

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. **PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.**

1. REPORT DATE (DD-MM-YYYY) xx-06-2005		2. REPORT TYPE Master's Thesis		3. DATES COVERED (From - To) 20-08-2004 to 26-05-2005	
4. TITLE AND SUBTITLE A Critical Vulnerability, A Valid Threat. U.S. Ports and Terrorist Mining				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Michael E. Sparks, CDR, USN				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Joint Forces Staff College Joint Advanced Warfighting School 7800 Hampton Blvd. Norfolk, VA 23511-1702				8. PERFORMING ORGANIZATION REPORT NUMBER JFSC 25789	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release, distribution is unlimited.					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Unclassified Unlimited	18. NUMBER OF PAGES 66	19a. NAME OF RESPONSIBLE PERSON JoAnne Hooper
a. REPORT UNCLASSIFIED	b. ABSTRACT UNCLASSIFIED	c. THIS PAGE UNCLASSIFIED			19b. TELEPHONE NUMBER (include area code) 757-463-6301

**JOINT FORCES STAFF COLLEGE
JOINT ADVANCED WARFIGHTING SCHOOL**

A CRITICAL VULNERABILITY, A VALID THREAT.

U.S. PORTS AND TERRORIST MINING

by

Michael C. Sparks

Commander, 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 April 2005

Abstract

Sea mines have been a nuisance in the maritime domain since their debut during the Revolutionary War to their most recent use in Operation Iraqi Freedom. An indiscriminate weapon, mines inflict fear and uncertainty in maritime powers and can successfully deny an adversary access to the high seas. It is the effects produced from the employment of mines which make them attractive to the terrorist. Fear, uncertainty, insecurity and the removal of freedom, all make mines a weapon of choice for the terrorist. For these reasons, it is worthy of assessing our capability to protect and defend against this specialized threat.

This paper will outline the economic and strategic significance of the U.S. Maritime Transportation System (MTS) and identify the shortfalls in current capabilities to defend the MTS from terrorist mining. The effectiveness of mines to deny access and achieve strategic goals will be presented using historical examples. More recently, indications that Osama bin Laden has acquired the capability to use mines, and that he has the desire to target our economy will be provided to support the urgency and the significance of the threat. The mission of mine countermeasures will be addressed as a contributor to the overall problem due to the difficulty of the mission. This will be reinforced by a general comparison of the recent mine countermeasures effort in Iraq to the suspected level of effort required to clear a U.S. port of mines. This comparison will demonstrate how the lack of a mine countermeasures capability by the Coast Guard to deter the employment of, or, when deterrence fails, to clear mines from harbors coupled with the consolidation of Navy assets in one port, thereby increasing response time, are the primary factors which dramatically increase the economic and strategic impact of a terrorist mining incident. Lastly, a recommendation that provides an immediate deterrent capability and a long-term transition of mine countermeasures capabilities to the Coast Guard will be outlined.

Table of Contents

Introduction	1
Thesis	4
The Significance of Maritime Trade and Access	5
The Threat to Access	8
Historical Use of Mines Justifies the Modern Threat	12
Economy as the Center of Gravity	15
The Department of Homeland Security	16
Future Coast Guard Programs	22
Time is Money, the Missions Contribution	24
Minesweeping	25
Minehunting	26
An Example of Required Effort, Operation Iraqi Freedom	29
Ten Days in Iraq, How Many in the United States?	31
Where are the Minesweepers?	33
Deterrence	36
Significance of Intelligence	38
Recommendation	42
Part I (Strategic Basing/HLS Mission)	42
Part II (Asset Transfer)	48
Part III (USCG Future Programs)	54
Conclusion	57

Introduction

It is a cool fall morning when you wake up and make the coffee. Turning on the television you hope to catch a quick weather report before you get ready for the day. Instead of the weather, your favorite news channel is reporting something that, at first, is newsworthy but not too unusual. At first glance it appears that a merchant ship may have run aground as it was transiting into New York harbor. The reports don't say much, just that the 40,000 ton, 900 foot cargo ship was dead in the water and leaking oil into the Long Island Sound. There is no speculation as to what caused this maritime incident. Just as you turn to go and get your shower a reporter cuts in to give a breaking news update. A merchant ship in San Francisco harbor is on fire and sinking quickly. All the reporter knows is that the ship was scheduled to arrive early that morning and had just passed under the Golden Gate Bridge when an explosion brought the ship to a halt taking on water with fires burning below decks. Inside of ten minutes, the news reports of very similar incidents come from Los Angeles, Norfolk, and Seattle. It is clear that something more than a rash of merchant accidents is the cause.

It is mid-day before the first confirmation is reported. All five of the ships had apparently struck or actuated some form of underwater explosive or mine. A national emergency is declared and the Department of Homeland Security springs into action with the Coast Guard shutting down the ports and coordinating the cleanup and salvage efforts. Immediately, the call goes out to the Navy in order to mobilize their specialized capability to locate and neutralize mines. It will be days before the required forces start moving towards the ports in order to commence mine clearance operations. In the interim, the ports remain closed. The port of Norfolk is given the highest priority to reopen as it hosts the largest naval base in the country. The remaining ports remain closed and the timeline for getting the required assets to the ports is

added to the timeline to conduct the clearance effort to open the ports. None of it looks good. The only assets on the West coast consist of the marine mammal system which will require considerable time to move to the operating areas before starting clearance operations. A detachment of a mine countermeasures helicopter squadron is sent from Corpus Christ, Texas to San Francisco and one to Seattle. They will start their operations inside of a few days, but it will be weeks before the first mine countermeasures ship reaches the port after sailing from Ingleside, Texas, through the Panama Canal and up the West coast. The situation on the East coast looks a little better. There is already a helicopter squadron in Norfolk, so work can start within a day in Norfolk and a detachment will deploy to New York and be able to start working in that area within a couple days. It will still take a couple weeks to get the first mine countermeasures ship from Ingleside, Texas, to Norfolk, and a few days more to get them to New York. With all the parts moving toward their objectives the situation gets worse. Mine detonations in Charleston, South Carolina and in the approaches to San Diego, California, are reported. Almost every major port has been subjected to terrorist mining. With concern for the ports that have not experienced an incident, the President is forced to halt all maritime traffic into the country until the channels leading into all U.S. ports are determined safe.

With the determination that the ports will remain closed for an undetermined period of time, the economic impact is felt immediately. Stock prices soar as the demand for commodities that rely upon maritime transportation increase with the expectation that the flow of imports will be at best severely restricted, at worst completely eliminated. Fuel prices skyrocket as imports are reduced. The cost of production increases so producers begin to lay off workers while they pass the increased cost of production to the consumer through higher prices. Recession looms on the horizon. On the international market, the drastic reduction in exports coupled with the

backlog of imports strains international trade agreements and creates political tension.

Strategically, the U.S. ports which are home to our naval forces remain closed but are given the priority for clearance. No military shipping is able to depart or return to the port until they are determined safe. The power projection capability of the U.S. which is provided by the Navy is handcuffed. The world's only superpower is vulnerable. The availability of naval forces is limited to those which were underway or deployed at the time the ports were closed.

The U.S. is again the target of terrorism. What is different is that this time, it is not the rampant loss of life and the devastating images of planes crashing into the World Trade Center or the buildings crumbling to the ground that will impact our way of life. We will not see the smoldering rubble or the countless pictures of people in mourning the loss of loved ones. It is the second and third order effects caused by the terrorist mining that would have an impact on every citizen of the country by straining resources and the economy. Throughout this difficult time the same questions would be asked: Who is responsible? What could we have done differently to prevent this from happening? If we couldn't prevent it, how could we have better prepared ourselves to deal with the consequences?

Although this is a hypothetical situation, it presents a potentiality that deserves investigation. To say that terrorists are not smart enough or do not have the capability to conduct an operation of this scale is an understatement, equivalent to not considering airliners as weapons of mass destruction was on September 10th. The United States remains vulnerable to the specialized threat of terrorist mining.

Thesis

The Department of Homeland Security's maritime security enforcers, the Coast Guard, are not equipped to counter the threat of terrorist mining and the Navy has poorly positioned the specialized forces capable of countering the threat.

Through the course of this paper time will be identified as the enemy when faced with the mining of U.S. ports. Time from the standpoint of its effect on the economy in conjunction with the time necessary to properly conduct mine countermeasures will be shown to be amplified by the current distribution of capabilities throughout the U.S. Additionally, the current and future capabilities of those responsible for maritime security (U.S. Coast Guard) coupled with the current process of combating the specialized threat posed by mining U.S. harbors will also be examined. Finally, a three part recommendation will be presented that supports changes in the current Navy mine countermeasures force disposition in order to provide a near-term capability to mitigate the terrorist mine threat coupled with an approach for the Coast Guard to acquire the specialized capability of mine countermeasures that will enable the Coast Guard to assume the responsibility for this specialized mission in support of maritime homeland security.

The Significance of Maritime Trade and Access

To say that maritime transportation is critical to the economy of the United States is an understatement. The size and complexity of the system that comprises the United States Maritime Transportation System (MTS) is indicative of its significance. Consisting of waterways, ports and their intermodal connections, vessels, vehicles, and system users, as well as Federal maritime navigation systems, the MTS objective is the safe, secure, environmentally sound movement of goods, people, and military assets in the most efficient and economically effective manner possible (Hearing on Implementation of the Maritime Transportation Security Act). Critical to the operation of the MTS are the 361 public ports in the United States that are an integral part of the Nation's commerce. These ports handle over 95 percent of the United States overseas trade. The variety of trade and commerce that is carried out via U.S. ports includes bulk cargo, containerized cargo and passenger transport and tourism. The reliance on ports for import and export needs is not declining. The volume of goods and trade imported and exported through United States ports is expected to more than double over the next twenty years. Currently, fifty ports in the United States account for approximately 90 percent of all the cargo tonnage shipments while twenty-five ports account for 98 percent of all container shipments (Maritime Transportation Security Act of 2002). The Port of New York and New Jersey, for example, is the third largest port in the United States, and the largest on the east coast of North America. In 2001, over three million containers and more petroleum production than any other port in the nation came through the port (Junot, 2002, p. 16). Ships are the primary mode of transportation for world trade, carrying approximately 80 percent of the world trade by volume. The United States is the world's leading maritime trading nation, accounting for nearly 20 percent (measured in tons) of the annual world ocean-borne overseas trade and accounts for 25

percent of the U.S. Gross Domestic Product (GDP), up from 11 percent in 1970 (Frittelli, 2004, p. 3).

Access to these port facilities is a critical link in the United States economic chain. Maritime shipping requires access from the open ocean to the port facility in order to transfer goods and cargo. Approximately 7,500 foreign ships enter U.S. ports every year and many of these ports are critical military strategic sealift ports whose availability must be constantly assured (Hearing on Implementation of the Maritime Transportation Security Act). The Departments of Defense and Transportation have designated 17 U.S. seaports as strategic because they are necessary for use by DOD in the event of a major military deployment. Thirteen of the seventeen ports are also commercial seaports. Among these ports are New York-New Jersey, Hampton Roads in Virginia, Corpus Christi in Texas, Morehead City and Wilmington in North Carolina, and San Diego and Long Beach in California. During Desert Storm, 90% of all military equipment and supplies were shipped from U.S. strategic ports. As the GAO reported; "If the strategic ports (or the ships carrying military supplies) were attacked, not only could massive civilian casualties be sustained, but DOD could also lose precious cargo and time and be forced to rely heavily on its overburdened airlift capabilities" (Frittelli, 2004, p. 6).

With regard to access, having 361 public ports in the United States, there is a minimum of 361 channels that ships must navigate to obtain access to the port. To provide an example of the potential economic impact that denial of access to our nations ports would cause, economists in 2002 estimated that the longshoreman strike on the West coast would equate to a loss of between one and two billion dollars per day for the first five days of the strike, rising sharply thereafter (Shaiken). Slowing or reducing the efficiency which materiel and goods are imported

also has the potential for significant economic impact. When the increased container security requirements post September 11, 2001 were analyzed, the impact became clear. Given the dependence of the United States and the global economy on a highly efficient maritime transportation system, many experts acknowledged that slowing the flow of trade to inspect all inbound containers, or at least a statistically significant random selection would be, in the words of James M. Loy, former Coast Guard Commandant and now deputy secretary at the Department of Homeland Security, “economically intolerable: (Frittelli, 2004, p. 5).

