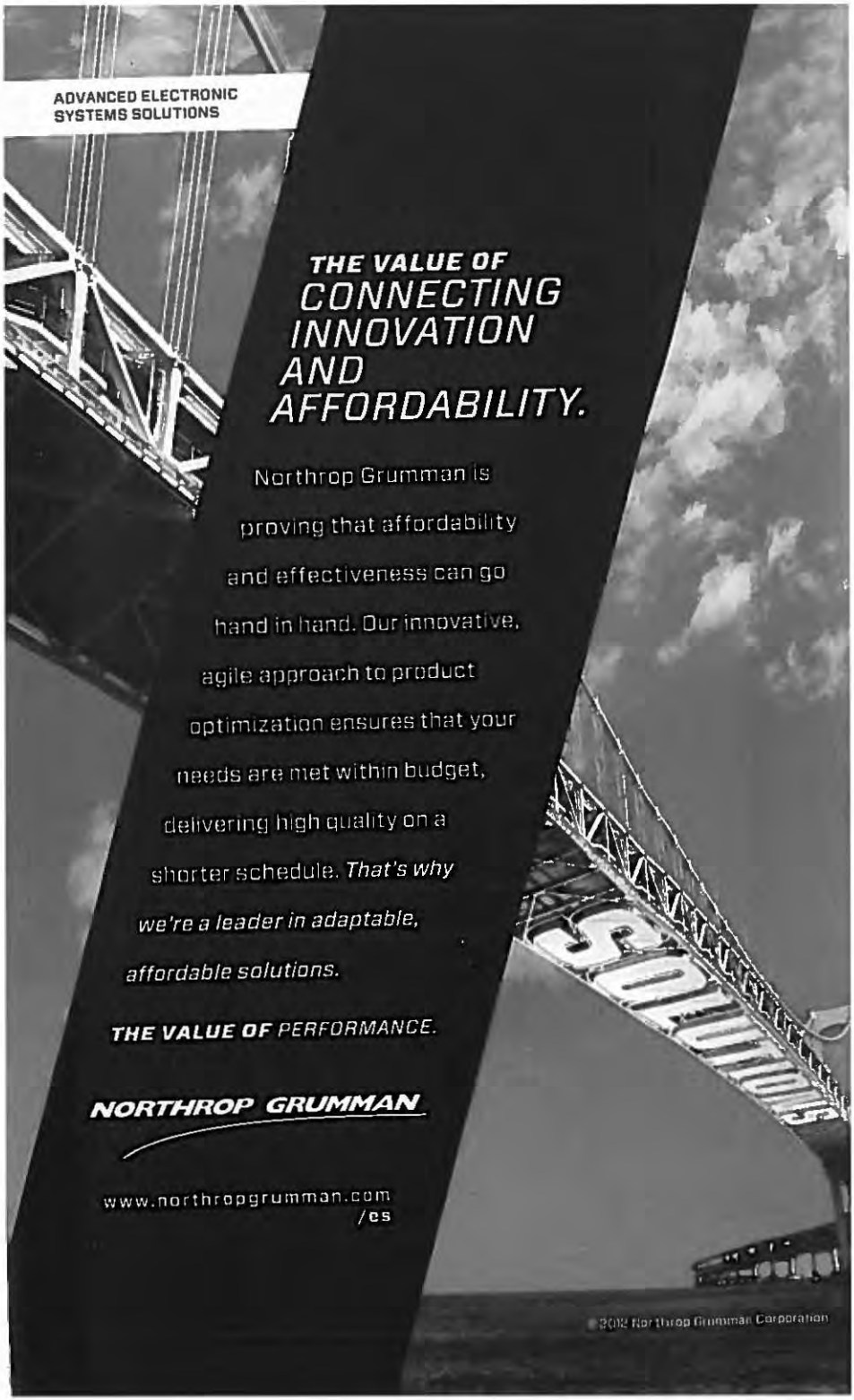
FALL 2012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THE SUBMARINE REVIEW ON-LINE

THE SUBMARINE REVIEW is joining the recent trend of publications like the Naval Institute's PROCEEDINGS, to publish in a dual-format with both a print and an on-line product. The content; Features, Articles, Reviews, Comments and Advertising will be exactly the same in the two forms, both produced from the same all-digital input.

The advantages to the League in going on-line lie mainly in the long-term issues involved in keeping up with modern technology. The League wishes to serve both those who look first to the internet for news and views and to those who prefer printed material. By opening this door to the Naval Submarine League efforts *as an advocate for an effective submarine component of the US national security,* it is hoped also that outreach will be significantly increased.

There will be two further advantages for those readers getting THE SUBMARINE REVIEW on-line. The first will be a more timely access to the magazine without the time involved in printing and mailing. The second will be when color graphics accompany any article or presentation, that color will appear on-line, whereas we cannot do color in the print version without excessive cost.

The on-line version will appear on the Naval Submarine League web site, with member's only access. The FALL issue will appear there on or about the first week in December. The normal full readership distribution of the print version of the FALL issue will also be made.

James C. Hay
Editor

John B Padgett III
President

EDITOR'S COMMENTS

There are important issues addressed in this FALL 2012 edition of THE SUBMARINE REVIEW which should be of concern to all in the submarine community. In addition, there are articles of both general and specific interest. The placement of the first page, however, is not meant as any indication of relative importance, but rather is to gain the notice of all readers with the advisement that THE SUBMARINE REVIEW will be offering an **on-line** version. Well before this printed magazine arrives in your mailbox the digital **on-line** version will be available on the Naval Submarine League web page.

The most important issue discussed in these pages remains the continuing concern for **Strategic Deterrence.** This is always a concern but it is particularly acute in these times of fiscal uncertainty about maintaining the necessary military capability, and doubts about the necessity itself being heard from influential quarters. Within the Defense establishment it even has been noted that the only mention of the OHIO Replacement Program comes from the Submarine Force. It is apparent we have a lot of education to do and we must all keep up the steady drumbeat.

One person speaking out is the Hon Frank Miller, an experienced and respected voice in national security affairs. A FEATURE of this edition is his address to a prestigious group at the Baltimore Council of Foreign Affairs. It is titled The Continuing Relevance of U.S. Nuclear Deterrence, and deserves wide distribution and understanding. In the 70s the then-SecDef noted that deterrence can't be affected with smoke and mirrors and it is really made up of two factors: credible national will and credible military capability. Frank Miller is addressing the intent and will portion and Admirals Conner and Bruner are outlining what our community is doing about maintaining the military capability. We have to get out the word about both sides of the ***Deterrence Equation.***

Note also in Admiral Bruner's presentation at the Annual Symposium that he speaks of ***Fourth Generation Undersea***

Warfare, that's the Attack Boat side of our business and he is pointing out the differences expected from our old way of working our SSNs. While considering Admiral Bruner's words about that 4th Generation of our warfighting, read Mr. Joe Buff's article about *Quantum Cyberwar.*

There is a lot going on within our submarine world and it's not all on the national strategic/tactical level. Consider Captain Heffron's article on the RAND Corporation analysis of success of submarine programs. Joe Leavitt's lengthy discourse on Submarine Rescue is also something everyone in the boats should have a working knowledge of. Enjoy your reading, and Happy Holidays.

Jim Hay
Editor

FROM THE PRESIDENT

Our U.S. Submarine Force had a very good year, performing with distinction and meeting key challenges and milestones. USS MISSISSIPPI (SSN 782) was commissioned in June and the proposed 2013 DoD budget has funding authorized for two VIRGINIA Class Submarines for 2013 and 2014. Some delays have been proposed for the OHIO Replacement Program Submarine.

We also have new leadership in the Submarine Force as VADM Mike Connor relieved as Commander Submarine Forces in September and ADM Richardson relieved as Director Naval Reactors in November.

The Naval Submarine League completed a successful summer with the election of new Directors, RADM Frank Drennan and CAPT Bob Wagoner. VADM Jay Donnelly and Mr. Matt Mulherin were elected to their first full four-year terms. RADM Phil Davis and Mr. John Fox were reelected to their second four-year terms. Mr. Kevin Poitras and Ms. Teri Marconi were appointed to a one-year terms to replace Mr. John Casey and Mr. Dave Perry who have resigned. VADM George Emery and ADM Rich Mies were appointed to one year terms to serve as STS Chairman and Chairman respectively. The Fiscal Year 2012 Annual Report was mailed with the Symposium invitations and is also posted on the League's webpage. The summary audit report is in this issue of the Review.

The Submarine Force leadership presented ***"The Future of Submarine Programs"*** at the annual symposium held on 17-18 October. All of the speakers were recorded and videos will be available for review when released. The Naval Academy sent 80 First Class Midshipmen to the Symposium Thursday afternoon. All of them have applied for the nuclear power program.

The highlights of the symposium included a luncheon honoring the 2012 Fleet Awardees and a banquet honoring Mr. Jerry Razmus and Senator John Warner as the Distinguished Civilians and VADM Pat Hannifin, USN (Ret) as the Distinguished Submariner. In addition to a distinguished group of speakers representing the officer and enlisted Submarine Force leadership from the operational, acquisition, resource sponsor, and technical communities, RADM Robert Thomas and VADM Bill Burke presented view from the Joint Staff and Chief of Naval Operations staff as our luncheon and banquet

speakers respectively.

We have more outstanding events scheduled for 2013. I encourage you to put these dates on your calendar and participate in as many as you are able.

- Corporate Benefactor Recognition Days are scheduled for 27-28 February 2013 (by invitation only). Corporate Benefactors continue to be the strong foundation of League support. Seventy-four corporations actively support League initiatives and activities.
- The Submarine History Seminar is planned for early April 2013 at the National War College. RADM Jerry Holland has proposed the presentation of ***"Policy, Strategy, Technology, Tactics, Acquisition - The Maritime Strategy: Before, During, After SEAWOLF".***
- The 2013 classified Submarine Technology Symposium (STS) held at The Johns Hopkins University Applied Physics Laboratory on 14-16 May 2012. The theme is ***"Technological Innovation to Influence Offensive Operations."*** VADM George Emery has identified all the session chairs, the plenary speakers and the papers to be presented.
- The 2013 Annual Symposium and Submarine Fall Cocktail Party will be held October 2013. The dates have not been established.

I welcome your comments and suggestions on what the League can do to better fulfill its mission of educating the public on the importance of submarines to our national defense, and I urge you to submit your ideas in the form of an article for **THE SUBMARINE REVIEW**. The **REVIEW** is widely read outside the Submarine Force by Congressional members and staff and Defense Department leadership.

Finally, I hope you all have a wonderful Holiday Season and ask you to continue to pray for the safety of our troops deployed all over the world. I am privileged to represent you in the leadership of the League and encourage you to recommend membership to your shipmates and friends.

John B. Padgett III
President

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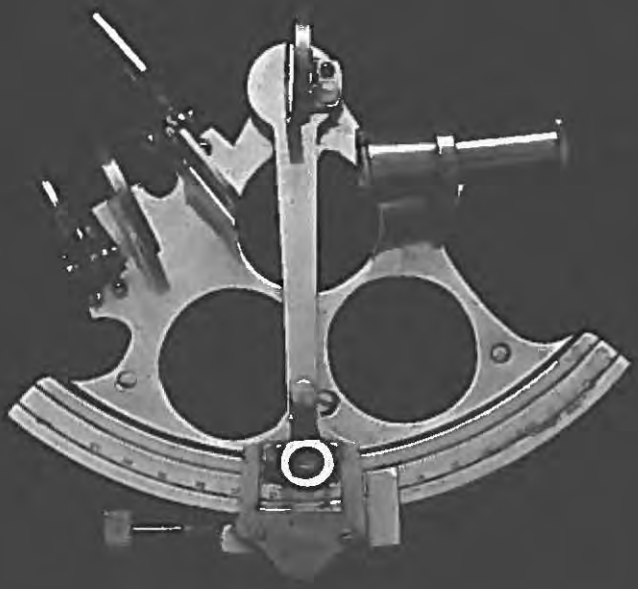

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CONGRESSIONAL RECORD 112TH CONGRESS (2011-2012)

TRIBUTE TO ADMIRAL KIRKLAND DONALD (SENATE - SEPTEMBER 20, 2012)

Mr. President, my colleague Senator Jim Risch joins me today in paying tribute to ADM Kirkland Donald, U.S. Navy, as he prepares to complete a naval career that began with his graduation from the Naval Academy in 1975 and concludes with his past 8 years of service as Director of the Office of Naval Reactors.

As Director of the Naval Nuclear Propulsion Program, Admiral Donald has had stewardship of every aspect of the nuclear navy, from fleet operations and training to reactor design and ultimate disposition of spent nuclear fuel. The dedication required of this mission is extraordinary, and our Nation has benefited from Admiral Donald's steadfast leadership.

Over the course of his career, Admiral Donald excelled as an undersea commander. He served as the commanding officer of the nuclear-powered attack submarine USS KEY WEST, commander of the elite Submarine Development Squadron Twelve and Commander Submarine Force, U.S. Atlantic Fleet, and Allied Submarine Command, Atlantic. Other highlights include tours at the Bureau of Naval Personnel, the Joint Staff, and as commander of all U.S. Submarine Forces.

While at Naval Reactors, he has ensured the safe operations of the nuclear navy. Nuclear-powered warships have safely steamed over 150 million miles and operated for more than 6,400 reactor years without an accident. The most recent 20 million miles and 800 reactor-years have been achieved under Admiral Donald's leadership.

Among his many achievements, one of the most impressive is the consistent and quiet success of the Naval Reactors Facility, NRF, in Idaho Falls. The highly complex and scientific work done

at NRF requires not only a highly skilled, diligent workforce but the trust and confidence of the people of Idaho. As a result of Admiral Donald's work, that confidence has flourished.

Admiral Donald has been instrumental to the future of the Navy, having overseen the highly successful construction of many Virginia-Class attack submarines, the final design and construction of the next-generation USS GERALD R. FORD aircraft carrier, and the initial design of the Ohio-class replacement ballistic missile submarine. All three platforms incorporate impressive new technologies into the nuclear propulsion plants that have proven to be safe and reliable for nearly 70 years. These ships will allow the Navy to continue to protect America and our interests around the globe and would not be possible without the steadfast leadership of Admiral Donald.

Admiral Donald's selfless commitment to serving our Nation has left us safer and better prepared to respond to threats around the world. He leaves a legacy of service, dedication to the Navy, and commitment to the environment. With our deepest gratitude, we wish him the very best in retirement after an impressive and impactful career.

CONGRESSIONAL RECORD
112TH CONGRESS (2011-2012)

HONORING THE SERVICE OF ADMIRAL KIRKLAND DONALD

REMARKS BY HONORABLE JOE COURTNEY OF CONNECTICUT IN THE HOUSE OF REPRESENTATIVES THURSDAY, SEPTEMBER 20, 2012

Mr. Speaker, I rise today, along with my friend and fellow co-chair of the bipartisan House Shipbuilding Caucus, Representative Rob Wittman of Virginia, to honor Admiral Kirkland Donald, U.S. Navy, as he prepares to retire upon completion of more than 37 years of faithful service to our Nation.

Admiral Donald has held the position of Director, Naval Nuclear Propulsion Program (Naval Reactors), for the last eight years. During his illustrious career, he played a pivotal role in ensuring that nuclear-powered warships continued to meet our global commitments in defense of our Nation's security.

Throughout his many years of service, Admiral Donald distinguished himself at the tip of the Navy's spear. He served as the Commanding Officer of the nuclear-powered attack submarine, USS KEY WEST, Commander of the elite Submarine Development Squadron Twelve, and Commander of NATO's Submarine Forces in Europe. Other highlights include tours at the Bureau of Naval Personnel, the Joint Staff, and as Commander of all US Submarine Forces.

As his time in Washington has shown, Admiral Donald's accomplishments do not end with his excellence as an undersea commander. Nuclear-powered warships have safely steamed over 150 million miles, and operated for more than 6,400 reactor years without a reactor accident. The last 20 million miles and 800

reactor-years have been achieved under Admiral Donald's superb leadership overseeing more than 100 operational nuclear reactors.

Admiral Donald has been particularly passionate about our Submarine Force and the investment in our current and future undersea programs. At a time when submarines are playing an increasingly vital role in our national security, Admiral Donald has been at the forefront of making the case for the need for robust construction of new *Virginia* class submarines—and has kept a steady hand on this crucial program at a time when a cooperative effort between the Navy and our shipbuilding reduced the cost and construction schedule of each new submarine. At a time when every corner of our government is challenged to find savings to ensure the most efficient use of taxpayer dollars, Admiral Donald has helped to guide this shining example of acquisition excellence.

Today, these incredible submarines are deployed worldwide, from the Arctic to the Antarctic, protecting Americans and our values. Their missions would not be possible without the ships' nuclear propulsion plants, impeccably designed and built by Admiral Donald and his team. I can speak from personal experience about the passion that Admiral Donald brings to this incredible responsibility.

When I first came to Congress in 2007 as a new member of the House Armed Services Committee, Admiral Donald and his team were among the first in my office in those early days to help educate me on the importance of our nuclear powered submarines and the value they bring to our nation. In particular, he invited me to join an *Ice Expedition* on board USS ALEXANDRIA—a two day voyage under the Arctic ice which was an opportunity to see firsthand the capability of the these extraordinary vessels.

Further, Admiral Donald oversaw the final design and construction of the nuclear propulsion plant for the Nation's next-generation aircraft carrier class—the first new aircraft carrier design in over 40 years. Owing much to his leadership, the USS GERALD R. FORD propulsion plant will triple the electrical power available for transformational technology, reduce reactor compartment manning by nearly 50 percent, and increase ship operational availability by nearly 25 percent.

As Director, Naval Nuclear Propulsion Program, Admiral Donald's commitment to environmental stewardship and public health and safety helped foster the highest degree of public trust. He worked tirelessly to develop and implement a robust process of preparing the nation's spent naval nuclear fuel to be stored safely for centuries. His foresight and execution give the American people great confidence that the nuclear Navy will continue to be safe and environmentally responsible for generations to come.

Mr. Speaker, Admiral Donald has been a thoughtful, forward-looking and hands-on leader for our nation's Naval Nuclear Propulsion Program, and his stewardship of this highly effective, responsive and world-class organization has set an example for all our nation's civilian and military leaders. Along with Representative *Wittman* and my colleagues in the House of Representatives, I wish him *Fair Winds and Following Seas* as he completes his honorable and distinguished service in the U.S. Navy, and wish him and his wife Diane the best as they embark on the next chapter of their lives.

THE CONTINUED RELEVANCE OF THE U.S. NUCLEAR DETERRENT TO WORLD PEACE

REMARKS BY FRANKLIN C. MILLER BALTIMORE COUNCIL ON FOREIGN AFFAIRS OCTOBER 9, 2012

Franklin Miller is a Principal at the Scowcroft Group in Washington D.C. He served in the White House as a Special Assistant to President George W. Bush and as Senior Director on the National Security Council. He also served for twenty-two years in the Department of Defense in a series of progressively senior positions under seven secretaries. During his career he had unusual influence on the evolution of national deterrence and nuclear targeting policy.

It is an honor to be here and an honor to speak to this distinguished audience.

This is an important time to discuss our nuclear deterrent. Our modernization programs are lagging and the very need for an effective US nuclear deterrent is being questioned in some quarters in Washington.

Let me begin by discussing why we need a deterrent in the first place. It is my firm belief that nuclear weapons will continue to influence global affairs for the foreseeable future and that as a result the United States—to protect our vital interests and those of our allies, and to moderate great power behavior—will continue to need an effective and viable strategic nuclear deterrent capability.

It has recently been in vogue in some circles in our nation's capital to assert:

- "the risk of a nuclear confrontation with either Russia or China belongs to the past not the future"
- "a large scale conflict with Russia or China is '*implausible*' " or that 'it seems increasingly *improbable*

> that US relations with China or Russia would deteriorate so severely in the next ten years that the nuclear balance would become a salient factor".

Pretty bold predictions, the danger of which can be summed up by Neville Chamberlain saying after the 1938 Munich Conference: "Herr Hitler has assured me he has no further territorial ambitions in Europe"

Trouble with pronouncements like those is that they reflect our aspirations and hopes, not what other capitals are saying and doing....

And those capitals have been fairly clear that they believe nuclear weapons are important tools in their diplomatic and military arsenal. No other nuclear weapons state has embraced the American and British desire 'to reduce the role of nuclear weapons'. In fact, quite the opposite has occurred:

In Russia, the role played by nuclear weapons has been dramatically increased: nuclear weapons are now at the very heart of Russian security doctrine. The public statements of the most senior Russian officials, the President, Prime Minister, Defense Minister and Chief of the General Staff routinely threaten nuclear weapons use against Russia's neighbors and, just a month or so ago, General Makarov asserted that Russia might use nuclear weapons pre-emptively against NATO BMD sites. Russian policy states that NATO is an enemy. Russian exercises feature simulated nuclear strikes against NATO countries, or those bordering on NATO and Russian strategic bombers are routinely violating US, UK, Norwegian and Japanese airspace. The Russians are now deploying two new types of SLBMs, a new class of SSBNs, a new type of ICBM, and are working on a new bomber and long range cruise missile. The Russian government is even contemplating building a second new type of ICBM—a giant Cold War throwback in the *heavy* ICBM class. Am I suggesting that a new Cold War has begun? No. Am I suggesting that the Russian government uses its nuclear arsenal to intimidate its neighbors? Yes. And do I think that Moscow has accepted the notion that nuclear weapons should have a **"Reduced role"? Hardly.**

The Chinese government refuses to engage in any discussion of its nuclear policy, maintaining a total opacity except for making the operationally empty statement that it has a "no first use policy". That, of course is a meaningless statement since such a policy can be changed literally in an instant by the Central Committee (and it's worth recalling that the USSR had a "no first use" *declaratory* policy and "first use *operational* policy"). China is deploying two new types of ICBMs, is building a new class of SSBNs and a new type of SLBM and refuses to accept any limits on the growth of its nuclear forces. **"Reduced role"? Not apparently.**

This leads to the point that it is an enormous conceit and the height of intellectual arrogance to believe that, because some Americans may believe some policy goal to be desirable, other countries' leaders—with extremely different values and with their own interpretations of their national interests—will also believe the same thing. In this case, it should be obvious they do not. And, as a result, the United States must maintain a strong, viable, and effective nuclear deterrent to prevent the other Great Powers from believing that they can threaten us or our allies with nuclear attack or blackmail or conventional attack.

Is our nuclear deterrent an all-purpose deterrent? Of course not. Nuclear weapons are not, never have been, and will never be, an all-purpose deterrent.

They are not useful for deterring terrorism (even WMD terrorism by state-less entities) or piracy, or cross-border drug trafficking, or even low-level insurgencies. They won't be useful in helping the free Syrian forces overthrow Assad. They are arguably of marginal use in deterring all but the most catastrophic cyber attacks or attacks against our space assets. And it's a cheap rhetorical trick to suggest that nuclear weapons have outlived their usefulness by pointing to attacks they *failed* to deter when they were not intended or deployed to prevent such attacks. So when you read recently published sentences like "no sensible argument has been put forward for using nuclear weapons to solve any of the major 21st century problems we face – threats posed by regional conflicts, terrorism, cyber warfare, organized crime, drug

trafficking, mass migration of refugees, epidemics or climate change" or "9/11 exposed the irrelevance of nuclear forces in dealing with 21st century threats", I urge you to recognize them and reject them for what they are: cheap rhetorical tricks.

To meet the new threats of the 21st century, which are very real and which must be deterred, or defeated and destroyed, the United States must continue to rely on—and to modernize—its conventional forces, its ballistic missile defenses, its special operations forces, and its space and cyber capabilities. And I urge you to remember that nuclear weapons were not designed to serve this role and can't; they can, however, prevent the big war and allow us to use our other tailored capabilities to deal with more proximate and daily threats—threats which are more proximate and daily precisely because nuclear deterrence has made the threat of Great Power conflict less proximate.

And while I am on policy topics, there are two other myths currently in vogue which I would like to destroy.

The first concerns our allies. You may have heard it said that "Non-nuclear forces are also far more credible instruments for providing 21st century reassurance to allies whose comfort zone in the 20th century resided under the US nuclear umbrella." Well, clearly some American philosophers believe so. But our Allies do not. And try as the philosophers may, and they have done so mightily, our Allies still make clear they want the reassurance provided by our nuclear umbrella. This is still the case in Asia and it is still the case in NATO, where twice in the last three years, the leaders of the Alliance have reaffirmed this.

And speaking of NATO, consider this remarkable set of statements made recently: "[The] military utility of US tactical nuclear weapons is practically nil....They remain deployed today only for political reasons within the NATO Alliance." *Imagine that*! To some, apparently, it is now a bad thing for our nuclear weapons to reassure Allies, persuade them that they do not need to develop their own nuclear weapons, and to ensure that Moscow understands that an attack on NATO could trigger a nuclear response? I don't think so. Nuclear weapons have always been

political weapons, weapons of war prevention. And that, ladies and gentlemen, was and remains a very good thing.

And, speaking of proliferation, we also are told *ad nauseum* that our nuclear weapons are contributing to the threat of nuclear proliferation. I've already noted how our nuclear arsenal is in fact an *anti-proliferant*, because we protect allies who otherwise might and could build their own nuclear weapons. But it is important to recognize that the oft-discussed linkage between the continued existence of the arsenals of the nuclear weapons states and further proliferation simply does not exist.

- The history of the last 20 years is that the US, British, French and Russian nuclear arsenals have declined dramatically in that time period while over the same period the Chinese, Indian, Pakistani, and North Korean arsenals have grown.
- North Korea has not pursued a nuclear weapons program because of our nuclear arsenal. It has pursued one because it seeks to intimidate its neighbors and to deter US conventional military action. The same holds for Iran. And while the continued existence of the nuclear weapons states' arsenals makes for a convenient talking point in international (and domestic) NPT circles, it is factually wrong and intellectually patronizing to believe that proliferant governments are mindlessly aping P5 policies.

So, nuclear weapons are going to be around for a long time and they will continue to play a significant role in war prevention, in deterring major conventional aggression, and in moderating Great Power interaction. The question now before us is how to structure our nuclear forces in the future to continue to carry out this vital task.

The US nuclear Triad of land-based ICBMs, submarine-based SLBMs and heavy bombers is a deterrent force which for five decades has provided a survivable and manifestly-capable deterrent. While its birth as a coordinated and combined deterrent

force was unintentional (it was the product of inter-service rivalry) the Triad has shown, in its combination of alert status, basing modes, delivery systems, and warhead types to provide an overall capability which ensures that no enemy attack could prevent effective US retaliation. The force's multiple basing modes ensured that an enemy attack could not destroy our retaliatory capability. The multiplicity of warheads and delivery systems ensured that no single technical failure, however serious, could negate our capability to respond. The combination of different ICBM and SLBM attack azimuths complicated and defeated a potential enemy's attempts to defend against our fast-flying deterrent. And our bombers provided every President since Harry Truman an ability to signal resolve and determination in a crisis.

But what of the future force?

In essence, the Triad has been modernized twice, in the early 1960s by the Kennedy Administration and in the 1980s by the Reagan Administration. But that was a long time ago. All of the Triad systems will require significant modernization or replacement in the next two decades, or they will be lost. Let me repeat that: absent modernization we will not have a nuclear deterrent in a few decades.

Have the policy and strategic requirements for having a triad changed? Some would certainly have you think so. Again, it is in vogue in some circles in this town to suggest that we should eliminate the ICBM force and remove the SSBNs from alert status—indeed to make them incapable of responding for up to 72 hours.

What's wrong with this picture? First, under the current force, any Russian leadership, in a future crisis—and remember we are not talking about any of this from a bolt-from-the-blue posture but in a hugely dangerous crisis in which the use of military force is being contemplated in the Kremlin—including the use of preemptive nuclear strikes as Russian doctrine suggests—would have to consider launching a huge attack in order to neutralize our ICBM force as well as the other Triad legs and our national command and control.

- Eliminate the ICBM force and the problem becomes dramatically easier: to succeed you only have to destroy two SSBN bases, two bomber bases, and Washington and then demand a cease fire. Even a smaller nuclear power could figure this out. Do we really need to discuss further why this is a terrible and dangerous idea?

- Second, removing forces from alert status has been a quest for some people in this town for decades. But they can't tell you why they are doing so...except, in the words of a recent study, they believe *and here I quote* that *our* ICBMs' " 'rapid reaction posture' runs a real risk of accidental or mistaken launch". **That, of course, is just not true.** Then they will tell you that they are worried about the security and safety about Russian ICBMs....but from all the Russians do and say, the Russians aren't worried about that. Moreover, de-alerting measures are inherently unverifiable. If you want to discuss this at length, we can do so in the Q and A session or you can just read the piece I wrote for the Perry-Schlesinger Commission in 2008. Finally, tying the President's hands and making it impossible for the US to respond for 24-72 hours is a perfect formula for a nuclear blackmail scenario which all of you could conjure up in a few seconds.

So, keeping a strategic triad, elements of which are always on alert, will remain vital. Additionally, as you will have discerned from my comments about NATO, not only do I believe a strategic triad remains vital, I believe we must maintain forward deployed weapons in Europe until our allies tell us they no longer believe those weapons have important deterrent value.

Finally, there is the question of how many warheads we need to maintain in the active force. A few short years ago, General Chili Chilton, at the time testifying on the New START treaty in his role as Commander, US Strategic Command, stated to Congress that he was "comfortable with the force structure that we have" provided by the New START treaty as it is "adequate for

the mission that we've been given, and is consistent with NPR". That meant a force of about 1550 deployed strategic nuclear weapons, which translates into about 2200 - 2500 actual weapons due to the treaty's *counting rules.* While some additional reductions may be justified depending upon future positive international developments, it should also be clear that radically deep reductions to only a few hundreds of weapons would be wholly inadequate. Such a small force would fail almost all of the requirements of a capable, secure and credible deterrent because

- It would not be able to deter direct attack on the US, let alone threats to and blackmail of our allies, because it would be too small to threaten retaliation against the most valued assets of a Russia or China gone bad, and
- The force would be too small to be based survivably, and most likely would have to be deployed in only a single basing mode rather than a triad. Put another way, it would be susceptible to an enemy pre-emptive first strike.

