

# THE SUBMARINE REVIEW

## APRIL 1999

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## EDITOR'S COMMENTS

**I**t is with both sadness and pride that **THE SUBMARINE REVIEW** honors the passing of those who have contributed so much to the Navy, the Nation and our magnificent submarine warfare capability. The leading Feature in this edition is Captain Ned Beach's eulogy for the recently departed Admiral Hal Shear. It has been often remarked that one defining characteristic of the submarine community is the closeness and strength of the bonds between its members, but it is a rare privilege to see such clear evidence of that in print. It is a fitting, and heartfelt, memorial to one of the giants of the post-WWII/Cold War era in submarines by one of the more eloquent veterans of that period of intense development and operation.

Two other Features in this April edition treat issues of great importance to America's submarine warfare community. Ernie Blazar, of the Lexington Institute, recounts the findings of "study after study issued by American military analysts" to outline the broad shape of future battlefields which will be faced by U.S. armed forces. He then summarizes the specifics of one such study report, by a recent Defense Science Board panel, to specifically place the modern U.S. Submarine Force within that context. A particular emphasis is given to the proposal for modification of four of the early Ohio class SSBNs to carriers of a large number of cruise missiles and special forces. The second issue has to do with America's need for nuclear weapons and the future of its nuclear weapons-armed forces. Both a report by a special panel looking into that subject, and a commentary by Captain Bill Norris, a retired submarine officer currently at the Sandia National Laboratory. This subject is carried here because the Submarine Force is one of the nation's primary nuclear components, both with Trident missiles and with the continuing capability for carrying the Tomahawk nuclear land-attack missile—and it behooves all in our community to be aware of the national policy issues involved.

The fourth Feature is an update on the progress of the Submarine Centennial preparations and the many events which will take place—nationwide—in the year long observance.

There are, of course, many fine Articles, Discussion items, Reflections, Letters and Book Reviews in each edition of **THE SUBMARINE REVIEW** and we cannot comment on all of them

in this page, but there are several pieces in the April edition to which your attention is specifically recommended. Captain Mel Lyman's technical critique of "Crimson Tide" is important in correcting easy misconceptions and restating the great care taken with the entire process of nuclear weapon control in the SSBN force. Also don't miss Lieutenant Bob Koonce's piece about the real *generation gaps* which appear in age-constrained professional groups, such as in submarine wardrooms, and the importance in bridging them. This seems to be one of those essays which is about much more than the stated subject. There is also an excellent review by Captain Ralph Enos of Clay Blair's final work on the 1939-45 U-boat War in the Atlantic. Not only is the Blair book a milestone effort, but is one destined to be the starting point of many discussions in the world of submarines.

*Jim Hay*



## FROM THE PRESIDENT

The importance of the United States Navy Submarine Force Centennial celebration during the year 2000 can not be exaggerated. SecNav has designated the year 2000 to commemorate the collective history and heritage of the Submarine Force.

The Centennial will serve to recognize the personal sacrifices and heroic acts of the Submarine Force throughout the past century and acknowledge the important innovative technology advances made by American industry.

Many events and commemorations are planned as promulgated in the brochures which all of our member should have received.

The point to remember is that the U.S. Submarine Force is the organization being honored. And we, the NSL, along with the Submarine Veterans WWII and Submarine Veterans Inc. are working in full support of the Force.

The Chairman, Admiral Hank Chiles, and his committees are working diligently to ensure the many events and exhibits (including a large one at the Smithsonian) are both appropriate, publicized and well received.

There are many requests for support in this vital endeavor but I encourage each of you to consider, strongly in your support, especially:

1. The Centennial committee itself and the many events it is sponsoring.
2. The Cold War Memorial, to be located at Patriot Point in Charleston, South Carolina as most of us remember it was from Charleston in November 1960 that Jim Osbourne took GEORGE WASHINGTON to sea for the first SSBN deterrent patrol.
3. The Submarine Force Library and Museum in Groton, Connecticut. This, of course, has NAUTILUS, a superb exhibit and, the primary submarine historical archives.

### Admiral Hal Shear

The Nation, the Navy, and the United States Submarine Force has lost a man who had an immeasurable influence on every person and submariner whom he ever touched, as well as many who did not even know him. No one can match the eloquence of the eulogy for Admiral Shear which Ned Beach has written, and is printed later. And, no one can match the impact of personally having known, and answered to Hal Shear.

*Dan Cooper*



## A EULOGY FOR ADMIRAL HAL SHEAR

*by CAPT Edward L. Beach, USN(Ret.)*

Hal Shear was the finest man, naval officer, shipmate, comrade I have known. He had guts, enthusiasm, presence of mind, a never failing appreciation of the men and women working with him, or for him. He also had determination, an appetite for hard work, an inflexible determination to do things right. He stands among the great men this country has produced. Had the tocsin sounded in his direction he would have been ready, as he was for all the duties and trials that came his way.

I was once his commanding officer, and I know whereof I speak. One of an exec's duties is occasionally to lay a two-by-four alongside his skipper's head and thus help him do his job. If you have to do this, you do it tactfully, firmly, and with the utmost conviction. Once Hal gave his friendship, he gave it without reservation, and permanently—and the proof of his regard could well be in the size of the two-by-four and how he wielded it. This he did more than once for me, even while I was trying to boss him, and I'm the better man for it. I suspect many of those present on this sorrowful, respectful occasion could say something very similar.

One of the things driving military outfits like our Navy is we live by training, exercise constantly for readiness, and believe that somewhere in our organization there exists the Nimitz, or Halsey, or Spruance who will surface when and if they must and the need is there. Not to everyone is given the privilege of being at hand when the whistle blows hard, but in our naval history there have been those moments, and the men we needed were there. How else do we explain those giants, Nimitz, Halsey, and Spruance? And the others through our time? The answer, of course, is that they are always there. They are ready, and they need only to hear the call. Harold Edson Shear was one of those. It was not given to him to lead our fleet in glorious battle as did others, but had the bugle sounded in his direction we know exactly how he would have responded, for he was truly, as was said long ago about a famous knight, a man without fear and without reproach. We as a Navy, as a nation, are the better for his presence among us, and we join his devoted family in this sorrowful farewell.

Hal is of course well known to everyone in this room, and to

everyone of our Navy. He is also well known to his community of New London and Groton, of which he became an integral part. Even in the last years of his illness he came to the fore in the restoration effort for the old State Pier at New London, the same one we submariners knew as State Pier. Through Hal's efforts, and those of the entire community which he organized and led, it has not only been refurbished in condition and appearance, it has also been given a new life, serving the Port of New London/Groton and the entire Thames Valley as a newly viable port of entry for the peaceful commerce on which our nation was founded. In recognition of his contribution, State Pier has been renamed. It is now officially the Harold E. Shear Marine Terminal, known informally by the residents of the area as *Shear Pier*. For a man who spent his boyhood at the tip of Long Island, who grew up in Shelter Island, on the sea, fishing the local waters and then becoming one of our premier naval officers, nothing could be more appropriate. It is a lasting, and beautiful, contribution to the welfare of the entire area in which, man and boy, he has spent so much of his life.

This is most fitting to the man, for the times, these days, are parlous. We have impeached a President. Many of our citizens, many of those present, fear we may have reached a nadir of the political life of our country. Deep in the souls of most Americans, I am positive lies a wonder at how we could have descended so low, and we cry loudly that we must rise above this. If we do not, if this is not a nadir but instead a new and lower *norm*, the nation of which we have been so proud cannot long survive. Yet, we have had people among us, and will continue to have them, who have both the strength of mind and the strength of character to rescue us from the abyss. Hal Shear was such a man. So were those named in passing above and so was George C. Marshall, and millions of others. We have them. We have them still; but we must bring them forward. Can we here imagine how any of these would have handled the Presidency had he been in that office? Can anyone doubt that Hal Shear would have enriched it? Can anyone even conceive of him, or any of them, besmirching it? Even the nobility of Hal's past several years, his triumph over the vicissitudes of the body that finally brought him low—as they must, eventually, for all of us—show us that here was the type of man, or woman, for that matter, whom we must continue to find for the

high offices of the land.

We here, who have come to celebrate Hal's life, should also use this moment to rededicate ourselves privately to the improvement of our country, as he did. We should set our sights higher than they have been. We must clean up our national act. The ills we have agonized over for so long need to be measured against the example of the outstanding life just ended. We must not fail Hal, and the others like him who have marked our nation's path. They are exemplars for all of us. We must not let them down.

Hal, old friend, it is hard to say goodbye. You have been for us the most magnificent archetype one could imagine of everything a good naval officer, citizen, and patriot should be. And you have been more than that. You have followed the footsteps of the mighty, and have at the same time blazed your own trail. Never once has smallness, meanness, or indecorousness marked your path. We stand small in your greatness. Your family will miss you. Your friends will miss you. Your thousands of admirers will be saddened. The United States of America has lost one of its true stalwarts, and our Navy is diminished. Perhaps most important of all, you have shown all of us the true path of greatness. God speed, old man, and God bless! We'll not be long behind!■



## PENTAGON BACKS SUBS' POST-COLD WAR MISSIONS

by Ernest Blazar

*Mr. Blazar is a Senior Fellow at the Lexington Institute. He holds a Master's degree in National Security Affairs from Georgetown University's School of Foreign Service. He covered the Pentagon for the trade and national press for over ten years.*

**T**hough ten years have elapsed since the Cold War's end, the Pentagon still struggles to orient itself to changed circumstances. Long-held assumptions about what war would look like—armored divisions rolling across Germany's Fulda Gap and war on the high seas—have been jettisoned like the dozens of military bases and tens of thousands of service members deemed excess in today's global military environment.

Fashioned for a half century towards fighting a *high-end* war against the Soviet Union's mighty arsenal, the Pentagon is in the midst of figuring which of its *Death Star* weapons are worth keeping and improving upon in an age when not every enemy intends to fight along high technology's lethal frontier. Defining precisely what those battlefields of tomorrow will look like is a tough task. However, study after study issued by American military analysts have concluded that three main characteristics have emerged.

First, the United States will face no equally-equipped military power for, perhaps, a generation. No country can today afford to shoulder the financial and political burden of building and fielding a military force that matches America's in quantity and quality.

Second, notwithstanding the first, many nations are selectively equipping their militaries with widely available high technology. These countries do not seek to counter U.S. military crown jewel weapons—like stealth planes, aircraft carriers, airlifters and satellites—on a one-for-one basis. Instead, what potential enemy states are buying and fielding is specifically intended to blunt or defeat America's *high-end* military systems while freeing those nations from the costs of such weapons. For example, Iran need not design, build, launch, and man aircraft carriers and cruisers to challenge the U.S. Navy's dominance of the Persian Gulf. Instead, all that is needed is a string of anti-ship cruise missile batteries dug into bunkers along Iran's Western coast linked to an effective targeting and communication system—precisely what Iran fields and

improves upon today. Countries watched the 1991 Persian Gulf War and learned a lesson: do not match American strengths. Target its weaknesses.

Third, some potential enemies will seek to counter American military hegemony with low technology, like the 1998 twin truck bomb attacks on U.S. embassies, or with *weapons of mass destruction* like chemical, biological or nuclear bombs.

While these trends are clear, the Rubik's Cube circumstances in which they will manifest themselves is not. Consequently, military experts have tied them together with a ribbon prominently marked "Uncertainty".

It is with these conclusions and little else that the Pentagon tries to confront its future. What Cold War strategies, weapons and posture must be shed? Which can still be used, with modification, to win tomorrow's unknown battles?

Last summer, the Pentagon cracked one of these tough nuts. The nuclear powered attack submarine, a sophisticated weapon that helped keep the Soviet Union's Cold War naval ambitions checkmated, retains its relevance in the coming decades of uncertainty. In fact, a study dedicated to examining the utility of these undersea craft found they are going to grow in importance.

"(T)he emerging politico-military environment and the rapidly changing technology environment are such that the nuclear attack submarine will remain an essential and enduring element of our naval force structure," concluded the Defense Science Board, a group of uniformed and civilian military experts who give advice to Pentagon leaders.

"Technology advances and proliferation will make the submarine's stealth, endurance and mobility even more important attributes in the future as (naval) surface and air forces become more vulnerable." Read the report, titled *Submarine of the Future*.

The submarine's stealth, that is its ability to escape detection by operating quietly in a medium that defies penetration by most types of sensors, was a design feature demanded by the cat-and-mouse moves played out under the Cold War's seas. Specifically, it was needed when U.S. submarines were mainly dedicated to hunting, tracking and practicing how to kill Soviet submarines.

What the new Pentagon report says is that a submarine's stealthy advantages, built and honed for the Cold War, have great application across today's global military demands. This is not a case of *reinventing* the nuclear powered attack submarine's mission. Rather it is a recognition of the submarine fleet's inherent

wider usefulness now that it has been freed from the narrow band of missions to which it was dedicated during the Cold War.

That understanding of the submarine's use outside of strict Cold War missions began first to change at the start of the 1991 Persian Gulf War. Joining in the first strikes against Iraq on January 17, 1991, a number of U.S. submarines fired Tomahawk missiles against Iraq, for the first time proving the submarine's ability to apply significant tactical military power against land targets—a mission still in its infancy.

It is this submarine mission which the Defense Science Board report found for several reasons to offer the most promising area for continued growth.

First, the Navy's surface ships, in which the bulk of available Tomahawk land-attack missiles now reside, are at growing risk. That is because potential enemies are taking advantage of twin global trends. First, the information revolution is giving all nations growing access to the computer hardware and software needed to create greater technical awareness of their surroundings. Specifically, they are increasing their ability to detect, track and target U.S. military troops and gear.

One has only to recall American fears that Saddam Hussein would take advantage of widely available commercial satellite imagery to discover the American "left hook" maneuver at the outset of the 1991 Persian Gulf War. And that was almost a decade ago.

Secondly, the collapse of the Soviet weapons complex has spurred a jump in the number and quality of sophisticated weapons widely available for sale on the international market.

The Defense Science Board found that these trends will "reduce the effectiveness of surface ships significantly within 30 years, while leaving the [attack submarine] relatively immune to threat escalation".

Even in cases where surface ships are immune to attack, they may still be vulnerable to detection which may block such ships from launching surprise missiles attacks.

"In these scenarios, the (attack submarine) becomes the perfect launch platform," the DSB report found. "Its ability to sail within relatively close range of the target undetected furnishes it with a unique ability to gain the element of surprise." Also, a submarine's ability to get close to a hostile shoreline shortens its missiles' flight time, also reducing an enemy's warning time.

Does this mean that the Pentagon has found today's fleet of

nuclear powered attack submarines perfectly suited to all of tomorrow's threats? Hardly. The report found that the ability of today's submarines to handle post-Cold War missions is constrained by their Cold War design constraints.

The Defense Science Board recommended several design changes in the next planned generation of American submarines, most of which focus on broadening the array of weapons the submarine can bring to the fight. The lead ship in this new class would not enter service until at least 2020.

The most important of the proposals is for the Navy to abandon the practice of designing into its submarines very specific launchers for its weapons. The kind of weapon carried aboard a submarine is limited. The Tomahawk land attack missile, for example, can be fired through its vertical launch system, designed for Tomahawk, and also can be fired from a torpedo tube. But both VLS and the torpedo tubes are too small to allow submarines to fire larger weapons.

That is why the Defense Science Board urged the Navy to move away from such design practices. The next generation of submarine "should not have torpedo tubes, VLS tubes or other weapon specific interfaces with the water. It should have a flexible interface which does not constrain the shape and size of weapons, auxiliary vehicles and other payloads when they are used." The advisory report urged the adoption of the "bomb bay" approach, instead.

But that is a long way off. There are efforts underway now to modify existing submarines to increase their utility in the range of post-Cold War missions now gaining in importance. The Pentagon is examining plans to convert up to four Ohio class ballistic missile submarines, which carry long range nuclear weapons, into shorter range Tomahawk shooters.

Indeed, the Pentagon found in a recent report, Joint Operations Superiority for the 21<sup>st</sup> Century, that just such a craft could make big contributions in the opening hours of a strike, when it counts most.

"In the crucial early hours of a campaign, against high priority targets that are critical for an integrated defense by the enemy, covertness allows 'out-of-the-blue' strikes from unexpected directions," stated the report, also from the Defense Science Board.

"Such strikes maximize the chance that the enemy is in a lower state of alert, increasing the effectiveness of the strike and the potential for success. If the undersea missile launcher has been

positioned within range, the uncertainty involved in a strike is limited to missile performance against the targets and the effectiveness of (the enemy's) missile defense against an attack with no warning."

According to the Defense Science Board, it would cost \$1.5 billion to convert the four ships. Each could carry over 100 Tomahawk missiles and/or special operations troops.

Such a ship "could make a significant impact early, since it can be on station, ready to respond, without the need to first establish air or sea superiority," the report concluded. "The submarine could operate securely from most threats that pose a hazard to U.S. forces operating close to enemy shores; thus it can be present before hostilities break out."

Along with bringing its warload of missiles close to an enemy's coastline with only a small risk of detection, the submarine also is a unique platform for the delivery, support and recovery of special operations troops, mainly Navy SEAL commandos.

"It is only the submarine that offers the best chance for minimal detection during the insertion and exfiltration of such large numbers of special troops," said Reynaldo Maduro, president of Research Planning, Inc., a company that helps the Pentagon determine such matters.

"One can use other platforms for this task, but all carry a greater risk of detection—hence warning the enemy of your presence—than does the submarine."

The Pentagon's Science Board report noted also that global trends indicate that only submarines may be able to sail close enough to an enemy coastline to launch their missiles. That is because the report admitted the Pentagon is increasingly concerned about other countries' efforts to bar U.S. Navy entry into some areas. Specifically, it worries about "the development of layered defense systems that create an in-depth, anti-access barrier to naval operations in littoral areas and out to ranges of 1,000-2,000 miles from their shores."

In those cases, an Ohio class submarine outfitted with Tomahawk missiles may be used because such a concept "offers a high probability of surveillance penetration".

While the ultimate changes to the future submarine fleet remain to be decided in the years ahead, what is clear is that the Pentagon has endorsed the continued use of these craft in an array of missions far different than those conducted during the Cold War. ■

## U.S. NUCLEAR POLICY IN THE 21<sup>ST</sup> CENTURY

*by Robert Joseph and  
Ronald Lehman*

*Editor's Note: This summary of a recent panel's analysis and report on the future of America's need for nuclear-armed forces is reprinted with permission from Strategic Forum, number 145, published by the Institute for National Strategic Studies at the National Defense University.*

*Immediately following this summary of the panel's book-length report is a commentary by Captain Bill Norris, a retired submariner, who is currently at Sandia National Laboratory. THE SUBMARINE REVIEW asked Captain Norris, as one of the submarine community's most knowledgeable observers of nuclear force affairs, to provide these comments as a submarine focus. With U.S. submarines a prime nuclear-armed force it is most appropriate for our community to have the opportunity to review important policy analysis such as this.*

### Setting a New Paradigm

Recognizing the need for a fresh, long-term look at national security strategy and requirements, and specifically at U.S. nuclear policy in the 21<sup>st</sup> Century, the Center for Counterproliferation Research at the National Defense University and the Center for Global Security Research at Lawrence Livermore National Laboratory brought together a group of experts with extensive experience in security policy and military affairs.

The participants examined the broad trends in the international environment and considered how the United States could both shape and respond to them. A forward-looking paradigm for the nuclear dimension of U.S. security policy emerged that builds on the lessons of the past while addressing the opportunities and challenges of the future. The paradigm is based on five elements:

1. Sweeping positive changes have occurred. The bilateral *nuclear balance* that occupied center stage in the past no longer dominates the strategic calculations of the United States or Russia. Yet, there remains a continuing need for deterrence and for the retention of nuclear weapons as an essential component of U.S. national security strategy.

2. Nuclear weapons will remain part of the global security setting. The knowledge to build them will continue to exist; they cannot be disinvented. Even if the United States were to divest itself of its nuclear arsenal, other nations would be unlikely to follow suit. To the contrary, some states would gain incentives to retain or acquire nuclear weapons against a conventionally superior but nuclear-free United States. If nuclear weapons were somehow eliminated, a serious deterioration of the international environment could engender strong incentives for nuclear rearmament. A rapid and competitive race to rebuild nuclear arsenals could increase prospects for a devastating war.
3. In the changing security setting, the nuclear weapons infrastructure—broadly defined to include both the operational forces and the development and production capabilities that can bring new forces into being when needed—takes on a heightened strategic prominence. This will require a greater attention to adaptation and reconstitution.
4. Increased engagement with Russia and China is required to foster a broader set of relationships and to strengthen the stability of nuclear postures. The dynamics and substantive focus of these relationships should be different from the past. As our relationship with Russia matures, we should be able to approach security concerns more directly and find common ground to further strengthen our joint and separate but not conflicting interests. One approach that could benefit both states is consideration of sharing early warning data and technologies—improving their warning network and improving our missile defense capabilities. At a minimum, we should divorce ourselves from the past policy of mutual vulnerability, a policy built on distrust and Cold War insecurities that continues to inhibit normal relations. Both states must look to the future.
5. The paradigm recognizes that the fundamentals of deterrence have not changed: effective deterrence will continue to depend on both real capabilities and the perception of a national will to respond to aggression. The participants concluded that they could place no credence in virtual deterrence. At the same time, there is an opportunity and need for a more balanced relationship among the three traditional elements of deterrence—retaliation, denial, and dissuasion.

## Judgments

Turning to the principal judgments of the study, the project participants reaffirmed that certain basics are enduring. Yet, the study contains much new thinking about how to pursue national security objectives, as well as new ideas on issues as diverse as the nuclear weapons infrastructure, stockpile maintenance in the absence of testing, and arms control.

**Nuclear weapons will remain indispensable to U.S. security.** The threat of war between the United States and Russia has been greatly diminished. The motives and capabilities of our former opponent have changed fundamentally. The results of these changes are apparent in the radical restructuring of U.S. conventional and nuclear forces. Nevertheless, the world remains uncertain and dangerous. In this context, U.S. nuclear weapons serve to protect against an uncertain future with Russia and China, states that continue to value nuclear weapons for both political status and, in Russia's case, to overcome what it sees as a growing conventional inferiority. In fact, nuclear weapons appear to play a growing role in the security policy of Russia, both in declaratory statements and defense planning. The retention of between 10,000 and 15,000 (and perhaps many more) theater nuclear weapons, the recent deployment of the SS-27 ICBM, and a continuing investment in its overall nuclear infrastructure, especially hardened command and control facilities and the extensive nuclear weapons production complex, are expressions of the importance assigned to these weapons by Russian leaders.

The new circumstances associated with the spread of chemical and biological weapons, as recognized in national guidance, have expanded the role of nuclear weapons to deter such use. The group concluded that U.S. nuclear weapons do play an important role in deterring the use of NBC weapons against U.S. forces and allies by regional and rogue states. States such as North Korea and Iran do not seek nuclear weapons because the United States has nuclear weapons. Rather, the motives for acquiring weapons of mass destruction are numerous and overlapping, ranging from status and regime survival, to use as tools of aggression against neighbors, to using them to overcome the U.S. conventional superiority.

Finally, nuclear weapons have also formed an indispensable basis for achieving stability through extended deterrence and remain important to assure friends and allies that their security is

linked as fully as possible to that of our own. As with the United States, the overall threat to most allies has declined. Yet, from Japan and Korea in the Far East, to Germany and other NATO allies in Europe, U.S. nuclear weapons continue to reassure allies, provide stability, promote peace and, by reducing incentives (or eliminating the need) for others to acquire nuclear weapons, contribute to nonproliferation goals.

**The U.S. nuclear deterrent force must be structured to counter existing and emerging threats.** The U.S. nuclear posture today can be different from the past when the United States faced a much larger and more immediate threat. However, certain attributes and capabilities of the nuclear deterrent must be enduring if the United States is to be perceived as having the capability and will to meet the security challenges of the future.

To achieve a stable deterrent, experience has demonstrated that the nuclear force must possess certain fundamental characteristics: the force must be safe, secure and reliable; it must be responsive to political control and effective against the potential targets contemplated in the strategy; and it must be survivable so that no adversary perceives vulnerabilities to exploit. To meet these requirements, the United States should retain the TRIAD of bombers, land-based ICBMs and sea-based SLBMs. Elimination of any one leg would weaken deterrence. The TRIAD remains valuable for the same reasons it always has: the synergy of its elements provides flexibility, enhances survivability, and complicates defenses, thereby strengthening deterrence. Diverse basing and penetration modes also provide a hedge against a technological breakthrough by an adversary or the discovery of significant material problems with any one system.

While the participants reached consensus on almost all of the operational assessments, including needed improvements to command and control capabilities and greater adaptability in planning, there was a difference expressed on theater nuclear issues. Although all supported the principle of extended deterrence, some questioned the need for shorter-range delivery systems insofar as the TRIAD could meet all targeting requirements. Most, however, felt strongly that to support regional deterrence the United States must retain, now and in the future, shorter-range systems, including dual-capable aircraft and sea-launched, land-attack missiles.

The participants also emphasized the need for high level attention to future organizational and readiness issues, broadly

defined. With the end of the Col War and the curtailment or cancellation of virtually all modernization programs, nuclear force matters no longer demand the continuous involvement of senior leaders. Current reorganization schemes within the Department of Defense leave it unclear which, if any, organization is the focal point for nuclear issues, and this lack of focus will be detrimental to readiness.

Continued downward trends in emphasis on U.S. nuclear weapons are forecast to result in critical shortfalls in the areas of planning, weapons technical issues, command and control, and operational test and evaluation. In addition, career military personnel today generally view the nuclear career fields as being out of the mainstream and having uncertain futures, posing significant obstacles to recruiting and retaining the necessary nuclear expertise. While the DoD and the Services are cognizant of these factors, it is imperative that senior-level attention be given to these issue today to avoid critical deficiencies in nuclear expertise in the future.

A confluence of factors is leading toward a greater role for denial capabilities in the U.S. deterrent strategy. Included in the concept of denial are diverse capabilities such as active and passive defenses, as well as counterforce actions that deprive the enemy the benefits of his weapons. Given the growing ballistic and cruise missile threat, coupled with the proliferation of nuclear, chemical and biological weapons, missile defenses are at the core of denial. The participants concluded that, in addition to defending U.S. forces and allies, the United States requires an effective missile defense against the emerging threat from rogue states armed with long-range missiles. In this context, the United States must pursue defenses of U.S. cities and population with the ability to protect against at least several dozen reentry vehicles.

