THE SUBMARINE REVIEW

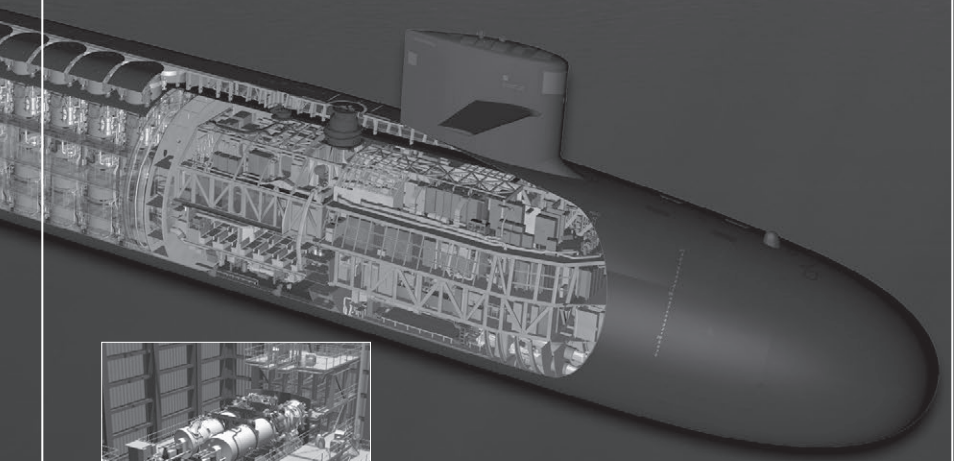
SEPTEMBER 2017

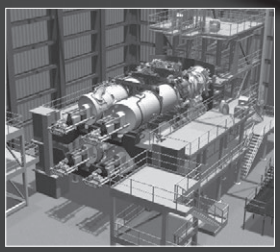
FEATURES

ARTICLES

SUBMARINE COMMUNITY

COLUMBIA CLASS SSBN
BUILDING THE FUTURE – TODAY





The World Demands Deterrence…The Times Demand Affordability

General Dynamics Electric Boat has demonstrated a new method of constructing the next-generation SSBN that will save millions of dollars per ship, a decade before work begins. Program has achieved Acquisition Milestone B and is proceeding with Engineering & Manufacturing Development Phase. One Navy admiral called it 'The most successful prototype program I have ever been involved with.' It's part of the Navy-EB commitment to controlling costs of a program vital to national security.

GENERAL DYNAMICS
Electric Boat
www.gdeb.com

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FROM THE PRESIDENT

As I write this, the "Dog Days" of summer are upon us, the Congress is finishing its work before going on Summer Recess, to include Senate confirmation of the Honorable Richard V. Spencer as Secretary of the Navy, and Defense Department Budget discussions are moving forward with solid support for our Armed Forces and, in particular, for our Navy.

The US Submarine Force is building upon its solid foundation as the key ingredient of our nation's undersea dominance, and the men and women who operate and maintain this national resource continue to prove that they are the most capable, most ready, most reliable and most lethal undersea force in the world.

With the 26 May 2017 delivery of the fourteenth Virginia-class Submarine, USS *Washington* (SSN 787), the team of submarine designers, builders, maintainers, and operators continues to perform with distinction. USS *Washington* earned the highest INSURV Inspection score awarded to date and has already taken her place as an operational member of our submarine fleet, and construction of the final four of the Virginia-class Program "Block III" submarines continues apace.

As challenges arise and are addressed by the professionals of "Team Submarine," the Submarine Force has a clear vision of what needs to be done and how best to engage and embrace the future. Supporting the most recent Force Structure Assessment and the Navy's Thirty Year Shipbuilding Plan, the way ahead sustains Virginia-class Submarine construction at two ships per year and, in 2021, begins construction of the Columbia-class Submarine, which will replace Ohio-class SSBNs as they are decommissioned at their end of service life.

Within the Virginia-class Submarine Program, beginning with the "Block III" submarines, there was a 20% redesign with a focus on cost reduction and, later, beginning with the "Block IV" submarines, major design changes focused on substantially reducing total ownership cost, reducing the number of availabilities and adding one additional deployment during the life of the ship.

With an eye on the future and anticipating the decommissioning of our four SSGNs, the Virginia-class "Block V" submarines will incorporate the Virginia Payload Module, a substantial design improvement which

adds four additional payload tubes aft of the sail and greatly expands payload capacity.

There is strong support within the Congress and within the Department of Defense for the Columbia-class Submarine Program as its design nears completion in support of starting construction in 2021. This essential modernization and replacement of the sea based leg of our nation's strategic nuclear deterrent remains the Navy's top acquisition priority and will support our nation's security until late in the 21st Century.

The superb performance of our submarines and their crews, sustained by the skilled Submarine Industrial Base, ensures solid support for the Submarine Force and improved awareness of its effectiveness executing myriad missions around the world. The ongoing effort to inform our elected officials and their staffs of the value of our Submarine Force provides a strong endorsement of their superb performance and reinforces the well earned professional reputation the Submarine Force enjoys today.

The Naval Submarine League remains strong and on solid financial footing and our recurring programs provide significant value to our membership. Our initiative to grow our membership - Active Duty and Retired, Officer and Enlisted - has been productive, and our Corporate support continues to grow. We join together as strong advocates for an exceptional fighting force - agile, mobile, responsive and lethal - and the submarine's inherent stealth is a force multiplier. Combatant Commander demand for submarines is high, and the Submarine Force has responded with exceptional professionalism. As our Navy grows in response to a dynamic and demanding international environment, the Submarine Force will be an essential element of our Navy's ability to ensure stability around the world.

This year's Naval Submarine League History Symposium will be held at the Navy Memorial in Washington, DC on Tuesday, 31 October 2017, and will focus on the exploits of our Submarine Force during the Cold War, with just a taste of "The Hunt for Red October" for added spice. Don't miss it!

The Naval Submarine League Annual Symposium will be held at a new venue, The Hyatt Regency Crystal City, on Wednesday and Thursday, 1-2 November 2017, and will feature a distinguished group of Sub-

marine Force leaders who will address the challenges our Navy and our Submarine Force are facing. In addition, we will recognize the 2017 Fleet Awardees, the 2017 Distinguished Submariners, and the 2017 Distinguished Civilian during the symposium. I look forward to seeing you there.

As always, your feedback to the Naval Submarine League leadership team is a key element in ensuring that we support our membership. Our website has been updated to be more agile and useful to the membership and THE SUBMARINE REVIEW benefits from your comments and contributions, so please provide your feedback to help us stay relevant, current, and responsive. Thanks.

It is my privilege to serve as President of the Naval Submarine League working to support the Submarine Force and inform others of the great value that the Submarine Force provides to our nation. I encourage you to recommend Naval Submarine League membership to your shipmates and friends to help us spread the word.

Finally, as you enjoy the warmth and recreation of the summer season, please keep our nation's men and women in uniform around the world in your thoughts and prayers.

John B. Padgett, III
President

EDITOR'S NOTES

We have an interesting, eclectic, and informative collection of articles for you in this issue. I encourage you to join these authors by providing other members of the Submarine League one or more examples of your experiences, lessons learned, and/or views on current submarine topics. Of course, we are also on the lookout for reviews of books dealing with submarine matters. We would prefer reviews dealing with current submarine-related topics, historical submarine events or personnel. Just send me a copy of your article for publication. Guidelines can be found on the inside back cover of this issue.

The Naval Submarine League co-sponsored another successful Submarine Technology Symposium (STS) at Johns Hopkins Applied Physics Laboratory in May and we are fortunate to have two terrific addresses for your review. As you are probably aware, the STS is a classified forum, however the addresses by VADM Rick Breckenridge and Mr. Ron O'Rourke were both unclassified and packed with information and thought-provoking questions and ideas, which should challenge and interest all of us. Additionally, RADM Charlie Young has provided us his Chairman's report on the STS. You will find it full of information on the theme and topics as well as the extremely well qualified presenters.

We have the pleasure and honor of publishing the first place award-winning Naval Submarine League essay from the Naval War College on the subject of the importance of submarine tenders to our war fighting capability. This essay, written by LT Patrick Rawlinson, USN, is timely and addresses a topic that requires serious consideration in light of current geo-political conditions and the age of our current tenders. This type of thoughtful writing by our active duty submariners must be encouraged at every opportunity. Well done, LT Rawlinson!

Another thought-provoking article has been provided by CAPT Rick Severinghaus, USN (Ret). Rick has done much good work over the years on crew and team performance analysis and lessons learned. In his essay on "The Lighting Plan," he gives us a good example of the value of clear communications on performance and issuance of directions up and down the chain of command.

Our submarine community is very fortunate to have with us veterans of World War II. CAPT Mike Pestorius, USN (Ret) has an acquaintance, LT (SS) Tim McCoy, who served on the USS Grenadier (SS-210) in World War II and was captured and held as a Prisoner of War by the Japanese for the remainder of the war. We extend our respect and admiration to LT McCoy for his service and thank him for the account of his experiences. We also appreciate the effort by CAPT Pestorius in providing us the opportunity to share in this interview.

Three more widely different accounts of submarine experiences are included in the section on SUBMARINE COMMUNITY. One, by CAPT Leonard Stoehr, USN (Ret), tells of his experience in the cold waters of Adak, Alaska while serving on the USS *Greenfish* (SS-351) during the early Cold War era. Another, by Michael Whitby tells of an interesting mission conducted by Canada's Oberon-class conventional submarines. The third is an analysis by Mr. Bruce Rule of what occurred to the USS *Scorpion* (SSN-589) propeller and shaft on the tragic loss at sea of this ship in May of 1968, based on extensive analysis of acoustic data.

I hope that you will enjoy this issue. Again, as I mentioned in the last issue, I look to you, our readers, to let me know your thoughts and recommendations regarding our journal. Contact me at Editor@navalsubleague.org.

Good hunting!!!
Mike Hewitt
Editor

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FEATURES

2017 SUBMARINE TECHNOLOGY SYMPOSIUM ADDRESS

VICE ADMIRAL RICK BRECKENRIDGE, USN

MAY 2017

Distinguished leaders, guardians of liberty and freedom, friends of the forces that prowl the great seas from the deep, ladies and gentlemen –

I am extremely grateful to join you this evening. It is like returning home from a faraway land following an extended absence — returning home for Christmas, back within the warm confines of close friends and family. It is truly an honor and a joy to be here.

The news media, social media and the internet have been aflame for the last year or two with "fake news."

This poorly defined term covers a wide range of related issues: propaganda, satire, alternative facts, yellow journalism, misinformation, disinformation, partisan bias, advertising and spin. These concepts are, of course, not new, but what is new is the scale at which any of these kinds of manipulative story can create influence given the speed with which unfiltered material spreads on the internet.

Everyone is fixated on the "fake" part of "fake news." I am not sure that is really the right area to worry about. The root of the problem, I think is the "news" part, not the "fake" part. The reason so much false material gets so much traction is really, in the end, about the speed of the news cycle and our ADD-like attention spans – about the fact that we only monitor "news."

When there is no time to process a story, to hold it up to the light, to see how other news outlets react to the story, there will always be room for errors – both accidental and malicious. If there is no time to root out the misleading stuff, the fake or biased stuff sticks, and we roll on to the next item in our news feed or the next tweet.

I think that most of the challenges we face as a society and especially most of the challenges we face as a Navy and a submarine force are not

in the "news" category of things that Steven Covey would have called "urgent." Covey always argued that people were too prone to allowing the "urgent" to crowd out the "important." News is urgent, by definition. If it's been around a while, it's not news.

Our biggest problems are in the "important" category, the snail mail category, the category of "frog in the pot" stuff. These are the long-term trends that never make it onto the crawler on the bottom of the TV. But these issues are important. They are huge, or maybe UGE. And if we are mistaken about the big, important stuff, we are in trouble.
If you have the wrong strategy, the best tactics in the world cannot bail you out.

I think my biggest concern is in the strategy area, the slow moving, not news area.

I want to talk about three macro trends that have been going on in the background. They are areas in which I worry that we are the frog, and the heat is going up and we are confronting our last moment where we can make one leap and get out of the pot before we are cooked.

The three areas where the world has taken a turn and we missed it are these:

1. Unreal Fiscal Realities
2. A Cold War that didn't end.
3. An inflection point in naval investments.

In each of these areas, holding onto the past perception, the old paradigm, is impeding our ability to see what we should be doing. And it is affecting the choices that we make.

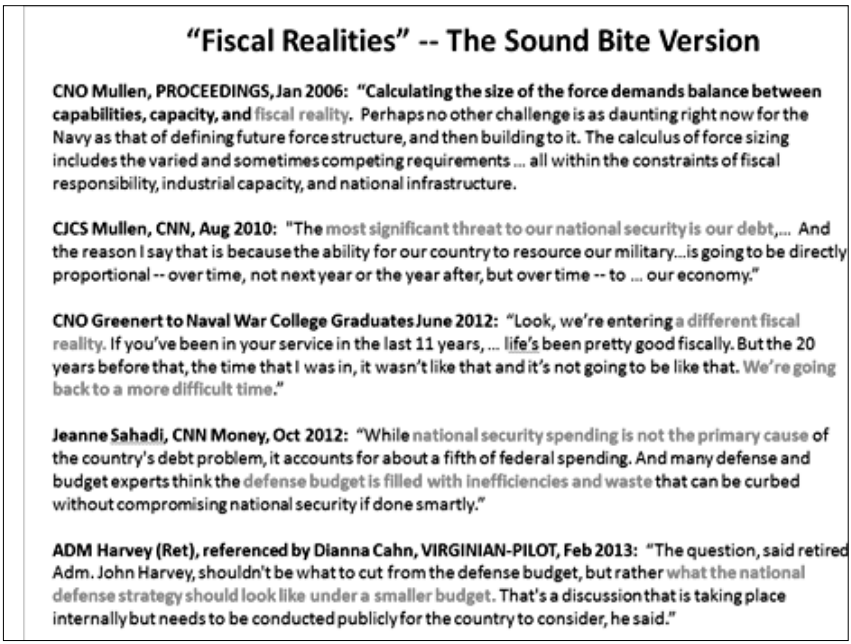
Let me make another comparison.

Probably a large portion of the people in the room have been involved in a formal critique at some point or another. Credit Naval Reactors for instilling in our culture an appreciation for the power and value of a good critique. Critiques, like the incident reports that sometime go with them, focus to a large extent on getting at the root cause or causes behind a problem. For completeness they deal with the short term corrective actions – how we handled the breaking news – but NR has

always been way more interested in the Root Causes and the Long Term Corrective Actions.

Getting at the root cause has always been the hardest part of any critique. It's the part of the investigation that gets at what is important, not just urgent. And if you think about it, how often have you gone into a critique thinking you know what the answer is, only to come out the other end having learned that things were very different from what you thought?

I am going to make a case that we have been going through life on these three topics like a submarine crew that never does a critique. (We should not feel too guilty on this, because it is really hard to notice these kinds of issues when you are busy in hand-to-hand combat in your fox-hole. That's why an off-site event like this is helpful.) We are the crew that is not doing critiques, and we are not noticing that the short-term corrective actions are not enough and never will fix the problem.



We have been watching tweets and dealing with urgent, near term actions, but we have taken our eye off of the macro trends and we missed the fact that the world took a turn.

Topic Number One: "Unreal Fiscal Realities"

Many of us will remember a number of these items in the "news" over the last several years. They paint a clear picture. "We in the Navy need to understand that the country is facing severe budgetary pressure" and "there is not enough money to do all the things we need to do." We are creating debt that we are passing to our children. We are creating debt that is going to divert more of the budget to paying off interest on the debt. We just don't have the money.

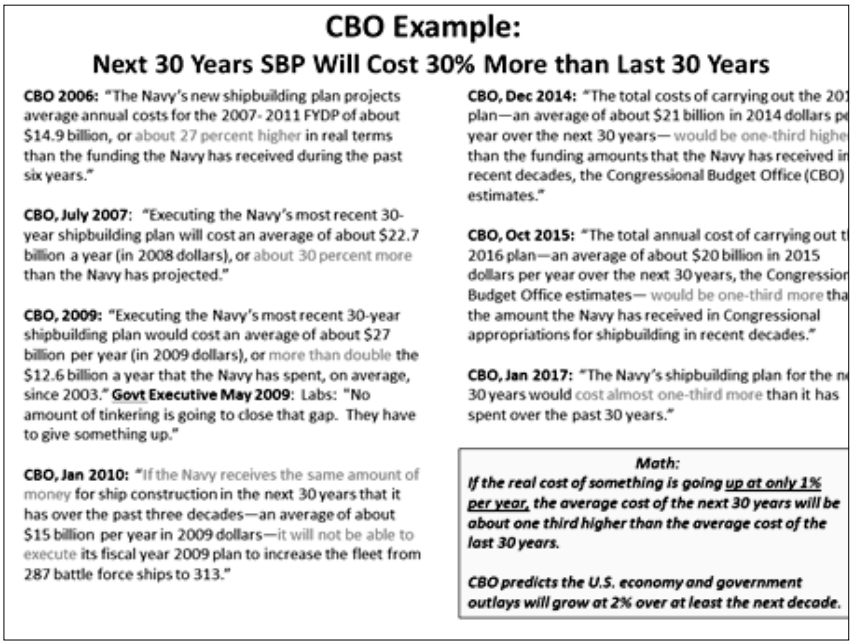
That's the root cause – a lack of resources. That's the fact – the "reality" – that we have gotten in our heads when we did no critique and just accepted "news" reports without any critical thinking.

As a result, we have accepted a flawed version of the problem and we took corrective actions that were designed to address the wrong root cause. We sought to deliver Navy capabilities in light of the reality of a "fiscally constrained environment." Indeed, as ADM Mullen famously pointed out, the most important part of our national security is our economic security.

We know the story. Because of the lack of fiscal resources, we were told to redouble our efforts to deliver capability more cost efficiently. We were told we needed to figure out ways to do our job with less money. We had to learn to figure out what we can do without and make the cuts required.

We were told that anyone who doesn't think this way is ignoring "fiscal realities" – in other words, is not being realistic. Everybody knows this is what we must do, right? Anyone who thinks otherwise is out of touch, right?

Every one of the authors of these quotes are responsible individuals who are smart and in positions of influence. But that doesn't mean that they are immune to being swept up in a sort of wave of collective thinking. We are all vulnerable to this. Even the people who do budget numbers for a living can get swept up in the story.

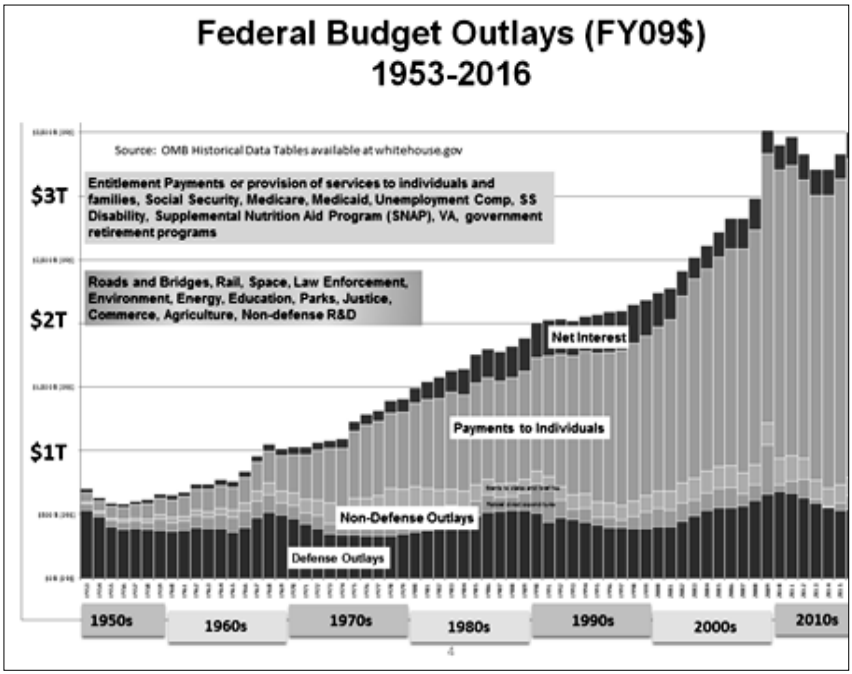


Here is an example. For a decade, the CBO has reported on Navy shipbuilding with a very consistent theme: the future 30 years of Navy SCN will require a third more money for shipbuilding than the past 30 years. The message in each CBO report is that the Navy is unrealistic to hope for this much more money.

Now, let's think about this. We can do some math. If you have ever played around with compound interest, you probably instinctively know that it doesn't take a very big interest rate to grow something so that the average over the past 30 years grows 30% when I continue that into the next 30 years. In fact, if you do the math, a growth rate of just under 2 percent per year will result in something that matches the CBO's indictment.

But let's remember that the federal budget outlays have grown at over 3% per year over the last 30 years, and even CBO says they will likely grow at 2 percent for the next 30 years. What that means is that the Navy need for money to build ships is growing at a rate smaller than the rate at which the federal coffers will grow.

What the CBO tells us to be ashamed of is, in fact, much slower Navy budget growth than the growth that is totally acceptable in the federal budget as a whole. In fact, we have done a sampling of CBO reports in other areas of the budget that are growing at rates higher than the Navy's, and they do not include a corresponding slap on the wrist to "Get Real!" Yet the Navy is prodded to feel guilty for growing at a rate of 2% per year? Why?!?



But here is the real lesson. Here are the insights from the critique we should have been doing all along.

This is data from the OMB historical data tables downloaded from whitehouse.gov. It is pretty unimpeachable as a source. It is not fake news, it is our federal government's official public record of its spending, available on the internet for every citizen. And it is history, so it does not involve analytical speculation or estimating or forecasting about the future.

What does it show?

First, this data is federal outlays. We looked at actual expenditures because that shows priorities in the clearest terms – It captures where we have put our money as a nation.

Second, all the data is in constant year dollars – 2009 in this case. The inflation has been removed. All the growth you see is real growth.

Third, the time frame is 1953 to the present. We picked that to be able to see the baseline before God created nuclear submarines, and we wanted to see the late 1950s Navy build-up, the Reagan build-up, and up to the present.

At the bottom is the Navy budget. It is between $100B and $200B the entire time. The high point was during the Reagan administration. The rest of the blue is Defense outlays. You can see that it is basically a rolling cycle with an overall flat long term growth.

The orange and reddish gold layer above that is all of the rest of the basic government services. Everything you learned about in middle school is in that little layer. That is where you find education funding, roads and bridges, highways, railroads, environmental protection, medical research, the national science foundation, law enforcement, the judicial system, federal courts, agriculture, FDA, EPA, FAA, Pell grants, endowment of the arts, PBS, commercial loans, energy infrastructure, waterways, dams, levees, parks, rangers, museums, federal buildings and infrastructure, the space program, GPS, NOAA, NASA, and on and on.

