AUGUST 2016

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SUBMARINE COMMUNITY

BOOK REVIEW


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EDITOR'S COMMENTS

This edition of THE SUBMARINE REVIEW is of more general interest than the recent issues which have emphasized policy statements from the submarine community's military and civilian leadership. We are publishing this issue between periods of League Symposia and during a summer in which political interest is focused elsewhere than on critical matters of defense materiel acquisition. The next issue of the magazine will return to a heavy coverage of policy statements from the League's Annual Symposium.

The *general interest submarine matters* covered here are, however, of importance to the community in several ways. The lead FEATURE is a republication of a Naval Institute Proceedings article by a senior submariner in one of the Navy's top operational positions. Vice Admiral Jamie Foggo is Commander of the Sixth Fleet and Commander of NATO's Striking and Support Forces. His area of concern is the "…oceans and seas which border Europe." His observation is that there is more activity from Russian submarines than we've seen since the days of the Cold War. His article is titled The Fourth Battle of the Atlantic and is a call for continued strength and technological advancement in Allied ASW forces in order to show an increasingly forward operating Russian that we can bring "…overwhelming force to bear if need be".

Our frequent contributor Mr. Joe Buff, in Part 2 of his No 'Cold War to End all Cold Wars' also offers proof of Russian aggressive actions and policies which signal a tendency to restart, if not continue, a Cold War aimed at limiting US influence in the world. It is a well thought-out argument which brings the weight of many actions over the past several years in support of his premise the *Cold War*, whatever it may be called, is with us still/again. Both the Foggo and Buff articles are telling us what we have been seeing is a real threat and as a nation we should be more attentive to what that means for our future in terms of what we are doing now.

We continue our emphasis on Strategic Deterrence with an article by Mr. Thomas Lee on the History of America's Strategic Deterrence. The submarine community's efforts with the *Forty One for Freedom* through the OHIO class SSBNs and now with the *OHIO Replacement Program* have a long line of precedent in the American principle of convincing potential evil-doers that the consequences of their aggressive deeds will be unacceptable to them because we can reach them with great force where ever they may be.

There is also one submarine-internal matter discussed here which may not be widely appreciated by those currently involved in the actual operation of nuclear powered submarines. Loss of Air Conditioning during at sea periods can be a very serious business matter. Many of the old-timers can cite at least one instance of that casualty at sea. Disruption of the mission is a given but there may well be other effects which have to be considered. It is one of those submarine-unique system failures which have nothing to do with nuclear power, sophisticated electronics or advanced weapons but can still put you out of business.

The magazine's support for submarine fiction written by former submariners continues with an unusual long treatment of a fourth novel by ex-skipper George Wallace with his co-author Don Keith. Several excerpts have been chosen to illustrate the writing and give a taste of the plot. The book has a lot of plot and a lot of submarine-related operations. There is good reflection of what qualification is all about and even some not-to-be-expected happenings. The hidden task for experienced submariners of old ages is to gage the plausibility of those happenings; and of course, to think what to do about them.

Jim Hay
Editor

FROM THE PRESIDENT

The Republicans and the Democrats have completed their National Conventions and, as the Olympic Games provide a venue for superb performances by athletes from around the world, the myriad campaigns for office for the 2016 election season are underway in earnest as the "dog days of summer" descend upon the country. And it is really hot and humid on the East Coast!

Regardless of the outcome of the November elections, the US Navy, in general, and the Submarine Force, in particular, are held in high regard by our Congress and the public. The men and women who operate, maintain, and support our fleet around the world are performing well and provide great value to our nation's leadership as they deal with the challenges of an uncertain international environment.

From the Mediterranean Sea and the North Atlantic Ocean, to the Arabian Gulf and the Indian Ocean, to the South China Sea and the Western Pacific Ocean, our Submarine Force is engaged and greatly in demand by our operational commanders.

Strong Congressional testimony by our Combatant Commanders earlier this year proclaimed the necessity of maintaining and modernizing our Strategic Ballistic Missile Submarine Force, affirming that Strategic Deterrence forms the cornerstone of our nation's defense. Our Navy leadership is united in their support for sustaining a robust ship construction program, with the OHIO Replacement Program (ORP) clearly the Navy's top priority program.

Further, this testimony strongly reenforced the need for more attack submarines worldwide. It is clear that, in addition to ORP, the Navy must sustain a build rate of two VIRGINIA Class Submarines per year while incorporating the VIRGINIA Payload Module design to ensure adequate deployed forces to meet projected future needs.

While supporting the Navy Shipbuilding Plan is certain to be expensive, the value of strategic deterrence and a forward

deployed ready force is well understood. The sustained superior performance of our Submarine Force ensures that our nation's leadership will be provided credible evidence supporting the wisdom of making investments in the near term to ensure our Navy's future capability to maintain stability or, if necessary, to engage and defeat potential adversaries.

This issue of THE SUBMARINE REVIEW includes a number of articles relevant to the challenges addressed above as well as personal insight into topical issues of concern today. As always, THE SUBMARINE REVIEW hopes to inform and entertain Naval Submarine League members and others who participate in important decisions concerning our nation's security. We encourage your comments, articles and feedback to the Editor as we endeavor to continually improve our product. Also, as you visit our website or view our periodic NSL Updates, please take time to offer constructive criticism on how the Naval Submarine League might better serve its membership.

I look forward to seeing you all at the Annual Symposium at the Crystal City Marriott in Washington, DC on 26 - 27 October 2016. Current status is provided on the web site.

In closing, I ask that you please keep our military personnel in your thoughts and prayers. They do a very hard job very well, and they do it for you.

John B. Padgett III
President

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FEATURES

THE FOURTH BATTLE OF THE ATLANTIC
U.S. Naval Institute

By VADM James Foggo III, U.S. Navy
Commander, U.S. Sixth Fleet and Commander of Striking and Support Forces NATO
and
Dr. Alarik Fritz
Senior Research Scientist at the Center for Naval Analyses

'With 'more activity from Russian submarines than we've seen since the days of the Cold War,' an improved European force posture becomes vital for the U.S. Navy and NATO.

One hundred and one years ago, a great power released a new weapon on the world. They allowed it to sidestep its adversaries' military advantages and deal them a near-crippling blow. Those weapons, the U-boats of the German Empire, used new technologies to blockade the British Isles and sink millions of tons of Allied shipping. Eventually, the Royal Navy prevailed, but the outcome of that battle was never a foregone conclusion. It took the development of an array of new antisubmarine technologies and tactics, as well as a massive mobilization of resources, that enabled the Allies to win this 'First Battle of the Atlantic."

Seventy-six years ago, the Second battle of the Atlantic began. Again, German U-boats threatened the Allies, this time with new tactics and technologies based on experiences in the previous war. The German had learned how to overcome the antisubmarine

warfare (ASW) advantages of the Allies, and only by again bringing new technologies, tactics, and resources to bear did the Allies prevail.

During the Cold War, our ASW forces engaged in a constant cat-and-mouse game with the Soviet Union's submarines. Nuclear power, ballistic and cruise missiles, and quieter systems empowered Soviet submarines in troubling ways. To respond, the United States and its allies were forced to build greater and more effective ASW forces and continually refine their own ASW technologies and doctrine to counter the Soviets. In the shadow of nuclear deterrence, the stakes of this competition were as high as could be imagined. This was the Third Battle of the Atlantic, and, although it was not a shooting war, it showed once again that a responsive, adaptive, and forward-deployed ASW force is necessary to deter aggression against our nation and its allies.[1]

In the early 1990s, the end of the Cold War, the collapse of the Soviet Union, and commentary such as Francis Fukuyama's landmark essay 'The End of History?" led us to believe that our strategic rivalry with Russia and our need to stay one step ahead of Russian capabilities had faded. It has not. Once again, an effective, skilled, and technologically advanced Russian Submarine Force is challenging us. Russian submarines are prowling the Atlantic, testing our defenses, confronting our command of the seas, and preparing the complex underwater battlespace to give them an edge in any future conflict. Vice Admiral Clive Johnstone, Royal Navy, the head of NATO's maritime forces, noted recently that his forces report 'more activity from Russian submarines than we've seen since the days of the Cold War."[2] Some analysts believe that even our underwater infrastructure-such as oil rigs and telecommunications cables—may be under threat by these new and advanced forces. Russian focus, investment, and activity in the undersea domain are now so unmistakable that even the head of the Russian Navy, Viktor Chirkov, has admitted that Russian submarine patrols have grown 50 percent since 2013.[3]

Despite the economic crisis in Russia, rubles continue to flow into the development of Russian submarine technology and the growth of that force. The father of the modern Russian Submarine

Force, the brilliant and highly decorated design engineer Igor Spassky, admits Russian Submarine Forces are expanding and advancing, and that they will be a key part of the country's arsenal for the foreseeable future.[4]

By 2020, the Russian Black Sea Fleet alone will receive the equivalent of $2.4 billion of investment.[5] And these are not the submarines we faced during the Cold War. There may be fewer of them, but they are much stealthier, carry more devastating weaponry, and go on more frequent and longer deployments than before. The submarines of the Russian Federation are one of the most difficult threats the United States has faced. This threat is significant, and it is only growing in complexity and capacity.

Russia's New Approach

Not only have Russia's actions and capabilities increased in alarming and confrontational ways, its national-security policy is aimed at challenging the United States and its NATO allies and partners. For example, the new Russian national security-strategy depicts the United States and NATO as threats to Russian security and accuses us of applying "political, economic, military, and information-related pressure" on Russia.[6] Thus, not only is Russia pursuing advanced military capabilities (especially in the underwater domain) that enable it to be a credible threat to us, it is now boldly saying that it intends to act as one.

An enduring objective of Russian foreign policy today is to challenge NATO and elevate Russia on the European stage once again.[7] Building on the national strategy, the new Russian maritime doctrine reorients its naval forces in a calculated and determined way. By confronting NATO at will, Russia confirms its status as a great power in the 21st century. The new maritime doctrine tells us that Russia will counter our existing ASW technologies; challenge U.S. and NATO's maritime presence in the Atlantic as well as the Baltic, Black, and Mediterranean seas; and expand Russian permanent presence in the arctic and Mediterranean.[8]

Furthermore, Russia is rapidly closing the technological gap with the United States. It has created an advanced military

designed to overcome our advantages and exploit our weaknesses—this is the epitome of asymmetric warfare. Nowhere is this more evident than in the maritime (and especially underwater) domain. Russia rapidly is building and deploying more advanced and significantly quieter attack submarines and frigates armed with the long-range Kalibr cruise missile (including six new Kilo-class attack submarines destined for the Black Sea).[9] Not coincidentally, these are the platforms that are the most challenging for us to deal with because of their inherent stealth. As demonstrated last December by Kalibr launches into Syria from the eastern Mediterranean, Russian leaders will use such weapons at will, without the same qualms we have about collateral damage. The clear advantage that we enjoyed in antisubmarine warfare during the Cold War is waning.[10] Russian submarines are more capable than before, and so we are again in a technological arms race with Russia.[11]

Russia is claiming maritime battlespace across Europe and deploying forces outside Russian borders. An interlocking system of Russian coastal missiles, interceptor aircraft, air defense systems, surface ships, and submarines now threatens all maritime forces in the Baltic, as well as our NATO allies in Lithuania, Estonia, and Latvia—who no longer control even their own coastlines unless Russian leaders allow them to do so. A similar anti-access/area-denial (A2/AD) *fortress* was constructed in the Black Sea after Russian forces invaded Ukraine and seized Crimea. Russian forces invaded Ukraine and seized Crimea. Russian forces deployed to Syria are growing steadily, and Russia has constructed military bases in the Arctic, militarizing and claiming large swaths of it, in contravention of customary international law.[12] In this way, Russia has blunted our power-projection capabilities through A2/AD and extended its influence far beyond its borders.

Russia now employs an ‘arc of steel” from the Arctic through the Baltic and down to the Black Sea.[13] Combined with extensive and frequent submarine patrols throughout the North Atlantic and Norwegian Sea, and forward-deployed forces in Syria, Russia has the capability to hold nearly all NATO maritime forces at risk. No

longer is the maritime space uncontested. For the first time in almost 30 years, Russia is a significant and aggressive maritime power.

In this extensive academic research on naval innovation, Owen R. Cote, Jr., of the Massachusetts Institute of Technology's Strategic Studies Program has long warned of a potential 'fourth battle' for control of the undersea domain.[14] it is now clear that a fourth battle is not looming, but is being waged now, across and underneath the oceans and seas that border Europe. This is not a kinetic fight. It is a struggle between Russian forces that probe for weakness and U.S. and NATO ASW forces that protect and deter. Just like in the Cold War, the stakes are high.

Winning the Fourth Battle Today

With our allies and partners in NATO and across the globe, we present a broad and united front against any potential Russian threats. Our maritime partnerships yield a global network of navies that together form the greatest maritime force for peace ever known. NATO exercises demonstrate our unity superbly. For example, on 7 June 2015, 17 nations, with 49 ships, more than 60 aircraft, and a vast array of ground forces, demonstrated their abilities to operate together to defend the Baltic region in BALTOPS. This exercise, in its 43rd year, made it clear that, the United States, NATO, and partner nations have an unwavering commitment to protect themselves by acting in concert. Similarly, Sea Breeze 2015 sent a clear signal to Russia that the United States and its allies will not back down in the Black Sea region. Eighteen ships from 11 nations (Bulgaria, Germany, Greece, Italy, Moldova, Romania, Sweden, Turkey, Ukraine, the United Kingdom, and the United States) demonstrated the will and ability to operate together to achieve maritime security and conduct air defense and antisubmarine warfare in the Black Sea.

A variety of policy and resource shifts have been enacted that signal our resolve to Russia. For example, the U.S. Navy's revised *Cooperative Strategy for 21st Century Seapower* notes the critical importance of all-domain access and deterrence. The Chief of Naval Operations' recent *Design for Maintaining Maritime*

Superiority puts the Navy on a clear path to adapt to the new global security environment.[15] But we must act now to implement such guidance before Russia provokes again. To do so, we must engage and conduct operations forward more deliberately, more strategically, and with more forethought-and in ways that encourage responsible behavior by Russia while still deterring Russian belligerence.

From a diplomatic perspective, we can find areas of common interest. One of the most obvious examples is maintaining safety at sea. Despite the recent aggressive 'buzzing' of the USS DONALD COOK (DDG-75) in the Baltic by a Russian Su-24, the incidents-at-sea (INCSEA) agreements with Russia remain a heartening example of how we can still cooperate with Russia despite its leadership's adventurism. We also share a desire to defeat violent extremist organizations such as ISIS. We must be prepared to work with Russian leaders if they want to collaborate responsibly on these or other issues of mutual interest. To do so, we can and should meet with our Russian counterparts when possible and prudent. Track-two diplomatic efforts, international symposiums, and other forums that provide such opportunities should also be encouraged.

Of course, diplomacy alone is unlikely to be sufficient. To encourage responsible behavior by Russia we must engage from a position of strength, not weakness, improving our current force posture in Europe will demonstrate our strength and thereby deter Russia from further adventurism. The first step in improving our force posture is to leverage allied navies to enhance our maritime security. We must work directly with our NATO partners to help them develop the capabilities and capacity to operate seamlessly together and with the United States, respond to contingencies, and protect key maritime infrastructure. Through combined exercises and maritime presence, a network of navies in Europe and across the globe can face Russia from a position of strength and ensure continued peace. Our part in supporting these efforts has been clearly outlined by CNO Admiral John Richardson: We must "prioritize key international partnerships through information sharing, interoperability initiates, and combined operations [and]

explore new opportunities for combined forward operations."[16] The old saying "a house divided cannot stand is more true now than it has been in many years. To preserve peace, we must unite to deter Russian aggression.

We also should reassess our own global force deployments and exercises. Additional submarines, ASW forces, carrier strike groups, and other assets should be rotated through Europe and used to show Russia that we can bring overwhelming force to bear if need be. We should increase our ASW exercises with our NATO allies, in both the Atlantic, Mediterranean, and elsewhere, to demonstrate that NATO can track Russian submarines at will, no matter where they are.

Finally, we must not lose our technological edge. More than perhaps any other warfare area, ASW requires us to stay one step ahead of Russian technologies. In the world wars, the Allies prevailed over German U-boats not by force alone, but by innovation. In the Cold War, the rise of nuclear-powered Soviet submarines required us to develop new acoustic and other technologies. Today, we are once again in a technological arms race with Russia. We must maintain an innovative edge and rapidly field new technologies if we are to prevail.[17]

At this time in history we would do well to remind ourselves it is better to prevent wars than to fight them. The U.S. Navy, through forward presence, power projection, and technological advantage, is the epitome of demonstrating resolve and capability in the service of war prevention. In today's world, wars can only be truly prevented in partnership and cooperation with other nations. The stronger and more resolute we and our allies and partners are together, the less likely that war will occur. And therein lies the true strength of the U.S. Navy—it is not simply by maintaining our technological edge and our readiness to impose unacceptable costs on Russia should the need arise. What makes ours the world's greatest and most effective navy is the fact that we act in concert with our NATO allies and partners. It is only in this way that we, and all like-minded allies and partners, maintain peace—by unmistakably and constantly deterring Russian aggression.

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THE HISTORY OF AMERICA'S UNDERSEA STRATEGIC DETERRENCE FROM V-1 to D5

By Mr. Thomas Lee

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The United States was not first to conceive or develop submarine-launched missiles, but it was the first to capitalize on the concept and emerging technology, making it a viable reality. Stealth was always an integral advantage of submarines, but combining that stealth with the reach of missiles made a truly formidable combination. No longer would submarines be limited to seaborne and shoreline targets. While submarine-launched missiles are by their nature offensive weapons, they quickly took on the arguably more important strategic deterrence role of preventing wars between major powers.

America's first successful submarine-launched missile was the Loon, which was a slightly larger, re-engineered version of Germany's V-1 flying bomb. The Navy didn't begin experimenting with launching the Loon from a submarine until 1946, but that wasn't the first missile launch from a submarine.

German Origins

German scientists began work in the 1930s to develop rockets to be used for space exploration. The German government later funded this research because it came to see that rocket technology could be applied to weaponry. Development of Germany's first rocket-propelled weapon began in 1941, which eventually led to Germany's V-1 flying bomb in June 1944 and the V-2 rocket in September 1944, both liquid-fueled. In 1942, British intelligence acquired photos and sketches of a crashed test model, which were shared with the United States.

The V-1 was essentially the first cruise missile, albeit rudimentary, able to fly at predetermined altitudes and guided on a given heading by a gyrocompass. A timer—an odometer driven by a vane anemometer (measures wind speed) and adjusted for observed prevailing wind conditions—determined the point at which the missile would drop from the sky, detonating on contact. The V-2 was a ballistic missile, which followed an arced—or ballistic—trajectory to its target area. Shortly before Germany was defeated, it had begun using a ground-based radio guidance system to direct V-2s to their intended target areas.

The First Submerged Rocket Launch

The Germans were the first to explore the idea of launching a guided missile from a submarine. In seeking how Germany might strike the U.S. mainland, two brothers, Ernst and Friedrich Steinhoff—Ernst a rocket engineer and Director for Flight Mechanics, Ballistics, Guidance Control, and Instrumentation at the Peenemünde Army Research Center who later worked for the U.S. government with Werner von Braun, and Friedrich the CO of *U-511* and later *U-873* who died of wrist wounds in Boston after surrendering to USS VANCE (DE 387)—began discussing the possibility of launching an artillery rocket (aimed but unguided) from the deck of a submerged submarine. This concept was tested on *U-511* in May and June of 1942 using a standard army launcher. The tests showed that the rockets could be successfully launched from a depth of 15m below the water's surface.[3]

Germany never used these weapons against the U.S. mainland because the project was delayed due to concerns with the launcher. Launchers were, however, installed on three U-boats and deployed against the Russians during Germany's retreat in 1945. The Germans claimed to have used them but there are no records indicating damage inflicted by rockets.[4]

German engineers also conceived of placing a V-2 missile inside a watertight tube that could be towed by submarine to a location near the U.S. coast. The tubes could then be trimmed to a vertical position and the missiles launched. The submarine would have to remain on the surface, however. The war ended before the concept could be tested, but the Soviet Union's Golem submarine-towed missile launcher, produced in the 1950s, was based on captured German plans of this system.[2]

The Allied nations were eager to acquire these rockets, their production facilities, documentation, and the engineers who developed and produced them so as to begin or enhance their own rocket programs. On April 11, 1945, as Allied forces were advancing through Germany toward Berlin from opposite directions, the U.S. Army 3rd Armor Division captured intact the subterranean Mittelwerk V-1 and V-2 production facility at Nordhausen. There they found a treasure trove of V-1 and V-2 parts and rockets in various stages of completion. The Soviet Union, however, had been given jurisdiction over Nordhausen at the Yalta conference. Between May 22 and May 31, the U.S. 144th Motor Vehicle Assembly Company loaded 341 rail cars with rocket-related materials and moved them to Antwerp, Belgium, for removal by ship to the United States, just one day before Soviet troops were scheduled to arrive in Nordhausen.[1] The United States got by far the lion's share of the hardware, documentation, and engineers, including Dr. Werner von Braun.

Loon

The United States began development of its first jet bomb in 1943, the JB-1, which used a flying wing design. Over 17 days in July 1944, the United States succeeded in reverse-engineering Germany's pulse-jet engine using crashed V-1 duds sent from Britain. This engine was used in a redesigned missile modeled after the V-1 and dubbed the JB-2, or Loon, which had a range of

50 nautical miles (NM) as limited by the guidance signal from the launching submarine, or 135 NM if a second submarine were in position downrange to continue broadcasting guidance information. The Loon's design was identical to the V-1 except for being 60cm longer at 8.25m and having a 5.4m wingspan, 6.35cm wider than that of the V-1.

America developed an improved guidance system for the Loon using radio command, which enabled a Circular Error Probable (CEP)[5] of about 5,500m (¼ NM cross range and ½ NM downrange). While this accuracy was better than that of the V-1, it was quite poor by today's standards. The radio command operator could also execute simple in-flight maneuvers such as changing the approach course to avoid enemy forces directing counteratattacking aircraft down the Loon's bearing. The next step was to figure out how to launch the Loon from a submarine.

A Triad of Strategic Deterrence

After World War II, a new era, the Cold War, began. Rising tensions between the West and the Eastern bloc nations led to increased development and production of nuclear weapons. The first means of delivering these weapons were bombers, followed by intermediate-range and intercontinental ballistic missiles (ICBMs). The final piece of what would be known as the Triad was the submarine-launched ballistic missile (SLBM). While heavy bombers provide advance notice that action is being taken and the ability to be reassigned or recalled, and land-based missiles assure prompt first-strike capability, the SLBM would complete the equation. Nearly undetectable, the submarine-based capability offers stealth, survivability, and assured second-strike capability, thus upping the ante of true strategic deterrence. They could be deployed in such sufficient numbers that not all of them could be targeted.

In 1946, the U.S. Navy began work on a submarine-launched version of the Loon. USS CUSK (SS 348) became the first submarine to launch a guided missile on February 12, 1947 and

was the first to be re-designated as a guided missile submarine (SSG) on January 20, 1948. The missile was carried in a hangar attached to the deck behind the conning tower and would have to be maneuvered onto a ramp to be launched. The submarine had to remain surfaced for this procedure, making it vulnerable to attack if spotted.

Regulus

Entering the 1950s, the Cold War was just heating up. The U.S. government's highest strategic priority was to develop a strong deterrent against a potential first strike by the Soviet Union. It was in this atmosphere that the developments in submarines, the atomic bomb, and missiles converged.

Even while testing the Loon aboard CUSK and later USS CARBONERO (SS 337), the Navy was already working with Chance Vought Aircraft Industries on specifications for its next guided missile, the subsonic Regulus, later named Regulus I. The Regulus was about 3½m longer than the Loon and had a 1m longer wingspan when its wings were in the deployed position. It was nearly twice as fast as the Loon, had a greater range of 500 NM, and carried a larger—and nuclear—warhead. Like the Loon, however, the Regulus required the submarine to be surfaced for launching, had to be launched from a ramp, and was guided by radio command, requiring a second submarine to act as a guidance relay to direct it to its target. It was also, like the Loon, liquid-fueled. Liquid rocket fuel had to be stored outside the missile and loaded into the missile immediately before launching. In addition to prolonging exposure on the surface, storing and handling the highly flammable fuel was dangerous in the sealed environment of a submarine.

Russia's SLBM threat

Beginning in 1958, our Cold War enemy, the Soviet Union, began commissioning its *Golf II*-class diesel-electric ballistic missile submarines, followed in 1959 by the *Hotel I*-class nuclear ballistic missile submarines. Each of these was designed to carry the Soviet Union's new R-11FM (Scud-A) missile, which could be launched from a surfaced submarine in about 12 minutes. Three silos were placed aft of the sail and the sail was extended to enclose the silos. The Scud-A had a range of about 80 NM when armed with a 50 kiloton nuclear warhead. From 1958 through 1962, the Soviet Union produced 22 *Golf II*-class and 8 *Hotel I*-class submarines, averaging about six boats per year.

While CUSK and CARBONERO each carried a single Loon missile, two other fleet boats were converted to SSGs, USS TUNNY (SS 282) and USS BARBERO (SS 317), each carrying two Regulus missiles in their missile hangars. On July 15, 1953, TUNNY became the first submarine to launch a Regulus missile. A month before this test launch, Chance Vought had begun development of an improved guided missile, the Regulus II.

In 1954, the Navy began building its second generation of guided missile submarine. The purpose-built USS GRAYBACK (SSG 574), USS GROWLER (SSG 577), and the first nuclear-powered guided missile submarine (SSGN), USS HALIBUT (SSGN 587) were each designed with two missile hangars. Each missile hangar could carry either two Regulus I missiles or one of the in-development Regulus II missiles for a total of two to four missiles per boat. GRAYBACK, GROWLER, and HALIBUT were launched in 1957, 1958, and 1959, respectively.

Even as the Regulus II was being developed, Navy leaders recognized its shortcomings. The most significant hurdle to overcome was the one that the Navy most wanted addressed: a missile that could be launched from a submerged submarine. This would require not only a new missile and launching mechanism,

but a new type of submarine as well. As early as 1955, the Navy committed to developing this new missile, the Polaris.

The Regulus II was successfully test launched in 1956, but the program was ended in 1958 because of progress being made on the Polaris. The Regulus II was never deployed, but the Regulus I was deployed on U.S. submarines from 1958 to 1964. During that time, U.S. submarines made 41 strategic deterrent patrols armed with the Regulus I. The number 41 was soon to have great significance to the U.S. Submarine Force and the nation's security.

Polaris A1

While the Loon and Regulus were cruise missiles, the Polaris A1, developed by Lockheed Missiles & Space Co., was America's first true submarine-launched ballistic missile (SLBM). In addition to using solid fuel, Polaris more than doubled the range of the Regulus I, was more than twice as accurate, was nearly 10 times as fast, and carried a warhead more than 12 times as powerful. Polaris, while becoming operational a year later than the Soviets' first SLBM and having a range less than the 1,500 NM desired by the Navy, was nonetheless a game changer.

Heading up the newly established Special Programs Office (now called Strategic Systems Programs) and the Polaris Program was Rear Adm. William "Red" Raborn, who was given exceptional authority and latitude to make the Polaris a near-term reality. His team included the inventive and persistent Dr. John Craven, whose job it was to figure out how to launch the massive new missile from a submerged submarine.

There were other advancements that came together at this time to make the Polaris a success. There were breakthroughs in reducing the size of atomic warheads, thus improving range, and in solid rocket fuel making it more reliable, responsive, and safe. The Massachusetts Institute of Technology developed an inertial guidance system, which eliminated the need for radio guidance and the need for a second submarine to guide the missile to its target area. Inertial guidance also brought a significant improvement in accuracy.

The Navy's development of the nuclear-powered ballistic missile submarine, or SSBN, took place concurrently with development of the Polaris. The advent of the SSBN in America was undertaken with a real sense of urgency due to the threat of a Soviet first strike. The first SSBN was originally laid down as a fast attack submarine (SSN) of the SKIPJACK class in 1958, three years after the Soviets conducted their first successful surfaced test launch of an SLBM. The vessel's partially constructed hull was cut across the middle to make room for a 40m-long section containing two rows of eight launch tubes to house 16 Polaris A1 missiles and other associated equipment.

