STATEMENT OF RADM MICHAEL G. MULLEN

DIRECTOR, SURFACE WARFARE DIVISION

BEFORE THE

SUBCOMMITTEE ON

SEAPOWER

OF THE

SENATE ARMED SERVICES COMMITTEE

ON

LITTORAL FORCE PROTECTION

AND

POWER PROJECTION IN THE 21ST CENTURY

24 MARCH 1999

Introduction

Chairwoman Snowe, Senator Kennedy, distinguished members of the Seapower Subcommittee, thank you for the opportunity to discuss the Surface Navy's role in providing littoral force protection and power projection in the 21st Century.

I have had the good fortune to be a Surface Warfare Officer for the past 30 years. During this time I have observed two constants: **the value of a strong Navy** in fulfilling the *National* Interest and **the value of people** in fulfilling the *Navy's* interest. I don't have to emphasize to anyone on this committee the value of a strong Navy. I very much appreciate the continued support from the committee in this regard. As to the value of our people, let me just say, none of the systems, programs, or strategies which I will discuss today, mean very much if we don't **continue to invest in our most important "system" – our people.**

Unfortunately, in the Surface Warfare Officer Community we are currently experiencing the lowest retention among the Navy's Unrestricted Line (URL) communities. Retention for junior officers has been in steady decline this decade from an historic average percentage of mid-30's, bottoming out in 1995 at 17% and slowly recovering to 24% in '98. Required retention of division officers to meet department head requirements for the next five years is from 34-38% depending on year group size. The greatest impact of this low retention is the overtouring of surface warfare officer line department heads aboard ships. Tour lengths of 36 months have grown to over 40 months. Without intervention, this trend will grow to 50 months for those reporting aboard today. Despite innovative Inter-Deployment-Training Cycle (IDTC) reductions, quality of life improvements, distribution and assignment policy changes and other retention initiatives, this trend is taking a *serious* toll in our SWO community and in our Navy.

Surface Warfare Officer Continuation Pay , commonly referred to as "the SWO bonus," is still the best immediate action we can take to retain the required number of junior officers to meet department head requirements. Without this bonus we can only make retention improvements on the margin. Continuation Pays have proven effective in other communities and the Bonus is projected to raise retention to 38%. The proposal, which would pay an officer up to $50,000 to serve through his or her department head tours, is targeted at those year groups approaching Minimum Service Requirement (MSR) and to meet DH requirements (275 per year). Start up costs are $18.75 million for FY 00, but the program will level out at $13.75 million by FY03. I ask for your strong support of this in the President's Budget.

The Role of Seapower

America has extensive interests around the world. Although any major military threat to the U.S. homeland must cross an ocean, today the threat is capable of crossing that ocean in a matter of minutes. Therefore, U.S. military power must be projected

overseas to be effective, and ***any*** **US military strategy must therefore be based on seapower. The U.S. Navy does this better than anyone in the world.**

Historically, the flexibility and versatility of sovereign U.S. Navy vessels have provided a wide range of options to the National Command Authorities. With control of the sea, U. S. forces can be deployed and sustained anywhere in the world. **Similarly, active forward presence** gives our forces the **credibility to prevent war and the flexibility to adapt to any situation**. The Navy's relevance will only increase in the 21st Century across the spectrum of conflict, from conduct in purely naval campaigns to full integration in joint operations. As the Chief of Naval Operations recently stated,

> "Forward Presence is what we do. That's us. That's our mission and we've got a very relevant mission for the 21st century."

From this forward deployed posture, in peacetime or during conflict, the Navy has been the first to be called to respond with credible combat power, to perform the missions of **deterrence, sea control and power projection**. In carrying out these enduring core missions, naval capabilities have always centered on mobility and maneuver warfare and have always been technology-intensive. The historic strengths of our combatants are underpinned by the following principles:

- The ability to use technology, precision, speed, and mobility rather than mass.
- The ability to strike from relative sanctuary off shore, beyond unfriendly influence, and out of enemy range.
- The ability to maintain stability and to deter or control local crises and conflicts to keep them small and far from U.S. shores.

Translating Vision to Reality

Describing a vision of the Navy's future is the easy part. Translating that vision into reality is somewhat more difficult. There are no simple and fast answers. The capabilities we develop and acquire must be appropriate for the world as we now know it and adaptable to the unpredictable changes that will occur in the future. Amidst all of the uncertainty and complexity surrounding what the future may hold, one pragmatic reality remains constant – the 21st century Surface Navy will be built piece by piece. Naval forces take time to build and last a long time. Tomorrow's fleet will only gradually take shape. **The surface combatants of today will be the core of the fleet for many years to come.** It is impossible to know all of the technologies that will emerge over the next 25 years, nor precisely how to adapt them to naval warfare – the world is simply changing too fast. Still, **one thing is certain: surface combatants are highly adaptable**. Not only can they be adapted to new technologies and capabilities, such as long range cruise missiles, but they can be used in ways in which their designers never imagined.

Building the Force

For the Surface Navy, the 1997 Quadrennial Defense Review established a level of 116 surface combatants as the *minimum essential* level. Determination of this number took into account many factors, fiscal constraints being a primary factor, and the resultant levels reflect, in the QDR's words, "*an acceptable level of risk*." **In the Surface Navy, we cannot accept any more risk**. **That is why we are pursuing "a *measured* revolution." One that takes into account fiscal realities, but remains focused on warfighting capability**. I use the term "*measured*" because it seeks an *evolution* of our current force, allowing us to leverage off the capabilities of what are already, without qualification, the world's most capable surface combatants – our Aegis cruisers and destroyers. Evolving these platforms to meet what we envision to be the requirements early in the 21st century maximizes their return to both the fleet and the American taxpayer. As new technologies mature, we can incorporate these into the designs of our future combatants and effect a true *revolution* in sea-based combat capability.