Finally, in thinking about nuclear deterrence, it is absolutely critical that we remember that the task is to deter a potentially hostile foreign leadership which possesses nuclear weapons. Our task is not to deter these states today; it is to deter them in a future crisis when they are contemplating the use of military force, including nuclear weapons, against our—or our allies'—vital interests. In such a perilous situation, US policy must reflect the fact that we deter hostile leaderships by threatening what <u>they</u> value most, *not* what <u>we</u> value most. <u>We</u> value our people. Hostile authoritarian leaderships value their ability to remain in power, the security apparatus which enable them to do so, their military forces, and the industrial capacity to sustain war. And so it is a strategic mistake of enormous proportion to believe an effective deterrent in a future crisis can be based on a few hundred weapons which threaten a potential enemy's cities. That strategy would be both immoral and self-defeating. "Mirror-imaging" is a dangerous

and fundamentally flawed approach to deterrence, and we must never fall into that trap.

With that point made, let me thank you for your time and your attentiveness and turn to your questions....

ANNUAL SYMPOSIUM

2012 NAVAL SUBMARINE LEAGUE SYMPOSIUM
ADMIRAL KIRKLAND H. DONALD, U.S. NAVY
DIRECTOR, NAVAL REACTORS
17 OCTOBER 2012

ADM Mies, thank you for the warm introduction. Fellow Flag Officers, distinguished guests, Submarine Force, and Naval Submarine League members—it is a privilege to be here again this year to discuss the future of our community. Thank you to the Naval Submarine League for hosting this 30th Annual Symposium and to all the individuals that helped to put this event together.

Thirty years—we've come a long way since 1982 when I was Engineer on USS MARIANO G. VALLEJO, in what was then the *wilds* (and I do mean wild) of Kings Bay, Georgia, from essentially an analog Navy to the digital marvel of today, PKs to flat panels, 16mm movies on reels to IPADS, periscopes to electro-optical sensors, flapper valves to flushing toilets. What has not changed, however, is submarining at its essence. Inherently hazardous, technically challenging, physically and mentally demanding, lethally capable in the eyes of our enemies, bonding to those lucky enough to earn Dolphins, extremely rewarding to those who have served. I am so proud of this Force—the ships and the people—for what it has done for this country for over 112 years and tremendously excited for what it will do for the next 100 years.

For the last 30 years the Naval Submarine League has been a coalescing force drawing together submariners, industry, government, media, and families to advance the Force on many fronts—in the public eye, in the academic, technical, and industrial domains, as well as amongst ourselves through well deserved recognition of our exemplary submariners, past, present, and future. You have made a real difference and I thank you. However, as I am inclined to say from my perch at Naval Reactors—your reward for a hard job—well done—is another hard job.

Your role will become more important, your mission more vital, your influence, hopefully, more profound in the years ahead. After we navigate the challenging times ahead—from our uncertain world, to the advance of competitors for undersea dominance, to the steady march of technological change, to the timeless advance of careers, I want Admiral Richardson, when he addresses the symposium for his last time as Naval Reactors, at your 60th anniversary, to be just as proud, enthusiastic, and hopeful for our Force.

The Future of Submarine Programs

The conference theme this year is *The Future of Submarine Programs*. Simple words but a tall order to actually flesh that theme out as we peer into the future from our foggy, uncertain present. I remember an XO of mine when I was learning the craft of submarining helping me sort out the fire control display on a torpedo approach. He, let's just say *emphasized* to me to make sure I understood what was *truth* on the display, as opposed to all other data which was *derived* (or as he called it "Lies! Damned lies"). Let's apply that teaching to looking at our future. First the truth:

- We have a clear mission of significant importance to the defense of the United States of America. Dominate the undersea domain.
- Our Submarine Force is the best in the world.
  - Our force is getting smaller and the operational stress is increasing.
  - Our adversaries, real and potential, are advancing their capabilities to challenge our unfettered access in the air, and on, and under the sea.
- As in the fire control system, if you pay attention to the *truths* that you have and smartly manipulate the other parameters of a target solution, you can and should act on those *derived* truths. Such as:
- The role of the Submarine Force will become more important in the nation's future defense strategy.
- We must continue to invest in technology and moderniza-

tion to advance capabilities of the ships we have and those we are going to buy.

- The lack of resolution on how to address the national debt and restore our economy and the role defense will play in the solution to both issues creates uncertainty, leads to suboptimal short term decision making in a decidedly long term business (shipbuilding), and in, ultimately, increased costs and slower production.
- We must continue, and if possible, accelerate our programs to build VIRGINIA class submarines and the replacement of the OHIO-class.

With that let's dwell a bit on our number one priority – the OHIO-class Replacement Program.

Supporting Ohio Replacement

We have done our due diligence to smartly phase the production and replacement of our submarine fleet to provide the most cost effective and capable platforms while meeting the strategic demand signal. VIRGINIA is in place to replace the retiring LOS ANGELES class and our next shipbuilding transition to manage is the replacement of the OHIO class which begins to retire in 2027 with a boat decommissioning each year thereafter. We have already taken steps to extend the life of the existing OHIO class, to the extent technically allowable, and the key to sustaining the minimally acceptable force structure is starting construction of Ohio's replacement no later than 2021.

The submarine based leg of our strategic triad is a national imperative and a unique responsibility of the United States Navy supported by the Department of Energy. Once commissioned, this new ship will be the foundation of our nation's nuclear deterrence until 2080. The requirement is clear and the timeline for getting our work done and putting a ship to sea is indisputable. The safe and secure future of this nation rests on our shoulders.

There are challenges; politics, budgets, bureaucracy, technical, but there can be no excuses and there can be no deviations from the unity of effort essential to our success.

A Vital Mission for Submariners

There should be no doubt in our minds that the mission of the sea based strategic deterrent is here to stay. The President and Secretary of Defense have re-affirmed that a safe and effective nuclear deterrent is vital and the sea based strategic deterrent remains its cornerstone. We rely on these submarines to strengthen regional deterrence and reassure our allies. Therefore, recapitalizing the fleet as the OHIO class decommissions ensures we meet the nation's national security requirements while sustaining a strong U.S. industrial base, with the skills and expertise unique to submarine design. This is well recognized in the Navy, in the Office of the Secretary of Defense, in the Administration, and on Capitol Hill as evidenced by formal establishment of a program of record and strong support for the resources we need to do the job.

We Are Mindful of Costs

Re-introducing SSBN construction to our Navy's shipbuilding plan after a 20-year hiatus, is a difficult task. All of the risks associated with a new class of ship are present, amplified by the unique challenges of nuclear submarine construction. We are mindful of both the technical and associated cost risks. We have been diligent in defending the fundamental requirements for the ship and disciplined in controlling *scope creep*. We continue to look for opportunities to take cost out of the ship. In the two years since Milestone A approval, our efforts have reduced the construction estimate for these ships by nearly $300 million, and we are not done yet.

We are striving to increase the collective readiness of this class through a life of the ship core, shorter overhauls, and reduced maintenance, reducing the number of hulls from 14 to 12 while meeting the availability requirements of the combatant commanders. This results in procurement savings of over $10 billion and saves a multitude of other life cycle costs when you include manning, maintenance, and upkeep. We are also reducing cost and risk through our proven technique of *evolutionary* introduction of technology.

Building On The Success Of VIRGINIA

We are applying modular construction techniques and lessons learned from the successful VIRGINIA Class program. We are re-designing and re-arranging where it makes sense, we are reusing components and systems from previous designs where we can gain cost, schedule, or operational efficiency. When corrected for ship size and inflation, we have seen a 30% reduction in design costs compared to previous designs. We are even drawing on the many lessons learned from our on-going aircraft carrier design to leverage improvements like large turbine generators supporting electric drive, our next generation propulsion plant monitoring and control systems, and plant simplification strategies.

We have also made improvements in the Reactor Compartment and engine room arrangements. The ship's modular construction enables the ship to be more maintainable, to have wider passageways to allow for voyage repairs, and we have placed a lot of effort in mitigating acoustic risk. With her 16 missile tubes, electric drive propulsion, and other stealth technology, the OHIO replacement will showcase a multitude of improved design and new technologies, but each improvement is leveraged on what we have learned about making and operating nuclear powered submarines over the last 60 years.

I know some remain skeptical that we can deliver an effective, affordable, and reliable electric drive propulsion system. I believe most of this skepticism is anchored in perceptions of our earlier electric drive efforts - ships like TULLIBEE and GLENARD P. LIPSCOMB. While they were great ships and advanced the state of the art, they didn't have the power and reliability and acoustic performance we need for this ship. We are applying the lessons learned from those ships, as well as from electric drive programs in the surface navy and commercial industry. We have been developing the permanent magnet motor technology with successively larger applications over the last two decades and we have a robust prototyping and testing program. The technology is essential to the ship and it will be ready.

Earlier in my remarks I mentioned the importance of unity of effort and with one last comment on that I will close. The Ohio

Replacement Program is vitally important to the nation, yet I occasionally hear the discussion framed in terms of the burden it places on the shipbuilding program. Yes, this ship will cost a lot of money and we will work hard to keep that cost as low as possible. But in terms of the dollars invested per any measure of importance to national security—this money is well spent. We should not be talking about this program as a burden—it is our solemn responsibility; our obligation to the citizens of this nation; one that we will fulfill to the very best of our ability, just as our predecessors did when they delivered USS GEORGE WASHINGTON (SSBN 598) and USS OHIO (SSBN 726).

We all need to be able to speak knowledgeably about the program and deterrence in general. And we need to engage frequently—even constantly to ensure our leadership and our public is informed on this very important topic. When there is criticism, we should listen to, understand it as it is intended, and address it either by changing to make our program better or by educating the critics to improve their understanding. This isn't about selling or spinning a story. If we do our jobs correctly the facts will tell the story. But that will only happen if our message is fact based and consistently delivered. There should be no daylight amongst us as we stand together doing our part to deliver this ship.

Wrap Up

This will be my final speech to you as the Director of Naval Reactors. Although I am retiring soon, I, like you, will always be a submarine advocate. I have enjoyed the opportunity to speak to you over the last several years, and I thank you for what you do to make the future of submarine programs just as promising as the past. We have a bright future ahead, and I look forward to the continued success of the silent service.

Thanks again to the Naval Submarine League and to all of you for participating in this symposium. I am looking forward to the remaining presentations and I would be happy to take some questions.

2012 NAVAL SUBMARINE LEAGUE ANNUAL SYMPOSIUM VICE ADMIRAL MICHAEL CONNOR, USN COMMANDER, SUBMARINE FORCES

17 OCTOBER 2012

Good afternoon and thank you for that warm introduction. Admirals, leaders and friends of the Submarine Force—it is a pleasure to be here today.

I want to thank all the leaders in the Submarine Force to include ADM Donald, and others, for their steady guidance and support ... always, but especially this past weekend.

I'm going to spend just a few minutes talking and then Admirals Caldwell and Bruner will continue. Between the three of us, we are going to tell you what the priorities are for the Force, where we are going operationally and where we are going with our ships, weapons and other payloads.

If we are successful today, we will have conveyed what our vital missions are, how they will evolve over time, what we need to do to sustain those missions in the future, and what we need to help us get the Undersea Force where it needs to go.

I will cover the underpinnings. Frank Caldwell will show you what the future of Undersea Warfare Operations will look like, and Barry Bruner will discuss the requirements for the tools that will enable this future. Then the three of us will take any questions.

Let's start by reviewing what we provide – and why it is vital.

As you all know, here is what we produce:

- Survivable sea-based deterrence.
- Covert surveillance and reconnaissance.
- Undeniable wartime access with credible combat power.

We provide these outputs 24/7 365 days a year. But we have a problem. These outputs are like oxygen—underappreciated until in short supply and—potentially—not fully appreciated until they run out. So—I would like to paint a picture of what the world looks like if we were negligent enough to let these things run out.

Let's picture a world without a survivable sea-based nuclear deterrent.

- First it means that we lack credible second strike capability.
- Which means that when tensions rise an adversary might have an incentive to strike us first.
- and also means that we don't have the ability to rapidly strike without over-flying other nuclear powers.
- Which altogether mean that we don't have this powerful deterrent to nuclear war – OR – to major power conventional war.

This will bring us back to the good, old days that so many seek—like the Global Zero crowd. So let's talk about the good old days—before those nasty nuclear weapons came on the scene. On average—during the 400 or so years prior to nuclear weapons, major power war killed about 1% of the population—the world population—every year!!

In a bad year that number approached about 3%. So what I am saying here is that if we manage to squander the sea-based nuclear deterrent, it could lead us to a time when in a typical year about 70 MILLION people might die in major wars that can no longer be effectively deterred. In a bad year, that number would push 200 MILLION. Numbers like this sound a little far-fetched in a time when a terrorist attack that kills four people dominates headlines for weeks.

So let's just think for a moment about the people who put the architecture of the strategic triad together. They were people like General Curtis LeMay and ADM Arleigh Burke. People like Presidents Truman, Eisenhower, and Kennedy. What did these people have in common? Well they all fought in at least one and

sometimes two world wars. They knew what massive casualties, military and civilian, looked like, smelled like, and felt like. They were great warriors—who hated war. And they set about the task of making major power war a choice that no one would ever make again. They have been successful—for 67 years and counting. Now—three generations later—some forget how this unprecedented period of relative peace came about.

I ask you to continue spreading the word about what the world without the oxygen of sea-based nuclear deterrence would be like—and the importance of your own contribution to making the world a better, safer place.

This is among the most important work being done by anyone—anywhere on the planet—and we need to make sure that we take it seriously, insist that it be done right, whatever role we play in that process. I will be taking this message everywhere I go, and I ask you to do the same. Barry Bruner will have more on this and he will give you some tools to help you do your part.

Covert surveillance and reconnaissance. We have been doing this for decades—and use it to ensure that we know more about potential enemies than they know about us. This process allows us to build weapons and develop tactics that give us an edge. It allows us, as a nation, to make decisions with better insight as to what our adversaries are thinking. Sometimes—for that last decade or so—we use a different name for this. We call it finding and fixing the enemy—so that we, or one of our brothers in arms, can finish them. We struggle to meet the world wide demand for this product. Our submarines continue to surge early, stay on station longer and deploy early because our unique ability to get to the right places with the right equipment to help our national leaders understand what is going on in the world is considered indispensible. What does the world look like when we don't have this? Well

- We start to lose track of the actual capabilities of potential adversaries, cracking open the window for strategic surprise.
- We would no longer be able to identify vulnerabilities that we can leverage.

- We would lose our comfort operating in the far forward regions, in the process ceding a home field advantage to those who chose to strike our interests abroad.
- Our regional allies and partners would lose the confidence that these operations generate.

Submarines will be relied upon to be up front scouting and striking the highest value targets, the carrier strike group will come in shortly thereafter—and with a lot more weapons. We need to be there first because for the foreseeable future, in a high end scenario, we will be the only ones with an initial ability to get our weapons within effective range of their assigned targets. If the goal is to take and hold territory, it will be a Navy-Marine Corps team that does that, but it will be our submarines that prepare the battlefield.

OK…you probably see a pattern by now.

And if we do squander the oxygen that is covert surveillance and reconnaissance, we:

- Eliminate our ability to open the door for other forces that bring the majority of combat power.
- Which means that this strike group would never get to the fight because they would be destroyed before they got within weapons range.
- Which means that our ability to prevent limited wars as countries compete for resources and territory would be lost.

These are not pretty pictures that I have painted.

So—what must we do to prevent these scenarios from coming true?

Let's talk about what we must do—using the terms that CNO uses—Platforms and Payloads—and adding a couple of other factors—Partnerships and People.

When we speak about platforms and payloads, we are speaking about an approach where we invest in a solid, versatile ship that is intended to last for a long time, and built with the intent that it will be able to evolve over time and out-pace the competition by

providing a flexible enough backbone to easily change its payloads—the weapons, sensors and so on. The most dynamic part of the process then becomes the payloads. Payloads are designed and built with the full understanding that today's state of the art may be obsolete in a few years.

We only have 2 priorities in the platform area:
The OHIO replacement SSBN
The Virginia Class SSN

We need the OHIO replacement SSBN to continue our most critical mission—deterring war between major powers. We have established the right requirements in the areas of size, stealth, payload volume and self defense capability for a ship that has to meet our platform attributes until about 2080. As a result the costs are in the range where they will fit in a smaller defense budget provided we keep our priorities straight. You will hear more details from Barry on this—our most important funding priority.

Our other platform is the Virginia class submarine—the best attack submarine ever built. We are at a steady production rate of two per year—a production rate that will slow—but not stop—the decline in the Force as those great Los Angeles class subs that we built in the 1980's reach end of life and we face the impact of the procurement holiday we took in the 1990's. So we need to keep that production rate at two per year. We will have to fight to maintain this rate, ship by ship and one budget cycle at a time as there will always be a reason why someone will propose that we abandon the proven tenets of stable production and block acquisition that made—and continues to make—this program the most successful acquisition program in the Department of Defense. The Virginia class is the platform that underpins the second and third major deliverables of the Submarine Force—covert surveillance and undeniable wartime access.

We do have a one major change coming in this program, however. Starting with Block 5, which begins construction in 2019, we will stretch all of the ships to include a payload module that will multiply its capacity for missiles and other developing

payloads. We need to do this to sustain the payload volume we will lose when the SSGN force retires and more importantly—to ensure that we have enough payload volume on the ships that are able to get into firing position in the world's hot spots.

While you could probably summarize the next two decades of platform acquisition as *steady as she goes*—that is not the case in the payload area. This is where the most dynamic change must take place. This is where the pace of innovation must be the fastest. This is where the greatest marginal return on the next warfighting dollar will be found. Barry Bruner will give you the juicy details on the projects we are working, but I wanted to give you some of the basic principles that underlie his efforts.

In the torpedo area, as the warfighting planners assign more and more targets to Submarine Forces due to our ability to get to those challenging targets, our aging torpedo inventory is shrinking. So we must build our inventory. We also need to extend the range of our torpedoes because there is a growing mismatch between the range at which we can sense our targets and the range at which we can kill them. There is also a huge body of existing technology that we can leverage if we are willing to trade torpedo speed for better navigation and sensing where appropriate. If we follow this path, the amount of territory that each of our submarines can influence with torpedoes will grow.

The missile area—land attack and anti-surface—will also prove to be fertile ground. In the continuously morphing war on terror, which is changing from a land war focused in one or two countries to a widely dispersed war on multiple continents, these are the weapons that we shoot the most. But, if we are to do what is expected of us in a high-end fight, we need our missiles to evolve. We need to have an anti-ship missile so we can influence larger areas at sea during the times when we will be the only forces in the fight. In order to be flexible across the mission set, we must have a missile that has a credible capability against both sea and shore-based targets.

We will need to bring higher performance missiles to bear, in terms of speed, payload and autonomy—as the senior leadership

expects our SSGNs and SSNs to focus on increasingly challenging targets.

Vehicles will be the key to increasing our reach in the undersea. With the budget pressures we face, we will not be able to go force on force with our rapidly growing competition. We will need to look at the degree we can use unmanned vehicles for sensing, attacking, and deceiving those adversaries, while focusing our submarines on the missions that only they can do.

Our sensors and systems must evolve as well. Right now, there is an insatiable appetite for our submarines equipped with particular types of carry-on equipment. The phenomena is very similar to the one in which we took special purpose carry on sonar gear 20 years ago and turned it into a main stream-highly adaptive sonar approach called Acoustic Rapid COTS Insertion or ARCI. We need a program called EWRCI—or Electronic Warfare Rapid COTS Insertion. It will be the only way to keep pace with the incredibly fast moving EW area.

There is a huge doctrine piece to our future as well. As we focus on doing the very important things that only we can do well, we need to work with others and shed some of our legacy missions. One area that we need to look at as low return—I think—relative to other things we need to get done—is man to man ASW. I'm not saying that we should not be able to fight our way through the enemy's submarines or give up the far forward ASW mission. But, I am saying that subs may not be the best forces for wide area ASW search in wartime, given our other priorities. We need to pass much of that mission to allies, netted systems, MPRA, and surface forces who can do a lot these days with high-end active sonar systems. As the Force that will always have the best understanding of the undersea environment, we will need to actively coordinate this combined effort. This will require us to work more closely with our brothers in other warfare communities and with other resource sponsors.

We will continue to expect a lot of our people—may be even more going forward than in the past. We are sustaining high OPTEMPO due to worldwide demand. We are diversifying our mission set—and despite our best attempts to plan and predict, we

know that the future is unpredictable. Therefore we will rely on our ultimate strength—the initiative, judgment, and courage of our people. If we are to expect more of them, it is only fair that they should expect more from us. We owe them world class equipment, a predictable schedule where possible, a maintenance commitment that ensures their safety, and—a willingness to listen to the incredibly talented people upon whom we depend so much.

The week after I relieved Admiral Richardson, Admirals Caldwell, Bruner and I met to work on the Update to the Design for Undersea Warfare.

The first update will be based on feedback from the Force and it sharpens our focus in several areas specifically:

- By Adding a *Commander's Intent*—that will simultaneously provide the foundation for our communications to the deckplate as well as to the broader Undersea Forces. Our focused efforts within the Design's three Lines of Effort (LOE) will achieve our three main purposes—deterring conflict, gathering unique and vital intelligence that only a submarine can access, and if necessary—decisively fight and win wars. The Submarine Force has, and always will provide our National Decision Makers great leverage in carrying out U.S foreign policy.
- The Update will add specific guidance from the Force Commander to the submarine Commanding Officers. This guidance will sharpen expectations for developing our people and maintaining proficiency in the Critical Core Competencies—such as navigation, contact management, force protection and safe reactor plant operations—to ensure a solid foundation from which a crew can quickly build mission-specific skills—such as submarine tracking, shooting torpedoes, and shallow water ISR .
- It will add guidance to the Undersea Forces regarding a new *Undersea Warrior Foundation of Strength*—This foundation underlies all three LOEs and emphasizes the importance of every person in our small elite force.
- It will add an emphasis on building regional and technical specialization into our forces and people—We are facing a

future that will demand greater levels of specialized expertise, both in our leaders and the teams they employ. We will do this while also maintaining our ability to surge as basic war fighters in response to world events.

And…

- Adding an emphasis on exploiting the Cyber/Electromagnetic spectrum (EMS) and emerging unmanned systems—Our unique undersea access is important in the rapidly changing cyber and electronic warfare area. Unmanned systems—both undersea and aerial—are becoming increasingly important. We need to adapt to these developments with the same degree of energy and innovation that led to our mastery of undersea acoustics and weapons. Our Acoustic Rapid commercial off the shelf program, commonly referred to as ARCI—has been a resounding success. It is time we establish something similar for Electronic Warfare—EWRCI.

The Update has been reviewed by our major commanders. We are incorporating their feedback and plan to review the Update with fellow Submarine Flag Officers at SUBFOTS later this month. I look forward to discussing this more with you all in the very near future.

In summary, the importance of being able to dominate the Undersea Domain has never been greater. Stealth, agility, mobility, and war-winning capability… that is what we have that NO other force can bring to a battle. It is one area—maybe the ONLY area—where our nation sustains a clear advantage against all competitors. Each of our counterparts working for a near peer competitor nation is working diligently every day, even as I speak now—to close the gap. The advantage our nation enjoys in the Undersea domain is ours to squander if we become complacent. We have seen this happen in other areas throughout military history, and we cannot—will not—let it happen here.

Thank you.

STRATEGIC DETERRENCE AND FORUTH GENERATION UNDERSEA WARFARE

RADM BARRY L. BRUNER, USN
DIRECTOR, UNDESEA WARFARE, OFFICE OF CNO

Good afternoon. I'd like to thank the Naval Submarine League, specifically CAPT Garverick, Admiral Padgett, and Admiral Mies for the invitation and everything they have done to put this amazing venue together. The venue here is a great one—and this event is one that I look forward to every year.

I'd also like to tell you how pleased I am to be part of the Submarine Team, working with Admiral Connor and Admiral Caldwell. As I think most of you know—Admirals Connor and Caldwell work Lines of Effort one and two—and I am responsible for Line of Effort three, ensuring we are procuring the right platforms, payloads and people for the future. And that is what I will talk about today. I am going to focus on two critical areas; Strategic Deterrence and Fourth Generation Undersea Warfare.

Let me get to the bottom line up front, there are three things I want you to take away from this talk. One—Strategic Deterrence is a National Imperative. Two—OHIO Replacement is the right submarine to take us through the 21st century—all the way to 2080. And three—We are building the OHIO Replacement class at a responsible cost.

Admiral Mies has a great diagram that he uses to demonstrate the significance of strategic deterrence and Admiral Connor also displayed it in his brief – it clearly demonstrates the impact of a successful nuclear deterrent on the number of world-wide deaths due to combat. Not only does it deter a nuclear attack on the United States, it also deters conventional warfare between major powers. It is clear to me, with the results demonstrated by his figure, and as stated by our Nation's senior leaders in the 2010 National Policy Review, "As long as nuclear weapons exist, the United States must maintain a safe, secure, and effective nuclear arsenal", we need Strategic deterrence now—and in the forseeable future. This is a need that is not going to go away.

Strategic Nuclear Deterrence
Why We Need It

- **Threat:**
  - At least one country poses an "existential threat" to the U.S. (ability to effectively destroy the country within a few hours)
  - Several countries pose an existential threat to our allies and partners
  - Many countries possess sufficient nuclear forces to severely disrupt our way of life
- **Deterrence:** To discourage such an attack from being launched, the U.S. employs nuclear deterrence
  - Credible threat to impose unacceptable costs on an adversary
  - Prevents the U.S. and our allies and partners from being coerced by the threat of nuclear attack

Role of Nuclear Weapons [2010 NPR]

To deter nuclear attack on the United States, our allies, and partners

Deter non-nuclear attack

"Reassure our non-nuclear allies and partners of our security commitments… Confirm that they do not need nuclear weapons capabilities of their own."

2010 NPR: "As long as nuclear weapons exist, the United States must sustain a safe, secure, and effective nuclear arsenal"

Slide 1

The Nuclear Deterrent Triad

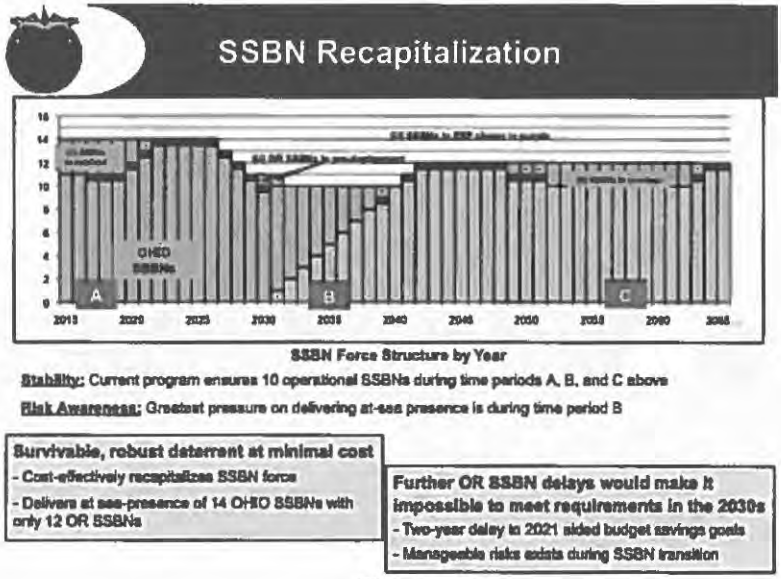
The Triad provides effective nuclear deterrence and assurance
- Each leg brings its own unique benefits (survivability, stability, and flexibility)

- **Nuclear powered submarines (SSBN) carrying submarine launched ballistic missiles (SLBM)**
  - Survivable – Assured second strike capability
  - Flexible – Variable launch location
- **Silo-based intercontinental ballistic missiles (ICBM)**
  - Prompt – Rapid response capability if desired
  - Stabilizing – Geographically dispersed hardened targets
- **Nuclear Capable Bombers**
  - Signaling – Demonstrate intent and resolve
  - Flexible – Recallable, variable flight path

The SSBN force provides the U.S. with a survivable assured response capability
"…the SSBN fleet is the most survivable leg of the Triad, I consider it indispensable" – CJCS Dempsey

Slide 2

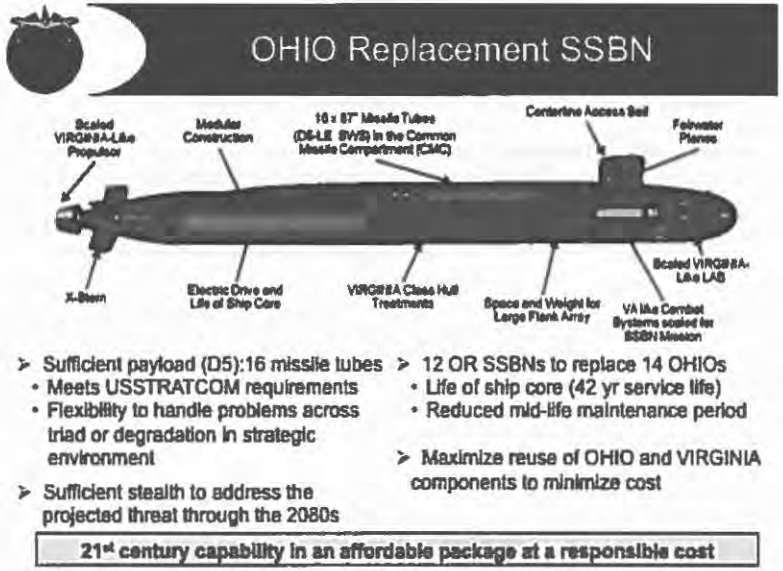
We are not in the business of competing with the other legs of the Strategic Triad—in fact, each leg brings it's own strengths. You can read them on slide 2—but the one important thing you should take away from this slide is the fact that the SSBN leg of the triad is the most survivable. The New Start Treaty shifts 70% of the strategic warheads to be carried on SSBNs. A fact recognized by all. As Chairman Dempsey said—"I consider it indispensable".



