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DAMN! THE TORPEDOES
Coping with Mine Warfare in the Joint Maritime Environment

By

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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Abstract

Technological advances and proliferation of sea mines have increased the asymmetric threat to expeditionary forces in the littorals as well as naval forces in general. Mine countermeasures is a complex area of naval warfare and the existence of a robust capability is critical to the successful execution of naval and expeditionary operations and the attainment of *joint operational maneuver*.

The potential exists for non-state actors to acquire sea mines and subsequently employ mine warfare as a means of crippling the Navy throughout the range of military operations. The Navy has an obligation to develop and effectively employ critical operational capabilities to counter that threat. Operational commanders must recognize the capabilities at their disposal as well as their limitations in order to plan and make appropriate risk decisions.

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*The implicit intraservice distinctions within the Navy provide an extensive, fine structured, hierarchical pecking order from top to bottom. At the pinnacle of this structure, since World War II, has been carrier-based fighter aviation. At...the bottom is mine warfare.*¹

Carl Builder,
Masks of War

Introduction

Naval mine countermeasures warfare is a small but crucial element of operational warfare that influences the balancing of naval objectives against the operational factors of space, time and force. Additionally, it is one of a few critical warfare disciplines that enable unimpeded movement, maneuver and operational logistics in the maritime environment.

However, given its current status as a warfare specialty, its capabilities, limitations and training cycles, the Navy’s mine countermeasures community may struggle to meet future warfare requirements as well as the challenges presented by an increasing asymmetric threat.

Naval mine warfare (MIW) has become one of the most misunderstood and readily neglected missions carried out by the United States Navy. A cursory glance at currently funded projects within the Department of Defense suggests that the only initiative of any importance related to naval mine warfare is the Littoral Combat Ship (LCS) and even this program may be in jeopardy due to contract issues. One might assume that naval mine warfare, particularly mine countermeasures, has ceased to exist as a core competency, concluding that international partners surely must bear the burden in accomplishing the mine countermeasures (MCM) mission. While it is true that the United States relies somewhat on coalition partners for wartime MCM support, the United States still maintains a robust MCM

¹ This is an assertion that Builder makes based on historical Naval “service culture,” and is used to help illustrate the relative importance of the mine warfare community within the Navy. See Carl H. Builder, *Masks of War* (Baltimore: RAND/Johns Hopkins University Press, 1991), p. 25.

Triad. Though it will likely never garner the attention of tactical aviation or *Aegis* cruisers, U.S. Navy MCM can and likely will play a significant role in future naval operations and it is a specific capability that the Joint/Combined Forces Maritime Component Commander (J/CFMCC) should expect at his disposal. Paradoxically, many operational commanders have little understanding of the complexities, limitations and importance of fully integrating mine countermeasures into current operational plans and exercises; instead treating it as an operational “afterthought” or simply assuming it will be there when needed with little regard for its potential operational impact.

Generally seen as an inconvenience, or in many cases ignored altogether during fleet exercises and routine deployments, Navy mine countermeasures may soon find itself unable to fulfill its operational roles pertaining to “full dimension naval power – from the stern gate, over water, across the beach, and to the objectives ashore” as articulated in Joint Vision 2010/2020 and the current Naval Transformation Roadmap². “In terms of...potential impact on joint expeditionary warfare, mines are perhaps the most attractive weapons available to any country determined to prevent U.S. naval forces from achieving sea control and power projection ashore.”³ The shift from the “blue water” Cold War threat to modern asymmetric warfare in the littorals seems to have outpaced the navy’s mine countermeasures capabilities. That is not to say there are no projects in development, but of those that exist many are over-budget or plagued by funding shortfalls and lagging test and evaluation schedules.

Technological advancement is only part of the equation however; a fundamental shift in the

² Joint Vision 2020 available at <http://www.dtic.mil/jointvision/jvpub2.htm> (accessed 12 April 2007). Office of the Secretary of Defense, *Naval Transformation Roadmap* (Washington, DC: Office of Force Transformation, 2003) available at http://www.oft.osd.mil/library/library_files/document_358_NTR_Final_2003.pdf (accessed 12 April 2007).