What is clear is that access is necessary to ensure continued economic stability. In the example of labor strikes there are actions that could be taken to off-set the problem. Presidential intervention to assign the National Guard or reserves to perform the duties of the longshoreman or the ports authorities hiring privatized labor to bypass the unions are examples. Regarding delays caused by increased port security measures, the impact can be mitigated by shipping companies adjusting the flow and scheduling of the container ships to account for the inspections. In each of these examples, the impact to the economy is clear, but both examples also have responses that either mitigates or off-set the impact of the dilemma. Additionally, in both examples, access to the ports had not been denied. The denial of access proposes a significantly different problem which is an economic and strategic threat to the United States.

The Threat to Access

“When you want to deny access, it is about mines. Lots of mines in great variety.”

Admiral Vern Clark, Chief of Naval Operations

It is inconceivable that any nation would be able to successfully deny maritime access to the United States through an overt act. Possibly a true statement in today's world but over the period 14 May 1942 to 1 April 1944 German U-Boats planted a total of 338 mines in the approaches to Western Atlantic ports running from St. Johns, Newfoundland to Panama. Of these, 130 were planted in the approaches to U.S. East Coast ports inflicting 9 ship casualties and closing ports for a combined total of 30 days (New York - 2 days; Chesapeake Bay - 3 days; Jacksonville, Charleston and Savannah - 3 days; Wilmington and Charleston - 8 days). In their attempt to stem the flow of critical materials to England and then Europe, the Germans elected to concentrate on torpedo attacks against East Coast shipping and the Atlantic convoys instead of continuing the mining operations. And yet, with only 11 submarine sorties and the expenditure of 120 mines they inflicted 9 ship casualties and interrupted the vital flow of war materials for a total of 30 days (A Misplaced Strategy).

Unfortunately, the threat faced by the U.S. is not from a single country with an established naval force but from terrorism which cannot be linked to a specific nation. Gone are the days when the U.S. knew exactly who the enemy was and from what axis the attack would originate. During the Cold War our forces prepared for the Soviet threat. Soldiers, Sailors, Airman and Marines knew the Soviets capabilities, tactics, techniques and procedures. With the Cold War over, the threat is no less significant, just much more difficult to recognize. Worse, today's enemy, the terrorist, can not be expected to align his attack from one direction. Our

forces cannot align defenses along a single known axis to deter the threat of terrorism. The threat is asymmetric, and worse, the enemy does not seek to target only the military force of the United States but the ideology of the United States and its people. The access to our ports is only one potential threat posed by terrorists. Security experts are concerned about a variety of terrorist threat scenarios at U.S. ports. Among other things, they are concerned that terrorist could:

- Use commercial cargo containers to smuggle terrorists, nuclear chemical, or biological weapons, components thereof, or other dangerous materials into the United States;
- Seize control of a large commercial cargo ship and use it as a collision weapon for destroying a bridge or refinery located on the waterfront;
- Sink a large commercial cargo ship in a major shipping channel, thereby blocking all traffic to and from the port;
- Attack a large ship carrying a volatile fuel and detonate the fuel as to cause a massive in-port explosion;
- Attack an oil tanker in a port or at an offshore discharge facility so as to disrupt the world oil trade and cause large-scale environmental damage;
- Seize control of a ferry or a cruise ship and threaten the deaths of the passengers if a demand is not met;
- Attack U.S. Navy ships in an attempt to kill U.S. military personnel, damage or destroy a valuable U.S. military asset, and (in the case of nuclear-powered ships) cause a radiological release.

Some of these scenarios (or similar ones) have already come to pass elsewhere. For example, in October 2002, the French oil tanker Limberg appears to have been attacked by a

bomb-laden boat off the coast of Yemen, killing one crewman aboard the tanker, damaging the ship, and causing an oil spill. In October 2000, the U.S. Navy destroyer Cole was attacked by a bomb-laden boat during a refueling stop in the harbor of Aden, Yemen, killing 17 sailors, injuring 39 others, and causing damage to the ship that cost about \$250 million to repair (Frittelli, 2004, p. 7). Where both of these incidents took place in or near a foreign port, not in or near a U.S. port, this type of overt terrorist attack poses a significant threat but because it is overt, there are measures that can be taken to mitigate the threat. Since the Cole attack, it has become commonplace for Navy ships to be escorted in and out of harbors both overseas and at home. Visible defenses both on board the ships and armed escort boats to establish a buffer between potential suicide boats and ships present a deterrent to the terrorist and provide levels of defense to the ships in the event of an attack.

What is of concern is not the overt threat to access that you can potentially see coming at you, but the covert threat that you cannot see. That threat is from mines. A few terrorist groups have been proficient in the use of mines and some have been known to manufacture their own (Gunaratna, 2001). U.S. intelligence officials believe Al Qaeda is in possession of mines after a U.S. spy plane discovered scores of acoustic sea-mines had disappeared from a naval base in North Korea. It is believed the mines could be aboard 28 "terror ships" Osama bin Laden has assembled in the past year [2002] (English, 2003). Knowing that terrorists have purchased sea mines does not mean that their use presents the only potential explosive threat in the maritime medium. The ingenuity of the insurgency in Iraq to create improvised explosive devices (IED) that lay in waiting for a passing convoy is indicative of potential similar future applications in the maritime domain. Just as the suicide car bomb made the transition to the small boat in the attacks on the USS Cole and M/V Limburg, it is only logical that the land based IED will make

the same transition. The significant difference between the land-based IED and the waterborne or subsurface IED is that objects on land can be seen and draw suspicion. With suspicion generated, an alternate route can be taken to avoid potential catastrophe and specialists (Explosive Ordnance Disposal) can be brought in to neutralize the IED. In the maritime medium, only in rare occasions are there multiple channels into ports to facilitate taking an alternate route. Additionally, when something lies below the surface of the water it cannot be seen from the ship to draw suspicion. Without this suspicion, and absent any intelligence indicating the presence of mines or underwater explosive device, there is nothing to motivate a sea captain to avoid entering the port or take an alternate route. The presence of mines is usually not known until they are detonated. The only suspicion that remains in the aftermath of the detonation is whether or not the one mine or underwater explosive that detonated was the only mine or underwater explosive that is present. Without proof that there is no longer a mine threat present, continued access brings significant risk. The risk is what must be mitigated to ensure access.

Historical Use of Mines Justifies the Modern Threat

The sea mine has been in existence since 1776 when David Bushnell invented the "Bushnell's Keg." This primitive mine was composed of a watertight keg filled with black powder and a flintlock detonator which was suspended from a float. These kegs were placed in the Delaware River so that, it was hoped, they would float into British ships downriver (Mines). The modern sea mine has developed into a weapon which lies in wait for its victim. Planted under the surface of the water, possibly hidden in the mud and sand on the bottom, it may remain there for weeks or months until a vessel comes within its lethal range (Duncan, 1962, p. xi). Sea mines or underwater explosives are an obvious choice of the current enemy, the terrorist. Radical terrorists frequently employ measures not considered ethical or not aligned with any rule of warfare. The events of September 11, 2001 clearly indicate the resolve and extent to which a terrorist will go in order to advance their cause. Since sea mines do not distinguish combatants from non-combatants, and their presence generates fear in the minds of those who have had their waters mined, then it is difficult to understand why mines have yet to be employed by terrorists.

One only needs to look at the effectiveness of the United States use of sea mines in history to consider the impact they would have if used against us today. Employed in every major conflict since the Civil War, there are numerous examples of their effectiveness. Used by the Confederates against the Federals, mines sank a good number of Federal vessels; mines laid by the United States during World War I, in large measure, restricted German submarines to the North Sea (Duncan, 1962, p. xi).

Two clear examples of the far reaching impact mines have had in history occurred during World War II and during the Vietnam War. Where the mining of North Vietnam will demonstrate the impact of mining on the war machine of the enemy in order to drive them to the

negotiating table, no better example of the widespread economic impact of mining exists than the starvation campaign conducted against Japanese sea lines of communication between March and July 1945.

"The results of mining was so effective against the shipping that it eventually starved the country. I think you probably could have shortened the war by beginning (mining) earlier."

*Captain Kyuzo Tamura
Strategic Bombing Survey Conference (1945)*

During this four and one-half month campaign, over 12,000 mines were planted on shipping lanes in and around Japan and in many Japanese and Korean ports. Japanese records indicate that 670 ships, including 65 warships were sunk or severely damaged. The end result was that approximately 1.4 million tons or about three-fourths of the shipping available in March was destroyed, relatively little food or raw materials were coming into Japan from Asia, and the traffic in the Inland Sea and along Japanese shores was only a trifle of that required to distribute materials effectively (Duncan, 1962, p. 157). From Japanese sources it was also learnt that at the height of the offensive, the average time a ship which had not been sunk but damaged by a mine required to spend under repair was from 70 days for small vessels to 100 days for large ships. And this was at a time when in all Japanese shipyards, drydocks and repair facilities were at a premium (Griffiths, 1981, p.140). Where the losses were staggering to the Japanese navy and merchant fleet, the loss of the use of ports and passages, the tying up of ships in areas where they were useless or could be destroyed at leisure, the failure to support outlying armies and the final starvation of the Japanese economy played a much larger part in losing the war than the sinking and damaging of the ships (Duncan, 1962, p. 157).

During the Vietnam War, in May, 1972, U. S. forces mined North Vietnamese ports following large scale employment of North Vietnamese Army units in South Vietnam. This

action completely shut down seaborne importations to North Vietnam. The logistics train needed to support the North Vietnamese Army units was crippled by eliminating 85% of imported supplies for the North Vietnam war effort. This forced war material imports to enter the country and move south by train making them much more susceptible to successful air attack. The combination of mines and B-52 bombing significantly reduced the capabilities of North Vietnam Army units operating in South Vietnam. Reseeding of minefields and resumption of B-52 bombing in December 1972 followed further intransigence by North Vietnam brought the North Vietnamese to the negotiation table in search of a cease-fire agreement. Eventually, a cease-fire agreement was reached in January, 1973, contingent on U. S. forces' clearance of mines. The U.S. began clearance in February, 1973. Further actions by North Vietnam which were not in compliance with the cease fire agreement and agreement for the release of American POW's prompted the U.S. to interrupt mine clearance operations. This resulted in the release of POW's by 1 April 1973. Combined with diplomatic isolation of North Vietnam from the USSR and the PRC and B-52 bombing, mining was clearly a key ingredient in dealing effectively with a previously intransigent government (Mine Lines Newsletter History Locker, 2004).

Economy as The Center of Gravity

The war planners in the Pacific theater during World War Two understood that the Japanese economy was a center of gravity which was easily targeted through the mining campaign. The question which presents itself is if our current enemy has come to the same conclusion in the analysis of the United States. It is possible that Osama bin Laden has conducted a center of gravity analysis and determined that the U.S. economy is a center of gravity which has critical vulnerabilities. In his November 2004 statement, Osama bin Laden indicated a sound understanding of the economic, as well as political impact of military operations on the United States saying “all that we have to do is to send two Mujahidin to the furthest point east to raise a piece of cloth on which is written al-Qaeda, in order to make the generals race there to cause America to suffer human, economic, and political losses without their achieving for it anything of note” (Bin Laden). Invoking what he called a “bleed until bankruptcy plan” it could be ascertained that Bin Laden is attacking the U.S. economic base by forcing military responses in the global war on terror. These responses are costly; not only from a monetary standpoint but also in the way the use of military force creates friction in popular opinion both at home and around the world. This is demonstrated by the economic costs and effect on public opinion that the ongoing military peace efforts in Iraq and Afghanistan have generated. Based upon Bin Laden’s own statements that demonstrate the likelihood that he has identified the U.S. economy as a center of gravity for his jihad. Having identified the economy as the U.S. center of gravity, determining where critical vulnerabilities exist is where the U.S. focus should be directed in order to properly defend the vulnerabilities in order to prevent them from being exploited. With Al Qaeda suspected to have mines and the ingenuity that has been demonstrated by his terrorist network, the threat of maritime access denial through terrorist

mining of our ports is a vulnerability which must be assessed and properly defended if access is to be assured.

