of 100 percent of forces transiting through the Straits of Hormuz to the ports of the Gulf States.

The remaining MCM forces joined by the *USS Cleveland (LPD-7)*, serving as the MCM support vessel, were deployed to the Eastern Mediterranean and reported to EUCOM's CTF 60, who was tasked with ensuring that the approaches to the Suez Canal remained free of mines. The Mediterranean MCM forces also stood on call for CTF 60 to provide a rapid response force to any access denying mine threat to coalition shipping elsewhere in the theater of operations. (Ibid)

During OIF, this sizeable force was fully employed to assure maritime access and handle any potential mine warfare threat. Although only a small number of mines were placed in Iraqi waters, the MCM operations consumed much of the force's efforts and resulted in humanitarian assistance ships being delayed by a day as mine clearance operations were completed and acceptable risk levels were realized. The sea mine problem could have been much worse and resulted in weeks of delays or even produced chaotic maritime problems. Fortunately, the potential for disaster was averted when Australian Special Forces intercepted a barge with hundreds of Iraqi mines headed for the NAG.

OIF demonstrated the likely course of action and MCM force required to ensure that maritime access is achieved and sustained for JFC. Knowing that nearly 70 percent of the U.S. Navy's MCM force was called to action for OIF, the vital question is: what kind of force structure and systems will be required to accomplish a mission of the magnitude of OIF or a

more involved mission such as the defense of the Korean Peninsula or a Homeland Security issue?

THE WAY AHEAD

Our future MCM capability will be faster, more precise and organic to both Expeditionary and Carrier Strike Groups and will ultimately remove both the man and our mammals from the minefield...we expect to reduce the time that it takes to render sea mining ineffective by at least half of the time that it takes us today.

(Clark ADM, House Appropriations Committee, 2004, p. 29)

Throughout its history, the U.S. Navy has struggled with determining force structure levels, funding and technology commitments of the MCM force. Over the past decade funding for MCM force structure has remained steady and in some cases has been boosted due to the concerned efforts of Congress. Admiral Clark's statement backed by decisive moves towards future mine warfare research have made it clear that the U.S. Navy is working towards transforming the mine warfare force. This involves converting the larger dedicated MCM forces to smaller, faster, technologically-leveraged weapons and platforms with more agile modular components that can conduct other missions while not engaged in MCM operations and still meet JFC and COCOM mission requirements.

To meet the growing sea mine threat and the demand from high-tempo global operations as part of a joint war fighting campaign, the naval services are undertaking a revolution in mine warfare. This revolutionary undertaking was directed by the Secretary of the Navy in the *Fiscal Year 2005 U.S. Naval Mine Countermeasures Plan (FY05 MCM Plan)*. Organic mine countermeasure (OMCM) systems are part of the plan, designed to support the forward-presence mission by providing the assets to fulfill the COCOM's operational requirements and the ability

to operate with coalition and multinational partners to ensure that adversaries cannot impede the free movement of U.S. joint forces, coalition partners, and the merchant fleet. (Wynne, 2004, p. 1)

This plan has two key principles. First, the *FY05 MCM Plan* seeks to realize at least “...a 50 percent improvement in the MCM capability across the FYDP with the fielding of OMCM systems in Strike Groups.” (Johnson, H., 2003, p. 1) Defense officials believe that the path towards effectively delivering the MCM capabilities necessary to provide the JFC a path through minefields and, if required, a vehicle for Joint Forcible Entry lies in technology, and specifically OMCM systems. OMCM includes platforms and equipment involving systems that can respond quickly, provide a punch-through or reconnaissance capability and hopefully provide a clear path through mine threat areas for seaborne forces. As originally designed, OMCM is based on MCM systems that can deploy onboard, operate from, or be integrated into a ship, aircraft or submarine that operates with the Expeditionary Strike Group (ESG), Carrier Strike Group (CSG), or independently. This concept has recently been retooled to have OMCM systems operating from the LCS and a small number of attack submarines and possibly a new generation of destroyers. Vessels such as the LCS are configurable MCM platforms which are capable of being fitted with mission packages to carry out MCM tasks while maintaining the ability to be re-configured to conduct other tasks. This is much different from the dedicated MCM platforms which are designed and constructed to conduct MCM as its primary mission. It is important to note that a configurable platform may function as different warfare platform while not engaged in MCM operations.

The second principle as written in the *FY05 MCM Plan* directs a transformational MCM vision and Concept of Operations (CONOPS) to directly support the Sea Power 21 principles and

global access requirements. The future transformation to a distributed, network force of manned and unmanned systems employed from multiple platforms is designed to lead the U.S. Navy towards the principal goals of reducing the time required to defeat mine threats and removing Sailors and Marines from the minefield. (Ibid)

The enormous task of MCM and the growing threat of asymmetrical use of sea mines have prompted the U.S. Navy to draft a meticulous concept of operations for FY06 that addresses the requirements created by the complexity, volume and mix of the threat and tactical cleverness of the adversary while developing a transformational design. The Navy's *Draft FY06 MCM Plan: Vision, Roadmap, and Program* will be submitted to the Department of Defense (DoD) in compliance with public law 102-190 (as modified). The draft plan describes the fielding of technology that will improve MCM throughout the FYDP. It builds upon the plan from years prior and attempts to actively promote the development of new technologies necessary to "...field a common set of unmanned, modular MCM systems employable from a variety of host platforms or shore sites that can quickly counter the spectrum of mines to enable assured access with minimum risk from mines." (*Draft FY06 MCM Plan: Vision, Roadmap, and Program*, 2004, p. 1)

With this plan, the Navy is attempting to deliver a comprehensive MCM Initial Capabilities Document (ICD) for review by the Joint Staff through the Joint Capabilities Integration and Development System (JCIDS). (Ibid, p. 1) The CNO promoted this in the following statement to the Senate in 2003:

Our Mine Countermeasures (MCM) Certification Plan will assure access to Naval and Joint forces by defeating the asymmetric mine threat proliferating worldwide...the stealthy and lethal LCS and its mine countermeasures module will add new dimensions to our ability to counter mines and is the future of our organic battle group capability.

(Clark ADM, Seapower Subcommittee of the Senate Armed Services Committee, 2003, p. 10)

Additionally, the MCM ICD promotes transformation from heavier dedicated MCM systems to lighter OMCM systems. This significant shift in the U.S. Navy MCM force structure and concept is described in the of the opening paragraph *Commander Mine Warfare Command (COMINEWARCOM) Concept of Operations*:

The focus of this Mine Warfare (MIW) Concept of Operations (CONOPS) is to provide the vision for mining and countering the effects of enemy maritime mining. This document addresses Mine Countermeasures (MCM) operations based on Tactical Situations (TACSITs) anticipated during Operational Plan (OPLAN) and Contingency Plan (CONPLAN) execution.

(COMINEWARCOM CONOPS, 2004, p. 1-1)

MCM capabilities that will be available to the JFC via the Joint Force Maritime Component Commander (JFMCC) are outlined in the COMINEWARCOM CONOPS in specified chronological time periods. The time periods were selected based on estimates of when capabilities will be fielded, projected merits of technological advance, and budgeting outlooks. Therefore, the dates that describe the near-term, mid-term and long-term periods may require adjustment. Near-term covers from the present day through 2008, when delivery of the LCS Flight 0 (vessels 1-4) and two MCM mission packages are planned. It includes the current dedicated platforms operating with several of the organic weapons intended for future OMCM platforms as well as introduction of several individual organic capabilities and programs. (Ibid, p. 1-2)

The mid-term, a period from 2009 to 2015, covers the introduction of two LCS Flight 0 sea-frames with associated MCM mission packages that are the expected to reach Initial Operational Capability (IOC) during that time-frame. Also during the mid-term, additional

increases in MCM capability will be realized with the introduction of the first LCS Flight 1 sea frame. (Ibid, p. 1-3)

Far-term begins in 2016. Leveraging great strides in technology, this time period should involve notable increases in MCM capability with the introduction of advanced influence minesweeping systems designed to foil the most sophisticated mines and advanced mine-hunting systems that could reduce the requirement for diver identification of mines and in some cases influence minesweeping. (Ibid, p. 1-3) Proper forecasting and planning of the future MCM force structure is critical in part because of the projected heavy reliance on technology, which will need to be developed well in advance. Therefore, the CNO has tasked OPNAV N752 to develop an initial CONOPS for the far-term, entitled *CONOPS for MCM in 2015 and Beyond*.

As RADM William E. Landay, Program Executive Officer for Littoral and Mine Warfare, has indicated, “The Navy will conduct its first organic mine warfare system development at the end of fiscal 2005, in which the *Swift* (High Speed Vehicle-2 (HSV-2)), a commercialized high speed catamaran currently on lease to the U.S. Navy, will act as the interim vessel for the LCS.” (Kreisher, 2004, p. 16-17) HSV-2 is scheduled to carry a Remote Mine Countermeasures System (RMS) and AQS-20 (advanced sonar mine hunting device) with support from MH-60S helicopters. RADM Landay went on further to say “...that if the LCS is not delivered in 2008 that the fleet will rely on ships like the *USS Momson* to deploy with RMS and MH-60S for OMCM coverage.” (Ibid, p. 17) The forces would constitute OMCM but, as RADM Landay pointed out, the “...long term status of the pure mine warfare community is uncertain.” (Ibid, p. 17)

This uncertainty has fueled a spirited debate over whether proposed MCM capabilities will be able to solve the sea mine threats which will face the JFC in the future. Making the

outcome of this debate extremely tenuous is the fact that the true importance a robust mine warfare force may often times be misunderstood or not understood at all.

IMPORTANCE OF MINE COUNTERMEASURES FORCES

The true importance of a robust mine warfare force requires only a short review to realize the huge impact sea mines have on U.S. national strategy, not to mention global economic interest. To begin with, the strategic security construct of the U.S. relies immensely on the ability to maintain control of the seas. Under the National Security Strategy, global access, essentially from the sea, provides the pillar of strength for America to strengthen alliances, defeat global terrorism, and defuse regional conflicts while championing aspirations for human dignity. Control of the sea is vital to America, creating global economic growth through free markets and trade, building the infrastructure of democracy and cooperating with other main centers of global power. (National Security Strategy, 2002, p. 3-29) Under the tenets of the National Defense Strategy, the U.S. must control the seas and provide global access to secure the U.S. from attack, maintain strategic access, establish favorable security conditions and strengthen alliances and partnerships. Defeating the most difficult sea mine problems will allow the U.S. to assure friends and allies, dissuade adversaries, deter aggression and defeat adversaries decisively. (National Defense Strategy, 2005, p. 7-8)

Both the NSS and the NDS further require that the services prepare now for an uncertain future. To that end, *Joint Vision 2020* concepts work to shape the military to fulfill the requirements of Full Dimension Protection, Precision Engagement, Focused Logistics, and Dominant Maneuver. (JV 2020, 2003, p. 20-26) Additionally, by *Joint Pub 3-15 Joint Doctrine for Barriers, Obstacles, and Mine Warfare*, the President/Secretary of Defense have tasked the

COCOMs with the responsibility of conducting mine warfare to include MCM operations. (JP 3-15, 1999, III-11) Understanding that, the U.S. Navy is required to develop mine warfare plans and field the required equipment to perform the often unglamorous and tedious task of responding to mine threats in support of the COCOM's requirement.

