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Report to the Chairman, Subcommittee on Military Research and Development, Committee on National Security, House of Representatives

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NAVY MINE WARFARE

Budget Realignment Can Help Improve Countermine Capabilities

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National Security and
International Affairs Division

Navy Mine Warfare: Budget Realignment Can Help Improve Countermine Capabilities

B-271137

March 13, 1996

The Honorable Curt Weldon
Chairman, Subcommittee on Military Research and Development
Committee on National Security
House of Representatives

Dear Mr. Chairman:

In response to your request, this report identifies opportunities for the Navy to realign its spending priorities to address weaknesses in its ability to conduct effective sea mine countermeasures. Operation Desert Storm highlighted many of the weaknesses that remain today. This report contains recommendations to the Secretary of the Navy to address those weaknesses.

This report is an unclassified version of our December 1995 report. In that report, we provided more detail and additional data to support our findings and recommendations.

We are sending copies of this report to the Chairmen and Ranking Minority Members, House and Senate Committees on Appropriations, Senate Committee on Armed Services, and House Committee on National Security; the Director, Office of Management and Budget; and the Secretaries of Defense and the Navy. Copies will also be made available to other interested parties upon request.

Please contact me at (202) 512-5140 if you or your staff have any questions concerning this report. Major contributors to this report are listed in appendix III.

Sincerely yours,

Mark E. Gebicke

Mark E. Gebicke
Director, Military Operations and
Capabilities Issues

Executive Summary

Purpose

Operation Desert Storm highlighted major weaknesses in the Navy's capability to detect and disarm enemy mines. The Navy possessed only a very limited capability at that time to conduct mine countermeasures at various water depths. In addition, two Navy warships, the U.S.S. Princeton and the U.S.S. Tripoli, both struck Iraqi mines in open waters in the Persian Gulf. The combined damage to the two ships, which totaled about $21.6 million, was caused by two mines—one estimated to cost $10,000 and the other about $1,500. The Navy has since made a number of organizational changes and initiated several research and development projects to address the weaknesses in its mine countermeasures program.

At the request of the Chairman, Subcommittee on Military Research and Development, House Committee on National Security, GAO examined the steps the Navy is taking to ensure a viable, effective naval force that will be ready to conduct mine countermeasures in two nearly simultaneous major regional conflicts. Specifically, GAO evaluated the (1) status of the Navy's research and development projects, (2) readiness of the Navy's on-hand mine countermeasures assets, and (3) match between the Navy's planned and on-hand mine countermeasures assets and its mine countermeasures requirements.

Background

The Navy uses ships, helicopters, and explosive ordnance units to detect and destroy enemy mines from deep water up to the beach. Until the late 1980s, the primary mission of these forces was to detect and destroy enemy mines laid along U.S. coastlines and in U.S. harbors. Subsequent to the fall of the Soviet Union and the greatly diminished threat to U.S. coastlines, the Navy redirected its mine countermeasures program to detect and destroy enemy mines overseas in support of U.S. naval and amphibious operations in regional conflicts. Current wartime doctrine requires mine countermeasures forces to be deployable outside U.S. coastal waters.

After Operation Desert Storm, the Navy designated the Commander of the Mine Warfare Command as the operational commander of all naval mine warfare forces. His responsibilities include ensuring the readiness of the mine warfare assets, enhancing the integrated training of all mine warfare forces, conducting training exercises with other fleet units, and commanding mine warfare forces when deployed to military operations.

Results in Brief

Critical areas in the Navy's mine countermeasures capabilities remain unmet, and the Navy is pursuing a number of different projects to address these areas. However, it has not established clear priorities among all of its mine warfare programs to sustain the development and procurement of its most needed systems. Consequently, the Navy has experienced delays in delivering new systems to provide necessary capabilities. In addition, the Navy has identified shortfalls of about $99.5 million in the development of its shallow water projects.

The systems and equipment installed on the Navy's ocean-going mine countermeasures ships have experienced reliability problems and parts shortages for several years. As a result, individual ships are not fully capable of performing their mine countermeasures missions, although collectively they may be able to carry out particular missions. To its credit, the Navy recognizes these shortfalls and has taken positive steps to improve the reliability and supportability of its ships. However, a number of the ships' systems and equipment are still not as reliable as predicted, and parts shortages persist.

At the same time that the Navy is experiencing delays in delivering critical capabilities, the Navy is spending about $1.5 billion to acquire 12 coastal mine hunter ships that were designed specifically to protect U.S. coastal waters against the Soviet Union but not to travel across the ocean under their own power. Each of these ships will cost the Navy an average of $3.6 million per year to operate and maintain. In addition, the Navy has discussed plans to acquire a new mine countermeasures command, control, and support ship early in the next century and is spending more than $118 million to convert the U.S.S. Inchon for this purpose in the interim. The Navy estimates that annual operation and maintenance costs for the U.S.S. Inchon will be about $4.5 million. These command, control, and support activities can be provided from existing ships and on-shore locations.

Principal Findings

Delays in Research and Development Projects Jeopardize the Navy's Ability to Conduct Mine Countermeasures

No single system can provide the Navy with the capability to conduct mine countermeasures from deep water to the beach. Therefore, the Navy has been developing numerous systems to address the varying water depths. However, the Navy does not have a definitive plan that identifies the additional systems needed in the long term to acquire necessary shallow

water capabilities. It has pursued these projects independently of each other and, consequently, has had to make tradeoffs among them. The Navy has started and stopped some of these projects repeatedly over different fiscal years to respond to changing priorities.

Reliability and Maintainability Problems Affect Mission Readiness

The Navy now possesses 14 ocean-going mine countermeasures ships and is experiencing significant logistics challenges to keep them operational. The ships have been unavailable at times for training because of failures of critical systems and equipment. The foreign-made engine, in particular, has a history of problems involving failures of cylinder heads, bearings, crankshafts, and engine actuators. These shortages have adversely affected the overall mission capability of the ships and resulted in parts being diverted from the production line and removed from some ships for use in other ships.

The Navy established an admirals' oversight council in November 1994 to identify corrective actions to address these issues. However, officials believe it will be several years before all the improvements can be made because the Navy will incur additional costs to address the corrective actions and the ships' schedules will have to be accommodated.

Additional Ships Are Unnecessary for Meeting the Navy's Mine Countermeasures Objectives

The Navy began to acquire 12 coastal mine hunter ships in the mid-1980s to counter the mine threat of the former Soviet Union. Because this threat to U.S. coastal waters was greatly diminished with the fall of the Soviet Union, the originally intended mission of the coastal ships no longer exists. However, instead of removing some of these ships from the Navy's inventory, as recommended by the Department of Defense (DOD) Inspector General in May 1995, the Navy is continuing to purchase all 12 ships at a total cost of about $1.5 billion.

The deployment capability of the coastal ships is limited. These ships are not designed to travel across the ocean under their own power, and they can only operate at sea for a maximum of 5 days. Because these ships were not intended to deploy, the Navy designed them with a very limited ability to communicate with other fleet units. It will cost the Navy, on average, $3.6 million per year to operate and maintain each of the coastal mine hunter ships. The Navy did not cancel orders for any of these ships or explore options or opportunities for removing them from the Navy's inventory. These options include deactivating the ships or transferring them to other allied navies through the foreign military sales program.

The Navy also tentatively plans to acquire a new command, control, and support ship early in the next century, even though the Navy can provide command, control, and support for mine countermeasures activities from existing naval ships or on-shore locations. In the interim, the Navy is spending more than $118 million to convert the U.S.S. Inchon to a command ship, even though the ship is already 25 years old. The Navy began the conversion in March 1995 and is anticipating a completion about March 1996. As of August 1995, the Navy had already committed $99 million of the conversion funds.

Recommendations

To improve the Navy's readiness to conduct mine countermeasures, GAO recommends that the Secretary of the Navy develop a long-range plan to identify the gaps and limitations in the Navy's mine countermeasures capabilities; establish priorities among the competing projects and programs, including those in research and development; and sustain the development and procurement of the most critical systems. The Secretary of the Navy should direct particular attention to those systems required to improve the Navy's shallow water mine countermeasures capabilities.

GAO also recommends that the Secretary of the Navy improve the readiness of ocean-going mine countermeasures ships. If the Navy finds that the funds necessary to sustain critical research and development and improve the readiness of ocean-going mine countermeasures ships are not available, the Navy should consider using funds that would otherwise be used to operate and maintain some of the coastal mine hunter ships.

Agency Comments

DOD partially agreed with GAO's findings and recommendations (see app. II). DOD acknowledged that delays in research and development projects have had an impact on the Navy's ability to conduct mine countermeasures and concurred that reliability and support problems have affected the mission capability of its mine warfare ships. Further, DOD partially concurred that the coastal mine hunter ships' role in overseas locations is limited. However, DOD did not concur with GAO's finding that the command, control, and support ship is not essential. DOD agreed with GAO's recommendations that the Secretary of the Navy develop a long-range plan to sustain the development and procurement of the most critically needed mine warfare systems and improve the readiness of the Navy's ocean-going mine countermeasures ships. However, while DOD acknowledged that cost savings could be achieved if the planned inventory

of coastal mine hunter ships were reduced, DOD did not agree that such a reduction is a viable option.

GAO questions the need to operate additional coastal mine hunter ships given the funding shortages in the mine warfare budget, which is causing projects addressing unmet mine countermeasures needs to go unfunded. Since critical areas in Navy mine countermeasures capabilities remain unmet, GAO believes these areas should have higher priority than operating additional coastal mine hunter ships.

Contents

Appendixes

Tables

Figures

Abbreviations

DET	Distributed Explosive Technology
DOD	Department of Defense
GAO	General Accounting Office
MCM	mine countermeasures
MCS	mine countermeasures command, control, and support
MHC	mine hunter, coastal
SABRE	Shallow Water Assault Breaching System

Introduction

Mine warfare captured the Navy's attention during Operation Desert Storm when two Navy warships, the helicopter carrier U.S.S. Tripoli and the guided missile cruiser U.S.S. Princeton, were heavily damaged by Iraqi mines in the Persian Gulf in February 1991. The combined damage to these two ships, which totaled about $21.6 million, was caused by two mines—one estimated to cost $10,000 and the other about $1,500. Naval mines are extremely economical weapons and are readily available on the world's arms market.

The Navy has identified naval mine countermeasures—the ability to detect and disable enemy sea mines—as a critical element for establishing maritime superiority to ensure access to ports, keep sea lanes open, and support amphibious assaults. During the Cold War, the major factor in developing mine countermeasures capabilities was the ability to clear Soviet-laid mines from U.S. harbors to enable U.S. ships to break out of U.S. ports. With the fall of the Soviet Union, however, the threat of enemy mining in U.S. coastal waters has greatly diminished. Changing world conditions have caused U.S. defense planning to shift from a concept of global conventional war to a concept of regional conflicts and crises.

