WHEN USS *OHIO* CHANGED THE WORLD P. 32

SPRING 2012

UNDERSEA WARFARE

U. S. SUBMARINES... BECAUSE STEALTH MATTERS

The STRATEGIC DETERRENCE MISSION

Ensuring a Strong Foundation for America's Security

INSIDE

Spring 2012
Issue No. 48

On the Cover

USS *Alaska* (SSBN 732) returning to Naval Submarine Base Kings Bay, Ga., in January 2011 after successful sea trials.

Photo by
Petty Officer 1st Class James Kimber

UNDERSEA WARFARE

THE OFFICIAL MAGAZINE OF THE U.S. SUBMARINE FORCE

The STRATEGIC DETERRENCE MISSION

Ensuring a Strong Foundation for America's Security

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FORCE COMMANDER'S CORNER

"In many ways, 'perfect' is exactly the right word to describe the performance of our strategic deterrent since 1960. The performance of the people and systems in our SSBN force has delivered what we asked of them: stability and peace."

Vice Adm. John Richardson, USN,
Commander, Submarine Forces

Team,

This edition of UNDERSEA WARFARE Magazine highlights the Submarine Force's most important mission to our nation—strategic deterrence. This is completely fitting. July 20 marks the anniversary of the first shot of a Polaris missile from USS *George Washington* (SSBN 598) while submerged. It's been 52 years since the commanding officer transmitted his message to President Dwight Eisenhower, "POLARIS — FROM OUT OF THE DEEP TO TARGET. PERFECT." In many ways, "perfect" is exactly the right word to describe the performance of our strategic deterrent since 1960. The performance of the people and systems in our SSBN force has delivered what we asked of them: stability and peace. If this were any other system, the nation would be routinely singing their praises—success like this is what America strives for! But our SSBNs face two unique challenges in the public relations department. First, their mission is to deter violence. As Admiral Mies will discuss in his article beginning on page 12, they have done a spectacular job of this. But, the absence of something is a difficult thing to deliberately measure, and almost impossible to notice day-to-day. Do you wake up each morning saying to yourself, "Thank goodness today will be another day free from major war between major powers!"? You should! And then remember the dauntless Sailors on patrol every moment of that day, like every other day for the last 52 years since they first took to sea. The second challenge they face is that their success hinges on being invisible — out of sight. Again, it's hard to take notice of something that's not there — undetectable by design! We Submariners are proud of our stealth and eschew the spotlight by nature. Stealth is in our DNA. So, it's appropriate to take some time to overcome these challenges and highlight the tremendous work being done by our sea-based strategic deterrent force and the existential value they provide to our nation.

The nuclear-powered ballistic missile submarine is a textbook example of how new technology and new ideas can fuel one another to become a decisive reality. As always, the best innovation arises from a crystal-clear definition of the military problem we must solve. Our "problem" arose when the Soviet Union detonated a thermonuclear weapon in 1953, signaling the end of the United States' monopoly over nuclear weapons. It was by no means a *fait accompli* that the nation could or would take a decisive number of nuclear weapons, submerge them beneath the waves, and hide them securely away underwater, always ready to respond. There was significant opposition to the SSBN idea, and a number of alternatives were proposed to respond to the Soviet nuclear threat. For instance, one alternative was to simply build and fortify more ICBMs and strategic bombers than the Soviets. It was only accomplished through the vision and heroic efforts of leaders like Adm. Arleigh Burke, the CNO, and Rear Adm. William Raborn, the first Director of the Special Programs Office (SPO), the forerunner of today's Strategic Systems Programs (SSP). As a testament to the significance of this achievement, naval historian David Rosenburg wrote in his biography of Adm. Burke, "Burke's most significant initiative during his first term was his sponsorship, in the face of considerable opposition, of a high-priority program to develop a naval intermediate-range ballistic missile."

It was this effort, among others, that ushered in a new era of peace through deterrence. What emerged was a coordinated land-, sea-, and air-based deterrent system — the Strategic Triad — that depended on our SSBN force to be the most survivable element, the guaranteed "second strike." In this way, since the beginning of the SSBN program, the combination of dedicated Submariners and cutting edge technology has ensured the "problem" of 1953 has remained "solved." As the original "problem" has changed and grown more challenging, our Strategic Triad has continued to keep pace, such that our nation's strategic deterrent submarine program remains central to the defense of our nation—today, and as far as we can see into the future.

In the more than 50 years of deterrent patrols, with nearly 4,000 patrols conducted, our SSBN Sailors have consistently embodied the most essential elements of the Design for Undersea Warfare, most notably the Operations and Warfighting lines of effort. At this very moment, they remain submerged and undetected in our Trident SSBN Force — ready for the call that they hope will never come. In fact it's that very readiness, the stealth of our submarines in combination with the skill and vigilance of our Submariners, that has allowed us to sustain indefinitely our secure and survivable posture — able to respond rapidly to national tasking at any time. In our uncertain world, it is this posture of deterrence, of perseverance, that minimizes the possibility that anybody will threaten the American homeland.

We are again at an important decision point for the nation. It's time to design and build the next generation SSBN to replace the Trident. It's been said that if you want a new idea, read an old book, and we can learn much from the giants who came before us. Historian Harvey Sapolsky concluded that the "programmatic success" of the Polaris program was due to "a convergence with technological opportunity and a widely accepted policy need. Next there must be committed to the project people who are extraordinarily skillful in the art of bureaucratic politics." All of this and more will be required as we sustain this cornerstone of our national defense. It must be done, so that as the motto of USS *George Washington* said 52 years ago, our SSBN program will remain "*Primus in Pace*" — First in Peace.

Semper Procinctum

NOTES

David A. Rosenberg, "Arleigh Albert Burke," in Robert William Love, *The Chiefs of Naval Operations* (Annapolis: Naval Institute Press)

Harvey M. Sapolsky, *The Polaris System Development* (Cambridge: Harvard University Press, 1971)

In putting this letter together, I used the article "The POLARIS, A Revolutionary Missile System and Complex," by Norman Polmar. It is Seminar Number Nine of the Colloquium on Contemporary History hosted by the Naval History and Heritage Command, http://www.history.navy.mil/colloquia/cch9d.html.

DIVISION DIRECTOR'S CORNER

Rear Adm. Barry Bruner, USN,
Director, Undersea Warfare Division

In this issue of UNDERSEA WARFARE, we shine the spotlight on one of the Undersea Force's most important missions, one often overlooked by those outside the Submarine Force: strategic deterrence. In a way, this lack of notice is a hallmark of our success. For over 50 years, submariners have quietly and reliably provided the most survivable leg of the strategic deterrent triad. Especially now, it is crucial that we highlight this achievement and its significance to our national security as we progress towards the replacement of the *Ohio*-class ballistic missile submarines. The feature articles in this edition describe both where we've come from (Robert Hamilton on the construction of USS *Ohio*, page 32) and where we're going (Capt. Dave Bishop on *Ohio* Replacement, page 4, and Strategic Systems Programs Public Affairs on Trident Life Extension, page 8), as well as making the case for the enduring importance of strategic deterrence in the 21st century (retired Adm. Richard Mies, page 12).

> "For over 50 years, submariners have quietly and reliably provided the most survivable leg of the strategic deterrent triad. Especially now, it is crucial that we highlight this achievement and its significance to our national security as we progress towards the replacement of the *Ohio*-class ballistic missile submarines."

Our national leaders recently and clearly stated: "As long as nuclear weapons remain in existence, the United States will maintain a safe, secure and effective arsenal … both to deter potential adversaries and to assure U.S. allies and other security partners that they can count on America's security commitments" (*Sustaining U.S. Global Leadership: Priorities for 21st Century Defense*, January 2012). The Submarine Force already bears a significant portion of our nuclear deterrent — greater than 50 percent of deployed nuclear warheads are today carried on Trident D-5 submarine-launched ballistic missiles (SLBMs) — and that percentage will grow in the future. When New START limitations come into effect in 2018, over 70 percent of our deployed warheads will be carried on SLBMs.

SLBMs must continue to be carried by a platform that is *survivable, reliable, credible,* and *persistent*. The *Ohio* Replacement SSBN is that platform, and it will have the right capability to meet 21st century challenges at minimal cost. To reduce cost, the *Ohio* Replacement design will maximize reuse of *Ohio* and *Virginia* components, and it will also incorporate new technology to maintain the platform as a viable deterrent into the 2080s. It will incorporate a life-of-ship reactor core, which is representative of the overall drive to design a next-generation SSBN that is sustainable while minimizing life-of-ship operational and maintenance costs.

Because of these design improvements, 12 *Ohio* Replacement SSBNs will provide the same at-sea presence as 14 *Ohio* SSBNs, effectively saving the Navy over $20 billion over the life of the class. The *Ohio* Replacement plan leverages 50+ years of SSBN design and operation combined with the cost controls of the *Virginia*-class SSN program to provide an assured response capability in a lean, cost-effective manner. Submarines of this class will be maintaining the nation's deterrent patrols into the 2080s. While expensive, the *Ohio* Replacement SSBN will fill a role that is absolutely vital to our nation's security; failure to maintain a survivable, reliable, credible, and persistent strategic deterrent would invite costs too great to contemplate.

The importance of the SSBN force too often goes unrecognized and unacknowledged. In light of this, I was particularly pleased to see the SSBN force's recent Meritorious Unit Commendation award. Bravo Zulu! I hope this edition of UNDERSEA WARFARE helps to highlight the important contributions of our Sailors and everyone involved in making our sea-based strategic deterrent the unqualified success that it has been for more than five decades.

Along the same line, I recently had the honor of attending the change-of-command ceremony at Naval Submarine Base Kings Bay, Ga. The pictures above show the undersea warriors of the present — and the future. The outgoing Base CO, Capt. John O'Neill, and his son, Midshipman 3rd Class Conner O'Neill, are in the picture on the left above. The incoming CO, Capt. Harvey Guffey, Jr., and his son, Ensign Matthew Guffey, are in the picture on the right. Congratulations to both captains and their families!

UNDERSEA WARFARE
The Official Magazine of the U.S. Submarine Force

Charter

UNDERSEA WARFARE is the professional magazine of the undersea warfare community. Its purpose is to educate its readers on undersea warfare missions and programs, with a particular focus on U.S. submarines. This journal will also draw upon the Submarine Force's rich historical legacy to instill a sense of pride and professionalism among community members and to enhance reader awareness of the increasing relevance of undersea warfare for our nation's defense.

The opinions and assertions herein are the personal views of the authors and do not necessarily reflect the official views of the U.S. Government, the Department of Defense, or the Department of the Navy.

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CHINFO Merit Award Winner

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LETTERS TO THE EDITOR

In keeping with UNDERSEA WARFARE Magazine's charter as the Official Magazine of the U.S. Submarine Force, we welcome letters to the editor, questions relating to articles that have appeared in previous issues, and insights and "lessons learned" from the fleet.

UNDERSEA WARFARE Magazine reserves the right to edit submissions for length, clarity, and accuracy. All submissions become the property of UNDERSEA WARFARE Magazine and may be published in all media. Please include pertinent contact information with submissions.

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FROM THE EDITOR

Traditionally, an online version of each issue of UNDERSEA WARFARE appeared on the website of OPNAV's Director of Undersea Warfare (N97). However, because that website is being phased out as part of OPNAV's drive to consolidate its online presence, we haven't posted any new issues of the magazine there since 2010.

Now, Commander, Submarine Force Atlantic, has given the magazine a new online home on the COMSUBLANT website. Starting in July, readers will be able to access UNDERSEA WARFARE at http://www.public.navy.mil/subfor/underseawarfaremagazine/. All of the back issues will be available there, and each new issue will be posted within a few weeks after the print version is distributed.

We're delighted to be back on the Web! Many thanks to the COMSUBLANT staff for helping put us back in touch with our online readers!

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SAILORS FIRST

Petty Officer 3rd Class Charles Miramonti, of USS *Louisville* (SSN 724), and Petty Officer 3rd Class Christopher Barton, of USS *Emory S. Land* (AS 39), play with a boy during a community service project at the Bukit Harapan Therapeutic Community Orphanage, in Kota Kinabalu, Malaysia. *Land* conducted a coordinated tended mooring with *Louisville* in Malaysia in April.

Photo by Petty Officer 2nd Class Chris Williamson

by Capt. Dave Bishop

TWO YEARS IN AND GOING STRONG!

The *Ohio* Replacement Program

2011 was a watershed year for the *Ohio* Replacement Program Office. The program took a large step down the acquisition milestone path, issued its first official cost estimate, established specific cost goals, and completed significant prototyping work. Although most of the work to begin construction of the *Ohio* Replacement submarine remains in the future, the program is laying a solid foundation to ensure the future success of this national asset.

The *Ohio* Replacement Program is a program of many firsts in the U.S. Navy: the first new submarine design in 20 years; the first new design for a strategic ballistic missile submarine (SSBN) in over 40 years; the first submarine that will be designed from the outset for a service life of over 40 years (not extended after the fact) — including a life-of-ship reactor core; and the first submarine designed for a mixed-gender crew.

Achieving Milestone A

From an acquisition perspective, 2011 saw the *Ohio* Replacement Program reach its first major acquisition milestone with the completion of its Milestone A Defense Acquisition Board (DAB) review in December 2010. The Jan. 10, 2011, Milestone A Acquisition Defense Memorandum (ADM) documented the results of the review and authorized the *Ohio* Replacement Program to enter the technology development phase. This phase will lay the groundwork for a class of 12 SSBNs, each with 16 missile tubes 87 inches in diameter. It will establish requirements and will develop and mature the technologies that *Ohio* Replacement submarines will require to operate into the 2080s.

Achieving Milestone A allowed the program to begin solidifying the submarine's design requirements via the findings of three meetings of the Navy Resources and Requirements Review Board. The board's findings have been written into the *Ohio* Replacement Program's preliminary Capabilities Development Document (CDD), which is currently in review for service approval by the Chief of Naval Operations.

Addressing Cost

As the *Ohio* Replacement Program worked to solidify requirements, it also developed its service cost position (SCP). The SCP is the Navy's estimate of how much it will cost to design, build and operate the new class of SSBNs for their entire operational life. In addition, the *Ohio* Replacement Program requested that the director of cost assessment and program evaluation (CAPE) in the Office of the Secretary of Defense conduct her own independent cost estimate, which validated the program office's estimate.

The *Ohio* Replacement Program is a program of many firsts in the U.S. Navy: the first new submarine design in 20 years; the first new design for a strategic ballistic missile submarine in over 40 years; the first submarine that will be designed from the outset for a service life of over 40 years (not extended after the fact) — including a life-of-ship reactor core; and the first submarine designed for a mixed-gender crew.

The *Ohio* Replacement Program accomplished a number of less-publicized, yet extremely important efforts, including the initiation of a design-for-affordability (DFA) program modeled after the *Virginia* DFA program, which allowed the Navy to remove $3 billion from the *Virginia* class's construction budget. In an effort to leverage the *Virginia* class's proven ability to reduce costs without sacrificing capability, the *Ohio* Replacement Program signed a memorandum of agreement with the *Virginia*-class submarine program for technology sharing.

In a budget-constrained environment, the cost of a design is just as important as the capability that the design provides. While ensuring that the new SSBN will have the requisite capabilities for successful operation into the 2080s, the program must also reduce costs wherever possible. In light of the current budget environment — and in accordance with the "better buying initiatives" issued by Office of the Undersecretary of Defense for Acquisition, Technology and Logistics, (the Pentagon's top weapon buyer and defense acquisition executive) — the Milestone A ADM assigned two affordability targets, one for follow-ship acquisition cost, and the second for operations and support (O&S) costs.

These cost targets were each broken down into a "will-cost" estimate and a "should-cost" target. The will-cost estimate for the *Ohio* Replacement Program is based on the program's own service cost position as well as the CAPE director's independent cost estimate. The should-cost target is significantly lower. The *Ohio* Replacement Program's will-cost estimates and should-cost targets are as follows (all amounts in constant year 2010 dollars):

- For recurring construction costs—those costs that are repeated for each submarine built after the lead ship—the current average will-cost estimate for hulls two through 12 is $5.6 billion per ship, and the should-cost target is $4.9 billion.
- For life-cycle costs—those costs associated with operation and maintenance of the submarine, which include crew cost and end-of-ship-life disposal cost—the average annual O&S will-cost estimate is $124 million per ship per year, and the should-cost target is $110 million.

Reducing NRE Costs

In addition to the two cost targets contained in the Milestone A ADM, the program is also actively reducing non-recurring engineering (NRE) costs. NRE costs include the design, prototyping, and technology development efforts associated with class design, including the design of all components, construction jigs and fixtures, and special tooling that are specifically designed for a new class of ships. NRE work has a direct impact on future costs. Reducing design budgets can add risk to a program, because it can prevent the program from fully maturing technologies that are required either to realize longer-term savings or to give the submarine capabilities it will need to meet long-term performance requirements.

Setting the DoD standard for putting cost management principles into action early in a program's life cycle, the *Ohio* Replacement Program will focus on all three cost contributors — NRE, recurring construction, and life-cycle costs. To achieve the cost target, the Navy and its industry design agent, General Dynamics Electric Boat, have developed detailed time-phased cost reduction plans for both NRE and construction.

To reduce NRE, the program is leveraging existing technologies and maximizing component and design re-use from the *Virginia* class (e.g., pumps, valves, and piping) and from other classes. The program is also evaluating using common command and control center arrangements for both *Virginia*-class and *Ohio* Replacement submarines.

Reducing Construction Costs

Less mature than the NRE cost reduction plan, but extremely important, is the *Ohio* Replacement Program's construction cost reduction plan. The program is importing and improving the tools, ideas and processes that were used to reduce per-ship acquisition cost in the *Virginia* class by nearly 20 percent. Leveraging cost reduction lessons from the *Virginia* class is essential for the daunting task of reducing *Ohio* Replacement recurring construction cost by an average of $700 million per ship (from $5.6 billion to $4.9 billion).

The construction cost reduction plan, currently being developed, will cover all cost contributors, both government and shipbuilder. On the government side, it will seek to reduce the cost of government-furnished equipment (GFE) such as non-propulsion electronics, which includes electronics for combat systems and strategic weapons. The program will work with its shipbuilder partners to develop smart contracting strategies for ship construction. It is currently inves-


Photo courtesy of General Dynamics Electric Boat

tigating the use of multi-year contracting with economic order quantity (EOQ) procurements. In addition, it will coordinate its material procurements with both the *Virginia* Class Program and with the U.K.'s Successor-class missile compartment effort to achieve cost savings for both the U.S. and the U.K.

The program will maximize use of the modular construction techniques that are proving successful in *Virginia*-class construction. Time is money, and submarine construction experience has shown that less time is required to complete tasks when they are performed off-hull earlier in the ship construction cycle. If it takes one hour to accomplish a task in an open shop environment, it will take three hours to accomplish the same task once the work has moved to one of the modules from which the submarine is assembled, and up to eight hours once the hull of the ship is complete. Shipbuilders call this the "1-3-8" rule, and it will play a key role in the *Ohio* Replacement Program's drive to reduce construction costs.

While the design has not been finalized, the *Ohio* Replacement submarine will not be a larger version of the *Virginia*-class attack submarine (SSN). The *Virginia*-class design does not lend itself to the strategic deterrence mission due to a variety of factors, including size and overall design philosophy. Because the *Ohio* Replacement will utilize the existing Trident II (D-5) Life Extension (LE) weapon system, it must be designed and built with missile tubes that are both tall enough and wide enough to accommodate this already fielded system. (The missile compartment for the *Ohio* Replacement is being jointly designed and developed with the United Kingdom (U.K.) and will be included in the U.K.'s Successor-class submarine.) SSBNs are also designed for very different operating and maintenance profiles than SSNs. The higher operational tempo requirements for SSBNs (including the continued use of dual crews), specialized logistics requirements, and the single mission of nuclear deterrence require a new total ship design.

Missile Compartment Strategy

Recognizing that building the missile compartment is a major cost contributor, the program is developing a missile compartment build strategy that will maximize modular construction. Traditionally, SSBN missile compartments have been "stick built." This means that the hull is fabricated and then cut open to insert the missile tubes one at a time. This process requires the shipbuilders to outfit the missile tube while in the hull, which is time-consuming, labor-intensive and expensive. In contrast, the *Ohio* Replacement missile compartment will be assembled from modules of four missile tubes known as a "quad-pack."

To demonstrate this modular construction technique, the Navy is building part of a prototype missile compartment. General Dynamics Electric Boat competitively awarded subcontracts to four companies, two in the United States and two in the United Kingdom, to produce prototype missile tubes. Once the companies completed their tubes, they sent them to Electric Boat's Quonset Point, R.I., facility. After affixing the crown assembly, which is the portion of the tube that penetrates the submarine's pressure hull, the tubes were placed into a new construction and assembly fixture that aligned the tubes prior to their being welded together. This not only allowed the Navy to recertify that the industrial base can make large missile tubes to tight tolerances, but also opened up the possibility of competing the production work for the missile tubes to ensure the best value to both the U.S. and the U.K.