This threat is enormous. The Navy estimated that there are 50 countries that manufacture and deploy water-based mines. The currently estimated 350,000 plus sea mines are considered an optimal asymmetric threat because one low-cost mine can put a billion-dollar ship out of service. (Ryan, 2004, p. 37) Undoubtedly, MCM is an expensive business whether the mines are removed or the mines do their job and damage or sink a ship. For example, in 1970 dollars, it cost \$10 million to mine the Haiphong harbor. At the completion of the MCM operations (removal of the mines) and after the loss of three H-53s minesweeping helicopters, the final cost of mine removal was over \$20 million. (Melia, 1991, p. 109) From the Korean Conflict to the end of Desert Storm, 14 U.S. Navy ships were either damaged or sunk by enemy mines. During this 44-year period, only one U.S. Navy ship was damaged by a missile, another by a torpedo, and two during aerial attacks. (Mine Warfare Training Center brief, 2003, slide 3) Looking specifically at the Gulf War, it cost the Iraqis less than \$15 million to lay approximately 1100 mines while damages to the *USS Tripoli* and *USS Princeton* resulted in repair costs of over \$100 million. (Ibid)

With just a small investment, the sea mine or even the threat of employing sea mines delivers a potent force multiplier that can cause navies to alter course, invasion forces to change ingress routes, global economics to change their focus, and nations to change security strategies. The COCOM needs to be cognizant that the asymmetrical use of mines can have deep striking impacts that could create economic regional instability, disrupt security agreements and prevent

and prevent the efficient and decisive accomplishment their mission. Assured access and the ability to conduct a forcible entry from the sea are essential elements to the success of the COCOM and JFC.

In some cases a small inventory of sea mines or even just the deceptive notion that an actor possesses sea mines creates gargantuan challenges for the U.S. Navy. The huge stockpile of Saddam Hussein's sea mines, which were captured just prior being deployed, created formidable challenges for the coalition that required expedient and dedicated steps to ensure MCM forces were on station and ready to clear the way for deploying forces. Easy to acquire and deploy, and challenging to find and remove, sea mines pose an immeasurable threat to sea lanes of communication and free access to American joint forces while providing our enemies an inexpensive profound force multiplier.

Obviously, sea mines can give an otherwise poorly equipped enemy a decisive asymmetrical advantage over the U.S. For instance, the enemy can project a strategic effect upon the JFC by deploying mines in the area of operations. If the enemy is able to close a port entrance or chokepoint with mines, the resulting consequences could have catastrophic results on the execution of any plans, especially if the sea mine problem was assumed away in the course of action development. There can also be a domino effect on other areas such as airlift by stressing an already thinly spread fleet of heavy lift assets. Also, if forces are blocked from getting to the fight, the JFC may be forced to alter his strategy or even endure un-needed hardships brought on by a lack of sufficient fighting units in theater.

Sea mines are truly effects-based weapons. They create second and third order effects whether or not they actually detonate and damage or destroy a ship. The immeasurable and

undeniable psychological fear created by situations such as the opening scenario can alone wreak havoc on the U.S. military, the U.S. economy and the confidence of the American people.

Countering sea mine, just like rooting out an insurgency, can be a tedious and sometimes dangerous process. The vastness of oceans, harbors and sea lanes coupled with the complexity of modern mines and environmental factors makes the process of clearing mine threats an extremely time consuming evolution. For instance, when attempting to clear a mine threat area that contains magnetic and acoustic bottom mines, several variables have to be met to complete the logic of how the mine will engage its target; MCM must exploit those variables to defeat the mine. In certain mines, ship counts, the number of times that a ship passes over the mine, determines when the mine detonates. In addition, certain modern mines can detect when they are being swept and deactivate themselves. This greatly increases the time investment for MCM forces to clear fields with those types of mines. In most cases, if the ship count is unknown or if intelligence sources cannot determine the count, MCM commanders are forced to make multiple sweeps over the suspected mines or make a best estimate of the number of passes needed and present the risk percentage data to the JFMCC for a clearance decision.

Obviously, with mine threat situation similar to Desert Storm along the Kuwaiti coastline, this can be enormous task. If the task is beyond the capabilities of the MCM force, the transfer of risk to ships transiting the area becomes enormous. Therefore, a prudent way of removing the threat and reducing the threat percentage is by mine identification and neutralization. This in itself is a complex and time consuming process that is heavily dependent on the ability to positively determine whether an object on the bottom of the sea is a mine or bottom clutter or debris. Much of this identification process is based on taking a very close look at these objects, either by diver or advanced technology.

Complicating the matter for the identification and neutralization of mines are environmental factors. Of those factors, the composition of the sea floor is the most critical to determining whether divers or equipment will be able to see the mine. Commonly, nature can hide mines in two ways. Muddy bottoms will bury the mines while rocky bottoms will mask a mine's position. When mines are sown in those types of areas, identification with current and mid-term technologies can be extremely difficult. Reverting back to sweeping may be the result.

The process of removing mines is a difficult and time consuming evolution that requires a significant commitment of MCM forces to properly complete the mission and thus allow the free global access to joint forces. The mine warfare problem, if a robust dedicated MCM forces is not ready to respond, could have monumental affects on Joint Force Commander and global economics.

FORCE DEPLOYMENT

I think it becomes more and more clear as we proceed, that the sea is not, and cannot be made neutral ground. For the purposes of passage it is almost always in the hands of one side or the other in war, and if undisputed passage across it is desired by one side, it must be obtained by conquest of the water territory.

Philip Colomb, On the Anglo-French Wars
(<http://www.jmr.nmm.ac.uk/server>, 2005)

Just as Philip Colomb believed that victory in warfare was dependent upon control of the seas, the same can be said for the US military today. Considering nearly two thirds of the planet is covered by water, it is no surprise that the lion's share of force deployment is and will be accomplished on and by the sea. There are no real alternate means for moving massive amounts of combat power and supplies to theater. Therefore, our ability to utilize the seas to move forces

could certainly be described as one of our critical capabilities when considering campaign planning.

A recently issued Joint Functional Concepts Validation cites the Joint Requirements Oversight Council's validation of the capabilities and attributes with definitions of the five initial Joint Functional Concepts of Battle Space Awareness, Command and Control, Focused Logistics, Protection and Force Application. (Pace, 2004, p. C) Although sometimes taken for granted due to an extended history of American domination of the seas, the JFC must be acutely aware that complete access to the world from the sea is the basis upon the fulfillment of the requirements of the Joint Functional Concepts are built. An effective, well trained and appropriately equipped MCM force plays a critical role in ensuring the success of all the concepts. That same MCM force creates the foundation for the nation's ability to safely and efficiently deploy forces. Force deployment is one of the most critical foundations of this country's ability to deliver potent firepower, protect US vital economic interest worldwide and access all corners of the globe to promote the tenets of the National Security and national economic interest.

Just as the U.S. Navy's concept of MCM is transforming, so is the way that forces are to be deployed. Theater operational plans that include a substantial build-up phase followed by several weeks of air attacks then ground force application, similar to Desert Storm, are not necessarily executed as design. The running start concept of deployment and execution coupled with the requirements to move combat power globally and quickly to support the Global War on Terrorism (GWOT) have resulted in challenges to the way strategic sea- and airlift assets are utilized. *Joint Vision 2020* states that U.S. joint forces are required to have dominant maneuver-

“...the ability of joint forces to gain positional advantage with decisive speed and overwhelming operational tempo in the achievement of assigned military task.” (JV 2020, 2004, p. 20)

Making the situation more complex is the added dimension of force redeployment to stateside installations, the adoption of adaptive planning and effects-based warfare, platform and budget challenges in the mobility communities, and the growing dependence on CONUS-based and forward deployed pre-positioned sea-lift to get the majority of equipment to the fight quickly. Consider the following statistics from the Commander of the Military Sealift Command, VADM Brewer, about the deployment events of OIF:

We reached a peak of 167 ships in our Steel Bridge of Democracy, carrying the torch of freedom to the Iraqi people. The span of that bridge was literally a ship every 72 miles from the US to Kuwait. That was more than 78 percent of the total MSC active fleet of 214 ships that day – ships dedicated to supporting the US forces engaged in freeing the Iraqi people from tyranny and persecution.

-The mix of ships encompassed all four of MSC's programs, and included the U.S. Maritime Administration's Ready Reserve Force, and more than four times the normal daily number of commercial ships.

-Twenty-five of 33 Naval Fleet Auxiliary Force ships were providing combat logistics for the carrier strike groups and amphibious strike groups involved in Operation Iraqi Freedom.

-Thirty-three of the 42 ships in the Prepositioning program were underway or had already off-loaded gear for war-fighting forces in the Persian Gulf area.

-In our Sealift Program, 106 of 115 ships, including government-owned surge sealift ships, MARAD RRF ships and chartered commercial ships, were carrying equipment and supplies for the Army's 3rd and 4th Infantry Divisions, 82nd and 101st Airborne Divisions and V Corps and the Marine Corps' I and II Marine Expeditionary Forces.

-From January through the end of April, we delivered more than 21 million square feet of war-fighting equipment and supplies, 260 million gallons of fuel and 95,000 tons of ammunition to the Persian Gulf area for the Army, Marine Corps, Air Force and Navy war fighters involved in Operation Iraqi Freedom. More than 90 percent of the military cargo to support OIF was delivered via MSC ships.

(Brewer, 2003, p. 2)

Two major points should be emphasized from VADM Brewer's statement. First, more than 90 percent of the military's cargo during OIF was delivered via MSC ships. Second, the percentage of ships used to complete the mobility/force deployment was very high for one theater of operation. The bottom line is that most of these ships made multiple trips. Depending upon the functional area, there were little to no maritime mobility reserves available for use.

Those ships carrying their massive and sometimes invaluable loads to OIF were subject to a variety of threats as they plowed the earth's seas. Each time they passed through a chokepoint the danger increased from asymmetrical attacks employing weapons such as sea mines, suicide boats and divers. To prevent this, the U.S. Navy is tasked with keeping those chokepoints as well as sea lanes open and free of sea mines. As discussed before, the COMINWARCOM plan spells out the transformational track that the MCM forces must take to meet the challenges of protecting forces and keeping SLOCs open. The transformational track integrates modular OCM packages of deployed assets capable of responding to but not prosecuting fully mine warfare situations. This is described in detail in the following passage from the *COMINWARCOM Concept of Operations*:

Current and future MCM systems will be employed as immediate response forces, rapid response forces, or as follow-on MCM forces. Immediate response forces will consist of OCM systems (assigned or attached) that respond to imminent mine threats to the Expeditionary Strike Force (ESF). They are designed to provide coverage rates to permit freedom of maneuver without significant operational pause. A combination of existing and emerging MCM systems will be task organized into MCM rapid response force(s). The rapid response force(s) can be attached to further augment organic ESF capability or it can provide rapid response capability to support theater missions in advance of approaching naval or strategic forces. To accomplish this, MCM forces will be either forward deployed or postured as a contingency force that can quickly arrive in theater from a forward operating base and/or from CONUS as a Flexible Deterrent Option (FDO). Follow-on MCM forces are forces that are time-phased to arrive in theater after combat operations have been initiated. Their role is to execute large-scale MCM campaigns, to expand the battle space initially cleared by immediate/rapid response forces, and to conduct post-hostility clearance. These forces include CONUS-based Surface Mine Countermeasures (SMCM) ships that either self-deploy or are heavy-lifted

into theater, and CONUS-based AMCM and EOD forces that may not have been employed in the rapid response role.