Today we are at a threshold. From 1988 to 1998 the DoN's total obligation authority decreased by 40% in constant 1998 dollars. Coincident with this decrease, we have experienced a marked increase in forward presence and contingency operations. In fact, owing to the unique capabilities naval forces bring to a turbulent post-Cold War world, the peacetime Navy has never been busier. As a consequence of the previous constrained fiscal environment along with a demanding operational tempo, we have not been able to maintain both readiness and still modernize/recapitalize the Fleet. Deployed readiness has, of necessity, been our priority. Non-deployed readiness and modernization/recapitalization for future readiness has consequently declined. We have "made do", but are at the point where we can no longer safely mortgage our future readiness by further deferring recapitalization and modernization.

In order to sustain required force levels beyond the FYDP, we must achieve a building rate roughly consistent with the level in the FY 2000-2005 SCN Plan shown below. Due to severely constrained finances for the past several years, we have not been able to recapitalize at a rate sufficient to maintain the required force levels for a 300 ship Navy over the long term -- and we have viewed this with increasing alarm.

The severity of the situation is apparent in the Chairman of the Joint Chiefs of Staff recent decision to change his overall risk assessment for a future two MTW scenario from moderate to high. As the CNO has testified, the Navy needs an increase of $6B/year across the FYDP above PRESBUD FY99 levels to restore non-deployed readiness and to recapitalize and modernization to meet future warfighting requirements. The higher level of funding requested in the President's FY 2000 budget, along with savings realized by efficiencies in the way the Department of the Navy operates, goes a long way to improve the situation, and will allow us to *begin* to increase our procurement rates across the FYDP. The chart below depicts the SCN Plan in the FY 2000 President's Budget, and

shows the increase in procurement over PB 1999. I was delighted to see the 8 additional ships in the President's budget. It is an important step in restoring the Navy's ability to recapitalize and modernize to meet future warfighting requirements. We look forward to working closely with Congress to address our needs so that the Navy continues to be ready and capable as we sail into the next millennium. What it does not do is make up for the 6 years of a building rate below 8 - 10 ships per year. If this current build rate is maintained over a 35 year period, the average service life of a navy ship, it will result in a fleet of about 274 ships.

SCN Plan

Quantity	FY00	FY01	FY02	FY03	FY04	FY05
CVN-77/CVX	AP	1	AP	AP	AP	AP
NSSN	AP	1	1	~~0~~ 1	1	1
DDG-51	3	3	3	3	0	0
DD-21	0	0	0	AP	1	~~2~~ 3
LPD-17	2	2	2	2	2	0
LHD	0	0	0	0	~~0~~ AP	~~0~~ 1
JCC	0	0	0	0	~~0~~ 1	~~0~~ 1
T-ADC(X)	~~0~~ 1	~~0~~ 1	~~1~~ 2	2	3	3
Total New Con	~~5~~ 6	~~7~~ 8	~~7~~ 8	~~7~~ 8	~~7~~ 8	~~6~~ 9
CVN RCOH	AP	1	AP	AP	AP	1
LCAC SLEP	2	1	2	3	3	4
LCU REPLACEMENT	0	0	0	0	~~0~~ 5	~~0~~ 5

1 NSSN, 1 DD-21, 1 LHD, 2 JCC, 3 T-ADC(X), 10 LCUs ADDED

In the near term, there are **three programs critical to the Surface Navy's continued ability to remain preeminent in controlling the battlespace and** projecting power ashore:

- **Adaptation of the DDG 51 Class to the Littoral**
- **Cruiser Conversion**
- **DD 21**

Adaptation of DDG 51 to the Littoral

Beginning with DDG 81, *USS Winston S. Churchill*, which christens next month in one of our great shipbuilding yards in Bath, Maine and which commissions in 2001, we will begin adapting the successful *Arleigh Burke* class destroyer to the littoral with the forward fit of the 5 inch /62 caliber gun and extended range guided munition (ERGM). Other class changes include the incorporation of an embarked helicopter (SH-60R), an organic minehunting capability and the introduction of an area-wide theater ballistic missile defense capability. The important lesson learned here is the wisdom of building a multi-mission surface combatant, that allows flexibility and adaptability to meet future

requirements. Additionally, the multiyear procurement strategy in buying these ships has proven to be an extremely wise fiscal decision.

Cruiser Conversion

In order to preserve the relevancy of our Aegis Cruiser force into the 21st century, we are pursuing a program known as "Cruiser Conversion." This conversion program will allow the combat system of these very capable ships to address the growing theater ballistic missile threat by incorporation of theater- and area-wide TBMD capability, as well as remaining full participants in the Land Attack mission with the introduction of a 5 inch / 62 caliber gun and extended range guided munition in 22 of these ships. They will continue to receive upgrades to their already robust command and control suites to ensure they remain full participants in the joint battlespace. Importantly, this conversion program extends these ships nominal service life from 35 years to 40 years.

DD 21

Our *revolutionary* platform, DD 21, will be a multi-mission combatant which will establish and maintain superiority over the surface, subsurface and local air battlespace. It will have a new, advanced gun system, capable of providing high volume precise naval fires, and a next-generation land attack missile, further extending the battlespace. DD 21, being designed from the keel up to operate in the complex waters of the littoral, will incorporate new stealth technologies to aid in survivability, will have a multi-function radar capable of exploiting that complex radar environment and possess a fully integrated undersea warfare suite to address the littoral's complex undersea warfare challenges.

Surface Navy Operations in the Littoral

As a recent Battlegroup Commander who operated in the Gulf last year as part of joint and coalition forces, I can attest to the fact that operating in the littoral, often in shallow waters in close proximity to merchant and civilian shipping, with sensors masked by land masses and urban environs, poses an enormously complex warfighting challenge. Taking from that experience, and now in my position as the Director of Surface Warfare for the Chief of Naval Operations, I am concerned with the threat that sea mines, submarines, anti-ship cruise missiles (ASCMs) and theater ballistic missiles (TBMs) pose to our forces. Furthermore, given the littoral's compressed battlespace and reduced engagement timelines, I am concerned over the greatly diminished response times required of ship's commanders, on the order of *seconds* rather than minutes.

The Surface Navy's three primary missions of Maritime Dominance, Theater Air Dominance and Land Attack are well-suited for providing protection to naval and joint forces in the littoral battlespace as well as fulfilling our role as the enabler for follow-on forces and projecting power ashore. Admiral Dennis Blair, Commander-in-Chief U.S. Pacific Command, summed up the Surface Navy's role well when he recently stated,

"The responsibility of the Navy, and of the Surface Navy in particular, is sea control, which is basically taken for granted by joint commanders… The joint warfare commander is not going to spend much time worrying about that."