The gray layer that starts small on the left and grows to the right is what OMB calls "payments to individuals" (not salaries or payment for services provided), but what we typically call "entitlements." It is Social Security, it is Medicare, it is Medicaid, it is unemployment compensation, it is disability pay, it is Supplemental Nutritional Aid or Food Stamps, it is school lunches. It is money that is moved from some members of the population and given to other members of the population, either in cash or in services.

On the very top is a purple layer called interest on the debt. You might notice that debt service has been pretty small lately, even though the accumulating debt is quite large. That is more a function of the interest rates. The CBO expects this number to get much larger in the future as the Fed adjusts interest rates back up toward normal rates near

3 percent from their current levels near zero.

I know this is a lot to absorb so late in the day, so let me distill this down into a few facts:

- The federal government took in more money last year than ever, total and per capita.
- The federal government spent more money last year than ever, total and per capita.
- The amount of money spent by the federal government has grown by a factor of 4 to 5 times since the 1950s, but defense spending has grown very little or remained flat.
- Let's talk sequestration. The basic rule of sequestration was that cuts to non-defense discretionary spending (the yellowish orangish part of the slide) have to be matched by defense spending cuts. Sequestration did not address "mandatory" spending (the entitlements within the gray).

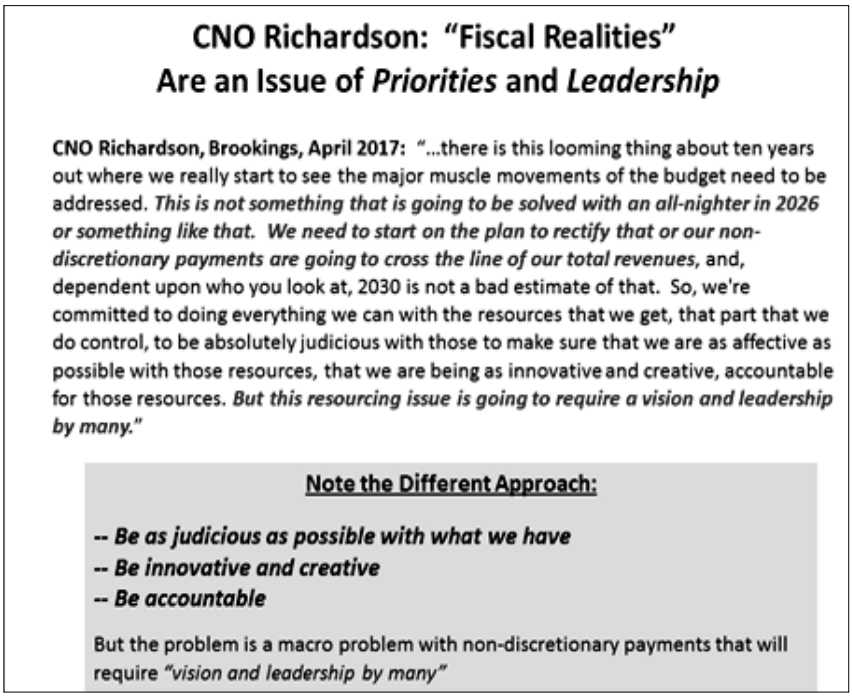
So, what is the real problem? It is not a lack of money, it is a lack of money for defense and for the Navy. You can see it on this chart as clear as day. The issue is a matter of Priorities, not Resources. The money is there, but we as a Nation are choosing to spend it on different things than defense and the Navy.

That is not a "reality," that is a policy choice. Policy Choices are not carved in stone "laws of physics" that we must live with. Policy Choices can be shaped and influenced.

When we tell ourselves that "resource constraints" are a matter of "realism," we are identifying the wrong root cause and the corrective actions we identify are going to miss the mark. We should never use the term "fiscal realities" to mean that we in defense must think of ourselves as "resource constrained" while the rest of the federal budget grows at a rapid rate.

My recommendation would be to purge the term "fiscal realities" from your vocabulary and challenge the thinking of others who use that term. To use the term "fiscal realities" is to imply that we should accept the current resourcing of the Navy as something beyond our influence. When you say "we must acknowledge fiscal realities," you are in effect

giving yourself permission to drift down the river, taking you wherever the current leads.



I want to discourage this passive approach. You have paddles in your canoe. Pick them up and start paddling where you want to go. What we are confronting are not "Fiscal Realities," they are "Funding Priorities." Now, there is a challenge that comes with a clearer view of the real Fiscal Realities – our job is to influence budgetary priorities more effectively. Look at the testimony and statements of the CNO. He is not passively accepting fiscal realities.

If we understand that shaping budgetary priorities is the "long-term corrective action" to fix a resource shortfall, we will start to implement measures that will actually help fix the problem.

Until now, we have been choosing programs to cut that which we know really should be funded. We have had to make contrived cas-

es about why it is okay not to have anti-ship missiles in the submarine force or the surface navy, about how we can go twenty years without a heavyweight torpedo production line, about how it is okay to take years to put an F18 through modernization. We have been "taking risk" over the past decade or two, and there are things we have not done that should be reconsidered.

So, the real root cause for an under-resourced Navy is a lack of appreciation of the importance of the Navy and why it should have a higher funding priority, especially as we look ahead. That is a burden on all of us as leaders of the Navy to make that case. When we just "mind our panel" and "take our medicine" we are not addressing the real root cause, and the problem will continue – and so it has. Are you with me?

There is a second area where I worry that we have been spending too much time with the urgent, news, immediate corrective action side of the ledger instead of the important, long-term side of the ledger:

The Nature of the Threat

The issue is this: What kind of struggle are we preparing for? What kind of adversary are we planning to face? Are we preparing for a major conventional war? Are we preparing for a nuclear war? Are we preparing for a long-term war against radical Islamist fighters? Are we developing "capabilities" in some kind of vacuum as if we have no idea when or where they might be used, and against whom?

Over history -

For many people, the role of the Navy has looked like this:

- We helped win the war against the Nazis and Imperial Japan
- We won the Cold War
- We are helping with the GWOT, War against ISIS
- We are trying to figure out if we are going to have to fight again soon.

This is a Navy engaged in either War or Peace or support to the war ashore, and I think it is the wrong picture.

We have lost a clear vision of the true threat based on a recent aber-

ration in history without an existential threat from a major global power.

Let me give you two contrasting cases. Imagine that I ask you, in one case, that you need to figure out how to defeat ISIS in a year. Now imagine a second case where I tell you that we are going to be engaged in a 100-year war with ISIS and you must get ready for that.

How different are your preparations and investments and intended operations for those two cases? They are very different. They are radically different. They are not even close to being the same.

Now, I don't want to talk about ISIS and how long a fight against them will take. I want you to consider that the fight against ISIS is only one battle or one campaign in an ongoing long-term hundred-year war that is not a religious war at all – it is a struggle on behalf of free societies threatened by oppressive authoritarianism.

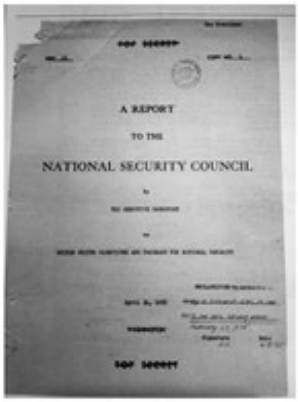
We need to think about it from a different perspective:

Truman NSC-68 (1950): Containment of Communism

" The fundamental purpose of the United States is laid down in the Preamble to the Constitution: '...to form a more perfect Union, establish Justice, insure domestic Tranquility, provide for the common defence, promote the general Welfare, and secure the blessings of liberty to ourselves and our Posterity.' In essence, the fundamental purpose is to assure the integrity and vitality of our free society, which is founded upon the dignity and worth of the individual.

"Three realities emerge as a consequence of this purpose: Our determination to maintain the essential elements of individual freedom, as set forth in the Constitution and the Bill of Rights; our determination to create conditions under which our free and democratic system can live and prosper; and our determination to fight if necessary to defend our way of life...." (p.5)

"This [threat] imposes on us, in our own interests, the responsibility of world leadership. It demands that we attempt, and accept the risks inherent in it, to bring about order and justice by means consistent with the principles of freedom and democracy." (p.9)


A REPORT
TO THE
NATIONAL SECURITY COUNCIL

"For us the role of military power is to ser
the national purpose by deterring an atta
upon us ... And by fighting, if necessary, to
defend the integrity and vitality of our fre
society and to defeat any aggressor." (p. 1

We have spent at least the last 80 years deterring or fighting against oppressive/authoritarian regimes. These regimes are threatened by the

existence of free democratic states. We fought the totalitarian Nazis and Japanese and Italians in World War II. Then we faced the first Berlin crisis and the need to face global Communism.

By 1950, we had adopted a strategy of Containment, with themes that were very familiar to a group that had just finished winning World War II: defend the integrity and vitality of our free society/defend our way of life.

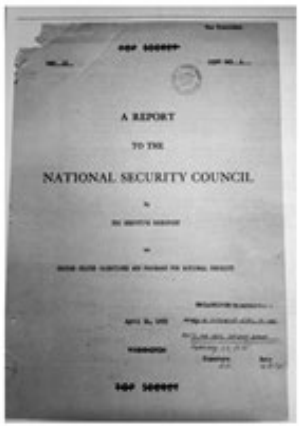
The United States realized that we needed to assume a position of leadership in the world, that we had to invest in a strong military, that we needed to construct a world order based on freedom, democracy and free trade and be prepared to defend that world order.

Truman NSC-68 (1950): Containment of Communism

" Our overall policy at the present time may be described as one designed to foster a world environment in which the American system can survive and flourish. It therefore rejects the concept of isolation and affirms the necessity of our positive participation in the world community.

"This broad policy intention embraces two subsidiary policies. One ... is a policy of attempting to develop a healthy international community. The other is the policy of 'containing' the Soviet system." (p. 21)

"In the concept of 'containment', the maintenance of a strong military posture is deemed to be essential for two reasons: (1) as an ultimate guarantee of our national security and (2) as an indispensable backdrop to the conduct of the policy of 'containment.' Without superior aggregate military strength, in being and rapidly mobilizable, a policy of 'containment' -- which is in effect a policy of calculated and gradual coercion -- is no more than a policy of bluff." (p. 21-22)


A REPORT
TO THE
NATIONAL SECURITY COUNCIL

Replace USSR/Soviet with Russian, Chines Iranian, or North Korean, and the theme is the same today

We realized that we needed to practice deterrence; that nuclear forces would be part of that deterrent posture, and that small scale conventional fights and struggles for influence would be the backdrop. NSC 68 was the name for this Top Secret/world view and approach. You can google

it and read it today, because it has been declassified. It is very interesting reading. (The bureaucrat who signed the declassification notice on the front was some guy named Kissinger.) These themes should be familiar to us today. But just to reinforce the point.

Reagan NSDD-32: National Security Strategy

" To deter military attack by the USSR and its allies against the U.S., its allies, and other important countries across the spectrum of conflict; and to defeat such attack should deterrence fail."

" To strengthen the influence of the U.S throughout the world by strengthening existing alliances, by improving relations with other nations, by forming and supporting coalitions of states friendly to U.S. interests, and by a full range of diplomatic, political, economic, and information efforts."

" To contain and reverse the expansion of Soviet control and military presence throughout the world, and to increase the costs of Soviet support and use of proxy, terrorist, and subversive forces."

Again, replace USSR/Soviet with Russian, Chinese, Iranian, or North Korean, and the theme is the same today

In 1982, Reagan was doing the same thing. This time the document was NSDD-32 – the Top Secret National Security Strategy. That is also declassified and you can read it, along with the vast majority of the scores of other NSDDs of the Reagan administration. Reasserting global leadership against an oppressive and authoritarian Soviet Union, rebuilding the military and working to protect a global system supportive of freedom. Same themes as NSC-68.

That is what NSC-68 said in 1950, what NSDD-32 said in 1982 (32 years later) and it is where we find ourselves again in 2017 (35 years later).

We have gone from the Nazis and the Japanese in World War II to

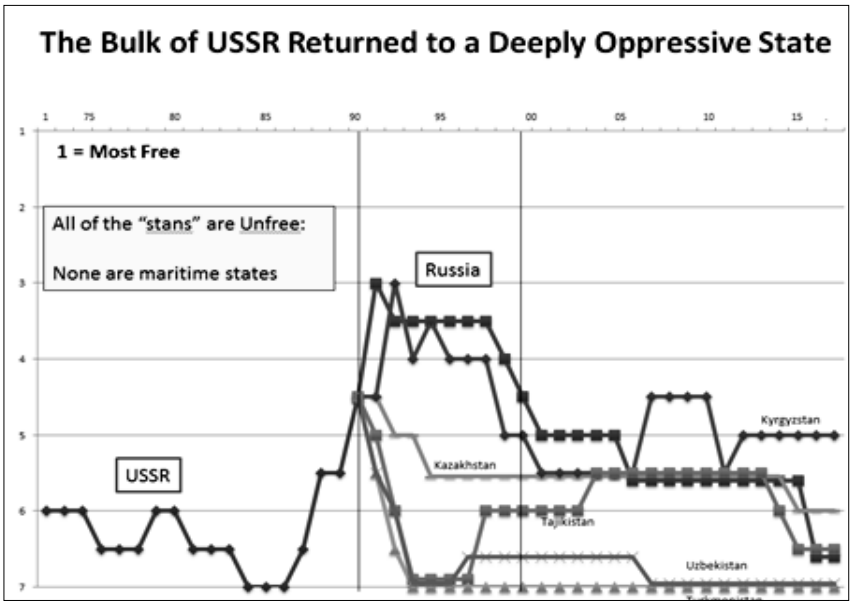
the Soviets, and now the Russians//the Chinese//the North Koreans, the Iranians, the Syrians, the Serbians and the Libyans, and now the various radical Islamist extremists: all were or are oppressive authoritarian regimes. It is important to note that we have not spent our history fighting every oppressive authoritarian regime in the world – such a goal would be unachievable – but when we have fought, it has always been against oppressive authoritarians that have been expansionist or otherwise challenging the liberal world order. When the threat is big enough and proximate enough, we fight…when it is more remote, we hold.

Think of all the places TLAMs have fallen: they have fallen on oppressive authoritarian regimes, either state sponsored or not. In each case, the interests we were protecting were those of the free world… sometimes directly, and sometimes indirectly.

The same Bad Actors with maritime access are the ones we have had to deal with: Russia, China, North Korea, Iran. It was this list of countries and groups when I was born, it was this list of countries when I was an Ensign, and it is this list of countries now.

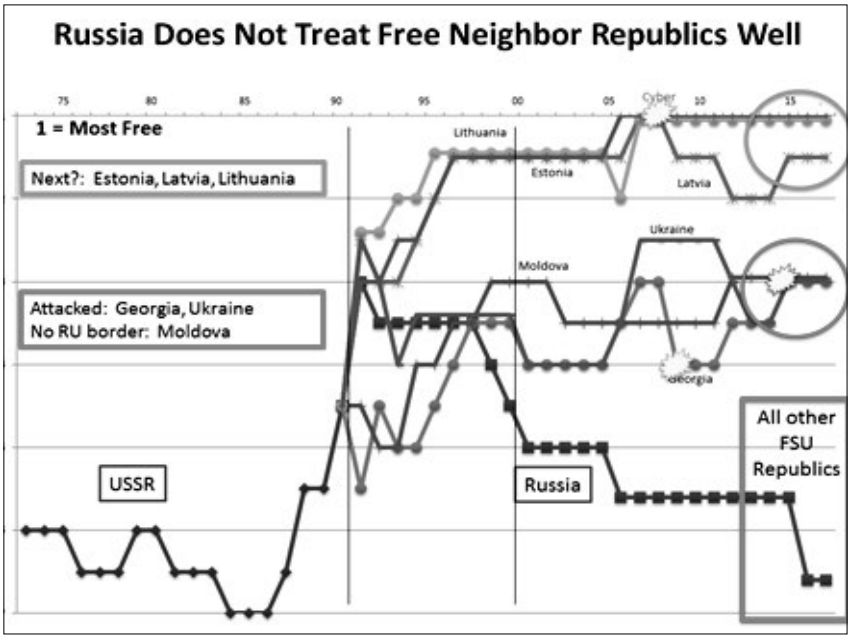
Notice that it doesn't make a difference that the Cold War is "over."

When the USSR came apart, Russia tinkered for a few years with liberty and then plunged literally back to where it was before Gorbachev started his reforms. The USSR wasn't the way it was because it was Communist, it was Communist because of the underlying authoritarian nature of the society. When Communism's inherent weaknesses became inescapable, it was tossed as a philosophy, but not the authoritarianism. Look at what happens to Freedom in the USSR after this brief experiment.



If we look at all of the Soviet Socialist Republics, we see an interesting effect. The Stans all immediately return to being Unfree as soon as the Soviet Union dismantles. This is basically what happened to Russia as well. A liberal experiment, then back to authoritarianism.

To see what we are struggling with today, let's look at what happened to some of the other SSRs.



The Baltic states immediately became Free and are in the orange circle at the top right. What happened then? Estonia soon becomes the victim of the world's first large scale cyberattack designed to bring an entire country to its knees.

Some other states became Partly Free, in the red circle. What happened to them? Well, Moldova is insulated from Russia by Ukraine, so nothing happened to it. But the other two are Georgia and Ukraine. Both have been attacked by Russia and in the case of Ukraine portions remain occupied.

Do you see a pattern? Is there any question why the Baltic states are feeling the heat from Russia? Just as NSC-68 and NSDD-32 described years ago, this long-term struggle is between the Free World and Authoritarians who are inherently threatened by nearby prosperous, free countries. Just as NSC-68 described, the authoritarian nature of Russia makes the presence of a prosperous Free state on its border a threat that requires action. That is why the Ukraine was attacked and a buffer layer was peeled off. That is why Georgia was attacked. That is why Estonia

was attacked and that is why the Baltic states are as anxious as they are.

That is why China has never considered a re-unified Korea – it would become a free nation on the border of China. That is why Taiwan is threatened. That is why Tibet and Taiwan and the South China Sea are vital national interests for China.

We would do better to think of our role in the world not in terms of tweets and crawlers on TV, but in long-term NSC-68 terms. We are the leader of the Free World and we are the anchor of principal, long-term resistance to the spread of Oppressive Authoritarianism. We in the Navy are especially called out to resist this spread if the effort spreads to the maritime domain. Our grandparents were doing the same thing.

We can, as a result, think of this as a struggle that has lasted generations and will most likely last generations more. If we think this way, it makes us aware of the need to not only resist coercion with large scale military efforts by Russia or China, but also to resist lower level intimidation in regional areas, to resist the erosion of the free world by low level but sustained coercive pressure. It helps us think in terms of the long-view. After all, that is how Red thinks!

If we think of our task this way, we are likely to envision that a different tool-kit is desirable. Of course, we need to ability to deter nuclear war, to fight and win high-end conflicts…but that will not be enough. We also need to win a struggle for influence that does not involve major conflict, which uses other means and lower levels of violence. We need to win the "competition for influence." This effort may perhaps require some different kinds of capabilities, including non-lethal or scalable effects, disabling capabilities, and perhaps some capabilities that are better adapted to better interoperability and cooperation with less prosperous but free countries.

This is a harder problem, and a different problem. But this is the real root cause we have to correct. We are not firemen waiting for some random alarm to sound so we can react to it. We know where the arsonists are, and we need to be watching them from very close range.

So, what actions do we need to take as we leave this symposium?

Navy Investment Turning Point

My third and final point: We are at another pivotal turning point in Naval Investments and we can't afford to miss it. We must adapt to this changing environment, fiscal and threat environment, and we must do so urgently.

We have, in the past, been absorbing cuts, killing programs we should not have killed, putting gaps in modernization and readiness that were not okay, and cancelling submarine refueling. But we had no choice.

But now we are at a turning point. We have an administration with a formal position that we need to invest more heavily in defense and in our Navy. We need to echo that message and make sure that it is reinforced. We have emerging maritime adversaries in multiple theaters who are challenging the liberal world order of free societies. The Cold War never ended for them, and that means it never really ended for us. We are still the leaders of the Free World, and the Free World will not defend itself without effort. We are engaged in a long-term struggle that is not going to end soon. As long as Russia, China, Iran and North Korea remain authoritarian, we will need to protect the global system – and remember, they have all been authoritarian for the entire lifetimes of everyone in this room.

The fact that in the past we could not invest in readiness does not mean that we are not going to invest in readiness now. We are: it is recovery priority number one. Then we are pushing our capacity up by starting growth using the major programs for which we have warm production lines. Then we are expanding to include the introduction of a variety of disruptive new capabilities: unmanned, offboard, distributed systems, sensors, and so on.

Don't worry, by the way, about 355 ships or 350 ships or whatever. Another look at history would show you that we have never ever reached a target fleet level before the circumstances driving that number changed. This much is clear, though: we know that we are going up, and not just a little bit. Never mind the number. We know we have too few ships and that our industrial capacity is less than the number we need to build each year.

Conclusion:

In summary, I ask that you recalibrate your picture of reality to look at some of the longer-term but more important trends include these features:

- A budget chart showing that it is not the Navy, or defense, or core government functions that are creating budgetary pressure, and cuts in these areas are not the solution.
- An image of history showing that the Russians, Chinese, Iranians and North Koreans are the same totalitarian, authoritarian oppressive expansionists that they were 70, 50 and 30 years ago, and we need to view our important global role with that kind of long-term perspective.
- That navy investment is hitting an inflection point and we need to make future decisions based on different rules than the past. Some things we did not fund need to be resurrected. Some things we have not considered need to be in the program. Our investments need to be mindful of the long-term struggle that we are in.

We have a rare opportunity that a generation of naval officers before us did not have, and wished for. It has fallen onto our shoulders to carry out this responsibility, this sacred calling.

I close with a quote from George Washington from 1788:

> "No country upon the earth had it more in its power to attain these blessings of liberty and freedom than United America. Wondrously strange, then, and much to be regretted indeed would it be, were we to neglect the means and to depart from the road Providence has pointed us to, so plainly."

We are the leader of the free World. Let's get after it.

2017 SUBMARINE TECHNOLOGY SYMPOSIUM ADDRESS

MR. RONALD O'ROURKE

MAY 10, 2017

Thank you for that introduction, and for the chance to speak to you today. As always, I should mention at the outset that these views are my own and not necessarily those of my employers.

A lot has changed over the last year, so there's a lot to talk about. I want to begin with a few comments about the Columbia-class program, then move on to attack submarines, and then finish with a general comment.

Columbia class program

Schedule resiliency

Regarding the Columbia-class program, you may recall that when I was last here two years ago, I talked about the idea of generating some room inside the program's development schedule, without changing the date for the boat's first deterrent patrol, so that the program would have more ability to absorb shocks that might arise from time to time due to funding issues or technical problems. The submarine community has since announced that it is doing this, and it's arguably not a moment too soon, because the program has already experienced one funding issue and one technical problem.