Lessons Learned From Operation Desert Storm

The 1992 Navy Mine Warfare Plan detailed four critical mine warfare lessons learned from Operation Desert Storm and the actions taken by the Navy in response to those lessons. The first major lesson was that the Navy lacked a unified command structure. The mine countermeasures commander's staff consisted of 23 individuals assembled from 21 different commands, resulting in a command staff that was ill-prepared for its task. Fortunately, the 4 months in theater before actual clearance operations provided for adequate command staff and mine countermeasures force training. The Navy has since consolidated operational command of all mine warfare forces in the Commander, Mine Warfare Command, who reports administratively and operationally to the Commander in Chief, U.S. Atlantic Fleet.[1] His responsibilities include ensuring the readiness of the mine warfare assets, enhancing the integrated training of all mine warfare forces, conducting training exercises with other fleet units, and commanding mine warfare forces when deployed to military operations. The Mine Warfare Command is located at the Naval Air Station, Corpus Christi, Texas. Mine warfare ships are homeported nearby at Naval Station, Ingleside, Texas. Plans to move all mine hunting helicopters from

[1]During military operations, the Mine Warfare Commander reports to the appropriate area Commander in Chief.

Alameda, California, and Norfolk, Virginia, to Corpus Christi have not been finalized.

A second lesson learned from Operation Desert Storm was the need to improve the readiness of mine warfare forces. Since that time, the Navy has conducted or participated in about a dozen exercises with U.S. and foreign naval battle groups. Mine warfare training courses have been expanded for both enlisted and officer personnel, and career paths for enlisted minemen have been revised to enhance opportunities for long-term tours of duty in mine warfare.

Third, the Navy acknowledged the need to identify and acquire the necessary resources to carry out its mine countermeasures mission. In 1994, the Navy took delivery of the last of 14 mine countermeasures (MCM) ships and acquired the first 2 of 12 planned mine hunter, coastal (MHC) ships. In addition, the Navy is converting a helicopter landing ship to a mine countermeasures command, control, and support (MCS) ship.

Last, the Navy recognized that it has very limited systems to counter mines in various water depths. Consequently, the Navy has established several research and development projects to address these limited capabilities.

Mines and Mine Countermeasures Forces

Sea mines are explosive devices hidden in the sea that can be detonated either by direct contact or indirectly at a distance by the acoustic, seismic, or magnetic signatures of passing ships. The mines can be floating, moored, bottom-laying, or buried. Sophisticated mines are equipped with electronic sensors designed to ignore certain types of ships and target others or count a specific number of ships before arming and detonating.

The various methods for countering mine threats include detection and avoidance, mine hunting, influence minesweeping, and mechanical minesweeping. Mine hunting is the process of detecting, locating, and identifying mines through the use of sonar. Influence minesweeping activates electronic sensors within the mines using towed magnetic or acoustic sweep gear to detonate mines at a safe distance. Mechanical minesweeping involves the physical removal of mines using sweep wire to drag mines or cutting gear to release and float tethered mines for later detonation. The Navy's primary mine countermeasures forces consist of ships, helicopters, and explosive ordnance disposal units.

Mine Countermeasures Ships

The Avenger class MCM ship, the larger and more capable of the two classes of mine countermeasures ships, is a 224-foot ocean-going mine warfare ship designed to clear mines in both coastal and offshore areas. (See fig. 1.1.) The hull is constructed of wood and glass-reinforced plastic to maintain a nonmagnetic character, which is essential to mine clearing operations.

Figure 1.1: An MCM Ship

Source: Navy.

The MCM is capable of both mine hunting and minesweeping—both mechanical and influence—and is designed for conducting mine countermeasures operations worldwide. Major on-board systems include

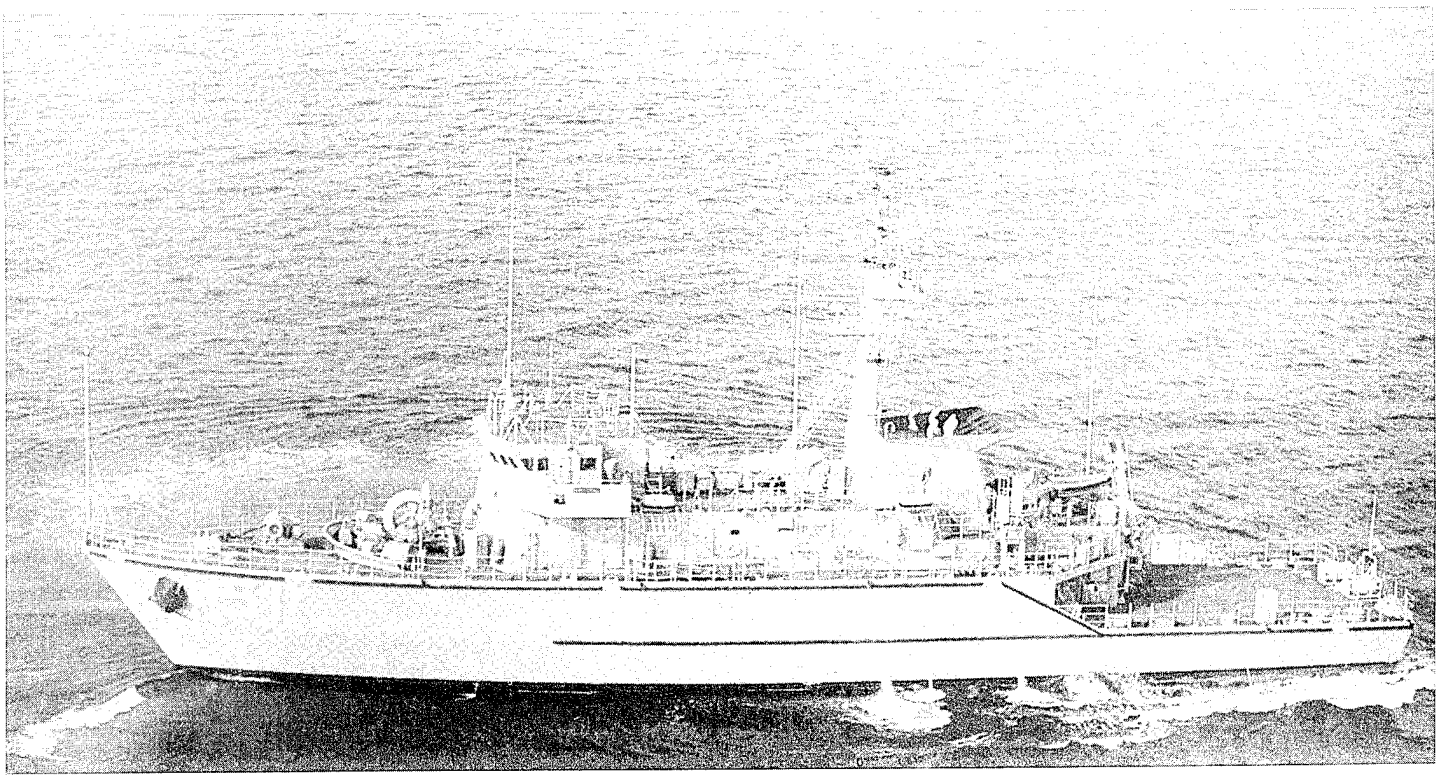
the mine hunting sonar, unmanned submersible mine neutralization vehicle, precise integrated navigation system, and standard magnetic/acoustic influence minesweeping system. The MCM ships are designed to travel at a speed of 13.5 knots. However, depending on the distance, the Navy might use heavy-lift ships to transport MCM ships to a battle site in a timely manner, which would benefit the MCM ships by reducing engine wear and tear en route to the battle site.

The MCM ship program, which is managed by the Mine Warfare Ship Program Office, Naval Sea Systems Command, cost $1.8 billion over a period of 10 years. The first of 14 MCM ships was commissioned in September 1987, and the last was commissioned in November 1994. The MCM ships have a crew of 8 officers and 75 enlisted personnel.

Coastal Ships

The Osprey class MHC ship, the smaller of the two classes of mine countermeasures ships, is 188 feet long and designed specifically to clear harbors and coastal waters. (See fig. 1.2.) The MHC hull is constructed of glass-reinforced plastic to provide the necessary low-magnetic character. The Mine Warfare Ship Program Office also manages the MHC ship program.

Figure 1.2: An MHC Ship



Source: Navy.

The role of the MHC has always been more limited than that of the larger MCM. The MHC class of ships was designed primarily to conduct mine hunting and mechanical minesweeping within U.S. harbors and coastal waters. These ships were originally designed to be nondeployable coastal mine hunters that would have a maximum mission capability length of 5 days. However, the MHCs can be deployed and operated for longer periods of time, as long as they are provided with fuel and supplies from a close support ship. In addition, the Navy has made some ship alterations to expand the storage capacity of the MHC.

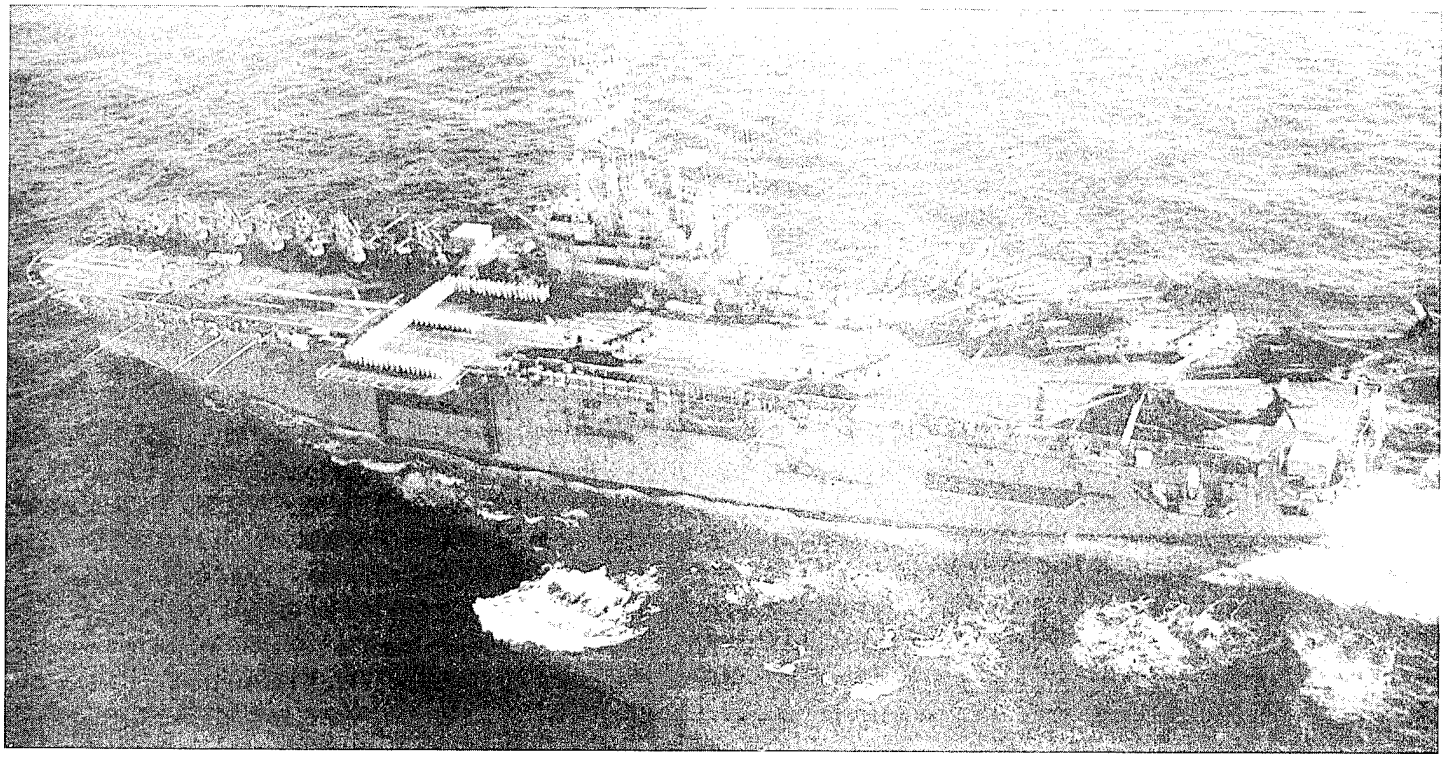
The MHC ship program, which is in the production phase, will cost about $1.5 billion. The first of 12 MHC ships was commissioned in November 1993 and the second in August 1994. The Navy took delivery of the third MHC in

April 1995. Construction of the 12th MHC ship began in September 1994, and delivery is scheduled in fiscal year 1999. The MHC ships have a crew of 6 officers and 46 enlisted personnel.