(*COMINWARCOM CONOPS*, 2004, p. 1-6)

This section of the CONOPS describes the ideal transformational force structure and mix of MCM forces required to support the JFC and COCOM missions. However, the planned future MCM force structure may be much different.

Defense Secretary Rumsfeld told reporters after a Senate hearing concerning military transformation that he "...believed that we should take advantage of advanced capabilities that (could) allow us to do more with less." (Bennett, http://insidedefense.com/secure/defense_docnum, 2004) This is the exact idea that surrounds the capabilities-based transformation of the U.S. Navy and certainly MCM. After planned technologies have replaced dedicated MCM assets, this transformed force will be tasked with countering a mine threat at sea. However, the plan relies heavily on "dual-hatted" or over-tasked platforms, accepting the inherit risk associated with the reliance on these multi-tasked assets. This risk associated with doing more with less MCM assets coupled with limitations in other DoD areas will create vulnerabilities. Specifically, the U.S. Navy's planned organic MCM force has three weaknesses: even with advanced technology the inventory is too small, the reliance on favorable risk and intelligence analysis results is too great, and the heavy reliance on sealift for deployment is not supported by future MCM force structure.

A Smaller Inventory of Advanced Technology-based MCM Platforms

...and when he prepares everywhere he will be weak everywhere.

(Sun Tzu, *Art of War*, p. 98)

Sun Tzu's statement superbly describes the U.S. Navy's plan for MCM, light forces spread over the globe that are capable of responding quickly, if not involved in other duties, but

unable to solve the mine problem. Hopefully, the JFC will not receive from the JFMCC notification that there is no way to clear the mine threat that has stopped the flow of forces or disrupted the battle-plan. The strong, dedicated MCM force built by the U.S. Navy of which a large percentage saw action in OIF is in jeopardy of being reduced in size and capability. To be strong and focused on defeating a mine threat at a decisive point, an MCM force of OIF capability must be kept in the U.S. Navy inventory. Unfortunately, this may not happen. The reduction in fleet size and budget, transformation of naval forces and a perceived reduction in threat, tempered by risk assessment, have fueled the campaign to decommission MCM ships, resulted in the decision not to replace the *USS Inchon* (MCM Command Ship) with a similar vessel, and delayed decisions for replacements of the MCM class SMCM and MH-53E helicopter.

While there have been no clear decisions on keeping the current MCM force structure, decisive moves have been made on how the MCM forces will be budgeted. A quick review of budgetary numbers shows how the U.S. Navy is spending its money on MCM. The U.S. Navy increased its investment in the Mine Warfare plan by adding over \$67 million in FY04 budget. (Nathman, 2003, p. 12) Major changes in the FY04 plan included additional funding for LCS/OMCM mission modules, the acceleration of assault breaching systems R&D as well as R&D in general and for the acquisition of Unmanned Undersea Vehicle (UUV) technology; only a small amount is budgeted dedicated MCM assets. Secretary of the Navy Gordon England told the Senate Appropriations Committee focused on the posture of the Department of the Navy that the FYDP includes \$2.76 billion to develop and procure modular packages to include mine countermeasures for the LCS. (England, Senate Appropriations Committee, 2004, p. 10) This

funding priority is directly in line with what the Navy has to do to field a new technologically advanced MCM force: replace dedicated systems with organic ones.

Although originally designed to provide a sea mine avoidance and marginal punch through capability, in certain sectors OMCM systems and platforms are envisioned as the solution for the total MCM problem and the replacement for the heavier, more costly, dedicated MCM force. Former COMINWARCOM Commander RADM Ryan foresees OMCM systems replacing dedicated systems. (Ryan, 2004, p. 37) As the minefield proposed clearance area rates provided by systems such as the MH-60S helicopters, unmanned surface vehicles (USVs) and remote mine-hunting vehicles (RMVs) improve, those systems will be matched with the speed and agility of the LCS to create faster MCM assets. He believes that eventually if the technological advancements are realized this combination could be more cost effective and could potentially replace the U.S. Navy's dedicated mine warfare force. (Ibid, p. 38) However, the drive for cost effectiveness and unproven replacement systems must not result in reduced MCM capability.

In the 2003, the Director of Expeditionary Warfare Division in the office of the CNO, Major Gen. James Battaglini, alluded to the fact that when OMCM systems mature, they will merge with dedicated systems. Battaglini said, "...the overall goal is to focus less on platforms and instead focus more on capabilities in a distributed, netted and cooperative environment." (Ma, 2003, p. 1) MGEN Battaglini's vision of that merger described the elimination dedicated forces once the modular OMCM systems prove their operational capability. Also in that same article, RADM Nowakowski, COMINWARCOM, stated "I believe that in the future we can phase out some of the older legacy systems...[since] the LCS would have mine warfare modules that would eventually be capable of broader-area sweeps to clean out an area." (Ibid, p. 2)

Although, RADM Nowakowski did not identify what the timeline on the future was, the idea of the merging is set within naval leadership and there is momentum to make it happen. (Ibid, p. 2)

As part of that momentum to pull away from the dedicated force, the U.S. Navy has commenced a transition of the force structure. For example, in order to fund future programs such as LCS, the centerpiece of the new force structure, all coastal mine hunters (MHC) will be decommissioned by FY08, showing that the U.S. Navy has commenced developing plans to reduce dedicated force structure. (COMINWARCOM N-83, 2005, p. 1)

However, prior to OMCM platforms coming on line and assuming the role of the dedicated force, and before cuts to existing forces begin, the U.S. Navy needs to consider the long-term impacts to capability from force reduction prior to the 2015. Considering delays in OMCM technologies or fielding of those platforms, the Navy's Office for Expeditionary Warfare has made several recommendations in a recent mine warfare study to maintain the overall capability of MCM forces at current levels:

- Retain MH-53E until an adequate replacement is developed.
- Upgrade MH-53E with "Organic" technologies.
- Support "Organic" introduction plan.
- Fund current dedicated MCM forces.
- Upgrade dedicated MCM force with proven organic technology.

(Chips Magazine, 2003, p. 17)

If an emphasis is not placed on the issues listed above or there are methodical early reductions in MCM force structure and premature blurring of dedicated and organic MCM, the JFC and COCOM will be faced with increased risk when conducting force deployment. This increased risk will eventually materialize from the gap created by the lack of available MCM forces and thus leave the JFC without complete global access and unable to perform critical joint force closure functions.

As one example of a scenario which results in a defeat for the JFC due to the enemy employment of sea mines, a Chief Staff Officer for one of the U.S. Navy's helicopter wings recently created a chronologically description of fictional events surrounding military action against a North Korea invasion into South Korea:

2006: MH-60S organic AMCM demonstrations and exercises convince Navy planners to disestablish HM-15, leaving HM-14 as the sole Navy H-53 squadron...2007: MH-60S AMCM accolades and the continued perceived lack of mine threats convince the admiralty to eliminate remaining H-53 aircraft... January 2008: North Korean troops cross the demilitarized zone and easily overrun ROK and U.S. positions. Seoul falls. U.S. and ROK troops retreat to Pusan to await reinforcement. U.S. dispatched 8 CSGs and 7 ESGs. An un-anticipated and extensive mine threat prevents littoral operations. MH-60S helicopters deploy, but once on the scene it becomes painfully clear they cannot sweep the minefields fast enough because of inherent range and time-on-station limitations...Mid-February 2008: Pusan falls. North Korea declares unification complete and claims victory over the imperial United States.

(Coyle, 2004, p. 53)

Even though this article is a fictitious production, it sends several chilling messages and sparks interest in several follow-on thoughts. North Korea certainly has the capability to seed minefields in the waters around the peninsula. The Democratic People's Republic of Korea (DPRK) has numerous small surface ships within both the Navy and civilian sectors that are capable of delivering mines. DPRK mines could be used to defend against amphibious assaults, defend strategic ports and provide seaward flank protection for land forces as well offensively to attack shipping. (<http://www.global security.org/military/world/dprk/navy.htm>, p. 3) Assuming that the U.S. would actually fight a war against North Korea as briefly depicted in the article, actions on the peninsula would require the introduction massive air, ground and naval forces that would be transported by all means available. Just as in OIF, the flow of forces to Korea would be heavily dependent upon MSC ships and commercial vessels, all of which would be hindered by mined waters. Additionally, the interdiction of the DPRK's initial thrust into South Korea

would require the rapid response of forward deployed naval forces that would attempt to slow the southward movement until supplement forces could arrive by sea. If DPRK forces were able to seed mine fields quick enough, both the initial response and follow-on force deployment could be negatively affected.

In terms of sea mine warfare, several key issues surround the defense of the peninsula. First, the Navy's LCS/OMCM concept in this case could experience difficulties. As mentioned earlier, mine detection, identification and neutralization are slow processes, even with advances in technology. Several factors that make it particularly tedious in this scenario are the number and sophistication of North Korean mines, the environmental factors of the waters around Korea, and number of assets that would be available and dedicated to removing the mine threat. North Korea is known to have a large stockpile of 2000 ex-Soviet KMD mines and domestically modified early generation mines that are fairly sophisticated in their ability to lie dormant until target acquisition occurs and they are activated. (<http://www4.janes.com/K2/doc.jsp?K2Doc>, p. 9) To make matters worse, intelligence on the inner-workings of certain North Korean mines is sketchy. Additionally, bottom clarity, or turbidity, in the waters around the peninsula, especially in the littorals, set less than ideal conditions for the mine identification process. For instance, the western coast of South Korea, due to large tidal ranges and sedimentation from four river outflows, has a variety of natural sea floor conditions such as thick mud, silt, and numerous shoals and troughs. Rocky areas create another set of problems for certain sonar devices designed to identify mines. (Chu, 2002, p. 2)

Taking into consideration all of these factors, the planned LCS/OMCM packages would be heavily tasked and possibly overwhelmed without the assistance of dedicated MCM systems. Additionally, the initial plan for the LCS has the vessels being matched with three modules, of

which only one can be carried at a time. The modules are designed to counter three distinct threats: mines, submarines or surface targets. If the LCS is solely tasked with an enormous MCM problem it would most likely be unavailable to accomplish the other two mission areas. In contrast, the dedicated surface MCM vessels, EOD units and AMCM MH-53E (or equivalent aircraft) squadrons, which have much greater on station times and sweep efficiency rates especially when equipped with technologically advanced OMCM systems, could be on station prosecuting the mine threat and would not negatively affect other missions vital to the maritime components requirement to the JFC.

Other OMCM systems such as Remote Mine Hunting System (RMS)-equipped guided missile destroyers (DDGs) would provide minimal assistance to the future OMCM force. The U.S. Navy has invested great time and money in equipping several DDGs with the RMS. In a recent Defense News article, Capt Barry Dagnall, head of the Navy's mine warfare branch in the Pentagon, spoke of the *USS Momsen*, a newly commissioned DDG that was delivered with AN/WLD-1(V)1 RMS minehunting device. (Cavas, 2004, p. 1) Capt Dagnall said that the idea behind the DDG/RMS combination is "...to have the sensor that's out there, operating with the fleet that can prep the battle space, learn more about it." (Ibid, p. 1) That system will be very good for what it is designed to accomplish: to determine whether areas contain mines or, in conjunction with other OMCM systems, provide minimal punch through capability.