The Department of Homeland Security

The broad and diverse number of threats facing the U.S. demands a close look at how the government is structured to provide the deterrence and, if needed, respond to the threat of a terrorist mining of one or more of our nation's harbors. This overview will provide a better understanding of where resources and effort need to be applied in order to better defend our nation from this specific threat.

In the wake of the terrorist attack of 11 September, 2001, the Department of Homeland Security was created. The creation of this new governmental department was the most significant transformation of the U.S. government in over a half-century. The new department transformed and realigned the previous confusing patchwork of government activities that contribute to homeland security into a single department whose primary mission is to protect the U.S. homeland. The Specific mission of the new department is to:

- “(A) prevent terrorist attacks within the United States;
- (B) reduce the vulnerability of the United States to terrorism;
- (C) minimize the damage, and assist in the recovery, from terrorist attacks that do occur within the United States;
- (D) carry out all functions of entities transferred to the Department, including by acting as a focal point regarding natural and manmade crises and emergency planning;

(E) ensure that the functions of the agencies and subdivisions within the Department that are not related directly to securing the homeland are not diminished or neglected except by a specific explicit Act of Congress;

(F) ensure that the overall economic security of the United States is not diminished by efforts, activities, and programs aimed at securing the homeland; and

(G) monitor connections between illegal drug trafficking and terrorism, coordinate efforts to sever such connections, and otherwise contribute to efforts to interdict illegal drug trafficking (Homeland Security Act, 2002).”

The new department melded over twenty separate governmental departments into one. Included in this reorganization was the United States Coast Guard. Previously aligned under the Department of Transportation, the Coast Guard became the armed force within the Department of Homeland Security. Charged with the missions of maritime safety, maritime mobility, maritime security, protection of national resources and elements of national defense, perhaps the most difficult is that of maritime security. In accordance with the Coast Guard Maritime Strategy for Homeland Security, the maritime security mission of the Coast Guard is to “protect the U.S. maritime domain and the U.S. marine transportation system and deny their use and exploitation by terrorists as a means for attacks on U.S. territory, population, and critical infrastructure. Additionally, the U.S. Coast Guard will prepare for and, in the event of attack, conduct emergency response operations. And, when directed, as the supported or supporting commander, the Coast Guard will conduct military homeland defense operations in its traditional role as a military service” (USCG Maritime Strategy, 2002, p. 9). To put this mission into a geographic context, the Coast Guard’s area of interest in conducting this mission incorporates over 300 ports, approximately 3.5 million square miles of ocean area and 98,000 miles of

coastline. Maritime security is a huge mission that, when faced with the threat of terrorism directed at access denial, is made more challenging due to the lack of resources and limited capabilities. One challenge the Coast Guard is prepared for is the legality of conducting operations to thwart terrorism. Since terrorism can be classified as either a criminal act or act of war the Coast Guard is well prepared. Since they are simultaneously and at all times both an armed force of the United States (14 U.S.C. 1), and a law enforcement agency (14 U.S.C. 89), its capabilities are extremely relevant, valuable and needed whether the threat is termed a military or terrorist attack (USCG Maritime Strategy, 2002, p. 2). Simply put, the Coast Guards capability to operate as both a military force and as a police force provides the functionality to combat terrorism in the U.S. without violating legal statutes.

Unfortunately, in countering a specialized threat like mining of U.S. harbors, the issue is not one of legalities but of capabilities. To counter the specialized threat of mining, it is the ultimate goal of the Coast Guard that likely terrorists would be interdicted prior to being afforded the opportunity to lay mines in our harbors. This is due to the fact that the Coast Guard has no capability to conduct the specialized mission of mine countermeasures. What they are relying upon is the concept of Maritime Domain Awareness (MDA). This is a level of situational awareness about the maritime domain where the Coast Guard seeks to attain a combination of a real time common operating picture coupled with the all-source intelligence that would enable interdiction of the terrorists prior to the conduct of the terrorist act. The core of MDA efforts revolves around the development and use of accurate information, intelligence, and knowledge of vessels, cargo, crews, and passengers, and extends well beyond traditional maritime boundaries. MDA is designed to provide a layered defense through collaborative efforts with international partners to identify and counter security risks long before they reach a U.S. port.

Attaining maritime domain awareness mandates possessing comprehensive awareness of the vulnerabilities, threats, and all matters of interest on the water in order to prevent and protect against all manner of threats. It means having extensive knowledge of geography, weather, position of friendly vessels and potential threats, trends, key indicators, anomalies, intent, and the activities of all vessels in an area of concern (Peterson, 2004). The Coast Guard is also working in partnership with the Chief of Naval Operations (CNO) to develop prototype joint harbor operations centers in select Navy homeports. These centers will be responsible for coordinating Coast Guard and Navy efforts to improve the Service's capabilities to provide and safeguard port security and force protection. Joint operations centers are currently in place in San Diego, California and Hampton Roads, Virginia (The Subcommittee on Coast Guard and Maritime Transportation, 2004).

MDA is a very ambitious and critical element of the Coast Guard's strategy which is, very realistically stated, only going to increase the awareness of what occurs in the maritime domain. The only way to know everything that occurs in the maritime domain would be to restrict the use of the maritime domain to only authorized users. This is an unacceptable and unrealistic solution to the enormous challenge faced by the Coast Guard. The closest attainment of true MDA will be achieved when either a surveillance system capable of the full-time monitoring of all the waterways is developed or when every user of the maritime domain takes an active role in the safety and security of that domain. Where technology may eventually achieve the latter, the former requires that every fisherman, recreational sailor, merchant, or ferry passenger understands and maintains awareness of the waterways and their approaches, and does not hesitate to report suspicious activity to the authorities. These expectations, while ambitious, are not very realistic. It is comparable to the police expecting citizens to report jay-walkers

because they slow traffic. Despite the ambitious nature of this approach, the engagement of local fisherman, recreational boaters and sailors regarding their responsibility to report suspicious activity is one tenant of the maritime domain awareness strategy. The program called, America's Waterway Watch is a national awareness program that asks those who work, live, or recreate on or near the water to be aware of suspicious activity that might indicate threats to our country's homeland security. The program urges Americans to adopt a heightened sensitivity toward unusual events or individuals they may encounter in or around ports, docks, marinas, riversides, beaches, or communities. Anyone observing suspicious activity is simply asked to note details and contact the National Response Center's Hotline (Coast Guard Community Relations). A good example of the type of engagement this program solicits comes from a handout on maritime domain awareness from the Coast Guard Marine Safety Office Pittsburgh which states: "Marine Safety Office Pittsburgh needs your help to combat domestic terrorism. In order to improve our collective ability to gain situational awareness locally, please ask your employees and security personnel to gather as much accurate and detailed information as possible whenever they observe anything unusual or suspicious".

The volume of maritime traffic that is simply recreational in nature is staggering and begs to question how effective programs like America's Waterway Watch will be. The most recent Coast Guard statistics site that all jurisdictions reported a total of 12,794,616 numbered (registered) recreational boats operating in America's waters (COMDTPUB P16754.17 et al, 2004). Added to this overwhelming number is that the activities of recreational boaters often raise eyebrows due to the party-like atmosphere frequently seen on boats. The often overzealous enjoyment of boating recreation could generate countless reports of "suspicious" activity. The concern generated is that this often party-like atmosphere of recreational boaters coupled with

the volume and types of traffic, the number of potential choke points, the size of the area from which a terrorist can originate and the size of the area that a device can be placed without knowing, would require the Coast Guard to have a force structure equal to that of a major cities police department to support oversight and enforcement. Even with this structure, the Coast Guard, just like a city police department, would likely spend an inordinate amount of time chasing down party boats and fisherman. Post 9/11, the Coast Guard has been authorized to increase it's manning to over 45,000. This increase will improve their visibility which will aide in deterrence, but the increase to their force structure does not incorporate the increased capability to conduct the specialized mine countermeasures mission.

The Coast Guard recognizes that it does not embody all of the necessary skills and equipment to deter or respond to all threats, with the mine threat being one. Fortunately, when the Coast Guard is faced with a mission that is outside of their area of expertise, they can request assistance from the Department of Defense under the provisions of Department of Defense Directive 3025.15, Military Assistance to Civil Authorities. In this directive, the Secretary of Defense has described three circumstances under which DoD assets would be involved in homeland defense and civil support missions:

- In extraordinary circumstances, DoD would conduct military missions such as combat air patrols or maritime defense operations. DoD would take the lead in defending the people and the territory of our country, supported by other agencies. Included in this category are cases in which the President, exercising his constitutional authority as Commander in Chief and Chief Executive, authorizes military action to counter threats within the United States.

- In emergency circumstances, such as managing the consequences of a terrorist attack, natural disaster, or other catastrophe in support of civil authorities, DoD could be asked to act quickly to provide capabilities that other agencies do not possess or that have been exhausted or overwhelmed.
- In non-emergency circumstances of limited scope or planned duration, DoD would support civil authorities where other agencies have the lead – for example, providing security at a special event such as the 2002 Winter Olympics, or assisting other federal agencies to develop capabilities to detect chemical, biological, nuclear, and radiological threats (Defense Study and Report to Congress, 2003, p. 2).

It is under this authorization that the Coast Guard would request specialized assets from the Navy to conduct mine clearance operations to enable access to the threatened port to be restored.

Future Coast Guard Programs

Without the current capability to conduct mine countermeasures, and having the responsibility to the nation for the protection of the countries ports and harbors, it would be expected that future programs within the Coast Guard would include attaining the capability to perform this specialized mission. In an effort to improve the existing capabilities of the Coast Guard and to “continue to meet America’s 21st century maritime threats and challenges,” the Coast Guard initiated the Integrated Deepwater System (IDS) Program. This is the largest and most innovative acquisition in the Coast Guard's history. According to the Coast Guard, the IDS is not just “new ships and aircraft,” but an integrated approach to upgrading existing assets while transitioning to newer, more capable platforms with improved systems for command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) and

innovative logistics support (US Coast Guard, 2005). This new "system of systems" is designed to significantly contribute to the Coast Guard's maritime domain awareness, as well as the improved ability to intercept, engage, and deter those activities that pose a direct challenge to U.S. sovereignty and security. For the Coast Guard, the Deepwater System is expected to provide the means to extend the layered maritime defenses from our ports and coastal areas hundreds of miles to sea (US Coast Guard, 2005).

According to the specifics of the IDS Program, the focus is on system-wide capabilities and not assets. With this approach, the Coast Guard began the design process with the goal to acquire the performance capabilities required to perform the full range of Coast Guard deepwater missions. The Deepwater missions are their current stated missions of maritime security, safety and mobility, protection of natural resources and national defense. Focusing on the overall required capabilities rather than the individual assets, the Coast Guard is using this performance-based acquisition approach to give industry the flexibility to propose the optimal mix of assets necessary to meet the needs of the Coast Guard for Deepwater missions (US Coast Guard, 2005).

The IDS program clearly identifies that the current fleet of legacy cutters (210' WMEC, 270' WMEC and 378' WHEC) will be modified to keep them operating, providing them with upgraded capabilities and interconnectivity, along with the acquisition of three new classes of cutters. These three new classes of cutters; the National Security Cutter (NSC), the Offshore Patrol Cutter (OPC), and the Fast Response Cutter (FRC) will all have improvements in C4ISR, aviation support capability and seaworthiness, but none of the projected new ships or aircraft capabilities statements address mine countermeasures as a necessary capability in conducting their missions of maritime security, safety, mobility or national defense (US Coast Guard, 2005).

It appears that for the near-term, the Coast Guard will continue to rely on the Navy to respond to the mine threat.

Time is Money, the Missions Contribution

"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."