The funding issue, as you may recall, was a couple of years ago, when limits on DOE's budget threatened to delay the procurement of high-speed computers needed for designing the boat's nuclear fuel core in a timely manner. Left unaddressed, the Navy said at the time, that issue could have delayed the program's development schedule by about six months.

The technical problem was the recently reported issue concerning the development of the motor for the boat's electric drive system, which

apparently didn't impact the program's overall development schedule, but serves as a reminder that there could be other technical issues over the next 14 years or so that might.

Those in the Columbia-class program office will recall that I had previously raised the issue of the technical risk involved in developing the boat's electric drive system, and what this might mean in connection with the boat's tight overall development schedule. I raised it not only because this is a change from the mechanical-drive technology, but because of what happened with the development of the DDG-1000 integrated electric drive system.

As some of you might recall, the DDG-1000 program encountered a problem with its intended permanent magnet motor. As a result, the Navy decided to switch to its fallback option, which was the advanced induction motor. The technical goals of the Columbia-class program don't allow for that kind of a fallback option. So the Columbia-class program doesn't have an off ramp for this component in the same the way that the DDG-1000 program did.

Electric drive technology has matured further since the time of the DDG-1000 development effort, in part because of the lessons learned with the DDG-1000 system. But what happened with the Columbia-class motor is nevertheless a reminder of the risks involved, and of how those risks might be addressed in part by generating resiliency within the Columbia-class development schedule for absorbing shocks.

In responding to reports about the Columbia-class motor problem and the issue of the program's technical risk and tight schedule generally, one option for the submarine community would be to explain in greater detail what the Navy is doing to generate resiliency within the Columbia-class program schedule, and provide periodic updates on the progress of that effort.

Another would be to note a point I heard someone make a while back, in a briefing I got from the Navy. It wasn't a briefing on the Columbia-class program, which is part of the reason I'm mentioning it here. This person acknowledged that there is some risk in developing the electric drive system. But he also noted that there would be technical risk in trying to develop a mechanical drive system that could meet the performance requirements for the Columbia class, particularly when you con-

sider that the submarine community has already spent decades perfecting mechanical drive technology, making further progress harder to achieve. That's a point that might help others put into perspective the recent issue with the Columbia-class motor and any future issues that might arise in the development of the boat's electric drive system.

National Sea-Based Deterrence Fund

The other item I want to talk about regarding the Columbia-class program is the National Sea-Based Deterrence Fund. Arguments about the fund continue to come up from time to time.

Critics of the fund have argued, first, that the fund is a basically budget gimmick—an example of budgetary smoke and mirrors. Second, they have argued that the special procurement authorities that have been added to the law governing the fund, for the purpose of reducing the cost of Columbia-class boats and other nuclear-powered vessels, could be enacted separately, through other legislation.

Supporters of the fund could argue that since it is intended to encourage policymakers to look at the Columbia-class program as something to be funded from resources from across DOD, and not just from the Navy's budget, it amounts to a policy statement from the Congress—a statement about how Congress would prefer the funding for this program to be resourced. As a policy statement, they could argue, it is similar to other congressional policy statements and sense-of-the-Congress statements that are from time to time incorporated into defense- and security-related legislation, including NDAAs. Supporters could argue that if the law governing the fund were to be repealed, there would be no guarantee, in a different legislative context, that the special procurement authorities would once again be approved by Congress in a timely manner. The issue of legislative context, supporters could argue, is sometimes why provisions are put into certain bills and not others.

Attack submarines

355-ship plan and mid-march budget outline

As everyone here is well aware, the Navy's new 355-ship force-level objective, which was released in December, includes a force-level goal of 66 attack boats. This has led to a lot of discussion about just how quickly the attack boat procurement rate can be increased, and to what level. It's helpful to understand the particulars of that issue.

And it turns out that the force can reach 66 boats by the mid- to late-2030s, if all the 1s in the Virginia-class procurement profile are changed into 2s, so that the profile shows 2+1 Virginia and Columbia class procurement in the 12 Columbia-class procurement years, while perhaps also procuring 3 Virginias per year in some non-Columbia years.

In mid-March, however, the administration released a federal budget outline that put a damper on the idea of building up the size of the military. The DOD funding level in that budget outline was judged by observers to be consistent with fully funding the Obama administration defense program of record, and with funding some readiness fixes beyond that, but not much more than that. The funding level was not deemed consistent with the idea of building up the size of the military along the lines of what the Trump campaign organization had talked about, which included a 350-ship Navy. As a result of that budget outline, a lot of observers are now reassessing whether the military buildup will be realized, or even attempted.

If the Navy budget top line winds up getting even a relatively small boost beyond what would be needed to fully fund the Navy's FY17 program of record and fix Navy readiness problems, then attack submarine procurement could be a candidate to receive some of that remaining additional funding, for reasons that I have discussed in my previous talks here.

And even with the constraints on defense spending that have existed for several years now, Congress has sometimes added funding for shipbuilding above the requested level. In the FY17 budget that Congress finalized a few days ago, for example, Congress increased funding for shipbuilding above the administration's request by $2.8 billion, which

was enough additional funding to pay for, among other things, an additional LPD-17, an additional LCS, and the remaining 30% or so of an additional DDG-51 that had been partially funded in FY16. There were also smaller amounts of additional funding for some other programs, including $85 million in additional advance procurement funding for the Virginia-class program. The total increase of $2.8 billion, it can be noted, happens to be about what you would need to fully fund an additional Virginia-class boat.

Given that, there's some reason for observers to perhaps think that some additional Virginia-class boats might be added to the shipbuilding plan in coming years, even if DOD budget increases are not large enough to pay for a general military buildup. But the goal, of turning all the 1s in the Virginia-class procurement profile into 2s, and that submarine procurement will move up to a steady rate of 2+1 and 3+0, is another question.

It's possible that the fully detailed FY18 budget request, which will be submitted in a couple of weeks, might move the DOD top line up to the levels needed to start a military buildup, including a fleet of 355 ships, making 2+1 and 3+0 more possible. But if the top line in that budget is closer to where it was in the mid-March budget outline, then that would suggest a potentially much more modest situation in terms of potential attack boat procurement increases.

If that's the case, then the date for getting to 66 will be pushed from the mid- to late-2030s to something even farther into the future, effectively bringing to mind that famous cartoon from the New Yorker.[1]

More to the point, if the increase in Virginia-class procurement is going to be relatively modest, then the projected valley in the attack boat force level from the mid-20s to the mid-30s will not be mitigated very much.

As you know, I've been testifying, reporting, and speaking about that valley since 1995. So this is my 23rd year of doing that.

For the last several years, I've argued that this valley might weaken, for a period of some years, conventional deterrence against a potential adversary like China. And if that's the case, it doesn't help that the valley will overlap with what some observers have characterized as a decade of concern regarding the potential for aggressive military moves by China.

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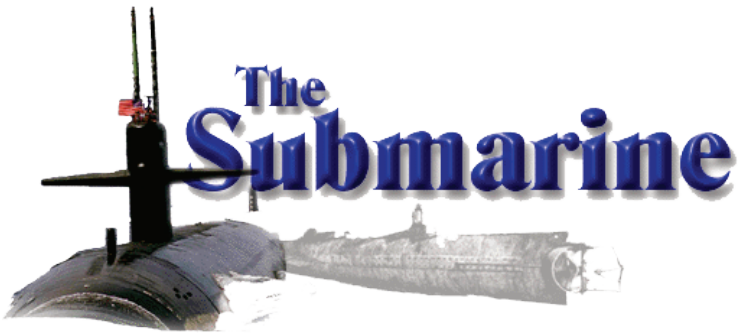

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When I first brought up the idea years ago that the valley might lead to a weakening of deterrence for some number of years, I didn't get much reaction from the submarine community. But in more recent years, my comments about this seem to have resonated more. I take that as one indication among many of how China has grown over the last several years as a planning concern for the Navy and DOD in general.

But more to the point, it is now apparent that China itself has taken note of the valley. Last September, I was at an unclassified roundtable discussion on China's navy that was held at CNAS—the Center for a New American Security—at the CNAS office in downtown Washington.

Among the presenters at that discussion was one of the analysts at the Naval War College who track developments in China's navy. And when he discussed developments in China's undersea warfare capabilities, he put up a slide showing an excerpt from the November 2014 edition of a military journal from China, highlighting a passage from one of its articles. That passage was translated on the slide as follows:

> "... in 2028, the [USN] force of nuclear attack submarines will fall from the current number of 55 down to 41 boats. Some are concerned about whether this force level can meet the requirements of the Asia-Pacific rebalance."[2]

Some options

If that is the general situation that might come to pass—a possibility for perhaps a few additional Virginia-class boats, but perhaps not much more than that, a competitor who has taken notice of the projected valley in the attack boat force level, and U.S. observers who are indeed concerned about potential military moves by China during those years—then what are some potential options for the submarine community for addressing that situation?

Here are some options. This is by no means a complete set of options, just some items that might be included in a list of options.

One of these relates to the current uncertainty over the future U.S. role in the world. There is arguably more uncertainty over this right now

than there has been since before World War II. To have an adult memory of the last time there was as much uncertainty over the future U.S. role in the world than there is right now, you arguably would need to be about 95 years old, or more.

In the presence of this uncertainty, one option for the submarine community would be to argue that control of the undersea domain, and using that control to leverage the world's oceans, could be crucial to implementing a wide range of possible future U.S. roles in the world. The argument, in other words, would be that as a consequence of world geography, leveraging the world's oceans could be a fundamental element of strategy for the United States, and controlling the undersea environment would be fundamental to that.

Another option would be to argue that the submarine community has saved a lot of money and improved its cost effectiveness over the years through things like the 2-for-4-in-12 cost-reduction effort, the 3:15 life cycle effort, and the use of multiyear contracting. As part of that, one option would be to have handy the total estimated amount of money that has been saved in submarine procurement over the years through multiyear contracting.

And similarly, an associated option would be to argue that the submarine community could save a lot of money in the future through continued use of multiyear procurement, use of the special procurement authorities in the National Sea-Based Deterrence Fund, and any higher annual procurement rates that occur.

All of these options could form part of a case for having the submarine community receive a share of any funding that might become available that is above the amount needed to fully fund the Navy's FY17 program of record and fix Navy readiness problems. As I have noted in the past, making a case applies to all parts of the Navy, and all the military services, so that policymakers have the best arguments available to support their decisions.

If it turns out that only modest amounts of additional funding become available to the submarine community, then one option would be to use it for things like restoring ARCI updates, buying new towed arrays, and doing other things that can help maximize the effectiveness of

the boats that you will have.

Another option, particularly if there is a chance that the amount of additional funding for submarines might be something more than that, would be to avoid making the mistake that the Navy made in 2007, when it told Congress, incorrectly, that you can't fund the procurement of an attack boat without first providing one or two years of advance procurement funding. That's not true. Congress can point-blank fully fund the procurement of an attack boat—or any other kind of nuclear-powered ship—if it wants to, without having provided any advance procurement funding in prior years, for two reasons. First, Congress has the constitutional authority to do so. And second, doing this doesn't create a problem in building the boat, as long as people realize that the interval between the nominal year of full funding and the year the boat enters service will be longer than normal. Congress in the past has fully funded nuclear-powered ships that could not be executed right away, and it could do so again.

The Navy's incorrect testimony in 2007 might not have cost the Navy one or more additional attack boats back then, but repeating that mistake this time around, in a possible context of an opportunity for getting one or two additional boats funded, just might. Years from now, when the attack boat force is at the bottom of the valley, having one or two additional boats might be helpful.

Another option would be to make sure that the submarine community understands, in the context of a more-constrained force structure and procurement scenario, what the potential quantity and capability tradeoffs are between building Virginia-class boats with or without the VPM. In other words, would building a few Virginia-class boats without VPM free up enough marginal funding to help facilitate, in conjunction with some funding from some other source, the building of an additional Virginia-class boat? And if so, how would having that additional boat compare to having a slightly larger number of VPMs? I'm not saying whether this tradeoff would make sense. I'm saying the submarine community might want to understand whether or not this would make sense.

Another option, which I've mentioned before, would be to take steps to maximize the number of operational boats during the bottom years of the valley—such as moving maintenance actions, if possible, to years before or after the bottom part of the valley—and then advertising these steps to potential adversaries.

Along the same lines, another option would be to take one additional look at whether, among the youngest of the 688s, there are a scant few—like maybe up to five—that could be extended for a small number of years, so that they could continue operating across the lowest part of the valley. As of a few months ago, at least, the Navy was operating three Los Angeles-class boats—the 698, 699, and 700—at age 36, which is 3 years beyond the class nominal service life, and one of these, the 698, was scheduled to go for another year or so, until age 37.[3] If some of the youngest 688s could be operated to age 36 or 37, perhaps in part by husbanding their neutrons between now and then, it could help fill in some of the bottom years of the valley.

A more radical version of this option, if the neutrons won't be there, would be to give a few of the youngest 688s an additional refueling for the purpose of operating them for just a few more years. I don't know whether that would be technically feasible, and even if it were, it would be a very expensive option in term of dollars spent for each of those few additional years of operation. And it would take those boats out of operation for the time needed to refuel them. On the other hand, it might help prevent a failure of deterrence during the valley that could lead to a vastly more expensive war.

Any 688s who lives were extended, of course, would be less capable than Virginia-class boats, but that doesn't mean they wouldn't be of some value, particularly since the Navy currently intends to operate 688s out to the year 2029, which is the year the force reaches the bottom of the valley.

Another option, which I've also mentioned before, would be to encourage the Japanese, as part of their defense review, to increase the planned size of their conventional attack boat force from 22 to 30, which they could do by keeping their boats in service for 30 years instead of 22, without increasing their one-boat-per-year procurement rate. The ad-

ditional boats, being non-nuclear powered, could not replace SSNs, but they could perform certain missions, and this is the closest thing to a free lunch that I've been able to identify in the world of U.S. and allied submarine force structure.

One final option would be to work to create some surprises for China that could throw them off balance in terms of their assessment of what the situation will look like during the valley years. That could include things like developing a new weapon in the black world and then announcing it before the bottom of the valley, but too late for China to do much about it—perhaps something like that 100-mile or more torpedo with associated command and control that Vice Admiral Connor testified about two years ago,[4] or one or two suddenly revealed squadrons of armed versions of the Extra Large UUV.

As a final comment about all these options, it should be noted that although I have pinned them to the specific scenario of helping to prevent a failure of deterrence during the valley, several of them could be considered for the attack boat force for more general reasons.

China

I want to finish with a general comment about China. It's not that I'm not concerned about Russia, or about the situation in the Middle East. I am. But for length purposes, I had to leave some things in my talk today on the cutting room floor, and while Russia or the Middle East are concerns that can be discussed during the Q&A, China is a kind of competitor the United States hasn't faced before, and one that the United States seems to be having some difficulty figuring out how to address.

China appears to have identified a set of goals for what it wants to accomplish in its home region and beyond, and appears to have put together an overall strategy for achieving those goals. That strategy includes a lot of elements other than their military, but their military modernization effort is part of it, and improvements in their submarine force and undersea warfare capability are a part of that.

China's rate of submarine commissioning in recent years hasn't been

as high as some observers might have projected. On the other hand, China reportedly is now finishing work on a new nuclear submarine construction facility that will be the world's largest. Reportedly, this facility includes a 430,000-squarefoot assembly hall with two parallel production lines, and is large enough to build four SSNs simultaneously.[5] You might have talked about this facility in one of your sessions at this conference. And this facility will be on top of China's ongoing production elsewhere of non-nuclear-powered boats. What is going to happen to China's submarine force after this new nuclear submarine facility goes into production, which reportedly will happen later this year?[6]

Stepping back from China's submarine force, and from its military, I would like to focus for a moment on our general competitive situation with China. China, as I said, appears to have a set of goals, and a strategy for achieving them. It also has resources to apply to that strategy, and is doing so with a wholeof-government approach and a persistence that reflects a long-term perspective.

By contrast, the United States in my view currently has no clear, consensus concept of its goals and strategy for Eurasia, or within that, its goals or strategy for East Asia, or within that, its goals or strategy for China. The United States has enormous resources it could apply to a strategy, but how the country will choose to apply its resources to such a strategy relative to other domestic and foreign spending priorities is not yet clear. U.S. observers and practitioners constantly aspire to a whole-of-government approach, but most of the time there is at best inconsistent evidence of such an approach being pursued in a consistent manner. The focus often appears to be on the short term rather than the long term, and there are competing demands on our leaders' time and attention in the Middle East and Europe, which are regions that tend to get more continuous and voluminous press coverage in the United States than do events in East Asia.

A country that has fewer overall resources, but which has a strategy, can compete successfully against a country or countries that have greater resources, but which do not have a clearly identified, consensus strategy. Or, if you want to boil it down to a few words: strategy can beat no strategy.

For the 20 years or so of the post-Cold War era, when the United

States was the unipolar power, the U.S. was in a situation where it could have high confidence of being able to accomplish its goals simply by announcing and taking some actions, without embedding those actions in a larger, coherent strategy. That ad hoc, nonstrategic approach to managing the world's affairs was a luxury the United States could afford during the post-Cold War era.

But the post-Cold War era has ended. In retrospect, it can now be seen that it started eroding around 2008. It was pretty much gone by 2014. The country is now in a new era, an era of renewed major power competition, and the question is whether the country can remember how to operate in that kind of a situation, after 20 years or so of not having been required to. And that, I would argue, starts with forming a clear, consensus strategy.

I'm not saying what that strategy should be—observers have various views on that. I'm saying it will be preferable to have a strategy than to not have one. If the country doesn't put one together—if it continues to muddle along without one—what will that mean for the U.S. position in the world over the long run, in an era of renewed great power competition where at least one other major power has such a strategy and is working to implement it? And for our purposes here today, the question becomes, what might that in turn mean for the submarine force?

One option for the submarine community would be to help nudge the national security leadership one or two levels up to work on devising a clearly defined approach to the U.S. role in the world, with a clearly defined grand strategy behind it. And while the submarine community is doing that, it could manage the current situation of strategic non-consensus by considering options such as those I outlined earlier.

Conclusion

Thank you for taking the time to listen. I hope you found some of the options, and the analysis that led to them, of value. As always, I'm happy to respond to any questions you might have.

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3. The Navy's FY2017 30-year shipbuilding plan shows the 698, which entered service in March 1981, as scheduled for deactivation in FY2019.
4. Testimony of Vice Admiral (retired) Michael J. Connor before the United States House of Representatives, Armed Services Committee, Sea Power and Projection Forces Committee, Hearing [on] Game Changers—Undersea Warfare, October 27, 2015, p. 2. See also Megan Eckstein, "COMSUBFOR Connor: Submarine Force Could Become the New A2/AD Threat," USNI News, May 14, 2015; and Christopher P. Cavas, "Seeking Game Changers in the Underwater World," Defense News, November 27, 2015.
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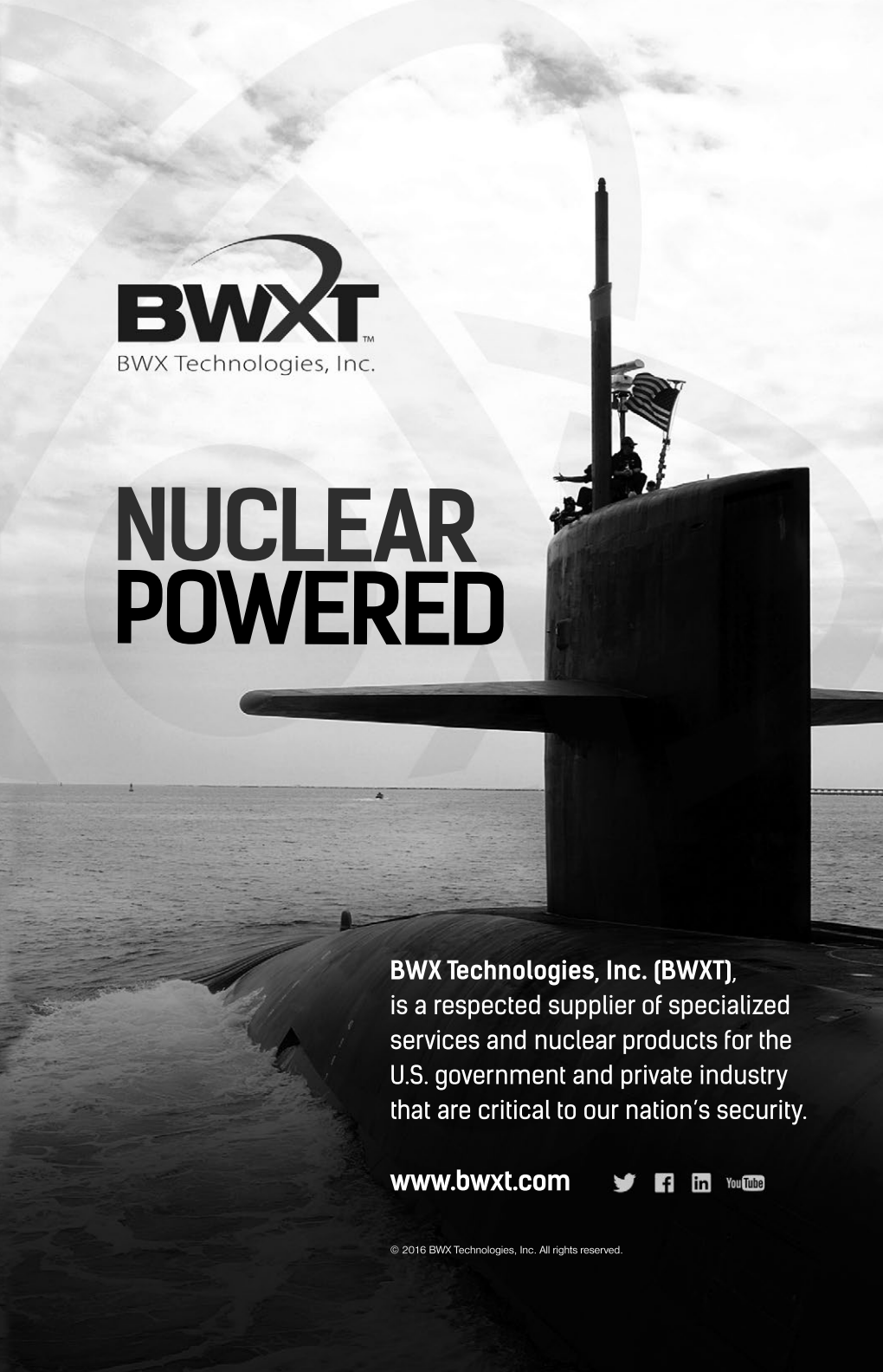

ARTICLES

THE IMPORTANCE OF SUBMARINE TENDERS TO A MODERN NAVAL WAR: NAVAL COMBAT LOGISTICS AND SEA BASING

LT Patrick T. Rawlinson, USN

This article was the winner of the 2017 NSL award to a student at the Naval War College for a technical paper on a submarine warfare related subject.