In a little over a year and a half, USS GEORGE WASHINGTON (SSBN 598) went from a nearly completed nuclear-powered SSN to being commissioned into service at the very end of 1959 as an SSBN. She successfully test-launched a Polaris A1 in July 1960 and began her first strategic deterrent patrol in November 1960. Before USS GEORGE WASHINGTON returned from her maiden 67-day patrol, the second SSBN, USS PATRICK HENRY (SSBN 599) set sail on December 30, 1960 on its first strategic deterrent patrol. Thus began the rapid SSBN building program known as *41 for Freedom*, the timing was profoundly fortuitous.

41 for Freedom

The GEORGE WASHINGTON was the first of 41 SSBNs, referred to as the 41 for Freedom, authorized from 1957 through 1963, the last of which, USS WILL ROGERS (SSBN 659), was commissioned into service in 1967. The first five SSBNs, comprising the GEORGE WASHINGTON class, were modified *Skipjack*-class SSN designs lengthened to accommodate the missiles. The *Ethan Allen* class was the first class of submarine designed from the outset to be an SSBN. As missile technology continued to advance and new missiles were developed, earlier boats were backfitted to carry the newer missiles.

Cuban Missile Crisis

In October 1962, President Kennedy was informed that the Soviet Union had been staging SS-4 medium-range nuclear ballistic missiles in Cuba, which led to the tense Cuban Missile Crisis. For 13 days, from the 16th to the 28th of October, 1962, the whole nation feared that a nuclear exchange with the Soviet Union could begin at any moment. It is arguably the closest we have ever come to nuclear war.

At the time the standoff began, there were already nine U.S. SSBNs in commission, six of which were known to be on station in the Norwegian and Mediterranean Seas, one of which had departed on patrol on October 10th, and another that was preparing to depart.[6] No doubt Soviet Premier Nikita Khrushchev was aware of the more than 100 Polaris missiles lurking beneath the surface within reach of major Soviet cities, which must have factored into his decision to remove Soviet missiles from Cuba. In addition, USS TUNNY (SSG 282), USS BARBERO (SSG 317), and USS GRAYBACK (SSG 574) were on station near the Soviet Pacific coast carrying eight Regulus I missiles.

Polaris A2

Well before the Polaris A1 became operational in 1960, the Navy knew that it was an evolutionary step toward getting a sufficient sea-based strategic deterrent in place. Even before the Polaris A1 went on patrol, the Navy and Lockheed Missiles & Space Co. began development of its successor, the Polaris A2. The A2 was first successfully test launched from a submerged submarine, USS ETHAN ALLEN (SSBN 608), in October 1961, and it became operational in June 1962.

The Polaris A2 met the Navy's original desired range of 1,500 NM and was more accurate and more reliable due to improved electronics. The five *Ethan Allen*-class submarines were designed to carry the Polaris A2, which was almost a meter longer than the A1 but with the same diameter. As with the Polaris A1, the Navy didn't stop development with the A2. Just two years after the A2 became operational, newer U.S. SSBNs began deploying with the Polaris A3.

Polaris A3

The first successful Polaris A3 test launch from a submerged submarine took place aboard USS ANDREW JACKSON (SSBN 619) in October 1963, and the first A3 patrol began in September 1964 aboard USS DANIEL WEBSTER (SSBN 626).

While the Polaris A3's name implies that it was an improved A2, that's not entirely accurate. The Polaris A3 was really a new missile design that had to fit into the A2 launch tubes. The A3 offered a greater range of 2,500 NM, significantly expanding SSBN operating areas and enabling full coverage of the European/Asian continent with the first Polaris patrols in the Pacific. USS DANIEL BOONE (SSBN 629) conducted the first Polaris patrol in the Pacific beginning in December 1964.

Aside from its greater range, the Polaris A3 was the first missile to have multiple re-entry vehicles (or bodies) (MRVs). The first A3s each carried a single nuclear warhead. Beginning in the 1970s, the A3 carried three separate and smaller nuclear warheads.[7] These would be ejected over the target area to improve target coverage and reduce the effectiveness of missile defenses. The three smaller warheads delivered greater destruction than the single large-yield warhead while maintaining the missile's original throw weight.

While the first five SSBNs comprising the *George Washington* class were never retrofitted to carry the Polaris A2, they were retrofitted to carry the A3, with conversions taking place between 1966 and 1971. The last A3 was removed from service in October 1982.

Beginning in the late 1960s, the U.S. government became concerned that the Soviet Union would begin moving strategic assets into hardened underground bunkers to protect them from U.S. missiles. To counter this, the Navy and Lockheed Missiles & Space Co. began development of a penetrator warhead to breach the bunker before detonating and an upgraded missile to deliver it. The A3 was not accurate enough for this task, so work began on an upgrade to the A3. As different warhead and re-entry body options were considered, the nomenclature for this new missile

changed, from A3A to B3 to C3 and finally, in January 1965, to a new name altogether: Poseidon.

Poseidon

The Poseidon C3, as it became known, was a half meter wider than the Polaris, but it still had to fit into the Polaris launch tubes. The Polaris launch tubes had a liner that could be removed to accommodate the larger missile. What really distinguished the Poseidon is that it had multiple independently targetable re-entry vehicles (MIRVs), enabling a single missile to hold multiple targets at risk.

The Poseidon C3 was first tested in 1968, and the first test launch from a submerged submarine took place in 1970 aboard USS JAMES MADISON (SSBN 627). USS JAMES MADISON set sail on the first Poseidon patrol in March 1971. Poseidon incorporated substantial improvements in accuracy and resistance to countermeasures over previous missiles, but its principal advantage was its targeting flexibility. Poseidon could deliver multiple warheads on multiple targets in multiple widely spaced target groupings (*footprints*). Greater accuracy allowed smaller warheads to be employed while achieving the target effects of larger, less accurate warheads.

Although the Department of Defense was working on a far more accurate, stellar-inertial, guidance system during the Poseidon's development in the latter half of the 1960s,[8] it decided not to use this on the Poseidon. Had Poseidon's accuracy been improved significantly, it could have been viewed by the Soviets as a first-strike weapon capable of destroying Soviet missiles and related military targets.[9] The DoD's position was that Poseidon SLBMs would be strictly for second-strike retaliation after a Soviet first strike.[10] The missile's small improvement in accuracy[11] over the Polaris A3 was more than sufficient for that task.

The last Poseidon was offloaded in September 1992. Stellar-inertial guidance fully matured in the 1970s for use in Poseidon's successor, the Trident.

Trident I

The Soviet Union lagged behind the United States in missile and submarine technology and development. The Soviets were deploying liquid-fueled missiles aboard submarines until 1980 when they deployed their first solid-fueled missile, the R-31 *Snipe* (NATO designation SS-N-17), which had a range of 2,100 NM.[12] What they lacked in technology, however, they made up for in the number of nuclear bombs, land-based intercontinental ballistic missiles (ICBMs), and SLBMs produced through the 1970s and 1980s. In the words of Marxist doctrine, "Quantity has a quality all its own." The Navy's answer to this Soviet nuclear build-up was the Trident SLBM.

The first version was the Trident I C4. The Navy and Lockheed Missiles & Space Co. commenced development in 1973, and the missile became operational in 1979. It was developed in conjunction with a new class of ballistic missile submarine to carry it, the Ohio class. Six *Lafayette*-class[13] and six *Benjamin Franklin*-class boats, however, were backfitted between 1976 and 1981 to carry it as well. Each *Ohio*-class boat can carry up to 24 missiles, eight more than previous SSBNs. The *Ohio*-class launch tubes were made 3m longer than the Poseidon launch tubes to accommodate a larger missile that was then in the planning stages, which was the Trident I's successor. The Trident I first went on patrol aboard USS FRANCIS SCOTT KEY (SSBN 657) in October 1979.

The Soviet Union greatly improved its anti-submarine warfare capabilities during the 1970s, thanks in no small part to the spy John Walker. Trident I's 1,500 NM increase in range over the Poseidon, however, meant that Trident-armed submarines had far more ocean in which to operate and still be able to reach their targets, thus making them harder to locate. The increase in range was due to technological advances in microelectronics and propulsion, the use of lighter-weight graphite epoxy materials, and something called an aerospike.

The third-stage rocket motor was placed between the missile's eight warheads in the nose fairing to make more space for other components, thus spreading the warheads farther from the

missile's axis. Combined with the unchanged launch tube height in the backfitted *Lafayette*-class and *Benjamin Franklin*-class boats, this necessitated a wider, flatter nose, which increased drag. To compensate, the aerospike was added to the missile's tip. After the first-stage rocket motor ignited, the aerospike extended from the nose of the missile. At the tip of the spike is a small disc that, at supersonic speed, creates an inclined shockwave behind it. This provides a lower-pressure area for the missile to move through. The effect improved range by making the missile aerodynamically more slender, thus reducing drag by about 50 percent.[14]

Also housed in the Trident's nose was the new and more accurate stellar-inertial guidance system. The stellar portion included a sensor to conduct a star sighting. This capability keeps SLBMs independent of external positioning signals (e.g., GPS). Stellar-inertial guidance improved the Trident I's accuracy more than two-fold over the Poseidon.

When USS MARIANO G. VALLEJO (SSBN 658) returned from her last patrol on April 2, 1994, it marked not only the last patrol of the 41 for Freedom boats, but also the last patrol of the *Benjamin Franklin*-class boats backfitted to carry the Trident I. The last Trident I patrol ended after 26 years of service with the return of USS ALABAMA (SSBN 731) (G) from its 67th patrol on September 2, 2005. The Trident I had been deployed on the first eight *Ohio*-class boats until the Trident II became operational.

Trident II

Continued improvements led to the next generation of missile, the Trident II D5, the backbone of today's U.S. strategic deterrence forces and one leg of the nuclear triad. Further use of lighter graphite epoxy and filament-wound Kevlar led to a further increase in payload capacity. This, in addition to retaining the aerospike, gave the larger missile greater throw weight and range than the Trident I. Improved accuracy also provided better performance against hardened targets.

Development of the Trident II began in October 1983. The Navy conducted eight Production Evaluation Missile (PEM) test flights. PEMs 1 and 3, early in the testing phase, were failed

launches. From December 1989 to March 2016, however, the U.S. and UK navies have conducted 160 successful Trident II D5 test flights. This record of success is unsurpassed by any other large-diameter rocket program. The first successful test launch from a submerged submarine occurred on August 2, 1989 aboard USS TENNESSEE (SSBN 734). The three most recent of these Trident II test launches—test launches 158, 159, and 160—were conducted March 14-16, 2016 by an SSBN assigned to Submarine Group 10 out of Kings Bay, Ga.

The new missile became operational on March 29, 1990, with 24 Trident II D5s aboard USS TENNESSEE as she left port for her maiden strategic deterrence patrol. This was nine months after the Polish elections that signaled the beginning of the end of the Cold War and five months after the fall of the Berlin wall.

While the Trident II is capable of carrying its MIRVs over 4,000 NM to their targets, the New START treaty limits the number of warheads deployable by the Navy to 1,550, which would mean an average of four or five MIRVs per SLBM.

Strategic Arms Treaties

In November 1969, U.S. and Soviet negotiators met in Finland to discuss limiting the number of nuclear weapons in each nation's arsenal. These became known as the Strategic Arms Limitation Talks, or SALT. The SALT Treaty (later called SALT I) and the Anti-Ballistic Missile (ABM) Treaty were signed two and a half years later in May 1972. At issue were two technologies of primary concern: MIRV warheads and ABM capability.

When negotiations began, the Soviets were more advanced in ABM technology and had deployed an ABM system around Moscow, and the United States was rapidly developing MIRV warheads. The Soviets were concerned that MIRV capability would both render their cities and ballistic missiles vulnerable to a U.S. first strike that would overwhelm their ability to intercept the incoming warheads. The United States was concerned that Soviet ABM technology could be advanced enough to intercept all or most of its MIRVs, which would negate its superior submarine-based advantage. If the Soviets were confident in their ability to

intercept incoming warheads, the United States feared that the Soviet Union could initiate a first strike with impunity.

The ABM Treaty limited each side to no more than 100 interceptor missiles and launchers located at no more than two deployment areas.[15] The Interim Agreement on the Limitation of Strategic Offensive Arms (SALT I) froze the number of nuclear ballistic missiles, both land-based and aboard submarines.

Later in 1972, follow-on negotiations began to replace the interim SALT I agreement with a longer-term and more comprehensive agreement, known as SALT II. SALT II established numerical limits on the total number of strategic nuclear delivery vehicles with additional numerical limits on MIRVs. Delivery vehicle refers to heavy bombers, ICBMs, and SLBMs. SALT II was signed by President Jimmy Carter in 1979, but it was never ratified by the Senate. Both sides, however, voluntarily met some of the agreement's terms.[16]

The follow-on agreement to SALT II was the result of the Strategic Arms Reduction Talks, or START, begun in 1982 and signed in 1991. Whereas SALT I and II focused on limiting strategic weapon systems, START would seek to actually begin reducing their numbers in three phases. By the end of the third phase in 2001, each side would have to reduce its number of attributable warheads from about 11,000 to no more than 6,000 and its number of delivery vehicles to no more than 1,600. Attribution refers to the number of warheads that may be on any of the three types of delivery vehicles. No more than 4,900 of the 6,000 warheads permitted could be mounted on deployed ICBMs and SLBMs at any time. START also limited the number of MIRV warheads resulting in no more than eight warheads attributable to an SLBM. START expired in December 2009.

START was to be followed by START II, negotiations for which got underway in 1992. START II would have banned all MIRVs in ICBMs and halved the number of warheads each side could deploy, but it never entered into force. The Senate approved it in 1996, but the Russians repeatedly delayed Duma approval due to its frustration with U.S. involvement in the Persian Gulf and the Balkans. The day following U.S. withdrawal from the ABM

Treaty on June 13, 2002, Russia ceased its efforts to bring START II into force.[17]

A month before both sides ceased efforts on START II in 2002, the Strategic Offensive Reductions Treaty (SORT), also known as the Moscow Treaty, was signed by both the United States and Russia. SORT, which entered into force in June 2003, would limit the number of operationally deployed nuclear warheads to between 1,700 and 2,200 per side by December 2012. The parties also agreed that the terms of START would remain in force. SORT was superseded by the New START Treaty (NST) in February 2011.[18]

NST is the current strategic arms reduction treaty in force between the United States and Russia. The Senate ratified NST in December 2010 and the Duma in January 2011. It went into force on February 5, 2011, replacing START and superseding SORT, and will expire 10 years later. NST limits each side to no more than 1,550 deployed warheads on up to 700 deployed delivery vehicles and no more than 800 total delivery vehicles. Of those 1,550 warheads on the U.S. side, approximately 70% are planned for SLBMs. U.S. plans are for no more than 240 deployed SLBMs at any given time. These reductions are about 30 percent lower than the levels set by SORT. These reductions must be accomplished by February 2018.[19]

While the reduction in the number of Ohio-class SSBNs from 18 to 14 due to the conversion of four to SSGNs, the number of Ohio Replacement submarines slated at 12, reduction of the number of launchers per SSBN from 24 to 20, and the reduction in the number of warheads may appear to reduce our deterrence posture, they don't as long as both sides reduce their nuclear forces accordingly.

Life Extension of the Trident II

Today the Navy and the nation have in the Trident II a reliable SLBM that does everything required of it and is limited by treaty, not capability. It may at some point be limited by age, however. Trident IIs were expected to have a service life of 25 years,[20] and they have reached that point. The Navy's first Ohio Replacement

SSBNs are expected to begin service in the early 2030s, but they will be carrying Trident IIs that first came online 40 years prior with warheads that were expected to have a service life of 10 years. To ensure that these missiles were kept safe, reliable, and effective, the Navy began the D5 Life Extension (LE) Program (D5 LE).

D5 LE was begun in 2002 to identify and replace aging Trident II missile components, some with upgraded components based on new technology. The goal of D5 LE is to ensure that the fleet of Trident II SLBMs remains operational for another 25 years, into the first decade or so of the Ohio Replacement submarines' patrols. Sometime after the first Ohio Replacement submarine is commissioned, the Navy may consider replacing the Trident II with a new missile.[21]

SSBN Conversions to SSGN

Although START II was agreed to in 1992, it was never ratified. Both parties nevertheless verbally agreed to abide by its terms, one of which was a limit in the number of SSBNs to 14.[22] To avoid decommissioning four of the 18 SSBNs to meet this requirement, the first four of the Navy's *Ohio*-class SSBNs—USS OHIO (SSBN 726), USS MICHIGAN (SSBN 727), USS FLORIDA (SSBN 728), and USS GEORGIA (SSBN 279)—underwent conversions between 2002 and 2007 to SSGN configuration.[23]

In addition to retaining their capability to fire Mk 48 ADCAP torpedoes, the modern SSGNs were designed to be multi-mission platforms. The two forward-most launch tubes became lockout chambers and docking stations for the Advanced SEAL Delivery System or Dry Deck Shelters for Special Operations Forces missions. The other 22 launch tubes can now accommodate mission-specific equipment or canisters that each hold seven Tomahawk cruise missiles for a maximum of 154 per boat.

USS FLORIDA successfully launched an unmanned undersea vehicle (UUV) from a modified Trident launch tube in 2003.[24] General Dynamics' Electric Boat Division has developed the Universal Launch and Recovery Module (ULRM) for use on the four SSGNs as well as with the Virginia Payload Module. The ULRM can launch and retrieve UUVs and deploy other payloads. ULRM prototype testing on SSGNs is scheduled to begin later this year.

The Only Constant Is Change

As the U.S.-Soviet arms race was gathering steam, the U.S. Navy, under the leadership of a handful of prescient and extraordinarily capable men, quickly outpaced America's Cold War adversary with technological advances in missile and submarine design and rapid building programs such as the 41 for Freedom. Despite the sense of tranquility that came with the

collapse of the Soviet Union, thus ending the Cold War, and the last commissioning of an SSBN taking place in 1997, U.S. Submariners have remained vigilant, keeping the watch, as life went on stateside without much thought given to the need for maintaining our strong strategic deterrent.

Leading up to 2000, the United States faced a decreasing number of challenges from nation-states. Beginning in 2000, America saw a sharp rise in asymmetric threats from non-state actors, against which a nuclear deterrence force has little deterrent effect, further reducing the apparent need for a strong strategic deterrence force. With alarming suddenness, however, America now finds itself again facing challenges from nuclear-capable major power nation-states. With all the proverbial lines in the sand being drawn and redrawn, making for a shifting and uncertain future, it would seem that, despite whatever appearances may suggest to the contrary, maintaining a strong deterrence capability and posture is the wise course.

Navy personnel will soon bear on their collective shoulders nearly three-quarters of the nation's strategic deterrence assets. U.S. Submariners on the *Ohio*-class boats—the first two of which have entered the *Ohio* class' own life-extended period—currently have the nation covered. As our nation's survivable and effective at-sea strategic deterrent, the Trident II D5 weapon system is out there day after day to quietly prevent major power war and provide extended deterrence to our non-nuclear-capable allies.

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ARTICLES

WHY I VOLUNTEERED FOR SUBMARINE DUTY

Krysten J. Ellis
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Since my recent move to Washington, D.C., I have found that, more and more, I am approached in uniform due to the gold dolphins on my chest. Some are curious, many supportive, and others are confused. They seek clarification on why a woman might want to join the submarine service. To quote a majority: "What on Earth made you want to do THAT?" While I could simplify the answer to their satisfaction, the answer is more complicated and unique to the story of my life around the Navy. I was recently asked to share that story. I hope you find it as compelling as I do.

My childhood revolved around naval bases, specifically with those I like to call the submarine family. My father was a career submariner and my mother served as an Army journalist before her discharge to follow his career and raise me. Needless to say, Army-Navy games were always interesting. Seriously though, I mention my mother because she was also a major part of the submarine family, those family members frequently left behind in the defense of our nation. Among military families, there is a common understanding about our transitional life and its challenges, most military families experience and cope with the same difficulties, but submarine life is uniquely more difficult with its communication and typically classified nature. Many of my playmates and I knew what a homecoming meant, or, conversely, the long deployment extensions and the missing father figure. In that absence, the extended submarine family fills in. Just as there is camaraderie on the boat, there is a strong bond at home while submariners are away too. That background molded me to

be strong, independent and self-sufficient. It also showed me how to make the most of a less-than-ideal situation.

My earliest introductions to boat life included my first lobster dinner in the wardroom, running through Sherwood Forest (between the missile tubes, for you fast boat guys) and playing in the Dive and Drive trainers. Perhaps most memorable, around age 6 or 7, I flooded the CO's stateroom because I forgot to secure flushing water. My poor XO father got an earful and relentless ribbing. Strangely, I remember the horrible times fondly as well. After a sailor died, I saw the entire boat take care of his family. The guys, the wives and girlfriends, and the kids ALL pitched in to show that widow she was not alone. From the tragedy, I learned the submarine community takes care of its own and it was our honor to do so.

THAT is what made me want to become a submariner. THAT is what the brotherhood is about. It is not just a brotherhood or the machismo of being exclusively men. It has never just been men. The girlfriends, wives, sons and daughters are all part of that magic. I experienced it as a child, but I craved it as an adult, too.

I excelled in math and science, so I thought I could apply for submarines through university ROTC and pursued engineering. Submarines were not an option at the time and many of my peers made fun of me for even thinking it was possible. Somewhat dejected, I looked for an alternative. After finding an officer program to teach at Nuclear Power School, I thought that would put me in the perfect position to hear about any future possibilities. After four years, the Navy was finally discussing submarine integration, but the timing would likely not support my dream.

Accepting that I would never serve on a boat, I still wanted to serve in the Navy and applied for lateral transfer into several communities. In the end, two communities offered me a position, of which I selected the Supply Corps. Previously, I had never heard of the community, but once I found out that submarines had a Supply Officer, all of my chips were down. There was still a chance.

Going from engineering to the business side of the Navy was a rough transition for me, in terms of culture shock. Going from teaching reactor theory to selling candy bars made me seriously

question my decision-making abilities, but I finally put it in perspective that leadership is leadership no matter your title. The men and women with whom I served, nuke or supply rating, were the reason I went to work each day. Each new experience taught me to appreciate my new community, even if it had landed me on a surface ship in the middle of the Gulf and not on a submarine.

That might have been a good end to my story, content with my life decisions and becoming a more mature officer in the process. But fate was not quite finished with me. News articles held snippets of information and I used social media to promote my thoughts on submarine integration. When the pilot program Women in Submarines was announced, I was ecstatic and could not believe that my lifelong dream might come true. Some of my ideas were being implemented which would account for my seniority. Whether the integration team had come up with the idea or used social media inputs, it made sense to have a more senior woman assigned during an integration process. She could mentor the junior women and be a sounding board and litmus test for the rest of the boat's leadership. I immediately applied for the program and within a few months I had interviewed with COMSUBFOR and had orders to Sub School and my first boat.

It would be a long road with more rough spots than anyone expected. Witch hunts, leadership challenges, perceptions, behavioral tendencies… conflict and resolution that I would not and could not change. They were overwhelmingly not integration-related and made me who I am today. The organizational culture hurdles, at times, were skewed to look gender-related, but mostly were not. By and large, people off the boats made more of a fuss over the changes, while the individual commands tried to stick to business as usual. The traditions of the submarine force are rooted in technical ability, training, and faith in one another, regardless of background. That did not, and never will, change from something like integration, not in the world's best and brightest submarine force. Toward the end of my tour, I found that submarine family I had been looking for. I found a home. THAT is why I volunteered for submarine service. It was my most unachievable (or so I thought) goal that became a reality.

The submarine-specific smell of amine usually isn't pleasant for anyone. But for me as a kid, it meant my Dad was home. Amine equated to a homecoming and I still love that smell to this day. It reminds me not only of my father, but also the family I made on my two boats. I will never serve on another submarine, but my professional and personal life has been irrevocably changed and I'm happy I took the path I did. As Frost wrote, "I took the one less traveled by, and that has made all the difference."

NO "COLD WAR TO END ALL COLD WARS" – PART 2

by Mr. Joe Buff

Part 1 appeared in THE SUBMARINE REVIEW, November 2015 issue, pages 113-130.

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Executive Summary (Repeated from Part 1)

The persistent claims in some media and political quarters that America's nuclear submarines are *Cold War relics* is invalidated in this two-part article by a multi-pronged attack on both 1) the underlying flawed post-Cold War military history involved, and 2) the sheer bad logical syllogism inherent in these claims. The U.S. Submarine Force was instrumental in winning the Cold War against the USSR; the Soviet Union fell but this did not in any way make nuclear subs antiquated or irrelevant.

This is particularly true for America's survivable strategic nuclear deterrent ballistic missile subs, its SSBN fleet: The Russian Republic retained (or regained) all of the nuclear warhead stocks owned by the USSR in 1991. While steep reductions have been made by the U.S. and Russia alike, this has mainly been to reduce the massive *overkill* of tens of thousands of Cold War *strategic* weapons that could have wiped out all humanity several times over. Recently, Russia has been modernizing her nuclear warheads and delivery systems, increasing in both capacity and capability these tools for not just nuclear deterrence but also nuclear blackmail and nuclear destruction. Russia's deployed *tactical* nuclear weapons, designed for use on local battlefields, outnumber NATO's by about ten to one.

The trend since 1991 across eastern EUCOM (U.S. European Command), and in CENTCOM (U.S. Central Command) as well,

in the Russian Federation's repeated near-abroad aggressions – and in Moscow's ongoing interference in U.S.—supported Middle East peacekeeping efforts (including in Libya, and now Syria with its mounting cross-Med immigration crisis)—indicates that either the Cold War never really ended, or a New Cold War by Russia has begun. Either way, we dare not send the U.S. Navy's Submarine Force into retirement. Other compelling national deterrence and defense needs also guarantee that nuclear subs must remain *front-line tools for peace maintenance and peace restoration*: 1) Nuclear armed China's non-transparent military rise and territorial expansionism, and her own nuclear arsenal expansion and modernization including (reportedly) the recent introduction of destabilizing, escalatory land-based MIRVed ICBMs; plus 2) multiple U.S./NATO/UN overseas contingency operations and containment challenges against brutal dictatorships, terrorists (and the state sponsors of terrorism), and other armed groups – such as in North Korea and Iran, and continuing in Iraq, Lebanon, Libya, Somalia, the Sudans, Syria, Yemen, and Afghanistan.

The danger of bloody conflict will always be prevalent so long as the world has a running supply of *talented, ambitious clinical sociopaths*, some of whom claw their way to absolute power, seize control of armies and arsenals, and commit aggressive wars and ethnic/religious genocides. Perhaps only nuclear weapons are frightening enough as a deterrent to force even sociopathic – and other – dictatorships (nuclear armed and nuke wannabes alike) away from hot war toward cold war and from rearmament toward disarmament. We have already seen that our nuclear submarines' superior designs and tactics can force a nuclear-armed adversary in a cold war onto the path toward (at least temporary, but decades-long) arms reduction and incrementally greater democracy. Thus, it is a U.S. national imperative that adequate funding be sustained for sufficiently numerous and promptly-built new SSBN(X) strategic deterrent subs (the OHIO-class replacements), more VIRGINIA-class fast attack SSNs in general, and the extended-hull SSGN-capable VIRGINIAs (with the Virginia Payload Module – VPM) in particular. These vessels and their

crews remain vital to current and future national security, homeland defense, and world peace and prosperity.

Russia Makes a Datum, Over and Over Again

This second part of a two-part article begins by taking a matrix overview of *post-1989 Late-Soviet-cum-Russian Federation aggression*. Though listed one by one for flow and readability, each of these matrix entries has two dimensions: location, and tactics. Russia's tactics, while they evolve as tactics always do, tend to repeat in different locations.