Photo courtesy of General Dynamics Electric Boat

(Opposite) The proof-of-concept prototype of a four-tube "quad-pack" takes shape at Electric Boat's Quonset Point facility. *(Above)* The finished product, with a worker standing in each tube to show the scale.

The prototype four-tube "quad-pack" is demonstrating that modular construction can be applied to something as large and complicated as an SSBN missile compartment. It has also given Electric Boat the opportunity to test a robotic welding capability that could both save money and decrease construction time. Normally, people would have to enter each missile tube and descend 45 feet to the bottom to weld it into the ship. The tight working space, coupled with the intense heat required for proper welding, would restrict a worker's time at the bottom of the tube to only a few minutes. If instead a robotic welding machine can be sent into the missile tube, it could remain there, welding non-stop, until the work is complete. While this procedure requires more testing, robotic welding holds the potential not only to save time and money for the *Ohio* Replacement Program, but eventually to achieve savings in other defense programs as well.

To date, the results of missile compartment prototyping have been promising, with welding completed within tolerance and with zero defects. The effort has proved that utilizing this modular construction technique for welding meets the required tolerances. Together, modular construction and robotic welding have the potential to shorten the build span of the missile compartment by 15 months.

Other Cost Reduction Efforts

Other efforts to reduce costs include using non-propulsion electronic systems common to all submarine classes. Specifically, the *Ohio* Replacement Program will leverage the Submarine Warfare Federated Tactical Systems (SWFTS) found aboard all current SSNs and SSGNs. SWFTS is based on commercial off-the-shelf (COTS) components, with a regular cycle of technology insertion (TI) and advanced processor builds (APBs) that ensures that the systems remain state-of-the-practice. It permits rapid introduction of new capabilities through open architecture on a system of systems. In fact, the *Ohio* Replacement Program Office has already determined that the regular TI/APB cycles will allow it to deliver the first ship of the class with the most up-to-date SWFTS build. Additionally, the program will incorporate Universal Modular Masts (UMMs) in the sail. Like SWFTS, the UMMs permit rapid integration of new equipment and capabilities as they become available.

Since both SWFTS and UMMs are already in use in the Submarine Force, the *Ohio* Replacement Program will be leveraging groundwork laid by previous programs to avoid designing and proving out its own class-specific systems. This will be the first time that a submarine design and construction of a new submarine class has been able to fully exploit ongoing system development programs for combat systems and associated non-propulsion electronics.

The Navy is also evaluating common command and control center arrangements for both Block IV of the *Virginia* class and the *Ohio* Replacement. A common arrangement will reduce research and development costs and take advantage of advances in computing and display power to reconfigure the command and control spaces for the operational mission while decreasing heat and power loads on the ships' hotel services. The Navy is also considering "decoupling" display and control stations in the common command and control center by using "cold rooms" for the computer servers. This would make control center arrangements more flexible, improve the reliability and maintainability of the servers, reduce costs, and allow more timely and cost-effective upgrades without disrupting control center operations while in-port. It will also have the operational benefit of making the arrangement and equipment in these spaces consistent across newer SSNs and SSBNs, making it easier for a Sailor trained on one ship to perform the same operations and maintenance on another.

A New Acquisition Baseline

Despite being a relatively young endeavor, the *Ohio* Replacement Program is establishing a baseline from which future acquisition programs will be judged. During the progression from the technology development phase to detailed design and construction, the program office will strive to give the fleet a ship capable of carrying out strategic deterrence for nearly half a century while always bearing in mind its responsibility to control costs. The *Ohio* Replacement Program's design-for-affordability efforts and its close cooperation with the *Virginia* Class Program are helping lay the groundwork for another success story in DoD acquisition.

Capt. Bishop is the *Ohio* Replacement Program Manager (PMS 397) in Washington, D.C.

by Strategic Systems Programs Public Affairs

Back to the Future with Trident Life Extension

The U.S. Navy's Strategic Systems Programs (SSP) organization has served for more than half a century as the keeper of the most survivable leg of the nation's strategic deterrent—the submarine-launched ballistic missile. Although the program began in response to a Cold War threat, the need for strategic deterrence did not disappear when the Cold War came to a close. Over the past two decades, the United States has succeeded in achieving a sufficient level of cooperation with Russia to significantly reduce the number of warheads each country deploys, but the world is still far from free of the threat of nuclear weapons. On the contrary, a number of other countries are seeking to develop or expand strategic nuclear weapon capabilities that could threaten our national security.

It is SSP's responsibility to ensure that the strategic weapons system (SWS) entrusted to the Navy remains safe, reliable and effective in deterring threats to our national security. As we look to the next 50 years and beyond, SSP's government-industry team will remain a key participant in ensuring our national security by preserving existing capabilities and preparing for the future.

SSP remains wholly focused on the mission of providing credible and affordable strategic solutions to the warfighter. Today, the SSP team is actively engaged in five key areas:

- Enabling deterrence through an assured second-strike capability that is survivable, reliable and credible, with a constant at-sea presence.
- Sustaining the approximately 70 percent of deployed strategic warheads designated for the sea-based leg of the strategic triad under the New START Treaty (an increase from approximately 50 percent under the previous START Treaty).
- Providing for the Trident II (D-5) weapon system to be deployed on *Ohio*-class SSBNs through 2042 and as the initial weapon system for the *Ohio* Replacement through life extension efforts in all the functional subsystems of the SWS.
- Supporting the Program Executive Office for Submarines (PEO Subs) in the continued development of the *Ohio* Replacement SSBN, which will ensure continuation of the sea-based leg of the strategic triad through 2080.
- Partnering with the United Kingdom through the Polaris Sales Agreement to provide the Trident II (D-5) weapon system, which makes up 100 percent of the U.K.'s nuclear deterrent, and to support that system through the 2060s.

SSP is dedicated to meeting the challenges of maintaining our aging strategic weapon system while developing the most survivable leg of the strategic deterrence system of the future.

Life extension efforts will push the Trident missile's service life beyond that of all five previous systems combined. Toward that end, SSP has aggressively tackled modernization of every subsystem of the Trident II (D-5) Strategic Weapons System — launcher, navigation, fire control, guidance, missile and reentry. Every subsystem is also integral to the overall team effort embodied in the *Ohio* Replacement Program. Just as their dedicated predecessors made it possible to create the first undersea leg of the strategic triad in a mere five years, today's dedicated SSP personnel are ensuring tomorrow's undersea deterrent through the D-5 Life Extension program.

A Rich Heritage of Innovation and Expertise

SSP is quickly closing in on its 57th anniversary of service to the security of our nation and the preservation of global stability. The program traces its origins to the Eisenhower administration's landmark 1955 decision to develop a sea-based intercontinental ballistic missile. 1955 was an unsettling year for American security. In May of that year, the signing of the Warsaw Pact created a military bloc of eight communist countries under the sway of the Soviet Union, reinforcing the Communist Bloc's bitter and dangerous rivalry with the United States and its allies. On Nov. 22, only five days after the creation of what was then called the Special Projects Office, the Soviet Union tested its first megaton hydrogen bomb.

The newly formed Special Projects Office was assigned the task of developing the first underwater-launched, solid-fueled ballistic missile. It was vital to America's national interest that this effort succeed, for it would enable the United States to deploy a continuous at-sea deterrent that was impregnable to a first strike by any enemy. This, in turn, would provide a level of strategic security never before enjoyed by any nation.

To meet this daunting challenge, the Special Projects Office initiated the Polaris program, directed by renowned Rear Adm. William F. "Red" Raborn under the watchful eye of the Chief of Naval Operations, the legendary Adm. Arleigh Burke. Development of the submarine-launched Polaris A-1 missile system was not only a remarkable feat of engineering research, development and acquisition, but also a pioneering example of Navy-industry teaming.

The Polaris A-1 went to sea only five years later — on Nov. 15, 1960—when the nuclear-powered ballistic missile submarine USS *George Washington* (SSBN 598) commenced the U.S. Navy's first strategic-deterrent patrol. It was the first of six generations of submarine-launched ballistic missile systems that the program would develop, produce and deploy in the roughly 35 years between 1955 and 1989.

Building on the legacy of excellence established during those years, SSP continues to provide stewardship for the sea-based strategic weapon system. Today, America's unmatched sea-based strategic deterrent consists of 14 *Ohio*-class SSBNs (12 currently operational, and two undergoing in-service refueling) outfitted with the Trident II (D-5) SWS. In addition, four Royal Navy *Vanguard*-class SSBNs are also outfitted with the Trident II (D-5).

What Is Old Is New Again

Trident II (D-5) was developed in the 1980s and went into service just as the Cold

War came to a close. USS *Tennessee* (SSBN 734) conducted the first operational deployment in early 1990. More than 20 years later, SSP continues to manage this unrivaled weapon system, the most numerous and most survivable component of the nation's strategic deterrence forces.

Life extension efforts will push the Trident missile's service life beyond that of all five previous systems combined. Toward that end, SSP has aggressively tackled modernization of every subsystem of the Trident II (D-5) SWS—launcher, navigation, fire control, guidance, missile and reentry. Every subsystem is also integral to the overall team effort embodied in the *Ohio* Replacement Program. Just as their dedicated predecessors made it possible to create the first undersea leg of the strategic triad in a mere five years, today's dedicated SSP personnel are ensuring tomorrow's undersea deterrent through the D-5 Life Extension (LE) program.

The fact that the Trident II (D-5) is projected to be in service on *Ohio*-class SSBNs until 2042 poses the challenge of ensuring the system's reliability long past its original planned lifespan. Moreover, the same system will constitute the initial load-out of the *Ohio* Replacement and *Vanguard* Successor SSBNs currently in development.

It has been more than a decade since Trident Life Extension options were first discussed. At that time, SSP outlined six alternatives for ensuring a credible submarine-launched ballistic missile program into the 2040s. Leadership determined the best way forward, and full funding of life-extension efforts commenced in 2002. Of the various challenges the life-extension program faced, then-SSP Director Rear Adm. Dwyer noted at the time that "…the biggest challenges involve determining the service life of the three-stage boost motors that comprise the missile propulsion system and modernizing the extremely complex D-5 guidance system and missile electronics."

The work accomplished over the last decade to meet these two key challenges, along with many lesser ones, is producing tangible results. SSP conducted the first flight test of a D-5 LE subsystem—the MK 6 Mod 1 guidance system—in Demonstration and Shakedown Operation (DASO)-23, which took place on *Tennessee* Feb. 22, 2012. This was not only a significant milestone for the LE program, but also an event with considerable historic resonance, since 22 years before, in February 1990, *Tennessee* had served as the platform for DASO-01, thus becoming the first *Ohio*-class SSBN ever to launch a Trident II (D-5) missile.

The flight testing of the MK 6 Mod 1 guidance system, which took place on time and on budget, was a major achievement for SSP's Guidance Branch, which had put significant effort into validating the design with new modeling, simulation and hardware-in-the-loop integration and test capability.

The ability of SSP's Enhanced Ground Test (EGT) program to dynamically test systems in environments that replicate actual missile flight conditions also played an important role. EGT's test cells, which include a thermal-vibe-shock acoustic shaker and an under-wing pod that can be installed on a high-performance aircraft, provided the level of confidence necessary to forego initial missile testing from a land-based launch pad. Conducting the first D-5 missile test of the MK 6 Mod 1 guidance system directly from an SSBN achieved significant savings.

Other key LE components are also making rapid progress. Qualification testing of the LE Flight Control Electronics Package started in February 2012 and is expected to continue for approximately 13 months. Qualification testing of the LE Command Sequencer began in November 2011 and is expected to be completed later this year. Meanwhile, the expected initial flight test of the D-5 Life Extension proofing test missile remains on track for FY14, and life-extended missiles with the full complement of modernized systems are scheduled to begin entering the fleet in 2017.

The life-extension effort has also yielded unexpected benefits for SSP. The Missile Branch and the Guidance Branch both committed at the outset to maximize the use of common processes, procedures and suppliers. This established new avenues of cooperation not only between the branches, but also with industry partners. It included procuring electronics parts and multilayer boards through a common circuit card assembly (CCA) supplier, resulting in a competition that produced significant overall savings on electronic parts. SSP continues to look for and take advantage of such spin-off benefits from the LE effort.

Beyond Missiles—Shipboard Systems and Warheads

The initial shipboard systems on *Ohio*-class SSBNs were developed in the 1970s and fielded in the 1980s and '90s, so they have required major updating in recent years to address electronics obsolescence. In order to keep pace with technology and reduce cost, SSP developed architecture for the updates based on commercial-off-the-shelf (COTS) components. This yielded many benefits by taking advantage of rapid advances in electronics, such as miniaturization. The first application of COTS-based architecture was the installation of a new navigation system. Among other benefits, it ultimately reduced the number of cabinets required for navigational components from nine to two.

Since that time, use of COTS has enabled SSP to put the shipboard systems on a "refresh cycle" of periodic upgrades to their hardware and software and has reduced both the cost and downtime associated with upgrading. Currently, SSP is installing Shipboard Integration Increment-1 throughout the fleet and in training facilities. It has completed the technical refresh on *Tennessee*, USS *Nevada* (SSBN 733), USS *Pennsylvania* (SSBN 735), USS *Kentucky* (SSBN 737), USS *Alabama* (SBN 731), USS *Louisiana* (SSBN 743), USS *Rhode Island* (SSBN 740), and USS *Maine* (SSBN 741). Britain's four *Vanguard*-class SSBNs have also received the refresh, as have the U.K.'s Software Facility and its Trident Training Facility (TTF) at Faslane, Scotland. Installation is also complete at the U.S. Trident Training Facilities in Bangor, Wash., and Kings Bay, Ga. This evolution of COTS-based upgrades will continue through 2013 with the six remaining U.S. boats and the second system at TTF Kings Bay.

Meanwhile, SSP continues to be involved in warhead life-extension studies to address the challenges of ensuring the continued reliability of in-service nuclear warheads. At the same time, the SSP-led management team for the MK 5 alteration is proceeding with development of a new arming, fuzing and firing (AF&F) system to refurbish the 30-year-old W88/MK 5 reentry system. The Air Force will then adapt the Navy AF&F for its own MK 12A and MK 21 reentry systems. This project remains fully funded, within budget, and on schedule for a full production unit in December 2018.

Collaboration for the Future

Along with extending the life of current systems, SSP continues to look for opportunities to collaborate on future possibilities with the many different U.S. programs and

agencies involved in strategic deterrence and undersea platforms, as well as with the United Kingdom.

The U.S. and the U.K. have maintained a shared commitment to nuclear deterrence since April 1963, when President John F. Kennedy and British Prime Minister Harold Macmillan signed the Polaris Sales Agreement. This longstanding agreement, only one year away from its 50th anniversary, remains the foundation of this strategic partnership as each country develops a new class of SSBNs designed to accept the Trident II (D-5) as their initial weapon system. It is worth noting that while Trident II accounts for 70 percent of the U.S. strategic deterrent, it accounts for 100 percent of Britain's. Consequently, we have a responsibility to our U.K. partner and ally to continue building on the success of our tested and fruitful collaboration.

A key component of the *Ohio* Replacement Program is the development of the Common Missile Compartment (CMC) that will support the deployment of the Trident II (D-5) on both the *Ohio* Replacement and *Vanguard* Successor. Despite the recent decision to postpone the planned deployment date of the *Ohio* Replacement by two years in response to current fiscal considerations, SSP is continuing to move forward without delay on the joint effort to develop the CMC.

Here at home, there are many opportunities for collaborating with the U.S. Air Force on future capabilities. SSP is involved in the Air Force-led study examining the possibility of reducing the number of warhead types by developing a common warhead for both land-based and sea-based strategic systems.

The Navy and Air Force are also interested in collaborating on other aspects of strategic systems as the two services face similar budget pressures and the challenge of sustaining and recapitalizing strategic missile systems in a similar timeframe. In addition to exploring areas of potential collaboration in technology development, they are already collaborating on a common fuze and on research and development related to guidance subsystems and propulsion. Electronic systems, ordnance, and tooling and facilities also offer potential opportunities for joint effort.

The degree of future collaboration and commonality will depend heavily on decisions about future sustainment and recapitalization of our strategic ballistic missiles. It is vital that the Air Force and Navy discuss programmatic timelines, plans, current and future system requirements, and other key subjects now to determine where the greatest opportunities are. At least some degree of commonality is possible between current and future missile systems if we communicate early and continue to foster a culture of cooperation.

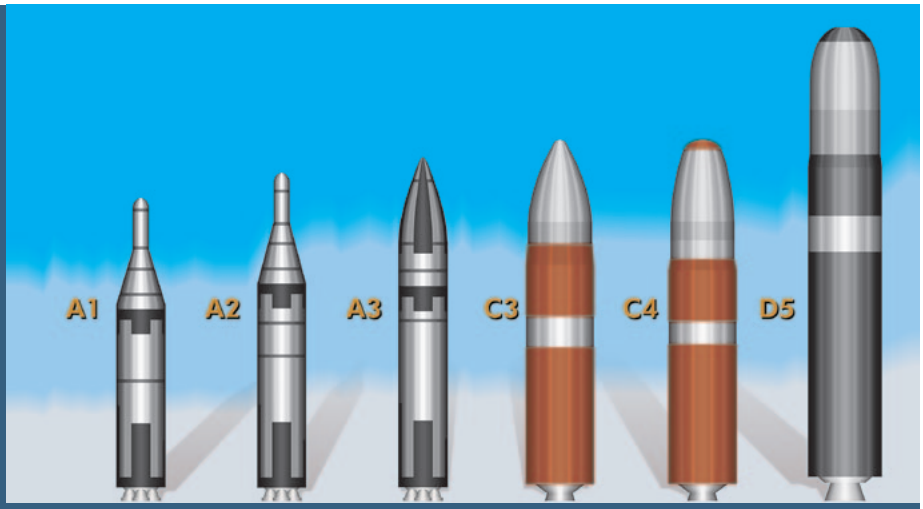
On Course for the Mid-21st Century

Building on its rich heritage of technical innovation and expertise, SSP has set course for the new global strategic deterrence environment of the mid-21st century and beyond. Testing remains the cornerstone of the continued viability of our strategic weapon system, ensuring that we collect the important data needed to quantify the system's performance well into the future. Operational tests have continued to demonstrate the outstanding performance and reliability of our SSBN force, with 142 successful test flights of the Trident II (D-5) completed to date.

America's Trident program continues to exceed all of the technical objectives established more than three decades ago, and life-extension efforts, coupled with the *Ohio* Replacement Program, are enhancing our ability to meet recapitalization and modernization requirements. Strategic Systems Programs remains a unique blend of preeminent military, civilian and industry partners dedicated to a unique mission—maintaining stability in our changing world through the excellence of our strategic deterrent.

The SLBM Family

The dimensions and capability of U.S. submarine-launched ballistic missiles increased dramatically from the early Polaris A-1 to today's long-lived Trident D-5.



	POLARIS A-1	POLARIS A-2	POLARIS A-3	POSEIDON C-3	TRIDENT C-4	TRIDENT D-5
Length	28 ft.	31 ft.	32 ft.	34 ft.	34 ft.	44 ft.
Diameter	54 in.	54 in.	54 in.	74 in.	74 in.	83 in.
Weight	28,000 lbs.	32,500 lbs.	35,700 lbs.	64,000 lbs.	73,000 lbs.	130,000 lbs.
Range	1,200 NM	1,500 NM	2,500 NM	2,500 NM	4,000 NM	>4,000 NM
Year Retired	1965	1974	1982	1992	2002	TBD

by Adm. Richard Mies, USN (ret.)

Strategic Deterrence in the 21st Century

The Transformation of Warfare

No discussion of deterrence strategy in the 21st century can be meaningful without a clear understanding of how nuclear weapons have revolutionized and transformed warfare. In a small book written at the dawn of the nuclear age, a group of scholars drew some profound and prescient conclusions about the significance for human warfare of what they termed "the absolute weapon." The authors recognized that the atom bomb was revolutionary and fundamentally different from conventional weaponry. Pound for pound, nuclear weapons were several million times more potent; no adequate defense against them was known or foreseen to exist; and some proliferation of nuclear weapon technology to other nations was inevitable, barring international control.[1] One of the most insightful, fundamental conclusions they reached reflected the atom bomb's revolutionary nature:

"Thus far the chief purpose of our military establishment has been to win wars. From now on its principal purpose must be to avert them."[2]

Nuclear weapons have extended the potential of warfare to a level where classical warfare concepts cease to have meaning — to the *reductio ad absurdum*[3] of warfare. In parallel, they have also come to be seen as different not just by their potency, but "by convention — by an understanding, a tradition, a consensus, a shared willingness to see them as different."[4] And this revolution in warfare — the virtually unlimited capacity to harm each other — is likely to be with us forever, since the knowledge to build nuclear weapons cannot be erased.