Mine Countermeasures Command, Control, and Support Ship

To provide command and control functions, serve as a platform for helicopters, and support supply and logistics operations, the Navy Mine Warfare Command began converting the helicopter landing ship U.S.S. Inchon to an MCS ship in March 1995. When this conversion is completed in about March 1996, at a cost of more than $118 million, the U.S.S. Inchon will be capable of carrying an MCM Group Commander and staff and supporting long-endurance airborne, surface, and underwater MCM operations. (See fig. 1.3.) The U.S.S. Inchon, which is 25 years old, has an expected lifespan of about 10 more years. The Navy has tentative plans to design and build a new MCS ship early in the next century.

Figure 1.3: The U.S.S. Inchon

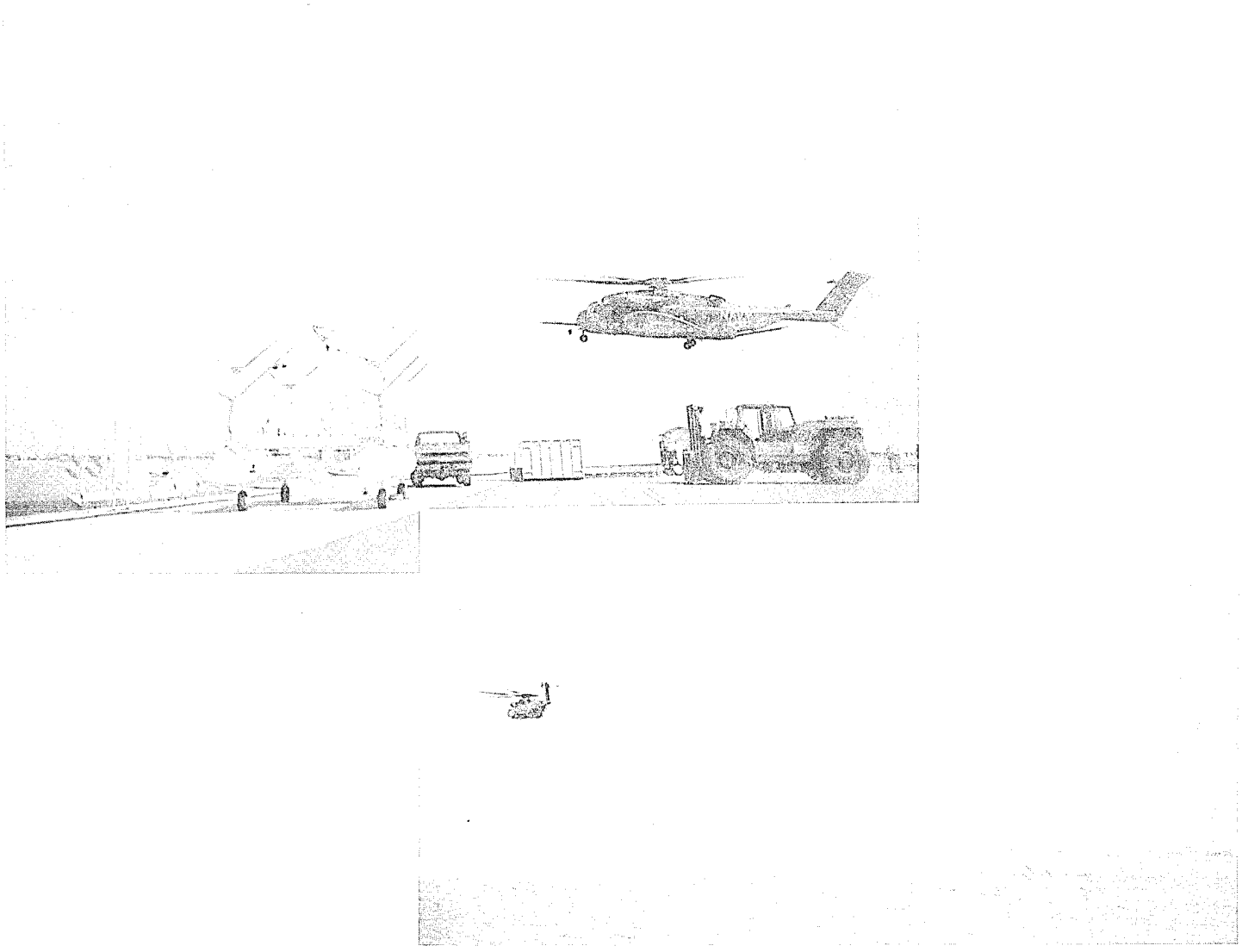


Source: Navy.

Helicopter Squadrons

The Navy's airborne mine countermeasures assets consist of 24 MH-53E Sea Dragon helicopters and their related sweep gear. (See fig. 1.4.) The Sea Dragon, the largest heavy-lift helicopter in the West, is capable of towing a variety of minesweeping and mine hunting countermeasures gear. The airborne forces enhance surface forces by providing rapid response and deployment capability as well as the ability to sweep wider areas of the sea in a shorter time. These forces are consolidated in Squadron HM-14 based in Norfolk, Virginia, and Squadron HM-15 based in Alameda, California. Each of these squadrons is made up of 12 MH-53E helicopters. The Mine Warfare Command plans to consolidate its airborne mine warfare helicopter squadrons at Naval Air Station, Corpus Christi, Texas. Squadrons report operationally to the Commander, Mine Warfare Command.

Figure 1.4: An MH-53E Helicopter With Minesweeping Gear



Explosive Ordnance Disposal Units

Fifteen explosive ordnance disposal units of eight personnel (one officer and seven enlisted) each report operationally to the Commander, Mine Warfare Command. These units are made up of underwater divers and demolitions experts who are trained and equipped to locate, identify, explode, disable, recover, and dispose of mines. Once mines have been located by surface or airborne forces, the units move in and detonate the mines safely or disable and retrieve them for future study. In addition,

these units are capable of supporting surface and airborne mine countermeasures operations.

Mine Warfare Research and Development Activities

The Navy is pursuing a number of different projects to develop new mine countermeasures capabilities or improve existing capabilities. These programs are largely developed at the Naval Coastal Systems Station in Panama City, Florida, and administered out of the Program Executive Office for Mine Warfare in Arlington, Virginia.

Objectives, Scope, and Methodology

At the request of the Chairman, Subcommittee on Military Research and Development, House National Security Committee, we examined the steps the Navy is taking to ensure a viable, effective naval force that will be ready to conduct mine countermeasures in two nearly simultaneous major regional conflicts overseas. Specifically, we evaluated the (1) status of the Navy's research and development programs, (2) readiness of the Navy's on-hand mine countermeasures assets, and (3) match between the Navy's mine countermeasures assets and its mine countermeasures requirements.

To determine the status of the Navy's mine warfare research and development projects, we examined the Navy's operational requirements documents and met with program managers to gather data on those systems the Navy is developing to meet its requirements. Further, we examined past and projected budget data to identify the funding history of the projects and estimate the delivery dates of the projects to the fleet.

To determine the readiness of ships, we reviewed Status of Resources and Training System reports, high-priority requisitions, Mine Readiness Certification Inspections, and other data related to mission capability. We discussed problem parts and unreliable systems with the Mine Warfare Command, the Shore Intermediate Maintenance Activity, and the Chief of Supply, and we identified efforts to resolve these problems. We conducted a detailed analysis of the Mine Warfare Commander's priority lists of problem systems and equipment affecting the MCM and MHC ship classes.

To determine whether the Navy has identified the type and quantity of assets needed to carry out its mine countermeasures mission, we discussed the need for mine countermeasures ships and support vessels with the Commander, Mine Warfare Command. We also reviewed and analyzed reports, testimony, and requirements studies published between 1989 and 1995 by the Deputy Chief of Naval Operations, Center for Naval

Analyses, Naval Audit Service, and Department of Defense (DOD) Inspector General.

We visited three MCM ships, the U.S.S. Defender, the U.S.S. Gladiator, and the U.S.S. Scout, in Ingleside, Texas. We also performed our work at the Shore Intermediate Maintenance Activity, Ingleside, Texas; the Mine Warfare Command, Corpus Christi, Texas; the Office of the Deputy Chief of Naval Operations, the Naval Sea Systems Command, the Naval Air Systems Command, the Program Executive Office for Mine Warfare, the Office of Naval Research, the Bureau of Naval Personnel, and the Office of the Director of Naval Reserves, Washington, D.C.; the Office of the Commander in Chief, Atlantic Fleet Headquarters, Norfolk, Virginia; the Center for Naval Analyses, Alexandria, Virginia; and the Naval Coastal Systems Station, Panama City, Florida.

We performed our review between July 1994 and July 1995 in accordance with generally accepted government auditing standards.

Delays in Research and Development Projects Limit the Navy's Ability to Conduct Mine Countermeasures

Critical limitations in the Navy's ability to conduct mine countermeasures at various water depths that were identified during Operation Desert Storm still exist today, and the Navy is pursuing several projects to address these limitations. However, it has not developed a long-range plan that identifies a baseline of its systems' current capabilities and weaknesses or establishes priorities among its competing projects to sustain the development and procurement of the most needed systems. One of the significant limitations demonstrated during Operation Desert Storm was the Navy's inability to conduct mine countermeasures in shallow waters. This capability is one of the Navy's greatest challenges and key priorities. The Navy's current plans to bring additional systems on line beyond 2001 in support of amphibious assaults are uncertain.