Transparent economic competition alone does not in this article's context constitute *aggression*, since such competition lies at the heart of healthy, capitalist economic growth and progress, and is basic to a good system of open access and unrestrained world commerce. Ruthless economic-warfare tactics intended to cause populations to suffer physically, emotionally, and/or financially, in order to enrich a few demagogues and/or deny basic human rights, however, do constitute cold war aggression as meant here. Use of United Nations Security Council veto power to short-circuit well-intentioned NATO (or other Western-led) peacekeeping efforts does qualify as *interference*, which I also take as a form of cold war aggression. (I do not include in this matrix the mounting series of recent, *escalating and dangerous* underwater and airspace incursions by Russia against both several NATO members, and non-NATO countries Sweden, Finland, and Japan. Some of these are unconfirmed, while others could be dismissed as mere *navigation error*. The incidents were fleeting, they have been reported and commented on elsewhere, and there have been no casualties – not yet.)

Locations of Russian expansionism and/or interference have peppered former Iron Curtain territory. Connecting these dots draws a widespread constellation covering much former Soviet Communist turf—areas many commentators suspect Russia's imperialistic potentate Vladimir Putin and his supporters want and intend to fully control again, soon.

Locations subject to intimidation and bloodshed are of at least three different types: current Russian Federation provinces (oblasts) or ethnic autonomous districts (krais), former republics

of the USSR (the Union of Soviet Socialist Republics) that are now fully independent countries, and countries that were part of the Warsaw Pact (Moscow's answer to NATO) but not part of the USSR itself. Here is a list with approximate years of the most active (invasion and/or shooting and/or ruthless intimidation) conflicts in each place. These can be thought of as the New Cold War's brushfire or proxy battles, so far.

1. *The North Caucasus*, particularly in the Russian Federation areas of *Chechnya, Ingushetia, North Ossetia, and Dagestan* —lying at one edge of the old Ottoman Empire, these contain many Muslim residents. Bloody counter-secessionist wars, which some commentators claim were started or provoked by Russia, in the early to mid-1990s and again in 2000 to 2004 and smoldering to the present. Some journalists claim plausibly that deadly terrorist attacks supposedly committed by Chechen separatists (a crowded theater, occupied apartment buildings, a bustling subway station, a large school full of teachers and children) were actually perpetrated, or at least intentionally badly aggravated, by Russian security operatives for the Kremlin's political gain. (One could consider Russia's ongoing quagmire suppressing Chechnya to be *Moscow's second Vietnam*, after their invasion of Afghanistan in 1979—1989.)

2. *The Republic of Georgia*, especially but not only in the Georgian provinces of *Abkhazia* and *South Ossetia*. Bloody, supposedly secessionist-led conflicts, encouraged and supported by Russia, occurred in the early 1990s, when Russia's occupying peacekeepers forced one-sided *frozen conflict* agreements, rife with conflicts of interest favoring Moscow hegemony. These happened again in 2008. During the 2008 war, the capital of Georgia, Tbilisi, was bombed extensively by Russian jets. That brief war's total death count was several thousand fighters and innocent civilians, with some 200,000 temporarily or permanently displaced refugees.

3. *Former Yugoslavia*, also known as *the Balkans*, in Serbian dictator Slobodan Milosevic's *ethnic cleansing* wars in *Croatia, Bosnia, and Kosovo* in the 1990s. Russia, in the UN and on the ground, supported Milosevic's clear-cut genocidal massacres while undermining NATO attempts to halt the bloodshed. Many tens of thousands died, and several millions were displaced, many across international borders. Russia then attempted, quite aggressively but ultimately unsuccessfully, to unilaterally seize a Kremlin-controlled military cantonment at the strategic Pristina Airport in Kosovo. (Russia's current operation to expand and use an air base at Latakia, in support of dictator Bashar al-Assad in civil war-torn Syria, seems like an eerie repeat of such a blatant power grab—but this time one that has not been halted, yet.)

4. *Moldova*'s eastern *Transnistria* district. Separatists supported by elements of the Soviet/Russian army broke away in a war lasting from 1990 to 1992. This remains another area of *frozen conflict* on Russia's border, i.e., part of a de facto renewed Russian *sphere of influence*.

5. *The Republic of Ukraine*, in the Crimean Peninsula and in the Donets River Basin (Donbass). Harsh economic warfare over natural gas supplies in 2005-2006 and again in 2010-2011. Full-scale invasions, with about eight thousand soldiers and civilians killed on all sides, in 2013 through 2015 and ongoing despite the purported Minsk ceasefire agreement. (The economic warfare included periods of cynically, cruelly denying Ukrainian men, women, and children their basic human need to adequate heating and cooking fuel, which they needed to survive freezing winter months. Vladimir Putin in October 2014, while receiving Serbia's highest medal at a military parade in Belgrade, threatened this freezing-out tactic again.)

6. The *Baltic States: Lithuania, Latvia, and Estonia*. Ongoing economic (energy) intimidation, plus destructive cyber-attacks against Estonia in 2007, which escalated in 2014 to small incursions of international borders for abducting innocent Baltic State citizens. Estonia, which likes to call herself *E-stonia*, has

been justifiably proud of that nation's widespread use of modern computer and communication technologies and the Internet. These cyber-attacks, according to analysts, were conducted by Russian security forces, and/or directed by such forces while manned by Russian *citizen hackers*—who are not officially part of any Russian government entity but do take orders from that government.

7. *Armenia's Russia-assisted domination of Azerbaijan's Nagorno-Karabakh region*. Another late-Soviet Union, then early-Russian, now frozen armed conflict, where heavy fighting lasted from the late 1980s to 1994. There were thousands of casualties on both sides, and hundreds of thousands were displaced. The disputed territory continues to be dominated by Russian interests, with Russian *peace-keeping* forces holding sway over valuable Azerbaijan agricultural land and pipeline routes near Iran and Turkey.

A common theme in these matrix entries, part of modern post- or New Cold War tactics, is how Russia seeks to maintain what I think of as *implausible deniability* for its aggression. This is done by trying to act invisibly, through third parties such as supposedly independent separatist militias, or Russian soldiers who are supposedly *taking vacation*, or supposedly volunteer (civilian) *citizen hackers*. But as U.S. Secretary of State John Kerry has insisted about Russia's invasion of Ukraine, the evidence of Kremlin culpability is clear. Nobody—at least, outside Russia's tightly controlled internal media propaganda audience—is being fooled.

Russia also seeks to justify its aggression by claiming to be simply protecting and helping Russians who reside in neighboring countries. But the definition of *Russian* in this context seems to depend on Moscow's expansionist goal of the moment. It could mean Russian by place of birth or citizenship (and Russian Federation passports are handed out liberally in her near-abroad), Russian by language spoken at home, or pan-Slavic by ethnicity,

or Eastern Orthodox by religion. Using such protectionism as an excuse to invade neighbors is in direct contradiction to all modern standards of civilized behavior between nations. It is much too redolent of Adolf Hitler's annexation of Czechoslovakia's Sudetenland on the excuse that German speakers lived there. Of course, modern democracies do recognize that willing-coalition military invasions might occasionally be needed to intervene against violent ethnic/religious discrimination in failing states. However, there is scant evidence of any systematic, violent oppression of Russians within Russia's neighbors, nor any evidence at all that the targeted governments in the Baltic States, or Georgia, or Armenia or Moldova or Ukraine were in any way becoming genocidal.

Some in the West argue that Russia's renewed expansionism is a reluctant but essential response by the Kremlin, to NATO directly threatening Russian security in what used to be Moscow-owned territory. This threat is supposedly embodied in what is simply the willing (in fact, eager) expansion of NATO to include much of the former Iron Curtain. (NATO membership was promised to Georgia and Ukraine, though a date was not set.) Russia has no valid claim to renewing its empire; it lost the Cold War and pulled back its occupying forces, fair and square. It is a very basic human right for any sovereign nation to choose what international organizations to apply to join or not, and what treaties to sign and ratify or not.

The Crimea is on the Black Sea: Security in Russia's "Watery Near-Abroad"

Russia's aggressive annexation of the Crimean Peninsula gains her much more than just some land territory and Russian-speaking citizenry. As *The New York Times* very rightly pointed out in "In Taking Crimea, Putin Gains a Sea of Fuel Reserves," on May 17, 2014 by William J. Broad, the Crimea juts into the Black Sea. The surrounding Black Sea waters and seabed contain many valuable resources, including fish stocks and fuel reserves. The Kremlin can try to exploit the UN Convention on the Law of the Sea (UNCLOS), which establishes a 200-nautical-mile-wide

Exclusive Economic Zone (EEZ) off the coast of each country. (UNCLOS includes somewhat ambiguous rules and regulations for drawing dividing lines when two countries' EEZs overlap, as the Crimea's – if it were a country, which it isn't—certainly does overlap with the rest of Ukraine's.)

But there's more. The Black Sea floor is of strategic importance if only because it is festooned with underwater oil and gas pipelines, leading from fossil fuel fields in Central Asia (the Caspian Sea bed, western Siberia, Kazakhstan) toward Europe. Controlling seabed corridors in *its own EEZ* would allow Russia to construct more such pipelines (some are underway or planned) that skirt what would be unwelcome Western influence if they were routed instead by land and/or through EEZ seabed owned by Turkey or Ukraine. As mentioned earlier, economic warfare via throttling back fuel supplies to other countries is an important tactic in Russia's New Cold War soft-power arsenal; underwater pipelines in its own-controlled or else in open international waters are much harder for third-party nations to turn off or tap. (This tactic has also been used against the Baltic States, in the Baltic Sea.) If Russia has multiple routes to Western Europe that do not cut across Ukraine (or Turkey either), it can reap energy revenues to the former while freezing out the latter—as it has already tried to do.

Additionally, possessing the Crimea gives Russia total control over the long-coveted land territory around the major former Soviet naval base at Sevastopol, which up until their invasion-annexation they had been leasing from and sharing with Ukraine – and thus perforce sharing with Ukraine's Western friends and allies. Furthermore, the Black Sea connects to the Mediterranean Sea, through the narrow Bosporus Straits and Dardanelles which both belong to Turkey. Turkey has long been a member of NATO, and neither Turkey nor the United States have yet ratified UNCLOS, although the Pentagon wants the U.S. Senate to do so.

The *Montreaux Convention of 1936*, as amended since then, gave Turkey sovereign control of the Bosporus and Dardanelles. This has provided NATO a major strategic advantage in case of cold conflict or hot war. During the Cold War, the USSR repeatedly protested Turkey's ownership of these vital waterways.

At times Moscow played such shenanigans as making sure a Soviet warship was always transiting the straits, so as to diminish NATO control. Russia now is reportedly trying to use selective readings of parts of UNCLOS to give it more wide-open access even in wartime through these straits. This is in direct contradiction to exclusive territorial claims it is trying to make under UNCLOS to key international straits on the Northeast Sea Route, above the coast of Siberia on the Arctic Ocean. These *convention controversies* seem likely to continue, and are beyond the scope of this article (as are arguments about recent alleged violations of First Cold War-era missile shield – ABM – and land-based cruise missile – INF – Treaties).

What is central to this article is for readers to recognize that land grabs along coastlines also constitute *substantial ocean and seabed grabs*. The Black Sea, because of its location – bordering much of Eastern Europe, Ukraine, Russia, the western Caucasus (both North and South), and Turkey (gateway to the Middle East and Asia)—besides its ample natural resources, is a very important body of water indeed. Much of the Black Sea is deep enough for nuclear submarine operations. Western subs can enter from the Med covertly with Turkey's compliance. Forward presence in the Black Sea gives U.S. Navy intelligence and force-projection assets, whether submarines, surface ships, or manned or unmanned aircraft, much closer reach (and longer dwell time) into Russian territory (physically and electromagnetically), than does presence staged from vessels in the Eastern Med. Speaking of *cold* war, keeping global perspective balance, and making multiple prongs of attack on flawed defense logic, the national security issues involved here are every bit as important as the similar unresolved conflicts about competing territorial claims between nations—including the U.S. and Russia—in the Arctic Ocean.

Cold Wars as a Never-ending Story: Sociable Sociopaths in Power

Personally I have a theory, that *the world will not soon see an end to war because the world will not soon run out of sociopaths.* What is a sociopath?

A collation of definitions found on the Internet shows that a sociopath (sometimes called, synonymously, a *psychopath*) is a

person lacking in any sense of remorse or conscience, who has no regard whatsoever for the physical or psychological well being of other humans. (They often, but not always, come from a very neglectful and abusive childhood—though possibly an affluent one—and there is a genetic component as well.) A taste of power corrupts them quite absolutely. Of course, many people with sociopathic tendencies are high functioning, and the majority do not come to the attention of psychiatrists or law enforcement authorities, let alone military historians. But imagine what can happen when social, psychological, political, economic, security, environmental, ethnic bigotry, and religious-strife conditions all conspire to let one become an absolute dictator!

Groups of people, even entire societies, can combine in unfortunate ways to collectively behave as a coven of sociopaths, typically under one domineering leader—this is known as a *group psychosis*. Sociopaths tend to be extremely, compulsively manipulative, even true geniuses at it. Smoothly charming opportunists, oily and pushy social chameleons, they make astonishingly convincing con men (and women). This is because they are *perfect* liars, who dissemble successfully since they have no conscience or remorse about lying, and thus give away no *tells*. They tend to be very egotistical, narcissistic-exhibitionistic, and vindictive, reacting against any challenges to their primacy with vicious, sarcastic rhetoric—and violence, often administered for them by those they control.

Again, think about ambitious, talented sociopaths let loose in the foreign relations sphere. They excel at a twisted behavioral two-step: provoking ire in others through their own nasty conduct, then angrily condemning those others for feeling such ire rather than accept any responsibility themselves for the provocation. This last trait gives an *unfair advantage* to sociopathic potentates: They play on America's so-called *liberal condition*, which is for some of our influential citizenry to blame ourselves for all the world's ills.

Some psychologists estimate that 1% of the American population are sociopaths. A clinical study of 200 corporate managers by Canadian psychology professor Robert D. Hare (e.g., Psychology Today, vol. 27, no. 1, 1994, pp. 54-61) suggested that 4% of top

business executives fit the diagnosis. You don't need to be a lurid serial killer to be a sociopath/psychopath—this apparent statistical *distillation* from 1% to 4%, from the general population down to the subset of corporate managers, suggests to me that some sociopaths are especially attracted to positions that yield great managerial power and wealth, and then their aberrant personalities provide them a competitive edge to claw their way to the top.

Ruthlessly amassing political power to eagerly command mass death and destruction certainly qualifies someone as a sociopath. The biggest wars and worst ethnic/religious cleansings of modern history were instigated by sociopaths; in total, many tens of millions of innocent people have died in the 20th century alone. Examples include Josef Stalin, Adolf Hitler, Idi Amin, Pol Pot, Saddam Hussein, and Slobodan Milosevic. One of their best (worst) weapons—as is sometimes also said about the Devil himself—is how sociopaths shrewdly exploit the fact that many people don't even suspect their terrible pathology's very existence. They have a special knack for passing themselves off as perfectly well adjusted, happy and responsible, charismatic leaders.

Why does this matter to national defense? A sociopath is very selfish and grandiosely over-confident, but they also, over time, become increasingly reckless in pursuit of further gains, and can even appear to normal people to be suicidal. (Think Hitler invading Russia.) Negotiating effectively across a diplomatic conference table with a sociopath and their sycophantic, even psychotic retinue is exceedingly difficult.

A sociopath is diagnosed by their *behavioral symptoms*. Some commentators have wondered whether Vladimir Putin might be a sociopath. This is meant as a serious question, not an insult. The question is a very important one because, I would argue, it is empirically true that sociopaths with enough power do cast a spell over hordes of followers, and then start wars and/or genocides.

Humanity alas does include an unfortunate share of sociopaths. The members of this demonic talent pool are always vying among themselves and the general population for supremacy. In a perverse form of social Darwinism, only the strongest, most dangerous of the sociopaths attain the pinnacle of power, to cast their lasting stain upon human history.

We need *not* be 100% certain that Mr. Putin does or does not fit the diagnosis; a probability somewhat greater than zero that he might be—which is what I perceive—is sufficient to cause great alarm. We also need some healthy concern that his eventual successor, whoever that is, might fit the behavioral profile. This is because *our duty to global security risk mitigation* demands extreme caution on our part in interpreting modern Russia's chronically disingenuous, provocatively belligerent behavioral trends; that same duty requires extreme care in making our decisions about things like *friendship* or *engagement* or *containment* or *confrontation* between the U.S. and the Russian Federation. This should particularly be borne in mind near term, during further deliberations about diplomacy, economic sanctions, and other measures aimed at resolving 1) the ongoing Ukraine/Crimea crisis, and 2) Russia's recent air power and seapower deployments into civil-war torn Syria.

As the USSR saw the hard way, cold wars can be lost. But the resulting regime change can only be counted on as an enabler of incremental progress toward greater transparency and accountability, democracy and freedom, and peace and prosperity, if the good guys win. Certainly Russia is a much better place for most of its people to live in today, compared to under hard-line repressionists Leonid Brezhnev or Josef Stalin or the Romanov czar-emperors. This is thanks to laudable reforms first tried by Nikita Khrushchev and by Alexei Kosygin, then fomented by Gorbachev, with the further modernizations instigated or at least allowed under Yeltsin and Putin—with generous help and encouragement from the West. America and our allies *must* be certain to win any future cold wars.

Conclusion: Crucial Investments for Peace and Prosperity

Hot, shooting wars are terrible and tend to spread uncontrollably for years before they can be ended. Sociopathic dictators are extremely manipulative, perfect liars who have no conscience or remorse, no regard for human life, and seek every opportunity to amass total power and start wars of aggression and genocide.

If the supply of sociopaths in the human race is truly never-ending, civilized society might benefit by learning to view an ongoing cold war as an important form of peacekeeping success: It is a way to divert an entrenched sociopathic/psychopathic aggressor leader or whole society away from a path to hot war and ethnic/religious cleansing. In this sense, nuclear weapons evolved rapidly from an American hot-war-ending weapon in 1945 to a NATO hot-war-preventing weapon against the Soviet Union-led Warsaw Pact. This, again, should be viewed as an important peacekeeping success. Perhaps nuclear weapons will always be needed as a strategic deterrent, because only they are terrifying enough to frighten even a sociopath onto the path to cold war and then peace.

Peace maintenance is very, very expensive, but it is much less costly than war. Peace-enforcement and peace-enablement must be invested in continually, and heavily, to prevent widespread war. Cold wars can be lost, just as they can be won. The winner can help foment loser regime change, which can allow incremental progress toward higher living standards and greater democracy—but only if the good guys win. Several areas of investment come to mind:

- *Maintain a strong, agile, well-balanced military.* A robust U.S. Navy Submarine Force is an important part of this mix. Rapid and full funding, without lapses or backsliding, is absolutely essential for the Sub Force's badly needed dozen SSBN(X) subs (the OHIO-class replacements), and the forty-eight VIRGINIA class SSNS—including SSGN-capable VIRGINIAs with the Virginia Payload Module (VPM) and diverse payload vehicles. Despite great progress in fabrication and in training methods, it takes most of a decade to buy and build a nuclear sub, and to then give her crew the necessary at-sea operational seasoning. America and our allies and friends also need to invest further for *balanced and effective conventional and nuclear deterrence forces* and for *effective all-domain defense and resiliency*. This must cover everything from the missiles and dual-capable aircraft (DCA) legs of a modernized, safe, secure, reliable Nuclear Triad Force; to sufficient sea-surface, air, and ground conventional capacity and

capabilities; to enhanced security and recoverability for cyber-space (including seabed fiber optic cable links) and out-space assets, platforms, and personnel (including cheap, disposable *cube-sat* satellites).

- Better sustain, and further focus, systematically informing the American general public, along with governmental policy makers and decision makers, to *enhance collective memory about recent and current military realities*, and also *strengthen cognizance of present, near-term, and long-term future defense challenges and opportunities*. Better balance and flesh out society's and politicians' very necessary military events consciousness. This is essential in order to chart the wisest course for our nation, that errs neither toward excessively celebrating past victories in a manner that can lead to complacency, nor excessively condemning past failures in a manner that can compromise current and future defense preparedness.

- *Achieve better U.S. and world energy security.* One area of investment for peace and prosperity, where good laboratory progress has been made recently—but long-term investment was, I think, shortchanged over the past several decades – is learning to harness commercial-scale *"hot" fusion reactor power* for abundant electricity. Fusion reactors would be inherently much safer and much more environmentally friendly than fission reactors; they can never suffer a nuclear blast and cannot be used to make nuclear bombs. They would produce energy as efficiently as our Sun does, using as fuel source the vast world ocean's most plentiful element, hydrogen. Generating electricity 24/7/365, independent of cycles and vagaries of sunshine, wind, and tide, they would be constructed in a capital-intensive way at centralized *locations——which* ought to make them of significant interest at this point to the forward-looking fossil fuel and nuclear energy industries. (Hedge funds and high-tech start-ups are beginning to invest in this area as well.) Compact, mobile hot fusion reactors could also some day power surface ships and submarines, sidestepping the quandary over HEU versus LEU in our subs and aircraft carriers. Likewise, greater investment in *liquid natural gas*

transport ships, plus more active construction of the special port facilities and local distribution pipe systems needed to deliver the gas to homes and factories, would reduce dependence on trans-national pipelines—whether on land or along the seabed—which can be held hostage during cold war.

- *Strive for better economic growth, and economic stability, in the U.S. and worldwide.* Wisely balance laissez-faire capitalism and regulatory oversight, and provide such best practices structural-procedural assistance abroad—especially to prevent more financial industry sociopaths (such as Bernie Madoff, or his Ponzi scheme imitators in Albania) from destabilizing whole economies. Economic disruptions heighten risk of a sociopath demagogue's rise, while making it more difficult for democracies to sustain a good international focus and afford adequate defense preparedness. Balance taxation, revenue, and monetary policies with the need to clearly and publicly recognize something very fundamental: Money needs to be spent to preserve peace and enhance prosperity, so as to protect—and grow—the value of all sorts of American assets, rather than risk mass destruction of those assets in terrorism and war. *We as a nation and a society simply must invest in defense, to defend corporate investments and personal savings alike.*

- Seek out better clinical practices and laws, and diplomatic, intelligence, and special operations mechanisms, for *limiting the scope of sociopathic behavior* at a national and international level. Early intervention, overtly or covertly, is key. Hitler could only be stopped by brute force. He could have been most easily stopped early, when he reoccupied the Rhineland, or annexed Austria, or occupied the Sudetenland. Sociopath dictators simply cannot be appeased. Their grandiose, rabble-rousing warmongering talk is all too often *not* mere campaign blather or *for domestic use only*. Threatening unprovoked, aggressive war should be no more acceptable free speech than shouting "Fire!" in a crowded theater. Dictators must be held responsible, early on, for making such provocative threats, with international courts and peacekeeping bodies watching for and sanctioning this felonious conduct. The

instantaneous information connectivity of today's world, and the immense lethality of today's weapons systems, demand early corrective intervention, with wise advance planning but without hesitation and without obfuscation. It is bogus to fear *provoking* the demonic urges to mass death and destruction that sociopaths already feel deep inside. It is essential to avoid enabling and empowering them. Who will be the first Hitler or Hitler-wannabe of the 21st century?

The bloody intentions of sociopathic dictators, and their mesmerizing power to delude whole populations into criminal and even group-psychotic war-making and ethnic/religious cleansing behavior, must never be underestimated. Continual investing for peace is essential. Mounting tensions with unrepentant autocrat Vladimir Putin and *his* Russia currently present a serious potential/emerging threat to European security, world peace, and the American way of life.

China's own territorial and nuclear expansionism, plus the Middle East's ongoing atrocities during Islamic extremists' drive for some sort of New Caliphate (horrors from which China and Russia are by no means completely safe), add further urgency and complexity to calls to repeal U.S. budget sequestration and protect the funding for U.S. defense capabilities and capacity. Cold war is indeed very expensive when it occurs, but it is much better than hot war. America's nuclear submarine fleet and her courageous, self-sacrificing Submariners successfully divert dictatorships away from starting big hot wars, they help keep cold wars cold, and they have proven their ability to undermine evil empires and allow the incremental spread of global democracy.

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SUBMARINE FORCE RESERVE COMPONENT: SUPPORTING THE NAVY MISSION

REAR ADMIRAL ANDREW LENNON, U.S. NAVY

MARCH 2016

This March, the Navy Reserve celebrated its 101st birthday. For more than a century, reserve Sailors have defended the nation serving in every crisis from World War I to the War on Terror. The mission of the Navy Reserve is to deliver strategic depth and operational capability to the Navy, Marine Corps, and Joint Force. Since 9/11, more than 70,000 reserve Sailors have mobilized and provided boots on the ground in Iraq, Afghanistan, Kuwait and other locations not normally associated with a maritime force. Today 2,000 are mobilized. Additionally 12,000 reserve Sailors provide day-to-day support to Navy missions each week around the globe.

Those who served in the reserves in the 80's and 90's might not recognize the force today. When I started my reserve career, active Sailors and reservists were seen as being members of separate organizations. Today that could not be further from the truth; the 21st century Navy consists of active and reserve components that are fully integrated. Our Submarine Force Reserve Component (SFRC) provides a great example of how well our citizen Sailors are supporting the Navy's mission.

Of the 57,000 Sailors in the Navy Reserve, approximately 1,600 are assigned to SFRC and directly support the Submarine Force. Like the rest of the Navy Reserve, SFRC provides strategic resources that may be needed during a crisis and helps the submarine force successfully accomplish its day-to-day tasks. Each year, SFRC Sailors serve on six of seven continents and in three of four of the world's oceans.

SFRC Sailors do not normally go to sea aboard U.S. submarines, but support submarine readiness and anti-submarine warfare via five lines of effort (LoEs): Undersea Warfare Operations, Expeditionary Maintenance, Force Protection, Submarine Escape and Rescue and support to the Undersea Warfighting Development Center (UWDC).

Reserve Sailors working in our Undersea Warfare Operations (UWO) LoE conduct ASW and help train the Submarine Force and the fleet. Many stand watch on theater ASW (TASW) watch floors keeping track of undersea activity at four sites around the world. In addition to real world operations, SFRC provides ASW-trained people to a wide variety of training exercises that prepare our fleets for battle. In 2015, SFRC sailors participated in 37 coalition, fleet and group level exercises such as Exercise SHARK HUNT, the certification event for Commander, Task Force 69 (CTF-69) in Naples, Italy. In fact, all of the TASW watches during SHARK HUNT were stood by reserve Sailors!

In addition to watch floor support, the Reserve Component also provides undersea warfare expertise to higher headquarters, to Combatant Commanders and to the fleets for operational planning. It is not uncommon to find reserve officers with more operational planning expertise than the active duty counterparts, gained from their time mobilized or serving overseas and on joint and fleet staffs. In fact, our reserve officers have conducted seminars to train the active component in the art of operational planning.

Because of our depth of expertise, UWO sailors augment destroyer squadron (DESRON) ASW watch floors aboard aircraft carriers during pre-deployment workups, both in port and at sea. The reserve team remains available to support the carrier strike group during deployment and can fly to meet the carrier in theater if needed. Last year, SFRC supported two DESRONs, and in 2014, we flew a team to the USS GEORGE H.W. BUSH in the Arabian Gulf in support of Exercise ARABIAN SHARK, a multi-national ASW event.

While reservists don't go to sea on U.S. submarines, we do go to sea on foreign diesel boats. SFRC junior officers interact with South American navies as part of the Diesel-Electric Submarine Initiative (DESI). The DESI program allows our fleet to train and

operate against modern, quiet diesel-electric submarines, while providing our partners with a chance to assess their capabilities and training readiness. SFRC officers embark as safety observers. Because they understand depth separation and other safety requirements, the commanding officer of the diesel boat can focus on fighting his ship, thereby improving everyone's training. This past year, our junior officers provided underway support on six diesel submarines and delivered deployment readiness seminars in Colombia and Chile.

Senior UWO Officers and Chiefs conduct approximately 40 submarine culture workshops (SCWs) each year. The SCW program, run entirely by SFRC, assesses a submarine's command climate through a series of interviews with a boat's crew. Feedback to the command triad has been found to reduce accidents and improve safety.