Maritime Dominance

Maritime Dominance is the seagoing component of dominant maneuver. It is the ***precondition*** necessary for conducting land attack and theater air dominance operations, which are the essence of power projection. By dominance, I mean control over the breadth, depth and height of the maritime portion of the battlespace. This control requires the ability to defeat coastal defenses and dominate a foe in the littoral battlespace - at sea, on the ground and in the airspace - extending from a significant distance offshore to hundreds of miles inland. Unless command of the seas and airspace is *gained and maintained,* deployed and follow-on forces will be at risk.

Our "roadmap" to Battlespace Dominance involves a move away from *platform*-centric warfare toward *network*-centric warfare**.** Admittedly, while we still have much work to do in defining the scope and details of network-centric warfare. Network-Centric Warfare will allow our combatants to combine their strengths through real-time data links, such as the Cooperative Engagement Capability (CEC), and improve and maintain their required situational awareness of the battlespace. Network-centricity will also ensure our combatants are "plugged in" to the joint command and control network, ensuring their access to long-range sensor suites and other theater and national systems. **Bottom line: network centric warfare gives our surface combatants, operating indepependently or with a battlegroup, the ability to attack and defend throughout the battlespace, with the right weapon, at the right time, on the right target.**

Force Protection: Maritime

The key to improving tactical reaction time is efficient integration of sensors, weapon systems, and command and control elements into a coherent system. The goal is to speed up the process of threat detection, evaluation and weapons assignment through computer automation. Reducing this processing time buys back tactical *reaction* time. The Ship Self-Defense System (SSDS) will accomplish this function in support of maritime force protection in aircraft carriers and large-deck amphibious ships, similar to the process the Aegis Weapons System provides for combatants.

Consistent with our "measured revolution," we selected an *evolutionary* self-defense strategy, which will culminate in fielding integrated combat system (ICS) capabilities for each ship class. Tailored packages of high-technology improvements to combat systems will reduce manpower and maintenance requirements. This approach allows for gradual improvement of both survivability and fleet combat effectiveness within budget constraints, while simultaneously reducing current life-cycle costs. Based on an

open system architecture and modularity in design, the upgrade ability is maximized. This *Push In/Pull Out* (PIPO) approach will allow for rapid improvement of ship self-defense systems and support a flexible variety of sensor and weapon mixes. However, to maximize the overall capabilities of the force in countering a continuously evolving threat, the acquisition of new systems must keep pace with available funding and computer technology advances.

The roots of this evolutionary approach to ship self-defense can be found in the 1995 review of the Ship Self-Defense Capstone Warfighting Requirements by the then-Program Executive Office for Theater Air Defense (PEO TAD) and the Office of the Chief of Naval Operations (CNO). The review determined it was best to establish ship self-defense requirements on a ship class basis, by analyzing class missions and employment doctrine. This result allowed for the initial reduction in the variety of ship self-defense elements in the fleet, an important principle we are applying to all our combat systems development. The FY 00 President's budget mandated a comprehensive analysis of ship self-defense requirements against capabilities. The results of this analysis provided a blueprint for achieving the capstone requirements throughout the fleet. By eliminating redundant efforts and focusing procurement on select systems, such as the Rolling Airframe Missile (RAM) and the Evolved Sea Sparrow Missile (ESSM), the Navy can field integrated combat systems and fully meet ship self-defense capstone requirements.

The requirements of the fleet demand battle group integrity. Future ship self-defense systems will allow for full support of the layered-defense doctrine. The plan, supported by the FY00 President's budget, will complete installation of a recently developed weapons control system, the Ship Self-Defense System (SSDS) Mk 1, in ten LSD 41/49 dock landing ships, and will install SSDS Mk 2 in 12 CV/CVNs, and seven *Wasp*-class (LHD 1) amphibious assault ships by Fiscal Year 2006 (FY 06). The SSDS Mk 1 and Mk 2 weapons control systems provide integration of sensors and control of engagement systems. SSDS Mk 1 integrates the SPS-49A(V) MPU radar, Close-In Weapon System (CIWS), and SLQ-32 electronic warfare system to detect threats and the RAM Block 0 missile, CIWS and Nulka decoy to engage and defeat incoming ASCMs.

SSDS Mk 2 will integrate sensor inputs from the SPS-48E radar, the SPQ-9B radar, Cooperative Engagement Capability (CEC), and Advanced Combat Direction System (ACDS) for detection, while relying on the RAM Block 1, the Rearchitectured NATO Sea Sparrow Missile system (RNSSMS) with RIM-7P missile, and the SLQ-32 for engagement. Eventually, the RIM-7P will be replaced by the Evolved Sea Sparrow Missile (ESSM) and the ESSM launching system (ESML).

Several of the key elements of the maritime force protection program have made substantial progress recently in pursuing evolutionary enhancement. The SPQ-9B radar, which is currently completing its Engineering and Manufacturing Development (EMD) phase, will be optimized to meet the ASCM threat in the littoral environment. The upgrade improves the ships' Anti-Ship Missile Defense (ASMD) capability to detect and track sea-skimming, low radar cross-section, high-speed targets in heavy clutter environments, while

also providing a low-cost means of fire control for surface engagement. The SPQ-9B uses a high resolution, track-while-scan, X-band, pulse Doppler radar to provide real-time acquisition and automatic tracking of multiple targets. This efficient detection system is an essential element in winning back critical reaction time against the ASCM threat.

TISS and IRST

Ship self-defense systems will be reinforced with the introduction of other advanced detection systems, such as the Thermal Imaging Sensor System (TISS) and the Infrared Search and Track System (IRST). This new electro-optical technology provides advantages in tracking quality over previous systems. TISS will replace mast-mounted sight systems procured during the Gulf War. TISS is capable of performing visual local surveillance, identification and automatic tracking of targets. It provides ships with the ability to perform day/night high-resolution imaging for small radar cross-section targets such as mines, light aircraft and small surface craft. Twenty-four TISS units are being procured as a rotatable pool for installation on ships deploying to the Persian Gulf.