A Long-Range Plan Can Direct Funding to Priority Projects

The capability to conduct naval mine countermeasures is a critical element in ensuring that the Navy can project military power from the sea onto the world's beaches in military operations. Operation Desert Storm demonstrated, and subsequent independent studies conducted by the Naval Studies Board of the National Academy of Sciences (1993) and the Johns Hopkins University Applied Physics Laboratory (1994) have documented,[1] that no single system can provide the Navy with the capability to conduct mine countermeasures at all water depths due to the complexity of mine warfare operations and the various mines that the Navy may encounter. Therefore, the Navy must develop a set of complementary systems and tactics to effectively carry out its mine warfare operations.

The mine warfare community is currently developing about 18 different projects to enhance its capability to conduct mine countermeasures at all water depths. These projects include

- enhancing the mine countermeasures ships' and helicopters' mine hunting sonars to provide greater area coverage and improve their capability to detect and classify enemy mines,
- upgrading the ships' and helicopters' minesweeping systems to provide greater output to destroy mines and improve serviceability,
- upgrading the ships' mine neutralization system to provide the ships with an immediate destruction capability of identified mines,
- developing a mine neutralization system for the MH-53E helicopters to be used with the airborne mine hunting sonar system, and

[1]Reports on these studies are classified.

- developing the capability to neutralize mines and obstacles in the surf zone.

The Navy's current approach to developing the mine warfare research and development projects has been inefficient. According to Navy officials, many of the projects have had to compete for limited financial resources, and the Navy has had to make tradeoffs among them. The Navy has started and stopped some projects repeatedly over different fiscal years to respond to changing priorities, and these repeated starts and stops have resulted in schedule delays. For example, officials explained that the airborne mine hunting sonar system (AN/AQS-20) program has experienced starts and stops that have resulted in a delay in the system's initial operating capability. The Navy began to develop this system in the late 1970s, yet has still not brought this system on line. Officials further explained that the Navy has had to place different management teams on this project over the years and that the program has suffered from the lack of continuity in expertise. Moreover, current procurement plans for this sonar system will only allow the Navy to fund procurement of two to three systems per year, despite the fact that mine countermeasures helicopters deploy in squadrons of four. According to mine countermeasures officials, the mine warfare community will consequently have to maintain support simultaneously for two different mine hunting systems until all of the helicopters are outfitted with the upgraded sonar.

The airborne mine neutralization system program has also experienced starts and stops since the program began in the mid-1970s. This program was dormant during Operation Desert Storm. It was restarted in fiscal year 1992 but canceled in fiscal year 1993. Funds were restored in fiscal year 1996.

Sustaining limited financial resources for priority programs will likely become even more challenging in the future. The independent studies conducted after Operation Desert Storm by the Naval Studies Board of the National Academy of Sciences and the Johns Hopkins University Applied Physics Laboratory concluded that the use of modeling and simulations could assist the Navy in identifying its mine countermeasures priorities. A long-range plan addressing the gaps and limitations in the Navy's mine warfare capabilities, especially its shallow water capabilities, could help the Navy maximize its limited financial resources and ensure sustained funding of its priority systems.

The Navy Still Lacks the Ability to Effectively Counter Mines in Shallow Water

After Operation Desert Storm, the Navy determined that its inability to clear mines and other obstacles in shallow waters is one of its greatest challenges. The Navy needs to develop this capability because enemy forces can easily lay mines and obstacles in shallow waters,[2] since this area is closest to their shorelines and because surf action causes many mines to partially or totally bury, making them harder to detect. Without a shallow water mine countermeasures capability, the only alternative for amphibious forces would be to avoid an enemy minefield and make an approach in another area. The risk associated with this maneuver, however, is that enemy forces might intend for U.S. troops to make an amphibious landing right into harm's way.

The Navy cannot operate its mine countermeasures ships in very shallow water due to the risk of running aground or damaging their hulls. The Navy would also have difficulty towing its mine sweeping gear because of the likelihood that the gear would snag on the bottom of the ocean.

The Navy is currently developing six mine countermeasures systems to clear mines and obstacles in shallow water.[3] Since Operation Desert Storm, however, the Navy has not added any of these systems to its fleet. Moreover, the Navy has not made final decisions about additional systems to conduct mechanical sweeping, hunt for buried mines, or perform reconnaissance of mines in very shallow water. In addition, the Navy is only developing the capability to counter light and medium obstacles and has not decided what it will do to counter heavy obstacles.

The mine warfare program is experiencing budget constraints, and the Navy has not fully funded its shallow water mine countermeasures projects, even though it identified this area as a priority. The Navy plans to spend about $317 million between fiscal years 1991 and 2001 in the development of its shallow water projects. However, budget documents, as of February 1995, show that unmet requirements for fiscal years 1997 through 2001 will total about $99.5 million. This figure may be understated because the Navy still has to make final decisions on some projects. Appendix I shows the Navy's shallow water mine countermeasures projects and the shortfalls associated with each project.

[2]Obstacles include barriers such as telephone poles, concrete blocks, steel objects, and barbed wire fences. They are classified as light, medium, or heavy. Enemy forces can place obstacles on the beach and in the surf zone.

[3]At the end of fiscal year 1995, the Navy canceled its participation in the development of a seventh system, the Semi-Autonomous Acoustic/Magnetic Vehicle, which is a remote-controlled, high-speed influence sweep.

In addition to funding shortfalls, some of these projects are experiencing technical and developmental delays. The Navy's Distributed Explosive Technology (DET) and Shallow Water Assault Breaching System (SABRE) programs are examples of two of these projects.[4] Initially, the Navy planned to destroy enemy mines in the surf zone by deploying these systems from the beach into the water. The Navy has since changed its strategy and is now planning to deploy these systems from the water onto the beach off of Landing Craft Air-Cushion vehicles. This change in strategy has resulted in an initial operating capability delay of about 2 years. Due to this decision, the Navy had to redesign the rocket propulsion mechanisms to deliver these systems to the targeted area and conduct additional testing to examine the impact of launching DET and SABRE from an unstable platform.

In another example, the Navy does not anticipate making final decisions about its Explosive Neutralization Advanced Technology Demonstration program until fiscal year 1998. This program is intended to enhance the capability of the DET and SABRE programs and increase the safety of Navy personnel either by using an unmanned glider to deploy the systems or enhancing the capability of Landing Craft Air-Cushion vehicles to deploy DET and SABRE from a greater distance.

Agency Comments and Our Evaluation

DOD agreed that critical limitations in the Navy's ability to conduct mine countermeasures that were identified during Operation Desert Storm still exist today. DOD also agreed with our emphasis on the complexity of mine countermeasures and the fact that no one system can handle the mine countermeasures requirement for all types of mines at all water depths.

[4]DET is a distributed explosive net delivered by rocket motors. SABRE is an explosive line charge used with DET to clear mines in the surf zone.

Reliability and Supportability Problems Affect Mission Capability of Mine Warfare Ships

Reliability problems and parts shortages continue to affect the readiness and performance capabilities of the Navy's MCM ships. The Navy has been working to overcome shortcomings associated with the engines, sonars, generators, winches, and other critical systems and has made progress in resolving some of the more serious problems. However, a number of the ships' systems and equipment are still not as reliable as predicted, and parts shortages persist. Mine warfare officials indicated that it would be several more years before all the necessary improvements could be made to the MCM ships because of the additional costs to fix the problems and changes in the ships' schedules. The MHC ships, some of which are currently being delivered to the Navy's fleet, are also experiencing similar reliability and supportability problems.

MCM Ships Are Not Fully Capable of Performing Mine Countermeasures Mission

The Mine Warfare Commander is committed to having eight MCM ships capable of deploying immediately to carry out mine countermeasures missions in two major regional conflicts occurring nearly simultaneously. The Navy uses detailed criteria to objectively determine whether each ship is fully capable of performing the wartime mission for which it is designed.

As of July 1995, no MCM ship was rated fully capable of performing its mine countermeasures mission. Instead, Navy status reports show that MCM ships generally possess the resources and have accomplished the training necessary to undertake major portions of wartime mine countermeasures missions. The Mine Warfare Commander stated that each MCM ship did not have to be fully capable of performing all missions. He said that commanding officers provide a subjective assessment of their ships' ability to perform their wartime missions and that the effectiveness rating goal was 80 percent.

The Commander further commented that some ships' mission effectiveness ratings could be increased quickly by cannibalizing missing parts from other ships. He also said that some ships that were missing certain systems or equipment could be used for portions of missions that did not require those systems or equipment that were inoperable.

The Commander acknowledged that achieving acceptable mission effectiveness rates for the MCM ships has been difficult because the ships' systems and equipment have broken down more often than expected and the Navy emphasized production schedules and program costs when building the ships and failed to order sufficient quantities of spare parts to support the ships after they became operational. He agreed that the MCM

ships have had serious problems and that they were continuing to have problems, but he emphasized that progress was being made and that problems were being fixed. However, reliability problems continue to cause some MCM systems to experience more downtime than the Navy average, result in high-priority requisitions for mission-essential parts, and affect crew training.

Systems and Equipment on MCM Ships Continue to Have Above-Average Downtime

Several of the systems on the MCM ships have experienced periods of inoperability that exceed the Navy average of 15 days. These reliability shortfalls have affected the ships' engines, combat systems, and other critical systems and equipment for several years. The foreign-made engine, in particular, has had a history of problems involving the cylinder heads, bearings, crankshafts, and actuators. Whenever the failure of a ship's system or equipment affects the ship's primary mission and repair is not possible within 48 hours, a report is prepared and entered into a tracking system; downtime exceeding 30 days is categorized as being unresolved for an excessive period of time. Downtime can affect the Navy's ability to train its crews and meet readiness goals. Management reports, which track systems and equipment downtime, indicate that downtime for MCM ships continues to be significant.

MCM Ships' High-Priority Requisitions Show Need for Mission-Essential Parts

The Navy assigns a high-priority code to a ship's order for parts to repair mission-essential systems and equipment if the ship cannot perform some or all of its missions while waiting for the replacement parts. About 16 percent of all requisitions by Navy ships are considered high priority. Each of the MCM ships has experienced periods in which it could not perform some or all of its missions while waiting for replacement parts ordered with a high-priority designation.

From February 1994 to January 1995, the MCM fleet averaged 392 high-priority requisitions per month, or 28 per month for each ship. In some months, over 600 high-priority requisitions for mission-essential parts were processed. Table 3.1 shows the number of total and high-priority requisitions processed from February 1994 to January 1995.

Table 3.1: Number of Total and High-Priority Requisitions for MCM Ships, February 1994 Through January 1995

Month and year	Total requisitions	High-priority requisitions	Percent of total requisitions	High-priority requisitions per ship
February 1994	2,053	154	8	11
March 1994	1,736	220	13	16
April 1994	4,720	678	14	48
May 1994	2,203	617	28	44
June 1994	1,671	495	30	35
July 1994	3,847	623	16	45
August 1994	1,574	208	13	15
September 1994	1,691	247	15	18
October 1994	2,052	212	10	15
November 1994	2,435	418	17	30
December 1994	2,380	227	10	16
January 1995	3,279	610	19	44
Total	**29,641**	**4,709**	**16**	**337**

The Mine Warfare Commander agreed that spare parts shortages, particularly shortages of those high-priority parts that affect mission capability, have been a concern since delivery of the first MCM ship and that the shortages have been made worse because systems and equipment have not been as reliable as predicted. The Navy has been taking extraordinary efforts to correct its MCM supply support deficiencies. Over the past year, the overall percentage of high-priority requisitions for MCM ships had been reduced to the same percentage as the rest of the Navy (16 percent).