Because of their revolutionary nature, nuclear weapons are, first and foremost, instruments of national policy, as opposed to instruments of military operations. Nuclear weapons serve as a deterrent against major war, a hedge against an uncertain future, a guarantee of our security commitments to our allies and friends, and a disincentive to those who would contemplate developing or otherwise acquiring their own nuclear weapons. They are primarily weapons of war *prevention*, as opposed to war *fighting*, although war prevention and war fighting cannot be totally disassociated. Nuclear weapons deter by the possibility of their use and by no other means.

Deterrence strategies, which evolved during the Cold War, recognize that the greatest utility of nuclear weapons is in their *non-use* — in the diplomacy derived from the threat of their use. In that sense, *nuclear weapons are used every day*. The concepts of deterrence, assurance and dissuasion associated with nuclear weapons differ fundamentally from classical military strategy in that they deal with the exploitation of *potential* force rather than the application of force. They are intended to shape behavior and, as such, they share some common elements of inducements — of threats and/or promises, explicit or implicit — to either prevent or promote an action. Their primary purpose is to influence potential adversaries' intentions far more than their capabilities through two interrelated means — the power to hurt and the power to deny.[5] These powers are most successful when held in reserve and their non-use, their potential, exploited through diplomacy. The most successful threats are the ones that never have to be carried out. As Sun Tzu noted, "To subdue the enemy without fighting is the acme of skill."[6]

The great paradox of nuclear weapons is that they deter conflict by the possibility of their use, and the more a potential adversary perceives the credibility of our capabilities and will, the less likely he is to challenge their use. The converse of that proposition is also true. To be credible, capabilities and plans have been developed since the early 1960s to provide the president with as broad a range of options as considered prudent to enable him to respond with the *minimum use of force* sufficient to deny an adversary's objective. This has been the nature of the concept of "flexible response" and the core of U.S. and NATO targeting doctrines. To argue that this has made nuclear weapons more useable is to ignore their central paradox and their fundamental difference from conventional weapons. To allow nuclear weapon use to become incredible would increase, not lessen, the risk of war.

And because nuclear weapons are primarily designed for war avoidance, nuclear deterrence ultimately depends on the threat of retaliation — not on our capability to strike first, but on the assurance we always have the capability to strike second. In my experience, our strategic forces have always been viewed by our leaders as weapons of last resort, to be employed only when deterrence has failed and all other means to counter aggression or coercion have failed. From a war-fighting perspective, nuclear weapons have historically been regarded as the nation's "ultimate insurance policy" — *de facto* weapons of last resort — the least-preferred option, short of surrender, to protect vital national interests.

Strategic Force Evolution

During the past decade, our strategic forces have been on a journey of reductions that was charted in the 2001 and 2010 Nuclear Posture Reviews (NPR) and codified in the Moscow Treaty and, more recently, the New START Treaty. The journey began out of recognition that U.S. nuclear doctrine and forces needed to have lower salience and a less adversarial character, most directly as a result of our changed relationship with

Preservation of our capability to adapt our deterrent forces to a rapidly changing and unpredictable strategic future is critical. Because we have neither new delivery platforms nor new warheads in development, we must not be hasty in taking irreversible steps to reduce our capabilities and flexibility.

Russia, and also out of recognition that deterrence was likely to be more complex and perhaps less reliable, particularly against non-state actors, *although not necessarily less relevant*. I emphasize that this is about a journey rather than a destination because the journey is far more important than the destination.

Simultaneously, since the end of the Cold War, we have experienced significant erosion in our strategic deterrent capabilities well documented in a number of reports.[7] In spite of the rhetoric of the past two Nuclear Posture Reviews and the National Defense Strategy, there has been a paucity of thinking by senior-level decision-makers about the role of our strategic deterrent, and particularly the role of nuclear weapons in the 21st century. Many reasons are given for this, such as the Global War on Terror, operations in Afghanistan and Iraq, unchallenged U.S. conventional superiority. Nevertheless, the result is a glaring mismatch between the rhetoric of national strategy and the resources committed to our national strategy objectives.

Despite recent actions to arrest some of this erosion, our strategic forces appear to be adrift—paralyzed by inaction and a lack of consensus. The fundamental underlying cause has been a lack of attention to nuclear weapon issues by senior leadership—both civilian and military—across both present and past administrations. This lack of senior leadership attention has resulted in public confusion, congressional distrust, and a serious erosion of advocacy, expertise, and proficiency in our nuclear forces.

Our Aging Strategic Deterrent Enterprise

While we have made great progress in the drawdown of our strategic forces, progress to modernize our strategic deterrent enterprise has been inadequate to meet our national security needs. If one thinks about our strategic capabilities as an enterprise, it really resembles a pyramid, as Figure 1 depicts, whose foundation is the scientific and technological expertise resident in our nuclear complex employees and in our strategic operating forces. That foundation is growing increasingly thin and brittle—through both an aging workforce and difficulties recruiting and retaining the best and brightest. And while many have spoken eloquently about the importance of science and technology programs as critical underpinnings of the Department of Energy's portion of the nuclear enterprise, there are really few, if any, programs on the DOD side that are analogous to DOE's science-based stockpile stewardship program or the advanced computing initiatives. We have raised a whole generation of *war-fighters* within DOD who have received virtually no professional education in the theories of deterrence, assurance, and dissuasion, and who consequently often fail to think in *war-prevention* terms. Additionally, there has been until recently little, if any, programmatic advocacy within the Office of the Secretary of Defense, the Joint Staff, and the military services for the strategic nuclear enterprise.

Several points are worthy of mention with respect to this enterprise pyramid. Foremost, deterrence depends on the health of the *entire* pyramid, not just any one element. We can't deter with just a strong foundation—a "virtual deterrent" is simply not credible. Second, the distinction between tactical and strategic nuclear weapons is an outmoded, treaty-derived distinction that relates more to delivery platforms than actual warheads. There is little significant difference in the design and capabilities of our tactical and strategic warheads. The principal distinction is in the delivery platform; any tactical

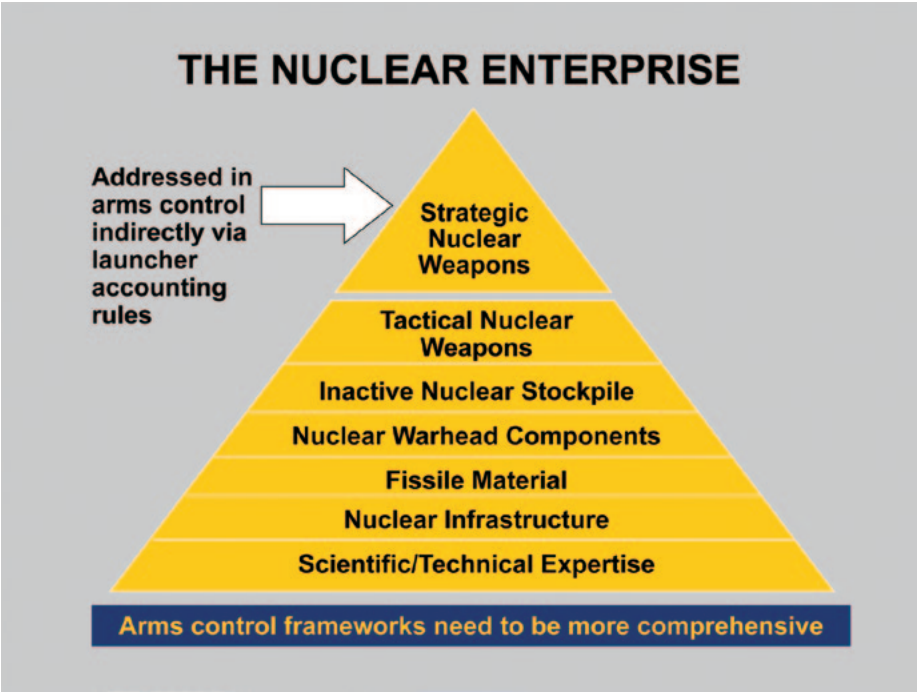


Figure 1 *(top)*. The U.S. nuclear enterprise.

nuclear weapon can be used with strategic effect. Despite these factors, our focus on the enterprise tends to be disproportionately narrow—driven to an over-emphasis on the very top of the pyramid to strategic weapons, and even then indirectly—because of our captivation with strategic warhead numbers.[8] As a consequence, we often fail to view the enterprise in a more comprehensive way.

Figure 2 illustrates the aging of our legacy Cold War stockpile and our lack of robust design and production capability. We have lost people with unique skills as well as design and production knowledge. Many of our warheads are beyond their design lives and lack desirable safety and surety features we are now capable of incorporating into replacement designs. Our legacy warheads are sophisticated machines, similar to a 20th Century Rolls Royce, with as many as 6,000 intricate parts and complex chemical interactions. Because of their sophistication, some warhead performance margins are extremely narrow. And unlike wine, the reliability of sophisticated machines doesn't improve with age. The best we can do is to extend their lives. Needless to say, reestablishing design and production capabilities remains a very complex and lengthy process.

Figure 3 complements the previous one. Not only is our warhead stockpile aging, all of our strategic delivery systems are aging and approaching end-of-life in an austere and potentially adverse fiscal environment. Contrast this with other key nuclear-capable nations who are modernizing substantially their strategic forces.

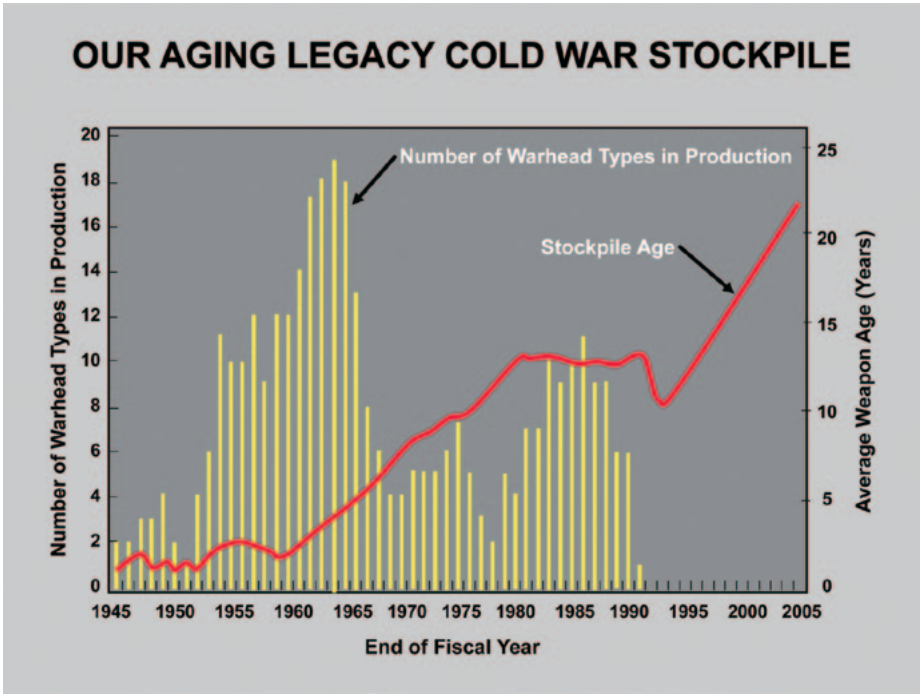
The Risks and Uncertainties of Strategic Force Reductions

As we contemplate further reductions in our nuclear forces beyond the New START Treaty to lower levels consistent with our national security needs, we will inevitably encounter several risks related to the national security concepts of deterrence, assurance, and dissuasion.

First, some of our allies may seriously question the credibility of our extended nuclear deterrent, so instead of promoting non-proliferation, our reductions may have the perverse, opposite effect. Decades ago, British Prime Minister Denis Healey explained the difference between extended deterrence and assurance with the observation that, "it takes only 5 percent credibility of American retaliation to deter the Russians, but 95 percent credibility to reassure the Europeans." By this, he meant that assuring allies may be more challenging than deterring foes, that there are different measures of adequacy for these two different goals.[9]

Second, below certain levels, potential adversaries may be encouraged to challenge us. A smaller arsenal may appear to be a more tempting and easier target for preemption, breakout, or a race to parity.

Third, at some level, it will become more difficult and economically impractical to sustain the present strategic triad. While there is nothing sacrosanct about the triad, numerous analyses and studies have repeatedly reaffirmed the wisdom of preserving the complementary capabilities of land-based intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs), and strategic bombers.[10]



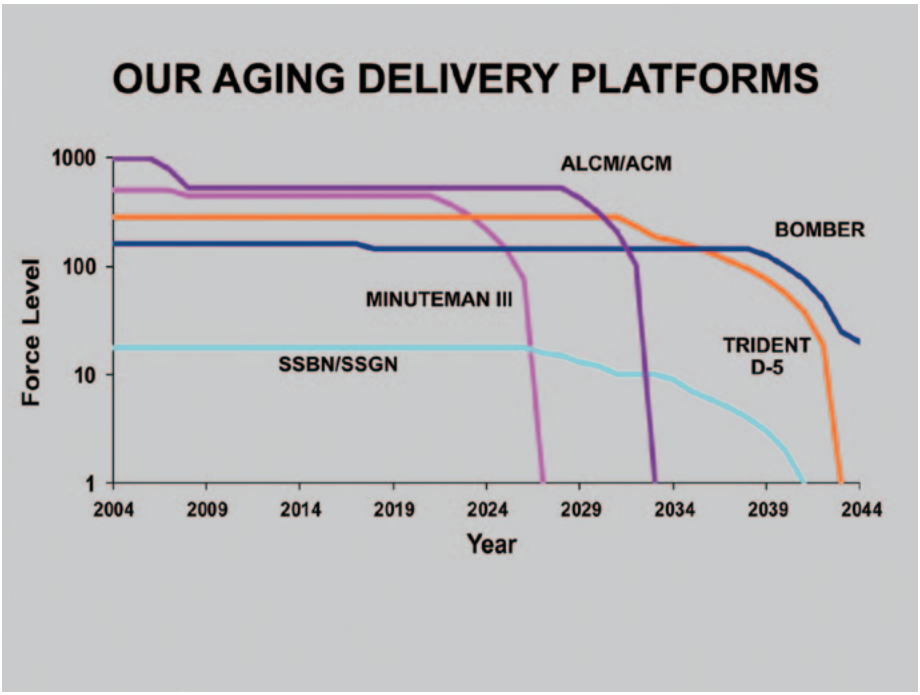


Figure 2 *(top)*. The aging of a nuclear stockpile inherited from the Cold War.
Figure 3 *(bottom)*. The aging of U.S. strategic nuclear delivery platforms.

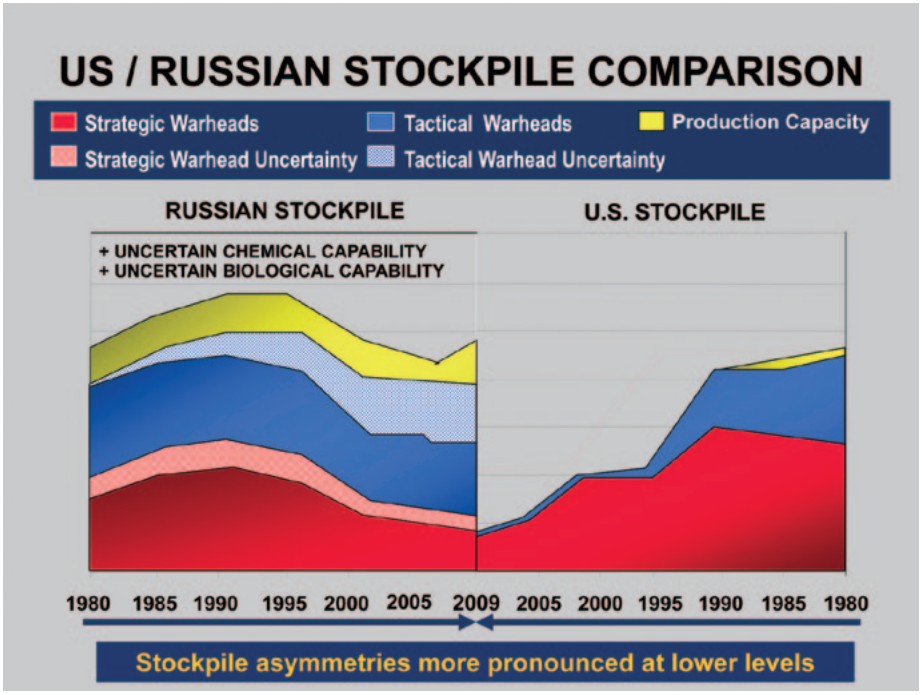
Each leg of the triad contributes unique attributes that enhance deterrence and reduce risk, such that the whole is greater than the sum of the parts. ICBMs provide a prompt response, the potential to launch under attack[11], and a hardened, geographically-dispersed target base. Additionally, single-warhead ICBMs are considered stabilizing, since they are less attractive as targets than multiple-warhead ICBMs because the ratio of weapons required to destroy them is greater than one. Missile submarines provide survivable, assured response and the mobility to adapt missile over-flight to targets. Strategic bombers provide great flexibility in force posturing, signaling intentions, route planning, and recall-ability. Together they comprise a robust deterrent capability that complicates a potential adversary's offensive and defensive planning and a synergistic force that provides protection against the failure of a single leg.

A fourth risk concerns the asymmetries in U.S. and Russian nuclear stockpiles. Figure 4 is a *relative* comparison of the U.S. and Russian nuclear stockpiles over the past three decades. (Note that both stockpile charts start from the outside and work toward the center.)

This comparison raises several noteworthy points. First, we have dramatically and unilaterally drawn down our tactical nuclear forces in contrast to Russia. To my knowledge, our unilateral disarmament initiatives have done little to promote similar initiatives in our potential adversaries, and at the same time, they have reduced our arms control negotiating leverage. In that sense, the lead part of the "lead and hedge" strategy — the idea that if we lead, others will follow — has proven illusory. Second, and similarly, the Nuclear Policy Reviews' promises of a responsive infrastructure remain largely unfulfilled. In contrast to Russia, we have had virtually no warhead production capability for the past two decades and have little likelihood of developing a robust one within the coming decade.

Finally, because of the difficulties and our lack of leverage in expanding treaty negotiations to include tactical nuclear forces and production capability, if we jointly agree to reduce our strategic nuclear forces to even lower levels, the asymmetries in our respective stockpiles will become even more pronounced. As stated earlier, the artificial and inappropriate distinction between strategic and tactical nuclear weapons is cause for concern. As Ambassador Robert Joseph has written, "Since the start of the atomic age, from Harry Truman to George W. Bush, the United States has sought to maintain, in the words of John F. Kennedy, a nuclear weapons capability 'second to none.'" Are we in danger of allowing our nuclear preeminence to become 'second to one'?[12]

A fifth risk concerns strategic targeting doctrine. Figure 5 is a notional chart intended to illustrate several of the dilemmas of strategic targeting. The curve on the right represents our present and long-standing targeting doctrine of flexible response — a doctrine designed to hold at risk our potential adversaries' military forces, war-supporting industry, command and control capabilities, and military and national civilian leadership, while minimizing to the maximum extent possible col-



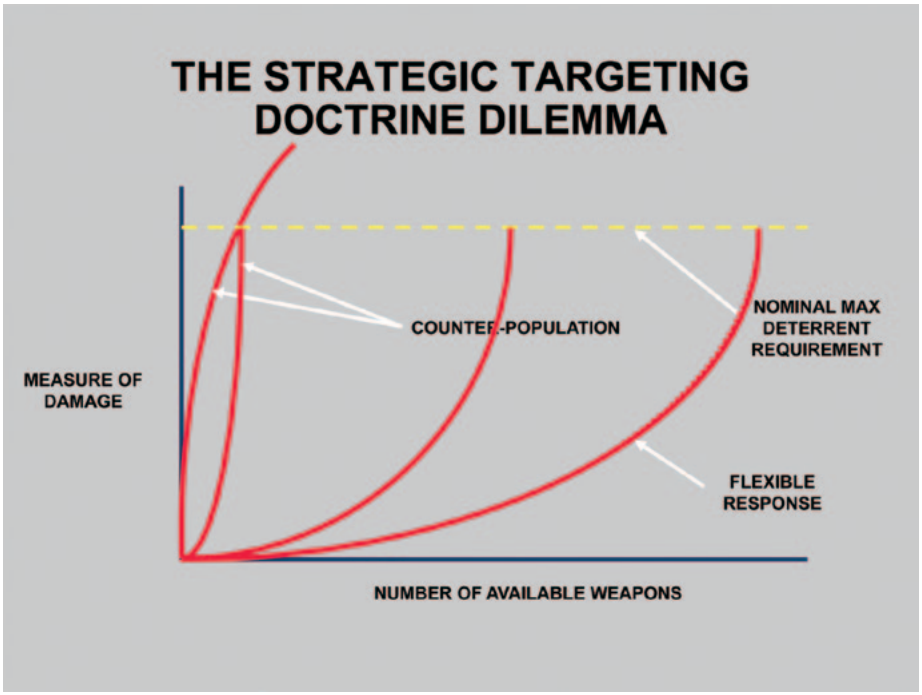


Figure 4 *(top)*. The decline of the U.S. nuclear weapon stockpile compared to Russia's.
Figure 5 *(bottom)*. The relationship between warhead numbers and strategic doctrine.

lateral damage to population and civilian infrastructure. It is a doctrine designed to *provide the president the widest range of options using the minimum level of force intended to achieve our objectives.* The curve on the far left illustrates that if we adopted a counter-population targeting strategy, we could achieve significantly more damage with fewer weapons. But at what cost and credibility?