ABSTRACT

The potential for the US Navy's adversaries to target its forward-projected ship maintenance depots, and the time required for ships to travel back to US based facilities presents major operational consequences to maritime commanders, and would pull ships out of the theatre for weeks at a time in the event of a high-end naval war. The Navy should invest in modern submarine tenders and dry dock platforms – capable of general maintenance, nuclear propulsion plant maintenance, battle-damage repair, and replenishment of weapons and stores. These tenders and dry docks, working within the sea basing construct, would offer ship repair and replenishment in protected harbors or at sea. With their mobility, the US' adversaries would not be able to target tenders with ballistic missiles as easily as they would static sites. Their mobility would also enhance the sea basing concept, as operational commanders could establish safe and secure maintenance depots anywhere in the world's oceans, with minimal concern of political risk or consequences of sovereignty.

INTRODUCTION

Since the end of the Cold War, the United States Navy has enjoyed undisputed global command of the seas. This lack of competition has allowed the Navy to become complacent regarding the need to maintain maritime superiority in contested environments. The growing power of naval rivals, and their potential for the implementation of maritime anti-access/area-denial (A2AD) environments mandates that the Navy once again consider the need to sustain forces in distant and contested maritime theatres. Regarding ship sustainment, commanders and planners have allotted little emphasis to naval logistics beyond the basic peacetime considerations of food and fuel. If a maritime conflict occurs in a distant theatre, the Navy will find that it cannot maintain global force projection and combat employment of ships in a contested theatre unless plans and platforms can meet logistical constraints to include intra-theatre sustainment beyond the baseline of food and fuel. To support meeting this need, the Navy should invest in a modern fleet of submarine tenders and floating mobile dry docks – capable of at-sea maintenance on submarines and surface ships, including nuclear maintenance, battle-damage repair, replenishment, and missile and torpedo handling – and incorporate them into the sea basing concept.

The sea basing concept has been gaining traction in the US Navy and Marine Corps in recent years, as a possible solution to the restraints of a contested maritime environment. These environmental restraints could be tactical, such as an adversary denying access to a base with firepower, or political, wherein a foreign host nation no longer allows the US to use a port or basing facility which the US thought to be reliable, as has occurred recently in the Philippines. These restrictions could combine to greatly limit a force's access to a battlespace, particularly in distant theatres. Designers of the sea basing concept, however, have not yet offered adequate consideration to the need to sustain the Navy's warships under the same restraints. Incorporating tenders into this concept would meet this need, improving the sustainability and flexibility of naval commander's operational plans.

DISCUSSION AND ANALYSIS

Considering the prospect of a naval campaign in the Western Pacific, the need for intra-theatre logistics provided by submarine tenders and dry docks becomes apparent. There are currently three US sites in the Western Pacific theatre with the capability to conduct battle damage repair, nuclear maintenance, and weapons handling for US Navy warships, namely Yokosuka, Sasebo, and Guam. It is reasonable to expect that these static sites, particularly Yokosuka and Sasebo, as being the closest to rivals such as North Korea or China, would come under attack during the early phases of a naval conflict.

The value provided by Japanese naval bases is in their provision as enablers to US Navy force projection in the Western Pacific; and China, the United States' premier naval rival in the region, has recognized this. In "Japanese Bases and Chinese Missiles," Naval War College Professor Toshi Yoshihara analyzes several recent publications from the PLA, at the operational and strategic levels.[1] In this analysis, he points out that PLA strategists see Yokosuka and Sasebo as the operational lynchpins of US naval force projection from the Western Pacific to the Indian Ocean. Without these bases, most of the Navy's major combatants would be wholly reliant upon Pearl Harbor for sustainment.[2]

Yoshihara goes on to discuss the PLA's doctrine, built around the contingent of a naval war with the United States. Conducting in-depth studies of the US Navy's logistical needs and shortcomings, the PLA has developed the strategy, and the capabilities, to eliminate the US' logistical and command and control centers in the Western Pacific, particularly the naval bases at Yokosuka and Sasebo.[3]

Alternatively, China has also published strategies suggesting that they would use missile coercion against the Japanese government as a tool to politically drive Japan to deny the United States access to those bases.[4] Given recent difficulties in maintaining the Japan-US alliance, the near proximity to China, and Japan's growing cultural distrust of nuclear power after the Fukushima accident, the possibility of the United States being politically denied the key bases there, which have been enjoyed for over 70 years, cannot be overlooked.

SCENARIO: LOSS OF FORWARD BASES IN THE PACIFIC

If Yokosuka and Sasebo become untenable, ships engaged in the East or South China Seas would have to transit to Guam for repair and replenishment, 1,300 NM one-way: six days for a damaged ship at ten knots (assumed speed of advance for a damaged or limited ship). Further, if Guam became untenable, ships would need to transit all the way to Pearl Harbor, 4,000 NM one-way: seventeen days at ten knots. Even for a ship undergoing basic repairs and replenishment, expected to turn back out in less than one week, the transit back to Pearl Harbor would pull a critical front-line combatant out of the theatre of war for nearly a month. This simple calculation also assumes that a damaged ship could make such a transit through open ocean.

Knowing that a weapons-reload or minor damage repair will pull critical warships from the theatre for weeks at a time while they are in high demand gives naval operational commanders apprehension to put their limited assets at risk. The inability to repair and replenish warships in a time-efficient manner not only reduces the number of ships available to the commander in later stages of a naval operation or campaign, but limits how effectively the naval commanders can employ the warships in the initial stages of an operation.

Having submarine tenders and floating dry docks in the theatre would mitigate much of this danger. The battle-damage expected to occur to a submarine, and be survivable, is generally not drastic. Primary damage concerns in the Western Pacific environment include: fouling of propellers or depth-control planes by cables and fishing nets; damage to sail, planes, and masts from a periscope depth collision; and damage to rudder and sonar systems by grounding.[5] These examples are all within the capabilities of submarine tenders to repair, provided they are properly trained and resourced and have a dry dock in which to work.

CASE STUDY: THE USS *SAN FRANCISCO* GROUNDING AND REPAIRS

Even in instances of more catastrophic battle damage, above the capacity of a tender to fully repair, having a tender nearby with mainte-

nance capability could make the difference between a ship and her crew surviving and returning to a navy yard for overhaul, or scuttling her at sea. An example of this is the USS *San Francisco*, a nuclear-powered attack submarine, which survived a high speed submerged collision in 2005. The collision smashed her bow, sonar dome, and forward ballast tanks, making her dangerously unseaworthy. She was unable to remain surfaced without constantly blowing the forward ballast tanks. She managed to surface and the USCG Cutter *Galveston Island* escorted her 350 NM to Guam. In Guam, a team led by engineers from Pearl Harbor Naval Shipyard, using the facilities and capabilities of the submarine tender USS *Frank Cable,* addressed the damage to the *San Francisco*. While the capability provided by the USS *Frank Cable* was not adequate to fully restore the *San Francisco* to mission readiness, they did complete sufficient repairs to the *San Francisco*, allowing her to safely complete the 5,600 NM voyage, unescorted, to Puget Sound Naval Shipyard (PSNS) in Bremerton, Washington. At PSNS she underwent a full overhaul and bow replacement.[6] Were it not for the tender capability in Guam, it is doubtful that the *San Francisco* could have completed this open-ocean voyage to PSNS for major repair. Had the tender at Guam not been available and Navy unable to return her to PSNS, the expense of heavy lifting her to PSNS or the risk of towing her might have led to instant decommissioning. While this case highlights the value and capability of the Navy's current submarine tenders, it is apparent that the problem would become more pronounced in a naval conflict, with many battle-damaged ships returning from the front line in a contested environment. A single tender in the theatre would not alone be able to support multiple such occurrences of this nature.

SCENARIO: CRISIS IN THE PACIFIC

In the event of naval conflict in the Western Pacific, the threat to US Navy bases in the region is legitimate. North Korea and China both have the capability to strike US facilities in Yokosuka and Sasebo using long range air, ship, or land based cruise or ballistic missiles. North Korea is rapidly developing their intercontinental ballistic missile capability, and China has recently developed the CSS-3 missile capable of ranging

Guam.[7] In this scenario, the static bases in Japan cannot be relied upon to provide consistent sustainment and repair of Navy warships, especially not in large numbers. One solution is to disperse maintenance and logistics capabilities throughout the theatre on survivable, mobile platforms.

The availability of tenders and floating dry docks to the theatre naval commander will enable this dispersal. Using Guam as an operational hub, for instance, the commander could establish mobile maintenance depots afloat throughout the theatre in harbors or, to a limited extent and dependent on weather and sea conditions, in deep water and open ocean. The mobility of the platform will reduce an adversary's ability to scout and target naval assets and keep the critical combatant warships in theatre.[8]

The ability to establish maintenance depots afloat also offers the benefits of improving operational security and reducing the risk of sabotage. Keeping warships away from land-based depots limits the ability of spies and informants to monitor the locations, movements, and level of damage to the Navy's ships, and reporting them to America's adversaries. Further, as the tenders are crewed by Navy personnel, with limited civilian technical experts, saboteurs outside of the service would not have access to the ships, preventing attempts to disable the ships in port.

HISTORICAL MODEL: TENDERS DURING WORLD WAR II IN THE PACIFIC

During World War II, the US Navy employed submarine tenders and floating dry docks throughout the Pacific in support of the Allied island-hopping campaign. Their presence allowed Allied naval forces to proceed forward and establish logistics lines, which enabled the high tempo of naval operations critical to defeating Japan.

Before the attack of 7 December 1941, the US Navy had, in anticipation of war, deployed tenders in the Western Pacific. Of the eight submarine tenders in service at the time, the Navy had three stationed in the Western Pacific. The tender USS *Canopus* was in Tsingtao China, USS *Holland* at Cavite, Philippines, USS *Otus* at Bataan, Philippines, as well as the USS *Seagull* and USS *Pelias* at Pearl Harbor.[9]

After the Japanese attack at Pearl Harbor, the Philippines, and Dutch

East Indies in December, the tenders came to demonstrate their inherent value. The tenders in theatre relocated to preserve their capability and keep the theatre open. Three tenders surged to Pearl Harbor to meet the need left by the Japanese onslaught. The *Holland* and *Otus* relocated to Darwin, Australia.

At 1752 on 7 December, mere hours after the raid on Pearl Harbor, Rear Admiral Charles Lockwood, USN, Commander Submarines Southwest Pacific, received the order: "Execute against Japan unrestricted submarine and air warfare."[10] Having tenders in the area allowed his combat forces to immediately get on station, and sustain the mission throughout the long war. The *Holland* reported to Darwin, Australia by January 1942 and went straight to work, servicing as many as twelve boats at a time, as they came off their first war patrols.[11] The ability to establish a maintenance and logistics depot is undoubtedly a capability that made the US unrestricted warfare campaign so successful, from the first days of the war and onward. Had the ships needed to sail back to Pearl Harbor for maintenance and supplies after each patrol, their time on mission and the success of the campaign would have been severely limited. Lockwood could not have established and held the presence in theatre which made the campaign so effective.

The US Navy saw the value of tenders, and immediately raised production, in coordination with the procurement of warships. By 1945, the Navy had 16 submarine tenders in service, all deployed throughout the Pacific. Some naval bases saw consistent supplemental service provided by the tenders over most of the course of the war, such as Pearl Harbor, San Diego, and Fremantle, Australia.[12] The tenders themselves rarely kept still, however. As the war progressed and the Allied forces pushed west, the tenders proceeded to establish expeditionary naval bases across the entire Pacific Ocean.

In *Beans, Bullets and Black Oil*, Rear Admiral Worrall Carter, USN (RET), describes in detail the logistical plans and employment of the Allied naval forces in the Pacific Theatre. He describes the battle for Guadalcanal and the seas surrounding it as the pivotal point of Allied momentum, based on the logistical capabilities employed to gain and hold the island, and to push forward, taking the war to Japan.[13]

Admiral Halsey, Commander of Service Squadron South Pacific

during Guadalcanal, established expeditionary naval bases at Espiritu Santo, Vanuatu, and Noumea, New Caledonia in support of the Guadalcanal operation. Halsey centered these bases around the destroyer tenders USS *Rigel*, and USS *Whitney* and USS *Argonne*, respectively. From these bases, the tenders conducted repairs on cruisers and destroyers damaged in the naval battles in support of the operation. The tenders were less capable than the large shipyards and they could not return all ships straight to the front lines, but they proved their value once again by patching the ships they could not fully repair to make them at least seaworthy. Three examples given by Carter were the cruisers USS *Salt Lake City*, USS *Farenholt*, and USS *Boise*, each damaged by 8-inch shells, causing major damage including steam ruptures and flooding. The tenders at Noumea and Espiritu Santo patched the ships and cannibalized their munitions, enabling them to reach the navy yard at Sydney, Australia, and transferring crucial ammunition to the USS *San Francisco*.[14] Had this expeditionary maintenance capability not been forward in the theatre, it is doubtful the Allies could have saved these ships and returned them to the fight, and the ever-present need for ammunition would have grown dire.

HISTORICAL MODEL: TENDERS DURING THE COLD WAR

During the Cold War, the US Navy structured itself around the seemingly likely contingent of a naval war against the Soviet Union. During this era, supplementing the Navy's high count of warships, each squadron of attack submarines had a tender and floating dry dock, which served as the intermediate maintenance activity, forward deployed in places like: Holy Loch, Scotland; Rota, Spain; Guam; Diego Garcia; and Naples, Italy. In addition to these forward deployed tenders, there were four more homeported in the United States, ready to respond to a theatre in the event of war or crisis. Beyond their maintenance and sustainment capabilities, tenders also served as squadron headquarters afloat, allowing tactical squadron commanders to position themselves forward to best support their forces through command and control as well as logistics, and keep open communication with fleet and operational commanders.[15] The Navy understood the usefulness of these tenders at all levels of naval

command. The Navy believed this construct was crucial to the successful conduct of a major naval campaign against the Soviet Union.

THE FORWARD BASED TENDER ADVANTAGE

A submarine tender and floating dry dock provide fleet commanders with self-sufficient maintenance capabilities at anchor and in austere ports. They have the capability to perform expeditionary and intermediate level maintenance on nuclear submarines and surface ships.[16] In 2016, the USS *Emory S. Land* performed voyage repair and Continuous Maintenance Availability (CMAV) on 15 submarines, 17 surface ships, and sent fly-away teams to seven more. While she conducted most of these repairs in her homeport of Guam, she also performed work in Diego Garcia, Singapore and Sasebo, as well as fly-away team repairs in Yokosuka and Bahrain.[17]

The *Emory S. Land*'s record demonstrates the operational value of a submarine tender during peacetime. The number of ships repaired and the capability she employs are consistent with those of static maintenance intermediate maintenance activities. The mobility allows her to perform work in austere and poorly developed ports, at anchor in protected harbors, and, to a limited extent, in open-ocean. In 2015, the *Emory S. Land* performed anchored moorings in Phuket, Thailand and Puerto Princesa, Philippines.[18] In 2016, *Emory S. Land* demonstrated, as a proof of concept, that she could perform VLS reloads of Tomahawk and all Standard Missile (SM) variants on SSGNs and DDGs.[19] This capability, in addition to the established torpedo handling capability for SSNs would prove tremendously valuable to fleet commanders in a naval campaign.

Unfortunately, the lack of a floating dry dock limits the tender's capability in an expeditionary setting. Currently, for any ships requiring hull, exterior propulsion, or exterior steering and depth control work as expected in ships returning from battle, *Emory S. Land* is unable to support such maintenance without a dry dock facility. As the US Navy has scrapped all but one of the floating dry docks, the USS *Arco* in San Diego,[20] this is effectively a lost capability the tender force once had.

The two tenders the US Navy has in service today, the USS *Emory*

S Land and the USS *Frank Cable*, could not by themselves support a theatre naval campaign, given the expected loss of shore-based maintenance depots such as Sasebo and Yokosuka. This calculus becomes more complex considering that to prevent America's adversaries from targeting them with ballistic missiles, these valuable and capable tenders, already challenged in capacity during peacetime, will need to spend a significant amount of time moving, further detracting from the amount of service they can provide.

THE SEA BASING CONCEPT: COMPLEMENTED BY TENDERS

Sea basing is a concept of modern warfare designed to enable options for power projection in either politically (the sea base can be established in international waters) or tactically (the sea base is mobile and can be protected by naval combatants) denied environments. The joint doctrine on amphibious warfare defines sea basing as "the deployment, assembly, command, projection, reconstitution, and re-employment of joint combat power from the sea without reliance on land bases within the Joint Operating Area."[21] The design of the concept is to provide a scalable tactical logistics hub supporting amphibious forces ashore from international waters.

The primary architects of the design are the Navy and Marine Corps. Chiefly, the focus of the concept has been the projection, employment, and sustainment of ground combat forces from Navy and Military Sealift Command shipping. Working up from the ARG/MEU concept of tactical amphibious warfare, sea basing employs heavy logistics shipping through the Maritime Prepositioning Force (MPF) and ship-to-shore or ship-to-objective connector capabilities considerably larger in scale and scope than the organic ARG/MEU capabilities.[22]

The level of logistics capability and complexity of sea basing makes it feasible to project ashore, employ, and sustain entire divisions, even corps, from a mobile base in international waters. Unfortunately, it overlooks a critical component of joint warfare required to make this possible: employment and sustainment of the warships that establish sea control to enable and protect the sea base. It is unreasonable for campaign planners

and commanders to expect that a large-scale naval contest over sea control would not precede a large-scale amphibious or ground fight that sea basing projects. The naval forces required to gain maritime superiority in the initial stages, particularly against a peer-level naval adversary in the Western Pacific, will see major combat resulting in significant battle damage and great expenditure of weapons. In this fight, every available ship will need to be kept at maximum mission readiness and as close to the combat theatre as possible.

The two remaining tenders, USS *Emory S. Land* and USS *Frank Cable,* were commissioned in 1979 and 1980, respectively. While there is currently no plan to decommission them, they are coming up on 40 years and showing signs of their age. The US Navy had long kept a contingent of several decommissioned tenders in the ghost fleet, but over the last 12 years the Navy has scrapped these ships at an alarming rate, with the last of the tender ghost fleet assigned to scrap in 2017.[23, 24] With this in mind, the Navy's latest 30-year shipbuilding plan makes no explicit expression of intent to replace or modernize these valuable assets. The plan does articulate the intent to build expeditionary transports and docks, fundamental to the sea basing concept, as it supports amphibious forces ashore from the sea.[25] The fact that the Navy and Marine Corps still emphasize the amphibious aspect of sea basing, but naval combat logistics continues to be ignored demonstrates that the Navy is still building its force structure on a phase zero construct, with the expectation that command of the seas will continue to be undisputed based on deterrence alone.

With a complement of tenders and floating dry docks into the sea basing design, the sea base will be able to sustain not only an amphibious conflict, but also the naval conflict surrounding it, making it a fully capable maritime support system. The tenders would keep the escort vessels, such as attack submarines and destroyers, supplied, armed, and refitted, giving them more time on station to perform security to the amphibious force. This extra time on station for each of the escort vessels offers direct benefit as well to the naval conflict, as front-line ships would not have to withdraw from the main engagement area to provide sea base security when the primary escorts must return to base for logistical needs.

NAVAL SUSTAINMENT: A FORGOTTEN CRITICAL CAPABILITY

While planners generally consider the need to fuel ships and aircraft and sustain the sailors, little planning effort goes beyond those simplest of needs. Planners give less attention and consideration to returning ships to the campaign when they have been battle-limited due to equipment failure, battle-damage, or expenditure of weapons, an oversight that is apparent at the strategic level based on the 30-Year Shipbuilding Plan.[26] This lack of attention could be the result of having several generations of naval officers with no direct experience at, and little consideration paid to operational level high-seas combat. Admiral Al Konetzni, Commander of Submarines, Pacific Fleet, recognized this in 2000, in a press interview. He suggested that more critical than the number of submarines available was the number of mission days each could assume. While concerned for the shrinking ship count of the submarine force, he was more concerned for the lack of submarine tenders he could employ to keep those submarines operating forward, particularly in combat.[27]

ADM Konetzni was unable to win the budget battle and to date, the USN has still not allotted appropriate resources to forward combat logistics. In 2000, at the time of that interview, the US Navy had just downsized to only two tenders, the two still in service today. 17 years later, these two ships, though still performing admirably, are the remnants of an atrophying capability as they approach their end of life with no planned replacement.[28] The Navy cannot afford to re-learn the importance of forward mobile basing and logistics first-hand at the outbreak of a naval war, and must consider how it will manage naval operational sustainment in future conflicts.

COUNTER ARGUMENTS

In building the US Navy, planners try to consider what ships will the Navy will need decades ahead of time, to properly appropriate funds. An analyst can derive the purest understanding of Navy strategy regarding force structure and future employment from the "Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels," also

called the 30-Year Shipbuilding Plan. Architects of the Navy's 2017 30-Year Shipbuilding Plan continue to place more value on warships as the source of combat power, but place little emphasis on sustainment of combat power. This comes from the presumption that overwhelming mass in the initial stages will decide a naval conflict quickly, and therefore is not likely to occur at all. Their design does not allot much credibility to the US' potential adversaries' ability to survive those initial stages and sustain their own combat power. This is an unrecognized assumption that the Navy cannot afford to make. In a naval campaign in a distant theatre such as the Western Pacific, the United States' ability to sustain and regenerate naval combat power will be the decisive factor, more so than just flowing force to the theatre quickly.

The expectation is that, given the firepower, speed, and endurance of modern US Navy nuclear powered submarines, they can get to theatre faster and perform longer than the World War II and Cold War era boats. This capability is true in peacetime, but will not continue to pass once a conflict becomes hot. In a situation which drives tactical commanders to take higher navigational risks, fire weapons, and sustain battle damage, the basic peacetime needs of food and fuel will no longer govern their endurance to remain on the front lines, and the Navy must be ready to allot greater logistical capability. If there is no capability to sustain and repair these ships in the forward theatre, they will, as discussed above, need to retreat from the engagement, leaving the front lines weakened.

This type of thinking is the result of generations of naval officers who have not experienced a violent struggle for command of the seas. Sailors today have enjoyed undisputed access and naval dominance worldwide. Indeed, few of the Cold War era officers remain in the service today. Given the geopolitical climate in 2017 with Russia and China growing quickly in naval power, and rising military tensions everywhere, this undisputed naval dominance that the US has enjoyed cannot endure longer.