However, DDGs are high value assets to the Navy and are designed to deliver combat power by means of Tactical Land Attack Missile (TLAM) strikes and air superiority missions. They would be ill-tasked if thrust into an MCM role, especially considering a campaign involving the Korean peninsula which would require the full attention of platforms like the DDG

to deliver munitions or effects to stop or slow North Korean aggression and give friendly forces on the ground a much needed chance to regroup to push back the invading force.

In all cases, the U.S. Navy's MCM participation in a battle for the Korean peninsula would be risk based if the MCM engagement was leveraged only by the limited number of technology based systems such as the LCS/OMCM combination. These systems would be spread too thin and unable to complete the mission of creating access to the strategic areas required by the JFC to win decisively.

Reflecting concerns about the effects of technology on MCM, RADM Malcolm I. Fages, Director of Submarine Warfare, made a series of comments in 2004 on the future of U.S. Navy MCM. The U.S. Navy's current efforts to develop and deploy anti-mine systems have all the ingredients of the classic "innovator's dilemma," said RADM Fages. (Willingham, 2001, p. 1) He went on further to say "...what it comes down to is a conflict between future vision and present bottom line. Unless somebody out there has seeds for a money tree, we aren't going to be able to afford an absolute solution to every problem that we face." (Ibid, p. 2) RADM Fages then addressed the issue of how the Navy is determining what the right MCM solution should be. He noted that the Navy was conducting an in-depth program review of anti-mine warfare programs. Going back to the technology verses proven force issue, he said the Navy "...is trying to decide, for example, how much money it should invest to fix its aging minesweeper vessels and how it can move forward with plans to deploy ad hoc mine detectors and neutralizers...so that the fighting forces can conduct anti-mine operations anywhere in the world." (Ibid, p. 2) Finally RADM Fages mentioned the fact that he does not believe the Navy is moving in the right direction when it comes to deploying new capabilities, stating, "Programs seem to be more concerned with dates, and deliver only slight improvements in ability." (Ibid,

p. 1)

Years of technology setbacks have resulted in possible delays in the operation capability of future systems. Several events in the U.S. Navy MCM force have shown how this situation is beginning to materialize as dedicated systems continue to age while projected systems continue to slip to the right on operational capability time. One example of a setback concerns the Airborne Mine Neutralization System (AMNS), an OMCM system designed to destroy mines with miniature remote controlled torpedoes that has been in development for nearly a decade. In an *Inside Defense* article, the Pentagon's top tester, Thomas Christie, informed Congress that the AMNS cannot reliably detonate sea mines. (Brown, 2005, p. 1) The Navy called the report incomplete and said the systems passed all development and testing milestones. However, Christie claimed the AMNS has not performed properly in ocean currents of any appreciable velocity and that aircrews alone cannot effectively operate the system without the help of a team of contracted engineers. (Ibid, p. 1) The article makes two points. First, technology is not infallible, and even years of development may result in degraded or less than perfect operational capabilities. Second, all technology has a human input and therefore is subject to the realistic capabilities of its operators. Complete reliance on a long-term plan based on technology is a dangerous path.

Undoubtedly, well developed technological leaps can be extremely beneficial. For example, the increased accuracy and fidelity of the laser identification system on the AQS-20 towed sonar to be used on the RMS and the MH-60S and the new commercial-off-the-shelf (COTS) unmanned underwater vehicles will reduce EOD man hours spent validating mine-like contacts. Another system very capable of enhancing future MCM operations is the Synthetic Aperture Sonar, which could help to fill possible gaps left by the lack of dedicated MCM forces

in the future. Although this sonar has several inherent limitations, it would be able to locate sea mines, especially buried mines, more easily than near-term sonar and laser detection devices. The Synthetic Aperture Sonar measures changes in the density of a medium to determine a location of object. Obviously, a 55 gallon oil drum has a different density than a rock or mud or a Manta sea mine. Even though operational delivery of such a device is years, maybe decades, away it would greatly improve detection of mines. However, the main drawback to the system, like that of most other OMCM systems, is that it only finds the mine and does not neutralize or remove it. That neutralization or removal is extremely time consuming and requires dedicated systems such as divers or magnetic/acoustic sweeping devices found on the surface mine sweepers and the MH-53E helicopter.

The Navy is expected to field an OMCM system capable of magnetic/acoustic sweeping. However, even with faster moving OMCM devices and platforms, when considering the forecasted one-for-one assets substitution, the sweep coverage will be much smaller and the time required to sweep will increase greatly. Depending upon the size of the threat, estimates have shown that up to four OMCM assets will be required to equal the sweeping efforts of one of the assets in the current MCM force. Adding to the situation, OMCM systems specially designed to replace the current removal or neutralization platforms and assets continue to be pushed to a later operational date.

While finding mines in general is difficult, the situation is magnified when mines are close to the coast. The removal of a sea mine threat in very shallow water and beach zones has plagued the U.S. Navy and Marines. The beach and minefields in very shallow water (0-40 feet depth) create considerable challenges for MCM planners. Due to this dangerous obstacle, opposed amphibious landings will face possible heavy losses. Often this restricts the JFC

because it takes away options in force deployment area. When the option for amphibious landing is removed, the JFC is forced to have Marine and Army units offload at cleared seaports of debarkation (SPODs), airlifted to aerial ports of debarkation (APODs), make a forceable entry elsewhere, or consider alternate forces to fill the cavity left by the lack of amphibious forces. This in turn could have a disruptive effect on the time-phased force and deployment data (TFFPD) process. When the U.S. Navy loses control of the beach, the JFC commander has been denied access and must consider other options.

For several years, the U.S. Navy has been wrestling with the problem and exploring the use of divers, remote vehicles, ocean floor crawlers and Landing Craft Air Cushion (LCAC) launched charges to clear the beach areas for follow-on forces. Recently, U.S. Navy officials have been testing an assault breaching system associated with the Joint Direct Attack Munition (JDAM) as a tool to remove the very shallow water mine threats. Known as the JDAM Assault Breaching System, or JABS, it is designed to be delivered from platform such as the B-52. RADM William Landay told reporters at a media roundtable in October 2004 that "...the Navy believes the military can destroy obstacles and mines by blanketing the beach zone with a JDAM-like system." (Shah, 2004, p. 1) He went on to say, "...if JDAMs gives the Navy a 95 percent probability of success, then getting rid of all mines and obstacles become pretty easy." (Ibid, p. 1)

JABS would be a tremendous leap in capability and would greatly supplement the capability that UUVs and marine mammals provide to the JFC by giving his forces complete access to beach areas. JABS in combination with advanced UUVs may solve the enormous problems created by the very shallow water sea mines and remove humans from the dangerous art of removing sea mines in the surf zone. However, this same technology would not help in

eliminating the burden of mines in water deeper than 40 feet. Due to projected technological advances, limitations of underwater ballistics and explosion parameters, even JABS by the end of the mid-term timeframe will not be able to affect other mine problems that will overwhelm the capability of OMCM forces. In this case, technology will have made marked improvements in one area but left another area still requiring the labor intensive dedicated task of removing sea mines in the deep littorals, SLOCs and chokepoints.

A significant portion of the global calculated mine threat will be concentrated in the littorals and constrained waterways such as Bab el Mandeb located between Yemen and Djibouti at the southern point in the Red Sea. Even though this area is heavily patrolled by a coalition of naval forces, it is a prime location for non-state actors to carry out attacks on shipping to include suicide boat attacks and sea mining. Although not the most critical chokepoint in the world, its position is vital to the majority of the trade routes from resource rich areas of Central and Southwest Asia and the main crude oil route for supertankers heading to Europe and North America from the Persian Gulf. Closing of this restricted waterway by the threat of a minefield would certainly have disruptive affects on the economies of many European and Asia countries, as well as having a significant effect on force deployment and hence the JFC's overall war plans. The control of this maritime area was critical to forces deploying from the East Coast of the U.S. and Europe for both OEF and OIF. This chokepoint will continue to be a concern in future deployments.

A well equipped, dedicated MCM force, either on station or standing by to respond, is critical if CENTCOM or any other COCOM is to retain flexibility for force deployment, the first and most critical step in the campaign process. An effective MCM force capable of prosecuting complex mine threats gives the COCOM and JFC greater agility and tactical dominance. MCM

forces will be required to clear vital chokepoints and SLOCs to ensure the free movement of forces that rely and will rely increasingly on the ship-board transportation and staging. The Joint Requirements Oversight Council (JROC) has approved Focused Logistics as a Joint Functional Concept, defining broad joint logistics capabilities as those "...that are necessary to deploy, employ, sustain, and re-deploy forces across the full spectrum of operations." (DoD Logistics Transformation Strategy, 2004, p. 5) SLOCs clear and free of sea mines allow for all of these capabilities to be fulfilled.

The uninhibited passage of deploying forces through chokepoints and across SLOCs is by far one of the JFC's most pressing requirements. A blockade of the seas with mines could result in devastating delays of equipment to arriving forces. Making this even more dangerous is the application of the "running start" type of deployment used at the beginning of OIF. Whether a course of action is planned and executed with the massive build up of forces or the gradual arrival of follow-on forces, the smooth, timely and efficient delivery of forces to the fight is essential. As an example of how the impact from the delayed arrival of forces can have strategic and operation consequences, consider the situation in OIF when the 4th ID and 3rd ARC arrived well after the start of ground hostilities to remove the regime in Iraq. The mining of Bab el Mendeb or any of the other maritime chokepoints along the route of the transport ships could have resulted in additional costly delays and significant degradation of capabilities on the stability operations. Although technology will improve future MCM operations, lapses in MCM capabilities due to gaps in technology could force the JFC to take an unfavorable path of risk analysis and intelligence preparation of the battle-space.

Risk Analysis and Intelligence

The prudent commander bases his plans on his antagonist's shape. 'Shape him', Sun Tzu says...the wise general at the same time takes every possible measure designed to prevent the enemy from 'shaping' him.

(Sun Tzu, *The Art of War*, p. 42)

The second area of inadequacy for the Navy's mine warfare plan involves risk analysis. Often, risk analysis and intelligence ends up shaping the battle-space. There is a very distinct line between accurate risk analysis and mission failure. When a risk takes on enough danger that mission failure could occur, the situation becomes a gamble. Playing a significant role in how risk analysis is developed is the intelligence on mine inventories, how countries will use them and how the U.S. can eliminate them before they are employed. Hopefully for the JFC, the U.S. Navy's future substitution of dedicated forces with OMCM forces is not hinged on a risk analysis influenced by technological promises and inaccurate or faulty intelligence on enemy mine inventories and employment.

As stated by RADM Landay, "MCM is a challenge of probabilities, balancing three interrelated elements of time, area and risk. Risk is measured in the number of residual mines-weapons left over after a mine-clearance effort." (Landay and Keeter, 2005, p. 2) If the number of mines left behind due to inadequate MCM resources is too great, it will turn into a gamble for the JFC.

Operational and budgetary planners must be careful when calculating the risk that is tailored to a mine warfare situation. An over-estimation of capability and under-estimation of threat can result in a force being ill-prepared to solve the problems created by minefields. With estimates of over 350,000 sea mines in the world, of which large portions are unaccounted for, it is difficult to imagine why the U.S. Navy would rely on a "dues ex machine," a person or thing

that appears or is introduced suddenly and unexpectedly and provides a contrived solution to an apparently insoluble difficulty.