As we reduce the number of available weapons, that flexible response curve moves to the left, which will diminish the robustness and flexibility inherent in a moderately sized arsenal (a few thousand, as compared to a few hundred). Greater stress will be placed on the reliability and survivability of our remaining forces. As stated earlier, at some level, it will become more difficult and economically impractical to sustain the present strategic triad. And of greatest concern, it will reduce the range of flexible response options designed to provide the president with *minimum use of force*. Ultimately, below a certain level, to remain credible our targeting doctrine and policies would have to shift away from our traditional flexible response targets to counter-population targets, as depicted by the two curves on the left, which represent the range of counter population options. This transition would be counter to our historical practice, politically less tolerable, and morally repugnant. Although I am not an international lawyer, I would also argue that such a transition is in violation of the Law of Armed Conflict and the Theory of Just War.

The Illogic of Zero[13]

In light of the aforementioned transformation of warfare, the widely publicized initiative to eliminate nuclear weapons deserves critical review. Theories and concepts abound on the political, strategic, and military significance of nuclear weapons, but we should be mindful of their limitations. We lack sufficient hard evidence about the consequences of nuclear weapon abolition. In the words of an experienced practitioner:

"The resulting limitations in our knowledge ought to instill in all who make predictive statements about these issues a degree of humility not always evident…. There is no substitute for looking at the merits of what is said [rather] than the eminence of who said it … the means for creating a world without actual nuclear weapons would have to be of a basic political kind, not a matter of technical arms control. Secure nuclear abolition would be consequence, not cause; and in the journey it has to be cart, not horse…. Better unquestionably, pending political transformation, to have nuclear weapons but not war than to have war but not nuclear weapons."[14]

If, as another experienced statesman has stated, "Nations don't distrust each other because they are armed; they are armed because they distrust each other,"[15] shouldn't our focus be on the more fundamental, underlying causes of distrust instead of disarmament? Hence a significant burden of proof rests upon those who advocate nuclear abolition. They need to answer some fundamental questions about the logic of zero. Without compelling answers to these questions and achievable actions, I believe their vision will prove counterproductive, promote unrealistic expectations, and serve as justification to keep the strategic enterprise adrift — paralyzed and frozen in time.

First: Is it feasible? If so, what detailed, specific actions must be taken by individual nations and the international community, and in what time frames? How do you achieve those reductions and avoid the risks and uncertainties outlined previously? Which other nuclear nations share the abolitionist vision and have actually demonstrated a commitment to work in concert toward that goal?

Second: Is it verifiable? If so, by whom, and with what means? How would compliance be enforced? Considering the examples of North Korea and Iran, is such an intrusive and comprehensive verification regime achievable in our existing geopolitical framework?

Third: If it is both feasible and verifiable, is it inherently stabilizing, and hence sustainable? Since the knowledge to build nuclear weapons cannot be erased, and many nations will have latent nuclear capabilities, what disincentives will preclude cheating or breakout? If biological terrorism remains a major threat despite the abolition of biological weapons, why do proponents believe that the abolition of nuclear weapons will significantly reduce the nuclear threat? What means will exist to prevent a terrorist from acquiring fissile material, which will still be in abundant supply? What means will exist to prevent a rogue nation from aspiring to become a nuclear superpower in a non-nuclear world? As a former professor of mine has written, under abolition, present nuclear powers would actually be latent nuclear powers — hardly "former nuclear powers." If the atom bomb could be invented from scratch during World War II, imagine how quickly the nuclear genie could be conjured back into action now.

"In summary, a *world without nuclear weapons* would be a world in which the United States, Russia, Israel, China and half a dozen or a dozen other countries would have hair-trigger mobilization plans to rebuild nuclear weapons and mobilize or commandeer delivery systems, and would have prepared targets to pre-empt other nations' nuclear facilities, all in a high-alert status, with practice drills and secure emergency communications. Every crisis would be a nuclear crisis; any war could become a nuclear war. The urge to pre-empt would dominate; whoever gets the first few weapons will coerce or pre-empt. It would be a nervous world."[16]

Lastly, if nuclear weapon abolition can be achieved and sustained, is it really desirable? How can we be sure we are not making the world safe for conventional war? And while it may be imaginable to envision a world without nuclear weapons while we are the world's superpower, how safe and secure will we be as a nation when, at some future, inevitable time, we no longer enjoy that distinction? To me these are the most fundamental questions the abolitionists blithely ignore.

Figure 6 reinforces this last question. As this graph of wartime fatalities as a percentage of world population illustrates, conventional warfare took a devastating toll throughout history before the advent of nuclear weapons. However, since the advent of nuclear weapons, the transformation of warfare has been dramatic. The fact that there has not been a war between major powers in almost 70 years is without historical precedent. In contrast, the idea that conventional weapons can credibly deter as effectively as nuclear weapons lacks historical evidence. As Margaret Thatcher has reportedly stated, "There is a memorial to the failure of conventional deterrence in every town and village in Europe…. A thousand years of European history prove that conventional weapons do not deter."[17] What evidence do those advocating disarmament and nuclear abolition proffer that illustrates how disarmament has made the world more peaceful?

Conventional deterrence can obviously complement strategic deterrence; but, there is no evidence it can supplant it. Regardless

of force superiority, conventional weapons are contestable both temporally and geographically; in contrast, nuclear weapons are not contestable. Whereas in the past, nations sought to achieve strategic objectives through war, nuclear weapons have created a strong restraining force among nations to avert war. And that has contributed to a remarkable, revolutionary transformation in warfare.

Misperceptions About Nuclear Weapons

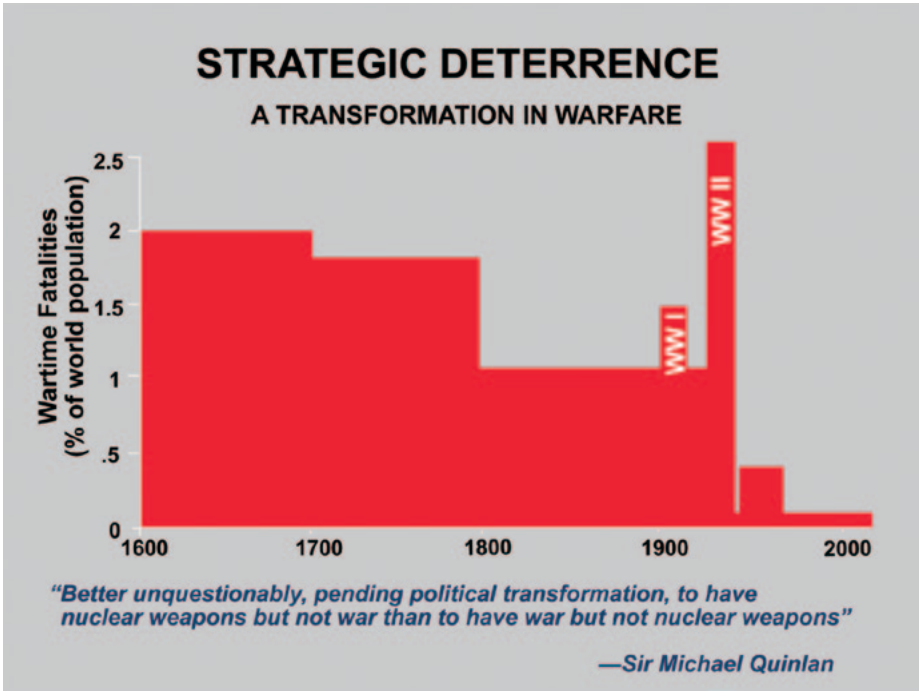
There is a common misperception that nuclear forces are disproportionately expensive—a rich "cash cow" that can be milked with further reductions to free up funding for other priorities. As the graph on the left of Figure 7 illustrates, nuclear forces (including dual-capable forces like bombers) are in reality very cost-effective relative to conventional forces and historically have consumed less than 5 percent of the DOD budget. Most of this cost is driven by overhead and infrastructure, such that warhead reductions will not result in meaningful savings. The graph on the right of Figure 7 is an expanded view of the nuclear force costs in the left graph. Considering their role in war prevention, one should think of our nuclear forces much like we think personally about health and life insurance. Their cost, as a small percentage of the DOD budget, is a very reasonable premium for the nation's "ultimate insurance policy."

There is also a naïve and mistaken belief that the "nuclear danger" is directly proportional to the number of nuclear weapons, and accordingly, lower is axiomatically better. However, disarmament is not inherently stabilizing. One can envision many scenarios where small numbers breed instability.

In addition, there is a common fallacy about deterrence that holds that nuclear weapons deter only nuclear weapons. To accept that, one has to accept that nuclear weapons have played no role in the remarkable peace among the nuclear powers during the past six decades despite periods of significant tension and East-West confrontation. While it is impossible to prove a negative, how else does one reasonably justify the precipitous change depicted in Figure 6?[18]

And it would be equally fallacious to assume, that without some fundamental change in the political configuration of the world, nuclear weapons have no relevance for the future. Deterrence is about preventing all major wars, not just nuclear ones, since major war is the most likely road to nuclear war. As such, a policy of "weapons of last resort" makes sense. A policy of "no first use" of nuclear weapons, if believable, weakens deterrence of major conventional war and rests upon a false strategic premise.

Finally, the oft-cited characterization that our strategic forces are on "hair trigger" alert is a scare tactic routinely used to justify proposals to lessen the potential responsiveness of our strategic forces. In fact, multiple stringent procedural and technical safeguards are in place to guard against accidental or unauthorized launch and to ensure the highest levels of nuclear weapon safety, security, reliability, and command and control. Robust reconstitution capabilities are in place to survive sufficient forces, command and control systems, and



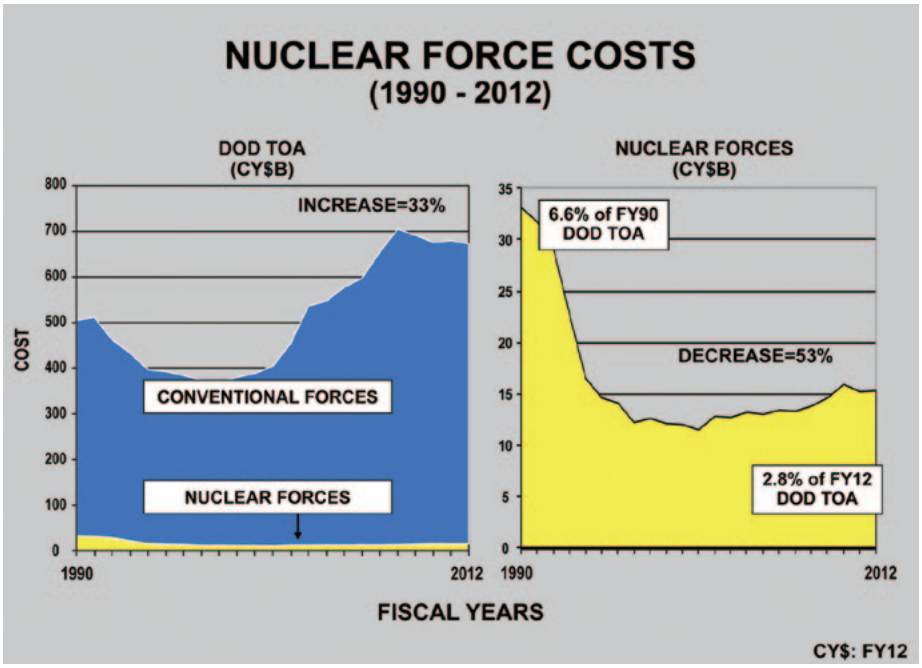


Figure 6 *(top)*. The historical trend of wartime fatalities as a percentage of world population from 1600 to 2000, showing the effect of nuclear deterrence after World War II.

Figure 7 *(bottom)*. Relative costs and cost trends for nuclear and conventional weapons.

national leadership to enable us to "ride out" an attack and not rely upon "launch on warning." In peacetime, our strategic forces are not even targeted against potential adversaries. The U.S. trigger is built so we can always wait.

Guiding Principles for Strategic Force Reduction

There are a number of fundamental principles that should guide further strategic force reductions.

First, we should continue to focus on arms control measures that directly and demonstrably enhance stability and reduce the risks of war. Stability — the lack of an incentive on either side to initiate major aggression or conflict, the assurance against being caught by surprise, the safety in waiting — rather than numerical parity is the most important criterion in assessing force structure and posture options. As Albert Wohlstetter wrote many years ago, "Relaxation of tensions, which everyone thinks is good, is not easily distinguished from relaxing one's guard, which everyone thinks is bad."[19] Deterrence ultimately depends not on our capability to strike first, but on the assurance, we always have the capability to strike second.

Second, we must preserve sufficient deterrent capabilities to respond to future challenges, to provide a cushion against imperfect intelligence and technological surprises, and to provide a reconstitution capability as a hedge against unwelcome geopolitical developments. As we reduce our nuclear forces to lower levels, numbers alone become less important. Attributes such as survivability, reliability, transparency, accountability, reconstitution, force asymmetries, production infrastructures, and verifiability become more and more important. It is ultimately the character and posture of our forces, as well as those of our allies and adversaries, more than just numbers, that makes the strategic environment stable or unstable. Preservation of our capability to adapt our deterrent forces to a rapidly changing and unpredictable strategic future is critical. Because we have neither new delivery platforms nor new warheads in development, we must not be hasty in taking irreversible steps to reduce our capabilities and flexibility.

Third, strategy must be the starting point — it should drive numbers rather than the reverse. A number of people have declared with unwarranted certitude that we can successfully reduce our operationally deployed forces to some lower number (e.g. 500 or 1,000) without ever formulating or articulating what changes in national strategy, objectives, capabilities, force structure, and force posture would be required. Instead of threat-based or capability-based deterrence underpinned by rigorous analyses, war-gaming and risk assessment, they seem to be advocating a form of faith-based deterrence.

Strategy must be the starting point for rigorous analysis with a logic path akin to the following:

- Whom do we want to deter, and under what circumstances might we need to simultaneously deter more than one potential adversary?
- What do those potential adversaries hold that they value most?
- What kinds of capabilities do we need to hold what they value at risk under the most stressful of scenarios?
- What kinds of capabilities do we need to meet our extended deterrence commitments to our allies and friends?
- How do we hedge those capabilities against technological surprise and imperfect intelligence?
- What form of strategic reserve, supporting infrastructure, and reconstitution capabilities are required to maintain those capabilities?
- How do we posture those capabilities to promote stability — i.e., to discourage any potential adversary from preemption, to avoid a "use them or lose them" situation, and to ensure we always have the capability to strike second?
- And finally, what numbers of various capabilities, based upon rigorous analyses, are required to hold at risk a sufficient amount of what our potential adversaries value without accepting undue risk ourselves, while providing the president the widest range of options using the minimum level of force intended to achieve our objectives?

Fourth, we need to view reduction as a means to an end — national security — and not as an end itself. Given the clear risks and elusive benefits inherent in additional deep reductions, those who advocate them bear the burden of proof to demonstrate exactly how and why such cuts would serve to enhance national security.

Summary

As Thomas Schelling has written:

"An early strategist's metaphor that nuclear planners are like homebuilders remains true today. A wise architect does not design only for benign environments, but for the worst weather conditions one can reasonably anticipate. We have to consistently maintain a 'building code' for our strategic forces to ensure they can weather the most stressing scenarios we can reasonably postulate."[20]

None of the foregoing discussion is intended to discourage reductions in our nuclear arsenal *that promote greater stability*, but it is essential to recognize that the journey is far more important than the destination, and that *the overriding goal is not reductions for disarmament's sake, but increased international stability and, most importantly, the avoidance of war.* We need to carefully manage the risks and uncertainties we face in this new strategic era. Our strategic enterprise, and particularly our force structure and doctrine, needs to be robust, flexible and credible. We must always maintain the ability to both reassure our allies and convince potential aggressors to choose peace rather than war, restraint rather than escalation, and conflict termination rather than continuation.

Adm. Mies, a former Commander, Submarine Forces, and Commander, U.S. Strategic Command, is chairman of the Naval Submarine League Board of Directors.

Endnotes

1 Frederick S. Dunn, Bernard Brodie, Arnold Wolfers, Percy F. Corbett, and William T. R. Fox, *The Absolute Weapon* (New York: Harcourt, Brace and Co, 1946), pp 21-107.
2 Ibid., p 76.
3 Michael Quinlan, *Thinking About Nuclear Weapons*, Whitehall Paper 41 (London: The Royal United Services Institute for Defence Studies, 1997), p. 8.
4 Thomas C. Schelling, *Arms and Influence* (New Haven: Yale University Press, 1967), p. 134.
5 See Schelling, Ibid. for a fuller discussion.

6 Sun Tzu, *The Art of War*, trans. Samuel B Griffith (Oxford University Press, 1963), p 77.

7 Numerous classified reports, including two Defense Science Board Reports separately chaired by Adm. Henry Chiles and Gen. Larry Welch, the Schlesinger Task Force Report, the End-to-End Review chaired by Lt. Gen. Brent Scowcroft, and the Nuclear Comprehensive Report that I chaired, serve as examples.

8 Albeit misleading, because strategic warhead numbers are tied to counting rules associated with delivery platforms due to practical limitations in our monitoring and verification capabilities.

9 Keith Payne, "Future of Deterrence: The Art of Defining How Much Is Enough," *Comparative Strategy: an International Journal*, Vol. 29, Issue 3, 2010, p. 219. Some refer to this as the Prime Minister Healy paradox.

10 In every STRATCOM force structure analysis I've been involved with over the years, there were two general truths:

- For the same force levels, a triad performs better than a dyad, and a dyad performs better than a monad. Diversity affords a hedge against single-point failures and significantly complicates a potential adversary's offensive and defensive planning considerations.
- There is a tyranny in low platform numbers that greatly restricts the flexibility, survivability and resiliency of the force. Fewer weapons in more delivery platforms fare far better than too many weapons in too few platforms.

11 While it is not U.S. policy to depend upon launch under attack, the ambiguity associated with the potential to launch under attack complicates any adversary's preemption calculations.

12 Robert G Joseph, "Second to One," *National Review*, October 17, 2011.

13 For a complementary rationale, see Bruno Tertrais, "The Illogic of Zero," *The Washington Quarterly*, April 2010.

14 Michael Quinlan, *Thinking About Nuclear Weapons*, Whitehall Paper 41 (London: Royal United Services Institute, 1997), pp. 5, 41.

15 Salvador de Madariaga, *Morning without Noon* (Farnborough, Hampshire, U.K.: Saxon House, 1974), p. 48.

16 Thomas C. Schelling, "A World without Nuclear Weapons?" *Daedalus*, September 2009, p. 124-129.

17 Although these alleged statements are widely quoted, no definitive source for them has ever been cited.

18 For a more complete and compelling rationale, see James Schlesinger, "The Impact of Nuclear Weapons on History," *The Washington Quarterly*, Autumn 1993.

19 Albert Wohlstetter, "The Delicate Balance of Terror," originally published in *The New Republic*, Sept. 1, 1958; revised Nov. 6, 1958, RAND Corporation publication P-1472.

20 Thomas C. Schelling, in discussion with the author.

The *Ohio*-class ballistic missile submarine USS *Rhode Island* (SSBN 740) transits the Atlantic Ocean during its 49th strategic deterrent patrol.