³ Department of the Navy, *U.S. Naval Mine Warfare Plan, Fourth Edition, Programs for the New Millennium* (Washington DC: Department of the Navy, 2000), p. 2.

way commanders look at mine countermeasures is just as important. The failure to fully integrate mine countermeasures into the operating forces, coupled with an incoherent and disjointed development program, are the major shortfalls facing current mine countermeasures employment. Joint Publication (JP) 3-15 and the current mine warfare doctrine in Naval Warfare Publication (NWP) 3-15 thoroughly describe naval mine warfare, but only in a very systematic and traditional sense. Both documents fail to address developing asymmetric threats and the operational considerations associated with them.

This paper will briefly explore the development of naval mine countermeasures within an historical framework, as well as examine current and future mine technologies and the threat they pose to naval and expeditionary forces. It will also identify the important limitations that operational planners can expect from the MCM Triad (Airborne, Surface and Underwater) in response to the increasing asymmetric mine threat in geographic trouble spots. Based on this analysis, the paper will evaluate the ability of current naval mine countermeasures initiatives to meet the needs of operational and theater-level commanders. Finally, this paper will outline some recommended actions operational commanders should take to help optimize the balance of operational factors and make appropriate risk decisions based on limitations of the capabilities at their disposal.

The Evolution of Mine Warfare

... since World War II, U.S. naval forces have suffered significantly more physical damage and operational interference from sea mines than from air, missile, and submarine attacks: 14 U.S. Navy ships have been sunk or damaged by mines, whereas only 2 have been damaged by missile or air attack.⁴

The introduction of sea mines to naval warfare dates to the American Revolutionary

⁴ Committee for Mine Warfare Assessment, *Naval Mine Warfare, Operational and Technical Challenges for Naval Forces* (Washington, DC: National Academy Press, 2001), p. 2.

War. The Bushnell Keg, named after its inventor David Bushnell, was little more than a watertight keg filled with gunpowder and hung beneath a float, but its introduction in 1776 would change the face of naval warfare forever. The commander of the British fleet, at anchor near Philadelphia, deemed it prudent to quickly move his ships from the area after a mine was detected and subsequently detonated nearby. Though ineffective at crippling and sinking British warships, these early mines, or torpedoes as they were called, nevertheless proved to be a very successful weapon. They created a new and profound psychological effect on naval commanders. By setting adrift his wooden kegs in the Delaware, Bushnell “started a form of naval warfare that was at first branded unethical... and for many years thereafter...the sea mine was considered a devilish device used only by unchivalrous nations.”⁵

Since its inception, mining operations have been employed in most every conflict involving naval forces since the American Revolution. The Battle of Mobile Bay during the American Civil War, the North Sea Barrage of World War I, Operation Starvation of World War II, Wonsan Harbor during the Korean War, Haiphong in Viet Nam, and the Persian Gulf during both Desert Storm and Operation Iraqi Freedom, are but a few of the prominent examples of mining campaigns involving U.S. forces. However it was not until the Navy encountered its first threat at Wonsan that the idea of a dedicated mine *countermeasures* force emerged. Being held up for six days at Wonsan due to enemy-laid mines led then Chief of Naval Operations Admiral Sherman to comment: “When you can’t go where you want to go, when you want to, you haven’t got command of the sea. And command of the

⁵ Naval Sea Systems Command, *U.S. Navy Mine Familiarizer*, (Panama City, FL: NAVSEA, 2000) available at <http://www.comomag.navy.mil/Mine%20History/Mine%20Familiarization%20Cover.aspx> (accessed 12 April 2007).

sea is a rock-bottom foundation for all of our war plans...now we're going to start getting mine-conscious.”⁶ The Navy did become “mine-conscious” during and after the Korean War with the introduction of helicopters into MCM, new sweep systems, and a more robust effort to incorporate mine warfare into operational planning, but to this day the MCM community is still operating to a large degree with “vintage” Korean War technology and traditional operational doctrine.