MCM Ships' Crews Are Not Fully Trained

The Mine Warfare Commander acknowledged that reliability shortfalls and inadequate supply support have had negative effects on crew training. He said, however, that crew rotation schedules were the primary cause of some ships not having fully trained crews and that training was sufficient to meet planned wartime commitments.

At times, failures in critical systems and equipment have prevented ships from participating in planned training. For example, in September 1994, we monitored an exercise in the Gulf of Mexico (JTFX-95) from the U.S.S. Defender and the command center at Corpus Christi. We observed that the U.S.S. Dexterous and the U.S.S. Champion had engine problems and were unable to participate in the exercise and that the U.S.S. Warrior could only perform some missions after a lightning strike knocked out its sonar. The

U.S.S. Defender was the only ship to participate fully and received a satisfactory evaluation for its performance in locating training mines placed in the Gulf of Mexico. The Mine Warfare Commander said that the performance of MCM ships in a May 1995 training exercise off the coast of Denmark (Blue Harrier 95) indicated significant improvement in the reliability of the ships. Although the postexercise evaluation was still underway, the Commander said the MCM ships' reliability and performance were outstanding.

Problems Persist With Reliability and Supportability of MCM Ships

The Navy has identified causes of reliability and supportability problems, initiated corrective actions, and resolved some of the problems. Navy officials commented that the MCM ships are operating longer periods of time without mission-degrading failures of the systems and equipment. However, documents show that the Navy is still in the process of identifying and quantifying the corrective actions needed and that technological challenges and funding shortages will make it difficult to address all of the necessary improvements.

The Mine Warfare Command has been concerned about the reliability shortfalls of its ships' engines, sonars, generators, winches, and other critical systems and equipment for several years. In early 1994, the Command established a priority list of key systems and equipment with problems and gave special attention to implementing long-term solutions. The list included 17 problems affecting the entire class of MCM ships. The Command has had some success with its efforts. For example, improved engine governor drives were expected to be installed on all MCM ships during fiscal year 1995, and improved water piping systems will be installed as each ship undergoes periodic maintenance.

After delivery of the last MCM in November 1994, the Navy began giving priority attention to the reliability and supportability problems affecting MCM ships by establishing an admirals' oversight council. The council is giving the highest priority to identifying and executing solutions to reliability shortfalls and ensuring that corrective actions are being identified and coordinated among responsible officials. Mine Warfare Command officials cited engine problems, inoperative combat systems, and inadequate supplies of parts among the key areas that need immediate attention.

Engine Problems

The main propulsion plant on MCM ships, which consists of four turbo-charged, 600-horsepower diesel engines, has been prone to catastrophic failures and poor reliability. The problems were so bad that during 1994 the Navy considered buying replacement engines. However, the Navy determined that this approach was not cost-effective and decided to fix the engine problems. Navy documents indicate that several factors have contributed to the engine problems, including an undersized water jacket cooler that causes the engine to overheat; fuel, oil, and exhaust leaks; and a poorly designed drive train. In addition, Navy officials said the fuel injection pump, thermocouple system, and cylinders were failing at high rates and needed immediate attention.

The Navy resolved the problem in part by changing the operating profile of the engines to a cruising speed of 8 knots and replacing engine governor drives with improved drives. As of July 1995, the Navy had redesigned all drive train components and developed improved return lines, gaskets, clamps, and injection pump valves. The Navy plans to install improved versions on all ships by December 1995. The Navy is also developing a larger water jacket cooler. Although no formal replacement schedule has been developed, the Mine Warfare Commander estimates that this problem will be corrected by 1997.

These actions, although helpful, have not solved all of the engine's problems. The Navy is still determining how much funding will be needed to make the required modifications. The Navy will then have to seek this funding through future budget requests. For the long term, the admirals' oversight council directed the Deputy Program Manager for Mine Warfare Ship Programs to explore the feasibility of purchasing replacement engines when the current engines are beyond economical repair and address the problem of obtaining funding for the replacement engines.

Combat Systems

Mine Warfare Command officials identified problems with certain key mine countermeasures combat systems that need priority attention to determine their causes and funding for proposed solutions. Among these problems, the officials noted that the Navy has not allocated funds to upgrade the navigation system on its MCM ships. It is very important that the ships know precisely where they are so they can communicate to other ships in the area the exact location of any mines that are found. The Navy has an upgraded version of its AN/SSN-2(V)4 precise integrated navigation system. According to the Mine Warfare Commander, funding will be made

available, and the Navy plans to have the system on all MCM ships by December 1997.

Parts Shortages

Navy officials commented that the admirals' oversight council was giving priority attention to improving supply support for specific systems and equipment, and Navy documents show that progress is being made. For example, the officials said that parts for the foreign-made engine would soon be bought exclusively from U.S. manufacturers. Nevertheless, parts shortages are expected to persist for some time in part because the ships have multiple configurations of systems and equipment. For example, the AN/SQQ-32 sonar suite has two variants that operate essentially the same but are two very different systems for maintenance and parts support. Navy officials said they were trying to determine if funding could be made available to standardize combat system configurations and address other key problems.

A Mine Warfare Command supply officer identified the most troublesome spare parts shortages that were continuing to affect operations. The officer provided a list of 15 out-of-stock parts that were causing operational problems and downtime for the engines, minesweeping gear, air conditioner, sonar system, sewage system, and main control console. Table 3.2 lists these parts.

Table 3.2: Most Troublesome Parts Shortages Affecting Mine Warfare Ships

Part	System
Turbocharger	Engine
Cooler core	Engine lube oil purifier
Belt	Engine fuel oil purifier
Upper cable section	Minesweeping gear
Middle cable section	Minesweeping gear
Acoustic power cable	Minesweeping gear
Cable assembly	Mine neutralization vehicle
6W5 cable	Mine neutralization vehicle
6W9 cable	Mine neutralization vehicle
Impeller	Air conditioner
Transformer	Air conditioner
Circuit card	SQQ-30 sonar system
Zinc anodes	SQQ-30 sonar system
Plasma display	Main control console
Macerator pump	Sewage system

Newer MHC Ships Are Experiencing Similar Reliability and Supportability Problems

It is too soon to fully assess the capability rates of the entire class of newer MHC ships because the Navy had received only three MHCs as of May 1995. Nevertheless, in early 1994, the Mine Warfare Command identified five problem areas affecting the entire class of MHC ships. The admirals' oversight council has also included the MHC in the scope of its work.

The MHCs contain many of the same systems found on the MCMs and therefore will require the same corrective action in certain cases. For example, early versions of the MHC will have to be backfitted with improved versions of the variable depth sonar and mine neutralization system. Later versions will have the improved versions installed during production. In other cases, problems may be even more acute on the MHC. For example, Navy documents indicate that communications problems on MHC ships are more serious than those on MCM ships. MHC ships, originally designed to hunt mines off the U.S. coast, are equipped only with high-frequency radios. Since the Navy has decided that MHC ships should now be deployable overseas, satellite communications will be essential. The Navy has funding available in fiscal years 1996 and 1997 to correct the deficiencies with off-the-shelf communications equipment. However, technicians are concerned that the MHC ships may not have room for antennas or additional radio equipment and are exploring the possibility of replacing the radios with small circuit cards to perform this function.

Agency Comments and Our Evaluation

DOD agreed with our finding that reliability and supportability problems have affected the mission capability of its mine warfare ships. According to DOD, the Navy has initiated various actions that have significantly improved systems reliability. DOD also commented that the Navy is incorporating improvements into the newer ships as they are built to improve their reliability and supportability and has adopted a revised maintenance philosophy that is enhancing operational availability.

The Navy Is Procuring More Ships Than Current Requirements Dictate

The Navy is continuing its MHC procurement program at a total cost of about $1.5 billion, even though the original mission of the MHCs has largely diminished with the dissolution of the former Soviet Union. Further, the Navy is continuing this procurement program at the same time that it has other unmet critical needs, including the need to develop its shallow water mine countermeasures programs. As of September 1995, 3 of 12 planned MHC ships had been delivered to the Navy. The remaining nine ships are currently under construction and are expected to be completed by fiscal year 1999. Moreover, the MHC ship, which the Navy is currently planning to operate as a naval reserve asset, has fewer capabilities than the larger MCM ships that already exist in the Navy's fleet.

In addition, the Navy has plans to acquire a new MCS ship early in the next century. In the interim, the Navy is spending more than $118 million to modify an existing amphibious warfare ship to provide mine warfare assets with command, control, and support. The conversion is expected to be completed about March 1996. Although it is essential to provide the necessary command, control, and support during military operations, it is not necessary to have a ship dedicated solely for this effort because other ships or shore-based facilities could provide the function.

The Navy's current estimate to operate and maintain each MHC is $3.6 million per year. Further, Navy officials estimate that it will cost the Navy $4.5 million annually to operate and maintain the MCS ship. The savings that would be achieved by removing some of these ships from the Navy's inventory could assist the Navy in achieving its other unmet critical mine countermeasures requirements.

MHC Role in Overseas Locations Is Limited

The MHC ship was initially intended to protect U.S. coastlines from Soviet mines and was not developed with an overseas mission in mind. By design, this ship class was not intended to transit across the ocean under its own power or operate on station for long periods of time, thereby reducing its ability to be a viable asset in overseas operations. In addition to its limited capabilities, the Navy is planning to make the MHC ship a reserve asset, which will further limit its role as an overseas asset.

MHC Ship Has Limited Warfare Capabilities

The MHC ship, which is smaller and has more limited capabilities than the Navy's larger MCM ships, was designed to protect U.S. coastlines. The MHC ships were not intended to transit the ocean under their own power and would have to be transported by heavy-lift ships to be used in overseas

contingencies. Currently, these ships can only operate at sea for a maximum of 5 days and depend on shore-based facilities for resupply. In addition, the MHC ships are limited in their missions. These ships were originally designed to conduct mine hunting operations only, although the Navy has plans to add a mechanical sweep, which will provide the MHC ships with the capability to physically remove moored mines.

Navy Plans for the MHC Ship Will Further Limit Its Use

Mine countermeasures assets have generally been assigned to the Naval Reserve Force. The Navy plans to continue this practice by placing 11 of the 12 MHC ships in the Naval Reserve Force, which will further limit their role in future overseas operations. Generally, about 15 to 20 percent of the crew, or 8 of 52 personnel assigned to the ship, will be reservists. For the ships to serve as platforms to provide training to reservists, the ships need to be located near the reserve population serving on those ships. Therefore, it would be impractical to position these ships in overseas locations.