Absolute numbers may be the biggest risk if the U.S. Navy resorts to dropping dedicated MCM and going with OMCM modules on the LCS. Currently, there are 26 MCM/MHC ships, all of which will quickly reach the end of their lift span without replacements in sight. Even if the technological advances of OMCM systems materialize to counter the perceived threat by the end of the mid-term, the Navy's LCS/OMCM combination may suffer due to budget cuts or delays in shipbuilding funding. Hailed as the U.S. Navy's preferred team, the number of LCS bought by the Navy may be in jeopardy. Originally desiring over 50 of the small stealthy LCS, the Navy may have to settle on 21 as initial cost for them skyrockets to over \$8.7 billion through 2011. (Capaccio, 2005, p. 1). Shortly after the cost numbers for the LCS were revealed, the Navy also announced that it would most likely be unable to mount four RMS vehicles on each LCS as requested by the CNO due to cost and size restriction placed on the program. (Brown, 2004, p. 1)

The precarious nature of the procurement of the LCS was exemplified when the 2005 Defense Appropriation Office barred the service from ordering a second such unit. (Cavas, 2005: p. 1, 4) The ship, to be built by Lockheed Martin, was scheduled to be the second LCS to enter the fleet and would have played a significant role in the MCM plan. As the second and larger of the two ships, it would have carried two OMCM capable MH-60S helicopters and expansive space for mine warfare packages. This delay could widen the gap between the end of service life of dedicated MCM systems and the on-line date of organic modular MCM systems.

As for the OMCM systems themselves, the planned time line introduction to fleet service has slipped from fiscal year 2005 to 2007 and possibly beyond because of technical problems

with the integration of the systems with the MH-60S. All seven of the systems are behind schedule; the four that were scheduled for service in 2005 will not make their initial operational capability on time and the RMS is experiencing debilitating vibration issues. (Ma, 2005, p. 1) These setbacks in technology-leveraged OMCM assets become even more debilitating to the future MCM force as sea mines become more advanced.

As mines become smarter through the development of improved sensors, micro-processes, software and explosive charge, the risk to ships becomes much greater. Moreover, the cost to the Navy from a mine strike increases as fewer ships are being bought at higher cost. For instance, the cost to procure one of the Navy's new generation DD(X) destroyers jumps to \$2.5 billion by fiscal year 2007. (Capaccio, 2005, p. 2) A potential enemy needs only minimal investment to inflict great damage on US military vessels, commercial shipping or the strategic aspirations of the United States.

The risk of not having an available dedicated MCM force greatly increases when considering the ability of both North Korea and China to lay mines. As previously discussed, the mine warfare situation involving a North Korean invasion of South Korea is bordering on a gamble. However, when considering a China-Taiwan Straits scenario, the mine warfare problem is even more challenging due to China's large mine inventory, deployment platforms, and ability to protect deployment assets.

Before discussing how the Navy would handle the mine warfare problem in that region, a brief discussion of the possible paths that China would take if it chose to re-unify with Taiwan is necessary. The best projections show several approaches to securing Taiwan. Estimates from as early as 1999 predicted that in the 2004-2020 time frame, the People's Republic of China (PRC) would threaten shipping with submarines and cruise missiles, forcing naval forces to the

east. The Chinese would then mine many of the Taiwanese harbors. (Whitehurst, 1999, p. 4) Chinese sea mines could pose an immense problem considering their submarines are each capable of deploying two to three dozen mines each. (O'Hanlon, 2002, p. 190) At that point U.S. MCM forces would most likely be required to clear mines at the Taiwan ports of Keelung, Kaohsiung and Hualien. (Whitehurst, 2002, p. 4) Without dedicated forces, the long-term likely outcome would be the losses to shipping and warships from heavily sown minefields.

In a second scenario, between 2004 to 2020, the PRC would announce an air and sea blockade of Taiwan and mine Taiwan waters. (Ibid, p. 5) In this situation, the aircraft carriers and other shipping would be forced east and those vessels that are trapped by the mines would be interdicted by cruise missiles. As losses mount and access to the seas around Taiwan are denied by minefield, the realization would be made that the mine problem is well beyond the capacity of the OCMCM capabilities. Unable to deploy adequate forces by sea and to retake the island, the U.S. would be forced to accept the PRC proposition of one country. (Ibid, p. 5)

Accurate intelligence on mine stockpiles and employment is critical in the development of a fundamentally sound risk analysis. A large portion of intelligence in relationship to sea mines deals with the location of the mines prior to employment. It is possible that kinetic strikes on mine storage facilities could prevent the employment of the sea mines and ultimately alleviate the need for heavy dedicated MCM forces. However, intelligence on mine stockpiles could be less than accurate. Moreover, even if intelligence sources determine the status or location of enemy sea mines, their pre-emptive elimination is not guaranteed.

Keeping track of enemy mine stockpiles can be a difficult task for the best intelligence assets. The enemy can use several techniques to hide sea mines. Because of their relatively small size, lethal mines like the Manta are very easy to conceal if stored or moved in their crates

that resemble a washing machine box. Masses of sea mines have been hidden in a variety of places to include being buried in the ground. Since only a few mines would be required to have an effect on the maritime situation, the movement of several mines to boats destined to deploy them could be hard to detect. Similar to counter-narcotics operations, human intelligence would be at the forefront of track those small quantities. Limitations in this area would hinder the ability to obtain actionable intelligence on the movements of these mines.

Even if solid intelligence is held concerning the location of mine stockpiles and intended employment, the ability of the JFC to conduct pre-emptive strikes on the mine caches may be hampered. Again, due to their size and hiding location, strikes may result in collateral damage that the JFC is not willing to accept. Additionally, attempts at employing sea mines usually come early in a possible conflict. At that point the JFC is left with a dilemma. Preventing deployment of the mines might require strikes that would possibly show the JFC's intentions, disrupt his plan of attack or inadvertently accelerate his campaign time line. Also, early strikes could possibly derail on-going flexible deterrent options.

Great care has to be taken when developing risk analysis on mine threats. Developing MCM force structure from intelligence could result in significant setbacks in the JFC's plan if that intelligence is proven wrong.

Heavy Reliance on Sealift for Deployment

The construct of the NDS requires that the U.S. military be able to agilely and expeditiously deploy forces to conduct joint war fighting operations. The most effective and efficient method of deployment continuously fields debate within the military. Due to its ability to move larger amounts of equipment in less time at one-tenth the cost of airlift and the inherent scarcity of airlift assets, America defaults to seaborne assets to deploy forces. To the dismay of

the COCOMs, sealift is vulnerable to anti-access weapons, especially in the littoral areas and constricted waterways, due to the vast number of threats they encounter and the speed at which they move. As the U.S. military searches for the best means of deploying equipment, the result points to the weighty reliance on sealift and an equally heavy dependence on dedicated MCM assets to protect the deploying forces.

The government Defense Science Board for Mobility is focused on advising the DoD on the proper makeup of the mobility capabilities necessary to deploy and sustain forces in theater. This board took into consideration the Mobility Requirements Study or MRS-05, which was actually written prior to 2001, in advising on the shaping the future mobility force structure. (Tirpak, 2004, p. 3) Two major areas that consistently arise during the discussions are Sea Basing and the composite and size of the Air Mobility Command (AMC) force. (Foss, 2005)

Several assumptions need to be considered when developing the mobility force structure. First, the services are going to be required to think differently about how to get forces to the fight. For example, with the ongoing redeployment of forces from Europe to the United States, the EUCOM commander, GEN James Jones, told the Senate Armed Services Committee on 23 September 2004 that, “One of the critical elements in achieving new capabilities will also be found in the mobility and the correct positioning of our prepositioned equipment—both at sea and on land—and ensuring that our strategic airlift and sealift remains modern.” (Bennett, 2004, p. 2) He added, “EUCOM, just like the other COCOMs has a valid need for robust lift assets.” (Ibid, p. 2) He implied that this need will be met by a mix of sealift, airlift, forward basing and rapid response forces that will be tasked to get effects-based forces to the battle quicker, defeat the aggressor and then move on to the next fight. Marine Corps GEN Peter Pace, Vice Chairman of the Joint Chiefs, referred to this mix of mobility assets in discussing supporting the concept

under the metric of 10-30-30 which equates to the goals of closing forces in as quickly as 10 days, the “swift defeat of the enemy” within 30 days and then being able to redeploy the force in another 30 days. (Shah, 2004, p. 2)

The second assumption when considering the development of the mobility force structure is that in certain cases access to bases on land may be denied requiring the joint force to establish staging areas elsewhere, possibly at sea, which will require protection of sealift assets as they transit to the area of interest. The U.S. Navy believes that, as a package, Sea Basing, Sea Strike and Sea Shield will be able to provide the concept and equipment to satisfy the requirements presented by the second assumption. Sea Basing is a notion that encompasses platforms and concepts to transport and deploy forces in support of joint war fighting. Sea Shield is designed to protect the Sea Base, and the Sea Base in turn is the staging medium to launch Sea Strike operations, which facilitate the joint force conducting decisive operations to accomplish objectives. Once formed in theater, the Sea Base would provide a lodgment point, similar in nature to the Joint Logistics Over The Shore concept, from which forces can deploy to shore to conduct operations. While the concept or the make up of platforms is not clearly defined, Maritime Preposition Force (Future) MPF(F) ships could provide a broader operational function than current prepositioned ships. A force of ships is envisioned that will enhance the responsiveness of the joint force team by the at-sea assembly of a Marine Expeditionary Brigade that arrives by high-speed airlift or sealift from the United States or forward operating locations or bases. These ships will selectively off-load weapons, equipment and supplies while remaining off shore, and they will reconstitute ground maneuver forces aboard the ships after completing assaults deep inland. (Clark ADM, Senate Armed Services Sub-Committee Meeting, 2003, p. 10)

The Sea Basing concept, daubed as the ultimate joint deployment platform and having 18 distinctive required capabilities, could feature a wide range of ideas from using current sea vessels nested in a tight area providing a logistics base for force flow to sections of floating runways that are sailed to the theater and assembled to form a base capable of landing and launching C-17s and a future quad-tilt rotor aircraft. (Donovan, 2005) In that range of Sea Base assets there could be a sea mobility force makeup similar to the current military sealift force structure of 8 Fast Support Ship (FSS), 19 Large, Medium-Speed, Roll On/Roll Off (LMSR) ships and a consortium of commercially flagged vessels. (TRANSCOM presentation, 2005) No matter the composition of sealift assets, the ability of the JFMCC to protect them from mine threats will be critical to the success of the JFC.

This leads to the last assumption when considering the employment of these Sea Base islands. This assumption holds that all seaborne deployment assets, whether they are part of the Sea Basing concept, a government contracted commercial vessel or naval amphibious ship, will require protection from a myriad of threats to include sea mines. With Sea Shield, future forces such as the LCS/OMCM module packages will be tasked with protecting the Sea Base against sea mine threats. If there are no fielded dedicated MCM forces and LCS/OMCM availability to counter a mine threat is low, the number of ships involved in the Sea Base could become a factor. The greater number of ships the greater the chance of a mine attack. If the larger MPF(F) option is favored, a fewer number of ships will require protection, but the loss of one vessel could have a huge impact a JFC's available combat power.