On the technology side, the report concludes that it will be feasible to field effective systems, although considerable testing remains to be conducted before any particular system can be designated as ready. On the policy side, the project participants emphasized the need to move away from a policy that accepts the total vulnerability of our society to missile attack. Emphasizing mutual vulnerability has a corrosive effect in political dealings with Russia and impedes better, more normal relations. Moreover, avoiding mutual vulnerability relationships with other states and developing and deploying effective defenses against such smaller-scale attacks would enhance deterrence.

The U.S. nuclear deterrent infrastructure must be capable of maintaining current forces, and must be sufficiently adaptive to provide new capabilities when required. This judgment is based on an in-depth assessment of the weapons infrastructure which plays an essential role in deterrence. A strong, flexible and responsive infrastructure is essential to make clear to potential adversaries that the United States could respond to any emerging threat, even with new forces if necessary, and more rapidly than the threat could be mounted.

One major problem identified in the report is the existing piecemeal approach to planning and funding for the deterrent infrastructure. The DoD lacks an overall roadmap to set priorities and guide actions to ensure confidence in the future of the infrastructure, up to and beyond the lifetime of currently deployed systems. The participants strongly recommend creating such a roadmap.

Retaining the safety, reliability, security, and performance of the nuclear weapons stockpile in the absence of underground nuclear testing is the highest-risk component of the U.S. strategy for sustaining deterrence. Critical factors affecting the stockpile include the known and unknown effects of aging, diminished diversity in weapons types, difficulties in maintaining expertise, and, most important, the prohibition on underground testing. The group concluded that the Stockpile Stewardship Program is the minimum effort required, and itself remains a high-risk endeavor as a result of an inability to validate the conclusions by nuclear testing, and the need for sustained funding. Moreover, unlike that of Russia, the U.S. manufacturing complex can no longer support the serial production of nuclear weapons. As a result, there is no immediate hedge against the failure of an individual type. This risk can be mitigated by retaining selected types withdrawn from the active stockpile as a form of *virtual manufacturing*.

## Conclusions

- Nuclear weapons will continue indefinitely to play an indispensable role in U.S. national security policy: as a hedge against uncertainties, to deter potential aggressors who are both more diverse and less predictable than in the past, and to allow the United States to construct a more stable security environment. Recent nuclear tests by India

and Pakistan make it clear that nuclear weapons remain part of the security setting. The aggressive pursuit of nuclear, biological, and chemical weapons by states such as Iran and North Korea underscores the role of deterrence as a central component of U.S. security strategy.

- The United States requires a credible nuclear deterrent posture, broadly defined to include forces-in-being; capabilities for weapon system design and production; and the ability to assure the safety and reliable performance of the nuclear stockpile—a fundamental challenge in the absence of underground testing. Because this posture must be both adaptable and responsive to new threats, the national deterrent infrastructure must be treated as a strategic resource. The posture must also incorporate a greater role for defenses in future deterrence calculations. All of this requires trained and motivated people, as well as new ways of thinking and considerable agility and foresightedness on the part of U.S. leaders.
- A nuclear force that is not backed by the perceived ability and willingness to maintain and, when necessary, reconstitute important elements will increasingly be seen as hollow. The decisions and actions that the United States takes concerning the total force posture in the years ahead will influence decisively how both allies and adversaries perceive the credibility of the U.S. deterrent. In turn, this holds important implications for the overall capacity of the United States to shape the security setting at the outset of the new millennium and to provide for the nation's defense in a world of change and turbulence.

### **Recommendations**

- People are the *sine qua non* for the maintenance of a safe, secure, and effective deterrent force. If present trends continue, it will become increasingly difficult to attract and retain the people needed to build, operate, and maintain the nuclear deterrent forces. Therefore, the Departments of Defense and Energy—in cooperation with the national laboratories, relevant industries, and universities—should develop a program to ensure that personnel with critical skills in nuclear weapons planning, operations, design, production, and maintenance are retained, and a suitable successor generation is developed before these key skills

atrophy.

- The Department of Defense should prepare a long-term plan encompassing specific needs for future U.S. nuclear weapons, delivery systems, and the supporting infrastructure. A senior official within the DoD Acquisition structure should be given overall responsibility for implementing such a plan, and for coordinating nuclear matters within DoD and with the Department of Energy as well as other appropriate agencies.
- Missile defenses will be of growing importance in the years ahead. The United States must be able to deploy effective defenses in regions with important interests and allies, as well as a national missile defense against the growing threat to the United States itself. Increasingly capable missile defenses can and should be deployed as a central component of deterrence. The United States should engage Russia on cooperative efforts to address mutual interests in this area, including early warning, while avoiding the pitfalls of destabilizing proposals such as *de-alerting*.
- The U.S.-Russian arms control approach needs to be transformed. That approach, which focuses primarily on mechanically reducing the number of deployed strategic weapons, conceals important imbalances in total nuclear postures. A more sound approach is needed, one that recognizes that different nuclear weapon states require different deterrent forces. As part of this transformation, the policy of the United States should recognize that holding our society totally vulnerable to nuclear attack is not in the security interests of the United States or Russia, but rather inhibits the positive evolution of our long-term relationship.
- Retaining the safety and reliability of the nuclear weapons stockpile in the absence of underground testing is the highest-risk component of the U.S. strategy for sustaining deterrence. The Stockpile Stewardship Program is the minimum effort required and itself remains a high-risk endeavor. To hedge against this risk, and the erosion of the U.S. weapons manufacturing complex, the United States must be prepared to resume underground testing if necessary and should retain selected weapons types withdrawn from the active stockpile.■



## U.S. NUCLEAR POLICY IN THE 21<sup>ST</sup> CENTURY

### A Commentary

*by CAPT William L. Norris, USN(Ret.)*

One of the positive things about the environment today is that we are beginning to see more dialogue on what is the rightful position for nuclear weapons in our national strategy. Even with the debates leading up to the Nuclear Posture Review (NPR), the Quadrennial Defense Review in 1996 and the Comprehensive Test Ban Treaty (CTBT), most of the dialogue was carried on in the corridors and back rooms, and on a non-attribution basis. Now we are beginning to see something for the record. This recent publication, co-sponsored by the Center for Counterproliferation Research at the National Defense University and the Center for Global Security Research at Lawrence Livermore National Laboratory joins several other efforts, such as those of the National Academy of Science, Admiral Hank Chiles' nuclear infrastructure review for Congress, General Larry Welch's review of nuclear defense posture for DOD and the Rumsfeld Report on National Missile Defense issues in making some of the key nuclear issues more visible.

Before I get into my critique, let me open by saying that I found this report an excellent summation of many of the issues that our nation faces in properly setting its nuclear weapons course. The organization, a fairly lengthy executive summary followed by more details in the four focus areas of the report, makes it a reader friendly document. The forty-two page executive summary will be sufficient detail for most of us, but the four subsequent chapters on each of the focus areas (Nuclear Strategy and Policy, Operations, DoD Nuclear Infrastructure and The Nuclear Stockpile) allows the reader who wants more depth and some insights into the conclusions of the authors. For submariners, it reinforces the vital importance of our SSBN force in the nuclear deterrent equation, but unfortunately gives mixed signals for the nuclear Tomahawk.

The nearly thirty key judgements made are anchored around the first, nuclear weapons will remain indispensable to U.S. security. Even though I agree, it is not a popular precept in this era where the abolitionists are trying to hold us to the letter of the Nonproliferation Treaty, the supporters of the CTBT believe and advocate that there will be no new nuclear weapons and the budget is a shrinking, zero sum game. It is also interesting to note that the

study group's work, which supports this conclusion, was done prior to the nuclear tests last summer conducted by Pakistan and India.

What else might we think about or question as we read this document? First, I guess we need to say that the authors/participants are much like the recent movie, "The Usual Suspects." The participants are, in the main, military officers, government officials and national laboratory employees (from only one laboratory—you may detect a bit of *pique*) who are expected to espouse these views. While that doesn't invalidate their findings, it may not carry the weight of a more widely based group of participants.

Second, the four focus areas, especially the last two, were not sufficiently integrated to avoid some self-conflict. This is especially true as related to non-strategic forces (as noted above). This may be due to the fact that the participants believed they were restricted to the present stockpile since many would prognosticate that new weapons cannot be developed because of the CTBT or our own political constrictions (real and imagined). It may also be due to the fact that the major operations input appears to be STRATCOM, where their thinking is more geared to strategic forces. If you limit yourself to today's world and non-strategic systems, it is hard to question their thinking.

However, I would have liked them to take their thinking further beyond new platforms and into how we might develop new weapons systems from existing systems (as we have done with the B61-11 earth penetrator for strategic systems). Otherwise this will be a self-fulfilling prophecy. That may not be all bad if we believe that there will always be sufficient strategic assets to maintain our deterrent posture. Or if we don't mind being the world's policeman by ourselves. Somehow, I was always comforted by the thought that NATO might deliver its nuclear response multi-nationally. However, non-strategic nuclear weapons are systems without an advocate and without some overarching policy direction they will soon perish.

Third, I would like to have had the concept that new weapon development or modification of existing weapons be accepted and expected more strongly emphasized. There are several passing comments to this effect, but in general this report tends to place emphasis on replacement platforms instead. The NPR advocated the development and prototyping of new nuclear weapons, but this recommendation was diluted and lost by a parenthetical statement

placed at the bottom of the slide to placate those who might have believed the NPR to be a vehicle to support a larger nuclear force. This statement, "No new nuclear weapons required" was meant to reflect that specific moment in history and was so embellished at the formal briefings for the Secretary of Defense and the President. But, there was no permanent history of the NPR, and the intended meaning has been lost to the strict interpretation that "what you have is what you have." We must break this mold so that our future systems are optimized in all respects.

Fourth, there is little mention of war fighting in a WMD environment. No one wants to fight in full protective gear in a chemical and biologic attack and its aftermath. But we are probably better prepared to do that than after an electromagnetic pulse, as might occur from an exo-atmospheric nuclear explosion. Budget has forced non-nuclear forces to eliminate the hardening requirement for their electronics. We must ensure that our successor communications systems for nuclear command and control are not forced, or allowed, to also be so restricted. What better employment could a small nuclear power make of its very limited resources?

Last, budget is ignored as a reality. The first three focus areas make almost no mention of this as a constraint and thus, appear more as wish lists than well thought out plans. The last focus area suggests that nearly a 50 percent increase is necessary in the DOE weapons budget to support Science Based Stockpile Stewardship. While I must admit that I always questioned how DOE developed their numbers to justify their claim that they could maintain the stockpile forever for \$4B including inflation (now \$4.5B), this claim did stop the DOE budgetary free fall. DOE must better identify the resources it needs. But it must come from a top down look at the real science and facilities DOE needs to maintain a stockpile size that could be as little as one third or one fourth of its peak size, and not just a number from a hat. Fifty per cent more may be the correct answer, but it is presently unsupported.

I have not spent time telling you what I agree with, but you should assume the majority. This report is an excellent primer for the initial schooling of all those (including submariners) who are interested in this discipline or will formulate our future nuclear policy. As this report points out, nuclear policy and planning is an area of expertise that we are not maintaining. It is an area that needs an infusion of new thinking and new people. If we leave it to others, they will take the mantle as well as our forces.■

## 2000—THE SUBMARINE CENTENNIAL

### Part III

*Status Report by  
ADM Hank Chiles, USN(Ret.)  
and CAPT Dave Cooper, USN(Ret.)*

Fundraising packages have been mailed to the entire NSL membership and corporate benefactors. We need your ideas for people or businesses that may have been overlooked in our initial mailing. This list is a work-in-progress, do not be shy about suggesting donors or sponsors.

Pledges and contributions. To date we have received pledges of about \$1,600,000 in corporate donations with initial contributions of over \$500,000 from Lockheed Martin Corporation, General Dynamics, McDermott/BWX Technologies and Newport News Shipbuilding. These contributions have allowed us to sustain our momentum on several key programs. However, our total budget is \$4.4 million dollars.

Fundraising Success Story. The individual response from the NSL membership is heartwarming. Of the first 300 responses, over 90 percent were for \$100 or more. It has been a push to keep up with the mailing of donor gifts to recognize your generosity.

Recognition to General Dynamics as the first Corporation to make a donation and to Lockheed Martin Corporation for their most generous pledge which has not been equaled !!! (Yet)

Centennial Events. The list continues to grow as we learn about new planned events around the country. Let us know if your event did not make the list.

Active Duty Forces are working on a variety of events for the Centennial year. They also are pursuing a Centennial jack to be displayed on all inport submarines.

Smithsonian Exhibit. Our efforts to place a display in the Smithsonian National Museum of American History are moving *ahead full!* The Museum continues to be enthusiastic. John Shilling has arranged to get the attack center, berthing spaces, mess hall, sonar room, and maneuvering room (declassified) from TREPANG and SAND LANCE. The Smithsonian is proposing to run the Exhibition for three years.

**Submarine Monument.** Work continues on the Submarine Memorial and we will see a clay maquette very soon. There are several good possibilities for locating the statue that we are pursuing. We have changed the Memorial from the three figures to a submarine rising from the deep. This change halves the cost of the bronze work to about \$150,000. We are still working on the final design and cost of the base.

**Submarine Stamp** remains an open issue. We believe there is a strong likelihood that we will have more than one submarine-related stamp issued in the year 2000. Representative Gejdenson's H.R. 229 that calls for a submarine stamp has 158 signatures and his staff expects to re-issue the resolution in the new Congress. The California State Legislature and a chapter of the Sons of the American Revolution are also sponsoring similar resolutions.

**Pasadena Rose Parade.** We have written and talked to personnel organizing the Rose Parade for the year 2000. We are pleased to announce that the 101 member U.S. Navy Band of Washington, DC augmented by side-marching submariners (possibly from USS PASADENA) and a Submarine Centennial banner will be in the parade.

**USNA.** The USNA Dolphin Club has gotten approval to sponsor one of the Academy's ocean racers for 1999. The Capital Chapter of the Submarine League is working with them to decorate the sail set with the Centennial logo.

**Dolphin Scholarship Foundation** is naming a year 2000 scholarship recipient as a Submarine Centennial scholar and naming other scholarships for our principal Centennial donors.

**Submarine Centennial Cruise** around the Caribbean is being organized for January 2000. See the advertisement in this issue of the Submarine Review.

**Publicity Campaign.** Commander James Taylor is the PAO Reservist on active duty to man the Centennial Liaison Office. He is currently developing a Media Support Kit that will be available to interested parties.

It continues to be a successful and prosperous year. We have laid the foundation for a meaningful commemoration and look forward to a more successful 1999. Your ideas and comments are needed and gratefully appreciated.

**Email Addresses and Phone Numbers.** We can be reached by email at [subcentnel@aol.com](mailto:subcentnel@aol.com) or by phone at 703-256-0891.

**U.S. SUBMARINE FORCE  
100<sup>TH</sup> ANNIVERSARY CELEBRATION EVENTS**

**Bold Items-Flagship Events**

<b>Date(s)</b>	<b>Event</b>	<b>Sponsor</b>	<b>Location</b>
23 Oct 99	USS O'KANE (DDG 71) Commissioning		Pearl Harbor, HI
01 Jan 00	Rose Bowl Parade	CSP	Pasadena, CA
16-23 Jan 00	Submarine Centennial Cruise	NSL	Caribbean
01 Feb 00	Smithsonian Exhibit Opening	N87/NSL	Washington, DC
01 Mar 00	SUBLANT Submarine Birthday Ball	CSL	Norfolk, VA
01 Mar 00	Seafood Festival	Pt Canaveral	Pt Canaveral, FL
TBD Apr 00	Washington Birthday Ball	N87	Washington, DC
TBD Apr 00	Submarine Stamp Unveiling	N87	Washington, DC Groton, CT
01 Apr 00	Dedication of Deterrence Pk	CSG 9	Bangor, WA
01 Apr 00	Tolling of Boats	USSVI/SV WWII SD Chap.	San Diego, CA
01 Apr 00	Submarine Exhibit Opening	Intrepid Museum	New York, NY
TBD Apr 00	Pearl Harbor Birthday Ball	CSP	Pearl Harbor, HI
TBD Apr 00	SUBGRU 2 Submarine Birthday Ball	CSG 2	New London, CT
TBD Apr 00	SUBGRU 9 Submarine Birthday Ball	CSG 9	Bangor, WA
TBD Apr 00	CSS 11 Submarine Birthday Ball	CSS 11	San Diego, CA
TBD Apr 00	SUBGRU 7 Submarine Birth- day Ball	CSG 7	Yokosuka, Japan

TBD Apr 00	SUBGRU 10 Submarine Birthday Ball	CSG 10	Kings Bay, GA
TBD Apr 00	USNA Submarine Birthday Ball	USNA	Annapolis, MD
TBD Apr 00	USS THRESHER Memorial Ceremony	CSL	Norfolk, VA
TBD Apr 00	Azalea Festival (NATO Event)	CSL	Norfolk, VA
01 Apr 00	Dedication of Granite Memorial	Subvets, Inc./- Subvets WWII	New Suffolk, NY
01 Apr 00	Blessing of the Fleet	Navy Memorial	Washington, DC
10 Apr 00	USS THRESHER Memorial Service	USSVI, Southern Tier NY Base	Endicott, NY
14 Apr 00	Centennial Navy Base	Great Lakes Com	Great Lakes, IL
15 Apr 00	Vallejo Submarine Birthday Ball		Vallejo, CA
01 May 00	SUBPAC International Submarine Visit	CSP	Pearl Harbor, HI
01 May 00	USS SCORPION Memorial Ceremony	CSL	Norfolk, VA
01 May 00	Beach Fest	CSL	Pt Canaveral, FL
3-6 May 00	North Central Region Subvets WWII	Subvets, WWII	Minnesota
13 May 00	Maritime Museum	Subvets WWII	Manitowoc, WI
13 May 99	USS PASADENA Salute, Ritz Carlton	CSS 11	Pasadena, CA
29 May 00	Cross and Flag Memorial Day Service	City of Fullerton	Fullerton, CA

31 May 00	THRESHER/SCORPION Memorial Dedication	USSVI/SV WWII LA Chap. NWSF	Seal Beach, CA
01 Jun 00	SUBLANT International Submarine Visit	CSL/NSL	NSL Symposium
1-2 Jun 00	NSL Annual Symposium	NSL	Alexandria, VA
2-9 Jul 00	New York International Navy Review	CSG 2	New York
01 Aug 00	San Diego Fleet Week	CSP/CSS- 11	San Diego, CA
01 Sep 00	Naval Institute Annual Symposium	N87/CSL	Norfolk, VA
01 Oct 00	Pittsburgh Fleet Week	CSG 2	Pittsburgh, PA
01 Oct 00	Broward Navy Days	CSL	Ft. Lauderdale, FL
05 Oct 00	SSP 45 <sup>th</sup> Anniversary	SSPO	Washington, DC
16-20 Oct 00	Subvets National Convention	USSVI	Atlantic City, NJ
11 Nov 00	Veteran's Day Parade	Subvets WWII	Long Beach, CA
15 Nov 00	Cold War Submarine Memo- rial Dedication—Patriot's Point	CSG 10	Charleston, SC
02 Dec 00	Army/Navy Football	N87	Maryland???
07 Dec 00	Tolling of Bells	Subvets WWII	USNA

**SUBMARINE CENTENNIAL CELEBRATION**

## To Our Major Contributors

Lockheed Martin Corporation

General Dynamics

McDermott/BWX Technology

Newport News Shipbuilding

Kollmorgen/Electro Optical

Marine Mechanical Corporation

CAE Electronics, Inc. • Sargent Controls & Aerospace  
Analysis & Technology

Cortana Corporation • Material Systems, Inc

Many thanks for your support in this important  
and historic endeavor



United States Navy  
**SUBMARINE FORCE**  
Centennial Celebration 1900-2000

## CRIMSON TIDE: THEY GOT IT ALL WRONG

by Mel Lyman

The Johns Hopkins University

Applied Physics Laboratory

**I**t made for great drama—a tyrannical commanding officer believes he has authorization to launch his Trident missiles while his executive officer is ready to support mutiny in his belief that such authorization may no longer exist. There is confusion over what the rules of engagement are for an SSBN involved in nuclear warfare. Tension, stress, theater! At the end, the American public is reassured that all will be okay because, as a subtitle tells us, starting in 1997 new codes will be implemented on submarines to preclude such an event. Two experienced FBM submariners are listed as *Technical Advisors* to lend an aura of credibility to all of this.

Well, it doesn't work that way and never has. This article will address a highly classified topic in an unclassified venue by attempting to explain how command and control really works on board a unit of the nation's premier strategic deterrent force. Much has changed since the Berlin Wall came down, since the U.S. Strategic Command (USStratCom) stood up, and since the nuclear posture review was published. However, the fundamental concept would be familiar to anyone who served in SSBNs in the 1960s.

### **Background**

Nuclear command and control procedures are those methods used to ensure that actual nuclear weapons, submarine launched ballistic missiles in this case, are only fired upon receipt of authorization from the National Command Authority—and to ensure that any such authorization is real. Similar procedures apply to other nuclear weapons such as the Tomahawk Land Attack Missile (Nuclear) and the U.S. Air Force's ICBMs.

Whatever system is used, it has to apply simultaneously to all U.S. nuclear delivery vehicles since one could reasonably assume that the President might only have time to approve a single message to retaliate against a disabling strike. That message would have to implement all phases of the American response without ambiguity

while still being as short as possible.

At the same time, the system would have to have built-in safeguards that would preclude anyone else from sending a false message; and which would provide recipients with absolute assurance that the horror they were about to inflict on the world was properly authorized at the highest level of the U.S. Government.

Out of these requirements evolved the Emergency Action Message system. The message contains values that decode to topics such as the U. S. forces involved, the nations and targets designated for attack, and a coordinated strike time. The message also contains a sealed authenticator system (SAS) value that must match, bit for bit, a sealed authenticator held under two person control on board the SSBN.

Prior to October 1997, if the message were exact in format, if all the appropriate decodes worked, if the sealed authenticator matched, and if the message made sense in the context in which received, the commanding officer would announce on the IMC, "Set condition ISQ for strategic launch<sup>1</sup>, the release of nuclear weapons has been directed." The executive officer would make a similar announcement on the sound powered telephone system and strategic weapons personnel would have had to hear both announcements in order to comply with the "Set ISQ" order. For exercises or test missile launches, different words are used. There is no *drill* that involves stating that nuclear weapons are released.

The commanding officer and his team have always been charged with ensuring that missiles would be launched only if the team was assured that the release was authorized, that the missiles released were for the right targets, and that all was in accordance with the strike timing.

SSBNs did not have a permissive action link or PAL system as did other U.S. systems. PAL, or its variants, is a system that locks weapons or launchers with a *combination* that must be sent to the launch site (silo, aircraft, ship, etc.) and entered into the system there. The idea of such a system was to preclude the two people on duty, or the pilot and co-pilot, from starting World War III on their own. SSBN force personnel argued successfully for

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<sup>1</sup>Condition ISQ is the highest condition of readiness for an SSBN. "ISQ for strategic launch" may only be set with Presidential Authorization and is the subject of several safety rules. "ISQ for (exercise name)" is passed at other times.

years that the complexity of a submarine missile launch and the necessary involvement of many people made PAL, or something similar, unnecessarily redundant.

### Fail-Safe and Risk Reduction Commission

In 1992, following separate initiatives by Senator Sam Nunn (D-GA) and by President George Bush, the Fail-Safe and Risk Reduction Commission was created under the chairmanship of Ambassador Jeanne Kirkpatrick and the deputy chairmanship of Admiral R. L. J. Long, USN(Ret). The Commission was charged with reviewing all U.S. nuclear weapons systems and the supporting command infrastructure in light of the end of the Cold War. It was to see if procedures, equipment, and systems that made sense at the height of our face off with the Soviet Union still made sense in the very different world with new geo-political realities.

The Commission's findings were extensive and thorough. For SSBN strategic weapons systems, however, they were few. The most dramatic recommendation, from the SSBN perspective, was to lock up a critical component of the SSBN strategic weapons system in an on-board safe to which the crew would not have access. At time of launch authorization, the combination would be provided from an off-board source. Although, this sounds very much like *install PAL on SSBNs* to those who are not familiar with the workings of a PAL system, there was no requirement to lock individual weapons or launchers, only a critical component of the system. This difference makes this a form of *Use Control* and not PAL. In summary, what the recommendation essentially said was to "install a use control device on submarine launched ballistic missile systems such that it takes a message from an outside source to employ it."

Secretary of Defense Cheney endorsed the findings of the Commission and directed compliance. President Clinton, after the nuclear posture review, issued a Presidential Decision Directive which, among other things, moved the requirement to implement the Commission's recommendations from a SecDef letter to a Presidential directive.

The change from *not having* use control on SSBNs to *having* use control requires some explanation—after all, the Navy had successfully argued against that for years. First, there is the issue

of the end of the Cold War. The Commission's responsibility was to ensure *Fail-Safe and Risk Reduction* and they were willing to have the SSBN Force stand a little further back in the fox-hole if, by so doing, the risk of nuclear war was acceptably reduced without giving up a credible nuclear option<sup>2</sup>. Further, employment of a use control system meant that a second set of external values enabling launch (the original sealed authenticator plus the new use control unlock combination) would give the commanding officer and his team greatly increased confidence in the validity of the launch order. The sealed authenticators and use control unlock values are created, distributed, and installed by separate activities along independent paths and the values are not co-located anywhere in the system except at the top command echelons. Note that these two reasons at no time discuss preventing a *rogue crew* from launching. The *rogue SSBN crew* argument was reviewed by the Commission and determined to be as fallacious now as it was during the Cold War.

### **Implementation**

Within the Navy, the Director Strategic Systems Programs (DIRSSP) was tasked with implementing the Presidential Decision Directive. A study showed that several requirements had to be met for whatever use control system was eventually employed. With the system in place, we had to be able to:

- do routine testing and maintenance of the weapons system both underway and in port;
- launch test missiles while still carrying tactical missiles as is done during Follow-on Commander-in-Chief Evaluation Tests;
- inventory keys and components at exchanges of command and at other required times;
- jettison a missile if a casualty mandated such an extreme action;
- make it applicable to both the Trident I and Trident II

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<sup>2</sup>Note that this was favorably endorsed by both the Bush and Clinton Administrations.

systems;

- not impact the length or format of the current emergency action message;
- not delay the launch; and
- ensure that the traditionally high weapons system reliability of the fleet ballistic missile was not diminished.