*Rear Admiral Alan E. (Hoke) Smith,
Commander Amphibious Force off Wonsan, Korea*

As stated previously, the denial of access to any one of the top fifty ports in the United States could equate to millions of dollars per day lost in revenue for the port and the country. Time, as with any business that relies upon shipment of goods, is money. The more time spent clearing a channel of a potential mine threat and then declaring the channel safe for shipping the greater the economic impact on the port and the country. Unfortunately, the mission of clearing mines is not quick and easy. Clearing mines first requires that mine is located. Second, the mine must be either neutralized or recovered in order to clear the area of the threat. Finding the mine is the most difficult part of the equation. Mines are classified as to their location in the water. Floating mines are buoyant and suspended in the water column tethered to an anchor. Bottom mines rests on the ocean floor. There are two methods for clearing mines; sweeping or hunting. Before providing a brief description of the differences between the two methods, it is important to note one very salient point about the conduct of mine countermeasures. That point is that no matter what method or level of effort applied in an area suspected to have been mined; absolute certainty that no mines are present can never be attained.

Minesweeping:

Traditional mine sweeping is conducted by a ship or a helicopter dragging mechanical or influence sweeping equipment through the suspected mine field. Sweeping can be classified as either mechanical, influence or a combination of both. The type of sweeping conducted depends upon the expected threat. Mechanical sweeping is effective against a moored mine threat because it involves the physical cutting of the mines mooring cable. When the cable is cut, the buoyancy of the mine allowing it to float to the surface where it can either be neutralized or recovered and rendered ineffective. Influence sweeping is effective against the most prolific mine threat which are influence activated mines. The majority of mines in use today are not the stereotypical floating ball with horns but are classified as bottom influence mines because they lay on the seabed and are activated through sensing some change in conditions. The type of actuation depends upon the package of electronic sensors which are used to detect the changes. Variations in fluid pressure, acoustic (noise), magnetic, and electric fields (or a combination of all four) that are generated when a ship passes near or over the mine will trigger the mine and detonate the explosives contained within. The sensors can be designed to distinguish between different types of vessels or to have delays before detonating to ensure maximum damage to the triggering vessel. When conducting influence minesweeping, the vessel or aircraft employs equipment that can present an acoustic, magnetic or pressure signals to detonate emplaced influence mines (National Research Council, 2000). Since mines can be configured to incorporate a combination of influence actuators, the influence sweeping systems can also be configured to inject a combination of signals into the water in an attempt to actuate the mine.

As stated, influence sweeping can be conducted by ships and aircraft, the only difference between the two is the speed of execution and the threat to the ship versus the aircraft. An

aircraft can conduct sweeping operations much quicker than a ship and since the aircraft hovers above the water, the crew is not threatened by a mine detonation. Aboard the ship, since the ship pulls the sweeping equipment behind it, requires the ship to pass over or near the mines before the influence equipment has the opportunity to initiate a detonation. Although the ships are designed to minimize this threat, the threat to the ship and crew is greater than the threat to the helicopter and its crew. Although minesweeping sounds simple, what makes the task of clearing influence mines more difficult is that mines have evolved to incorporate the technology of delays and counters within that prevent the mine from detonating on the first sensing the designated influence. This significantly negates the effectiveness of influence sweeping since the number of times required to pass the influence sweeping devices over the mines to initiate a detonation is not known until a detonation occurs. If no detonation is initiated, there can be no proof that a mine is not still laying in wait to sense the next influence to initiate detonation.

Minehunting:

The type of mine countermeasures operation most commonly employed and that would be utilized to clear a shipping channel is called minehunting. Minehunting primarily relies on sophisticated high-frequency sonar, high-fidelity side-scan sonar, and magnetometers; either towed, hull-mounted, or hand-held. Once mines are located, they are destroyed using mine neutralization vehicles (National Research Council, 2000). Mine hunting can also be conducted from either a ship (Surface Mine Countermeasures – SMCM) or from a helicopter (Airborne Mine Countermeasures – AMCM) but may also be conducted using marine mammals. Minehunting is the safest and most effective method of dealing with mines, particularly with modern influence mines. Unlike minesweeping, where techniques need to be altered with

variations in mine activation methods, minehunting is less dependent on the technical characteristics of the mine.

Mine hunting from a ship (SMCM) is accomplished by utilizing a mine hunting sonar array and magnetometers. The mine countermeasures vessel slowly moves across the water with its sonar active until it finds a mine or determines the area is free of mines. Modern sonar equipment can not only locate mines, but in many cases determine their type as well. The final classification of a mine is usually accomplished by a diver or remotely operated vehicle which has a camera that provides the operators with a picture of the mine. Once a mine is located, it is neutralized by placing explosives on or near the mine, which has the effect of crippling the mine's detonation electronics or flooding the mine with water, effectively destroying it or rendering it incapable of actuating (Mine Neutralization).

Mine hunting from aircraft (AMCM) is accomplished by the MH-53 helicopter towing side-looking sonar. An underwater towed body containing a high resolution, side-looking, multibeam sonar system provides real-time sonar images to the operators in the aircraft enabling them to locate, classify, mark and record mine-like objects and underwater terrain features. On board the helicopter, an operator can view the underwater image and identify objects on a video monitor while recording the data on digital tapes for post mission analysis. Once located, the exact coordinates of mine-like objects can be used by Explosive Ordnance Disposal (EOD) personnel or ships to reacquire and neutralize the mine (Airborne Mine Countermeasures).

A third method of locating sea mines is by using the Marine Mammal Systems (MMS). These unique mine detection systems are categorized as the Mark 4, Mark 7, and Mark 8 MMS. In the operation of these systems, a dolphin waits to receive a cue from its handler before it begins to search a specific area using its biological sonar called echolocation. When a dolphin

echo locates, it emits a series of clicks that bounce off an object and return to the dolphin, allowing a dolphin to construct a mental image of the object. The dolphin reports back to its handler, giving one response if a target object is detected and a different response if no target object is detected. If a mine-like target is detected, the handler sends the dolphin to mark the location of the object so it can be avoided by Navy vessels or to enable Explosive Ordnance Disposal (EOD) divers to relocate the mine for neutralization (Navy Marine Mammal Mine Hunting Systems).

All three of these methods individually have their advantages and disadvantages that are created by system limitations or the inability to both detect and then systematically neutralize the threat without departing the area or relying on another system or organization. All of them take time and effort to conduct but have in common the disadvantage created by the environment. Factors such as water temperature, depth, salinity, bottom composition, underwater visibility and currents, all contribute to the difficulty of detecting, identifying and neutralizing the submerged threat. Whether it is affecting the sonar technology that is being employed by limiting the range, clarity and effectiveness of the sonar or the underwater visibility and currents' limiting the effectiveness or even use of neutralization vehicles and explosive ordnance disposal divers, the difficulty of conducting mine countermeasures is only compounded when the expected threat is in a river or channel. In a river or channel, the maneuverability of the mine countermeasure vessel is also limited and the wind and current factors are multiplied.

Adding to the difficulty of conducting mine countermeasures in a river or channel, U.S. mine countermeasures forces have been historically trained to conduct mine hunting and neutralization in the coastal or open waters off of Ingleside, Texas or Panama City, Florida. Training in the coastal or open waters of the Gulf of Mexico presents its own challenges,

however, it does not prepare the operators for the dramatic impact of the environmental conditions that are present while operating in rivers or channels.

An Example of Required Effort, Operation Iraqi Freedom

Recent operations in the rivers of southern Iraq during Operation Iraqi Freedom are a excellent example of what level of effort would be necessary in order to conduct mine countermeasures operations to reopen a U.S. port threatened with mining. Prior to the outset of Operation Iraqi Freedom, the port of Umm Qasr was primarily a hub for the import of United Nations approved cargo identified under United Nations Security Council Resolutions (UNSCR) 661 which established the embargo, UNSCR 687 which authorized shipments of food and medical supplies, and UNSCR 986 which was the oil for food agreement (Maritime Interception Operations, 2003). In the months leading up to Operation Iraqi Freedom, a coalition mine countermeasures force consisting of four U.S. mine countermeasures ships which were permanently forward deployed to the Arabian Gulf and a deployment of six Royal Navy mine countermeasures ships with a logistics support ship and U.S. airborne mine countermeasures assets was assembled and trained together in the North Arabian Gulf. The significance of the early assembly and operation of the coalition force will be discussed later. At the outset of the operation, these forces conducted mine clearance operations from the North Arabian Gulf up the thirty nautical miles of the Khawr Abd Allah waterway to the port of Umm Qasr followed by the 32 nautical miles of the Khawr Al Zubayr waterway to the port of Al Zubayr. The operations were a success story for modern mine counter-measures since the operations were conducted in environmental conditions in which the crews were unfamiliar, and they cleared the waterway without incident in ten days, enabling the flow of humanitarian shipping into Iraq to begin.

Geographically, the waterway leading to the port of Umm Qasr is similar to many U.S. waterways that lead to naval bases or international maritime terminals. The average width of the Iraqi waterway was one nautical mile with a dredged channel width that averaged 300 yards. The channel was shallow and littered with debris. The mine countermeasures environmental conditions were characterized as poor acoustic conditions because of a muddy bottom which impacts the effectiveness of sonar, near-bottom visibility at best limited, and at most times nonexistent with strong currents. These conditions made diving operations and mine neutralization vehicle operations arduous and slow (Truver, 2004, p. 66). Tides and currents had to be closely monitored to determine when the conditions supported the conduct of diving and neutralization missions. This was made more difficult as there were no tide tables established for the Iraqi waterway, requiring significant trial and error. Operating a U.S. mine countermeasures ships during this effort, the comparison that I would use to describe the conditions of the waterways of Iraq would be like trying to drive a ship, operate a mine neutralization vehicle or scuba dive in a river of chocolate milk that runs with an average current of 3-5 knots on the surface with bottom currents which are often greater. Despite the challenges presented by the environment, the mine countermeasures effort of the ten ships and four helicopters resulted in the detection of over 500 underwater objects, of which each was investigated by either a mine neutralization vehicle or explosive ordnance diver. Approximately 90 were classified as mine-like and destroyed. The channel from the North Arabian Gulf to the port of Umm Qasr was cleared and the first shipment of humanitarian aide sailed into Umm Qasr ten days after the beginning of the war.

Ten Days in Iraq, How Many in the United States?

In retrospect, the mine countermeasures effort of Operation Iraqi Freedom does more than tell a success story in the conduct of a specialized mission under difficult circumstances. The scope and duration of the mine countermeasures operation conducted in the Arabian Gulf raises serious questions about the preparation for and the ability to respond to the same threat when applied to the waterways of the U.S. Where the success of the coalition mine countermeasures effort to clear the channel into Umm Qasr, Iraq is undeniable, it is expected that the same success would be experienced given a similar threat to one of our nation's ports. It is the capability to apply the same effort that was applied in Iraq to the U.S. that will now be examined.

To begin, it has been clearly stated that the closure of a U.S. port has a significant economic impact on the local and national economy and depending upon the threatened port, the closure could have significant strategic implications. For the country of Iraq, the ten days without use of the port did have an impact on the local community as all maritime traffic, to include fishing (a staple for a large portion of Iraqi's) was stopped on the rivers as a force protection measure to allow the mine countermeasures operation to proceed. There was no strategic implication for the closure of the port as the strength of the Iraqi navy was reduced to only a few patrol boats after Operation Desert Storm.

This is not to mitigate the importance of Umm Qasr. Economically, as Iraq's only deep water port, there is considerable potential for the port to have an impact on the national economy but the opportunity was restricted by the embargoes established by the United Nations in the aftermath of Operation Desert Storm. Following Operation Iraqi Freedom, the ports infrastructure is being rebuilt to support the flow of material for use in the reconstruction of the

country and, once reconstruction is complete, the full potential of the port will be available. Additionally, with the re-establishment of the Iraqi Coastal Defense Force in Umm Qasr in September, 2004, the ports strategic significance from the military standpoint has also been re-established (Kane, 2004). The growing importance of the port to the country relative to reconstruction and future economic growth will subsequently place Umm Qasr on comparative equal footing as any major port in the U.S. with regard to economic and strategic significance. The closure or loss of the use of the port today would have a greater impact on the economic growth and future prosperity of the country.