Another major LoE within SFRC is Expeditionary Maintenance (EM). Its 800 Sailors provide maintenance support to the submarine force aboard tenders, on submarines in port, and in shipyards. Last year, reserve Sailors provided over 2,900 days of support to submarine tender Repair Departments. They also provided over 1,300 days of assistance to seven SSGN Consolidated Maintenance Availabilities (CMAV) (crew exchanges) in Guam, Diego Garcia and Kings Bay.

Our reservists also make items that go on submarines like torpedo room bunk pans, guard shacks and coffee cup holders, known as zarfs. They also fabricate possibly the most important piece of gear on any submarine – the bunk curtain. If you don't think the bunk curtain is the most important piece of gear on a submarine, you need to deploy once without one. Lastly, our EM sailors augment submarine crews in the shipyard, thereby allowing the submarine's commanding officer to send some of his crew members to schools or give them leave. Last year, our sailors provided the USS GREENEVILLE and USS OLYMPIA with 545 days of support. This program, known as the SSN Sailor Quality of Life Initiative, not only benefits the active duty, it also allows our Sailors to keep their skills sharp.

Another way in which reservists can stand in for active component Sailors is by providing force protection for our ballistic

missile submarines (SSBNs). The Force Protection LoE is small, with just under 200 sailors supporting Submarine Groups 9 and 10. Their mission is to protect SSBNs pierside when they are out of home port. Most of the Sailors assigned to the force protection mission are civilian police officers. When standing guard, they are armed and may be authorized to use deadly force. Last year, our Masters-at-Arms provided 5,812 days of operational support, relieving ship's crew of this task.

Sailors in SFRC's fourth LoE, Submarine Escape and Rescue (SER), compose 60 percent of the Navy's 150 person team at Undersea Rescue Command in San Diego. This is a great mission for a reserve Sailor as the capability is rarely (hopefully never) needed, but can be called upon on short notice. Most SER Sailors have significant Navy diving experience, and they have supported the pressurized rescue module certification for the Submarine Rescue Diving and Recompression System. In addition to being prepared to operate very complex rescue equipment, SFRC's SER team also supports international exercises, conferences and events that have the potential to boost cooperation. In 2015, our Sailors engaged the Navies of United Kingdom, Australia, Belize, Canada, Germany, Malaysia, Mexico, Singapore and Vietnam.

The newest LoE in SFRC is the Undersea Warfighting Development Center (UWDC). UWDC reserve Sailors serve as TASW instructors and assist with certifying and assessing ASW watch teams.

As we begin the Navy Reserve's second century, SFRC stands ready to provide qualified Sailors who will seamlessly integrate into Submarine Force commands, enhance undersea warfighting capabilities, and ensure our boats are ready for tasking; we are ready to mobilize if needed. SFRC Sailors take great pride in being part of the submarine force and doing vital work for the Navy.

S.O.S. FOR A DECLINING AMERICAN NAVY:

TODAY'S 272-SHIP FLEET ISN'T NEARLY ENOUGH THE U.S. NEEDS 350 SHIPS TO MEET THE RISING GLOBAL DANGERS

By Mr. Seth Cropsey
Undersea Warfare

Mr. Cropsey is director of the Hudson Institute's Center for American Seapower. He served as a naval officer and as deputy undersecretary of the Navy in the Reagan and George H.W. Bush administrations.

China confirmed that it is building its first aircraft carrier from scratch, adding to a fleet that includes a Russian-made carrier. The news cast U.S. military policy in a particularly unsettling light: While China's naval power expands, America has deliberately reduced its presence on the seas. The Navy-after nearly $1 trillion of Defense Department cuts, in part mandated by the 2011 budget-sequestration deal between Congress and the Obama administration-is already down to 272 ships. That means the U.S. fleet is less than half its size at the close of the Reagan administration nearly 30 years ago (and down by 13 ships since 2009).

The Navy had intended to increase the fleet to 308 ships, including 12 that will replace the nation's aging ballistic-missile submarine deterrent. But in a mid-December memo, Defense Secretary Ash Carter told the Navy to cut the number of ships it plans to build in favor of placing more-advanced technology aboard the existing fleet.

Secretary Carter's plan implies that the deterrent effect of a constant U.S. presence in the world is less important than the Navy's ability to fight and win wars with the advanced weapons he favors. That assumption is mistaken. We need both the ability to be present, which demands more ships than we have, and the related power to win a war if deterrence doesn't work. Even the

Navy's now-endangered plan for 308 new ships was far below the approximately 350 combat ships needed to achieve this aim.

With danger rising around the world, from the Persian Gulf to the South China Sea, the increasing military and economic threats cannot be ignored. Here is what an expansion of the Navy to the 350 ships needed to safeguard national security would look like:

- Aircraft carriers. Applying power requires the anti-submarine, anti-surface warfare, surveillance and strike ability of aircraft carriers. It requires an increase from the congressionally legislated level of 11 aircraft carriers to 16, enough so that we could maintain at least one carrier strike group in the Western Pacific, the Persian Gulf, and return powerful U.S. naval forces to the Mediterranean.
- Supply ships. The ability to shape events on land is linked to the ability to operate independent of it. Supply ships assure this. The U.S. currently has 29 such vessels but it needs to double the number so that it can provision a larger fleet in the Western Pacific and return to the Mediterranean in strength.
- Submarines. The Pentagon's annual report last April on Chinese military power predicts that China will have between 69 and 78 submarines by 2020. The U.S. expects to have about 70 submarines in the same year. Yet repairs, maintenance and rotational cycles mean that only about 25% can be deployed at a time and must be spread around the world. The U.S. will likely retain its qualitative advantage, but the size and quietness of China's submarine fleet means that America needs a total of 90 submarines to provide a healthy nuclear deterrent, shadow or hunt enemy subs, assure dominance in the Western Pacific, and meet additional global challenges.
- Amphibious craft. Increased Russian naval presence in the Mediterranean and that of China and Iran as well as Islamic State's occupation of Sirte on the Libyan coast also demand a return to the amphibious

presence that the U.S. maintained during the Cold War. The possibility that China would seize and hold islands in the Western Pacific as a means of extending its strategic reach also emphasizes the need for greater amphibious capability. The U.S. Navy and Marine Corps should have 45 ships for these missions, an increase of nearly 50% over the current level.

- Large surface combatants, destroyers and cruisers. These remain the U.S. fleet's backbone. They hunt for subs and other surface ships, project power inland, and protect-and are protected by-aircraft carriers. For the foreseeable future they will be the main defense against proliferating missiles that can be launched against ships from land, air and sea. Weighing China's ability to concentrate naval forces in its adjacent seas against the U.S.'s global commitments, a total of 100 large surface combatants-an increase from the planned 88-is the minimum required to protect each of America's 16 carriers with five ships.
- Small combatant ships. Defense Secretary Carter wants to cut the number of the small naval combatants, called littoral combat ships (LCS), to 40 from 52. Even in its upgraded version, the LCS falls short of the ability both to defend itself and take the fight to an enemy. Instead of building 40 ill-defended combatants, the Navy needs a minimum of 30 new small combatants that possess a real frigate's offensive and defensive ability.
- High-speed vessels. Current plans are right when they call for 11 of the low-cost, unarmed and fast twin-hulled ships that can transport small Army or Marine units along with their equipment.

The fleet described here would number 350 ships, about 240 ships fewer than the Reagan Navy, and 13% larger than the combat fleet the Navy currently seeks. Using the Congressional Budget Office's cost estimates, this would require an annual $24 billion shipbuilding expense. That means a 45% increase of the

current $16.5 billion shipbuilding budget, or an added $7.5 billion yearly to the shipbuilding portion of the Navy's budget to reach a 350-ship fleet by 2045. China's shipbuilding plans, as well as other global challenges, show why a larger fleet is needed sooner than 30 years from now. Achieving this would increase annual shipbuilding budgets.

Yes, this is expensive, but it's cheaper than surrendering America's global naval dominance-and that's where the nation is headed, given the trend lines as China's fleet grows. The expense can be moderated. One example is the shipbuilding economies of scale found in the 1980s: The contracts for the aircraft carriers USS GEORGE WASHINGTON and USS ABRAHAM LINCOLN were signed on the same day and the great ships were built nearly simultaneously, saving about $700 million. More savings are possible if a new president were to overhaul the top-heavy Pentagon and make sorely needed reforms of military management.

Yet the $7.5 billion difference between the Navy's insufficient current plan and the minimum required to meet foreseeable commitments is a fraction of even the Obama administration's defense budget. What the nation can't afford is to retreat as menaces increase abroad.

LOSS OF AIR CONDITIONING ON A SUBMARINE: SIMPLE ENGINEERING EXERCISE OR LIFE-THREATENING MASS CASUALTY?

Authors: CAPT Raymond D. Woolrich, USN, Ret.
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" 'People were going to die': submarine crew trapped in searing heat after catastrophic systems failure."

Those headlines on 4 June 2014 from the UK newspaper THE TELEGRAPH reported an incident on board HMS TURBULENT, a Royal Navy fast attack submarine, as she left Fujairah in the United Arab Emirates on 26 May, 2011. CDR Ryan Ramsey, RN, Commanding Officer of TURBULENT at the time, who related the incident from his home after retiring from the Royal Navy, said "I genuinely thought there was going to be a loss of life on board."

That could never happen on a US submarine, right? Our boats are too redundant and have too many backups to let things get that bad. The fact is it has happened in the past on earlier classes of US submarines, and the progression of events was strikingly similar to TURBULENT's experience. TURBULENT's casualty was caused by marine organism buildup in air conditioning condensers while operating in warm waters. While it is tempting to respond "That could never happen on my ship", what if it did?

A catastrophic loss of air conditioning (AC), while a rare and unlikely scenario, is a possibility every Commanding Officer should thoughtfully consider and plan for, because its potential downside is a major medical casualty and potential loss of life. By the time the first heat casualty comes to medical attention, catastrophic loss is imminent: planning and preparations must

have occurred long before the first heat casualty presents itself. The means to recognize this situation early, take preventative measures and respond rests squarely with the command team. In truth, from a medical point of view the cause of AC loss is immaterial. Would you know how to handle what could quickly become a mass casualty? It's not just the Corpsman's problem. He will be heavily involved in limiting the danger to the crew, and stands a fair chance of becoming a casualty himself. What will you do if his advice is no longer available? How can you best prepare to overcome the threat to your crew regardless of who remains standing? How long do you have? When do you call for help?

The Timeline

Within the first hour following a total loss of air conditioning, temperatures in the engineering spaces will rise to approximately 140° F, while temperatures in forward spaces will rise to approximately 120° F; possibly higher depending on outside water temperature and the insulating effectiveness of anechoic coatings. Humidity will similarly rapidly approach 100%. Navy Physiological Heat Exposure Limits (PHEL) recommend stay times in temperatures exceeding 120° F be limited to 15 minutes or less. Where will you evacuate crew who show signs of serious heat stress? Pierside, perhaps, if you are in port. But, what if you are in the Middle East and outside air temperature is 110° F? What if you are at sea in the Persian Gulf or Indian Ocean where sea water temperatures at the surface can approach 95° F? Can you return to port quickly? Are you in a location where local authorities are able to comprehend and accommodate a nuclear submarine with a reported casualty?

A combination of high air temperature, high humidity, thermal radiation (from the sun and boat surfaces) and low air movement contribute to heat stress. The loss of AC on a boat in tropical environments could very quickly result in these conditions. If there is no decrease in crew physical activity then heat illness casualties would quickly present to the medical team. As the whole ship's company will soon be experiencing similar conditions, waiting for

the first casualty to occur is likely to lead to multiple simultaneous heat injuries. Heat injuries are more likely to occur first in occupations with a higher thermal load such as engineers or cooks, but are often masked in fit, healthy individuals who are highly motivated and focused on their task. This makes predicting exactly who will be affected and when they will reach their limit very difficult.

Well prepared Army units that have time for acclimatization still run into problems with heat stress. In 2011 during training in the United States an 18-year-old cadet at the U.S. Military Academy died during an exercise and, days later, a paratrooper died after physical training at Fort Bragg, N.C.[1] An Army unit normally has time to acclimatize and the opportunity to limit or prevent heat illness. In the event of an AC failure in a submarine the crew will not be acclimated to high heat and humidity and there will be no time to plan countermeasures.

What Happens to Your Body?

Physiology, fitness and, to a lesser extent, genetics determine how well and how quickly each of us responds to heat stress. In high temperatures the main means of heat regulation is evaporation of sweat from the skin, however when air temperature and humidity are high, the capacity for evaporative cooling is significantly impaired. The cardiovascular system directs heat to the skin to help increase heat transfer, but this places a considerable burden on the heart. Physical activity further contributes to heat injury by generating heat from metabolism, which strains the cardiovascular system further.

As body temperatures increase above about 104° F the risk of heat injury rises significantly and organ function begins to deteriorate. Organs most susceptible to this deterioration include the central nervous system, the kidneys, the heart, and the body's regulatory system. Regulatory failure can occur early in the course of heat illness, accelerating the severity of the heat illness. As core body temperature increases there is a progression of heat injury from mild to severe. Although many casualties develop mild symptoms first, there can also be a rapid progression to severe illness and sometimes severe cases present without reporting mild

symptoms at all. However, there is no doubt that when mild cases occur, if there is no change to the environmental conditions and no means to mitigate this heat burden, they will progress to severe heat casualties.

Fig. 1 The Spectrum of Heat Illness: Signs of Illness and Simple First Aid

Illness	Symptoms	First Aid*
DEATH	Unpredictable	Inevitable in heat stroke without hospital facilities
Heat stroke	▪ Confusion ▪ Fainting ▪ Seizures ▪ Excessive sweating or red, hot, dry skin Very high body temperature	▪ **Medical Emergency requires hospital treatment** ▪ While waiting for help: ▪ Place sailor in shady, cool area ▪ Loosen clothing, remove outer clothing ▪ Fan air on sailor; cold packs in armpits ▪ Wet sailor with cool water; apply ice packs, cool compresses, or ice if available ▪ Provide fluids (preferably water) as soon as possible Stay with sailor until help

		arrives
Heat exhaustion	▪ Cool, moist skin ▪ Heavy sweating ▪ Headache ▪ Nausea or vomiting ▪ Dizziness ▪ Light headedness ▪ Weakness ▪ Thirst ▪ Irritability ▪ Fast heart beat	▪ Have sailor sit or lie down in a cool, shady area ▪ Give sailor plenty of water or other cool beverages to drink ▪ Cool sailor with cold compresses/ice packs ▪ Take to clinic or **emergency room** for medical evaluation or treatment if signs or symptoms worsen or do not improve within 60 minutes. ▪ Do not return to work that day
Heat cramps	▪ Muscle spasms ▪ Pain ▪ Usually in abdomen, arms, or legs	▪ Have sailor rest in shady, cool area ▪ Sailor should drink water or other cool beverages ▪ Wait a few hours

		before allowing sailor to return to strenuous work ▪ Have sailor seek medical attention if cramps don't go away
Heat rash	▪ Clusters of red bumps on skin ▪ Often appears on neck, upper chest, folds of skin	▪ Try to work in a cooler, less humid environment when possible ▪ Keep the affected area dry
* Remember, if you are not a medical professional, use this information as a guide only to help workers in need.	▪	▪

Consider what happens to your crew when operating on the surface in heavy seas, often resulting in significant numbers of personnel sidelined by seasickness. Then think seasickness on steroids; and it gets worse. Heat illness would similarly result in crew becoming severely dehydrated and the provision of plentiful fluid replacement becomes critical. More than one severe heat injury requiring intravenous fluids would essentially overload the system, as the medical department has very limited stocks of intravenous fluid for rehydration. When the demand outstrips the resources it becomes only a matter of time before the situation deteriorates.

Within roughly a few hours of working in greater than 120° F heat a significant portion of the crew will show clinical signs of heat exhaustion (moist skin, heavy sweating, fast heartbeat, weakness, light headedness, dizziness, nausea/vomiting, headache, thirst and irritability) (see Fig 1). Physical and mental performance deteriorates, tasks are performed slowly, reaction times are reduced, decision times increase, errors of omission are more common; attention to detail, concentration and short term memory are degraded. Physical exertion in this environment exacerbates the problem by generating heat from muscle metabolism and can result in exertive heat illness with similar symptoms to heat exhaustion. Studies in Israeli helicopter pilots[2] have shown there is an increase in errors associated with increased thermal load. Laboratory experiments have confirmed the effect of heat on physical and mental performance. In large part this is probably due to the high degree of discomfort and hence distraction in a hot environment.

With additional heat exposure the symptoms can progress to heat stroke (confusion, fainting, and seizures). The end result is multiple organ failure followed by death without heroic reduction in core body temperature. Passive measures for heat reduction (drinking fluids, cooling mists, rest) are not effective once heat stroke has set in. Aggressive intensive measures must be taken at this point which include cooled IV fluids, intra-abdominal cooling baths, ventilator support, and dialysis…all measures not available on an underway submarine. Normal rehydration and cooling are typically not sufficient to manage heat stroke; these patients

require emergent hospitalization and treatment in an intensive care unit, capabilities not available on a submarine. It is this type of heat injury which ultimately defines the actions by the Commanding Officer. Actions must be taken well in advance of the symptomatic heat casualty in order to avoid heat stroke, as the only practical management strategy for heat stroke underway is prevention and avoidance. A case of heat stroke on an underway submarine will be uniformly lethal.

What Can You Do?

With any loss of AC, a contingency plan should be immediately activated, just as we would with our DoD active shooter action plans. The loss of AC should trigger a shipboard wide announcement that AC is lost, activities such as exercise should stop, and efforts to rest encouraged. Command leadership should begin to estimate the time AC will be lost. If no estimate can be made, or the time to restoration of AC is on the order of hours, then an immediate SITREP needs to be sent. As soon as it becomes clear that AC cannot be restored within hours then a request for assistance needs to be sent. In a serious loss of AC accident the responses available to you are limited: minimize heat exposure (place your crew in the coolest areas available), remove excess clothing, limit activity, provide rehydration and, if possible, provide further cooling such as cooled vests (e.g., if refrigeration plants are still available, filling plastic bags with ice or frozen stores and stuffing them inside clothing would provide some necessary cooling for crew who must continue to work to resolve the casualty). Some ships have provided saltwater cool-down showers using seawater vents. However, once the AC has failed there will inevitably be heat casualties. Rapid recognition and response will be essential. References exist for the management of heat illness, but the majority of these focus on prevention and safe exposure limits. Exposure limits essentially become irrelevant in the event of a loss of AC.

Minor and major heat illnesses overlap; hence symptoms of relatively minor heat illness such as heat cramps, exertional heat illness and heat exhaustion can be common to or the harbinger of more serious illnesses such as heat stroke. Heat injuries tend to

occur in clusters. One case of heat exhaustion is often quickly followed by others, and if left untreated often progress to more serious heat stroke. In a sustained loss of AC accident heat illness is likely to cascade, so waiting for the first casualty to occur will most likely lead to multiple heat injuries, as HMS TURBULENT found. Heat injuries are likely to occur first in those rates with a higher thermal load such as engineers or culinary specialists. Your Corpsman and his Emergency Medical Assistance Team (EMAT) will be heavily involved in stabilizing the casualties and will themselves be subject to significant heat stress. Medical supplies will be rapidly depleted in a sustained loss of AC and the Corpsman may also succumb to a heat casualty. Action plans should account for these issues.

Preparing for a Loss of AC

Practically speaking, this is not a casualty for which you can drill. It is, however, a casualty that lends itself to a serious tabletop exercise where key players sit around the wardroom table and discuss the casualty progression, learn the warning signs of heat illness, and fix in their minds the key decision points and the actions they might take or recommend. Your Corpsman and his EMAT are key players here, and their inputs would be enlightening. The principles learned from this type of exercise apply equally well to any mass medical casualty, and are well worth the training investment.

A Command Perspective

Should Type Commanders prepare a contingency plan for this situation and exercise the plan regularly? Should they identify the resources that would be required to assist a stricken submarine and how these supplies are delivered to a submarine at sea in sufficient quantity within time? What might those supplies be and where will they come from? Who will provide medical support? Would specially trained teams such as the USAF Parachute Jumpers or UK Submarine Parachute Assistance Group (SPAG) be mobilized to provide support? Where is the nearest appropriate medical

facility? Will the crew be capable of sailing the boat to port or will they require additional personnel to help stabilize the situation and recover normal operation?

Summary

Loss of AC sounds serious, and it is. If you suffer a loss of air conditioning casualty and are not certain you can restore air conditioning within 1-2 hours, you should seriously consider advising your operational commander and requesting assistance. Provide as much time as possible for command staff to locate nearby assistance and start the cavalry enroute. Heat stroke as part of a mass casualty is a serious medical emergency requiring immediate hospital-level assistance. Heed CDR Ramsey's warning. Don't delay until you are past the tipping point to request help.

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SUBMARINE NEWS FROM AROUND THE WORLD

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From the January 2016 Issue

ITALY

Funding Request for Type 212A Batch III Submarines

On 15 December 2015, AMI received information that the Italian Navy (IN) has begun working to secure funding for the procurement of the third pair of Type 212A (Todaro) class diesel electric submarines (SSK).

Italy ordered its first two Type 212A submarines from Fincantieri in August 1997, and the two submarines were built at Fincantieri's yard in Muggiano, Italy. The first steel was cut for the lead unit on 19 July 1999, and for the second in July 2000. The first unit of the class, SALVATORE TODARO, was commissioned in 2005, and was followed by the SCIRE in February 2008. In August 2008, the IN awarded Fincantieri the construction contract for two additional units of the Todaro class (PIETRO VENUTI and ROMEO ROMEI). The Italian U-212A Program also covers an Integrated Logistic Support (ILS) package and a new Type 212A training center at Taranto Arsenal.

Batch I was completed in February 2008. The two submarines cost approximately US$455M each. Batch II was ordered as of August 2008 for two additional units at an estimated cost of US$475M each. The Batch II units are to be delivered in 2017 and 2018.

With the IN seeking funding for the Batch III submarines, the timeline seems to fit in with the sea service's plan to have a construction contract in place by 2020. If a contract is able to be in place by then, the first unit (unit 5 overall) will likely commission in 2026 followed by the final unit in 2027. AMI anticipates that the Batch III submarines will cost around US$500M, taking into

account inflation as well as the cost of more sophisticated equipment over the Batch I and II SSKs.

MODERNIZATION AND SHIP TRANSFER

SWEDEN – Gotland (A19) Class Submarine HSwMS HALLAND: On 10 December 2015, Saab redelivered the Gotland (A19) class submarine HSwMS HALLAND back to the Swedish Defence Materiel Administration (FMV) after a general overhaul and upgrades. This is the conclusion of a 14-month maintenance period that occurs every six years and was part of an US$18M deal. The HALLAND will be followed by the HSwMS GOTLAND under a similar contract and work period.

Both units will then receive a major overhaul under a US$1.04B 30 June 2015 deal between the FMV and Saab. That contract covers the construction of two new construction A26 submarines and the mid-life upgrade of the HALLAND and GOTLAND, which will return to service by 2019.

Modernization plans for both submarines that will be accomplished under separate contracts and include the following:

- OSI Maritime will deliver the Tactical Dived Navigation system (TDNS) as per a late 2013 contract.
- On 28 January 2015, Kongsberg was selected to provide the SA9510 mine avoidance and navigation sonar as well as the EM2040 Dual RX multi-beam echo sounder.
- On 16 January 2015, Exelis was awarded a US$17M contract to provide the ES-3701 electronic warfare system (EW).
- The addition of a diving lock built into the sail.
- In early October 2015, Sagem (Safran) was selected to provide the Sagem Series 30 non-hull penetrating Search Mast System (SMS) for the HALLAND and GOTLAND in addition to the two new construction A26 submarines.
- Diesel engine and generator overhaul.
- Upgrade of the Air Independent Propulsion (AIP) system.

- Replacement of sonar suite.
- Upgrade of the combat management system (CMS).
- Upgrade of the Type 62 heavyweight torpedoes.
- The addition of an AUV/ROV capability (SUBROV).

ISRAEL – Dolphin Class Submarine: In December 2015, AMI received information that the Israel Defense Force's (IDF) multi-year work plan calls for reductions throughout the IDF through 2020. One of the recommendations in the plan is for the reduction of the Israeli Navy's (Heil Hayam HaYisraeli (HHHY)) Submarine Force beginning in 2019. As a cost cutting measure the first Dolphin class submarine, INS DOLPHIN, would be decommissioned when the sixth unit (not yet named) is commissioned. The sixth unit is currently under construction in Germany.

The submarine cut is one of many different recommendations throughout the IDF. A decision is expected to be made by the Government by early 2016. If the submarine is indeed decommissioned, AMI estimates that the HHHY would more than likely maintain it in a laid up status in the event it needs to be re-commissioned for further use.

INDIA – Sindhughosh (Kilo – Project 877) Class Submarine INS SINDHURAKSHAK (S63): On 04 December 2015, the Indian Navy (IN) decided to decommission the submarine INS SINDHURAKSHAK (S63). The SINDHURAKSHAK was crippled following a fire that occurred on 14 August 2013. Following decommissioning, the sea service will either scrap the submarine or use it as a target for testing new torpedoes.

A Board of Officers decided the dispose of the submarine due to its material condition with final approval by the Ministry of Defense in early 2016. At that time, the IN will decide on the method of disposal.

From the February 2016 Issue

UKRAINE – Submarine and Frigate Update

Future Submarine: The Navy Chief expressed his desire to create a modern sub-surface force consisting of 2-4 modern

submarines. The construction phase of the program would begin in 2020. The new force would replace the single Foxtrot class submarine ZAPORIZYA (U 01) that was commissioned in 1971 and has been in and out of service for the past two decades due to funding shortfalls. It re-entered service in 2013 following its latest overhaul.

There is no doubt that the BMCY desires a modern Submarine Force as a reaction to the Crimea and Eastern Ukraine crisis. The typically low procurement funding levels before the crisis has been made even worse (probably well under US$200M annually). It will be extremely difficult for the BMCY to attain any additional funding unless provided by a special Presidential fund or possibly even a foreign financer.

In regards to design, the short time line (2020 start) would force the BMCY to buy a foreign design with construction more than likely taking place at the foreign location of the designer as Ukraine has not built a submarine since the breakup of the Soviet Union.

It appears that if this program has any chance of getting off the ground, the BMCY will need to use a low cost provider such as China or South Korea as both offer low cost solutions in addition to finance packages. A second possibility would be a European solution that combines used submarines in the near term followed by new construction hulls being delivered after 2020. Again, it would assume a creative financing package to complete such a deal.

DID YOU KNOW?

ISRAEL: On 12 January 2016, the Israeli Navy (Heil Hayam Ha Yisraeli (HHHY)) took delivery of its second Dolphin II class submarine, INS RAHAV, at the Port of Haifa in Israel. The Rahav is the fifth overall Type 209 hull delivery to Israel (three Dolphins and two Dolphin IIs).

UNITED STATES: On 16 January 2016, the Secretary of the Navy named the sea service's 28th Virginia class nuclear powered attack submarine (SSN) as the USS UTAH (SSN 801).

MODERNIZATION & SHIP TRANSFER

UNITED STATES – Ohio Class SSBN and Virginia Class SSN: In early January 2016, L-3 Communications Corp was awarded a US$44.7M indefinite delivery/indefinite quantity, cost plus fixed fee, cost reimbursement, firm fixed price contract for depot level services for the upgrade, repair and overhaul of Photonics Masts (PM) and Photonics Mast Variants (PMV). The PMs and PMVs are major components in the imaging systems found in the Ohio Class Nuclear Powered Ballistic Missile Submarines (SSBNs) and the Virginia class Nuclear Powered Attack Submarines (SSNs).

The contract will cover the following:

- Repair of the masts.
- Replacement and repair of mast subassemblies.
- Testing and inspection of the masts.
- Upgrades to the PMs and PMVs.

Work is expected to run through January 2019.