During the 1980s Gulf Tanker War and the 1991 Persian Gulf War, cheap, low-technology mines cost the United States many millions of dollars in repairs to its warships, as well as substantial damage inflicted upon international tankers. The Samuel B. Roberts (FFG 58) struck an Iranian contact mine in 1988, which caused nearly \$96 million in damage.⁷ On 18 Feb 1991 while conducting mine countermeasures and support operations in the Persian Gulf, two ships encountered mines within hours of one another: as the Mine Countermeasures Command Ship, USS Tripoli (LPH 10) struck an Iraqi moored-contact mine operating off Faylaka Island, while USS Princeton (CG 59), also operating in the vicinity of the Mine Countermeasures Group, detonated and sustained crippling damage from an Italian Manta bottom influence mine laid by Iraqi forces.⁸ Iraq's employment of mines in conjunction with its beach defenses successfully shaped expeditionary operations by preventing the marine amphibious landing into Kuwait. “The historical success of...mines suggests that these weapons will continue to challenge U.S. naval forces...[and] twice complicated U.S. amphibious landings – first at Wonsan in 1950, then off Kuwait more than

⁶ NAVSEA, *U.S. Navy Mine Familiarizer*

⁷ Department of the Navy, *U.S. Naval Mine Warfare Plan*, p. 31.

⁸ U.S. Navy Ship Histories, available at <http://www.navysite.de/ships.htm> (accessed 14 April 2007).

40 years later.”⁹

Technological advancements in mine countermeasures matured as a direct result of the Korean experience but, as proven in the later part of the 20th century, mines posed a significant threat to naval vessels and still remain one of the cheapest and most effective weapons for denying sea control and slowing the ability to put forces ashore.

Technology, the Current Threat

An important issue facing modern mine countermeasures is the proliferation of advanced sea mine technology. By U.S. military standards, many mines are not technologically advanced, at least not in the sense of the latest long range guided missiles or detection/engagement systems employed by modern ships and aircraft. But, new developments are specifically aimed toward making MCM more difficult. Advanced counter-countermeasures mechanisms such as ship counting, inter-look/inter-count dormant periods and new mine-case geometries exacerbate an already difficult mission. Technical advancement in countermeasures systems inherently exceeds that of the mines themselves.¹⁰

Mines employ many of the same basic principles with which they were developed over 200 years ago and it is their relative simplicity, in lieu of technological advances, that keeps production costs low and makes them a viable weapon for use by small nations with limited budgets. Affordability and availability make sea mines particularly appealing to rogue states and terrorists looking to disrupt stability in key parts of the world. They are an economical force multiplier in the denial of sea control. Of particular concern to operational

⁹ Department of the Navy, *U.S. Naval Mine Warfare Plan*, p. 31.

¹⁰ For a more in-depth analysis of the state of the art of mine countermeasures technology and experimental research, see Albert M. Bottoms and Clyde Scandrett, *Applications of Technology to Demining: An Anthology of Scientific Papers (1995-2005)*, Volume 3, Part II, “Technology Applications to Naval Mine Countermeasures” (Society for Counter-Ordinance Technology (SCOT), July 2005).

and theater commanders is technology proliferation from friendly and “other” nations to unfriendly actors. While some countries (for example, China, Russia and Italy) sell high-tech mines on the open market, there is little telling to what extent advanced designs have been bootlegged and put into production indigenously by countries with less-than-desirable intentions. Proliferation can have as profound an effect on operational warfare and planning as it does on regional security cooperation and stability.

Current threats will likely affect Marine expeditionary forces as well. The Very Shallow Water (VSW) and beach zones have seen a dramatic increase in types and sophistication of mine systems employed. Countermeasures such as Advanced Lightweight Influence Sweep System (ALISS), Shallow-Water Assault Breaching (SABRE) system, Distributed Explosive Technology (DET), and Breached Lane Navigation System (BLNS) are significant developments that benefit expeditionary forces, but the Navy and Marine Corps have not fully integrated or coordinated their use in joint training exercises above the tactical level. Tactical proficiency is not the issue; the problem lies in doctrine and the coordination of available capabilities at the operational level of war.