The point of discussion now becomes how to assure access to a U.S. port threatened by terrorist mining. Using the Operation Iraqi Freedom example as the benchmark for the level of effort necessary to rapidly reopen a port for shipping, ten days were required to clear the first 30 miles of the waterway. Where this was a monumental task accomplished in a relatively short time, the principle difference between the mine countermeasures operation in the Arabian Gulf and potential mine countermeasures operations on a threatened U.S. port is that the Iraqi Freedom effort was planned and conducted with forces that were in position prior to execution. The execution of the mission was not easy. The mission took ten days. What is not calculated or even considered in the application of effort is the time that was necessary to establish the conditions to begin conducting the mission. The forces necessary to conduct the mission were in place. U.S. assets had been permanently forward deployed and operating in the Arabian Gulf since the mid-90's and the Royal Navy Mine Countermeasures Group had deployed from the U.K. in September, 2002 in order to be in theater. Iraqi Freedom was an offensive operation that facilitated the build up of forces in the region followed by training, rehearsals and forward staging near the objective (Iraqi waterways) prior to the commencement of the operation.

Terrorist mining of a U.S. port would not facilitate similar build-up, training and staging of forces prior to conducting the clearance operations. The effort would be initiated as a reaction, not offensive action.

Where are the Minesweepers?

In the U.S. with over 300 ports, seventeen designated as strategically significant, the Navy has positioned all of its mine countermeasures ships and one-half of its mine countermeasures helicopter squadrons in Ingleside, Texas. This co-location of forces took place after a 1992 reorganization that resulted in Commander Mine Warfare Command (COMINEWARCOM) being given operational commander status of all mine forces, followed by the establishment of the South Texas Mine Warfare Center of Excellence in 1992 which consolidated and developed the dedicated mine countermeasures “triad” in south Texas (Mine Warfare Command History). The impetus for this consolidation can be attributed to a couple of factors. First was the deficiencies identified in the mine countermeasures ability of the Navy after Operation Desert Storm. Prior to this consolidation, the mine force consisted of two active and eighteen reserve mine force ships spread out in twenty different ports with a mission that was focused on conducting break-out operations in case the port was mined by the Soviet Union. After Operation Desert Storm, during which the Navy was unable to clear minefields in advance of a planned amphibious assault and where the Navy lost two warships from mine damage in areas thought to be clear of mines, it became clear that since the fall of the Soviet Union the port break-out mission the force was currently training to accomplish was no longer applicable. The Navy determined that the future capability of mine countermeasures laid in having a deployable mine countermeasures package that can be surged to a hot-spot throughout

the globe. Having identified the shortfalls, the Navy consolidated all mine countermeasures assets in a single home port along with the entire requisite maintenance infrastructure in order to enhance training and readiness. This consolidation of assets allowed for close oversight of all units and provided a coherent and coordinated focus on both training and maintenance where the previous multiple site distribution of mine countermeasures assets did not permit such a focus (Lawrimore, 1993).

The second factor which facilitated consolidation of the mine force had to do with changes in navy-wide force structure and the Base Realignment and Closure of 1993. The Navy leaderships goal was to attain close oversight of all units. This, coupled with the changes in navy-wide force structure, types and composition of deploying battlegroups, established a requirement that every naval station be capable of berthing an aircraft carrier. These new requirements put the current home of the mine warfare leadership, Naval Station, Charleston, SC on the 1993 Base Realignment and Closure (BRAC) list and resulted in the relocation of the mine force ships to the newly established naval station in Ingleside, Texas (DOD, 1993).

The co-location of assets in a single port was, at the time (1993), the right choice for preparing the mine force for future employment. However, it does not support the potential threat to homeland security posed by the current global war on terror and should now be reconsidered. Where the previous threat of the Soviet Union mining U.S. harbors facilitated the stationing of mine countermeasures assets in a variety of ports on both the East and West coast to conduct breakthrough operations is no longer present, the terrorist threat now presents a similar concern with the same economic and strategic implications of the potential Soviet mining. The key strategic difference is that with all ships now located in Texas, when or if a port on either coast was faced with the threat of a mine, the ports do not have their own capability to conduct

the breakthrough operations necessary to facilitate the movement of naval ships or strategic military supplies. The necessary surface assets would have to deploy from Texas in order to conduct the clearance mission. The time needed to get from Texas to the threatened port can take from weeks in the case of deployment to the east coast, to over a month in the case of deployment to the west coast. In the interim, airborne mine countermeasures could be employed, however, a deployment time of days from their locations in Norfolk, Virginia and Corpus Christi, Texas will also result in extending the timeframe the port would remain closed.

The number of assets available that could be deployed in response to a threat would also be a significant question. With the routine lifecycle of ships and crews in maintenance and training, it is questionable that the same number of assets (ten) that were available in the coalition for Operation Iraqi Freedom could be ready and available for deployment in response to a homeland threat. Notionally there are two readiness groups of four ships each that are ready for deployment. Additional ships or groups could have their training accelerated in order to respond. Remembering that it took ten ships and four helicopters ten days to conduct the clearance of the thirty miles of waterway leading to the port of Umm Qasr, Iraq, it is difficult to imagine how long it would take get the forces in position then clear the channel into Norfolk, Virginia or the channels into San Francisco harbor if only four or eight ships were deployed to the threatened U.S. port. What we do know, is that with each day that the port remains closed to the import and export of goods and materials, millions of dollars are lost and the economy is impacted.

Deterrence

Another impact that the 1992 consolidation of mine force assets has presented can also be learned from the months leading up to Operation Iraqi Freedom and was a direct lesson from the aftermath of Operation Desert Storm. After Desert Storm, the strategic implications of an enemy's ability to lay mines was clearly understood. This generated the requirement to keep a forward deployed mine countermeasures capability in the Arabian Gulf not only as a response asset in case of mining, but also as a deterrent. The result was the permanent assignment to the Arabian Gulf of four mine countermeasures ships and the continuous rotation of a detachment of an airborne mine countermeasures squadron and a detachment of an explosives ordnance disposal unit. The significance of this decision was that this force provided a capability to conduct mine countermeasures on a full time basis. The strategic impact of this capability was that the response time of the assets to the threat of mining would minimize the timeframe a port or channel would be closed, thus assuring access to the Arabian Gulf's vital oil distribution terminals. Prior to Operation Desert Storm, when there was no mine countermeasure force present, the Iraqi's were able to sow multiple fields of mines in their territorial waters and in the international waters of the Arabian Gulf. With the continual U.S. mine force and subsequent coalition force presence in the North Arabian Gulf during the build up to Operation Iraqi Freedom, the confidence level that the operating areas in the north were free of mines was very high. As a result, the Iraqi's were deterred from conducting the large scale mining outside of their territorial waters as they had been free to conduct twelve years earlier.

It is clear that the permanent presence of the countermeasures forces ensured greater access to Iraq. If Iraq had been able to sow the minefields they had proven they were capable of twelve years prior, then the build up of coalition forces in the North Arabian Gulf would have

been limited by the need to conduct extensive mine countermeasures operations in the staging areas prior to the introduction of the coalition naval assets. Due to the near-constant presence of coalition mine countermeasures forces operating in the northern gulf area, the expectation by the Iraqi's that they could successfully lay mines in the approaches to Iraq was mitigated. This is not to imply that they did not try. The capture of the Iraqi tug Jumaria pulling its barge loaded with sea mines is indicative of the Iraqi's intent to use mines. This is also not to say that the presence of coalition forces could have guaranteed that mining did not take place. Presence of the forces only deters, it does not prevent. The mining is deterred by making the Iraqi's consider the implications of being caught, just as a police patrol through a neighborhood is a deterrent to burglars. And just as a burglar can wait until the police patrol passes by before robbing a house, so can the Iraqi's monitor and determine when the coalition forces provide an opportunity to conduct the mining. Fortunately, one of two factors prevented the Iraqi's from executing their mining plan. Either the coalition presence in the North Arabian Gulf was thorough enough to serve as a formidable deterrent, or, the start of Operation Iraqi Freedom occurred before the Iraqi's could execute their mining plan.

In either case, the presence of the coalition force, and in particular the coalition mine countermeasures force, provided a deterrent and an immediate capability to respond and neutralize the specialized threat and assured coalition access to the northern gulf region. With an understanding of the significance of presence as a deterrent and recognition of the strategic implications of assured access as demonstrated in the case of Operation Iraqi Freedom, the strategic implications of the current force disposition of mine countermeasure assets within the U.S. for homeland defense needs will be assessed.

With the overwhelming majority of the mine countermeasures assets in the U.S. located in one port, considering the assessment of presence as a deterrent, the only port where there is high confidence that there will be no terrorist mining would be conducted is Ingleside, Texas. Even if the port of Ingleside and its subsequent terminals may be on the strategic port list, the consolidation of the mine countermeasures capability in Ingleside only provides presence as a deterrent and the capability to immediately begin clearance operations in one port. Assuring access to the one port does not support the deterrence of mining, or rapid response to a mine threat in any of the other seventeen identified strategic ports. In short, the remainder of the country is vulnerable and has no capability to immediately conduct the necessary operations to clear the threat from the harbors.

Significance of Intelligence

In the post-9/11 world, the role that intelligence information plays in the safety and security of our everyday life has become highly publicized. The role of intelligence when it comes to countering the mine threat is no less significant. Knowing the type of mine that has been planted allows sonar operators to focus the effort towards identifying a particular shape of objects to look for when detected, and the type of actuation that should be planned to defeat. When it comes to the defense of the homeland in the global war on terror, no threat of any type of terrorist act can be dismissed. However, the earliest identification that a threat exists in order to enable forces to flow in the direction or to the area of the threat, and to be prepared to respond or hopefully act as a deterrent is another goal of intelligence. To quote the National Strategy for Homeland Security; “To secure the homeland, we must have an intelligence and warning system that is capable of detecting terrorist activity before it manifests itself in an attack so that proper

preemptive, preventive, and protective action can be taken. The indications of terrorist intent are often ambiguous. Terrorists are able to infiltrate and move freely within democratic countries making themselves effectively invisible against the backdrop of an enormously diverse and mobile society”. Not knowing puts the defender in the difficult position of waiting and reacting to the terrorist event when it occurs.

Part of the Coast Guard initiative of establishing Maritime Domain Awareness (MDA) is that it will provide the intelligence necessary to give the Coast Guard or the Navy the capability to take the preemptive measures that prevent the terrorist from being successful in laying mines to deny access to a port. The Coast Guard Intelligence Coordination Center coupled with the Atlantic and Pacific Area Maritime Intelligence Fusion Centers provide tactical intelligence to support all of the operational commanders within their areas of responsibility. Through established relationships and close partnerships with other Intelligence Community members, the program seeks to: support operational commanders with timely, actionable and decisive intelligence; ensure Coast Guard senior leaders have the full benefit of the national strategic intelligence picture; and contribute where appropriate to broader intelligence community efforts that protect national interests from foreign security threats. Field Intelligence Support Teams (FIST's) have been established in 30 ports to collect law enforcement information on all maritime threats, exchange information through relationships with government and private entities, conduct first order analysis, and disseminate tactical and operational intelligence directly to Coast Guard field commanders in the ports and out at sea. To date, the Coast Guard Intelligence Program has been a significant contributor to operational success in key mission areas. The program has delivered specific cues that have led to increases in the interception of illicit drugs and undocumented migrants while also enhancing the effectiveness of fisheries

enforcement efforts. Ongoing initiatives include expanding the field intelligence teams, developing sector intelligence staffs, and ensuring the Deepwater offshore cutters being built have organic intelligence capabilities (Sloan, 2005, p. 98).

But even the best intelligence apparatus is not infallible. No matter what the opinion of the intelligence effort that was applied towards Operation Iraqi Freedom, there was at least one considerable lapse. This lapse was clearly presented by the comments of a speaker at the 2004 Mine Warfare Association conference. Captain Tillotson, Commander, Explosive Ordnance Disposal Group ONE said: “Despite the good news from OIF, our MCM success was not complete. The need for good intelligence is clear, but U.S. intelligence did not pick up the threat; we were advised: ‘No mines had been moved from storage sites.’ Clearly we need to do better in the intelligence preparation of the battlespace” (Truver, 2004, p. 66). His statement is predicated on the fact that despite the claim of the intelligence community that the Iraqi mines had not been moved from storage sites in preparation for employment, recently planted mines were discovered in the waterway. Additionally, coalition forces successfully intercepted and boarded four Iraqi vessels containing nearly 100 mines in the Khor Abd Allah waterway. One of them, the tug Jumariya was towing a barge with 20 Manta (bottom influence) and 48 LUGM (moored contact) mines. Each vessel was equipped with concealing devices made of hollowed 50-gallon barrels. The barrels were lined in rows, simulating a cargo barge and tug (Krypel, 2003).