Additionally, since any system developed would be a U.S. only program and because the Trident II Weapons System has been bought by the United Kingdom, any design decision could not impact common equipment used by both countries.

Out of all this came the current SSBN use control system which was installed in every SSBN during the summer of 1997 and fully implemented on 1 October of that year.

The key component was determined to be the Commanding Officer's key (the Captain's Indicator Panel or CIP Key<sup>3</sup>). That key, previously stored in the two-man control SAS safe, was moved to a new safe. The new container has two combination locks, both set with identical combinations, either of which can cause the safe to open. This ensures that there is no impact on system reliability should one lock fail. The combination to these locks is set by a shore based team which is split into two groups. Each group knows only half of the combination, such that at no time is the full combination known to the entire team. With assistance from the National Security Agency, processes were developed so that the SSBN crew could derive the use control combination using the PAL value sent in the emergency action message. Further details are above the classification level of this article.

## Summary

Now, if a real emergency action message is ever received by an SSBN, the additional step of deriving the unlock values to open the safe and get the key will proceed in parallel with other operations. Seeing the Presidential authenticator (the sealed authentication system is unchanged) and obtaining the CIP key (meaning that the

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<sup>3</sup>\*ACIP Key\* for readers more familiar with the original Forty One for Freedom design.

proper combination was transmitted) provides the command and control team with two independent assurances that the message is real.

The system has been in operation for over a year. Exercises and Follow-on CinC Evaluation Tests have been conducted with the system working as designed. While one hopes that the system will never be used for real, the extensive testing provides the confidence that it would work as designed.

So *Crimson Tide* didn't get it right. I never met an SSBN commanding officer who was not fully aware of the nuclear rules of engagement—and I also never met one who took his Jack Russell terrier to sea.■

*Mel Lyman, (Captain, USN(Ret.)) is the Special Weapons Safety and Surety Program Manager at the Applied Physics Laboratory. He appreciates the contributions his deputy, Paul Hardy (Lieutenant Commander, USN(Ret.)), made in editing this article. Both are experienced submarine officers.*

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## **IN MEMORIAM**

CAPT Joseph W. Beadles, Jr. USN(Ret.)

ADM Harold E. Shear, USN(Ret.)



## BRIDGING THE GAP

by LT Robert A. Koonce, USN  
Engineer Officer, USS CHICAGO

*Editor's Note: Lieutenant Koonce's paper won The Naval Submarine League Essay Contest for Submarine Officer's Advanced Class 98070.*

Poor junior office accession and retention is a much overdone topic but one I feel I must address because it is important to the future of our Submarine Force. That we have a problem cannot be disputed. The mere fact that I was able to find almost a dozen articles in Proceedings magazine over the last 12 months is a clear sign for concern. I spent my shore tour on the staff of an NROTC unit, where I saw Navy-wide submarine accessions fall short of the goal. Now I am at Submarine Officers' Advanced Course (SOAC) at a period when an entire class (April 1999) has been canceled due to a shortage of students. Many people before me have brought up reasons why the problem exists. I would like to take a different route and discuss the reasons people choose to make the Submarine Force their career rather than trying to pinpoint the elusive single reason junior officers are leaving and midshipmen are choosing other paths. After all, every submariner could list for you a hundred reasons **not** to be in this profession. I am going to discuss why we join and why we stay and what we need to do to improve our current situation.

In order to understand why I think we make the choice to join and then stay in submarines, I must explain what I call the *Us versus Them Gap*. This is the natural gap between subgroups in our profession. The gaps mark career transition points and are easy to identify. One of these gaps is the gap between midshipmen and active duty personnel. Another gap is if the junior officer to department head/senior officer gap. There are natural differences between the groups on either side of these gaps. I believe understanding these gaps is the key to accession and retention.

I am sure you can all look back on your careers and see your transition across one of these gaps. It happens at different times for different people. The timing is irrelevant. What matters most is that it happens, otherwise the person shows up as another negative statistic on a BuPers chart. Why is it so important to

identify this process? Well, my theory is that these transitions occur not by chance but because someone bridges the gap by taking an officer under his wing. Think back in your career. Are there not one or more individuals who were crucial in your choice to stay Navy? Sure, there were lots of people and lots of excuses for you to write that letter of resignation, but you didn't, or at least you never sent it in. Many officers I have talked to say they never really made the decision to stay in; they just never made the decision to get out. But if you dig a little deeper, there always seems to be some sort of mentor or personal hero in their background. It is quite common to hear sea stories at SOAC of how great someone's Commanding Officer was or what a great guy the Navigator was. What effect do these personal heroes have that is so important?

To answer that question, we must step back and look at the bigger picture. The question that comes to mind is: "Why would anyone want a job where they spend weeks at a time away from their family, hundreds of feet under the ocean surface, in a steel tube with a bunch of overworked, underpaid, smelly guys" Good question! And probably one you have tried to answer before. It's not easy, is it? The answer is certainly not because of the money. Not that we are all poor, but I think if you calculate the hourly pay of an ensign, it's about equal to what the french fry dude at a McDonald's makes. Don't take this wrong, I never turn down a raise and I applaud the recent pay increase talk coming from Washington, especially for our mid-grade enlisted men. But throwing more money at this problem won't fix it.

Guys who are smart enough to run nuclear reactors and drive submarines can make about as much as they want to in the civilian world. I know this first hand because at the university where I spent my shore tour, I watched several former submariners earn six figure salaries after completing their MBAs. Many others would argue that the key reason people stay is for the great retirement plan. And it is nice to be able to retire after 20 years at 40 (or maybe 50) percent of base pay. But if you do some simple net present value calculations (I have to somehow justify my high priced MBA), you will soon see that if money is what matters, you are better off leaving the Navy and socking away a bunch of that six figure salary in your 401k. The short point to that long, drawn out discussion is that it's not the money or the good retirement plan

that is the key to the retention and accession issue. Money has never and will never be the primary motivator for naval officers.

What about quality of life issues? Hellooooo?!? We are in the Navy. We are warriors. We are steely-eyed killers of the deep. We go to sea. We deploy for months at a time. We work hard because the job is challenging and submariners have always worked hard. Whoa! That was not very politically correct of me. Let me rephrase that. Being a submariner is an extremely challenging way of life and we must make every effort to alleviate any unnecessary hardship on our sailors. I hope that was better. Sincerely through, the bottom line is that quality of life is not the key. I don't want to sound harsh. We must treat people with respect and dignity and we are getting better at that. What I mean to say is that taking a warship to sea and carrying out our mission in the interests of national security will never be easy. And besides, *easy* has never attracted the type of people we need to serve in the Navy.

Perhaps a personal story would best illustrate my point. On January 16, 1999 I attended the inactivation ceremony for my first submarine USS NARWHAL (SSN 671). What I witnessed there attests to what I write. I have never attended a decommissioning or inactivation before but many senior officers were saying that they could not believe the tremendous turnout. Eleven out of the twelve former commanding officers attended. There were hundreds of former sailors in attendance spanning three decades of service. As you may imagine there were plenty of long speeches by senior officers and lots of sea stories, but throughout the day I didn't hear about how good the pay was or how great retirement was now. I didn't hear about the great quality of life while they went to sea to fight the Cold War. These former and current sailors talked of the privilege of serving their country, the camaraderie they enjoyed (and still enjoy), the challenges they faced and the victories they shared. They talked of sacrifices they and their families made and pride in having done their jobs well. My heart swelled with pride as I thought of how wonderful it was to share in this honorable profession. And looking back I realize that if it were not for two men in my wardroom on board that ship, I would have made the wrong decision (wrong for me) to leave the Navy. I would have moved back to the civilian world, for that was my plan during the first three years of my naval career because I just couldn't make the pros outweigh the cons. But these two men

personified honor for me. They became my personal heroes because they showed me the way across the gap. They gave me a future in the Submarine Force by taking a personal interest in my professional and personal development. They were not easy on me and they did not give me special treatment. They challenged me, gave me support and showed me that I could become better through hard work and personal sacrifice. I was not alone. Out of a core of nine junior officers from that wardroom who served with these men during a 1994 Mediterranean deployment, six are still in the Navy. Four are serving or will soon serve as department heads. I also know of three midshipmen who chose submarines as their future after summer cruises on our ship. That is a pretty good retention rate. I guess you could say they have crossed the gap. For those of you who want more statistical analysis see Lead On by Rear Admiral Dave Oliver, Jr. In this book he states that for a two year period he studied, 90 percent of the officer resignations were from 10 percent of the submarines. He concluded that the root cause was a poor commanding officer on these particular submarines. I agree, but also place blame on the department heads and executive officers of those boats. It is critical to observe that the personal leadership, which is required to retain and access good officers, will not come from our institutionalized Navy-wide programs like the Leadership Continuum or through the interactions of the officer and his detailee. It only comes from the personal relationships forged by senior officers towards their juniors.

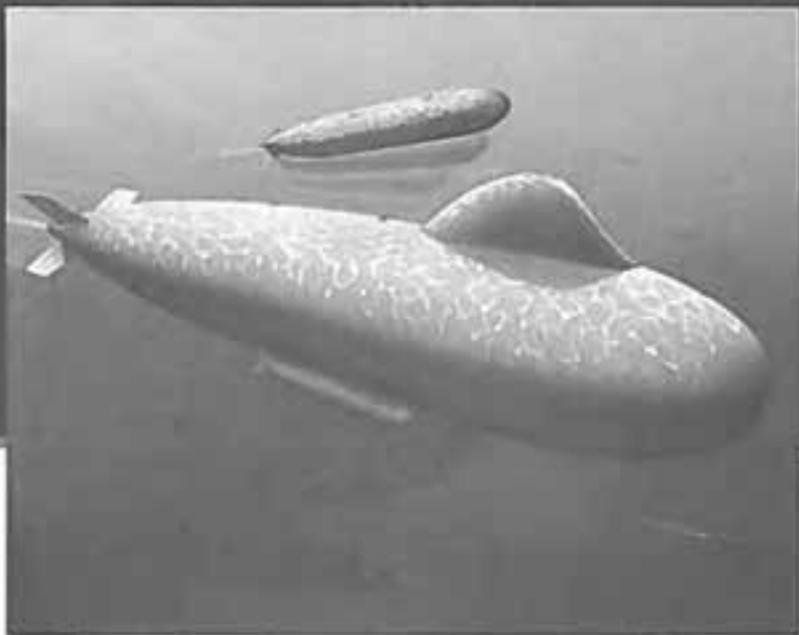
The next question should be "what has changed to make retention and accession a problem now". Well, the retention problem seems to start around my year group, 1991. Surprise, surprise! The Cold War ended and our Submarine Force (and the entire defense system) was put on a crash diet. I personally saw two excellent department heads leave the Navy when they failed to screen for executive officer. It was happening all around us. Men who had dedicated their adult lives to serving their country were being pushed out or having to take enormous pay cuts to stay in the Navy until retirement. The number of submarines was falling like crazy. Would there be any boats left for us to command? Budgets were tightening to extremes. Missions seemed to be less exciting, that is, if you could figure out what our mission was. Did I mention Tailhook, "Don't ask, don't tell" and the politically

correct pendulum swing? Couple all this with an expanding economy in most of the 1990s and a generation known for having little desire to stay in one job for an entire career, and you get yourself a retention challenge. The issue has been somewhat masked due to the reduction in the personnel needed to man our reduced Submarine Force but it is showing its ugly face now that the number of submarines is leveling out. So, has our culture changed? Yes. Is it a different world now than during the Cold War? Yes. Is this still a noble profession? Yes! And that is the message we must communicate to future generations of naval officers.

The key to turning around retention and accession is bridging the gap for midshipmen and junior officers. This is not going to happen by some CNO instituted program. It can only happen if each one of us decides to make it happen in our small sphere of influence. We must turn the intangibles which we value such as honor, courage and commitment into reality in the personal relationships we build. In building these relationships we bridge the gap and we turn a hard job into an honorable profession. That's it. I didn't promise a grand revelation. As they say in all those incident reports, no new lessons learned here. The hard part is doing it. Think back on your last command. What legacy did you leave? I am not talking about all those great point papers you wrote or the fantastic new tickler system you created to keep everyone busy. The greatest legacy you leave is the one reflected in the people that follow in your footsteps because you took the time and made the effort to care about their future.■



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## **SELLING THE SUBMARINE FORCE**

*by CAPT Karl Hasslinger, USN and  
LCDR Kevin Mooney, USN*

*Editor's Note: This article was prepared for presentation primarily to active duty submariners actually serving in the boats but is considered very appropriate for dissemination to the much broader submarine community.*

**T**hroughout the Cold War the need for submarines seemed obvious and submarine planners busied themselves with designing new ships and managing large new construction programs. Today however the need for submarines is no longer self-evident. In fact some military leaders and civilian defense planners argue they are Cold War holdovers in search of a mission. In reality that view could not be farther from the truth. Submarines not only remain relevant, but are also being tasked by commanders at a pace difficult for the force to support. Further, as missile and other threat technologies proliferate and place non-stealthy platforms at greater risk, submarines will likely play an increasing role in a variety of combat operations. Although studies repeatedly show Unified Commanders consider the 50 SSN goal established by the Quadrennial Defense Review to be inadequate, budget realities may make a larger force unaffordable. As competing force structure options are debated in the coming years, it is incumbent on submariners to ensure U.S. policy makers and military leaders understand the submarine's capabilities and its contribution to our national security. *Emphasis added by Editor.* Accordingly, submariners should surface and participate more proactively in the selling of the Submarine Force.

### **How Can You Help Sell the Submarine Force?**

First and foremost, develop your professional skills and continue to ensure U.S. submarines prevail in any mission assigned. Operational success says more than any brief or newspaper article.

Second, you can educate yourself. That's right, get yourself up to speed on major Force issues and programs. As a submariner,

you are a professional and a representative of the Navy and the Submarine Force. You are a better spokesman when armed with the facts. Where do you get such information? Well for starters, you can read these pages each quarter. In addition, Undersea Warfare was founded with the idea of educating our people so they would be better spokesmen and better informed to make career decisions. Also, by understanding the *big picture*, submariners can better appreciate how their individual ships and daily activities contribute to the Submarine Force's overall mission.

Third, you can join the professional organizations that educate our joint brethren and the public on the importance of the U.S. Navy and the Submarine Force. Consider membership in the U.S. Naval Institute, which many of you know as the publisher of Proceedings. Proceedings is a great way to keep up with overall Navy issues such as major platform programs, cutting edge ideas such as Network Centric Warfare and Fleet Battle Experiments. Personnel, pay and other quality of life issues are presented in a spirited and often passionate manner. A particular favorite with junior officers and sailors is the "Nobody Asked Me But..." column where the deckplate perspective on issues from uniforms to OPTEMPO to pay and allowances is presented in a no nonsense fashion. Proceedings is an open forum where professional issues can be debated and new ideas explored. Other organizations such as the Navy League, the Naval Submarine League and various Submarine Veterans groups provide opportunities to present a submariner perspective.

Finally, you can help sell submarines through your interactions with personnel outside the Force and outside the Navy.

### Who Do We Sell the Force to?

Our *customers* are a large and varied lot. Let's start at the top, with our national policy makers. For most of you in the fleet, that opportunity comes when a member of Congress, a professional staff member or a senior defense official visits your boat. These visits are often seen as a distraction from our real mission, but frankly there is no better advertisement for the Submarine Force than a ride on a submarine. Our ships, our sailors and the professional way they do their jobs, routinely impress visitors at all levels. Once people come aboard, submariners sell themselves.

Putting some effort into these events typically pays large dividends in the future. Part of the effort in preparing for visitors obviously is having the knowledge to answer questions not only about the ship, but also about overall Force issues and goals.

Another major area where our submariners can be effective spokesmen is at the Navy and sister service level. Assignments to Battle Group staffs, Joint commands and the Joint Staff are great opportunities to broaden your personal experience and to teach others. Submariners have invariably done well in these assignments, and have been effective in educating other war fighters on the capabilities, limitations and best employment of our ships. Overall, our comrades in arms have been deeply impressed with the capabilities of our personnel and ships and typically want more of both.

### Write! Don't Be Afraid to Express Your Opinion

If you have ideas about adapting emerging technologies, improved tactics, different concepts of operation or organization, or your ship has done some specific evolution in an innovative manner, make an effort to tell your story. Getting others to think about issues leverages the power of collaborative thinking. Contribute to the various forums on naval warfare such as the Joint Forces Quarterly, Undersea Warfare, Proceedings and THE SUBMARINE REVIEW. Let the rest of the Navy and other services know what is going on in the Submarine Force and what submariners are thinking about. In the past, submariners did not seem to contribute frequently to professional journals. Possible reasons for this likely included a culture of secrecy, as well as a feeling that publishing constitutes an unnecessary career risk in a very conservative organization—*publish and perish* rather than the usual *publish or perish*. Hopefully, today's submariners will reject those reasons as outdated and inconsistent with the needs of our force. Obviously, we do not discuss submarine operations and other sensitive topics in open forums, however there are many issues that lend themselves to open debate. Questions about the sensitivity of subjects can be answered by your chain of command, and it is a matter of professional courtesy to let your command know what you plan to publish in any event.

## Seek Opportunities to Talk to the Public

There are lots of civic groups that are genuinely interested in what their military is doing. This is particularly true for the Submarine Force, with its legacy of stealth. No doubt this shroud of secrecy has fueled the recent spate of movies and books claiming to provide a true peek into the classified world of the U.S. Submarine Force. To the public, the armed forces represent not only an expenditure of tax dollars, but also the use of their sons and daughters as soldiers, sailors, airmen and Marines. The people who are actively involved in community civic groups are typically concerned citizens who like to know how things are going, and more importantly, they are people who communicate with their elected officials.

Civic groups typically only think to invite the senior naval officers in their area to address their gatherings, although there are many others who are as qualified to represent the Navy and Submarine Force. Why not ask a submarine qualified Lieutenant or junior Lieutenant Commander who is actually manning a ship to go out and tell them what he does, the problems he faces and how he solves them. He can explain our vision of the future and how we plan to get there. The average submarine junior officer's knowledge and ability to articulate our message will undoubtedly impress such groups. The same holds true for the typical Submarine Force chief petty officer and many first class petty officers as well. Using personnel in this manner would allow us to engage more audiences. Sure, many of you think this is just another tasking from Washington bureaucrats who have forgotten how busy it is down on the waterfront. However, when this was discussed with a group of submarine department heads, they agreed with the idea. The time spent reviewing a type commander provided brief and presenting it would be no more than a few hours for one man in a period of a year.

Another method of reaching wider audiences is through Undersea Warfare. Representing a departure from its former silence, the Submarine Force is now providing greater insight into its activities. Although we don't talk about details of submarine operations, there are lots of things the magazine addresses in a general sense, such as the submarine's major contribution to forward presence. Readers of Undersea Warfare, which include

Congressmen and their staffs as well as non-Navy military organizations, are now presented with significantly more information on the workings of the Submarine Force than ever before.

### What Do We Say—What Are the Selling Points?

When talking about the U.S. Submarine Force, starting with its history is always useful. Many factors that were true in World War II are enduring to this day. For starters, the greatest asset a submarine has is its *stealth*. In World War II, stealth allowed U.S. submarines to take the fight almost immediately into Japanese home waters, despite the lack of forward bases, surface escort forces or air cover in the region. That same attribute exists today. Our ships can operate undetected gathering intelligence and preparing the battle space in any part of the world, and they can do it in a non-provocative manner.

Other submarine attributes include their endurance, agility and firepower. Nuclear power provides both high operating speeds and virtually unlimited endurance without reliance on costly and tactically limiting logistics tails. Further, multi-mission capability and high crew readiness allow submarines to quickly shift operational tasking in response to real world security requirements. If the National Command Authority determines that force is required to defend U.S. interests, SSNs can covertly deliver Special Operations Forces, deploy mines, or engage a variety of surface ships or submarines with torpedoes, as well as striking land targets well inland with Tomahawk cruise missiles.

Saving the best for last, you can talk about the Force's greatest asset, its people. U.S. submarines are manned by enthusiastic and dedicated professionals who have compiled an unparalleled record of mission accomplishment. Audiences are often surprised to learn the average age of our submarine sailors is twenty-something years old. These bright young officers and enlisted personnel are the backbone of our force and provide the impetus for the technological innovations the Submarine Force has been noted for throughout its history.

When speaking to the public about the Navy and the Submarine Force, audiences almost always enjoy hearing an anecdote or two from the speaker's own experience. Any qualified submariner will likely possess a repertoire of *sea-stories* which can be used to

underscore the attributes of our ships, tactics and our people. Tell your audiences the good-job and good-news stories that are not typically reported in official publications or in the media.

### **Recruiting Tomorrow's Submariners**

Recruiting is more difficult these days with an all-volunteer force and a robust economy. The Navy has to compete with industry for available manpower. Obviously people know there is a private sector hungry for employees, especially skilled ones. They also know there is a Navy, but how many of them think about it? How many young people know what the Navy is like, let alone the Submarine Force? Probably not many. As the number of veterans decreases in our society, those who traditionally encouraged military service are no longer there. High school teachers, counselors, parents and relatives without personal experiences in the military are not natural advocates of service to the nation in the Navy. In such an environment, who is better equipped to engage personnel at the high school and college level than a qualified submariner? There are scout troops, Navy Junior ROTC units, high school career days and the like where submariners can speak, and provide the information to make informed choices on their future. In speaking to these organizations, our goal should be to sell the Navy, but obviously to use the submarine force as the example we are most familiar with. Adopted schools and other community outreach programs are other venues where we can benefit from the interaction between submariners and members of the community.

### **The Bottom Line**

Just as each member of a submarine's crew bears responsibility for the safety and performance of the ship, we can all contribute to the long-term health of our Force. We can all work to educate our fellow citizens on our history, our present challenges and our vision for the future of the Submarine Force. The CNO and type commanders' staffs cannot do this job alone. They need force multipliers. As submarine professionals, each of you has a role in the selling of the Submarine Force.■

## UNCERTAINTY EFFECTS IN THE SUBMARINE FIRE CONTROL PROBLEM:

### Some Lessons for Network Centric Warfare

*by RADM W.J. Holland, USN(Ret.)*

**M**ark 48 Torpedo Certification and Proficiency Firings provided an unusual and perhaps unique laboratory in which the effect of uncertainty on decision making can be assessed in an environment without direct sensory information. A search of the literature reveals no similar experience that so clearly defines the effect of human nature in a situation which could well be the norm for war in the Information Age. War itself is rare and repetition in war with careful observation is inhibited by excitement and fear. Few peacetime exercises are carefully repeated so as to duplicate similar interaction and few, if any, military forces have the homogeneity which mark American submarine crews. As a result of these rare combinations of circumstances, the influence of human nature in dealing with uncertainty has never been so clearly demonstrated.

Deployment of the Mark 48 Torpedo markedly changed the submarine fire control problem. In a step change without parallel in naval warfare, weapon ranges increased by an order of magnitude. In most situations, the weapons outranged the sensors. Because of concerns with security, paucity of weapons and loss of very valuable property, early in the program shooting was done on constricted ranges which artificially limited the fire control party and the weapon performance. In these early proficiency and test firings, the target was within easy sensor and weapon range as soon as launched. As a result, the maximum target range was well short of half the weapon range and the only thing which really needed to be determined was the classification and the general direction of target motion. Only the weapon settings offered much challenge to the shooters. Nevertheless, even in these environments of shooting fish in a barrel, many shots missed.

With the opening of large instrumented ranges at AUTEK and BARSTR, the environment became more realistic though still constrained by the ranges' dimensions, exercise torpedo endurance and the need to conduct repeated runs while daylight allowed recovery. Unfortunately, the timidity of weapons designers and operational planners prevented using the exercise weapon in the same manner as the warshot (torpedo run was much reduced) which

falsely influenced doctrine for many years. The effect of these artificial limitations was significant but did not ameliorate or disguise the uncertainty aspects of solving the fire control problem.

While not every miss can be attributed to the difficulties arising from dealing with uncertainty, that problem is certainly in the forefront of the submarine fire control problem. When torpedo ranges were one to three miles, and the weapon had no homing or guidance, determining target range was crucial. The torpedo had to be launched one to three minutes before intercepting the target. Small errors in range caused large errors in calculating the interception point. Solutions to these errors were sought by firing spreads (the doctrinal solution) or by closing to very short ranges before firing (the Dealy/O'Kane solution).

The advent of a long range weapon with precision guidance substantially reduced the effects of range error but it was a long time before that fundamental fact was generally recognized. Even when recognized, the impact of the new capability was muted and acceptance of the new advantages delayed. The natural human reluctance to operate on what seems to be guesswork, buttressed by a demand for engineering precision inherent in training a technical professional, adds to the discomfort individuals and groups feel when dealing with uncertainty. The first evidence in the fire control problem is that *submariners always want one more leg*.

Unsatisfied with evidence that the target is within weapon's range and not moving out of it, most Approach Officers remained uncomfortable with proceeding smartly to shooting. Everyone else in the party usually has less experience than the Approach Officer so little coaching or prompting takes place. The Approach Officer's questions to the Fire Control Coordinator regarding his solution invariably were answered as "One more leg". The residue of *Solution Ready* from Mark 14 firings, where accuracy of the torpedo's course was important and small errors could exhaust magazine capacity to no purpose, remained a drag. For modern weapons, *in range* is enough to know to get a hit. Reluctance to shoot on an educated guess rather than a precise answer degraded performance rather than improving it.

In most approaches, the natural inclination is to believe the target is closing. While statisticians and PCO instructors argue that this is only a 50 percent probability, if the submarine has been patrolling in an area for some time, or is in a location where targets are likely to transit and not loiter, the probability that the target is

closing is much higher than half—probably close to 90 percent.<sup>1</sup> The manner in which the submarine fire control solution is obtained can most easily be seen by watching the geographic plot: as the plotter works his speed strips, the predicted target position moves ever closer. The algorithms that solve the problem mechanically are abstractions of the processes exemplified by the speed strips on the geographic plot in a bearings only approach and so they too converge toward zero range. As a result, the problem solution is biased toward closing targets. This bias is present even on a periscope approach unless the target has an obvious angle on the bow greater than 120 (90 is not enough to convince even the best *lookers*). The result of this bias is that *submariners always underestimate the range*.