INDIA – Kilo Class (877EKM) Submarine: On 13 January 2016, the two private yards of Larsen & Toubro (L&T) and Pipavav Defence in addition to the government-owned yard Cochin Shipyard Ltd (CSL) were shortlisted to upgrade the last three Kilo class (877 EKM variants) submarines for the Indian Navy (IN).

Although not official, sources indicate that L&T will be the winning yard and will be the lead contractor in the US$747M contract to upgrade the INS SINDHUGHOSH, INS SINDHURATNA and INS SINDHURAJ. These three submarines were commissioned from 1986 through 1988.

L&T naval engineers and technicians will begin training in Russia in June 2016 when the INS SINDHUKESARI is overhauled. This will allow L&T to start on its first overhaul in 2017. All three of the Indian-modernized submarines should be returned to service by 2022.

Highlights of the modernization effort include:

- Hull, mechanical an electrical maintenance and repair.

- Installation of the Novator Club-S (3M-54E1, SSN-27 Sizzler) missile system.
- Replacement of weapon control system.
- Upgrades to the electronic warfare (EW) suite.
- Installation of the indigenous Ushus sonar system.
- Installation of the indigenous CCS-MK radio communication system.
- Installation of L3 KEO non-hull penetrating mast.
- Installation of the Sagem SIGMA 40 ring laser gyro system.

From the March 2016 Issue

UNITED KINGDOM

Successor SSBN Design Work Continues

On 10 February 2016, the British Ministry of Defence (MoD) awarded BAE Systems US$294.6M to further the design of the Successor Nuclear Powered Ballistic Missile Submarine (SSBN). The funding will allow for the maturation of the design and also include the layout of equipment and systems as well as developing the manufacturing processes for the construction phase.

This award follows the 11 March 2015 award of US$422.5M for design work of the Successor SSBNs and is within the US$4.8B Assessment Phase funding line. BAE Systems also received two previous contracts in 2012 worth an estimated US$486M and US$467M in order to work the initial design.

The latest funding allows for the maturation of the design over the next 12 months and will culminate in the construction phase by the end of 2016. Main Gate Approval will be needed prior to the start of actual construction and is anticipated by the end of the year.

In regards to hull numbers for the Successor Program, assuming that there are no cutbacks in future funding; four hulls will be built to replace the Vanguard class on a one-for-one basis allowing for Continuous-At-Sea-Deterrence (CASD). The first hull is expected to enter service in 2028 with the entire class in service by 2033.

The CASD posture was supported in the long awaited *National Security Strategy and Strategic Defence and Security Review* (SDSR) that was released in November 2015. It gained traction earlier in the year following the 07 May 2015 general elections in which Prime Minister David Cameron won re-election and the Tory Party retaining a significant majority in Parliament with 331 seats. An additional US$18B is expected to be added to the defense budget through 2025 in order to support the Royal Navy's (RN) major construction programs including the Successor SSBN Program.

IRAN – New Frigates and Submarines

On 19 February 2016, AMI received information that Russia has confirmed the imminent signing of a major weapons deal with Iran. The US$8B proposed sale is to include Su-30SM multi-role fighters, Mi-8 attack helicopters, Mi-17 transport helicopters, K-300 Bastion-P coastal defense missile systems, multi-role frigates, and diesel-electric attack submarines (SSK).

Submarines: The Iranian Navy currently operates three Russian Kilo (Project 877EKM) class diesel-electric submarines (SSK) that were commissioned into service between 1992 and 1996. Two of the three units have undergone minor refits in 2011 and 2012 with the third refit being postponed.

AMI anticipates that the IN will be looking to replace the three Kilos on a one-for-one basis with new construction submarines. Originally, Iran had planned to design and build a large indigenous submarine to replace the three boats, but delays as well as technical issues have scuttled those plans, leading the IN to look to Russia for replacements.

Although the exact submarine design has not been publically released, AMI believes that the IN will be looking to the Improved Kilo (Project 636.3) class, vice the Amur (Project 1650) class due to the fact that the Amur has yet to be exported and Iran will likely desire a proven design.

The Improved Kilo design is 74.3 meters (248ft) in length and displaces 3,126 tons submerged. They are capable of engaging in ASuW and ASW as well as launching land-attack missiles through their torpedo tubes.

With the assumption that the IN will want to replace their three existing SSKs with the new submarines and assuming a construction contract, like the frigates, occurring in 2017, the first unit of the class could commission by 2021, followed by the remaining two units in 2022 and 2023.

ASIA – India

Jiangdao (Type 056) Class Corvette: On 22 February 2016, the People's Liberation Army-Navy (PLANs) launched its 25th Jiangdao (Type 56) class corvette, TONGREN (507). It has entered service with the South China Sea Fleet. This follows the 16 October 2015 commissioning of the 24th hull, QINHUANGDAO (505), which was commissioned into the North Fleet.

Thirty units of the class will be built through the end of 2016.

VIETNAM: Hanoi (Kilo 636) Class Diesel Electric Submarine (SS): On 22 December 2015, the fifth Vietnamese People's Navy (VPN) Hanoi (Kilo 636) class submarine, KHANH HOA (HQ-186), departed Denmark on the Dutch registered cargo ship Rolldock Star for Vietnam.

Russia's Admiralty Shipyard launched the sixth and final unit, BARIA VUNG TAU(HQ-187), in October 2015. It will be delivered by the end of 2016 ending the program.

SOUTH KOREA

Son Won-II Class Submarine (KSS-2): On 28 February 2016, the Republic of Korea Navy (ROKN) named its seventh Son Won-III class submarine HONG BEOM-DO (SS 079). The submarine is in the final stages of construction at Hyundai Heavy Industries (HHI) and is scheduled for launching in April 2016. It will be commissioned in 2017.

The two remaining units of the class (hull numbers SS 081 and SS 082) will be commissioned into the ROKN in 2018.

DID YOU KNOW?

UNITED STATES: On 05 March 2016, the USN's 14th Virginia class nuclear powered attack submarine (SSN), USS

WASHINGTON (SSN 787), was christened at Huntington Ingalls Industries (HII) Newport News Shipyard. It will be commissioned in 2017.

UNITED KINGDOM: On 19 February 2019, the Royal Navy's (RN) third Astute class nuclear powered attack submarine (SSN), HMS ARTFUL (S 121), has concluded its final contractor's sea trials.

From the April 2016 Issue

TAIWAN – Sea Dragon Class Submarines: On 01 April 2016, AMI received information that the Republic of China Navy (ROCN) was moving ahead with a Life Extension Program (LEP) for its two Sea Dragon (ZWAARDVIS) class submarines. The two submarines have been in service since 1988. It appears that the overhaul will be conducted at China Shipbuilding Corporation (CSBC) with the assistance of a foreign yard.

In mid-March 2016, a contract for the LEP design work was awarded to two European marine engineering companies. Taiwan's Ship and Ocean Industries Research and Development Center (SOIC) will be the local subcontractor for this phase which is expected to be completed in 2018. The modification phase will run from 2018 through 2020 and will address obsolescence issues. The work package is expected to include:

- Hull, mechanical and electrical (H, M&E).
- Non-propulsion electronic system modifications.
- Upgrades to the TIMNEX 4CH(V2) electronic support measures (ESM). Several firms are now competing for the estimated US$9M ESM upgrades.
- Replacement of the Thales Naval Nederland (TNN) SIMBADS-M CMS system and SIASS-Z integrated sonar system probably with the Lockheed Martin Submarine Integrated Combat System (SUBICS).
- Replacement of the SUT torpedoes with the Raytheon Mk 48 Advanced Capability (ADCAP) torpedoes.

- Replacement of the UGM-84L Harpoon anti-ship missiles (ASM) with the Harpoon Block II ASM including integration into the CMS.

The Chungshan Institute of Science and Technology (CSIST) will play a minor role in the LEP with foreign companies such as Lockheed Martin and Raytheon playing major roles. The LEP combat system work is expected to be under contract by 20 May 2016.

NORWAY

Submarine Program Shortlisted to Two Potential Suppliers

On 07 April 2016, the Norwegian Ministry of Defense (MoD) announced that had it shortlisted two potential suppliers for the Royal Norwegian Navy's (RNoN) future submarine program (Project 6346 Ny Ubat). Project 6346 will be the replacement for the RNoN's four Ula class submarines.

Following financial, industrial and military assessments, the MoD has concluded that France's DCNS and Germany's ThyssenKrupp Marine Systems (TKMS) are the strongest candidates for the program. All future efforts will be focused on these two suppliers.

By mid-2016, the RNoN will complete its project definition phase and submit its final recommendation on the future submarine capability to Parliament by the end of 2016. In 2014, the RNoN made the decision to move forward with the new construction option rather than to keep upgrading the Ula class.

Since that time, the sea service has been considering the possibility of bringing in international partners to reduce the cost of acquisition and operation of its own submarine fleet. Sweden, Netherlands and Poland were mentioned as possible partners.

In March 2016, press reporting suggested that Norway was offering the Polish Navy one of its Ula class submarines if it would join Norway in its submarine program although talks with all three of the possible partners are exploratory in nature and no firm decisions have been made. However, with TKMS and DCNS as the two potential suppliers, Sweden will no longer join with Norway as has already started its own indigenous A26 program.

For the Netherlands and Poland to remain as possible partners, they obviously have to agree on a single design (or variant thereof), which will most likely be the DCNS Scorpene (Scorpene Variant) and the TKMS Type 209/214 (or variant). These designs offer the least risk as they are already operated by various navies.

The big question that remains for the RNoN and the other potential partners are, which hull design will be selected and can it be modified to meet the operational requirements for all of the potential users and will all three agree to formally join the program?

Regardless of hull selection, Norway would probably want to construct some of the modules in country, with final assembly at the foreign partner's yard. With the Norwegian Parliament getting the MoD's recommendation by the end of 2016, a construction Request for Proposals (RfPs) could be released by the end of 2017 with a contract in place by the end of 2018 in order to get the first unit in service by 2025.

INDIA

Deep Submergence Rescue Vehicle (DSRV) Program Under Contract

In late February 2016, James Fisher Defence (JFD) was awarded a US$277M contract by the Indian Navy (IN) for the delivery of two Deep Submergence and Rescue Vehicles (DSRVs) in addition to a 25-year all inclusive maintenance contract. AMI estimates that the DSRVs cost around US$30M per unit with the remaining US$217M for the through life support.

JFD will supply the two DSRVs, launch and recovery systems (LARS) equipment and transfer under pressure systems (TUP). All equipment will be built and tested at JFD's facilities in the United Kingdom. The DSRVs will operate from India's rescue ship NIREEKSKAK (A 15) that is expected to be replaced by two, new construction submarine rescue ships (ASRs) that will probably be ordered by 2018.

In August 2014, the IN apparently had selected the JFD solution, which was for two of the DSAR SRVs that were also sold to the Republic of Korea Navy (ROKN). Both DSRVs were offered for US$66.6M although it took almost two years to negotiate the

final agreement and receive Indian Government approval. Both units will probably be delivered by the end of 2018.

The IN had been considering a modern DSRV program for the better part of 14 years. However, the sinking of the Sindhughosh (Kilo) class submarine, INS SINDHURAKSHAK on 14 August 2013 upped the priority of the program.

ASIA – Regional Update

JAPAN Jinryu (Modified Soryu) Class Submarine: On 07 March 2016, the Maritime Self Defense Force (MSDF) took delivery of the first Jinryu class submarine, JDS JINRYU (SS 507). It was built at Mitsubishi Heavy Industries' (MHI) Kobe Shipyard.

AMI estimates that at least seven other units will be built with one unit commissioning per year through 2023. This would give the MSDF a total of 14 Soryu/Jinryu class submarines. They will probably be followed by a new class of submarines to replace the Oyashio class while maintaining a fleet force of 22 hulls.

DID YOU KNOW?

ITALY: On 02 March 2016, the Italian Navy's fourth Todaro (Type 212A) class submarine, ITS ROMEO ROMEI, started sea trials off La Spezia, Italy.

UNITED KINDOM: On 18 March 2016, the Royal Navy's (RN) third Astute class nuclear powered attack submarine (SSN), HMS ARTFUL (s 121), was commissioned at HM Naval Base Clyde in the United Kingdom.

RUSSIA: On 18 March 2016, the Russian navy (VMFR) launched its fifth Improved Kilo (Project 636.6) class submarine, RFS VELIKIY NOVOGROD at the Admiralty Shipyard in St. Petersburg.

From the May 2016 Issue

AUSTRALIA - Future Navy in Focus

On 26 April 2016, the Australian Government announced the winner for the Future Submarine Program (SEA 1000), essentially completing the master plan for the future Royal Australian Navy (RAN). On 18 April, announcements concerning the Future Frigate Program (SEA 5000) and Offshore Combat Vessel (SEA 1180) and the 06 May contract announcement with Navantia for the Fleet Replenishment Ship (AOR) Program secures the future of every naval program through 2035 in addition to a new continuous build strategy that will ensure the viability of the Australian shipbuilding industry for decades to come.

The future of the RAN was supported by the latest defense document, *Defence White Paper 2016*, which was released in February 2016. The whitepaper established the future structure of the Australian Defense Force (ADF) past 2035 and funding commitments (at least on paper) needed for procurement programs throughout the next 20 year period. It also supported the Australian shipbuilding industry with a continuous naval shipbuilding plan to maintain the infrastructure.

Future Submarine (SEA 1000): On 26 April 2016, the Australian Government announced that DCNS of France was selected as its international partner for the A$50B (US$38.1B) Future Submarine Program. DCNS bested Mitsubishi and ThyssenKrupp Marine Systems (TKMS) with its Shortfin Barracuda design. Mitsubishi offered the Japanese Soryu design and TKMS the Type 216.

A major selling point was the intention to build all 12 hulls in Australia with DCNS assistance maximizing Australian Industry Involvement (AII). DCNS was unwavering in its commitment to AII since the beginning of the program. Additionally, the members involved in the competitive evaluation process (CEP) determined that the Shortfin Barracuda was the best option to meet Australia's unique requirements.

With the preferred design now announced, Australia will continue to further design work through 2021. A construction contract Request for Proposal (RfP) to DCNS and ASC could be finalized by 2018 with a construction contract in place by 2019.

DCNS has announced that the first unit will start construction around 2022 with launching in 2028 and commissioning in 2030. With the first submarines entering service in the early 2030s, the program will run through the late 2040s/early 2050s. To ensure there is no capability gap, development of the next generation submarine will begin by the mid-2050s.

Even with the design now being the Shortfin Barracuda, a key requirement for the program was for a US derived combat system. The white paper called for the combat system to consist of an upgraded version of the General Dynamics AN/BYG-1 combat system and the Raytheon Mk 48 Mod 7 heavyweight torpedo. The US combat system will be integrated into the Shortfin Barracuda hull.

ASIA: Regional Update

INDONESIA: Improved Chang Bogo (Type 209) Class Submarine: On 25 March 2016, the first Indonesian Navy (TNI-AL) Improved Chang Bogo (Type 209) class submarine (KRI NAGABANDA) was launched from Daewoo Shipbuilding and Marine Engineering's (DSME) Okpo yard in South Korea. It will be delivered to the TNI-AL in late 2017.

The second unit is under construction at DSME and will be commissioned in 2018. The third unit will be built at Indonesia's PAL Shipbuilding (with assistance) and will begin construction in 2017 and commissioned in 2020.

Modernization & Ship Transfer

FRANCE – Le Triomphant Class Nuclear-Powered Ballistic Missile Submarine (SSBN): On 15 April 2016, AMI received information that the French Navy (FN) would start a 20-month yard period for the LE TRIOMPHANT class nuclear-powered ballistic missile submarine (SSBN), LE TEMERAIRE (S617) by June 2016.

During the overhaul, the LE TEMERAIRE will be fitted with the M51.2 variant of the M45/TN-75 submarine launched ballistic missile (SLBM). Refit work will also include hull, mechanical and electrical (H,M&E) in addition to the replacement of sensors and

other combat systems. The existing DISAT torpedo countermeasures system (TCM) will be replaced with the Nemesis TCM.

On 04 August 2015, the FN took possession of the SSBN LE TRIOMPHANT (S616), the third unit to be modernized. The LE TEMERAIRE (S617) is the last unit to be modernized under this program. The overhauls are part of a December 2009 seven-year contract in which DCNS would overhaul all four units of the class. The upgrade is a segment of the US$31B for the French Armed Forces (FAF) to modernize its air and sea based nuclear deterrent forces through 2019.

INDIA – Kilo Class (877EKM) Submarine: On 18 April 2016, AMI received information that the Indian Navy (IN) Kilo class submarine INS SINDHUKESARI (S 60) would arrive in Russia on 27 June to begin its mid-life modernization effort at Severodvinsk. The overhaul should last around 18 months.
Highlights of the modernization effort include:

- Hull, mechanical and electrical maintenance and repair.
- Installation of the Novator Club-S (3M-54E1, SSN-27 Sizzler) missile system.
- Replacement of weapon control system.
- Upgrades to the electronic warfare (EW) suite.
- Installation of the indigenous Ushus sonar system.
- Installation of the indigenous CCS-MK radio communication system.
- Installation of L3 KEO non-hull penetrating mast.
- Installation of the Sagem SIGMA 40 ring laser gyro system.

During the overhaul period, naval engineers and technicians from India's Larsen & Toubro (L&T) will be trained in order for India to start its first Kilo overhaul at L&T in 2017. L&T will be the lead contractor in the US$747M contract to upgrade the next three units, INS SINDHUGHOSH, INS SINDHURATNA and INS SINDHURAJ. These three submarines were commissioned from 1986 through 1988. All three of the Indian-modernized submarines should be returned to service by 2022.

The INS SINDHUKESARI should be completed at Severodvinsk by late 2017 or early 2018.

From the June 2016 Issue

UNITED STATES – Ohio Replacement SSBN Design Contract in Late 2016

In mid-May 2016, the United States Navy (USN) announced that the design contract for the sea service's Ohio Class Nuclear Powered Ballistic Missile Submarine (SSBN) (ORP Program) would be in place by the fourth quarter of 2016.

General Dynamics – Electric Boat (GD-EB) has already been selected as the prime contractor for the program and was expected to submit its bid to the US Naval Sea Systems Command (USNAVSEA) on 20 May 2016. Negotiations could begin at any time in order to get the detailed design phase underway by the end of the year.

The ORP is expected to proceed through a Milestone B review in August 2016 in order to begin the engineering, manufacturing and development phase. The first unit will begin construction in Fiscal Year (FY) 2021. A work-share agreement for the construction phase of the twelve hulls has already been submitted to the Navy with Huntington Ingalls Industries (HHI) Newport News Shipbuilding being the other builder. Both yards also share construction in the Virginia Class Nuclear Powered Attack Submarines (SSNs) as GD-EB and HHI Newport News are the only two submarine builders left in the United States.

The first unit will cost over US$11B with the eleven follow on units at around US$6B although the Navy is attempting to push the price per unit to as low as US$5.5B for the follow on hulls.

For the first hull that will begin in FY2021, US$883M was already committed in FY2015 and US$971M in FY2016. The 30-year shipbuilding budget (FY2017-FY2021) calls for US$773M in FY2017, US$787M in FY2018, US$2.7B in FY2019, US$1.3B in FY2020 and US$3.6B in FY2021 when the construction phase begins.

The second unit will begin construction in FY2024 and the third unit in FY2030. The 12th hull is expected to begin in 2035 and commission in 2041. With the ORP in full swing by 2024, all

shipbuilding programs will be under budget stress as the projected Shipbuilding and Conversion (SCN) funding is not expected to support the ORP in addition to all other projected naval shipbuilding programs. With the anticipated blow out in the budget estimates, some members of the US Congress are now attempting to shift some of the ORP funding outside of the SCN budget.

Regional Update

INDIA: KALVARI (Scorpene) (Project 75) Class Submarine: On 01 May 2016, the first Indian Navy (IN) Kalvari class submarine, Kalvari, began what will be a series of sea trials that will lead to its commissioning by the end of 2016.

The KALVARI will be followed by five additional units through 2020. In October 2015, the IN began planning for four additional units to be built under the program bringing the class to 10 units. All of the submarines are being built at Mazagon dock Ltd (MDL).

This program began in 1998 and is over a decade behind schedule.

SOUTH KOREA

Jangbogo III Class Submarine (KSS-3): On 17 May 2016, the keel was laid for the Republic of Korea Navy's (ROKN) first Jangbogo III class submarine, JANGBOGO, at Daewoo Shipbuilding and Marine Engineering's (DSME) Okpo Shipyard.

It will be commissioned in 2020 and followed by eight additional units through 2029.

INTERNATIONAL

Combat, Sensor, and Integration System Developments

AMI is currently tracking combat, sensor and integration systems developments. The following are the highlights for the months of May and June 2016:

Wartsila ELAC Nautic Selected for Indonesian Type 209: Wärtsilä ELAC Nautik was selected to provide their VE5900 echo-sounder system – as well as the complete KaleidoScope Open Architecture Sonar Suite, the UT3000 digital underwater

communication system and the SBE1 sonar beacon – to be installed on the new construction Type 209 diesel-electric submarines (SSK) Narabanga class being built for the Indonesian Navy (IN) by Korean submarine builder DSME.

The OpenSonarSuite ELAC KaleidoScope performs integrated surveillance by using acoustic sensors which provide the tracking channels to allow automatic detection and tracking of contacts. The integrated surveillance functionality includes detection, tracking, analysis and classification. The detection and tracking function includes passive sonar narrowband, passive broadband, intercept and transient for contact detection, contact tracking and contact correlation. The analysis function integrates passive narrowband, acoustic intercept, transient features, and customer provided intelligence libraries as well as tools for classification features for track and contact classification. KaleidoScope is based on MOTS hardware and performance tested software for sonar processing. KaleidoScope is comprised of a cylindrical bow array, flank array, and intercept array as well as own-noise hydrophones and accelerometers. The middle ware (OpenDDS) based open architecture allows for the implementation of new algorithms and functions by the customer itself without the support and control of the system provider (customer owned and secret intellectual properties). This architecture holds the availability consistently at a high level and reduced lifecycle costs.

The ELAC UT 3000 is the first proven system to offer digital data transmission in addition to analog voice communication. It is already installed in an increasing number of submarines and surface ships worldwide. Digital communication opens an infinite number of new applications for a submarine at speed and depth. Fast exchange of tactical, operational and navigation data are only a few examples for the use of the system.

The VE5900 system is made up of a Display/Transmitter/Receiver/Processer Unit, Acoustic Transducers, Transducer Connection Box and several transducers. The system enhances safety of navigation by receiving reflected echoes from both the sea floor as well as the ocean's surface (when submerged) in order to accurately measure the depth of the water or the depth of the submarine. It operates at 50 kHz in deep water and 200/400

kHz in shallow waters, with more options to be added in the future.

DID YOU KNOW?

UNITED STATES: On 30 April 2016, the keel was laid for the United States Navy's (USN) USN's 18th Virginia class nuclear powered attack submarine (SSN), USS DELAWARE (SSN 791), at Huntington Ingalls Industries (HII) Newport News Shipyard. It will be commissioned in 2018.

Modernization and Ship Transfer

UNITED STATES –Attack and Guided Missile Submarines: In late May 2016, AeroVironment announced that the United States Navy (USN) would begin deploying its Blackwing Unmanned Aircraft System (UAS) aboard the sea service's nuclear attack submarines and nuclear guided missile submarines providing an advanced reconnaissance system. The guided missile submarines include the four Ohio class SSGNs and the attack submarines of the Virginia, Sea Wolf and Los Angeles classes.

The Blackwing UAS is a small tube launched system that can deploy from under the surface of the sea, on manned submarines and Unmanned Underwater Vehicles (UUVs). The Blackwing is a low cost system optimized for anti-access and aerial denial (A2/AD). The system employs an advanced, miniature electro-optical and infrared (EO/IR) payload, Selective Availability Anti-Spoofing Module (SASSM) GPS and secure Digital Datalink (DDL). The Blackwing UAS can be fully integrated into the submarine fleet using existing, standard command and control systems.

SUBMARINE COMMUNITY

THE SUBMARINE HISTORY READING LIST FOR SUBMARINERS

by LCDR Joel Holwitt, USN

Lieutenant Commander Joel Holwitt is an active duty submarine officer who has served on three fast-attack nuclear submarines. He earned a Ph.D. in history from Ohio State University and is the author of Execute Against Japan: The U.S. Decision to Conduct Unrestricted Submarine Warfare *(Texas A&M University Press, 2009). Any views expressed in this article are his and do not reflect the official policy or position of the United States Government, the Department of Defense, the Department of the Navy, or any other department or agency of the U.S. Government.*

I stumbled into the past while walking into Control during the midwatch.

It was 2013; I was on board a three-year old *Virginia*-class submarine, updated with the latest fire control and sonar systems and manned by a crew in their early twenties. But over on the port side of the Control Room, all five sonar technicians in my watch-section were wearing their dress uniform *Dixie cup* covers, mashed underneath their headphones, as if they were on a Second World War submarine. I blinked and asked the Sonar Supervisor what was going on. He told me his team had been inspired by a picture of their Second World War predecessors during the history presentation I had given the previous day in Crew's Mess. A few minutes later, my pilot and my contact manager were wearing their white dress uniform combination covers in solidarity with the Sonar watch team. And so was I.

Not only does this moment remain one of my favorite experiences, it highlighted something I had discovered to my surprise during the preceding seven years. Submariners love their history.

The roots of this moment stretched back ten years, when I attended graduate school at Ohio State University and earned a Master's and a Ph.D. in history, focusing on U.S. submarine warfare in the Second World War. But history degrees were of little use when I started Naval Nuclear Power School. By the time I reported to my first submarine, I had grown accustomed to a certain degree of skepticism regarding my degrees in history.

But a few months after I reported to my first boat, the off-going Reactor Operator asked me to consider giving a submarine history lesson to the crew at the next General Military Training (GMT). A week later, I gave my first history presentation on Crew's Mess, and I was amazed by the positive response. Since then, I presented a couple dozen more talks, ranging across Submarine Force history and even expanding to discuss naval history such as the sailing frigate USS *Constitution* and the Battle of the Komandorski Islands. By the end of my department head tour, even though my talks were entirely voluntary, some of my shipmates were arranging for wake-ups in their oncoming watch time in order to attend.

I failed my shipmates in one regard, however. I never provided them with a list of the books from which I had learned, even though many of these books were well written, interesting, and would only have deepened their historical enjoyment. With this article, I am hoping to rectify that oversight.

The list that follows is intended for U.S. submariners of all ranks, rates, and backgrounds, broken into three levels: basic, intermediate, and advanced. I recommend that the books be read in the order discussed.

I will freely admit that the list is biased. While the experiences of other submariners may be interesting, this is an American list for American submariners.

This reading list was written for ease of travel. All of the books listed are available electronically, and can be contained as a small portion of the many e-books that most submariners now take to sea in their e-readers.

Last but not least, this list is not comprehensive. I have listed some omissions that may make for enjoyable future reading at the end of this article.

The Basic Level

Paul Stillwell, ed., *Submarine Stories: Recollections from the Diesel Boats*

Paul Stillwell's edited anthology of oral history excerpts serves as an introduction to the history of the Submarine Force. *Submarine Stories* covers a broad sweep of history, from President Theodore Roosevelt's impressions of his 1905 ride on board USS PLUNGER (SS 2) to the decommissioning of the last U.S. diesel boat, USS DOLPHIN (AGSS 555) in 2006. The book includes previously unpublished accounts by officers and enlisted, including the early pioneers of the Submarine Force, various heroes of the Second World War, and the Cold Warriors. Perhaps the greatest value of *Submarine Stories* comes from the fact that this is one of the few published chronicles that includes first person accounts by such great submariners as Slade Cutter, *Red* Ramage, Eugene Wilkinson, Roy Benson, Maurice Rindskopf, and Robert *Dusty* Dornin. There is no better place for submariners to become acquainted with these legends.