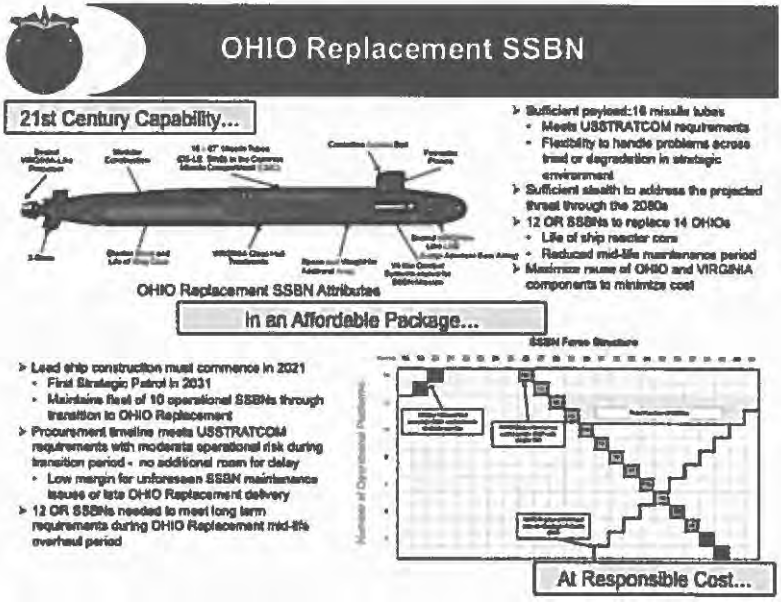
Slide 3

(Slide 3) Now I would like to talk about the OHIO Replacement SSBN. There has been quite a bit of discussion about the number of SSBNs that will be built in the new class, the OHIO Replacement. The right number and the required number is twelve. This graph depicts why we need twelve—and not ten. You can see that we are currently living with a deployable force of sometimes ten—or sometimes eleven SSBNs today out of a total force of fourteen. The reason for that is that three to four of the current class is in long term maintenance, or going into—or

coming out of that long term maintenance at the same time. We will begin to come out of that trough in around 2018 as we stop performing those long term maintenance periods. In the late 2020s, as the OHIO class is decommissioned and the OHIO Replacement class begins to come on line, we will be back at ten again—for about a decade. Then the number of OHIO Replacement SSBNs will come back up to twelve—and that is a necessity because around the middle of the century we will have to place this new class of submarines into a long term maintenance period also. But, since the ship is being built with a life of the ship core and with a focus on reducing long term maintenance—the time period the ships will out of service is only two years, vice the three to four years for the current OHIO class. So—we must have a class of twelve OHIO Replacement submarines – this is why and it is a must. (Slide 4)



Slide 4

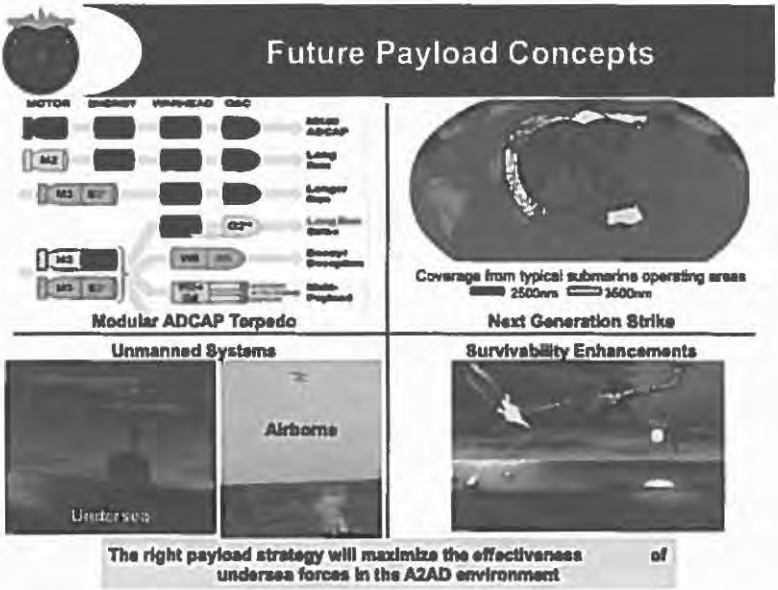


Slide 5

OHIO Replacement is not just a modernized OHIO class submarine. Nor is it a *big* VIRGINIA Class submarine. It certainly uses lessons from both of those classes—but let there be no confusion, it is a new submarine with new technology. This submarine will take us to nearly the end of this century. What's new? A life of the ship core—This makes the maintenance requirements for the ship much less than the OHIO Class. Also, it will have a new propulsor and X-stern. New arrays, space and weight for new coatings—this is a new submarine. One designed with current state of the art technology but also with flexibility to ensure modern technologies can be back-fitted into the ship decades from now when it is needed. The other key improvement is that this submarine is being built from the very beginning to have a 42 year service life. We are maximizing the re-use of OHIO and VIRGINIA class components where possible to keep the cost down; —bottom line; this is the right submarine to take us through this century and it is being built at a responsible cost.

Slide 6

Now I'd like to shift gears to SSNs. We need to build an asymmetric capability that can be used against our potential adversaries—a capability that they will have to react to, to defend against, to have to spend money on and invest in. The historic example I use to describe this concept is the invention of the bow and arrow. This is an asymmetric capability because it forces every warrior of the opposing force to carry a shield—even if there is only one arrow available to the enemy. Unfortunately—we, our nation, have been reacting far more defensively like the shield carriers vice causing the enemy to invest in shields. We have to fix that. And the submarine is the best, most effective and easiest way to do that. We can get inside the adversaries defense, we can offer disruptive capabilities that have to be defended against—even if we are not there. That is what our SSNs offer. The question is how do we capitalize on it?



Slide 7

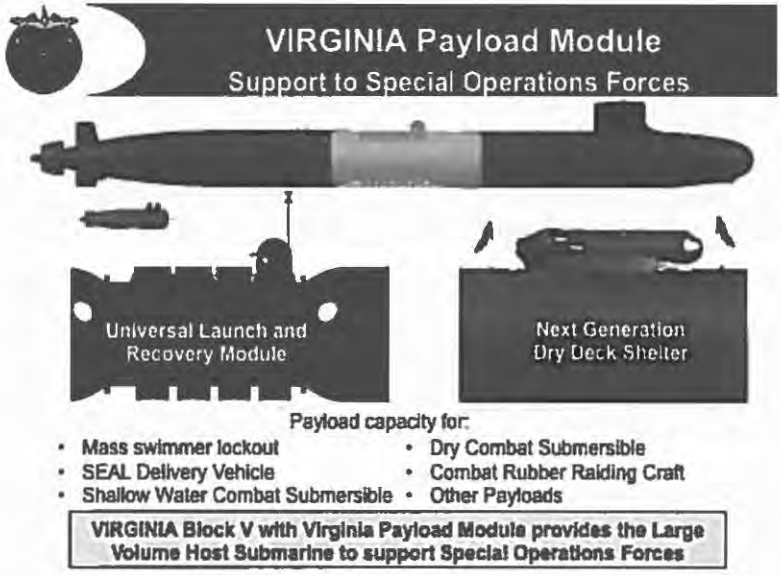
These are some of the ways we can better enable that asymmetric capability. A modular torpedo enables us to build torpedoes that can operate at longer ranges, have different missions, carry different—and multiple payloads, and most importantly—we can get a modular torpedo production line going fairly quickly. Some might say that our torpedoes are already modular, but this new torpedo needs better modularity up to the level of today's technology. We tried to fund this last year but we just could not find the money. I think we have a lot more support for this effort this year and I am confident that as part of POM-15 we'll be able to get moving on this project.

We published an "Unmanned Undersea Systems Strategy" earlier this year. In it we laid out a blue print for UUVs, up to and including potential uses, the development of a UUV Squadron and use of the Universal Launch and Recovery Module. The ULRM with a Marlin will happen in the near term. UUVs are clearly key enablers that we must invest in to make best use of our unique access in an A2AD (Anti-Access, Area-Denial) environment. This

is asymmetric. I can foresee a day when the crew of submarine loads UUVs before deployment as they load torpedoes today. A good sailor with a checklist marking it off as it comes aboard. When it comes time to use it on mission, the CO launches it with procedures much like the one we use to launch current payloads.

There has been a lot of talk the past few months about Conventional Prompt Global Strike—what it will be, when it will be fielded, etc. The bottom line is that whatever missile the Navy develops in the future we need, no, we must, be able to deploy that from a submarine. Only we have the unique access required to make best use of that missile—whatever it is.

Lastly, we have successfully launched UAVs from submerged submarines. I'll talk more about that in a minute. But, along with UAVs, we have the capability—with appropriate investments, of launching anti-aircraft missiles against adversaries. Although we are not known for sinking a lot of money into defensive payloads, this is something that we are also looking at.



Slide 8

(Slide 8) Virginia Block V and Virginia Payload Module are keys to our Navy's future. Not only does it largely make up for the loss of our SSGNs, recapitalizing strike payload volume, when they are decommissioned in the late 2020's—VPM also allows deployment of all the payloads mentioned in the last slide, plus the SOF capability required for the future. These are just two examples of where we could go in our effort to support our SOF brothers. VPM will allow not only vehicle capability—but also space for SOF planning, berthing and the like. For all intents and purposes, a VIRGINIA class submarine with the VPM is a small SSGN. It is absolutely needed for the future.

I recently spoke to a group in New York City and at the end of my speech I was asked some questions. One of them was new—I had not been asked that before. The question was, "what keeps you up at night?" I had to stop and think for a minute but my answer was that the need, the imperative that we invest in the right things today so that years from now, long after I am out of the Navy, those that come along behind me are able to fight and win with the tools they have. The tools that we are investing in today—that they are the right ones. That is what keeps me up at night. I thank you for your attention this afternoon and I ask for your help to ensure we are investing in the right things in the future. It is a team effort—I am open to help.

So let me close with this—if you only remember one thing, or three, remember that first—Strategic Deterrence is a National Imperative. Second—OHIO Replacement is the right Submarine to take us through the 21st century—all the way to 2080. And third—We are building the OHIO Replacement class at a responsible cost.

Thank you.

NAVAL SUBMARINE LEAGUE SYMPOSIUM

DISTINGUISHED SUBMARINER 2012
VICE ADMIRAL PATRICK J. HANNIFIN, USN(Ret)

FALLS CHURCH, VIRGINIA
OCTOBER 18, 2012

Thank you for the kind words—although I am reminded of an old journalist's remarks: "if you live long enough...first, you get accused of things you never did, and later, credited for virtues you never had..."

Admirals, fellow submariners and distinguished guests, it is a sincere privilege to be here with you this evening. My thanks to the Naval Submarine League for this distinct honor—quite a trip for a New Mexico kid (and former horse cavalry cadet) who had never even seen much water until showing up on the banks for the Severn in the summer of 1941. I am privileged to be considered with your previous selectees.

As one of the oldest in the room tonight, I'm already up past my bedtime—so I'll keep my remarks short. I've now been *US Navy (Retired)* for about as long as I was on active duty... and while my retired life has been fulfilling:

- Working with the Department of Energy
- Running a capital campaign for my Episcopal church in Del Mar
- Rubbing shoulders for a few years with a surprisingly enjoyable and down-to-earth group of Hollywood personalities while working on the movie U-571 (thanks to my classmate George Ellis)
- Running a family-owned oil and gas business
- And for the past twelve years—traveling the world with this beautiful lady, Phyllis Whittle

But, since 1944, my passion has been the US Navy Submarine Service.

While working for the *kindly old gentleman*—Admiral Rickover—1957, I was selected for the nuclear power program. That singular event pretty much defined my Navy career for the next 20-plus years.

Tonight, though—I'd like to reflect on my earliest years as a Naval Officer (at least as I recall them some 60 to 70 years later).

It was those World War II years that were the crucible in which the solid foundation of today's Submarine Force was forged. Does it really seem like it was a little over 70 years ago that a bunch of young men, many only teenagers, took some old S-boats and a few newer fleet boats out to the Pacific and defeated the Japanese Empire?

Of course, we didn't do it *all by ourselves*—we had some help from the Marines, the Army and the rest of the Navy.

But we did one hell of a job!

We sank well over half of their merchant fleet and almost a third of their Navy. About 16,000 of us (less than 2% of the Pacific Fleet Navy) accomplished that feat, making war patrols in about 260 boats.

And, we did a lot of things other than sinking ships—some of our boats performed special missions; delivering and evacuating personnel and delivering over 1300 tons of supplies.

Our boats on lifeguard duty rescued more than 500 airmen — including a future President of the United States—George H.W. Bush.

All of these accomplishments came at an extraordinarily high cost ..... from the loss of SEALION at Cavite in the first few days of the war, to the loss of BULLHEAD in the Java Sea in August of 1945.

Our Submarine Force experienced the highest per capita losses of any branch of our armed services.

Before Pearl Harbor, some of us were already in the Navy, but most of us were not. We answered the call from the big cities, from the small towns, from farms and ranches, from high schools and college. We were sons and brothers and husbands from

families all across America. It was a very different America then; our purpose was crystal clear and the entire country was galvanized:

We had to defeat an enemy that threatened our world.

We volunteered for submarines for many reasons—but mainly because it sounded exciting, and it seemed like a place where a young sailor or young officer would get a lot of experience and responsibility in a hurry ... **that it was!**

Some of us had never even seen salt water until the Navy showed it to us. And we sure didn't know what life in a submarine in wartime was really like.

But we learned - and we learned quickly!

We learned that our lives and the lives of our shipmates and survival of our boat depended on each of us knowing our job.

We learned confidence in ourselves and in our ability to do it right.

We learned that we could depend on our shipmates and, **more importantly**, that they could depend on us.

We learned that, in time of emergency, our lives and the life of our submarine could be in the hands of a well-qualified shipmate in the **right** place, at the **right** time, taking the **right** action!

So we busted our butts to qualify as submariners and to earn those silver and gold dolphins. Sometimes it was by our own energy and drive—and sometimes it was because some chief or more senior officer booted us in that butt... *(for our own good, of course!)*

Most of us were lucky—we had some **good** skippers and some **great(!)** Skippers—and we had some skippers who were **both good and lucky**! As junior officers, we worked for (or had friends who did) the **Fluckeys**, the **Dealeys**, the **O'Kanes**, the **Grenfells**,

the **Stimsons**, and the **Ramages**. All superb naval officers & extraordinary leaders!

They took us to war … and with them, we fought and defeated the enemy—and they brought most of us back home.

After the war, they mentored and guided us as we emerged from the post World War II drawdown into the Cold War and the nuclear age.

Today, almost 70 years later, some still refer to World War II submarine veterans as heroes. But we were just the ***lucky*** ones.

We left over 3,500 men and officers in 52 boats out there.

Those 3,500 accounted for about 16% of Submarine Force's officer corps and 13% of our enlisted strength.

They are the real heroes of the World War II Submarine Force.

If you could ask them today, if they considered themselves heroes—they'd probably say: "hell no! I was just doing my job. I was a submarine sailor, and damn proud of it!"

But we know differently—it was those sailors who did not come back, who are still on patrol, who were and will always be, the real heroes of the Submarine Force.

We honor and remember them; we are justly proud of them. Most of the surviving World War II submarine veterans are gone now; but they—and their shipmates on eternal patrol—forged a legacy of courage and of professionalism that has been carried forward by you younger submariners.

You who lead today's Submarine Force—can trace your heredity directly to our World War II submarine sailors. All of you were tutored and trained by these World War II heroes and their immediate protégés.

May their tradition of courage and honor always be hallmarks of our Submarine Force.

May god continue to bless them, our submarine service, and the United States of America!

Thank you.

ARTICLES

QUANTUM CYBERWAR AND UNDERSEA PROXIMITY

by Mr. Joe Buff

Joe Buff is the son of a Seabee and the nephew of a WWII Merchant Mariner; how naval history informs modern defense has been his lifelong hobby. After receiving a Masters of Science from MIT in 1977, Joe worked for 20 years as a qualified actuary, with a focus on the use of financial what-if scenarios to help steer life insurance companies through turbulent times. He began to write professionally about near-future undersea warfare in 1977, and this quickly became his full-time vocation. He has written six continuing-character novels and over 100 non-fiction articles, essays, and op-eds about the importance of the U.S. Submarine Force and Navy Special Warfare to national security and world peace. Most recently, he is an executive producer at Sub Pen Productions, LLC, helping turn his novels into a possible series of semi-independent blockbuster movies.

Abstract

This article overviews a historicist-futurist argument for increasing rather than decreasing funding to the U.S. Submarine Force in a time of national budgetary constraints, scientific breakthroughs, and global upheavals. The argument hinges on combining three facts:

1. Nuclear submarines with their adjuvant vehicles are ideal platforms for persistent and stealthy access into denied areas. The parent sub's on-board electrical generation and cooling utilities let them be powerful forward deployed data centers in close proximity to high-value adversary information warfare objectives.

2. Quantum computing is an emerging field with impressive potential cyberwarfare capabilities. These could apply against other quantum computer networks, and also particularly against more conventional digital computer networks. For technical reasons, physical proximity between hostile target and friendly data center is particularly essential and valuable in quantum computing and communications.

3. On the fundraising and recruiting fronts, the Sub Force is analogous to NASA in the twinned needs to attract young people, and excite and inspire taxpayers and Members of Congress, regarding technical development for manned exploration and exploitation in hyper-extreme environments at the very cutting edge of science and technology.

At least in theory, perfected quantum computers would render tractable the extremely difficult mathematical problem of decomposing an arbitrarily large integer into its prime factors, and the computationally intensive task of guessing the very long password sequence to any cybersystem. They would revolutionize encryption/decryption, and cybersecurity in general.

Nuclear Subs Are Undersea Data Centers

At a luncheon of the Nautilus (Groton) Chapter of the Naval Submarine League (NSL) on 13 July 2012, Rear Admiral Richard Breckenridge, COMSUBGRU 2, gave an unclassified talk about future prospects for the U.S. Submarine Force in the highly competitive international arena of exploiting high technology under the seas for peace and freedom vice intimidation and domination. One point he established was that, even in the age of the global Internet, on-scene proximity to adversary targets by friendly eavesdropping and hacking platforms is vital to the optimum success of cyberwarfare offense and defense.

The open literature and general reasoning help explain why this is so:

1. To tap an undersea telephone cable or fiber optic line, someone (SEALs and/or a submarine crew) and/or something (SEAL delivery vehicle, manually operated equipment, or an uninhabited undersea vehicle) must be right there to do the tapping.

2. To exploit the weak side lobes and surface ducts that leak from many electronic emitters such as radio and radar antennas, the detector needs to be as physically close as human ingenuity can allow. The numerous signal amplifier nodes needed by any long-distance fiber optic system offer *chinks in the armor* of that technology as well. SEALs infiltrating with covert miniaturized data repeaters can extend signals intelligence reach from the adversary's coastline to many miles inland.

3. The timeframe of blows and counter-blows in an active cyberwarfare battle might be measured in milliseconds or even nanoseconds. Friendly information processing up- and down-links (to remote super-computers) that need to rely on more-distant satellites, or airborne or seaborne repeaters, are subject to what can be relatively protracted signal transit times to and fro. The links might be too slow to map, analyze, and penetrate adversary security firewalls and patches adapting at supercomputer speed. Such links are also more subject to detection—ruining stealth—or to jamming or spoofing, and to direct-action kinetic attack via anti-satellite, anti-aircraft, and anti-ship weapons.

4. Certain peculiar, non-intuitive, yet amazingly powerful and absolutely real phenomena of quantum physics, needed for successful quantum computing and communications, are particularly subject to degradation with increasing range.

Sub Force leadership and civilian pundits alike have amply documented that nuclear submarines provide uniquely self-contained, on-scene, covert access into denied areas. This access is persistent, and also very capable as to:

1. available displacement of advanced computing hardware, and rapidly updatable software,

2. ample and dedicated supporting utilities such as electrical power and cooling, and

3. superbly trained and disciplined on-board staff expertise to operate and maintain all these facilities.

In short, a state-of-the-art SSN or SSGN comprises a covert yet highly connected, minimally radiating, heavily armed and shock hardened, extremely portable, and immediately responsive data center. It is a militarized undersea version of the many fixed, land-based, very utilities-dependent data centers that support the Internet, national defense, private research, and world cybercommerce.

The Sub Force and NASA Both Need to Inspire

In times of budget austerity, the Sub Force faces tight limits on how many submarines it can keep in commission and deployed, and on what systems it can develop and purchase to install within those hulls, for operation by the crew and exploitation by fleet commanders, the Joint Chiefs, national command authorities, and our Allies.

Given its continuing dependence on high technology systems and highly trained engineers and submariners to design, build, and work them, the Sub Force—and the Submarine Industrial Base as well—thus face some of the same educational, public relations, and allocations/appropriations challenges as does another federal entity, the National Aeronautics and Space Administration.

NASA strives to meet its various program goals by inspiring the imagination of both citizens and Members of Congress regarding space scientific exploration and space practical exploitation, manned and unmanned. NASA in this way tries to gain support for its very large, multiyear fiscal needs. As discussed over time for instance in the monthly astronomy magazine Sky and Telescope, NASA dovetails these efforts with appealing to young minds as potential new entrants to aeronautical engineering, earth and planetary sciences, astrophysics, and the U.S. Astronaut Corps.

Other NSL speakers, such as the late Vice Admiral J. Guy Reynolds, have drawn the apt comparison between a submarine and a space ship: The engineering challenges, and mortal threats to crews posed by the differences in fluid pressure between the environments inside and outside the craft, are in both cases self evident. But nowadays, given general public concerns about current and future funding availability in the Navy and in NASA—and thus also concerns re sustainable employment levels and career-track prospects in both fields—it can also be as challenging to gain new submariner recruits as new astronaut recruits.

Beyond its ongoing robotic, unmanned space telescope and interplanetary probe activities, NASA has identified two signature endeavors for its 21st-century raison d'etre: Putting humans back on the Moon, and sending people to Mars. These goals are controversial for being expensive and risky, but they are inherently peaceful, even noble.

The Submarine Force, by analogy, has an opportunity to serve the country and humanity beyond its traditional, ongoing missions of strategic nuclear deterrence, land attack, Special Warfare support, sea denial and control, and conventional C3I/ISR/ELINT. This additional raison d'etre arises from a new peacekeeping and peace-restoration mission at the confluence of two different dimensions of *inner space*. One dimension is the so-called inner space of the world's deep oceans and littorals. The other is the inner space of subatomic physics dictated by quantum theory.

Quantum Computing as a "Final Frontier" of Cyberdeterrence

The U.S. Submarine Force might borrow from NASA's (and Gene Roddenberry's) "to boldly go" marketing/fundraising theme in a rapidly burgeoning arena of scientific and engineering R&D. The quantum computing cyberwarfare arena is one where nuclear submarines would be indispensable platforms for national defense exploitation. Close proximity between adversary target and friendly eavesdropping/hacking data center is particularly important to preserve the *quantum entanglement* between specially matched pairs of photons or electrons, an essential ingredient of this exotic capability.

Quantum computing represents the next epoch, maybe even the final frontier in miniaturization, computational speed, and cybersecurity intrusion (attack) and exclusion (defense) power. It promises to open a breathtaking—and perhaps frightening—vista of new techniques and abilities in hacking (more properly, cracking) and eavesdropping, including encryption and decryption, by exploiting the proven phenomenon of quantum teleportation, which Albert Einstein in the 1930s called "spooky action at a distance." What better to excite imaginations in the defense spending sphere than something like this, which is at once very futuristic and yet very real, hi-tech, and both abstract/theoretical and practical/pragmatic at once?

As the present writer dramatized in his future undersea warfare novel Straits of Power (Morrow, 2004), the first nation or bloc to master militarized quantum computing could hold the potential to nonviolently render useless, or clandestinely rewrite, all of an adversary's conventional data processing operating systems, software, and files. Speculating further now, this might even become a true *Internet doomsday device*, a deterrent against outright cyberwarfare, enforcing (one hopes) worldwide cyber-peace through a virtual Mutually Assured Destruction. The capability-in-being could act analogously to how nuclear weapons helped keep the Cold War cold. Or perhaps, as Einstein urged regarding nuclear weapons, the consequences of perfected quantum computing equipment falling into the wrong hands might

be so awful as to argue against allowing any proliferation of the technology at all. For better or for worse, however, the pure science of this Pandora's Box has been opened; progress is active for instance at government, academic, and commercial laboratories in the U.S., Europe, China, and Israel.

Either way, on the front of quantum computing cyberwarfare advances, U.S. Navy nuclear submarines promise to remain as or even more important to offense and defense in the foreseeable future than they are today for conventional analog and digital electronic intelligence gathering and computer eavesdropping, manipulation, and intervention. Furthermore, quantum-computer-on-quantum-computer cyberwarfare, while in its earliest theoretical infancy now, appears to hold terrific promise for the further-off future. The strategic advantages of maintaining a technical edge herein should be apparent.

What is Quantum Teleportation?

The concept of quantum computing was first introduced in 1982 by the late Nobel-prize winning nuclear physicist Richard Feynman. Numerous scientific experiments and engineering demonstrations since then have shown the opportunities are quite genuine: As reported in Forbes magazine's news website www.forbes.com on 6 September 2012, in an article by staff writer Alex Knapp, European scientists in May of this year succeeded in *teleporting* an *entangled* photon—a massless fundamental particle of electromagnetic energy – over a record breaking distance of 143 kilometers. The previous record, set by researchers in China and also published this year in the peer reviewed scientific journal Nature, had been 97 kilometers. These distances are great in comparison to the very short lab bench distances achieved earlier in the past decade or two, indicating the current rapid pace of advances in the field.

This is important because the *spin* of a photon is manipulable and readable information, called a *qubit* in quantum computing and often conceptualized as a probabilistic superposition of *up* and *down*. A qubit plays a role like the 0's and 1's of the bits involved in conventional computing. But because of the uncertainties and

ambiguities inherent in quantum mechanics (think of Schrodinger's Cat and the Heisenberg Uncertainty Principle), a qubit—via *quantum superposition*—is able to take on more than one spin state at the same time. It can convey information as versatile as an arbitrary solid angle on a sphere, compared to a classical bit that can merely convey *north pole* or *south pole*. For these reasons, a quantum computer can perform calculations and store data using exponentially less processing speed and exponentially less memory space than an ordinary analog or digital computer would require. This is true whether the ordinary computer, in which each bit is deterministically either 0 or 1, is powered via electronics, optics, fluidics, biological tissue, or some other medium.

Because of properties of our universe at the very smallest scales, two photons can be made, for instance by human action with lasers, polarizers, and partially mirrored prisms, to become *entangled*. This means their quantum spins get locked together and share a common destiny no matter how far apart the two might then move. If a quantum computer-and-communications user retains one entangled photon and sends the other on a long journey—such as into enemy cyber-territory—and then puts the retained photon into a specific state of spin, the other entangled photon will also immediately become perfectly correlated to that assigned state of spin. The spin state of the *home* photon is said to have been *teleported* to the spin state of the entangled *away* photon. (No individual unit of matter or energy is physically transported at the moment of achieving this teleportation.) However, due to Einstein's limit of light speed on the transmittal of information, that distant photon's spin state will not be actionably useful at the receiving end (to friend or foe alike) without an additional packet of so-called *instructions* subsequently sent by conventional means. Conceivably, once technical details are worked out, this actionable usefulness applies even if no adversary human at the receiving end reads and acts on, or even detects said instructions; the real import of this step is a data processing delay long enough to obey the light speed limit.

In the ideal (theoretical) case, these instructions packets consist of just two bits of classical, deterministic *0 or 1* data for each

entangled qubit teleported. The application of the classical bit-pair instructions packet to *activate* the entangled away qubit—reducing its probability distribution to a single, determinate 0 or 1 value comprising *the answer* to something—is analogous to matrix multiplication. The present writer proposes that a variation appears possible to the standard formulation of quantum teleportation in which a previously-informed, overtly cooperating observer at the receiving end performs that activation. In the variation, the activation would be executed by a human sleeper agent, or software worm or hardware *back door* embedded within the adversary data center, possibly lying dormant for years until needed, if ever. The instructions packet might even be transmitted via conventional (non-quantum) hacking/malware methodologies; this *ancillary attack* could be relatively simple to implement and likely to succeed because, on the adversary receiving end, the bit string would seem like a short sequence of random noise.

An important limitation is that the state of entanglement can deteriorate and be lost (become useless) due to environmental noise and transmission signal loss. It is indicative of this decoherence problem that the European and Chinese demonstrations used laser beams over bodies of water rather than, say, (solid, bent and kinked, interrupted by amplifier nodes) fiber optic cables, to help preserve coherence over a range comparable to that of low Earth orbit satellites above the ground.

Individual electrons can also become entangled, although the decoherence problem appears technically harder to solve. Consequently, the same basic idea of quantum hacking a conventional (classical 0 or 1) network can apply to wire-based communications and conceivably also to radio and radar, as much as to laser beam and other optical transmittal and computation methods.

Long-distance entanglement, producing photons (or electrons) far away that nevertheless can finely obey a local user's most detailed bidding, thus forms the basis for both hyper-secure friendly quantum computing and communications, and hyper-capable infiltration of an adversary's conventional (digital) computing and communication facilities. The infiltration succeeds

because a string of individual photons (or electrons), though they comprise a vector of entangled cubits under friendly control, will appear to be perfectly ordinary to adversary observers and their firewalls. They will pass as random noise. But then they will be reset, by 1) resetting the home particles and 2) transmitting and applying the instructions packets, to represent and propagate intricate malware code. In effect, the conventional firewall and other security provisions, which rely on comparatively lengthy particle impulses to render just one 0 or 1, would be transparent with respect to the arriving entangled qubits of the quantum cyber attack. Those entangled qubits would have intelligible significance to anyone only when *activated* by the separately transmitted instructions packet, which also on its own would have no intelligible significance. (This two-step meta-encryption is roughly analogous to the classical encryption system based on one-time-use pads.)

In general, the *home* component of each entangled pair needs to be retained and stored for future use so as to control the *away* component. Tools for the fine control of individual particles are necessary, and here again recent progress has been rapid. For instance, another benchmark lab achievement has been to slow an ordered string of eight photons (in essence an 8-qubit *qubyte* of data) from light speed to less than 40 miles per hour. See for instance the New York Times for 18 February 1999, "Researchers Slow Speed of Light to the Pace of a Sunday Driver," which reported on an article in Nature.