Photo by Lt. Rebecca Rebarich

by COMSUBPAC Public Affairs

The Integrated Undersea Surveillance System

Photo by Petty Officer 2nd Class Jason Howard

The Silent Service's Quiet Partner

The dedicated men and women who staff the Integrated Undersea Surveillance System (IUSS) play a vital role in ensuring the U.S. Navy's ability to dominate the undersea domain, but their outstanding effort must remain unsung and largely unnoticed. Because of the highly classified nature of their work, we don't get to tell their story in public. What can be told, however, is the story of the impressive efforts on the part of this community to maintain their expertise and capabilities in a time when the undersea domain has never been more critical to our nation.

IUSS, the current-day descendant of the original Sound Surveillance System, or SOSUS, provides actionable intelligence to theater anti-submarine warfare commanders in ways not envisioned by its creators. SOSUS was conceived by Dr. Mervin J. Kelly, then president of Bell Telephone Laboratories, and Capt. Joseph P. Kelly, the first project manager of Project Caesar—with the assistance of several academic and naval research laboratories—to take advantage of long-range, low-frequency propagation of submarine acoustic sources trapped within the ocean's deep sound channel.

SOSUS initially formed the cornerstone of the nation's strategic indication and warning system while providing situational awareness of the Soviet ballistic missile submarines that routinely patrolled just off the East Coast of the United States in the mid-1960s. Naval Facilities (NAVFACs) around the world housed electronics and supported acoustic analysts who solely monitored Soviet submarine activity.

In the mid-1980s, the introduction of Surveillance Towed Array Sensor System (SURTASS) ships, which tow an acoustic array, transformed SOSUS into an integrated undersea surveillance system. Adding these new mobile sensors to the previous fixed capability enabled the system to monitor key Soviet patrol areas. Continued advances in connectivity and data delivery subsequently allowed IUSS to consolidate from over 30 NAVFACs and 18 SURTASS ships at the system's peak, down to what exists today: two Naval Ocean Processing Facilities (NOPFs), one at Dam Neck, Va., and the other at Whidbey Island, Wash., and five SURTASS ships, all in the Western Pacific.

In the early days of SOSUS, the system had two type commanders: Commander, Oceanographic System, Atlantic, and

Commander, Oceanographic System, Pacific. Through many transitions and consolidations, the two type commands eventually became one — the present-day Commander, Undersea Surveillance (CUS), located in Dam Neck, Va. Subsequently, Commander, Submarine Forces, U.S. Atlantic Fleet, and then Commander, Naval Meteorology and Oceanography Command, served as the IUSS TYCOM, but CUS continued to perform many of the typical TYCOM functions.

In March 2009, Commander, Submarine Force, U.S. Pacific Fleet (COMSUBPAC) assumed administrative responsibility as the current IUSS TYCOM as the result of a renewed emphasis on aligning the Submarine Force's capabilities with the proliferation of undersea threats in the Pacific theater. As the IUSS TYCOM, COMSUBPAC has been particularly interested in ensuring that the IUSS community is closely aligned with the submarine community's goals, particularly with the Design for Undersea Warfare's main objectives of ensuring that every organization involved with undersea warfare is ready for operations and, if necessary, for warfighting; that their capabilities can be employed effectively; and that they are also preparing to meet the changing demands of future undersea operations.

Since gaining responsibility for IUSS, COMSUBPAC has undertaken several initiatives to improve system-wide IUSS performance, implementing a number of changes within the IUSS community with the assistance of the CUS team. Several of these changes have focused on personnel programs. As with the rest of the undersea force and the Navy, people are the most valuable asset within IUSS. "As Undersea Warriors, our IUSS personnel must be trained and commands must be manned to ensure continued critical information is available to serve the combatant commanders and our national decision-makers," said Rear Adm. Frank Caldwell, Commander, Submarine Force, U.S. Pacific Fleet. "I am committed to the advancement of this valuable capability."

COMSUBPAC took action to optimize SURTASS military crew (MILCREW) manning and effectively defended the requirement to increase MILCREW manning as SURTASS ships were back-fitted with low-frequency active sonar systems. Shore manning requirements were also determined for each NOPF to ensure manning supported mission requirements. MILCREW Blue and Gold units were created to give these critical at-sea billets the proper manning priority. Operational units were established for each NOPF to ensure watch-floor manning supported operational requirements. Additionally, specific Navy enlisted classification codes (NECs) were reestablished to track IUSS-experienced personnel in support of follow-on tours within the IUSS community of practice.

The Submarine Force has inspired several improvements in IUSS training. The IUSS continuing training program transitioned to mirror the philosophy espoused in the Submarine Force's Continuing Training Manual. An IUSS Continuing Training Manual (ICTM) was developed and implemented, along with accompanying continuing training software support capabilities, attribute sheets, and a Force examination bank specific to IUSS.

COMSUBPAC reestablished the IUSS pipeline training that was disestablished more than five years ago. Navy Training System plans (NTSPs) were developed for both fixed and mobile surveillance systems, and curriculum development for ten pipeline training courses was placed under contract. Four of the pipeline training courses will award IUSS NECs following successful course completion, which will support career progression within IUSS. Funding has been approved to develop and field the first IUSS individual trainer, called the Integrated Common Processor Training Device, to support the IUSS pipeline training courses. Lastly, in July 2011, a Submarine Learning Center detachment was established in Whidbey Island to teach the new pipeline training courses.

Even more significant changes took place in IUSS readiness and certification. A homeport training period and pre-deployment certification manual was developed and implemented. This added rigor to the MILCREW deployment preparation processes by linking required skill sets to defined continuing training and to deployment certifications, transitioning certification from a purely in-house process to one that is led by the immediate superior in command (ISIC) with TYCOM oversight. COMSUBPAC now reports MILCREW readiness to deploy to Commander, Third Fleet, and Commander, Seventh Fleet, as well as supporting task force commanders.

"The maritime security environment is constantly evolving," said Rear Adm. Phil Sawyer, Commander, Task Force 74. "Understanding the readiness of IUSS forces and their ability to operate in the Western Pacific is critical to enabling access for the Navy and other joint forces."

To assist in maintaining MILCREW readiness while not deployed, COMSUBPAC enabled fielding of the first high-fidelity SURTASS Team Trainer (STT), which adapted the highly successful Submarine Multi-Mission Team Trainer (SMMTT) technology.

In terms of certifying warfighting capability, on the fixed surveillance side, tactical readiness evaluations (TRE) conducted by the COMSUBPAC TRE Team have replaced previous in-house operational readiness evaluations at the NOPFs. This warfighting readiness assessment process follows guidance contained in the COMSUBPAC IUSS TRE instruction and is similar to the process used for submarines.

Planned future changes within IUSS include a proposed final transition of the Commander, Undersea Surveillance, to the Commander, Integrated Undersea Surveillance System Squadron, or COMIUSSRON, to align the name with its ISIC roles and responsibilities. Additionally, COMSUBPAC and CUS staffs have developed an IUSS Roadmap to guide future IUSS developments within the larger Undersea Dominance Roadmap sponsored by OPNAV N2N6.

"Commanding these forces during this period of rapid transition is an exciting and challenging task," said Capt. Scott Rauch, the current CUS. "The team has pulled together to align our training and readiness to requirements and to deliver full capability to the warfighters."

IUSS will continue to improve its operational impact by emphasizing continued improvements both in training and in the qualification process, while providing critical feedback to personnel. Although different in many respects from what the creators of SOSUS envisioned in the early years of the Cold War, today's IUSS continues to stand on the front lines alongside the Silent Service — a small force in high demand, excelling in peacetime to ensure its readiness for effective warfighting.

by Submarine Squadron 11 Public Affairs

EPITS

The East Pacific Integrated Training Syndicate Enhances Anti-Submarine Warfare Training

Photo by Petty Officer 1st Class Shannon Warner

In August 2011, Vice Adm. Gerald Beaman, Commander, Third Fleet, began a new collaborative training initiative called the East Pacific Integrated Training Syndicate (EPITS). EPITS's goal is to bring together the various West Coast-based anti-submarine warfare (ASW) units across four major platforms — submarines, surface ships, and rotary-wing and fixed-wing aircraft — to enhance local opportunities for ASW training at sea by sharing operational schedules in an open forum among the stakeholder communities.

EPITS builds on a previous initiative called the Hawaiian Integrated Training Syndicate (HITS), which dates back to 2009 and shares the same goals. Vice Adm. Beaman became aware of HITS while touring the theater ASW facilities in Pearl Harbor shortly after he assumed command of Third Fleet. He noted that the key enabler of collaboration among the various warfare communities involved in HITS was the fact that they were all concentrated in close proximity at Pearl Harbor, and he realized that the fleet concentrations in San Diego and in the Pacific Northwest offered similar opportunities for collaboration.

"HITS is a great success in Hawaii, so we started EPITS in the Southern California and the Pacific Northwest operating areas to help ensure that meaningful anti-submarine warfare training opportunities are included in operational schedules of our submarines, ships, helicopters and P-3s," said Lt. Eric Stoffel, Third Fleet's ASW training officer. "Operations officers from the stakeholder ASW communities meet biweekly to discuss ASW training and to align schedules to identify opportunities for integrated training events." In addition, he added, "Monthly and quarterly meetings are held to provide an overview of theater-wide ASW training, to review past and future training, and to provide guidance and direction on where training should be focused."

The frequent meetings enable schedulers from each ASW community to break out of their silo and engage with other communities involved in the ASW problem. It allows operations officers to examine their schedules in day-to-day, hour-to-hour detail, which was not possible when the only forum for identifying cross-community training opportunities was the quarterly fleet-level scheduling meetings. The resulting increase in cross-deck training has given unit-level operators and technicians an increased opportunity to observe how other parts of the Navy deal with ASW challenges like the ones they themselves face. The ultimate intent is to encourage the sort of multi-disciplinary thinking that facilitates the identification and sharing of best practices across the Navy and improves each warfare community's ability to assist other communities in carrying out the ASW mission.

EPITS collaboration has increased the amount of time that surface and air teams spend training with submarines and helped to make that training more vigorous. One of its objectives was to increase the robustness of surface ships' ASW training by enabling them to track actual submarines earlier in their deployment workup rather than relying almost exclusively on pre-programmed submersible ASW training targets. In fact, EPITS has enhanced opportunities for train-

ing across the full spectrum of ASW events, from coordinated, multi-platform fleet exercises to individual platform training.

Since the inception of EPITS, Third Fleet ASW assets have conducted more than 20 integrated exercises encompassing more than a thousand hours of at-sea operations with the surface fleet, helicopter squadrons, P-3 squadrons, and the West Coast submarine squadrons located in San Diego and the Pacific Northwest. "The feedback we've gotten from our operating units is that they view EPITS as extremely valuable because it provides robust and complex training within the constraints of existing schedules without requiring additional underway days or flight hours," said Capt. Jesse Wilson, Commodore, Destroyer Squadron 23.

Capt. Jeff Hughes, who commands the Pacific Fleet's Helicopter Maritime Strike Wing, the San Diego-based organization responsible for the Fleet's MH-60R helicopters, added, "We are also taking advantage of this program to cross-deck officers and Sailors between air, surface, and sub-surface units to encourage information exchange and enhanced professional development among our communities. To date, EPITS has supported more than 50 cross-deck events across the different platforms—U.S. submarines, H-60 helicopters, P-3 maritime patrol aircraft, and even a visiting Chilean submarine. By sharing tactical perspectives, we help improve the quality of our coordinated training and our operational effectiveness."

In January, MH-60R helicopter pilot Lt. Cmdr. Jennifer Fleming embarked USS *San Francisco* (SSN 711) for a day to learn more about underway submarine operations. It was her first experience aboard a submarine. "I would recommend this experience to all pilots so they can gain an in-depth understanding and appreciation for the submarine community," Fleming said. "EPITS allows the aviation and submarine communities in the San Diego area to capitalize on opportunities to work together, testing and strengthening the skill sets of both communities."

In February, a sonar technician from USS *Hampton* (SSN 767) flew in a sub-hunting helicopter belonging to Helicopter Maritime Strike Squadron Seven Five (HSM-75) during an at-sea exercise involving USS *Rentz* (FFG 46) and USS *Albuquerque* (SSN 706). Experiencing an ASW exercise from the helicopter perspective made a significant impression on the submariner. "Until this experience, I did not fully appreciate how good their detection system is," said Sonar Technician 3rd Class Tyrell Maltby. "It's one thing to learn about ASW techniques in a classroom," he added, "but it's entirely different when you see it firsthand. The helicopter pilots, the aircrewman, and I shared a lot of in-depth knowledge about our respective platforms, and I think we all learned something we didn't know before."

By increasing ASW training opportunities from multi-ship evolutions down to cross-platform experiences for individual Sailors, EPITS is helping to advance the training objectives of the Submarine Force. With their laser-like focus on warfighting, Submarine Force leaders appreciate all that EPITS is doing to help submariners understand the ASW capabilities of other platforms and refine their own ASW capabilities.

"We are striving for increased cooperation, awareness, and ultimately better warfighting within the Submarine Force and across ASW communities," said Rear Adm. Frank Caldwell, Commander, Submarine Force, U.S. Pacific Fleet. "EPITS and HITS provide tangible and effective training opportunities so that our submarines and ASW forces are better prepared for missions in support of our national defense."

(Opposite) Helicopter pilot Lt. Cmdr. Jennifer Fleming peers through the periscope of USS *San Francisco* (SSN 711) during an EPITS cross-deck training opportunity. *(Above)* Lt. John Baxter, a helo pilot with HSM-75, explains the controls of an MH-60 to Cmdr. Tony Lott, commanding officer of USS *Hampton* (SSN 767).

by COMSUBLANT Public Affairs and Olivia Logan


Photo by Jim Sillman


Photo by Petty Officer 1st Class Peter Lawlor

Magnolia State Plays Host as USS *Mississippi* Joins the Fleet

The people of Mississippi, famous for their hospitality, welcomed the commissioning of their state's namesake submarine in a morning ceremony at the Port of Pascagoula June 2. More than 7,500 people braved tropical humidity with bright sun and temperatures in the mid-80s to see USS *Mississippi* (SSN 782) join the fleet. Secretary of the Navy Ray Mabus served as the keynote speaker, while *Mississippi*'s sponsor, Deputy Assistant Secretary of the Navy for Ship Programs Allison Stiller, gave the traditional order, "Man our ship, and bring her to life!"

"The Submarine Force and the fleet have eagerly anticipated this day," said Rear Adm. David Johnson, program executive officer for submarines. "USS *Mississippi* provides the Navy with unique and unparalleled capabilities and joins the fleet at a time when submarines are being called upon to perform vital national security tasking around the globe."

Built by General Dynamics Electric Boat in partnership with Huntington Ingalls Industries' Newport News Shipbuilding, *Mississippi* was delivered in just over 62 months, the fastest yet for a *Virginia*-class submarine. Construction began in February 2007; the keel was laid on June 9, 2010; and the ship was christened on Dec. 3, 2011. The Navy accepted delivery in early May, 12 months early and $60 million below contract.

Mississippi is the fifth Navy ship, and the first submarine, to be named in honor of the Magnolia State. The most recent USS *Mississippi* was a nuclear-powered guided missile cruiser (CGN 40) that was in service from August 1978 to July 1997.

Strong local support was a significant factor in the Secretary of the Navy's decision to name a submarine after the Magnolia State. Enthusiasm continued to grow as the ship was built, with Mississippi news media featuring stories on her progress and interviews with crewmembers and others involved in the process.

As *Mississippi* neared completion, local submarine veterans lobbied hard for the Navy to send her down to be commissioned in one of the state's Gulf Coast ports. Capt. John McGrath, her commanding officer, made two trips to the state to help scope out potential commissioning sites. Gulfport was the first venue chosen, but the ceremony was shifted to Pascagoula when it proved difficult to get the facilities at Gulfport dredged to sufficient depth in time for the event.

Mabus, a native Mississippian and former governor of the state, spoke of his enthusiasm for *Mississippi*'s commissioning. "I am so glad to be home to commission the wonderfully named *Mississippi*," said Mabus. "When you look at *Mississippi*, you know that American exceptionalism, to paraphrase Mississippian William Faulkner, will not only survive, it will prevail."

Also on hand to congratulate *Mississippi* were Chief of Naval Operations Adm. Jonathan Greenert and Mississippi Gov. Phil Bryant, both of whom lauded the ship's captain and crew.

"Along with ships that are well built and resilient, we must have bold and innovative leaders such as Captain McGrath," said Adm. Greenert. "Most importantly, we need

(Opposite, left) Sailors of USS *Mississippi* (SSN 782) stand at attention aboard their newly commissioned ship. *(Opposite, right)* Chief of Naval Operations Adm. Jonathan Greenert speaks at the commissioning ceremony. *(Below, left)* Secretary of the Navy Ray Mabus delivers the keynote speech. *(Below, right) Mississippi* Sailors run to man the ninth *Virginia*-class attack submarine and bring her to life.


Photo by Petty Officer 1st Class W.B. Swoboda


Photo by Petty Officer 1st Class Peter Lawlor

crews that are confident and proficient in our craft. This superb crew has been well trained, and they are ready for this magnificent warship."

Gov. Bryant said that *Mississippi* and her Sailors reflect the determination and patriotism of the state. "This great warship reflects the personality and resilience of all Mississippians," he said. "How proud we might be to also know that our state motto "Virtute et Armis" will go with it—By Valor and Arms… Peace through strength! Let the world know, from this moment on, *Mississippi* sails for freedom."

After the commissioning, *Mississippi* departed Pascagoula June 4, returning to her homeport of Groton, Conn., where she will begin her post-shakedown availability this fall.

Other upcoming major submarine acquisition milestones in 2012 include the start of construction on Pre-Commissioning Unit (PCU) *Indiana* (SSN 789) and the christening of PCU *Minnesota* (SSN 783), both planned for this fall.

A Hometown Boy's Return to Mississippi's Capital


Photo by Brian Leshak

One of the most notable events leading up to *Mississippi*'s commissioning was a late-March visit to Jackson, Mississippi's state capital, by a native son, Rear Adm. (sel.) Michael Jabaley, the *Virginia*-class program manager. Jabaley was in town as part of the 50-50 Program, a new outreach program featuring visits by flag officers and senior Navy civilians to engage local leaders in business, government, education, non-profit organizations, and the media.

"The Navy belongs to the people of Jackson just as much as to those who live along the ocean," said Jabaley. "We need to continue to share the great things our Navy does and foster a better understanding of the Navy's role in protecting our country and maintaining freedom of the seas."

At Jackson State University, Jabaley received briefings on ship-related research efforts funded by the Office of Naval Research. He also returned to Jackson's Murrah High School, from which he graduated in 1980.

On March 29, he had the rare honor for a serving naval officer of addressing a joint session of the Mississippi State Legislature *(above)*, telling the assembled lawmakers about the Navy's mission and the goals of the service's science, technology, engineering and mathematics initiatives.

State Sen. Brice Wiggins, who chairs the Mississippi Senate's Ports and Marine Resources Committee, presented Jabaley, Pascagoula Mayor Robbie Maxwell, and *Mississippi* Commissioning Committee Chairman Jerry St. Pé, with a Senate resolution saluting the upcoming commissioning.

by Olivia Logan

No Dolphins for Me *But What an Experience!*

On May 22, Olivia Logan, UNDERSEA WARFARE's managing editor, boarded USS *Mississippi* (SSN 782) for a four-day, three-night media embark as the submarine traveled to Pascaguola, Miss., for her commissioning. Olivia may not have qualified for dolphins by the end of her ride, but she came away knowing a lot more about how submariners live and work. This is her account of her experience underway on the Navy's newest submarine.

By Invite Only

I received an invitation to embark *Mississippi* from Commander, Submarine Forces Atlantic, Public Affairs just three weeks before the trip. I had wanted to ride a submarine since my first day at UNDERSEA WARFARE Magazine, but I never thought my wish would come true. I thought these sorts of trips were reserved for "distinguished visitors," and I am anything but. However, thanks to the kindness of Submarine Group Two Public Affairs Officer Lt. Cmdr. Jennifer Cragg, who recommended me for the trip, I was one of the media people selected to experience *Mississippi*'s last couple of days underway as a pre-commissioning unit.

Leaving Port

It was a gorgeous day when I met the sub in Port Canaveral, Fla.: sun shining, temperature in the 80s, and calm, sparkling water. But the most beautiful sight of all was PCU *Mississippi* gliding down the channel. The only submarines I'd been on before were tied up at the pier, so my first sight of one underway was breathtaking.

It took less than an hour for *Mississippi* to tie up, welcome the media group aboard, and depart Port Canaveral, also known as "PCAN," pronounced just like the pie. As I climbed down through the hatch into the boat, the typical submarine smell of amine filled my nose. That, and the scent of freshly baked bread, which brings me to our first order of business: eating lunch. I had recently eaten breakfast, so I wasn't all that hungry. Still, knowing submariners have some of the best food in the Navy, I couldn't resist. Soup, sandwiches, potato wedges and cake were on the menu. "Whew!" I thought to myself. "This is going to be a long couple of days of eating." I regretted not packing any pants with an elastic waistband.