Unfortunately, as in many circumstances, the LCS may be tasked with other missions such as anti-submarine warfare and anti-surface warfare (force protection) which are also Sea Shield requirements. This leads to other problems following the divestiture of dedicated MCM

forces. First, and most obvious, OMCM forces may be tasked with other mission that will detract from keeping the Sea Base clear of mines. Second, supporting Sea Shield platforms may be over-tasked and incapable of clearing SLOCs and chokepoints of mines, rendering a large amount of force without the ability to get the fight. The cause of these problems lies in the fact that the budgets for OMCM forces may not match the budgets for Sea Basing platforms. In an interview, Retired VADM Donovan, former Military Sealift Commander, who is active with consulting the Navy on the development of the Sea Basing concept, alluded to the fact that the Navy may be assuming away the magnitude of the requirements to protect the Sea Base. (Donovan, 2005) The requirement will be significant for Sea Shield forces. Dedicated MCM assets will need to arrive in theater early, prepare the battle-space and stand ready to remove any mine threat, and do all this void of other Sea Shield related activities.

After decisive operations, protection of reverse Joint Reception Staging Onward movement and Integration (JRSOI) sea routes plays an extremely important role when considering the 10-30-10 concept stated earlier. If forces engaged in combat operations were required to redeploy to another crisis, the SPODs and SLOCs designated for egress would need to be cleared by MCM platforms if a mine threat were to materialize after decisive combat operations. A dangerous situation arises when LCS/OMCM forces are overwhelmed by a mine problem or engaged in alternate war-fighting duties. If access out of one JOA to another is denied, the result would leave the JFC with an inordinate amount of risk at the second JOA.

Transportation Command (TRANSCOM) Director of Operations, BGEN Selva, stated in a presentation on 27 April 2005 that one of the critical roles of joint war fighting is getting the right forces to the theater as quickly as possible to ensure that risk due to lack of equipment and people is not transferred to the forces in the fight. (Selva, 2005) In that same presentation, he

described the enormous unit deployment/redeployment and sustainment lift requirement for OIF with an outstanding analogy. To create an image of the tons of cargo and equipment moved since the beginning of OIF, he said, “Imagine you stood next to the railroad tracks and watched 50 ton rail cars pass by; it would take 84 days for all of the 6.2 million tons to pass by at 30 mph.” (Ibid) If the LCS/OMCM packages are unable to clear the SLOCs or staging area for the sealift, the JFC will be forced to rely on other means to get forces to the JOA or wait for the JFMCC to muster the required OMCM force to clear the mines, creating a delay in the deployment process. This delay or denied access could result in a transfer of risk to fielded forces in terms of not having required fighting forces in the JOA, having to counter-attack to regain the battle-space or eventually having to capitulate to the enemy.

If seaborne deployment forces are denied access then airlift assets may be required to fill the gap until SLOCs can be cleared. This may be difficult due to several factors surrounding Air Force Mobility capabilities. GEN John W. Handy, commander of U.S. Transportation Command and Air Mobility Command, told lawmakers in March of 2004 that as a COCOM his number one shortfall is the “...aging and numerically inadequate strategic airlift fleet...that has a current strategic airlift shortfall of 9.8 million ton-miles per day (MTM/D).” (Tirpak, 2004, p. 4) Adding to this shortfall are Air Force plans to retire by 2006 its fleet of aging C-141s which represents 35 percent of the strategic airlift capability. (<http://www.globalsecurity.org/military/systems/aircraft/nsa.htm>, 2005, p. 1)

Moreover, the Air Force’s fleet of 117 C-5s that carry critical out-sized equipment have an uncertain future due to aircraft reliability and life span. As early as 2001, the Air Force had identified significant airlift shortfalls. In 2001 it was estimated that the aging C-5 fleet and the planned one-for-two replacement of C-17 to C-141 would not be able to accommodate the airlift

requirement that was forecasted for MRS-2005. (Erwin, 2001, p. 1-3) Air Force Chief of Staff Gen John P. Jumper on February 11, 2004 told the Senate Arms Service Committee that the current mobility requirement is 54.4 million ton-miles per day. That lift requirement for 54.4 MTM-D equates to 222 C-17 aircraft. (Ibid, p. 2) AMC is scheduled to have 180 C-17s by 2008. (TRANSCOM brief, 2005)

An Air Force study is in work to determine the number of C-17s and the number of re-engineered C-5s it would take to fulfill the global mobility requirements faced by the military. The need for additional airlift was highlighted by Missouri Sen. James Talent, who said that he found "...it troubling that 125 times in the past three years, DoD has contracted with the Russians to use An-124 aircraft...because we simply don't have enough of our own." (Elliot, 2005, p. 1) This problem of limited aircraft availability is exacerbated when air mobility assets are tasked with urgent transportation requirements, special movement of people and high value/low density platforms. Many of these missions may not completely fill the plane but an aircraft is required. Each time an aircraft is used for those missions a large portion of lift capability is lost.

Airlift is an exceptional platform to move smaller amounts of equipment that is required in theater quickly. However, if large amounts of equipment from units such as Army divisions are required to be moved, the preferred option is sealift. The requirement placed on sea-borne transportation will continue to exist if not expand in light of redeployment and future of Air Force airlift force structures. Therefore, as the sea mine threat to sealift assets remains, the requirement for dedicated MCM forces remains essential.

THREAT TO AMERICAN ECONOMIC SECURITY

The first and most obvious light in which the sea presents itself from the political and social point of view is that a great highway; or better, perhaps, of a wide common, over which men may pass in all directions, but on which some well-worn paths show that controlling reasons have led them to choose certain lines of travel rather than others.

(Mahan, A.T., 1987, p25)

History has shown that countries which control the sea control their economic destiny and prosperity. Well before Mahan's time, countries such as England, France and Spain sailed the seas paving their way to economic well being. Much of America's extended history of economic growth was achieved by a strong naval force that has allowed free and open trade throughout the globe.

Today, the importance of a strong naval force becomes even more critical as the global economy continues to increase its reliance on seaborne shipping and trade. Currently, somewhere in the range of 50,000 large ships carry 80 percent of global trade by sea. (Luft and Korin, 2004, p. 1) Tomorrow, as the global economy expands the amount of goods moved by sea and the dependence on the sea for strong global economies will only increase.

With the installation of global functions such as natural resource management, just-in-time cargo delivery and inventory, and overseas outsourcing, world economic powers become increasingly interconnected. This "...interconnectedness between states, their permeability, the globalization of economies, the transparency arising from information technology, and the intermixing of people around the world give every conflict regional and global repercussions." (Metz, 2004, p. 15) As a second order consequence of the disruption of the SLOCs by mines, the price of goods would go up due to vessels deviating to sail around the mined area or sailing to

and offloading at a different port. Additional economic strain could be placed on the system if shipping companies cannot obtain insurance which choose to sail through possibly mined waters.

An interruption of the oil flow from the Persian Gulf to Japan would have a considerable impact on the Japanese economy. A second order effect would result in an economic downturn of the U.S. economy due to the interruption in the flow of goods, the lagging of exports to Japan and the increased cost of products from Japan. The sea mine threat could have devastating effects on world trade and the United States would be forced to respond in order to preserve the global economy and American economic interest abroad.

Protecting the U.S. against these types of effects is critical to the economic well-being of the nation. The military must support a hierarchy of missions which include security interests, vital interests, and value interests. (Binnendijk, 2002, p. 16) The security interests of the nation require the survival of both the territorial and economic security. Economic security requires global access: freedom of seas and space, and access to raw materials and SLOC protection. (Ibid, p.17-18) The U.S. and, in particular the COCOM, must recognize that anti-access threats could create both regional and global harmful economic impacts.

A sense of security is created by the diligent and sometimes relentless work of the COCOM. Former CENTCOM Commander General Zinni described the commitment to developing regional capabilities and stability as one of the most critical aspects of the COCOM's job. (Zinni, 2005) COCOMs depend on the U.S. Navy keeping the seas free of mines as they pursue security cooperation, economic stability and the building of global partners. Consider the PACOM mission/vision statement:

Ready today and preparing for tomorrow, the U.S. Pacific Command enhances security and promotes peaceful development in the Asia-Pacific region by deterring aggression, responding to crises and fighting to win.

(USPACOM mission statement)

With regional cooperative and economic security agreements playing a greater role as flexible deterrent options, PACOM is aware that anti-access weapons such as sea mines can have a devastating effect on the basic tenets of its mission statement. This is further amplified in its strategic statement:

Today, we put the preponderance of our resources into engagement and preparedness which are the two ways we make conflicts and crises less likely. Engagement is our security dialogue with nations in the region and allows us to resolve security concerns before they erupt into crises or conflict. Preparedness enables us to respond to crises or conflict and to dissuade potential adversaries from using force as a means of resolving disputes.

(USPACOM strategic statement)

Chokepoints, SLOCs and nautically restricted areas such as harbors are of particular concern to the COCOM in terms of impacts on regional and global stability. When countries are unable to satisfy their basic needs due to broken economic chains, lack of resources or limitations to trade created by disruption of the SLOCs, regional instability creates a negative effect on a COCOM's ability to influence future situations and resolve potential regional disputes. If sea mines are placed in a body of water key to regional or even global economic interest and security, the COCOM would rely on the naval component to respond quickly and neutralize the situation before the disruption triggers harmful economic effects. Depending on the global employment of organic MCM forces and the number of platforms that can be pulled from other duties to be dedicated to clearing mines, the situation could have negative effects on the region as well as the nation.

The oil industry is an extremely oligopolistic in its supply, demand; control and geographic concentration (Rodrigue, 2004, p. 4) The chokepoints and constrained SLOCs between the oil producers and Europe, Asia and the United States have long been areas of major concern to Washington. The Straits of Hormuz have and can be the controlling point of the

Persian Gulf and in the past decided the global economic posture. President Jimmy Carter described the importance of the freedom of the Straits of Hormuz/Persian Gulf during his 1980

State of the Union Address:

An attempt by an outside force to gain control of the Persian Gulf region will be regarded as an assault on the vital interest of the United States of America, and such an assault will be repelled by any means necessary, including military force.

(Carter, 1980, p. 3)

Originally, the statement was initially directed at the Soviet Union to deter its aggressive movement towards the Gulf region after its invasion of Afghanistan in 1979. With the demise of the Soviets, the threats facing the flow oil from the gulf came from the Iranians for a short period and then shifted to the Iraqis from the Gulf War until the beginning of OIF. Now the threat lies again partially with Iran, but mainly with terror groups. These maritime terror groups could reap havoc on the world economy if sea mines deployed by them shut down the straits for an extended period. Consider the following information about world oil distribution:

- Two thirds of the world's oils and refined products move by sea tankers, which carry 43 million barrels per day of that is crude oil.
- Most crude is moved by very large capacity carrier's (VLCC), typically carrying over 2 million barrels of oil on every voyage.
- The world's most important oil chokepoint, the Straits of Hormuz, consist of 2-mile wide channels for inbound and outbound tanker traffic that carries 15-15.5 million barrels per day to United States, Japan and Western Europe.