These common problems lead to the third and most easily observed result of the discomfort caused by uncertainty. Even though the target is probably farther away than the fire control solution indicates, and even when a courageous or knowledgeable (not mutually exclusive attributes) First Control Coordinator or Assistant Approach Officer prompts that further legs are not necessary, most Approach Officers are reluctant to commit until comfortable with the situation or pressed into desperation. The result is that *submariners generally wait too long to shoot*.

Once the weapon is underway, new concerns arise on the adequacy of the solution. Because of lingering uncertainty in the accuracy of the solution, by expecting the target to be closer than it really is, and by waiting too long to shoot, the party watches its weapon getting closer and closer to the target's assumed position without indications that the weapon has sensed the target. Any target zig—real, suspected or undetected—adds to the anxiety. The temptation to *improve* things is overwhelming—particularly if someone in the party offers an opinion that the solution used is in error. The most common temptation is imagining the weapon has enabled too close to the target so that the target is outside of the torpedo's cone of acquisition. (See *submariners always underestimate the range* above).

Anxiety mounts as the weapon continues to progress without

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<sup>1</sup>In proficiency firings, there was no mechanism to introduce an opening target, at least at the beginning to the exercise run. Even with opening targets, aggressive submarine maneuvers would convert the situation to a closing one because of the limitations of the ranges.

sensing the target. With concentration of almost all members of the party on the weapon/target intersection, and with the ability to influence this intersection available, *submariners invariably steer too soon and too far.*

The activities which alleviate these problems are training and experience. Approach Officers see the results of their actions, as they gain confidence in themselves, their sensors and the party individually and collectively, everyone of these biases and the temptations inherent in them decline. However, they never disappear! Uncertainty is the bane of the commander's existence and improvement in sensors, communications and decision aids only add to the difficulty of understanding and coping with uncertainty. Officers who do not have a good knowledge of how their machinery works in sensing the target, building the solution, and ordering the weapons are most susceptible to the errors arising from these natural human tendencies.

Solving the fire control problem is a multi-faceted process requiring confidence that the limits of uncertainty are understood by many members of the party. Such comes only from experience—not from cerebration. Fire control parties become constipated with calculations attempting to achieve certainty. On the other hand, practice builds confidence, sets expectations and generates understanding of the machinery, the people and the process. Just as Michael Jordan does not plan his foot movements as he approaches the basket, a good fire control party does not overtly think through its activities. Both just execute a well understood pattern of actions that has been thought through and practiced beforehand.

Recognition of these tendencies and biases are the first step in compensating for them. Just as operators of the Mark I Torpedo Data Computer (TDC) learned that there were "...an infinite number of tracking solutions in the machine...", and thereby never put excessive trust in the answers shown, officers must be wary of overconfidence in the solutions generated by their fire control equipment. These panels are not like the Maneuvering Room where data displayed is data sensed. *Believe your instrumentation* also includes knowing what is being sensed, by what, how long ago and within what degree of precision.

The observations cited above were so universally true that instruction of the fire control party before any shooting took place reduced the errors caused by these factors but the underlying causes were so pervasive that instruction could never eliminate

them. The Commanding Officer of the Submarine School recently confirmed that these observations remain relevant—some twenty years after their original annunciation.

While these observations might seem to indict submarine officers, they in fact offer conclusions applicable to almost all tactical situations in the information age. In fact, submarine officers have been operating in the information age for many years. In the January issue of *Proceedings*, Commander Michael Loescher, a cryptologist and the inventor and mouthpiece of Copernicus Communications Architecture, suggests that submarine officers are best qualified to command in tomorrow's environments where sensors and instrumentation are remote from individual platforms because submariners have long been accustomed to dealing with uncertainty which comes from diverse and remote sensors or partial information<sup>2</sup>.

While observation of other situations may not have yielded similar adages, the fundamental problems expressed in these four maxims about uncertainty will apply in some fashion to every tactical decision. Training and experience build knowledge and confidence that uses such maxims to condition behavior to reduce anxiety and improve performance. Duty on staffs, in the Pentagon and at War Colleges do not enhance the tactical expertise needed to understand enough about the problem to deal with uncertainty easily. On the contrary, long tours at sea or in the field are the bedrock of such expertise.

As overheard at the back of a Control Room, the payment comes when the *Old Man* announces "Firing point procedure" to the surprise of the rest of the Fire Control Party.

"What's he shooting at?" the Ensign said under his breath. Came the whispered reply, "I don't know, but he always hits it!"<sup>3</sup>

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<sup>2</sup>Commander Michael Loescher, USN(Ret.), "Moving the Navy Into the Information Age", *Proceedings*, January 1999, page 42.

<sup>3</sup>The author commanded one of the first submarines in SUBPAC to be certified for the Mark 48 torpedo. He subsequently served as teacher, coach, and overseer of weapons certification exercises and proficiency firings in a large squadron (Squadron ONE with thirteen submarines) and a Group (Group FIVE with eight submarines). This experience provided the opportunity to observe a large number of Mark 48 torpedo exercise firings from which these lessons were drawn.

## A FEW DAYS IN OCTOBER

*by CWO-4 Jerry E. Beckley, USN (Ret.)*

I returned to Pearl Harbor for duty aboard USS GRAYBACK (SSG 574) in August 1962. As a former crew member of a conventional fleet snorkel submarine, USS PERCH (ASSP-313), and also familiar with Guppy conversion submarines, I was never prepared for what I saw tied up at the Sierra Piers. This was the ugliest submarine I had ever laid eyes on. For those who had never seen USS GRAYBACK or her sister ship USS GROWLER (SSG 377), imagine two grain silos secured side by side with the domes facing aft on the forward deck, about twenty feet forward of the sail of a Swordfish class submarine. The large forward superstructure was designed to cover two missile hangers, each the size of grain silos and each capable of storing two Regulus I missiles, or one Regulus II missile. The Regulus I missile, a transonic missile powered by J-33A turbojet engine was capable of delivering a thermonuclear warhead to a target 500 miles distant, at a speed of 550 knots.

The ugliness of this unusually configured boat notwithstanding, this submarine, and the other four Regulus boats were the only submarine Nuclear Deterrent Strike Force in PACFLT. Polaris was not yet a reality in the Pacific and the Soviet submarine fleet sailed from a warm water port to cover targets in Hawaii, Japan, Philippines, and CONUS without anyone, other than us, threatening their front door. In addition, submarines had not yet received the Mk 45 ASTOR Torpedo capability. SUBROC was still on the drawing board. There was very little except a lot of ocean between the guys wearing the white hats and those wearing black hats.

I had departed Subase Pearl Harbor in 1959 after a two year tour at Guided Missile Unit #90 (the predecessor of GMU-10) as a Gunners Mate Second Class (Submarine Service), for Nuclear Weapons School at Great Lakes and Albuquerque, New Mexico. After a three year tour in Nevada, where I frequently replied to the question, "what is a sailor, and more especially a submarine sailor doing in the Nevada desert?", by telling the person, "we are building a submarine in Lake Mead and will float it down the Colorado River". Some bought the response, others didn't. It wasn't much of a cover story, but it was all I could come up with to distract from the distinctive insignia of rate I wore, a bomb

dropping through a helium atom. The *crow* attracted so much attention that the rate was changed in 1961 to Gunner's Mate Technician, and the insignia changed to crossed guns.

As a GMT1 with dolphins, I was soon to become a member of a very restricted and unique group of warhead technicians who rode the Reg boats (Regulus submarines), and who, in the time of war, would comprise the *two man rule*, "Two men of equal knowledge, each capable of detecting an unauthorized act by the other", and arm the nuclear warheads if or when the balloon went up.

The Reg boats carried 120 percent of the crew which we dubbed the *Black and Blue Crew*, and tried to leave a few selected people in each time we deployed. The selected people were crew members with emergencies or schools, or any manner of problems that could have been impacted by their absence. There were also those who would never be part of the stay-in crew, and I was one of them, as the Captain would soon explain to me as I was introduced to him. When I reported aboard GRAYBACK, I was directed by the Chief of the Boat (COB) to the wardroom to meet Lieutenant Commander John J. Ekelund, the CO. During a short conversation, he mentioned the 120% and the stay-in crew. He also told me that anytime GRAYBACK got underway with Blue Birds (tactical missiles), that he, the Warhead Officer, me, the cook, and the Hospital Corpsmen would be on board, under any and all circumstances. The reason the Warhead Officer and I were required on board when the boat got underway while carrying tactical missiles was because we comprised the two-man rule. When it came to the nuclear warheads, he and I might as well have been joined at the hip. There was no doubt in my military mind that this was going to be *long and arduous sea duty*, because we would no sooner get into port, have a short refit, shoot Red Birds (Fleet Training Missiles), and deploy again. The average in-port period for a Reg boat was around three months.

Prior to the next GRAYBACK deployment, I was getting acquainted with my new duties. I was not only the Warhead Technician, but also the Deck Force PO. My primary duties were those of the Assistant First Lieutenant. A few weeks after reporting aboard, I was notified that I would be interviewed for the Personnel Reliability Program (PRP), which was really a screening process for those of us who have responsibilities for the missiles

and warheads. I was called into the Wardroom with the CO, XO, Missile Division Officer, and COB. These folks comprised the PRP screening process. Considering I was the only person authorized to make up the Two-Man-Rule with the Warhead Officer, I was asked questions pertaining to how I felt about the mass destruction and death a nuclear detonation would bring to the population of our target area. My response was simply that when I was in the Army during the Korean War as an infantryman, death was more individualized and personal, but in wartime it makes little difference if you kill one or a million, one must keep it in perspective. They seemed to be satisfied so, I was then part of the GRAYBACK PRP.

On 7 October 1962, after the refit and missile training, we slipped our moorings at pier S-9 and headed out for my first, and GRAYBACK's sixth deterrent missile patrol. The diesel subs made fuel stops at either Midway Island or Adak, Alaska depending on their respective operating area.

We had only been on station a short period when again I was called into the wardroom with the same folks who were present for the PRP screening. This time the Captain and XO were a little more stern faced than before, and for what I was soon to learn, good reason. The steward was asked to step out of the forward battery and both hatches were put on the latch (submariners know what that means). Captain Ekelund stated that we had received a message that the defense posture had increased to DEFCON 3 (DEFCON 5 was normal), and he was to open the sealed Emergency War Orders. The content of those orders, which for the sake of the security oath I swore as far back as the 1950s and '60s, as well as the one I still serve under, will not be revealed by me. I will say that some of the orders were directed to the Warhead Officer and myself, and what we were to do to prepare the nuclear warheads for arming, and if necessary, missile launch. My task was to remove over 60 Phillips-head screws securing an access panel on the underside of each of the four Regulus missiles, exposing the front of the W-27 warhead<sup>2</sup> where the high voltage thermal battery (HVTB) pack was bolted in the inverted (stored) position. I then removed the four bolts securing the HVTB, turned the battery around to the *potential use position*, reinstalled and torqued the bolts. After doing this to the three other missiles, we were ready for the next order. The next day, thankfully, we

received new orders to relax the DEFCON and restored the warheads to their war reserve (safe) condition. Few people alive today have a full appreciation for how close this country (and the Soviet Union) came to what was later to be coined Mutually Assured Destruction (MAD). In addition, few people, except for those of us who rode those old Regulus submarines, some of which were literally held together with baling wire, have a full appreciation for the sacrifices made by these Silent Service officers and men, whose usual patrol period was 90 plus days, and occasionally, a back-to-back-out-of-Adak.■

## NOTES

1. The Regulus II Program was canceled in 1958.
2. The W-27 warhead was the same warhead converted to the B-27 bomb by addition of aerodynamic fairing and fins. It was carried in the B-52 Stratofortress throughout the Cold War.

*About the author – CWO Beckley qualified in fleet snorkel submarines in 1954 as one of the last Gunner's Mates to be accepted into the Submarine Service. He served in USS PERCH (ASSP-313) and at Guided Missile Unit #90. In 1959 he converted to Nuclear Weaponsman and served onboard USS GRAYBACK (SSG-574), USS BARBERO (SSG-317), and USS HALIBUT (SSG(N)-587). Upon appointment to Warrant Officer, he served as Special Weapons Officer aboard USS HUNLEY(AS-31), and as Weapons and Diving Officer at Norfolk Naval Shipyard. After retirement from the U.S. Navy, Mr. Beckley was employed at the Polaris Missile Facility, Atlantic as a Management Analyst and served in the Cruise Missiles Program in Washington, D.C. as the Assistant Program Manager, Logistics, Submarine Launched Tomahawk Cruise Missiles until his retirement from Federal Civil Service in 1988. e is currently employed as a Senior Acquisition Logistics Engineer with OASN(RDA) at the Washington Navy Yard.*

## PERSPECTIVES OF RUSSIAN BALLISTIC MISSILE SUBMARINE DEVELOPMENT

*by Dr. George Sviatov*

**F**rom the beginning of 1960s the Soviet Union had built up to 120 ballistic missile submarines with 91 of them nuclear. Now the Russian Federation has about 27 contemporary ballistic missile nuclear submarines (SSBNs) of the three newest projects: 667BDR (Delta 3) with 16 RSM-50 (SS-N-18) missiles in 14 boats; 941 (Typhoon) with 20 RSM-52 (SS-N-20) missiles in 6 boats; and 667 BDRM (Delta 4) with 16 RSM-54 (SS-N-23) missiles in 7 units (in sum—up to 456 SLBMs).

The number of such submarines and their missiles now is determined by the American-Russian START I treaty which allows each side to have not more than 432 submarine launched ballistic missiles (SLBMs) and 3,456 nuclear warheads. If the Russian Duma ratifies the START II treaty by December 31 of 2007 Russia will have to reduce the number of SLBMs to 336 and their warheads to 1,750. In addition, Secretary of State Albright and Foreign Minister Primakov signed and exchanged letters legally codifying the Helsinki Summit commitment to deactivate, by December 31, 2003, the U.S. and Russian strategic nuclear delivery vehicles that under START II will be eliminated. The START III negotiations would consider further reductions in strategic nuclear warheads on ballistic missiles and strategic bombers to an aggregate limit of 2,000-2,500 per nation by December 31, 2007.

According to the opinion of Ambassador Linton Brooks, unofficially Russians purporting to speak for the Defense Minister Sergeev have been arguing that even the 2,000-2,500 warheads agreed to in Helsinki are more than Russia can afford. They speak of lower limits of, perhaps, 1,000-1,300 ballistic missile warheads with some greater flexibility on bombers.

The Russian leadership pays significant attention to its nuclear ballistic missile submarines' development. As former Commander in Chief of the Russian Navy Fleet Admiral Felix Gromov wrote: "The strategic naval nuclear forces and associated command and control systems are being updated to satisfy the most advanced scientific and technological requirements". And he also wrote: "The Navy's main task is deterrence, nuclear deterrence, which it

manages to carry out despite obvious difficulties”.

On August 25, 1996 a Russian Project 941 SSBN surfaced in the North Pole area and launched a RSM-52 MIRVed missile to a remote test range. It was a demonstration of Russian nuclear strategic capability.

What is known about perspectives of Russian nuclear ballistic missile submarine development?

The Russian press wrote about building a fourth generation SSBN, referred as Borey (Arctic Wind), in Severodvinsk. It is a St. Petersburg's Rubin Central Design Bureau's Project 935 submarine. The Project (Chief Designer V.A. Zdornov) had been approved for construction by presidential decree in 1995 and the submarine was laid down on November 2, 1996 at Severodvinsk shipyard. It was named YURY DOLGORUKY, for a Russian Great Prince—founder of Moscow. A representative delegation of Moscow's high officials, including its powerful Mayor Yury Luzhkov and Deputy Minister of Defense Andrey Kokoshin were at this ceremony. The Russian TV showed it to public.

YURY DOLGORUKY would have been fitted with a new ballistic missile RSM-52U. It is assessed the YURY DOLGORUKY will carry at least 12 strategic missiles.

Funding for this program was critical if the Russian Navy was to achieve its stated goal of launching the YURY DOLGORUKY by 2002, and construction of an additional submarine each year thereafter. The cost of this sub would be huge, but some official announcements had demonstrated a national commitment to this program. If funding had been provided, the first ship of the class would have reached initial operational capability in 2004.

The U.S. naval intelligence artist's depiction of the YURY DOLGORUKY SSBN had been used in an article of the Rubin's Head and Chief Designer, Academician I.D. Spassky, published in August 1997 issue of the U.S. Naval Institute *Proceedings*. The question arises: is it a *war ruse* or has he really agreed with this artist rendering?

From this article author's point of view the depiction is more or less correct. Why?

In the current Russian economic situation it would be cost-effective to use the well developed and hull from Project 971 (Acula class) SSN and only to add one or two ballistic missile compartments for 12 ballistic missile tubes and their new Trident

D-5 type solid fuel MIRVed RSM-52U (SS-NX-28) SLBMs with nuclear and, maybe, also conventional warheads, and also to use the bow part of the Project 667 BDRM (Delta 4) submarine.

A possibility for a conventional warhead option exists because Russia in 1975 created, tested and accepted the R-27K SLBM, built an experimental diesel, 3,600 t surface displacement, Project 605 submarine with the targeting system Kasatka and fire control complex Record to strike moving sea targets, first of all aircraft carriers, with nuclear and conventional warheads, at ranges of about 1,500 km using radar homing of the warhead.

The fourth generation SSBN's bow sonar and torpedo complex probably would be similar to that on the Project 667BDRM SSBN (4 533 mm torpedo tubes with up to 20 torpedoes and antisubmarine missiles and Scat 3 sonar).

As to a reduced number of strategic ballistic missiles on the YURY DOLGORUKY, it now is conceivable that due to START II and, maybe START III implementation, there is a possibility. It could also be a small ploy of the Russian Navy to preserve more SSBNs and more commanding officer's and admiral's posts with a future smaller number of SLBMs and their warheads for each ship. Of course, from a Russian state interests point of view it is not a cost effective decision. A ballistic missile submarine with 24 SLBMs (like the U.S. Ohio class) would have been almost twice as cost effective.

One of the principle naval architectural questions about the YURY DOLGORUKY is her diving depth. The Rubin Design Bureau, on all its contemporary ballistic missile newest submarines, provided only a 400 m test depth. The test depth of all contemporary Russian SSNs and SSGNs is 600 m. It seems that a 600 m test depth is more probable for the Yury Dolgoruky class SSBNs.

If it is more or less accurate that the Yury Dolgoruky's number of SS-NX-28 ballistic missiles is 12, the submarine would have approximately the following characteristics:

Surfaced displacement, t	12,000
Submerged displacement, t	15,000
Length, beam, draft, m	135x13.6x10

Strategic missiles	12 solid fuel SS-NX-28 (50 t, 13m x 2m), with up to 8 nuclear MIRVs or one conventional warhead
Range of strategic missiles	more than 8,000 km
Torpedo tubes	bow 4-533 mm, 20 torpedoes
Sonar	improved SCAT-3 with height 5 m and diameter 7 m sonar cylindrical array
Test depth, m	600
Speed, submerged, knots	30
Reactor	improved OK-650, 190 mgwt
Turbine	1x50,000 shp
Propeller	one skewed 7 bladed, 200 revolutions/min
Reserve power plant	two retractable electric motors 400 kwt each, one diesel generator (800 hp), speed 4 knots for 10 days
Material of hull	AK-32 steel with yield strength 100 kg/square mm
Complement	100

The submarine will have eight compartments and 25 percent reserve buoyancy. Surface unsinkability with any one flooded compartment will be provided.

The first compartment—torpedo, hydroacoustic equipment and living; the second compartment—control room and living; the third compartment—auxiliary mechanisms; the fourth and fifth compartment—ballistic missiles; the sixth compartment—reactor; the seventh compartment—turbine and turbogenerators; and the eighth compartment—planes and rudders hydraulics machines and auxiliary mechanisms.

It should be mentioned that one unofficial Russian publication presented its own artist depiction of the two reactors, two turbines and two propellers for the Yury Dolgoruky SSBN in an architectural scheme which is more traditional for the Rubine Central Design Bureau.

The surface displacement of that version was estimated as 14,720 t, with 24,000 t submerged, and a speed of some 30 knots,

and 12 RSM-52U ballistic missiles.

But in August 1998 Commander in Chief of the Russian Navy Fleet Admiral Vladimir Kuroedov announced that this SLBM's development had been canceled and a new smaller SLBM will be developed for the Yury Dolgoruky on the base of the solid fuel ICBM Topol-M. As a result the new Russian SSBN delivery date was shifted from 2004 to 2010.

In conclusion, it is necessary to say that the Russian Federation, in contrast with the United States, is building a new SSBN and developing a new SLBM for her. The main reason of such difference is some Russian lag in development of SSBNs and SLBMs from the USA and START II agreements which were concluded in an atmosphere of Russian-American relations' euphoria and which shifted MIRVs only to SLBMs.

But at the same time it is logical to expect some Russian renaissance of stationary and mobile ICBMs with nuclear and conventional warheads (an example is a new Topol missile) because of organic Russian continental mentality and the fact that ICBM complexes are cheaper in comparison with SLBM complexes.■

#### SUBMARINE CENTENNIAL CRUISE UPDATE

Since the purpose of the cruise is fundraising in addition to fun, the cruise agent is donating \$100 per stateroom sold to be shared between Dolphin Scholarship, USSVI Scholarship and Naval Submarine League Scholarship funds. This represents all proceeds minus some expenses.

Make your reservations as early as possible since Costa cruise representatives expect the ship to be 75 percent booked by June. All deposits are fully refundable until 1 November 1999.

For additional information please contact Jim Norris at Ph.D Cruises, Inc. at (888) 843-8595 or reserve a cabin on-line at: [www.phdcruises.com/centennial.htm](http://www.phdcruises.com/centennial.htm).

## CONVOY: THE FORGOTTEN YEARS 1919-1939

### Part II

#### Between the Wars

*by John Merrill*

By the end of the First World War, using accumulated convoy data from various sources and applying statistical methods British navy analysts easily affirmed the efficacy of the convoy tactic in a modern naval war. Lessons learned during the war also included the tactic of submarine versus submarine, which would evolve gradually in the years ahead.

Merchant ship protection from the U-boat was provided during World War I primarily by patrolling the seas (guarding the sea-lanes) and convoy escorting. Patrolling to counter enemy submarines steadfastly held its place as the primary U-boat countermeasure in the minds of some senior navy personnel in the years after World War I. In spite of convoying's documented successes, the reason for that bias toward patrolling perhaps was because it could be viewed as an *offensive* navy posture and more in keeping with navy aims.

The convoy concept made the enemy submarine confront defended merchant ships rather than independent ships defenseless against the U-boat. Patrolling expended scarce resources searching for enemy submarines in large ocean areas and in unknown locations without adequate tools for detection and localization of the U-boat, whether submerged or surfaced by day or night.

Convoying was a positive approach to resolving U-boat interdiction of merchant ships; it brought the enemy to a defended target. In the interim years, the subtle aspects of convoy were not always easily grasped by the military and elected officials. The effectiveness of convoying was available in the records.

The victorious countries involved in the war were determined to keep the hard-earned peace. A series of international peace conferences and treaties were held during the period 1921 to 1936. Reduction of capital ships was a main consideration. At the same time, submarines and their weapons steadily improved. In several countries, research was undertaken to better the methods for detection of submarines. Progress in this area would benefit both patrolling and convoying in the event of a future naval war.

Without the urgency of a wartime environment, planning and

preparing for navy convoying of merchant ships in time of war did not present itself as a critical issue nor one generally of much interest during the 20 years of peace. The nonconformist aspects of submarines and their use compared to surface craft came to national and international attention primarily in arguments concerning the abolition of submarines or restraining submarine actions towards merchant shipping during wartime. Full acceptance of submarines as an integral part of the panoply of naval weapons was not held in all quarters of the world's navies in spite of their increasing number.

In several countries, some of the antisubmarine warfare ongoing research focused on the development and implementation of acoustic detection of submarines. If successful, this was seen by some as a means to remove the convoying requirement.

The ambivalence of certain naval professionals regarding submarines in this period while the submarine and its weapons were developing tended to obscure convoying and the acquisition of the necessary resources for successful implementation in the event of war. A measure of the necessary anti-submarine resources to help defeat the U-boat and sink 200 U-boats in World War I has been estimated to include 5000 ships. Hundreds of miles of steel nets, and a million depth charges, mines, bombs, and shells.<sup>1</sup>

### National and International Naval Concerns 1919-1939

Disarmament was of considerable importance starting with the early post-War years. War was unthinkable during the decade after the War and beyond. The enormous debts of the vanquished and the victors alike and the excessive loss of lives and casualties were strongly perceived and remembered. There were multiple reasons for disarmament, some of safeguard peace, and some driven by economic considerations, which worsened during the 1920s.

A view as to how the submarine was held in the minds of some is expressed in a paper given in a March 1919 British War Cabinet meeting held to discuss future warfare research. Lord Weir, Secretary of the State for the Air Force asked: "What would the House of Commons say to the creation of a new big institution for

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<sup>1</sup>Len Deighton, *Blood, Tears, and Folly: An Objective Look at World War II*, Harper Collins, NY, 1993, p. 16.

Research in connection with warfare at a time when we may be presumed to be establishing peace conditions on a stable footing? If, for instance, the submarine were definitely ruled out of warfare, would not the strongest argument in favor of the Admiralty scheme disappear?"<sup>2</sup>

Starting in 1920, *The Ten Year Rule* prevailed in Britain. The rule implied that the British Empire would not be engaged in any Great War during the next 10 years. It provided a reason for reducing military expenditures and continued several years beyond 1930. All the armed forces were impacted by reductions in support.

Views regarding the submarine by naval and government figures during the decades between the world wars were diverse with generally no consensus among the five powers: France, United States, Great Britain, Italy, and Japan. A comment regarding submarines was made at this time "...that such methods as the Germans used will never be employed again, but need not be feared that any civilized nation would adopt them..."<sup>3</sup>

Moreover as early as 1922, with Germany banned from making submarines and other military weapons by the Versailles Treaty, German civilians were designing new German submarines for a Dutch firm, a front for certain German shipyards, located in The Hague. Later, experimental models were constructed in Holland and Spain.