Continuing to exclusively build a navy of warships without consideration of the maintenance, sustainment, replenishment, battle-damage repair, and munitions they would require if ever actually employed will be like having a hammer without a haft. It could not be swung repeatedly but rather thrown only once, and if it misses, the results will be catastrophic.

CONCLUSIONS AND RECOMMENDATIONS

The US Navy must immediately invest in a modern fleet of submarine tenders and floating dry docks. The Navy has let fall into decay what was once among the United States' strongest and most valuable naval capabilities: the ability to not only project, but sustain combat power across the globe with mobile, survivable, and capable logistics and maintenance ships. This has happened because, at the strategic level, the Navy has become so strongly founded on deterrence, the phase zero mentality. The Navy expects that, by having high numbers of ships with massive combat power, such as aircraft carriers, attack and ballistic missile submarines, cruisers, and destroyers, there will be no need to employ them, as their existence has prevented potential adversaries from starting a naval war.

This mindset has, in a sense, worked for decades and the US Navy hasn't seen such a naval conflict since World War II. Recent geopolitical strategies taken by the United States' rivals, such as Russia's annexation of Crimea and China's buildup and bullying in her surrounding seas, have demonstrated that this deterrence no longer has the same effect. These rivals have seen that, while the United States may have vast naval combat power on paper, the Navy is unwilling to commit to conflict. Whether recognized or not, the Navy knows it could not sustain a hot naval conflict when it suffers heavy battle damage, weapons expenditure, and ship losses, and forward bases become questionable or untenable.

The architects of the 30-Year Shipbuilding Plan, with input from operational commanders, have been for years building the US Navy around the assumption that deterrence will work. The architects must recognize this assumption, so they can begin to recognize the capability the Navy has lost through lack of focus in forward naval logistics. The next 30-Year Shipbuilding Plan must incorporate submarine tenders and floating dry docks, in the short and long-term, both to replace the two admirable but aging hulls in service currently, and to redevelop that capability into something truly viable and powerful.

FINAL REMARKS

Unless the US Navy shifts its strategic focus to combat sustainment and forward wartime endurance, the service will continue to grow risk averse and hollow. Naval and civilian leadership must be held accountable for their budgeting strategies, and reestablish them with a wartime mindset, considering all aspects and complexities of war. If the US Navy continues to overlook theatre logistics and the vulnerability of forward bases, focusing only on presence and appearance of power, that war which it has deterred for so long will eventually happen, and the Navy will not have the ability to win.

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27 Chapman, Don, "Running Silent No More, an Interview with Rear Admiral Al-Konetzni," MidWeek Magazine, May 26, 2000. Accessed at http://www.tendertale.com/ttp22.html.
28 The author researched, looking for any evidence of the Navy's plan to restore this capability, and found none.

THE LIGHTING PLAN
On understanding what's expected... and what is not

CAPT Rick Severinghaus, USN, Ret.

When operating at sea, a fundamental need for every watch officer is to understand what is expected, and, just as important, what is not expected. Communications among watchstanders – whether by SP phones, walkie-talkie, VHF radio, or face to face – offer infinite opportunity for misunderstanding, misinterpretation, and indeed, basic "mis-hearing." When multiple watchstanders are involved, the likelihood of such errors multiplies, often at a greater than linear rate. When miscommunication combines with uncertainty of data and sloppiness in use of reporting language, as can happen during casualty response or in attempting to make sense of multiple sensor inputs, the outcome can be confusion and delay in execution of tasks at hand, and at its worst, can result in disaster.

It is a known fact that your mind, on only partially hearing a verbal communication, will tend to fill in any missing words or phrases – for better or worse. This trait of the human ear and mind is one of the concepts behind our insistence, across the submarine force, on an array of standard verbal communications. "Restricting" certain orders and reports to standard formats is a time tested method for minimizing the types of error alluded to in the previous paragraph. Standard, and in some cases very formal, orders and reports under normal conditions have the same meaning to all who hear them voiced ("I am ready to relieve you;" "Helm, Bridge, come right to 035." Even our alarms are standard orders: on hearing the Diving Alarm, certain watchstanders automatically take certain very specific actions). Under casualty conditions, standard orders and reports can convey correct meaning from sender to receiver, even when background noise garbles, and sometimes eliminates, part of a standard order or report. A report, voiced over/thru an EAB, of "the fire is out, the reflash watch is stationed!" can be understood, even

when significant parts of the report are garbled: "…hsss, fire is out, hsss, ….reflash …hssss….gasp… …stationed." Your mind knows the context from training and experience – damage control and firefighting response in progress, and your ear is 'looking' for standard reports, many of which have been heard numerous times in past drills.

What follows is a true story, not of watch stander communications, but of miscommunications between a Commanding Officer and his new – two months on board – Engineer on an SSN homeported in San Diego in the mid-1980's. The misunderstanding, in hindsight, is almost comical, but, in real time, well, see for yourself.

You are the Engineer on a brand new 688 submarine, some 6 months out from new construction and PSA at Electric Boat. Two months ago you relieved a classmate as Engineer. Since then you've had two underways for local ops in the San Diego OpAreas, mostly – from your perspective – running engineering drills as you begin workup for an ORSE some 4 months down the road. Neither CO nor XO have been shipmates with either a 688 or your type of reactor plant, but then, neither have you, so learning to work CO-XO-DH relationships, figuring out drills, executing all the day-to-day requirements, has been a work in progress.

You are 3 days at sea of a planned two week underway from Ballast Point, on local ops.

The messenger of the watch knocks on your SR door. "Engineer, the Captain would like to see you in his Stateroom." You glance at a clock; it's late, about 2330. You are just finishing up review of tomorrow's drill set paperwork. It's been a very long day.

"Cap'n, you asked for me."

"Yeah, Eng, come on in. Have a seat."

"Yes, sir."

"You know we have the ORSE coming up. We need to get our act together to get ready. I've asked the XO to look at our schedule. What I need you to do is think about all the things you need to do, and get with the XO to work up an integrated schedule."

"Yes, sir," you reply, thinking, I hope drill performance gets better quickly – XO's all over me about critiques, and getting my junior department up to speed…

"I told the XO I want a schedule – a plan – within two weeks."

"Yes, sir."

"Make sure you look hard at switchgear testing. Right now, we have only one short maintenance period before Squadron starts working us up with drills. I want that testing done before then. Ok? That's all for now, Eng. Get some sleep."

"Thank you, yes, sir," you respond, getting up and heading for the passageway.

"One more thing, Eng", he calls out, as you try to slip the stateroom door shut.

"Sir?"

"I need a lighting plan from you."

"Sir?"

"A lighting plan – for the engine room."

"Er, yes sir. G'night."

Next day, you get together with your EDEA, EMC Killeen, who is also E-LCPO, and the only chief in the department, except for A-gang's chief. After some detailed discussion about ORSE planning, you remember the CO's last direction.

"Chief, we need a lighting plan. For the Engine Room."

"Uh, OK," from the chief.

"You got any idea what the Captain has in mind?"

"I'll get right on it", he says, with the air of a chief who knows the score.

A week later in the command passageway, the CO calls you over. "Have you got that lighting plan yet, Eng?" he asks.

"Working on it, Cap'n."

"Can't be that involved, Eng…"

"Soon, sir, I've got E-Div working it."

Four or five busy days pass by; in a hurried conversation with your E-Div officer, the best response you get is, "Eng, we're working on it."

The following Saturday, the CO catches you in the Wardroom right after noon meal. It's been nearly two weeks since the Captain first asked for a lighting plan. "How's that plan coming along, Eng?" he asks, his tone clearly indicating he's beginning to wonder about the delay. Your brief report, basically a repeat of the last one, doesn't cut it. "Eng, why

don't you come by this afternoon, and show me what you've got so far? Say, 1600?"

With a quick "Yes Sir" you head off to find your EDEA, and find him at the workbench in ERUL, starboard side. "Chief!" you exclaim. "Show me what you've got on the lighting plan! I have to see the Captain in about 3 hours and give him status." Over the next 15 minutes, the Chief shows you a diagram of all the engineering spaces, including Diesel/AMR, with different sections marked, names of Petty Officers assigned, and a code to show locations of fluorescent lighting, battle lanterns, and a few regular incandescent bulb locations. On a separate set of sheets, he shows you a partially filled out schedule for each section on the diagram, and explains to you how it will all work. It looks pretty good; in exasperation, you ask, "Chief, this looks fine; why haven't you just gotten it to me?"

Chief Killeen just shakes his head, and reports in a subdued voice, "Yes, sir, everything's basically a 'go,' but with all the mercury regulations and stowage requirements, I just can't figure out where to keep all the new spares, or to store the old ones. Some of those tubes are pretty long. Didn't want to tell you I was ready 'til I got that part figured out."

With a nod, you give the Chief a smack on his shoulder. "OK, this will have to do. Good job. I have to meet with the CO," you declare, collecting his diagrams and planning sheets, and glancing at your watch, "in about an hour. I'll let you know how it comes out."

You spend the next 50 odd minutes between the SSTGs, conducting an EWS qual checkout with a 1st class M-Div'r, your new division Leading Petty Officer. You wrap it up in time for a quick check on the EOOW, and then head for the CO Stateroom, lighting plan in hand.

"What's all this, Eng?" he asks, as you lay out your diagram and schedule between coffee cups and Nav charts on the CO's day table. "This diagram...?" he questions, pointing to the color-coded plan view of ERUL.

Before he can get rolling with a string of questions, you quickly interject, "Cap'n, it's the plan you asked for. These sheets…" you gesture, pointing at the diagrams, "show sections assigned to specific petty officers, and you can see the color coding here…" And, smoothing out the schedule pages provided by the Chief, you point out, "… and here's

the quarterly schedule for replacing lights. The holdup," you begin to explain carefully, "has to do with finding storage for all those fluorescent tubes. E-Div's been working that piece, but…."

"Whoa!" interrupts the CO. "What storage? Why? What for?" he asks in rapid, clipped tones.

"So we have the new ones ready to go to meet the schedule," you say, trying hard not to sound defensive, "in port or at sea."

The CO gives you a look, then glances again at the lighting plan materials your guys have worked up for you over the past 2 weeks.

"Ah, I see, Eng… all these plans," he waves an arm across your handiwork. "…and storage is the problem, eh?" The CO slowly shakes his head, but his expression seems to remain neutral.

"Yes, sir," you respond, suddenly wondering where the CO is going with this, thinking, It's not like my guys haven't been working hard on this plan.

"You know, Eng, this looks pretty good," he says, nodding at the table. "Thank you, sir…" you blurt out, trying to get another word in. "But!" he continues, "this isn't what I was looking for."

You stare at your plan, then look up at the CO. You've got to be kidding, you think; but before you can blurt out anything more, the Captain holds up a hand, sips his coffee, and leans back in his chair.

"How much time did your people spend working on this, Eng?" This asked matter-of-factly, typical of the CO when trying to work through an issue.

"Um, a good number of hours, I think. The guys put some real thought into this," you answer, hoping your guess, and your answer, will satisfy the CO.

The CO looks down again at the table and your "plan" spread out in front of him. He shuffles a couple of pages. At this point, you have no idea where the CO is going with this conversation.

After another long glance at your quarterly replacement schedule, the Captain looks up, takes another swallow of his coffee, and shakes his head slowly, twice. "Here it comes," you suddenly think. But, looking at the CO, it dimly penetrates that you are seeing what looks like the hint of an upturned corner of his lips….

"Eng, you know…" he starts in, in a low, even voice, "this is all fine,

but it's a shame you had your guys put all this work in." He taps a long finger on your schedule. "It's much too complicated. And the storage … don't have any need for that."

"But, Cap'n," you start to interrupt, "we figured we have to have that, to execute the schedule."

"Hold up, there, Eng!" he continues. "I guess you didn't get my meaning when I asked for a lighting plan." The beginning of an actual smile plays across the CO's face.

Confused, you can only muster a weak "sir?" in response.

"All I wanted, Eng, was for you to come tell me when you plan to relamp the Engine Room before ORSE, during some inport period. Have to make things bright for those guys.

"In some ports," he continues, "it takes some doing to get all those fluorescent tubes delivered to the pier when we want them during some inport period. Sometimes takes some coordination with the Supply Officer, and the XO needs to know for his schedule when you'll be pulling all your guys for relamp day, and when he needs to provide the Mercury Response Team to support you."

A really weak, "yes, sir" is all you can manage to say.

"Just trying to help out, Eng."

Talking Points

What discussion should have taken place between the Eng and CO to get on the same page?

When would it have been a good time for the Eng (had he thought of it) to go back to the CO to ask what the CO really expected?

When you think of the word "plan" in terms of submarine operations and maintenance, what meanings come to mind?

Do you think the timing of the CO's request, coming after putting major emphasis on ORSE planning and switchgear testing, might have influenced the Eng's thinking that a "lighting plan" was some standard

thing that E-div would know about and have a plan for? As it was, the Chief's initial response caused the Eng to pretty much leave it to E-div to produce the 'plan.'

It was the case in this true story that each of the CO, Eng, and EDEA/E-LCPO assumed understandings by the others which was just not the case. How do you know when you need to pull the string to make sure you and people you are working with are on the same page? Can you know? Or, is it the case that you might not know?

It is apparent from the story that the Engineer did not ask for, or require, any sort of work – in – progress report on the "plan." Nor did he ask his Chief, at the start, to give him any description of what would be produced as the "plan". Drawing on your past experience, can you come up with any broad principles to help you decide when asking about project details is appropriate and necessary?

Would this plan development effort have been any different if the Chief had not been so concerned about the issue of mercury control and containment?

SUBMARINE COMMUNITY

ODD JOBS: CANADA'S USE OF SUBMARINES ON FISHERIES PATROLS, 1993-1995 PART 1

Mr. Michael Whitby

In the late 1980s, the Canadian navy became embroiled in a controversial effort to acquire nuclear submarines. When it ultimately failed, the severe political and public fallout derailed the navy's original program to acquire replacement conventional boats for its 30-year-old *Oberon*-class conventional submarines. Seeking a way to resurrect its conventional program, and attempting to do so in the new and unfamiliar strategic environment that accompanied the end of the Cold War, naval planners thought they could derive positive publicity for submarines by supporting so called 'national missions' in aid of other government departments, something they had only rarely done during the Cold War. In October 1993, naval headquarters informed Atlantic command (MARLANT) that they "would like to raise the profile of our submarines in the public eye if possible to set the scene for future posturing on the submarine replacement issue." To accomplish this, they have suggested the following activities, some of which our submarines have been involved in the past:

A. Counter Drug Operations including exercises with the RCMP;

B. Fisheries patrols with Department of Fisheries and Oceans (DFO) personnel embarked;

C. Embarkation of an RCMP SERT Team and exercise boarding ships and/or scaling [oil] rigs;

D. Adriatic Deployment.

An Oberon never made it to the Adriatic to join NATO's Operation SHARP GUARD, but they did provide invaluable surveillance support to the RCMP on a number of counter drug operations. However, the

highest profile national missions were fisheries patrols carried out by *Ojibwa* on the Georges Bank in March 1993 and by *Okanagan* off the Grand Banks in the autumn of 1994. 'Fishpats' were 'odd jobs' for Canadian submarines, and this study will detail the two operations to explore the viability of using submarines in such a role.

Sea-going poachers of any nationality are crafty adversaries, and that trait was fully alive on Georges Bank south of Nova Scotia in the early 1990s. Historically, Georges Bank had been a vibrant fishery consisting largely of ground fish and scallops but stocks began to decline rapidly in the 1960s when European fishing fleets moved from the increasingly bare shelves of the Northwest Atlantic into the bountiful Gulf of Maine. The situation stabilized after Canada and the United States established 200-mile exclusive fishing zones in 1977, but the two countries disputed ownership of Georges Bank. They submitted the case to the World Court, which in 1984 established the 'Hague Line' to delineate the maritime boundary. Over the next few years, scallop beds on the American side declined when some 300 fishing vessels registered to fish the area; in contrast, scallop stocks remained abundant on the Canadian side where annual permits were given to just 35 boats. Not surprisingly, the Canadian side of the line became a lucrative area for American fishermen who, of course, had previously considered it their own. According to a DFO study:

> The scallop poacher penetrates into Canadian water under cover of night or fog. For the night or while the fog lasts his swath of dragging increases further and deeper with each new pass until he has taken all he can. He takes a more mature, larger and therefore more valuable Canadian scallop. Not only is he poaching; he is also over-fishing the area….They take approximately 5,000 lbs of scallop every night they are on the Banks. They return to the US side of the Hague Line before sunrise to process the catch during the day. Then they repeat the procedure again the next evening and so on until they have a full processed load. In a few days they have a catch worth a hundred thousand dollars on the US market at New Bedford.

To deter this activity, in the summer of 1992 DFO approached the navy about using submarines to enhance its surveillance and enforcement capability. Naval planners recognized this would not only provide a valuable national service but could raise the profile of submarines, and in March 1993 HMCS *Ojibwa* was made available.

This was not the first time that MARCOM had utilized a submarine for a fisheries patrol. In March 1975 *Okanagan* deployed to the Nose and Tail of the Grand Banks with three destroyers and maritime patrol aircraft (MPA) to trial procedures as to how mixed forces might detect and apprehend fisheries violators. Under the plan concocted, *Okanagan* would conduct covert surveillance of fishing areas, and if she detected illegal activity, would vector the destroyers waiting over the horizon to arrest the violator. As it was, this novel concept was never tested as bad weather forced cancellation of the operation, which, it appears, was never remounted.

OP AMBUSCADE had three objectives:

Primary. To detect, track, positively identify and initiate apprehension of fisheries violators; specifically, US scallop draggers operating in Canadian waters;

Secondary. To produce photographic, acoustic and electronic evidence in support of DFO and DND objectives; and

Tertiary. To conduct general surveillance of the assigned patrol area.

Ojibwa was the only warship involved, but she was supported by Canadian Forces Aurora and Sea King aircraft, DFO aircraft and patrol vessels, as well as by US Coast Guard (USCG) assets. DFO was the lead agency for AMBUSACADE, but CDR R.E. Bush, the Submarine Operating Authority at MARLANT, controlled *Ojibwa's* movements. Importantly, a DFO Fisheries Officer embarked in *Ojibwa* to provide technical information about fishing practices, and, if a violator was caught, to ensure proper evidence was gathered to ensure a conviction.

To obtain sufficient evidence, ROEs established that *Ojibwa* had to detect intruders that had fished more than a nautical mile over the Hague Line; fix their position with sufficient accuracy to prove the incursion; identify the vessels; and observe them deploying or recovering their fish-

ing gear. *Ojibwa'*s CO, LCDR Dean Marsaw was given several options to confirm the identity of contacts: he could track and observe covertly, and then call in DFO air and sea assets to track and board violators; he could track and observe, then pass the information to DFO to arrange interception by the US Coast Guard; or he could surface *Ojibwa* and identify the violator, although planners recognized this could prove risky if the violator reacted aggressively. No matter what option was utilized, *Ojibwa* had to maintain continuous contact with the violator.

AMBUSCADE opened at 0010Z 7 March 1993. Proceeding submerged about six miles northeast of the Hague Line, *Ojibwa* initially detected a Canadian fishing vessel. Marsaw chose to break his ops team "gently" into working in close proximity to such targets with instructions to approach no closer than 4000 yards during darkness, and to open the range when snorting. At daylight Marsaw realized that "closing for identification was easy and I found that a range of 1000 yards was adequate for identification." One problem, however, "is that in the vicinity of fishing vessels, the high concentration of seagulls could be a counter-detection risk. The seagulls are attracted to the periscope and wheel about it vigorously."

Now relatively comfortable in the environment, Marsaw closed the Hague Line. At 1635Z *Ojibwa* detected an American dragger, designated contact 'M02', fishing two miles inside the US side of the line. Marsaw approached to within 900 yards to ascertain its identity, and then withdrew to the line. *Ojibwa* maintained position at about 4000 yards, moving at about 4 knots at a depth of 52 feet. Plotting established that the vessel was trawling on an east-west line stopping just short of the Hague Line, but at 2330Z, in expectation of a transgression, *Ojibwa*'s ops team "stood watch for apprehension of Fishing violator." Sure enough, after night fell the dragger closed the line and at 0013Z 8 March, the OOW noted in his log that "M02 has altered course, believe he is closing the Canadian side. Good night clear, stars out, well lit by moon. Sea state is such as to cover periscope exposure while allowing good depth keeping." Minutes later the American vessel switched off its navigation lights, maintaining only a working light on its fantail. At 0028Z *Ojibwa* fixed it on the Canadian side of the line, and Marsaw "took every SATNAV fix available and then took a visual bearing and radar range"

to track its position. They eventually plotted it 1000 yards across the line and *Ojibwa*'s sonar operators heard it winching in its rake, confirmed by periscope, providing clear evidence of a violation. "Unfortunately," Marsaw wrote in his report, "it appears that at that instant he was less than 1nm inside the Canadian area," therefore outside the enforcement parameters set by the ROEs.

Despite the fact the boat never penetrated a full nautical mile inside Canadian territory, the Fisheries Officer onboard *Ojibwa* was nonetheless tempted to call in the DFO helicopter to make an arrest. It proved fortunate he exercised caution since it soon became apparent that *Ojibwa*'s navigation had been flawed. Summarizing that night's watch in the patrol narrative the OOW observed:

> Although it seemed M02 was violating the Hague Line, due to poor fixing and a significant tidal stream, *OJIBWA* was not where she thought she was. When a sat fix finally did come in, *OJIBWA* and [M02] were both in American water. His navigation is apparently superior to our own. Judging by how often and how close he skirts the Hague Line I would say he knows exactly where he is.

Thus, if the vessel had been apprehended and the case taken to court, *Ojibwa*'s errors in navigation would have fouled prosecution; any positive publicity garnered from the event would have evaporated in the face of acute embarrassment.

Marsaw noted a number of problems responsible for the navigation challenges. Experience demonstrated the tidal set "often exceeded" that predicted in the tidal atlas available in the boat. Loran C "was virtually useless as even occasional mast washover caused chain slippage." SATNAV was the "only navigation aid fitted that would have the continued accuracy needed….The great disadvantage of this method was that a convenient satellite was not always available and only through good luck would one be available coincident with the easternmost progress of the target." Something beyond luck was needed, and Marsaw concluded that "GPS fitted to a workable mast would have been invaluable for an operation of this nature." However, GPS units were then a scarce commodity in the Canadian navy and submarines were well down the priority list.