Edward L. Beach, *Submarine!*

Despite over a hundred years of history, the central historical experience of the U.S. Submarine Force remains a brief three-and-a-half year period: the Second World War, the experiences of which laid the foundation of the U.S. Submarine Force's success in the Cold War and beyond. A distinguished submarine warrior who served on submarines from the beginning through the end of the war, Edward L. Beach is the perfect author to bring this period to life. Beach intersperses chapters chronicling his war patrols with stand-alone chapters about other great submarines, such as WAHOO (SS 238), TANG (SS 306), SEAWOLF (SS 197), and HARDER (SS 257). Readers not only experience the first-hand terror of depth charging and the excitement of torpedoing an enemy ship, but they also stand next to numerous submarine

legends in battle through Beach's brilliant writing. There have been more recent histories of the Submarine Force in the Second World War since Beach's book was published about 60 years ago, many more comprehensive and more thoroughly researched. But *Submarine!* is the one book that simultaneously expresses the totality of the Submarine Force's sacrifice and contribution to victory in the war, while also capturing the experience of war in the boats.

A. J. Hill, *Under Pressure: The Final Voyage of Submarine S-Five*

While no submariner should consider any dive to be routine, the Submarine Force has grown accustomed to conducting these evolutions safely and regularly. It seems unimaginable that enlisted submariners once received extra pay for every time they submerged because how hazardous that evolution could be. One such dive occurred on the afternoon of September 1, 1920, when USS S-5 (SS 110) performed a crash dive off the coast of New Jersey, partially flooded, and nose-dived into the bottom. One pump failed after another and the crew found themselves in a desperate race for survival as they tried to escape from a submarine with no viable escape system. Well researched and well written, *Under Pressure* crackles with suspense, bringing to life the early years of American submarines and thrillingly describing the dangers those submarines faced.

William R. Anderson and Don Keith, *The Ice Diaries: The True Story of One of Mankind's Greatest Adventures*

Thirty-five years after USS S-5's final dive, the Submarine Force entered a new age with the first nuclear submarine, USS NAUTILUS (SSN 571). With NAUTILUS'S nuclear power plant able to keep her submerged indefinitely and able to proceed at high speeds for prolonged periods, a whole new range of tactical and operational options opened up for American submariners. William Anderson, the second captain of NAUTILUS, captures the excitement of these new possibilities, describing how NAUTILUS single-handedly defeated anti-surface warfare groups,

sailed at high speed across the Atlantic, and safely steamed underneath the North Pole. But *The Ice Diaries* is more than the adventure of the first under-ice transit. It is also the story of submarine pioneers transitioning to a new era of submarine operations, developing and testing the first reliable emergency air breathing and inertial navigation systems. A particularly vivid moment occurs when NAUTILUS bent both of her periscopes when she collided with the ice and her crew overcame incredible challenges to restore one of the scopes to operation while on the surface in frigid Arctic temperatures, roaring winds, and rolling seas. With passages like these, Anderson vividly describes the risk and thrills of being at the forefront of a new era of submarining.

The Intermediate List

Anthony Newpower*, Iron Men and Tin Fish: The Race to Build a Better Torpedo during World War II*

Although the disgraceful story of U.S. torpedo performance is well known, Anthony Newpower's excellent book is the best account of what happened and why. Newpower's book focuses on the American experience, but does not neglect the experience of other navies, particularly the Germans, who also experienced failure. The difference between the American and German responses to torpedo problems is instructive. Although the U.S. Submarine Force's waterfront staff ultimately found and fixed the issues with the troubled torpedoes, it took almost two years. Newpower's story of U.S. Submarine Force waterfront support during the torpedo debacle of 1941 to 1943 is an important cautionary tale.

Michael Sturma*, Death at a Distance: The Loss of the Legendary USS Harder*

Michael Sturma brings an Australian historian's perspective to the U.S. submarine war against Japan, and in particular about Commander Samuel David Dealey and USS HARDER. Sturma also focuses on HARDER'S support to Australian special forces, particularly Major Bill Jinkins, a legendary Australian commando. Sturma's research adds new wrinkles to the story of the U.S. Submarine Force in the war, such as remarkable anecdotes about

submarines tracking islands, brushing reefs, landing commandoes, and the exhaustion felt by submarine crews returning to port. This book builds upon *Submarine Stories* and *Submarine!* to present a more comprehensive history of the Submarine Force in the Second World War.

Richard H. O'Kane, *Wahoo: The Patrols of America's Most Famous World War II Submarine*

Richard H. O'Kane's memoir is about the education, through battle, of America's greatest submarine warrior. O'Kane served as WAHOO'S commissioning XO and experienced profound disappointment as he realized his first CO was not cut out for submarine combat. But when another officer named Dudley W. *Mush* Morton abruptly relieved the first CO, the creative and fierce energies that had been swirling amongst O'Kane and his shipmates were finally freed to express themselves through the destruction of Japanese shipping. Due to a unique command set-up, O'Kane manned the periscope during attacks, placing him at the center of the action and providing an invaluable experience in submarine command and tactics. Although numerous books have chronicled this incredible submarine, O'Kane's first person account remains the best.

Edward L. Beach, *Around the World Submerged: The Voyage of the Triton*

Around the World Submerged continues the exciting change in submarine operations first described in *The Ice Diaries* and made possible because of nuclear power. But unlike NAUTILUS'S quick transit under the polar icecap, USS TRITON (SSRN 586) left for her shakedown cruise and then remained submerged while transiting across the entire globe. Despite numerous equipment casualties and personnel issues, TRITON accomplished this remarkable two-month voyage without mishap and returned in time to give President Dwight D. Eisenhower a much-needed public relations victory in the aftermath of the Gary Powers U-2 shootdown. Beach's book captures the adventure of this voyage as well as conveying the weight of Beach's command responsibility as he and the crew struggled with numerous potentially voyage-

ending casualties, such as the loss of the fathometer, and even the life-threatening illness of one of the crew. Perhaps Beach's greatest accomplishment with this book, however, is the way he highlights the numerous contributions made by all hands that permitted TRITON to accomplish her remarkable voyage.

Alfred Scott McLaren, *Silent and Unseen: On Patrol in Three Cold War Attack Submarines*

Alfred Scott McLaren's *Silent and Unseen* picks up where *The Ice Diaries* and *Around the World Submerged* left off. McLaren graduated from the U.S. Naval Academy in 1955 and started his submarine service on board the diesel-electric submarine USS GREENFISH (SS 351) before transitioning to early nuclear submarines SEADRAGON (SSN 584) and SKIPJACK (SSN 585). McLaren's book is a terrific memoir covering all aspects of life on submarines in the early Cold War era. He transitioned from diesel boats to nuclear power, experienced the early years of under-ice exploration on board SEADRAGON, and served in the early Cold War missions in the Western Pacific and North Atlantic. McLaren's book not only describes the unclassified aspects of these missions but also details about submarine operations that are no longer in use, such as surfacing operations on board SKIPJACK-class submarines, when the crew would effectively hydroplane the submarine at high speed, a maneuver known as "getting on the step." These details bring alive this transitional era of submarining when the Submarine Force that won the Second World War transformed into the force that won the Cold War.

The Advanced List

Michael Sturma, *Surface and Destroy: The Submarine Gun War in the Pacific*

Most books about the submarine war in the Pacific have focused on the undersea aspect of the conflict. Although many histories indicate that surface attacks were atypical of the Pacific submarine experience, Sturma's *Surface and Destroy* shows that these experiences were far more common than thought. And

Sturma does not just discuss the American experience; he also devotes pages to the British and Japanese experiences. The British, in particular, frequently employed surface gun attacks. In 1944, despite having far fewer submarines in the Pacific, the British outdid the Americans in gun actions by almost a third. Sturma also dedicates multiple pages to Japanese submarine massacres, such as forcing Allied merchant ship survivors to run a gauntlet of swords and bayonets before being tied together and left to drown as the submarine submerged beneath them. Although sometimes uncomfortable, *Surface and Destroy* is essential reading for understanding the whole experience of the American submarine experience in combat, and placing that experience in the context of other submarine forces.

Richard H. O'Kane, *Clear the Bridge!: The War Patrols of the U.S.S. Tang*

Dick O'Kane's *Clear the Bridge!* details his command of USS TANG (SS 306) during an incredibly active one-year period. O'Kane was a persistent and remarkably effective captain. Whether the mission was sinking enemy shipping or rescuing downed aviators, O'Kane and his crew thoroughly planned ahead and approached each challenge with dogged tenacity. In short order, TANG and her crew were setting new records, whether for best war patrol in terms of ships sunk or number of aviators rescued during lifeguard operations. *Clear the Bridge!* stands apart from other submarine memoirs in terms of detail and imparting the motivations and thought processes of the commanding officer. While other submariners thought O'Kane was at least mildly crazy, O'Kane's discussions of his attacks and operational planning illustrate a brilliant ability to weigh risks and benefits. O'Kane's in-depth knowledge of his submarine, patrol areas, and combat tactics are evident throughout the book. Although other memoirs by great submariners such as Beach and Eugene Fluckey impart some of these aspects, *Clear the Bridge!* arguably goes the farthest toward illustrating the manifold complexities and level of detail that must be mastered by a great submariner.

Alfred Scott McLaren, *Unknown Waters: A First-Hand Account of the Historic Under-ice Survey of the Siberian Continental Shelf by USS* Queenfish *(SSN-651)*

Unknown Waters is a glimpse into the decision-making of a Cold War submarine commander conducting a prolonged operation with little to no communication from higher command authority. In particular, the book is a tribute to the workhorse submarine of the Cold War Navy, the *Sturgeon*-class. McLaren covers his time as the commissioning executive officer of QUEENFISH, his commanding officer training pipeline under Admiral Hyman G. Rickover, and his return to command QUEENFISH before commencing his fascinating memoir of QUEENFISH'S under-ice voyage. Much like the other memoirs, *Unknown Waters* is filled with moments when the crew overcame numerous operational, materiel, and personnel challenges under the icepack, such as the loss of a ship's service motor generator, nearly getting trapped inside an ice cave, and some poor decisions by one of the ship's most senior officers. But *Unknown Waters* illustrates one other aspect of submarine life: it can be pretty neat and a lot of fun. McLaren and his crew didn't miss an opportunity to celebrate entering Arctic waters, surfacing at the North Pole, or going out on the ice. *Unknown Waters* is a superb time capsule of the late 1960s and early 1970s in which the Submarine Force hit its Cold War stride.

Joel Ira Holwitt, *"Execute Against Japan": The U.S. Decision to Conduct Unrestricted Submarine Warfare*

It is undoubtedly shameless to recommend my own book. And yet, *"Execute Against Japan"* fills a genuine void in Submarine Force historiography. The operational and technical stories of the conflict have been deeply examined in many books, but the strategic rationale for the unrestricted submarine campaign and its moral implications have not. Only 24 years before the Pearl Harbor attack, the United States went to war with Imperial Germany in 1917 over unrestricted submarine warfare, which President Woodrow Wilson called "a warfare against mankind." And yet, within hours of the Pearl Harbor attack, the Chief of Naval Operations directed U.S. naval units to "EXECUTE

AGAINST JAPAN UNRESTRICTED AIR AND SUBMARINE WARFARE." Although many believed the order was in reprisal for the Japanese sneak attack, the U.S. decision to conduct unrestricted submarine warfare was actually the result of years of serious strategic planning. *"Execute Against Japan"* details the chain of events that led the Navy to such a dramatic change in policy. It provides a strategic perspective on the rationale for the U.S. submarine campaign and the vital contribution of that campaign, as well as the ethical and legal issues that accompanied it.

Concluding Thoughts

With so many fine books about submarine history available, some books had to be omitted. Most of these, however, are terrific books, and readers who want more may enjoy some of the omissions.

In addition to the memoirs in the reading list, the history of the U.S. Submarine Force has benefited from numerous memoirs. James Calvert's *Silent Running* stands out amongst the memoirs not listed above, both in terms of detail and honesty. Although not a memoir, *We Were Pirates: A Torpedoman's Pacific War* by Robert Schultz and James Shell focuses solely on the life and experiences of one enlisted submariner. There are a number of excellent historical works, including more books by Michael Sturma, Don Keith, and James F. DeRose. If it had been available electronically, I would have unhesitatingly added Clay Blair's *Silent Victory* to the advanced portion of the reading list. Similarly, Owen Cote's *The Third Battle* elevates the discussion of the Submarine Force's contribution in the Cold War from the tactical and operational level to a strategic overview of how the Navy and the Submarine Force swiftly adapted to the Cold War's challenges. I omitted *The Third Battle* because it is not available as an e-book, but can be downloaded as a Portable Document File from the Naval War College. Additionally, I omitted a number of combined memoirs and histories by Vice Admiral Charles A. Lockwood, the commander of the U.S. Pacific Fleet Submarine Force during the last two-thirds of the Second World War. Finally, I strongly recommend Edward L. Beach's novels, which perfectly

capture the experience of U.S. submarines in the Second World War and the early Cold War.

It is my great hope that this Submarine History for Submariners reading list will be a springboard for further reading. As the discussion of the omitted books should make clear, the reading list in this article is not meant to be an end-all-be-all list. But it will hopefully reveal the rich heritage and history of our Submarine Force to all submariners, and be a starting point for a continuing voyage into the past that may potentially inform our future.

CAMELOT

by CAPT Don Ulmer, USN, Ret.

Captain Ulmer commanded USS CLAMAGORE. In retirement he has written several submarine novels.

Explanation of this tale's unlikely title materializes at its very end. So stay tuned.

At a late fifties day's end, World War II veteran, leading and only CPO at New London's Submarine Development Group Two staff, set about closing his broom closet office. CPOs at DevGru, like everywhere in the Navy, made events run smoothly in addition to their main job of making officers look good.

The Chief, having earned well-deserved exhaustion, now longed to mount his '46 Chevy steed and make for home. A lone obstacle threatened this; a newly reported Lieutenant from one of the DevGru boats stood in the doorway.

Oh crap, CPO thought, *likely doesn't understand an operation order and too embarrassed to discuss it with his exec*. *This could take some time*.

"Can I help you, sir?"

The Lieutenant responded through a grin, "You already did, Chief. Can you spare me a few minutes?"

What CPO in his right mind's gonna say he can't spare a few minutes for an officer, especially one wearing gold dolphins? "Please have a seat, sir."

The Lieutenant opened, "I know you don't remember me, Chief. But there's no way I'll forget you."

Somewhat disarmed, the Chief drew a complete blank and settled back for what he feared would be more than just *a few minutes*.

The Lieutenant spun a yarn that began some nine years earlier in the Spring of '49. A third class Petty Officer fresh from Great Lakes, Illinois electronic school reported at the New London

transient barracks to await the next enlisted submarine school class.

Dog-tired from an overnight train ride, the new PO wished only to crash for a sleepathon. As fate would have it, he found himself assigned to that day's duty roster and in a few hours would stand the mid (12 to 4 a.m.) barracks fire watch.

PO struggled through, swilling coffee to stay awake, then at 4 a.m. made a rookie mistake. He awakened his relief, then turned in before the sleepy sailor dressed to relieve the watch properly. As PO should have expected, the sailor fell back into a deep slumber.

An hour later, a Chief of the Watch made his rounds and found the barracks without a fire watch. Surmising what had happened, he unceremoniously aroused both sleeping beauties and read the riot act. Still furious, he regained a modicum of composure and drew a bottom line for the pair of culprits.

"Okay, listen up. I'll give you an option; non-judicial punishment from the Captain." The Chief paused and glowered. "Or you can take what I give you."

The PO envisioned an embroidered eagle badge flying from his left sleeve and said almost too quickly, "I'll take what you give, Chief." The fellow slumberer, a seaman, eagerly chimed his assent.

Through an angry scowl, the Chief replied, "Both of you stand the next three mid-watches. Maybe you can keep one another awake!"

Only thing PO hated worse than prospects of three consecutive mid-watches … being broken back to seaman, a high probability of the non-judicial punishment option.

Six months later, aboard his first submarine, PO's Exec notified him he'd been selected from the crew to take an exam for entrance into the U.S. Naval Academy Preparatory School. If he made the grade there, he'd enter Annapolis the following summer.

Scion of a dirt-poor blue-collar family with no money for college, PO's elation can only be imagined. He'd planned to join his father in a textile mill when PO's enlistment expired. Prospects of a naval officer career exceeded his wildest dreams.

But another thought visited PO. Had Sub School CPO not offered three consecutive mid-watches in lieu of seeing the

Captain, none of this would have happened. Non-judicial Punishment in his record would've made PO ineligible to take the Navy Prep exam. A surge of appreciation ran through his breast on realizing magnitude of the break given by Sub School CPO.

"And so you see, Chief," the Lieutenant said, "if it hadn't been for you, I wouldn't be sitting here in this fancy sailor suit."

The old, grizzled CPO blinked back an unexpected tear.

The young officer set a fifth of Jack Daniels Black Label on CPO's desk. "So I brought a little gift."

"Why … thank you, sir. Thank you very much."

"Don't mention it, Chief. I got by far the better of the deal."

CPO groped for words to express his joy over how a considered inconsequential gesture he'd made long ago resulted in so consequential an outcome. He came up dry.

"Lieutenant, would you close the door please?" CPO took a pair of cups from near a coffee pot, shook out the dregs, opened the *Black*, and poured generous shots into each of them.

For half an hour, two men regaled each other with outrageous tales capable only of submariners. Later, they parted, pleased over results of their long ago made and now paid deal. The Lieutenant went on to complete thirty-two service years; all but two of them in either submarine sea or shore duty, including command.

The long interim of this late fifties tale finds us now in a different Navy, where likely the story's convening and closing events are no longer even in the cards.

Per King Arthur's closing lines in a Broadway triumph, "Don't let it be forgot / That once there was a spot / For one brief shining moment / That was known as Camelot."

ABOARD THE BIG SAM

PATRICK "RICK" OWEN LYONS AND HIS SERVICE IN THE U.S. NAVY

by Ms. Sally Lyons McAlear

Patrick *Rick* Owen Lyons was born on April 7, 1943, in Springfield, Missouri. He was educated at St. Joseph Elementary School and Reed Junior High School in Springfield and attended Willard High School (in nearby Willard, Missouri) for two years and Hillcrest High School in Springfield the last two years—being a member of the Class of 1961. On October 13, 1961, he enlisted in the U.S. Navy in St. Louis, Missouri, for a period of four years. Following an immediate flight to San Diego, California, his recruit training (boot camp) began the next day. Several days later, on October 19, he briefly described his days in a letter home to his parents:

> We've been getting up at 4:00 a.m. and going to bed at 9:00 p.m. . . . Camp Nimitz is supposed to be the hell hole of the USNTC [U.S. Naval Training Center]. You have to watch everything you do around here. Almost everything you do is wrong, and you get chewed out for it. We've got one of the nicest officers for a company officer . . . I can't see much of California from here, but what I can see is beautiful. It's everything they say about it and more. It's sort of mountainous around here, and a deep blue mist hangs over at morning and night.

Apparently, he was feeling sorry for himself—while at the same time trying to aggravate his older brother, John (a bank teller)—when he gave more details later that month:

> Tell John that he is lucky having a good job. Tell him also not to feel very tired when he gets home from work because he has it easy . . . We start marching right after breakfast and keep marching till about 10:00; we then go to different classes till noon. After lunch, we start marching again, and sometimes we have a few classes in the afternoon. Finally, after we are about half dead, we march to the mess hall to eat supper at 4:00, the same time John gets off work. After a hurried supper, we come back to the barracks and start our washing and other things. After all this, we hit the sack at 9:00, and believe you me, you're looking forward to it.

He learned to play the guitar while in boot camp and quickly became very accomplished. Fortunately, he was granted leave that Christmas, and he brought his guitar home—much to the delight of his family.

Home For Christmas Leave
Left-Right: Sally Lyons (sister), Rick, and Merle Lyons (mother)
1961
Lyons Family Photo Collection

He completed boot camp on January 18, 1962, and requested submarine school. In a letter home dated January 15, he related the following: "My new duty station will be right across the street in the Anti-Submarine Warfare (ASW) division. My school is in sonar. They say that a very large percentage of sonarmen do get stationed aboard subs, that is if they pass their physical and everything."

A couple of weeks later, he wrote about seeing a sub up close for the first time:

> I am going to put in a request for subs. I don't know whether I'll get it or not, though . . . If I do get subs, I will have to go to New London, Conn., for sub school, which they say is pretty hard. And after that, I still won't be a qualified sub man till I spend nine months on a sub and pass a test at the end of that duration. During that time, you have to learn every other man's job and know what every little knob, handle, gauge, and button does. That might not be as easy as it sounds, either. I went all through a sub that pulled in the other day. I was really surprised; they are nothing like the movies show them to be. This was a fairly big sub, and it looked huge from the outside, but from the inside, it is way smaller than you would ever have imagined. It all amounts to about eight or 10 compartments loaded down with instruments, instruments, and more instruments. There are all kinds of levers sticking out from the bulkheads and all kinds of scopes and big gauges. I believe if they turned me loose on all those knobs and switches, that it would take me a steady 24 hours just to flick them off or on. There is a crew of 90 men on this sub, but by looking at the room inside, you would believe that it would hold no more than 20 at the most. The galleys really surprised me. They have two kitchens and they measure about eight feet by three feet. They stack the sleeping bunks up about five high. It looks like there are about 14 or 16 inches between one bunk and another. They have two tiny restrooms. They don't have much water, so hardly anybody ever takes a shower and

> when they do, the rest of the crew calls them chicken. This is out at sea, of course. I got all this info from one of the crew as he was showing us around. Also, you don't wash clothes aboard, and sometimes you wear one set of dungarees for as long as two or three weeks. They all admit they are scrounges, but they say they are proud to be that way. They say that the sub Navy is the proudest of all, and they are all crazy about sub life.

He was next assigned to the Fleet Anti-Submarine Warfare School at the Naval base in New London, Connecticut. He described his first experience aboard a submarine in a September 20 letter to his parents:

> This school is harder than sonar school. It's all memory work now, where in sonar school, you could work things out. I never realized there was so much to a sub. There are all kinds of levers and controls and where you have one, you might have a couple more located elsewhere for safety. You get fairly snowed under when you learn hundreds of these per week . . . Yesterday, we got up at 5:00 in the morning and went aboard a sub for our first cruise. We went out to Long Island Sound near Orient Point and spent the day going under and then back up again (16 dives in all). It was really exciting the first time. By the sixteenth time, though, it became quite boring.

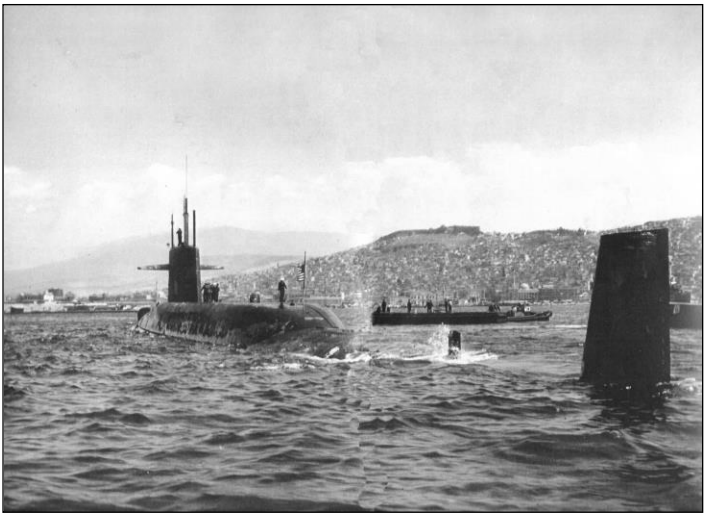
That training concluded on October 31, 1962, and on December 5, he was assigned to the Blue Crew of the USS SAM HOUSTON (SSBN 609)—Polaris submarine, qualifying as a sonar technician. The Navy assigned duplicate crews to each Polaris sub, a Gold Crew and a Blue Crew, which alternated in running the ship. For each crew, it meant three months in New London to rest and take classes, alternating with a three-month duty tour from the submarine base in Holy Loch, Scotland. That duty tour included a 60-day submerged patrol. Rick wrote a letter home about this assignment giving the following information:

> I guess you are wondering by now what kind of sub I'm going to be on, so—to start off, it is an atomic-powered, Polaris missile-firing sub commonly known as or referred to as FBM (Fleet Ballistic Missile) or SSBN (Ship Submersible Ballistic Nuclear). It is the SSBN SAM HOUSTON—609, and it is the second sub in the new A2 Class—which is the USS ETHAN ALLEN-SSBN 608 class. The first class of Polaris subs was of the George Washington class. This included the PATRICK HENRY, ROBERT E. LEE, etc. They were actually a Skipjack class of boat with the missile compartment added. It fires the A1 missile, which has a maximum range of 1,200 miles. This might seem complicated to you, but if you stop and think a minute, you will recall that the Skipjack (like the postcard sent home) is the world's fastest submarine and was the first sub (nuclear type) to employ the albacore-type hull, which is the whale-shape or teardrop-design hull for greater underwater speed and maneuverability. The type boat I will be on is built from the ground up for its primary purpose. It also fires the Polaris A2-type missile with a maximum range of 1,500 miles.

Rick was aboard when the Big Sam made history by being the first Polaris submarine to surface and make a port call during a patrol in the Mediterranean Sea. This occurred at Izmir, Turkey. On March 30, 1963, the Defense Department announced that the first of three Polaris submarines would be stationed in the Mediterranean. The underwater force preceded the removal of 45 obsolescent U.S. land-based missiles from Italy and Turkey. Dismantling of 15 Jupiter missiles in Turkey and 30 in Italy was expected to be completed early in April. Rick's parents were excited when they spotted the following article in the *Springfield (Missouri) Daily News* on April 15:

Turks Are Pleased By Arrival of Sub

Izmir, Turkey (AP) – The U.S. Polaris nuclear submarine SAM HOUSTON arrived in this Aegean port city Sunday for a two-day courtesy visit. The arrival of the big vessel, first of three U.S. Polaris nuclear subs to be stationed in the Mediterranean, created a festive mood here. Several thousand Izmir residents, including high ranking Turkish military officials, were at the quay as the SAM HOUSTON pulled in.



USS SAM HOUSTON on a Courtesy Visit at Izmir, Turkey
April 14, 1963
United States Navy Photograph – Shared by Howard Dobson

Soon after that historic mission, a letter arrived from Rick with a description of that experience:

I guess by now you've heard that we're in the Med and on the way to Turkey. We received a radio message about five days after we passed through the Straits of Gibraltar that the U.S. public had been informed that the

> first Polaris sub was now on patrol, though not naming the sub. Then today, we found out that Paris, France, announced that the Big Sam would be pulling into Izmir tomorrow morning. So you should know the whole story by now if you haven't known already. The whole crew was told in a roundabout way that we would be in the Med and probably visit some port. This was about two weeks before we left New London, but that info was stamped secret . . . I started standing sonar watches the day we left Holy Loch and have been since . . . We're going to pull into Izmir tomorrow morning about 10:00 a.m., and we'll stay there until the next morning; then we'll take some Turks out for a joy ride that day, and that evening, a small boat will come out and get the Turks, and we shall tarry on. I'm kind of anxious to see the reception we'll get, if any. I imagine all the nosy Turks and big-wig Turks will greet us. But it should be interesting anyway. I'll write again as soon as I get back to Holy Loch.

Rick's parents soon received a letter from Captain William P. Willis, Jr., commanding officer of the Blue Crew, reporting that their son had participated in a significant event. He stated the following: "The presence of SAM HOUSTON in the Mediterranean Sea marks another milestone for Polaris and gives added assurance that the United States is truly dedicated to its mission of preserving peace through deterrence. You have every reason to be proud of your son's contribution to the fulfillment of that mission."

USS SAM HOUSTON's Arrival at Holy Loch, Scotland
After Historic Mediterranean Sea Patrol
July 9, 1963
United States Navy Photograph – Shared by Howard Dobson

Rick must have known his family would worry about the danger he might be in aboard a Polaris submarine during the Cold War. The USS THRESHER sank on April 10, just four days before the USS SAM HOUSTON surfaced in Izmir, and it was very much on Rick's mind in his next letter:

> From what we've heard, it happened on the initial deep dive . . . The THRESHER is the lead ship of the Thresher-class subs, and it is defined as the truest submersible ever yet produced. It can dive deeper and can

> handle better than any other class sub. It's the quietest sub, and it had a complete isolated mechanically sonar system so secret that the gear is code named and the code is secret itself. To make a long story short, it stuns me—because of all subs, it shouldn't have happened to it.