Dedicated MCS Ship Is Not Essential

Mine countermeasures crises during the mid-1980s and early 1990s demonstrated the need to provide mine warfare assets with command, control, and support. The Navy's 1992 and 1994-95 mine warfare plans state that airborne and surface mine countermeasures assets require a dedicated ship for maintenance and logistics support during overseas deployments. The Navy believes that a platform is also necessary for the mine countermeasures group's commander and staff to enhance communication with the battle group and theater commanders. However, command, control, and support can be provided from other Navy ships or from shore-based locations.

Officials at the Mine Warfare Command informed us that the Navy plans to acquire one new MCS ship early in the next century. This plan, however, is tentative because no formal acquisition program is in place and no budget has been submitted for this effort. In addition, the Navy would have to shift the use of assets and rely on shore-based facilities or other naval platforms for command, control, and support during two nearly concurrent major regional conflicts because one MCS ship would not be able to support both simultaneously.

The Navy is in the process of modifying the U.S.S. Inchon, an existing amphibious warfare ship, as an interim measure to provide command, control, and support to air and surface mine countermeasures forces. The

Navy does not plan to have the U.S.S. Inchon and the new MCS ship in the fleet at the same time. The U.S.S. Inchon, which is already 25 years old, will only have an increased life span of about 10 years once it is converted. The Navy expects that the conversion will be completed about March 1996 at a cost of more than $118 million. As of August 1995, the Navy had already committed $99 million of the conversion dollars.

Cost Savings Can Be Achieved by Reducing Inventory of Ships

The Navy estimates that operating and maintaining each MHC ship will cost $3.6 million annually. This figure includes the cost for personnel, unit operations, fuel, direct maintenance, and other indirect costs. The Navy could achieve significant savings by removing some of the ships from its inventory and address its other critical needs by applying these savings to those programs. However, the Navy is not currently exploring other options for the MHC ships.

In May 1995, the DOD Inspector General reported[1] that the Navy could deactivate 5 of the 12 planned MHC ships and put to better use $69.2 million that would be required to operate and maintain the ships during fiscal years 1996 through 2001.[2] In addition, the Inspector General identified an additional $11 million, or $2.2 million per ship, that the Navy would unnecessarily spend to upgrade equipment on the five MHC ships between fiscal years 1996 and 2001. These upgrades include improving communications systems and installing reliability improvements on the propulsion systems.

The Navy could also declare the ships to be excess capacity and explore the possibility of transferring the excess MHC ships to allied countries through the foreign military sales program. Although we did not assess the world market for mine countermeasures ships, we did note during the course of this evaluation that a number of countries around the world possess mine countermeasures fleets.

Navy officials further estimate that it will cost $4.5 million annually to operate and maintain the U.S.S. Inchon. As with the case of the MHC ships, savings could also be achieved if the Navy were to decide to remove this platform from its fleet. However, because the Navy would still have to provide command, control, and support services from other Navy ships or

[1]This report is classified.

[2]The $69.2 million is based on the Navy's estimate to operate and maintain five MHC ships per year less any costs to deactivate the ships.

shore locations and incur costs in doing so, it is more difficult to estimate the savings to be achieved.

Agency Comments and Our Evaluation

DOD partially agreed with our finding that the MHC's short on-station time and reserve status would limit its role in overseas locations. DOD responded that a contract modification was in place that would increase the at-sea operational time. However, DOD also responded that the bulk of the MHC class ships are going to ultimately be assigned to the reserve forces.

DOD did not agree with our finding that a dedicated MCS ship is not essential, stating that the Navy has long held the tenet that a ship that provides effective command and control needs to be deployed with the operating forces. We acknowledged in this report that command, control, and support are essential during military operations. However, we also reported that these functions could be provided from other Navy ships or shore-based locations. Therefore, we do not believe the need for an MCS ship is as great as other more pressing needs, such as the need to develop the capability to conduct shallow water mine countermeasures.

DOD agreed with our finding that cost savings could be achieved by reducing the inventory of mine warfare ships, but did not agree that reducing the inventory of ships is a viable option. As discussed above, we and others believe that reducing the inventory of ships is a viable option.

DOD noted that the actual annual savings associated with not operating additional MHC ships, projected at $3.6 million each, would not be completely realized due to decommissioning and deactivation costs. As previously noted, the DOD Inspector General included deactivation costs in estimated cost savings and projected a 5-year, $69.2 million cost savings after deducting deactivation costs.

Conclusions and Recommendations

The experience of Operation Desert Storm revealed significant weaknesses in the Navy's ability to conduct effective sea mine countermeasures, and the damage sustained by two Navy warships during that operation clearly demonstrated the impact that enemy sea mines and obstacles can play in military operations. The Navy has since undertaken a number of projects to improve its mine countermeasures capabilities. However, critical limitations and delays in the delivery of new capabilities remain.

The Navy is pursuing a number of different projects to enhance current capabilities and develop new ones; however, it has not undertaken a total systems approach to identify a baseline of capabilities, develop alternatives, and establish priorities among those alternatives. Many of these projects have historically experienced starts and stops and are continuing to experience delays in delivery. Although the Navy has identified the ability to conduct mine countermeasures in shallow water depths as a key priority, it still has only very limited capabilities in this area. Many of the shallow water mine countermeasures projects are underfunded.

The Navy has finished procuring 14 MCM ships. However, the ships are experiencing significant reliability problems and parts shortages, which affect their readiness and performance capabilities. The Navy has been working to overcome these shortcomings and has made progress in resolving some of the more serious problems. However, mine warfare officials have stated that it would be several more years before all the necessary improvements could be made due in part to limited available funding.

At the same time, the Navy is continuing to procure 12 MHC ships, despite the fact that the original mission of the MHC has greatly diminished. The Navy estimates that it will cost $3.6 million per year to operate and maintain each of these ships. The Navy is also converting an amphibious ship to serve as an MCS ship. It will cost the Navy approximately $4.5 million per year to operate and maintain this ship. One of the lessons learned from Operation Desert Storm highlighted the importance of providing mine countermeasures assets with the necessary support. However, the functions that this ship will provide could be provided from other ships or on-shore locations.

The Navy cannot afford to support all of its mine countermeasures projects within its mine warfare budget without continuing to experience

future delays in delivering new capabilities. However, opportunities exist to realign the Navy's mine warfare budget to direct funding toward its most critical needs. If the Navy were to deactivate five MHC ships, the Navy would save about $18 million annually. These savings, if applied to the Navy's shallow water program, would greatly reduce the $99.5 million in budget shortfalls that the Navy has identified in that program. If the Navy were to deactivate the MCS ship as well, the Navy could achieve additional savings, although these savings are more difficult to estimate.

Recommendations

To improve the Navy's readiness to conduct mine countermeasures, we recommend that the Secretary of the Navy develop a long-range plan to identify the gaps and limitations in the Navy's mine countermeasures capabilities; establish priorities among the competing projects and programs, including those in research and development; and sustain the development and procurement of the most critical systems. The Secretary of the Navy should direct particular attention to those systems required to improve the Navy's shallow water mine countermeasures capabilities.

We also recommend that the Secretary of the Navy improve the readiness of ocean-going mine countermeasures ships. If the Navy finds that the funds necessary to sustain critical research and development and improve the readiness of ocean-going mine countermeasures ships are not available, the Navy should consider using funds that otherwise would be used to operate and maintain some of the MHC ships.

Agency Comments and Our Evaluation

DOD agreed with our recommendations that the Secretary of the Navy develop a long-range plan to sustain the development and procurement of the most critically needed mine warfare systems and improve the readiness of the ocean-going MCM ships. However, DOD did not agree that the last five MHC ships should not be operated and added that the possibility of using cost savings from deactivating these ships to support other aspects of the Navy's mine warfare program is not an option.

We question the need to operate additional MHC ships given the funding shortage in the mine warfare budget, which is causing projects addressing unmet mine countermeasures needs to go unfunded. Since critical areas in Navy mine countermeasures capabilities remain unmet, we believe these areas should have higher priority than operating additional MHC ships.

Navy Projected Shortfalls in Shallow Water Mine Countermeasures Projects

Dollars in millions

Project name and description	Research and development funding profile, fiscal years 1991-2001	Navy projected shortfalls, fiscal years 1997-2001
Obstacle Breaching—systems intended to counter light to heavy obstacles in the surf zone and on the beach.	$19.6	0
Breach Lane Navigation—a sector light placed on the beach to guide assault crafts through cleared lanes.	3.7	0
Semi-Autonomous Acoustic/Magnetic Vehicle—a remote-controlled, high-speed, influence sweep.	8.1[a]	0
Shallow Water Assault Breaching System (SABRE)—an explosive line charge to clear mines in the surf zone.	33.5	10.5
Distributed Explosive Technology (DET)—a distributed explosive net delivered by rocket motors and used with the SABRE.	51.2	18.9
Explosive Neutralization Advanced Technology Demonstration (ENATD)—a system to provide greater standoff distance and improve accuracy of deployment of the DET/SABRE.	109.7[b]	52.6
Advanced Lightweight Influence Sweep (ALISS)—a towed influence sweep for very shallow water.	89.0[c]	17.5

[a]This project was canceled at the end of fiscal year 1995. The Navy believes this system duplicates the Landing Craft Air-Cushion vehicle and is testing the feasibility of using that system to conduct sweeping operations.

[b]The Office of Naval Research will provide the funding for this program for fiscal year 1993 through mid-fiscal year 1998. Funding provided by this office represents $74.6 million of the total. Due to budgetary cuts, this program will be delayed about 6 months in transitioning into the research and development acquisition phase. The Navy's Mine Warfare Program Office will assume responsibility for the continuation of research and development in mid-fiscal year 1998.

[c]The Office of Naval Research will provide the funding for this program for fiscal years 1993 through 1997. Funding provided by this office represents $50.3 million of the total. Budgetary cuts have resulted in some refocusing of program development. The Navy's Mine Warfare Program Office will assume responsibility for the continuation of research and development to acquisition beginning in fiscal year 1998.

Comments From the Department of Defense

OFFICE OF THE UNDER SECRETARY OF DEFENSE

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ACQUISITION AND TECHNOLOGY

01 FEB 1996

Mr. Mark E. Gebicke
Director, Military Operations and
Capabilities Issues
National Security and International
Affairs Division
U.S. General Accounting Office
Washington, D. C. 20548

Dear Mr. Gebicke:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report, *"NAVY MINE WARFARE: Budget Realignment Can Help Improve Countermine Capabilities,"* (GAO Code 703124/OSD Case 1007-AX), dated December 21, 1995. The DoD partially concurs with the report.

The DoD acknowledges that delays in research and development projects have impacted the Navy's ability to conduct mine countermeasures. The cited delays are a result of competition with other warfare areas for resources and of changes in concept of operations to be consistent with in-stride neutralization of mines during an amphibious assault. Competition for limited resources among warfare areas is likely to continue and will require periodic program adjustments. To help deal with those changes, the Navy recently developed a proposed mine warfare concept of operations (not available at the time of the GAO study) and is developing a mine warfare architecture that will enable individual program priorities to be established for use in future program resource planning.