These concepts are difficult to grasp and retain, even for physicists. However, mastery of the theory of quantum computing is not necessary to appreciate its value, nor to command staff who might some day use such quantum black boxes to successfully prosecute cyberwarfare campaigns. (They might better be called *quantum gray boxes*, given a qubit's exploitation of the quantum superposition of black and white.)

A good and complete technical discussion of the basic concepts, including many equations and diagrams and footnotes to primary sources, is available on-line by searching for *quantum*

computer, *quantum entanglement*, and *quantum teleportation* on www.wikipedia.com.

Conclusion

Although complex and subject to considerable technology risk as basic techniques and hardware are developed further, quantum computing holds great promise as a tool for future offensive and defensive cyberwarfare. Entangled qubits offer a way to harness certain exotic properties of the basic fabric of our universe, to achieve hyper-secure encrypted friendly communication and computing, and also to enable hyper-capable eavesdropping and hacking of adversary communications and computer systems, both conventional and quantum mechanics based. Because of the problem of decoherence of quantum entanglement with increasing range, proximity between the opponent targeted facility and the friendly cyberwarfare data center is crucial. Nuclear submarines are ideally suited to provide this proximity, assuring them an additional, indispensible mission role for national defense and world peace in the decades to come. Undersea quantum cyberwarfare deterrence can be a force for good; perfecting and sustaining it are noble causes. Properly communicated to the U.S. Submarine Force's various audiences and constituencies, this can help attract both adequate funding appropriations and highly qualified, eager recruits.

AUTHOR'S NOTE

In October, 2012, the Nobel Prize Committee chose fundamental experimental work in quantum computing, published in the mid 1990s, for the 2012 Nobel Prize in Physics. The winners are Serge Haroche, PhD, of the College de Paris and the E'cole Normal Supe'rieur, and David Wineland, PhD, of the U.S. National Institute for Standards and Technology. Their separate research teams each developed non-destructive methods for the precise observation of individual particle quantum states. Wineland used lasers to slow a beryllium ion in an electrical field

to near absolute zero and then excite it to an indeterminate, temporary energy level half-way between two stable states. Haroche confined microwave photons between two highly reflective surfaces and then used atoms to probe the quantum states of each photon.

Nobel Prize for Physics rewards 'groundbreaking' quantum experiments

Frenchman Serge Haroche and American David Wineland, who share the 2012 Nobel Prize for Physics, worked independently to develop a way to watch quantum behavior of particles.

TOWARDS SUCCESS IN FUTURE UNITED STATES, UNITED KINGDOM AND AUSTRALIAN SUBMARINE BUILDING PROGRAMS

by CAPT John S. Heffron, U.S. Navy (Ret)

Captain John Heffron was the Virginia Class Submarine Program Manager from 2001 until his retirement from the U. S. Navy in 2005. He delivered the first ship of the class, USS Virginia (SSN 774). During that time and subsequently he has had firsthand experience with the Astute Submarine Program in the UK, and with the Collins and Future Submarine Programs in Australia.

As has been widely reported in various journals and articles, the success of the VIRGINIA Class Submarine Program has been attributed in large part to the effort to truly learn and carry forward the lessons learned from the SEAWOLF Program. The VIRGINIA Class Program followed close on the heels of the SEAWOLF Program and the principal players involved, both in government and in industry, were determined to have a better outcome in terms of cost and schedule performance than the earlier program experienced. They had the advantage of recent, firsthand experience to draw upon from a program that originally envisioned a 29 ship class but was foreshortened to only three.[1]

Likewise, the United Kingdom, embarking on a new program to replace its four VANGUARD Class submarines, is in a position to avail itself of lessons learned on the ASTUTE Submarine Program. Australia, after what will be more than a decade hiatus from submarine shipbuilding, is contemplating a replacement for its COLLINS Class submarines.

Australia's case is more typical of submarine shipbuilding programs in most countries. As budget realities and engineering re-evaluations of hull life are resulting in longer operational lives

of submarines, new starts for submarine programs are becoming less frequent. Unless positive steps are consciously taken submarine design, engineering, construction, testing and management skills atrophy over time. In order to continuously improve and deal with the periods of no design and production work, the positive steps required are to **document**, **learn**, **remember** and **use** past lessons, both good and bad, in future programs. Not all lessons apply in all circumstances, so it is important to also understand the context of a particular program and the circumstances it faced in order to apply the lessons appropriately.

As a first step to minimizing these losses in the submarine enterprise it is important to document the lessons of the past and occasionally reinforce them in a public forum. Recently the RAND Corporation authored a four volume report, Learning from Experience [2, 3, 4, 5], which extensively documents lessons learned from submarine programs in the United States, United Kingdom and Australia. This article summarizes and reinforces the most important, overarching lessons learned and adds other observations that may be helpful to those leading future submarine building programs, or for that matter, any large and complex design and construction enterprise.

Program success is usually measured in terms of how well the program met cost, schedule and performance requirements. Assuming that performance requirements must indeed be met and cannot be traded off once established, and that schedule has some flexibility within limits as long as costs are controlled, cost usually becomes the single most important factor in determining the success of a program. So most of the lessons learned discussed here relate to controlling costs, and in particular, program acquisition costs. Sustainment costs over the life of a submarine are generally much greater than acquisition costs. However, acquisition cost is usually the measure of success of a program, and it is up to the program manager to ensure he or she takes the right steps to properly address sustainment planning and the tradeoffs between acquisition and sustainment efforts. For any

given program, success in the sustainment area will likely take decades to determine.

Additionally, the scope of lessons learned included here is mostly limited to those that apply across any program, regardless of country differences, political environments, supporting industrial bases, budget limitations or threat environments. Finally, specific lessons learned in the areas of requirements generation, acquisition planning, design, build and sustainment will be briefly discussed and are worthy of more detailed review in future articles.

Overarching Lessons, Things You Must Get Right
—Develop and Maintain the Trust of the Legislators

Submarine design and construction programs are among the most complex programs a government undertakes. They are also among the strategically most important and usually well supported politically. Early, frequent and open communication with legislators and their staffs regarding cost, schedule and risks, while sometimes unpleasant at the time, builds long term trust and credibility, and ultimately helps ensure the long term funding needed for a multi-decade program is appropriated. At the time the *Virginia* Program received multi-year funding the lead ship had not yet been delivered but the program demonstrated a real understanding of what needed to be done to be successful, and gave Congress confidence that the program was moving in the right direction. The trust exhibited by Congress was, and still is, well placed.

A steady and reliable funding stream helps ensure one of the most important ingredients to program success, which is the next overarching lesson.

—Program Stability

A former president of General Dynamics Electric Boat Corporation, Michael Toner, once remarked to the author, "Three things are important to me: stability, stability and stability." In addition to long-term funding stability, stability is important in many other areas: operational and technical requirements that are firm and unchanging; program management personnel and leaders

unchanging; program management personnel and leaders who make long-term personal commitments to the program; and partnerships between the government and the private sector that are well established and enduring. From the contractors' point of view, stability allows for investment in facilities and people with the confidence that those investments will pay off in the future. For the government, stability facilitates steady improvement in cost performance and positive learning curve results.

For the US, another stabilizing factor is the leadership and overarching guidance across the entire nuclear shipbuilding enterprise provided by the Naval Reactors organization. The long term continuity of technical expertise, authority and leadership provided by Naval Reactors forms a solid foundation and way of conducting business that is well understood and followed by government and industry. Such expert domain knowledge and leadership is also evident in the U. S. Navy's Program Executive Office, Submarines and leads to the next lesson.

—The Importance of Government Being a Knowledgeable and Informed Customer

As the acceptance authority and user of the final product, a submarine, the government must be knowledgeable and informed in order to make timely, correct and cost effective decisions regarding designer and shipbuilder technical recommendations and tradeoffs.

Making correct decisions involves understanding risk and determining whether government or industry owns the risk. This, in turn, means that roles and responsibilities must be clearly stated and, while remaining partners, that boundaries between government and industry be respected. Whoever owns the risk must have the decision making authority to take actions required to mitigate or retire the risk. In order aggressively to manage risk, all parties should have formal risk and opportunity programs that are regularly supported by reviews with senior program leadership.

The UK and Australia, and to some extent the US in its Supervisor of Shipbuilding commands, have lapsed in this area in the face of budget pressures. Having seen the consequences, they are

making efforts to rebuild their capabilities. Lessons learned in the *Astute* and *Collins* programs have been particularly dramatic and have led to major efforts to re-grow or in some cases establish for the first time the required domain knowledge and skills required to be a knowledgeable customer. This is timely for Australia as it considers starting its Future Submarine Program (SEA 1000) and for the UK as it assumes the design authority role when the third *Astute* Class submarine enters service.

Budget challenges will only become more severe in the foreseeable future. One way to mitigate the challenges is through cooperation. The US, UK and Australia have agreements in place that allow for the interchange of personnel and technical information. Expanding those agreements may allow for more efficient and continuous use of limited resources. The ties of common interests and customs among all three countries are significant. This cultural affinity lowers transaction costs and enhances communication. Reading a plan or reading a contract is important, but you also need to be able to read people.

—Understanding the Impact of Program Gaps

Even though the US has not experienced any true gaps in submarine production in the modern era, the *Virginia* Class Program offers an instructive lesson. When General Dynamics Electric Boat and Northrop Grumman Shipbuilding (now Huntington Ingalls Industries) teamed at the start of the program, EB had been continuously building submarines but HII had experienced a 10 year hiatus from submarine production following completion of the *Los Angeles* Class Program. In spite of continuous government and EB involvement in submarine production and significant EB assistance at the HII shipyard in Newport News, VA, the difference in production performance between the two shipyards was significant at the start of the program. The ships are delivered alternately from the two shipyards (the first by EB, the second by HII, etc., with the delivering shipyard being responsible for approximately 70% of the performance for the ships it delivers). For the first few ships of the class, the learning curve was not the expected smoothly

decreasing curve, but rather a *sawtooth* decreasing curve with performance for the first ship being better than for the second and so on. The issue was not that this performance could necessarily have been avoided but that it was not properly anticipated and resources applied to manage the situation.

Similarly in the UK, the gap between completion of the *Vanguard* Class and the start of the *Astute* Class contributed to early *Astute* problems. Australia has a similar problem as there has been no submarine production work accomplished in that country since completion of the *Collins* Class. Compounding this, Australia has never accomplished a complete submarine design in country. The *Collins* Class was based on a Swedish design from Kockums AB. But at least there is recognition of this problem and it appears to be a factor in considering the planning and funding strategy for the SEA 1000 Program. Also, during the Submarine Institute of Australia's inaugural Submarine Science, Technology and Engineering Conference in 2011, one of the principal government speakers took the approach that the SEA 1000 Program is not a program with certain start and stop dates but is rather the start of a continuous, evolving and properly paced national enterprise involving submarine designers, builders and the industrial base. The intent seems to be to avoid gaps in the future.

Whether it is more cost-effective to allow gaps to occur and later rebuild capabilities or to pace work so as to avoid gaps is a decision each country must make. There are hidden costs associated with both approaches that are easily overlooked, but must be taken into consideration to ensure long-term success.

—Involve All Players Who Will Eventually *Touch* the Submarine

A wide variety of people are involved in a submarine over its life. A partial list includes: fleet operators (Sailors); maintainers; designers and engineers in the hull, mechanical, electrical, weight, electronic, combat systems, propulsion, signature, safety, acoustic, testing and other fields; logisticians; planners and schedulers; construction trades; quality assurance personnel; program managers and many others. Most need to be brought into the

program early and learn to work together in a respectful, productive and mutually supportive team environment.

In many cases there will be competing priorities, and considerable differences and biases regarding how to approach issues. Every Sailor wants his or her own bunk and personal space, maintainers want easy access to equipment, trades people want designs that are easy to build, logisticians want maximum commonality of parts, and so on. Yet the submarine is either weight limited or volume limited and all work must be done within a certain budget and schedule. Tradeoffs and compromises are inevitable and must be conducted in a manner that, regardless of the final solution, acknowledges the value of and considers all points of view.

Do not underestimate the need for formal team building training. This upfront investment was made in the *Virginia* Program and resulted in Integrated Product Teams that worked together effectively and, in the main, in a cordial manner.

—Transparency, Openness and Alignment

The importance of open and honest communication with legislators to help ensure funding stability was mentioned earlier. Political support is important and must be continually cultivated. Other forms of transparency and openness are important as well.

First, the team members need to maintain a policy of full disclosure with one another. If a budget cut is coming, figure out together how to deal with it. If an engineering issue is proving particularly difficult, a joint government/industry team may be the most effective approach to solving it. Two things to remember in a partnering environment, while they might sound a bit trite, are 1.) Bad news doesn't get better with age and 2.) Focus on solving the problem first and contractual consequences second.

The submarine community in the US is organized in such a way that it is hard to imagine the Fleet, NAVSEA, OPNAV and other government agencies not being fully aligned when advancing a submarine program. However, this has not been the case in Australia. To ensure the success of the Future Submarine Program, efforts will need to be made so that the Defence Material

Organization, Defence Science and Technology Organization, Department of Finance and Deregulation, and Royal Australian Navy are all synchronized, and together with the designer and shipbuilder, they must then focus on their common goals in a unified way.

The US, UK and Australia all live in democracies, each with a robust free press. Managing the media is important and bad press on a program can be crippling. Open and articulate media managers, who also communicate with one another, are needed in industry and government to ensure effective proactive media engagement and that positive program messages are publicized.

—Requirements Generation, Acquisition Planning, Design/Build and Sustainment Lessons

The continuum of program events from generation of requirements to sustainment of the delivered submarine yields numerous lessons learned. Briefly, a few will now be discussed in general terms without reference to a particular country or program. Much more detail is available in the previously cited RAND reports and in the EB publication on *Virginia* Class lessons learned[6].

—Requirements Generation

As previously mentioned, firm and unchanging requirements are key to a stable program. To make this a reality requires early collaboration between the operational and the technical communities. The technical community (designers, engineers, maintainers and builders) must verify that what the operational community desires is technically achievable at an acceptable level of risk and cost. It is lower risk to aspire to the *state of the practice* instead of the *state of the art* and to promote evolutionary change rather than revolutionary change. Radical changes in diving depth, propulsion (flank speed), payload handling/launch capability, and stealth, all at the same time, with attendant integration effort, have been attempted in the past and have led to cost and schedule blow outs. Up front, well considered, achievable requirements (stated in terms of a range from threshold and objective), as well as

agreement on how requirements will be tested, will minimize design and construction changes, and allow for on budget and on schedule program performance.

—Acquisition Planning

Acquisition planning, including contracting arrangements, varies considerably from country to country. However, the guiding principles in all cases should be openness; consideration of what is fair to all parties; establishment of an environment that fosters collaboration, incentivizes performance and enables competition at the appropriate levels; and avoidance of what the UK's National Audit Office calls "the conspiracy of optimism" or the tendency of all parties to underestimate risks, challenges and needed resources. Leadership that continually focuses on the common goal is essential. Generally, contracting for the design, first ship and other ships under construction before the first ship is delivered should be in a single contract on a cost plus fixed, award or incentive fee basis. Thereafter, a fixed price arrangement is appropriate. Realistic cost and schedule estimates are essential and incentives should be tailored to achieve the results desired. Logical decisions regarding ownership of risk must be made. Change management must be formal and well understood by all parties. And adequate management reserve, determined by the level of technical risk, should be established to deal with contingencies.

—Design/Build

At a high level, some aspects of this topic have already been discussed, such as the need to involve appropriate stakeholders early in the design process. Other lessons include rigorous oversight of design margins, and not starting construction until all arrangement drawings and most of the detail design drawings are complete. Computer aided design and construction models are very useful in mitigating construction risk. Build the submarine multiple times electronically before building it once in steel. Just as collaboration in design is important, so is collaboration on the deck plates during construction. The Navy program office must have a strong presence in the shipyard during construction and

test. Last, in order to orchestrate all activities in the design/build phase, the program must have a single integrated master plan and integrated master schedule that everyone follows.

—Sustainment

Sustainment planning needs to start at the beginning of the design process. For example, maintenance envelopes and equipment removal paths must be accommodated in the submarine's basic arrangements.

A disciplined approach by a strong program manager is needed to maintain the sustainment budget early in a program. As management reserve is consumed during the design/build phase, it is tempting to raid the sustainment budget to take care of present issues. Lack of sustainment funding and planning may not be noticed until years into the future. But using sustainment budgets to lower acquisition costs and mitigate design/build issues can easily result in a lack of the resources required to support the long-term goal of achieving lower through-life and total program costs. An adequate sustainment budget is needed early in the program in order to conduct proper maintenance and modernization planning.

Summary

Every lesson presented here is the result of issues that arose in US, UK and Australian submarine programs. In many cases the issues have recurred from program to program within a country or across two or all three nations. In other words, the lessons learned were not really learned. They were either not known, miss-applied, forgotten, or ignored. Documentation of issues is just the first step in the learning process. It is up to the government and industry partners in the *Ohio* Replacement, *Vanguard* Replacement and SEA 1000 Programs to truly learn, remember and use the lessons appropriate to their circumstances in order to move towards success in future submarine building programs.

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2. RAND Report MG-1128/1-NAVY, *Learning from Experience, Volume I: Lessons from the Submarine Programs of the United States, United Kingdom and Australia;* John Schank et al, 2011
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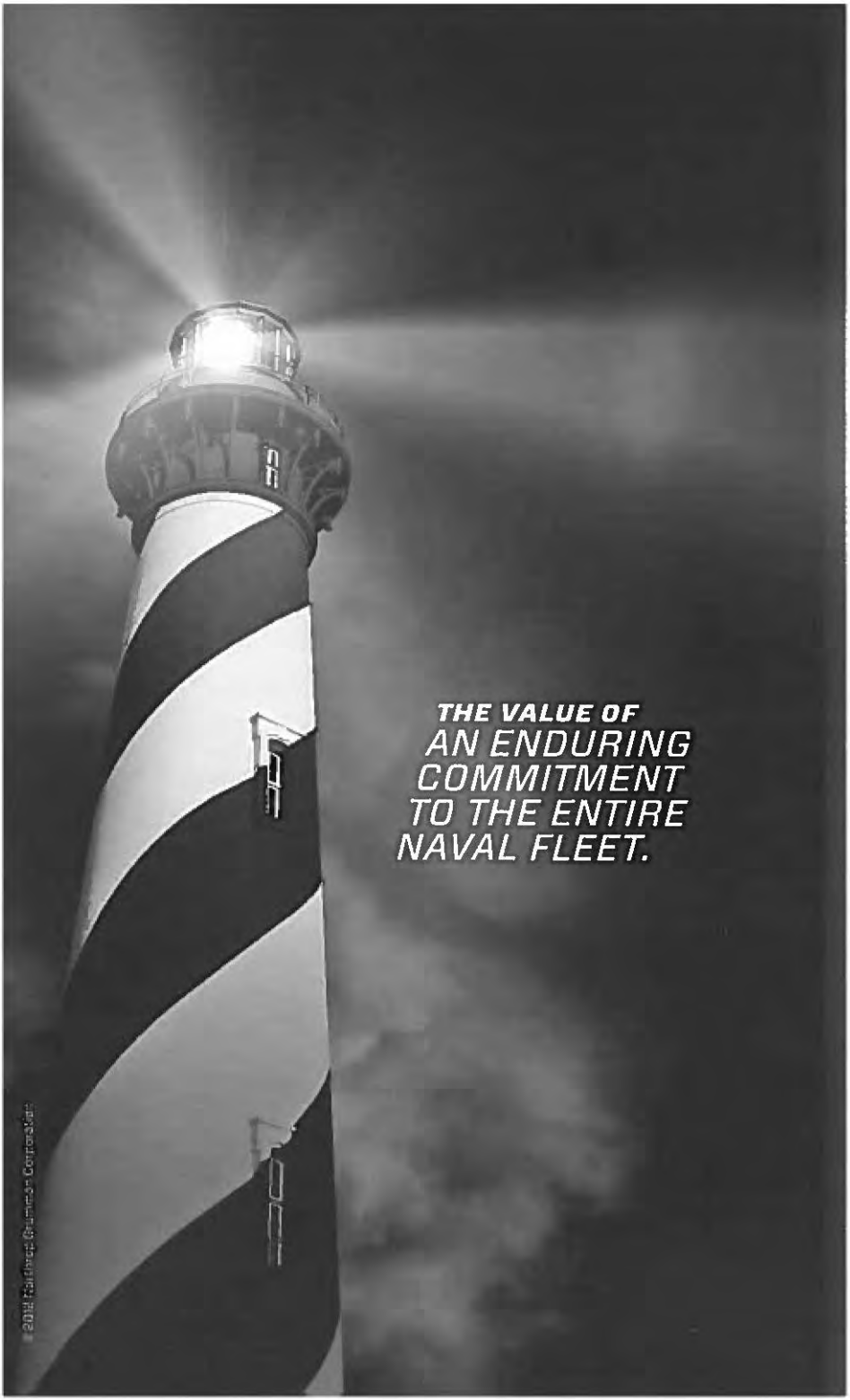
Editor's Note: Free eBook downloads for references 2, 3, 4 and 5 are available online at http://www.rand.org/pubs/monographs/MG1128z1.html



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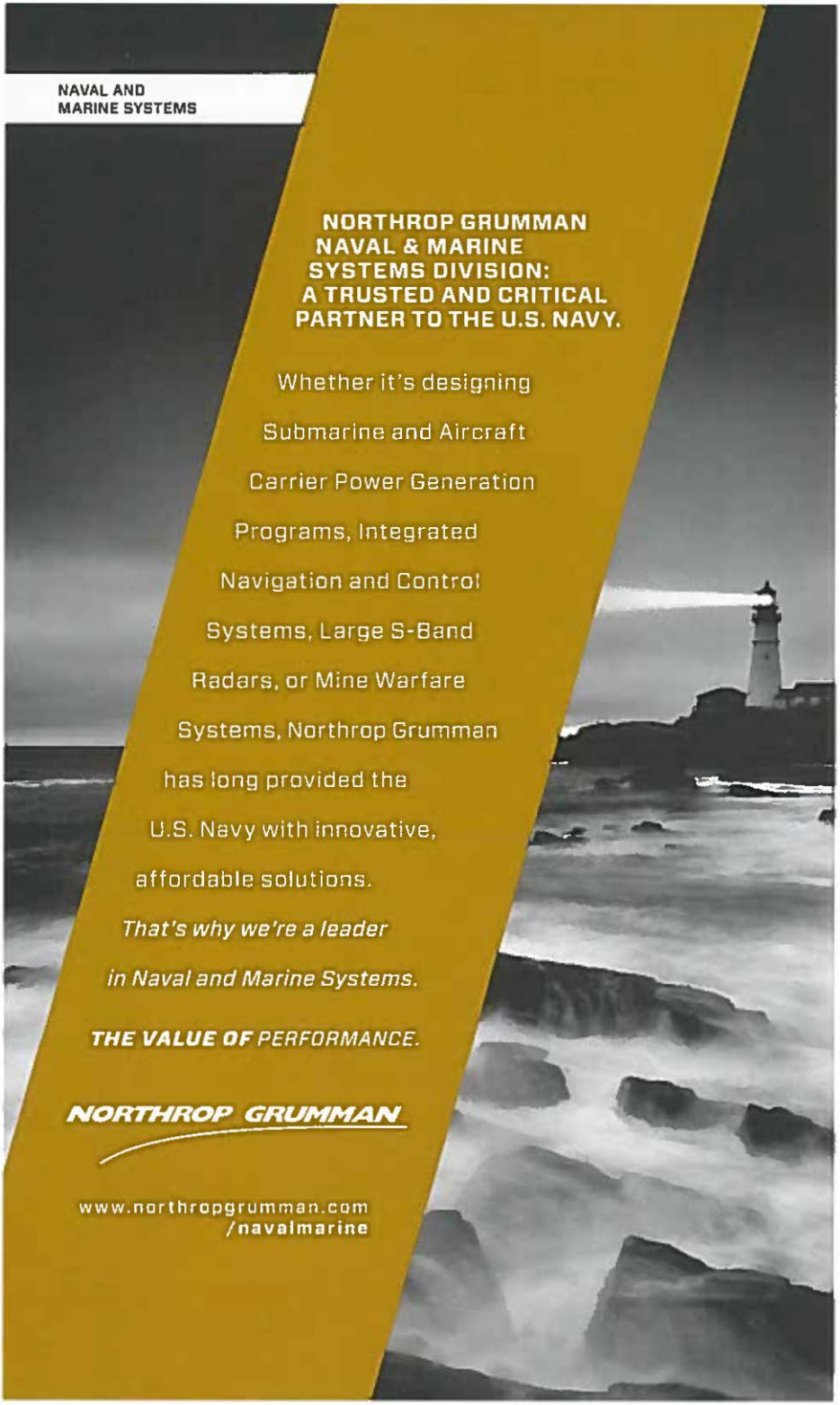
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SUBMARINE RESCUE STANDARDS

by Lt. Joseph Leavitt, USN

Born in the Portsmouth Naval Hospital in 1984, LT Leavitt is the son and grandson of career Submarine Officers and the great grandson of a Navy Chief. As his mother is originally from Spain, he grew up spending summers and some winters in Spain as well as completing his 8th grade studies in Madrid. Returning to the United States in 1998 for High School, he participated in track and field and cross country throughout his 4 years, earning many varsity letters and running a mile in 4 minutes and 46 seconds. Throughout high school and college, he spent several months overseas in Austria and Germany, volunteering with Doctors Without Borders in Vienna, Austria. He was selected to study at the prestigious Goethe-Institute in Munich, Germany during the summer of 2005. Graduating from the Naval Academy in 2006 with merit and in the top quarter of his class with a B.S. in Political Science (International Relations track) and two language minors, LT Leavitt has not only studied foreign cultures but has lived them as well.

After graduating from the Naval Academy in May of 2006, he was selected for assignment as an intern to the Defense Attaché Office in Madrid, Spain directly supporting the Assistant Naval Attaché on a range of issues. LT Leavitt reported to Nuclear Power School in September 2006. After completing the Nuclear Power Pipeline in the top half of his class, he completed Submarine Officer Basic Course in December 2007. He reported to the USS Maryland Gold (738G) in Kings Bay, Georgia in February 2008. While assigned to the 738G, he served as the Reactor Controls Assistant and then Assistant Weapons Officer. He earned his dolphins on June 25th, 2009. After 36 months onboard the 738G, he reported to the Navy Office of Diversity and Inclusion, OPNAV N134. Assigned

initially as a data analyst, he made a huge impact by leading the standardization of racial and ethnic reporting Navy-wide, with ramifications DOD-wide. As a fluent Spanish speaker, he was subsequently hand-picked as the Hispanic Outreach officer. He took on additional responsibilities by assuming Asian and American Indian outreach, roles previously filled by senior O5s. Additionally he serves as the N134 website coordinator, training officer, Navy Diversity Awards coordinator, and assistant data analyst. He is currently enrolled in JPME (Editor's Note: Joint Professional Military Education) phase I with an ECD of Feb 2013. He completed a master's in Engineering Management from Catholic University in August 2012 and is currently pursuing a master's in National Security and Strategic Studies from the Naval War College.

ABSTRACT

This paper describes the importance of common submarine rescue standards. While many nations are operating or developing advanced submarines, only 15 have any submarine rescue capability.[1] The development of common submarine rescue standards is essential in minimizing the time to rescue and maximizing the probability of success. The urgency of developing common and integrated rescue standards became overwhelmingly apparent following the loss of KURSK in 2000. This paper discusses current submarine rescue systems, the process for developing and coordinating submarine rescue standards, and benefits from common standards.

INTRODUCTION

While proper engineering safety standards and practices in the design and maintenance of submarines undoubtedly reduce the probability of submarine accidents (such as the Navy's reputable

record after implementing the 'SUBSAFE' program after the loss of USS THRESHER in 1963), proper awareness and maintenance of submarine rescue standards provides a reasonable assurance that if and when a submarine sinks, chance of rescue is probable. With over 40 countries operating over 400 increasingly sophisticated submarines worldwide, and increasing amounts of marine activity, future submarine accidents are almost inevitable.[2] Between 1981 and 2000, there has been an average of more than two potential rescue/escape scenarios per year with over half of these incidents in rescue capable waters (depth less than 2,000 feet).[3] The rate of potential scenarios since the year 2000 does not appear to be subsiding. As nations develop submarines with ever increasing endurances (both nuclear and air independent propulsion), the possibility of a nation having a submarine accident outside of their own territorial waters is increasing. Additionally, as nations face fiscal tightening, they must find ways to save money without comprising submarine safety.

WHY DO WE NEED SUBMARINE RESCUE STANDARDS?

Figure 1 - Russian Submarine Kursk in Drydock
Source: Unknown, Web

The importance of common submarine rescue standards has never been more important. Admiral Popov, then commander of Russia's Northern fleet, when asked whether there were naval guidelines on searching for a submarine (in reference to KURSK

incident) responded "No, there are no guidelines, because disasters do not repeat themselves."[4] Though most disasters are not identical, many are similar and developing a set of standard search and rescue practices (and updating them with lessons learned) is paramount in maximizing the possibility of rescuing a distressed submarine. When a submarine does sink, it is imperative that pre-established procedures and compatible rescue standards are present to ensure the highest probability of rescue.

BRIEF HISTORY OF SUBMARINE RESCUE STANDARDS 1900-1939

While submarines have a long history and the first submarine used in combat dates back to the 18th century, the submarine was not developed in any significant quantities until the early 20th century. With the purchase of the USS Holland in 1900, the U.S. Navy entered the modern age of submarines. The first U.S. commissioned submarine to be lost occurred in 1915. Though several more submarines would sink (for various reasons) in the coming years, it was not until the late 1920s that the U.S. Navy would invest serious efforts into improving submarine rescue capabilities.

Figure 2 - Momsen Lung, Source: Web, U.S. Naval Historical Center, NH 45641

Charles Momsen, a U.S. Naval Academy graduate and submarine commanding officer, after discovering the loss of USS S-51, decided to dedicate his efforts to developing a rescue chamber capable of rescuing submariners from a distressed submarine. Despite his proposals to the Bureau of Construction and Repair, it wouldn't be until another disaster occurred that his concept would be realized. The stimulus behind investing in more advanced submarine rescue methods was the tragic loss of S-4 in 1927 in 110 feet of water.[5] Despite several survivors onboard who were able to escape to a non-flooded

compartment, Navy divers were unable to rescue the survivors. In the wake of this tragedy, the Navy would adopt Momsen's concept and turn it into reality.