In retrospect, when reviewing an operation it is not uncommon to wonder “what if” something different may have occurred. In this case, the significance of the intelligence failure could have easily resulted in disastrous consequences for the forces operating in the waterways of Southern Iraq and in the North Arabian Gulf. A disaster that could have lead to a potential

repeat of the USS Princeton and USS Tripoli mine strikes from Operation Desert Storm.

Arguments could be made that an intelligence failure of the same magnitude could not occur when the mine threat is applied to a U.S. port. When only a cursory examination is conducted that argument is difficult to prove. The combination of the difficulty the threat presents, coupled with the complexity of the threat, the size and opportunity of the potential battlespace, and the dogged determination of the suspected enemy, would require intelligence information of considerable depth and breadth. The intelligence problem is not easy. The volume of information that must be assessed is mind boggling and requires prioritization. Information on every potential threat cannot be given top priority. Using Operation Iraqi Freedom as the benchmark for the end-state of the intelligence effort towards the mine threat, the assumption that can be made is that the priority was not very high. This is the message that Captain Tillotson was sending in his comments to the Mine Warfare Association. The intelligence preparation of the battlespace was incomplete. OIF was a large scale military operation against a country that has successfully demonstrated a propensity to employ both an offensive and defensive mining capability. The intelligence community was given ample opportunity (time) to collect, analyze and disseminate intelligence information. If they were unable to detect that the Iraqis had moved their mines from storage facilities, loaded them on to tug boats and barges, and laid some in the waterway, it calls into question how much Maritime Domain Awareness or “unprecedented information sharing by all agencies” in the defense of the homeland will be required to ensure the safety of and access to our ports remains unencumbered.

Recommendation

The ability to respond to the specialized threat posed by the potential terrorist mining of a U.S. port will require modifications to the current force structure and a reassessment of the how mine countermeasures assets are strategically positioned throughout the U.S. A three part transformation process will be presented that will provide a near term capability to respond to the threat, and eventually result in the gradual transition of the specialized mission of homeland security mine countermeasures from the U.S. Navy to the U.S. Coast Guard. This will provide them all the capabilities necessary to conduct the full spectrum of operations in support of their mission of maritime security. As each part is presented sequentially it must be noted that there are elements of all three parts that would be conducted in simultaneously to support the transformation.

Part I (Strategic Basing/HLS Mission)

Perhaps the most significant immediate change consists of two primary components. First would be to reverse the consolidation of the mine countermeasures assets that took place in the early 1990's and the second would be to assign some of these assets to the conduct of homeland security operations.

Returning mine ships to the exact ports where they had been previously stationed may not necessarily be required. With twenty mine countermeasure ship assets, determining the best location to station assets compared to the 17 designated ports of strategic significance would enable the relocation of assets to centralized ports and prevent the basing of a single asset alone in a port. Having the assets in ports that are within a short transit to the designated strategic port would facilitate the routine presence of mine countermeasures assets in the strategic ports,

familiarize the crews with the prospective battlespace, and provide continual surveys of the seabed in the ports. These routine surveys would enable a database of underwater contacts to be catalogued so that in the case of mining, objects that were known to be present prior to the threat of mining can be quickly distinguished from new objects discovered on the seabed. Optimally, the stationing of the ships would coincide with a location that already has an established naval station. This would provide the ships and crews with access to the requisite security, training, administrative and logistics support necessary to sustain routine operations. In the case where the stationing of an asset is needed where there is not an operating naval station, the mine countermeasures ship would be stationed at the ports Coast Guard station. Although this is not optimal for the training, administrative and logistics support requirements, it does provide a secure berthing location for the ship.

The East Coast provides more options for the stationing of the mine countermeasures ships in conjunction with existing naval stations. The submarine base at Groton, Connecticut could provide berthing for ships to work the ports in the Northeast. Little Creek Naval Amphibious Base could support the ports of the Mid-Atlantic region, Naval Station, Mayport, Florida the Southern region, with the current homeport of the mine force, Ingleside, Texas being responsible for the Gulf Coast ports.

The West Coast, where there are no assets currently stationed does not present the same opportunity. Naval Station San Diego could support Southern California ports but serious consideration would have to be given to co-locating one or more assets with the Coast Guard in Los Angeles or Long Beach in order to be positioned to provide a more rapid response. San Francisco and Portland, Oregon are two other potential co-location requirements while Washington State can be covered by placing assets at Naval Station, Everett, Washington.

In addition to the relocation of surface assets to various ports to facilitate response to the designated strategic ports, the current disposition of the helicopter mine countermeasures squadrons would also be necessary. Currently, one squadron is stationed in Norfolk, Virginia. That squadron would support the Atlantic Coast ports. The second squadron, currently located in Corpus Christi, Texas would better serve the West Coast ports if relocated to Naval Air Station, North Island in San Diego, California.

Before proceeding to the to second component of Part I, it is noted that the only areas that would be negatively impacted by the relocation of these assets due to the loss of income generated by the number of servicemen and women and their families is Ingleside and Corpus Christi, Texas. The naval station and its tenant commands consist of approximately 3400 servicemen and women and contribute an estimated 135 million dollars to the local economy (Naval Station Ingleside Texas, 2002). It is not recommended that the Mine Warfare Center of Excellence which was established in Ingleside in 1992 be shut down. The relocation of the majority of the ships coupled with selected tenant commands would be required however, the port would still be necessary to support the Gulf of Mexico assigned mine countermeasures ships. Since there would only be one or two mine ships permanently stationed at the Ingleside port, the opportunity to either lease pier space to local shipping companies or utilize the open pier space to moor mobilization assets could be explored. The primary tenant command, Mine Warfare Training Center, is a well established schoolhouse and provides intermediate and advanced schools to both officers and enlisted sailors to include international exchange students. This command and its associated billeting for students would remain and continue to support the fleet through its specialized training in mine warfare.

Of the tenant commands that would be recommended for relocation is the Afloat Training Group, Ingleside, a component of ATG Atlantic. The Afloat Training Group's mission is to provide dynamic, quality afloat training to Navy and Coast Guard Sailors to ensure a combat ready force capable of performing a broad spectrum of maritime missions (Mission Statement). The Ingleside component of the Atlantic organization specializes in training the mine warfare ships. In order to better provide the training required of the ships, the mine warfare training specialists would be split between the Atlantic and Pacific Afloat Training Groups which are headquartered in Norfolk and San Diego respectively. This relocation of the members with mine warfare training experience would put them closer to the relocated ships they would be required to train, therefore minimizing the travel costs associated with required training and evaluation. Additionally, the relocation of the ships to ports on the same coasts as the major training groups would benefit the ships through the availability of more afloat trainers at the fleet concentration areas. From the training group perspective, they could experience a cost savings by having the ships on their coasts conduct training port visits to the fleet concentration area, therefore minimizing the transportation and lodging costs of sending trainers to the assigned port.

The supply center would be another tenant command that would require relocation. Stocks of supplies to support the surface mine countermeasures ships would be split evenly between the East and West coasts to populate the established supply centers in Norfolk and San Diego. The personnel of the Shore Intermediate Maintenance Activity and South-Central Regional Maintenance Center would also be divided and relocated to the Atlantic and Pacific fleet concentration areas.

Relocation of components of the current mine force command structure would also better serve the relocated ships and helicopter squadron. Commander, Mine Warfare Command

located at Naval Air Station, Corpus Christi would be able to continue to provide the operational and administrative oversight of the surface mine countermeasures assets on both coasts by remaining at their current location. Two of the three surface mine countermeasures squadrons, all of which are currently located in Ingleside, Texas, would better serve their units if divided between the East and West coasts, and then located in the major fleet concentration areas of Norfolk and San Diego. The recommended relocation would place Mine Countermeasures Squadron ONE in San Diego with the responsibility for the West Coast and Japan based ships. Mine Countermeasures Squadron TWO would relocate to Norfolk with the responsibility for the East Coast based ships. Mine Countermeasures Squadron THREE could either remain in its current location of Ingleside, Texas or move over to Corpus Christi to be collocated with Mine Warfare Command. Squadron THREE would retain the responsibility for the mine countermeasures assets forward deployed in the Arabian Gulf and also have oversight of the assets stationed in Ingleside.

The squadron commanders would be responsible for the training, maintenance and operational scheduling of the surface mine countermeasures assets operating on their respective coasts. By collocating the squadron commanders and their staffs in the fleet concentration areas they would not only better serve their assigned assets but also provide a full-time, senior (O-6) local mine warfare expert to advise the numbered fleet, battle group, and expeditionary strike group commanders during fleet, joint and combined exercises conducted on their respective coasts.

The component of the first phase is not as much a physical move but a planning and scheduling requirement. The planning and scheduling that will be identified will provide the process that is the end state of Part I. The desired end state would routinely provide the Coast

Guard with times in which the operational control of mine countermeasures assets would be transferred to the Coast Guard District Commanders for employment in homeland security/maritime security harbor route survey operations. This requires close coordination between the Coast Guard and the Navy so that the training, administrative and operational requirements of both services can be maintained.

The entering argument for the second component of the first part is that the ships would still be required to conduct all training and evaluations in accordance with the Surface Force Training Manual's interdeployment training cycle that dictates the training and readiness requirements which determine when a mine countermeasures ship is finished with the training cycle and becomes an asset ready for deployment. What is proposed is that the options for deployment of the assets would be either the participation in fleet, joint and combined exercises in support of deploying battlegroups or CHOP to a Coast Guard district commander to be utilized for homeland security duties.

This benefits the Navy and the ships in some key ways. Currently, ships finishing their interdeployment training cycle conduct a deployment in groups of four ships called Mine Warfare Readiness Groups from Ingleside, Texas. These deployments are to either the East or West coasts in support of fleet, joint and combined exercises. Transit time to the fleet concentration areas where the exercises will be conducted are significant in the distance which must be traveled and its impact on the materiel condition of the ships. Materially, these long transits stress engineering plants that have limited redundancy and require considerable maintenance. These transits are also costly, requiring a significant investment in the deployment maintenance of the ships and the cost of port visits in route. This is particularly true of the deployments to the West Coast where several foreign port visits and a Panama Canal transit is

required. With the ships already stationed on the coasts where the exercises will be conducted, the transit times will be minimized and use of military port facilities would mitigate costs.

The option to CHOP to the Coast Guard will provide the necessary assets to the Coast Guard in order to conduct routine port surveys or respond to a homeland security mine threat. The required planning and scheduling is the major muscle movement. The rotation of ships through the interdeployment training cycle to ensure deployable assets are ready is already monitored by squadron commanders and type commanders. The coordination between the Coast Guard and the Navy to balance the homeland security requirements and the Navy operational and training requirements would be the only significant addition to the current deployment planning and scheduling process.

Part II (Asset Transfer)

The second part of the transition process builds upon the Navy's plan to shift mine warfare from dedicated platforms to organic capabilities and takes into consideration the Navy's current expeditionary strategy of mine warfare. By balancing the fielding of new organic capabilities with the transfer of still capable dedicated assets to the Coast Guard, the Navy would be moving forward with its mine warfare strategy while still retaining the capability to deploy assets. This would simultaneously provide the Coast Guard with the capability to conduct mine countermeasures in support of homeland security.

The Navy's movement towards deploying strike groups that have an organic capability to conduct mine countermeasures (MCM) is partly predicated on the speed of response of dedicated assets to the operating area in order to assure access of the deployed forces. The response timeline for current MCM forces is constrained by the speed of strategic lift or surface transit

time from CONUS or overseas stations to the area of conflict. From CONUS, MCM command elements, AMCM forces, and MCM EOD forces can be airlifted to theater and become operational within 10 days. However, SMCM forces must sail directly to theater or travel on specialized heavy-lift ships, requiring 30 to 60 days (Mine Warfare Plan).