The DoD concurs that reliability and support problems have affected the mission capability of mine warfare ships. However, the Navy has initiated various actions which have significantly improved systems reliability. In addition, improvements are being incorporated into newer ships as they are built to improve their reliability and supportability, and a revised maintenance philosophy is also enhancing operational availability.

The DoD partially concurs that the coastal minehunter (MHC-51 class) ships' role in overseas locations is limited. The primary role of the MHC ships is mine hunting and neutralization. They do not have the sweep capability that can be provided by the ocean-going mine countermeasures (MCM-1 class) ships or by airborne mine countermeasures. At-sea operational time between replenishment--although limited--will be more than doubled by a modification that is currently being installed.

The DoD nonconcurs with the GAO assertion that the Mine Countermeasures Command, Control, and Support ship (MCS) is not essential. The need for the MCS ship was demonstrated during the Gulf War. The ship will serve as a command and control ship and as a big deck to support airborne mine countermeasures operations. It will also support deployed MCM and MHC ships, and Explosive Ordnance Disposal detachments.

The DoD concurs with the GAO recommendation that a long range plan be developed to identify gaps and limitations in the Navy's mine countermeasures capabilities, establish priorities, and fund the most critical programs. This process is ongoing and consists of the development of an overall concept of operations for mine countermeasures and the development of an architecture within which needs and shortfalls in capability can be evaluated and prioritized. Critical programs will be identified and funded within the constraints of the overall DoD budget.

The DoD also concurs with the GAO recommendation that readiness of the mine countermeasure ships be improved. As previously indicated, steps are being taken to improve both readiness and supportability.

Although the DoD acknowledges that cost savings could be achieved if the planned inventory of MHC ships were reduced, the DoD does not agree that such a reduction is a viable option. The last 5 MHC ships will provide several important operational advantages that warrant their continued operation.

In summary, the Navy is in the process of evaluating mine countermeasures needs and priorities using a systems approach. Through that evaluation, the Navy will identify and fund the most critical systems. The Navy will continue to improve readiness of its dedicated mine countermeasures ships.

Detailed DoD comments on the GAO report findings and recommendations are provided in the enclosure. The DoD appreciates the opportunity to comment on the GAO draft report.

for George R. Schneiter
Director
Strategic and Tactical Systems

Enclosure

**GAO DRAFT REPORT--DATED DECEMBER 21, 1995
(GAO CODE 703124) OSD CASE 1007-AX**

"NAVY MINE WARFARE: BUDGET REALIGNMENT CAN HELP IMPROVE COUNTERMINE CAPABILITIES"

DEPARTMENT OF DEFENSE COMMENTS

* * * * *

FINDINGS

FINDING A: Delays in Research and Development Projects Jeopardize the Navy's Ability to Conduct Mine Countermeasures. The GAO determined that critical limitations in the Navy's ability to conduct mine countermeasures that were identified during Operation Desert Storm still exist today. The GAO explained that Operation Desert Storm demonstrated, and subsequent independent studies conducted have documented, that no single system can provide the Navy with the capability to conduct mine countermeasures at all water depths, due to the complexity of mine warfare operations and the various mines the Navy may encounter.

The GAO reported that as a result, the Navy has been developing numerous systems to address the varying water depths. The GAO concluded, however, that the Navy's current approach to developing mine warfare research and development projects has been inefficient. The GAO explained that the Navy has pursued the projects independently of each other and, consequently, has had to make tradeoffs among them. The GAO further pointed out that the Navy has started and stopped some projects repeatedly over different fiscal years to respond to changing priorities, which has resulted in increased costs and schedule delays. The GAO discussed several examples.

The GAO reported that as a result of its experience during Operation Desert Storm, the Navy is developing six projects to counter mines and obstacles in shallow water. However, since Desert Storm, the Navy has not added any of these systems to the fleet. The GAO found that the Navy has not made final decisions about additional systems to conduct mechanical sweeping, hunt for buried mines, or perform reconnaisance of mines in very shallow water. The GAO also pointed out that the mine warfare program is experiencing budget constraints and the Navy has not fully funded its

Enclosure
Page 1 of 11

Now pp. 3-4 and 22-25.

shallow water mine counter-measures projects, even though the area has been identified as a priority. The GAO noted that some of the projects are experiencing technical and developmental delays. (p. 5, pp. 24-30/GAO Draft Report)

DoD Response: Partially concur. The DoD agrees that critical limitations in the Navy's ability to conduct mine countermeasures that were identified during Operation Desert Storm still exist today. The DoD also agrees with the GAO emphasis on the complexity of mine countermeasures and the fact that no one system can handle the mine countermeasure requirement for all types of mines at all water depths.

The GAO concluded that the Navy's current approach to developing mine warfare research and development projects is "inefficient." The GAO descriptions of the particular programs selected to illustrate this finding, namely the AN/AQS-20 airborne mine hunting sonar and the airborne mine neutralization system (AMNSYS), are accurate. The DoD is completely aware that program adjustments are not necessarily beneficial to the specific program, but such adjustments are normally necessitated by larger funding and programmatic issues that override the requirements of certain individual projects. As long as mine warfare has to compete with other DoD warfare areas for resources, program adjustments are going to be regrettably necessitated in the future. A recently initiated overall mine warfare "systems" approach to program planning is currently being implemented through the development and promulgation of a mine warfare "concept of operations (CONOPS)," and through the development of an overall mine warfare "architecture" wherein the individual programs in mine warfare are placed in an overall structure, all contributing to the mine warfare CONOPS. Through this on-going mine warfare CONOPS and architecture systems assessment, the priorities of individual mine warfare programs are being determined and will be reflected in subsequent program resource planning.

The Navy continues to place the development of capabilities to neutralize mines and obstacles in the very shallow water and surf zone at a very high priority. Largely stimulated by the lessons learned from Desert Storm, most of the various shallow water mine countermeasures programs were initiated in the FY91-93 time frame.

In two cases cited by the GAO, program delays have been the result of a refined tactical concept. The Navy changed the concept of operations for the deployment of Distributed Explosive Technology (DET) and Shallow Water Assault

Enclosure
Page 2 of 11

Breaching System (SABRE) in order to improve the operational utility of the systems. The original system requirement stipulated deployment from the beach into the surf zone. The more operationally feasible, in-stride from the sea tactic, requires a more demanding launch mode (launch from a moving platform, e.g. Landing Craft--Air Cushion (LCAC)), rather than from a static shore location). However, the Navy accepted the increased cost in funding and time required to develop the in-stride launch mode, rather than pursue a technically easier, but tactically flawed approach (the original "breach back from the beach" launching approach). In addition, the GAO correctly identified FY98 as a decision point for the Explosive Neutralization Advanced Technology Demonstration. The issue is whether to pursue a pre-planned product improvement of DET and SABRE, versus an alternate delivery concept (such as airborne delivery of explosive mine neutralization systems). The decision is dependent upon completion of the existing advanced technology demonstration, which drives the FY98 time frame.

Referring to the shallow water mine countermeasures (MCM) program funding, the GAO stated that shallow water MCM is underfunded. During the Program Review 1997 (PR97) process (December 1994 through September 1995), shallow water MCM programs were reprioritized to support streamlined acquisition and to meet the Navy's requirement for breach "from the sea." The DET and SABRE research, development, test, and evaluation (RDT&E) emerged as the most critical programs. Consequently, DET and SABRE funding was enhanced during PR97 through realignment of mine warfare program funding, including cancellation of selected programs. Shallow water MCM remains among the Navy's highest priority for MCM modernization. If additional funding were available, the decremented programs would be restored.

FINDING B: Reliability and Support Problems Affect Mission Capability of Mine Warfare Ships. The GAO reported that the Navy now possesses 14 ocean-going mine countermeasures (MCM-1 class) ships and is experiencing significant logistics challenges to keep them operational. The Mine Warfare Command is committed to having eight MCM ships capable of deploying immediately to carry out mine countermeasures missions in two major regional conflicts occurring nearly simultaneously. The GAO noted that the Navy uses detailed criteria to objectively determine whether each ship is capable of performing the wartime mission for which it is designed. The GAO found that as of July 1995,

none of the MCM ships was rated fully capable of performing its mine countermeasures mission. The GAO pointed out that the Mine Warfare Commander acknowledged that reliability shortfalls and inadequate supply support have had negative effects on crew training. The ships have been unavailable at times for training because of failures of the engines, sonars, generators, winches, and other critical equipment and systems. The GAO noted that the foreign-made engine, in particular, has a history of problems. The shortages have adversely affected the overall mission capability of the ships and resulted in parts being diverted from the production line and removed from some ships for use in other ships. The GAO reported that systems and equipment failures have also prevented ships from participating in planned training.

The GAO reported that the Navy has identified causes of reliability and supportability problems, has initiated corrective actions, and has resolved some of the problems. The GAO found, however, that problems with MCM ships reliability and supportability persist, and discussed continuing problems with the engines, combat systems, communication systems, and inadequate parts supplies.

The GAO reported that the Navy established an admirals' oversight council in November 1994 to identify corrective actions to address these issues. However, officials believe it will be several years before all the improvements can be made, because the Navy will incur additional costs to address the corrective actions and because the ships' schedules will have to be accommodated.

Finally, the GAO reported that it is too soon to fully assess the capability rates of the entire class of new mine hunter, coastal (MHC) ships, because the Navy had received only three of the MHCs as of May 1995. The GAO pointed out, however, that in early 1994, the Mine Warfare Command identified five problem areas affecting the entire class of MHC ships. The MHCs contain many of the same systems found on the MCMs and, therefore, will require the same corrective action in certain cases. In addition, the GAO noted that the admirals' oversight council has also included the MHC in the scope of its work. (pp. 5-6, pp. 31-43/GAO Draft Report)

Now on pp. 4 and 26-32.

DoD Response: Concur. The Navy has initiated various actions which have significantly improved systems reliability. In addition, improvements are being incorporated into newer ships as they are built to improve

Enclosure
Page 4 of 11

their reliability and supportability, and a revised maintenance philosophy is also enhancing operational availability.

With respect to MCM ship reliability and supportability issues, implementation of necessary improvements is in process. Areas currently in execution include Isotta Fraschini (IF) engine reliability upgrades, communications upgrades, magnetic signature improvements and combat systems upgrades. In particular, the IF engine issue has been aggressively attacked. Examples of specific combat system concerns include the following:

(1) The gearsets on the OK-520/SQQ Winch are being replaced, with replacement for all 14 MCM ships scheduled for completion in FY96.

(2) Upgrade of the AN/SLQ-48(V) Mine Neutralization Vehicle (MNV) is in process. Additionally, a MNV rotatable pool was established in FY95 at the Shore Intermediate Maintenance Activity (SIMA), Ingleside, Texas, and a MNV repair capability is being established at the same location in FY96. Reliability improvements are being incorporated through a series of Engineering Change Proposals that are now being processed through the Configuration Control Board.