Ojibwa tracked a variety of contacts over the next 48 hours but was frustrated by additional navigation challenges, equipment breakdowns and the erratic behaviour of fishing vessels. Nonetheless, on 9/10 March *Ojibwa* tracked three American vessels, including one the DFO officer recognized as a repeat violator but it only penetrated 500 yards onto the Canadian side. With AMBUSCADE nearing conclusion, discussion centred on how to achieve the deterrence aspect of the mission. Marsaw recommended that if *Ojibwa* was "unable to firmly establish a violator's pos[itio]n in excess of 1NM inside CAN water PR opportunity should exist to surface near someone who is crowding the line." Headquarters disagreed, concerned that if *Ojibwa* surfaced close to a fishing boat, even if just for photographic purposes, the poacher might get spooked and endanger the submarine. Late on 10 March, CDR Bush informed Marsaw that a group of Canadian fishing vessels were working in the area and "[we] prefer that you use one of these vessels for overt PR photos rather than surprise someone."

An image of *Ojibwa* surfacing alongside a fishing vessel—even if Canadian—would reveal a submarine was patrolling Georges Bank, but, ultimately, more dramatic action was taken. After tracking two American vessels for a few hours, the fishing officer raised them on VHF from the submerged submarine. According to Marsaw's report, the officer "contacted the captains of both vessels by radio and identified himself as a Fishery Officer on board the Canadian submarine *Ojibwa*. He advised the captains their vessels' movements had been tracked over the past few days and he advised the captains if they strayed across into Canadian waters again they would be charged." Minutes later an Aurora punctuated *Ojibwa*'s warning by overflying the two vessels at low altitude. The fishermen were stunned, and their emotionally charged response remains legendary in MARLANT to this day. Personnel in Halifax monitoring the comms network overheard the Americans spreading the warning that a submarine was on Georges Bank, and one fisherman even radioed *Ojibwa* that it was not just he who was guilty of crossing the line. Later, the New Bedford Standard Times newspaper contacted DFO, who gladly expanded upon *Ojibwa*'s role. Canadian media also picked up the story. AMBUSCADE thus became common knowledge and, for a time at least, American fishermen had to assume that a Canadian submarine might be

covertly observing activities along the Hague Line.

AMBUSCADE demonstrated a submarine could locate, track, identify and monitor the activity of scallop draggers, and do so covertly. Moreover, she could not only obtain and record acoustic signatures of fishing vessels, but could tie them to a specific identity, confirmed visually by periscope. This helped to build a contact index similar to that for submarines so that individual fishing vessels could be identified by their unique acoustic signatures. The operation also provided valuable experience for ops teams, especially in building plots in a high density traffic area, a rare opportunity in Canadian waters. AMBUSCADE provided other useful lessons, especially the requirement for precise navigation, and although *Ojibwa*'s SATNAV and LORAN C systems had proved inadequate, a panacea was on the horizon in GPS. In terms of deterrence, there was a short term pay-off since violations of the Hague Line decreased from 33 in 1993 to just one in 1995, but AMBUSCADE proved a one-off and, inevitably, violations rose again. Nonetheless, despite significant training, operational and maintenance demands upon its three boats, the navy retained a willingness to devote precious submarine services to such national missions, and as Part 2 describes, within a year an Oberon embarked upon another fishpat.

INTERVIEW OF LT(SS) TIM MCCOY, USS *GRENADIER* WWII POW

Interviewed by CAPT Mike Pestorius, USN, Ret.

I recently had the pleasure of meeting LT (SS) Charles S. "Tim" McCoy in order to interview him for the Submarine League. Tim (whose nickname derives from a western movie star named Tim McCoy) was born on 12 October 1924 in San Angelo, Texas. He grew up in San Angelo, Dalhart and Lubbock, Texas and graduated from high school in Dallas in 1941. In those days, there were only 11 available years of elementary and secondary education; the twelfth year was added after the war. Tim joined the Navy in November 1941. He was just 17 years old. I asked him why he joined and he replied that "Jobs were hard to get and the Navy was the place to go. You got three meals a day and clean sheets." He decided on submarines immediately upon enlisting. Following boot camp at San Diego, he arrived in Pearl Harbor one week after the December 7, 1941 attack. Submarine School was in New London then, but Tim was sent directly to the submarine tender USS *Pelias* (AS-14), and after a few weeks on the tender he volunteered to join the crew of the new submarine USS *Trout* (SS 202). He came aboard as a torpedoman striker. CDR Frank W. "Mike" Fenno commanded *Trout*.[1]

Trout was at sea on December 7, 1941 making the voyage that became its first war patrol. During its next patrol, Trout was ordered to Corregidor to deliver antiaircraft shells. After offloading the shells, *Trout* needed ballast. Twenty tons of gold and bags of silver pesos, according to Tim McCoy, plus considerable paper money from the Philippine national treasury, were loaded onto the submarine. *Trout* then completed its war patrol with one verified sinking before returning to Pearl Harbor. CDR Fenno received the first of his two Navy Cross awards for this patrol and Tim McCoy and the crew were each awarded the Silver Star. The ship was also awarded the Army Distinguished Unit award and a Presidential Unit Citation. Tim stayed on *Trout* for its next very

successful war patrol, which included a six-hour depth charge attack. During my interview, Tim talked about being depth charged. "You're on silent running and you're just sitting there and everybody is just like this, throughout the entire submarine on battle stations submerged. And you're saying to yourself, is the next one going to get us?"

After the second *Trout* war patrol, Tim was transferred to Perth, Australia where he joined the crew of the USS *Grenadier* (SS-210).[2] During Tim's third *Grenadier* patrol (and the ship's sixth), *Grenadier* was surprised on the surface by Japanese aircraft near Phuket, Thailand and heavily damaged. Losing all power and lighting, the submarine sank in 270 feet of water and settled on the bottom for nearly 24 hours. Against all odds, the crew effected repairs and raised *Grenadier* to the surface just as night was falling. Propulsion was disabled and the ship was unable to dive. The next morning, the crew tried to erect a sail to move *Grenadier* closer to the Malay coast. That effort failed and a Japanese warship detected them. The order was given to scuttle the ship and the crew was ordered to abandon *Grenadier*. On April 22, 1943, their Japanese captors pulled 18-year-old Tim McCoy and 75 shipmates from the water. Initially they were all taken to the Light Street convent, a former exclusive Catholic girls school now transformed to a place of relentless beatings and torture. The *Grenadier*'s commanding officer, LCDR John Fitzgerald, was especially severely treated and he was later separated from the crew. After about five months at the converted convent, Tim and most of his enlisted shipmates were sent to the notorious Changi[3] POW camp in Singapore for four months and then transferred to Japan where they were kept in Third Branch POW Camp Fukuoka.[4] Tim reports that they worked as slave laborers in the Yahata Steel Mills near Sasebo, Japan until the end of the war. Remarkably only four *Grenadier* crewmen died during this ordeal. LCDR Fitzgerald, who Tim described as enduring his harsh treatment very bravely, was awarded the Navy Cross. Tim received the Purple Heart.

Tim had been promoted to Chief Torpedoman by the end of the war. He thinks that he was the youngest TMC in the fleet. I asked what torpedoes he had fired and he recalled the MK 14 and later the "electric" torpedo.[5] He could not estimate how many torpedoes he had helped launch. After the war ended, the liberated sailors were granted 90 days

POW leave. Tim also had an additional 90 days leave saved during the war. Shortly after returning to San Diego he met and married his wife, Jean, also a Texan from Fort Worth. They have been married for 70 years. Tim reports, "Jean was a marvelous homemaker, wife, mother and stood by her man."

After the war, Tim had tours in both San Diego and Pearl Harbor. He served for a time on shore patrol in San Diego and then on USS *Blueback* (SS-326) until it was transferred to Turkey in 1948. He then reported to USS *Blower* (SS-325), which was also transferred to Turkey in 1950. Tim's last submarine was USS *Pomodon* (SS-486) where he was the Chief of the Boat. *Pomodon* was the first submarine converted under the Greater Underwater Propulsion Power Program (GUPPY), which included installation of the snorkel. Tim was commissioned an Ensign in 1958 and served on the USS *Sperry* (AS-12), worked as the Pearl Harbor base security officer, became a deep-sea diver on USS *Chanticleer* (ASR-7) and worked on setting up an early school to instruct Navy personnel about the new nuclear powered submarines that most submariners rightly perceived as the future of the force.

I asked Tim about any particularly memorable people or events in his career. He immediately spoke of the time in July 1954 when Capt. (later RADM) Richard H. O'Kane was relieved as Commanding Officer of the *Sperry* by Capt. (later RADM) Eugene B. Fluckey. It was the only time in Navy history that the author is aware of where a Medal of Honor Winner relieved another Medal of Honor winner.

Tim McCoy retired from the Navy in 1965 and stayed in the reserves to complete his 30 years. He worked in insurance in Austin, Texas and eventually established his own very successful agency. He is still the Chairman of this agency. At the end of my interview, I asked Tim if there was anything he wanted to add. He said, "If I had to go back in the Navy today, I'd go right aboard submarines. Do you know why?"

"Because of the camaraderie, that's why."

"The camaraderie aboard a submarine is just unbelievable. … Back then, we had 72 men on submarines…. some of them had to hot bunk." I replied that today the number on board is closer to 130, but the sense of camaraderie, of knowing everyone on board, has not changed.

Meeting and interviewing Tim has been a great honor and pleasure.

Age has slowed a once formidable physical man (he was a torpedoman after all), but it has not diminished his memory or wit. He lived through two plus years of POW camp and emerged to complete his remarkable 30-year Navy career. It was Tim and men like him who won the war in the Pacific.

ENDNOTES

1. Trout's wartime exploits are thoroughly covered in Silent Victory, by Clay Blair, p206ff, J. B. Lippincott co., Philadelphia, PA, 1975. CDR Fenno's son, Ted Fenno, was a Naval Academy classmate of the author, class of 1961.
2. Silent Victory, p396ff.
3. Changi is now the site of Singapore's International Airport.
4. There are several website devoted to reporting on this camp. The most complete appears to be www.mansell.com/pow_resources/camplists/fukuoka/.../fuk_18_sasebo_main.ht
5. The first electric torpedoes got to the fleet in 1943 and had various MK numbers, MK 18, 26, 27 and 28.

A SWIM CALL IN ADAK

CAPT Leonard Stoehr, USN, Ret.

Shortly after ringing in the New Year for 1957, USS *Greenfish* (SS-351) slid quietly out of her berth at the U.S. Naval Submarine Base and departed Pearl Harbor for what was called a SPECOP. SPECOPs, short for Special Operations, were a routine part of submarine operations during that Cold War period. At the time, I had been on board *Greenfish* for less than eighteen months and she had already successfully completed two since I had reported. I guess the best way to define them is as information gathering missions off the coast of the Soviet Union.

When *Greenfish* got underway, my assignment was as Electronics Officer and I believe that I was also the Communications Officer. I had recently been promoted to Lieutenant and had also recently been designated Qualified in Submarines. I believe that I was the fourth senior officer, of a total of eight, on board under the C.O., Jack Knudsen; the X.O., "Mac" McKenzie; and the Senior Watch officer and OPS/NAV; Nevin Kennedy.

The mission proceeded normally for about a week in generally heavy seas. We were south of the Aleutian Islands when our Chief Hospital Corpsman diagnosed one of our electricians with acute appendicitis. The man was in considerable pain, and a decision was made to proceed to Adak Island to put the patient ashore for treatment. Course was adjusted to head for Adak. The weather deteriorated and we were navigating by Loran and soundings due to heavy fog. We made radar landfall during the midwatch, arrived in the harbor at Adak during the early morning hours, and tied up at a pier using only a bow and stern line. Adak is a small but very mountainous island with a well-protected small harbor, a landing strip, and a Navy complement at the time of an estimated 500 people. A striking aspect of the pier side was a large number of very large Alaskan Malamutes running free in the area and on the pier. The

air temperature was cold, in the thirties, but I don't remember very much, if any, snow. Water temperature was 38 degrees Fahrenheit and I will never forget that figure.

When on a SPECOP, submarines did not carry their normal complement of mooring lines since we didn't expect to enter port until we returned to Pearl Harbor. Mooring lines were normally stored in the free-flooding superstructure of the ship and were considered a source of noise. Therefore the bow and stern spring lines had been left ashore at Pearl, and the bow and stern lines were stowed below decks in the forward and after torpedo rooms respectively. To save time, only the needed portions of these lines were led topside through the upper torpedo room hatches and the remaining portions were kept below in their storage areas.

In another time-saving measure, the ship was not rigged for surface when we entered port. Since we were not expecting to remain in port more than the time that would be needed to offload our sick crew member, a number of short cuts were taken to help speed us on our way. For instance, underway watches remained set. I was the O.O.D. (Officer-of-the-Deck) for either the 0400-0800 or the 0800-1200 watch and was the O.O.D. when we arrived. I remember that the pier was very high and a crane was needed to bring in a long brow. Even with the long brow, the pathway leading from the foredeck to the pier must have described at least a thirty-degree upward angle and we had to pull ourselves up the brow when leaving the ship.

During our entry to port, the bow line handlers reported an unusual rattle in the superstructure. After mooring, an inspection of the superstructure revealed a torn section of aluminum superstructure in the vicinity of the bow planes near the water line. Since further tearing might interfere with the operation of the bow planes, a decision was made to remove the torn section. Because the ship was still rigged for dive and all fuel ballast tanks were full, the torn section was beneath the water surface by about a foot. The cutting was to be done by an oxyacetylene cutting torch so the section of damaged steel would need to be brought above the surface to work on it. At about this time, I was relieved as O.O.D. and went below. None of the officers had had much sleep during the previous night, so I grabbed something to eat in the wardroom and

crawled into my bunk for a short rest before we would be getting underway again.

I was awakened a short time later by the sounding of the collision alarm and the tipping of the bunk toward the stern. I would estimate that the up-angle on the ship was about twenty degrees. I don't remember how I got topside but, when I did, I could see that the after deck was beneath the surface from the stern to about the forward bulkhead of the maneuvering room. I went aft of the sail and saw TM1 (later ENS) Vernon Speed in the water near the position of the upper after torpedo room hatch. You could tell where the hatch was because air was bubbling up from the open hatch. Speed was pulling the bitter end of our stern line from the hatch opening. Somehow this part of the line was passed to the pier and the hatch was finally cleared. At about this time, we learned that one of our third class IC men (I believe his name was Fitch and will call him that from now on) was trapped in the flooded after torpedo room.

The flooding happened as a result of trying to raise the bow to permit the cutting torch to get at the torn section of superstructure. As I remember, the method used to achieve this goal was to cycle the after ballast tank (MBT#6) vents under the supervision of the O.O.D. on the bridge and the X.O. in the Control Room. The O.O.D. ordered the vents to be cycled via the Bridge intercom, the Chief-of-the-Watch quick-cycled the vents, and reported completion to the O.O.D. This was apparently done several times. As the stern of the boat increased its depth upon the loss of ballast in the after tanks, somehow the water came up far enough to begin spilling into the open upper after torpedo room hatch.

When the water began to enter the after torpedo room, the leading torpedoman-in-charge of the room, a TM1(SS) who was present in the room, ordered everyone to clear the room via the hatch in the forward bulkhead. He opened all of the bilge valves, checked the bunks to insure that everyone was out, and then proceeded into the maneuvering room himself. At this point, a large amount of water was coming through the upper hatch, covering the deck, and approaching the lower lip of the forward bulkhead hatch. As the TM1 was about to shut the hatch, he turned to give the room a final check and saw the head of IC3 Fitch peering over the edge of his bunk. (The after torpedo room had one bunk in the center of the overhead under the torpedo loading hatch. This bunk was general-

ly called the "Honeymoon Suite" and, because of its inaccessibility, was usually assigned to one of the smallest and most junior men in the room.) When the TM1 had ordered the room cleared, he had checked the bunks but, due to its location, he could not see into the honeymoon suite. Due to the small size of its occupant, the bunk did not sag as it would have with a larger size man in it. Because of the high water level, it was too late to get Fitch out of the room. He ordered Fitch to stay in his bunk, shut and dogged the hatch, and turned on the emergency salvage air. He then reported that Fitch was trapped to the O.O.D. via the sound-powered talker who was on watch in the Maneuvering Room.

(I have just mentioned "dogged the hatch." Submarine hatches are held shut by a set of heavy steel fingers mounted around the hatch's edge. These fingers are called "dogs." They are operated by either a lever or handwheel mounted at the center of the hatch.)

The knowledge that one of our crew members was trapped in the flooded room lent a feeling of tension and crisis to the ongoing operations aimed at getting the ship back to normal. As soon as the mooring line was cleared from the hatch, the next problem was to get the hatch shut so that the salvage air now being fed to the room could begin to drive the water out. At the time that the line was cleared, the hatch was about five to six feet below the surface. All of the upper hatches except the torpedo loading hatches in this class of submarine were spring-loaded to stand fully open when they were not dogged shut. An auxiliary latch could hold the hatch open by about an inch working against the force of the spring that functioned to keep it open.

One of our first-class Enginemen was a big, brawny man about six feet tall and weighing in at about 250. His name was Smith, and, as usual in the Navy, was often called Smitty. Smith and I volunteered to try to shut the hatch. Our plan was to walk down the sloping deck to the hatch. The hatch's position was clearly marked by the fountain of air that was now being emitted due to the salvage air that was being fed into the room to supply Fitch with oxygen and keep an air bubble in the room's overhead space. When we got to the hatch, I was to go under water and push the hatch shut so that Smith could stand on it while I dogged it shut. The first part of the plan worked well. I was able to push the hatch shut and Smith was able to get on it. However, it was difficult for Smith to

stay on it because the air pressure coming out of the room was acting to force the hatch open. It was also causing random currents in the water that made Smith's balance precarious. When we would get him into position on the hatch, I would take a breath and go into a handstand with Smitty holding my legs while I tried to dog the hatch. We attempted this several times but I was unable to get the dogging wheel to move. After one of these attempts, Nevin Kennedy waded into the water behind us. He came up to me and made a counter-clockwise signal with his hands. I understood that he was telling me that the dogging wheel had to be turned counter-clockwise to shut it. This was because it was on the outside of the ship and operated in the reverse of the normal clockwise closing action from below decks. I immediately went down again and had no trouble dogging the hatch shut. What an embarrassment for a recently qualified officer.

Once the hatch was shut, the pressure of the salvage air was added to the suction of the bilge pumps to clear water from the after room. It seemed to be no time at all before that infamous hatch was above the surface. As soon as the hatch and the trunk below it was cleared of water, the hatch was opened, and the C.O., Jack Knudsen, went down the ladder into the dark and still mostly flooded room. He called to Fitch and got an immediate answer. At this point, Fitch was still in his bunk and was still dry. The salvage air bubble had surrounded him for the whole time. He now dropped out of his bunk, into the water, and came up the ladder with the C.O.

For many years afterward, I was unable to think of this day's experiences without tears coming to my eyes and I have experienced the same reaction even now as I write about it. I remember meeting Vern Speed in the forward torpedo room about an hour after Fitch was freed. We both leaned against each other and sobbed.

Fitch had served in destroyers before reporting to *Greenfish*. After this incident, he often said that he was certain that if he had been trapped in a similar fashion on a destroyer, he would have died because too few of his shipmates would have known what to do to rescue him. In the ensuing months, he qualified to wear dolphins in near-record time. Ironically, less than two years later, he and his wife died in the crash of a light plane while on leave in Hawaii.

WHY THE *SCORPION* PROPELLER AND SHAFT SEPARATED FROM THE HULL

Mr. Bruce Rule

Bruce Rule analyzed acoustic detections of the loss of the USS *Thresher* (SSN 593), testified before that Court of Inquiry, and subsequently was the lead acoustic analyst at the Office of Naval Intelligence for 42 years. In 2008, confirmed the USS *Scorpion* (SSN 589) was lost because the main battery exploded. (1) In 2009, established - for the first time at any security level - that the GOLF II Class Soviet SSB (K-129) was lost because two R-21/D4 ballistic missile fired sequentially to fuel-exhaustion within in the pressure-hull, killing the crew and causing enormous structural damage. (2)

BACKGROUND

In 2008, Daniel McMillin (1929-2015), an electrical and mechanical engineer who was part of the AT&T Bell Labs "brain trust" involved in the development and evolution of the Navy's Sound Surveillance System, provided the author with a three-minute tape recording of acoustic signals produced by the loss of the USS *Scorpion* as detected at a range of 821 nm by a single hydrophone located near the island of LaPalma in the Canary Archipelago.

DISCUSSIONS OF ACOUSTIC DATA

Analysis of that recording confirmed the *Scorpion* pressure-hull collapsed at a depth of 1530-feet (680 psi) at 18:42:34Z on 22 May 1968 while the more pressure-resistant torpedo tubes survived within the wreckage to collapse at depths of 3370-, 3750-, 3810-, 3950-, 4510-, and 4750-feet. (1)

In 2017, refined analysis of those data identified - for the first time - the temporal asymmetry of the compression and expansion phases of the

acoustic signal (bubble-pulse) produced by the collapse of a submarine pressure-hull. The duration of the compression phase of the *Scorpion* hull-collapse was 0.037s ((37 milliseconds (ms) or 1/27th of a second)) while the duration of the expansion (rebound) phase of the noise-radiating bubble-pulse was about 190 ms.

Temporal asymmetry exists between the compression and expansion phases of the bubble-pulse acoustic signal because the duration of the collapse phase is truncated by the collapse phase pressure wave encountering the compacting mass of the hull and internal structures whereas the expansion phase terminates less abruptly when the falling pressure of that expanding wave and its momentum are overcome by the ambient pressure at the collapse depth.

DISCUSSIONS OF IMAGERY OF THE SCORPION WRECKAGE

Extensive imagery obtained of the *Scorpion* wreck by the US submersible *Trieste* confirmed the engine room had symmetrically "telescoped" 50-feet forward when the cone-to-cylinder transition junction failed between the auxiliary machine space and the engine room. The propeller shaft - with the propeller still attached - was found to have separated from the after section of the hull. It fell separately to the bottom at a depth of 11,100-feet.

Whether loss of the propeller shaft caused the loss of *Scorpion* or was the result of collapse of the pressure-hull at great depth has been a subject of continuing debate.

CONCLUSION

As discussed above, analysis confirmed the duration of the collapse phase was 1/27th of a second (0.037 seconds), a time within which the telescoping after hull sections traveled 50-feet, values that require an average velocity of about 900 mph. The velocity of the intruding water-ram which produced that compressive force was 2000 mph.

It was this enormous axially-aligned forward vector - opposed (primarily) by inertial forces (a body at rest tends to stay at rest) acting on

both the shaft and the propeller, and (secondarily) by the resistance of the water acting on the effective blade area of the propeller that tore the shaft - with the propeller still attached - from the thrust block and out of the submarine where it fell separately to the bottom to be imaged near the telescoped after hull sections by *Trieste*. Imagery also showed the retention flange of the shaft was separated from the body of the shaft. Basically, the after sections of the *Scorpion* accelerated forward (away from) the propeller and its attached shaft at 900 mph leaving the unsupported shaft to sink to the bottom.