The New Asymmetric Threat

Joint Publication (JP) 1-02 does not specifically define the term Asymmetric Threat; however, “put simply, asymmetric threats or techniques are a version of not ‘fighting fair,’ which can include the use of surprise in all its operational and strategic dimensions and the use of weapons in ways unplanned by the United States.”¹¹ One of the new concerns within the U.S. government is the potential for asymmetric/terrorist use of mines in or near major

¹¹ Institute for National Strategic Studies, National Defense University, *1998 Strategic Assessment, Engaging Power for Peace*, ch. 11, available at <http://www.au.af.mil/au/awc/awcgate/sa98/sa98cont.htm> (accessed 17 April 2007).

seaports of the United States. This concern is specifically illustrated in the National Strategy for Maritime Security, which recognizes that “mines are...an effective weapon because they are low cost, readily available, easily deployed, difficult to counter, and require minimal training.”¹² Though the U.S. Coast Guard bears most of the burden for port protection, there is little doubt that close coordination between the Navy and Coast Guard is required to meet the challenges in this unique environment. With the bulk of U.S. and international trade occurring via maritime shipping,¹³ any disruption within the industry from terrorist attack could have severe economic fallout. Fortunately, the Department of Homeland Security has at least identified the potential mine threat to commercial vessels: a good starting point for an effort to counter terrorist-planted sea mines near U.S. ports.

Seaports are not the only areas vulnerable to terrorist attack from a foreign mine threat. International straits and strategic chokepoints also pose a hazard to navigation should they be mined to accomplish terrorist or wartime objectives. Nations at war with the United States are not likely to follow the guidelines of the 1907 Hague Conference¹⁴ and the United Nations Convention of the Law of the Sea regarding the use of sea mines, and the only warning of presence might simply be a detonation. This assumes a defensive or “traditional” approach to laying a minefield, but what about the use of asymmetric methods? With remote detonation capability and an indefinite dormant time, unfriendly actors including terrorists might easily discriminate and attack U.S. or international vessels when the best opportunity

¹² U.S. Department of Homeland Security, *National Strategy for Maritime Security* (Washington, D.C., 2005), p.4.

¹³ Organisation for Economic Co-operation and Development, Directorate for Science, Technology and Industry, Maritime Transport Committee (MTC), “Security in Maritime Transport: Risk Factors and Economic Impact,” July 2003, available at <http://www.oecd.org/dataoecd/19/61/18521672.pdf> (accessed 19 April 2007).

¹⁴ Article VIII of the 1907 Hague Peace Conference addresses the laying of submarine contact mines. All articles of the 1907 Hague Peace Conference are available at <http://net.lib.byu.edu/~rdh7/wwi/hague.html> (accessed 17 April 2007).

presents itself, whether during war, a routine exercise or simply a target of opportunity such as a merchantman or tanker.

Despite attempted Iraqi mining efforts near Umm Qasr in March 2003, there have fortunately been no attempts of targeted mining efforts or asymmetric employment *specifically* against commercial shipping since the Iran-Iraq War. But, there is a lesson to be learned from that experience. On 21 September 1987, army attack/reconnaissance helicopters operating with prior intelligence from USS Jarrett (FFG 33) spotted the Iranian vessel *Iran Ajr* laying mines in the path of a U.S. convoy of re-flagged Kuwaiti tankers.¹⁵ They successfully engaged the ship and fortunately prevented a large portion of the mines from being planted. The Navy seized the vessel and neutralized the remainder of the mines, then scuttled the ship. This example highlights the efficacy of offensive mine countermeasures using available intelligence assets. It also reinforces the need to start offensive countermeasures operations well before hostilities begin, or at least to establish a plan that addresses the intelligence requirements for a potential mine threat. Though both defensive and offensive disciplines rely heavily on intelligence, offensive MCM is fundamentally easier and less technologically oriented than defensive mine countermeasures. No matter which is ultimately employed operationally (offensive vs. defensive), the importance of the intelligence community's role cannot be overstated. The United States can ill afford ignorance about what technology exists, how or where it will be employed, and who has the intentions to use it.

¹⁵ Gregory K. Hartmann with Scott C. Truver, *Weapons That Wait: Mine Warfare in the U. S. Navy* (Annapolis: U.S. Naval Institute Press, 1991), pp. 257-260.

Today's MCM Forces, a Devolving Capability against a New Threat?