The other factor that is moving the Navy towards the organic capability is the desire to get the man out of the minefield. The pursuit of technology that will enable mine countermeasures to be conducted with machines operating in the minefield and being monitored or controlled by people who are not in the minefield is the ultimate goal. The development and fielding of new organic systems that support both of these advances is ongoing. The Remote Minehunting System (RMS) is the first step towards this organic capability. Designed to meet the Fleet demand for beyond line-of-sight mine reconnaissance against bottom and moored mines in deep and shallow water regions of anticipated operating areas, the semi-autonomous system will detect, classify, and identify mines and record their precise location for avoidance and/or subsequent removal (Remote Minehunting System Focus Sheet). A prototype was installed on the destroyer USS CUSHING and deployed to the Persian Gulf with the USS KITTY HAWK Battlegroup. It has subsequently been installed in two ARLEIGH BURKE class destroyers, although plans for continued installation of the RMS on destroyers has been discontinued as the organic capability to conduct mine countermeasures will now be incorporated as a mission module in the planned Littoral Combat Ship (LCS). A fast, agile, and networked surface combatant, LCS's modular, focused-mission design will provide Combatant Commanders the required warfighting capabilities and operational flexibility to ensure maritime dominance and access for the joint force. The mine warfare module will enable LCS to conduct

mine warfare missions along its intended track and in operational areas with on-board and off-board systems from deep water through the beach (Littoral Combat Ship).

Whether it is the Littoral Combat Ships with the mine warfare module or other emerging technologies, as they are built tested and put into service, the Navy will no longer have the need for dedicated mine countermeasures assets. These assets, still very capable, could serve the Coast Guard in their maritime security role. A potential long term goal would be the transfer of the entire Navy's current dedicated mine countermeasures assets to the Coast Guard which would provide them with a very robust capability. However, a near term and more realistic goal would be to begin the transfer the Osprey class coastal mine hunters to the Coast Guard as soon as possible. This handover would require considerable human and capital investment by the Coast Guard but could be partially mitigated by leveraging the current training and support structure the Navy has for its mine ships and personnel.

The Osprey class ships are the world's largest glass-reinforced plastic (GRP) ships and are the first US Navy ships designed solely for minehunting. The platform was designed with exceptionally low magnetic and acoustic signatures to protect against mine detonations during minehunting operations. Twelve minehunter ships were built for the US Navy by Northrop Grumman Ship Systems (formerly Litton Avondale Industries) of New Orleans and Intermarine of Savannah. All twelve of the ships were commissioned between 1993 and 1999. The ship's construction is of a monocoque glass-reinforced plastic skin without longitudinal or transverse frames and is designed to withstand the sudden shock loading resulting from undersea explosions. A principle reason to select the Osprey class for transfer is the mission for which the class of ships was designed to perform. The ships mission is to clear coastal and ocean waters, shore areas, and harbors of pressure/contact, acoustic, and magnetic mines using reconnaissance,

classification and neutralization (Osprey Class Coastal Minehunter). Designed to operate in coastal and harbor areas with a small crew and shallow draft, this highly maneuverable ship with a designed endurance of fifteen days, is optimal for the Coast Guards use in the rivers and harbors of the strategically designated ports.

Another reason that it is recommended that the MHC's be transferred, is that the MHC does not support the Navy's need for a deployable asset. Its limited endurance and lack of redundancy are design flaws that mandate a heavy lift requirement to get them to distant areas of operation. Having only one engine per shaft, one gyro and minimal storage for repair parts, most equipment casualties significantly limit the ability of the ship to continue with operations and in most cases requires the ship to return to port for repairs. These ships are extremely capable assets; however, these limitations do not support the deployable requirement of the Navy. This is not to imply that it is not possible for the ship to conduct long open-ocean transits. MHC's have conducted deployments to the West Coast from Ingleside. It is questionable whether the associated risks brought about by the design limitations was worth the gains of having the asset on the West Coast. When the asset is established in an area of operation, as the two MHC's which are forward deployed to the Arabian Gulf, their utility is great. The performance of the MHC's in the southern waterways of Iraq during Operation Iraqi Freedom was exceptional. Their propulsion design utilizing two cycloidal propulsion units provided the ships the responsiveness and maneuverability that gave them the capability to hold a stable position in the currents much more effectively than the Avenger class mine countermeasures ships. This capability is exactly what would the Coast Guard would require to conduct harbor and channel surveys and mine countermeasures for maritime security.

The first step that would be necessary in order to support the transfer of these assets is to begin the training of Coast Guardsmen in the specialized mission of mine countermeasures. Coast Guard attendance at the Navy's Mine Warfare Training Center would facilitate the learning required for the Coast Guardsmen to begin their familiarization with the operation, maintenance and employment of the ships and their systems. As the ships are relocated to the various ports on the East and West Coast in accordance with the first phase of this plan, they could begin being augmented with Coast Guard graduates of the mine warfare training curriculum. Turnover of total responsibility for the ships could occur in a variety of manners. A phased handover of the ships as they become more populated with Coast Guardsman would be one possible process. Another would be to build and train an entire crew prior to assuming the responsibility for the ship. Either option would be equally effective and potentially take the same amount of time. The end state would ultimately be that the ships, home ported in the various ports on both coasts belonging to the Coast Guard. The efficiency of the Coast Guardsmen in conducting the specialized mission could be accomplished by keeping the ships incorporated in the Afloat Training Groups training cycle. Where training and certification of ships for deployments is the primary goal of the Afloat Training Group, since the Coast Guard mine countermeasures ships would not be deploying, a more regimented training cycle could be established that would better fit around the training group's fleet requirements.

Although built in the same timeframe as the Osprey class, the Navy's Avenger class mine countermeasures ships better supports the Navy's current strategy of an expeditionary mine warfare capability so would not be the choice for transfer to the Coast Guard in the near term. Designed as fully deployable, oceangoing ships capable of both mine hunting and mine sweeping, the Avenger class is much larger and has greater mechanical redundancy with two

engines per shaft and two gyros. Additionally, they have greater repair parts storage and thirty days endurance. Although the Avenger class was also very effective when operating in the Iraqi rivers during Operation Iraqi Freedom, their propulsion system and size did not provide the same responsiveness and maneuverability of the Osprey class. Due to the ability of the Avenger class to continue supporting the Navy's current expeditionary strategy of dedicated mine warfare while transforming towards the capability of organic mine warfare systems (like the RMS on destroyers or Littoral Combat Ship mine warfare module), the Avenger class should remain a Navy asset until the organic capabilities are developed and incorporated in the naval inventory. When the Navy has incorporated the new organic capabilities and no longer requires the Avenger class as a dedicated asset, the option to transfer them to the Coast Guard would remain viable. However, by that time, the Avenger class ships would be in the later years of their service life and would most likely not be transferred.

As a general estimate, if the training of Coast Guardsmen were to begin at the same time as the movement of the ships from Ingleside, Texas to coastal ports in support of the first part of this recommendation, Coast Guard crews could begin to populate the repositioned assets inside of one year from the commencement of the plan with the first turnovers taking place within two years. Phasing the turnovers would be required as the throughput of the Mine Warfare Training Center could not be shifted entirely to Coast Guardsmen due to the need to continue producing training sailors to support the Avenger class assets that are operating for the Navy. Aggressively pursued and properly funded, it is estimated that Coast Guard manning and ownership of the entire fleet of MHC's could be completed within five years.

Although the transfer of the Osprey class coastal minehunters would be conducted to provide a capability against a specific threat, the utility of the platform to conduct routine

maritime missions should not be overlooked. Equipped with a small boat and a deck crane, and possessing a large amount of open deck space, the ship is suited for harbor and coastal search and rescue and has a limited towing capability. Speed is the only significant limitation of the class. That notwithstanding, the ship could be used for routine patrols and inspections and possesses adequate communications and command and control capabilities to function as the command platform for a large scale environmental disaster or for the scene of action commander during a search operation.

Part III (USCG Future Programs)

The third phase does not entail the movement of naval assets or their transfer to the Coast Guard. This phase provides future planning recommendations to the Coast Guard. Looking both at near term and long term planning, these general recommendations are to provide budget priorities and justification that would enable the Coast Guard to: 1. Execute the previous two phases, thereby incorporating mine countermeasures as a force capability. 2. Fund future programs that will ensure the future force structure of the Coast Guard retains the mine countermeasures capability and continues to benefit from the technological improvements in organic and unmanned mine countermeasures systems.

The current Coast Guard plan for their future capabilities, primarily focuses on improving their current fleet of ships and aircraft while funding the development of new ships to replace their aging fleet of cutters. Where these improvements are needed, the focus of these improvements lies in their ability to conduct the law enforcement operations. Their acquisition program called Integrated Deepwater System is promoted as being “not just new ships and aircraft but an integrated approach to upgrading existing assets while transitioning to newer,

more capable platforms with improved command, control, communications and computers, intelligence, surveillance, reconnaissance (C4ISR) and innovative logistics support systems”(Coast Guard, 2005). The program is built around the requirement to continue conducting the five primary missions of the Coast Guard; Maritime Security, Safety, Mobility, National Defense and Protection of Natural Resources. These missions carry with them necessity for the Coast Guard to have a multitude of implied capabilities. Where the new program states that it is a transition to more capable platforms what is absent from the Integrated Deepwater System (IDS) program, as stated earlier, is a mine countermeasures capability.

The new construction process has just begun on some of the IDS ships. With the building process just underway, it is recommended that the Coast Guard examine the potential to incorporate the capability to conduct mine countermeasures into the design of some or all of their new cutter designs. Changing or modifying the design of these new assets to provide them with the new capability, would clearly indicate the Coast Guards pursuit of all the necessary capabilities to carry out its mission of maritime security. It would be recommended that if the Coast Guard decides to add mine countermeasures equipment to the new construction, they install currently utilized sonar systems. Using the system currently used on Navy mine countermeasures ships, the SQQ-32 minehunting sonar, provides the Coast Guard the opportunity to obtain the new capability while leveraging on the established support generated by the Navy’s longer term use of the system. System operator and maintenance training costs would be mitigated through utilizing the established training provided at the Mine Warfare Training Center in Ingleside, Texas. This would eliminate the costs of either standing up a new facility specifically for the new system or paying the contractor for the new system to conduct

the training of the Coast Guardsmen. The only cost would be the transportation and lodging costs of sending personnel to Texas for the training.

Maintenance and repair costs are another high price item for new systems. With the established maintenance program and the availability of repair parts and technical experts to provide assistance with repairs and depot level maintenance, the Coast Guard would also save. Overall, the financial decision to use an established system outweighs the costs of selecting a system that has not been previously developed.

Whether the Coast Guard chooses to incorporate the mine countermeasures capability in their new construction or not, in order to obtain the capability to conduct mine countermeasures in support of their maritime security mission, they would need to plan for the costs associated with taking over the Navy's MHC assets. From the costs of training and maintenance to any modifications to facilities needed to support basing the MHC, additions to their budgets would be required. The question that always follows budget recommendations is where the money will come from. The issue is not one of total budget reprogramming but more of the issue of establishing different priorities for the money that has been obligated. The Coast Guard was budgeted for 8.1 billion dollars for FY06, 966 million of which are directed towards the needed improvements of their legacy systems and the design and construction of the new generation cutters (Deepwater sees increase in FY06 budget). The Coast Guards funding was a 33 percent increase over the previous year and will be the utilized to accelerate the acquisition programs associated with the IDS program. Through the including the costs associated with the transfer of the MHC's into this budget increase they can begin phasing the transfer of the capability from the Navy to the Coast Guard.

An additional cost that the Coast Guard should incorporate into their budget considerations is the research and development of emerging technology in the field of unmanned mine countermeasures systems. Investing in the development of new programs will ensure that as the MHC's reach their service life they can be replaced with the new technology then decommissioned.

Conclusion

The impact of the maritime domain on the economy of our country is clear. Without the Maritime Transportation System (MTS) the economic power of the U.S. market would be devastated. Additionally, the strategic importance of assuring the access into and out of U.S. ports and harbors plays a significant role in the U.S. ability to project power throughout the world. Although an immediate threat to access is not present the potential of terrorist organizations, like Al Qaeda, to focus an assault on the U.S. economy and strategic sealift by mining the channels and harbors of U.S. ports remains a potentiality that warrants consideration by the Department of Homeland Security, the Coast Guard and the U.S. Navy.