Orientation

Stuffed and satisfied, we shuffled into the wardroom for a ship familiarization briefing, where we met Chief of the Boat Bill Stoiber and our media hosts, Damage Control Assistant Lt. Andy Weller, Chief Fire Control Technician Nate Holmes, and Chief Electronics Technician Askia Locure. I was slightly nervous about the embark. After all, underwater travel was completely foreign to me! But I knew within a couple of minutes of speaking with our media hosts that we were in good hands.

Next, we were shown our berthing unit, the place where we were to sleep—or try to, anyway—for the next three nights. The last time I shared sleeping space with several other people was as a teenager in a cabin at camp. But submarine racks are nothing like bunk beds. Although I'm rather petite, they still made me feel slightly claustrophobic. And propping up my rack to access the under-bed storage was quite a feat. I couldn't understand how a mattress and steel frame could be so heavy! A word to the wise: When lowering the rack back down, make sure your fingers are clear, or you'll be in for some serious pain!

The Fun Begins

After unpacking our things and getting settled, we each had an opportunity to go up to the bridge. At this point, we were

Photo by Petty Officer 2nd Class Todd Frantom

about 30 miles off the coast of Florida. It was important for us to do bridge tours right away, because the boat would only be on the surface for about five hours.

The procedure for going up on the bridge reminded me of indoor rock climbing, with the donning of a safety harness, instructions from crewmembers about where to put my feet and how to hoist myself up, and the uneasy feeling I could fall to my death at any moment! (Sure, I knew the harness would keep me safe, but it was still a long way down!)

Being on the bridge was one of my favorite experiences on *Mississippi*. Seeing nothing but ocean for miles in every direction, feeling the wind in my hair, and knowing I was riding on top of a huge, black beast made me feel—as Jack said in the scene on the bow in the movie "Titanic"—like "the king of the world!"

Dive! Dive! Dive!

After the bridge tours, we went to the control room as the boat prepared to rig for dive. I was surprised by how anti-climactic the dive

Photo by Petty Officer 2nd Class Todd Frantom

(Top) USS *Mississippi* approaching the dock in Port Canaveral, Fla. *(Above)* Olivia gives a thumbs-up next to Senior Chief Petty Officer Thomas Driscoll as she experiences *Mississippi* going through angles and dangles.

was. I expected it to be similar to an airplane taking off, but instead of feeling speed and an extreme angle, I felt only slow movement and a slight down angle. Had it not been for the images from the photonics mast and the pilot's commands, I wouldn't have even known we were slipping under the water.

While the dive process was not all that interesting, seeing the men at the controls and consoles do their job certainly was. The control room definitely made me appreciate what it means to be "on watch." Throughout my stay on *Mississippi*, I was constantly cold. I'm always cold on land, too, so that wasn't unusual, but after observing the control room, I wondered if the temperature weren't deliberately set low to keep everyone awake. I was impressed with the crewmembers' ability to stay alert for six hours at a time in a dark, quiet room—especially the sonar guys, who must listen intently for those six hours.

Down Time

Before I knew it, it was time to eat again. It was Taco Tuesday in the Gator Pit, as *Mississippi*'s galley is called, and the only thing missing was the margaritas! Chicken tortilla soup, tacos, fajitas, Spanish rice, refried beans, and cornbread, followed by toffee bars and ice cream for dessert. Ay, carumba!

After dinner, it was time for me to learn cribbage, a traditional submariner game. With Chief Locure assisting me, I won my first game. However, without his help, I was a horrible novice, so I soon let a more experienced cribbage player take my spot. I asked if there was another game we could play that was a little easier on my brain, to which Chief Holmes replied, "Bananagrams!" But I was exhausted by the day's events, so I asked him for a rain check and left the wardroom to get ready for bed.

Scrub a Dub Dub

Before turning in, I took my first submariner shower. I used to vacation on a house boat, so I was familiar with the idea of not letting the water run any more than necessary. I was impressed with the water's temperature and pressure, but I was not a fan of the squeegee and the sponge. After showering, you're required to squeegee the shower walls, and after using the sink, you have to sponge up every remaining drop of water. This ensures the head (or bathroom) remains clean for everyone. I thought I was pretty big on cleanliness, but submariners are on a whole other level! I couldn't believe how much cleaning was going on all around the boat, and the amount that had to be done on hands and knees with a dust pan and brush or a rag was amazing! I know who to call next time I need my apartment cleaned!

Day Two

The next day was packed with activity, including interviewing *Mississippi*'s executive officer, Lt. Cmdr. Daniel Reiss, and COB Stoiber; watching a damage control demonstration; touring the control and torpedo rooms; experiencing angles and

Photo by Petty Officer 2nd Class Todd Frantom

Photo by Olivia Logan

(Top) Olivia stirs diced chicken with buffalo wing sauce for her buffalo chicken pizza while Seaman Michael Proctor supervises.

(Left) Chief Holmes *(left)* and Chief Locure *(right)* take a break from hosting the media and other duties to play cribbage with Submarine Squadron Four Command Master Chief Todd Schultz *(center)*.

(Left) Sailors sweep *Mississippi*'s decks after every meal, just one of the many routine cleaning chores that keep the submarine in pristine condition.

(Right) Seamen Devin Williams receives his dolphins from his mentor, Petty Officer 1st Class Darrius Jenkins.

dangles—and finally, dinner in the wardroom with *Mississippi*'s commanding officer, Capt. John McGrath.

In the control room, I had the opportunity to listen to sonar sounds, one of which was biologics, or sea life. One of the crewmembers joked about having biologics for dinner when seafood is being served.

In the torpedo room, I took my hosts up on their offer to let me climb into a torpedo tube and sign my name inside. This was, thankfully, before we shot water slugs. I'm not so sure I would have been so eager to climb in there afterward! I particularly liked the torpedo room because it also serves as a hang-out area for the crew. As the only large, open space other than the galley, it's a great spot for people to gather.

Experiencing angles and dangles was also pretty thrilling—especially since by that time we were back in the galley, where something managed to come loose with a crash.

Day Three

Day three featured an interview with Capt. McGrath, a tour of the machinery room, a demonstration of the lock-out trunk, sitting in the co-pilot's chair, a dolphin-pinning ceremony, and pizza night! While I wasn't permitted to pilot *Mississippi*, I did get a chance to sit at the controls and imagine what it would be like to actually know how.

The dolphin-pinning ceremony was really neat. The sense of pride when a crewmember receives his dolphins is very evident. But unlike most celebrations, the crew can't stay around for ice cream and cake. After a few congratulatory hugs and handshakes, it's back to the grind.

Later that evening, I buttoned up a chef coat, put on a cook's hat, and got to work in the Gator Pit as a guest pizza-maker. I was allowed to make any pizza I wanted, provided the galley had the ingredients. I decided on buffalo chicken pizza. I began with a bleu cheese dressing base on the dough, sprinkled it with shredded mozzarella and breaded chicken tossed in buffalo wing sauce, and then drizzled bleu cheese dressing and wing sauce all over. I can barely cook for myself, let alone a galley full of hungry men, so I have to admit I was anxious waiting for the pizza to come out of the oven. Luckily, the culinary gods were watching over me, and my pizza was a huge hit!

Back to Land

On Friday, May 25, we surfaced around 0100 to begin the 10-hour journey into Pascagoula, where my voyage on *Mississippi* would come to an end. At around 0500, the media group took our last trip to the bridge to see the view under the night sky. Then the whole ship was abuzz with preparations for entering port, so I packed my things and stayed out of the way in the wardroom until further instructions.

The COB had one last treat for us. We were permitted to go topside while *Mississippi* traveled the Pascagoula River channel and prepared to dock. The feeling while topside was similar to that on the bridge, except this time we had a crowd waving and cheering at us! Now I know what a homecoming is like!

As I think back on it now, my favorite part of the embark was interacting with crewmembers, hearing their life stories, and seeing submarining through their eyes. The Submarine Force is made up of incredible people, and my trip allowed me to meet them first hand. Take the COB, for example, who, after spending time out to sea, comes back to land and serves in a different way, as a volunteer firefighter and EMT. Then there's Petty Officer 1st Class James Pearson, the ship's community service coordinator, who grew up underprivileged and has made it a priority to give back to the community. There's also Seamen Devin Williams, a culinary specialist, who, despite losing his grandfather this year, finished his qualification card 384 points ahead and received his dolphins the day we pulled into Pascagoula. These men are extraordinary, and I'm humbled to have had the opportunity to spend a few days in their company.

I left the ship not only with a new understanding of the unique world where submariners live and work, but also with a new appreciation of what it means to wear the submariners' dolphins. A huge thank-you to *Mississippi*'s crew for being such great hosts, and also to Commander, Submarine Force Atlantic; Submarine Group Two; and N97 for making my experience possible! And for the record: Chief Holmes and Chief Locure, you still owe me a game of Bananagrams!

by Olivia Logan

2011 Submarine Junior Officers of the Year


Photo by Olivia Logan

It's not every day you find a group of submarine junior officers roaming the nation's capital. But in mid-April, 11 submariners and their families made their way to Washington, D.C., to be recognized as the 2011 Junior Officers of the Year (JOOY), an honor reserved for only the best junior officers each submarine squadron and sub tender has to offer.

The JOOY program recognizes junior officers of the Submarine Force who demonstrate superior seamanship, management, leadership, and tactical and technical knowledge. Submarine candidates are nominated by their ship's junior officers and commanding officer and selected by their squadron commander. Submarine tender candidates are selected by the ship's commanding officer.

Some of the JOOYs said selection for the award came as a bit of a shock, citing the strong competition from other junior officers in the wardroom. "I'm stationed onboard with mainly limited duty officers with 15-plus years of prior enlisted experience," said the USS *Emory S. Land* (AS 39) JOOY, Lt. Brian Bitner, who has been in the Navy for nearly 23 years. "So being named Junior Officer of the Year in a wardroom that is so senior, with that much experience, was quite a humbling experience."

Lt. Arlis Steel, Submarine Squadron Nineteen's JOOY, said he was honored to be nominated from the Gold crew of USS *Michigan* (SSGN 727). "I think every junior officer brings a particular flare to their own submarine," he said. "And for that to be recognized outside of the submarine is a pretty big deal."

The JOOYs' week in Washington began on Monday, April 16. Their daytime agenda included a visit to Capitol Hill for meetings with congressmen and tours of the U.S. Capitol, the Library of Congress and the Supreme Court. They enjoyed a tour of the U.S. Naval Observatory on Wednesday night and a Washington Nationals baseball game on Thursday night. Their visit culminated with the D.C.-area Submarine Birthday Ball Friday evening. They also spent time in the Pentagon, meeting with Rear Adm. Barry Bruner, Director, Undersea Warfare Division; Vice Adm. Richardson, Commander, Submarine Forces; and Adm. Jonathan Greenert, Chief of Naval Operations. "The spirit of this program is admirable," said Adm. Greenert in a Facebook post. "These are outstanding Sailors. Was great to meet all their spouses and children; really nice to see the family connection."

Keeping the family connection strong is not always easy. The JOOYs said family separation was one of the biggest challenges of being a submariner. Lt. Bitner, who is married with five children, recalled that when he first joined the Navy, he only heard from his family in 50-word-limit "family grams," with an allotment of eight per deployment cycle. "Now you can receive e-mail in pretty much real time, depending on what you're doing out to sea," Lt. Bitner said. "It's gotten better, but still, the lack of seeing your family, being able to be home with your family when important things happen, is still always difficult."

Lt. Louis DeMarco, Submarine Group Two's JOOY, explained to his wife when they were dating that the submarine lifestyle would be hard. "The separation is the hardest thing to get used to," said his wife Rachel, "but it comes with the job, and you definitely work through it." She added that her husband's JOOY honor has made the sacrifice well worth it.

The JOOY program recognizes junior officers of the Submarine Force who demonstrate superior seamanship, management, leadership, and tactical and technical knowledge.

The JOOYs said the rewards of a submarine career far outweigh the challenges. "Time away from home is a pretty big challenge," said Lt. Steel. "But if the job is cool enough, it kind of drowns that out, let's you keep your mind focused."

The JOOYs emphasized job satisfaction as a big reward of being a submariner, including

(Opposite) The JOOYs stop to snap photos of the Rotunda during a tour of the U.S. Capitol Building. *(Above)* The 2011 Submarine Junior Officers of the Year, along with their wives and children, pose with Chief of Naval Operations Adm. Jonathan Greenert during a visit to the Pentagon. *(Below)* Adm. Greenert talks with the honorees.

"The spirit of this program is admirable. These are outstanding Sailors. Was great to meet all their spouses and children; really nice to see the family connection."

—Adm. Jonathan Greenert,
Chief of Naval Operations

"I loved what I did; I loved who I worked with. I loved what we did and when we ... went to sea and supported our mission and country. It was very fulfilling"

—Lt. Arliss Steel
Submarine Squadron
Nineteen's JOOY

getting to know a small crew, traveling to different ports, and accomplishing missions. Lt. Steel talked about his time on *Michigan*: "I loved what I did; I loved who I worked with. I loved what we did and when we… went to sea and supported our mission and country. It was very fulfilling."

Lt. Bitner enjoyed the feeling of coming home knowing he had made a major impact on the defense of the nation. He talked about the satisfaction of repairing deployed subs and returning them to their operating areas in a timely fashion during a deployment in Diego Garcia. "It was always good to see them come in and get a break," he said, "but it was also good to see them back out in 100 percent material condition."

The job satisfaction of a submarine career has already convinced Lt. DeMarco to sign a contract to stay on in the Navy. "I absolutely love this job," he said. "[Rachel and I] decided together that we love this lifestyle, so [I'm] staying in until at least the 20-year point. We'll see if the Navy will want to keep me after that, but I'm gonna keep working hard every day."

Working hard is exactly what the junior officers suggested for those wishing to become a Junior Officer of the Year. "If this is something you would like to do, to have on a resume or put on an eval, the only thing that I can say is that you have to work really hard on your submarine," said Lt. Steel. "If the wardroom can depend on you, and you can get the job done right, then you're on the right track."

Lt. DeMarco said it's important that those who are making a difference stick with it. "The good guys need to stay and help make everyone's life better by being good leaders and taking care of their men," he said. Lt. Bitner stressed being proactive in qualifications and general knowledge of submarines. "Always look for new methods to perform your job," he said. "And stay hungry."

by Robert A. Hamilton

WHEN USS *OHIO* CHANGED THE WORLD

When USS *Ohio* (now SSGN 726) departed on its first strategic deterrent patrol 30 years ago, it changed the submarine world forever. With new approaches to every aspect of the program — design, construction and life-cycle support — *Ohio* represented a brand new way of doing the business of undersea warfare.

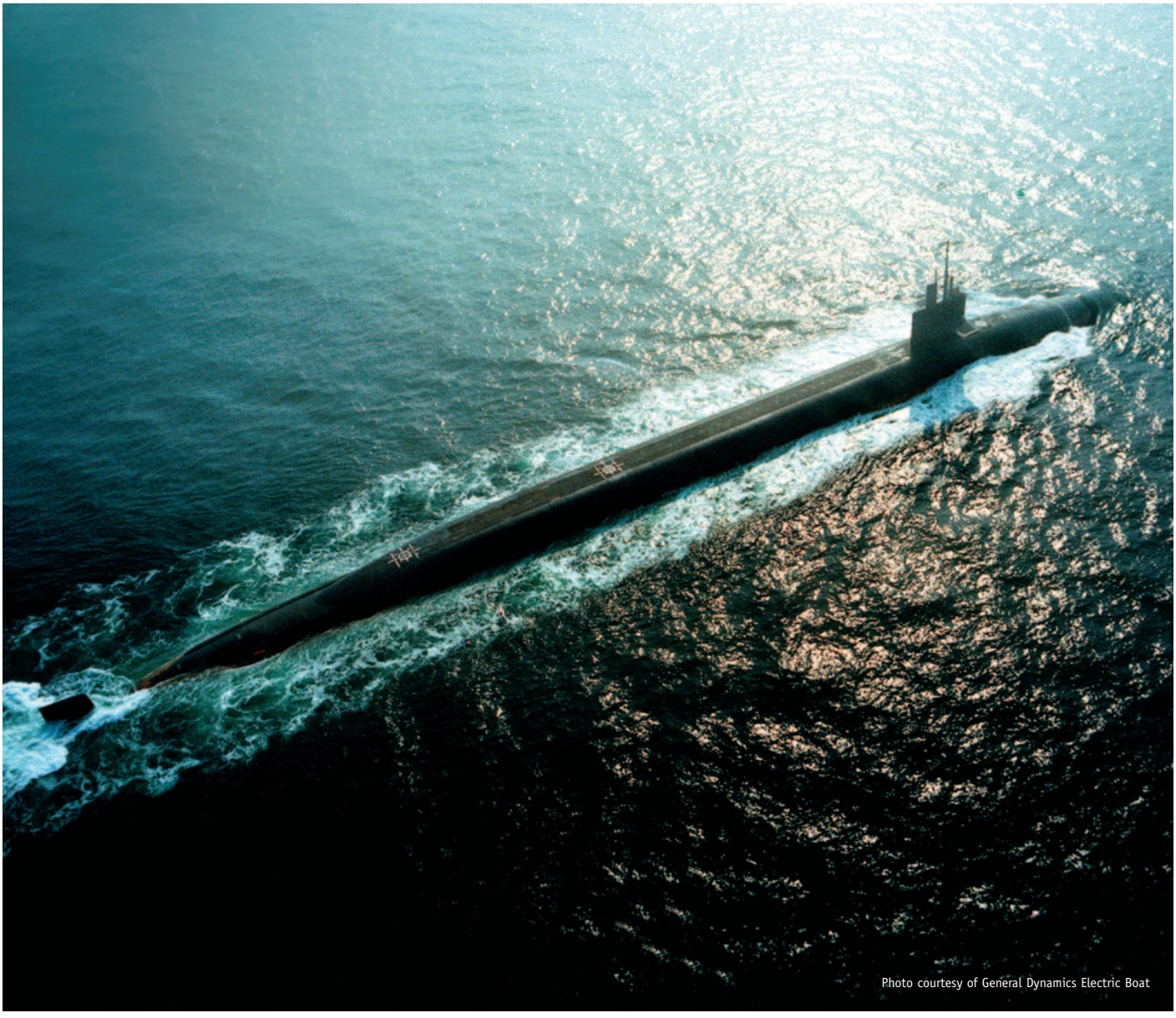


Photo courtesy of General Dynamics Electric Boat

As a young fluid systems engineer at General Dynamics Electric Boat, William Kowenhoven was in awe of the scale of *Ohio* as the design got under way.

"The biggest challenge we faced was probably the sheer enormity of the ship—a 42-foot diameter hull, about 10 feet bigger than anything we had done before, and the gross displacement, twice the displacement of any previous submarines," Kowenhoven said. "It was 560 feet long, 200 feet longer than the 688s that we were building at the time. It had 24 large-diameter tubes, replacing 16 smaller-diameter tubes on the previous [SSBN] class. It was just a huge undertaking."

In fact, Kowenhoven said, he witnessed changes taking place throughout the shipyard as the *Ohio* program moved forward during the 1970s and as the decade of the 1980s began.

"We built the whole land-level facility (now the main assembly area in Groton), and the new Graving Dock 3, just to be able to handle a boat that size, so it was clearly a challenge from a facilities standpoint as well," Kowenhoven said. "There were so many changes taking place all over the shipyard."

And outside the shipyard, Electric Boat acquired the former Naval Air Station in North Kingstown, R.I., where it started manufacturing hull sections for the *Ohio*. Today, that plant in the Quonset Point Industrial Park is the company's center for submarine module manufacturing and is widely recognized as the crown jewel of the U.S. submarine industrial base.

For the officers and Sailors reporting to Electric Boat to oversee the construction of the new ship, it was also a heady time.

"Being selected to serve on the new-construction crew of USS *Ohio* was a truly exciting experience from the moment that I was informed—onboard USS *Tullibee* (SSN 597) as engineer at sea conducting routine training operations at the time—until my departure after setting up the Off-Crew Office at the new submarine base in Bangor, Wash., some four years later," said retired Capt. John Demlein, the first engineering officer on *Ohio*.

"The nuclear-trained officers and engineering department personnel arrived at the shipyard excited and ready to charge ahead," Demlein said. "We met with our new shipmates in the other departments, formally joined as the pre-commissioning unit, and quickly felt their equal excitement in being a part of this unique experience. Each one of us recognized that we had a significant task ahead in becoming expert testers and then operators of this new ship, and we understood that there would be significant attention to everything that we did—or didn't do correctly—at the highest levels of the Navy. This feeling of personal responsibility for the *Ohio* was equally evident in the majority of the key shipyard personnel working on the ship, especially the ship managers and test engineers."