(3) Improvements to influence sweeping cables (both magnetic and acoustic) are being implemented through the establishment of a cable repair shop at the SIMA in Ingleside. In addition, the procurement of additional cables has been addressed (commencing FY97).

The Navy has implemented an aggressive program to identify and improve reliability of the MCM-1 combat system. However, actions to date, as indicated in the examples presented above, are rapidly reversing this situation. Since the First Quarter FY94, all MCM/MHC ships have shown an average increase of operating days between combat systems casualty reports (CASREPs).

With respect to MHC reliability and supportability problems, the lessons learned on the MCM-1 class ships are being applied to the MHC-51 class ships as they are being built. The GAO's conclusions relative to the MHC ships were based on the two earliest ships, MHC-51 and MHC-52, which have not yet received retrofits intended to improve reliability and supportability. The newer ships in the class are programmed to receive improvements such as the OK-520/SQQ gearset,

Enclosure
Page 5 of 11

upgraded Mine Neutralization Vehicles, and the AN/SQQ-32(V)2 sonar.

Changes to both MCM/MHC maintenance philosophy are driving better combat systems operational availability through the use of revised level of repair analysis; reprovisioning of spare parts to the lowest replaceable unit (circuit card replacement, rather than black box replacement); and the utilization of more realistic best replacement factors (component reliability predictions based on real world data) that drive more of the right spare parts on board.

With respect to MCM ship and MHC ship crew training, the following points are pertinent:

(1) More rigorous Combat System Ship Qualification Tests are being implemented.

(2) The Navy is introducing the AN/SQQ-94 Combat System Integrated Training Equipment onboard MCM and MHC ships and at the Fleet Mine Warfare Training Center (FMWTC). This new system is organic to the ship and will provide the crew the opportunity to train on combat systems without the ship actually being underway and operating in a mine field.

In general, all of the foregoing points illustrate that the MCM and MHC are new ships that are quickly maturing. The history of the MCM and MHC has been consistent with all new ship classes and these ship classes are experiencing similar growing pains. As the classes continue to mature, improvements in mission capability will continue.

The success of the above efforts is indicated by the fact that MCM-14 successfully completed a follow-on operational test and evaluation (FOT&E) in July 1995 and achieved outstanding results. In addition, four MCM's participated in Blue Harrier '95, a bi-annual North Atlantic Treaty Organization (NATO) exercise. The commander's post exercise report praised the MCM's capabilities and performance, specifically stating "I wouldn't trade one of our ships for five of any other nation."

FINDING C: The MHC Role in Overseas Locations Is Limited. The GAO reported that the MHC ship has limited warfare capabilities. The GAO explained that MHC is smaller than the larger MCM ships, having been designed to protect U.S. coastlines. Currently, the ships can only operate at sea

Now on pp. 4 and 33-34.

for a maximum of 5 days and depend on shore facilities for resupply. In addition, the ships are limited in their missions, having been originally designed to conduct mine hunting operations only, although the Navy has plans to add a mechanical sweep.

According to the GAO, the Navy plans for the MHC ship will further limit its use. The GAO explained that the Navy plans to continue the practice of assigning mine countermeasures to the Naval Reserve Force, with plans to place 11 of the 12 MHC ships in the Reserve. The GAO noted that generally 15 to 20 percent of the crew will be reservists. For the ships to serve as platforms to provide training, the ships will need to be located near the reserve population serving on the ships. The GAO concluded, therefore, it would be impractical to position the ships in overseas locations. (p. 7, pp. 45-46/GAO Draft Report)

DoD Response: Partially concur. The MHC ships are not dependent solely upon shore facilities for resupply; rather the MHC ships will be fully supportable at sea through underway replenishment. In addition, a contract modification is in place that will increase at-sea operational time. The MHC has the same mine hunting capability as its larger partner, the MCM-1 class ship. Both ships have the new AN/SQQ-32 mine hunting sonar and the AN/SLQ-48(V) Mine Neutralization Vehicle as the heart of their mine hunting capability.

The GAO finding also states that "the Navy plans to continue the practice of assigning mine countermeasures to the Naval Reserve Force..." While it is true that the bulk of the MHC class ships are going to ultimately be assigned to reserve forces, the overall responsibility and majority of the dedicated MCM forces reside in the Active Duty Fleet. The reserve MHC ships are but one of many contributors to Navy's total mine countermeasures resource.

FINDING D: Dedicated MCS Ship Is Not Essential. The GAO reported that mine countermeasures crises during the mid-1980s and early 1990s demonstrated the need to provide mine warfare assets with command, control, and support. According to the GAO, Navy mine warfare plans state that mine countermeasures assets require a dedicated ship for maintenance and logistics support during overseas deployments. The Navy also believes a platform is necessary for the mine countermeasures group's commander and staff to enhance communication with the battle group and theater

Enclosure
Page 7 of 11

Now on pp. 5 and 34-35.

commanders. The GAO observed, however, that command, control, and support can be provided from other Navy ships or from shore-based locations.

The Navy also plans to acquire a new command, control, and support ship early in the next century. In the interim, the GAO reported the Navy has allocated $118 million to convert the U.S.S. Inchon to a command ship, even though the ship is already 25 years old. The Navy began the conversion in March 1995, with completion expected by March 1996. As of August 1995, the Navy had already committed $99 million of the conversion funds. (p. 7, pp. 47-48/GAO Draft Report)

DoD Response: Nonconcur. Lessons learned from the Gulf War clearly show the need for a MCS. The Navy has long held the tenet that effective command and control of operating forces needs to be deployed with the forces they control. Operations EURO '93 and '95 both validated the command and control concept of the MCS. In addition to command and control functions, the MCS ship will (1) serve as a "big deck" to support in-theater airborne mine countermeasures (AMCM) operations, (2) serve as support for deployed MCM-1 and MHC-51 class mine countermeasures ships, (3) serve to support deployed Explosive Ordnance Disposal (EOD) detachments, (4) support any deployed special warfare forces, and (5) serve as the only AMCM training platform available on a consistent basis. The key operational role of the MCS ships is fully documented by studies of amphibious and mine warfare operations. The MCS will also significantly reduce the demand on an already severely taxed amphibious lift force.

FINDING E: Cost Savings Can Be Achieved By Reducing the Inventory of Ships. The GAO reported that the Navy estimates that operating and maintaining each MHC ship will cost $3.6 million annually. The GAO concluded that the Navy could achieve significant savings by removing the ships from its inventory and achieve other critical needs by applying the savings to those programs. The GAO found, however, that the Navy is not currently exploring other options for the MHC ships.

The GAO noted that Navy officials further estimate it will cost $4.5 million per year to operate and maintain the Inchon; therefore, savings could also be achieved if the Navy were to decide to remove that platform from its fleet. However, because the Navy would still have to provide command, control, and support from other sources, the GAO

Enclosure
Page 8 of 11

Now on pp. 4 and 35-36.

noted it is more difficult to estimate the savings to be achieved. (p. 7, pp. 48-49/GAO Draft Report)

DoD Response: Partially concur. The DoD acknowledges that cost savings could be achieved by reducing the planned inventory of MHC ships. It should also be noted that the actual annual savings associated with not operating MHC ships, projected at $3.6 million, would not be completely realized. For example, the costs of decommissioning and deactivating these units is considerable.

Inchon will be the command and control hub for the integrated MCM force. Inchon's contribution to the MCM force is significant in that it will provide a dedicated ship for training, maintenance support, command and control, and as an at-sea platform always available for MCM operations. Without Inchon, the MCM force requirements will put additional demand on an already taxed Amphibious lift force.

* * * * *

RECOMMENDATIONS

Now on pp. 5 and 38.

RECOMMENDATION 1: To improve the Navy's readiness to conduct mine countermeasures, the GAO recommended that the Secretary of the Navy develop a long-range plan which identifies the gaps and limitations in the Navy's mine countermeasures capabilities; establishes priorities among the competing projects and programs, including those in research and development; and sustains the development and procurement of the most critical systems. The GAO further recommended that the Secretary of the Navy direct particular attention to those systems required to improve the Navy's shallow water mine countermeasures capabilities. (p. 8/ p. 52/GAO Draft Report)

DoD Response: Concur. The DoD agrees with this recommendation and will endeavor to assure that it is fulfilled. The three components of the recommendation will be addressed individually.

First, regarding development of a long range plan, the Navy recently developed a proposed concept of operations (CONOPS) for mine countermeasures operations that consists of four basic pillars, namely:

Enclosure
Page 9 of 11

- Survey, Mapping, and Intelligence;
- Surveillance;
- Organic Mine Countermeasures; and
- Dedicated Mine Countermeasures.

Based upon this CONOPS (which was not available at the time of GAO study), the Navy is in the process of building an architecture to support the CONOPS. This architecture addresses the systems approach recommended by the GAO. The architecture will break down the four pillars of the CONOPS into top-level components or activities, which will in turn be further subdivided into specific operational tasks. The ability of the Naval forces (Navy and Marine Corps) to accomplish the various operational tasks associated with the mine countermeasures CONOPS will then be applied to the overall mine countermeasures architecture in the form of:

- In-service platforms, equipment or programs;
- Developmental platforms, equipment or programs;
- In-place applicable technology programs; and/or
- International contributions of systems or technologies.

It is expected that the architecture will be established in FY96.

This on-going systems approach to mine countermeasures will result in the assurance of the proper orientation of all mine warfare components within the overall operational mine warfare CONOPS, and will also serve to identify those areas of the mine warfare architecture that are not being properly addressed, or worse, are not being addressed at all.

Second, regarding prioritization of the various mine warfare programs, the relative importance of the many mine warfare ongoing and planned efforts will necessarily evolve from the combination of a mine warfare CONOPS and mine warfare architecture, and will be documented in a campaign plan and promulgated by the Director for Expeditionary Warfare (N85) during FY96.

Finally, the fulfillment of the GAO recommendation regarding sustaining the development and procurement of the most critical systems is ongoing. Throughout the DoD, funding constraints are going to be a fact of life in the future. Mine warfare program requirements must be balanced among other warfare priorities within the Navy, and must ultimately be balanced within the entire, multi-service DoD budget.

Enclosure
Page 10 of 11

Now on pp. 5 and 38.

RECOMMENDATION 2: The GAO recommended that the Secretary of the Navy improve the readiness of the Navy's ocean-going mine countermeasures ships. The GAO further recommended that should the Navy find that the funds necessary to sustain critical research and development and improve the readiness of ocean-going mine countermeasures ships is not available, the Navy should consider using funds that otherwise would be used to operate and maintain some of the coastal mine hunting ships. (p. 8, p. 52/GAO Draft Report)

DoD Response: Partially concur. The DoD agrees with the GAO recommendation for improving the readiness of the Navy's ocean-going mine countermeasure ships. Specific steps in this regard are detailed in the DoD response to Finding B. An aggressive readiness improvement program is underway for both the MCM-1 and MHC-51 class ships.

Enclosure
Page 11 of 11

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