He further tried to put their minds as ease regarding the danger involved in submarine service in a September 6, 1963, letter from Holy Loch by saying:

> Don't worry about any danger involved. I've never, anywhere—here, San Diego, or New London—seen a sub to compare in workmanship to this boat. I've never seen a better crew; they know this boat inside and out and on the other side like the back of their hand. The boat is in excellent shape; so is the crew. Sea trials more than proved this. We really put this boat through the paces—violent maneuvers, full speed for two days and nights, four test missiles, two torpedoes, etc. The tender personnel say this is the best-built boat running and the sharpest, and of the four others I've seen here, I think the same.

Rick was listed in the October 26, 1963, issue of the *Plan of the Day* sheet handed out to crew members. He was congratulated under the heading "Qualified SS and SAM HOUSTON." He had qualified on all of the submarine's systems and had the designation of SS (submarine specialist) added to his rate of rank.

Rick Being Awarded the Coveted Silver Dolphins Badge
for Qualifying on all Areas of the Submarine
Left-Right: Unidentified; Captain William P. Willis, Jr.; George Stratton;
Rick Lyons; Ralph Reeves; and Melvin Holliday
October 1963
Lyons Family Photo Collection

In January 1964, Rick flew with the Blue Crew to Scotland for another patrol, reporting that their flight was on a commercial airline equipped with windows and five stewardesses! He related the following about the SAM HOUSTON's preparation for the patrol out of Holy Loch:

> The boat right now is tied alongside the PROTEUS; the HUNLEY is here also, but the two tenders are sharing the load until the PROTEUS leaves next month. Everything so far has been nice and smooth. I'm working in sonar now, so I don't have anything to do with topside. Last time I was over, I was working topside, working in

sonar repairing the gear, working on spare parts for sonar, and trying to get qualified. This time, I am still the spare parts petty officer for sonar, but besides this, I have a couple of pieces of sonar gear to check and calibrate, and that's it. This coming Tuesday morning, we will change command with the Gold Crew and then begin.

After that patrol, he wrote home again from Holy Loch expressing his relief that the patrol was over:

> We finally pulled in yesterday and am I ever glad. It seems like we've been out for years. Everything was nice and smooth until about half the patrol was over, then everything started getting dull, and about 10 days ago, channel fever set in, and it made things miserable. With channel fever, you can't sleep, and you're irritable and nervous. Yesterday, I went up and took a look at the "good ole world" again. It sure is a sight to see. It seems really odd to see more than 20 or 30 feet at the most. Besides being dull, the patrol went pretty well.

On August 4, 1964, Rick wrote that he had been back in Holy Loch two and a half weeks preparing to leave on another patrol that would start the following day. He included an interesting story in that letter:

> I've only left the boat twice—once when we were on the tender and then yesterday. Yesterday morning, we were out on sea trials, and we were moored or anchored in Loch Fyne awaiting some sound runs back and forth in the loch. Anyway, after we surfaced, the Duke and Duchess of Argyll came aboard for a visit, and after they left, the captain made arrangements for us, if we wanted, to go over and see his castle, the Castle of Inveraray. So I went, and it was well worth the trip. Part of the castle is blocked off for visitors, so we didn't get to see it all, but what we did see was something else. I'm going to try to go to

Edinburgh to see the castle up there when we get back. It's really supposed to be something.

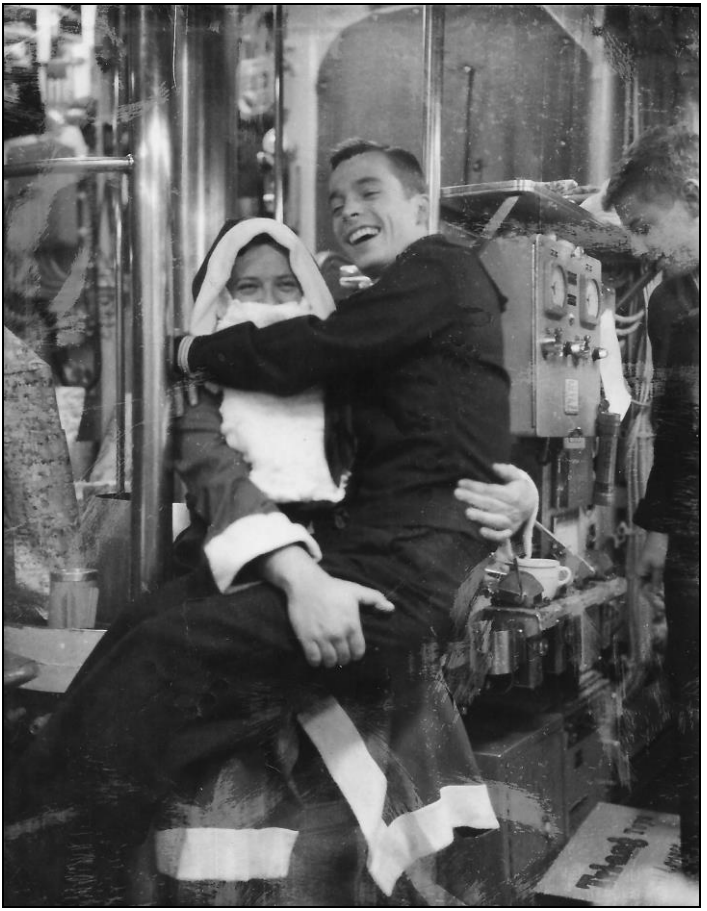
Rick wrote another letter home on December 23 of that year before departing on another patrol. This would be the only year he would not spend Christmas at home. He gave a humorous description of the flight over to Scotland:

> We had a nice flight over (TWA), one of the best I've been on. The stewardesses were European, and they naturally had the European charm, and they blended right in with the crew. That's not an easy feat because out of the 130 guys, there are about 100 who were busy doing industrious things like yoo-hooing in the passageway, throwing things, hunting down chow (wherever it might be), stalking out and then tracking stewardesses en route down the passageway, throwing side remarks at them as fast as they could, and then there were always that certain few, who after take-off, are so disrupted and nerve shattered that they wouldn't be able to survive the duration of the flight—that is, not without just one little sip. Anyway, it was a nice flight. About midway over the Atlantic, the stewardesses wanted us to play the guitars, and so the guys finally hounded us into playing. It finally turned into a jamboree with about four or five guys singing, plus the four stewardesses, and one of them had the mic for the intercom in her hand, so it went all over the plane.

Rick wrote a letter on January 13, 1965, from Holy Loch the day before the crew departed on their next patrol. He had some free time before leaving, which he recounted:

> I've really been traveling around a lot this trip over. I've had more liberty this upkeep than all the previous combined. I've been to Glasgow about 10 times including Christmas Eve, Christmas Day, and New Year's Eve, and I've spent one weekend up at Edinburgh. I revisited the castle and went to the Palace of the Holyrood House,

which is still the official residence of the Queen of England when she visits Scotland. The city itself is the most beautiful I think I've seen.



Rick with "Santa" (David Jenkins) – Aboard the USS SAM HOUSTON
Taken in Holy Loch Before Departing on Another Patrol
Christmas 1964
Lyons Family Photo Collection

Rick looked forward to leaves. He toured Europe twice, and during one of those leaves, he visited the ancestral home in Kilgarvan, County Kerry, Ireland, of his paternal grandfather, who had immigrated to the U.S. in the 1880s. One leave was from mid-March to mid-April of 1965, and for the first part of that leave, he travelled with his friend and fellow SAM HOUSTON shipmate, John Burns. In Berlin, they were there just long enough to see the Berlin Wall just before getting orders from the military to leave immediately. Berlin was deemed too dangerous for a couple of submariners with high-security clearances! They headed back to Frankfurt – then on to Copenhagen. He later went to Amsterdam, then on to Paris via Germany and Switzerland. He spent the morning of his 22nd birthday in Paris and that evening in London.

One of the things Rick loved best during the Navy years was learning to play the guitar, and he truly had a natural talent. In one of his performance evaluations, Captain Daniel P. Brooks stated: "Lyons is a fine guitar player and has substantially contributed to the morale of the crew at impromptu songfests and at ship's parties."

Crew Members Enjoying a Music Jam Session
While on Patrol
Left-Right: Jim Kujat, John Burns, and Rick Lyons
1965
Lyons Family Photo Collection

Rick was scheduled to be discharged in the fall of 1965, but an error was made on the number of days he had been granted in leaves. The Navy insisted he had another leave coming and encouraged him to take it—even though he disagreed with that, and his own records showed he had taken all of his leaves. However, he did as they insisted and took another leave for most of September 1965—also in Europe. When it came time to complete the papers for his discharge, they told him he had taken too much leave and that he owed the Navy a little more time! Of course, this news was very upsetting to him. Because there wasn't enough time for him to go on another 60-day patrol with the SAM HOUSTON, he was assigned for a short time to the USS DOGFISH—SS-350. He received his honorable discharge on February 11, 1966 – too late to start the spring term at Southwest

Missouri State College—now Missouri State University—in Springfield.

Rick returned home to Springfield soon after his discharge and began his college education that summer at MSU, taking general education and pre-electrical engineering courses. He had been impressed with the engineers who came aboard to work on the sub, and that impacted his decision to pursue an engineering degree. He was a member of Kappa Mu Epsilon Mathematics Honor Society and Young Democrats as well as being named to the Dean's Honor Roll each semester for the two years that he attended MSU. He was pre-enrolled for the fall semester of 1968 to attend the Missouri University of Science and Technology (formerly the University of Missouri-Rolla and earlier known as the Rolla School of Mines), where he intended to complete an undergraduate degree in electrical engineering. His long-term plans were to next complete master's and doctorate degrees in electrical engineering at the Massachusetts Institute of Technology. Tragically, those plans were cut short when he was killed in the crash of a small plane near Springfield on August 9, 1968, at the age of 25.

During his brief adult life after returning home from the Navy, Rick experienced great enjoyment from playing his new 12-string guitar—spending hours with his brother learning new songs and entertaining family and friends. He also enjoyed motorcycling with his family on their trail bikes (in search of log cabins in rural areas of the Ozarks), and he loved driving his new red 1966 Mustang 286 GT.

He was survived by his parents, Lawrence and Merle (Edmonds) Lyons; his older brother, John; and his younger sister, Sally; his girlfriend, Sherma Ledbetter; several aunts and uncles, cousins, and many friends. He was a member of St. Agnes Cathedral in Springfield. His joy of life, love of family and friends, energy, talents, and sense of humor has been forever missed by those who loved him most.

BEST ADVICE
(OR AS SOME CALL THEM, SEA STORIES)

by CAPT John Byron, USN, Ret.

1. 1960, USS CAVALLA (SS-244)

I was a sonarman second class qualifying in the boat. In the CO's stateroom sitting on the skipper's bunk, him in his chair interviewing me for possible endorsement for the NESEP program. CO: LCDR R. Y. 'Yogi' Kaufman.

Yogi asked me "Does an officer have to be popular to be effective?" Tough question for someone in Yogi's crew that week, as we'd been steaming independently in one of the NARRABAY OPAREAs and after seemingly endless hand-dives and airless-surface drills, we were beat and Yogi was singularly *unpopular* in the crew that Thursday (I'm pretty sure he knew that — it amused him).

My hand-dive station was especially tough, the Safety Tank Vent. Mounted with the operating handle facing forward right up against the joiner bulkhead for the crew's dinette at the forward end of Flatbush Avenue, there wasn't room to use a cheater bar like on all the other vents. *Cycle Safety Vent* meant three of us had to somehow get our hands on the stub of an operating arm and mule-haul the vent open, then shut. Tough, tough work.

I blathered an answer to the question, something along the lines of 'it might be nice and it might be helpful, but the task comes first and getting it done counts far more than being popular.' Yogi must have liked the answers I gave him that afternoon. He forwarded my NESEP application with a powerful endorsement and I got into the program.

Ran into Admiral Kaufman many times after I was commissioned, even after we both retired. About a year before he died, I sent him a letter saying that he was my model of a commanding officer, thanking him for his wise counsel over the years, and

wishing him well. The letter got lost and he didn't receive it until eleven months later. He called me, about 2200 one night, and we talked for over an hour. He died the next month at age 85. I treasure that phone call. And the advice and example I had of him as my best skipper.

2. In PCO School, 1979 Pearl, a session with serving COs

One of them told this story…

"As you know, you'll have a number of watch quals for which you are the final interviewer. My practice has been to ask the candidate this question: 'Why are you on watch?' I always got one of two answers, either 'I'm on watch to solve problems' or 'I'm on watch to prevent problems.' If it was the former, I'd press the guy a lot more to see if he'd come around to what I thought was the better answer, the second one.

Then in one interview I asked the question and got the best answer I've ever heard: 'Why are you on watch?' *'To make the right things happen, sir.'"*

I've always remembered that great anecdote from a wise and good skipper near the end of his tour.

3. In command of the Navy's oldest submarine, San Diego, 1979

I inherited an XO who was a rock. Decent guy I guess, good submarine skills, but one who's dealings with the crew and leadership in the wardroom and with the chiefs were really poor. That was my problem. *His* problem was that I wasn't going to recommend him for command if his conduct and performance stayed below what I considered minimum standards. He wasn't listening. What to do?

I decided to enlist the advice of a Sea Daddy *(everyone* needs a Sea Daddy), then-Commander Jim Beattie, Chief of Staff in the opposite squadron. His suggestion was that I draft an absolutely honest fitrep on the XO and use it as a coaching tool and possible corrective implement. I did, marks no higher than the middle of the page, none of the BS that passed for narrative in those days, and no recommendation for command.

It was brutal. I told the guy that this is what was going in next fitrep cycle if he didn't clean up his act.

He did. I was able to recommend him for command and he went on to a successful tour as CO of an ASR. That draft fitrep helped immensely in getting his mind right.

4. Serving as Executive Assistance to RADM Frank Kelso, Director of the Office of Program Appraisal on John Lehman's SecNav staff ca. 1985

I was having a really tough time with some jerk O-5 or O-6 on another staff somewhere in The Building. Asked Admiral Kelso if he might have a chat with the guy's boss. He suggested instead that I keep working it directly with the fellow I was feuding with, adding this super advice: *"John, never come down on a guy from the top."*

USS SUBMARINE HARDER, SS257

by Mr. Lawrence J. Opisso

HARDER was sunk August 24, 1944, after six wartime patrols, under Commander Sam Dealey, *Destroyer Killer*. HARDER was famous for sinking five Japanese destroyers in four days. An incredible feat. Sam Dealey was the first and only skipper of HARDER.

I had the pleasure after the war, in meeting with Captain Frank Lynch, who had skippered other subs. Frank had sent my copy of Through Hell and Deep Water: Authored by Admiral Charles A. Lockwood, and Colonel Hans Christian Adamson USAF to Admiral Lockwood. "Uncle Charlie" sent my book back with a glowing endorsement of HARDER and its exploits. Captain Lynch, along with now Admiral Jack Maurer, survived the sinking of HARDER off the coast of Luzon, in the South China Sea on August 24, 1944.

As Admiral Thomas Kinkaid wrote on May 11, 1956, "I am proud to have served in the war-time Seventh Fleet with Sam Dealey."

There were many tributes to the HARDER and her record of accomplishments, including a compliment by General Douglas McArthur, sent through Admiral Lockwood, to Commander Sam Dealey, stating "The recent exploits and achievements of your submarine were magnificent. My congratulations." General McArthur presented the army DSC to Sam Dealey and its gala crew, as well as the Navy Cross presented by Admiral Lockwood.

My first cousin, Larry A. Opisso served all 6 patrols of the HARDER, as MoMM1, and went down with HARDER. It is in his honor and memory, I respectfully submit the enclosed.

"There are no roses on a sailors grave,
No lilies on an ocean wave.
The only tribute is the seagull's sweeps,
and the tears that a sweetheart weeps."

Sincerely,
Lawrence J. Opisso
Twin Dolphins

BOOK REVIEW

DANGEROUS GROUND

by CDR George Wallace, USN, Ret. and Mr. Don Keith

Commander George Wallace is a retired submarine officer. He served on JOHN ADAMS and WOODROW WILSON, was XO of SPADEFISH and Commanded HOUSTON. While in command the ship worked with SEALS and was awarded the CIA Meritorious Unit Citation. He and Don Keith have written three other submarine novels; Final Bearing, Firing Point and Operation Golden Dawn.

Don Keith is a native of Alabama who enjoyed a long career in radio as a featured personality and later as a station owner. At the same time he became a successful author of fiction. He later wrote non-fiction historical works about World War II submarines and co-authored, with CDR Bill Anderson of NAUTILUS, The Ice Diaries.

Editor's Note: In this issue THE SUBMARINE REVIEW continues the practice of giving some special attention to submarine related novels. We did so in reviewing several of Joe Buff's novels and more recently we cited several retired submarine officers who have written submarine novels. The point in departing from our normal no-fiction policy is to take advantage of their fiction, based on long experience in the boats, as authoritative depictions of USN submariners, and how they probably would, and could, react in extreme situations. Dangerous Ground certainly does provide the extreme situations for those depictions. It is an exotic story with plenty of action

by a wide range of colorful people, ranging from South China Sea pirates, North Korean arms dealers, Islamic Terrorists, SEALS, all the way up to the President of the United States. Of course, several submariners act to accomplish all tasks and resolve all threats in an admirable manner. For the older members of our readership some of the scenarios will bring back memories of past incidents or near-instances, including the TREPANG Plot of the late 70s.

We have extracted some sections of the book to give our readers some flavor, a sample of the writing and touches of the plot without giving away too much. All the italicized subheadings are editorial guide posts for this purpose and are not part of the book's text.

Jim Hay

Extract # 1
Pirate Raid

PROLOGUE

The *Medong Sui* threaded her way among the hundreds of small islands that were silhouetted between the blue-black water and the pink and orange streaks of sunset. The ancient diesel engine groaned pitifully under the strain as it did its best to propel the overloaded freighter across the South China Sea. Long beards of sea grass draped under the hull, slowing the old coaster's progress even more. Jagged streaks of rust festooned her once white-painted sides.

Kei Nugyen Doa leaned back against the ship's bridge rail while he sucked on a Vietnamese cigarette. He took a deep draw then blew the smoke out, allowing the gentle tropical wind to take away what little smoke he had not been able to hold in his lungs. From up here he could see the passengers milling about on the

main deck below. They were finishing the last remnants of their evening meal by lantern light. Soon they would be bedding down for the night, their din would subside, and he could listen to the quiet of the night.

This evening, while the passengers and most of the crew slept, Kei would guide the *Medong Sui* through the narrow Balabac Straits, into the Sulu Sea. Tomorrow night, the *Medong Sui* would arrive, only a few hours late, at Isabella, on Basilan Island in the southern Philippines.

The freighter was four days out of Nakhon Pathom, Thailand. It carried a manifest proclaiming that the *Medong Sui* was hauling a cargo of foodstuffs for delivery to a wholesaler in Isabella and a supercargo of Buddhist pilgrims returning home from a pilgrimage to Doi Suthep, one of the faith's most revered shrines.

Kei would be happy when he could offload the fifty peasants who were making the passage. He would be even happier to rid himself of the other cargo the ship carried down in its hold. The manifest did not lie. It was just incomplete. It wasn't the bags of rice and the dried fish that made Kei so nervous. It was the ton of pure heroin hidden underneath the rice and fish that scared him. The value of that cargo represented more money than he and his family could ever earn, not in a hundred lifetimes. He also knew that Sui Kia Shun would hold him personally responsible for every baht's worth if it should somehow be lost, whether it was his fault or not.

Sui, the powerful Chinese drug lord, expected his servants to perform their duties unfailingly. There was no margin for error. Kei's duty was to deliver the heroin to a waiting freighter in Isabella. Barring catastrophe, he would do just that, then accept his small compensation and wait for Sui to call upon him again someday.

Kei had traveled this passage, and most every other one in the South China Sea, countless times. *Medong Sui* was almost new when, as a young man, he first set sail. Now both he and his ship were well past their prime, worn and tired. Now that they were once again near their destination, he would soon breathe easier again.

Kei inhaled the last bitter tendrils of smoke, held it in as long as he could, and then exhaled as he tossed the tiny butt over the side. The embers at its tip died in the damp air.

It was time to enjoy the solitude of the night. A million stars would keep him company on what was left of this moonless voyage.

Manju Shehab sat low in the black inflatable boat. Like the men behind him and those in the other two boats on either side of his, he was dressed all in black. The boats were running without any lights, invisible to anyone traveling these waters on such a dark night. Even with very sensitive radar, it would be almost impossible to detect the trio of boats, each with its own well-armed five-man team crouching inside.

But they knew their quarry tonight wouldn't have sensitive radar. Most ships transiting these waters were lucky to have engines that worked, much less electronics.

The rusty old freighter they were awaiting was a few hours late but that was to be expected. Shehab's instructions were to remain in this spot until it came, no matter how long it took. If Sabul u Nurizam…Allah praise his blessed leader's name…said they were to wait until the stars fell from the heavens, Shehab would do so.

Finally, near midnight, Shehab saw the freighter's running lights on the horizon. There was no mistaking the old coaster. He let it chug a mile past them before he signaled his men to start their engines. The powerful, expensive outboard motors could jet the rigid-hulled, inflatable boats across the water at better than forty knots, yet they were quiet enough that they were almost inaudible above the wave slap.

The old freighter was easy to track. The three boats followed the glimmering phosphorescent wake that trailed out far behind the ship.

Within minutes they had caught her and were hidden beneath the overhang of the high, sloping sides of the old vessel. Shehab moved his boat up along the starboard side and kept pace while he

watched for any sign that they had been observed while they closed. He listened for excited calls of alarm from up on the main deck, but there were none.

Satisfied they were ready, he allowed his boat to slip back until it was only a few feet in front of the freighter's single churning screw. It was a dangerous place to be. One small slip and they could be capsized and chopped into shark food. But this spot had the advantage of being aft of the bridge. In the unlikely event there was anyone up there awake, he would certainly be looking forward. Still, the ship's superstructure would hide Shehab and his men, even if someone on the bridge should glance backward.

The pirate checked his AK-47 ready and then, with one broad swing, tossed his rubber-coated grappling hook up over the rail. He scurried up the line, followed closely by the other four men from his boat. Shehab knew that one of his team leaders already had his boat riding along on the port side, and that they were mimicking every move his group made. The third team would remain a few yards astern, riding in the ship’s rough wake, ready to charge in and open fire if help was needed.

Shehab reached the top of his line, rolled over the railing onto the deck, and jumped to his feet, his AK-47 ready. He stayed in a low crouch as he ran the short distance to a ladder that led up to the bridge. He could hear the muted footfalls of his men, following behind. He silently charged up the ladder and rushed through the open doorway into the wheelhouse.

Kei Nugyen Doa was in danger of being lulled to sleep by the quiet night and the soft rocking of the ship beneath him. He was about to light another of the cigarettes when he was startled by movement out of the corner of his eye. He found himself staring at the business end of an AK-47 as a black-clad man slipped through the starboard hatch. Seconds later the first intruder was joined by an accomplice through the port hatch. The old seaman leaned against his chart table and watched the armed men while he allowed his heart to slow its racing.

He had sailed these waters long enough to know there was nothing he could do to stop them. The pirates would simply take what they wanted. The best course of action was always to be

helpful and hope they left peacefully. They would steal the little bit of money Kei had in the ship's safe and rob the passengers. There weren't any of them worth kidnapping and holding for ransom. Maybe, if the gods were smiling, they would never even go below, would never find the heroin hidden deep in *Medong Sui*'s bowels.

Kei was surprised when the pirates herded him off the bridge and down the ladder to the main deck. Pirates usually left one or two men to make sure he steered straight while the others seized what plunder they could easily get to. This time, he was shoved down, right into the middle of the milling mass of crew and passengers who had been awakened by the men's shouts.

This was not going well. The pirates should be in a hurry to gather any valuables and leave the *Medong Sui*. They would need to be far away from the ship before the sun rose. After all, they were only a few miles from the Philippine Coast Guard base at Balabac.

Kei felt the ship heel slightly as it began a turn. He knew at once what was happening. Someone was up in the wheelhouse, turning the *Medong Sui* so that she was retracing the track they had just steamed down.

This was trouble. Kei slumped down, squatting forlornly in the midst of his chattering passengers. There was nothing he could do now. Nothing but pray.

The sun had risen high into the sky when Manju Shehab spotted the ship for which he had been scanning the horizon from the old freighter's bridge. The vessel rode at anchor, just to the leeward of Royal Charlotte Reef, a narrow spit of land that barely broke the water's surface at the southern end of the Spratley Islands. The isolated bit of rock and coral was a perfect meeting place. It was too far off the beaten track for anyone to stumble across them accidentally. Not even the most desperate fishermen would venture out here.

Shehab ordered the engines stopped and allowed the old scow to coast until he came to a halt two hundred meters from the anchored ship. Then he directed one of his men to drop *Medong Sui*'s anchor.

It fell free with an awful racket and splashed into the blue water.

Kei Nugyen Doa had kept his eyes closed since the bright sun had come up. He did not want to see what might happen next. These men were not the usual pirates, looking for a few coins or cargo that was light enough to drop over the sides to their mates. These men seemed to have no interest in the few bills in an old sailor's dungaree pockets.

When he heard the anchor chain rattling loose, he dared to look. As his eyes grew accustomed to the brightness on the deck, he could see that they were stopped near a rocky sliver of land that looked vaguely familiar to him. If they were where he thought they were, rescue was not likely.

There was another ship anchored over there, as if it had been awaiting them. He watched as a pair of lighters left from alongside the other freighter and made their way across the short stretch of turquoise water. They pulled alongside the *Medong Sui* and tied up next to the Jacob's ladder that the pirates had lowered. A dozen armed men clambered up the ladder. They milled around on deck, shouting friendly greetings to the pirates who now controlled the *Medong Sui*.

This seemed to be a lot of effort and planning, a lot of men, all just to steal the rice from a little coastal freighter. It was almost as if they were intent on taking the whole ship. Certainly it wasn't for the value of the *Medong Sui*. The rusted old scow was near worthless. They wanted something much more valuable.

Kei felt his stomach sink.

The leader of the pirates, the one who was called Shehab, pointed at Kei and spoke to him for the first time.

"Show us where you hid the heroin. Show us now or we will kill all the passengers."

To punctuate his order, the pirate fired a short, vicious burst into the midst of the huddled group. The pilgrims screamed and cried in terror. Four of them fell, their blood staining the deck red as it drained toward the scuppers.

"Be quick or more will die. Passengers, then your crew, and finally you, old man."

There was nothing else for Kei to do. The inevitability of what was about to happen had already dawned on the old freighter captain.

If he refused to tell them where the drug was, the pirates would murder everyone. They knew already it was onboard and they would still find the heroin, even if they shot everyone and then searched the *Medong Sui* themselves. If he revealed the drugs' hidden location, the pirates would still murder them all, if for no other reason than to eliminate witnesses.

Kei shrugged his shoulders tiredly. He was much too old to think of dying defiantly. Better to go into the next world with as little angst as possible.

"Come, I will show you," he muttered.

Slowly, he forced his stiff old legs to push him upright. He made his way down the ladder into the main cargo hold. There, under the sacks of dried fish, the deck planks were loose. He pulled up one to show the pirates where the bags of white powder were stuffed.

Shehab forced the hapless captives to off-load the drugs while all the pirates stood about and watched. One ton of pure heroin made a nice little pile on one of the rusty old lighters' decks. It would be safely stowed on the other freighter soon.

But it was not to be. The actual plan puzzled even Shehab. It had mystified him ever since their leader, Sabul u Nurizam, had spelled out in no uncertain terms this most unusual final step in the plot. It didn't make any sense to go to all the trouble and danger of stealing fifty million dollars' worth of drugs, only to dump the stuff into the sea. That money would have gone far in the new war of terror against the infidels.

There was no question, though. Sabul had ordered it done so, and Sabul was the anointed one.