*Sea mines remain the Achilles Heel of our Navy!*¹⁶

Gordon England,
Former Secretary of the Navy

The state of current mine countermeasures capability, while not exactly devolving in the face of a new asymmetric threat, has certainly progressed little. Regardless, the effect is similar: a capability misaligned to the threat. But why has this occurred? The Naval Transformation Roadmap purports to establish the framework of a new, robust and flexible MCM capability that would benefit the operational commander, but it fails to offer a realistic threat-based assessment. It merely articulates aggressive, and perhaps for the time being, unrealistic technological initiatives to transform Mine Warfare: “The transformational naval approach to MIW is based on a Concept of Operations (CONOPS) that integrates a range of new technologies that will enable future naval forces to freely operate and maneuver in the littorals, and deliver ground forces throughout the beach regions.”¹⁷ This broad vision for future mine warfare, being highly techno-centric, is likely a root cause for today's stagnating capability. The focus on future technology (mid and long term developments) trumps current force expenditures and doctrine implementation. There is a bias toward platform technology which is decidedly tactical in nature and has tended to push doctrinal changes “down the road” as the Navy waits for its new toys. But, with ever- decreasing funding for “legacy” programs, current MCM forces will still be expected to meet the challenges in the near term. A 2001 Government Accounting Office report to the House of Representatives Committee on Armed Services concluded that:

The Navy has had [mine warfare] acquisition programs under way to improve its

¹⁶ Bottoms and Scandrett, *Applications of Technology to Demining*, p. i.

¹⁷ Office of the Secretary of Defense, *Naval Transformation Roadmap*, p. 26.

capabilities...for many years, but progress has been slow. Unless current efforts can be accelerated or alternatives developed, it will be another 10 to 20 years before the Navy and the Marine Corps will have the capabilities needed to successfully execute littoral warfare operations against competent enemy forces.¹⁸

A ten-to-twenty-year timeline will likely stress current MCM forces beyond useful effectiveness and drive operational commanders to take unwanted risks when time becomes critical for gaining an operational objective. Simply stated: if the MCM force cannot meet the timeline established by the operational commander, the commander may be pushed to commence an operation while assuming an increased level of risk or be forced to divert forces along a different line of operation, a potentially disastrous drain on resources.

The shifting focus from a dedicated MCM force to that of a flexible “organic capability” is certainly understandable in today’s climate of military streamlining and force efficiency, but there is a cost. Presently, the MCM Triad is being stretched in two very different directions. On the one hand, current dedicated assets (MH-53E, MCM/MHC, and EOD Mobile Units) are operating with less funding and meeting only minimum requirements for currency and proficiency despite being the “corporate knowledge” and capability base for fleet mine countermeasures. Interestingly, the AMCM community has recently seen a shift in focus toward other fleet support requirements (heavy lift, VIP transport, special operations support, etc.) to help ensure platform survival.

On the other end of the spectrum, the Organic MCM (OMCM) concept has begun to take shape and fields a truly integrated element within a battle group. In this concept however, mine countermeasures will become a collateral requirement or “non-specialty”

¹⁸ United States General Accounting Office, Report GAO-01-493, *Navy Acquisitions: Improved Littoral War-Fighting Capabilities Needed* (Washington, DC: GAO, 2001), p. 2, available at <http://www.gao.gov/new.items/d01493.pdf> (accessed 18 April 2007).

warfare area, one of perhaps half a dozen, that will be injected into the Required Operational Capability (ROC) matrix and training curricula of already overextended units. The OMCM force sacrifices depth of capability for quick reaction time while the inherently slow deployment of dedicated MCM is outweighed by the level of expertise and capability it brings to the fight. This divergence requires a very important decision to be made by an operational level commander: to go in quick with limited ability, limited coverage and higher risk or wait considerably longer for full spectrum maneuver. Operational factors of space, time, and force are closely tied to the operational objective but within each, there is little “wiggle room” with the current capability. MCM exists on a linear scale with dedicated MCM on one end and OMCM on the other, and this scale will only get wider as dedicated assets age and/or retire and OMCM assets are fielded with fewer and fewer capabilities. The navy must quickly reconcile this issue with technology *as well as* changes in doctrinal employment.

For traditional operations, the previous construct, even with its associated limitations, may still provide enough options to get the job done. But what about the ability to counter the already-recognized terrorist mine threat? No matter the forces, whether dedicated, organic, future, legacy or other, the ability to determine if a port entrance or chokepoint has been mined is extremely limited. Short of continuous exploratory MCM at every chokepoint and every harbor entrance around the world, defensive MCM is severely handicapped. Preemption through aggressive intelligence, reconnaissance and surveillance (ISR) to stop the laying of mines may be the only real solution. The focus on new devices must not surpass the importance of doctrine and the use of offensive mine countermeasures.