Britain's hesitant position regarding submarines in the postwar period was frequently voiced as favoring the abolition of the submarine as a weapon of war. This view was taken at the Versailles Peace Conference, in the 1921-22 Washington Peace Conference, in 1925, and at the London Conference in 1930 and the last London Conference in 1936. Beyond abolition of the submarine, a position aimed at reducing the international submarine tonnage or restricting submarine activities was taken, mostly without great success.

In 1927, the British Director of Naval Intelligence focused on

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<sup>2</sup>Willem Hackmann, *Seek and Strike*. Her Majesty's Printing Office, London, 1984, p. 99-100.

<sup>3</sup>*Ironclad to Trident: 100 Years of Defence Commentary*. Brassey's, 1888-1986, p. 111.

a possible reason for this anti-submarine position by Great Britain "...trying to influence other governments against submarines because Britain herself has 'more to fear from submarines than has any other power'..."<sup>4</sup>

Article 22 of the London Naval Treaty of 1930 agreed to by the United States and Great Britain approached the submarine problem by stating that in time of war "...a warship, whether surface vessel or submarine, may not sink or render incapable of navigation a merchant vessel without first having placed passengers, crew and ship's papers in a place of safety..." A further consideration provided that merchant ships would not be armed during peacetime. Later, the Third Reich officially agreed to this article on 23 November 1936.

Hitler's coming to power in 1934 was immediately followed with his flaunting of the Versailles Treaty by Germany ordering 24 of the previously mentioned Finnish model submarines and two of the Spanish version.

A body of naval opinion preserved the anti-convoy viewpoint throughout the 1930s. A March 1935 House of Commons speech by Lord Stanley of the Admiralty reflects such. Stanley assured the House that the convoy system would not be introduced at once on the outbreak of war. All the pre-April 1917 arguments against the need to have merchant ship convoying were recycled 18 years later in 1935.

The Anglo-German Naval agreement was reached on June 18, 1935. Germany was once again legally permitted to build and operate a fleet of submarines. The next month Winston Churchill observed that the German navy was meager. Other comments included "Today Germany has no submarines." Germany launched the first U-boat four months later. The following year the London Submarine Protocol, 3 September, cited that Germany would adhere strictly to the international prize law, which provided for safety of merchant ship passengers and crews in time of war.

During the 1920s and '30s, submarines and airplanes continued to be regarded as fleet reconnaissance and attack elements. However, naval strategist French Admiral Raoul Castex envisioned renewal of the use of submarines as commerce raiders.

The late 1930s found increasing numbers of sophisticated

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<sup>4</sup>Hackmann, *op cit*, p.126.

submarines with improved weapons on the international scene. The submarine's record as a successful merchant ship raider was available from the preceding war. It would seem that this would lead to positive national positions regarding convoying merchant ships and with it appropriate planning and preparation in the event of war.

Planning for the convoying merchant ships finally received some attention in Britain in 1937. The Air Staff and the Admiralty after further arguments agreed that convoying should be adopted in the event of war but only if the enemy resumed unrestricted submarine warfare. This allowed the Admiralty to create a worldwide shipping control organization, and by 1939 the planning was well advanced.

### Acoustic Detection of Submarines

Modest improvements in the acoustic detection of submarines were made on both sides of the Atlantic by November 1918. In England and the United States leading scientists and engineers, including Nobel award winners, turned their attention to solving the problem of submarine detection. By the end of World War I, submerged submarines could be located. Some of the unresolved equipment limitations included enemy submarine depth determination, detecting in rough seas, and range. Also, the vagaries of acoustic propagation in seawater were yet to be determined.

After the war ended, England continued investigating acoustic detection at a secret level. Similar work was undertaken in the United States. Because the detection equipment was classified-secret, sharing of information did not occur prior to 1939. Equipment testing with submarines under realistic conditions was not substantial.<sup>5</sup> The British acoustic detection equipment was known as Asdic (an acronym). It was advanced compared to the World War I equipment but limited in its capabilities. Civilian and naval observers of the equipment tended to become over optimistic. Some erroneously concluded that enemy submarines would not be a problem in the event of wars because of availability of the

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<sup>5</sup>Always demonstrated in perfect weather by well rehearsed crews, it enabled a confident Admiralty to declare the U-boat to be a weapon of the past.\* Deighton, *op. cit.* p. 21.

equipment.

Some comments made by Winston Churchill in Gathering Storm about Asdic are illuminating. On June 15, 1938, Churchill was on board a destroyer for an Asdic demonstration with Royal Navy submarines as targets. In 1948, Churchill noted that in 1938 he and others overrated the capability of the underwater acoustics detection of enemy submarines. The performance limitations of the early systems were not fully grasped by the fall of 1939. The optimism regarding the expected performances of Asdic led to a lack of preparation to make up for the equipment limitations which became apparent.

Advancement of military technology in the United States during the long peacetime period was slow, due heavily to lack of fiscal support for research and development. The funds available for military technology development were a small percentage of the overall military expenditure. Research project security classification and the independence of the various branches of the armed forces were additional barriers to progress. Academic and private sector scientific and engineering personnel did not have broad participation with the current government military research laboratories. The Naval Research Laboratory opened in Washington in 1923, and in conjunction with several industrial activities became the center for the development of enemy submarine detection equipment. By 1933, fifteen destroyers and five submarines were equipped with echo ranging acoustic detection equipment. At the end of the decade, additional progress was made regarding the numbers of installations and the beginnings of adequate training for equipment operators and use were initiated.

### Closing Comment

Navy problems and priorities during the years between the wars placed merchant ship convoying in an obscure role. Mahanian thinking with the capital ship at its focus still prevailed. Aircraft and aircraft carriers began to be acknowledged, and some inroads in naval thinking and planning were made in these areas during these years.

Decreased naval budgets and the high costs and years of construction time for the large ships placed construction of the smaller ships for convoy escorting in a low priority position. The

shorter time requirement for the building of convoy escort ships may have accounted for their lower priority.

The high performance expectations of the 1930s submarine detection equipment as cited above led to a downplaying of the enemy submarine's capabilities. In retrospect, even if the performance was as anticipated, there were only limited numbers of vessels equipped with the detection equipment, as a further problem, the number of skilled operators was insufficient.

As late as November 1938, a retired German Vice Admiral noted in an article "nothing substantial has as yet been done in England (and equally in France) for the protection of oceanic convoys." Soviet Admiral Gorshkov, observed in 1976 that the "American Navy came into the War (II) totally unprepared to protect merchant vessels from submarine strikes."<sup>6</sup>

Even though analysis of convoy performance presented evidence that convoying did not cause excessive delays in shipping and did save lives and ships, there were those in the Admiralty and in public office in 1939, twenty years later at the start of World War II, who were overtly not pro-convoy. As late as early 1942, some U.S. Navy personnel were initially not enthusiasts for convoying. A quotation in Morison "when the U-boats hit our coast in January 1942, we were caught with our pants down through lack of anti-submarine vessels"<sup>7</sup> is concise. In February, Britain gave the United States 24 trawlers and 10 corvettes; and these additional escorts allowed small East Coast convoys during the day and putting into harbor at night.

In both World Wars, merchant ship convoying was pivotal to eventual success. During the first War, the U-boat and *course de guerre* was unexpected. This and lack of resources contributed to delays in implementing broad merchant ship convoying.

Reasons for the neglect of merchant ship convoying in naval planning and preparation during the forgotten years are unclear. However, they do raise the question of what equally significant naval strategy or tactic is overlooked today.■

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<sup>6</sup>S.G. Gorshkov, "The Sea Power of the State", MIT 1976/79, p. 266.

<sup>7</sup>S.E. Morison, "The Battle of the Atlantic: September 1939-May 1943", Little, Brown and Company, Boston, 1988, p. 254.

## 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.

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## THE CHALLENGES OF RADIOACTIVE WASTE IN THE RUSSIAN NAVY

*by LT John D. Gerken, USN  
NROTC Unit  
University of Texas*

### The Current Status and Challenges of Radioactive Waste in the Russian Navy

The effects of the Cold War have been felt by billions of individuals worldwide. Politics, military force structures and the environment are just a few of the areas of nations which were touched by the Cold War often silently inflicting change under the guise of national defense. Only recently has the United States truly discovered those far-reaching environmental impacts. While the impact in America is significant, it is only a shadow of the scope of the problem found in the former Soviet Union.

In order to arm itself the Soviet Union conducted an unlimited production of nuclear weapons and nuclear powered military vessels. In particular, the Russian Navy produced several hundred nuclear powered submarines and surface ships. In many instances, the production, operation, refueling and decommissioning of these vessels completely overrode any concern for the long-term effects on the environment.

Recently, the radioactive waste generated by the Russian Navy has come to the forefront of public concern both within Russia and internationally. While recent political and legislative initiatives and a greater degree of openness in Russia have indicated that the problem is being addressed, the current challenges to those agencies tasked with managing several decades of radioactive waste from naval nuclear power and other sources are enormous.

As an example of the gross mismanagement of radioactive waste, spent nuclear fuel cells inside waste containers are stored in the open air at Andreeva Bay in Northeast Russia and are corroding rapidly. This facility and others like it across Russia have encountered numerous technical and financial hurdles in establishing and practicing credible radioactive waste management. In particular, the Russian Navy currently suffers under an enormous legacy of mismanagement of radioactive waste from its nuclear

powered fleet. The problem is two-fold in that the country bears the burden of past mistakes and must also confront the challenges of continuing to operate and build nuclear propelled naval vessels.

The Cold War provided the USSR with motivation to produce nuclear fleets unchecked in many cases by environmental concern. Intentional and risky disposal of radioactive waste during the height of the Cold War was common in the Soviet naval complex. Many practices concealed and condoned under the communist regime would be unthinkable by current Western standards.

Currently the Russian nuclear fleet operates approximately seventy-five vessels. Along with the concern for safe operation of those power plants, the Russian Navy leadership has inherited the ghosts of the radioactive waste problems created by operation and decommissioning of this nuclear fleet over the past 40 years.

The different radioactive waste management challenges presented to the Russian Navy can be summarized by studying the basic lifecycle of a nuclear ship. After initial construction a vessel will normally be utilized for two core lifetimes prior to decommissioning. In many instances the Russian Navy has kept vessels in its fleet longer than this by refueling the reactor plant a second time thus extending the lifetime of the naval asset to three core lifetimes. Each of the lifecycle phases presents its own unique radioactive waste management challenges to the Russian Navy.

The construction of a naval nuclear propulsion plant raises the same radioactive waste management concerns as the construction of a commercial nuclear power plant. Uranium mining results in the generation of mill tailings with a concern for the emission of radon gas from the tailing piles and exposure to workers within the mines. In 1990, the former Soviet Union had an inventory of 5 billion tons of mill tailings and was producing approximately 7 million tons of uranium mill tailings per year corresponding to 600,000 curies of radioactivity.

Fuel cell fabrication for Russian navy vessels with pressurized water reactors is conducted at Elektrosol just outside of Moscow. Russian naval propulsion plants use fuel with a uranium enrichment of 22 to 90 percent. The process of enriching the uranium is carried out at four sites throughout Russia. Each of these plants has been characterized by vast mismanagement of radioactive waste and emissions over the last several decades. For example, in one instance an enrichment plant dumped approximately 54,000 curies

into the Yenisey River. Consequently, this release yielded detectable radioactive contamination 1500 kilometers downstream.(Bradley, 1997)

Once fuel cells are fabricated they are shipped to the construction sites for the actual ships which they will propel. The sites are located at Severodvinsk Naval Yards near Arkhangelsk, Admiralty Yard in St Petersburg, Krasnoye Soromovo in Nizhny Novgorod, and Amursky Yard on the Pacific coast near Komsomolsk.(Nilsen et. al, 1997) Numerous instances of radioactive waste mismanagement have been documented at these shipyards. The Severodvinsk Naval Yards dumped nearly all solid radioactive waste produced prior to 1991 directly in the Kara Sea to the east of the shipyard. Additionally, some radioactive waste was discovered in municipal waste sites near the shipyard. While both of these practices have been discontinued and procedures are allegedly in place to prevent these problems from reoccurring, the problems of credible radioactive waste management at all of the construction shipyards continues to challenge the managers of these yards in the difficult fiscal environment within Russia.(Bradley, 1997)

Once construction or refueling is complete the vessel will be operated for approximately a decade during each of the core lifetime periods. Daily operation and periodic routine maintenance also generate radioactive waste requiring disposal by the military complex. Russian Navy nuclear subs and ships generate 20,000 cubic meters of liquid radioactive waste and 6,000 tons of solid radioactive waste annually.(Bradley, 1997)

In addition to normal daily operation, reactor accidents during operational periods of the nuclear power plants have also presented some difficult waste management problems for the Russian Navy. Serious reactor accidents have resulted in six Russian submarines being taken out of service early. Due to the leakage from the fuel cells into the propulsion plant piping and components, even after the removal of the damaged fuel cells approximately, 100,000 curies of activity remain spread through each of the propulsion plants. All damaged reactor plants are stored at a shipyard; - however, several of the reactor cores were removed and dumped into the Kara Sea, an offshoot of the Arctic Ocean near the island of Novaya Zemlya. A total initial activity of approximately 37 million curies of reactor radioactive waste has been dumped into the Kara Sea over the last 25 years.(Bradley, 1997)

In addition to the submarines which have returned to port following serious reactor accidents, the Russian Navy has had several reactor and non-reactor accidents that resulted in the complete loss of its nuclear vessels at sea. They have lost submarines in both the Pacific and Atlantic Oceans and as close to the United States as the Bahamas. A total of four nuclear powered and 5 diesel powered submarines have been lost at sea. Disregarding one of the nuclear powered submarines which was salvaged, a total of 5 nuclear reactors containing highly radioactive fission products and 43 nuclear warheads containing several kilograms of plutonium each remain lost in the world's oceans. (Bradley, 1997)

The most recent sinking has received international attention lately. The Mike class submarine was built by the Soviet Union in the mid 1980's and was referred to by its Russian name—KOMSOMOLETS. Propelled by a nuclear propulsion plant with two reactor cores, only one of this type of submarine was built by the Soviet Union. On 7 April 1989, the one and only Mike class submarine sunk in the Norwegian Sea just north of Bear Island.

Expeditions over the last several years by Deep Submersible Vehicles show the submarine has several holes in the front part of the hull and a large crack extending from the lower to upper portion of her hull. The end result was two reactor cores and two nuclear torpedoes resting in 4500 feet of water in the Norwegian Sea.

As of the 1<sup>st</sup> of January 1995, the total activity on the sunken submarine was estimated at 216,000 curies. Most of the activity is contained in the two reactor cores in the form of fission fragments. Calculations have shown that the reactor plant containment should remain intact for 2000 years by which time the only significant isotope present will be the long-lived plutonium activity. The two nuclear torpedoes that sunk with the submarine contain a total of 6 kg of plutonium which at present is still contained within the torpedo shells. Even if all plutonium were to leak from the torpedoes, the radionuclide contamination would still be considered low level as compared to other releases to the Arctic waters. For example, the British plutonium production and reprocessing plant at Sellafield England released approximately 300 kg of plutonium to the Irish Sea between Ireland and England over its years of operation. (Bradley, 1997)

Submarine operational accidents constitute only a small portion of the radioactive waste problem. A much more serious concern is the large inventory of spent fuel being amassed by the former Soviet Union. The Andreeva Bay refueling facility located in the northwest region of Russia near Murmansk performs the bulk of refueling operations for the Russian Northern fleet. At this facility, spent fuel cells are stored in a special building and in three enormous tanks. Currently, there are also 52 containers of spent fuel stored in open air storage. Outside storage is the most dangerous of the radioactive waste management practices at this facility due to the rapid corrosion of the waste containers. Some of the containers are already breached, allowing water to enter and contact the fuel cells themselves resulting in an even more dangerous situation as the fuel cell cladding begins to corrode.

Currently, 21,000 spent fuel cells are stored at the Andreeva Bay facility. As of 1994, approximately 30,000 spent fuel cells from Northern and Pacific fleet sources were in storage and approximately 25,000 more remain in submarines no longer in service awaiting defueling. Both the Northern and Pacific fleet fuel cells are scheduled to be sent eventually to the reprocessing facility at Mayak in south central Russia.(Bradley, 1997) However in 1997, only one shipment to Mayak was completed due to lack of funding and the inability of the rail transport system to meet new, more stringent, safety regulations.(BBC, 1998)

Besides the obvious problems involved in storing spent fuel, the risk and consequences of accidents occurring during the refueling process is enormous. The most serious refueling accident occurred in Chazma Bay near Vladivostok on the Pacific coast of Russia in August 1985. During refueling of a nuclear submarine, a reactor vessel lid was positioned incorrectly. A violation of procedures resulted in the vessel lid being lifted while the control rods for the reactor core were still attached. When the lid was raised the control rods were withdrawn from the core. The reactor became prompt critical resulting in an enormous power excursion and a steam explosion. The explosion led to a fire that took 4 hours to extinguish. In the end, ten people were killed and seven million curies of radioactivity were released to the environment. A radioactive trail 6 km long and 500 m wide was deposited on the adjacent countryside. However, most of the activity was subsequently washed into the bay. The sediment activity levels as

measured 10 years after the accident in Chazma Bay and the adjacent Strelok Bay are still considerable. The Chazma Bay incident remains at the forefront of environmental concerns and in 1995 was specified to receive funding priority for the remaining cleanup that is needed.(Bradley, 1997)

The final step in the lifecycle of a nuclear propulsion plant is decommissioning. The most crucial step involving radioactive waste disposal and management is the defueling process. The Russians have decommissioned and defueled approximately 150 submarines and surface ships. However, there are about 130 submarines being stored awaiting defueling and much of the fuel removed from earlier vessels is still not deposited in final storage. The current planned rate of defueling is 10 ships per year, meaning approximately 13 years will be required to defuel the current backlog. These ships are stored at various shipyards throughout Russia and most are still waterborne, sitting idle awaiting their turn for removal of their spent nuclear fuel.(Bradley, 1997) According to Russian sources, only two submarines were being accommodated for decommissioning during 1997 due to financial and labor issues at the shipyards.

Currently the Russian government intends to construct a high level radioactive waste storage facility on the island of Novaya Zemlya in the Kara Sea north of the Russian mainland as well as continue to send spent fuel to Mayak for reprocessing. However, current concerns over the safety of rail transport to Mayak have halted shipments to southern Russia at this time.(Bradley, 1997)

Although the United States' nuclear industry has been attacked for its practices and problems, the Russian problem is by far much worse. This trend of uncontrolled and intentional release by all nuclear industries in the Soviet Union carried directly over into the waste management practices of the Soviet Navy. Without the presence of political pressure and independent oversight, the Russian nation has released enormous amounts of radioactive waste to the environment.(Bradley, 1997)

The Russian Navy has used ocean dump sites for radioactive waste over the last few decades. The type of waste dumped has ranged from high volume low level waste to highly radioactive spent fuel from defueled ships, with most of the dumping under a veil of secrecy which has only recently been lifted. In fact they have dumped more activity into the Kara Sea than the entire rest of

the world has dumped throughout the world's oceans. The estimated activity level of Russian waste in the Kara Sea is presently over 2 million curies, accounting for decay from the time of disposal in the sea. This high activity level was reached due to the practice of dumping reactors with spent nuclear fuel into the sea, a practice which has since been discontinued. (Bradley, 1997)

Although the collapse of the communist regime within Russia has brought a better system of oversight to the Russian defense complex, radioactive waste management for the Russian Navy is still in its infancy. While the oversight and practices of the Russian Navy are showing signs of improving, the sheer magnitude of the recovery problem from the past 45 years of mistakes is staggering. The backlog of decommissioned ships which have yet to be defueled and the poor state of storage facilities for the spent fuel are two examples of the challenges faced by the Russian Navy. Moreover, the problem continues to grow since Russia still feels the need to provide for its national self defense utilizing nuclear powered vessels.

Although the picture is grim based upon the sheer magnitude of the contamination and waste inventory, recent years have resulted in a dramatic change in attitude of the Russian nation toward radioactive waste management. For the most of the Cold War the Ministry of Medium Machine Building oversaw the Soviet nuclear complex. However, this agency was entirely concerned with production. Until 1984 the radioactive waste safety concerns within the Soviet Union were covered by the State Sanitary Surveillance of Public Health Ministry which only approached the issue from a radiation protection standpoint and did little to affect safe disposal and storage of radioactive waste. The Ministry of Nuclear Power and the Ministry of Medium Machine Building were merged into the Ministry of Atomic Power and Industry, producing an organization with a more far-reaching regulatory role in 1989. As a result, government officials began to produce legislative results in 1991. Important safety regulations and environmental protection acts were passed that year, including several documents pertaining to radioactive waste management and handling. One year later, President Boris Yeltsin created by decree the Ministry of Atomic Energy of the Russian Federation (Minatom). By this decree Minatom became responsible for oversight and implementation of the entire nuclear fuel cycle from mining and milling to

waste management and disposal. Over the next several years, Minatom studied the problem and began to develop programs to deal with the Russian radioactive waste problem, declaring radioactive waste management as the top Russian priority. The legislative successes continued for several years culminating in the comprehensive Federal Program for the Management of Radioactive Waste and Spent Nuclear Material in 1995. This act was designed to "protect present and future generations and the environment from harmful effects of accumulated and generated radioactive wastes and spent nuclear materials."(Bradley, 1997)

These successes in government openness and oversight of the nuclear waste problem can be tied to several specific and promising accomplishments by the nuclear industry. By 1995, an aggressive waste vitrification program at the Mayak reprocessing plant had resulted in 220 million curies of high level liquid radioactive waste being vitrified. This total is equivalent to vitrifying 100 percent of the waste located at the Hanford site and 25 percent of the waste located at the Savannah River site in the United States. Additionally, as in the United States, the Russians are debating a location for a permanent geologic repository for their radioactive wastes. Two possibilities being studied are the Mayak region where a large amount of waste is already located and the permafrost region on the southern end of the island of Novaya Zemlya in the Arctic Ocean.(Bradley, 1997)

However, the commitment of the Russian government to an honest and open disclosure of the problem must be questioned at least at some levels of the national leadership. In late 1995 Russian security forces broke into the Murmansk offices of the Bellona Foundation, an organization studying the Russian Northern fleet radioactive waste management problem and its effects on the entire Arctic region. Computers, communication equipment and written material were confiscated. A second raid occurred one week later in Severodvinsk in the offices of a local environmental group. Nevertheless, having re-equipped their office in Murmansk the Bellona Foundation continues to study the waste problems of the Russian Northern fleet and act as unofficial advisors on the matter to the Norwegian government.(Perera, 1995)

In addition to their own efforts, the Russians have received both voluntary and requested international assistance in the area of radioactive waste management. The United States has played an

active role in ensuring the Russian federation has every chance of succeeding at credible waste management. The Cooperative Threat Reduction (CTR) program, a joint United States and Russian effort, has provided American funds to decommission five nuclear-powered submarines in 1998. Moreover, this program has committed funds for the decommissioning of four or five submarines during 1999. CTR is just one example of the commitment of the United States to aiding the Russian Navy in solving its radioactive waste problem.(Kudrik, 1998) Furthermore, geographic proximity has motivated Japan and Norway to also become actively involved in the Russian issue of radioactive waste. In 1993, an incident of dumping liquid radioactive waste in the Sea of Japan raised Japanese concerns. The Japanese and United States governments entered into negotiations to assist the Russian Pacific fleet with liquid waste processing facilities in the Pacific region. To the east, Norway had provided approximately \$20 million in free aid by 1996 to the Russian radioactive waste management industry. In late May 1998 agreements were reached overcoming several political hurdles involving liability and tariffs, which would allow the Norwegian government to directly aid in the cleanup of the Russian northern fleets leaking storage facilities for spent fuel on the Kola peninsula. This recent agreement funnels approximately \$60 million into the Russian radioactive waste management problem. In addition to economic aid, numerous Norwegian scientists such as those employed by the Bellona Foundation continue to study and document the scope and severity of the Russian radioactive waste problem. Additionally, a cooperative commitment of 17.3 million dollars by the Russian, American and Norwegian governments was negotiated to improve environmental conditions in the Arctic region with almost exclusive emphasis on radioactive waste concerns.(Bradley, 1997)

Recent achievements in Russia provide hope for the future. However, it is important to keep in mind the vast scope of the radioactive waste problem resulting from the Russian Navy's nuclear powered fleet. International concern and involvement is required as well as a continuing domestic policy of openness and sincere dedication to solving the radioactive waste issue within Russia. Although shipbuilding is at a lower rate than at the height of the Cold War, the continued production and operation of nuclear powered vessels make it imperative that credible radioactive waste

management practices are in place in the Russian Navy. The poor waste management practices of the Soviet regime during the Cold War have left a daunting legacy to the Russian federation and former Soviet republics.■

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## SOME THOUGHTS ON PROPULSION

by CAPT Michael Gouge, USNR-R

*Dr. Gouge is Head, Cryogenics and Superconductivity Group, Oak Ridge National Laboratory.*

I read with interest several articles in the October 1998 issue and can provide some technical comments. The first article, *Looking Forward—Submarines in 2050, Part Two*, by Mr. J.P. Buff, was thought provoking and interesting, especially the section on advanced propulsion. It is doubtful, however, given the volume constraints of deep-diving submarines, that fusion propulsion will be a feasible propulsion option for the foreseeable future. The physical limitations of magnetic fusion plants in terms of power density and other parameters were covered in reference 1. For inertial fusion, where a small, millimeter-scale, deuterium-tritium (DT) pellet is ignited by powerful lasers or heavy ion beams, the constraints are more severe. The proposed inertial fusion reactors run at a few to about 10 Hz (pellets/sec), so for 100 MW thermal power, this amounts to about a 10-50 megajoule explosion for each pellet injected (the interested reader can convert this into equivalent pounds of TNT). This requires a substantial containment chamber designed for pulsed loading that has to be cleared to vacuum conditions between each pellet injection. The high power lasers or heavy ion beams will require substantial auxiliary power for start-up as well as power conditioning systems; all these will require a large and unavailable interior volume. The radioactive tritium gas from the DT pellet will need to be recovered from the chamber exhaust, purified and recycled, which requires another large auxiliary system. The physics requirements for ignition of deuterium only (DD) fuel are much higher than the DT cycle.