The IRST program is developing a passive, lightweight, infrared, horizon detection and tracking sensor specifically for use against sea-skimming ASCM attacks. IRST's infrared system provides ships a unique set of sensing capabilities, required to protect a maritime force in the littoral environment. It can perform 360-degree surveillance, detection and declaration with high bearing accuracy. The IRST also is immune to jamming while complementing radar systems should their performance be degraded.

The IRST program is taking a phased engineering approach and will produce an early engineering development model. The IRST scanner was installed on the Self-Defense Test Ship during the RAM operational evaluation (OPEVAL) during early FY 99. A fully integrated demonstration and evaluation also will be held at the Aegis Combat Systems Center on Wallops Island in FY 99.

AIEWS

The development of the AN/SLY-2 Advanced Integrated Electronic Warfare System (AIEWS) is a two-increment program representing the next generation in shipboard electronic warfare. Specifically designed to employ layered countermeasures in the littoral environment, the main function of AIEWS is linking all soft-kill systems into the ship’s air warfare defense systems. The first increment of AIEWS will include an advanced display, improved emitter processing, enhanced combat system integration, a new receiver capability, and improved emitter identification. Increment two will introduce advanced RF (radio frequency) and IR (infrared) attack subsystems and advanced off-board countermeasures. Moreover, the AIEWS program is committed to preserving an open system architecture, providing the flexibility for easy insertion of future high technologies.

Sea Sparrow

The Sea Sparrow Missile system, first introduced in 1970, has had several upgrades to its missile and the fire control system. However, the system reached the point where the computer processing systems were restraining possible improvements to performance. The Rearchitectured NATO Sea Sparrow Surface Missile System (RNSSMS) will replace the old processing and control elements with Higher Order Language--based commercial, off-the-shelf (COTS) processors and Navy standard consoles. Additionally, RNSSMS will bring major upgrades to the Mk 73 transmitter and Mk 17 Signal Data Processor.

In effect, the RNSSMS removes the major artificial boundaries between systems. By using a fiberoptic LAN structure with the standard UYQ-70 consoles, RNSSMS creates a "plug and play" environment for NATO Sea Sparrow launchers and radars. In the end, the RNSSMS will reduce control console and manning requirements and will cut life cycle maintenance costs, through highly reliable COTS technology. For example, in the case of the Signal Data Processor (SDP) replacement, the time between critical failures is estimated to improve from 5,000 to 25,000 hours. An initial production contract for RNSSMS has been awarded to support LHD 6, LHD 7, CVN 68 and CVN 76. Future replacement of the current RIM-7P missile with the Evolved Sea Sparrow Missile (ESSM) will provide a foundation for the next generation of self-defense systems.

ESSM is an extensive upgrade of the RIM-7P missile with a new rocket motor, new tail control and new warhead. The guidance section is all that remains from the original. ESSM's improved speed, range, and payload give it the capability to destroy next-generation ASCMs. It is designed to be fired from three existing launchers, the Mk 29 GMLS, the Mk 48 Guided Missile Vertical Launching System (GMVLS) and the Mk 41 VLS. ESSM is planned to be the ship self-defense engagement system in Flight IIA *Arleigh Burke* destroyers.

RAM

The Rolling Airframe Missile (RAM) Program Office also has begun the implementation of a Helo/Air/Surface (HAS) Mode Engineering Change Proposal to the RAM Block 1. The HAS mode upgrade will involve software changes that will allow RAM to acquire and track an expanded set of close-range, fixed wing aircraft, helicopters and small surface craft, while preserving its primary point defense mission. The United States and Germany - cooperative development and production partners on RAM - are near completion on a joint development program for an *infrared-all-the-way* guidance upgrade, which would provide RAM Block 1 the capability to engage RF-passive ASCMs. RAM will complete operational evaluation testing of the Block 1 upgrade aboard the Self-Defense Test Ship in the second quarter of FY 99.

CIWS

The Phalanx Close-In Weapon System (CIWS) is also upgrading to meet the rising threat from ASCMs. The Block 1B surface mode ordnance alteration for Phalanx includes the addition of a thermal imager, an automatic acquisition video tracker and a stabilization system for the tracker to provide threat detection both day and night. The thermal imager also improves the accuracy of Phalanx's angle tracking information to the firing computer, enhancing the system's ability to engage ASCMs. The Phalanx Block 1B uses the Navy's first *fused* radio frequency/electro-optical (RF/EO) sensor system to improve its AAW capability. The RF/EO system increases the number of hits, extends the initial hit range, eliminates radar glint, and eliminates the effects of multipath propagation.

Undersea Warfare

Undersea Warfare is a Navy core competency which no other Service can do, therefore operational primacy in this mission area is critical. As CNO stated in a message to the fleet last month, "Lest we forget, sea control is the unique contribution the Navy makes to our national miltary strategy…throughout modern history, submarines and mines have been used by less capable adversaries to delay and disrupt highly capable navies of the world. I remain convinced that ASW will be a more potent threat in the future."

In terms of Undersea Warfare (USW), *which includes Mine Warfare and Anti-Submarine Warfare*, we are pursuing an aggressive two-pronged strategy. First, we intend on taking full advantage of the vast technological advancements in computing power and networking targeted for the AN/SQQ-89(V) 15 plus Multi-Function Towed Array, Undersea Warfare Suite, which will better exploit the USW environment; employing multi-static and active acoustic processing techniques key to defeating the noisy and complex waters of the littoral. Second, we are planning on enhancing surface combatant organic minehunting capability within the Carrier Battle Group. This will allow us to achieve a balance between organic battle group capabilities and maintaining a dedicated fleet of mine hunting and mine sweeping vessels. Finally, improvements in ship torpedo defensive systems, continued support of an embarked SH-60 helicopter program, and building better lightweight ASW torpedoes, such as the Mark 54 Lightweight Hybrid Torpedo, will result in increased ASW effectiveness. Surface combatant USW requires a highly trained force capable of operating sonar, fire control, data link, processing, display and weapons systems. These systems, originally designed to counter the Cold War threat, are being upgraded to perform effectively in environmentally different littoral regions against quiet, diesel-electric submarines. While providing reliable detection of blue-water targets at maximum theoretical ranges, the USW combat system must be able to detect shallow water targets regardless of speed or aspect.