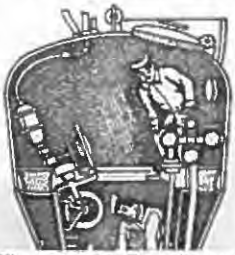

Figure 3 – McCann Rescue Chamber, Source: Web, U.S. Naval Historical Center, NH 97291

The rescue chamber, later called the McCann rescue chamber (named after LCDR Allan Rockwell McCann who was in charge of developing the rescue chamber), was developed by Momsen between 1929 to 1931 while assigned to the Bureau of Construction and Repair. This pear-shaped chamber was designed to be carried on a support ship and could be lowered to rescue personnel from a distressed submarine up to a depth of 850 feet. This rescue chamber proved to be critical in the rescue of the USS SQUALUS (SS-192). In addition to the rescue chamber, Momsen also helped develop an escape breathing device (the *Momsen Lung*) in case rescue was not a feasible option for the distressed submarine.

On 23 May, 1939, while engaging in sea trials, USS SQUALUS sank in 240 feet of water. The submarine rescue ship, USS FALCON (ASR-2) was deployed to the scene shortly thereafter and was able to rescue 33 survivors onboard. This rescue proved to be the first submarine rescue of its kind and was a testament to the success of the engineers, particularly Momsen, who developed this submarine rescue chamber. There were several key factors which contributed to the USS SQUALUS's rescue. The launching of a smoke bomb by USS SQUALUS alerted her sister ship (with the help of a sharp lookout), USS SCULPIN, that she was in distress. In addition, she was able to communicate for a brief period with USS SCULPIN via a communication buoy. These factors and the creation of the submarine rescue chamber contributed to the success in rescuing the crew of USS SQUALUS. Despite the success in rescuing the survivors from SQUALUS, only a week later, a British submarine, HMS THETIS would be lost with crew still onboard. While HMS THETIS sank in only 120 feet of seawater (due to human error and poor

engineering design), only four crewmembers were able to escape before succumbing to carbon dioxide asphyxiation. Despite being located by the destroyer, HMS BRAZEN, less than approximately 18 hours after the sinking, the destroyer had no submarine crew rescue capability (An attempt was made to raise the whole submarine, but failed due to the hawser parting under the increasing weight of the submarine. While most British submarines of this time were equipped with escape chambers and devices, there was no robust external crew rescue capability such as the McCann rescue chamber). [6]

1939-1970

No major changes to submarine escape or rescue emerged throughout World War II. The next development would come in 1961 when LT Harris Steinke develop a new escape breathing device called the *Steinke Hood*. This device would become standard issue for all U.S. submarines during the Cold War and until the end of the 20th century.

Along with the introduction of nuclear power onboard submarines during the 1950s, submarines were designed to go deeper and faster than ever before. Despite these increased operating depths, submarine rescue standards had not yet adapted to these changing operating environments. In 1963, USS THRESHER (SSN 593) was conducting a deep dive after undergoing shipyard repairs. Most likely due to a failure in a silver brazed piping joint in a salt water piping system, the Engine Room began to flood causing the reactor to shutdown. The loss of propulsion and inability to rapidly restart the reactor (due to inadequate operating procedures) directly contributed to the loss of USS THRESHER. USS SKYLARK, a submarine rescue vessel accompanying the USS THRESHER did have a submarine rescue chamber, but would not have been able to conduct rescue operations due to the depth of water.

Many lessons were learned from the loss of THRESHER. Perhaps the most significant was the establishment of the submarine safety program known as 'SUBSAFE'. Following its

implementation, strict standards were promulgated for initial tightness dives and for conducting deep dives (such as that the initial tightness dive shall be conducted in shallower water and that standard increments for changes in depths during deep dives).[7] SUBSAFE was designed to ensure hull integrity to prevent flooding and in case there is flooding to be able to recover from it. Since its inception, no SUBSAFE certified submarine has been lost. Another major lesson learned was the requirement to improve submarine rescue standards. Though USS THRESHER sank in water much deeper than her collapse depth, her sinking highlighted the need for submarine rescue systems capable of rescue at deeper depths. This led to establishment of the Deep Submergence Systems Project (DSSP) which was tasked with creating a relevant rescue capability. By 1970, the U.S. had launched the first Deep Submergence Rescue Vehicle, Mystic (DSRV-1), followed by Avalon (DSRV-2) in 1971. The DSRV was essentially a mini-submarine that could be mated to a mother submarine (MOSUB) and driven to the last known position of the DISSUB.

1970-2000

1970 marked the beginning of the DSRV phase of submarine rescue. By providing a rescue asset that could be transported by air, the DSRV provided a timely solution to any DISSUB situation in remote waters. Along with the development of the DSRVs came increased international cooperation. Soon after the development of the DSRV, other nations decided to modify their own submarines to make them compatible with the DSRV. The U.S. entered agreements with various nations and conducted inspections of foreign navies to ensure that their submarines were capable of DSRV and SRC rescue. In 1986, NATO hosted the first multinational submarine rescue exercise.

2000-PRESENT

The loss of the Russian submarine KURSK in 2000 highlighted the need for increased multinational cooperation. KURSK, which sank in only 350 feet of water, had multiple survivors in a non-flooded compartment. Due to Russia's refusal to accept

assistance until it was too late, all survivors onboard perished. Russia did learn its lesson from this tragedy and in 2005, when one of its submersibles, PRIZ (AS-28), was entangled in underwater cables at 625 feet, international assistance was requested in a timelier manner. The multinational effort was able to rescue the crew unharmed.

Two other significant developments with regards to submarine rescue occurred since 2000. First, the Steinke Hoods were replaced with the SEIE (Submarine Escape Immersion Equipment) Suit. This suit provides for escape from a depth of up to 600 feet from a distressed submarine. Some of the major improvements over its predecessor include thermal protection and a life raft as part of the suit. The other major development was that of the Submarine Rescue Diving and Recompression System (SRDRS). In 2008, the last U.S. DSRV (DSRV-1) was replaced with the SRDRS. The SRDRS is comprised of three systems. The first is the Atmospheric Diving System (ADS-2000—able to dive down to 2,000 feet) capable of inspecting a DISSUB's suitability to mate a rescue module. The second system is the pressurized rescue module or PRM, a remotely operated vehicle which can be operated from the deck of a vessel of opportunity (VOO). The third system is the transfer under pressure (TUP) facility which mates with the PRM for decompression treatment (TUP is scheduled to come online in 2014).[8]

Figure 4 - Atmospheric Diving System (ADS 2000), Source: Web, U.S. Navy Photo # N-4309A-008

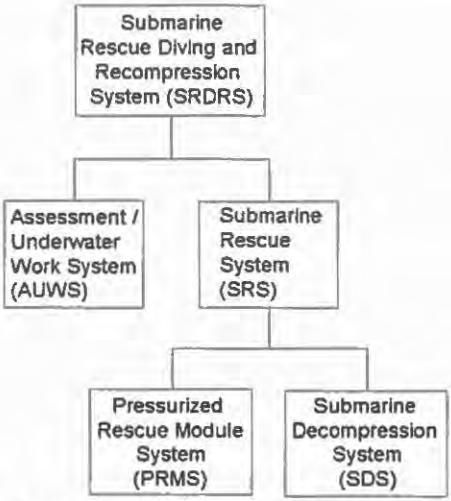

Figure 5 – SRDRS Subsystems, Source: Concept of Operation for the Submarine Rescue Diving Recompression System (SRDRS) Revision 7, 14 October 2009

The SRDRS provides significant advantages over the DSRV system in large part due to the role of standards. First, it is compliant with an existing NATO submarine rescue standard (STANAG 1297, to be discussed later) which will make it interoperable with all nations which have ratified and implemented this standard. Second, by adopting ISO (International Standards Organization) standard container (20 foot standard) characteristics for the subsystems that make up the SRDRS, all components can easily be transported rapidly by air, then by truck or van, and finally to a vessel of opportunity (VOO) that meets certain space and strength requirements. This container standard allows for welding to begin prior to the entire SRDRS system arriving onboard the VOO and reduces the overall amount of welding required, minimizing Time to First Rescue (TTFR). Third, the umbilical used to connect the VOO to the PRM is of sufficient length and width to meet standard Remotely Operated Vehicle (ROV) umbilical requirements. This umbilical also provides continuous power to the PRM, a large improvement over the DSRV system which was dependent on its battery life for operation (the PRM has batteries for emergency operation).[9]

NATIONAL SUBMARINE RESCUE STANDARDS

The national standards body for submarine rescue is the Department of Defense. Public Law 82-436, "Cataloging and Standardization Act" creates a single, unified standardization program in the Department of Defense. The Department of Defense Standardization Program Office (DSPO) is the lead office in charge of promoting "standardization throughout DOD to reduce costs and improve operational effectiveness".[10] Underneath the DSPO is the Department of the Navy Standardization Office under Naval Sea Systems Command (NAVSEA). NAVSEA 05S, is the organization responsible for specifications and standards. Just like all other federal agencies, the Department of Defense in accordance with Public Law 104-113 (the "National Technology Transfer and Advancement Act") is charged with adopting voluntary consensus standards (private sector standards) as much as practicable.

One example of the use of private sector standards is related to the certification process for the SRDRS. The U.S. Navy utilizes the *System Certification Procedures and Criteria Manual for Deep Submergence Systems* (SS800-AG-MAN-010/P-9290 Rev A), also known as the P-9290.[11] Submarine rescue systems must be maintained and operated in accordance with this certification. Appendix H of the P-9290 allows for the use of American Bureau of Shipping (ABS) design standards. By adopting commercial standards in this design process, companies would not have to invest extra funds and time to ensure that their designs were compliant with P-9290 standards. This not only would reduce costs, but would reduce development time, and increase competition. In this case, the adoption of commercial standards allowed for competition to improve the engineering design process.

Similar to some degree in the way in which the American National Standards Institute (ANSI) accredits conformity assessment bodies (CABs), NAVSEA has entered into a memorandum of Agreement (MOU) with the American Bureau of Shipping to conduct initial certification, lifecycle certification, installation certification, and deployment authorization of SRDRS

systems aboard a VOO. This MOU relies on the classification and certification capabilities of ABS (following all applicable rules such as the ABS Rules for Building and Classing Underwater Vehicles, Systems, and Hyperbaric Facilities (2002), Appendix 4 (Certification of Handling Systems) to determine whether or not a vessel could be a VOO in the case of a DISSUB alert. By maintaining an up to date certified list of vessels, timely identification of candidate vessels for SRDRS systems is facilitated, a vital capability in any DISSUB situation. While there may be risks with this approach (i.e. less oversight), a carefully managed process simplifies the certification process, reduces lifecycle costs, reduces time for certification, and provides other benefits.[12] Additionally, by de facto accrediting the ABS to conduct certifications, NAVSEA is allowing for a smooth transition for any potential replacements to the current contract owner of the SRDRS (Phoenix International Holdings, Inc.) which ends on November 30th, 2013.[13]

INTERNATIONAL SUBMARINE RESCUE STANDARDS

OPNAV Instruction 5711.95D governs the U.S. Navy participation in the International Standardization Process. While there is no single international organization that all navies participate to develop submarine standards, one of the most important international standard bodies is the NATO Standardization Agency (NSA). This agency is responsible for the "standardization of operational and logistical procedures, tactical doctrines, and measures to achieve interoperability and interchangeability". This agency develops STANAGS (Standardization Agreement) and APs (Allied Publication), several of which govern international submarine rescue standards.

STANAGS are "negotiated among nations, discussed with NATO commands, ratified by a majority of member nations, issued by NSA, and issued to Ministries and Departments of Defense and NATO commands." Once the respective nation's defense departments have issued all applicable guidance and instructions for the STANAG, it is implemented.

Perhaps one of the most important STANAGS (among numerous such as STANAG 1074, 1298, 1320, 1391, 1450, etc.) regarding submarine rescue, is STANAG 1297, requirements for a common submarine rescue seat (the technical characteristics of the hatch seating surface). This standard, being in the 1000 series, is governed by the Conference of National Armament Directors (CNAD) and subordinate groups. The purpose of this particular STANAG is to standardize requirements for a common submarine rescue seat. This document also establishes procedures for determining which rescue vessels can mate to particular rescue seats. Lastly, it establishes a certification and accreditation process for submarine rescue seats. The Rescue Certification Authority Approval Team (RCAAT) is in charge of approving lower level certification authorities (Approved Certification Authorities, or ACAs) based on audits and inspection of their certification records to include Objective Quality Evidence (OQE) that their certified rescue seats meet STANAG 1297. Figure 6 illustrates the roles and responsibilities in the Submarine Rescue Seat certification process.

The Submarine Escape and Rescue Working Group (SMERWG), was established under the NATO Standardization Agency as a forum to "initiate, develop, and staff proposals for military standardization and common doctrine for the conduct of submarine Escape and Rescue."[14] This standards development organization is open to both NATO members and non-NATO members. In 2003, after the KURSK tragedy, NATO and the SMERWG established the International Submarine Escape and Rescue Liaison Office (ISMERLO). ISMERLO operates under the SMERWG (hosted by the Allied Submarine Command in Norfolk, VA) as a "clearing house for escape and rescue information, including facilitating rescue efforts."[15] ISMERLO participates in international submarine exercises and has also shown effectiveness in quickly responding to a DISSUB alert (USS SAN JUAN) as recently as 2007. While this DISSUB alert proved to be a false alarm, the rapid mobilization and immediate response (facilitated by ISMERLO) from international partners was "superb."[16]

NATO Tasking Authority for Submarine Rescue [SMERWG] shall:

- Promulgate the COMMON SUBMARINE RESCUE SEAT STANAG 1297.
- Endorse the Rescue Certification Authority Approval Team (RCAAT).

Rescue Certification Authority Approval Team (RCAAT) shall:

- Report to the SMERWG via the appropriate Panel.
- Approve / endorse independent Approved Certification Authorities (ACA).
- Maintain appropriate records.
- Verify continuing compliance to the STANAG 1297 methodology.

Approved Certification Authority (ACA) shall:

- Be certified by the RCAAT.
- Review data and approve certification of submarine rescue seats.
- Maintain auditable records of each certification.
- Document their certification process.
- Maintain and adhere to the latest revision of STANAG 1297.

Requesting Country shall:

- Perform inspections as illustrated in STANAG 1297 with the resulting actions and objective quality evidence being certified by an RCAAT Approved Certification Authority.
- Maintain certification by verifying the condition of their Rescue Seats triennially.

Figure 6 - Responsible Party and Rescue Seat Certification Process, Source: STANAG 1297 (Edition 6), Draft Edition, Dated 28 Feb 2011

NATO also developed and published standards for submarine search and rescue operations when specific international procedures were not yet developed. As early as 1968, NATO published the ATP-10 (Allied Tactical Publication) which describes search and rescue tactics and procedures. Revisions to this publication have been difficult to promulgate as there have been disagreements and inability to reach consensus from all concerned nations. Following in NATO's footsteps, the International Maritime Organization in conjunction with the International Civil Aviation Organization developed a Search and Rescue manual (IAMSAR). Much like OMB circular A-119 directs federal agencies to adopt private standards where practical, NATO seeks to adopt civil standards wherever practical. For this reason and others (doctrinal conflicts with another ATP revision), one course of action may be for NATO to adopt the IAMSAR manual and cancel the ATP-10.[17]

While ATP-10 is specific to search and rescue with a minor section on submarine rescue, ATP-57 is specific to submarine rescue. This manual provides procedures and discussions regarding many aspects of submarine rescue including the search phase, escape and rescue phase, medical issues, mobilization of assets, and consolidated lists of submarine specific data by nation. This set of standardized phases and procedures improves understanding and coordination during exercises and will improve cooperation and interoperability during a real life scenario.

BENEFITS OF COMMON SUBMARINE STANDARDS

Adopting international submarine rescue standards has multiple benefits. First, standards reduce Time to First Rescue (TTFR) by improving interoperability. When rescue assets are compatible with STANAG 1297 and have been certified as such, any nation can rely on the assets of another certified nation (for reasons such as proximity to DISSUB, availability of assets, better rescue capability for particular scenario, etc.) in assisting with rescue. Second, adoption of international submarine rescue standards increases readiness. When more nations make their rescue assets compatible with STANAG 1297, the number of rescue assets

available at any given time in any given region is maximized. If maintenance is being conducted on the SRDRS and a U.S. DISSUB alert is issued, because other submarine rescue systems are certified to NATO rescue standards (including NATO's Submarine Rescue System or NSRS), rescue can still be executed. Third, in a time of increased fiscal constraints, adopting international standards to the maximum extent possible reduces and shares costs. Using standards such as the ISO container standard makes the logistics of getting rescue assets to the scene not only faster, but cheaper. By not requiring specialized transport to get to the port nearest the DISSUB, assets are not constrained to one particular aircraft or vehicle. Finally, by implementing international standards and coordination, understanding and interoperability between coalition forces will be improved. By increasing the use of both private sector and international standards (such as STANAGS) where applicable, submarine rescue standards will streamline and better coordinate submarine rescue capability across the globe.

ISSUES AND CONSTRAINTS

With over 60 submarines in operation, China is second only to the United States in the number of submarines it possesses. In the Pacific region, the size of China's submarine fleet dwarfs all other nations both in size and capability[18]. Despite this, China has been slow to take a submarine rescue standards and coordination role commensurate with the responsibility it should have. According to ISMERLO, "No details [regarding submarine rescue capabilities and standards] have been received from the People's Liberation Army (Navy) (PLA(N))." Because of this, it is not known whether Chinese submarines are compatible with STANAG 1297. China has taken some significant steps to improve submarine rescue capability and transparency. In 2004, China conducted its first major submarine exercise (perhaps after realizing the inadequate rescue capability it had following the loss of the entire crew of the Ming 361 in 2003).[19] In 2010, China sent two observers to the Pacific Reach exercise (an exercise similar to NATO's Bold Monarch exercise which conducts realistic submarine rescue

drills). Recently, China has also reached out to James Fischer Defense, a leading submarine rescue company (which participates in the SMERWG and is ISO 9001:2008 certified) for submarine rescue support and training. While Russia has learned many lessons from the KURSK (as evidenced by its active participation in the 2011 Bold Monarch exercise, including mating with a U.S. rescue system), China has not yet provided transparency or cooperation on a scale proportional to the size and capability of its Submarine Force.

While adopting non government standards (NGS) provides numerous advantages when it can fulfill a specific submarine rescue standard, caution must be taken to ensure that the end user is aware of how (or if) a referenced NGS affects a military certification. One example is the military specification MIL-H-2217D which is listed as *active* on the Department of Defense Standardization Program Website. This specification, which governs hose assemblies, wire-reinforced rubber, and submarine rescue chambers, adopted an American Society for Testing and Materials (ASTM) standard (D 750, Standard Test Method for Rubber Deterioration Carbon—Arc Weathering Apparatus) which it references. This ASTM standard has been revised twice since the publication of the military standard (once in 2000, once in 2006). Additionally, according to DOD 4120-24-M (Defense Standardization Program—Policies and Procedures), adoption of a NGS is a *one-time event.* This means that the ASTM standard referenced in MIL-H-2217D automatically rolls to the newest revision. Attention to detail is vital to ensure that the NGS revisions still meet the technical certification requirements from the military specification. Additionally, the end user (i.e. a certification authority) must ensure that they are using the most updated NGO standard.

RECOMMENDATIONS

Because submarine rescue involves personnel from active duty, reserves, contractors, and civilians, an evaluation should be made whether these manuals (NTTP 3-50.1, OPNAVINST 3130.6, Joint Pub 3-50, NAVSEA 5711.1A, OPNAV 5711.95D,

etc.) are different from international standards (such as ATP-57 or the IAMSAR manual). Consolidating these manuals where relevant, will reduce the cost of maintaining these publications (especially important now with reduced staffing and budgets) and increase the relevance of the remaining documents.

China should be strongly encouraged (in a politically and culturally competent way) to assume a more meaningful role in submarine rescue standards and coordination in the Pacific region via the Asia Pacific Submarine Conference (APSC) and other military forums. Though countries such as Singapore and Indonesia recently developed a joint standard for submarine rescue and have also developed an ASEAN website for submarine rescue information sharing, China has not taken such an active role.[20] While China may hesitate to share military capability, the information required to be shared for submarine rescue purposes would not reveal any military secrets. Given the fact China has not been immune from submarine accidents and that it possesses a large submarine fleet in the Pacific, improving its submarine rescue standards and coordination will benefit it in various ways. First, it will make it easier for other countries to provide assistance in case one of its submarines becomes a disaster victim. Also, if China develops a robust submarine rescue capability with common rescue standards, they would be able to rescue DISSUBs from other nations. Finally, by assuming more responsibility and transparency in submarine rescue standards, it will improve its standing among submarine operating nations.

Lastly, the United States should encourage countries which are developing a submarine capability to adopt existing submarine rescue standards. By adopting existing standards such as NATO's STANAGs, developing countries will not have to invest a large amount of resources in developing their own standard which may not be compatible with other STANAG compliant submarines. STANAGs for submarine rescue should be made accessible and affordable to all developing countries regardless of whether they are a NATO member, what their submarine technology is, or what their form of government is. Sharing these standards will benefit

countries with a strong submarine capability and those which are just developing them.

CONCLUSION

Despite the ability for many nations to operate complex submarines, no country is immune from potential failures. As submarines increase their endurance and ability to operate forward, the probability that a submarine will sink in waters away from its homeland is much greater. The only logical approach that will significantly reduce TTFR is a coordinated, international approach. For this reason, it is vital that countries adopt common technical standards, develop common rescue procedures, and conduct frequent exercises to ensure that when a submarine does go down that those inside will come back up.

LIST OF ABBREVIATIONS

ACA – Approved Certification Authority
ANSI – American National Standards Institute
AP – Allied Publication
APSC – Asia Pacific Submarine Conference
ASTM – American Society for Testing and Materials
CAB – Conformity Assessment Body
CNAD – Conference of National Armament Directors
DISSUB – Distressed Submarine
DSPO – Department of Defense Standardization Program Office
DSRV – Deep Submergence Rescue Vehicle
DSSP – Deep Submergence Systems Project
IAMSAR – International Aeronautical and Maritime Search and Rescue
ISMERLO – International Submarine Escape and Rescue Liaison Office
ISO – International Standards Organization
MOSUB – Mother Submarine
MOU – Memorandum of Understanding
NATO – North Atlantic Treaty Organization
NAVSEA – Naval Sea Systems Command
NGS – Non Government Standards
NSA – NATO Standardization Agency
NSRS – NATO Submarine Rescue System
OQE – Objective Quality Evidence
PRM – Pressurized Rescue Module
RCAAT – Rescue Certification Authority Approval Team
ROV – Remotely Operated Vehicle

SMERWG – Submarine Escape and Rescue Working Group
SRDRS – Submarine Rescue and Diving Recompression System
STANAG- NATO Standardization Agreement
TTFR – Time to First Rescue
TUP – Transfer Under Pressure

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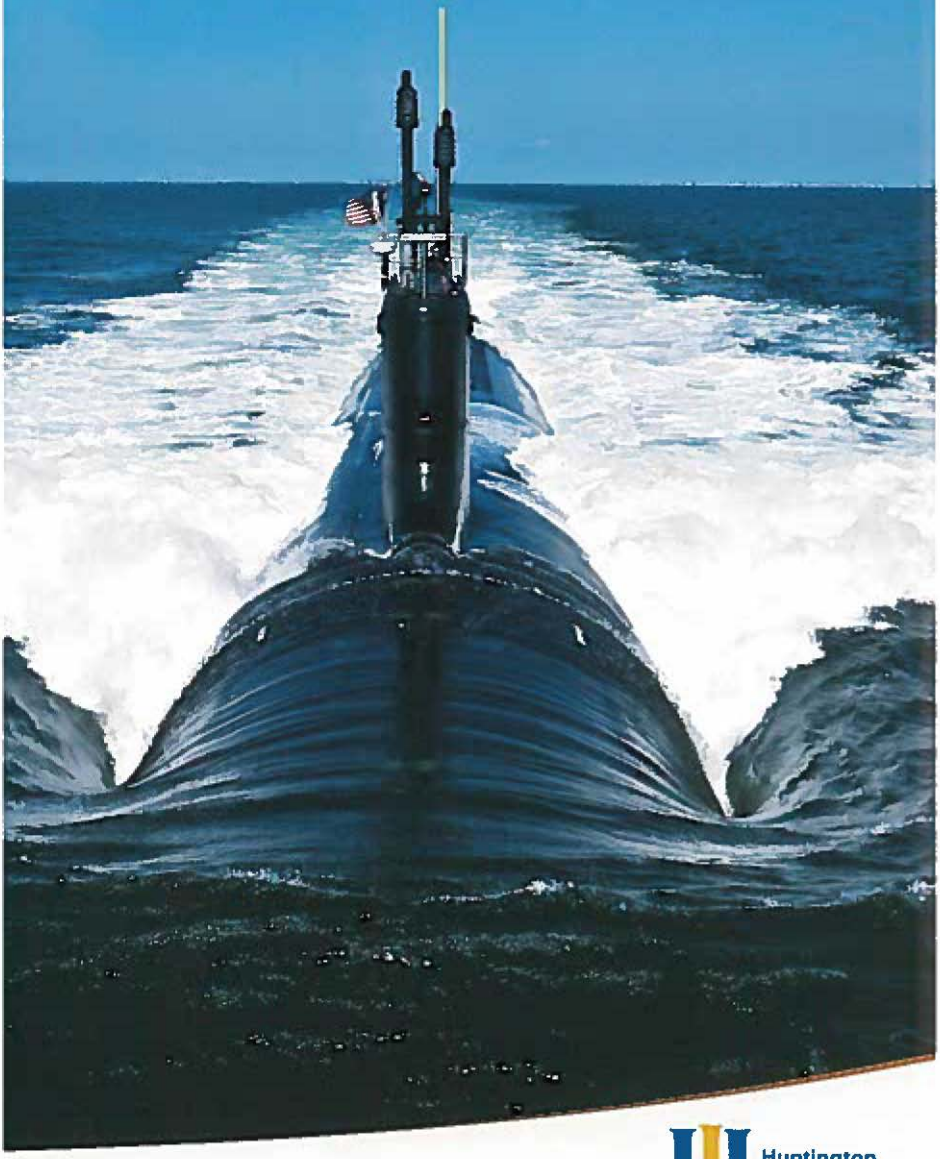

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Save The Dates:

- **Corporate Benefactor Days -**
  27-28 February 2013 (by invitation only)
  Fairview Park Marriott Hotel

- **Submarine History Seminar –**
  April 2013 at the National War College.

- **Submarine Technology Symposium (STS)**
  14-16 May 2013
  The Johns Hopkins University Applied Physics Laboratory

- **Annual Symposium and Submarine Fall Cocktail Party**
  October 2013
  Dates and place to be determined

HAVE A PLAN, BUT TAKE THE SHOT

by CAPT Jim Patton, USN(Ret)

Captain Patton is a retired submarine officer who is a frequent contributor to THE SUBMARINE REVIEW.

A mentor of mine once advised "to plan in pencil, but schedule in ink"—always have a plan, but remember that however *good* a plan might be, if it's not flexible, it's not a good plan. This is especially true in matters of warfare where, as von Molke the Elder noted, "No plan survives first contact with the enemy". The great value of having made a plan, however, is in the planning process itself, where as many variables as possible are identified and accounted for, and where operational assumptions are generated—a process which well prepares the planner rapidly to generate alternative courses of action when those variables change or the assumptions are proven false. We have all seen the situation in a basketball game, for instance, where the coach of a team that is one point behind, but with the ball and twenty seconds to play, takes a time out to orchestrate a very specific and complex plan that will both run out the clock and get a basket. However, it is implicit that if any of his five players sees a mistake by the opponents which creates an opening, he's to immediately take the shot—maybe even a three-pointer.

Submarine warfare, and the independent operations it generally entails, provides an almost perfect environment for implementing the ad hoc changing of a properly derived plan because of changes in the tactical scenario. First, the submarine typically doesn't have escorts, station-keeping ships in a battle group, wingmen or others in a multi-airframe strike to worry about closely coordinating with, and second, unlike the *time constant* of air-to-air warfare which might be in the order of several hundred milliseconds, the time constant of submarine warfare is fifteen

minutes or so—long enough to wake the CO and get him a cup of coffee. Most mistakes on a submarine are caused by doing the wrong thing too quickly rather than the right thing too late. It's because of this that those with absolutely no eye-hand coordination can still be great submariners as long as their mind-mouth coordination isn't impaired.

Post-command jobs for submariners can be a real downer. In fact, the *post-command menopause* you hear referred to can almost be considered a special form of PTSD—Post Traumatic Stress Disorder. As post-command jobs go, the author's was better than most—Director of Tactical Training at Submarine School—where, given a couple of good LCDRs to handle all the paperwork and administrative stuff, one could spend virtually all his time in the Attack Centers (A/Cs)—now having a hundred or so wardrooms to train instead of only one.

One of the first things that became apparent was how insignificant it was if an electronic torpedo actually hit an electronic target, and how inappropriate it was to judge the *goodness* of a team's session by how precisely the target's course, speed and range was determined as opposed to them recognizing when those were all known *good enough* to let the weapon solve the rest of the problem. It was also *negative training* to allow teams to practice their art against targets that never attempted to evade weapons and/or shoot back.

There are several ways to conduct *bad* A/C (or any other) training. One is to make the problem too easy—another is to make it too hard. The trick was to keep the team right at the extreme edge of their proficiency, where most is going right, but some mistakes are being made (the impact of mistakes made then pointed out having a much longer mental half-life than things done properly the first time). The metric for relative goodness of that team then became how hard instructors had to work to get the team to make these mistakes. It was still stressed that each run should start with a thoughtful plan on how it was intended to execute the assigned mission, but the insightful teams realized that, if they did well, there would be several events which would require a change to those plans on the fly, and that they must be

ready to *take the shot* if the opportunity suddenly presented itself. It was certainly made clear that teams should arrive at the A/Cs knowing the current doctrine, but it was also understood they should be quick to recognize when following doctrine wasn't appropriate and be prepared to explain why. In fact, signs hung in the A/Cs that stated:

"Doctrine is Guidance to be Followed in the Absence of Other Intelligence (including human)"

(i.e. nothing written in the Naval Warfare Pubs (NWPs) gives permission to do something stupid).