Existing pressurized light water fission reactor technology results in a propulsion plant and related machinery that occupy about 50 percent of the interior usable volume of present nuclear attack submarines. If a smaller, general purpose attack submarine with significant warfare capability is desired, then substantial reductions in size will require new, innovative technology for the propulsion plant. A technology with promise for a revolutionary improvement in nuclear propulsion system performance in a reduced physical envelope is a high temperature gas-cooled reactor (HTGR) as the

heat source in a close gas turbine (Brayton) cycle driving an advanced electric propulsion plant.<sup>2,3</sup> The Navy has substantial experience with open cycle, gas turbine power plants in surface combatants. Gas-cooled reactors have an extensive operating history and a closed Brayton cycle plant using a non-nuclear heat source has been operated in Germany at power levels up to 50 MW. I would argue that the next bold step in submarine propulsion, aside from nuclear-AIP hybrids, will be from the advanced fission reactor area.

In a second article, *The All Electric Ship: Enabling Revolutionary Changes in Naval Warfare*, by Mr. R.E. Leonard and Mr. T.B. Dade, I would only emphasize that this technology can be integrated into the proposed closed Brayton cycle propulsion plant discussed above. Additionally, the U.S. Department of Energy has an ongoing program in partnership with industry to develop prototypes of electrical system components based on the new class of high temperature superconducting (HTS) materials. These include power transmission cables, MW-class transformers, motors and fault current limiters, all using HTS. In many cases liquid nitrogen or electric cryocoolers can be used to maintain operating temperatures in the range 20-100 K. This technology could be used in the second generation of all-electric, integrated power systems to allow even higher power densities than nearer-term components such as permanent magnet motors.

Overall, I was impressed by these articles and the technical opportunities on the horizon for the second century of service to our country. ■

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**ATTACK SUBMARINE DESIGN:  
LET'S WAKE UP AND WIN**

*by Richard Boyle  
Former Deputy Director  
Arctic Submarine Laboratory*

**F**ace it. Many submarine designers, engineers and operators think we've been building the wrong submarine for 30 years. Maneuverability has been neglected.

Last year a friend described maneuverability to a lady at a cocktail party I attended by saying: "A short fat submarine is more maneuverable than a long skinny one." The lady understood; why can't we!

When I was in Submarine School in 1953, one of our instructors pointed out that a small length to diameter (L/D) ration was important to maneuverability, and his words were imprinted on my brain forevermore. A quick review of L/Ds for body of revolution hulls:

Boat	Year	L/D	Boat	Year	L/D
Holland	1900	5.17	Albacore	1953	7.53
X-1	1955	7.09	Barbel	1959	7.55
Skipjack	1959	7.88	Thresher	1961	8.79
Sturgeon	1967	9.21	Los Angeles	1976	10.91
Akula	1985	8.00	Seawolf	1997	8.83
Severodvinsk	2002?	8.82	Virginia	2004	11.09

A submarine design should be predicated on its mission profile. Operational boundary conditions that affect size and maneuverability of a submarine destined to operate in shallow littorals include:

- Minimum water depth expectation for submerged operations with and without ice cover.
- Requirement to operate submerged in fresh water at the mouths of littoral rivers or in the Marginal Sea Zone (MIX) in summer.

Do we really want to skulk around in shallow littorals with Virginia, an ungainly \$2 billion 7800 ton<sup>1</sup> submarine 377 feet long?

Captain Ken Cox put the situation in perspective as follows:

"With its submerged displacement of [7800 tons] and an expected crew of 113, the [Virginia] is larger than the Polaris class SSBNs, which displaced 6888 tons and had a crew of 112 officers and men."<sup>2</sup> He continued: "What may be required is a blend of submersible platforms, not every one a *super submarine* [emphasis in original], to cover the span of anticipated missions, while at the same time ensuring sufficient number [emphasis in original] of submarines and qualified, motivated personnel to do the job."<sup>3</sup>

The Fourth Estate is grumbling. A recent article states that VIRGINIA is "designed to prowls the world's shallow coastal waters" in one uninformed breath and then wonders if we "may be preparing for a war that will never come."<sup>4</sup>

The Defense Science Board (DSB) Report of July 1998 recommends:

"[T]he successor to [Virginia] be 'large' ... [and] ... future SSNs must have adjuvant [serving to aid] systems recognized as SSN payload instead of being a substitute or extra class of ship..."<sup>5</sup>

Is it too self-deprecating to ask if we have lost our ability to match rational thought with objectivity? Do we really want to build larger, less agile, more expensive submarines in long production runs? We need some large submarines to carry heavy payloads, but doesn't it make sense to have at least one other class of smaller, less sophisticated, highly maneuverable, and cheaper submarines for littoral missions?

Part of the *attractiveness* of a long run of Virginias has been touted as *technology insertion*. All well and good as far as hardware flexibility goes, but no amount of technology insertion can improve maneuverability.

Do we really want to freeze hull dimensions of a big production run of long skinny submarines?

Who can doubt that agility in shallow littorals, with or without ice cover, requires a small, highly maneuverable SSN? One possible concept design was proposed nearly three years ago as Littoral Submarine LS-2;<sup>6</sup>

Length	248 ft.
Diameter	32.8 ft.
L/D	7.6
SUBD	4450 tons
SHP	12,500
Subm Speed	27 + knots

LS-2's extraordinary SHP-Speed combination would be made possible by an electric drive propulsion plant and contrarotating propellers.

ALBACORE was a revolutionary design which advanced maneuverability dramatically. Using the thumb rule that Tactical Diameter (TD) with standard rudder and "Plus +" stern is roughly four times ship length, let's compare ALBACORE with LS-2:

	L	L/D	TD+	TDx
Albacore	203.8 ft.	7.53	272 yd.	165 yd.
LS-2	248 ft.	7.56	331 yd.	201 yd.

With an X-stern, ALBACORE's TD was only 2.4 times ship length: TDx was 165 yards. (For the sake of simplicity, we have assumed that TDx relationships for the two submarines are linear. TDx for LS-2 is therefore a rough estimate.)

The DSB Report lists a Navy Role as "littoral sea control ...,"<sup>7</sup> but does not mention ice cover. In winter, ice covered shallow littorals of the Northern Hemisphere are interspersed throughout peripheral seas as low in latitude as 45° N on both sides of the globe, e.g., Gulf of St. Lawrence and Sea of Okhotsk.

**When the last Sturgeon class submarine is decommissioned, we will lose all capability under ice in shallow water.<sup>8</sup>**

Using the 4 x L thumb rule for VIRGINIA (with Plus+ stern), we come up with a TD of 500 yards. This is not good enough for a shallow water transit under ice.

**"The immediate goal would seem to be ... to develop a highly maneuverable submarine that can transit [emphasis added] under ice in shallow water. This would ensure U.S. dominance in shallow, open water littorals and restore operational/surveillance capability in MIZ shallows."<sup>9</sup> [Emphasis added.]**

A recent analysis came up with a sobering assessment of future force levels: "[With] the expected low-rate production of the Virginia SSNs, and continued accelerated decommissioning of the Los Angeles-class ships, by 2025 the Navy submarine force will [be] ... perhaps no more than 33 submarines..."<sup>10</sup>

The DSB Report recommended "more, not fewer SSNs."<sup>11</sup> We are faced with the challenge of maintaining the 50 SSN force level mandated by the 1997 Quadrennial Defense Review. Large submarines are very expensive. Inclusion of smaller, cheaper submarines as part of a high/low mix seems to make a lot of sense fiscally as well as operationally.

As we look to the future, let's face up to the need for more than one class of attack submarine, and:

- Initiate design now of a prototype shallow water SSN which is highly maneuverable, functionally simple and relatively inexpensive.
- Accelerate development of electric propulsion now and integrate the concept with plans for the prototype.

## NOTES

1. Barbara Graves and Edward Whitman, "The Virginia-Class—America's Next Generation Submarine," *Undersea Warfare*, Winter 1998/1999, p. 2.

2. Captain Ken Cox, USN(Ret.), "Horses and Boast: Thoughts on the U.S. Submarine Force in the 21<sup>st</sup> Century," *The Submarine Review*, October 1998, p. 127, Footnote 5.

3. *Ibid.*, p. 127.

4. Mark Thompson, "That Sinking Feeling," *Time*, 8 February 1999, p. 34.

5. *Report of the Defense Science Board Task Force on Submarine of the Future*, Office of the Under Secretary of Defense for Acquisition and Technology, July 1998, p. 24.

6. Richard Boyle, "Bound in Shallows and Miseries?," *USNIP*, October 1996, p. 54.

7. DSB Report, July 1998, *op.cit.*, p. 12.
8. Richard Boyle and Waldo Lyon, "Arctic ASW: Have We Lost?", *USNIP*, June 1998, p. 34.
9. *Ibid.*
10. Scott C. Truver, "The Virginia-Class New Attack Submarine," *Sea Power*, January 1999, p. 48.
11. DSB Report, July 1998, *op.cit.*, p. 4.

### **DOLPHIN CALENDAR CARTOON CONTEST**

The Dolphin Scholarship Foundation has begun its annual search for cartoons to be published in the 2000 Dolphin Calendar. This will be a special commemorative edition celebrating the Centennial of the Submarine Force. In an effort to highlight this special event, DSF hopes submitted cartoons will have an emphasis on *historic* humor.

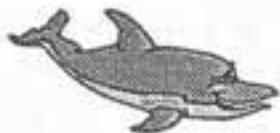
Entries and questions should be directed to:

Karen S. Sykora

Dolphin Scholarship Foundation  
5040 Virginia Beach Blvd., Suite 104-A  
Virginia Beach, VA 23462

(757) 671-3200 E-mail: [dsf@3xis.net](mailto:dsf@3xis.net)

Entries must be postmarked no later than May 31, 1999.



**SHIFTING FROM BLUE TO BROWN:  
PURSUING THE DIESEL SUBMARINE  
INTO THE LITTORAL**

*by LT John Vlattas  
Navigation Officer  
USS SALT LAKE CITY*

*Editor's Note: Lieutenant Vlattas' paper won The Naval Submarine League Essay Contest for Submarine Officers' Advanced Class 98060.*

In its 1992 White Paper, "...*From the Sea*", the United States Navy's mission was defined as "providing the initial, enabling capability for joint operations."<sup>1</sup> In more precise terms, the Navy's role in the joint arena was to project power into the littoral sea in order to open a "door through which the heavy ground and air forces required to overwhelm the enemy would pass."<sup>2</sup> As part of this strategy, the U.S. Submarine Force and its nuclear powered attack submarines (SSNs) would play an integral part in securing the dominance of the undersea battlespace.

In the years hence, drawing from countless years of experience obtained from real-world operations and training exercises, the Submarine Force has become adept at operations in waters less than 100 fathoms deep. Our experiences in the Persian Gulf, South China Sea, and Adriatic Sea have matured capabilities in mission areas such as intelligence and warning, special forces insertion, and strike warfare. But having said this, the Submarine Force has neglected to devote the necessary operational and training resources to what many consider to be a core competency: undersea warfare (USW) against a proficient diesel submarine operating in the littoral environment.

The Submarine Force remains focused on the same paradigm: blue water USW predominately against the 3<sup>rd</sup> and 4<sup>th</sup> generation SSN or SSBN. The vast majority of submarine approach and

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<sup>1</sup>...*From the Sea: Preparing the Naval Service for the 21<sup>st</sup> Century*, September 1992.

<sup>2</sup>LCDR Kevin Peppe, *Submarines in the Littoral*, U.S. Naval Institute Proceedings, July 1993, p. 46-48.

attack exercises continue to be conducted on *nuclear* submarines and when they do involve the *diesel* submarine, the platform is usually simulated as a non-proficient diesel with limited or non-existent USW weapons and acoustic-intercept capabilities. It is important to note that the failure here is two-fold. Not only are exercises weighted in favor of one target over the other (SSN/SSBN) versus proficient diesel), but when conducting USW on the simulated diesel, these exercises are normally done in a blue water environment where the adverse acoustic characteristics of the littoral sea are not at issue. In so doing we take one of the inherent advantages away from the *third world diesel*, the added stealth and security that the diesel obtains while operating in the littoral sea.

To insure the supremacy of the Submarine Force in the realm of littoral USW, a new operational and training paradigm needs to be developed. The distinct worlds of anti-diesel USW and littoral operations must be merged and put into practice. In short, there is no better way of learning than in doing. The training program and POM cycles must allow the SSN to venture into the shallow water environment to conduct USW against real-world adversaries. But training alone in the littoral sea may not be enough. We have to consider that Sun Tzu's adage of "Know the enemy and know yourself and in a hundred battles you will never be in peril,"<sup>3</sup> may ring true; that to be able to understand and counter a threat one should be able to pose that threat oneself. In the case of submarine warfare, this means developing the expertise to operate and tactically utilize the high-end diesel submarine. To develop this expertise the U.S. Navy should therefore purchase several high-end diesel submarines and integrate them in the force structure to act as the real world OPFOR (opposing force).

### The Diesel Submarine Threat

In February of 1996, the Office of Naval Intelligence released a report warning of the potential threat to U.S. forces from submarine proliferation. The report, *Worldwide Submarine Challenges*, noted that the threats posed by submarines "are more

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<sup>3</sup>Samuel B. Griffith, *Sun Tzu: The Art of War*, Oxford University Press, London, p. 84.

diverse and more complex than at any time during the Cold War." General John Shalikashvili, the then chairman of the Joint Chiefs of Staff, said in the report that continued proliferation of capable, quiet diesel submarines was a "serious concern to joint planners." There are currently more than 150 submarines in the navies of potentially unfriendly nations outside of Russia. Forty-five of these are modern, non-nuclear types. An additional forty-five more submarines are on order worldwide, principally from Russian and German shipyards. By 2030, it is projected that 75 percent of the submarine inventory in the rest of the world will exhibit advanced capabilities.

Many of these potentially adversarial third world countries have made these submarines into the capital ships of their navies. Submarines are the ideal weapons for states which lack, or cannot afford the capability to assert sea control in their own (or others) waterspace. They are desired because they are a cost effective platform for the delivery of several types of weapons; they counter surface forces effectively; they are flexible, multi-mission platforms (e.g., anti-surface warfare (ASUW), special forces, intelligence and warning, and ASW); they are covert and thus can be deployed with minimum political ramifications; and finally, they can operate without supporting escorts. The subs, which cost as little as \$200 million each, provide developing countries a capacity to hit even the most sophisticated Western ships and land targets. Since diesel subs are most effective in areas where ships have little room to maneuver, they pose a particular challenge to the U.S. Navy in critical areas such as the Persian Gulf and other shipping *choke points*.

The utility and effectiveness of even a moderately proficient submarine in a maritime conflict was demonstrated in the Falkland's War. On the British side, HMS CONQUEROR's sinking of GENERAL BELGRANO forced the Argentine Navy to retire to its bases, greatly complicating Argentinean efforts to keep control of the islands. Conversely, as told by the U.S. Navy's Summary report:

\*The Argentine submarine SAN LUIS was at sea, and at times in the area of the British force, for an estimated 36 days. The threat from the Argentine submarine was a continuous concern for the British Task Force commander,

and numerous attacks were made against suspected submarine contacts, with a large number of ASW weapons being expended. In any event SAN LUIS survived all British efforts.<sup>4</sup>

In short, the presence of one enemy diesel submarine significantly thwarted the tactics of a first world naval armada.

In addition to their rapid proliferation, the conventional submarine is undergoing a technological transformation. The diesel submarine has historically had two fundamental weaknesses relative to its nuclear counterpart—a lack of mobility and the requirement to recharge its battery. Air independent propulsion technologies in the form of the Stirling engine and the closed-cycle diesel are already a reality in the form of the Gotland class submarine. The goal of air independent propulsion is “to provide 100-400 [kilowatts] of power to allow slow speed operations (4-6 knots) for extended periods and still maintain the battery charge.”<sup>5</sup> These systems will allow 30 to 50 days of submerged endurance without surfacing or snorkeling. For the submarine that is in a defensive mode—not needing to travel great distances or operate at high speed—these technologies give the diesel submarine the endurance of the nuclear submarine in a regional theater. If we combine these propulsion technologies with a modern sensor suite and capable USW weapons the *third world diesel* achieves effective parity with the nuclear submarine.

### The SSN, The Diesel and the Littoral Environment

The combination of air independent propulsion, modern sensors, and weapons make the 21<sup>st</sup> century conventional submarine a potentially lethal adversary. When we combine this platform with the shallow water environment we generate a scenario that leaves no margin for error. The SSN that ventures into the littoral sea to conduct USW against such an adversary will face a negligible

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<sup>4</sup>*The South Atlantic Conflict Lessons Learned (Vol. II)*, March 1983, Report of the Falklands Islands Study Group to the Secretary of the Navy.

<sup>5</sup>Fitzgerald and Benedict, “Air Independent Propulsion Systems,” *Naval Engineering Review*, No. 230, p. 35.

acoustic advantage. The diesel submarine will provide low target strength, smaller sizes to ping on and consequently lower returns. When in motion it will have a lower electronic signature, minimal cavitation and produce little Doppler. In addition, the shallow water environment will produce high fast-contact rates due to higher ambient sea noise, ray-path bending and reflections, and bottom debris. The shallow water zones close to shore will be areas where fresh water from estuaries mixes with the ocean water, creating unpredictable layers with gradients not seen in the oceans.<sup>6</sup> More than likely, the area will be unsurveyed since the Navy's third world environmental database is not very large or up to date.

It is into this environment that the SSN will be sent and expected to succeed. In order to ensure this success the SSN commander and crew must be given the opportunity to train against this potential scenario. Most of the Pre-Overseas Movement Certifications (POMCERTs) and Tactical Readiness Exercises (TREs) that evaluate the combat readiness of our SSNs involve approach and attack scenarios that are executed on existing ranges which are principally in deepwater. Submarine attack parties must have the opportunity to train in realistic environments against real-world targets. It is only in this way that the submarine can be ready for the difficult nature of the shallow water, anti-diesel problem.

The means of achieving this are twofold. First, submarine training must elevate the shallow water, diesel problem to an equal footing with that of the modern nuclear submarine. In all likelihood, this is the scenario that will be encountered in the real-world. Attack centers and their computer modeling must be adapted to correctly reflect the shallow water environments. SSN need the opportunity to test diesel approach and attack tactics in the littoral environment. This may mean investing the necessary funds to allow these submarines to use these ranges or construct additional shallow water test ranges to meet the training requirements.

Second, the SSN must be provided with a real-world target. The use of another nuclear powered submarine in these training scenarios is unrealistic. Although the nuclear submarine can

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<sup>6</sup>K.T. Madsen (Cdr., Royal Danish Navy), "Fighting Time Coast," U.S. Naval Institute Proceedings, August 1996, p. 28.

imitate a diesel's operational patterns, it is hampered in its ability to mimic the true adversary because of its size and design. The nuclear submarine is four to ten times larger than its conventional counterpart. At best, a nuclear powered submarine with anechoic coating might be able to simulate an uncoated diesel submarine. The design of the nuclear submarine also prevents it from being as maneuverable in shallow water as the diesel and make it unable to perform tactics such as bottoming which will be a part of the *bag of tricks* that any proficient diesel force brings to the table.

The only way for a commander to gain an understanding of diesel tactics is to actually hunt an operational diesel submarine. Today, we do this by relying on friendly nations through bilateral exercises. Unfortunately, these training opportunities are extremely limited and normally occur when the SSN is already deployed, the time when her commander and crew are supposed to be at their peak readiness. It is also unrealistic to think that even the friendly-nation diesel will expose its full range of tactics to the U.S. submarine. For these reasons, the purchase of a small cadre of diesel submarines to serve as aggressors should be considered.

Indigenously constructing these submarines is an unrealistic scenario, but purchasing a high quality, top of the line diesel submarine such as the German Type 209 or Swedish Gotland is easily accomplished. For the price of one NSSN, the United States could purchase four to six of these platforms and distribute them evenly between the Atlantic and the Pacific under the command of the development squadrons. In this environment they could be used not only as training assets for the U.S. submarine and surface fleets, but as part of the Navy research and development efforts on USW weapons and countermeasures. Manning of these platforms is 20-25 percent that of a Los Angeles class submarine and innovative manning schemes like that of the dual crew system of the SSBN force could be used to minimize impacts on the crews and maximize operational time.

Some will argue that the presence of only four to six aggressor submarines will provide minimal training value to a fleet of 55 attack submarines, but even a one or two week training period with one of these platforms in a shallow water environment will be beneficial to the SSN and certainly is better than experiencing the shallow water diesel problem for the first time while on deployment. Supplemented with bilateral exercises from our allies and

the experience garnered by the officers and crews who will man these platforms, the knowledge and tactics developed will provide a knowledge base that will rebuild our core competency in littoral USW operations.

### **Conclusion**

No navy in the world today has the submarine or naval resources necessary to successfully challenge U.S. dominance in any littoral sea, and, more than likely, no navy will be in that position anytime in the near future. Nonetheless, it is essential for the U.S. Navy to study the potential benefit of acquiring a force of diesels, in order to effectively counter the real-world threat. The U.S. Submarine Force is by far the strongest and best equipped fleet in the world today, and it will remain so well into the next century. We became this way by identifying the threat and dealing with it. The shift from blue water operations to littoral operations has changed some of the Submarine Force's priorities and will continue to do so in the years to come, but if the Submarine Force maintains the focus on its core competencies there is no reason to believe that we will not be a successful in the *brown waters* of tomorrow as we are in the blue waters of today.■

#### **1999 NSL DIRECTORY**

The following name and address was inadvertently left out of the Directory:

Christopher W. Dueker, M.D.  
37 Ringwood Road  
Atherton, CA 94027

## HAVE WE CROSSED THE LINE?

by LT Jeff Pearson, USN  
Navigation Officer  
USS FLORIDA (SSBN 728)(Gold)

*Lieutenant Pearson's essay was written while a student at the Submarine Officers Advanced Course 98050.*

As the submarine draws closer to the equator, Davy Jones does not appear on board with a message for the captain from His Majesty, Neptunus Rex. When the navigator reports "the ship in on the line", King Neptune and his court do not appear. Shellbacks (those members of the crew who have previously crossed the Equator) are not recognized and pollywogs (those members of the crew who are crossing the Equator for the first time) are not called forward to begin the *right of passage*. Instead of the grand ceremony marking the momentous occasion, a IMC announcement states, "We have just crossed the Equator. Stop by the ship's office for your shellback certificates."

We are not certain as to why the customary pollywog to shellback initiation did not occur, but the possibilities included an underway schedule not allowing time for the ceremony, the fear of a perceived hazing incident, belief that it is not appropriate in today's Navy, or operations precluding this type of celebration. Whatever the reason, there are several strong arguments for retaining the *Crossing the Line* ceremony, including tradition, morale, crew cohesion, a sense of accomplishment, and esprit de corps.

### Tradition

The *Crossing the Line* ceremony goes back hundreds of years, is prevalent in many different societies, and is found in both military and merchant navies. As tradition goes, Neptune, the mythological god of the seas, was appeased by the seamen, and marks of respect were paid to those of his underwater domain.<sup>1</sup>

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<sup>1</sup>VADM William P. Mack, USN(Ret.), LCDR Royal W. Connell, USN, *Naval Ceremonies, Customs, and Traditions*. Naval Institute Press, Annapolis, 1980, p. 186.

Today's initiation is typically well supervised and controlled, mild in comparison to the cruelties and inhumanities of the past. Traditions have always had a very strong influence on our service and members; providing the framework upon which our military is built. These traditions should not be dismissed lightly.

### **Crew Cohesion**

Prior to *crossing the line*, the crew is divided; one group being shellbacks and the other group being pollywogs. The shellbacks prepare the ceremony in secrecy while the pollywogs anticipate what rituals and activities will be required to make the transition. The ceremony acts to bring the two groups together through the various phases of the event, culminating in an entire crew of shellbacks. The crew emerges as a more unified, cohesive group.

### **Morale**

The boost in morale from this event can be quite substantial. The crew will prepare and plan for the ceremony weeks in advance and it will be the subject of conversations for days afterward. The ceremony can make an otherwise long, uneventful, and unremarkable at-sea period one in which the crew will remember and cherish for many years. When administered with the proper level of supervision and within the limits of good order and discipline, the initiation can have a positive influence on the entire crew's morale.

### **Sense of Accomplishment**

At the completion of the ceremony, the entire crew has a sense of accomplishment. The shellbacks have prepared and executed the rite of passage that transformed all pollywogs on board into shellbacks. The pollywogs have successfully participated in the required events leading to their designation as a shellback; resulting in a more seasoned and experienced sailor.

### **Closing**

Arguments exist for letting the *crossing the line* ceremony fall by the wayside. Some will say that in today's technically advanced

Navy, there is no place for a ritual based on mythology. Others will contend that the initiation process might be perceived as hazing, and that even a perception of hazing is unacceptable. I believe *the crossing the line* tradition has a valuable place on board a submarine. The process must be well planned out utilizing senior involvement. Specific attention to detail will ensure a safe environment to minimize the possibility of personnel injury and equipment damage. Adequate supervision must be present during the ceremony to ensure hazing incidents do not occur. USS JOHN C. STENNIS recently conducted a *crossing the line* ceremony and their home page has an article describing the event. Included with the article is a picture of the Battlegroup Commander participating in the activities. STENNIS obviously had the right supervision in place to ensure a successful ceremony.

If performed properly within set limits, the ceremony can boost morale, bring the crew closer together as a team, give them a sense of accomplishment, and build esprit de corps.■



## INVOCATION AT NARWHAL DEACTIVATION

by Reverend E.S. Kellog, III

*Reverend Kellog is a retired submarine officer. While on active duty he was Reactor Officer in ENTERPRISE and commanded both NARWHAL and FULTON. He is now Rector of Saint Phillip's Episcopal Church in Lemon Grove, California.*

Lord God, we feel blessed by you this day, in this setting, with so many friends, shipmates, and loved ones around us. As we think back over the many, many accomplishments of NARWHAL, we realize that they were made possible not by the strength of her construction, but by the strength of the men who sailed her, and, along the way, by the many, many sacrifices of their families. We also realize that you, Lord, have been part of all of this, that you were there with them in their high-jinks as well as their camaraderie, in their goofs as well as their exploits, in their terrors as well as their triumphs; that somehow you smiled on them as you smiled on their ship, allowing the good times to far and away outnumber the bad ones. And so, as we give thanks for the men who have taken her critical and shut her down, who have taken her out and brought her back, who have submerged her and surfaced her every time, and for their leaders from Matson to Bock, and give thanks for the faithful families of these same men, many of whom are here today, we also give thanks to you, Lord, for sustaining all of us throughout her valiant history. AMEN■



## KEEPING OLD BOATS

*by Elizabeth P. Boriszek  
Baltimore Maritime Museum*

As the year 2000 approaches we look to a more advanced and sophisticated fleet of naval submarines—faster, quieter, extreme efficiency and performance—providing military platforms unlike any submarines of yesteryear. A sure defense for American naval forces both in peace and war.