The remainder of his leader's orders had made more sense. Shehab set about following them to the letter. When the off-loading of the drugs was completed, Shehab ordered the Buddhist pilgrims and the freighter's crew herded into *Medong Sui*'s main hold. Most of them assumed they were to be locked up there until

someone came to rescue them. They settled down to pray and wait.

Kei knew better. Even so, he could not resist looking up at the pirates as they glared down through the hold at them. He could not help pleading with his eyes.

It did no good. They opened fire.

The deep-throated rumbling roar of the AK-47s didn't stop until the last plaintive cry for mercy, the last shrieks of horror were silenced, and nothing remained but the eerie creaking of the old scow as she rocked in the sea swell.

Extract # 2

White House Situation Room

"You've got to be kidding!" President Adolphus Brown exclaimed in disbelief. "Let me get this straight. You're proposing I okay our personnel invading a sovereign country. And one that's not particularly friendly, either."

The briefing room, in the fourth basement under the West Wing of the White House, resembled any high-level executive conference room. The recessed indirect lighting reflected the dark walnut wainscoting and beige fabric wall covering. A pair of Monet prints added a bit of color to the long wall behind the President.

This room was a bit different from the average office-suite conference room though. When the heavy wooden doors were shut, it was totally isolated from the outside world. No sound wave or stray electron penetrated the sophisticated security barrier that protected its occupants from even the most advanced attempt at surveillance. The NSA engineers had used every trick, down to routing the room's electrical power through a series of isolation transformers, just in case someone came up with a new way of tapping the room through those lines. This was a place intended for use when the most secret and sensitive decisions had to be discussed.

Dr. Samuel Kinnowitz sat across the conference table. He looked the President directly in the eye when he answered his rather pointed question.

"Yes, sir, Mr. President. It would definitely be considered an act of war if the team were detected. Even bringing the sub in close enough to deploy and retrieve them in their territorial waters would be an act of war."

"Sam, are you telling me that there's no other way? That with all that hardware we have orbiting around up there, we can't spot nuclear weapons in North Korea?" President Brown asked. His jaw was clenched tightly as he looked around the table at the others who were assembled there. If the press had even an inkling that these people were all gathered in one place at the same time like this, the vultures would have themselves a field day, speculating on the possibilities and manufacturing their own wild theories about what might be going on. Even then, they would likely never guess the nature or the magnitude of the crisis that led to this meeting. Dr. Kinnowitz had gathered the heads of all the various intelligence and homeland security agencies for the job of briefing President Brown about the apparent North Korean nuclear threat. Now they had to come up with a way to verify and counter its existence.

No one spoke in response to the President's question. The Director of Central Intelligence shook his head slightly but remained silent. No one else moved. None of them wanted to be the one to confirm the NSA's bad news.

Dr. Kinnowitz finally answered the President's question.

"No, sir. There's no other way. We have to know for sure that the North Koreans have the weapons before we can do anything about them."

"Why don't we just go public with it? Demand they allow U.N. inspectors in?"

"You know the answer to that, sir. They'll just deny it and accuse us of looking for an excuse to invade their territory. Now, if you will allow Admiral Donnegan to continue with the brief, you will see that what we are proposing is the only option we have available to us."

President Brown nodded and sat back in his chair, rubbing his chin thoughtfully as he turned to where the tall black Naval officer stood.

Admiral Tom Donnegan aimed his laser pointer at a large map of North Korea and eastern Siberia. The tiny red dot rested squarely on the port city of Najin.

"Mister President, as we discussed earlier, we believe that two Russian nuclear weapons were smuggled into the DPRK naval base at Najin aboard a tramp steamer. The weapons are both old Soviet-era nuclear torpedoes that have the NATO designation of 'Type 53-65.' They each have a twenty-kiloton yield. As a torpedo, they have a range of twenty thousand yards. They require a Russian 53-centimeter torpedo tube and a *Felix-Artika* variant fire control system. It makes a real nasty anti-submarine or anti-carrier weapon."

"Do the North Koreans have a submarine that can shoot this thing?" Brown asked.

The admiral was ready for this line of questioning. He didn't miss a beat.

"They have several old *Whiskey*- and *Foxtrot*-class boats that the Soviets gave to them back in the fifties. They have 53-centimeter tubes all right, but they don't have the *Felix-Artika* fire control systems. They could be fired with a portable test set if they weren't too concerned with accuracy, though. The safety interlocks are crude and pretty easy to circumvent. But we don't see how they could deploy the torpedoes. All of their boats are rusting alongside the pier. None have been underway in two decades so…"

"Damn! I don't understand," President Brown interrupted again. "Why steal a nuclear torpedo if you don't have any way of using it?"

"Mr. President, that has us confused, too," Donnegan answered. "Even if they pulled the warhead off the torpedo body, it's still a big hunk of metal. The bastard weighs over a ton. It's not something the Koreans could set on top of a missile or that a suicide bomber could strap on and carry into some disco in Tel Aviv. That's a piece of the puzzle we don't have a good answer for. But remember this. The Koreans know why they stole them and

we have to assume it wasn't to keep themselves warm in the winter. Whatever their use is going to be, it won't be good news for us or anyone else in the world."

Dr. Kinnowitz moved over to stand next to Admiral Donnegan.

"Whether or not we know the purpose of the weapons doesn't really affect the decision to verify their existence and to destroy them if we can," he added.

President Brown nodded thoughtfully. His brow was creased in deep furrows as he tried to absorb all this bad news. He waved his hand for Admiral Donnegan to continue.

"We are reasonably certain that the weapons didn't stay in Najin very long. There doesn't look to be a facility there to handle them and we've seen no unusual activity. But we have satellite imagery of trucks hauling what could be weapons on the coast highway south of town. Unfortunately, we are not completely positive of the trucks' destination. We had a gap in coverage during that time period. The trucks were gone when we regained coverage. They could not have gotten to the next town. Not enough time for that. So the weapons have to be somewhere along this stretch of road." The red dot of the pointer danced along an isolated section of the highway that snaked along the coastline. "We think we know of three possible locations where they could be."

Donnegan next moved his laser pointer in turn to three spots on the topographic map of the area.

"These three points are all new construction facilities in relatively rugged country. Each would be the perfect place for hiding an important secret. There are copies of imagery from the latest Keyhole satellite pass in your folders." Donnegan pointed toward the thin, black notebooks on the table in front of each person in the room. The words "Top Secret, Special Compartmented Information" were stamped across the front of each notebook in two-inch-tall red letters. "As you can see, there is nothing to single out any one of the sites. We will need to check them all out."

President Brown opened his notebook and stared intently at the 8x10 images. He closed the cover again and looked up.

"Hell, since the experts can't differentiate anything, there's no reason for me to think I can. Okay, Admiral, what is the plan?" "Mr. President, we put a small SEAL team ashore that deploys simultaneously to each site. They carry self-defense weapons and some very sensitive monitoring equipment. With luck, they should be able to detect the presence of those 53-65s without needing to actually see them or lay their hands on them. Once they have found the weapons, they send the location back to the command and control team in Yokosuka. The target coordinates are sent to the submarine for a Tomahawk strike. The SEAL team stays in position to verify destruction and then they are extracted by the sub. The area has no civilian population so collateral damage will be minimal. The only people at risk are the garrison that is likely guarding the site. Oh, and our SEALs, of course. Any questions?"

The room was deathly silent. Each man was contemplating the import of what they were being asked to consider. Placing troops on the ground in a foreign country. Shooting missiles into that country and blowing things up. So many things could go wrong.

President Brown rose and looked to his right and then to his left. He spent a few seconds looking into the face of each man. These were his most trusted advisors. He knew any one of them would not hesitate to raise a howl if he had qualms. No one spoke.

The President turned and looked at Donnegan and Kinnowitz.

"You are certain of the intelligence we have? You are positive we need to do this? There's no other way we can find out for sure where these bastards have hidden those weapons?"

Donnegan answered smartly, "Yes, sir."

"There's no other alternative?"

"This is the best one we have."

President Brown straightened before he spoke again. There was a note of finality in his voice.

"Carry out the mission. Put together whatever resources you need. You have to get those nukes before they use them." He paused for a second and then added, "And gentlemen, don't try to micro-manage this from Langley or the Pentagon. Get someone you trust to take charge on scene and let him do his job."

Yes, sir!" both men said in unison.

With that, the President turned and left the room.

Extract # 3

In-Theatre Brief

Commander Don Chapman and his executive officer, Marc Lucerno, strode up the sloping walkway, past a row of gray, stone-and-concrete buildings. Each of them bore a large, blue sign that announced the important functions housed within the aging walls. The street slowly wound around a craggy, fissured, granite rock that towered over the Navy base. They had walked almost three-quarters of the way around the rock when they came to a narrow paved road that headed directly toward the extinct core of the volcano.

The road stopped abruptly at a pair of heavy steel doors carved into the rock. An LAV-25 light armored vehicle blocked the road. Its M242 Bushmaster 25mm chain gun pointed menacingly down at the two approaching submariners. The tank commander sat in the turret hatch, holding the M240E1 pintle-mounted 7.62mm machine gun at the ready as he balefully eyed the approaching men. Two more helmeted and combat-rigged Marines stood in front of the pile of sandbags that circled the cement block guard shack. A small blue sign with gold letters proclaimed that this was the home of the Commander, Seventh Fleet Command Center.

Chapman glanced around warily. Someone was real serious about security. It would take an all out assault by a very determined and heavily armed fire team to blast their way to the doors. And he suspected such an attack would only get tougher then.

When Chapman and Lucerno flashed their IDs to one of the Marines he nodded and a Navy Lieutenant emerged from the guard shack. He wore over his left shoulder the gold aiguillette of an admiral's aide.

"Please follow me, Commander. Everyone else is already in the briefing theatre." The lieutenant turned on his heel and disappeared through the steel doorway. Chapman glanced at his XO and shrugged. "Everybody" meant that the admiral was

cooling his heels while the commander and his XO were lollygagging up the hill.

Chapman slipped between the heavy steel doors. They must have been six inches thick. He had read someplace that this place was built as the Imperial Japanese Navy command center. The doors would stand up to everything but a direct hit from a two thousand pound bomb.

Inside, the walls were bare rock. They still bore the chisel marks from when they were carved out of solid granite almost a century before. A couple of strings of heavy-duty electric cables powered incandescent lights that dimly lit the passageway as it led down and then curved away to the right. Chapman guessed the tunnel was wide enough for two Toyota's to drive abreast.

A few feet further down the tunnel, the aide guided them through another set of steel doors that seemed identical to the outside pair.

"Ever been in here before?" their tour guide asked nonchalantly. He continued without waiting for an answer. "The Japs were smart. You notice how we turned ninety degrees from the time we started? Went exactly seventy-four feet and dropped down fifteen feet. Their engineers figured a sixteen-inch shell might be able to go through those outside doors and hit the rock inside. These doors would stop the blast from making it any lower."

Chapman grunted noncommittally. The aide went on.

"Yep, not that it means shit now. A nuke would vaporize the whole damn rock, doors or no doors. But it's still the best damn bug-proof room in Asia."

Then aide stopped abruptly in front of a dull, gray-painted door. The brass nameplate proclaimed that the "Briefing Theater" was on the other side. A small electric sign hung just above the door. "Classified Briefing in Progress," it said.

The aide indicated that the two submariners were to enter.

Jon Ward stood at the head of the briefing table that dominated the room. He motioned for Chapman and Lucerno to take their seats at the table and flipped on the projector. The low hum of idle conversation came to a halt as the large screen brightened and Ward stepped to a little wooden lectern to the right of the screen.

Large red letters read: "TOP SECRET. Special Compartmented Information. Sly Eye." Just beneath the words were the SEAL's "Budweiser" shield and the submariner's gold dolphins.

Chapman noticed that several of the people seated around the room were dressed in cammies and sported the large, gold SEALs shield. Two of them, a commander who appeared about his age and a youngish-looking lieutenant, were seated at the conference table.

The room was silent as Ward spoke.

"Gentlemen, this brief is classified. No notes will be taken. Nothing will leave this room. Couriers will deliver your orders to your individual commands later this evening."

He pressed a button. A map of the unmistakable peninsular shape of North and South Korea flashed up on the screen.

"We have reason to believe that the DPRK has acquired a number of nuclear weapons from Russian sources. Our intelligence is very reliable on this one."

He stopped for a second while a collective gasp arose from the group. They had just heard their worst fear verbalized. Something they had dreaded for their entire careers had apparently come to pass. The North Koreans, one of the most unpredictable and desperate nations ever to cloud the Earth, owned the power to ensnare Asia in a nuclear holocaust.

It was unthinkable, intolerable. And in his own mind, each man in the room knew immediately that they had to be stopped at any cost.

"We know that at least two old Soviet-era nuclear torpedoes disappeared from the submarine base at Vlad," Ward said, using his laser pointer to point to the spot on the edge of the map. "They were last located at the North Korean naval base at Najin. They probably came in by sea, as observed by *Topeka* while she was gathering intelligence in the area." Ward nodded in Chapman's direction. He was always glad to give a submariner props. "We have not positively located the torpedoes since. National assets aren't able to pinpoint them because of the high natural radium content in the mountains in that part of the world. We have only one recourse. We have to put eyeballs on the target to confirm

their existence. That's where the SEALs and the *Topeka* come in. They'll go in and they'll find the nukes if the are there."

The SEAL lieutenant, the one wearing a nametag that said " Walker" asked, "And then what? We blow 'em?"

"Easy, Cowboy," the older SEAL said, almost in a whisper. "We gotta let everyone play."

A Navy captain wearing a *Lake Erie* ball cap spoke up.

"Reckon that's where we come in. You guy's find 'em and we use *Erie*'s Tomahawks to smash 'em."

"That about describes the plan," Ward chimed in. "Now, let's get down to planning the nitty-gritty. We haven't got much time. They may keep moving them to lessen the chance we'll find them. Or they may intend to get them to their buddies somewhere else in the world. We have to find them first. I want *Topeka* and the SEAL team underway by first light tomorrow. *Lake Erie* will follow tomorrow afternoon." Jon Ward paused for a moment and looked into the eyes of each man in the room. "Fellows, do I need to tell you how sensitive this all is? Or what it means if we don't stop those nukes before the bastards use them. Or give them to somebody who does?"

No one said a word.

Extract # 4

Insert SEALs

Don Chapman swung the scope around slowly, looking carefully at the surface of the sea sixty two feet above his submarine. Nothing to see but the last glimmer from the sun as it slid below the horizon. They were all alone in this bit of the Sea of Japan. That was a good thing.

Chapman spoke into the open microphone just above his head.

"ESM, picking anything up?"

The early warning receiver was quiet, but it was still a good idea to have his experts make sure no one was looking for them.

"Captain, picking up a shore-based surface search radar," the ESM watchstander answered. The man was sitting in the forward

corner of the radio room, twenty feet aft of Chapman, watching a graphic display on his computer as it continuously built and shifted while his sensitive equipment searched the airwaves for probing radar signals. "Signal strength two. Probably on that mountain below Najin. Ten percent chance of detection."

Ten-percent chance of detection? Chapman wondered idly. How did he come up with that number? Why not fifteen percent or twenty? Or better still, why couldn't he be definite and just say they ain't gonna see us?

Chapman shook his head. Not a good time for idle wondering. There was a job to do. He continued his sweep of the horizon. Just one more check to make sure that no North Korean gunboat was going to come roaring over the horizon at them. He quietly ordered, "Officer of the Deck, surface the ship. Send the SEALs up into the bridge trunk."

Lieutenant Marc Lucerno glanced around the *Topeka*'s control room. The watch standers were sitting on the edge of their seats, nervous but ready. Lucerno rubbed the sweat from his palms onto the legs of his blue poopie suit. Everything looked ready. The SEAL team leader, Brian Walker, stood at the base of the ladder to the bridge, waiting for his order to scurry up. The man, his blackened face hidden in the shadows, was dressed in a black wet suit with a heavy pack on his back and a wicked looking M-4 rifle in one hand. He looked ready to go to war.

The fire control team was hunched over their computer panels, waiting and ready, just in case Kim Jae-uk sent a welcoming party out to spoil their little surprise. Two of *Topeka*'s four torpedo tubes were loaded with Harpoon missiles, ready to roar out and slam into any ship foolish enough to get in the way. The other two tubes had ADCAP torpedoes to blow their bottom out.

Everyone aboard the submarine hoped it would never come to that. Such an occurrence was, plain and simple, war. They were trained to go to war, to fight an enemy, but not a man onboard the boat had ever done it for real. Now, here in this part of the world and with the mission before them, they would be damned close.

"Diving Officer, surface the ship," Lucerno ordered with a lot more confidence than he felt. "Mr. Walker, stand by the bridge access hatch."

Lucerno watched the SEAL commander disappear up the ladder as he felt the boat take a slight up angle. The diving officer was using the planes to drive the sub up to the surface before he put air into the ballast tanks to hold her up.

"Thirty-eight feet and holding," Lucerno called out.

The diving officer ordered, "Chief of the Watch, conduct a ten second normal main ballast tank blow."

The chief of the watch stood and reached up to grab a pair of switches high up on the vertical panel in front of him. He flipped one marked "Forward Group" and then another one marked "After Group." The roar from the forty-five-hundred-pound high-pressure air rushing into the ballast tanks almost drowned out his report.

"Blowing the forward group," he yelled, then followed it with, "Blowing the after group."

The big sub bobbed up to the surface of the ocean as the air pushed seawater out of the huge tanks forward and aft of the "people tank." The chief of the watch locked his stare on the clock as it ticked off exactly ten seconds. He flipped both switches up. The roar stopped.

"Completed ten second normal blow. Three-four feet and holding. Half inch pressure in the boat."

Lucerno nodded and ordered, "Crack the bridge access hatch. Half inch pressure in the boat."

A green light blinked out on the ballast control panel.

The chief of the watch called out, "Bridge access hatch indicates intermediate."

Almost immediately, Lucerno felt his ears pop as air whistled out past the bridge access hatch, equalizing the sub's atmosphere with the air pressure outside the boat.

"Open the upper hatch," Don Chapman called out. "SEAL team to the bridge. All stop."

Topeka's screw slowly stopped turning. The boat slid forward for another thousand yards before it stopped dead in the water. In the meantime, Brian Walker had climbed up into the bridge

cockpit. He threw a rope ladder down over the vertical steel side of the sub's sail. The ladder just reached down to the round, slippery, rubber-coated deck of the sub. He dropped down the ladder and immediately clipped himself in to the deck traveler. No sense falling overboard. At least not just yet.

Two more SEALs, Tony Martinelli and Joe Dumkowski, followed Walker down the ladder. They clipped in as well and quickly headed aft. As the sub came dead in the water, they opened the engineroom escape trunk hatch and manhandled the two inflatable boats up onto the deck. Five minutes later, two black, six-man, inflatable assault boats sat on the deck, full of air and ready to go.

The rest of the SEAL team, Chief Johnston, Jason Hall, Mitch Cantrell, and Lew Broughton, helped by the sub's crew, passed the team's gear up the bridge trunk to the sail and down the rope ladder to the deck. Five minutes after the boats were ready; they were fully loaded with the black-clad SEALs sitting inside them.

The men could hear the bridge hatch clang shut. Each SEAL felt the same tinge of loneliness. They were out here on the open deck alone and the sub's hatches were closed.

Still, they sat quietly waiting. A few seconds later, the night was pierced with the low-pitched roar of twelve foghorns close aboard. Pressurized air blew columns of mist and water high into the sky as it rushed out of the ballast tanks through the vent valves atop each ballast tank. *Topeka* slowly settled lower and lower into the sea until the SEALs' boats floated free from the deck. There was no trace of the sub except for a few lingering bubbles and the tiny periscope sticking up from the water a few feet ahead of them. Slowly that, too, disappeared into the night as the sub moved silently away from them like some giant leviathan.

Chief Johnston was the first to speak.

"Okay, toads. Time to quit lollygaging. Man the paddles. I want a hundred feet between these two boats. Cantrell, you and Hill break an IR Chem-lite each and hold them up. The sub skipper is going to need something to steer by if he’s gonna snag us clean."

Chapman had already driven the *Topeka* a thousand yards from where the SEALs and their boats bobbed above them. He carefully turned her around and again looked through the periscope. He could just see the dim red glow of the Chem-lite beacons through the scope's IR lens. He spoke calmly.

"I'm going to call the mark on bearing to the left light and then the right. XO, get them plotted and give me a course. There ain't a whole lot of time to screw around fairing up here, so be quick about it."

Chapman couldn't actually see the bearing read-out through the periscope. Instead he would put the cursor he could see in the scope on the left light the SEALs were holding up, call "Mark," and let the XO read the bearings. Then he would repeat the procedure on the other light. The XO would have his team plot the bearings and yell out the course Chapman needed to steer.

Lieutenant Commander Sam Witte looked up from the chart he had taped down on the navigation table.

"Yes, sir. We'll split the difference, just like kicking a field goal to win the Rose Bowl in overtime."

Chapman shook his head and smiled. The XO seemed to come up with these football similes in every conceivable situation. Chapman was willing to bet the awkward, slightly overweight man had never donned pads in his life.

"Very well, XO. Officer of the Deck, lower the outboard and shift to remote."

The “outboard” was a small electric motor and screw that could be lowered out of the after ballast tanks. The motor, only a little over three hundred horse power, could only push the big sub along at a couple of knots. Its big advantage was that it was trainable so that it could push the boat's stern around faster than the rudder could. That was a real advantage when Chapman needed to maneuver quickly.

"Left bearing, mark!" Chapman called out, then swung the scope a tiny bit to the right. "Right bearing, mark!"

"Course three-two-four," Witte called out.

The sub swung around slightly to follow the new course directly between the two rubber boats.

"Left bearing, mark. Right bearing, mark."

"Course three-two-three."

Slowly the lights he was watching grew brighter and further apart as Chapman drove the sub back toward the SEALs.

"Left bearing, mark." Swing the scope. "Right bearing, mark"

"Course three-two-one."

Sweat trickled down Chapman's back as he made the meticulous maneuvers.

"Captain, plot shows one minute," Witte called out.

The lights were almost one hundred and eighty degrees apart now.

"Left bearing, mark." Chapman lugged the scope around, now swinging it almost a full half-circle. "Right bearing, mark."

"Looking good skipper. Right through the uprights."

Chapman watched as the two black boats seemed to swing astern and then come together behind the submarine. The men in the boats were little more than black shapes against an even blacker sky. One of the SEALs, and there was no way to tell who it was, flashed an IR light at the periscope.

Chapman read the Morse code out loud.

"Snag good. Now for a Nantucket sleigh ride."

Extract # 5

Firing Point

Lieutenant Commander Sam Witte looked up from the computer display. The dots were all neatly stacked in a vertical line. No doubt about it. He had the target dead nuts. It was like watching a snail meander its way across his flagstone patio back on Oahu. *Corpus* was running a steady course and speed, not the slightest hint of a zig. And now he had his own submarine exactly where the captain wanted it to be when he decided to shoot: five thousand yards aft of the sub and deep on her port quarter.

Witte tried to swallow. His mouth was too dry. Nothing went down.

It was time to shoot, before the nuclear sub somehow got away from them. Or turned around and found them. Then the hunter would become the hunted in an underwater free-for-all if anybody on the other boat were alive. If whoever had control of the vessel knew how to fire its deadly weapons.

But it still didn't feel right. They would be shooting friends. No, more than friends. Shipmates. And shooting them in the back.

Sam Witte took a deep breath and, in a voice far calmer than he felt, said, "Captain, I have a shooting solution. Recommend firing point procedures."

Don Chapman moved quietly to stand next to Witte. He glanced at the computer screen for a second and then, in a commanding voice, said, "Firing point procedures, master one, tube two. Tube one will be the back-up tube."

Witte immediately replied, "Solution ready."

The Officer of the Deck called out, "Ship ready."

Marc Lucerno glanced at his weapons monitoring panel and then yelled out, "Weapon ready!"

"Shoot on generated bearings."

"Jesus," somebody in the control whispered.

Marc Lucerno pulled the heavy brass handle to the left. A row of lights blinked from red to green.

"Standby," he said, in a voice that surprised him with its strength. First time he had ever done this for real. First time. He yanked the handle to the right, the way he had drilled a thousand times before. "Shoot tube two."

Down in the torpedo room, two decks below where Chapman, Witte, and Lucerno wrestled with their feelings, a solenoid valve opened and ported fifteen-hundred-pound-per-square-inch air into the chamber behind the firing piston. The piston slammed forward, shoving seawater ahead of it and up into a series of slide valves arranged around the aft end of number-two torpedo tube. The high-pressure water gave a mighty shove to the Mark 48 Mod 6 ADCAP torpedo sitting in tube two, flushing it forward. The first few inches of travel broke the A-cable connection just moments after the bits and bytes of the final firing solution were downloaded into the torpedo's microprocessor. The forward jerk generated

enough G force to close the acceleration switch in the aft end of the torpedo just as it cleared the torpedo tube shutter door. The switch made an electrical circuit that fired a tiny explosive squid in the torpedo's swash plate engine. The charge pushed the engine so that it was already up to speed when Otto fuel was sprayed into the combustion chamber. The tiny engine was attached to a pump jet that shoved the torpedo forward. As it came up to its pre-enable speed, steering vanes brought the ADCAP around to a course that would intercept with *The City of Corpus Christi* in a little over four minutes.

Four minutes. If the torpedo ran true—and there was no reason to think it wouldn't—then that was just about how much life anyone aboard the rogue submarine had left to live.

THE SUBMARINE REVIEW

THE SUBMARINE REVIEW is a quarterly publication of the Naval Submarine League. It is a forum for discussion of submarine matters. Not only are the ideas of its members to be reflected in the **REVIEW**, but those of others as well, who are interested in submarines and submarining.

Articles for this publication will be accepted on any subject closely related to submarine matters. Their length should be a maximum of about 2500 words. The League prepares **REVIEW** copy for publication using Word. If possible to do so, accompanying a submission with a CD is of significant assistance in that process. Editing of articles for clarity may be necessary, since important ideas should be readily understood by the readers of the **REVIEW**.

A stipend of up to $200.00 will be paid for each major article published. **Articles accepted for publication in the REVIEW become the property of the Naval Submarine League**. The views expressed by the authors are their own and are not to be construed to be those of the Naval Submarine League.

Comments on articles and brief discussion items are welcomed to make **THE SUBMARINE REVIEW** a dynamic reflection of the League's interest in submarines.

Articles should be submitted to the Editor, SUBMARINE REVIEW, 5025D Backlick Road, Annandale, VA 22003-6044.

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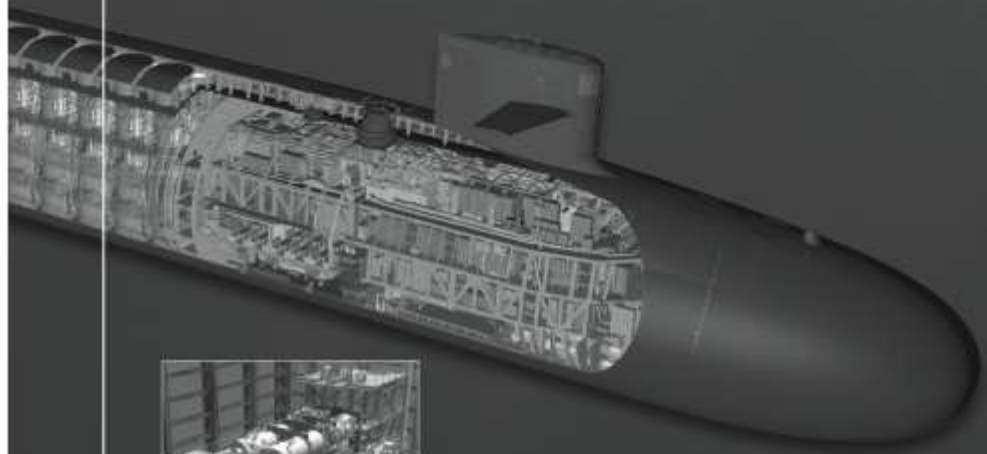

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