(<http://www.eia.doe.gov/emeu/cabs/choke.html>, 2004)

An attack on a chokepoint or a petroleum pipeline hub would be detrimental to America's economy and would have an effect on every aspect of the American way of life. The 1973 Arab Oil Embargo, despite the fact that only 28 percent of U.S. oil was imported from world-wide oil producers, had a profound effect on the U.S. economy. Oil prices quadrupled in a matter of

weeks "...causing unemployment to double due to the loss of 500,000 jobs which in turn caused a decline in the national product by 6 percent." (Luft and Korin, 2004, p. 1) Today, with more than half of U.S. oil imported, if a major portion of global oil production is removed through the mining of chokepoints or transfer facilities, the consequences could be even more devastating. (Ibid, p. 4) While, unlike 1973, the U.S. has today a Strategic Petroleum Reserve, this stockpile of oil would only temper the situation for approximately two months of disruption, not nearly enough to offset the loss in case a significant attack takes place. Maintaining oil flow to feed the global economic machine is so important that even prior to OIF the U.S. had spent over 60 billion dollars a year to stabilize the Persian Gulf region and committed untold billions to effort since the beginning of OIF. (Telhami, 2002, p. 3)

What makes the Persian Gulf oil so important? Kenneth Pollack of the Brookings Institute wrote of the need to protect the gulf region in his article Securing the Persian Gulf:

America's primary interest in the Persian Gulf is ensuring the free and stable flow of the region's oil to the world at large. The issue is not whether Americans pay \$2 or \$3 a gallon for gas at the pump or whether Exxon gets contracts instead of Lukoil or even how much oil the United States imports from the Persian Gulf. The global economy built over the past 50 years rests on a foundation of inexpensive, plentiful oil. If that foundation were removed, the global economy would collapse.

(Pollack, 2005, p. 1)

Roughly 25 percent of the world's oil coming from the Persian Gulf, and Saudi Arabia alone responsible for about 15 percent. A sudden loss of Saudi oil would send prices of oil through the ceiling, probably causing a global downturn at least as devastating as the Great Depression. (Ibid, 2003, p. 1)

The U.S. has only three percent of the world's oil reserves. However, consider the following facts about U.S. oil dependence.

-The U.S. imports somewhere in the range of 10 million barrels per day; in 20 years nearly 70 percent of the oil it uses will be imported.

-The Department of Energy (DOE) predicts that oil imports from the Middle East to the U.S. will increase from 25 percent today to about 50 percent by 2020.

-Oil supplies 96 percent of U.S. transportation energy and is the common component in production and distribution of everything from toothpaste to golf balls.

(Luft and Korin, 2004, p. 1-2)

Although the U.S. currently purchases approximately 18 percent of the Persian Gulf's oil it consumes roughly a quarter of the world's oil. It is not directly dependent upon Persian Gulf oil production. (Zinni, 2005 and Luft, 2005, p. 1) However, with Japan importing 76 percent of its oil from the Persian Gulf and Europe importing approximately 50 percent, the magnitude of damage to the U.S. economy from second order effects of interruptions of oil flow would be enormous. (Ibid) American's interdependence on the global economy creates an notable opportunity for terrorists to inflict great harm on America, its economy and its economic partners, especially if the attacks were timed with prolonged global or U.S. economic downturn.

With Saudi Arabia holding a quarter of the world's known oil supplies and the uncertainty of obtaining oil from countries such as Venezuela, Mexico and Nigeria and domestically from Alaska, Persian Gulf chokepoints, oil terminals and production facilities become tempting targets for terrorists or rogue states. (Telhami, 2002, p. 3)

Due to their limited MCM forces, the Saudi response to the problem would be moderate. Even in partnership with the other regional states, the total Gulf State MCM force would only have minor effect in terms of a larger mine problem. Possessing the urgent desire to clear their facilities of mines, the Saudis would response quickly with their fleet of sweepers. A quick response would be possible but a fast clearance would be improbable. The Saudi fleet of four

mine hunters and sweepers are slow with crews lacking the training to complete the job. (<http://www.globalsecurity.org/military/world/gulf/rsnf.htm>, 2005) Even though the states in the region are interconnected by a common mine threat, the other Gulf states could provide only little assistance to Saudi Arabia or may choose not assist since the Kingdom is a direct petroleum competitor. An appeal to the rest of the world for help would result in quick responses from many nations. As in most cases, like Operation Ernest Will, the U.S would be looked upon to respond in force. Currently, the U.S. could call on the four forward deployed MCM surface vessels and four AMCM helicopters in Bahrain. They could be on station in less than a day and start clearing the terminals quickly.

Through the efforts of the naval component, the COCOM's ability to solve complex mine problems like the Straits of Hormuz or the facilities around Saudi Arabia is essential to the development and sustainment of regional stability. Therefore, maritime operations of this size and scope would require multiple LCS ships with their MCM modules. The triple-hatted LCS (SUW, MIW and UUW) could find itself tasked with other missions, especially one involving critical escort duties for the deployment of forces that may be required by the JFC.

The Straits of Malacca are another critical global chokepoint. In 1996, Indonesia announced that it intended to restrict military and commercial shipping to the three lanes running through the archipelago (the Sunda strait between Sumatra and Java, the Lombok Strait between the islands of Bali and Lombok and the through the Flores Sea). (Nincic, 2002, p. 11) If these areas were mined, a deviation around those areas and the Straits of Malacca would require the "...circumnavigation of Australia which would add 5,800 miles of ocean steaming and the increased cost by millions of dollars to shipping traffic traveling to and from the Japan/China/South Korea area." (Ibid, p. 12)

Security cooperation agreements between COCOMs and countries bordering chokepoints are critical to regional stabilization and have monument effects on the global economy. In area such as the Straits of Malacca and Straits of Hormuz, it is critical for the naval force component to support maritime security cooperation operations. As part of regional stability, MCM forces should conduct surveys, commonly known as bottom mapping, using sonar devices to map the bottom of the SLOCs, SPODs and chokepoints to have on record a picture of the bottom. This can be compared later to new sonar pictures if an area is presumed to be mined. However, to do so this takes dedicated forces which are focused solely on the survey mission and not held under the veil of operations of another nature such as anti-surface or anti-submarine missions. As currently planned, OMCM forces may not be able to facilitate this mission.

To strengthen the regional commitment, precursor route surveys should be conducted to show any potential enemy that MCM force are monitoring the area. Also, the surveys would display U.S. resolve to protect and clear SPODs, SLOCs and chokepoints. Additionally, while the survey and show of force pay immediate benefits, the long term rewards for these actions are realized if MCM forces are called to the area if a mine problem exists. Having a map against which to compare current sonar pictures creates an enormous time savings that predicted technology of the 2020 time frame could not duplicate or recover if not conducted earlier by dedicated forces.

The JFC's reliance on intelligence to prevent the deployment of mines and on coalition forces to remove them if laid carries a false sense of security. Unlike the force deployment issue, intelligence collection results may be less clear due the possible players involved in a sea mine attack. It is believed that a country like Iran would most likely not mine the Straits of Hormuz

due to the catastrophic effects on its own oil exports; it would most likely only use mines to protect its territory. Assuming that the group placing mines has a specific agenda focused on disrupting regional or global economics, the most likely perpetrator would be a terrorist faction or a rogue section of a government. However, a terrorist faction or a fundamentalist group not concerned with the welfare of their unwilling host country may apply sea mines in places such as the Straits of Hormuz.

Tracking the large mine stockpiles are difficult since the weapons are smaller than a kitchen stove. Recognizing that it takes one sea mine to explode near one merchant ship to place a measure of concern and doubt about the safety of that waterway, it would be relatively easy for a terrorist group to conceal the employment of a mine and achieve the desired effect result. Intelligence sources could conceivably never know about the mines in the hands of terrorist groups. The purpose of intelligence on sea mines is to be able to take action before deployment and essentially not need dedicated MCM forces to come to the rescue. If this fails, however, the U.S. Navy should be ready to deploy a dedicated MCM force to ensure regional and global economic stability.

Undoubtedly, coalition MCM forces would want to be responsive in clearing mined SLOCs, especially if the impacts were affecting their security or economic livelihood. However, before the COCOM and the U.S. Navy become reliant upon coalition MCM forces two major issues need to be considered.

First, the quality and quantity of coalition MCM force committed to the fight deserves a focused review. Many countries such as Great Britain, Belgium, France, Germany and the Netherlands possess superior MCM forces that would be able to respond and solve a mine problem. These forces are extremely well trained. They have exercised together and have

worked in some actual mine warfare operations with the U.S. However, several drawbacks accompany coalition MCM operations. These forces may require a significant amount of support structure such as logistics, intelligence and force protection to allow them to participate. Once in a mine threat area, ships and crew may not be able to clear an area as fast as dedicated U.S. forces.

Categorizing other MCM forces as reliable or capable partners is not wise. While European MCM forces are by far some of the best in the world, MCM forces from Indonesia or Thailand are not as well trained or supported with logistical assets and may subsequently struggle with a larger mine problem.

The second issue to be considered by the Navy and the COCOM/JFC before they become reliant on coalition MCM forces is that such support may not materialize at the speed required to solve the mine problem or it may not materialize at all. There may be a plethora of factors similar to those affecting the coalition during OIF that may prevent a rapid MCM force response. Although European MCM coalition forces may possess some of the best MCM technology available, the response time due to diplomatic concerns, ship speed and mobilization may not be best suited for the situation. Response may depend on if their economies or those of their partners are affected, whether the country feels like there is a need to respond, or whether a country fears a retaliatory attack from the perpetrator of the sea mine problem. By no means is it clear that coalition MCM forces will be available to the COCOM.

It is critically important that the U.S. maintains a strong naval force to ensure complete global economic access and security. Part of that strong naval component needs to be a robust, dedicated MCM force. The Navy should be able to support a JFC anywhere in the world with a rapid response dedicated MCM forces designed to defeat complex mine threats. This MCM

force should be structured to continually support the COCOM in security cooperation initiatives that will maintain confidence in the U.S. response to regional and economic instability created by sea mines.

DEFENDING THE HOMELAND

While the Navy needs to be focused about the impact of a mine threat on force deployment and global economic security, it needs also to be concerned about its role in homeland defense. The requirement to maintain free access to vital seaports within the United States remains a top priority of the nation's leadership.

Government leaders and security experts have openly expressed concern that some portion of the maritime transportation system could act as a medium for terrorists to smuggle personnel, weapons and other dangerous materials into the United States. They are also concerned that ships in or in transit to and from U.S. ports could be susceptible to terrorist attacks. These attacks could certainly include mining of U.S. ports. Sea mines are a credible and dangerous peacetime threat which could "...quickly close a U.S. port or waterway, not only because of ships' immediate concerns about, but also because ships entering mined waters would not likely be insured." (<http://www.nap.edu/openbook/o309075785/htm/51.html>, 2001, p. 1)

The U.S maritime system includes more than 300 sea and river ports with more than 3,700 cargo and passenger terminals. Fifty ports in the U.S account for 90% of all cargo tonnage and 25 ports account for 98% of all container shipments. (Frittelli, 2003, p. 1)

Many ports in the U.S. are critical to the functioning and growth of the economy. The effects of a mining could be devastating. What makes these ports so highly vulnerable is the high volume of transient shipping and other vessels. For example, the ports of Los Angeles

handle more than 40% of the cargo-carrying steel containers shipped into the U.S. and about two-thirds of imports from Asia. (Machalaba, 2004, p. B1) Since the ports of Long Beach and Los Angeles share a common harbor and a complex system of distribution centers that are connected to transcontinental railroads that feed the products to the East Coast and the Midwest, the economic impact on the country from their closure would create huge ripple effects across the nation. (Ibid, p. B1) Steven Cohen, a University of California professor of regional planning, estimated that a five-day shutdown of the Long Beach and Los Angeles ports would cost the U.S. economy about \$4.7 billion and a 20-day shutdown would cost \$48.6 billion. (Osorio, 2003, p. 3) Cohen further expanded the importance of each port by describing it as a “...chokepoint of the global economy.” (Ibid)

Due to the sheer numbers of ships that visit U.S. ports and the limited capability of the Department of Homeland Security, it is virtually impossible to escort all of them in and out of ports leaving them vulnerable. Sea mines could be placed in U.S. territorial waters in numerous ways. For example, an unsuspected merchant vessel departing a harbor, especially at night, could release mines overboard. Because of the heavy dependence on relatively few U.S. seaports for economic strength, this situation could be disastrous.