Tactically, ships assigned a USW role will be required to act not only as elements of carrier battle groups or amphibious ready groups, but also independently in controlling the undersea battlespace. Active ASW prosecution will result in detecting, localizing and destroying the littoral USW threat. Through effective employment of cross-layer active sonar, both on and off-board, ships will be able to *see* both above and below the acoustic ocean layer.

Surface Ship ASW

As an integral part of the Surface Warfare vision, USW capability is centered on upgrading the AN/SQQ-89(V) suite to meet the near term and future undersea challenges. Our USW suite is constructed to counter the evolving, quiet threat by upgrading existing capabilities (e.g. shallow water active prosecution) and adding new, robust capabilities, such as torpedo recognition and alertment, cross-layer active detection and netted sensors. In addition, the future AN/SQQ-89(V) will use an open system architecture (network) and commercial-off-the-shelf (COTS) functional enhancements to reduce procurement and development costs and simplify future capability upgrades.

Planned upgrades are being developed to provide ships with the ability to reliably detect submarines, ensure surface combatants tactical advantage, maintain wide area coverage in coordination with the SH-60B/R. When we prosecute detections with an effective offensive lightweight USW weapon (lightweight hybrid torpedo) and delivery platform (SH-60R and vertical launch antisubmarine rocket) the surface combatant dominates and expands the littoral battlespace where follow on forces must sail to deliver men and equipment to the battle ashore.

The AN/SQQ-89(V) configurations are progressing toward COTS and are targeted for forward-fit into new ***Arleigh Burke***-class destroyers. System functions transitioned first will include displays, display processing, performance prediction, acoustic multiprocessing and passive sonar signal processing. The AN/SQQ-89(V)15 system design will complete the transition to COTS and open architecture software; utilizing COTS-based technology for active sonar signal processing, onboard training and integrated system fire control.

Further exploitation of multi-statics (active source and receiver located on separate platforms) will be possible with advancements in C4I, including the display, communication and automation functionality resident in the Computer Aided Dead Reckoning Trace and COTS processing upgrades. Critical to multi-static ASW is the Multi-Function Towed Array (MFTA), developed in concert with the Submarine and IUSS communities, it will provide war fighters with a significant below layer capability. Today our ASW capable surface combatants transmit from a hull array and receive on that same array. This important below-layer, active capability will allow war fighters to employ hull sonar-to-MFTA and hull sonar-to-ALFS (Airborne Low-Frequency dipping Sonar) as well as impulsive, echo-ranging multi-statics; providing full, active water column coverage.

USW System of the Future

Integrated Undersea Warfare for the 21st Century (IUSW 21) is Surface Warfare's commitment to provide long term revolutionary USW systems. Program Executive Office for Undersea Warfare (PEO (USW)) and the PEO DD21 together with the Naval

Undersea Warfare Center have developed an Advanced Demonstration Model (ADM) program that incorporates science and technology innovations to meet Navy's future USW threat. The three aspects of the IUSW-21 program are:

- Multi-function Hull array – providing In-stride mine avoidance and shallow water ASW capability with reduced profile and advanced transduction technology.

- Integrated Stern – providing stealth handling of Broad band Variable Depth Sonar, advanced bi-static towed array (MFTA), and towed torpedo countermeasures.

- Advanced Processing and display – supporting initiatives for sensor automation and manning reduction.

Surface Ship Lightweight Torpedoes

Since the introduction of the first lightweight torpedo, the U.S. Navy has continued to develop and improve its arsenal of capable Anti-Submarine Warfare (ASW) weapons. In response to the littoral USW challenges, the Navy's 21st century lightweight torpedoes, including the MK46 Mod 5A(SW), MK50 Block Upgrade I and the MK54, will equip our Sailors with the World's finest ASW weapons to counter current and future threats.

The MK46 Torpedo has been the workhorse of the U.S. Navy's lightweight ASW torpedo program since 1965. It is currently employed by all U.S. Navy surface and air ASW platforms as well as in the inventory of 25 foreign navies. Initially designed during the 1960s to attack high performance submarines, the MK46 has undergone extensive modifications over the past three decades. Today's MK46 Mod 5 torpedo is the benefactor of significant improvements in detection, counter-countermeasure and shallow water performance from earlier variants, but it is not adequate. In the late 1980s a major system upgrade was developed to improve MK46 Mod 5 performance in shallow water. The resultant MK46 Mod 5A(S) Torpedo is now the primary ASW weapon for surface ships and ASW fixed wing and rotary wing aircraft.

To further enhance shallow water performance and extend the service life into the 21st century, the MK46 Mod 5A(SW) (Service Life Extension Program (SLEP)) Torpedo was developed in the early 1990s and introduced to the fleet in September 1996. The MK46 Mod 5A(SW) SLEP further improved counter-countermeasure resistance, enhanced target acquisition, and incorporated a bottom avoidance feature to enhance operation in shallow water. The SLEP program is scheduled for completion in FY99.

The MK50 is the U.S. Navy's most advanced lethal lightweight ASW weapon. Introduced to the fleet in October 1992, after 16 years of development to an inventory of approximately 1000, the MK50 torpedo was designed to counter the fast, deep diving, double-hulled Soviet submarine threat of the Cold War period. The MK50 contains an advanced Stored Chemical Energy Propulsion System (SCEPS) capable of increased

speed, range, and depths. In addition, the MK50 torpedo has greatly enhanced processing, detection and counter-countermeasures capability relative to the MK46 family of torpedoes. With the shift in emphasis to the littoral, the Navy initiated a software block upgrade program in the early 1990's to improve MK50 performance in shallow water against diesel-electric threats. In 1996 the MK50 Block Upgrade I was introduced to the fleet and is the shallow water "weapon of choice" for the U. S. Navy.