If the scenarios supporting the above concepts, rather than being *canned*, are highly dynamic in the sense that they are being manipulated by the instructors in real time as the situation and performance of the team warrant, then it follows that any evaluation of the team's proficiency will be largely subjective rather than objective in nature. This should not be surprising, since the consummation of a submarine torpedo attack is a largely technique-associated skill, unlike shooting a Submarine Launched Ballistic Missile (SLBM) which is largely a procedure-oriented skill. Procedure-oriented skills can be evaluated objectively—technique-associated skills cannot. In fact, any demand that torpedo-shooting evaluations be made more objective would drive the process back towards the previously identified as unsatisfactory situation where proficiency was measured by how accurately course, speed and range were determined. It also follows that if evaluations are to be largely subjective, than it is much more than just *fun* for a post-CO individual to be the chief instigator and evaluator—it is actually essential that it be so.

At the time in question when the author was having all this fun, digital fire control systems were being brought on line at SubSchool, and a capability was achieved to tie a couple of A/Cs together, so that they would be *fighting* one another rather than the

instructors. The first time this was tried, it involved a hot-running and highly decorated *Los Angeles* class SSN against a Mark one, Mod zero off-crew SSBN—without either being aware of the arrangement. The results were breathtaking—not only did the SSBN shoot first in spite of detecting second, but it shot more often and more accurately. After two hours of the SSN being jerked around and made to be continually on the defensive and the SSBN's weapons having to be repeatedly *failed* to keep the problem running, the session was stopped and the SSN CO was furious about what a terribly unrealistic scenario to which his team had been subjected—at which point the SSBN team from the other A/C was brought in and he was introduced to his real adversary.

This mismatch between the tactical skills of SSNs versus SSBNs proved not to be an isolated event, and the root cause was attributed to the fact that the typical off-crew SSBN was getting dozens of hours of shoot-em-up A/C training each patrol cycle while the typical SSN was getting only a few hours a year, during which it was more likely to be practicing its *peacetime mission* of caution, remaining undetected and refining tactical pictures far beyond that required to attack. It led to the CO of SubSchool and the author visiting COMSUBLANT (a former shipmate of both) to describe the problem and propose a solution—then called PORT and STBD—Periodic Operational Refresher Training and Submarine Training Between Deployments, to provide SSNs a better opportunity to practice wartime skills without any distractions from pre-deployment training or upkeeps. It worked and was well received by the boats—wartime missions being much more fun to practice than peacetime ones.

Perhaps the most credible explanation for the superb reputation of the United States Submarine Force as a premier combat force is their continuing emphasis on operating in peacetime as (and whenever possible where) they would operate in war. An essential element of this philosophy is a thorough and challenging training regimen while in port, utilizing the best and most professionally operated simulators/stimulator devices available, properly evaluated, and an emphasis to always "have a plan, but take the shot". Nowhere is it better demonstrated that this

philosophy is alive and well than in the fact that an SSGN crew can be relieved by its Blue or Gold counterpart essentially in the middle of very complex forward operations, with the new crew seamlessly picking up where the prior one left off, having planned and trained accordingly while in an extended *off-crew* status.

A MESSAGE FROM THE DEEP

CDR John D. Alden, USN(Ret)

CDR Alden is a World War II submarine veteran and the recognized authority on the reconciliation of US and Japanese records of US submarine sinkings of Japanese ships during World War II. He is a frequent contributor to THE SUBMARINE REVIEW.

According to Japanese records, two auxiliary submarine chasers, KAMO MARU and KURAMA MARU, were sunk by a submarine on 18 July, 1944 in the vicinity of Balabac Strait, between the northern tip of Borneo and the southern tip of Palawan in the Philippines. On that same day USS LAPON (SS 260) made an attack in the same general area and claimed sinking two ships. No other attack by a U.S. submarine was reported on or close to 18 July anywhere in that part of the South China Sea, and a respected reference publication, *Warships of the Imperial Japanese Navy, 1869-1945*, attributed the downing of the two little ships to LAPON. The case appeared to be cut and dried. In addition, the subchasers were just *spitkits*, too small to be included in the official tally of U.S. submarine sinkings and therefore of little interest to researchers. There were a few small discrepancies between the Japanese and American accounts, but I chalked them off as probably misprints or garbles in one or another of the records, and there the matter rested until recently.

In the course of reviewing my data on U.S. and Allied submarine attacks, I had occasion to look more closely at the two cases in question, and found that what had appeared to be trivial discrepancies were far more controversial. There were significant differences in the details of the attacks as described in the respective U.S. and Japanese sources, making it much less probable that LAPON had downed the subchasers. Were the Japanese records mistaken in claiming that a submarine was the

agent? If not LAPON, could another sub possibly have been involved?

First, I think we can reject the possibility that the Japanese were mistaken in attributing the sinkings to a submarine. There have been several cases where Japanese ships mistook explosions for torpedoes when they were most likely mines, but the Japanese records describe the subchasers as engaging in a running gun battle with a surfaced submarine, and there were no Allied surface ships in the area in July 1944. As for the possibility that LAPON was mistakenly credited with the sinkings, we need to look more closely at the records.

The Japanese accounts are sketchy and in parts contradictory, but the most definitive source, as translated by my colleague Erich Muehlthaler, tells a reasonably clear story. On 15 July 1944 three auxiliary subchasers—KIKU MARU, KAMO MARU, and KURAMA MARU—left Manila en route to Kudat, a port near the northern tip of Borneo just south of Balabac Strait. The craft were sisters, former steam trawlers of 233 or 234 gross tons built in 1920. They had been commandeered by the Japanese Navy, armed, and *converted* into subchasers. Just after midnight on 18 July the KIKU MARU reported being in a running battle with a submarine between 08-44N 116-41E and 08-40N 116-30E, during which she fired six rounds from her 12 cm mortar and dropped two depth charges. KURAMA MARU also reported being shelled by an enemy sub that night, with five crewmen killed. KIKU MARU rescued the survivors and reached Kudat the same day. However, KURAMA MARU was not seen again, and the records show her as sunk at 08-00N 114-38E. As for KAMO MARU, she reportedly dropped out of sight on the 18th and was presumed to have been sunk by a torpedo 160 nautical miles SSW of Cape Buliluyan (a point at the southern tip of Palawan Island) or at the geographic coordinates 08-00N 114-38E, with the loss of her entire crew of 15. The Japanese records do not explain the basis for the presumed location—the same position as given for her sister, KURAMA MARU.

What is odd about the reported position is that it places the sinkings of KURAMA MARU and KAMO MARU about 180

miles from KIKU MARU's running battle. There are indications in the records that some positions may be approximate if not inaccurate. For instance, in different accounts the location of the subchasers is given with reference to various points on the map—off Balabac Straits, 150 nm NW of Jesselton, and 120 nm WNW of Cape Kudat—in addition to the geographic coordinates cited above. One source dates KURAMA MARU's sinking at 8 rather than 18 July, probably a typographical error. Another source also warns that some of the data were "probably generated by Allied records." Unfortunately, we don't know which, if any, of the positions are suspect. The reliability of the printed records will become an issue when we compare them with LAPON's attack report.

LAPON was on her fifth patrol, the fourth under command of Lowell T. Stone. At about midnight between 17 and 18 July Stone made three night surface torpedo attacks against a small convoy consisting of two medium AKs and one escort at position 08-20N 116-40E. This is close enough to KIKU MARU's running battle to be within the range of differences often found between U.S. and Japanese accounts of the same encounter. However, the cargo ships described by Stone hardly resemble 233-ton spitkits.

Stone's first attack was made at 2035 (H zone time) on the *very dark* night of 17 July. The targets were *medium* coal-burning AKs of about 4,000 tons with split superstructures, approximately 400 feet long. It stretches the imagination to think that an experienced skipper like Stone could have mistaken little trawlers for these cargo ships. Six bow tubes were fired at overlapping targets without results, although the fish ran hot, straight and normal and should have hit. At 2208 four more torpedoes were fired from the stern tubes at the same ship, this time with running depth set at three feet. Two timed explosions were seen and heard, the target smoked heavily, slowed, separated from the other AK, and disappeared from the radar screen at 5,000 yards. Stone was sure that it had sunk, and placed its position at 08-22N 116-45E.

The escort then departed, abandoning the remaining AK, which made a radical course change and headed for the nearest land about 40 miles away. At 0013 on the 18th, back at the original

position of 08-22N 116-40E, Stone fired four bow tubes at this target, which he described as having the same characteristics as the first AK, and observed one or two hits followed by a spectacular explosion. Globules of molten metal and pieces of hull rising in the air gave the effect of a fireworks display accompanied by flames of every color. When the sub passed through the position 20 minutes later, no wreckage was found. Yet here again the fact that two attacks almost four hours apart were made at exactly the same position, although both submarine and target were moving the entire time, raises doubts about the accuracy of LAPON's position reports. In fact, just before the attack started the sub hit a floating log that knocked out the pitometer log, which could have seriously affected the accuracy of its plotted positions.

According to other Japanese records. LAPON's victim was actually KYODO MARU #36, a 1,499-ton converted survey ship, that was torpedoed and sunk at LAPON's exact position (an indication that it too might have been "generated by Allied records"). Oddly enough, only one man was reported killed.

If LAPON did not sink the subchasers, could another submarine have been responsible, and if so, which one? There was apparently another submarine in the area, because at 0740 on 16 July LAPON sighted and avoided a periscope at 07-22N 114-52E. The brief entry in the patrol report implies that Stone may not have known that another friendly sub was in the vicinity and therefore avoided what he thought could have been a Japanese boat. In any case, he made no attempt to identify the stranger. If it was a U.S. submarine and it attacked the subchasers two days later, it never reported the engagement. Yet if the positions stated in the records are correct, the unknown boat could have been as close as 20 miles from LAPON during its running battle with the subchasers!

According to published U.S. accounts, ROBALO (SS 273), under Lt. Cdr. Manning M. Kimmel, left Fremantle, Australia, on 22 June 1944 to patrol in the South China Sea until 2 August. Thereafter, her only direct contact with shore was a radio message on 2 July reporting having sighted Japanese warships east of Borneo, and when she failed to return from patrol she was given up as lost. However, information was later received from

Philippine guerrillas that ROBALO sank on 26 July off western Palawan, probably after hitting a mine. Four survivors reached shore, but were captured by the Japanese and imprisoned at Puerto Princesa. On 15 August they were transferred to a Japanese destroyer and never heard from again. However, while still in prison one of the men had dropped a note to another U.S. prisoner, who passed it on to the local guerrillas, from whom the word ultimately reached American authorities.

Since ROBALO was clearly in the South China Sea within the right time period, why had Kimmel not reported sinking the subchasers? By that stage of the war gun attacks on small craft by U.S. submarines were quite common, but normally they were not of sufficient importance to warrant breaking radio silence in order to report them. Most were only mentioned in the written patrol report well after return to port. No other submarine ever reported sinking the subchasers and ROBALO was the only boat missing during the time period and in the ocean area in question. With LAPON eliminated as a contender, only ROBALO is left as the U.S. submarine that could have sunk the Japanese vessels.

My ultimate conclusion is that ROBALO was indeed the submarine responsible for sinking KURAMA MARU and KAMO MARU. Given the absence of positive evidence, this is inherently speculative, but I think the case is strong. Although they are still on eternal patrol, Manning Kimmel and his gallant crew deserve this belated recognition for a hitherto unrecorded success against the enemy.

SUBMARINE NEWS FROM AROUND THE WORLD

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From the September 2012 Issue

INDIA—Vertical Launch Missile Submarine (Project 75I):

Approval for the six submarine of Project 75I is apparently in the final stages of approval by the CCS and the Defense Acquisition Council (DAC). A design could be chosen by early 2013 and followed by an RfP by the end of 2013. The RfP will be released to the foreign designer and builder of two units, Mazagon Dock Ltd (MDL) which will build three units and Hindustan Shipyard (HSL) for the remaining unit.

It appears that India has changed the requirement from an entirely Indian build to allowing two units to be built at a foreign location; no doubt due to the slow construction rates and cost overruns occurring at Indian yards.

Assuming that the design is chosen in early 2013 and the RfP is released by the end of 2013, a final design and construction contract could be in place by 2014. The first unit could commission by 2018.

EGYPT—Discussion Concerning New Construction Submarines

As of mid-September 2012, press reporting continues to indicate that the Egyptian Navy (EN) ordered two ThyssenKrupp Marine Systems (TKMS) HDW Type 209 submarines. On 31 August, Egypt's new navy chief, Vice Admiral Osama El Gindi, also publicly made the announcement concerning the submarines that the EN had ordered (also on 31 August) as part of a general modernization effort for the sea service.

AMI source reporting from Germany in September suggests the Egyptian and German governments have discussed in general

terms possible submarine acquisitions, there has not been any concrete agreement to transfer Type 209s. Reports of a confirmed contract appear to be speculation at this time.

Further, any new submarine sale to Egypt would have to be approved by German Chancellor Angela Merkel, and would likely see considerable pressure from Israel. Israel is currently procuring Dolphin Type II submarine from TKMS and would likely consider the sale of modern submarines to Egypt as a major security threat.

Although there is no impending sale of Type 209s by TKMS to Egypt, it does appear that the EN is continuing its search for sources to replace its four aging Chinese-built Improved Romeo (Project 033) class submarines that were built in the 1960s. In March 2012, AMI reported that Turkey had offered to supply two of its type 209s to the EN. However, nothing further about this reported proposal has developed. Turkey's Type 209s (Atilay class) were also offered to Indonesia as part of a package deal of new and used submarines. However, since then, Indonesia has accepted a Korean solution.

Egypt will continue to scour the market for new and used submarines although AMI believes that the political and historical environment between Israel and Egypt will make it difficult to find a solution without considering the political ramifications from both countries as well as for the potential supplier.

UNITED STATES/UNITED KINGDOM—Missile Compartment Specs Finalized for USN/RN Ballistic Missile Submarine Programs

On 06 September 2012, the US Navy announced that is had formalized key specifications for the Common Missile Compartment (CMC) that will be utilized in the US Navy's (USN) Future Nuclear Powered Ballistic Missile Submarine (SSBN-X) Program and the Royal Navy's (RN) Successor Nuclear Powered Ballistic Missile Submarine (SSBN) Program. The formalization of the CMC is a major design and construction milestone for both programs as both are in the design phase with construction expected to start around the end of the decade.

The specifications document formalizes the First Article Quad Pack Ship Specification for a common design and the technical requirements for the four missile tubes as well as all associated equipment within the quad pack. The quad packs will be able to host four Lockheed Martin UGM-133 Trident II (D-5) Missiles currently found in the US Ohio class SSBNs. It will also be able to adapt the follow-on missile to the Trident II when replaced around 2040.

The number of quad packs for each of the USN's 12 SSBN-X hulls is projected as four (for 16 tubes) and the RN's 3-4 Successor hulls will be determined when the overall hull design is complete, around 2016 or 2017 for the RN.

The CMC is being developed by General Dynamics Electric Boat under a 2008 contract worth around US$500M if all options are exercised. Construction on the first USN SSBN-X is expected start in 2021 and the first RN Successor SSBN in 2019.

INDONESIA—South Korean Type 209 Contract Now Official

On 02 August 2012, AMI received information that a contract was signed between the Indonesian Navy (TNI-AL) and South Korea's Daewoo Shipbuilding and Marine Engineering (DSME) for the construction of three Type 209/1400 class submarines. This follows the 23 December 2011 announcement that DSME had won the competition and bested the French, German, Turkish and Russian competitors for the program. One of the keys to the win was the technology transfer agreements that will allow Indonesia to develop its submarine building capabilities at PAL Shipbuilding.

The Type 209/1400 is essentially a lengthened version of the Chang Bogo class and is 61.2m (200.7ft) in length displacing 1,586 tons submerged and manned by a crew of 40. It has a top speed of 22 knots submerged and 11 knots surfaced or snorting.

The estimated US$1.1B contract (US$367M per submarine) marks the beginning of the construction phase of the program with the first unit to be entirely built in South Korea. Follow-on units will be built, unit two as a shared construction between DSME and

Indonesia's PAL Shipyard and unit three, entirely built in Indonesia.

Based on the signing of the contract as anticipated, AMI anticipates that the first unit will begin construction immediately and should commission by 2017. Unit two, shared between DSME and PAL, will begin construction by mid-2013 and will likely commission in late 2017. The third and final unit, being built entirely at PAL will likely begin construction in 2013 and commission in 2018.

The construction of the third Type 209 will give Indonesia the experience to build additional units if it desires or move forward with other submarine designs. Additionally, the TNI-AL will be able to better maintain its Submarine Force in the future with less outside assistance.

The three units of the class will eventually replace the two units of the Cakra class on a three for two basis, increasing the TNI-AL's Submarine Force by one.

UNITED STATES—Long-Range Anti-Submarine Warfare (ASW) Developments

The surface-based long-range anti-submarine warfare (ASW) capability gap appears to be closing due to the continuing developments of Lockheed Martin's Anti-Submarine Rocket (ASROC) family of weapons. The latest concept improvement, the Vertical Launch ASROC Extended Range (VLA-ER), increases the range in which a surface ship can engage hostile submarines.

The latest surface ship developments allow ships to engage submarines at greater ranges, after detection using organic assets or Net Centric Warfare systems. The greater engagement distance provides the surface ship time to attack a submarine before the submarine can determine a fire control solution and fire its torpedo. The ship will, in other words, kill the archer rather than avoid the incoming arrows.

The VLA-ER essentially extends the range 3-4 times the existing VLA range by adding a wing glide kit to the original VLA. The majority of the world's submarines utilize torpedoes

with a maximum range of 18-22 nautical miles or less, giving the VLA-ER an advantage of ~8-12 nautical miles beyond the submarine's firing range. The VLA-ER is stored and launched from the MK41 Vertical Launch System (VLS) which uses the existing VLA canister and fire control systems. VLA-ER reuses 90% of the original VLA components (including the rocket motor). The reuse of components saves new missile development cost.

The VLA and VLA-ER are rocket-propelled, three-stage weapons consisting of a guided rocket motor and a MK54 or MK46 torpedo. A sealed MK15 canister serves as a launch tube and shipping container. The VLA and VLA-ER are inserted into the Lockheed Martin MK41 VLS for storage and launching. VLA can be found on US Navy Arleigh Burke class destroyers (DDG-51), Ticonderoga class cruisers (CG-47) as well as Japanese ships employing the MK41 VLS. These ships could also support VLA-ER in the near future. In addition to launching from the MK41 VLS, it is feasible to launch VLA/VLA-ER from MK112 box launchers, in use in surface ships around the globe, with minor modifications. Further, the VLA-ER concept may be used in an air drop version known as the High Altitude Anti-Submarine Weapon Capability (HAAWC).

Since 1993, more than 1,000 VLAs have been delivered to the USN and to Japan through Direct Commercial Sales (DCS) and Foreign Military Sales (FMS). The increasing number of new submarine programs around the globe, especially in the Asia-Pacific region, suggests an increasing need for capable and affordable ASW systems. AMI is currently tracking six active submarine programs in Asia consisting of 53 hulls, with an additional 60 hulls slated for the next two decades, for a total of 113 hulls. The USN recently (July 2012) purchased another production lot of VLAs to increase its inventory against this threat. AMI estimates that the USN will soon move forward with the extended range upgrade, followed by international navies.

It appears, that VLA-ER could become the weapon of choice for surface warriors. Its versatility combined with the latest sonar technologies being developed for surface ships, helicopters and

unmanned maritime systems (UMS) make it a premier low cost system. It will enable navies to engage their submarine threat at deliberate-attack ranges three-dimensionally: from on the sea, under the sea and in the air. The shared targeting information will allow a fast – supersonic – ASW missile to engage the submarine before it can evade.

UNMANNED DEVELOPMENTS

INTERNATIONAL – Unmanned Developments

Unmanned Snippets: 16 August 2012: The US Defense Advanced Research Projects Agency (DARPA) has awarded a contract for Phases 2 through 4 of its Anti-Submarine Warfare (ASW) Continuous Trail Unmanned Vessel (ACTUV) program to Science Applications International Corporation (SAIC), McLean, Virginia. As part of this contract, the ACTUV program will attempt to design (Phase 2), construct (Phase 3), and demonstrate (Phase 4) an unmanned vessel that tracks diesel electric submarines for months at a time spanning thousands of miles of ocean with minimal human input. An operational prototype for at-sea testing is expected in mid-2015.

VARIOUS—DID YOU KNOW?

VIETNAM: On 28 July 2012, the first Vietnamese Peoples' Navy (VPN) Kilo 636 submarine was launched from Russia's Admiralty Shipyard.

MODERNIZATION PROGRAMS

RUSSIA—Oscar II Class Nuclear Powered Guided Missile Attack Submarine (SSGN) (Project 949A) SMOLENSK: On 05 August 2012, AMI received information that the Oscar II SSGN SMOLENSK was refloated at Russia's Zvezdochka Shipyard in Severodvinsk. The submarine began its overhaul in September 2011 and is scheduled to be completed in the summer of 2014.

Highlights of the overhaul include:

- Nuclear reactor refuel.
- Turbine replacement.
- Overhaul of main generators.
- Replacement of SS-N-19 Granit cruise missiles with the SS-N-26 Onyx.
- Hull maintenance.
- Combat Management System (CMS) overhaul.
- Sonar systems and anti-torpedo defense software upgrades.

UKRAINE—Foxtrot Class (Project 641) Submarine ZAPOROZHYE: On July 2012, the Ukrainian Navy (UKN) began sea trials on the submarine ZAPOROZHYE following a major refit lasting several years. The submarine was largely non-operational since the 1990s.

The refit package included the following:

- Hull, mechanical and electrical (H,M&E) work.
- Replacement of batteries.
- Sonar software upgrades.
- Torpedo tube repairs.

Built in 1972, the UKN will have to either procure a used submarine from the international market or a new construction submarine if it intends to stay in the submarine business. ZAPOROZHY will more than likely only remain in service several more years in order to retain the submarine operations expertise.

USED SHIP TRANSFERS/RECEIPTS/ DECOMMISSIONINGS

ITALY: On 04 September 2012, AMI received additional information concerning the decommissioning schedule for the Italian Navy (IN) and is as follows:

- 3 Sauro III Class Submarines: LEONARDO DA VINCI (S520), GUILIANO PRINI (S 523) and SALVATORE PELOSI (S522); date not yet determined.

From the October 2012 Issue

PHILIPPINES-15 Year Development Plan

On 12 September 2012, AMI received additional information from industry and press sources regarding the Philippine Navy's (PN) *15-Year Development Plan (15YDP)*. Details of the program include the following mix of assets for the PN's future fleet force mix:

- Six frigates configured for anti-air warfare
- Twelve corvettes designed for anti-submarine warfare
- Eighteen Offshore Patrol Vessels (OPV)
- Three submarines
- Three Mine Countermeasures Vessels (MCMV)
- Four Strategic Sealift Vessels (LSL)
- Eighteen Landing Craft Utility (LCU)
- Three Logistics Support/Replenishment Ships (LSS)
- Three Ocean tugs
- Six Yard/Fire Tugs
- Twelve Cyclone Class Coastal Patrol Interdiction Craft (CPIC)
- Thirty Patrol gunboats
- Forty-two Multi-Purpose Assault Craft (MPAC)
- Twenty-four Rigid Hull Inflatable Boats (RHIB)
- Eight Amphibious Maritime Patrol Aircraft (AMPA)
- Eighteen Naval Helicopters embarked aboard frigates and corvettes
- Eight Multi-Purpose Helicopters (MPH) embarked aboard the LSL

It must be noted that some of the smaller craft (such as the MPAC) are already being procured and in the process of being built in shipyards within the Philippines. However, the larger more sophisticated vessels such as submarines, surface combatants, large OPVs and amphibious ships will have to be procured on the international used-ship market, due to continuing budget constraints of the PN.

In an attempt to supplement the traditionally low procurement budget for the PN, the Department of Budget and Management

(DBM) received a request from Philippine President Benigno S. Aquino III to increase the defense budget for 2013 by 12.5%; amounting to P121.6B (US$2.91B).

Although this seems to be a considerable amount of funding, this is the total amount allotted to the entire Department of National Defense (DND). According to AMI sources, the PN requires around P500B (US$11.9B) in order to fulfill the desired fleet force make-up from the *15YDP*.

Looking at the current make-up of the PN and comparing it to the fleet force make-up above, the following must still be acquired in order to complete the PN's *wish list*:

- Four frigates (allows for the decommissioning of the 70 year-old Cannon class FF)
- Nine corvettes
- Eighteen OPVs
- Three Submarines
- Three MCMVs
- Three LSLs
- Fourteen LCUs
- Three LSS
- Three ocean tugs
- Eleven Cyclone class CPIC
- Thirty MPAC
- Eight Amphibious Maritime Patrol Aircraft
- Eighteen Naval Helicopters
- Eight Multi-Purpose Helicopters

Additionally, the PN will need to evaluate the mission worthiness of its patrol gunboats as well as its RHIBs and make a determination when to replace them. When considering hull numbers alone, the PN has sufficient numbers to meet the *15YDP*. However, many are old and at the end of their effective service lives and will require replacement in the near term.

The above fleet mix will see the PN introduce vessels and capabilities not previously in the sea service. This will require extensive assistance from foreign suppliers and navies in order to conduct new missions with the required training and maintenance

to operate effectively. These include underway replenishment (UNREP), vertical replenishment (VERTREP), submarine operation, ship-borne helicopters, and anti-submarine warfare (ASW).

Current operations in the disputed island areas in the South China Sea has become a major driving factor pushing for a more robust surface combatant capability as well as the ability to remain at sea for longer periods of time through UNREP and VERTREP operations. The three LSS will allow for this capability that is currently installed on the two Hamilton class cutters (planned to be upgraded to frigates with addition of surface-to-surface (SSM) and surface-to-air missiles (SAM)), the one Cyclone class CPIC and some of the planned used acquisitions including additional Hamilton class cutters as well as Italian Navy Minerva class corvettes and Maestrale class frigates.

Due to the cost involved with new construction units as well as the limited availability of used vessels on the international market, the PN will certainly need a mix of new and used vessels to fulfill these requirements.

New construction units will likely consist of tugs, MPAC, LCUs and LSLs; all of which can easily be built in the Philippines, taking advantage of the reduced labor costs as well as receiving the economic benefit from the work.

Used vessels will probably include the submarines, frigates, corvettes, and MCMVs. The United States (US) and Europe are the likely suppliers of the vessels, with the submarines being the most difficult to come by in the near future. Possible suppliers of the submarines will include Greece, Turkey and South Korea.

OPVs and patrol boats will probably be a mix of new and used vessels, some with very lucrative financing or granted from Japan; as were the two former Japanese Coast Guard 1,000-ton OPVs (possibly Shiretoko class), offered in March under an Official Development Assistance (ODA) program along with up to ten 180-ton Mihashi class patrol boats.

The helicopters and AMPA will likely come from US suppliers and could also be a mix of new and used aircraft under both Foreign Military Assistance (FMA) and Excess Defense Articles

(EDA) programs. If other than US suppliers are selected, the likely list of suppliers for the new aircraft will be Sikorsky, Agusta Westland and Aerospatiale. Maritime patrol aircraft are another story. If indeed the aircraft are amphibious as desired, the only real supplier will be Japan that continues to build and operate numerous amphibious aircraft.

If the funding levels are achieved as desired, the *15YDP* is scheduled to be complete by 2022. AMI believes that although this is a very bold plan and will certainly require intense planning and funding, it can be achieved assuming increased funding levels from the DBM in conjunction with special financing arrangements, barter deals as well as foreign assistance. Many nations in the region as well as the US have interests in assisting the PN. While it goes without saying, the 800-pound gorilla in the room continues to be China and their aggressiveness in the region, more or less bringing the other nations together in a loose alliance to help defend contested areas.

BRAZIL—Slowdown in Scorpene Submarine Program?

As of late September 2012, AMI continues to receive information from various sources concerning cost overruns in the fledgling Brazilian Scorpene submarine program. Recent press and industry reports in Brazil are beginning to highlight the submarine projects importance in relation to job creation and its corresponding economic stimulus effect on the economy; further justifying the Scorpene programs existence; a sure sign that there may be trouble ahead.

Construction began on the first unit in May 2011 with the front section being built at DCNS. The rear half is to be built at Brazil's Itagual Construçoes Navais when the facility is completed and becomes functional.

Sources indicate that the Brazilian Navy is already experiencing cost overruns at this very early stage in the program indicating that the construction schedule and delivery timeline will also be affected. Submarine construction at a new yard with a wholly new design accompanied by a new supply chain are probably

attributing to some of these overruns. Combine that with Brazil's historically slow shipbuilding rates (7-8 years for a submarine); it does not take long to realize that this program is falling behind and will require further funding above and beyond original estimates.

This also comes at a time when budget shortfalls are beginning to kick in. These shortfalls are associated with the economic downturn and a political decision to slowdown the Brazilian Armed Force's major modernization efforts. This is probably one of the reasons that press and industry officials are beginning to accentuate the positives for the program; an effort to receive additional funds to move construction forward at a reasonable rate.

The Brazilian sea service has very aggressive plans for its conventional and nuclear Submarine Forces as well as its surface forces over the next 25 years (under *Fleet Renewal Program (FRP) 2008*). With the first of these programs already facing cost overruns in its first year is not a good sign of things to come in regards to the *FRP*.

VARIOUS—DID YOU KNOW?

UNITED KINGDOM: On 30 September 2012, the second Astute class submarine for the Royal Navy (RN), HMS AMBUSH (S95), was launched at BAE Systems.

AMI MODERNIZATION PROGRAMS

IRAN—Kilo Class Submarine TAREQ (901): In early September 2012, AMI received information that the Iranian Navy (IN) submarine TAREQ had completed a major overhaul and was re-launched at Bandar Abbas. This was the first Iranian upgrade to the Kilo class.

Work included:

- Hull, mechanical and electrical (H,M&E) maintenance and repair.
- Replacement of pneumatic and compressed air systems.
- Upgrades to the communications system.
- Upgrades to the Snoop Tray radar.