A major concern for Congress is assessing whether the nation and its government agencies are doing enough, quick enough to deter a terrorist attack in the maritime domain. Even with the enormity of the area to be defended from attack, the U.S. military and agencies have attempted to create a layered defense of the homeland in order to protect the vital economic seaport infrastructure. However, despite the progress that has been made in the strengthening port security thus far, many security officials still describe seaports as “...wide open and very vulnerable to terrorist attacks.” (Frittelli, 2003, 4) A GAO report in April 2003 stated that

seaports, along with air cargo, general, and mass transit, were the “major vulnerabilities” remaining in the nation’s transportation system. (GAO, 2003, p. 20) Even before September 11, 2001, the Seaport Commission estimated that enhancing security at U.S. ports would cost between \$10 to \$50 million per port. (Frittelli, 2002, p. 1)

Based on 50 years of terrorist acts targeting commercial shipping, one analyst projected that “...the next terrorist attack would come from a number of means to include attacks from ships loaded with explosives, hijacking of vessels, remotely controlled vessels laden with suicide bombers and attacks with mines.” (Kubiak, 2003, p. 3-4) However, the nation’s leadership does not always put the same emphasis on the fact that American ports could be attacked by the seeding of mines. In a CRS Report to Congress dated December 5, 2003, DoD listed eight significant threats to U.S. shipping ranging from commercial shipping to infiltrate weapons of mass destruction to attacking waterfront areas on land. The only reference to the use of mines suggests terrorist could “...sink a large commercial cargo ship in a major shipping channel, thereby blocking all traffic to and from the port.” (CRS Report to Congress, 2003)

The identification of the Navy’s possible limitations in MCM and the mine threat to U.S. ports spark a level of concern over who could assist in the clearance of a mined U.S. harbor. Under the Office of Homeland Security, the U.S. Coast Guard is not equipped or budgeted to handle a mine threat nor is any other inter-agency organization. The Coast Guard’s main capability to handle mine threats rest in prevention. With the port security role, they would attempt to prevent mines being deployed. However, the combination of the massive task of protecting against other threats such terrorist divers, boats and even mini-sub and the immensity of the U.S. waters to be patrolled leaves opportunity for terrorists to deploy mines in harbors. If mines were to get placed in U.S. waters, the Navy would be responsible for clearing them.

If a mine threat were to close a port, the duration that the port remains closed would determine the impact on the America economy. If dedicated forces had already been divested and OMCM assets were already deployed elsewhere at maximum utilization, then response time to be on station would greatly increase. Conceivably, it could take months to re-open a mined U.S. port. This could have sizable economic impact on the U.S and its economic partners.

Clearly, maintaining seaports free of mines by maintaining a strong dedicated MCM force capable of responding to a number of mine threats is critical to the nation's economic stability. That dedicated force must be focused on and dedicated to rapid response in times of homeland crisis while robust enough to deploy globally to several locations simultaneously. In addition to that force will be able to respond quickly, it must be able to prosecute a variety of mine threats to ensure that vital American seaports remain operating if U.S. economic interest is to be met.

CONCLUSION

America's reliance on the seas cannot be overstated. Dependent upon the ocean as the highway for force deployment and the medium for global economic security, the free access to the waterways of the world determine the United States' ability to survive and prosper. Sea mines, both the threat and the employment, are capable of interrupting the U.S. quest for national and economic security.

History has shown that sea mines can create significant challenges. Entities employing sea mines can use them to deny access to deploying U.S. forces, disrupt regional stability and create tremendous harm to the U.S. economy. The effects created by sea mines could greatly lessen the ability of the JFC or COCOM to uphold the national security and economic interest of the United States. As *Joint Publications 3-15* states, the COCOM is responsible for creating

seaborne access. To assist him, the naval component is relied upon to provide adequate MCM forces to protect regional waters to include chokepoints, SLOCs and SPODs. Robust dedicated MCM forces are required to conduct the mission.

The U.S. Navy has and continues to fluctuate on the size and composition of MCM forces. Having struggled with the Korean Conflict mine problem due to degraded MCM forces, the U.S. Navy began a slow reconstruction as it conducted several counter mine operations leading up to the first Gulf War. The experiences of Desert Storm led to the conclusion that a definite need for improvements in its future MCM force structure existed. In the decade to follow, the Navy nurtured a dedicated MCM force capable of fully supporting COCOM requirements to uphold the vital interest of the America. This well outfitted force provided critical assurance that forces deploying for OEF/OIF were unimpeded in their movement.

Ironically, just prior to OIF the U.S. Navy began to consider a long-term future plan that features the substitution of proven, dedicated MCM forces with as yet unproven technology-leveraged OMCM forces. This move could leave the COCOM and JFC with a vulnerability gap that would be created by the divestiture of dedicated forces prior to the deployment OMCM platforms being capable of conducting the mission. The U.S. Navy's planned organic MCM force has three weaknesses that would cause this gap in capability: even with advance technology the inventory is too small, the reliance on favorable risk and intelligence analysis results is too great, and the construct of future force deployment concepts is not supported by future MCM force structure.

RECOMMENDATIONS

In order for the COCOM to be successful at preserving the national and economic security of the United States, the U.S. Navy must adjust the future planned MCM force structure.

These adjustments should be made across a myriad of areas to include funding and basing. To avoid this gap in capability the U.S. Navy should consider the below recommendations.

In terms of command structure and leadership, U.S. Navy has a sound and well established institution capable of executing its MCM role. The COMINWARCOM and associated Mine Squadrons provide the required leadership infrastructure. This structure should remain in place.

A dedicated MCM force must remain in place, solely devoted to standing alert to respond to mine threat crisis worldwide while conducting flexible deterrent type operations in support of COCOM cooperative security initiatives. This force must be well funded and equipped with the latest technology. The force should be focused completely on MCM and should not be tasked with conducting other operations that would detract from their timely response to a crisis or commitment to COCOM regional security initiatives such as sonar surveys of harbors, SLOC and chokepoints.

In peacetime, this force should conduct underwater surveys which serve a two-fold purpose. First, they add to the forward presence and cooperative security missions that are required by the COCOM. Conducting those missions, especially as a coalition effort, would build stronger ties with regional entities by displaying the American commitment to maintaining free and open seas, which in turn bolsters regional confidence in using the seas as means of trade and continues to assist in igniting regional economies. The second benefit is that through surveys forward deployed dedicated MCM force would convey the message that any attempts to employ mines would be a futile effort and that any employment would result in quick reaction by Navy MCM forces.

Since DoD wishes to deploy forces rapidly, decisively defeat an enemy and then re-deploy as quickly as possible, having free global maritime access is critical. MCM forces must be able to quickly respond and defeat, without any significant delay, any global mine threat prior to rapidly deploying seaborne forces arriving in theater. Only dedicated MCM forces will be able to respond quickly while possessing the capability to defeat large mine threats without significant drain on the LCS assets required for other maritime missions. In order to accomplish this rapid response MCM mission, the U.S. Navy should logically divide dedicated MCM forces between forward deployed locations and appropriate homeland defense positions. Dividing deployed SMCM, AMCM and EOD diving units between forward operating bases would provide the most optimal coverage of vital SLOCs and chokepoints while stationing an appropriate portion of the MCM forces in strategic locations at home would allow for coverage of vital American seaports. While most likely each COCOM would not have a MCM unit dedicated to it specifically, the proper positioning of the forces would allow for global access coverage.

This “home guard” and forward deployed dedicated mine countermeasures forces would require a steady budgetary pledge to ensure that platforms such as the MCM class of surface minesweepers and the MH-53E helicopter continue to be updated or, if required, replaced with follow-on platforms capable of equal or better performance. In addition, mine countermeasures devices to be operated from those platforms should be equally capable of detecting and eliminating mine threats while units like Naval Special Clearance Team 1 need to be funded and equipped with the latest in UUV technology. In fact, OCMCM devices scheduled to operate from the RMS and MH-60S helicopters should continue to be integrated on the dedicated assets such as MCM surface minesweepers and MH-53E helicopters.

Upgrades for those dedicated platforms should be designed to fill a possible capability gap created by possible setbacks in the OMCM force and technology development. Meanwhile, the development of mid-term to long-term OMCM must continue. As former COMINWARCOM, RADM Conley, stated "...we should work both (OMCM development and dedicated MCM sustainment) in parallel, and if/when the new systems achieve success and the envisioned OMCM CONOPS pass muster, then we can decide what dedicated forces are no longer needed." (Conley interview, 2005)

If OMCM technological advancements are achieved prior to the fielding of improved dedicated platforms and the U.S. Navy chooses to divest heavy dedicated forces in favor of the platforms such as the LCS/OMCM package, an adequate number of the assets must be funded and procured. The scheduled procurement of 21 LCS will fall woefully short in providing the necessary MCM force structure to handle mine threats that require clearance and neutralization. The Navy must field at least 20 more LCS of which half should be of the larger multiple helicopter and OMCM package capable model. These vessels along with MCM packages should be forward deployed to areas of critical maritime interest areas. When not conducting MCM operations they could be used in the maritime interdiction role with only minor adjustments to their payloads. The 20 extra ships would replace the gap of capability created by the lack of replacement for the then aging MCM minesweepers and the decommissioned coast mine hunters. Additionally, these ships would be in theater at times of conflict ready to provide Sea Shield support for the ships that will constitute the Sea Basing concept.

By the nature of the force deployment and sustainment process, airlift and sealift are strategically linked. As U.S. forces are required to deploy quicker and deliver combat effects to the enemy faster with great lethality and efficiency, it is recommended that the U.S. Air Force

procure significantly more strategic airlift assets than currently scheduled. Retired General Foss, a member of the Defense Science Board for Mobility, suggested that 50 more C-17s would significantly increase the COCOM's ability to get equipment to the fight faster. (Foss, 2005) Although not the most efficient transportation medium for larger amounts of equipment, additional strategic air assets would provide an added capability to move more forces to the theater, especially when dealing with smaller regional conflicts or mission other than war. These additional assets could delivery combat power if a vital SLOC or chokepoint is mined and ships are delayed or unable to get to the SPODs.

CLOSING

American control of the seas is a critical requirement for COCOM and equally critical to the country in terms of global and regional economic stability. In order to continue to maintain firm control of the seas, the Navy must change its current plans in order to maintain a robust, dedicated MCM force in the mid-term. Doing so will allow the U.S. Navy to provide unimpeded access through the world's vital waterways while ensuring that COCOMs can conduct essential security cooperation initiatives. Ultimately, these implemented recommendations will prevent vulnerabilities in MCM capabilities that will occur in the 2015 to 2025 timeframe under the current plans, a vulnerability easily exploited by the enemy. The result will allow the Combatant Commander and Joint Force Commander to successfully accomplish and preserve National Security Strategic objectives and promote global economic interest to the benefit of all.

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