As the shallow waters of the littoral environment became better understood it was clear that ASW acoustic torpedoes would require more robust detection and signal processing capabilities to further enhance performance in littoral environments. With defense-wide fiscal constraints prevailing, a new "bottom's up" development program was not feasible. The determination was made that technologies and performance features already incorporated into the MK 50 Lightweight Torpedo and the MK 48 (ADCAP) Heavyweight Torpedo, if effectively adapted to inventory units of the MK 46, would provide a cost-effective alternative to counter today's threat. In 1995 the MK54 Lightweight Hybrid Torpedo program was initiated to provide a cost-effective shallow water performance upgrade to the lightweight torpedo inventory of MK46 and MK50 torpedoes.

The MK54 torpedo integrates the proven technologies of existing torpedoes, including the MK46 propulsion system, MK50 sonar, and MK48 ADCAP software with state-of-the-art digital signal processing technology available on the commercial market. Incorporating Non-Developmental Item technologies from existing weapons and commercial industry has resulted in a significantly improved shallow water performance while reducing total ownership cost. Extensive use of COTS and open systems architecture enables MK54 to be readily upgraded via technology insertion and software upgrades to counter future threats.

The MK54 program is currently in the Engineering and Manufacturing Development phase with Developmental Testing (DT) scheduled to begin in 3rd/4th QTR FY1999. Scheduled for fleet introduction in 2003, the MK54 will replace the older MK46 torpedoes with a far superior, expandable ASW weapon capable of countering current and future threats.

Torpedo Defense

Today surface ship torpedo defense capability is provided by a variety of systems because there is no one universal solution to the threat. The appropriate defense depends upon the type of incoming torpedo and upon the type of targeted platform. The defensive measures cover a range of active countermeasures, passive countermeasures, and tactics. Highly maneuverable combatants are able to employ vastly different tactics and countermeasures than would, for example, a slower, less maneuverable amphibious ship, which is not equipped with appropriate crew skills, acoustic sensors, or acoustic quieting.

The AN/SLQ-25A NIXIE system is a soft-kill countermeasure system that acts as a decoy to confuse incoming homing torpedoes. It is the most basic and most widely used torpedo countermeasure system fielded on our ships. The NIXIE is a towed system that operates at all times when the ship is at risk of torpedo attack and unlike some of the more sophisticated countermeasure systems, NIXIE does not rely on cueing from an Anti-Submarine Warfare (ASW) system. Because the system does not rely on cueing, it is well suited for deployment on all US Navy warships, including aircraft carriers, amphibious ships, sealift and large fleet auxiliaries.

Other torpedo countermeasure systems which are currently deployed require that the ship have an Anti-Submarine Warfare capability. One such system is the Multi-Sensor Torpedo Recognition and Processor (MSTRAP). This is a torpedo detection, classification and localization processing system that receives input from both the ship's hull sonar and towed arrays. It acts as an alertment system that is used in conjunction with maneuvers to evade and deployable countermeasures to effect a soft-kill of the incoming torpedo. This system is being integrated into the AN/SQQ-89 Anti-Submarine Warfare combat system as the Torpedo Recognition and Alertment Functional Segment (TRAFS). It will detect and localize torpedoes at tactically significant ranges when the primary detecting sensor is the towed array. The Navy began deploying the Multi-Sensor Torpedo Recognition and Processor on Anti-Submarine Warfare capable ships in 1997, and will continue to deploy the integrated version, Torpedo Recognition and Alertment Functional Segment, in Anti-Submarine Warfare capable combatants. Further system improvements, currently under way, will enable us to improve performance by discriminating properly between real threats and false targets, thus driving down the number of false alerts.

The Launched Expendable Acoustic Device (LEAD) is now in production and will deliver for Fleet use this fiscal year. Like NIXIE, Launched Expendable Acoustic Device is a soft-kill countermeasure system that decoys or confuses an incoming acoustic homing torpedo. It is deployed only on surface combatants because it requires the ship to be alerted to the incoming torpedo. The Launched Expendable Acoustic Device is most effective when combined with specifically developed tactical maneuvers. An enhancement, currently in early development, known as the Mobile Ship-launched Countermeasure Acoustic Device (MSCAD) will be a self-propelled version of the Launched Expendable Acoustic Device.

Organic Mine Warfare

The Navy has embarked on an effort to further decrease response time to commence the mine countermeasures campaign and to expand our overall mine countermeasures capabilities. This initiative is known as "**Organic Mine Warfare**,"and will mainstream mine countermeasures systems into our Battle Groups and Amphibious Ready Groups. They will be integrated, both physically and doctrinally, into all Navy Joint Task Forces, eliminating the exclusive reliance on dedicated mine countermeasures forces. Consistent with the Network Centric Warfare concept, our organic mine warfare

countermeasures capability will be provided to the Battlegroup via a “system of systems” to include air, surface, and subsurface components. For surface combatants, a new addition to the AN/SQQ-89 USW suite will be the AN/WLD-4, Remote Minehunting System (RMS), first installation DDG 91 in FY ‘03. The RMS is a semi-submersible vehicle that tows a mine hunting sensor suite and which will detect, classify, locate, and identify mines in the water column and on the sea bottom. RMS will operate autonomously and maintain a radio frequency link to the ship in order to reduce risk to the ship and minimize interference with other ship missions. Through the AN/SQQ-89 and Global Command and Control System – Maritime (GCCS-M), RMS will communicate mine location information to the rest of the fleet and will integrate Organic and Dedicated forces.

Maritime Power Projection

Maritime power projection takes on new dimensions in the 21st century. The future of maritime power projection envisions hard-hitting joint naval campaigns that combine precision operations deep in the littorals with close air and direct fire support and long-range precision strikes – mounted and maintained from the sea. The Surface Navy will leverage technological advances in information and targeting systems along with long range precision guided munitions to mass the effects of distributed fires, thereby increasing both our reach and precision. Maritime power projection will become the application of offensive military force against an enemy, *at a time and place of our choosing.*

The Surface Navy stands poised to execute two evolving, critical elements of maritime power projection necessary to realizing success in the 21st Century battlespace: Theater Air Dominance and Land Attack. These missions will **ensure the full-dimensional protection** of our forces and **the precision engagement of the enemy**.