The U.S. economy is a friendly center of gravity that requires protection. The geographic size and complexity of the MTS presents itself as a vulnerability which, without actions taken by the government to position forces in its defense, will remain an easy target for the terrorist to employ mines to deny access. September 11th proved to the U.S. that airline security was critical to ensure an airliner would never again be utilized as a weapon. It also proved to the world the extremes that terrorist will utilize in order to forward their goals. The use of airliners to inflict terror was undoubtedly a costly, long-term operation that resulted in the desired effect. It is already believed that Al Qaeda is in possession of mines obtained from North Korea.

Unfortunately, the use of a pre-manufactured mine is only one facet of the potential threat. The use of improvised explosive devices in the water presents as significant a threat as a pre-manufactured mine purchased from the black market and is ultimately a more difficult problem when it comes to detection and neutralization of the threat. The mission of mine countermeasures is not quick and it is not easy. It requires both ships and equipment, but most important, it requires time. If time is not allocated to the conduct of the mission then the risk of missing a mine or device is increased and access is not assured.

The principle difference between the events of September 11th and the potential terrorist mining of U.S. harbors is easy to identify. Airliners and private aircraft that stray from flight paths can be considered a threat and actions can be taken to neutralize the threat. This is made possible by the ability of radar operators to monitor airspace and aircraft to operate IFF systems that enable tracking. There is no equivalent in the maritime domain. Large merchant ships are required to announce their arrival days in advance however that only accounts for the large ships. There is no requirement for local commercial and pleasure craft to report any movements in coastal waters or in the harbors and there is no mandatory equivalent of IFF for commercial and recreational vessels. The closest oversight of movement that exists in only a few harbors is called a vessel traffic management system. This system functions primarily as a traffic cop in busy waterways. Even if traffic management systems were utilized to monitor for suspicious activity, the sheer volume of traffic, both commercial and recreational, creates a near impossible task.

The Department of Homeland Security utilizes the Coast Guard as the primary enforcer of maritime security. The unfortunate truth is that the Coast Guard is ill equipped to deal with the threat of terrorist mining. The continued reliance upon the Navy fleet of mine

countermeasures ships, aircraft and explosive ordnance disposal personnel is indicative of the Coast Guards concern regarding their responsibility towards the potential threat of terrorist mining. The Navy is well trained and equipped to counter the threat of mining in the U.S. however; the assets to counter the threat were moved in the early 90's from most major ports to one consolidated port, Ingleside, Texas. Previously, the ships were located where they could provide deterrence to the possible terrorist and also be able to rapidly respond in the case of mining. Until the Coast Guard acquires the capability to conduct mine countermeasures in the strategically significant ports, the Navy should reallocate the mine countermeasures assets and selected command organizations to both East and West coast ports. Additionally, the conduct of mine countermeasures survey operations under the control of the Coast Guard District Commander should become a standard component of each assets deployment cycle. For the Coast Guard, they should take responsibility for the specialized mission of mine countermeasures in its maritime security role. In doing so, the Integrated Deepwater System (IDS) program should be modified to incorporate MCM as a key functional area of the new ships and systems. Additionally, funding should be allocated to the acquisition of the Osprey Class coastal minehunters from the Navy and the training of Coast Guard crews to operate them. Adding the Osprey class to the Coast Guard would provide a near term capability until the IDS program provides a replacement.

Deterrence is a critical capability and response time is a valuable factor when the vulnerability of our ports to terrorist mining is considered. Currently the ports remain vulnerable due to the lack of deterrence capability and increased response time caused by the consolidation of naval assets and the lack of mine countermeasures capability in the Coast Guard. There are no mine countermeasures assets present in all of our strategically significant ports. Without the

capability present in the ports, then there will be little to deter the terrorist. The terrorist will want to put mines where they will remain unlocated until actuated. If there are mine countermeasures assets in a port, the possibility that the planted mines remaining unlocated is reduced. In parallel, the lack of mine countermeasures assets in the strategic ports requires the movement of assets to the effected port in the case of a mining incident. This takes time. Time that the port will remain closed to both economic and strategic shipping.

Being prepared to respond to the threat of terrorist mining is not a waste of time or assets. Protecting access to ports assures the U.S. connectivity to the world market. Terrorists were able to acquire pilot training and access to an aircraft prior to September 11th, specialized training that was costly and time consuming. It is safe to assume that the terrorists had to overcome some obstacles in pursuit of the training necessary to fly an airliner in the execution of their mission. Whatever that difficulty may have been, it greatly exceeds the relative ease at which a terrorist can acquire a boat and a chart of a harbor. The assets are readily available to conduct a terrorist mining mission and Osama bin Laden has indicated his desire to attack our economy. The threat exists and the vulnerability of the MTS to terrorist mining dictates the requirement for action in both the near and long-term to assure continued unencumbered access to U.S. ports.

References

- A misplaced strategy. (n.d.). Retrieved Feb. 28, 2005, from History Locker Web site:
http://www.minwara.org/History_Locker/Misplaced_Strategy.htm.
- Airborne mine countermeasures. (n.d.). Retrieved Feb. 28, 2005, from AMCM Airborne Mine Countermeasures Web site: <http://members.aol.com/helmineron/anaqs-14.htm>.
- Bin Laden, O. (n.d.). Arab world news. Retrieved Jan. 30, 2005, from Aljazeera.net Web site:
<http://english.aljazeera.net/NR/exeres/79C6AF22-98FB-4A1C-B21F-2BC36E87F61F.htm>.
- Coast guard community relations. (n.d.). Retrieved Feb. 28, 2005, from The Shield of Freedom in Your Community Web site:
http://www.uscg.mil/community/coastal_watch.htm.
- COMDTPUB P16754.17. (2004). *Boating statistics*. 2003 ed. Washington, DC: U.S. Coast Guard.
- Deepwater sees increase in fy06 budget. (n.d.). Retrieved Mar. 16, 2005, from Integrated Deepwater System Homepage Web site: <http://www.uscg.mil/deepwater/>.
- Defense Study and Report to Congress (2003). *The DoD Role in Homeland Security*.
- Duncan, R. (1962). *America's use of sea mines*. Silver Spring, MD: United States Naval Ordnance Laboratory.
- DOD (1993). *Base Realignment and Closure Report*.
- English, B. (2003). Al Qaeda targeting ocean liners. *Fox News Channel*, . Retrieved Feb 17, 2005, from <http://www.foxnews.com/story/0,2933,106814,00.html>.
- Frittelli, J. F. (2004, Dec 30). Port and maritime security: background and issues for congress. *CRS Report for Congress*, Retrieved Feb 15, 2005, from <http://www.fas.org/man/crs/>.
- Griffiths, M. (1981). *The hidden menace*. 1st ed. London: Conway Maritime Press.
- Gunaratna, R. (2001, Sep 24). The asymmetric threat from maritime terrorism. Retrieved Feb. 08, 2005, from Janes's website:
http://www4.janes.com/subscribe/jtic/doc_view.jsp?K2DocKey=/content1.

Hearing on implementation of the maritime transportation security act. (n.d.). Retrieved Feb. 05, 2005, from Implementation of the Maritime Transportation Security Act Web site: <http://www.house.gov/transportation/cgmt/06-09-04/06-09-04memo.html>.

House of Representatives. Homeland Security Act, HR 5005 (2002)

Junot, P. (2002). Maritime security revamping protection of America's ports and seaways. *The Journal of Counterterrorism and Homeland Security*, (3), 16-18.

Kane, J. (2004). Iraqi navy casts off in defense of coastal waters. Retrieved Mar. 05, 2005, from DefenseLINK News Web site: http://www.defenselink.mil/news/Oct2004/n10042004_2004100402.html.

Krypel, J. (2003). Iraqi mine smugglers intercepted by coalition forces. *Navy Newsstand*. Retrieved Feb 28, 2005, from http://www.news.navy.mil/search/display.asp?story_id=6520

Lawrimore, J.A. (1993). Mine warfare – where is it today? Unpublished master's thesis, Army Command and Staff College, Fort Leavenworth, Kansas.

Littoral combat ship. (n.d.). Retrieved Mar. 13, 2005, from Littoral Combat Ship Web site: <http://www.globalsecurity.org/military/systems/ship/lcs-mods.htm>.

Marine Safety Office Pittsburgh, (n.d.). Homeland security what you can do to help. Retrieved Feb. 28, 2005, from http://www.uscg.mil/d8/mso/pittsburgh/reference_docs/PittsburghBrochure.pdf.

Maritime Domain Awareness Web site: <http://www.house.gov/transportation/cgmt/10-06-04/10-06-04memo.html>.

Maritime interception operations. (2003). Retrieved Feb. 28, 2005, from Global Security .Org Web site: <http://www.globalsecurity.org/military/ops/mio.htm>.

Maritime Transportation Security Act, 107-295 U.S.C. (2002).

Mines. (n.d.). Retrieved Mar. 15, 2005, from FAS Military Analysis Network Web site: <http://www.fas.org/man/dod-101/sys/ship/weaps/mines.htm>.

Mine lines newsletter history locker. (2004). Retrieved Feb. 28, 2005, from Mine Lines December 2004 Web site: http://www.minwara.org/Mine_Lines/ML_2004_12.pdf.

Mine neutralization. (n.d.). Retrieved Feb. 28, 2005, from FAS Military Analysis Network Web site: http://www.fas.org/man/dod-101/sys/ship/weaps/mine_sweep.htm.

Mine warfare command history. (n.d.). Retrieved Feb. 21, 2005, from CMWC Press Release 3 Web site: <http://www.cmwc.navy.mil/history.htm>.

- Mission statement. (n.d.). Retrieved Mar. 12, 2005, from ATG Atlantic Web site:
<https://www.atgl.spear.navy.mil/public/lantMission.htm>.
- National Research Council, Washington DC, Ocean Studies Board Commission on Geosciences, Environment, and Resources. (2000). Oceanography and Mine Warfare. Retrieved February 19, 2005, from the National Academies Press Web site:
<http://books.nap.edu/books/0309067987/html/R1.html>.
- Naval station ingleside texas. (2002). Retrieved Mar. 06, 2005, from Global Security.org Web site: <http://www.globalsecurity.org/military/facility/ingleside.htm>.
- Navy marine mammal mine hunting systems. (n.d.). Retrieved Feb. 28, 2005, from Minehunting Systems of the US Navy Marine Mammal Program Web site:
http://www.spawar.navy.mil/sandiego/technology/mammals/mine_hunting.html.
- Osprey class coastal minehunter. (n.d.). Retrieved Mar. 12, 2005, from Naval-technology.com Web site: <http://www.naval-technology.com/projects/osprey/>.
- Peterson, G. I. (2004). The integrated deepwater system: satisfying the information needs of the operator . Retrieved Feb. 28, 2005, from The Integrated Deepwater System: Satisfying the Information Needs of the Operator Web site:
<http://www.frost.com/prod/servlet/market-insight-top.pag?docid=18817167>.
- Remote minehunting system focus sheet. (n.d.). Retrieved Mar. 13, 2005, from Naval Surface Warfare Center Web site:
http://www.ncsc.navy.mil/Our_Mission/Major_Projects/Remote_Minehunting_System_Focus_Sheet.htm.
- Shaiken, H. (n.d.). Troops for trade: bush administration threatens to bring in troops to squash possible longshoreman strike, federal mediators intervene in Boeing strike vote. Retrieved Feb. 05, 2005, from Democracy Now Web site:
<http://www.democracynow.org/article.pl?sid=03/04/07/036215>.
- Sloan, J. F. (2005). Coast guard expands intelligence efforts. *Proceedings*, 131/5/1227, 98.
- The Subcommittee on Coast Guard and Maritime Transportation , (2004). The subcommittee on coast guard and maritime transportation .
- Truver, S. C. (2004). Mine countermeasures and destruction. *Naval Forces International Forum for Maritime Power*, 66-68.
- U.S. Coast Guard (2002, Dec). Maritime Strategy for Homeland Security. Washington DC: United States Coast Guard.

US Coast Guard, (2005). Transforming america's shield of freedom; integrated deepwater system. Retrieved Feb. 28, 2005, from Integrated Deepwater System - The IDS Program Web site: <http://www.uscg.mil/deepwater/program/program.htm>.