This assessment resolves the long-standing issue: was loss of the propeller shaft the cause or the result of the loss of the USS *Scorpion*? The acoustic data confirms it was the result of collapse of the pressure-hull.

An alternate explanation - that the propeller had lost ("thrown") a blade and the resulting rotational imbalance separated the shaft causing the loss of *Scorpion* - is disproven.

ENDNOTES

1. "WHY THE USS *SCORPION* (SSN 589) WAS LOST." Nimble Books LLC, ISBN 978-1-60888-120-8, 31 Oct 2011

2. THE SUBMARINE REVIEW, Spring 2012 (Pages 98-105), "Russian SSBNs – A 'Dead Man' Launch Capability?"

SUBMARINE NEWS FROM AROUND THE WORLD

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From the April 2017 Issue:

TAIWAN

Submarine Program Announced/Agreement Signed with CSBC

On 06 April 2017, the Republic of China Navy (ROCN) formally announced its plan to build up to eight dieselelectric submarines under the Indigenous Defense Submarine (IDS) Program. The announcement follows the 21 March 2017 agreement signed between the Ministry of National Defense (MND) and China Ship Building Corporation (CSBC) and Chung-Shan Institute of Science and Technology (CSIST). The contacts were signed at the Zuoying Naval Base in the presence of President Tsai Ing-wen and Defense Minister Feng Shih-kuan.

CSBC will be the builder of the eight hulls and CSIST is tasked with the development of the combat system. CSBC established a submarine development center in August 2016. The program is currently in the design phase that began in 2016 under a US$65.6M contract. The design phase is now expected to last around four years.

Although there is much speculation concerning the actual design, it is expected to displace around 1,500 tons. The initial requirement called for a displacement range of 1,000-2,000 tons. Various sources indicate that the ROCN is expected to request its initial US$4.9B (construction phase) in 2017-2018 for the first four units indicating a Request for Proposals (RfP) date in 2019 and a construction start date around 2020.

Defense officials have indicated a desire for the entire class to be delivered in an eight year span although AMI believes it will take at least eight to ten years for the first four units to be completed as CSBC has never built submarines (long learning curve) and they will require a significant amount of foreign design/construction assistance and weapons

development assistance throughout the entire build process.

There is no doubt that the ROCN, CSBC and CSIST will receive construction advisory services from US companies as well as the purchase of all major engineering, sensor and weapons systems from US sources (and possibly others) as the program progresses. Whether all of those requests will be fulfilled is uncertain although likely. In the event that the ROCN does not receive all the required systems assistance for the program; then CSIST will be relied up to develop those systems indigenously, which could have an impact on the timeline.

Assuming that the construction phase begins in 2020, the first four units will probably enter service between 2028 and 2030. Assuming that the final four units are funded and built, they could begin as early as 2028 delivering in the late 2030s.

Additional information on this project can be obtained by contacting Pat Bright at AMI International (Tel: + 1 757 963 7719 or E-mail: pbright@amiinter.com) or by visiting the Future Submarine (Indigenous Defensive Submarine) project report at: http://amiinter.com/wnpr/projects/project.php?newcontID=299&countryID=60.

JAPAN

Jinryu (Modified Soryu) Class Diesel Electric Submarine (SS)

On 13 March 2017, the MSDF's second Jinryu class diesel electric submarine (SS), JS *Sekiryu* (508), was commissioned.

AMI estimates that eight units of the class will be built through 2023.

ALGERIA

Kilo (636) Class Submarine

On 14 March 2017, the first of two Kilo (636) class submarines for the Algerian National Navy (ANN) was launched from Russia's Admiralty Shipyard in St Petersburg. It is scheduled to be delivered to the ANN by 2018.

The second unit is currently under construction and will be launched in 2018 and delivered in 2019. Both units were ordered in 2014 in order to replace two Kilo 877Es that were procured from Russia and delivered in the late 1980s.

When the order is complete, the ANN will have four Kilo 636s in

service. The first two were delivered in 2010 to supplement the two 877Es until the two remaining 636s are delivered in 2018 and 2019, at which time the two 877Es will be decommissioned.

NORWAY

Kongsberg, TKMS and Atlas Elektronik Team for Submarines

On 3 February 2017 the Norwegian Government announced that Germany was chosen as their strategic partner for new submarines and that Norway has entered into negotiations with ThyssenKrupp Marine Systems (TKMS).

Following this decision, Kongsberg, TKMS, and Atlas Elektronik entered into a comprehensive teaming agreement on 9 March 2017. As part of this agreement, the three partners will form a company that is to be based in Norway that will be responsible for the development, production, and maintenance of combat systems for new and existing submarines.

With the Royal Norwegian Navy's (RNoN) submarine program expected to see a Request for Proposals (RfP) released in 2017, this teaming agreement is especially important to the nation and should ensure a smooth procurement process for the planned six-unit class.

NAVAL SHIP DESIGN DEVELOPMENTS

NETHERLANDS - Ortega Submersibles Mk. 1C

On 27 January 2017, Ortega Submersibles of Enschede, the Netherlands released the specifications of their Standard Mk. 1C swimmer delivery vehicle (SDV) that is being planned for the Royal Netherlands Navy (RNlN) six-unit SDV program that will begin by the end of 2017. The Mk. 1C design has the following specifications:

- Length 650cm (21.3ft)
- Width 155cm (5.1ft)
- Beam 115cm (3.8ft)
- Dry Weight 350kg (771.6 lbs)
- Operational Weight (less crew) 490kg (1080.3 lbs)
- Range 80nm
- Surfaced Speed 8.5 knots
- Submerged Speed 10.2 knots

Ortega Mk. 1C

They are powered by four Hancell 378i Li-ON batteries that provide 155 Volts DC to two 10kW (13.4hp) propulsion thrusters, one 4kW (5.4hp) bow thruster, and one 4kW (5.4hp) trim thruster. They are equipped with a graphic user interface for control and navigation and have optional GPS chart reference and wireless communication systems.

Each unit is equipped with an EPIRB, rescue buoy, and towing cable and comes with a transport container and custom transport trailer plus a 120 Volt AC charger unit to replenish the batteries and a spare parts kit.

MODERNIZATION AND SHIP TRANSFER

SOUTH AFRICA - Frigate and Submarine Upgrades

On 11 March 2017, ThyssenKrupp Marine Systems (TKMS) of Germany and Denel of South Africa signed a Memorandum of Understanding (MoU) to collaborate on modernization efforts for the South African Navy's (SAN) four Valour class frigates and three Heroine class submarines.

The four frigates and three submarines were built by Germany's TKMS and are in need of their mid-life upgrades. Denel's Maritime Division will take responsibility for maintenance and upgrades on the three submarines and four frigates. The upgrades will be done at Naval Dockyard Simon's Town.

The agreement provides the framework for TKMS, as the Original Equipment Manufacturer (OEM) of the four frigates and three submarines commissioned from 2005 through 2008; to provide technical and

shipyard support as subcontractors to Denel. It will include quality insurance and procurement, onsite technical support, transfer of technology and the development of a local supply chain in South Africa. Denel's technical personnel will be trained in Germany.

The modernization efforts of both the frigates and submarines have faced continuing delays although it appears that the SAN is now laying the framework to move forward.

SAS *Manthatisi* is the first of South Africa's Type 209 submarines to be overhauled in Naval Dockyard Simon's Town, thereby establishing this capability in the navy. The inordinate length of the overhaul is indicative of the SAN having to establish the processes and procedures, logistics support and work package for *Manthatisi* (to include follow-on units) and complete the work at a local shipyard with nominal foreign assistance.

Delays in obtaining spares have also contributed to this refit delays. However, the joining of TKMS and Denel in the modernization effort will now correct the deficiencies as evidenced in the first submarine upgrade.

The key with the frigate and submarine upgrades will depend on receiving the funding required, which has been elusive over the past several years.

Additional information on this article and the South African Navy (SAN) modernization activities can be obtained by contacting Pat Bright at AMI International (Tel: + 1 757 963 7719 or E-mail: pbright@ami-inter.com) or by visiting the Modernization Report at: http://www.ami-inter.com/wnpr/country/view-country.php?countryID=57.

RUSSIA - Oscar II Class Nuclear Power Guided Missile Submarine (SSGN)

On 07 March 2017, AMI received information that the VMFR's eight remaining Oscar II class SSGNs will continue a mid-life combat systems refit that includes:

- Hull modification, maintenance and repair.
- Upgrades to auxiliary and shipboard control systems.
- Installation of Omnibus-M combat information system.

- Replacement of Granit surface-to-surface missile system with P-800 Oniks and 3M54 Klub missiles, includes replacement of Granit missile tubes with a standard launch tube for Oniks and Klub missiles.
- Replacement of Type 40 torpedoes with the UGST and SAET 60M dual-purpose torpedoes.
- Replacement of Snoop (series) navigation radar.
- Replacement of Shark Gill hull mounted sonar, Shark Rib flank sonars and Pelomida towed sonar array.
- Replacement of Rim Hat electronic support measures (ESM) suite. eplacement of periscopes.

As per information received in March 2017, all eight of the units will receive further upgrades and re-designated as Project 949AM class SSGNs. All eight Oscar IIs (as listed above) are expected to receive additional modifications by 2020. The total cost of this modernization program is around US$2.9B with shipyard, hull and design modification requirements or US$179M per vessel.

The Oscar IIs will significantly improve their anti-ship/land attack capabilities by increasing the missile load out from 24 Granit missiles to a combination of 72 Oniks and Klub surface-to-surface missiles on board each submarine.

The Oscar IIs having been commissioned between 1988 and 1996 were used very little during the tumultuous years leading up to and following the fall of the Soviet Union in 1991. This combat systems upgrade, incorporating stateof-the-art weapons and systems, will take advantage of the available service life in these submarines.

Additional information on Russian Navy (VMFR) modernization activities can be obtained by contacting Pat Bright at AMI International (Tel: + 1 757 963 7719 or E-mail: pbright@amiinter.com) or by visiting the Decommissioning/Transfers/Receipts Report at: http://amiinter.com/wnpr/country/view-country.php?countryID=54.

BANGLADESH - Ming Class (Type 035G) Diesel-Electric Submarines (SS)

On 06 December 2013, AMI received information that the Bangladesh Navy (BN) ordered two submarines from China, probably of the

Ming class (Type 035G). The deal was worth US$203.5M, which included an overhaul and crew familiarization prior to transfer. The BN will make payments through the end of 2017 with delivery that was originally scheduled for 2019.

However, in May 2014, AMI received information that the People's Liberation Army Navy (PLAN) recently decommissioned two units of the Ming class. A Chinese spokesman indicated that the two units would be transferred to the BN by early 2017 rather than two other units that were originally selected for transfer in 2019. Both units were transferred on 15 November 2016 and renamed *Nabajatra* (*New Journey*) and *Joyjatra* (*Victorious Journey*). The transfer took place at Nan Shipyard in Dalian. Both units were officially commissioned into the BN on 12 March 2017.

The procurement of submarines is part of the three dimensional naval force consisting of air, surface and subsurface units announced by the Minister of Defense in 2009. The procurement of the Ming class boats is probably also the first step in the development of the BN's undersea service although it will be many more years before the BN can afford more modern used or new construction submarines.

Additional information on this article and the Bangladesh Navy's (BN) receipt activity can be obtained by contacting Pat Bright at AMI International (Tel: + 1 757 963 7719 or E-mail: pbright@amiinter.com) or by visiting the Decommissioning/Transfers/Receipts Report at: http://www.amiinter.com/wnpr/country/viewcountry.php?countryID=6.

From the May 2017 Issue:

UNITED KINGDOM

Contract Modification in Place for Astute SSN Hull Six

On 28 April 2017, BAE Systems launched the fourth of seven planned Astute class nuclear-powered attack submarines (SSN), being built for the Royal Navy (RN), at their Barrow-in-Furness shipyard. HMS *Audacious* is currently scheduled to commission in 2018.

This launching follows the news that on 22 April 2017, the Unit-

ed Kingdom (UK) Ministry of Defence (MoD) negotiated a new £1.4B (US$1.8B) contract with BAE Systems for the construction of the sixth Astute class, HMS *Agamemnon*.

The new contract is geared at getting a better deal for UK taxpayers and the Armed Forces by including an incentivized contract arrangement that will help save money as well as get the most out of the shipbuilding industry.

Construction of the 97m (318.2ft) 7,400 ton *Agamemnon* began in 2012 and is well underway, alongside the fifth boat, *Anson*. The current construction schedule for the remainder of the class is as follows:

Name	Laid Down	Launched	Commissioned
HMS *Anson*	13 Oct 2011	2016	2020
HMS *Agamemnon*	18 Jul 2013	2018	2022
HMS *Ajax*	2015	2020	2024

The seven boats of the Astute class are about 50 percent larger and offer much greater firepower than their predecessor, the Trafalgar class. They will be replacing the Trafalgar class on a one for one basis, three of which have already been decommissioned and replaced with the first three Astute class boats; HMS *Astute, Ambush*, and *Artful*.

Additional information on this project can be obtained by contacting Rick Dorn at AMI International (Tel: + 1 360 674 6494 or E-mail: rdorn@amiinter.com) or visiting the Astute Class Nuclear-Powered Attack Submarine (SSN) Project Report at: http://amiinter.com/wnpr/projects/project.php?newcontID=550&countryID=67.

EGYPT

S-41 (Type 209) Class Submarine

On 19 April 2017, the Egyptian Navy (EN) took delivery of its second (*S-42*) of four Type 209 class submarines from Germany.

S-42 arrived at Egypt's Ras al-Tin Naval Base. The submarines were built at Germany's ThyssenKrupp Industrial Solutions (TKIS) HDW Shipyard. Two additional units (*S-43* and *S-44*) are currently construction at TKIS and will be delivered to the EN by 2020.

Additional information on the Africa Region can be obtained by contacting Pat Bright at AMI International (Tel: + 1 757 963 7719 or E-mail: pbright@amiinter.com) or visiting AMI International's website at: http://www.amiinter.com.

UNITED STATES

L3 Technologies Acquires OceanServer Technology

On 4 April 2017, L3 Technologies announced that they had completed the acquisition of OceanServer Technology on 17 March 2017. The Massachusetts based company develops and manufactures autonomous, lightweight unmanned underwater vessels (UUV).

According to L3 Technologies, the OceanServer UUVs are operated by a number of customers, including the military, and they will compliment L3's sensor and communication systems, as well as its integrated intelligence, surveillance, and reconnaissance (ISR), mine countermeasures (MCM), and anti-submarine warfare (ASW) portfolio.

The acquisition will position L3 to support the US Navy's vision for the tactical employment of UUVs as well as positioning the company with a technological capability in one of the biggest growth areas within militaries around the world.

Additional information on these articles can be obtained by contacting Rick Dorn at AMI International (Tel: + 1 360 674 6494 or E-mail: rdorn@amiinter.com).

MODERNIZATION AND SHIP TRANSFER

RUSSIA - Kirov (Orlan) (Project 1144.1/2) Class Nuclear-Powered Cruisers (CGN)

As early as late 2009, the Russian Navy (VMFR) had plans to modernize and reactivate at least three of the Kirov class nuclear-powered cruisers. Currently, only one is operational, RFS *Pyotr Velikiy* (099). In 2013, RFS *Admiral Nakhimov* (085) (*ex-Kalinin*) entered Sevmash Shipyard for refit with an expected departure date of 2018. Information received indicates that the ship's in service date will slip until 2022. The third Kirov class cruiser, RFS *Admiral Lazarev* (ex-*Frunze*) was originally commissioned in 1984 and decommissioned in 1998.

From the June 2017 Issue:

SINGAPORE

Additional Type 218SG Submarine Ordered

On 16 May 2017 (at the International Maritime Defence Exhibition and Conference (IMDEX) Asia 2017), the Republic of Singapore's Defence Minister Ng Eng Hen announced that the Republic of Singapore Navy (RSN) would acquire two additional Type 218 Diesel Electric/Air Independent Propulsion (AIP) submarines from ThyssenKrupp Marine Systems TKMS) of Germany.

The two additional hulls will be delivered in 2024 and 2025. The first two units of the class are currently under construction in Germany at Kiel. The first unit started construction in June 2015 and is currently being outfitted and unit two is now under construction. The first unit will be delivered to Singapore in 2021 and unit two in 2022. Units three and four will probably begin construction in 2019 and 2020 in order to meet the 2024 and 2025 commissioning dates.

RSN officials also confirmed that units three and four would have minor upgrades to their combat systems to make up for the 10-year delay between the first two units and the final two. The upgrades probably include the latest software changes on all of the sensors and weapons.

TKMS will also provide in service support (not yet contracted) for the four submarines in partnership with domestic Singaporean industrial partners. Once complete, the four Type 218s will supplement the two Archer class submarines currently in service and will apparently maintain a six-hull submarine fleet as envisioned by the RSN. The Archer class will apparently be for territorial operations and the Type 218s for ocean going operations.

The remaining Challenger class submarines will be decommissioned when the first two hulls are delivered in 2021 and 2022.

Additional information on this project can be obtained by contacting Pat Bright at AMI International (Tel: + 1 757 963 7719 or E-mail: pbright@amiinter.com) or by visiting the Type 218SG Diesel Electric/AIP Submarine Project Report at: http://amiinter.com/wnpr/projects/project.php?newcontID=880&countryID=68.

MYANMAR

Considering a Submarine Force

On 04 May 2017, AMI received information that the Myanmar Navy (Tatmadaw Yay (TY)) was considering the development of a submarine force to counter other navies in the region that are continuing to procure submarines. This information confirms local press reports that senior navy officials were considering such a plan. There is growing concern within the Ministry of Defence (MoD) and navy circles that submarines are becoming a necessity to counter growing submarine forces in the region by India, Bangladesh, Thailand, Indonesia, Thailand and Malaysia.

Although there is a desire, sources do indicate that a submarine program would be difficult to finance as the TY is already involved in various acquisitions of surface vessels including Aung Zeya/Modified Aung Zeya class frigates, Anawratha class corvettes, Inle class Offshore Patrol Vessels (OPVs), and two types of Fast Attack Craft (FAC). The majority of these vessels are being built in country with assistance from China, their primary supplier.

If the TY would move forward with such a plan, AMI envisions that China would most likely be the supplier due to its historical supply chain ties to Myanmar in addition to lower cost systems and financing arrangements. The submarines would be built in China as Myanmar does not have the ability to build submarines although they have moved forward in the area of indigenous surface ship construction in recent years with China's help.

Similar to Bangladesh, the TY could procure used submarines from China with new construction hulls coming at a later date. AMI estimates that if submarines are procured by the TY, it would probably be after 2020 as the sea service will be involved in its current construction programs into the late 2020s. Follow-on new construction hulls could follow in the late 2020s/early 2030s with China providing the building location, hull design and financing. The initial requirement would probably be for two submarines. Any increase in hulls numbers would probably be determined by future submarine force levels in the region.

In regards to subsystems, used vessels would be 100 percent Chinese although new builds could be a mixture of Chinese, Indian and to a lesser extent Western systems. Western and Indian systems are slowly

appearing on TY surface units and could follow suit on Chinese-built new construction submarines as well.

Additional information on Myanmar can be obtained by contacting Pat Bright at AMI International (Tel: + 1 757 963 7719 or E-mail: pbright@amiinter.com) or by visiting the Myanmar Country Report at: http://amiinter.com/wnpr/country/view-country.php?countryID=76.

INDONESIA

STM/TKMS Industrial Team Offering Indonesian Submarine Solution

On 10 May 2017, at the 13th International Defense Industry Fair (IDEF) 2017 in Turkey, Turkish company STM and Germany's Thyssen-Krupp Marine Systems (TKMS) signed a Letter of Intent (LoI) to cooperate in building a variant of the Type 214 submarine for the Indonesian Navy (Tentara Nasional Indonesia Angkatan Laut (TNI–AL)).

Through a Joint Venture (JV) with STM, TKMS will partner with Turkey's Golcuk Shipyard for the construction phase. Golcuk Shipyard is building the six Turkish Naval Force's (TNF) Type 214 (Reis class) submarines. Under the LoI, Golcuk will build the first one or two hulls with follow on units being built in Indonesia. This assumes that the LoI results in an actual construction contract.

The new STM/TKMS JV Type 214 is the latest offering by international suppliers for additional submarines for the TNI-AL. STM/TKMS joins Saab Kockums, DCNS and Russia in looking to provide Indonesia in its quest to procure additional submarines as it attempts to increase its force levels to a minimum of 12 hulls (24 hulls over the long term).

The TNI-AL is currently involved in a three-hull purchase of the Improved Change Bogo (Type 209) through South Korea. The first unit is being built at Korea's Daewoo Shipbuilding and Marine Engineering (DSME) and is expected to be delivered to Indonesia by the end of 2017. Unit two is being split-build at DSME and Indonesia's PAL Shipbuilding (PT PAL) in Surabaya and expected to be completed by the end of 2018. Unit three will be built entirely at PAL and delivered in 2019.

It can be expected that the Type 214 design or any of the other previous offers are enacted, will have the first unit built at the foreign yard with the Indonesian units being built at PAL Surabaya. Although the

exact number of hulls being planned is not known publicly, the TNI-AL continues to call for a force of 12 hulls (minimum). Currently, there are two 1980s vintage Type 209s in the sea service (and recently overhauled in South Korea) with three newer units expected through 2019. This leaves the TNI-AL short by seven hulls just to meet its minimum planned force levels. That number would increase by at least two hulls as the older Type 209s will need to be retired as the new hulls enter service.

It is uncertain as to why Indonesia is continuing to search for new designs as the Chang Bogo class is fairly modern. It is possible that Indonesia wants to open a second supply line in order to support their indigenous construction goals of building all types of vessels in country. They also gain access to yet another supply line of weapons and sensor systems. Although an LoI is in place, Indonesia still retains the right to entertain other offers until an actual contract is in place and AMI estimates that the TNI-AL may be doing just that.

Additional information on Indonesia can be obtained by contacting Pat Bright at AMI International (Tel: + 1 757 963 7719 or E-mail: pbright@amiinter.com) or by visiting the Indonesia Country Report at: http://amiinter.com/wnpr/country/view-country.php?countryID=27.

DID YOU KNOW?

UNITED STATES - On 26 May 2017, the United States Navy (US) accepted delivery of its 14th Virginia class nuclear powered attack submarine (SSN), USS *Washington* (SSN 787), at Huntington Ingalls Industries (HII) Newport News Shipyard.

MODERNIZATION AND SHIP TRANSFER

From the Desk of the Vice President of Market Intelligence

Naval Vessel Transfers: Increasing Focus on the Asia-Pacific Region

The sale or transfer of retired naval vessels is a longstanding practice and key element of defense and foreign policy of many countries. For example, the United States transfers retired ships such as the Oliver Hazard Perry class frigates through the Excess Defense Articles (EDA) program administered by the Defense Security Cooperation Agency (DSCA), and legislation such as the Naval Vessels Transfer Act. The Royal Navy has sold Type 22 frigates to Chile, Romania and Brazil. Russia's sale of an

aircraft carrier 20 years ago marked the beginning of China's aircraft carrier construction. Further, dozens of ex-Soviet and Russian naval ships are operated by navies across the world.