"In some ways," said Peter Martin, the first navigator on *Ohio*, "we felt like we were reinventing the wheel, breaking ground that had never been tread upon before. We came from a variety of SSN and SSBN backgrounds, which made for an interesting clash of cultures. The SSN guys had their way of doing things, which was different enough from the SSBN ways that what came out was a blend of both. I'd like to think we combined the best of both worlds."

In the 1960s, the former Soviet Union was making some significant advances in its submarine-launched ballistic missile capability, prompting the United States to look diligently at how it could retain an advantage. Lockheed Missile & Space Co. won the contract to build the missile, while General Electric and Knolls Atomic Power Laboratory collaborated on the propulsion plant. EB, which had built more SSBNs than any other shipbuilder, won the contract to design and build the *Ohio* class.

The goal was a ship that could accommodate the Trident C-4, a submarine-launched ballistic missile still in development at the time. The C-4 was six feet longer than the original Polaris missile that went to sea in 1960, and its 74-inch diameter was 20 inches greater. Most important, it had more than three times the range of the original Polaris. This meant that for the first time, SSBNs could deploy directly from bases in the United States rather than forward bases in Scotland, Spain and Guam, since they would not have to travel far to reach their patrol areas. In fact, a Trident missile submarine could hit most Cold War targets while sitting in port.

In addition, the Navy wanted the *Ohio* class to have greater availability and range than any previous class, which required greater redundancy in key systems, including installed spares for standardized equipment. In fact, the program included the development of two new support bases—at Bangor, Wash., and Kings Bay, Ga.— to maximize the efficiency of maintenance and modernization so the boats could spend more time at sea.

Two important lessons came out of the Navy's procurement strategy. The first was to make sure that the design was sufficiently mature to avoid extensive rip-out and rework due to design changes. The second lesson was the benefit of steady procurement. Although the planned fleet size changed 11 times in 16 years, from as low as 10 to as many as 24, Congress wound up authorizing 18 ships in 18 years. This steady rate of one ship per year gave the industrial base predictability and stability, which translated into lower costs.

Conceptual work on the class started at EB in 1970, even before the initial design contract was awarded in May 1971. As a result, the shipyard had a lot of people who had worked on several one-of-a-kind programs in the 1960s, from the NR-1 research submarine to programs such as the early attempts at electric drive on *Tullibee* (SSN 597) and *Glenard P. Lipscomb* (SSN 685).

"We had a lot of people available, a lot of people who were very talented and had done some really innovative work," Kowenhoven said. "And that also gave us a more diverse engineering workforce."

What emerged from the process was a ship that displaced 18,750 tons submerged, more than twice the displacement of any submarine built in this country previously. *Ohio* consumed 34 miles of pipe, 4,100 valves and 80,000 fittings, and it took 5,000 miles of welds, including 50,000 pipe joints alone, to put her together.

Ohio represented the industry's initial steps towards two important concepts later developed for the *Virginia* program: "design-build," in which the people who will build, operate and even decommission the boat are involved with the design; and modular construction.

"As a structural engineer new to Electric Boat, working on concept design and contract design, I required a lot of guidance from my supervisor on the basics of design of submarine structures," said Thomas S. Korzenowski, now a principal engineer at EB, who was on a team that did structural concept work for *Ohio*. "During the course of doing structural calculations and working with designers, my supervisor advised me to take regular walks down to the shipyard and look at how the submarines were being built. I eventually got

to know the general superintendent of the steel trades, Elio Brittaglia, and several other management types in the shipyard who had essentially started working at Electric Boat right out of high school and had worked themselves into these management positions."

"At the beginning, there was a suspicion on their part concerning what this engineer from 'the hill' was really after, and on my part concerning whether they were truly open to giving me good information—their wisdom and knowledge accumulated from their many years working in the shipyard," Korzenowski said. "But after a mutual trust was established, visits by these shipyard managers to 'the hill' became a regular event. I spent many hours configuring the *Ohio* aft trim tank and Bulkhead 94 with the help of Mr. Brittaglia to ensure these structures were optimized for producibility. The lead structural engineer on the design of the logistics escape trunk and the missile tube spent many hours discussing manufacturing issues with personnel from the machine shop and the outside machinists."

"EB solicited input from the Navy Sailors at the Submarine Base, shipyard tradesmen and fleet personnel during various design reviews," said Constantine 'Gus' Proestakis, part of a team of electrical engineers who worked on concepts for the new ship. "Innovative ideas were introduced during the design phase, such as sectional construction. The ship was broken into nine sections, from the bow to stern, which allowed for end-loading of components."

The "design-build" concept worked so well that it was formalized when EB later developed the *Virginia*-class submarine, and it has now been expanded to "design-build-sustain" for the *Ohio* Replacement.

That innovation continued when it came time to build the submarine. Previously, submarine hulls were constructed, then decks and other internal structures were built. Large holes were cut in the top to allow for the insertion of the equipment, such as combat systems. It was, as many older shipbuilders observed, like building a watch through the stem-hole.

"From my point of view as a structural engineer, the biggest challenge was that, for the first time, this ship was going to be constructed in sections," Korzenowski said. "The sections were to be end-loaded with equipment to the maximum extent possible, and then the sections would be joined together, and all equipment and material in one section would interface as designed with the equipment and material in the adjoining section. This all required fairly tight dimensional control, which was accomplished by each section having primary and secondary reference points to which equipment and material within each section was located. To facilitate this method of construction, the land-level facility was constructed with a rail system that accommodated movement of the various large ship sections on cradles and with a pontoon and graving dock system that would launch the ship."

Shipbuilders quickly realized the efficiency of this new method. In fact, it has led to an understanding of what is called the 1-3-8 rule. If a task takes one hour on a shop floor, it will take three hours to do the same task once the assembly is on a module, and eight hours once it is on the ship.

Because of the *Ohio* class's mission, many innovations were geared toward increasing availability and reliability. It became the first class to use logistics escape trunks (LETs), three six-foot openings into the hull, and broad pathways throughout the ships, which not only allowed rapid exit from the submarine in an emergency, but also quick loading or unloading of supply pallets, equipment replacement modules, and large machinery components.

"This feature," Korzenowski said, "supported a rapid turnaround for logistics support that included the ability to replace certain equipment rather than having to repair in place and bringing supplies onboard in bulk rather than passing them individually through a personnel hatch, significantly reducing the time required for maintenance and stores loads." The LETs were key to getting so much work accomplished in the periods between patrols that only one mid-life refueling and overhaul period was necessary.

(Opposite) USS *Ohio*'s christening ceremony April 7, 1979. At right is USS *Michigan* (now SSGN 727), the second ship of the *Ohio* class, which was christened the following year.

(Left) Ohio at speed during her sea trials.

For EB engineers and designers, the *Ohio* era represented a tremendous opportunity to incorporate advanced technology into an undersea platform, technology that promised to save space and improve reliability.

"The mood of EB at that time was up and looking forward to meeting this new challenge," said Proestakis. "The electrical/electronics industry was booming with new integrated circuits — microprocessors, digital, microcircuits, linear integrated circuits, etc. — [that] were replacing the discrete semiconductors such as transistors, semiconductor-controlled rectifiers, and so on. EB engineers were looking forward in the electrical/electronics area to implement the new microprocessors and microcircuits in the new submarine design," he said.

"Coming from the SSBN 640 class as I did, the combat, sonar, radio systems were futuristic, as was the degree of ship control system automation," said Martin, *Ohio*'s first navigator. "One of the challenges was to master these systems without using all of the automatic features, the philosophy being that you had to know how to operate the ship 'bare bones' before you put your faith in computers controlling things like ship's depth and ship's maneuvers."

"It's interesting that the *Ohio* class was one of the first to use a centralized computer complex wherein the main computers combined all of the functions previously executed in a number of individual processors located throughout the submarine," Martin said. "When you compare that to today's *Virginia*-class architecture, you notice that in general a shift has now been made away from centralized back to distributed processing, while interface processing between the disparate subsystems — sonar, combat control, ship control, communications — has much tighter interface integration."

Demlein noted that even as work on the ship progressed, the new emphasis on "design-build" allowed the crew to influence the design of the ship.

"With this process we were able to identify and correct early in the construction period a number of design and construction issues that led to a better overall product at delivery," he said. "For example, the engine room-missile compartment watertight door was originally designed without a hydraulic damper or latch to hold the door open, since it was planned to be a normally shut watertight door. This was pointed out to be a significant problem, since the door was quite heavy and would be hard to control by one individual, especially in a moderate to high sea state with any ship motion. This led to the installation of a hydraulic damper and latch currently installed on all of the Trident watertight doors.

"Other examples include increased lighting in engine room lower level and the design and installation of tech manual lockers throughout the ship," Demlein added.

Designed for a 30-year life, the *Ohio* class was constructed well enough to certify them for 42 years as they approached their midlife refuelings.

"Overall, the thoughtfulness and elegance of the design of the *Ohio* class has … stood the test of time and a continued high tempo of operations," Demlein said. "When I took command of the USS *West Virginia* (SSBN 736) Blue crew in May 1994, 10 hull numbers and 10 years after USS *Ohio*, it was like going home again. It was truly rewarding to see how the *Ohio*-class design aspects of 360-degree access to all equipment, fully developed pull space and rigging paths, and the revolutionary concept of the logistics and escape trunk enabled USS *West Virginia* to remove and install a ship's service motor generator set rotor in just five days — a task that would have previously taken weeks and most likely required a hull cut on other classes of submarines."

"I admit to being a bit smug in knowing that *West Virginia* was still on the cutting edge of submarine technology, and that I had been a part of a great new-construction crew and a great team that had helped to make the *Ohio* class one of the most successful classes of submarines ever built."

Robert A. Hamilton is director of communications at General Dynamics Electric Boat.

Change of Command

COMSUBRON 1
Capt. James Childs relieved
Capt. Stan Robertson

COMSUBRON 4
Capt. Michael Holland relieved
Capt. Michael Bernacchi

COMSUBRON 15
Capt. Scott A. Minium relieved
Capt. John K. Russ

COMSUBRON 17
Capt. James V. Tolliver relieved
Capt. Paul A. Skarpness

USS Dallas (SSN 700)
Cmdr. Rich Houdeshell relieved
Cmdr. Rich Arnold

USS Houston (SSN 713)
Cmdr. Paul Davis relieved
Cmdr. David Schappert

USS Ohio (SSGN 726) (G)
Capt. Rodney Mills relieved
Capt. Dixon Hicks

USS Georgia (SSGN 728) (B)
Capt. Daniel Christofferson relieved
Capt. Kelly McDowell

USS Wyoming (SSBN 742) (G)
Cmdr. Christopher Nash relieved
Cmdr. Diego Hernandez

USS Albany (SSN 753)
Cmdr. David Soldow relieved
Cmdr. Thomas Buchanan

USS Scranton (SSN 756)
Cmdr. Seth Burton relieved
Cmdr. Paul A. Whitescarver

USS Asheville (SSN 758)
Cmdr. Douglas Bradley relieved
Cmdr. Gerald Miranda

USS Greeneville (SSN 772)
Cmdr. Martin Muckien relieved
Cmdr. Anthony Carullo

USS Jimmy Carter (SSN 23)
Cmdr. Brian P. Elkowitz relieved
Cmdr. Brian L. Davies

USS Texas (SSN 775)
Cmdr. Andrew Hertel relieved
Cmdr. Robert Ronska

USS Missouri (SSN 780)
Cmdr. Mike Luckett relieved
Cmdr. Tim Rexrode

Qualified for Command

Lt. Cmdr. Christopher L. Bryan
COMSUBRON 6

Lt. Cmdr. David M. Crescitelli
COMSUBRON 7

Lt. Cmdr. Ronald Hatt
COMSUBRON 11

Lt. Cmdr. James Henry
COMSUBRON 1

Lt. Cmdr. Joshua A. Hoops
USS Providence (SSN 719)

Lt. Cmdr. Jeremy Johnston
COMSUBRON 3

Lt. Cmdr. Craig Litty
COMSUBRON 15

Lt. Cmdr. Matthew P. Luff
COMSUBDEVRON 12

Lt. Cmdr. Jeremiah D. Minner
PCU North Dakota (SSN 784)

Lt. Cmdr. Jared Simsic
COMSUBRON 3

Lt. Cmdr. James W. Steffen
USS Missouri (SSN 780)

Lt. Cmdr. Matthew J. Sweeney
OPNAV N97

Lt. Darrel W. Brown II
USS Annapolis (SSN 760)

Lt. Thomas W. Bullock
USS Annapolis (SSN 760)

Lt. Aaron Coudray
COMSUBRON 19

Lt. Ryan Crisman
COMSUBRON 19

Lt. Thomas Kim
COMSUBRON 11

Lt. Blake Klinedinst
COMSUBRON 17

Lt. John Nilles
COMSUBRON 1

Lt. Jared Smith
COMSUBRON 7

Lt. Anthony Wilson
COMSUBRON 3

Qualified Nuclear Engineer Officer

Lt. James Bonner
USS Key West (SSN 722)

Lt. Christopher Chung
USS Seawolf (SSN 21)

Lt. Chase Dillard
USS Nebraska (SSBN 739) (B)

Lt. Nick Kasatkin
USS Houston (SSN 713)

Lt. Joel King
USS Columbia (SSN 771)

Lt. Luke Scholl
USS Alabama (SSBN 731) (G)

Lt. David Schwarzbart
USS Louisiana (SSBN 743) (G)

Lt. Daniel Shevenell
USS Houston (SSN 713)

Lt. Daniel Shofner
USS Alabama (SSBN 731) (G)

Lt. Austin Spina
USS Chicago (SSN 721)

Lt. j.g. Kevin Africa
USS Nebraska (SSBN 739) (G)

Lt. j.g. Jeffrey Aldrich
USS Charlotte (SSN 766)

Lt. j.g. David Bartz
USS Ohio (SSGN 726) (B)

Lt. j.g. Joshua Bond
USS La Jolla (SSN 701)

Lt. j.g. James Christensen
USS Charlotte (SSN 766)

Photo by Master Chief Petty Officer Kevin Elliott

SECNAV Names Five *Virginia*-class Submarines

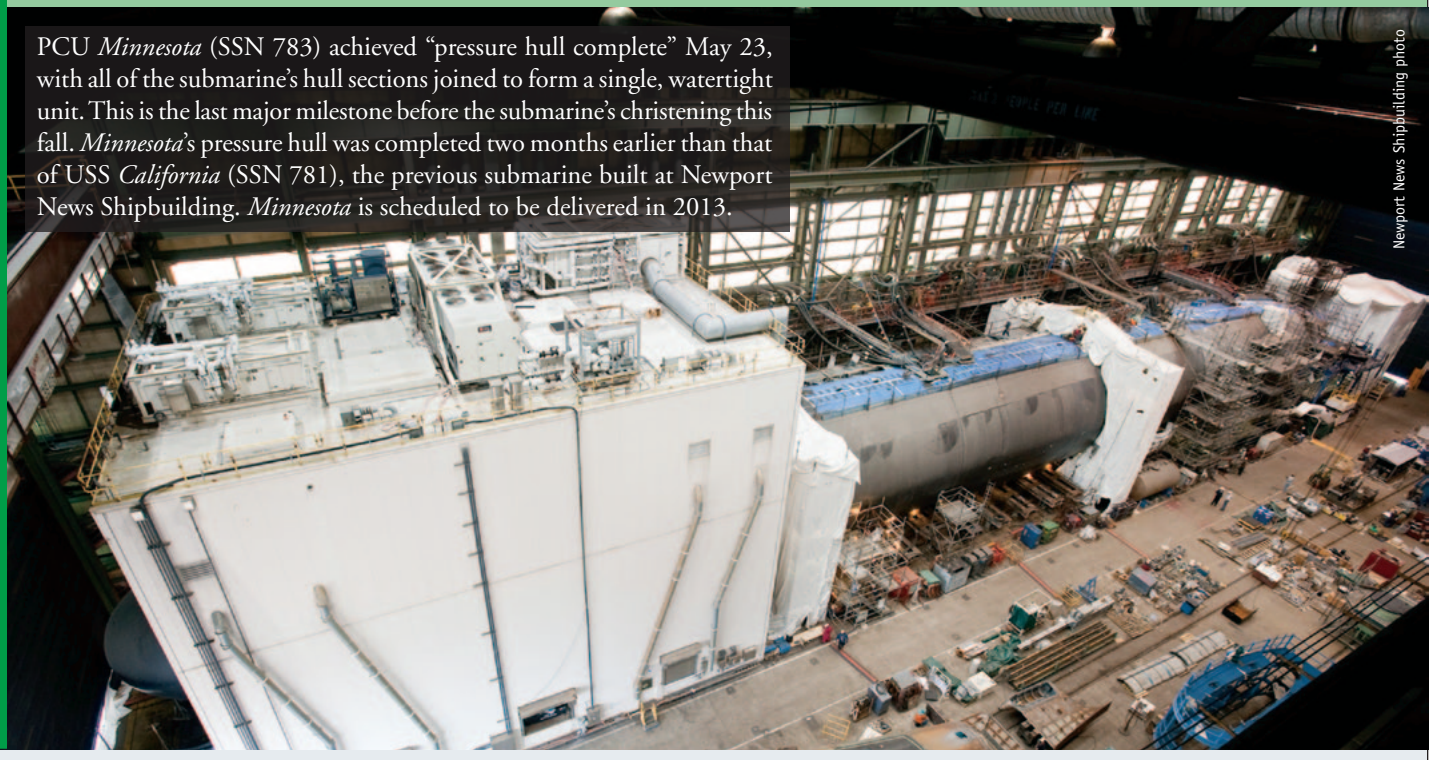
The next five *Virginia*-class attack submarines will be named USS *Illinois* (SSN 786), USS *Washington* (SSN 787), USS *Colorado* (SSN 788), USS *Indiana* (SSN 789), and USS *South Dakota* (SSN 790). Secretary of the Navy Ray Mabus said the names honor the contributions and support these states have given the military through the years. "Each of these five states serves as home to military bases that support our national defense and provides men and women who volunteer to serve their country," Mabus said. "I look forward to these submarines joining the fleet and representing these great states around the world."

Photo by Lt. j.g. Jeff Prunera

Navy Celebrates *North Dakota* Keel Laying

The Navy celebrated the keel-laying of Pre-Commissioning Unit *North Dakota* (SSN 784) at General Dynamics Electric Boat's Quonset Point division in North Kingstown, R.I., May 11. In a time-honored Navy tradition, ship's sponsor Katie Fowler, wife of North Dakota-native retired Vice Adm. Jeff Fowler, had her initials welded onto a steel plate that will be permanently affixed to *North Dakota*'s hull. "Being chosen to be the sponsor of *North Dakota* has been a great joy of my life," said Fowler. "I am looking forward to a life-long relationship with my ship and its crew." (Above, Fowler poses with EB President Kevin Poitras and welder Marvin Taul.)

The second U.S. Navy ship named after the state, *North Dakota* is the 11th submarine of the *Virginia* class and the first of the Block III construction contract. As the lead submarine of the Block III contract, she is the first to embody the design changes from the *Virginia*-class Cost Reduction Program. Chief among these are the introduction of the large aperture bow array and the *Virginia* payload tubes, which also improve the submarine's capabilities. *North Dakota* is on track to be commissioned in 2014.



PCU *Minnesota* (SSN 783) achieved "pressure hull complete" May 23, with all of the submarine's hull sections joined to form a single, watertight unit. This is the last major milestone before the submarine's christening this fall. *Minnesota*'s pressure hull was completed two months earlier than that of USS *California* (SSN 781), the previous submarine built at Newport News Shipbuilding. *Minnesota* is scheduled to be delivered in 2013.

Newport News Shipbuilding photo

Lt. j.g. Shawn Curtis
USS Nevada (SSBN 733) (G)

Lt. j.g. Paul Danos
USS Bremerton (SSN 698)

Lt. j.g. James Defazio
USS Olympia (SSN 717)

Lt. j.g. James Deupree
USS Michigan (SSGN 727)

Lt. j.g. John Dubiel
USS Bremerton (SSN 698)

Lt. j.g. Matthew Dunn
USS Columbia (SSN 771)

Lt. j.g. Phillip Foster
USS Santa Fe (SSN 763)

Lt. j.g. Esteban Gutierrez
USS Louisiana (SSBN 743) (G)

Lt. j.g. Austin Helm
USS Pennsylvania (SSBN 735) (B)

Lt. j.g. Robert Hoard
USS Bremerton (SSN 698)

Photo by Chief Petty Officer Kathryn Whittenberger

DSU Now Undersea Rescue Command

The San Diego-based Deep Submergence Unit (DSU), which embodies the U.S. Navy's submarine rescue capability, has changed its name to Undersea Rescue Command (URC). In addition, URC will now report to Commander, Submarine Squadron Eleven (SUBRON 11), in San Diego, rather than to Commander, Submarine Development Squadron Five (SUBDEVRON 5), in the Pacific Northwest.