New Initiatives, Same Challenges

Though instances of “tough talk” concerning mine warfare and its threat to U.S. interests are almost too numerous to count, it is quite a bit harder to find evidence that the Navy is “putting its money where its mouth is” when addressing mine countermeasures. Fortunately, there are several prominent initiatives that might bring MCM out of its malaise and provide for not only new technological advancements but also updated doctrine. These include development of the Littoral Combat Ship (LCS), MCM participation in joint and interagency exercises, and the merger of Mine Warfare Command with Fleet Anti-Submarine Warfare Command to form Naval Mine and Anti-Submarine Warfare Command (NMAWC).¹⁹

The Littoral Combat Ship concept is the next step in fulfilling the organic mine countermeasures vision and is to be part of the eventual replacement for dedicated airborne and surface assets. The inherent flexibility of the platform opens new possibilities and helps to mitigate long lead times and decreased capability of dedicated and organic forces respectively. The concept blends many of the features of a dedicated MCM capability into an organic component of the fleet. As a multi-mission platform that requires interchangeable force packages however, its technological advantages may ultimately be overshadowed by slow “real-time” flexibility at sea when converting from one package to the next (e.g., ASW to MCM). This limitation could be overcome by designating specific ships in the class to perform a particular mission on routine deployments with a strike group, but that would require several ships on each coast and a predetermined deployment cycle. With recent contract issues however, there is no definitive timeline for when enough ships in the class

¹⁹ See Naval Mine and Anti-Submarine Warfare Command (NMAWC) website available at <http://www.nmawc.navy.mil> (accessed 23 April 2007).

will be fielded to meet even a minimal deployment requirement.

Another important initiative involves the participation by fleet MCM forces in new interagency exercises, specifically the Homeland Security Exercise LEAD SHIELD series. During the spring of 2005, AMCM and UCM forces participated in LEAD SHIELD III in the Port of Los Angeles-Long Beach, coordinating with local, state and federal civil authorities, as well as other Navy and Coast Guard units to “evaluate our ability to respond to a homeland security threat in a major port.”²⁰ This exercise successfully validated the concept of operationalizing MCM into the interagency arena to tackle the potential asymmetric sea mine threat in the nation’s busiest ports.

The decision to combine two separate disciplines and create the Naval Mine and Anti-Submarine Warfare Command (NMAWC) is perhaps the most important and promising initiative regarding doctrinal development for the MCM Triad. At least on paper, the level of importance and influence of the MCM community is now on par with anti-submarine warfare. The effect however will likely be more profound, as new efforts can be focused across both specialties leveraging common resource sponsors, technologies, training, and operational capabilities “to ensure Navy-wide competency in the MIW...mission areas.”²¹ There will inevitably be conflicting priorities within NMAWC over the relative importance of each warfare area, but the overall synergistic benefit is a far more important effect.

Though these three initiatives are important to the future of mine countermeasures employment, none of them, either alone or in combination, is likely to be of much value without a fundamental shift in attitude at the operational (and higher) level. Unfortunately, it

²⁰ Vice Admiral Harvey E. Johnson, Jr. Commander, Coast Guard Pacific Area, U.S. Maritime Defense Zone Pacific, Regional Emergency Transportation Coordinator, interview with Chips Magazine available at http://www.chips.navy.mil/archives/05_Apr/PDF/VADM_Johnson.pdf (accessed 24 April 2007).

²¹ Naval Mine and Anti-Submarine Warfare Command (NMAWC).

may take an unexpected attack with disastrous consequences to effectively highlight the mine threat to U.S. interests.