Theater Air Dominance

The first mission, theater air dominance, goes to the heart of providing full-dimensional protection, not only for naval forces, but joint and coalition forces that will also be involved in any future operation. In the littoral, the two aspects of theater air dominance about which I am most concerned are defeating anti-ship cruise missiles and providing theater ballistic missile defense (TBMD). To afford protection to our forces operating in the littoral against such threats are several programs which afford a layered defense. Earlier I discussed self defense systems. I will now describe programs designed to keep the battle at the outer edge of the egagement zone.

Standard Missile

The Aegis Weapons System, with its Standard Missile, provides a robust Area Anti Air Warfare (AAW) capability against threat aircraft and Anti Ship Cruise Missiles (ASCMs) when conducting operations in the littorals. By providing this Area AAW shield, the Standard Missile is the enabler for operations close to land. For example, Aegis cruisers and destroyers can engage the F-1 Mirage aircraft and its electronic jamming techniques using the SM-2 Block IIIB missile at ranges up to 80 nm. If the Mirage launches ASCMs such as the Exocet, the SM-2 is relied upon to decrement the incoming raid by one half prior to engagement by self- defense weapons systems.

The SM-2 Block IV is an extended range variant of the Standard Missile that will reach initial operational capability (IOC) in FY99. The Block IV can engage threat aircraft and ASCMs at ranges up to 100 nm. It can engage stand off jamming aircraft beyond 100nm. It will also provide an increased capability against maneuvering ASCMs over earlier Standard Missile variants.

Both of these missiles build on the foundation of excellence that we have enjoyed with the Standard Missile family. The SM-2 Block IIIB completed final operational testing and evaluation last December with a "grand slam of sorts" – 9 for 9 hits against incoming targets. These weren't special missiles, they were production missiles, the types of which are being fielded today. The Block IV missile will complete testing this spring and IOC later this year.

Theater Ballistic Missile Defense

Positioning theater ballistic missile defense at sea can provide deterrence and war winning leverage. Capitalizing on the inherent flexibility of surface ships, TBMD at sea frees us from the need to provide land-based terminal defenses around every potential target we wish to protect. In the littoral, on-scene surface combatants can immediately influence events because they are combat ready and can sustain themselves independent of host nation support. In short, we position our forces where they are most effective.

Navy Area TBMD

The mission of the Navy Area TBMD system is to provide US and allied forces, as well as areas of vital national interest, defense against TBMs. In support of forcible entry and sustained ground combat operations, such as those associated with an amphibious landing, Navy TBMD forces provide the earliest capability when the heaviest TBM attack intensity is likely and when other TBMD systems are still enroute or are only present in limited numbers. The Navy Area TBMD System will provide protection against short- and medium-range TBMs for debarkation ports, coastal airfields, amphibious objective areas (AOAs) and expeditionary forces as they move from the sea towards their objective ashore.

The Navy Area TBMD program consists of modifications to the AEGIS AN/SPY-1 radar to enable detection, tracking and engagement of TBMs using a modified SM-2 and minor changes to existing C2 systems. More than 50 AEGIS cruisers and destroyers are at-sea or under construction and the support, training and logistics infrastructure is already in place and operating. The plan includes:

- Software/firmware modifications to AEGIS Combat System including SPY-1 radar.
- Development of changes to the SM-2 missile by incorporation of an infrared seeker, an improved fuze and modified warhead section to create the Block IVA variant.
- Providing a User Operational Evaluation System (UOES) called "LINEBACKER" for fleet use and feedback to influence tactical design improvements, that would also be available for CINC contingency use.

Two AEGIS cruisers have been designated for initial TBMD improvements, and are known as LINEBACKER ships. Serving as the focal points for getting a TBMD capability to sea, the two ships, USS LAKE ERIE (CG70) and USS PORT ROYAL

(CG73), are the first to receive the requisite TBMD system modifications, conduct at-sea testing, and develop core doctrine and tactics.

The computer program and equipment installations were completed in September 1998. Successful sea trials were completed in October 1998. During Autumn 1998 events at the Pacific Missile Range Facility, LINEBACKER ships tracked two targets. These launches provided the opportunity for the LINEBACKER ships to track, while conducting joint interoperability testing. With the addition of the SM-2 Block IVA missile in FY 01, these two LINEBACKER ships will have the capability to provide defense against short and medium-range theater ballistic missiles.

Navy Area TBMD is scheduled for First Unit Equipped (FUE) in FY03.

Navy Theater Wide TBMD

The Navy Theater Wide (NTW) Program builds upon the modifications to the AEGIS Combat System that provide Navy Area System capability, but provides fundamentally different and yields unique capabilities. Specifically, it is capable of exo-atmospheric and ascent phase intercepts and has a vastly greater defended footprint. This Theater-Wide capability will enable AEGIS ships operating near launch areas to fully exploit their mobility, endurance, and forward presence to defend U.S. forces or allies in key world regions.

The large defended operational areas afforded by NTW result in extensive flexibility for the CinC in accomplishing TBMD. A few ships can simultaneously protect many critical assets in the theater of operations as well as provide defense against longer ranged TBMs fired elsewhere. The NTW system provides a defensive overlay for Navy Area and land based TBMD systems. This overlay yields the opportunity to use layered defense for high value assets and target areas critical to achieving the CINC's objectives. This will yield high cumulative kill probability where it's needed most and the flexibility to provide significant protection over much of the theater. This is especially important where mobile forces may move out from under the less mobile land based TBMD umbrella.

Where geography or threat capabilities preclude forward placement of ships, external cueing from space assets or ground based radars enable employment of NTW over large operational areas. Engagements are possible with midcourse ship locations and terminal ship locations. For longer threat ranges, ships must be located closer to the defended areas to support engagement. However, even in these locations, NTW yields shoot-look-shoot opportunities when supported by Navy Area or ground based TBMD systems.

Land Attack

The other evolving **critical mission at the heart of naval capabilities in the littoral** operating environment, and which will **result in the precision engagement of the enemy**, is the **land attack mission**. Land attack encompasses a myriad of tasks from long-range, strategic precision strikes, such as those afforded by the Tomahawk cruise missile, to providing precision naval surface fires support to Marines or other forces on the beach.