Prior to the development of stealth aircraft, submarines provided naval warfare of awesome sort. Unseen and able (though with limitations) to approach a target and destroy such, it was the use of submarines that helped gain victory in World War Two.

As more advanced propulsion systems (nuclear) were developed and ballistic missiles were added, the Submarine Force gained extensive strength and today provides an excellent deterrence force.

With continuing advancements in electronics and computers the way is being paved for a Submarine Force unlike any considered in the past.

Yet today's Submarine Force had a quite humble beginning. The boats were slow, shallow diving, and at times difficult to maneuver.

A definite advancement came with the standard fleet boats. Consisting of three major classes, they all were built with minor differences.

It was during World War II in the Pacific theater that American subs proved their worth. Over 50 percent of enemy vessels were sunk by American submarines.

Unfortunately, faulty torpedoes were an extreme hindrance. Perhaps if they could have been replaced with functional weapons sooner, the conflict may have ended quicker. Perhaps even the use of the atom bomb may have not been needed.

In our nostalgia, we wish to preserve those things tying us with yesteryear as supporters of and/or members of our Submarine Force. To us the preserving and presenting of old boats is of significant importance.

Unlike periscopes and/or instrument panels retrieved from old boats placed at random in museum buildings, a retired submarine containing nearly all equipment, as when in service, provides the visitor a genuine feel of life aboard. Pictures, written text, even

the in depth testimony of veterans cannot provide the feel and true realization which can be gained when aboard an old boat.

When first seeing the boat's exterior, one is keenly aware of a definite difference in overall structure—low profile, long slender roundish hull, and little above deck structure.

The very sight of a submarine can stir a passerby's curiosity.

Once below, the smell of diesel oil and machinery is ever so present—even at times offensive to those not familiar with these extreme—close quarters and need to step over the high thresholds and literally squeeze through the 2x3 bulkhead openings provides a challenge even for limber folks. Here within the confines of these *fighting fish* one can realize the hardships of life aboard and hence gain a greater appreciation for those who risked their lives to gain a sure victory over the enemy.

Unlike duty aboard surface craft, subs proved a world apart from standard life aboard ships. They are confining, windowless, extremely technical and require full cooperative teamwork among their crews. Once beneath the surface the danger of going too deep is imminent. Regardless of sophisticated and state-of-the-art equipment a vessel could become a loss. Once below rated depth a submarine and crew falls victim to the severe forces of pressure.

Many submariner's final resting place is within the hulk of their boat. They gave their all to serve their beloved homeland. To honor and memorialize such brave souls and workhorse vessels, old boats make most adequate memorials.

Retired old boats, while costly to maintain and needing dedicated persons, both paid staff and volunteers, continue to provide a much needed service to today's modern and elite Sub Force.

These aging vessels allow those who served on subs to remember vividly times of victory, struggle, fear, and even old shipmates.

They provide the non-experienced visitor an insight into history and a deep appreciation for those who served. They also provide an excellent tool to support the modern Submarine Force by making people aware of just how important a strong naval Submarine Force is to our nation. Most of all they provide a sure platform for continuance of our proud submarine legacy.

There are only about 20 subs on display—about a dozen of which served in World War II. The only nuclear boat on display is USS NAUTILUS (SSN 571). For the other nuclear boats only

parts such as sails or props are on display.

Yet the old boats provide perhaps a more in-depth view of true history and submarine legacy.

As supporters of and/or crews of our proud Submarine Force it is quite important that these workhorses, once proudly traversing dangerous waters, receive our support. For when those that served aboard are no longer among us it is these old boats that will speak for them best speak to those who serve on today's mighty ballistic missile boats. Those on the premiere Seawolf class boats and the children of tomorrow's sub crews. The Submarine Force legacy lives on, lives on quite strongly within the dank dim confines of old boats.

Being an enthusiast of submarines in general and doing volunteer work aboard USS TORSK (SS 423) I've come to deeply care for her and other old boats and for this purpose the article was written.■

## **REUNIONS**

### **USS BUMPER (SS 333) ASSOCIATION**

November 4-8, 1999 at Holiday Inn, Kingsland, GA.

Contact: Edward W. Stone, 308 Merritt Avenue, Syracuse, NY 13207-2713.

E-mail: [ews\\_w2eer@juno.com](mailto:ews_w2eer@juno.com).

**USS PICUDA (SS 382)** October 10-12, 1999 in New

London, CT. Contact: Mike Wingeir, 656 Akins Road, Atoka, TN 38004, (901) 837-8610.

E-mail: [sanktbernie@aol.com](mailto:sanktbernie@aol.com)

**USS ROBERT E. LEE (SSB(N) 601)**

September 24-15, 1999 in Silverdale, WA. Contact:

Rick D. Stubbs, P.O. Box 10, Cawker City, KS 67430, (785) 781-4340.

**USS SEAFOX (SS 402)** November 2-6, 1999.

Contact: D. Smith, 6935 Carlisle Court, Apt. C-220, Naples, FL 34109-6883, (941) 596-1686.

## DOES YOUR SUBMARINE HAVE DIVE BRAKES?

### MINE DID!

by LCDR Jack Hunter, USN(Ret.)

**A**nd does your submarine have a dorsal rudder, contra-rotating propellers, no bow/sail planes, a combined rudder/stern planes, and *slippery water* outlets? Well, mine did. My submarine was USS ALBACORE (SS 569) and she was a test bed for these and other novel ideas. She had been constructed with a series of major modifications (phases) planned in advance to test different submarine concepts.

Built at the Portsmouth Naval Shipyard, ALBACORE was the yard's pride and joy and was treated with loving care during her many modifications. ALBACORE was in the fourth and final planned phase of major modifications when I joined her as Ops in 1966. The following paragraphs briefly discuss some of the different features of this unique boat.

The installation of a high capacity silver-zinc battery as part of the Phase 3 modification package gave ALBACORE the capability (at the one hour rate) to run faster than a Skipjack class SSN, thus making ALBACORE an ideal platform to examine potential high speed ship control problems. The most apparent problem occurred when rudder movements would induce sudden and significant roll angles. Several different systems were tried on ALBACORE to counter the rudder-induced snap roll. One was mounting a dorsal rudder at the end of the sail. On turns, the dorsal rudder was moved opposite to the conventional rudder. While it was effective in countering the snap roll, the large dorsal rudder created a lot of drag and greatly slowed the boat. A more effective system was that of limiting the amount of rudder motion. When running at speeds greater than 20 knots, a scaling system was activated that reduced the normal 30 degree maximum rudder angle to 5 degrees. A similar system was installed on later submarines.

Loss of depth control at high speeds could greatly reduce the time available to initiate recovery actions. To improve recovery chances, a series of ten large hydraulically operated doors (dive brakes) were arranged around the hull aft of the sail. Should depth control be lost at high speeds, the brakes would decelerate the boat by rapidly increasing hull drag. Opening like scoops into the water flow, the brakes were fully extended within seconds of activation

by the combination of hydraulic system and water pressure. While the concept proved effective, the brakes weren't considered feasible because the water flowing past the doors at high speeds tended to pop them open.

The four planned phases of modifications introduced some unique systems on ALBACORE. Her bow planes were removed and the conventional cruciform rudder/stern plane combination was replaced by four large control surfaces arranged in an x-configuration. The resulting steering and diving system used two airplane yoke-type controls in place of the old large hand wheels, a great improvement, and was the first integrated version of the airplane cockpit in a submarine. Rudder and stern plane commands were electronically resolved and the four control surfaces were individually positioned to produce the desired rudder/plane effects. The boat was very responsive, even at periscope depth.

As part of the Phase 4 modification, ALBACORE's single propeller was replaced by two contra-rotating propellers for greater propulsion efficiency. Spacing between the propellers was initially set at 10 feet. After engineering trials, spacing was reduced to 7.5 feet and later to 5 feet. (ALBACORE's propulsion arrangement was unusual in that when running on the surface, the boat's *ahead dead slow* speed was 7.5 knots!) Only USS JACK (SSN 605) was built with the x-stern and contra-rotating propellers.

The *slippery water* project was being setup at the end of my tour in 1968. Special tanks, pumps and piping was installed in the bow compartment for mixing and distributing a polymer solution out to ejection rings around the hull at the bow and sail. The solution served to promote increased laminar water flow over the hull, thereby reducing drag. Since only a limited amount of the polymer could be carried onboard, its use was viewed as a way to provide a short burst of speed. I left ALBACORE before the trials were run so I am unsure of the test results. I understand that, with this solution, ships speeds were reached at lower shaft rpm.

Duty on ALBACORE was highly prized. She was a good boat, had an excellent crew, and did a lot of interesting things with systems that most people never heard of, like the FAB. But that's another story. To top it off, she was a heck of a feeder. Her major weakness was her high speed Jimmy pancake engines which treated her dedicated enginemen badly.■

DIVINE SERVICE à la WHALE ISLAND

GUNNERY SCHOOL, 1928

by CDR Richard Compton-Hall, RN(Ret.)

There are still submariners around whom, at one time or another and much against our will, were exposed to gunnery and parade-ground drills of the type exemplified at full volume by the Royal Navy's Gunnery School HMS EXCELLENT at Whale Island. Here, deafened by their own excesses, leather-lunged gunnery officers and gunnery instructors (known as GIs, but definitely not from the New World) had their own way of phrasing orders connected with the noisier kinds of weaponry.

Only three submarines, anywhere, were equipped with really big guns of the type beloved by Whale Island—HMS M1, M2, and M3; and, of those, M1 alone, completed in 1918, retained her 12 inch Mk IX monster taken from an obsolete battleship and sawn off short. Her sisters were converted, with almost indecent haste, to a seaplane carrier (thereby inspiring the Japanese Navy) and an experimental minelayer respectively.

Gun drill by the book (CB 1475) on board M1 was everything a pukka gunnery officer could desire: *At the order "Test safety and loading gear", No. 1 opens the loading door and orders "Out tray". No. 2 should find this impossible and reports accordingly.*

And so on. Anything wrong should be *impossible* in gunnery language. Gun action in a submarine equipped with one quarter of a 19<sup>th</sup> century pre-DREADNAUGHT's main armament must have been wonderful to watch—from a distance. There were sundry mishaps, some of them verging on vaudeville comedy.

For example, during a practice off Portland the able seaman director-layer, his mind fully occupied with the forthcoming seduction of a young lady at the ship's company dance that night at Weymouth, neglected to check the hinged tampion open before firing. And (although this should have been *impossible* of course) the firing-switch interlock failed to do its job.

The gun was wire-bound, meaning that it had an inner rifle-tube strengthened by massive wire binding, the whole being encased by the visible barrel; and the sleeve of the tampion was connected to the business end of the wire binding. When the layer pressed the trigger the tampion opened alright, closely pursued by an 863 pound shell; but after the tampion went the wire, fathom after fathom of it.

In a moment the submarine found itself securely anchored by its own gun. There was no tool on board which could cut the wire quickly, and it was many hours before M1 was free. The able seaman gunner evidenced no shame for destroying his ship's main armament, but he was devastated by the blame laid on him, by crew and girlfriend alike, for the submarine returning to harbor too late for the dance.

HM Submarine M1 was the subject of many good-natured jests which were not entirely dispelled—such as the necessarily greyish nature of submariners' humor—when she sank with all hands after being accidentally rammed on 12 November 1925. Anyway, the Gunnery Branch in general was a legitimate butt: after all, a prime reason for joining submarines at Gosport at the beginning, in the early 1900s, was to distance oneself from Whale Island at the opposite end of Portsmouth Harbour.

It was also allowable for submarines officers to chivy the local chaplain from time to time if he was deemed sufficiently resilient. Thus arose, from the submarine depot ship HMS TITANIA on the China station in 1928, the following version of *Drill for a Church Mk 1*.

### *Drill for a Church Mk 1*

The Church's crew consists of 17 men:

The Vicar

The Verger

2 Church wardens

The Organist, assisted by a body of men numbering 12 who, for drill purposes, will be known as The Choir.

#### On the Order "Number":

The Vicar will call "One"; the Verger will call "Two"; the Organist will call "Three", and so on in succession to the left.

#### On the Order "Close Up"

The Vicar only, moving at the double, will repair to the Vestry, where he will provide himself with a surplice and cassock, and the necessary gear of office, on completion of which he will return to the church and place himself in the rear of the lectern.

The order "Close up" having been given, the remaining numbers will close up as follows: the Verger, providing himself with a

cassock, will place himself at the west end of the aisle. The Churchwardens will take position in the pews as detailed. The Organist will provide himself with the necessary music, and place himself, or take up his position, in rear of the organ. The Choir, having provided themselves with cassocks and surplices, will take position in the choir pews—six on each side, facing inboard.

#### Duties of the Church's Crew

The Vicar, who is responsible for the correct working of the church, inside and out, will conduct himself in a priest-like manner.

The Verger is directly responsible for the correct working of the church, inside and out, also for the prayer books, etc. He should acquaint himself with the various members of the congregation and their positions when closed up for service.

The Organist will be responsible for the correct working of the organ, and is directly responsible to the Vicar for the training and singing of the Choir.

The Choir, under the Organist, are responsible for the harmony of the church, and should make it their duty to sing in tune as well as in a loud and audible manner.

#### At the Order "Cast Loose"

All Members will first clear away any obstruction in the way of working the church.

The Vicar will double into the Vestry and see all his gear handy, should he require it at any time. He will see his altar clear, bookmarkers correct, lectern and pulpit. When called on for his report, he will report: "Altar ready. Lectern and pulpit cleared away. Vicar's clock in hand."

The Organist will double down below, and open up the pressure to the organ, at the same time giving the caution: "Stand clear of the stops." He will then see that his power is adjusted, and will run his organ through the full limits of the scales, both treble and bass and, in conjunction with the vicar, will test all church communications. When called upon for his report, he will report: "Organ cleared away and in power. Air pressure opened. Mirrors focused, power adjusted. Music ready. Communications correct."

The Verger will first go outside the church, see the tombstones cleared away and upright, and clear away any obstruction in the way of the congregation. He will then return to the church, see

everything in the *cleared away* position, font full and Hymn Tell-Tales correct. When called upon for his report he will report: "Outside cleared away. Tombstones upright. Inside cleared away. Font full. Hymn Tell-Tales correct."

The Churchwardens will provide themselves with bags or plates and side-arms for collecting the offering.

#### At the Order "Test Safety and Interlocking Gear"

The Organist will try to play his organ with all the stops in. This should be impossible. He will then endeavour to play without the Choir or Congregation. This should also be impossible.

The Vicar, in conjunction with his crew, will endeavour to sing the *Te Deum* before the Psalms. This should also be impossible.

#### At the Caution, "Hymn Number..."

The Congregation will seize their hymn books, and the Choir only, rising as one man and glancing at the Hymn Tell-Tales, will open their books at the right place.

The Organist will now perform the first two bars of the tune upon the organ, upon the conclusion of which the Congregation will rise.

Taking the lead from the Vicar, the Choir will sing the hymn as before detailed, the Congregation joining in as convenient.

The Service will be carried out as per drill book, the Vicar completing the same with a Sermon or address in accordance with the Regulations and Instructions for the Clergy.

#### At the Order "Cease Fire"

The Vicar will at once adopt the quickest possible method of concluding his sermon, at the same time stopping his Vicar's clock.

The Service having been completed, the "Secure" will be sounded by the Organist.

The Vicar, leaning his body slightly forward, will then step off with his left foot and lead the Choir out to the Vestry to a suitable accompaniment by the Organist. Whereupon the Congregation will rise, collect their impediments and, in an orderly manner, will leave the church by the shortest possible route.

The Organist will then shut off pressure to his organ and see that it is left *In Hand*. He will then proceed to the Vestry, muster the Crew, and report to the Vicar, who will give the order for them to be dismissed.■

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## LETTERS

### MORE ABOUT GHOST OF WAR

28 February 1999

Editor: I strongly endorse Prentice Cushing's recent review of Ghost of War and offer these additional comments.

I was Exec when we sank AWA MARU and as customary on a night attack the Exec made the approach and attack in the conning tower while the Captain stayed on the bridge with the conn. The target's radar image looked typical of the many Japanese destroyers we'd tracked (later believed due to her being loaded to the gunnels with only the superstructure a radar target) and she was making high speed without zigzagging directly toward the spot where SEA FOX had hit a convoy 10 hours earlier. We were already on her track so after getting a solution we pulled off and stopped. When the track angle was textbook and the torpedo run 1200 yards, convinced she was a destroyer we fired a 150 percent spread from the after nest at four feet depth. When the first hit—"hooray". Then the second—"We got the tincan." The third—"We must have hit some debris in the water." But when the fourth hit told us that this was a much longer ship than a destroyer and we turned and passed over the spot. There were a dozen or so people in the water visible through the thick peasoup fog under a full moon but they all swam away from heavies thrown to them. One man finally allowed himself to be hauled on board and we took him below and cleaned him up and later interrogated him.

Last year when I saw the flyer for Ghost of War on a hotel counter at a reunion at King's Bay trumpeting the book as describing the "victimization of Japan in the Pacific War" I could hardly believe my eyes. On return to the Coast I called the author, who had interviewed me extensively, and he said those were not his words but those of the Naval Institute. I remarked that aboard USS SAN FRANCISCO in Pearl Harbor that peaceful Sunday morning, December 7, 1941, somehow I felt more the victim than the aggressor as the Japs roared down out of the sky trying very hard to kill me. I got away with just a shrapnel fragment in my hand but the surprise attack left me with a lasting opinion of the Japanese culture and its fully documented lurid military history of ruthless aggression, torture, rape, and vandalism in Manchuko,

Korea, Nanking, etc. which their government officially lied about to the schoolchildren until very recently when a few grains of truth were revealed, e.g. the brutal enslavement of Korean "comfort girls" by the Army. The "victimization of Japan" is the last way I would describe the actions of the Imperial Japanese Empire in WWII.

To whom should I apply for reparations for the gross inconvenience, the life endangerment and the severe mental strain I encountered for four years almost constantly at sea and under attack due entirely to the actions of the Imperial Japanese Empire? Oh, and the pain and suffering caused by being struck and wounded again by a Japanese bomber off Guadalcanal. Victimization of Japan indeed!

*Jack Bennett*

### **INFORMATION WEB SITES**

Additional information about the Defense Science Board's report, and about the new Virginia class SSN, which may be helpful to any letter writers can be found on the N87 website at:

[www.chinfo.navy.mil/navpalib/cno/n87/winter99/defense\\_science.htm](http://www.chinfo.navy.mil/navpalib/cno/n87/winter99/defense_science.htm)  
[www.chinfo.navy.mil/navpalib/cno/n87/usw/winter99/virginia\\_class.htm](http://www.chinfo.navy.mil/navpalib/cno/n87/usw/winter99/virginia_class.htm)

Hope this is helpful.

*RADM Jud Scott, USNR*

### **AN E-MAIL EXCHANGE WITH THE AUTHORS OF BLIND'S MAN BLUFF**

Our Submarine Heritage!

Re: Blind Man's Bluff

To the authors: Drew & Sherry

What a book! I bought the book as soon as it hit the bookstores, read it, and finished reading it a second time and it's been *simmering*—my heart compelling me to speak out—but completely unsure as to what to say! Debating whether to swear and complain or praise and rejoice. Mixed emotions—anger, betrayal, thankfulness, pride—*triggered by reading a book!*

The *novelty* of obtaining information from "entrusted members

of a silent service". Sensationalism at it's greatest. On one hand the breaking of a *trust*, on the other hand the public awareness and recognition long past overdue "owed by so many to so few"! God know our leaders and fellow countrymen need to know the part played by our Submarine Force in the defense of our country! Not just during the Cold War or WWII but even today.

I wish to quote the Creed of U.S. Submarine Veterans:

"To perpetuate the memory of our shipmates who gave their lives in the pursuit of their duties while serving their country.

That their dedication, deeds and supreme sacrifice be a constant source of motivation toward greater accomplishments.

Pledge loyalty and patriotism to the United States Government."

I take this Creed seriously.

Our country is a free country—to maintain national security in such a society is a true challenge—but the price of not maintaining that security is so much more important, so much at stake!

Commenting on the events described in the book, "could be deemed detrimental to national security interests".

Pelton, the Walker spy ring, and all the other traitors did so much damage to our country, that I make but one comment; I believe that treason in a time of war (Cold or Hot) should be punishable by death.

*Submarines and submariners*—if you have ever been a crew-member—it's in your blood! It may be repressed for years; you can hide it, ignore it, or deny it but it's there and it will surface one day!

So you understand from what perspective you are getting this *blast*. I made patrols on a couple of boomers (SSBNs) during the '70s and '80s. A chunk of the prime of my life was spent underwater away from my family and loved ones, not knowing if the next battlestations missile would be Armageddon or just another damn drill! I also feel however, that it was us that helped prevent nuclear war!

Amazingly, I find myself thinking "When is the next book?", and at the same time praying that nothing of real value is revealed for fear of damage to the country and service I love.

The sentence in the last paragraph in your Acknowledgments

...that this history has to be told before it was lost forever, rings to terribly true.

In the year 2000, our submarine service will be 100 years old. Thank you for helping celebrate the Submarine Centennial. One hundred years ago the struggle was on just to prove that the submarine was workable, viable weapon worth spending tax dollars on. The many men who died in the early years of submarines did not lose their lives in vain.

The response received from the authors is as follows:

From: "Sherry" <sherry@panix.com>

To: gcmfish@juno.com, drew@nytimes.com

Date: Tue, 29 Dec 1998 09:46:17 Subject: Re: Our Submarine Heritage!

Thank you for the words of praise. As for your concerns: I want you to know that we shared them and worked hard to avoid compromising any ongoing operations. Perhaps it will make you feel better to know that on Nov. 11 former Secy of the Navy John Lehman reviewed the book in the Wall St. Journal and called it Brilliant. We also did a lot of reporting, and we were careful to make sure we were doing *no harm*. We had many very high level sources who thought that the information in our book could safely come out. And as you point out, Pelton and Walker had sold the secrets when they were secrets. What was left was putting a human face on all of this. We showed the daring and brilliance of cable tapping, but the Russians already have the cable tap sitting in their museum. We showed just what trailing takes, but we did so years after Walker told the Soviets that we were trailing their subs all over the oceans. We showed people far more than technology. We showed that the submarine force did a crucial job, and that men risked their lives to make it all happen.

Your members also might be interested to know that "Blind Man's Bluff" recently won the Theodore and Franklin Roosevelt Naval History Book Prize. The prize is awarded jointly by the Franklin & Eleanor Roosevelt Foundation, the Theodore Roosevelt Foundation, and the Navy League of the United States.

"After all, submarining has always been a game of Blind Man's Bluff." —a top submarine admiral.

[Sherry@Panix.com](mailto:Sherry@Panix.com) (Co-author "Blind Man's Bluff")

I, Thomas Denton, ETC/SS, USN(Ret.), submit this to the Submarine Review at the urging of several of my fellow submarine veterans (Capitol Base members of USSVI) who are well aware of what is at stake and know the true meaning of the *Silent Service*.

*Thomas Denton  
8629 Discovery Blvd.  
Walkersville, MD 21793*

### SPECIAL THANKS

December 27, 1998

Dear Vice Admiral Cooper,

I have been writing a letter of heart felt thanks to all committee and board members of the Naval Submarine League. Such a letter is well deserved not only for all that you do for the Sub League but also for choosing to honor myself with the current Admiral Frederick B. Warder Award. I wanted to write each and every one of the dozens of you.

With my recent transfer to Japan I have been very busy unpacking and getting settled so please forgive me for not writing this letter sooner!

I was very honored to have been presented with the award. My work on my boat, community service as a chef and historical teachings as the President of the Civil War Sailor and Marine Magazine and Association could not have been recognized better. I understand that I am the first MS to have received the award. I want to thank you for your continuous support of today's active submarine fleet and our important role. I'd also like to express how much I appreciate these awards and the awards program in general for the fleet sailor.

I wish you all a happy and peaceful 1999.

*Very respectfully,  
MSC(SS) Martin C.J. Mongiello, USN*

## BRITS PLEAD NOT GUILTY AS CHARGED

26<sup>th</sup> February 1999

*See: Memories Off Lombok Strait—Or Rites of Passage, SUBMARINE REVIEW, January 1999.*

Although Captain Gillette's introduction to the Lombok Strait transits by Allied submarines during World War II is not challenged, no evidence whatsoever exists to support his final paragraph! On passage to and from one's patrol area Lombok was certainly no place to loiter, or treat lightly. The comments, however, suggesting a gun surface action by an unnamed British submarine, flying a Japanese Ensign, are in my submission unfounded and pure myth. In short, the Brits plead, "Not guilty as charged."

### Arguments for the Defence

1. The only British submarine silhouette to resemble that of the Japanese R-O class is the River class. Only two HM submarines of this class—CLYDE and SEVERN—were operating in the Far East theatre at the time in question. Both were based in Trincomalee, Ceylon with all their operations taking place off the East coast of Malaya and in the Andaman Sea. At no time did either submarine transit the Lombok Strait.
2. HMS MAIDSTONE, the submarine depot ship, arrived in Freemantle in mid September 1944 and was joined on 24<sup>th</sup> September 1944 by the first submarine to operate from that area—HMS/M TANTALUS, commanded by Lieutenant Jeremy Nash. Rear Admiral Jimmy Fife relieved Admiral Christie as Commander Submarines South West Pacific shortly after the British arrival. It is at least doubtful that any Lombok transits by RN submarine took place while Admiral Christie was in post. Admiral Fife was well known to the more senior RN submarine officers. In 1941, well before the United States came into the war, he, then a Commander, had carried out patrols in the Mediterranean in HMS/M TRIUMPH with Commander Sam Woods with the object of gaining first hand experience of war time subma-

rine operations. He was an ideal choice to encourage friendly relations between the British squadron, which was arriving, and the two larger squadrons of United States submarines already based at Freemantle.