Recommendations

With the vulnerability of critical energy supply routes in and around the Middle East, domestic seaport weaknesses and the potential for traditional and asymmetric mining operations stemming from such things as Iranian belligerence or a clash between China and Taiwan, operational commanders may find their level of MCM capability incompatible with crisis response or current and future plans. The following recommendations help to balance operational factors and the level of risk involved with the mine countermeasures mission:

- *Increase the number of forward deployed AMCM units.*

Perhaps the single greatest detractor of dedicated AMCM forces is response time. Though the conduct of airborne MCM operations is considerably faster than surface and underwater MCM, the lead time for operations can be as much as 30 days or more, even in a permissive environment. This is due in large part to logistical factors, transit times and the need to “break down” assets before, and reassemble them after shipment. Increasing the number of forward deployed units is necessary in order to overcome the long lead times. The effectiveness of permanently stationed AMCM assets in Bahrain should serve as the benchmark for standing up additional detachments worldwide, for example in Japan or South Korea. Not only will transit times be significantly reduced, but forward deployed platforms can continue to provide such things as peacetime sonar bottom mapping which aids in bottom change analysis should hostilities arise. There is little doubt that the capability would prove indispensable in and around the Persian Gulf during a conflict with Iran as it did during Operation Iraqi Freedom. The same might also prove to be the case in the western Pacific.

• Integrate MCM into Joint Maritime Forces Component Commander (JFMCC) concept.

With the navy trying to grasp the full potential of the JFMCC concept and develop a cogent structure for its employment, it is crucial that all elements of naval warfare, including mine warfare, are incorporated into specified JFMCC training, planning and doctrinal employment. The current Composite Warfare Commander (CWC) doctrine²² describes the tactical employment of specific warfare areas, to include mine warfare, in great detail; however at the operational level, the JFMCC does not delineate operational responsibilities by warfare specialty. Though the organizational structure is scalable and flexible with regard to functionality,²³ the staff cannot operate in a vacuum. The inherent complexity of the maritime environment (to include subsurface, surface, air and perhaps even space) facilitates a requirement to ensure representatives from each naval warfare discipline are fully assimilated into the Maritime Operations Center (J3) and Maritime Future Plans Center (J5). Injecting MCM and other warfare disciplines into the initial planning structure ideally lessens the need for last-minute requests for capabilities using the maritime support request (MARSUPREQ) system and also helps to anticipate the lengthy timelines involved with MCM operations.

• Develop Coast Guard capability to perform limited domestic seaport MCM operations.

The Navy will be challenged to provide acceptable MCM protection of seaports in the United States without interagency cooperation from the U.S. Coast Guard. A solution to this problem may involve outfitting Coast Guard units with their own organic MCM assets. Full scale MCM development is unlikely due to the relatively small size of the Coast Guard and

²² Chief of Naval Operations, *Composite Warfare Commander's Manual*, NWP 3-56 (Rev. A) (Newport, RI: NWDC, 2003)

²³ Navy Warfare Development Command, TACMEMO 3-32-03, *Joint Force Maritime Component Commander (JFMCC) Planning and Execution* (Newport, RI: NWDC, 2004) p. EX-2.

its limited funding in relation to the other armed services, but even a minimal capability could pay great dividends in the immediate response to a threat. Local Coast Guard units are familiar with the ports within their jurisdiction, facilitating rapid response with the possibility of follow-on Navy assistance when necessary.

- *Focus ISR efforts toward the maritime threat to facilitate offensive countermeasures.*

In order to achieve its maximum effectiveness, mine countermeasures rely heavily on intelligence, surveillance and reconnaissance. Increasing global maritime intelligence cooperation and sharing through regional security initiatives is likely the best way to determine potential and actual terrorist use of sea mines. Both offensive and defensive countermeasures benefit from an in-depth ISR capability. Prevention and interdiction of mining efforts is preferred but, should mines ultimately be laid, good intelligence shortens the time involved with determining which countermeasures system best suits the situation. ISR also allows operational commanders to form better risk analyses when determining the desired level of maneuver (break through vs. full dimensional, etc.) for a given phase of operations.

Conclusion

With the offensive combat power of the carrier battle group established firmly as the bedrock of current naval warfare doctrine, it is unlikely that the less glamorous role of naval mine countermeasures can compete for funding and resources in a climate of constrained defense spending. The threat of mines to U.S. military and commercial interests, however, is not going away. Amid the increasing risk of terrorist-planted sea mines and the potential for conflicts in worldwide trouble spots, the mine countermeasures community may struggle to meet future warfare requirements. Unless a fundamental shift in the perception of mine

warfare occurs at the operational level of war, it is unlikely that the Navy and Marine Corps will be able to successfully execute littoral warfare against a competent enemy. As much as mine warfare, particularly mine countermeasures, has been neglected in the past, the loss of operational maneuver in the littorals is something the military cannot ignore.

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