As detailed in this month's Ship Modernization and Transfer newsletter, the Asia-Pacific (A-P) region is an area where naval ship transfers increasing. Many of those transfers come from countries such as Japan, China and the Republic of Korea (ROK) that have not historically been significant sources of used naval ships. As shown in the table below, ship types offered range from frigates to OPVs, to amphibious ships and even submarines:

From	To	Number	Class	Type	Status
ROK	Philippines	3	Pohang	FFG	Offered
Japan	Malaysia	2	Nojima	OPV	Transferred
U.S.	Taiwan	2	Perry	FFG	Transferred
U.S.	Philippines	3	Hamilton	OPV	Transferred
U.S.	Vietnam	1	Hamilton	OPV	Transferred
Italy	Bangladesh	4	Minerva	Corvette	Sold
Australia	Papua New Guinea	1	Balikpapan	LCH	Transferred
Australia	Philippines	5	Balikpapan	LCH	Transferred
China	Bangladesh	2	Ming	Sub	Transferred

AMI continues to report on the steady modernization and growth of Asian-Pacific navies such as China, Korea, and Japan over the past 25 years. As those navies continue to invest in newer ships and systems, it is not surprising to see that the ships retired from their fleets are attractive candidates for transfer elsewhere in the region. Many of these ships have 10-20 years (or more) of service life remaining. They are welcomed as costeffective additions to smaller and regional navies and coast guards trying to grow and modernize their maritime force structures, usually under strict budget constraints. Ship transfers enable recipient countries like Vietnam and the Philippines to become better equipped to meet the increased demands on their maritime forces in a changing regional security environment. This in turn serves both national and regional strategic goals.

AMI has tracked and reported on ship transfer trends worldwide for over 30 years. Our proprietary data on this sector of the naval market is extensive and detailed. As highlighted in the table below, taken from one

of our recent consulting studies, our Existing Ships Data Base (ESDB) provides the baseline to anticipate future ship transfers and modernization opportunities among the nearly 13,000 ships in service worldwide.

Current World Naval Market Snapshot: *In-Service Ships*

Existing Naval Market Ships Currently in Navy or Coast Guard service	Aircraft Carrier	Amphibious	Auxiliary	Corvette	Cruiser	Destroyer	FAC	Frigate	MCMV	OPV	Patrol Vessel	Submarine	*Totals*
Asia & Australia	3	995	203	134	1	84	685	166	201	152	2097	242	***4963***
Caribbean & Latin America	1	111	57	32	1	1	47	45	16	53	1059	26	***1449***
Middle East & North Africa		127	45	44		2	249	21	40	23	1122	33	***1706***
NATO	3	273	230	54		21	113	126	223	83	958	85	***2169***
Non-NATO Europe		126	54	9			38	5	50	16	182	5	***485***
Russia	1	54	240	28	4	14	111	16	44	39	196	62	***809***
Sub Saharan Africa		29	9	1			33	6	7	25	373	3	***486***
USA	10	199	145	1	22	63		18	11	27	184	71	***751***
Totals	***18***	***1914***	***983***	***303***	***28***	***185***	***1276***	***403***	***592***	***418***	***6171***	***527***	***12818***

It is no accident that we group ship transfers and modernization in a single monthly report, as the two are closely related. Most (if not all) of the ships retired from service and gifted or sold to other navies require equipment refits—often quite extensive. Every ship transfer therefore represents a market opportunity, especially for our clients in the maintenance and repair and systems sectors of the naval market.

AMI's ESDB is the foundation for consulting and advisory insights in the modernization and refit market. We apply assessment tools such as aged analysis— mapping by ship type, age, equipment fit and operating country—to help clients single out and evaluate modernization opportunities.

UNITED STATES - Los Angeles Class Nuclear-Powered Attack Submarine (SSN)

On 22 May 2017, the USN's Los Angeles class SSN, USS DALLAS (SSN 700), arrived at the Puget Sound Naval Shipyard (PSNS) in

Bremerton, Washington for inactivation and decommissioning process.

Following decommissioning, the submarine will remain in the inactive status and is not eligible for resale.

Additional information on this article and United States Navy (USN) decommissioning activities can be obtained by contacting Pat Bright at AMI International (Tel: + 1 757 963 7719 or E-mail: pbright@amiinter.com) or by visiting the Decommissioning/Transfers/Receipts Report at: www.amiinter.com/wnpr/country/viewcountry.php?country-D=68.

ANECDOTES

SUBMARINE BIRTHDAY BALL INVOCATION

NAVAL TRAINING CENTER, GREAT LAKES
APRIL 11, 1982

Chaplain Owen Melody (LT, CHC, USNR)

O God, it's rumored that you're a little upset with submariners. They have the annoying habit of topping some of your finest efforts. You walked on the water. They found a way to walk under it. You divided the Red Sea amid noise and clamor, leaving behind a gaping wide trench. They divide the sea silently, leaving behind no trace at all. Then, in one of your finest hours, when you were really on a roll, you took the first submariner, Jonah, submerged him in the sea for three days in the belly of a whale and then dramatically let him live to tell the tale. Now, these showoffs submerge themselves in their steel fish for months at a time, and without batting an eye, come home, hale and hearty. They're a determined lot, Lord. I can understand your being testy: no one likes to be upstaged. But, in your heart of hearts, I know you like their style. We are grateful for them in the Navy and I know that you are too. The world is a better place, a freer place, for what they do. They are the silent sentinels around the world. Bless those serving on lonely patrols this evening: unite us in spirit with them. And, on this, their birthday, grant these submariners your most special blessing. Amen.

SOVIET'S RESPONSE TO AN OFFER TO VIEW "THE HUNT FOR RED OCTOBER"

Mr. Lester Paldy

In January 1990, I was serving on the US delegation to the nuclear testing talks with the Soviet Union in Geneva. Our delegation was headed by ambassador Paul Robinson from Los Alamos National Laboratory who was a friend of movie producer Jack Valenti. Paul got a note from Valenti saying that he was about to release a new film called "The Hunt for Red October." Would Paul like to receive an advance copy of the movie to show to the delegation? Paul said yes and the film canisters arrived. Valenti also offered to pay for the rental of a movie theater in Geneva to accommodate as many guests as Paul might like to invite. Since our relationship with our Soviet counterparts was businesslike and cordial, Paul invited them to attend. The Soviets said they would think about it and let him know. A week later, they replied: "spasiba, nyet." Apparently Moscow had done some homework and found out about the plot.

THE OLD SUBMARINER

Author unknown

I sometimes don't know where I'm going, but Oh, all the places I've been.
Wrapped up in a hull made of steel, with a crew of fine sailors locked in.
The missions are lonely and silent, the dangers untold with no yield,
But we still climb down the steel ladders, the hatches above us are sealed....
The sunlight's a far distant memory, fresh air just a dream from the past
The world outside comes in short little bursts, from a buoy or a wire or a mast.
Between drilling and watches and work, there's no place to be secluded
Surrounded by lights and companions, and pressure is always included.
In sub school they taught you the stories, of boats that exceeded design,
And others that found ancient mountains, nearly ending before it was time.
Fires and flooding and things that exploded, in a hull that is closed on both ends,
Add to pressure from not really seeing, what's ahead or around the next bend.
You can hide from the storms in deep places, using thermals and currents as masks.
But if mission requires more exposure, the crew does what the Captain asks.
Sliding silently through the dark ocean, sometimes you forget where you are,
Until you remember there's no moon, not even a glimmering star.
They all wait above you in silence, for the boat to once more breach the waves
In a rush of wild water and motion, escaping a watery grave.
Unless you're an old submariner, it's hard to know what this means
As age dims my mind and my body, I'm back riding old submarines.
I sometimes forget what I'm thinking, but Oh, all the places I've been.

BOOK REVIEWS

SHEPPARD AND THE FRENCH RESCUE
VOLUME 1 OF *ALLIES AND ENEMIES*

William G. Weatherly

Published by köehlerbooks 610 60th Street, Virginia Beach, VA, 23451
ISBN: 978-1-63393-362-0 (hc)
ISBN: 978-1-63393-360-6 (sc)
ASIN: B06W6887SR (Kindle)

Reviewed by CAPT Jim Patton, USN, Ret.

Well, he's at it again - not only CAPT Sheppard McCloud, the Commanding Officer of the Battle Cruiser USS *Argonne*, but also his "biographer" G. William Weatherly, now finally allowing himself to be known as the Submarine Force's own CAPT George Jackson, USN (ret). In this second of what appears to be a trilogy (or more) of fascinating WWII "alternative histories," CAPT Sheppard and his *Argonne* continue the saga begun with this book's predecessor – *Sheppard of the Argonne*.

These tales are both not of the "...in a distant galaxy a long, long time ago" fantasy genre, but based solidly on historically recognizable events – not precisely how they actually occurred, but as they quite likely could have happened given a previously different flutter of a different butterfly's wings in the Amazon basin. As before, the author's intimate knowledge of WWII capital ships, their employment and their weaponry is extraordinary, and the credibility of the human dimension of leadership in battle that can only be written by one who has experienced the challenges of command of a warship at sea.

As in its precursor, the key to the story is the clever "alternative history" twist. In supposing that the nine nation Washington Naval Conference of 1921-1922, which placed significant limits on the growth of the participant's naval power, had fallen through, a credible scenario was

set. This scenario being that the Atlantic would have been a much larger arena for naval engagements than it was historically. In the first book, students of naval history noticed whiffs of both the Battle of Leyte Gulf and the Battle of Midway. In this one, they will relive, with somewhat different dimensions, what had to be done about "the problem" of the French fleet hunkered down in North Africa. Additionally there was a humanitarian crisis as the population of a French village was threatened with extinction as German retribution for French resistance actions.

Again, the author's ability to grasp and describe the surreal bond between a warship and its Commanding Officer is almost spooky – but laymen should believe those of us that have experienced it, it is very real.

As a result of the training submariners have always received, they acquire an almost "McGyver" level of ability to imaginatively improvise when the need requires. The author gives himself away as a submariner several times by having CAPT Sheppard use assets available to him in unusual, but extraordinarily effective ways – my reaction being "Wow! Wonder if they actually did this, and if not, why not?"

Admiral Rickover was adamant in telling all that worked under his tutelage, that one assumes a serious obligation when undertaking a "book review" in that you will be advising others whether or not to expend their money, and more importantly in Rickover's view, their time on the book in question. This one and its predecessor are worth both.

As in *Sheppard of the Argonne*, you will note many "loose ends" remaining when the last page is turned. I chose to interpret this as "good news," in that more adventures lie in the future for CAPT Sheppard McCloud and his German nemesis Vizeadmiral Klaus Schröder.

BLACKMAIL

Rick Campbell

St. Martin's Press, 2017

Reviewed by RDML Tom Kearney, USN, Ret.

Once again, Rick Campbell presents a captivating tale involving a dangerous world filled with political intrigue and military conflict. It also possesses sufficient real-world relevance to make you feel the story could happen - but you hope it doesn't! *Blackmail* begins after a brief but destructive war between the United States and China, during which each country lost a significant number of ships and other military assets. Both countries have taken a strategic pause to regroup and lick their wounds, and are working hard to sustain a tenuous truce. In this muted tension, a Russian Oscar II submarine launches a 24-missile salvo at a US aircraft carrier in an attempt to further cripple the United States and allow Russia to activate an audacious plan to rebuild their "wall of security" they lost when the Soviet Union disintegrated. The Russian efforts to recruit China and India into their scheme adds a dynamic political twist to the story. This story presents a compelling depiction of the devastating cost of war with a peer competitor - and the significant challenges those losses can create for follow on conflicts. This scenario will keep many in the Pentagon awake at night

Blackmail is a fast moving and enjoyable book. Previous Campbell readers will be happy to know that Christine O'Connor, the President's indomitable National Security Advisor stays the course and rises to the challenges presented in a very pointed way. She is joined by many familiar characters from Campbell's previous books as the team attempts to thwart the Russian maneuvers. Exceptionally well written are the details of the sub-on-sub battles and the portrayal of SSGN operations with Navy SEALs.

Many authors of "submarine" books often fail to write accurately

which can grate on knowledgeable readers with military experience. This is not a problem with Rick Campbell's books. His detailed research, coupled with his many years at sea as a Submariner, ensures credible dialog between characters, accurate weapon capabilities, and authentic location descriptions.

One of the most enjoyable aspects of the book is that, though the US sometimes takes a beating, our American spirit consistently shines through. Several times I wanted to cheer when the US President casts aside options for "politically correct" responses and drives home his points using American military might with devastating accuracy and audacity. *Blackmail* was a pleasure to read and is highly recommended.

RDML (Ret) Tom Kearney spent 25 years operating submarines, and served as the First CO of PCU VIRGINIA (SSN 774) as well as CO of USS ALEXANDRIA (SSN 757) where he spent a considerable amount of time under the Arctic Ice. He then spent 10 years in Navy Acquisition as the Undersea Weapons Program Manager, NAVSEA Vice Commander, and as NAVSEA 06 (Director of Commonality, Special Warfare and Expeditionary Warfare). He is retired from the Navy but remains active as an independent consultant providing solutions for defense acquisition challenges.

SUBMARINE TECHNOLOGY SYMPOSIUM

CHAIRMAN'S REPORT ON THE 2017 SUBMARINE TECHNOLOGY SYMPOSIUM

RADM Charlie B. Young, USN, Ret.
Chairman

Since its inception nearly three decades ago, the Submarine Technology Symposium—sponsored by the Naval Submarine League and hosted by the Johns Hopkins Applied Physics Laboratory (APL)—has served as a prime platform for collaboration and addressing technology challenges that affect the future of the undersea domain.

A capacity audience of approximately 500 attendees gathered in APL's Kossiakoff Center on its Laurel, Maryland, campus over three days in May. The attendees learned about and discussed innovative and critical technologies that have the potential to further undersea capabilities and mission execution.

In its 29th year, STS focused on a theme of "Delivering a Spectrum of Effects from Under the Sea." According to the 2015 Commander's Intent, Submarine Forces, undersea assets enjoy key attributes— stealth, technological advancement, highly trained crews—that "permit operational, deterrent, and combat effects that the Navy and the nation could not otherwise achieve ... These effects may be delivered within the undersea domain or across domain boundaries; they may be delivered from submarines far-forward or in broad ocean areas; they may be the result of carefully coordinated operations with other forces or achieved by independent operations; and they may be accomplished in peacetime, a time of tension or during conflict."

The vision for this year's STS was to focus on the advances necessary to meet this challenging Commander's Intent; namely, to enable discussion of innovative and critical technologies that expand undersea capabilities to achieve missions across this spectrum of effects, with specific emphasis given to the technology's relationship to the mission. Ad-

dressing this focus helped inform the undersea community regarding the move to domain effects from advanced platform capabilities, advanced payloads and off-board systems.

"Each year, we strive to put together this truly unique opportunity for those in the submarine force and undersea warfare community," said Lisa Blodgett, head of APL's Force Projection Sector. "Attendees hear from Submarine Force leadership, Fleet speakers, and subject-matter experts to learn both about operational challenges and about the latest undersea technology advancements. The venue includes technical presentations, hands-on exhibits, and opportunities for networking discussions."

The conference kicked off on May 9 with opening remarks by retired Admiral Kirk Donald, Chairman of the Board, Naval Submarine League, followed by a keynote from VADM Joseph Tofalo, Commander, Submarine Forces. Additional keynote speakers during the symposium included Submarine Force leaders RADM Fritz Roegge, Commander, Submarine Force, Pacific Fleet; RADM (Sel.) Bill Merz, Director, Undersea Warfare Division; VADM Terry Benedict, Director, Strategic Systems Programs; VADM James Foggo, III, Director, Navy Staff; VADM Rick Breckenridge, Deputy Commander, U.S. Fleet Forces Command; RADM Michael Jabaley, Program Executive Officer Submarines; and Ron O'Rourke, Specialist in Naval Affairs in the Congressional Research Service.

Industry, research, academic, government, and military speakers contributed to daily sessions covering a variety of topics, specifically Seabed Warfare, Vital Intelligence, Undersea Based Deterrence, Sea Control, and Effects Ashore.

The technical session on Seabed Warfare, led by Session Chair Pierre Corriveau and Assistant Session Chair Louis DiPalma, both of Raytheon, focused on technologies and future concepts that expand U.S. ability to exploit seabed topography, infrastructure, and obscurity as well as adversary technologies that may challenge that mission.

Session Chair Dave Pistacchio and Assistant Session Chair George Zvara of the Naval Undersea Warfare Center led a technical session on Vital Intelligence. Technical papers were presented on technologies, future concepts, and processing innovations that improve submarine intel-

ligence collection and expand the exquisite understanding of the adversary and battlespace, along with technologies that may present potential challenges to this mission.

Session Chair Bob Bacon and Assistant Session Chair Alex Edsall, both of Charles Stark Draper Laboratory, led the Undersea Based Deterrence technical session. Covered during the session were papers discussing technologies, future concepts, and concepts of operations that capitalize on undersea advantages to provide both a survivable strategic deterrent and a robust conventional capability to deter both nuclear and conventional conflict and adversary technologies.

The Sea Control technical session was coordinated by Session Chair Giles Gibson and Assistant Session Chair Justin Morrison of APL. It included four technical papers related to innovative technologies to improve submarine search, detection, classification, approach, and engagement of adversary submarines and surface ships. Session participants also discussed the need to enhance protection of sea lines of communications and maneuvering space and denial of same to the enemy, in addition to adversary technologies that may present challenges to this mission.

The final technical session of the conference was Effects Ashore, led by Session Chair Karl Hasslinger and Assistant Session Chair Jennifer Panosky, of General Dynamics – Electric Boat. Papers were presented on innovative technologies that improve submarine operations and mission execution in shallow water and close proximity to land.

Attendees also heard from various Fleet representatives – including CAPT Erik Burian, Director for Training, Tactical Development and Doctrine on the staff of the Commander, Submarine Force, Pacific Fleet; CAPT Rob Gaucher, Commander, Submarine Development Squadron 5; CDR Dan Reiss, Commanding Officer, USS *New Mexico* (SSN 779); and CAPT Brian Humm, former Commander of Submarine Squadron 19 – whose presentations connected the session technology discussions to Fleet challenges and opportunities.

Attendees also had the opportunity to take in 16 exhibits during the three-day symposium. On the last day of the conference, retired RADM Charlie Young, the 2017 STS General Chair, moderated a roundtable discussion with panel members RADM Roegge, RADM (Sel) Merz;

RDML Moises Deltoro, III, Deputy Commander, Undersea Warfare; and George Drakeley, III, Executive Director Program Executive Officer Submarines.

"We worked hard to create a program of diverse work, from a diverse group, with a focus on operational context and utility, to provide our attendees with the most relevant and interesting information related to the undersea domain," said Angela Sarich, of APL, who served as symposium Program Chair. "We addressed the historic, core missions related to undersea operations, and presented the latest techniques and technologies that can give the Fleet the tools and systems they need to maintain our nation's superiority."

The authors and exhibitors at the symposium were selected by session chairs, and received final approval from the executive committee led by RADM Young, who served as Chair, and Blodgett, STS Co-chair.

The first STS was held in 1988 at APL, which has hosted every symposium to date. The inaugural symposium was conceived as a classified forum where technologies relevant to capabilities of submarines and related systems could be advanced and examined by experts in various technical fields. Today, STS is considered the premier technical conference on submarine-related technologies.

The 30th Submarine Technology Symposium will be held at APL on May 15-17, 2018.

2017 NAVAL SUBMARINE LEAGUE CORPORATE MEMBERS

5 STAR LEVEL

Bechtel Nuclear, Security & Environmental (BNI)
BWX Technologies, Inc.
Delphinus Engineering, Inc. (New in 2017)
General Dynamics Electric Boat
L-3 Technologies, Inc.
Lockheed Martin Corporation
Newport News Shipbuilding a Division of Huntington Ingalls Industries
Northrop Grumman Navigation and Maritime Systems Division
Raytheon Company

4 STAR LEVEL

Booz Allen Hamilton
General Dynamics Mission Systems
NTT Data Services Federal Government

3 STAR LEVEL

Adaptive Methods, Inc.
AECOM Management Services Group
The Boeing Company
Curtiss-Wright Corporation
Leonardo DRS Technologies
JRC Integrated Systems, Inc.
METRON, Inc.
Oceaneering International, Inc.
Progeny Systems Corporation
Ultra Electronics-3 Phoenix, Inc.
USAA

2 STAR LEVEL

Advanced Acoustic Concepts, LLC
Alion Science & Technology
American Systems Corporation
Applied Research Lab – Penn State
BAE Systems Integrated Technical Solutions
Battelle
Cunico Corporation & Dynamic Controls, Ltd.
General Atomics
Hunt Valve Company, Inc.
In-Depth Engineering Corporation
Innovative Defense Technologies
Liquid Robotics, Inc.
Moog, Inc.
Nord-Lock/Superbolt, Inc.
Nuclear Fuel Services, Inc.
Orbis, Inc.
Orbital ATK
Preferred Systems Solutions, Inc.
Securitas Critical Infrastructure Services, Inc.
Sonalysts, Inc.
Systems Planning and Analysis, Inc.
TE Connectivity
Ultra Electronics Ocean Systems, Inc.
University of Texas at Austin - APL (New in 2017)
UTC Aerospace Systems
Xator Corporation

1 STAR LEVEL

AMADIS, Inc.
Applied Mathematics, Inc.
Assett, Inc. (New in 2017)
Business Resources, Inc.
Capitol Integration, LLC
C.S. Draper Laboratory, Inc.
CEPEDA Associates, Inc.
Cogitic Corporation (New in 2017)
Deloitte Consulting LLC (New in 2017)
Globe Composite Solutions
Gryphon Technologies LC
HII Technical Solutions
Hydroid, Inc.
Imes, Inc.
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Teledyne Technologies (New in 2017)
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Articles will be accepted for consideration on any subject closely related to submarine matters and may be submitted by anyone interested in submarines. The views expressed by the authors are their own and are not to be construed to be those of the NSL. Articles accepted for publication become the property of the NSL. All articles published in *The Submarine Review* will be considered for NSL Literary Awards.

A stipend of $200 will be paid for each major article selected for publication. A major article should be at least 2000 words, exclusive of footnotes and bibliography. Shorter articles and opinion pieces are welcome. Previously published articles may be considered for publication but will not receive a stipend.

All articles should be submitted in Microsoft Word, as an attachment to an email to both editor@navalsubleague.org and review@navalsubleague.org.

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