3. HMS/M TANTALUS, with Lieutenant Commander *Rufus* having resumed command after a short period of sickness, was the first British submarine to transit Lombok for a 52 day patrol in the Singapore area. Jeremy Nash remained operating from Freemantle in command of HMS/M TRADEWIND until July 1945. By that time, the United States squadrons and the British S class submarines had departed for Subic Bay. Jeremy Nash comments that had such an incident occurred all commanding officers would have been informed and briefed accordingly! Quite apart from personal memory, however, a thorough search of the Submarine Museum archives at HMS DOLPHIN has failed to produce any evidence to support the "unusual" action of which we are accused. If the name of the alleged submarine or its commanding officer can be suggested, further research will, of course, be made.

On a more aggressive note, HMS TAURUS commanded by Lieutenant Commander Mervyn Wingfield was involved in a gun action off Penang in November 1943. On completion of minelaying, he was hurriedly reloading his tubes with torpedoes while attempting to make for safer water off shore. Shortly thereafter, a large Japanese I class submarine was sighted making for Penang escorted by a submarine chaser. Wingfield immediately turned to attack at periscope depth. A full salvo of torpedoes sent I-34 to her doom with TAURUS, still in relatively shallow water, coming under attack from the sub chaser. Going deep in a hurry, the submarine hit the bottom with such force that its bows became stuck in the mud. The second pattern of depth charges exploded around her, doing little damage but shaking the bows free from the firm hold of the bottom. After bouncing along the bottom once or twice, TAURUS was brought to periscope depth for a look at the enemy. Wingfield, sighting the submarine chaser beam on at very close range, decided that gun action was his only option. Closing up, with the gun and conning towers fully manned, he hit the surface with a rush! The first two shells smashed into her bridge

and the third aft on her hull. It is doubtful if the Japanese chaser's crew realized what had hit them.

Mervyn Wingfield very much doubts that his gun action was the origin of the story. As far as the "Japanese Ensign" is concerned, no such flag was included in the RN signal stocks of a submarine at that time. To hoist such an Ensign, in any event, would have been disgraceful and only an idiot would have attempted to do so in the circumstances of this gun action. There was no time to hoist anything on surfacing—Japanese or British. Afterwards, with enemy aircraft already on the way, his only thought was to take the shortest possible route to deeper and calmer waters!

*Yours sincerely,*  
*Commander R. W. Garson, CBE, Royal Navy*

### **UK POLARIS COMMEMORATIVE COVERS**

February 2, 1999

Having been a Polaris submariner for 20 years I produced a commemorative cover the decommissioning of the four Polaris submarines, price £5 plus p&p, colour printed envelope with Commanding Officer HMS REPULSE and posted in Helensburgh, Scotland. Informative pictorial insert limited edition—only 300 left.

*Kind regards,*  
*Mike Bravery*  
*e-mail: Mikejackie@aol.com.uk*

### **REQUEST FOR INFO RE: INTER-WAR DEVELOPMENT**

February 4, 1999

I am currently engaged in research regarding the development of the submarine from World War I to the end of World War II. My emphasis is on (1) German submarine and tactical developments and (2) how the development of new tactics and technology affect convoy Allied convoy tactics and countermeasures.

I am a non-traditional student that has returned to the university environment after a 25 year absence from higher education. I am enrolled in a senior level history class devoted to the study of the European conflicts from 1870-1990. I must complete a research paper regarding a topic relating to this area of study. I have

always held submarines and their crews in the greatest respect of their courage and sacrifices. I wish to learn more and I was told that this is the place to come to for help and answers. Thanks in advance for any help you can throw my way.

*Professionally,  
Paul Self  
selfcp@gateway.net*

### **REQUESTING INFO RE: WWII SONOBUOYS**

February 23, 1999

Could anyone direct me to a source of information having to do with the development of the aircraft dropped sonobuoys carried by U.S. aircraft during WWII. These devices came into the fleet about 1943 and were used in the Atlantic against the German submarines. I am particularly interested in how they were developed and by what governmental and civilian organizations.

I thank you for your consideration of my request and any information you may be able to provide.

*Don Baker  
cdcasa@nwi.net*

### **REQUESTING HELP WITH ZIPPOS**

February 26, 1999

I was wondering if any of the NSL members might be able to help an old submariner out? I am a retired RMC/SS and was stationed on USS BENJAMIN FRANKLIN, USS BIRMINGHAM, and USS HONOLULU while on active duty. I collect submarine zippo lighters (or zippo types with the subs emblem on them, VULCAN, PENGUIN, etc.). I have around 100 of them right now and it is getting hard to come across some of the decommed boats. Would you happen to have any extras laying around, from your time on the boats, that you wouldn't mind parting with? I realize they probably hold a lot of good memories, but I would definitely give them a fine home.

I'm not a rich man, but I'd be willing to give you a fair and reasonable price of any that you would want to sell. I also have a few duplicates that I could trade if that's to your liking (mostly newer boats).

My plan is to leave both my submarine insignia and submarine *zippos* collections to one of the submarine museums when I am gone. I have a long way to go until I have all of them (or as many as possible) and I could sure use a tech assist. Even if you can't help me directly, I would appreciate it if you could point me in a direction where I could find some submarine *zippos*. Collecting the lighters has pretty much become a passion and I am running out of sources. Any help would be greatly appreciated.

*Thanks,*  
*Ken "Dert" Gordert, RMC/SS, Ret.*  
*9249 Edgemar Woods Cr. #A3*  
*(703) 553-7381 (work)*  
*(703) 541-0208 (home)*

### ANOTHER SPECIAL THANKS

Thank you very much for the wonderful way I was treated last year as a Naval Submarine League Lockwood Award Winner. I am sure it was a contributing factor in my selection and advancement to Chief Petty Officer.

I am submitting a Warrant Officer Package this year and I hope will be writing you next year to say my rank and address has changed although my new job here at SPAWARSYSCEN is very interesting. Take care and God bless always.

*V/R*  
*STSC(SS) Todd R. Greenfield*

### THE SUBMARINE BASE IN PANAMA

March 12, 1999

Regarding my letter to you last year (October 1998) on the topic of the closure of the USNAVSTA Rodman, Panama, I have the pleasure to report that a proposal has been presented to a potential publisher for a book entitled "Submarine Operations in Panama 1942-2000".

In response to my article, I was contacted by submarine author Dr. Gerald R. Menefee, and separately by Rear Admiral Maurice H. Rindskopf, USN(Ret.). I was especially intrigued by Admiral Rindskopf's personal account of life in Panama as a submariner. Now, a month and a half later, these two gentlemen have agreed to

co-author the book and are presenting the proposal to the Naval Institute Press. I am helping out as the in-country research assistant.

Since this project has significant momentum, (and because my e-mail address was previously misprinted) I would invite anyone with personal experience or source material that they would like to contribute to please contact any of us at the following e-mail addresses:

Dr. Gerald R. Menefee

*menefee@starquest.net*

RADM Maurice R. Rindskopf, USN(Ret.)

*mrindskopf@earthlink.net*

LT Charles Maher, USN

*co.msco.panama@smtpgw.msc.navy.mil*

I especially encourage anyone who had tried to contact me earlier, but were frustrated by the incorrect e-mail address, to contact us at this time.

Finally, the ceremony marking the transfer of USNAVSTA Rodman occurred on March 11, 1999, though the actual turnover will occur in mid to late April. It appears that we will be able to get the base street signs commemorating WWII subs donated to the WWII Submarine Vets Assn., but that the AC/DC motor-generator in the old battery shop and the 25hz diesel generator—which coupled with a 25/60hz converter is still the base emergency power supply—will be turned over to Panama in place.

*C.H. Maher*

*LT, USN*

*CO, MSCO Panama*



## BOOK REVIEWS

### DEMOLISHING U-BOAT MYTHS

Hitler's U-boat War;

Volume I The Hunters, 1939-1942

Volume II The Hunted, 1942-1945

by Clair Blair

New York: Random House, 1996, 1998

Vol. I: 809 pp; Vol. II, 909 pp.

Appendices, maps, photos, separate indexes of U-boats and ships.

Each volume \$40.00

*Reviewed by CAPT Ralph Enos, USN(Ret.)*

Clay Blair's massive two-volume history of the World War II U-boat war effectively demolishes what remains of the U-boat myth: that the Allied victory over the U-boats in the Battle of the Atlantic was a near-run thing. Not so, says Blair; the U-boats never came close to strangling vital seaborne traffic to the British Isles, and what is more, had they introduced snorkels and the fast Type XXI and XXIII "electro boats" earlier in the war it would have made no difference.

The German Unterseebootwaffe started WWII with 57 U-boats, too few to do the job, and they never caught up, despite building 1,052 more. They had faulty operational doctrine, bad torpedoes and sonar, no radar, boats that were poorly designed for their assigned missions, and they never tumbled to the Allies decrypting their Enigma codes, HF/DF-equipped escorts homing on their radio signals, aircraft using centimetric-band radar, escorts decoying their T-5 homing torpedoes, or that Allied shipbuilding was replacing ships much faster than they could sink them. The question naturally arises: "How were they able to pose such a threat, sink 2,919 ships of 14.6 million tons, and tie up huge ASW forces, with such a sorry start and poor equipment?"

Blair answers this question but the reader has to do much of the work in digging it out. Therein lies the job of reading *Hitler's U-boat War*, for it is this digging that reveals insights that have relevance for today's submariners.

Clay Blair died in December, just after the second volume of *Hitler's U-boat War* was published. Bringing this volume out was

the consuming interest of the last year of his life, and the meticulous checking involved was delayed by the heart trouble that eventually felled him. American submariners should be grateful for his painful diligence, because *Hitler's U-boat War* is a comprehensive history of that disastrous campaign told from an American viewpoint.

Blair's *New York Times* obituary identified him as a Navy veteran and an expert on submarines, and indeed submarines provided the bookends of his life. He started his adult life as a 20 year old quartermaster in USS GUARDFISH on its last two war patrols. He studied journalism at Tulane and Columbia and became a national security correspondent for *Time* magazine. After leaving journalism in 1964, his affection for submarines inspired him to undertake the painstaking research that resulted in *Silent Victory: The U.S. Submarine War Against Japan*, generally considered the definitive history of that campaign. And after a career as a freelance writer in which he wrote more than 20 books, in his last effort—literally—he came out with *Hitler's U-boat War*.

Blair's task this time was much harder than his 1975 history of U.S. submarines in the Pacific. The WWII U-boat campaign lasted longer (69 vs. 45 months), it was fought by more submarines (859 vs. 227), it saw more tonnage sunk (14.6 vs. 5.3 million tons), and it was contested by stronger and far more numerous anti-submarine forces than the Pacific campaign.

Blair applies the same attention to detail that made *Silent Victory* such a favorite among submariners. All the important actions involving U-boats are mentioned, skippers are identified, attacks made and damage and sinkings are assessed in the light of the latest analysis. He gives equal battle time to the U-boat hunters, naming pilots of attacking aircraft or surface warship skippers when data are available, and provides details of combat encounters from the ASW units, as well as from the U-boat's viewpoint.

The result is huge, and has been brought out by Random House in two volumes. *Volume I: The Hunters* covers the first three years of the war (September 1939 through August 1942) and has two parts: Book One—*The U-boat War Against the British Empire*—covers the period September 1939-December 1941 when the war was primarily Germany against Great Britain; Book Two—*The U-boat War Against the Americas*—covers the period January-August 1942 after the U.S. formally entered the war, and focuses on the

U-boat onslaught against shipping in American waters. *Volume II: The Hunted* covers the third phase of the campaign, from September 1942 to the end of the war.

All this may cause non-naval readers' eyes to glaze over. I urge them not to. Blair's style is spare and plain. He disdains lofty rhetoric and has a fondness for the cliché, but he does not dwell overly much on any one event, even when the historian in one wishes he would. The narrative fairly zips along.

Blair's objective in writing the work was to de-mythologize the U-boat war. He felt that since the war's end the reality of the U-boat campaign has been distorted by various historians, politicians, propagandists, journalists, and U-boat enthusiasts. The most flagrant of these distortions is that the defeat of the U-boats was a near-run thing, a close squeak for Great Britain. Blair makes it clear that Dönitz was playing a losing hand from the beginning.

He makes a strong defense of (U.S. Fleet Commander) Admiral Ernest J. King's actions in the face of the January-August 1942 U-boat offensive in American waters. Blair feels that King has been savaged by historians—mostly British—for resisting convoy and scorning British hard-won advice on fighting submarines. These historians focus on King's anglophobia—implying it colored his vision—and claim he was preoccupied by the Pacific when it should have been *obvious* that the war would be won or lost in the Atlantic! Blair also shoots these arguments down.

King—and all the relevant American commanders (Stark, Ingersoll, Andrews)—believed a poorly escorted convoy was worse than none at all, a conviction they had come by after hard and close examination of British experience to that date. Blair points out that the British never have given King credit for his insistence that convoys of troopships should be heavily escorted and that this policy was a genuine success, although it did consume precious escorts. He notes that British policy often resulted in inadequate escort for troopships, sometimes leading to massive tragedy.

As for the argument that King was preoccupied by the Pacific, Blair notes that much of this stems from a scheduled high level meeting with First Sea Lord Pound in April 1942 that King summarily deserted to meet with Nimitz in San Francisco. At this meeting King and Nimitz hammered out the strategy that led to American success at Coral Sea and Midway. It seems to this reader that King was fully justified in his apparent display of

discourtesy. Hooray for Blair taking an American view of the war!

The principal criticism of the work is that it lacks a summarizing focus. Blair does summarize each volume, but in Volume II he seems in a rush to cover all the ground with his characteristic thoroughness, and his summarizing suffers. It may have been a race against the clock of his own mortality that left him insufficient time to completely sum up his conclusions about a conflict that had already consumed 1,700 pages.

One wishes he had had the stamina to round out the work with a sweeping analysis of the entire U-boat war, rather than treat each volume as if it were a stand-alone document. This leaves the reader with a good deal of work to do. Despite 35 appendices in the two volumes covering each patrol and various other items of interest, there is no overall summary of the U-boat order-of-battle for the entire war, nor a single summary of merchant ship losses.

I couldn't help comparing the disastrous German U-boat campaign with America's successful submarine war against Japan. What did we do right that Dönitz and his gang did wrong? What did Dönitz do right that Allied ASW forces effectively countered? And are there lessons in this campaign that submariners of all navies can take to heart, even today? Some observations:

- German WWII torpedoes were worse than in 1918. Their *torpedo troubles* were eerily similar to those experienced by American submariners. Despite a much speedier response on the part of the German high command once a torpedo crisis was recognized, solutions were slow to enter the fleet and in some cases never did.
- German U-boats lacked radar and sonar, and their fire control and listening gear was only so-so. Dönitz expected a patrol line of these little, radarless boats to be his principal surveillance sensors to detect oncoming convoys; the discovering boat would trail and vector the rest of the wolfpack in for the kill. That they didn't do so very well explains a great deal of the failure of the *wolfpack tactic*.
- While the Allies continued to improve their weapons, sensors, tactics, and competence, the German posture stayed essentially the same as in 1939, or deteriorated.
- Despite the affection the Type VII U-boat seems to engender among today's naval buffs, it was a failure at its assigned

mission in the North Atlantic. Its sea-keeping ability, range, torpedo load, electronics, habitability, and durability were all inadequate. In contrast, the American fleet submarine proved admirably suited to conditions encountered on long patrols in the tropical Pacific.

- In addition to having lousy boats, torpedoes, and electronics, Dönitz was obsessed with the *wolfpack idea*, and pursued it long after its ineffectiveness had been demonstrated.
- German Navy failure to obtain long range air reconnaissance or protection over the Bay of Biscay was a significant failure of vision, as well as a telling example of serious interservice rivalries in the Third Reich and its endemic limited resources.
- The technological ignorance of the German high command is astonishing. They correctly guessed that the Allies had some kind of new detection gear that enabled them to attack a surfaced U-boat at night and in bad visibility. Their scientists didn't believe the Allies could mount 10 cm band radar on aircraft or HF/DF equipment on escorts, so the boats continued to be devastated by air attacks without warning and chattered away on their radios while escorts DF-ed them. When a captured Allied pilot said the Allies were really tracking U-boats by radiation given off by their *Metox* radar detectors, they believed him and cautioned U-boats to use care in deploying *Metox*.
- Technological ignorance was an institutional flaw in the German Navy, where line officers were not expected to be technically inclined. Contrast this to the American submarine community where technical solutions to critical problems, e.g., with torpedoes, were routinely generated in the fleet.
- The German Navy did not enlist the nation's vaunted technical community to solve urgent combat problems to the extent Americans and British did; again, this was symptomatic of an institutional flaw in Germany. The idea of a German Admiral Lockwood taking time to pester academics to hurry up FM sonar development because it was needed to penetrate a mined enemy sanctuary is too fantastic to contemplate.
- Despite technical and operational failures, such was the

competence of the U-boat skippers and crews, that they continued to mount a credible threat until the last days of the war. Things got incredibly harder for the U-boats as the war went on, yet their morale did not seem to flag despite enduring the highest casualty rate of any arm of any belligerent in the war.<sup>1</sup>

Dönitz has been much maligned in his own country for continuing to send his crews to near-certain doom after the Allies clearly had beaten the U-boats in May 1943. The picture that emerges from Blair is more complex. Dönitz agonized over this question continuously, and always came up with the same answer: the U-boats must continue to take the offensive. Allied forces tied down were much greater than the U-boat effort, forcing them to convoy complicated their logistics, and when compared to the sacrifices of other German forces on other fronts, including the home front, it was not too much to ask.

How did a force of dedicated and competent sailors such as the *Unterseebootwaffe* ultimately fail on a massive scale, and with such appalling casualties? How did they pose such a threat and sink so much tonnage if they were such a flawed force?

The answer is complex. For one thing, the U-boats never were so serious a threat as they seemed at the time and for many years thereafter. The key words here are "as they seemed at the time". One must understand that the U-boat war was fought over a huge ocean by small units; integration of data from this vast complex was difficult at best and slowly achieved, by both sides. At the time what was really happening was difficult or impossible to discern.

The biggest Allied alarm came during March 1943 when a couple of successful wolfpack convoy attacks and an unusually high worldwide monthly tonnage loss seemed to threaten the lifeline to Britain. It was a case of looking at a glass 10 percent empty vs. 90 percent full. In fact, 91.5 percent of all merchant ships bound for

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<sup>1</sup>Estimates of German U-boat personnel losses are: 36,325 of which 4,721 were captured. If one assumes 45 men per boat and 1,109 total boats commissioned, this represents a 63 percent killed-in-action rate. Of the 859 boats that set out on war patrols, 648, or 75 percent, were lost, 429 with no survivors. Some 215 U-boats were sunk on their first patrol.

Great Britain got through to their destination in March 1943, but the Admiralty focused only on the 84 ships sunk on the North Atlantic run, noticing that U-boats seemed to be returning to these waters in record numbers, and with good summer weather coming things would only get worse.

In April and May 1943 worldwide sinkings were down to 52 vessels of 207,000 tons (vs. 635,000 tons in March) against the operational loss of 58 U-boats! So much for extrapolating a couple of data points when parameters are changing rapidly (e.g., the coincident arrival of jeep carrier escort groups and closing the mid-Atlantic air gap in this same time frame). At that point Dönitz figuratively threw in the towel, but this hard won Allied victory could not be acknowledged by either side.

Germany continued to pour vast resources into the U-boat war, sending nearly four times as many boats on patrol as America did in the Pacific. And the force remained potent until the end: 396 U-boats were still in service when Germany surrendered. The strategy had its effect: no Allied escort could afford to let down its guard.

The failure of the U-boat campaign of 1939-45 should be of great interest to submariners of any nation. It should be studied and analyzed and dissected objectively. If one does this, some home truths emerge:

- A submarine's principal characteristic is stealth. Compromise this and the submarine is worthless. Allied radar destroyed the U-boat's stealth on the surface. If they dived, Allied sonar or sonobuoys or the FIDO homing torpedo detected them.
- A technologically dependent arm, such as a submarine force, must maintain close relations with its technical support community.
- One should not start vast projects with half vast ideas. Hitler went to war in 1939 with a U-boat arm that was just four years old, had inadequate materiel and numbers, and a strategy that was profoundly flawed.
- One must not assume the enemy's order-of-battle, training, equipment, tactics, and competence will stand still while one marshals one's forces.
- Submarines are not very good at defending against a major

assault from the sea (e.g. German failure at Norway, Normandy, and North Africa; U.S. failure in the Philippines and at Midway).

Clay Blair has written a book that ought to become a standard reference work for the German U-boat war, if not the definitive history. Despite its length, submariners around the world will find something of value on just about every page, and a caution they should heed: if such a disaster could happen to Hitler's submarines, it could happen to anyone's!■

### **RED SCORPION**

#### **The War Patrols of the USS Rasher**

By Peter T. Sasgen

Illustrations & Charts

Seven Appendices, Glossary, List of Sources

Naval Institute Press

Annapolis, Maryland 1995

ISBN 1-55750-760-0

*Reviewed by CAPT Leonard A. Stoehr, USN(Ret.)*

*(The true story of one of America's most successful submarines. Researched and written by the son of a wartime officer crew member.)*

**T**he two sentences above, with only minor editing, are from the opening of my first book review for **THE SUBMARINE REVIEW**. The book's title is War Patrols of the USS Flasher. So, as I began to read this book, my sense of déjà vu was very strong. Beside the similarity in their names, the two ships were very similar in other ways—FLASHER's hull number was 249, RASHER's was 269. In the tonnage statistics compiled in Theodore Roscoe's well known United States Submarine Operations in World War II, FLASHER was at the top of the tonnage sunk list with 100,231 tons, RASHER was number two with 99,901. (Note the difference: 240 tons. Less than 1/4 of 1 percent.) FLASHER won two Presidential Unit Citations; RASHER won three.

The list of similarities could easily be extended, but this review is addressing the wartime history of RASHER. RASHER was built

by the Manitowoc Shipbuilding Company, Manitowoc, WI. Always known as a high quality builder, Manitowoc was especially known for the neat interior layouts of its ships. She was launched on 20 December 1942 and commissioned on 8 June 1943. Three and one half months later, on 24 September, RASHER was underway for her first war patrol. At that time, though no one knew the future, there were less than twenty-three months of war remaining. In this short period, RASHER had five Commanding Officers, underwent a three month overhaul at Hunter's Point NSY, completed eight war patrols, and sank eighteen ships. Three of her COs won Navy Crosses. All of this happened in the period of a normal assignment in the postwar Navy. An interesting aspect of *Rasher's* wartime exploits is the fast turnover in her COs. Of the ship's five COs, three of them held command for only a single war patrol. The famous fifth patrol, where Hank Munson sank five ships for a total of 52,667 tons, produced better than half of RASHER's total tonnage score. Munson rightly became famous for this feat, but I was surprised by the score racked up by his predecessor, LCDR Willard R. Laughon. I don't remember ever having heard of Laughon before, but his consistency, as shown by his record of sinking nine ships in his three patrols, is certainly impressive. He appears to have been expert in the fine art of the calculated risk. His aggressive tactics won two Navy Crosses and a Presidential Unit Citation.

There have been many World War II submarine histories written and I have enjoyed all of those that I have read, but they all seem, in retrospect, to share one large fault. The submarines that fought World War II were successful or not because of the crews that manned them. Of course, luck had a certain effect—there were several boats that sank more ships than *FLASHER* and *RASHER*, but the average size of their kills was smaller—*FLASHER* and *RASHER* had the good luck to find some large ships in their periscope crosshairs. However, in many cases, this luck was bolstered by the aggressiveness and daring of individual Commanding Officers who "made their own luck." Ed Hutchinson, Bill Laughon and Hank Munson were all good examples of this. I'm taking a long time in getting to my point—that I don't feel that most of the histories adequately portray the personal characters of the captains and crews. Mr. Sasgen feels that he was impelled by his father's death to take on the task of writing this book. He wanted to "make it rich in detail and exciting to read." He has succeeded

in reaching this goal as have the other submarine history authors that I have read. If I had not read so many, perhaps I would not be feeling that I have missed really getting to know any of the men who drive these pages. Were they short or tall, skinny or muscular, humorous or serious, neat or sloppy? Whenever these points are described in these histories, they are handled in a superficial, almost off-hand, manner. Mr. Sasgen's father reported to RASHER as a Machinist Mate, was commissioned following the fifth patrol, and served aboard for all eight of her war patrols. We learn that he was an expert cribbage player and, at one time, undertook the tutelage of his CO, Chuck Nace, in the finer points of the game. The explanation that cribbage counting was difficult for someone who has played a lot of poker rings true and makes Chuck Nace a more realistic human. Nace contributed extensive personal notes and official documents to assist the author and becomes the most authentic and empathetic character in the book. If only more of the crew members could have come alive in this way. I wished, in particular, that I could have come to know Bill Laughon, Hank Munson, and Pete Sasgen better as men rather than only in their roles as submariners.

One other complaint that should be noted in any book that is published by the Naval Institute Press, arguably the premier naval publisher in the English language. It is surprising to find errors that a good technical editor should have caught without a second thought. I have been awakened and energized by the general alarm more times that I would care to count. I have never thought of it as a "chime" yet battle stations continue to chime throughout the narrative. How about the Chief of Naval Operations not having his title capitalized (Page 46)? On page 57, we find RASHER running on the surface in enemy waters without negative tank flooded. On page 256, having departed from San Francisco, RASHER approaches Oahu from the "southeast", passes Diamond Head and Waikiki, and makes the turn at Barber's Point for the Pearl Harbor channel entrance. We should not expect that Mr. Sasgen would have intimate knowledge of the geography of the southern coast of Oahu, but a Naval Institute Press editing staff certainly should.

While the above problems detracted from my overall enjoyment of the book by interrupting my attention to the flow of the story, they do not change the basic fact that this is a fine adventure story and well told. Mr. Sasgen has added another worthy chapter to the history of a too long "silent service." ■

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