The overhaul at Bandar Abbas took approximately one year with Russian technical assistance.

USED SHIP TRANSFERS/RECEIPTS/ DECOMMISSIONINGS

COLOMBIA—Type 206A Submarines: On 28 August 2012, the Colombian Navy commissioned two former German Type 206A submarines in Kiel Germany. The two submarines were named INTREPIDO (former U23) and INDOMABLE (former U24) and will double the Colombian sea service's Submarine Force, which consists of two German Type 209s, PIJAO and TAYRONA.

The two submarines were procured in February 2012 and were delivered following an upkeep effort and training period. The submarines were last overhauled in the early 1990s which included the installation of the Atlas Elektronik DBQS-21 sonar as well as a new weapon control system, electronic support measures system and periscopes. It is estimated that the submarines were transferred with the DM2A1 torpedoes, the predecessor to the DM2A3.

HONORING ADMIRAL KIRKLAND DONALD, USN

Remarks By
The Honorable Patrick W. Dunne, RDML USN(Ret)
at the Naval Reactors Change of Responsibility Ceremony

The Honorable Patrick W. Dunne, RDML USN(Ret), a retired submarine officer, is the Chief Operating Officer for Catholic Charities of the Archdiocese of Washington, DC. He previously served as Under Secretary for Benefits for Department of Veterans Affairs.

Distinguished speakers, guests and friends of the Navy—Good morning! It is a unique pleasure and thrill for me to be here this morning to help recognize a truly exceptional naval officer. When Kirk asked me to speak, I enthusiastically welcomed the opportunity to talk about my friend and shipmate whom I have watched progress from a student to a sage. My wife Diane and I have cherished our friendship with Kirk and Diane since we first served together in Charleston, SC.

But the journey really began in Annapolis back when a slide rule was the calculator of choice. Kirk was a newly sworn member of the Class of 1975. Returning from summer cruise, the Class of 1972 (my class) was up to the challenge of providing him and his classmates a memorable plebe year. And based on the frequency of Kirk's plebe year stories about the loss of his radio privileges, I know it was memorable. And although his firsties can't take all the credit for his subsequent success, I know we are all proud to see him recognized today.

After lots of training, Kirk got his first chance to put all that theory to practice on USS BATFISH. BATFISH wardroom was one of those special groups where everything clicked both on and off the ship. Even as a junior officer, Kirk was an integral part of BATFISH's success. He embraced the high standards of the Submarine Force and made them part of his routine. His

enthusiastic attitude, ability to qualify quickly and morale-enhancing wit were part of what made each of us revel in any mission we were assigned. Accomplishments like Operation Evening Star, which many of you may know from the Smithsonian exhibit, demonstrated Kirk's willingness to work hard, and contribute wherever his talents were needed, but also to capture the essential experience for the future.

Kirk's passion for submarines was always evident whether we were conducting Special Operations or taking our annual Reactor Safeguards exam or in a shipyard dry-dock for overhaul. On one occasion, after almost three months of special operations and then emergency shipyard repairs for two months, we were somewhat concerned about our proficiency when the Examining Board arrived at the sea buoy.

Kirk was one of the three ORSE EOOWs and thus a key to the ship's success. He was up to the task and expertly directed his watch section throughout the exam. Arriving in port on day two and anxiously awaiting the results, we were somewhat concerned when the messenger approached us and said the Senior Member wanted to know the year group of the Engineer and the EOOWs. How could that be a good omen? Hours later we breathed a sigh of relief when our grade of Excellent was announced.

Time for a party and Kirk was a leader there as well. Some of the best wardroom pranks were initiated by Kirk and his sidekick Jim Wright. No matter where the wardroom assembled, we never knew what *Electra decorations* or impromptu skits Kirk and Jim would provide—but we always waited with great expectations.

But not everything went smoothly for Kirk on that first tour. A recent assembly of the BATFISH wardroom led Kirk to reveal an event which showed his education was not quite complete. Hungrily entering the wardroom one morning after the midwatch, he commenced eating a big breakfast. After loading up his toast with jam, he was quite disappointed at the bitter taste. Acting promptly to spare his fellow officers, he directed the wardroom MS to put the spoiled jam in the TDU room for disposal. Unfortunately, it was actually the CO's personal stock of English marmalade.

Having earned a solid reputation as a great shipmate, it was now time to experience the strategic side of the Submarine Force and so Kirk moved on to USS MARIANO G. VALLEJO as Engineer. But when it came time for VALLEJO's overhaul and crew consolidation, Kirk realized he already had that ticket punched on BATFISH and began looking for a new challenge.

Only one problem—if he left VALLEJO he would lose his spot promotion to LCDR. So, once again the class of 1972 came to the rescue—this time in the person of the Department Head detailer—who detailed Kirk to the Propulsion Examining Board which also qualified for the spot promotion.

This enabled Kirk to see more of the Submarine Force, but the inverse was true as well. As his reach expanded, so did his impact and reputation—as an officer with not just superior technical knowledge, but also sound judgment, solid integrity and steadfast support for his shipmates.

And the Submarine Force was not shy about putting Kirk in leadership positions; first as the Executive Officer of USS SEAHORSE, and then as Captain of USS KEY WEST. Throughout those tours he not only operated with excellence, but also trained hundreds of officers and sailors in the myriad challenges of successful submarining.

But as Kirk left command, he found himself in a Submarine Force facing post-cold War challenges. As the country searched for a peace dividend, the Submarine Force worked to retain good sailors and maintain its technological and tactical advantage. Again, Kirk played an important role in preparing for the future both in the personnel arena at the Bureau of Personnel and with submarine tactics as the Commander of DEVRON 12.

Throughout these years, I served in different commands and different homeports. But whenever I met another former shipmate of Kirk's, the response was the same: unanimous recognition of his excellence as a naval officer and strong admiration for his performance as a shipmate. Everyone wanted to "be like Kirk."

But speaking of role models, today also provides me the opportunity to acknowledge another good friend who has served her country with distinction. Diane Donald has excelled at every

challenge inherent in being a member of a sea-going family. And I don't mean just her immediate family. We have all benefitted from her desire to make things better and see her extended family succeed. Whether picking up a sick friend's mother at the airport or actively leading the Dolphin Scholarship program or helping families deal with the surprises of a deployment, Diane has wholeheartedly been a part of the outstanding naval career we celebrate today. Diane—thank you for your service and your friendship.

So we all celebrated when Kirk made Flag and knew to expect good things for the Navy and the Submarine Force from both Kirk and Diane. To say they met our expectations is an understatement.

Whether working at J-3 on the Joint Staff, roughing it at PACFLEET in Hawaii, tasting the local fare in Naples, or leading the Submarine Force from Norfolk, Kirk always met the stress and demands of his job with the highest degree of skill, integrity and good common sense.

The past eight years are the capstone of this remarkable naval career. His leadership ensured not only a continued outstanding record of nuclear safety but also worldwide impact such as the use of deployed resources and critical advice in the aftermath of the March 2011 earthquake in Japan.

But Kirk knows that it is people that make the Navy great and he has always cared about each and every Sailor under his command. So, it is very telling to see Kirk in action—off duty and out of uniform.

Always a big supporter of Navy football, he is the Grill master of a large group of submarine tailgaters. Within what seems like seconds of arrival, his gadget laden vehicle transforms into a culinary oasis complete with tent, grill, dolphin flag and of course—cold beer.

But the real insight occurs after the game. As we wait for the parking lot to clear, Kirk is always surrounded by midshipmen—eager to hear his thoughts on their future.

And recently while engaging in a relaxing evening in Williamsburg, Kirk was notified about a certain senior submariner whose water skiing exploits landed him in the emergency room.

The injured officer recalls looking through the group of medical providers around him and spying a familiar face—Kirk's.

Over 50 years ago, Admiral George Anderson said "The Navy has both a tradition and a future—and we look with pride and confidence in both directions." Kirk and Diane—as we reflect today on your almost 40 years of selfless service it is with pride—that you have upheld the highest traditions of our Navy and with confidence—that no one has contributed more to ensure our Navy has a bright future. On behalf of all your shipmates and the citizens of our great country, I offer heartfelt Thanks!

In closing, many of you here today have also worked shoulder to shoulder with Kirk and may even have better stories which could show the depth of his love for and contributions to his country, the Navy and the Submarine Force. And like me, you know firsthand the extensive and long lasting impact he had on countless officers and sailors. So, I think you will all understand why I am proud to say "I served with Kirk Donald in the United States Navy."

SUBMARINE VETERANS OF WORLD WAR II, UNITED STATES SUBMARINE VETERANS, INC. CONVENTION AWARDS BANQUET 8 SEPTEMBER 2012

By VADM Al Konetzni, USN(Ret)

Good Evening ladies and gentlemen! What a wonderful week and a superb Convention. My hat is off to John Kennedy and his great team for the outstanding planning and execution of the Submarine Veterans 2012 Convention Week here in Norfolk, Virginia.

As many of you know, the U.S. Submarine Veterans of World War II conducted their formal closure last evening. These Shipmates will never be forgotten and I trust they will continue their camaraderie as members and friends of the U.S. Submarine Veterans Incorporated organization.

To honor these exceptional Americans and their families I offer the following statement and a prayer put together by a Submarine Veteran of World War II some years ago.

> "The final curtain on the play has fallen. And all that remains is for you and I to close the show. But, for us, there will always be the memory of glory, and the triumph, and the tragedy that was part of the play. And if some day some stranger should ask,
> "What was it like living and going through an attack on that submarine you were on?"
> There's just one answer you can give
> "You had to be a part of it. You had to be there".

Now the Prayer

They were young, straight of limb, true of eye, steady and aglow.
They were staunch to the end against odds uncounted,
They fell with their faces to the foe.
Bravely they died. In proud remembrance we salute them.

Thank you Submarine Veterans of World War II!! Shipmates join me in giving them a rousing round of applause!!

I know that being a Submariner means much to every individual here who has served this Nation. I feel the same way and can truthfully say that earning my coveted Dolphins was one of the most important moments in my professional career.

Lately, I've given considerable thought to what makes us such a strong fraternity, and perhaps more importantly, why do our submarines, manned by young Americans averaging 22 years old, perform so well under the most arduous of conditions for very long periods of time during deployments.

I may have found the answer in new research being done by the Gartner Group Distinguished Analysts, Drs. Debra Jergen and Carol Rozwell.

"The purpose of their research is to test the hypothesis that socially conscious leadership – characterized by personal authenticity and community connection – ALONE – are enough to define a good leader. If these two characteristics are present as leadership themes, then workers will be engaged, talent will be attracted and retained, successful projects will be delivered, innovation will come naturally and the 'key performance indicators' will fall into line. If they are not, then attrition will be high, management will be a struggle and organizational goals will not be met.

Their goal is:

- To interview leaders of companies, organizations and projects to determine their leadership styles and match that against the 'success' of their enterprise: whether that be a workgroup, project, division, or a whole company.
- To understand how leaders have developed their skills and what they recommend to others.
- To look at companies and projects that have failed or struggled, those that have a high rate of attrition or who rate badly with their customers, to determine what kinds of leadership styles prevail."

What caught my interest as I contemplated the hypothesis characterized by personnel AUTHENTICITY and community CONNECTION defining great leadership; was that the environment in our submarines, in the past and today, is made of officers, chiefs, and sailors who are forced to be authentic because there is no personal or psychological privacy on a submarine. Submarines makes a person AUTHENTIC or they fail and leave. Regarding community CONNECTION; all of us are taught on day number one that submarining is a team sport! We all understand early on that the newest crewmember is as important as the Skipper or Chief of the Boat when it comes to operating the *boat* or *sewer pipe* safely in times of war or peace; at great depths; far from home, for months on end. This CONNECTION or community spirit has always driven our crews to be close knit teams.

As I see it now, the nature of our Submarine Force is to attract smart, risk taking, inventive and socially adaptive people. Aboard the boats AUTHENTICITY is honored and grows in each crewmember and community CONNECTION is driven home constantly as each crewmember relies on one another! The result is a crew of real *leaders* who are truly defined by their AUTHENTICITY and CLOSENESS or CONNECTION.

The combination that I've discussed allowed our Submarines to readily defeat the Imperial Japanese Navy and Japanese Shipping in World War II. AUTHENTICITY and our

CLOSENESS allowed us to lead the world in development of nuclear powered submarines and warships and to invent passive ranging and digital tracking that enabled the defeat of the Soviet Union in the Cold War.

Shipmates, this leadership of yours spawned from AUTHENTICITY and CONNECTION in our Submarine Crews, continues today as our fine submarines operate worldwide, over long periods of times, in shallow water, taking on threats that we couldn't imagine a few decades ago.

If the hypothesis is true – "that leadership is defined solely by AUTHENTICITY and community CONNECTION"... then we have nothing to fear about the Submarine Force of today and that which will come tomorrow. The environment that exists, and has existed, on our boats has created great leaders who cherish authentic people and love the military community that they serve! That's why we are all here this evening!

In closing, God Bless our Shipmates who gave all;
God Bless our Shipmates who are no longer with us;
God Bless all who serve and have served this Nation;
And God Bless the wonderful spouses and families who support those who Serve!

Finally, God Bless our Great Submarine Force!

Good Evening Bubbleheads! Keep Charging!

DOLPHIN SCHOLARSHIP FOUNDATION

by Ms. Amy-Beth Johnson
Executive Director
Dolphin Scholarship Foundation

Update

The Dolphin Scholarship Foundation (DSF) is pleased to announce the selection of 30 outstanding high school and college students as the **2012 Dolphin Scholars**. Each Dolphin Scholar will receive an annual award of $3,400 for up to four years of undergraduate study. This fall DSF will fund a total of 115 scholarships, including 93 scholarships renewed for the 2008-2009 school year, for an annual total of **$391,000** in Dolphin Scholarships. The Foundation also awards the independent ***Laura W. Bush Scholarship*** for children of crewmembers of USS TEXAS (SSN 775).

Dolphin Scholarship Foundation was founded in 1960 and awarded the first Dolphin Scholarship of $350 in 1961 to John L. Haines, Jr. The scholarship is available to children of members or former members of the U.S. Navy who served in, or in direct support of, the Submarine Force. The 2012 Dolphin Scholars were selected from 309 applicants. Final selection was based on three criteria: academic proficiency, financial need, and commitment and excellence in school and community activities.

Members of the military and civilian community comprised the Scholarship Selection Board, including active duty, spouse and education representatives and the DSF Chairman, Mrs. Dana Richardson. Of the 30 Dolphin Scholars selected, 22 were high school seniors and 8 were college students, 9 male and 21 female. 21 alternates were also selected, many of whom will benefit from the scholarship due to others being fully funded by the post-911 G.I. Bill and/or scholarships from other sources. Eleven of the submarine sponsors were from the enlisted community and 19 were officers. Congratulations to the new ***2012 Dolphin Scholars!***

High school seniors selected:

Student	Sponsor	Home State
Alexandra Ambrosino	LT Vincent Ambrosino, USN	VA
Katelyn Anderson	LCDR David Anderson, USN (Ret.)	VA
Ethan Berg	EMCS(SS) Michael Berg, USN	CA
Victoria Bogdan	CDR David Bogdan, USN (Ret.)	MD
Cassandra Broeren	MM1(SS) Theodore Broeren, USN	WI
Winnie Chan	MMCS(SS) Alan Spangenberg, USN (Ret.)	HI
Frances Chapman	MMSC(SS) Mark Chapman, USN (Ret.)	FL
John Cooper	STSCS(SS) Ricky Cooper, USN	NC
Julia Diorio	CAPT David Diorio, USN (Ret.)	VA
Thomas Feustel	LCDR Richard Feustel, USN (Ret.)	WI
Grace Gardner	CAPT Thomas Gardner, USN (Ret.)	VA
Rachel Gillespie	CAPT Stephen Gillespie, USN	SC
Hayley Hamman	EMC(SS) David Hamman, USN	KY
Mitchell Haugen	CAPT Christian Haugen, USN	VA
Margaret Humm	CAPT Brian Humm, USN	WA
Crystal Johnson	MMC(SS) Douglas Johnson, USN	NC
Christina Krawiecki	LT Jurgen Krawiecki, USN (Ret.)	WA
Nicolas Lytle	CAPT Alan Lytle, USNR	VA
Megan Merwin	MTC(SS) Mark Merwin, USN (Ret.)	FL
Kendra Mikatarian	CAPT Douglas Mikatarian, USN	VA
Kevin Moran	CDR Michael Moran, USN (Ret.)	FL
Ashley Mortus	LCDR Jerry Mortus, USN (Ret.)	TX
Ryan Muir	CDR Robert Muir, III, USN (Ret.)	FL
Marcus Onley	CDR Albert Onley, USN	VA
Tanya Price	ET1(SS) Danny Price, USN (Ret.)	CT
Bailie Richards	CDR Jeffrey Richards, USN (Ret.)	KS
Shelby Sievers	CAPT Eugene Seivers, USN (Ret.)	VA
Courtney Spencer	CAPT Lennie Spencer, USN (Ret.)	CT
Jared Webber	CDR Robert Webber, USN (Ret.)	FL
Kristin Whitehead	ETCM(SS) William Whitehead, USN (Ret.)	OH
Michaela Tolliver	CAPT John Tolliver, USN	WA

Undergraduate college students selected:

Katrina Cribbins	STSCS(SS) David Cribbins, USN (Ret.)	MI
Michael Gould	EMC(SS) Robert Gould, USN (Ret.)	MI
Jessica Imgrund	ET1(SS) Kristopher Imgrund, USN	GA
Emily Janacek	LCDR Theodore Janacek, USN (Ret.)	CT
Riley Jones	ET1(SS) Kevin Jones	GA
Michael Merwin	CDR Michael Merwin, USNR (Ret.)	NY
Nathan Roe	LCDR Darren Roe, USN	MD
Brandi Wallace	MMCS(SS) Keven Wallace, USN (Ret.)	VA
Kathleen Waller	CDR Mark Waller, USN	Naples, Italy
Mason Zook	PO1 Dean Zook, USN (Ret.)	IN

MEMORIAL SCHOLARSHIP

A new fund for an endowed scholarship has been established in honor of RADM Thomas A. Meinicke by his family, who passed away earlier this year. Donations toward the endowment may be made directly to DSF either online or via check.

DONORS

The Foundation greatly appreciates the support of our generous donors, yet we need to continue to increase our funding in order to grow our scholarship program. *The Parents' Circle* and the *The Haines Society* continue to grow with the increased involvement of our past scholars and their parents. Please check our website frequently for updates on our ongoing fundraisers and sales.

JANUARY VIRTUAL RACE FUNDRAISER

We are currently running a contest for someone in our community to come up with the next theme for a virtual race, to be launched in January. The contest goes through November 30 and the winner will have the race named in their honor and receive a $25 prize. For more details and to follow the race progress after launch on January 15, please visit the DSF website, www.dolphinscholarship.org.

ANNUAL GOLF TOURNAMENT

The 2012 Annual DSF Golf Tournament, held October 4, was a huge success. We had exceptional turnout (123 players) and wonderful support from the waterfront and local shore commands. Over $36,000 was raised thanks to the generosity of our corporate sponsorship and participants. Corporate sponsors included General Dynamics, Lockheed Martin MS2, Newport News Shipbuilding, Northrop Grumman Corporation, Dresser Rand and L-3 Unidyne.

Next year's tournament has been scheduled for Thursday, October, 10th so be sure to save the date!

NEW SCHOLARSHIP APPLICATION WEBSITE

We are very excited to announce a new website, the creation of which was championed by RADM Chuck Beers, USN (Ret.), our Board of Directors President and VADM Al Konetzni, USN (Ret.), also a Board member. www.subforcescholarships.org will be a single point of application for Dolphin Scholarship, Laura W. Bush Scholarship, Nautilus Scholarship, USSVI scholarship and Bowfin Scholarship. With the goal of keeping the process as simple as possible for our scholars and alleviating the redundancies between our organizations, the young people we strive to serve will be able to apply online in just one submission for all scholarships for which they qualify.

For more information about Dolphin Scholarship Foundation, please visit our website, www.dolphinscholarship.org.

REUNIONS

USS WAHOO SS565 May 2-4, 2013
Groton, CT
Contact: Tom Young
1 Pine Knoll Drive
Atkinson, NH 03811
Phone: 603-362-5781
e-mail: tank@tomandshirleyyoung.com

USS HAWKBILL SSN 666 May 19-21, 2013
Las Vegas, NV
For info contact: Paul Rutter, (814) 574-7352
e-mail: JRutter@moc.edu

COLD WAR SUBMARINE EXHIBIT FORMALLY ACCEPTED

by RADM Jerry Holland, USN(Ret)

Rear Admiral Holland is a frequent contributor to THE SUBMARINE REVIEW. A Life Member of the Submarine League and the Naval Historical Foundation, he is presently Vice President of the NHF.

On 21 March 2012 the Under Secretary of the Navy Robert O. Work formally accepted the Covert Submarine Operations exhibit in the Museum of the United States Navy's Cold War Gallery. This exhibit began its life in the National Museum of American History of the Smithsonian Institution to celebrate the hundredth anniversary of the Submarine Force in 2000. That original exhibit, *Fast Attacks and Boomers, Submarines in the Cold War*, was sponsored by the Naval Submarine League and funded by private donations raised in a two year long campaign directed by Admiral Hank Chiles and Captain Dave Cooper. Their campaign raised over two million dollars to create an exposition that not only addressed the history of submarines from USS HOLLAND (SS-1) through both World Wars, but featured spaces and equipments of modern nuclear powered submarines. Also demonstrated for the first time were a number of declassified covert operations undertaken by submarines during the Cold War and the major contribution of the Submarine Launched Ballistic Missile submarines to national deterrence policy.

When the Smithsonian reclaimed the exhibit space after three years, the Naval Submarine League made major contributions to finance the move of the equipment and furnishings to storage. Over $850,000 was raised and expended by the Naval Historical Foundation (NHF) to fund the final installation in the Navy Yard museum. Construction of the present exhibit was completed in

2011 by Design and Production, Inc. The exhibit itself opened during the annual meeting of the Naval Historical Foundation in June 2011. Covert Submarine Operations is the first major exhibit in the Museum's Cold War Gallery.

The Naval Historical Foundation formally presented the completed project to the Navy earlier this year. On March 12, Under Secretary Work formally accepted the exhibit for the Navy and in his letter of acceptance asked the Foundation to "convey my personal appreciation and gratitude to the members of the Foundation for their support of this worthy project commemorating the Navy's contribution to the Cold War."

Much of the credit in the exhibit, in its original configuration, through this transition, and in its final format goes to Captain Peter Boyne who influenced the design of the original exhibit, who served as a docent at the Smithsonian, and who advised the designers and installers of the final product. His dedication and drive ensured that equipment was procured, transported, stowed and added to the displays in a manner consistent with the best traditions of the Submarine Force. Captain John Shilling played a major role in planning and financing the original exhibit. A measure of their assiduousness is the presence in the exhibit's Crew's Mess of the unique Steinway piano that was produced by that company especially for and installed in USS THOMAS A. EDISON (SSBN-610).

The National Museum of the United States Navy is located inside the Navy Yard in southeast Washington, a short walk from the Navy Yard and Eastern Market Metro stations. For those without an active duty, retired or dependents ID card, entry through the Gate at 11th and O Streets requires a picture identification card for persons over 16 but is otherwise uninhibited during the weekday hours from 0900 to 1700. For weekend visits, when the Museum is open from 1000 through 1700, those without military-issued ID cards should contact the Naval Historical Foundation (202-678-4333) to be added to the weekend Navy Yard access list.

SEQUESTRATION?
YOU SHOULD HAVE BEEN HERE IN 1967!

CAPT John F. O'Connell, USN(Ret.)

Captain John F. O'Connell, USN (Ret.) was commissioned from the United States Naval Academy. He served in USS BON HOMME Richard (CVA-31) and USS ROCHESTER (CA-124) before attending Submarine School. He served in USS PERCH (ASSP-313), USS CAIMAN (SS-323), GMU Ten, Squadron One staff, USS BARBERO (SSG-317), XO USS PICKEREL (SS-524), and ComSubPac staff. He commanded USS SPINAX (SS-489) and Submarine Division 41. He was a Branch Head in the Submarine Warfare Division of OpNav (OP-31) and Chief Staff Officer of Submarine Flotilla Seven. He served as ComSubPac N3, and then as Defense and Naval Attaché Tokyo. He has published five books, three dealing with air power and two with submarine operational effectiveness in the 20th century.

The newspapers are full of alarming news about the possibility, nay, the certainty of *sequestration*, which is the abrupt cutting back on funds available to various government agencies at the end of the year. If you are a program manager in any service, or government agency, you have some serious thinking to do about how you will handle the impending disaster.

Fortunately, or unfortunately, I got hit by a sequestration ax as I took USS SPINAX (SS 489) up to Hunters Point Naval Shipyard in September 1967. I had never heard the term *sequestration* and it would not have made the process any easier if I had.

We got underway from San Diego and cleared the sea buoy and headed north for an operating area off San Francisco Bay. There we were scheduled to spend several days performing

passive sonar calibration duties for a Skate class SSN that was finishing overhaul, before starting our own overhaul.

I came down below after securing the maneuvering watch and went to my cabin. My XO said in passing, "You might want to check the last mail that just came aboard. It's on your desk. There is a rather peculiar speed letter from ComSubPac."

I read it and called Bob Nevin, the executive officer, to my cabin. "Bob, have we heard anything about this from the Squadron before we got underway?" "No" was the answer.

The speed letter, signed by direction by a relatively junior officer in the Logistics Section (N4) of ComSubPac staff informed me that overhaul funds for USS SPINAX scheduled overhaul (due to start in a week) had been cut by 25%. That reduced our overhaul funding for work to be accomplished in the shipyard from 1 million dollars down to $750,000 effective immediately!

Shortly before we had had a *shipyard arrival conference* in San Diego with a BuShips representative, a senior ComSubPac staff officer, the Squadron Engineer, and the Division Engineer as well as shipyard representatives. All had an opportunity to critique the shipyard work package that we had prepared, and by God we had 1 million dollars worth of shipyard work all laid out and approved by all involved.

What on earth was going on? Why would such a devastating blow be delivered by speed letter, a relatively informal communication? I had told my engineer officer, Lt. Bill Hudiburgh, to drive up to the shipyard while we were underway and spend a few days smoozing with the shipyard shop masters so that we could ease into the overhaul routine smoothly. My key man was missing in a major engineering crisis.

I checked with my communications officer and the assistant engineer officer to find out if either had heard anything before we got underway. Neither had heard a peep. We had just completed a three-week long restricted availability alongside our submarine tender.

This was the height of the Cold War and we were on radio silence as soon as we cleared the sea buoy. There was no way to query our betters.

It was time for *Battle Stations*. An hour later I had an all-officer plus Chief of the Boat meeting in the wardroom and told them what seemed to be happening. Lots of curses, profanity and swear words filled the air. I told them that I felt exactly the same way as they did BUT we needed to do something very quickly. It was obvious that a new *shipyard arrival conference* would have to be held just as soon as we arrived at the shipyard, and we had to be prepared to cut a quarter of a million dollars worth of work. Either we would dictate what was to be cut or someone else would do it for us. The latter idea was unacceptable.

I instructed them to go to their departments and divisions, consult with their leading petty officers, and come back in twenty-four hours—prepared to cut $250,000 worth of work.

One more complication was involved. My prospective relief as commanding officer was aboard. He had come to me a couple of weeks earlier and pointed out that he had orders to relieve me in November up in the shipyard during overhaul. That meant that he would have to take SPINAX out on sea trials without ever having been underway in her—not a very satisfactory situation. I reluctantly agreed to his riding the boat up to the shipyard so he could get a feel for her. I told him that he was not invited to the impromptu *pre-arrival conference* the following day because there was only room for one commanding officer at a time and I didn't want to have any of my department heads looking to see what he thought about their decisions and mine. He would just have to live with them.

Twenty-four agonizing hours later we met and CHOPPED the previously approved shipyard work package down to $750,000. It was not a pretty sight.

We pulled in to Naval Air Station Alameda to offload our torpedoes before moving to the shipyard. My engineer, ashen-faced, was on the pier. He had learned about the cuts as soon as he arrived at the shipyard.

"Captain, you won't believe what has happened! We have another arrival conference tomorrow. The BuShips rep and the ComSubPac rep have just arrived." "Oh yes, I will Bill. In your absence we chopped $250,000 from the approved package. Go on

down and talk to your assistant engineer and see if you agree with what we have done."

We had a revised shipyard work package meeting the next day. I had a few choice words for the ComSubPac representative, about what had happened and how we were informed. I told him, and the squadron engineer, that a letter from me would be forthcoming laying out a proposed solution to handling the missing work.

When we chopped the work package we looked carefully at what might be accomplished by the tender if we sent specific pieces of machinery down to San Diego from the shipyard. I got the squadron engineer's agreement to that course of action. I also contacted my Division Commander and told him I couldn't spare an officer from the wardroom to ride herd on that work, and that I wanted his Division Engineer to be our representative at the submarine tender. He agreed.

A few days passed and tempers cooled. I had served on ComSubPac staff just before taking command of SPINAX. I knew that the dollar decision to drastically cut our overhaul funding, made at the end of the fiscal year, had not been an easy one. Rather than cursing the darkness, it was time to light a candle and show ComSubPac a possible way out of the mess that it had inadvertently created.

I studied the ComSubPac instruction dealing with the command philosophy about overhauls. It was clear that the intent was to ensure that the overhauled submarine was capable of going through its next full operating cycle without the necessity for major repairs.

In a letter up the chain of command I pointed out that due to unfortunate circumstances the pre-overhaul long restricted availability alongside our tender had gone by the boards and could not be retrieved. I laid out the amount of work that was being sent down to the tender while we were in overhaul. I then suggested that ComSubPac approve a five-week restricted availability alongside the tender upon completion of the overhaul in order to deal with all the unresolved material problems. If that was done, I predicted that Spinax would be able to go through her next

operational cycle without needing major repairs. It was a radical proposal.

The Squadron Commander and ComSubPac agreed. I was relieved in November 1967 to attend Post Graduate School at Monterey and Bud Hankins took over. The overhaul proceeded and sea trials went well.