The name Undersea Rescue Command better represents the mission of submarine rescue. SUBDEVRON 5 Commodore Capt. Brian Howes noted that having URC report to the nearby SUBRON 11 "allows more responsive and consistent support and oversight of submarine rescue system operations and maintenance." SUBRON 11 is also responsible for six *Los Angeles*-class attack submarines, three torpedo retrievers, and a floating dry dock.

Lt. j.g. Christopher Jeffries
USS Alabama (SSBN 731) (G)

Lt. j.g. Kyle Johnson
USS Maine (SSBN 741) (G)

Lt. j.g. Joseph Kimock
USS Hawaii (SSN 776)

Lt. j.g. Matthew Krieger
USS Hampton (SSN 767)

Lt. j.g. Simon Kwak
USS Albuquerque (SSN 706)

Lt. j.g. Francisco Martinez
USS Kentucky (SSBN 737) (G)

Lt. j.g. Ryan McCabe
USS Cheyenne (SSN 773)

Lt. j.g. Christopher Miller
USS Asheville (SSN 758)

Lt. j.g. John Patrick
USS Maine (SSBN 741) (G)

Lt. j.g. William Richardson
USS Louisville (SSN 724)

Lt. j.g. John Russell
USS Cheyenne (SSN 773)

Lt. j.g. Benjamin Smith
USS La Jolla (SSN 701)

Lt. j.g. William Spears
USS City of Corpus Christi (SSN 705)

Lt. j.g. Steven Stead
USS San Francisco (SSN 711)

Lt. j.g. Steven Weiner
USS Connecticut (SSN 22)

Lt. j.g. Taylor White
USS Chicago (SSN 721)

Line Officer Qualified in Submarines

Lt. Nicholas A. Dadds
USS Florida (SSGN 728) (G)

Lt. Daniel E. Ku
USS Florida (SSGN 728) (G)

Lt. Shaun A. Posey
USS Montpelier (SSN 765)

Lt. Jeriahmi L. Tinsley
USS Alaska (SSBN 732) (B)

Lt. j.g. George Ash
USS Nebraska (SSBN 739) (G)

Lt. j.g. Levi Burks
USS Hawaii (SSN 776)

Lt. j.g. Ryan W. Collins
USS Alaska (SSBN 732) (B)

Lt. j.g. Aaron Davila
USS Santa Fe (SSN 763)

Lt. j.g. Alexandro Follador
USS Newport News (SSN 750)

Lt. j.g. Sander J. Gossard
USS Alaska (SSBN 732) (B)

Lt. j.g. Roland E. Greer
USS Georgia (SSGN 729) (B)

Lt. j.g. Nicholas Hamilton
USS Charlotte (SSN 766)

Lt. j.g. Daniel S. Hatting
USS Springfield (SSN 761)

Lt. j.g. Collin Hedges
USS Key West (SSN 722)

Lt. j.g. Joe Innerst
USS Missouri (SSN 780)

Lt. j.g. John B. Judy
USS New Mexico (SSN 779)

Lt. j.g. Brian C. Juskiewicz
USS California (SSN 781)

Lt. j.g. Brandon Kent
USS North Carolina (SSN 777)

Lt. j.g. Firas Khouri
USS Wyoming (SSBN 742) (G)

Lt. j.g. Joseph M. Landon
USS Montpelier (SSN 765)

Lt. j.g. Christopher Marolt
USS Asheville (SSN 758)

Lt. j.g. Christopher Middleton
USS Henry M. Jackson (SSBN 730) (B)

Lt. j.g. Robert Miller
USS Pennsylvania (SSBN 735)

Lt. j.g. Justin Murty
USS Nebraska (SSBN 739) (G)

Lt. j.g. Craig Potthast
USS Missouri (SSN 780)

Lt. j.g. Nicholas Rausa
USS Albuquerque (SSN 706)

Lt. j.g. Mark Richard
USS Bremerton (SSN 698)

Lt. j.g. Eric P. Richardson
USS Norfolk (SSN 714)

Lt. j.g. Alex Rinaldi
USS Montpelier (SSN 765)

Lt. j.g. Sean Rocha
USS Hampton (SSN 767)

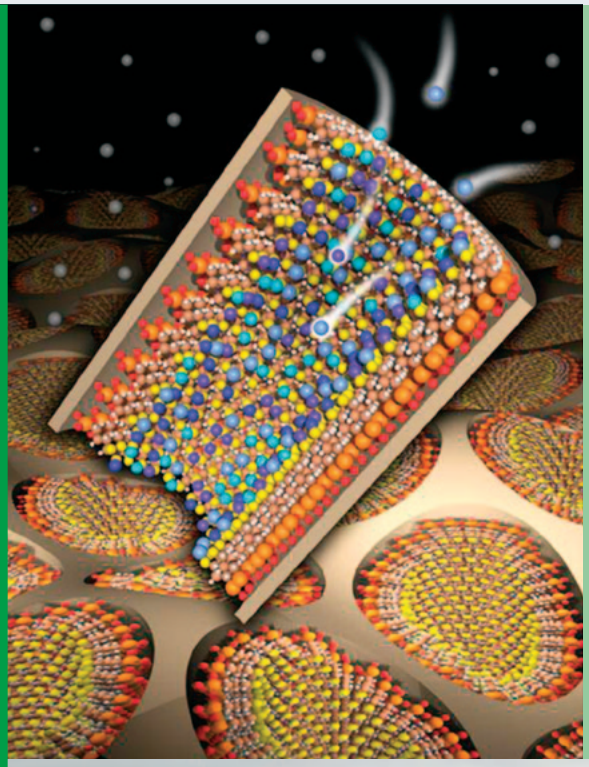
Lt. j.g. Mark Rostedt
USS Tucson (SSN 770)

Lt. j.g. James E. Santelli
USS Florida (SSGN 728) (G)

Lt. j.g. William Seaman
USS Key West (SSN 722)

Lt. j.g. Mark T. Simmons
USS West Virginia (SSBN 736)

Lt. j.g. Justin R. Smith
USS Pittsburgh (SSN 720)



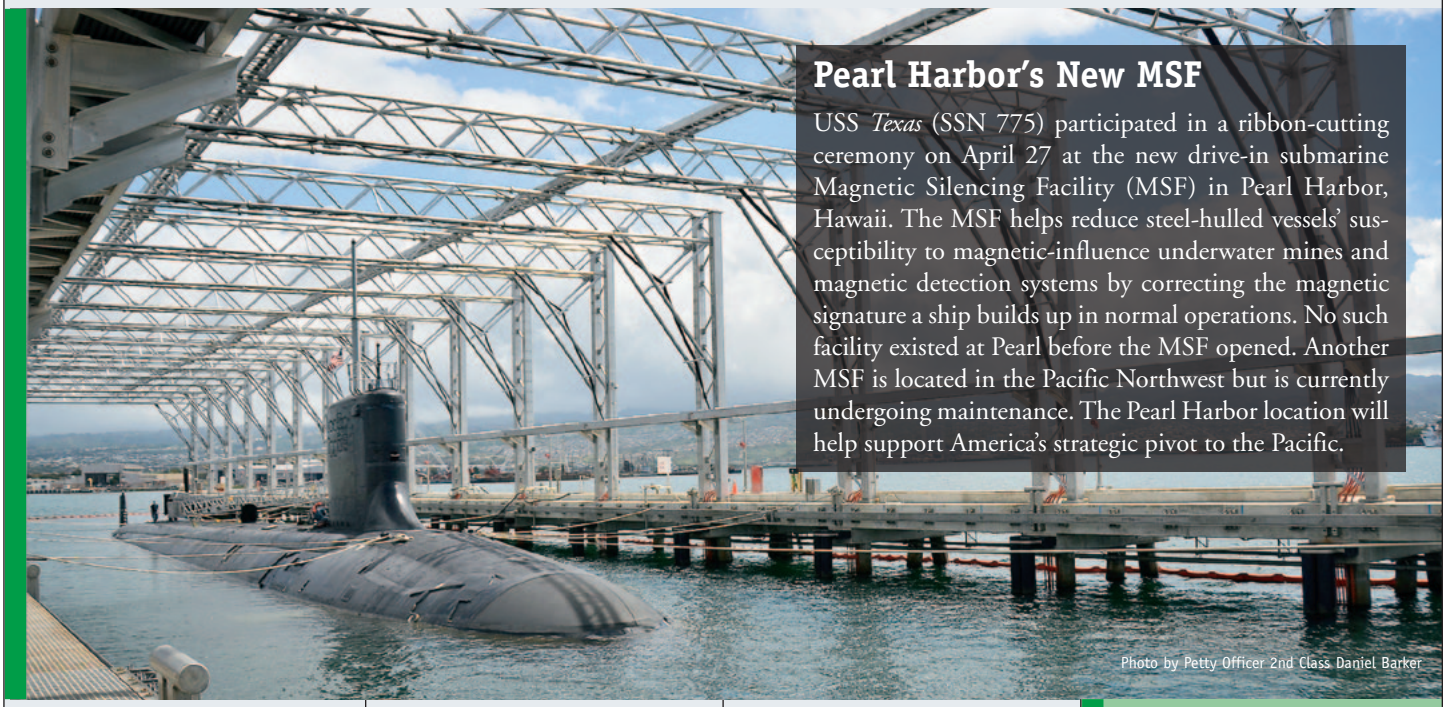
Researchers Honored for Submarine Air Quality System

A nanotech-based system that captures carbon dioxide directly from the atmosphere promises an easier and more environmentally friendly way to remove CO_2 from the air in submarines. The Department of Energy's Pacific Northwest National Laboratory in Richland, Wash., the Naval Surface Warfare Center Carderock Division's Ship Systems Engineering Station in Philadelphia, and the U.S. Naval Sea Systems Command won the 2012 Federal Laboratory Consortium (FLC) Interagency Partnership Award for creating the system.

The technology, called Self-Assembled Monolayers on Mesoporous Supports (SAMMS), is based on a new class of hybrid nanoporous materials that can rapidly capture contaminants such as carbon dioxide, mercury or arsenic directly from the atmosphere or from liquid environments, as demonstrated by the molecular model at left. (Graphic courtesy of Pacific Northwest National Laboratory.) SAMMS can achieve controlled release of CO_2 from the atmosphere using a gentle application of heat or vacuum. This new approach to cleaning breathing air in a confined space could eventually replace today's bulky, heavy, and corrosive liquid process, which produces a significant organic solvent waste stream.

A V-22 Osprey from Air Force Special Operations Command performs a proof of concept for personnel evacuation from USS *Wyoming* (SSBN 742) June 6 in the Atlantic Ocean. *Wyoming* was at sea performing routine operations.

Photo by Petty Officer 1st Class James Kimber



Pearl Harbor's New MSF

USS *Texas* (SSN 775) participated in a ribbon-cutting ceremony on April 27 at the new drive-in submarine Magnetic Silencing Facility (MSF) in Pearl Harbor, Hawaii. The MSF helps reduce steel-hulled vessels' susceptibility to magnetic-influence underwater mines and magnetic detection systems by correcting the magnetic signature a ship builds up in normal operations. No such facility existed at Pearl before the MSF opened. Another MSF is located in the Pacific Northwest but is currently undergoing maintenance. The Pearl Harbor location will help support America's strategic pivot to the Pacific.

Photo by Petty Officer 2nd Class Daniel Barker

Lt. j.g. Matthew Snyder
USS Pennsylvania (SSBN 735)

Lt. j.g. William C. Strobel
USS Wyoming (SSBN 742) (B)

Lt. j.g. Joseph J. Subjeck
USS California (SSN 781)

Lt. j.g. Ryan Sullivan
USS Missouri (SSN 780)

Lt. j.g. Matthew Swezey
USS Asheville (SSN 758)

Lt. j.g. Jeffrey S. Thode
USS Albany (SSN 753)

Lt. j.g. Douglas C. Trask
USS Newport News (SSN 750)

Lt. j.g. Theodore W. Trebaol
USS Toledo (SSN 769)

Lt. j.g. Christopher J. Vittorio
USS Maryland (SSBN 738) (B)

Lt. j.g. Joseph Westfall
USS Maine (SSBN 741)

Lt. j.g. Christopher R. Wilber
USS Albany (SSN 753)

Lt. j.g. Douglas Wozniak
USS Hawaii (SSN 776)

Limited Duty Officer Qualified in Submarines

Ensign Joshua Hahn
USS Pennsylvania (SSBN 735)

Supply Officer Qualified in Submarines

Lt. j.g. Les M. Begin
USS Georgia (SSGN 729) (B)

Lt. j.g. Christopher J. Fox
USS Florida (SSGN 728) (G)

Lt. j.g. Joseph M. Landon
USS Montpelier (SSN 765)

Qualified IUSS Officer

Flt. Lt. Daryl Pendlebury-Jones, RAF
NOPF Dam Neck

Lt. Michael J. Carr
NOPF Whidbey Island

Special Recognition—Junior Officers of the Year

COMSUBGRU 2
Lt. Louis DeMarco
USS San Juan (SSN 751)

COMSUBRON 1
Lt. Brendan Tower
USS Hawaii (SSN 776)

COMSUBRON 2
Lt. John Gilligan
USS Pittsburgh (SSN 720)

COMSUBRON 3
Lt. Mark Waite
USS North Carolina (SSN 777)

COMSUBRON 4
Lt. Brett MacLaren
USS New Hampshire (SSN 778)

COMSUBDEVRON 5
Lt. Joseph Leonelli
USS Connecticut (SSN 22)

COMSUBRON 6
Lt. j.g. Jason Ross
USS Scranton (SSN 756)

COMSUBRON 7
Lt. Daniel Kohnen
USS Columbus (SSN 762)

COMSUBRON 11
Lt. Nicholas Smith
USS Albuquerque (SSN 706)

COMSUBDEVRON 12
Lt. Josh Firkin
USS Alexandria (SSN 757)

COMSUBRON 15
Lt. Charles Allen III
USS Oklahoma City (SSN 723)

COMSUBRON 16
Lt. Greg Schmucker
USS Florida (SSGN 728) (B)

COMSUBRON 17
Lt. j.g. Damien Wall
USS Henry M. Jackson (SSBN 730)

COMSUBRON 19
Lt. Arlis Steel
USS Michigan (SSGN 727) (G)

COMSUBRON 20
Lt. Jeremy Smeltz
USS Maryland (SSBN 738) (G)

Lt. Brian Bitner
USS Emory S. Land (AS 39)

Lt. Jeremy Holloway
USS Frank Cable (AS 40)

COMSUBFOR Relief Nominated

Rear Adm. Michael J. Connor has been nominated for appointment to the rank of vice admiral and assignment as Commander, Naval Submarine Forces; Submarine Force Atlantic; and Allied Submarine Command, Norfolk, Va.

Rear. Adm. Connor is currently assistant deputy chief of naval operations for warfare systems (OPNAV N9B). Previous assignments have included director of OPNAV's Undersea Warfare Division (then N87, now N97), commander of Submarine Group Seven, commander of Submarine Squadron Eight during Operation Iraqi Freedom, commanding officer of USS *Seawolf* (SSN 21), executive officer of USS *Augusta* (SSN 710), and service in USS *Providence* (SSN 719) and USS *Pittsburgh* (SSN 720).

2011 Submarine Sailors of the Year

Photo by Petty Officer 1st Class Todd A. Schaffer

Commander, Submarine Force Atlantic (COMSUBLANT) and Commander, Submarine Force, U.S. Pacific Fleet (COMSUBPAC) have selected the 2011 Submarine Sailors of the Year from nearly 18,000 members of the Submarine Force, both afloat and ashore, based on professional performance, leadership skills, and military bearing.

COMSUBLANT recognizes both Senior and Junior Sailors of the Year. The Senior Sea Sailor of the Year was Petty Officer 1st Class William Nagel, a nuclear-trained and submarine-qualified electrician's mate assigned to USS *Albany* (SSN 753). Senior Shore Sailor of the Year went to Petty Officer 1st Class Scott Biden, a submarine-qualified yeoman assigned to the staff of Submarine Group Ten, in Kings Bay, Ga.

COMSUBLANT's Junior Sea Sailor of the Year was Petty Officer 2nd Class Mike Blizzard, a submarine-qualified fire control technician assigned to USS *West Virginia* (SSBN 736). Junior Shore Sailor of the Year went to Petty Officer 2nd Class Alexander Hiller, a surface warfare-qualified boatswain's mate assigned to the Naval Submarine Support Facility, in New London, Conn.

COMSUBPAC's Sea Sailor of the Year was Petty Officer 1st Class Kevin Swanson, a submarine-qualified machinist's mate assigned to USS *Houston* (SSN 713). Shore Sailor of the Year went to Petty Officer 1st Class Heath Northcutt, a surface warfare- and integrated undersea surveillance system-qualified sonar technician (surface) at the Navy Data Center in Yokosuka, Japan.

The four senior winners advanced to compete against nominees from other communities in their respective fleets.

Photo by Petty Officer 1st Class Shannon Warner

(Top) COMSUBFOR Vice Adm. John M. Richardson (far right) and Force Master Chief Kirk Saunders (far left) stand with SUBLANT Sailors of the Year (left to right) Blizzard, Nagel, Hiller and Biden.

(Above) COMSUBPAC Rear Adm. James Caldwell (far right) and Force Master Chief Cash Caldwell (far left) recognize all of the candidates who competed for SUBPAC Sailor of the Year.

(Bottom, left to right) Swanson and Northcutt celebrate their Sailor of the Year awards. Vice Adm. John M. Richardson, Commander, Submarine Forces, presents the Navy and Marine Corps Achievement Medal to Sailors of the Year Blizzard, Hiller, and Biden.

Photo by Petty Officer 1st Class Shannon Warner

Photo by Petty Officer 1st Class Todd A. Schaffer

Photo by Petty Officer 1st Class Todd A. Schaffer

Photo by Petty Officer 1st Class Todd A. Schaffer


Photo by Olivia Logan

The Navy Museum's Cold War Gallery

Washington, D.C.

Of the many museum exhibits featuring American submarines, few have much to say about strategic deterrence, the most fundamental mission of the U.S. Submarine Force. One notable exception is the Cold War Gallery being developed as a major addition to the U.S. Navy Museum at the Washington Navy Yard, in Washington, D.C.

Located in a 19th century building that once housed the Navy's first model basin, the Cold War Gallery tells how the service helped contain and eventually defeat the Communist threat posed by the Soviet Union. The gallery's "Covert Submarine Operations" exhibit describes the role of SSBNs and SSNs in achieving that goal. A visitor entering the gallery can't help noticing the huge Trident C-4 submarine-launched ballistic missile (SLBM) suspended above the lobby, symbolizing the pivotal contribution of sea-based strategic deterrence.

Realizing that Adm. Hyman G. Rickover's revolutionary nuclear-powered submarines could provide an invulnerable platform for the recently developed intercontinental ballistic missile, Chief of Naval Operations Adm. Arleigh Burke set up the Special Projects Office in 1955, under Rear Adm. William Raborn, to develop the first SLBM. In October of 1960, only five years later, USS *George Washington* (SSBN 598) embarked on the first strategic deterrent patrol.

The Cold War Gallery's "Covert Submarine Operations" section is an expanded version of the 2000-2003 "Fast Attacks and Boomers" exhibit hosted by the Smithsonian Institution's National Museum of American History. At the exhibit's entrance is a life-size mock-up of a submarine missile launch tube with the nose cone of a Trident C-4 inside. Nearby are models of the six generations of SLBMs—from Polaris and Poseidon to the Trident C-4 and today's superb Trident D-5—and of the six classes of submarines that carried them.

The rest of the exhibit displays artifacts from Cold War subs, including an attack center, sonar room, maneuvering room, mess hall, enlisted quarters, laundry facilities—and a Steinway piano from USS *Thomas A. Edison* (SSBN 610), the only piano ever installed in a U.S. submarine.

The Soviet Union is long gone, but the "Covert Submarine Operations" exhibit reminds us not only of what sea-based deterrence has achieved in the past, but of its continued relevance in a world that still abounds in weapons of mass destruction and still harbors those who would use such weapons to threaten the freedom and security of the United States.

In addition to the "Covert Submarine Operations" exhibit, the Cold War Gallery currently includes the "Ready Room" theater and the recently completed "Into the Lion's Den" exhibit on the Vietnam War. It is scheduled to open to the public in mid-October 2012, in conjunction with the Navy's 237th birthday celebration.