Precision Naval Fires

Recent and continuing investment in a robust land attack capability gives us a strong offense. Investment has grown to over $2.0 Billion dollars in the current FYDP. Not only does it support the Marine Corps in an offensive land campaign, but it also helps protect our forces and allies from attack. Land attack adds a whole new dimension to this mission area with the introduction of an offensive, long-range, responsive and lethal capability not previously resident in our surface combatants. This new capability contributes significantly to the definition and execution of the land campaign.

This type of high volume, precise firepower is exactly what is called for by the Marine Corps' Operational Maneuver from the Sea (OMFTS) concept. We have synchronized our investment plans to support their target implementation date of 2008. As OMFTS becomes reality with the fielding of the MV-22 Osprey and Advanced Amphibious Assault Vehicle (AAAV), we will be fielding an improved 5 inch gun and land attack missile. As OMFTS matures, so too will our fire support capability with DD 21 and the 155MM Advanced Gun System (AGS).

Specifically, our acquisition programs will produce a 5"/62 gun system for Aegis ships capable of delivering rocket assisted projectiles to an objective range of 63 NM, and an advanced gun system for DD 21 capable of delivering rocket assisted projectiles to an objective range of 100 NM. Importantly, this allows our combatants to remain over-the-horizon and still deliver ordnance at substantially greater ranges inland against the enemy.

Extended Range Guided Munition

The Extended Range Guided Munition (ERGM) is a 5" projectile that will be fired from the 5"/62 MK 45 Mod 4 Gun Mount. ERGM incorporates a rocket motor and internal Global Positioning System (GPS) coupled with an Inertial Navigation System (INS). The coupled GPS/INS will provide autonomous guidance and control to a fixed target location determined prior to firing. The rocket motor will provide range capability far in excess of current ballistic projectiles (Threshold range: 41nm; Objective range: 63nm). The warhead will consist of a highly effective submunition payload (72 M80s - Dual Purpose Improved Conventional Munition/DPICM). The combination of the extended range with GPS/INS position accuracy will provide significantly improved performance to meet future NSFS mission requirements.

Advanced Gun System

The Advanced Gun System (AGS) is a fully integrated gun weapon system (GWS) which includes dual large caliber (perhaps 155MM) guns, fully integrated gun and fire control systems, and built-in test and fault isolation functions. Each gun will be capable of independently firing 12 rounds per minute from an automated magazine storing 600-750 rounds. AGS will meet DD 21's stringent reduced manning, radar signature and maintenance requirements, as well as provide the range, lethality, and volume of fire required by the Marine Corps.

The AGS program also includes development of a large caliber Extended Range Guided Munition (ERGM), a GPS/INS guided, precision munition with an objective range of 100NM. Employing GPS/INS guidance technology developed in the 5" Extended Range Guided Munition (ERGM) program and submunitions (M80 and, perhaps, Sense And Destroy Armor (SADARM) developed by the Army), the system will address a wide range of targets in support of land forces. Future lethality enhancements may include high explosive (HE) and penetrator warheads.

AGS is being developed as part of the DD 21 Full Service Contractor acquisition strategy, with first system delivery to DD 21 scheduled for FY06.

Naval Fires Control System

In order to safely and effectively employ these long range, precision guided weapons in support of complex amphibious and joint land battle operations, we are developing the Naval Fires Control System (NFCS). NFCS is a battle management system that will be the enabler for surface land attack in net-centric warfare. NFCS will support mission planning for 5"/62 - ERGM and AGS. It will automate shipboard Land Attack battle management duties, support evolving Expeditionary Warfare capabilities, tactics and doctrine, and be interoperable and consistent with Joint C4ISR systems and Air Defense and Air Control systems and procedures.

Tactical Tomahawk

In response to the warfighting CINCs' requirement for a more responsive strike weapon, the Tomahawk missile will evolve to Tactical Tomahawk (TACTOM). Additional capabilities added with TACTOM will provide the flexibility to make it more responsive in the littoral for those targets which are beyond the reach of ERGM, AGS and the Land Attack Missile. TACTOM will be produced using modern manufacturing techniques reducing unit production costs from approximately $1.2-$1.4M (estimated cost of a new Block III missile in FY99 dollars) to $569K (Tactical Tomahawk in FY99 dollars). Associated with lower unit production costs are cost avoidance projections for the life cycle of the Tactical Tomahawk missile with a 15-year period between depot maintenance periods. Tactical Tomahawk will achieve initial operating capability in 2003 and will preserve long range precision strike capability while significantly increasing Tomahawk's responsiveness and flexibility. System improvements include: increased range, inflight retargeting; real time battle damage indication imagery with a missile mounted camera; GPS mission planning onboard firing units, battlefield loiter capability; and an architecture for future advances and alternative payloads. Tactical Tomahawk will allow the battlefield commander to react to time-critical emergent and relocatable targets. It is compatible with the existing infrastructure and maximizes use of commercial parts.

Summary

The **goal of our program is to improve the commander's warfighting capabilities.** To support this goal, we **rely first and foremeost on our people**. Navy men and women are very good at what they do – turning the best technology available and affordable into action to prevent wars or to win them quickly and decisively if required. They will forge the innovative and evolutionary links that will plot the best course from vision to reality.

Although the fundamental missions of the Navy – sea control, deterrence and power projection – will not change, **the utility of naval forces to the nation can increase dramatically** as new technologies are harnessed for maximum operational advantage. Just as the Surface Navy has adapted to a changing environment in the past, so we prepare for the future again in this post-cold war environment. To this end, we are **developing systems keyed to providing offensive, distributed, lethal firepower to the**

joint land battle, while ensuring we continue to perform our traditional mission of maritime dominance using layered defense, which contributes to our role as an enabler for follow-on forces.

To remain stagnant in these dynamic times is to become irrelevant. Each new opportunity will demand new thinking and evolving capabilities. Together, they will require continued careful planning to balance a whole series of competing priorities – current operating costs vs. long term investment, force structure vs. combat capabilities, multi-mission vs. core mission capabilities, force structure vs. new technology. Identifying which capabilities are most critical and the balancing of the requirements of the near term with those of 20 years is the essence of the challenge we face. We will embrace change as we see it necessary so that the **Surface Navy will continue to be the force of choice**, able to influence, directly and decisively, events ashore from the sea – *anytime, anywhere*.

Thank you for the opportunity to testify and your continued support.