The subsequent five week availability alongside the tender, although unprecedented, served to fill in the material gaps. SPINAX went on to win a third "E" for operational excellence and to operate well during 1968 and 1969.

Her outstanding material condition and readiness for further service was noted in SUBINSERVPAC message 192159Z Sep 69 and COMSUBPAC message 232207Z Sep 69 dealing with her decommissioning. It was a happy ending to a real mess. The hard work done by SPINAX officers and crew members and by the submarine tender had saved the day.

LETTERS TO THE EDITOR

BRING BACK THE FISH!

by CAPT R. J. Decesari, USN(Ret)

Captain Robert J. Decesari, USN retired after 30 years of service in both Surface and Submarine Warfare, Deep Submergence, and Engineering Duty. As an ED officer, he was CO of four Navsea reserve engineering duty units, and was personally involved with Spawar robotics RF communication systems analysis. A registered Professional Engineer, he has authored over 25 technical articles in the areas of electronic communications, deep submergence, and marine systems.

Over the years, the United States Navy has held to a convention for the naming of its ships. Although the criteria for the naming of ships has changed over the years, adapting to the times, it has basically followed a naming hierarchy based on equating the size of the ship to the importance of a person, historical event, or significance of a national event or icon. Basically, small vessels and craft could be named for local leaders, community leaders, towns, small cities and other assorted heroes, local leaders, or individuals. As the vessel grew in size, displacement, and armor, the name chosen was usually from a group of more distinguished, nationally known individuals, larger cities, or national icons. In addition, unique ship classes, namely destroyers, cruisers, aircraft carriers, and battleships, had names chosen from distinct categories, for example, destroyers traditionally were always named after famous individuals, and preferably Naval heroes. Cruisers were named after US cities or areas of the country. Aircraft carriers often had names associated with famous American battles or famous ships or people that fought in heroic battles or contributed to the revolution, and

sometimes flight oriented icons (Lexington, Saratoga, Wasp, Hornet, Kitty Hawk, Franklin, to name a few). The pride of the fleet, battleships, were primarily reserved for state's names. And from before 1920's through the 1960's, submarines were named for fish, indicative of their underwater function. The Blue Jacket's Manual listed in detail the naming categories for ships, and it was followed for the most part until about the late 1950's. Although there is nothing preventing our Congress and Department of Defense from selecting ship names to honor whatever they choose, they usually have followed a naming pattern similar to the one just described. Today, our capital ships are the aircraft carriers, cruisers, and submarines. Within the last thirty years or so, they have been given names, with some exception, of famous individuals and presidents, significant battles, states and cities, respectively.

Historically, submarine identity and names have evolved from an alpha-numeric system to replacing the names once reserved for cruisers and battle ships. In between, we have had fish names as well as patriots and presidents. When submarines were first introduced, they were small vessels of limited, sometimes questionable use, manned by Sailors of questionable virtue! In a recruiting photograph of the early 1900's, numerous submarines, (then legitimately called boats because of their small size) are shown on the deck of a transport ship with the crews napping on deck! In the technological progression of submarines from gasoline powered coastal patrol craft, to the true sea going, diesel electric fleet submarine, submarine names transitioned from letters and numbers (i.e. *O* class and *S* class), to the names of fish and sea creatures, the likes of Nautilus, Narwhal, and Squalus.

Indeed, the Porpoise class of 1921 was the first full class of submarines to be completely named for fish. (The Plunger class of the 1900's had all but one boat named for fish—the USS MOCCASIN). This tradition continued unbroken until the launching of the *41 for Freedom*, the fleet ballistic missile submarines, with USS GEORGE WASHINGTON (SSBN-598) being the lead boat in the late 1950's. (Note, though the WASHINGTON was over 300 feet long and displaced over 6000

tons, tradition still has it they are called *boats*!). Even though the Submarine Force had 41 famous patriots or freedom-loving individuals intertwined (actually 42 if one considers that the USS LEWIS and CLARK (SSBN- 644) was named for two people), fish names continued with the 637 class. USS STURGEON, (SSN-637) was the last full class of US attack submarines to carry the names of fish—and more importantly—the names of some of our most distinguished and honored World War Two combat submarines. Of the WWII *fish-boats*, fifty-two of them are on eternal patrol. With the exception of SSN-21, USS SEAWOLF, there are no fish-named attack submarines presently serving in our fleet. The fish names have given way to people, cities, and states. When asked why submarines were no longer being named after fish, it is said that Admiral Rickover replied, "Fish can't vote!"

I actually have no qualms about naming submarines for freedom-loving and patriotic individuals, states, or presidents. Indeed, the selection of the names for the *41 for Freedom* are very well suited for the charter of the fleet ballistic missile submarine. Albeit, when the names of the first boomers were made public, the George Washington class (SSBN-598), there was grumbling among the salty members of the sub force that the boats should not be named for people. This was a breech of tradition in their minds.

The subsequent 637 class boats, also constructed about the same time as the 41 missile boats, were all named for past famous World War II *fish-boats* and this fact quelled the concerns of the grumblers. However, the charter of the boomers was totally opposite of the fast attacks. Indeed, in the design phase, there was even talk of not having torpedo tubes on the boomers. Instead of sinking the enemy, performing special operations, collecting intelligence, and running around at flank speed, the fleet ballistic missile boats were intended to stay away from the enemy, lie quiet in the ocean, remain undetected, and move at three knots for months at a time, patiently awaiting the dreaded message to commence a launch. Thank God, that message never was sent. The ultimate mission of these boats was deterrence and projection of power, so that our country might enjoy freedom and not destruction or domination by a foreign power. Every one of the

original boomer namesakes, from Casmir Pulaski, to the great Indian Chief Tecumsa, believed in freedom, the individual's pursuit of happiness, and the greatness of a unique nation. The charter of these submarines ideally fit their name-sakes. The transition of ballistic missile submarine names to the states of the union reflects the success of United States submarine technology, transitioning from small *pig-boats*, to capital ships of the line, replacing the almighty battleship of that distinction. Admiral Rickover was correct in at least honoring the citizens of the cities and states with their namesake on a boat, as it was built from their tax dollar!

As previously stated, fifty-two boats never returned from their patrols, taking with them over 4000 US Sailors to their watery graves. The majority of the lost boat names were that of fish. Of these boats, the names, WAHOO, GROWLER, HARDER, TANG, and others, will always be associated with intense combat action and the finest and most gallant of the underwater warriors of World War Two. The extraordinary actions of "Mush" Morton, Sam Dealy, and Howard Gilmore, to name a few, should not be forgotten as well as the names of the boats that they served on. Although Admiral Rickover may have been correct in saying that "fish can't vote," the fifty-two United States submarines were lost in the quest for this country's survival, and these men gave their lives so that we, their sons and daughters, grandchildren, and now great grandchildren, might live and exercise the right to vote in freedom and security.

Our navy is steeped in tradition. We pipe flag officers aboard, sound bells for senior officers, man the rails when entering or leaving port, and the list goes on. The Submarine Force is no exception to naval traditions, and even has a few of its own—witness the tying of a broom to the periscope to indicate a *clean sweep* after a mission.* It is now time to see that the discontinued

*The practice of tying a broom to a periscope originated in World War II when a boat came back to Pearl Harbor from a combat patrol. It indicated that a "clean sweep" had occurred – that is, the sinking of all enemy ships encountered. The practice is enacted from time to time (with extreme discretion) in peace-time scenarios to indicate the accomplishment of all assigned mission tasks above and beyond the minimum required level.

tradition of naming submarines after fish, and more specifically the famous fish-boats that never returned, be reinstated. While continuing to name the new boats after states, cities, and great Americans, we should continue to honor those men and boats still on patrol by keeping at least some of the great submarine fish names mixed in with the new crop of fast attack boats. Why not name the lead boat of a new class after one of the boats that never returned? The remainder can then be named for whatever Congress chooses. This way we can continue a tradition and honor the submariners that gave their all. It's time to bring back the fish!!!

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CAPT Thomas E. Digan, USN (Ret)
CDR Trenton D. Hesslink, USN

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BOOK REVIEW

MY WRITING: STORY TO THE PUBLIC

by CDR Craig L. Etka, USN(Ret)

CDR Craig Etka is a retired nuclear submariner. He commanded USS POGY (SSN 647) from 1979 to 1982. He is currently VP Underwater Systems Technology for DownRange Global Solutions, Inc. and Chairman of the Marine Technology Society (MTS) Seafloor Engineering Committee. He is the Author of:
The Scorpius Connection, 1994, American Literary Press, Inc. The Kilo Affair, 1998, American Literary Press, Inc. MANTRA RISING – The 1999 Trident Affair, 2011, American Literary Press, LLC
[The first two novels were reviewed in the 1990's for The Submarine Review by John Pritzloff, a previous Chairman of the International ROV Safety Committee]

Throughout my life, I have considered that each event that happens and each person we encounter can become part of teachable and shareable moments. My wife, Fran, supported me in one way or another in my career and helped me finish the first novel started so long ago. She taught me about the female thought process and provided many of the mental reflections of the women presented in my novels. In addition, as an Emergency Medical Technician—Shock Trauma, she was invaluable in explaining to me the details of the medical traumas I presented in my novels.

While qualifying in submarines and standing watch as Officer of the Deck and Engineering Officer of the Watch on USS STONEWALL JACKSON (SSBN 634B) during three Polaris Deterrent Missile Patrols out of Guam, USA, in 1967 and 1968, I had a persistent theme running through my mind, which included space platforms that could attack United States missile submarines and my thoughts that women really could serve onboard SSBNs

and help prevent the ultimate demise of the world, unlike the novel and movie **On the Beach**.

One patrol after I qualified in 1968, I was transferred from STONEWALL JACKSON and arrived at the D1G (Editor's Note: Navy Nuclear Power Plants are designated alpha-numerically to identify general use, variation of a series and manufacture. Thus D1G was meant for a Destroyer, was the first of a series and was manufactured by General Electric) Nuclear Power Training Unit in Ballston Spa, NY, where I qualified as an Operator of the Bainbridge Plant, and started as a School House Instructor for the ongoing dispersion fuel conversion. I led the re-write of the Reactor Plant and Propulsion Plant manuals and all training materials, and got them approved by Naval Reactors [still Admiral Rickover]. I became the D1G Training Officer and was qualified as Engineer Officer of the Bainbridge Plant by Admiral Rickover before being transferred.

While at D1G, finally time became available in 1969 to start my notes on the first novel, with a nuclear powered submersible, space station, and shore based command and control for both. These notes were made possible because of my B.S. in Aeronautical Engineering from the U.S Naval Academy, my Scuba certification by the National Association of Underwater Instructors (NAUI) while at USNA before graduating in 1965, my Navy Nuclear Power Training, and my certification as the Outstanding NAUI Instructor in 1969; not to mention my interactions with myriad personalities in my short career to that date. The capabilities I developed for my initial hardware in the first two novels were from my imagination. I taught Scuba courses for Staff members at D1G.

After I was transferred in 1970 to USS HALIBUT (SSN 587) in Mare Island, CA, to be the Engineer Officer, I had no time to write anything more, but I was still able to teach Scuba courses for crew members. During that tour, I was contacted by personnel at Electric Boat (EB) concerning being Engineer of a proposed commercial 900 foot long nuclear submarine that would carry oil back and forth from the north coast of Alaska to the Groton area. The plan was for the submarine not to surface and allow the crew

to go ashore for three years at a time; a real bummer. Nevertheless, that submarine became an important aspect in all three novels. Unclassified notes and interactions with unique submarine operations and submarine personnel continued.

After I was transferred from HALIBUT in 1974, I obtained a Master's Degree in Oceanography from Scripps Institution of Oceanography in La Jolla, CA, in 1975. Interactions with my younger classmates, the bottom topography guru at Scripps for the SSBN Navigation Program, and the people of La Jolla filled my coffers with more notes and ideas, before being transferred in 1976 to USS HAWKBILL (SSN 666), another tour in Pearl Harbor, Hawaii. More notes and ideas filled my files for the upcoming novels, including those resulting from the fact that HAWKBILL was a DSRV mother ship. I continued to teach Scuba for crew members and also taught Oceanography classes on deployments through Chaminade University in Hawaii as part of the Navy's Program for Afloat College Education (PACE). While on HAWKBILL, I had numerous opportunities to visit Yokosuka Naval Base and create more ideas for the impeding novels. That started my interactions with the Japanese people, interactions that continue to this date as I am an invited [attendance by invitation only] member of the U.S.—Japan Sea Power Dialogue and the U.S.—Japan Technology Forum.

After HAWKBILL, I became CO of USS POGY (SSN 647), another tour in Hawaii [still Admiral Rickover, who agreed with RADM Thunman that I could be sent to command as a LCDR]. Once again, writing was put on the back burner, but notes continued to be amassed, also since POGY was another DSRV mother ship.

After command of POGY, I was ordered to the COMSUBPAC Staff in Pearl Harbor in 1982, where I was summarily sent to the Indian Ocean as the ASW Officer for the Commander Carrier Group SEVEN onboard USS CONSTELLATION (CV 64). I additionally served as the Senior Submarine Advisor in the Indian Ocean to Commander Submarine Group Seven in Yokosuka. In the Indian Ocean with Soviet submarines, Soviet surface ships, and Soviet bombers someplace

nearby, unclassified notes were amassed during that tour, as they were during my tenure as the War Plans Officer on the COMSUBPAC Staff for over three years and as Operations Officer on the Staff of the Defence Liaison Office of the VCNO in the Pentagon for nearly four years. While on the COMSUBPAC Staff, I travelled to Washington, DC, to meet at the U.S. Naval Observatory with the late RADM Richard Seesholtz, then Navigator and Oceanographer of the Navy. This provided more notes and ideas for the upcoming novels.

After my retirement in late 1989, I went to work in the design, construction, and operation of underwater systems for Westinghouse, Northrop Grumman, and Oceaneering International. Living in Aquia Harbour, VA, near Quantico Marine Base, I became familiar with the MV-22 Osprey and met one of the President's Helicopter Pilots on MARINE ONE when he visited my home to buy one of our puppies from a litter; more fodder for the coffers.

When the demise of the Soviet Union occurred, I knew that I needed to complete my first novel soon since many events I had predicated had already become reality. I truncated the first novel so that I would be forced to complete a sequel. **The Scorpius Connection** was completed in 1994 when I was a subcontractor for Westinghouse in Annapolis, working on underwater systems and the Advanced SEAL Delivery System (ASDS). The nuclear powered submersible, space station, and shore based systems came to fruition, as did the over 50 characters of my first two novels. In the summer of 1996, I was slowed down on the sequel when I became a technical consultant and contributor to the creation of the manuscript for **Tom Clancy SSN, Strategies of Submarine Warfare** for Tekno Books, a company that had a contract with Tom Clancy. Tekno Books asked me to initiate a movie proposal for a novel that never came to fruition. However, that experience led to my subsequent creation of a Trident Submarine that I converted into an SSPN, Nuclear Submarine, Presidential. That included the design of a Presidential Command Center, Presidential Conference Room, Presidential Suites, an Air Traffic Control Center to control the MV-22 Ospreys, a SOF Operations Center,

an SSGN Operations Center, and a special hanger for my nuclear powered submersible from the first two novels. This SSPN includes the first women onboard a nuclear submarine. My experiences in talking with Naval Academy women over the last several years that were going into the nuclear power surface and submarine pipelines, and with my friend, retired Admiral Frank (Skip) Bowman, helped immensely. Unfortunately, my surface warfare daughter, Kimberley, USNA 1988, was too early to become a submarine officer.

In 1998, I finally completed the sequel, **The Kilo Affair.** I forced myself to complete this before going into surgery for Stage 2 malignant melanoma in January of that year.

Surviving that cancer operation, the next decade was spent writing **MANTRA RISING - The 1999 Trident Incident**, based on my many years [1965 – 1989] as an officer in the Submarine Force during the Cold War with the Soviet Union working with the members of SEAL (Sea-Air-Land) units and additional years of post-retirement civilian work with the Advanced SEAL Delivery System (ASDS), for which I served as the Northrop Grumman Integration and Test Manager, preparing ASDS for manned testing. After ASDS, I served as an Oceaneering International, Inc. Advanced Technologies Program Manager for the preliminary design of the SSGN Battle Management Center (BMC) and Special Operations force (SOF) Tubes, once again working with Navy SEALs and Naval Sea Systems Command (NAVSEA) personnel. I had already created my SSPN, so I recused myself from visits to the SSGN conversion yard in Norfolk, VA, relying on my staff to make the right recommendations to me that NAVSEA would approve.

As tribute to history and as a teacher and trainer of my shipmates, I wanted to portray the late 1980s and early 1990s that saw the demise of the Soviet Union. In 1990, Soviet Premier Mikhail Gorbachev ushered in his policy of *glasnost*, or openness. As the Union of Soviet Socialist Republics (USSR), which had been the union of the Russian Soviet Federated Socialist Republic (RSFSR) (Russian as a first language) and the Autonomous Soviet Socialist Republics (ASSRs) (Russian as a second language) dissolved into

the Russia Federation, a number of independent countries were determined to maintain their independence from Moscow.

The earlier formation of the Baltic States consisted of Estonia, Latvia and Lithuania. In my earlier novels, I created a new alliance which was formed by the other previous non-Russian, or constituent, republics that became independent. I call these **SAWRS**, or the Southern And Western Rim States, with their equivalent of our Washington, D.C., government located in the Ukrainian capital of Kiev.

Of these fifteen ex-Soviet Republics of the real world ASSR, the most important during the timeframe of this novel included Belarussia with its state capital still in Minsk and Kazakhstan with its state capital still in Alma Ata. Both were nuclear weapons republics. Kazakhstan was the second largest republic in the USSR, having nearly five times the land mass of the Ukraine. Yet the population density of the Ukraine was nearly twenty-two times that of Kazakhstan. Plus the Ukraine has sea access. Coupled with the Soviet *Antonov* cargo plane having been designed in the Ukraine, these facts explain my assignment of Kiev as the seat of my fictitious **SAWRS** government. During the dissolution of the USSR, we are aware that a number of other important republics and cities, not just in the newly formed states, changed their names back to what they originally were many years before.

These real events surrounding the demise of the Soviet Union were followed by the actual sales of Russian KILO Class diesel submarines to Iran in 1992, 1993, and 1997. I allowed the first two of them to be stolen by some of my 1994 novel characters from Iran for use in my 1994 and 1998 novels involving the Colombian Drug Trade. Subsequent to my 1994 novel involving KILO submarines being used in the Colombian Drug Trade, the FBI arrested some nefarious characters in Miami who were trying to buy KILO submarines, probably for Colombian Drug Cartels.

My fiction novels provide the capabilities of my Thulium-170 isotope nuclear powered **USS SCORPIO (SSN X-1)** [Credit to the power plant designed by Lawrence Livermore Laboratory for an autonomous underwater vehicle (AUV) decades ago]; a 20,000 foot depth capable, DSRV look alike submersible with laser fire

power [based on my meetings with a defecting Soviet Union laser scientist from the University of Physics in Irkutsk, near Lake Baikal, who decided to leave the Soviet Union before its demise, following an Olympic sailing event that crossed the Pacific Ocean]. This fictitious submersible was originally named **SCORPIO X-1** before it was commissioned in my novel by the President of the United States as a nuclear attack submarine (SSN).

All the novels include the capabilities of the United States and Soviet Union (USASU) Space Platform; the Underwater Research Activity (URA) Complex on the island of Abaco, Bahamas; and the 900 foot submarine, **THE WALL**, moored at a depth of 800 feet against the southern wall of Abaco, N. E. Providence Channel, near the Tongue of the Ocean. This 900 foot long submarine, originally envisioned for use as a double-hulled oil transport carrier between the Atlantic and Pacific Oceans under the Arctic Ocean ice, was in the stages of conceptual design by Electric Boat Company in the late 1960's - early 1970's. I have also added some unclassified and fully published aspects of the ***Trident*** Submarine, the most formidable weapons platform in the history of the world as we know it today and as it will be into the millennium.

My latest novel includes details on some other submersibles, real and fictitious, including the real **USS NEVADA (SSBN 733)**, with some of my author's prerogatives with respect to additional modifications that might someday be considered; the real Soviet Union—now Russian - KILO Class diesel submarine, several of which were sold to Iran in the 1990's and continue to operate to this day; some real U.S. and Russian aircraft; the Advanced SEAL (Sea-Air-Land) Delivery System (ASDS), and a carship I designed based on VHF radio conversations with carship Pilots and Masters plying the Chesapeake Bay.

FORSAN ET HAEC OLIM MEMINISSE IUVABIT
[Perhaps One Day These Things
Too Will Be a Joy to Remember]

[*From a Plaque Presented to me by the Navy Operational Intelligence Center*]

2012 FLEET AWARDS

RADM JACK N. DARBY AWARD
FOR INSPIRATIONAL LEADERSHIP
AND EXCELLENCE OF COMMAND
CDR J. Carl Hartsfield, USN
USS NEWPORT NEWS (SSN 750)

MASTER CHIEF FRANK A. LISTER AWARD
FOR EXCEPTIONAL LEADERSHIP AND MOTIVATION
WHILE SERVING AS A CHIEF OF THE BOAT
ETCM (SS) Eric J. Murphy, USN
USS NEW MEXICO (SSN 779)

VADM CHARLES A. LOCKWOOD AWARDS
FOR SUBMARINE PROFESSIONAL EXCELLENCE
LCDR John T. Frye, USN
USS CITY OF CORPUS CHRISTI (SSN 705)
STSC (SS) James W. Music, USN
USS CITY OF CORPUS CHRISTI (SSN 705)
MM1 (SS) Kevin S. Swanson, USN
USS HOUSTON (SSN 713)

VADM J. GUY REYNOLDS AWARD
FOR EXCELLENCE IN SUBMARINE ACQUISITION
CAPT David T. Bishop, USN
PEO Submarines, OHIO Replacement
Program Manager (PMS 397)

VADM LEVERING SMITH AWARD
FOR SUBMARINE SUPPORT ACHIEVEMENT
LCDR William J. Hendershot, USN
USS FRANK CABLE (AS-40)

RADM FREDERICK B. WARDER AWARD
FOR SUBMARINE SUPPORT ACHIEVEMENT
LCDR Angel F. Rodriguez, USN
USS OLYMPIA (SSN 717)

GOLD DOLPHIN AWARD
CAPT Gregory M. Ott, USN
USS FLORIDA (SSGN 728) (BLUE)

SILVER DOLPHIN AWARD
MMCM (SS) Korey P. Kotola, USN
USS GEORGIA (SSGN 729) (BLUE)

2012 LITERARY AWARDS

FIRST PRIZE
BALLISTIC MISSILE DEFENSE FROM UNDER THE SEA
Dr. Robert L. Lowell

SECOND PRIZE
BEFORE AND AFTER OUTLAW SHARK
Dr. Robert Hess and
RADM Jerry Holland, USN (Ret)

THIRD PRIZE
RUSSIA'S FOURTH GENERATION SSN:
A MISSILE DEFENSE NIGHTMARE
Dr. Lajos Szaszdi

ACTIVE DUTY PRIZE
SPURRING INNOVATION AT THE DECKPLATE LEVEL
LT Ryan Higler, USN

2012 UNDERSEA WARFARE PHOTO AWARDS

FIRST PRIZE
MC1 James Klimber, USN

SECOND PRIZE
Ms. Courtney Carullo

THIRD PRIZE
LT Ed Early, USN

HONORABLE MENTION
Mr. Mark Koopmans

NAVAL SUBMARINE LEAGUE

COMPARATIVE STATEMENT OF FINANCIAL POSITION

	31-May-11	31-May-12	
ASSETS			
CURRENT ASSETS			
Cash	$ 132,895	$ 109,892	-23,003
Cash Equivalents	23,960	157	-23,803
Accounts Receivable	8,098	70,965	64,867
Investments at Market	429,052	464,117	35,065
Prepaid Expenses	12,153	6,204	-5,949
			0
Total Current Assets	$ 603,178	$ 651,335	48,157
			0
FIXED ASSETS			0
Furniture & Computer Equipment	36,359	36,359	0
Office Condominium	251,021	251,021	0
	287,380	287,380	0
Less Accumulated Depreciation	(175,419)	(181,963)	-6,544
Total Fixed Assets	111,961	105,417	-6,544
			0
	$ 715,139	$ 756,752	41,613
LIABILITIES			0
			0
CURRENT LIABILITIES			0
			0
Accounts Payable	$ 3,088	$ 23,500	20,412
Accrued Expenses	0	2,660	2,660
Deferred Income	44,380	69,145	24,765
Deferred Membership Dues	60,360	55,846	-4,514
Rental Deposit	675	675	0
			0
Total Current Liabilities	108,503	151,826	43,323
			0
LONG-TERM LIABILITIES			0
Deferred Membership Dues	221,426	220,346	-1,080
			0
Total Liabilities	329,929	372,172	42,243
			0
NET ASSETS			0
			0
UNRESTRICTED			0
Undesignated	364,060	363,430	-630
Board Designated for Equipment	21,150	21,150	0
RESTRICTED	0	0	0
			0
	385,210	384,580	-630
			0
	$ 715,139	$ 756,752	41,613

NAVAL SUBMARINE LEAGUE

COMPARATIVE STATEMENT OF ACTIVITIES
For The Year Ended 3/31/2012

REVENUES	Restricted	Unrestricted	31-Mar-11 Total	31-Mar-12 Total
Contributions			$162,810	$147,390
Dues			62,397	58,989
Annual Symposium			262,220	268,227
Subtech Symposium			302,778	271,391
History Symposium			4000	4850
Bank Interest			305	2302
Interest & Dividends			8,955	16,491
Advertisements			23,394	42,500
Rent			7,625	8,640
Realized Gain (Loss) On Investment				1,304
Unrealized Market Gain (Loss) On Investment			39,683	(5,455)
Royalties			51	62
CB Days Receipts			45,000	57,450
Other			1,126	1,839
Total Revenue			920,324	876,780
EXPENDITURES				
Awards and Grant			13,736	20,910
Publishing			88,468	100,287
Promotion			67,156	73,790
Annual Symposium			267,848	233,726
Subtech Symposium			253,333	232,439
History Symposium			11,301	10,412
Chapter Support			17,537	13,823
Total			717,382	685,357
SUPPORTING SERVICE			175,417	191,043
Total Expenditures			892,799	876,410
INCREASE (DECREASE) IN NET ASSETS			27,525	(630)
NET ASSETS, BEGINNING OF YEAR			357,685	385,210
NET ASSETS, END OF YEAR			$385,210	$384,580

NAVAL SUBMARINE LEAGUE

COMPARATIVE STATEMENT SUPPORTING SERVICES
For The Year Ended 3/31/2012

Detail of expenses for Supporting Services in the Statement of Activities follows

	31-Mar-11	31-Mar-12
SUPPORTING SERVICES		
Accounting/auditing	$ 7,410	$ 7,815
Bank Charges	2,724	2,825
Depreciation	6,544	6,544
Equipment rental & repair	11,998	4,609
Miscellaneous	238	32
Office Supplies	8,731	11,003
Payoll Taxes	12,373	11,525
Casual Labor	2,130	-
Postage	3,453	2,091
Printing	175	-
Fees	3,583	4,733
Telephone	2,814	4,623
Transportation	1,805	9,023
Wages	98,393	108,832
Memberships & Subscriptions	975	3,698
Office occupancy	7,431	7,392
Computer install/Training	720	836
Investment expense	-	1,211
Insurance	3,920	4,451
Total	$ 175,417	$ 191,043

ETERNAL PATROL

CAPT Roy C. Atkinson, USN(Ret)
CAPT Arthur L. Battson Jr., USN(Ret)
CAPT James E. M. Coleman, USN(Ret)
RADM Ralph M. Ghormley, USN(Ret)
Mr. John R. Haponski
LT Lester R. Hillman, USN(Ret)
LCDR Chuck Lindsey, USN(Ret)
Mr. Michael E. Wheeler

Show The World Our
PRIDE RUNS DEEP

Dolphin Scholarship Foundation is pleased to present the "Pride Runs Deep" Ladies' Submarine Community pins by renowned Washington DC jewelry designer Ann Hand. These pins feature a representation of the Submariner's "Dolphins" framing a fouled anchor. Each pin is adorned with hand-set, sapphire-blue and clear Swarovski crystals resting on a white faux pearl.

Proceeds will contribute to scholarships for children of Submariners

Price: 1¼" Pin $225, 1" Pin $150; Small Enamel Gold or Silver Pin $25

For ordering information contact pins@dolphinscholarship.org

THE SUBMARINE REVIEW

THE SUBMARINE REVIEW is a quarterly publication of the Naval Submarine League. It is a forum for discussion of submarine matters, be they of past, present or future aspects of the ships, weapons and men who train and carry out undersea warfare. It is the intention of the **REVIEW** to reflect not only the views of Naval Submarine League members but of all who are interested in submarining.

Articles for this magazine will be accepted on any subject closely related to submarine matters. Article length should be no longer than 2500 to 3000 words. Subjects requiring longer treatment should be prepared in parts for sequential publication. Electronic submission is preferred with MS Word as an acceptable system. If paper copy is submitted, an accompanying CD will be of significant assistance. Content, timing and originality of thought are of first importance in the selection of articles for the **REVIEW**.

A stipend of up to $200.00 will be paid for each major article published. For shorter Reflections, Sea Stories, etc., $100.00 is usual. Book reviewers are awarded $52.00, which is that special figure to honor the U.S. submarines lost during World War II. Annually, three articles are selected for special recognition and an additional honorarium of up to $400.00 will be awarded to the authors. **Articles accepted for publication in the REVIEW become the property of the Naval Submarine League.** The views expressed by the authors are their own and are not to be construed to be those of the Naval Submarine League. In those instances where the NSL has taken and published an official position or view, specific reference to that fact will accompany the article.

Comments on articles and brief discussion items are welcomed to make **THE SUBMARINE REVIEW** a dynamic reflection of the League's interest in submarines. The success of this magazine is up to those persons who have such a dedicated interest in submarines that they want to keep alive the submarine past, help with present submarine problems and be influential in guiding the future of submarines in the U.S. Navy.

Articles should be submitted to the Editor, SUBMARINE REVIEW, P.O. Box 1146, Annandale, VA 22003.